

Microwave Signal Generator MMSG-0120 Series

JS Microwave

RF/Microwave wideband
Signal Generator
100MHz ~ 20GHz

ACCURATE-INNOVATIVE-RELIABLE

62A Willoughby Ln, London N17 0SS, United Kingdom
+44 74 888 112 62
sales@jsmicrowave.com

www.jsmicrowave.com

JS Microwave Portable Instruments

RF\Microwave Signal Generator up to 20GHz

- **MMSG-0120A+**
Phase Noise Grade-A – 20dB Dynamic Range (0dBm ~ -20dBm)
- **MMSG-0120B+**
Phase Noise Grade-B – 70dB Dynamic Range (+10dBm ~ -75dBm)
- **MMSG-0120C+**
Phase Noise Grade-C – 70dB Dynamic Range (+10dBm ~ -75dBm)
- **MMSG-0120PE**
Phase Noise Grade-C – 70dB Dynamic Range (+10dBm ~ -75dBm)
FMCW radars test equipment
Direct Modulation/Fast Waveform Generating
High and low speed FMCW ramp generation
Ramp with 2 different sweep rates
FSK and PSK functions
Ramp superimposed with FSK
Microwave Sawtooth and triangular waveform generation

REVISION HISTORY

Revision 0: Initial Version 2023

Overview Description

The JS Microwave MMSG-0120 Series is a 100 MHz to 20GHz software tunable RF/Microwave signal generator and frequency sweeper with power level from 0 to -20 dBm and +10 to -75dBm (± 1 dB step), controlled by a device running Windows and Android via its USB/LAN port or Bluetooth.

The core architecture of the MMSG-0120 Series modules is derived from JS Microwave Proprietary Full Integrated design to provide the ultimate in phase and frequency stability. The attractive performance-to-price ratios available with the MMSG-0120 Series offers optimal solutions for electronics design, manufacturing test applications, wireless communications, aerospace and defense, computer, automotive, etc.

Features

- **Frequency range from 100MHz to 20GHz**
- **100us RF lock time**
- **50us fast frequency hopping**
- **1Hz frequency resolution**
- **CW, Pulse, Step sweep and list sweep**
- **Direct Modulation/Fast Waveform Generating/ Pulsed FMCW Chirp**
- **50 point Frequency and Amplitude Hop Table (up to 1000 point)**
- **External Sweep, Step, modulation and etc. Trigger**
- **Over 85dB of power control**
- **Up to +10dBm output power**
- **0.1 degree phase control up to 360 Degree**
- **10MHz ~ 350MHz external reference input**
- **50ppb OCXO/ 280ppb Internal TCXO Reference accuracy**
- **USB/LAN(Ethernet) and Bluetooth Communications Interface**
- **Modern graphical user interface for fast and intuitive operation**
- **Magnetic heatsink for long term applications**

62A Willoughby Ln, London N17 0SS, United Kingdom
+44 74 888 112 62
sales@jsmicrowave.com

JS Microwave

**RF/Microwave wideband
Signal Generator
100MHz ~ 20GHz**

MMSG-0120 Series Design Highlights:

- ✓ 50 ppb Low phase noise OCXO
- ✓ 280 ppb Low phase noise TCXO
- ✓ Ext. Reference up to 350MHz
- ✓ 50us lock time for fast frequency hopping
- ✓ Ultra Low Phase Noise Architecture (Grade-B/C)
- ✓ Military Applications
- ✓ Non harmonics Spurious better than -75dBc
- ✓ USB-C Power and I/O port
- ✓ Excellent windows and Android GUI

Electrical Specifications

Characteristic	Comment	Min.	Typ.	Max.	Unit		
Supply Voltage	USB-C Connection	5	6	6.5	V		
Supply Current		-	1.1	-	A		
Frequency Range		0.05	-	20	GHz		
Frequency Step Size	0.01Hz Optional	1	-	-	Hz		
RF lock time ⁽¹⁾	Grade-B/C 100us RF Lock Time	50	100		us		
Internal Reference Frequency		-	25	-	MHz		
Internal Reference Tolerance	Temperature Stability (50ppb OCXO)	-	50	280	ppb		
Aging	Per lffe (20Years)	-3.0		+3.0	ppm		
External Reference Frequency		10	-	350	MHz		
External Reference Level		-5	-	+10	dBm		
RF Output Power Maximum ⁽²⁾	Grade-A 0dBm, Grade-B, C +10dBm	0	-	+10	dBm		
RF Output Power Minimum ⁽²⁾	Grade-A -20dBm, Grade-B, C -75dBm	-75	-	-20	dBm		
RF OFF Output Power	100% Shut down RF Section	-	-	-90	dBm		
RF Output Power Resolution		0.5	-	-	dBm		
RF Level Accuracy		±0.3	-	±1	dB		
RF Level Switching Speed		-	20	-	us		
Phase Offset		0	-	360	Degree		
Phase Step Resolution		0.1	-	-	Degree		
Non Harmonics Spurious		-90	-	-70	dBc		
Harmonics		-10	-	-35	dBc		
Sub Harmonics		-	-45	-	dBc		
SSB Phase Noise	1GHz Grade-A		1GHz Grade-B		1GHz Grade-C		dBc/Hz
	1KHz	-90	1KHz	-113	1KHz	-116	
	10KHz	-115	10KHz	-125	10KHz	-135	
	100KHz	-125	100KHz	-128	100KHz	-135	
	1MHz	-145	1MHz	-145	1MHz	-145	
	1GHz Grade-A		1GHz Grade-B		1GHz Grade-C		
	1GHz Grade-A		1GHz Grade-B		1GHz Grade-C		

Electrical Specifications (Continued)

Characteristic	Comment	Min.	Typ.	Max.	Unit.
Jitter (RMS) at 18 GHz	5 kHz < BW < 20 MHz	-	60	-	fs
RF Output Impedance		-	50	-	Ω
VSWR		-	1.7	-	
REF Input Impedance		-	50	-	Ω
Frequency Sweep	<div> <div> Step Sweep Start Freq (min) 100 MHz Start Freq (max) 19999.999999 MHz Stop Freq (min) 100.0000001 MHz Stop Freq (max) 20000 MHz Step Freq (min) 1Hz Step Time (min) 100 us Step Time (max) 10000 s </div> <div> List Sweep Start Freq (min) 100 MHz Start Freq (max) 20000 MHz Step Freq (min) 1Hz Step Time (min) 100 us Step Time (max) 10000 s List Size (min) 50 List Size (max) 1000 </div> <div> Amplitude Sweep (optional) Amp (min) -75 dBm Amp (max) +10 dBm Step Amp (min) 0.5 dB Step Amp (max) 20 dB Step Time (min) 15 us List Size (max) 1000 Amp Step/List Sweep </div> </div>				
Frequency Hopping	<div> <div> Single Tone List Hopping Start Freq (min) 100 MHz Stop Freq (max) 20000 MHz Step Time (min) 50us </div> <div> Step Sweep List Hopping (Burst) Optional </div> </div>				
Pulse Modulation	<div> Analog Pulse Modulation Rise/Fall Time < 5 ns ON/OFF Ratio 60dB Pulse Width (min) 100 ns Pulse Width Step 10 ns (Optional) PRI (min) 110 ns PRI (max) 40 S PRI Step (min) 100 ns </div>				
External Trigger Threshold	Internally Pulled Up	1	-	3.3	V
External Trigger (B, C Grade)	<div> Trigger Functions (Rising/Falling Triger Polarity) RF Step Sweep (Full/Single) Amplitude Step Sweep (Full/Single) RF ON/OFF Fast Frequency Hopping System Shutdown Pulse Modulation Ext. REF Control </div>				

Electrical Specifications (Continued)

Characteristic	Comment	Min.	Typ.	Max.	Unit
Operating Temperature (3)		-30	-	+60	C
Operating Humidity		-	-	90	%
Storage Temperature		-40	-	+85	C
Power Consumption		-	-	8	W
RF Connectors (Input/Output)	Female SMA				
Control Interface	USB-C_ Common Port Between USB and Bluetooth dongle				
Dimensions	MMSG-0120A+ W x L x H = 70.5 x 107.4 x 23.15 mm MMSG-0120B+, C+ W x L x H = 84 x 140.2 x 25.15 mm				
Material	Aluminum extrusion				

NOTE (1): RF lock time in normal applications equal 100us. In fast frequency hopping mode, RF lock time equal to 50us.

NOTE (2): Calibration and measurement of the power level is done by directly connecting the device to the measuring equipment. When using, consider cable loss.

NOTE (3): For long term applications in hot weather it is recommended to use the device's magnetic heat sink.

Additional and Useful Features:

In the design and implementation of this device, we considered creativity, innovation and quality at the same time, and various environmental conditions for wide use have been reviewed by our team. For example, the device is equipped with internal magnets to connect to metal tools in the environment, or in long-term working conditions, you can use the special magnetic heat sink provided by the device. Also, in some cases, you can start and use the device with your smart phone and through the Bluetooth port. All the features that are available in the desktop Control Interface are also available in Android. The iOS version is coming soon. enjoy it ...

Sometimes you need to control the device through the Ethernet network. An Ethernet Adapter is provided with the device, which can solve this need and control your device on the network platform. For this purpose, you can configure the network settings in the device GUI interface.

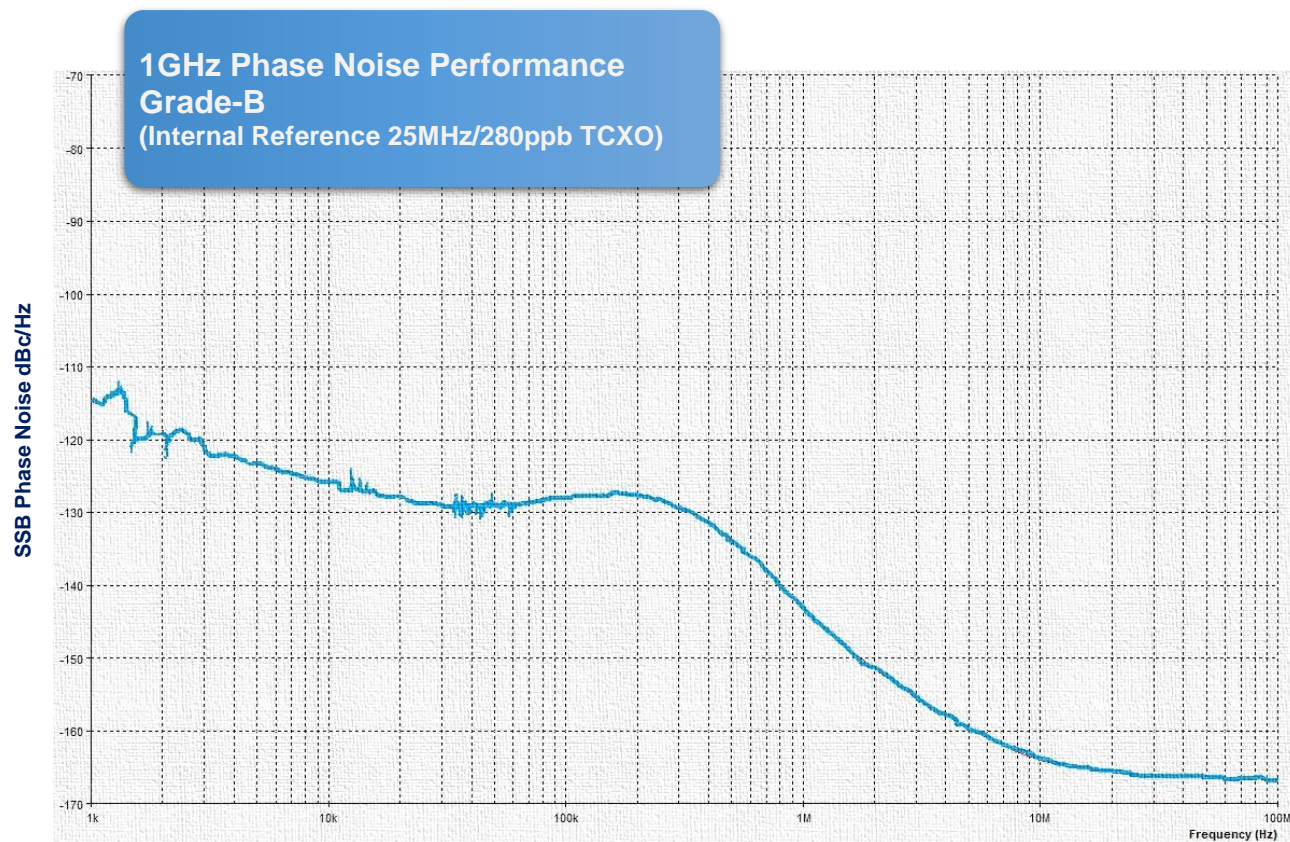


Figure 1

The raw data displayed in Figure 1 is of SSB Phase Noise vs. Frequency Offset as measured for the MMSG-0120 Series. All data was collected at an output power setting of +10dBm.

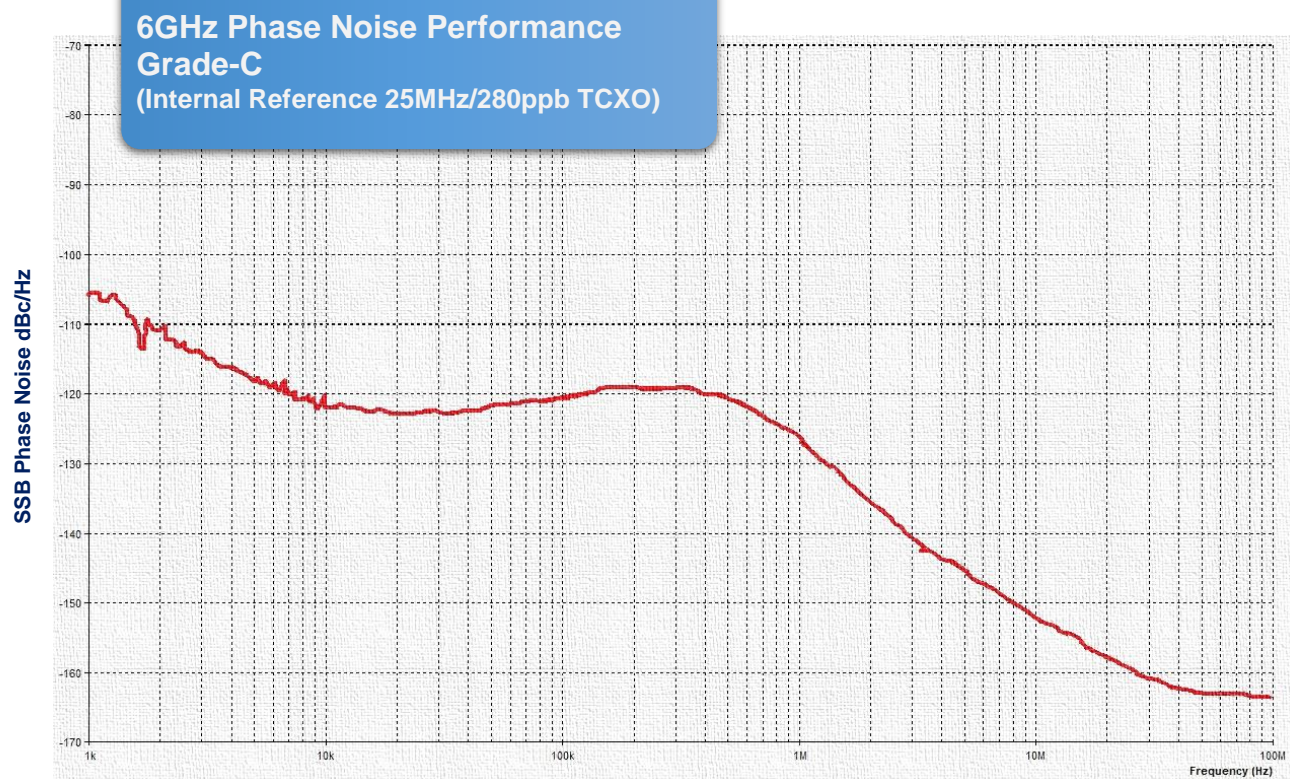


Figure 2

The raw data displayed in Figure 2 is of SSB Phase Noise vs. Frequency Offset as measured for the MMSG-0120 Series. All data was collected at an output power setting of +10dBm.

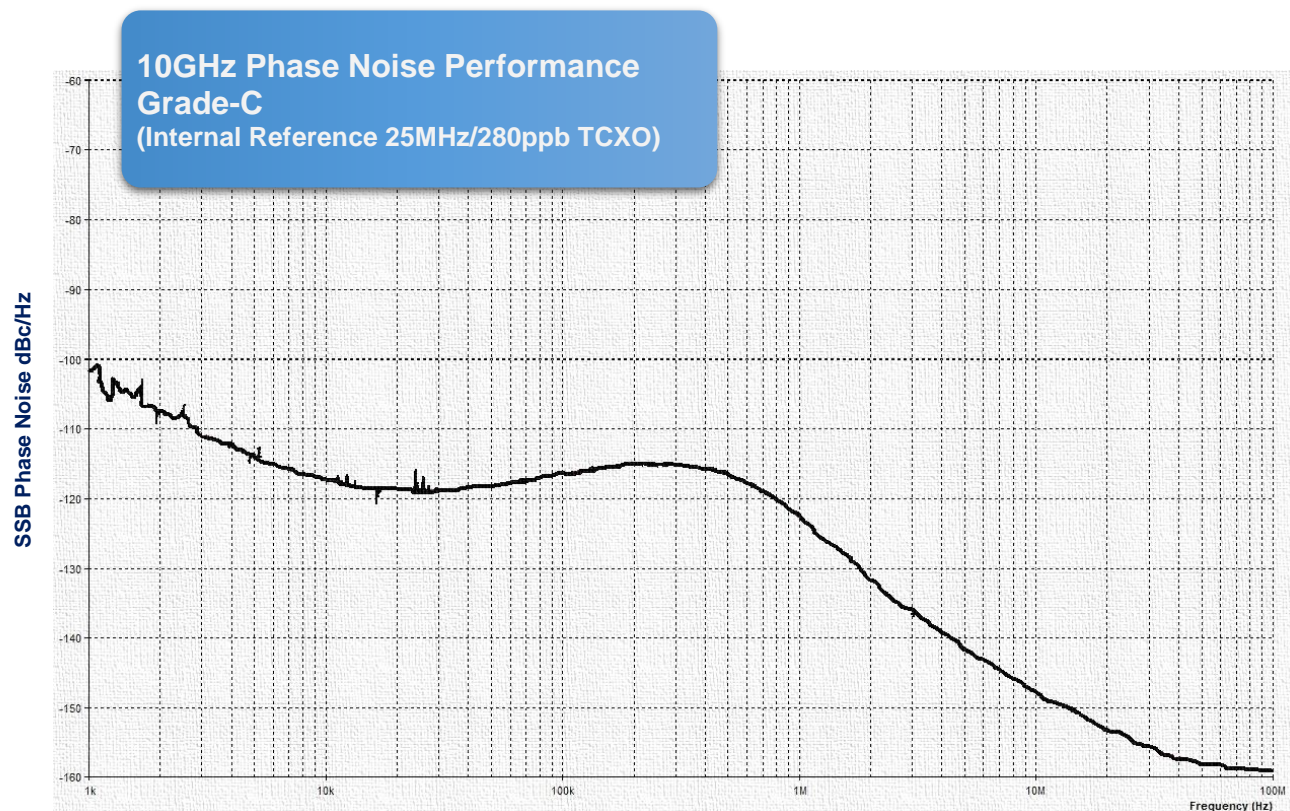


Figure 3

The raw data displayed in Figure 3 is of SSB Phase Noise vs. Frequency Offset as measured for the MMSG-0120 Series. All data was collected at an output power setting of +10dBm.

Dimension: Grade-A (Economy Version)
Top View

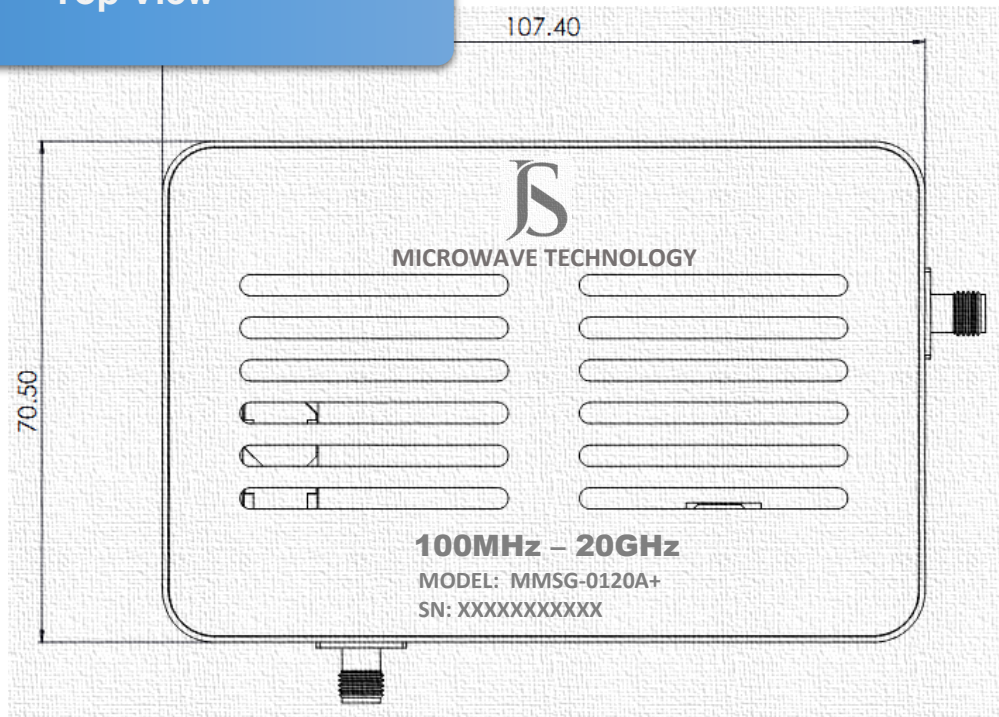


Figure 4

Dimension: Grade-A (Economy Class)
3D View

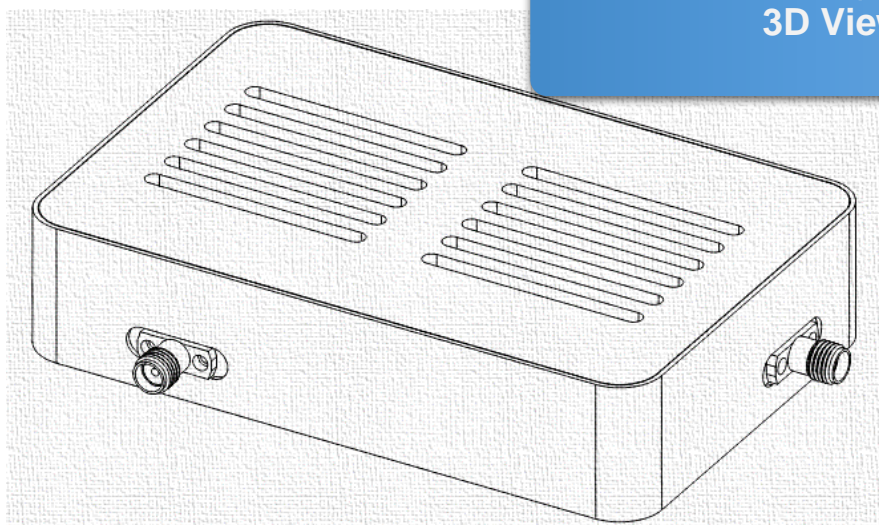


Figure 5

**Dimension: Grade-A (Economy Version)
Side View**

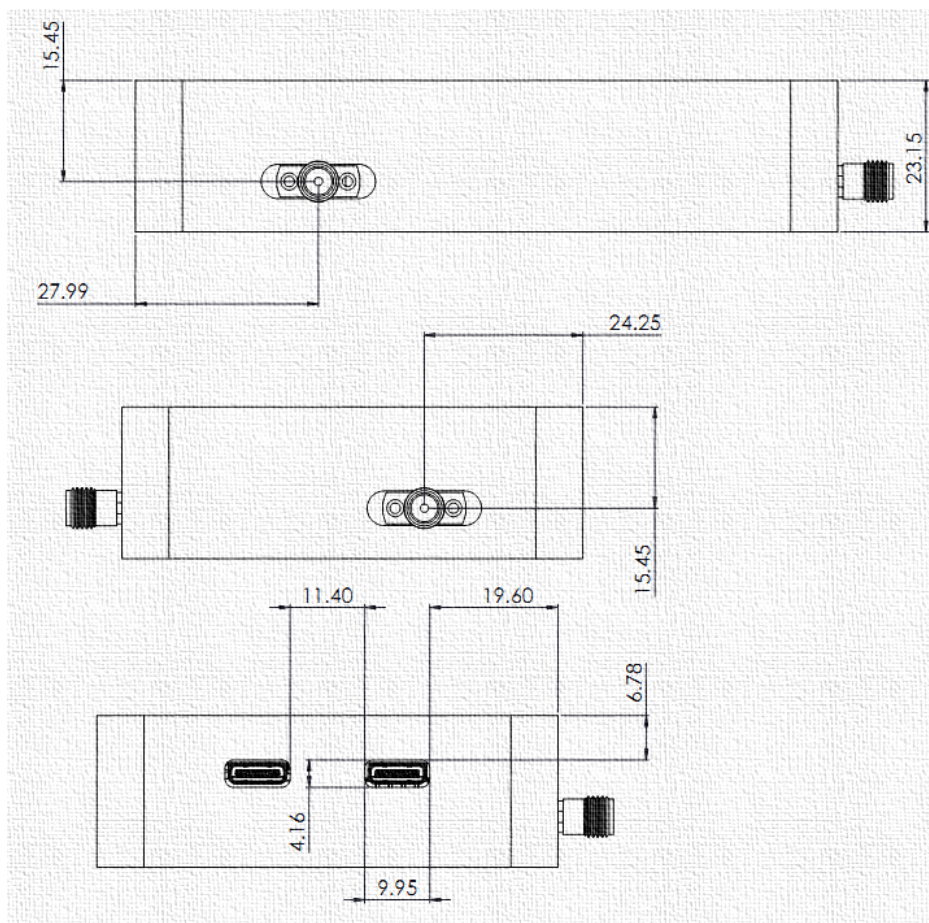


Figure 6

User Interface Pictures



NOTE:

