

Wideband

USB Synthesized Signal Generator SSG-6000

50Ω -60 dBm to +10 dBm, 25-6000 MHz

The Big Deal

- Wideband generator with 3 Hz frequency resolution
- 70dB adjustable output power range
- Internal pulse modulation
- Cost effective signal generator



Installation CD with
Software included

Case Style: LV1790



Product Overview

Mini-Circuits SSG-6000 (RoHS compliant) is a wideband synthesized signal generator operating over a frequency range of 25 to 6000 MHz. The signal generator is cased in a rugged metal shielded package (size of 8.37" x 8.5" x 2.15") and equipped with a N-type 50Ω connector at the RF output port.

The signal generator is supplied with a CD containing a unique user friendly GUI control program 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-6000 can be controlled from almost any Windows PC, via a USB 2.0 interface; a 2.7ft. USB cable and a 12V power adaptor are included while 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-6000 can be set to produce RF pulses either triggered, or continuous (1μSec resolution).
Multiple sweep options	The SSG-6000 can be set to sweep either power or frequency up, down or bidirectionally.
12V _{DC} Operating voltage	The SSG-6000 is powered using the supplied 12V AC/DC external power adaptor with three wire line cord (Use only grounded power supply)
Software CD with program instructions for various operating systems	The unit is supplied with a CD containing a friendly Windows® Graphical User Interface (GUI) control program, API objects and programing instructions for the 32 and 64 bit versions of Linux® and Windows® operating systems. The SSG-6000 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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USB Synthesized Signal Generator

50Ω -60 dBm to +10 dBm, 25-6000 MHz

Features

- Adjustable output power, 70 dB range
- 3 Hz frequency resolution
- USB HID control interface (Plug and Play)
- Small, light weight
- Power and/or frequency sweep options
- Multiple pulse modulation options (free run, triggered)
- Separate Trigger In and Trigger Out ports
- Compatible with 32/64-bit Windows® or Linux® operating systems
- ActiveX com object and .Net class library for use with other software: C++, C#, CVI®, Delphi®, LabVIEW® 8 or newer, MATLAB® 7 or newer, Python, Agilent VEE®, Visual Basic®, Visual Studio® 6 or newer, AutoIT and more¹
- Friendly Windows® Graphical User Interface
- Mounting bracket (Optional)



Installation CD with
Software included

SSG-6000

Model P/N	Description	Price	Qty.
SSG-6000	USB Signal Generator	\$2695.00 ea.	(1)
Included Accessories			
AC/DC-12-3W1	AC/DC 12V 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

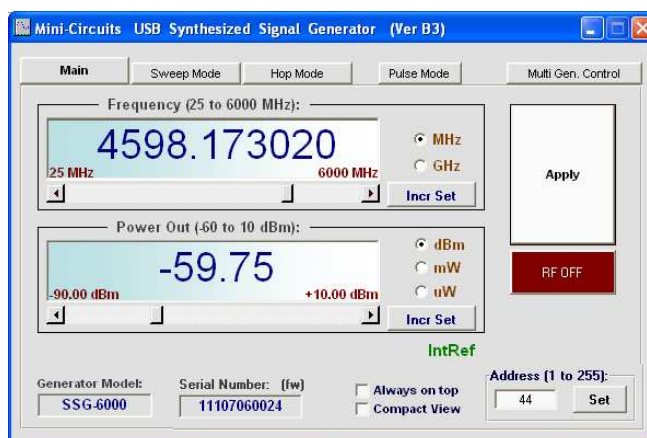
Applications

- 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



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RAV
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Page 2 of 11

Electrical Specifications (General RF) at +25°C

Parameter	Test Conditions		Min.	Typ.	Max.	Units
Output Frequency	–		25	–	6000	MHz
Frequency Resolution	25 - 3000 MHz		–	3	–	Hz
	3000 - 6000 MHz		–	6	–	Hz
Frequency accuracy	Using Internal Reference		–	±1	–	ppm
Settling time ^{2,4}	–		–	1.5	–	msec
Dwell time (nominal) ^{3,4}	–		20	–	10,000	
VSWR	25 - 4500 MHz		–	1.4	–	:1
	4500 - 6000 MHz		–	2.2	–	
Output power Max ⁵	25 - 750 MHz		+8	+12	–	dBm
	750 - 5100 MHz		+10	+13.5	–	dBm
	5100 - 6000 MHz		+6	+10	–	dBm
Output power Min ⁵	25 - 6000 MHz		–	-60	-50	dBm
Output power resolution (nom.)	–		–	0.25	–	dB
Dynamic range	–		–	70	–	dB
Output power accuracy	25 - 750 MHz	PWR _{out} : -50 to -10 dBm	–	±0.25	±0.80	dB
		PWR _{out} : -10 to +8 dBm	–	±0.15	±0.65	
	750 - 1500 MHz	PWR _{out} : -50 to -10 dBm	–	±0.25	±0.50	
		PWR _{out} : -10 to +10 dBm	–	±0.15	±0.60	
	1500 - 4000 MHz	PWR _{out} : -50 to -10 dBm	–	±0.25	±0.75	
		PWR _{out} : -10 to +10 dBm	–	±0.30	±0.55	
	4000 - 5100 MHz	PWR _{out} : -50 to +10 dBm	–	±0.35	±1.00	
		PWR _{out} : -50 to -10 dBm	–	±0.30	±1.00	
RF output level	@RF OFF		–	-110	–	dBm
			–	-110	–	dBm
Harmonics & Sub-Harmonics ⁶	25 - 100 MHz	-50 to +10 dBm	–	-35	–	dBc
	100 - 3000 MHz	-50 to 0 dBm	–	-55	–	
		0 to +10 dBm	–	-40	–	
	3000 - 6000 MHz	-50 to +10 dBm	–	-35	–	dBc
Non-Harmonic Spurious	-		–	-65	-50	dBc

² Settling time - transition between two signals during which generator is in RF OFF state.

³ Dwell time - duration of each signal point in a Sweep or Hop sequence set by user. Default is minimum dwell time.

⁴ Generator response time is Dwell time + Settling Time.

⁵ Generator units are calibrated within typical power range, however performance is guaranteed only within power max/min limits.

⁶ Generator Sub-Harmonics(F0.5, F1.5, F2.5, etc...) are produced only in the 3000-6000 MHz range.

Electrical Specifications (Phase Noise) at +25°C

Parameter	Test Conditions		Min.	Typ.	Max.	Units
SSB Phase Noise	RF _{out} =25 MHz	@ 100 Hz offset	–	-120	–	dBc/Hz
		@ 1 kHz offset	–	-133	–	
		@ 10kHz offset	–	-140	–	
		@ 100 kHz offset	–	-149	–	
		@ 1MHz offset	–	-155	–	
SSB Phase Noise	RF _{out} =46.875 MHz	@ 100 Hz offset	–	-114	–	dBc/Hz
		@ 1 kHz offset	–	-131	–	
		@ 10kHz offset	–	-139	–	
		@ 100 kHz offset	–	-145	–	
		@ 1MHz offset	–	-156	–	
SSB Phase Noise	RF _{out} =93.75 MHz	@ 100 Hz offset	–	-109	–	dBc/Hz
		@ 1 kHz offset	–	-126	–	
		@ 10kHz offset	–	-133	–	
		@ 100 kHz offset	–	-139	–	
		@ 1MHz offset	–	-155	–	
SSB Phase Noise	RF _{out} =187.5 MHz	@ 100 Hz offset	–	-104	–	dBc/Hz
		@ 1 kHz offset	–	-121	–	
		@ 10kHz offset	–	-127	–	
		@ 100 kHz offset	–	-133	–	
		@ 1MHz offset	–	-155	–	
SSB Phase Noise	RF _{out} =375 MHz	@ 100 Hz offset	–	-97	–	dBc/Hz
		@ 1 kHz offset	–	-115	–	
		@ 10kHz offset	–	-121	–	
		@ 100 kHz offset	–	-127	–	
		@ 1MHz offset	–	-153	–	
SSB Phase Noise	RF _{out} =750 MHz	@ 100 Hz offset	–	-92	–	dBc/Hz
		@ 1 kHz offset	–	-109	–	
		@ 10kHz offset	–	-116	–	
		@ 100 kHz offset	–	-122	–	
		@ 1MHz offset	–	-150	–	
SSB Phase Noise	RF _{out} =1000 MHz	@ 100 Hz offset	–	-90	–	dBc/Hz
		@ 1 kHz offset	–	-105	–	
		@ 10kHz offset	–	-113	–	
		@ 100 kHz offset	–	-115	–	
		@ 1MHz offset	–	-147	–	
SSB Phase Noise	RF _{out} =1500 MHz	@ 100 Hz offset	–	-86	–	dBc/Hz
		@ 1 kHz offset	–	-103	–	
		@ 10kHz offset	–	-110	–	
		@ 100 kHz offset	–	-115	–	
		@ 1MHz offset	–	-145	–	

Electrical Specifications (Phase Noise, continued) at +25°C

Parameter	Test Conditions		Min.	Typ.	Max.	Units
SSB Phase Noise	RF _{out} =2000 MHz	@ 100 Hz offset	–	-83	–	dBc/Hz
		@ 1 kHz offset	–	-99	–	
		@ 10kHz offset	–	-106	–	
		@ 100 kHz offset	–	-109	–	
		@ 1MHz offset	–	-141	–	
SSB Phase Noise	RF _{out} =2500 MHz	@ 100 Hz offset	–	-80	–	dBc/Hz
		@ 1 kHz offset	–	-98	–	
		@ 10kHz offset	–	-106	–	
		@ 100 kHz offset	–	-106	–	
		@ 1MHz offset	–	-139	–	
SSB Phase Noise	RF _{out} =3000 MHz	@ 100 Hz offset	–	-79	–	dBc/Hz
		@ 1 kHz offset	–	-96	–	
		@ 10kHz offset	–	-102	–	
		@ 100 kHz offset	–	-103	–	
		@ 1MHz offset	–	-136	–	
SSB Phase Noise	RF _{out} =3500 MHz	@ 100 Hz offset	–	-76	–	dBc/Hz
		@ 1 kHz offset	–	-95	–	
		@ 10kHz offset	–	-102	–	
		@ 100 kHz offset	–	-103	–	
		@ 1MHz offset	–	-134	–	
SSB Phase Noise	RF _{out} =4000 MHz	@ 100 Hz offset	–	-77	–	dBc/Hz
		@ 1 kHz offset	–	-93	–	
		@ 10kHz offset	–	-99	–	
		@ 100 kHz offset	–	-103	–	
		@ 1MHz offset	–	-134	–	
SSB Phase Noise	RF _{out} =4500 MHz	@ 100 Hz offset	–	-75	–	dBc/Hz
		@ 1 kHz offset	–	-93	–	
		@ 10kHz offset	–	-97	–	
		@ 100 kHz offset	–	-106	–	
		@ 1MHz offset	–	-135	–	
SSB Phase Noise	RF _{out} =5000 MHz	@ 100 Hz offset	–	-74	–	dBc/Hz
		@ 1 kHz offset	–	-92	–	
		@ 10kHz offset	–	-100	–	
		@ 100 kHz offset	–	-99	–	
		@ 1MHz offset	–	-132	–	
SSB Phase Noise	RF _{out} =6000 MHz	@ 100 Hz offset	–	-73	–	dBc/Hz
		@ 1 kHz offset	–	-90	–	
		@ 10kHz offset	–	-96	–	
		@ 100 kHz offset	–	-96	–	
		@ 1MHz offset	–	-130	–	

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

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Pulse Width resolution	Nominal value	3	–	–	μSec
Pulse Period	Measured at the 50% points	2	–	10 ⁷	μSec
Duty cycle ⁷	Pulse Width divided by Pulse Period	0.01	–	99.99	%
Rise / Fall time	Measured between 10% and 90%	–	200 / 100	–	nSec
Pulse Width Accuracy	Measured at the 50% points	–	±1	–	%
Trigger response delay ⁸	Relevant trigger edge to 50% point of the pulse	–	3.5	–	μSec
Pulse Power ratio	@PWR _{OUT} =+10dBm, FREQ _{OUT} =25 MHz	–	60	–	dB
Pulse Power ratio	@PWR _{OUT} =+10dBm, FREQ _{OUT} =6000 MHz	–	45	–	

⁷ In Free Run mode.

⁸ Max trigger frequency is 150 kHz

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

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Reference In	Frequency	–	10	–	MHz
	Power	-3.5	–	+7.5	dBm
	Phase Noise @10 kHz offset	–	-145	–	dBc/Hz
Reference Out	Frequency	–	10	–	MHz
	Freq. Accuracy Using Internal Reference	–	±1	–	ppm
	Power	–	+6	–	dBm
Trigger Out, Low	–	0	–	0.4	V
Trigger Out, High	–	2.4	–	3.3	
Trigger In, Low	–	0	–	0.4	
Trigger In, High	–	2.4	–	3.3	
Supply Voltage ⁹	–	11.4	12	12.6	V _{DC}
Supply Current ⁹	–	–	660	850	mA
USB current ⁹	–	–	Note 10	–	mA

⁹ Power On Sequence: Connect the 12V power, followed by the USB control before turning on the Generator.

¹⁰ SSG-6000 does not draw power from the USB bus, only from the DC power adapter

Minimum System Requirements

Interface	USB HID
Host operating system	32 Bit operating system: Windows 98®, Windows XP®, Windows Vista®, Windows 7®, Windows 8® 64 Bit operating system: Windows Vista®, Windows 7®, Windows 8® 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	8 V _{DC}
Reverse Power(DC) @ RF Out	8 V _{DC}
Voltage input to Trigger ports	-0.3V _{DC} to +3.5V _{DC}

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

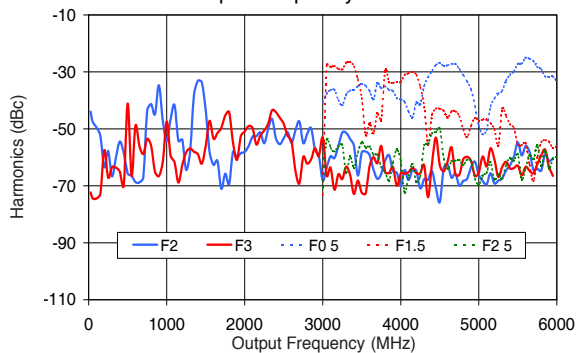
Connections

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)

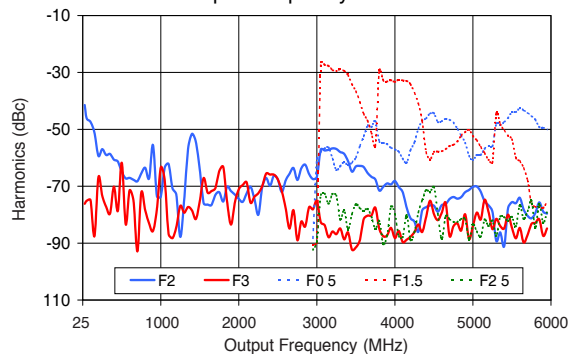
Typical Performance Curves*

*at +25°C unless mentioned otherwise

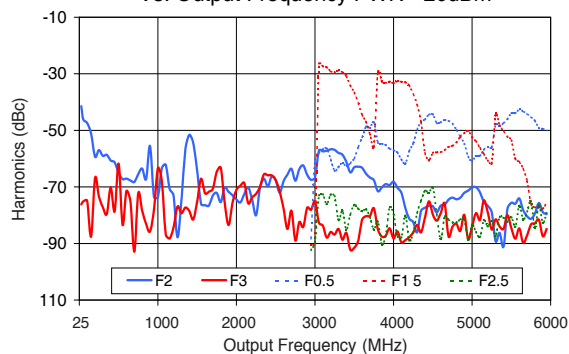
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-50dBm



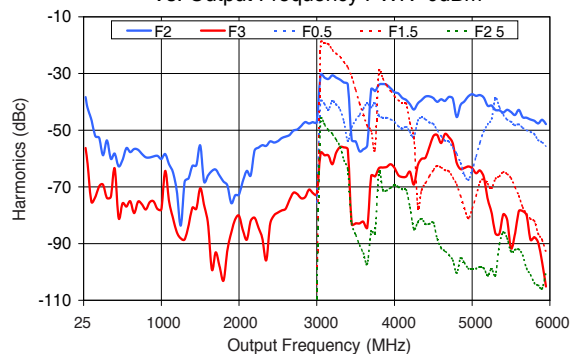
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-30dBm



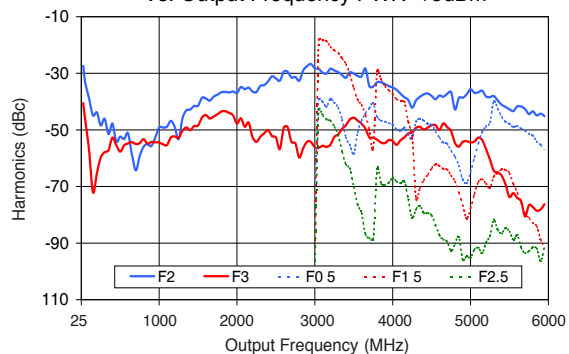
Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=-20dBm



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

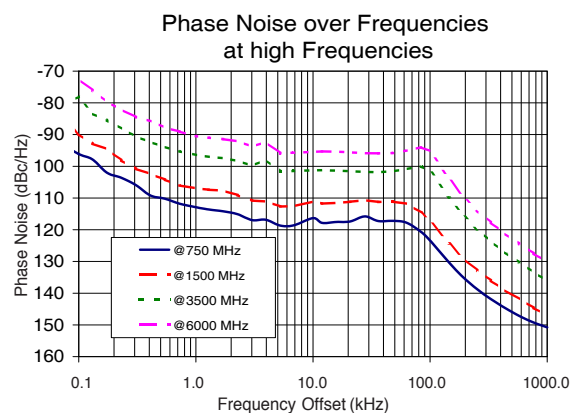
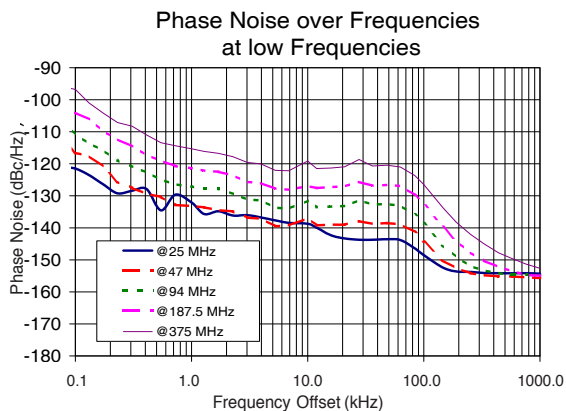
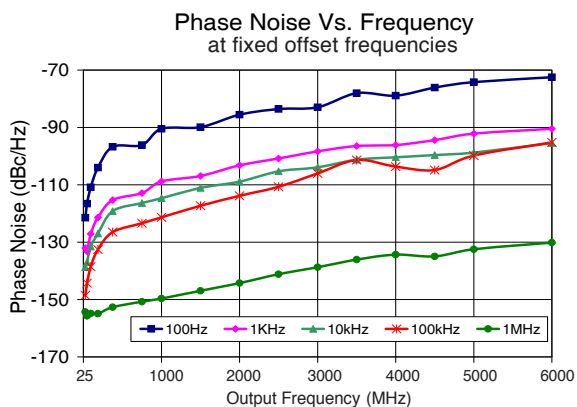
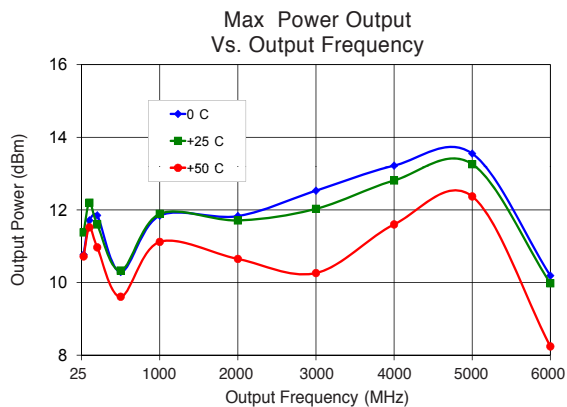


Harmonics & Sub-Harmonics Levels
Vs. Output Frequency PWR=+5dBm



Typical Performance Curves* (continued)

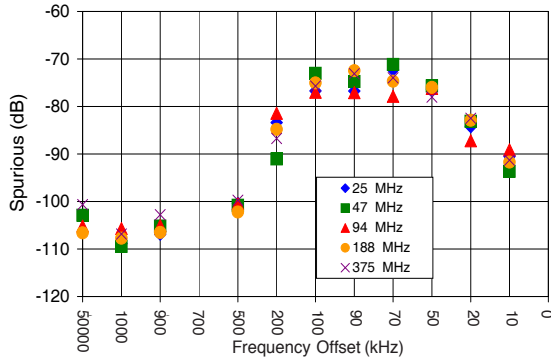
*at +25°C unless mentioned otherwise



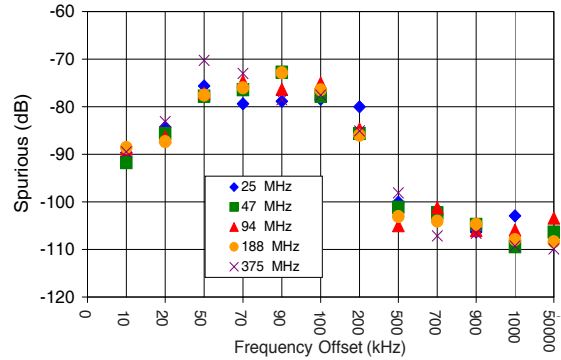
Typical Performance Curves* (continued)

*at +25°C unless mentioned otherwise

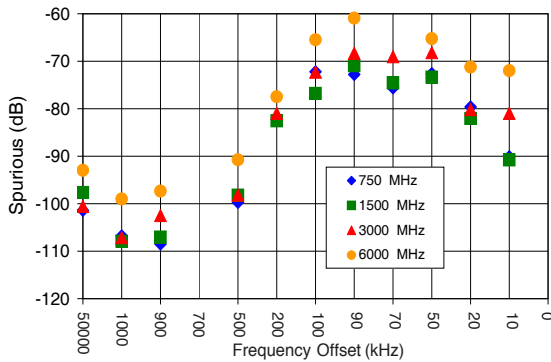
Spurious @Negative Offset & Low Freq Output
Vs Frequency Offset



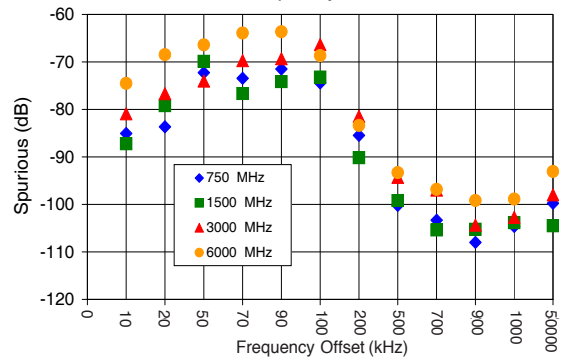
Spurious @Positive Offset & Low Freq Output
Vs Frequency Offset



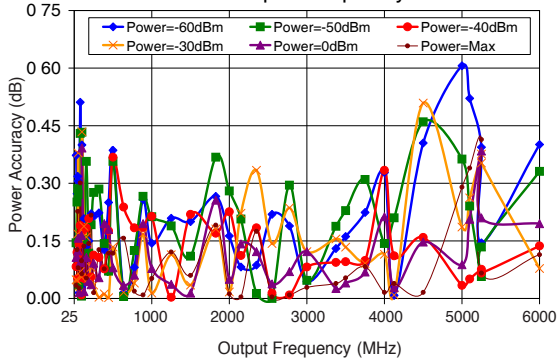
Spurious @Negative Offset & High Freq Output
Vs Frequency Offset



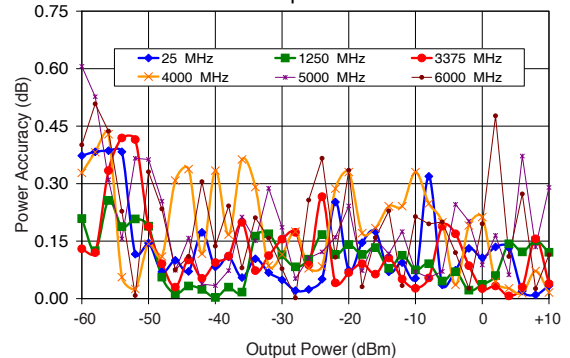
Spurious @Positive Offset & High Freq Output
Vs Frequency Offset



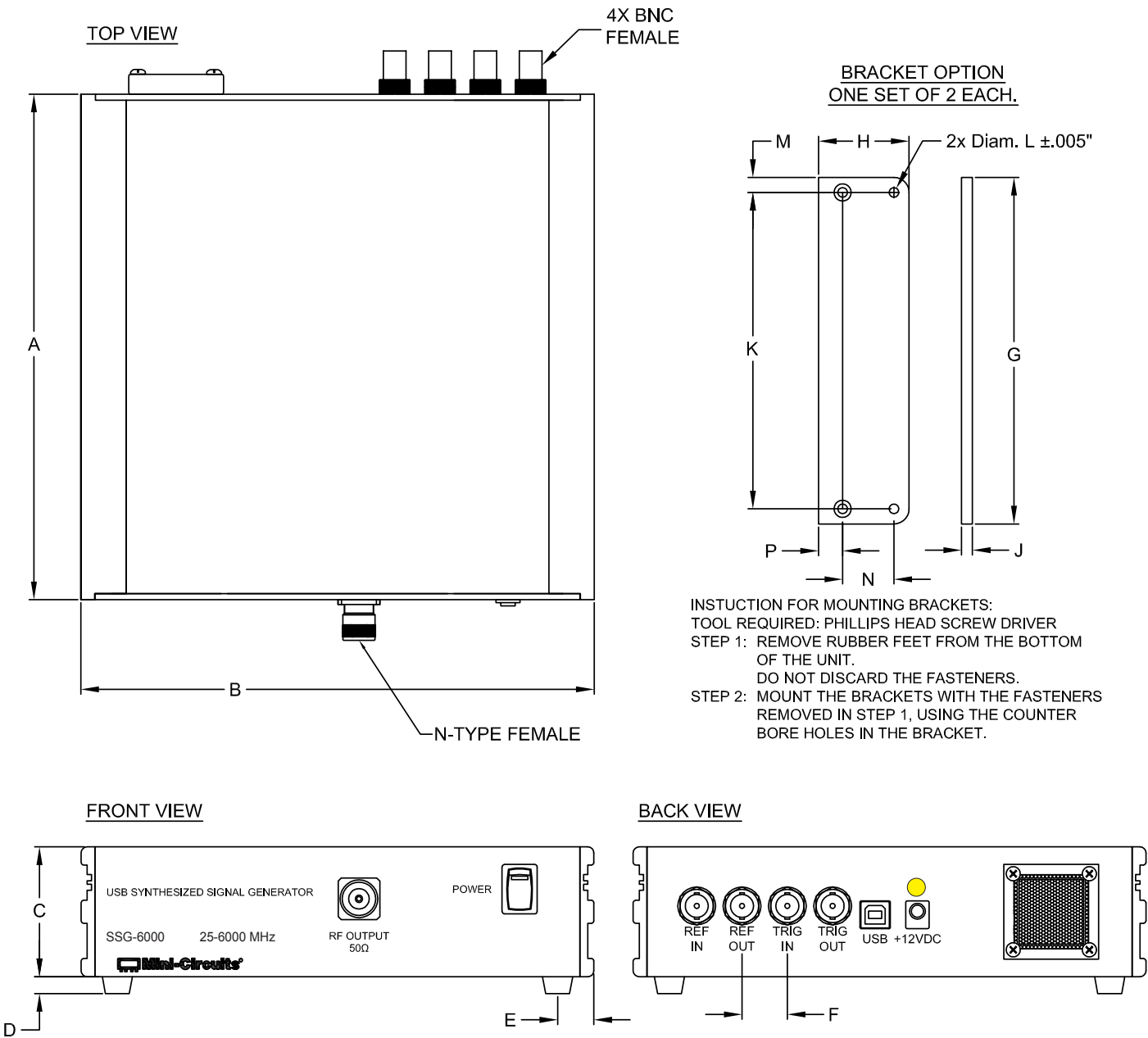
Power Accuracy
Vs. Output Frequency



Power Accuracy
Vs. Output Power



Outline Drawing LV1790



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-6000	USB Synthesized Signal Generator

Included Accessories	Part No.	Description
	AC/DC-12-3W1	AC/DC 12V _{DC} Grounded Power Adaptor. Operating temperature: 0°C to +40°C, I _{Max} =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 ¹¹	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

¹¹. 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-6000	Calibration Service

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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

