4025 Series

Spectrum Analyzer

Quick Start Guide

Ceyear Technologies Co., Ltd.

This manual applies to the following models of Spectrum Analyzers.

●The 4025 series spectrum analyzer includes models 4025A/B/D/E/G/K

Options other than standard accessories are as follows:

●4025-01 English options: English signs, English configuration software, English quick start guide.

●4025-02 User Manual (Chinese version).

●4025-03 User Manual (English version).

●4025-04 Programming Manual (Chinese version).

●4025-05 Programming Manual (English version).

●4025-S01 USB power measurement function: Built-in software function, providing power measurement function of USB interface, used with 4025-H12、4025-H13、4025-H14、4025-H15.

●4025-S02 USB peak power measurement function: Built-in software function, providing peak power measurement function of USB interface, used with 4025-H16、4025-H17、4025-H18、4025-H19.

●4025-S03 Interference analysis function option: Built-in software function, providing waterfall plots, RSSI measurement function.

●4025-S04 Channel sweep function options: Built-in software function, realizing multi-channel or multi-frequency signal power measurement.

●4025-S05 Field strength measurement function option: Built-in software function, providing field strength measurement functions.

●4025-S06 Outdoor map option: It has built-in software function and can be used for RSSI test and ACPR test,, used with 4025-H01 option.

●4025-S07 Indoor map option: It has built-in software function and can be used for RSSI test and ACPR test.

●4025-S08 Analog demodulation function option: Built-in software function, realizing modulation characteristic analysis of AM/FM/PM signals.

●4025-S09 Zero-span IF output option: Built-in software function, outputting IF signals at zero span.

●4025-S10 Gated Sweep option: Built-in software function for time-division interference signal testing, used with 4025-H01 option for wireless signal testing.

●4025-S11 Location Analyzer option: Built-in software function for locating external

interference sources or unknown signals, to be used in conjunction with the 4025-H01 option, the USB electronic compass option and the directional antenna option.

●4025-S12 40MHz bandwidth real-time spectrum analysis option: Built-in software function, providing real-time spectrum analysis and digital fluorescence test function, with the max. real-time bandwidth of 40MHz.

●4025-S13 List sweep function option: Enabling continuous sweep of multiple frequency bands for measurement.

●4025-S14 IQ analysis function option: built-in software function to realize the storage and display of IQ data.

●4025-S15 GSM/EDGE measurement function option: built-in software function to be used with H37x for demodulation and analysis of GSM/EDGE signals.

●4025-S16 LTE analysis function option: built-in software function to be used with H37x for demodulation and analysis of LTE signals.

●4025-S17 5G NR measurement function option: built-in software function to be used with H37x, which is mainly applied to measuring, analyzing and displaying signals emitted from 5G base stations.

●4025-S18 Vector signal Analysis function option: built-in software function, which is mainly used for demodulating and analyzing various sing-carrier digital modulated signals, and can provide multiple display windows such as spectrum diagrams, vector diagrams and eye diagrams etc. to analyze the characteristics of the modulated signals .

●4025-S19 EMI analysis function option: built-in software function providing EMI scanning , list scanning functions, with CISPR average, CISPR effective and quasi-peak detector.

●4025-S20 Phase Noise Meter function option: built-in software function providing single sideband phase noise curve and single-point phase noise testing.

●4025-H01 GPS/Beidou function option: Positioning function can be realized through the external antenna.

●4025-H02 WIFI wireless communication option: Wireless communication with external devices.

●4025-H03 Aluminum alloy trolley case: High strength aluminum alloy case with handles and casters for transport.

●4025-H04 Trolley transport case: High strength lightweight case, with carrying handles and casters for transport.

●4025-H05 Portable backpack: Daily protection of instruments.

●4025-H06 Power adapter: Standby power adapter.

●4025-H07 9900mAh rechargeable lithium-ion battery: backup battery pack, nominal voltage 10.8V, battery capacity 9900mAh, not suitable for air transportation.

●4025-H08 9000mAh rechargeable lithium-ion battery: spare battery pack, nominal voltage 10.8V, battery capacity 9000mAh, allowed for air transportation.

●4025-H09 Vehicle power adapter: vehicle charger field, input voltage 12~24V, output voltage 19V, supplying power to handheld measuring instruments.

●4025-H10 Intelligent battery charging dock: charging dock for lithium-ion batteries.

●4025-H11 Storage card: Kingston MicroSD Class10 (128G) storage card.

●4025-H12 87230 USB continuous wave function probe: Frequency range: 9kHz ~ 6GHz, interface type N(m).

●4025-H13 87231 USB continuous wave function probe: Frequency range: 10MHz ~ 18GHz, interface type N(m).

●4025-H14 87232 USB continuous wave function probe: Frequency range: 50MHz ~ 26.5GHz, interface type 3.5mm (m).

●4025-H15 87233 USB continuous wave function probe: Frequency range: 50MHz ~ 40GHz, interface type 2.4mm (m).

●4025-H16 87234D USB peak/average power meter: Frequency range: 50MHz ~ 18GHz, interface type N(m).

●4025-H17 87234E USB peak/average power meter: Frequency range: 50MHz ~ 26.5GHz, interface type 3.5mm(m).

●4025-H18 87234F USB peak/average power meter: Frequency range: 50MHz ~ 40GHz, interface type 2.4mm(m).

●4025-H19 87234L USB peak/average power meter: Frequency range: 500MHz ~ 67GHz, interface type 1.85mm(m).

●4025-H20 ZE9080 directional antenna A: frequency range: 9kHz ~ 20MHz, interface type N (f), recommended for use with option 4025-H24.

●4025-H21 ZE9080 directional antenna B: frequency range: 20MHz ~ 200MHz, interface type N (f), recommended for use with 4025-H24 option.

●4025-H22 ZE9080 directional antenna C: frequency range: 200MHz ~ 500MHz, interface type N (f), recommended for use with 4025-H24 option.

●4025-H23 ZE9080 directional antenna D: frequency range: 500MHz ~ 8GHz, interface type N (f), recommended for use with 4025-H24 option.

●4025-H24 ZE9080 antenna amplifier: frequency range: 9kHz ~ 8GHz, interface type N(m), used with Option ZE9080 antenna module A/B/C/D, including amplifier and electronic compass.

●4025-H25 ZE9080 antenna transport case: special transportation case for ZE9080 antenna, used to contain ZE9080 antenna module A/B/C/D and ZE9080 antenna amplifier.

●4025-H26 Active log-periodic antenna: Directional antenna with the frequency range of 700MHz ~ 6GHz, interface type SMA(f).

●4025-H27 Active log-periodic antenna: Directional antenna with the frequency range of 680MHz ~ 10GHz, interface type SMA(f).

●4025-H28 Active log-periodic antenna: Directional antenna with the frequency range of 680MHz ~ 20GHz, interface type SMA(f).

●4025-H29 6GHz Omni-directional antenna: Portable omni-directional antenna, frequency 680MHz~6GHz, interface type SMA(m).

●4025-H30 8GHz Omni-directional antenna: Portable omni-directional antenna, frequency 300MHz~8GHz, interface type SMA (m).

●4025-H31 Passive log-periodic antenna: With the frequency range of 700MHz ~ 6GHz, interface type SMA (f).

●4025-H32 Passive log-periodic antenna: With the frequency range of 680MHz ~ 10GHz, interface type SMA (f).

●4025-H33 Passive log-periodic antenna: With the frequency range of 680MHz ~ 18GHz, interface type SMA (f).

●4025-H34 USB electronic compass: External USB Electronic Compass can be used with 4025-H26~4025-H28, 4025-S11 options.

●4025-H35 N/SMA-JJ RF cable(2m): N/SMA double positive RF coaxial cable , frequency range, DC ~ 18GHz, length 2m.

●4025-H36 PBS1 near field probe: Maximum frequency to 9GHz, with 1 electric field probe and magnetic field probes for 6mm, 12mm, 25mm and 50mm, Interface: SMB(m).

●4025-H37A 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025A.

●4025-H37B 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025B.

●4025-H37D 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025D.

●4025-H37E 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025E.

●4025-H37G 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025G.

●4025-H37K 120MHz bandwidth real-time spectrum analysis: providing 120MHz bandwidth Real-time Spectrum analysis function, only applicable to 4025K.

Version: A.2 October. 2024, Ceyear Technologies Co., Ltd.

Address: No. 98, Xiangjiang Road, Qingdao Economic & Technological Development Zone, Shandong Province

Service Consultation: 400-1684191

Website: www.ceyear.com

Email: techbb@ceyear.com

Postal code: 266555

Foreword

Thank you for choosing and using 4025 series Spectrum Analyzer developed and produced by Ceyear Technologies Co., Ltd.! This product features quality, precision and excellence, and has a high cost performance/performanc e-price ratio among similar products.

We will take the responsibility to meet your needs and provide you with high-quality measuring instruments and good after-sales service. We aim to provide "high quality and considerate service", and operate on the principle of making customers satisfactory with our products and services.

Manual No.

YQ2. 731.1262SKEN

Version

A.2 2024.10

Ceyear Technologies Co., Ltd.

Manual Authorization

The contents of this manual are subject to change without notice. The contents and terms used in this manual are interpreted by Ceyear Technologies Co., Ltd.

Product warranty

The warranty period of this product is 18 months from the date of shipment. The instrument manufacturer will repair or replace the damaged components as required within the warranty period. For specific maintenance issues, see the contract.

Product quality certificate

This product is guaranteed to meet the specifications in this manual from the date of shipment. The calibration and measurement are completed by measuring bodies with national qualification, with relevant data to be provided for reference by users.

Quality/Environmental Management

This product complies with the quality and environmental management systems during R&D, manufacturing and testing. Ceyear Technologies Co., Ltd. is qualified and has passed ISO 9001 and ISO 14001 management systems.

Safety Precautions

The symbol " Caution " indicates a hazard. It reminds the user to pay attention to a certain operation process, operation method or the like. In case of any failure of observing the rule or maloperation, minor or moderate personal and equipment injuries can occur. Further operation cannot be proceeded until the warning conditions are fully understood and met.

The “ Notice ” symbol indicates some important information operation, and failure to observe it may cause damage to the instrument or loss of important data. Proceed to the next step only after fully understanding and meeting the notice conditions indicated; otherwise, danger may happen. It reminds the user to pay attention to a certain operation process, operation method or the like. Proceed to the next step only after fully understanding and meeting the notice conditions indicated.

Contents

1. Manual navigation

This chapter introduces the Quick Operation Guide's manual functions, chapter structure and main contents of 4025 series Spectrum Analyzer, as well as the instrument-related documents provided to users.

1.1. About the Manual

This manual introduces the structure and use of 4025 Series Spectrum Analyzer (hereinafter referred to as 4025) from such aspects as instrument panel, power supply, startup, typical applications and obtaining after-sales support. By reading this manual, we can have a relatively systematic overall understanding of 4025, and can quickly master some basic operations of the Analyzer. To facilitate your skillful use of such instrument, please read carefully and follow this manual in advance for correct operation.

The *Quick Start Guide of 4025 Spectrum Analyzer* contains the following chapters and sections:

●Get Prepared

This chapter introduces the preparation before operation, startup, panel introduction and battery replacement of 4025 After reading this chapter, you can have a perceptual knowledge of 4025 as a whole, and make early preparation for correct and safe operation of the instrument.

●Typical Applications

This chapter details the basic measurement methods of the 4025, and through test examples such as how to resolve signals that are very close to each other, how to improve frequency measurement accuracy, and how to measure small signals, it details the operation steps of the basic measurement functions of the 4025, and gives a brief explanation of the techniques used in testing. After reading this chapter, you can independently use 4025 to complete some typical testing.

●Get Help

This chapter includes two parts: after-sales maintenance and repair, with a focus on troubleshooting, maintenance and repair of the instrument during use.

1.2 Related Documents

Product documentation for 4025 includes:

- Quick Start Guide
- User's Manual
- Program Control Manual

Quick Start Guide

This manual introduces the basic methods for configuration and start-up measurement of the instrument to enable users to quickly understand the characteristics of the instrument, and master the basic settings and basic operation methods. Main chapters include:

- Get Prepared
- Typical Applications
- Get Help
- Appendixes

User's Manual

This manual describes the functions and operation methods of the instrument in detail, including configuration, measurement and maintenance, etc. The purpose is to guide users to fully understand the functional characteristics of the product and master common testing methods of the instrument. Main chapters include:

- Manual Navigation
- Overview
- Operation Guide
- Spectrum Analyzer Mode
- Interference analysis measurement Mode (option)
- Location analyzer Mode (option)
- AM/FM/PM analyze Mode (option)
- Power Measurement Mode (option)
- Channel Sweep Mode (option)
- Field strength measurement Mode (option)
- Real-time spectrum measurement Mode (option)
- Peak power Mode (option)

- Time gate sweep Mode (option)
- IQ analysis Mode (option)
- GSM/EDGE measurement Mode (option)
- LTE Analysis Mode (Option)
- 5GNR Mode (option)
- Troubleshooting and Repair
- Technical specifications and testing methods

Program Control Manual

This manual introduces remote programming basics, SCPI basics, SCPI, and programming examples in detail. The purpose is to guide users to quickly and comprehensively master the program control commands and methods of the instrument. Main chapters include:

- Manual Navigation
- Remote Control
- Program Control Commands
- Programming Examples
- Error Description
- Appendixes

2 Get Prepared

The 4025 Series Spectrum Analyzer have multiple advantages such as wide frequency band coverage, rich testing functions, excellent performance specifications, as well as simple and convenient operation. The 4025 Series Spectrum Analyzer provide multiple measurement modes, and feature excellent average noise level, phase noise and high sweep speed. Adopting integrated design of 10.1-inch LCD and capacitive touch screen and hand-held structure, the products feature small size, light weight, flexible power supply, and easy maneuverability, and are thus suitable for field operation. This chapter will focus on the test environment, power supply, structure and battery replacement of the instrument.

2.1 Preparation before operation

This section introduces the precautions before first use of 4025. 4025 meets the safety requirements specified in GJB 3947A-2009. Please read the following safety instructions carefully so as not to cause damage to the instrument or unnecessary personal injury.

Avoid damaging the instrument:

Pay attention to the follow to avoid electric shock, fire and personal injury:

➢Do not open the cabinet arbitrarily;

➢Do not try to disassemble or refit any part of the instrument not mentioned in the manual. Otherwise, such consequences as reduced electromagnetic shielding property and internal component damage can occur, affecting product reliability. In

this case, we will not provide any free maintenance any more even if the product is still in the warranty period.

➢Read carefully relevant contents in "2.2 Safety operation instruction" of the user manual as well as the following precautions on safety operation, and pay attention to the requirement on specific operation environment involved in the data pages.

NOTICE

Electrostatic Protection

Take electrostatic protection measures at workplaces to avoid any damage caused by the instrument. For details, please refer to "2.1.4 Electrostatic Protection (ESD)" in the manual.

NOTICE

Pay attention to the following when operating the instrument:

Improper operating or measuring can damage the instrument or the one connected to it. Pay attention to the following before powering on the instrument:

➢ Keep the air vent unblocked;

➢Keep the instrument level, and arrange it properly;

➢Keep the instrument dry;

➢Make sure the environment temperature meets with the requirement noted in the data page;

➢The input signal power and voltage of the RF port are within the range marked;

➢Make sure the signal input port is connected properly, without any overload.

TIPS

Effect of electromagnetic interference (EMI)

Since EMI can affect the measurement result, pay attention to the following:

➢Select proper shield cables. For example, to use the double-shielded RF/network connection cable;

➢In case of any opened cable connection port, close the output port not used temporarily or connect proper load to the port;

➢Ref. to the EMC level labels in the Data Page.

2.1.1 Unpacking

2.1.1.1 Visual examination

Step 1. Check the outer packing box and instrument shock-proof package for any damage. If not, continue to check according to the following steps.

Step 2: unpack, and check the mainframe and articles provided in the package for any damage;

Step 3. Check carefully the articles mentioned above as per Table 2.1 for any problem;

Step 4: in case of any outer package damage, or damage or problem to the instrument or articles provided in the package, never power the instrument on or start it up! Please contact our customer service center as per the contact information provide in title page or “4.3 Method to get after-sales service” of the operation manual, and we will repair or replace it as soon as possible as per actual conditions.

NOTICE

Handling: Since the instrument and the packing box are heavy, they should be handled with care.

2.1.1.2. Model confirmation

Table 2.1 List of articles provided together with the 4025

Name	Quantity	Function
Mainframe:		
✧ 4025 Spectrum Analyzer	1	—
Standard Configuration:		
✧ Standard 3-core power cord	1	—
✧ Power Adapter	1	—
✧ Rechargeable li-ion battery	1	—
✧ Quick Start Guide	1	—
✧ Product Certificate of Conformity	1	—
✧ Packing List	1	—
Options		
✧ Several options		

2.1.2 Environmental requirements

In order to ensure the service life of 4025 and the validity and accuracy of measurement, please carry out the tests under the following environmental conditions:

2.1.2.1 Temperature range

Storage temperature (spectrum analyzer, without battery) range: -50℃ ~ +70℃;

Working temperature range: -20℃ ~ +55℃;

Battery storage temperature range: -20℃ ~ +60℃;

Battery charging temperature range: +10℃ ~ +45℃.

Avoid the dangers caused by the hot battery:

Since the operating temperature range of the battery in the analyzer is -20℃ to 55℃, the analyzer with the battery should not work continuously for a long time at high temperature, to avoid danger caused by internal high temperature. It is recommended to use an adapter for power supply.

2.1.2.2 Low air pressure

Low air pressure (altitude): 0-4600m

2.1.3 Power supply requirement

The 4025 spectrum analyzer can be powered in three ways:

2.1.3.1 AC Power Supply and Adapter

When adopting AC power supply, the enclosed AC-DC adapter must be used. The input of the adapter is 100-240V, 50/60Hz AC.

To avoid overheating, please do not connect the AC-DC adapter to the 4025 when transporting or carrying it with a backpack. Ensure that the power supply voltage is within the range required in Table 2.2.

Table 2.2 Power supply requirements

Power supply parameter	Applications
Input voltage	100V ~ 240V_{AC}
Rated input current	1.5A
Working frequency	50/60Hz
Output voltage/current	19.0V/4.7A

Notice

Adapter power supply:

The operating voltage and frequency ranges should be subject to the data on the nameplate of the power adapter.

2.1.3.2 DC Power Supply

Voltage: 14~19V;

Current: 3A (min.)

2.1.3.3 Built-in Battery Power Supply

4025 series can be powered by a rechargeable lithium-ion battery. If the battery is left unused for a long time, it will be discharged by itself, so it must be charged before being used again. Please pay attention to the following during battery use. The basic parameters of the enclosed battery are as follows:

Nominal voltage: 10.8V

NOTICE

Please pay attention to the following during the use of rechargeable lithium-ion batteries:

1) Electrostatic prevention: The battery is equipped with protective circuitry to avoid various accidents. Do not use the battery in a place where Electrostatic is generated because it (more than 8KV) may damage the protection board, resulting in abnormal battery operation.

2) Charging: The battery of this instrument can only be charged with a special lithium battery pack charger, with the specification corresponding to the charging parameter requirements of this specification. The battery pack cannot be directly connected to the utility or an adapter for charging.

3) Storage: If the battery pack is to be put aside for a long time, ensure certain battery level before storing the battery, wrap the battery with non-conductive materials to avoid direct contact with metal batteries, and store the battery in a cool and dry place. Charge the battery every 6 months to prevent in-depth over-discharge of the battery after long-term storage.

WARNING

1) It is prohibited to disassemble or assembly the battery by any means.

2) It is prohibited to hit, throw or cause strong mechanical vibration of the battery.

3) It is prohibited to puncture the battery with sharp objects, such as nails.

4) It is prohibited to put the battery into a microwave oven or a pressure vessel, and keep it away from it heat and high pressure sources during use.

5) It is prohibited to use the battery in combination with batteries of different capacities, models and varieties.

2.1.4 Electrostatic discharge (ESD)

Attention should be paid to ESD protection when using the instrument. The following ESD protection measures, if applicable, can be taken:

➢Before connecting the cable to the instrument for testing, make sure that the center conductor of the cable is grounded first. This can be achieved in the following steps: connect a shorting device to one end of the cable to short-circuit the center conductor and the outer conductor of the cable. When wearing antistatic wrist straps, grasp the housing of the cable connector, connect the other end of the cable, and then remove the shorting device.

➢The operator should be grounded before cleaning or checking the test port of the device or connection. This can be realized by holding on to the metal casing of grounded device or the casing of test cable connector.

2.1.5 Instructions of start

Before powering 4025, please check the power supply equipment according to "Power supply requirements" in section 2.1.3. The power-on test can only be performed after confirmation.

Connect the 4025 with the power adapter, and observe that the power indicator on the front panel is yellow, which indicates that the standby power supply is working normally. Gently press the Power ON/OFF key 【⏻】 on the front panel for more than 3 seconds, observe that the power indicator on the front panel turns green and the backlight of the display is on. It takes about 30 seconds for the display startup until the normal startup status interface is displayed. In order to stabilize the performance indicators of the internal devices of the instrument and achieve better test effect, it is recommended to preheat instrument for at least 30 min before measurement. When the instrument is to be used for a long time, it should keep a distance of 10 cm or more from surrounding facilities to prevent ventilation and heat dissipation problems from impacting the measurement accuracy.

2.2 Instrument appearance

This section introduces the composition and functions of the front and rear panels as well as operation interface of 4025 series.

2.2.1 Front panel

This section details the front panel of 4025, which is shown in Figure 2.1.

Figure 2.1 Front panel of 4025

2.2.1.1 Power key/reset key and indicator

Located in the lower left corner of the front panel of 4025, it is used for startup, shutdown and reset of the 4025. If an external power adapter is used for power supply, when the instrument is in the "standby" state, the yellow indicator near the power switch is on; gently press the power switch, and then the indicator will turn green, indicating that the instrument is in the "working" state. During the working status, press the power key lightly to select shutdown and reset in the pop-up dialog box. After shutdown, the instrument will exit the program and turn off the power supply; After resetting, the instrument can be restored to the initial power-on state. The power indicator colors correspond to the physical states of the instrument, as shown in the following table.

Table 2.3 Description of indicator status

Instrument status	Indicator status	Physical state of 4025
Power off	OFF	a) Battery installed, power not connected. b) Battery not installed, power not connected.
	Normal on, yellow	a) Battery not installed, power connected. b) Battery installed and full, power connected.
	Flashing, yellow	Battery installed and not full, power connected.
Power on	Normal on, green	a) Battery not installed, power connected. b) Battery installed and full, power connected. c) Battery installed, power not connected.
	Flashing, green	a) Battery installed and not full, power connected.

2.2.1.2 Function keypad

The functions of common keys are described as follows:

➢[Freq]: It is used to set the frequency range, frequency step, signal standard, etc. for measurement.

➢[Span]: It is used to set the span and IF output of the measurement.

➢[Amplitude]:It is used to set the amplitude parameters for displaying measurement results, including display format, display scale, preamplifier control, etc.

➢[BW]: It is used to set such parameters as measurement RBW, VBW, detector type and average.

➢[Marker]: It is used to open the function menu related to the marker. When the marker is turned on, you can also manipulate the marker by touch such as dragging and clicking.

➢[Peak]: It is used to turn on the peak search function.

➢[Sweep]: It is used to set such parameters as Swp Time, Swp Type and Swp Mode, etc.

➢[Trace]: It is used to set such parameters as Max Hold, Min Hold and REFH Trace,

➢[Limit]: It is used to set such parameters as Limit line, Store and Call Limit.

➢[Measure]: It is used to select the measurement function in the measurement mode. For instance, in the normal spectrum analyzer mode, it offers such measurement functions as field strength, channel power, and occupied bandwidth.

➢[Config]: Press this key to skip to the measurement function setting menu when a certain measurement function is enabled.

2.2.1.3 Numeric keyboard

The digital keyboard includes arrow keys, sliding axle, numeric keys, Backspace, Cancel, and Enter keys. All inputs can be changed through keys and the knob in the digital keypad. Among them, the functions of the keys in the digital keypad are shown in table below.

Table 2.4 Function description of digital keyboard

No.	Name	Description
1	Direction keys	Up/Down keys are used to increase or decrease the value. There is no left/right key there. The step value of Up/Down keys corresponds to the step amount of each parameter.
2	Sliding axle	Increase or decrease the value. Slide up to increase the variable, and decrease the variable vice versa. The sliding sleeve can change the size of the value together with the Up/Down keys, and has the same amount of steps as the Up/Down keys.
3	Digital key	Enter numbers (including negative signs).
4	Backspace key	Undo the last data bit by bit depending on the state of the set number.
5	Esc key	Cancel the currently entered data that is not valid.
6	Enter key	Confirm the current parameter setting.
7	Info bar	Used to display the name and content of the currently edited project.

2.2.1.4 Soft key menu zone

This area is mainly used to display the menu of the current function, and different function keys in the function key area correspond to different menus.

2.2.1.5 System information display area

This area is mainly used to display date and time, power supply mode, GPS, WIFI, and other system information.

2.2.1.6 Label display area

This zone mainly includes instrument model, name, and frequency band covered.

2.2.1.7 Loudspeaker

The 4025 is equipped with a loudspeaker for audio demodulation output. Please keep its opening clean, so as to guarantee the sound effect.

2.2.1.8 Light sensing hole

It can sense the intensity of external light and is used for automatic LCD brightness adjustment.

2.2.1.9 Test results display area

This area is mainly used to display measurement data and basic information such as center frequency and sweep bandwidth. The contents displayed vary with the measurement mode.

2.2.1.10 System function zone

This area is mainly used for file operation, switching measurement mode, system settings and snapshot.

2.2.1.11 Left information display zone

This area is mainly used to display information such as reference level, attenuator value, RBW, VBW and sweep time, and can be touched for quick settings of corresponding parameters.

2.2.2 Operator interface

The 4025 is designed with an integrated 10.1-inch LCD and capacitive touch screen, and the operating interface is shown in Figure 2.2.

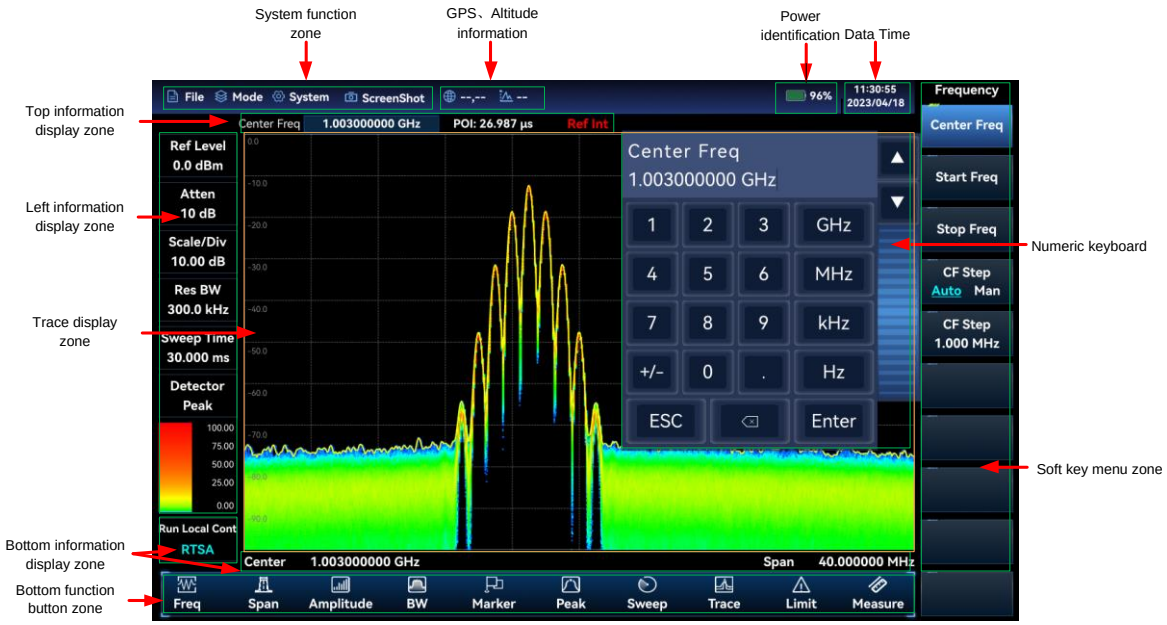

Figure 2.2 Operator interface of 4025

2.2.3 Top and side panels

Through taking 4025D as an example, the top and side panels of the 4025, as shown in Figure 2.3, can be divided into three parts: power interfaces, digital interfaces and test ports.

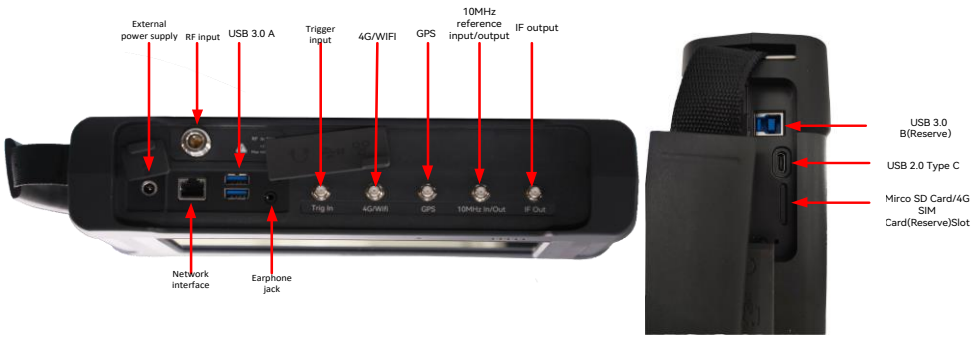

Figure 2.3 Top (left) and side (right) panels of 4025D

2.2.3.1 Power interface

The power interface of the instrument can supply power to the 4025 via the DC output of a AC-DC adapter or external DC power supply. The inner conductor of the external power interface is positive, and the outer conductor is grounded.

2.2.3.2 Test port

Table 2.5 Description of test port

No.	Name	Description
1	RF input interface	It is used for the input of the measured signal with 50Ω input port, N(f) port for 4025A/B/D, 3.5mm(m) port for 4025E, and 2.4mm(m) port for 4025G/K.
2	Trigger input port	The 4025 series can be set to external trigger mode. The external trigger source is connected to the trigger input port of the spectrum analyzer, and the output range of the source must be -5V to +5V. It can be set by software whether to use rising edge trigger or falling edge trigger.
3	4G/WIFI port	After connecting 4G (reserved) /WiFi antenna device, the spectrum analyzer can communicate with the outside world. The 4G port is reserved and not supported at present. (Optional).
4	GPS port	Connect a GPS antenna device to locate the current position of the spectrum analyzer. (Optional).
5	10MHz reference input/output port	The 10MHz signal from other devices can be externally connected as the reference signal of the 4025; the internal 10MHz reference signal of the 4025 can also be output for use by external devices.
6	IF output port	In the case of zero span, the IF signal output can be provided through software configuration for use by external devices. (Optional).

Danger identification of port:

To better protect the spectrum analyzer, the test port of the instrument is provided with some symbols. When using the 4025 series, users must pay attention to the symbols, so as to avoid permanent damage to the instrument.

Refer to the section 2.2.3.4 for the description of the symbols of the instrument.

2.2.3.3 Digital interface

Table 2.6 Description of testing port

No.	Name	Description
1	LAN (harness) interface	It is a 100/1000Mbps network interface that can be connected to a computer (PC) via a network cable. The PC can remotely control or transfer data to the 4025 series spectrum analyzer via programmed commands or programmed function libraries.
2	USB 2.0 Type C interface	Connect to an external PC, which can remotely control the 4025 series spectrum analyzer via programmed commands or programmed function libraries.
3	Earphone jack	3.5mm/3 wire standard earphone interface, used for FM/AM/SSB demodulation sound output. If the port is not connected to the earphone, the sound is output via the speaker of the 4025; when it is connected to the earphone, the sound output is switched from the speaker to the earphone automatically.
4	USB3.0 type-B interface (Reserved)	Reserved port for high-capacity IQ data transmission online.
5	USB3.0 Type-A interface	It is used to connect USB peripherals, such as USB A storage devices and USB A power probe.
6	Micro SD card and SIM card (reserved) slots	Micro SD card slot, which can be used for expanding the storage space of the instrument. The SIM card slot is reserved and is not supported at present.

NOTICE

Precautions for USB interface connection:

Device driver must be installed before connecting the 4025 to the PC via the USB for the first time.

2.2.3.4 Instrument symbol

The instrument symbol (warning label) at the RF input port indicates the maximum power input to the test port and the maximum input DC level. The maximum input power of the 4025A/B/D RF input port is +27dBm (50MHz~20GHz), the maximum input power of the 4025E/G/K RF input port is +25dBm (50MHz~54GHz).

When using the instrument, do not connect a signal exceeding this range to the port, otherwise, the instrument may be burnt down!

2.3 Battery installation or replacement

The 4025 series are randomly equipped with high-capacity rechargeable lithium-ion batteries. The instrument works in the spectrum analysis mode. In default state, the typical endurance of 4025A/B/D is about 4 hours, and that of 4025E/G/K is about 3 hours. For a long-term field test, it is recommended to purchase a battery of the same model as the enclosed battery for backup.

NOTICE

Precautions when transporting and storing batteries:

To ensure the service life, the battery should be removed from the battery compartment and charged as fully as possible during transportation and long-term storage. Do not let the battery charge below 5%; otherwise, the battery may not be charged. The recommended storage temperature range is -20℃~+50℃ (<1 month); -20℃~+40℃ (1~3 months); -20℃~+20℃ (>3 months).

The battery installation or replacement for the 4025 can be done by referring to the tips in Figure 2.4.

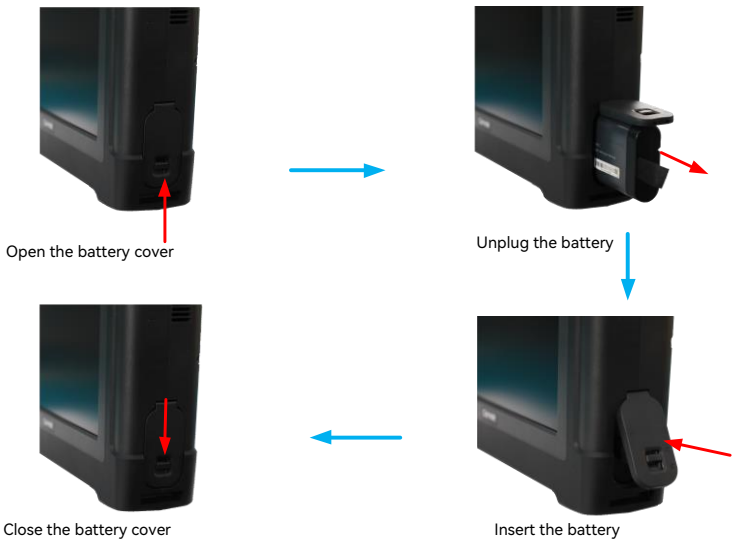

Figure 2.4 Battery installation or replacement

3 Typical applications

The 4025 provides a variety of operating modes, including spectrum analysis, interference analysis (option), demodulation analysis (option), power measurement (option), channel sweep (option), etc. Each operating mode provides a variety of intelligent measurement functions. This chapter introduces the basic tests in spectrum analysis mode, and please refer to the 4025 Spectrum Analyzer User's Manual for the detailed for the detailed operation of each option mode.

NOTICE

Description of the soft and hard keys in the guide:

In this guide, the function keys on the bottom are represented by [XXX], with XXX being the key name. The other buttons on the touch screen are represented by [XXX], with XXX being the menu name.

3.1 Basic signal measurement

The basic measurement consists of marking the frequency and amplitude of the signal with a marker on the 4025 screen. The input signal can be measured and the current measurement saved using the File menu by following the steps below:

First, the signal generator completes the pre-operation preparations according to the following steps:

Step 1. Set center frequency:

➢ Press [RF ON/OFF] → [RF ON] to output RF signal, and set the frequency of external signal generator to 1GHz. Set the center frequency of the 4025: press [Freq], select [Center Freq], and click [1] [GHz] in the key area in turn to set the center frequency to 1GHz. These numeric keys can be used to set exact values for the current parameters, and the step keys (up and down) and the sliding sleeve can also be used to change the center frequency value, as shown in Figure 3.1.

Step 2. Set Span:

➢Press [Span], and select [Span]. Note whether the span data is displayed in the information input area to determine the currently activated parameters. Reduce the span to 10MHz, for instance, type [1] [0] with the keyboard, select the unit [MHz] , or use the [↓] key to step down to this value (both sliding axle and step keys can be used to change the value of the current parameter). Displayed results are shown in Figure 3.2. Note that the resolution bandwidth and video bandwidth are adaptive with respect to span, and they are automatically adjusted to the appropriate value based on the given span value. The sweep time also has an adaptive function.

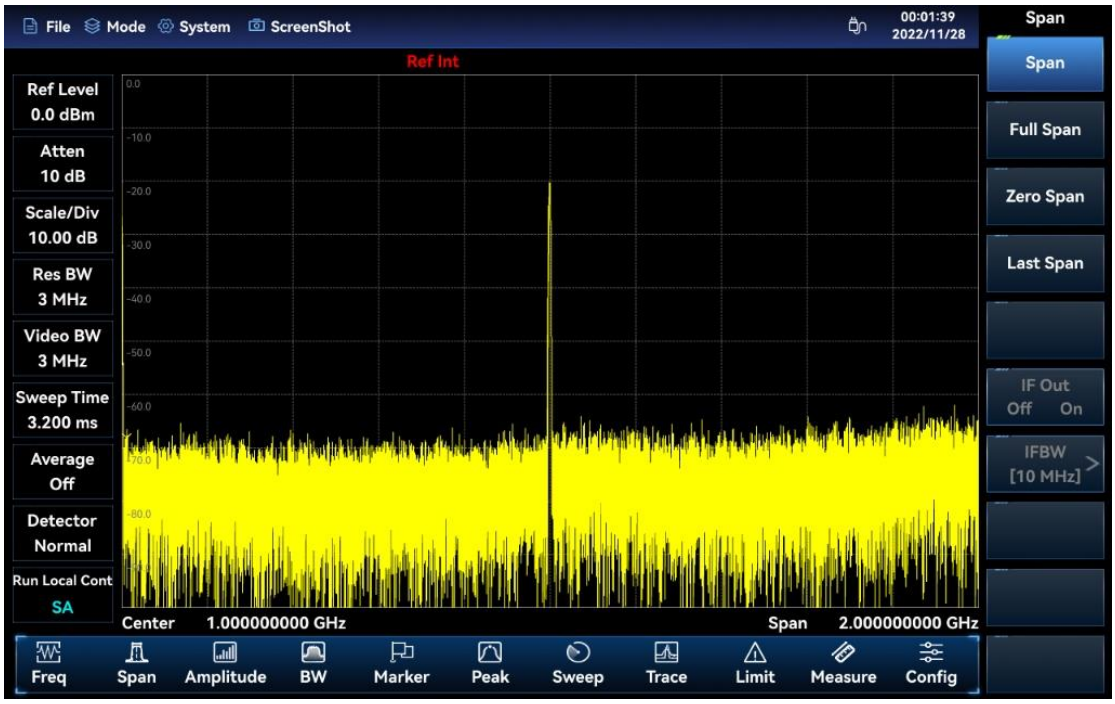

Figure 3.1 Center frequency of 1GHz

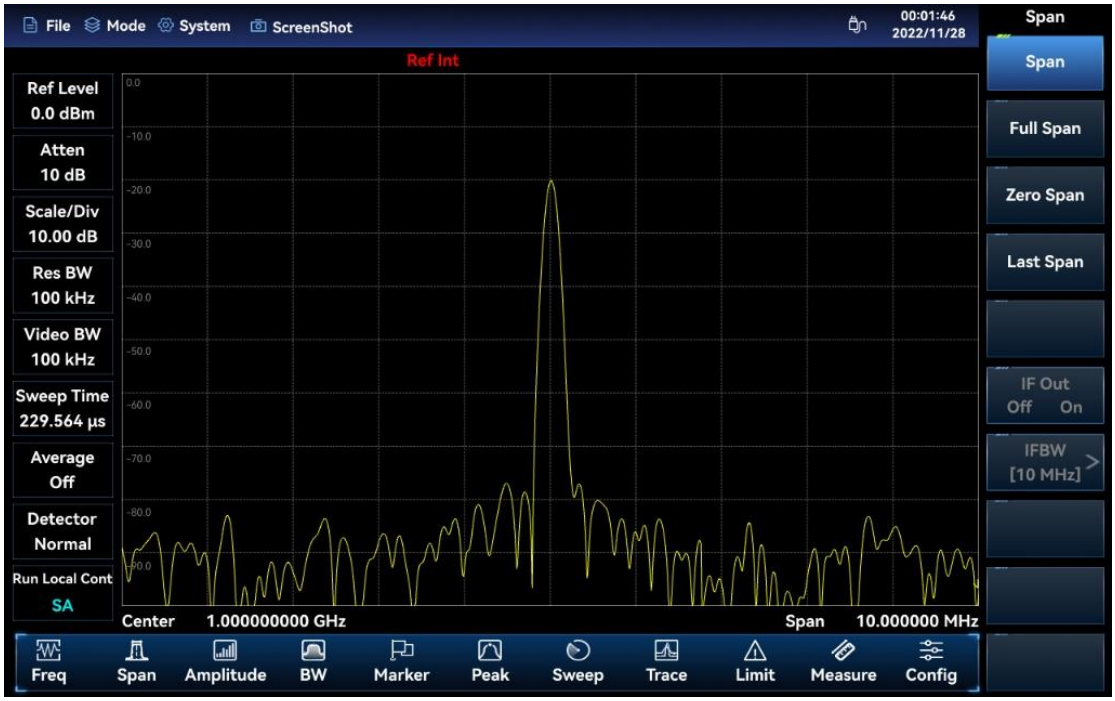

Figure 3.2 Center frequency of 1GHz and span of 10MHz

Step 3. Set sweep time:

➢Press the [Sweep] key and select the [Sweep Time Auto Manual] softkey. This softkey can be used to set the control of the sweep time to automatic or manual control, and the dark green indicates the currently active item. For example, when "Auto" is marked with dark green, the sweep time adapts to other relevant parameter settings.

Step 4. Activate marker:

➢Press [Marker] to activate the general marker and display it in the center of the horizontal coordinates (the frequency and amplitude values can be read out by the marker and displayed in the active function area.) At this time the marker reading frequency is 1 GHz, and the amplitude is about -20 dBm, as shown in Figure 3.3.

➢If the marker is not on the peak point of the signal, you can press the [Peak] key to make the marker jump to the peak of the signal automatically, or drag in manually to the peak of the signal.

3.1 Basic signal measurement

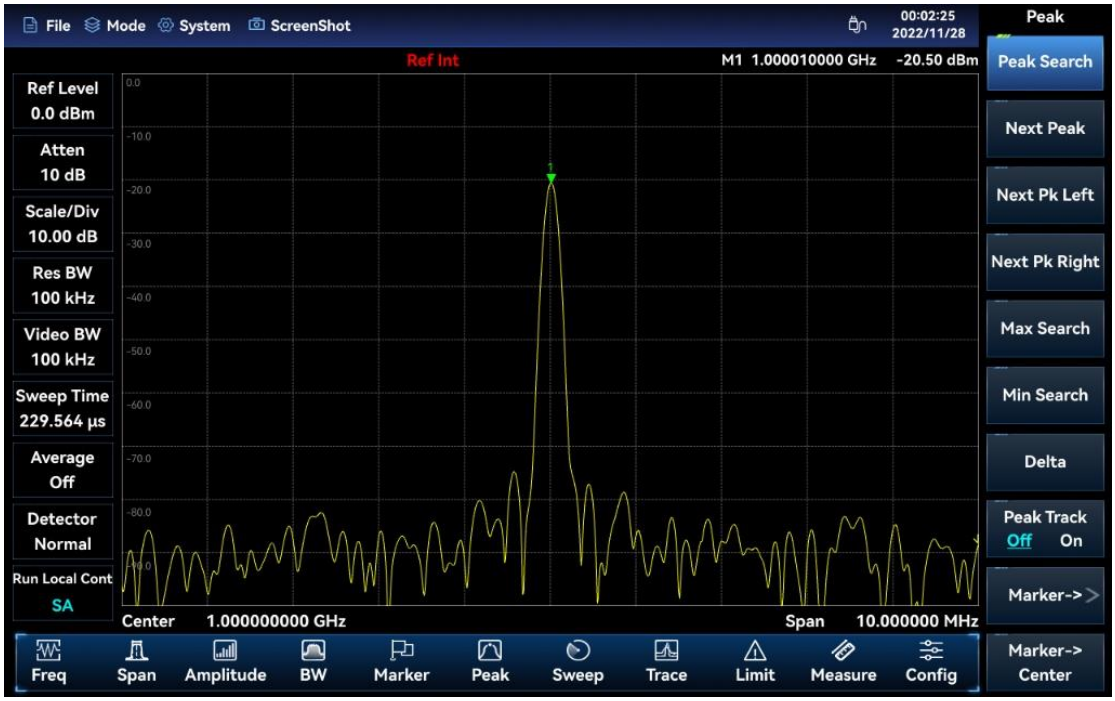

Figure 3.3 Activating marker

Step 5. Adjust amplitude parameters:

➢Typically, the best amplitude measurement accuracy is obtained by placing the signal peak at the reference level position, as shown in Figure 3.4. Press [Amplitude] → [Ref Level] to set the reference level to the marker amplitude value.

Figure 3.4 -20dBm reference level

Step 6. Save the test results:

➢Press [File] → [Quick Save&Call] → [Quick Save] to save the test results in the interface as shown in Figure 3.5. Select [Quick Call] to call the corresponding quick storage test results.

Figure 3.5 File saving

3.2 Method to improve the accuracy of frequency measurement

This section will, taking the measurement of an external 1GHz signal as an example, introduce how to use the marker counting function of the 4025 to improve the accuracy of the measured frequency readout. The test steps are shown as follows:

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore the instrument to its default state.

Step 2. Set center frequency:

➢Set the frequency of the external signal generator to 1GHz. Set the center frequency of the 4025: press [Freq], select [Center Freq], and click [1] [GHz] in the numeric keypad in turn to set the center frequency to 1GHz. These numeric keys can be used to set exact values for the current parameters, and the step keys and the sliding sleeve can also be used to change the center frequency value.

Step 3. Turn on the marker counting function.

➢Press [Marker] to activate the mark. Press [Marker]→ [Counter Mkr Off On] to turn

on the marker counting function.

➢Press [Peak] so that the marker is located on the signal frequency. Observe the marker reading at this point, and the numerical resolution of the frequency item can be up to 0.01Hz, as shown in Figure 3.6.

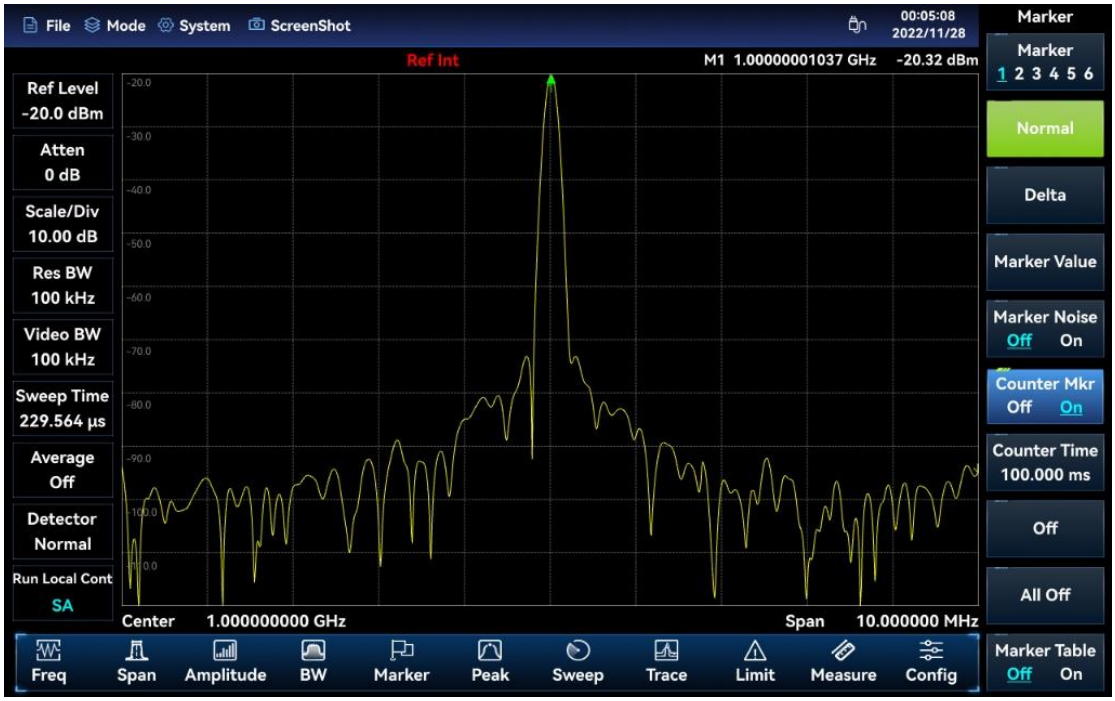

Figure3.6 Improve frequency measurement accuracy by using marker function

➢The marker counting function can only measure continuous wave signals or discrete spectral components, and the signal amplitude is greater than -50dBm, and the signal amplitude must be higher than the noise level by 30dB.

Step 4. Turn off the marker counting function:

➢Press [Marker]→[Counter Mkr Off On] to turn off the marker counting function.

NOTICE

Decrease in sweep speed when counting is on:

When performing the frequency counting function, if the user finds the 4025 sweep speed is reduced, it is because the 4025 is taking a long time in the background for accurate signal positioning and IF counting, which is normal!

NOTICE

Shared time base when the counting function is enabled:

In order to accurately measure the frequency when performing the frequency counting function, the signal generator and 4025D to be tested should be shared with the time base!

3.3 Method to measure small signal

The noise generated inside 4025 determines its ability to measure small signals. Changing the measurement settings with the following methods can improve the measurement sensitivity of 4025.

3.3.1 Reducing the attenuation of the RF attenuator to measure small signals

The input attenuator affects the signal level to the input instrument. If the input signal is very close to the noise floor, reducing the amount of attenuation of the attenuator can extract the signal from the noise.

NOTICE

Precautions for the maximum power of the spectrum input signal:

The total power of should be ensured to be less than +27dBm (4025A/B/D, frequency 50MHz~20GHz, input attenuation value ≥10dB), +25dBm (4025E/G/K, frequency 50MHz~54GHz, input attenuation value ≥10dB)!

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore the instrument to its default state.

Step 2. Set the center frequency, span and reference level:

➢Set the frequency of the external signal generator to 300MHz and the amplitude to -80dBm, and connect the RF output end of the signal generator to the RF input end of

the 4025. Set center frequency of 4025. Press [Freq] and select [Center Freq] to set center frequency to 300MHz. Select [Span] and set the span to 5MHz. Press [Amplitude] and select [Reference Level] to set the reference level to -40dBm.

Step 3. Move the signal peak to the center frequency (300 MHz in this case):

➢Press [Peak] and [Marker-> Center] to move the signal peak to the center frequency.

Step 4. Reduce bandwidth:

➢ Press [BW] → [RBW AUTO MAN] and set the resolution bandwidth to 30KHz. Repeat step 3 if necessary to ensure that the signal peak is at the center frequency of the 4025. as shown in Figure 3.7.

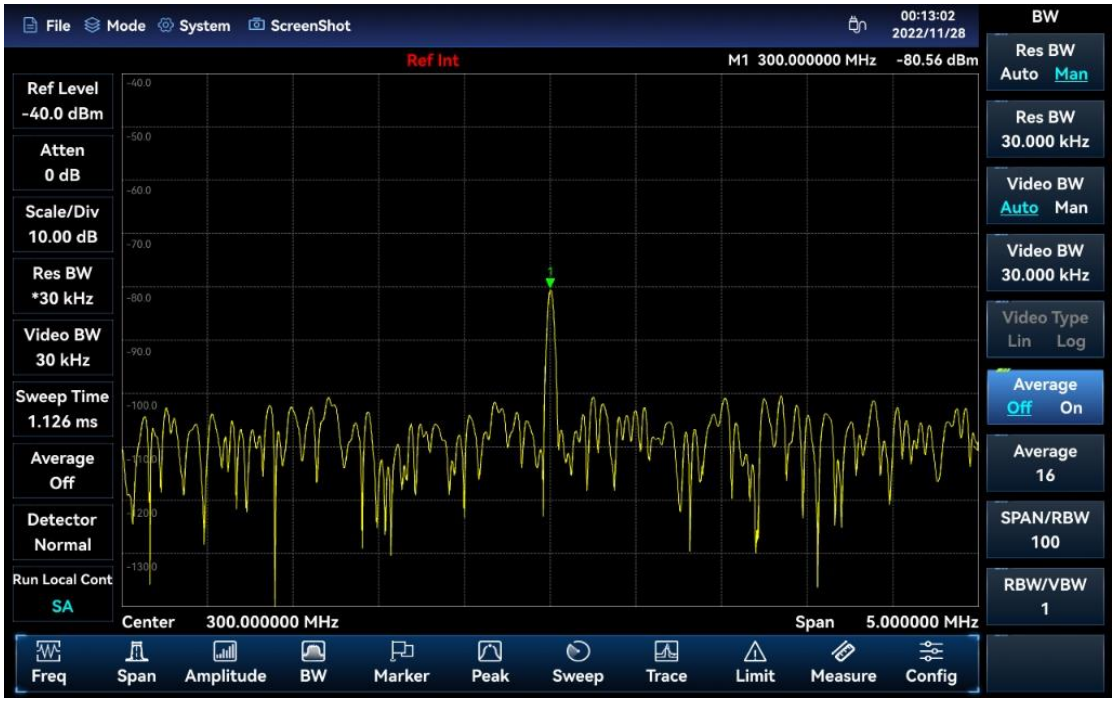

Figure 3.7 Small signal when the reference level is -40dBm and the preamplifier is OFF

Step 5.Turn on preamplifier:

➢On this basis, you can further turn on the preamplifier switch. Press [Amplitude] , [Pre Amp Off On] . As shown in Figure 3.8.

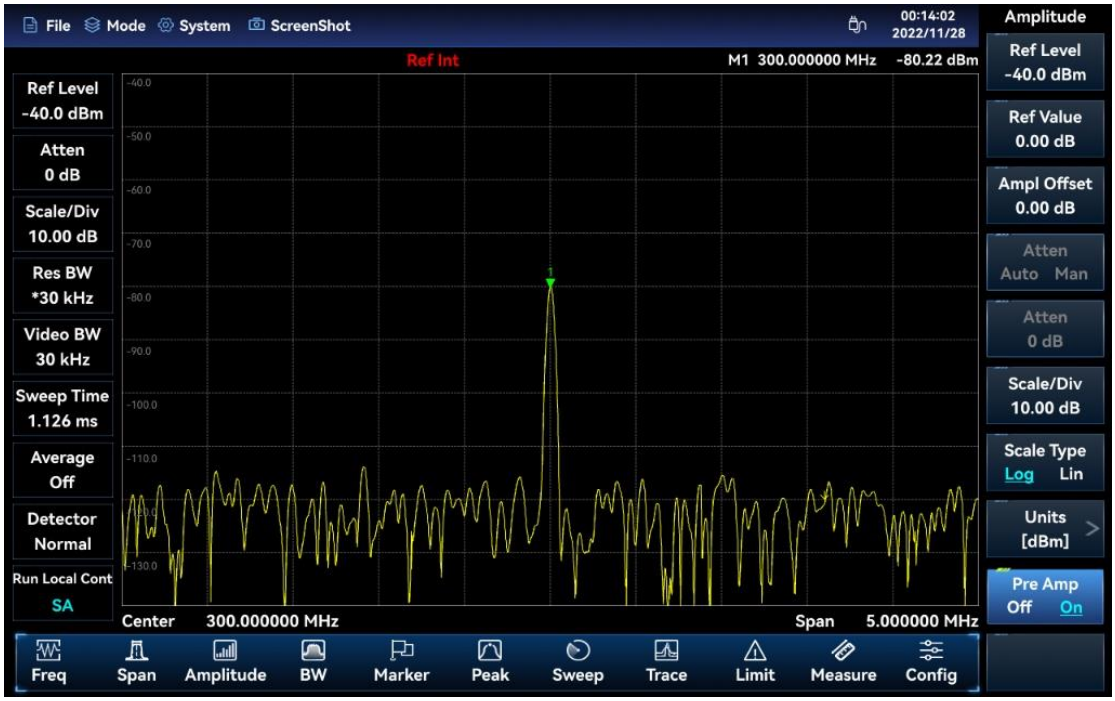

Figure 3.8 Small signal when the reference level is -40dBm and the preamplifier is ON

NOTICE

Precautions when the 4025 input port has been used:

After this test is complete, remember to increase the attenuation of the 4025 to protect the RF input port of the 4025.

3.3.2 Measure Small Signal by Reducing the Resolution Bandwidth

The resolution bandwidth affects the internal noise floor of the 4025, but has no effect on the level of the measured continuous wave signal. The relationship between the amount of noise reduction and resolution bandwidth can be expressed by the following formula:

$$\Delta L = 10 \log \frac{BW_1}{BW_2}$$

Where:Δ L——the amount of change in noise amplitude in dB.

BW_1 and BW_2—– Different resolution bandwidths in Hz.

So when the resolution bandwidth is reduced by 10 times, the noise floor is reduced by 10 dB.

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore

the instrument to its default state.

Step 2. Set the center frequency, span and reference level:

➢Set the frequency of the external signal generator to 300MHz and the amplitude to -80dBm, and connect the RF output end of the signal generator to the RF input end of the 4025. Set center frequency of 4025. Press [Freq] and select [Center Freq] to set center frequency to 300MHz. Select [Span] and set the span to 5MHz. Press [Amplitude] and select [Reference Level] to set the reference level to -40dBm.

Step 3. Use the step key [↓] to reduce the resolution bandwidth:

➢As the noise floor is reduced, it can be seen that the signal gradually becomes clear, as shown in Figure 3.9.

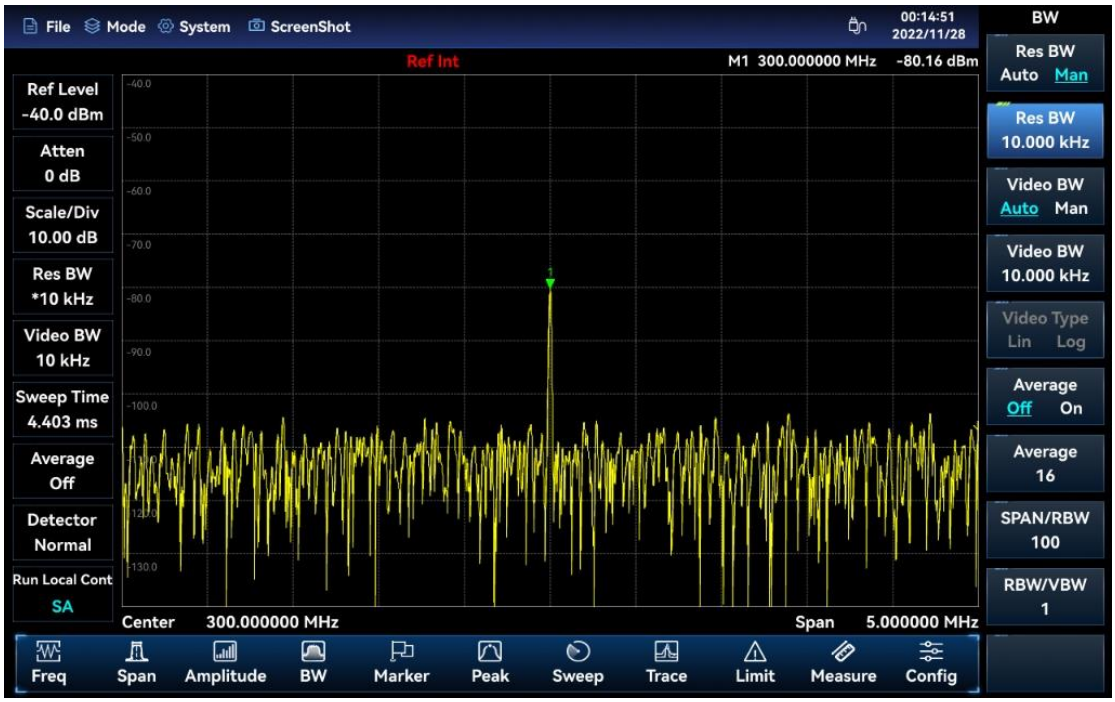

Figure 3.9 Measure Small Signal by Reducing the Resolution Bandwidth

➢As reducing the resolution bandwidth causes an increase in sweep time, the 4025 has a resolution bandwidth of 1 Hz to 20 MHz in 1-2-3-5-8-10 steps. Choosing the appropriate resolution bandwidth allows for a finer compromise between sweep time and resolution bandwidth.

3.3.3 Measuring the small signal using the average detection and increasing the sweep time

When the noise floor of the 4025 covers small signals, the application of average detection mode and the increase of sweep time can smooth the noise and improve the visibility of the signal. A slower sweep speed results in a better average noise variance.

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore the instrument to its default state.

Step 2. Set the center frequency, span and reference level:

➢Set the frequency of the external signal generator to 300MHz and the amplitude to -80dBm, and connect the RF output end of the signal generator to the RF input end of the 4025. Set center frequency of 4025. Press [Freq] and select [Center Freq] to set center frequency to 300MHz. Select [Span] and set the span to 5MHz. Press [Amplitude] and select [Reference Level] to set the reference level to -40dBm.

Step 3. Select the detection method of the 4025 as the average detection:

➢Press [Detector]→[Average] to select the average detection in the information display area on the left. At this time, the information bar on the left side of the display screen shows the words "Detector Average", indicating that the detection mode is manually set to average detection.

Step 4. Increase the sweep time of 4025:

➢Press [Sweep]→ [Sweep Time Auto Man], and increase the sweep time with the step key [↑]. Increasing the sweep time allows more time to average the data per trace pixel point.

3.3.4 Measure Small Signals by Using Video Average

The video average uses the digital processing method to average the average value of the currently swept track points and the previous positions of the same track. After turning on video averaging, you can set the number of times the video will be averaged. The video averaging function and the average detection get different results.

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore the instrument to its default state.

Step 2. Set the center frequency, span and reference level:

➢Set the frequency of the external signal generator to 300MHz and the amplitude to -80dBm, and connect the RF output end of the signal generator to the RF input end of the 4025. Set center frequency of 4025. Press [Freq] and select [Center Freq] to set center frequency to 300MHz. Select [Span] and set the span to 5MHz. Press [Amplitude] and select [Reference Level] to set the reference level to -40dBm.

Step 3. Turn on the video averaging feature:

➢Press [BW] and [Average Off On]. As the average program averages the trace, the small signal becomes more and more clear. The default average number of times is 16.

Step 4. Set the average number of times to 25:

➢ Press [Average], enter the number 25 from the numeric keypad, and press [Enter], as shown in Figure 3.10. At this time, the information display area on the left side of the display screen area will display the average times. Once the average times you set is reached, the 4025 will continue to average the data. If you want the measurement to stop after reaching the average number of times, you can use the Single Sweeping function.Press [Sweep]→[Sweep Cont Single]

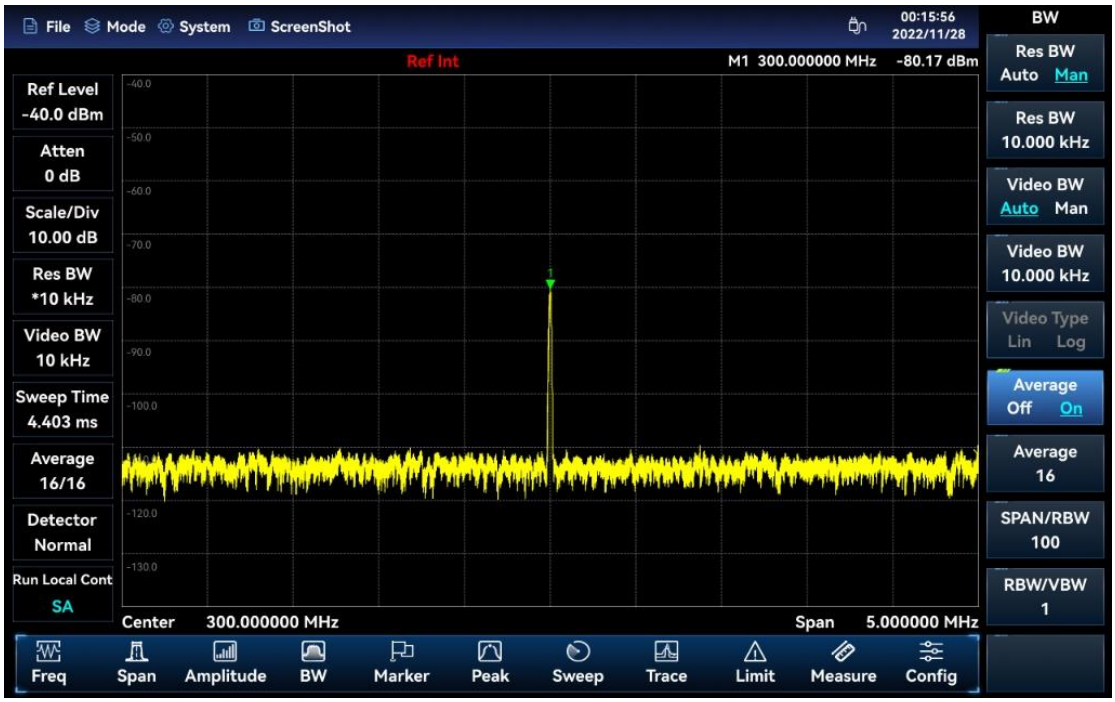

Figure 3.10 Measuring small signals with trace average

3.4. Method to resolve signals with very close frequencies

3.4.1 Description of Resolution Bandwidth

Signal resolution is determined by the 4025 intermediate frequency (IF) filter bandwidth, namely, resolution bandwidth (RBW). When a signal passes through the IF filter, the 4025 uses the signal to sweep the bandpass shape of the IF filter. Therefore, when the 4025 receives two signals of equal amplitude and close frequency, it

appears that the top of the bandpass filter waveform swept by one of the signals covers almost the other signal, so that the two signals look like a signal. If the two signals are not equal in amplitude but their frequencies are still close, there is a possibility that the small signal is overwhelmed by the response of the large signal.

3.4.2 Measurement to resolve two equal-amplitude signals

Generally, if two equal amplitude signals are to be resolved, the resolution bandwidth must be less than or equal to the frequency spacing of the two signals.

Step 1. Reset the 4025:

➢Press the power button lightly, and click [Reset] in the pop-up dialog box to restore the instrument to its default state.

Step 2. Set signal generator:

➢Use a T-connector to connect the outputs of the two signal generators to the RF input port of the 4025, as shown in Figure 3.11. Set one of the signal generators to have a frequency of 300 MHz and the other signal generator to have a frequency of 301 MHz. The output amplitudes of the two signal generators are both set to -20 dBm, and the signal output amplitude of two signal generators are adjusted. Then observe the display signal of 4025, so that the two signals displayed by the 4025 are equal in amplitude.

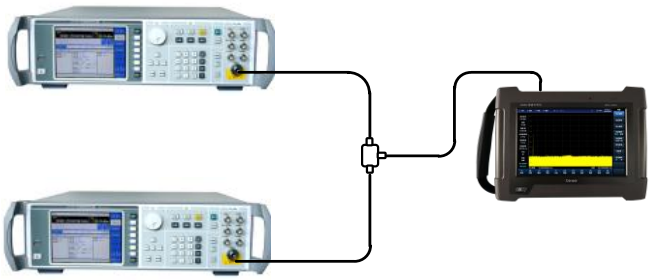

Figure 3.11 Connection diagram for instrument for testing two input signals

Step 3. Set the 4025 center frequency, span, and resolution bandwidth:

➢ Set the 4025 center frequency to 300MHz, select [Span] to set the span to 20MHz, and press [BW]→[Resolution Bandwidth Auto Manual] to set the resolution bandwidth to 3MHz.

Step 4. Observe signals in the 4025:

➢ At this point, it can be seen that the 4025 display screen has only one signal peak, and the two signals with close frequency intervals cannot be distinguished, as shown in Figure 3.12.

Step 5. Adjust the resolution bandwidth:

➢Press [BW]→ [Res BW Auto Man] to adjust the resolution bandwidth to 1MHz, so that the resolution bandwidth is less than or equal to the frequency interval of two signals. At this point, user can see that the signal peak on the screen has become flat, indicating that there may be two signals as shown in Figure 3.13.

Step 6. Reduce video bandwidth:

➢Press [BW]→[Video BW Auto Man] to set the video bandwidth to 500 kHz. At this point, you can clearly see two signals appear on the screen, as shown in Figure 3.14. Keep reducing the resolution bandwidth with the sliding axis or the [↓] key of the numeric keypad to see the two signals more clearly.

➢For a 4025 with a resolution bandwidth in steps of 1-2-3-5-8-10, a resolution bandwidth of 100 kHz must be used to resolve two signals with a frequency interval of 150 kHz. Because the frequency interval of the upper filter of the 4025 is 200 kHz, which is more than the frequency interval of 150 kHz, the two signals cannot be resolved.

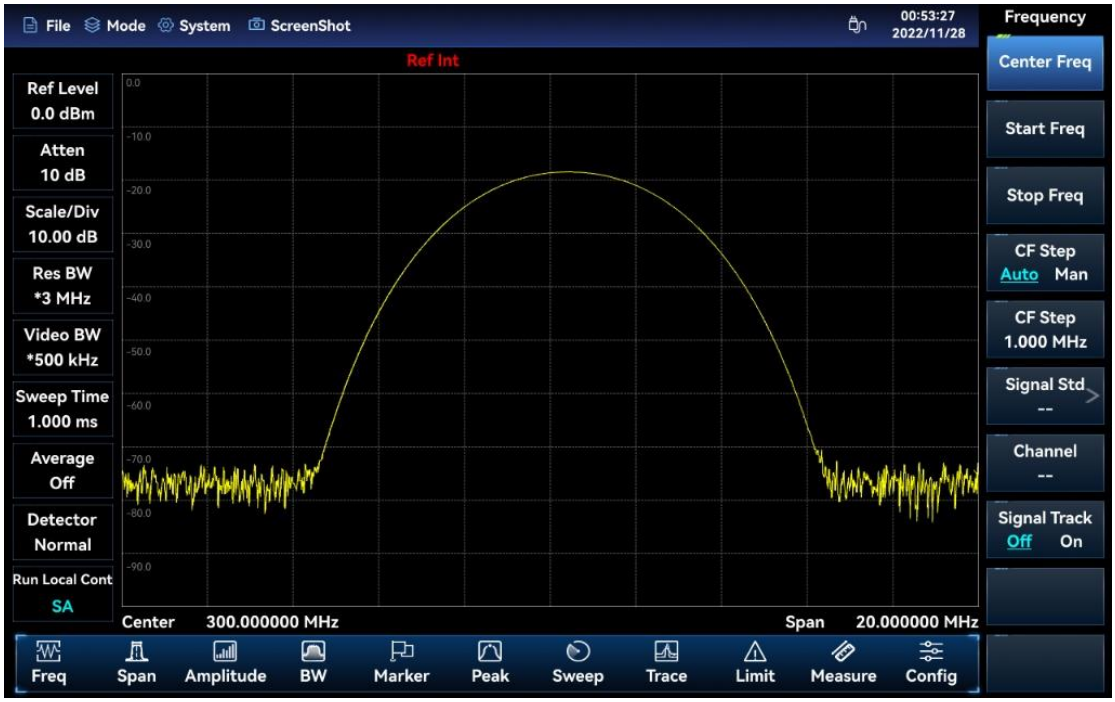

Figure 3.12 Failed to resolve two equal amplitude signals

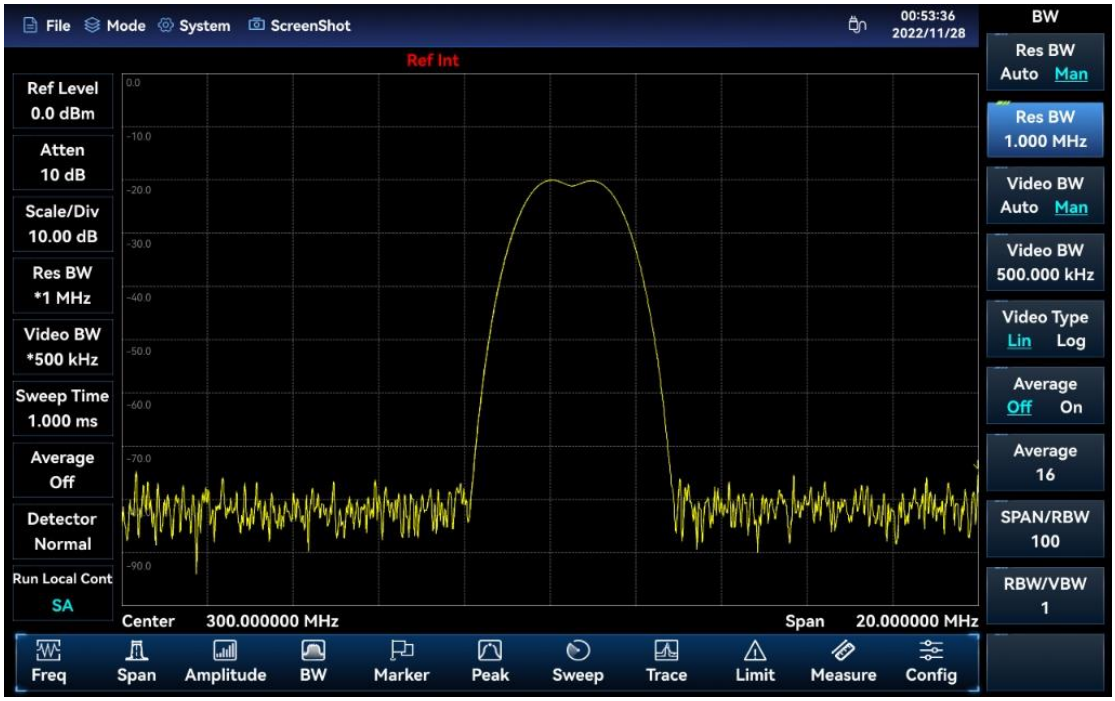

Figure 3.13 Signal peak becoming flat

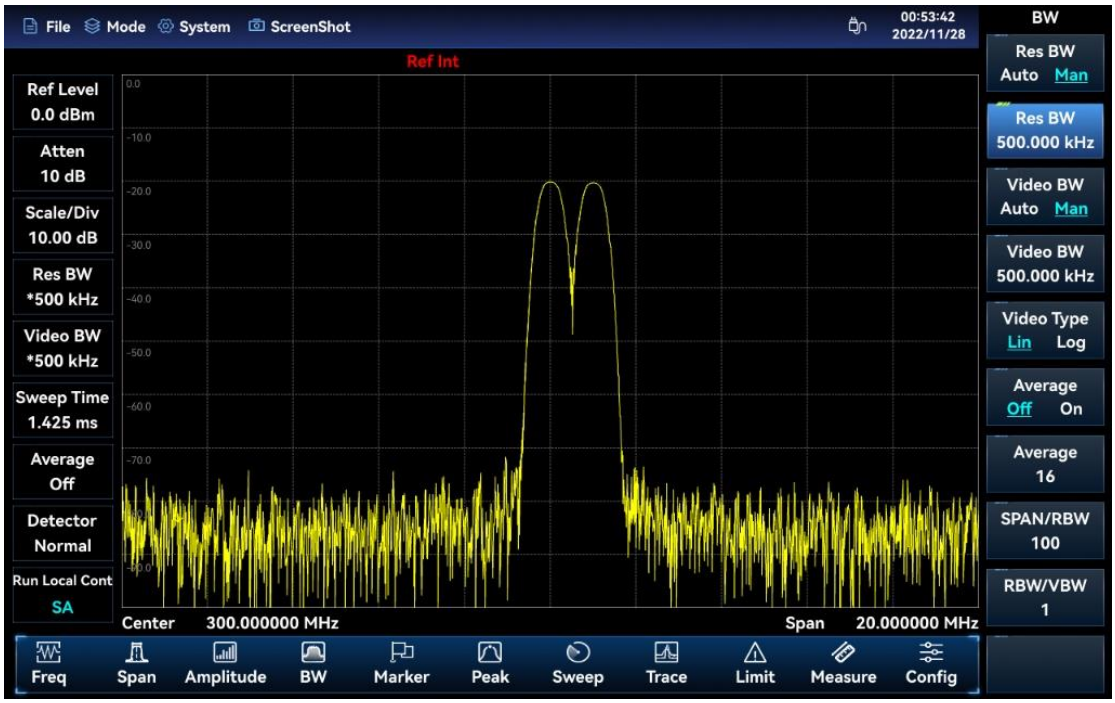

Figure 3.14 Resolve two equal amplitude signals

4 Getting Help

Typically, problems arise from hardware, software or user misuse. Once a problem occurs, check and save the error message, analyze possible causes, and refer to the methods provided in “4.1 Basic Inspection” for preliminary troubleshooting. Or contact our customer service center as per the contact information provided in “4.3 Method to Get After-sales Service” of the Quick Start Guide and provide the error message collected, and we will help to solve the problem as soon as possible.

4.1 Basic Inspection

In case of any problem with the 4025 spectrum analyzer you are using, you can check it by yourself according to the following tips. If the problem cannot be solved, please contact us.

✧If the 4025 cannot be started after pressing the start button, please check whether the power supply is normal and whether the adapter indicator is on or whether the battery level is normal. If there is nothing abnormal, instrument may be faulty, please contact us for repair.

✧If the 4025 cannot enter the system or application program after startup, please gently press the power key and click [Reset] in the pop-up dialog box to restore the instrument to its default state. If it still cannot work normally, it may be faulty, please contact us for repair.

✧Press [System] →[System] → [System Info] to observe the self-inspection information of relevant components. If the self-inspection fails, please gently press the power button and click [Shutdown] in the pop-up dialog box to turn off the instrument. If the self-test still fails after reboot, the instrument may be faulty, please contact us for repair.

✧If the touch screen of 4025 is faulty, please unplug the adapter directly. If it still cannot work normally after restart, it may be faulty, and please contact us for repair.

✧ Are the measurements performed and their results consistent with the performance indicators and characteristics of the 4025? Please refer to the relevant performance indicator data in section “19.3 Technical Indicators” of this manual.

✧If the performance indicators of 4025 are abnormal, please check the test tools and test environment for compliance with the requirements, the test port connectors for any damages and the calibration piece for normal performance indicators; If everything above is normal, the instrument may be faulty, please contact us for repair.

✧If the 4025 cannot realize communication via LAN, confirm the IP address settings of 4025 first, and check the yellow LED beside the LAN port on the top panel. If it does not flash, check the LAN cable and connection. If it still cannot work normally, it may be faulty, please contact us for repair.

4.2 Help information

The 4025 provides an "error log" function. When a problem occurs, the instrument automatically generates an "error log" to record abnormalities in hardware, missing files, programmed operations, etc. It includes three levels: prompt, warning, and error, which are used to assist in analyzing instrument failures. Users can view the error log by [System] → [Sys Settings] → [Error Log].

In addition, our customer service center can provide help to users at any time. We have set up sales points and offices throughout the country, each with technical support personnel stationed, who can quickly go to your site for technical exchange, training, product maintenance and other services and provide you with convenient technical support and related services for your convenient use of the instrument.

4.3 Method to obtain after-sales services

In case of any failure to the 4025 that is difficult to be eliminated, contact us by phone or fax. If it is confirmed that the instrument needs to be repaired, please package the instrument according to the following steps:

1) Write a paper document describing the instrument failure and put it in the package together with the 4025.

2) Pack it with the original packing materials, so as to minimize possible damage;

3) Place cushions at the four corners of the outer packing carton, and place the instrument in the outer packing carton.

4) Seal the opening of the packing carton with adhesive tape and reinforce the packing carton with nylon tape.

5) Specify text like “Fragile”! Do not touch! Handel with care!” and so on.

6) Please consign it as precision instruments.

7) Keep a copy of all shipping documents.

Contact information:

Service Consultation: **400-1684191**

Website: **www.ceyear.com**

Email: **techbb@ceyear.com**

Postal code: **266555**

Address:No. 98, Xiangjiang Road, Qingdao Economic & Technological Development Zone, Shandong Province

All the instruments we supply have passed the inspection by the internal quality and safety department in the company, and we promise warranty of the instruments during the 18 months of warranty period since shipment; Instruments within the warranty period will enjoy free repair except for instrument failures due to human reasons; instruments outside the warranty period may be repaired at corresponding costs. We can solve your problems by telephone or on-site repair according to different situations of instrument failures,

In addition, if the instrument fails, please contact us in time, and we will provide you with necessary assistance and repair, if necessary. to avoid damage to the internal circuits and devices due to wrong operation, users are strictly forbidden to disassembly the instrument without permission.

Maintenance statement:

It is hereby declared that the user shall be responsible for any instrument damage or personal injury caused by improper or illegal operation.

Appendixes

Appendix A: Technical indicators

The technical indicators of 4025 have been strictly tested at the factory. Users can also test and verify them according to the technical indicators provided in this manual, which are shown in the following schedule.

NOTICE

Precautions when testing performance indicators:

The 4025 should be stored at ambient temperature for 2 hours and powered on for warming up for 30 minutes at an ambient temperature of 25℃±10℃ to meet all performance metrics within the given operating temperature range.

The supplementary features given in the form of typical values are for user reference only and not for assessment.

Schedule 1 Technical indicators of 4025 Spectrum Analyzer

Test Item	Requirements
Frequency range:	4025A: 9kHz~6GHz 4025B: 9kHz~9GHz 4025D: 9kHz~20GHz 4025E: 9kHz~26.5GHz 4025G: 9kHz~44GHz 4025K: 9kHz~54GHz
Frequency reading accuracy	±(frequency reading × frequency reference error + 1% × span + 10% × resolution bandwidth)
Frequency reference accuracy	Nominal frequency: 10MHz Frequency reference error: ±(to last calibration date × aging rate + temperature stability + calibration accuracy) Aging rate: ± 0.5ppm/year Temperature stability: ±0.1ppm (-20℃~55℃, relative to 25±10℃) Initial calibration accuracy: ± 0.3ppm Note: By default, the time until the last calibration is 1 year. This indicator is guaranteed by the crystal oscillator manufacturer.

Appendix A: Technical indicators

<table>
<tr><td>Frequency Span</td><td colspan="2">Range: 10Hz ~ upper limit of frequency range of corresponding model or 0Hz (zero span),
Resolution: 1Hz, accuracy: ±1.0%</td></tr>
<tr><td>Sweep Time</td><td colspan="2">Range: 1μs~6000s (zero span), accuracy: ±1.0% (zero span)</td></tr>
<tr><td>Resolution Bandwidth</td><td colspan="2">1Hz~20MHz (1-2-3-5-8 steps)</td></tr>
<tr><td>Video Bandwidth</td><td colspan="2">1Hz~20MHz (1-2-3-5-8 steps)</td></tr>
<tr><td>SSB Phase Noise
(1GHz Carrier,+15℃ ~+35℃)</td><td colspan="2">≤-108.0dBc/Hz@10 kHz offset
≤-110.0dBc/Hz@100 kHz offset
≤-118.0dBc/Hz@1MHz offset
≤-129.0dBc/Hz@10MHz offset</td></tr>
<tr><td rowspan="2">Displayed Average Noise Level
(input port is connected with a 50Ω load, 0dB input attenuation, average detector, the logarithm of video type, RBW normalized to 1Hz,+15 ℃ to +35℃)</td><td>4025A/B/D preamplifier ON:
≤-161.0dBm (2MHz~2.4GHz)
≤-160.0dBm (2.4GHz~6GHz)
≤-159.0dBm (6GHz~9GHz)
≤-158.0dBm (9GHz~14GHz)
≤-156.0dBm (14GHz~20GHz)</td><td>4025A/B/D preamplifier OFF:
≤ -142.0dBm (2MHz~2.4GHz)
≤ -141.0dBm (2.4GHz~6GHz)
≤ -140.0dBm (6GHz~9GHz)
≤ -138.0dBm (9GHz~14GHz)
≤ -138.0dBm (14GHz~20GHz)</td></tr>
<tr><td>4025E/G/K preamplifier ON:
≤-159.0dBm (2MHz~9GHz)
≤-156.0dBm (9GHz~14GHz)
≤-154.0dBm (14GHz~21GHz)
≤-154.0dBm (21GHz~32GHz)
≤-152.0dBm (32GHz~40GHz)
≤-148.0dBm (40GHz~44GHz)
≤-145.0dBm (44GHz~50GHz)
≤-140.0dBm (50GHz~54GHz)</td><td>4025E/G/K preamplifier OFF:
≤-140.0dBm (2MHz~6GHz)
≤-138.0dBm (6GHz~9GHz)
≤-136.0dBm (9GHz~14GHz)
≤-136.0dBm (14GHz~21GHz)
≤-135.0dBm (21GHz~32GHz)
≤-133.0dBm (32GHz~40GHz)
≤-130.0dBm (40GHz~44GHz)
≤-126.0dBm (44GHz~50GHz)
≤-123.0dBm (50GHz~54GHz)</td></tr>
<tr><td>Second Harmonic Distortion
(0dB attenuation, -30dBm input signal, Pre-amplifier OFF)</td><td colspan="2">≤-70.0dBc (50MHz~27GHz)</td></tr>
</table>

TOI (-15dBm 2-tone signal input,100kHz span,0dB attenuator, Pre-amplifier OFF)	≥+13.0 dBm (50MHz ~ 54GHz)	
Image, multiple and out-of-band response (Mixer Level: -10dBm)	<-65.0dBc (10MHz~7.5GHz) <-60.0dBc (7.5GHz~10.5GHz) <-65.0dBc (10.5GHz~54GHz)	
Residual Response (RF input: 50 Ω load, input attenuation: 0dB)	Preamplifier ON: ≤-110.0dBm（10MHz~3GHz） ≤-105.0dBm（3GHz~9GHz） ≤-103.0dBm（9GHz~12GHz） ≤-100.0dBm（12GHz~20GHz） ≤-95.0dBm（20GHz~54GHz）	Preamplifier OFF: ≤-90.0dBm（10MHz~20GHz） ≤-85.0dBm（20GHz~54GHz）
Input attenuator	Attenuation range: 0dB-30dB, 2dB step Conversion uncertainty: ± 0.70dB	
Reference Level	Range: -150 dBm ~ +30 dBm, min. step 1dB Conversion error: ±0.50dB (reference level 0 dBm~-60 dBm)	
Display	Logarithmic Scale: 0.1~10dB/div, minimum 0.1dB step (10 division display) Scale Unit: V, A, W, dBm, dBW, dBV, dBmV, dBμV, dBA, dBmA, dBμA	
Absolute Amplitude Accuracy (Attenuation: 10dB,-15dBm input power level, Pre-amplifier: OFF, RBW 1kHz)	4025D: ±1.30dB（10MHz ~ 20GHz）	
	4025A/B/E/G/K: ±1.00dB（10MHz ~ 20GHz） ±1.40dB（20GHz ~ 44GHz） ±1.80dB（44GHz ~ 54GHz）	
Maximum Input Power	4025A/B/D: +27dBm CW (input frequency ≥ 50MHz)	
	4025E/G/K: +25dBm CW (input frequency ≥ 50MHz)	