SSG6M80A Series Multi-channel Microwave Signal Generator

SIGLENT®

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Data Sheet

EN01A



SIGLENT TECHNOLOGIES CO., LTD.

SSG6283A / SSG6285A
SSG6483A / SSG6485A

Product Overview

THE SSG6283A/ SSG6285A/ SSG6483A/ SSG6485A are a series of phase-coherent, multi-channel and low phase noise microwave signal generator with frequency range from 9 kHz to 13.6 / 20GHz, supports FM and pulse modulation, pulse sequence generator, power meter control and other functions. They feature a wide adjustable power range, ultra - low phase noise, and independently configurable frequency, phase, amplitude and time delay per channel. Phase-coherent is supported both among channels of a single unit and across multiple devices.

With standard OCXO reference hardware module inside ensures high-precision and high stability signal output. It is designed for communication, aerospace and other fields. And it is suitable for various application scenarios such as R&D and production.

Features and Benefits

- Frequency up to 13.6 GHz/20 GHz
- 0.001 Hz frequency setting resolution
- Phase Noise: -135 dBc / Hz @ 1 GHz, 10 kHz offset (typ.)
- Level error≤ 0.7 dB (typ)
- Provides FM, PM analog modulation with internal, external or Int + Ext source
- Single pulse, double pulse and pulse train generator (option)
- The power meter control kit can easily use the power meter to measure power, control power output and correct line loss
- Independently adjustable frequency, amplitude and phase per-channel
- Enables intra-device channel-to-channel phase coherence and inter - device cross - channel phase coherence.
- Phase - coherent mode: 10 GHz carrier, ±2 °C temp change, 5-h observation, phase fluctuation <1.5°
- Features phase-memory capability
- Standard interface includes USB Host, USB Device (USB TMC), LAN (VXI-11, Socket, Telnet). Optional interface: GPIB



Models and Main index

Model	SSG6283A	SSG6285A	SSG6483A	SSG6485A
Frequency Range	CW MODE 9 kHz-13.6 GHz	CW MODE 9 kHz-20 GHz	CW MODE 9 kHz-13.6 GHz	CW MODE 9 kHz-20 GHz
Frequency Resolution	0.001 Hz			
Amplitude Resolution	0.01 dB			
Level error	≤ 0.7 dB(typ.)			
Phase noise	-135 dBc/Hz @1 GHz, offset 10 kHz (typ.)			
Phase resolution	0.1°			
Display	5-inch capacitance touch screen, RGB (800*480)			

Specifications

Specifications are valid under the following conditions: The instrument is within the calibration period, has been stored at room temperature (approximately 25℃) at least 2 hours prior to use, and has been powered on and warmed up for at least 40 minutes. The specifications include the measurement uncertainty, unless otherwise noted.

Specifications: All products are guaranteed to meet published specifications when operating at room temperature (approximately 25℃), unless otherwise noted.

Typical (typ.): Performance deemed typical implies that 80 percent of the measurement results will meet the typical published performance with a 95th percentile confidence level at room temperature (approximately 25 ℃). Typical performance is not warranted and does not include measurement uncertainty.

Nominal (nom.): This value indicates the expected mean or average performance, or an attribute whose performance is by design, such as the 50 Ohm connector.

Frequency characteristics		
Frequency		
Frequency range	SSG6283A / SSG6483A	CW MODE 9 kHz-13.6 GHz
	SSG6285A/ SSG6485A	CW MODE 9 kHz-20 GHz
Frequency resolution	0.001 Hz	
Setting time	＜10 ms （typ） ALC ON ＜20 ms （typ） ALC OFF （S&H）	
Phase resolution	0.1°	
Frequency band [1]		
Band	Frequency range	N
1	9 kHz ≤f≤250 MHz	1/8
2	250 MHz＜f≤ 500 MHz	1/32
3	500 MHz＜f≤ 1000 MHz	1/16
4	1000 MHz＜f＜1500 MHz	1/8
5	1500 MHz ≤f＜3000 MHz	1/4
6	3000 MHz ≤f≤ 6000 MHz	1/2
7	6000 MHz＜f≤ 12000 MHz	1
8	12000 MHz <f≤ 20000 MHz	2
[1] Frequency modulation related parameter factor.		
Frequency Reference		
	Standard	
Reference frequency	10.000000 MHz	
Initial calibration accuracy	±100 ppb	
Temperature stability	±1 ppb, 0℃~50℃	
Frequency aging rate	50 ppb/ year	
Frequency sweep		
Sweep type	Frequency step (linear or logarithmic step) arbitrary list	

Sweep range	Full frequency range	
Sweep shape	Triangle, saw-tooth	
Sweep mode	Single, continuous	
Step spacing	Linear, logarithmic	
Number of points	Step sweep	2-65535
	List sweep	1-500
Dwell time range	10 ms-100 s	
Dwell time setting resolution	0.1 ms	
Trigger source	Auto, keyboard, external connector, bus (GPIB, USB, LAN)	
Trigger slope	Positive, negative (when trigger source is external)	
Phase specifications		
Phase Adjustment Range	0~360° or -180° ~ 180°	
Relative Phase Stability Between Channels,5-h observation, ±2 °C temp change	9 kHz-5 GHz <1° 5GHz-10GHz<1.5° 10G-20GHz < 2.5°	

Level Characteristics

ALC modes

The SSG6M80A series offer three ALC modes:

ALC STATE AUTO: The best suited ALC mode is set automatically.

ALC STATE ON: The level control loop is closed. This mode is suitable for CW, FM and PM.

ALC STATE OFF (S&H): At every frequency and level change, the level control loop is closed and the level control voltage is sampled. Then the level control voltage is the clamped. This mode is used internally while in ALC state AUTO for pulse modulation.

Level characteristics		
Level setting range		
	9 kHz ≤f < 1 MHz	-110 dBm~15 dBm
	1MHz ≤f < 6 GHz	-110 dBm~25 dBm
	6 GHz ≤f < 15 GHz	-100 dBm~+25 dBm
	15 GHz ≤f≤ 20 GHz	-100 dBm~+20 dBm
Power Resolution	0.01 dB	
Maximum output power(Specified)		
9 kHz ≤f < 1 MHz	+15 dBm	
1 MHz ≤f < 250 MHz	+23 dBm	
250 MHz ≤f < 4 GHz	+24 dBm	
4 GHz ≤f < 6 GHz	+23 dBm	
6 GHz ≤f < 14 GHz	+22 dBm	
14 GHz ≤f < 18 GHz	+18 dBm	

18 GHz ≤f≤ 20 GHz	+15 dBm			
Level error (ALC on, temperature is 20 ℃ ~ 30 ℃)				
	Max power to 10 dBm	10 dBm to -20 dBm	-20 dBm to -90 dBm	-90 dBm to -100 dBm
9 kHz ≤f < 100 kHz			≤0.7 dB	≤1.1 dB (nom)
100 kHz ≤f < 1 MHz	≤1 dB	≤0.7 dB	≤0.7 dB	≤1.1 dB
1 MHz ≤f ≤6GHz	≤1 dB	≤0.7 dB	≤1 dB	≤1.3 dB
6 GHz < f≤20 GHz	≤1 dB	≤0.7 dB	≤1 dB	
Additional level error	ALC State Off(S&H)	< 0.5 dB		
VSWR				
level ≤0 dBm, ALC State ON				
VSWR	1 MHz≤f≤6 GHz		≤1.6 (nom)	
	6 GHz<f≤20 GHz		≤1.8 (nom)	
Level setting				
Level setting time	ALC ON, fixed frequency, 20 ℃-30 ℃ temperature range		< 10 ms	
	ALC OFF(S&H) fixed frequency, 20 ℃-30 ℃ temperature range		< 20 ms	
Reverse power				
Maximum permissible DC voltage	50 V			
Maximum reverse input power	1 MHz≤f≤6 GHz		30 dBm	
	6 GHz≤f≤20 GHz		25 dBm	
Level step sweep				
Sweep type	Amplitude step (linear step), arbitrary list			
Sweep shape	Triangle, saw-tooth			
Sweep range	The device output range			
Trigger mode	Free run, single			
Step spacing	Linear			
Sweep points	Step sweep		2-65535	
	List sweep		1-500	
Dwell time range	10 ms-100 S, Alc on			
Dwell time setting resolution	0.1 ms			
Trigger source	Auto, keyboard, external connector, bus (GPIB, USB, LAN)			
Trigger Slope	Positive, negative (when trigger source is external)			

Spectral purity		
Harmonic	CW MODE，1 MHz < f≤2 GHz，output level ＜10 dBm	< -30 dBc
	CW MODE，2 GHz < f≤6 GHz，output level ＜10 dBm	< -64 dBc
	CW MODE，6 GHz < f≤11 GHz，output level ＜5 dBm	< -68 dBc
	CW MODE，11 GHz < f≤14 GHz，output level ＜5 dBm	< -52 dBc (typ.)
Sub harmonics	CW MODE，1 MHz < f≤6 GHz，output level ＜10 dBm	< -80 dBc
	CW MODE，6 GHz < f≤12 GHz，output level ＜5 dBm	< -80 dBc
	CW MODE，12 GHz < f≤20 GHz，output level ＜0 dBm	< -70 dBc
Non-harmonics	CW MODE，offset > 10 kHz ,6 GHz < f≤12 GHz	< -60 dBc
	CW MODE，offset > 10 kHz , 1MHz≤f≤6GHz or 12GHz≤f≤20GHz	< -60 dBc
SSB Phase Noise	CW MODE，offset=10 kHz ， 1 Hz bandwidth	
	f=100 MHz	< -133 dBc/Hz (nom.)
	f=1 GHz	< -136 dBc/Hz (nom.)
	f=2 GHz	< -128 dBc/Hz (nom.)
	f=4 GHz	< -123 dBc/Hz (nom.)
	f=6 GHz	< -119 dBc/Hz (nom.)
	f=10 GHz	< -115 dBc/Hz (typ.)
	f=20 GHz	< -109 dBc/Hz (typ.)

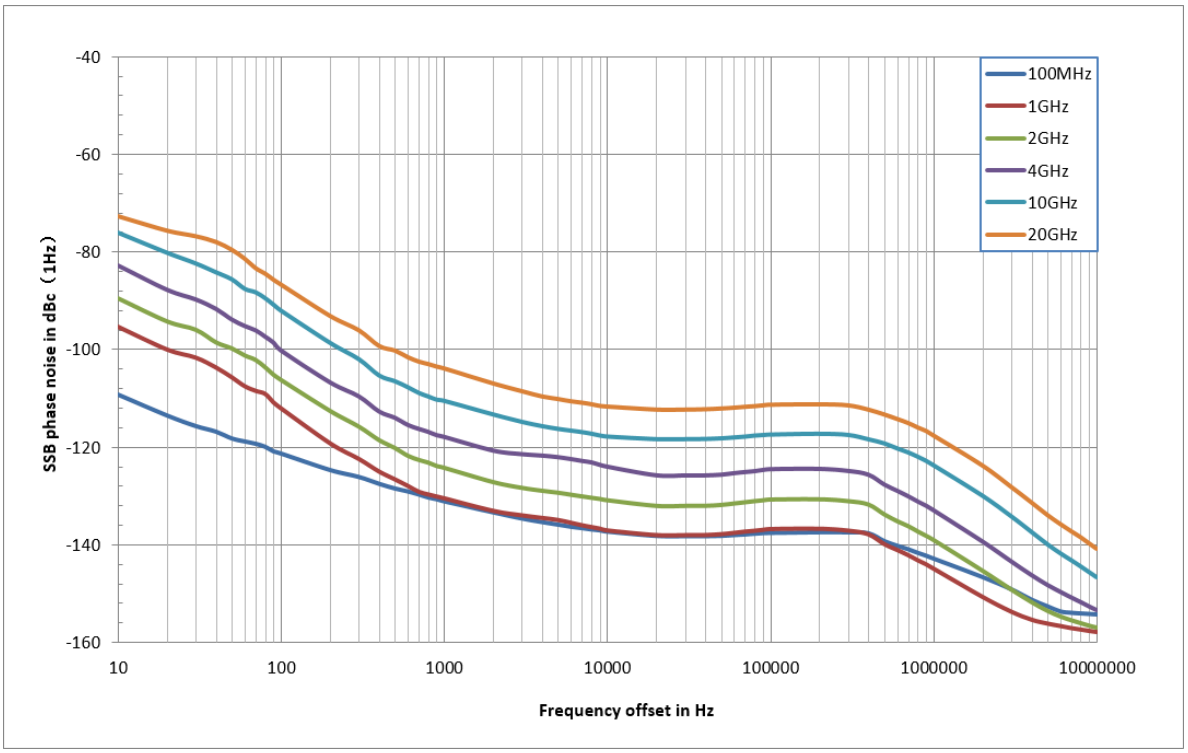

Figure 1 SSB Phase noise

Analog modulation

Simultaneous modulation			
	Frequency modulation	Phase modulation	Pulse modulation
Frequency modulation		×	●
Phase modulation	×		●
Pulse modulation	●	●	
●=compatible；×=incompatible；(●) =compatible limitations			
Frequency modulation			
Modulation source	Internal, external, internal+external		
Maximum deviation	N*1 MHz		
Resolution	0.1% of set deviation or 1Hz,whichever is larger		
FM deviation error	Fmod=1 kHz, internal	< (2% of setting +20 Hz) (nom)	
FM distortion	Fmod=1 kHz, deviation=N*1 MHz	< 0.	
Modulation frequency response	10Hz-100 kHz	< 3 dB (nom.)	
Phase modulation			
Modulation source	Internal, external, internal + external		
Maximum deviation	N*5 rad		
Resolution	0.1% of set deviation or 0.01 rad ,whichever is larger		
ØM deviation error	Fmod =1 kHz, internal, Deviation≤N*5 rad	<(2% of setting + 0.05 rad)	
ØM distortion	Fmod =1 kHz, deviation, deviation≤N*5 rad	<0.5 % (nom.)	
Modulation frequency response	10Hz-100 kHz	<3 dB (nom.)	
Pulse modulation（SSG6X85A-PU)			
Modulation source	Internal, external		
On/off ration	1 MHz < f≤6 GHz	> 60 dBc	
	6 GHz < f≤13.6 GHz	> 80 dBc	
	13.6 GHz < f≤18 GHz	> 75 dBc	
	18 GHz < f≤20 GHz	> 70 dBc	
Rise/fall time (10% / 90%)	< 15 ns (typ.)		
Pulse repetition time	40 ns - 300 s		
Pulse generator			
Pulse source	Internal, external		
Pulse polarity	Normal, inverse		
Pulse period	Setting range	40 ns - 300 s	
	Resolution of setting	10 ns	
Pulse width	Setting range	20 ns - 300 s	
	Resolution of setting	10 ns	

Double pulse Delay	Setting range	20 ns – 300 s
	Resolution of setting	10 ns
#2 Width	Setting range	20 ns – 300 s
	Resolution of setting	10 ns
Trigger modes	Auto, keyboard, external trigger, external gate trigger, bus	
Trig polarity	Normal, inverse (used in external gate trigger mode)	
Trigger Slope	Positive, negative (used in external trigger mode)	
External trigger delay	140 ns – 300 s	External trigger delay
External trigger delay		External trigger delay
Pulse train generator（SSG6X8XA-PT）		
Pulse train generator	Number of pulses	1-2047
	Pulse on time and off time setting range	20 ns-300 s
	Number of repetitions per pulse	1-65535

Intra-device multi-channel phase coherence:

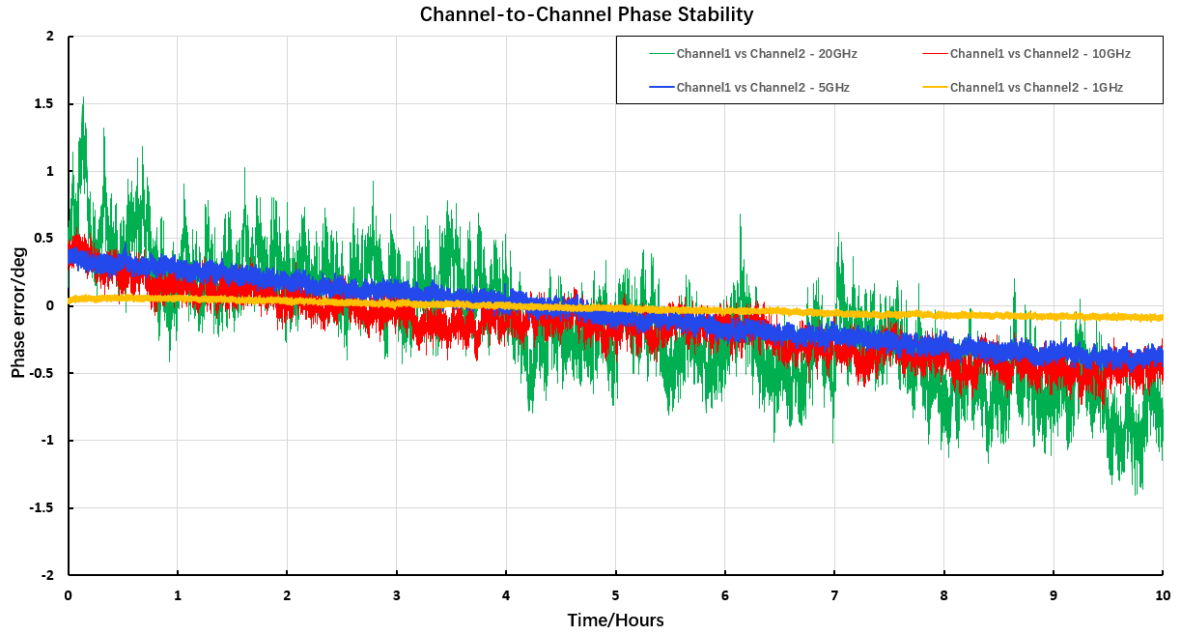

Figure 2 Phase drift over a 10-hour period at 1 GHz, 5 GHz, 10 GHz and 20 GHz, temperature: 25 ℃ ±2 ℃

Connectors

Front panel connectors		
RF OUTPUT 1	Impedance	50 Ω
	Connector	2.92mm male
RF OUTPUT 2	Impedance	50 Ω
	Connector	2.92mm male
RF OUTPUT 3（option）	Impedance	50 Ω
	Connector	2.92mm male
RF OUTPUT 4 (option)	Impedance	50 Ω
	Connector	2.92mm male
USB-DEVICE1	USB-B 2.0	
USB-DEVICE2	USB-B 2.0	
Rear panel Connectors		
Pulse in/out 1	Impedance	Input: High impedance Output: 50 Ω
	Connector	SMA-female
	output level	CMOS 3.3 V
Pulse in/out 2	Impedance	Input: High impedance Output: 50 Ω
	Connector	SMA-female
	output level	CMOS 3.3 V
Pulse in/out 3	Impedance	Input: High impedance Output: 50 Ω
	Connector	SMA-female
	output level	CMOS 3.3 V
Pulse in/out 4	Impedance	Input: High impedance Output: 50 Ω
	Connector	SMA-female
	output level	CMOS 3.3 V
Trig in/out	Impedance	Output: 50 Ω
	Connector	SMA-female
	output level	5V TTL
SYNC in	Impedance	50 Ω
	Connector	SMA-FEMALE
	output level	5 VTTL
SYNC out	Impedance	50 Ω
	Connector	SMA-FEMALE
	output level	5 VTTL
Ext ref in	Impedance	50 Ω

	Connector	SMA-FEMALE
	Input level	-5 dBm~10 dBm
10 MHz ref out	Impedance	50 Ω
	Connector	SMA-FEMALE
	output level	>0 dBm
1GHz INPUT	Impedance	50 Ω
	Connector	SMA-FEMALE
1GHz OUTPUT	Impedance	50 Ω
	Connector	SMA-FEMALE
EXT mod in/put	Impedance	High impedance
	Connector	SMA-FEMALE
USB-HOST		
USB-DEVICE		
LAN		

General Specification

Power source		
AC input voltage range	100 V-240 V(±10 %),50/60 Hz	
Power consumption	2-channel model	128 W
	4-channel model	196 W
Display		
Type	TFT LCD, RGB (800*480), 5-inch capacitive touch screen	
Form factor		
Dimensions	W×H×D=338×113×369 mm	
Weight without package	2-channel model 10.67kg 4-channel model 12.97kg	
Storage		
Storage	Internal (Flash)	64G Bytes
Operating environment		
Humidity	0 ℃ to 30 ℃, ≤ 95 % relative humidity; 30 ℃ to 50 ℃, ≤ 75 % relative humidity	
Temperature	Working temperature 0 ℃ to 50 ℃, Storage temperature - 20 ℃ to 70 ℃	
Electromagnetic Compatibility and Safety		
EN IEC 61326-1: 2021 / EN IEC 61000-3-2: 2019A1:2021	Class A	
EN 61000-3-3: 2013+A2: 2021	Plt : 0.65 Pst : 1.00 ; dmax : 4.00 % dc : 3.00 % ; dtLim : 3.30 % dt > Lim: 500 ms	
IEC 61000-4-2: 2008	AD ±8.0 kV，CD ±4.0 kV	
IEC 61000-4-3: 2020	80 MHz to 1000 MHz: 10 V/m； 1.4 GHz to 2.0 GHz: 3 V/m ; 2.0 GHz to 2.7 GHz: 1 V/m	
IEC 61000-4-4: 2012+A1: 2010	AC Line： +/- 1.00 kV	
IEC 61000-4-5: 2014+A1: 2017	Line to Line: 1.0 kV， Line to Earth: 2.0 kV	
IEC 61000-4-6: 2008	0.15 - 80 MHz: 3V 1 kHz 80 % AM	
IEC 61000-4-8: 2009	30 A/m， 50/60 Hz	
IEC 61000-4-11: 2004	Voltage Dips : 0%/0.5P； 40%/10P； 70%/25P ; Short Interruptions Test Level%UT:0%/250P	
Safety		
UL 61010-1:2012/R: 2018-11; CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11. UL 61010-2-030:2018; CAN/CSA-C22.2 No. 61010-2-030:2018.		
ROHS		
2011/65/EU		

Ordering Information

Product Description	SSG6M80A Signal Generator	Order Number
Product code	SSG6283A 9 kHz-13.6 GHz 2channels	SSG6283A
	SSG6285A 9 kHz-20 GHz 2channels	SSG6285A
	SSG6483A 9 kHz-13.6 GHz 4channels	SSG6483A
	SSG6485A 9 kHz-20 GHz 4channels	SSG6485A
Standard configurations	Quick start, an USB cable, calibration certificate, power cord, 2.92mm female to female adapter	
	Pulse modulation	SSG6M80A-PU
	Pulse train generator	SSG6M80A-PT
	Rack mount kit	SSG6000A-RMK
	USB-GPIB adapter	USB-GPIB
	Upgrade 13.6 GHz to 20 GHz,2 channels	SSG6283A-F85
	Upgrade 13.6 GHz to 20 GHz,4 channels	SSG6483A-F85

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, spectrum analyzers, function/arbitrary waveform generators, RF/MW signal generators, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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