TFN RMT Series Spectrum Analyzer

User manual

This manual applies to the following model tester：

- RMT 714A
- RMT 716A
- RMT 717A
- RMT 719A
- RMT 720A
- RMT 740A

Foreword

Thank you very much for choosing to use TFN handheld spectrometer!

We will be full at the maximum Your needs are responsible for your own needs to provide you with High -quality measuring instrument, which is brought to Your first-class after-sales service. I The consistent purpose of their consistent purpose is "customer -oriented Heart, serve customers, create value", mention Satisfied products and services are us Promise to users.

Safety Precautions

▲Warning

The warning logo indicates danger. It prompts users to pay attention to a certain operation process, operation method or similar situation. If you cannot follow the rules or correctly, it may cause personal injury. Before fully understanding and meeting the warning conditions pointed out, do not continue the next step.

Note

Note that the identification represents important information prompts, but does not cause danger. It prompts users to pay attention to a certain operation process, operation method or similar situation. If you cannot comply with rules or correct operations, important data that may cause damage or loss of instruments. Before fully understanding and satisfying the careful conditions pointed out, don't continue the next step.

Table Contents

1 Manual Navigation

This manual introduces the basic functions and operation methods of the RMT series spectrometer. Describe the characteristics, basic usage methods, measurement operation guidelines, fault diagnosis and repairs, etc. to help you familiarize themselves with and master the operation methods and points of use in the instrument as soon as possible. In order to facilitate you to use this instrument, please read this manual carefully before the instrument, and then follow the manual to guide the correct operation.

The chapters contained in the user manual are as follows:

- **Overview**

  In summary, the main performance characteristics, typical applications and operating instruments of the RMT series spectrometer are described. Users preliminarily understand the main performance characteristics of the instrument and guide users to operate the instrument safely.

- **Use Entry**

  This chapter introduces pre -operation inspection, instrument function browsing, basic measurement methods and data management of the RMT series spectrometer. In order to preliminarily understand the functions and operations of the instrument, and to fully introduce the preparation of the instrument measurement operation in the follow-up.

- **Menu Description**

  Introduce the menu structure and menu item description according to the functional classification, which is convenient for users to inquire for reference.

- **Spectrum Mode**

  Detailed introduction to the operating method of the spectrum measurement analysis function, including: instrument configuration and measurement parameter configuration.

- **Real -time Spectrum Mode**

  The operation method of real -time spectrum measurement analysis function is introduced in detail, including: the common measurement items such as the surplus and the waterfall map.

- **Interference Mode**

  Detailed introductions to the operation method of interference measurement analysis function, including: Yuhui map, waterfall map, RSSI measurement, time door, signal ID, signal strength, outdoor map, indoor map, 5G interference, 4G interference function and other common measurement items.

- **LTE Community Mode**

  Detailed introduction to the operation method of the LTE community function, including: EVM/frequency/error/power, signal strength, time domain error, outdoor map, ID scan, time

domain power and other common measurement items.

- **5G NR Community Mode**

  Detailed introduction to the function of the 5G NR community function, including: beam analysis, signal search, carrier scanning, indoor maps, outdoor maps and other common measurement items.

- **GSM Community Mode**

  Detailed introductions to the function of the GSM community function, including: fixed frequency points, fixed frequency bands, public network signals and other common measurement items.

- **Vector Demodulation Mode**

  The operation method of the vector signal demodulation function is introduced in detail, including: common vector and ETC vector and other common measurement items.

- Failure diagnosis and repairs

  Including the whole machine failure judgment and solution, error message description and repairs method.

2 Overview

This chapter introduces the main performance characteristics and use of the RMT series spectrometer. At the same time, it shows how to correctly operate the instrument and electricity safety.

2.1 Product Review

The RMT series spectrometer is a handheld test instrument designed for external tests. It has 5G NR demodulation analysis, spectrum analysis, real -time spectrum analysis, interference analysis, GSM demodulation analysis, LTE FDD/TDD demodulation analysis, vector vector A variety of measurement functions such as signal analysis and a variety of measurement functions such as channel power, occupation of bandwidth, neighboring power, spectrum launch templates, etc. have the characteristics of small size, light weight, flexible power supply, and easy to carry. It is suitable for external use.

The RMT series spectrometer can be applied to on -site debugging and installation and maintenance of mobile communications, microwave communication, satellite communication and other equipment, analysis of wireless communication signals, interference source testing and map positioning, broadband modulation or transient signal test analysis and other fields. Provide a relatively complete solution for users' external signal testing.

2.1.1 Product Characteristics

2.1.1.1 Basic Functions

The RMT series spectrometer adopts highly integrated, modular, and standardized design ideas, excellent performance, and full measurement. The main functions are as follows:

1) Multiple measurement function modes: 5G NR demodulation analysis, spectrum analysis, real -time spectrum analysis, interference analysis, GSM demodulation analysis, LTE FDD/TDD demodulation analysis, vector signal analysis, etc;
2) Multiple measurement functions: channel power, width, neighboring power, spectrum launch templates, etc;

2.1.1.2Main Technical Indicators

1) Frequency Range:
   9kHz~4.5GHz/6.32GHz/7.5GHz/9GHz/20GHz/40GHz
2) Resolution Bandwidth:
   1Hz~10MHz
3) Real -time Spectrum Analysis Bandwidth: maximum 100MHz

4) Show the average noise level (Reference level-40dbm):
   ≤-140dBm/Hz（9kHz～50MHz）
   ≤-160dBm/Hz（50MHz～9/20/40GHz）
5) Unilateral Phase Noise (Carrier 1GHz, 20 ℃ ～ 30 ℃):
   ≤-106dBc/Hz@ 10kHz
   ≤-120dBc/Hz@ 1MHz
6) Maximum Security Input Level:+26dbm (typical value)
7) Reference level range：-130dBm～+30dBm
8) Level Accuracy：±1.5dB

2.2 Safe Manual

Please read and strictly abide by the following precautions!

We will spare no effort to ensure that all production links meet the latest safety standards and provide users with the highest safety guarantee. The design and testing of our products and the auxiliary equipment used in our products meet the relevant safety standards. Monitoring to ensure that the product always meets such standards. In order to keep the state state intact and ensure the safety of operation, please comply with the precautions proposed in this manual. If you have any questions, please consult us at any time.

In addition, using this product correctly is also your responsibility. Before starting to use this instrument, please read and comply with the safety description. This product is suitable for use in the industrial and laboratory environment or on -site measurement. Remember to use the product restrictions correctly. So as not to cause personnel damage or property damage. If the product is not used properly or does not use it as required, the problems will be responsible for you, and we will not bear any responsibility. Therefore, in order to prevent dangerous situations cause personal damage or property damage, please follow safe use of safe use Manual. Please keep the product documentation properly and deliver it to the end of the user.

2.2.1 Safety Logo

2.2.1.1 Product Related

The safety warning logo on the product is as follows2.1.

Table 2.1 Product safety logo

Symbol	Meaning	Symbol	Meaning
	Note, especially remind users of the information that pay attention. Remind the operating information or instructions that users should pay attention to.		Power -off power supply
	Note, carry heavy equipment.		Standby Instruction
	Danger! Be careful of electric shock.		DC power（DC）
	warn! Be careful about surface hotness.		AC power（AC）
	Protective conductor		DC/AC Electric（DC/AC）
	Land		Instrument reinforcement insulation protection
	Ground		For specific instructions, please refer to the first item in this section of "2.2.7 abandoned treatment/environmental protection".
	Note, be careful to handle static sensitive devices.		Collect the EU logo of the electronic device separately. For specific instructions, please refer to the second item in this section of "2.2.7 abandoned treatment/environmental protection".
	warn! radiation. For specific instructions, please refer to the fifth item in the "2.2.4 Operation Note" in this section.		

2.2.1.2 Manual Related

In order to remind users to operate the instrument and pay attention to the relevant information, the following security warning logo is used in the product manual, which shows the following:

Dangerous logo, if it is not avoided, will bring personal and equipment damage.

The warning logo, if it is not avoided, it will bring personal and equipment damage.

Be careful, if you do not avoid it, it will cause mild or moderate personal and equipment damage.

Attention signs represent important information, but will not cause danger.

Prompt labels, information on instruments and operating instruments.

2.2.2 Operating status and location

Please note before operating the instrument:

1) Unless otherwise stated, the operating environment of the RMT series spectrum analyzer must meet the following requirements: when holding or placing the instrument on a table for testing, the instrument must be placed stably. The maximum altitude when operating and transporting the instrument shall not exceed 4600 meters. The actual power supply voltage is allowed to be within The marked voltage varies within the range of ±10%, and the power supply frequency is allowed to vary within the range of ±5% of the marked frequency.
2) Unless otherwise stated, the instrument has not been waterproofed. Please do not place the instrument on surfaces with water, vehicles, cabinets, tables and other items that are not fixed and do not meet the load conditions. Please place the instrument securely and reinforce it on a solid surface. surface (e.g. anti-static workbench) or held steady.
3) Do not place the instrument in an environment where fog is likely to form. For example, if you move the instrument in a hot and cold environment, the water droplets formed on the instrument can easily cause electric shock and other hazards.
4) Do not place the instrument on the surface of a heat dissipating object (such as a radiator). The operating environment temperature should not exceed the relevant specifications of the product. Overheating of the product may lead to dangers such as electric shock, fire, etc.

5) Do not insert any objects into the instrument through the openings on the instrument casing, or cover the slots or openings on the instrument, as their function is to ventilate the interior of the instrument and prevent the instrument from overheating.

2.2.3 Safety

Note for the instrument:

1) Before the instrument, the actual supply voltage shall match the supply voltage marked by the instrument.
2) According to the power supply requirements of the instrument, the corresponding power line is used to ensure that the ground wire of the power supply is reliably grounded when used. Floating ground or poor grounding may lead to the destruction of the instrument, and even cause damage to the operator.
3) Do not damage the power cord, otherwise it will cause electricity leakage, damage to the instrument, and even cause damage to the operator. If using external power cord or wiring board, check before use to ensure power safety.
4) If the power supply socket does not provide an on / off switch, if the power needs to be removed, unplug the power plug directly, so that the power plug can be easily plugged.
5) Do not use the damaged power cord. Before connecting the instrument to the power cord, check the integrity and safety of the power cord and place the power cord reasonably to avoid the influence of human factors. For example, the power cord is too long and trip the operator.
6) Keep the socket clean and tidy, plug and socket should contact well and firmly.
7) The socket and power cord should not be overloaded, otherwise it will cause fire or electric shock.
8) Unless specially allowed, the instrument shell can not be opened at will, which will leak the internal circuits and devices and cause unnecessary damage.
9) If the instrument needs to be fixed at the test site, the qualified electrician needs to install the test site and the instrument.
10) Use appropriate overload protection against overload voltage (e. g. lightning).
11) Note that once the instrument catches fire, toxic gases or liquids may be released harmful to human body.

2.2.4 Notes for operation

1) Instrument operators need to have a certain professional technical knowledge, as well as good psychological quality, and have a certain emergency response ability.
2) Before moving or transporting instruments, refer to the section of "2.2.6 Transportation".
3) Use substances that may inevitably cause allergies (e. g. nickel). If the instrument operator has allergic symptoms (e. g., rash, frequent sneezing, red eyes or breathing difficulties, etc.), please seek medical attention to check the cause and solve the symptoms.

4) Before dismantling the instrument, refer to the "2.2.7 Waste Disposal / Environmental Protection" in this section.
5) Radio frequency instruments will produce high electromagnetic radiation, at this time, pregnant women and operators with cardiac pacemakers need to be special protection, if the radiation degree is high, corresponding measures can be taken to remove the radiation source to prevent personnel injury.
6) In order to prevent the damage caused by static electricity to the instrument, the operating instrument should be used with anti-static table mat, foot pad and wrist band for anti-static treatment, and the anti-static voltage shall not exceed 500V.
7) Select the connectors and cables that meet the test conditions, and always check the connector and cables before the operation.
8) Ensure that the input signal power of the instrument RF input port is less than the maximum safe input level + 26 dBm to avoid burning the instrument.
9) Do not conduct hot swap of interfaces that do not allow hot plugging.
10) Do not remove all joint protectors and matching ers of the instrument to avoid joint damage and measurement error.
11) Use the side panel power switch to shut off the power supply, otherwise it may cause the operating system abnormality.
12) To ensure measurement accuracy, the instrument is recommended to be tested after 30 minutes.
13) To ensure the best measurement effect, the instrument should work in the related state as far as possible.
14) Prohibit users from deleting the factory data.
15) The instrument adopts open Windows 10 environment, prohibit the user to modify the setting in BIOS, otherwise it will cause the instrument to start and work abnormal.
16) Users can only delete their own files, delete system files.
17) When using USB port and network interface to transmit files, ensure the safety and reliability of the carrier to avoid poisoning the instrument.
18) When forming the test system, the network port address should be set correctly.
19) If the instrument fails, it is forbidden to dismantle the machine privately and return to the manufacturer for repair.

2.2.5 Maintenance

1) Only authorized and specially trained operators can open the instrument casing. Before such operation, disconnect the power cord to prevent damage to the instrument or even personnel.
2) The repair, replacement and maintenance of the instrument shall be completed by the special electronic engineer of the manufacturer, and the replacement and maintenance part shall be subject to safety testing to ensure the subsequent safe use of the product.

2.2.6 Transportation

1) If the instrument is heavy, move it carefully and use tools (e. g. crane) to avoid damage to the body.
2) The instrument handle is suitable for personal handling instruments and should not be fixed to the transport equipment. To prevent property and personal injury, please follow the manufacturer's safety regulations on transportation instruments.
3) To operate the instrument on the transportation vehicle, the driver needs to drive carefully to ensure the transportation safety, and the manufacturer is not responsible for the emergency in the transportation process. Therefore, do not use the instrument during transportation, and it should be strengthened to ensure the safety of product transportation.
4) The instrument contains lithium batteries and comply with aviation regulations by mail or air.

2.2.7 Waste disposal / environmental protection

1) Do not treat the equipment marked with batteries or batteries along with the unsorted garbage. It should be collected separately and discarded at the appropriate collection site or through the manufacturer's customer service center.
2) Do not dispose of discarded electronic equipment along with unsorted waste and should be collected separately. The manufacturer has the right and responsibility to help end users dispose of waste products. If necessary, please contact the customer service center of the manufacturer to avoid damaging the environment.
3) During mechanical or thermal reprocessing of products or their internal components, toxic substances (heavy metal dust such as lead, beryllium, nickel, etc.) may be released, so that specially trained technicians with relevant experience need to dismantle them to avoid personal injury.
4) In the process of processing, for the toxic substances or fuel oil released by the product, please refer to the safety operation rules suggested by the manufacturer, and adopt specific methods to avoid personal injury.

3 Use entry

This chapter introduces the pre-use precautions and panel description of RMT series spectrometer, so that users can initially understand the instrument itself and the preparation work required in the use process.

3.1 Preparation for use

3.1.1, Preparation before operation

This chapter describes the use of RMT series spectrometer.

Warning

Prevent personal injury and damage to the instruments

To avoid electric shock, fire, and personal injury:

- Do not open the chassis without authorization;
- Do not attempt to disassemble or modify any of the parts not specified in this manual. If self-disassembly, may lead to electromagnetic shielding efficiency decline, internal damage and other phenomena, affect product reliability. If the product is outside the warranty period, we will not provide free maintenance;
- Carefully read the relevant contents in the section of "2.2 Safety Use Manual", and the following operational safety precautions, and also pay attention to the specific operating environment requirements involved in the technical indicators.

Notice

electrostatic protection

Pay attention to the antistatic measures in the workplace to avoid the damage to the instrument. For details, please refer to the 2.2 Safety Use Manual section of this manual.

When operating the instrument, please take note that:

Inappropriate operating positions or measurement settings may damage the instrument. Note before powering up the instrument:

- Keep the instrument dry, put flat, and put the instrument reasonably;
- The ambient temperature meets the requirements marked in the technical indicators;
- Port input signal power conforms to the marked range;
- The signal output port is properly connected and does not overload.

Prompt

Effects of electromagnetic interference (EMI):

EMI can affect the measurement results, and thus:

- Select a suitable shielded cable. For example, using a dual shielded RF / network connection cable;
- Close the temporarily unused cable connection port;

3.1.1.1 Unpacking

1) appearance inspection

Step 1. Check whether the outer packing box and the instrument shock-proof package are damaged, and continue to check according to the following steps;

Step 2. Open the box, check whether the host and the box are damaged;

Step 3. Carefully check the above items according to Table 3.1;

Step 4. If the outer package is damaged, the instrument or the items with the box are damaged or wrong, it is strictly prohibited to power on! Please contact the service consultation center according to the service consultation hotline in this manual. We will repair or replace it quickly according to the situation.

Notice

Move: because the instrument is more precise and precious, when moving, should be gently put, to avoid collision.

2) Confirm along with the box of items

Items in the RMT family spectrometer are shown in Table 3.1:

Table 3.1 List of RMT series spectrometer items

name	quantity	function
main engine		
The RMT series of frequency spectrometers	1	—
standard configuration		
Electronic user manual	1	—
certificate	1	—
container loading list	1	—
Power adapter, three-core power cable	1	—
GPS antenna	1	—
option		
Defied according to user selection	—	—

3.1.1.2 Environmental requirements

The operating site of the RMT series spectrometer shall meet the following environmental requirements:

1) operational environment

The operating environment shall meet the requirements of Table 3.2:

Table 3.2 Operating Environment Requirements for RMT series spectrometers

working temperature	0° C ～40° C
relative humidity	For> + 10°C, the humidity is: (95% ± 5%) RH At> + 30°C, the humidity is: (75% ± 5%) RH
above sea level	0~4600 m

Notice

The above environmental requirements only address the operating environment factors of the instrument, and do not belong to the scope of technical indicators.

2) Radiation requirements

In order to ensure that the working environment temperature of the instrument is within the temperature range required by the operating environment, the cooling space requirements of the instrument shall be met, as shown in Table 3.3:

Table 3.3 Heat dissipation requirements of RMT series spectrometers

Instrument parts	Radiation distance
Lower left side	≥150 mm
Top right side	≥150 mm

3) electrostatic protection

Electrostatic electricity is extremely destructive to electronic components and equipment, usually we use two anti-static measures: conductive table pad and wrist combination; conductive floor mat and wrist combination. Both can provide good antistatic protection. If used alone, only the former can provide protection. To ensure user safety, antistatic components must provide at least 1 MΩ of ground isolation resistance.

Please apply the following antistatic measures to reduce static damage:

- Ensure that all instruments are properly grounded to prevent static electricity generation;

- Before connecting the coaxial cable with the instrument, the internal and external conductors of the cable shall be in short contact with the ground respectively;
- Staff must wear antistatic wrists or take other antistatic measures before contacting joints, core wires or doing any assembly operation.

Warning

voltage range

The above antistatic measures shall not be used for situations above 500V voltage.

3.1.1.3 On / off power

1) Note before power-up

The following items shall be checked before power up:

a) Confirm the power supply parameters

Table 3.4 lists the requirements for external power supply for the RMT series spectrometer.

Table 3.4 RMT series spectrometer, working power supply parameter requirements

Power parameters	subject range
input voltage	100V~240VAC
Rated input current	1.5A
service frequency	50/60Hz
Output voltage / current	15V/4A

Prompt

Prevent mutual disturbance of power supply

In order to prevent the destruction of instrument hardware due to power interference, it is recommended to use 220V AC power regulator to power RMT series spectrometer.

b) Confirm and connect the power cord

The RMT series spectrometer power adapter interface meets the national safety standards. Before the RMT spectrum meter, it must be confirmed that the protective ground wire in the power cord is reliably grounded, and the floating ground or poor grounding may cause damage to the destruction of the instrument and even cause harm to the operator. Never use the power cord without a protective ground. When connected to a suitable power outlet, the power cord will

ground the instrument.

When the RMT series spectrometer is connected to the power cord:

Step 1. Ensure that the working power cord is not damaged;

Step 2. Use the power cord and power adapter to connect the instrument upper panel power supply interface and power socket.

Warning

Poor grounding or wrong grounding is lead to cause damage or even personal injury. Before powering on the RMT series spectrometer, make sure that the ground wire is in good contact with the power supply ground wire.

Please use a protected power outlet. Do not replace grounding protection wires with external cables, power cables, and autotransformer without grounding protection. If an autotransformer must be used, the common end must be connected to the protective ground of the power connector.

2) For the first time

The on / off methods of RMT series spectrometers are as follows:

a) Connect the power supply

Before the initial power supply, please confirm the power supply parameters and power lines. For details, refer to the "Notes before power supply" section in Section 3.1.1.3 of this manual.

Step 1. Connect the power cord: connect the power interface of the RMT series spectrometer with the adapter with the adapter or the adapter in the packing box (FIFig. 3.1), and the voltage used by the user should meet the requirements. The other end of the adapter is connected to the three-core power cord required for the working power supply parameters, and the three-core power cable is connected to the required AC power supply.

Figure 3.1 Power interface of upper panel of RMT series spectrometer

b) Open / turn off the electricity

starting up:

Step 1. Start up according to the power switch shown in Figure 3.2:

Figure 3.2 Power switch of upper panel of RMT series spectrometer

Step 2. Windows 10 After successful startup, the system automatically runs the program of RMT series spectrometer, displaying the operation main interface of RMT series spectrometer.

Notice

system start-up

This instrument uses Windows 10 system, Windows 10 loading process, users need not intervention, do not power off.

The instrument has two ways: external power supply and built-in lithium battery power supply. When the built-in lithium battery power supply mode is used, the starting steps are as follows:

Step 1. Without the power adapter, directly press the power switch on the upper panel to start up;

Step 2. Windows 10 After successful startup, the system automatically runs the program of RMT series spectrometer, displaying the operation main interface of RMT series spectrometer.

Step 3. Observe the power display mark on the upper right of the interface in Figure 3.3. If the remaining power is large, the instrument can be used directly without external power supply; If the remaining power supply is low, please connect the external power line to supply it at the appropriate time to ensure the use effect.

Figure 3.3 Power mark of RMT series spectrometer

Shutdown: Press the power switch on the upper panel, when the instrument will automatically exit the measurement application and turn the power off.

Notice

Instrument power failure

The RMT series spectrometer can be closed only by operating the upper panel power switch. Otherwise, the instrument cannot enter normal shutdown, damage the instrument or lose the current instrument status / measurement data. Please shut down in the correct method.

3.1.1.4, use the connector correctly

Connectors are often used during testing of the RMT series spectrometer, although the calibrators, test cables, and the RMT series spectrometer measurement ports are designed and manufactured to the highest standards, all of which have a limited life. Due to the inevitable wear, normal use connector performance index drop even cannot meet the measurement requirements, so the correct connector maintenance and measurement connection can not only obtain accurate and repeatable measurement results, also can extend the service life of the connector, reduce the measurement cost, in the actual use process need to pay attention to the following aspects:

Checking of connectors

When conducting connector inspection, it is recommended to check the following items:

1) Whether the surface of electroplating is worn, whether there are deep scratches;
2) Whether the thread is deformed;
3) Whether there are metal particles on the thread and joint surface of the connector;
4) Whether the internal conductor is bent or broken;
5) Does the screw sleeve of the connector rotate poorly.

Be careful

Connector checks against damage to the instrument port

Any damaged connector may damage a good connector connected to it even during the first measurement connection, and to protect the RMT series spectrometer itself, check the connector before connector operation.

3.1.1.5 Initial configuration

After the initial power of the RMT series spectrometer, the initialization state can be configured for subsequent measurement.

This section describes how to initialize the internal clock of the RMT series spectrometers. The date / time is displayed on the lower right status bar of the RMT Series spectrometer operating interface. The following section describes the steps to set the date / time.

Prompt

First boot setting time

After the RMT spectrometer, an internal clock.

Set the date / time

Step 1. Press [Start]> [Control Panel]> [Date and Time] to enter the date / time as shown in Figure 3.4

Properties dialog box:

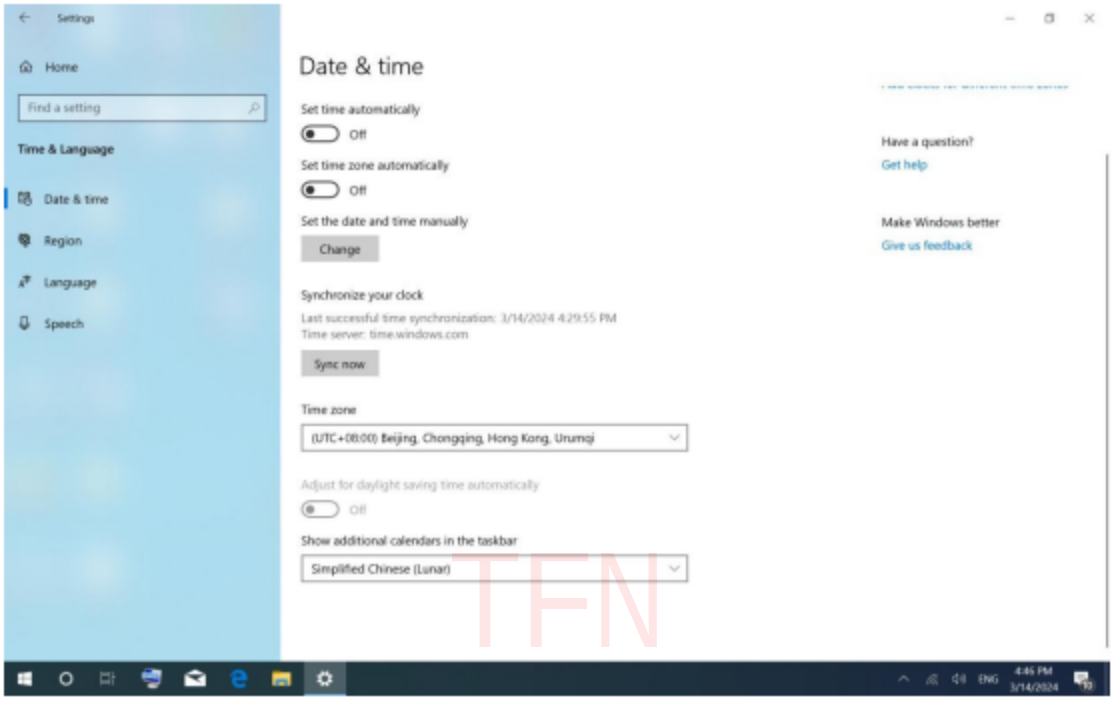


Figure 3.4 Date / Time Properties Dialog Box (Date & Time Property Page)

Step 2. Click Change, then enter the time page, as shown in Figure 3.5:

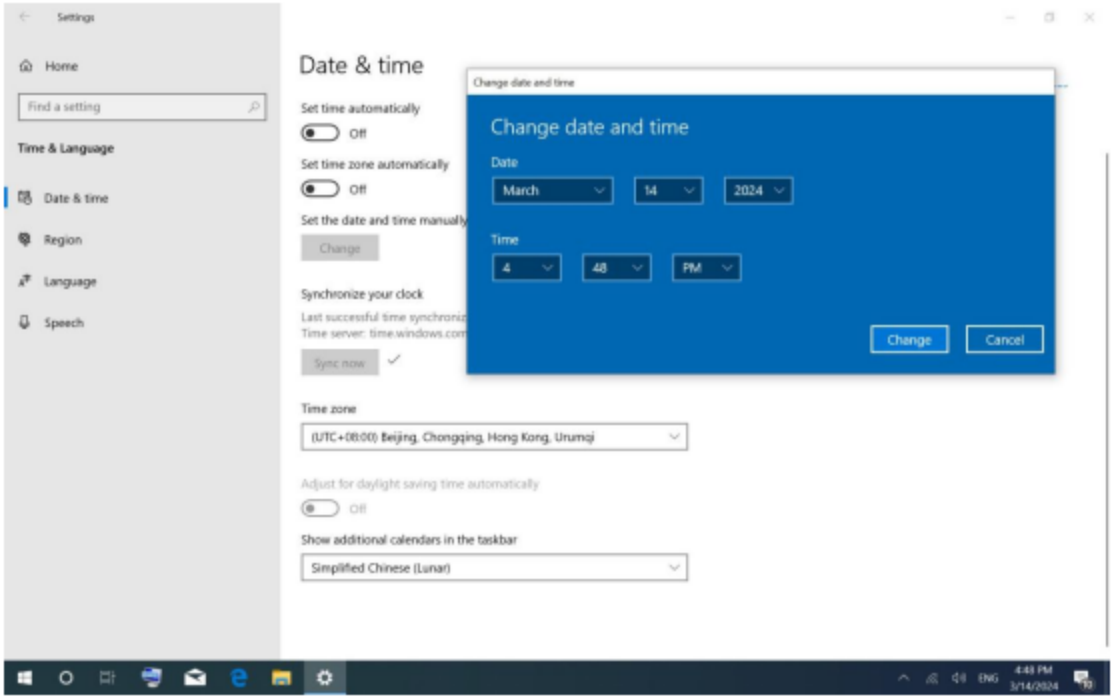


Figure 3.5 Date / Time Properties dialog box (Set Time Property page)

3.1.2 Operating system configuration

This chapter describes the operating system of the RMT series spectrometer, and its configuration and maintenance methods. To ensure the normal operation of the instrument software function, please refer to the following precautions for the RMT Series spectrometer operating system.

3.1.2.1 Description of the instrument operating system

The host software of the RMT series spectrometer runs an operating system of Windows 10, which has been installed and configured according to the characteristics of the RMT series spectrometer.

3.1.2.2 Windows 10 is used

Use the administrator account to do the following:

- Install the third-party software;
- Configuring the network;
- Read and write any file on the hard drive;
- Add and delete user accounts and passwords;

- Reconfigure the Windows 10 settings;
- Run the other applications.

Notice

Third-party software affects the instrument performance

The RMT series spectrometer uses an open Windows 10 environment, and other third-party software installation may affect the performance of the RMT series spectrometer. Only software tested and compatible with host software.

3.1.2.3 Windows 10 configuration

The operating system of the RMT series spectrometer is configured for the best condition, and any change in the operating system setting may degrade the instrument measurement performance. Normally, there is no change to the Windows 10 operating system setup.

Notice

Changing the system configuration has caused a problem

Once the instrument use problem or system crash occurs due to the change of system configuration, please contact our service consultation center according to the service consultation hotline in this manual, and we will solve it as soon as possible.

In order to facilitate the measurement report and system integration, the following items can change according to the needs.

1) Configure the USB devices

The upper panel of the RMT family spectrum meter provides USB interface, users can directly connect to the USB device. If the port number is insufficient, the USB interface can connect to the external USB hub to meet the demand. The accessible USB devices for the RMT series spectrometers are:

- USB memory that can be plugged directly from the computer to facilitate data update;
- Keyboard, mouse, easy to edit data, to operate instruments;

Windows 10 The operating system supports plug and play devices, so it is very convenient to install USB devices. When the device is connected to the USB port, Windows 10 will automatically search for the matching device driver. If not found, the system will prompt you to find the driver directory to complete the installation.

If the USB device is removed from the USB port, Windows 10 automatically detects a change in the hardware configuration and unloads the associated driver. The plugging of USB equipment does not affect the operating status of RMT series spectrometer.

2) Configure the network

a) Change the host name

The RMT series spectrometer host name (computer name) has been preset to "Administrator" before leaving the factory. In order to avoid the network name phenomenon, users can change the host name for a network connected to multiple RMT series spectrometers. How to change the host name is (refer to the Microsoft Windows 10 Help document):

Step 1. Press the Start menu, select the computer and right-select the properties, click the computer name, domain and working group to set the change settings on the right, and stop the computer name.

Step 2. Edit and type in a new host name, click OK and restart.

b) Configure the IP address, the subnet mask, and the default gateway

Enter the Windows 10 system network configuration interface, click the local connection and right-click the attributes, double-click "Internet Protocol Version 4 (TCP / IP)" to modify the local IP address, subnet mask and default gateway.

c) Change the system firewall settings

A firewall is used to prevent unauthorized users from operating instruments remotely. Therefore, the manufacturer suggests to open the firewall protection. The RMT series spectrometer has firewall protection for port connections associated to all remote operations.

The administrator has a unique permission to change the firewall settings.

3) configure BIOS

RMT series spectrometer has been set in BIOS. Users should not modify the settings in BIOS, otherwise it will cause instrument start and work abnormal.

3.1.2.4 Windows 10 System safety and maintenance

1) anti-virus software

The installation of antivirus software may have some negative impact on the performance of the instrument. It is strongly recommended that users do not use the instrument as a common computer for browsing web pages or passing files, so as to avoid virus infection.

Before using various USB mobile storage devices, these mobile devices should be sterilized based on the latest antivirus software to ensure that they do not become virus-carrying media.

Once the RMT series spectrometer system platform is infected with a virus, it will have a negative impact on its operation and user use. At this time, it is recommended to use the device after virus removal. If there is still a problem with the device, please contact our unit according to the service hotline of this manual, and we will solve it as soon as possible.

2) Hard disk partition and use

The hard disk is divided into 1 partition: "C".

C disk includes Windows 10 operating system and instrument application, can also install third-party software to C disk, while used for data storage.

3.1.3 Routine maintenance

This section describes the routine maintenance methods of the RMT series spectrometer.

3.1.3.1 Cleaning method

1) Clean the surface of the instrument

When cleaning the instrument surface, follow the following steps:

Step 1. Shut down and disconnect the power cord connected to the instrument;

Step 2. Gently wipe the surface with a dry or slightly wet soft cloth, prohibiting the inside of the instrument;

Step 3. Do not use chemical cleaners, such as alcohol, acetone, or diluting cleaners.

2) Clean the display

After time, clean the monitor. Follow the following steps:

Step 1. Shut down and disconnect the power cord connected to the instrument;

Step 2. Dip with a clean and soft cotton cloth in detergent and gently wipe the display panel;

Step 3. Dry the display panel with a clean, soft cotton cloth.

Notice

The monitor is cleaned

There is an anti-static coating on the surface of the display, do not use fluoride, acidic, alkaline detergent. Do not spray the cleaner directly onto the display panel, otherwise it may penetrate into the machine and damage the instrument.

3.1.3.2 Maintenance of test ports

The upper panel has 1 RF input port. If the port is damaged or dust inside affects the RF band test results, maintain the joint as follows:

- The joints should be kept clean away from the dust.
- To prevent static leakage (ESD), do not contact the joint surface.
- Do not use the damaged joints.
- Use a hair dryer to clean the joint and do not grind the surface using tools such as sandpaper.

Notice

Port impedance match

The RF input port for the front panel of the RMT Series spectrometer is a 50 Ω connector. Connecting misunmatched impedance connector will affect the test results.

3.2 Panel description

This section describes the panel composition and function of the RMT series spectrometer.

3.2.1, with the description of the front panel

The front panel of the RMT series spectrometer is shown in Figure 3.7, and the front panel is the operation interface of the instrument, as detailed in section 3.3 of this chapter.

Figure 3.7 Front panel description

3.2.2, along with the description of the upper panel

The upper panel composition of the RMT family spectrograph is shown in Figure 3.8:

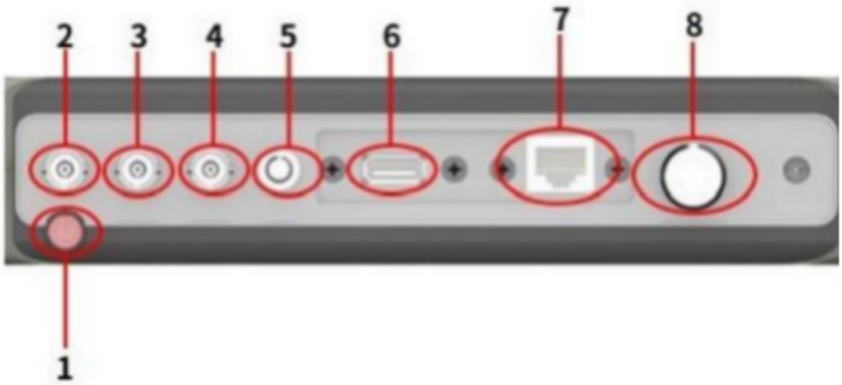


Figure 3.8 Upper panel description of the RMT series spectrometer

order number	name	function
1	Switch button	Realize the switch machine of the instrument
2	External power supply input interface	Power to the instrument with an external power supply
3	The GPS signal input interface	Access to the GPS signal
4	Medium frequency output interface	Output the medium frequency signal
5	External10MHz reference signal	Connect the external 10 MHz reference signal
6	USB joggle	Data exchange was performed using USB devices
7	LAN internet access	Ethernet port
8	RF input interface	Input interface for the external RF signals

Table 3.5 Upper panel description of the RMT series spectrometer

3.3 Introduction of the operation interface

This section describes the operation interface composition and function of RMT series spectrometer.

This section mainly introduces the operation interface of RMT series spectrometer. The operation interface can be divided from top to bottom, left to right, into: 1, shortcut bar, 2, mode bar, 3, parameter bar 4, result display bar, 5, information bar, 6, control panel bar, as shown in Figure 3.9 below:

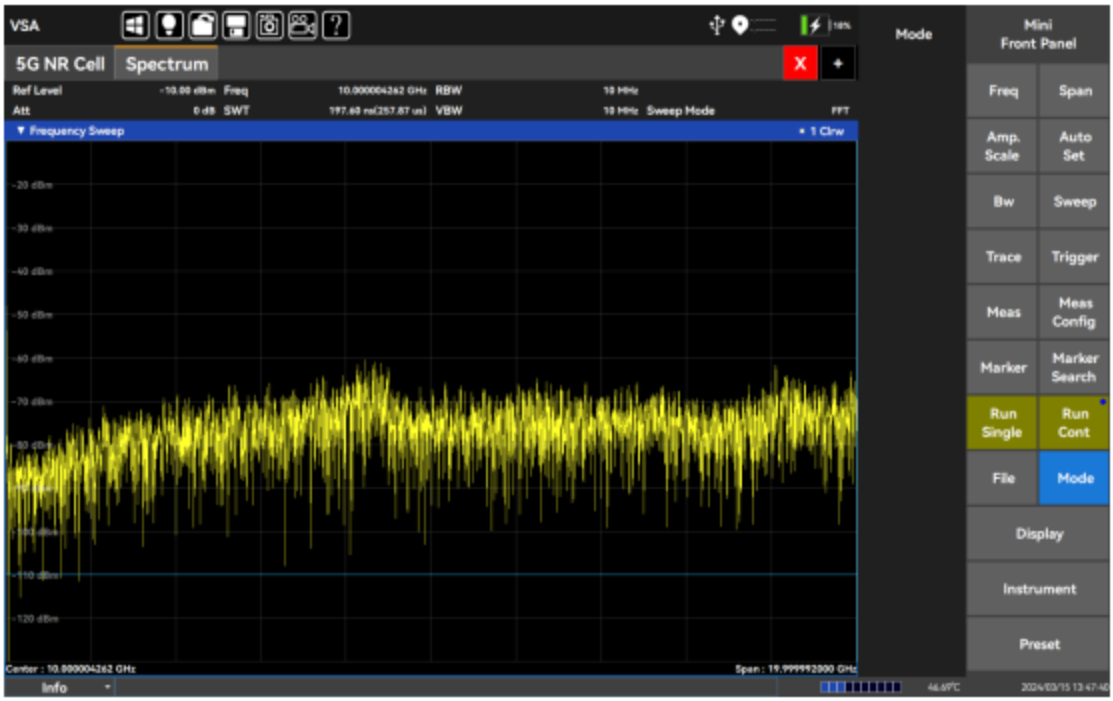


Figure 3.9 Introduction of the operation interface

.13.3, the shortcut bar description

The shortcut bar is located at the top of the entire operation interface, and the icon from left to right means that following:

VSA: Analysis software name for the RMT series spectrometer.

: Call up the Windows window shortcut key.

: Change the operation interface brightness, there are three brightness to adjust.

: Quickly read the shortcut key, with the quick save shortcut key, can call up the saved configuration information.

: Quick save shortcut keys, used to save the current configuration information, including frequency point, reference level, bandwidth, etc.

: Screen capture shortcut keys.

: Record the screen shortcut key.

: Call up the user manual shortcut key.

N:32.924676 E:117.333409 : latitude and longitude information, GPS synchronization, shows the latitude and

longitude of the current position.

: Battery information, display the charging status and current charge.

3.3.2 Description of the mode bar

The modes of RMT series spectrum meter include: spectrum mode, real-time spectrum mode, interference mode, LTE cell, 5 GNR cell mode, GSM cell mode and vector demodulation mode and other modes. The mode bar displays the mode that is already open and the mode in use.

: Turn off the current mode.

: Add a test mode.

3.3.3 Description of the parameter bar

The parameter bar of the user interface of RMT series spectrometer is used to display the main parameters in the current measurement mode, such as: in [spectrum], [measurement] and [channel power] measurement mode, the main parameters are: reference level, attenuation, frequency, scanning time, resolution bandwidth, video bandwidth, scanning mode and other parameters configuration.

3.3.4, and the description of the results display bar

Use to display the measurement results of the different measurement modes, occupying the main interface of the operation interface.

3.3.5 Description of the information column

Important information used to display the equipment of RMT series spectrometer, including synchronous success prompt, standby state, IF overload prompt, low power prompt, CPU temperature, date, time and other information.

3.3.6, description of the control panel bar

The control panel bar of RMT series spectrometer includes frequency menu, bandwidth menu, level setting menu, automatic setting menu, bandwidth menu, scan menu, track menu, trigger menu, measurement menu, mark menu, mark search menu, running single menu, continuous menu, running menu, file menu, mode menu, display menu, equipment menu and reset menu. The use of each menu will be introduced in detail in the fourth section of this chapter.

: Under the control panel submenu, an option such as with a small white triangle icon indicates that the option can open a new window.

: Language, preamplifier, marker type, noise cursor, stray suppression, external reference and other buttons with selection, color and background color is the current selection.

3.4 Basic test methods

.13.4 Basic setting instructions

This section introduces the main features of the user operation interface of the RMT series spectrometers, and these basic measurement settings are used for different subsequent measurement tasks.

The main features of the user operation interface of the RMT series spectrometer use a new intuitive graphical interface, which can clearly display the test results. The whole instrument operation interface is divided into different areas according to the functional modules, and multiple functional modules can be operated at the same time. The right side of the screen is the display area of the instrument menu, and the user can operate through the mouse or touch screen.

RMT Series spectrometer use procedure:

1. Select according to the test type: [Mode].
2. Press [Measurement], select the subdivision measurement item in this mode.
3. By [Measurement Configuration], configure the parameter information required for the measurement items.
4. **Configure [frequency], [level setting], [frequency width], etc., and adjust the display results.**

.23.4 Operation examples

First, the RMT series spectrometer completes the pre-operation preparation by following the following steps:

Step 1. Power up and start up;

Step 2. Preheat is recommended for 30 minutes;

Step 3. After the user operation surface is prompted without any error information, then start the following operation;

Step 4. Select [frequency scan] mode by [mode], [spectrum] and [measurement];

Step 5. Set [frequency] and [center frequency] to 1GHz;

Step 6. Set the [frequency band] to 100 MHz;

At this time, you can see the spectrum map with 1 GHz and width of 100 MHz, as shown in Figure 3.10:

Figure 3.10 Operating interface

4 Menu instructions

All menus of the RMT family spectrum instrument are located in the control panel on the right side of the user operation interface, including frequency menu, bandwidth menu, level setting menu, automatic Settings menu, bandwidth menu, scan menu, track menu, trigger menu, measurement menu, mark menu, mark search menu, run single menu, run continuous menu, file menu, mode menu, display menu, device menu, reset menu are 19 common menus.

4.1 Frequency menu

This section describes the functions of the frequency menu. The frequency menu is used to set the frequency parameters of the RMT series spectrometer, which can display the frequency measurement range. The frequency range is determined by the frequency range of the scanning local spectrum.

4.1.1 Menu functions:

Set the center frequency of RMT series spectrometer, press [frequency], [center frequency], enter the center frequency value in the frequency menu, unit selection [GHz], [MHz], [kHz], [Hz], or [] [] key and wheel set the center frequency value, the center frequency point and fixed bandwidth can be displayed. A spectrum of spectrum from start frequency to termination

frequency can also be displayed by [frequency], [start frequency] and [termination frequency]. All the above operations can be configured in [frequency] and [frequency Config]. The frequency configuration menu is shown in Figure 4.1:

.1 Figure 4 The frequency configuration menu shows

4.1.2 Parameter introduction:

Center frequency: the frequency located in the center of the spectrum width, the broadband of the spectrum is set by the width menu.

Start frequency: Set the start frequency of the spectrum width and use it with the termination frequency to obtain the spectrum of a frequency range.

Termination frequency: set the termination frequency for the spectrum width.

Signal tracking: The peak of the drift signal is always displayed at the center of the spectrum.

Signal tracking configuration: including the state switch of signal tracking, bandwidth tracking range, threshold tracking range, tracking signal quantity, etc.

Frequency configuration: including center frequency, frequency width, starting frequency, termination frequency and other configurations.

4.2 frequency bandwidth menu

This section introduces the functions of the bandwidth menu. The bandwidth also analyzes different names such as spectrum width, spectrum width, frequency range and spectrum span, and refers to the frequency range (spectrum width) of the response signal that can be displayed in the most left and most right vertical scale lines of the display screen.

4.2.1 Menu functions:

Set the bandwidth of RMT series spectrum instrument and press [width] [width manual] to set the bandwidth value in the current state.

The frequency width menu display is shown in Figure 4.2:

Figure 4.2 Width menu display

4.2.2 Parameter introduction:

Width manual: press [width] [width manual] to manually configure the current width.

Full bandwidth: press [bandwidth] [full bandwidth], and set the bandwidth of the current measured state as the maximum bandwidth value.

Zero frequency width: press [frequency width] [zero frequency width], the frequency width is zero, the measurement mode will automatically switch to [zero frequency width], you need to press [measurement] [frequency scan] to reset the frequency width.

Previous frequency width: press [frequency width] [previous frequency width], and set the frequency width of the current measured state as the frequency width value of the last time.

Frequency width configuration: press [frequency width] [frequency configuration], set the general menu for frequency width, and can set the center frequency, frequency width, start frequency, termination frequency, full frequency width, zero frequency width and previous frequency width.

4.3 Level Settings menu

This section describes the functions of the level setting menu, which is used to set the reference level, attenuator, amplifier, and the level related parameters.

4.3.1 Menu functions:

Set the reference level of RMT series spectrometer, and set the reference level by pressing [Level setting] [reference level]. Level setting menu is shown in Figure 4.3:

Figure 4.3 The level setting menu is displayed

4.3.2 Parameter introduction:

Reference level: The reference level value corresponds to the maximum power value that can be displayed on the RMT series spectrometer panel.

Attenuation manual and attenuation automatic: generally set as automatic, reducing the value of attenuator can reduce the background noise of RMT series spectrometer. [level setting] [attenuation manual] or [level setting] [attenuation automatic] is used to adjust the input attenuation of RMT series spectrometer. In automatic mode, the input attenuator is associated with the reference level. In manual mode, the amount of the attenuator can be adjusted, ranging from 0 dB to 53 dB.

Preamplifier: attenuation manual: the preamplifier switch can work, press [level setting] [preamplifier off / on] to control the switching state of the preamplifier; attenuation automatic: when the reference level is less than-10 dBm, the preamplifier will automatically activate.

Scale: press [level setting] [scale] to adjust the screen ordinate grid size, which can be selected between 1 dBm and 60 dBm.

Level offset: The reference level offset is used to compensate for the signal gain of the external device, when the signal power value displayed on the RMT series spectrometer is the actual original output signal power. For example, using the RMT series spectrometer to measure a signal power amplified by a power amplifier, and considering the power amplifier gain (eg: 10dB) and transmission line loss (eg: 3dB), the reference level offset should be set to- (10-3) = -7 dB.

Level setting: four sub-interfaces including reference level, input setting, attenuation and electronic attenuator.

a) Reference level: including reference power value, offset power value, power unit (default dBm);
b) Input settings: including amplification on / off, coupling mode, impedance;
c) Attenuation: automatic / manual mode, attenuation value;
d) Electronic attenuator: including attenuator state on / off, attenuator automatic / manual, electronic attenuation value.

Intenitude setting: including the reference level, the scale value configuration.

4.4 Automatic setting menu

Set the option value, or historical value, last measured by the RMT series spectrometer. Press [Automatic Settings] to find the target menu set by the historical value, and select the target menu to be set as required. The menu is currently closed. Automatic setting menu display is shown in Figure 4.4:

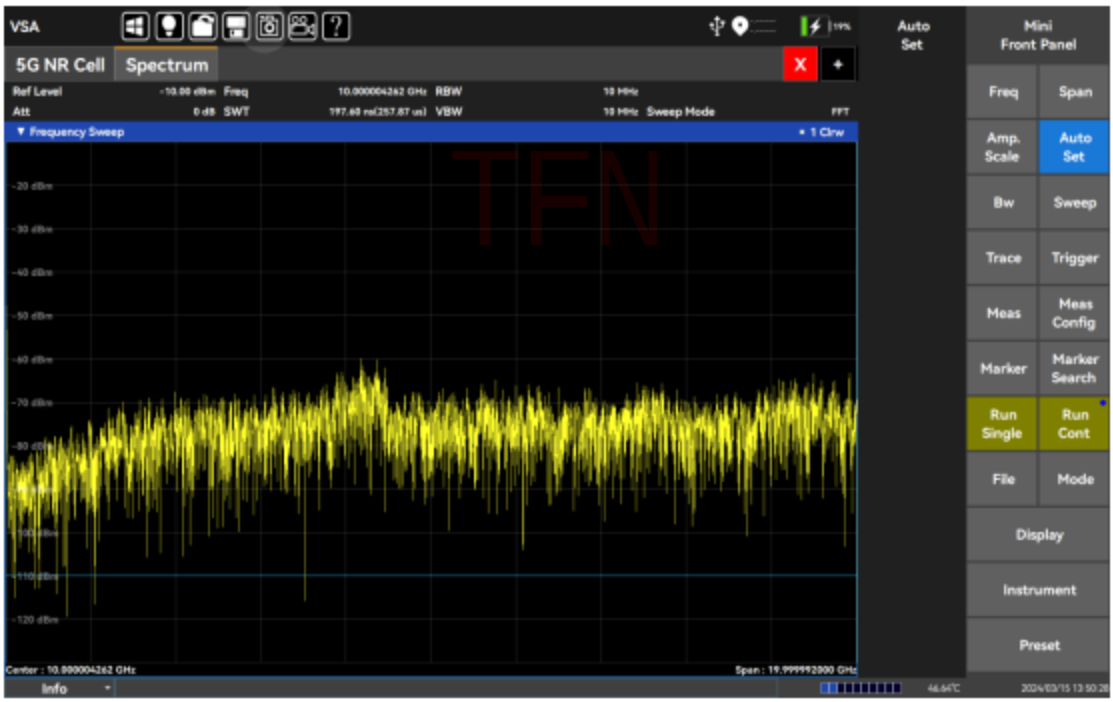


Figure 4.4 Automatic setting menu display

4.5 Bandwidth menu

This section describes the functions of the bandwidth menu, which is used to set the resolution bandwidth, video bandwidth, scan time and other parameters of the RMT series spectrometer.

4.5.1 Menu functions:

Set the resolution bandwidth, video bandwidth, and scan time of the RMT series spectrometer. Set the value of resolution bandwidth by [bandwidth] and [resolution bandwidth manual]; set the value of video bandwidth by [bandwidth] and [video bandwidth manual]. You can also set the resolution bandwidth, video bandwidth and scanning time by [bandwidth] and [bandwidth configuration]. Bandwidth menu, displayed as shown in Figure 4.5:

Figure 4.5 The bandwidth menu is displayed

4.5.2 Parameter Introduction:

[Resolution bandwidth automatic] / [resolution bandwidth manual]: press [bandwidth] [resolution bandwidth automatic] or [bandwidth] [resolution bandwidth manual], adjust the resolution bandwidth, range from 1Hz~3MHz/10MHz(6.3Hz version / 9GHz, 20GHz version). In manual mode, you can set the resolution bandwidth value with digital keys and rotary wheels. Automatic mode varies with bandwidth in SPAN / RBW ratio.

[Video bandwidth automatic] / [Video bandwidth manual]: press [bandwidth] [video bandwidth automatic] or [bandwidth] [video bandwidth manual], used to adjust the video bandwidth displayed in the active functional area, ranging from 1 Hz to 10 MHz. In the manual mode, you can set the video resolution bandwidth value with the digital key and the rotary wheel. The automatic mode follows the resolution bandwidth change in the RBW / VBW ratio.

[Scan time]: Set the scan time, scan refers to the time required for the local vibration tuning to scan the selected bandwidth, usually changing with the bandwidth, resolution bandwidth and video bandwidth.

[Bandwidth Configuration]: The total configuration menu containing the above measurement configuration.

4.6 Scan the Menu

This section describes the functions of the scan menu, which is used to set the scan time, scan point and other parameters.

4.6.1 Menu functions:

The scanning time is the time required for the local vibration tuning of the RMT series spectrometer to go through a chosen frequency interval. Press [Scan] and [Scan Time] to set the value of scan time and scan point. The menu display is shown in Figure 4.6:

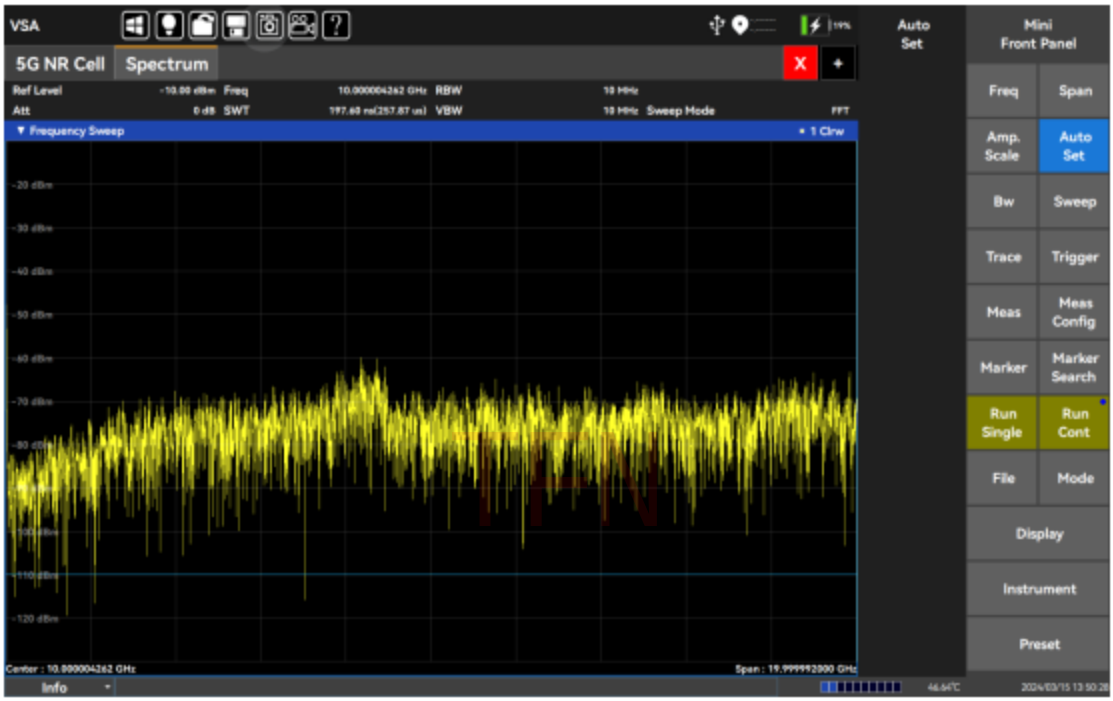


Figure 4.6 Scan menu display

4.6.2 Parameter Introduction:

[Scan time]: To set the scan time of the RMT series spectrometer, the scan time can be adjusted with the number key and the rotation wheel.

[Scan point]: Press [Scan] [Scan point] to set the number of scan points.

[Bandwidth configuration]: The configuration is as follows:

a) [Resolution bandwidth automatic] / [resolution bandwidth manual]: press [bandwidth] [resolution bandwidth automatic] or [bandwidth] [resolution bandwidth manual], adjust the resolution bandwidth, range from 1Hz~3MHz/10MHz(6.3Hz version / 9GHz, 20GHz version). In manual mode, you can set the resolution bandwidth value with digital keys and rotary wheels. Automatic mode varies with bandwidth in SPAN / RBW ratio.

b) [Video bandwidth automatic] / [Video bandwidth manual]: press [bandwidth] [video bandwidth automatic] or [bandwidth] [video bandwidth manual], used to adjust the

video bandwidth displayed in the active functional area, ranging from 1 Hz to 10 MHz. In the manual mode, you can set the video resolution bandwidth value with the digital key and the rotary wheel. The automatic mode follows the resolution bandwidth change in the RBW / VBW ratio.

c) [Scan time]: refers to the time required for the local vibration tuning to scan the selected bandwidth. Scan time usually changes with the bandwidth, resolution bandwidth and video bandwidth.

4.7 Track menu

4.7.1 Menu functions:

The track menu is used to set the display type of the track. According to the different requirements of the user test, the refresh, average, maximum hold, minimum hold, display and concealment of the track are selected. Multiple tracks can also be added. Track menu, displayed as shown in Figure 4.7:

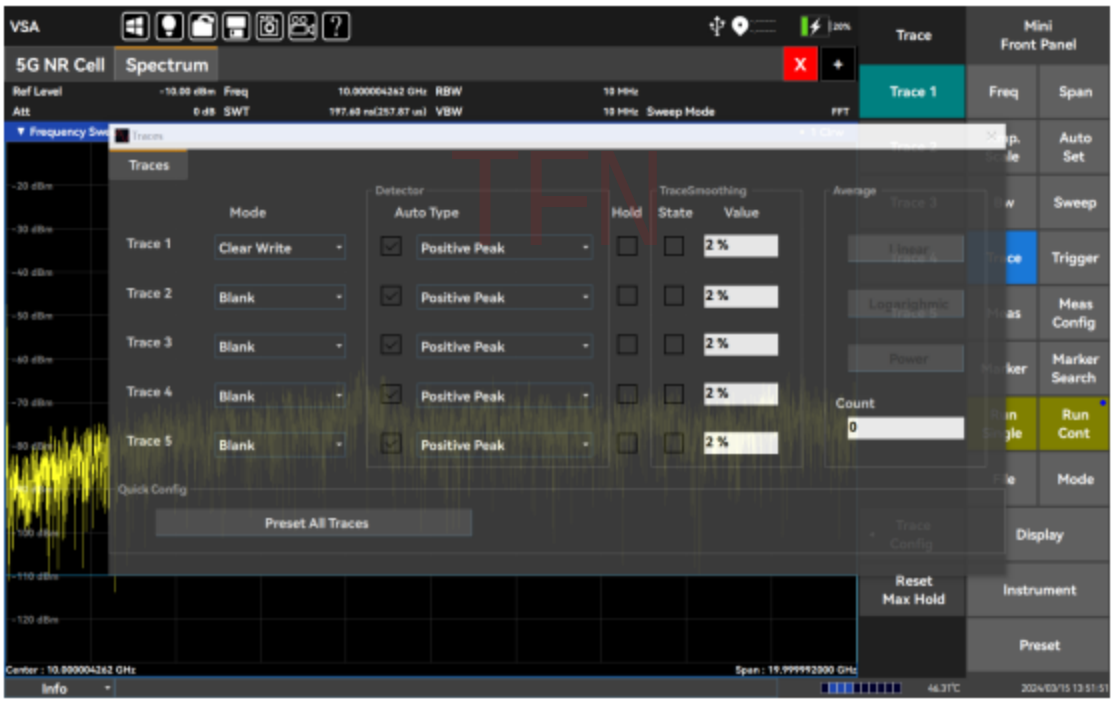


Figure 4.7 Track menu display

4.7.2 Parameter introduction:

Track 1 to track 5: Up to 5 tracks can be set simultaneously in the spectrum map.

Track configuration: you can set the track mode, track detection mode, smooth state value, and average number.

a) Mode: including refresh trace, average, maximum hold, minimum hold, display, hide, etc.

b) Detection: including normal, positive peak, negative peak, root mean square, average, sampling and other detection methods.

c) Smooth: Set the smooth state value, ranging from 0% to 100%.

d) Average: When the trajectory pattern is selected as: [average], the average number needs to be set, and the number of values range from 0 to 2000000.

Reset all tracks: quickly reset the track, only retain track 1, and track 1 returns to refresh mode.

4.8 Trigger menu

4.8.1 Menu functions:

The trigger menu is used to select the trigger mode of the scan or measurement, including free trigger, external trigger, bus trigger, and timing trigger. Users can choose the corresponding trigger mode according to different needs. Trigger menu, displayed as shown in Figure 4.8:

Figure 4.8 The Trigger menu is displayed

4.8.2 Parameter introduction:

Trigger: free trigger, external trigger, bus trigger, timing trigger and other trigger options.

a) Free trigger: press [Trigger] [Trigger Type] [Free Trigger], set the free trigger after the last continuous scan or single scan, start a new scan or measurement.

b) External trigger: press [Trigger] [Trigger Type] [External Trigger] and set the RMT series spectrometer as the external trigger mode. Select the scan and measurement to synchronize with the next voltage cycle, with GPS as an external trigger source.

c) Bus trigger: press [Trigger] [Trigger type] [bus trigger], and set the RMT series spectrometer as the bus trigger mode.

d) Timing trigger: press [trigger] [trigger type] [timing trigger], set RMT series spectrometer as timing trigger mode, use internal clock timing when GPS antenna is not connected, and synchronize through satellite timing after connecting to GPS.

4.9 Measurement configuration menu

The menu appears differently when selecting the measurement configuration, depending on the measurement items. The measurement configuration menu under each test item is detailed in the later section. The measurement configuration menu in the current [spectrum] and [frequency scan] modes is shown in Figure 4.9, including two measurement configurations: save spectrum and read spectrum.

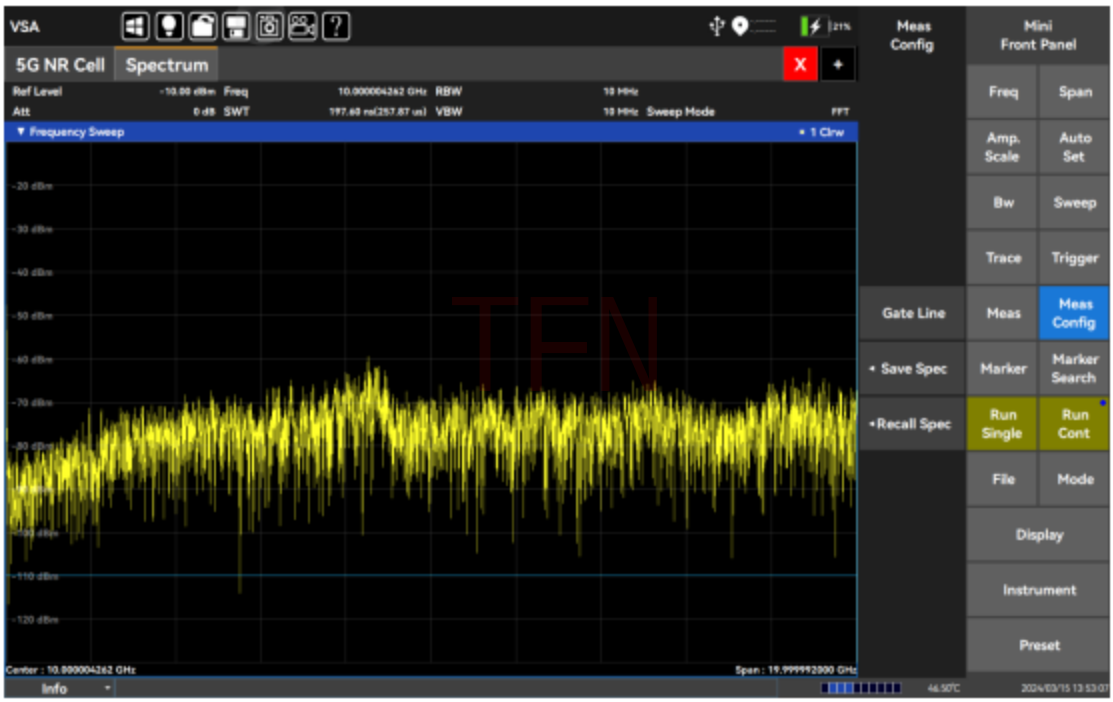


Figure 4.9 Measurement configuration is displayed

4.10, and the measuring menu

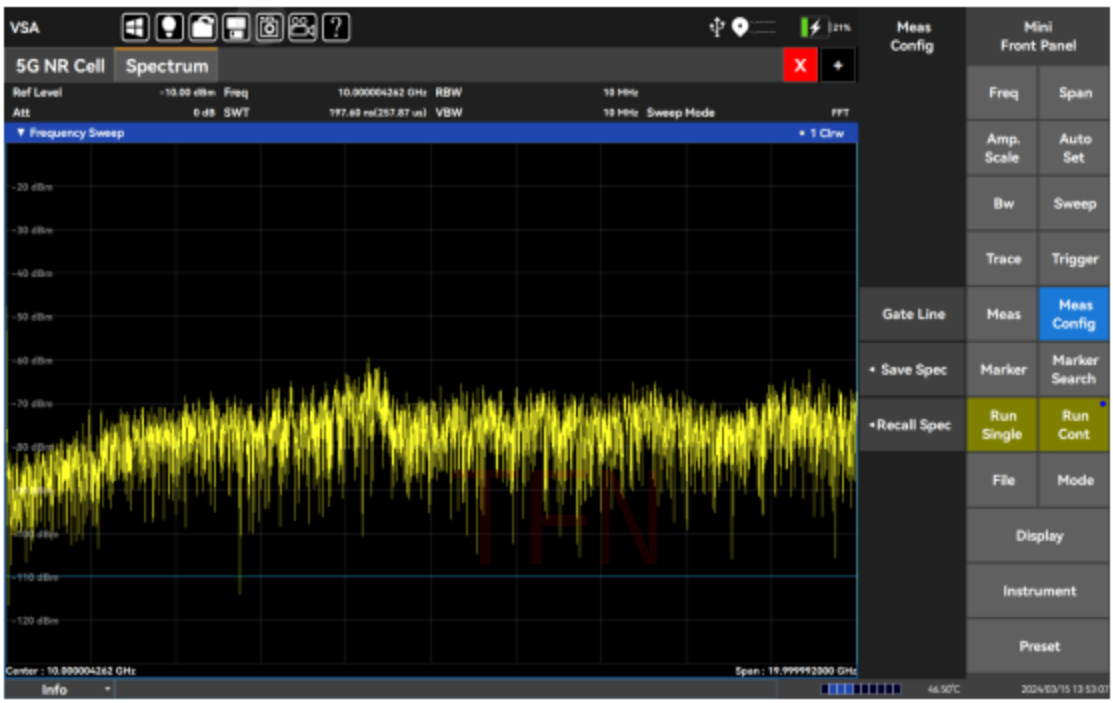
Measurement menu is a subdivision of measurement function items in different modes, and different measurement menus in different test modes. Example: The display under the measurement menu of the spectrum mode is shown in Figure 4.10:

Figure 4.10 shows display

4.11, mark the menu

4.11.1 Menu functions:

Mark the frequency point and power of the signal on the frequency spectrum. After selecting the mark, a single frequency mark will be activated and place the frequency mark on the trace line to display the frequency and power values of the frequency point in the upper left corner of the spectrum interface, as shown in Figure 4.11:



.1Figure Figure 41 The marker menu is shown

4.11.2 Parameter Introduction:

Marker 1 to 6: Up to 6 mark points are added to the spectral trace. A list of markers below the spectral trace.

Select mark: Call the list of marker switches to change the switch status of the points.

Marker type: including normal and differential values.

a) Normal: mark the frequency and power of the input frequency point.

b) Difference: used to display the amplitude difference and frequency difference between two frequencies (time difference in zero width).

All markers off: used to quickly clear all marks on the spectrum.

Noise cursor: open the noise level marking the current point, the default dBm / Hz.

4.12 Mark the search menu

4.12.1 Menu functions:

The peaks used to search the frequency spectrum, including peak, subpeak, left neighbor peak, right neighbor peak, minimum value, etc. Users can choose the corresponding peak tag according to the different needs. The marker search menu is as shown in Figure 4.12:

.1Figure 42 marks the search menu

4.12.2 Parameter Introduction:

Select the mark: manually select the switch status of the mark point.

Peak mark: Search by [mark] [peak mark] to place a frequency mark to the highest peak of the trace, and display the frequency and amplitude in the upper left corner of the screen.

Subpeak: Search by [mark] [Subpeak] to move the frequency mark to the next highest peak less than the current frequency mark peak. When this key is pressed repeatedly, the lower peak point can be quickly found.

Left neighbor peak: press [mark search] [left neighbor peak] to find the next peak on the left side of the current frequency mark position.

Right neighbor peak: Search by [mark] [right neighbor peak] to find the next peak on the right side of the current frequency mark position.

Minimum value: press [mark search] [minimum value], place a frequency mark to the lowest point of the trace, and display the frequency and amplitude of this frequency mark in the upper left corner of the screen.

Automatic search off: press [mark search] [automatic search off], when the automatic search

is open, the current cursor will be a peak search operation after the end of each scan.

Marking center frequency: press [mark search] [mark center frequency], can quickly move the frequency mark signal to the center of the screen.

4.13 Run a single menu

It is used to control the running state of the software interface trace. After clicking this menu, the trace line changes from the continuous running state to a single run. Click once and the trace line is refreshed once, which can be used to record the data. Run a single menu display as shown in Figure 4.13:

.1 Figure 43 Run a single display

: The small blue small dot in the upper right corner of the icon indicates that the current running state is a single run.

4.14 Run the continuous menu

It is used to control the running state of the trace. By default, the spectral traces are running continuously. When switching from a single time to continuous, click this menu to ensure that the trace state can be refreshed continuously. Run continuous menu displays as shown in Figure 4.14:

.1 Figure Figure 44 runs a continuous display

: The blue dots in the upper right corner of the icon indicate that the current running state is

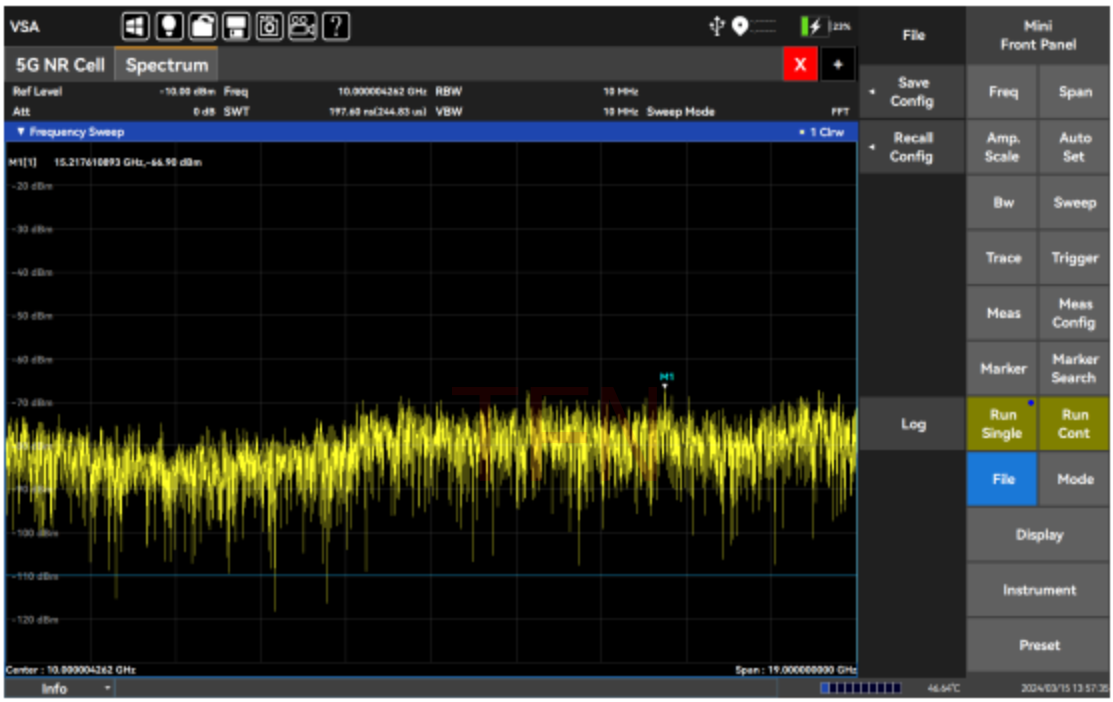
continuous.

4.15, File menu

This section describes how to use the file menu, including operations on files such as save, read configuration parameters, and logs.

4.15.1 Menu functions:

Mainly includes logging for save configuration, read configuration, and instrument operation. The file menu is displayed as shown in Figure 4.15:



.1Figure 45 shows the file menu

4.15.2 Parameter Introduction:

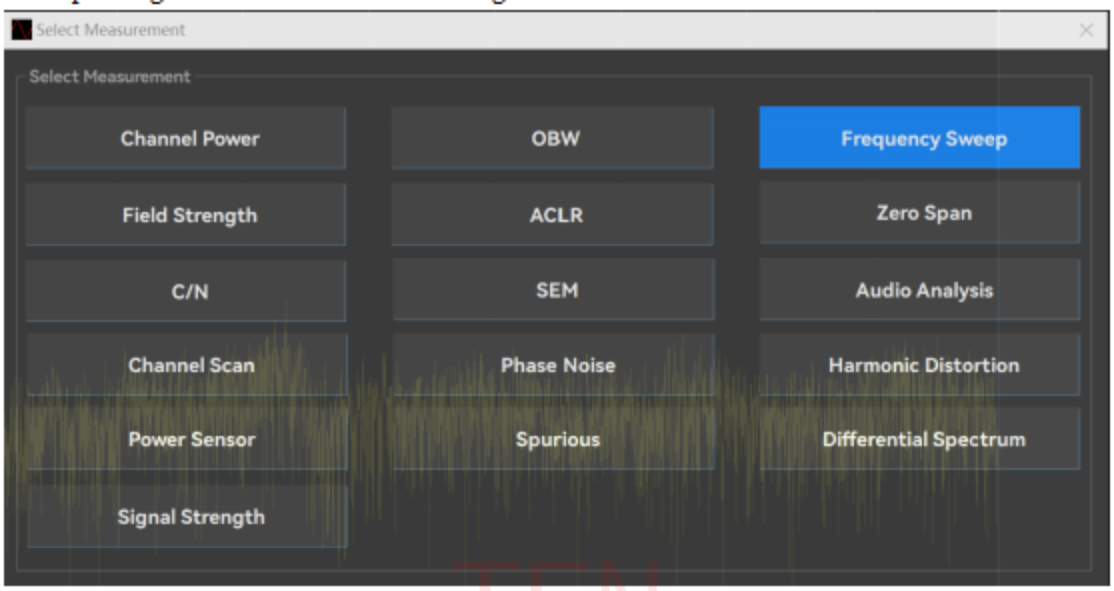
Save configuration: Press [File] [Save Configuration] to save the parameters of the current state.

Read configuration: press [file] [read configuration], pop up the status file list, and call the parameters of the corresponding state to the program through the saved name.

Log: Click the Log of the instrument, including the operation record, test results and other information.

4.16, the mode menu

used to select the measurement mode of RMT series spectrometer, the measurement mode is usually the first step of instrument operation. The measurement mode includes frequency spectrum mode, real-time spectrum mode, interference mode, LTE cell mode, 5 GNR cell mode, vector demodulation mode, GSM cell mode, etc., as shown in Figure 4.16. Users can choose the corresponding measurement mode according to their own needs.



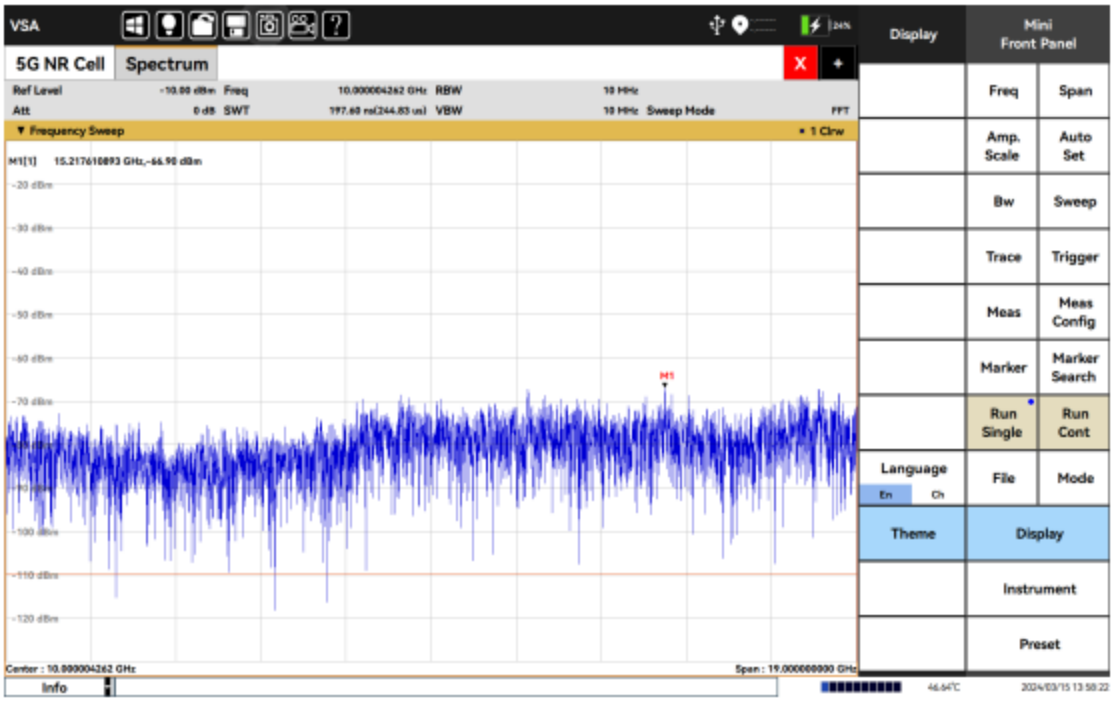
.1Figure 46 The mode menu shows

4.17, to display the menu

Language and topics for selecting the RMT series of spectrometers.

4.17.1 Menu functions:

Display menu setting of RMT family spectrum instrument, only for the operating software of RMT family spectrum instrument, including software language, software topics. There are two modes of Chinese and English, and users can quickly switch according to their personal habits. Topics include daytime mode and night mode, night mode contrast, suitable for indoor use, daytime mode contrast, suitable for scenes with strong field light, as shown in Figure 4.17:



.1Figure Figure 47 shows the menu

4.17.2 Parameter Introduction:

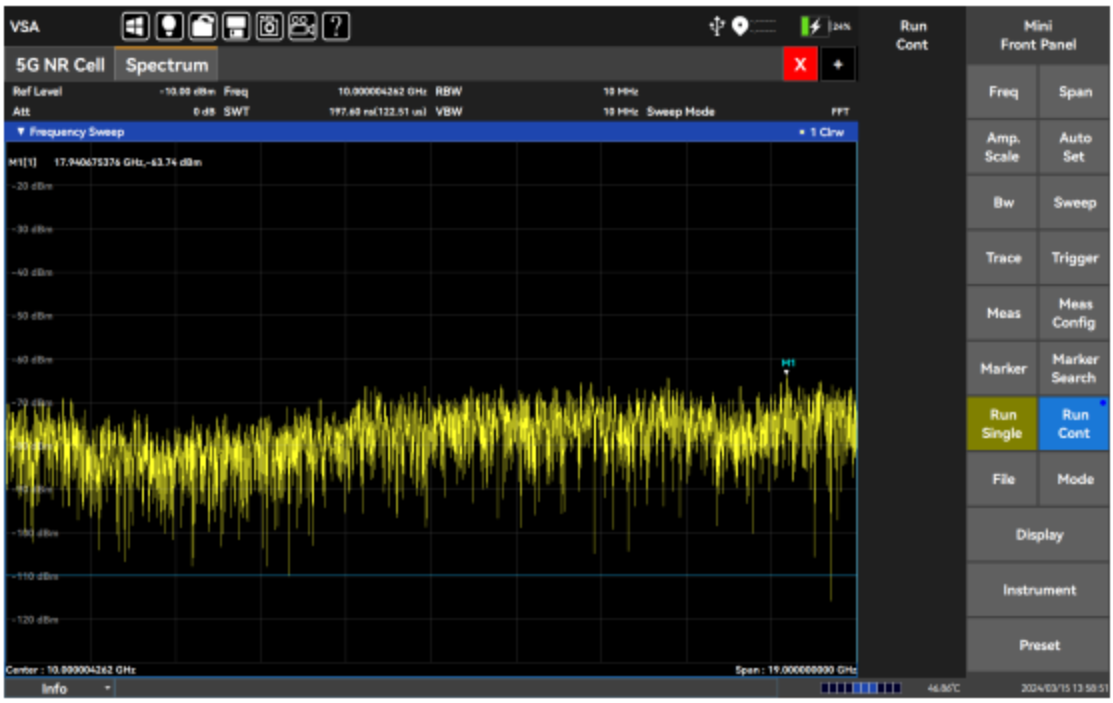
Language: Choose from Chinese or English.
Topic: Switch between daytime and nighttime modes.

4.18, the device menu

This section describes the functions of the equipment menu, which is used to display the instrument-related equipment status of the RMT series spectrometer, including software, hardware information, sleep settings, positioning system, stray suppression, external reference and other configurations.

4.18.1 Menu functions:

In the device menu, some of the settings related to the RMT series spectrometer are listed. Including version information, stray suppression, external reference, GPS positioning function, dormancy Settings and other featured menus. The device menu displays as shown in Figure 4.18:



.1Figure 48 The device menu displays

4.18.2 Parameter Introduction:

Heterious inhibition: there are three degrees of inhibition selected to adjust the inhibition ability of stray inhibition.

External reference: when using external frequency reference.

Hibernation setting: including hibernation switch and set sleep time.

Positioning system: use need to connect RMT series spectrometer, standard GPS antenna. Support GPS, BDS (Beidou), GLONASS three positioning systems.

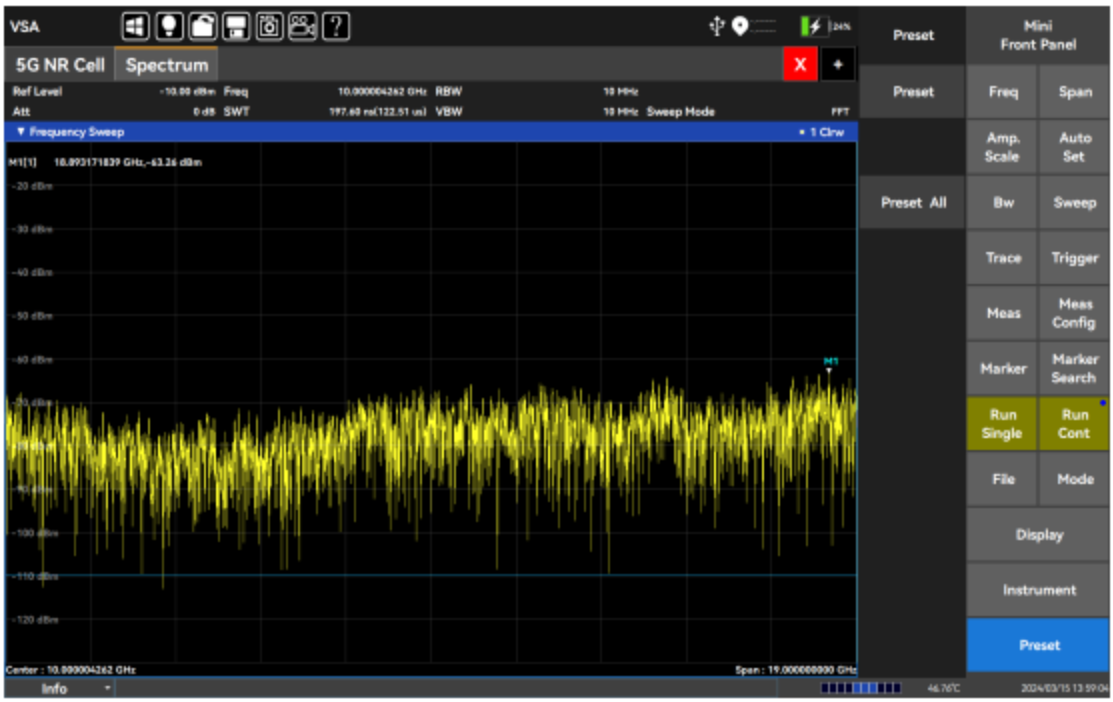
Version information: displays the software version and device number of the current device.

4.19, and reset the menu

This section describes the use of the reset menu, which is used to restore the default state of the RMT series spectrometer.

4.19.1 Menu functions:

In the reset menu, the RMT series spectrum is related to reset, including reset and reset. Reset menu, display as shown in Figure 4.19:



.1Figure Figure 49 shows the reset menu

4.19.2 Parameter Introduction:

Reset: It can be used to reset the default working state of the user's current mode.

Reset all: it is reset to the initial state when the device is turned on.

5 Spectrum mode

After the RMT series spectrum instrument is turned on, press [mode], select [spectrum] and switch to spectrum mode. Spectrum mode can be divided into the following commonly used measurement modes: channel power, occupied bandwidth, frequency scanning, field strength measurement, adjacent channel leakage suppression ratio, zero frequency width, signal-to-noise ratio, spectrum transmission template, audio analysis, channel scanning, phase noise, harmonic distortion, power sensor, stray, differential frequency spectrum, signal intensity, etc.

5.1 Channel power

Channel power is the power transmitted by signals over a range of frequencies over a specific time interval. Channel power measurements can be used to evaluate the communication transmitter to determine the quality of RF transmission by comparing with specific communication protocols. In this section, the modulation signal is 1GHz, power of-10 dBm and frequency width of 20 MHz to measure the power index of 2 broadband signal.

This section takes the channel power of the modulation signal as an example, introduces the use method of the channel power measurement function of the RMT series spectrometer, and conducts the channel power measurement of the signal.

5.1.1 Measurement configuration of the channel power

[Channel bandwidth]: Set the appropriate value according to the bandwidth of the modulation signal to be measured.

[Channel power configuration]: On / off status and channel bandwidth of the channel power test item can be set.

5.1.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.1. It is suggested to connect the reference signal for optimizing the test index. refer to section 3.2.2;

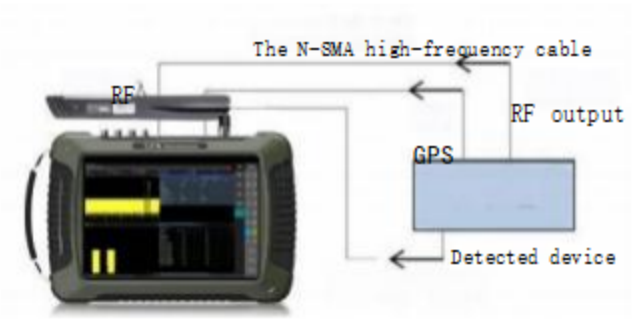


Figure 5.1 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Select the channel power measurement mode:

- Press [mode] and select the measurement mode as [spectrum].
- Select [Channel Power] test function by [Measurement]. the interface is shown in Figure 5.2:
-

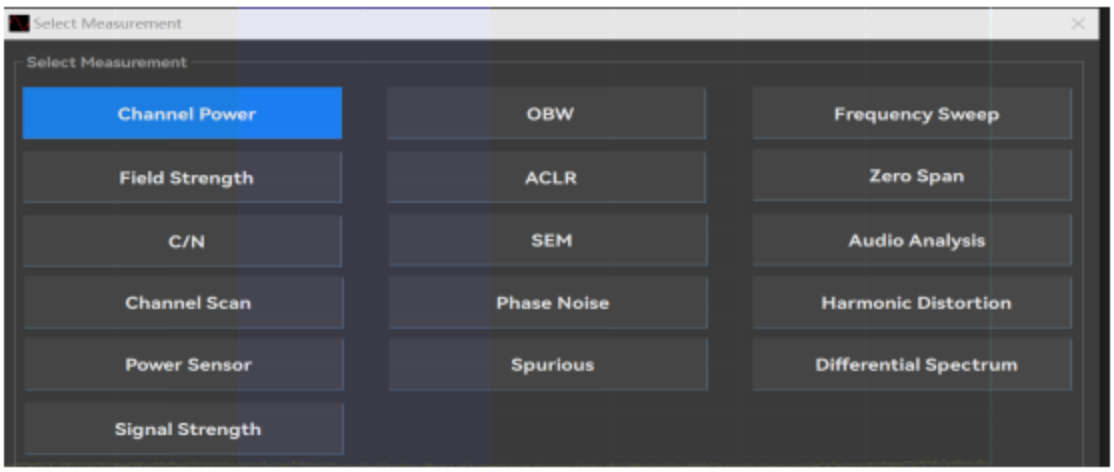


Figure 5.2 Select the measurement interface diagram

Step 3. Set the center frequency, bandwidth and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- Press [width] and [width manual] to set the bandwidth.

- Press [level setting] and [reference level] and set the reference level.

Step 4. Observation results:

- Press [measurement configuration], [channel power configuration] and [state], select open, and set [bandwidth] to 20 MHz. The measurement results are shown in Figure 5.3:

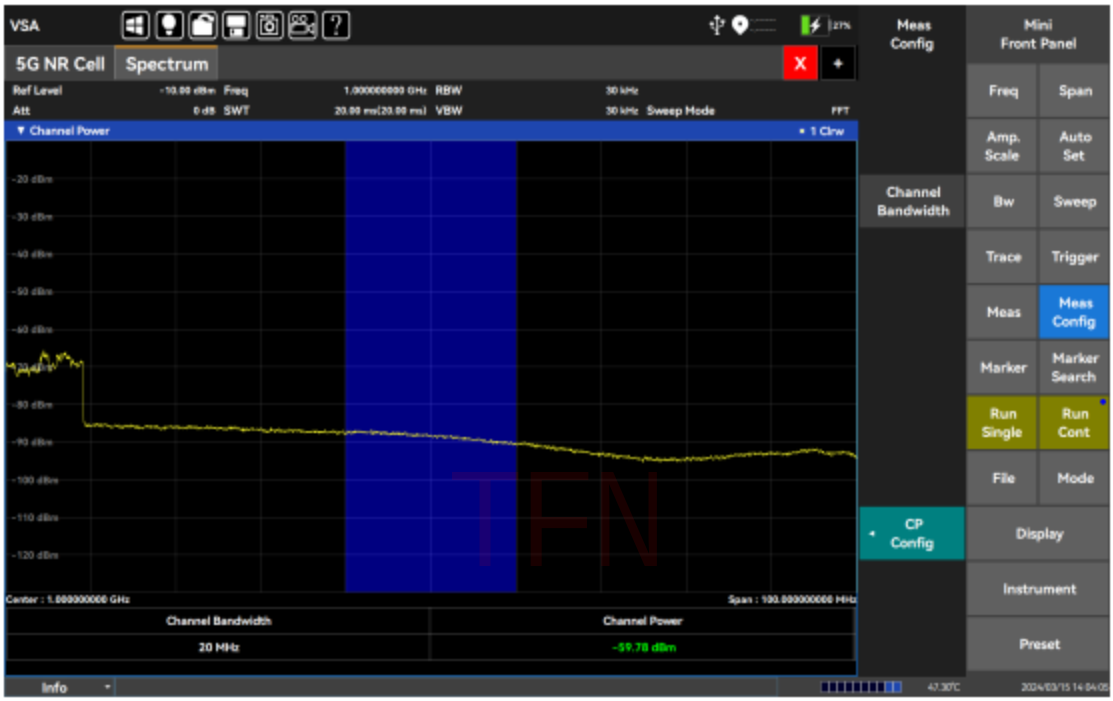


Figure 5.3 Measurement results diagram

5.2 Occupying the bandwidth

The occupied bandwidth refers to the band width corresponding to that of the frequency band when centering on the center frequency of the specified channel and including the energy of a certain ratio of the total transmitted power. The bandwidth occupied measurement of RMT series spectrometer can quickly, clearly and accurately give the measurement results, according to the different modulation mode, there are power percentage method and power drop XdB method two methods to calculate the bandwidth occupied.

In this section, the modulation signal to be generated with transmission center frequency of 1GHz, power of-10 dBm and frequency width of 20 MHz as the input signal of the RMT series spectrometer to measure the occupied bandwidth index of the signal.

5.2.1 Measurement and configuration of the bandwidth occupied

[Mode]: There are two mode choices:% and XdB:

a) Power percentage method:

By calculating the bandwidth of the frequency of a particular percentage of the entire transmitted signal power, the occupied bandwidth of the signal is obtained, and the percentage of the power can be set by the user.

b) Power drop XdB method:

This calculation method defines the occupied bandwidth as the distance interval between the two frequency points on both sides of the frequency point where the signal peak power drops by XdB respectively. The XdB of signal power drop is set by the user.

[Percent power bandwidth]: Set the energy percentage to a certain ratio of the total transmitted power, and the default is 99%.

[Channel bandwidth]: Select the bandwidth value of the modulation signal to be tested.

[XdB]: When the power reduction method is selected for XdB effect, the value of the signal power decrease can be set, and the default is 3dB.

[OBW Configuration]: Total configuration menu containing the above measurement configuration.

5.2.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.4. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

Figure 5.4 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Select the occupied bandwidth measurement mode:

- Press [mode] and select the measurement mode as [spectrum].
- Press [measurement] to select [bandwidth] test function, the interface displays as shown in Figure 5.2:

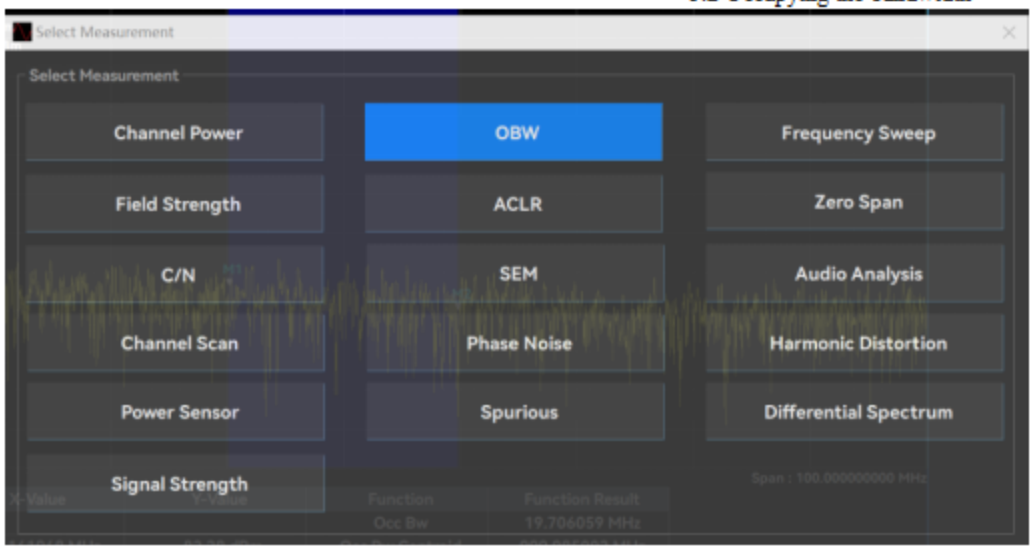


Figure 5.5 Select the measurement interface diagram

Step 3. Set the center frequency, bandwidth and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- **Press [width] and [width manual] to set the bandwidth.**
- Press [level setting] and [reference level] and set the reference level.

Step 4. Observation results:

- Press [OBW configuration] and [mode] to set to "%".
- Press [power%], set to 99%.
- Press [Channel Bandwidth], and set the bandwidth function to 20 MHz. The measurement results are shown in Figure 5.6:

.6Figure 5 measurement result Fig

5.3 Frequency scanning

In frequency scan mode, the RMT series spectrometer moves from the start frequency to the stop frequency at the specified scan rate. Users can set the center frequency, reference level, scanning bandwidth and other parameters.

In this section, the equipment under test generates a modulation signal with emission center frequency of 1GHz, power of-10 dBm and frequency width of 20 MHz as the input signal of the RMT series spectrometer to measure the frequency scanning function.

5.3.1 Measurement configuration of the frequency scan

[Save spectrum map]: Select the save path to save the current spectrum signal of up to 5GB.
[Read spectrum map]: Read the saved spectrum signal in the target path.

5.3.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.7. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

Figure 5.7 Schematic diagram of the tested equipment and RMT series spectrometer

. Step 2 Select the Frequency scan measurement:

- Press [Mode] and select the test mode as [Spectrum].
- Press [Measurement] and select the [frequency scan] test function for the interface display as shown in Figure 5.8:

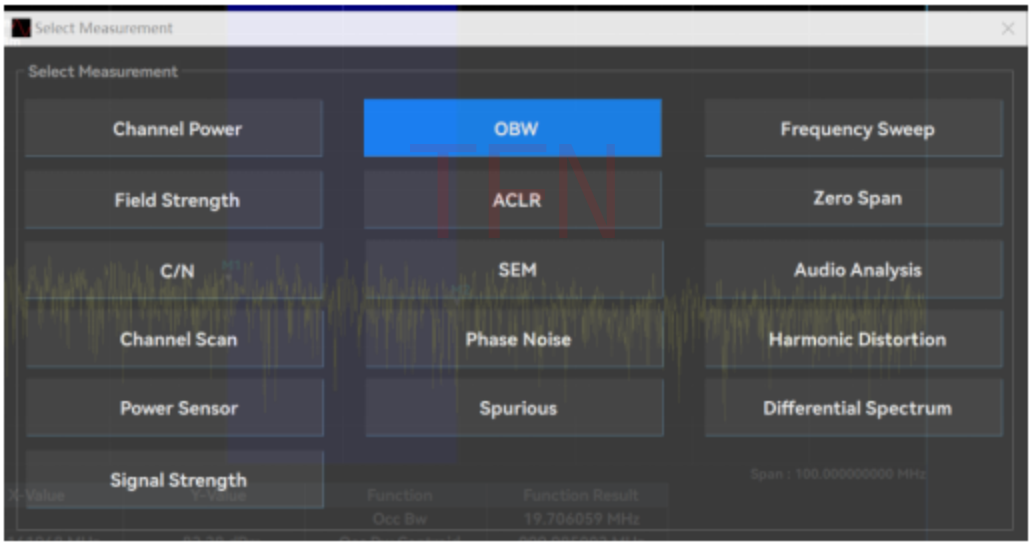


Figure 5.8 Select the measurement interface diagram

Step 3. Set the center frequency, bandwidth and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- Press [width] and [width manual] to set the bandwidth.
- Press [level setting] and [reference level] and set the reference level.

Step 4. Observe the measurement results of the frequency scan, as shown in Figure 5.9:

Figure 5.9 Measurement result Fig

5.4 Field-strength measurements

Field strength measurement is essential in the radiation intensity measurement of the tested equipment. The field frequency measurement can be divided, and the point frequency measurement at the current point by setting the point frequency rate; the list scanning measurement observes the field strength value of the list frequency point by calling the pre-edited or saved list.

5.4.1 Measurement configuration of the field strength

[Configuration List]: It contains two settings: antenna list and standard file.

a) Antenna list:

Select the field strength units, manually insert and delete the edit points, and configure the frequency point of the edit point and the antenna factor of the frequency point.

b) standard file:

You can import the made antenna factor file under the target path, and display the antenna list information in the file.

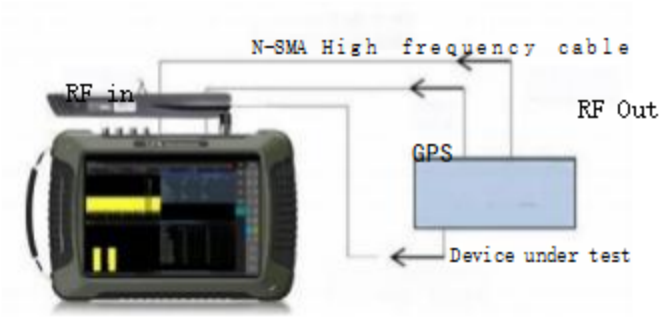
[Unit Type]: Set the type of the field strength unit.

[Standard file]: Import the antenna factor file.

[Field strength configuration]: contains the total configuration menu of the above measurement configuration.

5.4.2 Measurement steps

Step 1. Connect the omnidirectional antenna to the RF input port of the RMT series spectrometer, as shown in Figure 5.10:



.10 Fig. 5 The omnidirectional antenna connection of the monitoring receiver

. Step 2: Select the field strength measurement:

- Press [Mode] and select the test mode as [Spectrum].
- Press [Measurement], select [field strength] test function, and the interface displays as shown in Figure 51:.1

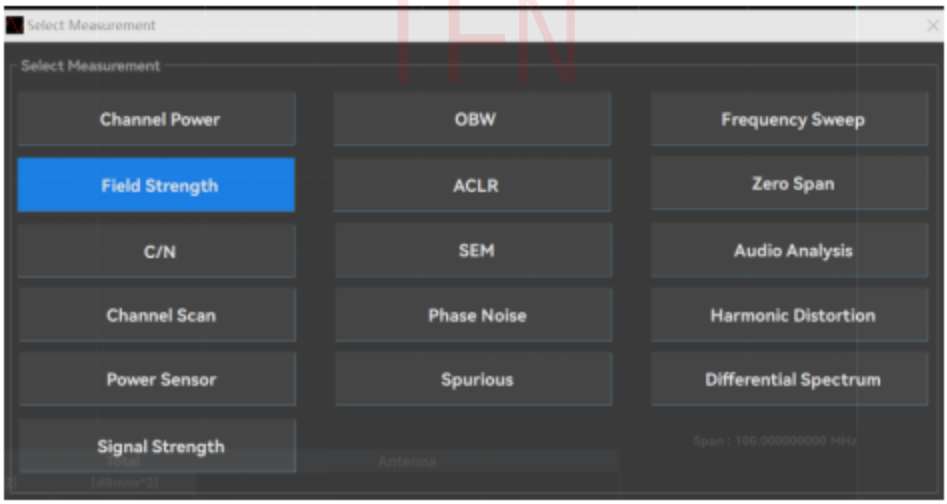


Figure 5.11 Select the measurement interface diagram

. Step 3 Set the center frequency and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- Press [level setting] and [reference level] and set the reference level.

. Step 4 Set the RMT series spectrometer marking point:

- Press [mark], add marks and set the frequency of mark points (up to 6 mark

points).

. Step 5. Field strength measurement configuration:

➢ Manually input the antenna factor of the marked point in [measurement configuration] and [antenna list], or select [standard file] to import the antenna factor standard file.

Step 6. Observe the test results: the field strength measurement results are shown in Figure 5.12:

Figure 5.12 Measurement result diagram

5.5 Neighbor-channel leakage inhibition ratio

The adjacent channel leakage suppression ratio is the ratio of the transmitting power of a channel and the radiation power that falls to the adjacent channel. It is usually expressed by the ratio of the power within the bandwidth to the total power of the channel specified at different frequency bias of the adjacent channel. The magnitude of the adjacent channel power depends mainly on the expansion of the tuned sideband and the noise of the transmitter.

In this section, the modulation signal with the transmission center frequency of 1GHz, power of-10 dBm and frequency width of 20 MHz is used as the input signal of the RMT series spectrometer to measure the adjacent channel leakage suppression ratio (ACLR) index for the broadband signal.

5.5.1 Measurement configuration of the leakage suppression ratio of the adjacent channel

[ACLR standard]: Set the template bandwidth of the signal.
[ACLR configuration]: Contains the common configuration and the channel settings.

a) [General configuration]: used to select the setting signal template, number of transmission channels, number of adjacent channels.
b) [Channel setting]: used to manually configure the bandwidth of the channel and adjacent channels.

5.5.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.13. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

Figure 5.13, Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Select the adjacent channel leakage suppression ratio measurement:

- Press [Mode] and select the test mode as [Spectrum].
- Press [measurement], select [adjacent channel leakage suppression ratio] test function, the interface display as shown in Figure 5.14:

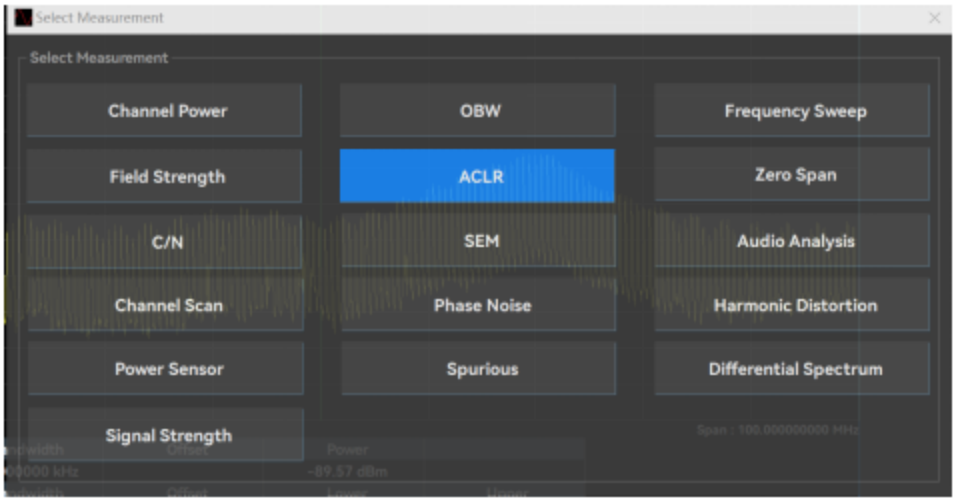


Figure 5.14 Select the measurement interface diagram

. Step 3 Set the center frequency and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].

- Press [level setting] and [reference level] and set the reference level.

Step 4. Observation results:

- Select EUTRA / LET 20M. Observation test results are shown in Figure 5.15:

.15Figure 5 measurement result Fig

5.6, with a zero-frequency width

The time domain of the signal can be observed through the zero frequency width mode, when the horizontal axis scale becomes time.

In this section, the device under test generates a 20 MHz bandwidth TDD signal as an input signal for the RMT series spectrometer to measure the zero frequency width indicator. Before use, it is recommended that the synchronous output (10 MHz) reference signal provided by the measured device is connected to the synchronous input of the RMT series spectrometer (10 MHz reference). The specific measurement steps are described as follows:

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.16. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

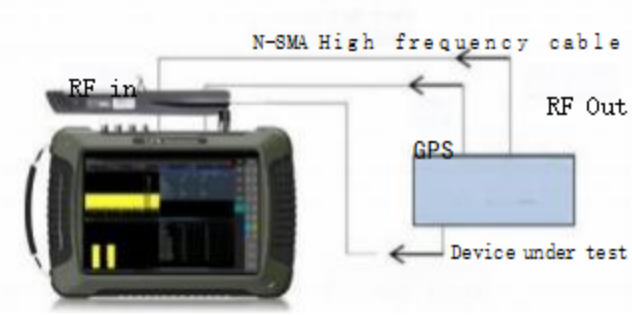
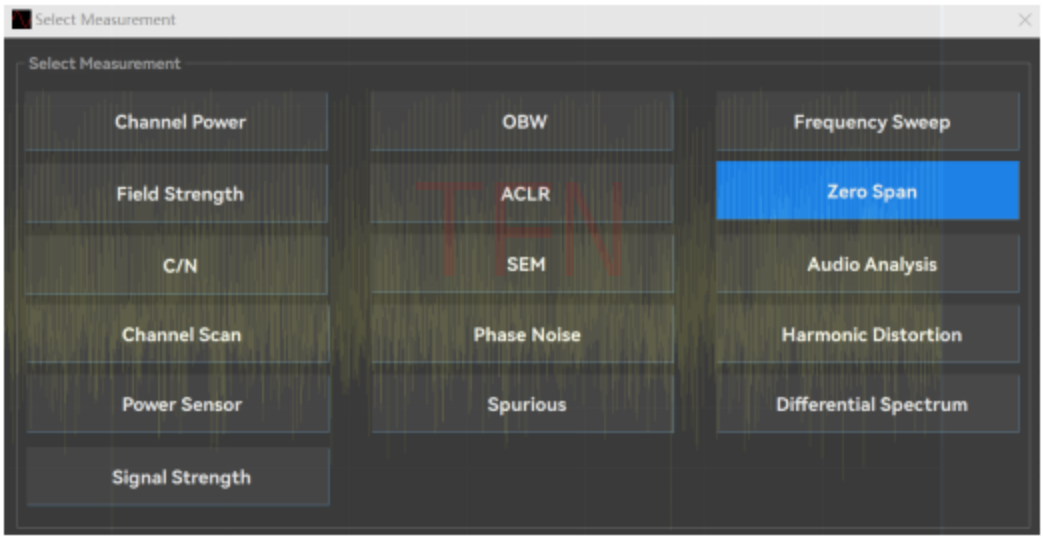


Figure 5.16 Schematic diagram of the tested equipment and RMT series spectrometer

. Step 2: Select the zero-frequency width measurement:

- Press [Mode] and select the test mode as [Spectrum].
- Select the [zero frequency width] test function by [measurement], and the interface displays as shown in Figure 5.17:



.17Figure 5 Select the measurement interface diagram

Step 3. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency] to set the reference center frequency.
- Press [level setting] and [reference level] and set the reference level.

Step 4. Observation, as shown in Figure 5.18:

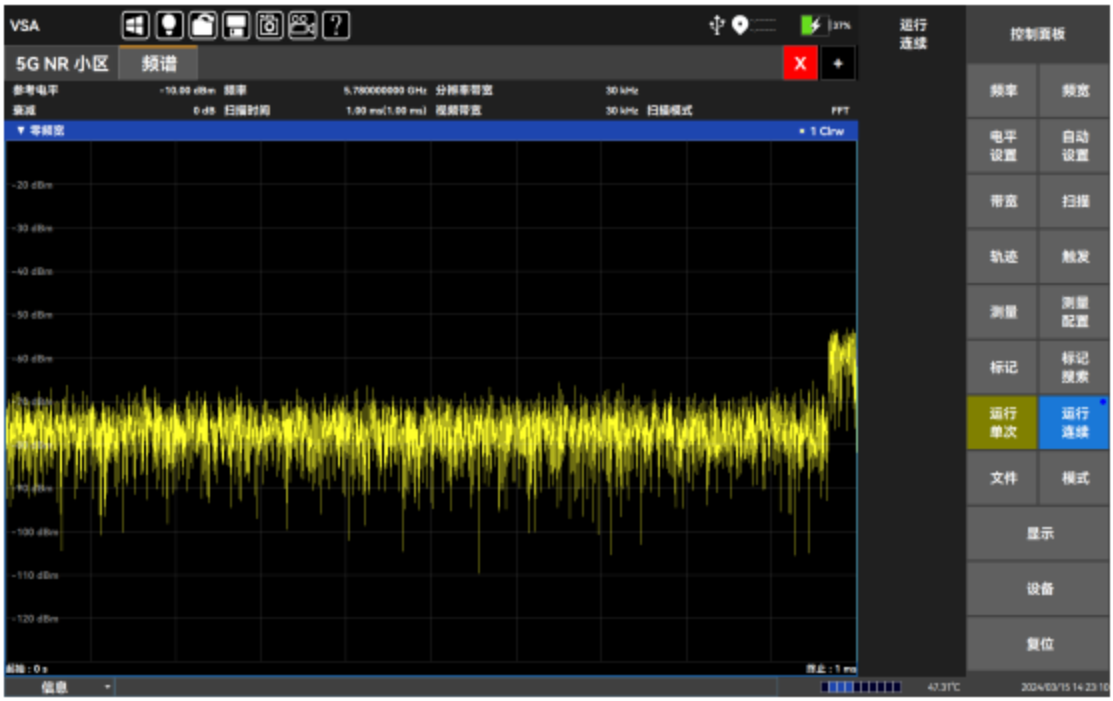


Figure 5.18 Measurement results

5.7, and the signal-to-noise ratio

SNR (CNR) is the ratio of measured carrier power to noise power, and is the standard measurement scale to mark the relationship between carrier and carrier noise. High SNR provides better network acceptance rate, better network communication quality, and better network reliability rate.

In this section, the modulation signal is 1GHz, power of-10 dBm and frequency width of 10 MHz.

5.7.1 Measurement configuration of signal to noise ratio

[NoR off / on]: switch of SNR measurement item.

[Carrier bandwidth]: Set the carrier bandwidth.

[Noise bandwidth]: Set the noise bandwidth.

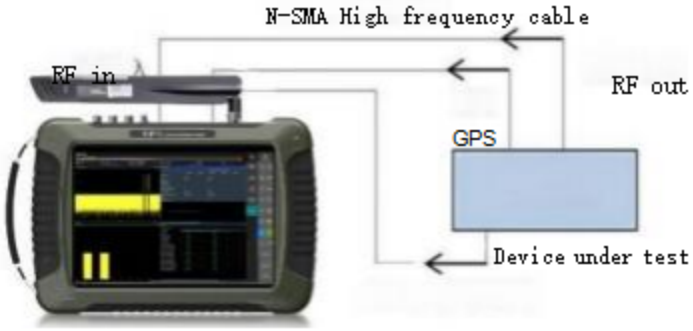
[Frequency offset]: Set the frequency offset.

[NoR configuration]: contains the total configuration menu of the above measurement configuration.

5.7.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.19. It is recommended to connect the

reference signal for optimizing the test index. Referring to section 3.2.2.



.19Figure 5 Schematic diagram of the tested equipment and RMT series spectrometer

. Step 2 Select [Signal to noise ratio] test function by [measurement], and the interface displays as shown in Figure 5.20:

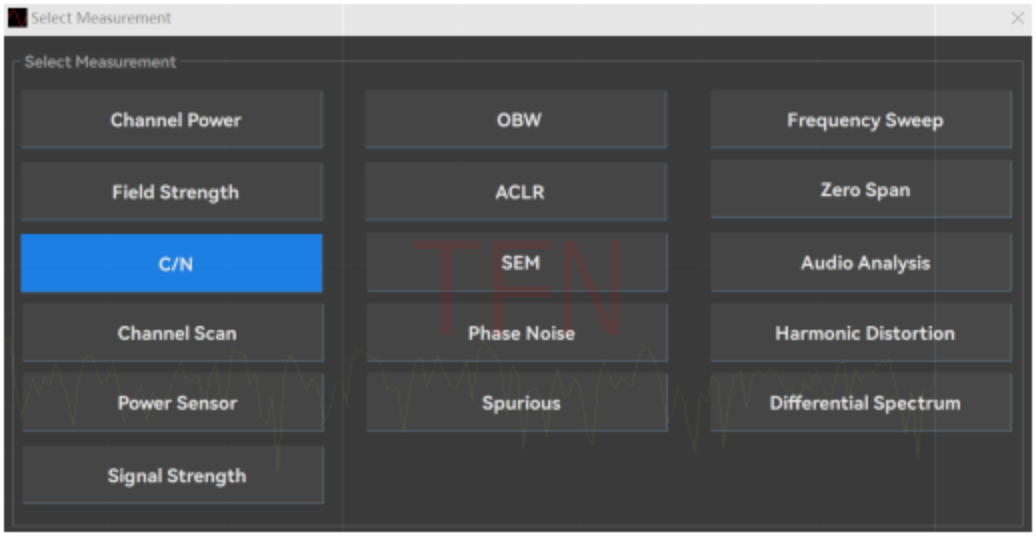


Figure 5.20 shows the interface

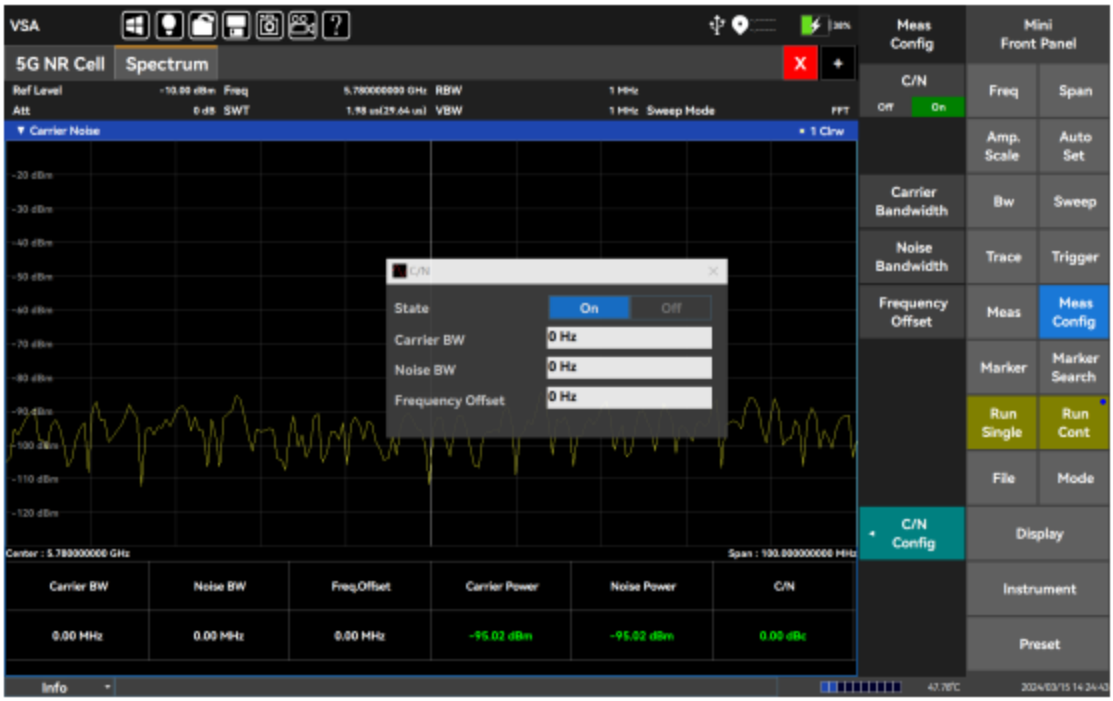
Step 3. Set the center frequency, frequency width, reference level, trajectory of RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- Press [width] and [width manual] to set the bandwidth.
- Press [level setting] and [reference level] and set the reference level.
- Press [Track] and set the mode of track 1 as: average.

Step 4. Observe the test results:

- According to [measurement configuration] and [noise ratio configuration], select the noise ratio and set the appropriate carrier bandwidth, noise bandwidth and

frequency offset. The results are shown in Figure 5.21:



.21Figure 5 measurement result Fig

5.8 Spectral emission template

The spectrum emission template function is to call the limit line as a template to measure whether the signal power is passed through the template limit, the template parameter is a limit line, assigned by calling the limit line value. The template can move to the left and right up and down according to the center frequency and the reference power.

In this section, the measured device generates an LTE signal with a central frequency point of 1GHz and a bandwidth of 20 MHz as the input signal of the RMT series spectrometer to measure the spectral emission template for analyzing the broadband signal.

5.8.1 Measurement configuration of the spectral emission template

[Configuration List]: It includes three submenus: scan list, reference range and standard file.

a) Scan list:

Use to manually configure template shapes, manually add and remove template bands, and edit.

b) reference ranges:

Include power reference type and channel power setting, power reference type includes channel power and peak power; channel power setting can set transmission bandwidth, RRC filter switch and filter factor.

c) standard file:

Read the spectral emission template of the standard template signal, including the common

5G and 4G template files.

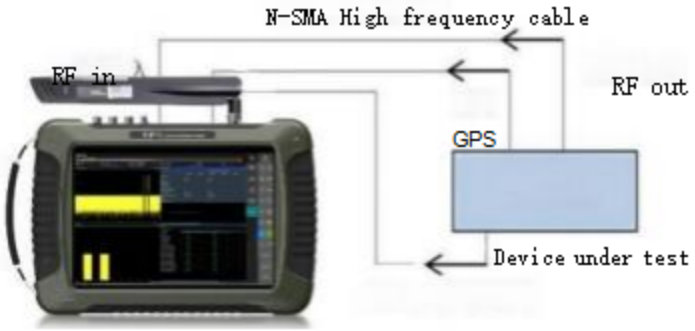
[Reference range]: Ditto

[Standard Document]: Ditto

[SEM Configuration]: The same configuration list as above.

5.8.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of RMT series spectrometer as shown in Figure 5.22. Section 3.2.2.



.22 Figure 5 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Press [mode] and select the test mode as [spectrum].

- Press [Measurement] to select the [Spectrum emission Template] test function, and the interface displays as shown in Figure 5.23.
- Set the center frequency by [frequency] and [center frequency].
- Press [level setting] and [reference level] and set the reference level.

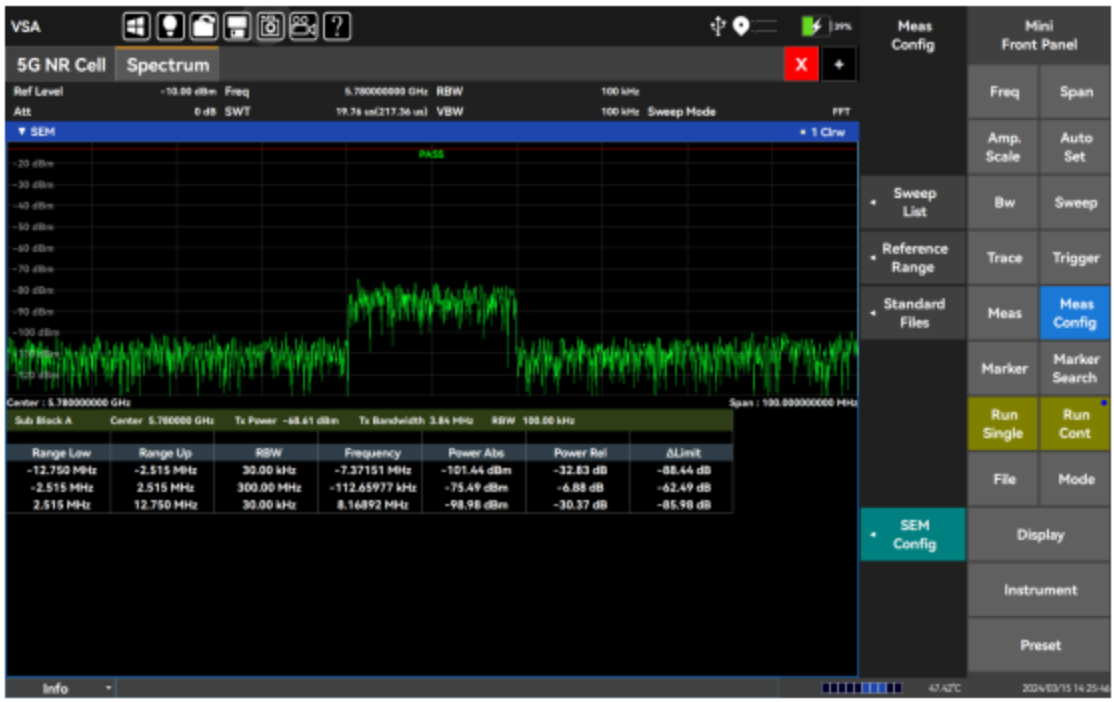


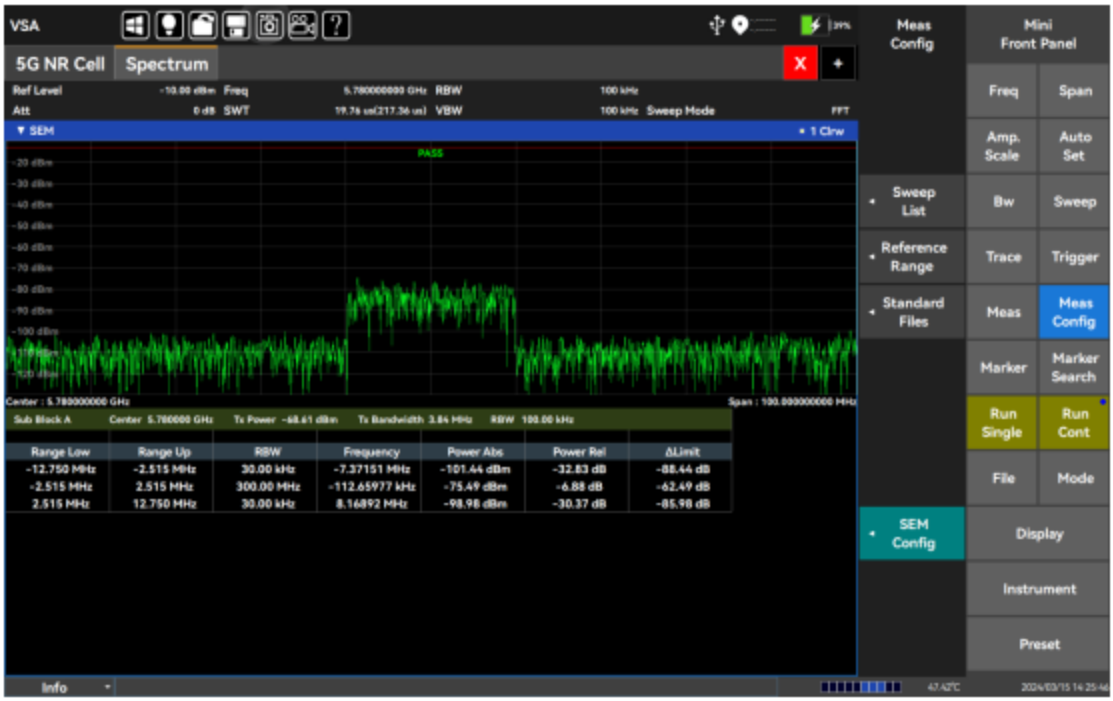
Figure 5.23 Select the measurement interface diagram

Step 3. Measurement of the spectral emission template:

- Call the spectrum emission template by [measurement configuration] and [standard file]: BW _ 20 _ 0 _ MHz.xml.

Step 4. Observe the test results:

- The test results are shown in Figure 5.24, the red line represents the standard spectrum template line, and the green line indicates the actual test spectrum. According to the difference, the spectrum template result is determined to be Pass or Fair.



.24Figure 5 measurement result Fig

5.9 Audio analysis

Audio analysis function can be used for radio monitoring, when the sound is poor, you can adjust the reference level to improve the sound effect, play through the headset.

This section takes the audio analysis of broadcast signal as an example, introduces the use method of the audio analysis and measurement function of RMT series spectrometer, and conducts the audio analysis and measurement of signals.

5.9.1 Measurement configuration for the audio analysis

[Mode]: It is used for selecting FM / AM.
[Sound]: For setting the volume size.

5.9.2 Measurement steps

Step 1. Connect the RF input port of the RMT series spectrometer to the omnidirectional antenna, as shown in Figure 5.25:

.25 Figure 5 Schematic diagram of the audio analysis and measurement connection

. Step 2 Press [Mode] and select the test mode as [Spectrum].

- Select [Audio Analysis] test function by [Measurement], and the interface displays as shown in Figure 5.26:

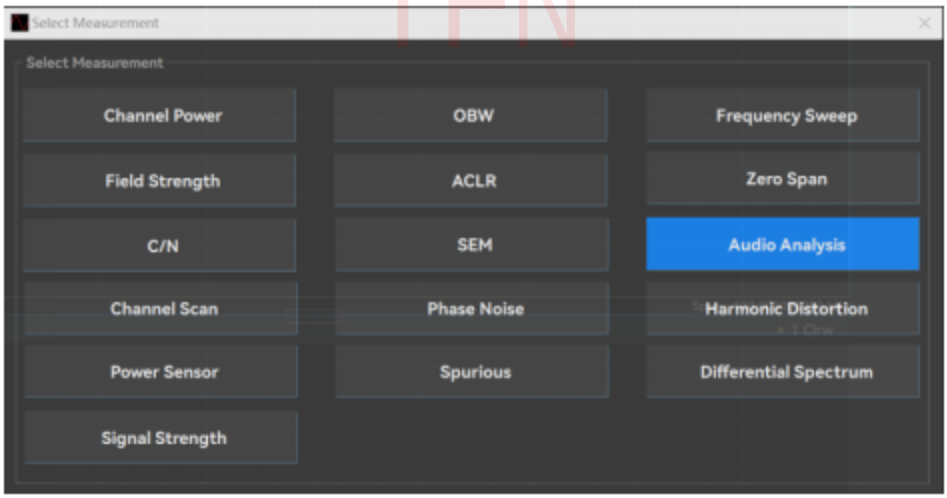


Figure 5.26 Select the measurement interface diagram

Step 3. Select mode [FM] by [measurement configuration], set center frequency 90.8MHz by [frequency] and [center frequency], and can hear local broadcast signal. The test results are shown in Figure 5.27:

Figure 5.27 Measurement result Fig

5.10, and the channel scan

Channel scanning is used to achieve signal power measurements of multiple channels or frequencies. In this section, an omnidirectional antenna is used, as an input signal for the RMT series spectrometer, to measure the channel scan.

5.10.1 Measurement configuration of the channel scan

[Channel scanning configuration]: Select the signal standards, including GSM and UMTS signals, and configure the starting channel, channel bandwidth, channel step, channel number and other parameters.

[Frequency scanning configuration]: Set the starting frequency, frequency step, bandwidth, and number of channels.

[List scanning configuration]: Set the frequency and channel bandwidth of list scanning to realize the continuous scanning measurement of multiple frequency bands.

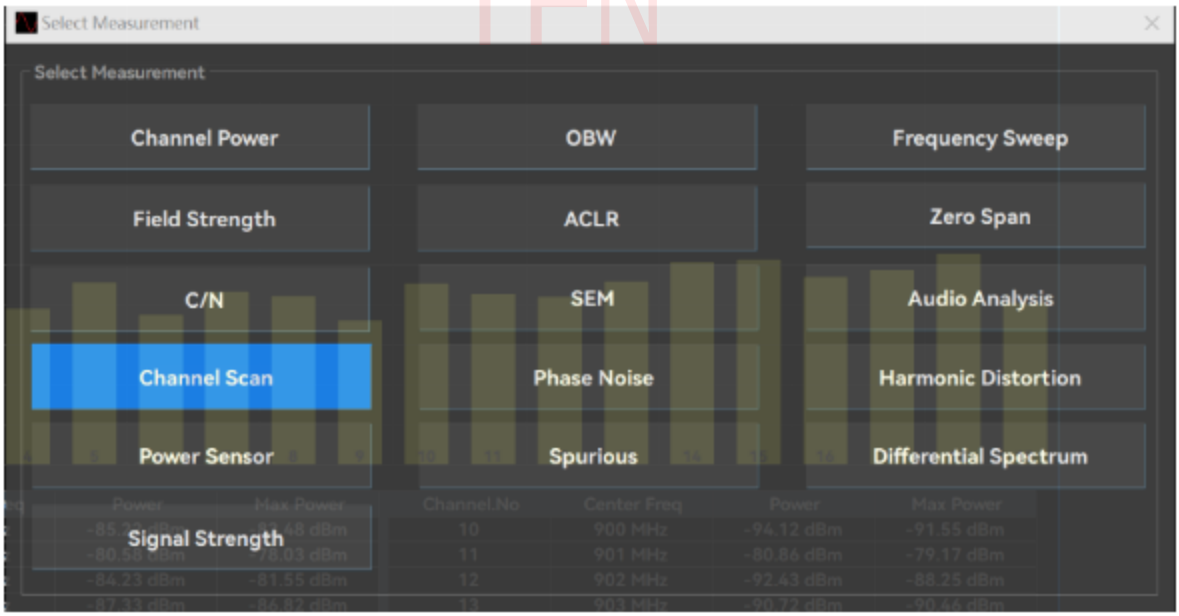
5.10.2 Measurement steps

Step 1. Connect the RF input port of the RMT series spectrometer to the omnidirectional antenna, as shown in Figure 5.28:

.2 Figure 58. Schematic diagram of the channel scan connection

. Step 2 Press [Mode] and select the measurement mode as [Spectrum].

- Select [Channel Scan] test function by [Measurement], and the interface displays as shown in Figure 5.29:



.2 Figure Figure 59 Select the measurement interface diagram

Step 4. Press [Measurement Configuration] and [Channel Scan Configuration] to select the channel standard.

Step 5. Set the parameters of starting frequency, frequency step, bandwidth and channel number according to [measurement configuration] and [frequency scanning

configuration]. The interface is displayed as shown in Figure 5.30:

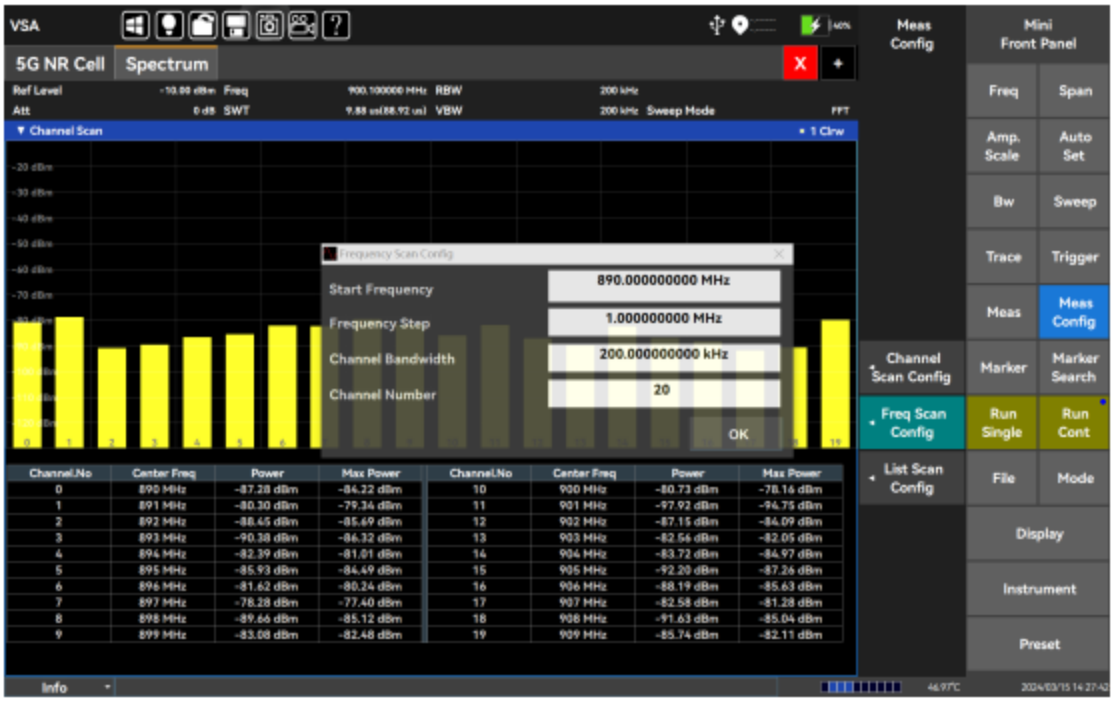


Figure 5.30 Measurement results

5.11, and the phase noise

The oscillator of the RMT series spectrometer converts the input signals of different frequencies to the middle frequency, and the phase noise represents the phase

The relative value of noise power and carrier power in the equivalent noise bandwidth of a carrier is commonly expressed in dBc / Hz.

Taking the phase noise of the single signal as an example, introduce the use of the phase noise measurement function of RMT series spectrometer, and measure the phase noise of the signal.

5.11.1 Measurement configuration of the phase noise

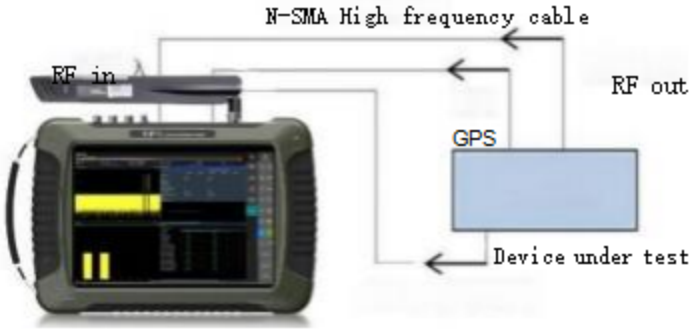
[Single point noise / multipoint noise]: used to select single point noise and multipoint noise mode.

5.11.2 Measurement steps

In this section, the single-tone signal with the center frequency of 1GHz and the power of-30 dBm is used as the input signal of the RMT series spectrometer to measure the phase noise index of the analysis signal. The following steps can be taken:

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.31. It is recommended to connect the

reference signal for optimizing the test index. Referring to section 3.2.2.



.31 Figure 5 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Press [mode] and select the test mode as [spectrum].

Step 3. Press [Measurement] to select [Phase Noise], and the interface displays as shown in Figure 5.32:

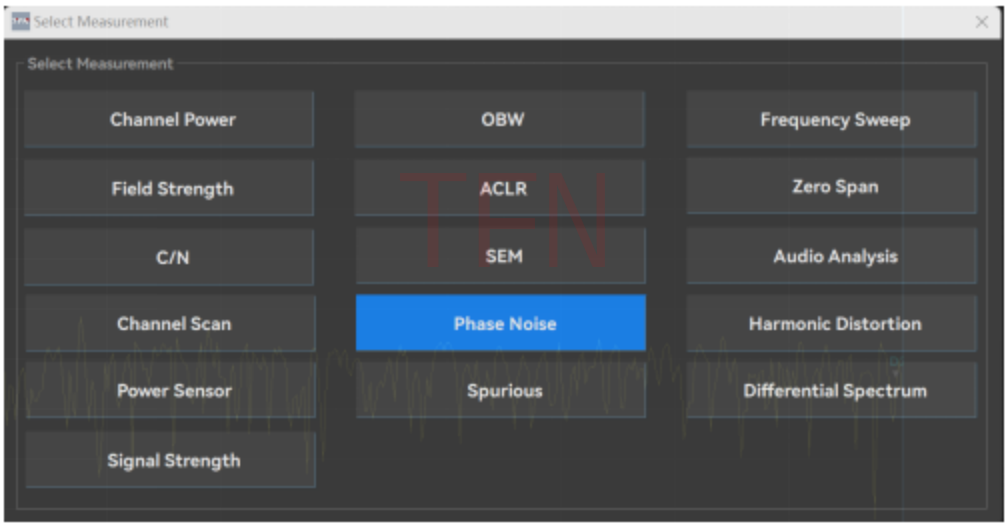


Figure 5.32 Select the measurement interface diagram

Step 4. Set the frequency, bandwidth and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], and set the center frequency to 1GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.
- Press [bandwidth] and [bandwidth manual] and set the bandwidth to 3 MHz.

Step 5. Measure the phase noise:

- Press [mark search] and [peak] and set M1 to the maximum peak.
- Press [mark], [mark 2], [mark type], set D2 as difference mode.

➢ Press [Mark 2] to set the offset: 1 MHz.

. Step 6 Observation results: Phase noise test results are shown in Figure 5.33:

Figure 5.33 Measurement result Fig

5.12, and the harmonic distortion

Set the base wave frequency and set the harmonic times. After the RMT series spectrometer measures the base wave according to the current parameters, measure the harmonics for each effective range table and set the center frequency as the frequency of the range table.

This section measures the harmonic distortion of the single tone signal, and introduces the use of the harmonic distortion measurement function of RMT series spectrometer to measure the harmonic distortion of the signal.

5.12.1 Harmonic distortion measurement configuration

[Basic frequency]: Set the base wave frequency point.

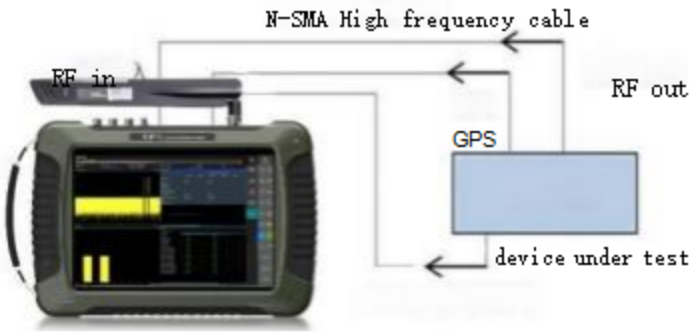
[Number of harmonics]: Set the number of harmonics.

[Harmonic configuration]: General configuration menu containing the above measurement configuration.

5.12.2 Measurement steps

In this section, the tested device is used to generate the input signal of the RMT series spectrometer to measure the harmonic distortion index of the analytical signal.

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.34. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.



.34 Figure 5 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Press [mode] and select the measurement mode as [spectrum].

Step 3. Press [measurement] to select [harmonic distortion], the interface display as shown in Figure 5.35:

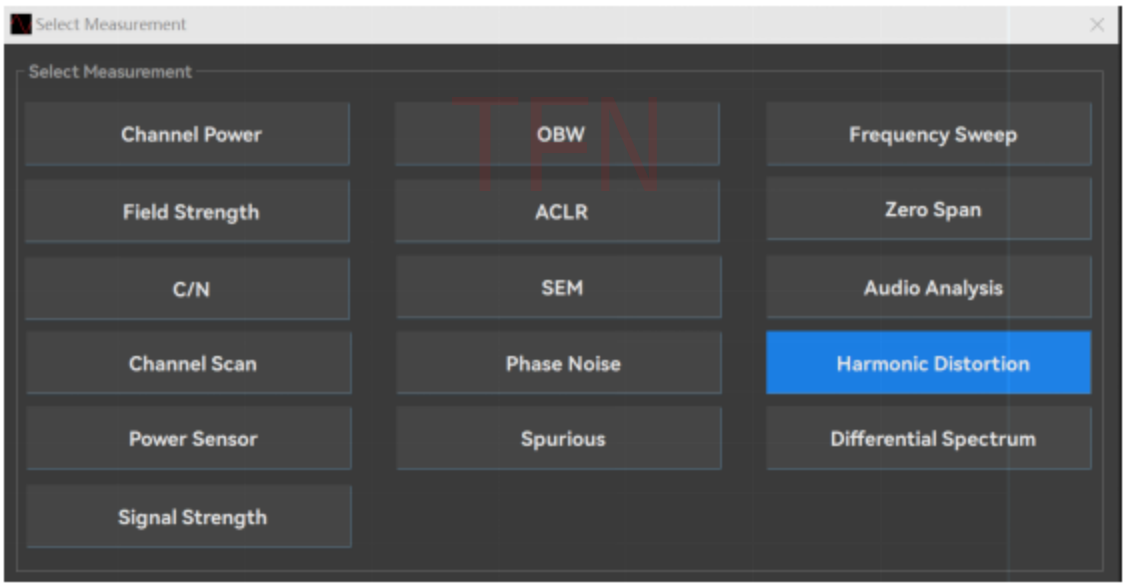


Figure 5.35 Select the measurement interface diagram

Step 4. Set the basic frequency by [measurement configuration] and [basic frequency], and set the number of harmonics measured to 3. The observation results are shown in Figure 5.36:

Figure 5.36 Measurement result Fig

5.13 Power sensor

The RMT series spectrometer connects the power sensor through the USB interface, which can read and display the measurement value of the power sensor.

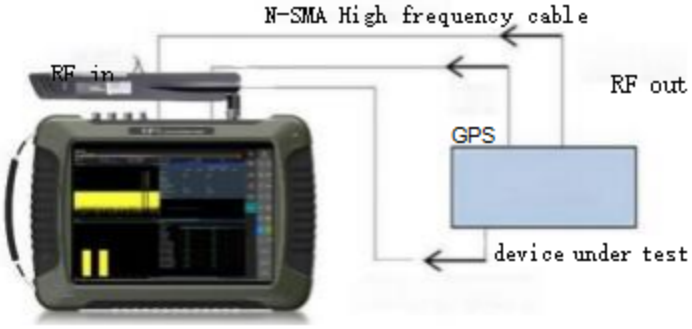
5.13.1 Measurement configuration of the power sensor

[Power sensor on / off]: the switch of the power sensor function.
[Parameter configuration]: Select the device name of the power sensor.

5.13.2 Measurement steps

To better measure the power sensor function, several steps can be taken:

Step 1. Connect the USB interface of the power sensor to the USB interface of the upper panel of the RMT series spectrometer as shown in Fig. 5.37. Section 3.2.



.37 Figure 5 Schematic diagram of the connection between the power sensor and the RMT series spectrometer

Step 2., press [mode], select the measurement mode as [Spectrum].

- Press [measurement] and [power sensor], the interface is displayed as shown in Figure 5.38:

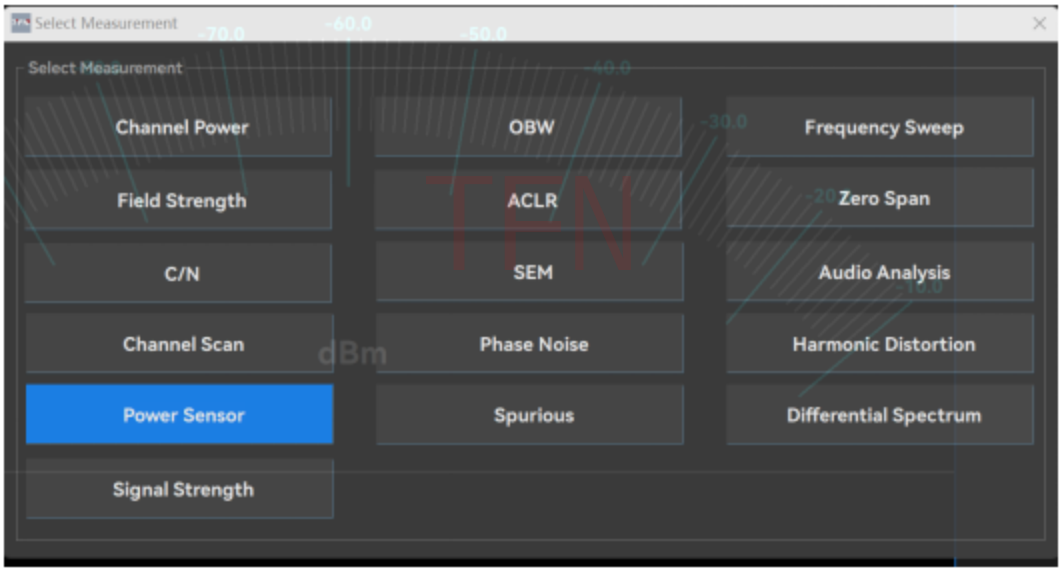
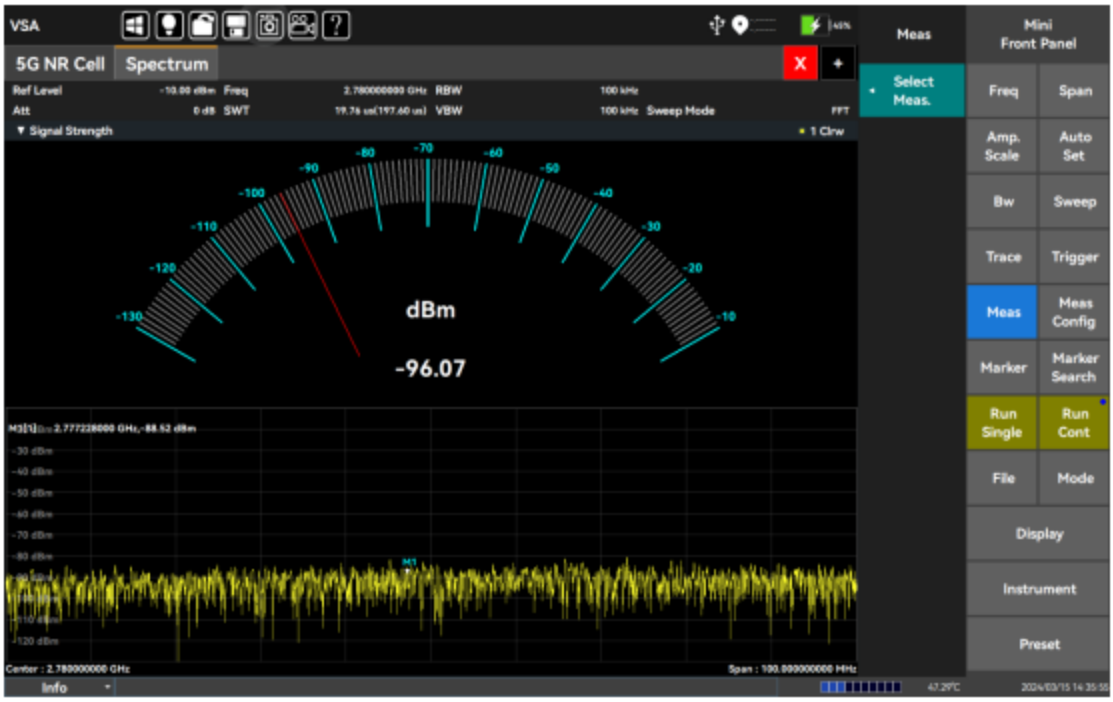


Figure 5.38 Select the measurement interface diagram

Step 3. Press [Measurement Configuration], select [power sensor] to open, press [Parameter Configuration], and select "Ceyear-8723X" to display the measured value of the power sensor.

. Step 4 Observation results: The measurement results are shown in Figure 5.39:



.39Figure 5 Power sensor measurement results diagram

5.14 Strious dispersion

The stray function is mainly used to measure the parasitism, harmonics and intermodulation of signals. In practice, the stray emission should be guaranteed at a low power level, preferably close to the background noise, so as not to cause interference to the communication in other frequency bands.

In this section, the method of RMT spectrometer.

5.14.1 Measurement configuration of measurement configuration

[Scope]: Up to 10 frequency bands can be set according to the test stray frequency band.

[Start]: Set the starting frequency of the current test frequency band.

[Deadline]: Set the cut-off frequency for the current test band.

[Start limit]: Set the start threshold power for the current test band.

[Peak limit]: Set the termination threshold power for the current test band.

[Attenuation]: Set the attenuator value.

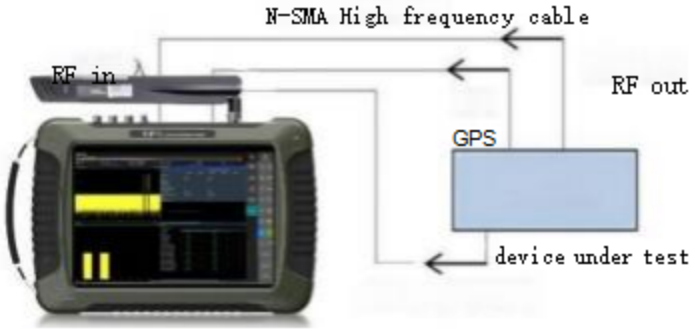
[Miscellaneous configuration]: including the above measurement configuration and the total configuration menu of RBW and VBW, the cyclic measurement stray configuration can be set.

5.14.2 Measurement steps

In order to better observe the impurity of signals, several steps can be taken:

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 5.40. It is recommended to connect the

reference signal for optimizing the test index. Referring to section 3.2.2.



.40 Figure 5 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Press [mode] and select the test mode as [spectrum].

- By [measurement] and [stray], the interface is displayed as shown in Figure 5.41:

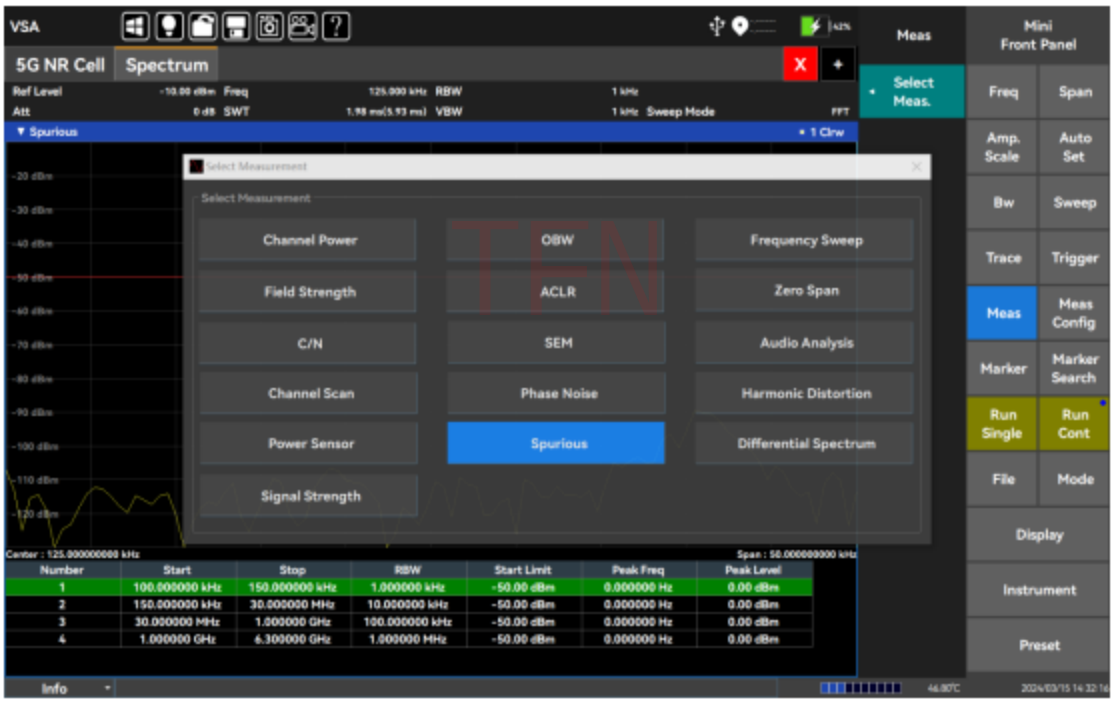


Figure 5.41 Select the measurement interface diagram

Step 3. Set the range, start frequency, termination frequency, start limit, peak limit, attenuation, RBW, VBW according to [measurement configuration] and [stray configuration]. Press [range], set stray range, other parameters are default value, then select loop.

. Step 4 Observe the test results as shown in Figure 5.42. You can see the peak power and the corresponding frequency points in the 100kHz~150kHz, 150kHz~30MHz, 30MHz~1GH, 1GHz~6.3GHz frequency band.

Figure 5.42 Measurement result Fig

5.15, and the differential frequency spectrum

Differential frequency spectrum is calculated by saving a set of frequency spectrum trace map as a template and working with the trace data of the current frequency spectrum to obtain the differential frequency spectrum map, which is used to eliminate the influence of background noise on the signal and record the change of frequency spectrum.

This section introduces the use method of the differential frequency spectrum measurement function of RMT series spectrometers to conduct the differential frequency spectrum measurement of signals.

5.15.1 Measurement configuration of the differential frequency spectrum

[Refresh template]: control the template refresh switch, save the current spectrum trace data as a template after opening it, and do the differential frequency spectrum after closing it.

[Threshold]: It is used to set the display range of the differential frequency spectrum.

[Configuration]: General configuration menu containing the above measurement configuration.

5.15.2 Measurement steps

Step 1. Connect the omnidirectional antenna to the RMT Series Specmeter RF input port, as shown in Figure 5.43:

.43 Fig. 5 The omnidirectional antenna connection of the monitoring receiver

Step 2., press [mode], select the measurement mode as [Spectrum].

- Press [measure] and select [differential frequency spectrum], as shown in Figure 5.44.

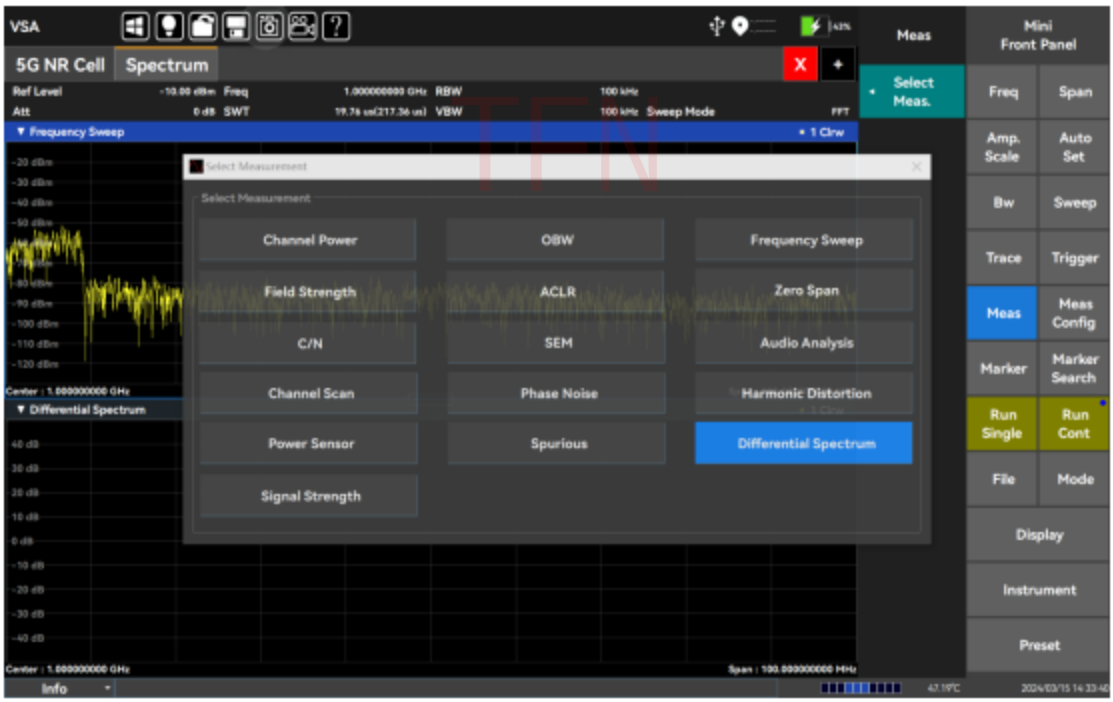


Figure 5.44 Select the measurement interface diagram

Step 3. Set the center frequency, bandwidth and reference level of the RMT series spectrometer:

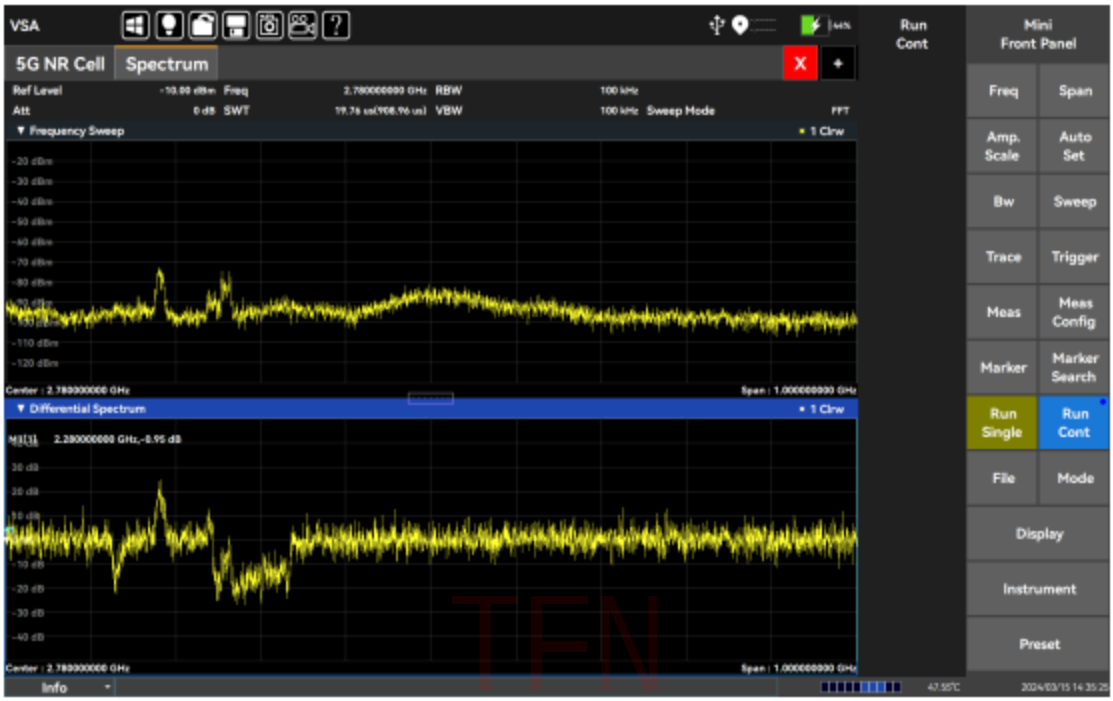
- Set the center frequency by [frequency] and [center frequency].
- Press [width] and [width manual] to set the bandwidth.
- Press [level setting] and [reference level] and set the reference level.

5.15, and the differential frequency spectrum

Step 4. Measure the differential frequency spectrum:

- Press [Refresh Template] on to save the current spectrum track.
- Press [Refresh template] off to obtain the difference frequency spectrum.

Step 5. Test results are shown in Figure 5.45:



.45 Figure 5 Differential frequency spectrum, the measured result Fig

5.16, and the signal intensity

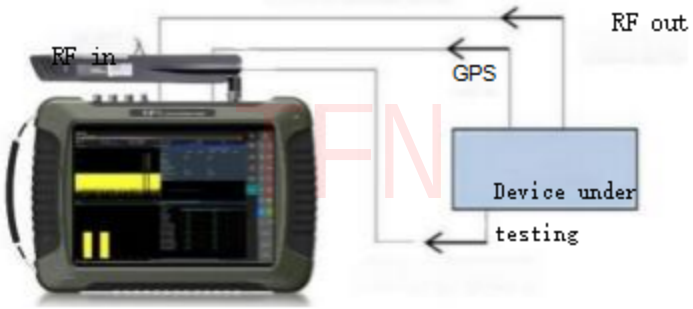
Signal intensity is the power value of the mark point is represented by the instrument panel and sound. Taking measuring the signal intensity of monotone signal as an example, we introduce the use method of RMT series spectrometer for signal intensity measurement.

5.16.1 Measurement configuration of the signal intensity

[Sound]: Turn on the sound switch under the measurement configuration, indicating the change of the signal intensity of the marked frequency point.

5.16.2 Measurement steps

Step 1. Connect the signal output port of the device under test to the RF input port of RMT series spectrometer as shown in Figure 5.46. refer to section 3.2.2.



.4 Figure 56 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2., press [mode], select the measurement mode as [Spectrum].

- Press [measure] and select [signal strength], and the interface is displayed as shown in Figure 57..4

5.16, and the signal intensity

.4Figure Figure 57 Select the measurement interface diagram

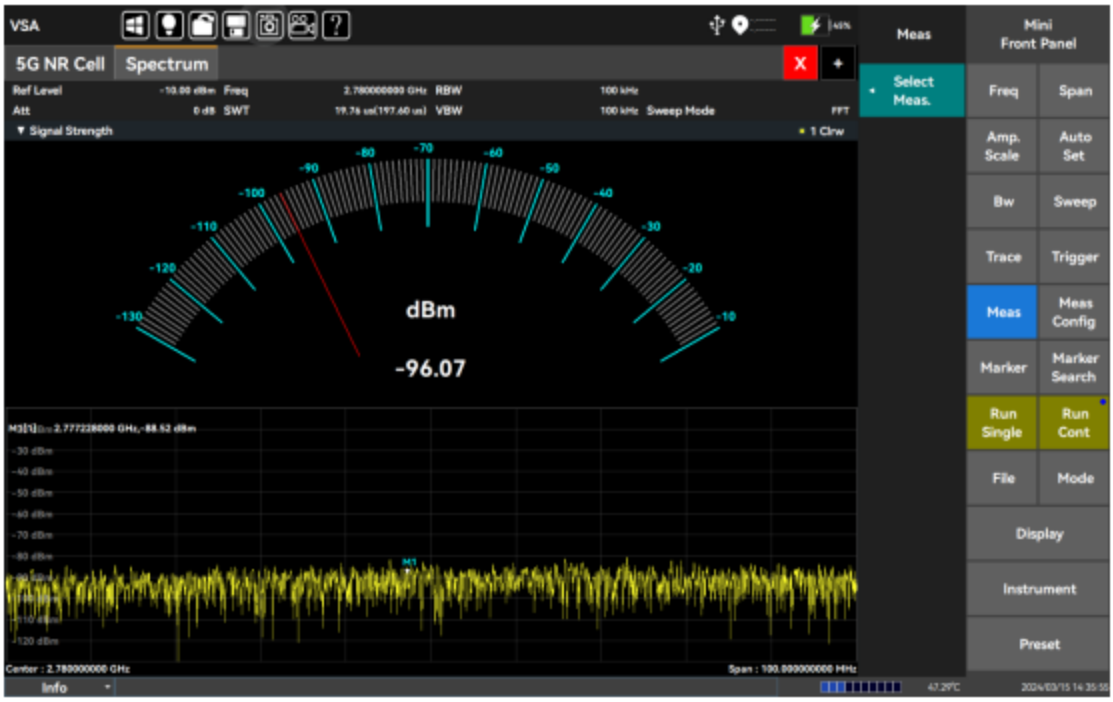
. Step 3 Set the center frequency, bandwidth, and reference level of the RMT series spectrometer:

- Set the center frequency by [frequency] and [center frequency].
- Set the bandwidth by pressing [bandwidth] and [bandwidth manual].
- Set the reference level by [level setting] and [reference level].

Step 4. Observation results:

- Press [measurement configuration] and [sound], select open, and observe the test results as shown in Figure 58:.4

5.16, and the signal intensity



.4Figure 58 Results of signal intensity measurements

6 Real-time spectrum mode

The real-time spectrum measurement mode is the extension of the spectrum measurement mode. The real-time spectrum measurement mode of the RMT series spectrum instrument is mainly to capture and analyze the transient signals and burst signals. This function can help users to solve the measurement problems of various transient signals.

Afterglow map and waterfall map are the most important functions in the real-time spectrum analysis mode. The three-dimensional map formed can allow users to easily observe according to the frequency of collected statistics and display of special measurements, which is a display interface with large information.

6.1 Afterlight map measurement

The afterglow diagram shows the probability of a certain spectrum at a fixed time. In the spectrum display region, the horizontal axis represents the frequency, the vertical axis represents the amplitude, the color represents the probability of signal occurrence, red represents the spectrum occurrence probability of 100%, blue represents the probability of 0, the color gradient from red to blue decreases according to the graph probability level. View the 3 D information in the image. Through real-time spectrum mode afterglow diagram, can be the frequency and amplitude of corresponding position density to demonstrate, color expression of the probability of the signal, we can through the difference of color, it is easy to see hidden from the afterglow diagram in strong signal under the weak signal, can be more intuitive and specific display signal change trend and frequency, monotone signal afterglow diagram as shown in figure 6.1:

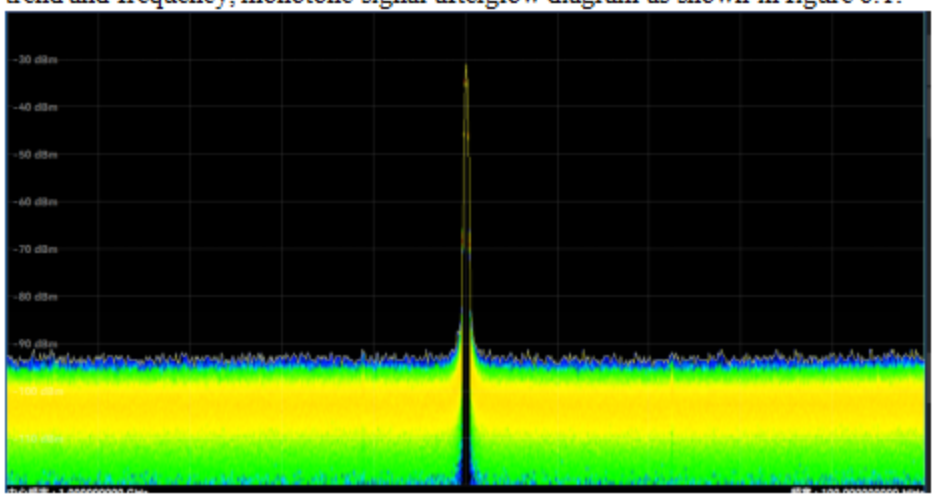


Figure 6.1 The afterglow diagram shows it

6.1.1 Measurement configuration of the afterglow diagram

Afterglow off / on: control the switch of the afterglow diagram.

Upper probability limit: upper probability limit percentage setting.

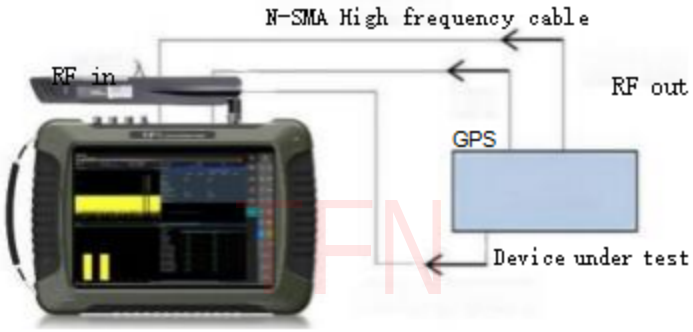
Lower limit of probability: lower limit of probability percentage set.

Probability upper and lower probability configuration: contains a list of upper and lower probability percentage configurations.

6.1.2 Measurement steps

To better observe the afterglow map of the signals, the following steps can be taken:

Step 1. Use the measured equipment to generate 20 MHz broadband signal at 1GHz frequency point as the input signal of RMT series spectrometer to measure the afterglow map function. As shown in Figure Figure 6.2:



.2Figure 6 Schematic connection of the tested equipment with RMT series spectrometer

. Step 2 Select the test mode of the RMT series spectrometer as the afterglow diagram:

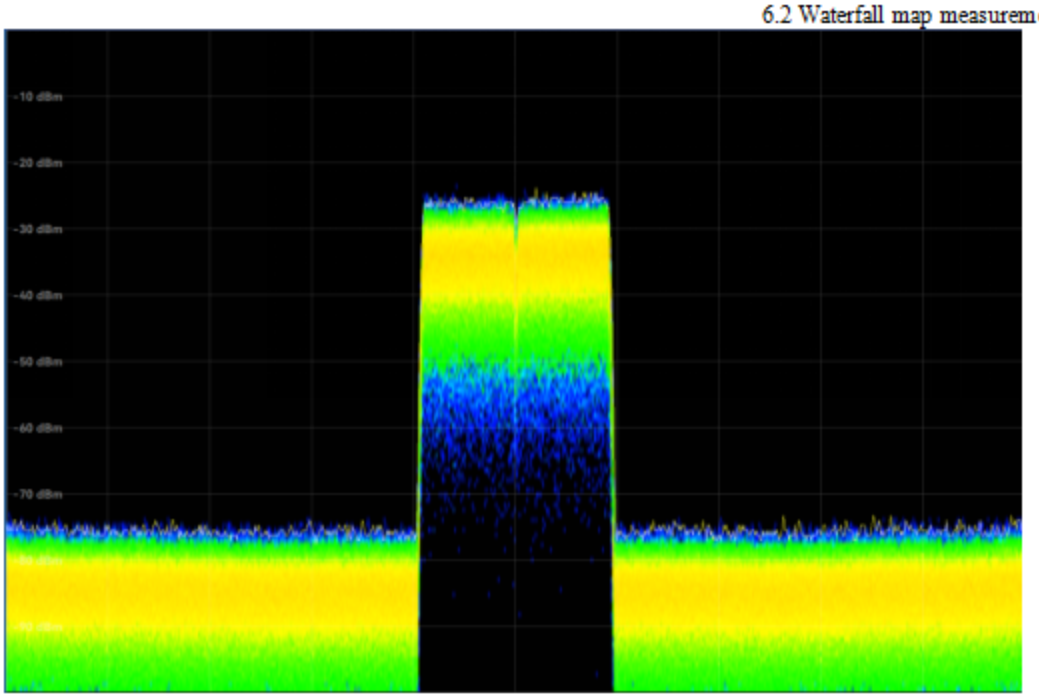
- **Press the [mode], [real-time spectrum].**
- According to [measurement], [afterglow diagram].

. Step 3 Set the center frequency, bandwidth, and reference level of the RMT series spectrometer:

- Press [frequency], [center frequency] to set the frequency.
- Press [level setting] and [reference level] to set the reference level.
- **Press the [bandwidth] and [bandwidth manual] to set the bandwidth.**

. Step 4. Observation results:

- The observed real-time spectrum afterglow map is shown in Figure 6.3:



.3Figure 6 The afterglow diagram shows the results

6.2 Waterfall map measurement

The waterfall diagram shows the results of all spectrum over time and seamlessly displays the spectrum in real time. The horizontal axis represents the frequency, the vertical axis represents the time, the color represents the amplitude, the waterfall chart rolls up continuously, and the latest spectrum data is always displayed at the bottom of the waterfall map.

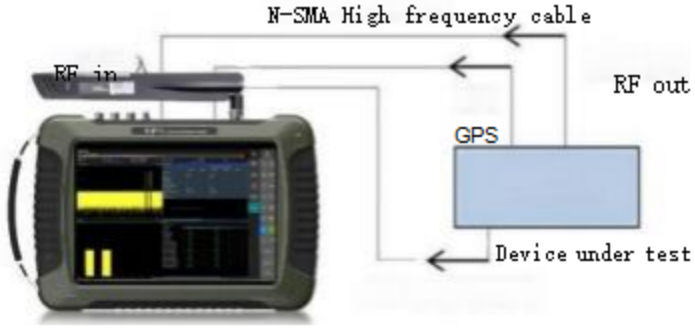
6.2.1 Measurement configuration of the waterfall diagram

Waterfall map: the switch of the waterfall map function.
Save the waterfall map: save the currently measured waterfall map.
Read the waterfall map: Read the waterfall map stored in the specified directory.

6.2.2 Measurement steps

To better observe the waterfall map of the signal, several steps can be taken:

Step 1. Connect the signal output port of the device under test to the RF input port of the RMT series spectrometer, as shown in Figure 6.4:



.4Figure 6 Schematic connection of the tested equipment with RMT series spectrometer

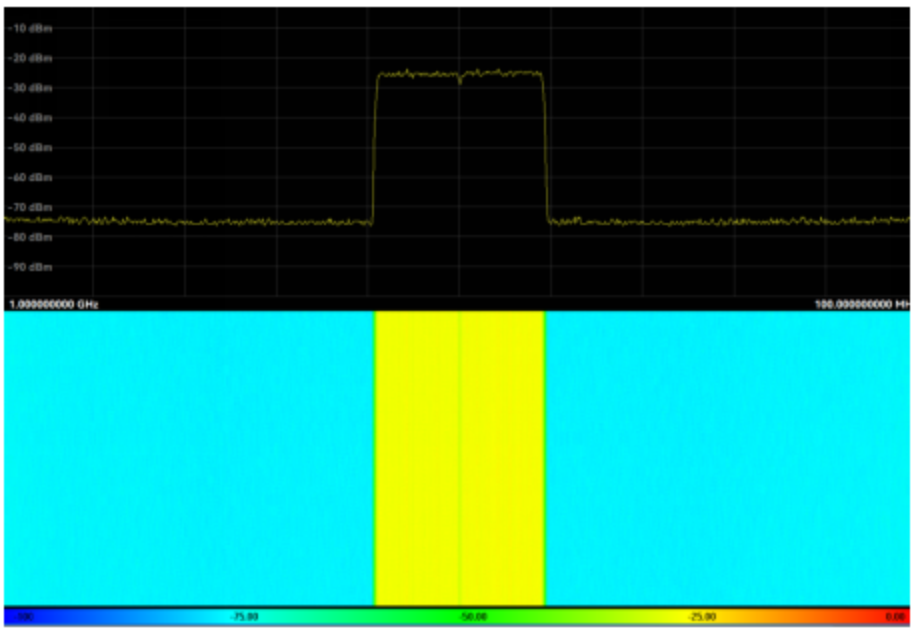
Step 2 Select the test mode for the RMT series spectrometer as the waterfall diagram:

- **Press the [mode], [real-time spectrum].**
- Press the [measurement], [waterfall diagram].

. Step 3 Set the center frequency, bandwidth, and reference level of the RMT series spectrometer:

- Press [frequency], [center frequency] to set the frequency.
- Press [level setting] and [reference level] to set the reference level.
- **Press the [bandwidth] and [bandwidth manual] to set the bandwidth.**

. Step 4 Observation results: Real-time spectrum waterfall map is shown in Figure 6.5:



.5Figure 6 The Waterfall diagram shows the results

7 Interference mode

The interference mode of RMT series spectrometer can be used for troubleshooting test of interference signals. The interference mode includes afterglow map measurement, signal intensity measurement, waterfall map measurement, outdoor map measurement, RSSI measurement, indoor map measurement, time gate measurement, 5G interference measurement, signal ID measurement, 4G interference measurement, etc.

7.1 Afterlight map measurement

The afterglow diagram shows the probability of a spectrum at a fixed time. In the spectrum display region, the horizontal axis represents the frequency, the vertical axis represents the amplitude, the color represents the probability of signal occurrence, red represents the spectrum occurrence probability of 100%, blue represents the probability of 0, the color gradient from red to blue decreases according to the graph probability level. After opening the parameter setting of the measurement configuration of the afterglow chart, you can quickly select different public network frequency bands and measure the signal afterglow diagram of this frequency band.

7.1.1 Afterglow map measurement configuration

[afterglow on / off]: open the switch of afterglow diagram.

[Parameter setting]: It is used to quickly select the mode and frequency band of the signal to be measured.

[Upper limit of probability]: Set red represents the probability of signal occurrence, for example, set to 50%, when the probability of signal occurrence reaches 50%, display as red.

[Lower limit of probability]: Set the blue color represents the probability of signal occurrence.

[Probability upper and lower limit configuration]: including upper and lower limit settings.

7.1.2, afterglow map measurement

The main operation steps of the afterglow chart measurement are as follows:

Step 1. Connect the handheld DF antenna to the RF input port of the RMT series spectrometer, as shown in Figure 7.1:

Figure 7.1 Schematic connection of hand-held DF antenna with RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

Step 3. Select the measurement item of the interference mode as the afterglow:

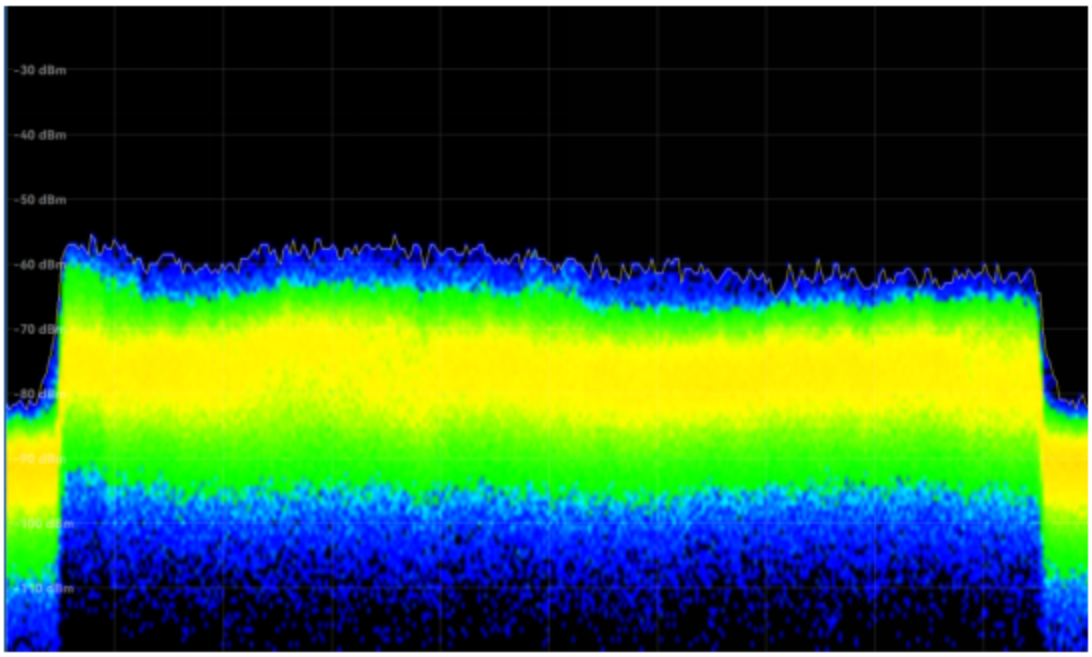
- According to [measurement], [afterglow].

. Step 4 Quickly select the pending signal mode and frequency band:

- Press [Measurement Configuration] and [Parameter Settings] to open the parameter setting menu.
- Press [FDC] and select mobile FDD: FDD 1800M Down in the parameter setting interface, as shown in Figure 7.2:

7.2, parameter setting interface of afterglow diagram

Step 5. Observe the interference pattern, and the afterglow diagram is shown in Figure 7.3:



.3Figure 7 The afterglow diagram shows the results

7.2 Signal intensity measurement

RMT series spectrometer with handheld direction finding antenna can measure the strength of signals in different directions.

7.2.1 Signal intensity measurement configuration

[Measurement state stop / start]: Turn on the switch of signal intensity measurement and mark the longitude and longitude of the current position in the map.

[Remove the current tag]: Delete the current tag.

[Delete all tags]: Delete all tags.

7.2.2 Signal intensity measurement

The main operating steps for the signal intensity measurement are as follows:

Connect the handheld direction finding antenna to the RF input port of the RMT series spectrometer and connect the GPS antenna. Select the 5G public network signal with the center frequency of 3.50976GHz and test after successful GPS synchronization. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RF input port of the RMT series spectrometer, as shown in Figure 7.4:

Figure 7.4 Schematic diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the RMT series spectrometer test mode as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the interference mode as signal intensity:

- **According to [measurement] and [signal intensity].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-30 dBm.

. Step 5 Select the measurement state as the start:

- Press [measurement configuration], [measurement state], select [start], Marker1 appears in the upper right corner of the map.
- Select [stop], move a distance to select [start], Marker2 appears in the upper right corner of the map.
- Select [stop], move a distance to select [start], Marker3 appears in the upper right corner of the map.
- Select [stop], and the three-point positioning algorithm will automatically locate the signal source location to the current signal, and mark it in the map.

. Step 6. Observation results:

- The measurements of the signal intensity of the observed interference pattern are shown in Figure 7.5:

Figure 7.5 Signal intensity measurement shows the results

7.3 Waterfall map measurement

Waterfall diagram using frequency, amplitude, time 3 dimensional display, can intuitively observe periodic, transient signal and intermittent signal. In the waterfall diagram, different colors reflect the signal amplitude. After opening the parameter setting of the measurement configuration of the waterfall map, you can quickly select different public network frequency bands and measure the signal waterfall chart under this frequency band.

7.3.1 Measurement configuration of the waterfall map

[Parameter setting]: It is used to quickly select the type and frequency band of the signal to be tested.

[Field strength unit]: There are two units of dBm and dBuV / m.

[Save the map]: Save the signal waterfall data for a period of time to the specified path.

[Read the waterfall map]: Read the saved waterfall map signal under the specified path.

7.3.2, and the measurement of the waterfall map

The main operation steps of the waterfall map measurement are as follows:

Step 1. Connect the handheld DF antenna to the RF input port of the RMT series spectrometer, as shown in Figure 7.6:

Figure 7.6 Connecting diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the waterfall pattern:

- Press the [measurement], [waterfall diagram].

. Step 4 Quickly select the pending signal mode and frequency band:

- Press [Measurement Configuration] and [Parameter Settings] to open the

parameter setting menu.

- Press [FDC] and select mobile FDD: FDD 1800M Down in the parameter setting interface, as shown in Figure 7.7:

Figure 7.7 Parameter settings of the waterfall diagram

Step 5. Observe the interference pattern waterfall diagram is shown in Figure 7.8:

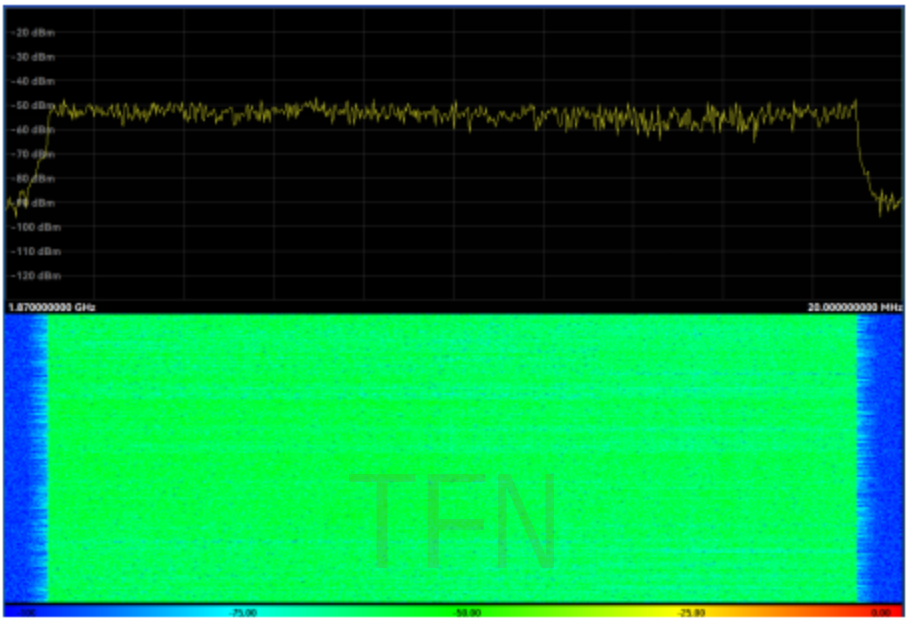


Figure 7.8 The waterfall diagram shows the results

7.4 Outdoor map measurement

The outdoor map can be used for RSSI test and ACLR test, and the test results can be marked on the map in real time according to the time or distance to form the track information.

7.4.1 Measurement configuration of the outdoor map

[Measurement state stop / Start]: Open the switch of the measurement state and locate to the current position.

[Track mode]: including equal time configuration and equal distance configuration.

a) Wait for time configuration:

Mark the map at the set time intervals.

b) Equal distance configuration:

Click on the map at the set distance interval.

[Measurement item]: Select the measurement item is RSSI or ACLR.

[Track save]: Save the track information after clicking.

[Track callback]: the saved track information callback.

[ACLR configuration]: The measurement item can be set for ACLR, set the standard signal template or manually configure the bandwidth and interval of the main channel and adjacent signal.

[Clear all marks]: Clear all mark points on the map.

7.4.2 Outdoor map measurement

The main operation steps of the outdoor map measurement are as follows:

Step 1. Connect the handheld DF antenna to the RMT spectrum RF input port, connect the GPS antenna and test as shown in Figure 7.9:

Figure 7.9 Schematic diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the interference mode as the outdoor map:

- **According to [measurement], [outdoor map].**

. Step 4 Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

. Step 5. Outdoor map measurement:

- Press [measurement configuration], [measurement item] to select RSSI.
- Press [Measurement Configuration] and [Measurement State], select Start and measure along the predetermined measurement track.

. Step 6. Observation results:

- The signal intensity of the observed interference pattern is shown in Figure 7.10:

Figure 7.10 The outdoor map measurement shows the results

7.5 RSSI measurements

The RSSI measurements are mainly used to measure the intensity changes of a point-frequency signal over a period of time.

In this section, the Chinese Unicom 5G public network signal, with the center frequency of 3.50976GHz, is selected as the input signal of the RMT series spectrometer to measure and analyze the RSSI index. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port for the test connection as shown in Figure 7.11:

Figure 7.11 Connecting diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the RSSI display in interference mode:

- **According to [Measurement], [RSSI].**

. Step 4 Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-20 dBm.

Step 5. Observe the RSSI measurement display results in interference mode as shown in Figure 7.12:

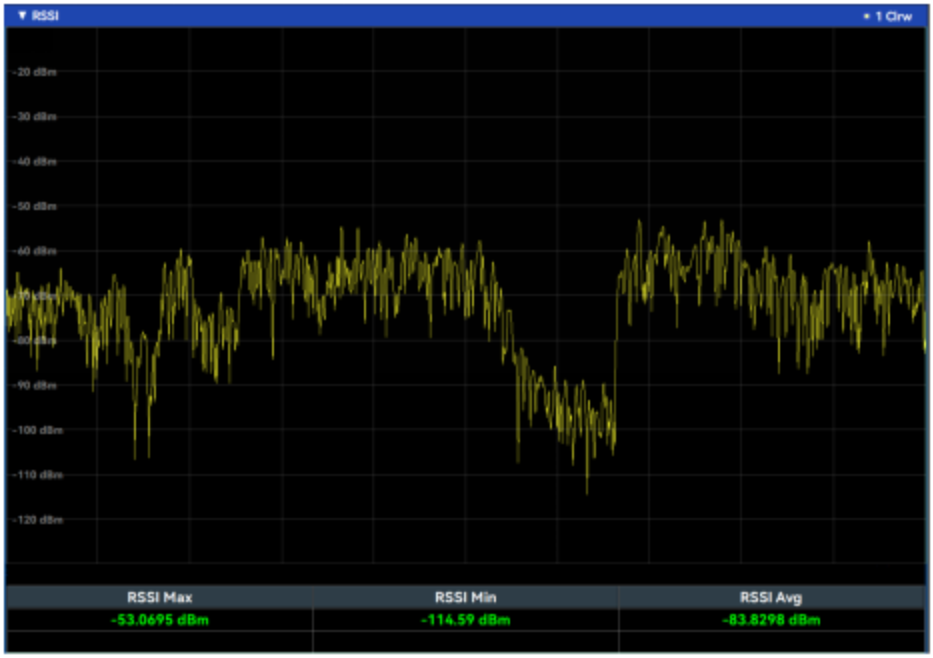


Figure 7.12 The RSSI measurements show the results

7.6 Indoor map measurement

Indoor map options can do RSSI test and ACLR test. Since the GPS signal cannot be received indoors, users need to manually move the location and mark the test results on the map. The test results marked on the map can be saved to the instrument and available
Call to view later.

7.6.1 Measurement configuration of the indoor map

[Measurement state stop / start]: Control the switch of the measurement state.

[Measurement item]: Select the measurement item is RSSI or ACLR.

[Track save]: Save the track information after clicking.

[Track callback]: the saved track information callback.

[ACLR configuration]: The measurement item can be set for ACLR, set the standard signal template or manually configure the bandwidth and interval of the main channel and adjacent signal.

[Clear all marks]: Clear the mark points on the map.

7.6.2 Indoor map measurement

The main operation steps of indoor map measurement are as follows:

Step 1. Connect the handheld DF antenna to the RF input port of the RMT series spectrometer, as shown in Figure 7.13:

Figure 7.13 Schematic diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the interference mode as the indoor map:

- **According to [measurement], [indoor map].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-20 dBm.

. Step 5. Indoor map test:

- Press [measurement configuration], [measurement item] to select RSSI.
- Press [measurement configuration] and [indoor map load] to load the indoor map.
- Press [Measurement Configuration] and [Measurement State], select Start, click the current position on the map, and the signal intensity of the position will be completed. Go to other locations on the map, click on the current location on the map, complete the signal intensity of the room, repeat the operation, until the indoor map measurement is completed.

Step 6. Observe the measurement results of the indoor map as shown in Figure 7.14:

Figure 7.14 The indoor map measurement shows the results

7.7 Time-gate measurement

The time gate function enables spectrum analysis of pulse RF signal, time division multiple access signal, intermittent signal, etc. The user can define the time window to perform the measurement. The time gate allows to measure the signal within a specified time period and eliminate or shield the interference signal.

7.7.1 Measurement configuration of the time gate

[Gating close \ open]: gating switch, the time door window will refresh after opening.

[Frequency domain close \ open]: frequency domain switch, open the time door _ frequency domain sub-window will refresh.

[Slot]: Select the location of the target time slot.

[Start time]: Set the start time of the time gate.

[Time Length]: Set the time length of the time gate

[Delay]: Set the delay of the time domain signal.

[Level limit]: Set the level limit.

[Gating configuration]: The total configuration list of time slot, start time, time interval, sampling rate, level limit, delay, and refresh times in the period.

[Time domain setting]: Select GPS synchronization to quickly select different public network frequency bands.

7.7.2, Time-door measurement

To better observe the measurement time gate, several steps can be taken:

Step 1. Connect the handheld direction finding antenna to the RF input port of RMT series spectrometer, connect the GPS antenna, and test after successful GPS synchronization, as shown in Figure 7.15:

Figure 7.15 Connecting diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the time door in the interference analysis mode:

- According to the [measurement] and [time gate].

Step 4. Time-door measurement:

- **Select [Measurement Configuration], [Time domain Settings].**
- Select [mobile 5G], [frequency band 2565], and select [GPS synchronization]. As shown in Figure Figure 7.16:

Figure 7.16 Time Door Selection

. Step 5 After selecting the time gate, the frequency spectrum corresponding to the special time slot is selected by default. Either the time gate can be dragged to other time slot in the time domain to observe the frequency domain map under the time slot. The test results are shown in Figure 7.17:

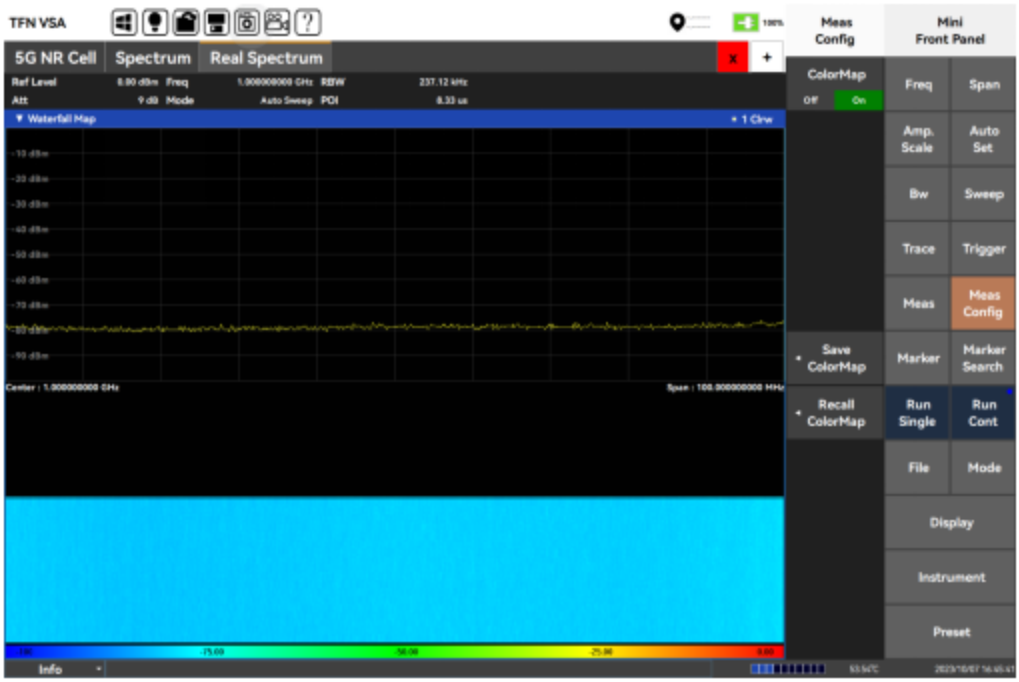


Figure 7.17 Measurement result Fig

7.8 5G interference measurement

5G interference measurement is mainly used to measure interference signals in the public network frequency bands of telecom operators. You can select the downlink signal mode, external interference mode, external signal mode, uplink signal mode and designated OFDM symbol mode.

7.8.1 5G interference measurement configuration

[5G Interference]: Used to quickly select the public network frequency band of telecom operators. After determining the frequency band, there are four interference modes: downlink signal mode, external interference mode, uplink signal mode and designated OFDM Symbol mode.

a) Downlink signal mode: display the spectrum at the downlink time slot to measure the interference of the downlink signal of 5G base station.
b) External interference mode: display the spectrum of the downlink signal and uplink signal switching to detect the interference signal outside the base station.
c) uplink signal mode: displays the spectrum at the uplink time slot to measure the interference of 5G uplink signal.
d) Specify the OFDM Symbol mode: you can directly specify the spectrum of any symbol in the 280 OFDM Symbol.

7.8.2 5G dry, disturbance measurement

To better observe and measure 5G interference, the following steps can be taken:

Step 1. Connect the handheld direction finding antenna to the RF input port of RMT series spectrometer, connect the GPS antenna, and test after successful GPS synchronization, as shown in Figure 7.18:

Figure 7.18 Connection diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the 5G interference mode in the interference mode

- **According to [measurement] and [5G interference].**

. Step 45G Interference Measurement:

- **Press the [measurement configuration], [5G interference].**
- **Select [mobile 5G], [frequency band 2565], and select [GPS] synchronization.**
- Select [External interference mode] and [bottom noise mode], as shown in Figure 7.19:.

Figure 7.19 Base noise mode selection

. Step 5. Observation results:

- Press [track], [Track 2] to set the maximum hold.
- Observation test results are shown in Figure 7.20:

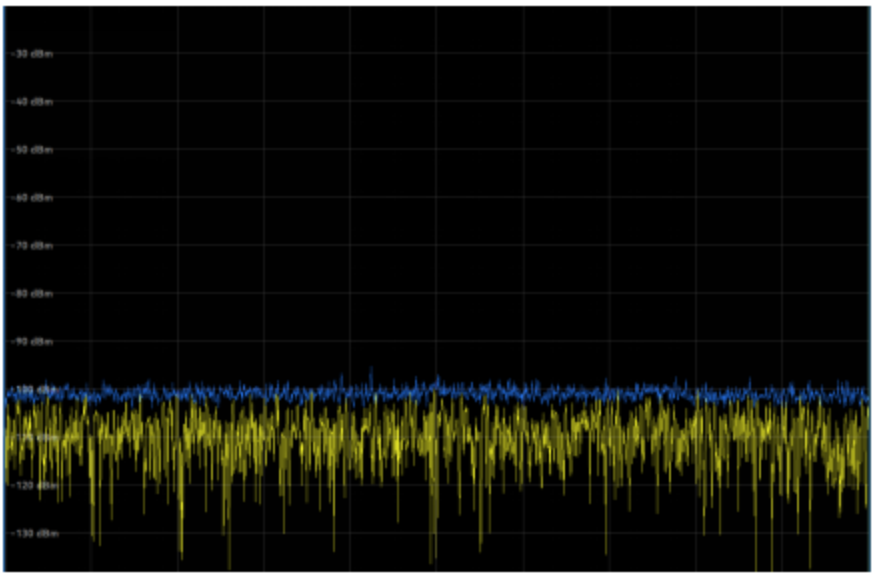


Figure 7.20 5G interference mode measurements

7.9 Signal ID measurement

The signal ID is used to measure the pattern type, center frequency, power and other information of the public network signal within a frequency range.

7.9.1 Signal ID measurement configuration

[Single frequency]: After the frequency point is set, display the power and signal mode of the public network signal at the frequency point.

[Single channel table]: After setting the frequency point and frequency width, display the power and signal mode of the public network signal in the frequency band.

[All signals]: Set the power and signal mode of the public network signal in the full frequency band.

7.9.2 Signal ID measurement

Connect the handheld DF antenna to the RF input port of the RMT series spectrometer as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port for the test connection as shown in Figure 7.21:

Figure 7.21 Schematic diagram of connecting the handheld DF antenna and the RMT series spectrometer

. Step 2 Select the test mode of the monitoring and receiving airport communication tester as the jamming mode:

- Press the [mode], [interference].

Step 3. Select the signal ID mode in the interference mode:

- **Press [measurement] and [signal ID].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], and set the frequency to 1.8GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.
- Press [bandwidth] and [bandwidth manual] and set the bandwidth to 200 MHz.

. **Step 5: press [measurement configuration], [all signals].**

Step 6. Signal ID measurement result is shown in Figure 7.22. The signal distribution of the public network within the 1.7GHz~1.9GHz range can be seen.

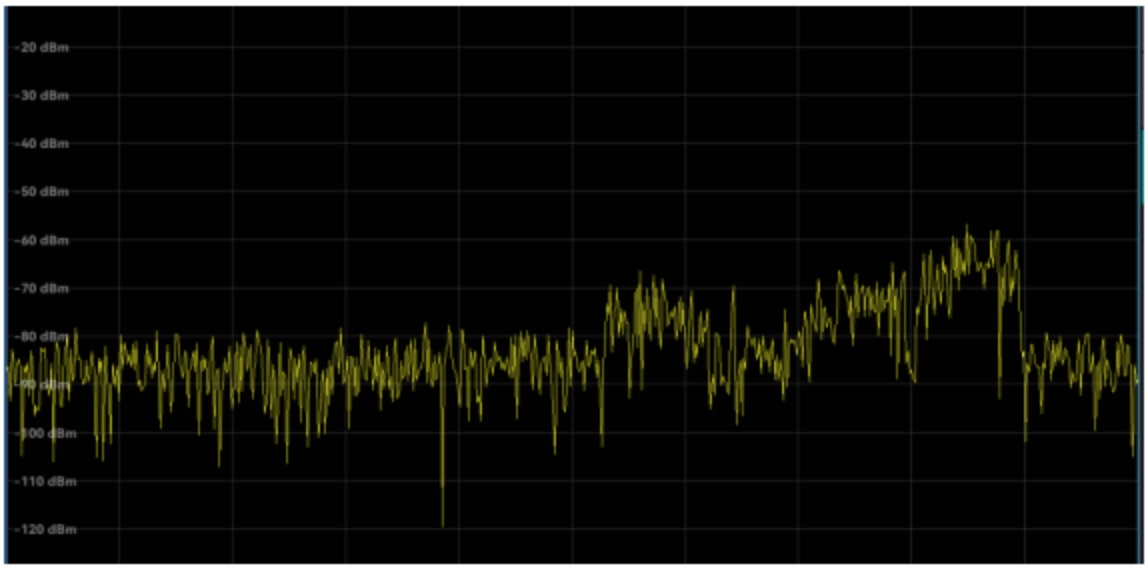


Figure 7.22 Signal ID measurements

7.10 4G interference measurement

4G interference is divided into TDD interference and FDD interference. Public network frequency bands of different telecom operators can be quickly selected for interference signal measurement.

7.10.1 4 GTDD interference

4 G TDD interference is to measure the interference signal for the mobile communication system using TDD mode.4 G TDD interference can quickly select the 4 G TDD band of the current public network, including F band, D3 band, D7 band, D8 band, E1 band, E2 band, E3 band, A band. Used to locate the interference information near this frequency band. To better observe and measure 4G interference, several steps can be taken:

Step 1. Connect the handheld direction finding antenna to the RF input port of RMT series spectrometer, connect the GPS antenna, and measure after GPS synchronization successfully, as shown in Figure 7.23:

Figure 7.23 Schematic diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the 4G interference in the interference mode

- **According to [measurement] and [4G interference].**

Step 4. Select the 4 G TDD mode:

- **Press [measurement configuration], [4G interference], [4G TDD].**
- Select [F-band 1895] and [Channel Measurement Mode] for PDSCH downlink service.
- Select [GPS] synchronization, 4 GTDD interference selection interface is shown in Figure 7.24:

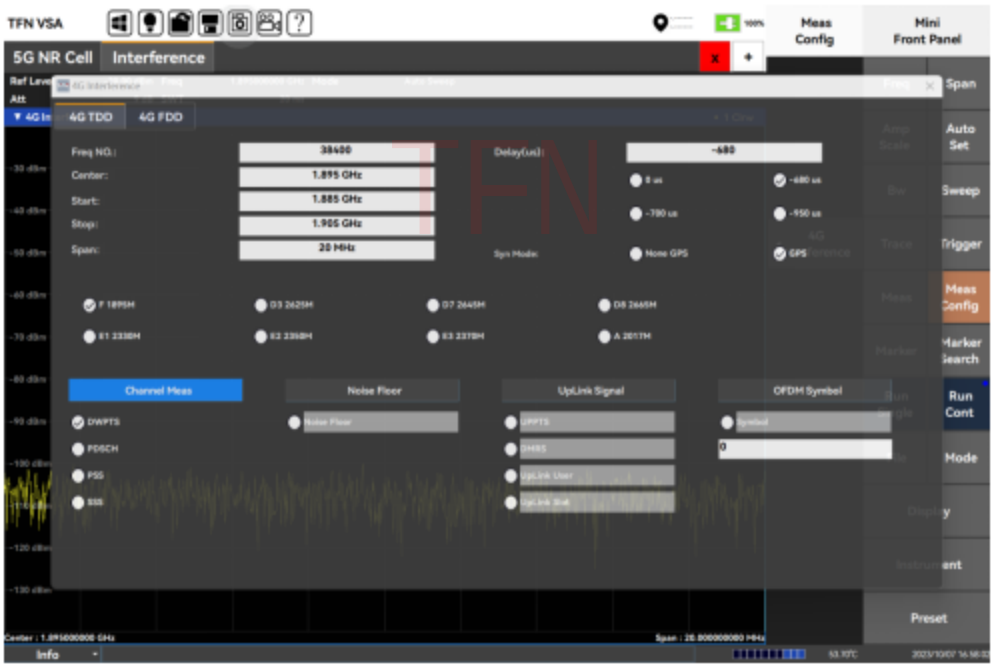


Figure 7.24 4 GTDD interference mode selection

. Step 5 Observe the 4 GTDD interference mode, and the test results are shown in Figure 7.25:

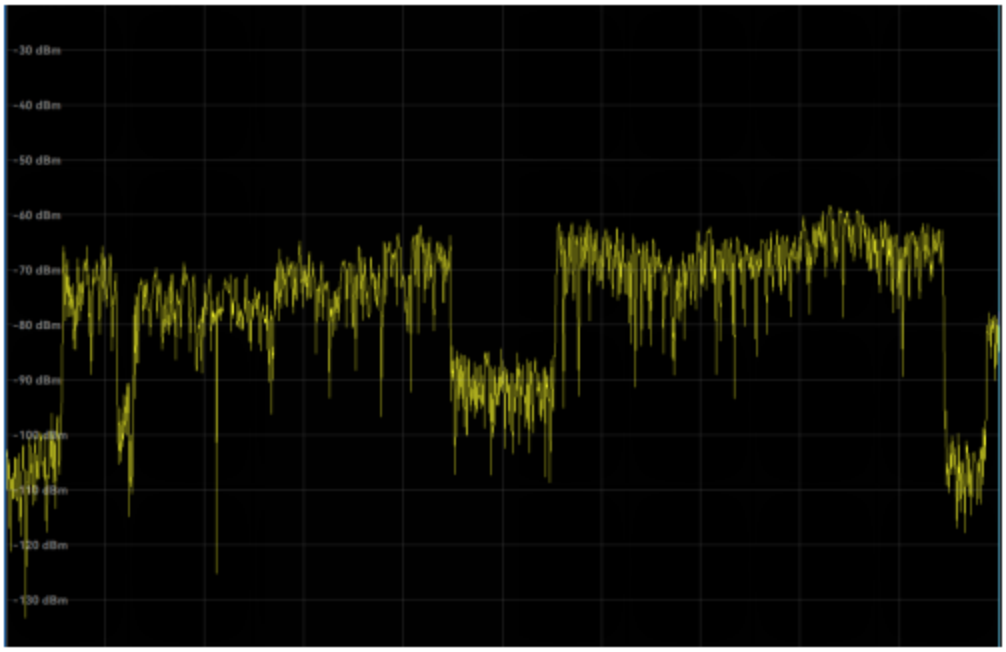


Figure 7.25 4 GTDD interference mode results

7.10.2 4 GFDD interference

4 GFDD interference is interference signal measurement for mobile communication system using FDD.

For FDD standard systems, you can quickly select the FDD uplink and downlink frequency bands of different telecom operators, query the interference situation in the full frequency domain or specific OFDM Symbol, find the interference signal, and achieve approximate search for interference sources using direction finding antennas.

Step 1. Connect the handheld DF antenna to the RF input port of RMT series spectrometer, connect the GPS antenna, and test after successful GPS synchronization, as shown in Figure 7.26:

Figure 7.26 Connecting diagram of handheld DF antenna and RMT series spectrometer

. Step 2 Select the test mode for the RMT series spectrometer as the interference mode:

- Press the [mode], [interference].

. Step 3 Select the 4G interference in the interference mode

- **According to [measurement] and [4G interference].**

Step 4. Select the 4 GFDD mode, as shown in Figure 7.27:

- Press [measurement configuration], [4G interference] and [4G FDD], select FDD 900 uplink in the mobile 4G area.
- Press [full frequency domain], select the full frequency domain scan mode...
- Select [GPS] synchronization, 4 GFDD interference selection interface is shown in Figure 7.27:

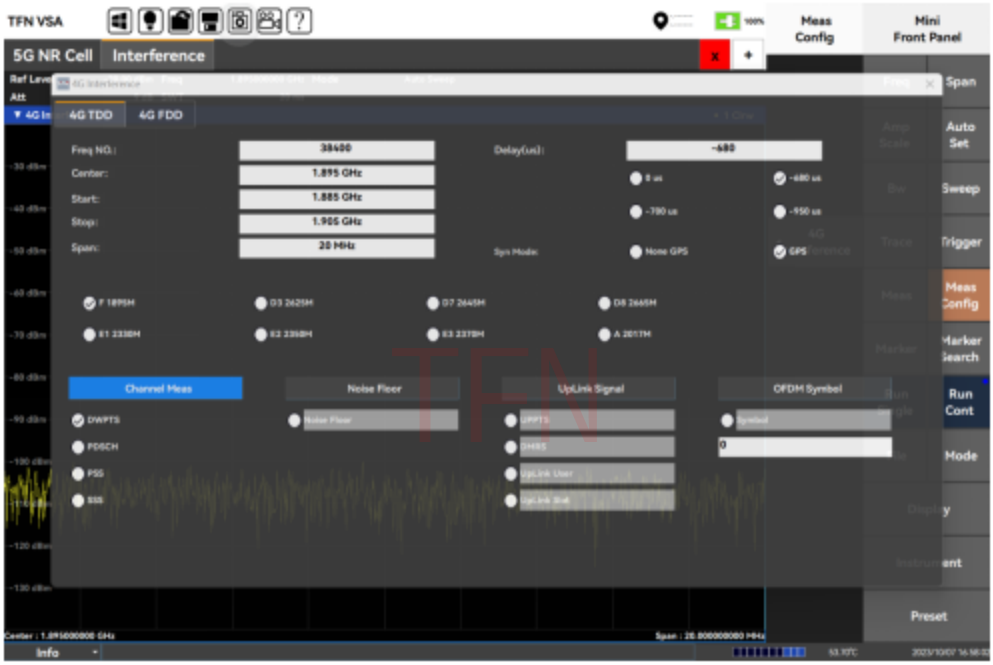


Figure 7.27 4 GFDD interference selection

Step 5. Observe the 4 GFDD interference mode, and the test results are shown in Figure 7.28:

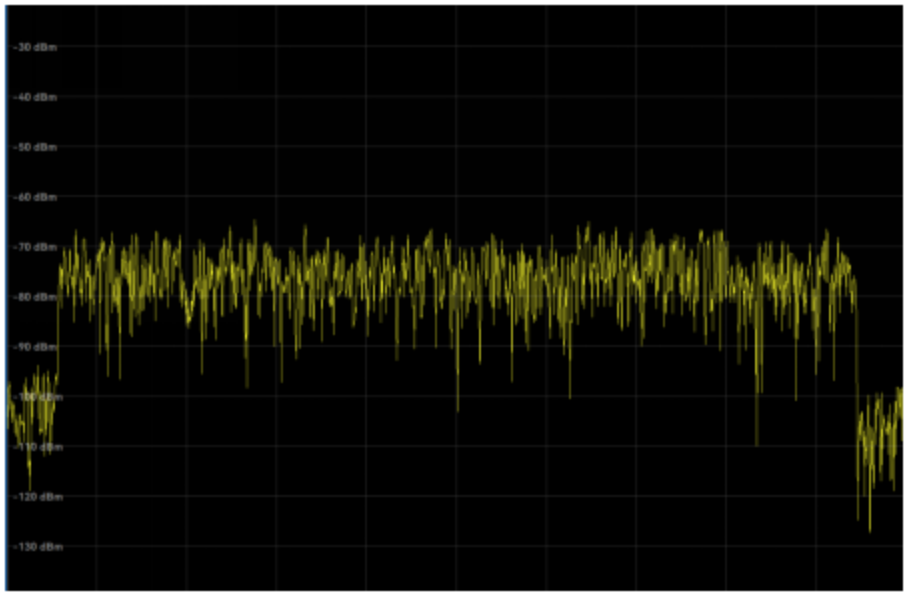


Figure 7.28 4 GFDD interference mode results

8 The LTE cell pattern

RMT series spectrometer LTE cell mode is mainly used for demodulation and analysis of LTE signals, including the following commonly used measurement modes: EVM / frequency / error / power measurement, signal intensity measurement, time domain error measurement, outdoor map measurement, indoor map measurement, ID scan measurement, time domain power measurement, etc.

8.1 EVM / frequency / error / power measurement

The EVM / frequency / error / power measurement function is used to test the EVM, frequency, error, power and other demodulation indexes of the standard template signal and the public network LTE signal under the corresponding configuration.

8.1.1 EVM / frequency / error / power measurement configuration

Signal description: including mode (TDD downlink, FDD downstream), carrier number (1~5 can be set), test mode (select standard template configuration), physical layer setting, and carrier configuration.

a) Physical layer setting: including channel bandwidth (1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz) and corresponding sampling rate and occupancy bandwidth, loop prefix (normal and extended optional), FFT points and occupancy number (corresponding channel bandwidth), channel, automatic detection switch (automatically detected ID), cell ID group (0~167 can be set), cell ID (0~503 can be set), and group ID (0~2 can be set).

b) Carrier configuration: center frequency, channel bandwidth.

MIMO / CA settings: including number of antennas (1,2,4 optional), number of ports, antenna number (fixed to 0), and reference antenna.

8.1.2 Standard Template signal

In this section, use the equipment under test to generate an LTE signal, set the center frequency at 1GHz, power at-30 dBm, mode selection FDD downstream, template selection E-TM 1 _ 1 __ 10 MHz, and measure the LTE signal demodulation ability of RMT series spectrometer. Specific steps are as follows:

Step 1. Use the tested equipment to output an FDDE-TM 1 _ 1 __ 10 MHz LTE signal, set the frequency to 1GHz and power to-30 dBm, and connect the output of the measured equipment to the RMT series spectrometer RF input port by cable, as shown in Figure 8.1. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

Figure 8.1 Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press the [mode], [LTE community].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the center frequency to 1GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

Step 5. Select the LTE signal test template:

- **Press [measurement configuration], [Signal Description].**
- In the [Signal Description] property page, select the test template: E-TM 1 _ 1 __ 10 MHz, and the setting interface is shown in Figure 8.2:

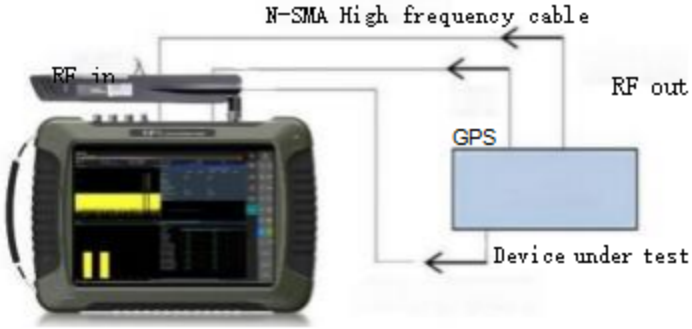


Figure 8.2 Parameter setting diagram

Step 6. Observation results:

- Double-click the [Result Summary] sub-window to enlarge the window, as shown in Figure 8.3:

Figure 8.3 Test results for EVM / frequency / error / power measurement

8.1.3 Public network LTE signal

For the current LTE signal of public network telecom operators, set the corresponding frequency point and reference time, and the RMT series spectrum analyzer can perform blind interpretation of the signal.

Step 1. Connect the omnidirectional antenna to the RMT series spectrometer RF input port and start measuring, connect as shown in Figure 8.4:

Figure 8.4 Schematic diagram of the connection of the omnidirectional antenna and the RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**
- Press [mode] and select [LTE cell].

. Step 3 Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center 5 frequency], set the center frequency to 1.850GHz.
- Press [level setting] and [reference level], and set the reference level to-20 dBm.

Step 4. Observation results:

➢ The observation test results are shown in Figure 8.5:

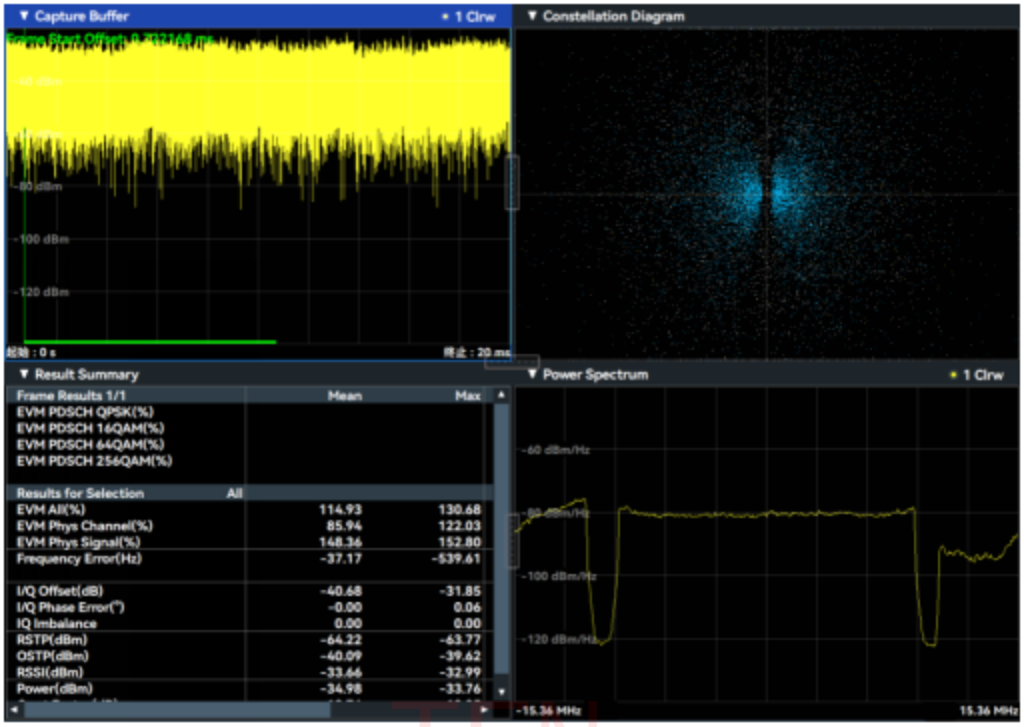


Figure 8.5 LTE public network signal, test results

8.2 Signal intensity measurement

The signal strength function helps the tester to quickly locate the position of the LTE signal source by measuring the coordination of the antenna and the electronic compass. Determine the direction of the signal source when the current signal strength (blue arrow) and the maximum signal strength (red arrow) coincide.

8.2.1 Measurement configuration of the signal intensity

Measurement status: the measurement start and stop switch.
Cell selection: used to select the cell ID to be tested.
Delete the current tag: Delete the current tag.
Delete all tags: Delete all tags.

8.2.2 Measurement steps

Use the handheld direction-finding antenna to connect the RF input port to the RMT series spectrometer and the USB port for testing. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RF input port of RMT series spectrometer,

connect the GPS antenna, and test after successful GPS synchronization, as shown in Figure 8.6:

Fig. 8.6 Connecting diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **According to [mode], [LTE cell], [measurement], [signal intensity].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 1850 MHz.
- **Press [level setting], [reference level], set, the reference level is-10 dBm.**

. Step 5 Select the measurement state as the start:

- Press [measurement configuration], [measurement state], select [start], the upper right corner of the Marker 1, after select [stop], move a distance to select [start], the upper right corner of the Marker 2, then select [stop], move a distance to select [start], the upper right corner of Marker 3, then select [stop], by three positioning algorithm will automatically locate to the location of the current signal source, and marked in the map.

Step 6. Observation results: After the above setting is completed, the signal intensity of different angles under the current cell ID can be displayed. The direction when the current signal intensity (blue arrow) and the maximum signal intensity (red arrow) coincide is the signal direction. The test results are shown in Figure 8.7:

Figure 8.7 Signal intensity measurements

8.3 Time-domain error measurement

The time domain error measurement function is used to test the time domain map, frequency spectrum map, frequency error and time error of the current cell ID signal.

8.3.1 Measurement configuration of the time-domain error

Signal description: including mode (TDD downlink, FDD downstream), carrier number (1~5 can be set), test mode (select standard template configuration), physical layer setting, and carrier configuration.

a) Physical layer setting: including channel bandwidth (1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz) and corresponding sampling rate and occupancy bandwidth, loop prefix (normal and extended optional), FFT points and occupancy number (corresponding channel bandwidth), channel, automatic detection switch (automatically detected ID), cell ID group (0~167 can be set), cell ID (0~503 can be set), and group ID (0~2 can be set).

b) Carrier configuration: center frequency, channel bandwidth.

MIMO / CA settings: including number of antennas (1,2,4 optional), number of ports, antenna number (fixed to 0), and reference antenna.

8.3.2 Measurement steps

In this section, use the equipment under test to generate an LTE signal, setting frequency at 1GHz, power at-30 dBm, mode selection FDD link, and E-TM1_1__1.4MHz as output signal. The specific steps are as follows:

Step 1. Use the tested equipment to output an LTE signal of FDD E-TM1_1__1.4MHz, set the frequency at 1GHz and power at-30 dBm, and connect the output of the measured equipment to the RMT series spectrometer RF input port, as shown in Figure 8.8. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

Figure 8.8 Connection diagram of the tested equipment and the RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press the [mode], [LTE community].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency] and set the frequency to 1GHz.
- Press [level setting], [reference level], set, the reference level is-10 dBm.

Step 5. Select the Time-domain error test view:

- Press [Measurement] and select [Time-domain error].

Step 6. Input the LTE signal demodulation parameters:

- **Press [measurement configuration], [Signal Description].**
- In the [Signal Description] property page, select the test template: FDD E-TM1_1__1.4MHz, and the setting interface is shown in Figure 8.9:

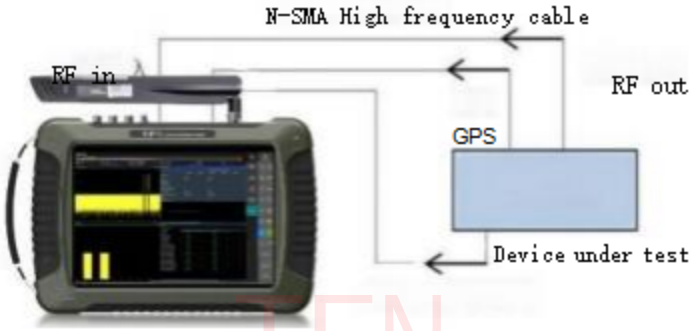


Figure 8.9 Parameter setting diagram

Step 7. Observation results:

- **Inverted triangle pull-down view selection [Time Alignment Error], the test results are shown in Figure 8.10:**

Figure 8.10 Time-domain Error Results Test Plot

8.4 Outdoor map measurement

Outdoor map measurements were used to measure the distribution of signal quality RSSI at the current frequency, distinguishing RSSI indices with different colors, and labeled on the map.

8.4.1 Measurement configuration of the outdoor map

Measurement status: the measurement start and stop switch.

Track mode: equal time configuration switch and equal distance configuration switch.

a) Wait time configuration: dot at a set time interval, such as, dot at every interval 1

seconds.

b) Equdistance configuration: dot at set intervals, such as every 10 meters.

Measurement items: RSSI, RSSI-RSRP and Cell ID are optional.

Track save: It is used to save the currently detected track.

Track callback: used to retrieve tracks that were originally saved in the specified directory.

Cell selection: used to select the cell ID to be tested.

Automatic search: set frequency (standard band optional), automatic search, mode (FDD down and TDD down), frequency step (fixed 20 MHz), center frequency.

Clear all markers: Clear all markers.

8.4.2 Measurement steps

The main operation steps of the outdoor map measurement of LTE signal are as follows:

Use the handheld direction finding antenna to connect the RF input port and USB port of the RMT series spectrometer, connect the GPS antenna, and test after successful GPS synchronization. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to RMT spectrum meter RF input port and USB port, as shown in Figure 8.11:

Figure 8.11 Connection diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **According to [mode], [LTE community], [measurement], [outdoor map].**

. Step 5. Outdoor map measurement:

- Press [measurement configuration], [track mode], select equal time configuration, time interval 100ms, open.
- Press the [measure item], select the RSSI.

- Press [Automatic Search], select the frequency and mode, and press [Automatic Search].
- Press [community Selection] to lock the cell ID to be tested.
- Press [measurement state], select start and measure along the predetermined measurement track.

. Step 6. Observation results:

- To see the RSSI and SS-RSRP at different positions on the route, the instrument can measure the LTE on the route, the information of the RSSI, RSRP, and Cell ID of the signal, and mark the results on the map, for track preservation and track callback. Test results are shown in 8.12:

Figure 8.12 Measurement results of the outdoor map

8.5 ID scan measurement

The RMT series spectrometer, combined with the omnidirectional antenna, ID scans the 4G LTE signals in the target frequency band to obtain the measurement results of the cell ID, RSRP, RSRQ, RS-SINR, RSSI, PSS, SSS and Time Offset of LTE signals in the current frequency band.

8.5.1 Measurement configuration of the ID scan

Signal description: set frequency (standard band optional), automatic search, mode (FDD down and TDD down), frequency step (fixed 20 MHz), center frequency.

Automatic search: Automatic search start button.

8.5.2 Measurement steps

The specific steps are described as follows:

Step 1. Connect the omnidirectional antenna to the RMT Series Specmeter RF input port, as shown in Figure 8.13:

Figure 8.13 The omnidirectional antenna connection of the monitoring receiver

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press the [mode], [LTE community].**

. Step 4 Select the ID scan test view:

- Press [Measure] and select [ID Scan].

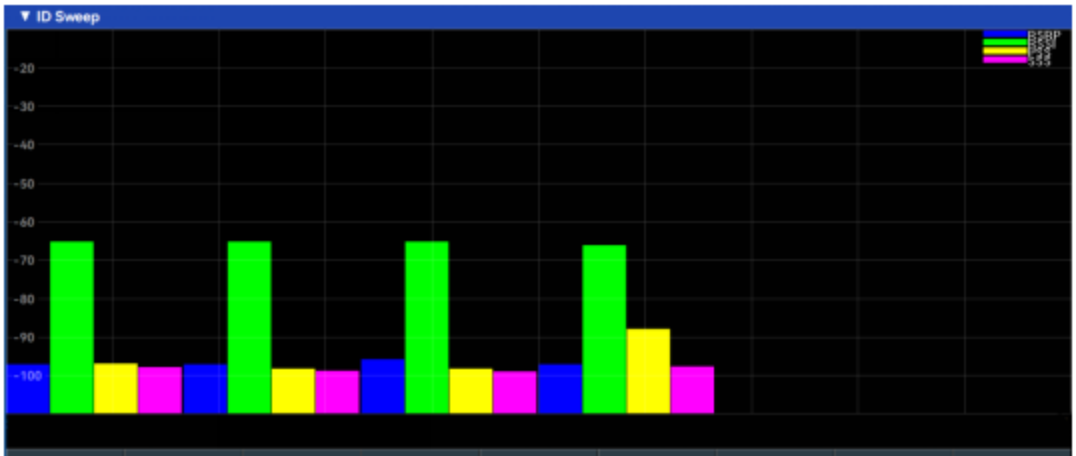
Step 6. Input the LTE signal demodulation parameters:

- **Press [measurement configuration], [Signal Description].**

Select Band 4 in the [Frequency] property page, and press [Automatic Search], as shown in Figure 8.14:

Figure 8.14 Parameter settings Fig

Step 7. After the search, the test results are shown in Figure 8.15:



No	Cell ID	RSRP [dBm]	RSRQ [dB]	RS-SINR [dB]	RSSI [dBm]	PSS [dBm]	SSS [dBm]	Time Offset [ms]
0	181	-83.207	-14.796	4.420	-51.421	-83.023	-84.000	6.299
1	168	-83.378	-14.975	4.199	-51.413	-84.486	-84.890	6.298
2	185	-81.927	-13.503	5.681	-51.434	-84.400	-85.203	6.297
3	356	-83.231	-13.987	4.332	-52.255	-74.183	-83.916	6.584
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Figure 8.15 The ID scan results

8.6 Indoor map measurement

Indoor map measurements were used to measure the distribution of signal quality RSSI at the current frequency, distinguishing RSSI indices with different colors and labeled on the map.

8.6.1 Measurement configuration of the indoor map

Measurement status: the measurement start and stop switch.

Measurement items: RSSI, RSSI-RSRP and Cell ID are optional.

Track save: It is used to save the currently detected track.

Track callback: used to retrieve tracks that were originally saved in the specified directory.

Cell selection: used to select the cell ID to be tested.

Indoor map loading: used to load the indoor map stored in the specified directory of the instrument.

Automatic search: set frequency (standard band optional), automatic search, mode (FDD down and TDD down), frequency step (fixed 20 MHz), center frequency.

Clear all markers: Clear all markers.

8.6.2 Measurement steps

The LTE signal indoor map measurement requires the connection to the RF input port of the RMT series spectrometer using the omnidirectional antenna. The specific steps are as follows:

Step 1. Connect the omnidirectional antenna to the RMT Series Specmeter RF input port, as

shown in Figure 8.16:

Figure 8.16 Schematic diagram of omnidirectional antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **According to [mode], [LTE community], [measurement], [indoor map].**
- Press [measurement configuration] and [indoor map load] to load the indoor map.

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 1850 MHz.
- **Press [level setting] and [reference level], set, the reference level is-20 dBm.**

. Step 5 Select the measurement state as the start:

- **Press [measurement configuration], [measurement item] to select RSSI.**
- Press [Automatic Search], select frequency Band 3, FDD down, and press [Automatic search].
- Press [community Selection] to lock the cell ID to be tested.
- Press [measurement state], select start, click on the current location on the map, and the signal intensity of the location will be completed. Go to another position on the map, click on the current position on the map, complete the signal intensity of the position, repeat the operation, until the indoor map measurement is completed.

Step 6. Observation results:

- After the above settings, the test results are shown in Figure 8.17:

Figure 8.17 Measurement results of the indoor map

8.7 Time-domain power measurement

The time-domain power measurement function of LTE signal is mainly used to measure the power frequency spectrum of different sub-frames, time slots and symbols in a frame of LTE signal.

8.7.1 Measurement configuration of the time-domain power

PVT mode: single frame, time frame, sub-frame (reserved) three mode selection.

Time slot position: only available in time slot mode, 0~9 can be set.

Starting symbol: only in slot mode, 0~13.

End symbol: available in slot mode, 0~13 available.

Special sub-frame: reserved function, not currently effective.

PVT configuration: only available in slot mode, showing the set slot position, start symbol, and termination symbol.

8.7.2 Measurement steps

The specific steps are described as follows:

Step 1. Connect the omnidirectional antenna to the RMT Series Specmeter RF input port, as shown in Figure 8.18:

Figure 8.18, Schematic diagram of omnidirectional antenna and RMT series spectrograph

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press [mode], [LTE cell], [measurement], [time domain power].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 1850 MHz.
- **Press [level setting], [reference level], set, the reference level is-30 dBm.**

. Step 5: Select the PVT mode:

- Press [Measurement configuration] and [PVT mode] to select PVT mode and [time slot].
- Press [Time-slot position] to select 10.

Step 6. Observation results: As shown in Figure 8.19:

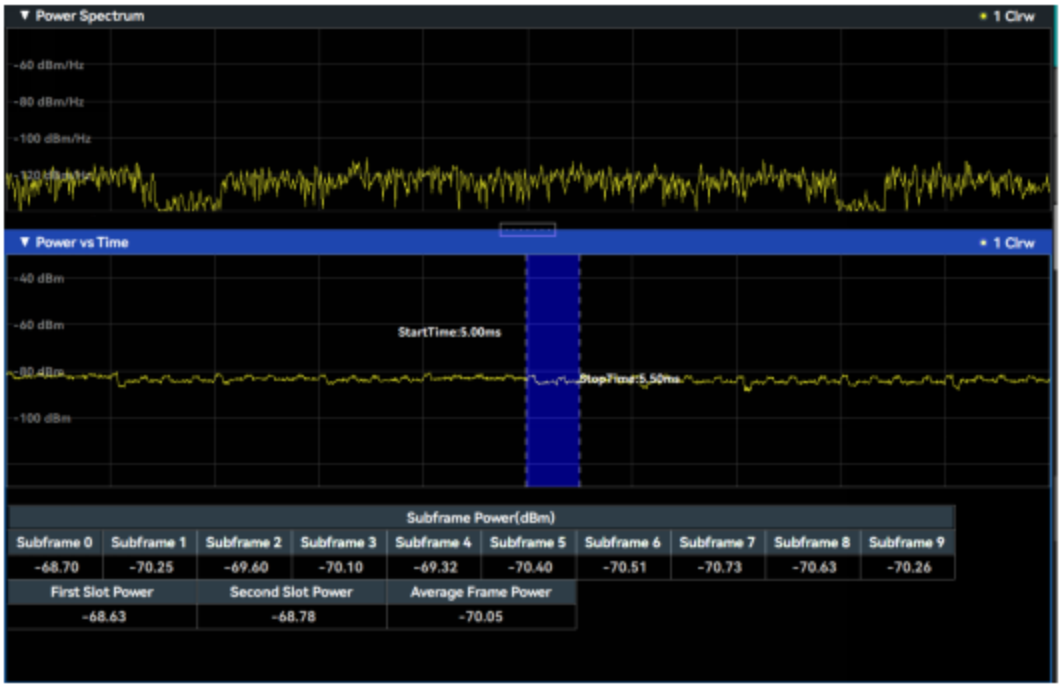


Figure 8.19 LTE Time-domain power test results

9 The 5 GNR plot pattern

The 5 GNR cell mode of RMT series spectrometer is mainly used to demodulate and analyze the 5 GNR signal of the public network, including beam analysis measurement, signal intensity measurement, signal search measurement, interference position measurement, time domain power measurement, outdoor map measurement, indoor map measurement, carrier scan measurement, etc.

9.1 Beam analysis and measurement

The 5 GNR beam analysis measurement function is used to measure the beam of the 5 GNR signal to obtain the measurement results of multiple beams.

9.1.1 Measurement configuration for the beam analysis

Signal capture: IQ reverse switch.

Parameter setting: Set the relevant parameters of 5 G NR demodulation, including mode (modulation mode and search mode, respectively representing manual configuration demodulation and automatic search demodulation), band bar, modulation bar, and carrier configuration bar.

a) Band bar: frequency band (a total of 27 standard frequency bands), corresponding frequency point and global synchronous channel number, automatic search (only in search mode), frequency range (FR 1 <=3GHz and FR 1> 3GHz), SSB SCS (only in search mode, three types of A, B, C).

b) Modulation bar: it is open to use in modulation mode, including channel bandwidth (5 MHz ~ 100 MHz optional), f 0, SSB SCS (with three types of A, B, C optional), setting periodicity (5ms ~160ms optional), SC offset (0~11 optional), RB offset (0~273 optional), and phase compensation switch.

c) Carrier configuration bar: carrier number selection switch, current carrier switch (the number of carriers is multiple times).

Measurement: divided into two components: beam analysis and time domain power.

a) Beam analysis: including constellation enabling switch, MIB decoding enabling switch, analysis mode switch, beam selection (used to select beams to require analysis), cell selection (PCI mode, used to select cells to analyze), channel selection (including PSS,

SSS, PBCH, PBCH _ DMRS, All).

b) Time domain power: including analysis mode (single / multiple times), subframe number, trigger mode.

CSI setting: sets the status information of the RS channel.

PCI data acquisition: PCI data acquisition Switch.

Community selection: select the community ID that needs to be analyzed.

9.1.2 Measurement steps

Connect the handheld direction finding antenna to the RF input port of RMT series spectrometer for testing, select the connected 5G public network signal here, and the center frequency is 3.50976GHz. The specific steps are as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrum instrument RF input port and the USB port, as shown in Figure 9.1:

Figure 9.1 Schematic diagram of hand-held DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the monitoring receiver center frequency and reference level:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-20 dBm.

. After successful synchronization in step 5, observe the results shown in Figure 9.2:

Figure 9.2 Beam analysis measurement results diagram

. Step 6 Select the Beam Histogram window and double-click in to see the beam information shown in Figure 9.3:

Figure 9.3 5 GNR beamanalysis shows the interface

9.2 Signal intensity measurement

The signal strength function helps the tester to quickly locate the position of the 5 GNR signal source by measuring the coordination of the antenna and the electronic compass. It can determine the direction of the signal source when the current signal strength (blue arrow) and the maximum signal strength (red arrow) coincide.

9.2.1 Measurement configuration of the signal intensity

Measurement status: the measurement start and stop switch.
Community selection: select the community ID that needs to be analyzed.
Delete the current tag: Delete the current tag.
Delete all tags: Delete all tags.

9.2.2 Measurement steps

The main operating steps for the signal intensity measurement are as follows:

Use the handheld direction finding antenna to connect the RF input port and USB port of the RMT series spectrometer, and connect the GPS antenna. Here select the 5G public network signal, the center frequency is 3.50976GHz, and the test after successful GPS synchronization. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and the USB port, as shown in Figure 9.4:

Figure 9.4 Schematic diagram of hand-held DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

Step 4. Select the cell to start the measurement:

- [Measurement configuration], [community selection], [community ID], select the community ID: 6.
- The handheld DF antenna rotates for a week to find the direction with the strongest signal.

Step 5. Signal strength measurement:

- Press [measurement configuration], [measurement state], select [start], Marker1 appears in the upper right corner of the map.
- Select [stop], move a distance to select [start], Marker2 appears in the upper right corner of the map.
- Select [stop], move a distance to select [start], Marker3 appears in the upper right corner of the map.
- Select [stop], and the three-point positioning algorithm will automatically locate the base station location in the current cell, and mark it in the map.

Step 6. Measurement results:

- After the above setting, the RMT series spectrometer can identify the PBCH EVM value of the signal under Cell ID 6 in different directions, including the maximum value and the current value. When the current value is the maximum value, the direction of the direction antenna is the direction of the signal source. The test results are shown in Figure 9.5:

Figure 9.5 Test Results

9.3 Signal search for the measurement

A 5 GNR signal search was used to measure the directional angle of the 5 GNR signal received at the current position.

Use the handheld direction finding antenna to connect the RF input port and USB port of RMT series spectrometer for testing, here select the connected 5G public network signal, the center frequency is 3.50976GHz. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and the USB port, as shown in Figure 9.6:

Figure 9.6 Connecting diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

Step 4. Set the measurement state:

- [Measurement configuration], [community selection], [community ID], select the community ID: 6.
- [Measurement], [Signal search], handheld DF antenna rotation for a week.

. Step 5. Observation results:

After the above setting is completed, the RMT series spectrometer can identify the power value of the signal under Cell ID 6 in different directions, including the maximum value and the current value. When the current value is the maximum value, the direction of the direction antenna is the direction of the signal source, and then the position of the signal is determined by approaching and finding. The test results are shown in Figure 9.7:

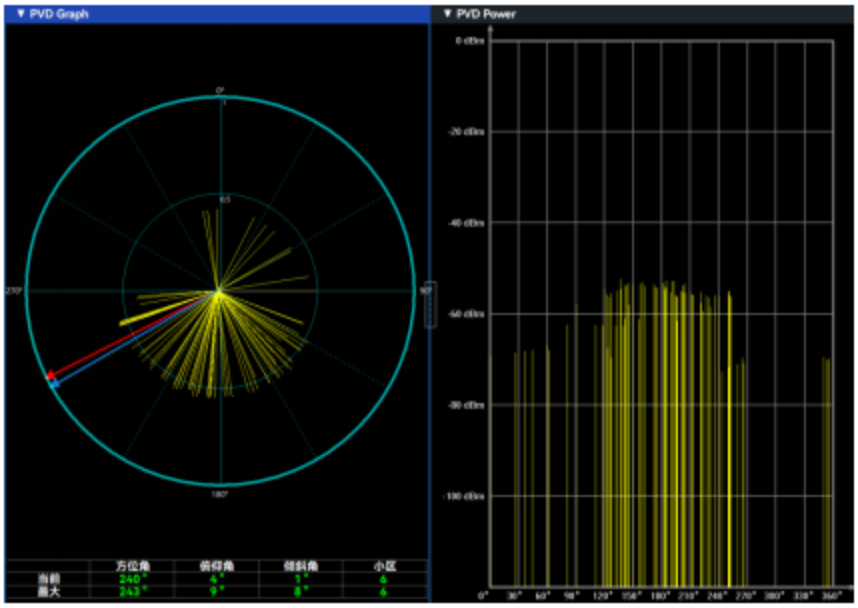


Figure 9.7

9.4 Interference position measurement

The 5 GNR interference position measurement is used to measure the orientation or position of the interference signal at the current frequency.

Use the handheld direction finding antenna to connect the RF input port and USB port of RMT series spectrometer for testing, here select the connected 5G public network signal, the center frequency is 3.50976GHz. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and the USB port, as shown in Figure 9.8:

Figure 9.8 Connecting of hand-held DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-20 dBm.

. Step 4 Set the 5 GNR interference position test:

- [Measurement], [Interference position], handheld DF antenna rotation for a week.

. Step 5 Set the trajectory maximum hold:

- Click select Power Spectrum, subinterface, press [Track] and [Track 2] to select [maximum Hold].
- The hand-held DF antenna rotates for a week to observe and record the direction angle of the interference signal intensity when the compass is the direction of the interference source, and then the location of the interference source is located by approximate search.

. Step 6. Observation results:

- After the above setting is completed, observe the spectrum map on the Power Spectrum sub-interface. If the direction antenna points in a certain direction, the RMT series spectrometer can identify the power value of the signal at the current frequency point in the direction. When the current value coincides with the maximum value, the direction of the direction antenna is the direction of the interference source. The test results are shown in Figure 9.9:

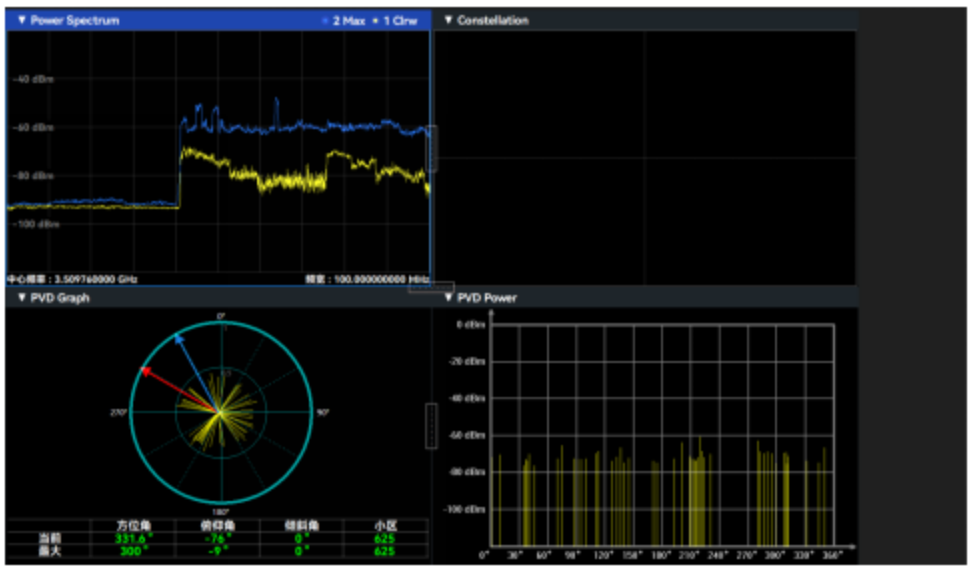


Figure 9.9

9.5 Time-domain power measurement

The 5 GNR time-domain power measurement function is used to measure the subframe power of the 5 GNR signal.

9.5.1 Measurement configuration of the time-domain power

PVT mode: single frame and time slot two mode selection.

Time slot position: only available in time slot mode, 0~9 can be set.

Starting symbol: only in slot mode, 0~13.

End symbol: available in slot mode, 0~13 available.

PVT configuration: only available in slot mode, showing the set slot position, start symbol, and termination symbol.

9.5.2 Measurement steps

Use the handheld direction finding antenna to connect the RF input port and USB port of the RMT series spectrum instrument. Select the connected 5G public network signal here, and the center frequency is 3.50976GHz. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and the USB port, as shown in Figure 9.10:

Figure 9.10 Connection diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

Step 4. Select the cell to start the measurement:

- [Measurement configuration], [community selection], [community ID], select the community ID: 6.
- [Measurement], [time domain power], [measurement configuration], select a single frame here.

. Step 5. Observation results:

After the above setting, the instrument can identify the power of different sub-frames of the current signal, and the test results are shown in Figure 9.11:

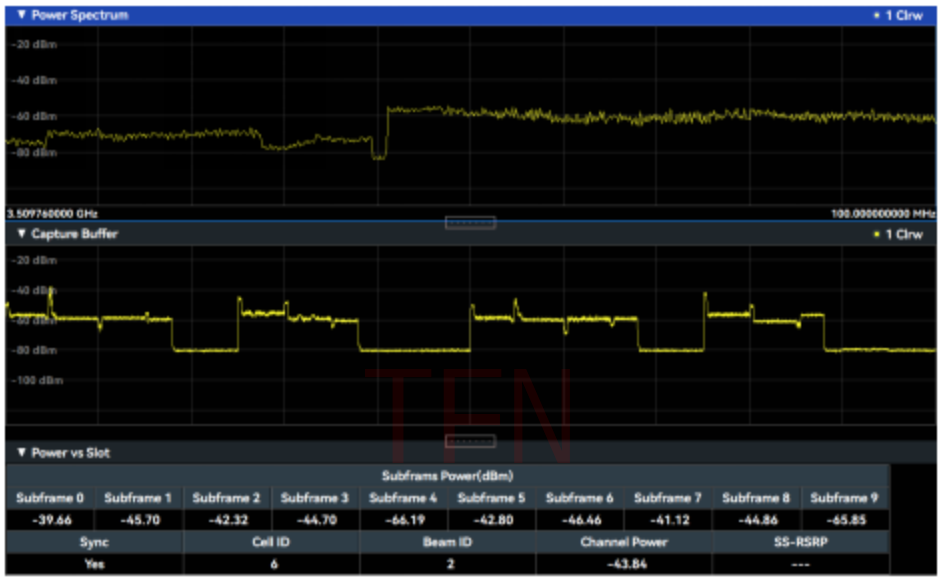


Figure 9.11 5 GNR signal, time-domain power measurement result interface

9.6 Outdoor map measurement

Outdoor map measurements were used to measure the distribution of signal quality RSSI at the current frequency, distinguishing RSSI indices with different colors, and labeled on the map.

9.6.1 Measurement configuration of the outdoor map

Measurement status: the measurement start and stop switch.

Track mode: equal time configuration switch and equal distance configuration switch, can only choose one mode.

Measurement items: including RSSI, SS-RSRP, Cell ID, Beam ID four measurement items are optional.

Track save: It is used to save the currently detected track.

Track callback: used to retrieve tracks that were originally saved in the specified directory.

Cell selection: Use to lock the cell ID to test.

Automatic search: Set the relevant parameters of 5 G NR demodulation, including mode (modulation mode and search mode, respectively representing manual configuration demodulation and automatic search demodulation), band bar, modulation bar, and carrier configuration bar.

a) Band bar: frequency band (a total of 27 standard frequency bands), corresponding frequency point and global synchronous channel number, automatic search (only in search mode), frequency range (FR 1 <=3GHz and FR 1> 3GHz), SSB SCS (only in search mode, three types of A, B, C).

b) Modulation bar: it is open to use in modulation mode, including channel bandwidth (5 MHz ~ 100 MHz optional), f 0, SSB SCS (with three types of A, B, C optional), setting periodicity (5ms ~160ms optional), SC offset (0~11 optional), RB offset (0~273 optional), and phase compensation switch.

Carrier configuration bar: carrier number selection switch, current carrier switch (the number of carriers is multiple times).

Clear all markers: Clear all markers.

9.6.2 Measurement steps

Take the measuring Chinese Unicom 5G, the signal as an example, and the handheld direction finding antenna is used to connect the RF input port and the USB port of the RMT series spectrometer, connect the GPS antenna, the center frequency is 3.50976GHz, and the test after successful GPS synchronization. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and the USB port, as shown in Figure 9.12:

Figure 9.12 Connection diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

. Step 4: Set up the 5 GNR outdoor map test:

- Press [Measurement] and select [outdoor map].
- Press [Measurement Configuration] and [Track mode] to select [other time configuration], and set the interval as: 1s, state: on.
- Press [Measure Item] to select the RSSI.
- Press [community selection], select the community 490.
- Press [measurement state], select the start, and then move the RMT series spectrometer along the predetermined route to complete the measurement of 5 G NR outdoor signal.

. The step 5 observation result is shown in Figure 9.13:

Figure 9.13 Measurement results of the outdoor map

9.7 Indoor map measurement

Indoor map measurements were used to measure the distribution of signal quality RSSI at the current frequency, distinguishing RSSI indices with different colors and labeled on the map.

9.7.1 Measurement configuration of the indoor map

Measurement status: the measurement start and stop switch.

Measurement items: including RSSI, SS-RSRP, Cell ID, Beam ID four measurement items are optional.

Track save: It is used to save the currently detected track.

Track callback: used to retrieve tracks that were originally saved in the specified directory.

Cell selection: used to select the cell ID to be tested.

Indoor map loading: used to load the indoor map stored in the specified directory of the instrument.

Automatic search: Set the relevant parameters of 5 GNR demodulation, including mode (modulation mode and search mode, respectively representing manual configuration demodulation and automatic search demodulation), band bar, modulation bar, and carrier configuration bar.

a) Band bar: frequency band (a total of 27 standard frequency bands), corresponding frequency point and global synchronous channel number, automatic search (only in search mode), frequency range (FR 1 <=3GHz and FR 1> 3GHz), SSB SCS (only in search mode, three types of A, B, C).

b) Modulation bar: it is open to use in modulation mode, including channel bandwidth (5 MHz ~ 100 MHz optional), f0, SSB SCS (with three types of A, B, C optional), setting periodicity

(5ms~160ms optional), SC offset (0~11 optional), RB offset (0~273 optional), and phase compensation switch.

c) Carrier configuration bar: carrier number selection switch, current carrier switch (the number of carriers is multiple times).

Clear all markers: Clear all markers.

9.7.2 Measurement steps

Use the handheld direction finding antenna to connect the RF input port and USB port of the RMT series spectrum instrument. Here, select the connected 5G public network signal, and the center frequency is 3.50976GHz, for testing. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT Series Specmeter RF input port and USB port, as shown in Figure 9.14:

Figure 9.14 Connecting diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the frequency to 3.50976GHz.
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

. Step 4 Set the 5 GNR indoor map test:

- Press [Measurement] and select [indoor map].
- According to [measurement configuration] and [indoor map Load].
- Press [Measure Item] to select the RSSI.
- Press [community selection], select the community 490.
- Press [measurement state], select start, click on the current location on the map, and the signal intensity of the location will be completed. Go to another position on

the map, click on the current position on the map, complete the signal intensity of the position, repeat the operation, until the indoor map measurement is completed.

. Step 5 is used for the observations

- After the above setting is completed, the instrument can record the signal intensity distribution of each location in the room. The test results are shown in Figure 9.15:

9.15 Indoor map test results

9.8 Carrier scanning measurement

5 GNR carrier scan is used to cycle to scan 5 G NR signals at different frequencies, frequency bands and reference level configurations and to display the test results.

9.8.1 Measurement configuration of the carrier scan

Parameter configuration: including test enable, frequency, frequency band, reference level setting. A maximum of 8 different sets of parameters can be set.

9.8.2 Measurement steps

Use the handheld direction-finding antenna to connect the RF input port to the RMT series spectrometer and the USB port for testing. The specific steps are described as follows:

Step 1. Connect the handheld DF antenna to the RMT series spectrometer RF input port and

the USB port, as shown in Figure 9.16:

Figure 9.16 Connection diagram of handheld DF antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

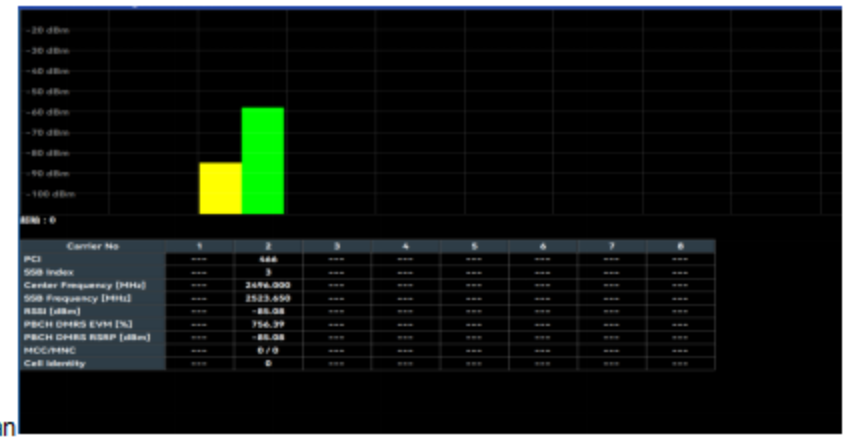
. Step 3 Set the 5 GNR carrier scan test:

- Press [Measurement], select [Carrier scan].
- Set the test enable, frequency, frequency band and reference level according to [measurement configuration] and [parameter configuration], as shown in Figure 9.17:

Figure 9.17 Carrier scanning parameter configuration

. Step 4 Observation results. After the above setting, the test results are shown in Figure 9.18:

Figure 9.18 Measurement results of carrier



scan

10 The GSM cell pattern

The GSM cell measurement is to demodulate the GSM signal to obtain the phase error, EVM, channel power, frequency error and other information.

10.1 GSM plot

Signal description: contains three submenus of device, frame and time slot.

a) Equipment: including equipment type, frequency band, power level, power control level; mode, automatic presentation sign, etc.

b) Frame: slot length switch, slot configuration, etc.

c) Time slot: slot 0~ slot 7 switch, burst type, demodulation, etc.

Select time slot: can select time slot 0~7.

Data acquisition: two menus include data acquisition and capture.

Data acquisition: including the sampling rate and its corresponding analysis bandwidth, capture time switch and time manually.

Capture: Setable statistics.

Parameter setting: including frequency band, automatic search switch, frequency step, center frequency and other parameters.

Multi-time slot: multi-time slot switch.

Automatic search: an automatic search switch.

10.2 GSM plot measurements

10.2.1 Fixed frequency point measurement of the GSM signal

The main operating steps for the fixed frequency point measurement of the GSM signal are as follows:

Step 1. Use the tested equipment to output a GMSK signal, set the frequency at 950 MHz and power at-30 dBm, and connect the output of the measured equipment to the RMT series RF input port of the spectrometer, as shown in Figure 10.1. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

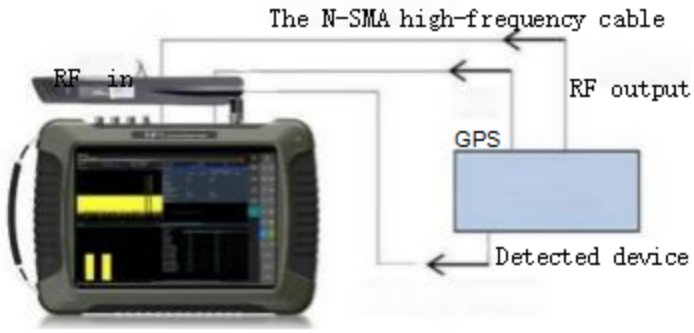


Figure 10.1 Connecting diagram of the tested equipment and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **By [mode], [GSM community].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- **By [frequency] and [center frequency], the center frequency is 950 MHz.**
- Press [level setting] and [reference level], and set the reference level to-10 dBm.

Step 5. After completing the above settings configuration, the instrument can identify the GSM signal and display the measurement results in the screen. The test results are shown in Figure 10.2:

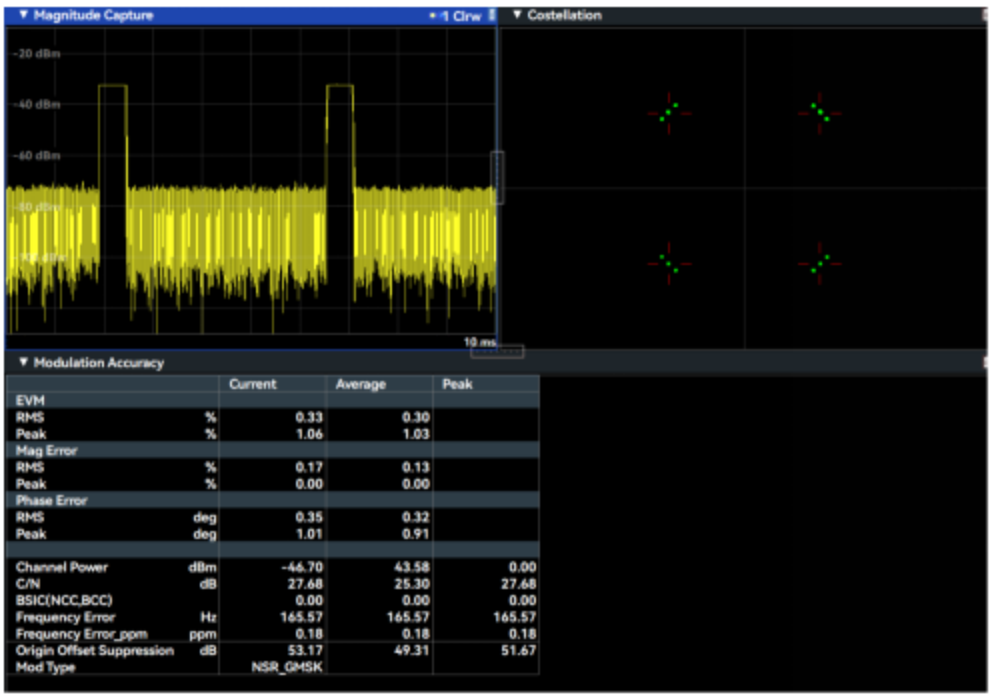


Figure 10.2 Results of the EVM test

10.2.2 Fixed frequency band measurement of the GSM signal

The fixed frequency band measurement of GSM signal supports the following frequency band: the frequency point can be set between 935.2MHz and 959.8MHz, with 200 kHz step point.

The main operating steps for the fixed frequency band measurement of the GSM signal are as follows:

Step 1. Use the measured equipment to output an 8 PSK signal, set the frequency at 936.8MHz and the power at-30 dBm, and connect the output of the measured equipment to the RMT series RF input port of the spectrometer through the cable, as shown in Figure 10.3. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

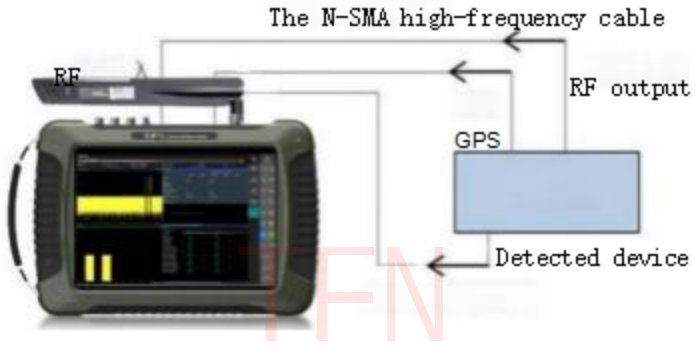


Figure 10.3 Connecting diagram of the tested equipment and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

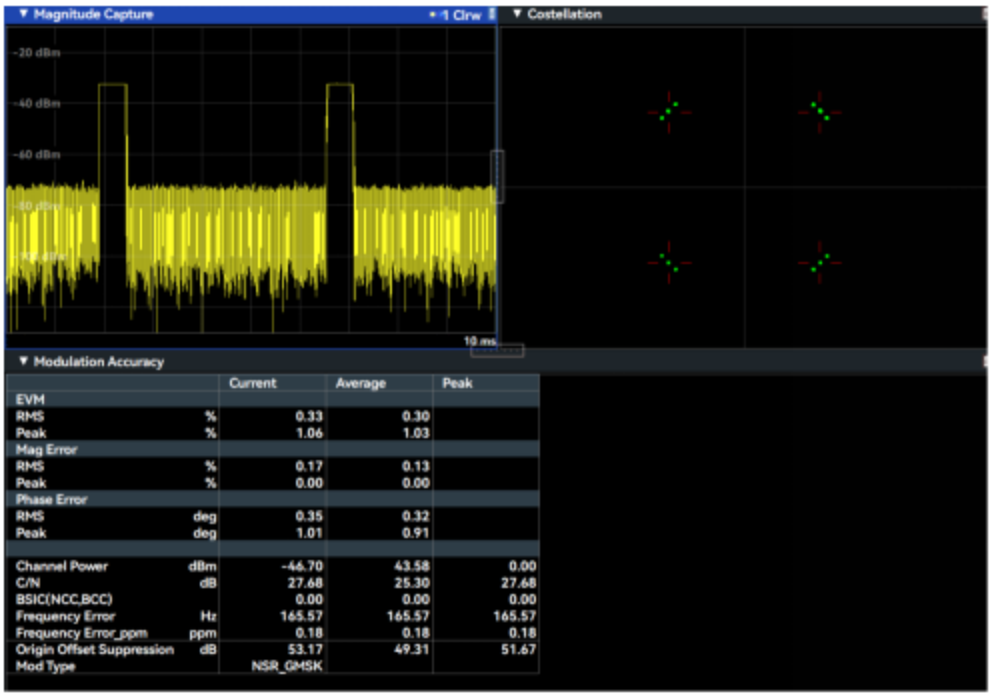
Step 3. Select the GSM test mode for the RMT series spectrometer:

- **By [mode], [GSM community].**

Step 4. Set up the automatic search:

- **Press [Measurement Configuration], [Automatic Search].**

Step 5. After completing the above settings configuration, the instrument can identify the GSM signal and display the measurement results in the screen. The test results are shown in Figure 10.4:



.4 Figure 10 The GSM signal test results

10.2.3 GSM public network signal measurement

The GSM signal with known frequency points obtains the phase error, EVM, channel power and frequency error. The specific test steps are described as follows:

Step 1. Connect the omnidirectional antenna to the RF input port of the RMT series spectrometer, as shown in Figure 10.5:

Figure 10.5 The omnidirectional antenna connection of the monitoring receiver

Step 2. Select the GSM test mode for the RMT series spectrometer:

- Press [mode] and select [GSM cell].

. Step 3 Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], set the center frequency at 1.8284GHz.
- Press [level setting] and [reference level], and set the reference level to-15 dBm.

Step 4. Observation results:

- Observation test results are shown in Figure 10.6:

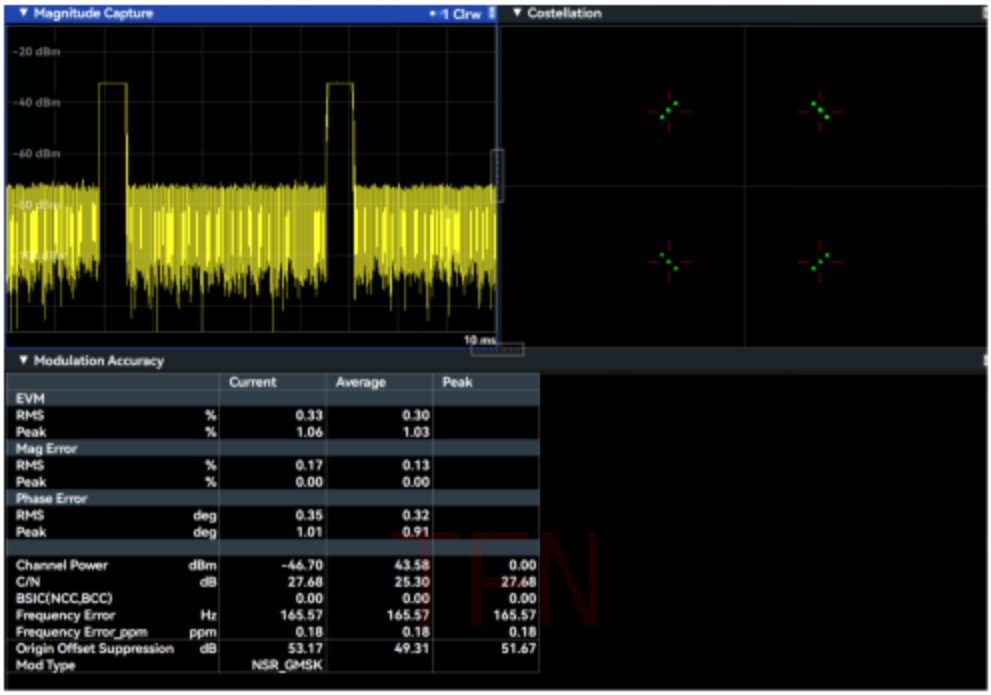


Figure 10.6 GSM signal test results

11. Vector demodulation mode

11.1, and the ordinary vector

Using the RMT series spectrometer, the user can detect and analyze the vector-modulated signal (Vector modulation).

11.1.1 Measurement configuration of the ordinary vector

Modulation type: PSK, MSK, QAM, FSK.

Modulation order:

a) PSK modulation type: BPSK, QPSK, 8 PSK.
b) MSK modulation type: MSK.
c) QAM modulation type: 16 QAM, 32 QAM, 64 QAM, 128 QAM, 256 QAM, 512 QAM, 1024 QAM.
d) FSK modulation type: 2 FSK.

Modulation mapping: DVB-C, GRAY, SMx.

Code rate: minimum 80 kHz, maximum 40 MHz.

Filter type: RRC, RC, GAUSS.

Filter factor: minimum value 0.03, maximum value 1.

Configuration: includes the demodulation setting bar and the emission filter bar.

a) Dodulation setting bar: including type, modulation mode, mapping, and symbol rate.
b) Emission filter bar: including type, roll-down coefficient, equalizer state switch.

11.1.2 Measurement steps

In this section, the vector signal is generated as the input signal to measure the EVM indicator of the analytical vector signal.

Step 1. Use a 16 QAM modulation signal, set the frequency to 1G Hz, the power is-10 dBm, the code rate is set to 1 MHz, and the filter type is Root Cosine (filter coefficient is 0.35). Connect the output of the device under test to the RMT series spectrometer RF input port, as shown in Figure 11.1. It is recommended to connect the reference signal for optimizing the test index. Referring to section 3.2.2.

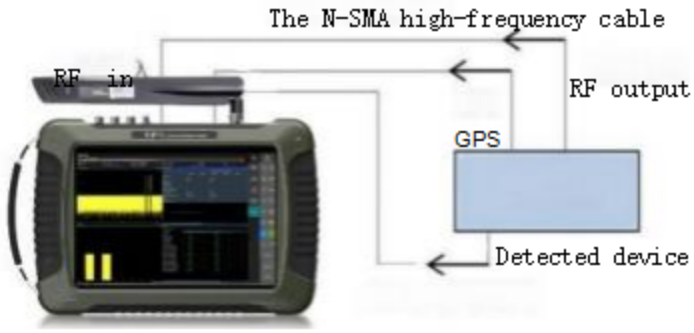


Figure 11.1, Schematic diagram of the tested equipment and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press the [mode], [vector demodulation].**

Step 4. Set the center frequency and reference level of the RMT series spectrometer:

- Press [frequency] and [center frequency], and set the center frequency to 1G Hz.
- Press [level setting], [reference level], set, the reference level is-10 dBm.

Step 5., Configure the measurement parameters:

- Press [Measurement Configuration], [Modulation Type] to select QAM.
- Press [Measurement Configuration], [Modulation Order] and select 16 QAM.
- Press [measurement configuration], [code rate], and enter 1 MHz.
- Press [Measurement Configuration], [Filter Type] to select the RRC filter.
- According to [measurement configuration] and [filter factor], the filter coefficient is set to 0.35. The measurement configuration interface is shown in Figure 11.2:

Figure 11.2 Measurement and configuration interface

Step 6. Observation results: After the above measurement configuration is completed, the instrument can identify the modulation signal and display the demodulation result in the screen, and adjust the appropriate [reference level] to minimize the EVM value. The test results are shown in Figure 11.3:

Figure 11.3 Measurement results after demodulation

11.2 The ETC vector

Using the RMT series spectrometer and the omnidirectional antenna, we can detect and analyze the ETC vector modulation signal, including signal frequency, signal intensity, occupied bandwidth, prelead code, etc. At the same time, the current position (longitude and longitude) can be recorded in real time, and the screen recording function of the device can be recorded.

11.2.1 Measurement configuration of the ETC vector

Modulation type: ETC-ASK.
Save ETC data: save ETC test data for a period of time to the specified path.
Read the ETC data: Read the saved ETC test data in the specified path.
ETC configuration: including frequency point and antenna factor.

11.2.2 Measurement steps

In this section, the ETC device is used to generate vector signals as the RMT series spectrometer input signal to measure the signal frequency, signal intensity, bandwidth, and lead code of the analysis signal. Use an omnidirectional antenna to connect the RF input port of the RMT series spectrometer with a set frequency of 5.83GHz and a reference level of-10 dBm for testing. The specific steps are described as follows:

Step 1. Connect the omnidirectional antenna to the RMT series spectrometer, as shown in Figure 11.4 below:

Figure 11.4 Schematic diagram of omnidirectional antenna and RMT series spectrometer

Step 2. Reset the RMT series spectrometer to the default state:

- **Press [Reset], [Reset all].**

Step 3. Select the test mode for the RMT series spectrometer:

- **Press the [mode], [vector demodulation].**

Step 4. Set the center frequency, the reference level:

- Press [frequency] and [center frequency], and set the frequency to be measured through the number key, set to 5.83G Hz.
- Press [Level Setting] and [Reference Level], and set the reference level through

the number key to-10 dBm.

Step 5., Configure the measurement parameters:

- Press [Measurement Configuration], [Modulation Type] and select ETC-ASK.

. Step 6: Configure the measurement parameters:

- According to [ETC configuration], frequency 5.83GHz, antenna factor 2dB (determined by different antennas), as shown in Figure 11.5:

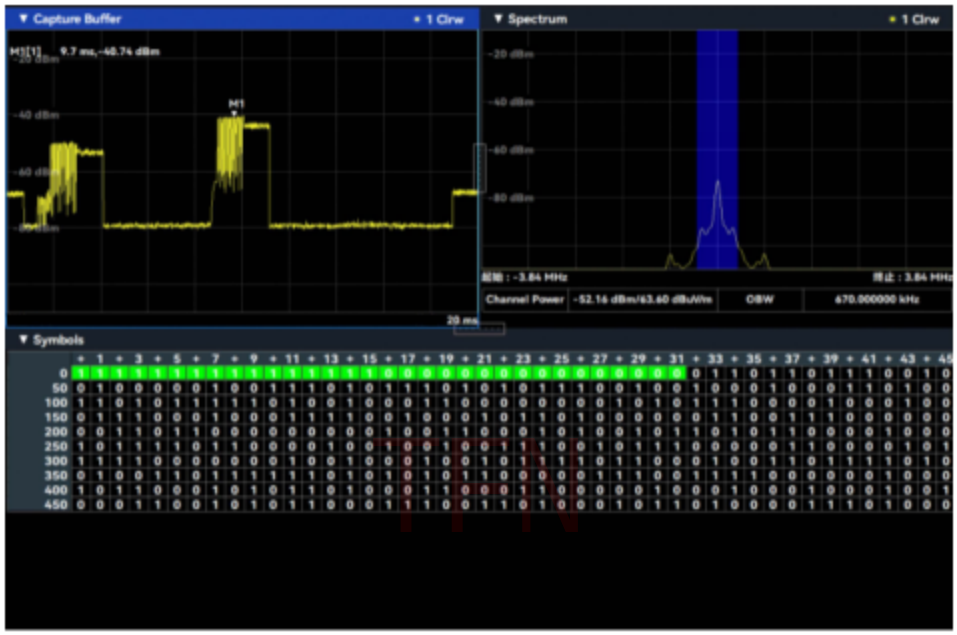


Figure 11.5 Measurement and configuration interface

. Step 7 Observation result: After the above measurement configuration is completed, the instrument can identify the modulation signal and display the demodulation result in the screen. The test results are shown in Figure Figure 11.6:

Figure 11.6 ETC signal measurements

12 Fault diagnosis and repair

This chapter will tell you how to identify problems and receive after-sales service, and describe common error information for the RMT family spectrometers.

If you buy RMT series spectrometer, encounter some problems during operation, or you need to buy related components or accessories, the company will provide perfect after-sales service.

Usually, the cause of the problem is from the hardware, software, or user misuse. Once there is a problem, please contact us in time. If the RMT series spectrometer you purchase is under warranty, we will make free service as promised in the warranty, we will only charge cost.

12.1 Troubleshooting

Usually, the cause of the instrument problems from the hardware, software, or user misuse, please first observe the error information and save, analyze the possible causes and refer to the chapter "12.1.1 fault diagnosis basic process" and "12.1.2 common fault phenomenon and troubleshooting method", to solve the problem. We can also contact our customer service center and provide the collected error information, we will help you to solve the problem. For details, please refer to the contact information provided in this manual, or the company online to find the nearest technical support contact information.

point out

Fault diagnosis and guidance

This part is to guide you on how to simply judge and deal with the failure of the RMT series spectrometer. If necessary, please feedback the problem to the manufacturer as accurately as possible, so that we can solve it for you as soon as possible.

12.1.1 Basic process of fault diagnosis

After the instrument has any problems, please first perform the following checks:

a) Is the power socket still electrical?

b) Is the RMT family spectrometer turned on? Check the power switch status and note the internal fan noise to determine if the instrument cooling fan is running.

c) If other instruments, cables, and connectors are used with the RMT series spectrometer, make sure they are properly connected and working properly.

d) If the RMT Series spectrometer cannot communicate through the LAN, check the cable port and if the light does not flash, check the LAN cable and connection.

If the RMT Series spectrometer does not fully load or run the operating system, or the instrument's application has not been successfully started, the problem may be hard drive damage.

12.1.2 Common fault phenomena and troubleshooting methods

Below are the common faults and troubleshooting methods according to the function type.

12.1.2.1, there are problems in the startup process

If the RMT series spectrometer fails during startup, it may involve power supply, processor hardware, system setting, instrument setting and other aspects. This section will analyze the possible failures and causes of the RMT series spectrometer. The entire start time of the instrument takes about 2 minutes, with the different hardware configurations, installation options of the instrument, and the number of measurement applications.

1) System startup exception

Press the power switch on the upper panel and the system activates. If the instrument is not powered up or the system is not started successfully, the instrument power supply fails or the system may crash. Please contact the customer service center according to the contact information provided in this manual and provide the collected error information. We will help you to solve the problem as quickly.

2) Fan anomaly

After the RMT series spectrum power, all the fans of the instrument should work. If the fan is not working, it may be the instrument power failure; if individual fans do not work, the fan may fail. Please contact the customer service center according to the contact information provided in this manual and provide the collected error information. We will help you to solve the problem as quickly.

12.1.2.2 Instrument setting problem

When the RMT series spectrometer enters the test interface and successfully completes all the startup operation, the instrument enters the normal test state, and the continuous refreshed spectrum can be seen on the interface. However, if some parameters of the instrument are not set properly, the user may not be able to see the desired spectrum or signal. If the spectrum refresh or signal display fails, please check the following settings first:

1) Spectrum trajectory is not refreshed or refreshed abnormally

If the spectrum track on the interface is not refreshed, or the refresh is not normal, refer to the following steps:

a) Click [Run continuously] on the interface control panel to observe whether the spectrum is refreshed. If there is still abnormal, please proceed to the next step.

b) Click [Mark Search] and [Peak Mark] to see if the mark reading changes. If there is a marked reading change, it may be due to setting, for example, the reference level is too high, and the spectrum is at the bottom of the screen, so that the spectrum can not be seen. In this case, the reference level can be small and observe the spectrum again. If the mark reading is not moving, it may be a data return error, please try to restart the machine. If the fault is still not eliminated, please contact the customer service center according to the contact information provided in this manual and provide the collected error information. We will assist you to solve the problem as soon as possible.

2) No signal is shown

If all bands have no signal display, please follow the following steps: check whether the hardware configuration is normal, if there is still no signal, then the hardware circuit of RMT series spectrum instrument may fail, please contact the customer service center according to this manual and provide the error information, we will assist you to solve the problem at the fastest speed.

12.1.2.3: Abnormal signal frequency reading

If the signal finds that the signal is shaking on the RMT series spectrometer screen or the frequency reading exceeds the error range, first check whether the signal frequency of the input RMT series spectrometer is stable. If the input signal frequency is stable, then it may be the internal local vibration failure of the RMT series spectrometer, please contact the customer service center according to the contact information provided in this manual and provide the collected error information. We will assist you to solve the problem as soon as possible.

12.1.2.4 The instrument network cannot be connected

1) First, ensure that the network supports the Internet function.

2) Ensure that the appropriate IP settings are obtained from the system administrator.

3) Check whether the network cable of the access instrument network interface is intact.

Check whether the access cable is inserted in the LAN interface on the panel of the RMT series spectrometer and whether orange lights flashes at the interface. If you still cannot get online, please contact the customer service center according to the contact information provided in this manual and provide the collected error information. We will help you to solve the problem as quickly as possible.

12.2, the repair method

12.2.1 Contact us

If there is a problem with RMT series spectrum instrument, first observe the error information and record the fault phenomenon, analyze the possible causes and refer to the method provided in chapter "12.1 fault diagnosis and troubleshooting" to investigate and solve the problem in advance. Also contact our customer service center and provide the error information, we will help you to solve the problem.

12.2.2 Packaging and Mailing

When your RMT series spectrum meter, contact us by phone. If contact confirms that the RMT series spectrometer needs repair, please package the RMT series spectrometer in the original packaging material and box and follow the following steps:

1) Write a detailed description of the RMT family spectrum and into the box with the RMT family.
2) RMT family spectrometers with original packaging material to minimize possible damage.
3) Seal the opening with tape and reinforce the box with nylon tape.
4) On the box, mark the words " fragile! Don't touch!handle with care!"model of written characters.
5) Please check it by precision instrument.
6) Keep copies of all shipping documents.

Notice

Package the RMT family spectrometer to note

Package the RMT series spectrometer with other materials, which may damage the instrument. It is forbidden to use polystyrene balls as the packaging material, on the one hand, they can not fully protect the instrument, on the other hand, they will be electrostatic suction into the instrument fan, causing damage to the instrument.

point out

Packaging and transportation of the instrument

When transporting or handling this instrument, please strictly follow the precautions described in section "2.2.6 Transportation" of this manual.