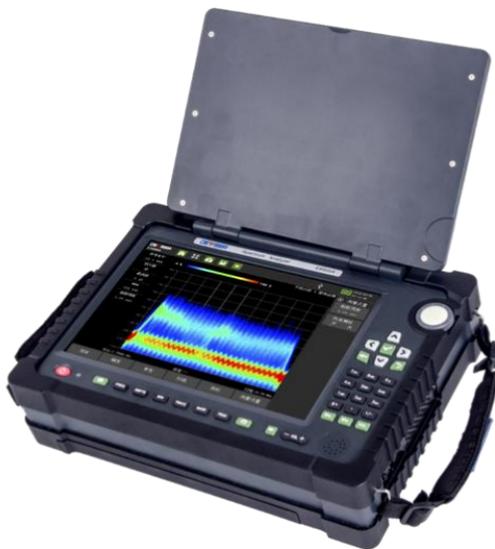


E8900A 5G NR Spectrum Analyzer

User Manual



Safety requirements

Security Level

Will be using this manual uses the following security prompt.

Warning This prompted some to note specifically refers to methods of operation hazard issues. Before fully aware of and meet the conditions referred to in this symbol may not be operating or treatment, or operation, or improper handling may cause injury.

Notice This prompted some to note specifically refers to methods of operation of dangerous items. Fully understand and meet the conditions referred to in this symbol can not be operated before or treatment, or operation, or improper handling may damage the instrument.

Before switching on the power switch of the instrument, you should confirm whether the AC power supply voltage supplied by the external AC-DC power adapter meets the requirements of the instrument. Non-conforming power supply may damage the adapter or instrument.

Because there are many electrical connectors inside the instrument, touching them may cause slight personal injury or damage to the instrument, so only the personnel with maintenance training can remove the shell of the instrument to maintain the instrument.

Warranty

Equipment is guaranteed for two years after sale. In two years warranty period, the user can buy extended warranty, the warranty period of the battery is one year. Manufacturers or agents be responsible for necessary adjustment or inspection, equipment for authorized inspection before packing, return the user.

Users need to follow the instructions to test and use of the apparatus, if repair is required, please sent to agents of the company or designated repair station.

In general, during the warranty period, all improper use of non-human fault, when by our company free maintenance. Users need to pay shipping and insurance costs to return the product to the repair Department, to repair a product is delivered to the user's costs are paid by the agent of the company or designated repair station.

The companies for the design of this product software and hardware when properly installed on the instrument, the instrument will execute its programming instructions. But the company does not guarantee the uninterrupted operation of the instrument or without errors.

Warranty is limited to the instruments, did not involve the improper use of personal and property damage caused by other equipment.

Warranty restrictions

Incorrect use or improper maintenance (including additional software or user interface), and the user disassembles the machine by themselves, the company will not be under warranty. Two years warranty, calibration, repair services, consultation is free of charge. During the two years warranty, the user can buy extended warranty. Materials and the maintenance service outside the warranty period, check fee will be charged. Warranty of battery is one year.

The following are not covered under warranty:

- ① Because add-ins not instrument rated voltage AC or DC power supply required, formation pressure and cause damage to the instrument.
- ② Due to mechanical forces (impacts, falls, etc) cause, panels, switches, LCD device and casing damage and involves an internal device fault.
- ③ Damage caused by unauthorized disassembly of the antenna in an attempt to repair it.
- ④ User when taking delivery, should check, if the instrument damage negotiations with the shipping company related departments. Only the consignee (receiving individuals and units of the instrument) is entitled to claim compensation for damage to the carrier for transport requirements.
- ⑤ Damage caused by the antenna operating outside the product environment specification.

Technical specifications and methods of operation contained in this manual may change without prior notice. After a period of use, if you have any needs, please query. The company reserves all rights reserved, not be copied without the prior written consent of, adaptation or translation.

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1 General description

This chapter will focus on the following main elements:

- Main functions
- Preventive Care
- Inspection and calibration instruments
- ESD Protection methods

1.1 Main Function introduction

E8900A spectrum analyzer provides 5G-NR, LTE base analysis and signal demodulation functions, spectrum analysis, interference analysis, signal coverage functions and so on. Radio frequency power, EVM, constellation, cell ID, signal power, signal to noise ratio and other indicators can be measured by space interface or radio frequency.

E8900A also has the function of interference test, which can be combined with DF series antenna to realize the positioning and search of interference signals. This function can also be used for remote PAD test with the optional PAD to find interference signals on the PAD. At the same time, interference search function can be equipped with DF series antenna for fast signal positioning. Meanwhile, E8900A also has the indoor and outdoor test function of 5G-NR and LTE base stations, which is used for testing base station coverage range. Finally, E8900A also has IQ data collection for third-party development.

E8900A is a spectrum analyzer based on superheterodyne structure, with a wider 9GHz spectrum span, a wider 100MHz IF bandwidth, and a faster spectrum scan speed. It uses more advanced digital processing technology and powerful hardware processors, with faster, stronger signal processing and analysis capabilities.

E8900A spectrum analyzer with 10.1 inches TFT color touch-panel display, it is also easy to observe the test results under strong light. It has a lithium battery and can work continuously for about 2 hours.

This instrument is produced by Deviser Instruments in accordance with the strict requirements of ISO9001 international quality management system standard. In 1996, Deviser Instruments ISO9001 quality system passed the international certification and was registered and recognized.

1.2 Preventive Care

Preventive care includes instrument surface cleaning, RF connector cleaning and attachment cleaning. The surface of the instrument can be cleaned with a soft cotton cloth or cotton ball dipped in water.

Note: Do not use solvent or corrosive liquid to clean the display screen.
--

Clean RF connector and inner conductor with cotton ball dipped in anhydrous alcohol. The inner conductor of the N-type connector should be free from damage and the surface should be smooth. Ensure the cable of test port is free from stretching, twisting and breakage.

1.3 Inspection and calibration instructions

All branches or offices of Deviser Instruments are responsible for the maintenance and calibration of the instrument once a year. In order to ensure the normal operation of the instrument, we recommend customers to do periodic maintenance and calibration.

1.4 ESD protection methods

The E8900A spectrum analyzer is susceptible to electrostatic damage, like many high performance instruments. Coaxial cable and antenna often accumulate a large amount of static charge, if the instrument discharge operation, may damage the internal circuit of the instrument. Staff should be clearly aware of the potential hazards of static electricity and take appropriate preventive measures.

When inserting and unplugging the wire of the connection, the maintenance personnel should have the aid of certain measures to be well grounded.

Proficient in these operations to ensure a safe environment for personnel and equipment.

2 Acquainted with the Instrument

This chapter will introduce the overview of E8900A spectrum analyzer, so that users can get familiar with the instrument.

This chapter will focus on the following main contents:

- Introduce the instrument
- Introduction front panel
- Introduction connector
- Introduce the screen

2.1 Introduce the instrument

The E8900A spectrum analyzer can work continuously for about 2 hours when the battery is fully charged, and can also work while charging through the AC-DC power adapter.

Warning: users can only use power adapters and chargers licensed by Deviser company. Make sure the outlet is clean and dry. Plug is very hot, should be immediately disconnected, stop using. Non-professionals should not open the equipment shell and battery compartment.

2.1.1 Introduction front panel

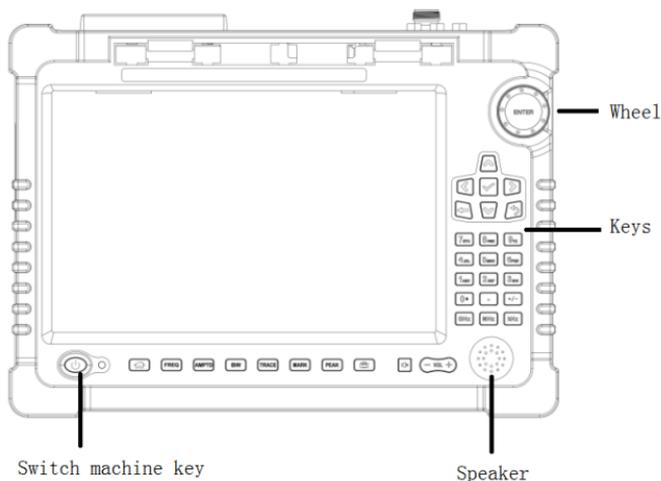


Fig.2-1 Front panel key distribution

Tip: some keys are the same in any case, and some keys are different according to the currently selected measurement mode and measurement type.

1 Switch machine key

Start up: Press the red power button on the front panel for 2 seconds, the power indicator lights up, the instrument will start, wait for a few seconds, and the instrument will enter the measurement interface.

Shut down: Press the power button, the indicator will flash, and the interface will shut down. When the shutdown is completed, the indicator will stop flashing and went out.

2 Wheel

The wheel is located above the keyboard area on the right side of the screen and is used to change parameters being edited or to move options in a list. It is also used to move the marker. Press the wheel is equivalent to 'ENTER'.

3 Keys

'↑ ↓' direction key is located in the middle of the keyboard area on the right side of the screen and is used to change parameters being edited or to move options in a list. It is also used to move the marker.

'0~9' number keys, '+/-' symbol key and '.' key below the keyboard area on the right side of the screen to complete the editing of parameters.

4 Speaker

Speaker function supports sound output.

2.1.2 Introduction connector

2.1.2.1 The upper panel

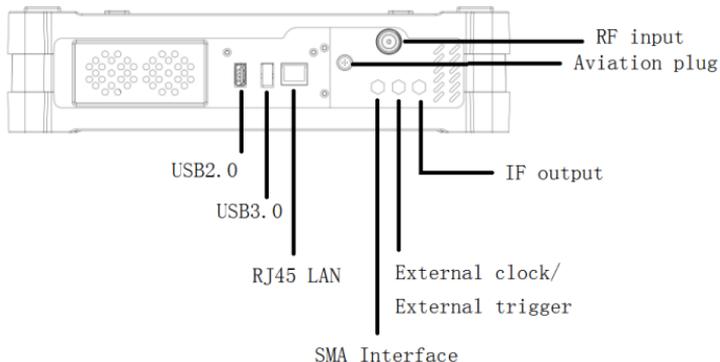


Fig.2-2 the upper panel

1 USB2.0

Above the instrument, there is a USB2.0 interface, which can be used to insert USB disk, store status files and image files, and import building figures and maps. The USB port can also be connected to an external WIFI module, test data is transmitted to PAD in real time via WIFI.

2 USB3.0

USB3.0 port used to connect directional antenna.

3 RJ45 LAN

RJ45 LAN is 100M/1000M adaptive. Spectrum analyzer is connected to PC through LAN port to realize software communication.

4 SMA Interface

It is used to connect the external GPS antenna with SMA interface.

5 External clock/External trigger

External clock 10MHz and external trigger input interface.

6 IF output

IF output interface.

7 RF input

50ΩN-type female connector, the maximum input +30dBm, ± 50 VDC.

8 Aviation plug

Antenna data and control interface.

2.1.2.2 The left panel

On the left side of the instrument, there are two USB2.0 interfaces, which are used to insert USB disk, store files such as status files and image files, and import files such as building figure and maps.

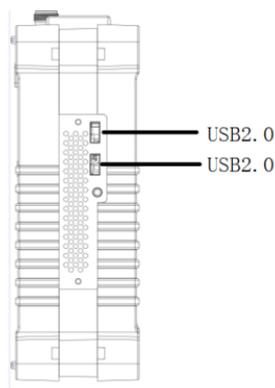


Fig.2-3 the left panel

2.1.2.3 The right panel

The power adapter interface is used to directly power the instrument or charge the battery. The input DC voltage is 15V and the maximum power is 90W. When the AC-DC power adapter is connected to start charging the battery, the indicator light at the adapter interface will be red, and the indicator light will be green when the battery is full.

Warning: Users can only use power adapters and chargers licensed by Deviser company. Make sure the outlet is clean and dry. Plug is very hot, should be immediately disconnected, stop using. Non-professionals should not open the equipment shell and battery compartment.

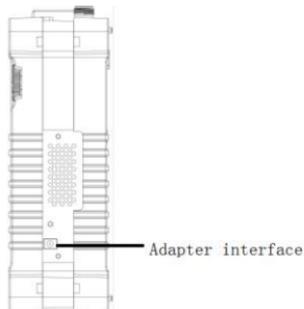


Fig.2-4 the right panel

2.2 User interface

2.2.1 Screen display information

This section introduces the screen display information, taking spectrum scanning measurement in spectrum analysis mode as an example.

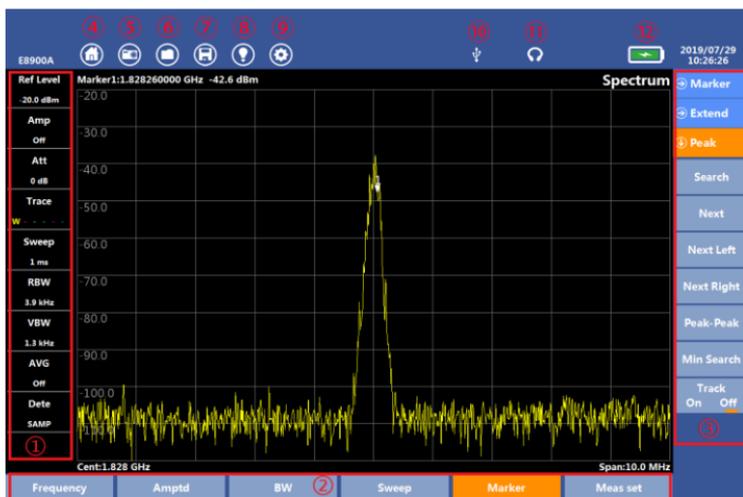


Fig.2-5 User interface

- | | | | |
|---|------------------------|---|---------------------------|
| ① | Parameter display area | ② | Main menu Settings area |
| ③ | Sub-menu Settings area | ④ | MENU touch key |
| ⑤ | Snapshot touch key | ⑥ | File management |
| ⑦ | File saving | ⑧ | Screen brightness control |
| ⑨ | System Settings | ⑩ | USB logo |
| ⑪ | Headset logo | ⑫ | Battery information |

2.2.2 Measurement mode selection

Click the MENU touch key to enter the measurement mode selection interface, click the menu icon to select the measurement mode, and then click the sub-menu to enter the measurement.

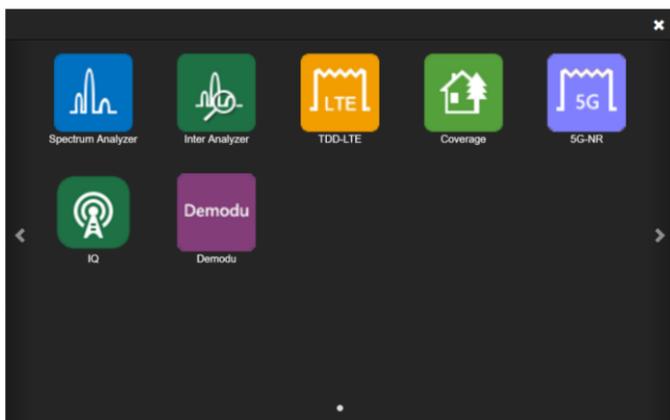


Fig.2-6 Measurement mode selection

3 Spectrum Analysis

This chapter will focus on the following:

- The specific function and use of Swept SA

Please pay attention to the following tips and precautions before starting to use the E8900A spectrum analyzer for signal measurement and analysis. These are very important for the operator to be able to use the instrument safely and give full play to its performance:

Note:

1. If the input signal is too strong, it will damage the input attenuator and input mixer of the instrument. The upper limit of input power of E8900A spectrum analyzer is +30dBm MAX.

2. If the DC voltage transmitted with the signal input cable is too high, it may damage the input attenuator. Therefore, it should be noted that the highest DC voltage should not exceed the nominal value of $\pm 50V$ DC MAX marked on the front panel of the instrument.

3. For accurate measurement results, please preheat the instrument for more than 10 minutes.

Press [MENU], click < Spectrum Analyzer > from the screen, a sub-menu will pop up, and Swept SA measurement can be performed.

3.1 Swept SA

3.1.1 Based parameter set

Swept SA measurement mainly measures the amplitude-frequency characteristics of signals. It mainly involves the frequency and amplitude buttons located at the bottom of the panel.

1 Frequency

Click [Swept SA] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters. Press the < Span > menu to set the relevant parameters of span.

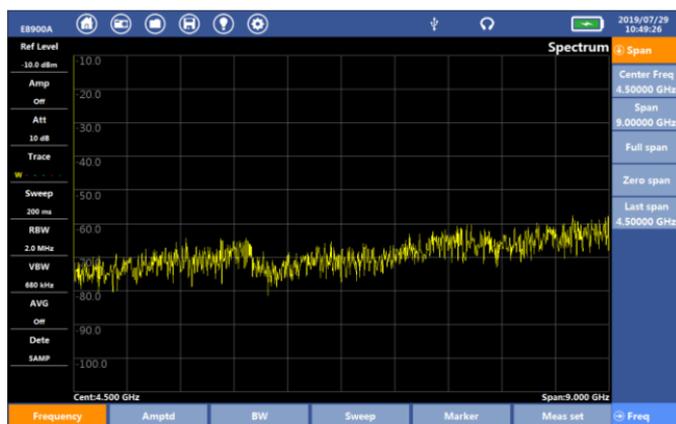


Fig.3-1 Frequency

< Span >

(1) Center Freq

Under the < Span > menu, click < Center freq > and enter center frequency in the menu that pops up at the top right of the screen. Example: if the center frequency is set to 20MHz, press the number key "2" and "0", and press the key corresponding to "MHz". Users can also step through the direction key and wheel key.

(2)Span

Span refers to the current measurement frequency range of the instrument.

Under the < Span > menu, click < Span > and set the span in the menu that pops up at the top right of the screen. The maximum input range is 9GHz, and the minimum can be set to 0Hz.

Three ways to change the span: manual input, direction key and wheel key.

(3) Full span

Under the < Span > menu, press < Full span >, and directly set the span to the highest frequency that can be input by the instrument.

(4) Zero span

Press < Zero span >, and directly set it to the span of 0Hz. Zero span is very useful for measuring low modulation frequency signals of AM and FM.

(5) Last span

Last span is the frequency of the last span quickly invoked by the user. For example, when the current span is wrongly input, the last span can be easily returned to the last state.

<⏪ Freq >

(1) Start Freq

Under the < Freq > menu, click < Start Freq > and enter start frequency in the menu that pops up at the top right of the screen. After entering the corresponding start frequency, the "Center Freq" and "Span" set before will be changed accordingly.

(2) Stop Freq

Under the < Freq > menu, click < Stop Freq > and enter stop frequency in the menu that pops up at the top right of the screen. After entering the corresponding stop frequency, the "Center Freq" and "Span" set before will be changed accordingly.

(3) Freq step

The default frequency step is 1/10 of the span, so changing the frequency will move one grid at a time. When you set to manual, you can change the current frequency step value. Three ways to change the frequency step: manual input, direction keys and wheel keys.

2 Amptd

Click [Amptd] to set < Amptd >, < Att >, < Scale > and other parameters, as shown in the menu below:

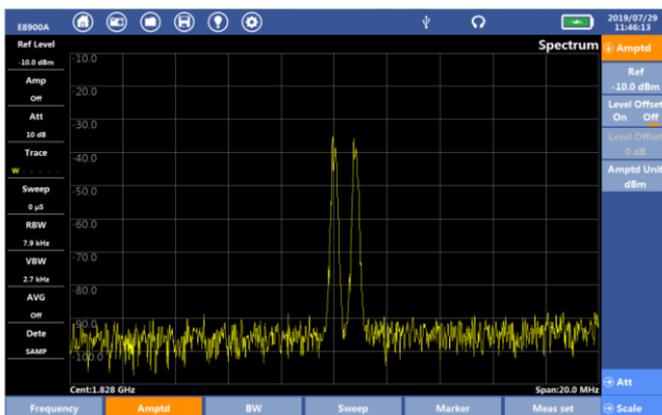


Fig.3-2 Amptd

<↓>Amptd>

(1) Ref

Ref is the level corresponding to the scale at the top of the screen and can be adjusted between +35dBm and -130dBm.

Note: When the <Pre Amp> is off, the maximum allowable reference level is +35dBm, and the attenuator is 50dB. As the attenuator decreases, the maximum reference level also decreases. See the next section for details.

The reference level units used in this instrument are dBm, dBmV, dBμV, Volt, Watt.

Users can click the < Amptd > menu, click < Amptd >, select < Ref >, and input value in the reference level input box. Also step through the direction key and wheel key.

(2) Level Offset

Compensation values for attenuator or amplifiers connected to input ports. When the level offset is set to on, if the level offset is set to 10dB, the reference level and signal amplitude compensate for 10dB at the same time.

Click the < Amptd >, click < Level Offset >, enter the corresponding value, or step through the direction key and wheel key.

(3) Amptd Unit

Click the < Amptd Unit > to select the unit: dBm, dBmV, dB μ V, Volt, Watt.

Tip: changing units only changes the displayed units, not the logarithm/linear properties.

<⏴Att>

(1) Att

Attenuator can reduce the input signal into mixer amplitude, reduce the signal distortion. The range is 0dB to 50dB, stepping 1dB.

The use of attenuator should be reasonable, the increase of attenuator can reduce the distortion of mixer, but the noise of the machine will increase and reduce the range of measuring signal. In use, the attenuator value should be reasonably set to make the instrument work in the best state.

When the attenuator is auto, the system will automatically provide a suitable attenuator. To change the attenuator, the attenuator must be set to manual. Press the direction key or wheel key to change 5dB each time. For manual input by numeric key, step by 1dB.

Note: the signal entering the mixer is the amplitude of the signal passing through the attenuator, which should be less than -20dBm. For example, if the amplitude of the input signal is -10dBm, the

attenuator should be at least 10 dB, otherwise the instrument itself will produce distortion or even be damaged!

When the attenuator is manual, a "#" mark will be added to the left attenuator parameter display area. Similar RBW, VBW and sweep time are preceded by a "#" flag when they become manual.

(2) Pre Amp

Amplifier refers to the internal pre-amplifier of the spectrum analyzer. Turn on the amplifier to increase sensitivity. To ensure measurement accuracy, the maximum input signal with the pre-amplifier on should not exceed -40dBm.

<Scale>

(1) Auto Scale

Auto Scale means automatically changes the reference level value according to the peak value of the current waveform and the Scale/Div, so that the waveform achieves the best visual effect.

(2) Scale/Div

Scale/Div display on the top of the screen, also divided into logarithm, linear two cases:

When the logarithmic, it is value of dB per cell, which is 10dB per cell by default. Users can manually input scale parameters by setting "Scale/Div".

Users can use "Auto Scale" to automatically adjust to the appropriate observation range according to the amplitude change of the current signal.

3.1.2 Measurement parameter set

The parameters are the RBW, VBW, Video Avg, Sweep Mode, Sweep Time, Trig Mode, etc. This part is mainly to set the parameters of the instrument IF receiving unit.

1 BW

Click [BW] to display sub-menus < BW > and < Average >, as shown in the figure below:

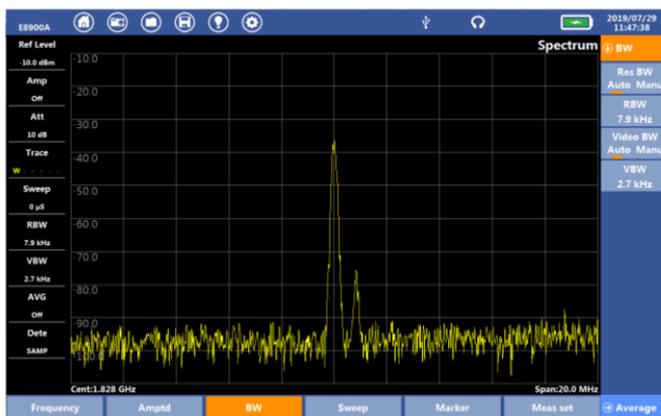


Fig.3-3 BW

<↓BW>

(1) RBW

Resolution bandwidth, also known as RBW, refers to the spectrum analyzer IF filter bandwidth. RBW determines the nearest distance between two adjacent signals that the instrument can distinguish. If the signal distance is less than RBW, it will not be able to distinguish.

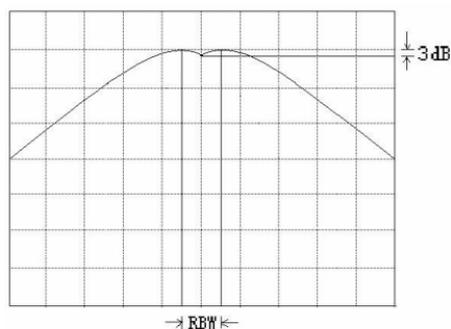


Fig. 3-4 The max IF bandwidth that can distinguish between two signals

Click the <BW> menu and click the <RBW> button, which can be set by manual input, direction key and wheel key.

(2) VBW

The video bandwidth (VBW) is useful for observing signals in noise. It is a low pass filter after IF detection, which is used for noise averaging processing.

Users can click the [BW] menu and click < VBW >, which can be set through manual input, direction key and wheel key. At this time, there is an "#" sign in the left parameter display area, representing the manual state. It will adjust automatically according to the change of RBW in automatic state.

<⏴Average>

(1) Video Avg

When the video average is turned on, the analyzer will output the current data and previous data by weighted average. The more the average times, the more data will be taken from the previous fields. Video average is turned off by default.

Users can set < Video avg > as open, click < Avg Num > to input the average times of the current spectrum waveform. The input range is 1-100.

(2) Avg Type

Users can use different average types according to different measuring environments. There are Log-Pwr Avg, Power Avg, Voltage Avg.

2 Sweep

Click [Sweep] to display sub-menus < Sweep >, < Trace > and < Dete >, as shown in the figure:



Fig.3-5 Sweep

<↓Sweep>

(1) Sweep Time

Sweep time mainly depends on the span, RBW, VBW, it is proportional to the span and inversely proportional to RBW, and inversely proportional to RBW and VBW minimum value. When the span is equal to zero, the sweep time can be set arbitrarily. If the sweep time is too small, the system will prompt "UNCAL". At this point, the user needs to manually increase the sweep time.

Click < Sweep > menu, click < Sweep > button to switch to "Auto" and "Manu", or enter the time manually.

(2) Sweep Mode

Currently only supports continuous sweep.

(3) Sweep Mode

Two sweep modes: Performance, Normal.

(4) Sweep Point

Users can click the < Sweep > menu and select < Sweep Point > to set the sweep points, the minimum can be set to 3 points, the maximum can be set to 100,000 points.

(5) Trig Mode

Users can click the < Sweep > menu and select < Trig Mode > to set the trig mode, providing a choice of Free Run, External and GPS. User also can set the Trig delay.

<⏴Trace>

Users can click the [Sweep] menu and select < Trace > to set and operate the spectrum trace.

(1) Trace

Supports up to 6 traces and 6 different colors are used to distinguish the display. The user chooses to use different trace by selecting the < trace > sub-key under the [trace] sub-menu.

(2) Trace operation

Write: Write is the continuous refresh display status of the current trace.

View: View means maintain the status of the currently selected trace, click the <View> button, the last trace refresh is displayed.

Blank: It does not show the currently selected trace, that is, it hides the currently sweep trace. By default, traces that are not used are in the erase state.

Max Hold: It displays the maximum value of each point of spectrum scan through the current trace line.

Min Hold: It displays the minimum value of each point of spectrum scan through the current trace line.

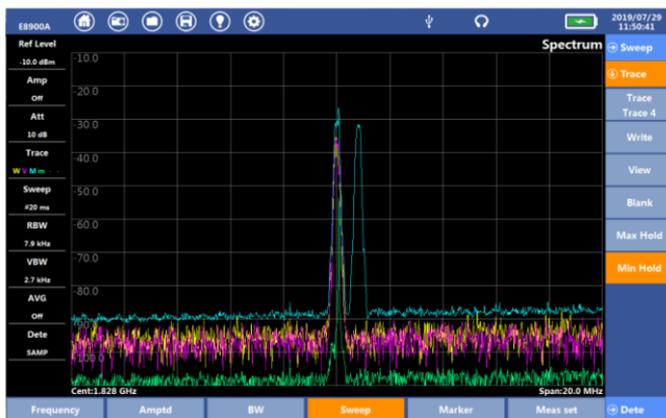


Fig.3-6 Multiple trace

<Dete>

(1)Sample:

Sample detection is to display the original sampled data completely without any operation, which is the fastest scanning speed compared with other detection. It is to display a sampling point randomly selected from all sampling points contained in each pixel of the instrument. The advantage is that it can show the randomness of noise fluctuation.

(2)Posi-Peak

Posi-Peak detection takes the maximum peak point from each pixel and displays it.

Posi-Peak detection is the original detection mode of many spectrum analyzer, so it is one of the most commonly used detection. Maximum peak detection has many applications. In addition to continuous wave signal, it can also be used to test pulse signal, which is also a common detection in EMC test. Input signal loss does not occur even if the pixel width is much larger than the resolution filter bandwidth.

(3)Neg-Peak

Neg-Peak detection takes the minimum sampling point from each pixel point and displays it. Although most spectrum analyzer provide this detection, it is not commonly used. Neg-Peak detection can distinguish weak continuous sinusoidal signal from noise, which can well suppress the display noise and show the minimum level of noise fluctuation.

(4)Average

The average value contains the amplitude information of many sampling points in each pixel, and the average value detection makes effective use of the information of all sampling points in this pixel to average the values of all sampling points allocated to each pixel on a linear scale.

(5)RMS

RMS detection is used to calculate the values assigned to all sampling points in each pixel, and the calculated results correspond to the signal power in the spectrum. When using RMS detect, increasing the sweep time will increase the sampling points involved in the calculation and smooth the trace.

3.1.3 Meas Set

Measurement parameter settings there are different settings under each function. The following is a brief description of parameter settings under Swept SA.

1 NdB BW

Users can click the [Meas set] in the screen, click the <NdB BW> setting to turn on and off the NdB BW function, and also to set parameters.

The NdB BW mainly measures the resolution bandwidth of the instrument, which is only used in the log state. For example, when the NdB BW is set to -3dB, the frequency difference between two points is 3dB lower than the maximum amplitude.

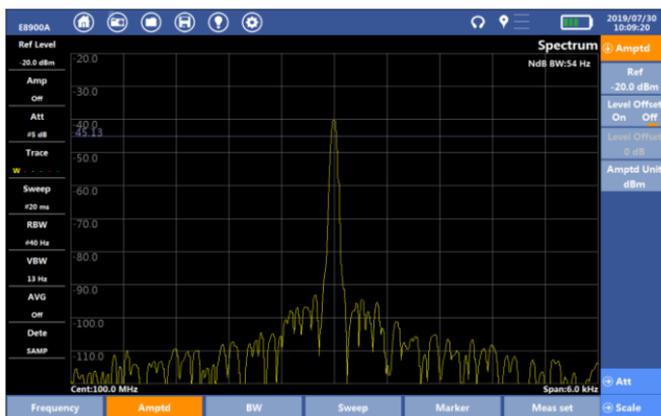


Fig.3-7 NdB BW

2 Disp Line

Users can click the [Meas set] in the screen, click the <Disp Line> to open or close the Disp line, and manually input to set parameters. When the Disp line opens, a green line displays in the center of the screen and does not change the waveform amplitude.

3.1.4 Marker

1Marker

E8900A can be set up to 6 Markers open at the same time. Touch the menu of Marker at the bottom of the screen and click [Marker]. Under the sub-menu, select one of the Markers from M1 to M6 as the active marker. After selecting marker, it will automatically return to the menu of < Marker >. The user can see the currently selected marker under the button of < Marker >.

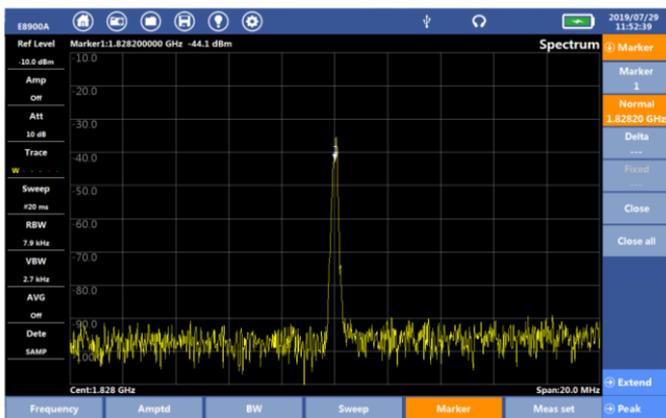


Fig.3-8 Marker

<⏴Marker>

(1) Normal

Click <Normal>, the selected marker can be stepped by moving arrow keys and wheel keys, and the frequency and amplitude value of the position of the Marker will be displayed, while in the zero-span mode, the time and amplitude value will be displayed.

(2) Delta

When the user clicks the < Delta >, the system will display two markers at the same time. By turning the wheel or arrow keys or manually entering the frequency difference, the second marker will change position, thus directly reading the amplitude difference and frequency/time difference between two points at different positions.

(3) Close & Close all

Click < Close > to close the marker in the currently selected active state, and click < Close all > sub-key to close all currently opened Markers.

<⏴Extend>

(1) Marker To

When the normal marker is in the selected state, click < Marker to > sub-key, the sub-menu will pop up, select < Rev Level> sub-key to set the level of the current marker as the reference level, select < Center Freq > key, the frequency of current marker directly jumps to the center frequency.

(2) Sel Trace

When multiple trace are opened in the measurement interface, the user opens the normal Marker1, and click < Sel trace > to select 2, then the Marker1 will be displayed on trace2. Other markers can also select the corresponding trace display.

(3) Maker Tab

When the Maker Tab is set to on, there is a table with each maker detail will show below the measure figure.

(4) Counter

When the Counter Tab is set to on, user can set the Precision of 0.1Hz, 1Hz or 10Hz to control the maker's frequency precision.

<  Peak >

(1) Search

By clicking the < Search > under the [Marker] menu, the Marker will automatically lock to the maximum peak value in the current span range.

(2) Next、 Next Left、 Next Right

Users can use the < Peak > sub-menu under [Marker] to operate other peak functions.

Click < Next >, and the system searches the secondary peak lower than the current peak in the entire field.

Click < Next Left > to find the secondary peak to the left of the current marker position.

Click < Next Right > to find the secondary peak to the right of the current marker position.

(3) Track

Click the < trace > and set it to the "on" state to automatically find a new peak in each field. If it is in the "off" state, the horizontal position of the marker will not change any more.

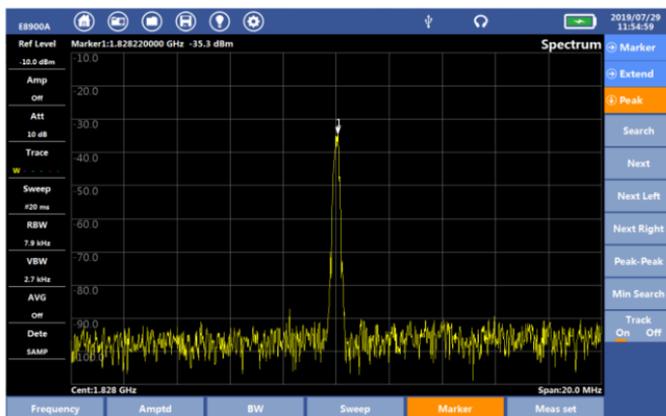


Fig.3-9 Trace

(4) Peak-Peak & Min Search

Press <Peak-Peak> and the instrument will automatically search the highest and lowest amplitude in the current span range.

Press <Min Search> and the current active marker will automatically lock to the lowest amplitude in the current span range.

3.2 Channel Power

Channel Power is the total power within a certain span.

Select the [Spectrum Analyzer] and Click [Channel Power] to enter the measurement interface

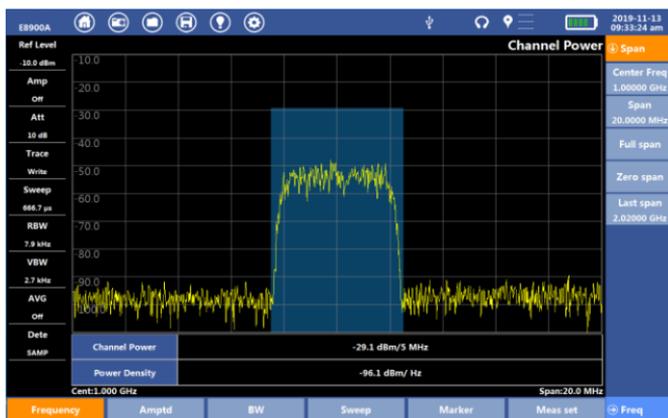


Fig.3-10 Channel Power

3.2.1 Parameters Set

Under the < Channel Power > measurement, users can refer to the parameters set in the Swept SA.

3.2.2 Meas Set

1 Integ BW

Sets the integration bandwidth for the channel power measurement.

2 RF

Sets the RF trigger to Burst or Continuous (Free Run) mode. The default setting is Continuous.

3 RF Burst

Opens the RF Burst submenu, where you can set various parameters of the burst signal.



Fig.3-11 Burst RF setting menu

Trig Slope: Sets the trigger polarity. Tap “Rise” to trigger on a rising edge, and “Fall” to trigger on a falling edge.

Position: Sets the trigger line position. Adjust with the rotary knob or arrow keys. (With arrow keys, press Left/Right to adjust by 1 and Up/Down to adjust by 10.).

Gate Delay: Controls the length of time from the time the gate condition goes True until the gate is turned on.

Gate RBW: Toggles Gate RBW mode from Auto to Manual (Manu) and vice-versa. On Auto, the instrument selects the res bandwidth based on the current span.

Gate RBW: Manually set the gate resolution bandwidth. Use the arrow keys, rotary knob, or data keypad to adjust.

Gate VBW: Toggles Gate VBW mode from Auto to Manual (Manu) and vice-versa. On Auto, the instrument selects the video bandwidth based on the current RBW.

Gate VBW: Manually set the gate video bandwidth. Use the arrow keys, rotary knob, or data keypad to adjust.

Pulse Filter: Sets the pulse filter value. Use the arrow keys, rotary knob, or data keypad to adjust.

4 Signal Standard

Tapping the Signal submenu key opens the Signal Standard submenu, enabling users to select a specific signal standard from the Select Signal list, as well as the specific channel number and respective link, downlink or uplink.

3.2.3 Marker

Users can refer to the marker function under Swept SA measurement.

1.Marker

When measure channel power in Burst mode. Click [Marker]-<Extend>, and in the <Sel Trace > user can select Time domain in the upper figure or Frequency domain in the below figure to measure.



Fig.3-12 Marker Trace

3.3 Occupied Bandwidth (Occ BW)

Occupied bandwidth is the bandwidth which includes ninety-nine percent of total transmit power and declining x dB.

Select the [Spectrum Analyzer] and Click [Occ BW] to enter the measurement interface

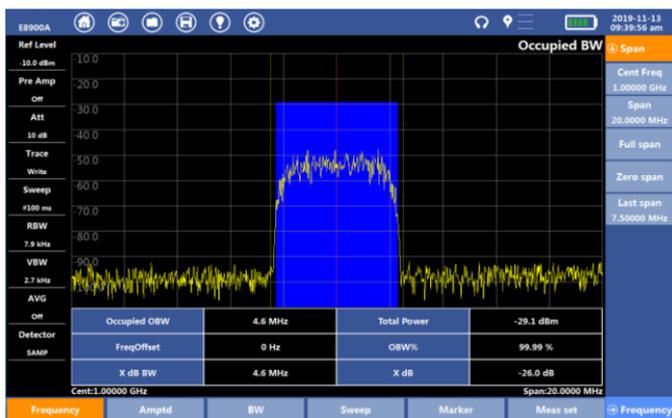


Fig.3-13 Occupied bandwidth

After capturing a group data. System will calculate the total power in all span firstly. Then find the max point of power in all data, the interval between this point and frequency center is frequency offset.

In the figure, the background color width represents the carrier bandwidth, the height represents the carrier power, and the center dotted line position is the current center frequency offset position.

3.3.1 Parameters Set

Under the < Channel Power > measurement, users can refer to the parameters set in the Swept SA.

3.3.2 Meas Set

In {occupied bandwidth} measurement mode, users can click [Meas set] to set parameters such as < Integ BW >, < OBW Power >, and RF signal type .

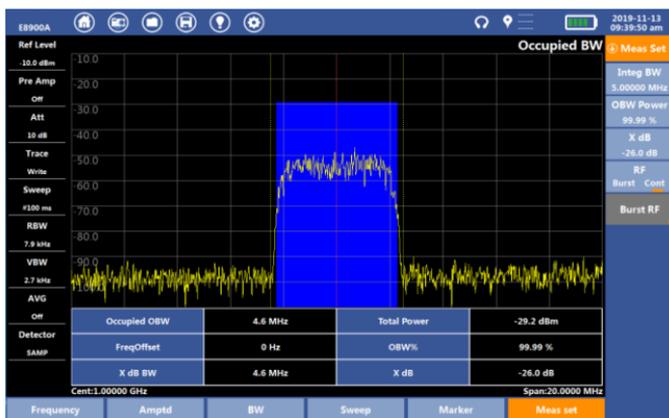


Fig.3-14 Measurement setting

1 Integ BW

Sets the integration bandwidth for the channel power measurement.

2 OBW Power

Sets the percentage of power for calculating the occupied BW.

3 X dB:

Sets the dB Down level for calculating the occupied BW.

4 RF:

Sets the RF trigger to Burst or Continuous (Free Run) mode. The default setting is Continuous.

5 Burst RF:

Opens the Burst RF submenu if RF is toggled to Burst. The method of setting Burst RF is same to the method in [Channel Power] measurement.



Fig.3-15 Burst RF setting

3.3.3 Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

3.4 Adjacent Channel Leakage Ratio (ACLR)

Adjacent channel power ratio refers to the ratio between the power of main channel and that of adjacent channels.

Select the [Spectrum Analyzer] and Click [ACLR] to enter the measurement interface



Fig.3-16 ACLR measurement

3.4.1 Parameters Set

Under the < Channel Power > measurement, users can refer to the parameters set in the Swept SA.

3.4.2 Meas Set

1 Meas Set

Tapping the Meas Set softkey opens up a dialog box enabling the user to setup the ACLR measurement. (See below.) Within this dialog, you can set signal standard, bandwidth values, and other specifications. In the measurement setting dialog, click "OK" to save the setting and exit the dialog, and click "Cancel" to cancel the setting and exit the dialog .



Fig.3-17 measurement setting

Sig Std: The instrument prefabricates the templates of various communication systems. By selecting the communication mode in the template, parameters can be set in one key mode.

Carr BW: Set the spectrum width of the carrier frequency signal to be measured.

Num: Multiple signal to carrier can be measured, this system can support 12 Carrier signal for measurement.

Res BW: The setting is the same as RBW parameter setting under [bandwidth]

Ref Car: The user can use the current carrier as the main reference carrier.

RMS: Turn on RMS and display the power value of the outer adjacent channel of the carrier after RMS operation.

Adj BW: Set the carrier width of the adjacent signal.

Offset: With a center frequency as the reference, the carrier frequency of adjacent channels can be set. The instrument can set up 6 pairs of adjacent channels at most, each pair of adjacent channels has one on the left and one on the right.

Use Default: After clicking, the parameter setting will automatically adjust to the default initial state of the signal type of the signal meter.

2 Limit

Under ACLR measurement, click the [Meas Set] menu, click the < Limit > submenu, and the qualified line setting check box will pop up.



Fig.3-18 Limit line setting

The qualified line of ACLR is divided into absolute qualified line and relative qualified line. Absolute qualification refers to the actual power of the adjacent channel, and relative qualification refers to the power difference between the adjacent channel and the carrier. If the adjacent channel power is less than the absolute qualified line value, it is absolute qualified; if the relative value is less than the relative qualified line value, it is relatively qualified; similarly, green, red and white indicate qualified, unqualified and not enabled.

There are four modes for each pair of adjacent channels, absolute(Abs), relative(Rel), And, Or.

Abs: Absolutely qualified means qualified;

Rel: Relatively qualified means qualified;

And: Absolute and relatively qualified is qualified;

Or: Absolute or relative qualification is qualified.

Only the left and right adjacent roads are qualified as the adjacent roads. The comprehensive result of the qualified line on the top of the screen is to check whether all the adjacent channels of the enabled line are qualified. When all the adjacent channels of the enabled line are qualified in the selected mode, the comprehensive result is qualified, otherwise it is unqualified. Also green, red and white indicate qualified, unqualified and not enabled.

3.4.3 Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

3.5 Field Strength

The field strength measurement in the spectrum analysis mode is not the test item of "field strength instrument", which is just a general "level tester" in the field of measuring instruments, while the real field strength measurement refers to the level tester and antenna, whose measurement unit generally is dBuV/m.

Select the [Spectrum Analyzer] and Click [Field Strength] to enter the measurement interface

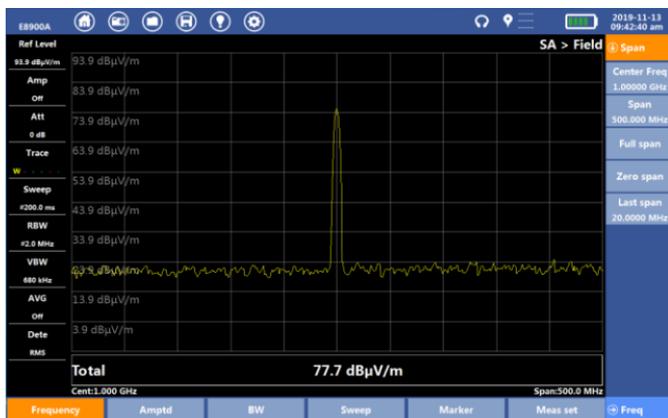


Fig.3-19 Field Strength measurement

3.5.1 Parameters Set and maker operation

Users can refer to the parameter setting and marker function under Swept SA.

In the field strength mode, the user can click the [Amptd] menu and click < Amptd Unit > to select the supported units under the field strength measurement:

dBm/ m², dBV/m, dBm V/m, dB μ V/m, Volt/m, Watt/m²

Calculation formula of field strength:

$$(E) \text{ dB}\mu\text{V/M} = (V_o) \text{ dB}\mu\text{V} + (AF) \text{ dB/M}$$

Electric field strength E (V/M)

Power density S (W/m²)

Range of maximum and minimum values in each unit:

	Minimum (magnitude)	Maximum(magnitude)
d B μ V	-40	137
d B μ V/m	-40+AF	137+AF
V/m	10 n V/m	7V/m
W/ m ²	10 ⁻⁸ n W/ m ²	1 W/ m ²

Three expressions of antenna coefficients:

Antenna gain Gain(G)[1/m], Antenna gain(g)[dBi], Antenna factor(AF)[dB(1/m)]

$$g=10d B*\log_{10}(G);$$

$$AF=20*\log_{10}(f/\text{MHz})-29.7707d B-g.$$

3.5.2 Meas Set

1 Antenna Select

In the field strength measurement mode, the user can select the antenna correction by clicking measurement < measurement Settings > and then click < Antenna Select > to select the appropriate antenna list in the pop-up check box.



Fig.3-20 Field Strength Antenna List

2 Antenna Manage

Copy to USB: import the antenna list to USB flash disk, add and edit it through PC notepad and other software.

Copy to Local: import the edited antenna list file to the local computer.

3 Disp Line

User can add a reference line, open the reference line and set the appropriate reference line value. A green field strength reference line will appear on the screen.

3.5.3 Basic Measurement

- 1 Select [Field Strength] to enter the field strength measurement mode.
- 2 Click the [Frequency] menu to set the frequency point to be measured by the user.
- 3 Press the < Antenna Selection >, and select the required antenna.

4 Connect the antenna to the instrument.

5 The user can set the measurement parameters according to the test requirements.

6 To change the measurement unit, the main menu [Ampd] menu, click < Ampd unit > to select the unit required by the user.

7 Press the measurement function key [Maker] to set the cursor to read the measurement parameter.



Fig.3-21 Field Strength Test

3.6 SEM

The spectrum template can be used to offset the spectrum trace in sections, with a maximum of 6 offset pairs. The measurement of this project is to ensure that the modulation processing link does not produce excessive spectrum broadening, so as to avoid interference to users working at other frequencies.

Select the [Spectrum Analyzer] and Click [SEM] to enter the measurement interface

The upper window is absolute spectrum trace, the lower window is relative spectrum trace, and the relevant parameters and measurement results are displayed in the table below.

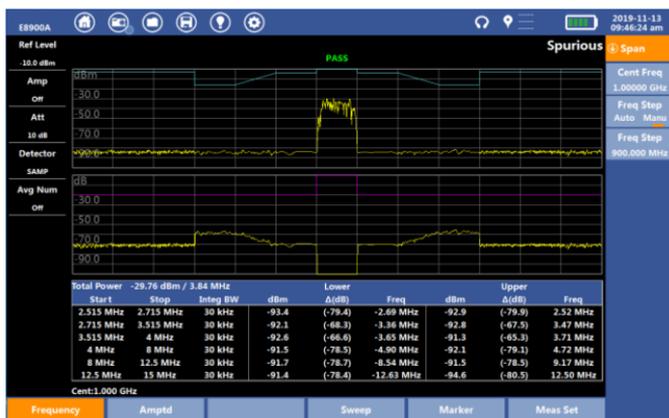


Fig.3-22 Spectrum Template

3.6.1 Parameters Set and maker operation

Users can refer to the parameter setting and marker function under Swept SA.

3.6.2 Meas Set

1 Meas Set

In the measurement setting, the user can set the parameters of carrier, offset number and offset, and can set the spectrum parameters of offset pair such as start frequency, end frequency, channel bandwidth, RBW and VBW, respectively.

Low frequency = frequency center - frequency offset;

High frequency = frequency center + frequency offset.

Meas Set					
Use Default		Offset Num: 1 2 3 4 5 6			
Carrier					
Integ BW	3.84 MHz	Span	5 MHz		
RBW	100 kHz	VBW	100 kHz		
Offset					
1	Start	2.915 MHz	Stop	2.715 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz
2	Start	2.715 MHz	Stop	3.515 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz
3	Start	3.515 MHz	Stop	4 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz
4	Start	4 MHz	Stop	8 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz
5	Start	8 MHz	Stop	12.5 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz
6	Start	12.5 MHz	Stop	15 MHz	
	Integ BW	30 kHz	RBW	30 kHz	VBW 300 Hz

Fig.3-23 measurement setting

2 Limit

The user can click the [Meas Set] menu and click < Limit > to set the parameters of qualified line

There are four modes each spectrum line : absolute(Abs), relative(Rel), And, Or.

Abs: Absolutely qualified means qualified;

Rel: Relatively qualified means qualified;

And: Absolute and relatively qualified is qualified;

Or: Absolute or relative qualification is qualified.

The absolute qualified line is displayed in the upper window in blue, and the relative qualified line is displayed in the lower window in purple.

Limit										
1	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-14.0 dBm	-	-14.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
2	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-14.0 dBm	-	-26.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
3	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-26.0 dBm	-	-26.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
4	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-13.0 dBm	-	-13.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
5	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-13.0 dBm	-	-13.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
6	Fail Mask	Abs	Rel	And	Or	Side	Both	Lower	Upper	
Abs	-13.0 dBm	-	-13.0 dBm	Rel	-30.0 dB	-	-30.0 dB			
					OK	Cancel				

Fig.3-24 Limit line setting

3.7 Fix Frequency Mode(FFM)

Users can observe the spectrum of 104.4MHz bandwidth under this function.

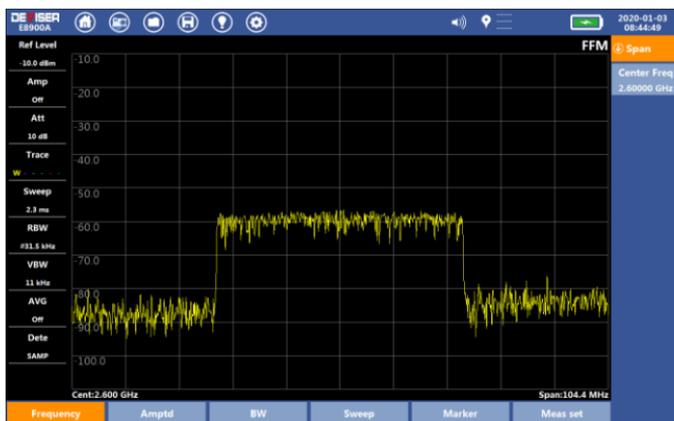


Fig.3-25 Frequency Fix Mode

3.7.1 Parameter Set

1. Frequency

Click [FFM] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters.

2.Amplitude

User can refer to the method of amplitude setting in [Swept SA]measurement.

3.Bandwidth(BW)

RBW: use can set the RBW in auto mode or manu mode, the range is from 15.8kHz to 3MHz in normal sweep mode. In performance sweep mode RBW can be set 2.016MHz, 1.008MHz,504KHz,252KHz,126KHz,63KHz,31.5KHz.

VBW: use can set the RBW in auto mode or manu mode, the range is from 1kHz to 3MHz.

4.Sweep

User can refer to the method of sweep setting in [Swept SA]measurement.

5.Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

3.7.2 Meas Set

1.Disp Line

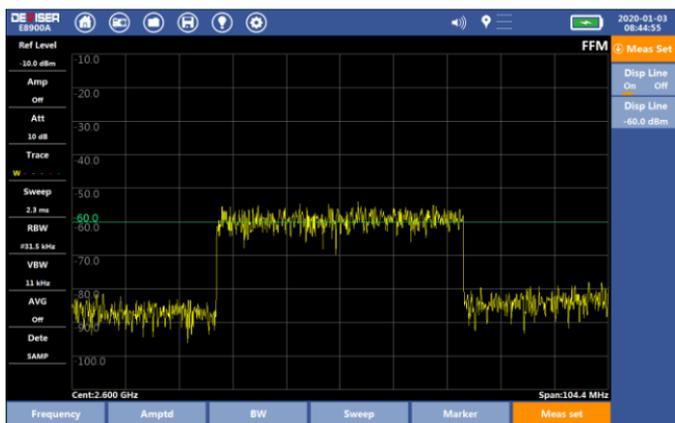


Fig.3-26 Disp line setting

3.8 Gate Sweep

This function will show the waveform after GPS locking, user must connect GPS module and select “Built-in GPS ” Source .

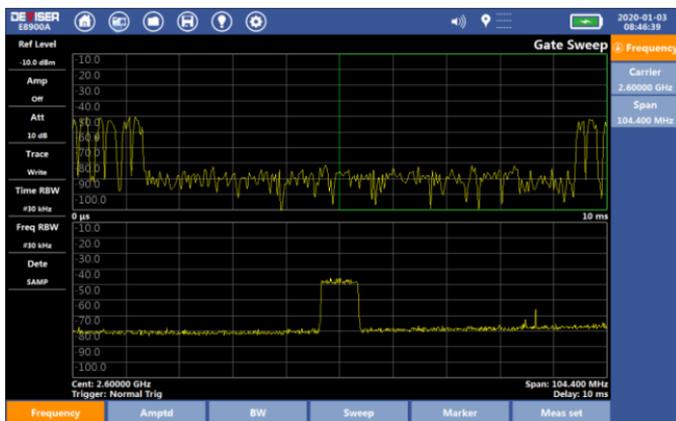


Fig.3-27 Gate sweep measurement

3.8.1 Parameter Set

1.Frequency

Click [Gate Sweep] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters.

2.Amplitude

User can refer to the method of amplitude setting in [Swept SA]measurement.

3.Bandwidth(BW)

Time RBW: use can set the RBW to adjust the waveform of time domain, the range is from 30kHz to 122.88MHz.

Freq RBW: use can set the RBW to adjust the waveform of frequency domain, the range is from 30kHz to 1MHz.

Freq VBW: use can set the VBW to adjust the waveform of frequency domain, the range is from 30kHz to 1MHz.

4.Sweep

User can refer to the method of sweep setting in [Swept SA]measurement.

5.Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

3.8.2 Meas Set



Fig.3-28 Measurement setting

1.Normal Trig

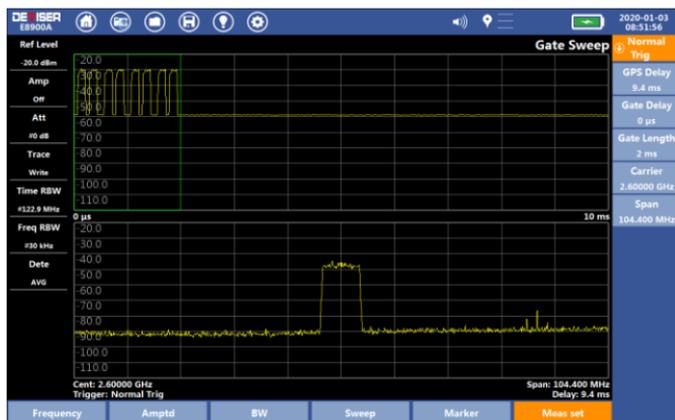


Fig.3-29 Normal Trigger measurement setting

GPS Delay: The interval time of GPS 1PPS trigger signal and the starting time of time domain measurement signal. The minimum is 0us and the maximum is 10ms.

Gate Delay: Based on the start time of signal. The time after Gate Delay of the start time of signal is the start time of spectrum calculation. The minimum is 0us and the maximum is 10ms.

Gate Length: The Length of frequency spectrum calculated.

Carrier: the same to [Carrier] in [Frequency] setting.

Span: the same to [Span] in [Frequency] setting.

2. 5G Trig

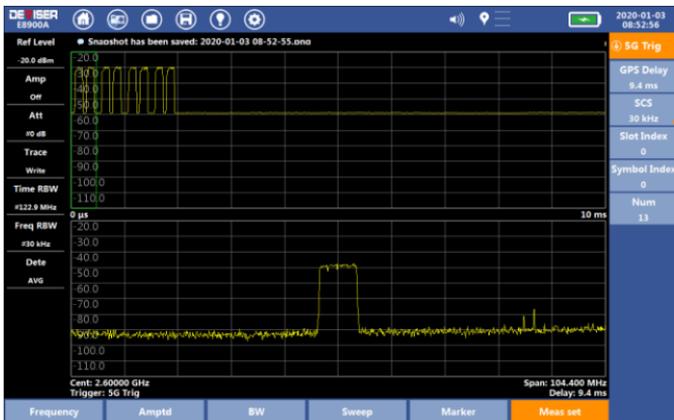


Fig.3-30 5G Trigger measurement setting

GPS Delay: The interval time of GPS 1PPS trigger signal and the starting time of time domain 5G measurement signal. The minimum is 0us and the maximum is 10ms.

SCS: The parameter of 5G signal: 15kHz or 30kHz in FR1.

Slot Index: The number of 5G signal slot, which combines the [Symbol Index] setting decide the start of signal for spectrum calculation.

Symbol Index: The number of 5G signal symbol in one slot, and combines the [Symbol Index] setting decide the start of signal for spectrum calculation.

Num: the length of symbol, decides the length of spectrum calculation.

3. TDD-LTE Trig

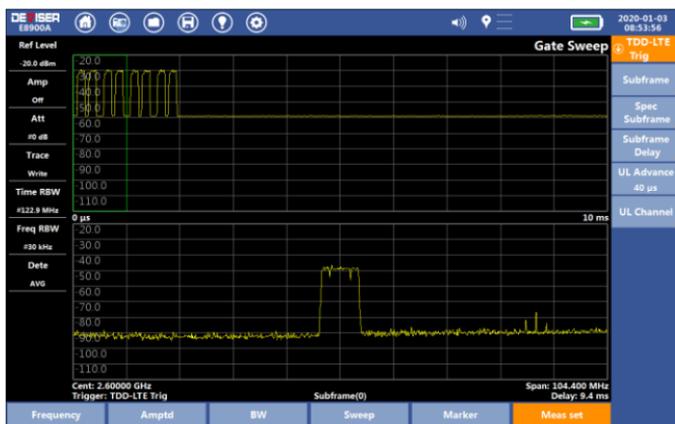


Fig.3-31 TDD-LTE Trigger measurement setting

Subframe: user can set the number of subframe and symbol offset and length to view the spectrum waveform of each select signal part.

Spec Subframe: The user can select Config ID (0-8) and Test Item (DwPTS, GP, UpPTS).

Subframe Delay: The user can set the time of subframe delay, which include Delay, F Band, E Band, D Band,

UL Advance: The user can set the time of uplink advance from 0 to 1ms.

UL Channel: The user can select PUSCH, PUCCH, Spec Subframe, UI Subframe.

4 Inter Analyzer

4.1 Spectrogram

Spectrogram is a way to record spectrum by 3D display. The horizontal coordinate represents the frequency, the vertical coordinate represents the time. Use different colors to indicate the amplitude of the signal. The user can analyze the time stability of the signal or search for intermittent interference signal through the spectrogram.

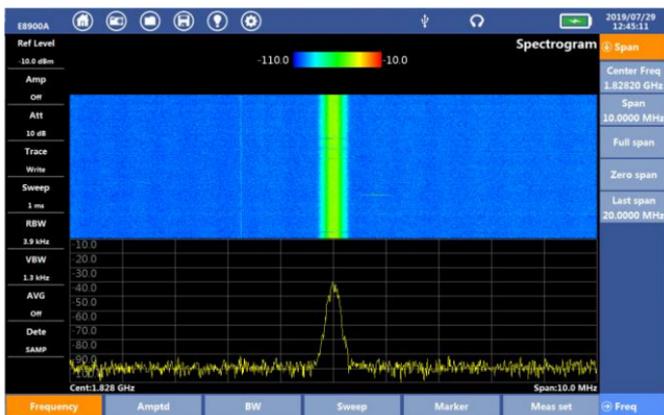


Fig.4-1 spectrogram

4.1.1 Parameters Set

Under the < Spectrogram > measurement, users can refer to the parameters set in the Swept SA.

4.1.2 Marker

The marker function acts in the spectrogram window. Click [Marker] and click [Move], the user can select "X" and "Y", and select "X" to operate in frequency domain with the current active marker, while "Y" to operate in time domain with the current active marker. For the function of Delta marker, please refer to the marker operation of Swept SA.

4.1.3 Meas Set

1 Meas Set

(1) View

Click < View >, and click < Display > to switch between "double window" mode and "single window" mode. The upper part of the window is "Spectrogram" and the lower part is "Swept SA" mode, which is convenient for users to measure and analyze.

(2) Top Level/Bot Level

Click < Top Level > or < Bot Level > to set the maximum and minimum values of the signal amplitude recorded by the current spectrogram, which can be set automatically or manually.

(3) Restart

After clicking < Restart >, the system will clear the accumulated spectral information in the screen and start measuring again.

2 Record

The instrument can be set so that spectrogram plots are automatically saved when the display is full. Tap the Record submenu key, then tap the Record On/Off submenu key to the On position.

3 Replay

Once you have recorded a span of time, the file will be saved to internal memory.

Tap Replay and Open File to replay the recorded period. Tap Pause to replay once, or Cont to replay continuously.

4.2 DPS

In a complex wireless spectrum environment, it is often the case that multiple signals in the same frequency band are superimposed together. At this time, the strong signal covers the weak signal. Multiple superimposed signals can be displayed simultaneously through DPS.

DPS is a three-dimensional spectrum analysis. The X-axis is the frequency domain, the Y-axis is the amplitude domain, and the z-axis is the color, which represents the frequency of current signal occurrence. The more the color tends to red, the more the frequency of occurrence. The more the color tends to blue, the less the frequency of occurrence.

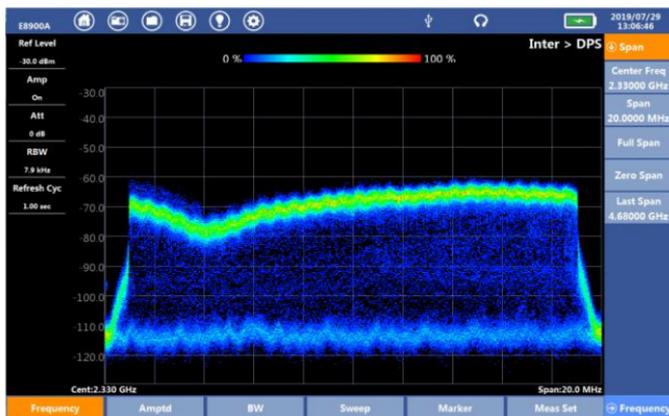


Fig.4-2 DPS

4.2.1 Parameters Set

Under the <DPS> measurement, users can refer to the parameters set in the Swept SA.

4.2.2 Meas Set

Refresh Cycle

Click the < Meas set > and click < Refresh Cyc > to set the refresh time of the trace, and the refresh time range is 1ms-100s.

4.2.3 Marker

1.Marker direction selection

Click the <Marker> and click <Move>. The user can select "X" and "Y" and select the "X" mode to operate in the frequency domain with the current active marker, while in the "Y" mode, operate in the amplitude domain with the current active marker.

2.Marker

Users can refer to the marker function under Swept SA measurement.

4.3 Orientate

Under the [Orientate] measurement, users need to use directional antenna with GPS and electronic compass. Directional antenna is used to test the direction of the strongest interference frequency signal, electronic compass is used to automatically record the direction information of the test signal value, and GPS is used to automatically record the longitude and latitude of the current test point.

4.3.1Parameter Set

Under the <Orientate> measurement, users can refer to the parameters set in the Swept SA.

4.3.2Meas Set

1 Test

Click the < Meas set> menu and < Test > is Off by default.

Connect the directional antenna, after the longitude and latitude positioning is successful, click < Test > to set it on, and a yellow direction Angle indicator line will be displayed. Click < Test > to set it off. At the time, a red confirmation Angle indicator line will be displayed. During the test, the pitch Angle and polarization Angle of the antenna will be displayed.

When longitude and latitude are not successfully located, set < Test > to on, and the system will prompt "GPS is not connected".

2 Antenna

Click < Antenna > to enter the sub-menu. You can choose three kinds of antennas: ET250M (20-250MHz), ET500M (200-500MHz), and ET8000LM (500-8000MHz).

3 Polarization

Polarization modes are horizontal and vertical. The user can choose "Hor" and "Ver".

4.4 Signal Strength

The signal strength measurement has the function of alarm. Judge the position of the transmitter according to the strength of the signal

The upper window of signal strength measurement is dial scale display mode, which is convenient for users to observe the current signal peak value, and the lower window is spectrum mode.



Fig.4-3 Signal Strength

4.4.1 Parameters Set and maker operation

Users can refer to the parameter setting and marker function under Swept SA.

4.4.2 Meas Set

1 Max Scale and Min Scale

The user can click < Max scale > and < min scale > or <Auto Scale> to set the range of signal strength that can be displayed currently.

2 Sound

Click < Sound > to set it to "on". As the signal strength increases, the frequency of the prompt sound will increase gradually. It is helpful to judge the distance between the starting source and the current instrument.

3 Freq

Set the center frequency.

4.5 Inter Locate

With ET30 series directional antenna, the instrument can realize the interferon positioning function. ET 30 series directional antenna transmits the information obtained by GPS and electronic compass to the instrument through USB interface, obtains the signal strength information through N-type interface, and obtains the position information of interference source by using triangle positioning method (points are 3 points for positioning).

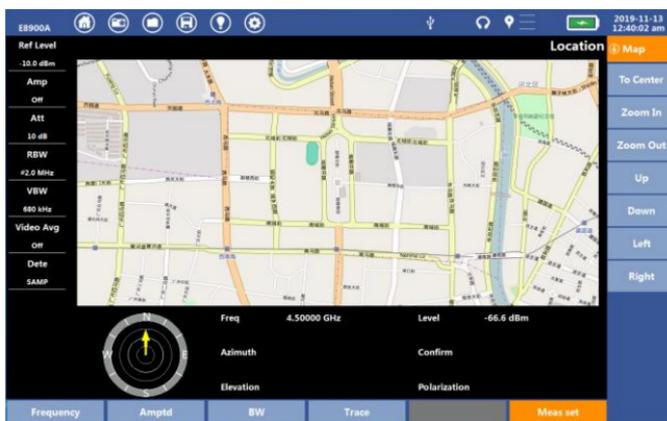


Fig.4-4 Inter Locate

4.5.1 Test map loading operation

First load the map, which is divided into two steps: copy the map file to local and load it, as follows:

1. Copy the map file to the root directory of the U disk, click " button, select "Map" as the file type, select "USB disk" as the save location, check the file to be copied by the user, and click "copy to local",

2. Set the location to "Local Disk", select the copied map file, and click "Load".

3. After the instrument locks the GPS information, the instrument will automatically load the map of the area copied to the instrument in advance. The red positioning mark in the map is the location of the instrument after the GPS is locked.

4.5.2 Parameters Set and maker operation

Users can refer to the parameter setting and marker function under Swept SA.

4.5.3 Interference location measurement

1. Set the frequency point of the located emission source.

2. Click < Test > to set on. The current test site is assumed to be test point 1, holding directional antenna. The sweeping time should be more than 30 seconds per circle. Set < Test > off after sweeping, the instrument automatically saves the current test data and draws a blue trace on the map, pointing to direction of strongest signal. The polar chart at the bottom left of the interface correspondingly shows all current scanning points, current antenna direction and signal strongest direction. Select test point 2 and 3 near test point 1. Repeat test point 1. At this time, the interface depicts three blue traces. When it is greater than or equal to 3, the instrument automatically calculates the area with the strongest signal and circles it with a red circle.

Press "Clear Test", the instrument will delete all data of this test

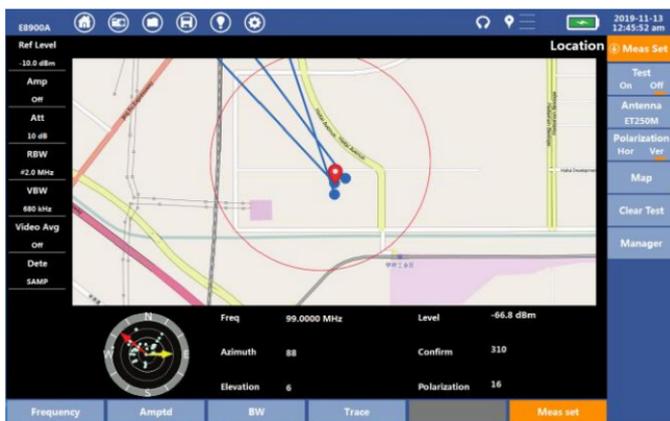


Fig.4-5 Three point positioning

5 TDD-LTE

The TDD-LTE function of E8900A can conduct relatively comprehensive demodulation analysis of 4G communication system and improve the work efficiency of base station maintenance.

5.1 Power vs RB

Click the [MENU], and click the [TDD-LTE], and click the sub-menu [Power vs RB] measurement.

Power vs RB analysis capability to test RB allocations for TDD-LTE signals and view the Power of each allocated RB through Settings.

Users can set parameters such as Threshold, Range, Max value, etc., which can be manually entered by clicking <Meas set> or set by <Auto Scale>.

RB grid display: the horizontal axis displays activation state and RB power in each sub-frame (time domain), while the vertical axis displays activation state and RB power in frequency domain.

The "Subframe" table at the top right of the screen displays the measured "Active RBs", "Utilization", "Channel Power", and "Cell ID".

At the bottom right of the screen is the RB Markers, which selects a particular RB or subframe through the <Marker> function.



Fig.5-1 RB power test

5.1.1 Parameter Set

1 Frequency

Center Freq: Click < Center Freq >, and the center frequency of current LTE signal can be set through keyboard or wheel key.

2 Amplt

Ref Offset: Compensates for positive and negative compensations of attenuators or amplifiers connected to the input port. The user enters a compensation value at < Ref Offset >. The instrument defaults to 0dB.

Ref Unit: Users can select "dBm" and "mW".

Auto Range: In "on" state, the instrument will automatically switch "attenuator" and "amplifier" according to the current signal strength.

Pre Amp: In "on" state, the instrument improves sensitivity.

Att: The attenuation range is 0dB ~ 50dB. The user can manually attenuate the signal according to the current measurement value.

3 BW

According to the TD-LTE standard of 3GPP protocol, TD-LTE bandwidth can be set to 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz. Users can manually select according to the current bandwidth.

4 Mark

Under the Power vs RB, The Mark is divided into two types: RB and Free. Click the <Mark>, and set the mark state to "on".

RB Mode: Click the < RB#> key, select the RB through the arrow keys, or wheel key, and then read the RB power of each sub-frame through the RB Markers table.

Free Mode: Modify < RB# > and < SubFrame# > to read the power of corresponding RB through the "Free Mark".

5.1.2 Mode Set

Band Width: Same as the <BW> menu.

EVM Max Hold: Users can set the on-off state.

Freq Err Avg: Set the average number by pressing arrow keys or wheel key.

Channel: Select the corresponding item to turn P-SS, S-SS and RS on or off. Select "PDSCH" to set the modulation mode (QPSK, 16QAM,64QAM).

Cell ID: You can set the <Cell ID> to "Auto" or "Manu". When set to "Manu", set the cell ID number through the keyboard.

If the Cell ID specified by the user cannot be searched in the current spatial signal, the prompt "Cell ID not exist" will be displayed.

ULDL Allocate: Users can set the uplink sub-frame and downlink sub-frame allocate mode of TD-LTE according to the current signal. Please refer to the 3GPP specification for relevant information.

DW/GP/UP: Users can set the special sub-frame allocate mode of TD-LTE according to the current signal. Please refer to the 3GPP specification for relevant information.

5.1.3 Meas Set

Auto Scale: Click [Auto Scale], and parameters such as < Max Value >, < Range >, < Threshold > can be set automatically according to the power value of the current test signal.

Max Value: The user can set max value of RB power.

Range: Range can be set manually.

Threshold: The user can manually set the minimum threshold value of the current RB power.

5.2 Constell

Under this function, the signal is demodulated and the noise points in the constellation are aggregated and discretized to intuitively judge whether the EVM of each sub-frame meets the test requirements.



Fig.5-2 Constell

The table at the bottom of the screen shows RS Power, EVM(rms), IQ offset, IQ Quad Err, Freq Err, EVM(pk), IQ Gain Imbalance, Cell ID and other test results of the current LTE system.

5.2.1 Parameter Set

Under the <Constell> measurement, users can refer to the parameters set in the Power vs RB.

5.2.2 Mode Set

EVM Max Hold: The <EVM Max Hold> is set to on, EVM will maintain the current test max value.

Channel: The P-SS, S-SS and RS are set to “on” or “off” . Select "PDSCH" to set the modulation mode. When the modulation modes of QPSK, 16 QAM and 64 QAM are set to on, the constellation mode of PDSCH channel can be turned on.

5.2.3 Meas Set

Auto Scale: Automatically adjust the display interface size of constellation according to demodulation symbol.

Subframe: Users can choose to switch to other sub-frames for measurement.

Ref Point: Reference points can be set to display or turn off.

Data Legend: Data Legend can be set to display or turn off.

5.3 Power vs Time

Under the <Power vs Time>, the user can measure the frame Power of each sub-frame of TDD-LTE, and convert the time-domain state of the sub-frame to the frequency-domain state and display it.

Users can test the Sub-Frame Power, Total Power, DwTPS Power, Trans off Power, Cell ID and other test indicators.



Fig.5-3 Power vs Time

5.3.1 Parameter Set

Under the <Power vs Time> measurement, users can refer to the parameters set in the Power vs RB.

5.3.2 Meas Set

Subframe: The user can set the sub-frame number to view the spectrum waveform of each sub-frame.

Spec Subframe: The user can select DwPTS, GP, UpPTS.

UL Subframe: The user can select PUSCH, DMRS.

15kHz: If BW is selected, the current sub-frame power will be integrated and converted according to the whole LTE system bandwidth. If 15kHz is selected, the bandwidth of a single sub-carrier is converted by integration.

5.4 Control CH Power

The test results are displayed in image and list form, mainly measuring the power and EVM of the RS Power, P-SS and S-SS, PBCH, PCFICH.



Fig.5-4 Control CH Power

5.4.1 Parameter Set

Under the <Control CH Power> measurement, the users can refer to the parameters setting in the Power vs RB.

5.4.2 Meas Set

Under the <Control CH Power> measurement, the users can refer to the measurement setting in the Power vs RB.

6 FDD-LTE

The FDD-LTE function of E8900A can conduct relatively comprehensive demodulation analysis of 4G communication system and improve the work efficiency of base station maintenance.

6.1 Power vs RB

RB power measurement provides RB quantity, RB utilization, channel power, Cell ID ... etc. metrics.

Pressing [MENU], [FDD-LTE] and [Power vs RB] key, enter power vs RB measurement.

Power vs RB measure resource block allocation for 1 frame



Fig.6-1 Power vs RB measurement

6.1.1 Parameter Set

1 Frequency

Center Freq: Click < Center Freq >, and the center frequency of current LTE signal can be set through keyboard or wheel key.

2 Amptd

Ref Offset: Compensates for positive and negative compensations of attenuators or amplifiers connected to the input port. The user enters a compensation value at < Ref Offset >. The instrument defaults to 0dB.

Ref Unit: Users can select "dBm" and "mW".

Auto Range: In "on" state, the instrument will automatically switch "attenuator" and "amplifier" according to the current signal strength.

Pre Amp: In "on" state, the instrument improves sensitivity.

Att: The attenuation range is 0dB ~ 50dB. The user can manually attenuate the signal according to the current measurement value.

3 BW

According to the TD-LTE standard of 3GPP protocol, TD-LTE bandwidth can be set to 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz. Users can manually select according to the current bandwidth.

4 Mark

Under the Power vs RB, The Mark is divided into two types: RB and Free. Click the <Mark>, and set the mark state to "on".

RB Mode: Click the < RB#> key, select the RB through the arrow keys, or wheel key, and then read the RB power of each sub-frame through the RB Markers table.

Free Mode: Modify < RB# > and < SubFrame# > to read the power of corresponding RB through the "Free Mark".

6.1.2 Mode Set

Band Width: Same as the <BW> menu.

EVM Max Hold: Users can set the on-off state.

Antenna: it supports SISO OTA mode .

Freq Err Avg: Set the average number by pressing arrow keys or wheel key.

Channel: Select the corresponding item to turn P-SS, S-SS and RS on or off. Select "PDSCH" to set the modulation mode (QPSK, 16QAM,64QAM).

Cell ID: You can set the <Cell ID> to "Auto" or "Manu". When set to "Manu", set the cell ID number through the keyboard.

If the Cell ID specified by the user cannot be searched in the current spatial signal, the prompt "Cell ID not exist" will be displayed.

6.1.3 Meas Set

Auto Scale: Click [Auto Scale], and parameters such as < Max Value >, < Range >, < Threshold > can be set automatically according to the power value of the current test signal.

Max Value: The user can set max value of RB power.

Range: Range can be set manually.

Threshold: The user can manually set the minimum threshold value of the current RB power.

6.2 Constell

The analyzer can demodulate LTE signal, and give the RS power, EVM rms, EVM peak, frequency error, IQ offset, IQ Quadrature error, IQ gain imbalance, PCI results.

Through the signal is demodulated in the constellation of noise and discrete polymerization to visually determine each sub-frame of the current error vector magnitude (EVM) meets the test requirements.



Fig.6-2 Constellation measurement

6.2.1 Parameter Set

Under the <Constell> measurement, users can refer to the parameters set in the Power vs RB in [FDD-LTE].

6.2.2 Mode Set

Pressing <Mode Set>, enter mode setup menu. User can set bandwidth, Cell ID, UL/DL allocation parameters.

Bandwidth: Set bandwidth for LTE. According to 3GPP standard, LTE bandwidth can be set to 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz. default is 20MHz.

EVM Max Hold on/off: Set EVM max hold on or off.

Antenna: it supports SISO OTA mode .

Freq Err Avg: Set average times for frequency error test. The range is 1-10.

Channel:Set which channel is measured. User can select RS, P-SS, S-SS, PDSCH

Cell ID:Set cell ID to auto or manu mode. When it is auto mode, analyzer auto lock the cell ID which quality is best one. When it is manu mode, analyzer lock the cell ID which is set by user. Pressing “Cell ID”, user can set the cell ID manually. Default is auto mode

6.2.3 Meas Set

Auto Scale: Automatically adjust the display interface size of constellation according to demodulation symbol.

Subframe: Users can choose to switch to other sub-frames for measurement.

Ref Point: Reference points can be set to display or turn off.

Data Legend: Data Legend can be set to display or turn off.

6.3 Control CH Power

Give a test power and EVM result list for RS, P-SS, S-SS, PBCH, PCFICH, PDSCH-QPSK, PDSCH-16QAM, PDSCH-64QAM.



Fig.6-3 Control power measurement

6.3.1 Parameter Set

Under the <Control CH Power> measurement, the users can refer to the parameters setting in the Power vs RB in [FDD-LTE].

6.3.2 Meas Set

Under the <Control CH Power> measurement, the users can refer to the measurement setting in the Power vs RB.

7 Coverage

7.1 SS Indoor

Users can import building map files via USB disk and mark them on the building map by manual tapping. Capture data based on user-defined time intervals or user-defined building map locations.(Import and load building map from File Manager interface).

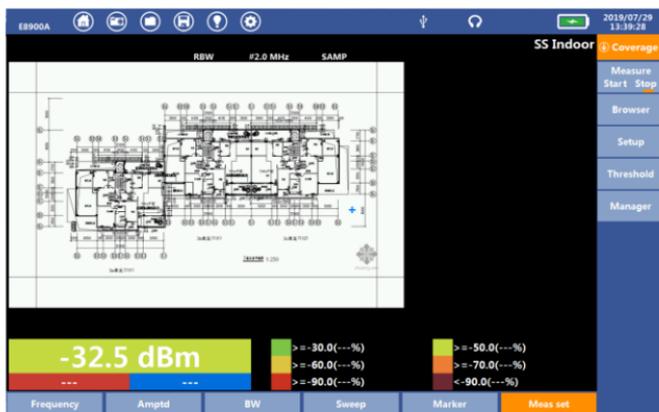


Fig.7-1 SS Indoor test

7.1.1 Parameter Set

(1)Freq

The user can refer to the frequency setting under [Swept SA] measurement. (The user needs to set the frequency when the measurement status is "Stop").

(2)Amptd

The user can refer to the amptd setting under [Swept SA] to perform related operations. (The user needs to set the amplitude when the measurement status is "Stop").

(3)BW

Users can refer to the BW setting under [Swept SA] to perform related operations. (Users need to set the bandwidth when the measurement status is "Stop").

(4)Sweep

Users can refer to the sweep setting under [Swept SA] to perform related operations. (Users need to set the bandwidth when the measurement status is "Stop").

(5)Marker

The user can perform the corresponding test by moving the marker in the "start" measurement state.

To Cent:After clicking this button, the current marker can be automatically marked to the center of the screen test area.

Sign:When the user clicks "Sign", the marker changes from blue to red, and this position is used as the test marker point. The current signal strength is represented according to the threshold color.

Clear:The user clicks the <Clear> button to clear all measurement data on the map.

Undo:The user clicks the <Undo> button to clear the data between this marker point and the previous marker point.

7.1.2 Meas Set

Measure: The user clicks "Start" to perform a dot test, and click "Stop" to end the test.

Browser:The user clicks [Up] [Down] [Left] [Right] to move the indoor building map.

Setup:

Mode: The user can select the "Time" and "Free" modes by clicking the "Mode" button under <Setup>.

“Time” mode is to mark the points according to the time interval set by the user.

“Free” mode is marked by the user manually tapping.

Time Interval: Only in the "Time" mode, the user can manually input the sampling point interval, the setting range is between 100ms and 1Min.

Threshold:The user clicks <Threshold> to manually set the threshold values of “Excellent”, “Very Good”, “Good”, “Poor” and “Fail”. When the indoor dot test is performed, it will be displayed by the color of the set threshold.

Manager:The user can import the indoor building map to the instrument through the USB disk. Select “Load” the relevant building map for testing.

7.2 SS Outdoor

The SS Outdoor provides an outdoor road test function for the frequency of interest to the user. When performing SS Outdoor testing, an external GPS module and a map of the test area are required. After obtaining the GPS information, the user can perform an automatic dot test at the "time" or "distance" interval.

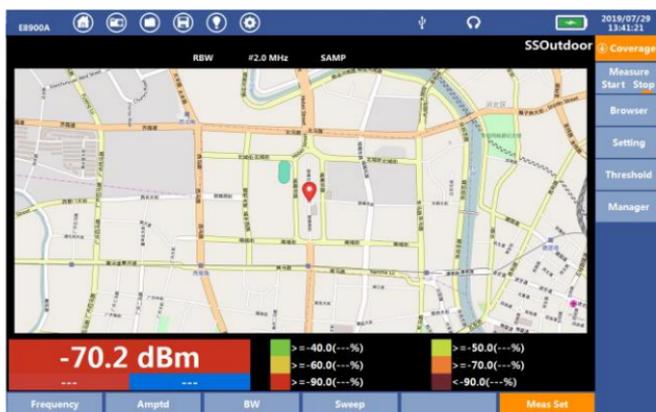


Fig.7-2 SS Outdoor test

7.2.1 Parameter Set

(1)Freq

The user can refer to the frequency setting under [Swept SA] measurement. (The user needs to set the frequency when the measurement status is "Stop").

(2)Amptd

The user can refer to the amptd setting under [Swept SA] to perform related operations. (The user needs to set the amplitude when the measurement status is "Stop").

(3)BW

Users can refer to the BW setting under [Swept SA] to perform related operations. (Users need to set the bandwidth when the measurement status is "Stop").

(4)Sweep

Users can refer to the sweep setting under [Swept SA] to perform related operations. (Users need to set the bandwidth when the measurement status is "Stop").

7.2.2 Meas Set

Measure: After the user obtains the GPS information, click the “Start” button to start the measurement. When the GPS information is not acquired, clicking “Start” will prompt “GPS is not connected” .

Browser:The user clicks [Meas set] and clicks <Browser> to operate on the currently loaded map, such as: to the center, zoom in, zoom out, up, down, left, right, etc.

Setting:

a.Mode:The user can select the "Time" and "Distance" modes by clicking the "Mode" button under <Setting>.

“Time” mode: Automatically mark sampling points according to the time interval that the user has set.

“Dist” mode: Mark the sampling points according to the user setting distance interval.

b. Dist Inter: In Distance mode, the user can set [Dist Inter]. After starting the measurement, the instrument marks the sampling points on the map at the set distance. The input range is from 1 meter to 500 meters.

c. Time Interval: In Time mode, the user can set [Time Interval]. The setting range is from 100 ms to 1 Min.

Threshold: The user clicks <Threshold> to manually set the thresholds of “Excellent”, “Very Good”, “Good”, “Poor” and “Fail”. When testing, it will be displayed by the color of the set threshold.

Manager: Users import maps to the instrument via USB Disk. Then select "Local" and click "Load".

7.3 Netclean Outdoor

Using the netclean outdoor function for testing can effectively check this area before the base station construction or using a certain section of spectrum resources. To avoid the interference of spectrum resources in the later stage.

The upper part of the screen displays the coverage map of the area concerned by the user, and the lower window displays the usage of the current spectrum resources concerned by the user.



Fig.7-3 Netclean Outdoor test

7.3.1 Parameter Set

The setting of Freq, Amptd, BW, Sweep, Marker setting, user can refer to the frequency setting under [Swept SA] measurement.

7.3.2 Meas Set

Measure: The user clicks "Start" to perform a dot test, and click "Stop" to end the test.

Mode: The user can select the "Time" and "Distance" modes by clicking the "Mode" button under <Setting>.

“Time” mode: Automatically mark sampling points according to the time interval that the user has set.

“Dist” mode: Mark the sampling points according to the user setting Dist Inter.

Time Inter: Only in the "Time" mode, the user can manually input the sampling point interval, the setting range is between 100ms and 1Min.

Browser: The user clicks [To Center] [Zoom In] [Zoom out] [Up] [Down] [Left] [Right] to move the indoor building map.

Threshold: The user clicks <Threshold> to manually set the threshold values of “Excellent”, “Very Good”, “Good”, “Poor” and “Fail”. When the indoor dot test is performed, it will be displayed by the color of the set threshold.

Map Manager: The user can import the indoor building map to the instrument through the USB disk. Select “Load” the relevant building map for testing.

7.4 FDD Outdoor

Outdoor drive test for FDD-LTE provides signal FDD-LTE signal quality coverage map. Users connect GPS module to the analyzer. The analyzer will auto capture the FDD-LTE signal quality data with GPS information (Longitude, Latitude and Time). The data is captured by user-defined time interval or user-defined distance. The analyzer sign tags on the map. The color of tag represent the level of SS. The location of the tag is from GPS information.

The FDD-LTE quality data include CELL ID, S-SS, P-SS, RSRQ, RSRP.

The operation is same as the Drive test for SS Outdoor. So please take it as the reference.



Fig.7-4 FDD Outdoor test

7.5 TDD Outdoor

Under the TDD Outdoor test, the user can test the TDD-LTE information quality and coverage in the relevant area to determine whether there are weak coverage or overlapping coverage in the area. An external GPS module is required for this test.

By demodulating and analyzing the signal, the user can obtain test results, such as CELL ID, S-SS, RSRQ, RSRP, SINR of the TDD-LTE.

The user can refer to the parameter setting and operation method of the <SS Outdoor> function for measurement.

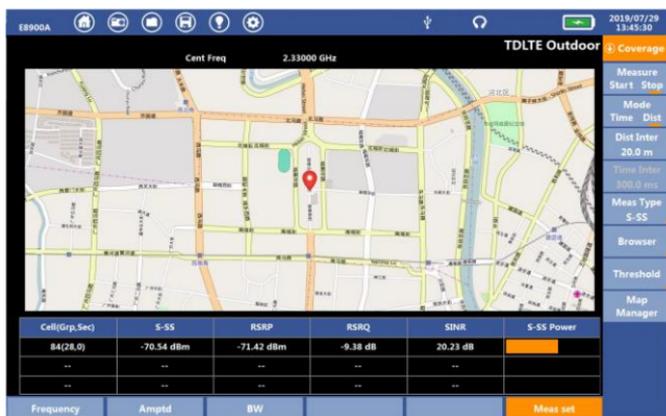


Fig.7-5 TDD Outdoor test

7.6 5G NR Outdoor

Under the 5G-NR Outdoor test, the user can test the 5G information quality and coverage of the relevant area to determine whether there are weak coverage or overlapping coverage in the area. An external GPS module is required for this test.

By demodulating and analyzing the signal, the user can obtain the physical cell ID, Beam ID, SS-RSRP, SS-RSRQ, and SS-SINR and other test results of the 5G-NR signal.

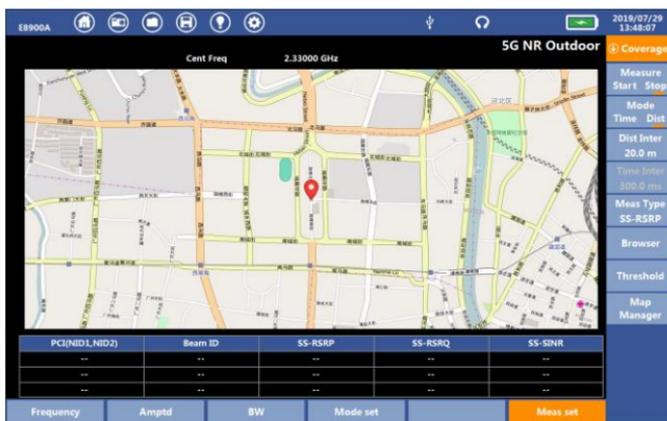


Fig.7-6 5G NR Outdoor test

7.6.1 Parameter Set

(1)Freq

The user can refer to the frequency setting under [Swept SA] measurement.

(2)Amptd

The user can refer to the amptd setting under [Swept SA] to perform related operations.

(3)BW

Users can refer to the BW setting under 5G-NR [Summary] measurement for related operations.

7.6.2 Mode Set

Users can refer to <Meas set> under 5G-NR [Summary] for related operations.

7.6.3 Meas set

Measure: The user clicks the <Measure> button to select "Start" and "Stop". After the user obtains the GPS information, click the "Start" button

to start the measurement. When the GPS information is not acquired, clicking “Start” will prompt “GPS is not connected” .

Mode: The user clicks the <Mode> button to select the “Time” and “Distance” modes.

“Time” mode: Automatically mark sampling points according to the time interval that the user has set.

“Dist” mode: Mark the sampling points according to the user setting distance interval.

Dist Inter: In Distance mode, the user can set [Dist Inter]. After starting the measurement, the instrument marks the sampling points on the map at the set distance. The input range is from 1 meter to 500 meters.

Time Inter: In Time mode, the user can set [Time Interval]. The setting range is from 100 ms to 1 Min.

Meas Type: The user clicks the <Meas Type> button to select "SS-RSRP", "SS-RSRQ", and "SS-SINR".

Browser:The user clicks [Meas set] and clicks <Browser> to operate on the currently loaded map, such as “to center”, “zoom in”, “zoom out”, “up”, “ ” down”, “left”, “right”, etc.

Threshold: The user clicks <Threshold> to manually set the thresholds of “Excellent”, “Very Good”, “Good”, “Poor” and “Fail”. When testing, it will be displayed by the color of the set threshold.

Map Manager: Users import maps to the instrument via USB Disk. Then select "Local" and click "Load".

7.7 5G NR Indoor

Users can import building map files via USB disk and mark them on the building map by manual tapping. Capture data based on user-defined time intervals or user-defined building map locations.

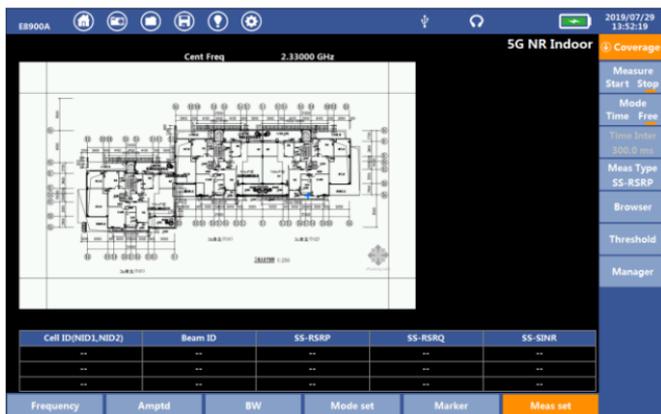


Fig.7-7 5G NR Indoor test

7.7.1 Parameter Set

(1)Freq

The user can refer to the frequency setting under [Swept SA] measurement. (The user needs to set the frequency when the measurement status is "Stop").

(2)Ampltd

The user can refer to the ampltd setting under [Swept SA] to perform related operations. (The user needs to set the amplitude when the measurement status is "Stop").

(3)BW

Users can refer to the BW setting under [Swept SA] to perform related operations. (Users need to set the bandwidth when the measurement status is "Stop").

(4)Marker

Users can refer to the [SS Indoor] setting under [Coverage] to perform related operations.

7.7.2 Mode set

Users can refer to <Mode set> under 5G-NR [Summary] for related operations.

7.7.3 Meas set

The user can refer to the setting of [5G NR Outdoor] under [Coverage] to perform related operations.

8 5G-NR

8.1 Summary

Select the main menu [5G-NR] and choice <Summary> measurement, the following figure show the measurement diagram:

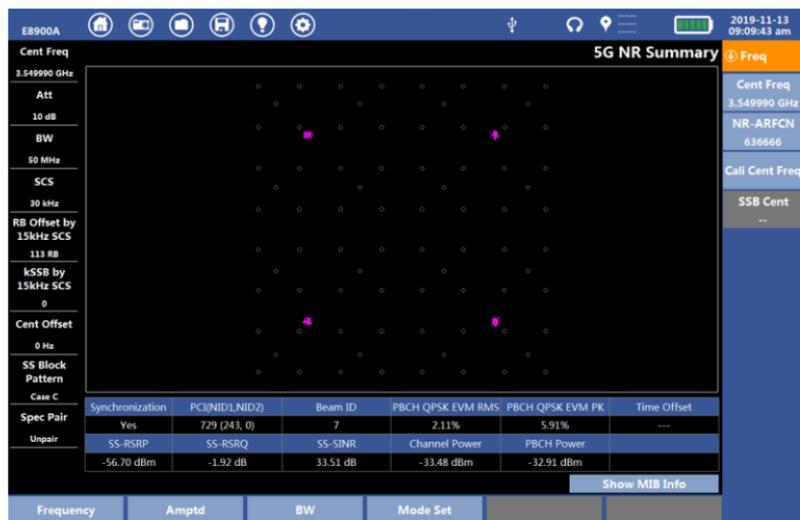


Fig.8-1 5G-NR Summary Measurement

This measurement shows the measured parameters which include Synchronization flag, Physical Cell ID(NID1,NID2), Beam ID, PBCH QPSK EVM RMS, PBCH QPSK EVM PK, SS-RSRP, SS-RSRQ, SS-SINR, PBCH Power, Time Offset, PBCH constellation and PBCH MIB decode.

In the summary measurement, E8900A shows the following settings:

8.1.1 Parameter Set

1.Frequency

Select [Summary] and press <Frequency> key, user can set parameters refer to frequency by the right column menu.

(1) Center Frequency

change to “3GHz” automatically. User can also use the rotary knob or the arrow keys.



Fig.8-3 Frequency Channel Setting

(3) Cali Cent Freq

In the <Frequency> setting, press < NR-ARFCN>,waiting for about 6 seconds ,<Cali Cent Freq > will show the calculate value and change < Cent Freq > value. Here, if the user uses "Cent Freq" in the frequency setting, the accuracy of the calibration center frequency is 15KHz. If the user uses "NR-ARFCN" in the frequency setting, the accuracy of the calibration center frequency is 30kHz

(4) SSB Cent

After press <Cali Cent Freq>, the <SSB Cent> will show the 5G-NRSS Block center frequency offset.

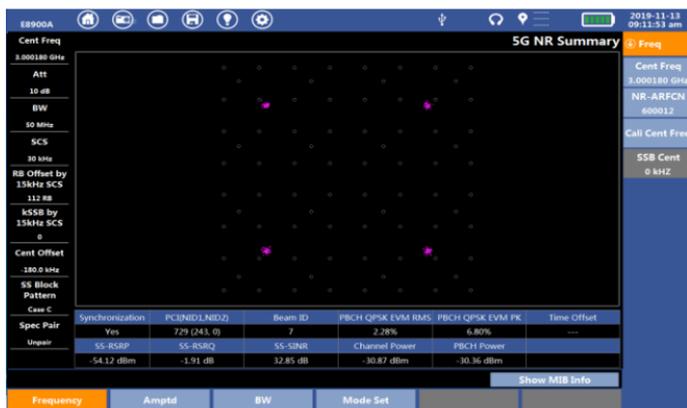


Fig.8-4 Calibrate SSB Center Frequency

2. Amplitude

User can refer to the method of amplitude setting in [Spectrum Sweep] measurement. The "AGC" option is added here. When the user selects AGC on, the software automatically adjusts the values of amplifier switch and attenuator according to the measured values.

3. Bandwidth

In [Summary], user press [BW] item, then select analyze bandwidth: 5MHz、10MHz、15MHz、20MHz、25MHz、30MHz、40MHz、50MHz、60MHz、70MHz、80MHz、90MHz、100 MHz, default : 50MHz.

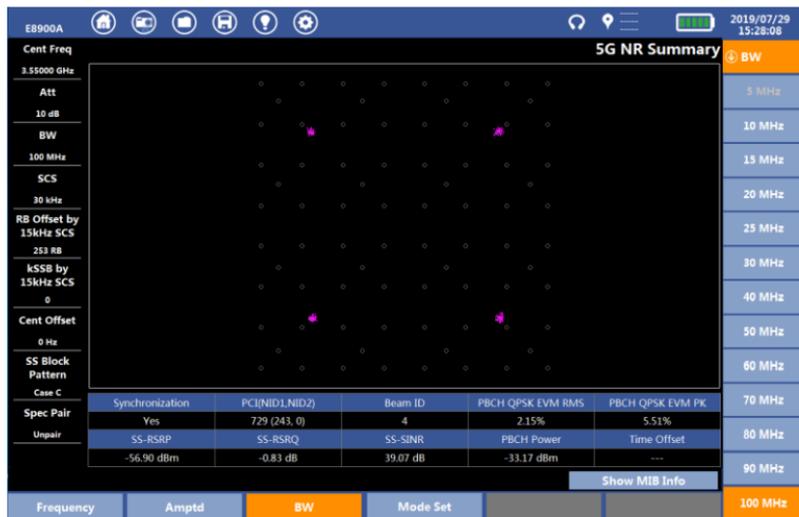


Figure.8-5 5G-NR Bandwidth setting

8.1.2 Mode Set

(1)SCS

- ① In [Summary], user press [BW] item.
- ② Press <SCS>, select the measured value 15kHz or 30kHz, default: 30kHz.

Note: SCS is corresponding with analyzed bandwidth. When set bandwidth is greater than 50MHz, the SCS just can be set to 30kHz. When set bandwidth is 5MHz,the SCS just can be set to 15kHz.



Figure.8-6 SCS Setting

(2)RB Offset by 15kHz SCS

This parameters with SCS Offset by 15kHz SCS define the location of the synchronization signals in the frequency domain in terms of resource blocks (RB).

- ① In [Summary], user press [Mode Set] item.
- ② Press <SSB>.
- ③ Press < RB Offset by 15kHz SCS >, enter a value of frequency offset in RB.
- ④ Press <OK>.

Note: When SCS is 30kHz, RB Offset by 15kHz SCS can be set with a range from 0 to (RB Number -20)*2. When SCS is 15kHz, RB Offset by 15kHz SCS can be set with a range from 0 to (RB Number -20). RBs defines the number of physical resource blocks (PRB) the bandwidth part occupies. The number of physical resource blocks also defines the frequency width of the bandwidth part. The sum of RB Offset by 15kHz SCS and SCS Offset by 15kHz SCS cannot more than (RB Number -20).

Default: the center position of SS block is located in center frequency.



Figure.8-7 RB Offset Setting

(3)SCS Offset by 15kHz SCS

This parameters with RB Offset by 15kHz SCS define the location of the synchronization signals in the frequency domain in terms of 15kHz sub-carrier.

- ① In [Summary], user press [Mode Set] item.
- ② Press <SSB>.
- ③ Press <SCS Offset by 15kHz SCS>, enter a value of frequency offset in SCS.
- ④ Press <OK>.

Note: When SCS is 30kHz, SCS Offset by 15kHz SCS can be set to even with a range from 0 to 22. When SCS is 15kHz, SCS Offset by 15kHz SCS can be set with a range from 0 to 23. SCS offset cannot more than (RB Number -20).

Default: the center position of SS block is located in center frequency.

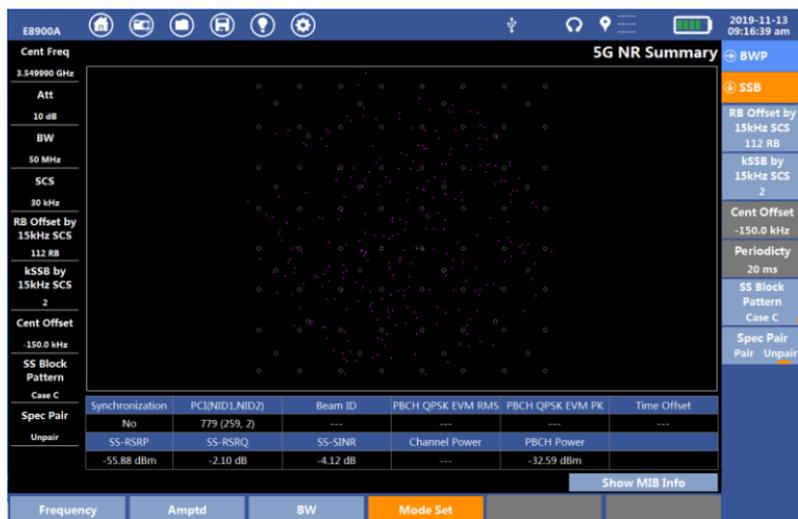


Figure.8-8 SCS Offset Setting

(4)SS Block Pattern

- ① In [Summary], user press [Mode Set] item.
- ② Press <SSB>.
- ③ Press < SS Block Pattern >, select the SSB pattern : Case A , Case B or Case C.

Note: When SCS is 15kHz, SSB pattern only can be set Case A. When SCS is 30kHz, SSB pattern can be set Case B or Case C.

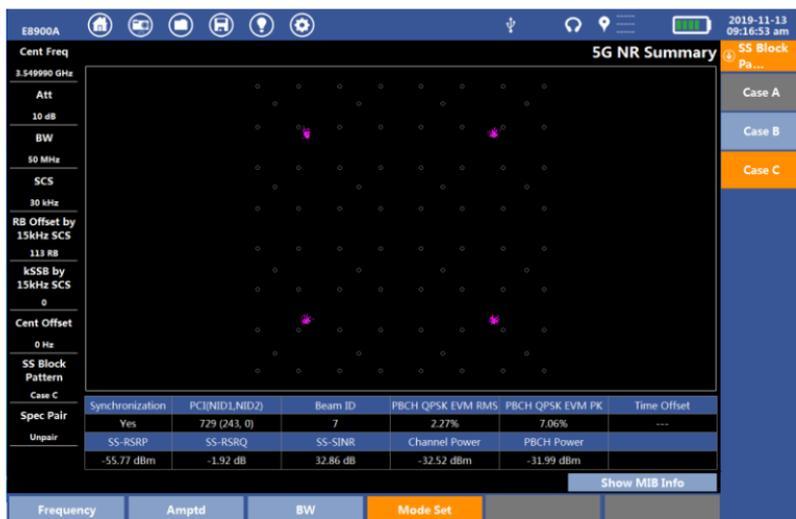


Figure.8-9 SS Block Pattern Setting

(5)Spec Pair

- ① In [Summary], user press [Mode Set] item.
- ② Press <SSB>.
- ③ Press <SSB Pattern>, select <Case C>
- ④ Press <Spec Pair>, select the pattern in Case C: Pair or Unpaired.

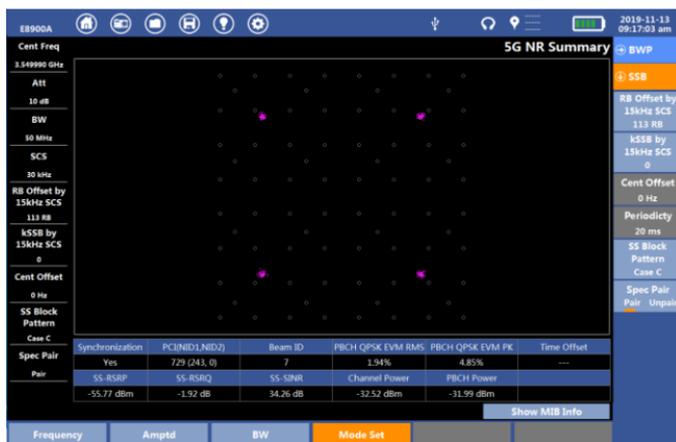


Figure.8-10 Spec Pair Setting

(6)PBCH MIB Info

Click<Show MIB Info>, the measurement figure will show the PBCH MIB specific information in the block(See below) . The first column is the source code of MIB, the second column is the meaning according to 3GPP protocol. And user can Click<Hide MIB Info> to close this measurement and return back to original constellation measurement.



Figure.8-11 PBCH MIB message

8.1.3 Meas Set

Synchronization flag, Physical Cell ID(NID1,NID2), Beam ID, PBCH QPSK EVM RMS, PBCH QPSK EVM PK, SS-RSRP, SS-RSRQ, SS-SINR, PBCH Power, Time Offset and PBCH constellation.

(1) Sync: show whether the 5G-NR cell is locked. “Yes” means the synchronization was successful. “No” means the synchronization was not successful.

(2) PCI(NID1,NID2) : physical cell id (NID1,NID2)

(3) Beam ID: the number of the most powerful beam among the received signal.

(4) PBCH QPSK EVM RMS: show the root-mean-square value of vector magnitude of sub-carriers in PBCH channel whose mod type is QPSK.

(5) PBCH QPSK EVM PK: show the peak value of vector magnitude of sub-carriers in PBCH channel whose mod type is QPSK.

(6) SS-RSRP: SS reference signal received power.

(7) SS-RSRQ: SS reference signal received quality.

(8) SS-SINR: SS signal-to-noise and interference ratio

(9) PBCH power: show the PBCH channel power.

(10) Channel Power: show the average power value of all subcarriers of each symbol in the current bandwidth.

(11) Time Offset: The time offset between GPS-1pps and the head of 5G NR frame. The unit is microsecond.

8.2 Inter Detect

Select the main menu [5G-NR] and choice <Inter Detect> measurement, the following figure show the measurement diagram:

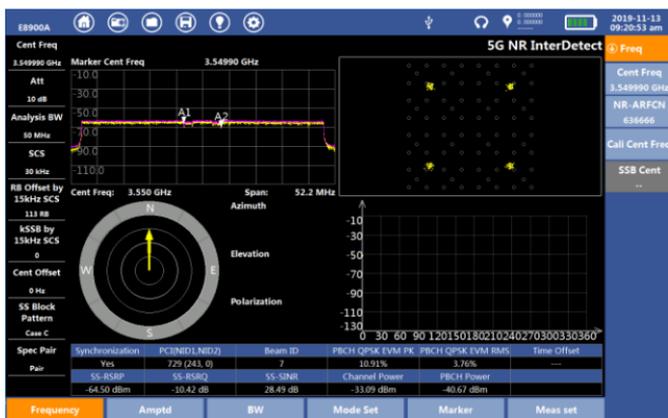


Figure.8-12 5G-NR Inter Detect

This measurement shows the measured parameters which include Synchronization flag, Physical Cell ID(NID1,NID2), Beam ID, PBCH QPSK EVM RMS, PBCH QPSK EVM PK, SS-RSRP, SS-RSRQ, SS-SINR, PBCH Power and four figure of interference detection which include spectrum analyze, PBCH channel constellation, antenna angle diagram and statistics diagram of antenna angle and SS-RSRP in each antenna angle.

In the inter detect measurement, E8900A shows the following settings:

8.2.1 Parameter Set

1. Frequency

User can refer to the method of frequency setting in [Summary] measurement.

2. Amplitude

User can refer to the method of amplitude setting in [Spectrum Sweep] measurement.

3. Bandwidth

User can refer to the method of bandwidth setting in [Summary] measurement.

4. Mode Setting

User can refer to the method of mode setting setting in [Summary] measurement.

5.Marker

In [Inter Detect] measurement, user press [Maker] item to select the setting in right column. This setting only point to the spectrum analyze diagram.

(1) Marker1

Marker1 is corresponding to A1 in spectrum diagram.

① Press <Marker1>.

② User enter the number of frequency where A1 locates, user also use the rotary knob or the arrow keys.

③ Select the unit of frequency: GHz,MHz,kHz,Hz.



Figure.8-13 Maker Setting

(1) Marker2

The method is the same to set Marker1.

(2) Max Hold

< Max Hold >function is show the max value of every spectrum point in current trace. Here can select <On> or <Off>.



Figure.8-14 Max Hold On/Off State

(3) Select trace

<Sel Trace> decide the trace where maker1 and maker2 point to in the diagram. When <Max Hold> is <Off>, <Sel Trace> is on <Real> state. When <Max Hold> is <On>, <Real> and <Max Hold> can be selected as follow figure:



Figure.8-15 Select Trace Setting

8.2.2 Meas Set

In [Inter Detect] measurement, user press [Meas set] item to select the setting in right column. This setting correspond to the antenna angle diagram and SS-RSRP in each antenna angle diagram.

1.Measurement Setting

(1) Orientate

② Press<Orientate>

②Press<Antenna> into next menu, there are three antenna can be choice: ET250M (20-250MHz) 、 ET500M (200-500MHz) 、 ET8000M (500-8000MHz) .

③Press<Polarization>,user can select <Hor> or <Ver>.



Figure.8-16 Antenna Setting



Figure.8-17 Polarization Setting

(2) PvsD

Press <PvsD> can select <Clear PVD>, when press this item, the statistics trace in fourth figure will be all clear.



Figure.8-18 Clear PVD

2. Measured parameters specification

User can refer to the measurement specification in the form of 5G-NR Summary.

3.Four measurement diagram specification

(1) Spectrum Analyze diagram

This diagram provide real time spectrum of 5G signals with setting bandwidth. The horizontal axis represent frequency and its unit is GHz or MHz. The vertical axis represent amplitude and its unit is dBm.

User can set two makers A1 and A2. In the middle top of diagram show the center frequency of A1 and A2,which is use for finding the center frequency of SSB.

In the left bottom of diagram,it shows the setting center frequency. In the right bottom of diagram, it shows the measurement span. The center frequency must more than half of span. The following form show the relation of setting bandwidth and display span.

num	Bandwidth(setting parameter)	Span (display value)
1.	5MHz	6.25MHz
2.	10 MHz	13 MHz
3.	15 MHz、 20 MHz 、 25 MHz	26.1 MHz
4.	30 MHz、 40 MHz、 50 MHz	52.2 MHz
5.	60 MHz、 70 MHz、 80 MHz、 90 MHz、 100 MHz	104.4 MHz

(2) Constellation

The Constellation is used to observe some aspects of modulation accuracy. It displays constellation diagram by modulation type.This diagram show the PBCH channel constellation. It is the same as constellation is 5G-NR Summary diagram.

(3) Antenna angle

Shows the angle of current directional antenna. Throughout antenna angle and SS-RSRP of each direction angle to analyze the direction of 5G-NR signals source.

- (4) statistics diagram of antenna angle and SS-RSRP in each antenna angle

The horizontal axis represent antenna angle and i The vertical axis represent SS-RSRP measurement parameter. User can trace the most powerful direction of interference direction during measurement to lock the position of interference source.

8.3 Beam Analyzer

Select the main menu [5G-NR] item and choice <Beam Analyzer> measurement, the following figure show the measurement diagram:



Figure.8-19 5G-NR Beam Analyzer

This measurement shows the measured parameters which include Synchronization flag, Physical Cell ID, Beam ID, SS-RSRP, SS-RSRQ, SS-SINR, PBCH Power and histogram of power measurement. In the form, it will highlight one column with the max value of SS-RSRP. In statics mode, it will show the data with different cell id or beam id. User can select one column data to see the details.

In the beam analyzer measurement, E8900A shows the following settings:

8.3.1 Parameter Set

1. Frequency

User can refer to the method of frequency setting in [Summary] measurement.

2. Amplitude

User can refer to the method of amplitude setting in [Spectrum Sweep] measurement.

3. Bandwidth

User can refer to the method of bandwidth setting in [Summary] measurement.

4. Mode Setting

User can refer to the method of mode setting setting in [Summary] measurement.

8.3.2 Meas Set

In [Beam Analyzer] measurement, user press [Meas set] item to select the setting in right column.

(1) Mode

① Press <Meas set>.

② Press <Mode>, select the mode: <Real> or <Statis>.

In the mode of <Real>, the diagram will show the current measurement of all cell id, beam id and signals power. When No. is labeled “*”, it mean the cell is not synchronization in this column. In the mode of <Statis>. The diagram will show all statistic data with different cell id or beam id.

(2) Statistic

① Press <Meas Set>

② Press <Mode>, select the mode: <Real> or <Statis>.

③ Press <Start>, it will show the statistic information in the data form with different cell id or beam id.

③ Press <Stop>, it will stop statistic. When press <Start> again, the data in the form will be cleared and statistic renew.

Time	Beam0	Beam1	Beam2	Beam3	Beam4	Beam5	Beam6	Beam7
2019-11-13 09:28:34 am	729	729	729	729	729	729	729	729
2019-11-13 09:28:37 am	729	--	729	729	729	729	729	729
2019-11-13 09:28:47 am	729	729	--	729	--	--	729	729
2019-11-13 09:29:03 am	729	729	--	729	--	--	729	--

Figure.8-20 Statistic Mode

(1) Detail

① Press <Meas set>

② Press <Mode>, select the mode: <Real> or <Stat>.

③ Press <Start>.

④ Select one column data, press <Detail>. The form will move down, on the top half part in this diagram will show the details of selected data include measurement parameters and histogram of signals power.



Figure.8-21 Beam Detail

(2) Return

In the mode of statistic ,after starting statistic the cell and select the detail, user can press <Return> back to the data form diagram.

(3) PCI Search

Physical cell ID Search can be divided into "Auto" mode and "Manu" mode. In "Auto" mode, the system detects and displays all received cell ID information. In "Manu" mode, the user can set the specified "PCI" value. The system only detects and displays the demodulation information related to the set cell ID. if the cell is not detected, no information will be displayed.

8.4 Power Vs Time

Select the main menu [5G-NR] item and choice <Power VS Time> measurement, the following figure show the measurement diagram:



Figure.8-22 5G-NR Power VS Time

This measurement will show the time waveform and the spectrum of the TDD symbol the user set when the 5G signal is synchronization. User can set any PDSCH symbol or servals consecutive symbols in one 10ms frame.

Besides, users can test every slot power in 10ms, Synchronization flag, PCI, Beam ID, Channel Power, SS-RSRP.

8.4.1 Parameter Set

1. Frequency

User can refer to the method of frequency setting in [Summary] measurement.

2. Amplitude

User can refer to the method of amplitude setting in [Spectrum Sweep] measurement.

3. Bandwidth

User can refer to the method of bandwidth setting in [Summary] measurement.

4. Mode Setting

User can refer to the method of mode setting in [Summary] measurement.

5.Marker

User can refer to the method of Marker setting in [Spectrum Analysis]<Swept SA> measurement.

8.4.2 Meas Set

In [Power Vs Time] measurement, user press [Meas set] item to select the setting in right column.

(1) PVT Mode

① Press<Meas set>.

② Press<PVT Mode>, select the mode: <Frame> or <Slot>.

This function only influence the time-domain measurement. In the mode of <Frame>, the second time-domain diagram will show the waveform of one frame. In the mode of <Slot>. The diagram will only show the selected slot waveform. According to the 3GPP protocol, when SCS is 15KHz, duration of one slot is 1ms,when SCS is 30KHz, duration of one slot is 0.5ms.



Figure.8-23 Frame mode of PVT



Figure.8-24 Slot mode of PVT

(2) Allocated Slot

① Press <Meas set>.

② Press < Allocated Slot >, user can enter the slot number from 0 to 9 when SCS is 15KHz, and from 0 to 19 when SCS is 30KHz. The first measurement diagram will show the selected slot spectrum.

(3) First Symbol

① Press <Meas set>.

② Press < First Symbol >, user enter the start symbol number from 0 to last symbol number

(4) Last Symbol

① Press <Meas set>.

② Press < Last Symbol >, user enter the start symbol number from First Symbol to 13.

When select allocated slot, the first symbol and the last symbol, the second frequency-domain diagram will show the spectrum of selected symbol or several consecutive symbols in this slot.

Note: when SCS is 15KHz the number of slot power in measurement parameters table is from 0 to 9 and when SCS is 30KHz the slot power number of slot power is from 0 to 19.

8.5 Channel Power

5G Channel Power is the total power within a certain span which up to 100MHz.

Select the [5G-NR] and Click [Channel Power] to enter the measurement interface.

8.5.1 Parameter Set

1.Frequency

Click [Channel Power] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters.

2.Amplitude

User can refer to the method of amplitude setting in [Swept SA]measurement.

3.Bandwidth(BW)

In [Channel Power], user press [BW] item, then select analyze bandwidth: 1.92MHz、3.84MHz、7.68MHz、15.36MHz、30.72MHz、61.44MHz、122.88MHz.

4.Sweep

User can refer to the method of amplitude setting in [Swept SA]measurement.

5.Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

8.5.2 Meas Set



Fig.8-25 Measurement setting

1.Integ BW

Sets the integration bandwidth for the channel power measurement. The range of setting bandwidth is from 300kHz to 100MHz.

2 RF Burst

User can refer to the method of amplitude setting in [Channel Power] of Spectrum Analysis measurement.

8.6 Occupied Bandwidth (Occ BW)

Occupied bandwidth is the bandwidth which includes ninety-nine percent of total transmit power and declining x dB.

Select the [5G-NR] and Click [Occ BW] to enter the measurement interface



Fig.8-26 5G Occupied bandwidth

8.6.1 Parameter Set

1.Frequency

Click [Occ BW] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters.

2.Amplitude

User can refer to the method of amplitude setting in [Swept SA] measurement.

3.Bandwidth(BW)

RBW:

In [Occ BW], user press [BW] item, then select analyze bandwidth: 1.92MHz、3.84MHz、7.68MHz、15.36MHz、30.72MHz、61.44MHz、122.88MHz.

Average:

User can refer to the method of amplitude setting in [Occ BW] of Spectrum Analysis measurement.

4.Sweep

User can refer to the method of amplitude setting in [Swept SA]measurement.

5.Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

8.6.2 Meas Set

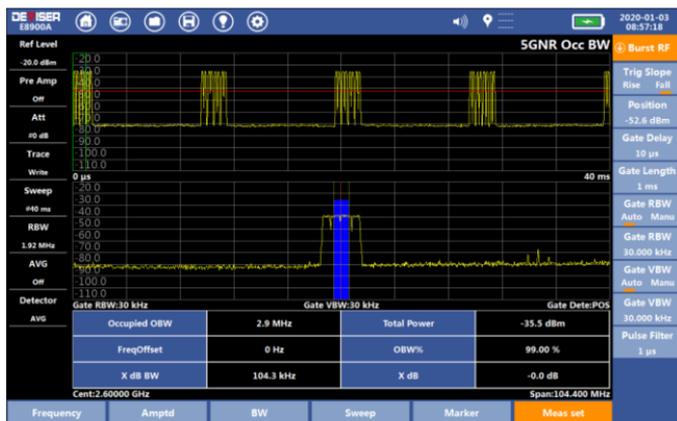


Fig.8-27 Occupied Bandwidth Measurement setting

1.Integ BW

Sets the integration bandwidth for the channel power measurement. The range of setting bandwidth is from 300kHz to 100MHz.

2 RF Burst

User can refer to the method of amplitude setting in [Occ BW] of Spectrum Analysis measurement.

1 Integ BW

Sets the integration bandwidth for the channel power measurement.

2 OBW Power

Sets the percentage of power for calculating the occupied BW.

3 X dB:

Sets the dB Down level for calculating the occupied BW.

4 RF:

Sets the RF trigger to Burst or Continuous (Free Run) mode. The default setting is Continuous.

5 Burst RF:

Opens the Burst RF submenu if RF is toggled to Burst. The method of setting Burst RF is same to the method in [Channel Power] measurement.

8.7 Adjacent Channel Leakage Ratio (ACLR)

8.7.1 Parameter Set

1.Frequency

Click [ACLR] to enter the measurement interface, click [Frequency], and press < Freq > menu to set frequency-related parameters.

2.Amplitude

User can refer to the method of amplitude setting in [Swept SA]measurement.

3.Bandwidth(BW)

RBW:

In [ACLR], user press [BW] item, then select analyze bandwidth: 1.92MHz、3.84MHz、7.68MHz、15.36MHz、30.72MHz、61.44MHz、122.88MHz.

Average:

User can refer to the method of amplitude setting in [ACLR] of Spectrum Analysis measurement.

4.Sweep

User can refer to the method of amplitude setting in [Swept SA]measurement.

5.Marker

Users can refer to the marker function under Swept SA and Channel power measurement.

8.7.2 Meas Set

Tapping the Meas Set softkey opens up a dialog box enabling the user to setup the ACLR measurement. (See below.) Within this dialog, you can set signal standard, bandwidth values, and other specifications. In the measurement setting dialog, click "OK" to save the setting and exit the dialog, and click "Cancel" to cancel the setting and exit the dialog .



Fig.8-28 measurement setting

1 Meas Set



Fig.8-29 5G ACLR Measurement setting

Sig Std: The instrument prefabricates the templates of various communication systems. By selecting the communication mode in the template, parameters can be set in one key mode.

Carr BW: Set the spectrum width of the carrier frequency signal to be measured.

Num: Multiple signal to carrier can be measured, this system can support 12 Carrier signal for measurement.

Ref Car: The user can use the current carrier as the main reference carrier.

RMS: Turn on RMS and display the power value of the outer adjacent channel of the carrier after RMS operation.

Adj BW: Set the carrier width of the adjacent signal.

Adj Num: Number of adjacent signals.

Offset: With a center frequency as the reference, the carrier frequency of adjacent channels can be set. The instrument can set up 6 pairs of adjacent channels at most, each pair of adjacent channels has one on the left and one on the right.

Use Default: After clicking, the parameter setting will automatically adjust to the default initial state of the signal type of the signal meter.

2 Limit

Under ACLR measurement, click the [Meas Set] menu, click the < Limit > submenu, and the qualified line setting check box will pop up.

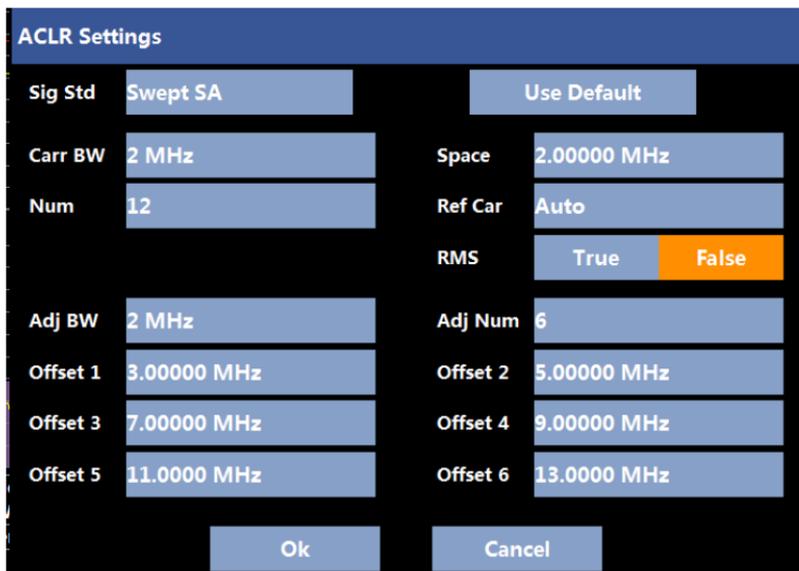


Fig.8-30 Limit setting

The qualified line of ACLR is divided into absolute qualified line and relative qualified line. Absolute qualification refers to the actual power of the adjacent channel, and relative qualification refers to the power difference between the adjacent channel and the carrier. If the adjacent channel power is less than the absolute qualified line value, it is absolute qualified; if the relative value is less than the relative qualified line value, it is relatively qualified; similarly, green, red and white indicate qualified, unqualified and not enabled.

There are four modes for each pair of adjacent channels, absolute(Abs), relative(Rel), And, Or.

Abs: Absolutely qualified means qualified;

Rel: Relatively qualified means qualified;

And: Absolute and relatively qualified is qualified;

Or: Absolute or relative qualification is qualified.

Only the left and right adjacent roads are qualified as the adjacent roads. The comprehensive result of the qualified line on the top of the screen is to check whether all the adjacent channels of the enabled line are qualified. When all the adjacent channels of the enabled line are qualified in the selected mode, the comprehensive result is qualified, otherwise it is unqualified. Also green, red and white indicate qualified, unqualified and not enabled.

3 Burst RF:

Opens the Burst RF submenu. The method of setting Burst RF is same to the method in [Channel Power] in Spectrum Analysis measurement.

9 IQ

9.1 IQ

Click [IQ] to enter the measurement interface, and the instrument can perform IQ capture.

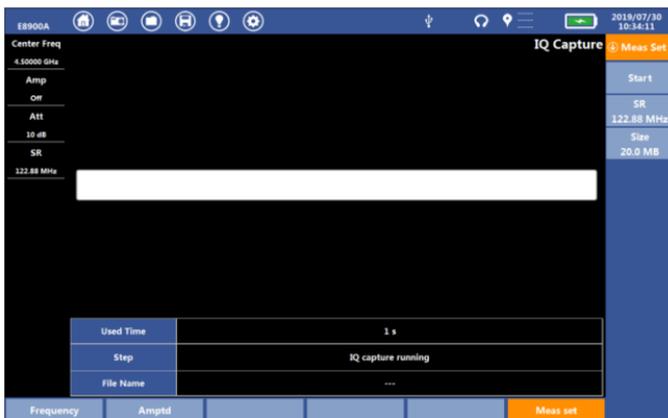


Fig.9-1 IQ Capture test

9.1.1 Parameter Set

(1) Freq

The user can refer to the frequency setting under [Swept SA] measurement.

(2) Amptd

The user can refer to the amptd setting under [Swept SA] to perform related operations.

9.1.2 Meas Set

To perform IQ capture, user need to complete the following steps:

(1) SR

Press [Meas set], click <SR> on the right side of the interface, and select the sampling rate required for the test. The options are “122.88MHz”, “61.44MHz”, “30.72MHz”, “15.36MHz”, “7.68MHz”, “3.84MHz”, “1.92MHz”. The default is “122.88MHz”.

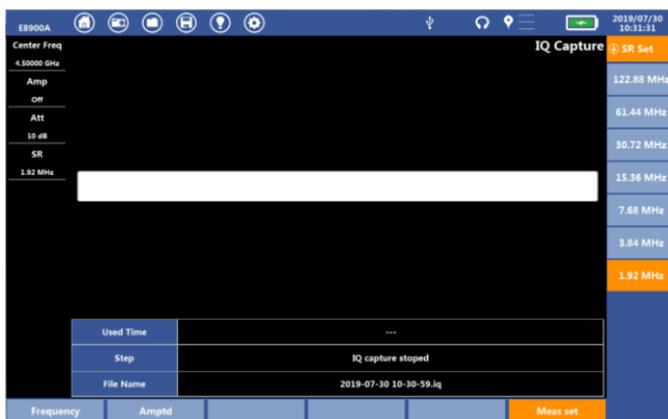


Fig.9-2 SR Set

(2) Size

Press [Meas set], click <Size> on the right side of the interface, enter the size of the file to be stored, and click “OK” .

Note: The file size setting unit is "MB" and the maximum can be set to 256MB. The default is "20MB".

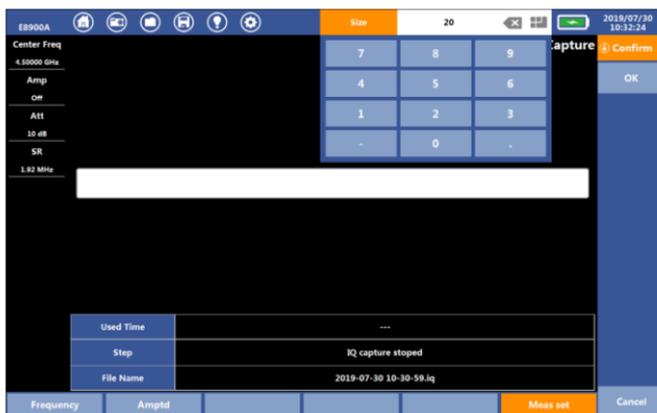


Fig.9-3 Size Set

(3) Start

Click the "Start" button to start IQ data capture. When the "Step" at the bottom of the interface is displayed as "IQ capture stopped", the user performs other operations.

Note: During the IQ capture process, the "Used time" display is a continuous time from the start of capture to the completion of the save.



Fig.9-4 IQ Capture

10 Demodu

10.1 Analog

Select "Demodu" in the main menu, and enter the "Analog" function. This function can demodulate AM, FM or CW analog signals, as shown below:

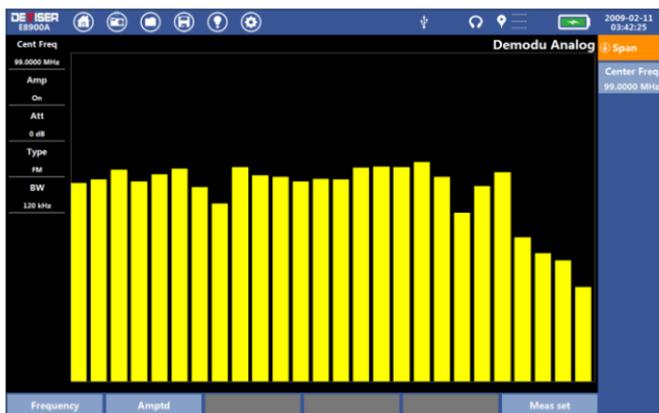


Fig.10-1 Analog

The parameter settings are as follows:

1.Frequency

Set the center frequency of the analog modulation signal.

2.Amptd

Set up attenuators and amplifiers.



Fig.10-2 Amptd setting

3.Meas set

The following steps are required for analog demodulation:

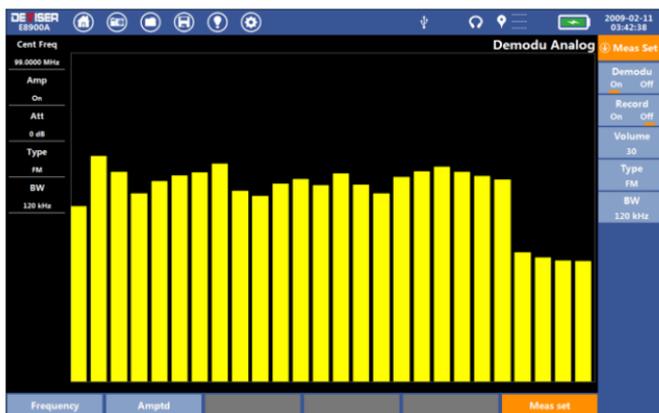


Fig.10-3 measurement setting

(1) Demodu

Click the "on" button to start the analog demodulation, play the analog demodulation sound at the same time, and click the "off" button to stop the analog demodulation.

(2) Record

Click "on" to start recording analog demodulation sound, click "off" to stop recording, and the recorded wav audio file is saved locally.

(3) Volume

Adjust the volume of the analog demodulation output sound in the range of 0-100. The display "-1" represents the mute state.

(4) Type

Set the signal system of analog demodulation, including AM, FM, CW.

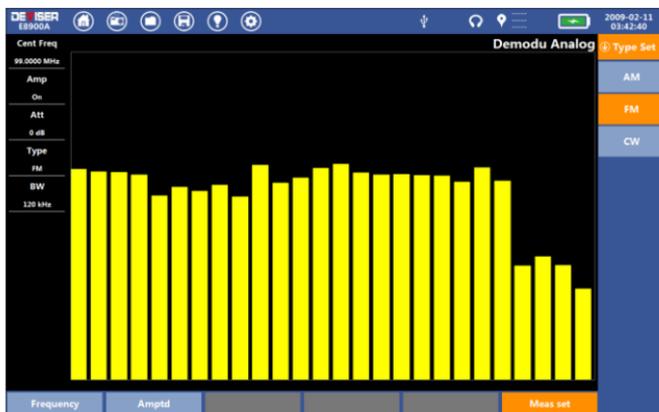


Fig.10-4 demodulation type

(5) BW

Set the demodulation bandwidth of analog demodulation, including 1.5KHz, 2.4KHz, 6KHz, 9KHz, 12KHz, 15KHz, 30KHz, 50KHz, 120kHz, 150kHz, 250kHz, 300KHz, 500KHz.



Fig.10-5 demodulation bandwidth

10.2 Digital

Select "Demodu" in the main menu, and enter the "Digital" function. This function can demodulate ASK, FSK, MSK, PSK or DPSK digital signals, as shown below:



Fig.10-6 Digital

The parameter settings are as follows:

1. Frequency

Set the center frequency of the digital modulation signal.

2.Amptd

Set up attenuators and amplifiers.

3.Meas set

The following steps are required for digital demodulation:

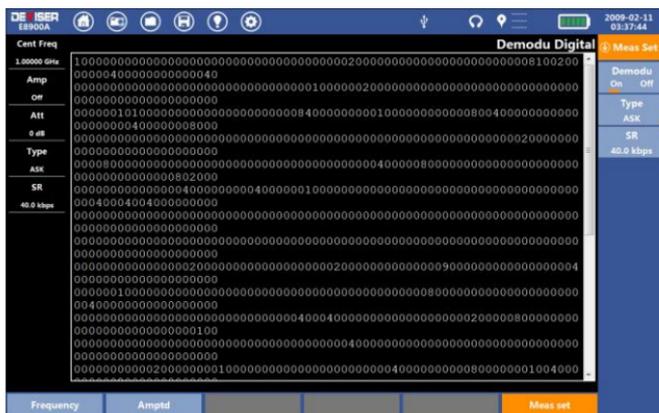


Fig.10-7 measurement setting

(1) Demodu

Click the "on" button to start the digital demodulation and display the demodulation data results. Click the "off" button to stop the digital demodulation.

(2) Type

Set the signal system of digital demodulation, including ASK, FSK, MSK PSK, DPSK.

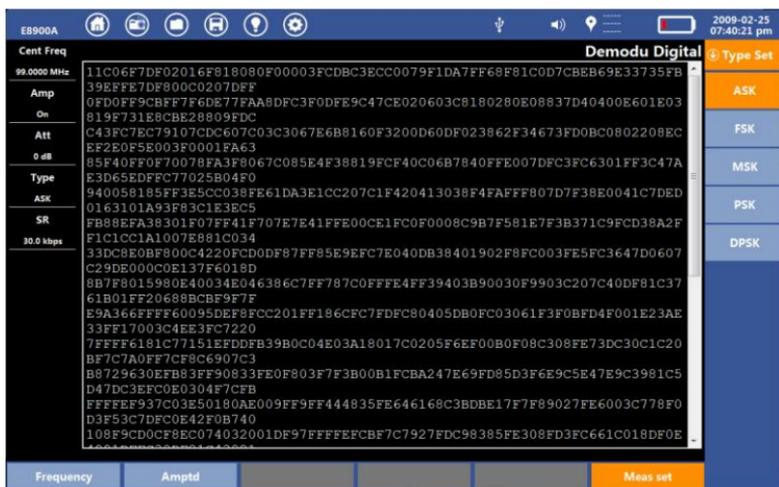


Fig.10-8 demodulation type

(3) SR

Set the signal symbol rate of digital demodulation in the range of 30-120kbps.

11 File Management

11.1 File management

Click the file management key "", files can be stored in the Position of "Local Disk" and "USB Disk". File types includes Status, Results, Report, Image, Trace, Building map, Map, Chan Plan, Audio and IQ files.

File Load							File
File Type	Status	Result	Report	Image	Trace		File
	Building	Map	Chan Plan	Audio	IQ		Load
Position	Local Disk			USB Disk			Remove
	Name	Type	Size	Create Time	Checked		
	2019-07-04 09-31-09.png	png	50.1KB	2019-07-03 14:31:09	<input type="checkbox"/>		Refresh
	2019-07-04 09-35-07.png	png	53.1KB	2019-07-03 14:35:07	<input type="checkbox"/>		Copy to USB
	2019-07-04 09-35-24.png	png	50.8KB	2019-07-03 14:35:24	<input type="checkbox"/>		
	2019-07-04 09-35-37.png	png	50.5KB	2019-07-03 14:35:37	<input type="checkbox"/>		Navigate
	2019-07-04 09-36-01.png	png	53.2KB	2019-07-03 14:36:01	<input type="checkbox"/>		
	2019-07-04 09-41-31.png	png	48.7KB	2019-07-03 14:41:31	<input type="checkbox"/>		
	2019-07-04 09-41-47.png	png	45.4KB	2019-07-03 14:41:47	<input type="checkbox"/>		
	2019-07-04 09-42-00.png	png	50.0KB	2019-07-03 14:42:00	<input type="checkbox"/>		
	2019-07-04 09-42-58.png	png	45.0KB	2019-07-03 14:42:58	<input type="checkbox"/>		
	2019-07-04 09-43-13.png	png	53.3KB	2019-07-03 14:43:13	<input type="checkbox"/>		
	2019-07-04 09-47-12.png	png	46.0KB	2019-07-03 14:47:12	<input type="checkbox"/>		
	2019-07-04 09-47-16.png	png	46.0KB	2019-07-03 14:47:16	<input type="checkbox"/>		
	2019-07-04 09-47-21.png	png	46.0KB	2019-07-03 14:47:21	<input type="checkbox"/>		
	2019-07-04 09-50-07.png	png	46.0KB	2019-07-03 14:50:07	<input type="checkbox"/>		
	2019-07-04 09-50-24.png	png	51.4KB	2019-07-03 14:50:24	<input type="checkbox"/>		

Fig.11-1 File Management(File)

File Load							File
File Type	Status	Result	Report	Image	Trace		File
	Building	Map	Chan Plan	Audio	IQ		Navigate
Position	Local Disk			USB Disk			Next
	Name	Type	Size	Create Time	Checked		
	2019-07-04 09-31-09.png	png	50.1KB	2019-07-03 14:31:09	<input type="checkbox"/>		Last
	2019-07-04 09-35-07.png	png	53.1KB	2019-07-03 14:35:07	<input type="checkbox"/>		Top
	2019-07-04 09-35-24.png	png	50.8KB	2019-07-03 14:35:24	<input type="checkbox"/>		
	2019-07-04 09-35-37.png	png	50.5KB	2019-07-03 14:35:37	<input type="checkbox"/>		Bottom
	2019-07-04 09-36-01.png	png	53.2KB	2019-07-03 14:36:01	<input type="checkbox"/>		
	2019-07-04 09-41-31.png	png	48.7KB	2019-07-03 14:41:31	<input type="checkbox"/>		
	2019-07-04 09-41-47.png	png	45.4KB	2019-07-03 14:41:47	<input type="checkbox"/>		
	2019-07-04 09-42-00.png	png	50.0KB	2019-07-03 14:42:00	<input type="checkbox"/>		
	2019-07-04 09-42-58.png	png	45.0KB	2019-07-03 14:42:58	<input type="checkbox"/>		
	2019-07-04 09-43-13.png	png	53.3KB	2019-07-03 14:43:13	<input type="checkbox"/>		
	2019-07-04 09-47-12.png	png	46.0KB	2019-07-03 14:47:12	<input type="checkbox"/>		
	2019-07-04 09-47-16.png	png	46.0KB	2019-07-03 14:47:16	<input type="checkbox"/>		
	2019-07-04 09-47-21.png	png	46.0KB	2019-07-03 14:47:21	<input type="checkbox"/>		
	2019-07-04 09-50-07.png	png	46.0KB	2019-07-03 14:50:07	<input type="checkbox"/>		
	2019-07-04 09-50-24.png	png	51.4KB	2019-07-03 14:50:24	<input type="checkbox"/>		

Fig.11-2 File Management(Navigation)

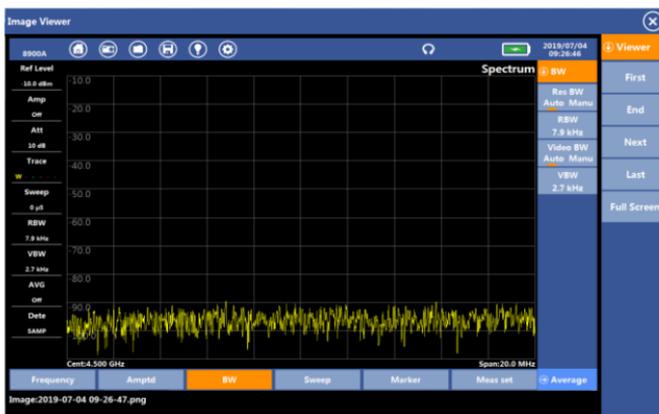


Fig. 11-3 Load File

Load: Users can select a file and click <Load> to automatically load the file.

Remove: The files selected by the user can be deleted.

refresh: Refresh the files in the current storage location directory.

Copy to USB: < Position > select "Local Disk", after the instrument recognizes the USB disk, click < Copy to USB >, the selected file will be exported to the USB disk.

11.2 File Saving

1. Save File

Click the File saving key "", users can save Trace, Status, Image, etc.



Fig. 11-4 File saving

When "Trace" is saved, the instrument will save the current setting state and measurement trace. Save types include tra (data type) and CSV (text type). When the tra file is loaded, the instrument loads both the corresponding state and waveform data, and the interface displays a single sweep of the state and waveform. The single sweep indicator will be displayed in the upper right of the screen, just like in the normal measurement. Exit the loaded file, change the sweep mode from "single" to "continuous", and the instrument will continuously measure and take the loaded state as the standard.

When "Status" is saved, the instrument will save the current setting state to sta file, which can be saved to Local Disk or USB Disk.

When "Image" is saved, the instrument will save the current measurement waveform in the form of png picture, which can be saved to Local Disk or USB Disk.

2.File naming

The user can input the file name through the virtual keyboard, and the file name can be input using letters or Numbers.

3.File save path

By default, the path to save the file is "Local Disk", and when the user inserts a USB disk, the "USB Disk" item is highlighted. Click "Local Disk" or "USB Disk", and click "Save" to save to the appropriate path.

12 System Setting

12.1 System information and Setting

Click the system setting key "⚙️" to enter the system setting menu. The user can view the System Info, view and change the Display, Date & Time, Network, GPS source and Touch Screen.

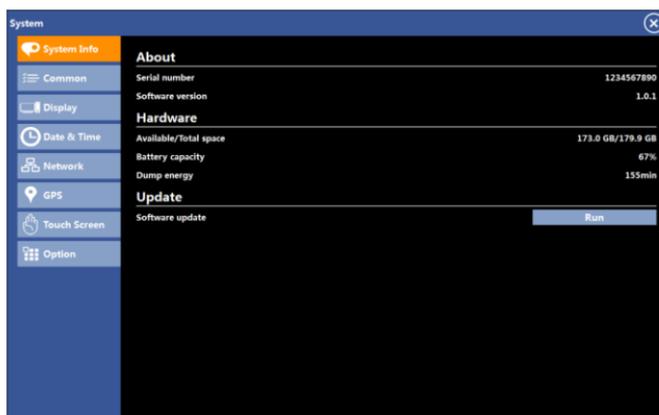


Fig.12-1 system setting

12.1.1 System information

After entering the system interface, click <System Info> on the left. Users can view the Serial number, Software version, Available/Total space, Battery capacity and Dump energy, and perform Software update function.

12.1.2 Common



Fig.12-2 common setting

Language: Chinese/English

Power On: Select "Last", after shutdown, restart the instrument and still set the parameters from the last test. Select "Preset", boot up again and return to default state.

Alarm Beep: Alarm Beep can be set to turn on or off.

Power Save: Users can choose "Off", "1 Min", "2 Min", "5 Min", "10 Min" and "20 Min". Choose different power saving time, the instrument will dim the screen at the specified time. When any key on the keyboard is clicked, the instrument screen lights up.

Voice: Users can adjust the sound switch and volume. Optional sounds are "Off", "20%", "40%", "60%", "80%" and "100%".

12.1.3 Display

Brightness: The screen brightness can be adjusted according to the user's needs. The brightness can be divided into five brightness modes: "5%", "25%", "50%", "75%" and "100%". After entering the interface, users can also click  to adjust the brightness.

Skin: Users can choose Modern, Daytime and Night interface styles according to their needs.

Desktop display: Users can select two display modes: Default and Measure.

If the desktop display is set as "Default", the user can enter the measurement interface as shown in Figure 11-3 after clicking the home touch key;

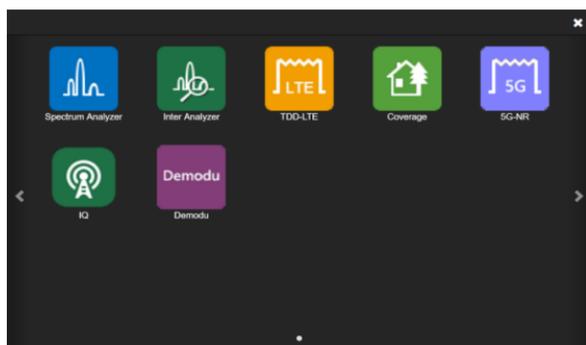


Figure 12-3 Main menu

If the desktop display is set as "Measure", the user can enter the measurement interface as shown in Figure 11-4 after clicking the home touch key;

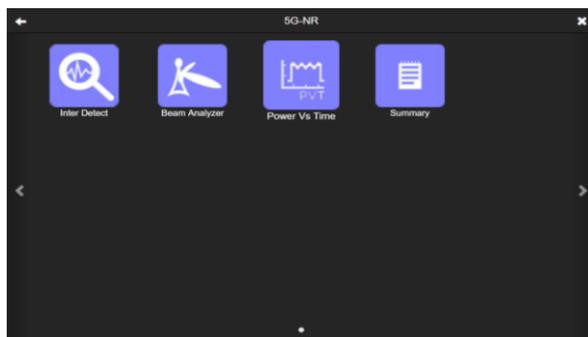


Figure 12-4 Sub measurement menu

12.1.4 Date & Time

Date: Click the date input box to enter the date through the virtual keyboard.

Date Format: Users can choose three different date display modes, which are "YYYY-MM-DD", "MM-DD-YYYY" and "DD-MM-YYYY".

Time: Click the time input box to enter the time through the virtual keyboard.

Time Format: Users can choose 12-Hour system or 24-Hour system.

Time Zone: Users choose different time zones depending on their geographic location.

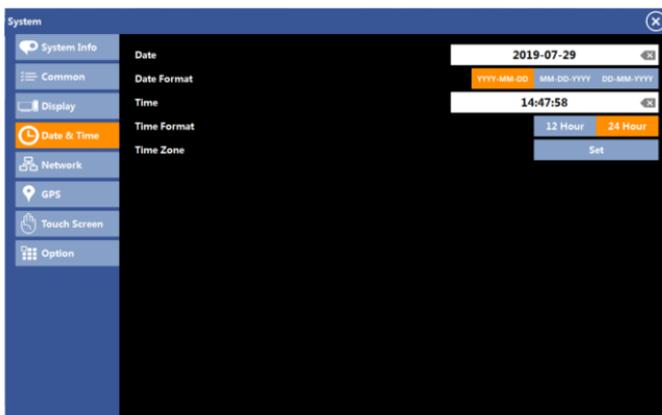


Fig.12-5 Date & Time



Fig.12-6 Time zone

12.1.5 Network

Type: Users can choose the IPV4 or IPV6 network protocol.

Mode: Users can choose "DHCP" or "Static IP", the default is "Static IP". In the "Static IP" mode, users can set network parameters such as "IP Address", "Net mask", "Control Port" and "Gateway" through manual input.

Host name: Users can input the network identification name of the instrument.

Echo: Users can choose to turn echo on or off.



Fig.12-7 Network

12.1.6 GPS

GPS Source: Users can choose "Off", "External GPS", "Built-in GPS", "ET30-USB", "ET30H-AUX", "DF108".

External GPS: It is not used now.

Built-in GPS: It is used for 5G-NR TimeOffset test, GPS Gate Trig, and also SS/LTE/5G NR Outdoor coverage measurement. The user needs to connect a GPS antenna with SMA interface.

ET30-USB: It is used for Orientate measurement, the user needs to connect an ET30 series antenna with USB interface.

ET30H-AUX: It is used for Orientate measurement, the user needs to connect an ET30 series antenna with AUX interface.

DF108: Used when connecting a DF108 antenna.

GPS Test: Click "Run" to test the current GPS status.

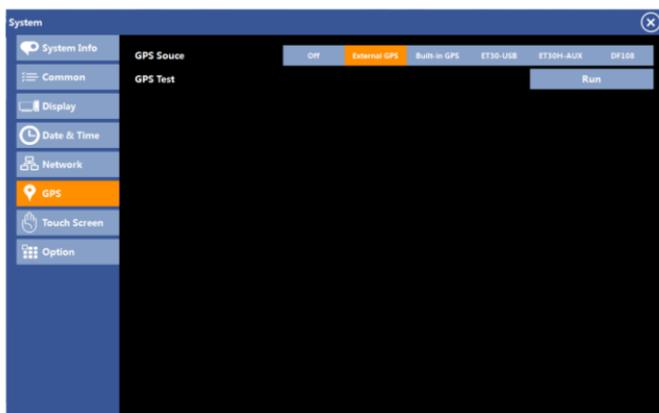


Fig.12-8 GPS

12.1.7 Touch Screen

Calibrate: Click< Start >, the touch screen can be calibrated and corrected according to the prompts.

12.1.8 Option

Users can select option update as needed, and the option list displays information such as the option name and its expiration date.

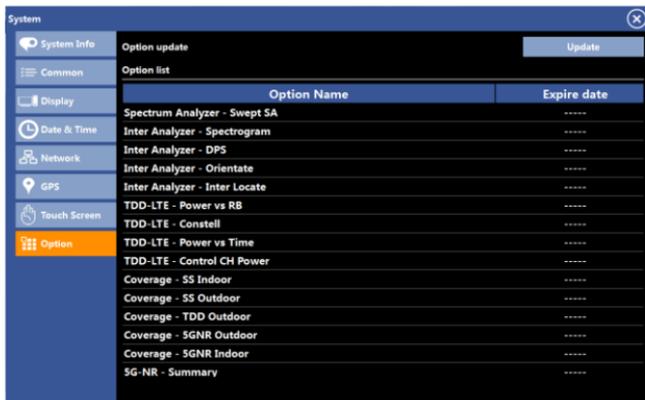


Fig.12-9 option

13 Technical Index

Parameter	Specifications
Frequency Range	9kHz – 9000MHz
Frequency accuracy	$\pm 1 \times 10^{-6} \pm 1/1\text{Hz}$ (0 - +50 °C)
Phase noise	Typical < -105 dBc/Hz @ frequency offset 100kHz
Average noise display level (normalized 1Hz)	Amplifier OFF: $\leq -135\text{dBm}$, 10MHz ~ 3GHz、 $\leq -130\text{dBm}$, 3GHz ~ 6GHz、 $\leq -125\text{dBm}$, 6GHz ~ 9GHz; Amplifier ON: $\leq -155\text{dBm}$, 10MHz ~ 3GHz、 $\leq -150\text{dBm}$, 3GHz ~ 6GHz、 $\leq -145\text{dBm}$, 6GHz ~ 9GHz、
Level of accuracy	$\pm 1.5 \text{ dB}$ (+20°C - +30°C)
Level resolution	0.1dB
Max safety input level	+25dBm (peak power/entrance attenuation > 15dB); $\pm 50\text{VDC}$
TOI intercept point	Typical > +14dBm
Residual Response	< -85dBm
Reference level range	-130dBm - +35dBm
Input port/VSWR	N type/50Ω/<2.0
Spectrum sweep speed	30GHz/s @ 7.8kHz
Real-time spectrum analysis bandwidth	Max 100MHz
Demodulation	5G-NR, LTE

analysis supports patterns	
Power supply	Adapter AC100-240V/50-60Hz DC15V
Environment temperature	Working temperature 0°C - +50°C
Display	10.1 inches
Size	316mm X 228mm X 77mm
Weight	<4.5kg
5G NR test standard	3GPP TS38.104 3GPP TS38.141 3GPP TS38.211 3GPP TS38.213 3GPP TS38.215

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Tianjin, China, 300392

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