SMG1000X
Arbitrary Waveform Generator

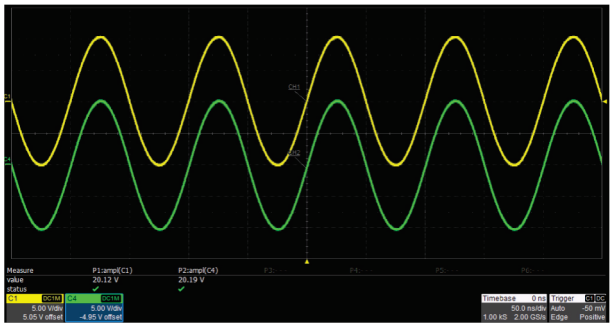
Key Features

- Dual-channel, with bandwidth up to 60MHz and amplitude up to 20Vpp
- 150MSa/s sampling rate
- 14-bit vertical resolution
- 16kps waveform length
- Lower jitter Pulse waveforms
- Square wave with frequency up to 60MHz and jitter less than 300ps+0.05ppm of period
- Analog and digital modulation types: AM, DSB-AM FM, PM, FSK, ASK, PSK and PWM
- Sweep and Burst functions
- High precision Frequency Counter
- Standard interfaces: USB Host, USB Device (USBTMC), LAN (VXI-11) Optional interface: GPIB
- 4.3" TFT-LCD display

Technical Specifications	SMG1062X	SMG1032X
Bandwidth	60MHz	30MHz
Sampling Rate	150MSa/s	
Frequency Resolution	1µHz	
Frequency Accuracy	± 25ppm	
Vertical Resolution	14 bit	
Waveform lenght	16kpts	
Num. of channels	2	
Max. Amplitude	20Vpp	
Display	4.3" display 480 x 272 x RGB	
Interface	Standard: USB Host, USB Device, LAN Optional, GPIB (USB–GPIB adaptor)	

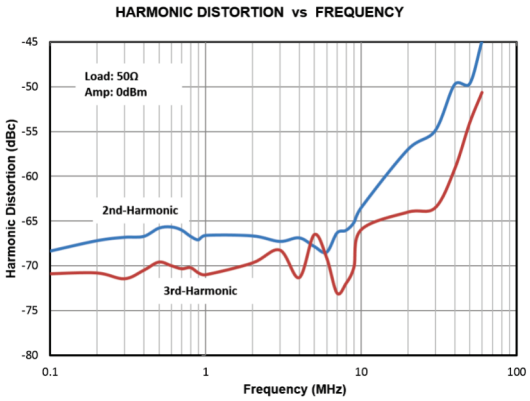
Identical dual output-channels with high performance

Capable of outputting large signals at high frequencies. dual-channels, 20 Vpp amplitude can be guaranteed at up to 10 MHz.

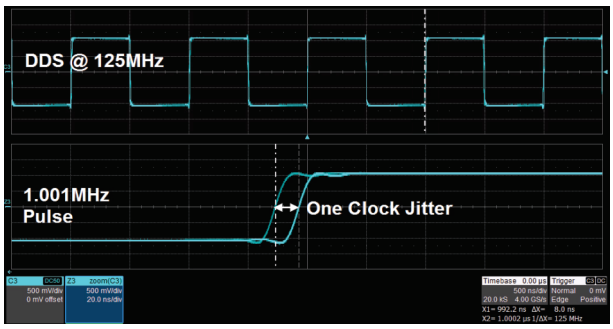


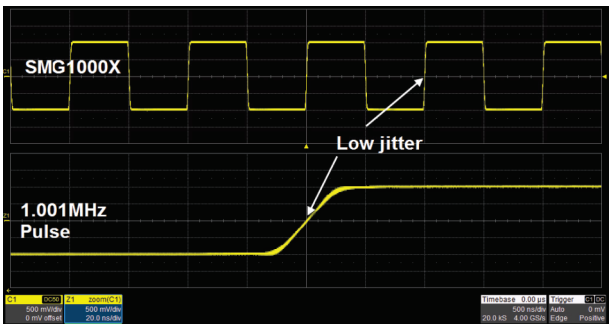
Low Distortion Output

With 0 dBm output, the THD (Total Harmonic Distortion) is less than 0.075%. Harmonics and spurs are less than -40 dBc throughout the entire bandwidth.

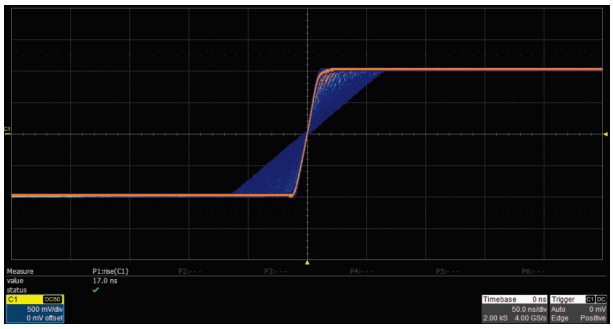


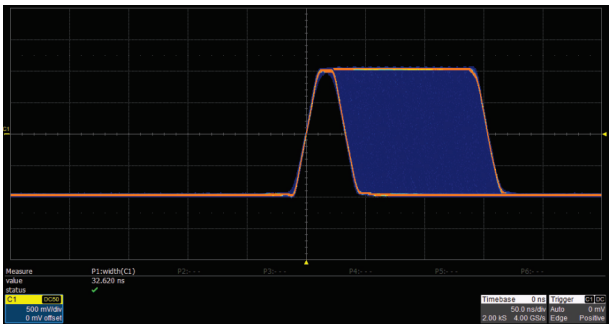
Innovative EasyPulse Technology





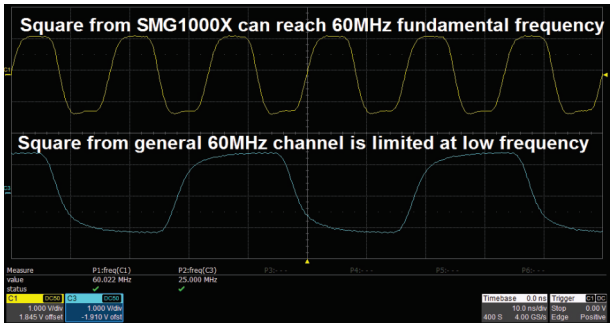
When a Pulse waveform is generated by a common DDS generator, there will be a one-clock-jitter if the sampling rate is not an integer-related multiple of the output frequency. SMG1000X Easy Pulse technology successfully overcomes this weakness in DDS designs and helps to produce low jitter Pulse waveforms.

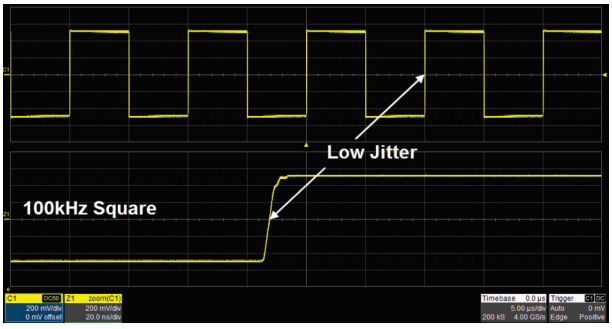




The rise/fall times can be set independently to the minimum of 16.8 ns at any frequency and to the maximum of 22.4 s. The adjustment step is as small as 100 ps. The Pulse width can be fine-tuned to the minimum of 32.6 ns with the adjustment step as small as 100 ps.

High performance Square Waves

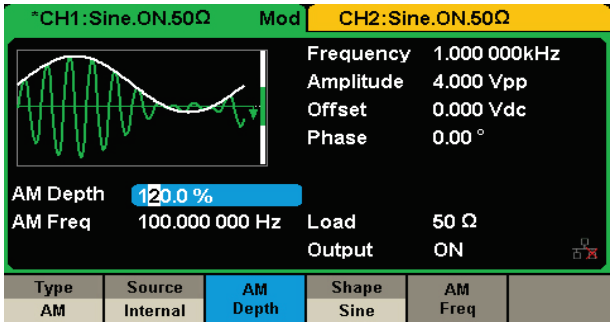




Benefitting from a special square-wave generating circuitry, the Square from the SMG1000X breaks the 60 MHz bandwidth barrier, reaching rise/fall times of less than 4.2 ns, and frequencies up to 60 MHz.

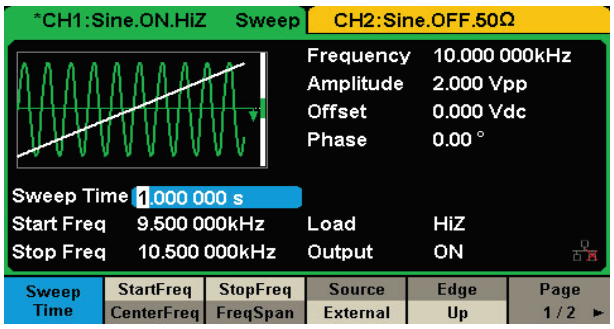
Characteristics

Modulation



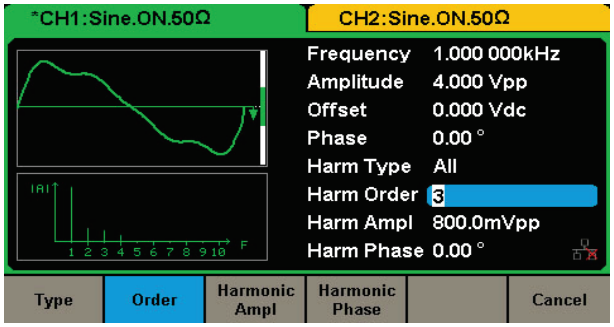
Multiple modulation types: AM, DSB-AM, FM, PM, FSK, ASK, PSK and PWM. The modulation source can be configured as “Internal” or “External”.

Sweep



Two Burst modes, “N cycle” and “Gated”. The Burst source can be configured as “Internal”, “External” or “Manual”.

Harmonics Function

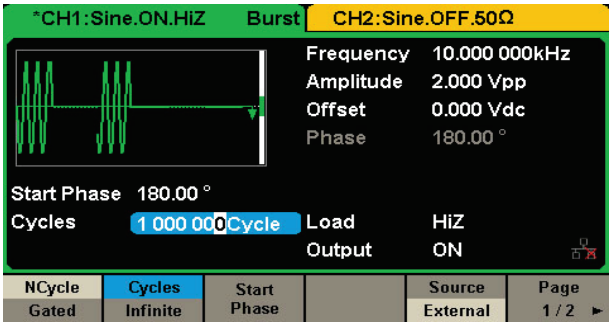


Up to 10 harmonics may be generated. Amplitude and phase of each harmonic can be set independently

Arbitrary Waveform Software EasyWave

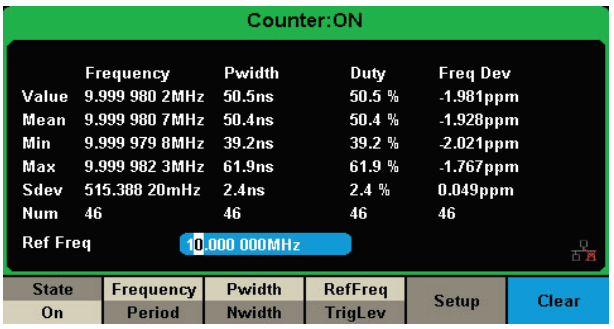
EasyWave is a powerful arbitrary waveform editing software program that supports several ways to generate arbitrary waveform such as manual drawing, linedrawing, equation-drawing, coordinate-drawing, etc. It is quite convenient for users to edit their own arbitrary waveforms through EasyWave.

Burst



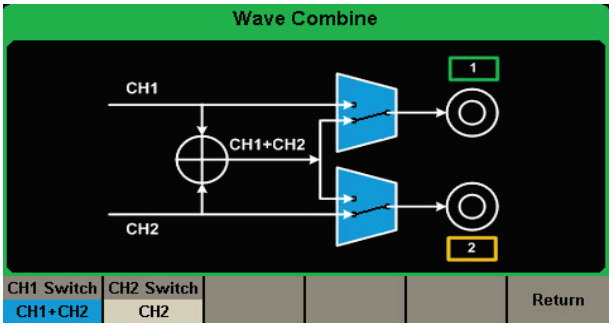
Two Burst modes, “N cycle” and “Gated”. The Burst source can be configured as “Internal”, “External” or “Manual”.

Frequency Counter

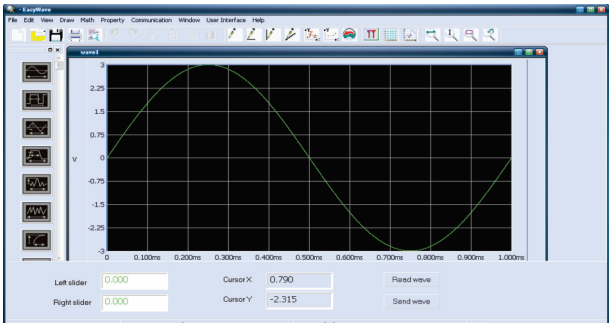


High precision Frequency Counter with an input frequency range of 0.1 Hz-200 MHz.

Waveform Combining



Capable of combining the waveforms of 2 channels from internal, providing more flexible tools to generate complex waveforms.



Specifications

All specifications apply to both channels, unless otherwise stated.
All specifications are not guaranteed unless the following conditions are met.

- The generator is within calibration period of validity.
- The generator has been working continuously for at least 30 minutes at a specified temperature (18°C−28°C)

Technical Specifications	SMG1062X	SMG1032X
Sine Characteristics		
Frequency	1μHz – 60MHz	1μHz – 30MHz
Harmonic distortion	-60 dbc 0dbm (0dbm, 0 – 10MHz) -50 dbc 0dbm (0dbm, 10 – 30MHz) -45 dbc 0dbm (0dbm, 30 – 60MHz)	
Total Harmonic Distortion	0.075% (0dBm, 10Hz – 20kHz)	
Non-harmonic spurious	-65 dBc (0dbm, 0 – 10MHz) -55 dBc (0dbm, 10 – 30MHz) -45 dBc (0dbm, 30 – 60MHz)	
Square Characteristics		
Frequency	1μHz – 60MHz	1μHz – 30MHz
Rise/fall times	4.2ns (10% – 90%, 1Vpp, 50Ω load)	3.5ns (10% – 90%, 1Vpp, 50Ω load)
Overshoot	3% (100kHz, 1Vpp, 50Ω load)	
Duty cycle	0.001 – 99.999%	
Jitter (rms), Cycle to cycle	300ps + 0.05ppm of period (1Vpp, 50Ω load)	
Pulse Characteristics		
Frequency	1μHz – 12.5MHz	
Resolution	6 digits	
Pulse width	32.6ns	
Pulse width accuracy	± (0.01% + 1ns)	
Rise/fall times	16.8ns – 22.4s (10% – 90%, 1Vpp, 50Ω load, Subject to pulse width limits)	
Overshoot	3% (100kHz, 1Vpp)	
Duty Cycle	0.001 – 99.999%	
Duty cycle resolution	0.001%	
Jitter (rms) cycle to cycle	300ps + 0.05ppm of period (1Vpp, 50Ω load)	
Noise Characteristics		
-3db Bandwidth	60MHz	
Ramp Characteristics		
Frequency	1μHz – 500kHz	
Symmetry	0 – 100%	
Linearity	1% (Percentage of peak – peak output, 1kHz, 1Vpp, 100%)	
Arbitrary Wave characteristics		
Frequency	1μHz – 6MHz	
Waveform length	16kpts	
Sampling rate	150MSa/s	
Vertical solution	14bit	
Jitter (pk–pk)	6.7ns	
Built in Arb waveform types	196	
DC Characteristics		
Range	± 10V (Hiz load) ± 5V (50Ω load)	
Accuracy	± (1% + 3mV) Hiz load	

Harmonic Characteristics	
Order	10
Type	Odd, Even, All
Output Characteristics	
Range	4mVpp – 20Vpp (≤10MHz, HiZ load), 4mVpp – 10Vpp (>10MHz, HiZ load) 2mVpp – 10Vpp (≤10MHz, 50Ω load), 2mVpp – 5Vpp (>10MHz, 50Ω load)
Accuracy	± (1%+1mVpp) 10kHz, sine, 0V offset
Amplitude flatness	± 0.3dB (50Ω load, 2.5Vpp, compare to 10kHz sine)
Output Impedance	50Ω (10kHz sine) ± 0.5Ω
Output current	± 200mA
Crosstalk	-70dBc (CH1– CH2) / (CH2 – CH1)
Modulation Characteristics	
AM	
Carrier	Sine, Square, Ramp, Arb
Modulation Source	Internal/External
Modulating Wave	Sine, Square, Ramp, Noise, Arb.
Modulation depth	0 – 120%
Modulation frequency	1mHz – 20kHz (While modulation source is ”Internal”)
FM	
Carrier	Sine, Square, Ramp, Arb
Modulation Source	Internal/External
Modulating Wave	Sine, Square, Ramp, Noise, Arb.
Frequency deviation	0 – 0.5*BW (BW is limited by the max. output frequency)
Modulation frequency	1mHz – 20kHz (While modulation source is “Internal”)
PM	
Carrier	Sine, Square, Ramp, Arb
Modulation Source	Internal/External
Modulating Wave	Sine, Square, Ramp, Noise, Arb.
Phase deviation	0 – 360°
Phase Noise, Typical	- 125 dBc/Hz at 10 kHz
Modulation frequency	1mHz – 20kHz (While modulation source is “Internal”)
ASK	
Carrier	Sine, Square, Ramp, Arb
Modulation Source	Internal/External
Modulating Wave	Square with 50% duty cycle
Keying frequency	1mHz – 50kHz (Limited by frequency setting while modulation source is “Internal”)
FSK	
Carrier	Sine, Square, Ramp, Arb
Modulation Source	Internal/External
Modulating Wave	Square with 50% duty cycle
PWM	
Carrier	Pulse
Modulation Source	Internal/External
Modulating Wave	Sine, Square, Ramp, Noise, Arb
Modulation frequency	1mHz – 1MHz (while modulation source is “Internal”)
Pulse width deviation resolution	6.67ns

Burst Characteristics	
Carrier	Sine, Square, Ramp, Pulse , Noise, Arb.
Type	Count (1–1000000 cycles), Infinite, Gated
Carrier Frequency	2mHz – BW (BW is the max. output frequency)
Start/Stop phase	0 – 360°
Internal period	1µs – 1000s
Trigger Source	Internal, External, Manual
Gated Source	Internal / External,
Trigger delay	100s
Sweep Characteristics	
Carrier	Sine, Square, Ramp, Pulse , Arb
Type	Linear, Log
Direction	Up, Down
Carrier frequency	1µHz – BW (BW is the max. output frequency)
Sweep time	1ms – 500s
Trigger Source	Internal, External, Manual
Frequency Counter Characteristics	
Function	Frequency, Period, Positive/ Negative pulse width, Duty Cycle
Coupling mode	AC, DC, HF REJ
Frequency range	100mHz – 200MHz (DC coupling)
	10mHz – 200MHz (AC coupling)
Input amplitudes	100mVrms to ± 2.5V (DC coupling, <100 MHz) 200mVrms to ± 2.5V (DC coupling, 100 MHz – 200 MHz) 100mVrms to 5Vpp (AC coupling, <100 MHz) 200mVrms to 5Vpp (AC coupling, 100MHz – 200MHz)
Input Impedance	1MΩ
Reference Clock Input / Output	
Reference Clock Input	
Frequency	10MHz
Amplitudes	1.4Vpp
Input impedance	5kΩ (AC coupling)
Reference Clock Output	
Frequency	10MHz (Synchronized to Internal reference clock)
Amplitudes	2Vpp – 3.3 Vpp (Hiz load)
Output impedance	50Ω
Auxillary In/Out Characteristics	
Trigger Input	
V_{IH}	2V to 5.5V
V_{IL}	-0.5V to 0.8V
Input impedance	100kΩ
Pulse width	100ns
Response time	100ns sweep, 600ns Burst
Trigger Output	
V_{OH}	3.8V (I_{OH} = – 8mA)
V_{OL}	0.44V (I_{OL} = 8mA)
Output impedance	100Ω
Frequency	1MHz

Sync Output	
V_{OH}	3.8V (I_{OH} = –8mA)
V_{OL}	0.44V (I_{OL} = 8mA)
Output impedance	100Ω
Input impedance	500ns
Frequency	1MHz
Auxiliary In / Out Characteristics	
Modulation Input	
Frequency	0 – 50kHz
Intput impedance	10kΩ
Amplitude @100% Modulation depth	11 to 13Vpp
General Characteristics	
Voltage	100 – 240Vrms (± 10%) 50 / 60Hz 100 – 120Vrms (± 10%) 400Hz
Power consumption	21W (typ.) 50 W Max. (Dual)
Display	
Color depth	24bit
Contrast ratio	350:1
Luminance	300 cd/m^2
Environment	
Operation Temperature	0 – 50°C
Storage Temperature	-20 – 60°C
Operating humidity	5 – 90% (≤30°C), 5 – 50% (40°C)
Non–operating humidity	5 – 95%
Operating attitude	3048m (≤30°C)
Non–Operating attitude	15000m
Calibration Interval	1 Year
Dimension	W : 260.3mm, H : 107.2mm, D : 295.7mm
Net Weight	3.43 Kg
Gross Weight	4.35 Kg
Compliance	
LVD	IEC 61010–1–2010
EMC	EN61326–1:2013
Accessories	Power Cord, BNC–BNC Cable, USB Cable, CD (Manual, Datasheet & Software)

Subject to Change

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Scientific Mes-Technik Pvt. Ltd.

B-14, Pologround, Industrial Estate, Indore 452 015, India

0731-2422330/31/32/33 **0731-2422334** **sales@scientificindia.com** **www.scientificindia.com**

Bengaluru	080-23452635	bangalore@scientificindia.com	
Chennai	044-42054180	chennai@scientificindia.com	
Gujarat	+917567463752	gujarat@scientificindia.com	
Hyderabad	+917095228811	hyderabad@scientificindia.com	
Kolkata	+919673162333	kolkata@scientificindia.com	
Mumbai	+919850901735	mumbai@scientificindia.com	
New Delhi	+918889912554	ndelhi@scientificindia.com	
Pune	+919850901735	pune@scientificindia.com	