UNI-T®

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User Manual

Signal Analyzer VSA

This manual is for:

UTS5000A series

UTS3000A series

V1.0

July 15th, 2024

Preface

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

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- 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 defective 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

- Inspect Packing List
- Safety Instruction
- Environmental Requirements
- Connecting Power Supply
- Electrostatic Protection
- Preparation Work
- Usage Tip
- Touch Operation
- Remote Control
- Help Information
- Operation Mode

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 Information

This chapter contains information and warnings that must be observed. To ensure that the instrument is operating under the 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 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 Sign

	**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		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.
UK CA	**Certification**	UKCA indicates a registered trademark of United Kingdom.
Intertek 4007682	**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 used 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 properly	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 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 the power fuse of specified 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 to 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 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 keys, 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 action 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 openings on the rear and side panels of the instrument. Please ensure that air can flow through these vents. To prevent excessive dust from blocking the vents, 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 the AC power supply is as shown in the following table.

Voltage Range	Frequency
100-240VAC (Fluctuations ±10%)	50/60 Hz
100-120VAC (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 lead has 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 power switch to enter standby mode.
3. Press the soft switch to power on the signal analyzer.

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

Usage Tip

Use an External Reference Signal

If a user wants 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. The measuring bar on the top of the screen will indicate "**Freq Ref: Ext**."

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 have 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 Operation

The signal analyzer has a 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 and edit them.
- 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 for each functional key and menu control key on the front panel.

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

Operation Mode

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

- Spectrum Analysis
- IQ analysis
- EMI
- Analog Demodulation
- Vector Signal Analysis (refer to Chapter 3 for more details)
- Real-time Spectrum Analysis
- Vector Network Analysis
- Phase 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 uses the vector signal analysis mode as an example to introduce the user interface and functional keys.

2. User Interface

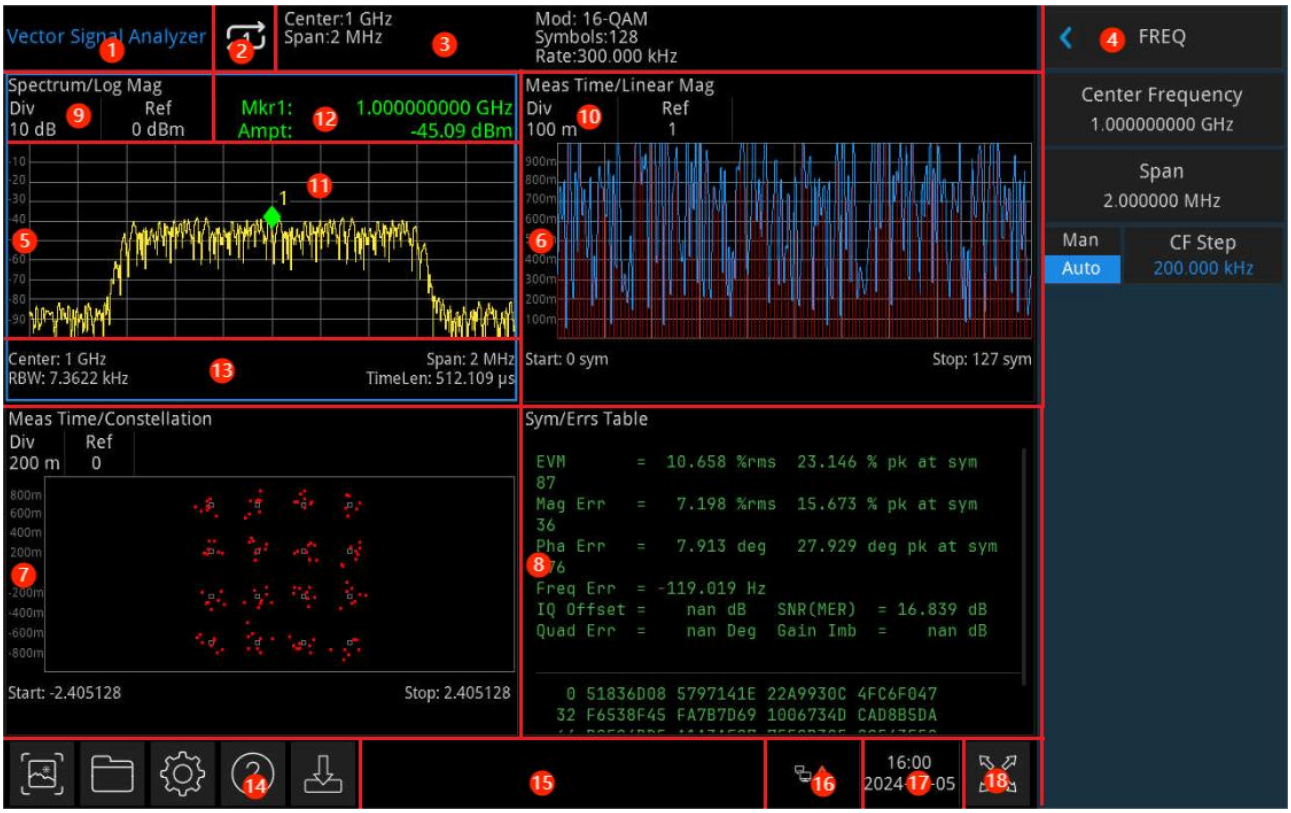

Figure 2-1 User Interface

1. Working mode: including spectrum analysis, IQ analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis, vector network analysis, and phase noise analysis.
2. Scan/Measure: The current scan mode includes single and continuous, and you can quickly switch between them by clicking on the screen symbol.
3. Measurement bar: Displays measurement setting information, including center frequency, sweep width, measurement length, bit rate, modulation type, and others. Quick switch can be achieved by clicking on the screen symbol.
4. Panel menu: The menu and function items to which the current function hard keys belong, including frequency, amplitude, bandwidth, trace, marker, and other function displays.
5. Trace 1 Window: Displays the waveform or data of Trace 1.
6. Trace 2 Window: Displays the waveform or data of Trace 2.
7. Trace 3 Window: Displays the waveform or data of Trace 3.
8. Trace 4 Window: Displays an error summary.
9. Trace Data Source and Trace Format:

   The data sources of the current trace are: the time domain and frequency domain of the captured data, the time domain of the measurement data, the frequency domain of the measurement data, the time domain of the reference data, the frequency domain of the

reference data, the time domain of the error vector, the frequency domain of the error vector, the IQ amplitude error, the IQ phase error, and the error summary.

The current trace formats are logarithmic amplitude, linear amplitude, real, imaginary, I-Q, constellation, I-eye diagram, Q-eye diagram.

10. Reference level and scale: Displays reference level value, scale value.
11. Grid display area: Including trace display, marker points, marker lines, marker lists, and so on.
12. Cursor measurement result: Displays the current measurement result of the cursor, including frequency and amplitude.
13. Data display: Including center frequency, sweep width, resolution bandwidth, etc.
14. Function Settings: Including 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 memory exists, it will be saved to external memory first.
    - File system  : In the file system, the user can save status or other files to internal or external memory and can call them up. Mainly used to view, create, delete, copy, and move files.
    - System Information  : View basic information and option information.
    - Help System  : Open the help navigation.
    - File Storage  : Import and export operations on status.
15. System Log dialog box: Click the blank part on the right side of the file storage to enter the system log, and view the local operation logs, alarms, prompts and other information.
16. Connection Type: Displays the connection status including mouse, USB flash drive, screen lock and other connection conditions.
17. Date & Time: Displays the date and time.
18. Full screen on/off: Turn on the full screen display, the screen is stretched horizontally, and the right key is automatically hidden.

3. Key Description (VSA)

- Frequency (FREQ)
- Amplitude (AMPT)
- Bandwidth (BW)
- Sweep (Sweep)
- Trace line (Trace)
- Market (Marker)
- Peak value (Peak)
- Measurement (Meas)
- Measurement/Setup (Meas/Setup)
- Single (Single)
- Default setting (Default)
- System setting (System)
- File storage (Save)
- Touch/lock (Touch/Lock)
- Mode (Mode)

Note

- The key here is for the signal analyzer vector signal analysis mode.
- For different models of equipment, the parameter configuration and range under each key menu are different, please refer to the corresponding data sheet of each model for specific parameter configuration.

Frequency (FREQ)

Press the [FREQ] key to enter the frequency function menu. Values with start and cut-off frequencies are displayed at the bottom of the screen grid.

Center Frequency: Activates the center frequency function to set a specific frequency value at the horizontal center of the screen. The center frequency value can be changed by the user via

numeric keys, knobs, arrow keys, or touch panel menus. The center frequency is changed, the sweep width remains the same, and the start and cut-off frequencies are updated.

Sweep Width: Lets you enter a sweep range value. The user can change the sweep width value via numeric keys, knobs, arrow keys, or touch panel menus. Changing the sweep width will change the frequency range symmetrically by the center frequency. The reading of the sweep width is the total display frequency range. To determine the sweep width for each horizontal scale division, the said sweep width should be divided by 10.

Note

- When adjusting the sweep width, the center frequency remains the same, and the start and cut-off frequencies will change.
- The minimum sweep width can be set to 10 Hz. The sweep width is up to 1 MHz.

Center Frequency Step: Setting the frequency step will change the length of the center, start, and off frequencies when stepping with the arrow keys, and the user can change the step value via the number keys, knobs, arrow keys, or touch panel menus. In automatic mode, the center frequency step is sweeping width/10.

Amplitude (AMPT)

Press the [AMPT] key to activate the reference level function and enter the following amplitude setting menu. By adjusting the amplitude parameter, the signal under test can be displayed in the current window in a way that is easy to observe and has minimal measurement error. The amplitude parameters of each trace window are independent of each other, and if you select a trace window, you can modify the amplitude parameters of the trace window under the amplitude menu.

Reference Value: Setting the reference level. Press the **[AMPT]** key to activate this function. The reference level is the power, voltage value, or percentage (depending on the trace format) represented by the screen reference grid lines. The reference value can be changed by the user via numeric keys, knobs, arrow keys, or touch panel menus. Reference values are displayed at the top of the grid.

When the trace format is selected for Logarithmic Amplitude or Linear Amplitude, the reference value is at the top of the Y axis; In other cases, it is in the middle of the Y-axis.

Scale: Sets the tick size per grid on the vertical axis of the selected trace. The scale can be changed by the user via numeric keys, knobs, arrow keys, or touch panel menus. Scale values are displayed at the top of the grid. When you select a different trace format, the vertical axis scale defaults and units are different.

Input Attenuation: Set up the RF front-end attenuator so that large signals can pass through the mixer with low distortion (low noise is allowed for small signal). The user can change the input attenuation value via the number keys, knobs, arrow keys, or touch panel menus.

Note

- When the maximum mixing level and reference level are determined, the minimum value of the instrument input attenuation satisfies the following formula: reference level≤ input attenuation - pre-amplification - 10dBm.

Preamplifier: Controls the switch of the preamplifier inside the instrument. Turn on the gain generated to compensate for the preamplifier, so that the amplitude value read out is the actual value of the input signal.

Bandwidth

Press the **[BW]** key to activate the Resolution Bandwidth (RBW) operation function and set the BW related parameters.

FFT Window Type: Sets the type of the FFT window function. There are two types of window functions to choose from: Hanning, Flat, Gaussian, Blackman, and Blackman-Harris. Users can choose the appropriate filter type for more realistic measurement needs. Please refer to the following table:

Window function	Features	Application
Hanning	Also known as the raised cosine window. The main lobes are widened and lowered, while the side lobes are significantly reduced, and from the point of view of reducing leakage, Hanning windows are better than rectangular windows. However, the widening of the main lobe of the Hanning window is equivalent to the widening of the analysis bandwidth and the decrease of frequency resolution. Compared with rectangular windows, it has reduced leakage, fluctuations, and improved selectivity.	If the test signal has multiple frequency components, the spectrum performance is very complex, and the purpose of the test is more concerned about the frequency point than the energy, you need to choose the Hanning window. If the signal to be measured is random or unknown, select Hanning Window.
Flat	Flat windows have very small passband fluctuations in the frequency domain.	Since there is a small error in the amplitude, this window can be used for

		calibration.
Gaussian	It is an exponential window. The main lobe is wide, and the frequency resolution is low. There are no negative side lobes, and the first side lobe is attenuated up to -55 dB. It is commonly used to truncate some non-periodic signals, such as exponentially attenuated signals.	For functions that attenuate exponentially over time, an exponential window can be used to improve the signal-to-noise ratio.
Blackman	The second order raised cosine window has a wide main lobe and a lower side lobe, but the equivalent noise bandwidth is a little larger than that of the Hanning window, and the fluctuation is a little smaller. The frequency recognition accuracy is the lowest, but the amplitude recognition accuracy is the highest, and it has better selectivity.	It is commonly used to detect two signals with similar frequencies and different amplitudes.
Blackman-Harris	The cosine window with four-term coefficients has a good sidelobe performance.	For precise amplitude recognition

Sweep (Sweep)

Press the [Sweep] key to enter the sweep settings menu and set the sweep parameters.

Sweep/Measure (Single/Continuous): Set the sweep mode to single or continuous, the default is continuous sweep, and there is a corresponding status corresponding to the selected mode at the top of the screen.

Continuous Sweep: The  on the screen indicates continuous. In continuous sweep mode, the system automatically sends a trigger initialization signal, and directly enters the trigger condition judgment step after each sweep.

Single Sweep: Set the current sweep mode to Single, and the  on the screen indicates a single sweep. When the current sweep is continuous, press the single key to enter a single sweep, the single key backlight is on, press the single key to enter a single sweep and perform a sweep measurement. When the current sweep is single, the sweep can only be started by pressing the single key.

Trace (Trace)

Press the [Trace] key to enter the trace setting menu and set various trace parameters for VSA measurement. The trace parameters of each trace window are independent of each other, and if you select a trace window, you can modify the trace parameters of the trace window under the trace menu.

Select Trace: Select the trace you want to use. A total of 4 traces are included (the displayed traces are arranged in different ways for different selected trace formats), and the selected traces are highlighted in the window, as shown in Figure 3-1 below.

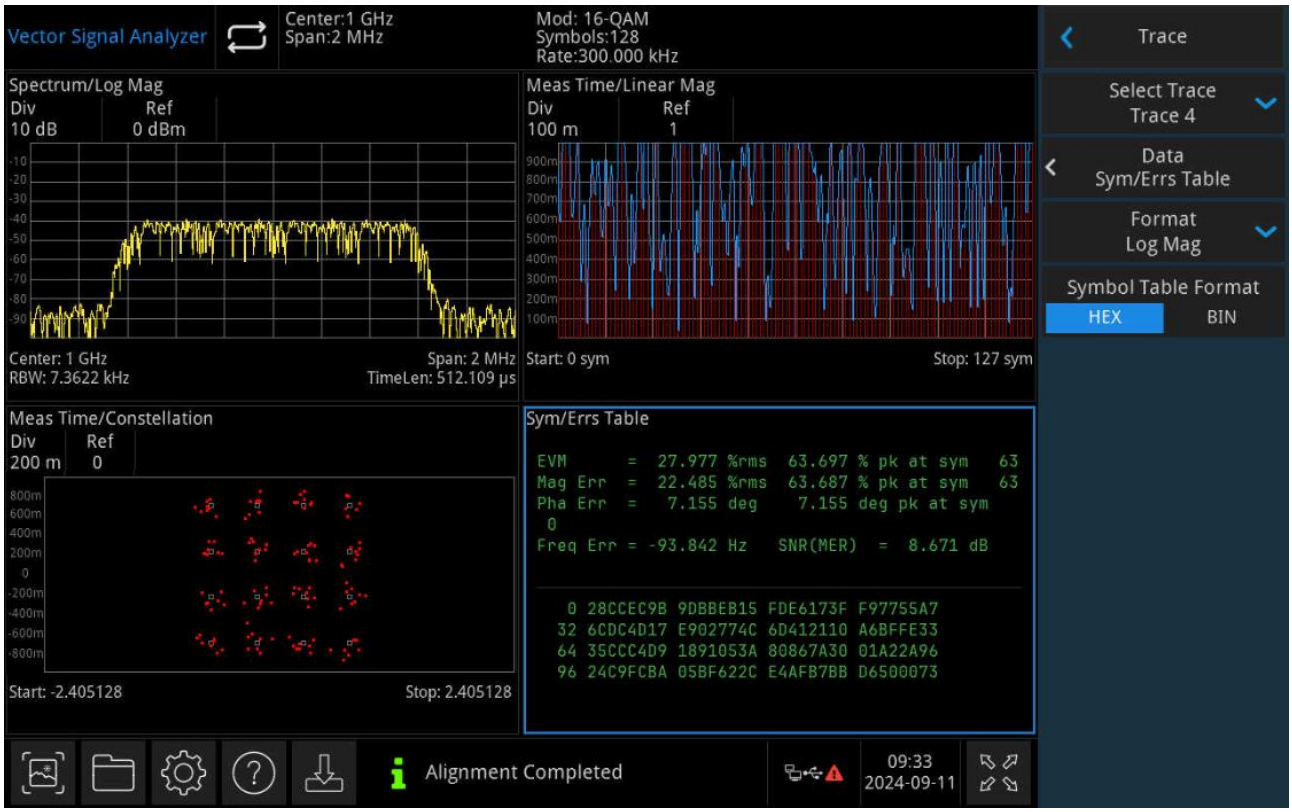

Figure 3-1 Select Trace

When the Select Trace menu is activated, you can select the appropriate trace sequence number and set the corresponding trace parameters. The currently displayed traces can be stored in the instrument's internal or external memory and loaded.

Data Source: Sets the data source for the selected trace. VSA measurements can produce a variety of results from a single sweep, which can be assigned to a trace and displayed.

1. **Capture Data**: Set the pre-demodulation data displayed by the selected trace to time domain and frequency domain. When the data source is selected, the "I-Q", "I-Eye Diagram", "Q-Eye Diagram", and "Constellation Diagram" in the trace format are grayed out.
2. **Measurement/Reference Data**: Set the demodulated data displayed by the selected trace as

measurement data time domain, measurement data frequency domain, reference data time domain, and reference data frequency domain.

3. **Demodulation Error Data**: Set the demodulation error data of the selected trace, error vector time domain, error vector frequency domain, IQ amplitude error, and IQ phase error.

   Error Vector Time Domain: Shows the vector difference between the IQ measurement time and the IQ reference time at each time point.

   Error Vector Frequency Domain: Shows the FFT operation results of the vector difference between the IQ measurement time and the IQ reference time at each time point.

   IQ Amplitude Error: Shows the amplitude difference between the IQ measurement signal and the reference signal at each time point.

   IQ Phase Error: Shows the phase difference between the IQ measurement signal and the reference signal at each time point.

4. **Error Summary**: Sets the selected trace window to display the corresponding error summary. If the selected demodulation types are different, different error results are displayed. When the data source is selected, each format in the Trace Format menu is grayed out.

The main information in the error summary is EVM (Error Vector Magnitude), Mag Error, Phase Error, symbol table, etc. EVM refers to the vector difference between the ideal reference signal and the measured signal at a given moment, this vector difference is called the error vector, which is a complex number, including both amplitude and phase, the smaller the EVM, the better the modulation quality of the signal. Mag Error in the time domain is calculated by comparing the amplitude of the IQ measurement signal with that of the IQ reference signal point-by-point. Phase Error trajectories in the Phase Error time domain are calculated by comparing the unfolded phase of the IQ measurement signal with that of the IQ reference signal point-by-point.

Trace Format: Set the display format of the selected trace, logarithmic amplitude, linear amplitude, real part, imaginary part, I-Q, constellation, Q-eye diagram, I-eye diagram.

If the data does not have a symbolic time defined, the constellation format is the same as the I-Q format, the eye diagram format is the same as the real or imaginary number format, and the grid format is the same as the unfolded phase.

1. **Logarithmic Amplitude**: The amplitude of the signal is displayed in units of decibel, which is displayed on the linear Y-axis in dB.

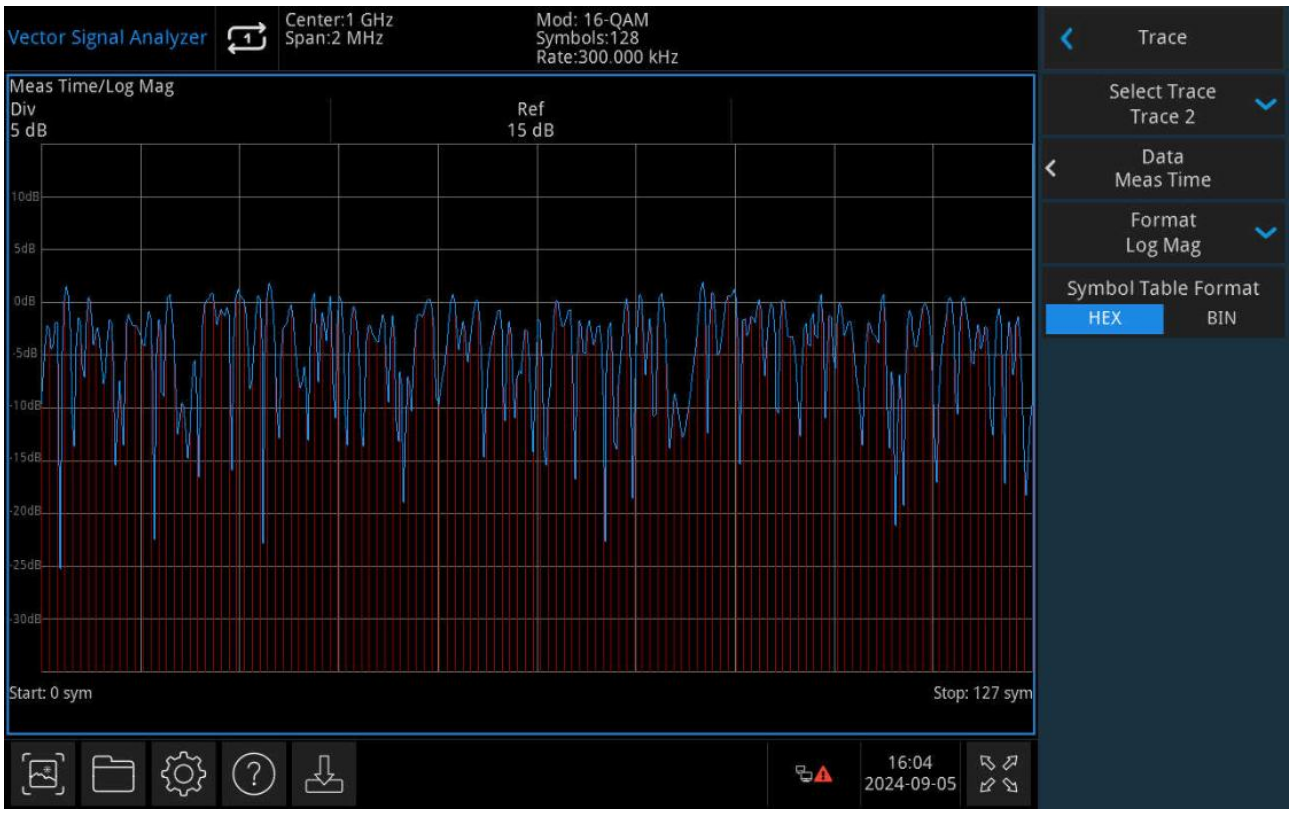

Figure 3-2 Logarithmic Amplitude Format

2. **Linear Amplitude**: The amplitude of the signal is displayed in linear units and is displayed on the linear Y axis.

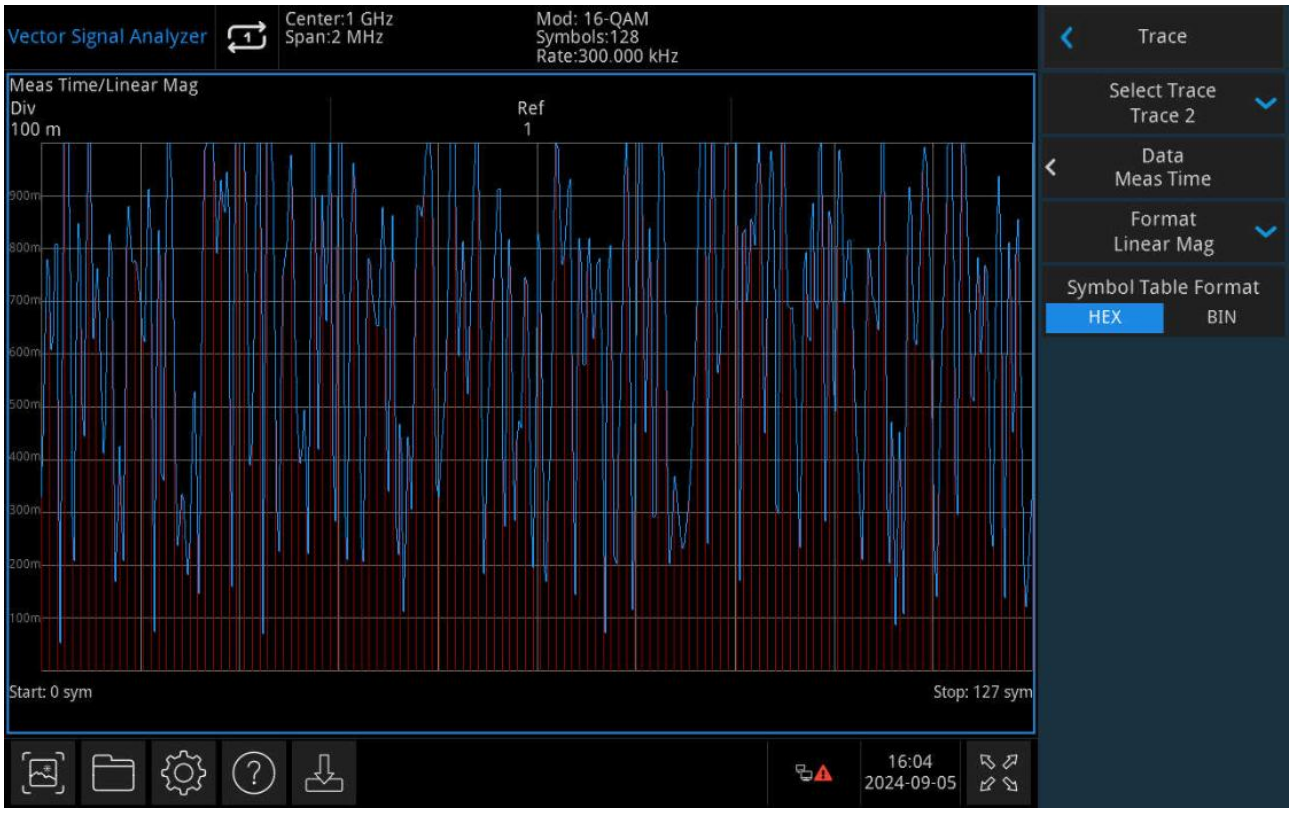

Figure 3-3 Linear Amplitude Format

3. **Real part**: Displays the real part of the signal, which is displayed on the linear Y-axis.

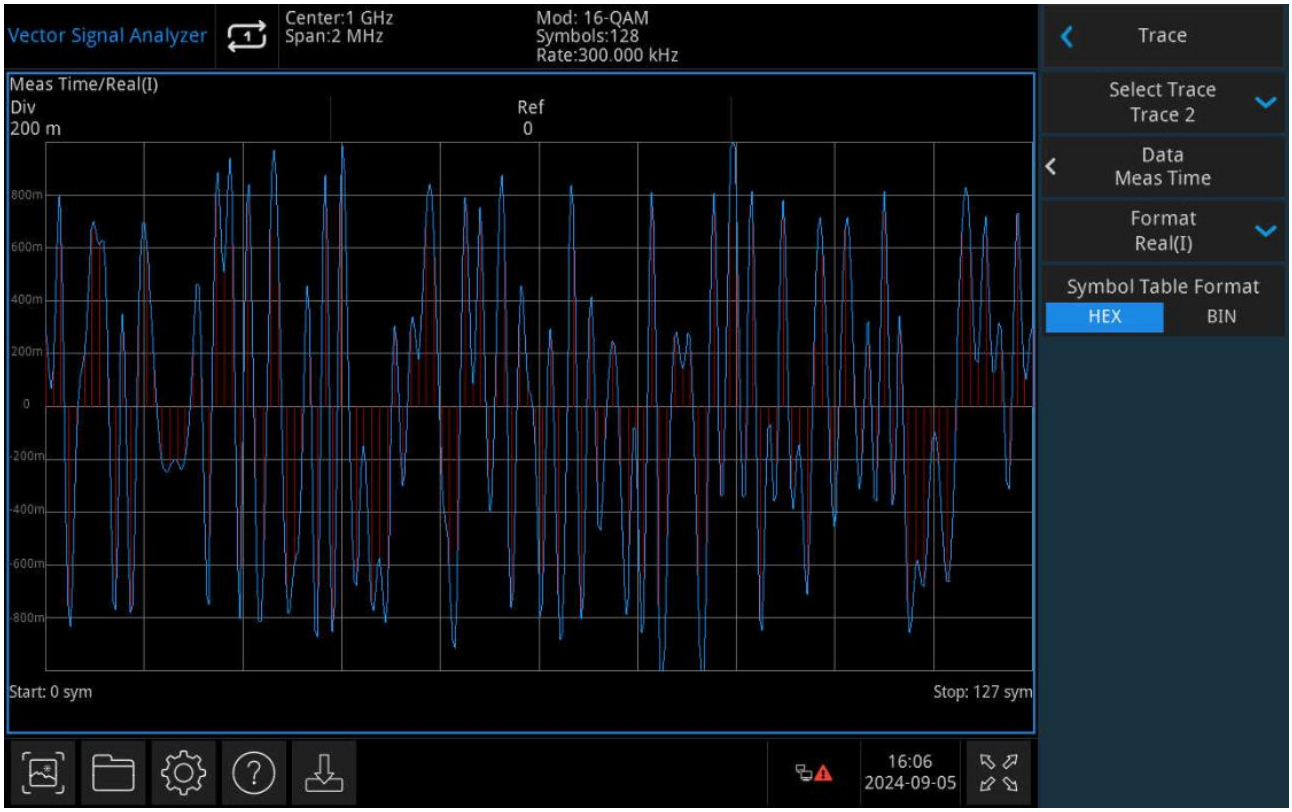

Figure 3-4 Real Part Format

4. **Imaginary part**: Displays the imaginary part of the signal, which is displayed on the linear Y-axis.

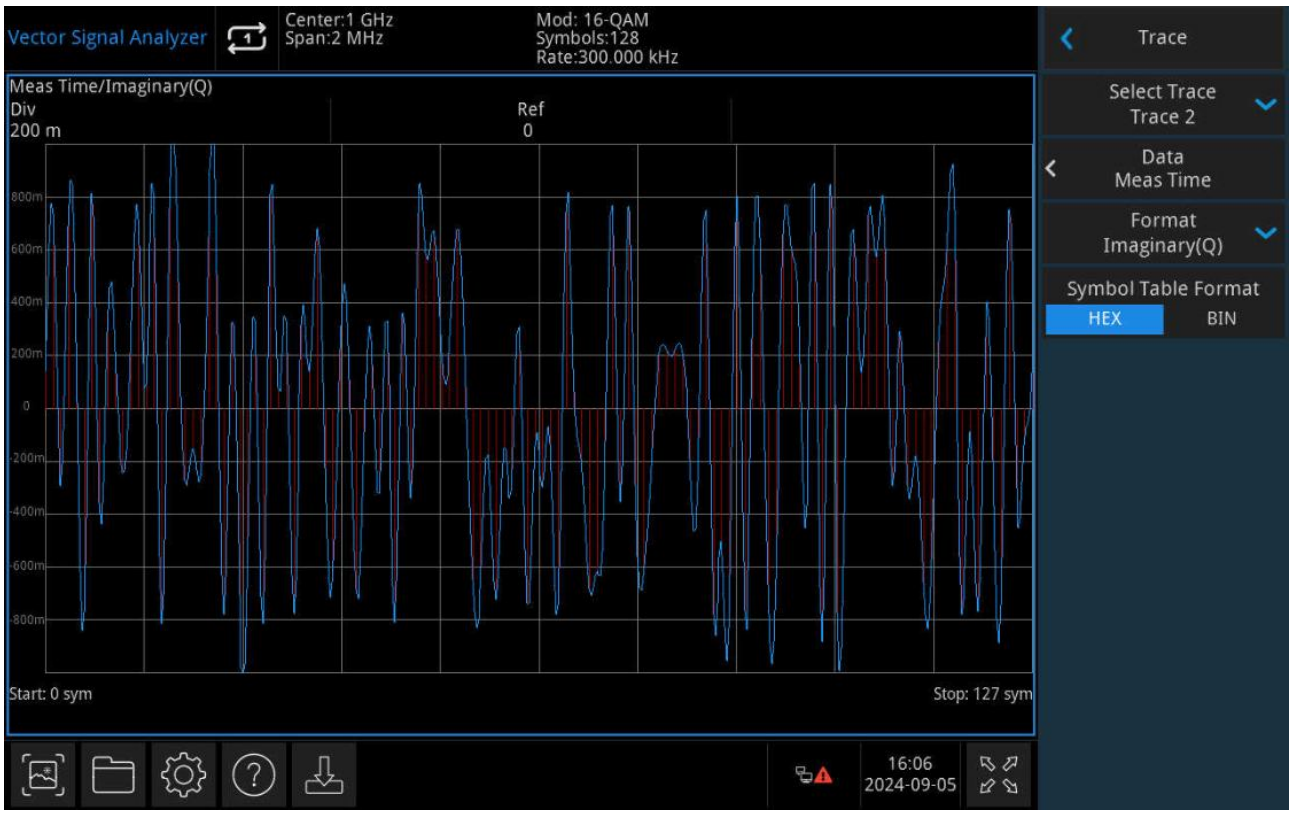

Figure 3-5 Imaginary Part Format

5. **I-Q**: The real part of the data is displayed on the X-axis, and the imaginary part of the data is displayed on the Y-axis. It shows the different states of the signal and the jumps of the signal as it moves between symbols. If the center point is connected to a symbol point on the diagram, the corresponding vector represents the instantaneous voltage at this moment.

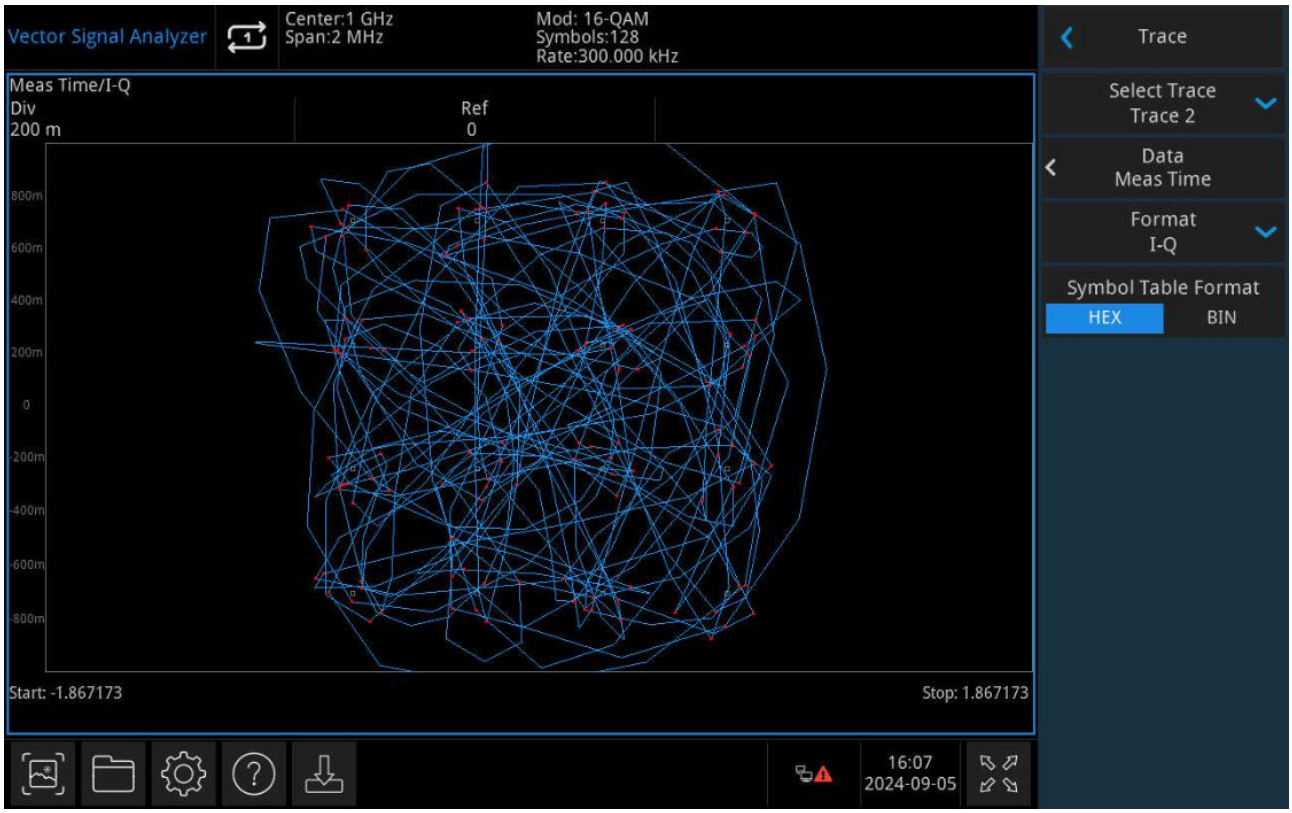

Figure 3-6 I-Q Format

6. **Constellation**: Like the I-Q display, the difference is that only the symbol points are displayed, and the jump trajectories between symbols are not displayed.

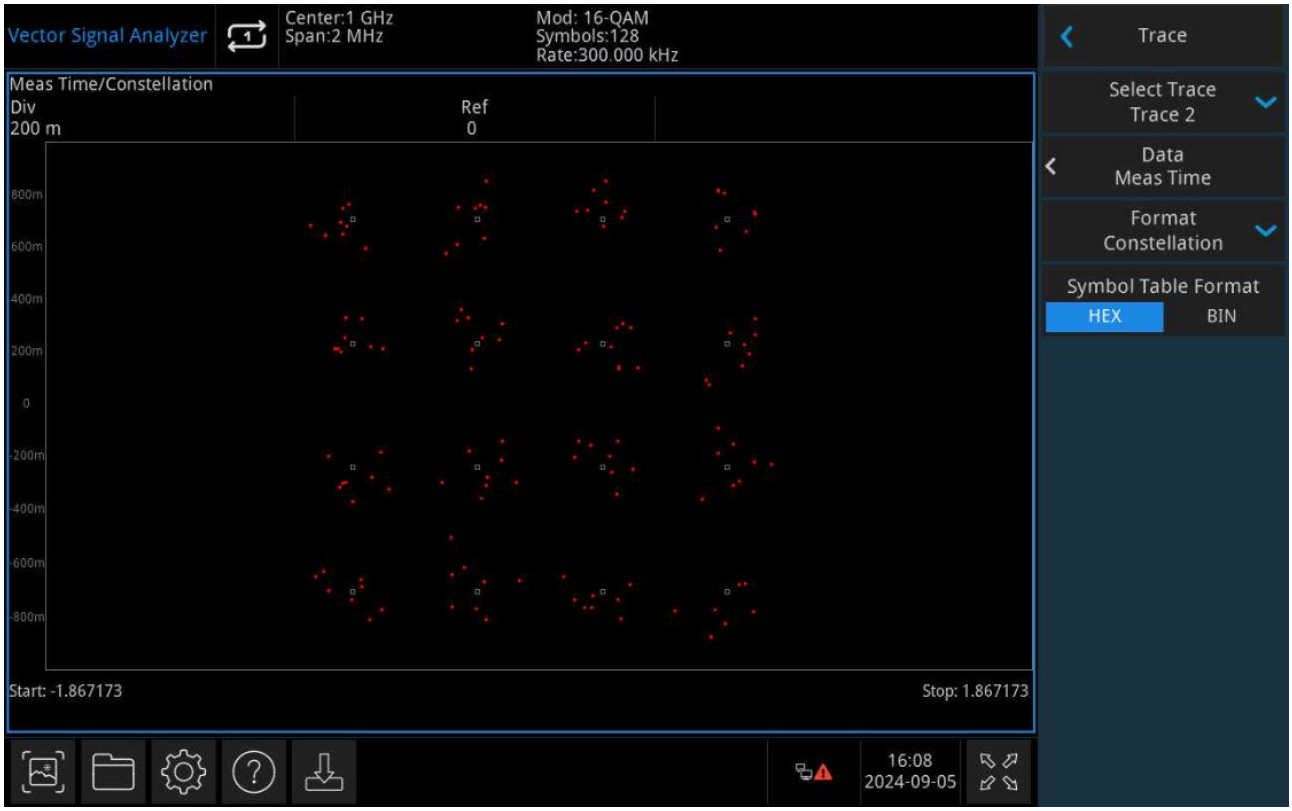

Figure 3-7: Constellation Diagram Format

7. **I-Eye Diagram**: Eye diagram of the in-phase channel. The real part of the data is represented as X-axis segments (divided into 2 symbol segments), and each segment is superimposed to represent the signal intersection on the symbol boundary.

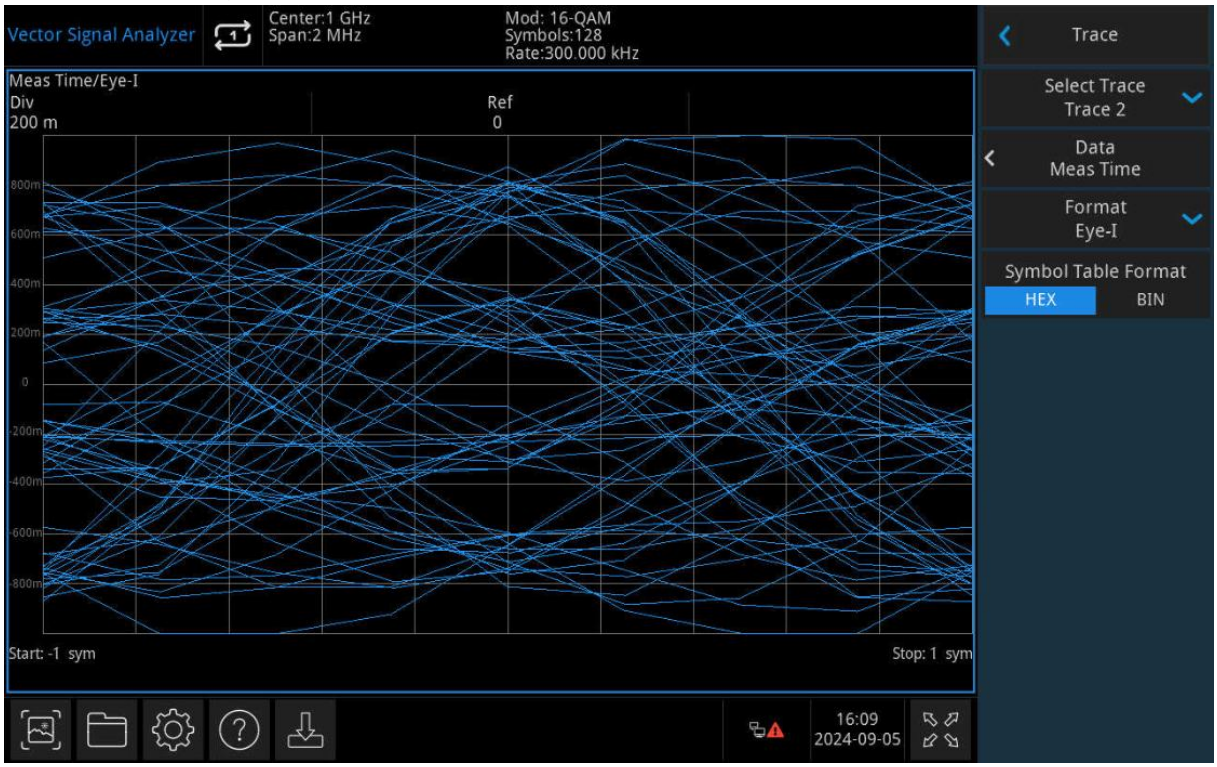

Figure 3-8 I-Eye Diagram Format

8. **Q-Eye Diagram**: The eye diagram of the quadrature channel. It is same as the I-Eye diagram, but the imaginary part of the data is shown.

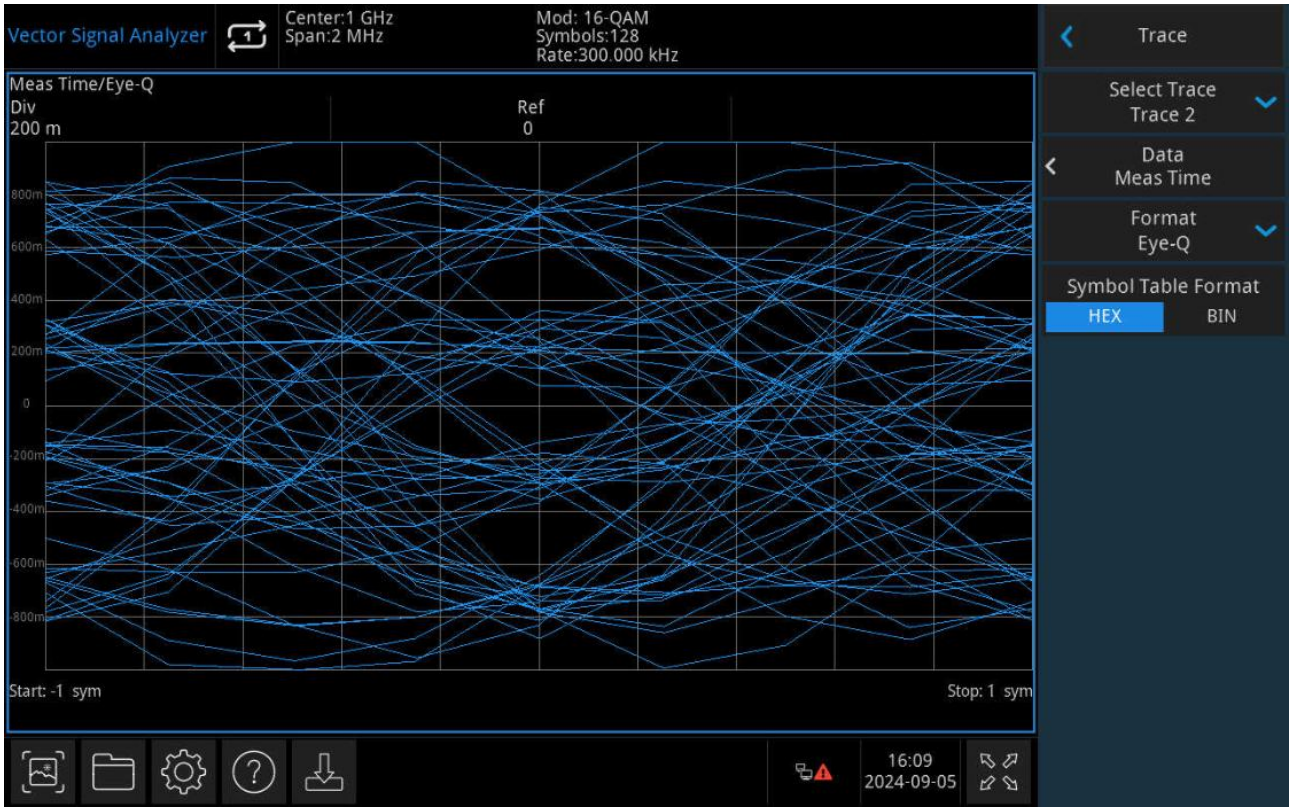

Figure 3-9 Q-Eye Diagram Format

Symbol Table Format: Set the format of the symbol data display. "Hexadecimal" or "binary" can be selected.

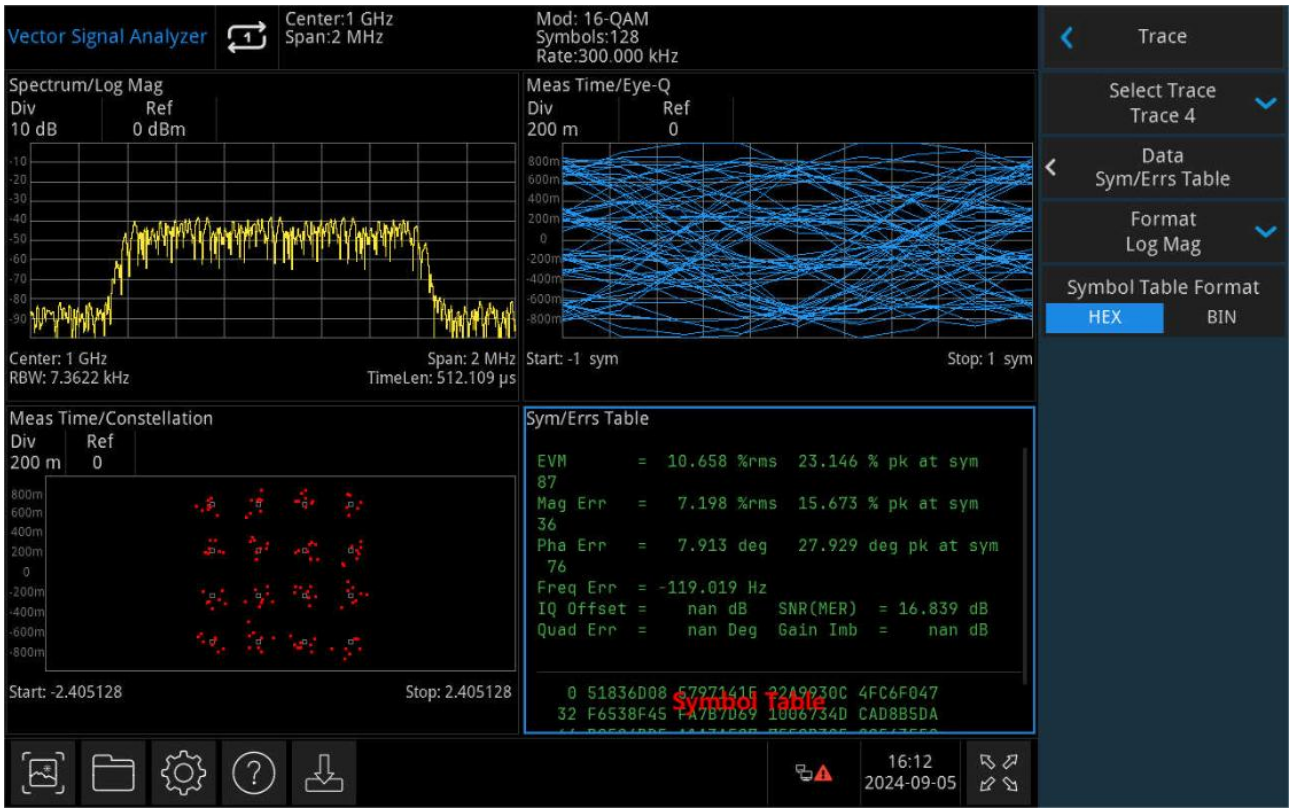

Figure 3-10 Symbol Table

Marker

Press the [Marker] key to access the panel menu of the marker function, which can be used to select the type and number of markers, as shown in Figure 3-11 below.

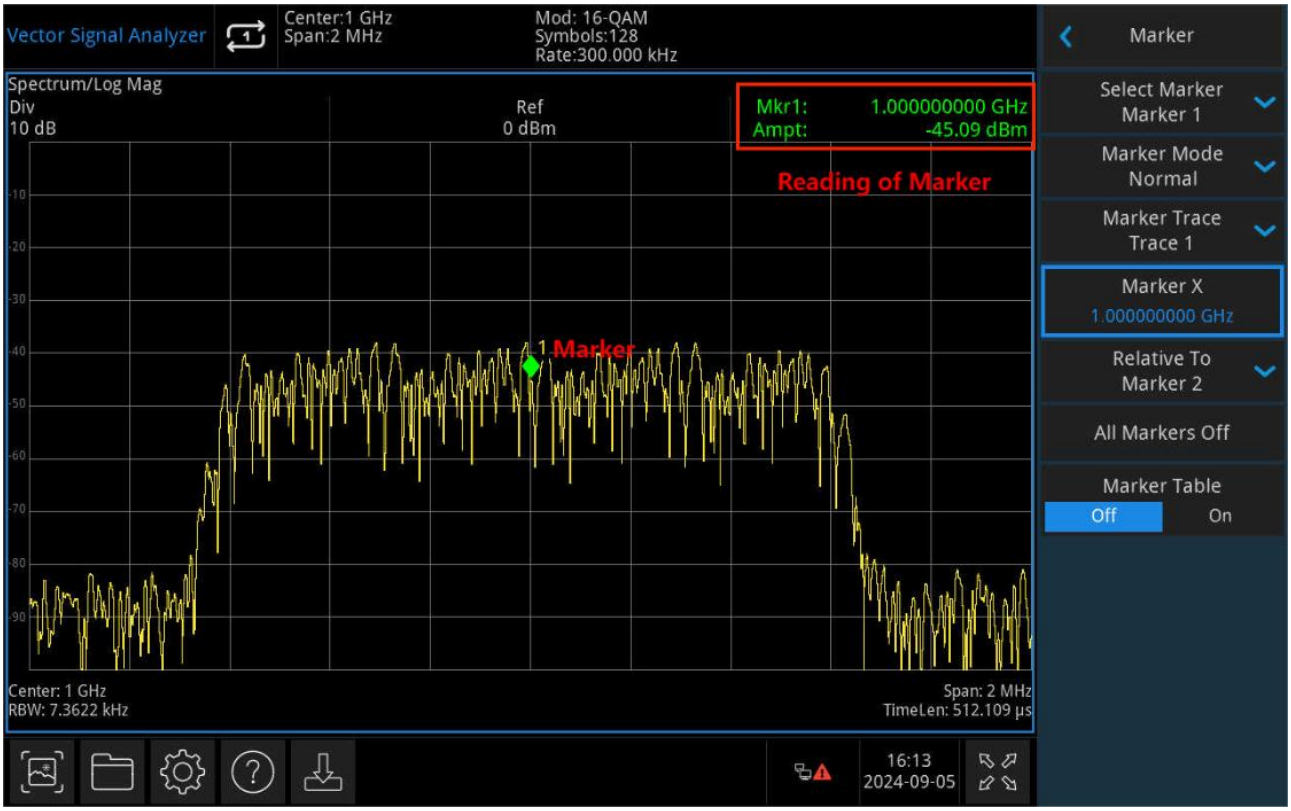

Figure 3-11 Marker

Select marker: The instrument provides a total of 6 cursors, and cursor 1 is turned on by default. After you select the cursor, you can set parameters such as the type of cursor, the marked trace, and so on. The currently open cursor will be marked on the trace selected by the Marker Trace, and the measurement results bar in the upper right corner of the screen will show the reading of the currently active cursor at the marker.

Marker types: Set the cursor types, including Normal, Difference Δ, Fixed, and Off.

1. Normal: Used to measure the X (frequency or time) and Y (amplitude) values of a certain point on the trace. After selecting "Normal", a cursor identified by the current cursor number will appear on the trace, such as "1". Please pay attention to the following points during use:
   If there is no currently active cursor, activates a cursor at the center frequency of the current trace.
   Displays the current cursor reading in the upper right corner of the screen.
   The resolution of the X-axis (time or frequency) reading is related to the sweep width, which can be reduced to obtain a higher reading resolution.

2. Difference Δ: Used to measure the difference between the "reference point" and the "point on the trace": X (frequency or time) and Y (amplitude) values. When you select Difference, a pair of cursors will appear on the trace: a reference cursor (marked with "×") and a difference cursor (marked with "Δ").

3. Fixed: When the Fixed cursor is selected, the X and Y values of the cursor are set directly or indirectly, and their positions remain the same, and the Y values do not change with the trace. The fixed cursor is used as a reference cursor for the difference cursor, and the fixed cursor is identified with a "×".

4. Off: Turn off the currently selected cursor, and the cursor information displayed on the screen and the cursor-related functions will also be turned off.

Mark Traces: Select the traces marked by the current cursor as: Trace 1, Trace 2, Trace 3, Trace 4.

Marker X: The frequency point or distance of the marker point on the trace. The user can change the frequency value via the number keys, knobs, arrow keys, or touch panel menus.

Relative: Used to measure the difference between two cursor difference points, which can be marked on different traces at the same time.

Close All: Close all marker points.

Marker List: Turns the marker list on or off.

When you open the marker list, all open cursors are displayed as a list in the lower window of the split screen. The display includes cursor number, marker mode, marker trace number, X-axis scale type, X-axis reading, and amplitude. The marker list allows you to view the measured values of multiple measurement points.

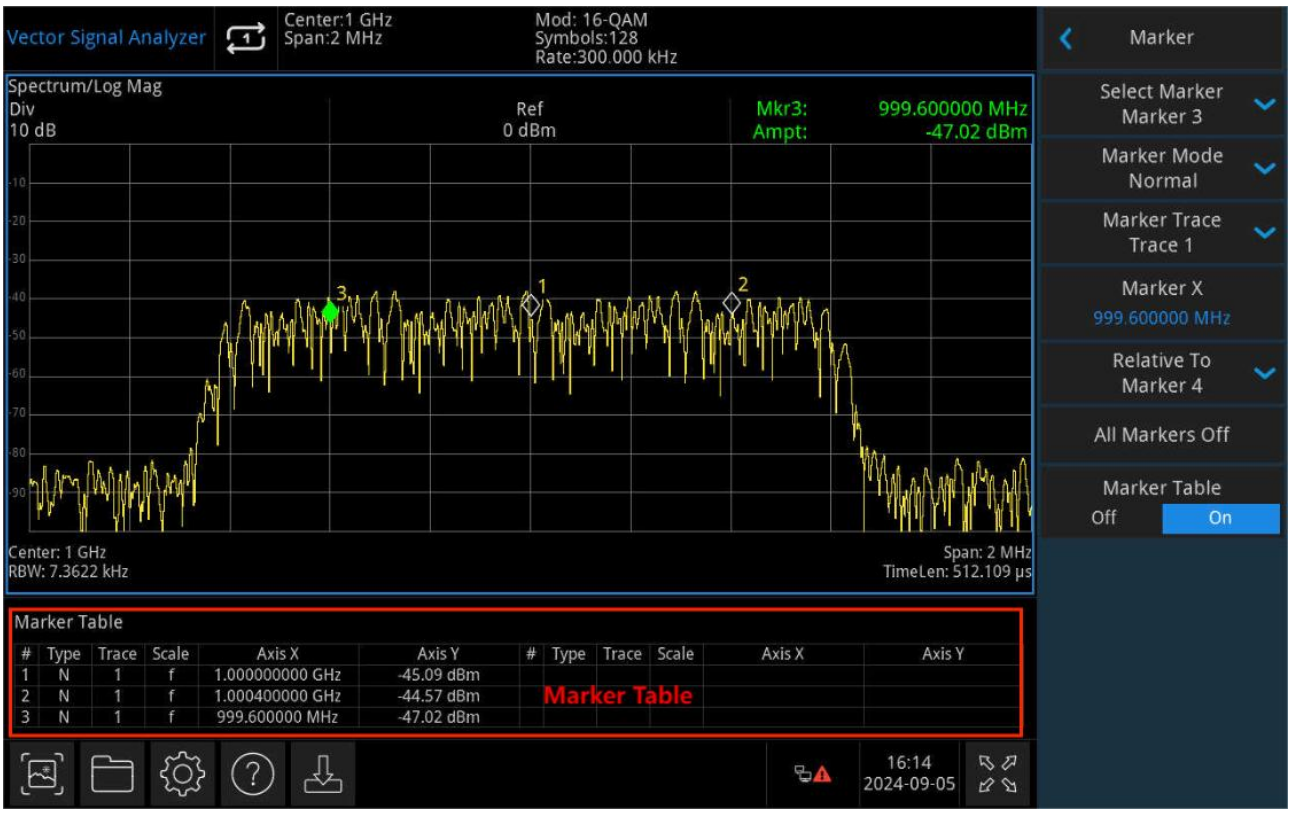

Figure 3-12 Marker List

Peak

Press the [Peak] key to open the settings menu of the peak search and perform the peak search function once.

Marker X: The frequency point or distance of the marker point on the trace. The user can change the frequency value via the number keys, knobs, arrow keys, or touch panel menus.

Peak Search: Search for the highest amplitude peak in the trace with normal marker mode and display its frequency and amplitude values, press to perform a peak search function once.

Next Peak: Finds the peak on the trace that is second only to the current peak in amplitude and satisfies the search criteria and marks it with a cursor. If there is no peak, the mark will not move.

Next Peak on Left: Finds the peak that is to the left of the current peak and is closest to it that satisfies the search criteria and marks it with the cursor.

Next Peak on Right: Finds the peak on the trace to the right of the current peak and is closest to it that satisfies the search criteria and marks it with the cursor.

Lowest Peak: Finds the smallest amplitude value on the trace and marks it with a cursor.

Peak-to-Peak Search: Perform both a peak search and a minimum value search, and mark them with a Difference cursor, where the peak search results are marked with a reference cursor and the minimum search results are marked with a difference cursor.

Meas

Press the **[Meas]** key to open the measurement selection menu, under which there is a measurement: digital demodulation, which is selected by default.

Meas/Setup

Press the [Meas Setup] key to open the setting measurement function and its corresponding parameter setting menu. These include Average/Hold Times, Modulation Type, Bit Rate, Measurement Length, Sampling Points/Symbols, Measurement Filter, Reference Filter, Filter Coefficient, Preset Standards, Burst/Synchronization, and Measurement Reset.

Average/Hold (On/Off): Press Average (On) to specify the average number of sweeps used to calculate the measurement results, the number of sweeps ranges from 1 to 10000. The user can change the average number of times through the number keys, knobs, arrow keys or touch panel menus. The average value of the measurement will be displayed after each sweep. Select (Off) to turn off this measurement average function.

Modulation Type: Provides digital demodulation measurement function. FSK, PSK, QAM, ASK and MSK can be set.

1. **FSK**: Including 2-FSK, 4-FSK, 8-FSK, and 16-FSK.
2. **PSK:** Including BPSK, QPSK, 8-PSK, DQPSK, Π/4 DQPSK, and Offset QPSK.
3. **QAM**: Including 16-QAM, 32-QAM, 64-QAM, 128-QAM, and 256-QAM.
4. **ASK**: Including 2-ASK, 4-ASK, 8-ASK, and 16-ASK.
5. **MSK**: Including MSK Type1 and MSK Type2.

Bitrate: Sets the symbol rate (symbols per second) of the analyzer's digital demodulator. Set this parameter to the symbol rate that matches the system.

In digital modulation, the rate of the symbol determines the rate (frequency) at which the symbol appears. A symbol can consist of one or more bits determined by the modulation format. For example, in the BPSK system, each symbol represents 1 bit; In the QPSK system, each symbol represents 2 digits.

The symbol is only valid at the timing moment when the receiver interprets the signal. This timing moment is called the detection-decision point.

The analyzer's demodulator uses the symbol rate to determine the frequency of the detection decision point. It is important to set the symbol rate to exactly match the symbol rate of the system,

as the symbol clock frequency is not estimated.

Note that the more complex the modulation format, the more precise the symbol rate. Specifying the wrong symbol rate will result in an error during demodulation.

The analyzer can accurately measure symbol rates that are smaller than the maximum span of the analyzer. In some cases, you want to set the symbol rate beyond what can be measured. The analyzer allows this but does not specify the accuracy.

If the symbol rate of the input is slightly different from the symbol rate of the signal, then the EVM (Error Vector Magnitude) is usually small at the center of the result length and increases linearly at the end of the result length.

The symbol rate determines the maximum frequency span (information bandwidth) that can be measured. For QAM and PSK signals, the symbol rate also determines the minimum frequency span to meet the published specification.

Measure Length: Allows you to set the number of symbols that will be analyzed by the demodulation. This value and the symbol rate set the total time recording length (in seconds) used by the demodulator. It also indirectly sets the resolution bandwidth for various spectral results. (RBW cannot be set independently.)

The resolution bandwidth, and duration are related to the following equation:

RBW = ENBW/T, where ENBW is the normalized effective noise bandwidth of the window,

For the premodulation spectrum results, T=1.2*(Meas Interval)/Symbol Rate,

For all other spectral results, T=Meas Interval/Symbol Rate.

Sample Points/Symbols: Sets the number of points to be displayed for each symbol in the time display of the demodulation data. The available values are 4, 8, 16, and 20.

Measurement Filter: Set the measurement filter type of the receiver, that is, the matching filter required for the demodulation of vector modulated signals, including "None", "Root Rising Cosine", "Gaussian", "Rectangle", and "User Defined".

Digital filtering is used in digital demodulation to limit bandwidth and reduce inter-symbol interference. The analyzer includes several commonly used filter types and can apply user-defined filters. The length of all filters is calculated as 20 symbols. If the filter alpha is < 0.2, the analyzer will use 40 symbols to calculate the length of the filter (for most formats).

The shape and width of the filter are defined by alpha (for cosine filters) or BT (for Gaussian filters). The shape and width of the cosine and Gaussian filter can be defined by modifying the alpha (cosine filter) or BT (Gaussian filter) parameters. Alpha or BT indicates the filter roll (or extra bandwidth) of

the selected filter, and this is because the filter technique cannot build a perfectly square (brick wall) filter that has an alpha value of 0 (no extra bandwidth). For example, a typical filter with an alpha value of 0.3 has a bandwidth 30% greater than the theoretical minimum.

The analyzer's digital demodulator generates two signals: a measurement signal and a reference signal. These signals are referred to as I/Q measurements and I/Q references, or, in the case of FSK measurements, FSK measurements and FSK references.

The measured signal is the signal generated after the waveform is demodulated. A reference signal is a signal that is generated after demodulating a signal when the signal is ideal (error-free).

Note that there are separate filters for the measurement signal and the reference signal. You must choose the right filter for both signals.

Filtering of various communication systems can occur on either the transmitter or the receiver; alternatively, filtering can be distributed between the transmitter and receiver. This is an important concept that influences the choice of filters for both the measured and reference signals. The analyzer's measurement filter represents the filtering in the system receiver, while the reference filter represents the filtering throughout the system. These two filters share the same alpha/BT. the following table shows some examples of filter selection:

Transmitter filters	Measurement filters	Reference filters
Root raised consine	Root raised consine	Raised consine
Raised consine	None	Raised consine
Gaussian	None	Gaussian
Any type	User defined	Any type

Reference Filter: Set the reference filter type to build filters that refer to digital modulated signals, including "Raised Cosine", "Root Raised Cosine", "Gaussian", "Rectangle", "Half Sine", and "User Defined".

The analyzer includes several commonly used filter types and can apply user-defined filters. The length of all filters is calculated as 20 symbols. If the filter alpha is < 0.2, the analyzer will use 40 symbols to calculate the length of the filter (for most formats).

The shape and width of the filter are defined by alpha (for cosine filters) or BT (for Gaussian filters). Alpha or BT indicates the filter roll (or extra bandwidth) of the selected filter, and this is because the filter technology cannot build a perfect square (brick wall) filter that has an alpha of 0 (no extra bandwidth). For example, a typical filter with an alpha value of 0.3 has a bandwidth 30% greater than the theoretical minimum.

Filter Coefficient: This parameter determines the characteristics of the raised cosine, root raised cosine, and Gaussian filters used by the instrument's digital demodulator. It is suitable for measurement filters and reference filters, and the value range of raised cosine and root raised cosine is [0.05,1], and the value range of Gaussian filter is [0.05,100].

Preset Standards: Select pre-set digital demodulation settings and sweep widths to measure a variety of standard digital communication formats. The preset standards include the following:

1. Cellular: Optional standards include GSM, NADC, WCDMA, PDC, PHP.
2. Wi-Fi: Optional standards include Bluetooth, WLAN, ZigBee 868, ZigBee 915, ZigBee 2450.
3. Other Standards: Including TETRA, DECT, APCO-25.

Burst/Synchronous: Sets the search parameters for the current measurement.

1. Burst Search Length: Set the duration of the burst search. This menu only works when the burst search feature is turned on.
2. Burst Search Offset: Set the length of the interference signal to be deleted after searching for the rising edge of the pulse, in units of symbol. This menu only works when the burst search feature is turned on.
3. Burst Search: Turn the burst search feature on or off.
4. Synchronous Search Length: Set the number of symbols to be analyzed during synchronous search. This menu only works when the synchronous search feature is turned on and burst search is turned off.
5. Synchronization Offset: Set the time between the start of the measurement data and the start of the synchronization word. If it is positive polarity, the synchronous characters will not start until the measurement data starts; In the case of negative polarity, the synchronous characters have started before the measurement data starts.
6. Mode: Set the bit mode of synchronous search. Press or click the "Sync Mode" menu to pop up the Sync Mode window.

   Enter a binary number of 1 or 0 in the Binary text box, and the corresponding hexadecimal number is displayed in the Hex text box. The Bits/Symbol text box displays the number of digits for each symbol in the currently selected modulation format. Tick the "Separate Symbol" checkbox to separate binary and hexadecimal data by spaces; when unchecked, binary and hexadecimal data are not separated.
7. Synchronous Search: Turn on or off the synchronous search function.

Measurement Reset: Resets the measurement/setting parameters of the current measurement mode to factory defaults.

Single

Press the [Single] key, the shortcut of sweep mode. See "Scanning/Measurement" in the Sweep section of Chapter 4 for specific instructions.

Default setting (Default)

Press the [Default] key to provide a convenient starting environment for measurements.

Press [Default] to reset > perform factory settings as follows:

1. Reset the VSA mode parameters of the signal analyzer.
2. Go to the frequency menu.
3. Set default values for certain environmental parameters.
4. Perform the test of the processor without affecting the correction data.
5. Clear the input and output caches and all trace data.

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

Menu	Parameter	Default value
Frequency	Center frequency	1 GHz
Frequency	Sweep width	1 MHz
Frequency	Center frequency step	100 kHz
Amplitude	Reference value	0 dBm
Amplitude	Scale	10 dB
Bandwidth	FFT type	Flat
Sweep	Sweep/Measurement	Continuous
Trace	Select trace	Trace 1
Trace	Data source	Trace 1 frequency domain, Trace 2 measurement data time domain, Trace 3 measurement data time domain, Trace 4 error summary.
Trace	Trace format	Trace 1 logarithmic amplitude, Trace 2 linear amplitude, Trace 3 constellation diagram
Marker	Select marker	Marker 1
Marker	Marker mode	Off
Marker	Marker trace	Trace 1
Marker	Marker X	0Hz
Measurement Setup	Average number of holds	100
Measurement Setup	Modulation type	16-QAM

Measurement Setup	Bitrate	64 kHz
Measurement Setup	Measurement length	64
Measurement Setup	Number of sample points/symbols	4
Measurement Setup	Measurement filter	Root raised cosine
Measurement Setup	Reference filter	Raised cosine
Measurement Setup	Filter coefficient	0.22

Note: The above table shows the reset parameters of UTS3000A.

System Setting (System)

Press the [System] key to enter the settings interface, where you can access the signal analyzer system information, basic settings, and network settings.

System Information: Enter the menu of the system information panel to view the basic information and option information.

1. Basic information: including product name, manufacturer, product model, serial number, software version number, IF hardware version number, RF hardware version number, IF logic version number, RF logic version number, etc.
2. Option information: You can check the version number and status of the option.

Setting: In the setting panel menu, you can make basic settings and network settings.

1. Basic settings

   Language settings: Chinese, English and German.

   Time format: 12 hours and 24 hours.

   Date/Time: Touch this area to pop up the setting box, swipe the number up and down to modify, touch "√" to confirm and close the setting box after the setting is completed.

   Image Format: Set the formats in which the screenshot is saved, including bmp, jpeg, and png.

   Power-on parameters: Set the system parameter settings to be loaded after power-on, there are default, last and preset for selection.

   Backlight: Slide the scroll bar to change the screen brightness.

   Volume: Slide the scroll bar to change the volume of the headphones and the amplifier.

   HDMI: High-definition multimedia interface, touch "□" and check the blank box, which means that the interface is open.

   Invert Screenshot: Set the inverted color processing of screenshot images.

   Preset file: Use the saved settings when powering up. When the power-on parameter is preset, the configuration file is used to set the parameters to power-on.

Shutdown Confirmation: After checking Shutdown Confirmation, the system will pop up a confirmation shutdown prompt box when you press the power key to shut down.

2. Network settings

Adapter: LAN switch. Touch "□" to check the blank box, which means that LAN is enabled.

DHCP: Touch "□" and select a blank box to automatically obtain the network configuration, and if it is not checked, it means that the network configuration is manually set.

IPV4 address: The format of the IP address is nnn.nnn.nnn.nnn, the first nnn ranges from 1 to 223, and the other three nnns range from 0 to 255, it is recommended to consult with the network administrator for an available IP address.

Subnet mask: The format of the subnet mask is nnn.nnn.nnn.nnn, where the range of nnn is 0 to 255, it is recommended to consult with the network administrator for an available subnet mask.

Gateway settings: The format of the gateway is nnn.nnn.nnn.nnn, the first NN ranges from 1 to 255, and the other three NNNs range from 0 to 255, it is recommended to consult with the network administrator for an available gateway address.

MAC address: physical address, used to confirm the location of network equipment address, also called hardware address, length is 48 bits (6 bytes), composed of hexadecimal numbers, divided into the first 24 bits and the last 24 bits, the format is xx-xx-xx-xx-xx-xx-xx, the first 24 bits are called the organization unique identifier, and the last 24 bits are assigned by the manufacturer itself, called the extended identifier.

3. Interface settings

Web Login Username: Set the username to log in to the browser. The web address is http://IP, in which the IP address is the IPv4 address set by the network, for example, http://192.168.20.117.

Web Login Password: Set the username to log in to the browser. After successful login, you can control the instrument, execute SCPI commands, network settings and other operations on the browser.

Once the web login username and password are set, the device can be remotely controlled using a web browser on a PC or mobile terminal, mimicking the touchscreen/mouse clickable display function, just like a physical instrument, and the operation is as follows:

(1) LAN access

The computer and the signal analyzer are required to be in the same LAN and can ping each other. View the signal analyzer's local IP via the Signal Analyzer System-Setting menu, and then access the signal analyzer by accessing the http://ip port in a browser.

Example:

Computer IP: 192.168.20.3

Signal Analyzer IP: 192.168.20.117

Use 192.168.20.117 to access the signal analyzer in the computer browser, view the basic information, and perform operations such as instrument control, network settings, password settings, and SCPI command control, as shown in Figure 3-13 below:

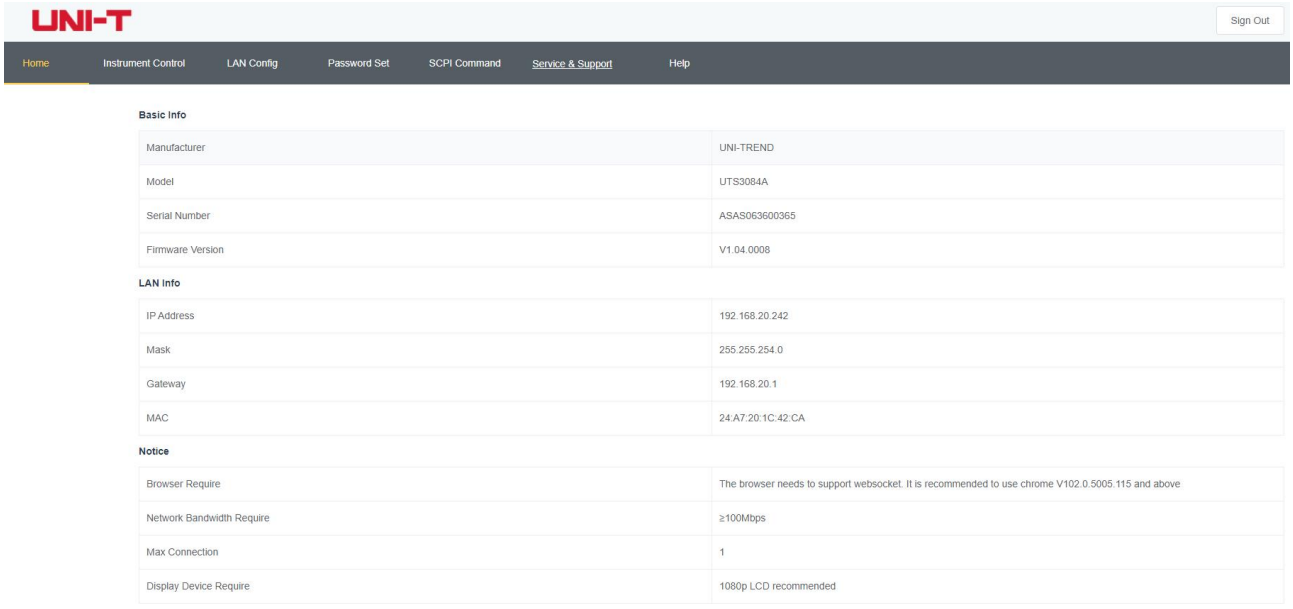

Figure 3-13 Web Basic Information

When viewing instrument control, network settings, password settings, and SCPI command control, you need to log in. For the username and password required to log in, see Web Login Username and Web Login Password in API settings. After logging in, view and control the signal analyzer, as shown in Figure 3-14 below:

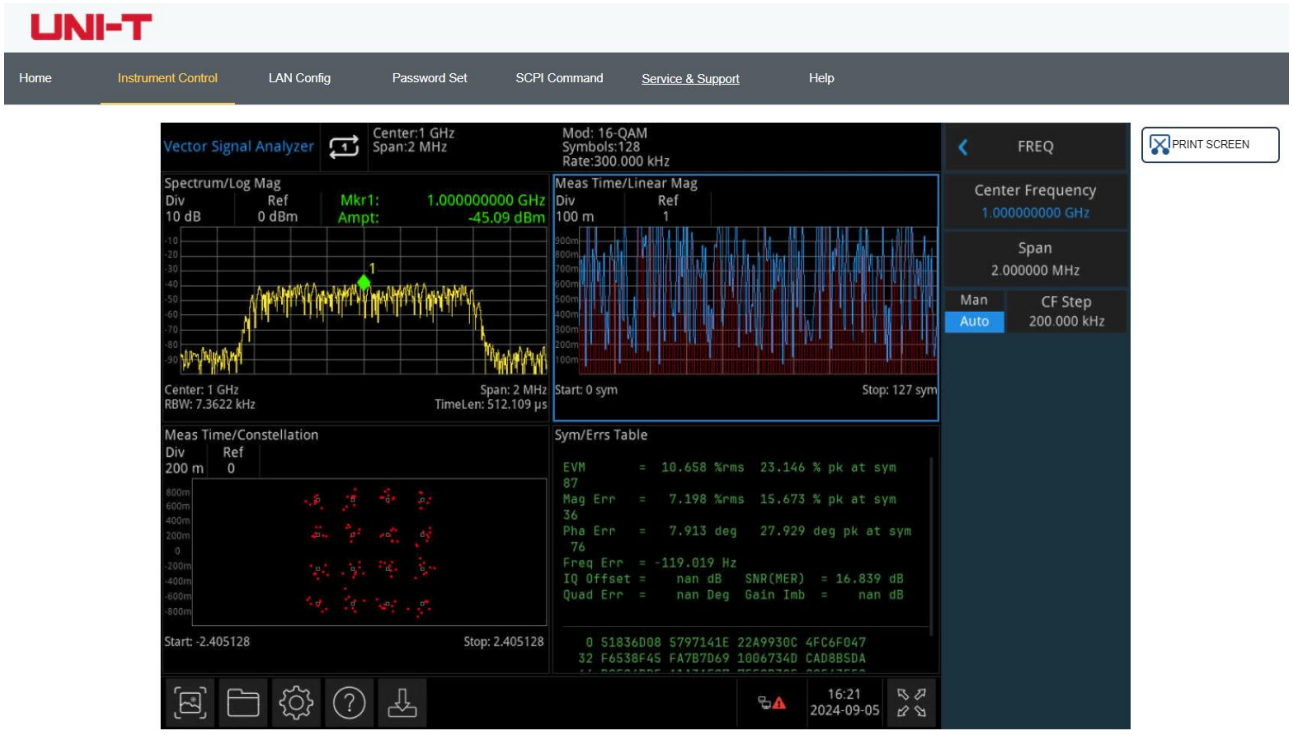

Figure 3-14 Web Instrument Control

Operations that can be performed on the touch screen of a physical instrument, such as selecting a menu panel, clicking function keys, entering numbers and characters, dragging a mark, etc. These operations can be performed on this Web page, and the screen can be printed.

(2) Extranet access

a. The signal analyzer is plugged into a network cable and the network is connected to the Internet.

b. Enable the FRP proxy service on the server.

c. Configure the Signal Analyzer FRP Proxy IP and Port.

d. Browser access proxy http://IP: web_port port to access the signal analyzer, the access interface is the same as the above.

Note: The analyzer uses FRP intranet penetration to achieve external network access, and the FRP version is 0.34.0. The analyzer has a frp-0.34.0 client, which needs to be used with a server, and the server needs to enable the frp server, and the frp server port connected to the client is 7000, so the server needs to be configured with bind_port = 7000.

(3) Network settings

Set and modify the network information of the signal analyzer and the FRP agent, as shown in Figure 3-15 below:

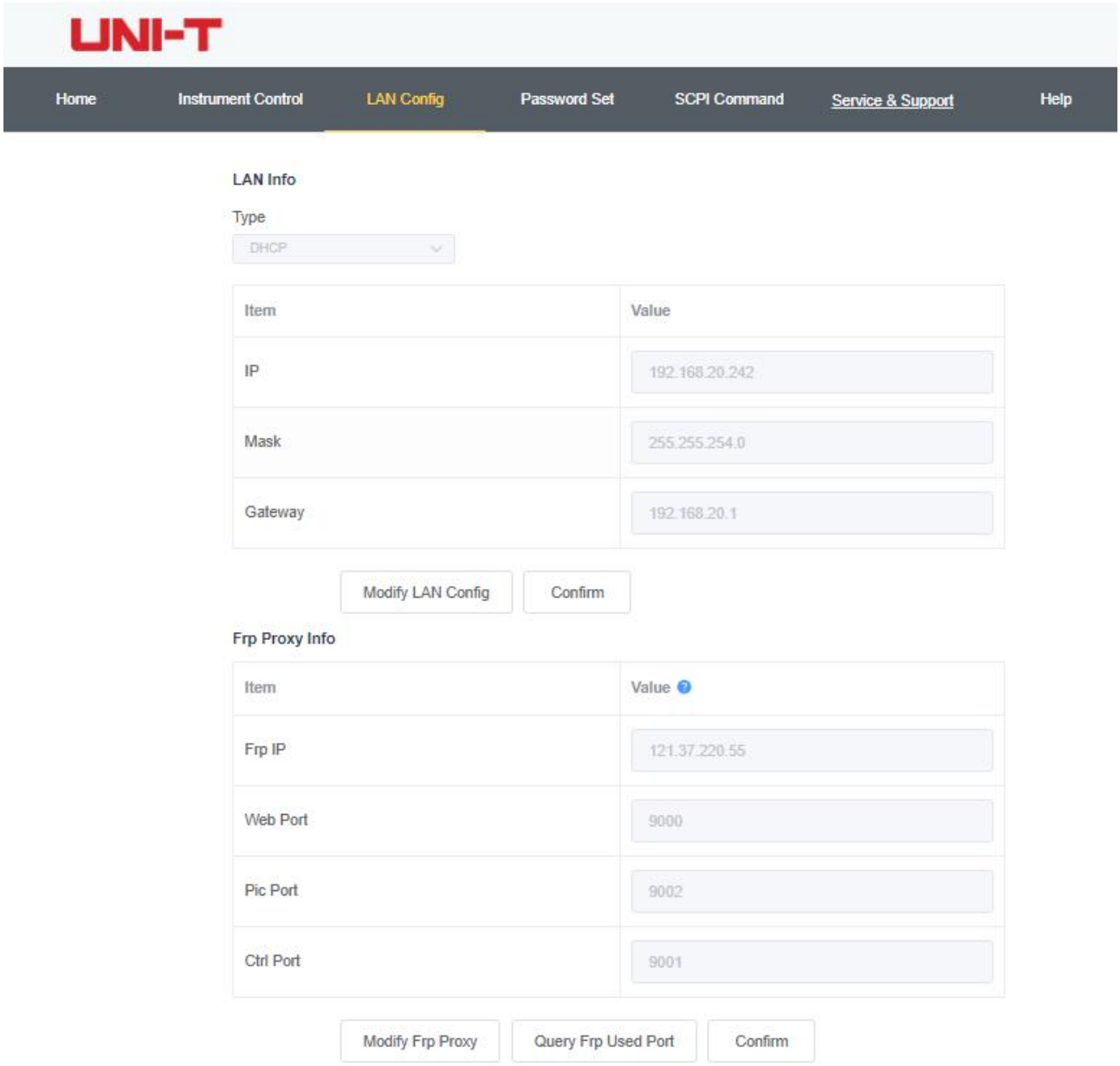

Figure 3-15 Web Network Setting

(4) Password setting

Set and modify the web login password of the signal analyzer, as shown in Figure 3-16 below. The original password can be view under: Physical Instrument >System->Setting-> Interface Setti

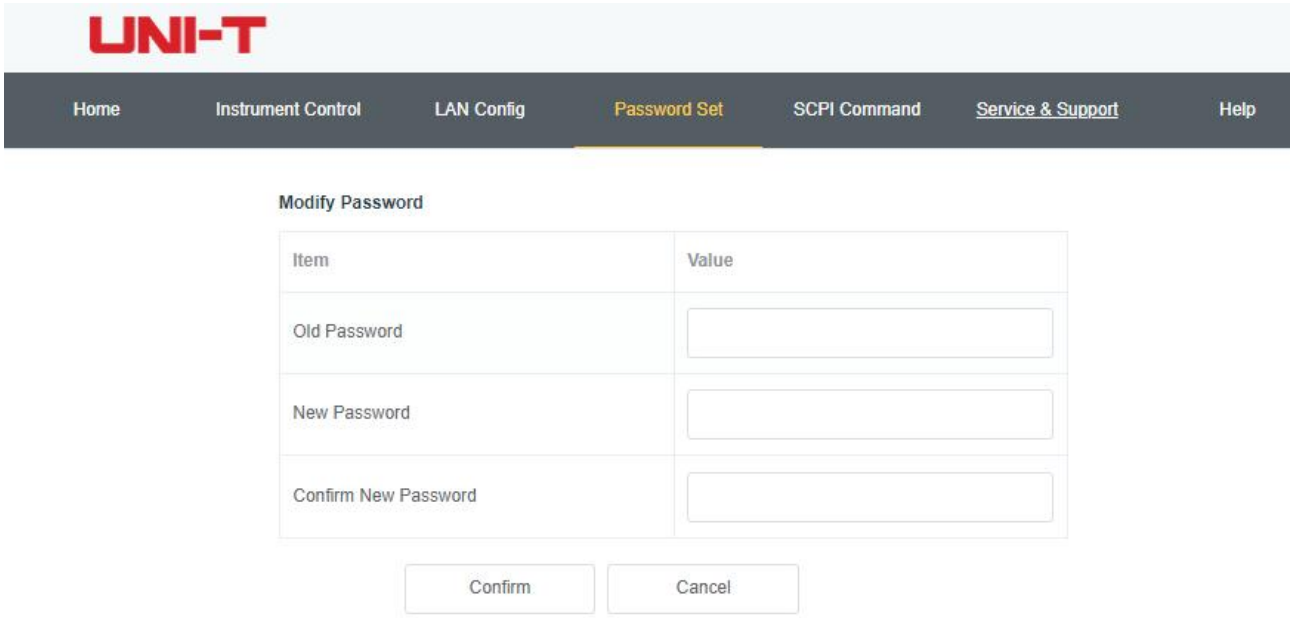

Figure 3-16 Web password setting

(5) SCPI command

Execute the SCPI command, as shown in Figure 3-17 below. Enter the command in the SCPI command edit box, click the "Send Command" key, and print the execution result to the report column below.

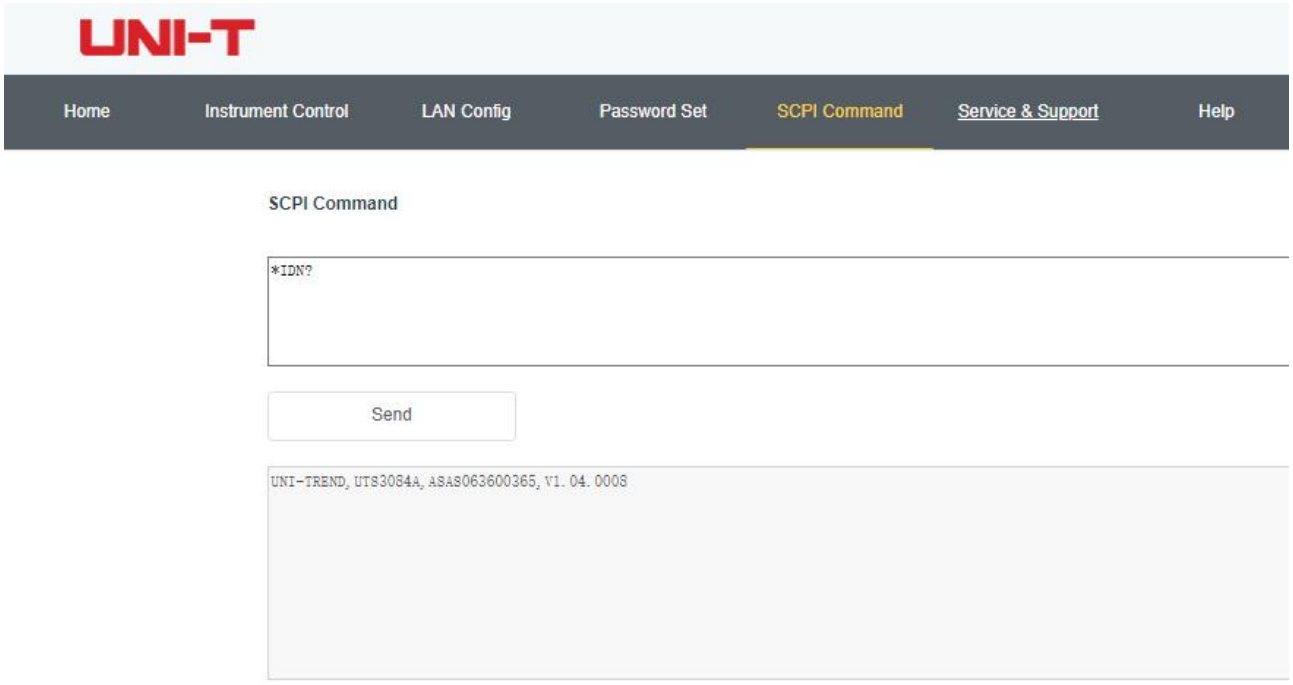

Figure 3-17 SCPI Command Contro

Restore Default: Enter the Restore Default panel menu to restore the operation.

1. Settings: Restore the system settings (restore the signal analyzer system settings to the default state).
2. Data: Clear the data (all the data saved by the signal analyzer are deleted).

3. All: Restore all settings (restore all settings of the signal analyzer to the default state and clear the user data).

File Storage (Save)

Press the **[Save]** key to enter the save interface, and the file types that can be saved by the instrument include Status.

Status: Press the status panel menu to enter the state saving menu. The status can be saved to the instrument.

1. Press the Export key to save the current state with either the default file name or the file name entered by the user.
2. After selecting the status file, press the import key to read the current state file.

Export: Exports the file of the current selected type.

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

Touch/Lock

Press the **[Touch/Lock]** key, the key turns green to indicate that the touch function is locked, and the light is off to indicate that the touch function is enabled. Press the **[Esc]** key to exit the lock screen.

Mode

Press the **[Mode]** key to open the Mode selection window, you can select: IQ analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis, vector network analysis, and phase noise analysis. If there are options that need to be activated separately, please go to the official website to download the required instructions.

Note

- This key is designed for UTS3000A series models. For UTS5000A series models, [Mode] and [Meas] are combined into one key, press the **[Mode/Meas]** key to open the Mode Select window. Various modes of operation can be selected: IQ analysis, EMI, analog demodulation, vector signal analysis, real-time spectrum analysis, vector network analysis, and phase noise analysis.
- For each working mode, you can select specific measurements. For spectrum analysis mode, channel power, time domain power, occupied bandwidth, third-order intermodulation, adjacent

channel power, spectrum monitoring, carrier-to-noise ratio and harmonic can be selected. For IQ analysis mode, complex spectrum and IQ waveform can be selected. For EMI mode, spectrum sweep can be selected. For analog demodulation mode, amplitude modulation, frequency modulation and phase modulation can be selected. For real-time spectrum analysis mode, spectrum & PvT can be selected. For vector network analysis mode, S11 and S12 can be selected.

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

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 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.