

NON-CATALOG

Low Harmonics level

USB Synthesized Signal Generator SSG-4000LH

50Ω -60 dBm to +10 dBm, 250-4000 MHz

The Big Deal

- Low Harmonics (-66dBc typ.)
- 70dB Adjustable output power range
- Internal & External pulse modulation
- Cost effective Signal Generator



Case Style: LV1753

Product Overview

Mini-Circuits SSG-4000LH is a wideband synthesized signal generator operating over a frequency range of 250 to 4000 MHz. The signal generator is cased in a rugged metal shielded package (11.0" x 8.5" x 2.15") and equipped with an N-type 50Ω connector at the RF output port.

The signal generator is supplied with a CD containing user friendly GUI control software and programming APIs for 32 and 64 bit environments. Using the supplied software, the user can easily select one of several different output modes including multiple pulse modulation options, frequency sweep, and power sweep (up, down, or bidirectional).

The SSG-4000LH can be controlled from almost any Windows or Linux PC, via USB 2.0 interface. Included with the generator are a 2.7 ft. USB cable and a 24V power adapter. Longer USB cables and a mounting bracket are available as additional options.

Key Features

Feature	Advantages
Wide output power dynamic range	Dynamic range 70 dB, output power from -60dBm to +10dBm in 0.25dB steps
USB HID (Human Interface Device)	Plug-and-Play (no need to install a driver for the device).
Pulse modulation options	The SSG-4000LH can produce pulse modulated RF using internal or external modulating signal
Multiple sweep options	The SSG-4000LH can be set to sweep either power or frequency up, down, or bidirectionally.
Software CD with program instructions for various operating systems	The unit is supplied with a CD containing a user friendly Graphical User Interface (GUI) control program and API objects for Windows® operating systems. Programming instructions are included for 32 and 64 bit versions of Linux® and Windows® operating systems. The SSG-6001RC is compatible with LabVIEW®, Delphi®, C++, C#, Visual Basic®, .NET software and more; for other operating environments and languages please contact our applications department for support.

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Features

- Low Harmonics level (-66 dBc typ.)
- Adjustable output power, 70 dB dynamic range
- USB HID control interface (Plug and Play)
- Small, light weight
- Power and/or frequency sweep options
- Multiple pulse modulation options (external, free run, triggered)
- Separate Trigger In and Trigger Out ports
- Easy installation and operation
- User friendly Windows® Graphical User Interface
- Supports a wide range of programming environments (See application note [AN-49-001](#) for details)
- Mounting bracket (Optional)



Installation CD with Software included

SSG-4000LH

Included Accessories

Model No.	Description	Qty.
AC/DC-24-3W1	AC/DC 24V adapter (see Ordering Information)	1
CBL-3W1-XX	AC power cord (see Ordering Information)	1
USB-CBL-AB-3+	2.7ft. USB cable	1
SSG-CD	Software CD	1

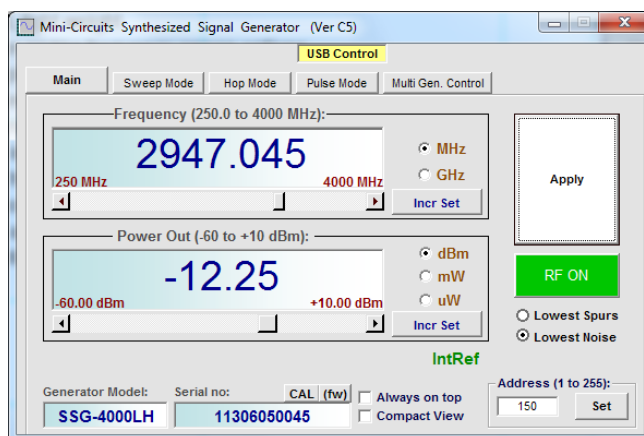
Applications

- Lab test equipment
- Automated test capability
- Production line testing
- Field testing

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

Mini-Circuits Control Program for USB Synthesized Signal Generators



NON-CATALOG

USB Synthesized Signal Generator

SSG-4000LH

Electrical Specifications at +25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Output Frequency	-	250	-	4000	MHz
Frequency Resolution	-	5	-	-	kHz
Frequency accuracy	Using Internal Reference	-	±1	-	ppm
Settling time ^{1,3}	-	-	2.5	-	msec
Minimum Dwell Time ^{2,3}	-	-	15	-	
VSWR	250 - 3000 MHz	-	1.5	-	:1
	3000 - 4000 MHz	-	2.3	-	
Output power Max	250 - 4000 MHz	+10	-	-	dBm
Output power Min	250 - 4000 MHz	-	-	-60	
Power resolution (nom.)	-	-	0.25	-	dB
Dynamic range	-	-	70	-	dB
Output power accuracy	-	-	±0.25	±1.00	dB
RF output level	@RF OFF	-	-95	-	dBm
Harmonics & Sub-Harmonics	PWR _{out} = -50 dBm	-	-58	-	dBc
	PWR _{out} = -30 dBm	-	-78	-	
	PWR _{out} = -10 dBm	-	-78	-	
	PWR _{out} = 0 dBm	-	-74	-	
	PWR _{out} = +10 dBm	-	-47	-	
Non-Harmonic Spurious ⁴	@Frequency step size = 5 kHz	-	-50	-	dBc
	@Frequency step size = 100 kHz	-	-66	-	
	@Frequency step size = 1 MHz	-	-80	-	
	@Frequency step size = 10 MHz	-	-94	-	

Typical Phase Noise, SSB ⁴ (dBc/Hz) at +25°C

Carrier Frequency (MHz)	Frequency Offset									
	100 Hz		1 kHz		10 kHz		100 kHz		1 MHz	
	Lowest Spurs	Lowest Noise	Lowest Spurs	Lowest Noise	Lowest Spurs	Lowest Noise	Lowest Spurs	Lowest Noise	Lowest Spurs	Lowest Noise
250	-95	-96	-102	-111	-101	-107	-121	-123	-147	-147
1060	-81	-83	-92	-98	-91	-94	-111	-112	-139	-139
2600	-74	-75	-82	-91	-82	-89	-102	-105	-132	-132
4000	-70	-72	-79	-85	-81	-88	-101	-106	-131	-131

¹ Settling time - transition between two signals during which generator is in RF OFF state.

² Dwell time - duration of each signal point in a Sweep or Hop sequence set by user. Default is minimum dwell time.

³ Generator response time is Dwell time + Settling Time.

⁴ It is recommended to work in Lowest Spur mode when using frequency step size of up to 50 kHz and Lowest Noise mode for frequency step size greater than 50kHz. Working in Lowest Spur or Lowest Noise mode outside the recommended range may cause excessive Noise (in Lowest Spur mode) or excessive spurs (in Lowest Noise mode)

Electrical Specifications (Pulse modulation modes)⁵ at +25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Units	
Pulse Width	Nominal value	Internal Pulse source	1	–	–	μSec
		External Pulse source	10	–	–	
Pulse Period	Measured at the 50% points	2 μSec	–	10 Sec	–	
Duty cycle (in Free Run)	Pulse Width divided by Pulse Period	0.01	–	99.99	%	
Rise / Fall time	Measured between 10% and 90%	–	35 / 45	–	nSec	
Pulse Width Accuracy	Measured at 50% of pulse level for Internal and external modulation	–	±2	–	%	
External pulse mod. input threshold	External pulse modulation	–	–	2.4	V	
Trigger response delay	Trigger edge to 50% of pulse level	Internal Pulse source ⁶	–	3.5	–	μSec
		External Pulse source	–	0.8	–	
Pulse Power ratio	@PWR _{OUT} =+10dBm, FREQ _{OUT} =250 MHz	–	60	–	dB	
Pulse Power ratio	@PWR _{OUT} =+10dBm, FREQ _{OUT} =4000 MHz	–	45	–		

⁵ Pulse mode is supported from Firmware Rev. B3, external pulse source from Firmware Rev. C4. Firmware from Rev. B1 onwards can be upgraded using the latest software CD (available for download from http://www.minicircuits.com/support/software_download.html)

⁶ Max trigger frequency is 200 kHz

Electrical Specifications at +25°C (Reference, Trigger & DC power)

Parameter	Test Conditions	Min.	Typ.	Max.	Units	
Aging	Using Internal Reference	–	1	–	ppm/yr	
Reference In	Frequency	–	10	–	MHz	
	Power	–	–3.5	+7.5	dBm	
Reference Out	Frequency	–	10	–	MHz	
	Freq. Accuracy	Using Internal Reference	–	±1	–	ppm
	Power	–	+7	–	dBm	
	Aging	Using Internal Reference	–	1	–	ppm/yr
Trigger Out, Low	–	0	–	0.4	V	
Trigger Out, High	–	2.4	–	3.3		
Trigger In, Low	–	0	–	0.8		
Trigger In, High	–	2.4	–	3.3		
Supply Voltage ⁷	–	22.8	24	25.2	V _{DC}	
Supply Current ⁸	–	–	400	500	mA	
USB current ⁷	SSG-4000LH does not draw power from the USB bus, only from DC power adapter				mA	

⁷ Power On Sequence: Connect the 24V power, followed by the USB control before turning on the Generator

Minimum System Requirements

Interface	USB HID
Host operating system - USB Control	Windows 32/64 Bit operating system: Windows 98®, Windows XP®, Windows Vista®, Windows 7®, Windows 8®, Windows 10® Linux® support: 32/64 Bit operating system
Hardware	Pentium® II or better

Absolute Maximum Ratings

Operating Temperature	0°C to +50°C
Storage Temperature	-20°C to +60°C
Power in @ Reference In	+10 dBm
Reverse Power(DC) @ Reference Out	25V _{DC}
Reverse Power(DC) @ RF Out	10V _{DC}
Voltage @ Trigger out	-0.3V _{DC} to +3.5V _{DC}
Voltage @ Trigger in	-0.3V _{DC} to +3.5V _{DC}

Permanent damage may occur if any of these limits are exceeded.

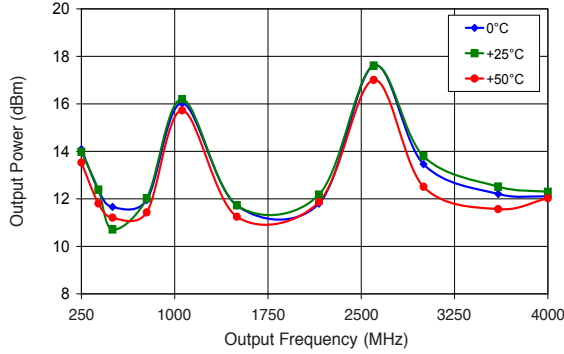
Connections

RF Output	(N Type-Female)
Ref. In	(BNC-Female)
Ref. Out	(BNC-Female)
Trigger In	(BNC-Female)
Trigger Out	(BNC-Female)
Power In	(2.1 mm DC socket)
USB Port	(USB B female)

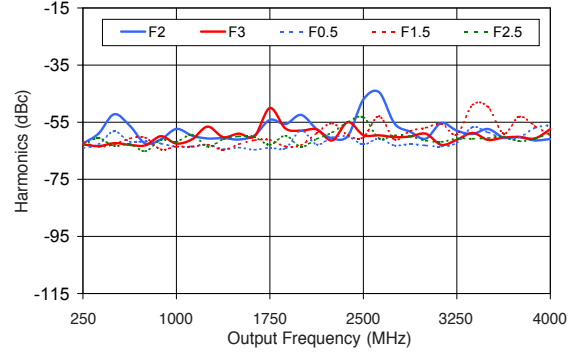
Typical Performance Curves*

*at +25°C unless mentioned otherwise

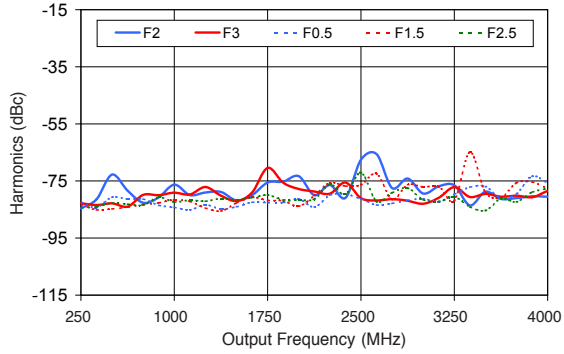
Max. Power Output
Vs. Output Frequency



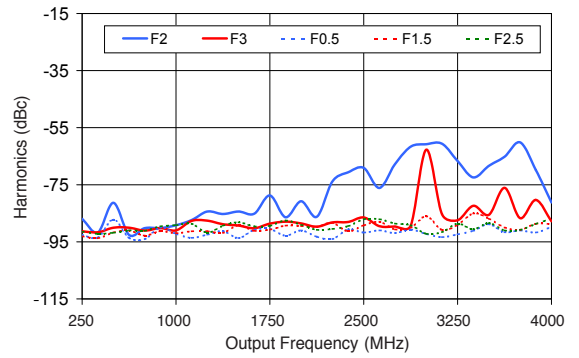
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-50dBm



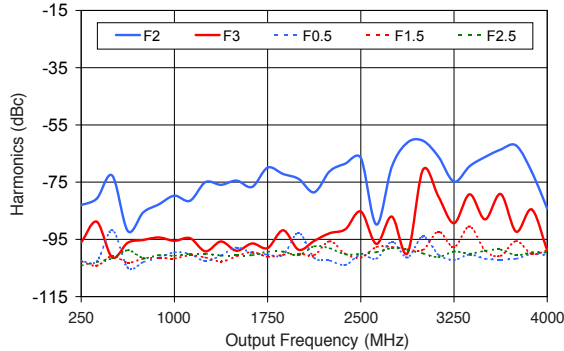
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-30dBm



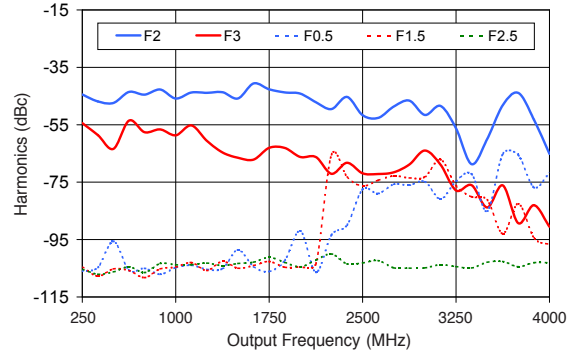
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-10dBm



Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=0dBm



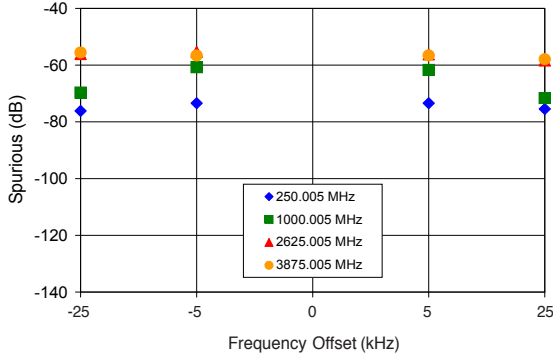
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=+10dBm



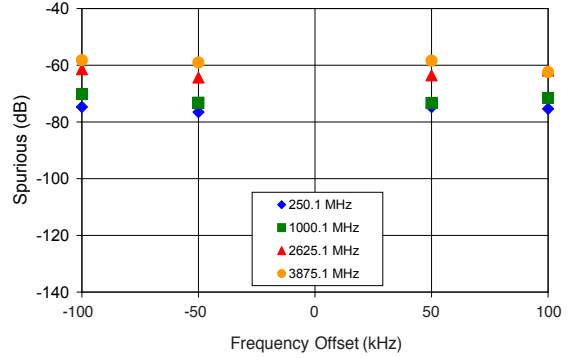
Typical Performance Curves* (continued)

*at +25°C unless mentioned otherwise

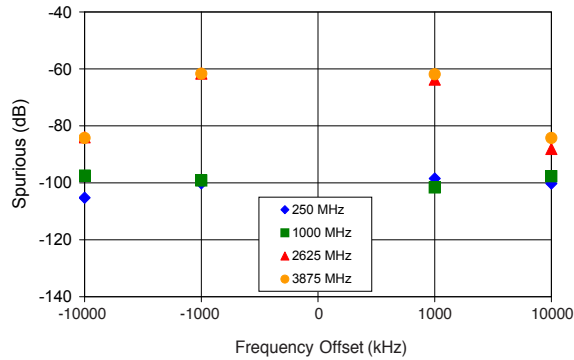
Spurious @ Freq. Resolution 5 kHz
Vs Frequency Offset



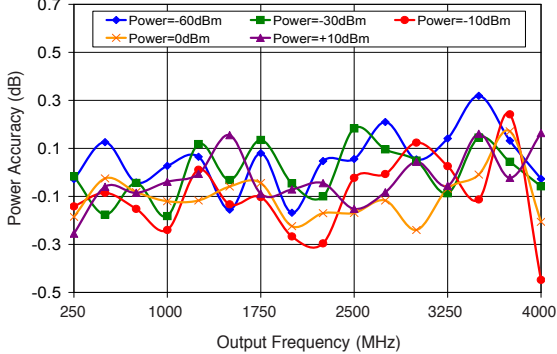
Spurious @ Freq. Resolution 100 kHz
Vs Frequency Offset



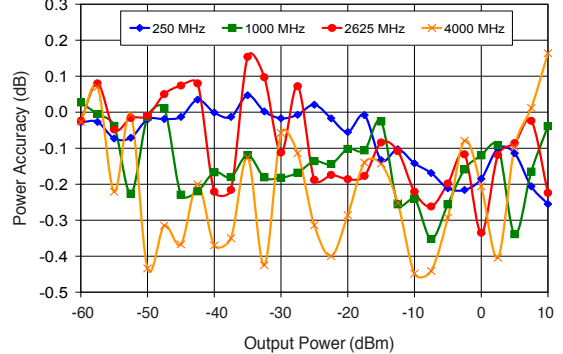
Spurious @ Freq. Resolution 1 MHz
Vs Frequency Offset



Power Accuracy
Vs. Output Frequency

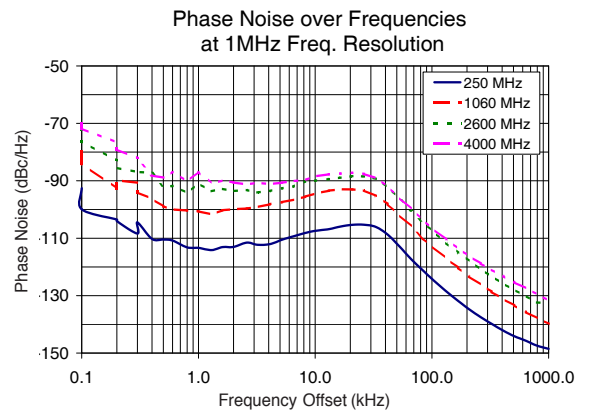
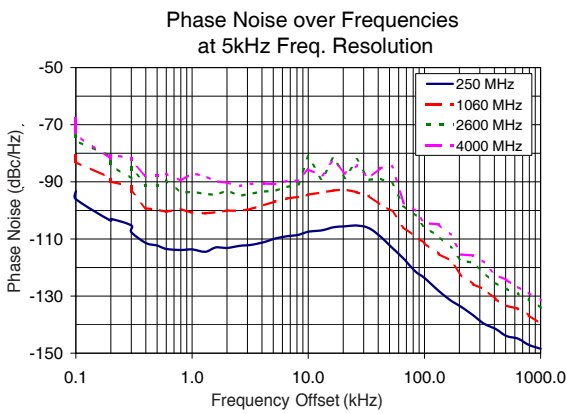
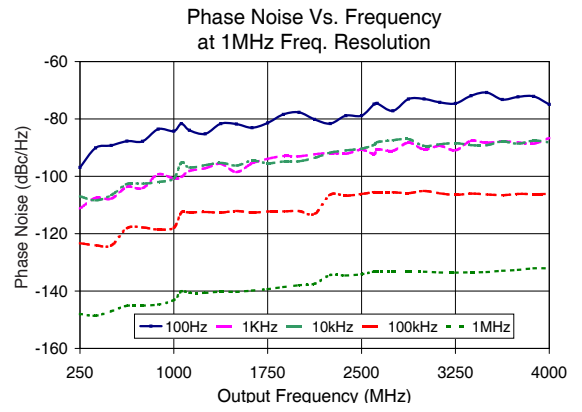
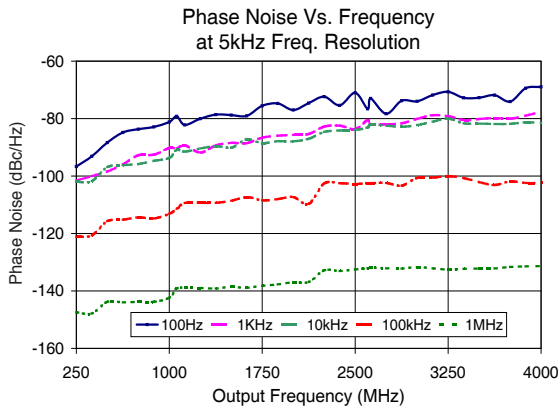


Power Accuracy
Vs. Output Power

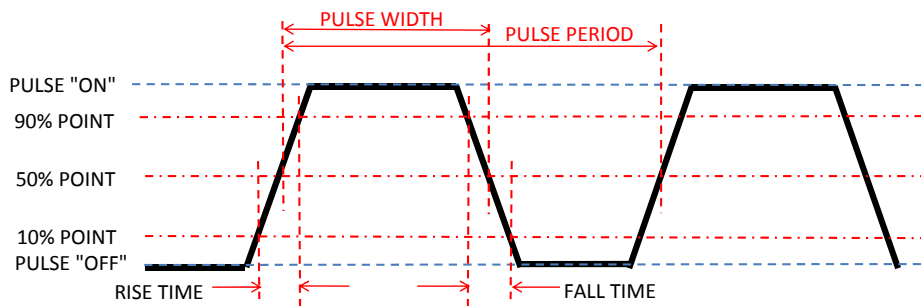


Typical Performance Curves* (continued)

*at +25°C unless mentioned otherwise



Pulse mode definitions

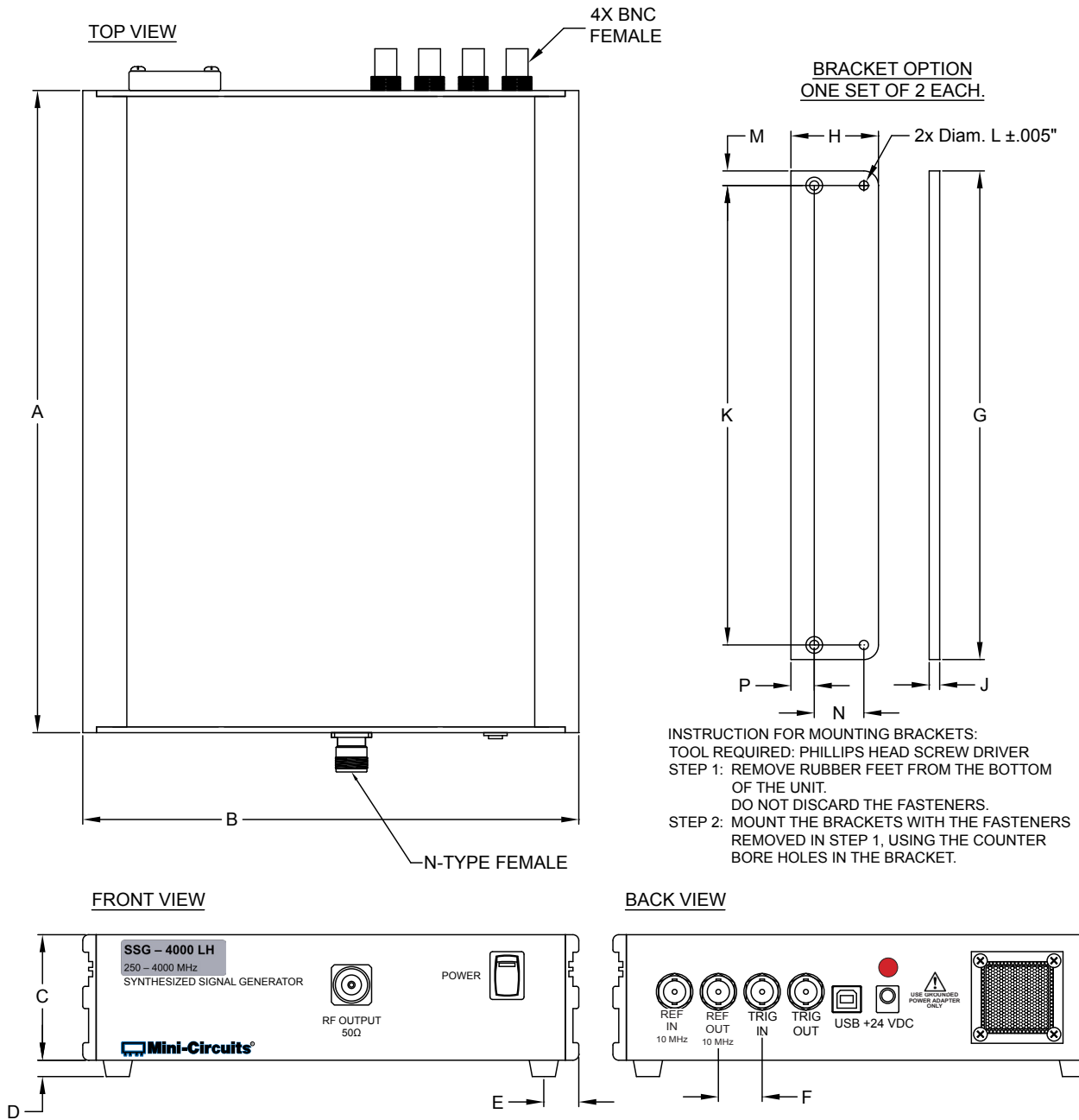


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SSG-4000LH

Outline Drawing LV1753











Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
11.00	8.50	2.15	0.28	0.60	0.75	8.37	1.50	0.18	7.870	0.158	0.25	0.850	0.40	2500
279.4	215.9	54.6	7.1	15.2	19.05	212.6	38.1	4.6	199.9	4.0	6.35	21.6	10.2	

Ordering, Pricing & Availability Information see our web site

Model	Description
SSG-4000LH	USB Synthesized Signal Generator

Included Accessories	Part No.	Description
	AC/DC-24-3W1	AC/DC 24V _{DC} Grounded Power Adaptor. Operating temperature: 0°C to +40°C, I _{Max} =2.5A
	CBL-3W1-XX	AC Power Cord (Select one power cord from below with each Signal Generator)
	SSG-CD	Software CD
	USB-CBL-AB-3+	2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)

AC Power Cords ⁸	Part No.	Description
	CBL-3W1-US	Power Cord for United States
	CBL-3W1-EU	Power Cord for Europe
	CBL-3W1-UK	Power Cord for United Kingdom
	CBL-3W1-AU	Power Cord for Australia and China
	CBL-3W1-IL	Power Cord for Israel

⁸. Power cords for other countries are also available, if you need a power cord for a country not listed in the table please contact apps@minicircuits.com or check <http://www.minicircuits.com/contact/offices.html> for regional offices e-mail and phone numbers.

Optional Accessories	Description
USB-CBL-AB-3+ (spare)	2.7 ft. (0.8 m) USB cable
USB-CBL-AB-7+	6.8 ft. (2.1 m) USB Cable
USB-CBL-AB-11+	11 ft. (3.4 m) USB Cable
BKT-280-06+	Bracket (One set of 2 each)

Calibration	Description
CALSSG-4000LH	Calibration Service

[Click Here](#)

Additional Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp