Spectrum Analyzer

GSP-8000 Series

QUICK START GUIDE

October 2023

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USER NOTICE

This chapter helps you in preparing the spectrum analyzer for use and provides the information to start using the spectrum analyzer correctly.

General Inspection

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

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
   Please ensure that all the listed accessories are present and undamaged, if any problems are found please contact your distributor.

3. Check the Complete Instrument
   If there is any physical damage, operational fault, or performance issue please contact your distributor or GW Instek's 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.

Safety Precaution before Operation

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.

Allowed Variation Range of Supply Power Parameters

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

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

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.

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.
	Make sure the supply power is stable before turning on the analyzer to protect it from damage. Refer to "First Time to Power on" on page 9

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.

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.

Steps

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 60 minutes for stabilization to obtain the most accurate results.

GETTING STARTED

This chapter introduces the front / rear panel, the user interface and explains how to use the instrument with a measurement example demonstration.

Front Panel Overview
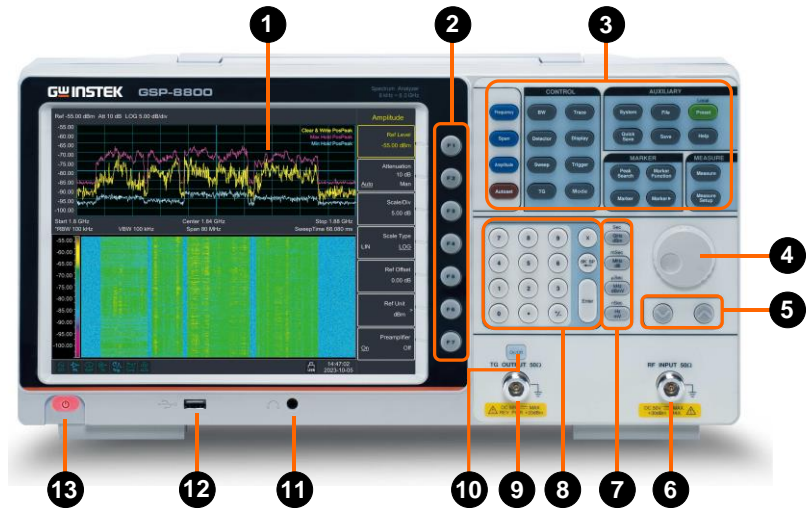
1.	LCD		1024x768 color LCD display. The display shows the soft keys for the current function, frequency, amplitude and marker information.

2. Menu soft keys

F 1

The F1 to F7 function keys directly correspond to the soft keys on the right-hand side of display.

3. Function keys

See page 15 for details.

4. Knob

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

5. Arrow keys

(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

6.	RF Input connector	RF INPUT 50Ω	The RF input may be connected to a device via a N type connector.
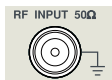
⚠ Note	When input attenuator is higher than 10 dB, the RF port input signal must be less than +30 dBm.
	Input voltage at RF input port must not be higher than 50 V DC to avoid damage to the attenuator and input mixer tracking generator.

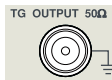|		
7.	Unit keys	Sec GHz dBm / mSec MHz dB / μSec kHz dBmV / nSec Hz mV	Unit keys include GHz/dBm/s, MHz/dB/ms, kHz/dBmV/μs and Hz/mV/ns. After entering the desired numbers, choose an appropriate unit to complete the input. The specific meaning of unit is decided by the type of input parameter ("frequency", "amplitude" or "time").

8.	Numeric keypad		See page 18 for details.

9.	TG output connector	TG 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.

10.	TG output On/Off button	On/Off	When the TG function is enabled, the backlight of button turns on and turns off when the function is disabled.

11.	Earphone interface		3.5mm stereo headphone jack (wired for mono operation)

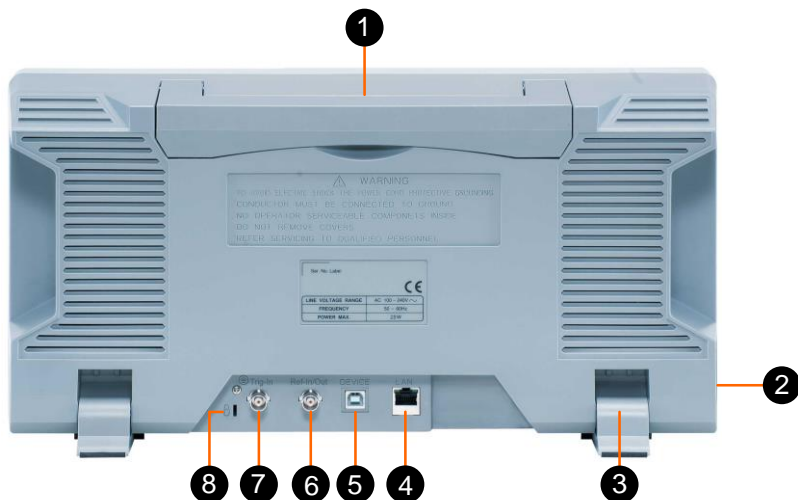|		
12.	USB Host port		The analyzer may serve as a "host" device to connect to external USB devices. This interface is available for USB storage devices.

13.	Power key	⏻	Push to turn on, long push to turn off

Rear Panel

1. Handle	Stow the handle for mobile use.
2 AC power connector	AC: frequency 50Hz/60Hz ±10%, single-phase alternative 220V±15% or 110V±15%
3. Stool	To adjust the angle of the device
4. LAN interface	Through this interface, the analyzer can be connected to your local network for remote control. An integrated testing system can be built quickly, as the analyzer conforms to the LXI C Device class instrument standards.
5. USB Device interface	This configurable USB port permits external USB devices. It supports PictBridge printer and remote-control connection.
6. Ref In/Out	The BNC input or output of the 10 MHz reference clock
7. Trig-In	Input an external signal (TTL signal) for external trigger function.

8. 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.

Front Panel Function Key

Basic keys   Control keys   Utility keys
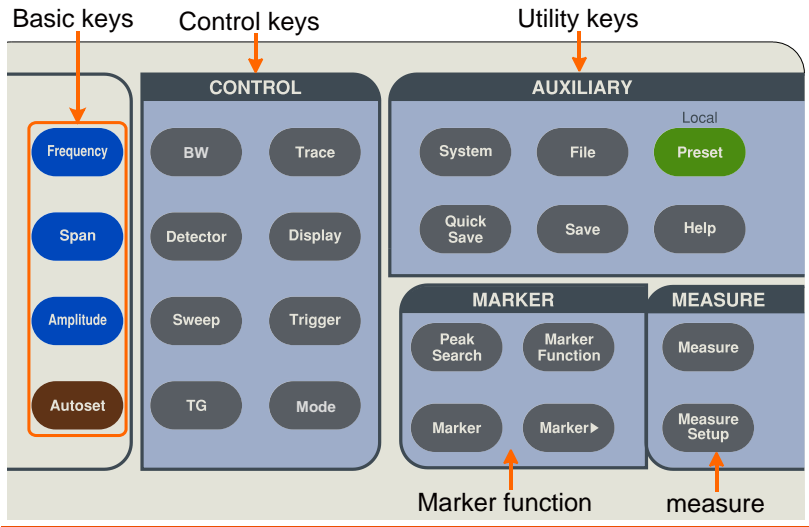
Basic keys

Frequency	Activates the center-frequency function, and accesses the frequency function menu.
Span	Activates the frequency sweep span function, and set Full Span\Zero Span\Last Span.
Amplitude	Activates the reference level function, and accesses the amplitude softkeys, with which you set functions that affect data on the vertical axis.
Autoset	Searches the signal automatically within the full frequency range.

Control keys

BW	Activates the RBW (resolution bandwidth), VBW (video bandwidth) function, and accesses the softkeys that control the bandwidth.
Trace	Accesses the softkeys that allow you to store and manipulate trace information.

Detector   Accesses the softkeys that allow you to configure detector functions.

Display   Accesses the softkeys that allow you to control what is displayed on the analyzer, including the display line, graticule, Label, Menu Hide, Brightness and Screen Sleep.

Sweep   Accesses the softkeys that allow you to set the sweep time, select the sweep mode of the analyzer.

Trigger   Accesses the softkeys that allow you to select the trigger mode of the analyzer.

TG   Accesses the softkeys that allow you to set the tracking generator.

Mode   Accesses the softkeys that allow you to set the Spectrum and demodulation mode.

Marker function keys

Peak Search   Places a marker on the highest/lowest peak, and accesses the Peak functions menu.

Marker   Accesses the marker control keys that select the type and number of markers and turns them on and off.

Marker▶   Accesses the marker function soft keys that allow you to set other system parameters based on the current marker's value.

Marker Function   Accesses the menu of other marker functions, such as N-dB bandwidth measure, marker noise, and frequency counting.

Advanced measure keys

Measure   Accesses the softkeys that let you make transmitter power measurements such as Time Spec, ACPR (adjacent channel power), channel power, and OBW (occupied bandwidth), etc.

Measure Setup   Sets the parameters for the selected measurement function.

Utility keys

System   Accesses the softkeys that allow you to get the system information, or set the system parameters.

File   Accesses the softkeys that allow you to configure the file system of the analyzer.

Preset   Resets the analyzer to the factory settings or user state. This state can be specified in 【System】→ [PowerOn/Preset►] →[Preset►].

Quick Save   Save the contents of the current screen quickly.

Save   Accesses the soft keys that allow you to save current screen, trace data, user state or limit line data.

Help   Press the Help key to activate the help system. Press the Help key again to exit.

Parameter Input

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

Numeric Keypad

Numeric keys		Numbers 0-9 are available to be used.
Decimal point		A decimal point "." will be inserted at the cursor position when this key is pressed.
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.
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.
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.

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

Unit keys   Sec
GHz
dBm

mSec
MHz
dB

µSec
kHz
dBmV
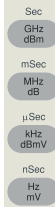
nSec
Hz
mV
    Unit keys include GHz/dBm/Sec, MHz/dB/mSec, kHz/dBmV/µSec and Hz/mV/nSec. After entering the desired numbers, choose an appropriate unit to complete the input. The specific meaning of unit is decided by the type of input parameter ("frequency", "amplitude" or "time").

User Interface
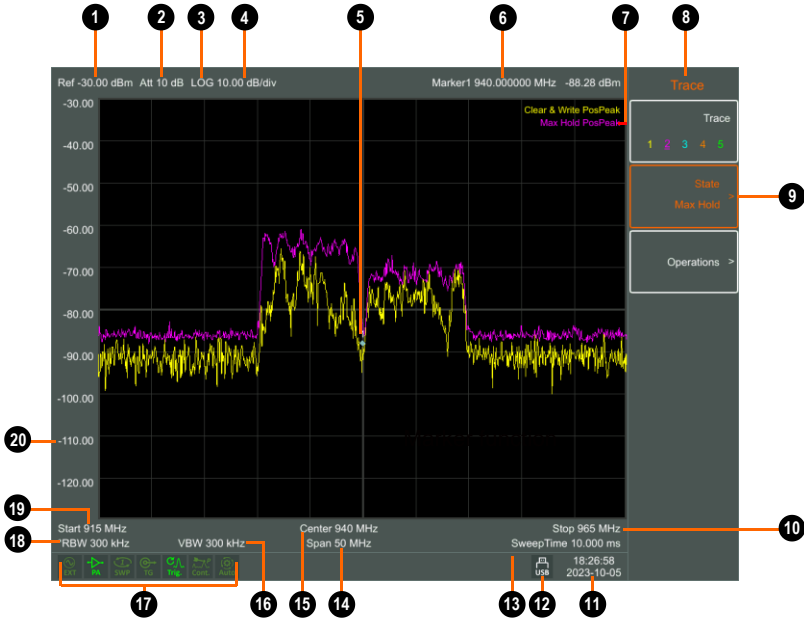
No.	Name	Description	Related Key
1.	Reference level	Reference level	Amplitude → [Ref Level]
2	Attenuation	Display input attenuation setting	Amplitude → [Attenuation]
3.	Amplitude Division Type	Can choose logarithmic or linear	Amplitude → [Scale Type]
4.	Amplitude Division	Display Division scale	Amplitude → [Scale/ Div]
5.	Marker	Display current activated marker	Marker
6.	Marker readout	Display frequency and amplitude of current marker	Marker

7.	Trace Mode	Trace Type and Detector Type	Trace	
8.	Menu title	Function of current menu belongs to.		
9.	Menu item	Menu item of current function		
10.	Stop Frequency	Display Stop Frequency	Frequency	→[Stop Frequency]
11.	Date/time	Display system date and time	System	→[Date/Time]
12.	USB storage device	Show if USB storage device is inserted;		
13.	Sweep Time	System sweep time	Sweep	→[Sweep Time]
14.	Span	Display span width	Span	→[Span]
15.	Center frequency	Display center frequency	Frequency	→[Center Freq]
16.	Video bandwidth	Display video bandwidth	BW	→[VBW]
17.	System status icon	Display spectrum analyzer status		
18.	Resolution bandwidth	Display resolution bandwidth	BW	→[RBW]
19.	Start Frequency	Display Start Frequency	Frequency	→[Start Frequency]
20.	Amplitude Graticule	Display Amplitude Graticule	Display	→[Ampt Graticule]

Menu INTEPRETATION

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

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

$$f_{center} = (f_{stop} + f_{start}) / 2$$

$$f_{span} = f_{stop} - f_{start}$$

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

Span

Set the spectrum analyzer to span mode. When press the **SPAN** button, **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.

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**, **Scale/Div**, **Scale Type**, **Ref Offset**, **Ref Unit** and **Preamplifier**.

Autoset

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.

- Some parameters such as reference level, scale, and input attenuation may be changed during the auto tune. If there is no signal is found, a message "Auto tune fail, can't search any signal."will appear on the screen.

Bandwidth

BW

Sets the RBW (Resolution Bandwidth) and VBW (Video Bandwidth) parameters of the analyzer. Pop out the setting menu includes **RBW**, **VBW**, and **EMI Filter▶**.

Trace

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**, **State** and **Operations**.

Detector

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 Pos Peak, Neg Peak, Sample, Normal, Voltage Avg, RMS Avg (EMI Option) and Quasi-Peak (EMI Option).

Key Points
- Selects an appropriate type according to the application in order to ensure the accuracy of the measurement for your application.

- It can be divided into five Traces and set their own Detectors respectively.

- Every selected type is shown with a parameter icon on the left status bar of screen.

Display

Display

Controls the screen display of the analyzer, such as setting the on or off for, display line, amplitude scale, grid, label, Menu Hide, Brightness and Screen Sleep.

Sweep

Sweep

Sets parameters about the Sweep time and mode including **Sweep Time, Sweep Single** and **Sweep Cont**.

Trigger

Trigger

Sets the trigger type and other associated parameters, menu includes **Free** and **Video**.

Tracking Generator

TG

When the Tracking Generator is On, a signal with the same frequency of the current sweep signal will be output from the TG OUTPUT 50Ω terminal on the front panel. Press the key will pop out related menu includes **TG►**, **Track Gen On Off**, **Output Power Level, Reference, Position, Do normalize and Normalize On Off**. The tracking source is turned off in the power-on and reset states.

Mode

Mode

There has three modes for display: Spectrum, Demod and Modulation. Default is Spectrum mode. In Demod mode, it set the volume of the speaker on audio demodulation. Enter the modulation settings, the spectrum analyzer supports AM, FM digital demodulation.

Peak Search

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.

- If Min is selected from the Peak Search option, it will search and mark the minimum on the trace.

- The peak search of Peak-Peak, Next Peak, Peak Right, Peak Left or peaks in the peak list must meet the specified parameter condition.

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

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 three 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.

Measurement

`Measure`

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.

Measure Setup

`Measure Setup`

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

System

`System`

A soft menu for system parameter settings pops up. Including System Info ►, Firmware Update, Option►, LAN►, Shutdown On Off, Language►, Date/Time►. 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.

File

`File`

Pop up file management soft menu.

Quick Save

`Quick Save`

Save the contents of the current screen quickly.

Save

`Save`

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

APPENDIX

Specifications

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 60 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.

Model	GSP-8000 Series	
FREQUENCY		
FREQUENCY		
Range	GSP-8180	9 kHz ~ 1.8 GHz
	GSP-8380	9 kHz ~ 3.8 GHz
	GSP-8800	9 kHz ~ 8.0 GHz
Resolution	1 Hz	
FREQUENCY SPAN		
Span Range	0 Hz, 100 Hz to max. frequency of instrument	
Span Uncertainty	±span / (sweep points-1)	
INTERNAL FREQUENCY REFERENCE		
Frequency Range	10.000000 MHz	
Reference Frequency Accuracy	±[(days from last calibrate × freq aging rate) + temperature stability + initial accuracy]	
Temperature stability	<1ppm (15°C ~ 35°C)	

Aging rate	<1ppm/year
Initial Accuracy	< 1ppm

SSB PHASE NOISE	

	fc=1 GHz, RBW= 1 kHz, VBW=1kHz, 20°C ~ 30°C, avearge $\geq$ 40	
Offset from Carrier	10 kHz	< -104 dBc/Hz
	100 kHz	< -106 dBc/Hz (Typical)
	1 MHz	< -115 dBc/Hz (Typical)

BANDWIDTH	
Resolution Bandwidth	1Hz to 1MHz (1-3-5-10 steps by sequence)
	200Hz, 9kHz, 120kHz, 1MHz, EMI Filter(6dB), Optional
RBW Uncertainty	< 5%, Typical, RBW $\leq$ 1 MHz
Resolution Filter Shape Factor(60dB: 3dB)	< 5: 1, Typical, digital and close to Gaussian shape
Video Bandwidth (VBW)	10 Hz ~ 3 MHz

AMPLITUDE		

AMPLITUDE AND LEVEL		
Amplitude measurement range	GSP-8180	DANL ~ +10 dBm, 100 kHz ~ 1 MHz, Preamp Off
		DANL ~ +20 dBm, 1 MHz ~ 1.8 GHz, Preamp Off
	GSP-8380	DANL ~ +10 dBm, 100 kHz ~ 1 MHz, Preamp Off
		DANL ~ +20 dBm, 1 MHz ~ 3.8 GHz, Preamp Off
	GSP-8800	DANL ~ +10 dBm, 100 kHz ~ 10 MHz, Preamp Off
		DANL ~ +20 dBm, 10 MHz ~ 8 GHz, Preamp Off
Reference Level	-80 dBm ~ +30 dBm, 0.01dB by step	
Preamp	20 dB, 100 kHz ~ Max. Frequency Range	
Input Attenuation	0 ~ 40 dB, in 1 dB step	
Max Input DC Voltage	50 VDC	
Max continuous power	+30dBm, Average continuous power	

Displayed Average Noise Level (DANL)		
Preamp Off	Input Attenuation = 0 dB, ref. level $\geq$ -60dBm, trace average $\geq$ 40 RBW normalizes to 1Hz, DETECTOR = SAMPLE, RBW =100Hz, VBW = 100Hz	
	GSP-8180	9 kHz ~ 1MHz, <-95 dBm (typical), <-88dBm
		1 MHz ~ 1 GHz, <-140dBm (typical), <-130 dBm
		1 GHz ~ 1.8 GHz, <-138dBm (typical), <-128 dBm
	GSP-8380	9 kHz ~ 1MHz, <-95 dBm (typical), <-88dBm
		1 MHz ~ 1 GHz, <-140dBm (typical), <-130 dBm
		1 GHz ~ 3.8 GHz, <-138dBm (typical), <-128 dBm
	GSP-8800	9 kHz ~ 1MHz, <-95dBm (typical), <-88 dBm
		1 MHz ~ 500MHz, <-140dBm (typical), <-130 dBm
		500MHz ~ 3GHz, <-138dBm (typical), <-128 dBm
		3GHz ~ 6GHz, <-134dBm (typical), <-124 dBm
		6GHz ~ 8GHz, <-129dBm (typical), <-119dBm
Preamp on	Input Attenuation = 0 dB, ref. level $\geq$-60dBm, trace average $\geq$ 40 RBW normalizes to 1Hz, DETECTOR = SAMPLE, RBW =100Hz, VBW = 100Hz	
	GSP-8180	100 kHz ~ 1MHz, <-135 dBm (typical), <-128dBm
		1 MHz ~ 1 GHz, <-160dBm (typical), <-150 dBm

		1 GHz ~ 1.8 GHz, <-160dBm (typical), <-150 dBm
	GSP-8380	100 kHz ~ 1MHz, <-135 dBm (typical), <-128dBm
		1 MHz ~ 1 GHz, <-160dBm (typical), <-150 dBm
		1 GHz ~ 3.8 GHz, <-160dBm (typical), <-150 dBm
	GSP-8800	100 kHz ~ 1MHz, <-135dBm (typical), <-128 dBm
		1 MHz ~ 500MHz, <-160dBm (typical), <-150 dBm
		500MHz ~ 3GHz, <-160dBm (typical), <-150 dBm
		3GHz ~ 6GHz, <-154dBm (typical), <144 dBm
		6GHz ~ 8GHz, <-149dBm (typical), <-139dBm

FREQUENCY RESPONSE

Filter Bandwidth	20°C to 30°C, 30% to 70% relative humidity, input attenuation=10 dB, reference frequency =50 MHz, SPAN = 200KHz, RBW = 10KHz, VBW = 10KHz
Preamp Off, fc ≥100 kHz	±0.8 dB, 100K ~ Max. Frequency Range
Preamp On, fc ≥1MHz	±0.9 dB, 100K ~ Max. Frequency Range

UNCERTAINTY AND ACCURACY

RBW Switch Uncertainty	Reference: 10 kHz RBW at Frequency Center is 50 MHz	
	±0.2 dB, Log resolution	
Input Attenuation Uncertainty	20°C ~ 30°C, fc =50 MHz, Preamplifier Off, 10 dB RF attenuation,RBW = 10K,	
	1 ~ 40 dB ±0.5 dB	
Absolute Amplitude Uncertainty	20°C to 30°C, fc=50 MHz, Span=200 kHz, RBW=10 kHz, VBW=10 kHz, peak detector, 10 dB RF attenuation,average ≥ 20, 2db/div, 95% confidence level	
	Preamp Off	±0.4 dB, input signal level -20 dBm
	Preamp On	±0.5 dB, input signal level -40 dBm
Uncertainty	20°C to 30°C, fc=>1MHz, signal iput range 0~-50dBm, Ref Level range 0~-50dBm, 10 dB RF attenuation, RBW =1kHz, VBW =1kHz,Preamp Off；	
	±1.5 dB(typical)	
VSWR	GSP-8180	<1.5, Nominal, Input 10 dB RF attenuation, 1MHz ~ 1.8GHz
	GSP-8380	<1.5, Nominal, Input 10 dB RF attenuation, 1MHz ~ 3.8GHz
	GSP-8800	<1.8, Nominal, Input 20 dB RF attenuation, 1MHz ~ 8.0GHz

DISTORTION AND SPURIOUS RESPONSE

Second harmonic distortion	fc ≥ 50 MHz, Preamp off, signal input -20 dBm, 0 dB RF attenuation, 20°C ~ 30°C
	-65 dBc
Third-order intermodulation	fc ≥ 50 MHz, Input double tone level -20 dBm, frequency interval 100 kHz, input attenuation 0 dB, preamplifier off, 20°C ~ 30°C
	+10 dBm
1 dB Gain Compression	Nominal, fc ≥ 50 MHz, 0 dB RF attenuation, Preamp off , 20°C ~ 30°C
	> -2 dBm

Residual response	Connect 50 Ω load at input port, 0 dB input attenuation, 20°C to 30°C, average ≥ 40, RBW = 300Hz, VBW = 3kHz,SPAN = 2M
	<-85 dBm, 1 MHz ~ Max. Frequency Range
Input related spurious	<-60 dBc, -30 dBm signal at input mixer, 20°C ~ 30°C

SWEEP	
SWEEP TIME	
Range	10 ms ~ 3000 s, None-zero Span
	1 ms ~ 3000 s, Zero Span
Sweep Mode	Continuous; Single

TRACKING GENERATOR (EXCEPT GSP-8000 BASIC UNIT)	
TRACKING GENERATOR OUTPUT	
Frequency Range	100 kHz ~ Max. Frequency Range
Output power level range	-40 dBm ~ 0 dBm
Output power level resolution	1 dB
Output flatness	± 3 dB
Maximum safe reverse level	Average total power: +30 dBm, DC: ±50 VDC
Impedance	50 Ω, Nominal
Connector	N Type Female

FREQUENCY COUNTER	
FREQUENCY COUNTER	
Resolution	1Hz, 10Hz, 100Hz, 1kHz
Accuracy	±(frequency indication × frequency reference accuracy) + counter resolution

INPUTS AND OUTPUTS		
RF INPUT		
Impedance	50 Ω, Nominal	
Connector	N Type Female	
REFERENCE INPUT		
Connector	BNC Female	
10MHz Reference Amplitude	0 dBm to +10 dBm	
Trigger Input		
Impedance	1 kΩ	
10MHz Reference Amplitude	BNC Female	
USB		
USB Host	Connector	A Plug
	Protocol	USB 2.0 (Host End)
USB Device	Connector	B Plug
	Protocol	2.0 Version
GENERAL		
Display	Type	TFT LCD
	Resolution	1024*768
	Size	10.4 inches
	Color	65,536 colors

Remote Control	USB Device	B Plug, supports USB TMC
	LAN TCP/IP Interface	RJ-45, supports 10Base-T/100Base-Tx
Mass Memory	Internal Memory	256M Bytes
Temperature	Operating Temperature	0 °C to 40°C
	Storage Temperature	-20°C to 70°C
Relative humidity	0°C to 30°C	≤ 95%
	30°C to 40°C	≤ 75%
Dimensions & Weight	421(W) × 221(H) × 115(D) mm; Approx. 5.0 kg (without package)	
AC Power Socket	100V ~ 240V, 50/60Hz	
Power Consumption	28W	