-Key Features-

- 0.05 to 41GHz coverage
- Wide power output range
- Tiny frequency step size
- Very low phase-noise
- External 10MHz reference input
- Oven-controlled reference source
- USB COM Interface
- Industry standard SCPI commands
- Output phase control
- Ethernet control
- Dual USB-C powered
- Harmonic-filtered output
- Multi-use trigger input
- Native frequency sweeping support

DS INSTRUMENTS

SG40000PRO R10

LOW-NOISE WIDEBAND MICROWAVE SIGNAL GENERATOR

SG40000PRO – Wideband, Compact, and Reliable

The SG40000PRO was designed with high-frequency in mind, as a performance alternative to the economical SG6000 line of ultra-compact RF signal generators. While remaining compact and low-cost, the SG40000PRO brings a powerful set of new features and upgrades:

- Ultra-wide frequency range (**0.05 - 41GHz**)
- High output power for driving microwave mixers (**+15dBm**)
- Significantly lowered phase noise
- Small frequency step size
- Extended dynamic power range: (>35dB @ 18GHz)
- **Two output bands** covering 0-20GHz and 20-41GHz
- Ultra-stable oven-controlled 10MHz reference oscillator
- Multi-stage PLL source with temperature compensation
- Full-bandwidth harmonic filtering

Signal Generator Control

Unlike other signal generators in its class, the SG40000PRO allows for stand-alone control AND PC USB remote control via a lightweight windows application or SCPI serial commands. Users can easily generate a microwave signal with no configuration or user manual needed. The stand-alone OLED display and interface buttons allow frequency selection, attenuator control, and RF output control without need for a host PC. All settings can be saved as boot-up defaults for added convenience. Standard Ethernet mirrors the USB functionality for local area network connected devices.

SG40000PRO Applications

- Automated testing environments
- General RF lab use
- Production verification
- Educational / university lab use
- Aerospace / defense research
- Wireless infrastructure
- Radar systems
- Line-of-sight links
- Satellite communications
- Up/Down-converting applications
- 5G and mm-wave testing

ENGINEERED IN NEVADA

MADE IN U. S. A.

SG40000PRO Low-Noise Microwave Generator

IN-DEPTH SYSTEM INFORMATION

Ease of Use

The SG40000PRO stand-alone front controls, windows control GUI, and SCPI command set are all designed to be simple, intuitive, and complete.

Signal Generator USB Operation

With the SG40000PRO connected to a PC via USB-C port, industry standard SCPI commands are used to fully control the instrument. The USB port is configured on the host PC as a virtual COM port. This feature allows users to control the device for automated test applications from many different operating systems, scripting languages, and environments. Drivers for this virtual COM port are built-in to all modern and legacy operating systems including embedded and mobile platforms.

Ethernet Port

The Ethernet port allows identical control to the USB serial port, but over a local network. The SG40000PRO will use DHCP to acquire an address, then our provided standard control application instantly finds the device and seamlessly connects. Users can alternatively open a TCP connection for remote control from many environments or scripting languages.

Precision Reference

The SG40000PRO has an ultra-low-noise precision high-frequency internal oscillator that is phase locked to an **oven-controlled** ±10PPB 10MHz oscillator. An external 10MHz can be auto-detected and locked to if required via the rear MCX port.

Output Level Control

Power level (in dBm) can be controlled via internal calibrated step and variable attenuators for both output bands.

Power Output Calibration

Power output for band 1 is calibrated with an accuracy of ±1.0dB (typical). Band 2 is calibrated to ±2.0dB typical accuracy. This device also features active temperature compensation to keep within calibration while components warm up to normal operating conditions.

RF Harmonic Filtering

The SG40000PRO has harmonic and sub-harmonic filtering down to 500MHz for a more clean output waveform. Harmonic levels are typically < -30dBc. See plot for details.

Phase Control

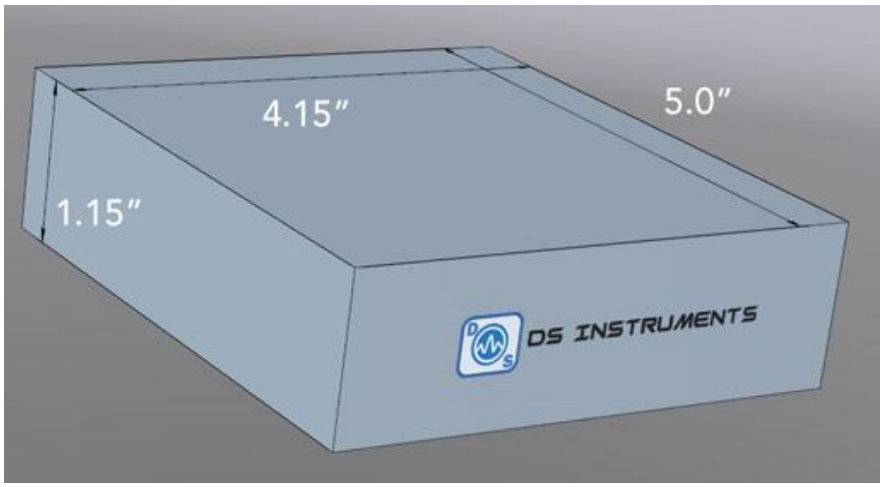
The SG40000PRO supports phase control with 1 degree resolution. This functionality is available down to 150MHz output frequency in the control software. Note that some other device performance can be affected when in phase mode, like minimum frequency step size.

Device Power Input

Two USB Type-C connectors are provided to allow for many different powering options including lithium-ion battery packs, wall adapters, usb hubs, laptops, and combinations of these different sources. Under normal usage conditions, both inputs are typically required for stable device operation.

SG40000PRO

Case Dimensions



Signal Generator Mechanical Information

SG40000PRO

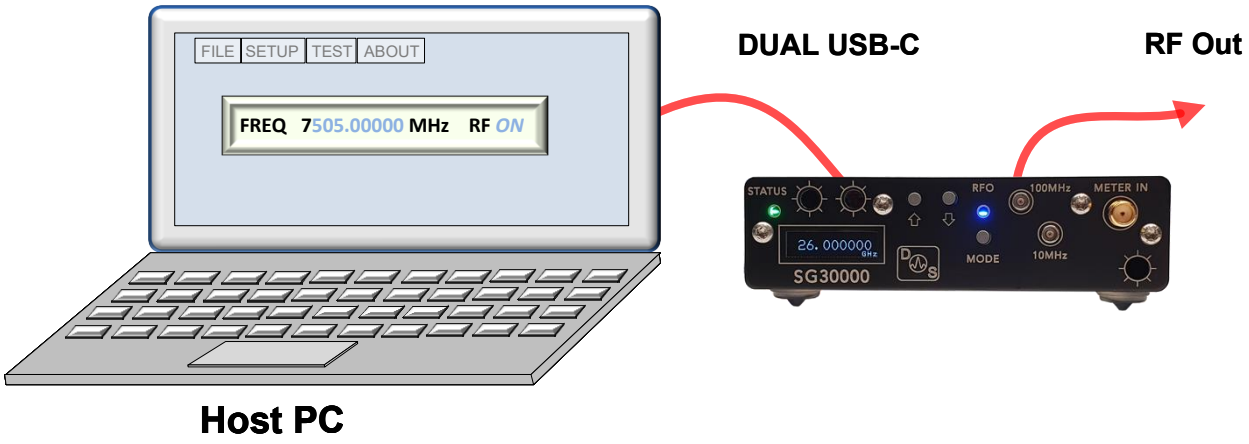
SPECIFICATIONS

Conditions: 25° C, Internal ultra-low phase noise oscillator

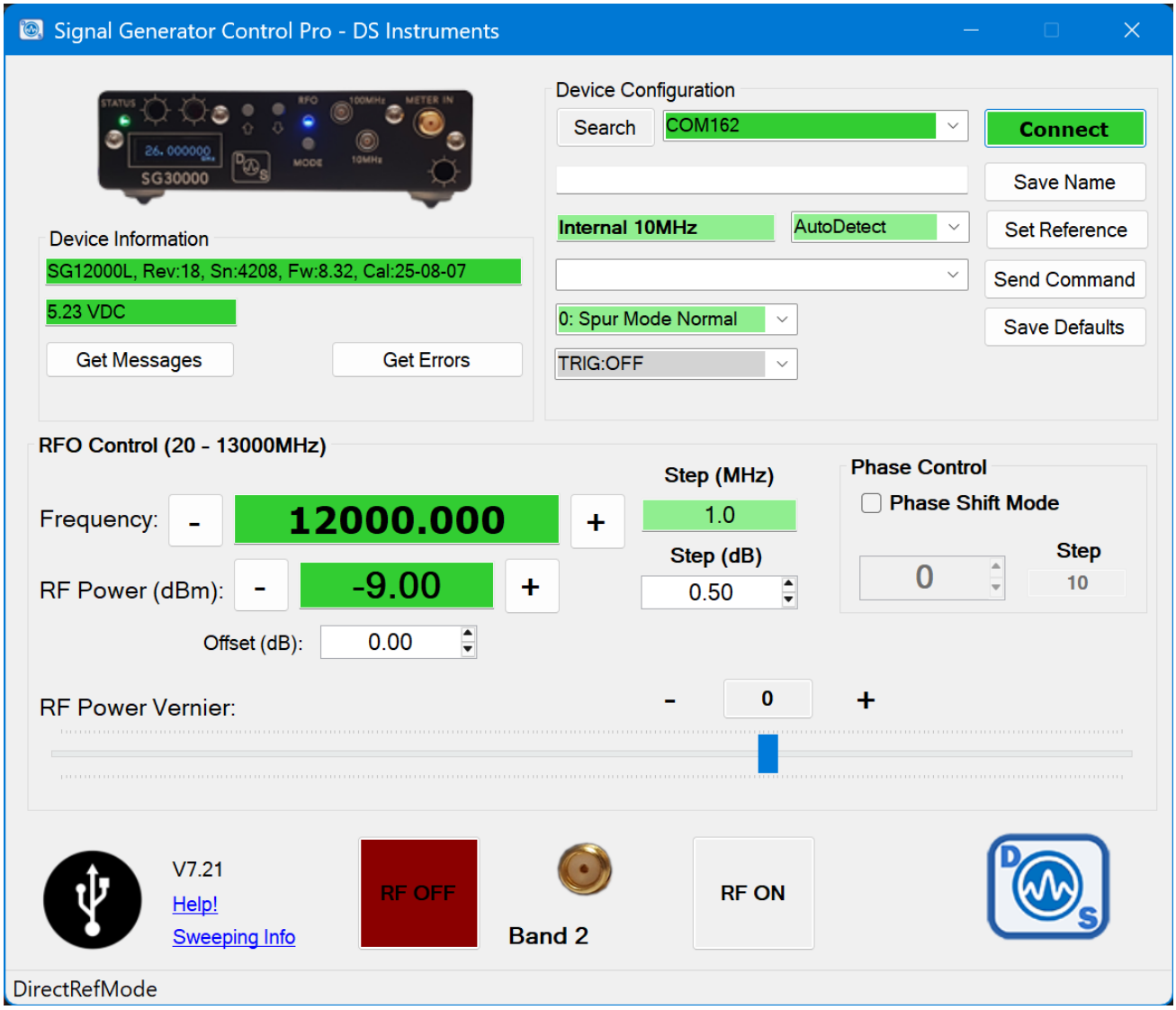
Parameter	Min	Max	Typ	Units
Output Frequency Range				
Band 1 - SMA	0.05	20		GHz
Band 2 – 2.4mm	20	41		GHz
Output power max (calibrated)			**+15**	dBm
Phase noise (10KHz offset)				
@ 40.0GHz			**-88**	dBc
@ 18.0GHz			**-96**	dBc
@ 12.0GHz			**-100**	dBc
Output RF port return loss	6		**10**	dB
Frequency step size (minimum)			**3**	Hz
Calibrated power step resolution			**0.50**	dB
Power output range - Band 1	-28	**+15**		dBm
Power output range - Band 2 (up to 40GHz)	-15	**+15**		dBm
Absolute calibration accuracy (Band 1)	±2.5		**±1.0**	dB
Absolute calibration accuracy (Band 2)	±4.0		**±2.0**	dB
Power vernier (fine power tune) range			**10**	dB
Typical vernier resolution		0.1	**0.05**	dB
Typical frequency lock and settle time		5	**3**	mS
Reference oscillator stability OCXO (10MHz)			**±10**	PPB
Operating temperature range	0	50	**25**	C
USB input voltage	4.5	5.4	**5.0**	Vdc
USB current requirement (dual USB-C)	0.75	3.0	**1.8**	A
Harmonic levels (0.5 – 40GHz)		-20	**-30**	dBc
Spurious levels (excluding integer-boundary)		-60	**-70**	dBc
Phase shift step resolution			**1**	Deg

SG40000PRO

Typical User connections for remote Operation via USB



Windows Control GUI Application

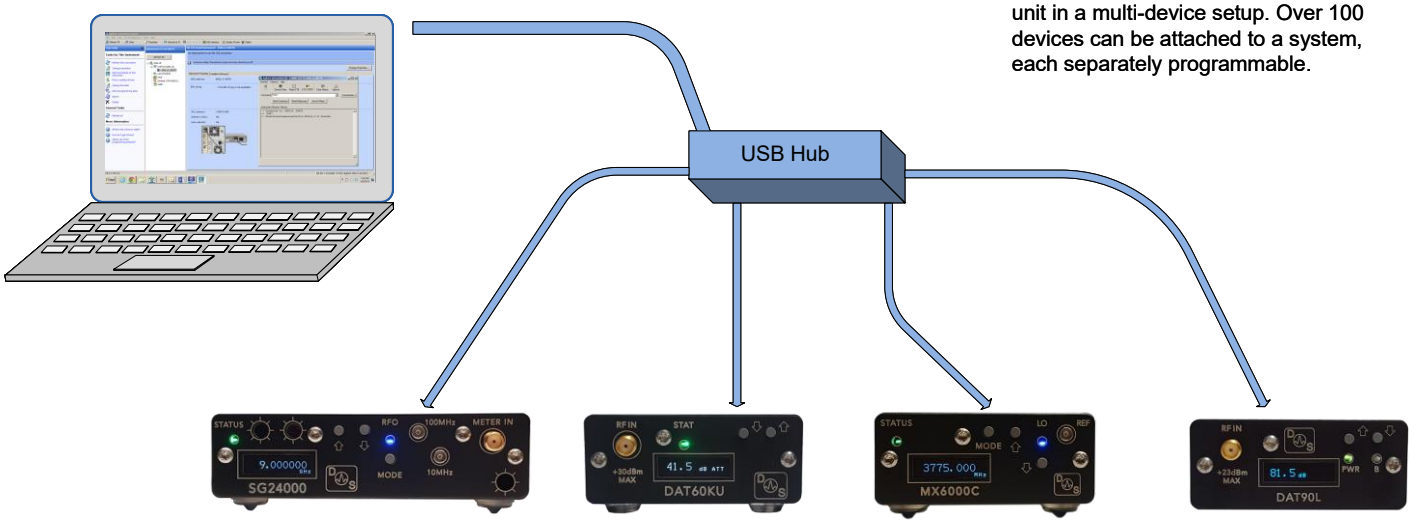


SG40000PRO

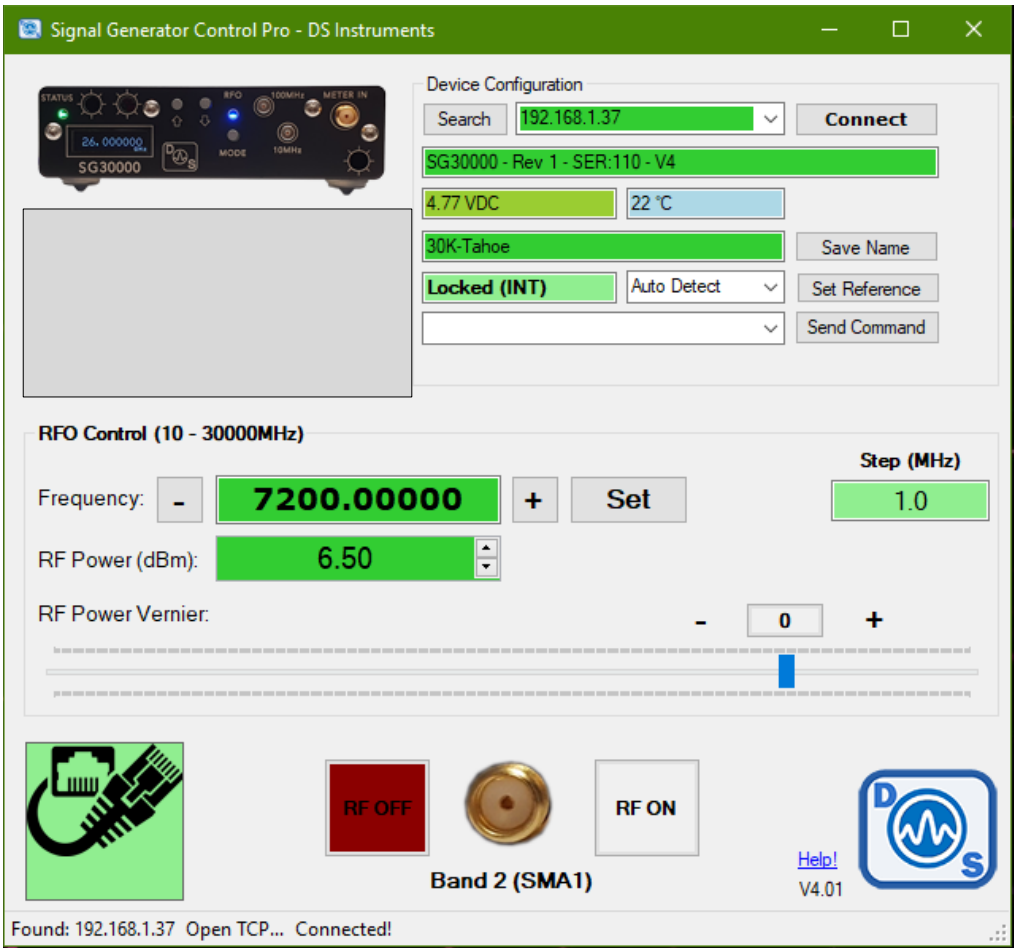
Windows Sweeping Control GUI Application

Multiple DSI Device Setup & Control - USB

Our products feature a programmable DEVICE NAME to identify each specific unit in a multi-device setup. Over 100 devices can be attached to a system, each separately programmable.

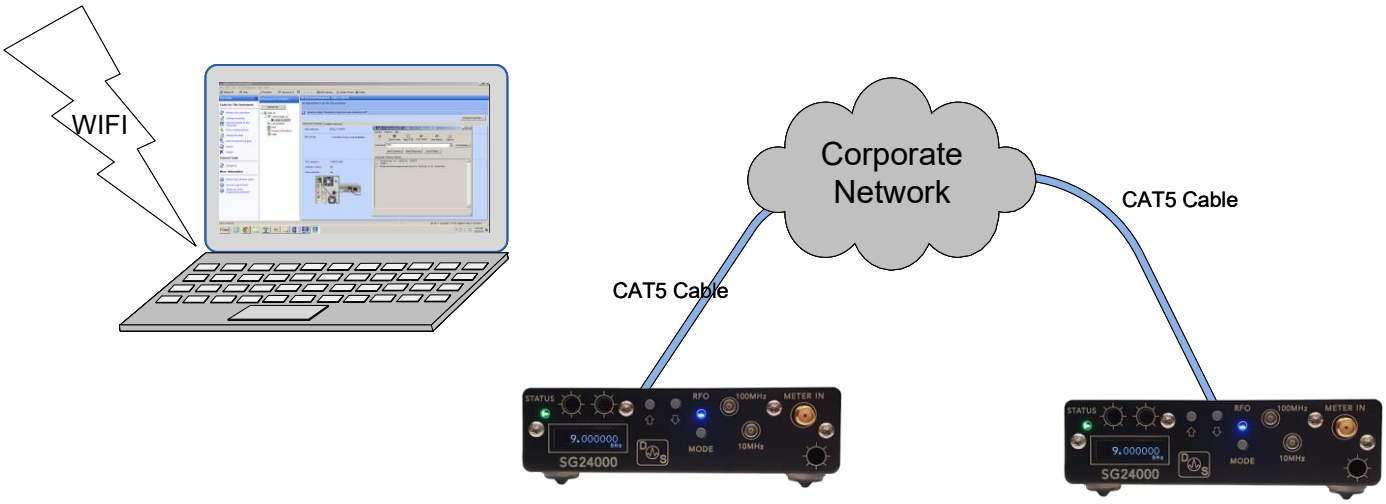


Ethernet Local Area Network Connection



Simply click the search button to find the IP addresses of devices found on your network. The default setting is DHCP, so IP addresses will be automatically assigned by the local router.

Ethernet Controlled Devices



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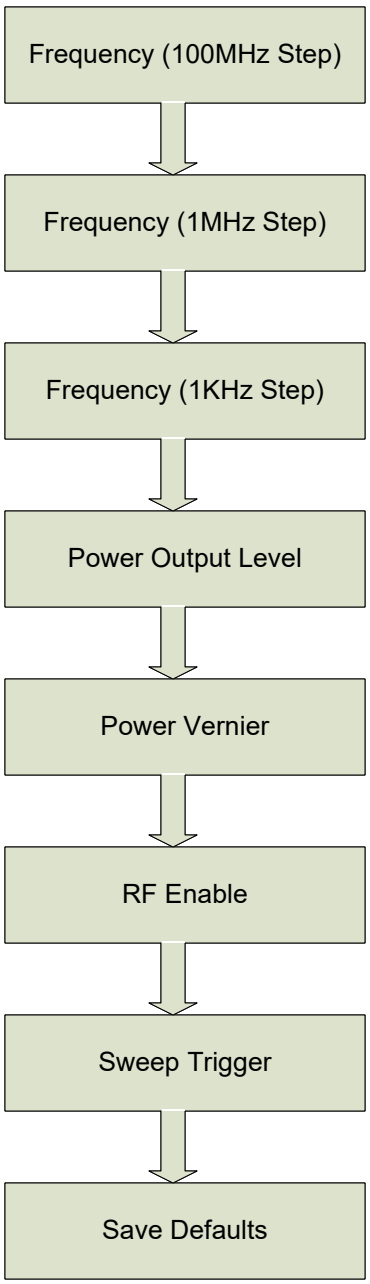
Front Panel Device Control

The MODE button determined what property the up and down buttons modify. The default upon power up is frequency in large steps.

Mode State Diagram



Increment or decrement the current frequency by 100MHz.

Increment or decrement the current frequency by 1MHz.

Increment or decrement the current frequency by 1KHz.

Sets the value in dBm of the RF output signal. Uses the internal calibrated digital step attenuators for the appropriate band.

Changes the output level fine tune. This is a digitally controlled variable attenuator. Resolution depends on frequency but it typically around 0.05 – 0.20dB.

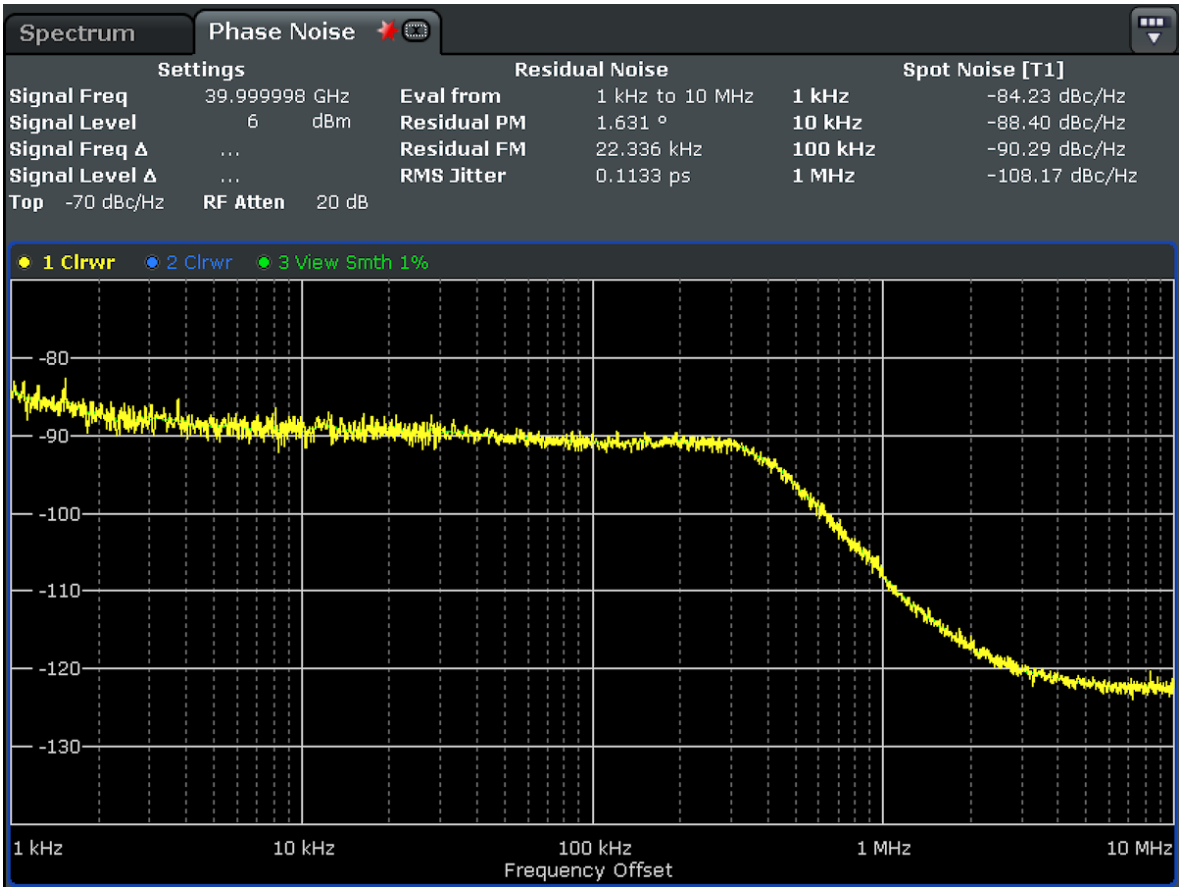
Set the RF output port to on or off. The SG40000PRO also has a dedicated RFO button.

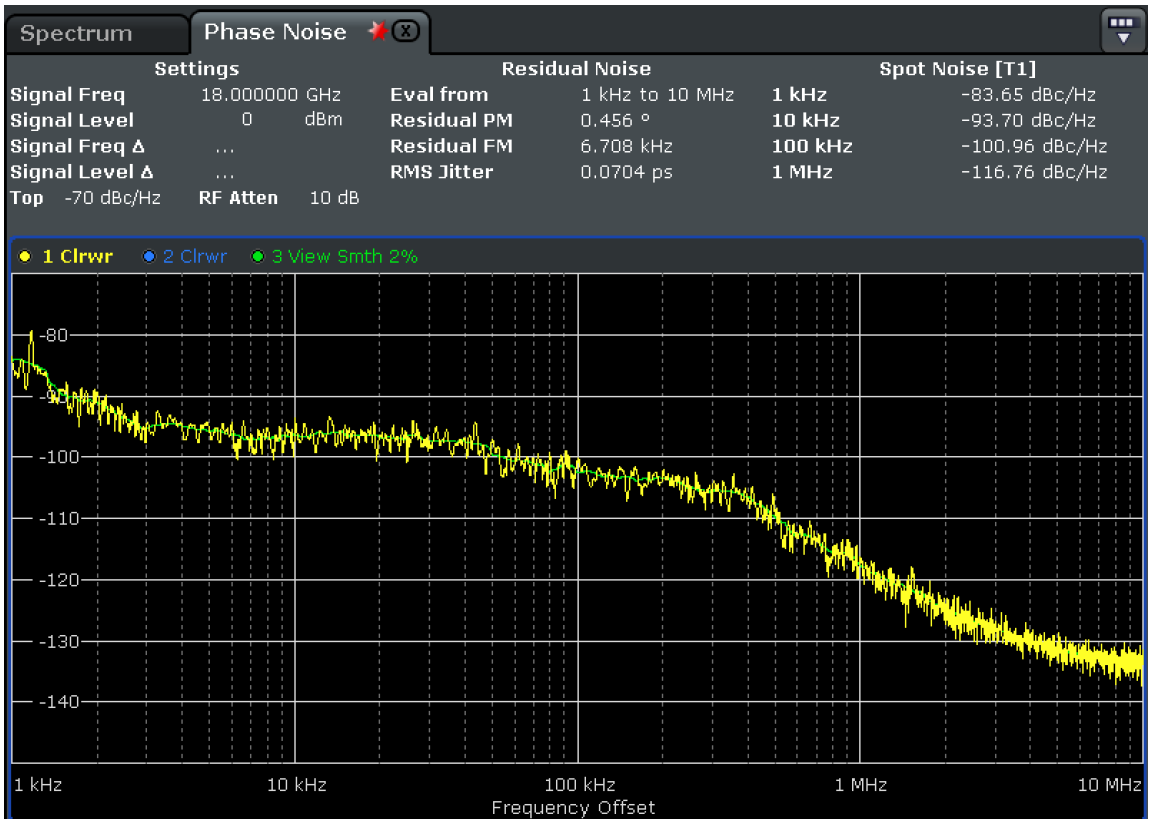
If there is a saved frequency sweep, trigger it now.

Save the current device settings into non-volatile memory to be used as power-on defaults

SG40000PRO

Typical Phase Noise Plots





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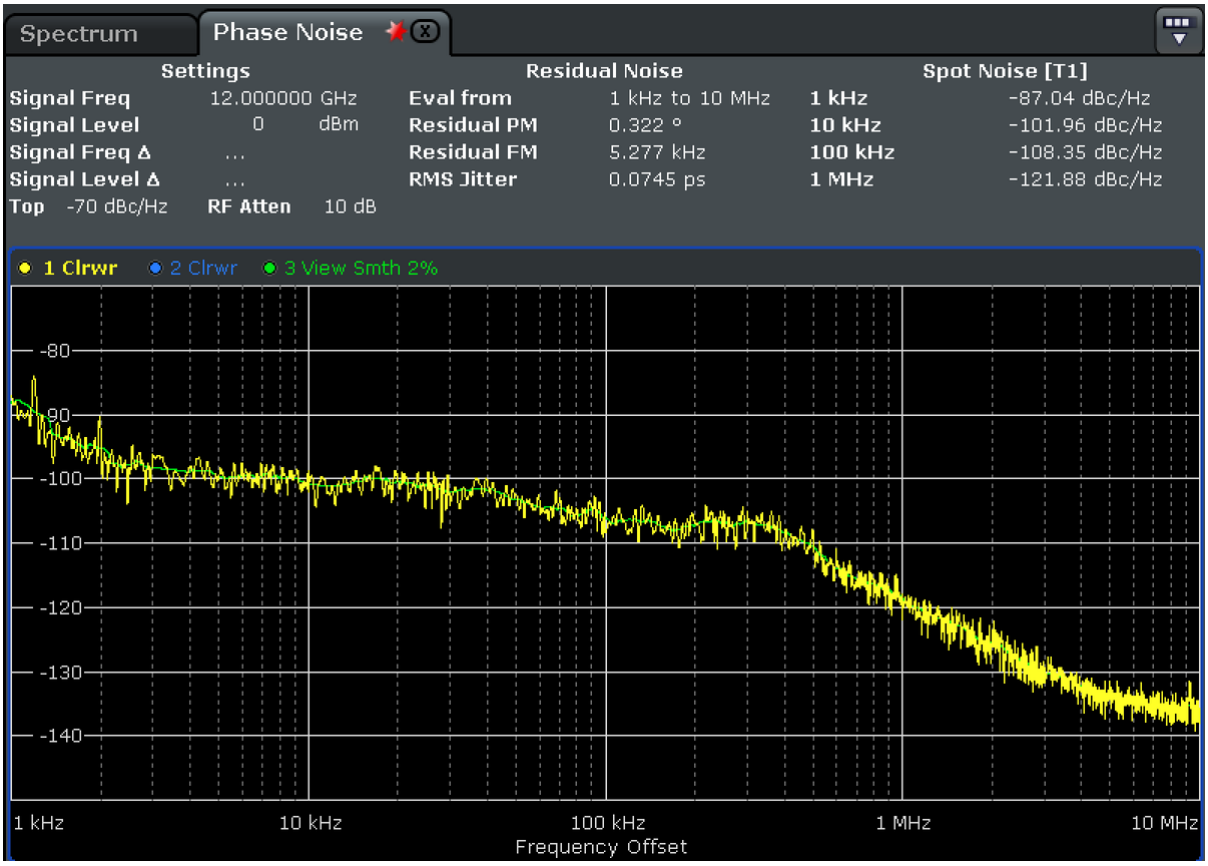
Typical Phase Noise Plots



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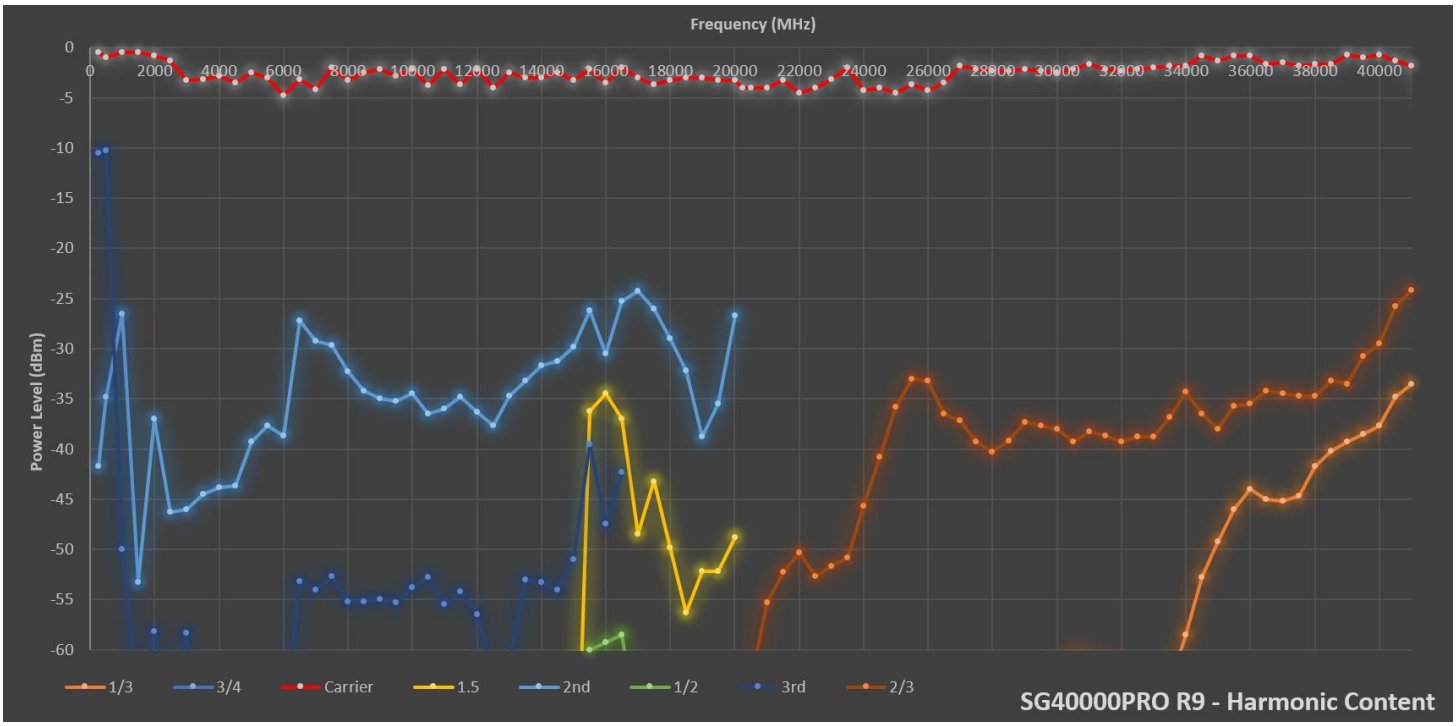
Typical Harmonics



Please note that output frequencies below 500MHz are not harmonic filtered, and will have significant distortion compared to a dedicated low frequency model like the SG6000F or SG6000PRO.

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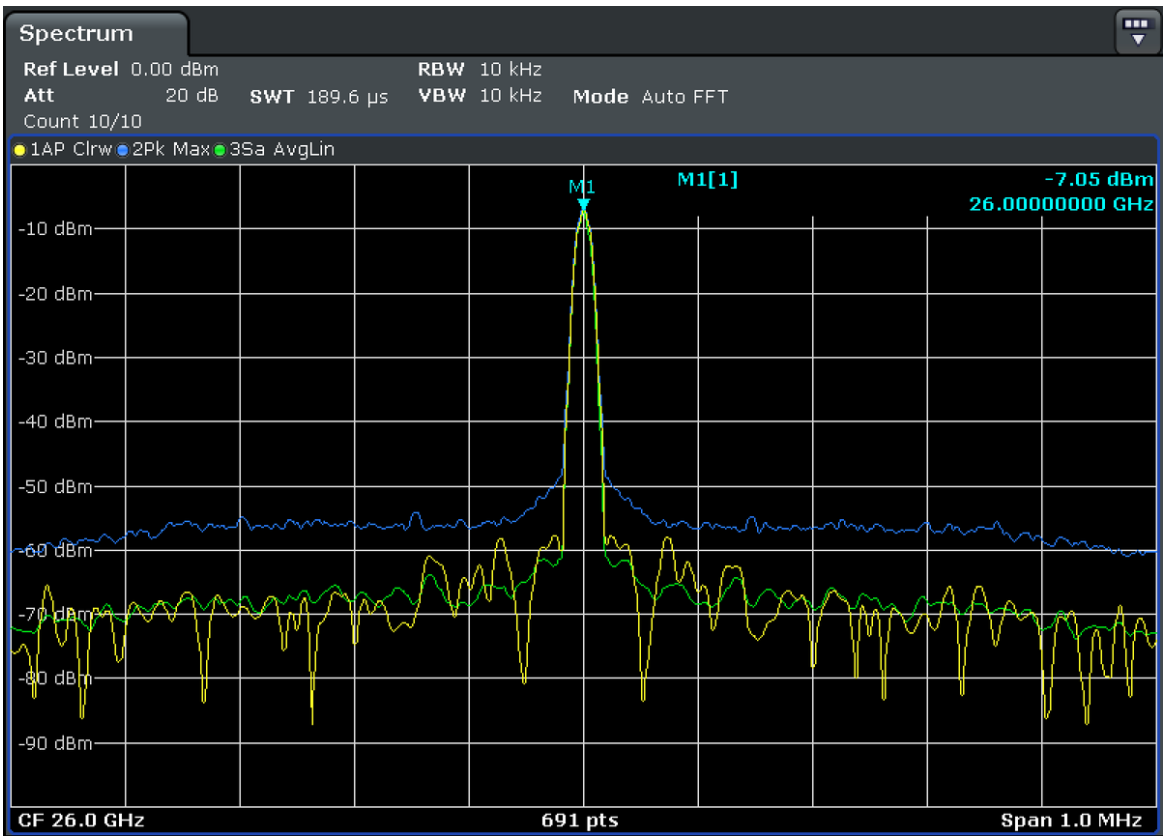
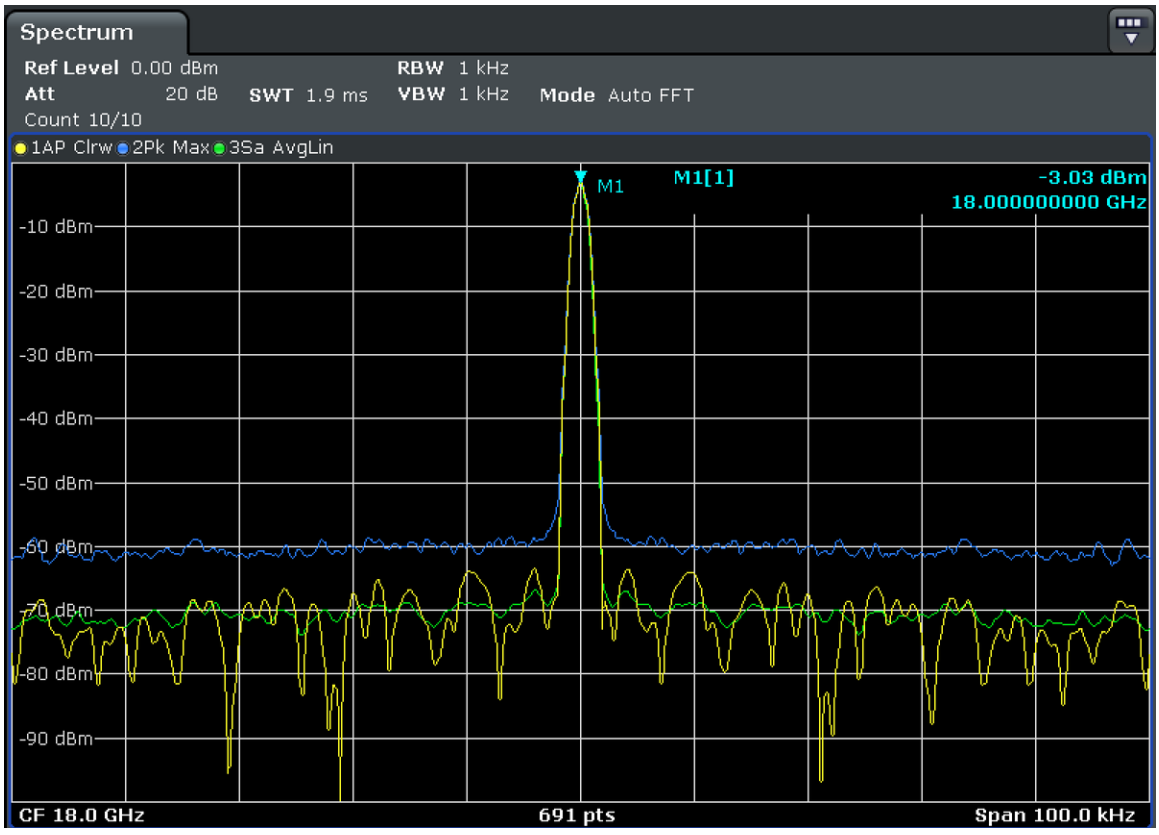
Typical Output Spectrums





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SCPI Command List (Abbreviated)

FREQ:CW 8GHz	Set output Frequency
FREQ:CW?	Return current Frequency
OUTP:STAT	Turn on or off the RF output
OUTP:STAT?	Return if output is enabled
POWER 5.0	Set output RF level in dBm
POWER?	Return current attenuation value
VERNIER 0.6	Set the output power level vernier (fine tune variable attenuator)
VERNIER?	Return vernier setting
*IDN?	Return the SCPI identification string
*UNITNAME ted	Set a unique name in flash memory
*UNITNAME?	Return this device's name
SYST:ERR?	Returns any pending error messages
SYST:DBG?	Returns last status message
*RST	Reset unit now
*DISPLAY OFF	Power ON or OFF the display
*BUZZER OFF	Mute the buzzer
*SAVESTATE	Save frequency & attenuation as boot defaults
SWE:MODE LIST	Select the mode for sweeping (LIST, SCAN)
SWE:DWELL 100	Sweep dwell time in milliseconds
LIST:DIR DOWN	Sweep direction
INIT:IMM	Start the sweep now
INIT:CONT	Sweep continuous mode or single
ABORT	Stop the sweep now
SWE:ACTIVE?	Is the device sweeping now
FREQ:START 9GHZ	Sweep start frequency
FREQ:STOP 10GHZ	Sweep stop frequency
SWE:POINTS 10	Sweep point count
LIST:ADD 11GHZ	Add a point to the end of the sweeping list
LIST:CLEAR	Clear the working frequency list and start over

*NOTE 1: Full command list is available as a separate document
*NOTE 2: Sweeping commands have a separate dedicated list

SG40000PRO

Ordering Information

SG40000PRO – OLED Display, Ethernet, Dual USB Type-C **$8999**

Contact Information

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