High Power Output

USB Synthesized Signal Generator SSG-4000HP

50Ω   -50 dBm to +20 dBm,   250-4000 MHz

The Big Deal
- High output power (+20 dBm max)
- 70 dB Adjustable output power range
- Internal & External pulse modulation
- Cost effective Signal Generator

Installation CD with Software included

Case Style: LV1754

Product Overview

Mini-Circuits SSG-4000HP 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 (8.37" 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-4000HP 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 -50dBm to +20dBm 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-4000HP can produce pulse modulated RF using internal or external modulating signal
Multiple sweep options	The SSG-4000HP 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.

Mini-Circuits®

High Power Output

USB Synthesized Signal Generator

50Ω   -50 dBm to +20 dBm,   250-4000 MHz

Features

- High power output (+20 dBm max)
- 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-4000HP

Included Accessories

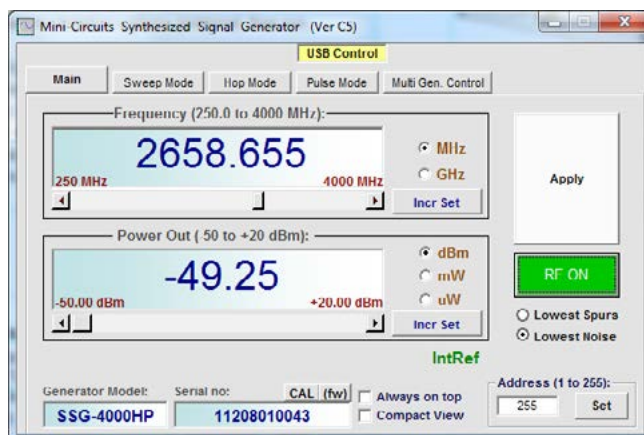| Model No.	Description	Qty.
AC/DC-24-3W1	AC/DC 24V adapter *(see Ordering Information)*	1
CBL-3W1-XX	AC power cord *(see Ordering Information)*	1
USB-CBL-AB-3+	2.7ft. USB cable	1
SSG-CD	Software CD	1

RoHS Compliant
See our web site for RoHS Compliance methodologies and qualifications

Applications

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

Mini-Circuits Control Program for USB Synthesized Signal Generators

Rev. E
M155776
EDR-10768/3F1
SSG-4000HP
RAV
160405
Page 2 of 9

Mini-Circuits®

www.minicircuits.com   P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

Electrical Specifications (General RF) 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]	–	–	10	–	
VSWR	250 - 3000 MHz	–	1.5	–	:1
	3000 - 4000 MHz	–	1.3	–	
Output power Max [5]	250 - 3200 MHz	+20	+21.5	–	dBm
	3200 - 4000 MHz	Note 4	+19	–	
Output power Min [5]	250 - 4000 MHz	–	–	-50	
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	–	-43	–	dBc
	PWR $_{out}$= -30 dBm	–	-61	–	
	PWR $_{out}$= 0 dBm	–	-46	–	
	PWR $_{out}$ +10 dBm	–	-45	–	
	PWR $_{out}$ +15 dBm	–	-38	–	
Non-Harmonic Spurious [6]	@Frequency step size = 5 kHz	–	-50	–	dBc
	@Frequency step size = 100 kHz	–	-63	–	
	@Frequency step size = 1 MHz	–	-80	–	
	@Frequency step size= 10 MHz	–	-90	–	

Typical Phase Noise, SSB [6] (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	-94	-96	-102	-111	-102	-107	-120	-123	-147	-147
1060	-81	-83	-91	-98	-91	-94	-110	-112	-139	-139
2600	-74	-76	-82	-90	-82	-87	-102	-106	-132	-133
4000	-69	-72	-79	-87	-81	-88	-101	-106	-131	-132

[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] Max available power out degrades over the 3200-4000 MHz range to +17 dBm
[5] The generator is calibrated within typical power range, however performance is guaranteed only within power max/min limits.
[6] 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) [6] 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 [7]	–	3.5	–	μSec
		External Pulse source	–	0.8	–	
Pulse Power ratio	@PWR$_{OUT}$=+20dBm, FREQ$_{OUT}$=250 MHz		–	60	–	dB
Pulse Power ratio	@PWR$_{OUT}$=+17dBm, FREQ$_{OUT}$=4000 MHz		–	45	–	

[6] Pulse mode is supported from Firmware Rev. B3 external pulse source from Firmware Rev. C7. 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

[7] 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 [8]		–	22.8	24	25.2	V$_{DC}$
Supply Current [8]		–	–	400	500	mA
USB current [8]		SSG-4000HP does not draw power from the USB bus, only from DC power adapter				mA

[8] 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

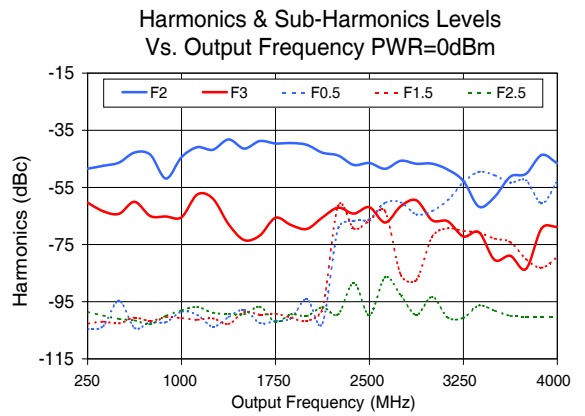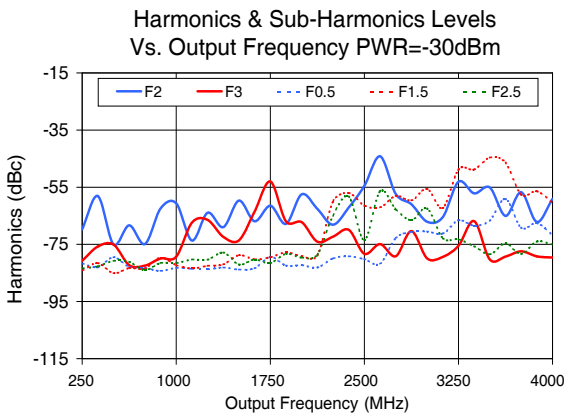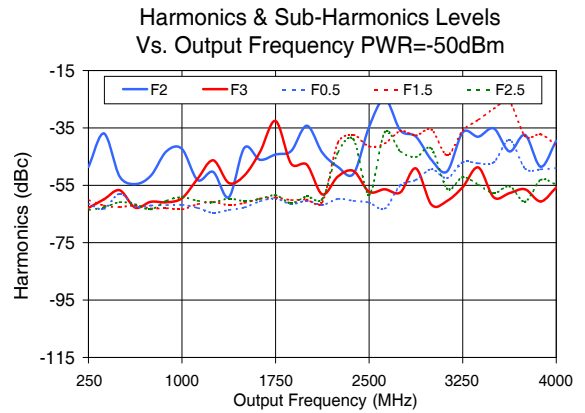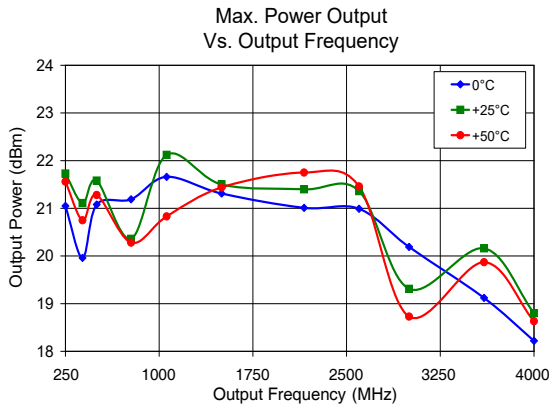| Operating Temperature	0ºC to +50ºC
Storage Temperature	-20ºC to +60ºC
Power in @ Reference In	+10 dBm
Reverse Power(DC) @ Reference Out	25V$_{DC}$
Reverse Power(DC) @ RF Out	10V$_{DC}$
Voltage @ Trigger out	-0.3V$_{DC}$ to +3.5V$_{DC}$
Voltage @ Trigger in	-0.3V$_{DC}$ to +3.5V$_{DC}$

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)

USB Synthesized Signal Generator

SSG-4000HP

Typical Performance Curves*

*at +25℃ 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=0dBm

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

Harmonics & Sub-Harmonics Levels Vs. Output Frequency PWR=+15dBm
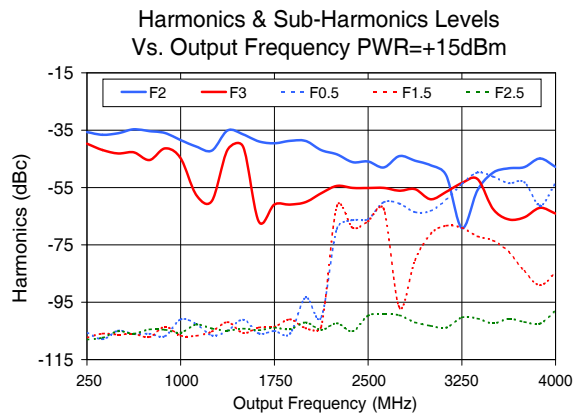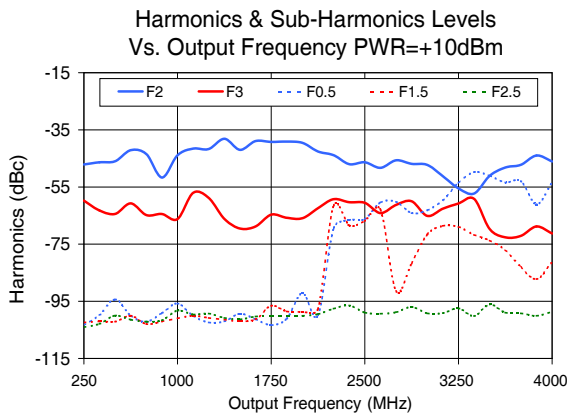
Typical Performance Curves* (continued)

*at +25°C unless mentioned otherwise

Spurious @ Freq. Resolution 5 kHz
Vs Frequency Offset
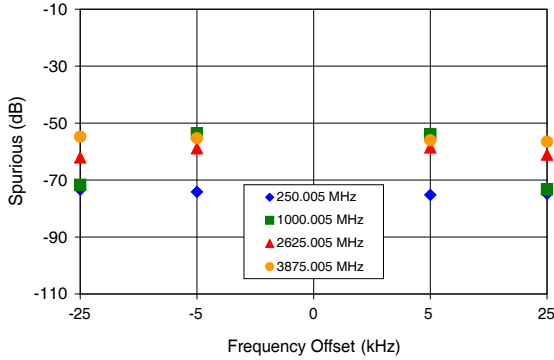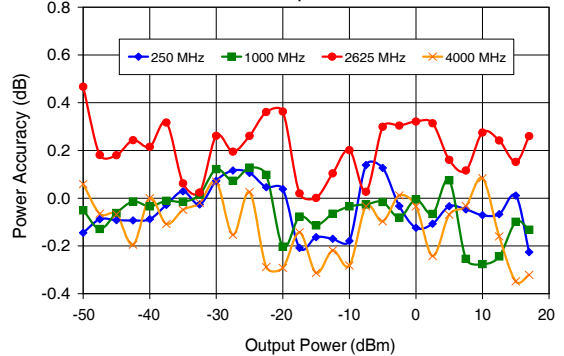
Spurious @ Freq. Resolution 100 kHz
Vs Frequency Offset
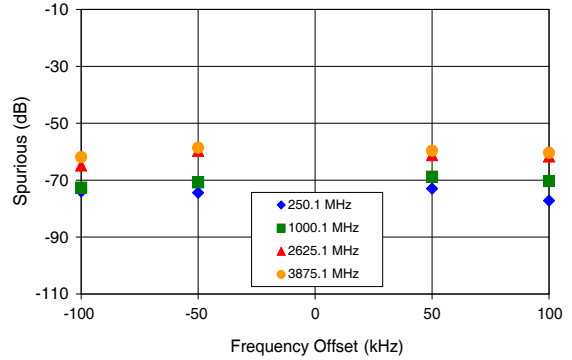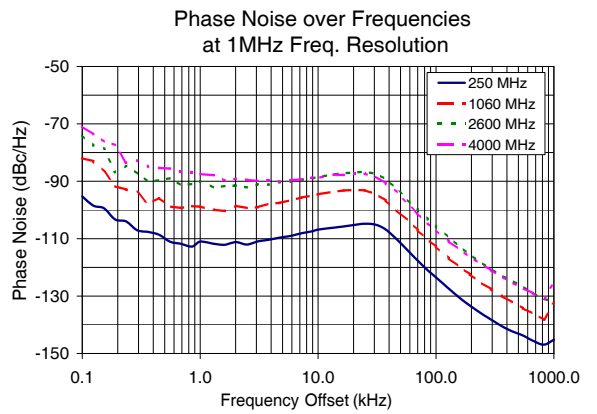
Spurious @ Freq. Resolution 1 MHz
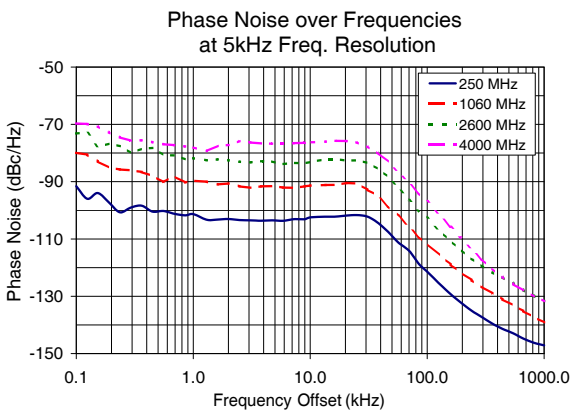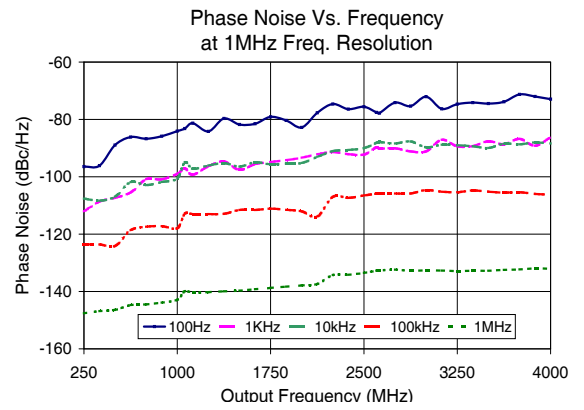Vs Frequency Offset
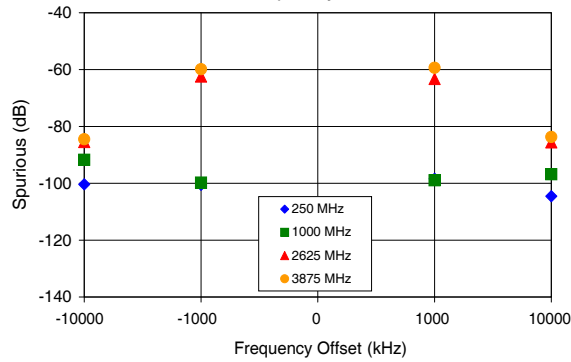
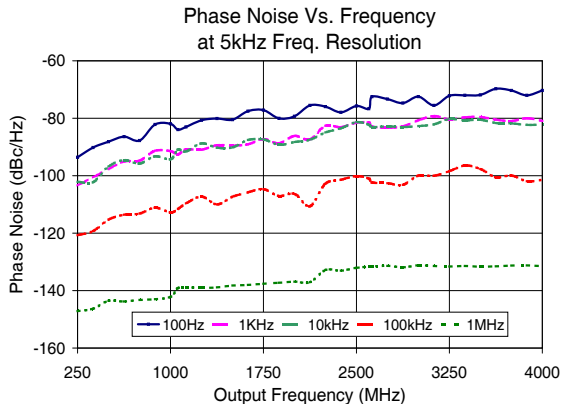Power Accuracy
Vs. Output Frequency
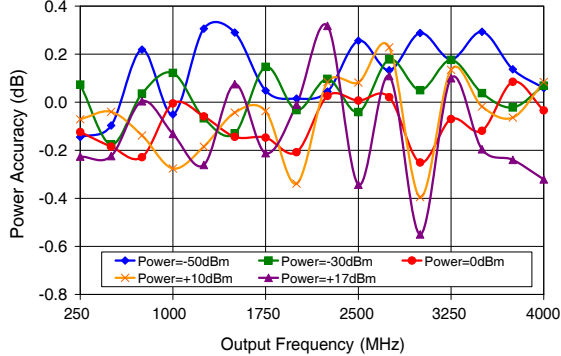
Power Accuracy
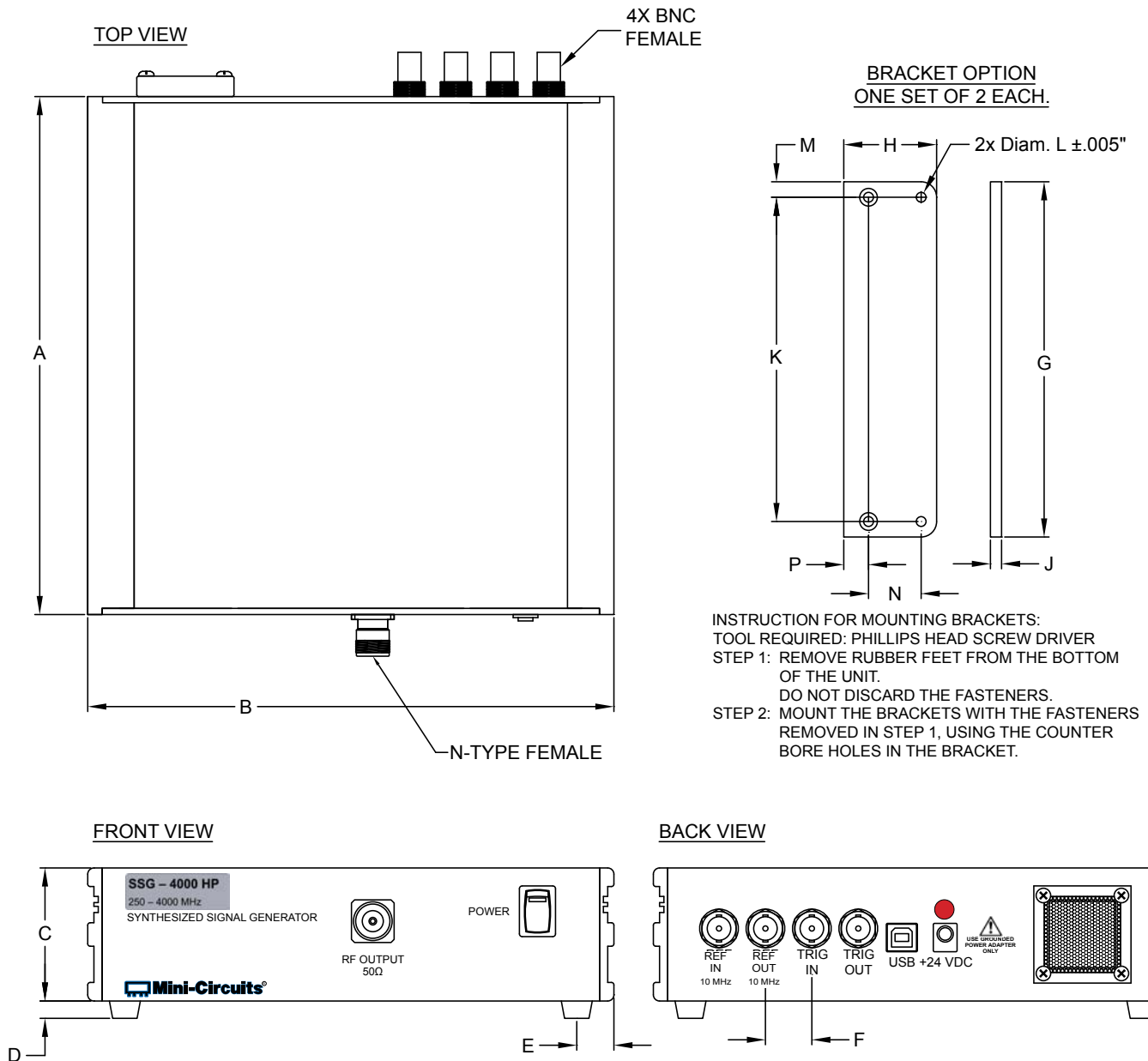Vs. Output Power

Typical Performance Curves* (continued)

*at +25°C unless mentioned otherwise

Phase Noise Vs. Frequency at 5kHz Freq. Resolution

Phase Noise Vs. Frequency at 1MHz Freq. Resolution

Phase Noise over Frequencies at 5kHz Freq. Resolution

Phase Noise over Frequencies at 1MHz Freq. Resolution

Pulse mode definitions

Outline Drawing LV1754

TOP VIEW

4X BNC FEMALE

N-TYPE FEMALE

BRACKET OPTION
ONE SET OF 2 EACH.

2x Diam. L ±.005"

INSTRUCTION FOR MOUNTING BRACKETS:
TOOL REQUIRED: PHILLIPS HEAD SCREW DRIVER
STEP 1: REMOVE RUBBER FEET FROM THE BOTTOM
OF THE UNIT.
DO NOT DISCARD THE FASTENERS.
STEP 2: MOUNT THE BRACKETS WITH THE FASTENERS
REMOVED IN STEP 1, USING THE COUNTER
BORE HOLES IN THE BRACKET.

FRONT VIEW

SSG – 4000 HP
250 – 4000 MHz
SYNTHESIZED SIGNAL GENERATOR
RF OUTPUT 50Ω
POWER

Mini-Circuits®

BACK VIEW

REF IN 10 MHz   REF OUT 10 MHz   TRIG IN   TRIG OUT   USB   +24 VDC   USE GROUNDED POWER ADAPTER ONLY

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
8.37	**8.50**	**2.15**	**0.28**	**0.60**	**0.75**	**5.74**	**1.50**	**0.18**	**5.240**	**0.158**	**0.25**	**0.850**	**0.40**	1900
212.6	215.9	54.6	7.1	15.2	19.05	145.8	38.1	4.6	133.1	4.0	6.35	21.6	10.2	

Ordering, Pricing & Availability Information see our web site

Model	Description
SSG-4000HP	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[9]	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

[9] 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-280-07+	Bracket (One set of 2 each)

Calibration	Description	
CALSSG-4000HP	Calibration Service	Click Here

Additional Notes

A. 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.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. 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