Product Features
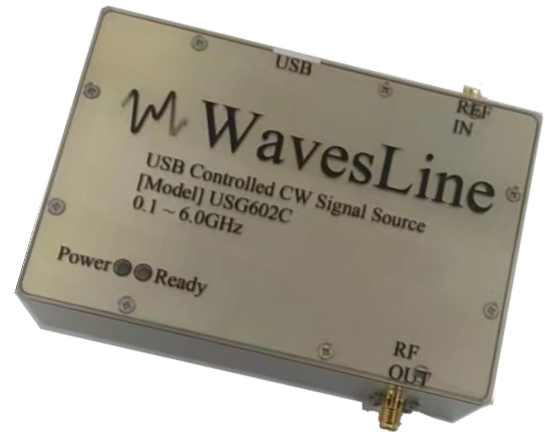
- 100-6000MHz Wide Frequency Range
- Low Phase Noise
- Ultra-Low Spur <-90 dBc
- High Output Power: +15dBm
- Wide Output Power Range > 85dB
- Fine Step Size: 0.02 dB
- Programmable linear frequency sweep
- USB Powered and Controlled
- Easily Programmed by GUI Software
- Robust Compacted Aluminum Enclosure
- Low Cost and High Efficient for Lab and Manufacture Applications

WavesLine USG series USB controlled signal generators cover frequencies from 0.05 MHz to 30 GHz with low phase noise, high output power, small step size, ultra-low spur and wide output tuning range.

USG602C is a broadband (100-6000MHz), high performance, low cost RF CW Signal Generator that designed for Automated Test Equipment (ATE), 5G/WiFi/4G LTE Manufacture and Lab Testing. USG602C's ultra-low spur level is suitable for Intermodulation Distortion (IMD) test, and low phase noise & fine power tuning give the advantage for P1, EVM and ACP test in ATE system.

USG602C functions with a single USB connection to host computer, and easily controlled by various Virtual Instrument software and coding languages. GUI software can track and control multi-connected signal generators, and simplify multiple-signal test setups. Each unit stores settings in internal memory, allows it to power up in a specific instrument state.

Applications

- Lab/Production Testing
- Automated Test Equipment (ATE)
- Portable LO Source for IMD/EVM /ACP Test
- Integrated/Customized Test Setups

Absolute Maximum Ratings

Parameter	Ratings
Operation Temperature	0°C ~ 60°C
Storage Temperature	-30°C ~ 80°C
USB Vmax	5.5V

Electrical Specifications

Parameter	Specification				Condition
	Min.	Typ.	Max.	Unit	
RF Performance					
Operation Frequency	100		6000	MHz	
Frequency Resolution		1		Hz	
Output Power Step		0.05		dB	0.02 dB Operational
Max. Output Power		+15		dBm	<800 MHz
		+12			<4200 MHz
		+6			<6000 MHz
Min. Output Power*		-70		dBm	<2700 MHz
		-50			<6000 MHz
Absolute Power Accuracy		±1.0		dBm	
Phase Noise @ 800MHz		-109		dBc/Hz	10k offset
		-118		dBc/Hz	100k offset
		-143		dBc/Hz	1M offset
Phase Noise @ 2700MHz		-99		dBc/Hz	10k offset
		-108		dBc/Hz	100k offset
		-133		dBc/Hz	1M offset
Phase Noise @ 3800MHz		-98		dBc/Hz	10k offset
		-105		dBc/Hz	100k offset
		-130		dBc/Hz	1M offset
Phase Noise @ 4900MHz		-95		dBc/Hz	10k offset
		-103		dBc/Hz	100k offset
		-128		dBc/Hz	1M offset
Phase Noise @ 5800MHz		-94		dBc/Hz	10k offset
		-102		dBc/Hz	100k offset
		-126		dBc/Hz	1M offset
Harmonics		-40		dBc	+0dBm @3500MHz
		-50		dBc	+0dBm @2140MHz
Fractional Spur		<-90		dBc	
Reference Frequency		10		MHz	Internal or External

USG602C USB CONTROLLED SIGNAL GENERATOR

DC Performance					
DC Power Supply Voltage		+5		V	Unique USB** Powered
DC Power Supply Current		350		mA	Via USB
USB Standard		2.0			USB 2.0 Full Speed
Attenuation Control*					
Control Software	EXE, Windows OS, .Net Framework 4.5***				
Devices Driver	Windows Driver***				
Windows API	Wrapped in DLL*** and Example Program				
Outline					
Coaxial RF Connector	SMA, Female				
Outline Dimensions	120 mm[W] x 80 mm[L] x 40 mm[H]				

All Above Performances are measured at 23-25 degree C room temperature when USG device is powered for 1 hour until device temperature is balanced.

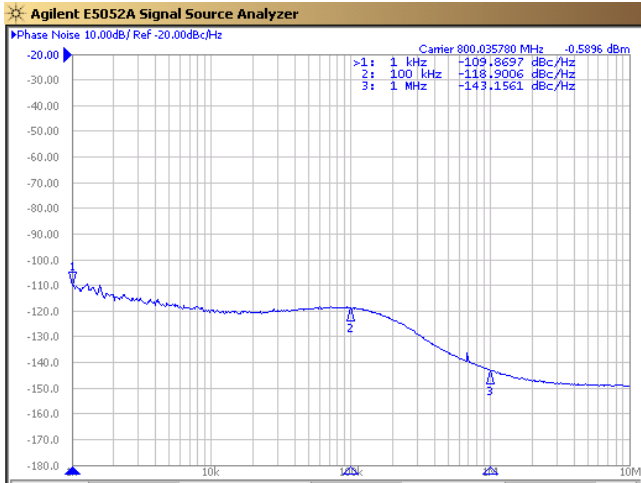** Lower output power settings may degrade power accuracy especially when output frequency is also working at high band.*
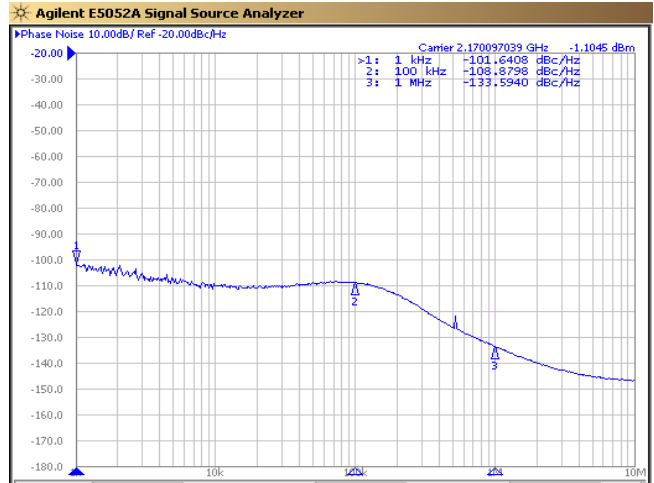*** USB Type B*
*** Other platform support is available; please contact our sales representative for more detailed information
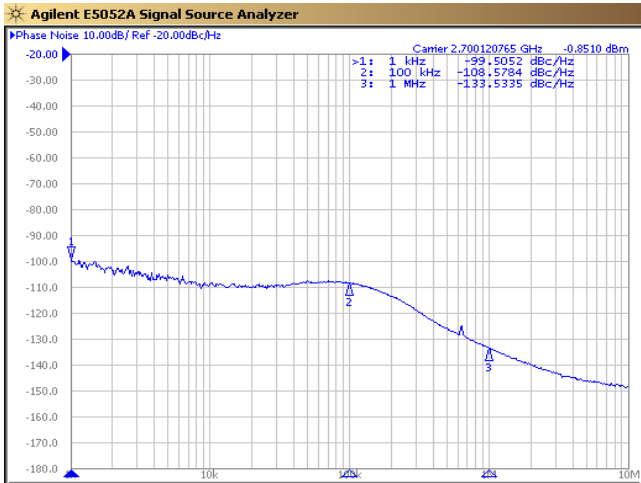
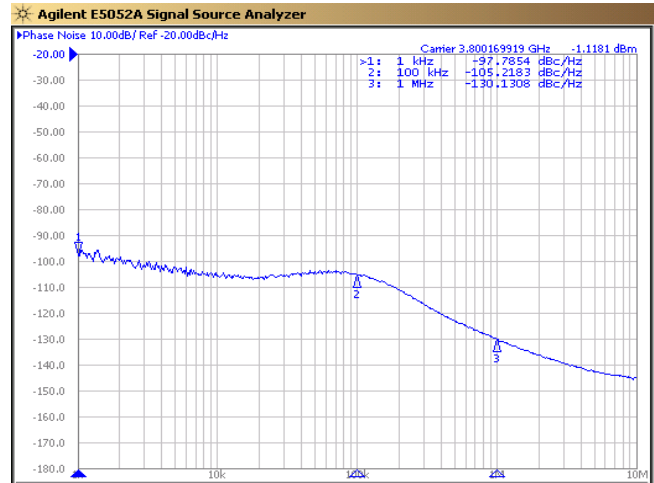## Typical Phase Noise [Internal Reference]
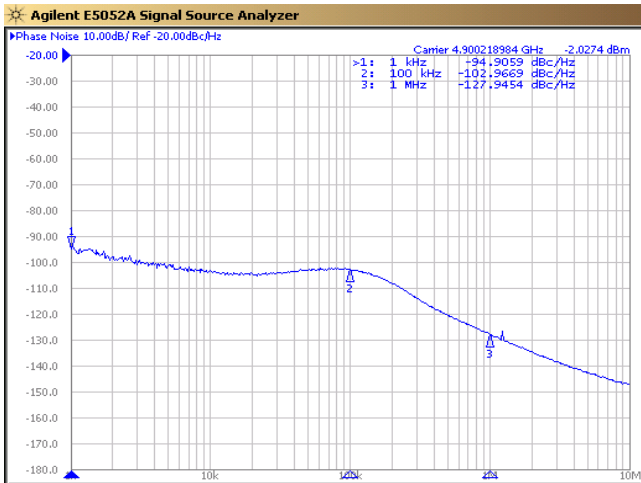

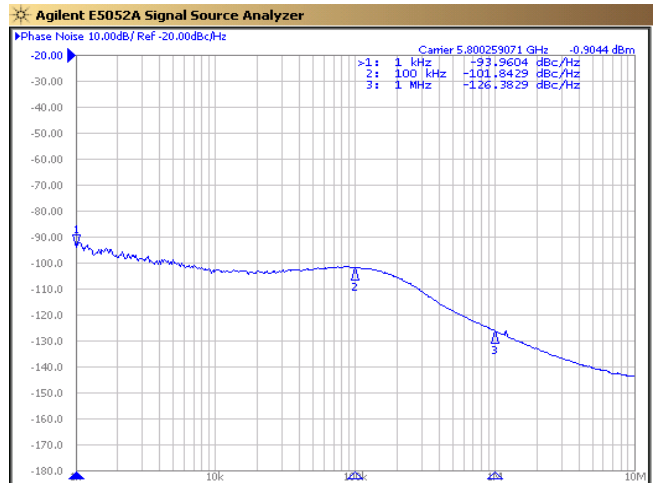Phase Noise @ 800MHz

Phase Noise @ 2170MHz

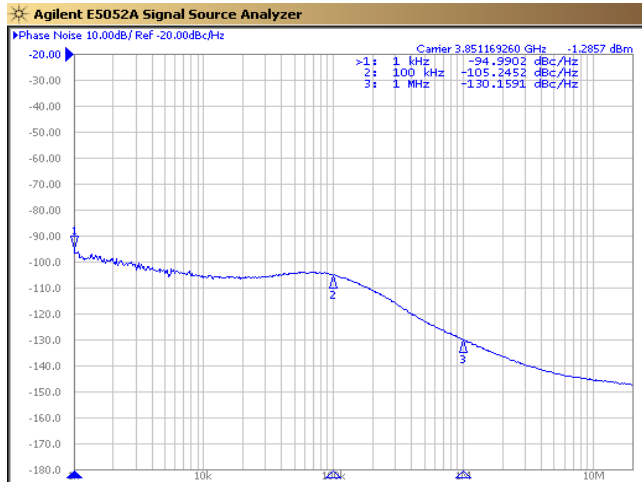Phase Noise @ 2700MHz

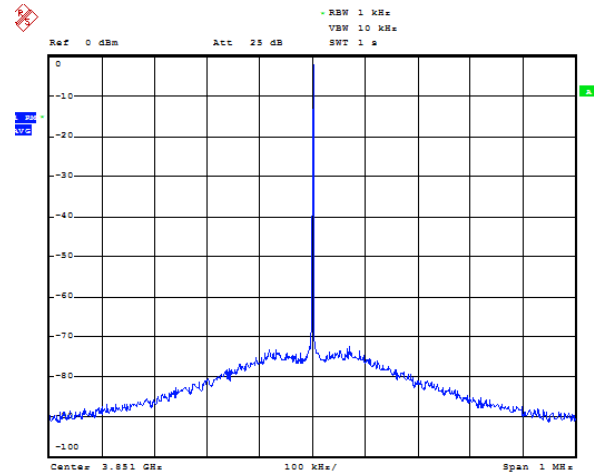Phase Noise @ 38000MHz

Phase Noise @ 4900MHz

Phase Noise @ 58000MHz
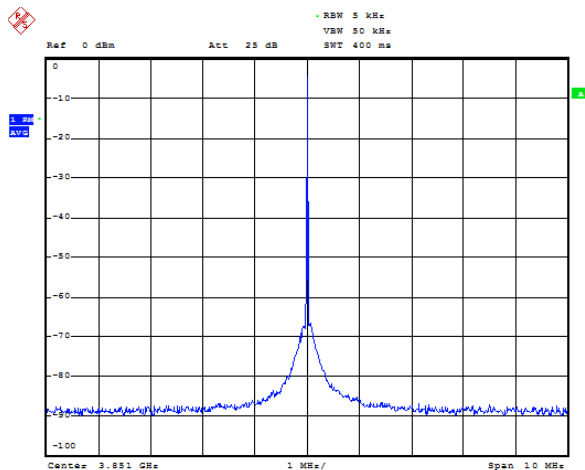
Fraction Spur

Power Density @ 3851MHz

Spectrum @3851MHz 1M Span

Spectrum @3851MHz 10M Span
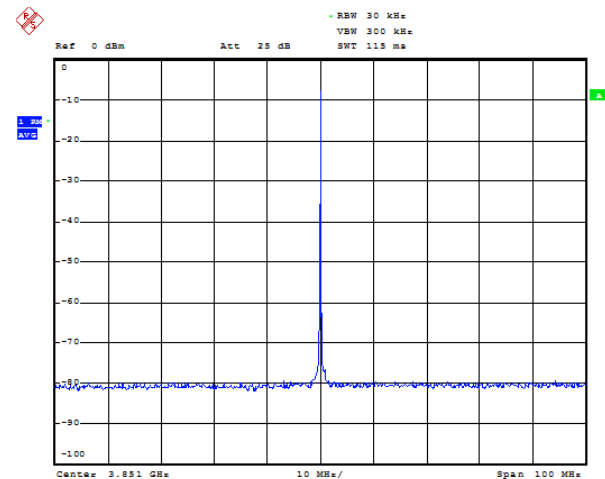
Spectrum @3851MHz 100M Span

In the most cases, USG602 device delivers almost no fractional spurs at output. Thus, it is almost impossible to measure the spur level by spectrum analyzers due to limited equipment noise floor. Alternately, we could use SSA to measure signal density as well as spur power density if it exists.

In order to demonstrate USG602 fractional spur performance, we set output frequency to 3851MHz and do not see any spurs from above plot.

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Controlling the Signal Generator

The USB driver for Microsoft Windows 7, 8 System must be installed when attach the USG device to host computer. This driver only needs to been installed at the first time. The driver is developed over USB CDC protocol, which treats the USB device as a virtual serial port (COM) that can be easily controlled. Windows 10 is able to recognize USG device and no drivers are required.

Waves-Line Control Software (wsCWS) is an easy-to-use application software to control USG device from host computer.

In an attempt to minimize customers' efforts in controlling the device via USB, Waves-Line offers easy-to-use dynamic link library (dll), which wraps a variety of functions such as, checking active ports that device is attached to, opening/closing connections to device, writing command to device, reading response from device and etc. The dll is wrapped to work over Microsoft .Net Framework 4.5[1].

Control Software (wsCWS.exe)

Command Format

Commands written to device must be in string formats, and all return values are in string format as well. The USG device control command are listed below.

Note: A <CR> (char 13 or 0x0D) need to been applied to the tail of all the commands.

*IDN?

Query device information, it returns device information in string format.

*RST

Reset the Device.

SN?

Query device Serial Number, it returns device SN information in string format.

FLASH

Device indicator LED [Green] will flash when receive this command.

FREQ[space]_value_

Set Frequency value, it returns the value when settings are done.
**return: Value in unit of Hz**;

FREQ?   Query device Frequency Setting
**return: Value in unit of Hz**;

POWR[space]_value_

Set power value, it returns the value when settings are done.
**return: Value in unit of dB**;

POWR?   Query device Power Setting
**return: Value in unit of dB**;

OUTP[space]_1|0_

RF Power On/Off
1: RF ON
0: RF Off
**return: 1 or 0**

OUTP?   Query device Output Setting
**return: 1 or 0**

REFE[space]*1|0*

    1: Lock to external 10MHz Reference

    0: Use Internal Reference

    return: 1 or 0

LOCK?   Query device Internal PLL Lock Status

    1: Internal PLL is Locked

    0: Internal PLL is NOT Locked

    return: 1 or 0

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USG602C USB CONTROLLED SIGNAL GENERATOR

Default Power On State:

    Frequency = 6000MHz

    Power = -50dBm

    Reference = Internal

    Output Off

Recommended Power-On Initialization Procedure for Customer Program:

    1, Set Output On

    2, Set Frequency

    3, Set Power

    4, Change Frequency[②], Power[②], Output...

  ① *Always Change Frequency prior to power when switching frequencies.*

Example Program:

    FREQ 3800000000<CR> *//Set Frequency to 3800M*

                       //wait USG device to return "3800"

    POWR -10<CR>   *//Apply -10dB Power to 3800M*

                       //wait USG device to return "-10"

    OUTP 1<CR>   *//Turn Output On*

                       //wait USG device to return "1".

    FREQ 3300000000<CR> *//Change Frequency to 3300MHz*

                       //wait USG device to return "3300"

    POWR -20<CR>   *//Apply -20dB Power to 3300M*

                       //wait USG device to return "-10"

    POWR 0<CR>   *//Apply 0dB Power to 3300M*

                       //wait USG device to return "0"