

RF Signal Generator SG6000 Series



Features

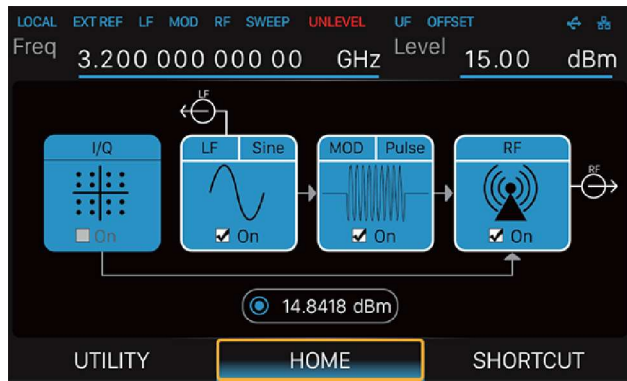
- Frequency up to 2.1 GHz / 3.2 GHz
- 0.01Hz frequency setting resolution
- Level output from -110 dBm to +13 dBm
- Maximum level up to +20 dBm (typ.)
- Phase Noise: -110 dBc / Hz @ 1 GHz, 20 kHz offset (typ.)
- Level accuracy ≤ 0.7 dB (typ.)
- Provides AM, FM & PM analog modulation with internal, external or Int + Ext source
- Pulse modulation, on/off ratio ≥ 70 dBc
- Pulse train generator (option)
- External IQ modulation with SMG4000 as the baseband IQ signal
- USB-power meter measurement
- 5 inch TFT touch screen, mouse and keyboard supported
- Web browser remote control on PC and mobile terminals
- Standard interface USB Host, USB Device (USB TMC)
- LAN (VXI-11, Socket, Telnet). Optional interface: GPIB

Technical Specifications

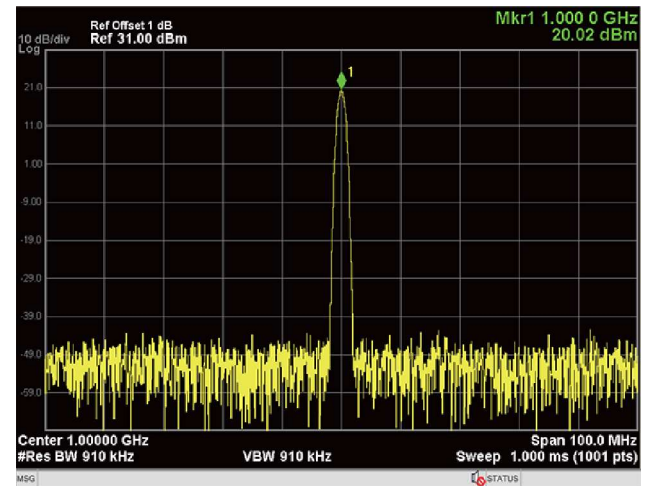
Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
Frequency Characteristics				
CW Mode	9 kHz to 2.1 GHz	9 kHz to 3.2 GHz	9 kHz to 2.1 GHz	9 kHz to 3.2 GHz
IQ Mode	-	-	10 MHz to 2.1 GHz	10 MHz to 3.2 GHz
Frequency Resolution	0.01 Hz			
Setting time	< 5 ms (typ.) ALC ON			
	< 10 ms (typ.) ALC OFF (S&H)			
Resolution of phase offset setting	0.1°			
Frequency Band	Frequency Range		N	
1	9 kHz $\leq f \leq$ 1 MHz		0.25	
2	1 MHz $< f \leq$ 250 MHz		0.5	
3	250 MHz $< f \leq$ 500 MHz		0.125	
4	500 MHz $< f <$ 1000 MHz		0.25	
5	1000 MHz $\geq f <$ 2000 MHz		0.5	
6	2000 MHz $\geq f \leq$ 3200 MHz		1	
N is a factor used to define certain specifications in this document				

Design Features

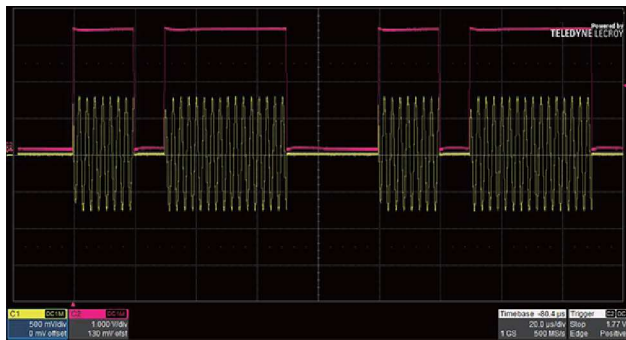
5 inch touch screen, keyboard and mouse support



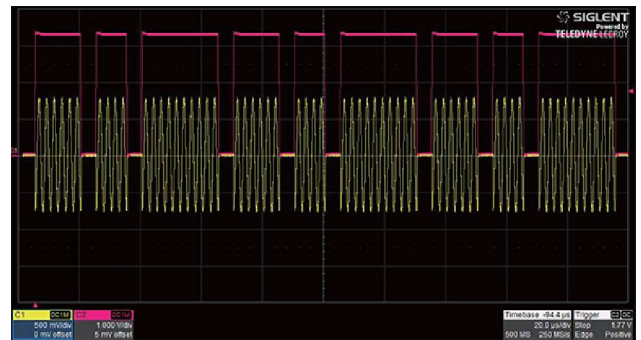
Maximum output level up to + 20 dBm



Double pulse modulation



Pulse train generator

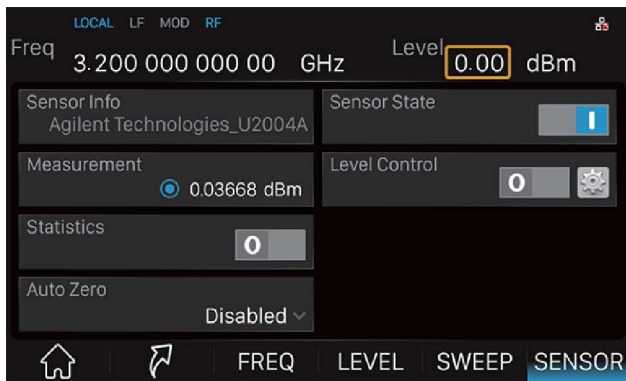


Example for auto level control

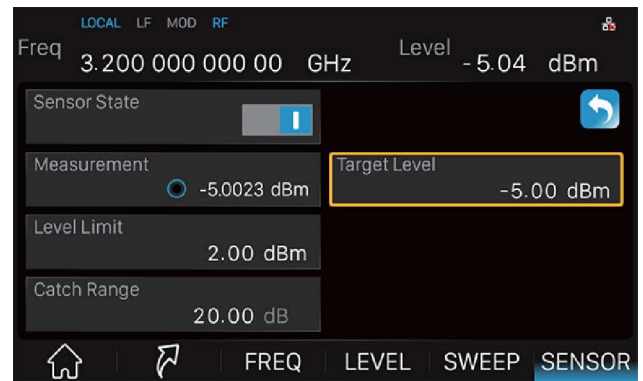


Design Features

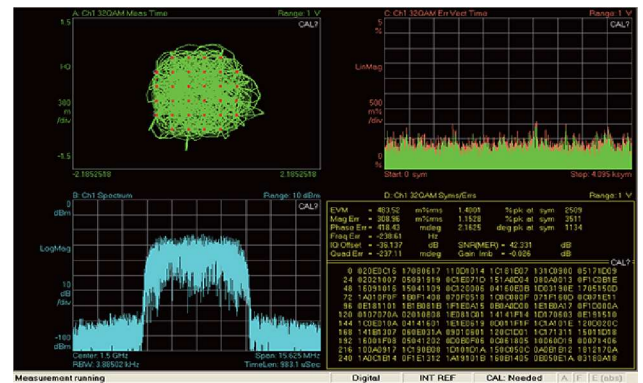
Power output display using USB power



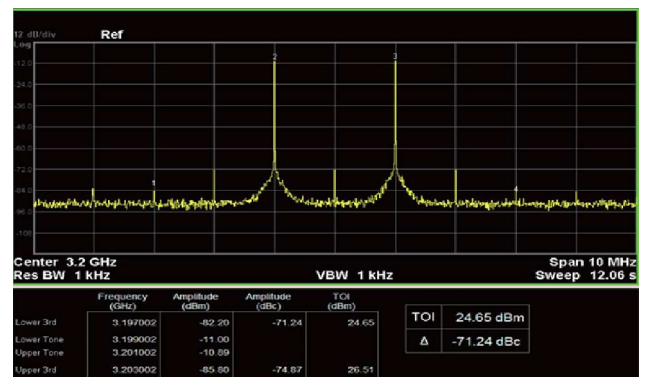
Power output display using USB power sensor



External IQ modulation using theas the baseband source

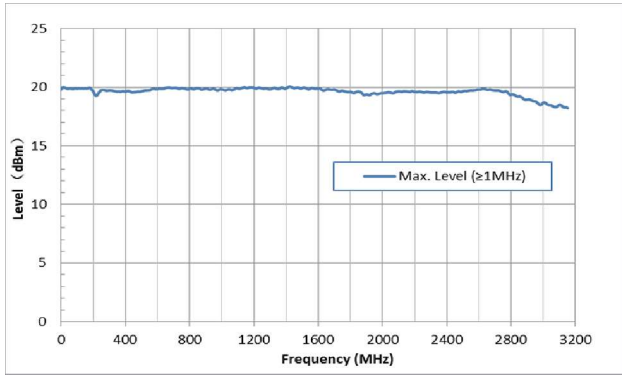


Provides double -tone signal with IQ modulation, easily do TOI testing

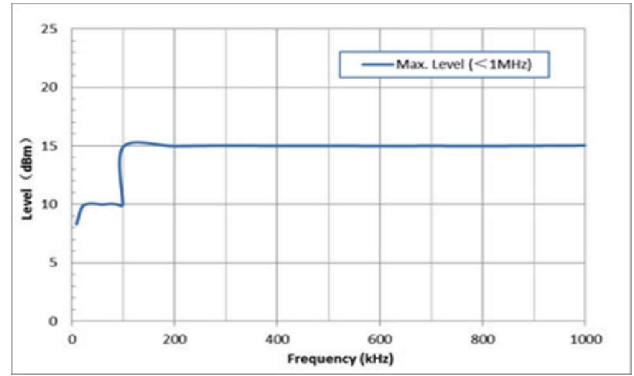


Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
Frequency Reference				
Reference frequency	10.000000 MHz			
Basic Accuracy	< 0.2 ppm			
Temperature Stability	< 1 ppm / year, 0°C to 50°C			
Frequency aging rate	< 0.5 ppm / first year, 3.0 ppm / 20 years			
Frequency Sweep				
Sweep Type	Linear or logarithmic Frequency step			
Sweep Range	Full frequency range			
Sweep Shape	Triangle, Saw-tooth			
Sweep Mode	Single, Continuous			
Number of points	Step sweep : 2 to 65535			
	List Sweep : 2 to 500			
Dwell Time Range	10 ms to 100 s			
Dwell time setting resolution	0.1 ms			
Trigger Source	Auto, Keyboard, External connector, Bus			
Trig slope	Positive, Negative when Trigger source is external			
Level Characteristics				
Level Setting				
Level Setting Range	9 kHz ≤ f < 100 kHz	-110 dBm to + 9 dBm		
	100 kHz ≤ f < 1 MHz	-110 dBm to +15 dBm		
	1 MHz ≤ f < 3.2 GHz	-110 dBm to +20 dBm		
Resolution of setting	0.01 dB			
Level of Performance Range	9 kHz ≤ f < 100 kHz	-110 dBm to +7 dBm		
	100 kHz ≤ f < 1 MHz	-110 dBm to +10 dBm		
	1 MHz ≤ f < 3.2 GHz	-110 dBm to +13 dBm		
Level error (ALC on, temperature is 20°C to 30°C)	+13 dBm to - 50 dBm	- 50 dBm to - 90 dBm	- 90 dBm to -110 dBm	
9 kHz ≤ f < 100 kHz	≤ 0.9 dB	≤ 1.1 dB	≤ 1.1 dB	
	≤ 0.7 dB(typ.)	≤ 0.7dB (typ.)	≤ 0.7 dB (typ.)	
100 kHz ≤ f ≤ 3.2 kHz	≤ 0.7 dB	≤ 0.7dB	≤ 1.1 dB	
	≤ 0.5 dB (typ.)	≤ 0.5 dB (typ.)	≤ 0.7 dB (typ.)	
Additional level error	ALC State off (S&H)	< 0.2 dB		
VSWR				
(Level ≤ 0 dBm, ALC State ON)	1 MHz ≤ f < 3.2 GHz	≤ 1.8 (nom.)		
Level Setting				
Level Setting Time	Level deviation < 0.1 dB from final value, with GUI update stopped, temperature range from 20°C to 30°C			
	ALC State On	< 5 ms		
	ALC State S & H	< 10 ms		
Reverse Power				
Maximum permissible DC Voltage	50 V			
Maximum reverse input power	1 MHz ≤ f ≤ 3.2 GHz :	+ 30 dBm		
Level Step Sweep				
Sweep Type	Amplitude step (linear or logarithmic step), Arbitrary list full specified level range			
Sweep Shape	Triangle, Sawtooth			
Sweep Range	The device output range			
Trigger Mode	Free run, Single			
Step spacing	Linear			
Sweep points	Step sweep : 2 to 65535			
	List Sweep : 1 to 500			
Dwell time setting range	10 ms to 100 s			
Dwell time setting resolution	0.1 ms			
Trigger Source	Auto, Keyboard, External connector, Bus			
Trigger slope	Positive, Negative			

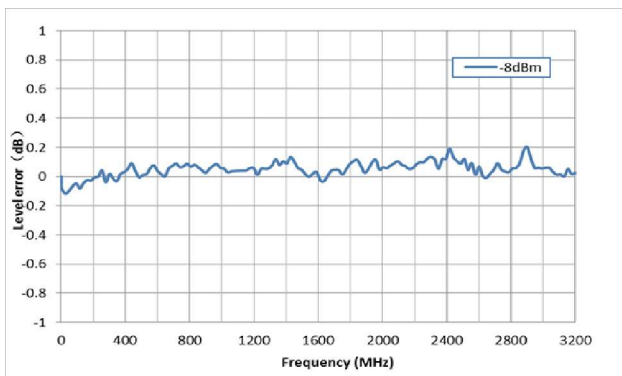
Maximum output power versus frequency, $f \geq 1$ MHz



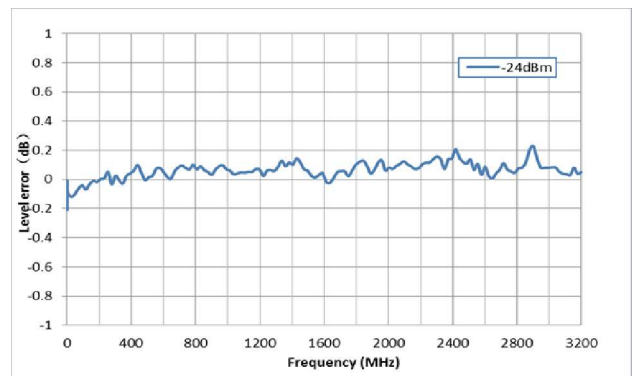
Maximum output power versus frequency, $f < 1$ MHz



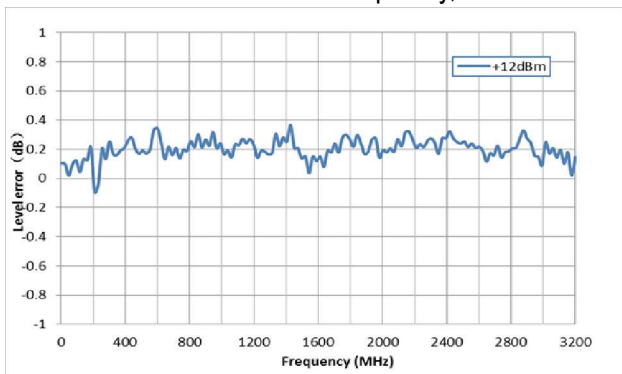
Measured level error versus frequency, Level = + 12 dBm



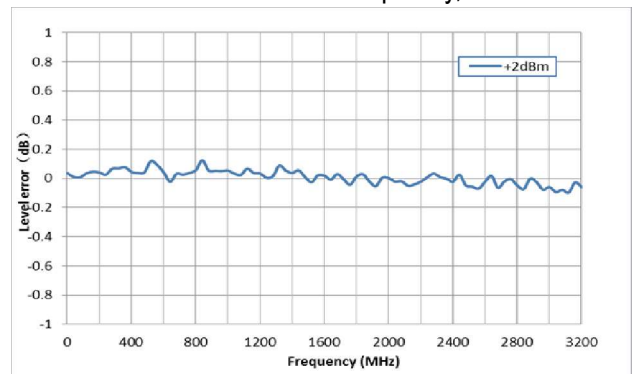
Measured level error versus frequency, Level = + 2 dBm



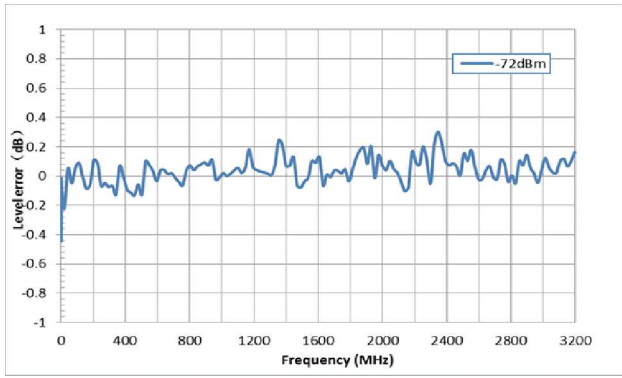
Measured level error versus frequency, Level = - 8 dBm



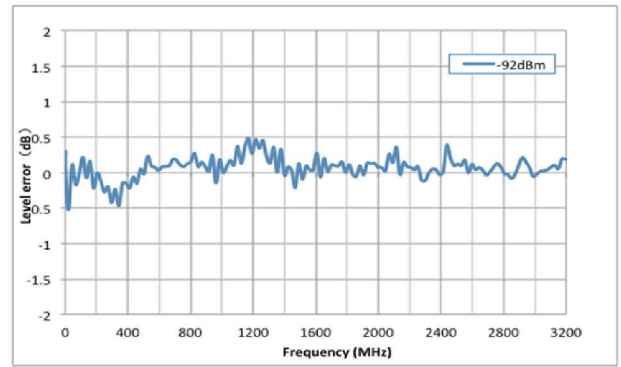
Measured level error versus frequency, Level = - 24 dBm



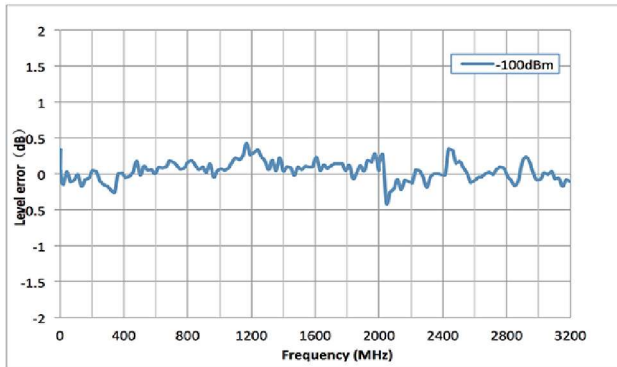
Measured level error versus frequency, Level = -72 dBm



Measured level error versus frequency, Level = -92 dBm

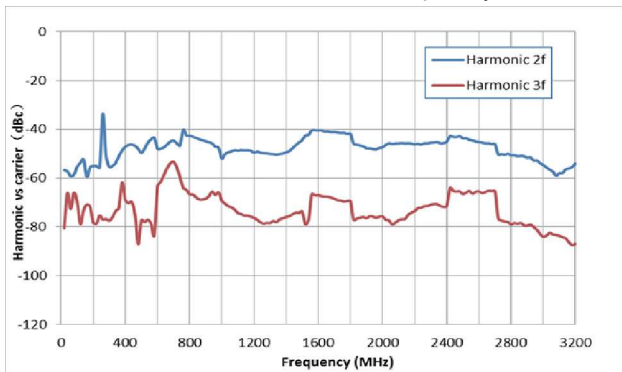


Measured level error versus frequency, Level = -100 dBm

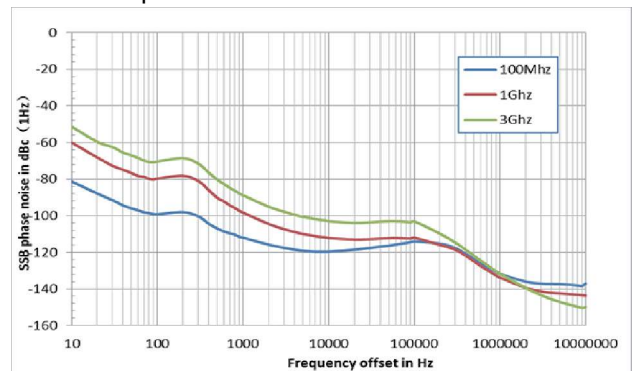


Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
Spectral Purity				
Harmonic	CW mode, 1 MHz < f ≤ 3.2 GHz, Level ≤ +13 dBm < -30 dBc			
Sub Harmonic	CW mode, 1 MHz < f ≤ 3.2 GHz, offset > 10 kHz < -45 dBc Level ≤ +13 dBm			
Non-Harmonic	CW mode, offset > 10 kHz, Level ≤ +13 dBm < -65 dBc 1 MHz < f ≤ 1.5 GHz			
	CW mode, offset > 10 kHz, Level ≤ +13 dBm < -75 dBc 1.5 GHz ≥ f ≤ 3.2 GHz			
SSB Phase noise	CW mode, offset = 20 kHz, 1Hz measure bandwidth			
	F = 100 MHz	< -118 dBc / Hz (typ.)		
	F = 1 GHz	< -110 dBc / Hz (typ.)		
	F = 3 GHz	< -105 dBc / Hz (typ.)		

Measured harmonic versus carrier frequency at level ≤ +13 dBm



Measured phase noise



Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
Internal Modulation Generator (LF)				
Waveforms	Sine, Square, Saw tooth, Triangle, DC			
Frequency Range	Sine	0.1 Hz to 1 MHz		
	Square, Triangle, Saw Tooth	0.1 Hz to 20 kHz		
Resolution of Frequency Setting	0.01 Hz			
Frequency Error	Similar with RF Source			
Frequency Response	Sine wave < 0.3 dB			
Level Offset	Setting range	min (2.5 V ^{-1/2} Level, 2 V)		
	Offset resolution	0.01 V		
Output Voltage Range	V _p at connector	1 mV _{pp} to 3 V _{pp}		
	Resolution of amplitude setting	1 mV		
Output Impedance	50 Ω (nom.)			
LF Frequency Sweep				
Operating Mode	Digital sweep in discrete steps			
Sweep Type	Linear, Logarithmic			
Sweep Shape	Saw-tooth, Triangle			
Sweep Direction	Up, Down			
Sweep Range	0.01 Hz to 1 MHz			
Trigger Mode	Auto, Keyboard, External connector, Bus			
Trigger slope	Positive, Negative			
Dwell time setting range	1 ms to 500 s			
Dwell time setting resolution	0.1 ms			
Analog Modulation				
Simultaneous Modulation	Amplitude Modulation	Frequency Modulation	Phase Modulation	Pulse Modulation
Amplitude Modulation		●	●	(●)
Frequency Modulation	●		×	●
Phase Modulation	●	×		●
Pulse Modulation	(●)	●	●	
● = Compatible, × = incompatible, (●) = compatible limitations, No specification Applies to AM distortion				
Amplitude Modulation				
Modulation Source	Internal, External, Internal + External			
AM Depth Setting Range	0 % to 100 %			
Resolution of Setting	0.1 %			
AM Depth Error	F-mod = 1 kHz, m < 80 %, Level < =13 dBm		< 4 % of setting +1 %	
AM Distortion	F-mod = 1 kHz, m < 30 % Level < 0 dBm		< 3 % (typ.)	
Modulation Frequency Response	m < 80 %, 10Hz to 100 kHz		< 3dB (nom.)	
Frequency Modulation				
Modulation Source	Internal, External, Internal + External			
Maximum Deviation	N*1 MHz (typ.)			
Resolution	0.1% of set deviation or 1Hz, whichever is larger			
FM deviation error	Fmod = 1 kHz, Internal		< (2 % of setting + 20 Hz)	
FM distortion	Fmod = 1 kHz, Deviation = N*1 MHz		< 0.5 % (nom.)	
Modulation Frequency response	10Hz to 100 kHz		< 3dB (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			
φM deviation error	Fmod = 1 kHz, Internal Deviation ≤ N*5 rad		< (2 % of setting + 0.05 rad)	
φM distortion	Fmod = 1 kHz, deviation ≤ N*5 rad		< 0.5 % (nom.)	
Modulation Frequency response	10 Hz to 100 kHz		< 3 dB (nom.)	
Pulse Modulation				
Modulation Source	Internal, External			
On/off ratio	1 MHz < f < 3.2 GHz		> 70 dBc	

Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
Rais/Fall time (10% / 90%)	10 % to 90 % of RF amplitude		> 50 ns	
Pulse repetition time	Setting Range		40 ns to 300 s	
Pulse Generator				
Pulse Modes	Single pulse, Double pulse			
Pulse Source	Internal, External			
Pulse Polarity	Normal, Inverse			
Pulse Period	Setting Range		40 ns to 300 s	
	Resolution of setting		10 ns	
Pulse Width	Setting Range		20 ns to 300 s	
	Resolution of setting		10 ns	
Double Pulse Delay	Setting Range		20 ns to 300 s	
	Resolution of setting		10 ns	
# 2 Width	Setting Range		20 ns to 300s	
	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 to 300 s			
External Trigger delay resolution of setting	10 ns			
Pulse Train Generator (Option)				
Number of pulses	1 to 2047			
Number of repetitions per pulse	1 to 65535			
Pulse on time and off time setting range	20 ns to 300 s			
Pulse on time and off time setting resolution	10 ns			
IQ modulation feature				
Modulation Source	-		External	
Bandwidth	-		Base Band I or Q < 100 MHz (typ.)	
	-		RF (I + Q) < 200 MHz (typ.)	
Full Scale Input	-		$\sqrt{I^2 + Q^2} = 0.5 V_{rms}$	
EVM	-		16 QAM (5), Root cosine filter (a = 0.22), 5 MSps, level ≤ 0 dBm 10 MHz < f ≤ 1.5 GHz, EVM ≤ 0.7 % (nom.) 1.5 GHz < f ≤ 3.2 GHz, EVM ≤ 1.2% (nom.) QPSK, root cosine filter (a = 0.22), 5 Msps, level ≤ 0 dBm 10 MHz < f ≤ 1.5 GHz, EVM ≤ 0.7 % (nom.) 1.5 GHz < f ≤ 3.2 GHz, EVM ≤ 1 % (nom.)	
Connectors				
Front Panel Connectors				
RF Output	Impedance	50 Ω		
	Connector	N female		
Modulation Generator output (LF)	Impedance	50 Ω		
	Connector	BNC female		
Rear Panel Connectors				
TRIG IN / OUT	Impedance	100 kΩ		
	Connector	BNC female		
	Active Trigger Voltage	5 V TTL		
EXT MOD INPUT	Impedance	50 Ω		
	Connector	BNC female		
PULSE IN / OUT	Impedance	100 kΩ		
	Connector	BNC		
	Input/Output Voltage	CMOS 3.3 V		

Model	SG6021	SG6032	SG6021-IQ	SG6032-IQ
10 MHz IN	Impedance	50 Ω		
	Connector	BNC female		
	Input Power Range	-5 dBm to + 10 dBm		
10 MHz OUT	Impedance	50 Ω		
	Connector	BNC female		
	Input Power Range	> 0 dBm		
Signal Valid	Impedance	50 Ω		
	Connector	BNC female		
	Output Voltage Range	CMOS 3.3 V		
I INPUT	Impedance	50 Ω		
	Connector	BNC female		
Q INPUT	Impedance	50 Ω		
	Connector	BNC female		
Communication Interface				
USB host	USB-A 2.0			
USB Device	USB-B 2.0			
LAN	LAN (VX111, 10/100 Base RJ-45)			
Electromagnetic Compatibility and Safety				
EMC	EN 61326-1:2013			
Electrical Safety	EN 61010-1:2010			
General Specification				
Display	TFT LCD, RGB (800 X 480), 5 inch capacitive touch screen			
Storage	Internal (Flash) 256 MB, External (USB Storage device),			
Source	Input voltage range (AC) 100V - 240V (\pm 10 %), AC frequency supply 100 V to 240 V, 50 / 60 Hz			
	Supply 100 V to 120 V, 400 Hz, Power consumption 35 W with all function working			
Temperature	Working temperature 0°C to 50°C, Storage temperature -20°C to 70°C			
Humidity	0°C to 30°C, \leq 95 % relative humidity;			
	30°C to 50°C, \leq 75 % relative humidity;			
Dimensions	W :338 x H :113 x D : 369 mm			
Weight	4.84 kg.			
Std. Accessories	Mains Cord, CD, USB Cable			

Subject to change

scientific

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