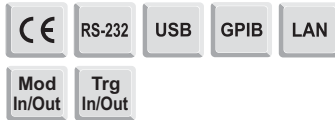


GSG-2000 Series

6GHz Vector Signal Generator 6GHz Signal Generator

GW INSTEK
Simply Reliable



FEATURES

- * Frequency Range : 9kHz ~ 6GHz
- * Frequency Resolution : 1mHz
- * Standard 10ppm Frequency Stability, 2ppm/year Aging Rate. (Optional: 10ppb Frequency Stability with 0.1ppm/Year Aging Rate)
- * Amplitude Range : -140dBm ~ +20dBm
- * 0.01dBm Amplitude Setting Resolution
- * Amplitude Support dBm, dBμV, Vrms Unit
- * Phase Noise : <-117dBc/Hz (Typical) @1GHz Output and 20kHz Offset
- * Frequency/Amplitude Switching Speed : <5ms
- * Built-in LF Output, Pulse Output
- * Built-in in AM, FM, PM Analog Modulation
- * Support IQ Modulation Output(Only for GSG-2160)
 - Maximum 60MHz Baseband I or Q Modulation Output
 - Maximum 120MHz RF I+Q Modulation Output
 - Built-in ASK,PSK,APSK,QAM,FSK,MSK,User-define IQ, User-define FSK Modulation Signal
- * Provide USB, LAN and GPIB (Opt.), Compatible SCPI Command Standard

APPLICATIONS

- * Educations
- * Automotive
- * Electronic Component
- * IoT

The GSG-2000 series is a basic RF vector signal/signal generator that covers a frequency range from 9kHz to 6GHz. It is suitable for applications in communications education, RF component testing (such as amplifiers, antennas, and filters), automotive electronic signal testing, and IoT applications. It meets the testing requirements of RF products during production and development stages. Compared to its main competitors, the GSG-2000 series offers superior specifications including a wide amplitude output range of +20dBm to -140dBm, lower phase noise of -117dBc/Hz, and high frequency accuracy with 10ppm frequency stability and 2ppm aging rate. Users have the option to enhance frequency stability and aging rate by selecting the OCXO (Oven Controlled Crystal Oscillator) option, which provides 10ppb stability and 0.1ppm aging rate.

For the signal modulation, the entire series has built-in AM, FM, and PM analog modulation, and GSG-2160 features a digital signal modulation function with a maximum bandwidth of 60MHz digital signal output, supporting ASK, PSK, APSK, QAM, FSK, MSK, User-defined IQ, User-defined FSK modulation signals.

Furthermore, the GSG-2000 series also provides LF signal and Pulse signal output. The LF signal allows users to output Sine, Square, Triangle/Ramp, Gaussian Noise signals, and the Pulse signal output can simulate pulse wave applications of various widths. In addition to the above signal outputs, GSG-2000 also provides AM/FM/digital IQ signal input, as well as independent output ports for digital I or Q signals.

GSG-2000 adopts a seven-inch TFT LCD display that can fully display the parameters and status set by the user, and the series also provides USB, LAN, GPIB (option) communications interfaces, and provides standard SCPI-compatible commands to support remote control. GSG-2000 is designed for 3U high standard rack size.

Model	GSG-2160	GSG-2060
Frequency Range	9kHz~6GHz	9kHz~6GHz
Analog Modulation	AM, FM, PM	AM, FM, PM
Digital Modulation	ASK, PSK, APSK, QAM, FSK, MSK, user define IQ, user define FSK	—
LF Output	√	√
Pulse Output	√	√

SPECIFICATIONS			
FREQUENCY RANGE			
Frequency Range	9kHz ~ 6GHz	GSG-2160, GSG-2060	
Frequency Resolution	1mHz		
Frequency Bands	Band	Frequency Range	N
	1	9kHz to 5MHz	digital synthesis
	1	<5MHz to 187.5MHz	1
	2	<187.5MHz to 375MHz	0.25
	3	<375MHz to 750MHz	0.5
	4	<750MHz to 1500MHz	1
5	<1500MHz to 3000MHz	2	
6	<3000MHz to 6000MHz	4	
Frequency Switching	≤ 5ms		
SSB PHASE NOISE, CW at 20kHz OFFSET(dBc/Hz)			
Frequency (MHz)		ALC on	ALC off
	5	-	-122
	100	-112	-115
	250	-112	-117
	1000	-112	-117
	2000	-108	-112
	3000	-107	-110
6000	-102	-105	
Residual FM (0.3kHz ~ 3kHz)(1GHz CW)	<2Hz		
NON HARMONICS			
Non Harmonics	Level > -10dBm, Offset > 10kHz	<65dBc	1M ≤ freq. ≤ 5M
		<66dBc,-70dBc(typ)	5M < freq. ≤ 187.5M
		<75dBc	187.5M < freq. < 750M
		<70dBc,-74dBc(typ)	750M ≤ freq. < 1500M
		<62dBc,-66dBc(typ)	1500M ≤ freq. < 3000M
<58dBc,-60dBc(typ)	3000M ≤ freq. < 6000M		
HARMONICS			
Range	Level < 4dBm		
9k ≤ Freq < 6000M	<35dBc		
FREQUENCY REFERENCE			
Frequency Reference	10MHz		
Temperature Stability	<10ppm, Standard		<10ppb, OCXO Option
Aging	2ppm/year, Standard		0.1ppm/year, OCXO Option
Output	1Vpp, 50 Ohm Load		
Input	-3 ~ 20dBm, 50 Ohm Load		
Input Deviation	Standard: 3ppm		OCXO Option: 0.5ppm
AMPLITUDE SPECIFICATIONS			
AMPLITUDE			
Setting Range	20dBm ~ -140dBm		
Resolution	0.01dB		
Amplitude Unit	dBm, dBμV, Vrms		
AMPLITUDE ACCURACY			
Absolute Level Accuracy in CW Mode (ALC On)		14dBm to -60dBm	-60dBm to -90dBm
	9k < freq. < 3GHz	±0.6dB	±0.8dB (±0.6dB typical)
	3GHz < freq. < 6GHz	±0.8dB	±1dB (±0.6dB typical)
Addition Level Accuracy in CW Mode (ALC Off, Power Search Run, Relative to ALC On)		0.15dB	
VSWR (5M ~ 3GHz)	<1.8 (output ≤ -66dBm)		
Amplitude Switching (ALC on, CW)	≤ 5ms		
SWEEP SPECIFICATIONS			
SWEEP			
Mode	Frequency, amplitude, list		
Dwell Time	100μs ~ 100s		
Number of Points (Step)	2 ~ 65,535		
Number of Points (List)	1 ~ 4,096		
Triggering	Free, trigger key, external, timer		
ANALOG MODULATION SPECIFICATIONS			
FM			
Source	Internal, external		
Max. Deviation	N*1MHz		
Rate	freq ≥ 10MHz	0.1Hz ~ 1MHz	
	freq < 10MHz	0.1Hz ~ 100kHz	
Resolution	1mHz		
Accuracy (1kHz rate, N*50kHz deviation)	2% setting + 20Hz		
Distortion (1kHz rate, N*50kHz deviation)	0.40%		
PM			
Source	Internal,external		
Max. Devaition	N* 1MHz/rate or 5N rad		
Rate	freq ≥ 10MHz	0.1Hz ~ 1MHz	
	freq < 10MHz	0.1Hz ~ 100kHz	
Resolution	0.001rad		
Accuracy (1kHz rate)	1% of setting+0.1rad		
Distortion (1kHz rate, max deviation)	0.20%		
Response	0.1Hz ~ 1MHz		
AM			
Source	internal, external		
Resolution	0.01%		
Depth	0 ~ 100%		
Accurcay (1kHz, 0dBm)	<5MHz	1.5% setting +1%	
	5M ~ 4GHz	3% of setting+1%	
	4GHz ~ 6GHz	5% of setting + 1%	
Distortion (1kHz, 80%, <8dBm)	<5MHz	1.50%	
	5M ~ 4GHz	2%	
	4GHz ~ 6GHz	3%	
Response	0.1Hz ~ 20kHz		

SPECIFICATIONS		
PULSE SPECIFICATIONS		
PULSE		
Mode	Free-run, square, triggered, adjustable doublet, trigger doublet, gated, pulse train, and external pulse	
Source	Internal, external	
Pulse Input	-0.5V ~ 5V, $V_{IL}=V_{IH}=1.5V$ (typ)	
Edge Time	<20ns	
On/Off Ratio	70dB, 5M ~ 3GHz 45dB, 3G ~ 6GHz	
Repetition Rate	0.1Hz ~ 10MHz	
Pulse Period	100ns ~ 42s	
Resolution	10ns	
Width	50ns ~ period-10ns	
Pulse Train Number of Patterns	2047	
LF SPECIFICATIONS		
LF		
Waveform	Sine, square, triangle, ramp, gaussian noise	
Frequency Range	Sine	0.1Hz ~ 10MHz
	Square, Triangle, Ramp	0.1Hz ~ 1MHz
	Gaussian Noise	10MHz BW
Resolution	1mHz	
Output	2mVpp ~ 6Vpp	
Impedance	50 Ohm	
VECTOR MODULATION SPECIFICATIONS		
VECTOR MODULATION (GSG-2160 only)		
Source	Internal, external	
Bandwidth (baseband)	60MHz	
Bandwidth (RF)	120MHz	
Carrier Frequency	<5MHz ~ 6,000MHz	
Carrier Suppression	25±5°C	>50dBc
Sideband Suppression	25±5°C	>50dBc
Modulation Mode	ASK, PSK, APSK, QAM, FSK, MSK, user define IQ, user define FSK	
ASK	2ASK(0 ~ 100%), 4ASK, 8ASK, 16ASK, 32ASK	
PSK	BPSK, QPSK, DQPSK, OQPSK, $\pi/4$ DQPSK, 8PSK, D8PSK, 16PSK	
APSK	16APSK, 32APSK	
QAM	16QAM, 32QAM, 64QAM, 128QAM, 256QAM	
FSK	2FSK, 4FSK, 8FSK, 16FSK	
Internal Modulation EVM (16QAM, RRC filter, $\alpha=0.25$, 4Mpsps, level ≤ 4 dBm, ALC off)	0.8%, 10MHz < freq < 3GHz 1.2%, 3GHz < freq < 5GHz	
IQ GENERATOR		
Resolution	16bit	
Sample Rate	10kHz ~ 180MHz	
Baseband Bandwidth	60MHz	
ARB Memory	Waveform Length	16Msa
	Storage Capacity	16GB
Trigger Type	Free, single, gated, trigger and run	
Trigger Source	External, trigger key	
INTERNAL IQ ADJUSTMENT		
IQ Offset	±10%	
IQ Gain	±6dB	
IQ Skew	max 30ps ~ 100ps	
EXTERNAL IQ OUTPUT		
Impedance	50Ohm per output	
Maximum per Output	0.5Vpk	
Bandwidth	60MHz	
Common Mode Offset	±1.25V	
Differential Mode Offset	±50mV	
EXTERNAL IQ INPUT		
Bandwidth	60MHz	
Full Scale	±1V into 50Ohm	
IQ Offset	±10% full scale	
IQ Gain	±6dB	
SIMULTANEOUS MODULATION		
All modulation types (I/Q, FM, AM, Φ M, and pulse modulation) may be simultaneously enabled except: FM and phase modulation		
GENERAL SPECIFICATIONS		
Power Source	AC 100 ~ 240V, 50 ~ 60Hz	
Power Consumption	90VA Maximum	
Display	7 inch TFT LCD, 1024(RGB)*600	
Interface	GPIB (option), USB, LAN	
Operating Temperature	0 ~ 50°C	
Storage Temperature	-10 ~ 70°C	
Humidity	85% at 40°C	
Altitude	Up to 2000m	
Dimensions (W x H x D) & Weight	430(W) x 140(H) x 540(D)mm ; Approx. 13 kg	

Specifications subject to change without notice. GSG-2000_E_ID1DH

ORDERING INFORMATION

GSG-2160 6GHz Vector Signal Generator
GSG-2060 6GHz Signal Generator

ACCESSORIES

CD (User Manual) x1, Power Cord x1

OPTIONAL ACCESSORIES

ADP-001 N(M)-BNC(F) Adapter **GTL-301** N(M)-N(M) RF Cable
ADP-002 N(M)-SMA(F) Adapter **GTL-303** SMA(M)-SMA(M) RF Cable
GRA-447 Rack Mount Kit. 19", 3U Size

OPTION

OCXO clock reference source

* GPIB and OCXO options can only be installed prior to the shipment. Please select these options while placing an order.

GOOD WILL INSTRUMENT CO., LTD.

No.7-1, Jhongsing Road, Tucheng Dist., New Taipei City 236, Taiwan

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