

## Oscilloscope/ Spectrum Analyzer

1 GHz analog input bandwidth

## Arbitrary Waveform Generator

10 mHz to 150 MHz output frequency

## Data Recorder

1 nS to 365 days/division

**Custom API to control all features**

**No external power supply required**

**Intuitive application software with an assortment of features**



## Introduction

**SG Series** is a complete 5-in-1 USB-powered test instrument. It includes an oscilloscope, a spectrum analyzer, a data recorder, an arbitrary signal generator (AWG,) and a frequency and phase meter. This compact device has been developed for professionals with a limited budget. Hobbyists can also benefit from the many features of the instruments. The oscilloscope offers a bandwidth of 1 GHz, and a real sampling rate of up to 250 MHz (125 MHz/channel) with an effective sampling rate of 100 GHz. The AWG generates over 25 standard functions with frequencies of up to 150 MHz. Arbitrary wave-forms can also be generated with sampling rates of 1 to 100 MHz and memory depths of 1 to 64K. Its graphical editor makes generation of any signal seamless. **SG Series** is an ideal lab for any user.

## Applications

- Scientific Research
- Project Lab
- Electronic & Electrical testing
- Communication Industry
- Audio Industry
- Automation Industry
- Vibration Analysis
- Education and Training
- Medical and Academic research

## Technical Specifications

Model	SG985	SG884	SG834	SG814
<b>Oscilloscope/ Spectrum Analyzer/ Data Recorder</b>				
Bandwidth	1 GHz	500 MHz	300 MHz	100 MHz
Rise time	0.5 nS	1.0 nS	2.5 nS	5.0 nS
Input channels	2			
Vertical resolution	8 bits			
Input characteristics	< ±3%			
Common Mode Rejection Ratio	1 MΩ in parallel with 5 pF			
Input type	Single-ended, BNC connector			
Input coupling	Software selectable AC/DC			
<b>Input Ranges (full scale)</b>				
10X probe	±80 mV to ±80 V in 10 ranges			
1X probe	±8 mV to ±8 V in 10 ranges			
<b>Sampling rate (each channel)</b>				
Real / per channel	125 MHz			100 MHz
Effective / per channel	100 GHz			25 GHz
<b>Vertical Sensitivity</b>				
1X probe	2 mV - 2 V / DIV			
10X probe	20 mV - 20 V / DIV			
<b>Buffer memory size</b>				
One channel in use	1024 KB			
Two channels in use	512 KB			
<b>Time Base</b>	1 ns/div to 100 ms/div			5 ns/div to 100 ms/div
<b>Trigger modes</b>	Normal, auto, one shot, single, CH1, CH2			
<b>Trigger threshold</b>				
Internal	Adjustable, ± range setting (variable) 8 bits			
External	1.2 Volts			
<b>Basic triggers</b>	External/ CH1/ CH2/ Alternative/Rising edge/ Falling edge/ Auto/ Normal/ Single			
<b>External trigger bandwidth</b>	1 GHz	500 MHz	300 MHz	100 MHz
<b>Spectrum Analyzer (Typical)</b>				
Common features between the Oscilloscope and the spectrum analyzer have the same specifications.				
<b>Frequency Bandwidth</b>	1 GHz	500 MHz	300 MHz	100 MHz
<b>Display Span</b>	204.8 KHz to 60 MHz			
<b>Resolution</b>	(Span/2 <sup>18</sup> ) 0.78 Hz to 195 Hz			
<b>Reference Levels (10 ranges)</b>				
1X probe	- 35 dBV to 25 dBV (0.6 to 5.623 VRMS)			
10X probe	- 25 dBV to 35 dBV (0.06 to 56.23 VRMS)			
<b>Display modes</b>	Sampling, peak hold, average, history			
<b>Windowing types</b>	Rectangular, Bartlett, Gaussian (2.5, 3.5, 4.5), Triangular, Blackman, Blackman-Harris, Hamming, Hanning, Welch, Kaiser Bessel, Flat Top,			

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<b>Frequency Analyzer (Typical)</b> The same specifications apply to the common features of the oscilloscope and the frequency and phase analyzer in the model.				
<b>Frequency Range</b>	1 GHz	500 MHz	300 MHz	100 MHz
<b>Resolution</b>	0.1Hz			
<b>Accuracy</b>	50 ppm		100 ppm	100 ppm
<b>Data Recorder (Typical)</b> The same specifications apply to the common features of the oscilloscope and the data recorder in the model.				
<b>Sampling Interval</b>	102 MHz to 10 pHz			
<b>Time Base</b>	500 nS to 365 days			
<b>Timing Accuracy</b>	50 ppm		100 ppm	100 ppm
<b>Arbitrary Waveform Generator</b>				
Arbitrary waveform length	2 to 64K adjustable			
Ram (Memory)	64K			
Amplitude resolution	12-bits (with 14-bits optional)			
Sample rate (sine wave)	400MHz	300MHz	200 MHz	100MHz
Sample rate	100 MHz			50MHz
Sample rate (Arbitrary)	1MHz to 100 MHz			1-MHz to 50MHz
Frequency adjustment resolution	10 MHz			
Standard waveforms	DC, Sine, square, pulse, triangle, rising ramp, falling ramp, noise, rising exponent, falling exponent, sinc, cardiac, gated burst, single burst, log continuous sweep, linear continuous sweep, gated ASK, gated FSK, gated PSK AM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms) FM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms) burst (carrier signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)			
<b>Open offset</b>				
Open circuit	0 to $\pm 2.2V(7 V_{pp})$			
500	0 to $\pm 2.2V(3.5 V_{pp})$			
Output Impedance	500			
Output Current	60 mA ( With the standard 50 O impedance )			
Sync	TTL compatible			

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<b>Output Amplitude</b> (Frequencies < 5MHz) Open circuit 50 Ω	0 to ± 3.5V(7 Vpp) 0 to ± 1.75V(3.5 Vpp)			
(5MHz > Freq. < 15MHz) Open circuit 50 Ω	0 to ± 3.0V(6 Vpp) 0 to ± 1.5V(3.0 Vpp)			
(15MHz > Freq. < 50MHz) Open circuit 50 Ω	0 to ± 2.0V(4 Vpp) 0 to ± 1.0V(2.0 Vpp)			
(50MHz > Freq. < 100MHz) Open circuit 50 Ω	0 to ± 1.5V(3 Vpp) 0 to ± 0.75V(1.5 Vpp)			
(100MHz > Freq. < 150MHz) Open circuit 50 Ω	0 to ± 1.0V(2 Vpp) 0 to ± 0.5V(1.0 Vpp)			
Accuracy (up to 100 kHz)	.1% of the specified output			
Adjustment resolution	± 5mV 3 digits (1mv)			
<b>Frequencies Ranges</b>				
Sine Wave	10 mHz to 150 MHz	10 mHz to 100 MHz	10 mHz to 50 MHz	10 mHz to 10 MHz
Triangle	10 mHz to 100 KHz			10 mHz to 100 KHz
Ramp	10 mHz to 100 KHz			10 mHz to 100 KHz
Sinc	1 Hz to 5 MHz			1 Hz to 1 MHz
Noise (White) Bandwidth	25 MHz			10 MHz
AM (Carrier)	1 Hz to 5 MHz			1 Hz to 1 MHz
FM (Carrier)	1 Hz to 5 MHz			1 Hz to 1 MHz
Sweep	DC to 15 MHz (start & stop frequency)			DC to 5 MHz
Burst (Burst Rate)	100 Hz to 2 MHz			100 Hz to 1 MHz
Digital (shift keying rate)	1 kHz to 2 MHz			1 kHz to 1 MHz
Exponent	1 Hz to 5 MHz			1 Hz to 1 MHz
Cardiac	1 Hz to 1 MHz			1 Hz to 1 MHz
Resolution	10 mHz (1 μHz optional)			
Accuracy	2% ±5mV (.1% optional) At room temperature			
Temp Coefficient	20 pm/°C			
Aging	10 ppm/yr			

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<b>Waveform Characteristics</b>				
<b>Sine Wave Output</b>				
Flatness				
< 1 MHz	0.1 dB			0.1 dB
< 10 MHz	0.5 dB			0.2 dB
< 100 MHz	1 dB			-
<b>Sine Wave (2Vpp)</b>				
Frequency	10 mHz - 15 MHz			10 mHz - 5 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Rise/ Fall time	< 4 nS			
Overshoot	1%			
Settling time	10 nS to .5% of final value			
Asymmetry	< 2 nS			
Duty cycle	5% to 95% (1MHz)			
Adjustment resolution	10nS			
Jitter	< 10pS (rms)			
<b>Triangle, Ramp (2Vpp)</b>				
Frequency	10 mHz- 15 MHz			10 mHz - 5 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Linearity	.1% of peak output			
Asymmetry	< 2 nS			
Duty cycle	5% to 95%			
Adjustment resolution	10nS			
Jitter	< 10pS (rms)			
<b>Exponential (2Vpp)</b>				
Frequency	10 mHz- 5 MHz			10 mHz - 1 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Rise/ Fall time	< 4 nS			
Damping factor	-1,000 to 1,000			
Jitter	< 10pS (rms)			

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<b>Sinc (sin(x)/x) (2Vpp)</b>				
Frequency	10 mHz- 5 MHz			10 mHz - 1 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Zero crossings	2 to 1,000			
<b>Cardiac (2Vpp)</b>				
Frequency	10 mHz- 1 MHz			10 mHz - 1 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Zero crossings	2 to 1,000			
<b>Noise</b>				
Type	White			White
Bandwidth	50MHz			20MHz
<b>AM (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Frequency	10 mHz to 1MHz			
Modulation depth	0% to 150%			
Source	internal (external optional)			
<b>FM (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Frequency	10 mHz to 1MHz			
Modulation depth	0% to 100%			
Source	internal (external optional)			
<b>ASK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Getting signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			

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<b>FSK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Gating signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			
<b>PSK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Gating signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			
<b>Burst (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Source	any internal waveform including Arb			
Rate	100 Hz to 2 MHz			
Count	variable			10 mHz - 1 MHz
Gate source	internal (external optional)			
Trigger	single, internal rate, external(optional)			
<b>Sweep</b>				
Type	Linear or log (exponential)			
Direction	up or down			
Start frequency	0to15MHz			0 to 1 MHz
Stop frequency	0to15MHz			0 to 1 MHz
Sweep time	1 uS to1mS			1 uS to1mS
<b>Editing Tools</b>				
Math operation	Addition, subtraction, multiplication, gain, clip, absolute, resize, invert, mirror, expand to fit			
Filtering	smoothing, ideal low pass, first order low pass			
Windowing	Gaussians, Blackman, Blackman-Harris, Cosine, Hanning, Hamming, Flat-Top, Kaiser-Bessel, Welch, Triangular			
<b>Signal library</b>	sine, square, triangle, falling ramp, rising ramp, rising exponent, falling exponent, sinc, cardiac, noise			
<b>GUI Editors</b>	pen, line, manual, insert			
<b>Options</b>	save / recallin.txt & .csv format			

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<b>Units</b>				
Frequency	Hz, kHz, MHz			
Amplitude	mVpp, Vpp			
Offset	mV, V			
<b>Protection</b>	short circuit			
<b>Configuration time</b>				
Arbitrary save	10 mS			
Arbitrary Recall	100 mS			
Setting save	10 mS			
Setting Recall	100 mS			
Function	100 mS			
<b>Physical Properties</b>				
Dimensions	200 X 95x 80 (mm)			
Weight	750gm(approx.)			
<b>Other</b>				
PC Requirements	Operating system: 32/ 64-bit edition of Microsoft Windows XP (SP3), Vista, Windows 7/ Windows 8/ Windows 10 Ports: USB 2.0/ 3.0 compliant port			
<b>Environmental</b>				
Operating Environment	0 °C to 45 °C for normal operation			
Temperature range	15 °C to 32 °C for quoted accuracy			
Humidity	5% to 80% RH, non–condensing			
<b>Storage environment</b>				
Temperature range	-20 °C to +60 °C			
Humidity	5% to 95% RH, non–condensin			
<b>Software</b>	Save setting, recall setting, save plot, recall/print plot, zoom in vertical, zoom in horizontal, pen editor, line editor, DSP, variable sampling rate			
<b>List of Accessories:</b>				
BNC to BNC Cable, USB Cable (A type to A type), Product Tutorial (CD) : 1 no (each)				