SDG1000X Plus Series Function/Arbitrary Waveform Generator

SIGLENT®

Data Sheet

EN01A

SIGLENT TECHNOLOGIES CO.,LTD

SDG1062X Plus
SDG1032X Plus
SDG1022X Plus

Product Overview

SIGLENT's SDG1000X Plus series dual-channel function/arbitrary waveform generator, with a maximum bandwidth of 60MHz, has excellent sampling system indicators of 1GSa/s sampling rate and 16-bit vertical resolution. Based on the traditional DDS technology, the innovative TrueArb and EasyPulse technologies are used to overcome the inherent defects of DDS technology in outputting arbitrary waves and square waves/pulses. It can provide users with high-fidelity, low-jitter signals. In addition, SDG1000X Plus also provides PRBS pattern generation, sequence wave output, and dual pulse output functions to meet a wider range of application needs.

Key Features

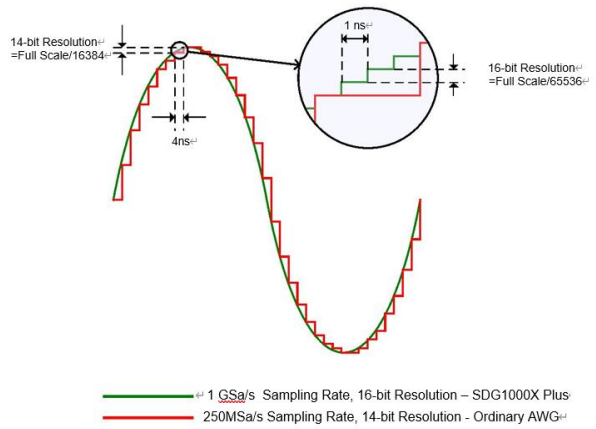
- Dual channel, maximum output frequency 60 MHz, maximum output amplitude 20 Vpp
- 1 GSa/s digital-to-analog converter sampling rate, 16-bit vertical resolution
- Innovative TrueArb technology, based on a point-by-point architecture, supports any 24pts ~ 8Mpts Arb waveform with a sampling rate in range of 1 μSa/s ~ 250 MSa/s
- Supports sequence wave playback function, maximum storage depth per channel 8 Mpts
- Innovative EasyPulse technology, capable of generating lower jitter Square or Pulse waveforms, brings a wide range and extremely high precision in pulse width and rise/fall times adjustment
- Multi-pulse output function can be used to measure the switching parameters of power equipment and evaluate its dynamic characteristics
- Supports PRBS up to 40 Mbps
- Plenty of analog and digital modulation types: AM, DSB-AM, FM, PM, FSK, ASK, PSK and PWM
- Sweep and Burst function
- Harmonic function
- Waveform Combining function
- High precision Frequency Counter
- 196 built-in arbitrary waveforms
- Built-in WebServer supports instrument control via web browser
- Standard interfaces: USB Host, USB Device (USBTMC), LAN (VXI-11)
- 4.3" LCD display

Models and Key Specifications

Model	SDG1062X Plus	SDG1032X Plus	SDG1022X Plus
Max output frequency	60 MHz	30 MHz	25 MHz
Number of channels	2		
Sampling rate	1 GSa/s (4X Interpolation)		
Vertical resolution	16 bits		
Arbitrary waveform length	8 Mpts/CH		
Max. amplitude	±10 V		
Display	4.3” display, 480 x 272 x RGB		
Interface	Standard: USB Host, USB Device, LAN Optional: GPIB (USB-GPIB adaptor)		

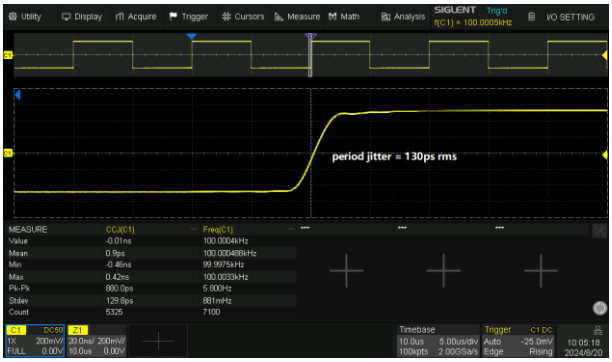
Characteristics

High-performance Sampling System



Benefiting from a 1GSa/s and 16-bit sampling system, SDG1000X Plus achieves extremely high accuracy performance in both time domain and amplitude, which resultsin more accurately reconstructed waveforms and lower distortion

Innovative EasyPulse Technology



When a Square/Pulse waveform is generated by DDS, there will be a one-clock-jitter if the sampling rate is not an integer-related multiple of the output frequency. SDG1000X Plus EasyPulse technology successfully overcomes this weakness in DDS designs and helps to produce low jitter Square/Pulse waveforms

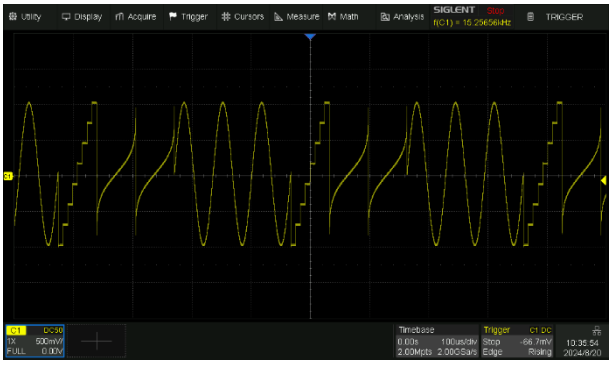
The rise/fall times can be set independently to the minimum of 10ns at any frequency and to the maximum of 22.4s. The adjustment step is as small as 100 ps.

The Pulse width can be fine-tuned to the minimum of 19.4ns with the adjustment step as small as 100ps

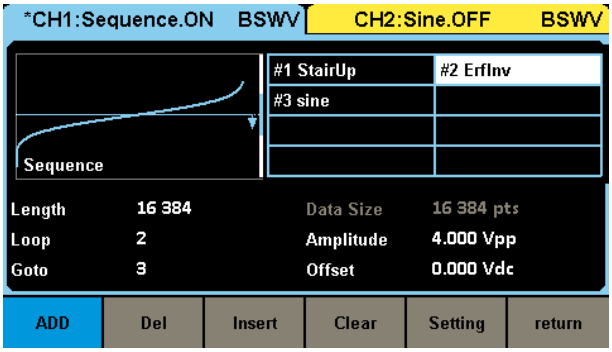
Innovative TrueArb Technology

For arbitrary waveforms, TrueArb not only has all the advantages of traditional DDS, but also eliminates the probability that DDS may cause serious jitter and distortion. TrueArb generates arbitrary waveforms point by point, never skips any point so that it can reconstruct all the details of the waveform as defined.

Powerful arbitrary wave generation capability and sequence playback function



Provides sequence playback function to easily meet various testing needs. Maximum waveform storage depth reaches 8 Mpts/ch.



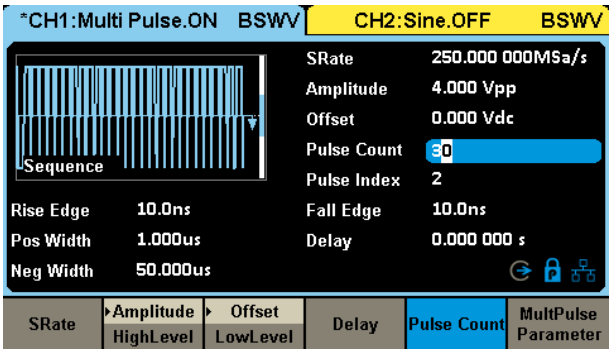
Easily set the number of cycle times for each waveform and the order of waveform playback.

Three operating modes: continuous, burst and single.

Three trigger sources are available: "internal", "external" and "manual".

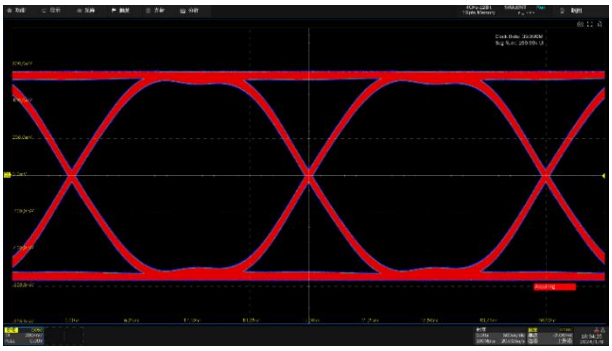
Built-in multi-pulse output function

Built-in dual pulse output function, combined with siglent's oscilloscope, can quickly measure the switching parameters and dynamic characteristics of power devices without the need for host computer software.

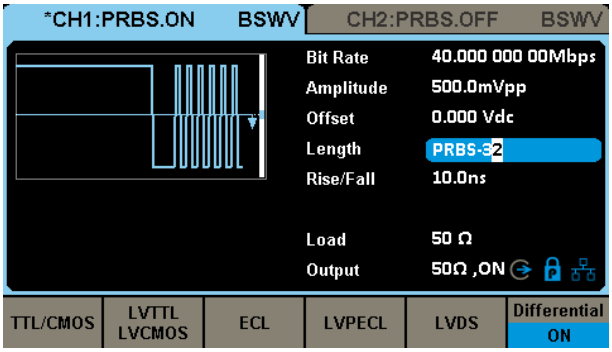


Supports up to 30 pulses, each pulse can be independently set with pulse edge and positive and negative pulse width.

PRBS pattern output

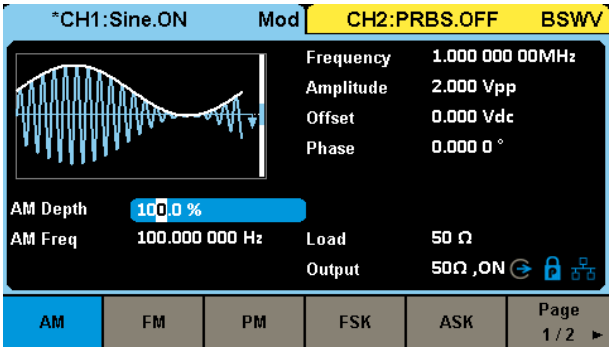


Provides PRBS3 ~ PRBS32 multiple pattern outputs, the rate is arbitrarily adjustable between 10^{-6} bps ~ 40 Mbps, and the edge is arbitrarily adjustable between 10 ns ~ 1us.



Quickly select preset level logic such as TTL, LVCMOS, LVPECL and LVDS. Differential mode allows you to easily set up two channels as a differential pair output.

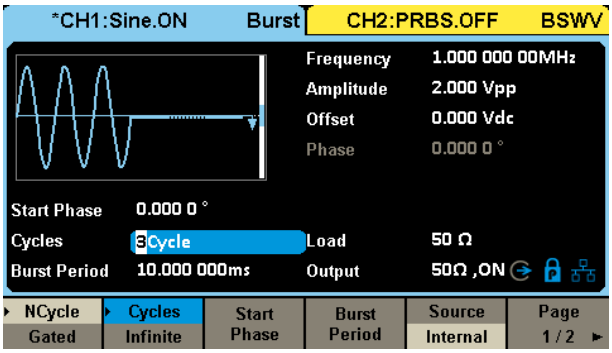
Modulation



Rich modulation functions, supporting commonly used AM/DSB-AM/ FM/ PM/ ASK/ FSK/ PSK/ PWM modulation methods.

Optional internal and external modulation sources.

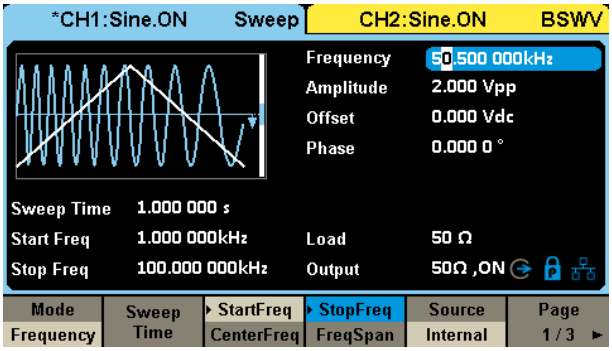
Burst



Supports two Burst modes: N cycle and Gating

Three trigger sources are available: internal, external and manual.

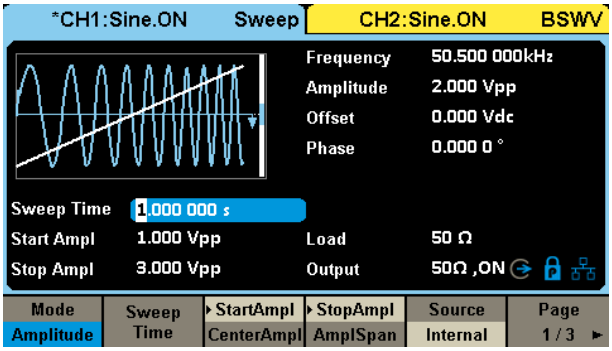
Sweep



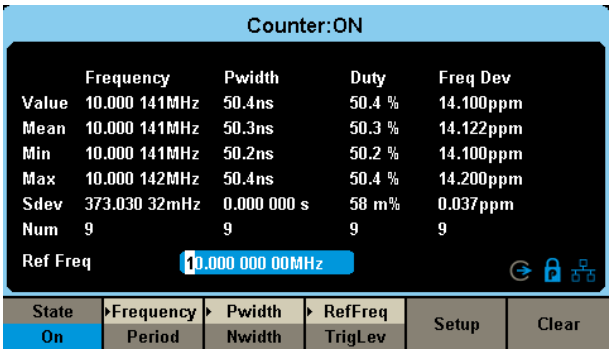
Supports two sweep modes, frequency and amplitude, to easily implement frequency sweep and amplitude sweep tests.

Supports two sweep type: linear and log, and three sweep directions of up, down and up_down.

Three trigger sources are available: internal, external and manual.



Frequency Counterm



High-precision frequency counter, capable of testing the frequency range of 0.1Hz~200MHz.

Built-in WebServer

Supports instrument control through a web browser, allowing testing tasks to be completed remotely.

Specifications

Unless otherwise specified, all specifications can be guaranteed to meet the following conditions:

• Within the validity period of product calibration.

• Within the ambient temperature range of 18 ℃ ~ 28 ℃.

• The instrument is powered on and operating for more than 30 minutes.

Frequency Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Resolution			1 μ	Hz	
Initial accuracy	-1		+1	ppm	25 ℃
	-2		+2		0～40 ℃
1st-year aging	-1		+1	ppm	25 ℃
10-year aging	-3.5		+3.5	ppm	25 ℃

Sine Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency	1 μ		60 M	Hz	SDG1062X Plus
	1 μ		30 M		SDG1032X Plus
	1 μ		25 M		SDG1022X Plus
Harmonic distortion (0 dBm, 50Ω Load)			-65	dBc	≤ 10 MHz
			-60		10 MHz～20 MHz (include)
			-55		20 MHz～40 MHz (include)
			-50		40 MHz～60 MHz (include)
Total Harmonic Distortion			0.075	%	0 dBm, 10 Hz～20 kHz
Non-harmonic spurious (0 dBm, 50Ω Load)			-70	dBc	≤ 50 MHz
			-65		＞50 MHz

Square Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency	1 μ		20 M	Hz	
Rise/fall times		10		ns	10%～90%, 1Vpp, 50Ω Load
Overshoot			3	%	100 kHz, 1Vpp, 50Ω Load
Duty cycle	0.001		99.999	%	Limited by frequency setting
Jitter (rms),Cycle to cycle			200	ps	1Vpp, 50Ω Load

Pulse Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition

Frequency	1 μ		20 M	Hz	
Pulse width	19.4			ns	
Pulse width accuracy			± (0.01%+0.5ns)		
Rise/fall times	10 n		22.4	s	10%～90%, 1Vpp, 50Ω Load
Overshoot			3	%	100 kHz, 1Vpp, 50Ω Load
Duty cycle	0.001		99.999	%	Limited by frequency setting
Jitter (rms), Cycle to cycle			200	ps	1Vpp, 10ns edge, 50Ω Load

Noise Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
-3dB bandwidth		60		MHz	
Adjustable bandwidth range	20		60	MHz	

Ramp Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency	1 μ		2 M	Hz	
Symmetry	0		100	%	
Linearity			1	%	Percentage of peak-peak output, 1kHz, 1Vpp, 100% symmetry

Arbitrary Wave characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
DDS Mode					
Frequency	1 μ		20M	Hz	Sampling rate 250 M Sa/s
Waveform length	16 k			pts	
Rise/fall times		6		ns	10% ~ 90%, 1Vpp step, 50 Ω Load
True Arb Mode					
Sampling rate	1 μ		250 M	Sa/s	
Waveform length	24		8 M	pts	
jitter (rms)			200	ps	Cycle to cycle, “010101”pattern，1Vpp, 50Ω Load, 250 MSa/s
Interpolation mode	0-order hold, linear				
Sequence	Run mode: Continuous, Step, Burst				

PRBS characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Bit rate	1 μ		40 M	bps	

Pattern length	2m-1, m = 3,4,…,32				
Rise/fall time	10n		1μ	s	10% ~ 90%, 1 Vpp, 50Ω Load

DC characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Output Range	-10		+10	V	Hiz Load
Accuracy	±(1%+2mV)				Hiz Load

Harmonic Output characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Order			16		
Type	Even, Odd, All				

Output Characterisics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Range (Note 1)	2m 2m		20 10	Vpp	≤20 MHz, HiZ Load ＞20 MHz, HiZ Load
Accuracy	±(1%+1mV)				10 kHz sine, 0 V offset
Amplitude flatness	-0.3		+0.3	dB	50Ω, 2.5Vpp, compare to 10 kHz sine
Output impedance		50		Ω	10 kHz sine
Output current	-200		+200	mA	
Channel Isolation		-60		dBc	

Note 1: The specification will be divided by 2 while applied to a 50Ω load

Modulation Characteristics					
AM					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Sine, Square, Ramp, Noise, Arb				
Modulation depth	0		120	%	
Modulation frequency	1 m		1 M	Hz	While modulation source is “Internal”
FM					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Sine, Square, Ramp, Noise, Arb				
Frequency deviation	0		0.5*BW		BW is the max. output frequency Limited by frequency setting

Modulation frequency	1 m		1 M	Hz	While modulation source is “Internal”
PM					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Sine, Square , Ramp, Noise, Arb				
Phase deviation	0		360	°	
Modulation frequency	1 m		1 M	Hz	While modulation source is “Internal”
ASK					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Square with 50% duty cycle				
Keying frequency	1 m		1 M	Hz	While modulation source is “Internal”
FSK					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Square with 50% duty cycle				
Keying frequency	1 m		1 M	Hz	While modulation source is “Internal”
PSK					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Modulation Source	Internal/External				
Modulating wave	Square with 50% duty cycle				
Keying frequency	1 m		1 M	Hz	While modulation source is “Internal”
PWM					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Pulse				
Modulation Source	Internal/External				
Modulating wave	Sine, Square, Ramp, Noise, Arb				
Modulation frequency	1 m		1 M	Hz	While modulation source is “Internal”
Pulse width deviation resolution	8			ns	

Burst Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Pulse, Noise, Arb				
Type	Count (1-1000000 Cycles), Infinite, Gated				
Carrier frequency	2 m		BW	Hz	BW is the max. output frequency
Phase	-360		360	°	
Internal period	1μ		1000	s	
Trigger source	Internal, External, Manual				
Gated source	Internal/External				
Trigger delay			100	s	

Sweep Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Carrier	Sine, Square, Ramp, Arb				
Sweep mode	Frequency, Amplitude				
Sweep type	Linear, Log				
Direction	Up, Down, Up_ Down				
Carrier frequency	1μ		BW	Hz	BW is the max. output frequency
Sweep time	1 m		500	s	
Trigger source	Internal, External, Manual				

Frequency Counter Characteristics					
Parameter	Min.	Typ.	Max.	Unit	Condition
Function	Frequency, Period, Positive/Negative pulse width, Duty cycle				
Coupling mode	AC, DC, HF REJ				
Frequency range	100 m 10		200 M 200 M	Hz	DC coupling AC coupling
Input amplitude	0.1 Vrms 0.2 Vrms 0.1 Vrms 0.2 Vrms		±2.5 V ±2.5 V 5 Vpp 5 Vpp		DC coupling, ≤100 MHz DC coupling, >100 MHz AC coupling, ≤100 MHz AC coupling, >100 MHz
Input impedance		1M		Ω	

Reference Clock Input/Output					
Reference Clock Input					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency		10		MHz	
Amplitude	1.4			Vpp	
Input impedance	5			kΩ	AC coupling
Reference Clock Output					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency		10		MHz	Synchronized to internal reference clock
Amplitude	2	3.3		Vpp	Hiz Load
Output impedance		50		Ω	

Auxiliary In/Out Characteristics					
Trigger Input					
Parameter	Min.	Typ.	Max.	Unit	Condition
VIH	2		5.5	V	
VIL	-0.5		0.8	V	
Input impedance	100			kΩ	10 kHz sine
Pulse width	100			ns	
Response time			620	ns	
Trigger Output					
Parameter	Min.	Typ.	Max.	Unit	Condition
VOH	3.8			V	IOH=8 mA
VOL			0.44	V	IOL=8 mA
Output impedance		100		Ω	
Frequency			1	MHz	
Sync Output					
Parameter	Min.	Typ.	Max.	Unit	Condition
VOH	3.8			V	IOH=8 mA
VOL			0.44	V	IOL=8 mA
Output impedance		100		Ω	
Pulse width		100		ns	
Frequency			5	MHz	
Modulation Input					
Parameter	Min.	Typ.	Max.	Unit	Condition
Frequency	0		50	kHz	
Input impedance	10			kΩ	
Amplitude@ 100% Modulation depth	11	12	13	Vpp	

General Characteristics					
Power					
Parameter	Min.	Typ.	Max.	Unit	Condition
Voltage	100 - 240 Vrms (± 10%), 50/60 Hz 100 - 120 Vrms (± 10%), 400 Hz				
Power consumption		25	50	W	
Display					
Parameter	Min.	Typ.	Max.	Unit	Condition
Color depth		24		Bit	
Contrast ratio		350:1			
Luminance		300		cd/m2	
Environment					
Parameter	Min.	Typ.	Max.	Unit	Condition
Operating temperature	0		40	℃	
Storage temperature	-20		60	℃	
Operating humidity	5 5		90 50	%	≤30 ℃ 40 ℃
Non-operating humidity	5		95	%	
Operating altitude			3048	m	≤30 ℃
Non-operating altitude			15000	m	
EMC/EMI	EMC directive (2014/30/EU), IEC 61326-1:2021				
Safety	UL 61010-1:2012/R: 2018-11; CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11				
RoHS	EU 2015/863				
Calibration					
Parameter	Min.	Typ.	Max.	Unit	Condition
Calibration interval		1		year	
Mechanical					
Parameter	Min.	Typ.	Max.	Unit	Condition
Dimensions	W×H×D = 260.3mm×107.2mm×295.7mm				
Net weight		3.48		kg	
Gross weight		4.4		kg	

Ordering Information

Product Model	Description
SDG1022X Plus	25 MHz, 2 CH, 1 GSa/s, 16-bit, Sequence playback function.
SDG1032X Plus	30 MHz, 2 CH, 1 GSa/s, 16-bit, Sequence playback function.
SDG1062X Plus	60 MHz, 2 CH, 1 GSa/s, 16-bit, Sequence playback function.

Standard Configurations	Quantity
Quick Start	1
Power Cord	1
USB Cable	1
Calibration Certificate	1

Optional Configurations	Model
BNC Coaxial Cable	SDG-BNC
20 dB Attenuator	ATT-20 dB
USB-GPIB Adapter	USB-GPIB
10W Power Amplifier	SPA1010

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, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, 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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