CellAdvisor™ 5G

CellAdvisor 5G

User’s Guide

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About CellAdvisor 5G

CellAdvisor 5G

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Safety and compliance information

Product Regulatory compliance

Federal Communications Commission (FCC) notice

This product was tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

The authority to operate this product is conditioned by the requirements that no modifications be made to the equipment unless the changes or modifications are expressly approved by VIAVI.

Caution:

– To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all person. (본 기기는 통상 이용 상태의 경우 인체 (머리, 몸통)와 20cm 초과하는 거리에서 사용되어야 합니다).

– This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada requirements

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This Class A digital apparatus complies with Canadian standard ICES-003.

Le présent appareil numérique de classe A est conforme à la norme ICES-003 du Canada.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Device operation in the band 5150–5250 MHz is for indoor use only.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: 1) l'appareil ne doit pas produire de brouillage; et, 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Dans la bande de fréquence 5150-5250 Mhz, l’utilisation du produit doit être uniquement en intérieur.

Japan Ministry of Internal Affairs and Communications (MIC) Requirements

This device is compliant with Japan’s Radio Law and the Technical Conformity (Giteki) Mark can be viewed on the instrument’s display screen. The telec.pdf file containing the conformity mark is located in the files/disk/licenses folder under the System menu.

EU WEEE and battery directives

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations.

VIAVI has established a take-back processes in compliance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive, 2012/19/EU, and the EU Battery Directive, 2006/66/EC.

Instructions for returning waste equipment and batteries to VIAVI can be found in the WEEE section of VIAVI Standards and Policies web page.

If you have questions concerning disposal of your equipment or batteries, contact VIAVI WEEE Program Management team at WEEE.EMEA@ViaviSolutions.com.

EU REACH

Article 33 of EU REACH regulation (EC) No 1907/2006 requires article suppliers to provide information if a listed Substances of Very High Concern (SVHC) is present in an article above a certain threshold.

For information on the presence of REACH SVHCs in VIAVI products, see the Hazardous Substance Control section of VIAVI Standards and Policies web page.

EU CE marketing directives (LV, EMC, RoHS, RE)

This product conforms with all applicable CE marking directives. Please see EU Declaration of Conformity for details.

EU Radio Equipment Directive

In accordance with Article 10.8 of the EU Radio Equipment Directive 2014/53/EU, the following table provides information on the frequency bands and the maximum RF transmit power of this product for sale in the EU:

Frequency range (MHz)	Channels Used	Max. Transmit Power (dBm/mW)
5470-5725	100-140	29.9 dBm (977 mW) with TPC 26.9 dBm (490 mW) non-TPC
5250-5350	52-64	22.9 dBm (195 mW) with TPC 19.9 dBm (97.7 mW) with TPC
5150-5250	36-48	22.9 dBm (195 mW)
2400-2483.5	1-13	ODFM: 19.9 dBm (97.7 mW) CCK: 17.9 dBm (61.7 mW)

TPC: Transmit Power Control

Guide conventions

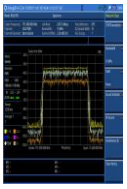
This guide uses the following conventions:

Typographical conventions

Description	Example
Buttons that the user presses or tap on a physical device	Press the **ON** button.
Screen buttons, menus, icons, and options that you tab/select on the touch-screen in **this typeface**	Tap the **Apply** button. Tap **Limit line** to turn on. Go to **Settings**. Select **Channel standard**.
A single slanted bracket (>) indicates choosing a submenu from a menu.	On the menu bar, click **File** > **Save.**
A file type in `this typeface`.	In `.trav` file type

Symbol conventions

Items	Descriptions

	This symbol indicates a note that includes important supplemental information or tips related to the main text.
	This symbol represents a general hazard. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message.
	This symbol represents an alert. It indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.
	This symbol represents hazardous voltages. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message.
	This symbol represents a risk of explosion. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message.
	This symbol represents a risk of a hot surface. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message.
	This symbol represents a risk associated with fiber optic lasers. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message
	This symbol, located on the equipment, battery, or the packaging indicates that the equipment or battery must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

Safety definitions

Term	Definition
NOTE	Indicates important supplemental information or tips related to the main text.
DANGER	Indicates a potentially hazardous situation that, if not avoided, will result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
WARNING	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. When applied to software actions, indicates a situation that, if not avoided, could result in loss of data or a disruption of software operation.
ALERT	Indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.

Technical assistance

If you require technical assistance, call 1-844-GO-VIAVI or send an email to TAC@viavisolutions.com. For the latest TAC information, go to http://www.viavisolutions.com/en/services-and-support/support/technical-assistance.

Introduction to CellAdvisor 5G

What is CellAdvisor 5G?

VIAVI RF and fiber test solutions for the field include spectrum analyzers, cable and antenna analyzers, and signaling analyzers for the installation and maintenance of modern wireless communication systems. RF and fiber test is critical for wireless operators facing challenges of signal quality and signaling interference, and maintaining quality high-bandwidth services. The CellAdvisor 5G is designed to be rugged, portable, touch-based, and battery-operated test solutions that facilitate the quick turn-up and validating 5G radio access.

The CellAdvisor 5G addresses spectrum analysis, interference analysis, and signal analysis, using the 5G technology with FR1 and FR2 bands, frequency up to 30 GHz and 44 GHz.

Main features of the CellAdvisor 5G CA5000 are as below:

- Full flexibility to test multi-radio access technologies from 3G to 5G for macro-cell and small-cell site, DAS, and C-RAN
- Small cell signal modulation quality assessment in FR1 and FR2 bands and in frequency range up to 30 GHz and 44 GHz with channels up to 100 MHz
- Real-time spectrum with persistence for effective interference analysis

CellAdvisor 5G

Features and capabilities

The CellAdvisor 5G is the optimal portable test solution for installation and maintenance of cellular base stations and cell sites, running with external AC power or battery for the field. Its touch-based user interface has been specifically designed with customized menus and simple calibration procedures, providing service providers with accurate and reliable measurement results.

- Intuitive user interface that facilitates quick test configuration and execution, and easy interpretation of test results.
- Detailed test results that displays the entire screen to observe test results.
- Real-time spectrum with persistence display for 5G FR1 band (Sub-6 GHz) and FR2 band (24 GHz to 40 GHz), frequency up to 30 GHz and 44 GHz.
- 5G Carrier scanner measuring up to eight single component carriers' power as well as strongest beam power level and its corresponding ID.
- 5G beam analyzer assessing individual beam’s ID, its power level and corresponding signal to noise ratios.
- 5G route map for coverage verification mapping the beam strength in real-time as well as making data available for postprocessing.

Specifications

The physical, power supply, battery and environmental characteristics for the CellAdvisor 5G are listed in the tables below.

Physical specifications

Product	Dimension (H x W x D)
CellAdvisor 5G	309 mm x 241 mm x 113 mm with a top bumper 309 mm x 225 mm x 113 mm without a top bumper

Power supply specifications

Power	Descriptions
External DC Input	19V DC
Power consumption	Option F001 54 W Option F002 64 W

Battery specifications

Although battery life varies depending on the type of test, the following table provides specifications for the battery life and the specifications for the AC adapter.

Battery	Descriptions
Battery	14.4 V, 6800 mA-h, Lithium Ion
Operating Time	Option F001 standard (one battery) > 2 hours/ Option F001 option (two batteries) > 4.10 hours (Typical) Option F002 standard (one battery) > 1.40 hours/ Option F002 option (two batteries) > 3.30

	hours (Typical)
Charge Time	In case of a fully charged battery with only one battery installed, > 2.30 hours and with two batteries, > 4.30 hours (100%) In case of battery charging up to 80% with only one battery installed, > 1.40 hours and with two batteries, > 3.20 hours (80%)
Charging Temperature	0 to 60°C, ≤ 85% RH
Discharging Temperature	-20 to 55°C ≤ 85% RH
Storage Temperature	-20 to 60°C, the battery pack should be stored in an environment with low humidity.

Environmental specifications

You can check the environment specifications in the following table.

Item	Descriptions
Maximum Humidity	95% RH non-condensing
Shock and Vibration	MIL-PRF-28800F Class 2
Drop	MIL-PRF-28800F Class 2
Storage Temperature	-20 to 60℃

Data storage

You can check the data storage specifications in the following table.

Item	Descriptions
Internal	Maximum 4 GB
External	Maximum 32 GB (FAT32), supports USB 2.0 compatible memory devices

Options

This instrument is provided with various options/features that are available to be ordered. See “Appendix A. Ordering information” for more information.

Getting Started

Unpacking and inspecting the CellAdvisor 5G

VIAVI ships our instruments using anti-static packing material to stabilize the components inside the box. When unpacking the components, verify that all the items you ordered are included in the package. Accessories may be shipped in a separate box. After you unpack the components, you should inspect them for damage. If undamaged, consider saving the box and packing materials in case you need to repackage the components for shipment.

After you unpack the components, examine the connectors, ports, LEDs, and screen for damage. Be sure to check the top, bottom, and front panels. If you find damage, contact VIAVI Customer Care at 1-844-GO-VIAVI. For the latest TAC information, go to https://www.viavisolutions.com/en-us/services-and-support/support/technical-assistance.

Make sure that the LCD protector is undamaged. For more details to how to use the LCD protector, see the *Quick Start Guide* provided with the instrument.

Accessories

The following standard accessories are shipped with the instrument. Optional accessories can be also purchased when needed.

Standard accessories

Item	Description
CA5000 CellAdvisor 5G	A base unit. Software and Hardware options are also available which enable you to expand your testing capabilities.
AC/DC adapter	A power adapter designed specifically for use with your instrument is included. *Use only the VIAVI AC Power Adapter that shipped with your particular instrument.* For details, refer to “Powering the instrument”.
Lithium Ion battery	A rechargeable Lithium Ion battery
Stylus pen	A small pen-shaped instrument
Cross LAN cable	A 1.5 meter cross LAN cable that enables network connection
LCD Protector	A LCD protector that protects the main unit's front side
USB memory stick	A USB memory stick with 1 GB memory which includes the CellAdvisor 5G User's Guide
Side strap	A 208 mm handle with D-ring attached to the CellAdvisor 5G
Power cord	A power cord that is equipped with AC/DC power adapter

CellAdvisor 5G User's Guide	A manual that is stored in the USB memory stick

Optional accessories

Item	Description
Soft carrying case (G700050431)	Light weight cases allow you to store your test instrument when it is not being used. The size is 420 (H) x 270 (W) x 285 (D) mm. The CellAdvisor 5G soft carrying cases are designed to have a main base unit and modules.
Horn Antenna (G700050370)	It is a Ka-band pyramidal horn antenna that operates from 26.5 to 40 GHz. The antenna offers 20 dBi nominal gain and a typical half power beam width of 14 degrees on the E-plane and 16 degrees on the H-plane. The antenna suppports linear polarized waveforms. The input of this antenna is a WR-28 waveguide with UG-599/U flange. The Horn Antenna Kit consists of Horn Antenna and WR-28 Waveguide Adaptor.
Omni-directional Antenna K(f), 26 GHz to 40 GHz (G700050340)	It is a full band, Ka band omnidirectional antenna that covers the frequency range of 26.5 and 40 GHz. This vertically polarized antenna offers 360 degrees azimuth coverage with a 3 dBi typical gain and ±1 dB nominal gain flatness. The antenna features a half power beam width of 45 degrees in its vertical direction. The RF port of the antenna is equipped with WR-28 waveguide with UG-599/U flange.
GPS SMA Mount Antenna	It is GPS L1(1575.42 MHz) Passive Antenna with -5 dBi gain. It is easy to connect to the CellAdvisor 5G GPS port because of SMA plug.

Exploring the CellAdvisor 5G

Top panel

The CellAdvisor 5G product has the following top view.

Top panel view with optical hardware options (CellAdvisor 5G 1.0)

No.	Description

1	**Trigger In** port: You can use this SMA type female connector to receive 1 PPS clock or 10 ms synchronization signals from an external timing reference. Digital CMOS Input DC Coupled Input signal requirements: Minimum logic high ≥ 2.4V, Maximum logic high ≤ 3.3V
2	**Trigger Out** port: You can use this SMA type female connector to send 1 PPS clock or 10 ms synchronization signals from an internal timing reference. Digital Ouput DC Coupled 5V logic Do not terminate with 50-Ohm. Minimum termination value is 220-Ohm.
3	**Ref Out** port: CellAdvisor 5G provides a 10 MHz sine-wave reference signal at approximately 0 dBm into 50-Ohms.
4	**Ref In** port: You can use this SMA type female connector to receive 10 MHz, 13 MHz, or 15 MHz reference clock signals from an external frequency source. Input is AC-coupled 50-Ohm terminated. Input signal requirements: AC or DC coupled signal, Frequency 10 MHz, 13 MHz or 15 MHz, Maximum Amplitude 500 mV peak to peak, Minimum Amplitude 50 mV peak to peak.
5	**USB** port: CellAdvisor 5G has two **Host** ports on the top panel. You can use this port to plug in an external USB memory to extend storage capacity or to upgrade the instrument's firmware. It supports most USB memory devices with 32-bit file system. You can also use this port to connect an external power sensor, Bluetooth USB adapter, or P5000i.
6	**GPS** port: You can plug in a GPS antenna to this SMA type female connector in order to get location information and highly accurate reference.
7	**Audio jack:** The audio jack is labeled with a headphones icon. It is a 3.5 mm size mono jack. Plugging in specified headset with integrated microphone turns unit internal speaker off..
8	**POWER** button: Use the power button to turn your CellAdvisor 5G on or off. When external power is supplied via the AC/DC adapter, the LED is illuminated based on the battery status.
9	**SFP/SFP+** ports: The optical hardware option board (Option O001) for RFoCPRI supports all types of MSA (Multi-Source Agreement) compliant SFP transceivers. You can use these SFP/SFP+ ports to connect SFP modules to test CPRI protocols, detect an error or alarm, perform interference analysis, and transmit test pattern over fiber link.
10	**RJ-45 Ethernet test** port: This port is available on the hardware option board (Option 001) for RFoCPRI and provides testing of Cooper Ethernet connections up to 1Gbps-Ethernet.
11	**RF Input** port for Option CA5000 F001 (K connector): This port is a precise 50 Ω N-type female connector that is used as the input signal port for spectrum analysis, signal analysis, and RF power measurement. **RF Input** port for Option CA 5000 F002 (K connector): This port is a precise 50 Ω K male connector that is used as the input signal port for spectrum analysis, signal analysis, and RF power measurement.
12	**RF Input** port for Option CA5000 F002N: This N type port is to receive RF signal under 6 GHz through under 6 GHz antenna (RF Brick 40 GHz (NSA)). **RF Input** port for Option CA 5000 F002-O): This N type port is to allow CellAdvisor 5G to receive RF signal under 6 GHz through a separate antenna while the main K type port is receiving mm Wave signal on FR2 band through a mm Wave antenna (RF Brick 40 GHz (NSA), CPRI function).

Top panel view with optical hardware options (CellAdvisor 5G frequency extension up to 30 GHz)

Top panel view with optical hardware options (CellAdvisor 5G frequency extension up to 44 GHz)

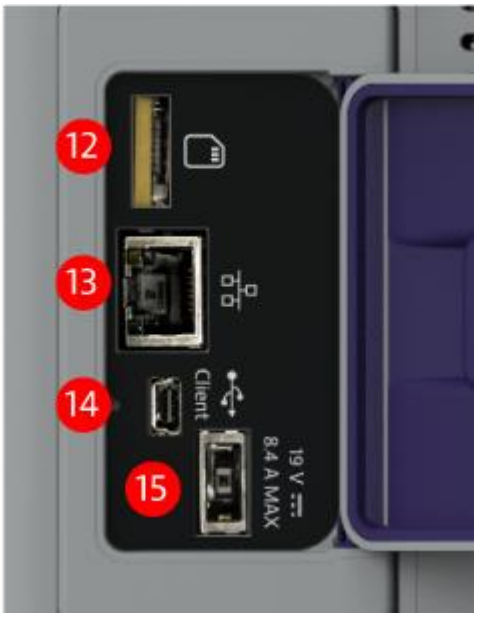
No.	Description
1	**Trigger In** port: You can use this SMA type female connector to receive 1 PPS clock or 10 ms synchronization signals from an external timing reference. Digital CMOS Input DC Coupled Input signal requirements: Minimum logic high ≥ 2.4V, Maximum logic high ≤ 3.3V
2	**Trigger Out** port: You can use this SMA type female connector to send 1 PPS clock or 10 ms synchronization signals from an internal timing reference. Digital Ouput DC Coupled 5V logic Do not terminate with 50-Ohm. Minimum termination value is 220-Ohm.
3	**Ref Out** port: CellAdvisor 5G provides a 10 MHz sine-wave reference signal at approximately 0 dBm into 50-Ohms.

4	**Ref In** port: You can use this SMA type female connector to receive 10 MHz, 13 MHz, or 15 MHz reference clock signals from an external frequency source. Input is AC-coupled 50-Ohm terminated. Input signal requirements: AC or DC coupled signal, Frequency 10 MHz, 13 MHz or 15 MHz, Maximum Amplitude 500 mV peak to peak, Minimum Amplitude 50 mV peak to peak.
5	**USB** port: CellAdvisor 5G has two **Host** ports on the top panel. You can use this port to plug in an external USB memory to extend storage capacity or to upgrade the instrument's firmware. It supports most USB memory devices with 32-bit file system. You can also use this port to connect an external power sensor, Bluetooth USB adapter, or P5000i.
6	**GPS** port: You can plug in a GPS antenna to this SMA type female connector in order to get location information and highly accurate reference.
7	**Audio jack:** The audio jack is labeled with a headphones icon. It is a 3.5 mm size mono jack. Plugging in specified headset with integrated microphone turns unit internal speaker off..
8	**POWER** button: Use the power button to turn your CellAdvisor 5G on or off. When external power is supplied via the AC/DC adapter, the LED is illuminated based on the battery status.
9	**RF Input** port for Option CA5000 F030 & 044 (K Connector): This port is a precise 50 Ω K male connector that is used as the input signal for spectrum analysis, signal analysis, and internal RF measurement from 9 kHz to 44 GHz.
10	**RF Input** port for Option CA5000 F030 & 044 (N Connector)**:** This port is a precise 50 Ω K female connector that is used as the input signal for spectrum analysis, signal analysis, and internal RF measurement from 9 kHz to 18.5 GHz.

Side panel

The CellAdvisor 5G product has the following side view on the right.

Side panel view (right)



No.	Description

12	**MicroSD** port: You can use this port to insert your Micro SD card to save measurement data of the instrument.
13	**LAN** port: You can use this Ethernet communication port to connect your instrument.
14	**Mini USB** port: You can use this USB client port to connect and control your instrument. It supports USB TMC and controls via SCPI communication.
15	**AC/DC Adapter** port: This port is to supply power via AC/DC power adapter provided with your instrument.

	NOTE: You need to open the led located between the cooling fans on the right side panel to use ports.

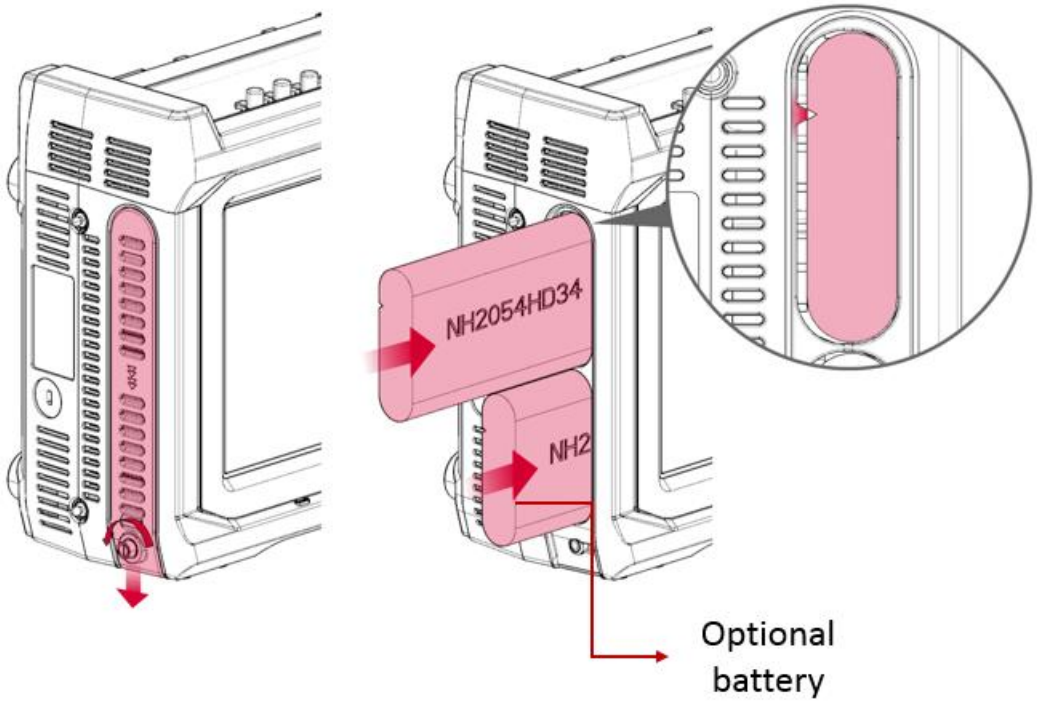
Installing battery

You need to install the Lithium Ion battery pack provided with your instrument. Follow the instruction to install batteries.

Installing battery

1. Lay the unit on the back side with the LCD facing up.
2. Unscrew the battery door thumb screw and slide the battery door off.
3. Slide a battery straight in keeping care to have the key feature on the back side of the battery.
   A user will feel the battery contacts engage the battery.
4. Push the battery an additional 1/8 to 1/4 of an inch to fully seat the battery. The battery will seem to snap into position when the connector is seated.
5. Slide the battery door back on, making sure to engage the center and end hooks of the door.
6. Tighten the thumb screw.

Installing battery



CAUTION:
The battery pack that came with your instrument is Lithium Ion and it may, if not connected correctly, lead to explosion. In case you need to replace the battery, you must use one of the same kinds or compatible ones. You must dispose a battery according to your local safety and environmental regulation.

NOTE:
It is recommended that you turn off the instrument to replace the battery. However, if yo do not want to interrupt the current test, you can leave the module tuned on with the AC power adapter plugged in.

Powering the instrument

Power is supplied to the instrument by the battery or the AC power adapter. For the CellAdvisor 5G, the adapter is supplied with the instrument. Use of AC power adapters or batteries other than those supplied with your CellAdvisor 5G, is not recommended as other slices/modules may be supplied with incompatible adapters or batteries. When supplying power using AC power adapter, you need to verify that you have the correct adapter.

The following figure shows the label on the adapter that ship with CellAdvisor 5G.

Adapter label

Using the AC power adapter

Supplying power using the AC power adapter

1 Verify that the AC power adapter is the one that shipped with your instrument (see the adapter label above).

2 Plug the adapter into the power supply jack.

— The jack is located on the bottom right side of the side panel.

3 Plug the opposite end of the adapter in the power mains.

Power is supplied using the adapter.

Turning on the instrument

1 Press the **ON/OFF** button approximately1 second then release.
The On LED for the Power button, located on the top panel, displays different color based on the battery status.

The following table shows the LED indication when the unit powered on or in hibernate mode.

Battery status	LED color
Battery charging	The LED color is amber (red+green). The unit can be either On or Off.
Battery fully charged	The LED color is green.
Battery low	The LED color is red. Make sure the instrument is not powered by AC adapter.

Turning off and rebooting the instrument

1 Press the **ON/OFF** button for approximately1 second then release.

2 Check whether the **Power options** appear on the display.

3 Select **Power off** to turn your instrument off..
When the unit is off and battery is not charging, there is no illumination of LED.

4 Select **Reboot** to reboot your instrument.

To cancel the operation, simply select **Cancel** and go back to the previous screen.

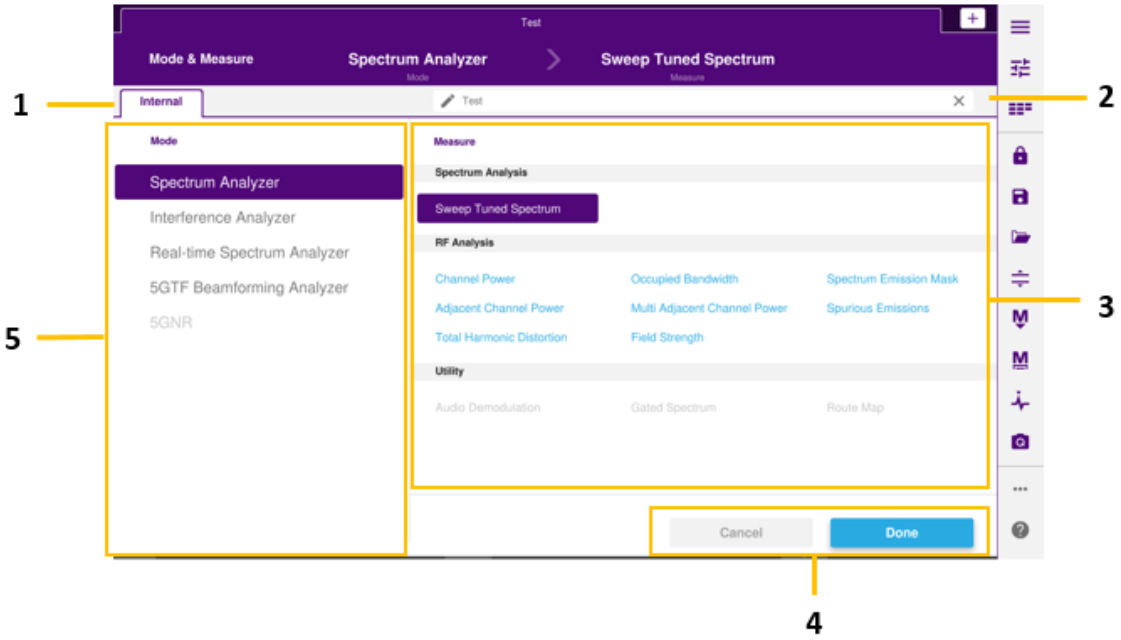
	NOTE: Continued holding of the POWER button more than 7 seconds will initiate a non-graceful unit shutdown.

Navigating the user interface

Starting the CellAdvisor 5G

The user interface lets you set up the instrument, configure tests, and display test results. The figure below is the Home screen where you need to select mode and measure using the icon ( ) on the Main screen.

Home screen (CellAdvisor 5G)



Items	Name	Description
1	**Module**	This indicates that the current active module. It may have more tabs when the external module is attached. If there is no other modules attached, only the internal tab is displayed.
2	**Title edit box**	Tap the Edit ( ) icon to change the title name using the on-screen keypad. The default name is test #.
3	**Measurement panel**	Tap to select measurement that you want to measure.
4	**Cancel/Done button**	Tap the Cancel or Done button to cancel or apply the mode and measurement that you have selected.
5	**Mode panel**	Tap to select mode that you want to measure.

Main screen (CellAdvisor 5G)

Items	Name	Description
1	**Home screen button**	This is a Home screen button to return to the Home screen and select a new mode and measure.
2	**Title**	This is a test title that you can edit on the Home screen.
3	**Sweep**	This is a Sweep Mode/Sweep Once icon that can be easily changed without accessing Menu.
4	**Sync**	This is a Sync indicator. When the signals are demodulated and received correctly, it displays green and otherwise red.
5	**Pass and Fail**	This is a pass and fail indicator for the measurement result. It is activated only when you turn the Limit on.
6	**Add button**	This is an icon that creates a new measurement tab.
7	**Side bar**	This is a menu set which includes all parameters that you can set for the selected mode and measure.
8	**Hot keys**	This is a hot key group that you can quickly access the operation.
9	**GPS info**	This indicates GPS information.

10	**Warning message**	This shows the warning message that you need to be aware of.
11	**Toast message**	This shows a toast message that indicates the user's action. Up to 10 messages are popped up.
12	**Measurement screen**	This is a measurement result screen.
13	**Quick access and display tab**	This is a quick access and display tab. You can quickly access the menus and parameters. Once you tap it, the tab that you have selected outlines purple.

Operating CellAdvisor 5G

CellAdvisor 5G provides an easy-to-use touch-based user interface that users can easily operate.

There are four ways to operate the CellAdvisor 5G as below.

Method 1: The **Quick Access and Display** tab in the upper part of the screen enables you to set each spectrum measurement for the selected measure. You can simply tap it and set the parameters.

Method 2: The first icon, **Menu** ( ) on the **Side bar** provides test parameters to set for the selected measure. You can simply tap it and set the parameters.

Method 3: The third icon, **Full Menu** ( ) on the **Side bar** provides test parameters to set for the selected measure. You can simply tap it and set the parameters.

Method 4: CellAdvisor 5G provides you with finger touch gesture operation for the Center Frequency, Span Frequency and Reference Level. For how to use gestures, see the following table.

Finger Touch Gesture

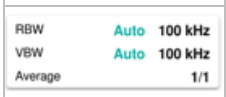
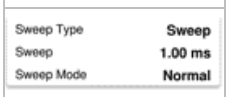
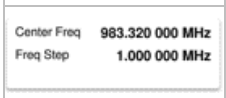
Gestures	Description	Gestures	Description
	Tap and drag left and right to change the Center Frequency.		Tap and drag up and down to change the Reference Level.
	Tap two fingers and pinch in to change the Span Frequency.		Tap two fingers and pinch out to change the Span Frequency.

Glancing at menus and icons

There are menus and icons that you need to get familiar with to operate CellAdvisor 5G efficiently.

Quick access and display tab

The quick access and display tab displays parameters to be set based on the Mode and Measurement that you have set. The following table shows the example of the Sweep Tuned Spectrum in SA mode.

Items	Menu	Description
	Trace	Tap to set the Trace related parameters. The Trace menu pops up on the right side.
	Amp/Scale	Tap to set the Amp/Scale related parameters. The Amp/Scale menu pops up on the right side.
	**BW/AVG**	Tap to set the BW/AVG related parameters. The BW/AVG menu pops up on the right side.
	**Sweep**	Tap to set the Sweep related parameters. The Sweep menu pops up on the right side.
	Channel	Tap to set the Channel related parameters. The Channel menu pops up on the right side.
	**Frequency**	Tap to set the Frequency related parameters. The Frequency menu pops up on the right side.
	Trigger	Tap to set the Trigger related parameters. The Trigger menu pops up on the right side.
	Limit	Tap to set the Limit related parameters. The Limit menu pops up on the right side.
	Marker	Tap to set the Marker related parameters. The Marker menu pops up on the right side.

Menus on the side bar

Items	Name	Description
	Menu	Tap to view all menus for the selected measurement and mode. Note that the Menus vary based on the selected measurement and mode.
	Setup	Tap to view measure setup menus for the selected measurement and mode. Note that the measure setup menus vary based on the selected measurement and mode.
	Full menu	Tap to view full menus for the selected measurement and mode in one screen. You can set all the parameters needed for a test at once.
	More	Tap to view more hot keys available.
	Help	Tap to view the CellAdvisor 5G Help.

Hot keys and icons on the side bar

Items	Name	Description
	Hold	Tap to hold spectrum measurement.

	Save	Tap to save the current measurement from one of the five file types: **Result**, **Result as CSV**, **Setup**, **Report**, or **Screen**.
	Load	Tap to load the saved measurement result file.
	Auto Scale	Tap to set the scale automatically.
	Marker Table	Tap to view the active marker with its information.
	Marker Setting	Tap to select the marker from 1 to 6 to set the marker position.
	Peak Search	Tap to set the active marker to peak. When makers are all off, M1 will be the active marker.
	Screen Capture	Tap to quick save the current screen.
PRE	**Preset**	Tap to reset the instrument to the factory default. It can be shown when you tap the more ( ) icon on the side bar.
	System Setting	Tap to view the system information and system settings. The CellAdvisor 5G saves important logs permanently. In the System Settings, you can tap the Click to Save button to save the log files. You can tap Power On to set last setting or predefined setting by switching Last or Preset. You can tap the Factory Reset button to reset your instrument. If you need to select multi-frequency or multi-channel in your measurement mode, make sure to switch this to On (default). This enables you to select multi-frequency and multi-channel using the pop-up windows. The Global 30 days options are also available in the System Setting screen. Self Test for main-board and RF calibration is available by taping the Start button.
	Favorite	Tap to view pages identified as Favorites and the most recent pages visited.
	Connector Selection	Tap to select a connector between 9 kHz to 18.5 GHz and 9 kHz to 44 GHz. You must select a correct connector based on the connected input RF port on the top panel of your instrument.

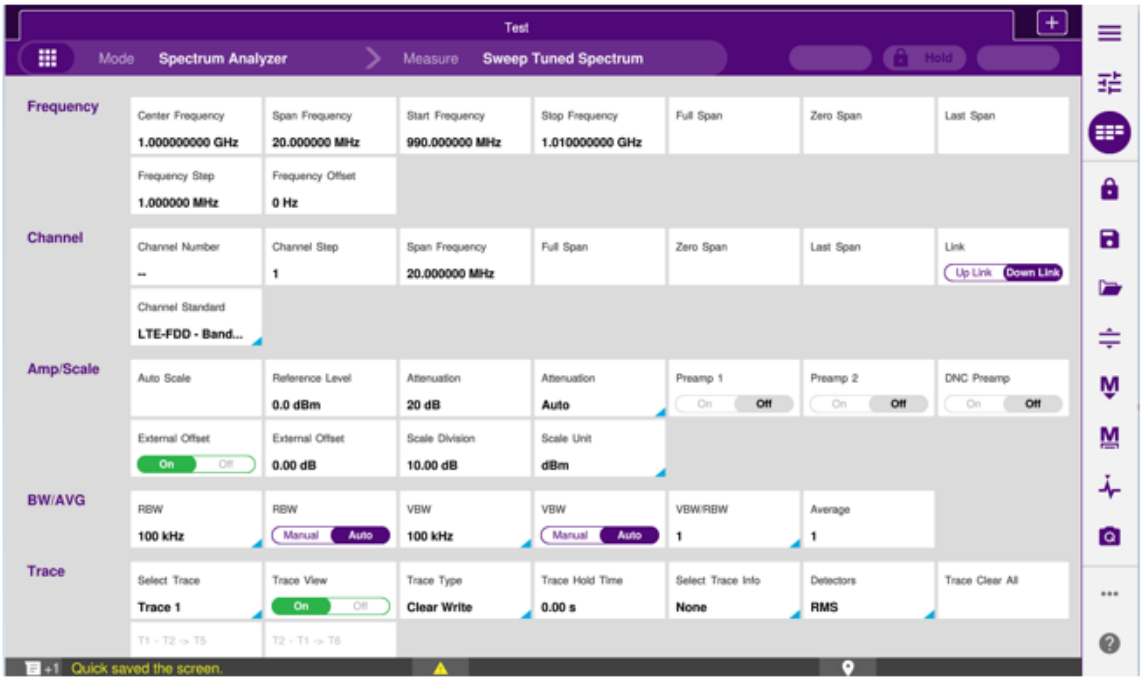
	NOTE: In the System Setting screen, there is Global 30 days options available. The option that starts with S with 3 numbers are only used. You can simply tap the Active button to activate the option you want, and you can only use it for 30 days once activated.

Glancing at full menus

You can configure test parameters, marker, trace and other settings that you want at one time in one place. The full menus displayed are different based on the Mode and Measure that you have selected. The following is the example of full menus for SA mode, Sweep Tuned Spectrum.

Access: Tap the **Full Menu** ( ) icon from the third one on the side bar.

Full menus



> **NOTE:**
> You can simply touch the screen and scroll up and down to set more parameters available.

Managing files

The CellAdvisor 5G lets you save and load screen, result, setup, logging data, or Fail events depending on your selected measurement modes and options. You can also save the limit when saving the File Type as Setup.

Using save

You can save your current screen, result, and setup into the internal memory or your external USB memory drive, **USB A** or **USB B** or **SD card.** To see the storage location, tap the **Folder** ( ) icon. Make sure to insert a USB memory drive to USB A or B port and insert the SD card to MicroSD port to enable the option. When you are using the Save feature, Hold is automatically enabled.

There are two ways that you can access **Save**.

Method 1: Tap the first **Menu** ( ) icon on the side bar and select **Save/Load** > **Save**.

The menu popped up beside the side bar is the last operation that you had set. Tap the **Back** ( ) icon.

Method 2: Tap the **Save** ( ) hot key on the side bar.

1 Tap the **File Name** input field.

2 Enter the file name you want using the on-screen keyboard.

3 To know what and how to save, see the following options:

- **a** Select **Screen** to save the current screen with a fie type, `.png`.
- **b** Select **Report** to save the measurement result in a report format with comments and captured screen images with a fie type, `.pdf`.
- **c** Select **Result** to save the measurement result with a file type, `.trav` and `.gomv` (Route Map).
- **d** Select **Result as CSV** to save the number of points displayed on the screen with a file type, `.csv`.
- **e** Select **Setup** to save the setup and test configuration with a file type, `.stav`.
- **f** Select **Logging** to save the logging data with a file type, `.grrv`.
- **g** Select **Logging as CSV** to save all measurement results with a file type, `.csv`.
- **h** Select **IQ Capture** to save the raw data with a file type, `.cfg`. and `bin`. (LTE/LTE-A FDD Analyzer, LTE/LTE-A TDD Analyzer, and 5G NR Signal Analyzer).

NOTE:
Result as JSON is a feature to save a CDM (Common Data Model) file. It cannot be saved alone but can be saved with other File Types. You can customize files using this CDM file.

4 *Optional.* Tap to switch the **Color Inversions** to **On** to invert the image color (only available to save as Screen or Report).

NOTE:
The file type Result and Result as CSV is inactivated (greyed-out) based on the selected measurement mode. The option, Logging as CSV and IQ Capture are available based on the selected mode.

Creating a report

You can create a report by clicking the **Report Setup** box in the Save and Quick Save Setup mode. To create a report, do the following steps.

1 Tap the **Report Setup** box.

2 Insert the company image using the icon.

3 Enter the company name in the **Company Name Here** field.

4 Enter the name of the person who performed testing in the **Your Name Here** field.

5 Enter your company or site address in the **Address** field.

6 Enter your test purpose in the **Test Purpose** field.

7 Enter a summary of your test results in the **Result** field.

8 Tap the **Image Add** ( ) button to add up to six screenshots and tap the **Apply** button.

Using event save

Depending on the measurement mode, you can let the instrument automatically save measurement screen or result that falls outside the defined limit settings or the Fail indicator is on. You can also set to save the first event and hold the measurement or to save all the events continuously.

1 Tap the **Event Save** tab.

2 Tap the **File Name** input field and enter the file name using the on-screen keyboard.

3 Tap to select the **File Type** from the following options displayed on the screen.

4 Specify the **Save To** directory where you want saved files to be stored.

5 Tap to switch the **Save On Event** to **On** or **Off**. If the Save On Event is On, it is saved with the selected file type in accordances with limit(s) fail.

6 Tap to switch the **Save Then Stop** to **On** to save the first event that fails outside the defined limit(s) and to hold the measurement automatically. To resume the measurement until the next event occurs, tap the Hold icon on the side bar. Otherwise, leave this feature off to save the fail event every time a new event occurs.

7 Tap to switch the **Color Inversions** to **On** to invert the image color when the **File Type** is **Screen**.

8 Tap the **Apply** button to get ready for event saves the file. Then the **Event Save** (

) indicator appears up on the screen.

9 Tap the **X** button in the Event Save indicator to turn the event save off.

Using quick save setup

You can save your configured settings by using this Quick Save Setup feature.

1 Tap the **Quick Save Setup** box.

2 Tap the **File Name** input field and enter the file name using the on-screen keyboard**.**

3 Tap to select the **File Type** from the following options: **Result**, **Report**, and **Screen**.
If the file type is not selected, it is saved as a Screen type.

4 Tap the **Apply** button to apply the settings.

Using load

You can load your saved screen, result, and setup from the internal memory or your external USB memory drive, **USB A** or **USB B** or **SD card.** To see the storage location, tap the **Folder** ( ) icon. Make sure to insert a USB memory drive to USB A or B port and insert the SD card to MicroSD port to enable the option.

There are two ways that you can access **Load**.

Method 1: Tap the first **Menu** ( ) icon on the side bar and select **Save/Load** > **Load**.

The menu popped-up beside the side bar is the last operation that you had set. Tap the **Back** ( ) icon.

Method 2: Tap the **Load** ( ) hot key on the side bar.

1 Select the file to be loaded from the internal memory or from your USB drive.
Information of your selected file appears in the File Information pane.

2 Check the file information on the right pane**.**

3 Tap the **Load** button to load the file.

Using file manager

The CellAdvisor 5G lets you create a user-defined folder, select, copy, cut, paste, and delete data files saved in the internal memory or in your USB memory drive. You can manage your data files using the icons below.

Items	Name	Description
	Select	Tap the **Folder** ( ) icon to open the files or folders you want to select. Tap to select files or folders.
	New	Tap to create a new folder. Once tapped, the on-screen keyboard pops up and enter any folder name that you want to create.
	Copy	Tap to copy a selected file or folder.
	Paste	Tap to paste the copied or cut file or folder to the location where the file or folder to be pasted. You can tap the **Folder** ( ) icon to select the location. The default setting is greyed out and it is only activated when copy and cut is performed.

	Cut	Tap to cut a selected file or folder.
	Undo	Tap to undo copy, cut or select. The default setting is greyed out and it is only activated when copy and cut is performed.
	Delete	Tap to delete a selected file or folder. The confirmation dialog box appears. Once the file or folder is deleted, you cannot recover it.

	NOTE: You can simply select the file or folder by tapping it on the File Information pane on the left. Once tapped, it will be highlighted as purple.

Using favorites

The Favorites page provides access to test pages identified as Favorites and the most recently visited test pages.

Editing favorites

You can add, edit, and remove items from Favorites. The following procedures describe how to add, edit, and remove items.

To add an item to Favorites from the Favorites page

1 Open the Favorite page by pressing Home, then pressing Favorites.

2 Press the **Edit favorites list** button.
The items in Favorites are outlined in purple, signifying they are now able to be edited.

3 Click and drag the test from Recent to Favorites.

To add an item to Favorites from a test page

	NOTE: This procedure is only available on certain solution modules.

1 On the test page you want to add, select the **Save** button from the side menu.
The **Save** screen appears.

2 Click the **Create Favorite** tab.
The **Create Favorite** screen appears.

3 Tap the **Create** button.
The items in Favorites are outlined in purple, signifying they are now able to be edited.

4 Edit the item:

- **a** To change the name, click the item's name and enter a new one using the on-screen keyboard.
- **b** To change the icon:
  - i. Click the icon. The Load Icon window appears.
  - ii. Select the new icon, then press the Load Icon button.

The item's icon has been changed.

To remove an item from Favorites

1 Open the Favorite page by pressing **Home**, then pressing **Favorites**.

2 Press the **Edit favorites** list button. The items in Favorites are outlined in purple, signifying they are now able to be edited.

3 Click the **x** button in the top right corner of the item you want to remove.

To conduct auto launch preference

CellAdvisor 5G enables you to launch any measurement mode you have lastly operating.

1 Press the **Auto launch preferences** button.

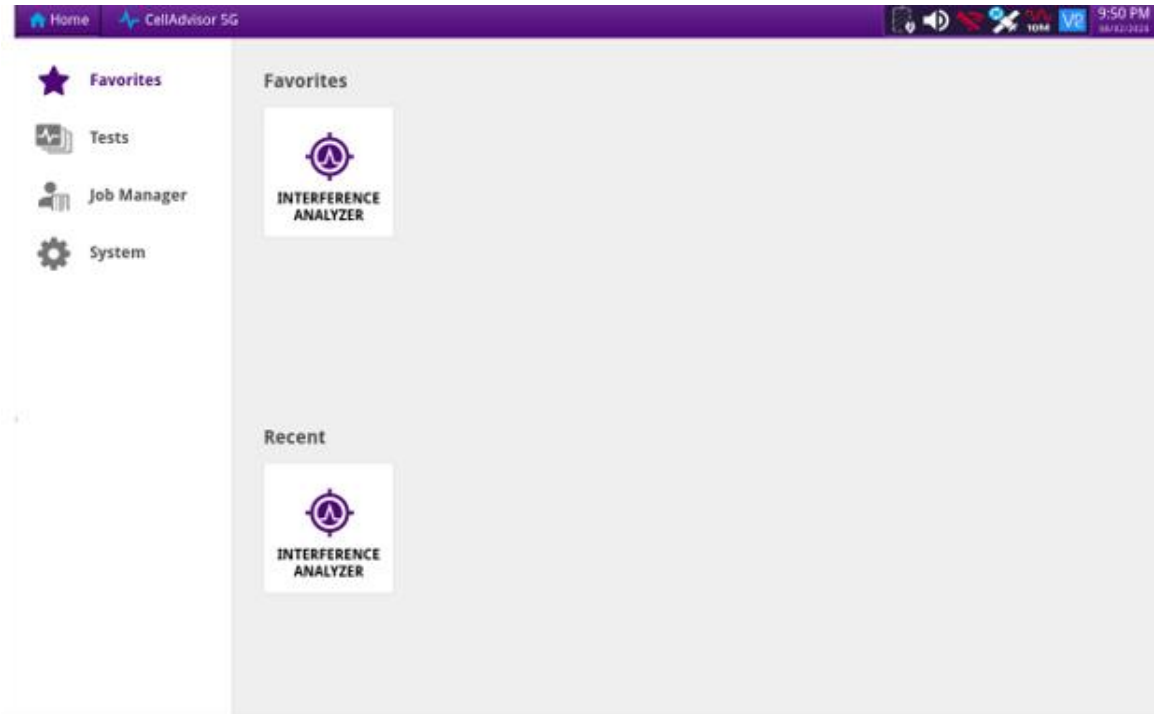
2 Press **the Last running state** in the list. This moves you to the mode you operated lastly.

Setting up the instrument

Home screen

When you first start the CellAdvisor 5G, the Home Screen appears, as shown in the following figure.

Home screen



The Home screen provides access to the **Tests**, **Job Manager**, and **System** pages. You can return to the **Home** screen at any time by clicking the **Home** button in the top left corner of the screen.

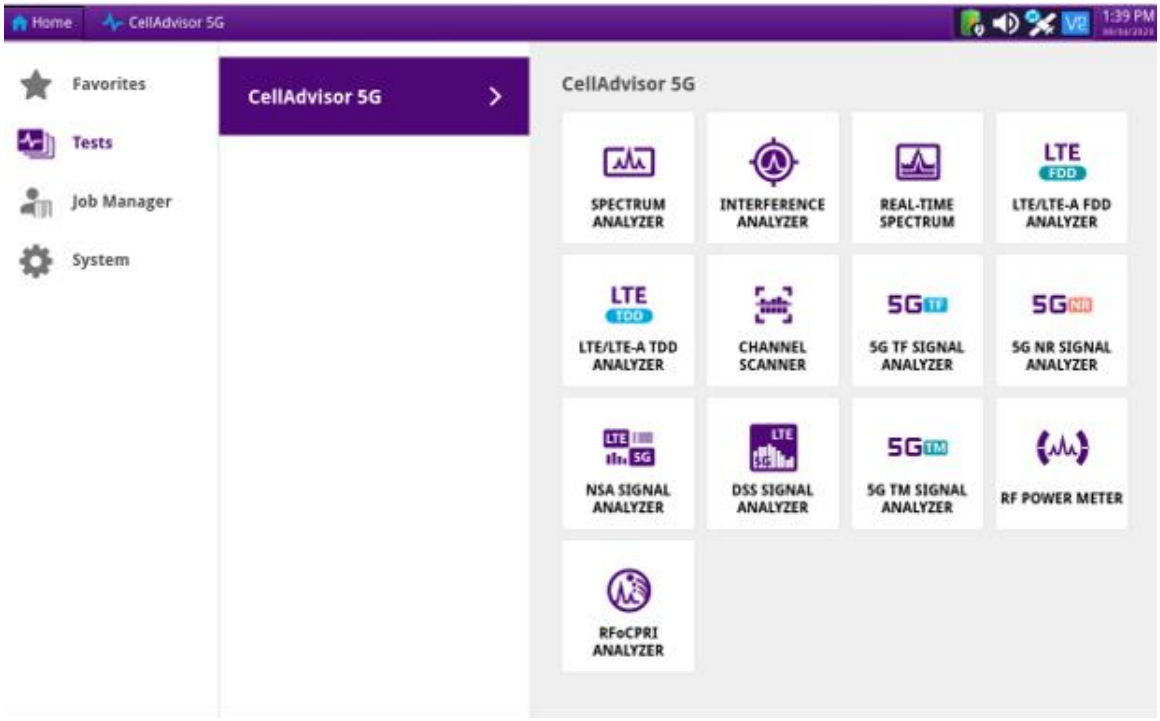
Favorites

The Favorites page provides access to pages identified as Favorites and the most recent pages visited.

Tests

The Tests page provides access to the available tests.

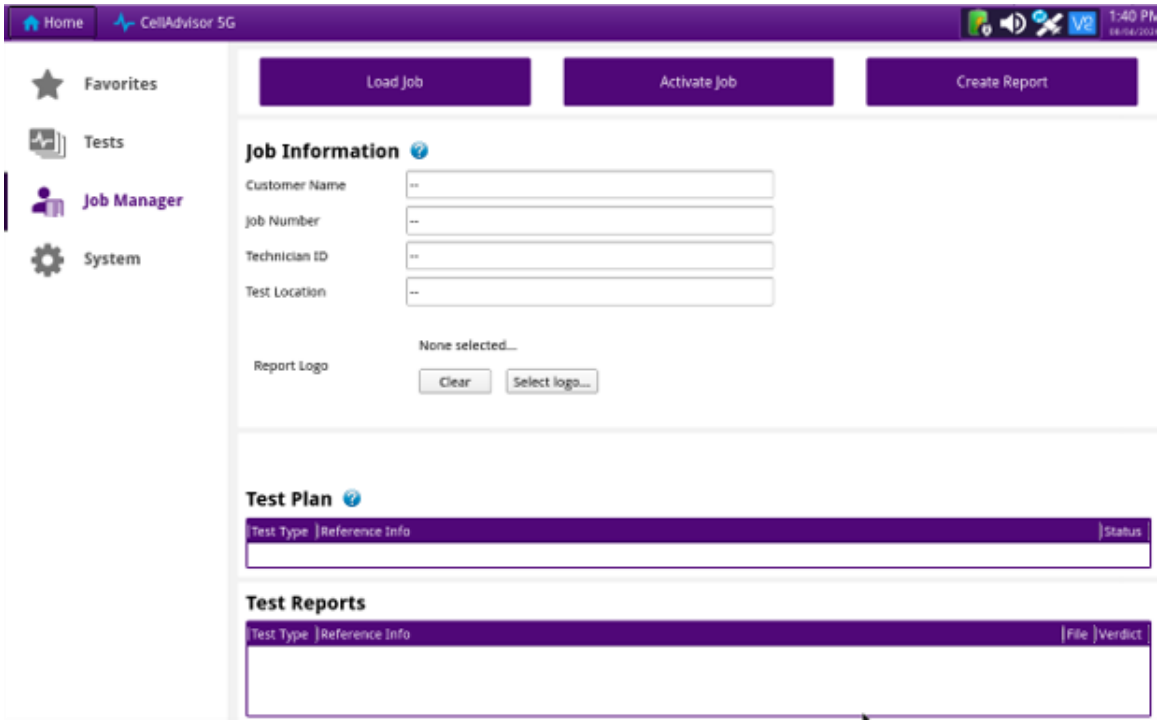
Tests page



Job Manager

The Job Manager allows you to specify the information to be included whenever you run a test and generate a report. Each time you generate a report, your instrument will automatically insert the Customer Name, Job Number, Technician ID, and Test Location that you specified in the Job Manager into the report heading.

Job Manager



NOTE:
Additional tools might be available on the System screen when optional software features are installed.

If you change the report information on the Report Info screen (before you generate a report), the new report information will override the defaults that are specified in the Job Manager. For example, if you change the Work Order number on the Report Info screen, the Work Order number will be included in your report output instead of the default Job Number.

To specify report information

1 On the Home screen, select **Job Manager**.
The Job Manager screen appears.

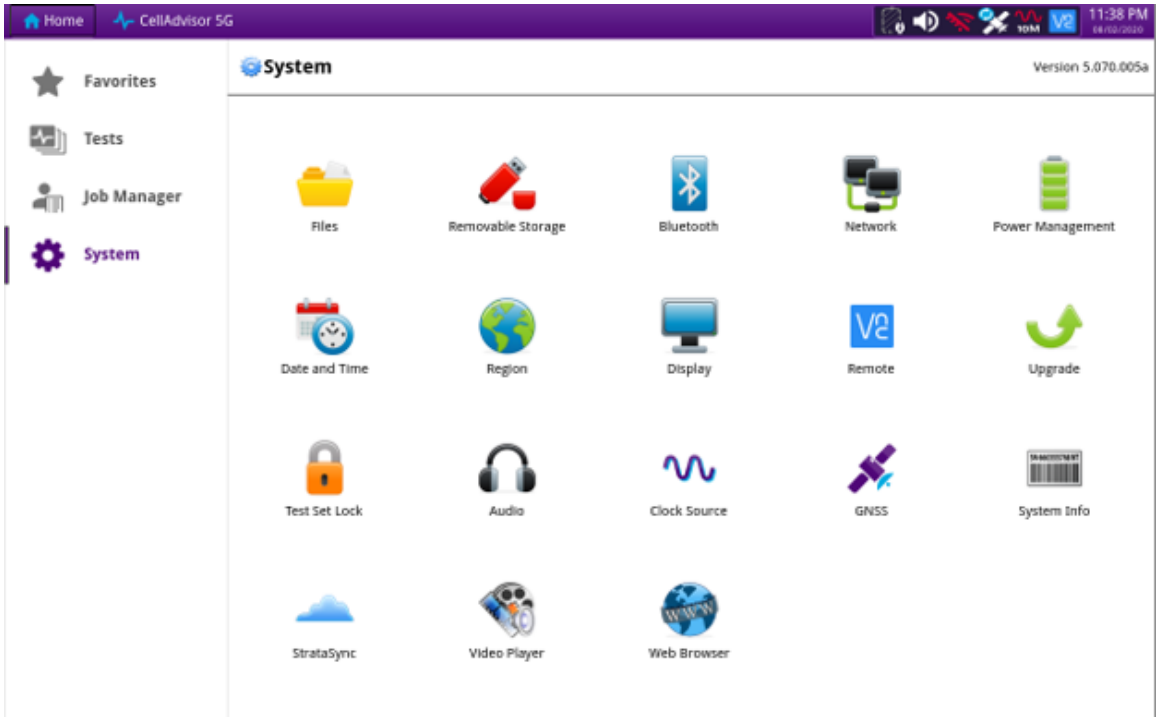
2 Specify the Customer Name, Job Number, Technician ID, and Location.
The report information is specified, and will be retained until you change it.

System

The System screen provides access to tools for viewing system information and performing other tasks as required.

NOTE:
Additional tools might be available on the System screen when optional software features are installed.

System menu



The tool bar also provides access to certain system tools, including and power management.

Specifying international settings

Before testing, you can specify the language and the date and time format for the user interface.

1 Select the **SYSTEM** icon.
The System Menu appears.

2 Select **Region**.

3 The System Setup screen appears, listing settings that control the appearance and behavior of your instrument.

4 In the **Language** box, select the language for the user interface.
The formatting standard changes automatically.

5 In the **Samples for selected formatting** box, the date, time, and number formatting appear.

6 To change the formatting standard, click the **Change formatting standard** box and select a country.

7 In the **Customize** box, click the check box next to **Use 24-hour time**.

8 Turn the instrument off then back on.
The user interface changes to the language you specified.

Setting the date and time

You can change the date and time on your instrument by editing the system settings, and then rebooting your instrument. You can set the date and time in two ways:

Method 1: The date and time in the upper right corner of the screen provides current date and time set by user. You can simply tap it to change the date and time.

Method 2: Tap the **System Menu** > **Date and Time**.

1 Select the **System** icon.
The System screen appears.

2 Select **Date and Time**.

3 Specify the **Region**, **Country**, and **Area**, and if you wish to do so, click the check box for **Automatically adjust for daylight savings time**.

4 Under the current Date & Time, do the following:

a Use the up and down arrows to specify the current local time. If you wish to do so, click the check box next to **Use 24-hour time**.

b Use the calendar to select the current date.

Setting the remote access password

To change the default password, do the following steps.

1 Select the **System** icon.
The System screen appears.

2 Select the **Remote (VNC)** icon.

3 Tap the **Remote access password** filed, then specify a new password using the on-screen keyboard.

4 *Optional.* Tap the check box for **Enable Firewall** if you wish to do so.

5 *Optional.* Tap the check box for **Enable VNC access** if you wish to do so.

6 *Optional.* Tap the check box for **Require password for VNC access** if you wish to do so.

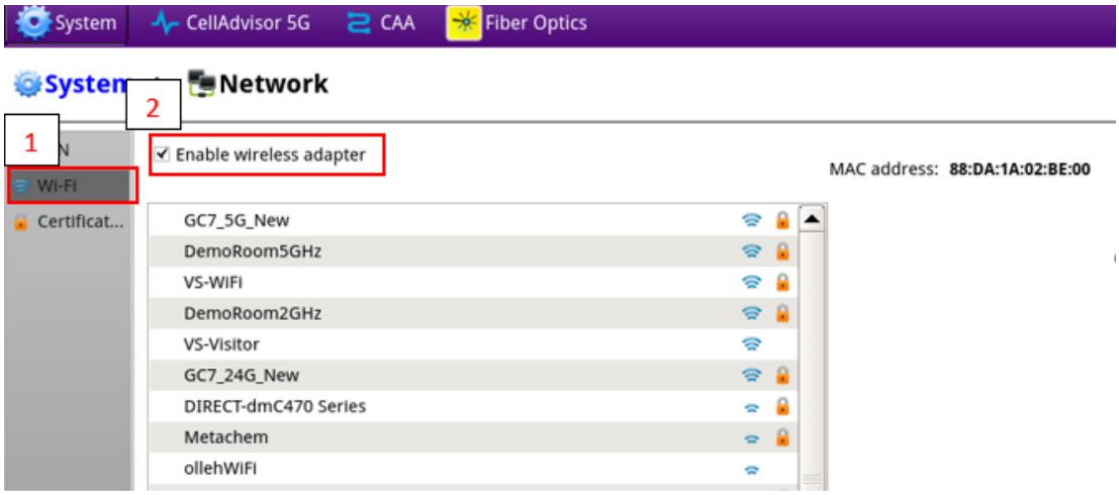
Setting the Wi-Fi connection

To connect to the Wi-Fi, do the following steps.

1 Select the **System** icon.
The System screen appears.

2 Select the **Network** icon.

3 Tap **Wi-Fi** at the upper left of the screen, then click **Enable Wireless Adapter** as shown below**.**



4 Find AP information, then select your desired AP.

5 Enter the password and you can find the IP information.

Setting up the bluetooth connection

NOTE:
Bluetooth connectivity is an option that must be available on the unit before this procedure can be performed. Contact your VIAVI sales representative for more information.

1 Select the **System** icon, and then select **Bluetooth**.
The System screen appears.

2 Enable the following check boxes:

- **Enable Bluetooth**
- **Allow other devices to pair with this device**

3 Optionally, enter a name for the instrument.

4 Activate **Bluetooth** on the remote device to be paired with the instrument.

5 On the instrument, select **Start Scanning** to locate detectable devices in range.
The names of newly detected devices appear in the **Discovered Devices**, and the names of previously detected devices appear in the **Paired Devices** list.

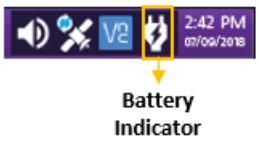
6 Select the remote device.

7 On the remote device, enter a pairing code if prompted, and then select **Pair** to pair it with the instrument.

Checking the battery

You can check the status of the battery in two ways:

Method 1: The battery status indicator in the upper right corner of the screen provides a graphic indication of the approximate battery charge.



Method 2: The Battery Level percentage on the Battery status page.

1 Select the **System** icon.
The System screen appears.

2 Select the **Power Management**.
The battery status appears.

3 View the **Battery Level**.
The Battery Status page indicates the charge level (both in percentage under the battery and the color of the battery), whether the adapter is plugged in, and indicates the battery temperature range.

4 Tap the check box for **Enable auto-off while on battery** if you wish to do so.

5 Tap **Inactive time (minutes)** and set it using the on-screen keyboard.

6 Tap **OK** to apply the inactive time you have set or **Cancel** to cancel the inactive time that you have set.
The default inactive time is set to 30 minutes.

Setting up the display

Setting up the display includes setting the screen brightness and setting up the screen saver.

Adjusting screen brightness

The following procedure describes how to adjust the screen brightness.

1 Select the **System** icon, then select **Display**.

2 Change the brightness level by moving the slider left or right.

Setting up the screen saver

If you are operating the instrument using the battery, you should set up the screen saver to switch off the screen automatically after the instrument has not been used for a specific interval of time.

1 Select the **System** icon, then select **Display**.

2 To enable the screen saver, tap the check box next to **Enable automatic screen saver**.

3 To change the message displayed as a screen saver, tap in the **Message** field, and then enter the message.

4 To specify the time to wait until the screen saver begins, do the following:

   a Tap on the drop down next to the Delay field, and then specify the time unit, for example, seconds, minutes or hours.

   b Tap in the Delay field. A keyboard appears. Enter the amount of time, and then click OK. For example, if you selected minutes in the previous step, enter the number of minutes of delay.

5 Tap the check box next to **Screen saver password** if you wish to enable a screen saver password (a password is required to close the screen saver and resume using the instrument). Make a note of the password and put it somewhere safe.

The screen saver is setup.

Using the clock source

The Clock Source is used as a reference frequency and timing source for the CellAdvisor 5G application. You can configure the clock source to be used.

Setting up the clock source

The following procedure describes how to use the clock source.

1 Select the **System** icon, then select **Clock Source**.

2 Tap the drop down menu and select the options from the following choices:

- **Internal**:Uses a 10 MHz internal clock
- **External - 10 MHz**: Uses an external 10 MHz clock which must be accurate within +/500ppb which is connected using the top panel.
- **External - 13 MHz**: Uses an external 13 MHz clock which must be accurate within +/500ppb which is connected using the top panel.
- **External - 15 MHz**: Uses an external 15 MHz clock which must be accurate within +/500ppb which is connected using the top panel.
- **GPS**: Uses a built-in GPS as a frequency and timing source.

Icon indication

The following shows the icon indication based on each setting.

- **Internal**:

- **External - 10 MHz**:

- **External - 13 MHz**:

- **External - 15 MHz**:

Setting up the GPS

You can configure the GPS setting by clicking the GPS icon on the System screen. You are required to configure GPS settings if you need the GPS location or need to use it as a frequency and clock source.

1 Select the **System** icon, then select **GPS**.

Specifying GPS settings

You can configure the settings depending on what you need, but turning GNSS on and Antenna Power on should make it work for most cases.

1 In GPS, turn on **Antenna Power** if required. The antenna power setting enables the external antenna power so it depends on what you plugs into the instrument. If you have an externally powered antenna, you will not need to turn on antenna power.

2 Select the required Fix Type from the following choices:

- **2D Mode**: A 2D (two dimensional) position fix that includes only horizontal coordinates. It requires a minimum of three visible satellites.
- **3D Mode**: A 3D (three dimensional) position fix that includes horizontal coordinates plus altitude. It requires a minimum of four visible satellite.
- **Any**: Calculates a 3D position fix if possible but reverts to 2D position if necessary.

3 Turn the **GNSS** value on if using GPS.

4 Select the value representing the **GNSS System** supported in the region where you intend to conduct testing. If you want to use Satellite Based Augmentation Systems (SBAS) to augment the GNSS System, select the option that provides SBAS (indicated with + SBAS).

5 Select the desired Survey Mode from the following choices:

- **Dynamic**: Continuously calculates positioning for continuous location information
- **Auto**: Calculates positioning until accurate location information is determined and switches to fixed position using accurate location information and switches to determine timing accuracy

6 In **Elevation Limit (deg)**, specify the elevation limit in degrees. This value represents the lowest point on the horizon on which the receiver will try to locate and obtain information from GNSS satellites. The default elevation is set to 10 degrees. Using satellites near the horizon may degrade performance.

7 In **Minimum C/No (dBHz)**, specify the minimum Carrier to Noise Ratio (C/ No) for the satellite signals that will be used by the module's GNSS receiver. The C/No is an indication of signal strength ranging from 0 to 50 dBHz. The default value is 9 dBHz. Using satellites with a weak C/No may degrade performance.

8 Specify the **Antenna Time Bias** value. The default Antenna Time Bias value is 28 (the optimal value for the VIAVI qualified antenna). If you are using a different antenna, determine the optimal bias value by referring to the vendor specifications for the antenna (and, if applicable, splitter or amplifier), then specify the bias value in nanoseconds. This value represents the bias that is used to compensate for the delay introduced by your antenna, the antenna's cable, and if applicable, an inline splitter or amplifier where absolute accuracy of PPS is important.

Checking GPS results

In the GPS result screen, the items indicate as below:

- **Latitude (deg)**: Distance north or south of the equator measured by degrees (°) from 90° to +90°.
- **Longitude (deg)**: Distance east or west of the prime meridian, usually measured in degrees (°) which runs from the North to South Pole through Greenwich, England. Longitude is expressed from 180° to +180°.

- **Altitude (m)**: Height above Ellipsoid (HAE) - The height coordinate determined from GPS observations is related to the surface of a Reference Ellipsoid (WGS84). The coordinates are derived initially in the 3D Cartesian system (as XYZ values), and then for display/output purposes they are transformed to Latitude, Longitude and (Ellipsoidal) Height using well known formulae to an ellipsoid such as that associated with the WGS84 Datum (semimajor axis: 6378137m; inverse flattening: 298.257223563). The surface of the ellipsoid is the zero ellipsoidal height datum. In Relative Positioning, the height component of the receiver whose coordinates are being determined relative to the Base Station can also be related to an ellipsoid by transforming the baseline vector from the 3D form (DXDYDZ) to a change in Latitude, change in Longitude, and change in Ellipsoidal Height.

- **Lock Status**

  i) Searching: The GPS system has not achieved lock and is searching for satellites.

  ii) Locked: A signal has been established with enough satellites to provide location information as specified by Fix Type.

Icon indication

Icon indication is available only if GNSS is On.

- **Lock Status: Searching**

- **Lock Status: Locked**

Viewing the System Info

To view the revisions of internal components and to see which options are enabled, use the System Info menu. This menu also provides the serial number of the instrument and serial numbers of internal components. The Copy System Info to File button is used to save a file that includes all of the system information for the instrument.

1 Select the **System** icon, then select **System Info**.

2 The instrument Info appears on the left box of the screen.

- **Reset Instrument to defaults** button: Tap to reset the System and Test settings to defaults. Instrument reboot is required.

- **Export logs to usb stick** button: Tap to export logs to your USB memory stick. Make sure to insert a USB memory stick to **USB A** or **USB B** port.

- **Secure erase instrument** button: Tap to securely erase all data from this instrument. The instrument is inoperable until software is reloaded.

Enabling software options

You can enable purchased software options by using the Import Options button. Please call the regional VIAVI Solutions Sales Office for more details about enabling options. They will ask you the serial number of the test instrument for which the upgrade or software option was ordered.

Viewing options

Your instrument may come with software options installed or you may order them later and install yourself.

1 Select the **System** icon, then select **System Info**.

2 The options installed appears in the **Base Options** pane on the right**.**

The icon indicates whether the option is enabled.

Icon	Indicates
	Option is enabled.
	An expiring option. An “expiring option” is an option that is installed for free for a trial period. The time left in the trial is indicated to the right. When the trial period ends, a warning message appears. If you are running a test when the option expires, you can continue testing, but the expiration warning will reappear every minute until you either enter a permanent option code or reset the module (changing applications will reset the module).
	Option has not been enabled. If you need this option, contact regional Sales Office to place an order.

Installing software options

You can enable purchased software options by using the Import Options button. Before installing the options, you need to have a USB memory stick including option files provided by VIAVI.

1 Select the **System** icon, then select **System Info**.

2 Connect the USB memory stick with option files to the **USB A** or **USB B** port of the instrument.

3 In the lower part of the **Base Options** pane, tap the **Import Options** button.
A message alerting the option file is imported appears.

4 Reboot the instrument and check the option is installed.

Updating the software

System Software and Solution Firmware upgrades can be loaded from storage media such as a USB memory stick and over the network. To obtain the latest software release for your unit, visit VIAVI Software Updates website and check if your installed software and firmware are the latest ones.

The CellAdvisor 5G software can be updated in the field two ways:

- Using a USB memory drive.
  - Software and/or firmware can be downloaded for the CellAdvisor 5G from CellAdvisor.updatemyunit.net.
- Over a network.

The process for updating varies depending on the way the update is performed.

Downloading the software to a USB

A USB memory stick with at least 1GB of space is required to store the latest CellAdvisor 5G software. It is recommended that you have nothing stored in your USB memory stick when downloading a software.

1 Using a browser, go to CellAdvisor.updatemyunit.net.
This will bring you to a landing page where you can download the latest self extracting software/firmware upgrade file.

2 Click the software/firmware link for the software release you want to download.

3 Save the file to the desktop of your personal computer (PC).

The software is downloaded.

Extracting the software to a USB stick

After downloading the firmware to your PC, it must be extracted to a USB stick.

1 Insert the USB memory stick into your PC.

2 Double-click the downloaded self-extracting file you saved to your desktop, then click **Run** as prompted.
A dialogue box appears asking for the location to extract the files.

3 Click **Browse** to navigate to and select the drive with the USB stick.

4 Click **Extract**.
The files are extracted to the USB stick. Do not remove the USB stick.

5 Using Windows Explorer, navigate to the drive with the USB stick, right-click on the drive, and then select **Eject**.

6 Remove the USB stick from the PC.

The software is ready to be installed on your instrument using the USB stick.

Installing the software using a USB stick

1 To ensure an uninterrupted supply of power during the installation, connect the AC power adapter to the CellAdvisor 5G.

WARNING:
Electrical shock may result in serious injury or death. Be sure the AC power adapter is connected to the correct voltage mains. Do not use the adapter outdoors or in wet locations. Use only the AC power adapter supplied with the instrument.

2 Connect the USB flash drive with the extracted firmware/software into the USB connector on the top panel of the instrument.

3 Select the **SYSTEM** icon.

4 Select **Upgrade**.

5 Select **USB**.
The release number of the software on the USB is displayed.
If the release is equal to the current software release installed on your instrument, an equals symbol will be displayed next to the USB software release number.
If the release is a retrograde (an earlier software release than that installed on your instrument), a down arrow will be displayed next to the USB software release number. If the release is an upgrade (a later software release than that installed on your instrument) an up arrow will be displayed next to the USB software release number.

6 Select **Start Upgrade**.
A dialog box appears instructing you to exit any existing tests. You have the option to cancel the upgrade at this point (for example, if you need to complete a test that you are currently running).

7 Select **OK**.

The software is installed. The instrument automatically reboots when the installation is complete. After the instrument reboots, remove the USB stick from the instrument.

Reimage software using a USB stick

Reimage is deleting the internal flash of the instrument and reinstalling the software. Users can perform reimage when the instrument is inoperable and the instrument can be only recovered by performing reimage in cases where the instrument is not rebooting.

1 To ensure an uninterrupted supply of power during the installation, connect the AC power adapter to the CellAdvisor 5G.

WARNING:
Electrical shock may result in serious injury or death. Be sure the AC power adapter is connected to the correct voltage gains. Do not use the adapter outdoors or in wet locations. Use only the AC power adapter supplied with the instrument.

2 Connect the USB flash drive with the extracted firmware into the USB connector on the top panel of the instrument.

3 Use the **POWER** button to turn off the instrument.

4 Use the **POWER** button to turn on the instrument.

5 Remove the USB memory stick once the USB removal message appears.

The software is installed. The instrument automatically reboots when the installation is complete.

NOTE:
If you run reimage, you must update your software/firmware with the latest one.

Upgrading over a network connection

Before updating your instrument using a network connection, review the following recommendations:

- A wired network connection is recommended for software/firmware upgrades.
  - Software and/or firmware can be downloaded for the CellAdvisor 5G from CellAdvisor.updatemyunit.net.
- You may experience problems accessing the CellAdvisor.updatemyunit.net site from behind a firewall. If this is the case, please connect the instrument or your PC to a public network for the purpose of performing the upgrade.

1 Connect the CellAdvisor 5G to AC power to ensure an uninterrupted supply of power during the update.

WARNING:
Electrical shock may result in serious injury or death. Be sure the AC power adapter is connected to the correct voltage mains. Do not use the adapter outdoors or in wet locations. Use only the AC power adapter supplied with the instrument.

2 Select the **SYSTEM** icon.

3 Select **Upgrade**.

4 Select **Network**.

5 Do one of the following:

a Enter the address where the software file is located. This could include the FTP address, server IP address or hostname, and the proxy server address (if necessary), as well as a User Name and Password.

b Use the provided CellAdvisor.updatemyunit.net server address.

6 Select **Connect**.
This will bring you to a landing page where you can select the firmware release that you want to use to update your instrument.
Click the firmware link for the firmware release that you want to install.
The release number of the software on the USB is displayed.
If the release is equal to the current software release installed on your instrument, an equals symbol will be displayed next to the USB software release number.
If the release is a retrograde (an earlier software release than that installed on your instrument), a down arrow will be displayed next to the USB software release number.
If the release is an upgrade (a later software release than that installed on your instrument) an up arrow will be displayed next to the USB software release number.

7 Select **Start Upgrade**.
A dialog box appears instructing you to exit any existing tests. You have the option to cancel the upgrade at this point (for example, if you need to complete a test that you are currently running).

8 Select **OK**.

The instrument will communicate with the upgrade server, download the software, and then install it. In some cases, the instrument automatically reboots even before you turn off the instrument, you need to reboot again to restart the update, and if the USB removal message appears, remove it and the instrument will automatically reboots and the software is updated.

NOTE:
You will be downloading a file in excess of 700MB; therefore, the update will typically take 15 to 30 minutes, depending on the speed and reliability of the network.

Synchronizing to the StrataSync server

To automatically obtain the latest configuration settings, software options, updates and ownership registration information, the instrument should be synchronized with a VIAVI server via the Internet with an optional subscription-based service called StrataSync. In addition to the latest operating software, the synchronization also stores any user files saved to the unit's hard drive on the StrataSync server. A connection to the internet would be provided upon receipt of the unit and on a regular (daily) basis thereafter to ensure that it has the most currently issued options and updates and to allow all user information to be backed up. If an internet connection is available and contact has been made with the StrataSync server, a message appears asking you to initiate the syncing process.

Synchronizing with the StrataSync server

Your CellAdvisor 5G must have Internet access to be able to connect to the StrataSync. You can set up for wireline or wireless Ethernet network connection. it is recommended that you set your network IP mode to DHCP.

1. Select the **System** icon, then select **Stratasync**.
2. Verify that the server address is displayed in the Server Address field (default= *stratasync.viavisolutions.com).*
3. Enter the Account ID for this test instrument. No synchronization can occur without the entry of a pre-approved, unique ID number. This ID must be obtained from VIAVI before attempting to sync to the server.
4. Enter an optional Tech ID. This will be populated by a default value representing your test instrument, but can be changed to identify the user who is initiating the synchronization.
5. Tap the **Start Sync** button.
6. Go to the *stratasync.viavisolutions.com* via internet connection.

NOTE:

During Synchronization, a cloud icon will be displayed at the top of the screen and the state of the synchronization activities will be displayed below the Start Sync button. The cloud icon will also be modified to indicate the following actions:

Up/Downloading: Cloud with arrows

Failed to Sync: Cloud with X overlay

Sync Success: Green cloud with check mark

If an error or failure occurs, a message detailing the possible reason for the problem will be displayed in the status message next to the Start Sync button.

Using OneCheck

Introduction

OneCheck is a part of TPA (Test Process Automation) solution and it provides the most optimized function that automates the work process done by technicians who take care of intallations, cutomization, and maintenance of celluar network. Due to increasing complexity of network, work process trainings are more needed. In this regard, a senario-based WA (OneCheck) helps customers conduct their jobs easier and faster with pre-defined procedures and settings and it can also diversify work senarios based on different conditions. WA is structured with Selector and Measure. The Selector suggests required settings only and the Measure consists of subcategories related to the settings. Once you finished all the required measurements, you can check the measurement results by creating a report.

OneCheck supports the following measurement:

- OneCheck:

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **OneCheck** on the **MODE** panel.

2 Tap the measurement mode from the following choice:

OneCheck > **OneCheck**

Creating OneCheck

The following procedure describes how to create OneCheck scenario.

Creating OneCheck

1 Tap the **OneCheck Creator** (

) button on the Information pane.

2 If there is OneCheck file saved in the internal storage, tap the **Import** icon.

a Tap the **Import** icon.

b Tap the required OneCheck file in the Import window.

c *Optional.* Tap the **Instruction file name** button to load the file if you have to refer to it.

- Tap the **Document** button to import the document and select the file in the file list.
- Tap the **Streaming Address** button to play the video file and input the **Title** and **YouTube URL**.

	NOTE Only pdf document can be uploaded and the duplicated document cannot be uploaded. Only Youtube URL is available and played.

3 If there is no OneCheck file saved in the internal storage, do the following steps:

a Tap the **Title** bar and input the required title using the on-screen keyboard.

b Tap **Selector** to create the required setting.

- Input Title (required), Sub-title, and Note. You can also import images as required for options you have created.
- Add options by tapping the + button.
- Select the option by tapping the Next/Back arrow button.

- Tap the **Apply** button to apply the changes.

c Tap **Measure** to load the required setup files for the measurement.

- Tap **Load Setup** pane.
- Tap the **Setup file name here** ( ) button.
- Import the required setup file saved in the internal storage.
- Tap the **Import** button to import the selected setup file.
- Tap the **Timer** checkbox. Once the timer ends, the file saved automatically.
- Tap the **Apply** button to apply the changes.

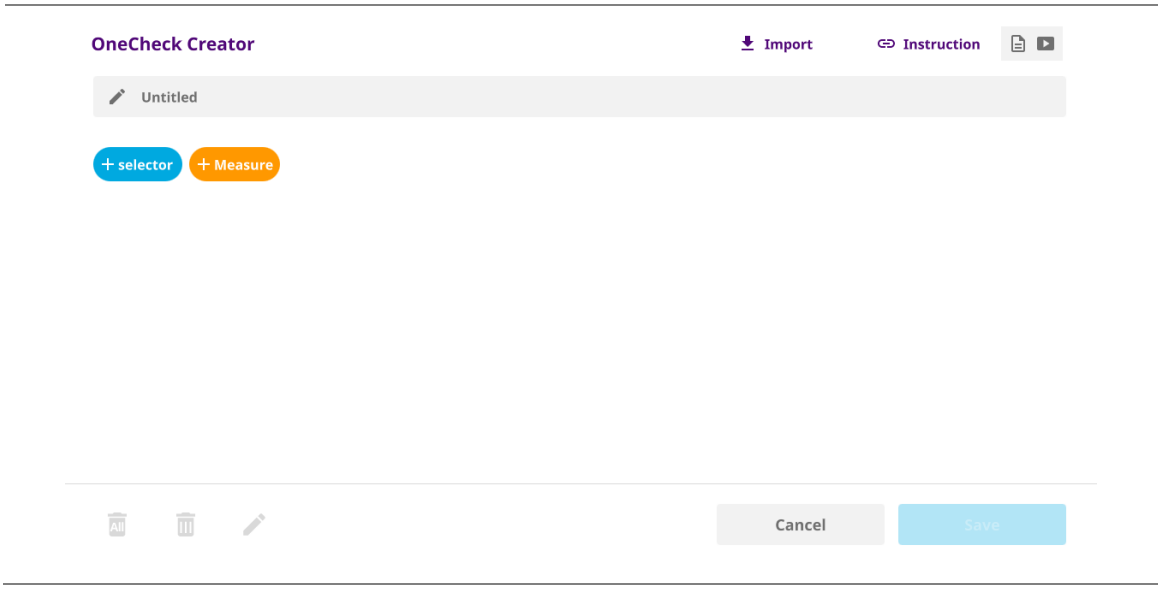
d Returning to the OneCheck Creator page, tap **Measure** to set the required parameters/items for the measurement.

- Tap **Setting**.
- Select the required **Mode and Measure**.
- Tap the **Next** button.
- Select the menus to be set.
- Tap the **Next** button.
- Input the required values in the User Setting Item Window.
- Tap the **Configuration** icon to edit the setting menus.
- Input the **Chart View** icon on the top right to go to the measurement screen.
- Once you have set all the required menus, tap the **Done** button.

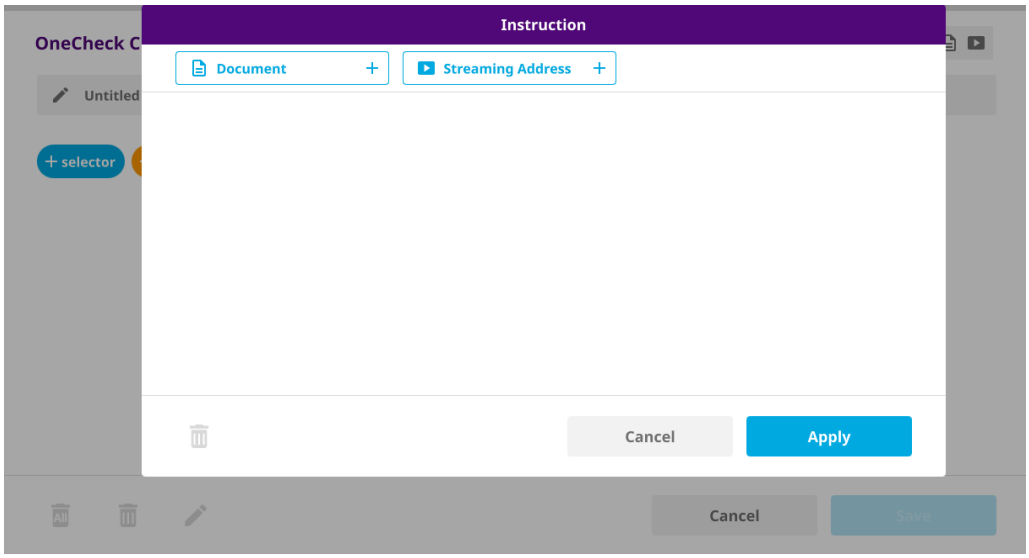
4 Returning to the OneCheck Creator page, tap the **Save** button to save the all changes. map.
The Export window will appear then you need to input the workflow file name and tap the **Export** button to export in the internal storage for the future usage.

	NOTE You can delete all OneCheck files created, selected OneCheck files, or edit Selector using the icons at the bottom left.

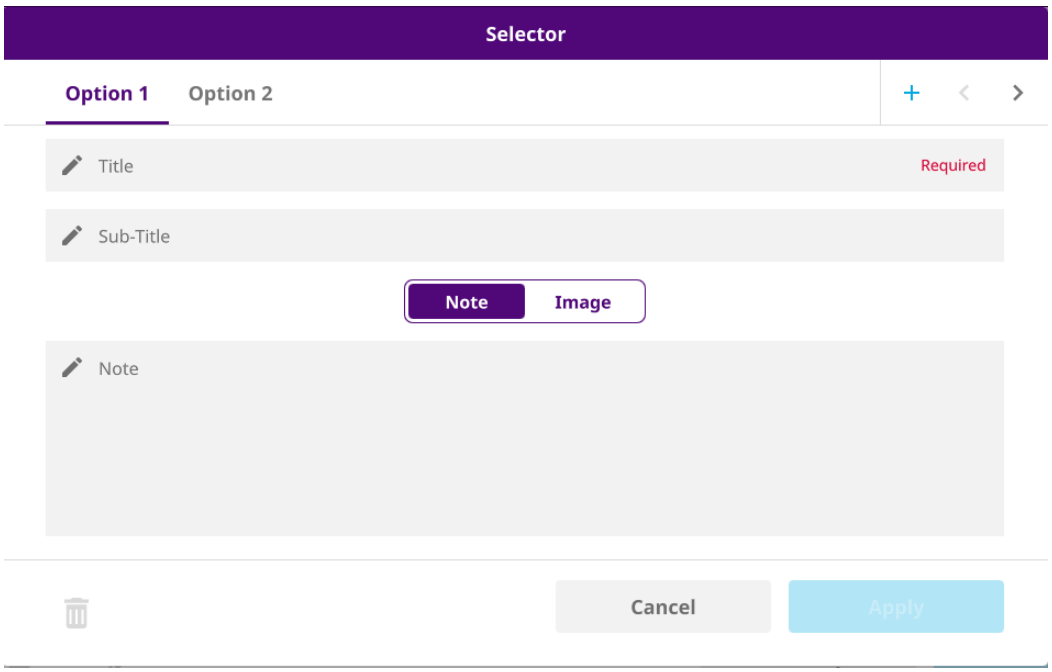
OneCheck creator page



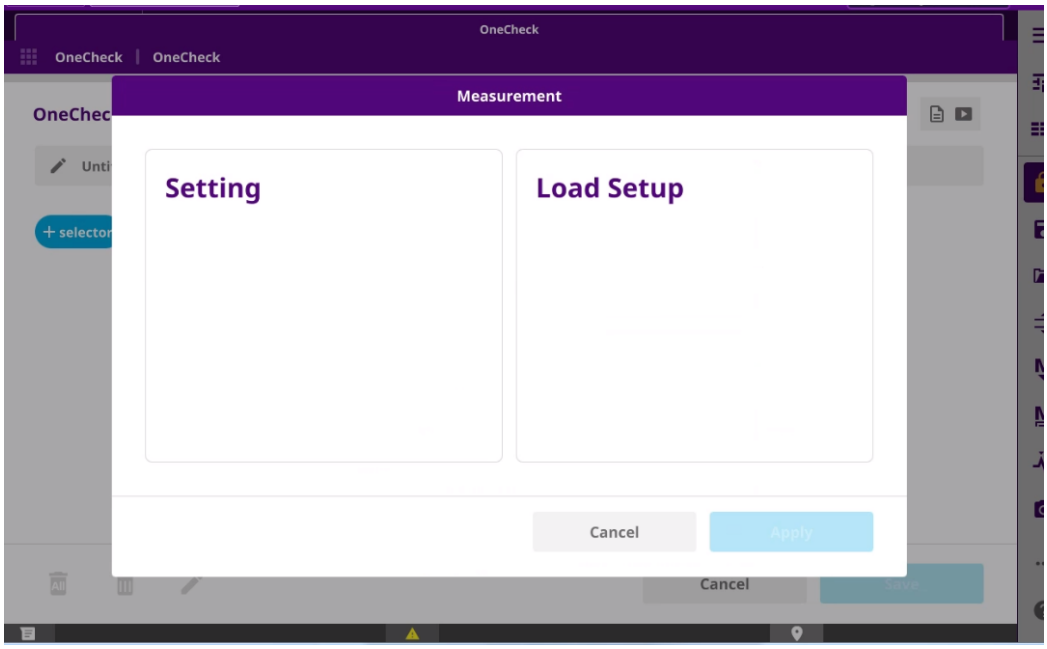
OneCheck Instruction window



Selector configuring window



Measurement configuring window



Loading OneCheck file

The following procedure describes how to create OneCheck scenario. If there is already created OneCheck file in the internal storage in the left pane, you can simply load the file and operate it.

Loading OneCheck file

1 Select the required OneCheck file (.wfa) in the left pane.

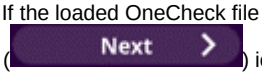
2 Tap the **Load** button at the bottom right.

3 It goes to the first scenario step that was pre-defined.

4 Tap the **Next** (

) button at the bottom right until it disappears.

5 If the loaded OneCheck file with a timer set, the measurement screen appears with the timer on top left and go to the next step automatically.
As soon as the timer ends, the current screen will be save automatically.

6 If the loaded OneCheck file without a timer set, you will need to go to the next step by tapping the Next (

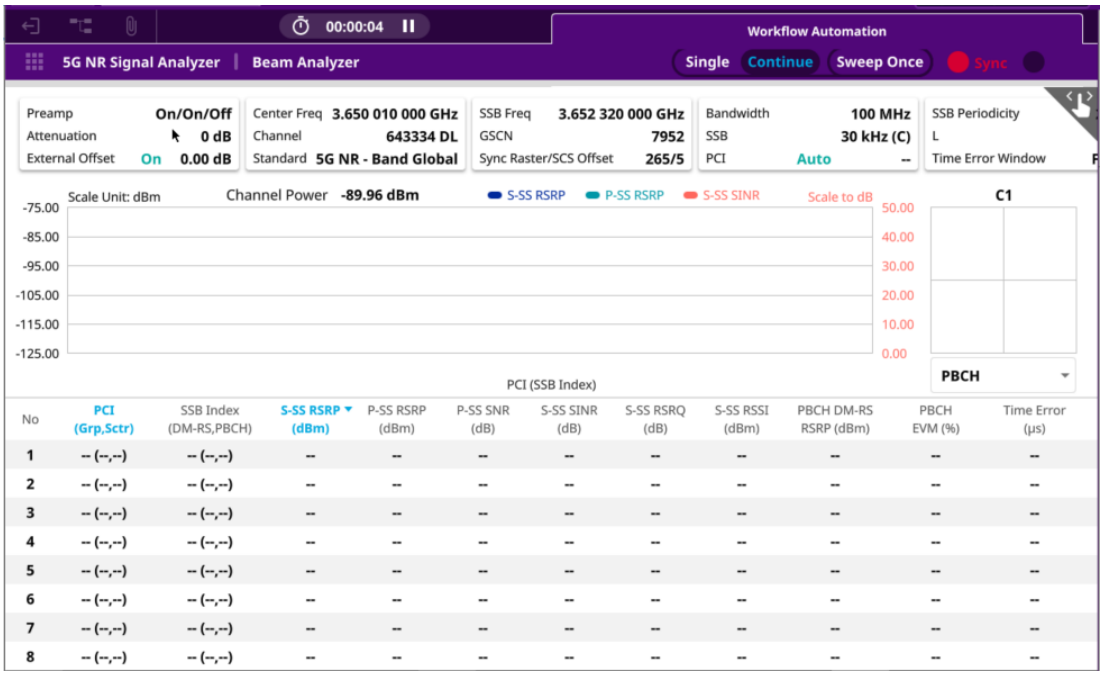
) icon on top of the current measurement screens.

7 Once you reach a final step in the OneCheck file loaded, a Report window appears.

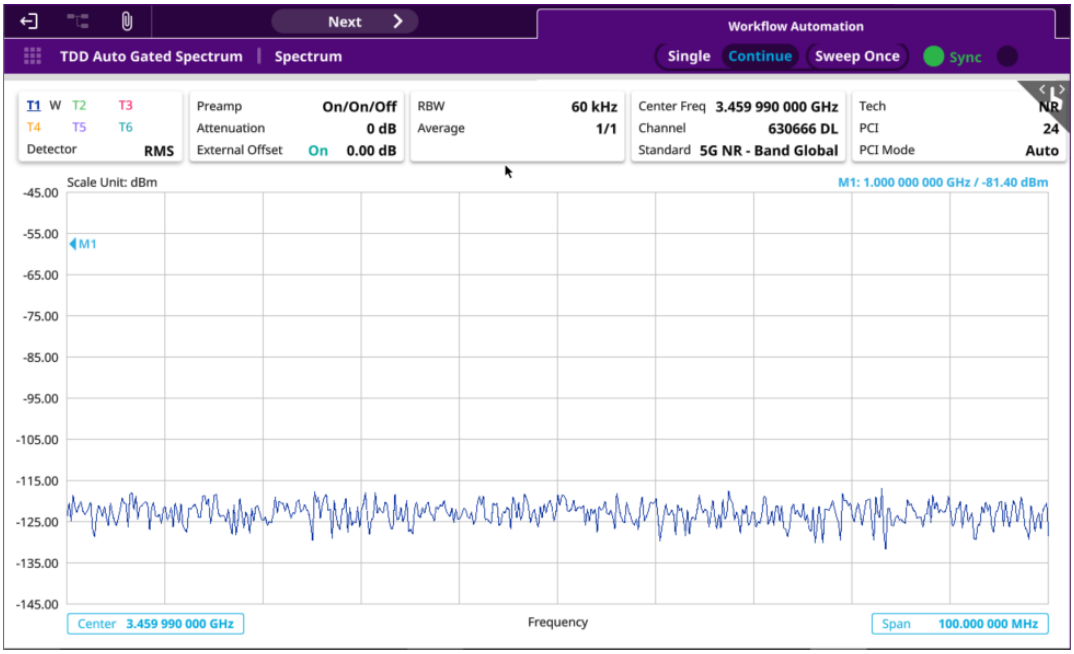
8 Input the **File Name** field using the on-screen keyboard.
You can input other fields as required.

9 Tap the **Create Report** button to create a pdf report file.

Measurement screen with timer



Measurement screen without timer



Using Spectrum Analyzer

Introduction

The advantage of using the Spectrum Analyzer is easy to verify the presence of unwanted signals such as spurious and harmonics, which are normally very hard to identify in time domain analysis.

Performance assurance in wireless communication systems includes the observation of the out-of-band signal characteristics in order to identify the presence of harmonic signals. Harmonic signals of a carrier may interfere with other signals far out of the transmission band, or harmonic signals from other transmitter may interfere with in band signals affecting the spectral integrity.

In these days when wide variety of wireless communication services are provided in frequency bands assigned very closely to each other, it is critical to ensure that each communication service is carried out within their assigned frequency band minimizing interference with adjacent frequency bands. The Adjacent Channel Power Ratio (ACPR) characteristic of a power amplifier or other RF components is an important factor in evaluating the system performance.

Spectrum analyzer in CellAdvisor 5G has three measure categories as the following with frequency extension up to 18.5 GHz in addition to existing 24 GHz to 40 GHz:

- RF Analysis
  - Sweep Tuned spectrum
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - Adjacent Channel Power (ACP)
  - Multi Adjacent Channel Power (Multi-ACP)
  - Spurious Emissions
  - Total Harmonic Distortion (THD)
  - Field Strength
  - AM/FM Audio Demodulation
  - Internal Power Meter
- Gated Sweep Analysis
  - Gate Sweep Spectrum (Optional)
- Route Map Analysis
  - Route Map (Optional)
- Online Route Map Analysis
  - Online Route Map (Optional)

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **Spectrum Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

RF Analysis > **Sweep Tuned Spectrum**, **Channel Power Occupied Bandwidth**, **Spectrum Emission Mask**, **Adjacent Channel Power**, **Multi- Adjacent Channel Power**, **Spurious Emissions**, **Total Harmonic Distortion**, **Field Strength**, **AM/FM Audio Demodulation**, **Internal Power Meter**

Gated Sweep Analysis > **Gate Sweep Spectrum**

Route Map Analysis > **Route Map**

Online Route Map Analysis > **Online Route Map**

	NOTE: You can choose **RF Source On** or **Off** in setup menu after tap to **CAA RF Power On** if you have **RF Source** option in your CAA(Cable and Antenna Analyzer).

Configuring spectrum measurements

Configuring spectrum measurements

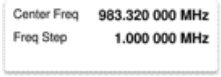
The Quick Access and Display tab contains all necessary functions to configure the horizontal axis, vertical axis and to configure and trigger the sweep for spectrum measurements. The Quick Access and Display tab also allows you to set traces, markers, and display lines and limit lines. The contents of the menu vary by the currently selected measurement.

In general, the horizontal axis contains frequency information in spectrum mode. You can specify the frequency in terms of the center frequency or by defining a start and stop frequency for a particular span. The settings related to the vertical axis can be access via Amp/Scale menu.

Setting frequency

You need to set the frequency range to be measured with either the center frequency/span or the start/stop frequencies. You can also set the frequency with the channel number and span. The center frequency, or start and stop frequency values appear below the graticule on the display.

If you are aware of the frequency of the signal you are going to measure, the best option is to match the center frequency to the signal's frequency. If you are investigating signals, for example harmonics distortion, that are within a particular frequency range, it is best to enter a start and stop frequency to define the span.

Access: 

on the Quick access and display tab or **Menu** > **Frequency**.

Frequency and span

The following is the definition of each key function:

Parameter	Definition
Center Frequency	Sets the horizontal center of the display to a specific frequency using the on-screen keyboard. The left and right sides of the graticule correspond to the start and stop frequencies using the on-screen keyboard..

	Access: **Menu** > **Frequency** > **Center Frequency**
Start Frequency	Sets the frequency starting at the left side of the graticule. **Access**: **Menu** > **Frequency** > **Start Frequency**
Stop Frequency	Sets the frequency starting at the right side of the graticule. The right sides of the graticule correspond to the stop frequency using the on-screen keyboard. **Access**: **Menu** > **Frequency** > **Stop Frequency**
Frequency Step	Sets the step size for the frequency setting. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the instrument using the on-screen keyboard. **Access**: **Menu** > **Frequency** > **Frequency Step**
Frequency Offset	Allows you to set a frequency offset value that is added to the frequency readout of the marker, to account for frequency conversions external to the instrument using the on-screen keyboard. Offset entries are added to all frequency readouts including marker, start frequency, and stop frequency. Offsets are not added to the span or frequency count readouts. Setting an offset does not affect the trace display. **Access**: **Menu** > **Frequency** > **Frequency Offset**
Span Frequency	Sets frequency range symmetrically about the center frequency using the on-screen keyboard. The span frequency readout describes the total displayed frequency range. To determine span frequency per horizontal graticule division, divide the frequency span by 10. **Access**: **Menu** > **Frequency** > **Span Frequency**
Full Span	Sets the span to full span showing the full frequency range of the instrument. For the F002 option (24 GHz to 40 GHz). you need to change the center frequency to the 24 GHz to 40 GHz frequency range. **Access**: **Menu** > **Frequency** > **Full Span**
Zero Span	Sets the frequency span to zero. In this mode, the current center frequency is displayed in the time domain. It is only available in the Spectrum mode. If you have selected **Zero Span**, select **Trigger** > **Free**, **External**, **GPS**, or **Video**. **Access**: **Menu** > **Frequency** > **Zero Span**
Last Span	Sets the span to the previous span setting. **Access**: **Menu** > **Frequency** > **Last Span**
Center Frequency List	Sets the Technology,Center Frequency, Channel Number, Bandwidth as required using the **Add (+)** button from the Center Frequency List table. *This menu may not be shown in specific measurement mode.* **Access**: **Menu** > **Frequency** > **Center Frequency List**

NOTE:

If you want to edit the added center frequency list, tap the one of the list items (highlighted in purple) then tap the **Configuration** icon at the bottom of the table. You can select the required parameters. This applies commonly to the following measurement mode:

- **Commonly supported:** Spectrum Analyzer, Real-time Spectrum Analyzer, 5G NR Signal Analyzer, LTE FDD/TDD Analyzer, and DSS Signal Analyzer
- **Multi-select supported**: Carrier Scanner in 5G NR Signal Analyzer, Carrier Aggregation, and OTA Channel Scanner in LTE FDD/TDD Analyzer, NSA Signal Analyzer, OTA Channel Scanner in DSS Signal Analyzer
- **Not supported**: Interference Analyzer, Channel Scanner, 5G TM Signal Analyzer, RFoCPR Interference Analyzer, 5G TM Signal Analyzer, and EMF Analyzer

	You can multi-select the center frequency list and apply them to your measurement only if there are more than 2 carriers to be set. For more details, you can find it in each measurement mode.

Setting channel

Almost all transmission systems divide their assigned frequency ranges into channels. Each channel corresponds to a specific frequency. To easily operate such systems, you can use channel standard table instead of setting frequencies manually. You can set the frequency with either frequency or channel number.

The channel standard table is already implemented in the CellAdvisor 5G, and it enables you to use it easily without doing anything.

Access:

on the Quick access and display tab or **Menu** > **Frequency**.

Channel number, channel step, and channel standard

The following is the definition of each key function:

Parameter	Definition
Channel Number	Sets the channel number using the on-screen keyboard. You can set the center frequency as channel number instead of setting frequency. In order to set the accurate frequency, you need to set channel standard and link first. **Access: Menu** > **Channel** > **Channel Number**
Channel Step	Sets the channel step using the on-screen keyboard. **Access**: **Menu** > **Channel** > **Channel Step**
Link	You can toggle between **Uplink** and **Downlink**. **Access**: **Menu** > **Channel** > **Link Uplink/Downlink**
Channel Standard	Shows you list of technology, Band Class, Channel Range, and Frequency Range (MHz). Tap to set the channel standard. **Access**: **Menu** > **Channel** > **Channel Standard**
Channel List	Sets the Technology,Center Frequency, Channel Number, Bandwidth as required using the **Add (+)** button from the Center Frequency List table. *This menu may not be shown in specific measurement mode.* **Access**: **Menu** > **Channel** > **Channel List**

	The menu Channel List functions the same as Center Frequency List. If you want to edit the added center frequency list, tap the one of the list items (highlighted in purple) then tap the **Configuration** icon at the bottom of the table. You can select the required parameters. This applies commonly to the following measurement mode: ▪ **Commonly supported:** Spectrum Analyzer, Real-time Spectrum Analyzer, LTE FDD/TDD Analyzer

Setting amplitude

You can set the reference and attenuation levels automatically or manually to optimize the display of the traces measured.

Access when operating CellAdvisor 5G V1:

on the quick access and display tab or **Menu** > **Amp/Scale**.

Amplitude

The following is the definition of each key function for CellAdvisor 5G V1:

Parameter	Definition
Reference Level	Sets the horizontal bar that can be placed at any graticule. Enter a value using the on-screen keyboard. **Access**: **Menu** > **Amp/Scale** > **Reference Level**
Attenuation	Tap to set the attenuation value using the on-screen keyboard. **Access**: **Menu** > **Amp/Scale** > **Attenuation**
Attenuation Auto/Couple/Manual	Tap to select the attenuation option from **Auto**, **Couple**, or **Manual**. **Auto** to set the input attenuator's level automatically. **Manual** to set the input attenuation manually up to 55 dB for the CellAdvisor 5G to optimize S/N. **Couple** to couple the input attenuator's level with your reference level setting. **Access**: **Menu** > **Amp/Scale** > **Attenuation/Manual** *Note that this menu is not available when you have set Auto Preamp, and the instrument sets it Manual automatically.*
Scale Division	Allows you to use the Scale/Div feature available for the total harmonic distortion screen. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB. Set the value using the on-screen keyboard. **Access**: **Menu** > **Amp/Scale** > **Scale Division**
Scale Unit	Tap to change the scale unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**. **Access**: **Menu** > **Amp/Scale** > **Scale Unit**
Preamp 1 On/Off	Allows you to turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector. It is the first Preamp for the CellAdvisor 5G FR1 Band and operated when the input level is -50 dBm or below. **Access**: **Menu** > **Amp/Scale** > **Premap 1** On/Off
Preamp 2 On/Off	Allows you to turn the external pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector. It is the second Preamp for the CellAdvisor 5G FR1 Band and operated when the input level is -70 dBm or below. **Access**: **Menu** > **Amp/Scale** > **Premap 2** On/Off
DNC Preamp On/Off	Allows you to turn the external DNC pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector. It is a Preamp for the CellAdvisor 5G FR2 Band and operated when the input level is -50 dBm or below. **Access**: **Menu** > **Amp/Scale** > **DNC Premap** On/Off
External Offset Mode On/Off	Tap to turn the external offset mode on or off. **Access**: **Menu** > **Amp/Scale** > **External Offset** On/Off
External Offset	Tap to manually set the external offset value from - 120 to 120 using the on- screen keyboard. When you compensate for the external loss, input the positive values, and when you compensate for the external gain, input the negative values. **Access**: **Menu** > **Amp/Scale** > **External Offset**

External LNA Mode On/Off	Tap to turn the external LNA (low-noise amplifier) mode to on or off. When on, it will compensate the low level signal. If it is on and the center frequency is between 26 GHz and 30 GHz, the external offset is automatically changed to -15 dB, and the center frequency is between 37 GHz and 40 GHz, the external offset is automatically changed to -20 dB. **Access**: **Menu** > **External LNA Mode** > On/Off
Auto Scale	Tap to automatically set the reference and attenuation level. Each time you tap this, both of the Y-axis scale and input attenuation level change to be optimized with some margin. **Access**: **Menu** > **Amp/Scale** > **Auto Scale**

	NOTE: It is recommended that you set the **Attenuation** to **Auto** in most situations so that the level of the input attenuator can be set automatically according to your input signal level.

Access when operating CellAdvisor 5G V1.5 and V2.0:

on the quick access and display tab or **Menu** > **Amp/Scale.**

The following is the definition of each key function for CellAdvisor 5G V1.5 and V2.0:

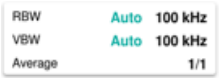
Parameter	Definition
Reference Level	Sets the horizontal bar that can be placed at any graticule. Enter a value using the on-screen keyboard. **Access**: **Menu** > **Amp/Scale** > **Reference Level**
Attenuation	Tap to set the attenuation value using the on-screen keyboard. The recommended input range is as below: 9 kHz to 18.5 GHz: 0 to 55 dB 18.5 to 28.5 GHz: 0 to 50 dB **Access**: **Menu** > **Amp/Scale** > **Attenuation**
Attenuation Auto/Couple/Manual	Tap to select the attenuation option from **Auto**, **Couple**, or **Manual**. **Auto** to set the input attenuator's level automatically. **Manual** to set the input attenuation manually up to 55 dB for the CellAdvisor 5G to optimize S/N. **Couple** to couple the input attenuator's level with your reference level setting. **Access**: **Menu** > **Amp/Scale** > **Attenuation/Manual** *Note that this menu is not available when you have set Auto Preamp, and the instrument sets it Manual automatically.*
Scale Division	Allows you to use the Scale/Div feature available for the total harmonic distortion screen. It represents the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB. Set the value using the on-screen keyboard. **Access**: **Menu** > **Amp/Scale** > **Scale Division**
Scale Unit	Tap to change the scale unit of the display scale: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**. **Access**: **Menu** > **Amp/Scale** > **Scale Unit**

Preamp 1 On/Off	Allows you to turn the internal pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector. It is the first Preamp to measure the low input level. The recommended input level is as below: 9 kHz to 18.5 GHz: ≤ -45 dBm 18.5 to 28.5 GHz: ≤ -75 dBm 28.5 to 44 GHz: ≤ -65 dBm **Access**: **Menu** > **Amp/Scale** > **Premap 1** On/Off *Note that Preamp 1 setting is not available when you have set Auto Preamp or On and Linearity to High.*
Preamp 2 On/Off	Allows you to turn the external pre-amplifier on to correct and compensate for the gain of the preamp so that amplitude readings show the value at the input connector. It is the second Preamp to measure the low input level. The recommended input level is as below: 9 kHz to 18.5 GHz: ≤ -35 dBm 18.5 to 28.5 GHz: ≤ -45 dBm 28.5 to 44 GHz: ≤ -25 dBm **Access**: **Menu** > **Amp/Scale** > **Premap 2** On/Off *Note that Preamp 2 setting is not available when you have set Auto Preamp or On and Linearity to High.*
Linearity High/Normal	Allows you to switch Linearity to High to measure high input signal without attenuation. It is mainly recommended to measure TOI and 2nd harmonic distortion performance. The recommended input level is as below: 9 kHz to 18.5 GHz: ≤ -20 dBm 18.5 to 44 GHz: ≤ -25 dBm Note that the attenuation range to be set for 9 kHz to 18.5 GHz is 0 to 55 dB and for 18.5 to 44 GHz is 0 to 50 dB, and Preamp setting is not available. Allows you to switch Linearity to Normal to measure spectrum analysis with no noise floor. The recommended input level is as below: 9 kHz to 18.5 GHz: ≤ -30 dBm 18.5 to 44 GHz: ≤ -35 dBm Note that the attenuation range to be set for 9 kHz to 18.5 GHz is 0 to 55 dB and for 18.5 to 44 GHz is 0 to 50 dB, and Preamp setting is available. **Access**: **Menu** > **Amp/Scale** > **Linearity** High/Normal *Note that Linearity High/Normal setting is not available in OTA Analysis of the instrument. If you set Linearity to High, the instrument automatically applies this setting in the case of mode change.*
Auto Preamp On/Off	Tap to turn the **Auto Preamp** to on or off. **Access**: **Menu** > **Amp/Scale** > **Auto Preamp** On/Off *Note that Auto Preamp is used when measuring Spectrum Analyzer, Interference Analyzer (except PIM detection), Real-time Spectrum Analyzer, LTE/LTE-A FDD/TDD Analyzer (OTA Analysis), and DSS Signal Analyzer (OTA Analysis).*
External Offset Mode On/Off	Tap to turn the external offset mode on or off. **Access**: **Menu** > **Amp/Scale** > **External Offset** On/Off
External Offset	Tap to manually set the external offset value from - 120 to 120 using the on- screen keyboard. When you compensate for the external loss, input the positive values, and when you compensate for the external gain, input the negative values. **Access**: **Menu** > **Amp/Scale** > **External Offset**
External LNA Mode On/Off	Tap to turn the external LNA (low-noise amplifier) mode to on or off. When on, it will compensate the low level signal. If it is on and the center frequency is between 26 GHz and 30 GHz, the external offset is automatically changed to -15 dB, and the center frequency is between 37 GHz and 40 GHz, the external offset is automatically changed to -20 dB. **Access**: **Menu** > **External LNA Mode** > On/Off
Auto Scale	Tap to automatically set the reference and attenuation level. Each time you tap this, both of the Y-axis scale and input attenuation level change to be optimized with some margin. **Access**: **Menu** > **Amp/Scale** > **Auto Scale**

	NOTE: When you turn both Preamp 1 and Preamp 2 on, you can measure the low input signal. It is recommended to use to measure DANL and Sensitivity more correctly. See the recommended input level as below: 9 kHz to 18.5 GHz: ≤ -70 dBm 18.5 to 28.5 GHz: ≤ -90 dBm 28.5 to 44 GHz: ≤ -80 dBm

Setting BW/AVG

You can manually set the Resolution Bandwidth (RBW), Video Bandwidth (VBW), and the proportional VBW based on the designated RBW. Selecting **Auto** changes the value to correspond to your frequency span setting for RBW and to the current RBW and VBW/RBW settings for VBW.

Access: 

on the Quick access and display tab or **Menu** > **BW/AVG**

BW/AVG

The following is the definition of each key function:

Parameter	Definition
RBW	Tap **RBW** to set it manually. Tap a value between 1 Hz to 3 MHz. The RBW setting automatically changes to **Manual**. **Access**: **Menu** > **BW/AVG** > **RBW**
RBW Mode Manual/Auto	Toggle the **RBW Mode** to **Manual** or **Auto**. When you select Auto, it will be automatically set to an approximate value for Span/100. **Access**: **Menu** > **BW/AVG** > **RBW** (Manual/Auto)
VBW	Tap **VBW** to set it manually. Tap a value between 1 Hz to 3 MHz. The VBW setting automatically changes to **Manual**. **Access**: **Menu** > **BW/AVG** > **VBW**
VBW Mode Manual/Auto	Toggle the **RBW Mode** to Manual or Auto. **Access**: **Menu** > **BW/AVG** > **VBW** (Manual/Auto)
VBW/RBW	Sets the proportional VBW based on the designated RBW. Select the ratio: 1, 0.3, 0.1, 0.03, 0.01, or 0.003. Toggle the **VBW** and **RBW** to **Auto**. **Access**: **Menu** > **BW/AVG** > **VBW/RBW**
Average	Sets the number of measurements to be averaged for the trace presentation. A maximum of 100 times of averaging can be set. **Access**: **Menu** > **BW/AVG** > **Average**

VBW/RBW ratio example

RBW	Ratio (VBW/RBW)	VBW
30 kHz	1:1	30 kHz
	1:0.3	10 kHz

	1:0.1	3 kHz
	1:0.03	1 kHz
	1:0.01	300 Hz
	1:0.003	100 Hz

Setting sweep

You can set the length of time that the instrument takes to tune across the displayed frequency span (or, in zero span, the time that the instrument takes to sweep the full screen). Reducing the sweep time increases the sweep rate. The default settings of the sweep mode are **Continue** and **Normal** to sweep continuously at a normal speed for most on-going measurements. If you want to hold the measurement or get a single sweep, you can change the sweep mode.

Access:

on the Quick access and display tab or **Menu** > **Sweep**.

Sweep

The following is the definition of each key function:

Parameter	Definition
Sweep Time	Shows the sweep time when the sweep time is set to **Auto**. If the sweep time is set to **Manual**, you can manually input the sweep time using the on-screen keyboard. **Menu** > **Sweep** > **Sweep Time**
Sweep Time Mode Manual/Auto	Select the sweep time mode to **Manual** to set it manually or to **Auto** to set it automatically. **Menu** > **Sweep** > **Sweep Time** Manual/Auto
Sweep Mode Single/Continue	Tap to switch the sweep mode to **Single** or **Continue**. **Menu** > **Sweep** > **Sweep Mode** Single/Continue
Sweep Once	Tap to get a new measurement in Single mode. If Continue is set in sweep mode, the sweep mode will be changed to Single after tapping it. **Menu** > **Sweep** > **Sweep Once**
Sweep Speed Fast/Normal	Tap the sweep speed to **Fast** to speed up sweeping. You can set it to Fast when the RBW range is from 1 Hz to 30 kHz. You can set it to Normal when the RBW range is from 1 kHz to 3 MHz. **Menu** > **Sweep** > **Sweep Mode** Fast/Normal
Zero Span Time	Enabled when you select **Zero Span**. Adjusts sweep time to allow enough time for a cycle. **Menu** > **Sweep** > **Zero Span Time**
Period Time	Enabled when you select **Zero Span**. Tap to set **Period Time** using the on-screen keyboard. **Menu** > **Sweep** > **Period Time**
Period Type Manual/Standard	Enabled when you select **Zero Span**. Tap to switch **Period Type** to **Manual** or **Standard**. **Menu** > **Sweep** > **Period Type** Manual/Standard

Standard Signal	Enabled when you select **Zero Span**. Tap to select Standard Signal from: **GSM**, **WCDMA**, **LTE**, **EV-DO**, **TD-SCDMA**, or **WiMAX**. **Menu** > **Sweep** > **Standard Signal**

Setting trigger/frequency reference

Trigger

If you have to perform measurements according to certain signal conditions, you can use a trigger. A trigger responds to certain events. When using a trigger source other than Free, the CellAdvisor 5G starts to sweep only with the selected trigger conditions are met. The trigger can be generated either externally or internally.

Access:

on the Quick access and display tab or **Menu** > **Trigger/Freq. Ref**.

The following is the definition of each key function:

Parameter/Definition
Trigger ▪ **Trigger - Free** Select **Free** to start a new sweep right after the current sweep ends. This is the default state of the CellAdvisor 5G. **Menu** > **Trigger/ Trigger/Freq Ref** > **Trigger** > **Free** ▪ **Trigger - Internal** Select **Internal** to start a sweep using the internal reference clock and creating a trigger. **Menu** > **Trigger/ Trigger/Freq Ref** > **Trigger** > **Internal** ▪ **Trigger - External** Select **External** to start a sweep based on the external input trigger. **Menu** > **Trigger/ Trigger/Freq Ref** > **Trigger** > **External** ▪ **Trigger - GPS** If you use a GPS receiver while performing measurements on a base station, you can synchronize the sweep via the GPS receiver. **Menu** > **Trigger/ Trigger/Freq Ref** > **Trigger** > **GPS** ▪ **Trigger - Video** A sweep starts when the video voltage exceeds a particular level. The video trigger is available only in the time domain (when it is Zero Span = 0). **Menu** > **Trigger/ Trigger/Freq Ref > Trigger** > **Video**

Setting trace

The CellAdvisor 5G provides display of up to 6 traces. Each trace consists of a series of points where amplitude data is stored. The CellAdvisor 5G updates the information for any active trace with each sweep.

Access:

on the Quick access and display tab or **Menu** > **Trace**.

Trace

The following is the definition of each key function:

Parameter	Definition
Select Trace	Tap to select trace from the following options: **Trace 1**, **Trace 2**, **Trace 3**, **Trace 4**, **Trace 5**, or **Trace 6**. **Access**: **Menu** > **Trace** > **Select Trace**
Trace View On/Off	Select the **Trace View** to **On** of **Off**. Once you select On, you can see the selected trace with its dedicated color on the chart, or select Off, the Trace Legend, F is indicated on the Quick access and display tab for Trace. **Access**: **Menu** > **Trace** > **Trace View** On/Off
Trace Type	Tap to select the **Trace Type** from the following options: **Clear Write**, **Capture**, **Max**. **Min**, or **Load**. For details, refer to "Trace type" below. **Access**: **Menu** > **Trace** > **Trace Type**
Trace Hold Time	Tap to set the **Trace Hold Time** using the on-screen keyboard. **Access**: **Menu** > **Trace** > **Trace Hold Time**
Select Trace Info	Tap to select the trace information from the following options: **None**, **Trace 1**, **Trace 2**, **Trace 3**, **Trace 4**, **Trace 5**, or **Trace 6**. Based on your choice, the selected trace's parameter setting information stored at the time of the measurement is displayed on the left top of the screen. You can select **None** to hide the information display. **Access**: **Menu** > **Trace** > **Select Trace Info**
Detectors	Tap to select the detection mode from the following options: **Normal**, **Peak**, **RMS**, **Negative Peak**, or **Sample**. For details, refer to "Trace detection" below. **Access**: **Menu** > **Trace** > **Detectors**
Trace Clear All	Tap to remove all the traces and initialize the trace settings. **Access**: **Menu** > **Trace** > **Detectors** > **Trace Clear All**
T1 - T2 -> T5	If Trace 1 and Trace 2 are active, this menu is activated.
T2 - T1 -> T6	If Trace 1 and Trace 2 are active, this menu is activated.
Threshold RMS	Tap to switch **Threshold RMS** to **On** or **Off**. Note that this is only available in SA. **Access: Menu > Trace > Threshold RMS**
Threshold Auto	Tap to switch **Threshold Auto** to **On** or **Off**. Note that this does not affect the value for Threshold RMS level. Note that this is only available in SA. **Access: Menu > Trace > Threshold Auto**
Threshold RMS level	Tap to set Threshold RMS level only if Threshold RMS/Threshold Auto are disabled.
Set Write/Min/Max	Tap to set Trace 1 to Clear Write, Trace 2 to min, and Trace 3 to Max automatically in SA, IA and RFoCPRI Interference Analyzer. Note that Trace 1 for Spectrogram measurement in IA and RFoCPRI Interferency Analyzer is only available and automatically set to Clear Write.

NOTE:

Threshold RMS feature is to measure Channel Power for TDD signal more accuarately and it creates a trace that averages trace points over a specfic level.

Trace Type

- **Clear Write**: Clears current data and display with new measurements, and once selected, the Trace Legend, W is indicated on the Quick access and display tab for Trace.
- **Capture**: Captures the selected trace and compare traces, and once selected, the Trace Legend, C is indicated on the Quick access and display tab for Trace.
- **Max Hold**: Displays the input signal's maximum response only (unlimited or for a certain amount of time), and once selected, the Trace Legend, M is indicated on the Quick access and display tab for Trace.
- **Min Hold**: Display the input signal's minimum response only (unlimited or for a certain amount of time), and once selected, the Trace Legend, m is indicated on the Quick access and display tab for Trace.
- **Load**: Loads a saved trace, and once selected, the Trace Legend, L is indicated on the Quick access and display tab for Trace.

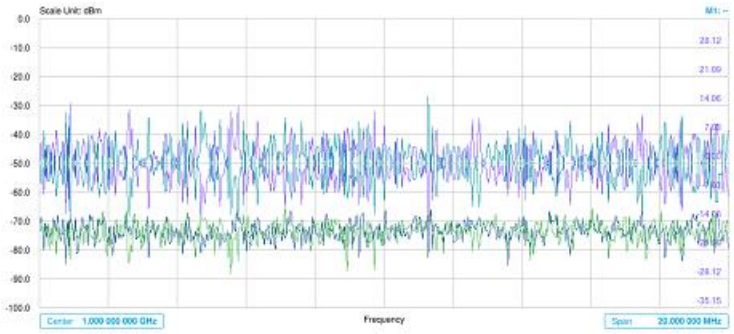
	NOTE: For the Max Hold and Min Hold, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen.

Trace detection

- **Normal**: Displays random noise better than the peak without missing signals.
- **Peak**: Displays the highest value in each data point.
- **RMS**: Displays root mean squared average power across the spectrum.
- **Negative Peak**: Displays lowest value in each data point.
- **Sample**: Displays the center value in each data point.

Trace math

The trace math shows the difference of Trace 1 and Trace 2 measurement results. If Trace 1 and Trace 2 are active, the menu, **T1 – T2 -> T5** or **T2 – T1 -> T6** become available and you can perform trace math. When performing the trace math, the scale is automatically set and the display of scale for the trace math is on the right side of the screen as below.



Setting limit

A limit value can be set to alert you that the measured value exceeds the value that is specified. If the span is selected as Zero Span, the line is not displayed.

Access:

on the Quick access and display tab or **Menu** > **Limit**.

Limit

The following is the definition of each key function:

Parameter	Definition
Display Line	Tap to set values for the reference line using the on-screen keyboard. **Access**: **Menu** > **Limit** > **Display Line**
Display Line Mode On/Off	Tap to set the **Display Line Mode** to **On** or **Off** to display or dismiss the reference line. The inactive vertical move bar on the left edge with straight line appears across the screen to be used as a visual reference only. To adjust the display line, tap and drag the move bar up or down, then the vertical move bar becomes purple and activated. If there is no touch operation for 2 seconds, the move bar becomes inactive again. This display line does not indicate Pass/Fail. **Access**: **Menu** > **Limit** > **Display Line Mode** On/Off
Multi Segment Line	Tap **Multi Segment Line** for Pass/Fail indication. **Access**: **Menu** > **Limit** > **Multi Segment Line**

Multi segment line

1. Tap **Menu** > **Limit**.
2. Tap **Multi Segment Line**.
3. Tap to switch the select side to **Upper** or **Lower**.
4. Tap the **# of Line** to set the number of segments for the selected side for upper of lower up to 50 segments using the on-screen keyboard.
5. Tap **Autoset** soft key to automatically set the limit for each segment and display the line.
6. Tap **Offset Up/Down** or **Offset Left/Right** to move the limit line using the on-screen keyboard.

The following table shows the parameters displayed for the multi-segment line.

Parameter	Definition
Autoset	Tap to autoset the limit for each segment and display line. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Autoset**
Select Side	Tap to set the **Select Side** to **Lower** or **Upper** to select the one to be displayed. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Select Side Lower/Upper**
Limit	Tap to select the Limit to **On** of **Off**. Once the **Autoset** is selected, the Limit changes to On. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Limit On/Off**
# of Line	Tap to set the **# of Line** up to 50 segments for the selected upper or lower limit line using the on-screen keyboard. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **# of Line**
Offset Up/Down (dB)	Tap to set the **Offset Up/Down** to move the limit line up or down when the Display Line Mode is set to on using the on-screen keyboard. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Offset Up/Down**
Offset Left/Right	Tap to set the **Offset Left/Right** to move the limit line left or right when the Display Line Mode is set to on using the on-screen keyboard. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Offset Left/Right**
Edit Limit Table	Tap to edit the Limit Table. The limit table appears on the bottom of the chart screen. **Access**: **Menu** > **Limit** > **Multi Segment Line** > **Edit Limit Table**

Editing limit table

1. Tap to switch the select side to **Upper** or **Lower**.
2. Tap **Select Display Plot** to select the segment that you want to edit.
3. Tap the switch to switch the selected segment line to **On** or **Off**.
   To remove the selected segment line, select **Off**.

4 Tap **Add Point** to add a new segment line.

5 Tap **Delete Point** to delete the selected point.

6 Tap **Frequency** or **Amplitude** to change the position and input the value using the on-screen keyboard.

NOTE:
If the Upper and Lower are set to Off in the Select Side menu, the Edit Limit Table mode is not available.

Using marker

Marker is used to get the information about a specific trace. Six markers can be set on the display and each marker can be used independently. The X and Y coordinates of the trace are displayed when the marker is placed on any position of the trace. The position displaying the marker's X and Y coordinates may be slightly different for each measurement mode and refer to the description of each measurement. There are three different marker types available: Normal, Delta, and Delta pair. Marker position can be set manually by entering numeric values (frequency) or using the purple move bar when one of the marker types is selected.

Access:

on the Quick access and display tab, go to **Menu** > **Marker**, or tap the hot key icon ( ).

Marker

The following is the definition of each key function:

Parameter	Definition
Frequency Count On/Off	This Frequency Count is used when a highly accurate reading of the frequency is needed for the active marker on the signal. The measurement sweeps get significantly slower because the instrument runs the measurement of the signal peak with 1 Hz resolution in background. Select to switch the **Frequency Count** between **On** and **Off** to enable or disable the frequency count function for the selected marker. **Access**: **Menu** > **Marker** > **Frequency Count** On/Off
Noise Marker On/Off	This Noise Marker is used to measure a noise adjacent to a signal by averagin several data points to calculate the readout for the Noise Marker as if making a measurement using a 1 Hz bandwidth. Select to switch the **Noise Marker** between **On** and **Off** to enable or disable the noise marker function for the selected active marker. **Access**: **Menu** > **Marker** > **Noise Marker** On/Off

NOTE:
Frequency Count and Noise Marker functions are used only in the Spectrum Analyzer mode.

Using marker table

- **Select Marker**: Selects an active marker whose position can be changed by tapping and switching marker from M1 to M6 (each marker has a different color). The assigned number of the active marker is displayed in the Marker Table box and the active marker number is also displayed right next to the active marker on the trace.

  When tapping the Active Marker Off ( ) icon, the selected marker disappears.

- **Normal**: This Normal marker type provides the reading of a marker position on the trace along with the marker number between one and six.
- **Delta**: This Delta marker type is associated with a Normal marker. A Normal marker must be set before a Delta marker is set. When the Delta marker is set, the position set by the Delta marker becomes the reference position of the Normal marker and the marker's X and Y values displays the difference compared with the Delta marker.
- **Delta Pair**: This Delta Pair marker type is associated with a Normal marker. A Normal marker must be set before a Delta Pair marker is set. When the Delta Pair marker is set, the position set by the Delta Pair marker becomes the reference position of the Normal marker and the marker's X and Y values displays the difference compared with the Delta Pair marker. The reference position will be varied in accordance with trace change.
- **Marker All Off (** **)**: Turns all the markers the screen off. When the Marker View is selected for those markers, the instrument displays those markers back at the previous position. If a measurement mode is changed, current settings are not restored.
- **Start**: Sets the frequency of the active marker to the start frequency of spectrum analyzer.
- **Center**: Sets the frequency of the active marker to the center frequency of spectrum analyzer.
- **Stop**: Sets the frequency of the active marker to the stop frequency of spectrum analyzer.
- **Peak Search**: Moves the active marker to the highest peak of the trace. You can also tap the hot key icon ( ) to use this function.
- **Min Search**: Moves the active marker to the lowest peak of the trace.
- **Next Peak**: Moves the active marker to the second highest peak of the trace.
- **Left Peak**: Moves the active marker to the highest peak to the left of its current position.
- **Right Peak**: Moves the active marker to the highest peak to the right of its current position.
- **Always Peak**: When the Always Peak is set to On, the instrument moves the active marker automatically to the highest peak of the trace every time the trace is refreshed.

Moving a marker to a selected trace

If you have selected marker using the marker table, you can move the marker position to the other trace by following the procedure.

1 Tap **Menu** > **Trace**.

2 Tap **Select Trace** and select the trace from **Trace 1** to **Trace 6.**.

3 Tap **Trace View** to **On**.
The selected marker moves to the selected trace.

NOTE:
If the marker is beyond the frequency range, the purple horizontal move bar appears on the right and left edge of the chart screen. You can move the marker by moving the bar right and left.

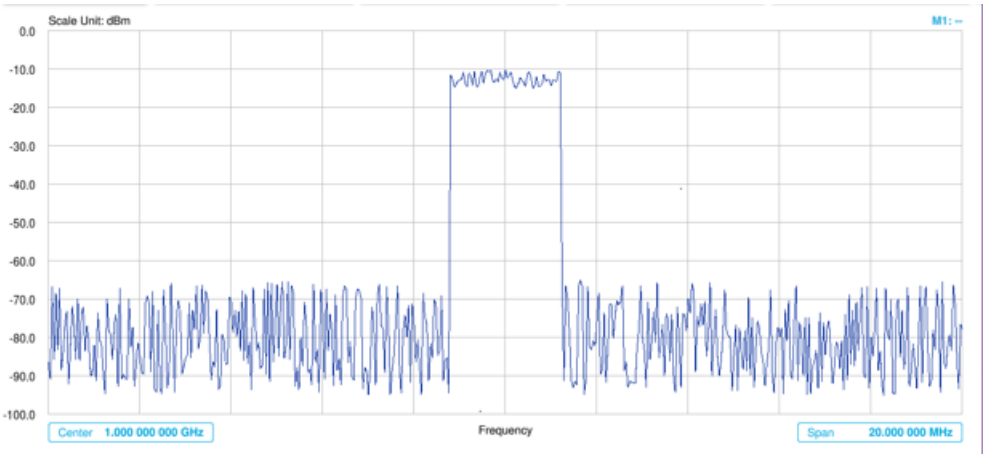
Conducting RF measurements

Sweep tuned spectrum

If you have configured test parameters as described in the "Configuring Spectrum Measurements", your measurement is displayed on the screen as like the following example. You can simply change Center Frequency and Span by tapping the icons right below the result chart screen.

Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

Sweep tuned spectrum measurement with spectrum analyzer



NOTE:
If the Sweep Mode is set to Normal and RBW is 300 Hz or below, the Sweep Type changes to FFT. If the Sweep Mode is set to Fast and RBW is 30 kHz or below, the Sweep Type changes to FFT.

Channel power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

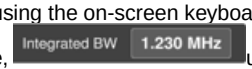
The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Integrated BW** and input the value using the on-screen keyboard.

You can also tap the rectangle with value, 

under the chart screen and input the value using the on-screen keyboard.

3 Tap

to set the frequency range over which the instrument will sweep using the on-screen keyboard.

4 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

5 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

NOTE:
Make sure the Detector is selected to RMS when you perform the channel power measurement.

Setting limit

1 Tap **Menu** > **Limit**.

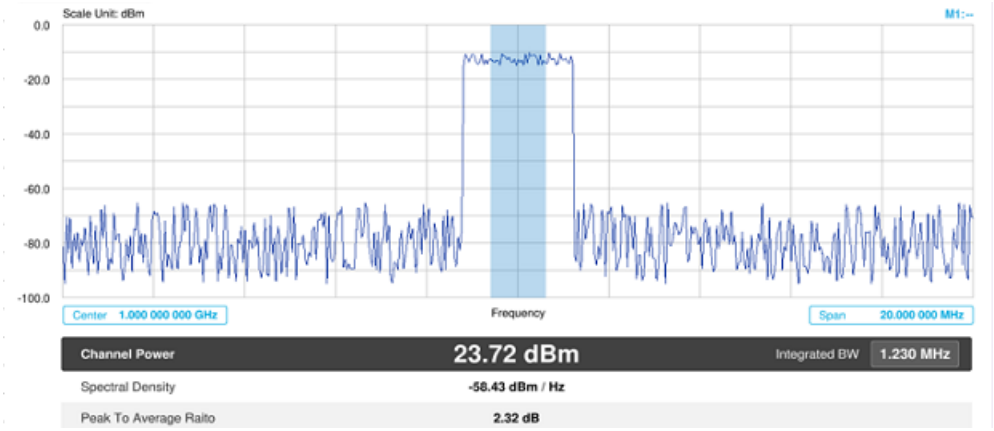
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the Save hot key on the side bar and select the save option form the choices available for your measurement mode.

Channel power measurement with spectrum analyzer



Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

NOTE:
If the Trace View is set to Off, the Channel Power, Spectral Density, and Peak to Average Ratio is not shown. If the Trace View is set to On and the Trace Type is selected other than Clear Write, the Channel Power, Spectral Density, and Peak to Average Ratio is shown with value and "*" at the end of the value.

Occupied bandwidth

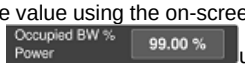
The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Occupied BW % Power** and input the value using the on-screen keyboard.

You can also tap the rectangle with value, 

under the chart screen and input the value using the on-screen keyboard.

3 Tap **x dB** to input a value using the on-screen keyboard.
The input value range is from -50 to 0 dB.

4 Tap

to set the frequency range over which the instrument will sweep using the on-screen keyboard.

5 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

Setting Limit

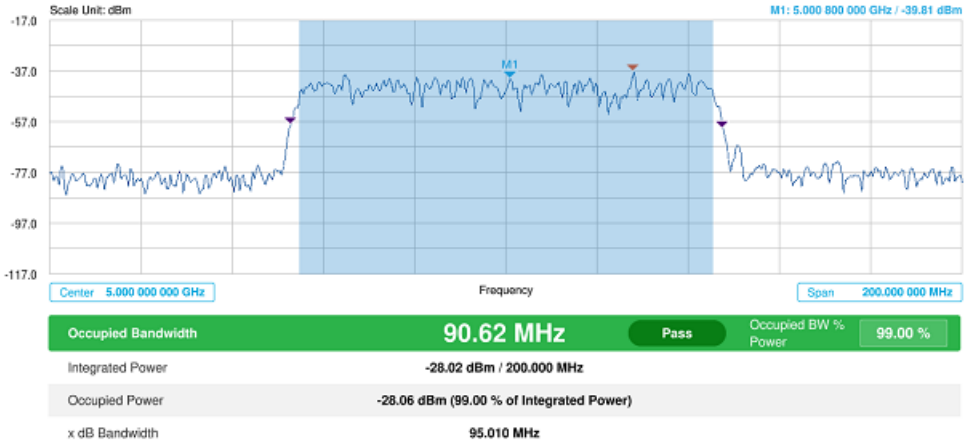
1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Occupied bandwidth with spectrum analyzer



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

NOTE:
If the Trace View is set to Off, the Occupied Bandwidth, Integrated Power, Occupied Power, and x dB bandwidth is not shown. If the Trace View is set to On and the Trace Type is selected other than Clear Write, the Occupied Bandwidth, Integrated Power, Occupied Power, and x dB bandwidth is shown with value and "*" at the end of the value.

Spectrum emission mask (SEM)

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Configuration** to configure an offset, up to five. The below table appears.

You can also tap the Configuration ( ) under the chart screen.

a Select **Offset** from 1 to 5 and switch each to **On** to display or **Off** to hide the active offset.

b Select **Offset Frequency** to set the start frequency of SEM using the on-screen keyboard.

c Select **Measurement Bandwidth** to set the bandwidth for the selected offset using the on-screen keyboard.

d Switch the **Reference** to **Relative** or **Absolute** depending on how to use the reference.

e Select **Start Limit** to set the start point of the mask.

f Select **Stop Limit** to set the stop point of the mask.

3 Tap **Main Channel BW** to set the main channel bandwidth and input the value using the on-screen keyboard.

You can also tap the rectangle with value, Main Channel BW 1.000 kHz under the chart screen and input the value using the on-screen keyboard.

4 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

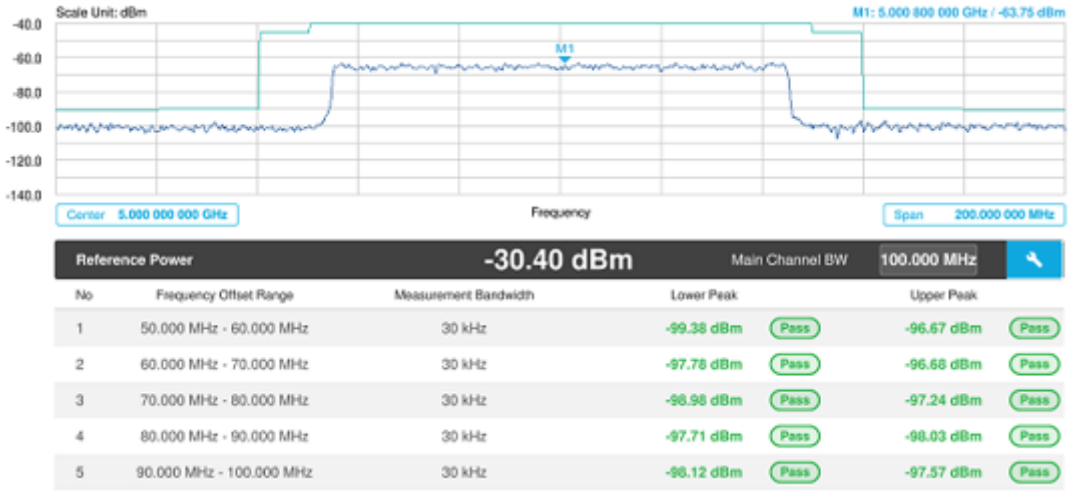
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Spectrum emission mask measurement with spectrum analyzer



If Lower Peak or Upper Peak indicates Fail, the mask line becomes red.

NOTE:

If the Trace View is set to Off, the Reference Power, Lower Peak, and Upper Peak is not shown. If the Trace View is set to On and the Trace Type is selected other than Clear Write, the Reference Power, Lower Peak, and Upper Peak is shown with value and "*" at the end of the value.

Adjacent channel power (ACP)

The Adjacent Channel Power (ACP) is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

The ACP measures the power of a carrier channel and the power in its adjacent (offset) channels. The measurement results allows you to determine whether the carrier power is set correctly and whether the transmitter filter is working properly. You can measure the channel power in from one to five adjacent (offset) channels on the lower frequency and upper frequency side of the carrier channel. Limits can be used to quickly see if too much power is measured in the adjacent channels.

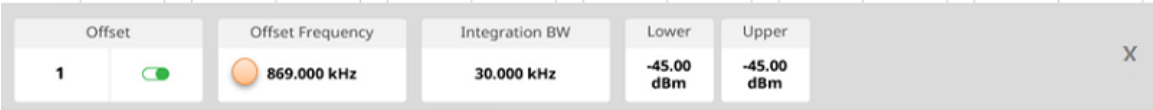
Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Configuration** to configure an offset, up to five. The below table appears.

You can also tap the Configuration ( ) under the chart screen.



a Select **Offset** from 1 to 5 and switch each to **On** to display or **Off** to hide the active offset.

b Select **Offset Frequency** to set the center frequency of the offset using the on-screen keyboard.

c Select **Integration BW** to set the channel power bandwidth for the selected offset using the on-screen keyboard.

d Select **Lower** to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the left using the on-screen keyboard.

e Select **Upper** to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the right using the on-screen keyboard.

3 Tap **Main Channel BW** to set the main channel bandwidth and input the value using the on-screen keyboard.

You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

4 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

5 Tap **Menu** > **Trace** > **Threshold RMS** to switch **On** or **Off**. Threshold RMS function detects RMS above a certain level of power and make sample detecting for the power below that level. When switched **On**, Average is automatically set to 100 while switched **Off**, Average is automatically set to 1. Threshold can also be adjusted by the menu under **Trace**, **Threshold Auto** and **Threshold RMS Level**.

An offset represents a difference in center frequencies of the carrier channel and its adjacent channel to be measured. The frequency range for each offset is specified with an Offset Frequency and Integration BW. Each offset that is created has a Lower and Upper set of frequencies.

NOTE:
Make sure the Detector is selected to RMS when you perform the adjacent channel power measurement.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the Save hot key on the side bar and select the save option form the choices available for your measurement mode.

Adjacent channel power measurement with spectrum analyzer

Multi adjacent channel power

The Multi-ACP measurement is used to do multi-channel ACP testing. It helps you to measure ACP in multichannel transmitting base station environment.

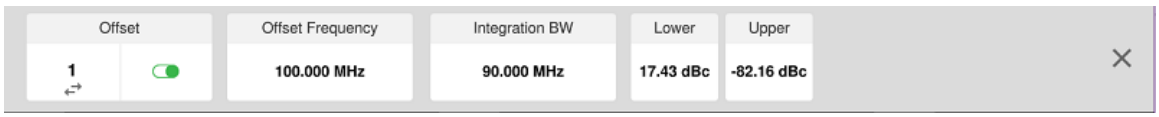
Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Configuration** to configure an offset, up to five. The below table appears.

You can also tap the **Configuration** ( ) under the chart screen.



a Select **Offset** from 1 to 5 and switch each to **On** to display or **Off** to hide the active offset.

b Select **Offset Frequency** to set the offset frequency using the on-screen keyboard.

c Select **Integration BW** to set the bandwidth for the selected offset using the on-screen keyboard.

d Select **Lower** to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the left using the on-screen keyboard.

e Select **Upper** to set the threshold for the power difference between the main channel bandwidth and the selected offset bandwidth on the right using the on-screen keyboard.

3 Tap **Main Channel BW** to set the main channel bandwidth and input the value using the on-screen keyboard.

You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

4 For channel setting, tap **Lowest Channel Number** and input the value using the on-screen keyboard.
You can also tap the rectangle with value, under the chart screen and input the value using the on-screen keyboard.

5 For channel setting, tap **Highest Channel Number** and input the value using the on-screen keyboard.

5 For frequency setting, tap **Lowest Frequency** and input the value using the on-screen keyboard.
You can also tap the rectangle with value, under the chart screen and input the value using the on-screen keyboard.

6 For frequency setting, tap **Highest Frequency** and input the value using the on-screen keyboard.
You can also tap the rectangle with value, under the chart screen and input the value using the on-screen keyboard.

7 Tap Span 50.000 000 MHz to set the frequency range over which the instrument will sweep using the on-screen keyboard.

8 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

NOTE:
Make sure the Detector is selected to RMS when you perform the multi adjacent channel power measurement.

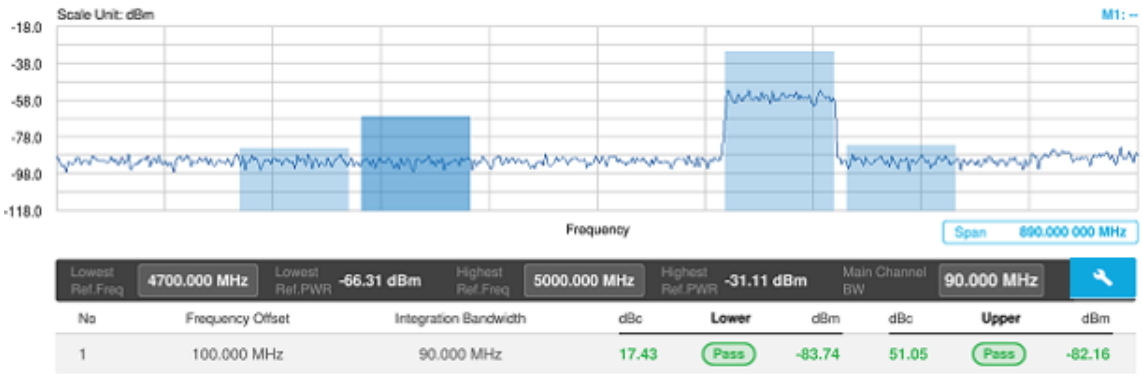
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-adjacent channel power measurement with spectrum analyzer



Spurious emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

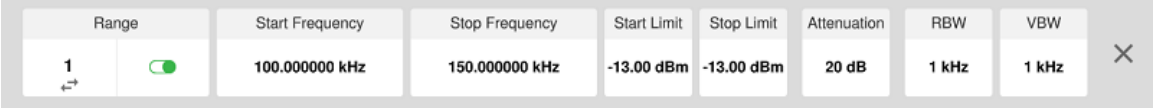
After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The frequency setting is not used in the Spurious Emissions mode. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap to switch the **Measure Type** to **Full** or **Examine**.

> **NOTE:**
> The Examine mode displays only the selected range while the Full mode lets the instrument automatically changes the selected range from one another.

3 Tap **Configuration** to set up the range table and parameters as below.



- **a** Select **Range** from 1 to 20 and switch each to **On** to display the selected range in the result table or **Off** to hide it from the table.
- **b** Select **Start Frequency** to specify the start frequency for the selected range using the on-screen keyboard.
- **c** Select **Stop Frequency** to specify the stop frequency for the selected range using the on-screen keyboard.
- **d** Select **Start Limit** and **Stop Limit** to specify the upper limit for Pass/Fail indication using the on-screen keyboard.
  You can set the threshold line by setting the start/stop limit.
- **e** Select **Attenuation** and specify a value in the multiple of five using the on-screen keyboard.
- **f** Select **RBW** to specify a RBW value using the on-screen keyboard.
- **g** Select **VBW** to specify a VBW value using the on-screen keyboard.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

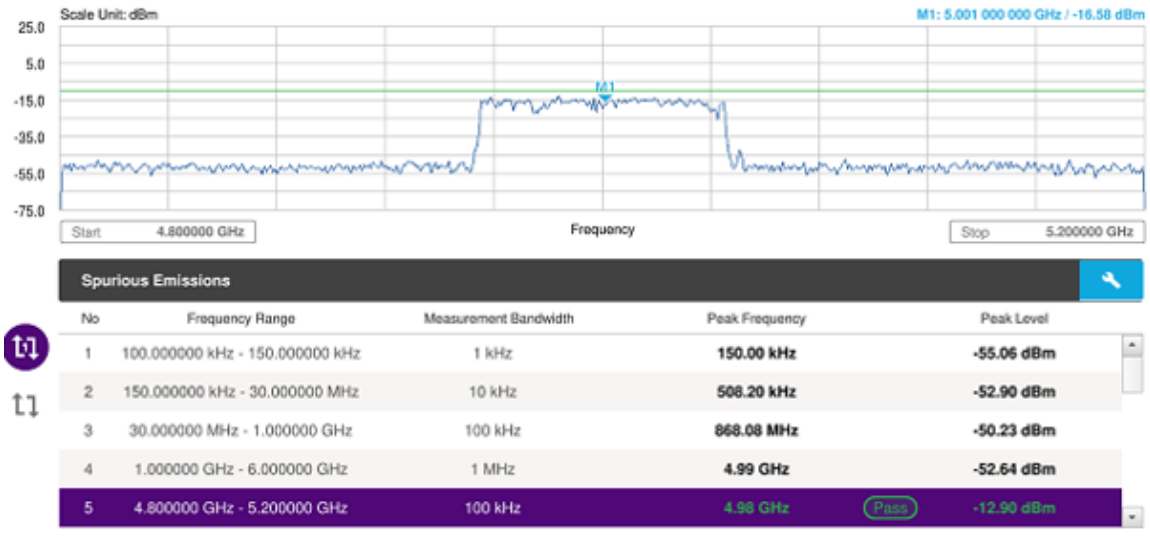
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Spurious emissions measurement with spectrum analyzer



NOTE:

If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

Total harmonic distortion (THD)

The CellAdvisor 5G can measure the Total Harmonic Distortion using spectrum analyzer. The Total Harmonic Distortion is defined as the ratio of RMS voltage of the harmonics to that of the fundamental component. This is accomplished by using a spectrum analyzer to obtain the level of each harmonic with peak detector.

Setting measure setup

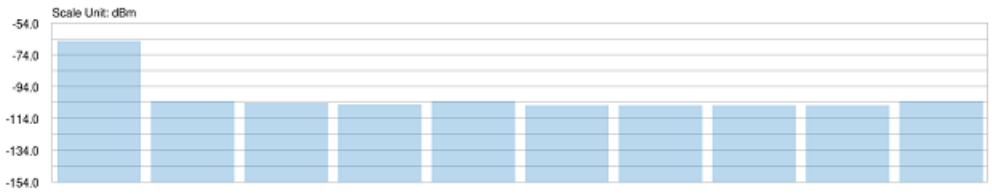
You need to set the fundamental frequency to measure the total harmonic distortion. Once you set up, it will automatically collect the harmonic outputs up to the tenth harmonics from the spectrum analyzer and calculate the corresponding THD value (%) and the distortion attenuation (dB).

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Fundamental Frequency** and input the value using the on-screen keyboard.
The total harmonic distortion screen changes accordingly.

3 Tap **Menu** > **Amp/Scale** to set the related parameters such as Reference level, Attenuation, Preamp, External Offset, and Scale Division. For details, see "Setting amplitude".

Total harmonic distortion measurement with spectrum analyzer



Frequency Table

Index	Frequency (MHz)	Level	Index	Frequency (MHz)	Level
Fund	100.00	**-65.06 dBm**	5	600.00	**-40.32 dBc**
1	200.00	**-37.72 dBc**	6	700.00	**-40.69 dBc**
2	300.00	**-39.15 dBc**	7	800.00	**-40.35 dBc**
3	400.00	**-39.86 dBc**	8	900.00	**-40.54 dBc**
4	500.00	**-37.79 dBc**	9	1000.00	**-38.07 dBc**

Field strength meter

The Field Strength Meter measures the field strength over the frequency range of a connected antenna, which is known with its specific bandwidth and gain characteristics. A standard or user-defined antenna can be selected from the antenna list in the CellAdvisor 5G. After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

Setting measure setup

1 Connect an antenna to be used with your instrument.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap **Antenna List** to select antennas to be used for field strength measurement from the list stored in the instrument.
The antenna list window appears.

4 Tap the **Apply** button to apply the selection.

5 Tap **Antenna Start Frequency** to edit the start frequency of the connected antenna using the on-screen keyboard.

6 Tap **Antenna Stop Frequency** to edit the stop frequency of the connected antenna using the on-screen keyboard.

7 Tap **Gain** to input the gain information of the antenna using the on-screen keyboard.

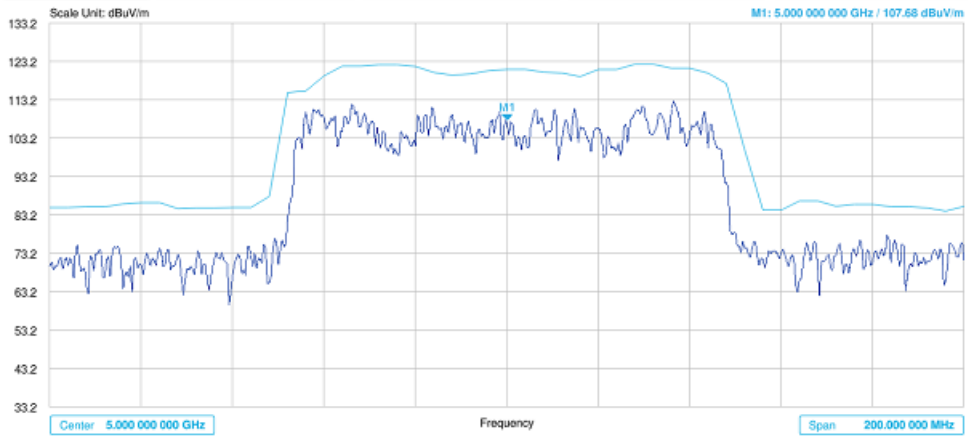
Setting limit

You can show or hide the display line on the screen that is used as a visual reference only. You can also use the multiple segment limit line to set up different limits for different frequency ranges for Pass/Fail indication.

1 Tap **Menu** > **Limit**.

2 For details, see "Setting limit".

Field strength measurement with spectrum analyzer



AM/FM Audio Demodulation

The AM/FM Audio Demodulator operates using the power received from radio waves and it serves as an alternative to identify interfering signals easily. The instrument sounds demodulated signals that can be heard through the built-in speaker or plugged-in headphones. You can hear the sound and identify interfering signals easily.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap to switch the **Audio Demod** to **On** or **Off** to turn the AM/FM audio demodulation on or off.

3 Tap **Demod At** to select the marker number for the frequency to be demodulated.

> **NOTE:**
> You must set the marker(s) first as the AM/FM demodulator uses the marker position to demodulate. See "Using marker" for more details.

4 Tap **Demod Mode** to select the demodulation mode: **CW**, **AM**, or **FM**.

5 Tap **Dwell Time** and set the demodulation interval between 1 and 20 using the on-screen keyboard.

6 Tap Volume to set the speaker volume using the on-screen keyboard.

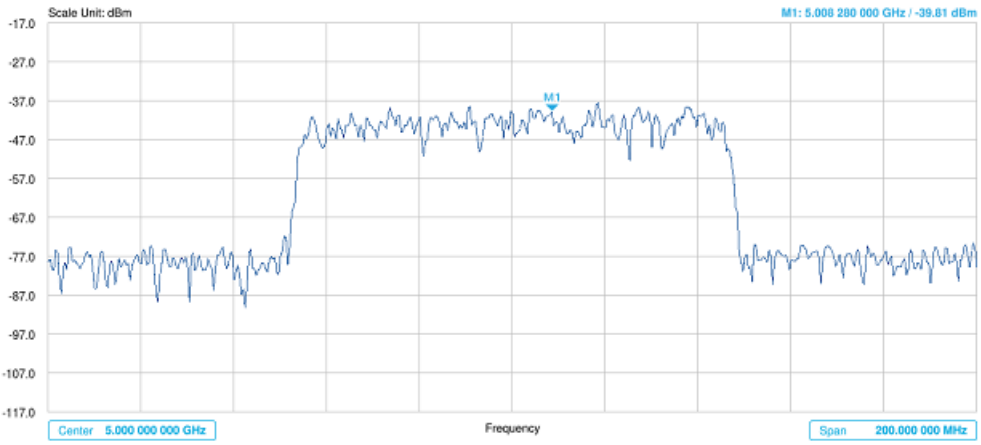
7 *Optional.* You can use the **Save** icon and select **Save to Event Setup** to let the instrument automatically save measurement screen or result that falls outside the defined limit settings or the Fail indicator is on. You can also set to save the first event and hold the measurement or to save all the events continuously.

Setting limit

1 Tap **Menu** > **Limit**.

2 For details, see "Setting limit".

AM/FM audio demodulation with spectrum analyzer



Internal power meter

The internal power measurement of the CellAdvisor 5G collects powers from the raw data of spectrum analyzer in the optimal span and integrates the powers up to the specified user span, which results in an accurate power measurement, independent of the span setting. The frequency is extended up to 18.5 GHz in addition to existing 24 GHz to 40 GHz. Before starting the Internal RF Power Meter, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Resolution** and select the resolution option from the following choices:

- **0**: Displays the reading with no decimal place
- **1**: Displays the reading with one decimal place
- **2**: Displays the reading with no decimal place

3 Tap **RBW** to set the resolution bandwidth and select from the 8 options available.

4 Tap **Accuracy Mode** and select the accuracy mode option: **Low**, **Middle**, or **High**.
Select High when the measurement accuracy is high comparing to speed and select Low when the measurement accuracy is low comparing to speed.

5 Tap **Average** to specify the number of measurements to be averaged from 1 to 100 using the on-screen keyboard.

6 Tap **Menu** > **Amp/Scale** > **Reference Type** to set **Relative**, then the **Set Reference** shows up on chart.

7 Tap to switch the **Limit** to **On** or **Off** to enable or disable the Pass/Fail Indication on bottom of result screen.

- **a** Tap the value box next to **High** to set a threshold value using the on-screen keyboard.
- **b** Tap the value box next to **Low** to set a threshold value using the on-screen keyboard.

Internal RF power measurement

NOTE:
You cannot select the Detector Mode in the RF power measurement.

Conducting Gated Sweep

Gate Sweep Spectrum

To get appropriate gate sweep spectrum, you have to set the gate delay and gate length in a way that the measurement is active during the interesting part of the signal. You can also modify the sweep time in order to match the horizontal axis to the length of the signal and thus set the gate delay and gate length parameters more accurately.

The gate delay parameter means the time between the trigger event and the beginning of the actual measurement. The gate length means the duration of the measurement, before it is interrupted and the next gate signal is expected to resume the measurement.

The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

Gate sweep spectrum setup screen

Setting Gate Sweep Spectrum

The above figure is the first screen you will see when entering the gate sweep measurement mode. If you want to set Gated Sweep automatically, tap Auto Set. Be aware that it changes to single gate.

1 Tap **Gate Delay/Gate Delay2** on the setup table and input a value using the on-screen keyboard.
When the gate delay changes, the gate length line also changes accordingly with the same interval.

2 Tap to switch **Dual Gate** to **On** or **Off**. This will let you set the gated window to one (Off) or two (On).

3 Tap **Gate Length** on the setup table and input a value using the on-screen keyboard.
The gate length cannot be moved on the left side of the gate delay.

4 Tap **Zero Span Time** on the setup table and input a value using the on-screen keyboard.

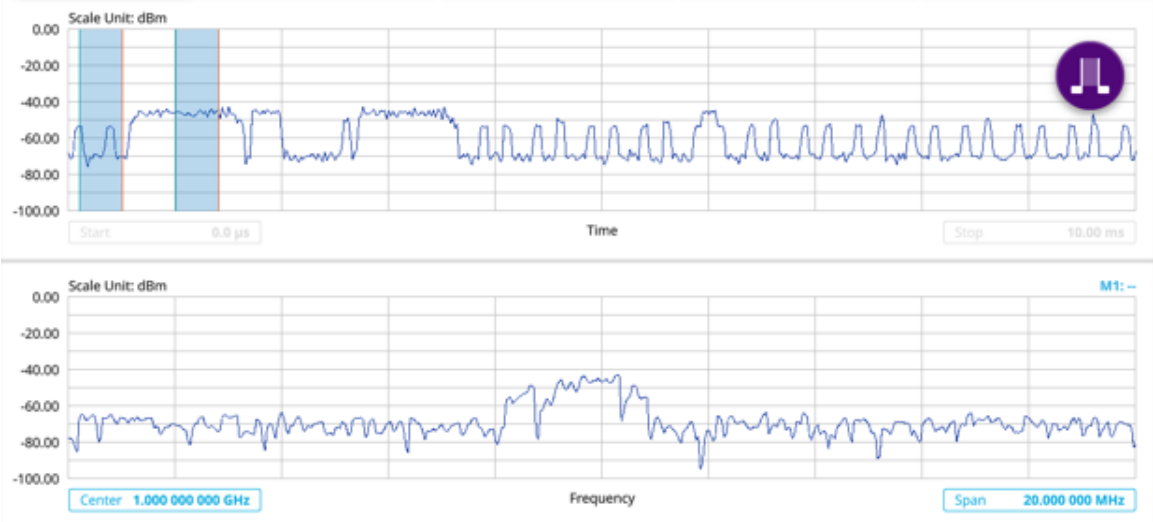
5 Tap **StdSingal** to select a Standard Signal from the pop-up list

6 Tap **Period** and switch it to **Standard** or **Manual** and input a value using the on-screen keyboard.

7 Tap **x** button on the setup table then Gate Sweep becomes On.
The setup table disappears and the Edit mode icon appears on the right edge of the chart screen as below figure.

8 When judged Triggering is not valid, e.g. Delay set bigger than Trigger Period, **Trigger not Detected** message appears on the screen.

Gate Sweep Spectrum with spectrum analyzer



Conducting Route Map

Route map

The CellAdvisor 5G provides the Route Map function that allows you to collect data of points in an indoor or outdoor environment and track the received signals and coverage of RF transmitters by plotting data real time directly on top of a loaded floor plan or a map.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.

	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch the **Plot Point** to **GPS**, **Position** or **Time**.

- **a** To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
  With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.
- **b** To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.
- **c** To collect data/plot points based on time, select **Time**.

3 Tap to switch **Plot Item** to **RSSI**, **ACP**, or **Peak**.

4 *Optional.* If **ACP** is selected, set the **Main Channel BW** and **Offset Limit**.

- **a** Tap **Main Channel BW** and input a value using the on-screen keyboard.
- **b** Tap **Offset Limit** and tap to switch the Offset to **On** to display or **Off** to hide the offset.
- **c** Tap **Integration Bandwidth** and input a value using the on-screen keyboard.
- **d** Tap **Offset Frequency** and input a value using the on-screen keyboard.
- **e** Tap **Offset Limit** and input a value using the on-screen keyboard.

5 Tap the **Start** button ( ) on the right panel of the map to start plotting for the Position or Time setting.
Touch directly on the screen and tap to collect data and plot points on the loaded map. For the Position setting, you can change the direction of the route with screen touch. For the Time setting, when you first touch screen a purple triangle appears on the point and the "Number of n" appears in the bottom left of the map. The instrument interpolates points in between two enters on a straight dotted line. The max count is 2560, and the time interval is 0.5 s.

6 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to ( ) and GPS cannot be plotted.

7 Tap to switch **Plot** to **Stop** to stop plotting.

8 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

9 If you start test and select **Setup** > **Plot Point** > **position**, you can undo by tapping the **Start** button.

10 If you select **Stop** button, **Plot Stop** popup window appears.

NOTE: The number of Cell site Count has been increased to max.1000.

The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Route map with spectrum analyzer

NOTE:

When you tap the **Start** (Testing) button, the corresponding power will show on the measurement screen.

Conducting Online Route Map

Online route map

Spectrum online route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline.

Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **Plot Item** to **RSSI**, **ACP**, or **Peak**.

4 *Optional.* If **ACP** is selected, set the **Main Channel BW** and **Offset Limit**.

- **a** Tap **Main Channel BW** and input a value using the on-screen keyboard.
- **b** Tap **Offset Limit** and tap to switch the Offset to **On** to display or **Off** to hide the offset.
- **c** Tap **Integration Bandwidth** and input a value using the on-screen keyboard.
- **d** Tap **Offset Frequency** and input a value using the on-screen keyboard.
- **e** Tap **Offset Limit** and input a value using the on-screen keyboard.

5 Tap the **Start** button ( ) on the right panel of the map to start plotting for the Position or Time setting. Touch directly on the screen and tap to collect data and plot points on the loaded map.

6 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to ( ) and GPS cannot be plotted.

7 Tap to switch **Plot** to **Stop** to stop plotting.

8 Tap **Menu** > **Sweep** > **Gated Sweep** to set the Gated Sweep **On** or **Off**. This function needs License S015.

NOTE: The number of Cell site Count has been increased to max.1000.

The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

NOTE:

If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online route map with spectrum analyzer

Using Real-time Spectrum Analyzer

Introduction

Real-time Spectrum Analysis (RTSA) is a new method that leverages overlapping FFTs and high-speed memory to have a 100% probability of intercept (POI) in even extremely dense environments. Real-time bandwidth, the maximum frequency span offering gap-free overlapping FFT processing, is an important variable factor of an RTSA that can enable more detailed analysis of a spectrum, based on the type of signal content under scrutiny.

The CellAdvisor 5G is the optimal solution to perform following measurements with frequency extension up to 18.5 GHz in addition to existing 24 GHz to 40 GHz:

- Interference Analysis
  - Persistent Spectrum
  - Persistent Spectrogram
  - Persistent RSSI
  - Persistent Interference Finder
  - Persistent Radar Chart
  - Real-time Spectrum Replayer
- Online Interference Analysis
  - Online Persistent Interference Finder
  - Online Persistent Radar Chart

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **Real-time Spectrum Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Interference Analysis > **Persistent Spectrum**, **Persistent Spectrogram**, **Persistent RSSI**, **Persistent Interference Finder**, **Persistent Radar Chart**, or **Real-time Spectrum Replayer**

Online Interference Analysis > **Online Persistent Interference Finder** or **Online Persistent Radar Chart**

NOTE:
You can choose **RF Source On** or **Off** in setup menu after tap to **CAA RF Power On** if you have **RF Source** option in your CAA(Cable and Antenna Analyzer).

Conducting interference measurements

Persistent spectrum

The persistent spectrum of a signal is a time-frequency view that shows the percentage of the time that a given frequency is present in a signal. It is a histogram in power-frequency space. The longer a particular frequency persists in a signal as the signal evolves, the higher its time percentage and thus the brighter or hotter its color in the display. The persistent spectrum is used to identify signals hidden in other signals.

Setting measure setup for Sound Indicator

If you have configured test parameters as described in the "Configuring Spectrum Measurements", continue to set measure setup. You can simply change Center Frequency and Span by tapping the icons right below the result chart screen.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Sound Indicator**.

- **a** Tap to switch the **Sound** between **On** and **Off** to enable and disable the alarm sound.
- **b** Tap to switch the **Alarm Reference** to **Marker** to set the active marker position as the alarm reference.
- **c** Tap to switch the **Alarm Reference** to **Line** to set the limit as the alarm reference.
  The Reference Line Mode menu becomes activated to be set.
- **d** Select **Reference Line** to specify a threshold for the reference line using the on-screen keyboard.
- **e** *Optional.* To adjust the volume for alarm sound, tap **Volume** and input from 1 to 10 using the on-screen keyboard.

Setting measure setup for Interference ID

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Interference ID**.

- **a** Tap to switch the **Interference ID** between **On** and **Off** to turn the Interference ID on and off.
- **b** Tap **Threshold** and input a value using the on-screen keyboard.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

- **a** Tap to switch the **Mode** between **High** and **Normal**.
  The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz

	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

NOTE:
If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

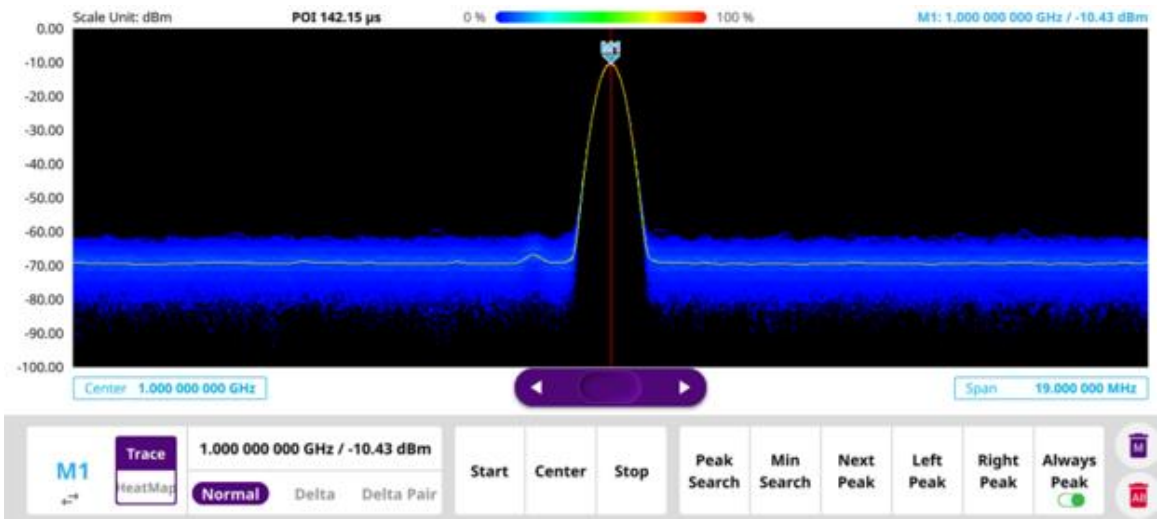
4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

Persistent spectrum measurement



> **NOTE:**
> You can go to **Menu** > **Limit** to analyze your measurements with the reference line, multi-segment line, and channel limit table. See "Setting limit" for details.

Persistent spectrogram

The Persistent Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

a Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

Mode	A	B	C	D

Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		**A**	**B**	**C**	**D**	**E**	**F**
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

7 Tap **Reset/Restart** to start a new measurement.

> **NOTE:**
> Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

> **NOTE:**
> If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

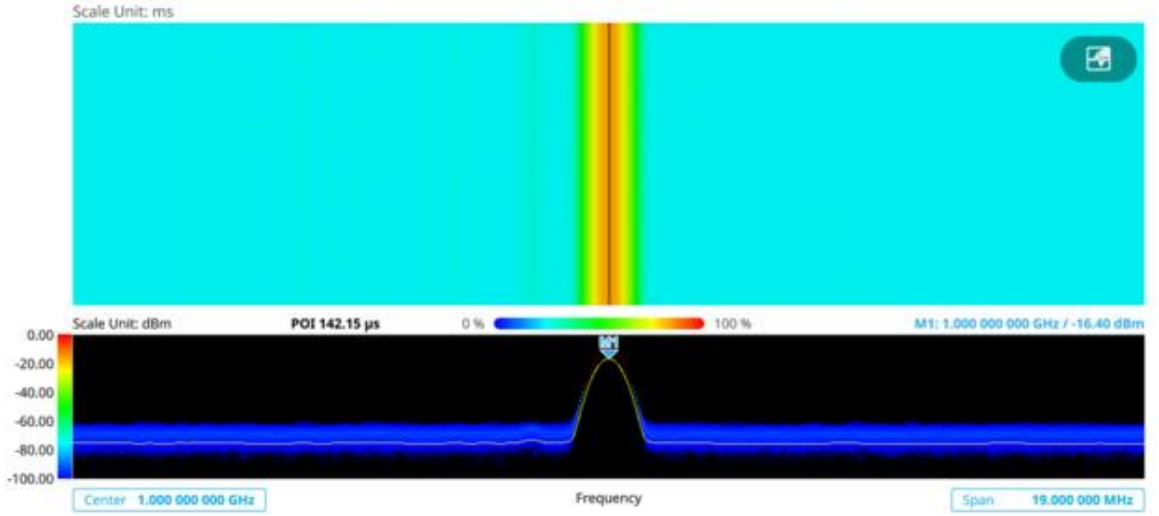
4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

Persistent spectrogram measurement



NOTE:
You can go to **Menu** > **Limit** to analyze your measurements with the reference line, multi-segment line, and channel limit table. See “Setting limit" for details.

Persistent RSSI

The Received Signal Strength Indicator (RSSI) is a multi-signal tracking metric that is particularly useful for measuring power-level variations over time. The RSSI measurement lets you assign power limit line for audible alarms and increase alarm counters every time a signal exceeds a defined limit line. For long-term analysis, the spectrogram and RSSI measurements can be automatically saved into an external USB memory.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Alarm** to set the alarm parameters.

3 Tap **Alarm at** and select the marker number from Marker 1 to Marker 6.

4 Tap **Reference Line** to set a threshold for the alarm and input a value using the on-screen keyboard.

5 Tap to switch **Alarm** to **On** or **Off** to turn the alarm feature on or off.

6 *Optional.* Tap **Volume** to adjust the volume from 1 to 10 using the on-screen keyboard.

7 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

a Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

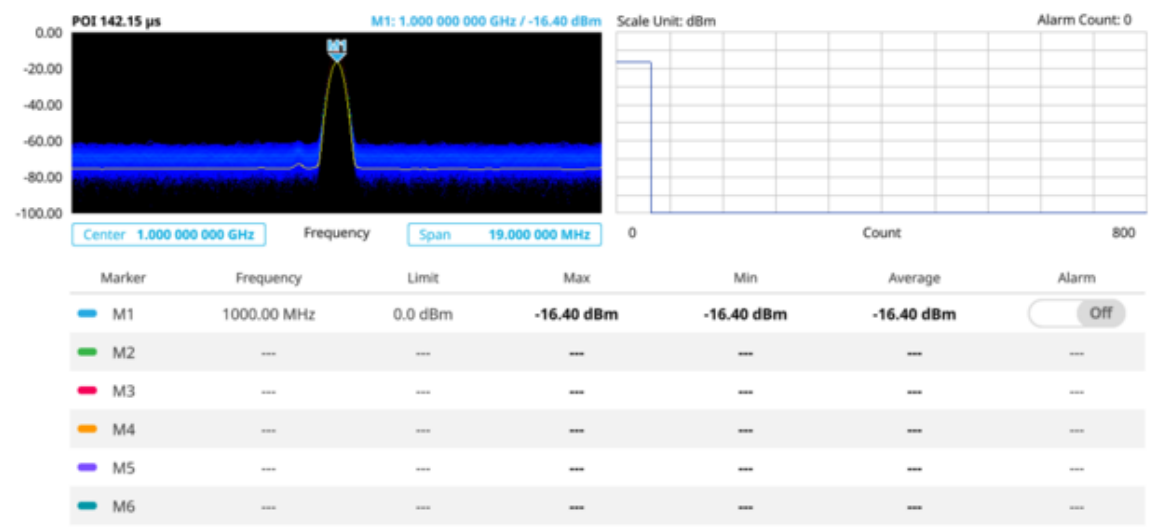
Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

8 Tap **Reset/Restart** to start a new measurement.

NOTE:
You must set the marker(s) for the alarm as this feature use the marker position to sound alarm. See “Using marker” for more details.

Persistent RSSI measurement



You can go to Menu > Limit to analyze your measurements with the display line, multi-segment line, and channel limit. See "Setting limit" for more details. Once you tap the vertical move bar and move it up and down, the reference line value changes.

Persistent interference finder

The Persistent Interference Finder is an automatic triangulation algorithm that uses GPS coordinates to locate possible interference sources based on three measurements. The persistent interference finder calculates possible interference locations using its inscribed circle or circumscribed circle based on measured intersection points. You can plot up to

seven measurement points and select three that are more representative for triangulation. CellAdvisor 5G automatically logs measurement positions not to lose them while changing measurement modes. You can switch the main screen from

persistent spectrum view to map view and vice versa using the icon, ( ) on the persistent spectrum view screen.
Before starting the Persistent Interference Finder, you need to configure spectrum measurements. See "Configuring Spectrum Measurements". Note that the purpose of the measurement is to monitor the intermittent and transient interfering signals.
To make full use of the feature available in the map mode, you will need a GPS receiver and an antenna. For more details, see the antenna connection below.

Antenna connection

Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1 Mount a broadband antenna to your AntennaAdvisor Handle.

2 Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.

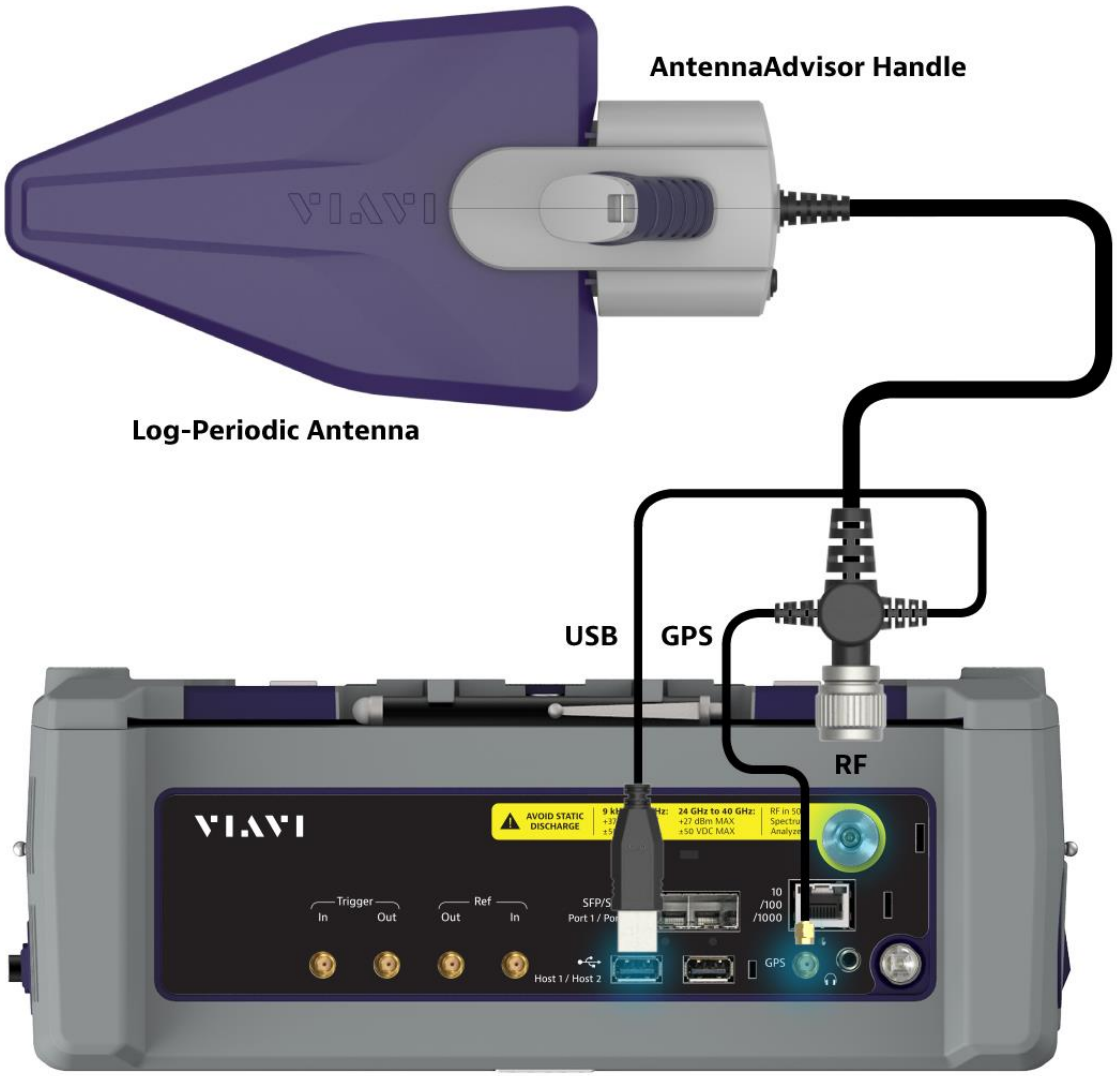
3 Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
The GPS status indicator appears on the instrument screen.

4 Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
The device icon appears in the system status bar on the screen.

NOTE:

The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon ( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Measure Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.

2 Point the antenna to the north and tap the **Measure Setup** > **Initialize AntennaAdvisor**.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1 Tap the **Point 1**, **Point 2** and **Point 3** on the map.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

2 Tap each point and use the **Degree** bar or button to change degrees.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

3 Tap the **GPS** icon to automatically get the selected point's location information.
The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.

4 Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position.
The values should be input based on the Decimal Degrees.

5 Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1 Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.

2 Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1 Tap the circle on the Degree bar and move it gently until you get the right azimuth.

M**ethod 3**: You can use the log-periodic antenna.

1 Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

NOTE:
The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

3 Tap **Measure Setup** > **Screen Mode**.

4 Tap the **Screen Mode** to select **Map** or **Full**.

- **a** **Map**: This option displays what are inside the base map with the map image.
- **b** **Full**: This option displays three location points and defined circle without the map image.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

- **a** Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

Persistent interference finder

Persistent radar chart

If you have identified an interfering signal on your spectrum view, you can move to the Radar Chart mode and measure RSSI power level through 360 degrees at a location received by the connected broadband directional antenna so that you can determine the direction of the source of the interference. Using a set of the AntennaAdvisor Handle that holds a broadband directional antenna is mandatory in the Radar Chart mode and its built-in compass, GPS antenna, and a built-in low-noise amplifier (LNA) benefits you to determine the direction of the interference. You can switch the main screen from spectrum view to map view and vice versa using the icon, ( ) on the spectrum view screen. Before starting the Interference Finder, you need to set Spectrum measurements. See "Configuring Spectrum Measurements" for more details.

For antenna connection, see antenna connection in "Interference finder"

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.
To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.

2 Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

NOTE:

It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining Persistent RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1 When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from ‘Unknown Position’ to the obtained position information.

2 Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.

3 Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.

4 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5 Hold the antenna handle set horizontally and then make the following measurement

6 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a Persistent RSSI value, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain Persistent RSSI values continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.

	NOTE: The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

7 Tap **Setup** > **Screen Mode Full/Map** to change the display mode.

a **Map**: It displays measured points inside the base map image. If you are in the area outside the base map and continue your measurement with the Trigger button, the instrument continues obtaining data even though the radar chart disappears from the screen. You can view obtained data when you change this display option to Full.

b **Full**: It displays measured points without the base map image. In case that you made measurements in the area outside the map image, selecting this option moves your measured data to the center of the display so that you can view the result.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap Localization again to clear all the data plots on the radar chart.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

a Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

Persistent radar chart

Persistent radar chart_localized

Real-time spectrum replayer

The Real-time Spectrum Replayer lets you retrieve and replay recorded real-time spectrum analyzer traces in interference analysis mode. These traces can be played back in the persistent spectrum, persistent spectrogram or persistent RSSI. You can configure the limit line to create failure points when signals exceed it. The failure points are clearly displayed on the trace timeline for quick access during playback.

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Spectrum Replayer**.
The File Manager window appears.

3 Select the file to be loaded and press the **Load** button.
The replay bar appears at the bottom of the screen. The green color indicates Pass and the red color indicates Fail.

4 Tap the replay direction icon between **FWD** and **REV** to change play direction to forward or reverse.

5 Tap the right and left button to change the speed from the options: **x1**, **x2**, **x3**, and **x4**.

6 Toggle the **Play** button to start playing.

7 Toggle the **Pause** button to pause or stop playing.

8 Tap **Fail** to move to a particular failure position directly and play from there.
The Frame Fail Count in the middle of bar changes.

9 Tap the Frame Fail Count to change the value using the on-screen keyboard. Once tapped, replaying stopped. If you change the value, it jumps to the corresponding index.
You can also change the value by tapping right and left button.

10 Tap to change display mode to **Spectrum**, **Spectrogram**, or **RSSI**.
3D display (Waterfall) is not supported in case of spectrum logging.

11 *Optional.* Tap to switch Time Cursor to On or Off to display or hide the time cursor on the screen. This key becomes activated when you play logged data in the Spectrogram mode.

	NOTE: If you connected a USB drive, do not remove it while playing. Doing so may freeze the USB port, which will require you to restart the instrument to get a USB drive recognized again.

Conducting online interference measurements

Online persistent interference finder

The online persistent interference finder enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection below.

Antenna connection

Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1 Mount a broadband antenna to your AntennaAdvisor Handle.

2 Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.

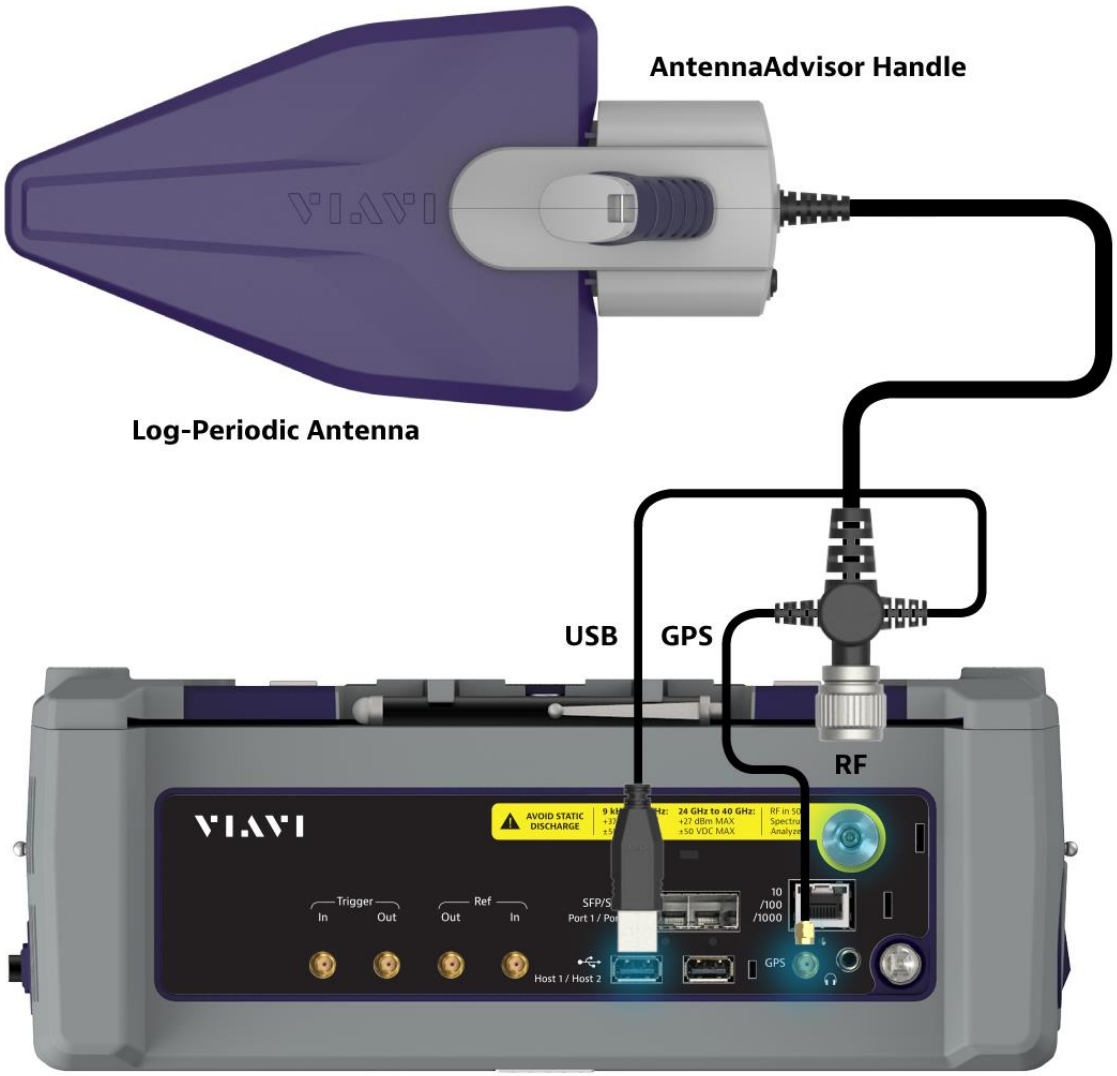
3 Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
The GPS status indicator appears on the instrument screen.

4 Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
The device icon appears in the system status bar on the screen.

NOTE:

The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.

	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Measure Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.

2 Point the antenna to the north and tap the **Measure Setup** > **Initialize AntennaAdvisor**.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1 Tap the **Point 1**, **Point 2** and **Point 3** on the map.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

2 Tap each point and use the **Degree** bar or button to change degrees.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

3 Tap the **GPS** icon to automatically get the selected point's location information.
The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.

4 Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position.
The values should be input based on the Decimal Degrees.

5 Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1 Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.

2 Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1 Tap the circle on the Degree bar and move it gently until you get the right azimuth.

Method 3: You can use the log-periodic antenna.

1 Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is

	weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

- **a** Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

- **b** Tap **Speed** and input a value using the on-screen keyboard.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

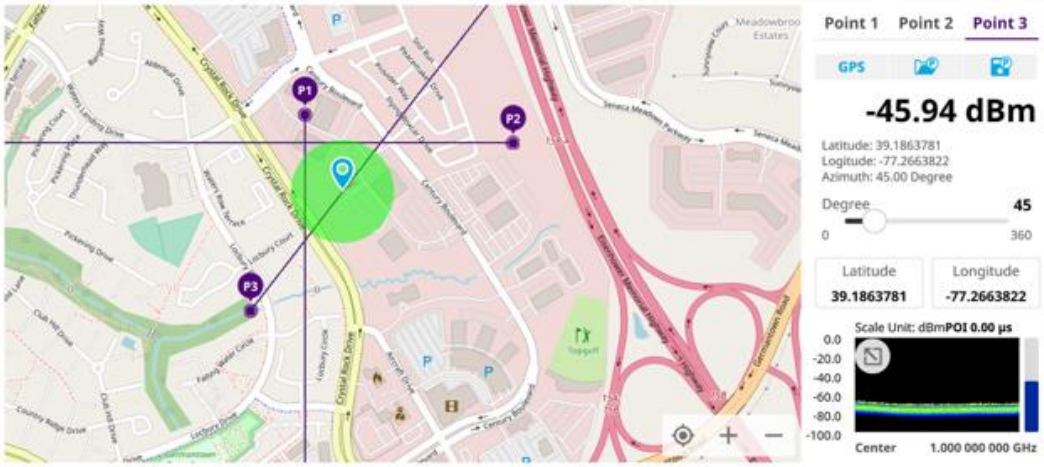
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online persistent interference finder



Online persistent radar chart

The online persistent radar chart enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection "Interference finder".

Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.

	Tap to zoom in the map.
	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.
To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.

2 Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining Persistent RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1 When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from 'Unknown Position' to the obtained position information.

2 Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.

3 Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.

4 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5 Hold the antenna handle set horizontally and then make the following measurement

6 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a Persistent RSSI value, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

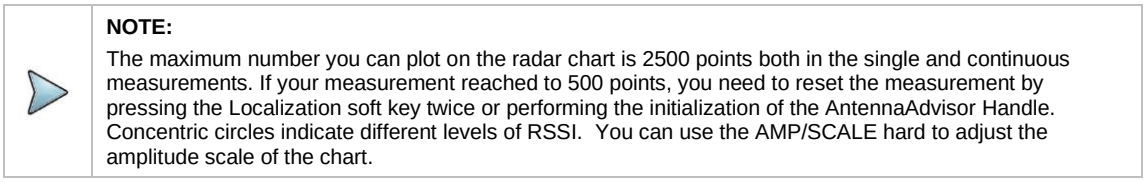
b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain Persistent RSSI values continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.



NOTE:

The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap Localization again to clear all the data plots on the radar chart.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

a Tap to switch the **Mode** between **High** and **Normal**.
The following table shows RBW and Span setup range per Normal and High mode.

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Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
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Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
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	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz

	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

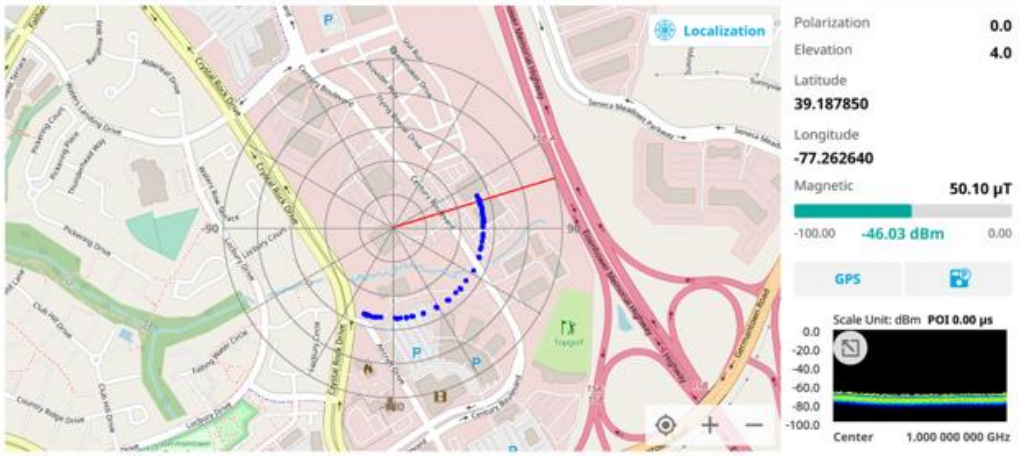
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

NOTE:
If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online persistent radar chart



Online persistent radar chart_localized

Using RFoCPRI Interference Analyzer

Introduction

Cell sites today have a distributed architecture of the radio that consists of the radio equipment control (REC) or base band unit (BBU) installed at the bottom of the tower and the radio equipment (RE) or remote radio head (RRH) installed at the top of the tower. These two elements communicate with each other via the Common Public Radio Interference (CPRI) protocol over fiber links.

This distributed architecture provides the benefit of replacing coax-based feeders with fiber- based feeders, significantly reducing the problems of signal loss and reflections. However, since all the RF interfaces reside on the RRH, any RF maintenance or troubleshooting requires climbing to the top of the tower to access the RRH, increasing operational cost and unnecessary safety issues.

CellAdvisor 5G provides the option of RFoCPRI that allows you to perform RF maintenance and troubleshooting activities on the ground via the fiber interfaces at the BBU, significantly reducing maintenance time and operational expenses. Thanks to the RFoCPRI technology, you can verify the CPRI control signals and extracts the IQ data transmitted between the BBU and RRH to monitor and analyze the uplink interferences and the downlink signals.

You can also monitor current and history CPRI alarm status for LOS and LOF displayed on the interference measurement screen.

The RFoCPRI testing provides following measurements:

- Spectrum Analysis
  - Spectrum
  - Spectrogram
  - Spectrum Replayer

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **RFoCPRI** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Spectrum Analysis > **Spectrum, Spectrogram** or **Spectrum Replayer**

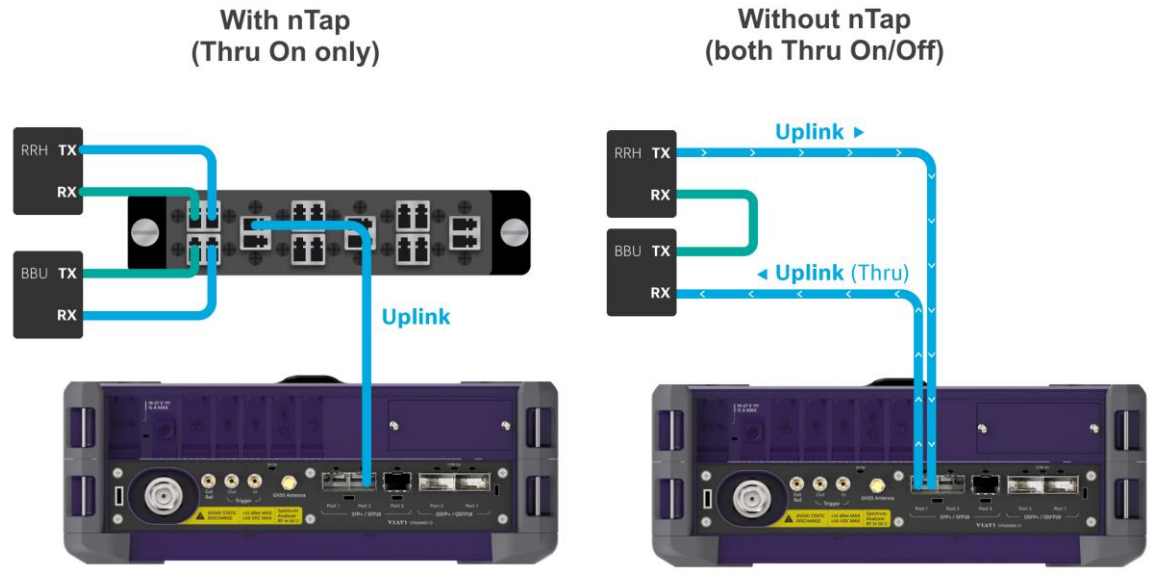
NOTE:
You can choose **RF Source On** or **Off** in Setup menu after tap to **CAA RF Power On** if you have **RF Source** option in your CAA(Cable and Antenna Analyzer).

Connecting cables

You can connect cables with a tap or without a tap as illustrated below. If you have connected cables directly from RRH and BBU without using the nTap, you must turn on the through mode (Thru) in the CPRI parameter settings.

A SFP/SFP+ transceiver that is connected to your CellAdvisor 5G must be compatible with your DUT and you must have your module information such as line rate, wavelength, and mode (MM or SM) handy.

Connection diagram for interference analysis



Selecting port

CellAdvisor 5G supports two antenna ports for signal transmission, and each port can generate up to four different waveforms selectively and simultaneously. User can select the port to use for the measurement in any measurement modes of RFoCPRI mode.

1 Tap the **Setup (** **)** icon on the side bar of each measurement mode and choose **Rx Settings** or **Port Configuration**.

2 Select **Port 1** or **Port 2** in **Select Port** line.

Configuring Auto CPRI

Auto CPRI configuration lets you set link rate, antenna, and carrier search for Port 1 or Port 2 automatically.

To search link rate and carrier

1 Go to measurement mode (Spectrum/ Spectogram) then tap the **Setup** ( ) >**Auto CPRI Configuration** on the side bar.

2 Tap **Port 1** or **Port 2**.

3 Tap **Configuration**.

- **a** Select **Search** mode to **Normal** or **Sub-banding**. You need to select Sub-banding when NEM is Ericsson Legacy.
- **b** Tap **Trace Type** box and select the options from **RMS**, **Max**, or **Min**.
- **c** Tap to switch the **Bandwidth** options to **On** or **Off**.
- **d** Tap the **Done** button to apply the changes.

4 Tap the **Start** button on the right panel of the screen.
Link rate will be scanned and if LOS/LOF indicate pass, the instrument performs carrier search.

5 Once link rate and carrier search are successfully done, Optic Power and SFP information are displayed on the right panel of the screen.

	NOTE: If the instrument detects more than one carrier or antenna, you can continue measuring another port and tap the Retest button to see the scanning result.

6 On the upper right side of the screen, the **AxC Map** button appears and you can continue measuring and checking AxC Map.

7 Tap the **Report** button at the bottom right of the screen.

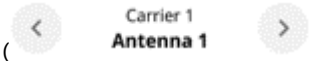
	NOTE: If you tap the Report button, you will be able to create a report in pdf format. It includes user-defined Site Location, Site Information, Test Purpose, Test Result, and File Name. You can also designate File Location and select Images (Fail Screenshots/All Screenshots) you will need to add in the report. The measurement screens for Interference Result and PIM Result for each carrier will be automatically saved in the report once you tap the Apply button.

To check AXC map

1 Tap the **AxC Map** (

) button on the upper right of the screen.

2 AxC map screen appears and Carrier 1 and Antenna 1 are selected as default.
The selected antennas are active on the map.

3 On the right side of the screen, select Carrier/Antenna by tapping the **Arrow** (

) button to see the values and trace for selected carrier and antenna.
The active carrier and antenna are changed based on your selection.

To check Interference

1 From the carrier line in the detected carrier list, tap the **Chart** (
) icon under the Interference Result.
The view mode changes based on the number of antennas under the selected carrier. For example, if the number of antennas is 4, it displays as Quad mode.

2 From the antenna line in the detected carrier list, tap the **Chart** (
) icon under the Interference Result.
It moves to Single mode view.

3 When the screen changes to a chart view, it displays 3 traces.

- Trace 1: Current trace
- Trace 2: Max hold
- Trace 3: Min hold

	NOTE: When you tap the Chart view icon, the instrument turns limit line to on and performs auto leveling automatically.

4 Tap the **Exit** button on the top left side to go back to the detected carrier list screen.

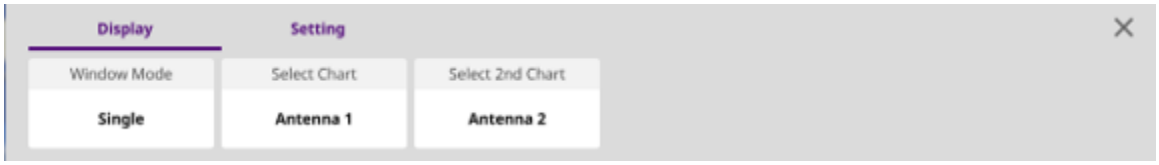
5 Tap the **PIM Check** button on the top right side to continue PIM analysis.

To perform PIM Check

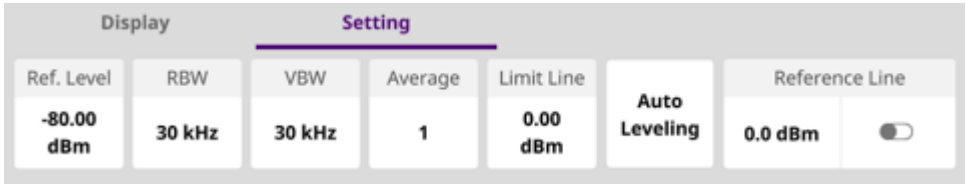
Before performing PIM check, you can set the display mode and parameters by going to **Setup** on the side bar and setting the corresponding values in the pop-up window.

1 Tap the **setup** ( ) icon on the side bar. A Display and Setting table appears.

2 Tap **Display** and select **Window Mode**, **Select Chart**, and **Select 2nd Chart** as required**.**
When you select Window mode to Single or Quad, Select 2nd Chart will be grayed out.



3 Tap **Setting** and set the following parameters as required: **Ref. Level**, **RBW**, **VBW**, **Average**, **Limit Line**, and **Auto Leveling**.
When you select **Global**, **Ref. Level**, **RBW**, **VBW**, **Average** values for Antenna 1 to Antenna 4 are equally applied.



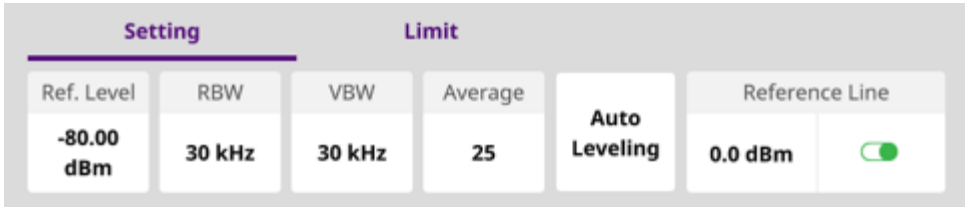
4 From the carrier line in the detected carrier list, tap the **Chart** ( ) icon under the PIM Result.
The number of traces changes based on the number of antennas under the selected carrier. For example, if the number of antennas is 4, the number of traces is also 4.

5 From the antenna line in the detected carrier list, tap the **Chart** ( ) icon under the PIM Result.
The selected trace will be displayed.

6 When the screen changes to a chart view, the instrument performs Auto Leveling and turns Flatness table to on.

7 Go back to **Setup** on the side bar. A Setting and Antenna table appears.

8 Tap **Setting** and set the following parameters as required: **Ref. Level**, **RBW**, **VBW**, **Average**.



9 Tap **Antenna 1** to **Antenna 4** and set the following parameters as required: **Flatness BW**, **RSSI BW**, **RSSI Limit (Low/High)**, **Slope Limit (Low/High)**.
The RSSI Limit and Slope Limit judge pass or fail.

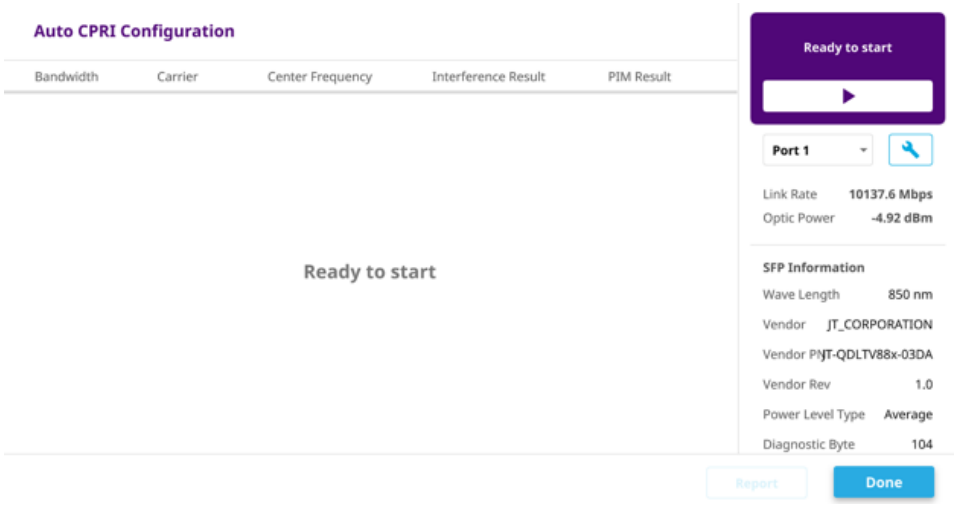
To save PIM result

1 Tap the **Exit** button on the upper left side of the screen. The screen moves and you can check pass of fail indication for each carrier and antenna.

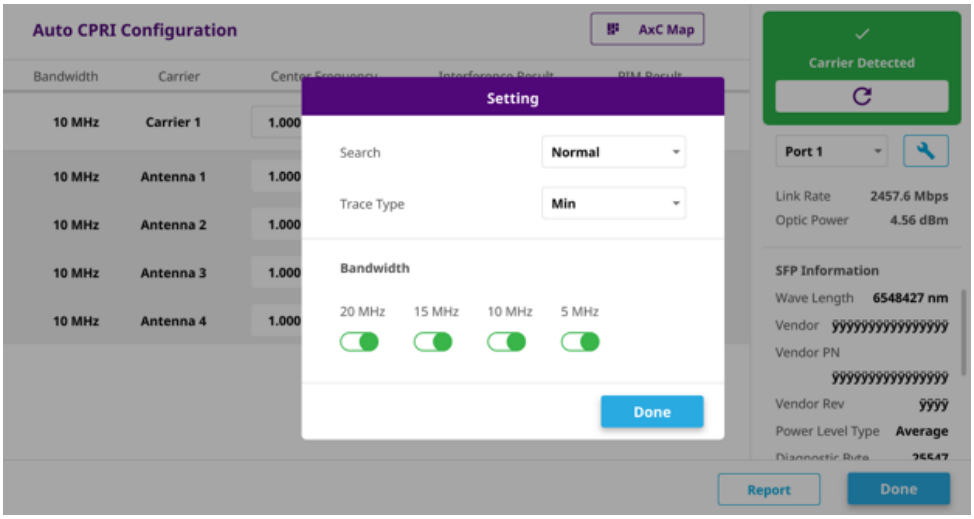
2 Tap the **Save** button to save the Interference and PIM result**.**
When you select Window mode to Single or Quad, Select 2nd Chart will be grayed out.

3 Tap **Done** to complete the measurement.

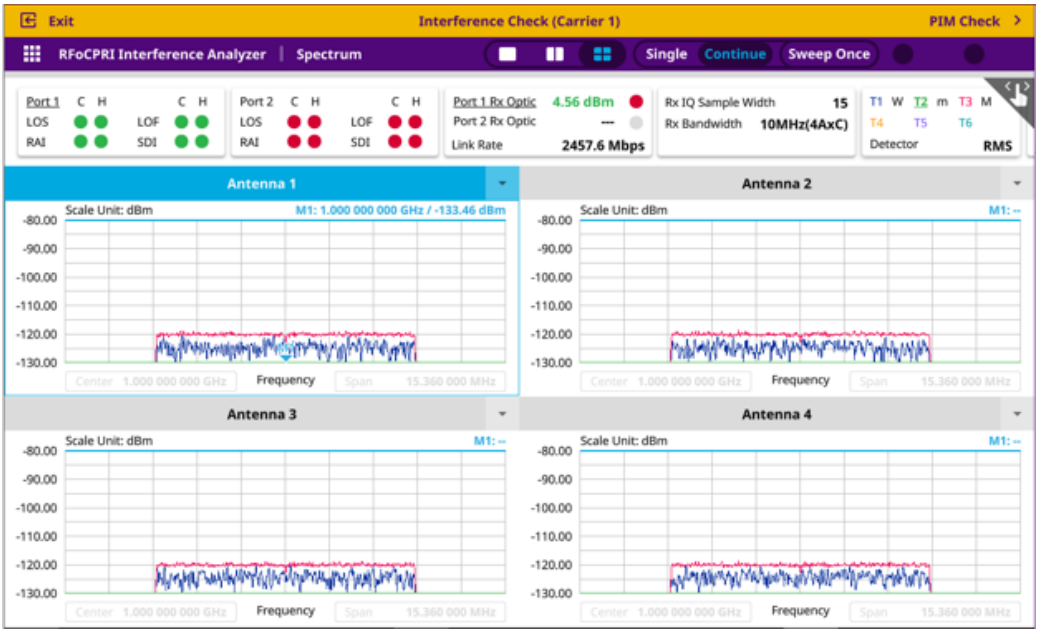
Carrier search with RFoCPRI Interference Analyzer



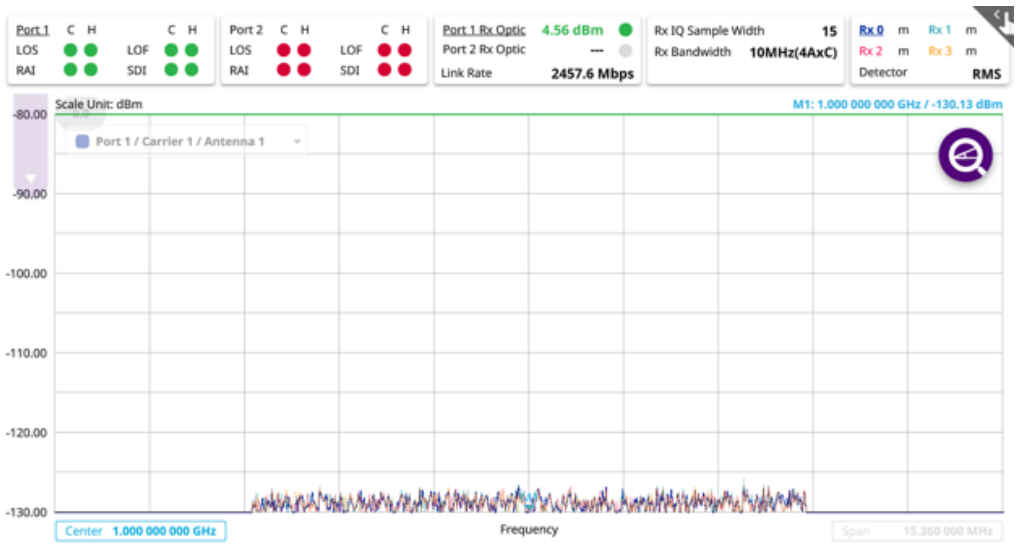
Detected carrier list with RFoCPRI Interference Analyzer



Interference check chart view with with RFoCPRI Interference Analyzer



PIM check chart view with with RFoCPRI Interference Analyzer



NOTE:
You can turn Flatness Table to On or Off using the icon on the top right corner of the measurement screen.

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 To set the CPRI line bit rate, tap **Link Rate** under **Port Configuration** and select the CPRI link rate option from **614.4 Mbps**, **1228.8 Mbps**, **2457.6 Mbps**, **3072.0 Mbps**, **4915.2 Mbps**, **6144.0 Mbps**, **9830.4 Mbps**, **10137.6 Mbps**, or **Auto**.

NOTE:
It is important that you set the link rate correctly to avoid any misleading LOS and LOF alarms displayed on the screen. Once Auto is selected, the instrument will automatically search Auto Link Rate.

3 To turn on or off the through mode, tap **On** or **Off** in **Thru** line.

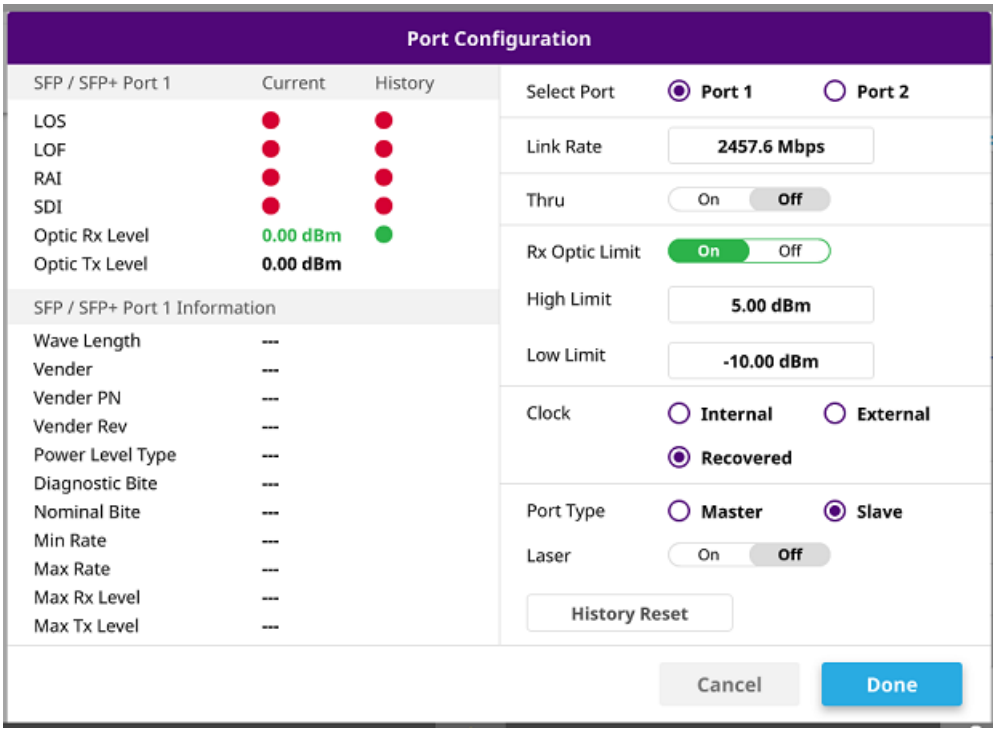
4 To set the Tx Clock, tap **Recovered** (default) in **Clock** box.

5 Tap **Port Type** to **Slave** (default).

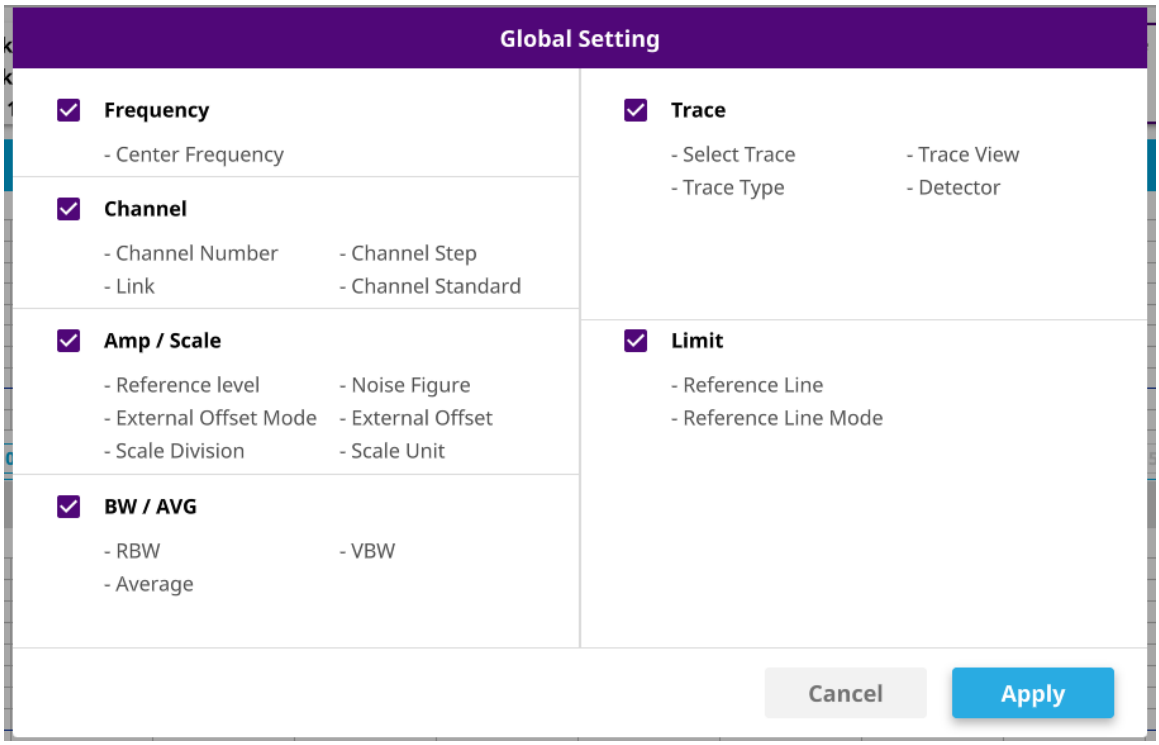
6 Tap **Global Settings** to configure each Rx carrier with the same parameter values especially when operating Dual or Quad windows screen.

a Frequency, Channel, Amp/Scale, BW/AVG, Trace and Limit settings are checked as default.

Port Configuration with RFoCPRI Analyzer



Global Settings window



Configuring Rx parameters

Because each network technology requires different Rx parameter settings, you need to configure the Rx parameters for the network technology you selected.

To configure Rx parameters for LTE, WCDMA:

1 Tap the **Setup** ( )icon on the side bar.

2 To **Rx Settings**.

3 Tap the **Port** drop-down menu and select beween **Port 1** and **Port 2**.

4 Tap the **Carrier** drop-down menu and select a carrier from 1 to 4.

5 Tap the **MIMO** drop-down menu and select from **2xMIMO**, **4xMIMO**, and **8xMIMO**.

6 To set the antenna per carrier group, tap one of the **Map Position (AxC 0 to AxC 7) box** and enter a value by using the on-screen keyboard.

NOTE:
Maximum number of the AxC Group is determined by the factors of link rate, sample width, oversampling, and signal bandwidth.

7 To set the I and Q sample widths, tap **IQ Sample Width** and enter a value between 4 and 20 by using the on-screen keyboard.

NOTE:
According to the CPRI specification, the IQ sample width shall be between 4 and 20 bits for I and Q in the uplink and between 8 and 20 bits in the downlink.

8 To set the stuffing bit, tap **Stuffing Bit** and enter a value between 0 and 20 by using the on-screen keyboard.

9 Tap **Exponent Bit** and enter a value between 0 and 2, using the on-screen keyboard.

NOTE:
This will be activated only if you choose NEM to None, this means you can test without any limitation for Sample Width or Stuffing Bit based on the NEM selection.

10 To set the first bit position of each **AxC Container** in the IQ data block of a basic frame, complete the following steps:

a Tap **Map Position**.

b Select the AxC Container number you want to set from: **AxC 0**, **AxC 1**, **AxC 2**, **AxC 3**, **AxC 4**, **AxC 5**, **AxC 6**, or **AxC 7**. Not all of these are activated depending on the bandwidth setting of the network technology you selected.

c Enter a value by using the on-screen keyboard.

NOTE:
The Antenna-Carrier (AxC) is the amount of digital baseband (IQ) U-plane data necessary for either reception or transmission of one carrier at one independent antenna element. The number of required AxC Container for a basic frame are two AxCs for 5 MHz, four AxCs for 10 MHz, and eight AxCs for 20 MHz.

11 To set the bandwidth of the downlink signal, complete the following steps:

a Tap **Bandwidth**.

b Select the bandwidth among **3 MHz**, **5 MHz**, **10 MHz (3 AxC)**, **10 MHz (4 AxC)**, **15 MHz (4 AxC)**, **15 MHz (5 AxC)**, **15 MHz (6 AxC)**, **20 MHz (5 AxC)**, or **20 MHz (6 AxC)**, **20 MHz (7 AxC)**, **20 MHz (8 AxC)**.

The RBW range changes depending on the bandwidth you selected. Required number of AxC containers may vary depending on the bandwidth you selected.

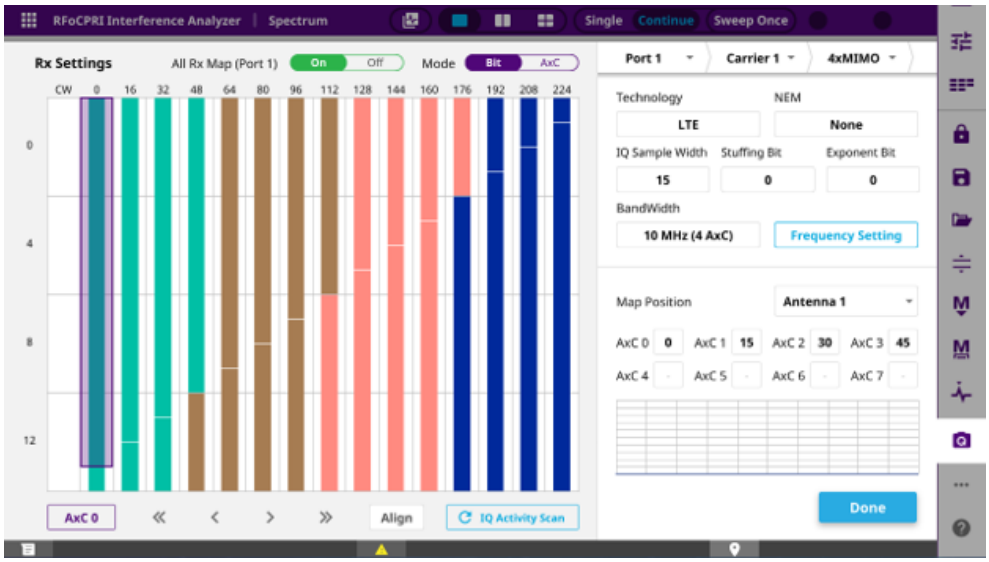
NOTE:
The Antenna-Carrier (AxC) is the amount of digital baseband (IQ) U-plane data necessary for either reception or transmission of one carrier at one independent antenna element. The number of required AxC Container for a basic frame are two AxCs for 5 MHz, four AxCs for 10 MHz, and eight AxCs for 20 MHz.

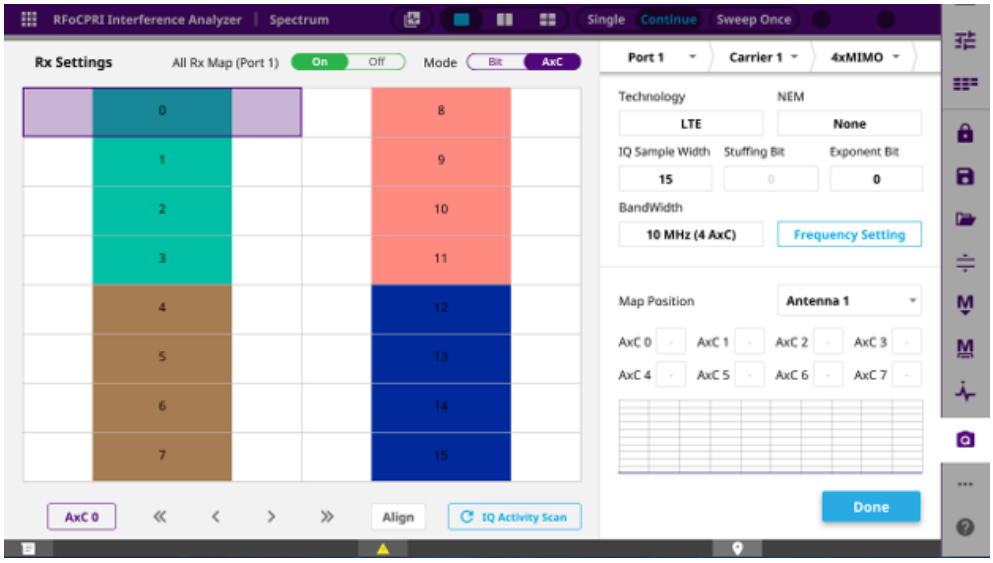
12 To use the pre-configured settings for NEM, select an **NEM** among **None** (no pre-configuration), **Alcatel-Lucent (UL/DL)**, **Samsung (UL/DL)**, **Huawei > Huawei (UL)** or **Huawei (DL)** and **ZTE (UL/DL)**.

NOTE:
If you have selected a NEM, the instrument sets the Map Position and other related settings automatically based on the selected NEM and you cannot edit the map position setting. The pre-configured information may be subject to changes at any times by NEMs.

13 Tap the **Frequency Setting** button to choose **Uplink** or **Downlink** and Band to be tested, then select your preferred band after tapping **Channel Standard**.

Rx Settings with RFoCPRI Analyzer





Configuring test parameters

Configuration of test parameters described in this section is used in the RFoCPRI mode including spectrum, spectrogram and spectrum replayer measurements.

Setting frequency

You can set the frequency with either frequency or channel number. If a frequency to be set matches to the frequency corresponding to the selected channel standard, the instrument calculates its channel number and updates the screen with it automatically.

To set the frequency with center frequency:

1 Tap **Frequency** under **Menu** ( ).

2 Tap **Center Frequency** and enter a value by using the on-screen keyboard.

3 Select a unit from **GHz, MHz, kHz**, or **Hz** and tap **Apply**.

To set the frequency with channel number:

1 Tap **Channel** under **Menu** ( ).

2 To select the standard channel:

   a Tap **Channel Standard**, then the standard channel window appears.

   b Tap the band to be measured.

3 Tap **Link** between **Uplink** and **Downlink**.

4 Tap **Channel Number**.

5 Enter a value by using the on-screen keyboard and tap **Apply**.
The CellAdvisor 5G automatically displays the corresponding center frequency value for the selected channel number.

Setting reference level

You can set the reference level automatically or manually to optimize the display of the traces measured, as you desire.

To automatically set the reference level:

1 Tap **Amp/Scale** under **Menu** ( ).

2 Tap **Auto Scale**.
Each time you tap, the Y-axis scale changes to be optimized with some margin.

To set the reference level manually:

1 Tap **Amp/Scale** under **Menu** ( ).

2 To set the maximum reference value on the Y-axis manually:

   a Tap **Reference Level**

   b Enter a value by using the on-screen keyboard and tap **Apply**.

Optional. **To change the scale unit:**

1 Select **Scale Unit** under **Amp/Scale**.

2 Select the unit of the display scale from: **dBm**, **dBV**, **dBmV**, **dBµV**, **V**, or **W**.
The scale unit on the screen changes accordingly.

Setting scale per division

You can use the **Scale Division** feature to change the scale per division, representing the value of one division on the horizontal scale. The default setting is 10 dB per division and the maximum value can be set up to 20 dB.

1 Tap **Scale Division** under **Amp/Scale**.

2 Enter a value between 1 and 20 by using the on-screen keyboard and tap **Apply**.

Setting external offset

You can turn the **External Offset** on and manually set the external offset value. An offset consists of a cable loss and a user offset, and the measurement result shows the value reflecting both offset values. When the external offset value is set at 40 dB, the measurement result compensates 40 dB.

1 Tap **External Offset Mode** to **On** under **Amp/Scale**.

2 Tap **External Offset**

3 Enter a value by using the on-screen keyboard and tap **Apply**.

4 To turn the external offset off, tap **External Offset Mode** to **Off**.

Enabling Auto leveling

It is normal that you see higher level of RSSI in CPRI spectrum than you have seen in RF spectrum because the digital signal has a different gain level from RF's. If you use the Auto Leveling feature and enter the Noise Figure (NF) for the system to be tested, the instrument calculates an offset that compensates the digital gain of RRH and applies it to the spectrum automatically to displace the level of spectrum to a known RSSI power even though its accuracy cannot be guaranteed. Offset calculation for Auto Leveling is based on the following:

Auto Level offset = (Noise Floor of RFoCPRI) – (Ideal Noise Floor of RRH), where (Idea Noise Floor) = N.F (RRH) + Thermal Noise + 10log (RBW)

1 Tap **Auto leveling** under **Amp/Scale**.
A calculated level of offset without NF is applied as the external offset and the user input field is activated for entry of the noise figure value.

2 Enter a noise figure value by using the on-screen keyboard.

3 Tap **Apply** to complete the entry.
New external offset value appears in the **External Offset** menu box.

4 Tap **External Offset** to **Off**, then **Auto Leveling** will be **Off**.

NOTE:
Having the noise figure factored in the offset calculation for Auto Leveling will enable you to view the CPRI spectrum closer to what you can view in the RF spectrum, but if you do not know the noise figure, you can skip this noise figure setting.

Setting RBW

You can set the RBW and VBW in the Spectrum, Spectrogram modes. The RBW range is limited as per the bandwidth of the signal under test.

1 Tap **BW/AVG** under **Menu (** **)**.

2 Tap **RBW** to set the resolution bandwidth.

3 Choose one of the following options: **100 kHz**, **30 kHz**, **10 kHz** or **7.5 kHz**.

- For signal bandwidths 1.4 MHz and 3 MHz: RBW from 1 kHz to 30 kHz
- For signal bandwidths 5 MHz, 10 MHz, 15 MHz, and 20 MHz: RBW from 1 kHz to 100 kHz

4 Tap **VBW** to set the video bandwidth and choose one of the following options: **100 kHz**, **30 kHz**, **10 kHz** or **7.5 kHz**.

Setting average

You can set the number of measurements to be averaged for the trace presentation in the Spectrum, Spectrogram modes. A maximum of 100 times of averaging can be set. When the averaging reaches your setting, a new measurement value replaces the measurement value in sequence from the earliest.

1 Tap **BW/AVG** under **Menu (** **)**.

2 Tap **Average** and enter a value between 1 and 100 as needed by using the on-screen keyboard.

Setting sweep mode

In the RFoCPRI Spectrum and Spectrogram measure modes, different sweep settings are available for better measurement including the sweep run mode (**Single**, **Continue**).

1 Tap **Sweep** under **Menu (** **)**.

2 Select the desired sweep run mode by tapping the **Sweep Mode** between **Single** and **Continue**

- **Single**: In this mode, the instrument performs a single sweep and waits for further entries.
- **Continue** (default): In this mode, the instrument is continuously measuring and updating result.

3 *Optional*. In the Single mode, tap **Sweep Once** to get a new measurement.

Setting trace

You can display up to six traces on the measurement chart simultaneously.

1 Tap **Trace** under **Menu (** **)**.

2 Tap **Select Trace** and select the trace number: **Trace 1**, **Trace 2**, **Trace 3**, **Trace 4**, **Trace 5**, or **Trace 6**.

3 Complete one of the followings by tapping **Trace Type**:

- **Clear Write**: Clear current data and display with new measurements
- **Max** : Display the input signal's maximum response only (unlimited or for a certain amount of time)
- **Min** : Display the input signal's minimum response only (unlimited or for a certain amount of time)
- **Capture**: Capture the selected trace and compare traces
- **Load**: Load a saved trace
- **Trace View** to **Off**: Hide the displayed trace
- **Trace Set Max/Min** : To set Trace 1, Trace 2, and Trace 3 to Clear Write, Max, and Min (only available in spectrum mode)

4 To **r**emove all the traces and initialize the trace settings, tap **Trace Clear All**.

NOTE:
For the **Max** and **Min**, your instrument compares newly acquired data with the active trace and displays larger maximum values or smaller minimum values on the screen.

5 To select the detection option, tap **Detectors**, and then complete one of the followings:

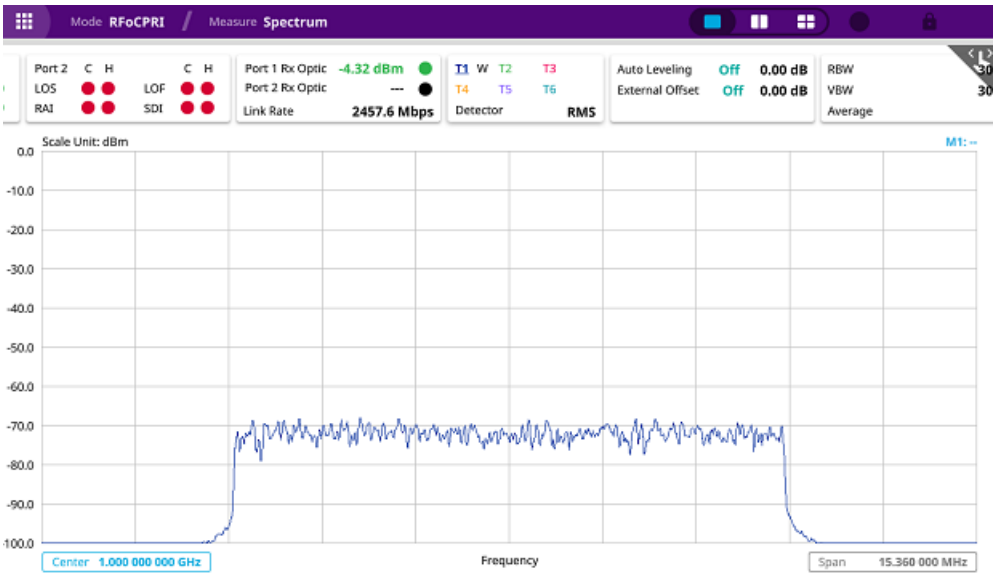
- Select **Normal** to display **'**Random noise better than the peak without missing signals'
- Select **Peak** to display 'The highest value in each data point'
- Select **RMS** to display 'The root mean squared average power across the spectrum'
- Select **Negative Peak** to display 'The lowest value in each data point'
- Select **Sample** to display 'The center value in each data point'

6 *Optional.* **Select Trace Info**, and then select the trace number to view the trace's parameter setting information stored at the time of the measurement or **None** to hide the information display.

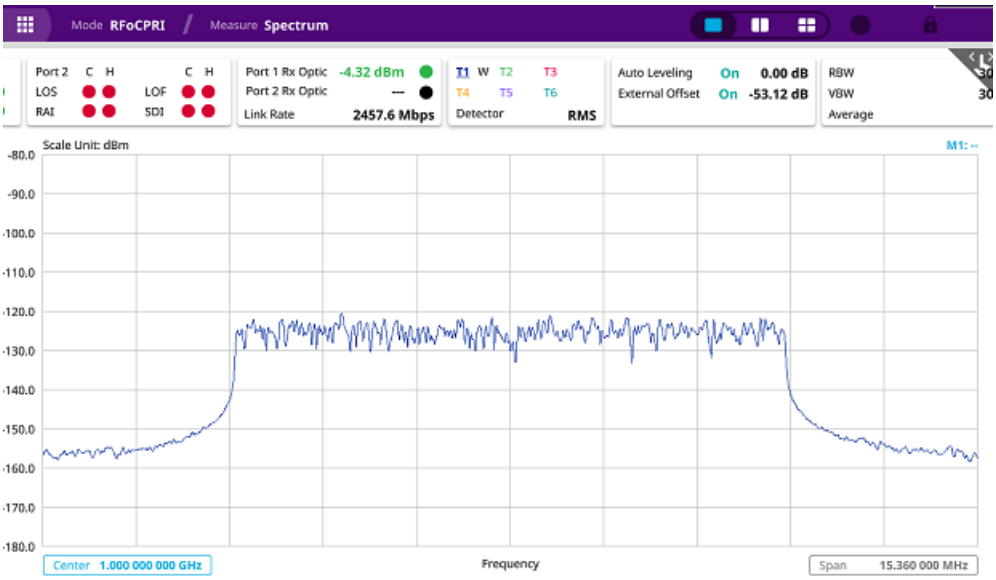
7 *Optional.* If you have the two traces Trace 1 and Trace 2, you can perform trace math. To view the power difference between the traces, tap **T1 – T2 -> T5** or **T2 – T1 -> T6**. The result is overlaid on the screen along with the second Y-axis.

NOTE:
To be able to load a trace, the trace to be overlaid must be saved in the same measurement mode and frequency setting as the current measurement.

Before enabling Auto Leveling



After enabling Auto Leveling



Selecting network technology

Before you start performing the interference analysis, you need to choose a network technology to analyze.

1 Tap the **Setup** ( ) icon on the side bar of each measurement mode.

2 Tap **Rx Settings** > **Technology** and select a desired network technology form the menu bar: **LTE** (default), **WCDMA**.

Depending on the network technology you selected, the settings on the Rx Parameter menu change accordingly.

Conducting spectrum measurement

After setting test parameters as described in "Configuring test parameters", you can perform spectrum measurements with an audible indicator. You can also turn on the interference ID.

1 Tap the **Setup** ( )icon on the side bar of Spectrum Measurement mode.

2 To set the sound indicator, complete the following steps:

a Tap **Sound Indicator > Alarm Reference** then, choose either **Marker** or **Line**.

- **Marker**: Sets the active marker position as the alarm reference if you have enabled a marker on the spectrum.
- **Line**: Makes the reference line as the alarm reference.

b If you have set the alarm reference to **Line**, tap the **Reference Line** to set a threshold for an alarm.

c Enter a value by tapping + or -, and tap **Apply**.

d Tap **Sound** either **On** or **Off** to turn on/off the alarm sound.

e *Optional.* To adjust the volume for alarm sound, tap **Volume**, and adjust the volume.

	NOTE: The Sound Indicator is used to identify interfering signals with alarm sound. It is especially useful for locating interferer sources with a directional antenna.

3 To set the interference ID, complete the following steps:

a Tap **Interference ID** and **Threshold**.

b Enter a value and tap the **dBm**.

c Tap **Interference ID** and choose either **On** or **Off** to turn on/off the Interference ID.

	NOTE: The Interference ID automatically classifies interfering signals over a designated spectrum and displays a list of possible signal types corresponding to the selected signal.

4 Tap **Window Mode** and select from the options: **Single**, **Dual**, or **Quad**.

a When you select **Dual**, you can select two Rx carriers to be seen for each chart. You can see the two charts at the same time only when you select Dual.

b Tap to switch **Multi Active Trace** to **On** or **Off**.

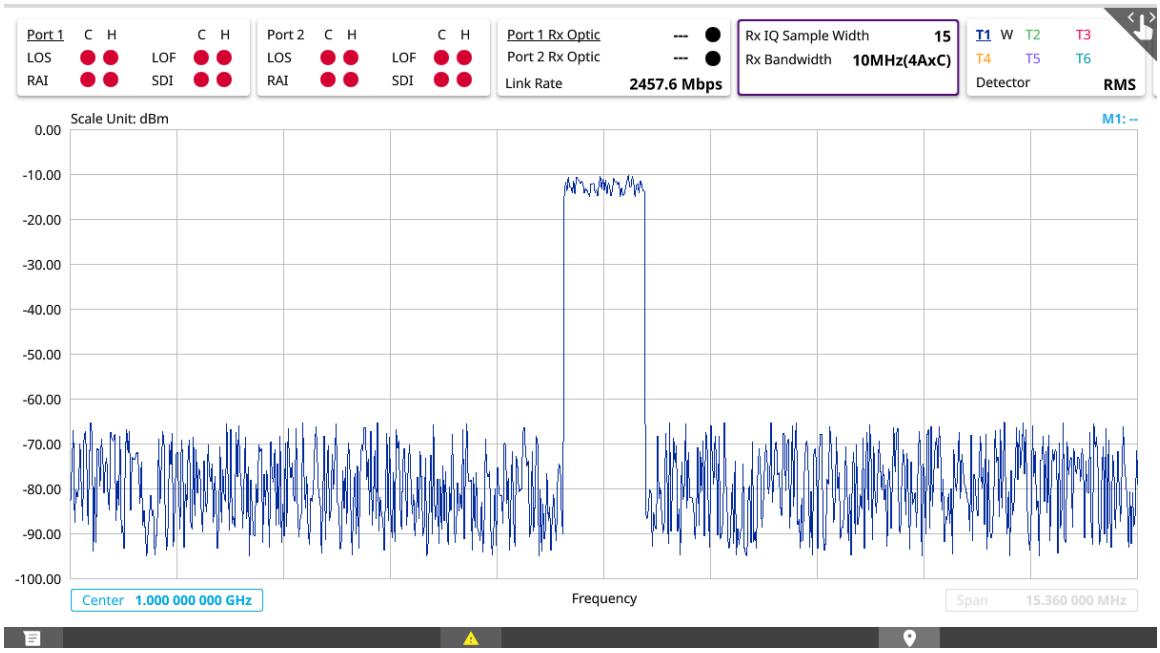
If turned on, you can view two sweeping traces, one from the top window and the other from the bottom window, overlapped on a single chart. This function is not enabled when you select Single.

5 To clear current (C) and history (H) status of CPRI alarm on LOS and LOF and start a new monitoring, tap the **Port Configuration** under **Setup** ( ) icon and **History Reset**.

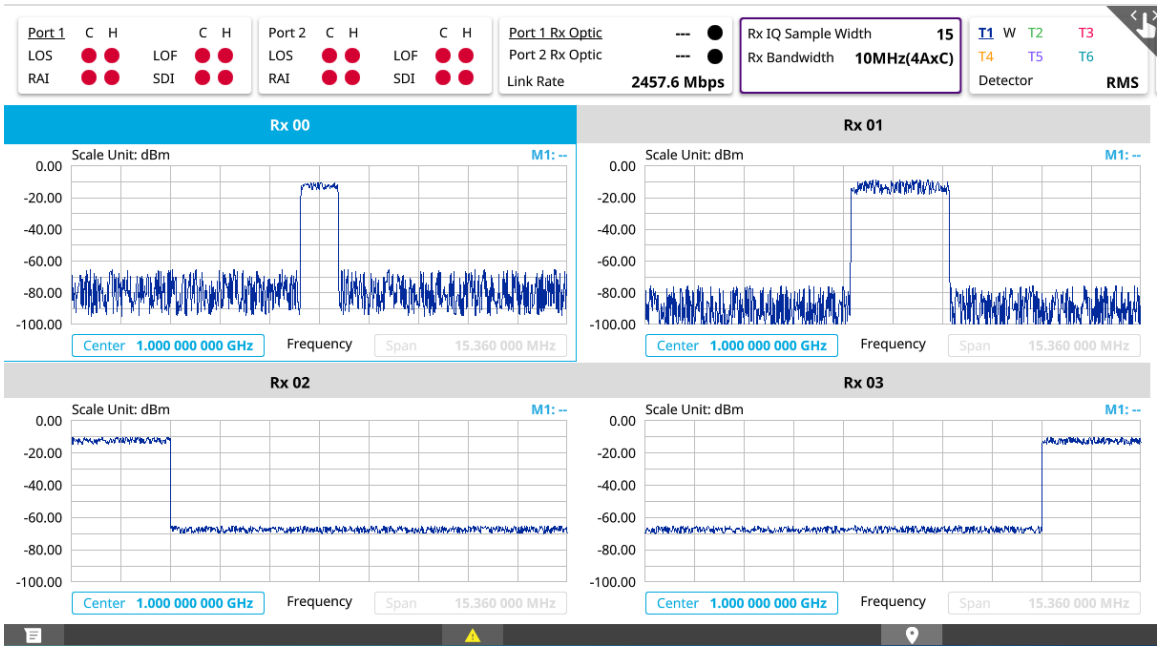
6 *Optional.* Go to **Save**( ) icon on the side bar, and then select the save option from the choices available for your measurement mode. If you have saved logging data, you can play them in the Spectrum Replayer mode.

NOTE:
You can use the **Limit** menu to analyze your measurements with the display line.

RFoCPRI spectrum measurement



RFoCPRI spectrum measurement (Quad)



To perform PIM detection

1 Tap the **Setup** ( )icon on the side bar of Spectrum Measurement mode.

2 Tap **Windows Mode** and select **Dual** or **Quad**.

a Tap **Multi-Active Trace** to **On**.

> **NOTE:**
> You will find a combo box on the left side of the screen and you can select carriers from Rx0 to Rx3 to be shown in the screen.

b Select the AxC Container number you want to set from: **AxC 0**, **AxC 1**, **AxC 2**, **AxC 3**, **AxC 4**, **AxC 5**, **AxC 6**, or **AxC 7**. Not all of these are activated depending on the bandwidth setting of the network technology you selected.

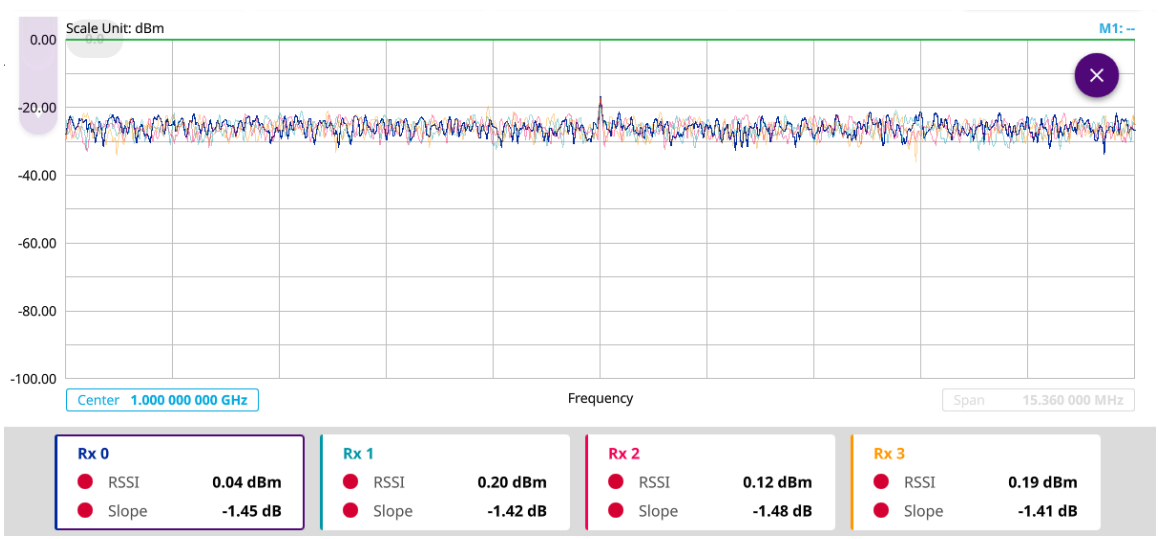
c Enter a value by using the on-screen keyboard.

3 Go to **Setup** and tap **Flatness** to **On** or tap the top right button in the screen.

a If you select **Dual**, tap **Rx0** and **Rx1 Flatness Bandwidth**, and **Rx0** and **Rx1 RSSI Bandwidth** then input the required bandwidth using the on-screen keyboard.

b If you select **Quad**, tap **Rx0**, **Rx1**, **Rx2**, and **Rx3 Flatness Bandwidth**, and tap **Rx0**, **Rx1**, **Rx2**, and **Rx3 RSSI Bandwidth** then input the required bandwidth using the on-screen keyboard.

RFoCPRI PIM detection



Conducting spectrogram

The Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

After setting test parameters as described in “Configuring test parameters”, you can perform spectrogram measurements.

1 Tap the **Setup** ( )icon on the side bar of **Spectrogram Measure** mode.

2 To set the amount of time between each trace measurement, tap **Time Interval** and enter a value by using the on-screen keyboard.

3 To set the time cursor on a specific trace position, complete the following steps:

   a Tap **Time Cursor** to **On**.

   b Tap **Position** to enter a value. You can also use the move bar (up and down arrows) in the lower left screen to move the time cursor.

   c To turn the time cursor off, tap **Time Cursor** to **Off**.

> **NOTE:**
> Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

4 To start a new measurement, tap **Reset/Restart**.

5 To clear current (C) and history (H) status of CPRI alarm on LOS and LOF and start a new monitoring, tap the **Port Configuration** under **Setup** ( ) icon and tap **History Reset.**

6 *Optional.* Go to **Save**( ) icon on the side bar, and then select a desired save option for your measurement mode.

> **NOTE:**
> You can use the **Limit** menu to analyze your measurements with the display line.

RFoCPRI interference measurement in spectrogram

Performing spectrum replayer

The Spectrum Replayer lets you retrieve and replay recorded spectrum analyzer traces in interference analysis mode. These traces can be played back in the spectrogram or RSSI. You can configure the limit line to create failure points when signals exceed it. The failure points are clearly displayed on the trace timeline for quick access during playback.

1 Select a file to be loaded, and then tap **Load**. The measure setup menu appears below on the screen.

2 Tap **FWD** or **REV** to change play direction to forward or reverse.

3 Tap the left or right arrow of **Speed** to select the speed option: **X1**, **X2**, **X3**, or **X4**.

4 Tap **Play** to start playing.

5 Tap **Pause** to pause or stop playing data.

6 To move to a particular failure position directly and play from there, tap **Index Fail** and enter a value by using the on-screen keyboard.

7 *Optional.* Tap **Time Cursor** under the **Setup** ( ) icon between **On** and **Off** to display or dismiss the time cursor on the screen. This key becomes activated when you play logged data in the Spectrogram mode.

NOTE:
If you connect a USB drive, do not remove it while playing to prevent freezing the USB port, which will require you to restart the instrument to get a USB drive recognized again.

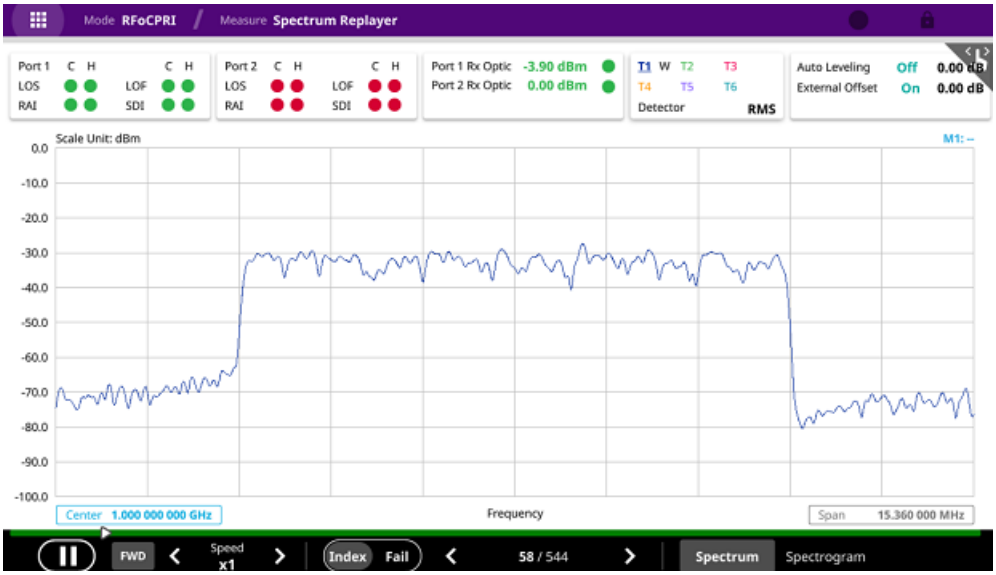
Setting Display

You can select the display option to view data in a different mode.

1 Select the display option from **Spectrum** or **Spectrogram** in the lower right screen.

NOTE:
You can use the **Limit** menu to analyze your measurements with the display line.

RFoCPRI spectrum replay



Using TDD Auto Gated Spectrum Analyzer

Introduction

TDD Auto Gated Spectrum (TAGS) allows to detect interference signal on the TDD band by gating on the Guard Period. In case of intervals where singal changes from uplink to downlink, there exists no signal (Guard Period). The TAGS is designed to find unwanted or interfering signals.

- Interference Analysis
  - Spectrum
  - Spectrogram
  - Persistent Spectrum
  - Persistent Spectrogram
  - RSSI
  - Interference Finder
  - Radar Chart
- Online Interference Analysis
  - Online Interference Finder
  - Online Radar Chart

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **TDD Auto Gated Spectrum Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Interference Analysis > **Spectrum**, **Spectrogram**, **Persistent Spectrum**, or **Persistent Spectrogram**, **RSSI**, **Interference Finder**, or **Radar Chart**

Online Interference Analysis > **Online Interference Finder** or **Online Radar Chart**

Auto configuring parameters

For each measurement of TAGS, you can configure parameters automatically in the pop-up window.

Setting auto cofiguration

1 Go to any measurement then tap the **Setup** ( ) icon on the side bar.

2 Tap to switch **Technology** between **NR** and **LTE**.

a If you select **NR**, do the following steps:

- Tap **Auto Configuration**.

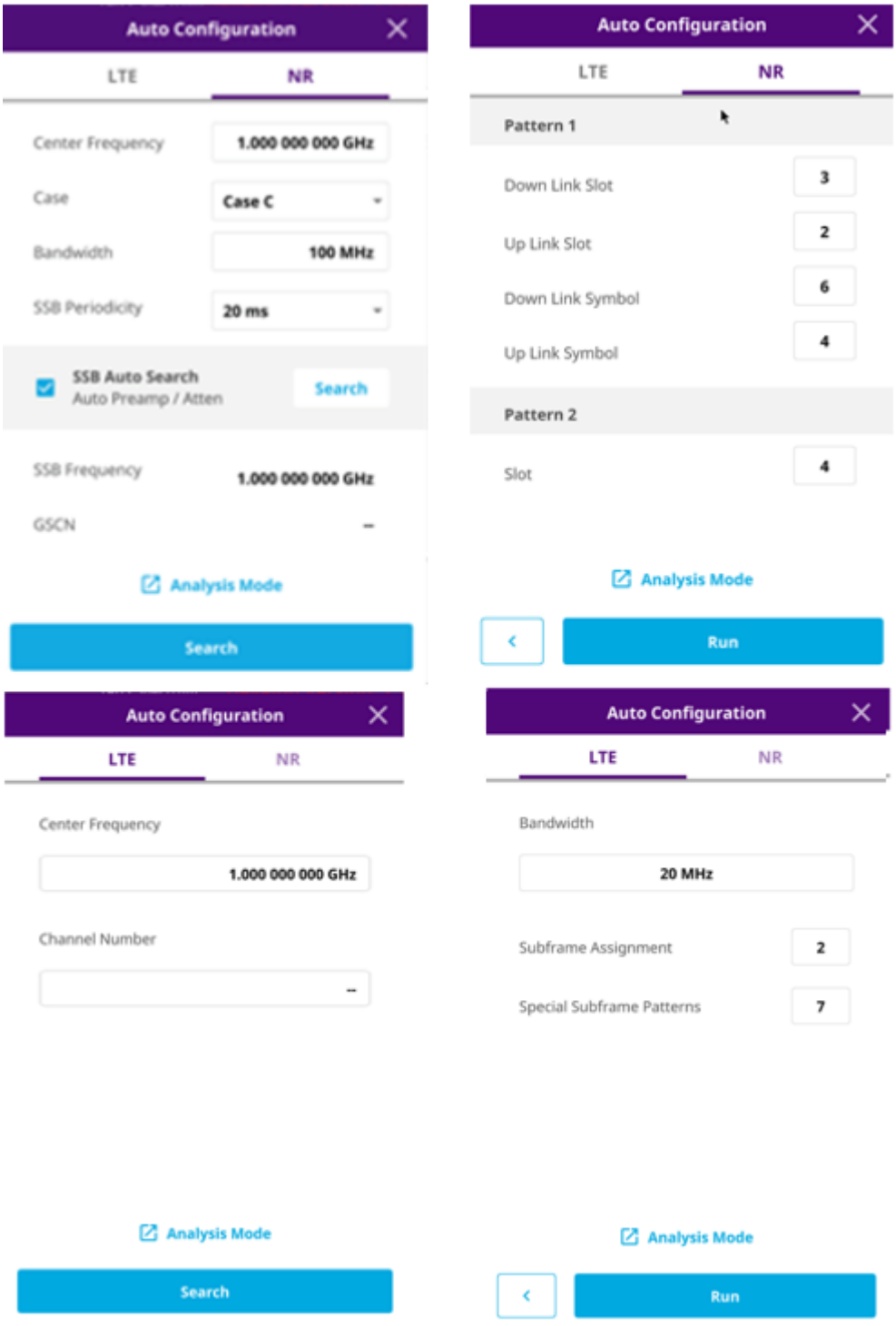
- Select the parameters as required in the pop-up window: Center Frequency, Case, Bandwidth, SSB Periodicity.
- Click SSB Auto Search then tap the Search button. You can also type in SSB Frequency and GSCN.
- Once SSB is obtained, Sync LED at the background turns to green.
- Once the Frame and Slot format has been identified, it shows the values detected: Down Link Slot, Down Link Symbol, Up Link Slot, and Uplink Symbol.
- Tap the **Run** button to start TDD Auto Gated Spectrum when the auto detection is successful.
- Tap to start the **Analysis Mode** to determine the Frame and Slot Format manually.

b If you select **LTE**, do the following steps:

- Tap **Auto Configuration**.
- Tap the **Center Frequency** box and input the required value using the on-screen keyboard.
- Tap the **Channel Number** box and input the required value using the on-screen keyboard.
- Tap the **Search** button.
- Once the search is successful, Sync LED at the background turns to green.
- Once the Frame and Slot format has been identified, it shows the values detected:Bandwidth, Subframe Assignment, Special Subframe Assignment.
- Tap the **Run** button to start TDD Auto Gated Spectrum when the auto detection is successful.
- Tap to start the **Analysis Mode** to determine the Frame and Slot Format manually.

NOTE:
Auto Search works with Standalone 5G NR network only. You need to check the deployment mode of your 5G NR Network if Auto Search does not work even with a strong RSRP.

Auto configuration



NOTE:
Once you tap the Analysis Mode in the Auto Configuration Window, you can identify frame and slot formats.

Identifying frame format

1 Tap **Deviation** to see the slot activity. Each bar represents the peak power of each slot.

2 Analyze the height variation of each bar.

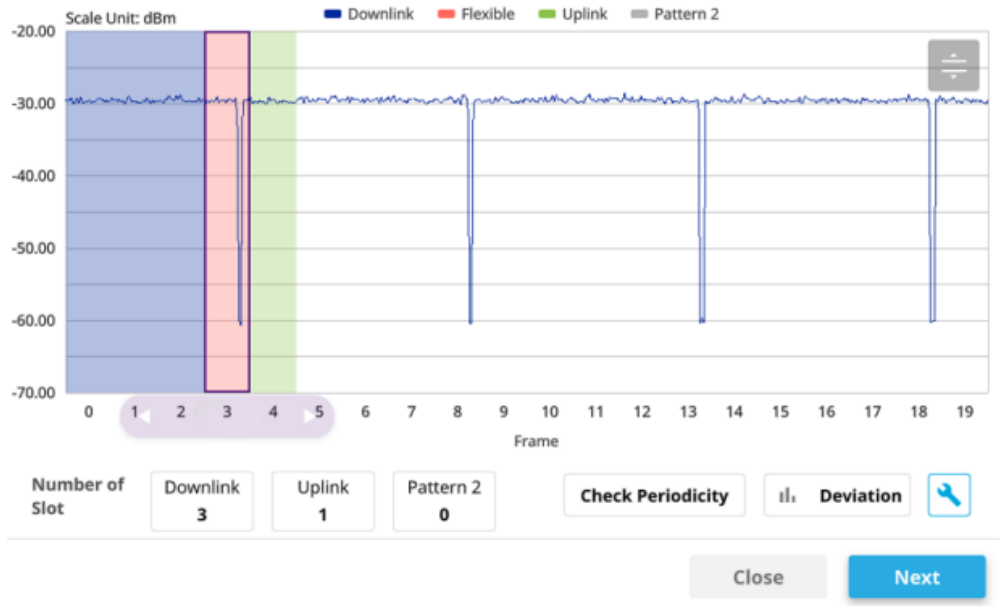
3 When selecting **NR** tech, do the followings:

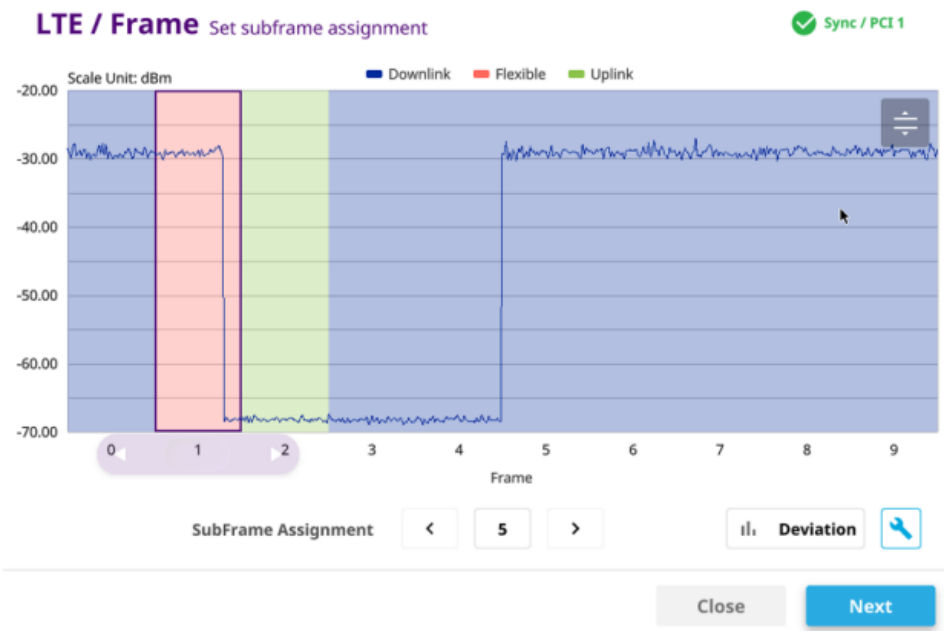
- **a** Configure **Number of Downlink Slot** and **Number of Uplink Slot**.
- **b** Tap **Check Periodicity**.
- **c** Verify if all UL slots assigned (in green color) shows relatively less power variation.
- **d** Select **Next** to move to Slot Format analysis.

4 Tap **Check Periodicity**.

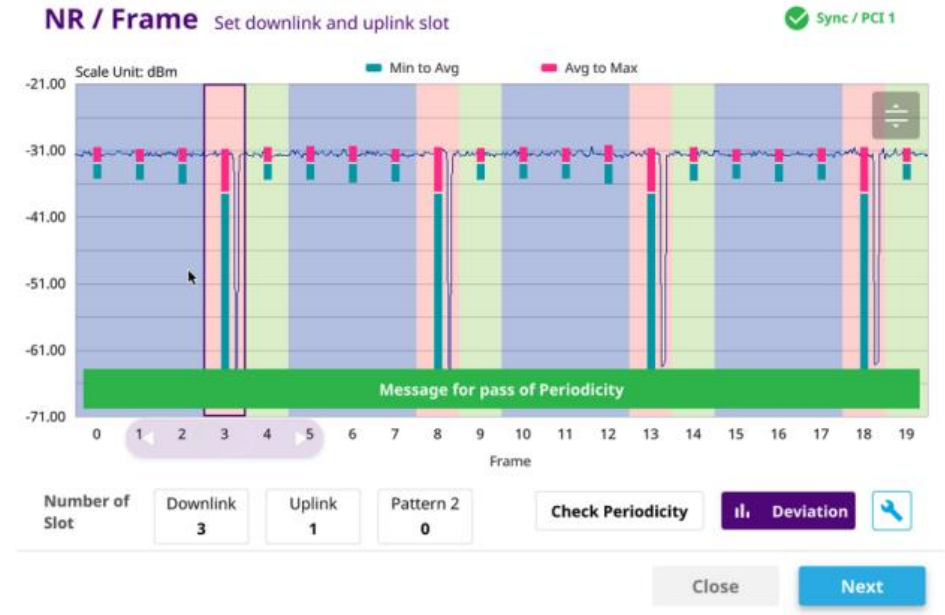
- **a** Tap **Subframe Assignment**.
- **b** Select the required assignment then tap the **Apply** button.
- **c** Select **Next** to move to Slot Format analysis

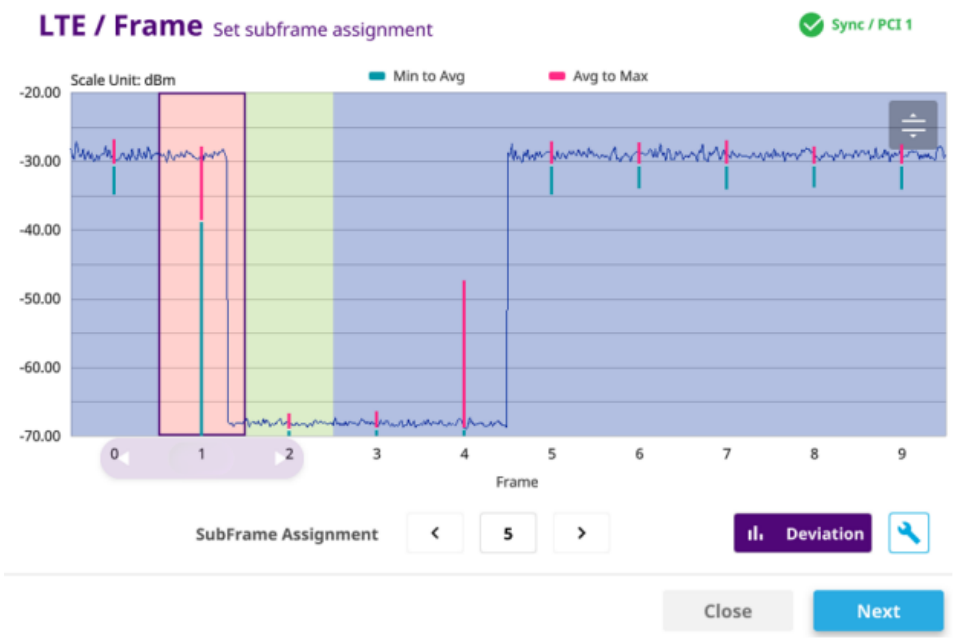
P vs T frame chart veiw





P vs T frame deviation bar





NOTE:
The figure above is an example of Check Periodicity with a success message.

Identifying slot format

1 When selecting **NR** tech, do the followings:

   a Top chart shows symbol power variation for one special slot period where the DL to UL transmission is made.

   b Check the Symbol Power activity and assign the number of DL symbol and UL symbol.

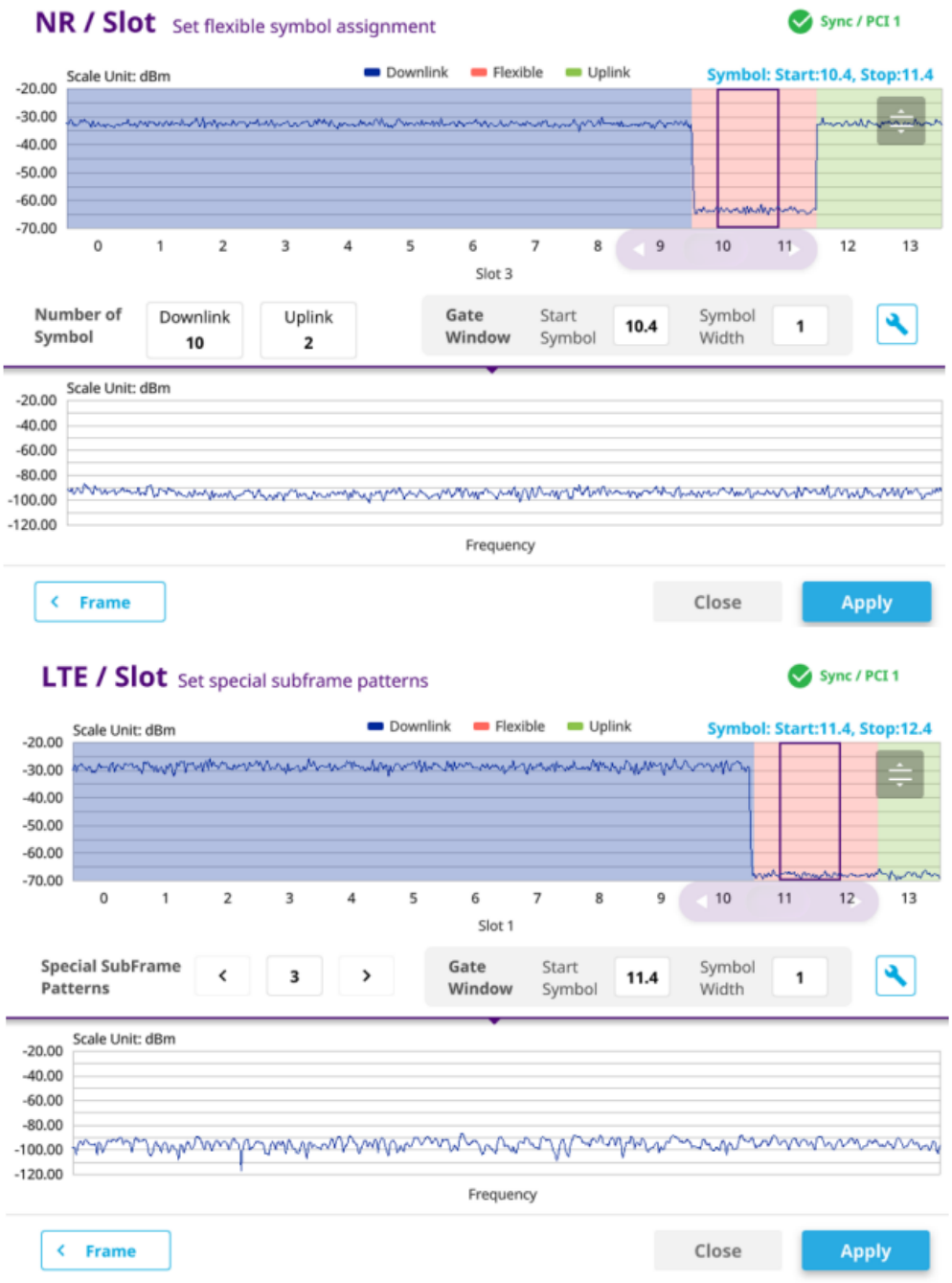
2 When selecting **LTE** tech, do the followings:

   a Top chart shows symbol power variation for one special slot period where the DL to UL transmission is made.

   b Check the Symbol Power activity assign the special subframe patterns (SPP).

NOTE:
DL Symbols always start from the beginning of the slot and extended to the right, whereas the UL symbols start from the end of slot and extended to the left. The rest symbols are for FF and placed in between DL and UL symbols.

Slot format



Setting gate window

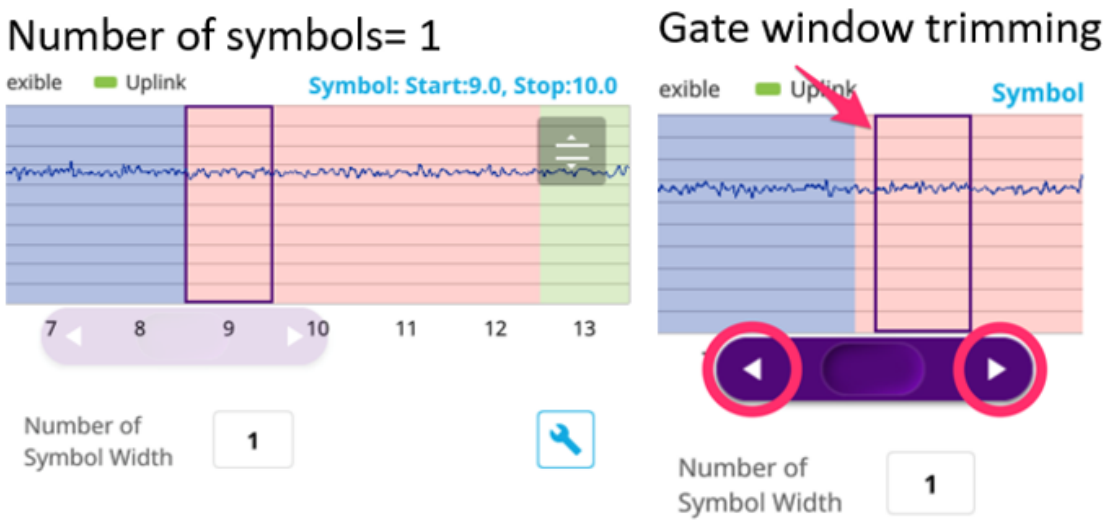
1 Set the number of symbols to monitor.
By increasing the number of symbol width, CellAdvisor 5G can provide RTSA persistence spectrum with better POI.

NOTE:
Make sure that your Gate window is free from UL or DL signal activities as tradeoff is increasing possibility of involving delayed DL or UL.

2 Trim the start point of Gate window by using the control bar to avoid DL or UL signal activity caused by the propagation delay of UL signal and advanced signaling from UE to compenstate the delay.

3 Tap the **Apply** button to run Gated Spectrum with a full chart veiw.

Slot format/Gate window



Conducting interference measurement

The following sections describe how to conduct interference measurements for manual Configuraiton.

Spectrum

You will be able to perform Spectrum Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Maual configuration for NR

The following is the procedure for manual configuation for NR.

NOTE:
Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

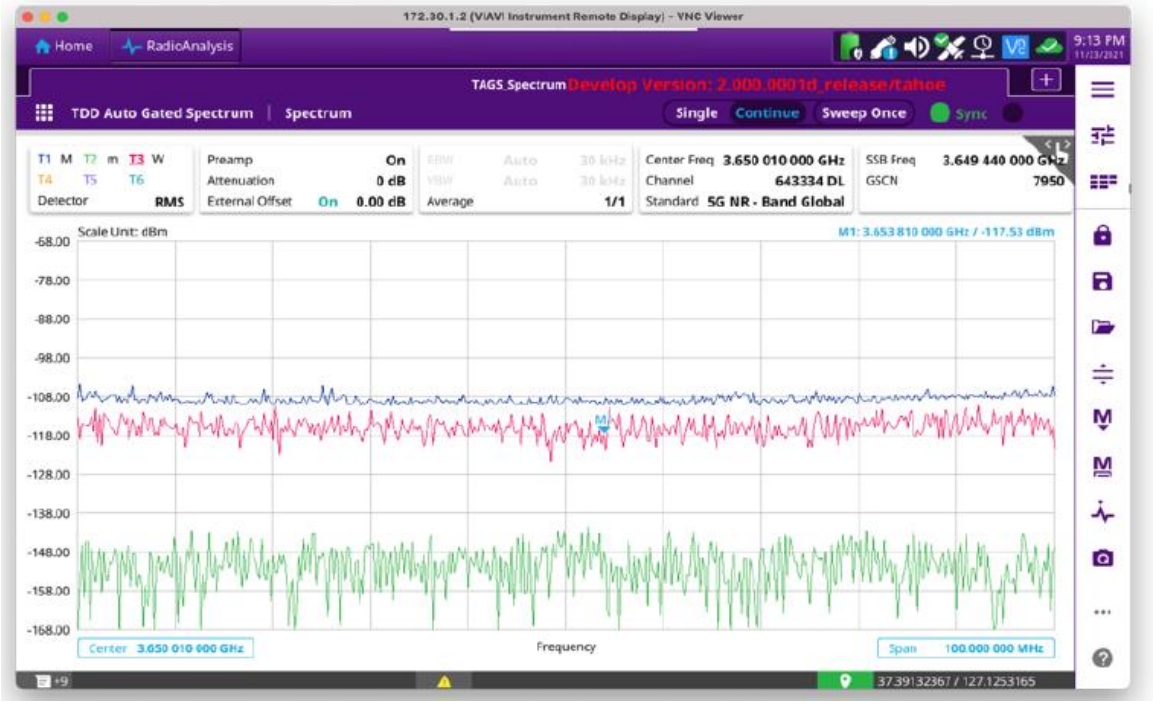
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Spectrum measurement with TAGS



Spectrogram

You will be able to perform Spectrogram Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

The following is the procedure for manual configuation for NR.

	NOTE: Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

Setting measure setup

Manual configuration for NR

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

> **NOTE:**
> Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

7 Go back to **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

8 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

9 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

11 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**,**Uplink Symbol** as required.

12 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

> **NOTE**
> If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

13 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

14 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

15 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

16 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

17 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual configuration for LTE

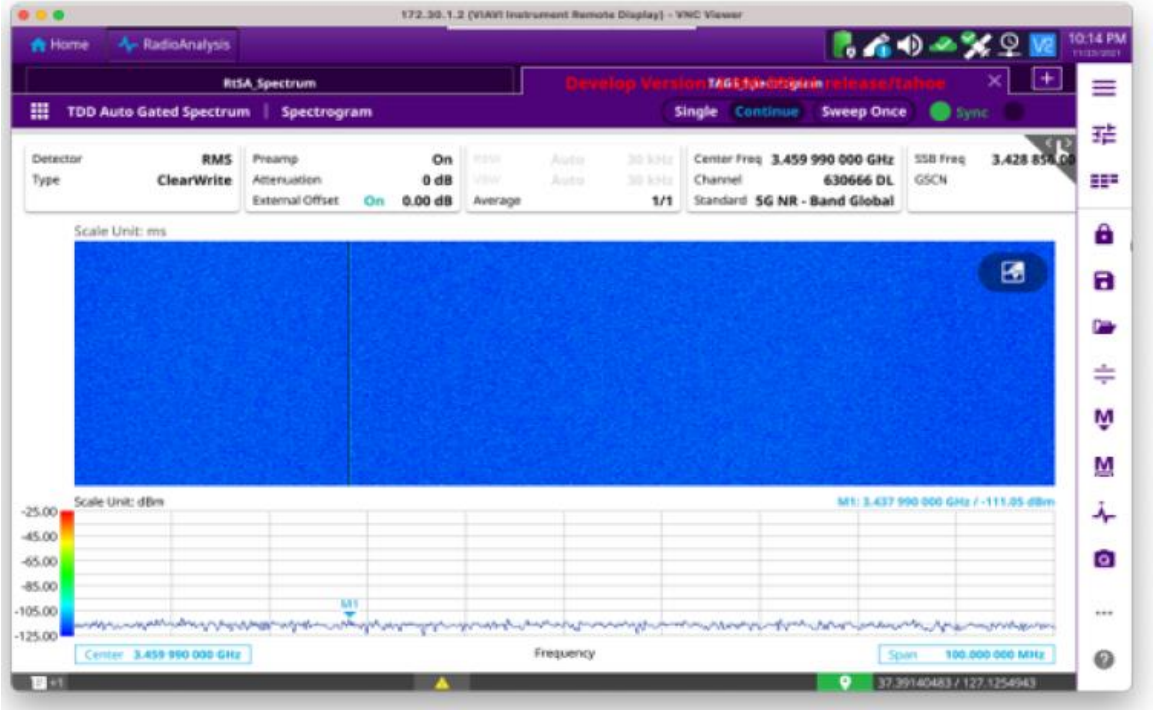
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Spectrogram measurement with TAGS



Persistent spectrum

You will be able to perform Persistent Spectrum Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Maual configuration for NR

The following is the procedure for manual configuation for NR.

	NOTE: Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

   a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

   - SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
   - SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

> **NOTE**
> If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

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Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

> **NOTE:**
> If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

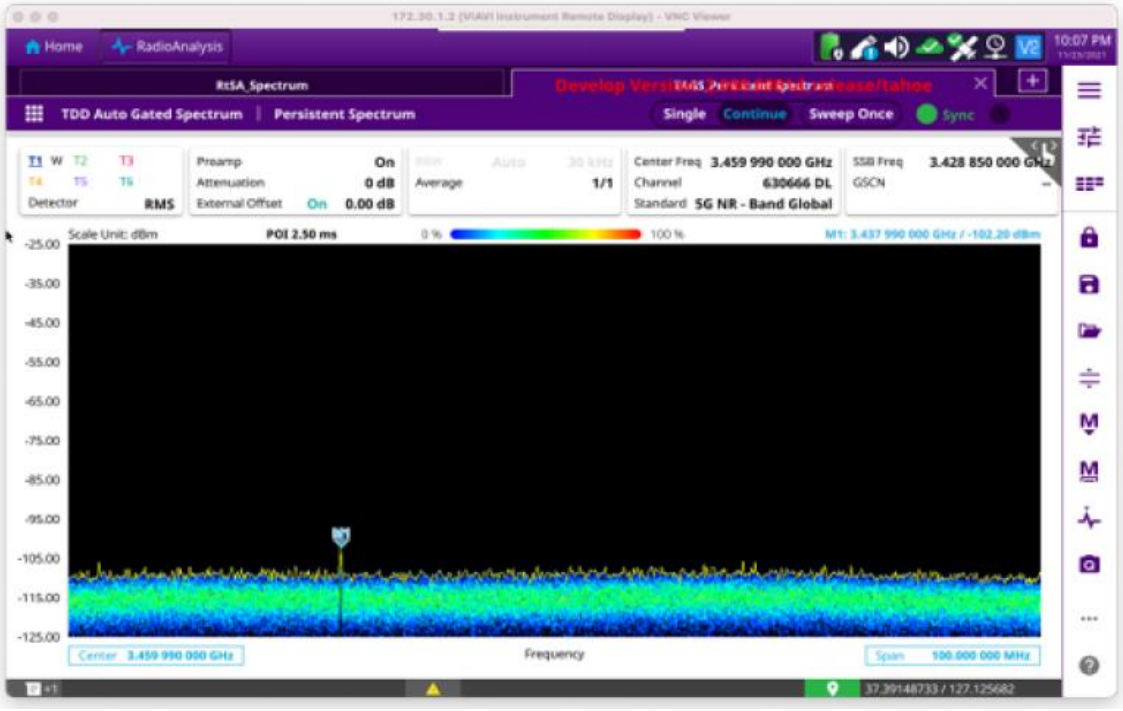
5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

NOTE:
You can go to Menu > Limit to analyze your measurements with the reference line, multi-segment line, and channel limit table. See "Setting limit" for more details.

Persistent spectrum measurement with TAGS



NOTE:
Compared to Persistence Spectrum in RTSA, Persistent Spectrum in TAGS is especially useful when tracking the level of weak interference to find interference source.

Persistent spectrogram

You will be able to perform Persistent Spectrogram Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

> **NOTE:**
> Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

> **NOTE:**
> Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

7 Go back to **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

8 Tap **Bandwidth/SSB SCS** then a Setting window appears.

- **a** If you select the operating frequency as FR1, select from the following (FR 2 is not available):
  - SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
  - SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

9 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

11 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**,**Uplink Symbol** as required.

12 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

> **NOTE**
> If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

13 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

14 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

15 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

16 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

17 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual configuration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

NOTE:
If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

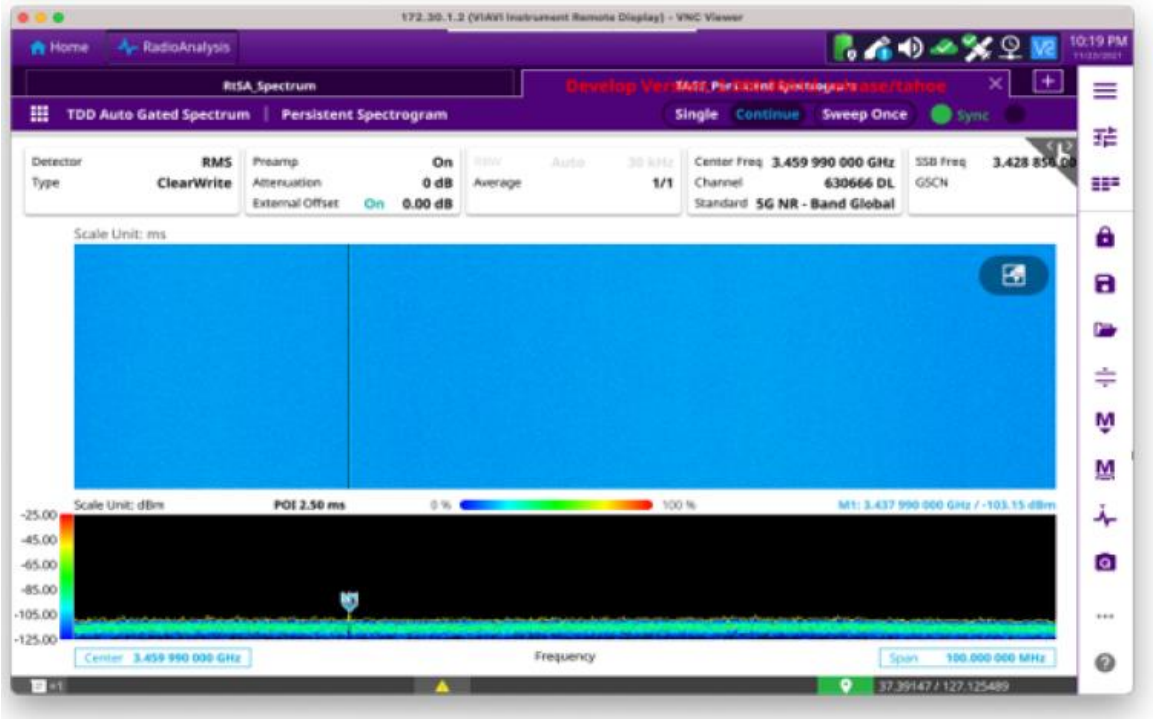
5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

NOTE:
You can go to Menu > Limit to analyze your measurements with the reference line, multi-segment line, and channel limit table. See "Setting limit" for more details.

Persistent spectrogram measurement with TAGS



NOTE:
Compared to Persistence Spectrum in RTSA, Persistent Spectrum in TAGS is especially useful when tracking the level of weak interference to find interference source.

RSSI

The Received Signal Strength Indicator (RSSI) is a multi-signal tracking metric that is particularly useful for measuring power-level variations over time. The RSSI measurement lets you assign power limit line for audible alarms and increase alarm counters every time a signal exceeds a defined limit line.

Setting measure setup

Manual configuration for NR

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

NOTE:
Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

7 Go back to **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

8 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

9 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

11 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**,**Uplink Symbol** as required.

12 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

13 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

14 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

15 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

16 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

17 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual configuration for LTE

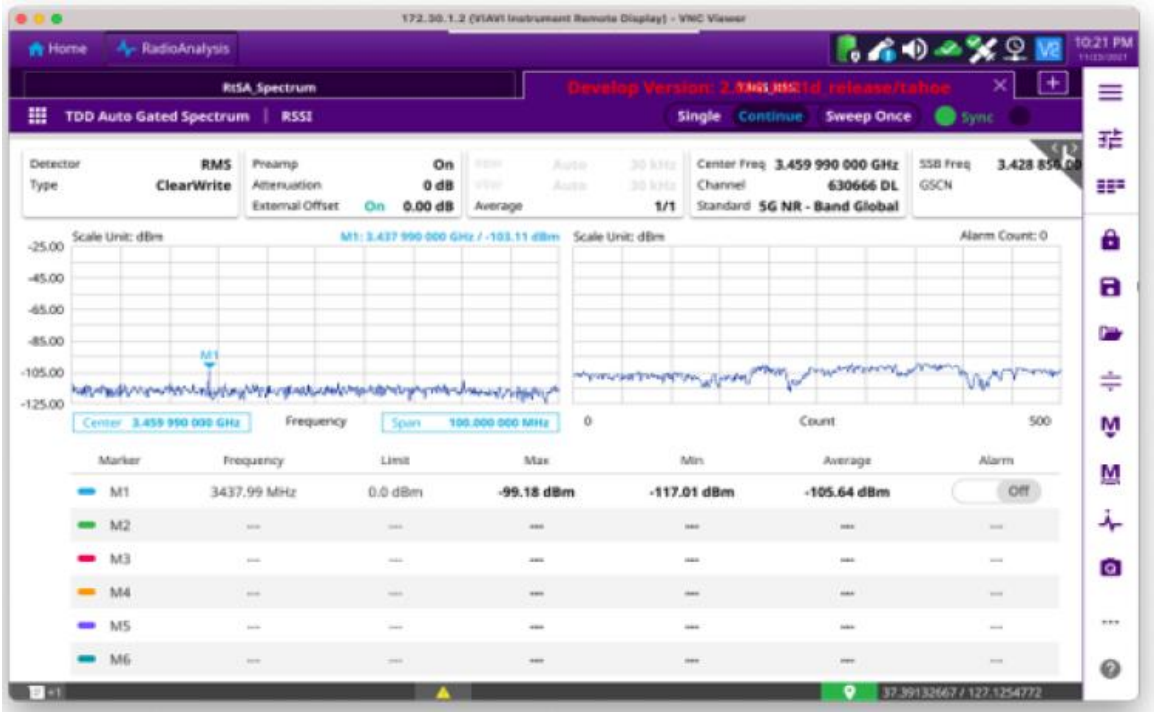
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

RSSI with TAGS



Interference finder

The Interference Finder is an automatic triangulation algorithm that uses GPS coordinates to locate possible interference sources based on three measurements. The interference finder calculates possible interference locations using its inscribed circle or circumscribed circle based on measured intersection points. You can plot up to seven measurement points and select three that are more representative for triangulation. CellAdvisor 5G automatically logs measurement positions not to lose them while changing measurement modes. You can switch the main screen from spectrum view to map view and vice versa using the icon, ( ) on the spectrum view screen. Before starting the Interference Finder, you need to set Spectrum measurements. See "Configuring Spectrum Measurements" for more details.

To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection below.

Antenna connection

Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1 Mount a broadband antenna to your AntennaAdvisor Handle.

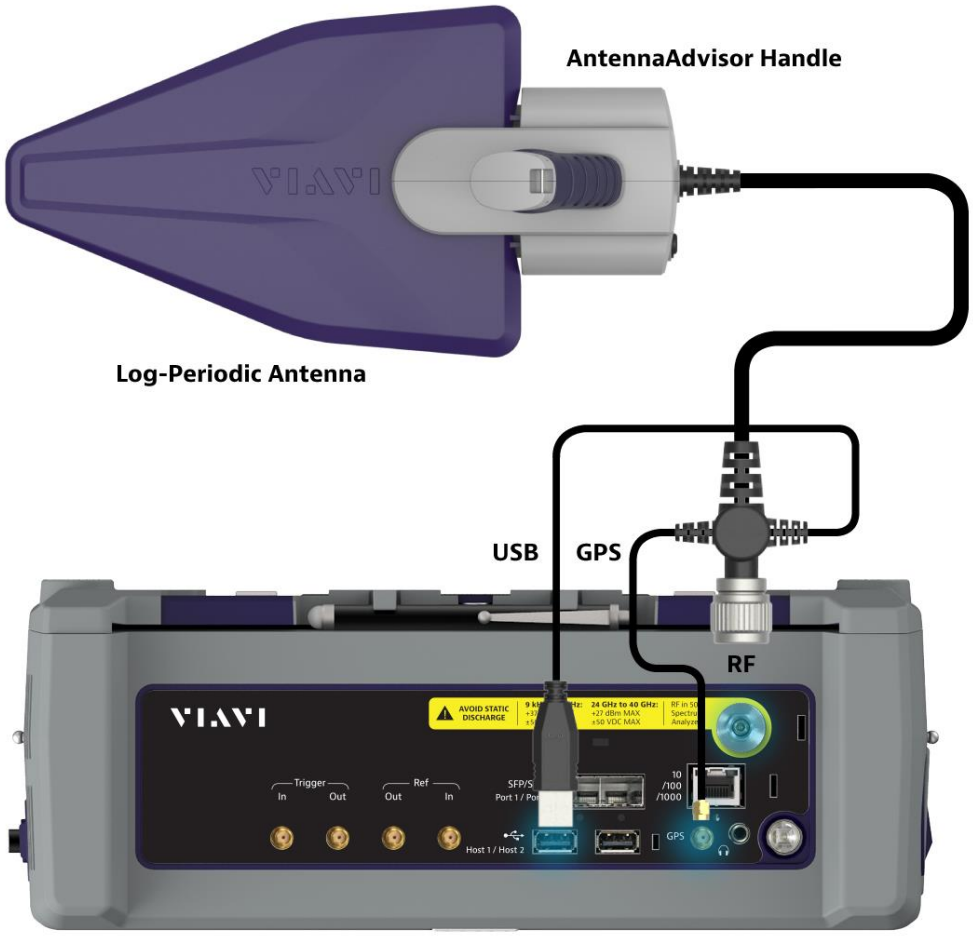
2 Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.

3 Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
The GPS status indicator appears on the instrument screen.

4 Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
The device icon appears in the system status bar on the screen.

NOTE:
The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.
To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.

2 Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1 Tap the **Point 1**, **Point 2** and **Point 3** on the map.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

2 Tap each point and use the **Degree** bar or button to change degrees.
Make sure to set three location points so that the straight lines started from the point and can create three intersections.

3 Tap the **GPS** icon on the side panel to automatically get the selected point's location information.
The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.

4 Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position. The values should be input based on the Decimal Degrees.

5 Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1 Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.

2 Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1 Tap the circle on the Degree bar and move it gently until you get the right azimuth.

M**ethod 3**: You can use the log-periodic antenna.

1 Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

NOTE:
The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon on the side panel.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon on the side panel. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

3 Tap **Measure Setup** > **Screen Mode**.

4 Tap the **Screen Mode** to select **Map** or **Full**.

- **a** **Map**: This option displays what are inside the base map with the map image.
- **b** **Full**: This option displays three location points and defined circle without the map image.

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

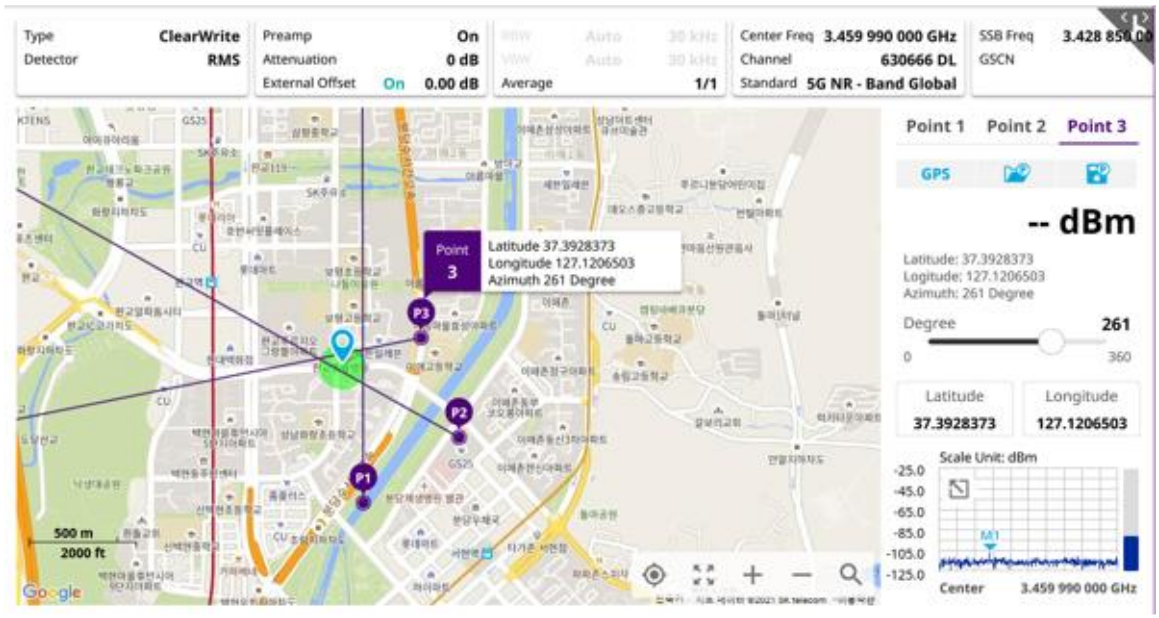
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Interference finder with TAGS



Radar chart

If you have identified an interfering signal on your spectrum view, you can move to the Radar Chart mode and measure RSSI power level through 360 degrees at a location received by the connected broadband directional antenna so that you can determine the direction of the source of the interference. Using a set of the AntennaAdvisor Handle that holds a broadband directional antenna is mandatory in the Radar Chart mode and its built-in compass, GPS antenna, and a built-in low-noise amplifier (LNA) benefits you to determine the direction of the interference. You can switch the main screen from spectrum view to map view and vice versa using the icon, ( ) on the spectrum view screen. Before starting the Interference Finder, you need to set Spectrum measurements. See "Configuring Spectrum Measurements" for more details.

For antenna connection, see antenna connection in "Interference finder"

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description

	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining Persistent RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1. When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from ‘Unknown Position’ to the obtained position information.
2. Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.
3. Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.
4. The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5 Hold the antenna handle set horizontally and then make the following measurement

6 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a Persistent RSSI value, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

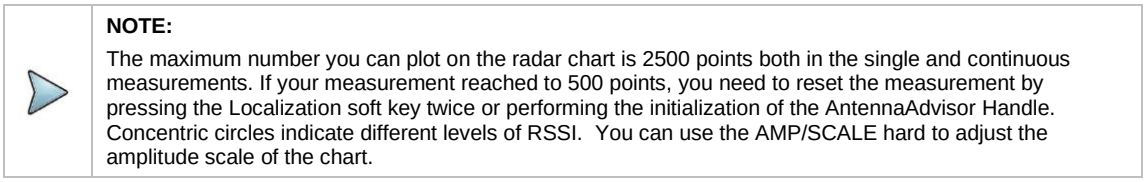
b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain Persistent RSSI values continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.



NOTE:

The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

7 Tap **Setup** > **Screen Mode Full/Map** to change the display mode.

a **Map**: It displays measured points inside the base map image. If you are in the area outside the base map and continue your measurement with the Trigger button, the instrument continues obtaining data even though the radar chart disappears from the screen. You can view obtained data when you change this display option to Full.

b **Full**: It displays measured points without the base map image. In case that you made measurements in the area outside the map image, selecting this option moves your measured data to the center of the display so that you can view the result.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap Localization again to clear all the data plots on the radar chart.

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz

- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

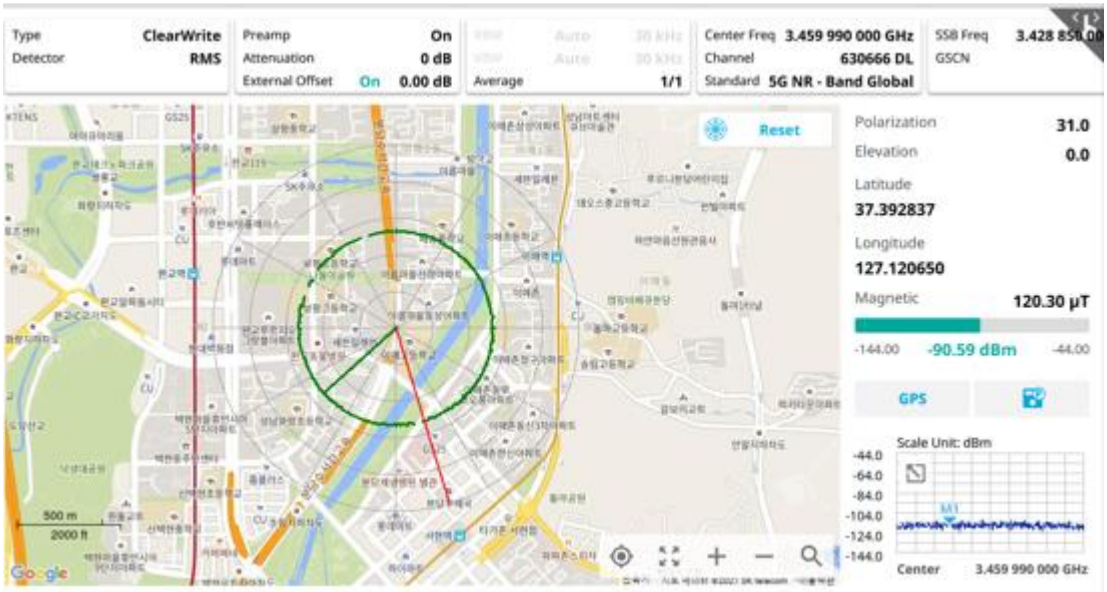
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Radar chart with TAGS



Conducting online interference measurement

The following sections describe how to conduct online interference measurements.

Online interference finder

The online interference finder enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection below.

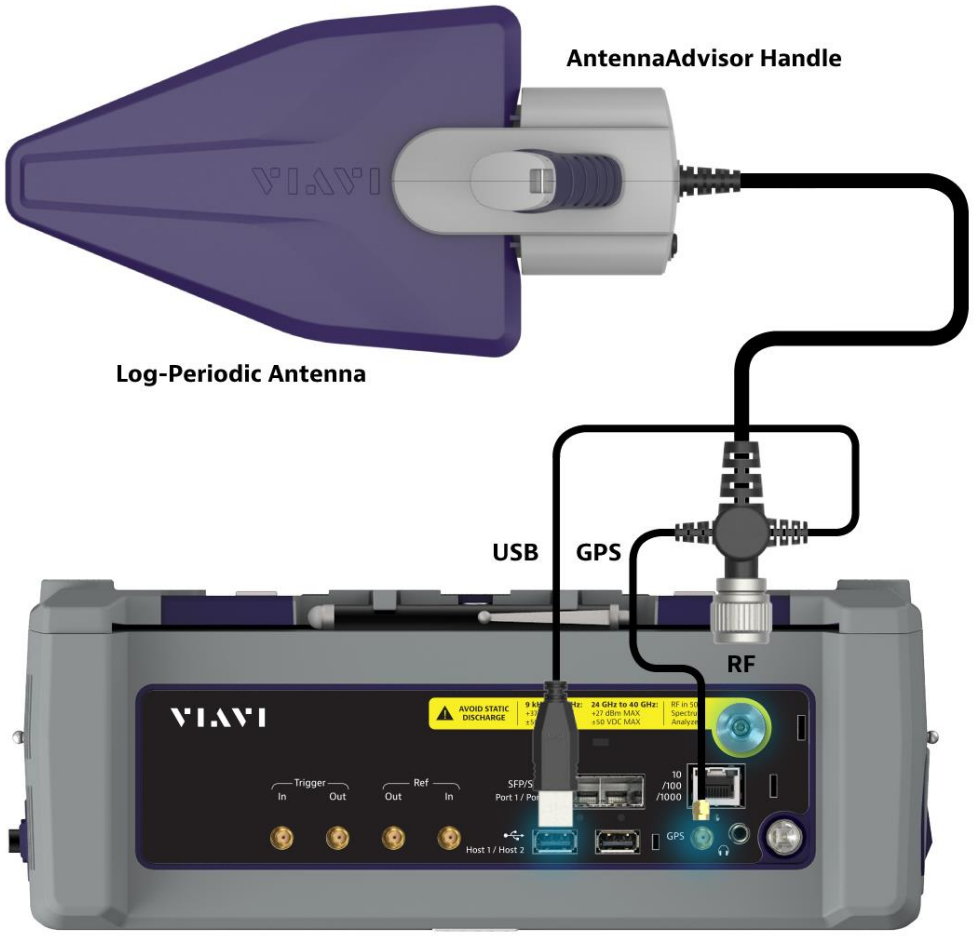
Antenna connection

Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1. Mount a broadband antenna to your AntennaAdvisor Handle.
2. Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.
3. Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
   The GPS status indicator appears on the instrument screen.
4. Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
   The device icon appears in the system status bar on the screen.

	NOTE: The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1. Tap the **Point 1**, **Point 2** and **Point 3** on the map.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
2. Tap each point and use the **Degree** bar or button to change degrees.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
3. Tap the **GPS** icon on the side panel to automatically get the selected point's location information.
   The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.
4. Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position.
   The values should be input based on the Decimal Degrees.
5. Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1. Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
   RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.
2. Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1. Tap the circle on the Degree bar and move it gently until you get the right azimuth.

Method 3: You can use the log-periodic antenna.

1. Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

NOTE:

The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon on the side panel.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon on the side panel. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

- **a** If you select the operating frequency as FR1, select from the following (FR 2 is not available):
  - SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
  - SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

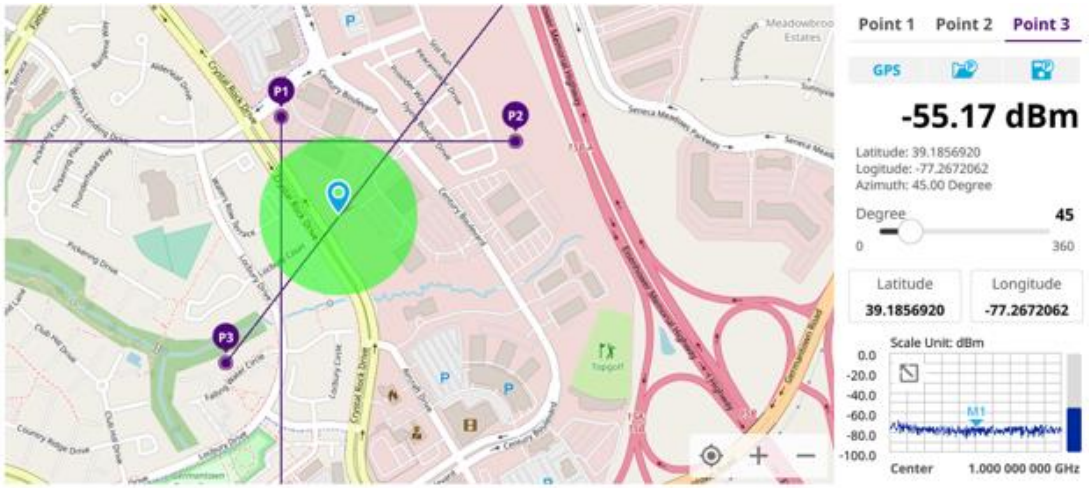
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online interference finder with TAGS



Online radar chart

The online interference finder enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. See "Configuring Spectrum Measurements" for more details.

For antenna connection, see antenna connection in "Interference finder"

Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1 Hold your antenna handle horizontally in its upright position.
To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.

2 Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining Persistent RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1 When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from 'Unknown Position' to the obtained position information.

2 Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.

3 Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.

4 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5 Hold the antenna handle set horizontally and then make the following measurement

6 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a Persistent RSSI value, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain Persistent RSSI values continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.

	NOTE: The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap Localization again to clear all the data plots on the radar chart.

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz

- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

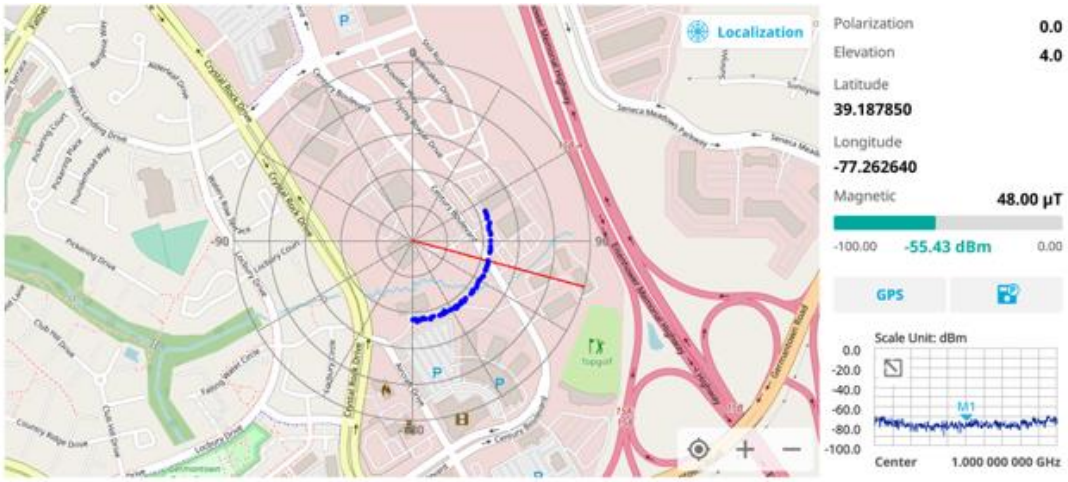
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

NOTE:
If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online radar chart with TAGS



Online radar chart_localized with TAGS

Using Interference Analyzer

Introduction

Interference is becoming more prevalent in the wireless community with the increasing number of transmitters coming on the air. Wireless service providers have traditionally used spectrum analyzers to monitor service channels, frequencies, and adjacent spectrum and to locate sources of interference. A spectrum analyzer can only show you an interfering signal and you require determining the source of the interference. To solve interference problems, you must understand the RF environment, know adjacent operating transmitters, and identify any new or unlicensed emitters.

Once a potential interfering signal is identified in the Spectrum Analyzer mode, you can monitor the signal further in the Interference Analyzer mode. CellAdvisor 5G provides two different methodologies to identify and determine interference signals: Spectrogram and Received Signal Strength Indicator (RSSI). Locating the source of interference signal can be done with geographical information received from the built-in GPS receiver.

The CellAdvisor 5G is extremely effective for locating and identifying periodic or intermittent RF interference. Interference signals derive from several kinds of licensed or unlicensed transmitters that cause dropped calls and poor service quality.

The CellAdvisor 5G provides following measurements for interference analysis with frequency extension up to 18.5 GHz in addition to existing 24 GHz to 40 GHz:

- Interference Analysis
  - Spectrum
  - Spectrogram
  - RSSI (Received Signal Strength Indicator)
  - Interference Finder
  - Radar Chart
  - Spectrum Replayer
  - PIM Detection Single Carrier
  - PIM Detection Multi Carrier
- Online Interference Analysis
  - Online Interference Finder
  - Online Radar Chart

Using a set of the AntennaAdvisor Handle that holds a broadband directional antenna is mandatory in the Rader Chart mode and its built-in compass, GPS antenna, gyro sensor, and low-noise amplifier (LNA) benefits you to determine the direction of the interference.

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **Interference Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Interference Analysis > **Spectrum**,**Spectrogram**, **RSSI**, **Interference Finder**, **Radar Chart**, **Spectrum Replayer**, **PIM Detection Single Carrier**, or **PIM Detection Multi Carrier**

Online Interference Analysis > **Online Interference Finder** or **Online Radar Chart**

NOTE:
You can choose **RF Source On** or **Off** in setup menu after tap to **CAA RF Power On** if you have **RF Source** option in your CAA(Cable and Antenna Analyzer).

Conducting interference measurements

Spectrum

Most spectrum measurements of the interference analyzer are also available in Spectrum mode. Using these measurements allow you to locate interferences in the frequency spectrum. You can configure the measurements just as in Spectrum mode. For more information see "Configuring spectrum measurements".

The spectrum measurement with an audible indicator is especially useful for locating interferer sources with a directional antenna.

Setting measure setup for sound indicator

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Sound Indicator**.

- **a** Tap to switch the **Sound** between **On** and **Off** to enable and disable the alarm sound.
- **b** Tap to switch the **Alarm Reference** to **Marker** to set the active marker position as the alarm reference.
- **c** Tap to switch the **Alarm Reference** to **Line** to set the limit as the alarm reference.
  The Reference Line Mode menu becomes activated to be set.
- **d** Select **Reference Line** to specify a threshold for the reference line using the on-screen keyboard.
- **e** *Optional.* To adjust the volume for alarm sound, tap **Volume** and input from 1 to 10 using the on-screen keyboard.

Setting measure setup for Interference ID

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Interference ID**.

- **a** Tap to switch the **Interference ID** between **On** and **Off** to turn the Interference ID on and off.
- **b** Tap **Threshold** and input a value using the on-screen keyboard.

NOTE:
You can go to **Menu** > **Limit** to analyze your measurements with the display line, multi-segment line, and channel limit table. See “Setting limit" for details.

Spectrogram

The Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

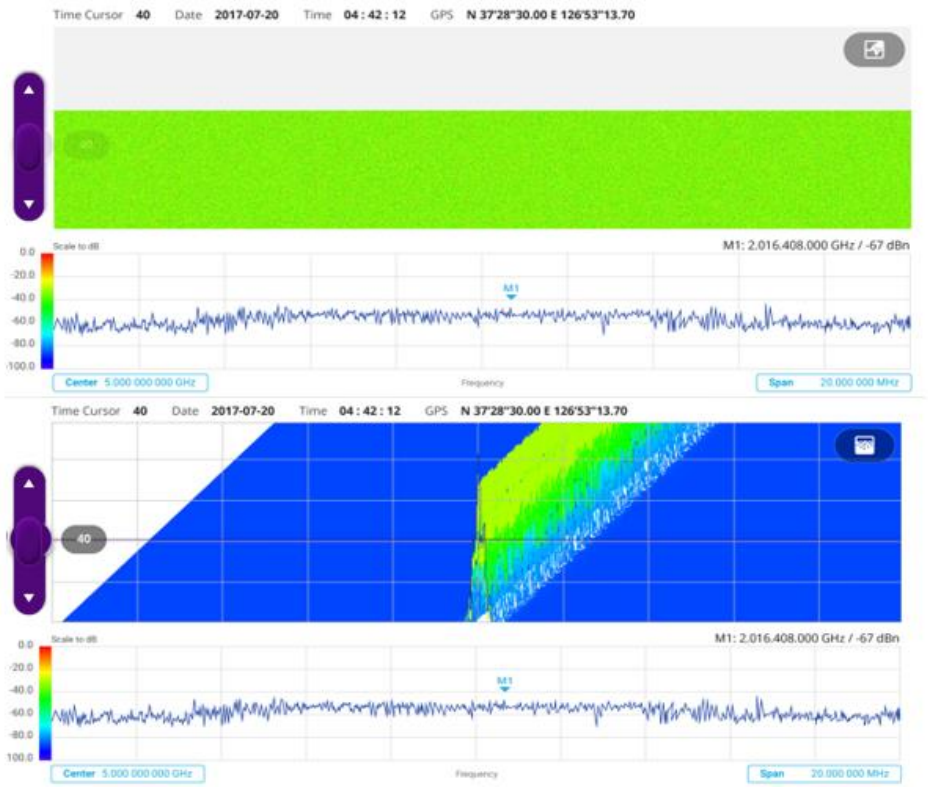
4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

NOTE:
Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

Interference measurement in spectrogram



The Spectrogram shows a vertical line on the chart when the marker is enabled on the screen. The first figure shows Normal chart view, and the second figure below shows Waterfall (3D display) chart view.

- The horizontal line or X-axis of the spectrogram indicates frequency.
- The vertical line or Y-axis indicates time.

- The color identification (Spectrogram) indicates power level of the tracked signal. As the signal strength increases, the color on the spectrogram changes accordingly.
- Once you set the reference line to On, the purple move bar becomes activated and the green line appears. You can set the reference line moving it up or down in the spectrum chart below spectrogram chart.
- You can set the GPS by selecting Frequency Reference as GPS in System Settings ( ) page.

RSSI

The Received Signal Strength Indicator (RSSI) is a multi-signal tracking metric that is particularly useful for measuring power-level variations over time. The RSSI measurement lets you assign power limit line for audible alarms and increase alarm counters every time a signal exceeds a defined limit line. For long-term analysis, the spectrogram and RSSI measurements can be automatically saved into an external USB memory.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Alarm** to set the alarm parameters.

3 Tap **Alarm at** and select the marker number from Marker 1 to Marker 6.

4 Tap **Reference Line** to set a threshold for the alarm and input a value using the on-screen keyboard.

5 Tap to switch **Alarm** to **On** or **Off** to turn the alarm feature on or off.

6 *Optional.* Tap **Volume** to adjust the volume from 1 to 10 using the on-screen keyboard.

NOTE:
You must set the marker(s) for the alarm as this feature use the marker position to sound alarm. See “Using marker” for more details.

Interference measurement in RSSI

You can go to Menu > Limit to analyze your measurements with the display line, multi-segment line, and channel limit. See "Setting limit" for more details. Once you tap the vertical move bar and move it up and down, the reference line value changes.

Interference finder

The Interference Finder is an automatic triangulation algorithm that uses GPS coordinates to locate possible interference sources based on three measurements. The interference finder calculates possible interference locations using its inscribed circle or circumscribed circle based on measured intersection points. You can plot up to seven measurement points and select three that are more representative for triangulation. CellAdvisor 5G automatically logs measurement positions not to lose them while changing measurement modes. You can switch the main screen from spectrum view to map view and vice versa using the icon, ( ) on the spectrum view screen. Before starting the Interference Finder, you need to set Spectrum measurements. See "Configuring Spectrum Measurements" for more details.

To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection below.

Antenna connection

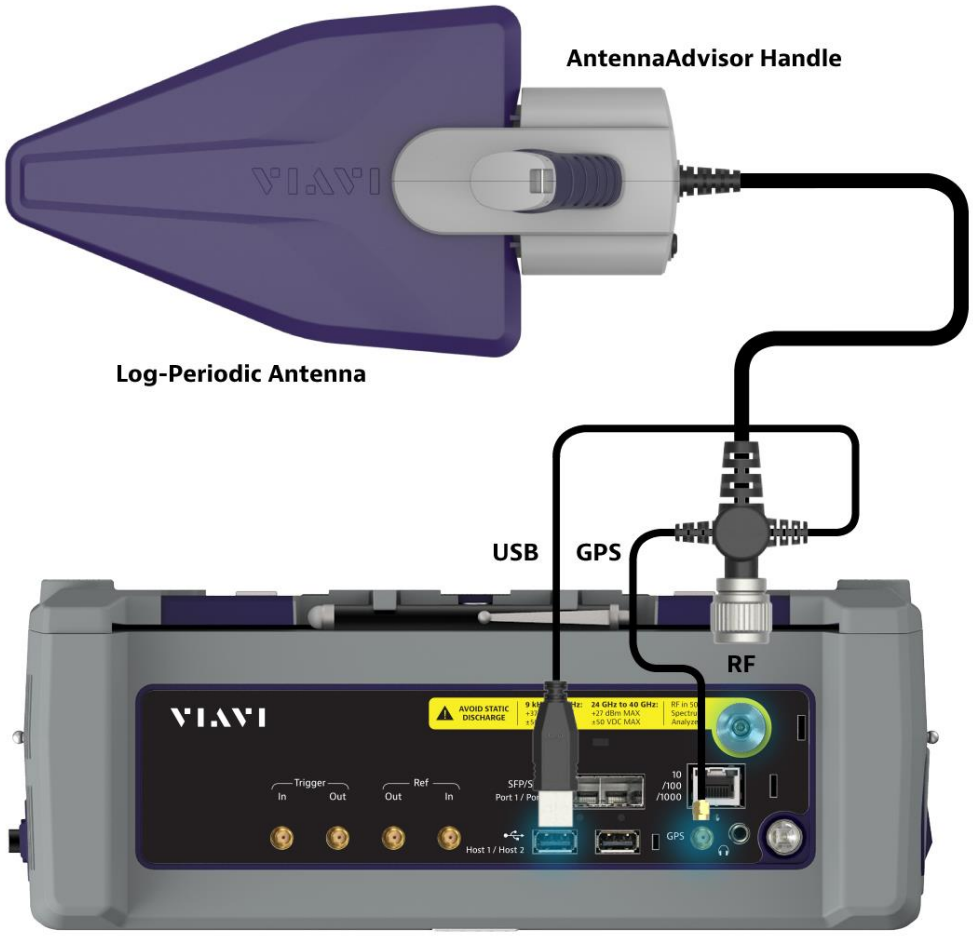
Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1. Mount a broadband antenna to your AntennaAdvisor Handle.
2. Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.
3. Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
   The GPS status indicator appears on the instrument screen.
4. Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
   The device icon appears in the system status bar on the screen.

NOTE:

The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1. Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.
2. Tap the **Load** icon( ) on the side bar.
3. Navigate the map file you want to open.
   The File Information pane displays the file properties including its name, size, type and date modified.
4. Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.

	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1. Tap the **Point 1**, **Point 2** and **Point 3** on the map.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
2. Tap each point and use the **Degree** bar or button to change degrees.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
3. Tap the **GPS** icon on the side panel to automatically get the selected point's location information.
   The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.
4. Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position.
   The values should be input based on the Decimal Degrees.
5. Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1 Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.

2 Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1 Tap the circle on the Degree bar and move it gently until you get the right azimuth.

M**ethod 3**: You can use the log-periodic antenna.

1 Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon on the side panel.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon on the side panel. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

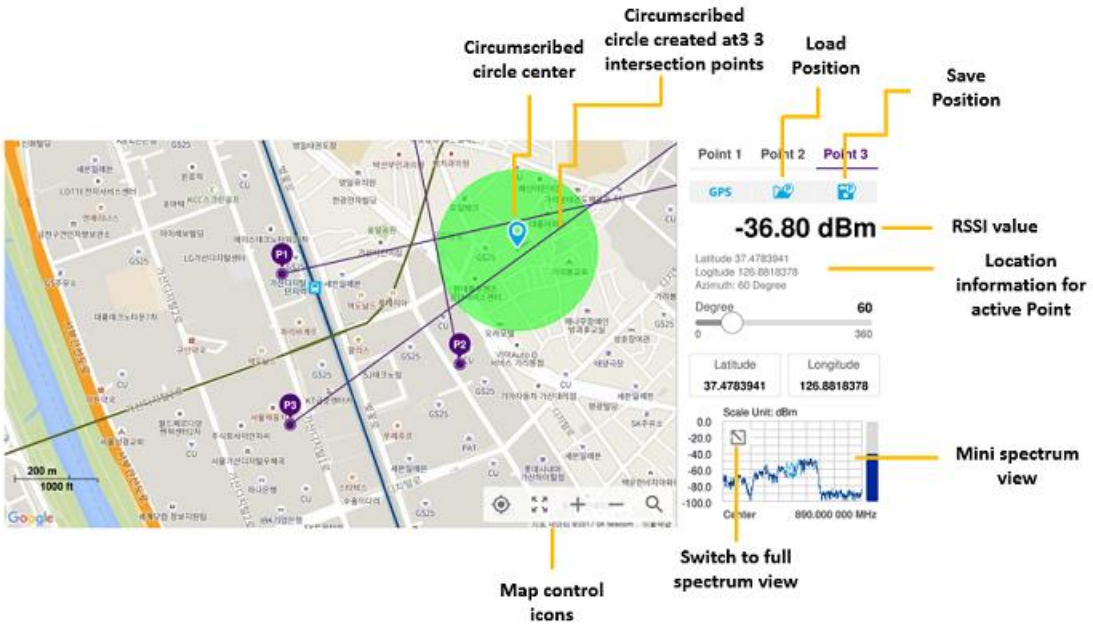
- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

3 Tap **Measure Setup** > **Screen Mode**.

4 Tap the **Screen Mode** to select **Map** or **Full**.

- **a** **Map**: This option displays what are inside the base map with the map image.
- **b** **Full**: This option displays three location points and defined circle without the map image.

Interference finder measurement in map view



Radar chart

If you have identified an interfering signal on your spectrum view, you can move to the Radar Chart mode and measure RSSI power level through 360 degrees at a location received by the connected broadband directional antenna so that you can determine the direction of the source of the interference. Using a set of the AntennaAdvisor Handle that holds a broadband directional antenna is mandatory in the Radar Chart mode and its built-in compass, GPS antenna, and a built-in low-noise amplifier (LNA) benefits you to determine the direction of the interference. You can switch the main screen from spectrum view to map view and vice versa using the icon, ( ) on the spectrum view screen.Before starting the Interference Finder, you need to set Spectrum measurements. See "Configuring Spectrum Measurements" for more details.

For antenna connection, see antenna connection in "Interference finder"

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description

	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1. When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from ‘Unknown Position’ to the obtained position information.
2. Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.
3. Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.
4. The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5. Hold the antenna handle set horizontally and then make the following measurement
6. The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a RSSI value and direction, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain RSSI values and direction continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.

NOTE:

The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

7 Tap **Setup** > **Screen Mode Full/Map** to change the display mode.

a **Map**: It displays measured points inside the base map image. If you are in the area outside the base map and continue your measurement with the Trigger button, the instrument continue obtaining data even though the radar chart disappears from the screen. You can view obtained data when you change this display option to Full.

b **Full**: It displays measured points without the base map image. In case that you made measurements in the area outside the map image, selecting this option moves your measured data to the center of the display so that you can view the result.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap Localization again to clear all the data plots on the radar chart.

Radar chart

Radar chart localized

Spectrum Replayer

The Spectrum Replayer lets you retrieve and replay recorded spectrum analyzer traces in interference analysis mode. These traces can be played back in the spectrogram or RSSI. You can configure the limit line to create failure points when signals exceed it. The failure points are clearly displayed on the trace timeline for quick access during playback.

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Spectrum Replayer**.
The File Manager window appears.

3 Select the file to be loaded and press the **Load** button.
The replay bar appears at the bottom of the screen. The green color indicates Pass and the red color indicates Fail.

4 Tap the replay direction icon between **FWD** and **REV** to change play direction to forward or reverse.

5 Tap the right and left button to change the speed from the options: **x1**, **x2**, **x3**, and **x4**.

6 Toggle the **Play** button to start playing.

7 Toggle the **Pause** button to pause or stop playing.

8 Tap **Fail** to move to a particular failure position directly and play from there.
The Frame Fail Count in the middle of bar changes.

9 Tap the Frame Fail Count to change the value using the on-screen keyboard. Once tapped, replaying stopped. If you change the value, it jumps to the corresponding index.
You can also change the value by tapping right and left button.

10 Tap to change display mode to **Spectrum**, **Spectogram**, or **RSSI**.
3D display (Waterfall) is not supported in case of spectrum logging.

11 *Optional.* Tap to switch Time Cursor to On or Off to display or hide the time cursor on the screen. This key becomes activated when you play logged data in the Spectrogram mode.

	NOTE: If you connected a USB drive, do not remove it while playing. Doing so may freeze the USB port, which will require you to restart the instrument to get a USB drive recognized again.

PIM detection single carrier

The Passive Intermodulation (PIM) Detection allows you to detect Uplink PIM across the full spectrum for any technology. When PIM is detected, the normal repair mode is to replace the offending cable and what you need to do is replacing the whole cable irrespective of the location of the fault. The following is a measurement for PIM detection single carrier.

Making a measurement

1 Connect cables as instructed on the screen.

2 *Optional.* To check any possibility of PIM existence in red color by calculation, complete the following steps:

- **a** Tap **Calculated PIM**.
- **b** Check the Radio 1 Band and its information in the table.
- **c** Tap **Channel Standard** and select **Technology** and **Band**.
- **d** Tap the **Apply** button.
- **e** Tap the **X** button to return to previous screen.

3 Tap **Uplink Center Frequency** and input a value using the on-screen keyboard.

4 Tap **Uplink Span** and input a value using the on-screen keyboard.

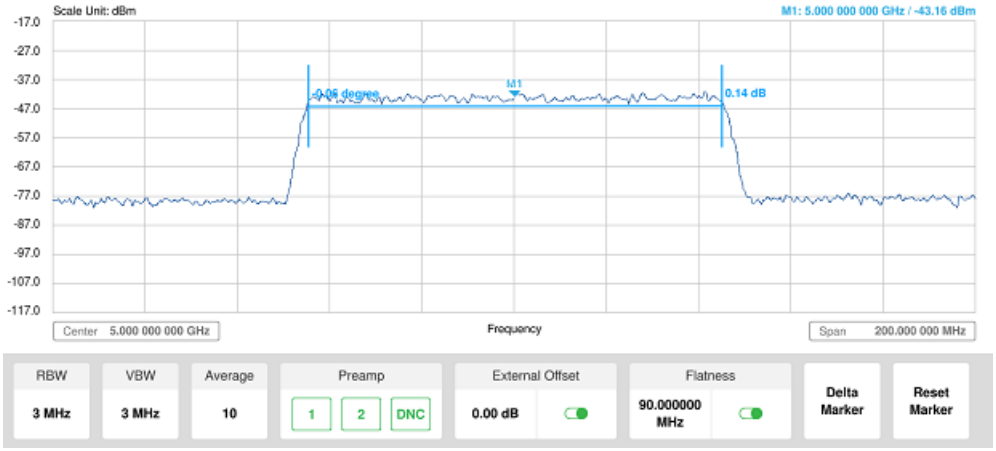
5 Tap **Channel Standard,** select **Technology** and **Band**, and then the **Apply** button.

6 Tap **Channel Number** and input a value using the on-screen keyboard.

7 Tap the **Continue** button on the right edge to continue.

8 Set the parameters appeared on the table below the chart screen as needed.

PIM detection single carrier



PIM detection multi-carrier

The Passive Intermodulation (PIM) Detection allows you to detect Uplink PIM across the full spectrum for any technology. When PIM is detected, the normal repair mode is to replace the offending cable and what you need to do is replacing the whole cable irrespective of the location of the fault. The following is a measurement for PIM detection multi carrier.

Making a measurement

1 Connect cables as instructed on the screen.

2 *Optional.* To check any possibility of PIM existence in red color by calculation, complete the following steps:

- **a** Tap **Calculated PIM**.
- **b** Check the Radio 2 Band and its information in the table.
- **c** Tap to switch **Mode** to **Band** or **Frequency**.
- **d** If **Band** is selected, tap **Radio 1 Band** and select the technology and band from the channel standard list, and do the same for **Radio 2 Band**.
- **e** If **Frequency** is selected, tap **Radio 1 Frequency** and select the technology and band from the channel standard list, and do the same for **Radio 2 Frequency**.
- **f** Tap the **X** button to return to previous screen.

3 Tap **Uplink Center Frequency** and input a value using the on-screen keyboard.

4 Tap **Uplink Span** and input a value using the on-screen keyboard.

5 Tap **Channel Standard,** select **Technology** and **Band**, and then the **Apply** button.

6 Tap **Channel Number** and input a value using the on-screen keyboard.

7 Tap the **Continue Step2/4** button on the right edge to continue.

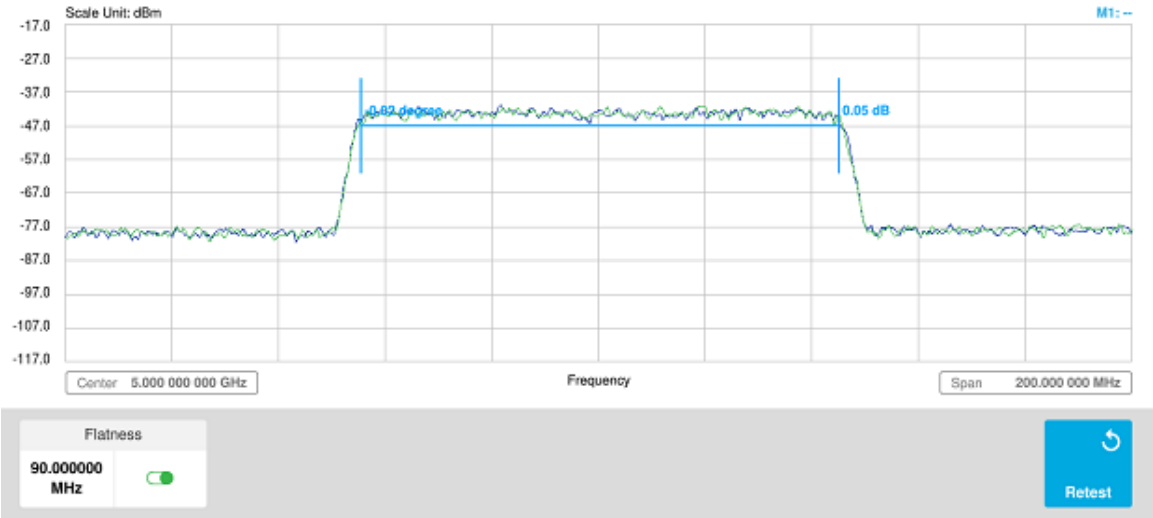
8 Set the parameters appeared on the table below the chart screen as needed.

9 Tap the **Continue Step3/4** button on the right edge to continue.

10 Follow the instruction on the screen and tap the **Continue Step4/4** button on the right edge to continue.

11 Tap to enable **Flatness** on.

PIM detection multi carrier



Conducting online route map

Online interference finder

The online interference finder enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. To make full use of the functions available in the map mode, you will need a GPS receiver and an antenna. For more details, see the Antenna connection below..

Antenna connection

Before starting the measurement, you need to connect the Omni or Log periodic antenna to your instrument. In the Interference Finder mode and the Radar Chart mode, you can perform interference hunting using the optional Antenna Advisor Handle after attaching a broadband directional antenna to it. The handle is a device that has a built-in GPS antenna and LNA. The following are examples of the antenna connection.

1 Mount a broadband antenna to your AntennaAdvisor Handle.

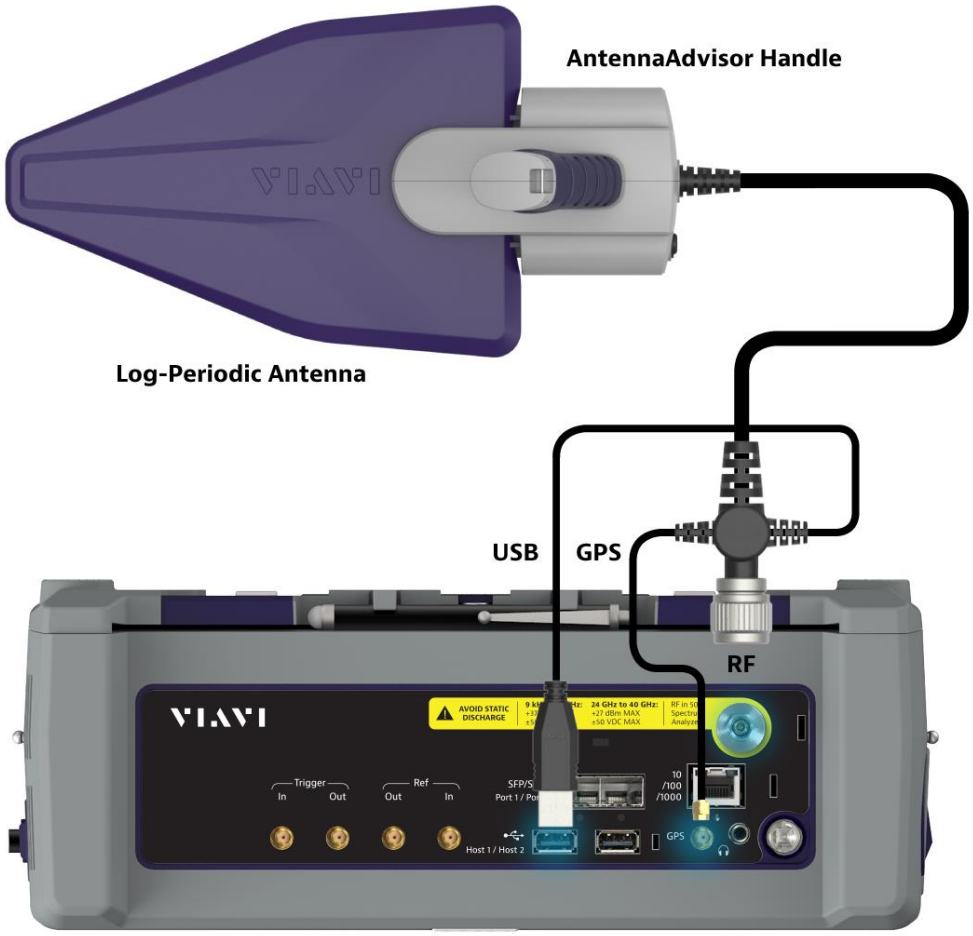
2 Connect the **RF Type-N jack** of the handle to the **RF In port** of the instrument.

3 Connect the **GPS SMA jack** of the handle to the **GPS port** of the instrument.
The GPS status indicator appears on the instrument screen.

4 Connect the **USB plug** of the handle to the **USB Host port** of the instrument.
The device icon appears in the system status bar on the screen.

NOTE:
The AntennaAdvisor Handle is an optional item. It is recommended that you use a log periodic antenna with AntennaAdivsor handle to search more exact directional information. You can use a log periodic antenna or Omni antenna alone as well.

Antenna connection example



Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

Setting geographic location

A point is a particular location that contains information about that location. This information includes, for example, GPS coordinates, the time of the measurement or level that has been measured. You can evaluate the Point information directly onsite or save the information for later evaluation.

With this functionality, you can mark locations where you have performed a measurement. Thus, you can analyze the geographical distribution of the received signal strength. This allows you to analyze, for example, the coverage conditions around a base station's coverage area.

In the map view, a point is displayed as a dot with a number. The straight line represents the direction you are facing.

1. Tap the **Point 1**, **Point 2** and **Point 3** on the map.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
2. Tap each point and use the **Degree** bar or button to change degrees.
   Make sure to set three location points so that the straight lines started from the point and can create three intersections.
3. Tap the **GPS** icon on the side panel to automatically get the selected point's location information.
   The instrument displays the latitude and longitude information of the signal received by either the GPS antenna or AntennaAdvisor Handle. This function is only available when the GPS antenna is connected.
4. Tap the **Latitude** and **Longitude** icon and enter the value using the on-screen keyboard to manually define a position.
   The values should be input based on the Decimal Degrees.
5. Tap the **Apply** button.

Setting azimuth

Method 1: You can use the AntennaAdvisor Handle. Make sure to initialize AntennaAdvisor first to get more accurate directional information.

1. Press and hold the **TRIGGER** button on the handle then it finds the strongest RSSI value.
   RSSI, polarization, elevation and azimuth readings are continuously updated on the screen while pressing the physical button.
2. Release the **TRIGGER** button to stop scanning.

Method 2: You can use the **Degree bar** (functions as a compass) by moving it right and left.

1. Tap the circle on the Degree bar and move it gently until you get the right azimuth.

M**ethod 3**: You can use the log-periodic antenna.

1. Pan your log-periodic antenna to find a signal with the highest RSSI value and measure an azimuth of the interfering signal.

NOTE:

The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off using the physical On/Off button located on the rear side of the handle unit. For example, if the received signal is weak, you can turn on the switch to improve S/N.

Save position

1 To save the defined position, tap any point on the map where you want to save the position information.

2 Tap the **Save Position** icon on the side panel.
The instrument stores the saved location points in the internal memory so that you can load them by using the **Load Position** icon on the side panel. You can save and load up to 10 positions.

Setting display mode

When the triangulation is done with three location points and azimuth for each point, you can view a circumscribed circle by default. You can change the display mode to inscribed circle or double circles to view a narrower area. The center of the green-shaded circle is determined to be where the source of the interfering signal resides.

1 Tap **Measure Setup** > **Display**.

2 Select the option from the following choices.

- **a** **Circum**: displays a circumscribed circle that meets three vertices of the triangle.
- **b** **Inscribed**: displays an inscribed circle that meets the three sides of the triangle.
- **c** **Double**: displays both circumscribed and inscribed circles.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online interference finder measurement in map view

Online radar chart

The online interference finder enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline.

For antenna connection, see antenna connection in "Interference finder"

Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Initializing AntennaAdvisor

Once you have connected the AntennaAdvisor Handle to your instrument, antenna initialization is required to get the right azimuth data. You need to initialize the antenna handle to calibrate the built-in compass by completing the following steps. Note that the you can adjust Bandwidth based on the center frequency of the interfering signal that you have identified in the Spectrum view by tapping the **Setup** > **Bandwidth**. A message appears at the bottom of the screen to alert you if you have not performed initialization of your connected the antenna handle set.

1. Hold your antenna handle horizontally in its upright position.
   To avoid unnecessary impact of external magnetic field, position yourself at the location where the value of magnetic field strength displayed on the instrument is green.
2. Point the antenna to the north and tap the **Setup** > **Initialize AntennaAdvisor**.
   The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

	NOTE: It is recommended that you re-initialize the AntennaAdvisor Handle after measurements to re-calibrate the compass when you notice that the red line on the radar chart is not aligned with the north on the map even though you are pointing the antenna to the north.

Obtaining RSSI and direction data

Once you have connected your antenna handle set and done necessary setups, you can monitor the power level of the received signal, the amount of polarization, and elevation level real time. Using the Trigger button on the antenna handle set, you can plot the RSSI level and obtain current direction of antenna at your location.

1 When you have the green GPS indicator, Tap the **GPS** icon on the side panel to set your current location to the center of the radar chart. The latitude and longitude information at the side of the display changes from 'Unknown Position' to the obtained position information.

2 Tap the **Save Position** icon on the side panel to save a position to recall for triangulation in the **Interference Finder** mode and select one that you want to save.

3 Monitor the RSSI reading of the received signal. If the signal is weak, turn on the LNA switch on the antenna handle set to improve S/N.

4 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

NOTE:
The AntennaAdvisor Handle has a built-in low-noise amplifier (LNA) and you can turn it on and off by toggling the physical On/Off switch located on the rear side of the handle unit.

5 Hold the antenna handle set horizontally and then make the following measurement

6 The message disappears and the red line for the current antenna direction moves to the 0-degree line and overlaps to let you know that the initialization is done successfully.

To obtain a RSSI value and direction, complete the following steps:

a Press the **TRIGGER** button located on the antenna handle.
Every time you press the physical button on the handle, a beep is sounded and a power level of the received signal is plotted as a blue dot on the radar chart. Depending on the strength of the measured value, you may hear different tones of beeping.

b while receiving the power level, you can also obtain the current direction of the antenna. Repeat pressing the **TRIGGER** button to obtain at least five points if you want to do the localization.

To obtain RSSI values and direction continuously, complete the following steps:

a Press and hold the **TRIGGER** button located on the antenna handle to start a continuous measurement.

b A beep is sounded repeatedly to let you know that the measurement is continuing and measured values are plotted and lined on the radar chart.

c Release the **TRIGGER** button to stop the continuous measurement.

NOTE:
The maximum number you can plot on the radar chart is 2500 points both in the single and continuous measurements. If your measurement reached to 500 points, you need to reset the measurement by pressing the Localization soft key twice or performing the initialization of the AntennaAdvisor Handle. Concentric circles indicate different levels of RSSI. You can use the AMP/SCALE hard to adjust the amplitude scale of the chart.

Localizing RSSI data

The Localization feature lets you view averaged and smoothed measurement data with a bold green line on the radar chart that helps you determine the direction of the highest RSSI value. When you have five or more data points plotted on the radar chart, you can perform this localization.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Localization**.
All the measured points turn to green color and you can view the bold green line that indicates the possible direction of the interference source.

3 Tap **Localization** again to clear all the data plots on the radar chart.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

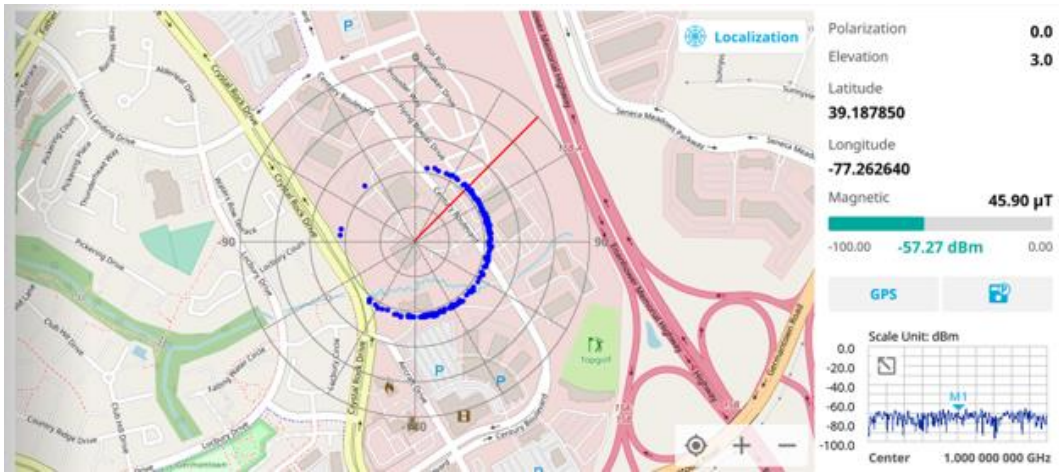
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online radar chart



Online radar chart localized

Using EMF Analyzer

Introduction

Base stations emit electro-magnetic fields (EMF) of high frequency, which varies between wireless technologies and countries. As personal exposure to high frequency fields from base stations can provoke health effect, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has provided general guidelines on limitations regarding high frequency exposure. Using the EMF Analyzer in JD700B series with an isotropic antenna connected, you can now measure the level of EMF onsite in the field in order to verify if the level of emission from of your base station is compliant with the guidelines.

- RF Analysis
  - Spectrum
  - Scanner
- 5G NR Analysis
  - 5G NR Beam Analysis

Connecting antenna

In the EMF Analyzer mode, connecting an isotropic antenna (omni antenna) or a logperiodic antenna (yagi antenna) is mandatory. Using these antennas, you can make three-dimensional measurements.

To connect an isotropic antenna

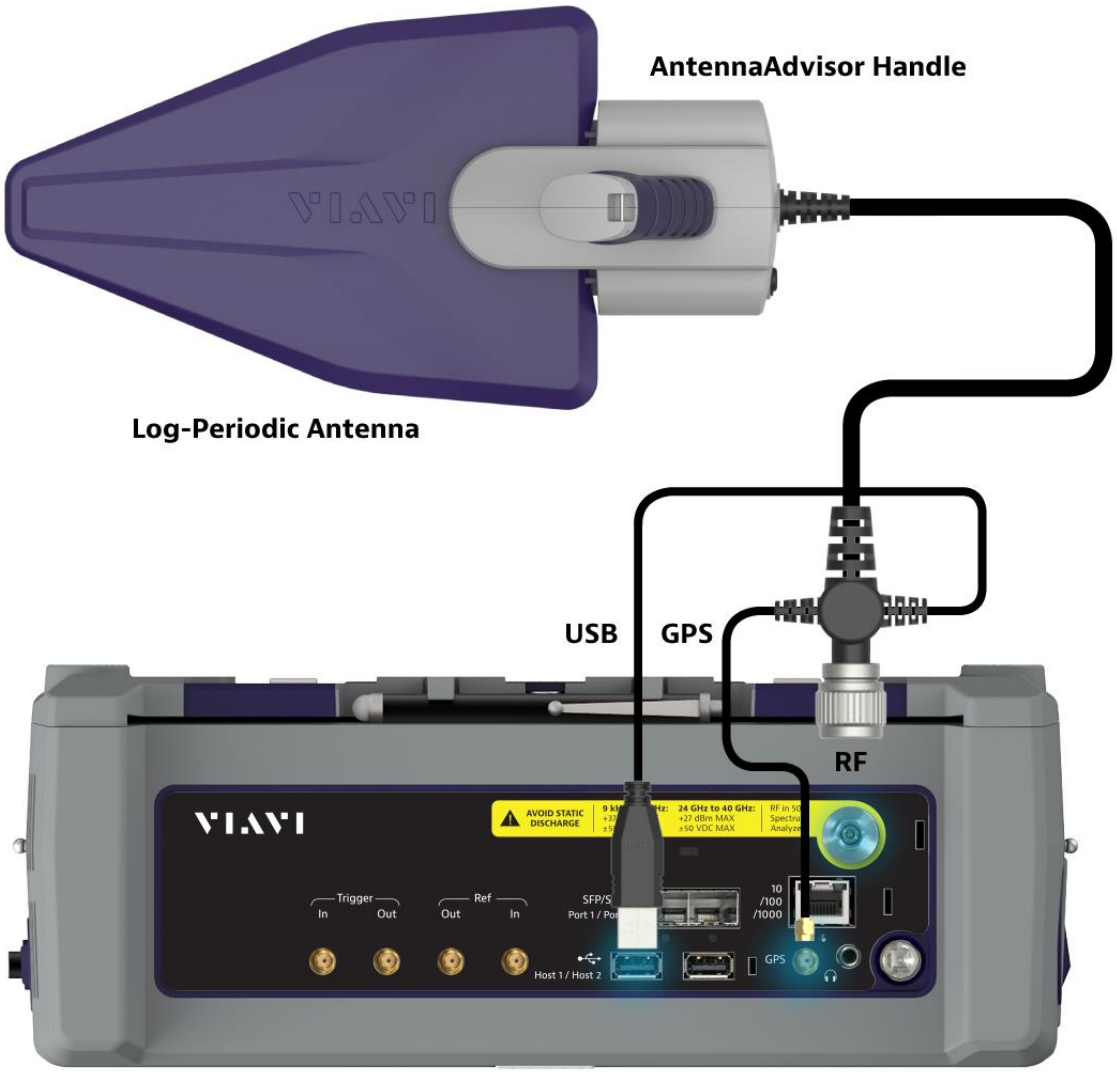
1. Connect the RF Type-N connector of the isotropic antenna to the RF In port of the instrument.
2. Connect the USB plug of the isotropic antenna to the USB Host port of the instrument. The device icon appears in the system status bar on the screen.

Connecting an isotropic antenna

To connect a log periodic antenna

1. Mount a broadband antenna to your AntennaAdvisor Handlle.
2. Connect the RF Type-N Jack of the handle to the RF In port of the instrument.
3. Connect the GNSS SMA jack of the handle to the GNSS port of the instrument.
   The GNSS status indicator appears on the instrument screen.
4. Connect the USB plug of the handle to the USB Host port of the instrument. The device icon appears in the system status bar on the screen.

Connecting a log-periodic antenna



Selecting mode and measure

To start measurement, do the following steps:

1 Tap **EMF Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

RF Analysis > **Spectrum** or **Scanner**

5G NR Analysis > 5G NR Beam Analysis

Conducting RF measurement

Spectrum

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Test Configuration**.

a Tap to switch **Auto Range** to **On** or **Off**.
When you set Auto Range On, the instrument scans to-be-measured bandwidth for EMF in advance and sets appropriate Attenuation and Preamp based on the different received signal level for the choice of axis.

b Tap **Dwell Time** to specify the amount of measurement time that you want the instrument to stay for on each axis and input the value from 1 to 60 (second) using the on-screen keyboard.

c Tap **Measurement Time** to specify the amount of measurement time that you want the instrument to stay for on all three axes in order to display current and accumulated EMF power and set this up to 60 minutes using the on-screen keyboard.

NOTE:
If you set the measurement time, the count which means the number of EMF measurements on the right panel of the measurement screen is changed corresponding to the measurement time you have set.

3 Tap to switch **Axis** to **Manual** or **Auto**.
If you set it to **Manual**, Axis setting is available and if you set it to Auto, Axis setting is unavailable.

– **Manual**: When using isotropic EMF antenna, you can manually set x, y, and z axis. You can set Manual as a diagnosis mode whether you can receive correct signal based on each axis: X, Y, or Z.

– **Auto**: Each axis of antenna is automatically changed and measured.

4 When selected as Manual, tap **Axis** and select from: **X**, **Y**, or **Z**.

5 Tap **Move to RtSA** to view the real-time spectrum measurement mode.

6 Go back to **Setup** and tap **Antenna & Cable Loss**.

a *Optional*. Tap to switch **Antenna Gain** to **On** or **Off**.

b When the Antenna Gain is on, tap **Antenna Gain Value** and input the required value using the on-screen keyboard.

NOTE:
You need to be cautious when using this value as the instrument applies not an antenna gain value selected from Antenna List EMF but applies this setting. This may cause measurement errors.

c Tap **Antenna List EMF** and select the required antenna from the pop-up window. Based on the antenna list you selected, you need to check the Axis mode and do the following:

– When selecting G700050381 (Isotropic E-Field) Antenna and Axis to Auto, the Current on the measurement screen indicates as x, y, or z automatically and the Isotropic EMF Power is measured.

– When selecting Yagi antenna (Log Periodic Broadband) and Axis to Auto, the Current on the measurement screen indicates YAGI and the EMF Power is measured.

– When tapping Custom > Configuration icon, an Antenna List Editor window appears and you can customize Frequency and Antenna Factor. You can add up to 500 customized antennas.

NOTE:
The instrument supports an engineering mode as ‘Axis Mode: Manual’ to inspect G700050381 antenna. You must not use this mode for a general purpose to measure EMF Power. It does not guarantee the accuracy of the measurement result.

d Optional. Tap to switch **Cable Loss** to **On** or **Off**.

e When the Cable Loss is on, tap **Cable Loss Value** and input the required.

NOTE:
When you need to use an antenna that is not listed in Antenna List EMF, connect your antenna and then set the Antenna Gain and Cable Loss required for your measurement.

7 Tap **Cable List** and select between **Standard** and Custom.

a Tap **Standard** and select a cable if you use a cable provided with G700050381 (Isotropic E-Field) antenna.

b Tap **Custom** and select a registered cable if you use a cable that you registered.

c Once tapped, a **Cable List Editor** window pops up.

– Tap **Add** (+) button to add a new cable. This will add to a new cable list.

– Tap the **Configuration** icon to edit a cable shown in the ‘Cable List’. After designating the cable name by selecting the Configuration icon, you need to input the real loss value of the cable measured between the bandwidth from 1 GHz to GHz. This will automatically compensate the measurement result by calculating the input cable loss.

– Tap the **Delete** icon to delete the customized cable that you have set.

8 Tap the **Display Mode** icon between **Spectrum** and **Level Recorder**. Refer to the figure below.
Based on the selection, the measurement screen will change.

9 On the right panel of the screen, do the following steps:

a Tap the **Testing** button to start the measurement.
The instrument displays measurement results on the screen.

b Tap the **Hold** icon on the side bar to hold the display.

c Tap the **Hold** icon again to release the display.

d Tap the **Stop** button to stop the measurement.
The alert message pops up to confirm whether you want to stop now or not.

– The (Isotropic) EMF Power is the sum of EMF power measured with three axes for the specified dwell time for the axis while the Accumulated (Isotropic) EMF Power is the average, maximum, and minimum power taken from the counts of measurements.

– Integrated BW displays as channel power of the current displayed signal on the measurement screen.

To configure Telecom Service Table

The telecom service table is a frequency/band editor that users can set and select frequency/band they want in advance.

1 Tap the **Configuration** icon to set **Telecom Service Table**.

a Tap the **Configuration** icon on the bottom left to edit the parameters: Start Frequency, Stop Frequency, Technology, and Minimum BW.

b Tap the **Channel Standard** button and select from the pop-up window.

c Tap the **Apply** button to apply the settings.

NOTE:
Make sure to go to Menu > Frequency and set the proper Integrated Bandwidth based on the frequency bandwidth for technology in service to get the right measurement result.

To set trace

If you set Axis to Manual, you can see only whether T1 displays with a selected axis correctly and Current displays as a selected antenna in the Antenna List EMF. The following is the case of setting trace if you set Axis to Auto and enter into measurement mode.

1 Tap **Menu** > **Trace** in the side bar.

2 Tap **Select Trace** from **1** to **4**.

- T1: Maximum Hold
- T2: Minimum Hold
- T3: Current (I; When connected Isotropic Antenna, E: When connected Isotropic Antenna)
- T4: Average

3 Tap to switch **Trace View** to **On** or **Off**.
If you set the Trace from 1 to 4 to off, the trace information in Top Info will indicate it as F (false).

4 Tap to switch **Detectors** to RMS or Peak.

a Tap **RMS** to display 'The root mean squared average power across the spectrum'.

b Tap **Peak** to display 'The highest value in each data point'.

5 Tap **Trace Clear All** to clear Min/Max/Isotropic EMF/Accumulated Isotropic EMF traces.

NOTE:
Trace Clear All resets traces you have set and it also affects overall measurement (Max, Min, etc...) and measurement result. Therefore, you need to be cautious when using this function.

To set limit

1 Tap **Menu** > **Limit** in the side bar.

2 Tap **Display Line**, and then enter a value that you want to set as a reference. The unit will vary depending on your selection of the unit in the Units setting in Amp/Scale.
You can also scroll up and down the purple bar on the measurement screen.

3 Tap to switch **Display Line Mode** to **On** or **Off**.
If you set it to On, the display line will appear with the purple bar on the measurement screen and set it to Off, the display line will disappear with the purple bar on the measurement screen.

4 Tap to switch **Standard Line Mode** to **On** to display the standard line on the screen or **Off** to hide the standard line on the screen.

5 Tap **Standard Limit Line** and select from the following options:
Standard Line is displayed on the screen based on the pre-defined standard. If you select ICNIRP Occupational or ICNIRP General Public, the Standard Line is automatically displayed with automatically calculated value defined in the ICNIRP guideline. Make sure you change the Scale Unit to V/m in this case to follow the guideline. Other standard limit lines listed in the pop-up window indicate specific standard applied to each country.

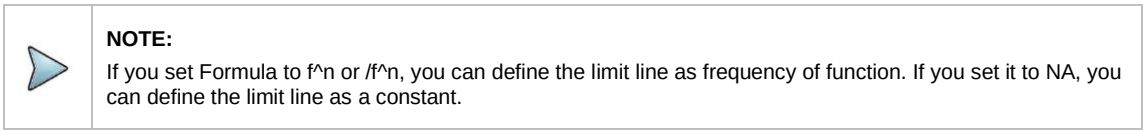
a Tap **ICNIRP Occupational** and **Apply** when EMF power is measured in a site where people work for long hours (occupational).

b Tap **ICNIRP General Public** and **Apply** when EMF power is measured in a public site where unspecified people come and go.

c Tap **Custom Limit** and then tap the **Configuration** icon if you want to customize setting and measure EMF power based on your need.

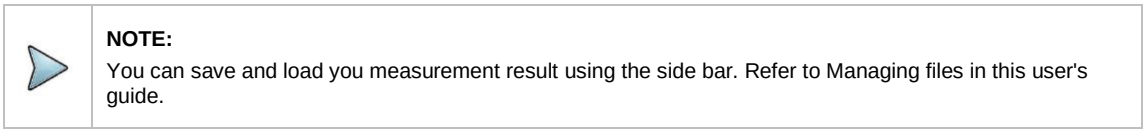
- A **Standard** window appears.
- Tap **Lower Frequency** and input a desired value using the on-screen keyboard.
- Tap **Upper Frequency** and input a desired value using the on-screen keyboard.

- Tap **Value** for **Frequency Range** and input a desired value using the on-screen keyboard. It sets coefficient of function.
- Tap **Formula** and select from the following choices: f^n, /f^n, NA. It defines an operator between coefficient and frequency. The operator to be defined is multiplication or division.
- Tap **Exponent Value** and input a desired value using the on-screen keyboard. It defines an exponent of the frequency.
- Tap the **Save** button if you want to save the setting.
- *Optional*. Tap the **Add** button to add Custom Limit.
- *Optional*. Tap the **Delete** button to delete the defined Custom Limit.



NOTE:

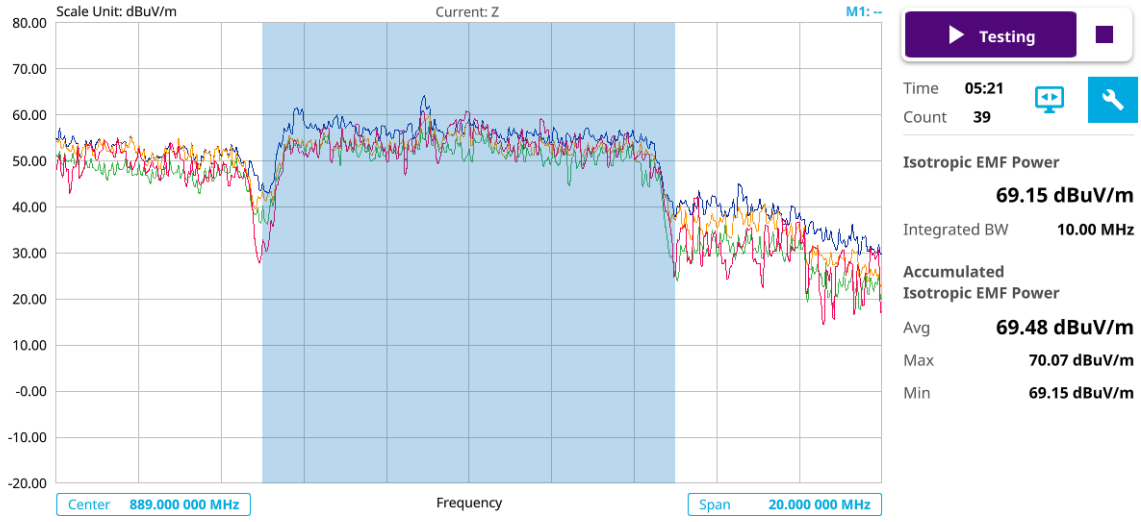
If you set Formula to f^n or /f^n, you can define the limit line as frequency of function. If you set it to NA, you can define the limit line as a constant.



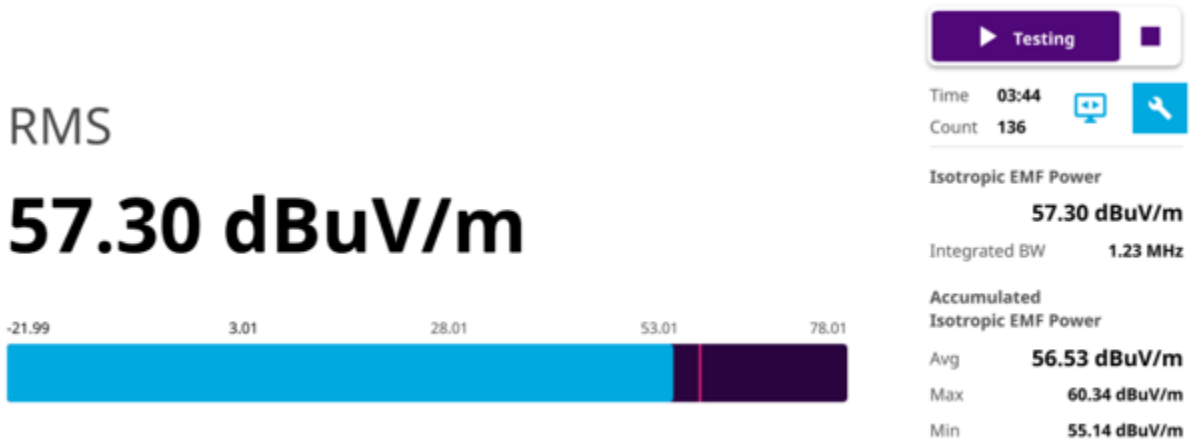
NOTE:

You can save and load you measurement result using the side bar. Refer to Managing files in this user's guide.

EMF Spectrum measurement



EMF Spectrum (level recorder) measurement



Scanner

You can set frequency to be scanned. You can measure up to 100 channels with this scanner. Using existing format-based or custom parameters, you can measure the integrated EMF power for each frequency band sequentially and continuously for predefined measurement time.

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Test Configuration**.

   a Tap to switch **Auto Range** to **On** or **Off**.
   When you set Auto Range On, the instrument scans to-be-measured bandwidth for EMF in advance and sets appropriate Attenuation and Preamp based on the different received signal level for the choice of axis.

b Tap **Dwell Time** to specify the amount of measurement time that you want the instrument to stay for on each axis and input the value from 1 to 60 (second) using the on-screen keyboard.

c Tap **Measurement Time** to specify the amount of measurement time that you want the instrument to stay for on all three axes in order to display current and accumulated EMF power and set this up to 60 minutes using the on-screen keyboard.

NOTE:
If you set the measurement time, the count which means the number of EMF measurements on the right panel of the measurement screen is changed corresponding to the measurement time you have set.

3 Tap **Move to RtSA** to view the real-time spectrum measurement mode.

4 Tap **Antenna & Cable Loss**.

a *Optional*. Tap to switch **Antenna Gain** to **On** or **Off**.

b When the Antenna Gain is on, tap **Antenna Gain Value** and input the required value using the on-screen keyboard.

NOTE:
You need to be cautious when using this value as the instrument applies not an antenna gain value selected from Antenna List EMF but applies this setting. This may cause measurement errors.

c Tap **Antenna List EMF** and select the required antenna from the pop-up window. Based on the antenna list you selected, you need to check the Axis mode and do the following:

– When selecting G700050381 (Isotropic E-Field) Antenna and Axis to Auto, the Current on the measurement screen indicates as x, y, or z automatically and the Isotropic EMF Power is measured.

– When selecting Yagi antenna (Log Periodic Broadband) and Axis to Auto, the Current on the measurement screen indicates YAGI and the EMF Power is measured.

– When tapping Custom > Configuration icon, an Antenna List Editor window appears and you can customize Frequency and Antenna Factor. You can add up to 500 customized antennas.

NOTE:
The instrument supports an engineering mode as ‘Axis Mode: Manual’ to inspect G700050381 antenna. You must not use this mode for a general purpose to measure EMF Power. It does not guarantee the accuracy of the measurement result.

d Optional. Tap to switch **Cable Loss** to **On** or **Off**.

e When the Cable Loss is on, tap **Cable Loss Value** and input the required.

NOTE:
When you need to use an antenna that is not listed in Antenna List EMF, connect your antenna and then set the Antenna Gain and Cable Loss required for your measurement.

5 Tap **Cable List** and select between **Standard** and **Custom**.

a Tap **Standard** and select a cable if you use a cable provided with G700050381 (Isotropic E-Field) antenna.

b Tap **Custom** and select a registered cable if you use a cable that you registered.

c Once tapped, a **Cable List Editor** window pops up.

– Tap **Add** (+) button to add a new cable. This will add to a new cable list.

– Tap the **Configuration** icon to edit a cable shown in the ‘Cable List’. After designating the cable name by selecting the Configuration icon, you need to input the real loss value of the cable measured between the bandwidth from 1 GHz to GHz. This will automatically compensate the measurement result by calculating the input cable loss.

– Tap the **Delete** icon to delete the customized cable that you have set.

6 Tap the **Display Mode** icon between **Table** and **Bar**. Refer to the figure below.
Based on the selection, the measurement screen will change.

7 On the right panel of the screen, do the following steps:

a Tap the **Testing** button to start the measurement.
The instrument displays measurement results on the screen.

b Tap the **Hold** icon on the side bar to hold the display.

c Tap the **Hold** icon again to release the display.

d Tap the **Stop** button to stop the measurement.
The alert message pops up to confirm whether you want to stop now or not.

– The Total indicates the sum of user-defined Average, Maximum and Minimum Integrated EMF Power and Others indicate not user-defined Integrated EMF Power taken from the counts of measurements.

NOTE:
If you go to Menu > Trace > Trace Clear All, it resets traces you have set and it also affects overall measurement (Max, Min, etc...) and measurement result. Therefore, you need to be cautious when using this function.

To configure Telecom Service Table

The telecom service table is a frequency/band editor that users can set and select frequency/band they want in advance.

1 Tap the **Configuration** icon to set **Telecom Service Table**.

a Tap the **Add** (+) button to add a band based on the previous selection.

b Tap the **Configuration** icon on the bottom left to edit the parameters: Start Frequency, Stop Frequency, Technology, Minimum BW, and Individual Limit (V/m).

c Tap the **Channel Standard** button and select from the pop-up window.

d Tap the **Apply** button to apply the settings.

e Once all set, select the **Test Range** using the on-screen keyboard.

f Tap **Set** to use this settings.

g Tap **Clear Al**l to deselect all the selected lists.

NOTE:
You can save and load the telecom service table setup using the Save or Load icon on the side bar.

To set limit

1 Tap **Menu** > **Limit** in the side bar.

2 Tap **Display Line**, and then enter a value that you want to set as a reference. The unit will vary depending on your selection of the unit in the Units setting in Amp/Scale.
You can also scroll up and down the purple bar on the measurement screen.

3 Tap to switch **Display Line Mode** to **On** or **Off**.
If you set it to On, the display line will appear with the purple bar on the measurement screen and set it to Off, the display line will disappear with the purple bar on the measurement screen.

4 Tap to switch **Scanner Limit Mode** to **On** to display the Filter icon on the screen or **Off** to disable the icon on the screen.

NOTE:
Tap the Filter icon to see the filtered failure items only.

5 Tap to switch **Limit Type** to **Individual** or **Standard**.

> **NOTE:**
>
> Based on the Individual Limit set in Telecom Service Table, the instrument judges Pass (Black) or Fail (Red).

6 Tap **Standard Limit Line** and select from the following options:
Standard Line is displayed on the screen based on the pre-defined standard. If you select ICNIRP Occupational or ICNIRP General Public, the Standard Line is automatically displayed with automatically calculated value defined in the ICNIRP guideline. Make sure you change the Scale Unit to V/m in this case to follow the guideline. Other standard limit lines listed in the pop-up window indicate specific standard applied to each country.

a Tap **ICNIRP Occupational** and **Apply** when EMF power is measured in a site where people work for long hours (occupational).

b Tap **ICNIRP General Public** and **Apply** when EMF power is measured in a public site where unspecified people come and go.

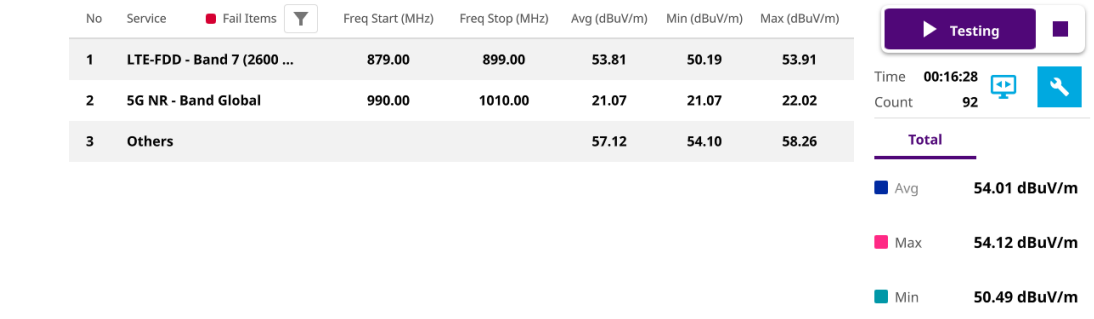
c Tap **Custom Limit** and then tap the **Configuration** icon if you want to customize setting and measure EMF power based on your need. You can set and add up to 10 custom limit values.

- A **Standard** window appears.
- Tap **Lower Frequency** and input a desired value using the on-screen keyboard.
- Tap **Upper Frequency** and input a desired value using the on-screen keyboard.
- Tap **Value** for **Frequency Range** and input a desired value using the on-screen keyboard. It sets coefficient of function.
- Tap **Formula** and select from the following choices: f^n, /f^n, NA. It defines an operator between coefficient and frequency. The operator to be defined is multiplication or division.
- Tap **Exponent Value** and input a desired value using the on-screen keyboard. It defines an exponent of the frequency.
- Tap the **Save** button if you want to save the setting.
- *Optional*. Tap the **Add** button to add Custom Limit.
- *Optional*. Tap the **Delete** button to delete the defined Custom Limit.

> **NOTE:**
>
> If you set Formula to f^n or /f^n, you can define the limit line as frequency of function. If you set it to NA, you can define the limit line as a constant.

> **NOTE:**
>
> You can save and load you measurement result using the side bar. Refer to Managing files in this user's guide.

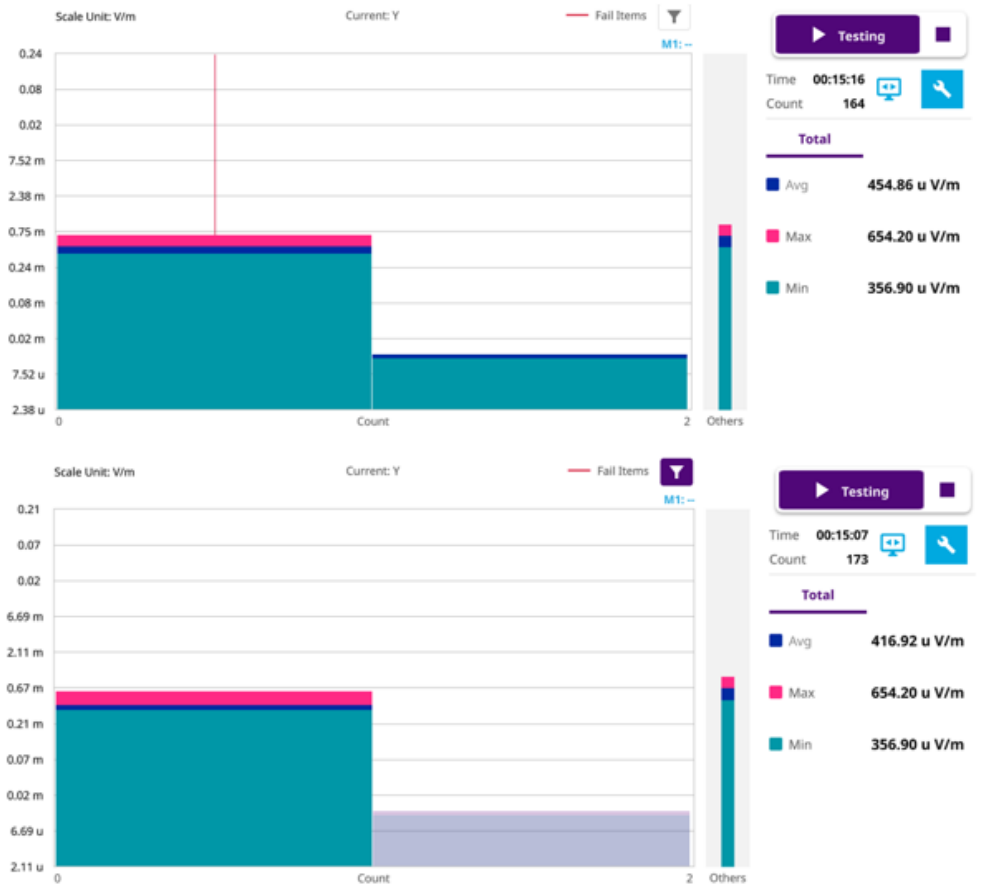
EMF Scanner measurement



NOTE:
If you choose the Display Mode to Table, it shows Others in the last row of the table. Others indicates the sum of EMF power for undefined bands among predefined bands. The Total EMF Power does not include the values for Others.

NOTE:
Fail items can be seen as red based on the limit you have set as individual or standard limit. If you tap the Filter icon, you will only see the fail items.

EMF Scanner measurement



NOTE:
If you choose the Display Mode to Bar, it shows Others in the screen. Others indicates the sum of EMF power for undefined bands among predefined bands. The Total EMF Power does not include the values for Others.

NOTE:
Fail items can be seen as a vertical red line based on the limit you have set as individual or standard limit. If you tap the Filter icon, the failure items can be seen as the first bar and others can be seen as translucent colors as shown in the above figure.

Conducting 5G NR analysis

5G NR beam analysis

5G NR beam analysis in EMF Analyzer shows the strength of RSRP for each carrier with the trend of Extrapolated Isotropic EMF Power, Extrapolated Accumulated EMF Power (Average, Maximum, and Minimum).

Setting measure setup

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap Bandwidth/SSB SCS and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The table below shows setting criteria.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11

30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

5 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among 4, 8 and 64. Refer to the selection criteria based on the table in **Step 2**.

6 Tap **GSCN** and input the vaulue using the on-screen keyboard. Based on the GSCM input frequency, the SSB frequency changes automatically.

7 Tap **SSB Auto Search Mode** and do the following:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically..

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting as required.

NOTE:

If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching.

You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from 5 ms, 10 ms, 20 ms, 40 ms, 80 ms, 160 ms. The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (Physical Cell ID) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard. The PCI switches to Manual.

NOTE:

You can go to **Menu** > **Frequency** > **Center Frequency Lis**t to add frequently used center frequency using the Add button in the Frequency List or to delete the selected frequency using the Delete button. You can also apply one of the default frequencies in the Frequency List by tapping the **Apply** button.

11 Tap **Test Configuration**.

a Tap to switch **Auto Range** to **On** or **Off**.
When you set Auto Range On, the instrument scans to-be-measured bandwidth for EMF in advance and sets appropriate Attenuation and Preamp based on the different received signal level for the choice of axis.

b Tap **Dwell Time** to specify the amount of measurement time that you want the instrument to stay for on each axis and input the value from 1 to 60 (second) using the on-screen keyboard.

c Tap **Measurement Time** to specify the amount of measurement time that you want the instrument to stay for on all three axes in order to display current and accumulated EMF power and set this up to 60 minutes using the on-screen keyboard.

NOTE:

If you set the measurement time, the count which means the number of EMF measurements on the right panel of the measurement screen is changed corresponding to the measurement time you have set.

d Tap to switch **Axis** to Manual or Auto.
If you set it to **Manual**, Axis setting is available and if you set it to Auto, Axis setting is unavailable.

– **Manual**: When using isotropic EMF antenna, you can manually set x, y, and z axis. You can set Manual as a diagnosis mode whether you can receive correct signal based on each axis: X, Y, or Z.

– **Auto**: Each axis of antenna is automatically changed and measured.

e When selected as Manual, tap **Axis** and select from: **X**, **Y**, or **Z**.

f Tap **UL/DL Config** and select Simple (default).

g Tap **UL (%)** and input the value using the on-screen keyboard.

h Tap **DL (%)** and input the value using the on-screen keyboard.

i Tap to switch **Scaling Factor** to **On** or **Off**.
You can apply additional TDD attenuation factor by turning it on and manually input the required value.

j Tap **Move to RtSA** to view the real-time spectrum measurement mode.

12 Tap **Antenna & Cable Loss**.

a *Optional*. Tap to switch **Antenna Gain** to **On** or **Off**.

b When the Antenna Gain is on, tap **Antenna Gain Value** and input the required value using the on-screen keyboard.

NOTE:
You need to be cautious when using this value as the instrument applies not an antenna gain value selected from Antenna List EMF but applies this setting. This may cause measurement errors.

c Tap **Antenna List EMF** and select the required antenna from the pop-up window. Based on the antenna list you selected, you need to check the Axis mode and do the following:

– When selecting G700050381 (Isotropic E-Field) Antenna and Axis to Auto, the Current on the measurement screen indicates as x, y, or z automatically and the Isotropic EMF Power is measured.

– When selecting Yagi antenna (Log Periodic Broadband) and Axis to Auto, the Current on the measurement screen indicates YAGI and the EMF Power is measured.

– When tapping Custom > Configuration icon, an Antenna List Editor window appears and you can customize Frequency and Antenna Factor. You can add up to 500 customized antennas.

NOTE:
The instrument supports an engineering mode as ‘Axis Mode: Manual’ to inspect G700050381 antenna. You must not use this mode for a general purpose to measure EMF Power. It does not guarantee the accuracy of the measurement result.

d Optional. Tap to switch **Cable Loss** to **On** or **Off**.

e When the Cable Loss is on, tap **Cable Loss Value** and input the required.

NOTE:
When you need to use an antenna that is not listed in Antenna List EMF, connect your antenna and then set the Antenna Gain and Cable Loss required for your measurement.

13 On the right panel of the screen, tap the Display Mode icon between **P vs T** and **Level Recorder**. Refer to the figure below.

14 On the right panel of the screen, do the following steps:

a Tap the **Testing** button to start the measurement.
The instrument displays measurement results on the screen.

b Tap the **Hold** icon on the side bar to hold the display.

c Tap the **Hold** icon again to release the display.

d Tap the **Stop** button to stop the measurement.
The alert message pops up to confirm whether you want to stop now or not.

e Tap to switch to **RSRP** or **Extrapolated**.
The (Isotropic) EMF Power and Accumulated (Isotropic) EMF Power (Average/Max/Min) values are displayed respectively for RSRP or Extrapolated. The chart on the left panel displays based on the values displayed on the right panel.

To set limit

1 Tap **Menu** > **Limit** in the side bar.

2 Tap **Display Line**, and then enter a value that you want to set as a reference. The unit will vary depending on your selection of the unit in the Units setting in Amp/Scale.
You can also scroll up and down the purple bar on the measurement screen.

3 Tap to switch **Display Line Mode** to **On** or **Off**.
If you set it to On, the display line will appear with the purple bar on the measurement screen and set it to Off, the display line will disappear with the purple bar on the measurement screen.

4 Tap to switch **Standard Line Mode** to **On** to display the standard line on the screen or **Off** to hide the standard line on the screen.

5 Tap **Standard Limit Line** and select from the following options:
Standard Line is displayed on the screen based on the pre-defined standard. If you select ICNIRP Occupational or ICNIRP General Public, the Standard Line is automatically displayed with automatically calculated value defined in the ICNIRP guideline. Make sure you change the Scale Unit to V/m in this case to follow the guideline. Other standard limit lines listed in the pop-up window indicate specific standard applied to each country.

   a Tap **ICNIRP Occupational** and **Apply** when EMF power is measured in a site where people work for long hours (occupational).

   b Tap **ICNIRP General Public** and **Apply** when EMF power is measured in a public site where unspecified people come and go.

   c Tap **Custom Limit** and then tap the **Configuration** icon if you want to customize setting and measure EMF power based on your need.

   – A **Standard** window appears.

   – Tap **Lower Frequency** and input a desired value using the on-screen keyboard.

   – Tap **Upper Frequency** and input a desired value using the on-screen keyboard.

   – Tap **Value** for **Frequency Range** and input a desired value using the on-screen keyboard. It sets coefficient of function.

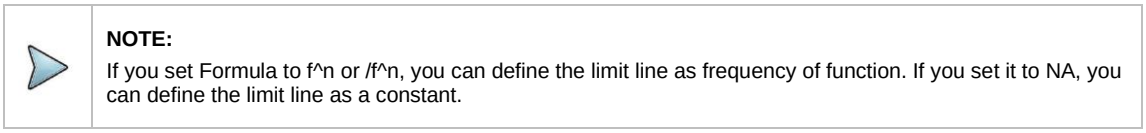
   – Tap **Formula** and select from the following choices: f^n, /f^n, NA. It defines an operator between coefficient and frequency. The operator to be defined is multiplication or division.

   – Tap **Exponent Value** and input a desired value using the on-screen keyboard. It defines an exponent of the frequency.

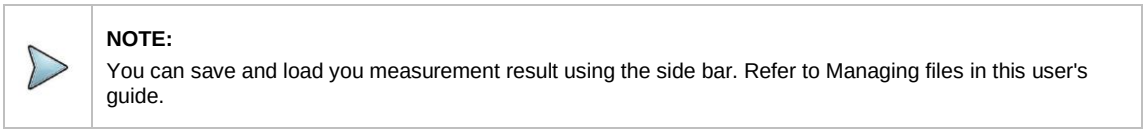
   – Tap the **Save** button if you want to save the setting.

   – *Optional*. Tap the **Add** button to add Custom Limit.

   – *Optional*. Tap the **Delete** button to delete the defined Custom Limit.



NOTE:
If you set Formula to f^n or /f^n, you can define the limit line as frequency of function. If you set it to NA, you can define the limit line as a constant.



NOTE:
You can save and load you measurement result using the side bar. Refer to Managing files in this user's guide.

To set sweep

1 Tap **Menu** > **sweep** in the side bar.

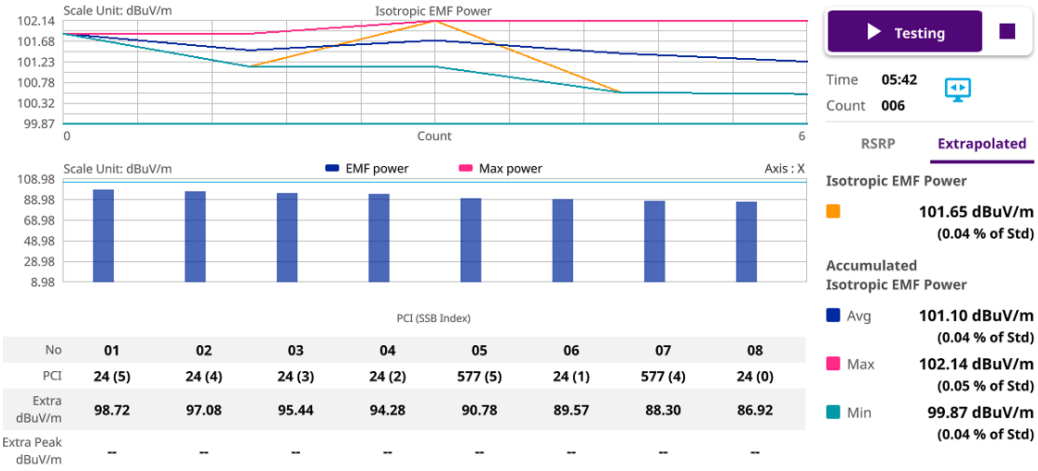
2 Tap to switch **Sweep Speed** to Fast or **Normal**.

   a If you set it to Normal, it displays the strongest PCI's beam with beam ID.

   b If you set it to Fast, it displays multi-PCI beam.

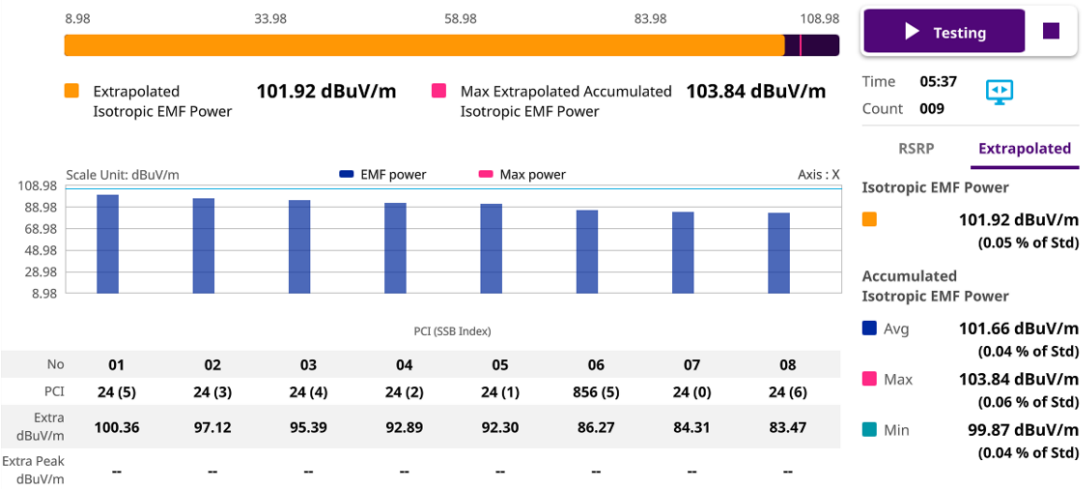
3 Tap to switch **Sweep** mode to **Continue** or **Single**.

EMF 5G NR beam measurement (Extrapolated)



No	01	02	03	04	05	06	07	08
PCI	24 (5)	24 (4)	24 (3)	24 (2)	577 (5)	24 (1)	577 (4)	24 (0)
Extra dBuV/m	98.72	97.08	95.44	94.28	90.78	89.57	88.30	86.92
Extra Peak dBuV/m	--	--	--	--	--	--	--	--

EMF 5G NR beam measurement (level recorder)



No	01	02	03	04	05	06	07	08
PCI	24 (5)	24 (3)	24 (4)	24 (2)	24 (1)	856 (5)	24 (0)	24 (6)
Extra dBuV/m	100.36	97.12	95.39	92.89	92.30	86.27	84.31	83.47
Extra Peak dBuV/m	--	--	--	--	--	--	--	--

NOTE:

If you tap the Level Recorder icon in the Display Mode, you will check the Extrapolated Isotropic EMF power and Max Extrapolated Accumulated isotropic EMF Power in a form of bar chart with its corresponding colors. If you want to see the chart view, you can tap the P vs T icon in the Display Mode then you will see the trend of Isotropic EMF Power, Accumulated Isotropic EMF Power (Average/Max/Min) based on Time and Count that you have set.

Using 5G TF Signal Analyzer

Introduction

VIAVI CellAdvisor 5G is the ideal field portable solution to validate 5G radio access. Its main 5G TF test functions are carrier scanner measuring up to eight single component carriers' power as well as the strongest beam and its power level, beam analyzer assessing individual beam's ID, power level and signal to noise levels, and coverage verification including real-time coverage map as well as data available for post-processing.

- OTA Analysis
  - Beam Analyzer
  - Carrier Scanner
  - Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **5G TF Signal Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

OTA Analysis > **Beam Analyzer**, **Carrier Scanner** or **Route Map**

Conducting OTA measurements

Beam analyzer

5G Beam Analyzer provides the beamforming profile of each transmission carrier, including the eight strongest beams and the corresponding power levels during its transmission period, and includes:

- **BRSRP (Beam Reference Signal Received Power)** — cumulative power measurement of the beam through the entire transmission bandwidth (90 MHz)
- **PSS-RSSI (Primary Synchronization Signal – Received Signal Strength Indicator)** — average power measurement through all the primary sync signals
- **BRS-SNR (Beam Reference Signal – Signal to Noise Ratio)** — is the ratio between the average power of the beam reference signals through the transmission bandwidth (90MHz) and average noise level of the carrier's guard-band

Setting measure setup

Before starting the Beam Analyzer, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **BRS Tx Period** and select the options from **< 5 ms**, **5 ms**,**10 ms**, **20 ms** or **Auto**.
Set the BRS transmission period as the following: 1 slot <5 ms, 1 subframe =5 ms, 2 subframes =10 ms, 4 subframes =20 ms. If you set it to Auto, the CellAdvisor 5G automatically decodes MIB.

3 Tap **Beam Index** and select between **symbol order** and **subframe region**.
You can select symbol order if you want to allocate the beam index in a sequential symbol order in the same antenna.
You can select subframe region if you want to allocate the beam index from 0 to 111 within a subframe.

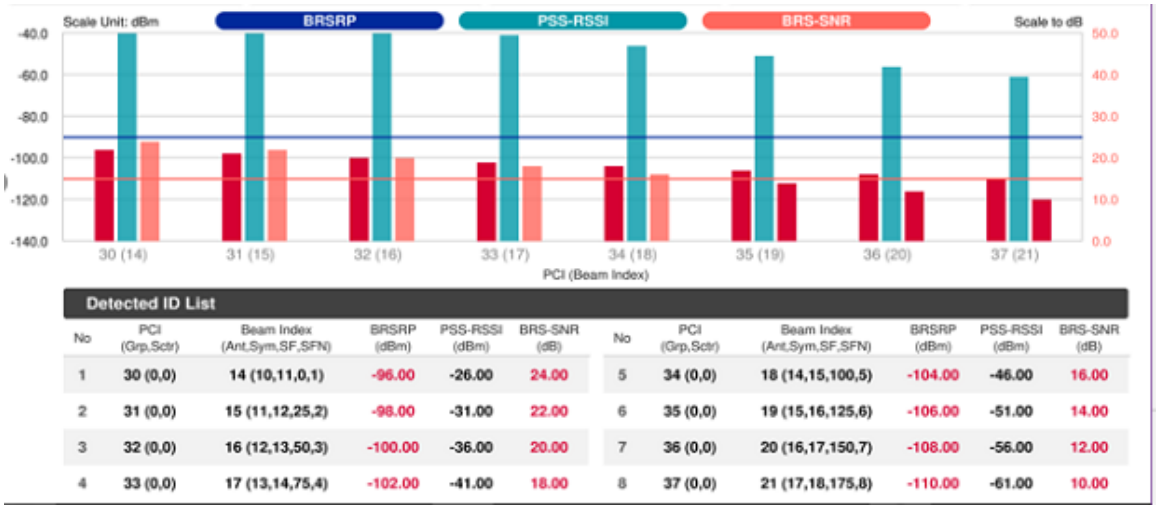
4 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

5 Tap **PCI** and input a value using the on-screen keyboard.
The **PCI** switches to **Manual**.

6 Tap to switch **BRSRP Type** to **Average** or **Cumulative**.
You can select Cumulative if you want to see the sum of all BRS (82*8 resource elements) within one symbol. You can select Average to see the average value.

NOTE:
You can go to **Menu** > **Frequency** > **Frequency List** to add frequently used center frequency using the **Add** button in the Frequency List or to delete the selected frequency using the **Delete** button. You can also apply one of the default frequencies in the Frequency List by tapping the **Apply** button.

Beam analyzer measurement



Detected ID List

No	PCI (Grp,Sctr)	Beam Index (Ant,Sym,SF,SFN)	BRSRP (dBm)	PSS-RSSI (dBm)	BRS-SNR (dB)	No	PCI (Grp,Sctr)	Beam Index (Ant,Sym,SF,SFN)	BRSRP (dBm)	PSS-RSSI (dBm)	BRS-SNR (dB)
1	30 (0,0)	14 (10,11,0,1)	-96.00	-26.00	24.00	5	34 (0,0)	18 (14,15,100,5)	-104.00	-46.00	16.00
2	31 (0,0)	15 (11,12,25,2)	-98.00	-31.00	22.00	6	35 (0,0)	19 (15,16,125,6)	-106.00	-51.00	14.00
3	32 (0,0)	16 (12,13,50,3)	-100.00	-36.00	20.00	7	36 (0,0)	20 (16,17,150,7)	-108.00	-56.00	12.00
4	33 (0,0)	17 (13,14,75,4)	-102.00	-41.00	18.00	8	37 (0,0)	21 (17,18,175,8)	-110.00	-61.00	10.00

NOTE:
The undetected values in the Detected ID List table will be indicated as "--". You cannot save the measurement as a Result. Logging as CSV option is added. For more details, see Managing files.

Carrier scanner

5G Carrier Scanner provides an easy and fast response power measurements of up to eight single component carriers of 100 MHz. The power measurement for each carrier includes:

- **Channel Power** — integrated power of the entire channel bandwidth (100MHz) during an entire transmission frame (10ms)
- **RSRP (Beam Reference Signal Received Power)** — cumulative power measurement of the strongest beam in the corresponding carrier through the entire transmission bandwidth (90MHz) during the beam's transmission period (one symbol or 10 ms/700)

Setting measure setup

Before starting the Carrier Scanner, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **BRS Tx Period** and select the options from **< 5 ms**, **5 ms**,**10 ms**, **20 ms**, or **Auto**.**region**.
Set the BRS transmission period as the following: 1 slot <5 ms, 1 subframe =5 ms, 2 subframes =10 ms, 4 subframes =20 ms. If you set it to Auto, the CellAdvisor 5G automatically decodes MIB.

3 Tap **Beam Index** and select between **symbol order** and **subframe region**.
You can select symbol order if you want to allocate the beam index in a sequential symbol order in the same antenna.
You can select subframe region if you want to allocate the beam index from 0 to 111 within a subframe.

	NOTE: For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

4 Tap **Configuration** to set **Center Frequency** for each carrier from 1 to 8.

You can also tap the **Configuration** ( ) under the chart screen.

5 Tap the **Search** icon of the selected carrier in the carrier scanner table to set the limit. This enables you to check the beam information without changing the measurement mode to Beam Analyzer.
The beam information pops up for the selected carrier.

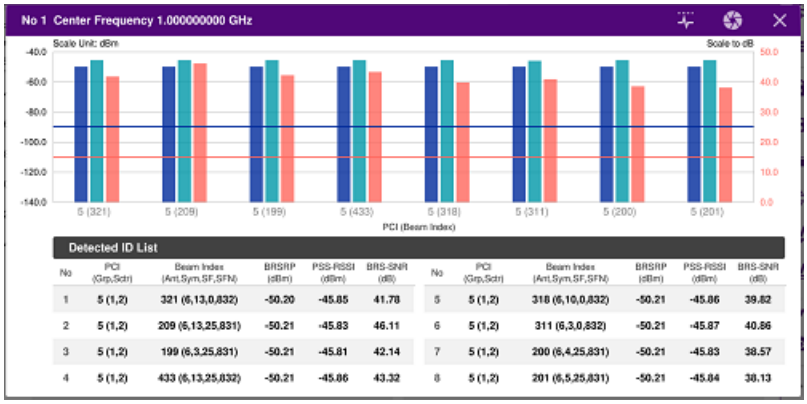
a Select the **Limit** ( ) icon to set **BRSRP Line** and **BRS-SNR Line** to **On** or **Off**. When selecting on, set the limit using the on-screen keyboard.
You can also set limits moving the BRSRP Line Limit (default: blue) bar on the left edge and BRS-SNR Line Limit (default: orange) bar on the right edge. If the setting value is smaller than the limit, the line bar color and the result text color of the table become red.

b Select the **Quick Save** ( ) icon to capture the current screen

c Select the **Close** ( ) icon to close the Beam Information window

6 *Optional.* To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

7 To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.



8 Tap to switch **BRSRP Type** to **Average** or **Cumulative**.
You can select Cumulative if you want to see the sum of all BRS (82*8 resource elements) within one symbol. You can select Average to see the average value.

Carrier scanner measurement

NOTE:
You cannot save the measurement as a Result or Result as CSV.

Route map

5G route map traces the power level of the strongest beam corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information panel displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.

	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch the **Plot Point** to **GPS** or **Position**.

- **a** To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
  With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.
- **b** To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.

4 Tap to switch **Plot Item** to **PSS-RSSI** or **BRSRP**.

5 Tap **BRS Tx Period** and select the options from **< 5 ms**, **5 ms**,**10 ms**, **20 ms**, or **Auto**.
Set the BRS transmission period as the following: 1 slot <5 ms, 1 subframe =5 ms, 2 subframes =10 ms, 4 subframes =20 ms. If you set it to Auto, the CellAdvisor 5G automatically decodes MIB.

6 Tap **Beam Index** and select between **symbol order** and **subframe region**.
You can select symbol order if you want to allocate the beam index in a sequential symbol order in the same antenna.
You can select subframe region if you want to allocate the beam index from 0 to 111 within a subframe.

7 Tap to switch **BRSRP Type** to **Average** or **Cumulative**.
You can select Cumulative if you want to see the sum of all BRS (82*8 resource elements) within one symbol. You can select Average to see the average value.

	NOTE: The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS point cannot be plotted.

5 Save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon ( ) on the side bar. Make sure the file extension is `. gomv`.

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **BRSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right pane.

3 Select the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding BRSRP value, and if there is no detected Beam Index, the point will be hidden.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for Excellent, and the minimum value is the Limit for Poor. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap **Menu** > **Limit**.

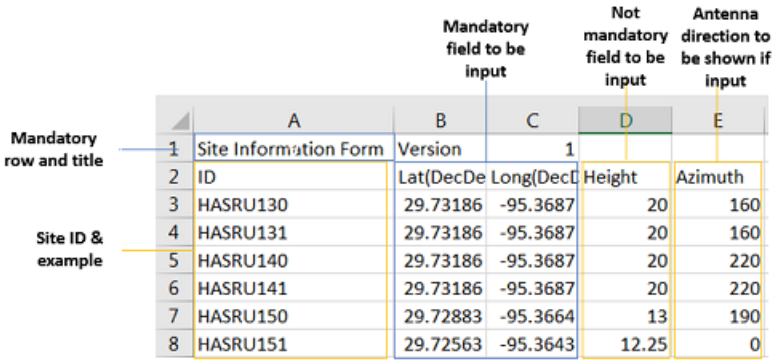
2 Tap **Excellent** and set a value using the on-screen keyboard.

3 Tap **Poor** and set a value using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** field if you want to check the direction of antenna.

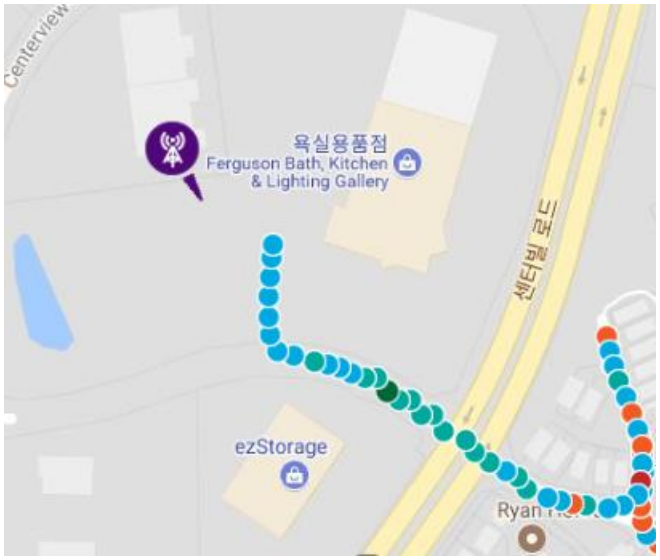
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Route map measurement with site information screen



NOTE:
The purple icon indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

Route map measurement screen

Using 5G NR Signal Analyzer

Introduction

VIAVI CellAdvisor 5G NR is the ideal field portable solution to validate 3GPP 5G NR radio access. Its main 5GNR test functions are RF measurement, over-the-air measurement, and demodulation measurement. The RF measurement includes channel power, ACLR, SEM and occupied bandwidth based on triggered spectrum analysis. The over-the-air measurement includes beam analyzer, carrier scanner and route map. The demodulation measurement includes PDSCH EVM and constellation. The carrier scanner is measuring up to eight single component carriers' power as well as the strongest beam and its power level. The beam analyzer is assessing individual beam's ID, power level and signal to noise levels, and coverage verification including real-time coverage map as well as data available for post-processing.

- RF Analysis
  - Trigger Spectrum
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - ACLR
  - Multi-ACLR
  - Spurious Emissions (frequency extended up to 18.5 GHz in addition to existing 24 GHz to 40 GHz)
- OTA Analysis
  - Beam Analyzer
  - Carrier Scanner
  - Route Map
  - Beam Availability Index
  - Freq/Time/Power Variation
  - Multipath Profile
- Signal Analysis
  - Constellation
  - Allocation Mapper
  - Power vs Time (Slot)
  - Power vs Time (Frame)
- PDSCH Analysis
  - PDSCH Constellation
  - EVM vs Subcarrier
- Cell Phase Sync Analysis

- Sync Analysis
- Sync Route Map

- Online Route Map Analysis
  - Online OTA Route Map
  - Online Sync Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **5G NR Signal Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

RF Analysis > Trigger Spectrum, **Channel Power**, **Occupied Bandwidth**, **Spectrum Emission Mask**, **ACLR**, **Multi-ACLR**, or **Spurious Emissions**

OTA Analysis > **Beam Analyzer**, **Carrier Scanner**, **Route Map**, **Beam Availability Index**, **Freq/Time/Power Variation**, or **Multipath Profile**

Signal Analysis > **Constellation** or **Allocation Mapper**, **Power vs Time (Slot)**, or **Power vs Time (Frame)**

PDSCH Analysis > **PDSCH Constellation** or **EVM vs Subcarrier**

Cell Phase Sync Analysis > **Sync Analysis** or **Sync Route Map**

Online Route Map Analysis > **Online OTA Route Map** or **Online Sync Route Map**

Conducting RF measurement

Trigger spectrum

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap **Slot Formats** and input the value from 0 to 55 using the on-screen keyboard.
The slot format means how to use one slot between downlink and uplink.

10 Tap to switch **Link** to **UL** or **DL**.

11 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

12 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

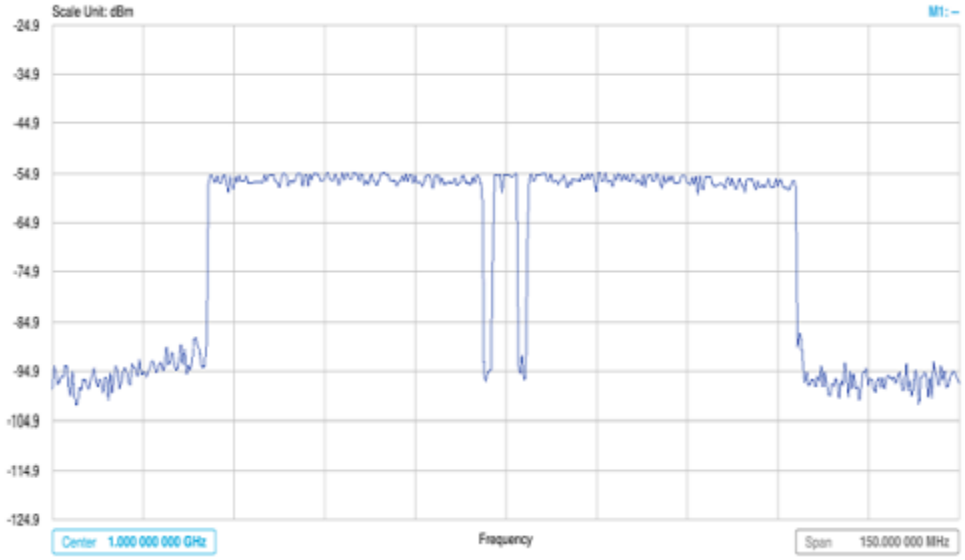
13 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.

- **Off**: Setting radio frequency to 0.

14 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

Trigger spectrum measurement with 5G NR



Channel Power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **EIRP Settings** and input the value using the on-screen keyboard.

a Select **Set Max to EIRP1** to save the currently measured maximum value to EIRP1.

b Select **Set Max to EIRP2** to save the currently measured maximum value to EIRP2.

c Select **Clear Max** to clear the currently measured maximum value.

d Select **Clear All** to reset EIRP1, EIRP2, and maximum value.

e Select **Distance** and input the value using the on-screen keyboard.

f Select **Antenna Gain** and input the value using the on-screen keyboard.

NOTE
Distance and Antenna gain values are required when calculating EIRP. Effective Isotropic Radiated Power (EIRP) refers to the amount of power that a theoretical isotropic antenna (which evenly distributes power in all directions) would emit to produce the peak power density observed in the direction of maximum antenna gain . EIRP can take into account the losses in transmission line and connectors and includes the gain of the antenna. The EIRP is often stated in terms of decibels over a reference power emitted by an isotropic radiator with equivalent signal strength. The EIRP allows comparisons between different emitters regardless of type, size or form. From the EIRP, and with knowledge of a real antenna's gain, it is possible to calculate real power and field strength values.

Formula to calculate: EIRP = Tx RF Power (dBm)+GA (dB) - FL (dB)

Tx RF Power refers to RF power measured at RF connector of the unit

GA refers to Gain Antenna

FL refers to Feeder loss (cable loss of any other loss occurred)

You can tap to switch to **Channel Power** or **EIRP** under the chart in the table, and it will show the automatically calculated value.

13 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

Setting limit

1 Tap **Menu** > **Limit**.

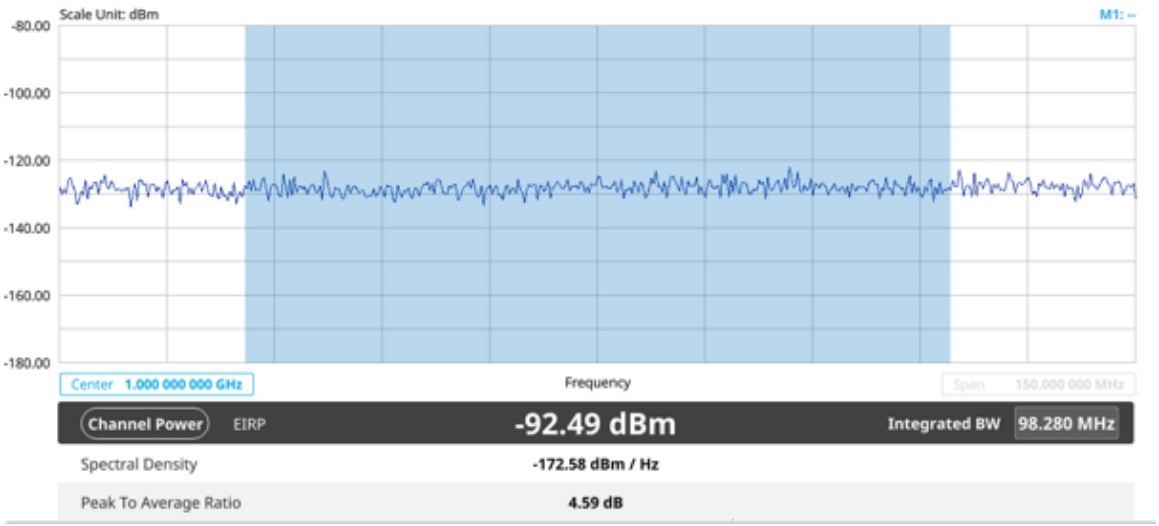
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Channel power measurement with 5G NR



Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

Occupied bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation:	4	A {2,8} +14*n	15 kHz	5 (1 ms)

< 1.88 GHz		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

Setting Limit

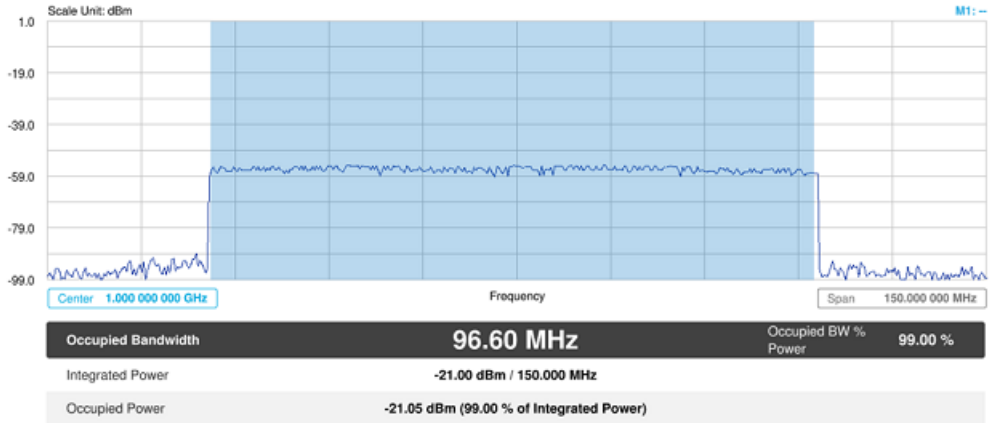
1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Occupied bandwidth with 5G NR



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Spectrum emission mask

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5

240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **SEM Config** to configure the following items:

a Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

b Tap **Category** and select the option from **Wide Area BS A**, **Wide Area BS B**, **Medium Range BS**, or **Local Area BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Medium Range BS for micro cell, and Local Area Base Station for pico cell.

c Tap **Mask Type** and select the option from **KCA** or **3GPP**.
You can select the KCA to follow Korea Communications Agency standard (Korea-specific) or select 3GPP to follow international standard.

13 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

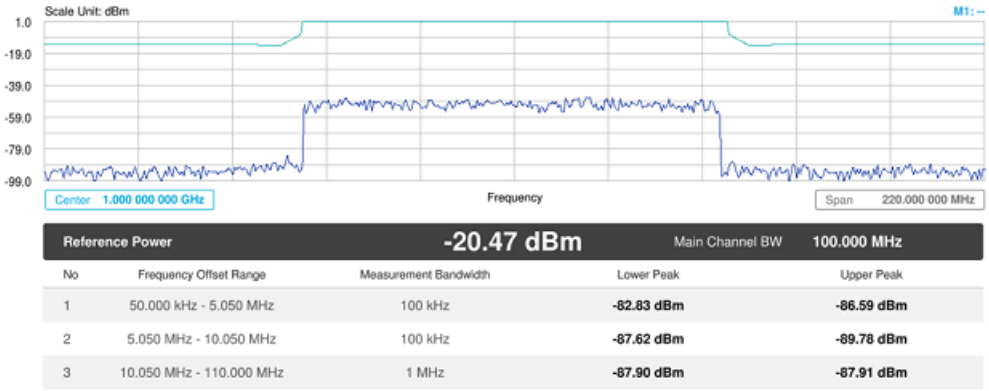
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Spectrum emission mask measurement with 5G NR



If Lower Peak or Upper Peak indicate Fail, the mask line becomes red.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP WCDMA specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **Sync Raster/SCS Offset** to fine-tune the offset using the SCS.
The following table shows the sync SCS offset range per SSB SCS and sync SCS resolution.

5 Tap **SSB Frequency** and input the value using the on-screen keyboard.

6 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

9 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

10 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

11 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.

- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

13 Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

14 Tap **Category** and select the option from **Wide Area BS A**, **Wide Area BS B**, **Medium Range BS**, or **Local Area BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Medium Range BS for micro cell, and Local Area Base Station for pico cell.

15 Tap **Menu** > **Trigger** and tap to switch **Burst Spectrum** to **On** or **Off**, which takes time for FPGA change.

- **On**: Functions as Threshold RMS Spectrum. Automatically sets UI Update Rate 100 ms, Average 100, RBW 100kHz, VBW 100kHz.
- **Off**: Functions as PSS Correlation Spectrum. Automatically sets UI Update Rate 600 ms, Average 1, RBW 100kHz, VBW 100kHz.

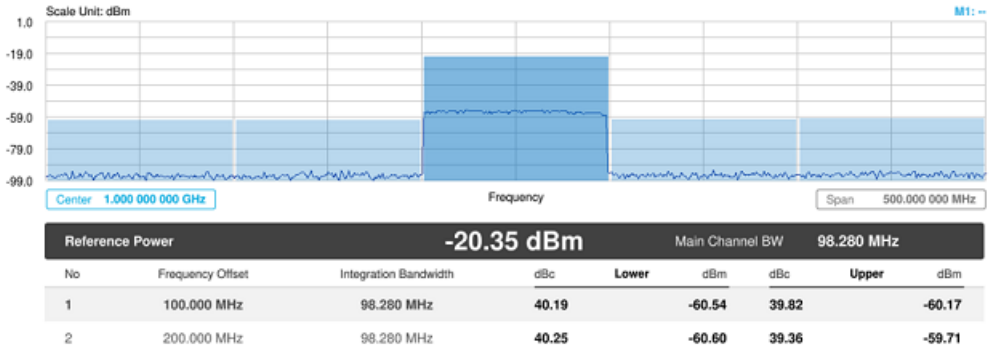
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

ACLR measurement with 5G NR



Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	Case	SCS
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	A {2,8} +14*n	15 kHz
	B {4,8,16,20} +28*n	30 kHz
	C {2,8} +14*n	30 kHz
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	A {2,8} +14*n	15 kHz
	B {4,8,16,20} +28*n	30 kHz
	C {2,8} +14*n	30 kHz
> 6 GHz (FR2)	D {4,8,16,20} +28*n	120 kHz
	E {8,12,16,20,32,36,40,44} +56*n	240 kHz

3 Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

4 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

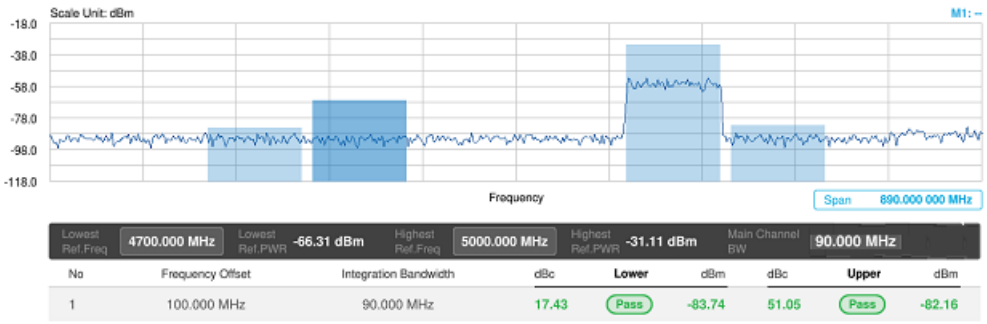
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-ACLR measurement with 5G NR



NOTE

You can set the Lowest Ref. Frequency and Highest Ref. Frequency by tapping the rectangle with value using the on-screen keyboard.

Spurious emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal. Frequency extended up to 18.5 GHz in addition to existing 24 GHz to 40 GHz.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The frequency setting is not used in the Spurious Emissions mode. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

3 Tap **Measure Type** and select the option from **Transmitted** or **Receiver**.

4 Tap to switch **Setting** to **User** if you want user defined setting, and tap **Configuration** or **Configuration** ( )icon.

- **a** Tap **Range** under the chart screen and switch to **On** to display or **Off** to hide the selected range in the result table.
  You can select the range number between **1** and **20** to add as a new or change the existing settings.
- **b** Tap **Start Frequency/Stop Frequency** and enter the value for the selected range using the on-screen keyboard.
- **c** Tap **Start Limit/Stop Limit** and enter the lower limit/upper limit for Pass/Fail indication.
- **d** Tap **Attenuation/RBW/VBW** and specify or select the value.

5 Tap to switch **Setting** to **3GPP** if you want 3GPP standard defined setting, and tap **Configuration** or **Configuration** ( )icon.

   a Tap **Range** under the chart screen and switch to **On** to display or **Off** to hide the selected range in the result table.
   You can select the range number between **1** and **20** to add as a new or change the existing settings.

   b Tap **Attenuation** and specify or select the value.

6 Tap **Measurement Type** between **Full** and **Examine**.
The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically change the selected range from one another.

7 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

8 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

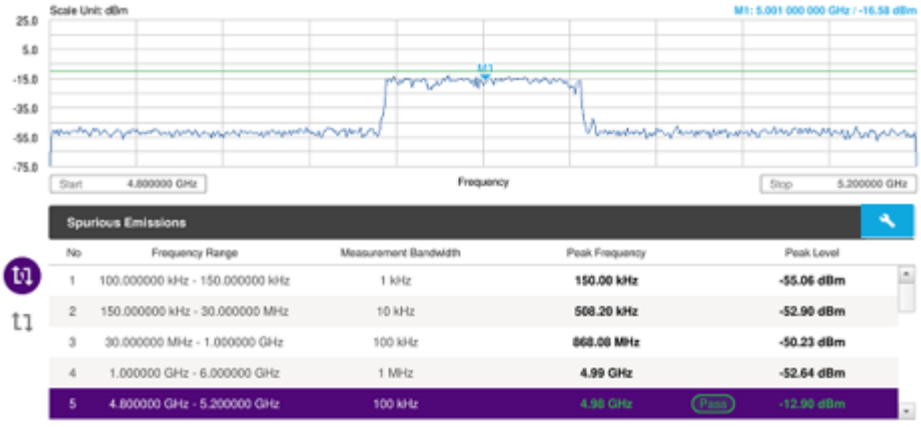
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Optional. Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Spurious emissions measurement with 5G NR



NOTE:

You can only set the frequency range and attenuation by tapping the Configuration icon if your setting is 3GPP. If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

Conducting OTA measurement

Beam analyzer

5G NR provides the beamforming profile of each transmission carrier, including the eight strongest beams and the corresponding power levels during its transmission period, and includes:

- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals
- **P-SS RSRP (Primary Synchronization Signal – Reference Signal Received Power)** — average power measurement through all the primary sync signals
- **S-SS SINR (Secondary Synchronization Signal – Signal to Interference Plus Noise Ratio)** — linear average over the power contribution (in Watts) of the resource elements carrying secondary synchronization signals divided by the linear average of the noise and interference power contribution (in Watts) over the resource elements carrying secondary synchronization signals within the same frequency bandwidth
- **S-SS RSRQ (Secondary Synchronization Signal – Reference Signal Received Quality)** — ratio of N x SS-RSRP/NR carrier RSSI. Here N refers to number of resource blocks in NR carrier RSSI measurement Bandwidth

Setting measure setup

Before starting the Beam Analyzer, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)

		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous** and do the following steps:

a Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency
- **Manual**: Setting radio frequency as required
- **Off**: Setting radio frequency to 0

b Tap to switch **Compensation** to **On** or **Off**.
When the Compensation is set to On, Multi-PCIs changes to Single PCI and it applies the compensation for distance for Single PCI to Time Error.

c Tap **Distance** and input the required value using the on-screen keyboard. .
This will be applied when you are measuring the time error.

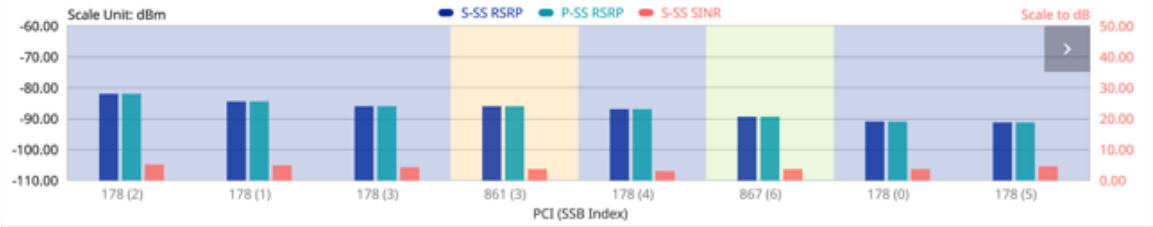
13 Tap **Limit** > **PCI Dominance**. Once tapped **On**, you can set the value using the on-screen keyboard.
If the PCI dominance is on, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold,the fail indicator (red) can be identified in the PCI column of the result table and the top right corner of the instrument at the same time.

14 Tap **Limit** > **PBCH EVM**. Once tapped On, you can set the PBCH EVM Limit value using the on-screen keyboard.

15 Tap **Limit** > **PBCH DM-RS EVM**. Once tapped On, you can set the PBCH DM-RS EVM Limit value using the on-screen keyboard.

NOTE:
You can go to **Menu** > **Frequency** > **Center Frequency List** to add frequently used center frequency using the **Add** button in the Frequency List or to delete the selected frequency using the **Delete** button. You can also apply one of the default frequencies in the Frequency List by tapping the **Apply** button.

Beam analyzer measurement



No	PCI (Grp,Sctr)	SSB Index (DM-RS,PBCH)	S-SS RSRP (dBm)	P-SS RSRP (dBm)	P-SS SNR (dB)	S-SS SINR (dB)	S-SS RSRQ (dB)	S-SS RSSI (dBm)	PBCH DM-RS RSRP (dBm)	PBCH DM-RS EVM (%)	Time Error (µs)
1	178 (59,1)	2 (2,--)	-81.89	-82.30	31.83	5.07	-14.96	-60.85	-76.91	107.21	910.67
2	178 (59,1)	1 (1,--)	-84.31	-83.59	27.46	4.78	-15.83	-63.28	-78.71	379.38	910.67
3	178 (59,1)	3 (3,--)	-85.80	-85.27	28.46	4.12	-18.33	-64.77	-78.31	237.91	910.67
4	861 (287,0)	3 (4,--)	-85.84	-84.65	28.28	3.49	-18.00	-64.80	-79.12	132.46	910.77
5	178 (59,1)	4 (4,--)	-86.88	-87.73	27.27	3.06	-17.10	-65.84	-80.86	313.52	1233.08
6	867 (289,0)	6 (0,--)	-89.39	-89.52	20.83	3.42	-18.07	-68.36	-80.95	103.29	2233.86
7	178 (59,1)	0 (6,--)	-90.83	-92.27	24.15	3.70	-18.83	-69.79	-81.76	152.20	910.67
8	178 (59,1)	5 (6,--)	-91.30	-88.89	23.56	4.46	-19.36	-70.26	-82.40	606.95	1661.21

NOTE:
The undetected values in the Detected ID List table will be indicated as "--". You cannot save the measurement as a Result. Logging as CSV option is added. For more details, see Managing files.

Carrier scanner

5G Carrier Scanner provides an easy and fast response power measurements of up to eight single component carriers of 100 MHz. The power measurement for each carrier includes:

- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals
- **Channel Power** — integrated power of the entire channel bandwidth (100 MHz) during an entire transmission frame (10 ms)

Setting measure setup

Before starting the Carrier Scanner, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. Carrier Scanner supports N type and K type port selection automatically using top right panel ( ) icon. You will need to connect the RF input port correctly on your instrument based on the frequency range (9 kHz to 18 GHz/9 kHz to 44 GHz).

1 Tap the **Setup** ( ) icon > **Configuration** on the side bar.

a Tap the number to switch the carrier on or off in the **Carrier Configuration** box. You can select up to 8 carriers.

b Tap the **Center Frequency** box and input the value using the on-screen keyboard.

- If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:
  - Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
  - Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
  - Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
  - Tap the **Delete** icon to deleted the selected list(s).
  - Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

	NOTE: You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

c Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

d Tap the **Channel Number** box and input the value using the on-screen keyboard.

e Tap the **Bandwidth/SSB SCS** box and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum	8	A {2,8} +14*n	15 kHz	5 (1 ms)

operation: 1.88 GHz to 6 GHz		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

f Tap to switch **SSB Auto Search Mode** to **Auto Preamp/Atten** or **Manual**.
Auto Preamp/Atten to set preamp and attenuation automatically or Manual for user-defined settings.

g Tap **Start** or **Stop** to start/stop Auto Search.

h Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step e**.

i Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

j Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

k Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.

l Tap **SSB Frequency** and input the value using the on-screen keyboard.

m Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

n Tap the **Sync Raster Offset** and input the value using the on-screen keyboard. in **Auto Search** box to search SCS, type, and the number of SSB automatically or the **Stop** button to set the SSB period based on the base station.
Once the **Start** button is tapped, the progress bar appears.

o Tap the **Sync SCS Offset** and input the required value using the on-screen keyboard.

2 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

3 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Viewing beam information

1 Tap the **Search** icon of the selected carrier (highlighted in purple) in the table to set the limit. This enables you to check the beam information without changing the measurement mode to Beam Analyzer.
The beam information pops up for the selected carrier.

a Select the **Auto Scale** ( ) icon to set **S-SS RSRP Line** and **S-SS SINR Line** to **On** or **Off**. When selecting on, set the limit using the on-screen keyboard.
You can also set limits moving the S-SS-RSRP Line Limit (default: blue) bar on the left edge and S-SS-SINR Line Limit (default: orange) bar on the right edge. If the setting value is smaller than the limit, the line bar color and the result text color of the table become red.

b Select the **Limit** ( ) icon to set **S-SS RSRP Line** and **S-SS SINR Line** to **On** or **Off**. When selecting on, set the limit using the on-screen keyboard.
You can also set limits moving the S-SS RSRP Line Limit (default: blue) bar on the left edge and S-SS SINR Line Limit (default: orange) bar on the right edge. If the setting value is smaller than the limit, the line bar color and the result text color of the table become red.

c Select the **Quick Save** ( ) icon to capture the current screen.

d Select the **Close** ( ) icon to close the Beam Information window.

No	PCI (Grp,Sctr)	SSB Index (DM-RS,PBCH)	S-SS RSRP (dBm)	P-SS RSRP (dBm)	P-SS SNR (dB)	S-SS SINR (dB)	S-SS RSRQ (dB)	S-SS RSSI (dBm)	PBCH DM-RS RSRP (dBm)	PBCH DM-RS EVM (%)	Time Error (µs)
1	0 (0,0)	4 (2,--)	-57.87	-57.88	34.97	33.83	-10.67	-36.83	-57.67	3.11	2071.88
2	0 (0,0)	2 (4,--)	-57.88	-57.87	35.78	34.54	-10.68	-36.84	-57.68	3.15	1071.88
3	0 (0,0)	7 (7,--)	-57.88	-57.88	36.61	32.74	-10.68	-36.84	-57.67	2.45	3500.00
4	0 (0,0)	6 (6,--)	-57.89	-57.88	33.51	33.94	-10.67	-36.85	-57.69	2.61	3071.88
5	0 (0,0)	0 (0,--)	-57.89	-57.88	34.09	25.81	-10.68	-36.85	-57.71	5.19	71.88
6	0 (0,0)	1 (5,--)	-57.90	-57.88	42.49	29.73	-10.69	-36.86	-57.67	2.60	500.00
7	0 (0,0)	5 (1,--)	-57.90	-57.88	41.38	28.41	-10.69	-36.87	-57.67	2.15	2500.00
8	0 (0,0)	3 (3,--)	-57.91	-57.87	40.66	27.97	-10.69	-36.87	-57.66	2.19	1500.00

Setting the sweep speed

1 Tap **Menu** > **Sweep**.

2 Tap **Sweep Speed** and you can choose between **Fast** and **Normal**.

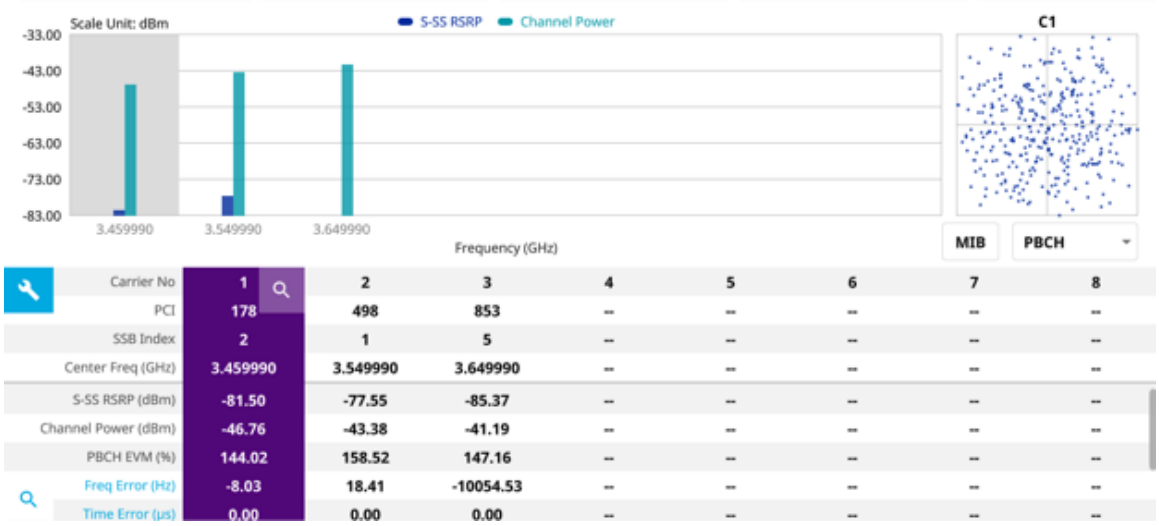
Setting Limit

1 Tap **Menu** > **Limit**.

2 Tap **PBCH EVM** between **On** and **Off**.
Once on, you can set the PBCH EVM Limit value using the on-screen keyboard.

2 Tap **PBCH DM-RS EVM** between **On** and **Off**.
Once on, you can set PBCH DM-RS EVM Limit value using the on-screen keyboard.

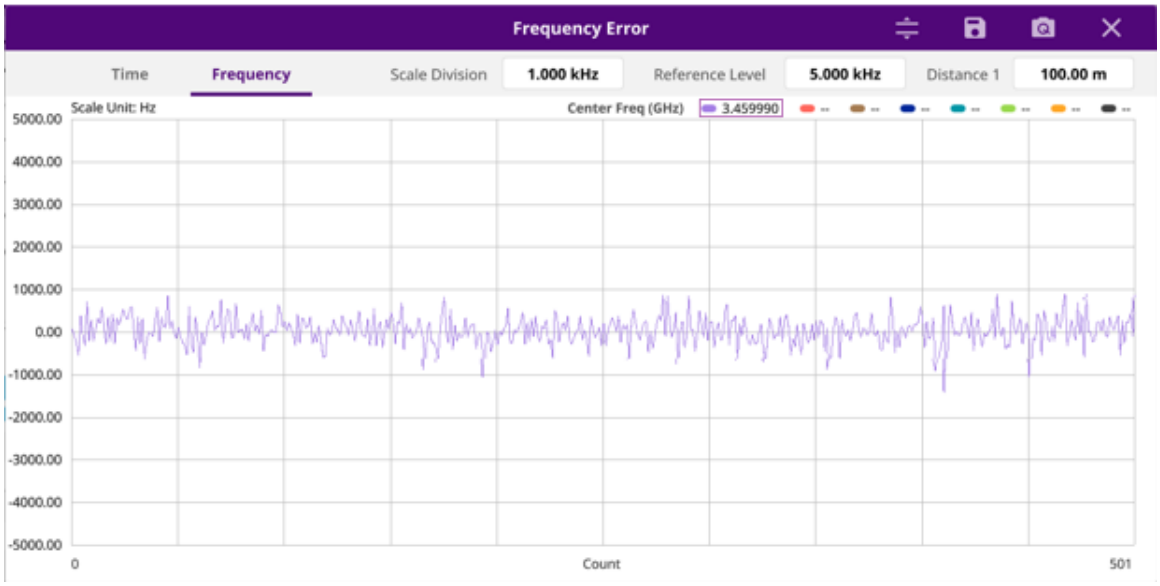
Carrier scanner measurement



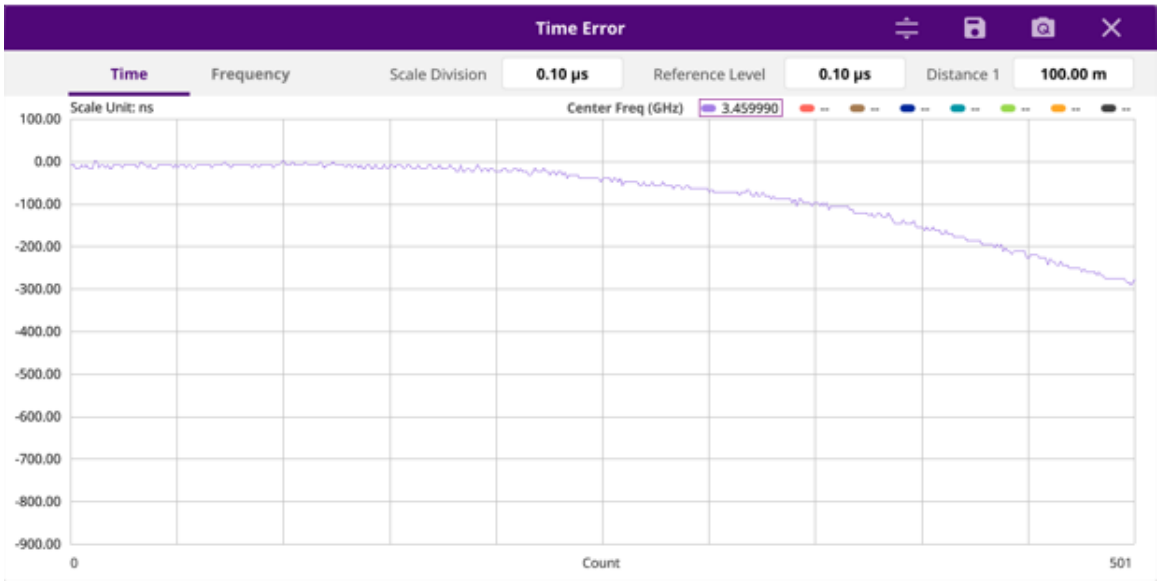
Carrier No	1	2	3	4	5	6	7	8
PCI	178	498	853	--	--	--	--	--
SSB Index	2	1	5	--	--	--	--	--
Center Freq (GHz)	3.459990	3.549990	3.649990	--	--	--	--	--
S-SS RSRP (dBm)	-81.50	-77.55	-85.37	--	--	--	--	--
Channel Power (dBm)	-46.76	-43.38	-41.19	--	--	--	--	--
PBCH EVM (%)	144.02	158.52	147.16	--	--	--	--	--
Freq Error (Hz)	-8.03	18.41	-10054.53	--	--	--	--	--
Time Error (µs)	0.00	0.00	0.00	--	--	--	--	--

NOTE:
You cannot save the measurement as a Result or Result as CSV.

Carrier scanner measurement with frequency error



Carrier scanner measurement with time error



Using icons

You can tap the **Magnifier** icon to check the frequency or time error. You can also perform the following operation using the icons.

(Auto scale): You can set the scale automatically.

(Save as CSV): You can assign file name using the on-screen keyboard and apply the changes. This will let you save your measurement file internally.

(Quick save): You can save current measurement screen as it is.

(Close): You can close the screen you are seeing now.

NOTE:
You can adjust Scale Division, Reference Level, and Distance using the on-screen keyboard.

Route map

5G route map traces the power level of the strongest beam corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 1.9 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap **Map Config** to switch the **Plot Point** to **GPS** or **Position** or **Time**.

- **a** To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.
- **b** To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.(If you tap the **Start** button ( ) on the right panel of the map, the Undo icon appears).

4 Tap to switch **Plot Item** to **S-SS RSRP, P-SS RSRP**, **S-SS RSRQ**, or **S-SS SINR**.

5 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)

< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

6 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

7 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

9 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 5**.

10 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

11 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

12 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

13 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

14 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

15 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

NOTE:
If you select the Plot Item to PCI Dominance, you will see the plotting circled dot and its edge with PCI legend color based on its receieved power and PCI Dominance color based on the threshold you have set respectively. If PCI Dominance is lower than the value you have set, it judges fail showing red in the edge. Otherwise, it judges pass showing green in the edge.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS point cannot be plotted.

5 If you start test and select **Setup** > **Map Config** > **Plot Point** > **Position**, you can undo by tapping the **Start** button.

6 If you select **Stop** button, **Plot Stop** popup window appears.

7 Save the logging file to your USB.

NOTE:
If you go to Limit > PCI Dominance and set it, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold, the fail indicator (red) can be identified in the PCI column of the Information window and the top right corner of the instru ment at the same time.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is . `gomv`.

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **P-SS RSRP** value. When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

NOTE:
When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

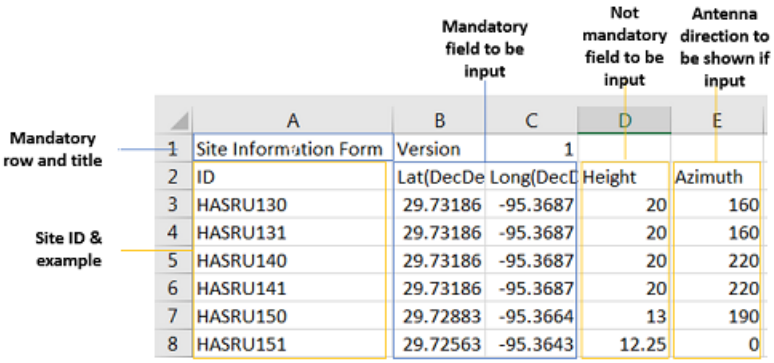
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(Dec[	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

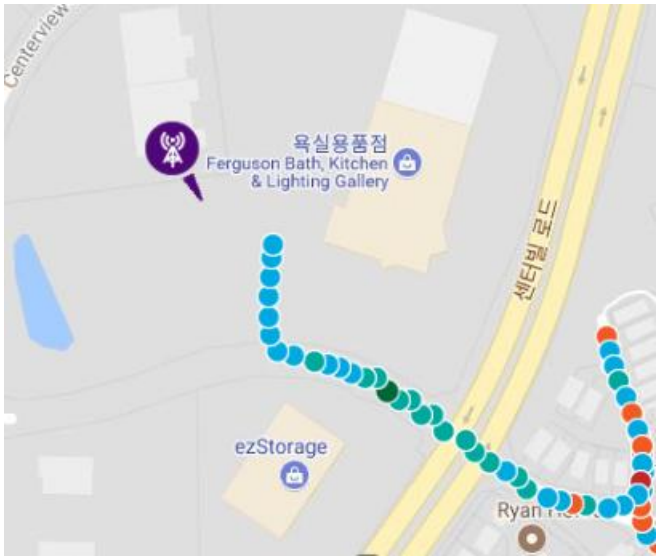
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Route map measurement with site information screen



NOTE:
The purple icon indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

Route map measurement screen with 5G NR Signal Analyzer

NOTE:
20 different PCI colors in small circle and Beam power in line are displayed.

Route map measurement screen (Plot Point to Time) with 5G NR Signal Analyzer

NOTE:
When you setup **Plot Point** to **Time** and tap the start/testing button, you can't touch the screen to active.
After the waiting indicator(Waiting) stops, the active indicator(00 Data) shows up.

Beam availability index

Beam availability index measurement enables showing the maximum beam resource blocks with its power for each detected PCI. Normally recognized beam color is blue and unrecognized one is gray.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11

30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **Distance** and input a value using the on-screen keyboard.

13 Tap **Antenna Gain** and input a value using the on-screen keyboard.

NOTE
Distance and Antenna gain values are required when calculating EIRP. Effective Isotropic Radiated Power (EIRP) refers to the amount of power that a theoretical isotropic antenna (which evenly distributes power in all directions) would emit to produce the peak power density observed in the direction of maximum antenna gain . EIRP can take into account the losses in transmission line and connectors and includes the gain of the antenna. The EIRP is often stated in terms of decibels over a reference power emitted by an isotropic radiator with equivalent signal strength. The EIRP allows comparisons between different emitters regardless of type, size or form. From the EIRP, and with knowledge of a real antenna's gain, it is possible to calculate real power and field strength values.

Formula to calculate: EIRP = Tx RF Power (dBm)+GA (dB) - FL (dB)

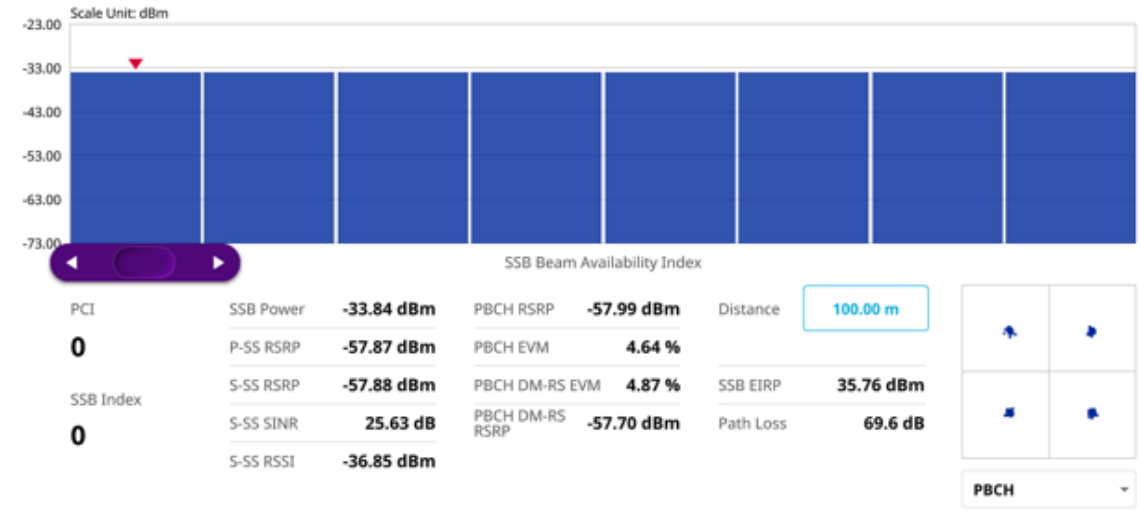
Tx RF Power refers to RF power measured at RF connector of the unit

GA refers to Gain Antenna

FL refers to Feeder loss (cable loss of any other loss occurred)

You can tap to switch to **Channel Power** or **EIRP** under the chart in the table, and it will show the automatically calculated value.

Beam availability index measurement



NOTE

You can adjust SSB frequency using the purple scroll bar on the chart. You can see the constellation information by selecting either PBCH or PBCH DM-RS.

Freq/Time/Power Variation

Frequency, time, and power variation shows the frequency, time, and power error trend based on the time elapsed.

Setting measure setup

Before starting the Frequency/Time Error Variation, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

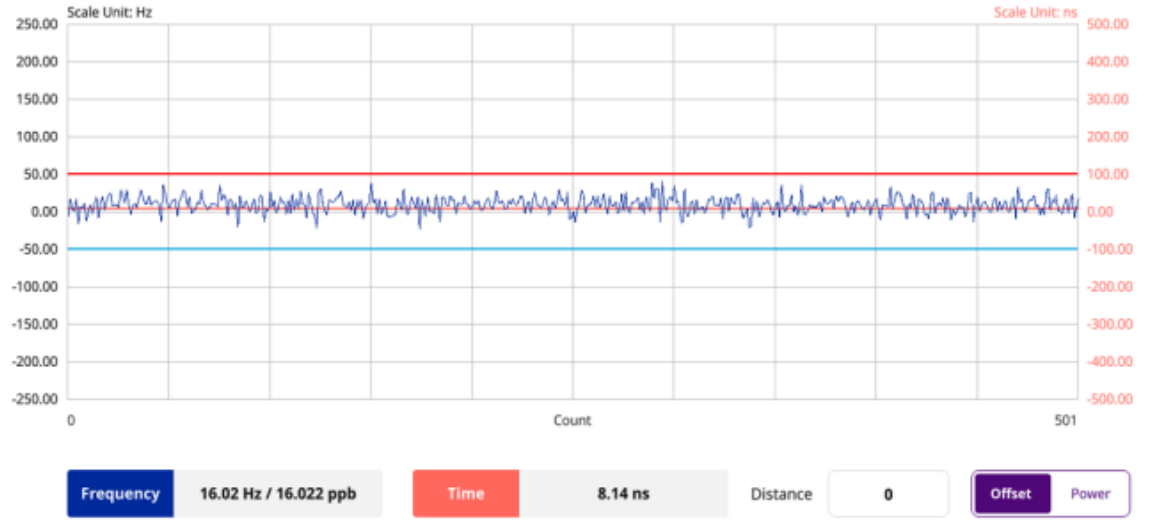
10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

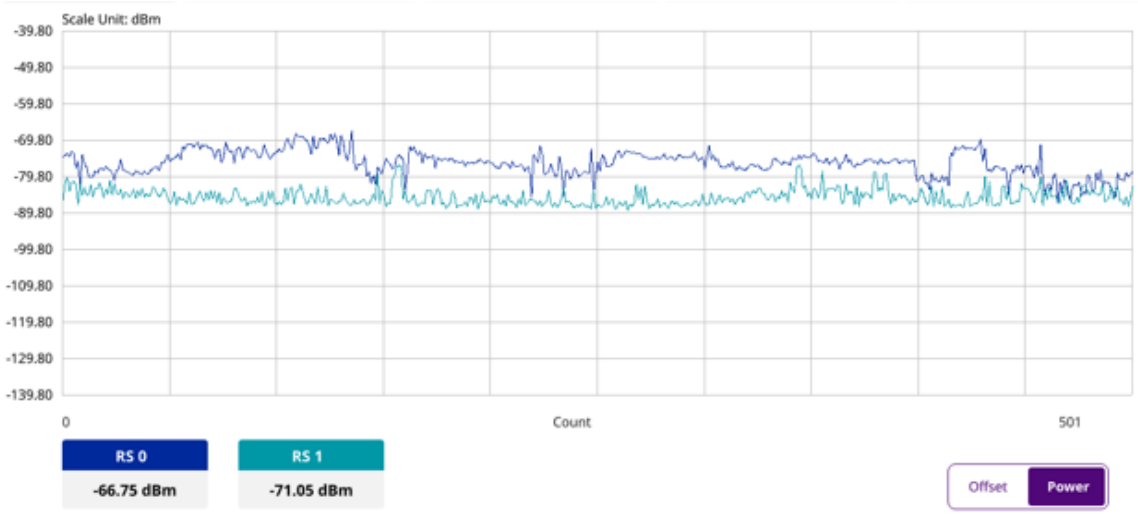
- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Frequency/time/power variation by offset with 5G NR Signal Analyzer



NOTE:
You can tap the Distance box and input the value that you want to compensate for distance. When distance is entered, the time will show the value with distance correction. Make sure the default value for Distance is 0.

Frequency/time/power variation by power with 5G NR Signal Analyzer



Multi-path profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings or being refracted through the atmosphere differently from the main signal.

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

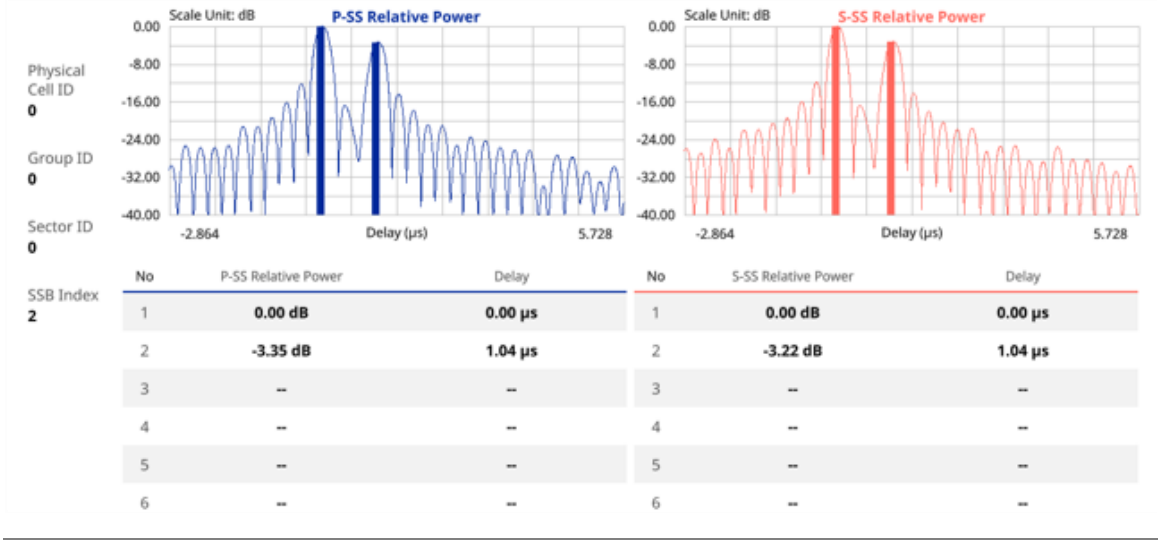
9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Multi-path profile measurement with 5G NR Signal Analyzer



No	P-SS Relative Power	Delay
1	**0.00 dB**	**0.00 µs**
2	**-3.35 dB**	**1.04 µs**
3	--	--
4	--	--
5	--	--
6	--	--

No	S-SS Relative Power	Delay
1	**0.00 dB**	**0.00 µs**
2	**-3.22 dB**	**1.04 µs**
3	--	--
4	--	--
5	--	--
6	--	--

Conducting signal measurement

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap the test items and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
Time error	Time error	Test limits On/Off, High Limit/Low Limit
SS-RSRP Power	SS-RSRP Power	Test limits On/Off, High Limit/Low Limit
PDSCH error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

NOTE:
The CellAdvisor 5G currently measures the PDSCH EVM values based on SIB1 contained PDSCH RB. The CellAdvisor 5G performs the 3GPP recommended call protocol connection to get SIB1 RDSCH RB which should have the following pieces of information required for proper measuring support:

• Pdcch-configSIB1 of MIB (Master Information Block) determines the common search space of type-0 PDCCH

	• DCI (Downlink Control information) format 1_0 is used to get the information of SIB1 PDSCH RB location • SIB1 (System Information Block type

Constellation measurement with 5G NR Signal Analyzer

NOTE:
Once you tap the Time Offset button at the right bottom of the screen, the histogram graph appears.

Allocation mapper

CellAdvisor 5G NR allocation mapper displays power for X axis (time) and Y axis (frequency) of 1 frame with resources being measuring for current PCI.

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

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< 1.88 GHz		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE

Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Setting limit

You can set the thresholds for the two different color indicators: maximum value and minimum value. The input range is from -120 dBm to 100 dBm.

1 Tap the rectangle with value before color legend bar on the measurement screen.

2 Set a value for **Minimum** using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Maximum** using the on the measurement screen.

Allocation Mapper measurement with 5G NR

NOTE
If SSB Area is set to On, it shows the expected resource location of SSB in the currently set 5G NR.

- Frame Power: the average RE power of the whole frames (dB, full bandwidth)
- Frame Utilization: RE% of “PBCH-DMRS RSRP(dB) - 6dB” or more in whole frame RE
- Slot Power: the average RE power of the corresponding whole slot (dB, fullbandwidth)
- Slot Utilization: RE% of “PBCH-DMRS RSRP(dB) - 6dB” or more in the corresponding whole slot

Power vs Time (Slot)

The Power vs. Time measurement measures the mean transmission power during the useful part of GSM bursts and verifies that the power ramp fits within the defined mask. It also lets you view the rise, fall, and useful part of the GSM burst.

This measurement provides masks for both of Base Transceiver Station (BTS) and Mobile Station (MS). The timing masks are referenced to the transition from the bit 13 to the bit 14 of the mid-amble training sequence. For GMSK measurements, the 0 dB reference is determined by measuring the mean transmitted power during the useful part of the burst.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

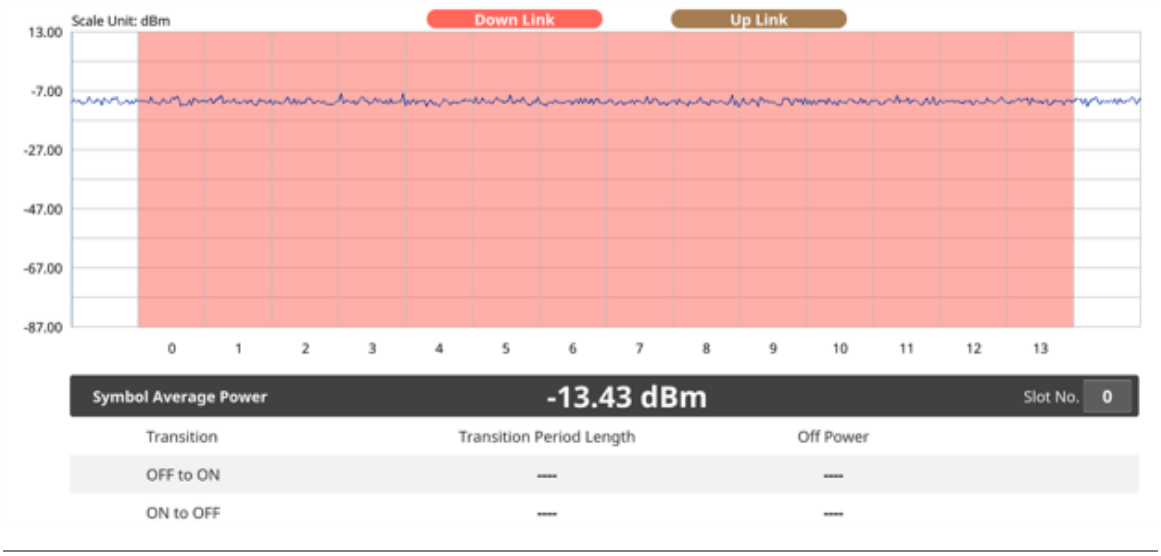
10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **Slot Formats** and input the value from 0 to 55 using the on-screen keyboard.
The slot format means how to use one slot between downlink and uplink.

Power vs Time (Slot) measurement with 5G NR



NOTE
You can set the Slot No. from 0 to 19 in the Symbol Average Power table.

NOTE:
You cannot save the measurement as a Result. Logging as CSV and IQ Capture options are added. For more details, see Managing files.

Power vs Time (Frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in a NR signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)

< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

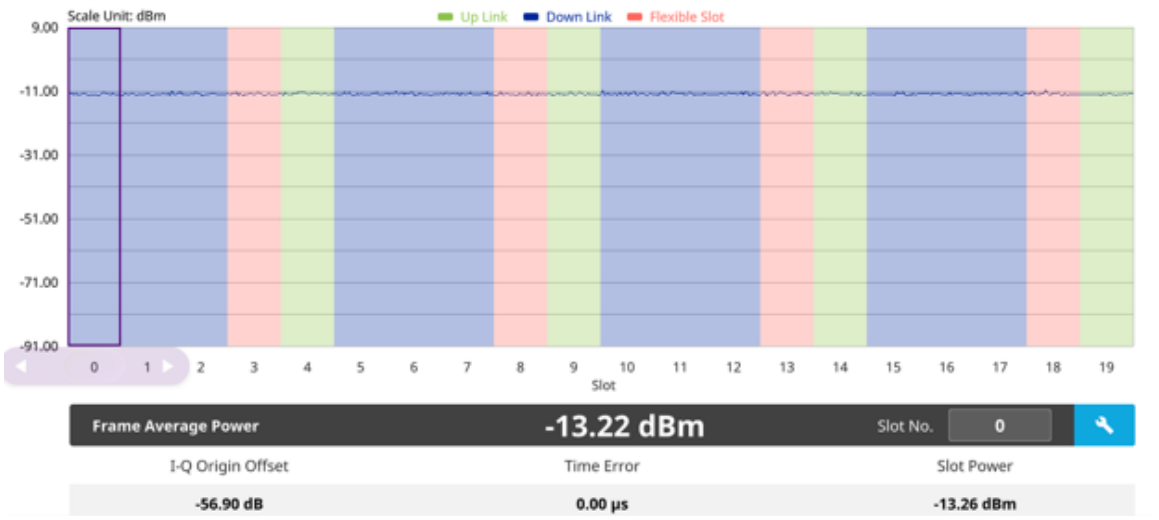
10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Power vs Time (Frame) measurement with 5G NR



NOTE
You can set the Slot No. from 0 to 19 or move the purple scroll bar to set and highlight the slot number you want to see. Once highlighted, you can tap the **Search** button to see the selected slot number information (zoomed in 3 slots). If you set slot number 4, you will see slot number 3 ,4, and 5 with chart displaying uplink, downlink, and flexible slot.
You can also set slot type (Uplink/Downlink/Flexible Slot) and number by tapping the Configuration icon.

NOTE:
You cannot save the measurement as a Result. Logging as CSV and IQ Capture options are added. For more details, see Managing files.

Conducting PDSCH analysis

PDSCH Constellation

In 5G NR, PDSCH is defined as the physical downlink channel that carries user data. DM-RS and PT-RS are the reference signals associated with PDSCH. These signals are generated within the PDSCH allocation. DM-RS is used for channel estimation as part of coherent demodulation of PDSCH. CellAdvisor 5G enables PDSCH EVM setting and shows its demodulated data as constellation.

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE
Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **PDSCH Configuration** or the **Configuration** icon on the screen to set PDSCH EVM in the PDSCH EVM Setting window appeared.

a Tap **Data** and select **Data Subcarrier Spacing** from the following options: **15 kHz**, **30 kHz**, **60 kHz**, or **120 kHz**.

- **Start Symbol** and **Number of RBs** are automatically changed based on the Data Subcarrier Spacing selection.

b Tap **Grid** to set the resource grid that BWP to be assigned per each numerology (SSB SCS and Data SCS).

- In the formula, a wider numerology between SSB SCS and Data SCS represents μ0 and a narrower numerology represents μ.

- Based on the input numerology and bandwidth you have set, input **Start Grid** and **Size Grid** using the on-screen keyboard.

c Tap **Bandwidth Part** to set the range that to be assigned BWP for the input Data SCS.

- In the formula, input Start BWP and Size BWP value using the on-screen keyboard.

d Back to **Data**, do the following steps:

- Select **Slot Number** for analyzing PDSCH EVM from 1 to 19 using the on-screen keyboard.
- Tap **Offset RB** and **Number of RBs** to set resource blocks within the range of BWP using the on-screen keyboard.

NOTE

You need to input values for Offset RB and Number of RBs considering the range that actual data should be allocated. As the input values need to be within the range of BWP, if you assign data from BWP start RB, the Offset RB should be 0.

- Tap **Start Symbol** and **Number of Symbols** set from 10 to 13 using the on-screen keyboard.
- Tap **Modulation type** and select the options from: **QPSK**, **16 QAM**, **64 QAM**, or **256QAM**

e Tap **PDSCH DM-RS** and do the following steps:
PDSCH DMRS is a special type of physical layer signal which functions as a reference signal for decoding PDSCH in 5G NR:

- Select N_{SCID} between **0** or **1**. The quantity N_{SCID} ϵ {0,1} is given by the DM-RS sequence initialization field, if DCI is associated with the PDSCH transmission, 1 is selected and, otherwise 0 is used.
- Select N_{ID} source between **Scrambling ID** and **PCI**. Set Scrambling ID for configuring with the higher-layer parameter data-scrambling identity or PCI from the physical cell ID and input the required value using the on-screen keyboard.
- Select between **Mapping Type A** and **B**. Set Mapping Type A to start only at symbol 2 or 3 within a slot, meaning that SLIV (Start and Length Indicator for the time domain allocation for PDSCH) that starts from symbol 4 or higher cannot use this type of DMRS and Mapping Type B to start always at the first symbols of scheduled SLIV.
- Select between **Configuration Type 1** and **2**. In Configuration type 1, the minimum resource element group in frequency domain is one RE. In Configuration type 2, the minimum resource element group in frequency domain is two consecutive REs.
- Select **DM-RS Type A Position** between **pos2** and **pos3** to set the PDSCH DM-RS position for mapping type A.
- Select **DM-RS Additional Position** to set the Position for additional DM-RS in DL.
- Select **DM-RS Duration** between **Single** and **Double**. Set Single when single-symbol DM-RS is used or Double when double (two) symbols are used.
- Set **Antenna Port** to be used as reference for initial synchronization for DM-RS. Usable antenna port is determined by Configuration Type and DM-RS Duration.
- Set **Power Boosting** in dB (relative) of the DMRS associated with the PDSCH physical channel relative to PDSCH power.

NOTE

You need to make sure PDSCH DM-RS setting is accurately done to get the right analysis data. For more details on setting, you can find it in the following location:
https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3213 and check the latest 38.211 documentation.

f Tap to switch **PT-RS** to **On** or **Off** and when On, do the following steps:

- Select K_{PT-RS} to set the PTRS period in subcarrier in the frequency domain between **2** and **4**.
- Select L_{PT-RS} to set the start PTRS symbol in time domain from the options: **1**, **2**, and **4**.
- Select **Resource Element Offset** to set PT-RS resource element offset from **Offset00**, **Offset01**, **Offset10**, and **Offset11**.
- Select N_{RNTI} to set the physical channel.

g Tap **Summary** to check all the parameters are accurately set. o the following steps:

- **PDSCH Preview** displays resources that are assigned PDSCH within BWP (X axis: symbol, Y axis: subcarrier).

h Tap the **Done** button if you finish all settings.

Setting limit

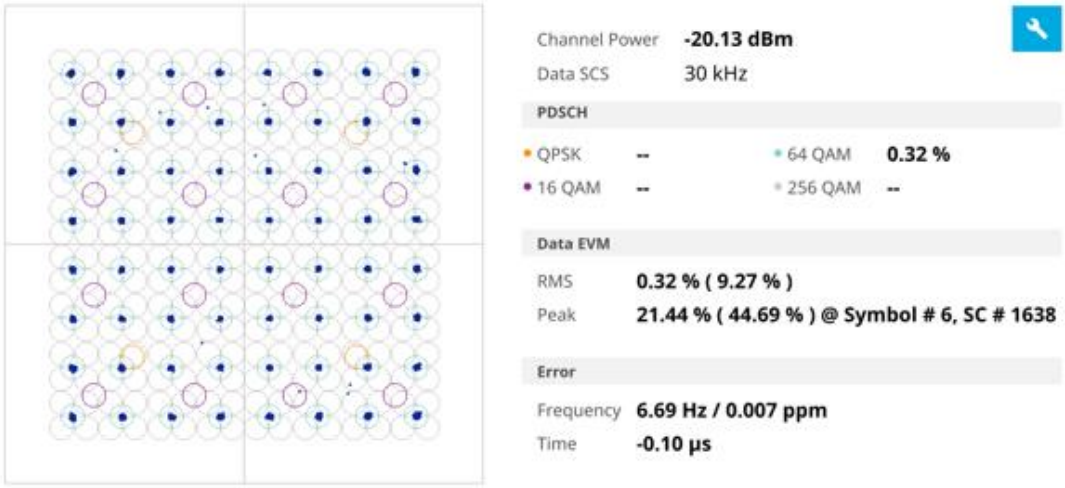
1 Tap **Menu** > **Limit**.

2 Tap the test items and set the limits depending on your selected measurement mode:

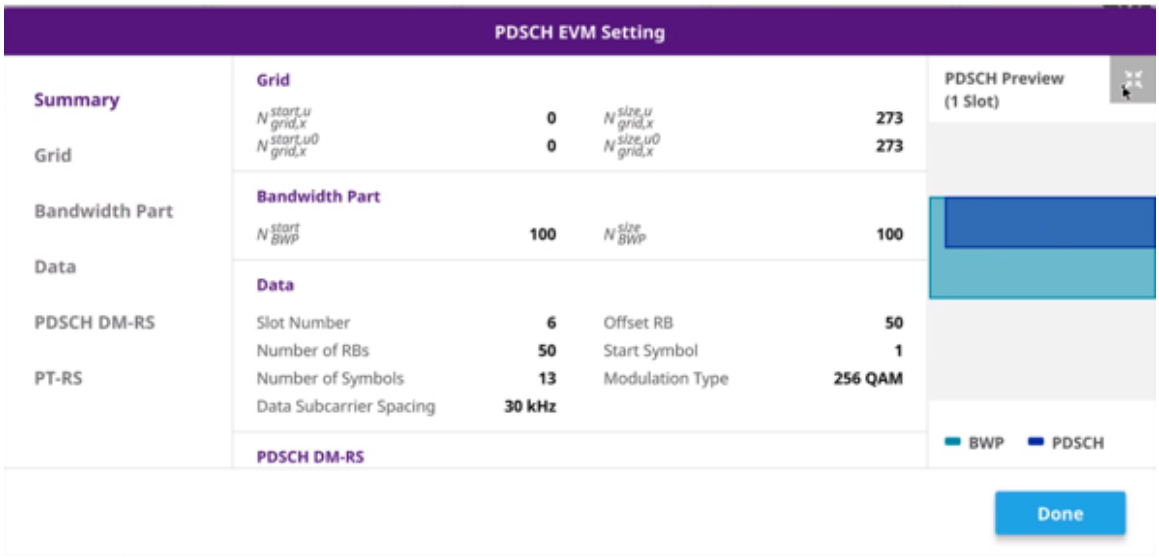
To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
Time error	Time error	Test limits On/Off, High Limit/Low Limit
Channel Power	Channel Power	Test limits On/Off, High Limit/Low Limit
PDSCH error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

PDSCH Constellation measurement with 5G NR



PDSCH EVM setting summary



> **NOTE**
> You can tap the **Enlarge** icon on the top right side of the screen to zoom in the PDSCH Preview screen.

EVM vs Subcarrier

CellAdivisor 5G NR EVM vs Subcarrier provides bar chart consisting of the average for resource elements with assigned PDSCH in each RB (12 subcarriers x 14 symbols).

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)

3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE
Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

12 Tap **PDSCH Configuration** or the **Configuration** icon on the screen to set PDSCH EVM in the PDSCH EVM Setting window appeared.

a Tap **Data** and select **Data Subcarrier Spacing** from the following options: **15 kHz**, **30 kHz**, **60 kHz**, or **120 kHz**.

- **Start Symbol** and **Number of RBs** are automatically changed based on the Data Subcarrier Spacing selection.

b Tap **Grid** to set the resource grid that BWP to be assigned per each numerology (SSB SCS and Data SCS).

- In the formula, a wider numerology between SSB SCS and Data SCS represents μ0 and a narrower numerology represents μ.
- Based on the input numerology and bandwidth you have set, input **Start Grid** and **Size Grid** using the on-screen keyboard.

c Tap **Bandwidth Part** to set the range that to be assigned BWP for the input Data SCS.

- In the formula, input Start BWP and Size BWP value using the on-screen keyboard.

d Back to **Data**, do the following steps:

- Select **Slot Number** for analyzing PDSCH EVM from 1 to 19 using the on-screen keyboard.
- Tap **Offset RB** and **Number of RBs** to set resource blocks within the range of BWP using the on-screen keyboard.

NOTE
You need to input values for Offset RB and Number of RBs considering the range that actual data should be allocated. As the input values need to be within the range of BWP, if you assign data from BWP start RB, the Offset RB should be 0.

- Tap **Start Symbol** and **Number of Symbols** set from 10 to 13 using the on-screen keyboard.
- Tap **Modulation type** and select the options from: **QPSK**, **16 QAM**, **64 QAM**, or **256QAM**

e Tap **PDSCH DM-RS** and do the following steps:
PDSCH DMRS is a special type of physical layer signal which functions as a reference signal for decoding PDSCH in 5G NR:

- Select N_{SCID} between **0** or **1**. The quantity N_{SCID} ϵ {0,1} is given by the DM-RS sequence initialization field, if DCI is associated with the PDSCH transmission, 1 is selected and, otherwise 0 is used.
- Select N_{ID} source between **Scrambling ID** and **PCI**. Set Scrambling ID for configuring with the higher-layer parameter data-scrambling identity or PCI from the physical cell ID and input the required value using the on-screen keyboard.
- Select between **Mapping Type A** and **B**. Set Mapping Type A to start only at symbol 2 or 3 within a slot, meaning that SLIV (Start and Length Indicator for the time domain allocation for PDSCH) that starts from symbol 4 or higher cannot use this type of DMRS and Mapping Type B to start always at the first symbols of scheduled SLIV.
- Select between **Configuration Type 1** and **2**. In Configuration type 1, the minimum resource element group in frequency domain is one RE. In Configuration type 2, the minimum resource element group in frequency domain is two consecutive REs.
- Select **DM-RS Type A Position** between **pos2** and **pos3** to set the PDSCH DM-RS position for mapping type A.
- Select **DM-RS Additional Position** to set the Position for additional DM-RS in DL.

- Select **DM-RS Duration** between **Single** and **Double**. Set Single when single-symbol DM-RS is used or Double when double (two) symbols are used.
- Set **Antenna Port** to be used as reference for initial synchronization for DM-RS. Usable antenna port is determined by Configuration Type and DM-RS Duration.
- Set **Power Boosting** in dB (relative) of the DMRS associated with the PDSCH physical channel relative to PDSCH power.

NOTE

You need to make sure PDSCH DM-RS setting is accurately done to get the right analysis data. For more details on setting, you can find it in the following location: https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3213 and check the latest 38.211 documentation.

f Tap to switch **PT-RS** to **On** or **Off** and when On, do the following steps:

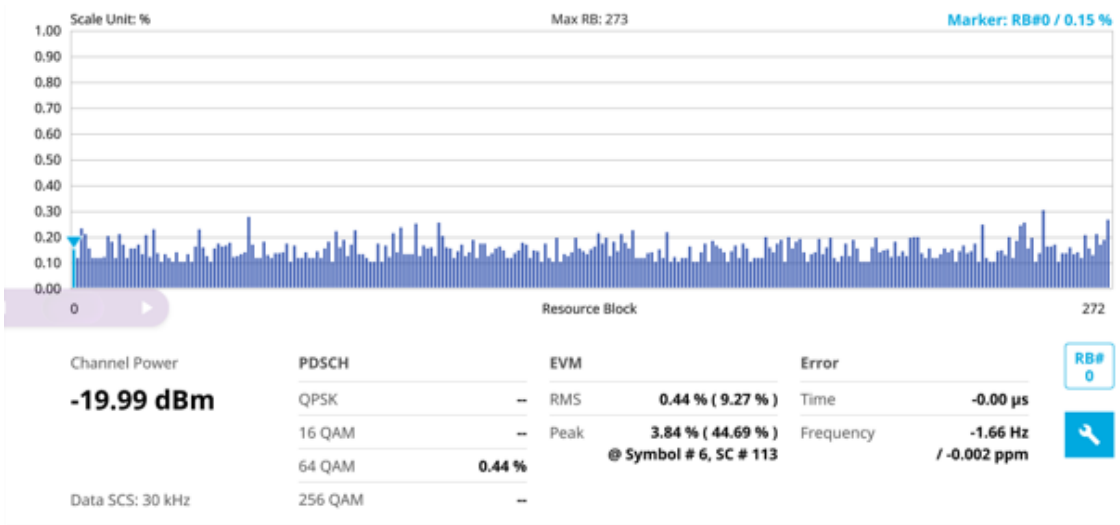
- Select K_{PT-RS} to set the PTRS period in subcarrier in the frequency domain between **2** and **4**.
- Select L_{PT-RS} to set the start PTRS symbol in time domain from the options: **1**, **2**, and **4**.
- Select **Resource Element Offset** to set PT-RS resource element offset from **Offset00**, **Offset01**, **Offset10**, and **Offset11**.
- Select N_{RNTI} to set the physical channel.

g Tap **Summary** to check all the parameters are accurately set. o the following steps:

- **PDSCH Preview** displays resources that are assigned PDSCH within BWP (X axis: symbol, Y axis: subcarrier).

h Tap the **Done** button if you finish all settings.

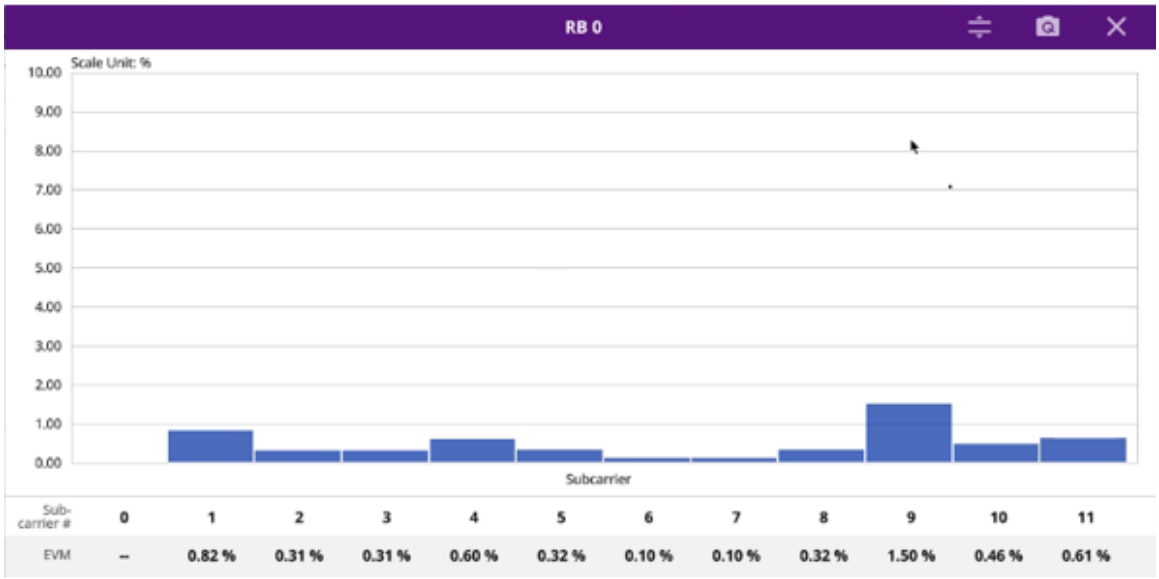
EVM vs Subcarrier measurement with 5G NR



NOTE

EVM vs Subcarrier does not display subcarriers with PT-RS and if there is any of this case, it shows as "─ " in value.

Selected RB's EVM vs Subcarrier measurement with 5G NR



Sub-carrier #	0	1	2	3	4	5	6	7	8	9	10	11
EVM	--	0.82 %	0.31 %	0.31 %	0.60 %	0.32 %	0.10 %	0.10 %	0.32 %	1.50 %	0.46 %	0.61 %

NOTE

You can move purple scroll bar right and left once tapped (activated) to set the specific RB number. If you tap the **Magnifier** icon, you can check the selected RB's EVM and subcarrier information and the mean for resource elements with assigned PDSCH in each RB (12 subcarriers x 14 symbols).

(Auto scale): You can set the scale automatically.

(Quick save): You can save current measurement screen as it is.

(Close): You can close the screen you are seeing now.

Conducting cell phase sync analysis

Sync Analysis

Sync Analysis is to measure time difference between every signal (PCI). Sync Error is defined as difference for Time Error between Primary PCI and target PCIs. Once itexceeds a specific limit set by a user, the alarm will beep and the screen displays the interference signal as red).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE

Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE

If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

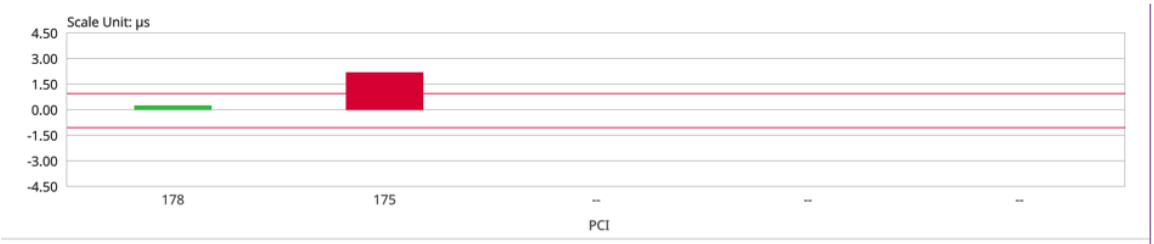
Setting limt

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Sync Analysis measurement with 5G NR



No	PCI	S-SS RSRP		Sync Error	Time Error	S-SS SINR	S-SS RSRQ
Primary	**861**	**-84.50 dBm**		**0.00 µs**	**-3.08 µs**	**4.16 dB**	**-16.04 dB**
2nd	**178**	**-87.08 dBm**	●	**0.25 µs**	**-2.83 µs**	**4.13 dB**	**-18.63 dB**
3rd	**175**	**-98.85 dBm**	●	**2.24 µs**	**-0.85 µs**	**4.05 dB**	**-28.30 dB**
4th	--	--	●	--	--	--	--
5th	--	--	●	--	--	--	--
6th	--	--	●	--	--	--	--

- S-SS RSRP represents the average power of every symbol delivering S-SS.
- Sync Error represents the time offset of each PCI on the reference of Primary PCI.
- Time Error represents the time offset between Trigger Source and 5G NR frame start.

NOTE
You can go to Menu > Amp/Scale > Ref Time Error Offset to adjust scale on the chart.

Sync Route Map

5G sync route map traces the power level of the NR signal's beam and sync and time error corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 1.9 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description

	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)

		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE
Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.

- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Setting limt

You can set the thresholds for the two different color indicators, red and green. When there is no interference signal, the color is diplayed as green (pass). Otherwise, it is displayed as red (fail).

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap Limit and input the value using the on-screen keyboard. The default value is 3 µs.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to ( ) and GPS point cannot be plotted.

5 If you start test and select **Setup** > **Map Config** > **Plot Point** > **Position**, you can undo by tapping the **Start** button.

6 If you select **Stop** button, **Plot Stop** popup window appears.

7 Save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is . gomv.

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **P-SS RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

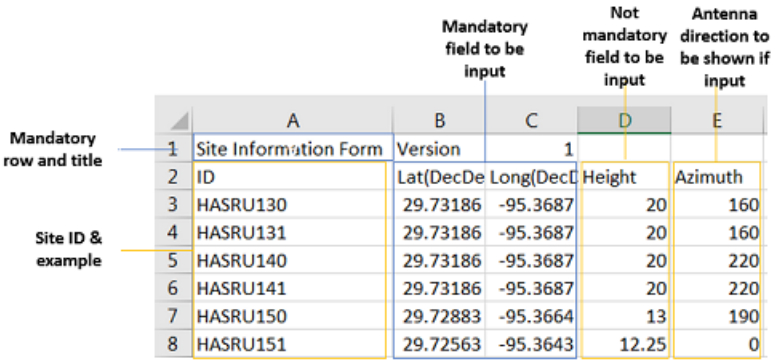
5 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

NOTE:
When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Sync Route Map Analysis measurement with 5G NR

Conducting online route map

Online OTA route map

Online OTA route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the NR signal's beam and sync and time error corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurementscan be exported for post-processing purposes.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **Plot Item** to **S-SS RSRP, P-SS RSRP**, **S-SS RSRQ**, **S-SS SINR**, or **PCI Dominance**.

4 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

6 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

7 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

8 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 5**.

9 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

10 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

11 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

12 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

13 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

14 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.

- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

> **NOTE:**
> The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

> **NOTE:**
> If you select the Plot Item to PCI Dominance, you will see the plotting circled dot and its edge with PCI legend color based on its receieved power and PCI Dominance color based on the threshold you have set respectively. If PCI Dominance is lower than the value you have set, it judges fail showing red in the edge. Otherwise, it judges pass showing green in the edge.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS point cannot be plotted.

5 If you select **Stop** button, **Plot Stop** popup window appears.

6 Save the logging file to your USB.

> **NOTE:**
> If you go to Limit > PCI Dominance and set it, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold, the fail indicator (red) can be identified in the PCI column of the Information window and the top right corner of the instrument at the same time.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is `.orrm` or `.orr`

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **P-SS RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

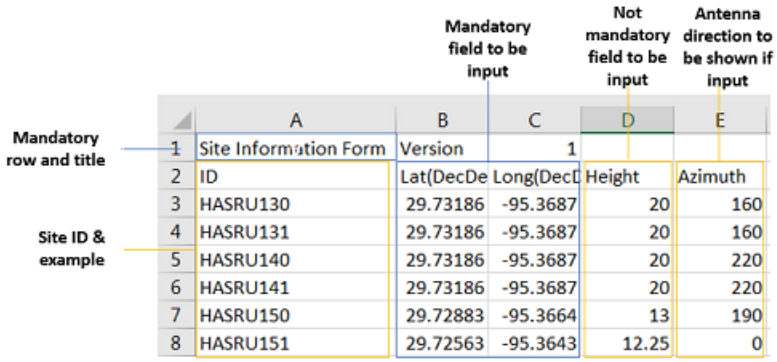
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (`*.csv`).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online OTA route map measurement screen

Online sync route map

Online sync route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the NR signal's beam and sync and time error corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurementscan be exported for post-processing purposes.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.

+	Tap to zoom in the map.
−	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **Plot Item** to **S-SS RSRP, P-SS RSRP**, **S-SS RSRQ**, or **S-SS SINR**.

4 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range

15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

6 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

7 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

8 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 5**.

9 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

10 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

11 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

12 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

13 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

14 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS point cannot be plotted.

5 If you select **Stop** button, **Plot Stop** popup window appears.

6 Save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is `.orrm` or `.orr`

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **P-SS RSRP** value. When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

Setting limit

You can set the thresholds for the two different color indicators, red and green. When there is no interference signal, the color is displayed as green (pass). Otherwise, it is displayed as red (fail).

1 Tap **Menu** > **Limit**.

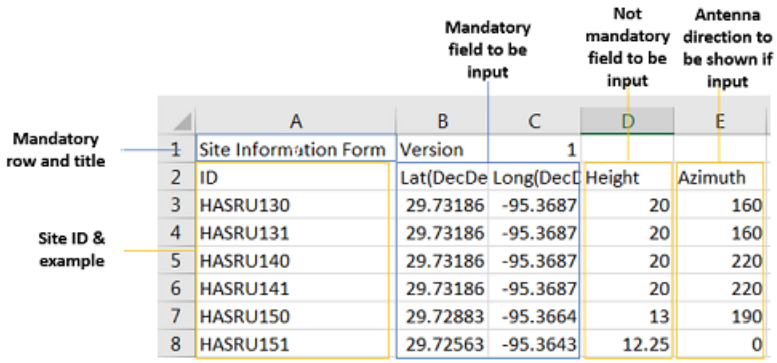
2 Tap to switch **Test Limits** to **On** or **Off**.

3 Tap Limit and input the value using the on-screen keyboard. The default value is 3 µs.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (*`.csv`).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online sync route map measurement screen

Using 5G TM Signal Analyzer

Introduction

VIAVI CellAdvisor 5G TM Analyzer focuses on the following measurements based on each Test Models supported for 5G NR FR1 and FR2 band.

- Conformance Test
  - BS Output Power
  - Occupied Bandwidth
  - ACLR
  - Multi-ACLR
  - Operating Band Unwanted Emissions
  - Transmitter Spurious Emissions
  - Transmit ON/OFF Power
  - Modulation Quality
  - MIMO Time Alignment Error
  - CA Time Alignment Error

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **5G TM Signal Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Comformance Test > BS Output PowerUnwanted Emissions > Occupied Bandwidth, ACLR, Multi-ACLR, Operating Band Unwanted Emissions, Transmitter Spurious Emissions, Transmit ON/OFF Power, Modulation Quality, MIMO Time Alignment Error, or **CA Time Alignment Error**

Conducting conformance test

BS output Power

Output power of the base station is the mean power of one carrier delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Setting measure setup

Before starting the BS output power measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

	NOTE: Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

	NOTE When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1, or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required..

7 Tap **EIRP Settings** and do the following:

a Select **Set Max to EIRP1** to save the currently measured maximum value to EIRP1.

b Select **Set Max to EIRP2** to save the currently measured maximum value to EIRP2.

c Select **Clear Max** to clear the currently measured maximum value.

d Select **Clear All** to reset EIRP1, EIRP2, and maximum value.

e Select **Distance** and input the value using the on-screen keyboard.

f Select **Antenna Gain** and input the value using the on-screen keyboard.

	NOTE Distance and Antenna gain values are required when calculating EIRP. Effective Isotropic Radiated Power (EIRP) refers to the amount of power that a theoretical isotropic antenna (which evenly distributes power in all directions) would emit to produce the peak power density observed in the direction of maximum antenna gain . EIRP can take into account the losses in transmission line and connectors and includes the gain of the antenna. The EIRP is often stated in terms of decibels over a reference power emitted by an isotropic radiator with equivalent signal strength. The EIRP allows comparisons between different emitters regardless of type, size or form. From the EIRP, and with knowledge of a real antenna's gain, it is possible to calculate real power and field strength values. Formula to calculate: EIRP = Tx RF Power (dBm)+GA (dB) - FL (dB) Tx RF Power refers to RF power measured at RF connector of the unit GA refers to Gain Antenna FL refers to Feeder loss (cable loss of any other loss occurred) You can tap to switch to **BS Output Power** or **EIRP** under the chart in the table, and it will show the automatically calculated value.

Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

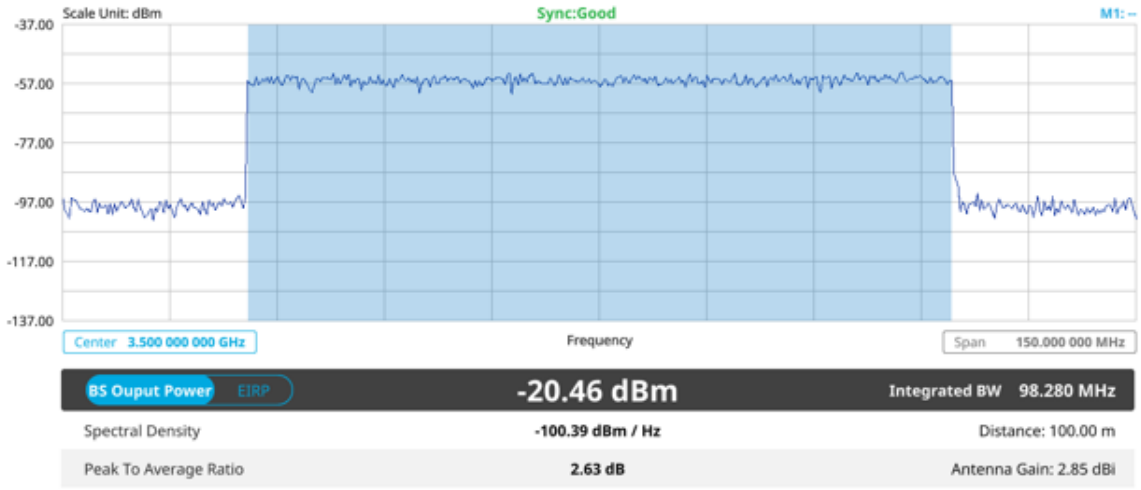
2 Tap to switch the Test Limits to On or Off to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

BS output power measurement with 5G TM



Occupied bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

> **NOTE:**
> Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies

- When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE

When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

Setting limit

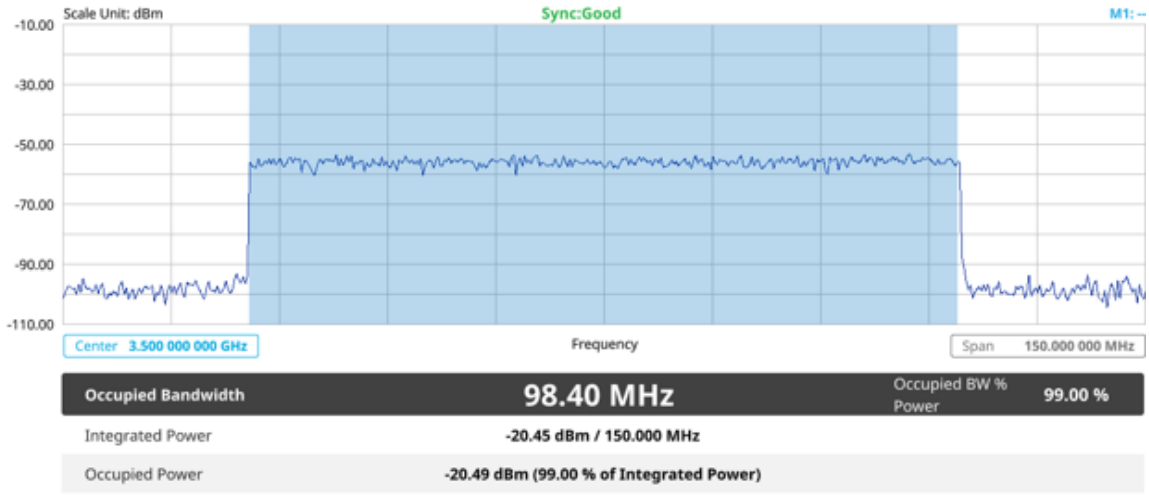
1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Occupied bandwidth measurement with 5G TM



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP WCDMA specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

> **NOTE:**
> Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

> **NOTE**
> When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

8 Tap **Category** and select the option from **Wide Area BS A**, **Wide Area BS B**, **Medium Range BS**, or **Local Area BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Medium Range BS for micro cell, and Local Area Base Station for pico cell.

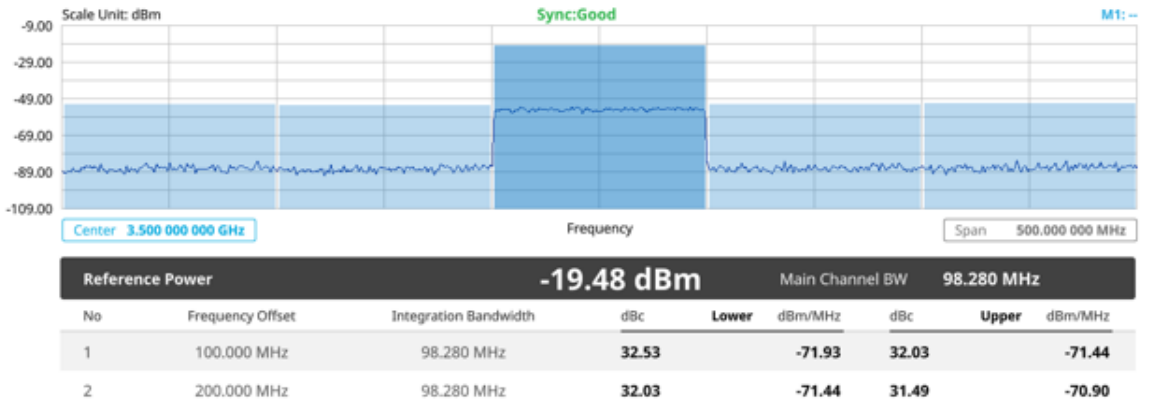
Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

ACLR measurement with 5G TM



Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

	NOTE: Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies

- When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE
When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

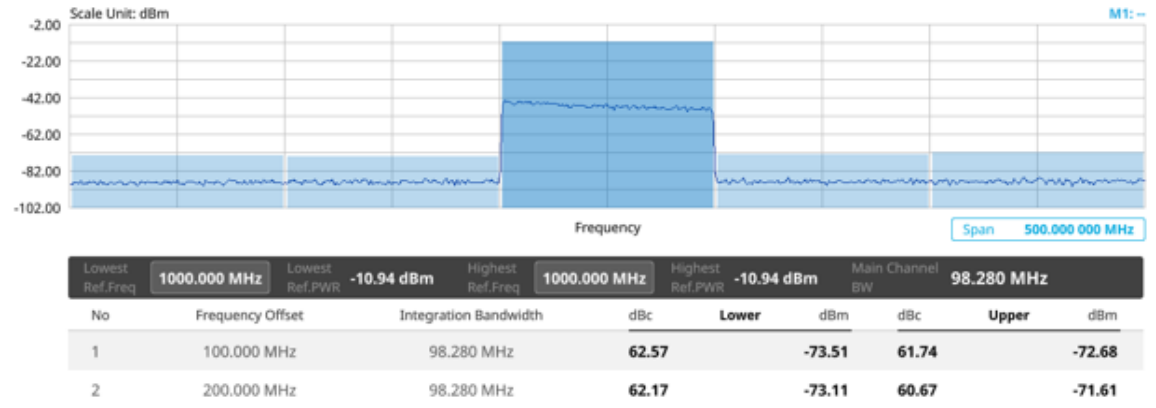
Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-ACLR measurement with 5G TM



No	Frequency Offset	Integration Bandwidth	dBc	Lower	dBm	dBc	Upper	dBm
1	100.000 MHz	98.280 MHz	62.57		-73.51	61.74		-72.68
2	200.000 MHz	98.280 MHz	62.17		-73.11	60.67		-71.61

NOTE
You can set the Lowest Ref. Frequency and Highest Ref. Frequency by tapping the rectangle with value using the on-screen keyboard.

Operating band unwanted emission

The operating band unwanted emissions define all unwanted emissions in the downlink operating band plus the frequency ranges 10 MHz above and 10 MHz below the band. Unwanted emissions outside of this frequency range are limited by a spurious emissions requirement.

For a BS supporting multi-carrier or intra-band contiguous CA, the unwanted emissions requirements apply to channel bandwidths of the outermost carrier larger than or equal to 5 MHz.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

NOTE:
Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE
When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap **SEM Config** to configure the following items:

a Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

b Tap **Category** and select the option from **Wide Area BS A**, **Wide Area BS B**, **Medium Range BS**, or **Local Area BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Medium Range BS for micro cell, and Local Area Base Station for pico cell.

c Tap **Mask Type** and select the option from **KCA** or **3GPP**.
You can select the KCA to follow Korea Communications Agency standard (Korea-specific) or select 3GPP to follow international standard.

8 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on screen keyboard.
The input value range is from 1 to 100.

Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Operating band unwanted emission measurement with 5G TM

Reference Power	-20.57 dBm	Main Channel BW	100.000 MHz

No	Frequency Offset Range	Measurement Bandwidth	Lower Peak	Upper Peak
1	50.000 kHz - 5.050 MHz	100 kHz	**-80.85 dBm**	**-79.47 dBm**
2	5.050 MHz - 10.050 MHz	100 kHz	**-80.11 dBm**	**-82.65 dBm**
3	10.050 MHz - 110.000 MHz	1 MHz	**-78.86 dBm**	**-80.01 dBm**

NOTE:
If Lower Peak or Upper Peak indicate Fail, the mask line becomes red.

Transmitter spurious emissions

The transmitter spurious emission limits apply from 9 kHz to 12.75 GHz, excluding the frequency range from 10 MHz below the lowest frequency of the downlink operating band up to 10 MHz above the highest frequency of the downlink operating band.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

NOTE:
Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE
When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap to switch **Setting** to **User** if you want user defined setting or **3GPP** if you want 3GPP defined setting.

8 When choosing 3GPP, do the followings:

a Tap **BS Type** and select the option from **1-C/1-H**, **1-O**, or **2-O**.
Set 1-C (Conducted)/1-H (Hybrid) for multi-band operation with mapping of transceivers to one or more antenna connectors (1-C) or TAB (transceiver array boundary) connectors for 1-H. Set 1-O when BS operates at FR1 and 2-0 when BS operates at FR2.

b Tap **Measure Type** and select the option from **Transmitted** or **Receiver**.
Based on the measure type you have selected, the frequency range changes automatically to apply to each standard.

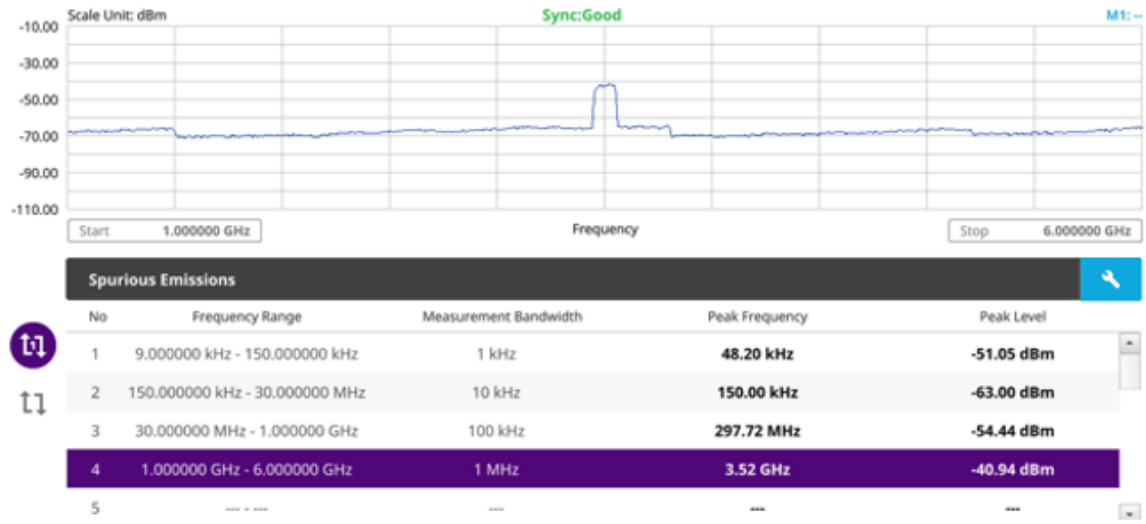
c Tap **Category** and select the option from **Wide Area BS A**, **Wide Area BS B**, **Medium Range BS**, or **Local Area BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Medium Range BS for micro cell, and Local Area Base Station for pico cell.

d T ap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on screen keyboard.
The input value range is from 1 to 100.

Setting limit

1. Tap the **Menu** > **Limit** on the side bar.
2. Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
   The result table color for Pass is green, and the result table color for Fail is red.
3. *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Transmitter spurious emissions with 5G TM



NOTE:
You can only set the frequency range and attenuation by tapping the Configuration icon. If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

Transmit on/off power

Transmitter OFF power is referred to as the mean power measured over 70 us filtered with a square filter of bandwidth equal to the transmission bandwidth configuration of the BS centred on the assigned channel frequency during the transmitter OFF period. Transmit OFF power requirements apply only to TDD operation of the BS.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

> **NOTE:**
> Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

> **NOTE**
> When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap to switch **Phase Correction** to **On** or **Off**.
Phase Correction is a way of optimizing EVM performance. When you switch it On, it will decrease inter-symbol interference and compensate distortion caused by a filter applying to each OFDM symbol.

8 Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Setting radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:

When calculating Symbol Phase Compensation, you can use the following formula. It is a formula that complies with 3GPP standard and used to calculate conversion of 5G NR signal to RF signal.

$$\mathrm{Re}\left\{ s_l^{(p,\mu)}(t) \cdot e^{j2\pi f_0 \left(t - t_{\mathrm{start},l}^{\mu} - N_{\mathrm{CP},l}^{\mu} T_c\right)} \right\}$$

9 Tap **Slot No.** and input the slot number from 0 to 19 using the on-screen keyboard.

Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

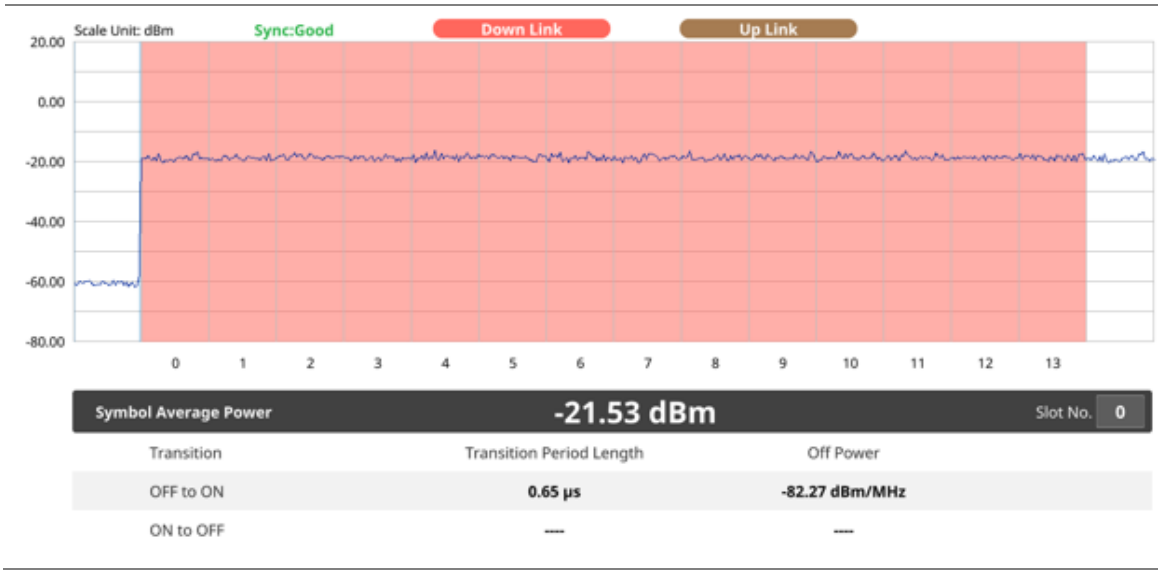
2 Tap the test items and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Symbol Average Power	Symbol Average Power	Test limits On/Off, High Limit/Low Limit
Off Power	Off Power	Test limits On/Off, High Limit
Transition Period	Transition Period	Test limits On/Off, High Limit

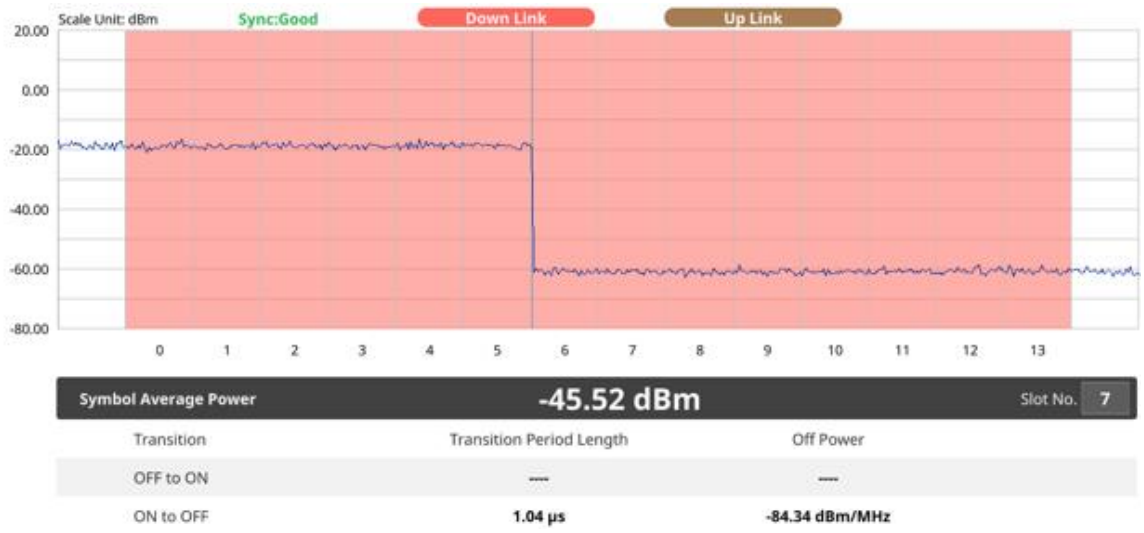
NOTE:

The result table color for Pass is green, and the result table color for Fail is red.

Transmitter off to on power with 5G TM



Transmitter on to off power with 5G TM



Modulation quality

Modulation quality is defined by the difference between the measured carrier signal and an ideal signal. Modulation quality can be expressed as Error Vector Magnitude (EVM). The Error Vector Magnitude is a measure of the difference between the ideal symbols and the measured symbols after the equalization. This difference is called the error vector. OTA modulation quality is defined by the difference between the measured carrier signal and an ideal signal. Modulation quality can e.g. be expressed as Error Vector Magnitude (EVM). The Error Vector Magnitude is a measure of the difference between the ideal symbols and the measured symbols after the equalization. This difference is called the error vector. OTA modulation quality requirement is defined as a directional requirement at the RIB and shall be met within the OTA coverage range.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

	NOTE: Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE
When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap to switch **Phase Correction** to **On** or **Off**.
Phase Correction is a way of optimizing EVM performance. When you switch it On, it will decrease inter-symbol interference and compensate distortion caused by a filter applying to each OFDM symbol.

8 Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Setting radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:
When calculating Symbol Phase Compensation, you can use the following formula. It is a formula that complies with 3GPP standard and used to calculate conversion of 5G NR signal to RF signal.

$$\mathrm{Re}\left\{ s_l^{(p,\mu)}(t)\cdot e^{j2\pi f_0\left(t-t_{\mathrm{start},l}^{\mu}-N_{\mathrm{CP},l}^{\mu}T_c\right)}\right\}$$

9 Tap to switch **Select Mode** to **Frame** or **Slot**.
If Slot is selected, tap the **Slot No**. from 0 to 19 using the on-screen keyboard. You can also set it on the screen at the bottom.

Setting limit

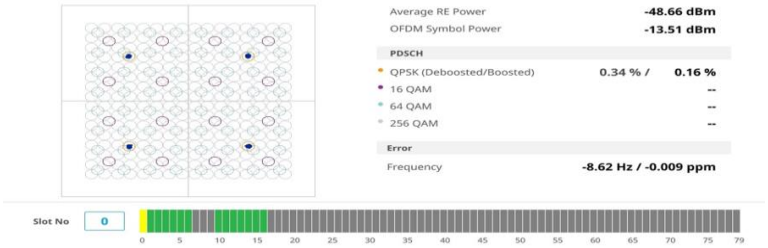
1 Tap the **Menu** > **Limit** on the side bar.

2 Tap the test items and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set

Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
PDSCH error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)

Modulation quality measurement with 5G TM



NOTE:

You can easily set the slot number by tapping the rectangular next to Slot No (

). Once you select any slot number from 1 to 19, the selected slot number is indicated as yellow (active data signal). The valid signal data is indicated as green, therefore you must set the right slot number not to select the invalid data signal indicated as gray.

MIMO time alignment error

In eNode-B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

3 Select **3GPP version** from the choices.

NOTE:

Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

4 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

a If you select the operating frequency as **FR1**, select from the following:

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz

- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
- Select **Duplex Type** between **FDD** and **TDD** as required.
  - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
  - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

b If you select the operating frequency as **FR2**, select from the following:

- SCS 60, 120 kHz: 50, 100 MHz
- You can only select the **Duplex Type** as **TDD**.

5 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

6 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE

When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

7 Tap to switch **Phase Correction** to **On** or **Off**.
Phase Correction is a way of optimizing EVM performance. When you switch it On, it will decrease inter-symbol interference and compensate distortion caused by a filter applying to each OFDM symbol.

8 Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Setting radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:

When calculating Symbol Phase Compensation, you can use the following formula. It is a formula that complies with 3GPP standard and used to calculate conversion of 5G NR signal to RF signal.

$$\mathrm{Re}\left\{ s_l^{(p,\mu)}(t) \cdot e^{j2\pi f_0 \left(t - t_{\mathrm{start},l}^{\mu} - N_{\mathrm{CP},l}^{\mu} T_c\right)} \right\}$$

Setting limit

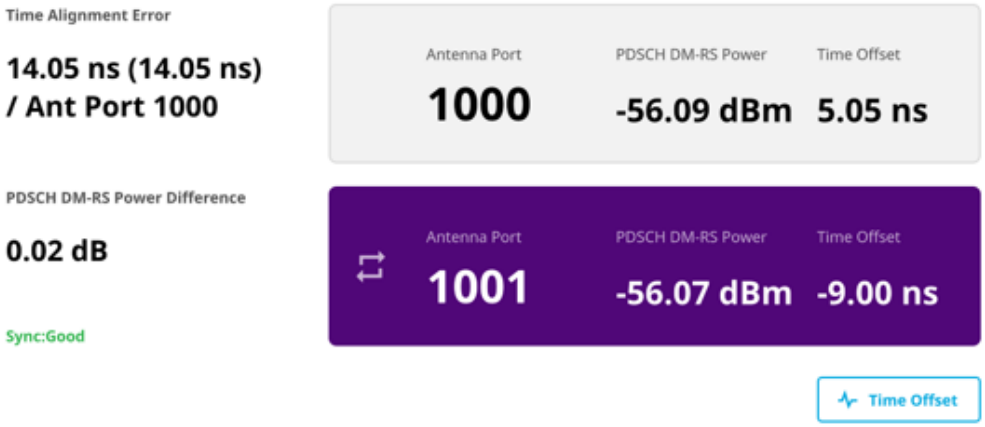
1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result color for Pass is green, and the result color for Fail is red. It is shown on the top right side of the screen.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

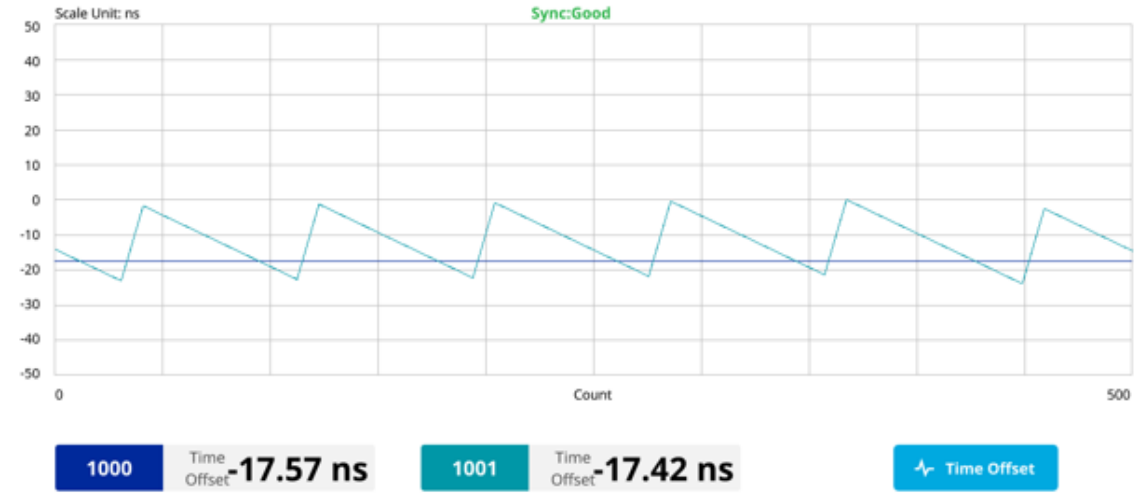
4 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

MIMO time alignment error with 5G TM



NOTE:
You can tap to switch Antenna Port 1000 or 1001 to receive correct source for each antenna port. To see it with chart view tap Time Offset button at the right bottom of the screen.

MIMO time alignment error with time offset chart with 5G TM



CA time alignment error

CellAdvisor 5G Carrier Aggregation time alignment error measures time error of each signal that has different carrier frequency and show difference between measured time errors.

Setting measure setup

Before starting the measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **CA Configuration**.

   a Tap the number to switch the carrier on or off. You can select up to 8 carriers.

   b Tap **Center Frequency** and input the value using the on-screen keyboard.

3 Tap **TM Configuration** and select **3GPP** first and then **Radio**, and **Test Model** from a pop-up window.

4 Select **3GPP version** from the choices.

NOTE:
Based on the activation of software license (S042N), the 3GPP version that you can select varies. If the software license S042N is disabled, you can only select TS 38.141 v 15.2.0 (2019-06). If it is enabled, the selection options are TS 38.141 v 15.2.0 (2019-06), TS 38.141 v 15.4.0 (2019-12), TS 38.141 v 16.4.0 (2020-06), and TS 38.141 v 16.5.0 and after (2020-09).

5 Tap **Radio** and select **Frequency Range**, **Bandwidth**, **Subcarrier Spacing** and **Duplex Type**.

   a If you select the operating frequency as **FR1**, select from the following:

   - SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
   - SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
   - SCS 60 kHz: 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
   - Select **Duplex Type** between **FDD** and **TDD** as required.
     - When selecting FDD, both uplink and downlink can transmit at the same time at different spectrum frequencies
     - When selecting TDD, both uplink and downlink use the same spectrum frequencies but at different times.

   b If you select the operating frequency as **FR2**, select from the following:

   - SCS 60, 120 kHz: 50, 100 MHz
   - You can only select the **Duplex Type** as **TDD**.

6 Based on the above setting, tap **Test Model FR1** and select the options from the following choices: FR1-TM1.1, FR1-TM1.2, FR1-TM3.1, FR1-TM3.1a, FR1-TM3.2, FR1-TM3.

7 Based on the above setting, tap **Test Model FR2** and select the options from the following choices: FR2-TM1.1, FR2-TM2, FR2-TM3.1.

NOTE
When you choose TS 38.141 v 16.4.0 (2020-06) or TS 38.141 v 16.5.0 and after (2020-09), the Test Model for FR2 varies. You can select FR2-TM1.1, FR2-TM2, FR2-TM2a, FR2-TM3.1,or FR2-TM3.1a. The Modulation Type is already set for FR1 test models of each 3GPP version, but some test models in FR2, you can select from the options displayed in Modulation Type column as required.

8 Tap to switch **Phase Correction** to **On** or **Off**.
Phase Correction is a way of optimizing EVM performance. When you switch it On, it will decrease inter-symbol interference and compensate distortion caused by a filter applying to each OFDM symbol.

9 Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.

- **Manual**: Setting radio frequency as required.
- **Off**: Setting radio frequency to 0.

NOTE:

When calculating Symbol Phase Compensation, you can use the following formula. It is a formula that complies with 3GPP standard and used to calculate conversion of 5G NR signal to RF signal.

$$\mathrm{Re}\left\{ s_l^{(p,\mu)}(t) \cdot e^{j2\pi f_0 \left(t - t_{\mathrm{start},l}^{\mu} - N_{\mathrm{CP},l}^{\mu} T_c\right)} \right\}$$

Setting limit

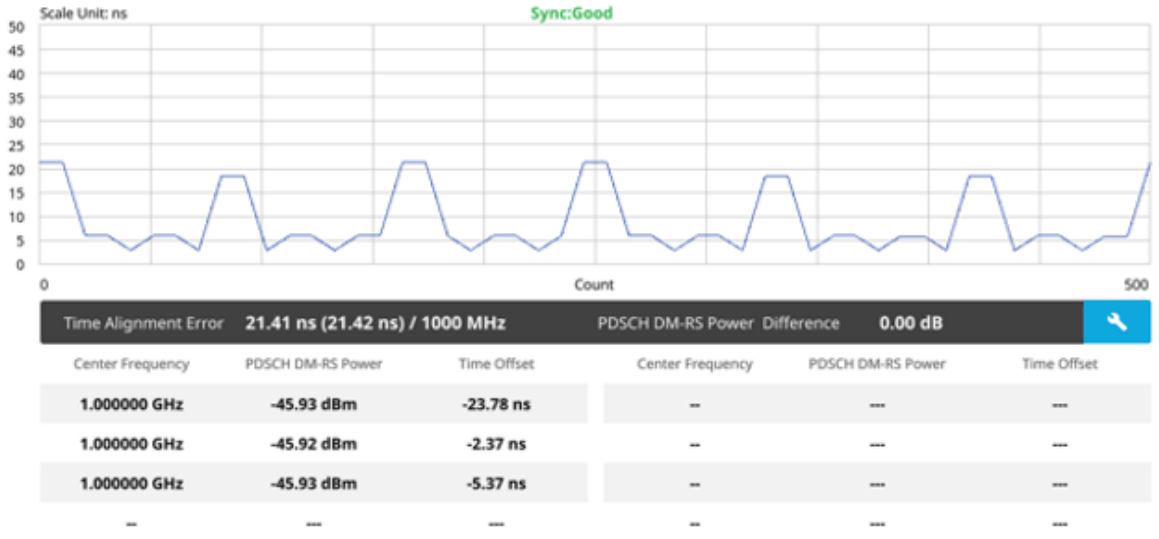
1 Tap the **Menu** > **Limit** on the side bar.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result color for Pass is green, and the result color for Fail is red. It is shown on the top right side of the screen.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 *Optional*. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

CA time alignment error with 5G TM



NOTE:

You can tap **Configuration** icon on the table and set the carrier number from 1 to 8 and center frequency for each carrier.

Using RAN Analyzer

Introduction

RAN Analyzer allows you to perform essential turn up tests for 5G NR Radio, by purchasing only RAN Analyzer license option without purchasing all required licenses, users can perform the required tests in a cost-effective way.

The CellAdvisor 5G is the optimal solution to perform following measurements::

- 5G NR Signal Analysis
  - Beam Analyzer
  - Freq/Time/Power Variation
  - Allocation Mapper
- Real-time Spectrum Analysis
  - RtSA Persistent Spectrum
  - RtSA Persistent Spectrogram
- TDD Auto Gated Spectrum Analysis
  - TAGS Spectrum
  - TAGS Spectrogram
  - TAGS Persistent Spectrum
  - TAGS Persistent Spectrogram

Selecting mode and measure

To start measurement, do the following steps:

1. Tap **RAN Analyzer** on the **MODE** panel.
2. Tap any measurement mode from the following choices:

5G NR Signal Analysis > **Beam Analyzer**, **Freq/Time/Power Variation**, or **Allocation Mapper**

Real-time Spectrum Analysis > **RtSA Persistent Spectrum** or **RtSA Persistent Spectrogram**

TDD Auto Gated Spectrum Analysis > **TAGS Spectrum**, **TAGS Spectrogram**, **TAGS Persistent Spectrum**, or **TAGS Persistent Spectrogram**

Conducting 5G NR signal measurements

Beam analyzer

5G NR provides the beamforming profile of each transmission carrier, including the eight strongest beams and the corresponding power levels during its transmission period, and includes:

- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals
- **P-SS RSRP (Primary Synchronization Signal – Reference Signal Received Power)** — average power measurement through all the primary sync signals
- **S-SS SINR (Secondary Synchronization Signal – Signal to Interference Plus Noise Ratio)** — linear average over the power contribution (in Watts) of the resource elements carrying secondary synchronization signals divided by the linear average of the noise and interference power contribution (in Watts) over the resource elements carrying secondary synchronization signals within the same frequency bandwidth
- **S-SS RSRQ (Secondary Synchronization Signal – Reference Signal Received Quality)** — ratio of N x SS-RSRP/NR carrier RSSI. Here N refers to number of resource blocks in NR carrier RSSI measurement Bandwidth

Setting measure setup

Before starting the Beam Analyzer, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous** and do the following steps:

- **a** Tap **Symbol Phase Comp** and select from the following choices: **Auto**, **Manual**, or **Off**.
  Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency
- **Manual**: Setting radio frequency as required
- **Off**: Setting radio frequency to 0

b Tap to switch **Compensation** to **On** or **Off**.
When the Compensation is set to On, Multi-PCIs changes to Single PCI and it applies the compensation for distance for Single PCI to Time Error.

c Tap **Distance** and input the required value using the on-screen keyboard. .
This will be applied when you are measuring the time error.

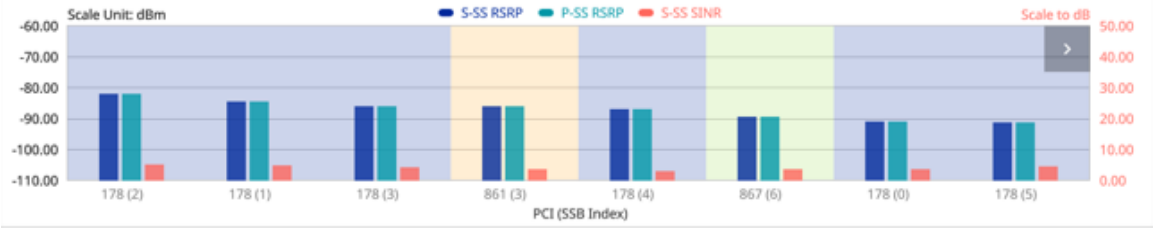
13 Tap **Limit** > **PCI Dominance**. Once tapped **On**, you can set the value using the on-screen keyboard.
If the PCI dominance is on, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold,the fail indicator (red) can be identified in the PCI column of the result table and the top right corner of the instrument at the same time.

14 Tap **Limit** > **PBCH EVM**. Once tapped On, you can set the PBCH EVM Limit value using the on-screen keyboard.

15 Tap **Limit** > **PBCH DM-RS EVM**. Once tapped On, you can set the PBCH DM-RS EVM Limit value using the on-screen keyboard.

NOTE:
You can go to **Menu** > **Frequency** > **Center Frequency List** to add frequently used center frequency using the **Add** button in the Frequency List or to delete the selected frequency using the **Delete** button. You can also apply one of the default frequencies in the Frequency List by tapping the **Apply** button.

Beam analyzer measurement



No	PCI (Grp,Sctr)	SSB Index (DM-RS,PBCH)	S-SS RSRP (dBm)	P-SS RSRP (dBm)	P-SS SNR (dB)	S-SS SINR (dB)	S-SS RSRQ (dB)	S-SS RSSI (dBm)	PBCH DM-RS RSRP (dBm)	PBCH DM-RS EVM (%)	Time Error (µs)
1	178 (59,1)	2 (2,--)	-81.89	-82.30	31.83	5.07	-14.96	-60.85	-76.91	107.21	910.67
2	178 (59,1)	1 (1,--)	-84.31	-83.59	27.46	4.78	-15.83	-63.28	-78.71	379.38	910.67
3	178 (59,1)	3 (3,--)	-85.80	-85.27	28.46	4.12	-18.33	-64.77	-78.31	237.91	910.67
4	861 (287,0)	3 (4,--)	-85.84	-84.65	28.28	3.49	-18.00	-64.80	-79.12	132.46	910.77
5	178 (59,1)	4 (4,--)	-86.88	-87.73	27.27	3.06	-17.10	-65.84	-80.86	313.52	1233.08
6	867 (289,0)	6 (0,--)	-89.39	-89.52	20.83	3.42	-18.07	-68.36	-80.95	103.29	2233.86
7	178 (59,1)	0 (6,--)	-90.83	-92.27	24.15	3.70	-18.83	-69.79	-81.76	152.20	910.67
8	178 (59,1)	5 (6,--)	-91.30	-88.89	23.56	4.46	-19.36	-70.26	-82.40	606.95	1661.21

NOTE:
The undetected values in the Detected ID List table will be indicated as "--". You cannot save the measurement as a Result. Logging as CSV option is added. For more details, see Managing files.

Freq/Time/Power Variation

Frequency, time, and power variation shows the frequency, time, and power error trend based on the time elapsed.

Setting measure setup

Before starting the Frequency/Time Error Variation, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5

240	720	0 to 48	240	0 to 2

4 Tap **SSB Frequency** and input the value using the on-screen keyboard.

5 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

6 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table in **Step 2**.

7 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE

If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

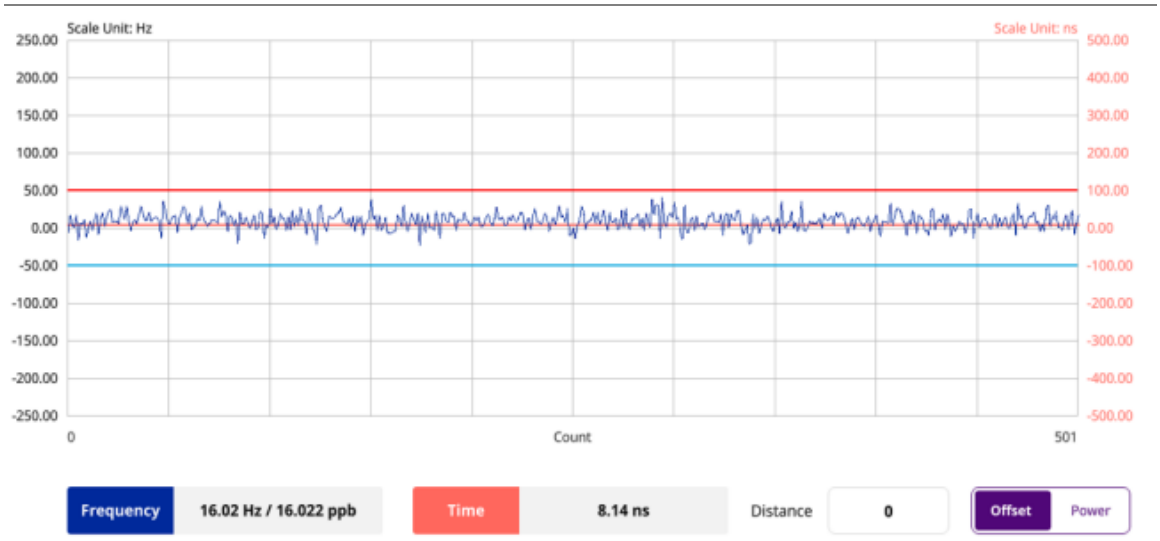
10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Time Error Window** and select from the choices: **SSB Periodicity**, **Frame**, or **Half Frane**.
If you select Frame, the range is -5 ms to +5 ms based on 10 ms specified by 3GPP and if you select Half Frame, the range is -2.5 ms to +2.5 ms based on 5 ms specified by 3GPP.

12 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

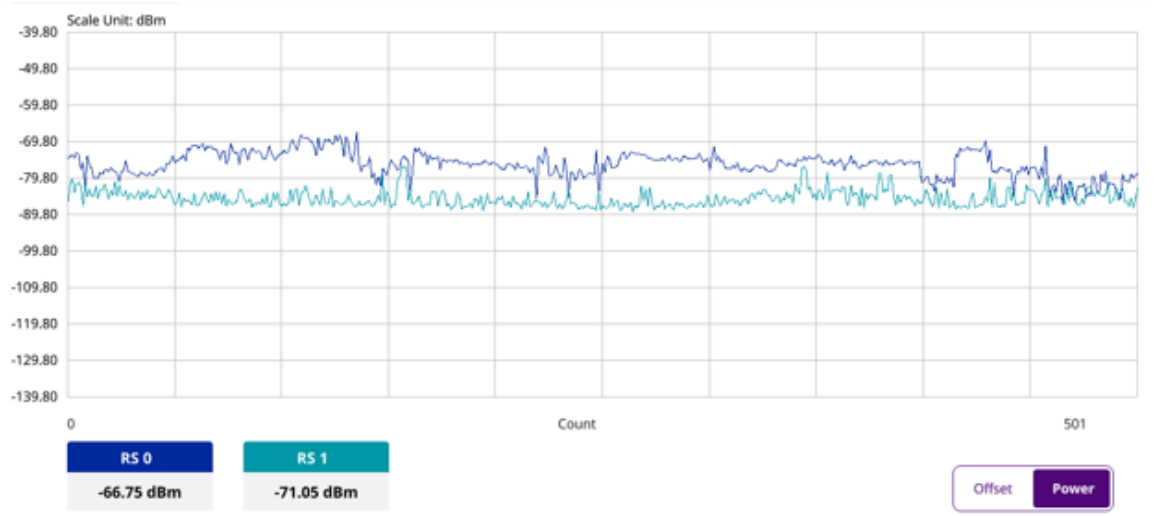
Frequency/time/power variation by offset with 5G NR Signal Analyzer



NOTE:

You can tap the Distance box and input the value that you want to compensate for distance. When distance is entered, the time will show the value with distance correction. Make sure the default value for Distance is 0.

Frequency/time/power variation by power with 5G NR Signal Analyzer



Allocation mapper

CellAdvisor 5G NR allocation mapper displays power for X axis (time) and Y axis (frequency) of 1 frame with resources being measuring for current PCI.

Setting measure setup

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth/SSB SCS** and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)

		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (0.0625 ms)

3 Tap **SSB Frequency** to set SSB location using the on-screen keyboard.

4 Tap **GSCN** to set SSB location using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **Sync Raster/SCS Offset** to set the sync raster resolution to 180 kHz (FR1) or to 720 kHz (FR2) for carrier frequency center using the on-screen keyboard.
The following table shows the sync raster offset range and sync SCS offset range per SSB SCS and sync raster/SCS resolution.

SSB SCS (kHz)	Sync Raster Resolution (kHz)	Sync Raster Offset Range	Sync SCS Resolution (kHz)	Sync SCS Offset Range
15	180	0 to 250	15	0 to 11
30	180	0 to 506	30	0 to 5
120	720	0 to 92	120	0 to 5
240	720	0 to 48	240	0 to 2

NOTE
Make sure to sync signals using SSB frequency setting as SSB location set by Sync Raster Offset and Sync SCS Offset might not be matched.

6 Tap **SSB Auto Search Mode** if you do not know SSB location and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **6**.
Refer to the selection criteria based on the table in **Step 2**.

8 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

9 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

10 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Setting limit

You can set the thresholds for the two different color indicators: maximum value and minimum value. The input range is from -120 dBm to 100 dBm.

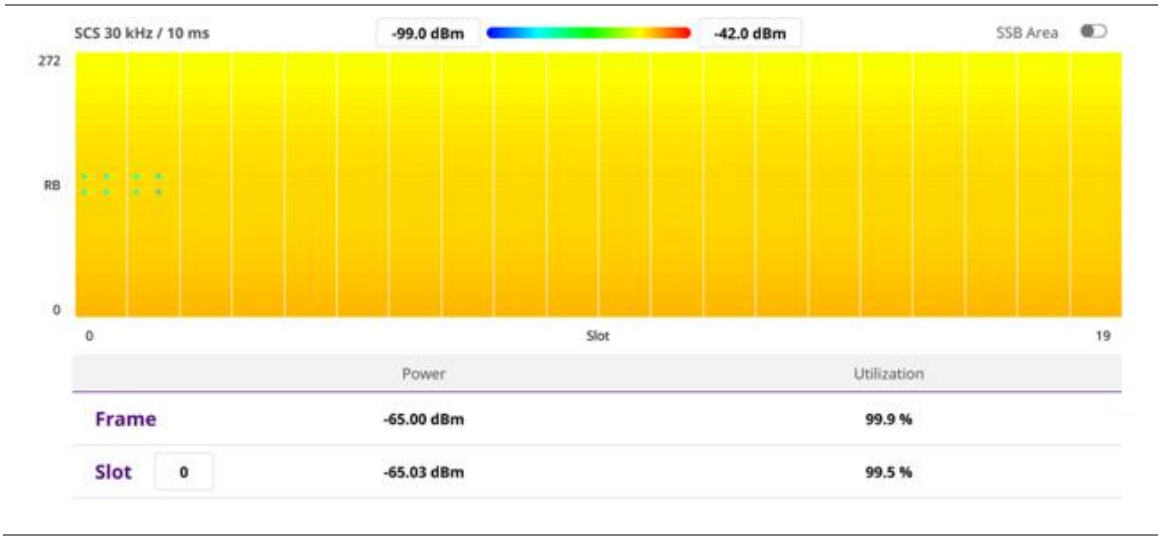
1 Tap the rectangle with value before color legend bar on the measurement screen.

2 Set a value for **Minimum** using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Maximum** using the on the measurement screen.

Allocation Mapper measurement with 5G NR



NOTE
If SSB Area is set to On, it shows the expected resource location of SSB in the currently set 5G NR.

- Frame Power: the average RE power of the whole frames (dB, full bandwidth)
- Frame Utilization: RE% of “PBCH-DMRS RSRP(dB) - 6dB” or more in whole frame RE
- Slot Power: the average RE power of the corresponding whole slot (dB, fullbandwidth)
- Slot Utilization: RE% of “PBCH-DMRS RSRP(dB) - 6dB” or more in the corresponding whole slot

Conducting real-time spectrum measurements

RtSA persistent spectrum

The persistent spectrum of a signal is a time-frequency view that shows the percentage of the time that a given frequency is present in a signal. It is a histogram in power-frequency space. The longer a particular frequency persists in a signal as the signal evolves, the higher its time percentage and thus the brighter or hotter its color in the display. The persistent spectrum is used to identify signals hidden in other signals.

Setting measure setup for Sound Indicator

If you have configured test parameters as described in the "Configuring Spectrum Measurements", continue to set measure setup. You can simply change Center Frequency and Span by tapping the icons right below the result chart screen.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Sound Indicator**.

- **a** Tap to switch the **Sound** between **On** and **Off** to enable and disable the alarm sound.
- **b** Tap to switch the **Alarm Reference** to **Marker** to set the active marker position as the alarm reference.
- **c** Tap to switch the **Alarm Reference** to **Line** to set the limit as the alarm reference.
  The Reference Line Mode menu becomes activated to be set.
- **d** Select **Reference Line** to specify a threshold for the reference line using the on-screen keyboard.
- **e** *Optional.* To adjust the volume for alarm sound, tap **Volume** and input from 1 to 10 using the on-screen keyboard.

Setting measure setup for Interference ID

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Interference ID**.

- **a** Tap to switch the **Interference ID** between **On** and **Off** to turn the Interference ID on and off.
- **b** Tap **Threshold** and input a value using the on-screen keyboard.

Setting measure setup for POI

The Interference ID automatically classifies interfering signals over a designated spectrum and displays the list of possible signal types corresponding to the selected signal.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

- **a** Tap to switch the **Mode** between **High** and **Normal**.
  The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz

	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

NOTE:
If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

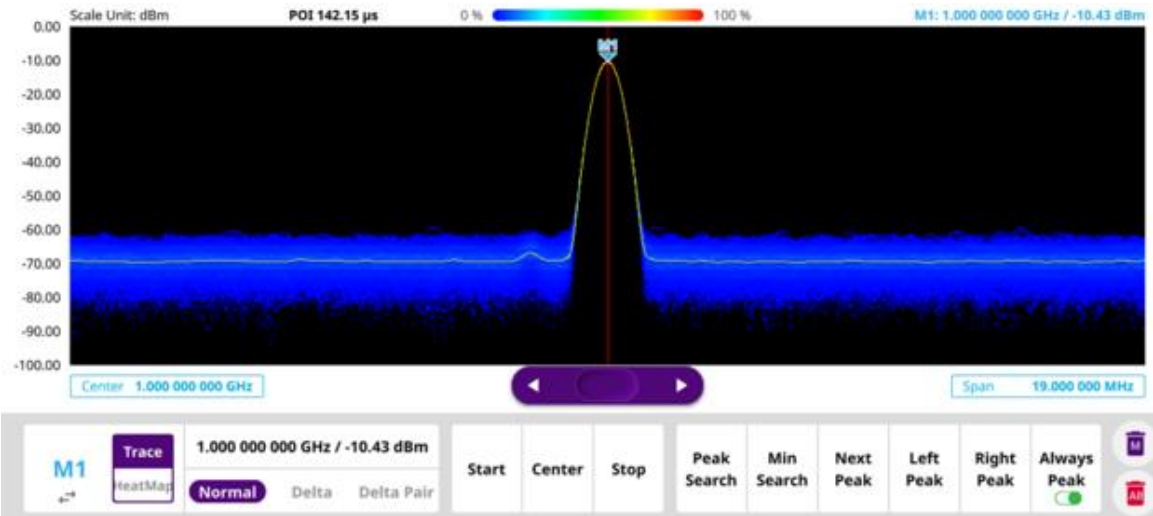
4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

Persistent spectrum measurement



> **NOTE:**
> You can go to **Menu** > **Limit** to analyze your measurements with the reference line, multi-segment line, and channel limit table. See “Setting limit" for details.

RtSA persistent spectrogram

The Persistent Spectrogram is particularly useful when attempting to identify periodic or intermittent signals as it captures spectrum activity over time and uses various colors to differentiate spectrum power levels. When the directional antenna is used to receive the signal, you will see a change in the amplitude of the tracked signal as you change the direction of the antenna and see a change in the Spectrogram colors. The source of the signal is located in the direction that results in the highest signal strength.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **POI**. You can also access this menu via Quick Access and Display Tab on top.

   a Tap to switch the **Mode** between **High** and **Normal**.
   The following table shows RBW and Span setup range per Normal and High mode.

Mode		A	B	C	D
Normal	POI	100 to 34 µs	392 to 136.5 µs	800.5 to 270.5 µs	3200 to 1076 µs
	Bandwidth	100 to 20 MHz	19 to 5 MHz	4 and 3 MHz	2 and 1 MHz
	RBW	30 kHz to 10 MHz	10 kHz to 1 MHz	3 kHz to 1 MHz	1 kHz to 300 kHz

Mode		A	B	C	D	E	F
High	POI	18.5 to 2.5 µs	29.5 to 4 µs	73.5 to 7.5 µs	147 to 15 µs	284 to 28 µs	587 to 56.5 µs
	Effective Bandwidth	122.88 MHz	61.44 MHz	30.72 MHz	15.36 MHz	7.68 MHz	3.84 MHz
	Display Bandwidth	100 MHz	50 MHz	25 MHz	14 MHz	7 MHz	3 MHz
	RBW	100 kHz to 30 MHz	100 kHz to 10 MHz	30 kHz to 10 MHz	10 kHz to 3 MHz	10 kHz to 3 MHz	3 kHz to 1 MHz

b Tap **Speed** and input a value using the on-screen keyboard.

7 Tap **Reset/Restart** to start a new measurement.

NOTE:
Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

NOTE:
If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

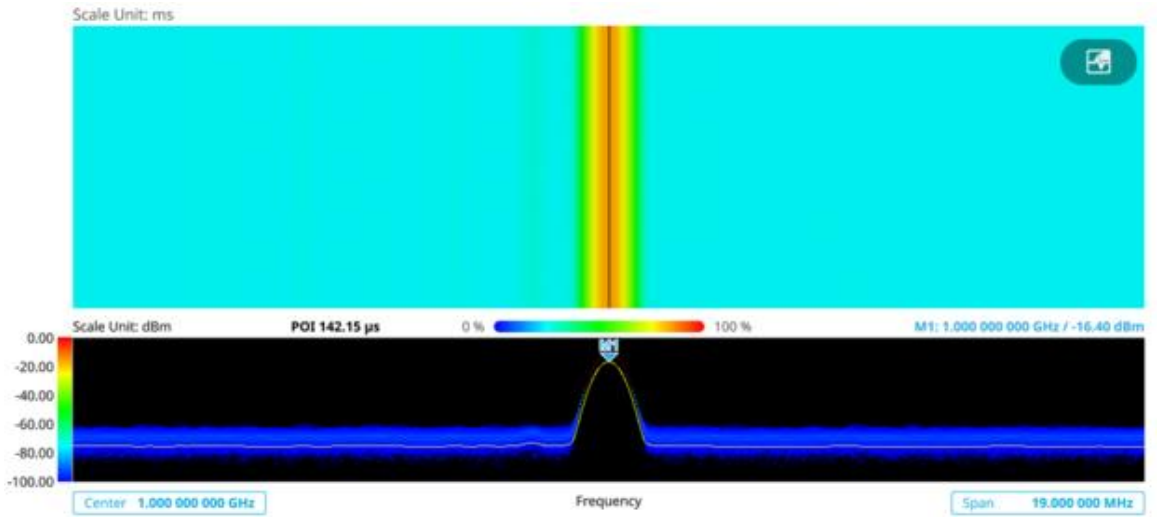
4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

Persistent spectrogram measurement



NOTE:
You can go to **Menu** > **Limit** to analyze your measurements with the reference line, multi-segment line, and channel limit table. See “Setting limit" for details.

Conducting TDD auto gated spectrum measurements

TAGS Spectrum

You will be able to perform Spectrum Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Maual configuration for NR

The following is the procedure for manual configuation for NR.

NOTE:
Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn’t be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

NOTE
If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

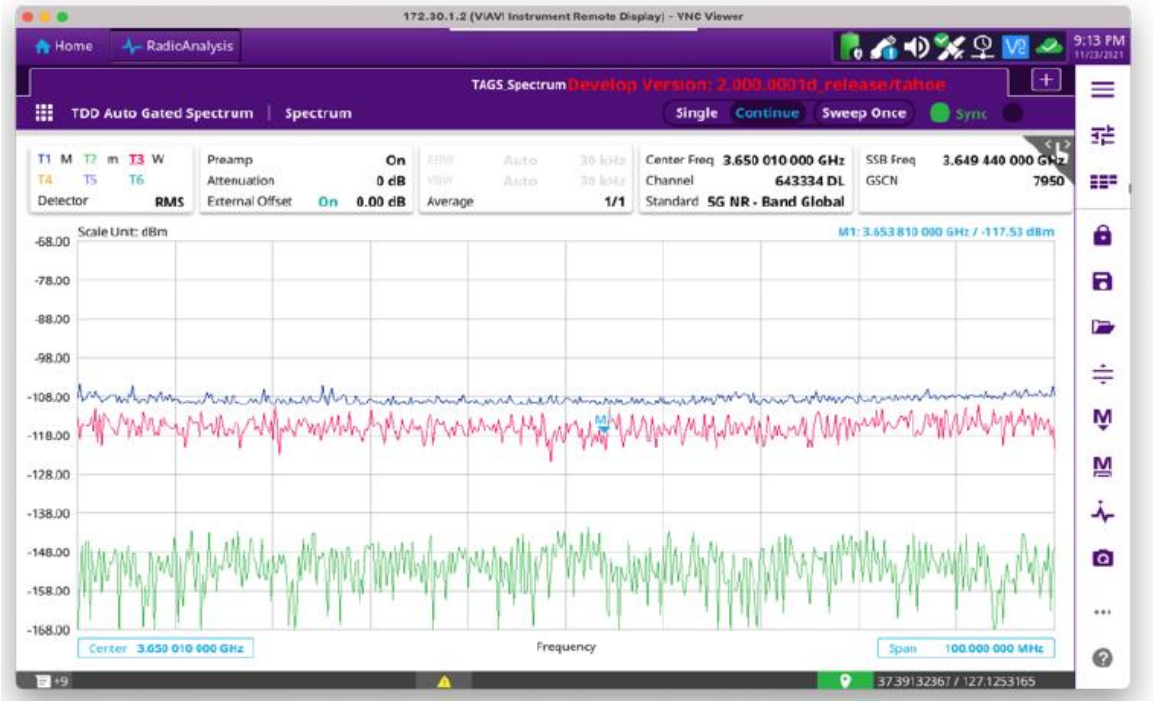
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Spectrum measurement with TAGS



Spectrogram

You will be able to perform Spectrogram Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

The following is the procedure for manual configuation for NR.

NOTE:
Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

Setting measure setup

Manual configuration for NR

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

> **NOTE:**
> Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

7 Go back to **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

8 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

9 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

11 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**,**Uplink Symbol** as required.

12 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

> **NOTE**
> If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

13 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

14 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

15 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

16 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

17 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual configuration for LTE

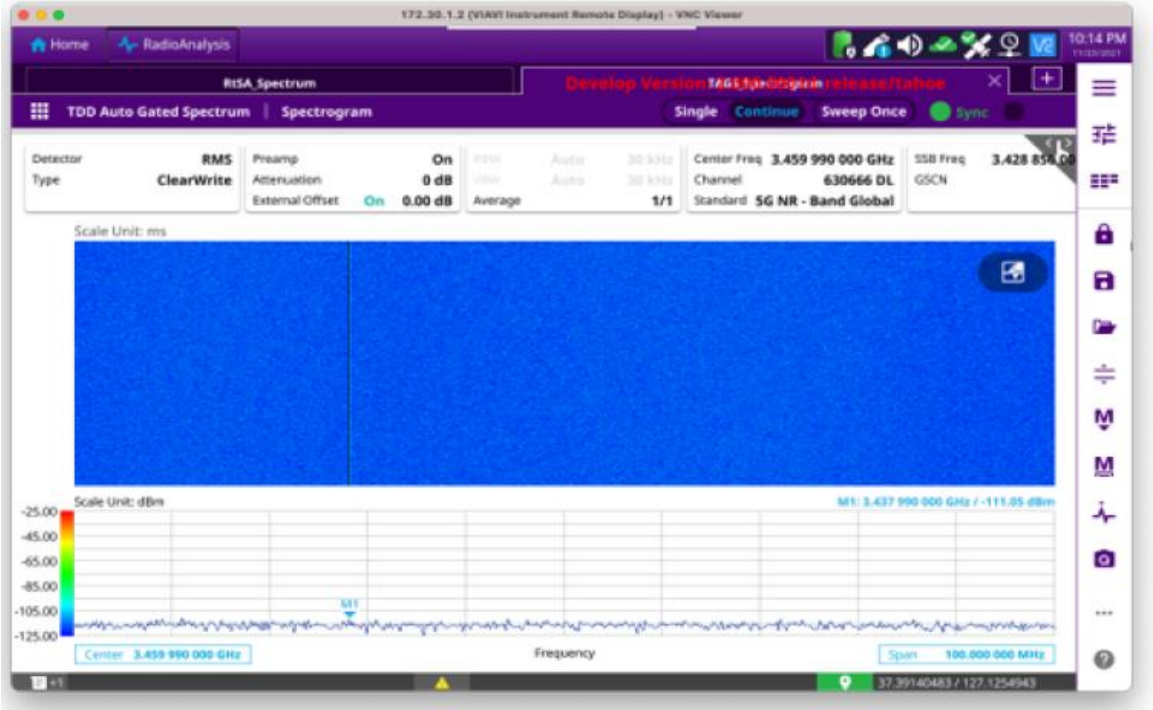
1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Spectrogram measurement with TAGS



Persistent spectrum

You will be able to perform Persistent Spectrum Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Maual configuration for NR

The following is the procedure for manual configuation for NR.

	NOTE: Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

2 Tap **Bandwidth/SSB SCS** then a Setting window appears.

   a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

   - SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
   - SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

3 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

4 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

5 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**, **Uplink Symbol** as required.

6 Tap **SSB Auto Search Mode** and do the following steps:

- **a** Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.
- **b** Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

> **NOTE**
> If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

7 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

8 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

9 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

10 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

11 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual cofiguration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

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Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

> **NOTE:**
> If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

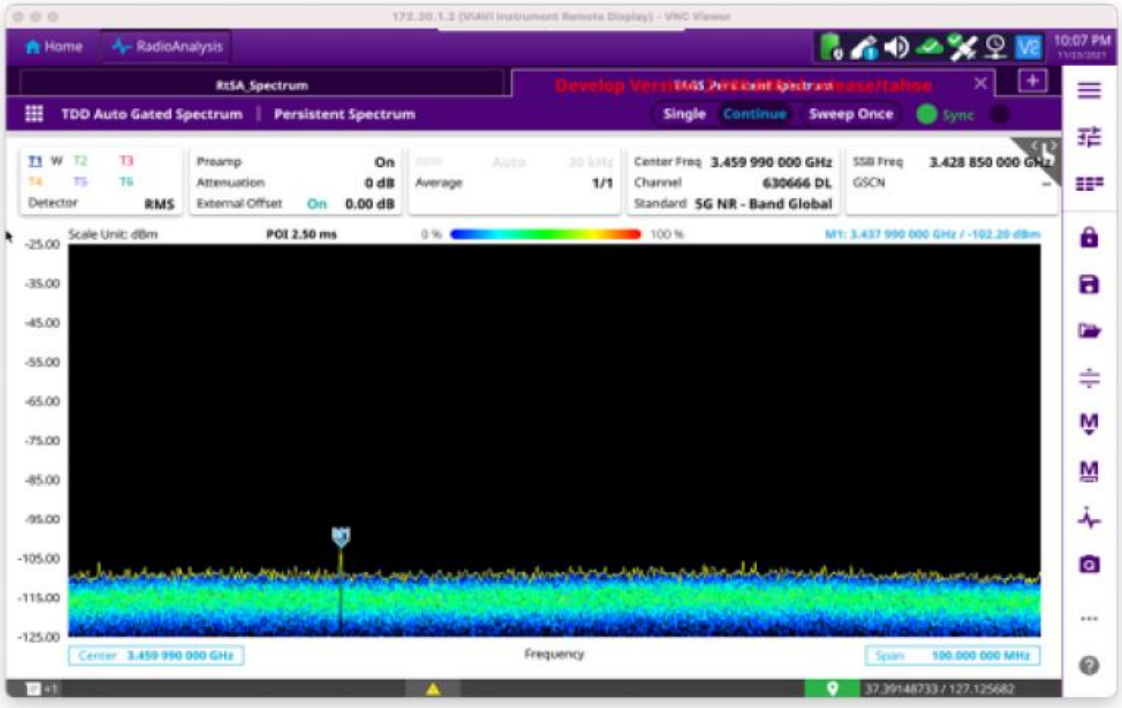
5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

NOTE:
You can go to Menu > Limit to analyze your measurements with the reference line, multi-segment line, and channel limit table. See "Setting limit" for more details.

Persistent spectrum measurement with TAGS



NOTE:
Compared to Persistence Spectrum in RTSA, Persistent Spectrum in TAGS is especially useful when tracking the level of weak interference to find interference source.

Persistent spectrogram

You will be able to perform Persistent Spectrogram Analysis in Guard Period for a specific measuring area. Before starting the measurement, you can set test parameters such as Amp/Scale, Average, Trace, Trigger, and Marker as described in "Configuring Spectrum Measurements".

Setting measure setup

Manual configuration for NR

The following is the procedure for manual configuation for NR.

	NOTE: Make sure to keep on gating on the GP of TDD signal, sync with SSB should be maintained. Therefore, Carrier & SSB frequency shouldn't be changed, RBW should be Auto, and Span is to set 10 MHz to Carrier BW.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Time Interval** to set the amount of time between each trace measurement using the on-screen keyboard.

3 Tap **Time Cursor** to **On** to set the time cursor on a specific trace position.
The Position menu becomes activated to be set. You can also move the time cursor up and down using the move bar on the left edge.

4 Tap **Position** to move the time cursor by inputting a value using the on-screen keyboard.

5 Tap **Type** to switch the chart view type **3D Display** or **Normal**.
You can also change the cart view type using the icon on the chart screen.

6 Tap **Reset/Restart** to start a new measurement.

	NOTE: Enabling the time cursor puts the measurement on hold and you can make postprocessing analysis for each measurement over time using the time cursor.

7 Go back to **Setup** ( ) icon > **Manual Configuration (NR)** on the side bar.

8 Tap **Bandwidth/SSB SCS** then a Setting window appears.

a If you select the operating frequency as FR1, select from the following (FR 2 is not available):

- SCS 15 kHz: 5, 10, 15, 20, 25, 30, 40, 50 MHz
- SCS 30 kHz: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz

9 Tap **SSB Center Frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB frequency changes automatically.

11 Tap **TDD Formats** then set **Downlink Slot**, **Downlink Symbol**, **Uplink Slot**,**Uplink Symbol** as required.

12 Tap **SSB Auto Search Mode** and do the following steps:

a Tap **Auto Preamp/Atten** and switch **SSB Auto Search** to **Start** to set preamp and attenuation automatically.

b Tap **Manual** and switch **SSB Auto Search** to **Start** for manually setting based on your need.

	NOTE If you tap SSB Auto Search to Start, the searching progress screen appears to let you know the status of searching. You can tap SSB Auto Search to Stop to stop searching.

13 Tap **SSB Periodicity** and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

14 Tap to switch **PCI** (**Physical Cell ID**) to **Manual** or **Auto**.

15 Tap **PCI** and input a value from 0 to 1007 using the on-screen keyboard.
The **PCI** switches to **Manual**.

16 Tap **Gate Window Settings** and input **Slot No**, **Start Symbol No**, and **Symbol Width**.
You can view P vs T Slot format measurement screen once you tap **P vs T Slot view**.

17 Tap **Miscellaneous > Symbol Phase Comp** and select from the options: Auto, Manual, and or **Off**.
Symbol Phase Compensation is used to compensate for phase differences between symbols caused by upconversion. Users do not always use the instrument based on RF frequency. In this case, you can set it to Manual or Off.

- **Auto**: Setting radio frequency to center frequency.
- **Manual**: Radio Frequency menu is enabled and set radio frequency as required.
- **Off**: Setting radio frequency to 0.

Manual configuration for LTE

1 Tap the **Setup** ( ) icon > **Manual Configuration (LTE)** on the side bar.

2 Tap **Subframe Assignment** then input the required value using the on-screen keyboard.

3 Tap **Special Subframe Patterns** then input the required value using the on-screen keyboard.

4 Tap **Bandwidth** and select the from the options: **1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15MHz,** or **20 MHz**.

Setting Heatmap marker

1 Tap **Menu** > **Marker**.
The marker setting table appears.

2 Tap **Heatmap**.
The vertical bar and horizontal bar appear. A heatmap marker shows the hit rate of X-axis (amplitude) and Y-axis whereas a normal trace marker shows a value of the x-axis.

3 Tap the chart screen to move the heatmap marker or move the vertical bar and horizontal bar.

NOTE:
If you select the heatmap marker, you can only use Peak Search and Always Peak options. Delta pair is not available as well. See "Using maker" for more details.

Setting bitmap

1 Tap **Menu** > **Bitmap**.

2 Tap **Dot Persistence Time** and input a value using the on-screen keyboard.
The dot persistence time means the time that accumulates heatmap data.

3 Tap to switch **Bitmap Scale** to **On** to enable auto scale or **Off** to disable auto scale.
If the Bitmap Scale is On, the point where the maximum hit represents maximum colors, if the Bitmap Scale is Off, the bluer color (closer to 0% of the color bar) is mapped with hit.

4 Tap **Bitmap Min** and input % value using the on-screen keyboard.
The Bitmap Min represents unused bitmap color range. If you set it to 10%, the color matched with 10% or below does not show.

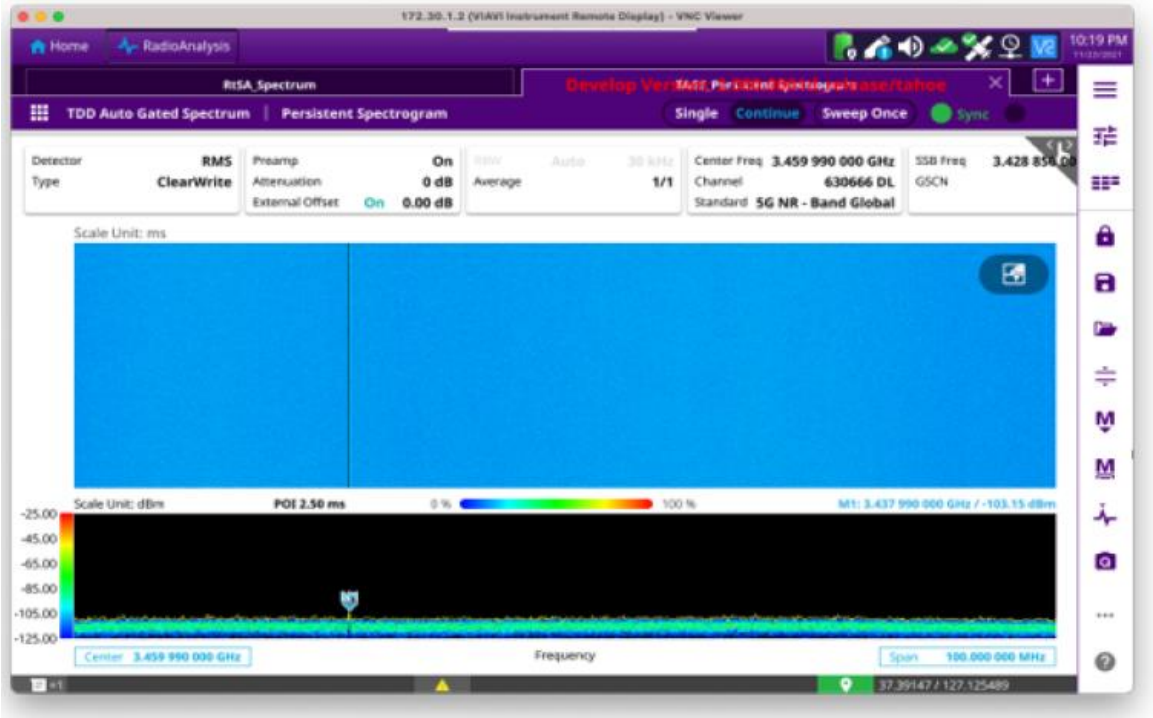
5 Tap **Bitmap Max** and input % value using the on-screen keyboard.
The Bitmap Max represents max range of bitmap colors to be used. If you set it to 90%, the color that exceeds 90% does not show.

6 Tap **Hit Min** and input % value using the on-screen keyboard.
The Hit Min represents the minimum number of hits not to be converted to colors. If you set it to 10%, the hit matched with 10% or below is not converted to colors.

7 Tap **Hit Max** and input % value using the on-screen keyboard.
The Hit Max represents the maximum number of hits to be converted to colors. If you set it to 90%, the hit matched with 90% or above shows with max colors.

NOTE:
You can go to Menu > Limit to analyze your measurements with the reference line, multi-segment line, and channel limit table. See "Setting limit" for more details.

Persistent spectrogram measurement with TAGS



NOTE:
Compared to Persistence Spectrum in RTSA, Persistent Spectrum in TAGS is especially useful when tracking the level of weak interference to find interference source.

Using Blind Scanner

Introduction

In the CBRS band, service providers using General Authorized Access (GAA) spectrum have limited knowledge of the channels that may be assigned to them and other collocated services.

Using Blind Scan, you can scan the frequency range or frequency bands of interest, showing the active channels in use. Once RF channels are discovered, you can select one of those channels for deeper and signal and beam analysis.

Blind Scan provides an auto-discovery mode that quickly detects active RF channels at any selected location, enabling you to validate active 4G, 5G and 5G DSS services, particularly in CBRS band and DAS environments.

Selecting mode and measure

To start measurement, do the following steps:

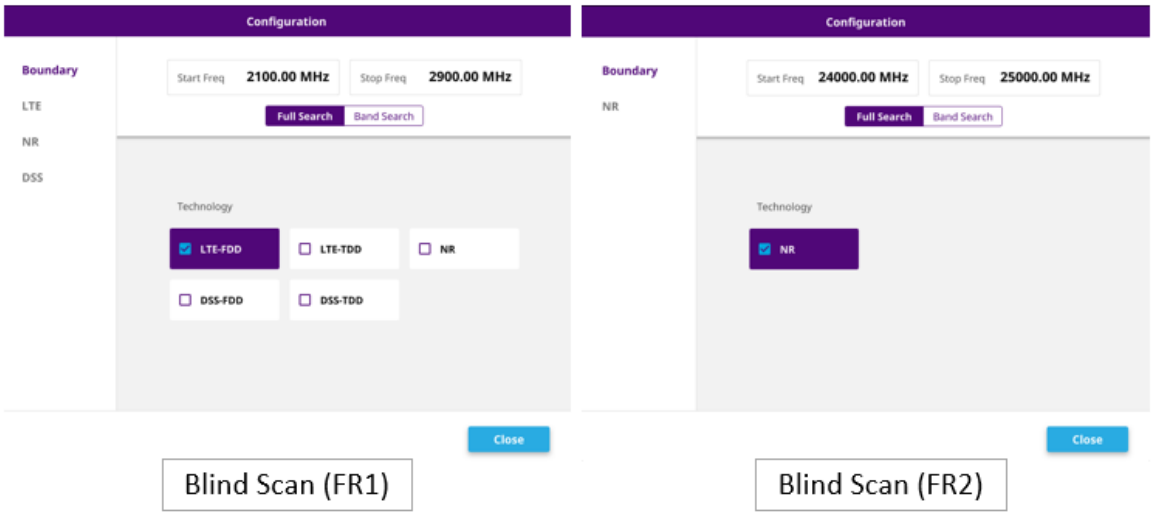
1 Tap **Blind Scanner** on the **MODE** panel.

2 Tap the **Blind Scanner** measurement mode, then tap **Done**.

Configuring Blind Scan

To configure blind scan

1 Tap the **Setup** ( ) icon on the side bar then tap **Configuration**. Or tap the **Configuration** icon on the right side of the screen.
The configuration page appears, as shown in figure below.



2 On the left side of the page, tap **Boundary**.

3 Tap **Start Freq** and enter the start frequency of the range you want to scan using the on-screen keyboard.

4 Tap **Stop Freq** and enter the stop frequency of the range you want to scan using the on-screen keyboard.

   a Tap **Full Search** to search the selected technology that is within the range of start frequency and stop frequency.

b Tap **Band Search** to search the user-defined band and technology from the band list within the range of start frequency and stop frequency.

5 In the Technology section, tap to select the technology type(s) to be included in the scan.

6 On the left side of the page, tap a technology type to configure its specific parameters.

FR1:

Parameter	Description
LTE	
CP Type	Specifies the cyclic prefix (CP) of the signal. The options are: Normal/Extended
NR	
SCS	Specifies the Subcarrier Spacing (SCS) mode used by the signal. The options are: 30 kHz/15 kHz
Periodicity	Specifies the periodicity of the signal. The options are: 5/10/20/40/80/160 ms
Search Type	Specifies the signal type to search. The options are: GSCN/NR-ARFCN
DSS	
CP Type	Specifies the cyclic prefix (CP) of the signal. The options are: Normal/Extended
SCS	Specifies the Subcarrier Spacing (SCS) mode used by the signal. The options are: 30 kHz/15 kHz
Periodicity	Specifies the periodicity of the signal. The options are: 5/10/20/40/80/160 ms
SSB Step	Specifies the The Synchronization Signal/PBCH block (SSB) type to scan. The options are:GSCN/NR-ARFCN

FR2:

Parameter	Description
NR	
SCS	Specifies the cyclic prefix (CP) of the signal. The options are: Normal/Extended
Periodicity	Specifies the periodicity of the signal. The options are: 5/10/20/40/80/160 ms

Search Type	Specifies the sinal type to search. The options are: GSCN/NR-ARFCN

7 Tap **Close**.

Performing Blind Scan

To perform blind scan

1 Tap the **Start Scan** button to start Blind Scan.

2 When the scan is complete, the results appear on the screen.

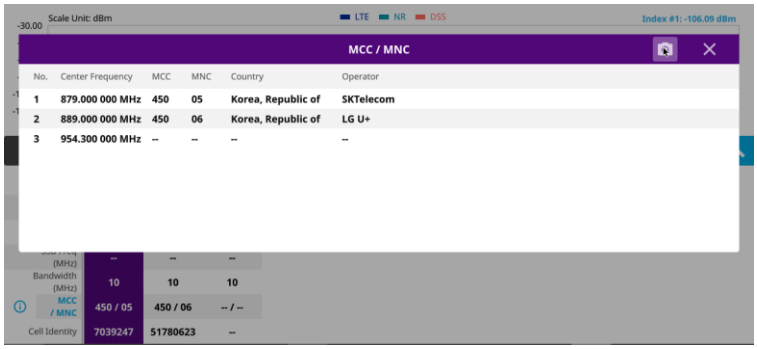
3 To further analyze the results, tap the **Application Launcher** ( )button.

4 If not selected TDD, select the analysis type you wish to perform, then tap **Run**.

- Interference: If selected TDD, it moves to Persistent Spectrum of Real-time Spectrum Analyzer.
- Signal: it moves to the searched Technology.

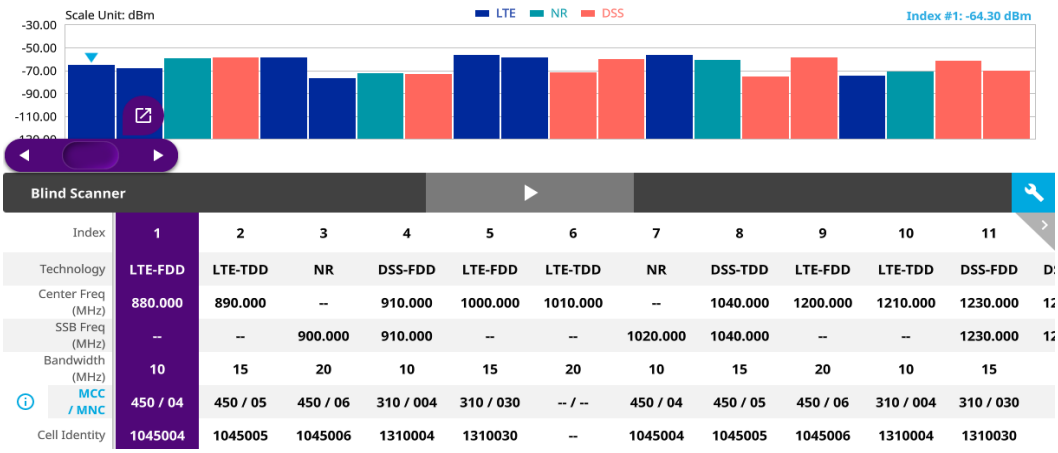
NOTE:
If you move to IA and SiA and back to BS, the last searched carrier will remain and you can continue measuring for other carriers.

5 *Optional.* Tap the **Information** icon to check Moblie Country Codes(MCC) and Mobile Network Codes(MNC). The pop-up window appears, as shown in figure below.



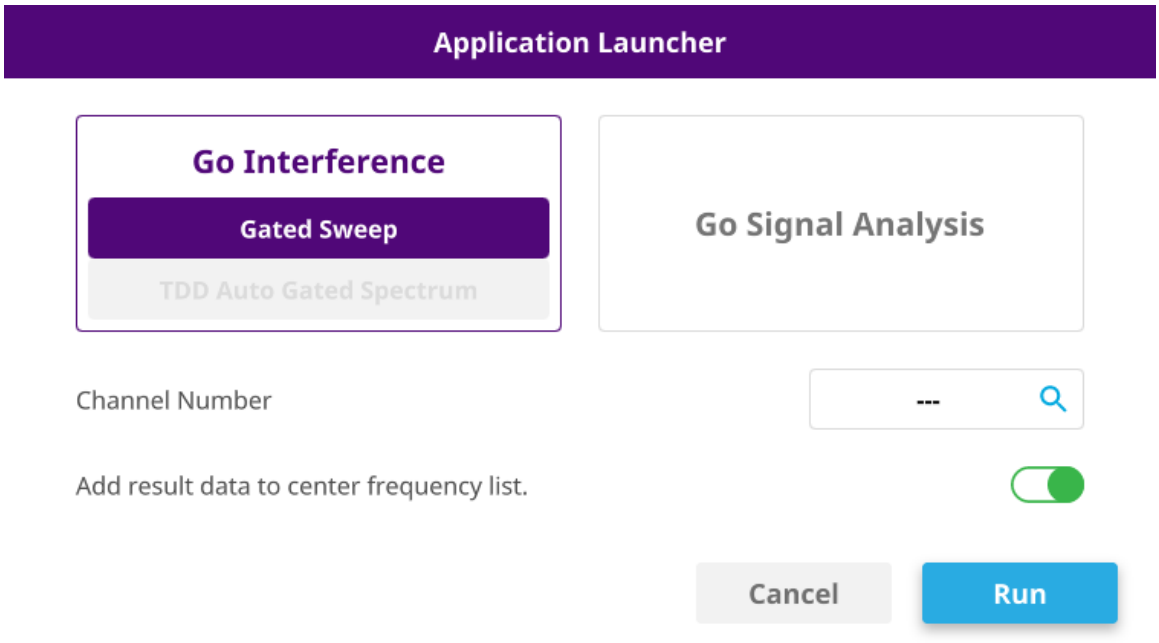
NOTE:
You can check the MCC and MNC information only if you select LTE tech.

Blind Scan result



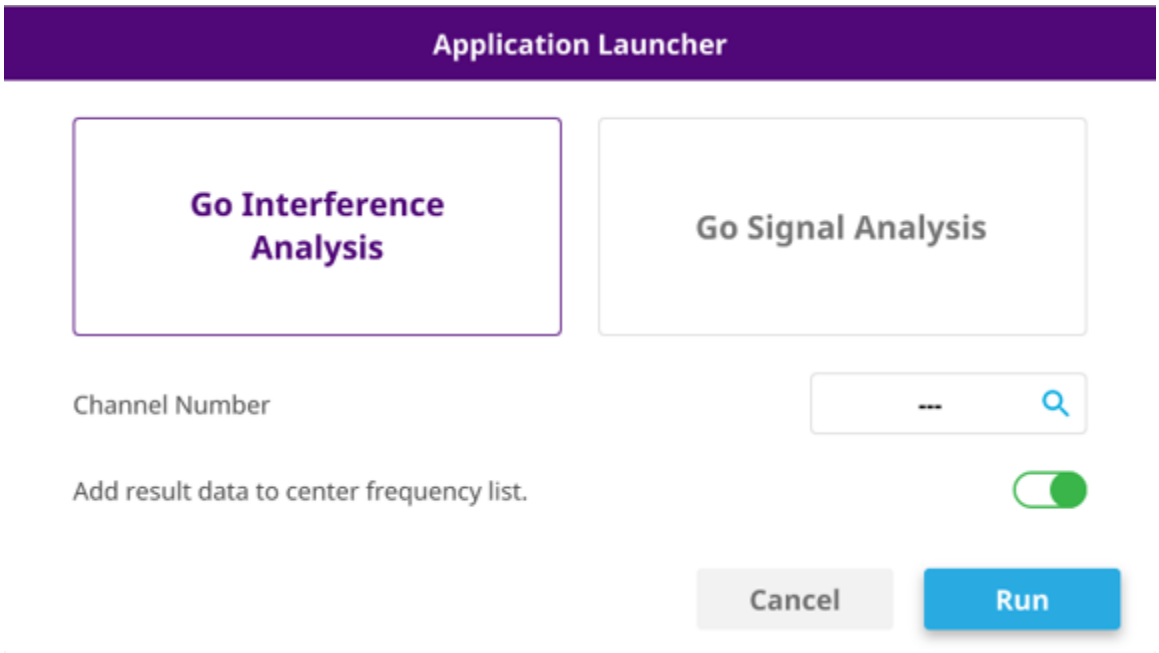
Index	1	2	3	4	5	6	7	8	9	10	11
Technology	LTE-FDD	LTE-TDD	NR	DSS-FDD	LTE-FDD	LTE-TDD	NR	DSS-TDD	LTE-FDD	LTE-TDD	DSS-FDD
Center Freq (MHz)	880.000	890.000	--	910.000	1000.000	1010.000	--	1040.000	1200.000	1210.000	1230.000
SSB Freq (MHz)	--	--	900.000	910.000	--	--	1020.000	1040.000	--	--	1230.000
Bandwidth (MHz)	10	15	20	10	15	20	10	15	20	10	15
MCC / MNC	450 / 04	450 / 05	450 / 06	310 / 004	310 / 030	-- / --	450 / 04	450 / 05	450 / 06	310 / 004	310 / 030
Cell Identity	1045004	1045005	1045006	1310004	1310030	--	1045004	1045005	1045006	1310004	1310030

Application Launcher screen when selecting LTE-TDD/DSS-TDD



NOTE:
When you select TDD tech such as LTE-TDD and DSS-TDD, you have an option to select Gated Sweep (only when you have Gated Sweep license) and the instrument moves to Gated Sweep Spectrum in Spectrum Analyzer.

Application Launcher screen



NOTE:

When you set add result data to center frequency list to On (Green), based on the tech you chose, you can add the result data to Center Frequency List. See below for more details:

- LTE-FDD/TDD, NR :Spectrum Analyzer, Real-time Spectrum Analyzer
- LTE-FDD: LTE-FDD Signal Analyzer
- LTE-TDD: LTE TDD Signal Analyzer
- NR: 5G NR Signal Analyzer
- DSS-FDD/TDD: DSS Analyzer
- LTE-FDD/TDD, NR: NSA Analyzer

Once blind scan search is done and if you want to check the result table values, go to each tech > Menu > Frequency > Center Frequency List. You are able to see the added result data.

Performing Blind Scan (FR2)

To perform blind scan

1 Tap the **Start Scan** button to start Blind Scan.

2 When the scan is complete, the results appear on the screen.

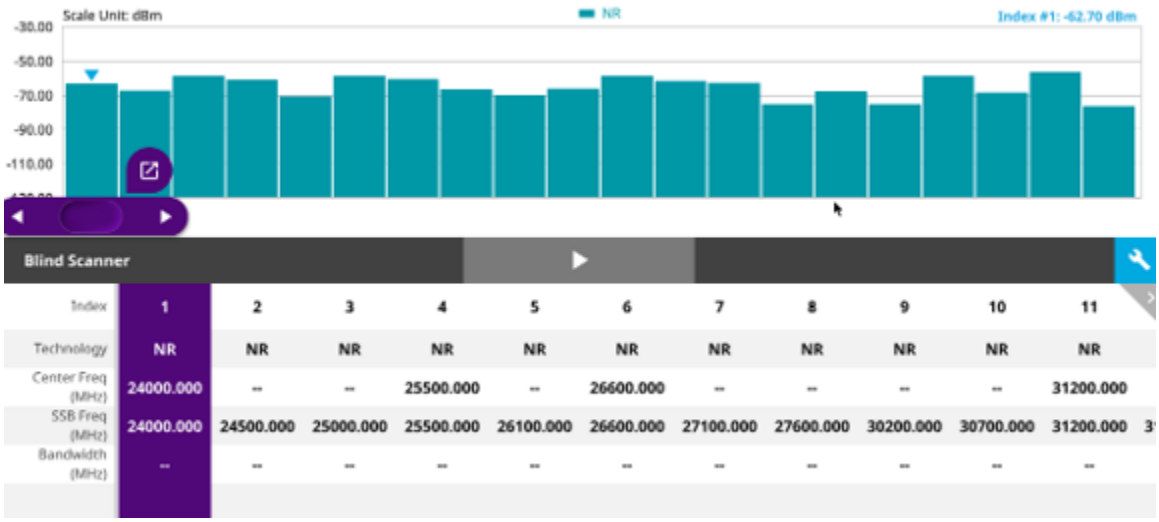
3 To further analyze the results, tap the **Application Launcher** ( )button.

4 Select the analysis type you wish to perform, then tap **Run**.

- Interference: It moves to Persistent Spectrum of Real-time Spectrum Analyzer.
- Signal: it moves to the searched Technology.

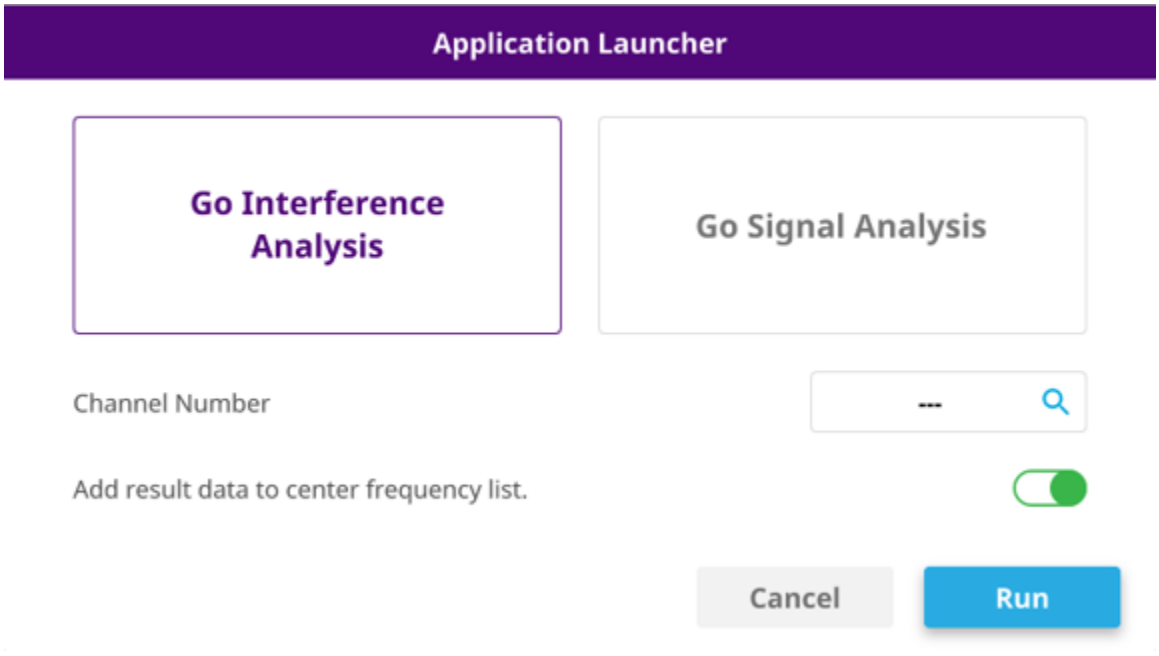
	NOTE: If you move to IA and SiA and back to BS, the last searched carrier will remain and you can continue measuring for other carriers.

Blind Scan result



Index	1	2	3	4	5	6	7	8	9	10	11
Technology	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Center Freq (MHz)	24000.000	--	--	25500.000	--	26600.000	--	--	--	--	31200.000
SSB Freq (MHz)	24000.000	24500.000	25000.000	25500.000	26100.000	26600.000	27100.000	27600.000	30200.000	30700.000	31200.000
Bandwidth (MHz)	--	--	--	--	--	--	--	--	--	--	--

Application Launcher screen



Using NSA Signal Analyzer

Introduction

VIAVI CellAdvisor 5G NSA (Non-standalone) Signal Analyzer focuses on enhanced mobile broadband to provide higher data-bandwidth and reliable connectivity. In NSA mode, 5G networks will be aided by existing 4G infrastructure which means 5G system does not operate alone but utilizes LTE-NR dual connectivity if needed. CellAdvisor 5G provides NTE and NR measurement simultaneously with easy setup. NSA supports N type and K type port selection automatically using top right panel ( ) icon. You will need to connect the RF input port correctly on your instrument based on the frequency range (9 kHz to 18 GHz/9 kHz to 44 GHz).

Its main 5G NSA test functions are focused on over-the-air measurement such as NSA analyzer, NSA scanner, and NSA route map.

- OTA Analysis
  - NSA Analyzer
  - NSA Scanner
  - Route Map
- Online Route Map Analysis
  - Online NSA Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **NSA Signal Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

OTA Analysis > **NSA Analyzer**, **NSA Scanner**, or **NSA Route Map**

Online Route Map Analysis > **Online NSA Route Map**

Conducting OTA measurements

NSA analyzer

CellAdvisor 5G NSA Analyzer provides combined functions which are available in OTA ID Scanner in LTE mode and Beam Analyzer in 5G NR mode.

- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals
- **P-SS RSRP (Primary Synchronization Signal – Reference Signal Received Power)** — average power measurement through all the primary sync signals
- **S-SS SINR (Secondary Synchronization Signal – Signal to Interference Plus Noise Ratio)** — linear average over the power contribution (in Watts) of the resource elements carrying secondary synchronization signals divided by the linear average of the noise and interference power contribution (in Watts) over the resource elements carrying secondary synchronization signals within the same frequency bandwidth
- **S-SS RSRQ (Secondary Synchronization Signal – Reference Signal Received Quality)** — ratio of N x SS-RSRP/NR carrier RSSI. Here N refers to number of resource blocks in NR carrier RSSI measurement Bandwidth

- **P-SS SNR (Primary Synchronization Signal - Signal to Noise Ratio)** — ratio of signal power to the noise power through the primary sync signals

NSA Analyzer also provides the seven strongest LTE signal with corresponding power levels during its transmission period, and includes:

- **RSRP (Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements that carry cell-specific reference signals (CRS) within the considered measurement frequency bandwidth
- **RSRQ (Reference Signal Received Quality)** — Where N is the number of Resource Block(RB)'s of the E-UTRA carrier Received Signal Strength Indicator(RSSI) measurement bandwidth
- **P-SS SNR (Primary Synchronization Signal – Signal to Noise Ratio)** — ratio of signal power to the noise power through the primary sync signals
- **RS SINR (Reference Signal – Signal to Noise and Interference Ratio)** — linear average over the power contribution (in Watts) of the resource elements carrying cell-specific reference signals divided by the linear average of the noise and interference power contribution (in Watts) over the resource elements carrying cell-specific reference signals within the considered measurement frequency bandwidth
- **S-SS RSSI (Secondary Synchronization Signal – Received Signal Strength Indicator)** — linear average of the total received power (in Watts) observed only in secondary synchronization signal
- **P-SS RSRP (Primary Synchronization Signal – Reference Signal Received Power)** — average power measurement through all the primary sync signals
- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals

Setting measure setup

The setup menus for NSA analyzer are available in the screen with two categories: general setting and carrier setting. You can set up up to 8 carriers for each NR and LTE simultaneously.

General setting

1 Tap the **Setup** ( ) icon > **Configuration** on the side bar.

2 Tap **General Setting** on the screen.

3 To set the reference level, tap the number under NR or LTE and input the reference level using the on-screen keyboard.

4 Tap to switch the **Sweep Speed** between **Fast** and **Normal**.

   a **Fast**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP for one signal with the strongest RSRP for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for one signal with the strongest S-SS RSRP for NR carrier.

   b **Normal**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP for six signals with top-down order based on the strongest RSRP signal for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for eight signals with top-down order based on the strongest S-SS RSRP signal for NR carrier.

5 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

   a **Internal**: when starting a signal processing using the internal reference clock and creating a trigger.

   b **External**: when starting a signal processing based on the external input trigger

   c **GPS**: When synchronizing the signal processing via the GPS receiver.

6 Tap to switch **Sorting Type** to set **PCI** or **RSRP** as required.

Carrier setting

1 Tap the number to switch the carrier on or off for **NR** or **LTE** in the **Carrier Configuration** box. You can select up to 8 carriers.

2 Tap to select a carrier in the drop-down box and rename a carrier using the **Edit**.

icon next to the drop-down box.:

3 If you select NR, do the following steps:

a Tap the **Center Frequency** box and input the value using the on-screen keyboard.

▪ If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).
- Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

NOTE
You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray).

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap the **Bandwidth/SSB SCS** box and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum	8	A {2,8} +14*n	15 kHz	5 (1 ms)

operation: 1.88 GHz to 6 GHz		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (62.5 µs)

i Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table, **h**.

j Tap the **SSB Period** box and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, or **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

k Tap the **Auto Search** box and select the options from **Auto Preamp/Atten** or **Manual**.
Auto Preamp/Atten to set preamp and attenuation automatically or Manual for user-defined settings.

l Tap the **Start** button in **Auto Search** box to search SCS, type, and the number of SSB automatically or the **Stop** button to set the SSB period based on the base station.
Once the **Start** button is tapped, the progress bar appears.

m Tap the **SSB Frequency** button and input the required value using the on-screen keyboard.

n Tap the **GSCN** box and input the required value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB Frequency, Sync Raster Offset, and Sync SCS Offset are automatically changed.

o Tap **Sync Raster Offset** box to manually set the required value using the on-screen keyboard.

p Tap **Sync SCS Offset** box to manually set the required value using the on-screen keyboard**.**

4 If you select LTE, do the following step:

a Tap the **Center Frequency** box input the value using the on-screen keyboard.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**,**2**,**DNC**, and **Auto** to **On** (green) or **Off** (gray).

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap to switch the **LTE Mode** box to **TDD** or **FDD**.

i Tap the **Bandwidth** box and input the value using the on-screen keyboard.

j Tap to switch the **Cyclic Prefix** box to **Extended** or **Normal**.

4 If you set up 1 or 2 carriers, the graph chart appears based on the setting.

a Tap the **Magnifier** ( ) icon of the selected carrier. This enables you to check the beam information without changing the measurement mode to Beam Analyzer.
The beam information pops up for the selected carrier.

- Select the **AutoScale** ( ) icon to automatically set the reference and attenuation level. Each time you tap this, both of the Y-axis scale and input attenuation level change to be optimized with some margin.

- Select the **Quick Save** ( ) icon to capture the current screen.
- Select the **Close** ( ) icon to close the Beam Information window.

b Tap the **Information** ( ) icon of the selected carrier to see the setup information.

5 If you set up 3 or more carriers, the carrier information table appears based on the setting.

a Refer to **a** to **b** in **step 4** above.

- Select the **AutoScale** ( ) icon to automatically set the reference and attenuation level. Each time you tap this, both of the Y-axis scale and input attenuation level change to be optimized with some margin.
- Select the **Quick Save** ( ) icon to capture the current screen.
- Select the **Close** ( ) icon to close the Beam Information window.

b Tap the **Carrier Information Table** ( ) icon to see the carrier information list.

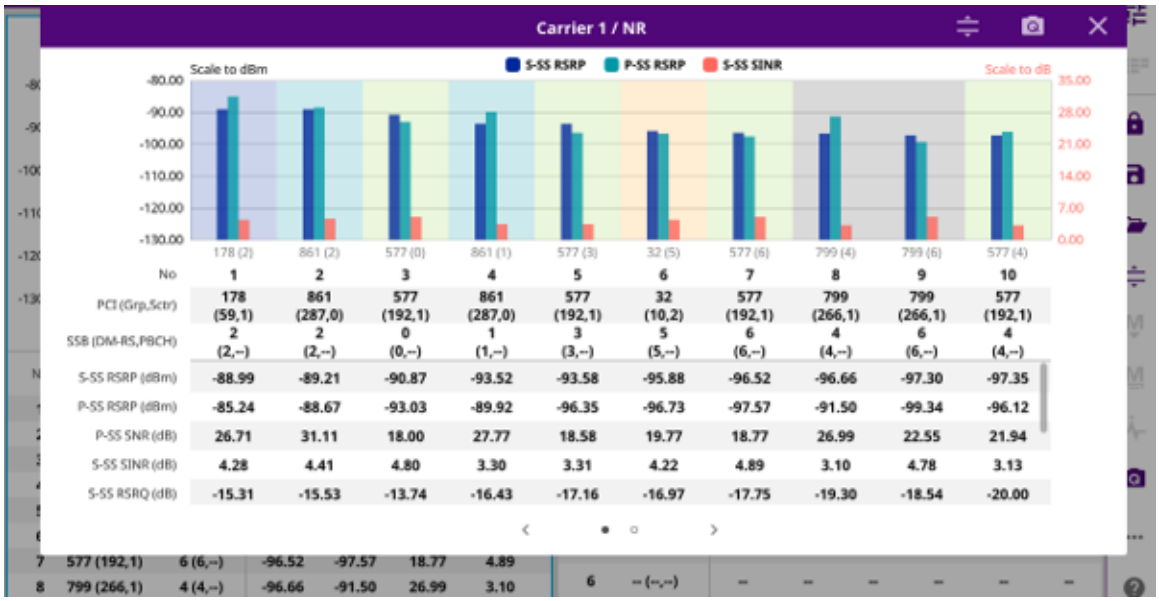
c Tap the **Chart** ( ) icon to see the carrier information graph.

NSA analyzer measurement with sweep normal

No	PCI (Grp,Sctr)	SSB (DM-RS,PBCH)	S-SS RSRP (dBm)	P-SS RSRP (dBm)	P-SS SNR (dB)	S-SS SINR (dB)
1	861 (287,0)	2 (2,--)	-90.46	-88.62	27.52	3.36
2	577 (192,1)	0 (0,--)	-91.03	-91.22	20.37	3.87
3	861 (287,0)	1 (1,--)	-92.73	-91.68	25.85	3.76
4	577 (192,1)	3 (3,--)	-93.02	-92.93	19.87	4.59
5	799 (266,1)	4 (4,--)	-94.15	-92.24	27.86	4.08
6	577 (192,1)	6 (6,--)	-96.63	-99.58	21.34	4.25
7	861 (287,0)	5 (5,--)	-100.36	-102.94	24.15	4.10
8	-- (--,--)	-- (--,--)	--	--	--	--

No	PCI (Grp,Sctr)	RSRP (dBm)	RSRQ (dB)	P-SS SNR (dB)	RS SINR (dB)	S-SS RSSI (dBm)	P-SS RSRP (dBm)
1	410 (136,2)	-59.37	-5.77	36.52	25.91	-41.09	-58.99
2	-- (--,--)	--	--	--	--	--	--
3	-- (--,--)	--	--	--	--	--	--
4	-- (--,--)	--	--	--	--	--	--
5	-- (--,--)	--	--	--	--	--	--
6	-- (--,--)	--	--	--	--	--	--

NSA analyzer measurement with sweep normal (tapped the Magnifier icon)



NSA scanner

CellAdvisor 5G NSA Analyzer provides combined functions which are available in Carrier Scanner in 5G NR mode and Channel Scanner in LTE mode.

NSA Analyzer provides Channel Scanner function that is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

NSA Analyzer also provides an easy and fast response power measurements of up to eight single component carriers of 100 MHz. The power measurement for each carrier includes:

- **S-SS RSRP (Synchronized Signal – Reference Signal Received Power)** — linear average over the power contributions (in Watts) of the resource elements which carry secondary synchronization signals
- **P-SS SNR (Primary Synchronization Signal - Signal to Noise Ratio)** — ratio of signal power to the noise power through the primary sync signals
- **Channel Power** — integrated power of the entire channel bandwidth (100 MHz) during an entire transmission frame (10 ms)
- **Antenna**— 0,1,2,3 peak antenna port among 4 antenna ports

Setting measure setup

Before starting the NSA Analyzer, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The setup menus for NSA analyzer are available in the screen with two categories: general setting and carrier setting. You can setup up to 8 carriers for each NR and LTE simultaneously.

1 Tap the **Setup** ( ) icon > **Configuration** on the side bar.

2 Tap **General Setting** on the screen.

3 To set the reference level, tap the number under NR or LTE and input the reference level using the on-screen keyboard.

4 Tap to switch the **Sweep Speed** between **Fast** and **Normal**.

a **Fast**: measuring PCI, RSRP, Channel Power and S-SS RSSI for one signal with the strongest RSRP for LTE carrier/ measuring PCI, S-SS RSRP and Channel Power for one signal with the strongest S-SS RSRP for NR carrier.

b **Normal**: measuring PCI, RSRP, Channel Power, RS EVM, Frequency Error, Time Error and S-SS RSSI for six signals with top-down order based on the strongest RSRP signal for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, Channel Power, PBCH EVM, Frequency Error, Time Error, S-SS RSSI and PBCH DM-RS EVM for eight signals with top-down order based on the strongest S-SS RSRP signal for NR carrier.

5 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

a **Internal**: when starting a signal processing using the internal reference clock and creating a trigger.

b **External**: when starting a signal processing based on the external input trigger

c **GPS**: When synchronizing the signal processing via the GPS receiver.

6 Tap to switch **Sorting Type** to set **PCI** or **RSRP** as required.

Carrier setting

1 Tap the number to switch the carrier on or off for **NR** or **LTE** in the **Carrier Configuration** box. You can select up to 8 carriers.

2 If you select NR, do the following steps:

a Tap the **Center Frequency** box and input the value using the on-screen keyboard.

▪ If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).
- Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

NOTE
You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray.

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap the **Bandwidth/SSB SCS** box and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1)	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1)	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (62.5 µs)

i Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table, **h**.

j Tap the **SSB Period** box and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, or **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

k Tap the **Auto Search** box and select the options from **Auto Preamp/Atten** or **Manual**.
Auto Preamp/Atten to set preamp and attenuation automatically or Manual for user-defined settings.

l Tap the **Start** button in **Auto Search** box to search SCS, type, and the number of SSB automatically or the **Stop** button to set the SSB period based on the base station.
Once the **Start** button is tapped, the progress bar appears.

m Tap the **SSB Frequency** button and input the required value using the on-screen keyboard.

n Tap the **GSCN** box and input the required value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB Frequency, Sync Raster Offset, and Sync SCS Offset are automatically changed.

o Tap **Sync Raster Offset** box to manually set the required value using the on-screen keyboard.

p Tap **Sync SCS Offset** box to manually set the required value using the on-screen keyboard.

3 If you select LTE, do the following step:

a Tap the **Center Frequency** box input the value using the on-screen keyboard.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**,**2**,**DNC**, and **Auto** to **On** (green) or **Off** (gray).

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap to switch the **LTE Mode** box to **TDD** or **FDD**.

i Tap the **Bandwidth** box and input the value using the on-screen keyboard.

j Tap to switch the **Cyclic Prefix** box to **Extended** or **Normal**.

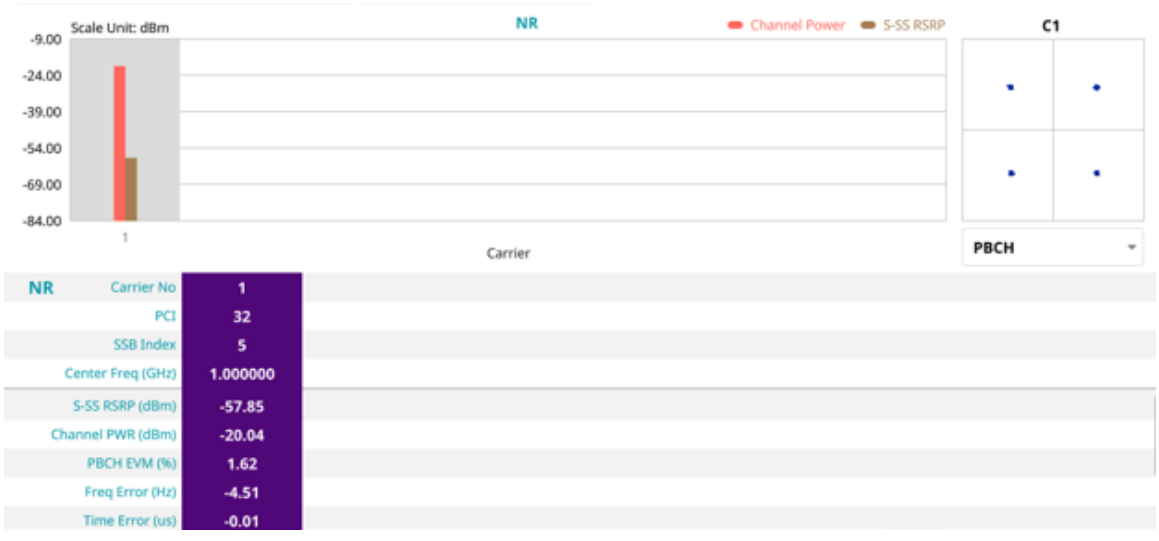
4 Once the carrier setup is done, the carrier setup information appears on the top left screen.

NSA scanner measurement with LTE and NR carrier (when taped LTE carrier)

NOTE:

If you want to see the constellation information, tap and select the carrier number that you want to check. If tapped, the carrier information will be highlighted in purple and constellation information will appear.

NSA scanner measurement with only NR carrier



	NOTE: If you tap the **Close** (X) button of the Carrier Setting screen, the above list appears with constellation information for each carrier. If you select NR carrier, you can select to view either PBCH or PBCH DM-RS under the constellation information.

Route map

NSA route map traces the power level of the NR signal's beam and the power level of the strongest LTE signal in terms of RSRP and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The setup menus for NSA route map are available in the screen with two categories: general setting and carrier setting. For Map Configuration, you need to tap Menu icon on the side bar.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the **Cancel** or **Apply** button when **Display** pop-up window appears.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap **Plot Point** and select **GPS** or **Position** or **Time**.

   a To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
   With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.\

   b To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.(If you tap the **Start** button ( ) on the right panel of the map, the Undo icon appears).

5 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **SINR** or **SNR**.

6 Tap **Configuration** to continue with carrier setting or general setting.

General setting

1 Tap **General Setting** on the screen.

2 To set the reference level, tap the number under NR or LTE and input the reference level using the on-screen keyboard.

3 Tap to switch the **Sweep Speed** between **Fast** and **Normal**.

   a **Fast**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS Power, S-SS Power for one signal with the strongest RSRP for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for one signal with the strongest S-SS RSRP for NR carrier.

   b **Normal**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS Power, S-SS Power for six signals with top-down order based on the strongest RSRP signal for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for eight signals with top-down order based on the strongest S-SS RSRP signal for NR carrier.

4 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

   a **Internal**: when starting a signal processing using the internal reference clock and creating a trigger.

   b **External**: when starting a signal processing based on the external input trigger

   c **GPS**: When synchronizing the signal processing via the GPS receiver.

5 Tap to switch **Sorting Type** to set **PCI** or **RSRP** as required.

Carrier setting

1 Tap the number to switch the carrier on or off for **NR** or **LTE** in the **Carrier Configuration** box. You can select up to 8 carriers.

2 If you select NR, do the following steps:

   a Tap the **Center Frequency** box and input the value using the on-screen keyboard.

   ▪ If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:

   - Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
   - Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
   - Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
   - Tap the **Delete** icon to deleted the selected list(s).

- Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

	NOTE You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray.

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap the **Bandwidth/SSB SCS** box and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)
< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (62.5 μs)

i Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table, **h**.

j Tap the **SSB Period** box and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, or **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

k Tap the **Auto Search** box and select the options from **Auto Preamp/Atten** or **Manual**.
Auto Preamp/Atten to set preamp and attenuation automatically or Manual for user-defined settings.

l Tap the **Start** button in **Auto Search** box to search SCS, type, and the number of SSB automatically or the **Stop** button to set the SSB period based on the base station.
Once the **Start** button is tapped, the progress bar appears.

m Tap the **SSB Frequency** button and input the required value using the on-screen keyboard.

n Tap the **GSCN** box and input the required value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB Frequency, Sync Raster Offset, and Sync SCS Offset are automatically changed.

o Tap **Sync Raster Offset** box to manually set the required value using the on-screen keyboard.

p Tap **Sync SCS Offset** box to manually set the required value using the on-screen keyboard.

3 If you select LTE, do the following step:

a Tap the **Center Frequency** box input the value using the on-screen keyboard.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray).

g Tap to switch the **LTE Mode** box to **TDD** or **FDD**.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 5** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the GPS point cannot be plotted.

5 If you start test and select **Menu** > **Map** > **Plot Point** > **Position**, you can undo by tapping the **Testing** button.

6 If you select **Stop** button, **Plot Stop** popup window appears and tap **Yes**.

7 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is . `gomv`.

2 If **Power** is selected, you can view the selected carrier(s)'s power related parameters based on the **Plot Item** parameter (RSRP, RSRQ, SINR, or SNR) that you have selected.

3 If the **PCI** is set to **Auto**, the point on the map appears with a color representing the highest **S-SS-RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

4 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

5 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

6 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

> **NOTE:**
> When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. Only if you set the Plot Item to RSRP, you can manually input the max and min power using the on-screen keyboard in the right side of the screen indicating Scale. For other cases, the max power and min power are fixed and you can not edit it. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color	
0	0	255		Poor
0	32	255		
0	64	255		
0	128	255		
0	255	255		
0	255	170		
0	255	85		
0	255	0		
85	255	0		
170	255	0		
255	255	0		
255	128	0		
255	64	0		
255	32	0		
255	0	0		Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

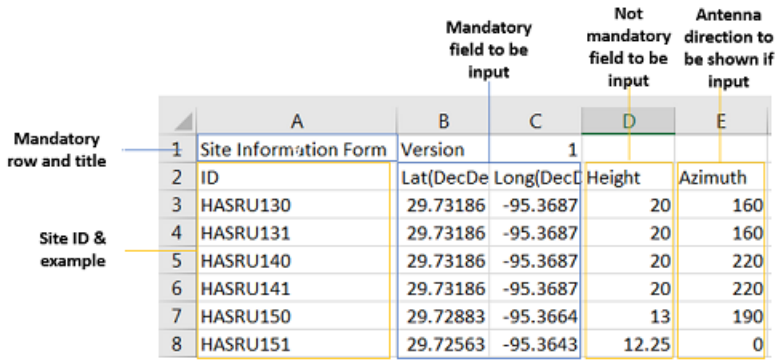
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

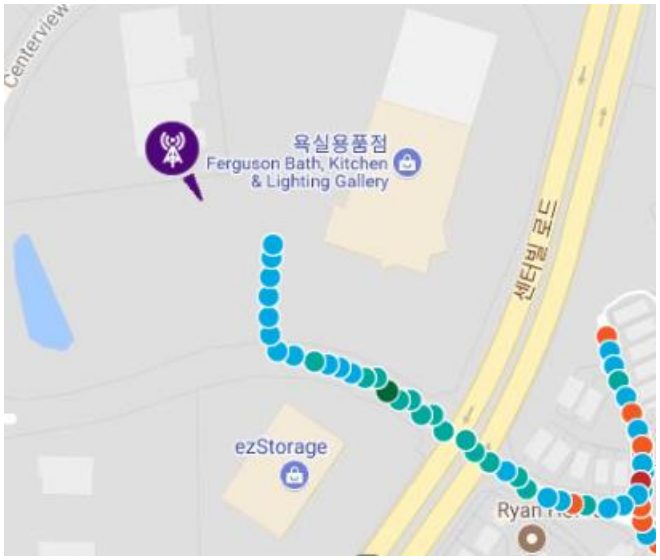
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

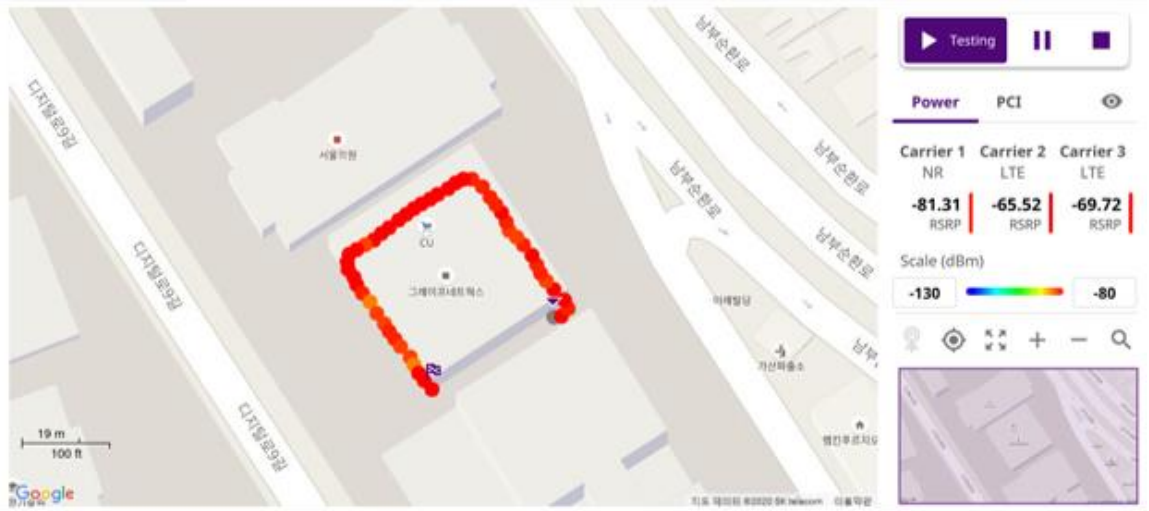
7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Route map measurement with site information screen

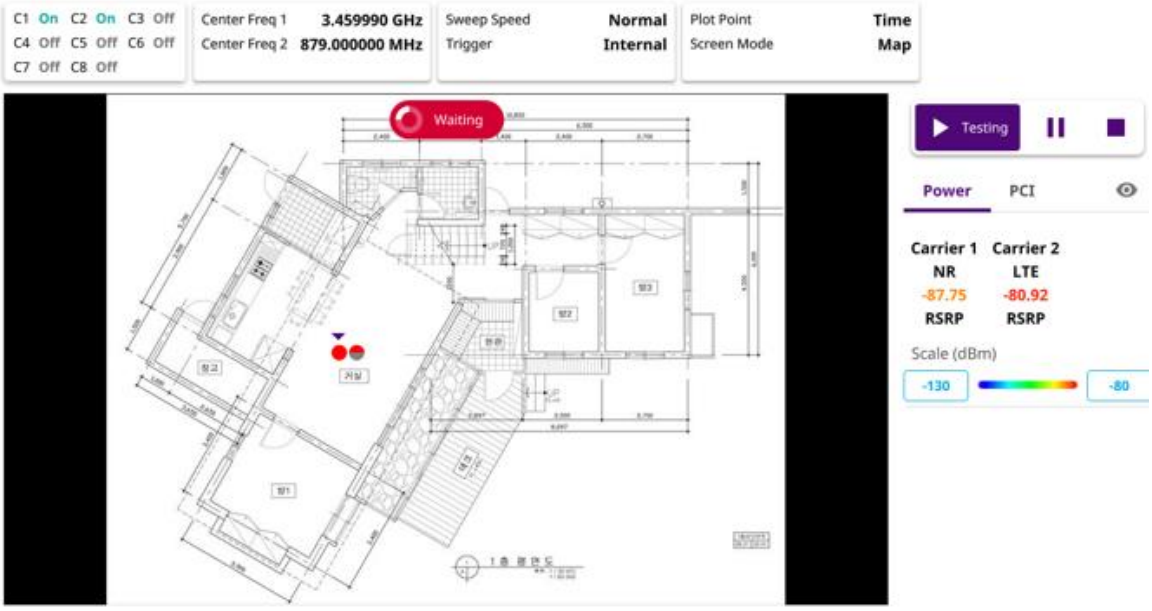


NOTE:
The purple icon indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

Route map measurement screen with 5G NSA Signal Analyzer



Route map measurement screen (Plot Point to Time) with 5G NSA Signal Analyzer



NOTE:
When you setup **Plot Point** to **Time** and tap the start/testing button, you can not touch the screen to active.
After the waiting indicator(Waiting) stops, the active indicator(00 Data) shows up.

Conducting online route map

Online NSA route map

Online NSA route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the NR signal's beam and the power level of the strongest LTE signal in terms of RSRP and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details. The setup menus for NSA route map are available in the screen with two categories: general setting and carrier setting. For Map Configuration, you need to tap Menu icon on the side bar.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Cancel** or **Apply** button when **Display** pop-up window appears.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **SINR**, **SNR**, or **PCI Dominance**.

5 Tap **Configuration** to continue with carrier setting or general setting.

General setting

1 Tap **General Setting** on the screen.

2 To set the reference level, tap the number under NR or LTE and input the reference level using the on-screen keyboard.

3 Tap to switch the **Sweep Speed** between **Fast** and **Normal**.

a **Fast**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS Power, S-SS Power for one signal with the strongest RSRP for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for one signal with the strongest S-SS RSRP for NR carrier.

b **Normal**: measuring PCI, RSRP, RSRQ, P-SS SNR, RS SINR, S-SS RSSI, P-SS Power, S-SS Power for six signals with top-down order based on the strongest RSRP signal for LTE carrier/ measuring PCI, SSB Index, S-SS RSRP, P-SS RSRP, P-SS SNR, S-SS SINR, S-SS RSRQ for eight signals with top-down order based on the strongest S-SS RSRP signal for NR carrier.

4 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

a **Internal**: when starting a signal processing using the internal reference clock and creating a trigger.

b **External**: when starting a signal processing based on the external input trigger

c **GPS**: When synchronizing the signal processing via the GPS receiver.

5 Tap to switch **Sorting Type** to set **PCI** or **RSRP** as required.

Carrier setting

1 Tap the number to switch the carrier on or off for **NR** or **LTE** in the **Carrier Configuration** box. You can select up to 8 carriers.

2 If you select NR, do the following steps:

a Tap the **Center Frequency** box and input the value using the on-screen keyboard.

- If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:

  - Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
  - Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
  - Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
  - Tap the **Delete** icon to deleted the selected list(s).
  - Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

	NOTE You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray.

g Tap to switch the **PCI** (**Physical Cell ID**) box to **Manual** (number) or **Auto**, and input a value in the number box from 0 to 1007 using the on-screen keyboard.

h Tap the **Bandwidth/SSB SCS** box and select the Setting in the pop-up window based on your need. SSB is abbreviation for Synchronization Signal Block or SS Block and it actually refers to Synchronization PBCH block since the synchronization signal and PBCH channel are packed as a single block that always moves together. SSB should be detected first in 5G NR frame.
The following table shows the setting criteria based on the operating frequency.

Operating Frequency	L	Case	SCS	Slots in a burst period (slot duration)

< 3 GHz (FR1) For case C, unpaired spectrum operation: < 1.88 GHz	4	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
3 to 6 GHz (FR1) For case C, unpaired spectrum operation: 1.88 GHz to 6 GHz	8	A {2,8} +14*n	15 kHz	5 (1 ms)
		B {4,8,16,20} +28*n	30 kHz	10 (0.5 ms)
		C {2,8} +14*n	30 kHz	10 (0.5 ms)
> 6 GHz (FR2)	64	D {4,8,16,20} +28*n	120 kHz	40 (0.125 ms)
		E {8,12,16,20,32,36,40,44} +56*n	240 kHz	80 (62.5 µs)

i Tap **L** to set the maximum number of SS-PBCH blocks within a single SS burst set (A set of SS being transmitted in 5 ms window of SS transmission) among **4**, **8** and **64**.
Refer to the selection criteria based on the table, **h**.

j Tap the **SSB Period** box and select the options from **5 ms**, **10 ms**, **20 ms**, **40 ms**, **80 ms**, or **160 ms**.
The SS burst period (SSB periodicity) is defined by each base station and network configurable. 20 ms is the default for the initial cell selection.

k Tap the **Auto Search** box and select the options from **Auto Preamp/Atten** or **Manual**.
Auto Preamp/Atten to set preamp and attenuation automatically or Manual for user-defined settings.

l Tap the **Start** button in **Auto Search** box to search SCS, type, and the number of SSB automatically or the **Stop** button to set the SSB period based on the base station.
Once the **Start** button is tapped, the progress bar appears.

m Tap the **SSB Frequency** button and input the required value using the on-screen keyboard.

n Tap the **GSCN** box and input the required value using the on-screen keyboard.
Based on the GSCN input frequency, the SSB Frequency, Sync Raster Offset, and Sync SCS Offset are automatically changed.

o Tap **Sync Raster Offset** box to manually set the required value using the on-screen keyboard.

p Tap **Sync SCS Offset** box to manually set the required value using the on-screen keyboard.

3 If you select LTE, do the following step:

a Tap the **Center Frequency** box input the value using the on-screen keyboard.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

e Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

f Tap to switch the **Preamp** box **1**, **2**, **DNC**, and **Auto** to **On** (green) or **Off** (gray).

g Tap to switch the **LTE Mode** box to **TDD** or **FDD**.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 5** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the GPS point cannot be plotted.

5 If you select **Stop** button, **Plot Stop** popup window appears and tap **Yes**.

6 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

NOTE:
If you go to Limit > PCI Dominance and set it, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold, the fail indicator (red) can be identified in the PCI column of the Information window and the top right corner of the instrument at the same time.

Viewing the logging data

1 Load the saved logging file using the **Load** icon( ) on the side bar. Make sure the file extension is `.orm` or`.orr`.

2 If **Power** is selected, you can view the selected carrier(s)'s power related parameters based on the **Plot Item** parameter (RSRP, RSRQ, SINR, or SNR) that you have selected.

3 If the **PCI** is set to **Auto**, the point on the map appears with a color representing the highest **S-SS-RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

4 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

5 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

6 Tap the **Apply** button.
The point color of the map changes to the corresponding SS-RSRP value, and if there is no detected Beam Index, the point will be hidden.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. Only if you set the Plot Item to RSRP, you can manually input the max and min power using the on-screen keyboard in the right side of the screen indicating Scale. For other cases, the max power and min power are fixed and you can not edit it. See below to check the plot point color based on the Legend Color Table.

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

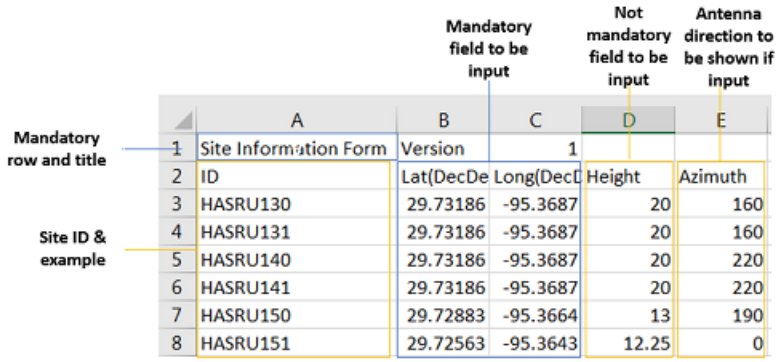
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (`*.csv`).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online NSA route map measurement

Using DSS Signal Analyzer

Introduction

VIAVI CellAdvisor 5G Dynamic Spectrum Sharing (DSS) Signal Analyzer provides technology that allows the deployment of both 4G LTE and 5G NR in the same frequency band and dynamically allocates spectrum resources between the two technologies based on user demand.

- RF Analysis
  - Spectrum
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - ACLR
  - Multi-ACLR
  - Spurious Emissions
- OTA Analysis
  - OTA Channel Scanner
  - OTA ID Scanner
  - OTA Multipath Profile
  - OTA Control Channel
  - OTA Route Map
  - Freq/Time/Power Variation
  - Power vs Time (Frame)
  - Power vs Time (Slot)
- Signal Analysis
  - Constellation
  - Channel Mapper
  - Control Channel
  - Subframe
  - Frame
  - Time Alignment Error
- Online Route Map Analysis
  - Online OTA Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **DSS Signal Analyzer** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

RF Analysis > Spectrum, **Channel Power**, **Occupied Bandwidth**, **Spectrum Emission Mask**, **ACLR**, **Multi- ACLR**, or **Spurious Emissions**

OTA Analysis > **OTA Channel Scanner**, **OTA ID Scanner**, **OTA Multipath Profile**, **OTA Control Channel**, **OTA Route Map**, **Freq/Time/Power Variation**, **Power vs Time (Frame)**, or **Power vs Time (Slot)**

Signal Analysis > **Constellation**, **Channel Mapper**, **Control Channel**, **Subframe**, **Frame**, or **Time Alignment Error**

Online Route Map Analysis > **Online Route Map**

Conducting RF measurements

Spectrum

Setting measure setup

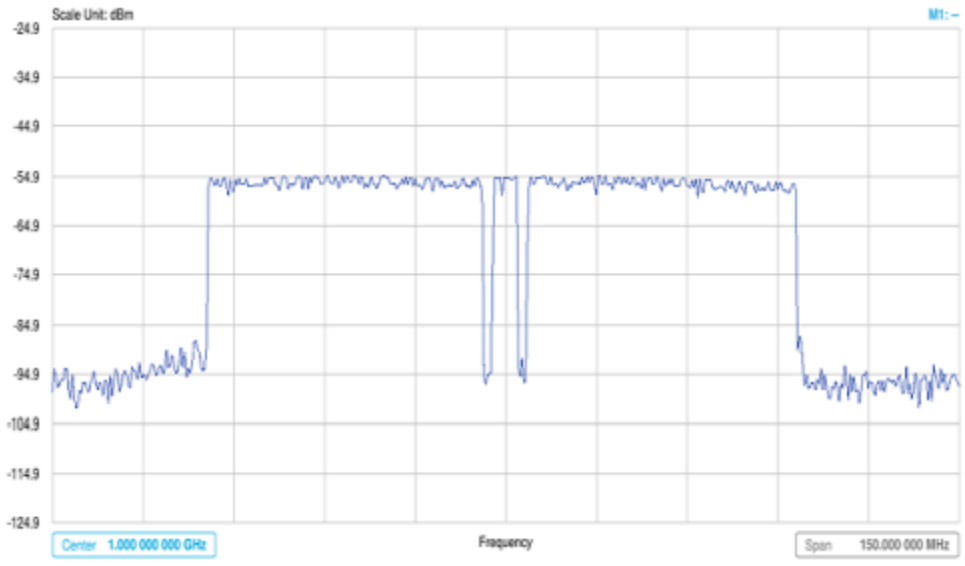
After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

Spectrum measurement with DSS Analyzer



Channel Power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting limit

1 Tap the **Menu** > **Limit** on the side bar.

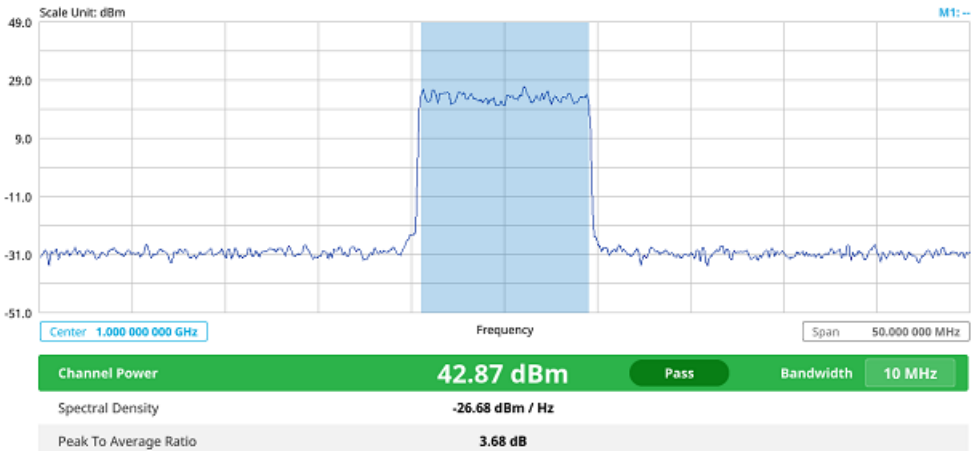
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication. The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Channel power measurement with DSS Analyzer



Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

Occupied bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting Limit

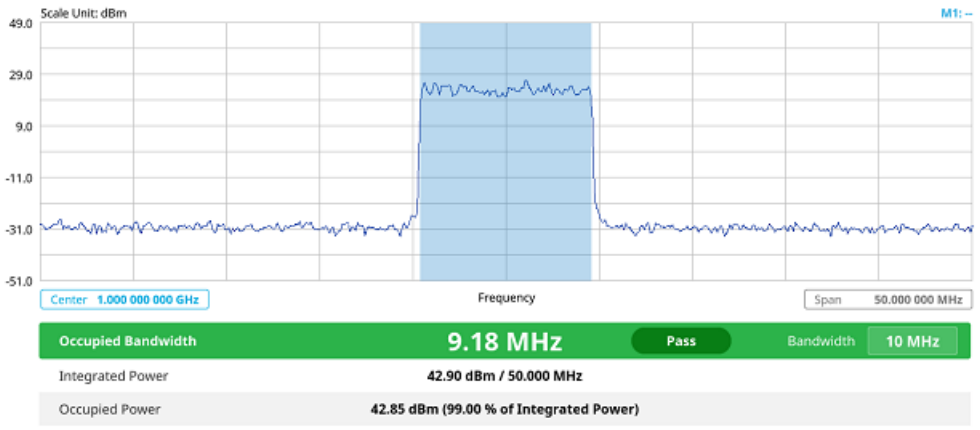
1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Occupied bandwidth with DSS Analyzer



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Spectrum emission mask

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Mask Type** and select from the following options: **Wide Area BS A**, **Wide Area BS B**, **Local Area BS**, or **Home BS**.
The category is defined with base station type. Set Wide Area BS A/B for macro cell, Local Area Base Station for pico cell, and Home Base Station for femtocell.

5 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard.
The input value range is from 1 to 100.

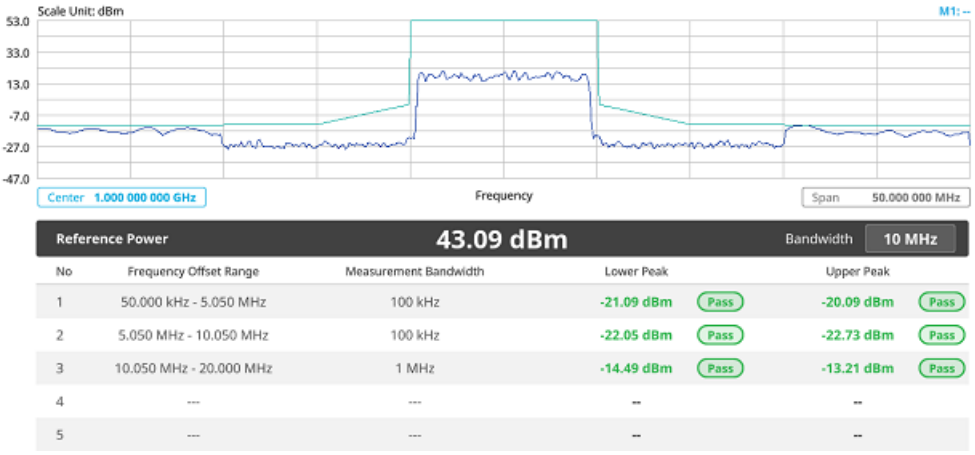
Setting Limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Spectrum emission mask measurement with DSS Analyzer



If Lower Peak or Upper Peak indicate Fail, the mask line becomes red.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP WCDMA specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

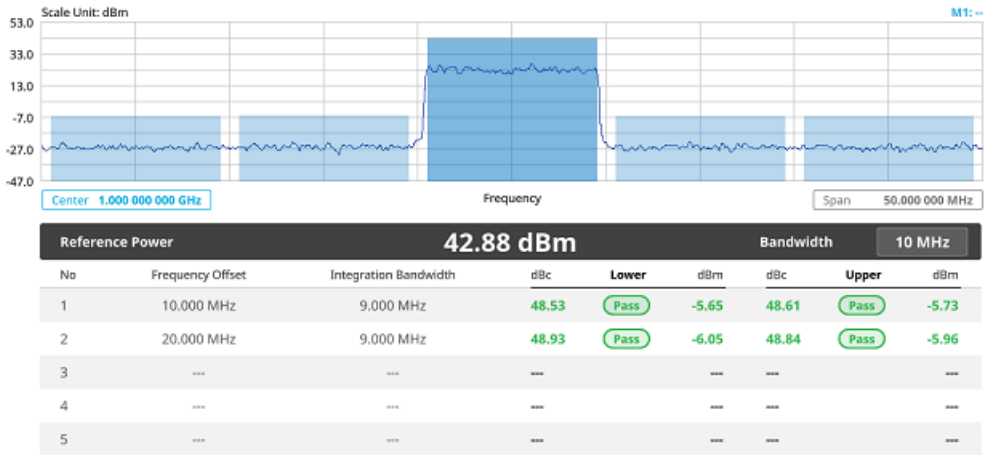
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

ACLR measurement with 5G DSS Analyzer



Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

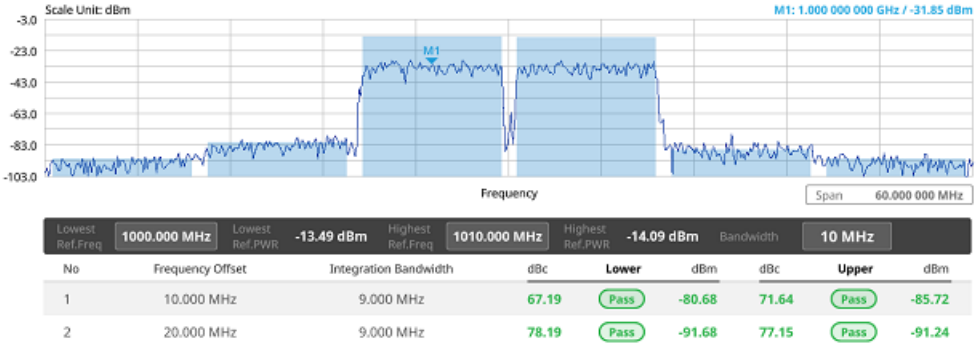
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-ACLR measurement with DSS Analyzer



No	Frequency Offset	Integration Bandwidth	dBc	Lower	dBm	dBc	Upper	dBm
1	10.000 MHz	9.000 MHz	67.19	Pass	-80.68	71.64	Pass	-85.72
2	20.000 MHz	9.000 MHz	78.19	Pass	-91.68	77.15	Pass	-91.24

NOTE
You can set the Lowest Ref. Frequency and Highest Ref. Frequency by tapping the rectangle with value using the on-screen keyboard.

Spurious emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The frequency setting is not used in the Spurious Emissions mode. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

3 Tap to switch **Measure Type** to **Full** or **Examine**.

- **Full** lets the instrument automatically changes the selected range from one another.
- **Examine** displays only the selected range.

4 Tap **Configuration** to set up the range table and parameters as below.

Range	Start Frequency	Stop Frequency	Start Limit	Stop Limit	Attenuation	RBW	VBW
1	100.000000 kHz	150.000000 kHz	-13.00 dBm	-13.00 dBm	20 dB	1 kHz	1 kHz

a Select **Range** from 1 to 20 and switch each to **On** to display the selected range in the result table or **Off** to hide it from the table.

b Select **Start Frequency** to specify the start frequency for the selected range using the on-screen keyboard.

c Select **Stop Frequency** to specify the stop frequency for the selected range using the on-screen keyboard.

d Select **Start Limit** and **Stop Limit** to specify the upper limit for Pass/Fail indication using the on-screen keyboard. You can set the threshold line by setting the start/stop limit.

e Select **Attenuation** and specify a value in the multiple of five using the on-screen keyboard.

f Select **RBW** to specify a RBW value using the on-screen keyboard.

g Select **VBW** to specify a VBW value using the on-screen keyboard.

5 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

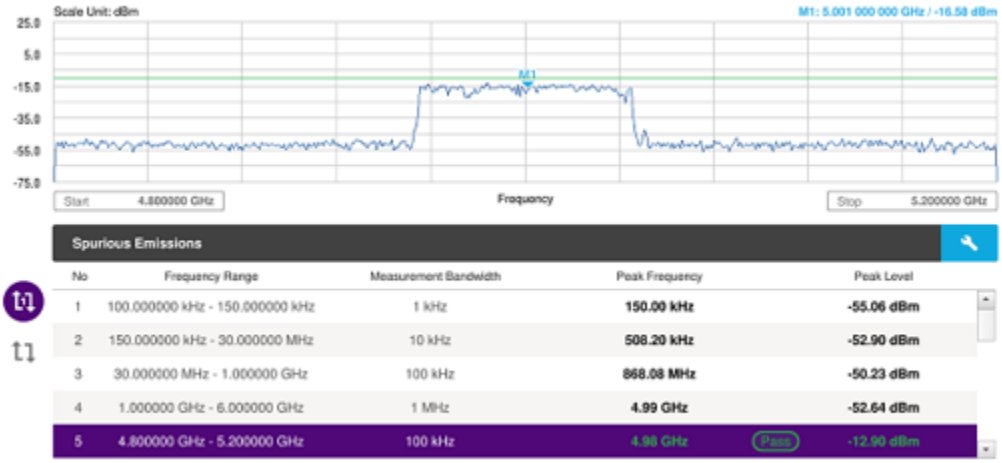
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Spurious emissions measurement with DSS Analyzer



NOTE:
You can only set the frequency range and attenuation by tapping the Configuration icon. If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

Conducting OTA measurements

OTA channel scanner

The Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4**.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

3 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

4 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

5 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

6 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

7 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

General setting

You can configure trigger setting in the general setting section.

1 Tap the **Configuration** icon in the detected list table or **Setup** > **Configuration**.

2 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

- **Internal**: when starting a signal processing using the internal reference clock and creating a trigger

- **External**: when starting a signal processing based on the external input trigger
- **GPS**: When synchronizing the signal processing via the GPS receiver

Carrier setting

You can configure up to three carriers in the carrier setting section.

1 Tap the **Index** box. You can select up to 3 carriers.

2 Select the carrier number from 1 to 3 and set the following:

a Tap the **Center Frequency** box and input the value using the on-screen keyboard.

- If you apply **Center Frequency**, **Channel No**, **Bandwidth**, **SSB Frequency**, **SCS**, **GSCN**, and **Periodicity** all at once, tap the **Center Frequency List** ( ) icon and do the following:
  - Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
  - Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
  - Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
  - Tap the **Delete** icon to deleted the selected list(s).
  - Tap the **Toothed Wheel** ( ) icon to load the applied parameters based on the center frequency input values. You need to input the required center frequency in the Setting table in advance.

NOTE
You will be able to multi-select the added items and apply them all at once only if the carrier number is On. If the carrier 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

NOTE
If you input the center frequency, the instrument automatically searches SSB frequency and displays the searched NR frequency in the Detected List table.

b Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

c Tap the **Channel Number** box and input the value using the on-screen keyboard.

d Tap the **Bandwidth** box and input the value using the on-screen keyboard.

e Tap the **Add** button to add more carriers and set from **step a to d**.

f Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

g Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

h Tap to switch the **Preamp** box **1**,**2**, and **Auto** to **On** (green) or **Off** (gray).

i Tap to switch **SSB Auto Search** to **On** or **Off**.

j Tap **SSB frequency** and input the value using the on-screen keyboard.

k Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

l Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503. The **PCI** switches to **Manual**.

m Tap to switch **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007. The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manualto set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

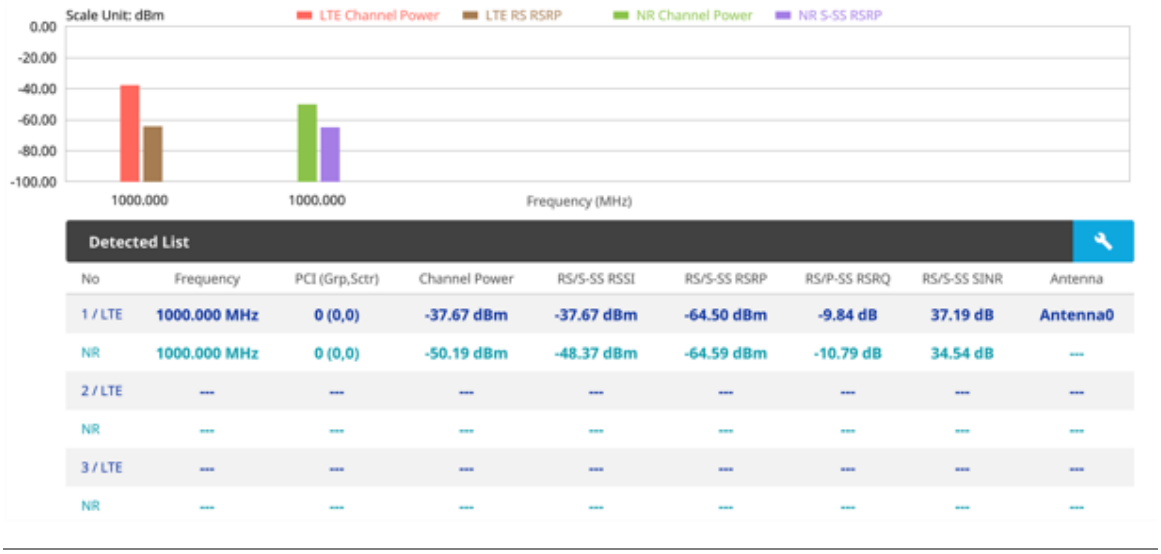
Setting Limit

1 Tap **Menu** > **Limit**.

2 Tap to select **Limit Line** to **on** or **off**.

3 Enter the **Limit Line** value using the on-screen keyboard as required once limit line is on.

OTA Channel Scanner measurement with DSS Analyzer



No	Frequency	PCI (Grp,Sctr)	Channel Power	RS/S-SS RSSI	RS/S-SS RSRP	RS/P-SS RSRQ	RS/S-SS SINR	Antenna
1 / LTE	1000.000 MHz	0 (0,0)	-37.67 dBm	-37.67 dBm	-64.50 dBm	-9.84 dB	37.19 dB	Antenna0
NR	1000.000 MHz	0 (0,0)	-50.19 dBm	-48.37 dBm	-64.59 dBm	-10.79 dB	34.54 dB	---
2 / LTE	---	---	---	---	---	---	---	---
NR	---	---	---	---	---	---	---	---
3 / LTE	---	---	---	---	---	---	---	---
NR	---	---	---	---	---	---	---	---

NOTE
OTA Channel Scanner displays LTE signal with RS channel and NR signal with SS channel during its transmission period.

OTA ID scanner

The LTE mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

The ID Scanner shows key parameters such as RSRP (Reference Signal Received Power) and RSRQ (Reference Signal Received Quality) that predict the downlink coverage quickly. RSRPs from entire cells help to rank between the different cells as input for handover and cell reselection decisions. RSRQ provides additional information when RSRP is not sufficient to make a reliable handover or cell reselection decision.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

> **NOTE**
> If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4**.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

5 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

6 Tap **SSB frequency** and input the value using the on-screen keyboard.

7 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

8 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

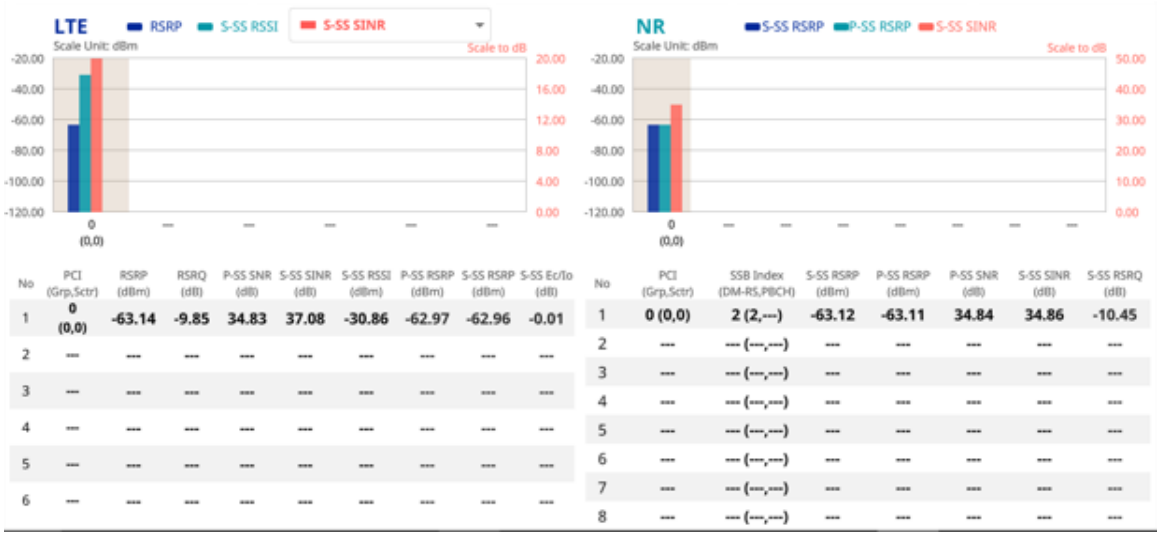
NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

9 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

10 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

11 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

OTA ID Scanner measurement with DSS Analyzer



No	PCI (Grp,Sctr)	RSRP (dBm)	RSRQ (dB)	P-SS SNR (dB)	S-SS SINR (dB)	S-SS RSSI (dBm)	P-SS RSRP (dBm)	S-SS RSRP (dBm)	S-SS Ec/Io (dB)
1	0 (0,0)	-63.14	-9.85	34.83	37.08	-30.86	-62.97	-62.96	-0.01
2	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---

No	PCI (Grp,Sctr)	SSB Index (DM-RS,PBCH)	S-SS RSRP (dBm)	P-SS RSRP (dBm)	P-SS SNR (dB)	S-SS SINR (dB)	S-SS RSRQ (dB)
1	0 (0,0)	2 (2,---)	-63.12	-63.11	34.84	34.86	-10.45
2	---	--- (---,---)	---	---	---	---	---
3	---	--- (---,---)	---	---	---	---	---
4	---	--- (---,---)	---	---	---	---	---
5	---	--- (---,---)	---	---	---	---	---
6	---	--- (---,---)	---	---	---	---	---
7	---	--- (---,---)	---	---	---	---	---
8	---	--- (---,---)	---	---	---	---	---

NOTE
OTA ID Scanner displays LTE signal with RS channel and NR signal with SS channel during its transmission period. You can select signals between RSRQ/ S-SS Ec/Io and S-SS SINR based on your need by tapping the down arrow button on the graph chart.

OTA multipath profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE

If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

5 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

6 Tap **SSB frequency** and input the value using the on-screen keyboard.

7 Tap **GSCN** and input the value from 2 to 26699 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

8 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

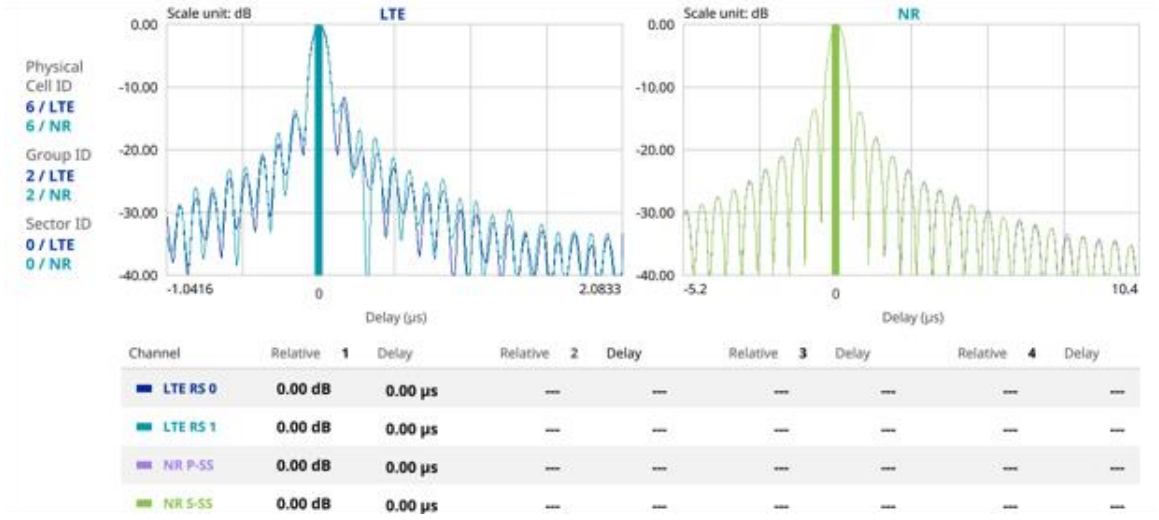
NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

9 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

10 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

11 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

OTA Multipath Profile measurement with DSS Analyzer



OTA control channel

DL RS power is the resource element power of Downlink Reference Symbol. The absolute DL RS power is indicated on the BCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the BCH and the DL RS power at the BS antenna connector.

The OTA Control Channel provides summary of all control channels including RS power trend over time. GPS coordinates (latitude and longitude) will be displayed on the screen if a GPS antenna is connected and locked to the GPS satellites.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

> **NOTE**
> If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

6 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

7 Tap **SSB frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

> **NOTE**
> Based on the GSCN input frequency, the SSB Frequency is automatically changed.

9 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE

You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

10 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

11 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

12 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

13 Tap **Menu** > **Display** and select **EVM** or **Power**.
The screen changes according to the selected options.

14 Tap **Menu** > **Display** and select **Reset** to refresh your measurement screen.
You can check the EVM Peak is changed at the right bottom of the measurement screen when you tap Reset.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap **NR Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Error vector magnitude of Primary Synchronization Signal	P-SS EVM	Test limits On/Off, High Limit
Error vector magnitude of Secondary Synchronization Signal	S-SS EVM	Test limits On/Off, High Limit

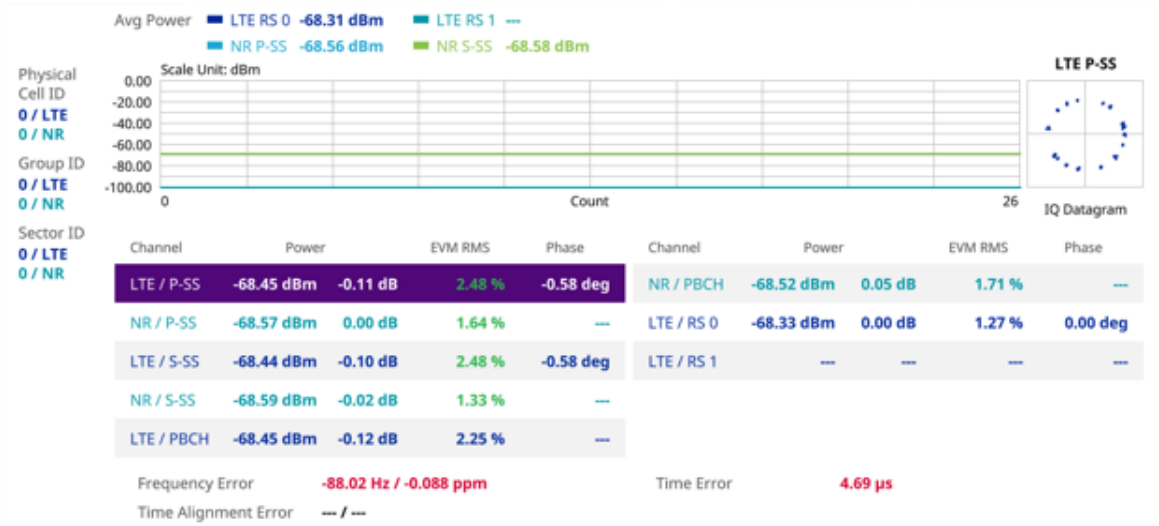
3 Tap **LTE Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Root Mean Square (RMS) average of the reference signal for data error vector magnitude	RS EVM	Test limits On/Off, High Limit
Error vector magnitude of Primary Synchronization Signal	P-SS EVM	Test limits On/Off, High Limit
Error vector magnitude of Secondary Synchronization Signal	S-SS EVM	Test limits On/Off, High Limit

Frequency error	Frequency Error	Test limits On/Off, High Limit/Low Limit
Time error	Time Error	Test limits On/Off, High Limit/Low Limit
Time alignment error	Time Alignment Error	Test limits On/Off, High Limit

4 *Optional.* Tap the **Save** icon on the side bar and select the save option from the choices available for your measurement mode.

OTA Control Channel measurement with DSS Signal Analyzer



OTA route map

OTA route map traces the power level of the NR signal's beam and the power level of the strongest LTE signal in terms of RSRP and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap **Map Config** to switch the **Plot Point** to **GPS** or **Position** or **Time**.

   a To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
   With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.

   b To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.(If you tap the **Testing** button ( ) on the right panel of the map, the Undo icon appears).

4 Tap to switch **Plot Item DSS** to **RSRP**, **RSRQ**, **SINR** or **SNR**.

5 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

	NOTE If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

6 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

   a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

   b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

7 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

8 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

9 Tap **SSB frequency** and input the value using the on-screen keyboard.

10 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

11 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

12 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3**.**1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

13 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

14 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 4** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** ( ) button to pause plotting, then the GPS point cannot be plotted.

5 If you start test and select **Menu** > **Map** > **Plot Point** > **Position**, you can undo by tapping the **Testing** button.

6 If you select the **Stop** button, the Plot Stop popup window appears and tap **Yes**.

7 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** ( ) icon on the side bar. Make sure the file extension is `.gomv`.

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **S-SS RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding S-SS RSRP value, and if there is no detected Beam Index, the point will be hidden.

NOTE:
When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for Excellent, and the minimum value is the Limit for Poor. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap **Menu** > **Limit**.

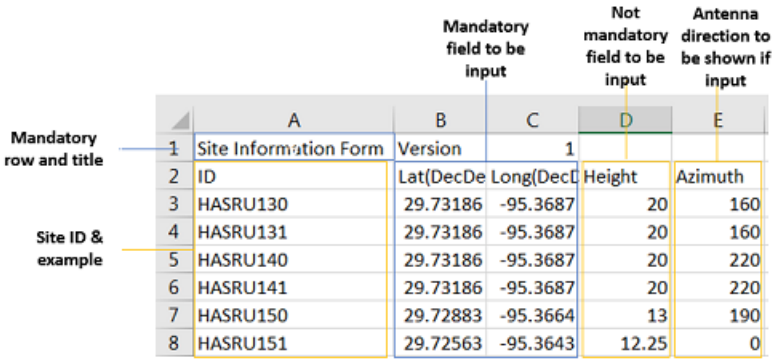
2 Tap **Excellent** and set a value using the on-screen keyboard.

3 Tap **Poor** and set a value using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

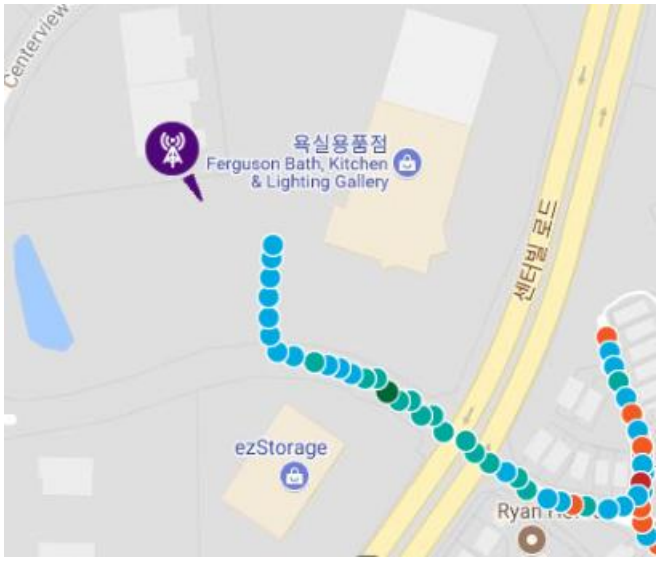
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) icon on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Route map measurement with site information screen



NOTE:
The purple icon indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

Route map measurement screen with DSS Signal Analyzer

NOTE:
If the Plot Point is set to Position, you can tap the estimated area by point. If you tap incorrectly, you can tap Undo icon on the map, and then it will delete the point you have tapped incorrectly.

Freq/Time/Power variation

Frequency, time, and power error variation shows the frequency , time, and power error trend based on the time elapsed.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE
If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

6 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

7 Tap **SSB frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

9 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

10 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

11 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

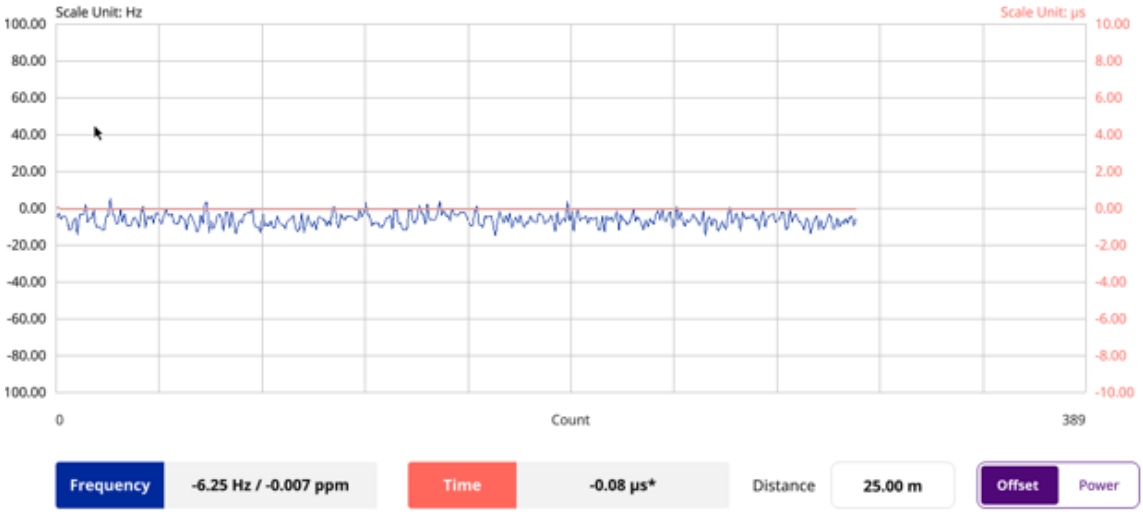
12 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

13 Tap **Menu** > **Display** and select **Reset** to refresh your measurement screen.

NOTE

If you want to set the reference level and scale, tap **Menu** > **Amp/Scal**e > **Reference**. You can set Reference Freq Error Offset, Scale Division (Freq Error), Reference Time Error Offset, Scale Division (Time Error), Reference Level, and Scale Division (Power) on demand using the on-screen keyboard. You can also select the unit on the keyboard.

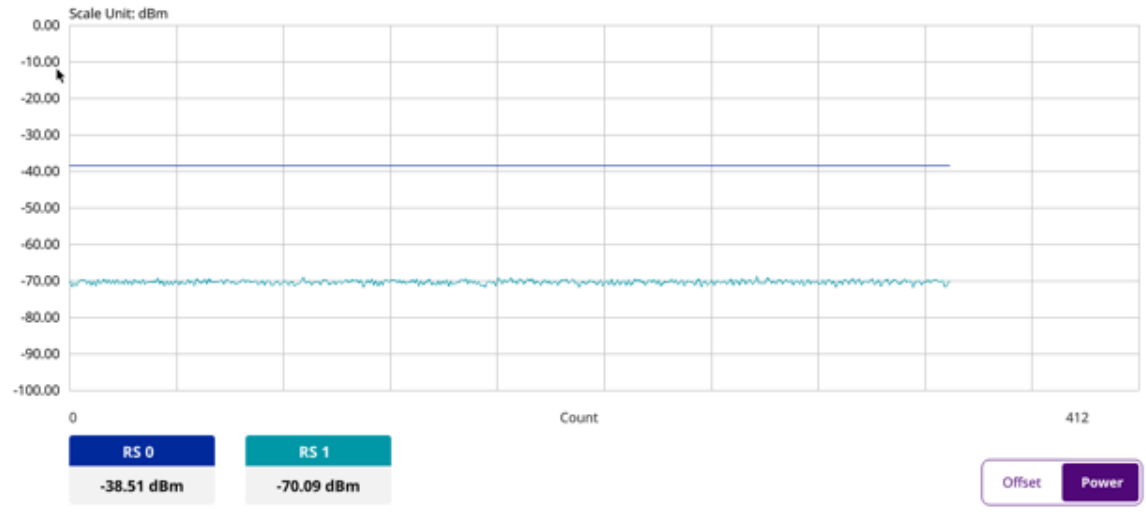
Frequency/Time/Power variation by offset with DSS Analyzer



NOTE:

You can tap the Distance box and input the value that you want to compensate for distance. When distance is entered, the time will show the value with distance correction. Make sure the default value for Distance is 0.

Frequency/Time/Power variation by power with DSS Analyzer



Power vs Time (Frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in a DSS signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Subframe Number** from 0 to 9.

5 Tap to switch **PCI (Physical Cell ID)** to **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the DSS signal automatically.
- **Manual** sets the specific Physical Cell ID for the DSS signal manually in order to speed up the synchronization with a BTS.

6 Tap **PCI** and input a value from 0 to 503 using the on-screen keyboard.
The **PCI** switches to **Manual**.

7 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.

8 Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

9 Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread

Setting limit

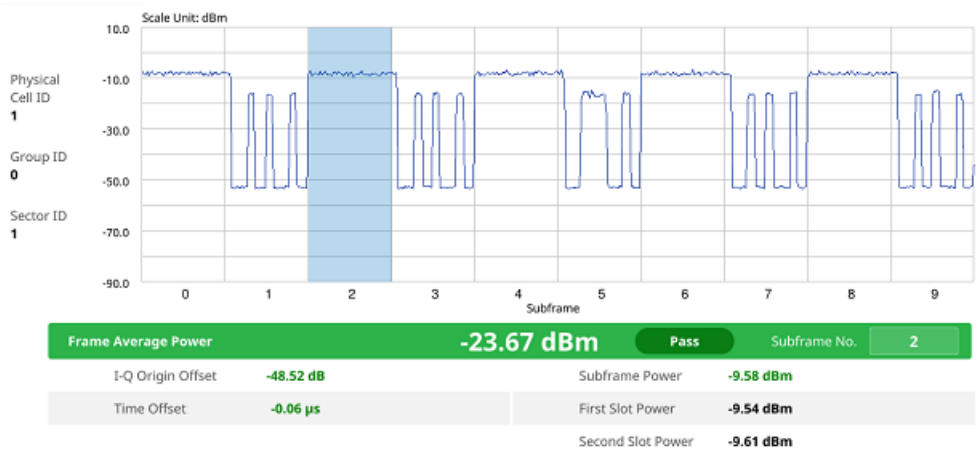
1 Tap **Menu** > **Limit**.

2 Tap the test items and set the limits depending on your selected measurement mode:

To set the limit for	Set
Subframe Power	Test limits On/Off, High Limit/Low Limit using the on-screen keyboard
Frame Average Power	Test limits On/Off, High Limit/Low Limit using the on-screen keyboard
Time Error	Test limits On/Off, High Limit/Low Limit using the on-screen keyboard
IQ Origin Offset	Test limits On/Off, High Limit using the on-screen keyboard

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Power vs Time (Frame) measurement with DSS Analyzer



Power vs Time (Slot)

The Power vs. Time (Slot) in DSS Signal Analyzer measures the modulation envelope in the time domain, showing the signal rise and fall shapes of DSS signal.

NOTE:
In this measurement, desirable level of the input power is lower than -10 dBm. If the input power to be measured is -10 dBm or higher, it is highly recommended that you use an external attenuator.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** from the following choices: **5 MHz**, **10 MHz**, **15 MHz**, or **20 MHz**.

3 Tap to switch **Signal Tech Type** to **TDD** or **FDD**.

4 Tap **Slot Number** from 0 to 19.

5 Tap to switch **PCI (Physical Cell ID)** to **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the DSS signal automatically.
- **Manual** sets the specific Physical Cell ID for the DSS signal manually in order to speed up the synchronization with a BTS.

6 Tap **PCI** and input a value from 0 to 503 using the on-screen keyboard.
The **PCI** switches to **Manual**.

7 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.

8 Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

9 Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios

- **Extended**: Intended for scenarios with particularly high delay spread

10 Tap **Delay** and input the value using the on-screen keyboard.
Delay setting is used only when there is a time offset in the signals to be measured.

Setting limit

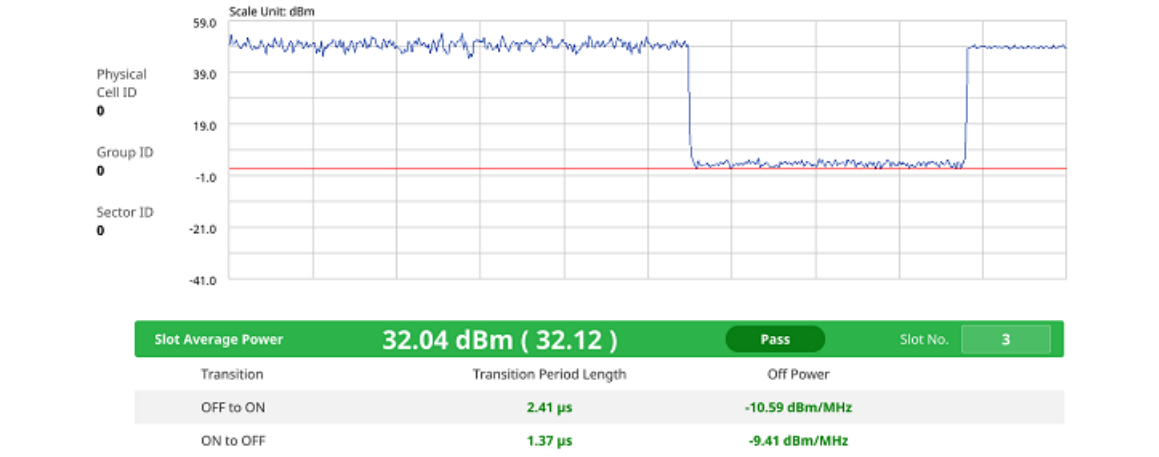
1 Tap **Menu** > **Limit**.

2 Tap the test items and set the limits depending on your selected measurement mode:

To set the limit for	Set
Slot Avg Power	Test limits On/Off, High Limit/Low Limit using the on-screen keyboard
Off Power	Test limits On/Off, High Limit using the on-screen keyboard
Transition Period	Test limits On/Off, High Limit using the on-screen keyboard

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Power vs Time (Slot) measurement with DSS Analyzer



NOTE
You can set the number of slot from 0 to 19 by tapping the Slot No. box using the on-screen keyboard.

Conducting signal measurements

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

> **NOTE**
> If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Subframe Number** from 0 to 9.

5 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

6 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

7 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

8 Tap **SSB Frequency** and input the value using the on-screen keyboard.

9 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

10 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

11 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

12 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

13 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

14 Tap **Menu** > **Display** and select **Reset** to refresh your measurement screen.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap **NR Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
Time error	Time Error	Test limits On/Off, High Limit/Low Limit

3 Tap **LTE Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit

PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit
DL RS power	DL RS power	Test limits On/Off, High Limit/Low Limit
Time error	Time Error	Test limits On/Off, High Limit/Low Limit

4 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Constellation measurement with DSS Analyzer

Channel mapper

CellAdvisor 5G DSS Channel mapper displays NR and LTE signal location based on sub carrier and symbol spacing with different colors within the resource block.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE
If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

6 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

7 Tap **SSB frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

9 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

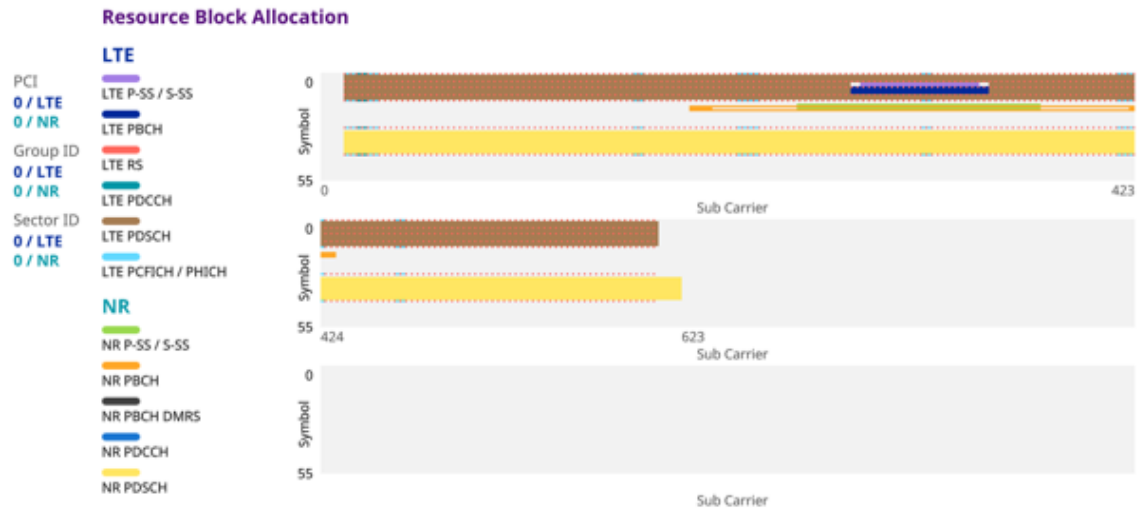
> **NOTE**
> You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

10 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

11 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

12 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Channel mapper measurement with DSS Analyzer



Control channel

The Control Channel measures the constellation for the specified control channel as well as modulation accuracy of the control channel at the specified subframe.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

> **NOTE**
> If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Subframe Number** from 0 to 9.

5 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

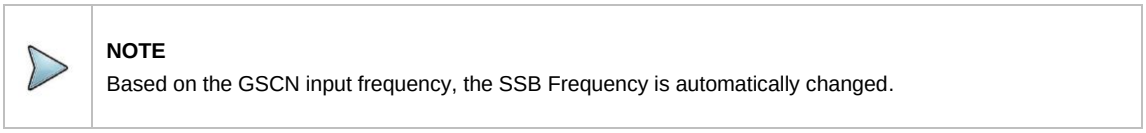
6 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

7 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

8 Tap **SSB frequency** and input the value using the on-screen keyboard.

9 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.



NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

10 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE

You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

11 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3.1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

12 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

13 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

14 Tap **EVM Detection Mode** to set **Combine** or **Single**.

- **Combine**: Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.
- **Single**: Testing on one single antenna connected to your CA5G series with a cable.

15 Tap **Menu** > **Display** and select **Reset** to refresh your measurement screen.
You can check the EVM Peak is changed at the right bottom of the measurement screen when you tap Reset.

Setting limit

1 Tap **Menu** > **Limit**.

2 If you want to set the NR limit, tap **NR Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
Primary Synchronization Signal for error vector magnitude	EVM PSS	Test limits On/Off, High Limit
Secondary Synchronization Signal for error vector magnitude	EVM SSS	Test limits On/Off, High Limit
Primary Synchronization Signal for power	Power PSS	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal for power	Power SSS	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel for power	Power PBCH	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Time error	Time Error	Test limits On/Off, High Limit/Low Limit

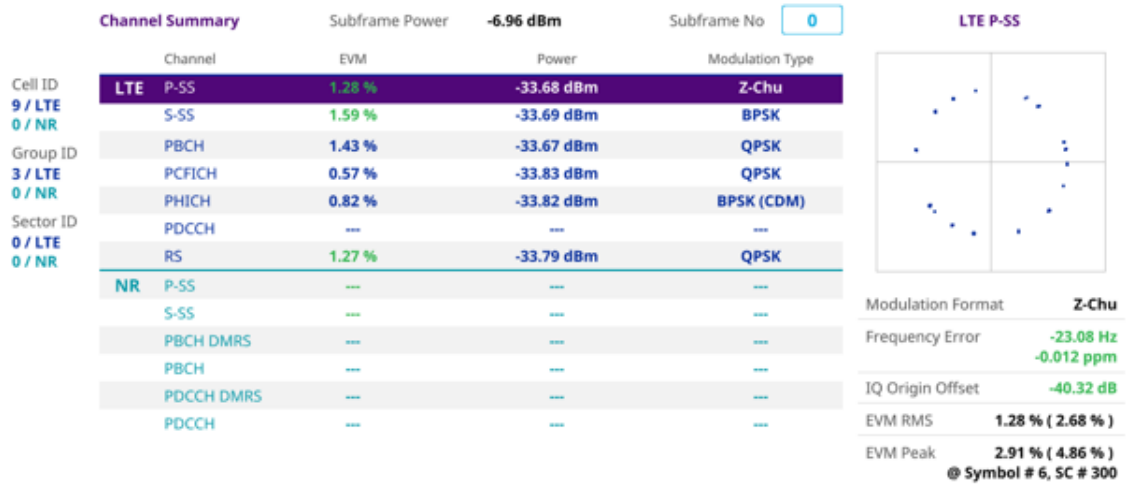
3 If you want to set the LTE limit, tap **LTE Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set

Frequency error	Frequency Error	Test limits On/Off, High Limit/Low Limit
Root Mean Square (RMS) average of the reference signal for data error vector magnitude	RS EVM	Test limits On/Off, High Limit
Error vector magnitude of Primary Synchronization Signal	P-SS EVM	Test limits On/Off, High Limit
Error vector magnitude of Secondary Synchronization Signal	S-SS EVM	Test limits On/Off, High Limit
Downlink Reference Signal Power	DL RS Power	Test limits On/Off, High Limit/Low Limit
Primary Synchronization Signal power	P-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal power	S-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel Power	PBCH Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Magnitude of the carrier feedthrough signal	IQ Origin Offset	Test limits On/Off, High Limit

4 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Control Channel measurement with DSS Analyzer



Subframe

The Subframe measures the modulation accuracy of all the data and control channels at the specified subframe (1 ms).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE
If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Subframe Number** from 0 to 9.

5 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

6 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

7 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

8 Tap **SSB frequency** and input the value using the on-screen keyboard.

9 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

10 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

11 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3**.**1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

12 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

13 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

14 Tap **EVM Detection Mode** to set **Combine** or **Single**.

- **Combine**: Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.
- **Single**: Testing on one single antenna connected to your CA5G series with a cable.

15 Tap **Menu** > **Display**.

a Select **Reset** to refresh your measurement screen.
You can check the EVM Peak is changed at the right bottom of the measurement screen when you tap Reset.

b Tap to switch **Chart** to **On** or **Off**.
You can check the Chart view when On is selected. You can check Channel Summary with Subframe in a table when Off is selected.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap **NR Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
Primary Synchronization Signal for error vector magnitude	P-SS EVM	Test limits On/Off, High Limit
Secondary Synchronization Signal for error vector magnitude	S-SS EVM	Test limits On/Off, High Limit
Primary Synchronization Signal for power	P-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal for power	S-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel for power	PBCH Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Time error	Time Error	Test limits On/Off, High Limit/Low Limit

3 Tap **LTE Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit

PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit
Root Mean Square (RMS) average of the reference signal for data error vector magnitude	RS EVM	Test limits On/Off, High Limit
Error vector magnitude of Primary Synchronization Signal	P-SS EVM	Test limits On/Off, High Limit
Error vector magnitude of Secondary Synchronization Signal	S-SS EVM	Test limits On/Off, High Limit
Downlink Reference Signal Power	DL RS Power	Test limits On/Off, High Limit/Low Limit
Primary Synchronization Signal power	P-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal power	S-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel Power	PBCH Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Subframe Power	Subframe Power	Test limits On/Off, High Limit/Low Limit
OFDM Symbol Power	OFDM Symbol Power	Test limits On/Off, High Limit/Low Limit
Time error	Time Error	Test limits On/Off, High Limit/Low Limit

4 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Using Marker

If you tap the **Chart** to **On** under **Display Menu**, you can use **Marker** to place a marker at a specific symbol.

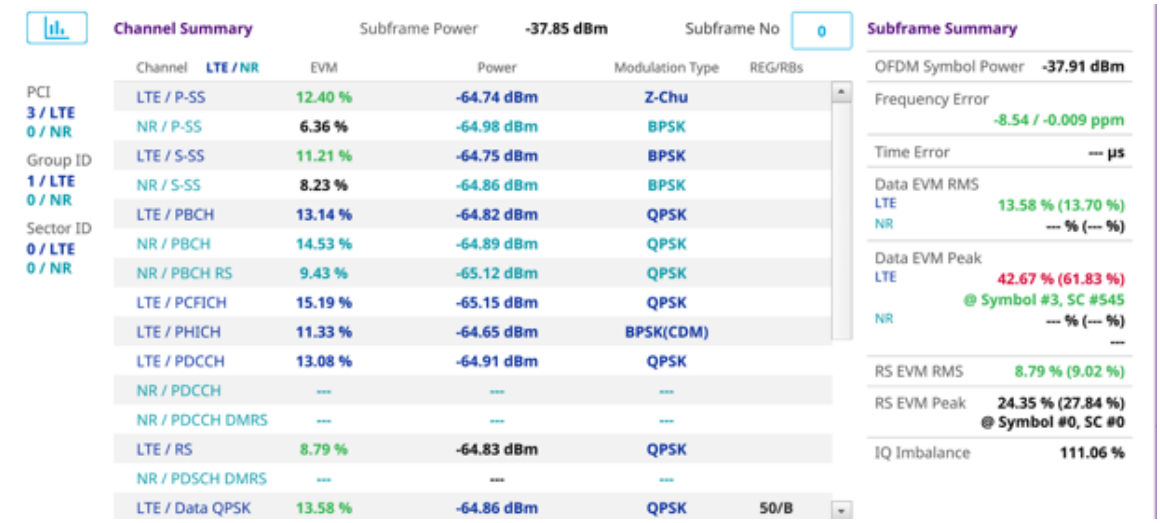
1 Tap **Menu** > **Marker**.

2 Tap **Marker View** between **On** and **Off** to display or dismiss the marker on the chart.

3 Tap **Symbol** to select the symbol number to which the marker is placed.

4 Enter the value using the on-screen keyboard and tap the **Apply** button.

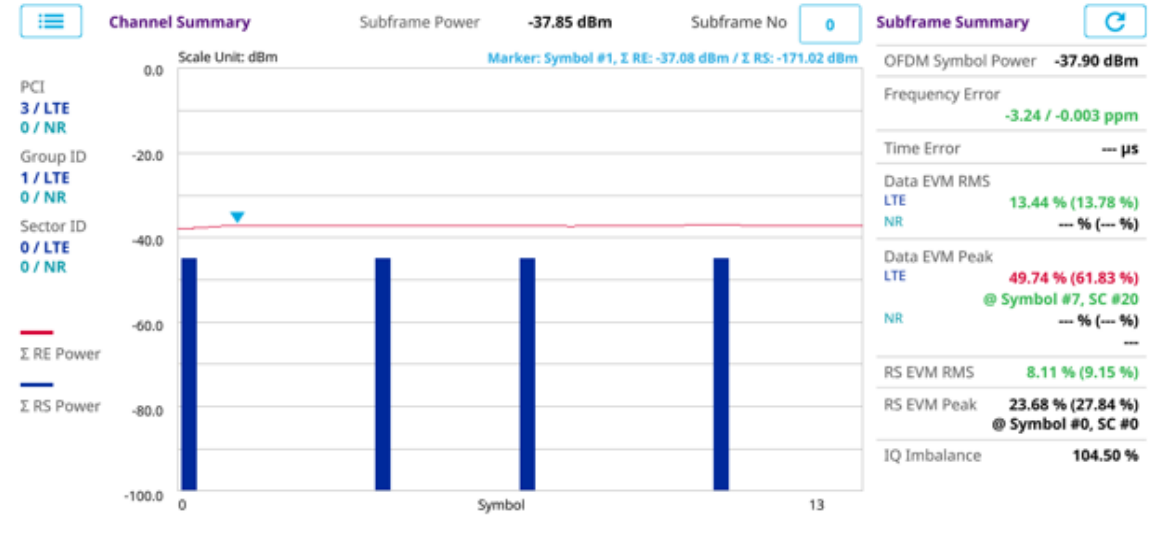
Subframe measurement with DSS Analyzer



NOTE

You can directly set Subframe number from 0 to 9 by tapping the Number box next to Sumbframe No. If you enter subframe number 1, you will see NR data. Right before the Channel Summary, you can tap the Chart icon to see the result in a chart view.

Subframe measurement with DSS Analyzer (bar chart)



NOTE
You can tap the Reset button next to Subframe Summary on the right side of the screen to refresh the measurement result screen.

Frame

The Frame measures the modulation accuracy of all the data and control channels at the frame (10 ms).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE
If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

6 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

7 Tap **SSB frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

9 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

10 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3**.**1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

11 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

12 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

13 Tap **EVM Detection Mode** to set **Combine** or **Single**.

- **Combine**: Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.
- **Single**: Testing on one single antenna connected to your CA5G series with a cable.

14 Tap to switch **Select Half Block** to **Second** or **First**.
If you set First, it will show the average value of Subframe 1 to 4 and Second it will show the average value of subframe 5 to 9.

15 Tap **Menu** > **Display** and select **Reset** to refresh your measurement screen.
You can check the EVM Peak is changed at the right bottom of the measurement screen when you tap Reset.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap **NR Limit** and set the limits depending on your selected measurement mode:

To set the limit for	Select	Set
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)

RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
Primary Synchronization Signal for error vector magnitude	P-SS EVM	Test limits On/Off, High Limit
Secondary Synchronization Signal for error vector magnitude	S-SS EVM	Test limits On/Off, High Limit
Primary Synchronization Signal for power	P-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal for power	S-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel for power	PBCH Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.

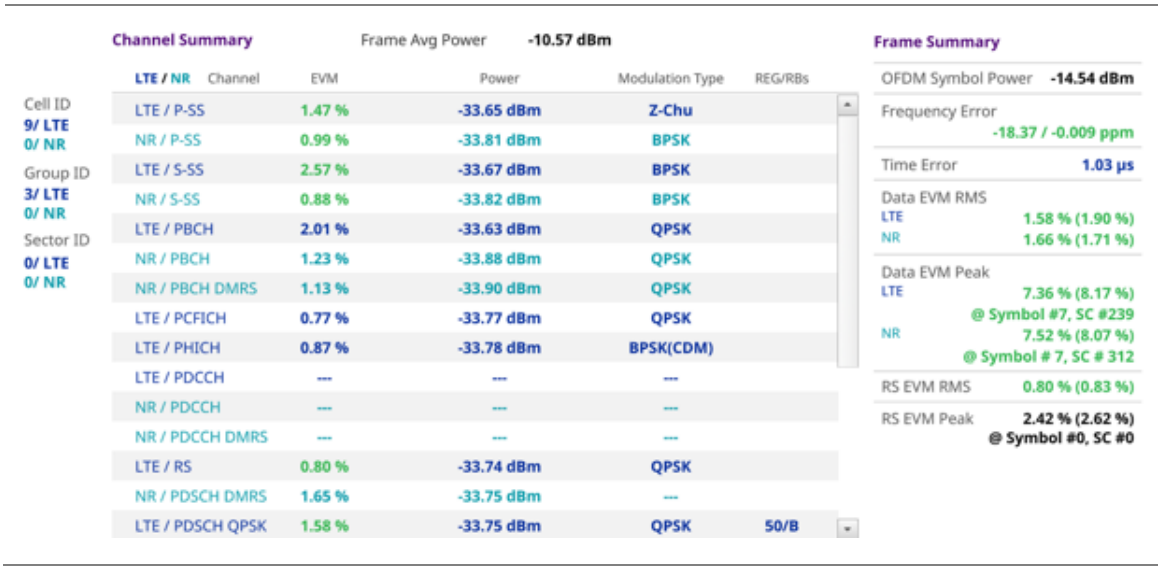
3 Tap **LTE Limit** and set the limits depending on your selected measurement mode:

To set the limit for	**Select**	**Set**
Frequency error	Frequency error	Test limits On/Off, High Limit/Low Limit
PDSCH for data error vector magnitude	PDSCH EVM	Test limits On/Off, High Limit (QPSK), High Limit (16QAM), High Limit (64QAM), High Limit (256QAM)
RMS for data error vector magnitude	Data EVM RMS	Test limits On/Off, High Limit
Peak for data error vector magnitude	Data EVM Peak	Test limits On/Off, High Limit
Root Mean Square (RMS) average of the reference signal for data error vector magnitude	RS EVM	Test limits On/Off, High Limit
Error vector magnitude of Primary Synchronization Signal	P-SS EVM	Test limits On/Off, High Limit

Error vector magnitude of Secondary Synchronization Signal	S-SS EVM	Test limits On/Off, High Limit
Downlink Reference Signal Power	DL RS Power	Test limits On/Off, High Limit/Low Limit
Primary Synchronization Signal power	P-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Secondary Synchronization Signal power	S-SS Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Physical Broadcast Channel Power	PBCH Power	Test limits On/Off, High Limit/Low Limit Note that based on the **Reference Mode** you have chosen from **Menu** > **Reference Mode** between **Absolute** and **Relative**, you can set the first high/low limit when you chose absolute, and second high/low limit when you chose relative.
Frame Average Power	Frame Avg Power	Test limits On/Off, High Limit/Low Limit
OFDM Symbol Power	OFDM Symbol Power	Test limits On/Off, High Limit/Low Limit
Magnitude of the carrier feedthrough signal	IQ Origin Offset	Test limits On/Off, High Limit

4 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Frame measurement with DSS Analyzer



Time alignment error

In eNode-B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

> **NOTE**
> If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

3 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

4 Tap **Antenna Port** to assign an antenna port number automatically or manually, and select from **Auto**, **Antenna 0**, or **Antenna 1**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

5 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.

- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

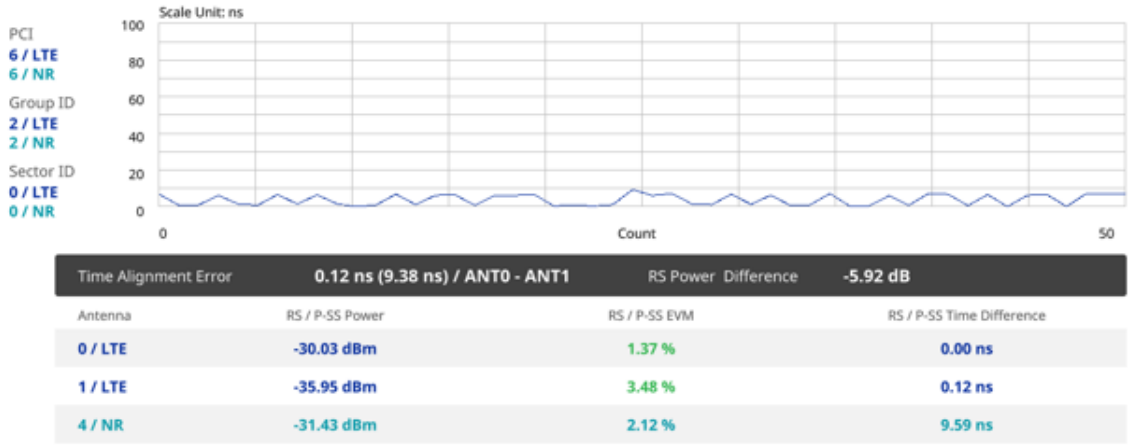
6 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

7 Tap **SSB frequency** and input the value using the on-screen keyboard.

8 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

Time Alignment Error measurement with DSS Analyzer



Conducting online route map

Online OTA route map

DSS online OTA route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the NR signal's beam and the power level of the strongest LTE signal in terms of RSRP and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **Plot Item DSS** to **RSRP**, **RSRQ**, **SINR** or **SNR**.

4 Tap **Carrier Auto Search** to **Start** to start searching the SSB frequency and apply it or to **Stop** to stop searching.

NOTE

If searching is unavailable, the instrument displays a pop-up message saying that it fails to detect NR (SSB) frequency.

5 Tap to switch **Radio Config** and set **Duplex Type** (FDD/TDD), **DSS Type** (Co-channel/Adjacent channel), and **Technology** (LTE/NR) and other related parameters as below:
You can select Co-channel to find NR frequency based on the LTE operating frequency in co-channel and select Adjacent channel to search both LTE and NR frequency. Note that Adjacent channel will be available in the next release.

When **LTE** is selected as **Technology**, do the following steps:

a Select **Bandwidth** (MHz) from the following choices: **20**, **15**, **10**, or **5**.

b Select **MIMO** between **2x2** and **4x4** to set the number of antenna ports.

c Select **Cyclic Prefix** between **Normal** and **Extended**.
Cyclic prefix works as a buffer region or guard interval to protect the OFDM signals from inter symbol interference.

- **Normal**: Intended to be sufficient for the majority of scenarios
- **Extended**: Intended for scenarios with particularly high delay spread.

d Select **PHICH Ng** between **Normal** and **Extended** and then to set the number of PHICH groups (Ng) : **1/6**, **1/2**, **1**, or **2**.
The PHICH group value/Ng is decided based on the number of PHICH groups per subframe. PHICH duration is a higher layer parameter configured either as Normal or Extended that says the demodulator how many symbols per subframe are used by PHICH.

- **Normal**: There are 8 PHICH sequences in one PHICH group (4 symbols).
- **Extended**: There are 4 PHICH sequences in one PHICH group (2 symbols).

When **NR** is selected as **Technology**, do the following steps:

a Select **Sub-Carrier Spacing** as **15 kHz (Case A)**.
The standard for NR SCS is 15 kHz and CellAdvisor 5G supports 15 kHz of sub-carrier spacing.

6 Tap to switch **CFI** to **Manual or Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by 0, 2, 3 or 4 in 1.4 MHz bandwidth and 1, 2 or 3 in other bandwidths.

7 Tap **CFI** and input a value from 1 to 3 as desired using the on-screen keyboard.

8 Tap **SSB frequency** and input the value using the on-screen keyboard.

9 Tap **GSCN** and input the value from 2 to 26639 using the on-screen keyboard.
If you need to search SSB based on ARFCN raster, it would take too long time since ARFCN raster is very narrow. Therefore, it is recommended that you define a SSB searching frequency in wider steps. This is the usage/purpose of GSCN. You can search the frequency corresponding to GSCN in maximum 100 MHz bandwidth of ARFCN that CellAdvisor 5G supports.

NOTE
Based on the GSCN input frequency, the SSB Frequency is automatically changed.

10 Tap **PCI** (**Physical Cell ID**) and select between **LTE PCI** and **NR PCI**.

a Tap to switch **LTE PCI Mode** to **Manual** or **Auto** and input a value from 0 to 503.
The **PCI** switches to **Manual**.

b Tap **NR PCI Mode** to **Manual** or **Auto** and input a value from 0 to 1007.
The **PCI** switches to **Manual**.

NOTE
You can set Auto to let the instrument detect the Physical Cell ID for the LTE/NR signal automatically and Manual to set the specific Physical Cell ID for the LTE/NR signal manually in order to speed up the synchronization with a BTS.

11 Tap **PDSCH**, and then select the PDSCH modulation type option: **Auto**, **QPSK**, **16 QAM**, **64 QAM**, **256 QAM**, **LTE E-TM3.3**, **LTE E-TM3.2**, **LTE E-TM3**.**1a**, **LTE E-TM3.1**, **LTE E-TM2a**, **LTE E-TM2**, **LTE E-TM1.2** or **LTE E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

12 Tap **PDSCH Threshold** to set the threshold for PDSCH and enter a value by using the on-screen keyboard.

13 Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 4** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** ( ) button to pause plotting, then the GPS point cannot be plotted.

5 If you select the **Stop** button, the Plot Stop popup window appears and tap **Yes**.

6 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** ( ) icon on the side bar. Make sure the file extension is `.orm` or `.orr`.

2 If the PCI is set to Auto, the point on the map appears with a color representing the largest **S-SS RSRP** value.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Set the **PCI** to **Manual** and tap the **Select** button.
The Select PCI window appears.

4 Select **PCI** on the left and then the corresponding Beam Index appeared on the right.

5 Tap the **Apply** button.
The point color of the map changes to the corresponding S-SS RSRP value, and if there is no detected Beam Index, the point will be hidden.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for Excellent, and the minimum value is the Limit for Poor. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap **Menu** > **Limit**.

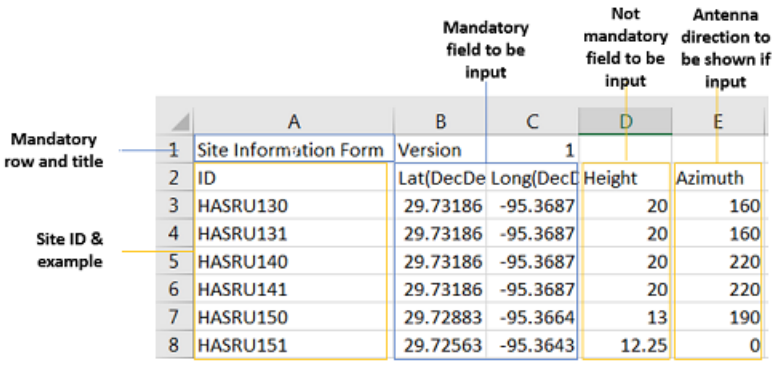
2 Tap **Excellent** and set a value using the on-screen keyboard.

3 Tap **Poor** and set a value using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (*`.csv`).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) icon on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online OTA route map measurement

Using LTE/LTE-A FDD Analyzer

Introduction

The CellAdvisor 5G LTE/LTE-A FDD Analyzer is the optimal portable test solution for installation and maintenance of cellular base stations and cell sites, running with external AC power or battery for the field. Its touch-based user interface has been specifically designed with customized menus and simple calibration procedures, providing service providers with accurate and reliable LTE/LTE-A FDD measurement results.

The CellAdvisor 5G is the optimal solution to perform following measurements:

- RF Analysis
  - Spectrum
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - ACLR
  - Multi-ACLR
  - Spurious Emissions
- OTA Analysis
  - OTA Channel Scanner
  - OTA ID Scanner
  - OTA Multipath Profile
  - OTA Control Channel
  - OTA Datagram
  - OTA Route Map
  - Freq/Time/Power Variation
- Signal Analysis
  - Constellation
  - Data Channel
  - Control Channel
  - Subframe
  - Frame
  - Time Alignment Error

- Data Allocation Map
- Carrier Aggregation
- Power vs Time (Frame)
- Power Statistics CCDF

- Online Route Map
  - Online OTA Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **LTE/LTE-A FDD Analyzer** on the **MODE** panel

2 Tap any measurement mode from the following choices:

RF Analysis > **Spectrum**, **Channel Power, Occupied Bandwidth, Spectrum Emission Mask, ACLR, Multi-ACLR** or **Spurious Emissions**

OTA Analysis > OTA Channel Scanner, OTA ID Scanner, OTA Multipath Profile, OTA Control Channel, OTA Datagram, OTA Route Map or **Freq/Time/Power Variation**

Signal Analysis > **Constellation, Data Channel, Control Channel, Subframe, Frame, Time Alignment Error, Data Allocation Map, Carrier Aggregation, Power vs Time (Frame),** or **Power Statistics CCDF**

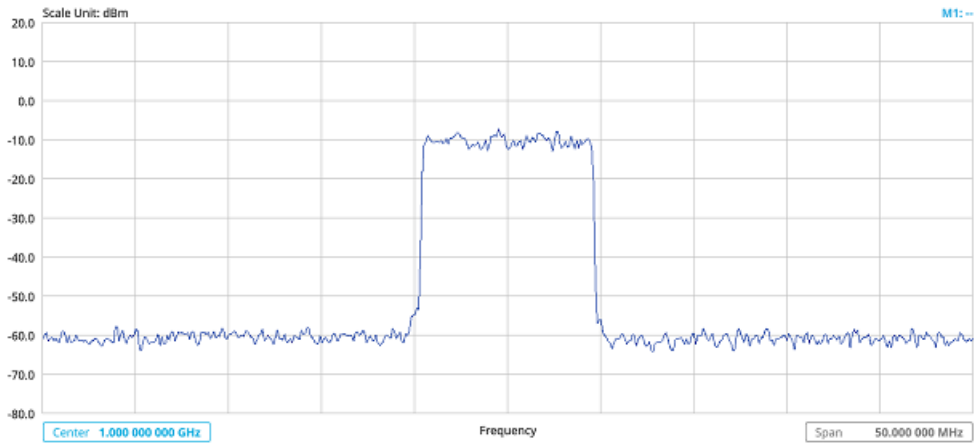
Online Route Map > Online OTA Route Map

Conducting RF measurement

Spectrum

If you have configured test parameters as described in the "Configuring Spectrum Measurements", your measurement is displayed on the screen as like the following example. You can simply change Center Frequency by tapping the icons right below the result chart screen.

Spectrum measurement with LTE/LTE-A FDD Analyzer



Channel Power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

3 Tap

to set the center frequency using the on-screen keyboard.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting limit

1 Tap **Menu** > **Limit**.

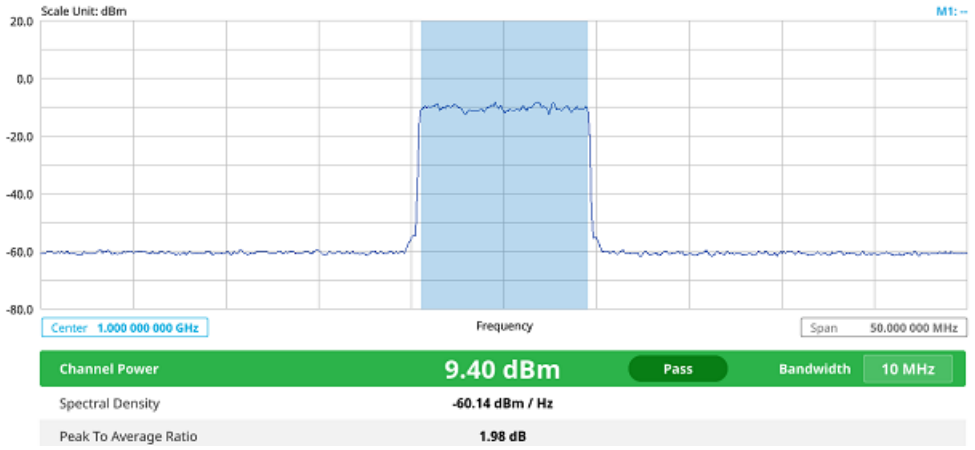
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option from the choices available for your measurement mode.

Channel Power measurement with LTE/LTE-A FDD Analyzer



Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

Occupied bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

3 Tap

to set the center frequency using the on-screen keyboard.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting limit

1 Tap **Menu** > **Limit**.

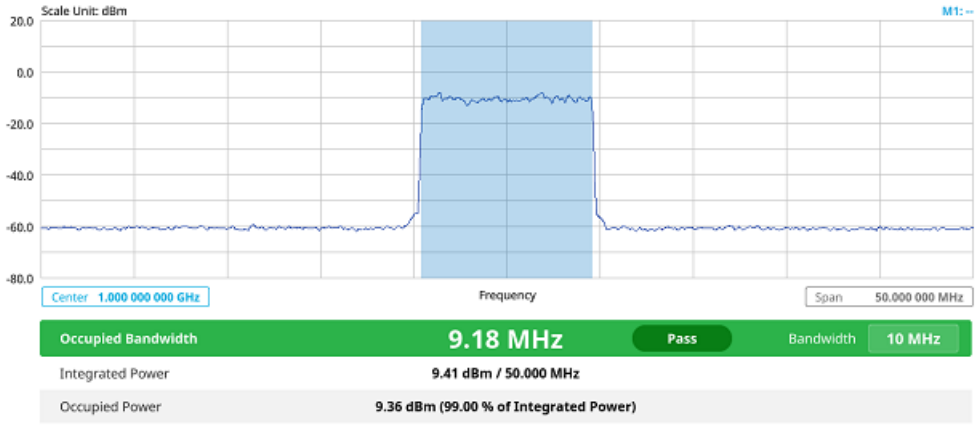
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option from the choices available for your measurement mode.

Occupied Bandwidth with LTE/LTE-A FDD Analyzer



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Spectrum Emission Mask (SEM)

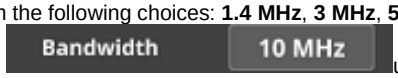
The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

You can also tap the rectangle with value, 

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Mask Type** and select the type from the following choices: **Wide Area BS A**, **Wide Area BS B**, **Local Area BS**, **Home BS**.

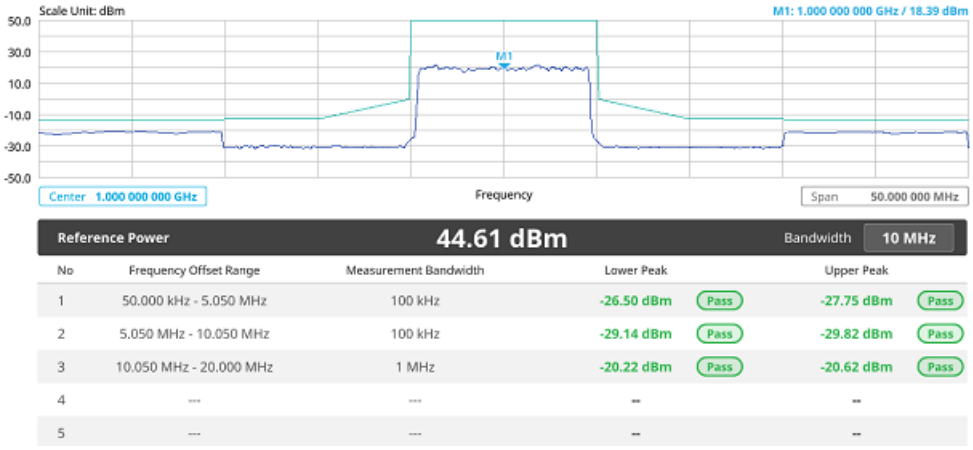
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Optional. Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Spectrum Emission Mask measurement with LTE/LTE-A FDD Analyzer



No	Frequency Offset Range	Measurement Bandwidth	Lower Peak		Upper Peak	
1	50.000 kHz - 5.050 MHz	100 kHz	-26.50 dBm	Pass	-27.75 dBm	Pass
2	5.050 MHz - 10.050 MHz	100 kHz	-29.14 dBm	Pass	-29.82 dBm	Pass
3	10.050 MHz - 20.000 MHz	1 MHz	-20.22 dBm	Pass	-20.62 dBm	Pass
4	---	---	--		--	
5	---	---	--		--	

If Lower Peak or Upper Peak indicates Fail, the mask line becomes red.

NOTE:
If the Trace View is set to Off, the Reference Power, Lower Peak, and Upper Peak is not shown. If the Trace View is set to On and the Trace Type is selected other than Clear Write, the Reference Power, Lower Peak, and Upper Peak is shown with value and "*" at the end of the value.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP LTE/LTE-A specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.
You can also tap the rectangle with value, Bandwidth 10 MHz under the chart screen and input the value using the on-screen keyboard.

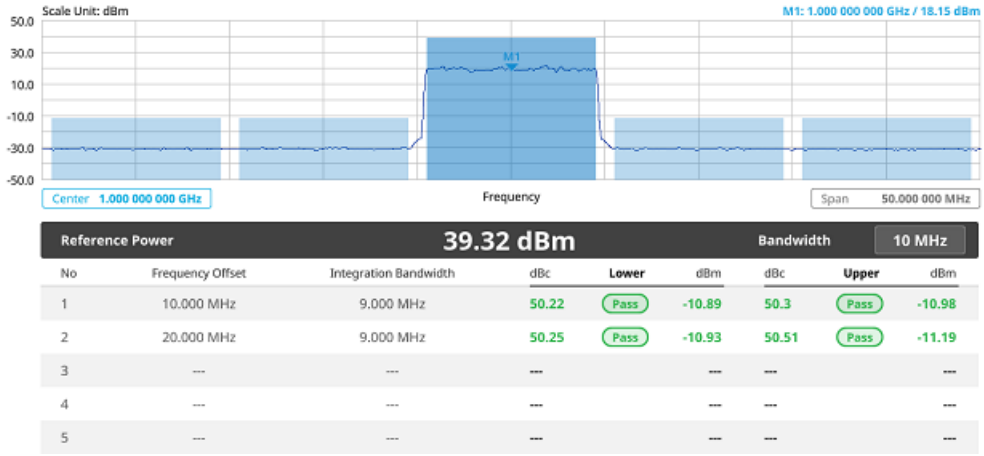
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

ACLR measurement with LTE/LTE-A FDD Analyzer



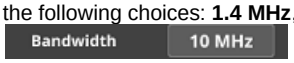
Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.
You can also tap the rectangle with value, 

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Lowest Frequency** to set the starting center frequency and enter the value using the on-screen keyboard.

4 Tap **highest frequency** to set the stopping center frequency and enter the value using the on-screen keyboard.

5 Tap **Lowest Channel Number** to set the starting channel and enter the value using the on-screen keyboard.

6 Tap **highest Channel Number** to set the stopping Channel and enter the value using the on-screen keyboard.

7 Selecting **Channel Standard** sets the channel to **Band Global** automatically.

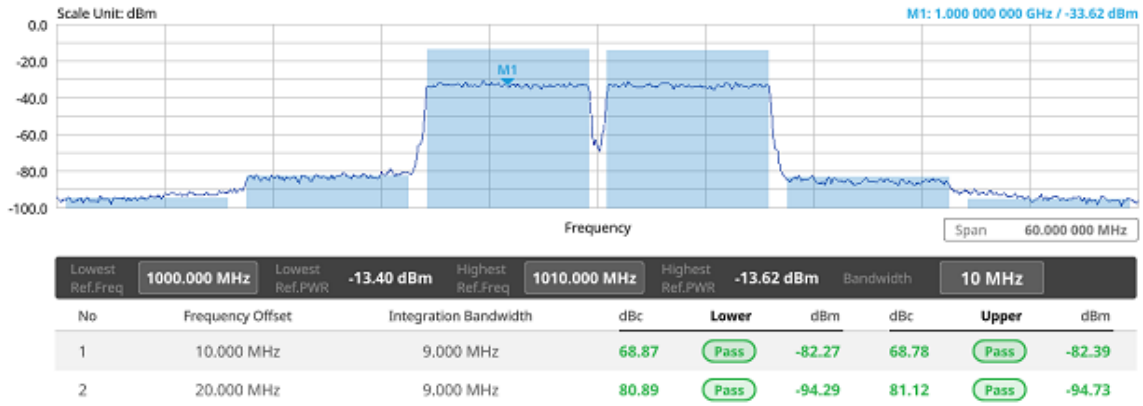
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-ACLR measurement with LTE/LTE-A FDD Analyzer



No	Frequency Offset	Integration Bandwidth	dBc	Lower	dBm	dBc	Upper	dBm
1	10.000 MHz	9.000 MHz	68.87	Pass	-82.27	68.78	Pass	-82.39
2	20.000 MHz	9.000 MHz	80.89	Pass	-94.29	81.12	Pass	-94.73

NOTE

You can set the Lowest Ref. Frequency and Highest Ref. Frequency by tapping the rectangle with value using the on-screen keyboard.

Spurious Emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The frequency setting is not used in the Spurious Emissions mode. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Configuration** or **Configuration** ( )icon.

2 Tap **Range** under the chart screen and switch to **On** to display or **Off** to hide the selected range in the result table.
You can select the range number between **1** and **20** to add as a new or change the existing settings.

3 Tap **Start Frequency/Stop Frequency** and enter the value for the selected range using the on-screen keyboard.

4 Tap **Start Limit/Stop Limit** and enter the lower limit/upper limit for Pass/Fail indication.

5 Tap **Attenuation/RBW/VBW** and specify or select the value.

6 Tap **Measurement Type** between **Full** and **Examine**.
The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically change the selected range from one another.

7 Tap **Average** on the box of upper screen and enter the value between **1** and **100** to set the number of measurements to be averaged.
You can also access this menu through **Menu** > **Average** on the side bar.

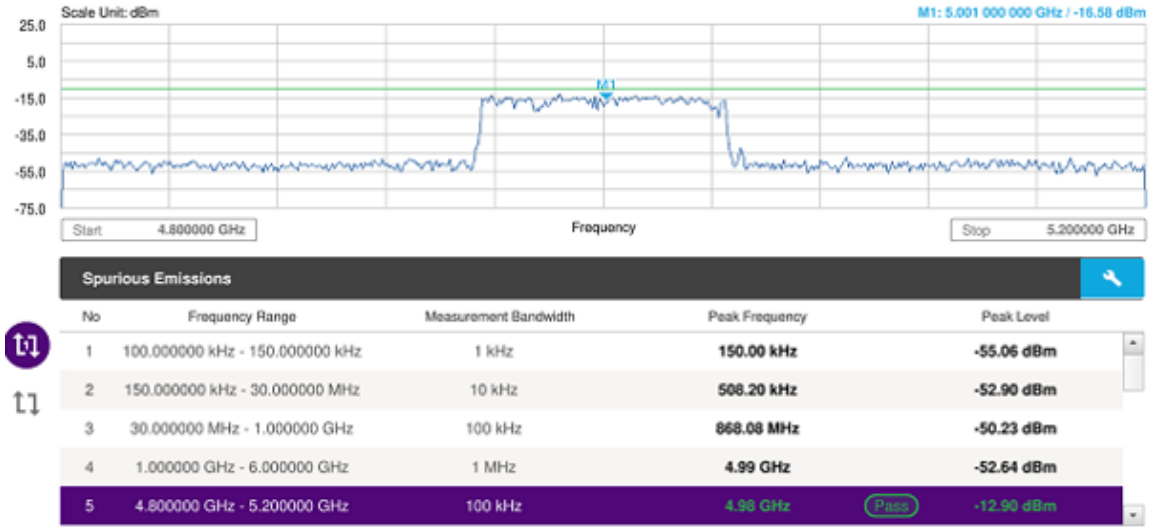
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.

3 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Spurious emissions measurement with LTE/LTE-A FDD Analyzer



NOTE:
You can only set the frequency range and attenuation by tapping the Configuration icon. If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

OTA Analysis

Channel Scanner

The Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

4 Tap **CA Configuration** or tap the **Configuration** ( ) icon.
General Setting and Carrier Setting table appear.

General setting

1 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

- **Internal**: when starting a signal processing using the internal reference clock and creating a trigger
- **External**: when starting a signal processing based on the external input trigger
- **GPS**: When synchronizing the signal processing via the GPS receiver. If you want to check the time error correctly, set the trigger to GPS

Carrier setting

1 Tap **Index** to select up to 6 numbers of carriers.

2 Tap the **Center Frequency** box and input the value using the on-screen keyboard.

a If you apply **Center Frequency**, **Channel No**, and **Bandwidth** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).

NOTE:
You will be able to multi-select the added items and apply them all at once only if the Index number is On. If the Index 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

3 Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

4 Tap the **Channel Number** box and input the value using the on-screen keyboard.

5 Tap the **Bandwidth** box and select from **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

6 Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

7 Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

8 Tap to switch the **Preamp** box **1**, **2**, and **Auto** to **On** (green) or **Off** (gray).

9 Tap the **Add** button to add a new index or **Delete** button to delete the carrier number you have set.

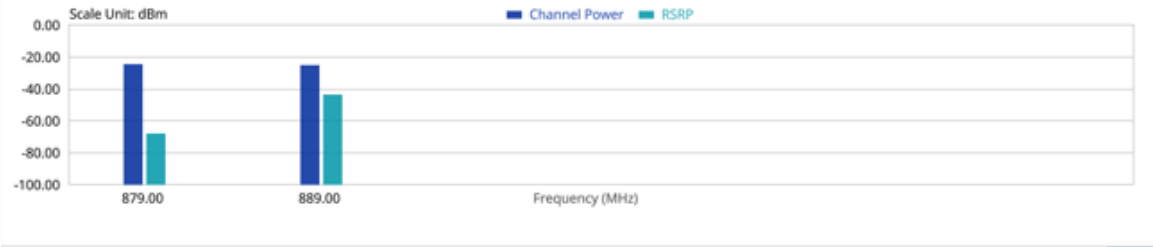
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch **Limit Line** to **On** or **Off**.

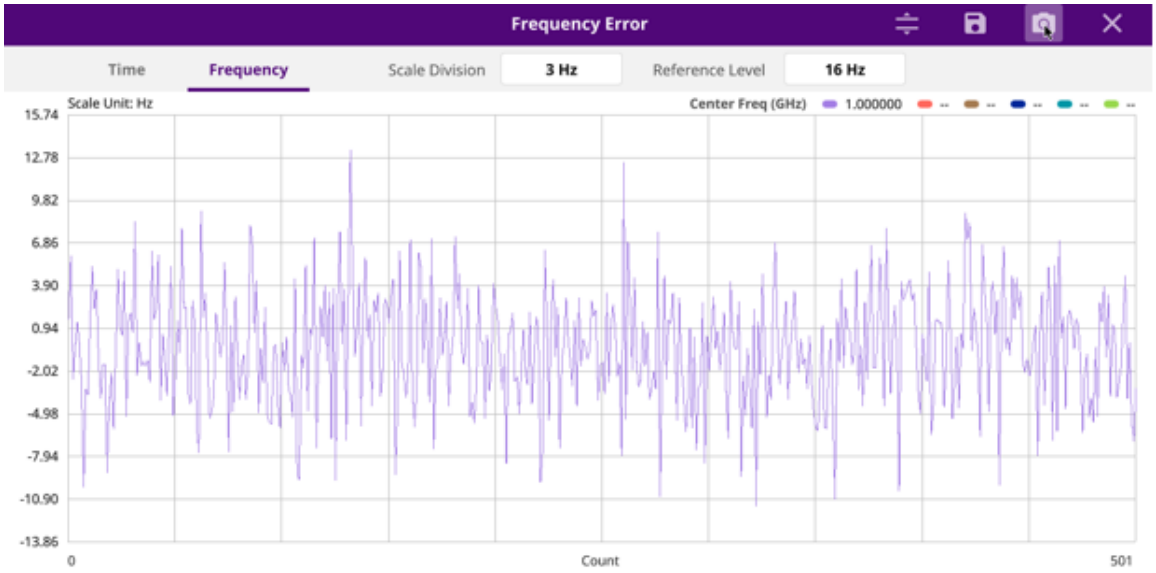
3 Tap **Limit Line** and input the value using the on-screen keyboard to enable or disable Pass/Fail indication.

OTA Channel Scanner measurement with LTE/LTE-A FDD Analyzer

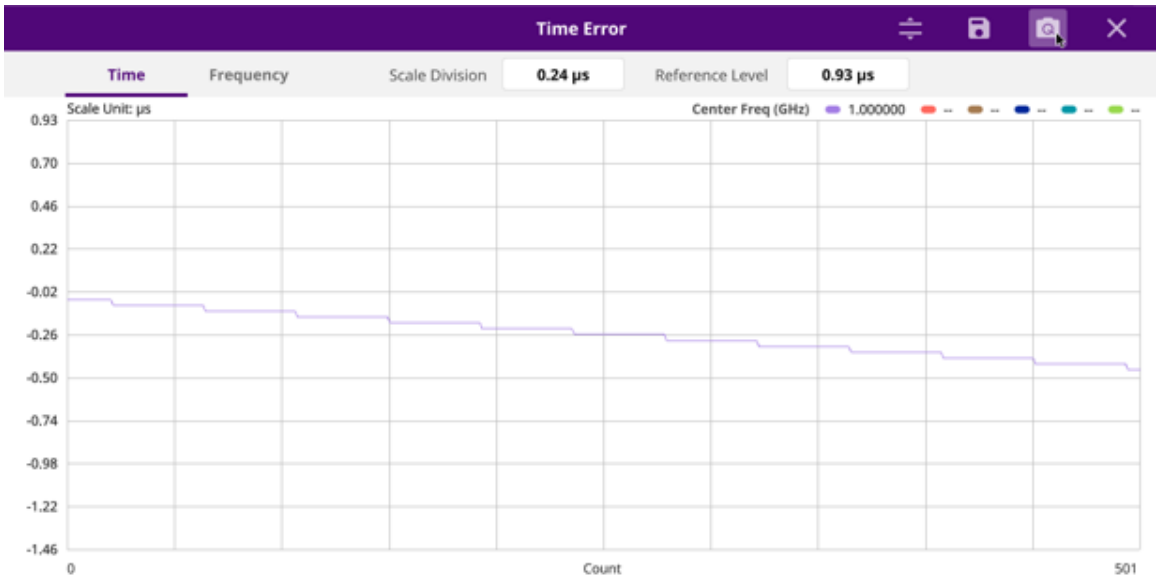


No	Frequency (MHz)	PCI (Grp,Sctr)	Channel Power (dBm)	RSSI (dBm)	RSRP (dBm)	RSRQ (dB)	RS SINR (dB)	S-SS RSSI (dBm)	Time Error (µs)	Freq Error (ppm)	Antenna
1	**879.00**	**174 (58,0)**	**-24.61**	**-23.07**	**-68.14**	**-28.08**	**9.58**	**-54.58**	**2.57**	**7.12**	**Antenna0**
2	**889.00**	**410 (136,2)**	**-25.09**	**-21.89**	**-43.73**	**-4.85**	**29.31**	**-26.31**	**0.16**	**-3.09**	**Antenna0**
3	---	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---

OTA Channel Scanner measurement with frequency error



OTA Channel Scanner measurement with time error



Using icons

You can tap the **Magnifier** icon to check the frequency or time error. You can also perform the following operation using the icons.

(Auto scale): You can set the scale automatically.

(Save as CSV): You can assign file name using the on-screen keyboard and apply the changes. This will let you save your measurement file internally.

(Quick save): You can save current measurement screen as it is.

(Close): You can close the screen you are seeing now.

ID Scanner

The LTE mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

The ID Scanner shows key parameters such as RSRP (Reference Signal Received Power) and RSRQ (Reference Signal Received Quality) that predict the downlink coverage quickly. RSRPs from entire cells help to rank between the different cells as input for handover and cell reselection decisions. RSRQ provides additional information when RSRP is not sufficient to make a reliable handover or cell reselection decision.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

5 To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

6 Optional. Tap **Limit** > **PCI Dominance**. Once tapped On, you can set the value using the on-screen keyboard.

> **NOTE:**
> If you go to Limit > PCI Dominance and set it, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold, the fail indicator (red) can be identified in the PCI column of the Information window and the top right corner of the instrument at the same time.

7 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

OTA ID Scanner measurement with LTE/LTE-A FDD Analyzer

No	PCI (Grp,Sctr)	RSRP (dBm)	RSRQ (dB)	P-SS SNR (dB)	RS SINR (dB)	S-SS RSSI (dBm)	P-SS RSRP (dBm)	S-SS RSRP (dBm)	S-SS Ec/Io (dB)	Time Error (µs)
1	**410 (136,2)**	**-59.29**	**-10.77**	**39.64**	**25.80**	**-41.17**	**-59.13**	**-59.10**	**-0.97**	**0.07**
2	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---

Multipath Profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **RS Window** and select the RS window option: **2 µs, 4 µs,** or **8 µs**.

5 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

6 Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

7 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

8 To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

OTA Multipath Profile measurement with LTE/LTE-A FDD Analyzer

Control Channel

DL RS power is the resource element power of Downlink Reference Symbol. The absolute DL RS power is indicated on the BCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the BCH and the DL RS power at the BS antenna connector.

The OTA Control Channel provides summary of all control channels including RS power trend over time. GPS coordinates (latitude and longitude) will be displayed on the screen if a GPS antenna is connected and locked to the GPS satellites.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

> **NOTE:**
> For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

7 *Optional.* To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

8 To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

9 To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

10 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

11 Tap **Menu** > **Display** and select **EVM** or **Power**. The screen changes according to the selected option.

Setting limit

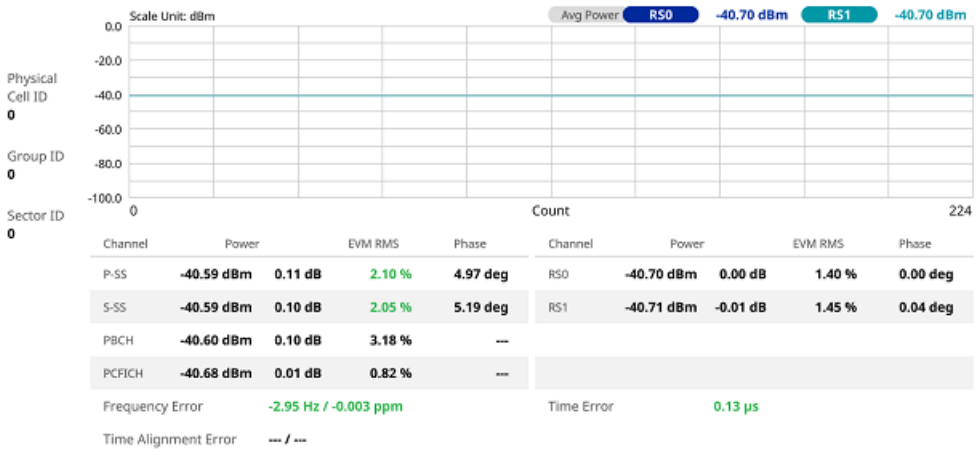
1 Tap **Menu** > **Limit**.

2 Tap **RS EVM** to set the limit for RS error vector magnitude. Select **RS0 EVM**, **RS1 EVM**, **RS2 EVM** or **RS3 EVM** and set the Limit Line **On** or **Off**, entering the value of **Limit Line** using on-screen keyboard to enable or disable Pass/Fail indication.

3 Tap to switch the **P-SS EVM**/ **S-SS EVM**/ **Frequency Error**/ **Time Error**/ **Time Alignment Error** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

4 *Optional.* Tap the **Save** icon on the side bar and select the save option from the choices available for your measurement mode.

OTA Control Channel measurement with LTE/LTE-A FDD Analyzer



Datagram

The OTA Datagram is a time-varying spectral representation that shows how the power of a signal varies with time. The power allocated to the specific resource block will be represented with an amplitude axis (in dBm) and the waterfall diagram will show the trend of past resource block power over certain period. Using a marker function facilitates analysis of accumulated resource block power for data utilization.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 Tap **Position** to set the number of position using the on-screen keyboard when **Time Cursor** is set to **On**.

6 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

7 *Optional.* To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

8 To set the time cursor at a specific position, tap **Time Cursor** and select **On.**

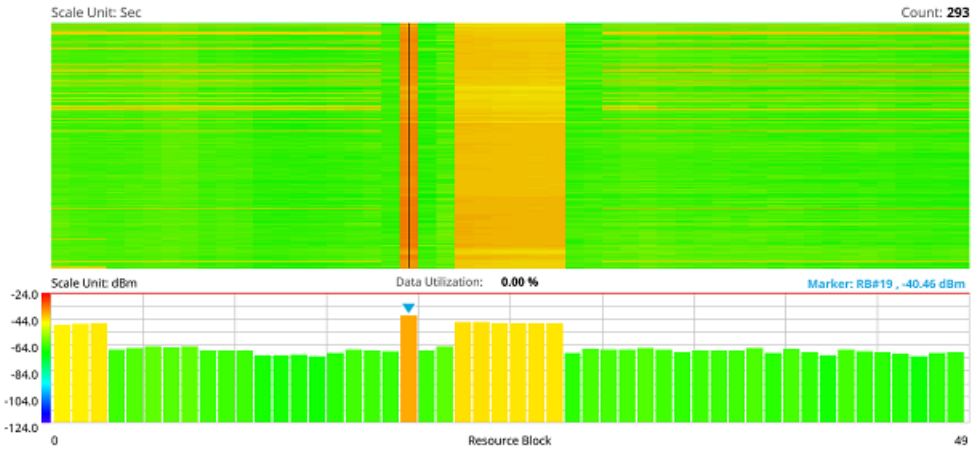
NOTE:
Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

9 To start a new measurement, tap **Reset**.

10 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

11 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

OTA Datagram measurement with LTE/LTE-A FDD Analyzer



Route Map

LTE route map traces the power level of the strongest LTE signal in terms of RSRP corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the strongest LTE signal for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information panel displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.

	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap to switch the **Plot Point** to **GPS** or **Position**.

   a To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
   With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.

   b To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.

5 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **RS SINR**, **S-SS RSSI**, **P-SS RSRP**, **S-SS RSRP**, **S-SS Ec/Io**, or **P-SS SNR**.

6 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

	NOTE: The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to ( ) and GPS point cannot be plotted.

5 Save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon ( ) on the side bar. Make sure the file extension is `.gomv`.

2 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **RS SINR**, **S-SS RSSI, P-SS RSRP**, **S-SS RSRP**, **S-SS Ec/Io**, **or P-SS SNR**.

3 Tap the **Apply** button.
The point color of the map changes to the corresponding value, and if there is no detected LTE signal, the point will become gray color.

NOTE:
When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

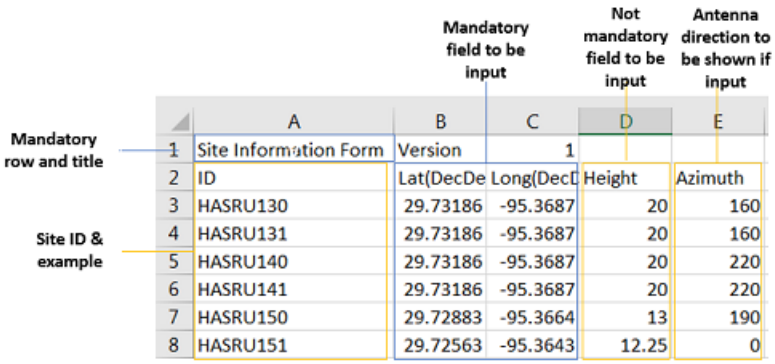
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** field if you want to check the direction of antenna.

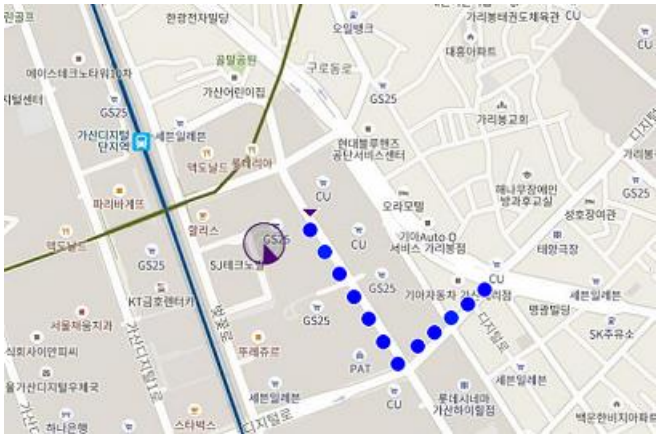
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Route map measurement with site information screen



	NOTE: The purple icon (,) indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

OTA Route Map measurement with LTE/LTE-A FDD Analyzer

Freq/Time/Power Variation

Frequency, time, and power variation shows the frequency, time, and power error trend based on the time elapsed.

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** and input the value from 0 to 9 using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets the specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

6 Tap to switch **PCI (Physical Cell ID)** to **Manual** or **Auto**.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

7 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2**, or **3** in other bandwidths.

8 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

9 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

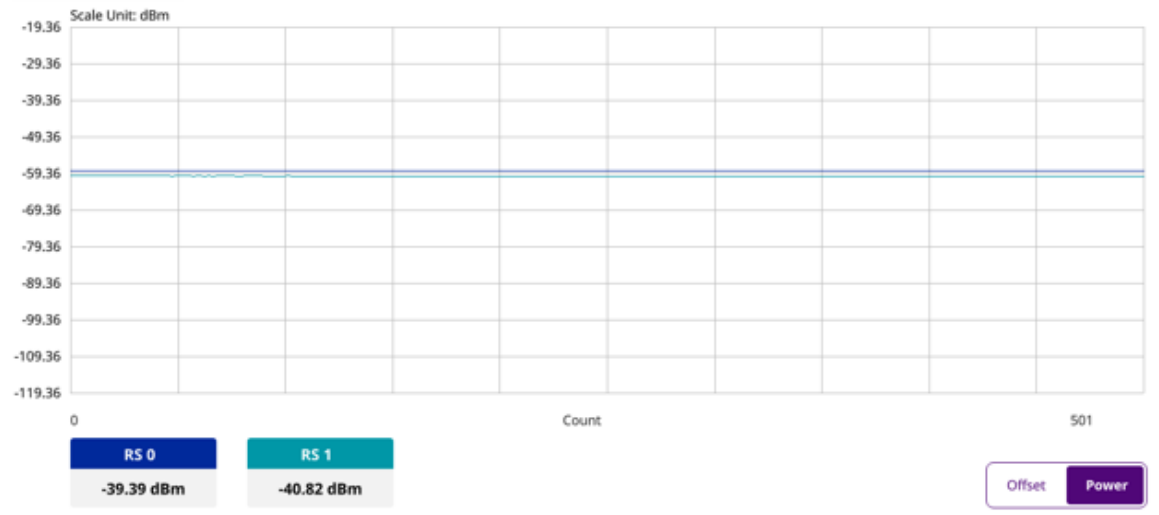
NOTE
If you want to set the reference level and scale, tap **Menu** > **Amp/Scal**e > **Reference**. You can set Reference Freq Error Offset, Scale Division (Freq Error), Reference Time Error Offset, Scale Division (Time Error), Reference Level, and Scale Division (Power) on demand using the on-screen keyboard. You can also select the unit on the keyboard.

Frequency/time/ power variation by offset with LTE/LTE-A FDD Analyzer

NOTE:

You can tap the Distance box and input the value that you want to compensate for distance. When distance is entered, the time will show the value with distance correction. Make sure the default value for Distance is 0.

Frequency/time/power variation by power with LTE/LTE-A FDD Analyzer



Signal Analysis

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

NOTE:
The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

f To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

g Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

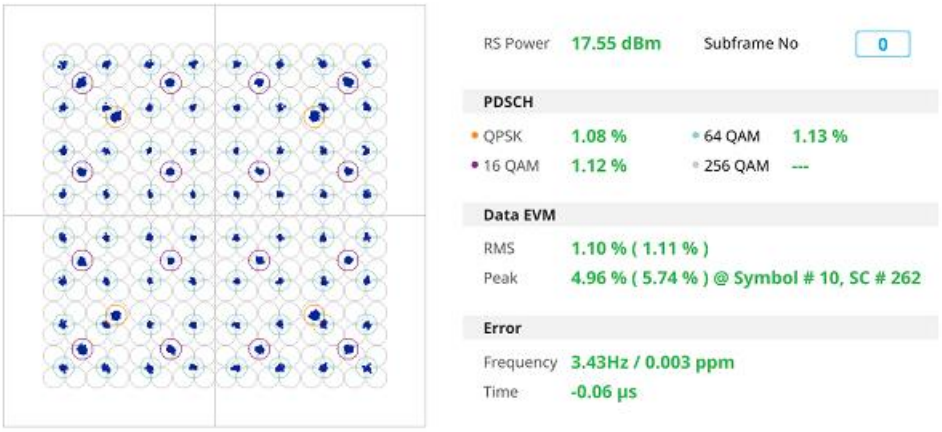
h Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Freqency Error/ PDSCH EVM/ PMCH EVM/ Data EVM RMS/ Data EVM Peak/ DL RS Power/ Time Error** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Constellation measurement with LTE/LTE-A FDD Analyzer



Data Channel

The Data Channel measures the constellation for the specified resource block as well as the modulation accuracy of each PDSCH at the specified subframe.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

NOTE:
For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

NOTE:
The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **Event Hold** and select **On** or **Off** to enable or disable the event hold feature.
When enabled, the display line for the PDSCH threshold appears**.** When an event occurs, the measurement is put on hold until you tap **Hold** ( ).

9 O*ptional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

f To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

g Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

h Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Data EVM RMS/Data EVM Peak/IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Using marker

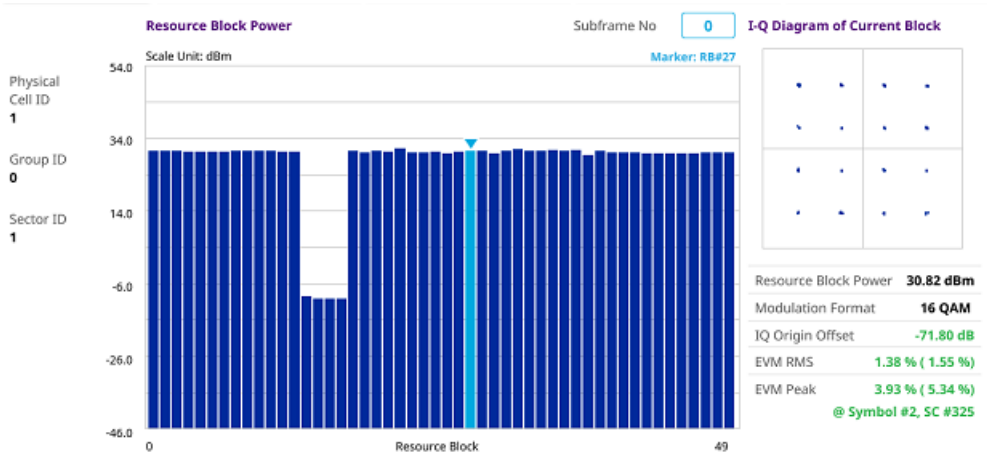
You can use **Marker** to place a marker on a resource block and display the IQ diagram for the selected resource block.

1 Tap **Menu** > **Marker**.

2 Tap **RB Number** to select the resource block to be marked and enter the resource block number using the on-screen keyboard.
The marker appears on the selected resource block.

3 Tap **Marker View** between **On** and **Off** to display or dismiss the result of the selected resource block.

Data Channel measurement with LTE/LTE-A FDD Analyzer



Control Channel

The Control Channel measures the constellation for the specified control channel as well as modulation accuracy of the control channel at the specified subframe.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

NOTE:
For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

NOTE:
The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

9 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

f To set the threshold for PDCCH, tap **PDCCH Threshold** and enter a value by using the on-screen keyboard.

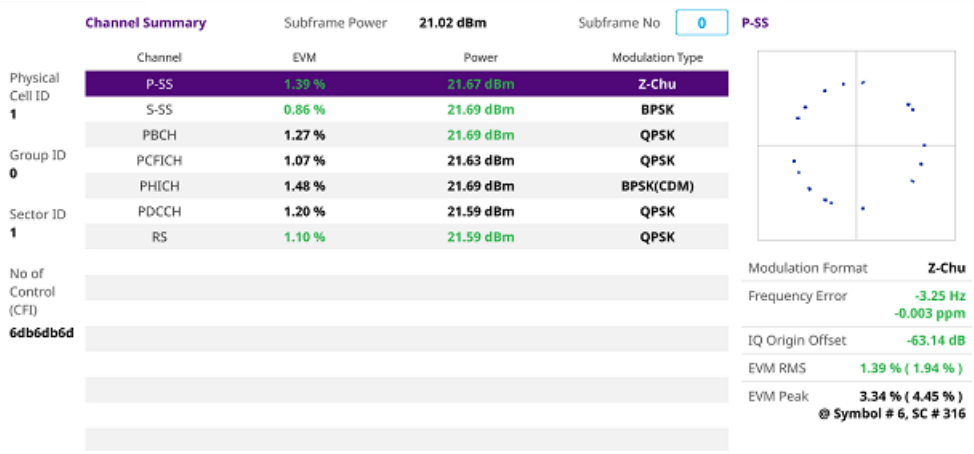
g Tap **PDCCH Mode** to select **REG** to calculate EVM based on Resource Element Group or **Average** to calculate EVM after adding all the PDCCH signals from one subframe.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Frequency error/ RS EVM/ P-SS EVM/ S-SS EVM/ DL RS Power/ P-SS Power/ S-SS Power/ PBCH Power/ IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Control Channel measurement with LTE/LTE-A FDD Analyzer



Subframe

The Subframe measures the modulation accuracy of all the data and control channels at the specified subframe (1 ms).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

> **NOTE:**
> For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

> **NOTE:**
> The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.

9 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

f To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

g To set the threshold for PDCCH, tap **PDCCH Threshold** and enter a value by using the on-screen keyboard.

h Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

i Tap **PDCCH Mode** to select **REG** to calculate EVM based on Resource Element Group or **Average** to calculate EVM after adding all the PDCCH signals from one subframe.

j Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Frequency error/ EVM/ Power/ Time Error** to set the **Test limits** to **On** or **Off** with setting **High and Low Limits/required options** using the on-screen keyboard to enable or disable Pass/Fail indication.

Using marker

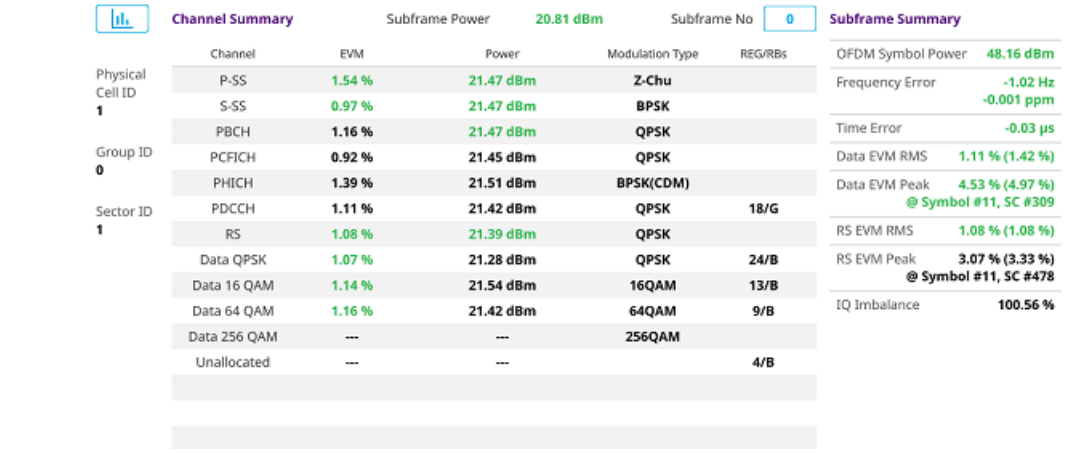
If you turn the Chart view on, you can use **Marker** to place a marker at a specific symbol.

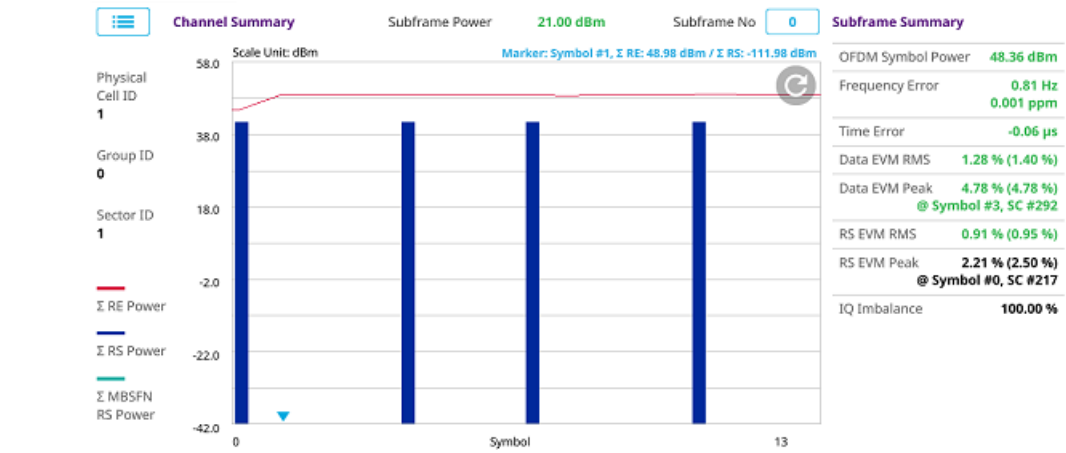
1 Tap **Menu** > **Marker**.

2 Tap **Marker View** between **On** and **Off** to display or dismiss the marker on the chart.

3 Tap **Symbol** to select the symbol number to which the marker is placed. Enter the value using the on-screen keyboard.

Subframe measurement with LTE/LTE-A FDD Analyzer





Frame

The Frame measures the modulation accuracy of all the data and control channels at the frame (10 ms).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

5 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

NOTE:
The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

6 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

7 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.

8 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

f To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

g To set the threshold for PDCCH, tap **PDCCH Threshold** and enter a value by using the on-screen keyboard.

h Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

i Tap **PDCCH Mode** to select **REG** to calculate EVM based on Resource Element Group or **Average** to calculate EVM after adding all the PDCCH signals from one subframe.

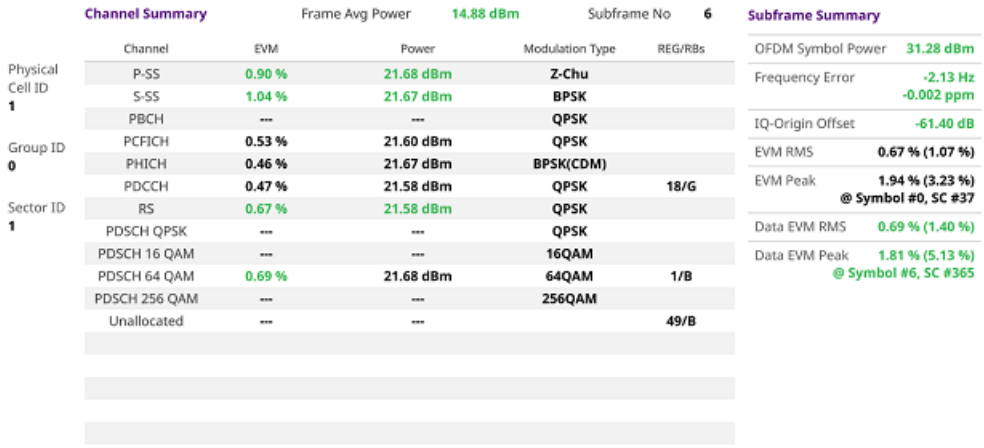
j Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Frequency error/ EVM/ Power/ IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High and Low Limits/required options** using the on-screen keyboard to enable or disable Pass/Fail indication.

Frame measurement with LTE/LTE-A FDD Analyzer



Time Alignment Error

In eNode-B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

5 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

6 *Optional.* To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

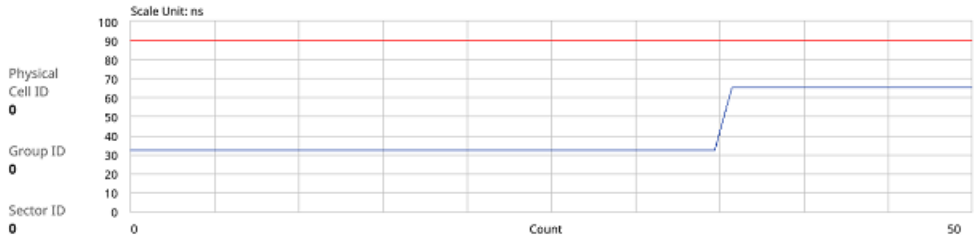
7 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **RS EVM/ DL RS Power/ MIMO** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Time Alignment Error measurement with LTE/LTE-A FDD Analyzer



Time Alignment Error	65.10 ns (65.10 ns) / ANT0 - ANT3	RS Power Difference	0.35 dB
Antenna	RS Power	RS EVM	RS Time Difference
0	18.39 dBm	0.95 %	0.00 ns
1	18.74 dBm	1.07 %	32.55 ns
2	18.71 dBm	1.14 %	32.55 ns
3	18.75 dBm	1.72 %	65.10 ns

Data Allocation Map

The Data Allocation Map function represents data allocation as a frame.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

7 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

Setting display

1 Tap **Menu** > **Display**.

2 Select the display mode from the choice: **PDSCH**, **PMCH** or **Both**.

Using marker

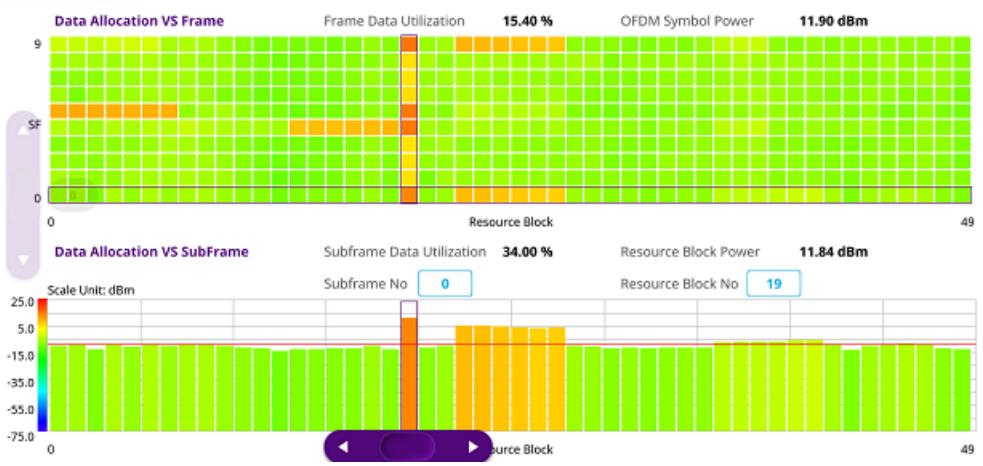
1 Tap **Menu** > **Marker**.

2 Tap the **Marker View** to **On** or **Off** to display or hide the marker on the chart.

3 To select the resource block number, tap the **RB Number** and enter a value by using the on-screen keyboard.

4 To select the subframe block number, tap the **Subframe No** and enter a value by using the on-screen keyboard.

Data Allocation Map measurement with LTE/LTE-A FDD Analyzer



Carrier Aggregation

Carrier aggregation enables a maximum of five multiple LTE carriers to be used together in order to provide high data rate required for LTE-Advanced. Component carriers to be aggregated can be intra-band contiguous, intra-band non-contiguous, or inter-band. The CA5G provides carrier aggregation measurements supporting for all the different modes with carrier aggregation bands added to the channel standard. This functionality is activated if the license for the option 030 LTE-Advanced FDD is installed.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **CA Configuration** or tap the **Configuration** ( ) **icon** then the component carrier configuration window appears.

4 Select the number of the component carrier to be set between one and five by tapping the number in **Range** box.

5 Set the Range **On** to set parameters and view the results for the selected component carrier on the screen or **Off** to turn it off.

6 Tap **LAA** (License Assisted Access) and select one among the three options: **2.4 GHz**, **5 GHz**, or **Off**.

7 Set the following parameters as needed: **Center Frequency**, **Channel No**, **Bandwidth**, **Physical Cell ID**, **MBMS**, **MBSFN**, **MIMO**, **Antenna Port**, **CFI, PHICH Ng**, **Cyclic Prefix**, and **PDSCH Modulation Type**.

	NOTE: When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

a If you apply **Center Frequency**, **Channel No**, and **Bandwidth** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).

	NOTE: You will be able to multi-select the added items and apply them all at once only if the Range number is On. If the Range 1 and 3 are On and you highlight No, 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

9 To select the subframe number to be measured, do one of the following:

- If the **EVM Detection Mode** is set to **Single**, tap **Subframe Number** and set the subframe number
- If the **EVM Detection Mode** is set to **Combine**, tap **Subframe Number** and then select 0 or 5

10 To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

11 Tap **PDSCH Precoding** between **On** and **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

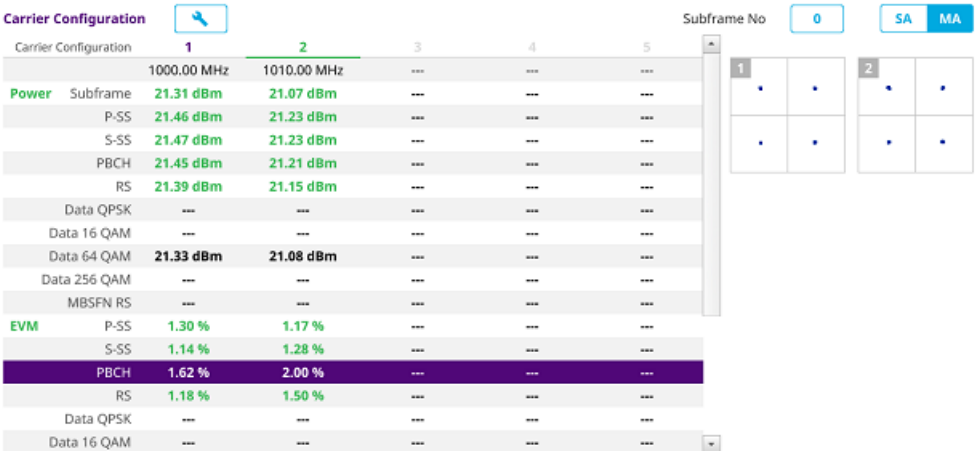
2 Tap **Frequency Error** to set the **Test limits** between **On** and **Off** and set **High** and **Low Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

3 Tap **EVM** to select **PDSCH EVM**, **RS EVM**, **P-SS EVM**, **S-SS EVM** or **PMCH EVM** and set the **Test limits** between **On** and **Off**. Then set **High Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

4 Tap **Power** to select the **DL RS Power**, **R-SS Power**, **S-SS Power**, **PBCH Power**, **Subframe Power** or **Channel Power** and set the **Test limits** between **On** and **Off**. Then set **High** and **Low Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

5 Tap **TAE** to set the **Test limits** between **On** and **Off**. Then enter the value using the on-screen keyboard for each **Intra Cont High**, **Intra Non-Cont High** and **Inter Band High** to enable or disable Pass/Fail indication.

Carrier Aggregation measurement with LTE/LTE-A FDD Analyzer



Power vs Time (Frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in a LTE/LTE-A FDD signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

7 To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

8 To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

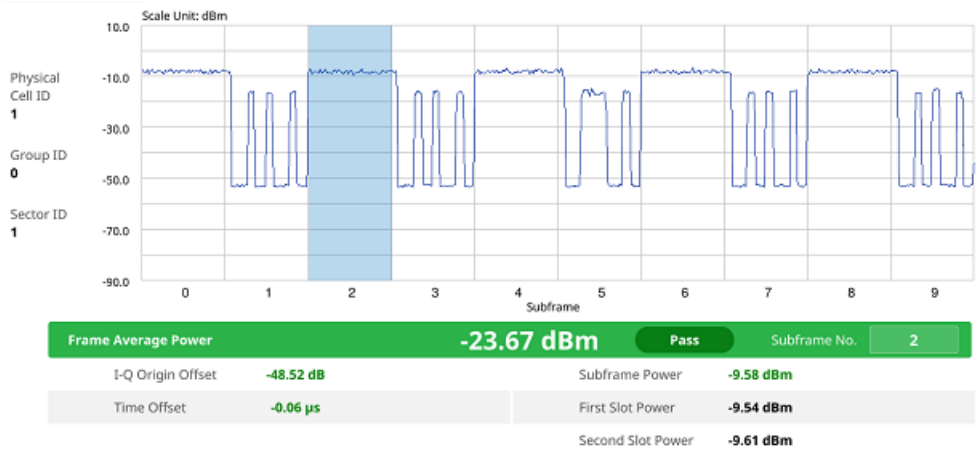
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Subframe Power/ Frame Avg Pwer/ Time Error/ IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Power vs Time (Frame) measurement with LTE/LTE-A FDD Analyzer



NOTE
You can set the Subframe No. from 0 to 9 based on your need using the on-screen keyboard.

Power Statistics CCDF

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

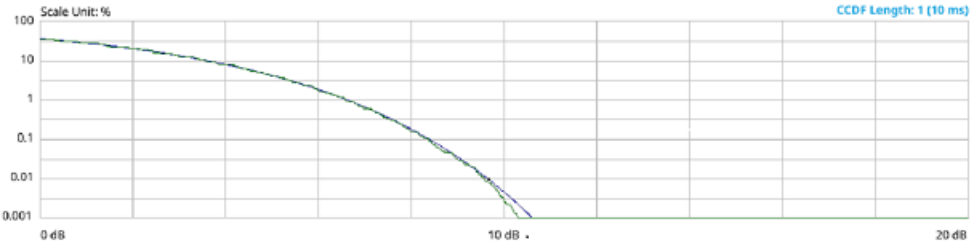
Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **CCDF Length** and select the value between 1 and 100.

CCDF measurement with LTE/LTE-A FDD Analyzer



Power		Probability		Distribution	
Average Power	-52.74 dBm	[10 %]	3.55 dB	4 dB	8.19 %
Max Power	-41.78 dBm	[1 %]	6.55 dB	8 dB	0.16 %
Crest Factor	10.96 dB	[0.1 %]	8.34 dB	12 dB	0.00 %
		[0.01 %]	9.55 dB	16 dB	0.00 %
		[0.001 %]	10.26 dB	20 dB	0.00 %

Conducting online route map

Online OTA route map

LTE online OTA route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the strongest LTE signal in terms of RSRP corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the strongest LTE signal for each measurement point, including its measurement time and geographical location.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.

—	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth or **Off**.

4 Tap to switch **Plot Item** to RSRP, RSRQ, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP, S-SS Ec/Io, or P-SS SNR.

5 Tap **Bandwidth** and select the value from the following choices: 1.4 MHz, 3 MHz, 5MHz, 10 MHz, 15 MHz, or 20 MHz.

6 Optional. Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

NOTE:
The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 4** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** ( ) button to pause plotting, then the GPS point cannot be plotted.

5 If you select the **Stop** button, the Plot Stop popup window appears and tap **Yes**.

6 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** ( ) icon on the side bar. Make sure the file extension is `.orm` or `.orr`.

2 Tap to switch **Plot Item** to RSRP, RSRQ, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP, S-SS Ec/Io, or P-SS SNR.

3 Tap the **Apply** button.
The point color of the map changes to the corresponding value, and if there is no detected LTE signal, the point will become gray color.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for Excellent, and the minimum value is the Limit for Poor. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap **Menu** > **Limit**.

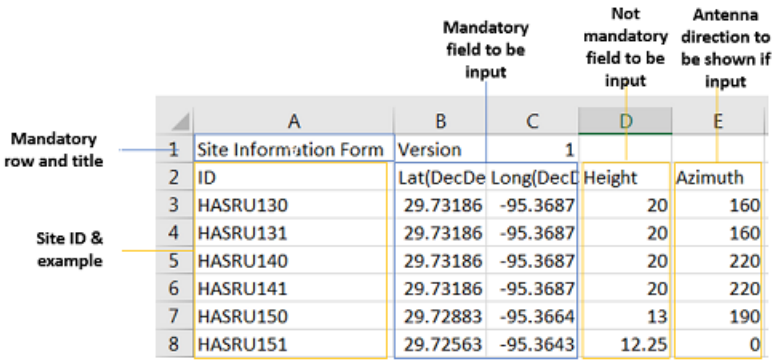
2 Tap **Excellent** and set a value using the on-screen keyboard.

3 Tap **Poor** and set a value using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(DecD	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) icon on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online route map measurement

Using LTE/LTE-A TDD Analyzer

Introduction

The CellAdvisor 5G LTE/LTE-A TDD Analyzer is the optimal portable test solution for installation and maintenance of cellular base stations and cell sites, running with external AC power or battery for the field. Its touch-based user interface has been specifically designed with customized menus and simple calibration procedures, providing service providers with accurate and reliable LTE/LTE-A TDD measurement results.

The CellAdvisor 5G is the optimal solution to perform following measurements:

- RF Analysis
  - Spectrum
  - Channel Power
  - Occupied Bandwidth
  - Spectrum Emission Mask
  - ACLR
  - Multi-ACLR
  - Spurious Emissions
- OTA Analysis
  - OTA Channel Scanner
  - OTA ID Scanner
  - OTA Multipath Profile
  - OTA Control Channel
  - OTA Datagram
  - OTA Route Map
  - Freq/Time/Power Variation
- Signal Analysis
  - Constellation
  - Data Channel
  - Control Channel
  - Subframe
  - Frame
  - Time Alignment Error
  - Data Allocation Map

- Carrier Aggregation
- Power vs Time (Frame)
- Power vs Time (Slot)
- Power Statistics CCDF

- Online Route Map
  - Online OTA Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **LTE/LTE-A TDD Analyzer** on the **MODE** panel

2 Tap any measurement mode from the following choices:

RF Analysis > **Spectrum**, **Channel Power, Occupied Bandwidth, Spectrum Emission Mask, ACLR, Multi-ACLR** or **Spurious Emissions**

OTA Analysis > OTA Channel Scanner, OTA ID Scanner, OTA Multipath Profile, OTA Control Channel, OTA Datagram, OTA Route Map or **Freq/Time/Power Variation**

Signal Analysis > **Constellation, Data Channel, Control Channel, Subframe, Frame, Time Alignment Error, Data Allocation Map, Carrier Aggregation, Power vs Time (Frame), Power vs Time (Slot),** or **Power Statistics CCDF**

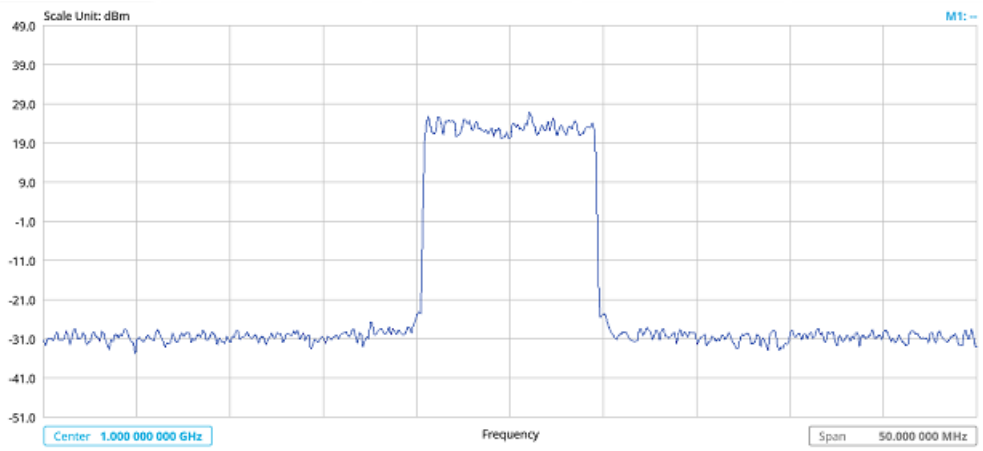
Online Route Map > Online OTA Route Map

Conducting RF Measurement

Spectrum

If you have configured test parameters as described in the "Configuring Spectrum Measurements", your measurement is displayed on the screen as like the following example. You can simply change Center Frequency by tapping the icons right below the result chart screen.

Spectrum measurement with LTE/LTE-A FDD Analyzer



Channel Power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel. It acquires a number of points representing the input signal in the time domain, transforms this information into the frequency domain using Fast Fourier Transform (FFT), and then calculates the channel power. The effective resolution bandwidth of the frequency domain trace is proportional to the number of points acquired for the FFT.

The channel power measurement identifies the total RF power, power spectral density, and Peak to Average Ratio (PAR) of the signal within the channel bandwidth.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

You can also tap the rectangle with value, Bandwidth 10 MHz under the chart screen and input the value using the on-screen keyboard.

3 Tap Center 1.000 000 000 GHz to set the center frequency using the on-screen keyboard.

4 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting limit

1 Tap **Menu** > **Limit**.

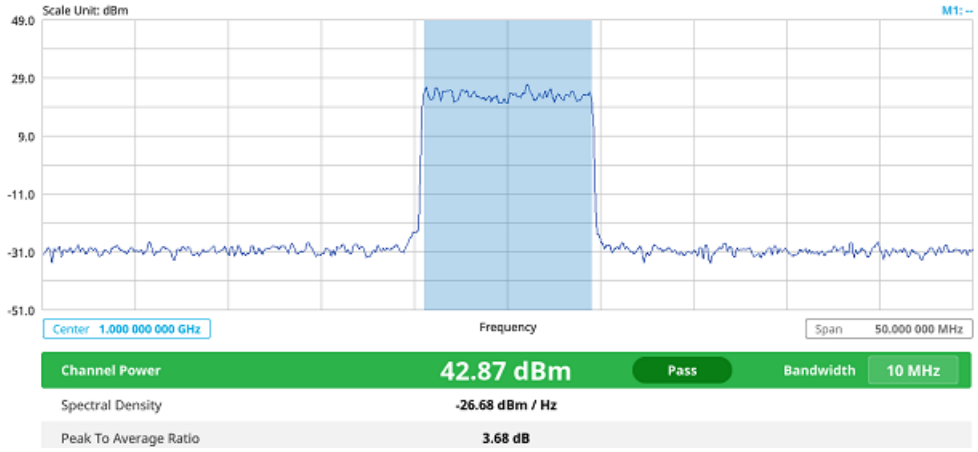
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option from the choices available for your measurement mode.

Channel Power measurement with LTE/LTE-A TDD Analyzer



Channel power measurement result shows channel power and spectrum density in a user specified channel bandwidth. The peak to average ratio (PAR) is shown at the bottom of the screen as well. The shaded area on the display indicates the channel bandwidth.

Occupied Bandwidth

The Occupied Bandwidth measures the percentage of the transmitted power within a specified bandwidth. The percentage is typically 99%.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Subframe Number** from 0 to 9 using the on-screen keyboard.

4 Tap

to set the center frequency using the on-screen keyboard.

5 Tap **Menu** > **BW/AVG** > **Average** to set the number of measurements to be averaged using the on-screen keyboard. The input value range is from 1 to 100.

Setting limit

1 Tap **Menu** > **Limit**.

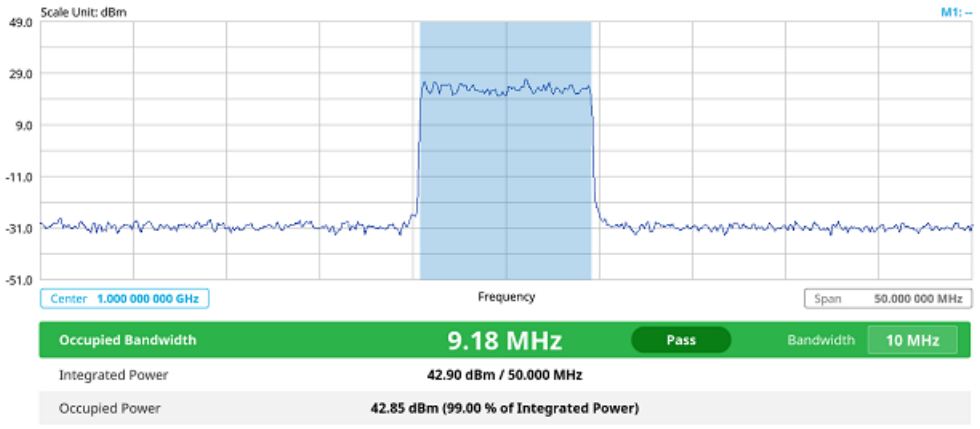
2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 Tap **High Limit** to set the upper threshold using the on-screen keyboard.

4 Tap **Low Limit** to set the lower threshold using the on-screen keyboard.

5 *Optional.* Tap the **Save** hot key on the side bar and select the save option from the choices available for your measurement mode.

Occupied Bandwidth with LTE/LTE-A TDD Analyzer



The Occupied Bandwidth measurement shows both of power across the band and power bandwidth in a user specified percentage to determine the amount of spectrum used by a modulated signal. Occupied bandwidth is typically calculated as the bandwidth containing 99% of the transmitted power.

Spectrum Emission Mask (SEM)

The Spectrum Emission Mask (SEM) measurement is to identify and determine the power level of out-of band spurious emission outside the necessary channel bandwidth and modulated signal. It measures the power ratio between in-band and adjacent channels. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.
You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Mask Type** and select the type from the following choices: **Wide Area BS A**, **Wide Area BS B**, **Local Area BS**, **Home BS**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

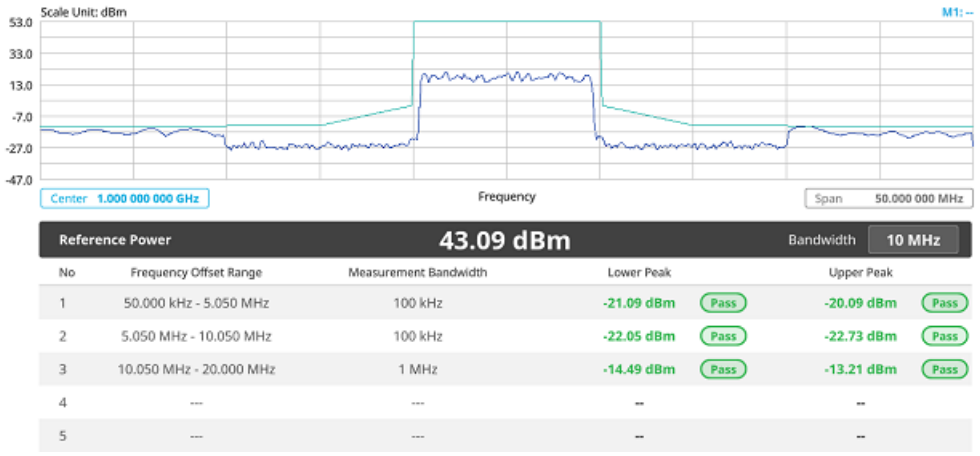
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

Spectrum Emission Mask measurement with LTE/LTE-A TDD Analyzer



If Lower Peak or Upper Peak indicates Fail, the mask line becomes red.

> **NOTE:**
> If the Trace View is set to Off, the Reference Power, Lower Peak, and Upper Peak is not shown. If the Trace View is set to On and the Trace Type is selected other than Clear Write, the Reference Power, Lower Peak, and Upper Peak is shown with value and "*" at the end of the value.

ACLR

The Adjacent Channel Power Ratio (ACPR), designated by the 3GPP LTE/LTE-A specifications as the Adjacent Channel Leakage power Ratio (ACLR), is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.
You can also tap the rectangle with value,

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

4 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

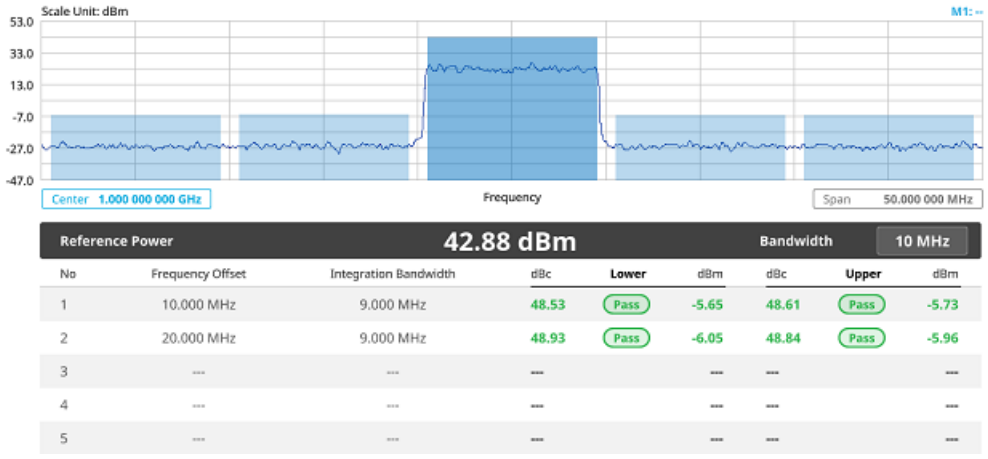
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** hot key on the side bar and select the save option form the choices available for your measurement mode.

ACLR measurement with LTE/LTE-A TDD Analyzer



No	Frequency Offset	Integration Bandwidth	dBc	Lower	dBm	dBc	Upper	dBm
1	10.000 MHz	9.000 MHz	48.53	Pass	-5.65	48.61	Pass	-5.73
2	20.000 MHz	9.000 MHz	48.93	Pass	-6.05	48.84	Pass	-5.96
3	---	---	---		---	---		---
4	---	---	---		---	---		---
5	---	---	---		---	---		---

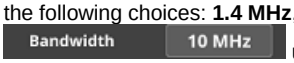
Multi-ACLR

The Multi-ACLR measurement is used to perform multi-channel ACLR measurements with as many channels as possible. It helps you to measure ACLR in multi-channel transmitting Base Station environment.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.
You can also tap the rectangle with value, 

under the chart screen and input the value using the on-screen keyboard.

3 Tap **Lowest Frequency** to set the starting center frequency and enter the value using the on-screen keyboard.

4 Tap **highest frequency** to set the stopping center frequency and enter the value using the on-screen keyboard.

5 Tap **Lowest Channel Number** to set the starting channel and enter the value using the on-screen keyboard.

6 Tap **highest Channel Number** to set the stopping Channel and enter the value using the on-screen keyboard.

7 Selecting **Channel Standard** sets the channel to **Band Global** automatically.

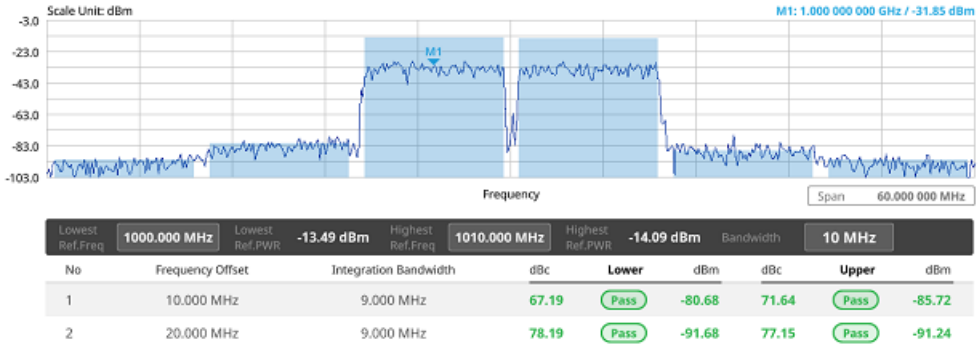
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.
The result table color for Pass is green, and the result table color for Fail is red.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Multi-ACLR measurement with LTE/LTE-A TDD Analyzer



NOTE

You can set the Lowest Ref. Frequency and Highest Ref. Frequency by tapping the rectangle with value using the on-screen keyboard.

Spurious Emissions

The Spurious Emissions measurement is to identify or determine the power level of in-band or out-of-band spurious emissions within the necessary channel bandwidth and modulated signal. The CellAdvisor 5G indicates either Pass or Fail based on the specified limit of the signal. Frequency extended up to 18.5 GHz in addition to existing 24 GHz to 40 GHz.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The frequency setting is not used in the Spurious Emissions mode. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Configuration** or **Configuration** ( )icon.

2 Tap **Range** under the chart screen and switch to **On** to display or **Off** to hide the selected range in the result table. You can select the range number between **1** and **20** to add as a new or change the existing settings.

3 Tap **Start Frequency/Stop Frequency** and enter the value for the selected range using the on-screen keyboard.

4 Tap **Start Limit/Stop Limit** and enter the lower limit/upper limit for Pass/Fail indication.

5 Tap **Attenuation/RBW/VBW** and specify or select the value.

6 Tap **Measurement Type** between **Full** and **Examine**.
The **Examine** mode displays only the selected range while the **Full** mode lets the instrument automatically change the selected range from one another.

7 Tap **Average** on the box of upper screen and enter the value between **1** and **100** to set the number of measurements to be averaged.
You can also access this menu through **Menu** > **Average** on the side bar.

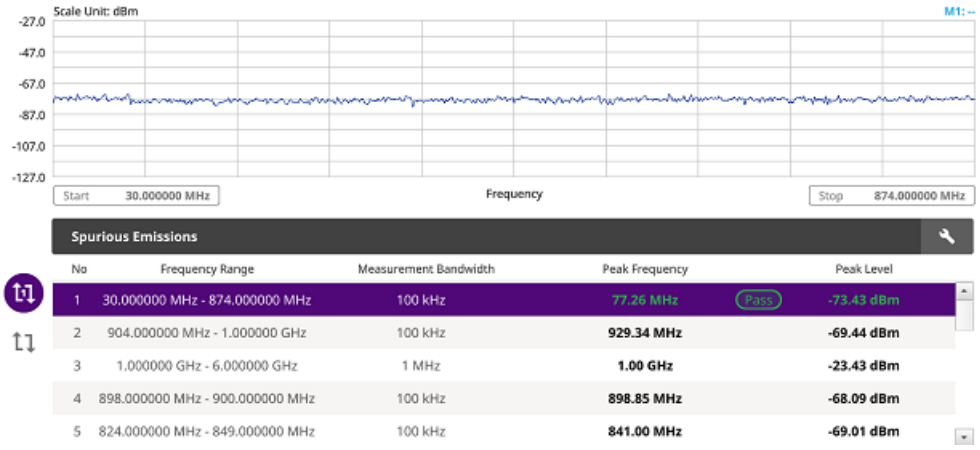
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Test Limits** to **On** or **Off** to enable or disable Pass/Fail indication.

3 Optional. Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Spurious Emissions measurement with LTE/LTE-A TDD Analyzer



NOTE:
You can only set the frequency range and attenuation by tapping the Configuration icon. If you select the first icon next to the Range table above, it only shows the selected range and if you select the second icon next to the Range table, it keeps moving from the first selected range to the final selected range.

OTA Analysis

Channel Scanner

The Channel Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

4 Tap **CA Configuration** or tap the **Configuration** ( ) icon.
General Setting and Carrier Setting table appear.

General setting

1 Tap **Trigger** to set **Internal**, **External** or **GPS** as required.

- **Internal**: when starting a signal processing using the internal reference clock and creating a trigger
- **External**: when starting a signal processing based on the external input trigger
- **GPS**: When synchronizing the signal processing via the GPS receiver. If you want to check the time error correctly, set the trigger to GPS

Carrier setting

1 Tap **Index** to select up to 6 numbers of carriers.

2 Tap the **Center Frequency** box and input the value using the on-screen keyboard.

a If you apply **Center Frequency**, **Channel No**, and **Bandwidth** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).

NOTE:
You will be able to multi-select the added items and apply them all at once only if the Index number is On. If the Index 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

3 Tap the **Channel Standard** box and choose one from the pop-up window and tap the **Apply** button.

4 Tap the **Channel Number** box and input the value using the on-screen keyboard.

5 Tap the **Bandwidth** box and select from **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

6 Tap the **External Offset** box and input the value using the on-screen keyboard, and tap to switch the external offset to **On** (green) or **Off** (gray) as desired.

7 Tap the **Attenuation** box and input the value using the on-screen keyboard if you want to set it manually (**Manual**). Or tap it to set **Auto**.

8 Tap to switch the **Preamp** box **1**, **2**, and **Auto** to **On** (green) or **Off** (gray).

9 Tap the **Add** button to add a new index or **Delete** button to delete the carrier number you have set.

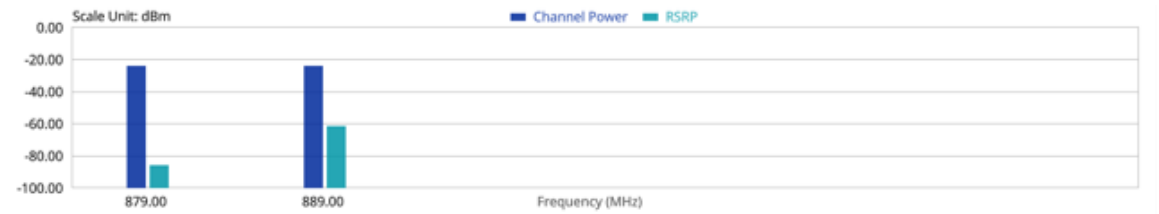
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch **Limit Line** to **On** or **Off**.

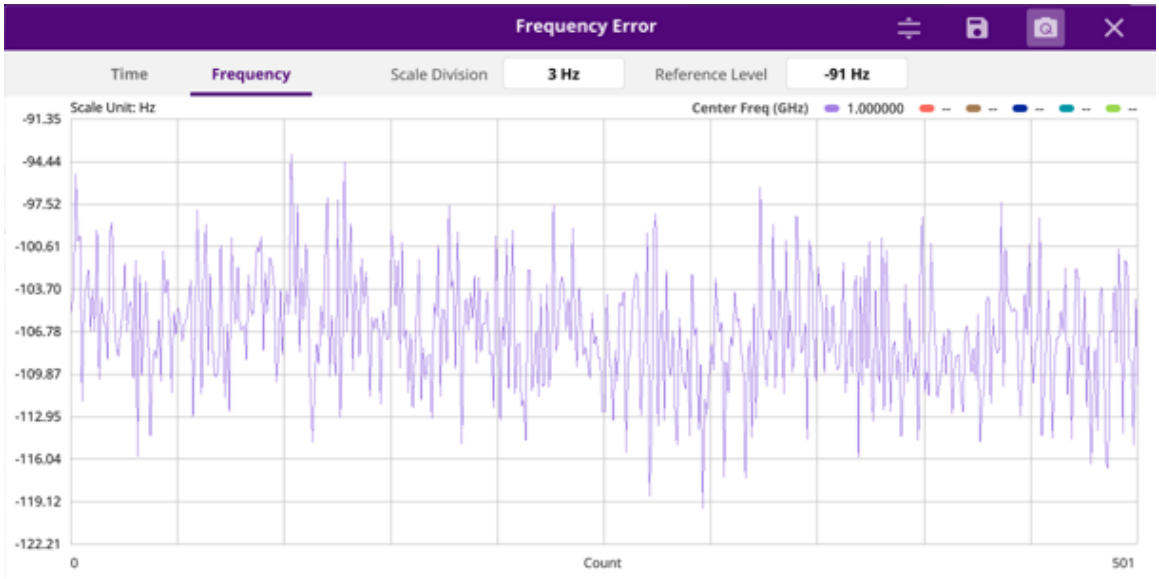
3 Tap **Limit Line** and input the value using the on-screen keyboard to enable or disable Pass/Fail indication.

OTA Channel Scanner measurement with LTE/LTE-A TDD Analyzer

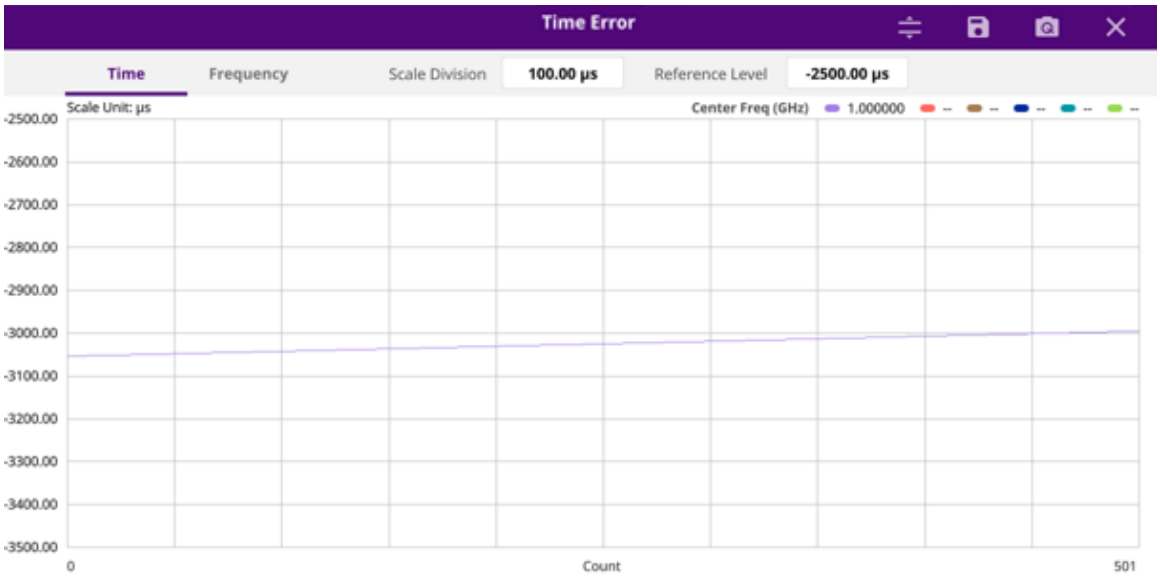


No	Frequency (MHz)	PCI (Grp,Sctr)	Channel Power (dBm)	RSSI (dBm)	RSRP (dBm)	RSRQ (dB)	RS SINR (dB)	S-SS RSSI (dBm)	Time Error (µs)	Freq Error (ppm)	Antenna
1	879.00	301 (100,1)	-23.61	-26.22	-85.61	-42.40	4.31	-79.06	-5001.82	-2119.10	Antenna0
2	889.00	65 (21,2)	-23.81	-25.70	-61.41	-18.72	13.93	-41.91	-5000.62	990.00	Antenna0
3	---	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---

OTA Channel Scanner measurement with frequency error



OTA Channel Scanner measurement with time error



Using icons

You can tap the **Magnifier** icon to check the frequency or time error. You can also perform the following operation using the icons.

(Auto scale): You can set the scale automatically.

(Save as CSV): You can assign file name using the on-screen keyboard and apply the changes. This will let you save your measurement file internally.

(Quick save): You can save current measurement screen as it is.

(Close): You can close the screen you are seeing now.

ID Scanner

The LTE mobile receives signals from multiple base stations that all of these signals share the same spectrum and are present at the same time. Each base station has unique scrambling code assigned to the particular base station and it differentiates its signal from other base stations in the area.

The ID Scanner shows key parameters such as RSRP (Reference Signal Received Power) and RSRQ (Reference Signal Received Quality) that predict the downlink coverage quickly. RSRPs from entire cells help to rank between the different cells as input for handover and cell reselection decisions. RSRQ provides additional information when RSRP is not sufficient to make a reliable handover or cell reselection decision.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

5 To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

6 Optional. Tap **Limit** > **PCI Dominance**. Once tapped On, you can set the value using the on-screen keyboard.

NOTE:
If you go to Limit > PCI Dominance and set it, you can judge pass (green) or fail (red) with colors based on the limit you have set. For example, if it becomes smaller than the threshold, the fail indicator (red) can be identified in the PCI column of the Information window and the top right corner of the instrument at the same time.

7 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

OTA ID Scanner measurement with LTE/LTE-A TDD Analyzer

No	PCI (Grp,Sctr)	RSRP (dBm)	RSRQ (dB)	P-SS SNR (dB)	RS SINR (dB)	S-SS RSSI (dBm)	P-SS RSRP (dBm)	S-SS RSRP (dBm)	S-SS Ec/Io (dB)	Time Error (µs)
1	**479 (159,2)**	**-60.89**	**-19.03**	**24.39**	**14.16**	**-68.76**	**-48.95**	**-86.68**	**-11.17**	**-1.66**
2	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---

Multipath Profile

The Multipath Profile enables you to determine RF environmental conditions of testing area. It indicates the amount of power of the dominant pilot signal that is dispersed outside the main correlation peak due to multipath echoes that are expressed in dB. This value should be very small ideally.

The multipath profile is the result of portions of the original broadcast signal arriving at the receiving antenna out of phase. This can be caused by the signal being reflected off objects such as buildings, or being refracted through the atmosphere differently from the main signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **RS Window** and select the RS window option: **2 µs, 4 µs,** or **8 µs**.

5 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

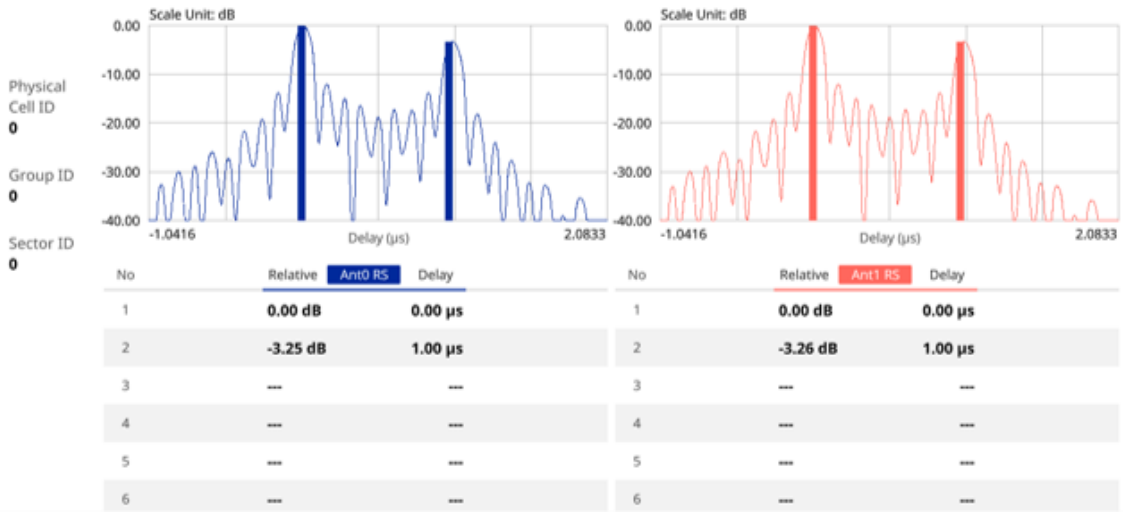
6 Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

7 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

8 To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

OTA Multipath Profile measurement with LTE/LTE-A TDD Analyzer



No	Relative	Ant0 RS	Delay
1	0.00 dB		0.00 µs
2	-3.25 dB		1.00 µs
3	---		---
4	---		---
5	---		---
6	---		---

No	Relative	Ant1 RS	Delay
1	0.00 dB		0.00 µs
2	-3.26 dB		1.00 µs
3	---		---
4	---		---
5	---		---
6	---		---

Control Channel

DL RS power is the resource element power of Downlink Reference Symbol. The absolute DL RS power is indicated on the BCH. The absolute accuracy is defined as the maximum deviation between the DL RS power indicated on the BCH and the DL RS power at the BS antenna connector.

The OTA Control Channel provides summary of all control channels including RS power trend over time. GPS coordinates (latitude and longitude) will be displayed on the screen if a GPS antenna is connected and locked to the GPS satellites.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

NOTE:
For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

7 *Optional.* To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

8 To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**. For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

9 To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

10 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

11 Tap **Menu** > **Display** and select **EVM** or **Power**. The screen changes according to the selected option.

Setting limit

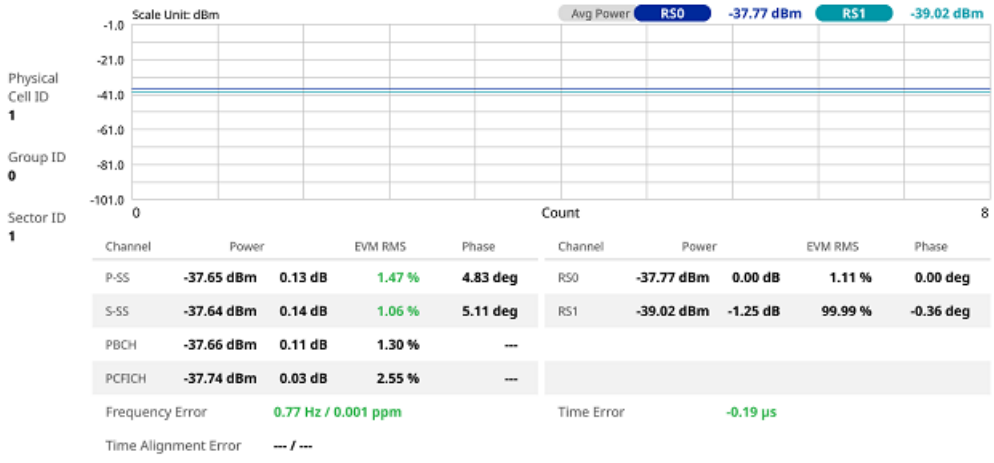
1 Tap **Menu** > **Limit**.

2 Tap **RS EVM** to set the limit for RS error vector magnitude. Select **RS0 EVM**, **RS1 EVM**, **RS2 EVM** or **RS3 EVM** and set the Limit Line **On** or **Off**, entering the value of **Limit Line** using on-screen keyboard to enable or disable Pass/Fail indication.

3 Tap to switch the **P-SS EVM**/ **S-SS EVM**/ **Frequency Error**/ **Time Error**/ **Time Alignment Error** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

4 *Optional.* Tap the **Save** icon on the side bar and select the save option from the choices available for your measurement mode.

OTA Control Channel measurement with LTE/LTE-A TDD Analyzer



Datagram

The OTA Datagram is a time-varying spectral representation that shows how the power of a signal varies with time. The power allocated to the specific resource block will be represented with an amplitude axis (in dBm) and the waterfall diagram will show the trend of past resource block power over certain period. Using a marker function facilitates analysis of accumulated resource block power for data utilization.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 Tap **Position** to set the number of position using the on-screen keyboard when **Time Cursor** is set to **On**.

6 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

	NOTE: When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

7 *Optional.* To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

8 To set the time cursor at a specific position, tap **Time Cursor** and select **On.**

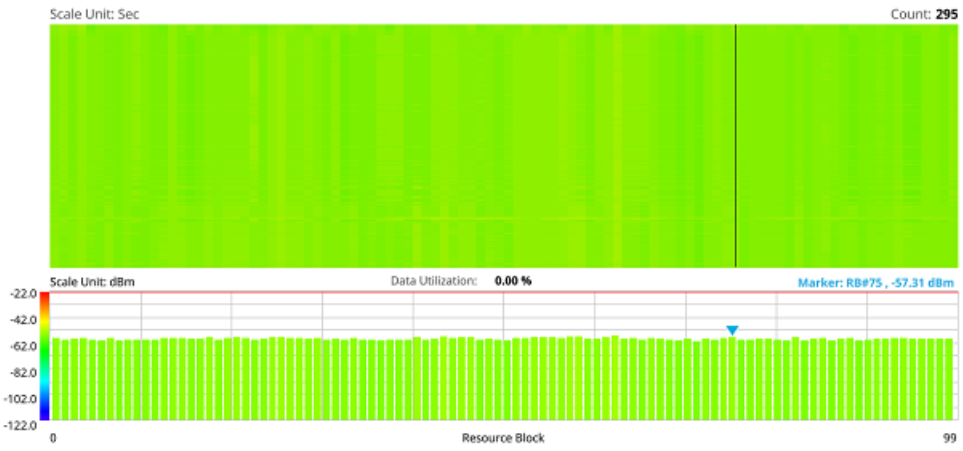
	NOTE: Enabling the time cursor puts the measurement on hold and you can make post-processing analysis for each measurement over time using the time cursor.

9 To start a new measurement, tap **Reset**.

10 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

11 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

OTA Datagram measurement with LTE/LTE-A TDD Analyzer



Route Map

LTE route map traces the power level of the strongest LTE signal in terms of RSRP corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the strongest LTE signal for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information panel displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.

	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap to switch the **Plot Point** to **GPS** or **Position**.

   a To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
   With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.

   b To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.

5 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **RS SINR**, **S-SS RSSI**, **P-SS RSRP**, **S-SS RSRP**, **S-SS Ec/Io**, or **P-SS SNR**.

6 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

	NOTE: The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 3** in Setting measure setup.

2 Tap the **Start** button ( ) on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to ( ) and GPS point cannot be plotted.

5 Save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** icon ( ) on the side bar. Make sure the file extension is `.gomv`.

2 Tap to switch **Plot Item** to **RSRP**, **RSRQ**, **RS SINR**, **S-SS RSSI**, **P-SS RSRP**, **S-SS RSRP**, **S-SS Ec/Io**, or **P-SS SNR**.

3 Tap the **Apply** button.
The point color of the map changes to the corresponding value, and if there is no detected LTE signal, the point will become gray color.

NOTE:
When you load the result file, a pop-up message asking whether you want to load data only or data with map appears. If the current screen does not display all the loaded data, the screen mode will be automatically changed to Full.

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value in red is the Limit for **Excellent**, and the minimum value in blue is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

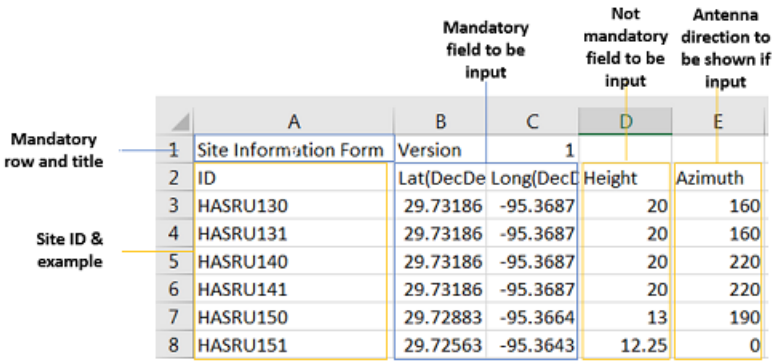
3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** field if you want to check the direction of antenna.

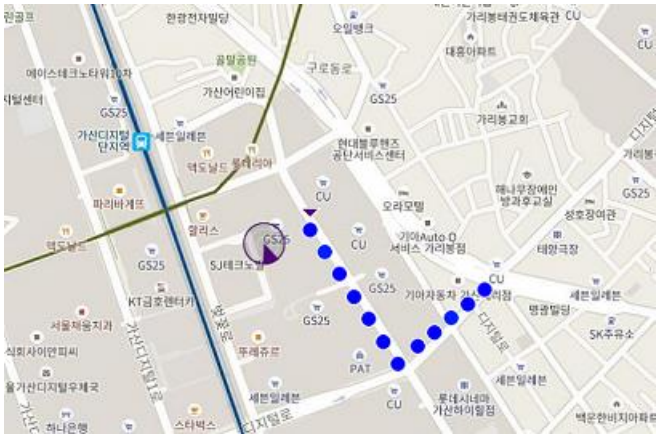
4 Make sure to save the file as (Comma delimited) (*.csv).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) hot key on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

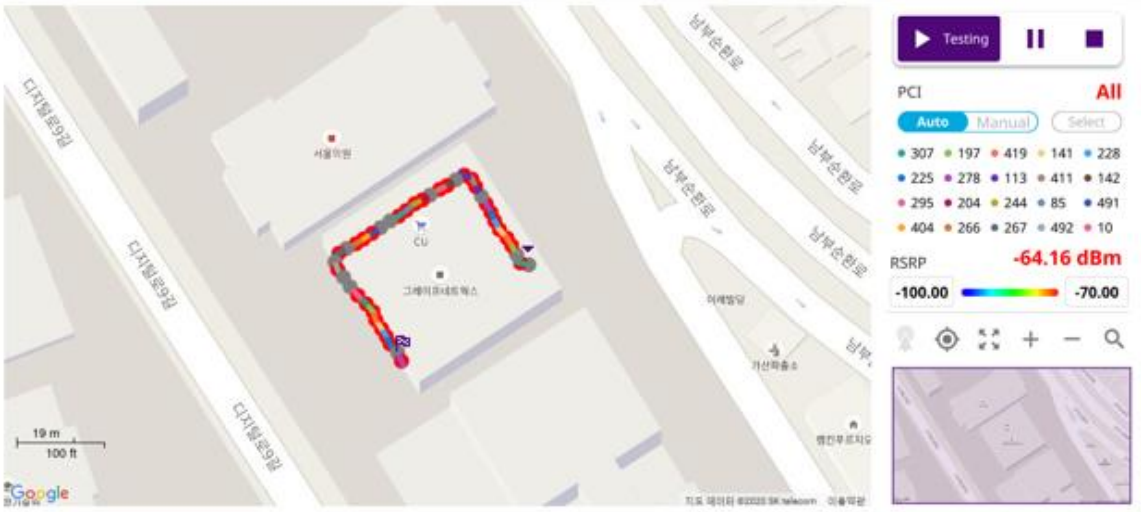
Route map measurement with site information screen



NOTE:

The purple icon (,) indicates the base station (site) location and the direction of antenna. If the site is beyond the latitude and longitude of the map file, it will not show.

OTA Route Map measurement with LTE/LTE-A TDD Analyzer



Freq/Time/Power Variation

Frequency, time, and power variation shows the frequency and time error trend based on the time elapsed.

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets the specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

5 Tap to switch **PCI (Physical Cell ID)** to **Manual** or **Auto**.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe.
- **Manual** sets the number of OFDM symbols manually. The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidths.

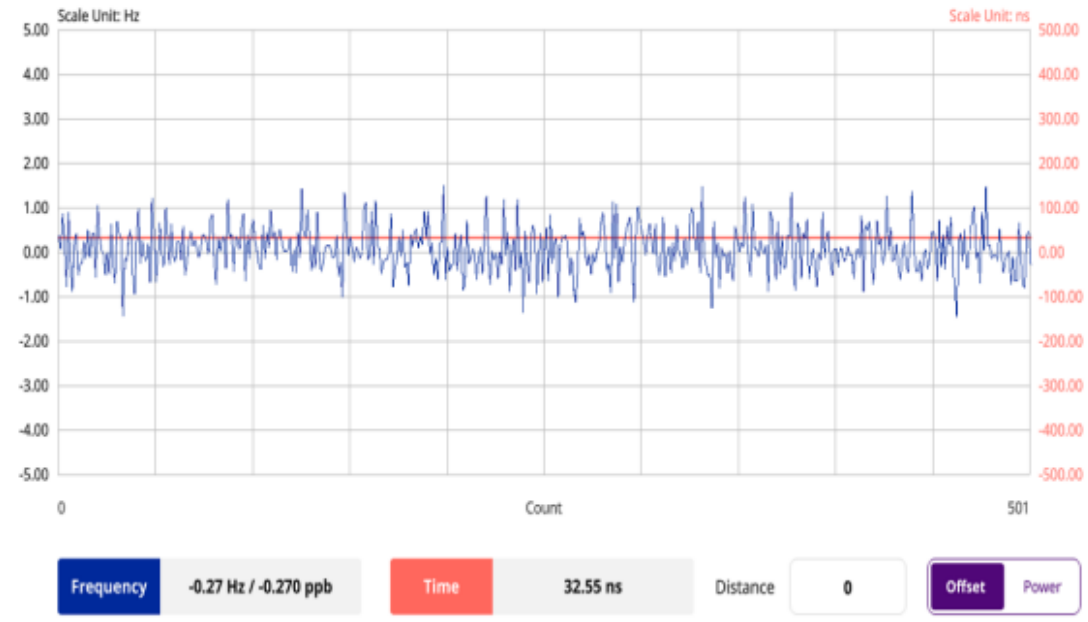
7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

NOTE
If you want to set the reference level and scale, tap **Menu** > **Amp/Scal**e > **Reference**. You can set Reference Freq Error Offset, Scale Division (Freq Error), Reference Time Error Offset, Scale Division (Time Error), Reference Level, and Scale Division (Power) on demand using the on-screen keyboard. You can also select the unit on the keyboard.

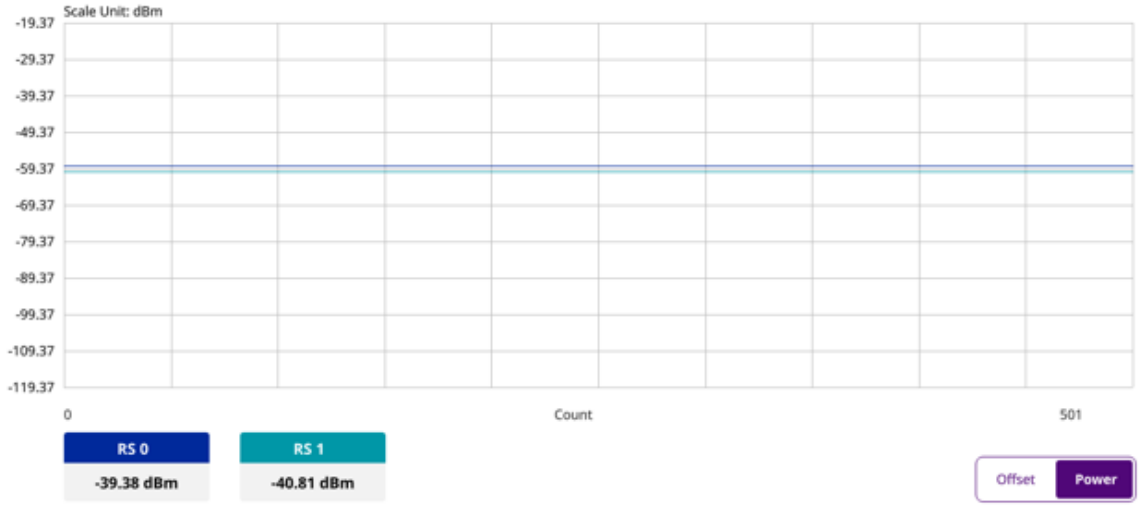
Frequency/time/power variation by offset with LTE/LTE-A TDD Analyzer



NOTE:

You can tap the Distance box and input the value that you want to compensate for distance. When distance is entered, the time will show the value with distance correction. Make sure the default value for Distance is 0.

Frequency/time/power variation by power with LTE/LTE-A TDD Analyzer



Signal Analysis

Constellation

The Constellation is used to observe some aspects of modulation accuracy and can reveal certain fault mechanisms such as I/Q amplitude imbalance or quadrature imbalance. It displays constellation diagram by modulation types.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

> **NOTE:**
> The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **Subframe Assignment** and select the number of uplink/downlink using the on-screen keyboard.

9 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

- **a** To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.
- **b** To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
  If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.
- **c** To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
  For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
  If this setting is on, the measurement item MBSFN RS appears in the result table.
- **d** To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
  An automatically detected or manually entered MBSFN ID appears on the screen.
- **e** To set the delay, tap **Delay** and enter the value using the on-screen keyboard to set the amount of delay in µs.

> **NOTE:**
> The Delay setting is used only when there is a time offset in the signals to be measured.

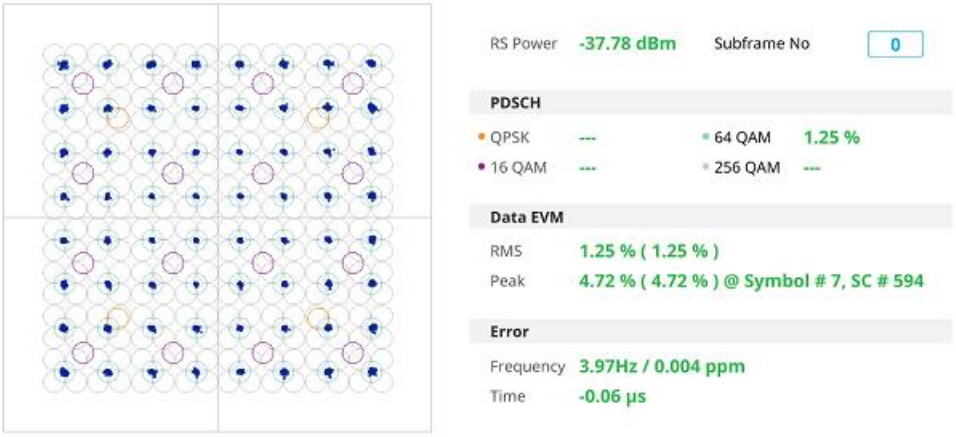
- **f** To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.
- **g** To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.
- **h** Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
  If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.
- **i** Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Freqency Error/ PDSCH EVM/ PMCH EVM/ Data EVM RMS/ Data EVM Peak/ DL RS Power/ Time Error** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Constellation measurement with LTE/LTE-A TDD Analyzer



Data Channel

The Data Channel measures the constellation for the specified resource block as well as the modulation accuracy of each PDSCH at the specified subframe.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

> **NOTE:**
> For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

NOTE:
The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **Event Hold** and select **On** or **Off** to enable or disable the event hold feature.
When enabled, the display line for the PDSCH threshold appears**.** When an event occurs, the measurement is put on hold until you tap **Hold** ( ).

NOTE
You can view detailed current resource block on the I-Q diagram, particularly in a dynamic field environment.

9 Tap **Subframe Assignment** and select the number of uplink/downlink using the on-screen keyboard.

10 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To set the delay, tap **Delay** and enter the value using the on-screen keyboard to set the amount of delay in µs.

NOTE:
The Delay setting is used only when there is a time offset in the signals to be measured.

f To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

g To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

h Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

i Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Data EVM RMS/Data EVM Peak/IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Using marker

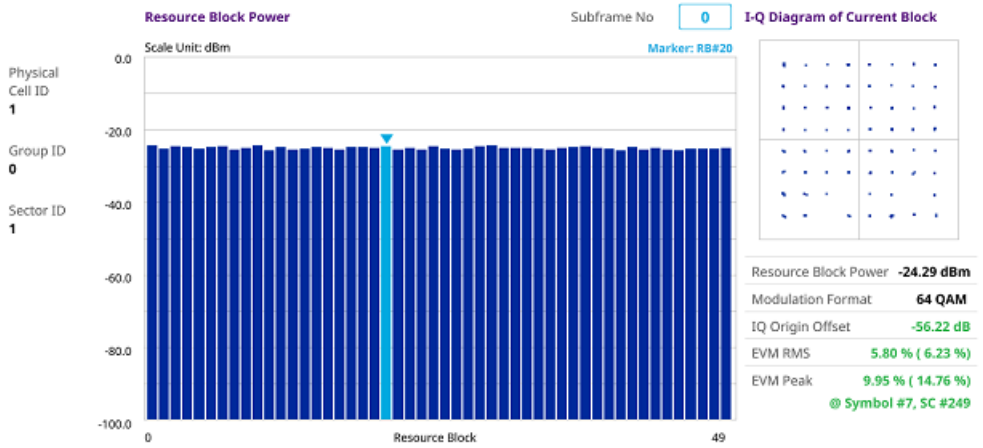
You can use **Marker** to place a marker on a resource block and display the IQ diagram for the selected resource block.

1 Tap **Menu** > **Marker**.

2 Tap **RB Number** to select the resource block to be marked and enter the resource block number using the on-screen keyboard.
The marker appears on the selected resource block.

3 Tap **Marker View** between **On** and **Off** to display or dismiss the result of the selected resource block.

Data Channel measurement with LTE/LTE-A TDD Analyzer



Control Channel

The Control Channel measures the constellation for the specified control channel as well as modulation accuracy of the control channel at the specified subframe.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

> **NOTE:**
> For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

> **NOTE:**
> The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

9 Tap **Subframe Assignment** and select the number of uplink/downlink using the on-screen keyboard.

10 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To set the delay, tap **Delay** and enter the value using the on-screen keyboard to set the amount of delay in µs.

NOTE:
The Delay setting is used only when there is a time offset in the signals to be measured.

f To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

g To set the threshold for PDCCH, tap **PDCCH Threshold** and enter a value by using the on-screen keyboard.

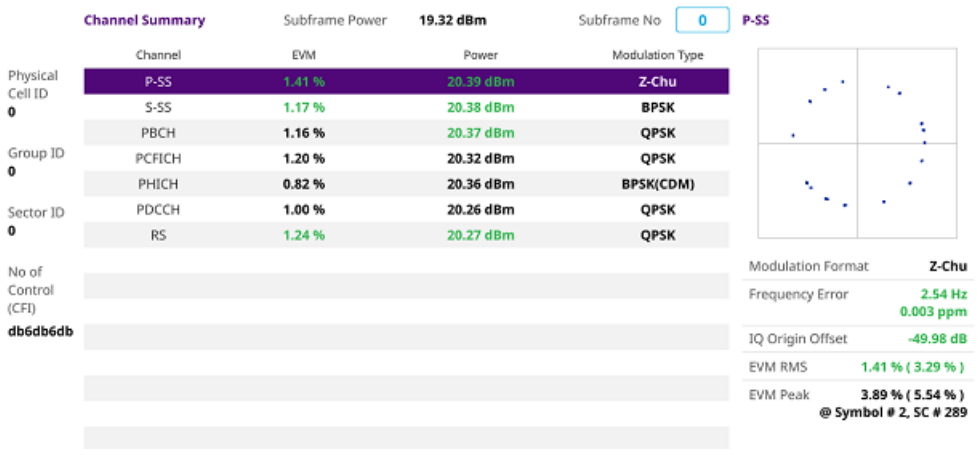
h Tap **PDCCH Mode** to select **REG** to calculate EVM based on Resource Element Group or **Average** to calculate EVM after adding all the PDCCH signals from one subframe.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Frequency error/ RS EVM/ P-SS EVM/ S-SS EVM/ DL RS Power/ P-SS Power/ S-SS Power/ PBCH Power/ IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Control Channel measurement with LTE/LTE-A TDD Analyzer



Subframe

The Subframe measures the modulation accuracy of all the data and control channels at the specified subframe (1 ms).

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

> **NOTE:**
> For MBMS testing, this subframe number must be either 0 nor 5 as these subframes 0 and 5 are not available for MBMS and it must be set to the MBMS transmitted channel's subframe number.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 *Optional.* Tap **CFI** and select the type **Manual** or **Auto**.
Auto lets the instrument set the number of OFDM symbols used for transmitting PDCCHs in a subframe, and **Manual** sets the number of OFDM symbols manually.

> **NOTE:**
> The set of OFDM symbols that can be used for PDCCH in a subframe is given by **0**, **2**, **3** or **4** in 1.4 MHz bandwidth and **1**, **2** or **3** in other bandwidth.

7 *Optional.* Tap **PHICH Ng** to set the number of PHICH groups (Ng): **1/6**, **1/2**, **1**, **2**, **E-1/6**, **E-1/2**, **E-1**, or **E-2**.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna.

9 Tap **Subframe Assignment** and select the number of uplink/downlink from one to six using the on-screen keyboard.

10 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To set the delay, tap **Delay** and enter the value using the on-screen keyboard.

NOTE:
The Delay setting is used only when there is a time offset in the signals to be measured.

f To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

g To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

h To set the threshold for PDCCH, tap **PDCCH Threshold** and enter a value by using the on-screen keyboard.

i Tap **PDSCH Modulation Type**, and then select the modulation type option:**Auto, QPSK, 16 QAM, 64 QAM, 256 QAM, E-TM3.3, E-TM3.2, E-TM3.1a, E-TM3.1, E-TM2a, E-TM2, E-TM1.2 or E-TM1.1**.
If two or more modulation types are used in a frame, select **Auto**. If the PDSCH uses the same modulation type in a frame or in a subframe, select a specific modulation type to get more accurate EVM.

j Tap **PDCCH Mode** to select **REG** to calculate EVM based on Resource Element Group or **Average** to calculate EVM after adding all the PDCCH signals from one subframe.

k Tap **PDSCH Precoding** to set **On** or **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **Frequency error/ EVM/ Power/ Time Error** to set the **Test limits** to **On** or **Off** with setting **High and Low Limits/required options** using the on-screen keyboard to enable or disable Pass/Fail indication.

Using marker

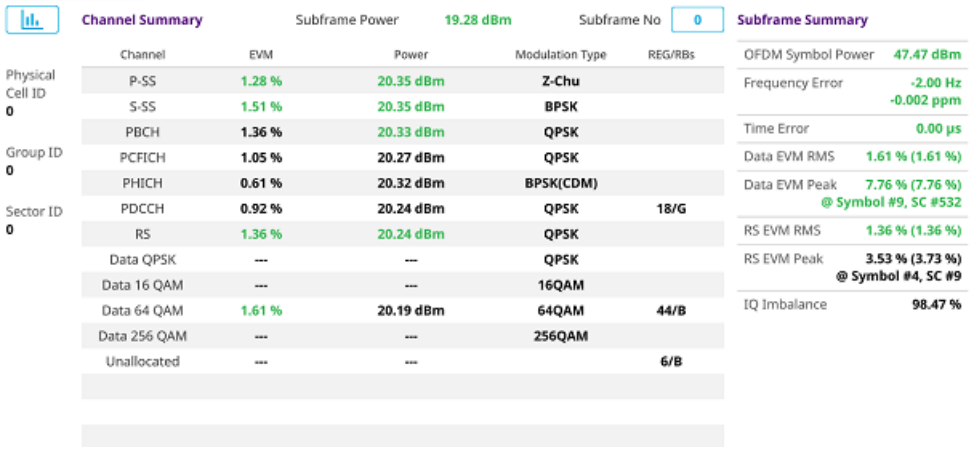
If you turn the Chart view on, you can use **Marker** to place a marker at a specific symbol.

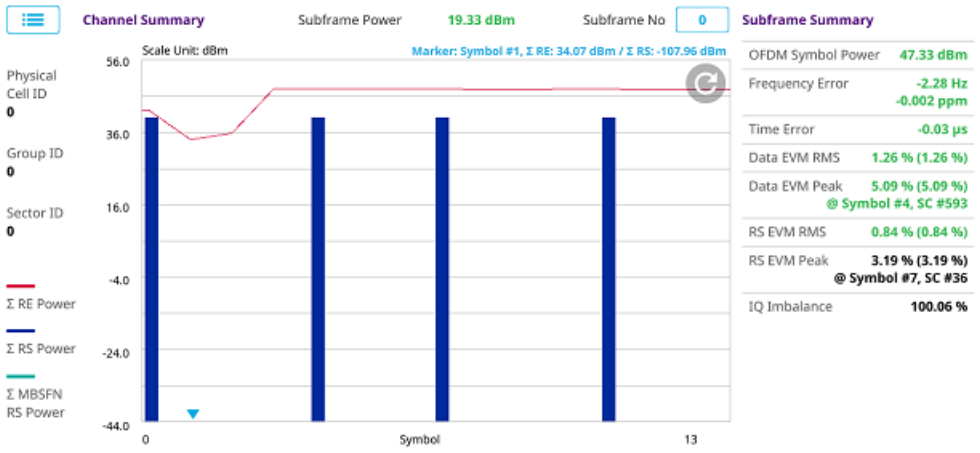
1 Tap **Menu** > **Marker**.

2 Tap **Marker View** between **On** and **Off** to display or dismiss the marker on the chart.

3 Tap **Symbol** to select the symbol number to which the marker is placed. Enter the value using the on-screen keyboard.

Subframe measurement with LTE/LTE-A TDD Analyzer





Time Alignment Error

In eNode-B supporting Tx Diversity transmission, signals are transmitted from two or more antennas. These signals shall be aligned. The time alignment error in Tx diversity is specified as the delay between the signals from two antennas at the antenna ports.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

5 *Optional.* To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

6 *Optional.* To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

7 To set the delay, tap **Delay** and enter the value using the on-screen keyboard to set the amount of delay in µs.

NOTE:
The Delay setting is used only when there is a time offset in the signals to be measured.

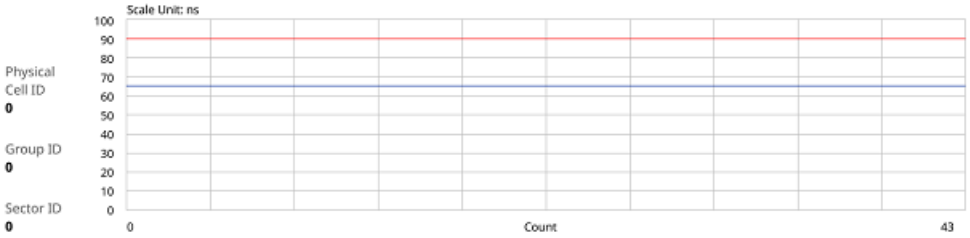
8 *Optional.* To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch the **RS EVM/ DL RS Power/ MIMO** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

Time Alignment Error measurement with LTE/LTE-A TDD Analyzer



Time Alignment Error	65.10 ns (65.10 ns) / ANT0 - ANT3	RS Power Difference	0.35 dB

Antenna	RS Power	RS EVM	RS Time Difference
0	13.99 dBm	0.89 %	0.00 ns
1	14.32 dBm	1.08 %	32.55 ns
2	14.33 dBm	1.47 %	32.55 ns
3	14.33 dBm	1.71 %	65.10 ns

Data Allocation Map

The Data Allocation Map function represents data allocation as a frame.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** to set the number of subframe using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.
Auto lets the instrument detect the Physical Cell ID for the LTE signal automatically, and **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 Tap **Subframe Assignment** and select the number of uplink/downlink using the on-screen keyboard.

7 *Optional.* To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

8 *Optional.* Tap **Miscellaneous** under **Menu** to do the following as needed.

a To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

b To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

c To turn the Multimedia Broadcast Multicast Service (**MBMS**) feature on or off, tap **MBMS** and select **On** or **Off**.
For proper MBMS testing, you need to set the **Subframe Number** in the upper right screen with the same PMCH subframe number.
If this setting is on, the measurement item MBSFN RS appears in the result table.

d To set the Multicast Broadcast Single Frequency Network (**MBSFN**) detection automatically or manually for MBMS testing, tap **MBSFN** and select **Auto** or **Manual**.
An automatically detected or manually entered MBSFN ID appears on the screen.

e To select the Cyclic Prefix, tap **Cyclic Prefix** and select **Normal** or **Extended**.

Setting display

1 Tap **Menu** > **Display**.

2 Select the display mode from the choice: **PDSCH**, **PMCH** or **Both**.

Using marker

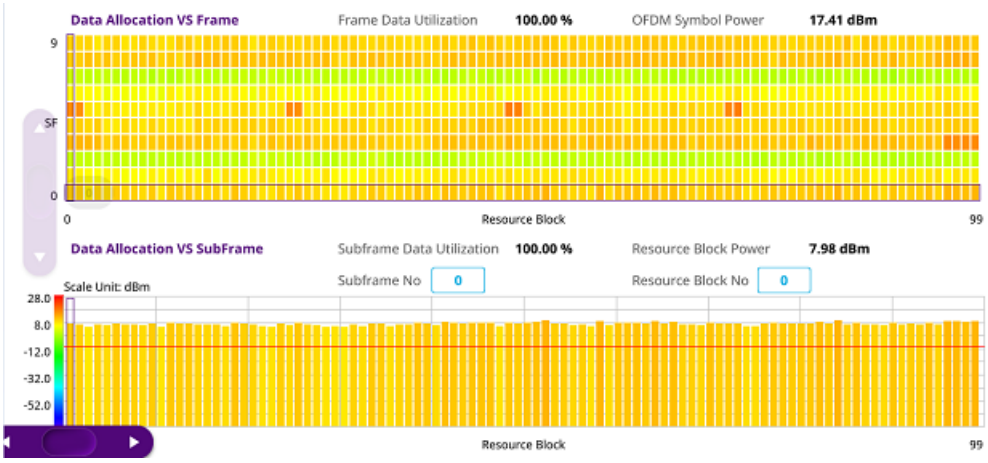
1 Tap **Menu** > **Marker**.

2 Tap the **Marker View** to **On** or **Off** to display or hide the marker on the chart.

3 To select the resource block number, tap the **RB Number** and enter a value by using the on-screen keyboard.

4 To select the subframe block number, tap the **Subframe No** and enter a value by using the on-screen keyboard.

Data Allocation Map measurement with LTE/LTE-A TDD Analyzer



Carrier Aggregation

Carrier aggregation enables a maximum of five multiple LTE carriers to be used together in order to provide high data rate required for LTE-Advanced. Component carriers to be aggregated can be intra-band contiguous, intra-band non-contiguous, or inter-band. The CA5G provides carrier aggregation measurements supporting for all the different modes with carrier aggregation bands added to the channel standard.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas, PHICH ng, and Bandwidth otherwise to **Off**.

3 Tap **CA Configuration** or tap the **Configuration** ( ) **icon** then the component carrier configuration window appears.

4 Select the number of the component carrier to be set between one and five by tapping the number in **Range** box.

5 Set the Range **On** to set parameters and view the results for the selected component carrier on the screen or **Off** to turn it off.

6 Tap **LAA** (License Assisted Access) and select one among the three options: **2.4 GHz**, **5 GHz**, or **Off**.

7 Set the following parameters as needed: **Center Frequency**, **Channel No**, **Bandwidth**, **Physical Cell ID**, **MBMS**, **MBSFN**, **MIMO**, **Antenna Port**, **CFI, PHICH Ng**, **Cyclic Prefix**, and **PDSCH Modulation Type**.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

a If you apply **Center Frequency**, **Channel No**, and **Bandwidth** all at once, tap the **Center Frequency List** ( ) icon and do the following:

- Tap the **Add** (+) icon and input **Center Frequency**, **Channel No**, and **Bandwidth** as required using the on-screen keyboard.
- Tap the **Apply** button to apply the changes. The screens moves to the Center Frequency List table.
- Highlight the one of the added lists and tap the **Configuration** icon that appears in gray to change the applied values.
- Tap the **Delete** icon to deleted the selected list(s).

NOTE:
You will be able to multi-select the added items and apply them all at once only if the Range number is On. If the Range 1 and 3 are On and you highlight No. 0,3, and 4, the first two highlighted lists, 0 and 3 are applied to each carrier 1 and 3.

8 Tap **EVM Detection Mode** and select **Single** or **Combine**.

- **Single:** Testing on one single antenna connected to your CA5G series with a cable
- **Combine:** Testing on multiple antennas connected to your CA5G series with a 2x1 or 4x1 combiner or an antenna

9 To select the subframe number to be measured, do one of the following:

- If the **EVM Detection Mode** is set to **Single**, tap **Subframe Number** and set the subframe number
- If the **EVM Detection Mode** is set to **Combine**, tap **Subframe Number** and then select 0 or 5

10 To set the threshold for PDSCH, tap **PDSCH Threshold** and enter a value by using the on-screen keyboard.

11 Tap **PDSCH Precoding** between **On** and **Off** to enable or disable the PDSCH precoding.

Setting limit

1 Tap **Menu** > **Limit**.

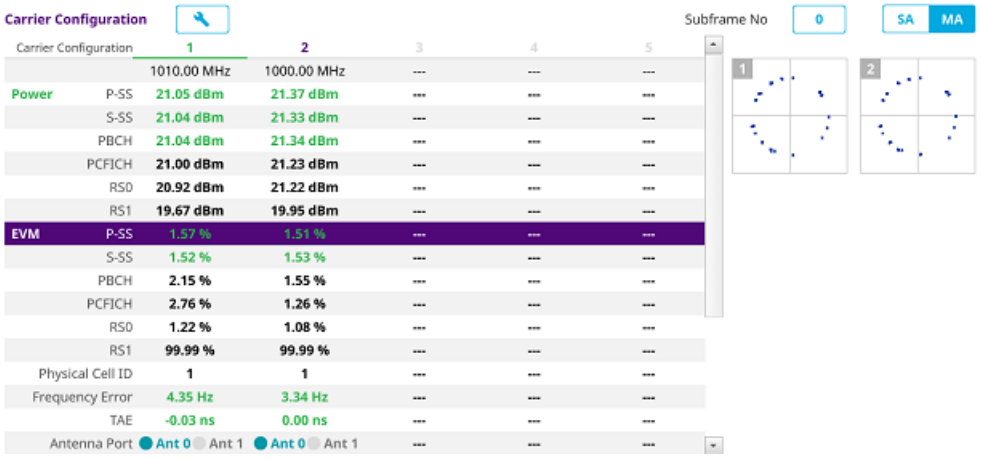
2 Tap **Frequency Error** to set the **Test limits** between **On** and **Off** and set **High** and **Low Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

3 Tap **EVM** to select **PDSCH EVM**, **RS EVM**, **P-SS EVM**, **S-SS EVM** or **PMCH EVM** and set the **Test limits** between **On** and **Off**. Then set **High Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

4 Tap **Power** to select the **DL RS Power**, **R-SS Power**, **S-SS Power**, **PBCH Power**, **Subframe Power** or **Channel Power** and set the **Test limits** between **On** and **Off**. Then set **High** and **Low Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

5 Tap **TAE** to set the **Test limits** between **On** and **Off**. Then enter the value using the on-screen keyboard for each **Intra Cont High**, **Intra Non-Cont High** and **Inter Band High** to enable or disable Pass/Fail indication.

Carrier Aggregation measurement with LTE/LTE-A TDD Analyzer



Power vs Time (Frame)

The Power vs. Time (Frame) measures the modulation envelope in the time domain, showing the power of each time slot in a LTE/LTE-A TDD signal.

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Subframe Number** and input the value from 0 to 9 using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets the specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

NOTE:
When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

7 To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

8 Tap **Cyclic Prefix** and select **Normal** or **Extended**.

9 Tap **Delay** and enter a value using the on-screen keyboard to set the amount of delay in **µs**.

10 Tap **Special Subframe** and enter a value using the on-screen keyboard.

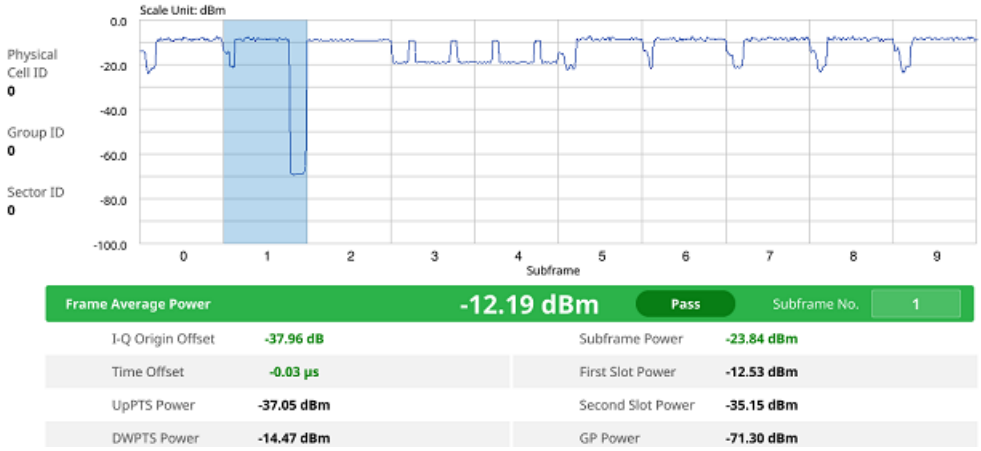
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch **Subframe Power/ Frame Avg Power/ Time Error/ IQ Origin Offset** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Power vs Time (Frame) measurement with LTE/LTE-A TDD Analyzer



Power vs Time (Slot)

The Power vs. Time (Slot) in LTE/LTE-A TDD Signal Analyzer measures the modulation envelope in the time domain, showing the signal rise and fall shapes of LTE/LTE-A TDD signal.

NOTE:
In this measurement, desirable level of the input power is lower than -10 dBm. If the input power to be measured is -10 dBm or higher, it is highly recommended that you use an external attenuator..

Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth otherwise to **Off**.

3 Tap **Bandwidth** and select the value from the following choices: **1.4 MHz**, **3 MHz**, **5MHz**, **10 MHz**, **15 MHz** or **20 MHz**.

4 Tap **Slot Number** to set the number of slot using the on-screen keyboard.

5 *Optional.* Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets the specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

> **NOTE:**
> When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

6 To select the number of antenna ports, tap the **MIMO** and select **2x2** or **4x4**.

7 To assign a antenna port number automatically or manually, tap the **Antenna Port** under **Antenna menu** and select the option: **Auto**, **Antenna 0**, **Antenna 1**, **Antenna 2**, or **Antenna 3**.
If the MIMO is set to 2x2, the antenna ports 2 and 3 are disabled.

8 Tap **Cyclic Prefix** and select **Normal** or **Extended**.

9 Tap **Delay** and enter a value using the on-screen keyboard to set the amount of delay in **µs.**

> **NOTE**
> The Delay setting is used only when there is a time offset in the signals to be measured.

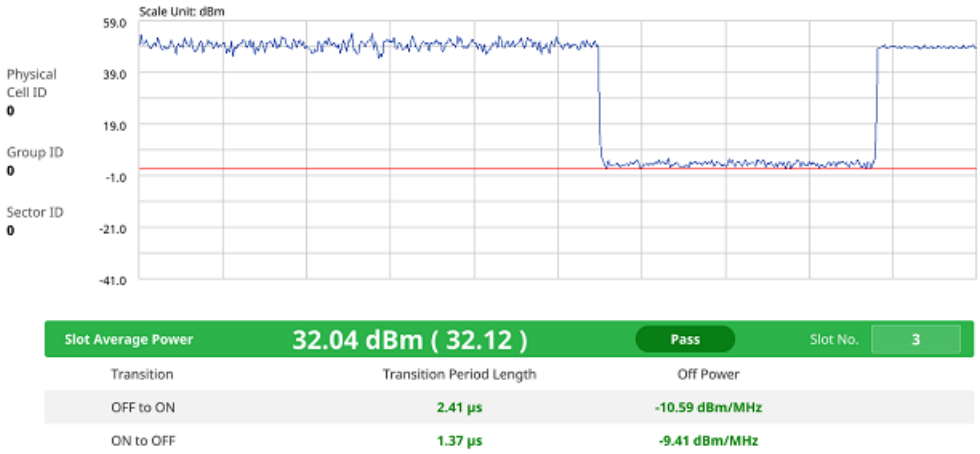
Setting limit

1 Tap **Menu** > **Limit**.

2 Tap to switch **Slot Avg Power/ Off Power/ Transition Period** to set the **Test limits** to **On** or **Off** with setting **High and (Low) Limits** using the on-screen keyboard to enable or disable Pass/Fail indication.

3 *Optional.* Tap the **Save** icon on the side bar and select the save option form the choices available for your measurement mode.

Power vs Time (Slot) measurement with LTE/LTE-A TDD Analyzer



Power Statistics CCDF

The Power Statistics Complementary Cumulative Distribution Function (CCDF) measurement characterizes the power statistics of the input signal. It provides PAR (Peak to Average power Ratio) versus different probabilities.

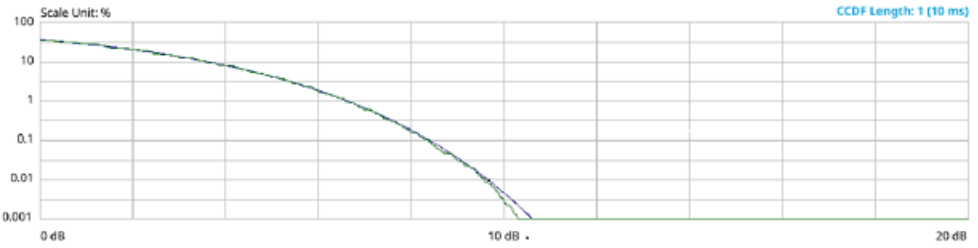
Setting measure setup

After configuring spectrum measurement in "Configuring Spectrum Measurements", you can set the measure setup to continue your measurement. The measurement settings can be saved and recalled as a file by selecting File Type as Setup and load the file onto the instrument using the **Save/Load** icons on the side bar.

1 Tap the **Setup** ( )icon on the side bar.

2 Tap **CCDF Length** and select the value between 1 and 100.

CCDF measurement with LTE/LTE-A TDD Analyzer



Power		Probability		Distribution	
Average Power	-52.74 dBm	[10 %]	3.55 dB	4 dB	8.19 %
Max Power	-41.78 dBm	[1 %]	6.55 dB	8 dB	0.16 %
Crest Factor	10.96 dB	[0.1 %]	8.34 dB	12 dB	0.00 %
		[0.01 %]	9.55 dB	16 dB	0.00 %
		[0.001 %]	10.26 dB	20 dB	0.00 %

Conducting online route map

Online OTA route map

LTE online OTA route map enables you to download a map automatically when connected to the network then you can continue route map measurement using the downloaded map whether you are online or offline. It traces the power level of the strongest LTE signal in terms of RSRP corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the strongest LTE signal for each measurement point, including its measurement time and geographical location.

Loading a map

1 Tap the **Load** icon( ) on the side bar.

2 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

3 Tap the **Load** button on the screen.

Once you load the map, you can also control the map using the following icons on the map. (The left-most Cellsite icon is activated when you import the cellsite information file. Refer to below **Importing cellsite DB**.)

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.

	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 Connect a GPS receiver to your CellAdvisor 5G for outdoor mapping.

2 Tap the **Setup** ( ) icon on the side bar.

3 Tap to switch **MIB Decoding** to **On** when you do not know the number of transmitter antennas and Bandwidth or **Off**.

4 Tap to switch **Plot Item** to RSRP, RSRQ, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP, S-SS Ec/Io, or P-SS SNR.

5 Tap **Bandwidth** and select the value from the following choices: 1.4 MHz, 3 MHz, 5MHz, 10 MHz, 15 MHz, or 20 MHz.

6 Optional. Tap **Physical Cell ID** and select the type **Manual** or **Auto**.

- **Auto** lets the instrument detect the Physical Cell ID for the LTE signal automatically.
- **Manual** sets a specific Physical Cell ID for the LTE signal manually in order to speed up the synchronization with a BTS.

	NOTE When there are no PSS and SSS signals, set the PCI Cell ID to Manual and input the required PCI number to search CRS.

	NOTE: The instrument does not automatically save the collected data. It is recommended that you save the result. Otherwise, you will lose all the collected data.

Logging data

1 Follow the **step 1 to 4** in Setting measure setup.

2 Tap the **Testing** ( ) button on the right panel of the map to start plotting on the map.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

3 Tap the **Stop** ( ) button to stop plotting.

4 Tap the **Pause** ( ) button to pause plotting, then the GPS point cannot be plotted.

5 If you select the **Stop** button, the Plot Stop popup window appears and tap **Yes**.

6 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB.

Viewing the logging data

1 Load the saved logging file using the **Load** ( ) icon on the side bar. Make sure the file extension is `.orm` or `.orr`.

2 Tap to switch **Plot Item** to RSRP, RSRQ, RS SINR, S-SS RSSI, P-SS RSRP, S-SS RSRP, S-SS Ec/Io, or P-SS SNR.

3 Tap the **Apply** button.
The point color of the map changes to the corresponding value, and if there is no detected LTE signal, the point will become gray color.

Setting limit

You can set the thresholds for the two different color indicators. The maximum value is the Limit for Excellent, and the minimum value is the Limit for Poor. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap **Menu** > **Limit**.

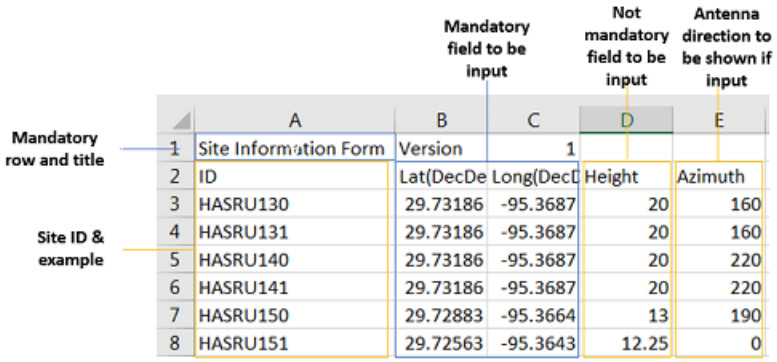
2 Tap **Excellent** and set a value using the on-screen keyboard.

3 Tap **Poor** and set a value using the on-screen keyboard.

Importing cellsite DB

You can import the site DB by creating the 5G site information form.

1 Create the 5G site information with an excel file as below.



	A	B	C	D	E
1	Site Information Form	Version	1		
2	ID	Lat(DecDe	Long(Decl	Height	Azimuth
3	HASRU130	29.73186	-95.3687	20	160
4	HASRU131	29.73186	-95.3687	20	160
5	HASRU140	29.73186	-95.3687	20	220
6	HASRU141	29.73186	-95.3687	20	220
7	HASRU150	29.72883	-95.3664	13	190
8	HASRU151	29.72563	-95.3643	12.25	0

2 Input the two mandatory fields: **Lat (DecDeg)** and **Long (DecDeg)**.

3 Input the **Azimuth** filed if you want to check the direction of antenna.

4 Make sure to save the file as (Comma delimited) (`*.csv`).

5 Copy the file to the USB memory stick and insert it to the **USB A** or **USB B** port of the instrument.

6 Tap the **Load** ( ) icon on the side bar.

7 Import the saved file.
Once the file is loaded, the following cellsite information appears with an icon.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom..

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

4 Tap the **Capture** button to start capturing the map. .
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

	NOTE: If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online route map measurement

Using Scanner

Introduction

A Scanner is a radio receiver that can automatically tune or scan two or more discrete frequencies and multi-channels, indicating when it finds a signal on one of them and then continuing scanning when that frequency goes silent.

You can measure up to 20 channels with this channel scanner. Using existing format-based or custom parameters, you will be able to easily verify improper multi-channel power levels. The frequency has been extended up to 18.5 GHz in addition to existing 24 GHz to 40 GHz. Channel Scanner supports N type and K type port selection automatically using top right panel ( ) icon. You will need to connect the RF input port correctly on your instrument based on the frequency range (9 kHz to 18 GHz/9 kHz to 44 GHz).

- Scanner
  - Channel Scanner
  - Frequency Scanner
  - Custom Scanner (Channel or Frequency)
  - Route Map
- Online Route Map
  - Online Route Map

Selecting mode and measure

To start measurement, do the following steps:

1 Tap **Scanner** on the **MODE** panel.

2 Tap any measurement mode from the following choices:

Scanner > **Channel Scanner**, **Frequency Scanner**, **Custom Scanner**, or **Route Map**

Online Route Map > **Online Route Map**

Channel scanner

Before starting the Channel Scanner, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

Setting measure setup

You need to set the channel to be scanned.

1 Tap the **Menu** ( ) icon on the side bar and tap **Channel**.
Channel menus appears.

2 Tap **Channel Standard** to select the standard channel.
The channel standard window appears.

   a Select **Technology** and then select the band to be measured.

3 Tap **Link** to switch it to **Uplink** or **Downlink**.

4 Tap **Start Channel** to set the starting channel using the on-screen keyboard.

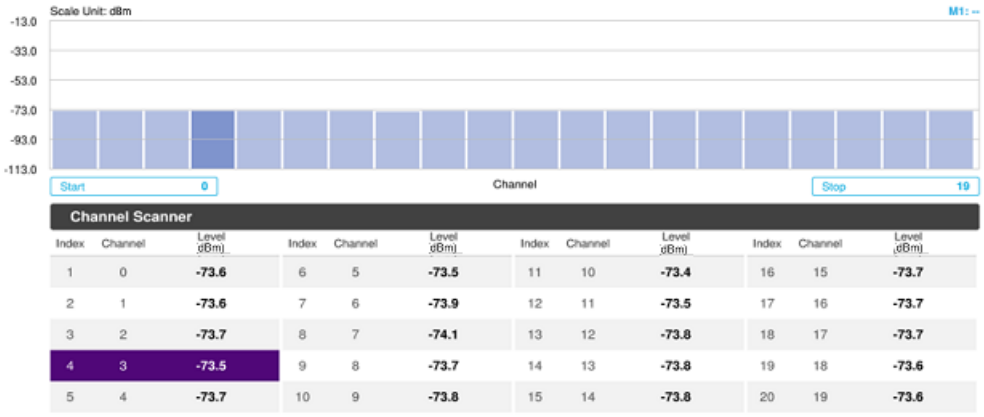
5 Tap **Channel Step** to set the amount of channel increment in scanning channel using the on-screen keyboard.

6 Tap **Integration BW** and input a value using the on-screen keyboard.

7 Tap **# of Channels** to set the number of channels to be displayed in the measurement table using the on-screen keyboard.

Channel scanner measurement

Test results can be saved as a `.csv` file format so that you can work on it in any spreadsheet software.



Channel Scanner

Index	Channel	Level (dBm)	Index	Channel	Level (dBm)	Index	Channel	Level (dBm)	Index	Channel	Level (dBm)
1	0	-73.6	6	5	-73.5	11	10	-73.4	16	15	-73.7
2	1	-73.6	7	6	-73.9	12	11	-73.5	17	16	-73.7
3	2	-73.7	8	7	-74.1	13	12	-73.8	18	17	-73.7
4	3	-73.5	9	8	-73.7	14	13	-73.8	19	18	-73.6
5	4	-73.7	10	9	-73.8	15	14	-73.8	20	19	-73.6

NOTE:

You can go to **Menu** > **Limit** to analyze your measurements with the limit line using the on-screen keyboard and the channel limit turning channel limit table On or Off.

You can go to **Menu** > **Marker** to analyze your measurements with markers. See "Using marker" for details.

Frequency scanner

Before starting the Frequency Scanner, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

Setting measure setup

You need to set the frequency to be scanned.

1 Tap the **Menu** ( ) icon on the side bar and tap **Frequency**.
Frequency menus appears.

2 Tap **Start Frequency** to set the starting center frequency using the on-screen keyboard.

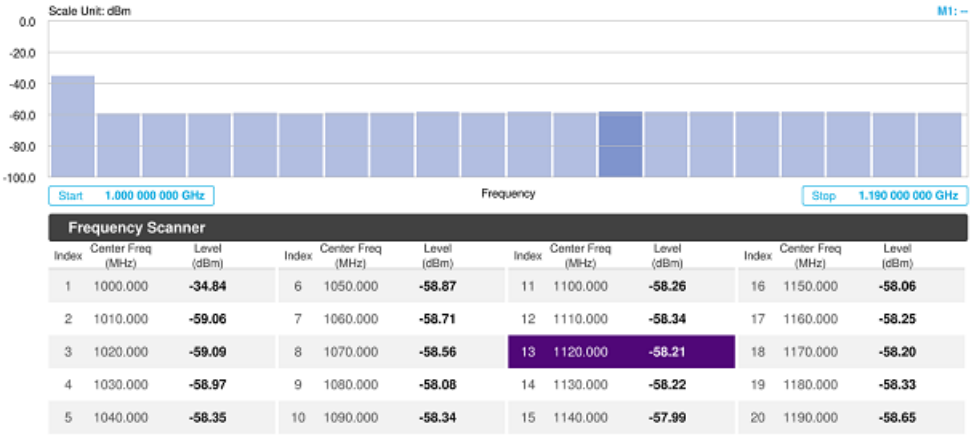
3 Tap **Frequency Step** to set the amount of frequency increment in scanning channel using the on-screen keyboard.

4 Tap **Integration BW** and input a value using the on-screen keyboard.

5 Tap **# of Frequency** to set the number of channels to be displayed in the measurement table using the on-screen keyboard.

Frequency scanner measurement

Test results can be saved as a `.csv` file format so that you can work on it in any spreadsheet software.



Frequency Scanner

Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)
1	1000.000	-34.84	6	1050.000	-58.87	11	1100.000	-58.26	16	1150.000	-58.06
2	1010.000	-59.06	7	1060.000	-58.71	12	1110.000	-58.34	17	1160.000	-58.25
3	1020.000	-59.09	8	1070.000	-58.56	13	1120.000	-58.21	18	1170.000	-58.20
4	1030.000	-58.97	9	1080.000	-58.08	14	1130.000	-58.22	19	1180.000	-58.33
5	1040.000	-58.35	10	1090.000	-58.34	15	1140.000	-57.99	20	1190.000	-58.65

NOTE:

You can go to **Menu** > **Limit** to analyze your measurements with the limit line using the on-screen keyboard and the channel limit turning channel limit table On or Off.

You can go to **Menu** > **Marker** to analyze your measurements with markers. See "Using marker" for details.

Custom scanner

Before starting the Frequency Scanner, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

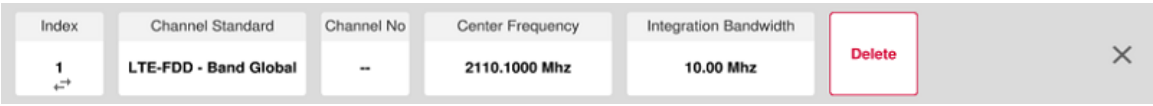
Setting measure setup

You can customize channels or frequencies to be scanned.

To set the channels to be scanned

1 Tap the **Setup** ( ) icon on the side bar.

2 Tap **Configuration** or Tap the **Edit** icon on the result table.
Setup table appears as below.



3 Tap **Channel Standard** to select the channel standard.
The channel standard window appears.

4 Select **Technology** and then the band to be measured by tapping.

5 Tap the **Apply** button to apply the settings.

6 Tap to switch the **Link** to **uplink** or **downlink**.

7 Tap **Index** and select the number from 1 to 20.

8 Tap **Channel No** to set the channel number for the selected index using the on-screen keyboard.
The instrument displays a corresponding center frequency for the channel number.

9 Tap **Integration Bandwidth** to set the integration bandwidth for the selected index using the on-screen keyboard.

10 Tap to switch the **Delete** button to **Add** to add more channels to be scanned and repeat steps **7-9**.

11 Tap the **X** button to dismiss the channel list window and view the scanning result.

To set the frequencies to be scanned

1 Tap the **Index** and select the number from 1 to 20.

2 Tap **Center Frequency** to set the center frequency for the selected index using the on-screen keyboard.

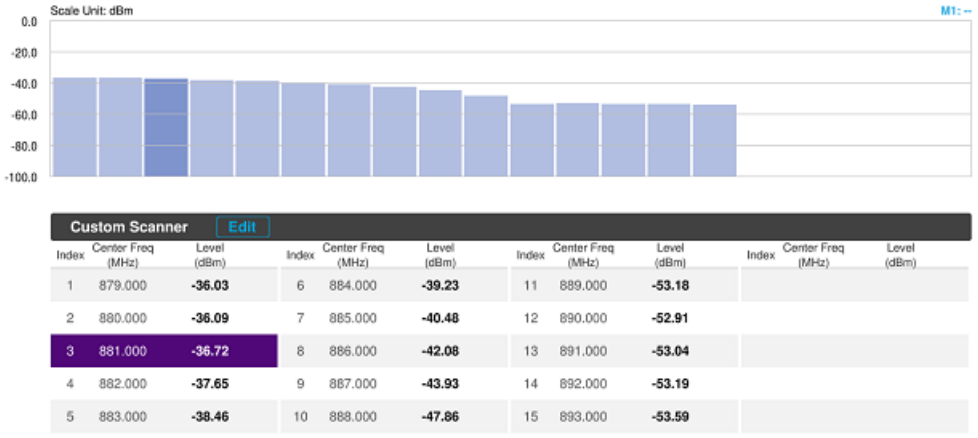
3 Tap **Integration Bandwidth** to set the integration bandwidth for the selected index using the on-screen keyboard.

4 Tap to switch the **Delete** button to **Add** to add more channels to be scanned and repeat steps **1-3**.

5 Tap the **X** button to dismiss the channel list window and view the scanning result.

Custom scanner measurement

Test results can be saved as a `.csv` file format so that you can work on it in any spreadsheet software.



Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)	Index	Center Freq (MHz)	Level (dBm)
1	879.000	**-36.03**	6	884.000	**-39.23**	11	889.000	**-53.18**			
2	880.000	**-36.09**	7	885.000	**-40.48**	12	890.000	**-52.91**			
3	881.000	**-36.72**	8	886.000	**-42.08**	13	891.000	**-53.04**			
4	882.000	**-37.65**	9	887.000	**-43.93**	14	892.000	**-53.19**			
5	883.000	**-38.46**	10	888.000	**-47.86**	15	893.000	**-53.59**			

NOTE:

You can go to **Menu** > **Limit** to analyze your measurements with the limit line using the on-screen keyboard and the channel limit turning channel limit table On or Off.

You can go to **Menu** > **Marker** to analyze your measurements with markers. See "Using marker" for details.

Route map

Channel Scanner route map traces the power level of the channel power and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Loading a map

To use any features related to maps, you need to download and install the maps on the CellAdvisor 5G. The VIAVI JDMapCreator will help you download maps. Make sure the JDMapCreator application on your computer is connected to the instrument via LAN. You can send a map file with a single layer to the instrument directly by using the **Send to EQP** menu in JDMapCreator. For more information on how to use the JDMapCreator, see the *JDMapCreator 2.0 User Guide*.

1 Plug in your USB flash drive that has a map file in `.mcf` file type created in JDMapCreator.

2 Tap the **Load** icon( ) on the side bar.

3 Navigate the map file you want to open.
The File Information pane displays the file properties including its name, size, type and date modified.

4 Tap the **Load** button on the screen.

Once you loaded the map, you can also control the map using the following icons on the map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to switch to the full screen map view.
	Tap to zoom in the map.
	Tap to zoom out the map.
	Tap and select the area where you want to expand.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the the **Cancel** or **Apply** button when Display pop-up window appears.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap to switch the **Plot Point** to **GPS**, **Position** or **Time**.

- **a** To collect data/plot points automatically as you move around in a vehicle or outside (outdoor), select **GPS** and then tap to switch to the **Screen Mode** between **Map** and **Full**.
  With the **Map** setting, you can view only the collected points that can be seen within the boundary of the loaded map. With the **Full** setting, you can view all the collected points of the route without the loaded map.
- **b** To collect data/plot points manually in indoor layout without a GPS antenna, select **Position**.
- **c** To collect data/plot points based on time, select **Time**.

5 Tap **Configuration** to continue with setup appeared in the setup table.

- **a** Tap the number to switch the Index number. You can select up to 20 index numbers.
- **b** Tap to switch the **Link** to **Uplink** or **Downlink**.
- **c** Tap **Channel Standard** and select the required channel standard.
- **d** Tap **Channel Number** and input the required channel number using the on-screen keyboard.
- **e** Tap **Center Frequency** and input the required value using the on-screen keyboard.
- **f** Tap **Integrated Bandwidth** and input the required value using the on-screen keyboard.
- **g** Tap the **Add** button to apply the settings.

6 Tap the **Start** button ( ) on the right panel of the map to start plotting for the Position or Time setting. Touch directly on the screen and tap to collect data and plot points on the loaded map. For the Position setting, you can change the direction of the route with screen touch. For the Time setting, when you first touch screen a purple triangle appears on the point and the "Number of n" appears in the bottom left of the map. The instrument interpolates points in between two enters on a straight dotted line. The max count is 2560, and the time interval is 0.5 s.

7 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS cannot be plotted.

8 Tap to switch **Plot** to **Stop** to stop plotting.

9 If you start test and select **Menu** > **Map** > **Plot Point > Position** you can undo by tapping the **Start** button.

10 If you select **Stop** button, **Plot Stop** popup window appears and tap **Yes**.

10 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB..

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	→ Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	→ Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Route map with Channel Scanner

NOTE:
When you tap the **Start** (Testing) button, the corresponding power will show on the measurement screen.

Online route map

Channel Scanner route map traces the power level of the channel power and corresponding a particular time and geographical position and presents it in a geographical map as a measurement point. All the collected measurements can be exported for post-processing purposes, including data of the eight strongest beams for each measurement point, including its measurement time and geographical location.

Controlling a map

See the following table to control a map.

Icon	Description
	Tap to go to your current location on the map. Once tapped, the purple icon appears on the map indicating your current location.
	Tap to zoom in the map.
	Tap to zoom out the map.

Setting measure setup

Before starting the Route Map measurement, you need to set Spectrum measurements displayed on the quick access and display tab. See "Configuring Spectrum Measurements" for more details.

1 If required, connect a GPS receiver to your CellAdvisor 5G for outdoor mapping. Indoor mapping does not necessarily need a GPS antenna.

2 Tap the the **Cancel** or **Apply** button when Display pop-up window appears.

3 Tap the **Setup** ( ) icon on the side bar.

4 Tap **Configuration** to continue with setup appeared in the setup table.

- **a** Tap the number to switch the Index number. You can select up to 20 index numbers.
- **b** Tap to switch the **Link** to **Uplink** or **Downlink**.
- **c** Tap **Channel Standard** and select the required channel standard.
- **d** Tap **Channel Number** and input the required channel number using the on-screen keyboard.
- **e** Tap **Center Frequency** and input the required value using the on-screen keyboard.
- **f** Tap **Integrated Bandwidth** and input the required value using the on-screen keyboard.
- **g** Tap the **Add** button to apply the settings.

5 Tap the **Start** button ( ) on the right panel of the map to start plotting.
When you select a point on the map, a marker appears and the Information window appears on the right panel.

7 Tap the **Pause** button ( ) to pause plotting, then the **Pause** button changes to (Paused) and GPS cannot be plotted.

8 Tap to switch **Plot** to **Stop** to stop plotting.

9 If you select **Stop** button, **Plot Stop** popup window appears and tap **Yes**.

10 Tap **Yes** when the Save pop-up window appears and save the logging file to your USB..

Setting limit

You can set the thresholds for the two different color indicators, red and blue. The maximum value is the Limit for **Excellent**, and the minimum value is the Limit for **Poor**. See below to check the plot point color based on the Legend Color Table.

Red	Green	Blue	Color
0	0	255	Poor
0	32	255	
0	64	255	
0	128	255	
0	255	255	
0	255	170	
0	255	85	
0	255	0	
85	255	0	
170	255	0	
255	255	0	
255	128	0	
255	64	0	
255	32	0	
255	0	0	Excellent

1 Tap the rectangle with value before color legend bar on the right panel.

2 Set a value for **Poor** (minimum value) using the on-screen keyboard.

3 Tap the rectangle with value after color legend bar on the right panel.

4 Set a value for **Excellent** (maximum value) using the on-screen keyboard.

Creating a map

You can create a map online and continue to conducting a route map analysis using the created map even when there is no Ethernet connection.

1 Tap the **Map Creator** button on the right panel at the bottom.

2 Tap the **Search** box and input the location using the on-screen keyboard and select one of the options as required.

3 Tap the **Zoom Level** box to capture the map with corresponding zoom level.

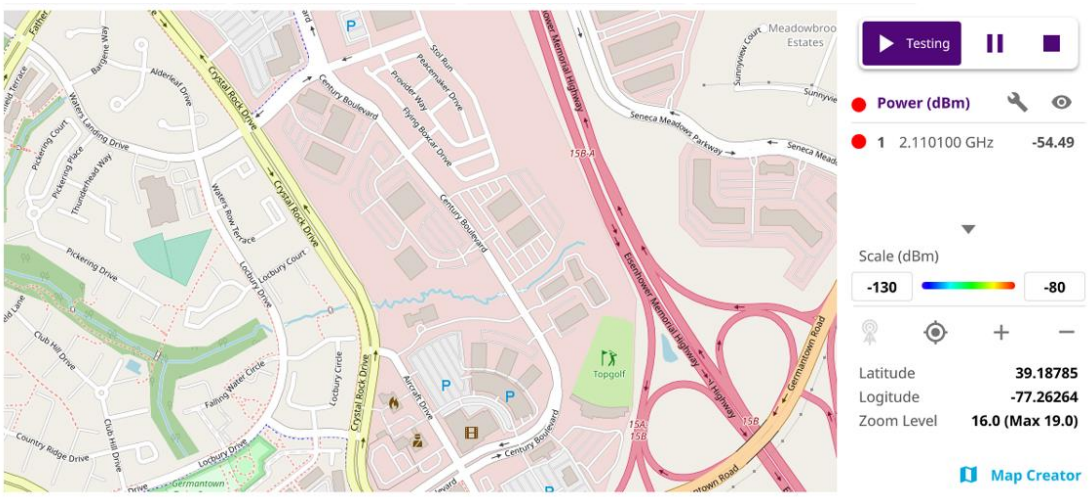
4 Tap the **Capture** button to start capturing the map.
Once the map is captured, the capturing completed pop-up will appear.

5 Select between two options: Save in the system or Save as file.

6 Tap the **Done** button.

NOTE:
If you have unsaved measurement data (map) and start measuring by tapping the Testing button or by tapping another measurement mode, a pop-up window will appear asking whether you will restore the unsaved data or not.

Online route map with Channel Scanner



NOTE:
When you tap the **Start** (Testing) button, the corresponding power will show on the measurement screen.

Appendix

A. Ordering information

The Warranty Period for VIAVI Solutions Accessories shall apply to all the standard and optional accessories listed below. The warranty period varies by product and is generally one (1) year unless otherwise specified.

CA5000 CellAdvisor 5G

Internal Hardware Options

Catalog Number	Description
CA5000-F001	Frequency for 5G NR FR1 up to 6 GHz
CA5000-F002	Frequency for 5G NR FR1 up to 6 GHz and FR2 up to 40 GHz
CA5000-F001-O	Frequency for 5G NR FR1 up to 6 GHz with optic HW
CA5000-F002-O	Frequency for 5G NR FR1 up to 6 GHz and FR2 up to 40 GHz with optic HW
CA5000F002N	Frequency for 5G NR FR1 6 GHz and FR2 40 GHz with two RF ports
CA5000F002N-O	Frequency for 5G NR FR1 6 GHz and FR2 40 GHz with optic HW and two RF ports
CA5000-F030	Frequency up to 30 GHz with two RF ports
CA5000-F044	Frequency up to 44 GHz with two RF ports

Hardware Upgrade Options

Catalog Number	Description
CA5000-FU02	Frequency upgrade to FR2 up to 40 GHz (Requires F001 or F001-O)
CA5000-OU01	Upgrade Optic Hardware
CA5000-FU30	Frequency upgrade to 30 GHz with two RF ports

CA5000-FU44	Frequency upgrade to 44 GHz with two RF ports

Bandwidth Range

Catalog Number	Description
CA5000-B100	100 MHz/100 MHz analysis bandwidth

Options

Catalog Number	Description
CA5000-S002	GPS connectivity with antenna
CA5000-S003	Bluetooth connectivity
CA5000-S004	Wi-Fi connectivity
CA5000S005	2 port transmission measurement
CA5000S006	RF CW source
CA5000-S010	50 MHz bandwidth real-time spectrum analyzer
CA5000-S011	100 MHz bandwidth real-time spectrum analyzer (Requires B100)
CA5000-S012	Upgrade RtSA BW from 50 MHz to 100 MHz (Requires B100 and S010)
CA5000-S013	Interference analyzer
CA5000-S014	Route map
CA5000-S015	Gate sweep
CA5000-S016	Channel scanner

CA5000S032	LTE/LTE-A FDD signal analyzer
CA5000S033	LTE/LTE-A TDD signal analyzer
CA5000S032	LTE/LTE-A FDD signal analyzer
CA5000-S040	5G TF signal analyzer (Requires B100)
CA5000S041	5G NR signal analyzer
CA5000S050	RFoCPRI line rates 1 to 7 interference analyzer
CA5000S051	RFoCPRI line rate 8 interference analyzer
SAAADVISOR	Smart Access Anywhere for CellAdvisor Products

Accessories

Catalog Number	Description
G700050150	98 Wh Lithium-Ion Battery
G700050340	RF omni antenna Type-K (f), 26 GHz to 40 GHz
G700050390	GPS SMA mount antenna
G700050431	CA5G soft carrying case
G700050551	RF cable DC to 40 GHz, K(m) to K(f), 0.8 m

B. RoHS information

This appendix describes the RoHS (Restriction of Hazardous Substances) information, which is a mandatory requirement from China. The RoHS directive consists in the restriction on the use of certain hazardous substances in electrical or electronic equipment sold or used in the European Union, after July 1, 2006. These substances are: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers.

“中国 RoHS”

《电子信息产品污染控制管理办法》（信息产业部，第 39 号）

附录 (Additional Information required for the Chinese Market only)

本附录按照“中国 RoHS”的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

产品系列: CA5000
(Product Family)

环保使用期限：

本标识标注于产品主体之上，表明该产品或其配件含有有毒、有害物质（详情见下表）。
其中的数字代表在正常操作条件下至少在产品生产日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。
有关正常操作条件，请参见产品用户手册。
产品生产日期请参见产品的原始校准证书。

有毒、有害物质的类型和所在部件

	有毒、有害物质和元素					
元器件 (Component)	铅(Pb)	汞 (Hg)	镉(Cd)	六价铬 (CR^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	O	O	O	O	O
内部配线 (Internal wiring)	X	O	O	O	O	O
显示器 (Display)	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O
电源 (Power Supply)	O	O	O	O	O	O
电工零件 (Electro-mechanical parts)	O	O	O	O	O	O
光模块 / 辅助模块 (Optical modules) / (Auxiliary modules)	X	O	O	O	O	O
金属外壳零件和紧扣件 (Metal case parts and fixings)	X	O	O	O	O	O
塑料外壳零件 (Plastic case parts)	O	O	O	O	O	O
标签和胶带 (Labels and tapes)	O	O	O	O	O	O
配件 (Accessories)						
外接电缆和适配器 (External cables and adapters)	X	O	O	O	O	O
USB	X	O	O	O	O	O
手册和其它印刷材料 (Handbooks and other printed material)	O	O	O	O	O	O
包装箱和缚带 (Carrying case and strap)	O	O	O	O	O	O
其它配件 (Other accessories)	X	O	O	O	O	O

本表是按照 S / T 11364 的规定编制的:
O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

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English

VIAVI Solutions

North America	**(Toll Free) 1-844-GO-VIAVI / 1-844-468-4284**
Latin America	**+52 55 5543 6644**
EMEA	**+49 7121 862273**
APAC	**+1 512 201 6534**
All other regions	**www.viavisolutions/contacts**
Email	**TAC@viavisolutions.com**