ERAVANT
FORMERLY SAGE MILLIMETER, INC.

Low Phase Noise Synthesized Signal Generator
User Manual
(STL-SG-022403-S1)

Rev 1.0

Eravant

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1. Introduction

STL-SG-022403-S1 is a portable, touchscreen direct control and programmable remote control Synthesized Signal Generator designed and manufactured for standard test instrumentation, communication, and radar systems as a local signal source. It covers a wide frequency range with exceptionally low harmonics and spurious emissions and offers superior low-phase-noise performance. It is externally referenced with a high-performance internal reference backup. The frequency resolution is up to 0.2 Hz. This Synthesized Signal Generator has a maximum spurious of -65 dBc. It has a built-in voltage regulator to improve signal quality further and provide overvoltage protection. This instrument features an advanced embedded processor that runs stably and responds quickly. It supports touchscreen direct control via an easily accessible HMI or programmable remote control via the USB port from a computer.

This manual introduces two control methods for the Synthesized Signal Generator.

2. Touchscreen Direct Control

The touchscreen direct control is intuitive, fast, and convenient, especially suitable for rapid measurement settings in testing or application systems.

2.1 Welcome Page

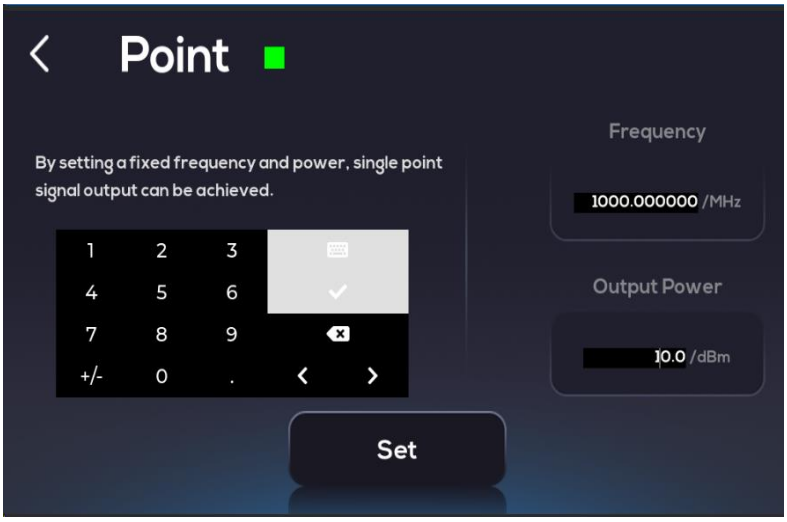
After connecting the system and turning on the power, the touch screen will display a welcome interface. Please press the Launch button and enter the device system.

2.2 Main Page

In the system's main interface, the current frequency, power, and temperature of the device will be displayed, along with the status of the output, reference source, and lock.

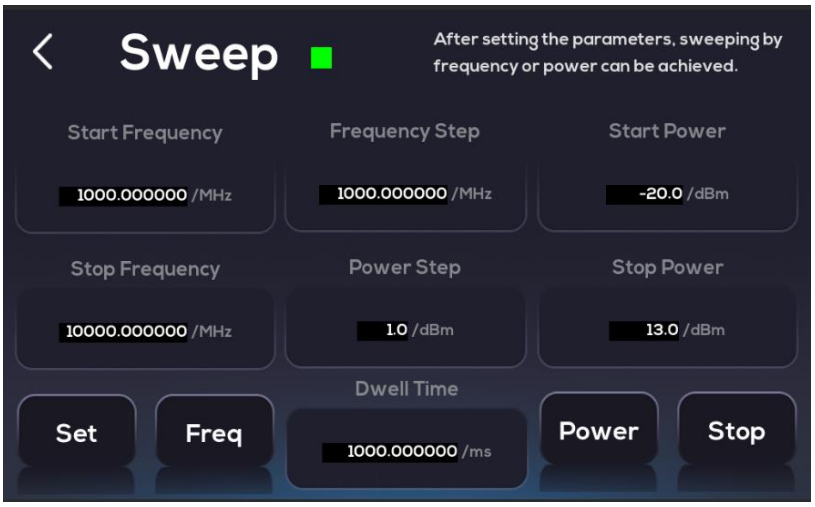
You can access the point frequency, sweep frequency, and system setting interfaces by pressing the Point, Sweep, and Setting buttons, respectively.

2.3 Point Mode



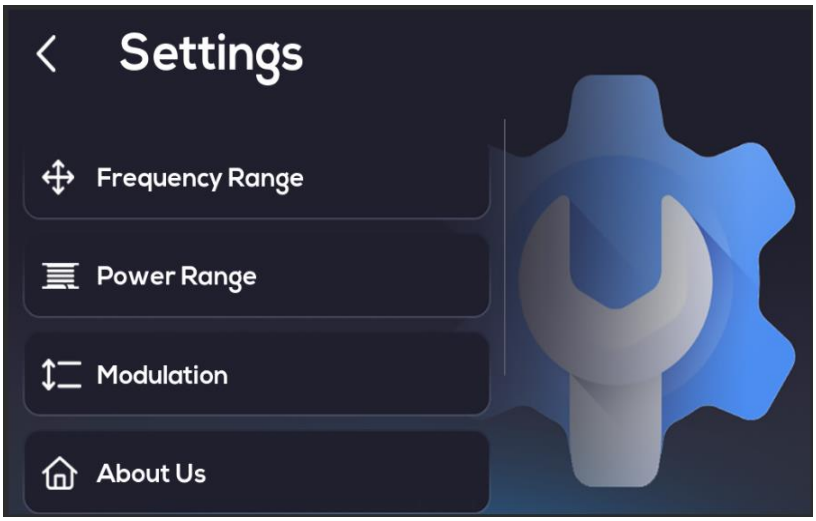
In the point frequency setting interface, you can enter the required frequency and power values, then press the Set button to apply the settings.

2.4 Sweep Mode



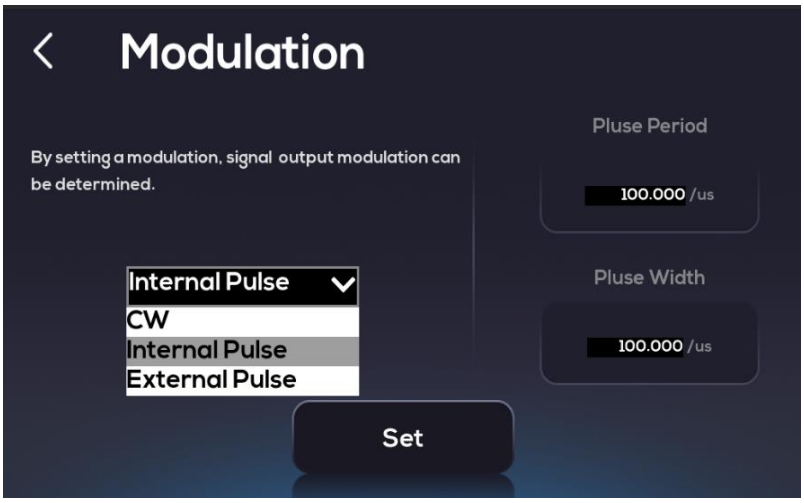
In the Sweep settings interface, you can enter the frequency and power of the start and stop points for the scan, as well as the step and dwell time values, and then press the Set button to apply the settings. You can choose between two scanning methods: frequency or power.

2.5 Settings Page



In the system settings interface, various system parameters can be set.

2.6 Modulation Mode



In the Modulation settings interface, you can set the modulation method. There are three modulation methods to choose from: continuous modulation, internal pulse, and external pulse modulation.

3. Programmable Remote Control

The programmable remote control is precise, flexible, and efficient, making it especially suitable for automated measurement settings in testing or application systems.

3.1 Connecting Device

Connect the Synthesized Signal Generator to your computer using the provided USB Type-A to Type-B cable. Once the generator is powered on and the USB cable is connected, the Windows “Device Manager” displays the generator unit device under “Ports.” It will be listed as “USB Serial Device,” with its corresponding COM port number next to it.

3.2 Serial Communication Protocol

3.2.1 Asynchronous Serial Port Configuration

Baud Rate	Start Bit	Data Frame	Parity Bit	Stop Bit
115200bps	1 bit	8 bits	NA	1 bit

3.2.2 Command Format

Format	Number of Bytes	Description
Header	1	Command begins with 0xaa
Module Number	1	0x55, broadcasting
Command Index	1	Refer to the command summary
Data Length	1	Number of data bytes
Data	Variable Length	MSB first
Parity	1	XOR output of all other bytes

3.2.3 Command Summary

Command Index	Data Length	Data	Note	Data Transmission
0x00	1 byte	1. 0x01 Product Version; 2. 0x02 Frequency and Power; 3. 0x03 Modulation Type and Parameter; 4. 0x04 Temperature; 5. 0x05 Reference Clock; 6. 0x06 Lock and Output Status.	Check Status	PC->STL
0x02	8 bytes	6 bytes (Frequency, step 1 Hz) 2 bytes (Attenuation, step 0.1 dBm, and add up 1500)	Frequency and Attenuation	PC->STL
0x08	1 bytes	1. 0x01 Use Internal Reference; 2. 0x00 Use External Reference.	Select Reference Clock	PC->STL
0x09	1 bytes	3. 0x01 Output ON 4. 0x00 Output OFF	Output Switch	PC->STL
0x11	9 bytes	1. 1 byte (0x00, CW) 8 bytes RESERVED; 2. 1 byte (0x01, Internal Pulse) 4 bytes (Pulse Period, unit ns) 4 bytes (Pulse Width, unit ns) 3. 1 byte (0x02, External Pulse) 4 bytes (Pulse Period, unit ns, INVALID) 4 bytes (Pulse Width, unit ns, INVALID)	Modulation Configuration	PC->STL
0x32	28 bytes	6 bytes (Start Frequency, unit 1 Hz) 6 bytes (Stop Frequency, unit 1 Hz) 6 bytes (Frequency Step, unit 1 Hz) 2 bytes (Start Power, unit 0.1 dBm) 2 bytes (Stop Power, unit 0.1 dBm) 2 bytes (Power Step, unit 0.1 dBm) 4 bytes (Dwell Time, unit ns)	Frequency Sweeping Setup	PC->STL

0x35	4 bytes	1 byte (0x00 Disable Sweeping; 0x01 Enable Sweeping) 1 byte (0x00, Enable Frequency Ascending; 0x01, Enable Frequency Descending; 0x10, Enable Power Ascending; 0x11, Enable Power Descending) 2 bytes RESERVED	Enable Sweeping	PC->STL
0x10	8 bytes	2 bytes (Production Date) 2 bytes (Project Number) 2 bytes (Product ID) 2 bytes (Software Version)	Report Product Version	STL->PC
0x11	9 bytes	1 byte (0x02) 6 bytes (Frequency, unit 1 Hz) 2 bytes (Attenuation, unit 0.1 dB, and add up 1500)	Report Frequency and Power	STL->PC
0x12	9 bytes	1. 1 byte (0x00, CW) 8 bytes RESERVED 2. 1 byte (0x01, Internal Pulse) 4 bytes (Pulse Period, unit ns) 4 bytes (Pulse Width, unit ns) 3. 1 byte (0x02, External Pulse) 8 bytes RESERVED	Report Modulation Type and Parameters	STL->PC
0x13	2 bytes	Signed integer (unit 0.0625)	Report temperature	STL->PC
0x14	1 byte	0x01 Using Internal Reference Clock 0x00 Using External Reference Clock	Report Reference Clock	STL->PC
0x15	1 byte	Bit 0 (0, Out of Lock; 1, Locked) Bit 1 to Bit 6, RESERVED Bit 7 (0, Output Disabled; 1, Output Enabled)	Report Lock and Output Status	STL->PC

3.3 Serial Communication Process

When the PC sends a parameter setup command via the serial communication protocol to the generator, the generator calculates the parameters and generates the required waveforms. When the PC sends a status check command to the generator, the generator reads the requested status data. It sends a command back to the PC via the serial communication protocol. Note that all the commands sent by both the PC and the generator follow the same command format.

To program the generator, there are three steps,

1. Power on the generator. The default operating frequency is 10 GHz, the power level is 0 dBm, and the output is disabled.
2. Enable the generator output. PC sends the command below to the generator,
   AA 55 09 01 01 F6
   where AA (Header) 55(Module Number) 09(Command Index) 01(Command Length) 01(Data) F6(Parity).
3. Configure the operating frequency and power level. For example, if the generator is configured to generate a CW waveform with a frequency of 1 GHz and a power of 0 dBm, frequency unit 1 Hz, the PC sends the command below to the generator,
   AA 55 02 08 00 00 3B 9A CA 00 05 DC 47
   In addition to a continuous wave, the generator can generate a pulse waveform. The command to generate an internal pulse with a 0.1 ms period and 0.05 ms pulse width is shown below,
   AA 55 11 09 01 00 01 86 A0 00 00 C3 50 52