

Microwave Signal Generator MMSG-01XX Series

JS Microwave

RF/Microwave wideband
Signal Generator
0.1GHz ~ 10/12/15GHz

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JS Microwave Portable Instruments PRO ver

RF\Microwave Signal Generator up to 15GHz

- **MMSG-01XXA+ Pro ver**
Phase Noise Grade-A – 110dB Dynamic Range (+10dBm ~ -100dBm)
- **MMSG-01XXB+ Pro ver**
Phase Noise Grade-B – 110dB Dynamic Range (+10dBm ~ -100dBm)
- **MMSG-01XXC+ Pro ver**
Phase Noise Grade-C – 110dB Dynamic Range (+10dBm ~ -100dBm)

REVISION HISTORY

Revision 0: Initial Version 2023

Overview Description

The JS Microwave MMSG-01XX Series is a 0.1GHz to 10/12/15GHz software tunable RF/Microwave signal generator, frequency sweeper and Pulse Modulation with power level from +10 to -100 dBm (± 1 dB step), controlled by a device running Windows and Android via its USB/LAN port or Bluetooth.

The core architecture of the MMSG-01XX 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-01XX Series offers optimal solutions for electronics design, manufacturing test applications, wireless communications, aerospace and defense, computer, automotive, etc.

Features

- **Frequency range from 0.1GHz to 10/12/15GHz**
- **200us 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)**
- **Pulse Video Output**
- **Over 110dB of power control**
- **Up to +10dBm output power**
- **0.1 degree phase control up to 360 Degree**
- **10MHz ~ 500MHz 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**

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MMSG-0120 Series Design Highlights:

- ✓ 50 ppb Low phase noise OCXO
- ✓ 280 ppb Low phase noise TCXO
- ✓ Ext. Reference up to 500MHz
- ✓ 50us lock time for fast frequency hopping
- ✓ Ultra Low Phase Noise Architecture (Grade-B/C)
- ✓ Military Applications
- ✓ Non harmonics Spurious better than -70dBc
- ✓ 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	5.5	6	6.5	V		
Supply Current		-	2	-	A		
Frequency Range		0.1	-	10/12/15	GHz		
Frequency Step Size	0.01Hz Optional	1	-	-	Hz		
RF lock time ⁽¹⁾	Grade-B/C 100us RF Lock Time	50	200		us		
Internal Reference Frequency		-	10	-	MHz		
Internal Reference Tolerance	Temperature Stability (50ppb OCXO)	-	50	280	ppb		
Aging	Per lIfe (20Years)	-3.0		+3.0	ppm		
External Reference Frequency		10	-	500	MHz		
External Reference Level		-10	-	+10	dBm		
RF Output Power Maximum ⁽²⁾	Grade-A, B, C +10dBm	-	-	+10	dBm		
RF Output Power Minimum ⁽²⁾	Grade-A, B, C -100dBm	-	-	-100	dBm		
RF OFF Output Power	100% Shut down RF Section	-	-	-130	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		-	-	-	dBc		
SSB Phase Noise	1GHz Grade-A		1GHz Grade-B		1GHz Grade-C		dBc/Hz
	1KHz	-90	1KHz	-113	1KHz	-116	
	10KHz	-118	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		

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		-	1.5	-	
REF Input Impedance		-	50	-	Ω
Frequency Sweep (MMSG-0110 ver)	<div> Step Sweep Start Freq (min) 100 MHz Start Freq (max) 9999.999999 MHz Stop Freq (min) 100.0000001 MHz Stop Freq (max) 10000 MHz Step Freq (min) 1Hz Step Time (min) 200 us Step Time (max) 10000 s </div> <div> List Sweep Start Freq (min) 100 MHz Start Freq (max) 10000 MHz Step Freq (min) 1Hz Step Time (min) 200 us Step Time (max) 10000 s List Size (min) 50 List Size (max) 1000 </div> <div> Amplitude Sweep (optional) Amp (min) -100 dBm Amp (max) +10 dBm Step Amp (min) 0.5 dB Step Amp (max) 50 dB Step Time (min) 15 us List Size (max) 1000 Amp Step/List Sweep </div>				
Frequency Hopping (MMSG-0110 ver)	<div> Single Tone List Hopping Start Freq (min) 100 MHz Stop Freq (max) 10000 MHz Step Time (min) 50us </div> <div> Step Sweep List Hopping (Burst) Optional </div>				
Pulse Modulation	Analog Pulse Modulation Rise/Fall Time < 10 ns ON/OFF Ratio 60dB (Typ) Pulse Width (min) 50 ns Pulse Step 10 ns PRI (min) 110 ns PRI (max) 40 S PRI Step (min) 10 ns				
External Trigger Threshold	-	-	-	-	-
External Trigger (B, C Grade)	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				

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		-	-	12	W
RF Connectors (Input/Output)	Female SMA				
Control Interface	USB-C_ Common Port Between USB and Bluetooth dongle				
Dimensions	MMSG-01XXA+/B+/C+ W x L x H = 84.4 x 139.82 x 46.15 mm				
Material	Aluminum				

NOTE (1): RF lock time in normal applications equal 200us. 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.

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. In long-term working conditions, you can use the special cooling system 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 port 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.

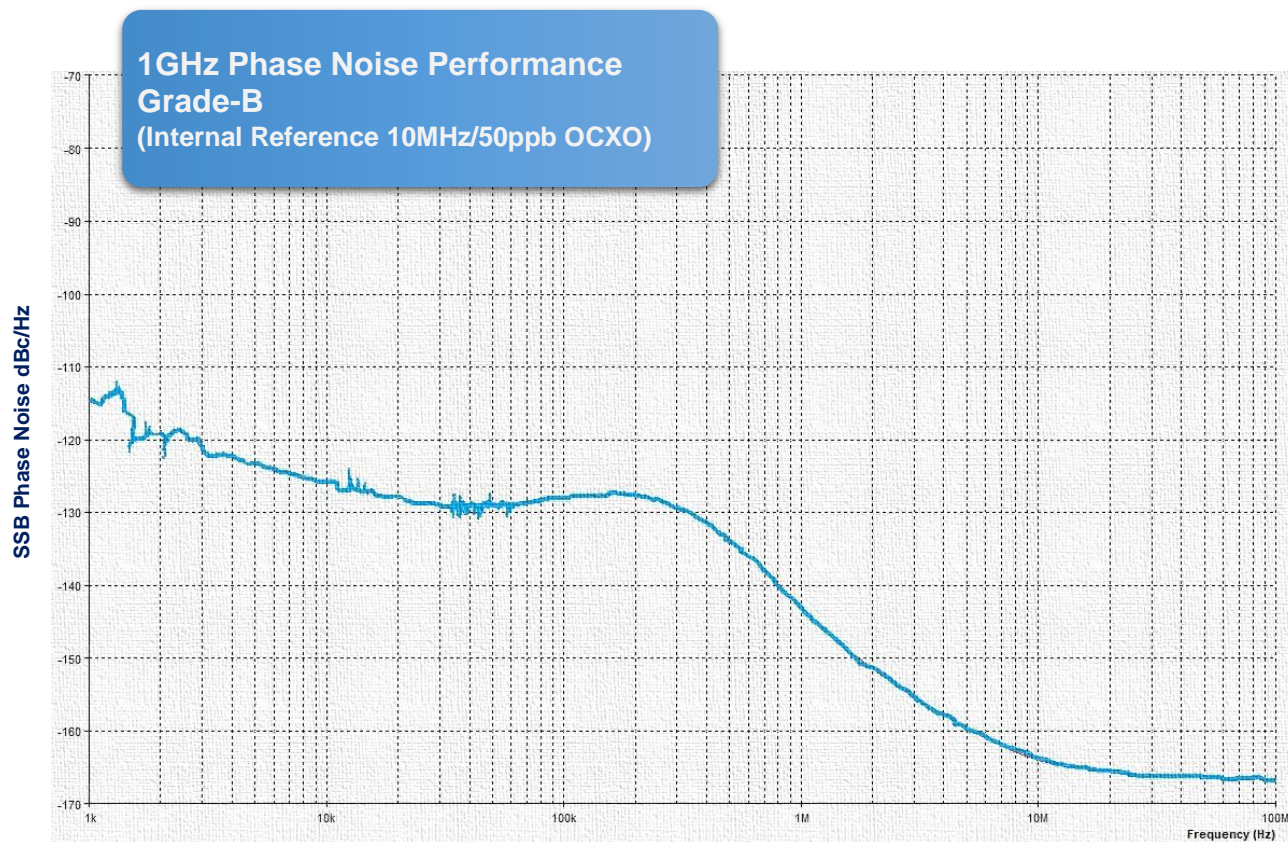


Figure 1

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.

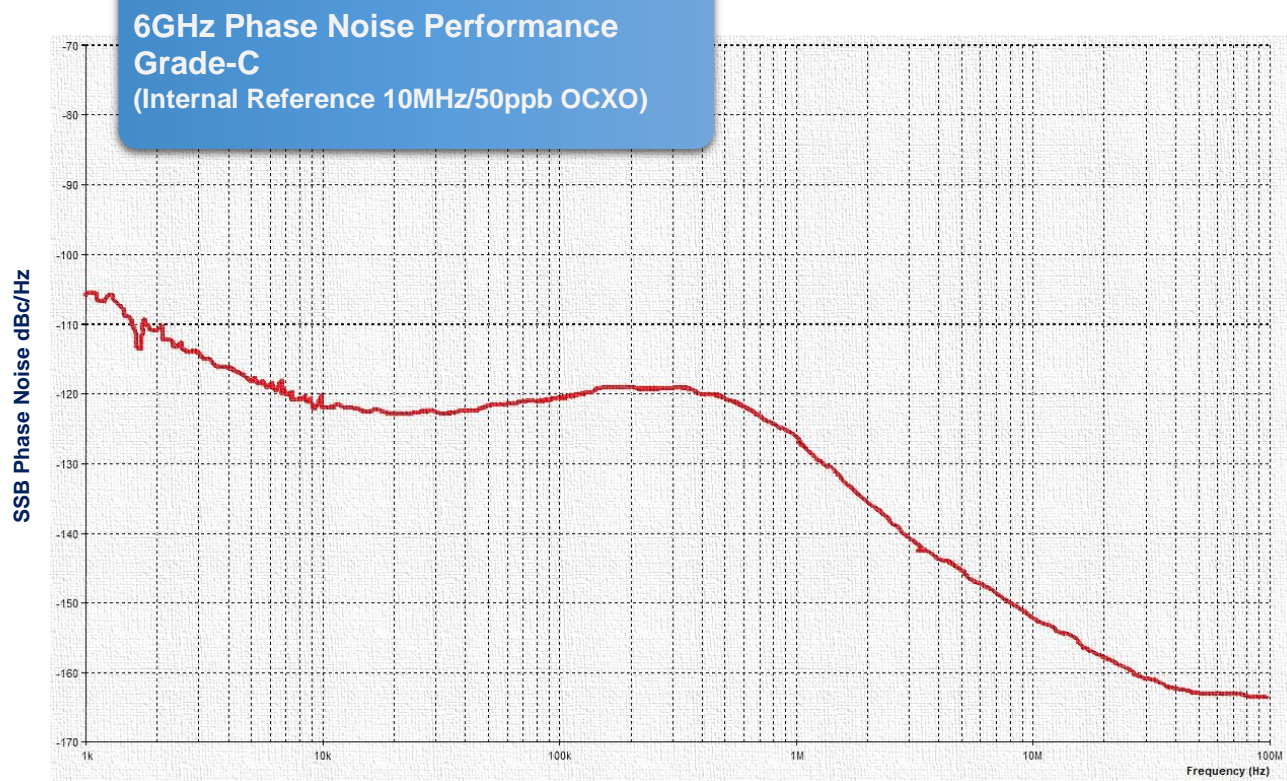


Figure 2

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.

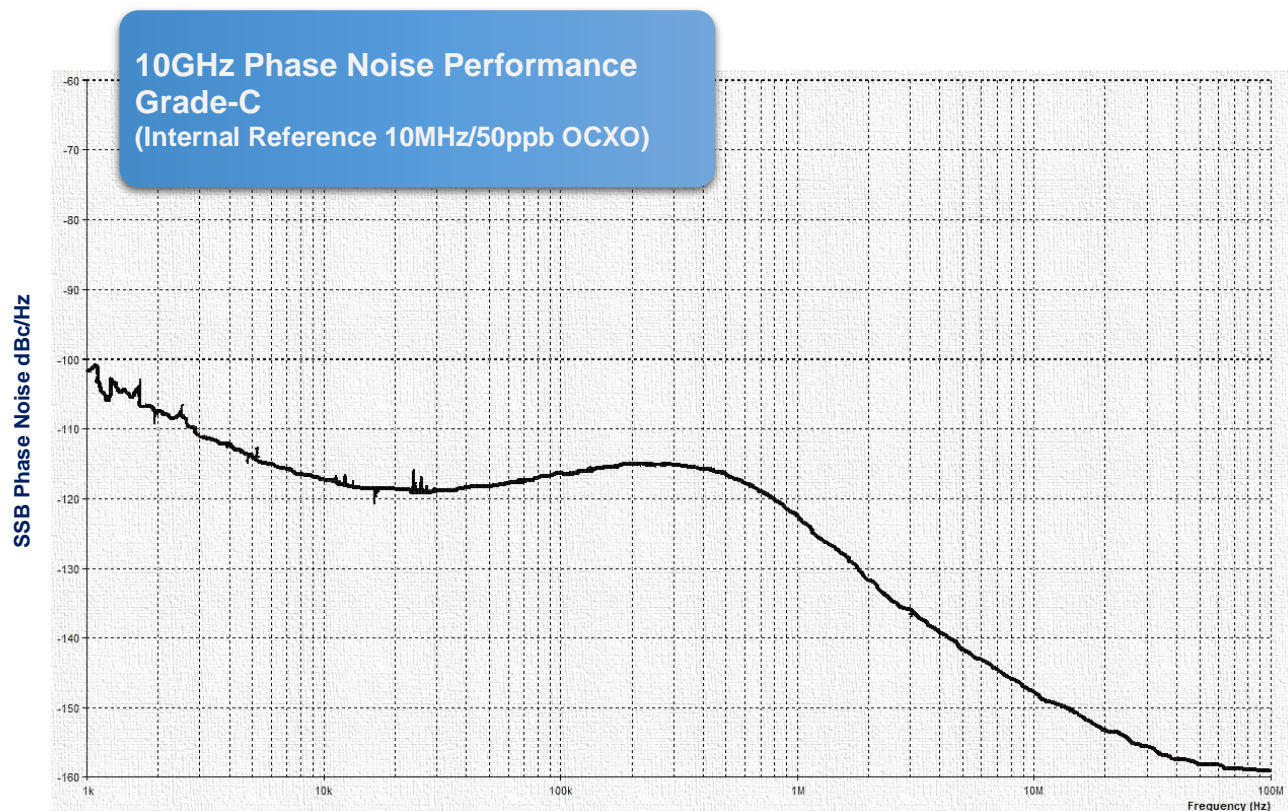


Figure 3

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 (Pro Version)
Top View

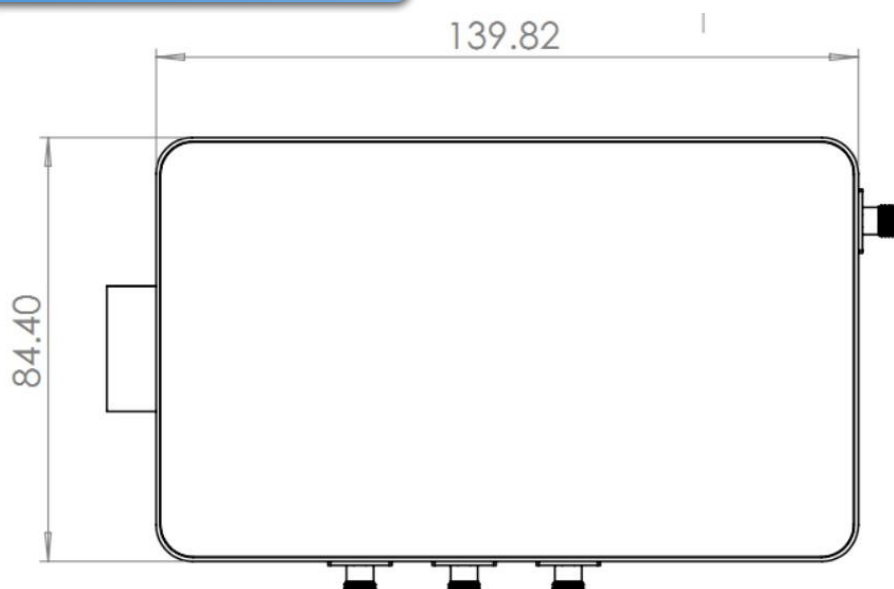


Figure 4

Dimension: Grade-A (Pro version)
Side View

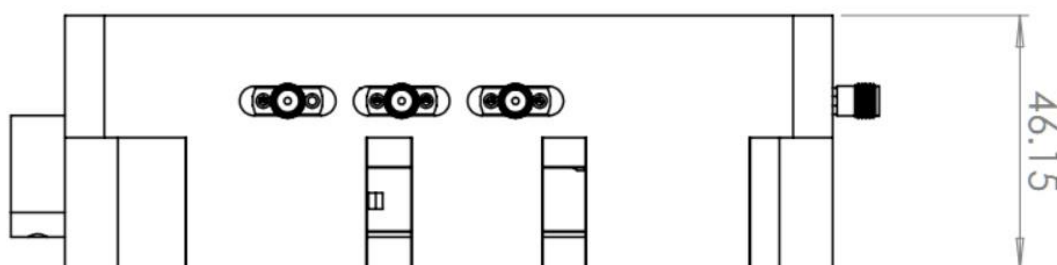


Figure 5

Dimension: Grade-A (Pro Version)
Bottom View

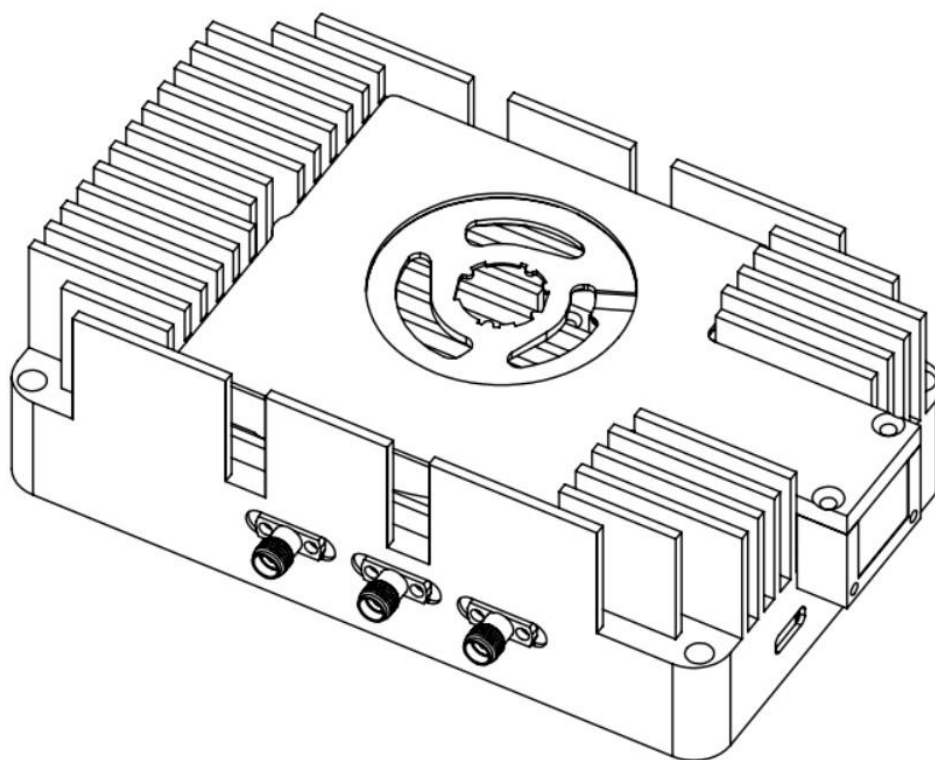


Figure 6

JS Microwave
Technology & Solution



User Interface Pictures



NOTE:



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