UNI-T®

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User Manual

Signal Analyzer RTSA

The Manual applies to:

UTS5000A series

UTS3000A series

V1.0

July 15th, 2024

Foreword

Dear Users,

Hello! Thank you for choosing this brand-new UNI-T instrument. To ensure safe and correct usage, please read this manual thoroughly, especially the Safety Requirements part.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

Copyright Information

Trademark

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Statement

- UNI-T products are protected by patent rights in China and foreign countries, including issued and pending patents.
- UNI-T reserves the rights to any product specification and pricing changes.
- UNI-T reserves all rights. Licensed software products are properties of UNI-Trend and its subsidiaries or suppliers, which are protected by national copyright laws and international treaty provisions. Information in this manual supersedes all previously published versions.

Warranty Service

If the product is proved to be defective within the warranty period, UNI-T reserves the rights to either repair the defective product without charging of parts and labor or exchange the defected product to a working equivalent product (determined by UNI-T). Replacement parts, modules and products may be brand new or perform at the same specifications as brand-new products. All original parts, modules, or products which were defective become the property of UNI-T.

The "customer" refers to the individual or entity that is declared in the guarantee. To obtain the warranty service, "customer" must inform the defects within the applicable warranty period to UNI-T and perform appropriate arrangements for the warranty service.

The customer shall be responsible for packing and shipping the defective products to the individual or entity that is declared in the guarantee. In order obtain the warranty service, customers must inform the defects within the applicable warranty period to UNI-T and make appropriate arrangements for the warranty service. The customer shall be responsible for packing and shipping the defective products to the designated maintenance center of UNI-T, paying the shipping cost, and providing a copy of the purchase receipt of the original purchaser. If the product is shipped to the location of the UNI-T service center, UNI-T shall pay the return shipping fee. If the product is sent to any other location, the customer shall be responsible for all shipping, duties, taxes, and any other expenses.

This warranty shall not apply to any defects or damages caused by accidental, machine parts' wear and tear, improper use, and improper or lack of maintenance. UNI-T under the provisions of this warranty has no obligation to provide the following services:

a) Any repair damage caused by the installation, repair, or maintenance of the product by non-UNI-T service representatives.
b) Any repair damage caused by improper use or connection to an incompatible device.
c) Any damage or malfunction caused using a power source which does not conform to the requirements of this manual.
d) Any maintenance on altered or integrated products (if such alteration or integration leads to an increase in time or difficulty of product maintenance).

This warranty is written by UNI-T for this product, and it is used to substitute any other express or implied warranties. UNI-T and its distributors do not offer any implied warranties for merchant ability or applicability purposes.

For violation of this guarantee, regardless of whether UNI-T and its distributors are informed that any indirect, special, incidental, or consequential damage may occur, UNI-T and its distributors shall not be responsible for any of the damages.

1. User Guide

This chapter introduces the safety instructions and basic information about using the signal analyzer.

Inspect Packing List

When you received the instrument, please inspect the packaging and packing list as follows,

- Inspect the packaging box for any damage or scratches caused by external forces and check the instrument's appearance for any damage. If you have any questions or issues with the product, please contact the distributor or local office.
- Carefully take out the goods and check them against the packing list.

Safety Instruction

This chapter contains information and warnings that must be observed. Ensure that the instrument is operated under safe conditions. In addition to the safety precautions indicated in this chapter, you must also follow accepted safety procedures.

Safety Precautions

Warning	**Please follow these guidelines to avoid possible electric shock and risk to personal safety.**
	Users must follow the following conventional safety precautions in the operation, service and maintenance of this device. UNI-T will not be liable for any personal safety and property loss caused by the users' failure following the safety precautions. This device is designed for professional users and responsible organizations for measurement purposes.
	Do not use this device in any way not specified by the manufacturer. This device is only for indoor use unless otherwise specified in the product manual.

Safety Statements

Warning	"Warning" indicates the presence of a hazard. It warns users to pay attention to a certain operation process, operation method or similar. Personal injury or death may occur if the rules in the "Warning" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Warning" statement.
Caution	"Caution" indicates the presence of a hazard. It warns users to pay attention to a certain operation process, operation method or similar. Product damage or loss of important data may occur if the rules in the "Caution" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Caution" statement.
Note	"Note" indicates vital information. It reminds users to pay attention to procedures, methods, and conditions, etc. The contents of "Note" should be highlighted if necessary.

Safety Signs

	**Danger**	It indicates possible danger of electric shock, which may cause personal injury or death.
	**Warning**	It indicates that some factors you should be careful to personal injury or product damage.
	**Caution**	It indicates possible danger, which may cause damage to this device or other equipment if you fail to follow a certain procedure or condition. If the "Caution" sign is present, all conditions must be met before you proceed to operation.
	**Note**	It indicates potential problems may cause failure to this device if you fail to follow a certain procedure or condition. If the "Note" sign is presented, all conditions must be met before this device will function

		properly.
	**AC**	Alternating current of device. Please check the region's voltage range.
	**DC**	Direct current of device. Please check the region's voltage range.
	**Grounding**	Frame and chassis grounding terminal.
	**Grounding**	Protective grounding terminal.
	**Grounding**	Measuring grounding terminal.
	**OFF**	Main power off.
	**ON**	Main power on.
	**Power Supply**	Standby power supply: when the power switch is turned off, this device is not completely disconnected from the AC power supply.
CAT I		Secondary electrical circuit connected to wall sockets through transformers or similar equipment, such as electronic instruments and electronic equipment. Electronic equipment with protective measures, and any high-voltage and low-voltage circuits, such as the copier in the office.
CAT II		Primary electrical circuit of the electrical equipment connected to the indoor socket via the power cord, such as mobile tools, home appliances, etc. Household appliances, portable tools (e.g., electric drill), household sockets, sockets more than 10 meters away from CAT III circuit or sockets more than 20 meters away from CAT IV circuit.
CAT III		Primary circuit of large equipment directly connected to the distribution board and circuit between the distribution board and the socket (three-phase distributor circuit includes a single commercial lighting circuit). Fixed equipment, such as multi-phase motor and multi-phase fuse box; lighting equipment and lines inside large buildings; machine tools and power distribution boards at industrial sites (workshops).
CAT IV		Three-phase public power unit and outdoor power supply line equipment. Equipment designed to "initial connection", such as power distribution system of power station, power instrument, front-end overload protection, and any outdoor transmission line.
	**Certification**	CE indicates a registered trademark of EU.
	**Certification**	UKCA indicates a registered trademark of United Kingdom.
	**Certification**	Conforms to UL STD 61010-1, 61010-2-030, Certified to CSA STD C22.2 No. 61010-1, 61010-2-030.
	**Waste**	Do not place equipment and accessories in the trash. Items must be properly disposed of in accordance with local regulations.
	**EEUP**	This environment-friendly use period (EFUP) mark indicates that

		dangerous or toxic substances will not leak or cause damage within this indicated time period. The environmentally friendly use period of this product is 40 years, during which it can be used safely. Upon expiration of this period, it should enter the recycling system.

Safety Requirements

Warning	
Preparation before use	Please connect this device to AC power supply with the power cable provided. The AC input voltage of the line reaches the rated value of this device. See the product manual for specific rated value. The line voltage switch of this device matches the line voltage. The line voltage of the line fuse of this device is correct. Do not use it to measure mains circuit.
Check all terminal rated values	Please check all rated values and marking instructions on the product to avoid fire and impact of excessive current. Please consult the product manual for detailed rated values before connection.
Use the power cord properly	You can only use the special power cord for the instrument approved by the local and state standards. Please check whether the insulation layer of the cord is damaged, or the cord is exposed, and test whether the cord is conductive. If the cord is damaged, please replace it before using the instrument.
Instrument grounding	To avoid electric shock, the grounding conductor must be connected to the ground. This product is grounded through the grounding conductor of the power supply. Please be sure to ground this product before it is powered on.
AC power supply	Please use the AC power supply specified for this device. Please use the power cord approved by your country and confirm that the insulation layer is not damaged.
Electrostatic prevention	This device may be damaged by static electricity, so it should be tested in the anti-static area if possible. Before the power cable is connected to this device, the internal and external conductors should be grounded briefly to release static electricity. The protection grade of this device is 4KV for contact discharge and 8KV for air discharge.
Measurement accessories	Measurement accessories are of lower class, which are not applicable to main power supply measurement, CAT II, CAT III, or CAT IV circuit measurement. Probe assemblies and accessories within the scope of IEC 61010-031, and current sensors within the scope of IEC 61010-2-032 shall meet the requirements thereof.
Use the input / output port of this device	Please use the input / output ports provided by this device in a proper manner. Do not load any input signal at the output port of this device. Do not load any signal that does not reach the rated value at the input port of this device. The

properly	probe or other connection accessories should be effectively grounded to avoid product damage or abnormal function. Please refer to the product manual for the rated value of the input / output port of this device.
Power fuse	Please use a power fuse of exact specification. If the fuse needs to be replaced, it must be replaced with another one that meets the specified specifications by the maintenance personnel authorized by UNI-T.
Disassembly and cleaning	There are no components available for operators inside. Do not remove the protective cover. Qualified personnel must conduct maintenance.
Service environment	This device should be used indoors in a clean and dry environment with ambient temperature from 0 °C to + 40 °C. Do not use this device in explosive, dusty or humid air.
Do not operate in humid environment	Do not use this device in a humid environment to avoid the risk of internal short circuit or electric shock.
Do not operate in flammable and explosive environment	Do not use this device in a flammable and explosive environment to avoid product damage or personal injury.
Caution	
Abnormity	If this device may be faulty, please contact the authorized maintenance personnel of UNI-T for testing. Any maintenance, adjustment or parts replacement must be done by the relevant personnel of UNI-T.
Cooling	Do not block the ventilation holes at the side and back of this device. Do not allow any external objects to enter this device via ventilation holes. Please ensure adequate ventilation and leave a gap at least 15 cm on both sides, front and back of this device.
Safe transportation	Please transport this device safely to prevent it from sliding, which may damage the keys, knobs, or interfaces on the instrument panel.
Proper ventilation	Poor ventilation will cause temperature rise of device, even damage to this device. Please keep proper ventilation during use, and regularly check the vents and fans.
Keep clean and dry	Please take actions to avoid dust or moisture in the air affecting the performance of this device. Please keep the product surface clean and dry.
Note	
Calibration	The recommended calibration period is one year. Calibration should only be conducted by qualified personnel.

Environmental Requirements

This instrument is suitable for the following environment:

- Indoor
- Pollution degree: Class 2
- For overvoltage: This product should be powered from a mains supply that complies with Overvoltage Category II, which is a typical requirement for connecting equipment via power cords and plugs.
- Operating: Altitude below 3,000 meters; non-operating: Altitude below 15,000 meters
- Unless otherwise specified, the operating temperature is 0 to +40°C; storage temperature is -20 to +70 °C.
- Operating: Humidity at temperatures below +35°C, ≤ 90% RH.; non-operating: Humidity at temperatures from +35 °C to 40 °C, ≤ 60% RH.

Note

There are ventilation outlets on the rear and side panels of the instrument, please keep the air ventilation in the outlet of housing. To prevent excessive dust from blocking the vents, clean the instrument housing regularly. The housing is not waterproof; please cut off the power supply first and then wipe the housing with a dry cloth or a slightly moistened soft cloth.

Connecting Power Supply

The specification of the AC power supply is as shown in the following table.

Voltage Range	Frequency
100-240 VAC (Fluctuations ±10%)	50/60 Hz
100-120 VAC (Fluctuations ±10%)	400 Hz

Please use the attached power cord to connect to the power port.

Connecting to the service cable:

This instrument is a Class I safety product. The supplied power cables have reliable performance in terms of case grounding. This signal analyzer is equipped with a three-prong power cable that meets international safety standards. It provides good case grounding performance for the specifications of your country or region.

Please install the AC power cable as follows:

- Ensure the power cable is in good condition.
- Leave enough space for connecting the power cord.
- Plug the attached three-prong power cable into a well-grounded power socket.

Electrostatic Protection

Electrostatic discharge may cause damage to components. Components can be invisibly damaged by electrostatic discharge during transportation, storage, and use.

The following measures can reduce the damage caused by electrostatic discharge:

- Test in an antistatic area as far as possible.
- Before connecting the power cable to the instrument, briefly ground the inner and outer conductors of the instrument to discharge static electricity.
- Ensure all instruments are properly grounded to prevent the accumulation of static.

Preparation Work

1. Connect the power cable and insert the power plug into a protective grounding outlet.
2. Press the switch to enter the standby mode.
3. Press the soft switch and the signal analyzer powers on.

It takes about 30 seconds to initialize the boot, and then the signal analyzer enters the analysis mode of system default. To ensure optimal performance, it is recommended to warm up the signal analyzer for 45 minutes after powering on.

Usage Tips

Use an External Reference Signal

If users want to use an external signal source 10 MHz as a reference, please connect the signal source to the **10 MHz In** port on the rear panel. "**Freq Ref: Ext**" indication will be displayed on the measuring bar, on the top side of screen.

Activate the Option

If you want to activate an option, you need to input the secret key for the option. Please contact the UNI-T office to purchase it.

Refer to the following steps to activate the option you purchased:

1. Save the secret key into a USB drive and insert it into the signal analyzer.
2. Press the **[System]** key > **System Information** > **Add Token**.
3. Select the purchased secret key and press the **[ENTER]** key to confirm.

Touch Operations

The signal analyzer provides multipoint touch screen for various gesture operations, which include:

- Tap the top right of the screen to enter the main menu.

- Tap parameters or menus on the screen to select or edit.
- Turn on and move the cursor.
- Use auxiliary quick keys to perform common operations.

Use **[Touch/Lock]** key to turn on/off the touch screen function.

Help Information

The signal analyzer's built-in help system provides help information of each functional key and menu control key on the front panel.

- Tap the "  ", on the lower left side of screen, and a help dialog box will pop out in the center of the screen. Tap the support function to get more detailed help descriptions.
- After the help information is displayed in the center of screen, tap "×" or any other keys to close the dialog box.

Operation Modes

The signal analyzer offers various operating mode, press the **Mode** key to select it.

- Spectrum Analysis
- IQ Analysis
- EMI
- Analog Demodulation
- Vector Signal Analysis
- Real-time Spectrum Analysis (See chapter 3 for details)
- Vector Network Analysis
- Phase-Noise Analysis
- Mode Presetting

Mode Presetting: Each operation mode has its own reset mode. The options include IQ analysis, EMI, analog demodulation, vector signal analysis, and phase analysis, which require purchase to activate. In different operation modes, the functional keys on the front panel may differ. This manual is specialized for Real-time spectrum analysis, UI and functional keys.

2. User Interface

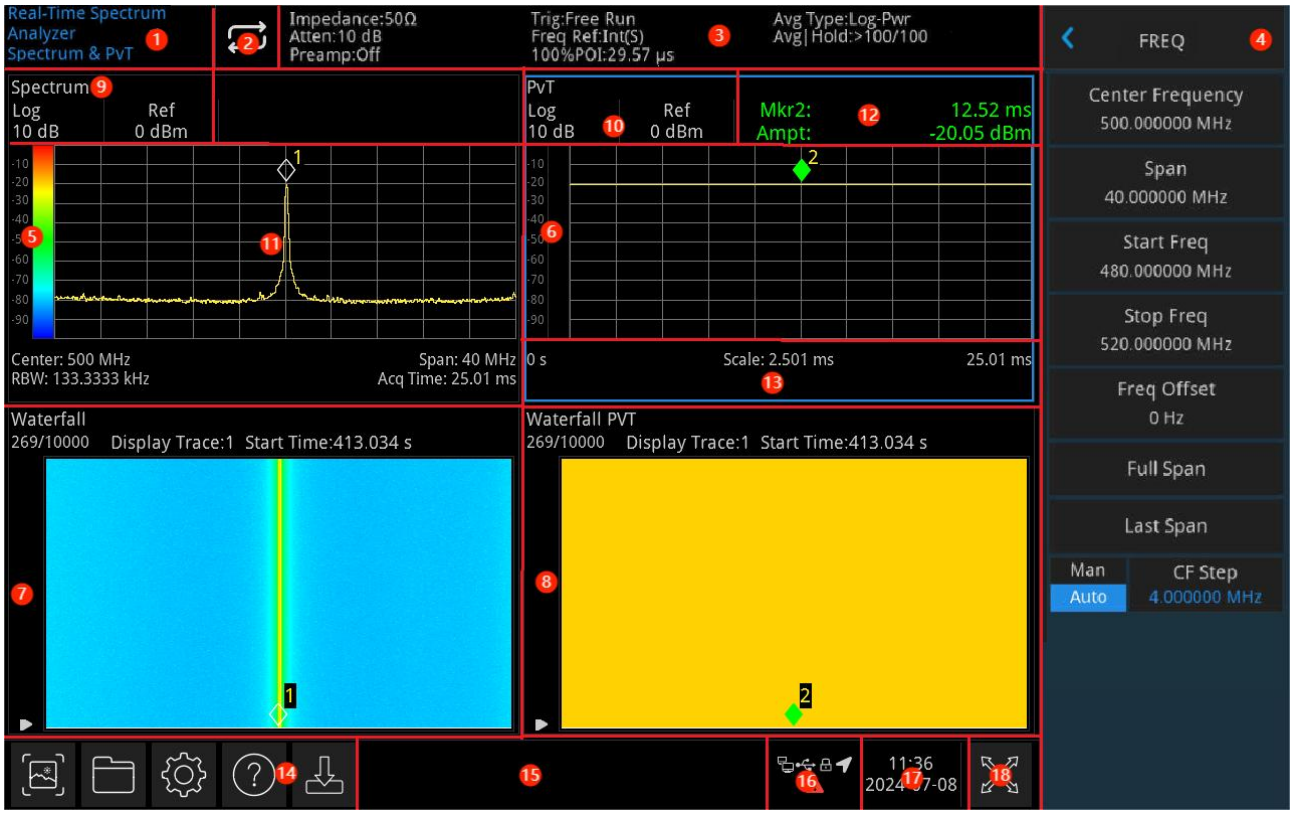


Figure 2-1 User's Interface

1. **Operating Mode**: Spectrum analysis, IQ analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis, vector network analysis, phase noise analysis.
2. **Sweep/Measurement**: Tap switch icon to quickly step through the sweep mode, single or continuous.
3. **Measurement Bar**: Displays measurement settings (attenuation, pre-amplify, trigger, average | hold, impedance, etc.). Tap the icon to switch quickly.
4. **Panel Menu:** Current functional keys and items, includes frequency, amplitude, bandwidth, trace, markups, and other functional displays.
5. **Trace 1 Window:** Display the waveform or data of trace 1.
6. **Trace 2 Window:** Display the waveform or data of trace 2.
7. **Trace 3 Window:** Display the waveform or data of trace 3.
8. **Trace 4 Window**: Display the waveform or data of trace 4.
9. **Display Window:** The current display windows include normal Spectrum, density spectrum-Density, light spectrum-Waterfall, power time-PvT, and power diagram-Waterfall PvT.
10. **Reference Level & Scale**: Display the reference level value and scale value.
11. **Gird Display Area**: includes trace display, cursor point, mark line, mark list, peak list, etc.
12. **Measurement Results Marked**: Display the current measured results, including frequency,

time or amplitude.

13. **Data Display:** includes start time, stop time and scale in X-axis.
14. **Functional Settings:** Quick Screenshot, File System, Setup System, Help System and File Storage.
    - Quick Screenshot  : Take a screenshot and save it to the default folder. If external storage exists, it will be saved to the external storage first.
    - File System  : In a file system, users can save trace state, status, measurement data, frequency mask or other files to internal or external memory and can make calls. View, create, delete, copy, and move files.
    - System Information  : View basic information and options.
    - Help System  : Open the Help Navigation.
    - File Storage  : Import and export status, trace + status, measurement data and frequency mask.
15. **Log Dialog Box of System**: Click the blank part on the right side of file storage to view running logs of system, alarms, tips, etc.
16. **Connection Type**: Display connection status including mouse, USB flash drive, screen lock and other connection conditions.
17. **Date & Time:** Display the date and time.
18. **Full Screen ON/OFF:** Open the full screen display, the screen is elongated horizontally, and the button on the right side is automatically hidden.

3. Key Descriptions (RTSA)

- Frequency (FREQ)
- Amplitude (AMPT)
- Bandwidth (BW)
- Sweep
- Trace
- Marker
- Peak
- Measurement (Meas)
- Measurement/Setup (Meas/Setup)
- Single
- Default Setup (Default)
- System Setup (System)
- File Storage (Save)
- Touch/Lock
- Mode

Note

- The key descriptions are for the real-time spectrum analysis of device.
- For different devices, the parameter configuration and functions may differ. Refer to the data sheet of each device for specific parameter configurations.

Frequency (FREQ)

Press the **[FREQ]** key to enter the frequency function menus. The numerical values of start frequency and stop frequency are displayed at the bottom of the screen.

Center Frequency: Activate this function to set a specific frequency value at the center of the screen. Use the numeric keys, rotary knob, arrow keys, or by touching panel menu to change the

center frequency.

Sweep Width: Used to enter the range value of sweep width. Users can change the sweep width value by numeric keys, rotary knob, arrow keys, or touching panel menus. Changing the sweep width will change the frequency range symmetrically as per the center frequency. The reading of sweep width is the total display frequency range. To ensure the sweep width of each horizontal scale division, the above sweep width should be divided by 10.

Note

- In the process of sweep width adjustment, keep the center frequency unchanged, the start frequency and stop frequency will be changed.
- Minimum sweep width is up to 5 kHz, and the maximum one is 40 MHz.

Start Frequency: The start frequency is displayed on the left end of the screen, while the stop frequency is shown on the right end of the screen. Use the numeric keypad, rotary knob, arrow keys, or by touching panel menu to adjust the start frequency.

Note

- The modification of start frequency will cause the sweep width and center frequency to change. Additionally, changes in sweep width will impact other system parameters.
- Do not set the start frequency to > stop frequency, otherwise, the stop frequency will be changed for keeping the minimum difference between start frequency and stop frequency in 5 kHz.
- Do not set the start frequency to = stop frequency, otherwise, the stop frequency will be changed for keeping the minimum difference between start frequency and stop frequency in 5 kHz.

Stop Frequency: The stop frequency is displayed on the right end of the screen, while the start frequency is shown on the left end of the screen. Use the numeric keypad, rotary knob, arrow keys, or by touching panel menu to adjust the stop frequency.

Note

- The modification of start frequency will cause the sweep width and center frequency to change. Additionally, changes in sweep width will impact other system parameters.
- Do not set the start frequency to > stop frequency, otherwise, the stop frequency will be changed for keeping the minimum difference between start frequency and stop frequency in 5 kHz.
- Do not set the start frequency to = stop frequency, otherwise, the stop frequency will be changed for keeping the minimum difference between start frequency and stop frequency in 5 kHz.

Frequency Offset: Set a frequency offset to account for the frequency conversion between the

DUT (device under test) and the input of the signal analyzer. Use the numeric keypad, rotary knob, arrow keys, or by touching panel menu to adjust the frequency offset.

Note

- Any hardware settings of signal analyzer will not be affected by the parameters; it only changes the displayed values of center frequency, start frequency, and stop frequency.
- Set the frequency offset to 0 Hz if needed to eliminate the frequency shift.

Full Sweep Width: Change the sweep width to the sweep width display of all frequency range.

Last-Time Sweep Width: Set the sweep width to the last-time one.

Stepped Center Frequency: It will change the length of center frequency, start frequency, and stop frequency during the arrow keys step using, and users are able to change the stepped value by numeric keys, rotary knob, arrow keys or touching the panel menu.

Amplitude (AMPT)

Press the **[AMPT]** key to activate the reference level function and enter the amplitude setting menus. The amplitude parameters of each trace window are independent of each other. When selecting a trace window, each amplitude parameter of trace window can be modified in the amplitude menu.

Reference Level: Set the reference level and enable it by pressing the **[AMPT]** key. The reference level is the power or voltage value displayed on the reference grid line of screen (use amplitude unit). Users can adjust the reference level by using the numeric keypad, rotary knob, arrow keys, or touching panel menu.

Note

- The reference level is an important parameter of the signal analyzer, representing the upper limit of the dynamic range at the current setting. If the energy of the signal being measured exceeds the reference level, it may cause non-linear distortion or even overload alarms. Understanding the nature of signals to be measured and carefully selecting the reference level is essential to achieving optimal measurement results and protecting the signal analyzer.

Input Attenuation (Auto/Manual): Set the RF front-end attenuator to allow the signal to pass through the mixer with low distortion (small signals with low noise). Input attenuation can be switched between Automatic and Manual modes. When Auto is selected, the input attenuation value is linked to the reference level. When Manual is selected, the user can change the input attenuation value using the numeric keypad, rotary knobs, arrow keys, or by touching the panel menu.

Note

- When the maximum mixer level and reference level are determined, the minimum input attenuation of the signal analyzer should meet the following formula:

Reference Level ≤ Input Attenuation - Pre-amplification -10 dBm.

Preamplifier: This switch controls the instrument's internal preamplifier. Turning it on to produce a gain for preamplifier compensation, ensure that the amplitude value reading is the actual value of input signals.

Scale/Division: Set a value corresponding to one grid division in the vertical direction of the screen, and the scale function is available only in logarithmic scales. The users can change the scale value by numeric keypad, rotary knobs, arrow keys, or touching the panel menu.

Scale: In the normal spectrum measurement, set a logarithmic value corresponding to one grid division in the vertical direction of screen, with a value range of 0.1 to 20 dB per grid. In linear measurement, the vertical grid becomes a linear scale with the default amplitude in volts (V) unit. The grid line at the top of screen represents the set reference level, while the grid line at the bottom represents the zero level. Each grid division represents a tenth of reference level in volts (V) unit.

Y Axis Unit: Change the amplitude unit, available in both logarithmic and linear modes. Optional units: dBm, dBmV, dBμV, V, and W. The default is dBm.

Ref Level Offset: When there is a gain or loss between the DUT and input of the signal analyzer, an offset value is added to the reference level to compensate for the resulting gain or loss. This value does not change the position of the trace but modify the reference level and the amplitude readings of the cursor.

Impedance: Set the input impedance during the voltage converting to power, and the default input impedance is 50 Ω. If the input impedance of DUT to the signal analyzer is 75 Ω, use a 75 Ω-to-50 Ω adapter to connect the DUT to the signal analyzer and set the input impedance to 75 Ω.

Bandwidth (BW)

Press the **[BW]** key to enable the resolution bandwidth (RBW) function, and manually set RBW.

RBW: In RTSA mode, preset 6 filter types of options for 6-setting RBW, from RBW1 to RBW6, and users can select a proper RBW setting as per needed.

Auto RBW: Set the coupling way of RBW to "Auto" or "Manual". In RTSA mode, select a calculated value for RBW and the formula is as follows: RBW = SPAN/Scale Value of Filter Types, and the scale value depends on the filter types.

Filter Types: Set the types of functions for FFT windows. There are 6-filter types: Gaussian, Flattop, Blackman-Harris, Rectangular, Hanning, and Kaiser.

Note

- Select the PVT window or Waterfall PVT, the bandwidth setting is disabled.

Sweep

Press the **[Sweep]** key to enter the sweep setting menu, and set the sweep, control, and trigger functions.

Capturing Time: Set the gathering time for single trace generating or an afterglow bitmap. In this mode, the single trace will combine multiple overlapped FFT analysis results.

Auto-capturing Time: Set the capturing time of signal analyzer to "Auto" or "Manual." In "Auto" setting, the gathering time is default. In "Manual" setting, the gathering time can be set within the range value.

Sweep/Measurement (Single/Continuous): Set the sweep mode to single and continuous. The default is continuous. The corresponding status is displayed at the top of the screen according to the selected mode.

- **Continuous**: The icon  indicates continuous mode. The system automatically sends the trigger initialization signal and enters the part of trigger condition judgment directly after each sweep. The setting is for the entire settings, and all activated traces are effective.
- **Single**: Press the key to enter the single sweep and measurement, and the icon  indicates single mode. Tap the **Single** key to light up the backlight. When the current system is in the single sweep mode and not in the measuring status, press **Single** key to sweep in the trigger condition. When the current system is in the single sweep mode and in the measuring status, press **Single** key to sweep and measure in the trigger condition. The setting is for the entire settings, and all activated traces are effective.
- **Restore/Pause:** Select "Pause" to stop the current sweeping. Select "Restore" to recover the stopped sweep and continue to sweep from the stopped sweeping point.
- **Restart:** Re-clear the history measurement data and restart the measurement.
- X-Axis Parameters: Only in the related measurement modes of PVT, select the PVT or the Waterfall PVT window, can this function be used.

1. Auto X-axis: Select the setting ways of X-axis scales in PCT window.

   Note

   - Select the "Auto" scale mode to automatically set the reference time and X-axis scale as per the gathering time and reference position. X-axis scales are the 10% of gathering time, and the reference time can be set to be different as per the reference positions. The reference position is in "Left" and reference time is 0us. The reference position is in "Middle" and reference time is half of gathering time. The reference position is in "Right"

and reference time is the gathering time.

- When manually setting the reference time and X-axis scales, the function of auto scales will be switched to "Manual."

2. X-axis Reference: Set the reference time of X-axis in PVT window. The value modification will not cause re-measurement, and only be used for trace display. The value will be changed by opening auto scale function or changing reference positions.

Note

- X-axis scale types are only related to the data display, not the sweep and trace data. PVT measurement displays the signal power changes in the user-defined time period, X-axis shows time, Y-axis shows amplitude.

3. X-axis Scale: Set the scale value of X-axis in PVT window. The value modification will not cause re-measurement, and only be used for trace display. The value will be changed by opening the auto scale function.
4. X-axis Reference Position: Set the reference-time positions of X-axis in PVT window to "Left", "Middle" or 'Right".'

In RTSA mode, the medium frequency trigger and frequency mask template (FMT) trigger are added in the trigger types, not supported to video trigger.

Trigger Type: Free trigger, External trigger, Medium frequency trigger, and Frequency mask template trigger (FMT).

1. **Free Trigger**: The trigger signal can be generated continuously at any time if the trigger conditions are met. No need to set trigger conditions, after each frame sweeping, the next frame sweeping will be automatically triggered.
2. **External Trigger**: Input an external signal (TTL) via the connector **[TRIGGER IN]** on the rear panel. A trigger signal is generated when the signal meets the trigger edge conditions.

   Trigger Edge (Rising-Edge/Falling-Edge): Set the trigger edges to be the rising or falling edge of pulses in the external trigger. A trigger signal is generated when the signal meets the trigger edge conditions.

   Trigger-Delay ON/OFF: Set the trigger-delay to on/off. When setting the trigger-delay function ON, the trigger-delay time can be set.

   Trigger-Delay: Set the waiting time before sweeping in the condition of trigger signals meets the trigger requirements. Users can modify the trigger level by numeric keys, rotary knob, arrow keys or touching panel menu.
3. **Medium Frequency Power (Time-Domain) Trigger**: When detects the signals in medium frequency are out of the range limit, it triggers signals.

   Level Trigger: Set the level trigger to the medium frequency trigger. It triggers when the

signals reach the level setting. Level value in medium frequency power is showed on the waveform display area with a horizontal line. When the setting value is not in the range of waveform display, the level trigger line will be showed on the top or bottom of the waveform display area.

4. **Frequency Mask Template (FMT) Trigger**: When selecting the FMT, a trigger occurs on the amplitude spectrum, and the frequency mask template is triggered. FMT masks can be set by the controlling parts in option cards of FMT.

Trigger Condition: The parameters are used to define the events that may cause triggers. These trigger events are the ways of interaction between signals and FMT. RTSA captures data generated by using multiple FFTs.

Trigger criteria are used to determine which FFTs are used in data generation. Options are Enter, Exit, Inside, Outside, Enter-Exit, and Exit-Enter.

Enter: A trigger occurs when a signal enters the frequency mask area. The trigger event will not occur again until the signal exits the mask and re-enter. When the trigger criteria are set to "Enter," once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated. All these FFTs will be used to generate the gathering data. If the trigger delay is negative, all FFTs calculated in this time period will be included in the gathering data.

Exit: A trigger will occur when a signal exits the frequency mask area. It requires a signal in the mask area. When the trigger criteria are set to "Exit," and once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated, and all these FFTs will be used to generate the gathering data. If the trigger delay is negative, all FFTs calculated in this time period will also be included in the gathering data.

Inside: A trigger occurs when the signal is within the mask area and will continue to trigger until the signal is no longer within the mask area. When the trigger criteria are set to "Inside," once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated, but only the

FFTs meet the trigger criteria and will be used to generate gathering data. If the trigger delay is negative, all FFTs calculated in this time period will also be included in the gathering data.

Outside: A trigger event will occur when the signal is not in the mask area and will continue to trigger until the signal is in the mask area. When the trigger criteria are set to "Outside," once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated, but only the FFTs that meet the trigger criteria will be used to generate gathering data. If the trigger delay is negative, all FFTs calculated in this time period will also be included in the gathering data.

Enter-Exit: A trigger occurs when the signals enter the frequency mask area and exits. When the

trigger criteria are set to "Enter-Exit," once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated, all these FFTs calculated will be used to generate gathering data. If the trigger delay is negative, all FFTs calculated in this time period will also be included in the gathering data.

Exit-Enter: A trigger occurs when the signal exits the frequency mask area and re-enters. When the trigger criteria are set to "Exit-Enter," once the FFT meets the trigger criteria, all subsequent FFTs during the gathering time period will be calculated, all these FFTs calculated will be used to generate gathering data. If the trigger delay is negative, all FFTs calculated in this time period will also be included in the gathering data.

Mask Types: Are used to determine the masks used for triggers, options of upper mask, lower mask, and all masks.

Edit (Mask): Press the key to enter the Edit menu, open the mask editing window, includes:

Select: Select the mask needs to be edited, options of upper mask and lower mask, and the default one is the upper mask.

Frequency Reference: Fixed frequency and center frequency. The default frequency is fixed.

Amplitude Reference: Fixed reference and amplitude reference. The default amplitude is fixed.

Lines Select: Select the line counts in the limits table.

Frequency: Edit the frequency of the current point. The user can change the frequency by using number keys, rotary knobs, arrow keys, or touching panel menu.

Amplitude: Edit the amplitude of the current point. The user can change the amplitude by using number keys, knobs, arrow keys, or touching panel menus.

X Offset: Set the frequency offset of the current mask.

Y Offset: Set the amplitude offset of the current mask.

Apply Offset: When X offset and Y offset data are reached to each point on the current limit line, then reset the X offset and Y offset to 0.

Insert Line: Insert an edit point.

Lines Delete: Delete the currently selected line.

Trace

Press the **[Trace]** key to enter the trace setting menu. It is used to control trace gathering, display, storage, detection, and trace data operation. Each trace consists of a series of data points containing amplitude information. With each sweep, the signal analyzer refreshes its information for any valid trace. For slower sweep, there is a visual indicator at the trace where new data is written, that is the green "Insert icon" or ^ icon, showing the trace moving of current trace point at the

bottom of grid line.

The trace parameter settings in trace window of power-time and in trace window of spectrum are independent of each other. If a window is selected, each trace parameter of trace window can be modified in the trace menu.

Select Trace: Select the trace needs to be used. There are 6 spectrum traces and 6 power-time traces.

Trace Types: Set the trace type of currently selected. According to the trace type, the sweep data will be displayed by taking different calculations. The trace types include refresh, trace average, maximum hold, and minimum hold. Each type has a corresponding parameter displayed on the upper right side of the screen.

1. **Refresh**: Take the real-time sweep data on each trace point.
2. **Trace Average**: Each point on the trace displays the results of data averaging after multiple sweeps. As the average sweeping times increase, the waveform becomes smoother.
3. **Max. Hold**: Each point on the trace keeps displaying the maximum value over multiple sweeps, updating the data display when a new maximum value is generated.
4. **Min. Hold**: Each point on the trace keeps displaying the minimum value over multiple sweeps, updating the data display when a new minimum value is generated.

Detector: Set the detection mode of the current measurement and apply it to the current trace. Optional detector types include sampling, peak, negative peak, and average.

1. **Sampling**: For each point on the trace, the sampling shows the transient energy in the fixed time (usually the first sampling point in this time period), in the corresponding time interval. Sampling is applicable to noisy or noise-like signals.
2. **Peak:** For each point on the trace, peak detection shows the maximum value of the sampled data within the corresponding time interval.
3. **Negative Peak:** For each point on the trace, negative peak detection shows the minimum value of the sampled data within the corresponding time interval.
4. **Average:** For each data point, the detector will take the average value by sampling data within the time interval. The average effect varies between different data types. The average type can be set using the **[Meas/Setup]** key.

Refresh (ON/OFF): When refresh is enabled, all stored data in the selected trace are cleared, and signals are continuously displayed during the sweep period. When refresh is disabled, the amplitude data of the selected trace are held and displayed. The trace register will not be refreshed with the sweep.

Display (ON/OFF): Turn on/off the selected trace.

Trace Operation: Performs mathematical operations between traces or between traces and a specified offset.

1. **OFF**: Disable the mathematical operations.
2. **Power Difference (A-B)**: Calculate the power difference between operand A and B and store it in the target trace. During the sweep, the following calculation is performed for each point:

   Trace=10log $(10^{A/10}-10^{B/10})$

   In this formula, the parameter unit is the decibel value of logarithmic power. If one value on operand A is the maximum trace, then the difference result is also the maximum trace value. If the difference result is less than or equal to 0, the value is the minimum trace.
3. **Power Sum (A+B)**: Calculate the power sum of operand A and B and store it in the target trace. During the sweep, the following calculation is performed for each point:

   Trace=10log $(10^{A/10}+10^{B/10})$

   In this formula, the parameter unit is the decibel value of logarithmic power. If one value on operands A or B is the maximum trace, then the sum value is also the maximum trace.
4. **Log Difference (A-B+Offset)**: With the logarithmic difference function, operand A subtracts operand B and then adds the offset, store it in the target trace. During the sweep, the following calculation is performed for each point:

   Trace=A-B+offset

   In this formula, the unit of trace data is dBm.
5. **Log (A+Offset)**: Calculate the sum of operand A and offset and store it in the target trace. During the sweep, the following calculation is performed for each point:

   Trace=A+offset

   In this formula, the unit of trace data is dBm.

   Note

   The functions of trace arithmetic are mutually exclusive. That is, when an arithmetic function is applied to a trace, the previously selected arithmetic function will be off.

Operand A: Set operation trace 1 in the operation function. Trace 1, trace 2, trace 3, trace 4, trace 5, and trace 6 are available for selection.

Operand B: Set operation trace 2 in the operation function. Trace 1, trace 2, trace 3, trace 4, trace 5, and trace 6 are available for selection.

Offset: Set logarithmic offset in the operation function, in dB unit. The user can change the offset using the numeric key, rotary knob, arrow keys, or by touching the panel menu.

Marker

Press the **[Marker]** key to access the panel menu with cursor function, to select the cursor type and quantity. In RTSA mode, the cursor function of real-time spectrum window is nearly same as that of SA mode ("Cursor Z" menu is effective in the power diagram or in the spectrum window). The cursor point is a rhombic icon, as shown in Figure 3-1.

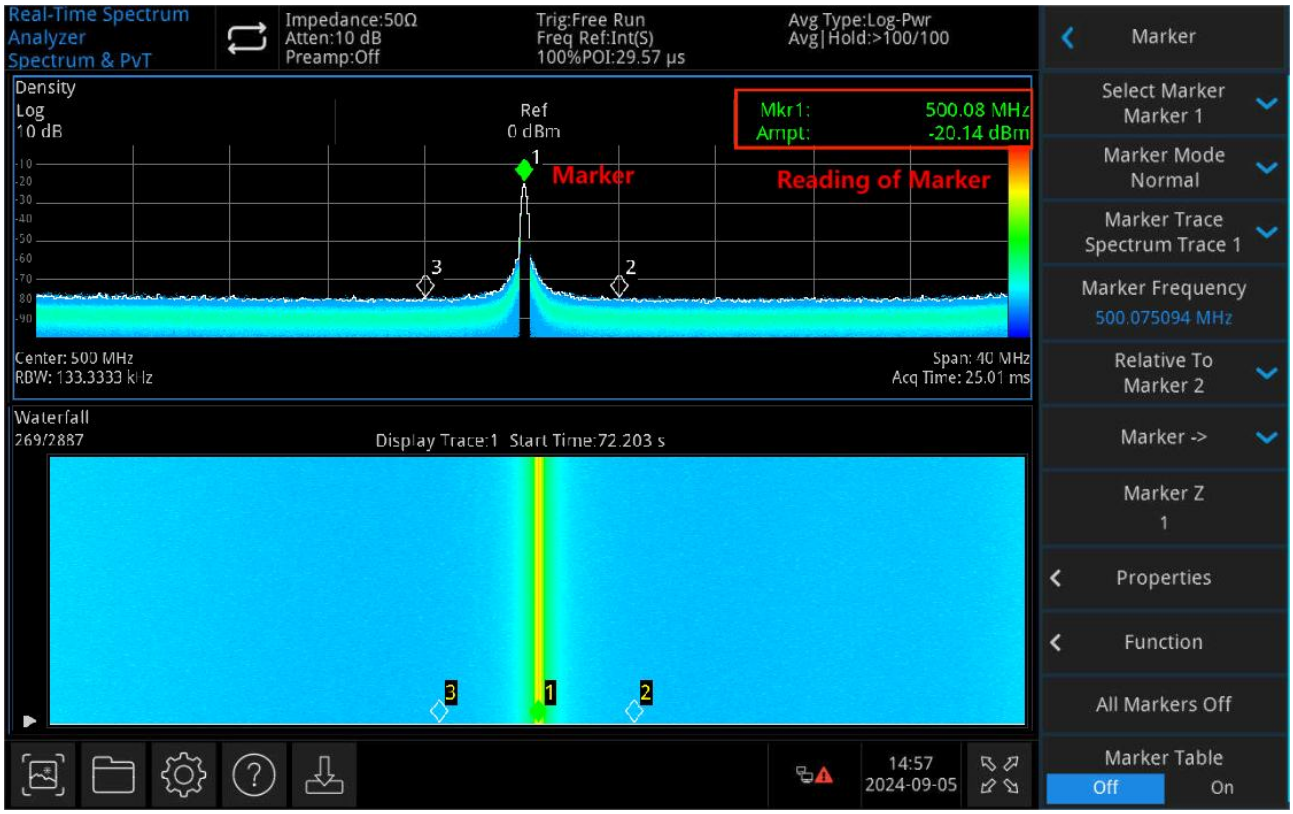


Figure 3-1 Marker

10 markers can be simultaneously used on the screen, however, only one or a pair can be controlled at one time.

Select Marker: Choose one of ten available cursors. By default, Cursor 1 is selected. After selecting a cursor, the user can set parameters of cursor types, the trace to mark, reading modes, etc. The active cursor will be displayed on the selected trace, and the readings on the current activated cursor will be shown on the parameters area and the upper right side of the screen.

Marker Modes:

1. **Normal:** This mode is used for measuring X (frequency or time) and Y (amplitude) values at a specific point on the trace. After selecting Normal mode, a cursor identified by its number (e.g., "1") will appear on the trace. Note the following points when using this mode:
   - If no cursor is currently activated, a cursor will be activated at the center frequency of the current trace.
   - The reading of the current cursor will be displayed in the upper right corner of the screen.

- The resolution in reading of X-axis (time or frequency) is related to the sweep width; reducing the sweep width can achieve a higher reading of resolution.

2. **Delta** △: Measure the difference between "reference point" and "a point on the trace": X (frequency or time) and Y (amplitude) values. After selecting "Difference," a pair of cursors will appear on the trace: the reference cursor (marked with "×") and the difference cursor (marked with "△").
3. **Fixed**: After selecting the "Fixed" cursor, set the X and Y values of cursors directly or indirectly, and their positions remain unchanged. The Y value does not change as the trace change. The fixed cursor is used as the reference cursor for the difference cursor and is marked with "×".
4. **OFF**: Turn off the selected cursor. The cursor information displayed on the screen and the related function will also be closed.

Trace mark: Select the trace marked by the current cursor as Spectrum trace1, Spectrum trace 2, Spectrum trace 3, Spectrum trace 4, Spectrum trace 5, Spectrum trace 6, Power-time trace 1, Power-time trace 2, Power-time trace 3, Power-time trace 4, Power-time trace 5, and Power-time trace 6.

Frequency/Time Mark: Mark the frequency point on the trace. The user can change the frequency value by numeric keys, rotary knob, arrow keys, or touching the panel menu. When in "Difference" cursor mode, the markup should be changed into "MarkerΔFrequency." When the marked one is the power-time trace, the parameter is the Time Cursor.

Marker Z: Set the trace mark No. in the power diagram or in the spectrum window. The menu is only effective in the condition of selecting power diagram or spectrum window.

Relative To: Used for measuring the difference between two cursors. These two cursors can be marked on different traces at the same time.

All Markers OFF: Closes all cursor points.

Marker ->: Use the values of current cursor to set other system parameters in the signal analyzer (such as center frequency, reference level, etc.). If no cursor is available currently, pressing the **Marker** menu will activate a cursor automatically. In RTSA mode, the "Cursor->" function in the real-time spectrum window is the same as that of SA mode. In PVT measurement window, only "Cursor->Reference Level" menu is supported.

1. **->**Center Frequency: Set the center frequency of the signal analyzer to the frequency of the current cursor.
   - When the "Normal" cursor is selected, the center frequency is set as the frequency of the cursor.
   - When the "Difference" cursor is selected, the center frequency is set to the frequency in the Difference cursor.

- In zero sweep width mode, this function is not effective.

2. ->Center Frequency Stepping: Set the center frequency stepping of the signal analyzer to the frequency of the current cursor.
   - When the "Normal" cursor is selected, the center frequency stepping is set as the frequency of the cursor.
   - When the "Difference" cursor is selected, the center frequency stepping is set to the frequency difference between the Difference Cursor and the Reference Cursor.
   - In zero sweep width mode, this function is not effective.

3. ->Start Frequency: Set the start frequency of the signal analyzer to the frequency of the current cursor.
   - When the "Normal" cursor is selected, the start frequency is set as the frequency of the cursor.
   - When the "Difference" cursor is selected, the start frequency is set to the frequency in the Difference cursor.
   - In zero sweep width mode, this function is not effective.
4. ->Stop Frequency: Set the stop frequency of the signal analyzer to the frequency of the current cursor.
   - When the "Normal" cursor is selected, the stop frequency is set as the frequency of the cursor.
   - When the "Difference" cursor is selected, the stop frequency is set to the frequency in the Difference cursor.
   - In zero sweep width mode, this function is not effective.
5. ->Reference Level: Set the reference level of signal analyzer as an effective amplitude cursor and move the cursor point to the reference level (on the top of the grid).
   - When the "Normal" cursor is selected, set the cursor amplitude of signal analyzer as the amplitude of the current reference level.
   - When the "Difference" cursor is selected, set the reference level as the amplitude difference between cursors.

Marker List: Set Marker List on/off.

Open the Marker List, and all markers will be showed on the lower window of split screen, includes cursor No., mark mode, trace No., X-axis scale type, X-axis reading and amplitude. Measured values of multi-points can be viewed on this list.

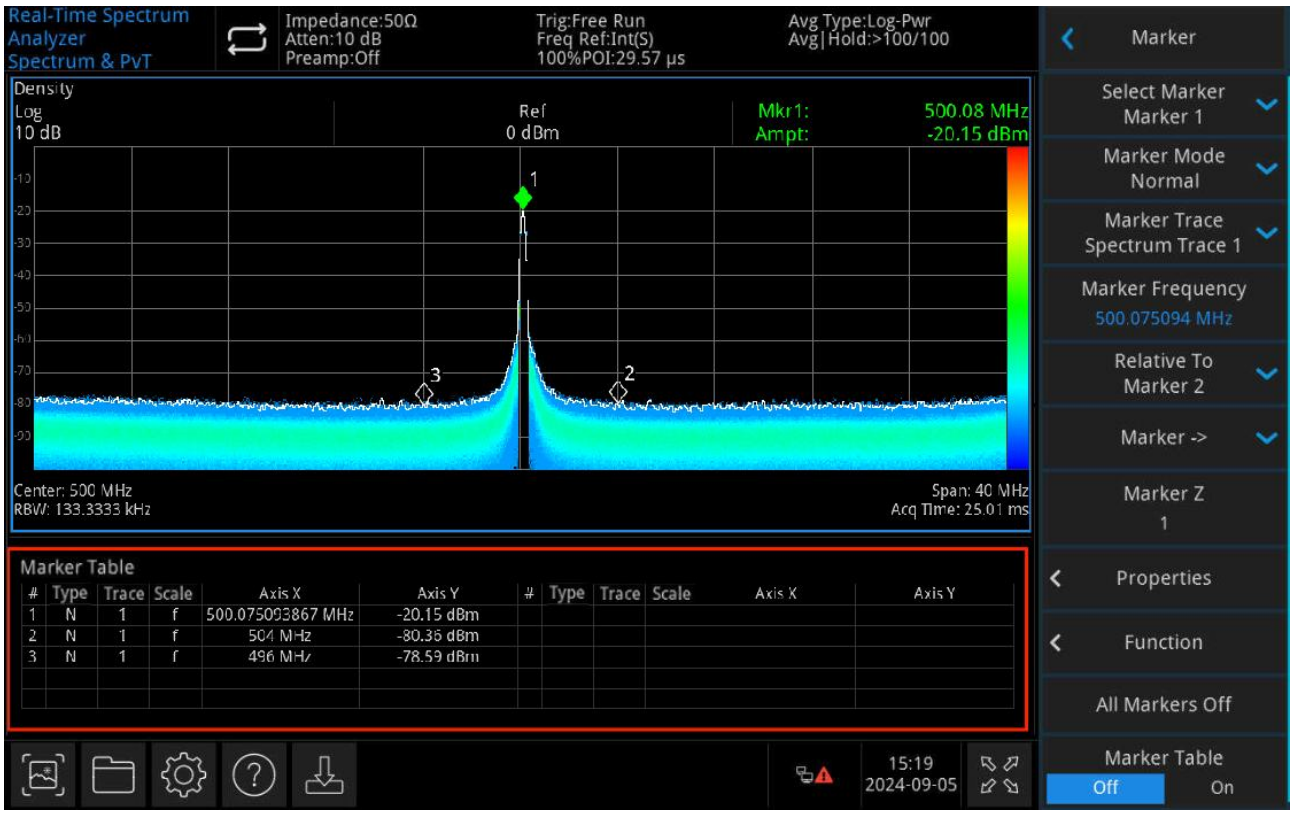


Figure 3-2 Marker List

Properties: X-axis scale, auto/manual X-axis scale ON/OFF, and mark lines ON/OFF.

1. **X-axis Scale:** Frequency, period, time, and inverse time can be set. The reading units of cursor points change as the X-axis scale change.
   - **Frequency:** When this type of reading is selected, the "Normal" and "Fixed" cursors show the absolute frequency. The "Difference" cursor shows the frequency difference relative to the reference cursor. In non-zero sweep width mode, the default reading type is "Frequency."

     When the trace mark is the power-time trace, the frequency and period in X-axis is disabled.
   - **Period:** When this type of reading is selected, the "Normal" and "Fixed" cursors show the reciprocal of the cursor frequency. The "Difference" cursor shows the reciprocal of the frequency difference. When the frequency difference is zero, the reciprocal will be infinite, and the reading is showed "---."
   - **Time:** When this type of reading is selected, it shows the reciprocal of the sweep time difference between the difference cursor and the reference cursor. The "Difference" cursor shows the sweep time difference between the difference cursor and the reference cursor. In zero sweep width, the default reading type is "Time."
   - **Inverse Time:** When this type of reading is selected, it shows the reciprocal of the sweep time difference between the difference cursor and the reference cursor. When the time

difference is zero, the reciprocal will be infinite, and the reading is showed "---."

2. **X-axis Scale (Man/Auto):** Manual and automatic X-axis scale can be set. When X-axis scale is automatic, the sweep width is set to zero sweep width, the reading mark will be changed to "Time" automatically.
3. **Mark Lines (ON/OFF):** Turn on/off the mark line.
   - When the mark line is on, the crossover line is displayed at the amplitude point indicated by the cursor, and the width of horizontal line and the height of vertical line are consistent with the length and height of the grids in the waveform display area.
   - If the cursor is not in the visible area, then extend the mark line to the display area. This function is useful for cursors out of the display area, the mark extension line indicates the amplitude of the cursor, for observing the comparison.

Functional Markers: Noise, Power in-Band and Density in-Band.

1. **Noise Mark:** Mark the noise using the selected cursor and read the power density value of normalized noise at the cursor.
   If the currently selected cursor is off in the **Marker** menu, pressing "Noise Mark" will automatically turn it on to the "Normal" type. This measures the average noise level of the frequency point at the cursor and normalizes it to the 1 Hz bandwidth, compensating for different detection methods and trace types. The noise cursor measurement can be more accurate by using "RMS Average" or "Sampling" methods.
2. **Power-in-Band Mark:** In non-zero sweep width mode, it calculates the total power of signals within a certain bandwidth range. In zero sweep width mode, it calculates the average power within a specific time range.
3. **Density-in-Band Mark:** In non-zero sweep width mode, the density in-band refers to the total power in bandwidth to be measured divided by the measurement bandwidth. In zero sweep width mode, the density in-band refers to the measured power in-band divided by Bn (Bn is the noise bandwidth of RBW filter).
4. **N dB (ON/OFF):** Enable the N dB bandwidth measurement function or set the value of N dB. The N dB bandwidth refers to the frequency difference between two points where the current cursor frequency point is down (N < 0) or up (N > 0) by N dB amplitude to the left and right. The user can change the value of N using the numeric key, rotary knob, arrow keys, or by touching the panel menu. When the trace mark is the power-time trace, the N dB measurement function is disabled.

Peak

Press the **[Peak]** key to access the setting menu of peak search and perform a peak search function.

Frequency Marker: Mark the frequency point on the trace. The user can change the frequency value by numeric keys, rotary knob, arrow keys, or touching the panel menu.

Marker ->: Refer to "Marker ->" in the panel menu.

Peak Search: Use the normal cursor mode to search for the highest amplitude in the trace and display the frequency and amplitude value. Press to perform the peak search function once.

Next Peak: Search the peak on the trace that has the second highest amplitude after the current peak and meets the search criteria. Mark it with the cursor. If this peak does not exist, the cursor will not be moved.

Next Peak on the Left: Search the current peak on the left side and search for the closest peak that meets the search criteria on the trace. Mark it with the cursor.

Next Peak on the Right: Search the current peak on the right side and search for the closest peak that meets the search criteria on the trace. Mark it with the cursor.

Minimum Peak: Search the minimum amplitude value on the trace and mark it with the cursor.

Peak-to-Peak Search: Perform peak search and minimum search simultaneously, marked with the "Difference" cursor, and the search result of peak is marked with "Reference" cursor, the minimum search is marked with the "Difference" cursor.

Continuous Peak Search (ON/OFF): Turn on/off continuous peak search. The default setting is OFF. When continuous peak search is turned on, the signal analyzer automatically performs a peak search after each sweep for measured signal track.

Peak List (ON/OFF): Turn on/off the peak list. The default setting is OFF.

When the peak table is on, a list of peaks that meet the search parameters (displaying frequency and amplitude) is displayed below the split screen window. A maximum of 20 peaks that meet the criteria can be displayed.

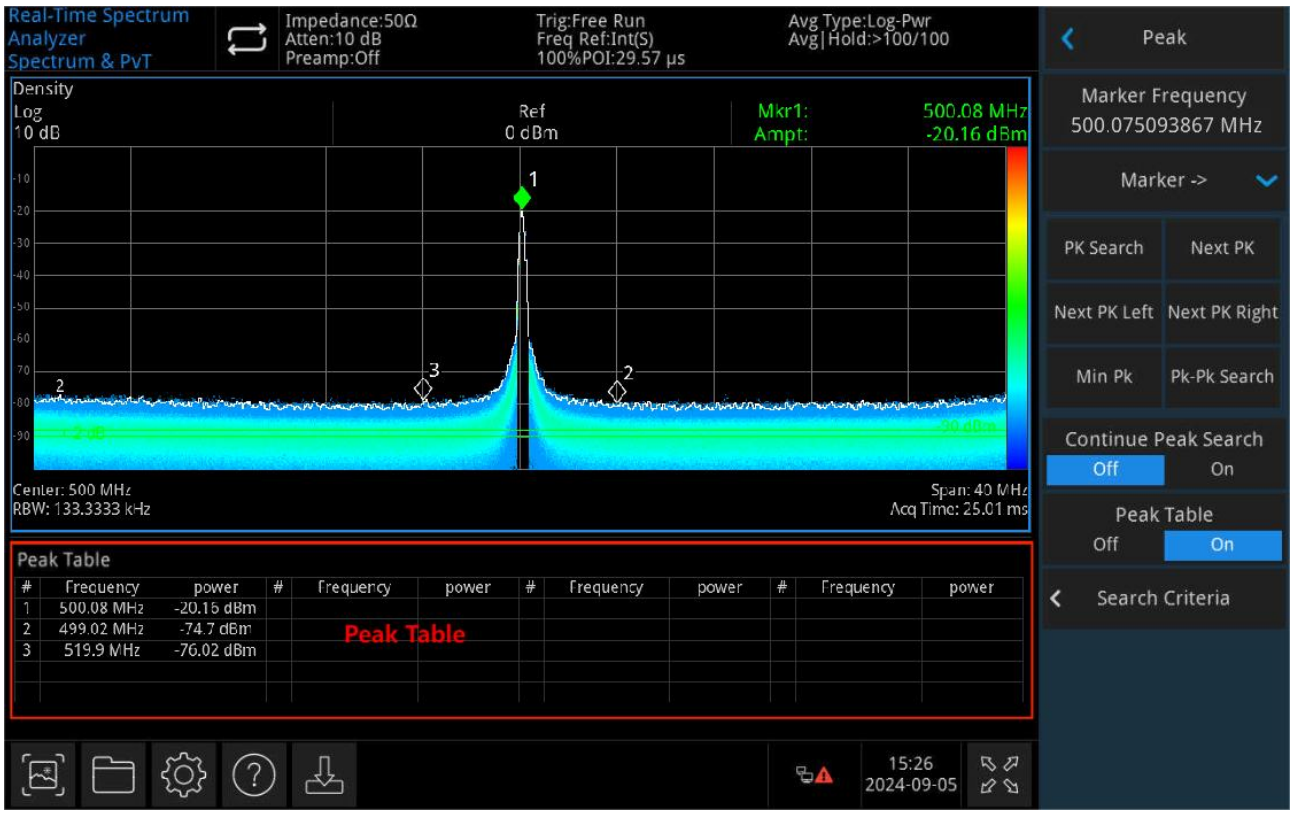


Figure 3-3: Peak List

Search Criteria: Threshold line, peak threshold, and peak offset.

Threshold Line (ON/OFF): Set whether to display the peak threshold and peak offset indicator line, the threshold line displays the peak offset value, and the default setting is OFF.

Threshold (Man/Auto): Specify the minimum peak amplitude manually or automatically. Only the peak is greater than the peak threshold can it be peaks. The user can change the threshold by numeric keys, rotary knob, arrow keys, or touching the panel menu.

Threshold Offset (Man/Auto): Automatically or manually specify the difference between the peak and the minimum amplitude on the left and right sides. Only if the difference is greater than the peak offset, can the peak be a peak. The user can change the offset by numeric keys, rotary knob, arrow keys, or touching the panel menu.

Measurement (Meas)

Press the **[Meas]** key to open the measurement options menu, and the spectrum & PvT is the default measurement.

Measurement Setting (Meas/Setup)

Press the **[Meas/Setup]** key to open the parameter setting panel, includes the following settings:

Display Window

There are options of normal, density (afterglow), spectrum, density spectrum, power-time, power-time spectrum, power-time light spectrum, power diagram and power-diagram spectrum. After selecting the measurement function, the screen is divided into multiple Windows. When in multi-window mode, a window can be selected as the current window by keys or screen touch, and the current window can be maximized. When the currently selected window is different, the corresponding menu will be changed. See follows for each measurement window details:

1. Spectrum Sweep

Select the "Normal" measurement mode and see following figure 3-4 for interface details:

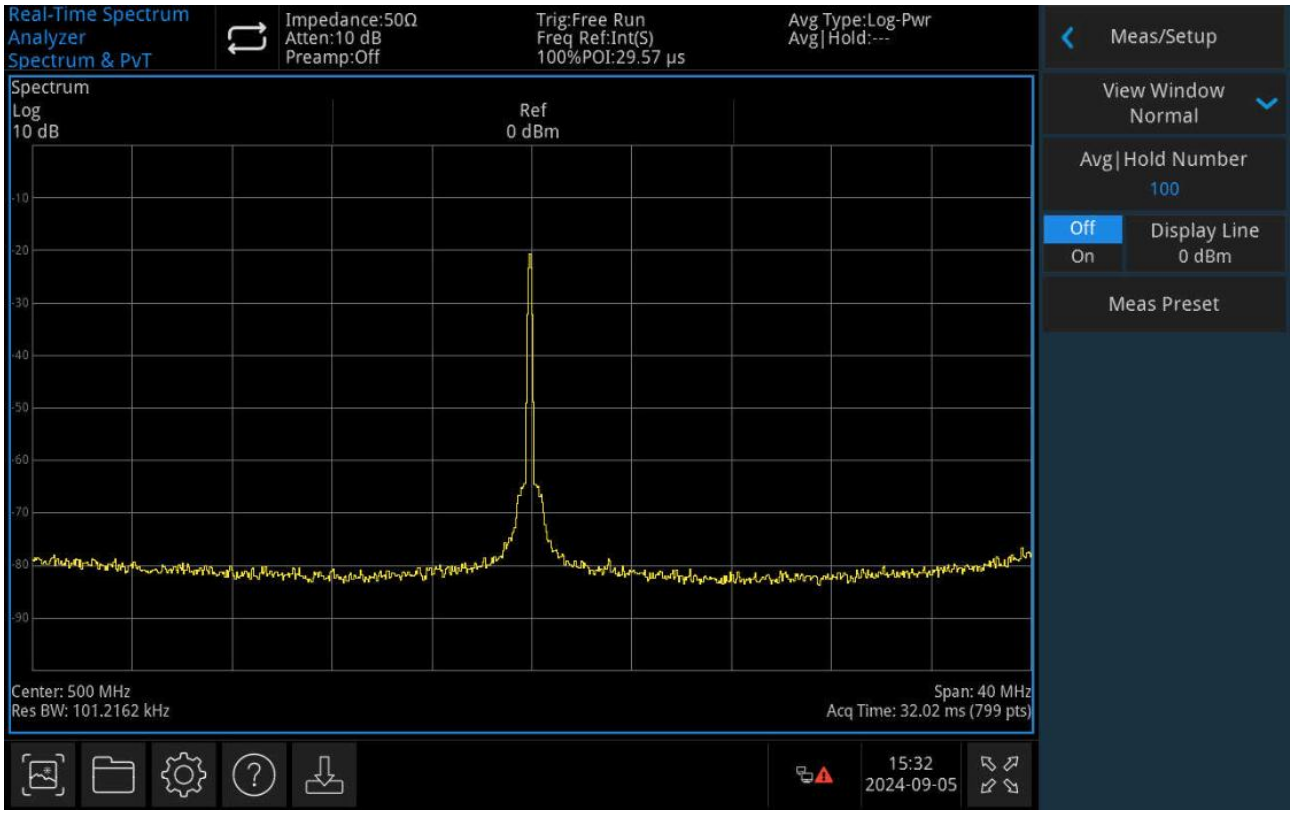


Figure 3-4

Press the **[Meas Setup]** key to set parameters.

In RTSA mode, all signals will be sampled as per the setting and cause corresponding results, or cause triggers.

2. Density

Select the "Density" measurement mode and see following figure 3-5 for interface details:

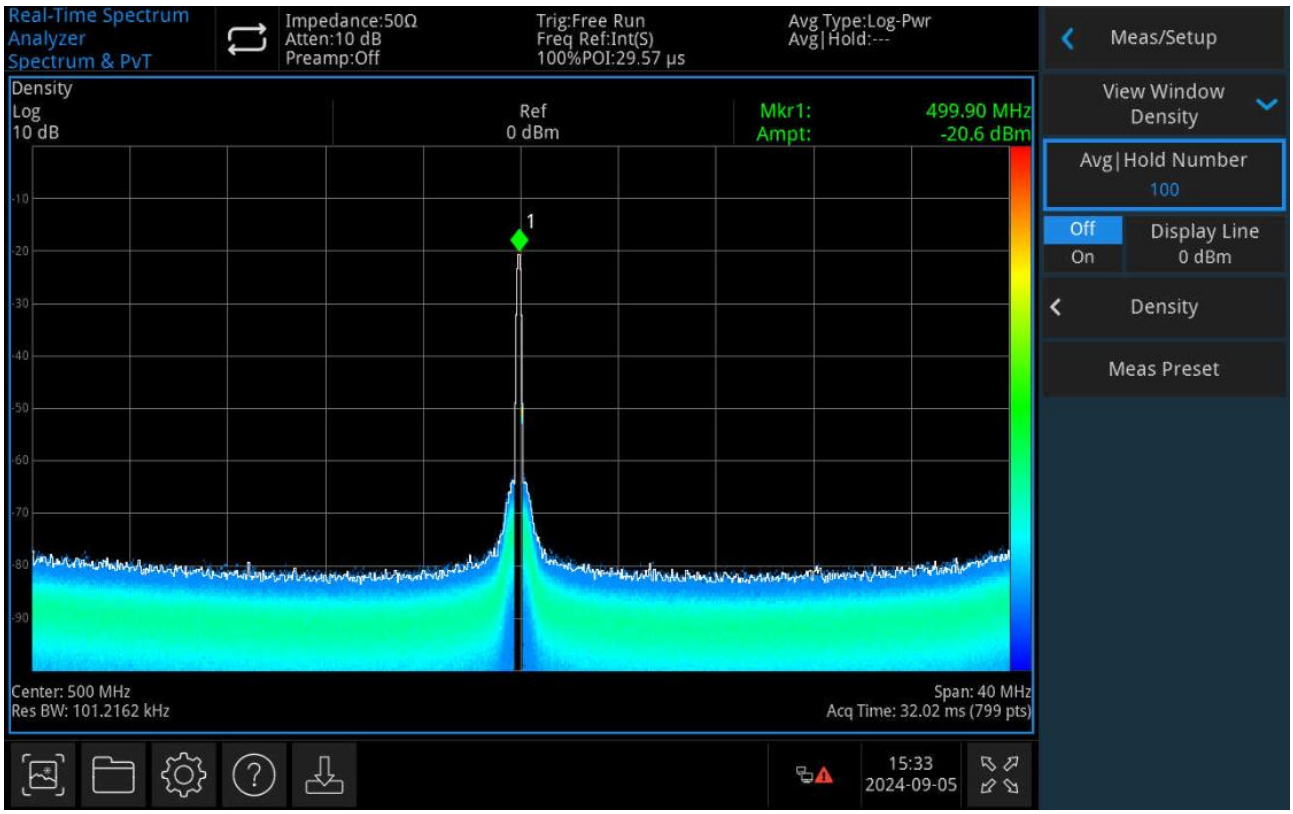


Figure 3-5

Press the **[Meas Setup]** key to set parameters.

Probability density refers to the show times of the frequency and amplitude point in a gathering interval.

Meanwhile, a white trace appears on the density spectrum, showing the real-time spectrum of the most recent sampling interval. When in the positive peak, negative peak or average detection, the white trace gets detection data from all data in the sampling interval. When in the sampling detection, the last FFT calculation result is taken.

To show the signal conditions in an extended period, it is suggested to make multiple probability density maps display on the screen, and the latest one is shown in maximum brightness. The longer the distance from current time, the lower the brightness of probability density maps, called Afterglow chart.

Combine the probability density with afterglow display, frequency in X-axis, amplitude in Y-axis, show times in Z-axis, and time in T-axis. Shows Z-axis in color and T-axis in brightness and achieves four-dimensional data display in the two-dimensional interface.

3. Spectrum

Select the "Spectrum" measurement mode and see following figure 3-6 for interface details:

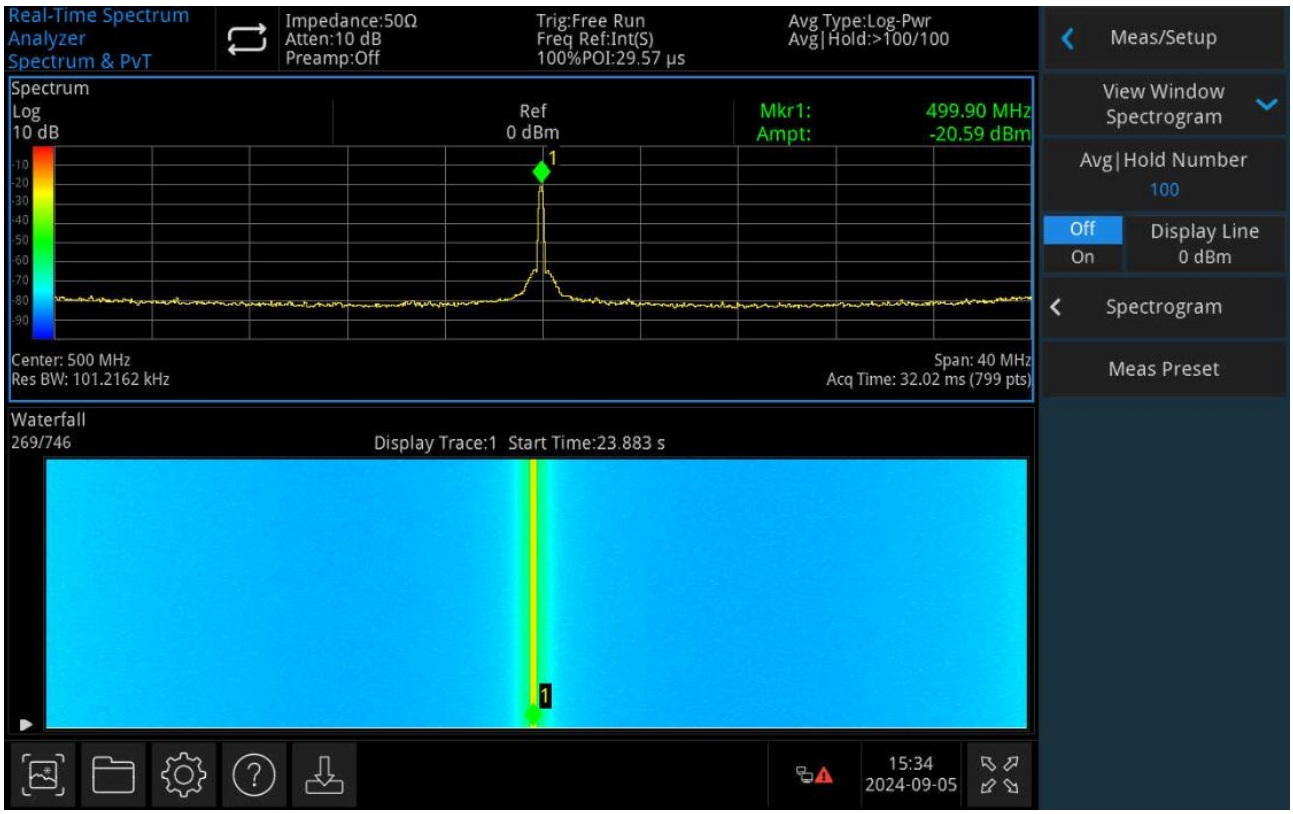


Figure 3- 6

Press the **[Meas Setup]** key to set parameters.

The spectrum view is shown in multiple windows, including the normal standard view. In the spectrum view, there is coupling relation between multiple windows. The spectral lines specified by the trace parameters will be shown on the window of normal standard view. In the spectrum window, the current trace is shown in a white horizontal line. When enter the spectrum mode, the value of displayed trace is 1, and that is the latest trace.

In the spectrum charts, each horizontal line shows a trace, and time is in vertical Y-axis. The latest trace data is shown in the lower line of the spectrum chart by default, and the trace history is up moved as the time. The spectrum chart contains 10,000 traces, when the chart occupies the entire vertical window, 269 traces can be shown in one time. When occupies the lower half of vertical window, 1134 traces can be showed in one time.

In the spectrum chart, the amplitude of signals is shown in color. The color bar is shown on the left side of the spectrum window. Any setting about color bar, please refer to the "Spectrum Parameter" part.

If users chose a trace without gathering data, the trace window and spectrum window stays blank until the trace is gathered. After that, the spectrum window gathers once, the window updates once, and the trace will be showed in the trace window.

Apart from the status of single measurement and ready-to-trigger, the spectrum data will be cleared and restarted to gather by any parameter change. When exit the spectrum mode, the

related data will be cleared.

In the spectrum chart, zero-hour moment is the start-to-gather time of first trace, means that each subsequent trace's time is the positive value of its start-to-gather time relative to zero-hour moment. The time difference of start-to-gather time will be recorded on each trace. With the increasing of traces, the subsequent time difference will get bigger and bigger.

4. Density Spectrum

Select the "Density Spectrum" measurement mode and see following figure 3-7 for interface details:

Figure 3-7

Press the **[Meas Setup]** key to set parameters.

The density spectrum view is shown in multiple windows, including density spectrum and light spectrum. In the density spectrum mode, there is coupling relation between multiple windows. The full screen display of one window can be done via keys or screen touch.

The parameter rules of interface are shown on the density spectrum, same as the sole density spectrum. Please note, the white real-time trace in the density spectrum window corresponds to the displayed trace, but the latest data is showed in the density spectrum.

The parameter rules are shown on the density spectrum interface, same as the separate density spectrum.

Apart from the trace display setting, the combined display of density spectrum and light spectrum can be used to observe the frequency time of all signals in a gathering time interval,

frequency amplitude and time information.

5. Power-Time

Select the "Power-Time" measurement mode and see following figure 3-8 for interface details:

Figure 3- 8

Press the **[Meas Setup]** key to set parameters.

The time-domain data analysis is provided in the power-time measurement, gathering time in X-axis, power of signals in Y-axis.

In RTSA, the gathering time setting of PVT measurement can be different from that of real-time spectrum measurement. But in the combined display of PVT and real-time spectrum measurement, the gathering time of real-time spectrum measurement can be set to that of PVT.

In the PVT measurement, the menu in BW is not effective. There are separate setting options in the AMPT, Trace, Sweep and Marker menus.

6. Power-Time Spectrum

Select the "Power-Time Spectrum" measurement mode and see following figure 3-9 for interface details:

Figure 3- 9

Press the **[Meas Setup]** key to set parameters.

The power-time spectrum view is shown in multiple windows, including power-time spectrum and normal real-time spectrum. In the power-time spectrum view, there is coupling relation between multiple windows. The full screen display of one window can be done via keys or screen touch.

The parameter rules shown in the power-time spectrum interface are the same as the separate power-time display.

The parameter rules shown in the normal real-time spectrum interface are the same as the separate normal display.

In PVT mode, the gathering time applies to all traces.

7. Power-Time Light Spectrum

Select the "Power-Time Light Spectrum" measurement mode and see following figure 3-10 for interface details:

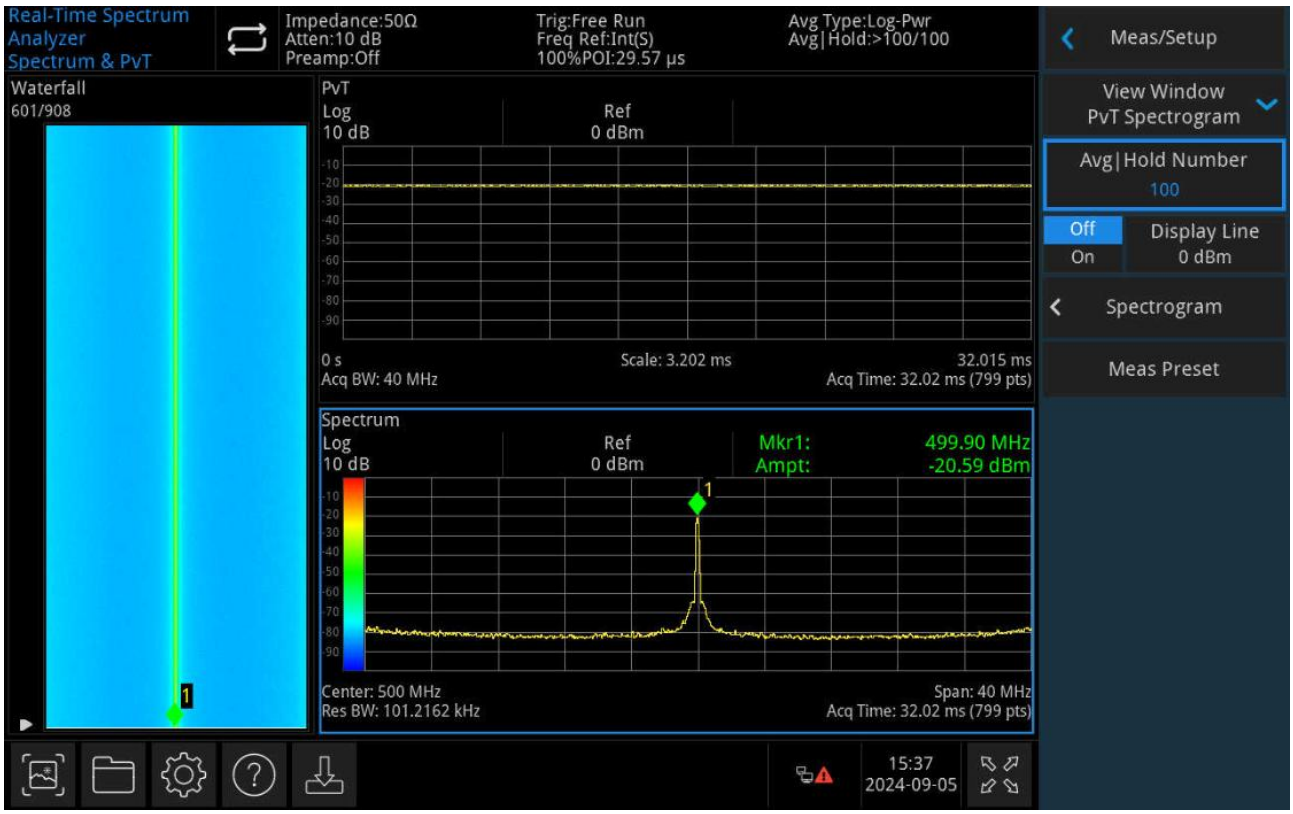


Figure 3-10

Press the **[Meas Setup]** key to set parameters.

The power-time light spectrum view is shown in multiple windows, including power-time light spectrum normal real-time spectrum and light spectrum. In the power-time light spectrum view, there is coupling relation between multiple windows. The full screen display of one window can be done via keys or screen touch.

The parameter rules shown in the power-time light spectrum interface are the same as the separate power-time display.

The parameter rules shown in the normal real-time spectrum interface are the same as the separate normal display.

The parameter rules showed in the light spectrum interface is same as the separate spectrum display.

In PVT mode, the gathering time applies to all traces.

8. Power Diagram

Select the “Power Diagram” measurement mode and see following figure 3-11 for interface details:

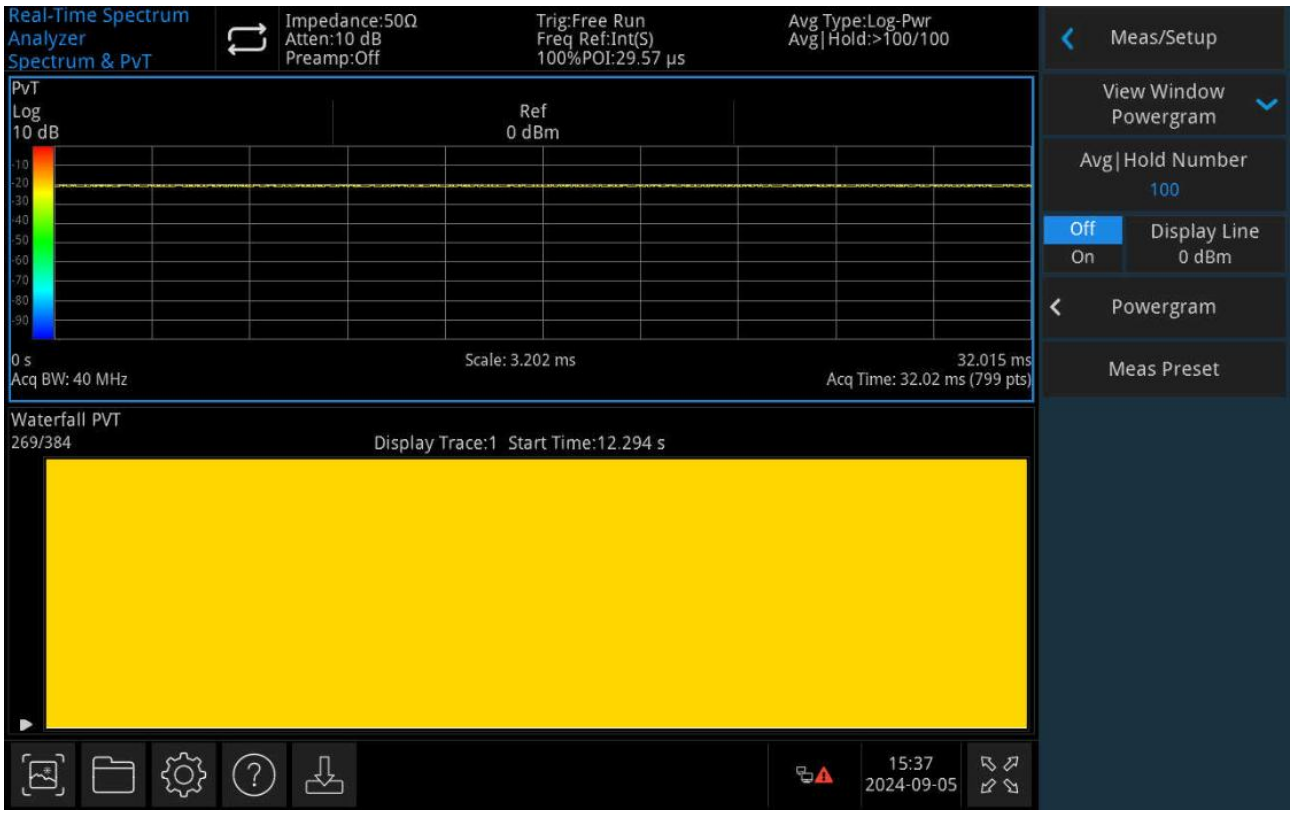


Figure 3-11

Press the **[Meas Setup]** key to set parameters.

The power diagram is shown in multiple windows, including power-time spectrum and power diagram. In the power diagram view, there is coupling relation between multiple windows. The full screen display of one window can be done via keys or screen touch.

The parameter rules shown in the power-time spectrum interface are the same as the separate power-time display.

The power diagram is like the spectrum chart, but it shows a history gathering of PVT traces, not the spectrum traces. The function and state of this window is same as that of waterfall window and follows the same rules with it.

In PVT mode, the gathering time applies to all traces.

9. Power Diagram Spectrum

Select the “Power Diagram Spectrum” measurement mode and see following figure 3-12 for interface details:

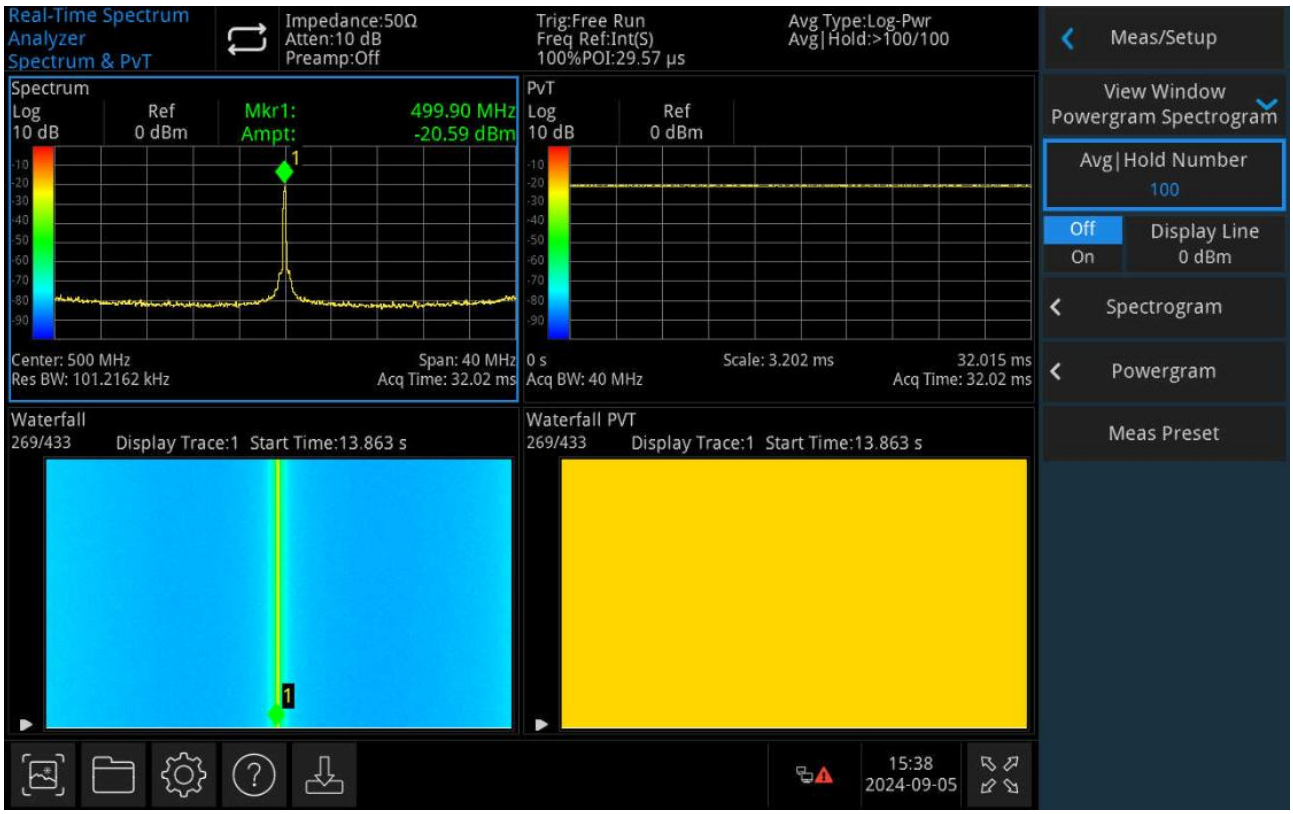


Figure 3 -12

Press the **[Meas Setup]** key to set parameters.

The power diagram spectrum is shown in multiple windows, including normal spectrum, spectrum chart, power-time spectrum, and power diagram. In the power diagram spectrum view, there is coupling relation between multiple windows. The full screen display of one window can be done via keys or screen touch.

The parameter rules shown in the normal real-time spectrum interface are the same as the separate normal display.

The parameter rules shown in the spectrum chart interface are the same as the separate spectrum display.

The parameter rules shown in the power-time spectrum interface are the same as the separate power-time display.

The power diagram is like the spectrum chart, but it shows a history gathering of PVT traces, not the spectrum traces. The function and state of this window is same as that of waterfall window and follows the same rules with it.

In PVT mode, the gathering time applies to all traces.

Average/Hold Count: Set the average times for the trace. The user can change the average times by numeric keys, rotary knob, arrow keys, or touching the panel menu. Multiple averages can reduce the influence from noise or other random signals and highlight the stable characteristics of signals.

The more the average times you get, the smoother the trace will be.

Average Type:

1. Log-Power Averaging: It averages the logarithmic amplitude values (in dB) of the signal envelope measured within a signal collection unit. The average detection type will be changed to video detection. For random noise, logarithmic averaging = power averaging - 2.5 dB = voltage averaging - 1.45 dB. Therefore, it reduces the displayed level of noises (not the true noise level) and is suitable for observing low-energy narrowband signals, especially those close to noises.
2. Power Averaging: It averages the power of signals (the square of amplitude). The average detection type will be changed to RMS (power) detection. Power averaging provides the true power for noises and is most suitable for measuring the real-time power of complex signals.
3. Voltage Averaging: It averages the voltage values of the signal envelope measured in a signal collection unit. The average detection type will be changed to voltage detection. Voltage averaging still provides a linear display, making it suitable for observing the rise and fall conditions of AM signals or pulse-modulated signals (e.g., radar, TDMA transmitters).

Display Line (ON/OFF): Set the display line level to change its position. The display line is a reference horizontal line with an amplitude value equal to the set value, and the amplitude unit corresponding to the Y-axis unit. The user can change the display line level using the numeric keys, rotary knob, arrow keys, or by touching the panel menu.

Note

- The display line serves as a reference horizontal line with an amplitude value equal to the set value, and its amplitude unit matches the Y-axis unit.
- If the display line is outside the visible range, it will be displayed at the top or bottom of the grid and indicated by an arrow.

Measurement Reset: Reset the measurement in current mode/Set the parameters to be factory default.

Parameters of Density Spectrum

Time Duration: Set a frequency/amplitude to display the brightness attenuation time of a point in the Afterglow bitmap. The point's brightness is controlled by the afterglow duration from 100% to 0%. If the bitmap point does not appear in the time duration, it becomes transient and even disappears.

Infinitely Continue: Set the infinite mode of continuous display on/off.

Set to OFF, and that is in limit mode. At this time, users can observe the probability density of each

point in the entire measurement time duration as per the user-defined afterglow duration.

Set to ON, and that is in infinite mode. It shows the probability occurrence of each frequency/amplitude point in all sampling intervals since the measurement start. In the infinite mode, the display brightness of each point is 100%, no attenuation but its probability will be changed as the measurement time.

Color Palettes: Select the display color of afterglow as per the signal features, comparison, display optimization, etc. In RTSA mode, there are 5 color palettes options: cool tones, warm tones, radar tones, fire tones, frost. The default color tone is the "warm."

Highest Probability Value: Set the percentage of highest probability to be displayed.

Lowest Probability Value: Set the percentage of lowest probability to be displayed.

Curvature of Color Table: In the middle position of highest and lowest probability density, change the gradient between different densities by setting curvatures, so the displayed results are biased toward the high or low end. Increasing the curvature value will compress the color towards the high end and vice versa.

Auto Color Correction: Set the displayed highest probability as the highest probability of the current bitmap, the displayed lowest probability as the lowest probability of the current bitmap.

Color Phase Truncation: Set the function of color phase truncation on/off. In "ON" mode, the area greater than maximum value and smaller than minimum value is replaced by black color. In "OFF" mode, replaced by the edge values.

Parameters of Spectrum

Trace Display: Set the trace indexes shown on the trace window in the spectrum mode or related. Traces can be determined through trace No. or trace time. Trace 1 means the latest trace. If the trace is chosen through the time, select the trace closest to the setting time.

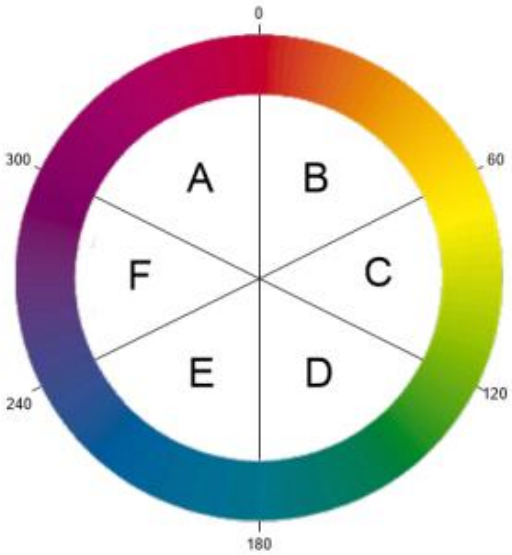
Trace Display Types: Set the trace types displayed on the trace window to "No." or "Time." Each trace is related to a time value, and the time value means the gathering time. Time can be calculated by following formula:

Trace time= Trace No.* Gathering time

Relate Cursor to Trace: Set whether to relate the cursor to the selected trace. Open a cursor, set n as the cursor Z (that is, cursor Z is set to n, in range of 1-10000), set n as the displayed trace No., at this time, open the function of Relate Cursor to Trace, and the cursor will be stopped at the trace n and follows its change. When the function is off, the cursor will be fixed to cursor Z. When opening the cursor function, the trace No. will be changed, and the cursor will not follow the trace change.

Reference Tones: Adjust the tone value on the top of the color bar in spectrum chart. The color bar will be displayed on the side of waveform display area, indicating the reflection relation between

amplitude and tones. The tones run from 0 to 359 (360 and 0 are same), and display on the lower color wheel.



Color details of 0-359 degree are as follows:

In color bar, red in 0 degree (255, 0, 0), see figure 3-13.

Green in 120 degrees (0, 255, 0), see figure 3-14.

Blue in 240 degrees (0, 0, 255), see figure 3-15.

Yellow in 60 degrees (255, 255, 0), see figure 3-16.

Cyan in 180 degrees (0, 255, 255), see figure 3-17.

Carmine in 300 degrees (255, 0, 255), see figure 3-18.

In A-B area, normal 255 in red; In C-D area, normal 255 in green; In E-F area, normal 255 in blue; In F-A area, no green; In B-C area, no blue; In D-E area, no red.

In the reference tones adjustment, tones on the top of color bar are adjusted, the bottom color temperature is the tone of reference tone rotated in 240° clockwise direction.

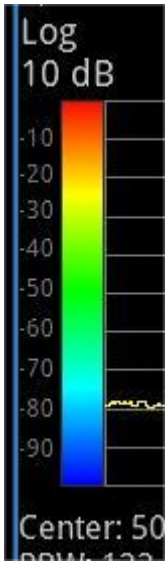


Figure 3-13

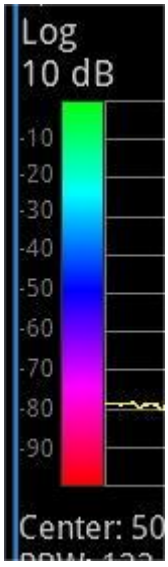


Figure 3-14

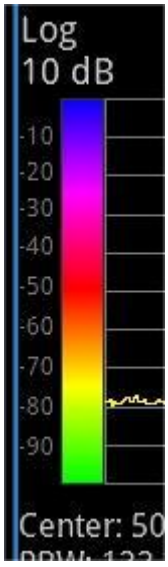


Figure 3-15

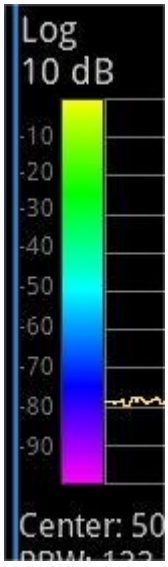


Figure 3-16

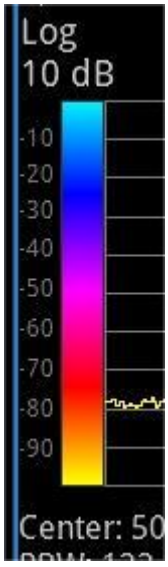


Figure 3-17

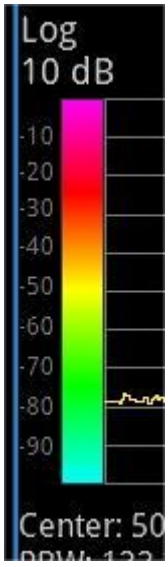


Figure 3-18

Reference Tone Location: Set the display location of reference tone in the grid area, and any amplitude greater than the reference area should be displayed in black.

Bottom Tone Location: Set the display location of bottom tone in the grid area, and any amplitude smaller than the bottom area should be displayed in black.

Auto Tone Correction: Automatically adjust the location of reference tone and bottom tone as per the maximum and minimum amplitude in the spectrum chart.

Parameters of Power Diagram

Trace Display: Set the trace indexes shown on the trace window in the power diagram or related mode.

Traces can be determined through trace No. or trace time. Trace 1 means the latest trace. If the trace is chosen through the time, select the trace closest to the setting time.

Trace Display Types: Set the trace types displayed on the trace window to "No." or "Time."

Each trace is related to a time value, and the time value means the gathering time. Time can be calculated by following formula:

Trace time= Trace No.* Gathering time

Relate Cursor to Trace: Set whether to relate the cursor to the selected trace. Open a cursor, set n as the cursor Z (that is, cursor Z is set to n, in range of 1-10000), set n as the displayed trace No., at this time, open the function of Relate Cursor to Trace, and the cursor will be stopped at the trace n and follows its change. When the function is off, the cursor will be fixed to cursor Z. When opening the cursor function, the trace No. will be changed, and the cursor will not follow the trace change.

Reference Tones: Adjust the tone value on the top of the color bar in spectrum chart. The color bar will be displayed on the side of waveform display area, indicating the reflection relation between amplitude and tones in power diagram. Refer to the color details in the spectrum chart.

Color details of 0-359 degree are as follows:

In color bar, red in 0 degree (255, 0, 0)

Green in 120 degrees (0, 255, 0)

Blue in 240 degrees (0, 0, 255)

Yellow in 60 degrees (255, 255, 0)

Cyan in 180 degrees (0, 255, 255)

Carmine in 300 degrees (255, 0, 255)

In A-B area, normal 255 in red; In C-D area, normal 255 in green; In E-F area, normal 255 in blue; In F-A area, no green; In B-C area, no blue; In D-E area, no red.

In the reference tones adjustment, tones on the top of color bar are adjusted, the bottom color temperature is the tone of reference tone rotated in 240° clockwise direction.

Reference Tone Location: Set the display location of reference tone in the grid area, and any amplitude greater than the reference area should be displayed in black.

Bottom Tone Location: Set the display location of bottom tone in the grid area, and any amplitude smaller than the bottom area should be displayed in black.

Auto Tone Correction: Automatically adjust the location of reference tone and bottom tone as per the maximum and minimum amplitude in the power diagram. Set the reference tone area as the maximum amplitude, bottom tone area as the minimum amplitude.

Single

Pressing **[Single]** key is the quick way to enter the sweep mode. For more details, refer to "Sweep".

Default Settings (Default)

Press the **[Default]** key to provide a convenient start condition for measurement.

Press [Default] > Reset to restore to the factory settings:

1. Reset the RTSA parameters of signal analyzer.
2. Enter the frequency menu.
3. Set the default parameter for some environments.
4. Perform a processor test without affecting the correction data.
5. Delete the input and output caches and all trace data.
9. The state is set to 0.

See followings for default values of key parameters after resetting:

Menu	Parameter Name	Default Value
Frequency	Center frequency	4.205 GHz
Frequency	Sweep width	40 MHz
Frequency	Start frequency	4.185 GHz
Frequency	Stop frequency	4.225 GHz
Frequency	Medium-frequency stepping	4 MHz
Frequency	Medium-frequency stepping mode	Auto
Frequency	Frequency offset	0Hz
Amplitude	Reference level	0 dBm
Amplitude	Input attenuation	Auto, 10 dB
Amplitude	Pre-amplify	Off

Amplitude	Scale	10 dB
Amplitude	Y-axis unit	dBm
Amplitude	Reference level offset	0 dB
Amplitude	Impedance	50 Ω
Bandwidth	Resolution bandwidth	Resolution bandwidth 1
Bandwidth	Filter type	Caesar
Sweep	Sweep time	Auto
Sweep	Sweep type	Continuous
Sweep	Trigger type	Free trigger
Sweep	Trigger edge	Rise edge
Sweep	Trigger delay	Off, 1 μs
Sweep	Trigger level	-25d Bm
Sweep	Medium-frequency power	0dBm
Sweep	Mask type	Upper mask
Sweep	Trigger condition	Enter
Trace	Trace selects	1
Trace	Trace type	Refresh
Trace	Trace detection	Peak
Trace	Auto detection	On
Trace	Trace refresh	On
Trace	Trace display	On
Marker	Select marker	Cursor 1
Marker	Marker modes	Off
Marker	Trace marker	Trace 1
Marker	Relative to	Marker 2
Marker	Frequency/time marker	4.205 GHz
Marker	Mark line	Off
Marker	Marker list	Off
Marker	N dB bandwidth	Off, -3.01 dB
Marker	Marker function	Off
Peak	Peak-to-peak search	Off
Peak	Peak threshold	Auto
Peak	Peak offset	Auto
Peak	Threshold line	Off
Peak	Peak list	Off

Measurement Settings	Display windows	Density spectrum
Measurement Settings	Average hold times	100
Measurement Settings	Display lines	0 dBm, off
Measurement Settings	Density spectrum	
Measurement Settings	Time duration	320 ms
Measurement Settings	Infinitely continuous	off
Measurement Settings	Color palette	Warm tone
Measurement Settings	Max. probability value	100
Measurement Settings	Min. probability value	0
Measurement Settings	Curvature of color table	75
Measurement Settings	Color-phase truncation	off
Measurement Settings	Spectrum	
Measurement Settings	Trace display	1
Measurement Settings	Trace display type	No.
Measurement Settings	Relate cursor to trace	off
Measurement Settings	Reference tone	0
Measurement Settings	Reference tone location	100
Measurement Settings	Bottom tone location	0
Measurement Settings	Power diagram	
Measurement Settings	Trace display	1
Measurement Settings	Trace display type	No.
Measurement Settings	Relate cursor to trace	off
Measurement Settings	Reference tone	0
Measurement Settings	Reference tone location	100
Measurement Settings	Bottom tone location	0

Note: The above table shows the reset parameters of UTS3000A

System Setting (System)

Press the **[System]** key to enter the settings menu, allowed to access to the system information, general settings, and network settings of signal analyzer.

System Information: Enter the System Information panel menu to check general and options information.

1. Basic Information: Displays the product name, manufacturer, product model, serial number, software version No., medium frequency hardware version No., radio frequency hardware version No., medium frequency logical version No., radio frequency logical version No., etc.

Options Information: Check the version No. and states.

Setting: Enter the settings menu to configure the basic and network settings.

1. General Settings
   - Language: Chinese (Simplified), English, and German
   - Time Format: 12-hour and 24-hour.
   - Date/Time: Touch this area to pop out the setting dialog box, swipe up and down to modify the digitals. After setting, tap "√" to confirm and close the setting dialog box.
   - Picture Format: Set the format of screenshots, with "bmp," "jpeg," and "png" options.
   - Power-on Parameters: Set the loaded system parameter settings after power on, with options of default, previous, and preset.
   - Backlight: Swipe the scroll bar to adjust the screen backlight.
   - Volume: Swipe the scroll bar to adjust the sound volume.
   - HDMI Output: HD multimedia interface, tap "□" to tick it, indicating the interface is on.
   - Screenshot Inverse: Set the inverse color of screenshot pictures.
   - User Preset: In power-on default setting, when the power-on parameter is set to be preset, this configuration file will be used to set the parameters when the instrument powers on.
   - Shutdown Confirmation: When selecting it, a confirmation dialog box will pop up when press Switch key to power off.
2. Network Settings
   - Adapter: This is the LAN switch. Tap "□" to tick it, indicating that LAN is enabled.
   - DHCP: Tap "□" to tick it, indicating that the network configuration is automatically acquired. If no "□" tapping, needs to be manually set.
   - IPv4 Address: The format of IP address is "nnn.nnn.nnn.nnn". The first "nnn" range is 1-223, and the other three "nnn" ranges are 0-255. It is recommended to consult a network administrator for an available IP address.
   - IP Mask: The format of subnet mask is "nnn.nnn.nnn.nnn", where "nnn" ranges from 0 to 255. It is recommended to consult a network administrator for an available subnet mask address.
   - Gateway: The format of gateway is "nnn.nnn.nnn.nnn". The first "nnn" range is 1-255, and the other three "nnn" ranges are 0-255. It is recommended to consult a network administrator for an available gateway address.
   - MAC Address: The physical address, also called the hardware address, confirms the location of a network device. The length is 48 bits (6 bytes) and consists of hexadecimal digits, including the first 24 digits and the last 24 digits, in the format of "XX-XX-XX-XX-XX-XX". The first 24 bits are called organization-unique identifiers, while the

last 24 bits are assigned by the manufacturer and are called extended identifiers.

- Interface Settings

  Web Login Username: Set the username for browser login. The web address format is http://IP, and IP is the IPv4 address set by network, e.g. http://192.168.20.117.

  Web Login Password: Set the password for browser login. When successfully login, users can control the instrument, perform SCPI commands, set network, etc.

After setting the web username and password, users can use a PC or mobile web browser to remotely control the device. It mimics the clickable display function of touchscreen/mouse, just like a physical instrument. The operation steps are as follows:

(1) Access Local Area Network

The computer and signal analyzer should share the same LAN. Check the local IP address through the **UTILITY** menu of signal analyzer, and then the browser accesses the signal analyzer using http://ip port.

Example:

- Computer IP: 192.168.20.3
- signal analyzer IP: 192.168.20.117
- PC browser using 192.168.20.117 to access the signal analyzer can check the basic information and operate the instrument control, internet settings, password settings, and SCPI control, as shown in Figure 3-19.

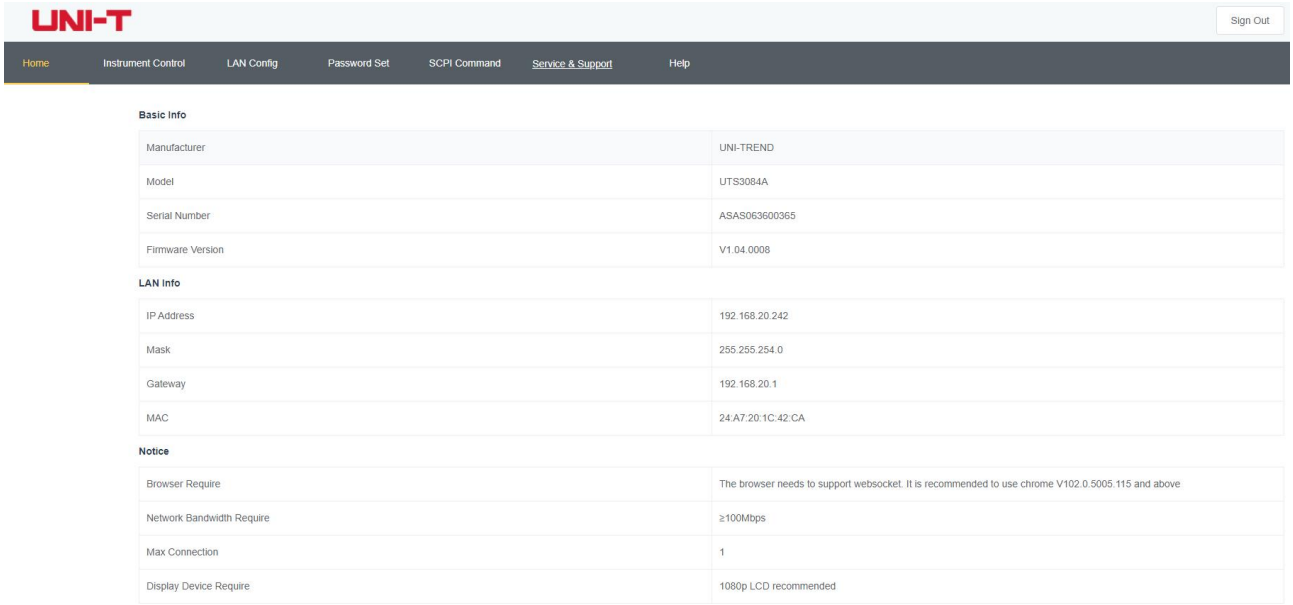


Figure 3-19 Web Basic Information

Log in to check the instrument settings, internet settings, passwords settings and SCPI control. The web username and password can be found in interface settings. After login, users can view and control the signal analyzer, as shown in Figure 3-20.

Figure 3-20 Web Control for Instrument

All operations that can be performed on the touchscreen of a physical instrument, such as selecting the menu panel, clicking the function key, inputting digitals and characters, and moving the cursor can be performed from the web interface.

(2) Access Outer Network

a. Ensure the network cable is plugged into the signal analyzer and that internet access is available.

b. Turn on the frp proxy service on the server.

c. Configure the frp proxy service and IP port of the signal analyzer.

d. Accessing the port http://IP:web_port via browser, which is to visit the signal analyzer, the access interface is same as above mentioned.

Note

This instrument uses a way of frp (Fast Reverse Proxy) intranet penetration to access to the outer network. The frp version is 0.34.0. The instrument carries an FRP-0.34.0 client port, required with a server to run, with frp sever opened. The client connects to the FRP server port 7000, so the server configuration must include “bind_port = 7000”.

(3) Network Settings

Modify the internet information and frp service settings of signal analyzer as shown in Figure 3-21.

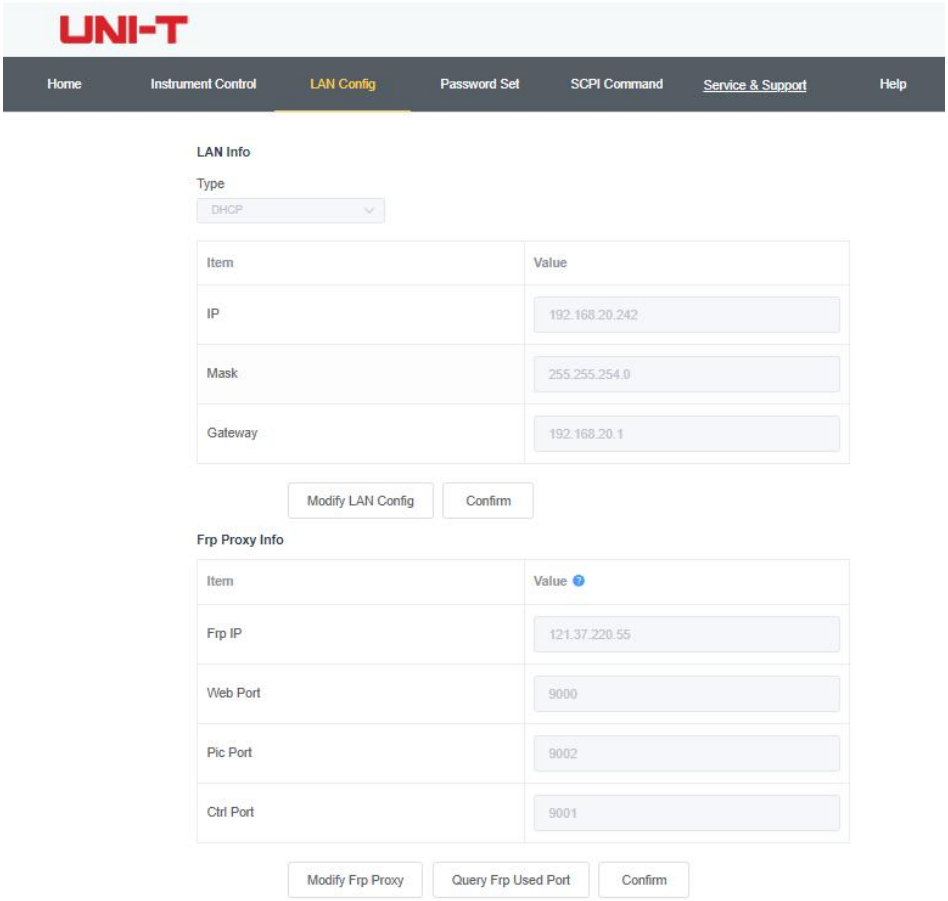


Figure 3-21 Web Network Settings

(4) Password Settings

Modify the web password of signal analyzer, as shown in Figure 3-22.

The original password can be found by navigating to Physical Instrument -> System -> Setting -> Port Setting.

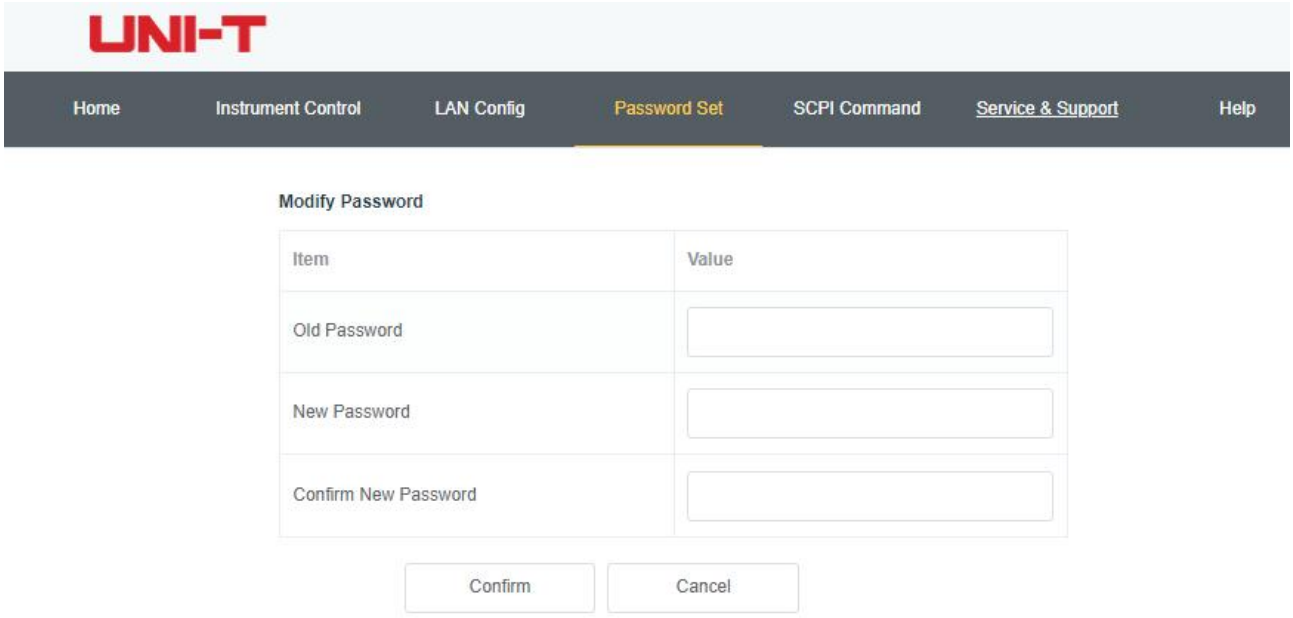


Figure 3-22 Web Password Settings

(5) SCPI

Execute SCPI commands as shown in Figure 3-23. Input the command in the edit box and click the Send key. The executed result will be displayed in the report frame below.

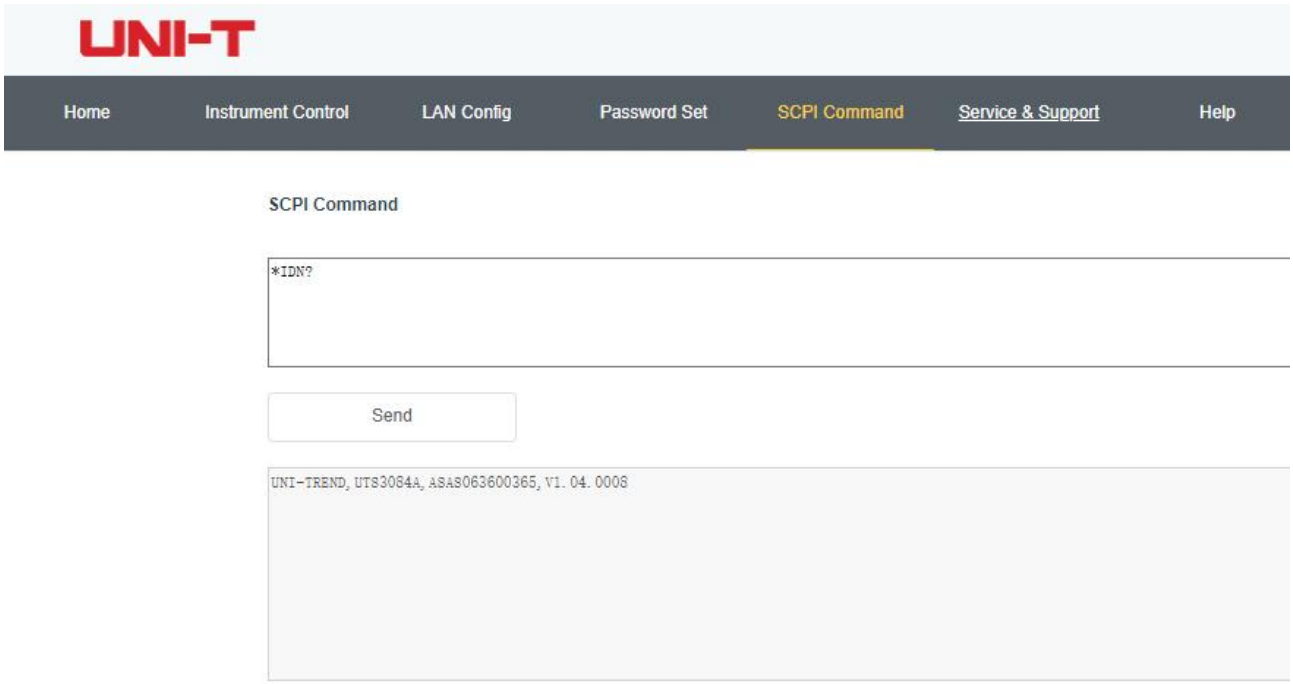


Figure 3-23 SCPI Control

Restore Defaults: Enter the restore default menu to perform this function.

1. Restore the system settings: The system settings of signal analyzer will be restored to the default state.
2. Clear data: All data stored in signal analyzer will be deleted.
3. Restore all settings: All settings of signal analyzer will be restored to the default state, and data will be cleared.

File Storage (Save)

Press **[Save]** key to enter the save menu. The types of files can be saved as state, trace + state, measurement data.

State: Press the State panel menu to enter the state save menu. Save the state into the instrument.

1. Press the **Export** key. The instrument will save the current state using default filename or a user-defined filename.
2. After the state file is selected, press the **Import** key to read the current state file.

Trace + State: Press the Trace + State panel menu to enter the trace and state save menu. Save the instrument state and selected trace into a file.

Trace Selection: There are five traces available.

1. Press the **Export** key. The instrument will save the current state and trace, using default filename or a user-defined filename.
2. After selecting the state file, press the **Import** key to read the current files of trace + state.

   Measurement Data: Press the Measurement Data panel menu to access the measurement data save menu. The selected measurement data type (such as trace) can be saved into the specified file. The instrument will save the corresponding data in CSV (comma-separated values) format for data analysis using Excel tool.

   ①. Press the **Export** key. The instrument will save the current measured data, using default filename or a user-defined filename.

   ②. After selecting the file, press the Import key to read the current measured data.

   Frequency Mask Panel: Press the frequency mask panel menu to enter the frequency mask saving menu. Save the selected frequency mask into the files.

   ③. Press the **Export** key. The instrument will save the current frequency mask, using default filename or a user-defined filename.

   ④. After selecting the file, press the Import key to read the current frequency mask files.

Export: Export the current selected file type.

Import: Import the current selected file data. (This key is hidden when no file is selected).

Touch Lock

Press **[Touch/Lock]** key, turning green indicates the Touch function is locked, light off indicates Touch function is enabled, and press **[Esc]** to exit the Screen Lock.

Mode

Press the **[Mode]** key to open the Mode window with options of IQ analysis, EMI, analog demodulation, vector signal analysis, real-time sweep frequency analysis, vector network analysis, and phase noise (some options may require additional activation). Please download the required instructions from the official website.

Note

- The key is designed for UTS3000A series. For UTS5000A series, **[Mode]** and **[Meas]** keys can be combined as one key, press **[Mode/Meas]** key to open Mode Select window. Multiple work modes: IQ analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis, vector network analysis and phase noise analysis.
- For different work modes, there are detailed measurements. In spectrum analysis mode, channel power, time domain power, occupied bandwidth, third-order cross modulation,

adjacent channel power, spectrum monitoring, carrier-to-noise ratio, and harmonic measurement. In IQ analysis mode, complex spectrum, and IQ waveform measurement. In EMI mode, optional spectrum sweep. In analog demodulation mode, AM, FM, and phase. In real-time spectrum analysis mode, spectrum and PvT. In vector network analysis mode, S11 and S12.

4. Appendix

Maintenance and Cleaning

(1) General Maintenance

Keep the instrument away from the direct sunlight.

Caution

Keep sprays, liquids and solvents away from the instrument or probe to avoid damaging the instrument or probe.

(2) Cleaning

Check the instrument frequently according to the operating condition. Follow these steps to clean the external surface of the instrument:

a. Please use a soft cloth to wipe the dust outside the instrument.

b. When cleaning the LCD screen, please pay attention and protect the transparent LCD screen.

c. When cleaning the dust screen, use a screwdriver to remove the screws of the dust cover and then remove the dust screen. After cleaning, install the dust screen in sequence.

d. Please disconnect the power supply, then wipe the instrument with a damp but not dripping soft cloth. Do not use any abrasive chemical cleaning agent on the instrument or probes.

WARNING

Please confirm that the instrument is completely dry before use, to avoid electrical short-circuit or even personal injury caused by moisture.

Contact Us

If you experience any issues with this product and are in mainland China, you can contact UNI-T directly. Our service support is available from 8 a.m. to 5:30 p.m. (UTC+8), Monday to Friday, or via email at infosh@uni-trend.com.cn.

For product support outside mainland China, please contact your local UNI-T distributor or sales center. Many UNI-T products offer options for extended warranty and calibration periods; please contact your local UNI-T dealer or sales center for more information.

To obtain the address list of our service centers, please visit our website at:

http://www.uni-trend.com.