Product Features
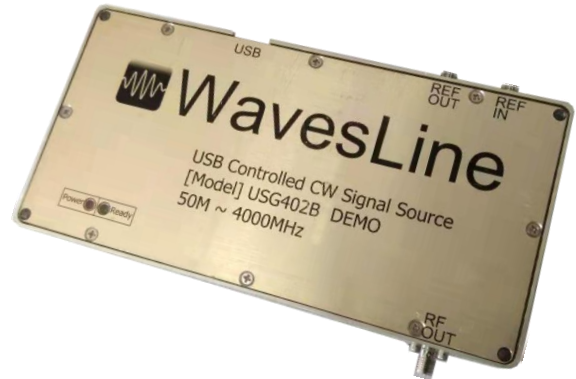
- 50-4000MHz Wide Frequency Range
- Low Phase Noise
- Ultra-Low Spur <-80 dBc
- High Output Power: +13dBm
- Wide Output Power Range> 50dB
- Fine Step Size: 0.02 dB
- Programmable linear frequency sweep
- USB Powered and Controlled
- Easily Programmed by GUI Software
- Robust Compacted Aluminum Enclosure
- 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.

USG402B is a broadband (50-4000MHz), high performance, low cost RF CW Signal Generator that designed for Automated Test Equipment (ATE), 5G/WiFi/4G LTE Manufacture and Lab Testing. USG402B'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.

USG402B 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

USG402B USB CONTROLLED SIGNAL GENERATOR

Electrical Specifications

Parameter	Specification				Condition
	Min.	Typ.	Max.	Unit	
RF Performance					
Operation Frequency	50		4000	MHz	
Frequency Resolution		10		Hz	
Output Power Step		0.05		dB	0.02 dB Optional
Output Power Accuracy		0.2		dB	Ambient*
Max. Output Power		+13		dBm	50-3800 MHz
		+11		dBm	3800-4000 MHz
Min. Output Power		-40		dBm	
Absolute Power Accuracy		±1.0		dBm	0-40 degree C
Phase Noise @ 800MHz		-115		dBc/Hz	1K Offset
		-115		dBc/Hz	100K Offset
		-142		dBc/Hz	1M Offset
Phase Noise @ 2100MHz		-110		dBc/Hz	1K Offset
		-105		dBc/Hz	100K Offset
		-140		dBc/Hz	1M Offset
Phase Noise @ 2700MHz		-108		dBc/Hz	1K Offset
		-103		dBc/Hz	100K Offset
		-135		dBc/Hz	1M Offset
Phase Noise @ 3800MHz		-102		dBc/Hz	1K Offset
		-100		dBc/Hz	100K Offset
		-132		dBc/Hz	1M Offset
Harmonics		-60		dBc	+0dBm @4000MHz
		-58		dBc	+0dBm @2951MHz
		-50		dBc	+0dBm @951MHz
		-58		dBc	+0dBm @451MHz
		-58		dBc	+0dBm @101MHz
		-50		dBc	+0dBm @51MHz
Fractional Spur		<-80		dBc	
Reference Frequency		10		MHz	Internal or External

USG402B USB CONTROLLED SIGNAL GENERATOR

| DC Performance					
DC Power Supply Voltage		+5		V	Unique USB** Powered
DC Power Supply Current		500		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	160 mm[W] x 80 mm[L] x 37 mm[H]				

Measured at 23-25 degree C in room when USG device is powered for 1 hour until device temperature is balanced.
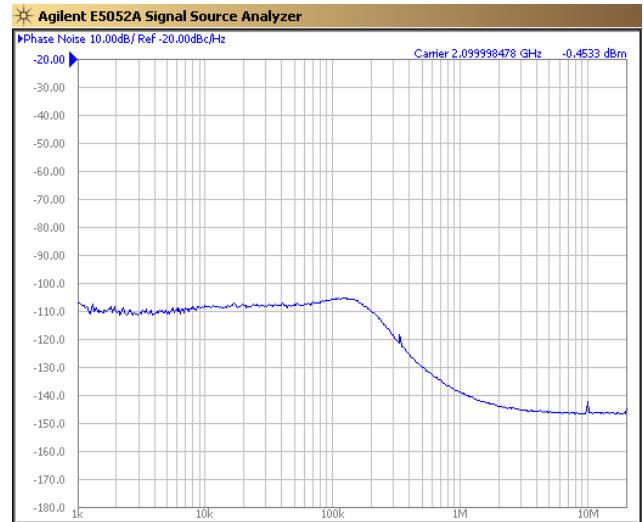*** USB Type B*
**** Other platform support is available; please contact our sales representative for more detailed information*
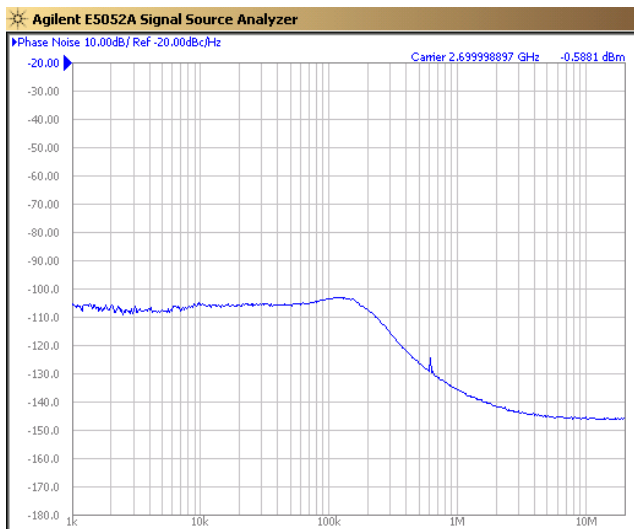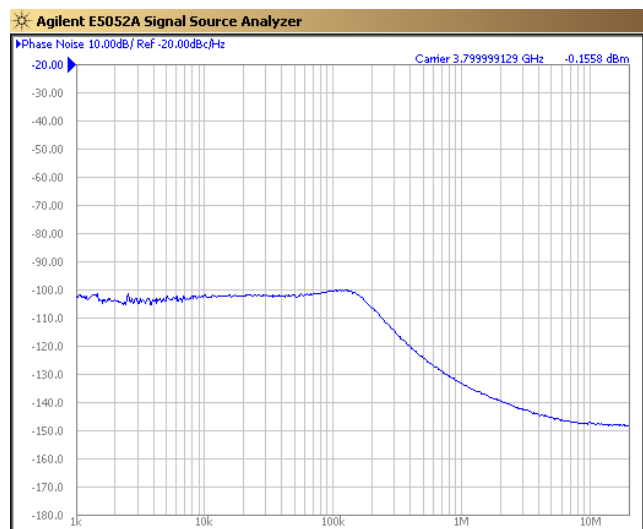
Typical Phase Noise [Internal Reference]
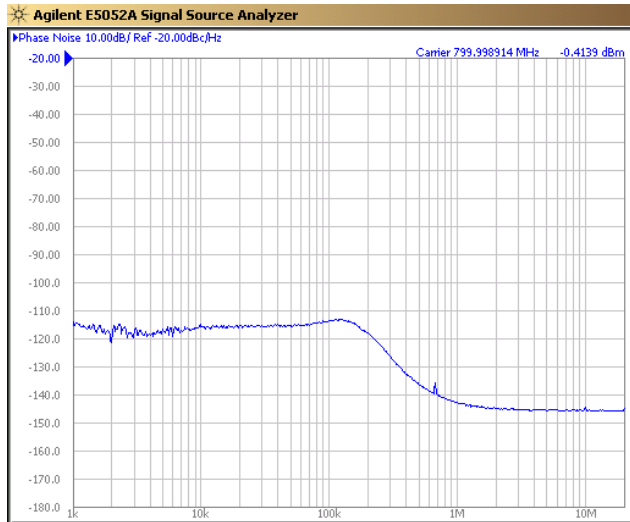
Phase Noise @ 800MHz

Phase Noise @ 2100MHz

Phase Noise @ 2700MHz

Phase Noise @ 38000MHz

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.

SN?

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

VER?[1]   Query device Firmware Version
return: Firmware Version

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 MHz;

FREQ?[1] Query device Frequency Setting

return: Value in unit of MHz;

POWR[space]_value_

Set power value, it returns the value when settings are done.

return: Value in unit of dB;

POWR?[1] 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?[1] 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

[1] _Query Commands Effective from SN 20210125S001, Firmware 00.21.01.25A._

USG402B USB CONTROLLED SIGNAL GENERATOR

Default Power On State:

    Frequency = 400MHz

    Power = -40dBm

    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...

  ② *Always Change Frequency prior to power when switching frequencies.*

Example Program:

    FREQ 3800<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 3300<CR>   *//Change Frequency to 3300MHz*

                      //wait USG device to return "3300"

    POWR -10<CR>   *//Apply -10dB Power to 3300M*

                      //wait USG device to return "-10"

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

                      //wait USG device to return "0"