SSA463

Portable Spectrum Analyzer

User Manual

Version:V1.0
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Hangzhou SYSJOINT Technology Co., Ltd.

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1. Product Overview

The SSA463 Portable Spectrum Analyzer is based on a swept super-heterodyne architecture, covering an RF frequency range of **35 MHz to 6.3 GHz** with a dynamic range of **–110 dBm to +10 dBm**. It supports **three selectable RBW settings (2 MHz, 250 kHz, and 15 kHz)** to meet different measurement requirements.

The instrument integrates a high-performance RF front end, a low-noise local oscillator, and an advanced IF processing architecture, delivering signal analysis capability comparable to benchtop spectrum analyzers in a compact portable form. It supports accurate analysis of broadband and narrowband signals, spurious emissions, harmonics, and interference sources for field, laboratory, and educational applications.

Built-in **Marker Table**, **ΔMarker**, and **Waterfall** functions enable efficient multi-signal comparison and intuitive observation of time-varying signals.

A **30 dB precision input attenuator** allows a maximum input power of **+15 dBm** to protect the RF front end. An **internal signal generator** with an output range of **35 MHz to 6.3 GHz** and **–30 dBm to +0 dBm** is also provided.

Factory calibration ensures stable frequency reference and consistent measurement accuracy. Under typical conditions, the SSA463 achieves a **power measurement accuracy of ±0.5 dB (typical)**.

Product Features

- **Frequency Range**: 35 MHz to 6.3 GHz
- **Dynamic Range**: –110 dBm to +10 dBm
- **Resolution Bandwidth (RBW)**: Three selectable settings — 2 MHz, 250 kHz, 15 kHz
- **Built-in Signal Generator** with 0.5 dB step output level control
- **Marker Table** for multi-point marker display, providing clear visibility of key frequencies
- **Waterfall Display** for intuitive visualization of spectrum changes over time
- **High-stability reference source** with factory frequency calibration and power calibration compensation
- **4.3-inch high-brightness IPS capacitive touchscreen**, ensuring clear visibility in outdoor environments
- **Metal enclosure with internal shielding design** for effective electromagnetic interference suppression and improved measurement accuracy
- **Touchscreen + rotary knob operation** for smooth and efficient control
- **Compact dimensions**: 125 mm × 74.3 mm × 22 mm, lightweight and portable
- **Built-in 4000 mAh lithium battery** with over 5 hours of typical operating time; **10 W charging power (5 V / 2 A)**

2. Technical Specifications

The main technical specifications of the SSA463 Portable Spectrum Analyzer are listed below :

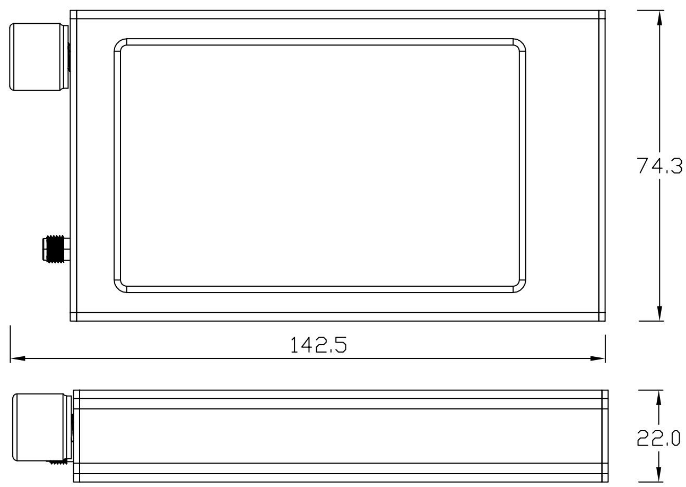
	Specification	Condition
Frequency measurement range	35M ~ 6.3GHz	
Amplitude measurement range	-110 ~ +10dBm	
Scan speed	12GHz/s	RBW=2MHz, SPAN=1.5GHz
Noise floor	<-100dBm	RBW=2MHz, 35M ~ 3.2GHz
	<-95dBm	RBW=2MHz, 3.2G ~ 6.3GHz
	<-105dBm	RBW=250kHz, 35M ~ 3.2GHz
	<-100dBm	RBW=250kHz, 3.2G ~ 6.3GHz
	<-115dBm	RBW=15kHz, 35M ~ 3.2GHz
	<-110dBm	RBW=15kHz, 3.2G ~ 6.3GHz
RF port	SMA femal	Input for spectrum analyzer
	MCX femal	Signal generator output
RF port impedance	50Ω	
Amplitude measurement accuracy	35M ~ 4GHz	±0.5dB @ -70 ~ +10 dBm
		±1dB @ -110 ~ -70 dBm
	4G ~ 6.3GHz	±1dB @ -70 ~ +10 dBm
		±2dB @ -110 ~ -70 dBm
Built-in attenuator	0 ~ 30dB	1dB step
Signal generator frequency range	35M ~ 6.3GHz	
Signal generator output level	-30 ~ +0dBm	
Display	4.3" IPS LCD + RTP	800×480
Operation method	Touch screen + knob	
Battery life	5h	3.8V 15.2Wh rechargeable Li-on
Charge port	USB type-C	
Enclosure material	Aluminium	
Dimensions	130×75×22mm	RF port not included
Net weight	280g	

3. Appearance Overview

The SSA463 features a minimalist exterior design, equipped with a high-resolution display and intuitive control keys, and provides multiple interfaces to accommodate different application scenarios.

With a lightweight body of **280 g**, it achieves a good balance between battery life and portability, making it particularly well suited for **outdoor testing applications**.

Overall Dimensions



【Figure 3-1 : Overall Dimensions Diagram (Unit: mm)】

【Figure 3-2. Product Interface Diagram】

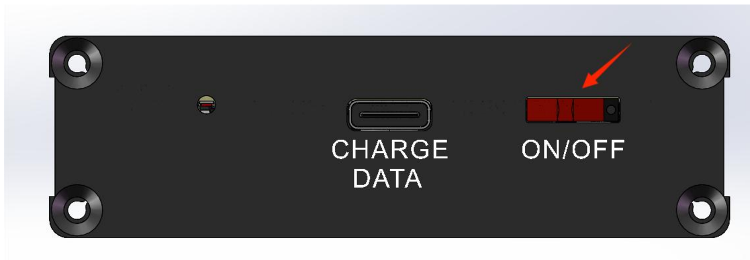
【Table 3-1 Appearance Description】

No.	Description
1	LCD touchscreen
2	Charging indicator LED
3	USB Type-C port (charging and data)
4	Power switch
5	Rotary control knob
6	RF output port (signal generator, MCX)
7	RF input port (spectrum analyzer, SMA)

4. Operation Guide

4.1 Power Switch Operation

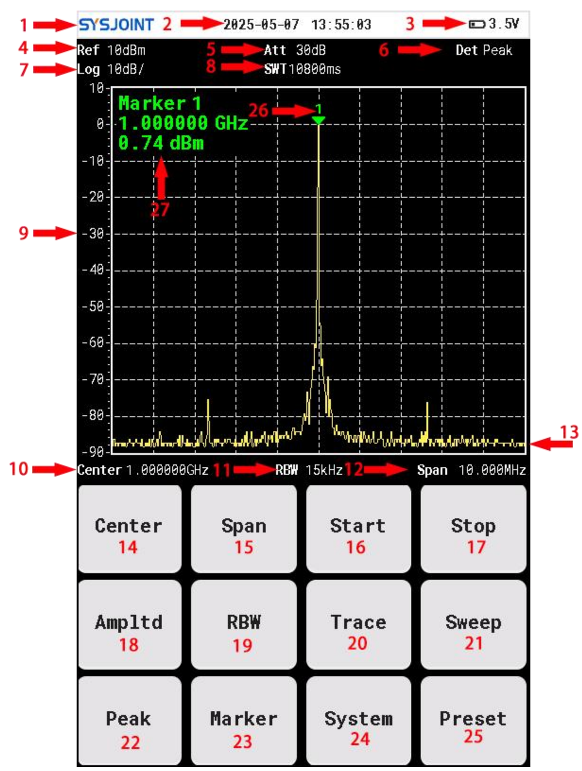
Move the red power switch to the **ON** position to turn on the instrument.
Move the power switch to the **OFF** position to turn off the instrument.



【Figure 4-1. Bottom View of the Spectrum Analyzer】

4.2 Main Interface and Function Description

Main Screen Display and Function Description



【Figure 4-2. Main Interface】

【Table 4-1. Main Interface Description】

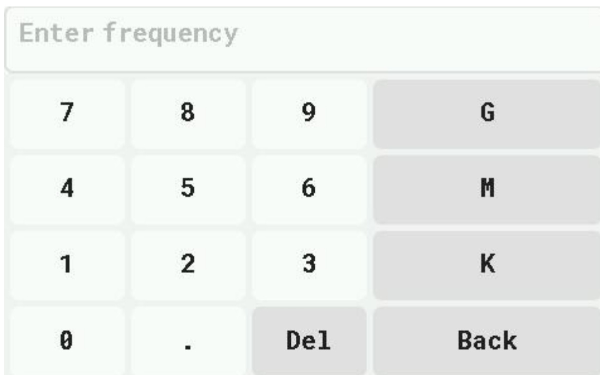
No.	Function Name	Function Description
1	SYSJOINT	Company logo
2	TIME	Displays the system time
3	Battery Voltage	Displays the current battery voltage; **4.2 V indicates fully charged**
4	Ref	Signal reference level at the top of the display (typically in dBm), determines the vertical scale and input attenuation
5	Att	Displays the input attenuator value
6	Det	Detector type. Sets the detection method for the current measurement and applies it to the active trace. Available detector types include **Positive Peak**, **Negative Peak**, and **Sample**
7	LOG	Logarithmic scale of the Y-axis
8	SWT	Sweep time required for a single sweep, determined by RBW and Span
9	Y Axis	Scale labeling of the Y-axis
10	Start or Center	Displays the start frequency or the center frequency
11	RBW	Displays the resolution bandwidth of the sweep
12	Stop or SPAN	Displays the stop frequency or the frequency span
13	Spectrum Trace	Spectrum trace display area
14	Center	Sets the center frequency of the sweep
15	SPAN	Sets the frequency span of the sweep
16	Start	Sets the start frequency of the sweep
17	Stop	Sets the stop frequency of the sweep
18	Ampltd	Sets reference level, RF attenuation, scale, Y-axis unit, and related amplitude parameters
19	RBW	Sets the resolution bandwidth, which determines frequency resolution. A smaller RBW provides higher resolution but slower sweep speed
20	TRACE	Sets trace mode: Clear/Write, Max Hold, Min Hold, or Average
21	Sweep	Sets sweep mode, including single sweep and continuous sweep
22	Peak	Executes the peak search function to locate the highest peak on the trace
23	Maker	Places movable markers on the spectrum to read frequency and amplitude
24	SYSTEM	Configures system-related parameters
25	Preset	Restores the system to factory default settings or user-defined preset
26	Maker_1	Movable green triangular marker indicating the current marker number and position
27	Measurement Result	Displays the measurement result of the currently selected marker, including frequency and amplitude; position is movable

4.3 Center, Span, Start and Stop Settings

When the **Center**, **Span**, **Start**, or **Stop** button is selected, the corresponding input screen is displayed. Users can enter numerical values to set the related sweep frequency parameters.

The unit keys **k**, **M**, and **G** correspond to **kHz**, **MHz**, and **GHz**, respectively. Pressing one of these keys confirms the input value, applies the setting to the sweep frequency, and returns to the previous screen.

The **Del** key is used to delete characters, and the **Back** key returns to the previous screen without applying changes.



【Figure 4-3. Frequency Setting Interface for Center, Span, Start, and Stop】

4.4 AMPLTD Settings

AMPLTD (Amplitude) is a core menu of the spectrum analyzer used to configure signal amplitude display behavior and front-end gain–related parameters. Through this menu, users can precisely control input attenuation, reference level, and amplitude unit formats in order to achieve optimal dynamic range and measurement accuracy.

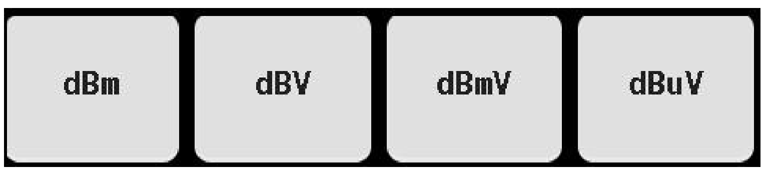
【Figure 4-4. AMPLTD Settings Interface】

Table 4-2. AMPLTD Settings Description

Name	Function Description
Ref Level	Sets the reference power level at the top of the display
Scale	Sets the logarithmic scale value per division
Atten	Controls the front-end variable attenuator (0–30 dB) to accommodate signals of different power levels
Y Axis Units	Sets the Y-axis unit (amplitude unit) of the spectrum analyzer

4.4.1 Y Axis Units Settings

This option is used to select the power or amplitude display unit of the spectrum analyzer. Different units are suitable for different professional applications, such as RF engineering or broadcast systems.



【Figure 4-5. Y-Axis Unit Settings Interface】

【Table 4-3. Y-Axis Units Description】

Name	Unit Symbol	Primary Applications and Typical Use Cases
Decibel-milliwatt	dBm	Default unit for RF, microwave, and wireless communication measurements (0 dBm = 1 mW)
Decibel-millivolt	dBmV	Commonly used in cable television (CATV), DOCSIS, and video signal measurements
Decibel-microvolt	dBμV	Default regulatory unit for EMC/EMI compliance testing (CISPR, FCC, GB/T standards)
Decibel-volt	dBV	Audio measurements (professional audio, recording, broadcasting); baseband video signals (composite video, SDI); low- and mid-frequency testing (< 100 MHz)

· 0 dBm ≈ -13dBV ≈ 47 dBmV≈ 107 dBμV (50 Ω)

· 0 dBV ≈+13dBm

· 0 dBmV ≈ -47dBm

· 0 dBμV ≈ -107 dBm

4.5 RBW Settings

RBW (Resolution Bandwidth) is one of the most important parameters of a spectrum analyzer. It defines the bandwidth of the intermediate-frequency (IF) filter.

RBW determines the ability of the spectrum analyzer to resolve adjacent signals and directly affects key performance factors such as noise floor, sweep speed, and dynamic range.

Users can switch RBW values using the [RBW] key according to measurement requirements, or enable Auto mode to allow the instrument to automatically couple and select the optimal RBW.

【Figure 4-6. Resolution Bandwidth (RBW) Settings Interface】

【Table 4-4. Resolution Bandwidth (RBW) Description】

RBW	Typical Applications
Auto	Automatically couples and selects the optimal RBW
2 MHz	Suitable for fast scanning of wideband signals, modulation bandwidth measurements, and capturing short-duration burst signals
250 kHz	Recommended for general RF signal observation and channel power measurements, providing a good balance between speed and accuracy
15kHz	Suitable for narrowband signal separation, adjacent signal resolution, partial low- and mid-frequency EMI pre-scan, and applications requiring higher frequency resolution

4.6 TRACE Mode Selection

TRACE is one of the core display functions of the spectrum analyzer. It represents the "trace" of signal amplitude versus frequency. Different trace modes are used for different measurement purposes, such as peak observation, averaging, and maximum/minimum value analysis.

This spectrum analyzer supports the following four commonly used trace modes, which can be quickly selected via the **[TRACE]** key:

【Figure 4-7. Trace Mode Settings Interface】

【Table 4-5. TRACE Mode Description】

Trace Mode	Function and Typical Applications
Clear/Write	Completely refreshes the display with the latest spectrum on each sweep (default mode). Used for real-time signal observation, routine measurements, and marker readout
Max Hold	Retains the maximum value that has occurred over time; the trace only rises and never falls. Used to capture intermittent signals, short-duration bursts, worst-case spurious emissions, and EMI pre-scan to identify maximum radiation points
Min Hold	Retains the minimum value that has occurred over time; the trace only falls and never rises. Used to observe noise floor variations, identify minimum signal levels, and verify signal stability
Average	Performs power averaging over multiple sweeps (averaging count configurable from 1 to 16). Used to reduce noise, stabilize measurement results, analyze phase noise curves, and recommended for formal test reports

4.7 Sweep Settings

Sweep is one of the core functions of a spectrum analyzer. It refers to the process in which the instrument, under local oscillator control, scans from the start frequency to the stop frequency to complete a full spectrum measurement.

Proper configuration of sweep parameters directly determines measurement speed, accuracy, and the ability to capture target signals.

【Figure 4-8. Sweep Settings Interface】

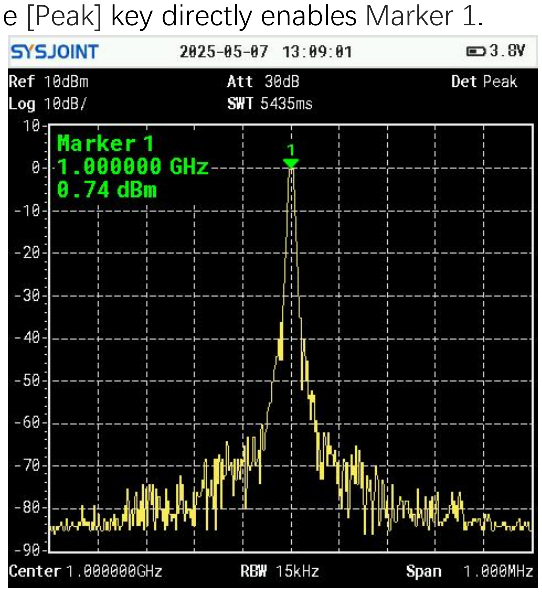
【Table 4-6. Sweep Settings Description】

Sweep Mode	Function and Typical Applications
Single	Performs one sweep and then stops. Used for formal measurements, screenshots, report generation, and to freeze Max Hold traces
Continuous	Continuously updates the display in real time. Used for routine observation and debugging

4.8 Peak Settings

This function automatically moves the marker to the highest point of the current trace, allowing quick identification of the main signal's frequency and amplitude.

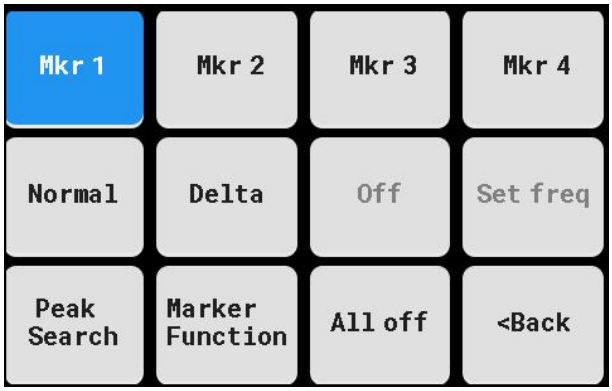
By default, pressing the [Peak] key directly enables Marker 1.



【Figure 4-9. Marker 1 Positioned at the Peak After Peak Search】

4.9 Marker Settings

Markers are one of the most frequently used and important functions of a spectrum analyzer. They are used to accurately read the frequency and amplitude at any point on the spectrum display.



【Figure 4-10. Marker Settings Interface】

【Table 4-7. Marker Settings Description】

Name	Function and Usage
Mkr1,Mkr2,Mkr3, Mkr4	Selects the corresponding marker when the Marker key is pressed
Normal	Movable green triangular marker used to display the current frequency and amplitude
Delta	Calculates the difference between two markers to measure frequency and amplitude differences (essential for bandwidth and suppression measurements)
Off	Turns off the currently selected marker
Set Freq	Sets the frequency of the selected marker
Peak Search	Moves the selected marker to the peak, next peak, left peak, or right peak and displays the corresponding power level
Marker Function	Sets the marker frequency as the center, start, or stop frequency
ALL OFF	Turns off all markers

4.10 SYSTEM Settings

【Figure 4-11. SYSTEM Settings Interface】

【Table 4-8. SYSTEM Settings Description】

Name	Function and Recommended Settings
Det Mode	Selects the detector mode: **Positive Peak**, **Negative Peak**, or **Sample**
Marker Table	The Marker Table displays the frequency and amplitude of multiple markers simultaneously. It is suitable for observing multiple carriers, spurious signals, harmonics, and sidebands at the same time
Waterfall	Displays time on the vertical axis and signal strength using color. The spectrum flows downward frame by frame over time, forming a waterfall-style display
F Correct	Manually calibrates the frequency axis to align the displayed frequency with the actual signal frequency. Calibration data can be saved
Signal Generator	Independently configures the signal generator without affecting spectrum sweep settings. Frequency range: **35 MHz to 6.3 GHz** Level range: **–30 dBm to 0 dBm**
Back Light	Adjusts the screen brightness
About	Displays instrument information such as model number, serial number, and firmware version
Date & Time	Sets the system date and time
Language	Selects the system language: **Chinese / English**
BEEP	Enables or disables the buzzer and key tone

4.10.1 Detector Mode

Detector Mode defines how the spectrum analyzer processes the intermediate-frequency (IF) signal within each resolution bandwidth (RBW) and determines the displayed amplitude value for each frequency bin.

Different detector modes are suitable for different measurement objectives, such as peak signal detection, noise observation, and average behavior analysis. Selecting the appropriate detector mode can significantly affect measurement results and interpretation.

【Figure 4-12. Detector Mode Settings Interface】

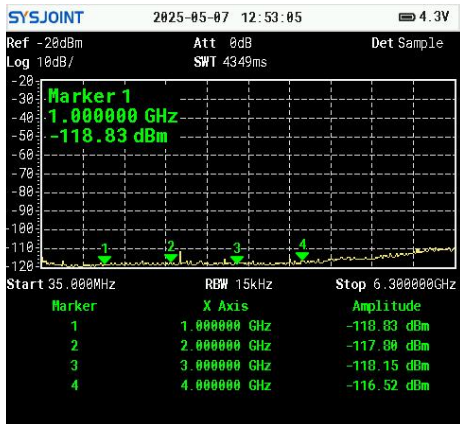
【Table 4-9. Detector Mode Settings Description】

Name	Detection Method	Typical Applications
Sample Detector	Randomly samples an instantaneous value within the RBW	Used for noise power and digital signal power measurements, mandatory for OBW, CCDF, and ACPR standards
Positive Peak Detector	Takes the maximum value within each RBW	Never misses signals, default choice, observation, spurious search, and EMI pre-scan
Negative Peak Detector	Takes the minimum value within each RBW	Rarely used; enabled mainly for observing noise valleys

4.10.2 Marker Table

The **Marker Table** function displays the frequency and amplitude values of multiple markers in a tabular format simultaneously. This allows users to observe and compare several carriers, spurious signals, harmonics, or sidebands at the same time.

The Marker Table is particularly useful in multi-signal analysis scenarios, where quick comparison of frequency and amplitude information across multiple markers is required.



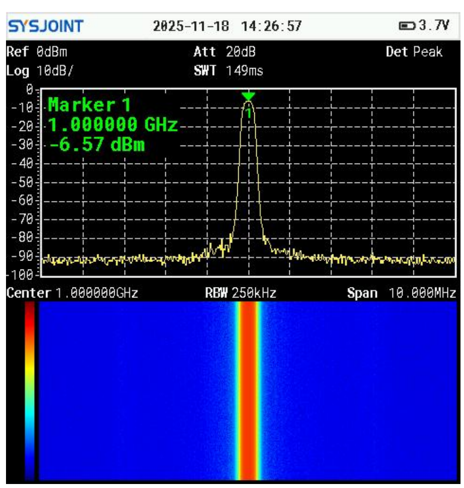
【Figure 4-13. Marker Table Interface】

4.10.3 Waterfall Display

The **Waterfall Display** presents spectrum data over time by extending time along the vertical axis and representing signal amplitude using color intensity. Each new spectrum trace is added sequentially, causing the display to flow downward over time, similar to a waterfall.

This function is particularly useful for observing time-varying signals, intermittent interference, frequency hopping behavior, and signal stability over time.

The color scale on the left side of the waterfall display represents signal amplitude. Red indicates higher signal levels, while blue indicates lower signal levels or noise.



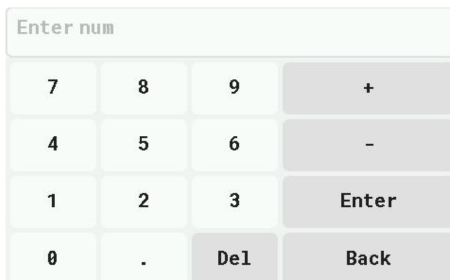
【Figure 4-14. Waterfall Display Interface】

4.10.4 Frequency Correction

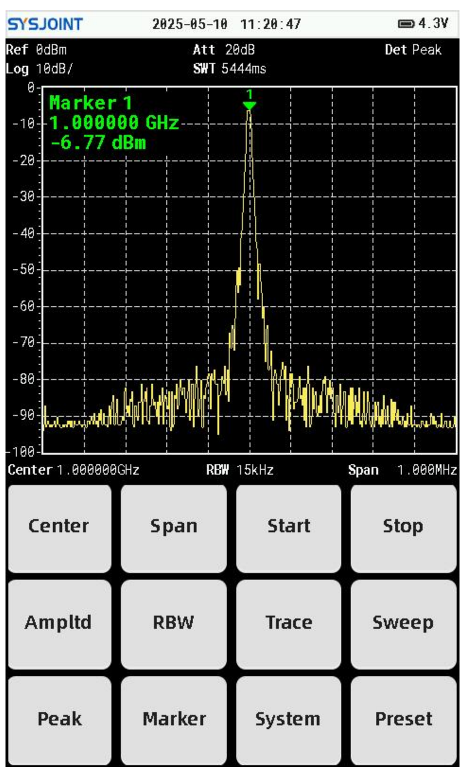
The frequency synthesizer of this instrument uses a **100 MHz crystal oscillator**. Factory calibration is performed prior to shipment under the following conditions: the instrument is warmed up for **5 to 10 minutes**, the ambient temperature is **15 °C to 30 °C**, and the reference measurement instrument is an **Agilent E4440A**.

If a frequency offset is still observed during operation, the frequency can be manually corrected using the **F Correct** function. The correction value is entered in **Hz**, with a typical adjustment range of **–1.5 kHz to +1.5 kHz**.

The frequency correction input interface is shown in Figure 4-**15**, and a calibration example is shown in **Figure 4-16**. When measuring a **1 GHz** signal, setting the correction value to **500 Hz** shifts the originally left-offset 1 GHz signal back to the center frequency.



【Figure 4-15. Frequency Correction Input Interface】



【Figure 4-16. Frequency Correction Example Interface】

4.10.5 Signal Generator

The **Signal Generator** function allows the instrument to operate as an independent signal source, separate from spectrum sweep operation. Users can configure the output **frequency** and **power level** directly.

The supported output ranges are as follows:

Frequency range: 35 MHz to 6.3 GHz

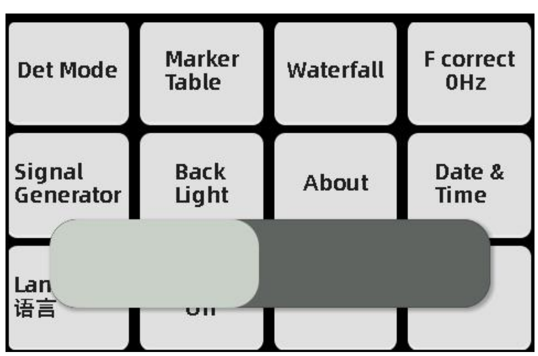
Output level range: –30 dBm to 0 dBm

The output frequency is entered via the numeric keypad, while the blue control on the right is used to enable or disable the signal output.

【Figure 4-17. Signal Generator Operation Interface】

4.10.6 Screen Brightness

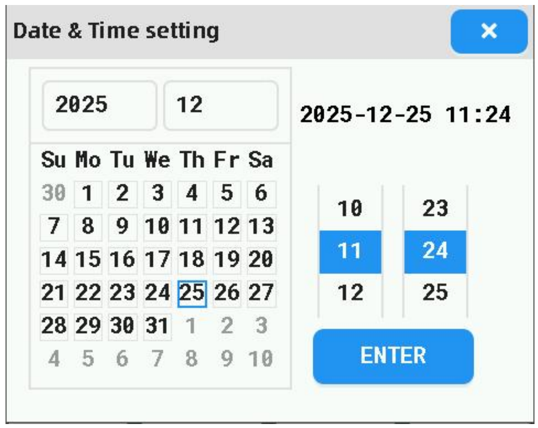
When the **Screen Brightness** menu is opened, the adjustment interface shown in **Figure 4-18** is displayed. Moving the control to the left decreases the brightness, while moving it to the right increases the brightness.



【Figure 4-18. Screen Brightness Settings Interface 】

4.10.7 Date & Time

The **Date & Time** function is used to set the system date and time. Correct date and time settings ensure accurate timestamping of measurements, screenshots, and saved data.



【Figure 4-19. Date & Time Settings Interface 】

5. Application Examples

The following section lists two simple application examples commonly encountered in practical operation, intended to help users quickly become familiar with the instrument.

For additional application scenarios and operation demonstrations, please refer to our official technical sharing platform:

Official BiliBili Account: SYSJOINT 矢志科技
Website: https://space.bilibili.com/3493078704851181

5.1 Single-Tone Signal Input Measurement

Application Example: Single-Tone Signal Measurement (1 GHz, –10 dBm)

Description: This instrument does **not** support self-test. This example demonstrates how to use the SSA463 to measure a single-tone signal provided by an external signal source.

1. Test Conditions

- **Signal Type:** Single-tone signal (Continuous Wave, CW)
- **Frequency:** 1 GHz
- **Input Level:** –10 dBm

2. Required Equipment

- SSA463 Portable Spectrum Analyzer
- External RF Signal Generator
- 50 Ω RF Coaxial Cable

3. Operation Steps

1. Power on the SSA463 and allow a warm-up time of at least **5 minutes**.
2. Connect the RF output of the external signal generator to the RF input port of the SSA463 using a 50 Ω coaxial cable.
3. Configure the external signal generator to output a **1 GHz**, **–10 dBm** continuous wave signal.
4. On the SSA463 main screen, set the **center frequency** to **1 GHz**.
5. Set the **span** to **10 MHz** and the **RBW** to **250 kHz**.
6. Set the **detector mode** to **Positive Peak** and the **trace mode** to **Clear/Write**.
7. Verify that a single-tone spectral line appears near **1 GHz** on the display.
8. Press the **[Peak]** key to place **Marker 1** at the signal peak and read the frequency and amplitude values.

4. Expected Result

A stable single-tone spectral line should appear near **1 GHz**. The measured amplitude should be close to **–10 dBm**, allowing for minor deviations due to cable loss.

5. Notes

- Do not exceed the maximum input power rating of the instrument.
- Ensure proper **50 Ω** system impedance matching.
- For higher measurement accuracy, allow sufficient warm-up time and select an appropriate RBW.

5.2 Signal Generator Application Example (1 GHz, –10 dBm)

Description:

This example demonstrates how to use the built-in signal generator of the SSA463 to output a **1 GHz**, **–10 dBm** test signal for system debugging, functional verification, or external device testing.

1. Output Conditions

- **Output Frequency:** 1 GHz
- **Output Level:** –10 dBm

2. Operation Steps

1. Power on the SSA463 and complete the startup process.
2. Press the **[SYSTEM]** key to enter the system menu.
3. Select **Signal Generator** to enter the signal generator interface.
4. Enter the output frequency **1 GHz** using the numeric keypad.
5. Set the output power level to **–10 dBm**.
6. Switch the **blue ON/OFF control** on the right side to **ON** to enable signal output.
7. Connect the signal output port to the device under test (DUT) using an RF cable.
8. Verify that the DUT receives the correct frequency and power level.

3. Notes

- Ensure proper **50 Ω** impedance matching.
- Do not exceed the maximum input power rating of the DUT.
- Disable the signal output after testing.

6. System Update

6.1 Firmware Upgrade

The SSA463 supports system upgrades via **Virtual U-Disk mode**. The upgrade can be completed using the supplied **USB Type-C cable**.

The upgrade procedure is as follows:

1、Use the supplied USB Type-C cable to connect the SSA463 to a USB port on the PC.

2、Press and hold the **top rotary knob**, then power on the instrument.

3、The device will enter **U-Disk mode** and the PC will automatically recognize it as a removable storage device. At the same time, the following message will be displayed on the screen:

Firmware upgrade:
1. Connect the device to PC with Type-C cable;
2. The device will be recognized as a U-Disk;
3. Copy 'SSA463.bin' into the U-Disk;
4. Power off and on;

4、Download the firmware package from the official website:
www.sysjoint.com

5、Extract the downloaded file to obtain the firmware file "**SSA463.bin"**.

6、Copy "**SSA463.bin"** to the root directory of the recognized U-Disk (the copy process takes approximately **60 seconds**).

7、After the copy is complete, power off the instrument and then power it on again. The system will automatically complete the firmware upgrade.

7. Charging Instructions

This instrument is charged via a USB Type-C interface.

1. Use the supplied Type-C charging cable to connect the instrument to a USB power adapter or computer USB port.
2. During charging, the **red indicator light remains ON**, indicating that the battery is charging.
3. When charging is complete, the **red indicator light turns OFF**, indicating that the battery is fully charged.
4. After the battery is fully charged, disconnect the charging cable.

Notes

- Use only the original or certified Type-C charging cable.
- Do not use the instrument in high-temperature or humid environments while charging.
- If the instrument is not used for a long time, it is recommended to recharge the battery periodically to maintain battery performance.

8. Precautions

1. Do not apply input signals exceeding the rated power (**> 15 dBm**).
2. Avoid operating the instrument in humid, dusty, or high-temperature environments.
3. Disconnect the power supply if the instrument will not be used for an extended period.
4. Use only the supplied original data cable.
5. Avoid applying signals that exceed the measurement range, as this may result in measurement inaccuracies.
6. Allow the instrument to warm up for **5 to 10 minutes** before use to ensure measurement accuracy.

9. After-Sales Service and Technical Support

For product updates, technical support, or after-sales service, please contact:
Hangzhou SYSJOINT Technology Co., Ltd.
Website: www.sysjoint.com
Email: support@sysjoint.com
Tel: +86 136 8574 1101