SIGLENT X and A Series Waveform Generators Selection Guide

SIGLENT X and A Series Waveform Generators

Performance Function Generation

Standard functions with high signal integrity, speed, and accuracy

Includes: SINE, SQUARE, PULSE, RAMP, NOISE, DC, and PRBS

Max Frequency and Amplitude by Series (Hi-Z load; for Sine waves)

	20 MHz	40 MHz	60 MHz	120 MHz	150 MHz	160 MHz	200 MHz	350 MHz	500 MHz	1 GHz	1.5 GHz	1.8 GHz	2 GHz
SDG1000X Plus	20 Vpp	10 Vpp	10 Vpp										
SDG2000X	20 Vpp	10 Vpp	10 Vpp	10 Vpp									
SDG3000X	20 Vpp	20 Vpp	20 Vpp	10 Vpp	10 Vpp	5 Vpp	5 Vpp						
SDG6000X	20 Vpp	20 Vpp	10 Vpp	10 Vpp	5 Vpp	5 Vpp	3 Vpp	3 Vpp	1.28 Vpp				
SDG7000A	24 Vpp	24 Vpp	12 Vpp	12 Vpp	6 Vpp	6 Vpp	6 Vpp	6 Vpp	6 Vpp	6 Vpp			
SDG8000A (DC-HBW)	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.5 Vpp	1.32 Vpp	1.2 Vpp

For 50 Ohm load, divide the voltage by 2.

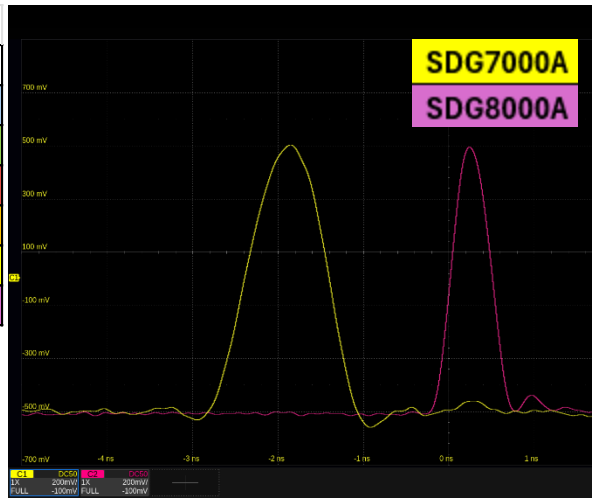
For SDG8000A, the DC-AMP option (SDG8000-DCAMP) doubles the voltage available.

SDG7000A and SDG8000A also have output settings for differential outputs.

Pulse Shape and Timing

Pulse Width / Rise & Fall times, minimum by Series

	Width	Rise / Fall Time
SDG1000X Plus	19.4 ns	10 ns
SDG2000X	16.3 ns	8.4 ns
SDG3000X	8 ns	3 ns
SDG6000X	3.3 ns	1 ns
SDG7000A	1 ns	0.5 ns
SDG8000A (AC)	0.5 ns	0.25 ns

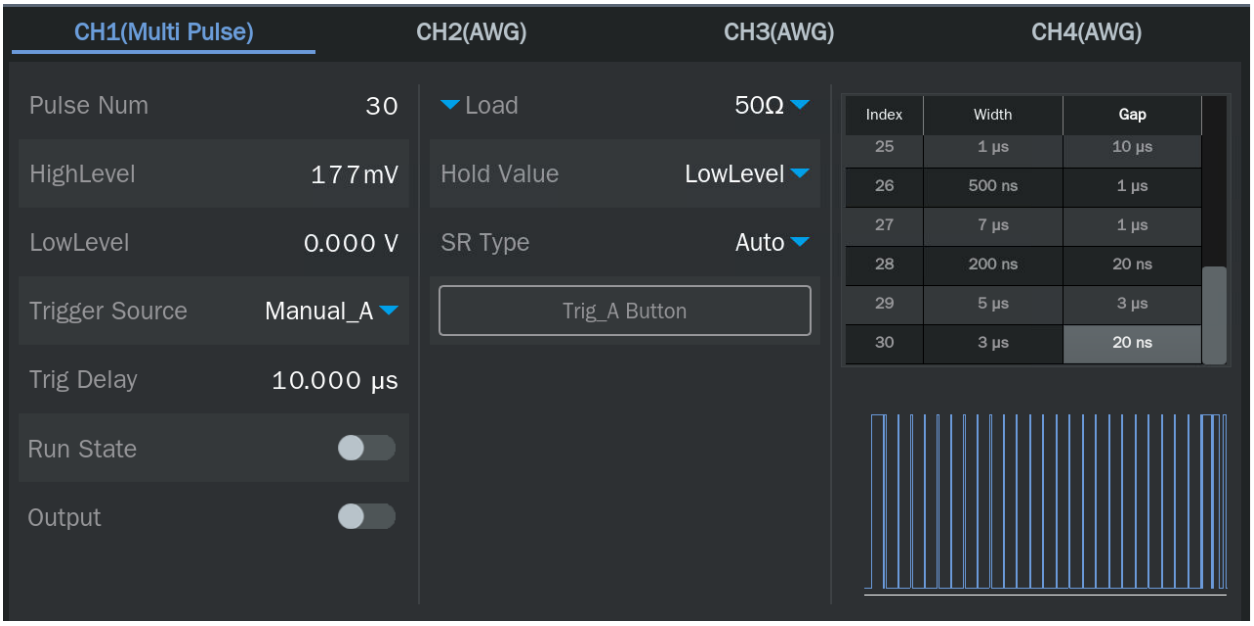


Pulse generation with customizable pulse shaping and independent rise and fall timing controls. Generate bursts of pulses as well or customize with multi-pulse options.

Multi-Pulse and Pulse sequences

Sequence up to 30 pulses with custom on and off time for each pulse sequence. Manage and trigger as a combined waveform.

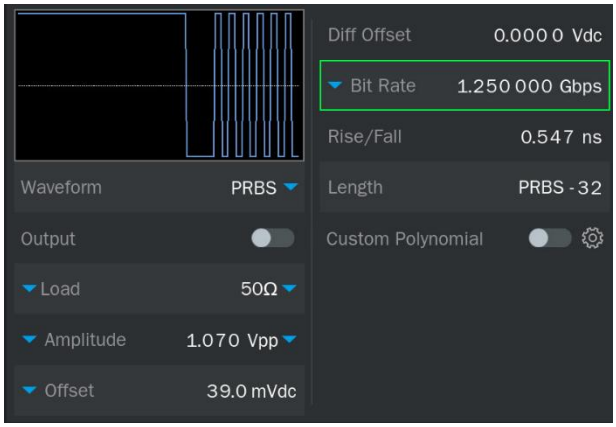
Multi-Pulse - # of Configurable Pulses	
	Pulses
SDG1000X Plus	30
SDG3000X	30
SDG6000X	30
SDG8000A	30



Pseudo-Random Bit Streams (PRBS)

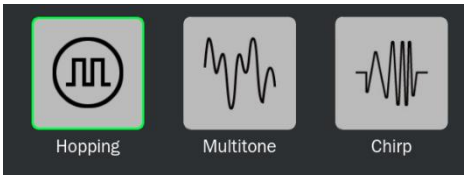
PRBS signals emulate data sequences for throughput and communication error and efficiency testing. Select a generator for bit rate and rise/fall times. Use up to PRBS-32 length signals.

PRBS Signal Generation		
	Max bit rate	**min Rise / Fall Time**
SDG1000X Plus	40 Mbps	10 ns
SDG3000X	120 Mbps	2.5 ns
SDG6000X	300 Mbps	1 ns
SDG7000A	625 Mbps	0.5 ns
SDG8000A	1250 Mbps	0.25 ns

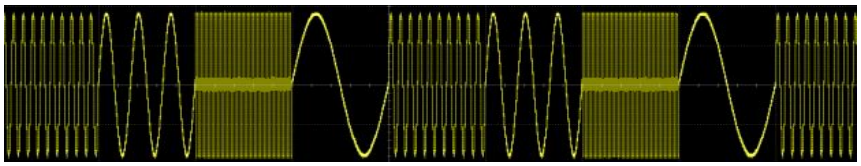


The HSS option (SDG8000-HSS) on SDG8000A enables high speed PRBS and related signals with complex signaling schemes such as PAM 4, PAM 8, and PAM 16 as well as jitter, equalization, spread spectrum, and duty cycle distortion.

Multi-Frequency Signals



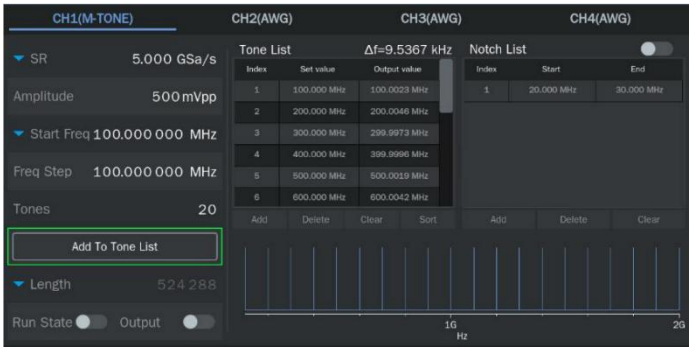
Frequency hopping, Harmonics & Multi-Tone generation, and Chirp signals

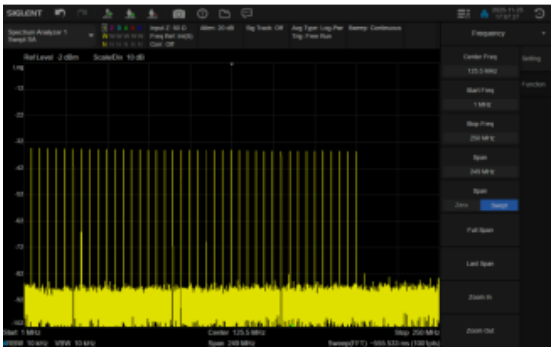


Frequency hopping is a function for communication signals where the carrier changes for security using a randomized or preset list of carrier frequencies and timing. AM modulation is supported during frequency hopping. Create a list or pattern to establish carrier frequencies.

A ***chirp*** signal sweeps through frequencies quickly – this is often used in radar and sonar applications.

Harmonics and ***multi-tone*** signals contain multiple frequencies at the same time overlayed. This can look like a comb or RF noise signal on a spectrum analyzer:





Harmonics & Multi-Frequency Signals				
	Harmonics	**Chirp**	**Hopping**	**Multi-Tone**
SDG1000X Plus	up to 16			
SDG2000X	up to 10			
SDG3000X	up to 20	Option	**X**	Option: Up to 1024 tones
SDG6000X	up to 16			
SDG7000A	up to 16		**X**	
SDG8000A	up to 20	Option	**X**	Option: Up to 1000 tones

Option models: SDG-3000X-MTONENL and SDG8000-MTONENL

Arbitrary Waveform Generation

For complex waveforms not defined by standard formulas, Siglent generators provide an arbitrary mode for outputting completely customized waveforms that are loaded by the engineer programmatically using the programming commands or the stand-alone EasyWaveX software. The SDG7000A and SDG8000A also have EasyWaveX embedded for use from the front panel.

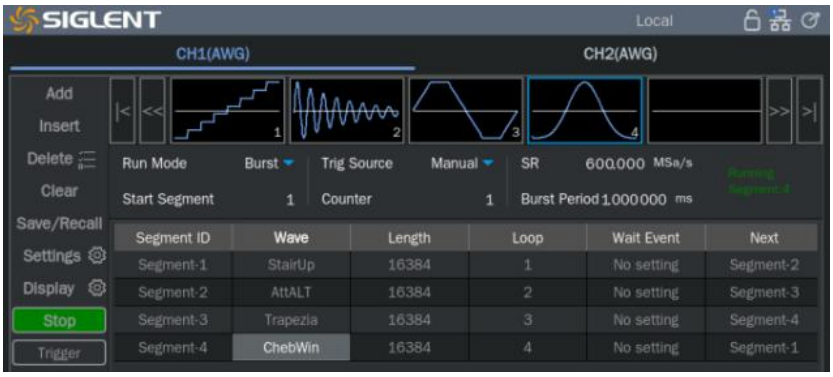
The key elements of arbitrary waves are output type, sample rate, and memory depth. The type is either TrueArb (true point-to-point) or DDS (phase-based selection of points). The rate and memory depth defines the length and bandwidth of the signal.

Arbitrary Waveform Generation

	DDS Max Sample Rate	TrueArb Max Sample Rate	Max Standard Memory Depth	Optional Memory Depth
SDG1000X Plus	250 MSa/s	250 MSa/s	8 Mpt	
SDG2000X	300 MSa/s	75 MSa/s	8 Mpt	
SDG3000X	600 MSa/s	600 MSa/s	20 Mpt	40 Mpt
SDG6000X	1200 MSa/s	300 MSa/s	20 Mpt	
SDG7000A	2500 MSa/s	2500 MSa/s	512 Mpt	
SDG8000A	5000 MSa/s	5000 MSa/s	2 Gpt	4 Gpt

Options: SDG-3000X-40MPTS and SDG8000-4GPTS

Arb Sequencing

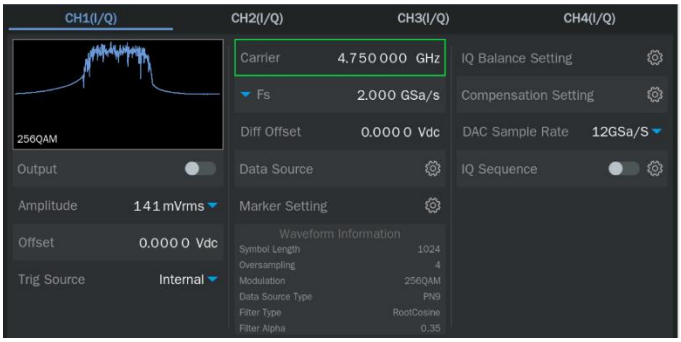


For quick sequencing of signals, such as serial data streams where the response payloads must be quickly updated, the SDG3000X, SDSG7000A, and SDG8000A provide an advanced wave sequencing toolkit. The SDG3000X and SDG7000A can organize up to 1024 segments. Engineers can set individual loop counts and next segments for each component waveform. The SDG8000A adds a multilevel segmentation option (SDG8000-Multi-Level SEQ) for even more complex outcomes. The complete 4 Gpt memory is available for organizing sequences.

IQ Signal Generation

Advanced signal generators have the ability to generate IQ data that can be output as baseband data or put directly on a carrier. Baseband data is usually connected to signal generator or transmitter to be put on carrier externally. IQ signals require the generator's IQ software option. These generators can create standard and custom IQ wave types including ASK, FSK, PSK, QAM, and Custom IQ signals.

Arbitrary Waveform Generation		
	Max IQ Symbol rate	**Max Carrier Frequency**
SDG3000X	50 Msym/s	200 MHz
SDG6000X	37.5 Msym/s	500 MHz
SDG7000A	500 Msym/s	1 GHz
SDG8000A	2 Gsa/sec	5 GHz

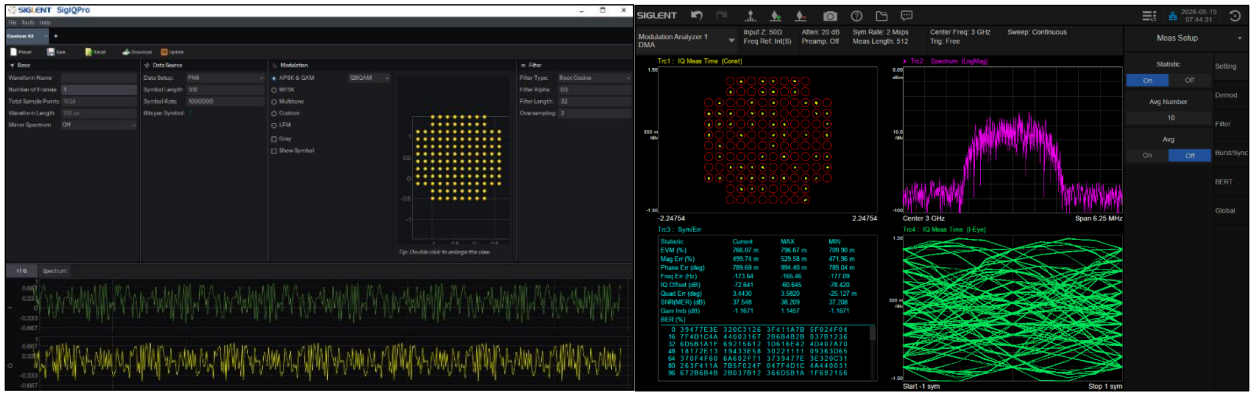


*SDG8000A has a 12 GSa/s mode for IQ only that enables carrier bandwidth to approach 5 GHz. This is available only when all channels are in on carrier IQ mode. Enable baseband output by setting the carrier to 0 Hz.

IQ mode uses 2 channels to output baseband or on carrier signals.

SigIQPro PC Software can connect to these generators to define and upload custom IQ patterns. Some advanced SigIQPro signal types are only available for the SDG7000A or SDG8000A series. This makes it possible to customize advanced waveforms for baseband and on carriers up to 5 GHz:

SigIQPro Signal Definition with a SDG8000A: SSA5000A Signal Demodulation:



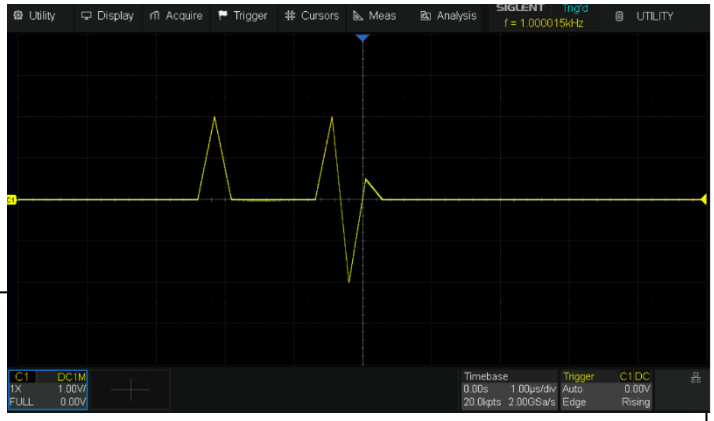
Remote Control

In addition to SigIQPro for IQ signals, Siglent waveform generators can work with EasyWaveX arbitrary waveform software. VISA based remote control via Python, LabVIEW, MATLAB, and others can be used to automate these instruments using Ethernet or USB. SDG1000X Plus, SDG3000X, SDG7000A, and SDG8000A have web browser control that duplicates the front panel.

Find programming examples, drivers, and additional support at www.siglentna.com

[Load arbs in Python]

*Large arbs can be loaded to the wavetable in 10 Mpt chunks.




```
import pyvisa
import io
import binascii
import codecs
import time
import struct

rm = pyvisa.ResourceManager()
sdg = rm.open_resource(rm.list_resources()[8])

#arb create
hlist = [0,32767,0,0,0,0,0,0,32767,-32767,8192,0,0,0,0,0]
zerolist = [0]
alist = hlist + zerolist*4080
#alist is now a list of 4096 with a quick pulse.
sdg.write("C1:OUTP OFF")
sdg.write("C1:SRATE MODE,TARB")
headersdg7 = 'C1:WVDT WVNM,"ARB6",WAVEDATA,'
header = 'C1:WVDT
WVNM,ARB6,TYPE,5,LENGTH,8192B,FREQ,1000.000000,AMPL,2.000,OFST,0.000,PHASE,0.0,WAVEDATA,'
a = bytes(header,'utf-8')
b = bytes()
b = b.join((struct.pack('h', val) for val in alist))
message = a + b
sdg.write_raw(message)
time.sleep(5)
sdg.write('C1:ARWV NAME,ARB6')
sdg.write("C1:OUTP ON")
sdg.close()
rm.close()
```

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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.