UNI-T®

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# User's Manual

## Spectrum Analyzer EMI

This document applies to the following models:

UTS5000A series

UTS3000B/T series

UTS3000A series

UTS1000B/T series

UTS3000Tplus series

V1.1

2024.06

# Preface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

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



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. In order 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, 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 designated maintenance center of UNI-T, pay the shipping cost, and provide a copy of the purchase receipt of the original purchaser. If the products is shipped domestically to 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.

The warranty is inapplicable to any defects, failures or damages caused by accident, normal wear of components, use beyond specified scope or improper use of product, or improper or insufficient maintenance. UNI-T is not obliged to provide the services below as prescribed by the warranty:

a) Repair damage caused by installation, repair or maintenance of personnel other than service representatives of UNI-T;
b) Repair damage caused by improper use or connection to incompatible equipment;
c) Repair any damages or failures caused by using power source not provided by UNI-T;
d) Repair products that have been changed or integrated with other products (if such change or integration increases time or difficulty of repair).

The warranty is formulated by UNI-T for this product, replacing any other express or implied warranties. UNI-T and its distributors refuse to give any implied warranty for marketability or applicability for special purpose. For violation of the warranty, repair or replacement of defective products is the only and all remedial measure UNI-T provides for customers.

No matter whether UNI-T and its distributors are informed of any possible indirect, special, occasional or inevitable damage in advance, they assume no responsibility for such damage.

# 1. User Guide

This chapter is to introduce the safety instructions and basic information about the use of spectrum analyzer.

## Inspecting Product and Packing List

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

- Inspect whether the packaging box is broken or scratched caused by external force, and further check whether the instrument appearance is damaged.
  If you have any questions about the product or other problems, please contact with distributor or the local office.
- Take out the goods carefully and check with the packing list.

## Safety Instruction

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

### Safety Precautions

| | |
|---|---|
| Warning | **Please follow the following guidelines to avoid possible electric shock and risk to personal safety.** |
| | Users must follow the following conventional safety precautions in operation, service and maintenance of this device. UNI-T will not be liable for any personal safety and property loss caused by the user's failure to follow the following 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 reminds 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 reminds 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 important information. It reminds users to pay attention to procedures, methods and conditions, etc. The contents of the "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 you should be careful to avoid 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, which may cause failure of this device if you fail to follow a certain procedure or condition. If the "Note" sign is present, 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 | | CATII: 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. |

| | | |
|---|---|---|
| CE | Certification | CE indicates a registered trademark of EU |
| UKCA | Certification | UKCA indicates a registered trademark of United Kingdom. |
| ETL Intertek 4007982 | Certification | Conformance to UL STD 61010-1, 61010-2-030 and CSA STD C22.2 No.61010-1 and 61010-2-030. |
|  | Waste | Do not place equipment and its 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 environment-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;<br>The AC input voltage of the line reaches the rated value of this device. See the product manual for specific rated value.<br>The line voltage switch of this device matches the line voltage;<br>The line voltage of the line fuse of this device is correct.<br>It not used for measuring the main 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 definitely not applicable to main power supply measurement, CAT II, CAT III or CAT IV circuit measurement. |
| Use the input / output port of | Please use the input / output ports provided by this device in a properly manner. Do not load any input signal at the output port of this device. Do |

| | |
|---|---|
| this device properly | not load any signal that does not reach the rated value at the input port of this device. The 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 power fuse of specified specification. If the fuse needs to be replaced, it must be replaced with another one that meets the specified specifications. |
| Disassembly and cleaning | There are no components available to operators inside. Do not remove the protective cover.<br>Maintenance must be carried out by qualified personnel. |
| Service environment | This device should be used indoors in a clean and dry environment with ambient temperature from 0 ℃ to +40 ℃.<br>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;<br>Do not allow any external objects to enter this device via ventilation holes;<br>Please ensure adequate ventilation, and leave a gap of 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 buttons, knobs or interfaces on the instrument panel. |
| Proper ventilation | Poor ventilation will cause the device temperature to rise, thus causing 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 carried out by qualified personnel. |

## Environmental Requirements

This instrument is suitable for the following environment:

- Indoor use
- Pollution level 2
- In operating: altitude lower to 3000 meter； in non-operating: altitude lower to 15000 meter
- Operating temperature 0 to +40℃; Storage temperature -20 to + 70℃ (unless otherwise specified)

- In operating, humidity temperature below to +35℃, ≤90% relative humidity;
  In non-operating, humidity temperature +35℃ to +40℃, ≤60% relative humidity.

There are ventilation opening on the rear panel and side panel of the instrument. So please keep the air flowing through the vents of the instrument housing. To prevent excessive dust from blocking the vents, please clean the instrument housing regularly. The housing is not waterproof, please disconnect 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 AC power supply that can input:

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

Please use the attached power lead to connect to the power port.
Connecting to service cable

This instrument is a Class I safety product. The supplied power lead has good performance in terms of case ground. This spectrum analyzer is equipped with a three-prong power cable that meets international safety standards. It provides good case grounding performance for the specification of your country or region.

Please install AC power cable as follows:

- Ensure the power cable is in a 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 component. Components can be damaged invisibly by electrostatic discharge during transportation, storage and use.

- The following measure can reduce the damage of electrostatic discharge:
- Testing in anti-static area as far as possible;
- Before connecting the power cable to the instrument, inner and outer conductors of the instrument should be briefly grounded to discharge static electricity;
- Ensure all the instruments are properly grounded to prevent the accumulation of static.

## Preparation Work

1. Connecting the power cable and insert the power plug into protective grounding outlet.
2. Press the switch on the rear panel, the spectrum analyzer will enter standby mode.
3. Press the switch on the front panel, and then the spectrum analyzer is powered on.

It takes about 30 seconds to initialize the boot, and then the spectrum analyzer enters the system default menu mode. In order to make this spectrum analyzer perform better, it is recommended that warm up the spectrum analyzer for 45 minutes after power on.

## Usage Tip

### Use External Reference Signal

If users want to use an external signal source 10 MHz as reference, please connect signal source to the 10MHz In port on the rear panel. The measuring bar on the top of the screen will indicate **Reference Frequency: External.**

### Activate the Option

To activate this option on your spectrum analyzer, you need to purchase the correct EMI option for your instrument. Please contact your local dealer or Uni-T office.

Once you have purchased the option, please follow these steps:

1. Save your license key onto a USB drive and then insert it into the spectrum analyzer;
2. Press **[System] key > System Information > add token;**
3. Select EMI license key and then press **[ENTER]** to confirm.

## Touch Operation

Spectrum analyzer has a multi-point touch screen for various gesture operating, which includes:

- Tap the top right on the screen to enter the main menu
- Tap parameter or menu on the screen to select and edit it
- Turn on and move the cursor
- Use auxiliary quick key to perform common operation

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

## Help Information

The spectrum analyzer's built-in help system provides help information for each function button and menu control key on the front panel.

- Touch the left of the screen "  ", help dialog box will pop out on the center of the screen. Tap support function to get more detailed help description.
- After help information displayed on the center of the screen, tap "×" or other key to close the dialog box.

## Operating Mode

Spectrum analyzer provides various operating mode, use Mode key to select it:

- Spectrum Analyzer
- Vector Signal Analyzer
- EMI, refer to chapter 3
- Analog Demod
- Real-Time Spectrum Analyzer
- IQ Analyzer
- Mode preset

Vector signal analyzer, analog demodulation, Real-Time Spectrum Analyzer, IQ Analyzer and EMI are the option, which should purchase to activate it.

The function of the front panel button may be different in different operating modes.

Mode preset: Different operating modes have their own independent preset modes.

# 2. User Interface

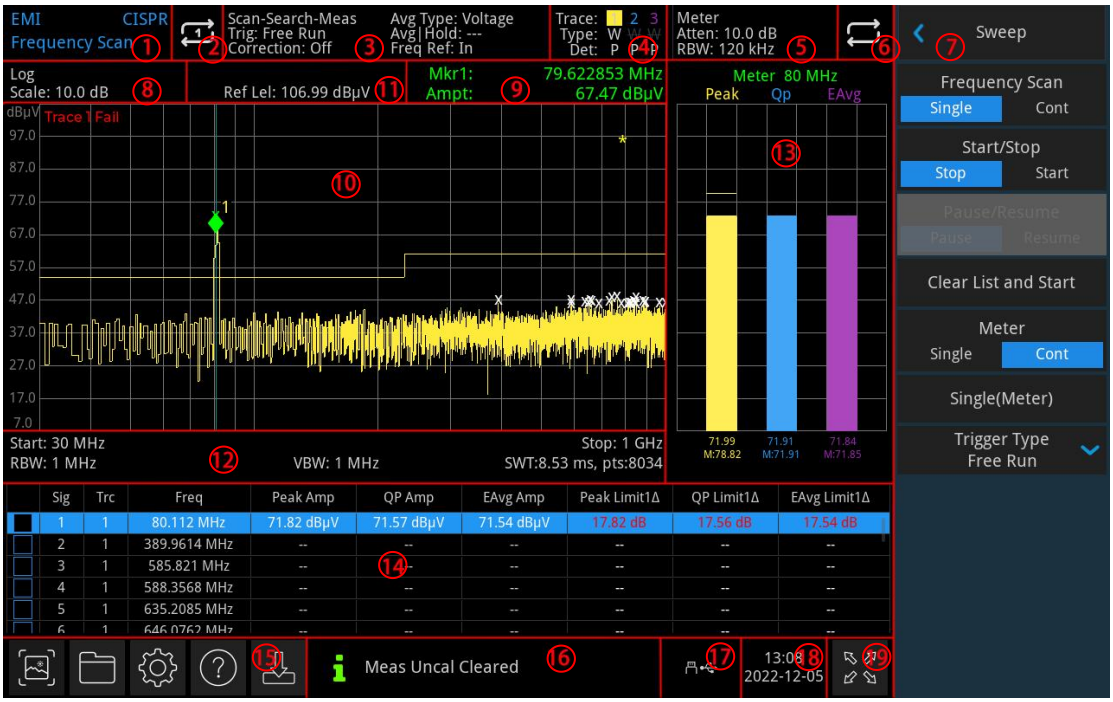


Figure 2-1 User Interface

1. **Working mode:** RF analysis, vector signal analysis, EMI, analog demodulation
2. **Sweep/Measuring:** Single / continuous sweep, tap the screen symbol to quick step through the mode
3. **Measuring bar**: Display the measurement information which includes sweeping sequence, trigger type, correction, average type, average/hold and reference frequency. Touch screen sign to quick switch these mode.
4. **Trace Indicator:** Display the trace line and detector message which includes number of trace line, trace type and detector type

**Note**

The first line displays the number of trace line. The color of number and trace should be the same. The second line displays the corresponding trace type which includes W (refresh), A (average trace), M (the maximum hold), m (the minimum hold).

The third line displays the corresponding detector type, including P (peak), Q (quasi peak), E (EMI average), A (average), p (negative peak). The detector type is shown in white letters.

Tap screen sign to quick switch different modes, different letter presents different mode.

- Letter in highlight white color, it presents the trace is being updated;
- Letter in grey color, it presents the trace is not updated;
- Letter in grey color with strikethrough, it presents the trace will not be updated and displayed;
- Letter in white color with strikethrough, it presents the trace is being updated but not displayed; this case is useful for trace mathematical operation.

5. **Meter Information:** Meter attenuation, resolution bandwidth.
6. **Meter Single/Continuous**
7. **Panel Menu:** Menu and function of hard key, which includes frequency, amplitude, bandwidth, trace and marker.
8. **Display Scale:** Scale value, scale type
9. **Result of Cursor Measurement:** Display the current result of cursor measurement which includes

frequency and amplitude.

10. Lattice Display Area: Trace display, marker point, video triggering level, display line, threshold line, cursor table, peak list.
11. Reference Level: Reference level value, reference level offset value
12. Data display: Start frequency, stop frequency, RBW, VBW, sweep time and sweep count.
13. Meter Display Area: Meter frequency, meter detector, meter histogram
14. Signal table: Serial number, measured trace line, frequency of the frequency point that meets the peak condition, each detection amplitude and the difference between detection amplitude and limit line.
15. Function Setting: Quick screenshot, file system, setup system, help system and file storage
    - Quick Screenshot  : screenshot will save in the default file; if there has an external storage, it is preferentially saved to external storage.
    - File System  : users can use file system to save the correction, limiting value, measuring result, screenshot, trace, state or other file into internal or external storage, and it can be recall.
    - System information  : view the basic information and option.
    - Help System  : Help guides.
    - File Storage  : Import or export state, trace + state, measuring data, limiting value and correction
16. System Log Dialog Box: Click blank space on the right of file storage to enter system log to check the operation log, alarm and hint information.
17. Connection Type: Display connecting state of mouse, USB and screen lock
18. Date and Time: Display the date and time
19. Full Screen Switch: Open full screen display, the screen is stretched horizontally and the right button is automatically hidden.

# 3. Key Function (EMI)

## Measurement Setup (Meas/Setup)

### EMI Measurement Standards

Set the EMI measurement standard to "None" or "CISPR".
Select "None" and set the filter type to Gaussian, the filter bandwidth is -3 dB. Select "CISPR" and set the filter type to EMI. Then the filter bandwidth is -6 dB.

Note

- When the EMI measurement standard is "None", the resolution bandwidth is available in 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz and 3 MHz. The default value is 3 MHz.

Select "CISPR". For meter 1, the detector defaults to positive peak value; For meter 2, the detector defaults to the quasi-peak value; For meter 3, the detector defaults to EMI average. RBW has four optional values: 200 Hz, 9 kHz, 120 kHz, and 1 MHz.

### Meter Control

Set the meter parameters.
**Select Meter:** Meter 1, meter 2 or meter 3 can be selected.
**Meter on/off:** Turn on or off the selected meter.
Select "On", the selected meter histogram will be displayed in the meter display area of the user interface, and the corresponding detector type will be used to perform the measurement.
Select "Off", the selected meter is not displayed and the measurement is not performed.

**Detector:** Set the detector of the selected meter, including "Positive peak", "Quasi-peak", "EMI average", "Average" and "Negative peak".
Quasi-peak, EMI average, and Average are mutually exclusive. In addition, users can select at most two of these three values.

**Limit Value:** Set the limit value of the selected meter. Use numeric key, direction key or touch panel menu to change limit value.

**Limit Switch:** Turn on or off the limit line of the selected meter.

**Close All:** Close all currently open meters.

**Dwell Time:** Set the dwell time of the meter detector. Use numeric key, direction key or touch panel menu to change dwell time.

**Max Hold Type:** Set the maximum hold time type of the meter to Adjustable or Unlimited.
If users select Unlimited, the peak holding line of the selected meter will not be reset. The Minimum Hold Time menu is disabled.
If users select Adjustable, the peak hold line of the selected meter will be reset to the current signal value after waiting for the set peak hold time. In this case, users can set the peak hold time by using the Maximum Hold Time menu.

**Maximum Hold Time:** Set the peak hold time of the meter. When the maximum hold type is Adjustable, use numeric key, direction key or touch panel menu to change maximum hold time.

**Coupling to Signal:** Turn on or off the coupling function between the meter and the signal table.

If "On" is selected, the instrument will automatically find the signal frequency in the signal table that is closest to the current meter frequency, and change the meter frequency to that signal frequency.
**Coupling to Marker:** Turn on or off coupling between the meter and the current cursor.
If Open is selected, set the meter frequency to the current cursor frequency.

## Average Settings

**Average Count:** Specify the count of trace average, maximum hold, and minimum hold N. Use numeric key, direction key or touch panel menu to change average count.
For trace average, the larger the N value, the smoother the trace display. In the mode of trace average, maximum hold and minimum hold, the sweeping sequence is "sweep only" and the sweeping is stopped after the number of sweeping reaches N times.

**Average Type:** Set the average type to Logarithmic Power, Power, or Voltage.
In logarithmic power mode, logarithmic (dB) units are selected for all filtering and averaging processes. This averaging method is most effective for detecting small signals close to the noise amplitude.
In power mode, all filtering and averaging is based on power (amplitude squared). For complex signal real time measurement, power averaging is the best way.
In voltage mode, all filtering and averaging are based on signal voltage envelope processing. For radar and TDMA signals measuring AM or pulse modulation, scalar averaging is the most suitable because of its large envelope fluctuation.

## Limit Value

**Selection:** select the current limit line, 6 limits can be selected, the default limit is 1.

**Limit Switch:** Select whether the trace displayed is tested with the corresponding limit line. Open the corresponding limit line for each trace displayed. The upper left corner of the trace shows whether the test passed or not.

**Test Trace:** Set the trace of the current limit line test.

**Margin Switch:** Turn on or off the margin display. When the margin is opened, the margin line is displayed on the measurement interface; when closed, the margin is invalid.

**Margin:** Set the margin of the current limit line. Use numeric key, direction key or touch panel menu to change margin value.

**Edit Limit Value:**
Press this key to enter the edit menu and open the limit line edit window.
Select a limit: Select a limit that needs to be edited from the drop-down list.
Select row: Enter a number to select a row in the limit line table.
Frequency: Use numeric key, direction key or touch panel menu to edit the current point frequency.
Amplitude: Use numeric key, direction key or touch panel menu to edit the current point amplitude.
X offset: Set the frequency offset of the current limit line.
Y offset: Set the amplitude offset of the current limit line.
Apply offset: Increase the X and Y offsets to each point on the current limit line, then reset the X and Y offsets to 0.
Insert row: Insert a row of limit data before the currently selected row.
Delete row: Delete the data of the selected row.
Delete limit: Delete all the data of the selected limit.

**Test Limit:** Test limit (On/Off): Turns on or off the test of the current limit line.

**Copy from Limit:** Copy the limit data from the selected limit line to the current limit line.

**Build from Trace:** Select the trace and build the limit line from the selected trace.

**Delete All Limits:** After all limits are deleted, the data of all limit lines is deleted and changed to factory settings.

## Signal Table

Set the signal table parameters.
The signal table is displayed in the lower part of the user interface, as shown in Figure 3-1.

| Sig | Trc | Freq | Peak Amp | QP Amp | EAvg Amp | Peak Limit1Δ | QP Limit1Δ | EAvg Limit1Δ |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 515 MHz | -40.24 dBm | -39.99 dBm | -39.98 dBm | -20.24 dB | -19.99 dB | -19.98 dB |
| 2 | 1 | 695.42 MHz | -66.19 dBm | -71.07 dBm | -77.26 dBm | -46.19 dB | -51.07 dB | -57.26 dB |
| 3 | 1 | 726.46 MHz | -66.45 dBm | -71.00 dBm | -77.23 dBm | -46.45 dB | -51.00 dB | -57.23 dB |
| 4 | 1 | 768.17 MHz | -66.57 dBm | -71.22 dBm | -77.42 dBm | -46.57 dB | -51.22 dB | -57.42 dB |
| 5 | 1 | 875.84 MHz | -67.15 dBm | -71.13 dBm | -77.44 dBm | -47.15 dB | -51.13 dB | -57.44 dB |

Figure 3-1 Signal Table

Parameter description:
Sig: Serial number
Trc: Measured trace
Freq: The frequency of the search point that meets the peak condition
Peak Amp: Positive peak detection amplitude. The amplitude corresponding to the positive peak value of the current trace is displayed after the search operation. After the final measurement is performed, the detection amplitude of type 1 of the final measurement detector is displayed. If no measurement data is available, "--" is displayed.
QP Amp: Quasi-peak detection amplitude. The amplitude corresponding to the quasi-peak value of the current trace is displayed after the search operation. After the final measurement is performed, the detection amplitude of type 2 of the final measurement detector is displayed. If no measurement data is available, "--" is displayed.
EAvg Amp: EMI average detection amplitude. The amplitude corresponding to the EMI average value of the current trace is displayed after the search operation. After the final measurement is performed, the detection amplitude of type 3 of the final measurement detector is displayed. If no measurement data is available, "--" is displayed.
Peak LimitΔ: The difference between the positive peak detection amplitude and the limit line 1. Only when the corresponding limit line is opened and the final measurement is performed, the difference between the detection amplitude and the limit line of type 1 of the currently selected final measurement detector is displayed. If no measurement data is available, "--" is displayed.
QP LimitΔ: The difference between the quasi-peak peak detection amplitude and the limit line 1. Only when the corresponding limit line is opened and the final measurement is performed, the difference between the detection amplitude and the limit line of type 2 of the currently selected final measurement detector is displayed. If no measurement data is available, "--" is displayed.

EAvg LimitΔ: The difference between the EMI average detection amplitude and the limit line 1. Only when the corresponding limit line is opened and the final measurement is performed, the difference between the detection amplitude and the limit line of type 3 of the currently selected final measurement detector is displayed. If no measurement data is available, "--" is displayed.

**Navigation:** Relocate to the first signal in the signal table by default.

**Select Signal:** Select any signal in the signal table. After inputting signal number n, the signal table locates the nth signal.

**Coupling to Meter:** Change the meter frequency to the selected signal frequency.

**Marker:**
1. Current signal: Mark the currently selected signal, marks a check box next to the selected signal.
2. All signals: Mark all signals in the signal table.
3. Clear markers: Clear all markers in the signal table.

**Delete:** Delete the signal of the selected type.
1. Current signal: Delete the selected signal from the signal table.
2. All signals: Delete all signals in the signal table.
3. Marked signals: Delete all marked signals from the signal table.
4. Unmarked signals: Delete all unmarked signals from the signal table.

**Zoom in:** After selecting a signal in the signal table, click "Zoom in". The X-axis will take the signal frequency as the center to reduce the sweep width and enlarge the signal details.

**Zoom out:** After selecting a signal in the signal table, click "Zoom out". The X-axis will take the signal frequency as the center to enlarge the sweep width.

**Measurement Type:** Specify the measurement type, which can be for all signals, current signals, or marked signals in the peak list.

**Sorting:** Signal sorting. Sort the signals in the signal table according to the "frequency", "detector amplitude" or "detector limit line difference amplitude". Among them, the detector amplitude includes "amplitude of detector 1", "amplitude of detector 2" and "amplitude of detector 3". The range of the limit line difference of the detector includes "detector 1 difference Δ", "detector 2 difference Δ" and "detector 3 difference Δ".
Sort: Select "Ascending" or "Descending" order to sort signals.

**Search:** Set the search criteria. When a peak that meets the search conditions is found, the signal will be added to the signal table.
Search criteria include "peak value", "peak value and limit value", and "segment and limit value".
1. Peak value: Search for the peak value that meets the peak value criteria.
2. Peak value and limit value: Search for peaks that meet the peak value and limit value criteria.
3. Segment and limit value: Search for peaks within each segment that meets the peak condition and the limit line condition. After selecting this search mode, the whole sweep width is equally divided into n sub-ranges, and the value of n is set by the menu "number of segments".

**Peak Value:** Set the maximum number of peak values when the search criterion is "peak value" or peak value and limit value. Use numeric key, direction key or touch panel menu to change peak value.

**Segment Value:** Set the number of subranges for the search signal. Use numeric key, direction key or touch panel menu to change segment value.

## Sweep Table

Set the parameters of the 10 frequency bands in the sweep table.
Parameter description:

Start: Start frequency
Stop: Stop frequency
RBW: Resolution bandwidth
Scan Time
Scan Points
Att: Attenuation
Preamp: Preamplification

Select Frequency Band
Specify the selected sweep frequency band. There are 10 frequency bands.

Frequency Band Switch: Enable or disable the selected sweep frequency band. If set to on, the selected frequency band will be used as part of the measurement. In addition, users can also touch and click the check box to the left of the selected frequency band in the pre-sweep settings list. If it is highlighted, it will be displayed
"√" means turning on the selected frequency band.

Start Frequency: Set the start frequency for the selected sweep frequency band. Use numeric key, direction key or touch panel menu to change start frequency.

Note

- Users cannot set start frequency > stop frequency or start frequency = stop frequency. The difference between the start frequency and the stop frequency cannot be less than 100 Hz. If any of these operations are attempted, the stop frequency changes to maintain a minimum of 100 Hz for the difference between start and stop.
- If users change the start frequency of the selected band to < the stop frequency of the previous band (the previous band is turned on), the start frequency of the current band will be changed to the stop frequency of the previous band.
- If users change the start frequency ≥ the maximum frequency of the instrument, the start frequency of the selected frequency band will be set to the maximum frequency of the instrument -100 Hz. The stop frequency of the selected range will be set to the maximum frequency of the instrument.

Stop Frequency: Set the stop frequency for the selected sweep frequency band. Use numeric key, direction key or touch panel menu to change stop frequency.

Note

- If users change the stop frequency of the selected band to a value > the start frequency of the next band, the start frequency of the next band will be changed to the stop frequency of the current band.
- If users change the stop frequency ≥ the maximum frequency of the instrument, the stop frequency of the last band in the selected band will be set to the maximum frequency of the instrument.

Resolution Bandwidth: Set the resolution bandwidth for the selected sweep band.
Enable or disable the automatic resolution bandwidth function in the selected sweep frequency band. When Enable selected, the instrument automatically matches the resolution bandwidth. Select Disable to manually set the resolution bandwidth for the selected range. In manual mode, the user can change the resolution bandwidth by using numeric key, direction key or touch panel menu
Reducing RBW results in higher frequency resolution, but it also results in longer scan times.

Scan Time: Enable or disable the automatic scan time function in the selected sweep frequency band. When Enable selected, the instrument automatically matches the scan time. Select Disable to manually set the scan time for the selected range. In manual mode, the user can change the scan time by using numeric

key, direction key or touch panel menu

**Scan Points:** Set the scan points in the selected sweep frequency band. Use numeric key, direction key or touch panel menu to change scan points.

**Input Attenuation:** Sets the attenuation value of the selected sweep frequency band. Use numeric key, direction key or touch panel menu to change attenuation.

**Preamplification:** Turn on or off the preamplifier in the selected sweep frequency band.

**Preset Frequency Band:** Reset the sweep frequency band. After the preset frequency band is selected, the start frequency and stop frequency of the selected sweep frequency band are updated to the start and stop values of the selected preset frequency band.

## Sweep Sequence

Select the measurement sequence.
Sweep only: Pre-sweep is performed only.
Search only: Perform peak search operations only.
Sweep, Search & Measure: Perform pre-sweep, peak search, and final measurement.
Sweep & Search: Perform pre-sweep and peak search.
Search & Measure: Perform peak search and final measurement.
Measure: Perform final measurement.

Note
If a sweep sequence is currently executed, the sweep sequence menu is disabled.

## Measurement Detector

Set the detector parameters for measurement. The available detector is "detector 1", "detector 2" or "detector 3".

Note

- When setting the detector here, the detector parameters marked in the Marker menu will also change accordingly.

**Dwell Time:** Set the dwell time of the selected detector. Use numeric key, direction key or touch panel menu to change dwell time.

**Detector:** Sets the selected detector type, including peak, quasi-peak, EMI average, average, and negative peak.

**Limit Line:** Select the limit line of current detector measurement to obtain the difference data of limit line in the signal table. Optional limit lines include Limit Line 1 to Limit Line 6.

## Autocoupling

After the autocoupling is performed, all manual/auto selector switches in the current measurement mode will be set to automatic state; Other measurement modes will not be affected.
In the auto state, the parameters of the autocoupling change according to the parameters being coupled. The instrument is guaranteed to be in optimal condition by autocoupling. After this operation is performed, all automatically coupled parameters are automatically reset based on the coupled parameters.

### Reset Measurement

Reset all parameters for the current measurement mode to factory defaults.

## Frequency（FREQ）

Press [FREQ] key to activate the frequency (meter) function and enter the frequency menu. The numerical values of start frequency and stop frequency are displayed at the bottom of the screen.

**Frequency (meter):** It is used to set the frequency of the meter during frequency scanning. Users can change this parameter with a numeric key, knob, direction key, or touch panel menu.

**Center Frequency:** Activate the frequency function and set a specific frequency value at the center of the screen. Use numeric key, direction key or touch panel menu to change center frequency.

**Sweep Width:** This function is to input range value of sweep width. Use numeric key, direction key or touch panel menu to change sweep width. The sweep width will be changed symmetrically according to the center frequency. The reading of sweep width is the total displayed frequency range. To determine the sweep width for each horizontal scale division, the above sweep width should be divided by 10.

Note

- Under the premise of constant sweep width to change the center frequency, it will automatically modify the start and stop frequency.
- The minimum sweep width can set to 100Hz. When the sweep width is set to the maximum, the spectrum analyzer enters full span mode.

**Start Frequency:** Start frequency is on the left side of the screen, the right side is stop frequency. Use numeric key, rotary knob, direction key or touch panel menu to change the start frequency.
In auto mode, the start frequency value is coupled to the minimum start frequency of the selected band in the sweep table.
When switching from auto to manual coupling, the "#" tag appears before the "Start" of the comment.

Note

- Changing the start frequency will cause the change of sweep width and center frequency, and the change of sweep width will affect the parameter of other system.
- Start frequency > stop frequency cannot be set, or the stop frequency will change to maintain a minimum difference of 100 Hz between the start frequency and the stop frequency.
- Start frequency = stop frequency cannot be set, or the stop frequency will change to maintain a minimum difference of 100 Hz between the start frequency and the stop frequency.

**Stop Frequency:** Stop frequency is on the right side of the screen. Use numeric key, rotary knob, direction key or touch panel menu to change the stop frequency.
In auto mode, the stop frequency value is coupled to the maximum stop frequency of the selected band in the sweep table.
When switching from auto to manual coupling, the "#" tag appears before the "Stop" of the comment.

Note

- Changing the stop frequency will cause the change of sweep width and center frequency, and the change of sweep width will affect the parameter of other system.
- Start frequency > stop frequency cannot be set, or the stop frequency will change to maintain a minimum difference of 100 Hz between the start frequency and the stop frequency.
- Start frequency = stop frequency cannot be set, or the stop frequency will change to maintain a minimum difference of 100 Hz between the start frequency and the stop frequency.

**X Axis Scale Type:** Set the scale type displayed on the horizontal axis to linear scale or logarithmic scale.

Note

- The horizontal scale type is only relevant to the data display and does not affect the sweep and trace data.
- Changing the horizontal scale type does not restart the sweep and does not affect the number of sweeps.

## Amplitude (AMPT)

Press **[AMPT]** key to enable reference level and enter amplitude setting menu.

**Reference Level**: Set reference level, press **[AMPT]** key to enable this function. Reference level is the power or voltage value on the top grid of the screen (Unit is the selected amplitude unit). Use numeric key, rotary knob, direction key or touch panel menu to change the reference level.

Note

- Reference level is the important parameter of spectrum analyzer; it presents the upper limit of dynamic range of the spectrum analyzer at the current. When the energy of the signal to be measured exceeds the reference level, it may cause non-linear distortion or even overload alarms. The nature of the signal to be measured should be understood and carefully select reference level, in order to perform the best measurement effect and protect the spectrum analyzer.

**Input Attenuation (meter):** Set the meter attenuation value. Use numeric key, rotary knob, direction key or touch panel menu to change the input attenuation value.

Note

- In a frequency sweep measurement, this value only affects the attenuation value of the meter.

**Pre-amplification (meter):** Control the switch of the instrument's internal preamplifier, turn on to generate the gain to compensate for the preamplifier, so that the reading of amplitude value is the actual value of the input signal. When the measurement signal is small, turning on the preamplifier can reduce the average noise level of the display and thus distinguish the small signal from the noise. The default preplayback gain is 20 dB.

Note

- For UTS5000 series models,there are two preamplifiers, one for the low frequency band and one for the full frequency band.Low frequency band preamplifier, which works from 0 Hz to 7.5 GHz; full frequency band preamplifier, which is effective for all frequency bands.

**Y Axis Unit:** Change the amplitude unit which can be both used in logarithmic and linear mode. Optional units: dBm, dBmV, dBμV, Volts and Watts. The default unit is dBm.

**Impedance:** Set the input impedance when converting voltage to power. The default input impedance is 50Ω. If the input impedance of the DUT to the spectrum analyzer is 75Ω, then need to use a 75Ω to 50Ω adapter to connect the DUT to the spectrum analyzer and set the input impedance to 75Ω.

**Scale:** Sets the logarithmic value corresponding to a grid in the vertical direction of the screen. Values range from 0.1 to 20 dB per grid. User can change the scale value by using the numeric key, rotary knobs, direction key or touch panel menu.

**Reference Level Offset:** When there is gain or loss between the device under test and the import of spectrum 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 and modifies the reference level and the

amplitude reading of the cursor

**Correction:** Enter the amplitude correction to set the compensation of the gain or loss of external devices, such as antennas and cables. When the correction is turned on, the trace and the corresponding measurements are corrected.

1. Corrective option: Spectrum analyzer provides 10 correction factors and each factor can edit independent.
2. Correction (On/Off): The switch of correction, the default is off.
3. Close all: Close all the correction has been turned on.
4. Edit correction:

| | |
|---|---|
| Corrective option | Provide 10 correction factors to save, the default: correction 1 |
| Select row | Select number of revised row |
| Insert row | Add revised point |
| Delete row | Delete select row at the current |
| Delete revised data | Delete revised data at the current |

5. Delete all the revised data: Remove all the saved revised data.

## Bandwidth (BW)

Press **[BW]** key to enable the resolution bandwidth (RBW) function to manually set RBW. This control is only used to set the RBW of the meter.

**Auto/manual mode of resolution bandwidth (meter):**
Select "Manual" mode to use the resolution bandwidth (meter) menu to set the RBW value.
Select "Auto" mode to automatically couple RBW to the meter frequency. The automatic resolution bandwidth mode is selected by default.
In manual mode, users can change the resolution bandwidth value of the instrument in the range of 1Hz to 3MHz by using the numeric key, rotary knob, direction key or touch panel menu.

Note

- When the EMI measurement standard is "None", the resolution bandwidth is available in 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz and 3 MHz.
- When the EMI measurement standard is "CISPR", the resolution bandwidth is available in 200 Hz, 9 kHz, 120 kHz or 1 MHz.

## Sweep

Press **[Sweep]** key to enter the following panel menu to control the sweep measurement and trigger Type when the spectrum analyzer is in EMI mode.
**Sweep/Measurement:** Set the current frequency scanning mode to Single or Continuous.

Note

- When the sweeping sequence is sweeping and sweep is in progress, changing this parameter to single completes the current sweep and stops.

- When the sweeping sequence is sweeping but not swept, changing this parameter initiates the sweep.
- Changing this parameter does not affect measurements when running sweeping sequences other than sweep.

**Start/End:** Select "Start" to start sweeping, searching or measuring according to the selected frequency sweep sequence. When the sweep sequence is running, "Clear List and Start", "Meter Single/Continuous", "Single (Meter)", "Trigger Type" controls are disabled.
Select "End" to stop sweeping, searching or measuring.

**Pause/Continue:** Select "Pause" to pause sweeping, searching or measuring. Users can pause only between two sweep ranges.
Select "Continue" to continue sweeping, searching or measuring. Continue sweeping from the paused sweep point.

**Clear List and Start:** After pressing or clicking this menu, delete all signals in the signal table first. Then, start the selected sweep sequence. If the selected sweep sequence is being swept in continuous sweeping mode, users need to select "End" to stop sweeping. In other cases, the sweep sequence will automatically stop when the measurement is complete.

**Continuous (meter):** Set the measurement mode of the meter to continuous. The measurement will stop only when the measurement mode changes to single or the sweep sequence is restarted.

**Single (meter):** Set the measurement mode of the meter to single. The meter will stop after taking one measurement. Start the meter by changing the measurement mode to continuous.

**Trigger Type**
Trigger types include freedom trigger, external trigger and video trigger.

1. **Freedom Trigger**: The trigger signal can be generated continuously at any time as long as the trigger conditions are met. No need to set trigger condition, after sweep each frame will sweep the next frame automatically.
2. **Video Trigger**: When the voltage of the detected video signal exceeds the setup video trigger level, a trigger signal is generated.

**Triggering Level:** When the video trigger is selected, the trigger level line and the value of trigger level are displayed on the screen. User can change the trigger level by using the numeric key, rotary knob, direction key or touch panel menu.

3. **External Trigger**: Input an external signal via connector [TRIGGER IN] on the rear panel, a trigger signal is generated when the signal meets the trigger edge conditions.
   **Trigger Edge（rise/fall edge）**: Set the trigger edge for external trigger to be the rising or falling edge of the pulse, a trigger signal is generated when the signal meets the trigger edge conditions.
   **Trigger Delay:** Set trigger delay time.

## Trigger

Press the **[Trigger]** key to enter the trigger menu and to set the trigger parameter.

Note

- This button is designed for UTS5000 series models.
- For UTS3000B/T,UTS3000A,UTS1000B/T series models, there is no Trigger key, and trigger related functions are under the Sweep menu.

**Trigger type:** arbitrary trigger, external trigger, video trigger and Periodic Trigger

1. **Arbitrary trigger:** any moments are satisfied with the trigger conditions, that is continue to generate the trigger signal, no need to set the trigger conditions. After each frame is scanned, the next frame will be scanned automatically.
2. **Video trigger:** when the detected video signal voltage exceeds the set video trigger level, a trigger signal is generated.
   **Trigger level:** when the video trigger is selected, the trigger level line and the value of the trigger level are displayed in the screen. The user can change the trigger level by using the numeric key, rotary knob and arrow key or touch the panel menu.
3. **External Trigger:** an external signal (TTL signal) is input through the **[TRIG1]** connector on the rear panel, and a trigger signal is generated when the signal meets the set trigger edge condition.
   **Trigger edge (rising edge/falling edge)**: set the trigger edge for external triggering to the rising or falling edge of the pulse, and generate a trigger signal when the signal meets the set trigger edge condition.
   **Trigger delay:** set the trigger delay time.
4. **Periodic Trigger:** when the periodic trigger is selected, the analyzer will use the built-in periodic timer signal as a trigger. The trigger event is set by the periodic timer signal, and the periodic timer signal is set by the offset and synchronous source. When a period signal is available but no reliable signal, use this trigger to synchronize the periodic signal with an external event (using a periodic synchronization source) to more closely approximate a reliable trigger signal. If the synchronous source is not selected (it is "OFF"), then the internal timer will not be synchronized with any external timing events.
   **Period:** set the period for the internal periodic timer. For digital communication signal, this is usually set to the frame period of the current input signal.
   If the synchronization source is not set to OFF and the rate of external synchronization source is changed for some reason, the periodic timer is synchronized by resetting the timer circuit's internal state, the periodic timer is synchronized at each external synchronization pulse.
   **Offset:** adjust the accumulated offset between the periodic timer events and trigger events.
   **Synchronous source:** Use this drop-down list to select the synchronous source of the periodic timer. Select a source to synchronize the periodic timer trigger, otherwise, the trigger could be generated anywhere in the frame. Synchronization reduces the accuracy required for period settings.
   **Trigger delay:** set the trigger delay time.

Note

- Periodic trigger is designed for UTS5000 series models. For UTS3000 and UTS1000 series models, there are only three trigger types: arbitrary trigger, external trigger, video trigger.

## Trace

Press **[Trace]** key to enter menu which can select and control trace information and detector. Each trace consists of a series of data points with amplitude information. With each sweeping, the spectrum analyzer will refresh information for every valid trace. For slower sweeping, there is a visual indicator on the trace line where new data is written, the green "caret" or ^ symbol, which moves at the bottom of the grid line showing the current trace point.

**Trace Selection:** Select the required trace, there are 3 traces.

**Trace Type:** Set the type of the current selected trace. The system will display the scan data after taking the corresponding calculation method according to the selected trace type. The trace types include refresh, trace averaging, maximum hold, and minimum hold. Each type has a corresponding parameter on the upper right side of the screen.

1. Refresh

Take the real-time data after sweeping of each point of the trace.

2. Trace Averaging
   Each point of the trace displays the result of averaging the data after multiple sweeps. As the time of average sweep increases, the waveform becomes smoother.
3. Maximum Hold
   Each point of the trace keeps displaying the maximum value in multiple sweeps, and updates the data display when a new maximum value is generated.
4. Minimum Hold
   Each point of the trace keeps displaying the minimum value in multiple sweeps, and updates the data display when a new minimum value is generated.

**Detector:** Set the detection mode of the current measurement and apply the detection mode to the current trace. Optional detector types include peak, quasi-peak, EMI average, average and negative peak.

1. Peak
   For each point on the trace, peak detection shows the maximum value of the sampled data within the corresponding time interval.
2. Quasi-peak
   Quasi-peak detector implemented according to CISPR standard.
3. EMI average
   Average detector implemented according to CISPR standard.
4. Average
   For each data point, detector will take average value by sampling data in the time interval. The average effect is different for different data types.
5. Negative peak
   For each point on the trace, negative peak detection shows the minimum value of the sampled data within the corresponding time interval.

**Auto Detector:** Enable or disable the automatic trace selection detector function. By default, the automatic detection mode of trace line is enabled. If the detection type is set manually, the automatic detection function of trace line will be closed.

**Update:** When the update is enabled, remove all the stored data in the selected trace and continuously display any signals in sweep time. When the refresh is disabled, hold and display the amplitude data of the selected trace. The trace register will not refresh with the sweep.

**Display:** Set the switch of the selected trace. Closing makes the trace invisible, but does not affect whether the trace is being updated.

## Marker

Press **[Marker]** key to access marker menu to select type and amount of marker. Marker is a rhombic icon, as shown in the Figure 3-2

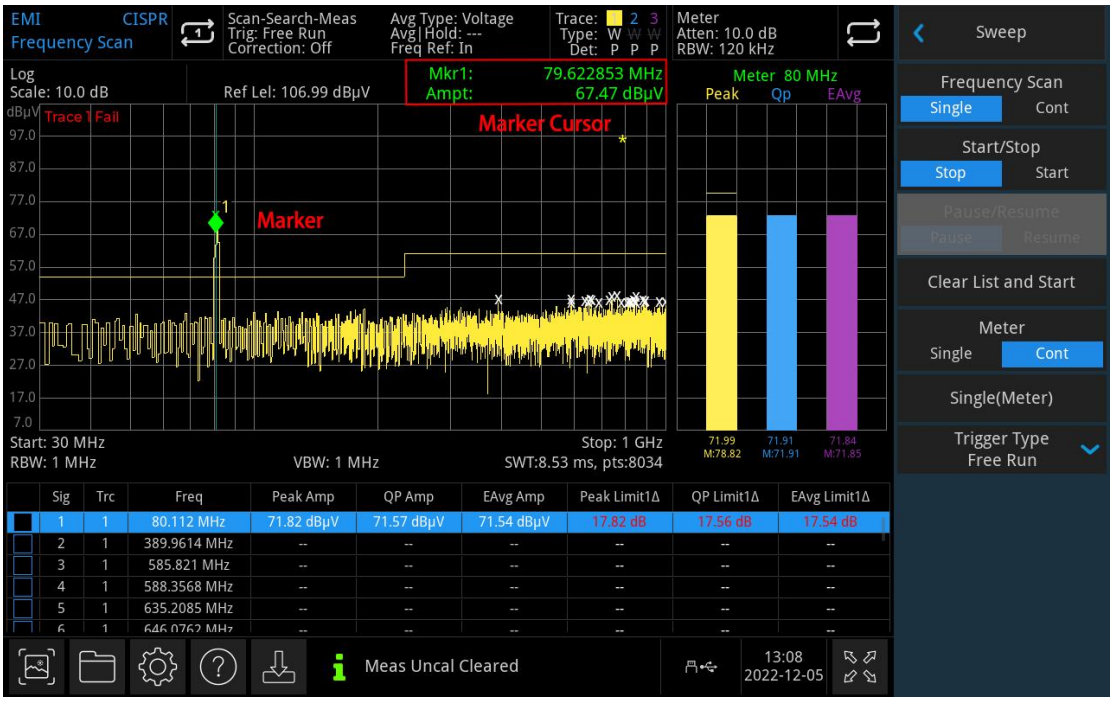


Figure 3-2 Reading of Marker Cursor

It can display 6 markers on the screen at the time, but each time can only control one or a pair of markers.

**Marker Selection:** Select one of the six cursors. The default is signed as marker 1. After selecting the cursor, it can set parameters such as the cursor type, the marked trace, and the reading mode. The currently open cursor will be marked on the trace selected by "Mark Trace", the current parameter area and upper right corner of the screen will display the current active cursor reading at the marker.

**Marker Mode:**

1. Normal: For measuring X (frequency or time) and Y (amplitude) values in a point of trace. After selecting normal, a cursor identified by the current cursor number will appear on the trace, such as "1", pay attention to the following points in using:

If no activated cursor at the current, then activate a cursor at the center frequency of the current trace.
The reading of the current cursor will display on the upper right of the screen.
The resolution of X-axis (time or frequency) reading is related to the sweep width, which can be reduced to achieve higher reading resolution.

2. DifferenceΔ:
   Used to 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 "Δ")

3. Fixation: After selecting "fixed" cursor, set the X and Y values of the cursor directly or indirectly, their positions remain unchanged. Y value does not change with the trace. The fixed cursor is generally used as the reference cursor of the difference cursor, and the fixed cursor 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.

**Mark Trace:** Select the trace marked by the current cursor as Trace 1, Trace 2, or Trace 3.

**Mark Frequency:** Mark the frequency point on the trace. Users can change the frequency value by using the

numeric key, rotary knob, direction key or touch panel menu.

**Mark Amplitude:** The amplitude position of the marked point on the grid graph when marked in fixed mode. Users can change the amplitude value by using the numeric key, rotary knob, direction key or touch panel menu.

**Relative to:** For measuring the difference between two cursors and the two cursors can be marked on the different trace at the same time.

**Close All**: Close all the marker point.

**Marker->**: Use the value of the current cursor to set other system parameters of the spectrum analyzer (such as center frequency, reference level, etc.). If no cursor is available at the current, press **Marker** menu to activate a cursor automatically.

1. Marker->add signal: Add the frequency at the current cursor to the signal table. If it is not marked ON when doing this, the current tag will open.

Note

- The newly added signal frequency information is sorted according to the current sorting rule.
- If the trace detector matches the signal table detector, the corresponding amplitude values and limit differences are updated; otherwise, these values are displayed as "--" to represent undefined values.

2. Marker measurement->add signal: Add the current cursor measurement results (including frequency, cursor amplitude value, and limit difference) to the signal table.

Note

- If no valid cursor measurements are performed, an error may occur and the addition of measurements to the signal table cannot be performed.
- The newly added signal measurement result information is sorted according to the current sorting rule.
- If the trace detector matches the signal table detector, the corresponding amplitude values and limit differences are updated

3. Meter->marker frequency: Set the meter frequency to the frequency at the currently selected cursor. If it is not marked ON when doing this, the current tag will open.

4. Marker->meter frequency: Set the frequency at the currently selected cursor to the meter frequency. If it is not marked ON when doing this, the current tag will open.

5. Meter->replace signal: Replace the frequency of the currently selected signal with the frequency currently set by the meter. If it is not marked ON when doing this, the current tag will open.

6. Meter->add signal: Add the currently set meter frequency to the signal table. If it is not marked ON when doing this, the current tag will open.

**Marker line:** Turn on/off the marker line.

Note

- When the cursor line is opened, the cross line is displayed at the amplitude point indicated by the cursor. The width of the horizontal line and the height of the vertical line are consistent with the grid length and height of the waveform display area.
- If the cursor is not visible, extend the cursor line to the display area. This feature is useful for cursors outside the display area, where the cursor extension line indicates the cursor's amplitude for comparison purposes.

**Marker measurement window:** Turn on or off the display of the cursor measurement window. If "Open" is selected, the cursor measurement window is displayed at the upper left corner of the user interface, showing the final measurement result of the current cursor.
If multiple traces are opened, users can place a cursor on any trace in the sweep display and take measurements at the cursor.

**Marker measurement:** After turning on the marker measurement window, press this key to perform the cursor measurement. At this point, the final measurement is performed according to the detector setting at the current cursor frequency, and the measurement results are displayed in the window.

Note

- If the measurement detector configuration changes, the measurement result displayed by the corresponding detector in the marked measurement window will change to "--" until the next measurement.

## Peak

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

**Peak Search:** Use the normal cursor mode to search for the highest amplitude in the trace and display the frequency and amplitude value, then press peak search to perform it one time.

**Next Peak:** Find the peak on the trace that is second only to the amplitude to the current peak and meets the search criteria, and mark it with the cursor. Without this peak, the marker will not move.

**Next Peak on the Left:** Find the current peak on the left side and search the close peak that meet the search criteria on the trace, and mark it with the cursor.
**Next Peak on the Right:** Find the current peak on the right side and search the close peak that meet the search criteria on the trace, and mark it with the cursor.

**Minimum Peak:** Find the minimum amplitude value on the trace and mark by the cursor.

**Threshold line (on/off):** Set whether to display the peak threshold and peak offset indicator line. The default setting is off.

**Peak threshold (manual/auto):** Specify the minimum of peak amplitude by manual or auto. Only peak greater than the peak threshold can be judged as the peak. User can change the threshold by using the number key, rotary knob, direction key or touch panel menu.

**Peak offset (manual/auto):** Specify the difference between the peak and the minimum amplitude of the left and right side. The peak can be judged as the peak only the difference value is greater than the peak offset. User can change the threshold by using the number key, rotary knob, direction key or touch panel menu.

## Single

**[Single]** key is the quick key of sweep mode.

## Default Setting (Default)

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

Press **[Default]**>restore to the factory setting,
1. Reset spectrum analyzer to EMI mode

2. Enter frequency menu
3. Set the default parameter for some environment
4. Perform processor test but not affect the correction data
5. Delete the input and output caches and all trace data
6. The amplitude values of traces 2 and 3 are not displayed.
7. The amplitude correction factor is turned off but remains in the spectrum analyzer's memory
8. The limit line test is turned off but the list of limit line remains in the spectrum analyzer's memory
9. The state is directly set to 0

The default values of key parameters after reset are as follows:

| Menu | Parameter | Default value |
|---|---|---|
| Frequency | Frequency (meter) | 515MHz |
| Frequency | Center frequency | 515MHz |
| Frequency | Start frequency | Auto/30MHz |
| Frequency | Stop frequency | Auto/1GHz |
| Frequency | X-axis | Logarithm |
| Amplitude | Reference level | 106.99dBμV |
| Amplitude | Input attenuation (meter) | 10dB |
| Amplitude | Pre-amplification | Off |
| Amplitude | Reference level offset | 0dB |
| Amplitude | Impedance | 50Ω |
| Bandwidth | Resolution bandwidth (meter) | Auto/120kHz |
| Sweep | Sweep/Measure | Continuous |
| Sweep | Meter | Continuous |
| Sweep | Trigger type | Freedom trigger |
| Trace | Select trace | 1 |
| Trace | Trace type | Refresh |
| Trace | Trace detector | Peak |
| Trace | Auto detection | On |
| Trace | Trace update | On |
| Trace | Trace display | On |
| Measurement Setup | Average hold times | 100 |
| Measurement Setup | Average type | Logarithmic power |

Note: This table shows the parameters of UTS3000B after reset

## System Setting (System)

Press the [System] key to enter the setup menu, it can access the system information, basic setting and network setting of the signal analyzer.

System information: enter the system information panel menu to check basic and option information.

1. Basic information: product name, manufacturer, product model, serial number, software version number, medium frequency hardware version number, radio frequency hardware version number, medium frequency logical version number, radio frequency logical version number, etc.

2. Option information: check the version number and state of the option.

Setting: enter the setup panel menu to set up the basic and network setting

1. Basic Setting.
   Language: simplified Chinese, English, German.
   Time format: 12 hours and 24 hours.
   Date/Time: tap this area to pop out the Windows system time setting window, modify the time and date in the time setting window.
   Picture format: set the format of screenshot, it has bmp and png for selection.
   Power-on parameter: set the system parameter settings that are loaded after power on, the default setting can set to previous or preset.
   Backlight: swipe the scroll bar to change the backlight of the screen.
   Sound: swipe the scroll bar to change the sound.
   HDMI: HD multimedia interface, touch "☐" to tick it, it indicates the interface is turned on.
   Screenshot inverse color: set the inverse color of screenshot.
   Preset file: When the power-on parameter is set to preset, this configuration file will use to set the parameter when the instrument is turned on.

2. Network Setting
   Adopter: that is LAN switch, touch "open" to enter the network setting window of Windows, modify the network configuration in the network setting window.
   DHCP: touch "open" to enter the network setting window of Windows, modify the network configuration in the network setting window.
   IPV4 address: the format of IP address is nnn.nnn.nnn.nnn, the first nnn range is 1 to 223, and the other three nnn ranges are 0 to 255. It is recommended to consult network administrator for an available IP address.
   Subnet mask: the format of subnet mask is nnn.nnn.nnn.nnn, nnn range is 0 to 255. It is recommended to consult network administrator for an available subnet mask address.
   Gateway setting: the format of gateway is nnn.nnn.nnn.nnn, the first nnn range is 1 to 255, and the other three nnn ranges are 0 to 255. It is recommended to consult network administrator for an available gateway address.
   MAC address: the physical address to confirm the location of a network device which is also called hardware address, the length is 48 bits (6 bytes). It 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 called extended identifiers.

3. Port Setting
   Web login user name: set the user name for logging in the browser. Web address http://IP:9000, where IP is the IPv4 address of the network settings, e.g.: http://192.168.20.117:9000.
   Web login password: the password for logging in the browser. After successful login, you can control the instrument, execute SCPI commands, network settings, etc. on the browser.

   After the Web login user name and password are set, the device can be remotely controlled using a Web browser on a PC or mobile terminal, which mimics the touch screen/mouse clickable display function, just like a physical instrument, and operates as follows.

   (1) Access Local Area Network
   The computer and the oscilloscope are under the same LAN. Check the IP address through the system menu of the signal analyzer, and then the browser accesses the signal analyzer by http://ip:9000 port.

Example

Computer IP: 192.168.20.3

Signal analyzer IP: 192.168.20.117

PC browser using 192.168.20.117:9000 to access the signal analyzer to checking the basic information and control parameter of the instrument, such as network setting, password and SCPI, as shown in the following Figure 3-3.

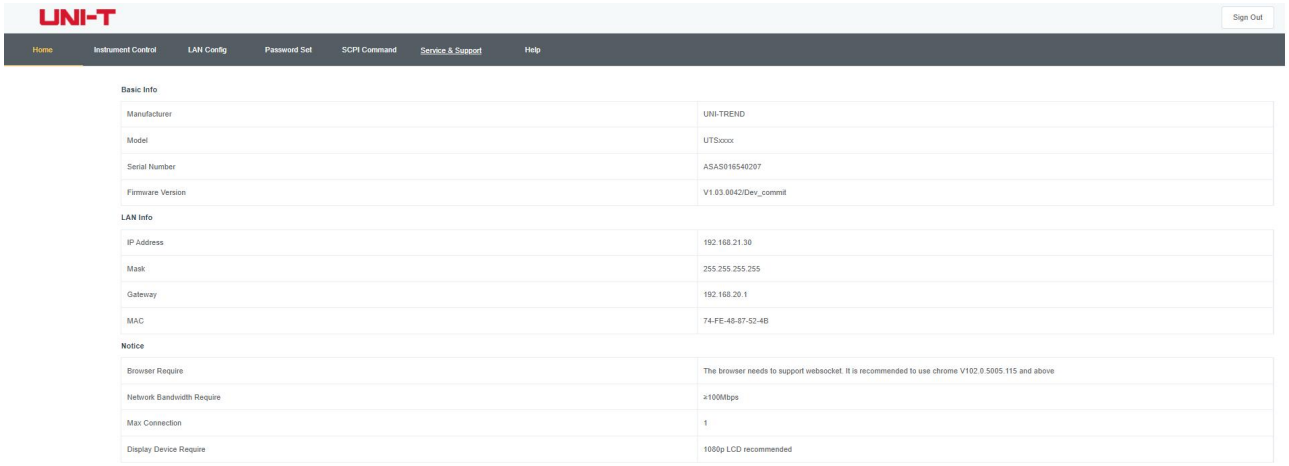


Figure 3-3 Web Basic Information

Log in to check the network and password and SCPI setting of the instrument. Web user name and password refer to port setting, as shown in the following Figure 3-4.

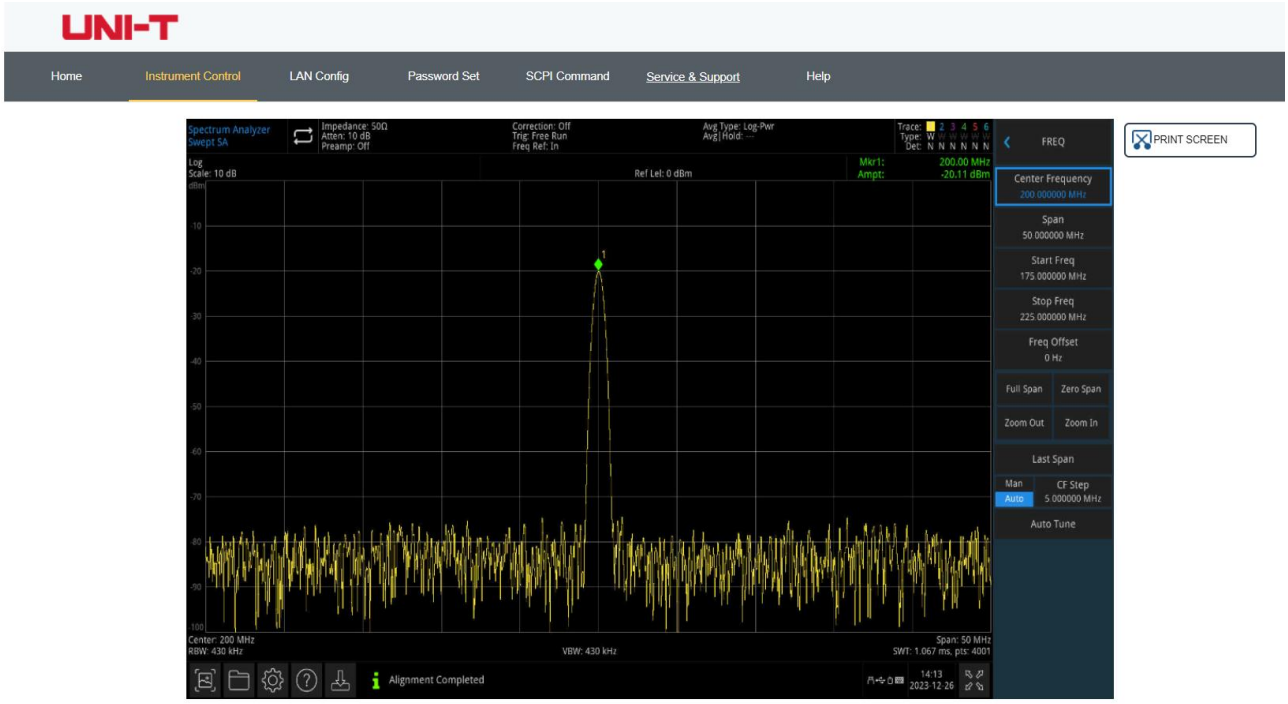


Figure 3-4 Web Control

The operations that can be performed on the touch screen of the physical instrument, such as selecting menu panels, clicking on function keys, entering numbers and characters, dragging marks, etc., can also be performed on this Web page, as well as printing the screen.

(2) Access Outer Network

a. plug the network cable into the signal analyzer and the network can be access internet

b. open the frp proxy service on the server

c. configure the frp proxy IP and port of signal analyzer

d. the browser can access http://IP:web_port, and the access interface is consistent with the above.

Note

(3) This signal analyzer uses frp intranet penetration way to achieve external network access. frp version is 0.34.0. This machine with frp-0.34.0 client, it need use with the server, the server needs to open frp server, the client connects to the frp server port is 7000, so the server needs to configure bind_port = 7000.

(4) Network Setting

Modify the network and Frp agent network information of signal analyzer, as shown in the following Figure 3-5.

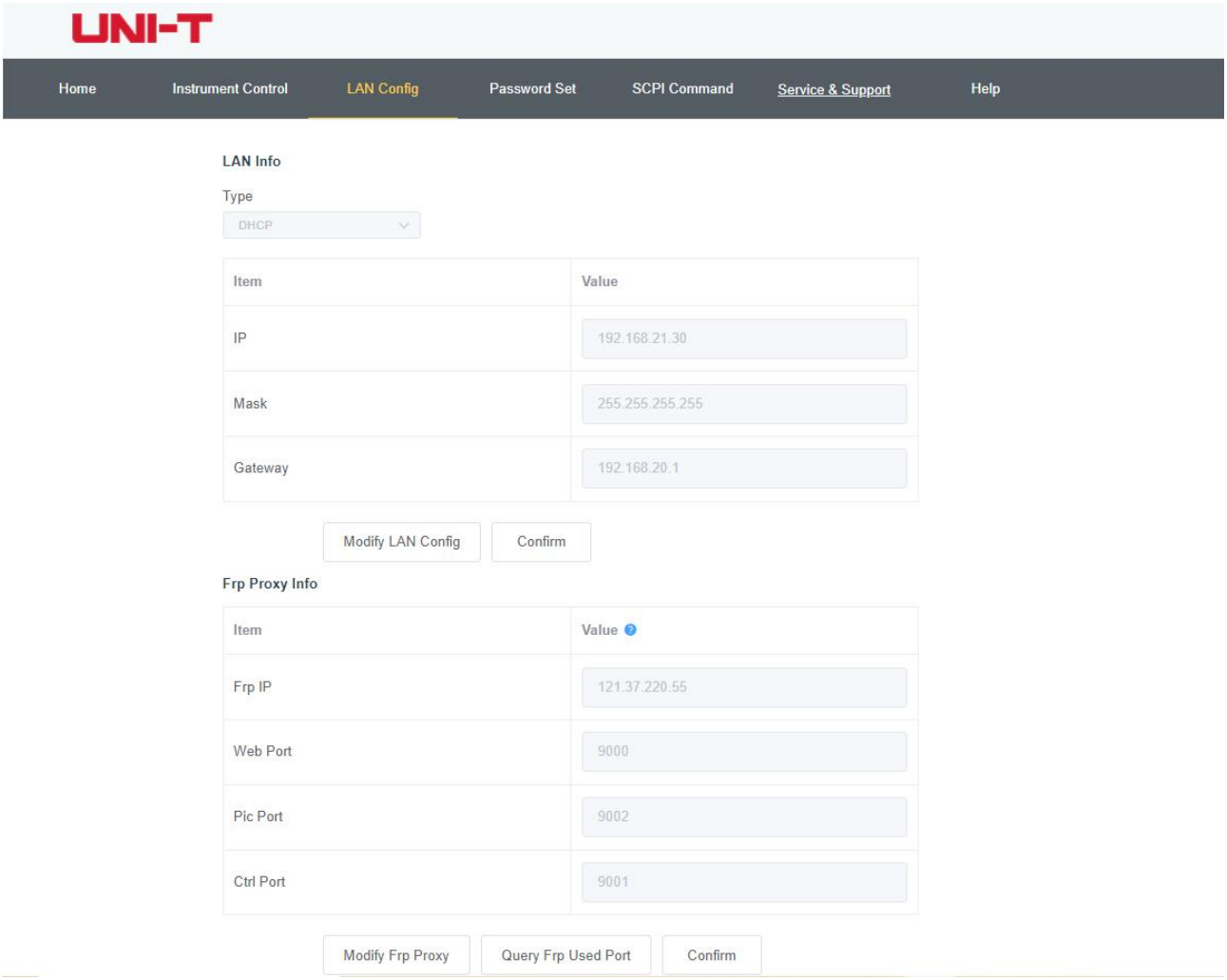


Figure 3-5 Web Network Setting

(5) Password Setting

Modify Web login password of the signal analyzer, as shown in the following Figure 3-6, the original password can be viewed under Physical Instruments->System->Setting->Interface Settings.

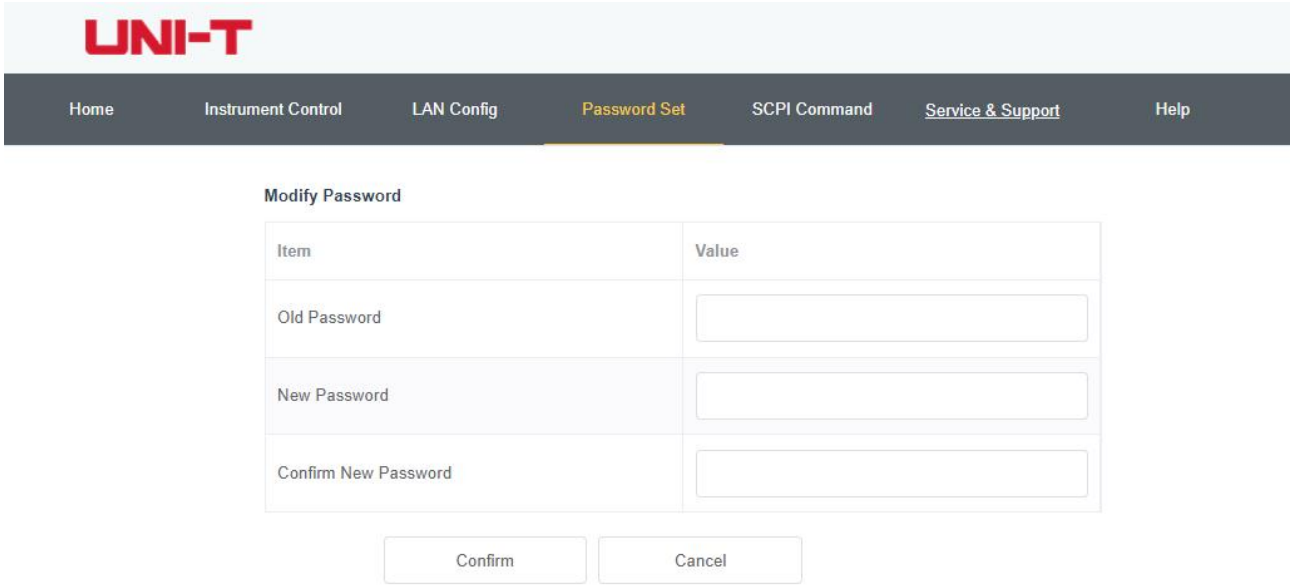


Figure 3-6 Web Password Setting

(6) SCPI

Execute the SCPI command, as shown in the following Figure 3-7, enter the command in the SCPI command edit box, click the "Send Command" button, and the execution result will be printed in the report column as below.

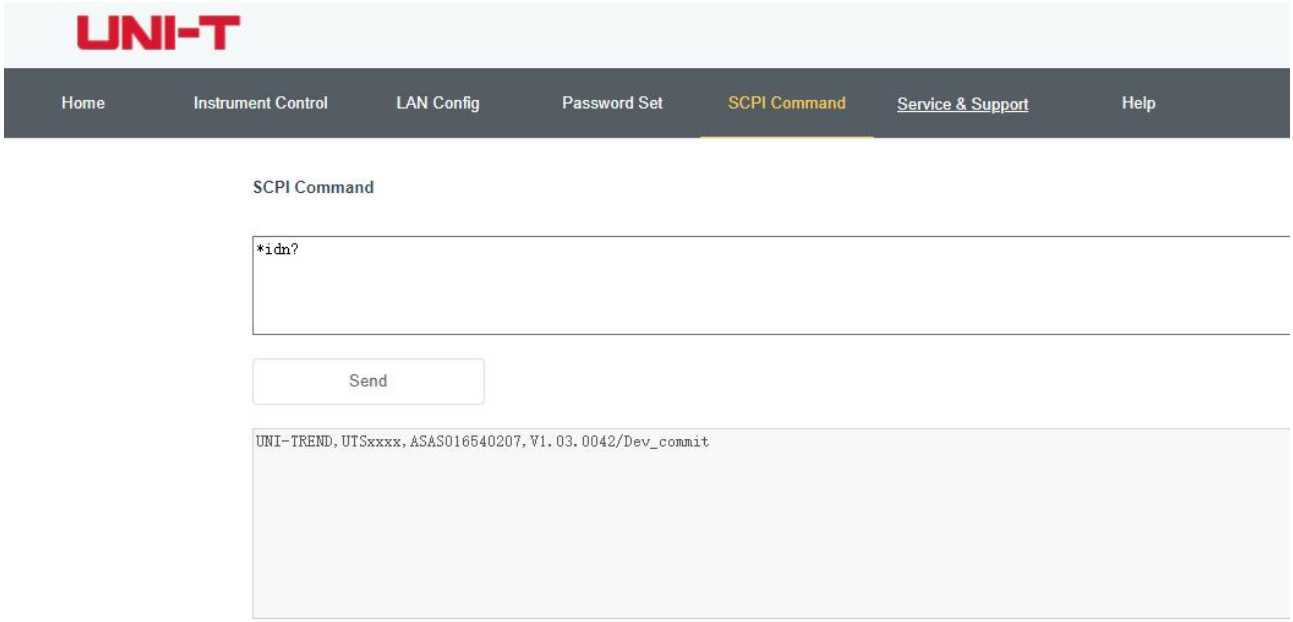


Figure 3-7 SCPI Control

**Restore default setting:** enter the restore default menu to perform this function

1. Restore the system setting, the system setting of the signal analyzer will restore to the default state.
2. Clear data, all the stored data of the signal analyzer will be deleted.
3. Restore all the setting, all the setting of the signal analyzer will restore to the default state and empty user's data.

## File System(File)

Press the **[File]** key to enter the file system to check, create, delete, copy and move.

**Check**: check each file and file folders in the file system

**Create**: in the file system, under any directory, press the blank space on the touch screen, and select "New" -> "Folder" in the pop-up menu to create a new folder

**Delete**: in the file system, under any directory, select the file or file folders to be deleted, long press the touch screen to pop out the menu, select "Delete" and confirm the selected

**Copy**: in the file system, under any directory, select the file or file folders to be copied, long press the touch screen to pop out the menu, select "Copy" and confirm the selected

**Move**: in the file system, under any directory, select the file or file folders to be moved, long press the touch screen to pop out the menu, select "Move" and confirm the selected

## File Storage (Save/Recall)

Press **[Save]** key to access save menu, the types of files that can be saved in the instrument are state, trace + state, measurement data, limit, correction and export. Long press this key to screenshot.

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

1. Press **Export** key, the instrument will save the current state by the default file name or the input file name.
2. After the state file is selected, press **Import** key to read the current state file.

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

Trace Selection: there are six traces for selection.

1. Press **Export** key, the instrument will save the current state and trace by the default file name or the input file name.
2. After the trace and state file is selected, press **Import** key to read the current trace and state files.

**Measurement Data**: Press **Measurement Data** panel menu to access measurement data save menu. The selected measurement data type (such as trace, measurement result, peak list or cursor list) can be saved into the specified file. The instrument will save the corresponding data in csv (data separated by comma) format for data analysis by using Excel software.

Trace Selection: there are six traces for selection.

Data type: trace, peak list and marker list

1. Press **Export** key, the instrument will save the current selected type of measurement data by the default file name or the input file name.
2. After the measurement data file is selected, press **Import** key to read the current measurement data file.

**Limit**: Press **Limit panel** menu to access limit save menu. Save the limit line to a file.

Limit Selection: there are six limit data

1. Press **Export** key, the instrument will save the current limit by the default file name or the input file name.

2. After the limit file is selected, press **Import** key to read the current limit file.

**Correction**: Press **Correction** panel menu to access correction save menu. Save the selected correction data to a file.
Correction Selection: there are 10 correction data.
1. Press **Export** key, the instrument will save the current corrected data by the default file name or the input file name.
2. After the correction file is selected, press **Import** key to read the current correction file.

**Sweep table**: Press **Sweep table** panel menu to access sweep table save menu. Save the selected sweep table data to a file.
1. Press **Export** key, the instrument will save the current sweep table data by the default file name or the input file name.
2. After the sweep table file is selected, press **Import** key to read the current sweep table file.

**Signal table**: Press **Signal table** panel menu to access signal table save menu. Save the selected signal table data to a file.
1. Press **Export** key, the instrument will save the current signal table data by the default file name or the input file name.
2. After the signal table file is selected, press **Import** key to read the current signal table file.

**Export**: export he current selected file
**Import**: import the current selected file (This key is hidden when no file is selected.)

## Screen Lock（Touch Lock）

Press the **[Touch Lock]** key, if indicator turns red, it represents the touch function is locked. If the indicator off, it represents the touch function is enabled.

## Mode(Mode/Meas)

Press the **[Mode/Meas]** key to open the Mode Select window. For spectrum analysis mode, you can select channel power, time domain power, occupied bandwidth, third-order intermodulation, adjacent channel power, spectrum monitoring, carrier-to-noise ratio, and harmonic measurements.
Mode: spectrum analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis,IQ Analyzer(there are some options that need to be activated separately.) Please go to the official website to download the required instructions.

Note

- This button is designed for UTS5000A series models.
- For UTS3000B/T,UTS3000A,UTS1000B/T series models, **[Mode]** and **[Meas]** are two separate keys. Press the **[Meas]** key,you can select channel power, time domain power, occupied bandwidth, third-order intermodulation, adjacent channel power, spectrum monitoring, carrier-to-noise ratio, and harmonic measurements.Press the **[Mode]** key,spectrum analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis,IQ Analyzer.

# 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 shorts or even personal injury caused by moisture.**

## Contact Us

If the use of this product has caused any inconvenience, if you in mainland China you can contact UNI-T company directly.

Service support: 8am to 5.30pm (UTC+8), Monday to Friday or via email. Our email address is 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 have the option of extending the warranty and calibration period, please contact your local UNI-T dealer or sales center.

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

http://www.uni-trend.com