XSA800 Series Spectrum Analyzer
User Manual

■XSA805（TG）

■XSA810（TG）

■XSA815（TG）

For product support, visit:www.owon.com.hk/download

※： The illustrations, interface, icons and characters in the user manual may be slightly different from the actual product. Please refer to the actual product.

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General Warranty

We warrant that the product will be free from defects in materials and workmanship for a period of 3 years from the date of purchase of the product by the original purchaser from our company. The warranty period for accessories is 12 months. This warranty only applies to the original purchaser and is not transferable to a third party.

If the product proves defective during the warranty period, we will either repair the defective product without charge for parts and labour, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by our company for warranty work may be new or reconditioned like new. All replaced parts, modules and products become the property of our company.

To obtain service under this warranty, the customer must notify our company of the defect before the expiration of the warranty period. Customer shall be responsible for packaging and shipping the defective product to the designated service centre, a copy of the customer's proof of purchase is also required.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than our company representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of not our supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

Please contact the nearest Sales and Service Offices for services.

Excepting the after-sales services provided in this summary or the applicable warranty statements, we will not offer any guarantee for maintenance definitely declared or hinted, including but not limited to the implied guarantee for marketability and special-purpose acceptability. We should not take any responsibilities for any indirect, special or consequent damages.

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1. General Safety Requirements

Before use, please read the following safety precautions to avoid any possible bodily injury and to prevent this product or any other connected products from damage. To avoid any contingent danger, ensure this product is only used within the ranges specified.

- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Product Grounded.** This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminals.
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markings on this product. Refer to the user manual for more information about ratings before connecting to the instrument.
- **Use Proper Overvoltage Protection.** Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might expose to danger of electrical shock.
- **Do not operate without covers**. Do not operate the instrument with covers or panels removed.
- **Avoid exposed circuit**. Be careful when working on exposed circuitry to avoid risk of electric shock or other injury.
- **Do not operate if any damage.** If you suspect damage to the instrument, have it inspected by qualified service personnel before further use. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by qualified service personnel.
- **Use your Oscilloscope in a well-ventilated area.** Make sure the instrument installed with proper ventilation.
- **Do not operate in damp conditions.** In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

- **Do not operate in an explosive atmosphere.** In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.
- **Keep product surfaces clean and dry.** To avoid the influence of dust or moisture in air, please keep the surface of device clean and dry.
- **Electrostatic Prevention.** Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.
- **Protect the Input Terminals of Instrument.** Do not bend or hit the input terminals and the connected devices, (such as filter, attenuator, etc.) as such stress may cause damages to devices and the instrument. Do not mix the use of 50Ω and 75Ω connectors and/or cables.
- **Do Not Overload the Input.** To avoid damaging the instrument, the signals at input terminal must be less than 50V DC voltage components and 30 dBm (1 W) AC (RF) components.
- **Appropriate Use of Power Meter.** If you are not sure of the characteristics of signal under measure, follow these recommendations to ensure safe operations: if a RF power meter is available, use it to measure the power level of this signal first; or add a rated external attenuator between signal cable and input terminal of the instrument. Maximum attenuation, reference level and maximum span frequency should be selected, so as to make the signals displayed within the screen.
- **Know About the Specification Conditions of the Instrument.** For maximum performance of the instrument, use the analyzer under specified conditions.
- **Handling Safety.** Please handle with care during transportation to avoid damages to buttons, knob, interfaces and other parts on the panels.

2. Safety Terms and Symbols

Safety Terms

Terms in this manual (The following terms may appear in this manual):

WARNING
Warning indicates conditions or practices that could result in injury or loss of life.

CAUTION
Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the product (The following terms may appear on this product):

DANGER	Indicates an immediate hazard or injury possibility.
WARNING	Indicates a possible hazard or injury.
CAUTION	Indicates potential damage to the instrument or other property.

Safety Symbols

Symbols on the product (The following symbols may appear on the product):

Hazardous Voltage

Chassis Ground

Refer to Manual

3. Document Overview

- **Quick Start**

  This chapter states the matters need to attention before first power on, how to power on at first time, introduces spectrum analyzer's front/rear panel and user interface, explains how to use the instrument with a measurement example demonstration.

- **Menu interpretation**

  This chapter offers spectrum analyzer's front panel menu and button interpretation.

- **Specification Parameter**

  This chapter lists spectrum analyzer's specification parameter.

- **Trouble Shooting**

  This chapter helps to implement the troubleshooting and deal with after sale repair.

- **Appendix**

  This chapter introduces accessories of spectrum analyzer and how to maintain device.

Convention on button and menu key format:

Button: Button character + bold bracket, e.g. [FREQ]stands for FREQ button.

Menu key words+bracket, e.g.[Center frequency] stands for [FREQ]function's center frequency item, that is common called softkey menu item.

Related document:

Related documents including: Quick guide, User manual, programme guide and etc.

4. User Notice

This chapter states the matters need to attention before first power on, and how to power on at first time, introduces spectrum analyzer's front/rear panel and user interface, explains how to use the instrument with a measurement example demonstration.

4.1 General Inspection

When you receive your new instrument, it is recommended that you check the instrument following these steps:

1.Check for transportation damage.

If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away until the complete device and its accessories have been electrically and mechanically checked.

2.Check the Accessories

The supplied accessories are described in the "*Appendix A: Enclosure*" of this Manual. Please ensure that all the listed accessories are present and undamaged, if any problems are found please contact your distributor or our local office.

3.Check the Complete Instrument

If there is any physical damage, operational fault, or performance issue please contact your distributor or our local office. If there is any damage to the instrument please ensure you keep the original packaging. Ideally you should always keep the original packaging if the instrument must be returned for repair.

4.2 Safety Precaution before Operation

4.2.1 Check Power Supply

The analyzer is equipped with a three-wire power cord in accordance with international safety standards. The product must be grounded properly before being powered on, as floating or improper ground may cause damage to the instrument or personal injury.

Make sure the grounding conductor of the spectrum analyzer is grounded before turning on the instrument. After which the AC power cord can be connected. Do not use a non-ground power cord.

4.2.2 Allowed Variation Range of Supply Power Parameters

The spectrum analyzer is compatible with 100V~240V, 50Hz-60Hz AC power, Table 4-1 lists the power requirement to run the spectrum analyzer.

Table 4-1 Working Power Variation Range

Power Supply Parameter	Compatible Range
Voltage	100 - 240 VAC
Frequency	50 - 60 Hz ±10%
Power	28 W

To prevent or lower the risk of damage to the spectrum analyzer from power interference between instruments, especially from peak pulses produced by large power consumption instruments, a 220V/110V AC regulated power supply is recommended.

4.2.3 Power Cord Selection

The analyzer is equipped with a three-wire power cord in accordance with international safety standards. This cable grounds the analyzer cabinet when connected to an appropriate power line outlet. The cable must be rated greater than 250Vac and 2A.

WARNING

Improper grounding may cause damage to the instrument, or result in personal injury. Make sure the grounding conductor of the spectrum analyzer is grounded before turning on the instrument.

Always use a well-grounded power source. Do not use an external power cable, power cord or an auto transformer without grounded protection. If this product is to be powered via an external auto transformer for voltage reduction, ensure that its common terminal is connected to a neutral (earthed pole) of the power supply.

WARNING

Make sure the supply power is stable before turning on the analyzer to protect it from damage. Refer to "First Time to Power on" section 3.

4.2.4 Electro-static Discharge (ESD) Protection

ESD is an issue often ignored by users. Damage from ESD on the instrument is unlikely to occur immediately but will significantly reduce the reliability of it. Therefore, ESD precautions should be implemented in the work environment, and applied daily.

Generally, there are two steps to manage ESD protection:

1) Conductive table mats to connect hands via wrist bands

2) Conductive ground mat to connect feet via ankle straps

Implement both protection methods will provide a good level of anti-static protection. If used alone, the protection will not be as reliable. To ensure user's safety, anti-static components should offer at least 1MΩ isolation resistance.

WARNING
The above ESD protections measures cannot be used when working with over 500V!

Make good use of anti-static technology to protect components from damage:

1) Quickly ground the internal and external conductor of the coaxial cable before it is connected with the spectrum analyzer.

2) Staff must wear anti-static gloves before touching the connector cord or doing any assemble work.

3) Assure all the instruments are grounded properly to avoid static storage.

4.3 First Time to Power on

Connect the three-pin AC power cord into the instrument. Insert the plug into a power socket provided with a protective ground.

WARNING
Check the power source before turning on the spectrum analyzer, to protect the device from damage.

1) Press the power switch  on the bottom left of the front

panel.

2) Self-initialization takes about 30 seconds, after the boot screen the spectrum analyzer will default to the scanning curve.

3) After power on, let the spectrum analyzer warm up for 30 minutes for stabilization to obtain the most accurate results.

4.4 Front Panel

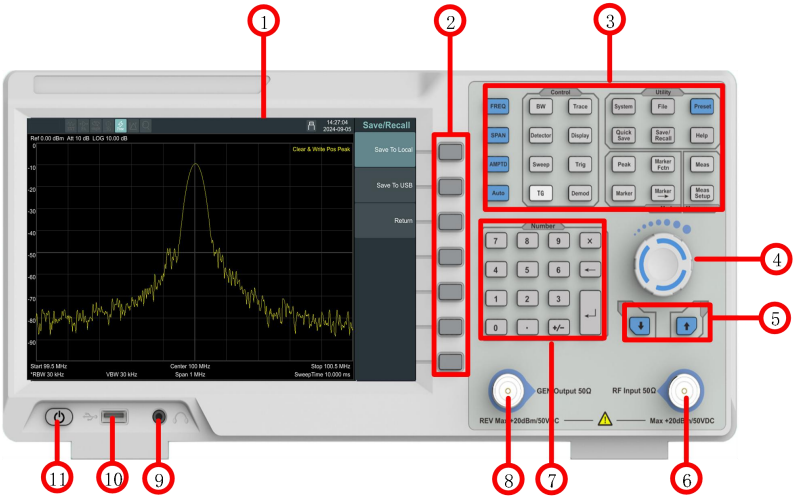

Figure 4-1 Front panel

Table 4-2 Front Panel Description

NO.	Description	NO.	Description
①	LCD	⑦	Numeric keypad
②	Menu softkeys	⑧	Tracking generator output connector
③	Function keys	⑨	Earphone interface
④	Knob	⑩	USB Host port
⑤	Arrow keys	⑪	Power key (Push to turn on, long push to turn off)
⑥	RF Input connector		

4.4.1 Front Panel Function Key

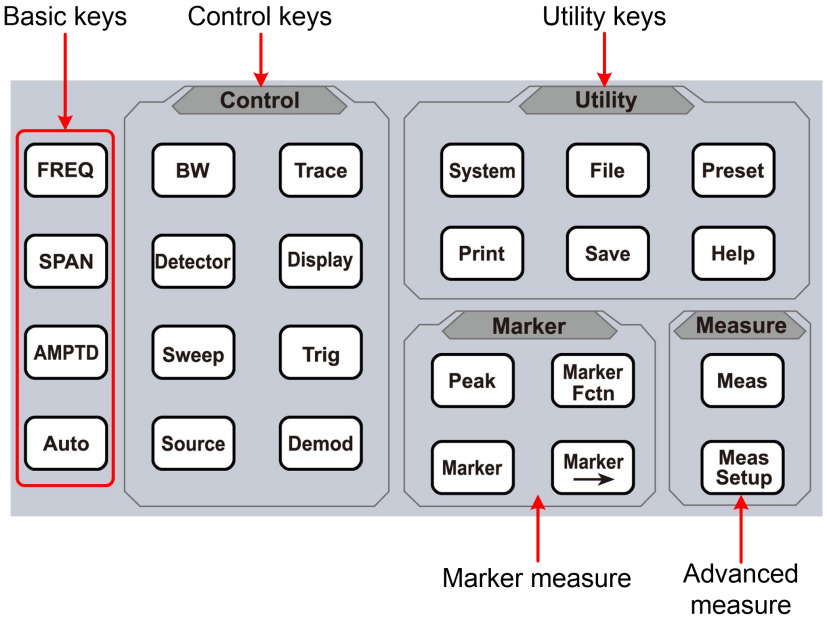

Figure 4-2 Function Keys

Table 4-3 Function Key Description

Keys	Description
Basic keys	
FREQ	Activate the center frequency function and set the frequency-related parameters, including center frequency, start frequency, stop frequency, frequency step, frequency offset, and frequency reference settings.
SPAN	Activate the frequency sweep width function, set the spectrum analyzer to center frequency sweep width mode, and configure the sweep width parameters. Also, set up common sweep width shortcuts, such as full sweep width, zero sweep width, and previous sweep width.

AMPTD	Activate the reference level function to pop up the soft menu for amplitude settings. Configure the spectrum analyzer's amplitude-related parameters, including reference level, attenuator, scale and units, and preamplifier. Note that the reference level and attenuator settings are interrelated.
AUTO	Auto-locate the signal across the full frequency range. Automatically search for the RF port input signal and center it on the screen, with the sweep width set to 1 MHz for quick signal measurement. Press the [Preset] button to exit auto-search.
Control keys	
BW	Activate the resolution bandwidth function and set the related parameters for the spectrum analyzer, including resolution bandwidth, video bandwidth, and other settings. These parameters are coupled with the sweep width, so it is generally recommended to use automatic coupling in typical measurement scenarios.
Trace	Set up the trace measurement and display modes, and perform mathematical operations on the related traces.
Detector	Set the detector mode.
Display	Set the screen display parameters.
Sweep	Set the system to single or continuous sweep mode. The user can also manually set the sweep time.
Trig	Set the trigger mode and corresponding parameters.
TG	Set the tracking generator.
Demod	Settings for audio demodulation and analog demodulation menus.

Marker measure keys	
Peak	Operate the peak markers, including parameters such as maximum value, minimum value, and left/right peaks for positioning and adjustment.
Marker	Read amplitude, frequency, or sweep time at various points on the trace using the cursor. Configure and operate frequency marker settings as needed.
Marker →	Use the current cursor values for quick adjustments to other relevant instrument parameters.
Marker Fctn	Special measurement functions of the cursor include frequency marker noise, frequency counting, and NdB bandwidth.
Advanced measure keys	
Meas	Expanded measurement functions on the spectrum analyzer platform include adjacent channel power measurement, channel power measurement, and occupied bandwidth measurement. For specific parameter settings, refer to the measurement setup menu.
Meas Setup	Advanced measurement parameter settings are used in conjunction with the measurement menu, providing configuration for the measurement parameters selected in the menu.
Utility keys	
System	System parameter settings and instrument calibration operation menu.
File	Browse, delete, and export stored files.
Preset	Restore the instrument measurement settings to factory defaults or user-defined states. Users can select factory default, user-defined, or last shutdown state via the [System] panel key → [Power On/Reset] → [Reset Parameters] submenu.

Quick Save	Quickly save screen captures, trace data, and user states.
Save/ Recall	Save or recall screen captures, trace data, and user states.
Help	Spectrum analyzer help menu: Click the key once to open the system help, and click again to close the help function.

4.4.2 Parameter Input

Specific parameter values are able to be entered using the numeric keypad, knob, and directional keys.

Numeric Keypad

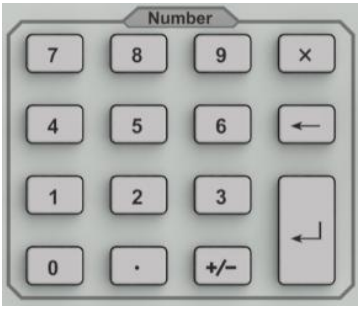

Figure 4- 3 Numeric Keypad

1. Numeric keys
   Numbers 0-9 are available to be used.
2. [·] Decimal point
   A decimal point "." will be inserted at the cursor position when this key is pressed.
3. [+/−] Sign key
   Sign key "+/-" is to toggle the sign of a parameter. When pressed the first time, a "-" will be inserted and changed into "+" following the second press.
4. [×] Cancel Key
   (1) During the editing process this key will clear the inputs in the active area and exit editing mode at the same time.
   (2) Turn off the display in the active area.
   (3) Exit current test mode while in keyboard test.
5. [←] Back Key
   (1) During the process of parameter editing, this key will

delete the characters on the left side of the cursor.

(2) While in the process of file name editing, pressing this key will delete characters that have been entered.

6. Enter

When pressed, the system will complete the input process and insert a default measurement unit for the parameter automatically.

Knob

Figure 4- 4 The knob

The knob function:

During parameter editing, turn the knob clockwise to increase, or counterclockwise to decrease the parameter values at specified steps.

Direction key

Figure 4- 5 Direction keys

The directional keys have following functions:

1) Increase or decrease the parameter value at specific steps while editing a parameter.
2) Move the cursor though the directory tree in the[File]function.

4.4.3 Front Panel Connector

1. USB Host

The analyzer may serve as a "host" device to connect to external USB devices. This interface is available for USB storage devices.

2. GEN Output 50Ω (tracking generator output 50Ω)

The output of the tracking generator can be connected to a receiver through an N type male connector, users can purchase this option if required.

CAUTION
Input voltage at RF input port must not be higher than 50 V DC to avoid damage to the attenuator and input mixer tracking generator.

3. RF Input 50Ω
The RF input may be connected to a device via a N type connector

CAUTION
When input attenuator is higher than 10 dB, the RF port input signal must be less than +30 dBm.

4.5 Rear Panel

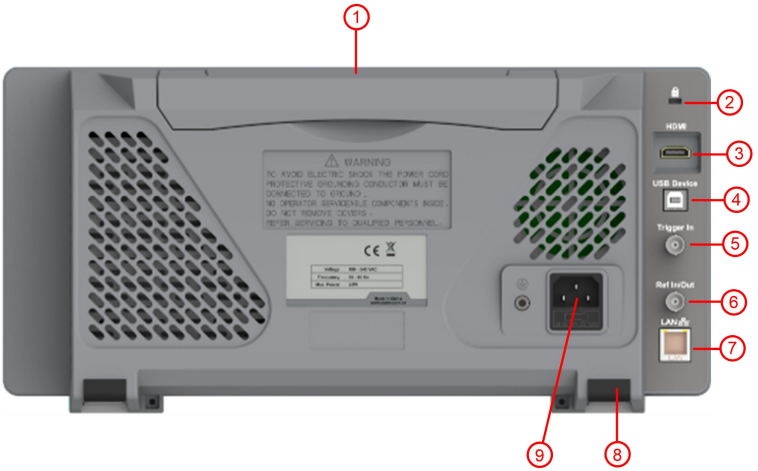

Figure 4- 6 Rear Panel

Table 4-4 Rear Panel Description

NO.	Name	Description
①	Handle	Stow the handle for mobile use.
②	Lock hole	You can lock the spectrum analyzer to a fixed location using the security lock (please buy it yourself) to secure the spectrum analyzer.
③	HDMI interface	HDMI output, connect an external monitor or projector.
④	USB Device interface	This configurable USB port permits external USB devices. It supports PictBridge printer and remote-control connection.
⑤	External trigger connector	Connect an external TTL signal.
⑥	10MHz IN/OUT	The BNC input or output of the 10 MHz reference clock
⑦	LAN interface	Through this interface, the analyzer can be connected to your local network for remote control.
⑧	Stool	To adjust the angle of the device
⑨	AC power connector	AC: frequency 50Hz±10%, single-phase alternative 220V±15% or 110V±15%

4.6 User Interface

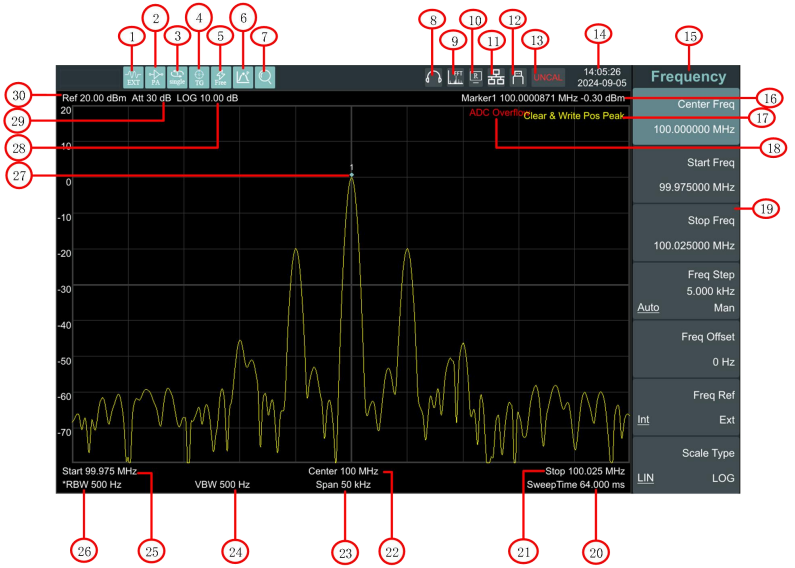

Figure 4- 7 User interface

Table 4- 5 User interface Description

NO.	Name	Description	Related Key
①	Reference frequency	Set the reference frequency as **Int** (internal) or **Ext** (external) input	**FREQ** → [Freq Ref]
②	Preamplifier	Turn on/off the preamplifier	**AMPTD**→ [Preamplifier]
③	Sweep status	Set the sweep status to **Single** or **Cont** (continuous)	[Sweep]→ [Sweep Single] or [Sweep Cont]
④	Tracking generator	Press to turn on/off the source output	[TG]→ [Track GEN]
⑤	Trigger type	Set the trigger type to **Auto**, **Video**, **Pos** (external positive edge), **Neg** (external negative edge)	[Trig]
⑥	Continuous peak search	Enable/Disable continuous peak search	[Peak]→ [Cont Peak]

⑦	Automatic search	Searching automatically	[Auto]
⑧	Audio demodulation	Turn on audio demodulation	[Mode]→ [Demod＞]
⑨	FFT mode	When RBW is set to less than 3kHz, automatically switch to FFT mode	
⑩	Remote control	Turn on remote control	
⑪	LAN access sign	LAN access sign	
⑫	USB storage device	Show if USB storage device is inserted;	
⑬	UNCAL sign	Measurement is not calibrated	
⑭	Date/Time	Display the date/time of system. Click to display the interface of date modification	[System]→ [Setting＞] →[Date/Time ＞]
⑮	Menu title	Function of current menu belongs to，Click to call the shortcut menu	
⑯	Marker readout	Display the frequency value (time during zero scan span) and amplitude value of current frequency standard. Display the frequency standard function of response when the frequency standard function can be enabled	[Marker]
⑰	Trace 1	Display the current type of trace 1 is refresh, and peak is detected positive	
⑱	Overflow sign	When the input signal exceeds the ADC range, this sign will appear	
⑲	Menu item	Menu item of current function	

⑳	Sweep Time	System sweep time	[Sweep]→ [Sweep Time]
㉑	Stop frequency	Display stop frequency	[FREQ]→ [Stop Freq]
㉒	Center frequency	Display center frequency	[FREQ]→ [Center Freq]
㉓	Span	Display span width	**[**SPAN**]**→[Span]
㉔	Video bandwidth	Display video bandwidth	[BW]→ [VBW]
㉕	Start frequency	Display start frequency	[FREQ]→ [Start Freq]
㉖	Resolution bandwidth	Display resolution bandwidth	[BW]→[RBW]
㉗	Marker	Display current activated marker	[Marker]
㉘	Amplitude Scale Type	**Log** (logarithmic) or **Line** (linear)	**AMPTD** → [Scale Type]
㉙	Attenuation	Display input attenuation setting	**AMPTD** → [Attenuation]
㉚	Reference level	Reference level	**AMPTD** → [Ref Level]

4.7 Build-in Help

The built-in help provides information that refers to every function key and menu key on the front panel. Users can view this help information if required.

1.How to acquire built-in help

Press Help; a prompt about how to obtain help information will be shown

2.Page up and down

If there is more than one page of information, you can read the complete information by using the directional keys.

3.Close the current help information

Press "Help" again to close help.

4.Acquire the menu help

A message about how to obtain help information will be shown, press the menu keys to get the corresponding help.

5.Acquire the help information of any function key

A message about how to obtain help information will be shown, press any function key to get the corresponding help.

4.8 Basic Measurement

Basic measurements include, input signal frequency and amplitude display, marked by a frequency marker. Follow these four simple steps below to implement input signal measurement.

Basic:

1. Setting center frequency;
2. Setting span and resolution bandwidth;
3. Activate marker;
4. Setting amplitude;

For example, to measure a 100MHz -10dBm signal, you must turn on the spectrum analyzer and ensure it is warmed up for 30 minutes to ensure measurement accuracy.

1. Equipment connection:

Connect the output terminal of signal generator to the **RF Input 50Ω** terminal of spectrum analyzer. Set the parameters as follows:

Frequency	100 MHz
Amplitude	-10 dBm

2. Setting parameters:

1) Press [Preset] to restore the analyzer to its factory-defined state. The Spectrum analyzer will display the spectrum from 9kHz to the maximum span width. The signal generated will display as a vertical line at 100MHz. Refer to Figure 4-8.

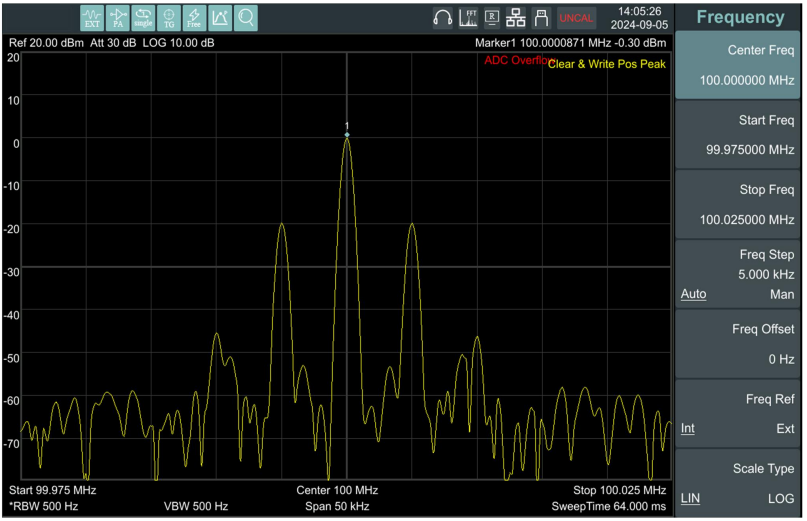

Figure 4- 8 Full Span

To clearly observe the signal, reduce the frequency span to 1 MHz and set the center frequency to 100MHz.

2) Setting Center Frequency

Press "FREQ", select [Center frequency] on corresponding pop up menu. Input "100" and select the unit as MHz on the numeric keypad. The keys can be used to set the exact value but the knob and directional keys can also be used to set the center frequency.

3) Setting Frequency Span

Press [SPAN], input "**1**" and select **MHz** as its unit using the numeric keypad; or press [↓] to decrease to 1MHz.

Press [BW], set [resolution bandwidth] to manual, and input "**30**" and select **kHz** as its unit using the numeric keypad; or press [↓]to decrease to 30kHz.

Press [Detector], set the detection type to positive peak.

Figure 4- 9 shows the signal at a higher resolution.

Please note that resolution bandwidth, video bandwidth and frequency span are self-adapted. They adjust to certain values according to frequency span. Sweep time can be self-adapted too.

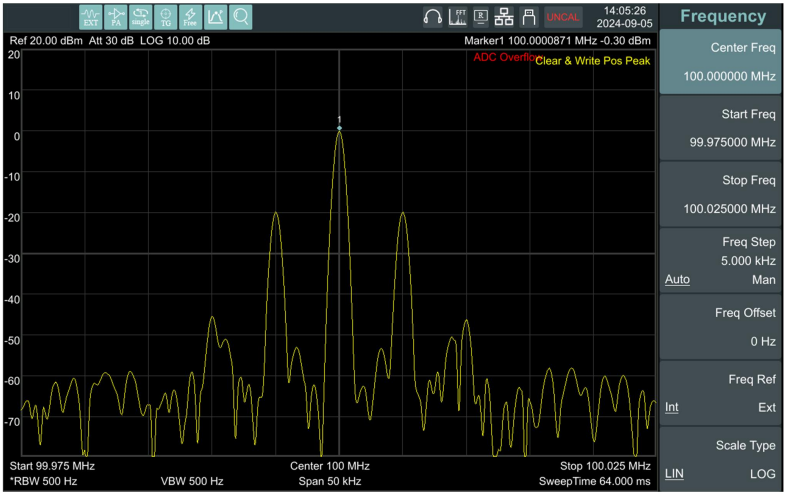

Figure 4-9 Set frequency span

4) Activate Marker

- Press[Marker]button in the function area. Press the softkey to select [Marker 1 2 3 4 5], select Marker 1, the marker is located at horizontal center by default, that is the signal peak point or its neighbor.
- Press Peak, and enter the next level menu, select [Max Search]. Frequency and amplitude values are read by the marker and shown on the top right of the display area.

5) Setting amplitude

The reference level will be shown at the top of the display grid. To get a better dynamic range, the real signal peak point should be located at or near the top of display grid (reference level). The reference level is also the maximum value on Y axis. Here we reduce to 10dB reference level to increase the dynamic range. Press [AMPTD], the amplitude setting menu will pop up, and the [reference level] soft key will be activated. The reference level can be input at the top left of the display grid. Input "-10" using the numeric keypad and set the unit to dBm. You can also use the [↓]key or the knob for adjustment.

The reference level is set at -10dBM, which is the signal peak value near the top of the grid. The balance between the signal peak value and noise is dynamic range.

5. Menu Interpretation

This section provides you with the information on using the front panel of the spectrum analyzer.

5.1 [FREQ]Frequency

The frequency range of a channel can be expressed by either of two groups of parameters: Start Frequency and Stop Frequency; or Center Frequency and Span. If any such parameter is changed, the others would be adjusted automatically in order to ensure the coupling relationship among them

$$f_{center} \quad (f_{stop} \quad f_{start}) / 2 \qquad (5\text{-}1)$$

$$f_{span} \quad f_{stop} \quad f_{start} \qquad (5\text{-}2)$$

f_{center}, f_{stop} , f_{start} and f_{span} denotes the center frequency, the stop frequency, the start frequency and the span respectively.

5.1.1 [Center Freq]

Sets the center frequency of the sweep. When pressed, the frequency mode is switched to Center Freq and Span in order to enter the desired parameter data.

Key Points:

- The start and stop frequencies vary with the center frequency when the span is constant.
- Changing the center frequency horizontally shifts the current sweep channel and the adjustment is limited by the specified frequency range.
- In Zero Span mode, the start frequency, stop frequency and center frequency are always equal. If one is changed the others are updated to match.
- You can modify this parameter using the numeric keys, knob, or direction keys.

5.1.2 [Start Freq]

Sets the start frequency of the sweep. When pressed, the frequency mode is switched to Start Freq and Stop Freq in order to enter the desired parameter data.

Key Points:

- The span and center frequency are changed automatically according to the start frequency. The change of the span would

have influence on other system parameters. For more details, please refer to "Span".

- In Zero Span mode, the start frequency, stop frequency and center frequency are always equal. If one is changed the others are updated to match.
- You can modify this parameter using the numeric keys, knob, or direction keys.
- If start freq is larger than stop freq when setting, then stop freq will increase automatically to the same value of start freq.

5.1.3 [Stop Freq]

Sets the stop frequency of the sweep. When pressed, the frequency mode is switched to Start Freq and Stop Freq in order to enter the desired parameter data.

Key Points:

- Modifying the stop frequency changes the span and center frequency, and the change of span influences other system parameters, see "Span".
- You can modify this parameter using the numeric keys, knob, or direction keys.
- If stop freq is larger than start freq when setting, then start freq will decrease automatically to the same value of stop freq.

5.1.4 [CF Step Auto Man]

Sets the step of center frequency. Changing the center frequency in a fixed step continuously switches the channel to be measured.

Key Points:

- The frequency step type could be "Manual" or "Auto". In Auto mode, the CF step is 1/10 of span if it is in Non-zero span mode or equals 25% of RBW while in Zero span mode; in Manual mode, you can set the step using the numeric, step keys or knob. Then activate [Center Frequency], press step, center frequency will change as setting step.
- After you set an appropriate frequency step and select center frequency, you can use using up and down direction keys to switch between measurement channels in a specified step in order to sweep the adjacent channels manually.
- You can modify this parameter using the numeric keys, knob, or direction keys.

Frequency step lends itself to detect the harmonic waves and bandwidths that are beyond the current span.
For example, for order of harmonic of a 300 MHz signal, you can use set both the center frequency and frequency step to 300 MHz, and press the up direction key continuously to increase the center frequency to 600MHz, that is secondary harmonic. Press frequency steps to increase center frequency by 300MHz, which reaches 900MHz. [CF Step Auto Man] shows the auto or manual mode to setting the steps. When step is under manual mode, press [CF Step Auto Man] to return to auto mode.

5.1.5 [Freq Offset]

You can set a frequency offset to displayed frequency value, including freq marker value. This movement won't influence sweep frequency range.
While this function activated (frequency offset isn't 0), you can modify this parameter using the numeric keys, knob or direction keys. `

5.1.6 [Freq Ref Int Ext]

Set the reference frequency as internal or external input, this is regarded as whole device reference.

5.2 [SPAN]

Set the spectrum analyzer to span mode. When press [SPAN], [Span],[Full Span],[Zero Span] and [Last Span] will be available to configure. You can modify span using the numeric keys, knob or direction keys. Use numeric key or [Zero Span] to clear span.

5.2.1 [Span]

Sets the frequency range of the sweep. When pressed, the frequency mode is switched to Center Freq/Span.
Key points:

- The start and stop frequencies are changed with the span automatically.
- In manual span mode, the span can be set down to 0 Hz, that is zero span mode. And up to the full span described in "Specification". When it is set to the maximum span, it enters full span mode.

- Modifying the span in non-zero span mode may cause an automatic change in both CF step and RBW if they were in Auto mode, and the change of RBW may influence VBW (in Auto VBW mode).
- In non-zero span mode, variation in the span, RBW or VBW would cause a change in sweep time.
- You can modify this parameter using the numeric keys, knob, or direction keys.

5.2.2 [Full Span]

Sets the spectrum analyzer to center frequency/sweep mode, and span of the analyzer to the maximum.

5.2.3 [Zero Span]

Sets the span of the analyzer to 0 Hz. Both the start and stop frequencies will equal the center frequency and the horizontal axis will denote time. The analyzer here is measuring the time domain characteristics of amplitude, located at the corresponding frequency point. This will help to observe the signal (especially for modulated signal) at time domain.

5.2.4 [Last Span]

Changes the span to the previous span setting.

5.3 [AMPTD]Amplitude

Sets the amplitude parameters of the analyzer. Through these parameters, signals under measurement can be displayed at an optimal view with minimum error. The pop out amplitude menu includes [Ref Level], [Attenuation Auto Manual], [Scale/Div], [Scale Type Lin Log], [Ref Offset], [Ref Unit>], and [Preamplifier On Off].

5.3.1 [Ref Level]

Activate reference level function and sets the maximum power or voltage for display window.

Key points:

- This value is affected by a combination of maximum mixing level, input attenuation, and preamplifier. When you adjust it, the input attenuation is adjusted under a constant max mixing level, meeting:

$L_{Ref} \quad a_{RF} \quad a_{PA} \quad L_{mix}$ (5-3)

L_{Ref}, a_{RF}, a_{PA} and L_{mix} denotes the reference level, the input attenuation, the preamplifier, and the max mixing level, respectively.

- You can modify this parameter using the numeric keys, knob, or direction keys.

Reference level located at the top of axis grid. Measurement near the reference level would gain better accuracy, but input signal amplitude should not exceed the reference level; if it exceeds, the signal will be compressed and distorted, result in wrong measurement. Analyzer's input attenuation is related with reference level, it can self-adjust to avoid signal compression. Minimum reference level is -80dBm at Log scale under 0dB attenuation.

5.3.2 [Attenuation Auto Man]

Sets the front attenuator of the RF input in order to permit big signals (or small signals) to pass from the mixer with low distortion (or low noise). It only works under internal mixer mode to adjust input attenuator insider analyzer. In Auto mode, input attenuator is related with reference level.

Key points:

- When the preamplifier is On, the input attenuation could be set up to 40 dB. You can adjust the reference level to ensure that the specified parameters meet the requirement.
- Modifying the reference level may cause an automatic change in attenuation value; But the change of attenuation value won't influence reference level.
- You can modify this parameter using the numeric keys, knob, or direction keys.

Attenuator adjustment is to make the maximum signal amplitude pass from mixer less than or equal to -10dBm. E.g. if the reference level is +12dBm, the attenuator value is 22dB, then the input level in mixer is -18dBm (12-22-8=-18), its mainly purpose is to avoid signal compression. Switch [Input Atten Auto Manual] to manual mode, adjust the attenuator manually. The highlight under auto or manual stands for auto coupling and manual coupling. When attenuator is under manual mode, press [Input Atten Auto Manual] will match the attenuator and reference level again.

Note: Maximum input signal amplitude of input attenuator (10dB input attenuation at least) is +30dBm, higher power signal will damage input attenuator or mixer.

5.3.3 [Scale/Div]

Sets the logarithmic units per vertical grid division on the display. Select 1,2,5 or 10dB log amplitude scale. It's 10dB/div by default. Every activated marker is with dB as unit, difference between two markers is treated as marker difference under dB unit.

Key points:

- By changing the scale, the displayed amplitude range is adjusted.
- The amplitude that can be displayed is from reference level minus 10 times the current scale value to the reference level.
- You can modify this parameter using the numeric keys, knob, or direction keys.

5.3.4 [Scale Type Lin Log]

Sets the Scale Type of Y-axis to Lin or Log, the default is Log. It only works under internal mixer mode. In general, select mV as Lin amplitude scale unit. Of course there would be other units for select.

Key points:

- In Log scale type: the Y-axis denotes the logarithmic coordinates, the value shown at top of the grid is the reference level and the grid size is equal to the scale value. The unit of Y-axis will be automatically switched into the default "dBm" when the scale type is changed from Lin to Log.
- In Lin scale type: the Y-axis denotes the linear coordinates, the value shown at the top of the grid is the reference level and the

bottom of the grid shows 0 V. The grid size is 10% of the Reference level and the Scale/Div is invalid. The unit of Y-axis will be automatically switched into the default "mV" when the scale type is changed from Log to Lin.

- Other than as mentioned above, the unit of Y-axis is independent of the Scale Type.

5.3.5 [Ref Offset]

Assigns an offset to the reference level to attempt to compensate for gains or losses generated between the device under measurement and the analyzer.

Key points:

- The changing of this value changes both the readout of the reference level and the amplitude readout of the marker, but will not impact the position of the curve on the screen.
- You can modify this parameter using the numeric keys.
- This offset use dB as absolute unit, will not change with selected scale and unit.

5.3.6 [Ref Unit>]

Sets the unit of the Y-axis to[dBm], [dBμW], [dBuA], [dBmV], [dBμV], [W] or [V]

Key points:

1) [dBm]
   Choose decibel equals to 1mW as amplitude unit.
2) [dBμW]
   Choose decibel equals to 1μW as amplitude unit.
3) [dBμA]
   Choose decibel equals to 1μA as amplitude unit.
4) [dBmV]
   Choose decibel equals to 1mV as amplitude unit.
5) [dBμV]
   Choose decibel equals to 1μV as amplitude unit.
6) [W]
   Choose Watts as amplitude unit.
7) [V]
   Choose Voltage as amplitude unit.

5.3.7 [Preamplifier On Off]

Sets the status of preamplifier located at the front of the RF signal path. Turning on the preamplifier reduces the displayed

average noise level in order to distinguish small signals from the noise when working with small signals.

5.4 [Auto]Auto Tune

Searches for signals automatically throughout the full frequency range, adjusts the frequency and amplitude to their optimum and realizes one-key signal search and auto setting of parameters. Key points: some parameters such as reference level, scale, and input attenuation may be changed during the auto tune.

5.5 [BW]Bandwidth

Sets the RBW (Resolution Bandwidth) and VBW (Video Bandwidth) parameters of the analyzer. Pop out the setting menu includes [RBW Auto Man], [VBW Auto Man], [EMI Filter On Off].

5.5.1 [RBW Auto Man]

Adjust the resolution bandwidth ranging from 10Hz-1MHz. Use numeric key, step key or knob to switch resolution bandwidth. The underline under Auto or Manual means Auto mode or Manual mode. Press [Resolution Bandwidth Auto Manual] and hold it until underline under Auto has been highlighted. Then the resolution bandwidth is under auto coupling mode.

Key points:

- Reducing the value of RBW will increase the frequency resolution, but may also cause sweeps to take longer (Sweep Time is effected by a combination of RBW and VBW when it is in Auto mode).
- RBW decreases with the span (non-zero span) in Auto RBW mode.

5.5.2 [VBW Auto Man]

Sets the desired video bandwidth in order to remove the band noise. Set the video resolution displays in function area, ranging from 10Hz to 1MHz by sequence step. You can modify this parameter by numeric key, step key or knob. The underline under Auto or Manual means Auto mode or Manual mode. Press [VBW Auto Manual] and hold it in manual until the underline highlighted

under Auto to return auto mode.

Key points:

- Reducing the VBW to smooth the spectrum line and differentiate small signals from the noise. However, this may cause a longer sweep time. (Sweep Time is effected by a combination of RBW and VBW when it is in Auto mode).
- VBW varies with RBW when it is set to Auto.

5.5.3 [EMI Filter On Off]

Pop out the menu for EMI measurement bandwidth.
When the EMI filter (-6 dB bandwidth) is currently enabled, the resolution bandwidth can only be set to 200 Hz, 9 kHz, 120 kHz, or 1 MHz. At this point, you can choose the detection mode as "quasi-peak."

5.6 [Trace]

As the sweep signal is displayed as a trace on the screen, you can set parameters about the trace using this key. The analyzer allows for up to five traces to be displayed at one time, and press this key to check the menu for trace. It includes [Trace 1 2 3 4 5], [State>], [Operations>].

5.6.1 [Trace 1 2 3 4 5]

Select trace, the analyzer offers 1,2,3,4,5 trace. The selected trace and corresponding status menu will be underlined.

5.6.2 [State＞]

Set the refresh state type of spectral traces.

5.6.2.1 [Clear & Write]

Refresh the current spectrum curve by collecting real-time scanned data at each point of the trace to display the analyzer trace.

5.6.2.2 [Max Hold]

Maintains the maximum for each point of the trace. It continuously receive scan data and select positive peak value detect mode.

5.6.2.3 [Min Hold]

Maintains the minimum for each point of the trace. It continuously

receive scan data and select negative peak value detect mode.

5.6.2.4 [Average]

Average the current trace. Each point of the trace displays the averaged result of multiple scans, resulting in a smoother display of this type of trace. Times of trace: 100 on average (by default) and 1,000 at maximum..

5.6.2.5 [View]

Stops updating trace data and display current trace for observation.

5.6.2.6 [Blank]

Clear the trace on screen. But the trace stock will keep still without refreshing.

5.6.2.7 [Return]

Return to the previous menu.

5.6.3 [Operations>]

Enter trace math related sub menu.
1) [1 ↔ 2**]**
Exchange the trace stock 1 data with trace stock 2 and place them in display mode.
2) [2-DL → 2]
Deduct display line value in trace stock 2. This function execute once when activated. Press [2 - DL → 2] again to execute it the second time. When this function activated, display line will also be activated.
3) [2 ↔ 3]
Exchange the trace stock 2 data with trace stock 3 and place them in display mode.
4) [1→3]
Exchange the trace stock 1 data with trace stock 3 and place them in display mode.
5) [2→3]
Exchange the trace stock 2 data with trace stock 3 and place them in display mode.

5.7 [Detector]

While displaying a wider span, each pixel contains spectrum information associated with a larger subrange. That is, several samples may fall on one pixel. Which of the samples will be represented by the pixel depends on the selected detector type. Press this key to pop out the relevant menu includes [Trace 1 2 3 4 5], [Pos Peak], [Neg Peak], [Sample], [Normal], [Voltage Avg], [More>].

Key points:

- Selects an appropriate type according to the application in order to ensure the accuracy of the measurement for your application.
- When [**BW**]→[EMI Filter]→[EMI Filter] is On, [Quasi-Peak] is available.

Table 8- 1 Detector type comparison

Detector Type	Measurement
Pos Peak	*Positive peak detector* ensures that no peak signal is missed, which is useful for measuring signals that are very close to the base noise.
Neg Peak	*Negative peak detector* is used in most cases with the self-test of the spectrum analyzer and is rarely used in the measurement. It is able to restore the modulation envelope of the AM signal well.
Normal	Display pos peak and neg peak alternately when noise is detected, or it only display pos peak.
Sample	*Sampling detector* is conducive to measurement noise signal. Compared with the standard detection method, it can measure noise better.
RMS Avg	*RMS Average detector* averages rms levels to calculate the true average power. It is best for measuring the power of complex signals.

Voltage Avg	*Voltage Average detector* averages the linear voltage data of the envelope signal measured during the bucket interval. It is useful for observing rise and fall behavior of AM or pulse-modulated signals.
Quasi-Peak	*Quasi-peak detector* is a weighted form of peak detection. The measured value drops as the repetition rate of the measured signal decreases. It is used in EMI testing.

5.7.1 [Trace 1 2 3 4 5]

Select a trace. The spectrum analyzer provides traces 1, 2, 3, 4, and 5. The selected trace number and its corresponding status menu item will be underlined. The color of the numbers corresponds to the color of the traces.

5.7.2 [Pos Peak]

Searches the maximum from the sampling data segment and displays it at the corresponding pixel. Positive peak detector will be selected when [Max Hold] pressed.

5.7.3 [Neg Peak]

Searches the minimum from the sampling data segment and displays it at the corresponding pixel.

5.7.4 [Sample]

Set the detector to the sampling detector mode. This mode is usually used for video averaging and noise frequency Maker.

5.7.5 [Normal]

When noise is detected, the positive and negative peaks are alternately displayed, otherwise only positive peaks are displayed.

5.7.6 [Voltage Avg]

Set the detector to the Voltage Average detector mode. This mode calculates the average voltage of all the samples in the sample bucket.

5.7.7 [More>]

5.7.7.1 [RMS]

Set the detector to the RMS Average detector mode. This mode calculates the RMS average power of all the samples in the sample bucket.

5.7.7.2 [Quasi-Peak]

Set the detector to the Quasi-Peak detector mode. This mode is available when EMI filter is turned on. The quasi-peak detector is a peak detector that is weighted by the duration and repetition rate of the signal, as specified by the CISPR 16-1-1 standard. Quasi-peak detection is characterized by a fast charge time and slow decay time.

5.7.7.3 [Return]

Return to the previous menu.

5.8 [Display]

Controls the screen display of the analyzer, such as full screen, setting the on or off for window zoom, display line, amplitude scale, grid and label.

5.8.1 [Full Screen]

Set to full-screen display graphical interface, press any key to exit.

5.8.2 [Display Line On Off]

When this menu is on, an adjustable horizontal reference line is activated on the screen.

5.8.3 [Ampt Graticule On Off]

Turn on or Off amplitude scale function.

5.8.4 [Label On Off]

Defines the content displayed or hidden in the comments that appear in the display grid area.

5.8.5 [Menu Hide On Off]

Display and hide the menu at the right side of the screen. When the menu hiding is enabled, the menu will be hidden if there is no any button operation within the preset menu hiding time (optional

menu hiding time: 5-50 s). Recover menu display by pressing any button.

5.8.6 [Brightness]

Set screen brightness display within 1%~100%.

5.8.7 [Screen Sleep On Off]

Set the time for enabling or disabling automatic screen off function. When the automatic screen off function is enabled, the screen will be off automatically if there is no any operation within the set automatic screen off time (optional screen off time: 1-60 min). Recover screen display by pressing any button.

5.9 [Sweep]

Sets parameters about the Sweep time and mode including [Sweep Time Auto Man], [Sweep Single], [Sweep Cont]].

5.9.1 [Sweep Time Auto Man]

Sets the time interval for the analyzer to complete a sweep.

- In non-zero span, the analyzer uses the shortest sweep time on the basis of the current RBW and VBW settings if Auto is selected.
- You can modify this parameter using the numeric keys, knob, or direction keys.

5.9.2 [Sweep Single]

Press [Single Sweep] to set the sweep mode to Single. Press [Single Scan] to restart the scan when the next trigger signal arrives. Allows you to set continuous scan mode.

5.9.3 [Sweep Cont]

Press [Continuous Scan] to activate the sweep scan mode.

5.10 [Trig]

Sets the trigger type and other associated parameters, menu includes [Auto Run] , [Video], [External>].

5.10.1 [Auto Run]

Set the trigger mode to the free trigger mode so that the scan trigger is as fast as possible with the spectrum analyzer. It meets the trigger conditions at any time, that is, continue to generate a trigger signal.

5.10.2 [Video]

This indicates a trigger signal will be generated when the system detects a video signal in which the voltage exceeds the specified video trigger level.

5.10.3 [External >]

In this mode, an external signal (TTL signal) is input from the [Trigger In] connector at the rear panel, its edge conditions should meet with the user settings to generate trigger signals.
Press [External >] to enter the submenu, and select [Positive Edge] or [Negative Edge] as the trigger condition.

5.11 [TG]

When the Source is turned on, an independent signal or a signal with the same frequency of the current sweep signal will be output from the GEN OUTPUT 50Ω terminal on the front panel. Press the key will pop out related menu includes [Track Gen On Off], [Output Level], [Reference], [Position], [Do Normalize], [Normalize On Off]. The source is turned off in the power-on and reset states.

5.11.1 [Track Gen On Off]

Select the tracking generator to be on or off.

5.11.2 [Output Level]

Set the output power of CW or TG source.

5.11.3 [Reference]

After enabling normalization, adjust the vertical position of trace on the screen by adjusting the reference level value.

5.11.4 [Position]

After enabling normalization, adjust the vertical position of normalized reference level on the screen by adjusting the reference position.
Note:

- It is similar to the function realized by normalized reference level, which is at the bottom of the screen grid when it is 0% or at the top of the screen grid when it is 100%.
- The parameter can be changed via numeric buttons, knob, or direction buttons.

5.11.5 [Do Normalize]

This soft menu is used to track the user's field calibration of the source network measurements. After connecting the instrument's RF output to the RF input, press the "normalized" soft menu and the display shows a straight line on the 0dB scale.
Note: Disable normalization before the operation above.

5.11.6 [Normalize On Off]

This soft-menu is used to turn normalization on or off after executing normalization.

5.12 [Demod]Demodulation

Enter the demodulation settings, the spectrum analyzer supports audio demodulation and analog demodulation.

5.12.1 [Demod On Off]

When it is enabled, the audio demodulation soft menu is displayed.

5.12.1.1 [Demod Mode>]

Enter the demodulation mode soft menu. Including FM, AM. After enabling the audio demodulation function, click the Meas button to quickly switch to this menu.

5.12.1.2 [Sound]

When the audio demodulation is on, adjust the speaker output

volume.

5.12.1.3 [Carrier Freq]

Set the center frequency after enabling AM demodulation.
Set the center frequency after enabling FM demodulation.

5.12.2 [Analog Demode >]

Enter the digital demodulation soft menu.

5.12.2.1 [AM>]

Enter AM demodulation soft menu.

1) [Carrier Freq]

Set the carrier frequency of the AM modulation signal.

2) [IF BW]

Set the demodulation bandwidth of the AM modulated signal.

3) [Setup>]

Set the time axis, depth axis and AF trigger of AM modulation.

a) [Time Axis>]

Set the time axis parameters.

- [Ref.Value]

Set the starting reference time on the time axis.

- [Position]

Set the reference position of the waveform on the time axis.

- [Scale/Div Auto Man]

Automatically or manually set the grid division scale.

- [Return]

Return to the previous menu.

b) [Depth Axis>]

Set the depth axis parameters.

- [Ref Depth]

Set the reference offset position as a vertical percentage.

- [Position]

Set the reference position of the waveform on the depth axis.

- [Scale/Div Auto Man]

Automatically or manually set the grid division scale.

- [Return]

Return to the previous menu.

c) [AF Trigger>]

Set the AF triggering conditions.

- [AF Trigger On Off]

Set the AF trigger to be On or Off.

- [Edge Pos Neg]

Set the trigger to rising or falling edge.

- [Trigger Mode]

Set the triggering mode to single trigger or continuously trigger.

- [Trigger Level]

Set the trigger level as a percentage of the depth.

- [Trigger Delay]

Set the trigger delay time.

- [Return]

Return to the previous menu.

d) [Return]

Return to the previous menu.

4) [Data Reset]

Set the maximum, minimum, and average data reset under the AM modulated signal.

5) [Return]

Return to the previous menu.

5.12.2.2 [FM>]

Enter FM demodulation soft menu.

1) [Carrier Freq]

Set the carrier frequency of the FM modulation signal.

2) [IF BW]

Set the demodulation bandwidth.

3) [Setup>]

Set the time axis, deviation axis and AF trigger of FM modulation.

a) [Time Axis>]

Set the time axis parameters.

- [Ref.Value]

Set the starting reference time on the time axis.

- [Position]

Set the reference position of the waveform on the time axis.

- [Scale/Div Auto Man]

Automatically or manually set the grid division scale.

- [Return]

Return to the previous menu.

b) [Deviation Axis>]

Set the deviation axis parameters.

- [Ref Deviation]

Set the reference offset position as a vertical percentage.

- [Position]

Set the reference position of the waveform on the deviation axis.

- [Scale/Div Auto Man]

Automatically or manually set the grid division scale.

- [Return]

Return to the previous menu.

c) [AF Trigger>]

Set the AF triggering conditions.

- [AF Trigger On Off]

Set the AF trigger to be On or Off.

- [Edge Pos Neg]

Set the trigger to rising or falling edge.

- [Trigger Mode]

Set the triggering mode to single trigger or continuously trigger.

- [Trigger Level]

Set the trigger level as a percentage of the depth.

- [Trigger Delay]

Set the trigger delay time.

- [Return]

Return to the previous menu.

d) [Return]

Return to the previous menu.

4) [Data Reset]

Set the maximum, minimum, and average data reset under the FM modulated signal.

5) [Return]

Return to the previous menu.

5.13 [Peak]

Executes peak searching immediately and opens the Peak setting menu.

Key Points:

- If Max is selected from the Peak Search option, it will search and mark the maximum on the trace.
- The peak search of Next Peak, Peak Right, Peak Left or peaks in the peak table must meet the specified parameter condition.

- The spurious signal at the zero frequency caused by LO feed through is ignored.

5.13.1 [Mkr→CF]

Used to move the peak point to the center frequency point.

5.13.2 [Peak-Peak]

Execute peak search and a min. search at the same time and mark “difference pair” frequency standard. In particular, mark peak search result with the difference frequency standard and the min. search result with the reference frequency standard.

5.13.3 [Next Peak]

Searches the peak whose amplitude is the closest to that of the current peak. The peak is then identified with a marker. When this key is pressed repeatedly, you can quickly find a lower peak.

5.13.4 [Left Peak]

Searches the nearest peak located to the left side of the current peak and meets the current peak and peak thresholds condition. The peak is then identified with a marker.

5.13.5 [Right Peak]

Searches the nearest peak located to the right side of the current peak and meets the current peak and peak thresholds condition. The peak is then identified with a marker.

5.13.6 [Cont Peak On Off]

Set the peak search form, off by default. On mode will automatically search for the peak.

5.13.7 [Peak Setup＞]

Enter peak setup interface.

5.13.7.1 [Peak Excursion]

Set Peak Excursion.

5.13.7.2 [Peak Mode Max Min]

Set the search under max. or min. value mode.

5.13.7.3 [Sort Freq Ampt]

Set the sorting of peak value list by frequency or amplitude.

5.13.7.4 [Peak List On Off]

Enable or disable peak list. If the peak value list is enabled, all the frequency standard marks meeting the peak value requirements will be displayed on the trace according to sorting mode. All the frequency standard lists meeting the peak value requirements will be listed below with trace color.

5.13.7.5 [Return]

Return to the previous menu.

5.14 [Marker]

The marker appears as a rhombic sign (shown below) for identifying the point on the trace. We can easily readout the parameters of the marked point on the trace, such as the amplitude, frequency and sweep time.

Key points:

- The analyzer allows for up to eight groups of markers to be displayed at one time, but only one pair or one single marker is active every time.
- You can use the numeric keys, knob or direction keys to enter the desired frequency or time when any marker type menu is active, so as to view the readouts of different points on the trace.

5.14.1 [Marker 1 2 3 4 5 6 7 8]

Selects one marker, the default is Marker1. And place the frequency scale at the center of the trace. If the frequency difference is activated, this softkey changes to the menu under the [Delta] function.

If there is already a marker, this command will not produce any operation. If there are already two markers (e.g. in [Delta] mode), [Marker] changes the active frequency scale to a new single frequency scale. Amplitude and frequency information can be obtained from the frequency scale (time information when the sweep width is 0Hz), and these values are displayed in the upper

right corner of the active function area and the screen. You can use the numeric keys, the step key, or the knob to move the active frequency scale.

The marker reads data from the current active track (this track may be track A or track B). If both tracks are active or both tracks are in static display mode, the frequency scale will read data from track A.

5.14.2 [Trace 1 2 3 4 5]

In the trace measurement, the frequency scale used to activate the traces.

5.14.3 [Normal]

One of the marker types, which is used to measure the values of X (Frequency or Time) or Y (Amplitude) at certain point of the trace. When selected, a marker will appear with its own digital ID such as "1" on the trace.

Key points:

- If no active marker exists currently, a one will be enabled automatically at the center frequency of current trace.
- You can use the knob, direction keys or numeric keys to move the marker. The readouts of the marker will be displayed on the upper right of the screen.
- The readout resolution of the X-axis corresponds to the span and sweep points. For higher resolution, add sweep points or reduce the span.

5.14.4 [Delta]

One of the marker types, which is used to measure the delta values of X (Frequency or Time) and Y (Amplitude) between the Reference point and certain point on the trace. When selected, a pair of markers appears on the trace, which are the Reference Marker and the Delta Marker. Will be in the active area and the display area of the upper right corner, showing the amplitude delta value between the two markers and frequency difference. If a single marker already exists, [Delta] will place a static marker and an active marker to the original position and a single marker position. Use the knob, step key, or number keys to move the marker. If there are two markers, press [Delta] directly. However, if

[Delta] has been activated, press [Delta] to place the still frequency scale to the active marker. The displayed amplitude difference is expressed in dB, or is the linear unit in terms of the corresponding scale.

Key points:

- The Reference Marker will be activated at the position of current marker, or else both the reference marker and Delta Marker will be simultaneously activated at the center frequency location if no marker is active at the present.
- The location of the Reference Marker is always fixed (both in the X-axis and the Y-axis), while the Delta Marker is active. You can use the numeric keys, knob or direction keys to change the location of Delta Marker.
- The delta of both the Frequency/Time and the amplitude between the two markers are displayed at the upper right of the screen.
- Two ways to enable a certain point as the reference:
  a) Open a "Normal" marker and locate it onto a point and then switch the marker type into "Delta", creating a new reference, then you can modify the location of the delta point to achieve the delta measurement.
  b) Open a Delta Marker and place it onto a point, then reselect the Delta menu to locate the marker you opened onto this points, then you can modify the location of the delta point to achieve the delta measurement.

5.14.5 [Off]

The marker information displayed on the screen and functions based on the marker will be turned off and won't show up again.

5.14.6 [All Off]

Turns off all the opened markers and the related functions. The marker won't show again.

5.14.7 [Marker Table On Off]

Turns on or off the display of all marker table.

5.15 [Marker→]

A soft menu associated with the marker function is popped out for setting the other system parameters (such as Center frequency,

Reference level) by current marker readings. These menus relate to the frequency of the spectrum analyzer, whether the sweep width and marker are in normal or delta marker mode.

5.15.1 [Mkr->CF]

Sets the center frequency of the analyzer based on the frequency of the current marker. This feature quickly moves the signal to the center of the screen.

- If Normal is selected, the center frequency will be set to the frequency of the current marker.
- If Delta Marker is selected, the center frequency will be set to the frequency at which the Delta Marker is located.
- The function is invalid in Zero span mode.

5.15.2 [Mkr->CF Step]

Sets the center frequency step of the analyzer based on the frequency of the current marker.

- If Normal is selected, the center frequency step will be set to the frequency of current marker.
- If Delta Marker is selected, the center frequency step will be set to the frequency at which the Delta Marker is located.
- The function is invalid in Zero span mode.

5.15.3 [Mkr->Start]

Sets the start frequency of the analyzer based on the frequency of the current marker.

- If Normal is selected, the start frequency will be set to the frequency of the current marker.
- If Delta Marker is selected, the start frequency will be set to the frequency at which the Delta Marker is located.
- The function is invalid in Zero span mode.

5.15.4 [Mkr->Stop]

Sets the stop frequency of the analyzer based on the frequency of the current marker.

- If Normal is selected, the stop frequency will be set to the frequency of the current marker.
- If Delta Marker is selected, the stop frequency will be set to the frequency at which the Delta Marker is located.
- The function is invalid in Zero span mode.

5.15.5 [Mkr->Ref Level]

Sets the reference level of the analyzer based on the amplitude of the current marker.

- If Normal is selected, the reference level will be set to the amplitude of the current marker.
- If Delta Marker is selected, the reference level will be set to the amplitude at which the Delta Marker is located.

5.15.6 [MkrΔ->Span]

Changes the span of the analyzer to the frequency difference between the two markers.

5.15.7 [MkrΔ->CF]

Set the center frequency of spectrometer to make it equal to the frequency standard difference.

5.16 [Marker Fctn]Marker Function

Executes specific marker soft menu.

5.16.1 [Marker 1 2 3 4 5 6 7 8]

To switch the currently selected frequency mark, press this menu item to switch the currently selected frequency mark, and underline the following.

5.16.2 [Function Off]

Turn off marker measurement function.

5.16.3 [NdB On Off]

Enables the N dB BW measurement or sets the value of N. The N dB BW denotes the frequency difference between points that are located on both sides of the current marker while the amplitude falls off (N<0) or rises (N>0) N dB separately,

Key points:

- When the measurement starts, the analyzer will search the two points which are located at both sides of the current point and are N dB amplitudes smaller or greater than the current point, and display the frequency difference between the two points.
- You can use the numeric keys, knob or direction keys to

modify the value of N, 3 at default.

5.16.4 [Marker Noise On Off]

Turn on or off the frequency noise function. The function of marking noise is applied to the selected cursor, and then the noise Power Spectral Density at the cursor is read. When turned on, the average noise level read at the frequency scale is normalized to 1 Hz bandwidth for noise power.

5.16.5 [Freq Count>]

Activate the frequency counter function and display the count results in the upper right corner of the screen. The counter counts only the signals that are displayed on the screen. The frequency count also pops up an additional counter function for the soft menu, including [Freq Count On Off].

5.16.5.1[Freq Count On Off]

Turn on or off the frequency counter mode. This function is invalid when the trace signal generator is activated. The count value is displayed in the upper right corner of the screen.

5.16.5.2 [Resolution]

Counter resolution is divided into 1 kHz, 100 Hz, 10 Hz, 1Hz. Changing the counter resolution can change the counter accuracy. The higher the resolution, the higher the counting accuracy.

5.16.5.3 [Return]

Return to the previous menu.

5.17 [Meas]Measurement

Provide a variety of advanced measurement functions, pop-up spectrum analyzer built-in and user-defined measurement function soft menu, turn on or off the time spectrum, adjacent channel power measurement, channel power measurement, occupied bandwidth, Pass-Fail measurement menu.

5.17.1 [Measure off]

You can directly close the currently running measurement function, you can also choose to close the measurement menu.

5.17.2 [Time Spec On Off]

Turn on time spectrum measure mode.

5.17.3 [ACPR On Off]

Turn on or off the adjacent channel power measurement. Press [Meas Setup] to pop up the parameters of the adjacent channel power measurement soft menu. The adjacent channel power is used to measure the ratio of the adjacent channel power of the transmitter. The absolute value of the main channel power and the absolute value of the adjacent channel power are obtained by the linear power integration method, so that the adjacent channel power ratio is gained.

5.17.4 [Chanel Power On Off]

Turn on or off channel power measurements. Press [Meas Setup] to pop up the channel power measurement parameter settings soft menu. The channel power is used to measure the transmitter channel power, according to the user set the channel bandwidth, through the linear power integration method to obtain the absolute value of the main channel power.

5.17.5 [OBW On Off]

Turn on or off the occupied bandwidth measurement. Press [Meas Setup] to pop up the parameter setting soft menu for occupying the bandwidth measurement. Occupied Bandwidth is a measure of the bandwidth occupied by the transmitter signal can be measured from the total power ratio within the in-band power span, with a default value of 99% (the user can set this value).

5.17.6 [Pass-Fail>]

Enter the pass / fail measurement function soft menu. Pass / fail measurement has two modes of window measurement and area measurement.

5.17.6.1 [Window Meas>]

Enter Window measurement soft menu.

1) [Window Meas On Off]
Turn on or off window measurement mode.

2) [Limit Line On Off]

Turns the amplitude line on or off, and the amplitude line turns on when the window measurement is on.

3) [Freq Line On Off]

Turns the frequency line on or off, and the frequency line turns on when the window measurement is on.

4) [Limit Set Up Low]

Used to edit the upper and lower limit on the amplitude line.

5) [Freq Set Start Stop]

Start and stop frequencies for scanning line for editing.

6) [Window Sweep On Off]

Turns window sweep on or off. When the window sweep is on, only the window formed by the intersection of the amplitude line and the frequency line is scanned. The peripheral stops scanning; the full frequency is scanned when it is closed.

7) [Return]
Return to the previous menu.

5.17.6.2 [Limit Meas>]

Enter limit measurement soft menu.

1) [Limit Meas On Off]
Turn on or off limit measurement mode.

2) [Line Up On Off]

When the upper limit line is turned on or off, the upper limit line is opened by default when the area measurement is on.

3) [Line Low On Off]

When the lower limit line is turned on or off, the lower limit line is opened by default when the area measurement is on.

4) [Shift X/Y Freq Ampt]

Frequency: For the actual measurement, the edited area as a whole superimposed on a frequency, so that it can implement left or right shift, easy to measure. Does not affect the frequency and marker of the spectrum analyzer settings.

Amplitude: The region has been edited on the whole superimposed on a degree, so that it can move up or down, easy to measure. Does not affect the amplitude setting of the spectrum analyzer.

5) [Edit>]

a) [UpLine Edit>]

Upper line editing is used to edit the control line above the trace, depending on the trace.

b) [LowLine Edit>]

Lower line editing is used to edit the control line above the trace, depending on the trace.

c) [Save Limit Line]

Saves the currently selected limit line.

d) [Load Limit Line>]

Call the limit line saved inside the device.

e) [Return]

Return to the previous menu.

6) [Return]
Return to the previous menu.

5.17.6.3 [Return]

Return to the previous menu.

5.17.7 [More>]

Enter the more measurement function menu.It includes harmonic measurement,phase noise measurement and TOI measurement.

5.17.7.1 [Harmonic＞]

Enter the harmonic measurement menu.
H[dBc] = PH [dBm] - P_C [dBm]

H[dBc]:Harmonic distortion value;
PH[dBm]:Harmonic distortion signal level;
P_C [dBm]:Fundamental signal level.
THD = sqrt(sum[W] / P_C [W]) * 100%;
THD denotes total harmonic distortion and sum denotes power of individual harmonic signals.

Parameter	Description
Harmonic	The harmonic of the fundamental frequency
Frequency	A multiple of the fundamental frequency
Amplitude	The amplitude of the harmonic frequency in dBm
dBc	Harmonic distortion value, the amplitude of the harmonic frequency relative to the fundamental frequency
THD	Total harmonic distortion in % or dBc
Bar chart	The frequencies listed in the table correspond to the amplitudes, with the number 1 representing the fundamental frequency and the remaining numbers representing the individual harmonic frequencies.The trace of this mode is only used as a rough reference to facilitate the observation of the position of all harmonics, which is not consistent with the amplitude in the bar charts and tables, and the specific data are mainly in tables or bar charts. If the frequency value of the tenth harmonic exceeds the upper limit of the spectrum meter measurement, the harmonic position will deviate from the bar chart.

1) [Harmonic On Off]
Enable or disenable the harmonic measurement mode.
2) [Fundamental Freq]
Set the fundamental frequency,when the harmonic measurement mode is turned on, the center frequency in the spectrum mode is set according to the number of harmonics.
3) [Number of Harmonics]
Set the number of harmonics that can be displayed, up to the tenth harmonic can be displayed. When the fundamental frequency is set, the upper limit of the number of harmonics will vary due to the

limited measurement range of the spectrum instrument.

4) [RBW Auto Man]

Adjust the resolution bandwidth ranging from 1Hz-1MHz. Use numeric key, step key or knob to switch resolution bandwidth. The underline under Auto or Manual means Auto mode or Manual mode. Press [RBW Auto Man] and hold it until underline under Auto has been highlighted. Then the resolution bandwidth is under automatic mode.

Key points:

- Reducing the value of RBW will increase the frequency resolution, but may also cause sweeps to take longer (Sweep Time is effected by a combination of RBW and VBW when it is in Auto mode).
- RBW decreases with the span (non-zero span) in Auto RBW mode.

5) [Return]

Return to the previous menu.

5.17.7.2 [Phase Noise＞]

Enter the phase noise measurement mode menu.

P_{Offset} [dBc] = P_{SSB} [dBm] - P_C [dBm] - 10 * log(1.2 * RBW) + 2.5

P_{Offset} denotes phase noise power at the frequency offset;

P_{SSB} denotes single-sideband phase noise power;

P_C denotes carrier power;

RBW denotes resolving bandwidth.

Parameter	Description
Position	Combine the phase noise values of each frequency band at 6 frequency points to obtain a complete phase noise trace, and plot the trace on a logarithmic scale.
Frequency Offset	Adjust the stop frequency in spectrum mode based on the starting frequency offset and stop frequency offset, obtain the amplitude values at various frequency points within this frequency band, and calculate the phase noise values.
Source trace	In spectrum mode, the original trace data obtained for the start and stop frequencies is referred to as the yellow trace.

Average trace	The trace data resulting from averaging the original trace data ten times is labeled as the blue trace.

1) [Phase Noise On Off]
Enable or disenable the phase noise measurement mode.
2) [Auto Tune]
Searches for signals automatically throughout the full frequency range, adjusts the frequency and amplitude to their optimum and realizes one-key signal search and auto setting of parameters.
Key points: some parameters such as reference level, scale, and input attenuation may be changed during the auto tune.
3) [Carrier Freq]
Set the carrier frequency, when the phase noise measurement mode is on, set the carrier frequency to the starting frequency in the spectrum mode.
4) [Start Offset]
The starting frequency offset value is fixed, and the phase noise value at this frequency offset is measured in increments of a factor of 10.
5) [Stop Offset]
The stop frequency offset value is fixed as the upper limit of the frequency offset value.
6) [Return]
Return to the previous menu.

5.17.7.3 [TOI＞]

Enter the TOI measurement mode menu.
$f_{lowTOI} = 2 f_1 - f_2$
$f_{highTOI} = 2 f_2 - f_1$
f_{lowTOI} denotes low third order intermodulation frequency;
$f_{highTOI}$ denotes high third order intermodulation frequency;
f_1 denotes low monophonic frequencies;
f_2 denotes high monophonic frequencies.
[C / IM] = 10 * log(P_C [dBm] / P_{IM} [dBm])
[C / IM] denotes third order intermodulation distortion ratio;
P_C denotes fundamental output power;
P_{IM} denotes third order intermodulation product output power.

Parameter	Description
Marker	1,2,3,4 marker corresponding to f_{lowTOI},f_1 ,f_2 , $f_{highTOI}$ respectively.

Frequency	f_{lowTOI},f_1 f_2 ,$f_{highTOI}$ corresponding frequency.
Amplitude	f_{lowTOI},f_1 , f_2 ,$f_{highTOI}$ corresponding amplitude.
dBc	The relative amplitude of [C/IM], f_1, and f_2 to the amplitudes of f_{lowTOI} and $f_{highTOI}$.
Trace	Draw traces based on the data obtained by scanning the start and stop frequency in spectrum mode,and obtain four frequency markers from the peak list. If the calculated high and low third order intermodulation frequencies exceed the scan range, they will be displayed as *."

1) [TOI On Off]
Enable or disenable the TOI measurement mode.
2) [Low Monophonic Freq]
Press[Low Monophonic Freq Auto Man] and hold it until underline under Auto has been highlighted. Then the low monophonic frequency is under auto mode.According to the peaklist, select the frequency corresponding to the amplitude of the second peak as the low single-tone frequency.When switched to manual mode, the frequency is set by the user.
3) [High Monophonic Freq]
Press[High Monophonic Freq Auto Man] and hold it until underline under Auto has been highlighted. Then the high monophonic frequency is under auto mode.According to the peaklist, select the frequency corresponding to the amplitude of the maximum peak as the high single-tone frequency.When switched to manual mode, the frequency is set by the user.
4) [Return]
Return to the previous menu.

5.17.7.4 [SEM＞]

Enter the spectrum emission template measurement menu.

Parameter	Description
Offset	Indicate the number of offsets. Up to 5 offsets can be configured, each represented by a different color.
Start	Starting frequency of this offset.
Stop	Stop frequency of this offset.
RBW	RBW of this offset.
Lower Freq	The frequency point corresponding to the

	maximum amplitude in the lower frequency segment of the offset trace data.
Higher Freq	The frequency point corresponding to the maximum amplitude in the higher frequency segment of the offset trace data.
Peak(dBm P/F)	The maximum value within the frequency band, green "P" indicates that this offset segment passed the template, while red "F" indicates that this offset segment failed to pass the template.
Channel IBW	Calculate the power value within the test main channel.
Total Power	Calculate the reference value based on the total power within the channel, the channel integrated bandwidth, and the channel resolution bandwidth.
PSD	Calculate the reference value based on the total power within the channel and the channel RBW.

1) [SEM]

Enable or disenable the spectrum emission template measurement.

2) [Center Freq]

Set the center frequency value.

3) [Ref Level]

Set the reference level value.

4) [Userconfig Mask>]

a）[Channel Setup>]

Set the parameter of the main channel.

●[Channel IBW]

Set the channel integrated bandwidth,it is used to calculate the power within the main channel.

●[Channel Span]

Set the channel span value.

●[RBW]

Set the resolution bandwidth value.

●[Measure Ref Type]

Select the TotalPwr or PSD as the reference value.

●[Total Pwr Ref]

Set the total power reference value of carrier waveform,when switch into automatic mode,calculate the reference value based on

the total power within the channel,the channel integrated bandwidth and the channel resolution bandwidth.Under the manual mode,the reference value is set by user.

●[PSD Ref]

Set the power spectral density reference value,when switch into automatic mode,calculate the reference value based on the total power within the channel and the channel integrated bandwidth. Under the manual mode,the reference value is set by user.

●[Return]

Return to the previous menu.

b）[Offset Setup>]

Set the frequency,power and other template parameters of selected offset.

●[Select Offset]

Select the offset index.

●[Offset Limit]

Enable or disenable the offset limit.If the offset is off or the start frequency is equal to the stop frequency when it is on, the offset segment trace and template are not displayed.

●[Start Freq]

Set the starting frequency of the selected offset.

●[Stop Freq]

Set the stop frequency of the selected offset.

●[RBW]

Set the resolution bandwidth of the selected offset.

●[More>]

◆[Pass/Fail Mask]

Select to use Absolute or Relative templates.

◆[Abs Start Ampt]

Set the absolute start amplitude of the selected offset.

◆[Abs Stop Ampt]

Set the absolute stop amplitude of the selected offset.When switch into automatic,set to the same value as the absolute starting amplitude.Under manual mode,the reference is set by user.

◆[Rel Start Ampt]

Set the relative start amplitude of the selected offset.

◆[Rel Stop Ampt]

Set the relative stop amplitude of the selected offset.When switch into automatic,set to the same value as the relative starting amplitude.Under manual mode,the reference is set by user.

◆[Return]

Return to the previous menu.

●[Return]
Return to the previous menu.
c）[Preset]
Restore the user configuration template parameters to their initial state.
d）[Return]
Return to the previous menu.
5) [Stationary Mask>]
User can select stationary as spectrum emission template.
a）[3GPP>]
Set 3GPP as spectrum emission template.
●[3GPP]
Enable or disenable the 3GPP template.
●[Channel Setup>]
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>]:a)[Channel Setup>] for detail.
●[Offset Setup>]
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>],b)[Offset Setup>] for detail.
●[Duplex Mode>]
◆[Duplex Mode]
Select FDD or TDD as the duplex mode.
◆[FDD Config>]
[Transmission]
Select BS or UE as the transmission mode.
[Max Out Pwr]
Select the maximum output power with the options P >= 43,39 <= P < 43,31 <= P < 39,P < 31.
[Add Max Out Pwr]
When the maximum output power is selected P < 31,it will has additional option None,6 <= P < 20,P < 6.
[Return]
Return to the previous menu.
◆[TDD Config>]
[Transmission]
Select BS or UE as the transmission mode.
[Chip Rate]
Select the chip rate with the options 1.28M,3.84M,7.68M.
[Max Out Pwr]
Select the maximum output power with the options P >= 43,39 <= P < 43,31 <= P < 39,P < 31;P >= 34,26 <= P < 34,P < 26.When the

chip rate is 1.28M, the last three terms are selected, and when the chip rate is 3.84M and 7.68M, the first four terms are selected.
[Return]
Return to the previous menu.

◆**[Return]**
Return to the previous menu.

●**[Return]**
Return to the previous menu.

b）[802.11b>]
Set 802.11b as the spectrum emission template.

●**[802.11b]**
Enable or disenable the 802.11b template.

●**[Channel Setup>]**
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>]:a)[Channel Setup>] for detail.

●**[Offset Setup>]**
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>],b)[Offset Setup>] for detail.

●**[Return]**
Return to the previous menu.

c）[802.11g>]
Set 802.11g as the spectrum emission template.

●**[802.11g]**
Enable or disenable the 802.11g template.

●**[Channel Setup>]**
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>]:a)[Channel Setup>] for detail.

●**[Offset Setup>]**
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>],b)[Offset Setup>] for detail.

●**[Modulation>]**
Select modulation mode:OFDM or DSSS/PBCC/CCK.

●**[Return]**
Return to the previous menu.

d）[802.11n>]
Set 802.11n as the spectrum emission template.

●**[802.11n]**
Enable or disenable the 802.11n template.

●**[Channel Setup>]**
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>]:a)[Channel Setup>] for detail.

●[Offset Setup>]
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>],b)[Offset Setup>] for detail.
●[Channel IBW>]
The channel bandwidth is chosen to be 20M or 40M.
●[Return]
Return to the previous menu.
e）[802.16>]
Set 802.16 as the spectrum emission template.
●[802.16]
Enable or disenable the 802.16 template.
●[Channel Setup>]
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>]:a)[Channel Setup>] for detail.
●[Offset Setup>]
Please refer to 5.17.7.4[SEM>],4)[Userconfig Mask>],b)[Offset Setup>] for detail.
●[Channelization>]
The channelization parameter is chosen to be 10M or 20M.
●[Return]
Return to the previous menu.
f）[Return]
Return to the previous menu.
6) [Return]
Return to the previous menu.

5.18 [Meas Setup]

Measurement setting menu for the corresponding measurement parameter settings when adjacent channel power, channel power, occupied bandwidth measurement mode is turned on.

5.18.1 [Channel BW]

Set the bandwidth of the channel power measurement, and set the total display power percentage of bandwidth.

5.18.2 [Channel Interval]

Set the center frequency difference of the primary channel to the adjacent channel.

5.18.3 [Channel Nums]

Set the number of upper and lower adjacent channels measured by adjacent channel power.

5.18.4 [Power Percent]

Set the power ratio of occupied bandwidth.

5.19 [System]

A soft menu for system parameter settings pops up. Including [System >], [Setting >], [PowerOn / Preset >]. For first time you use the spectrum analyzer, set the date and time, the system will store the settings, restart the machine after power off won't change the settings.

5.19.1 [System>]

Pop up system information and system log soft menu.

1) [System Info]
2) [Firmware Update]
3) [Option>]

5.19.1.1[System Info]

Press to display system information.

5.19.1.2 [Firmware Update]

1. Create a folder named "spectrum" (lowercase) on the root directory of the USB memory device, and copy the firmware file onto this folder.
2. Insert the USB memory device into the front-panel USB connector on your instrument. Press [System]key on the front panel, press [System >], and press [Firmware Update] to execute firmware update.
3. The analyzer will perform the update process. The upgrade procedure will take approximately 30 seconds. During the update process, do not remove the USB memory device, do not power off the instrument or press any key. If the update process fails, please report the problem to your distributor or our technical support.
4. Once the upgrade is completed, the instrument will automatically

restart

5.19.1.3[Option>]

Enter option TG or EMI function configuration.

5.19.1.4[Return]

Return to the previous menu.

5.19.2 [Setting>]

A soft menu for setting the interface address of the spectrum analyzer, including [Network >]. The spectrum analyzer supports VGA, LAN and USB interface communication.

5.19.2.1 [LAN>]

Pop out the relative menu for network configuring.
1) [IP]
Used to set the IP address of the LAN port.
2) [Mask]
Set the subnet mask parameter.
3) [Gate]
Set default gateway address.
4) [DHCP On Off]
One of the setting methods of IP address. The DHCP server assigns an IP address, subnet mask and gateway to the analyzer on the basis of the current network status.
5) [Return]
Return to the previous menu.

5.19.2.2 [Shutdown On Off]

Enable or disable the automatic shutdown time of the spectrometer. When the spectrometer is idle, execute automatic shutdown according to the time parameters set.

5.19.2.3 [Language>]

To set the system language.

5.19.2.4 [Date/Time>]

Used to set the device date, time, and their format.

1)[Date/Time On Off]

Turn on or off Date/Time display.

2)[Date Set]

Set the display date for spectrum analyzer. Format is YYYMMDD. E.g. June 22th,2012 should display as 20120622.

3)[Time Set]

Set the display time for spectrum analyzer. Format is HHMMSS. E.g. 16:55:30 should display as 165530.

4)[Return]

Return to the previous menu.

5.19.3 [PowerOn/Preset>]

Used to set the analyzer power on parameters or reset parameters.

5.19.3.1 [Power Set>]

Power-on parameter settings include [Factory] and [User>].

5.19.3.2 [Preset>]

Power-on parameter settings include [Factory] and [User>].

Note: To save the current system configuration as a user-defined configuration, press the [Save/Recall] panel key and select the [User Status] menu item.

Table 8-2 [Factory] Settings

Parameter	Value	
Frequency		
Center Frequency	500M	250.009000MHz
	1G	500.009000MHz
	1.5G	750.009000MHz
Start Frequency	9.000 kHz	
Stop Frequency	500M	500.009000MHz
	1G	1.000009000GHz
	1.5G	1.500009000GHz
Frequency Step	500M	Auto 50.000000 MHz
	1G	Auto 100.000000 MHz
	1.5G	Auto 150.000000 MHz
Frequency Offset	0 Hz	
Frequency Reference	Internal	
SPAN		
Sweep	500M	500.000000MHz

	1G	1.000000000GHz
	1.5G	1.500000000GHz
AMPTD		
Reference Level	0.00 dBm	
Attenuator	Auto 10 dB	
Scale/div	10.00 dB	
Scale Type	Log	
Reference Offset	0.00 dB	
Unit	dBm	
Preamp	Off	
BW		
Resolution Bandwidth	Auto 1 MHz	
Resolution Step	Default	
Video Bandwidth	Auto 1 MHz	
Trace Average	Off	
Detector		
Detect Type	Pos Peak	
Sweep		
Sweep Time	Auto 24.000 ms	
Sweep Term	Continuous Sweep	
Source		
Tracking Source	Off	
Output Level	-10dBm	
Network Meas	Off	
Trace		
Trace	1	
Trace Type	Clear Write	
Trace 1 Math	1<- ->2	
Display		
Full Display	Off	
Window Zoom	Off	
Display Line	Off	
Amplitude Scale	On	
Grid	On	
Label	On	
Trig		

Trigger Type	Auto
Demod	
DEMOD	Off
Analog Demod	Off
Peak	
Peak Search	Off
Marker Fctn	
NdB	Off
Marker Noise	Off
Frequency Count	Off
Marker	
Marker	1
Trace	1
Marker List	Off
Meas	
Time Spectrum	Off
Adjacent Power	Off
Channel Power	Off
Occupied Bandwidth	Off
pass-fail	Off
Meas Setup	
Channel Bandwidth	1.000000 MHz
Channel Gap	2.000000 MHz
Adjacent Number	3
Occupied Bandwidth	99.00%
System	
Interface	LAN
IP	192.168.1.13
Mask	255.255.255.0
Gate	192.168.1.1
DHCP	Off
Language	English
Date/Time	On

5.20 [File]

Pop up file management soft menu.

5.20.1 [Storage Int Ext]

Select file storage location: Internal or external.

5.20.2 [Type >]

To check file type under directory, includes screen image, trace data and display all.

5.20.3 [First Page]

Display first page of current directory.

5.20.4 [Prev Page]

Display Previous page.

5.20.5 [Next Page]

Display next page.

5.20.6 [Last Page]

Display last page of current directory.

5.20.7 [Operations>]

Enter file operation soft menu, including [Sort>], [Delete>], [Export>], [Load], [Power Set], [Preset].

5.21 [Preset]

Press the [**Preset**] key on the front panel to restore the factory default settings or user-defined settings with one key. By default, the factory default settings are restored with the [**Preset**] key.

5.22 [Quick/Save]

Shortcut key for saving screenshots, trace data or user state. The type of file is set in the [**Save Setup►**] menu of the [**Save/Recall**] key. Generally, you can select the file save type as screenshots, trace data or user state, and save it to the internal memory or an external U disk (if inserted).

5.23 [Save/Recall]

Save, recall or set to quickly save screenshot, trace data, or user state.

5.23.1 [Save>]

It's available to save screenshot, trace data, or user state.

5.23.1.1 [Screen Pixmap>]

Enter screenshot save soft menu, you can choose to save screenshots to local or flash memory, the image file format is bmp, the lower left corner of the screen status display bar will display the saved screenshots information.

5.23.1.2 [Trace Data>]

Enter the trace data save soft menu, you can choose to save the trace data to the local or flash memory, trace data file format is csv, the bottom left corner of the screen status display trace data saving information.

5.23.1.3 [User State]

Save the current system configuration as a user self-defined configuration. Save it in local. The information on saving the user status will display in the status bar of the bottom left corner of the screen.

5.23.1.4 [Limit Line]

Save the limit line file at local site. The format of limit line file is sp.

A progress display box (pop-up window) in the middle of the screen will display relevant information about saved limit lines.

Note: The limit line can only be loaded when the area measurement mode is enabled (Meas → Pass-Fail → Area Measurement).

5.23.1.5 [CISPR Config]

Save the current CISPR configuration, including but not limited to the start frequency, stop frequency, sweep segments, and limit lines.

5.23.1.6 [Antenna]

Save the current antenna configuration.

5.23.2 [Recall>]

Recall screenshot, trace data, user state or all related information.

5.23.2.1 [Type>]

Select to recall screenshot, trace data, user state or all file types to the local. The screenshot file format is bmp, the trace data file format is csv, and the user state file format is user. The progress box displayed in the middle of the screen will display load successfully and other related information.

5.23.2.2 [Sort>]

Select screenshot, trace data, user state or all files to view related information in the required order of name, time, or size.

5.23.2.3 [First Page]

Display the first page of the current directory.

5.23.2.4 [Prev Page]

Display the previous page.

5.23.2.5 [Next Page]

Display the next page.

5.23.2.6 [Load>]

Load the relevant information of the selected file.

5.23.2.7 [Return]

Return to the previous menu.

5.23.3 [Save Setup>]

Set the file type for quick save as screenshot, trace data or user state.

5.23.3.1 [Screen Pixmap]

Set the file type for quick save as screenshot.

5.23.3.2 [Trace Data]

Set the file type for quick save as trace data.

5.23.3.3 [User Stage]

Set the file type for quick save as user state.

5.23.3.4 [Limit Line]

Save the limit line file at local site. The format of limit line file is sp. A progress display box (pop-up window) in the middle of the screen will display relevant information about saved limit lines.

Note: The limit line can only be loaded when the area measurement mode is enabled (Meas → Pass-Fail → Area Measurement).

5.23.3.5 [CISPR Config]

Save the current CISPR configuration, including but not limited to the start frequency, stop frequency, sweep segments, and limit lines.

5.23.3.6 [Antenna]

Save the current antenna configuration.

5.24 [Help]

Spectrum analyzer help menu, press this key once to open the system help, press any key to display the help content, and press this key again to close the help function.

6. EMI Measurement mode(optional)

6.1 EMI Measurement mode interface

Press **[Mode]** to enter mode menu and select **[EMI]** to enter the EMI measurement mode interface,as shown in the below figure.

Scan Spectrogram, and its configuration information

Meter Results, and its configuration information

Signal list and its final measurement results are displayed

Figure 6-1 EMI measurement interface

6.2 Basic Control

6.2.1 [FREQ]

Press [FREQ] to enter frequency menu.

6.2.1.1[Meter Freq]

Set the meter frequency.

Parameter	Description
Default value	165MHz
Range	0 Hz ~ Full Span
Unit	GHz 、MHz、kHz、Hz
Knob step	Step=Span/200;the minimum value is 1Hz
The arrow keys step	Span/10
Association	None

6.2.1.2[Center Freq]

Set the center frequency of the current sweep.

Key points：

- The value of center frequency and sweep width will be modified together when the span does not reach the minimum value (please refer to the "[SPAN]" description of P30 for parameter modification caused by span change), and the stop frequency will be changed if the span continues to increase after it reaches the minimum value.

Parameter	Description
Default value	165MHz
Range	50 Hz ~ (full span - 50 Hz)
Unit	GHz 、MHz、kHz、Hz
Knob step	Step=frequency step/100
The arrow keys step	Frequency step
Association	Start frequency, stop frequency

6.2.1.3[Start Freq]

Set the start frequency.

Parameter	Description
Default value	30MHz

Range	0 Hz ~ (full span - 100 Hz)
Unit	GHz 、MHz、kHz、Hz
Knob step	Step=frequency step/100
The arrow keys step	Frequency step
Association	Center frequency, stop frequency and related parameters

6.2.1.4[Stop Freq]

Set the stop frequency.

Parameter	Description
Default value	300MHz
Range	100 Hz ~ full step
Unit	GHz 、MHz、kHz、Hz
Knob step	Step=frequency step/100
The arrow keys step	Frequency step
Association	Start frequency, center frequency and related parameters

6.2.1.5[Freq Step]

Set the frequency step.

Parameter	Description
Default value	Span/10
Range	1 Hz ~ full span
Unit	GHz 、MHz、kHz、Hz
Knob step	1MHz
The arrow keys step	1, 2, 5 multiple steps
Association	Span and related parameters

6.2.1.6[Freq Offset]

Set the frequency offset.

Parameter	Description
Default value	0Hz
Range	-9 GHz ~ 9 GHz
Unit	GHz 、MHz、kHz、Hz
Knob step	1MHz
The arrow keys step	1, 2, 5 multiple steps
Association	Span and related parameters

6.2.1.7[Freq Ref]

Set the reference frequency as internal or external input, this is regarded as whole device reference. If the external signal is not locked according to judgment after switching to external, the prompt will pop up and it will switch back to internal automatically.

6.2.2 [SPAN]

Press [SPAN] to enter the span menu.The change of span will cause the change of frequency parameters. When the span is changed, it stops the running sequence.

6.2.2.1[Span]

Set the span.Under the same CISPR configuration, a larger span results in a correspondingly larger number of scan points.
For example, the CISPR segmentation configuration parameters are as follows:
Start Freq =150kHz Stop Freq =30MHz
RBW=9kHz RBW/Step =1.0
Max_{span} = 800 * (RBW / RBW/Step)
The start frequency of the system scan is S_1 = 1MHz,stop frequency of the system scan is S_2=20MHz
n = (S_2 - S_1) / Max_{span}
Max_{span} denotes the maximum sweep width of a segment
n represents the number of frequency bands spanned, and one

number of scan points represents the size of the frequency interval of one RBW/ RBW/Step

Key points:

- Adjusting the span will automatically modify the start and stop frequency of the spectrum analyzer.
- When manually setting the span, the minimum setting is 100 Hz. Setting the span to the maximum value puts the spectrum analyzer into full span mode.
- Changing the span will automatically modify the frequency step if it is in automatic mode.
- The maximum value of n is 100, and its maximum sweep width is 100* $Max_{span.}$

Parameter	Description
Default value	270MHz
Range	100 Hz ~ full span
Unit	GHz 、MHz、kHz、Hz
Knob step	Step = frequency step /100
The arrow keys step	1, 2, 5 multiple steps
Association	Start frequency, stop frequency, and CISPR configuration

6.2.2.2 [CISPR Band>]

Access the file list and load the CISPR configuration file. Prior to conducting EMI scans, it is mandatory to load a CISPR configuration; otherwise, scanning will not be permitted.

6.2.3 [AMPTD]

Press [AMPTD] to enter the amplitude menu.Sets the amplitude parameters of the analyzer. Through these parameters, signals under measurement can be displayed at an optimal view with minimum error.After the amplitude parameter is changed, the span starts again.

6.2.3.1[Ref Level]

Set the reference level, which represents the maximum

power/level that can be displayed on the current grid. This value is also shown in the top left corner of the screen. Changing the reference level will modify the front-end parameters, and its setting must satisfy the condition:
Reference level ≤ Input Attenuation - Preamplifier - 20 dBm.
The reference level is a critical parameter of the spectrum analyzer, indicating the upper limit of the dynamic range of the current spectrum analyzer. When the energy of the signal under test exceeds the reference level, nonlinear distortion or even overload warnings may occur.
It is important to understand the nature of the signal under test and carefully select the reference level to achieve optimal measurement results and protect the spectrum analyzer.

Parameter	Description
Default value	0 dBm
Range	-120 dBm ~ 30dBm
Unit	dBm、dBμW、dBμA、dBmV、dBμV、W、V
Knob step	Low knob step = (scale/div) /100 Quick knob step = (scale/div) /10
The arrow keys step	Scale/div
Association	Attenuator, preamplifier, and related parameters

Note:The maximum reference level may be different for different machine models, please refer to the Specification for details.

6.2.3.2 [Attenuation]

Sets the front attenuator of the RF input in order to permit big signals (or small signals) to pass from the mixer with low distortion (or low noise).
Reference Level≤Input attenuation-Preamplifier-20 dBm
The input attenuation can be set to automatic and manual attenuation modes:

- The attenuation value in automatic mode is automatically adjusted according to the preamplifier state and the current reference level value
- The preamplifier is turned on in manual mode, and the input attenuation can be set to a maximum of 40dB. When the set

parameters do not satisfy the above formula, it is guaranteed by adjusting the reference level.

Parameter	Description
Default value	10 dB
Range	0 dB ~ 40 dB
Unit	dB
Knob step	1 dB
The arrow keys step	10 dB
Association	Reference level, preamplifier, and related parameters

6.2.3.3 [Scale/Div]

Sets the vertical scale size per grid to adjust the current range of magnitudes that can be displayed. This feature is only available if the scale type is logarithmic.Note the following points during use:
Adjust the current range of magnitudes that can be displayed by setting different scales. The range of signal amplitudes that can currently be displayed:
Minimum value:Reference level-10*Current scale
Maximum value:Reference level.

Parameter	Description
Default value	10 dB
Range	0.01 dB ~ 1000 dB
Unit	dB
Knob step	Low knob step=0.01dB Quick knob step=0.1dB
The arrow keys step	1, 2, 5 multiple steps
Association	Reference level

6.2.3.4[Scale Type]

Sets the Scale Type of Y-axis to LIN or LOG, the default is LOG.

- The scale value is immutable under the linear scale, and the display range is 0% to 100% of the reference level.
- In Log scale type: the Y-axis denotes the logarithmic coordinates, the value shown at top of the grid is the reference level and the grid size is equal to the scale value. The unit of Y-axis will be automatically switched into the default "dBm" when the scale type is changed from LIN to LOG.
- In Lin scale type: the Y-axis denotes the linear coordinates, the value shown at the top of the grid is the reference level and the bottom of the grid shows 0 V. The grid size is 10% of the Reference level and the Scale/Div is invalid. The unit of Y-axis will be automatically switched into the default "V" when the scale type is changed from LOG to LIN.
- Other than as mentioned above, the unit of Y-axis is independent of the Scale Type.

6.2.3.5[Ref Offset]

Assigns an offset to the reference level to attempt to compensate for gains or losses generated between the device under measurement and the analyzer.

- The changing of this value changes both the readout of the reference level and the amplitude readout of the marker, but will not impact the position of the curve on the screen.
- You can modify this parameter using the numeric keys.

Parameter	Description
Default value	0 dB
Range	-120 dB ~ 120 dB
Unit	dB
Knob step	Slow knob step=0.01dB Quick knob step=0.1dB
The arrow keys step	Scale/div
Association	None

6.2.3.6[Ref Unit>]

Please refer to 6.5.3.3 [Measure mode] for detail.

6.2.3.7[Preamplifier]

Sets the status of preamplifier located at the front of the RF signal path. Turning on the preamplifier reduces the displayed average noise level in order to distinguish small signals from the noise when working with small signals.
When the preamplifier enable, the PA appears in the left status area of the screen.

6.3 Scan Settings

6.3.1 [BW]

Press [BW] to enter bandwidth menu.

6.3.1.1[Scan RBW>]

Please refer to 6.5.3.2 CISPR Edit “4）RBW” for detail.

6.3.1.2[Meter RBW]

Set the meter resolution bandwidth.

Parameter	Description
Default value	9 kHz
Range	200Hz、9kHz、120kHz、1MHz
Unit	MHz、kHz、Hz
Knob step	Step up one gear
The arrow keys step	Step up one gear
Association	None

6.3.2 [Trace]

Press [Trace] to enter the trace menu.As the sweep signal is displayed as a trace on the screen.

6.3.2.1[Trace]

Up to three traces can be displayed, corresponding to 1, 2, and 3. Each trace is colored differently (trace 1- yellow, trace 2- purple, trace 3- light blue).

6.3.2.2[State>]

1) [Clear&Write]
Each point of the trace takes the data after real-time scanning.
2) [Max Hold]
Each point of the trace keeps displaying the maximum value of multiple scans, and updates the data display when a new maximum value is generated.
3) [Min Hold]
Each point of the trace keeps displaying the minimum value of multiple scans, and updates the data display when a new minimum value is generated.
4) [Average]
Set the trace average.

Parameter	Description
Default value	50
Range	2 ~ 50
Unit	None
Knob step	1
The arrow keys step	10
Association	None

5) [View]
Stop updating trace data to facilitate observation and reading. Traces that are loaded to the system from storage devices or remotely.The default type is view.
6) [Blank]
Clear the trace on screen. But the trace stock will keep still without refreshing.
7) [Return]
Return to the previous menu.

6.3.3 [Detector]

The detection type supports three detection types:Positive peak, Quasi-Peak,and RMS Average.

6.3.4 [Sweep]

Press [Sweep] to enter sweep menu.

6.3.4.1[Scan>]

1) [Scan Mode>]
The default is Sweep cont, sweep continuous only after Meas Setup-> Sequence -> Scan and then start measurement,the scanning process is performed sweep continuous. Single scan, the scan will stop after the completion of the number of scans.
2) [Sweep Count]
Valid only if scan mode is set to sweep single.
3) [Select Section]
According to the CISPR configuration file, select the current section, which defaults to 1.
4) [RBW/Step]
Please refer to 6.5.3.2 CISPR Band “4）RBW” for detail.
5) [Dwell Time]
Please refer to 6.5.3.2 CISPR Band “6）More” for detail.
6) [Return]
Return to the previous menu.

6.3.4.2[Meter>]

1) [Meter Mode>]
The default is Sweep cont, sweep continuous only after Meas Setup-> Sequence -> Scan and then start measurement, the scanning process is performed sweep continuous. Single scan, the scan will stop after the completion of the number of scans.
2) [Dwell Time]
Please refer to 6.5.7.2 Dwell Time for detail.
3) [Return]
Return to the previous menu.

6.4 Marker Settings

Press [Marker] to enter the marker menu.The marker appears as a rhombic sign (shown below) for identifying the point on the trace. We can easily readout the parameters of the marked point on the trace, such as the amplitude, frequency and sweep time.
Key points:
- The analyzer allows for up to eight markers to be displayed at one time, but only one single marker is active every time.
- You can use the numeric keys, knob or direction keys to enter the desired frequency or time when any marker type menu is active,

so as to view the readouts of different points on the trace.

6.4.1 [Marker]

6.4.1.1[Marker]

A total of eight different cursors can be set, and each trace can have multiple cursors.

6.4.1.2[Trace]

Up to three traces can be displayed, corresponding to 1, 2, and 3. Each trace is colored differently (trace 1- yellow, trace 2- purple, trace 3- light blue).

6.4.1.3[Normal]

Please refer to P55 “[Marker]” for detail.

6.4.1.4[Delta]

Please refer to P55 “[Marker]” for detail.

6.4.1.5[Off]

The marker information displayed on the screen and functions based on the marker will be turned off and won’t show up again.

6.4.1.6[All Off]

Turns off all the opened markers and the related functions. The marker won’t show again.

6.4.1.7[Marker Table]

Turns on or off the display of all marker table.Open the list of frequency, the list of all open frequency will be displayed in the color of the frequency trace at the bottom of the screen, including the frequency sequence number, frequency type, frequency trace, frequency time and frequency amplitude.It is used to observe the spectrum information of multiple frequency.

6.4.2 [Marker→]

Press [Marker→] to enter Marker→ menu.

6.4.2.1[Marker]

The default is 1, and the currently selected marker will be

displayed in the upper right corner of the scanning interface. Set the marker function for the current marker.

6.4.2.2 [Mkr→List]

The frequency corresponding to the current marker is added to the peak list.

6.4.2.3 [Mkr→Meter]

The frequency measured by the Meter is set to the frequency corresponding to the current marker.

6.4.2.4 [Meter→Mkr]

The frequency of the current selected marker is set to the Meter frequency.

6.4.3 [Peak]

Press [Peak] to enter Peak menu.

6.4.3.1[Mkr→CF]

The center frequency is set to the frequency value corresponding to the current cursor.

6.4.3.2[Peak-Peak]

The current cursor is set to the difference state, and the reference is marked as the frequency at the minimum amplitude value, and the Marker is marked as the frequency at the maximum amplitude value.

6.4.3.3[Next Peak]

Search for the peak value on the trace that is currently under the highest grid, and find the peak value that has the smallest difference in magnitude with it. Mark it with a cursor.

6.4.3.4[Left Peak]

Search for the peak value on the trace that is to the left of the current peak value, and find the peak value that has the closest distance to it. Mark it with a cursor.

6.4.3.5[Right Peak]

Search for the peak value on the trace that is to the right of the

current peak value, and find the peak value that has the closest distance to it. Mark it with a cursor.

6.4.3.6[Cont Peak]

Automatic research extreme amplitude.

6.5 Measurement Settings

Press [Meas Setup] to enter measurement menu.

6.5.1 [Sequence>]

Setting different processes results in variations in the measured content.

6.5.1.1[Scan Only]

Measurements related only to scan.

6.5.1.2[Search Only]

Search the current trace and it is meaningful to search only after the trace scan is completed, otherwise the measured signal will be inaccurate.

6.5.1.3[Scan&Search&Meas]

The sequence of operations is scanning, searching, and then measuring.

6.5.1.4[Scan&Search]

Combine scanning and searching for measurement purposes.

6.5.1.5[Search&Meas]

Combine searching and measuring for measurement purposes.

6.5.1.6[Meas]

Measure each frequency in the peak signal list sequentially. If the measurement result exceeds the corresponding limit line frequency value, display the difference in the list as red.

6.5.2 [Start/Pause]

To start the measurement, import the required CISPR configuration file([Meas Setup]->[Scan Config]->[CISPR Band]),after importing the file, you can also change its related configuration, and finally

press the [Start] button to scan([Meas Setup]->[start]),according to the CISPR Band in the scan configuration, the test is started or stopped after selecting the process. When the scan is completed, enter the Meter for measurement.

6.5.3 [Scan Config>]

6.5.3.1[CISPR Band>]

Enter the list of file,import CISPR file,a CISPR profile must be loaded before EMI scan, otherwise scanning is not allowed.

6.5.3.2[CISPR Edit>]

User is required to load a CISPR configuration file from the file list, which describes the frequency range, dwell time, peak value settings for scanning, as well as the corresponding limit lines for different detectors.

1）[Select Section]
According to CISPR configure file and select section,the default section is 1.

2）[Start Freq]
Edit the start frequency of the current segment.

Parameter	Description
Default value	CISPR configuration file Settings
Range	0 Hz ~ (full span - 100 Hz)
Unit	GHz 、MHz、kHz、Hz
Knob step	Current segment span/200
The arrow keys step	Current segment span/10
Association	stop frequency

3）[Stop Freq]
Edit the stop frequency of the current segment.

Parameter	Description
Default value	CISPR configuration file Settings
Range	100 Hz ~ (full span)

Unit	GHz 、MHz、kHz、Hz
Knob step	Current segment span/200
The arrow keys step	Current segment span/10
Association	start frequency

4）[RBW]

Set the RBW under the currently selected section.

Parameter	Description
Default value	CISPR configuration file Settings
Range	200Hz、9kHz、120kHz、1MHz
Unit	MHz、kHz、Hz
Knob step	Step up one gear
The arrow keys step	Step up one gear
Association	None

5）[RBW/Step]

Set the RBW/Step under the currently selected section.

Max RBW=Scan Points *（RBW / RBW Step）

Parameter	Description
Default value	CISPR configuration file Settings
Range	0.1、0.3、0.5、1、2、3
Unit	None
Knob step	Step up one gear
The arrow keys step	Step up one gear
Association	None

6）[More>]

e）[Dwell Time]

Set the dwell time under the currently selected section.

Parameter	Description
Default value	CISPR configuration file Settings
Range	1ms ~ 1s
Unit	s、ms、μs、ns
Knob step	Step = one-tenth of the current unit For example:120ms step=1ms*0.1
The arrow keys step	Step in integer multiples of 1, 2, and 5
Association	None

f）[Peak Setup>]

●[Peak Threshold]

Specify the minimum value of peak amplitude, where only peaks exceeding the peak limit value can be considered as valid peaks.
Set the peak threshold under the currently selected section.

Parameter	Description
Default value	CISPR configuration file Settings
Range	-180dBm ~ 30dBm
Unit	dBm、dBμW、dBμA、dBmV、dBμV、W、V
Knob step	1dBm
The arrow keys step	Step in integer multiples of 1, 2, and 5
Association	None

●[Peak Offset]

Specify the difference between the peak value and the amplitude of the adjacent local minima on both sides. Peaks with a difference greater than the peak offset are considered as valid peaks.
Set the peak threshold under the currently selected section.

Parameter	Description
Default value	CISPR configuration file Settings
Range	0dB ~ 120dB

Unit	dB
Knob step	1dB
The arrow keys step	10dB
Association	None

●[Peak Number]
Specify maximum peak number of current section.
Set the peak number under the currently selected section.

Parameter	Description
Default value	CISPR configuration file Settings
Range	1 ~ 20
Unit	None
Knob step	1
The arrow keys step	5
Association	None

●[Return]
Return to the previous menu.
g）[Return]
Return to the previous menu.
7）[Return]
Return to the previous menu.

6.5.3.3[Measure mode]

Measure mode is divide into near filed measurement and far field measurement.
Near filed measurement:the measurement unit is dBm,dBμW, dBμA,dBmV,dBμV,W,V.
Far field measurement:the measurement unit is dBμV/m,dBμA/m or dBpT.

6.5.3.4[Limit Edit>]

1）[Limit]
The default limit is 1，the index 1 in the menu list serves as the limit

line for positive peaks, 2 serves as the limit line for quasi-peaks, and 3 serves as the limit line for average values.Different CISPR configuration have different limit lines, and the user can also edit the limit lines for different detectors separately.

2）[Pos Peak Limit>]

a）[Limit Edit>]

Add, insert, delete, clear the list of limit lines, and modify the frequency and amplitude of a screen point.

b）[Save Line]

Save the currently selected limit line.

c）[Load Line>]

Retrieve the limit lines saved internally in the device.

d）[Return]

Return to the previous menu.

3）[Offset X/Y]

All limits are biased in amplitude and frequency.

4）[Return]

Return to the previous menu.

6.5.3.5[Antennae Config>]

Set the far field measurement configuration.

1）[Edit>]

Set the antenna factor.

2）[Save Antennae]

Save as an.ant file.

3）[Load Antennae>]

Load the saved.ant file.

4）[Return]

Return to the previous menu.

6.5.3.6[Save CISPR]

Save the current CISPR configuration, including but not limited to start frequency, stop frequency, scan section, limit lines, etc.

6.5.4 [Peak Setup>]

6.5.4.1[Select Section]

According to CISPR configure file to select current section,and the default is 1.

6.5.4.2[Peak Threshold]

Please refer to 6.5.3 [Scan Config] for detail.

6.5.4.3[Peak Offset]

Please refer to 6.5.3 [Scan Config] for detail.

6.5.4.4[Peak Number]

Please refer to 6.5.3 [Scan Config] for detail.

6.5.5 [Meas Config>]

6.5.5.1[Meas Signal>]

1）[Current Signal]
Only the currently signal in the peak list is measured, valid if and only if the process is a measurement.
2）[All Signal]
All signals in the peak list are measured and valid if and only if the process is a measurement.
3）[Marker Signal]
Only the marker signal in the peak list is measured, valid if and only if the process is a measurement

6.5.5.2[Select Detector]

The default selection is 1,1 is used only as a positive peak detector, 2 as a quasi-peak detector, and 3 as an RMS average detector.

6.5.5.3[Pos Peak>]

1）[Switch]
Enable or disenable the positive detector.
2）[Dwell Time]
Set the dwell time of current detector.

Parameter	Description
Default value	CISPR configuration file Settings
Range	1ms ~ 1s
Unit	s、ms、μs、ns
Knob step	Step = one-tenth of the current unit Foe example:120ms step=1ms*0.1
The arrow keys step	Step in integer multiples of 1, 2, and 5

Association	None

3）[Return]
Return to the previous menu.

6.5.6 [List Control>]

6.5.6.1[Select Signal]

The default current signal is 1,the index is used as the current signal.When different signals are selected, the Meter Freq will change accordingly.

6.5.6.2[Marker Signal]

Mark the current signal.

6.5.6.3[Clean Marker]

Clear the mark of the current signal.

6.5.6.4[Marker All]

Mark all signals in the peak signal list.

6.5.6.5[Clan All Marker]

Clean the marker of all signal in the peak signals.

6.5.6.6[More>]

1）[Delete Signal]
Removes the current signal from the list.
2）[Delete All]
Removes all signals from the signal list.
3）[Delete Marker]
Remove all marked signals.
4）[Sort>]
a）[Frequency]
Sort all signals in the signal list by frequency.
b）[Detector Result]
Detector result 1:Sort the magnitude of positive peak values;
Detector result 2:Sort the magnitude of true RMS values;
Detector result 3:Sort the magnitude of average effective voltage.
c）[Difference Result]
Difference result 1:Sort the magnitude of positive peak difference;
Difference result 2:Sort the magnitude of true RMS difference;

Difference result 3:Sort the magnitude of average effective voltage difference.

d）[Return]

Return to the previous menu.

5）[Sequence]

The list of peak signals is sorted in ascending or descending order

6）[Return]

Return to the previous menu.

6.5.7 [Meter Config>]

6.5.7.1[Meter Mode>]

Set the scanning mode of Meter measurement, which is divided into single and continuous sweep.

1) [Sweep Signal]

Sweep will stop after sweeping the metering frequency only once.

2) [Sweep Cont]

The measurement frequency is sweep continuously.

3) [Return]

Return to the previous menu.

6.5.7.2[Dwell Time]

Set the dwell time of meter mode.

Parameter	Description
Default value	10 ms
Range	1ms ~ 1s
Unit	s、ms、μs、ns
Knob step	Step = one-tenth of the current unit For example:120ms step=1ms*0.1
The arrow keys step	Step in integer multiples of 1, 2, and 5
Association	None

6.5.7.3[Reset MaxHold]

Reset the historical maximum values measured by the meters of the three types of detectors.

6.5.7.4[Close All]

All the detector interfaces in the Meter measurement are closed, and the measurement results are not displayed.

6.5.7.5[Detector Config>]

1）[Meter Select]
The default choice is 1 as the current measurement. Set different metering parameters.
2）[Meter Switch]
Enable or disenable the current selected meter detector.
3）[Meter Detector>]
The default menu button list: Meter 1 corresponds to the positive peak detector, Meter 2 corresponds to the true RMS detector, and Meter 3 corresponds to the average voltage detector. You can switch the current meter selection to any of the three detectors mentioned.
4）[Meter Limit>]
a）[Limit Switch]
Whether to display the limit values of the current measurement.
b）[Limit Value]
Set the limit values for the current meter detector. Used to determine if the amplitude at this meter frequency under measurement conditions exceeds the limit standards.
c）[Limit To Value]
Read limit line data under the meter detector according to the meter frequency.
d）[Return]
Return to the previous menu.
5）[Return]
Return to the previous menu.

7. Specification

This chapter lists the technical specifications and general technical specifications of the spectrum analyzer. Unless otherwise stated, the technical specifications apply to the following conditions:

- The instrument has been preheated for 30 minutes before use.
- The instrument is in the calibration cycle and has been self-calibrated.

"Typical" and "nominal" for this product are defined as follows

- Typical: Refers to the performance of the product under certain conditions.
- Nominal: Refers to the approximate value under product application process.

Frequency		
Frequency Range	XSA805（TG）	9.000 kHz to 500.009 MHz
	XSA810（TG）	9.000 kHz to 1.000009 GHz
	XSA815（TG）	9.000 kHz to 1.500009 GHz
Frequency Resolution	1 Hz	
Frequency Span		
Span Range	0 Hz, 100 Hz to max frequency of instrument	
Span Uncertainty	± span / (sweep points-1)	
Internal Reference Frequency		
Reference Frequency	10.000000 MHz	
Reference Frequency Accuracy	±[(days since last calibrate × freq aging rate) + temperature stability + initial accuracy]	
Temperature stability	0℃ to 50℃, reference to 25℃ < 0.5 ppm	
Aging rate	<1 ppm/year	
Frequency Readout Accuracy		
Marker frequency resolution	span / (number of sweep points - 1)	

Marker frequency uncertainty		±(frequency indication × reference frequency accuracy + 1% × span + 10% × resolution bandwidth + marker frequency resolution)
Frequency Counter		
Resolution		1 Hz, 10 Hz, 100 Hz, 1 kHz
Uncertainty		±(frequency indication × reference frequency accuracy + counter resolution)
Frequency Span		
Range		0 Hz, 100 Hz to maximum frequency of instrument
Uncertainty		± span / (number of sweep points - 1)
SSB Phase Noise (20℃ to 30℃,fc=1 GHz)		
Carrier Offset	10 kHz	< -80 dBc/Hz
	100 kHz	< -100 dBc/Hz
	1 MHz	< -115dBc/Hz
Residual FM (20℃ to 30℃, RBW = VBW = 1 kHz)		
Residual FM		< 50 Hz (nominal)
Bandwidth		
Resolution Bandwidth(-3dB)		1 Hz to 1 MHz (1-3-5-10 steps by sequence)
RBW accuracy		< 5%, typical
Resolution Filter Shape Factor (60 dB : 3 dB)		<5 typical
Video Bandwidth (-3 dB)		10 Hz to 1 MHz(1-3-5-10 steps by sequence)
Resolution bandwidth (-6 dB) (EMI)		200 Hz,9 kHz,120 kHz,1 MHz 200 Hz, 9 kHz, 120 kHz, 1 MHz
Amplitude and level		

Amplitude measurement range	DANL to +10 dBm, 100 kHz to 10MHz, Preamp Off DANL to +20 dBm, 10 MHz to 1.5 GHz, Preamp Off		
Reference Level	-80 dBm to +30 dBm, 0.1dBm by step		
Preamp	20 dB, nominal, 100 kHz to 1.5 GHz		
Input Attenuator Range	XSA805（TG） XSA810（TG） XSA815（TG）	0 to 40 dB, in 1 dB step	
Max Input DC Voltage	50 V		
Max continuous power	+20dBm, average continuous power		
Max. damage level	+30 dBm（1 W）		
Display Average Noise Level (attenuation = 0 dB, RBW = VBW = 100 Hz, sample detector, trace average ≥ 50, 20℃ to 30℃, input impendence = 50 Ω)			
Preamp Off	9 kHz 至 1 MHz		-95 dBm (Typical), <-88 dBm
	1 MHz 至 500 MHz		-140 dBm (Typical), <-130dBm
	XSA810（TG）	500 MHz to 1 GHz	
	XSA815（TG）	500 MHz to 1.5 GHz	-138 dBm (Typical), <-128dBm
Preamp On	9 kHz 至 1 MHz		-135 dBm (Typical), <-128 dBm
	1 MHz 至 500 MHz		-160 dBm (Typical), <-150 dBm
	XSA810（TG）	500 MHz to 1 GHz	
	XSA815（TG）	500 MHz to 1.5 GHz	-158 dBm (Typical), <-148 dBm
Level Display			
Logarithmic level axis	1 dB to 255 dB		
Linear level axis	0 to reference level		
Number of display points	513		
Number of traces	5		
Trace detectors	positive-peak, negative-peak, normal, sample, RMS, voltage average		

		quasi-peak
Trace functions		clear write, max hold, min hold, average, view, blank, trace math
Units of level axis		dBm, dBμW, dBpW, dBmV, dBμV, W, V
Frequency response (20℃ to 30℃, 30% to 70% relative humidity, input attenuation=10 dB, reference frequency=50 MHz)		
Preamp Off (fc≥9K)		±0.7 dB
Preamp On (fc≥50 MHz)		±1.0 dB
Input Attenuation Switching Uncertainty		
Setting range		0 dB to 40 dB, in 1 dB step
Switching uncertainty		fc = 50 MHz, relative to 10 dB, 20℃ to 30℃
		＜0.5 dB
Absolute Amplitude Uncertainty		
Uncertainty		fc = 50 MHz, peak detector, preamplifier off, attenuation = 10 dB, input signal level = -10dBm, 20℃ to 30℃
		＜0.4 dB
RBW Switching Uncertainty		
Uncertainty		relative to 10 kHz RBW
		＜0.1 dB
Reference Level		
Range		-80 dBm to +30 dBm, in 1 dB step
Resolution	log scale	0.01 dB
	linear scale	4 digits
Preamplifier input signal range 0 dBm to -50 dBm		
Gain	100 kHz to 1.5 GHz	20 dB (nominal)
Level Measurement		

Uncertainty		95% confidence level, S/N > 20 dB, RBW = VBW = 1 kHz, preamplifier off, attenuation = 10 dB, -50 dBm < input level ≤ 0 dBm, fc > 10 MHz, 20℃ to 30℃	
RF Input VSWR (attenuation ≥ 10 dB)			
VSWR	300 kHz to 1.5 GHz	＜1.5 (nominal)	
Distortion and spurious response			
Second harmonic distortion		fc ≥ 50 MHz, Preamp off, signal input -20 dBm, attenuation = 10 dB	
		-45 dBc	
Third-order intermodulation		fc ≥ 50 MHz, two -20 dBm tones at input mixer spaced by 200 kHz, attenuation = 0 dB	
		＞+10 dBm	
1 dB Gain Compression			
1dB compression of input mixer (P1dB)		fc ≥ 50 MHz, 0 dB RF attenuation	
		>0 dBm, nominal	
Residual response		connect 50 Ω load at input port, 0 dB input attenuation, 20℃ to 30℃	
		<-90 dBm, typical	
Intermediate frequency		＜ -60 dBc	
System related sidebands		referenced to local oscillators, referenced to A/D conversion, referenced to subharmonic of first LO, referenced to harmonic of first LO	
		＜ -60 dBc	
Input related spurious		-30 dBm signal at input mixer	
		<-60 dBc	
Sweep			
Sweep Time		Span≥10 Hz	10 ms to 3000 s
		Zero	20 us to 3000 s

	Span	
Sweep time uncertainty	span ≥ 100 Hz: 5% (nominal) zero span (sweep time setting value > 1 ms): 5% (nominal)	
Sweep Mode	Continuous, Single	
Trigger		
Trigger source	free run, video, external	
External trigger level	5 V TTL level	
Tracking Generator (Option)		
Frequency Range	XSA805（TG）	100 kHz to 500.009 MHz
	XSA810（TG）	100 kHz to 1.000009 GHz
	XSA815（TG）	100 kHz to 1.500009 GHz
Output power level range	-40 dBm to 0 dBm	
Output power level resolution	1 dB	
Output flatness	relative to 50 MHz ±3 dB	
Maximum safe reverse level	Harmonic spurious	-30 dBc (Tracking generator output power = -10 dBm)
	Non-harmonic spurious	-40 dBc(Tracking generator output power = -10 dBm)
Tracking generator to input terminal isolation	-60 dB (Tracking generator output power = 0 dBm)	

Input/Output

RF Input	
Impedance	50 Ω, typical
Connector	N Type Female
Tracking generator output	
Impedance	50 Ω, typical
Connector	N Type Female

Internal reference	
frequency	10 MHz
output level	+3 dBm to +10 dBm, +8 dBm (typical)
Impedance	50 Ω, typical
Connector	BNC female
External reference	
frequency	10 MHz ± 5 ppm
output level	0 dBm to + 10 dBm
Impedance	50 Ω, typical
Connector	BNC female
External Trigger Input	
Impedance	1 kΩtypical
Connector	BNC female
Audio interface	
Impedance	30 Ω, typical
Connector	3.5 mm
USB Host	
Connector	A Plug
Protocol	USB version 2.0
USB Device	
Connector	B Plug
Protocol	version 2.0
HDMI	
Connector	A Plug
Protocol	version 1.4
LAN	
10/100Base，RJ-45	
Display	
Type	TFT LCD
Resolution	1280*800
Size	9 inches

Color	65536
Mass Memory	
Mass memory	Flash disk (internal storage 256 MByte), USB storage device (not supplied)
Power Supply	
Input voltage range, AC	100 V to 240 V
AC supply frequency	50 Hz to 60 Hz
Power consumption	28 W (nominal)
Temperature	
Operating	0 ℃ to 40 ℃
Storage	-20 ℃ to 60 ℃
Humidity	
0℃ to 30℃	≤ 95% relative humidity
30℃ to 40℃	≤ 75% relative humidity
Altitude	
operating height	up to 3,000m
Appearance	
Dimensions	375 mm (Width)×185 mm (Height)×120 mm (Depth)
Weight	Approx. 3.7 kg (without package)

8. Warranty

8.1 Troubleshooting

Typical issues that may occur when using your spectrum analyzer:

- Power on malfunction
- No signal display
- Wrong measurement results or poor frequency or amplitude precision.

1. Power on malfunction

Power on malfunction can include a situation where the screen is still dark (no display) after switch on.

If the screen is still dark after power on, please check:

1) If the power supply has been connected correctly and it the power supply voltage range is within the specification.

2) If the power switch has been turned on.

3) If the fan is running, please contact us for service.

2. No signal display

If there is no signal display at any wave band. Please try the following: set a signal generator at 30 MHz frequency and -20 dBm power and connect it to the spectrum analyzer RF input connector. If there is still no signal display, there may be a problem with the spectrum analyzer hardware circuit. Please contact us for service.

3. Wrong measurement results or poor signal frequency precision

If the display contents shakes a lot or the frequency readout exceeds the error range during measurements, check if the signal source is stable. If so, check if spectrum analyzer reference is precise. Select internal or external frequency reference according to measurement conditions: press [FREQ]→[frequency reference Internal External].If the frequency is still not precise, then the spectrum analyzer LO has lost its phase lock, please contact us for service.

4. Wrong measurement results or poor readout amplitude precision

If signal amplitude readout is not precise, perform a calibration. If amplitude readout is still not precise, then it may be a problem with internal circuit, please contact us for service.

8.2 Spectrum Analyzer Repair

When it is difficult to solve your spectrum analyzer's problem, you can contact us by phone or fax. When it's confirmed that the instrument is damaged and need return to repair, you need to wrap the spectrum with the original packaging material and the packing box, follow the steps below to package:

1) Write a detailed description of the malfunction of the spectrum analyzer, put it in the box together with the spectrum analyzer.
2) Put the instrument in a dustproof / antistatic plastic bag to reduce possible damage.
3) Place pads in four corners of mother packaging carton, then put the instrument into the mother carton.
4) Seal the carton with tape and tighten it with nylon tape.
5) Mark the carton with words of "Fragile! Do not touch! Carefully".
6) Ship by type of precise instruments.
7) Keep all the copies of shipping sheets.

CAUTION

The use of other materials to package the spectrum analyzer may damage the instrument. Do not use polystyrene pellets as packaging materials, they can not adequately fit the instrument, and can be sucked into fan by the generated electrostatic, causing the spectrum analyzer damage.

9. Appendix

Appendix A: Enclosure

(The accessories subject to final delivery.)

Standard Accessories

Power Cord

Quick Guide

USB Cable

N-BNC joint

Options

N-N Cable

N-SMA Cable

SMA-SMA Cable

SMA Adaptor

N-SMA Adaptor

Near Field Probe includes: Four near-field probes, N-SMA adapter, SMA-SMA cable (Frequency range: 30 MHz – 3 GHz)

Appendix B: General Care and Cleaning

General Care

Do not store or leave the instrument where the liquid crystal display could be exposed to direct sunlight for long periods of time.

Caution: To avoid any damage to the instrument or probes, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument and probes as often as operating conditions

require.
To clean the instrument exterior, perform the following steps:

Wipe the dust from the instrument surface with a soft cloth. Take care not to scratch the transparent LCD protection screen when cleaning.

WARNING
Before re applying power, ensure that the instrument is completely dry, avoiding any electric shock or electrical short circuit resulting from moisture.

Appendix C: USB Disk Requirements

USB disk requirements:
Max capacity 4G, NTFS file system is not supported.

If the USB disk doesn't work properly, format your USB disk and then try again.

Appendix D: PC Software Requirements

The PC software does not support Windows XP.

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