Boonton
SGX1003/SGX1006
RF SIGNAL GENERATOR

The SGX1003 and SGX1006 utilize a unique non-PLL (phase locked loop) design with a digital front-end and direct, proprietary back end. The design enables a distinctive combination of features and performance.

SGX1003/SGX1006 RF Signal Generator

KEY FEATURES

|	
Frequency range:	10 MHz to 6 GHz
Output power range:	-50 to +18 dBm
Lightning fast - Frequency switching speed:	
(list/step sweep modes)	350 µs, settled
Ultra-low phase noise - single sideband phase noise	-122 dBc/Hz
	3 GHz, 10 kHz offset
	-116 dBc/Hz
	6 GHz, 10 kHz offset
Ultra-low jitter	< 100 fs
Excellent amplitude accuracy (as low as -40 dBm)	+/-0.5 dB

SGX1003/SGX1006 RF Signal Generator
Front Panel

(1) USB ports for peripherals

(2) At-a-glance display of key synthesis parameters

(3) RF output (option to move to rear panel)

(4) Multi-touch display with intuitive user interface

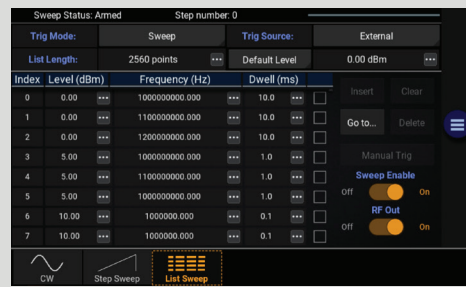**(5)** Quick access to freq and amp settings and to turn RF output on/off

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(6) SGX100x Additional Signal Generation Capabilities (beyond CW)
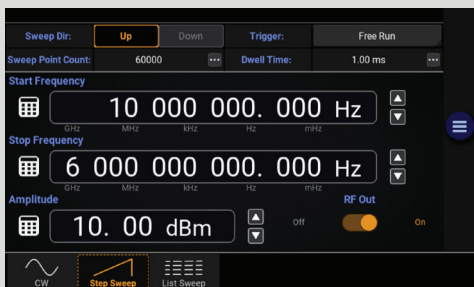
Sweep Mode

The RF output signal can be swept up or down between frequency points with a user-defined number of points and dwell time.

List Mode

Users can import a .csv file with a list of frequencies and power levels to which the instrument can be set via an external trigger or set of triggers.

SGX1003/SGX1006 RF Signal Generator
Specifications

PARAMETER	MIN	TYPICAL	MAX	COMMENTS
Frequency Range				
Model SGX1003	10 MHz		3.072 GHz	Settable from 5 MHz to 3.072 GHz
Model SGX1006	10 MHz		6.000 GHz	Settable from 5 MHz to 6.720 GHz
Frequency Step Size		0.001 Hz		Nominal
Switching Speed (Frequency)				
List/Step Sweep Mode		350 µs		Nominal
Internal Time Base Reference				
Adjust-to-Nominal			+/- 0.2 ppm	Uncertainty
Aging Rate		± 1 ppm/yr		1st year. ±0.5 ppm/yr each subsequent year
Temperature Effects		≤ ± 1 ppm		0 to 55° C
Reference Output				
Frequency		100 MHz		
Amplitude	+2 dBm		+ 6 dBm	Into 50 Ω, nominal
External Reference Input				
Input Frequency		10 or 100 MHz		Software select 10 MHz, 100 MHz or No Ext. Ref.
10 MHz Lock Range		+/- 4 ppm	+/- 1 ppm	20 Hz Locking BW, Internal OCXO remains on
10 MHz External Amplitude	0 dBm		+ 10 dBm	20 Hz Locking BW, Internal OCXO remains on, nominal
100 MHz External Amplitude	+ 2 dBm		+6 dBm	Internal OXCO shuts off with 100 MHz Ext. Ref. , nominal
Waveform				Sine
Digital Sweep Modes				
Operating Modes				Step sweep (linear, internal)
				List (simultaneous frequency and amplitude step changes)
Sweep Range	10 MHz		3.072 GHz	SGX1003
	10 MHz		6.72 GHz	SGX1006
Dwell Time	100 µs		10 s	1 µs increments
Number of Points (Step sweep)	2		65535	
Number of Points (List)	2		2560	
Triggering				Free Run, Sweep, and Point
Trigger Source				External, Bus, and Key

SGX1003/SGX1006 RF Signal Generator
Specifications

| PARAMETER	MIN	TYPICAL	MAX	COMMENTS
Output Power (Calibrated)*				Settable from -50 dBm to +20 dBm; Refer to typical data: Page 6
10 MHz ≤ f ≤ 3 GHz	- 40 dBm		+ 18 dBm	
3 GHz < f ≤ 6.0 GHz	- 40 dBm		+ 15 dBm	
Resolution		0.01 dB		Nominal
Connector		50 Ω		Type N
SWR (return loss)*				
10 MHz ≤ f ≤ 2 GHz		1.33 (-17 dB)		Measured
2 GHz < f ≤ 4.1 GHz		1.57 (-13 dB)		Measured
4.1 GHz < f ≤ 6.0 GHz		2.21 (-8 dB)		Measured
Maximum Reverse Power				
Max DC Voltage		25 VDC		
> 10 MHz		10 mW (+16dBm)		
Absolute Level Accuracy*				
10 MHz < f < 6.0 GHz, +18 to +15 dBm		+/-0.3 dB	± 1.0 dB	20° C to 30° C
10 MHz < f < 6.0 GHz, <+15 dBm to >-10 dBm		+/-0.25 dB	+/- 0.65 dB	20° C to 30° C
10 MHz < f < 6.0 GHz, -10 to -40 dBm		± 0.50 dB	± 1.5 dB	20° C to 30° C
Single Sideband Phase Noise*				Refer to typical data: Page 7
100 MHz, 10 kHz offset		≤ -147 dBc/Hz	≤ -141 dBc/Hz	
500 MHz, 10 kHz offset		≤ -138 dBc/Hz	≤ -132 dBc/Hz	
1.0 GHz, 10 kHz offset		≤ -132 dBc/Hz	≤ -126 dBc/Hz	
2.0 GHz, 10 kHz offset		≤ -126 dBc/Hz	≤ -120 dBc/Hz	
3.0 GHz, 10 kHz offset		≤ -122 dBc/Hz	≤ -116 dBc/Hz	
4.0 GHz, 10 kHz offset		≤ -120 dBc/Hz	≤ -114 dBc/Hz	
6.0 GHz, 10 kHz offset		≤ -116 dBc/Hz	≤ -110 dBc/Hz	
Harmonics (CW mode)*		(2nd / 3rd)	(All)	Refer to typical data: Page 8
100 MHz to 1.024 GHz		-42 / -60 dBc	-30 dBc	@ 0 dBm
>1.024 GHz to 4.096 GHz		-45 / -75 dBc	-30 dBc	@ 0 dBm
>4.096 GHz to 6.0 GHz		-50 / -65 dBc	-40 dBc	@ 0 dBm
Sub-Harmonics (CW mode)*		($^1/_2$ / $^3/_2$)	(All)	Refer to typical data: Page 9
10 MHz to 1.024 GHz		-90 / -75 dBc	-60 dBc	@ 0 dBm
>1.024 GHz to 4.096 GHz		-75 / -60 dBc	-45 dBc	@ 0 dBm
>4.096 GHz to 6.0 GHz		-65 / -80 dBc	-50 dBc	@ 0 dBm
Non-Harmonics/Broadband Spurious(CW mode)*				Refer to typical data: Page 10
10 MHz to 2 GHz		-70 dBc	-60 dBc	@ +10 dBm
>2 GHz to 4.096 GHz		-65 dBc	-50 dBc	@ +10 dBm
>4.096 GHz to 6.0 GHz		-60 dBc	-45 dBc	@ +10 dBm
Jitter**				
155 MHz		60 fs		100 Hz < BW < 1.5 MHz
622 MHz		60 fs		1 kHz < BW < 5 MHz
2.488 GHz		90 fs		5 kHz < BW < 20 MHz

* The SGX1003 is limited to 3 GHz.   **Calculated from measured phase noise data in CW mode at nominal +10 dBm

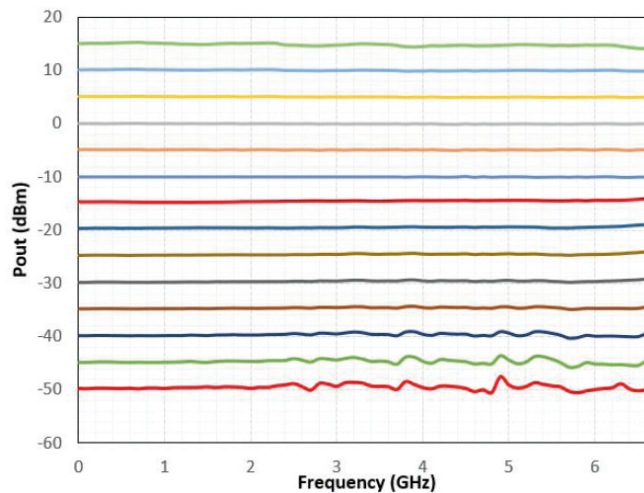# SGX1003/SGX1006 RF Signal Generator
Output Power Data

The data contained in this section demonstrates the typical output power performance of the SGX1003 and SGX1006 series.

Maximum (Unleveled) Output Power
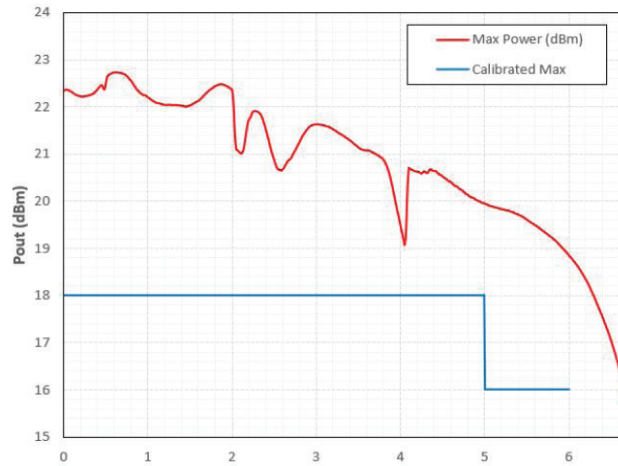
FIGURE 1: Maximum Output Power
10 MHz - 6.7 GHz
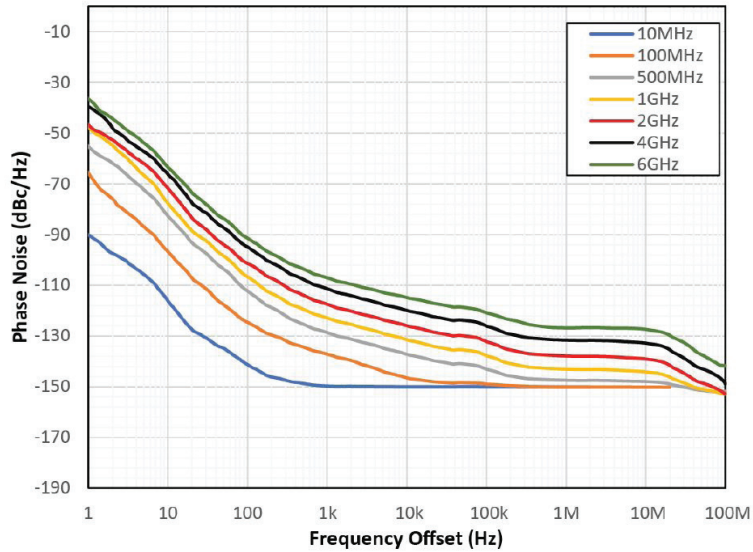P_{OUT} Setting: +25 dBm

Calibrated Output Power

FIGURE 2: Calibrated Output Power
+15 dBm to -40 dBm
10 MHz - 6.7 GHz

SGX1003/SGX1006 RF Signal Generator
Phase Noise Data

The data contained in this section demonstrates the typical phase noise performance of the SGX1003 and SGX1006 series.

Phase Noise

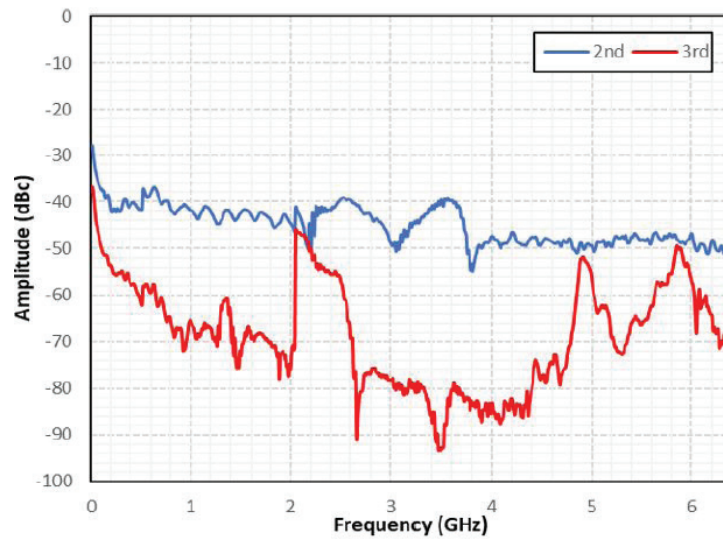**FIGURE 3:** Phase Noise Performance
500 MHz - 6 GHz
P_{OUT} Setting: +10 dBm

SGX1003/SGX1006 RF Signal Generator
Spectral Purity Data

The data contained in this section demonstrates the typical spectral purity performance of the SGX1003 and SGX1006 series.

HARMONICS

2nd Harmonic

3rd Harmonic

Harmonics Performance
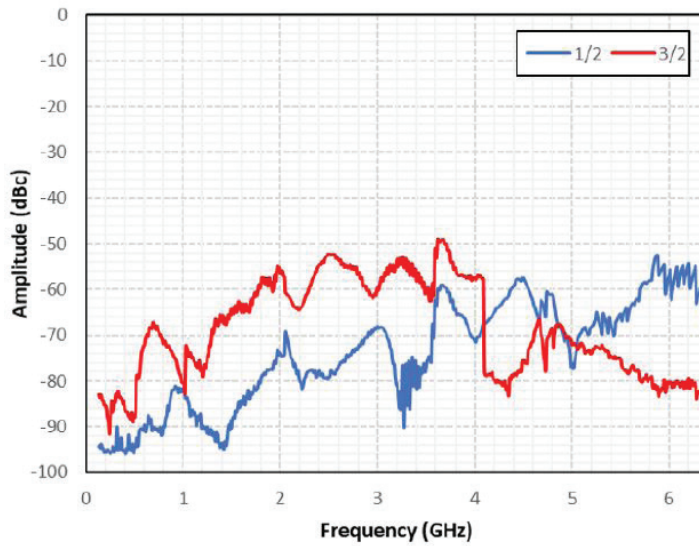10 MHz – 6.0 GHz
P_{OUT} Setting: 0 dBm

SGX1003/SGX1006 RF Signal Generator
Spectral Purity Data

The data contained in this section demonstrates the typical spectral purity performance of the SGX1003 and SGX1006 series.

SUB-HARMONICS

$^{1}/_{2}$ Sub-Harmonic
$^{3}/_{2}$ Sub-Harmonic

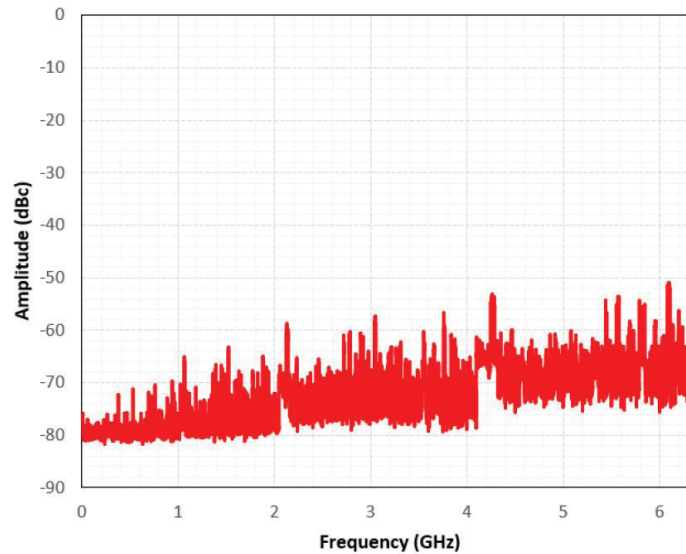**Sub-Harmonics Performance**
10 MHz – 6.0 GHz
P_{OUT} Setting: 0 dBm

SGX1003/SGX1006 RF Signal Generator
Spectral Purity Data

The data contained in this section demonstrates the typical spectral purity performance of the SGX1003 and SGX1006 series.

NARROWBAND NON-HARMONICS / SPURIOUS

Maximum Spurious Response

Narrowband Maximum Spurious Performance
10 MHz – 6.0 GHz
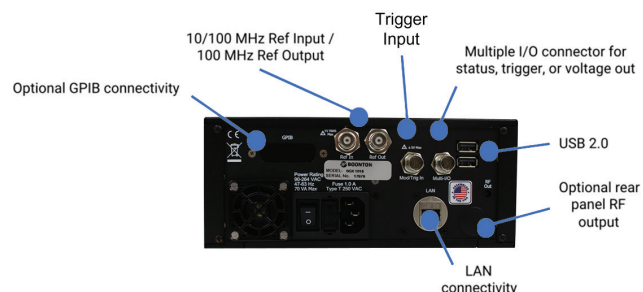P_{OUT} Setting: 0 dBm

Spectrum Analyzer Settings:
10 MHz span
10 kHz bandwidth

SGX1003/SGX1006 RF Signal Generator
Specifications

Inputs/Outputs (front panel)	USB	2 ports USB2.0: Type A receptacle
RF Output		50 Ω, N-type (f)
Inputs/Outputs (rear panel)	LAN	RJ-45 modular socket
	USB	2 ports USB2.0: Type A receptacle
RF Output (optional)		50 Ω, N-type (f)
Multi I/O Connector (Trigger Out)		BNC(f); DC-coupled
Trigger In		+/- 5V max ; BNC(f); DC-coupled
Reference Input		1V RMS max ; 50 Ω, BNC(f); AC-coupled
Reference Output		100 MHz ; BNC(f); AC-coupled
Remote Control	Command Set	SCPI-1999.0
	LAN	Ethernet:10/100/1000 BaseT; HiSLIP
	GPIB (optional)	
Regulatory Compliance		CE compliance with the following European Union directives
		Low Voltage Directive 2014/35/EU
		Electromagnetic Compatibility Directive (EMC) 2014/30/EU
		RoHS Directive EU 2015/863, WEEE Directive 2012/19/EU
Construction		Manufactured to the intent of MIL-PRF-28800F, Class 3
Dimensions (excluding connectors)	H x W x D	3.5x8.3x11.2 (in),89x211x284 (mm)
Weight		7 lbs, 3.2 kg
AC Power		
Rated Voltage		100 to 240 VAC
Voltage Range		90 to 264 VAC
Rated Frequency		50/60 Hz
Frequency Range		47 to 63 Hz
Power Consumption		60 W (70 VA) max, 30 W (35 VA) nominal with no external peripheral devices attached
		This instrument is designed for indoor use only
Operating Temperature		0 to 50 °C (32 to 122 °F)
Storage Temperature		-40 to +70 °C (-40 to 158 °F)
Humidity		95% maximum, non-condensing
Altitude		Operation up to 15,000 feet (4,575 m)
Warranty		3 years

SGX1003/SGX1006 RF Signal Generator
Ordering Information

SGX1003	RF Signal Generator (10 MHz to 3 GHz)
SGX1006	RF Signal Generator (10 MHz to 6 GHz)

Options

SGX-GPIB	GPIB Control (internally installed)
SGX-RRF	Moves RF output the rear panel
SGX1K-SECURE	Removes internal microSD and enables boot from USB drive (included)
SGX1K-2SECOP	Installation SGX1K-SECURE post initial purchase (retrofit); requires return to factory

Included Accessories

Information Card (provides information on where to find latest manual versions)

Optional Accessories

SGX1K-RMK	19" Rack Mount Kit (includes handles & hardware for mounting one or two generators)
SGX1K-TCASE	Transit case
SGX1K- RSSD	Additional external USB drive for secure operation