20 MHz/10MHz/7MHz/4MHz DDS Function Generator

SFG-2100 Series (20/10/7/4 MHz)

The SFG-2000/2100 Series' function generators are available in 4MHz, 7MHz, 10MHz and 20MHz frequencies. The SFG-2100 Series include additional sweep (Lin / Log), AM / FM modulation and external counter functions. Based on Direct Digital Synthesized (DDS) technology and unique FPGA design, this series supports output frequencies of up to 20MHz with low distortion and a frequency resolution of 0.1Hz. With above functions and features, the SFG-2000 and 2100 Series are able to provide highly accurate, stable, powerful waveform outputs suitable for a wide variety of applications such as calibration and adjustment sources for electronic devices. SFG-2000 Series consists of the SFG-2004/2007/2010/2020 while the SFG-2100 Series consists of SFG-2104/2107/2110/2120 models.

SFG-2000 Series (20/10/7/4 MHz)

FEATURES

* DDS Technology and FPGA Chip Design
* Frequency Range:0.1Hz~4/7/10/20 MHz
* High Frequency Accuracy : ±20ppm
* High Frequency Stability : ±20ppm
* Frequency Resolution : 100mHz
* Low Distortion Sine Wave : -55dBc, 0.1Hz ~ 200kHz
* Front Panel Setting Save/Recall with 10 Groups of Setting Memories
* Built-in 9 Digits, 150MHz/High Resolution Counter (SFG-2100 Series Only)
* INT/EXT AM/FM Modulation (SFG-2100 Series Only)
* LIN/LOG Sweep Mode (SFG-2100 Series Only)

SPECIFICATIONS

	SFG-2000 Series				SFG-2100 Series			
MAIN								
	SFG-2004	**SFG-2007**	**SFG-2010**	**SFG-2020**	**SFG-2104**	**SFG-2107**	**SFG-2110**	**SFG-2120**
Frequency								
Range(For Sine, Square)	0.1Hz~ 4MHz	0.1Hz~ 7MHz	0.1Hz~ 10MHz	1Hz~ 20MHz	0.1Hz~ 4MHz	0.1Hz~ 7MHz	0.1Hz~ 10MHz	1Hz~ 20MHz
Range(For Triangle)	0.1Hz~1MHz (1Hz ~ 1MHz for SFG-2020/2120)							
Resolution	0.1Hz (1Hz for SFG-2020/2120)							
Stability	±20 ppm							
Accuracy	±20 ppm							
Aging	±5 ppm / year							
Output Function	Sine, Square, Triangle							
Amplitude Range	2mVpp ~ 10Vpp(into 50Ω load)							
Impedance	50Ω±10%							
Attenuator	-20dB±1dBx2							
DC Offset	<-5V ~ >+5V(into 50Ω load)							
Duty Control	20% to 80% , 2Hz ~ 1MHz (Square wave only)							
Range Resolution	1%							
Display	9 digits LED display							
SINE WAVE								
Harmonics Distortion	-55dBc,0.1Hz～200kHz; -40dBc,0.2MHz～4MHz; -30dBc,4MHz～10MHz (Specification applied to both TTL/CMOS OFF and from MAX. to 1/10 level)							
Flatness(Relative to 1kHz)	<±0.3dB, 0.1Hz~1MHz; <±0.5dB, 1MHz~4MHz; <±2dB, 4MHz~10MHz							
TRIANGLE WAVE								
Linearity	≥98%,0.1Hz～100kHz;≥95%,100kHz～1MHz							
SQUARE WAVE								
Symmetry	±1% of period + 4ns, 0.1Hz～100kHz							
Rise or Fall Time	≤25ns at maximum output.(into 50Ω load)							
CMOS OUTPUT								
Level	4Vpp±1Vpp～15Vpp±1Vpp adjustable; Rise or Fall Time≤120ns							
TTL OUTPUT								
Level	≥3Vpp							
Fan Out	20 TTL load							
Rise and Fall Time	≤ 25ns							
SWEEP OPERATION								
Rate	—				100:1 ratio max. and adjustable(*)			
Time					1Sec～30Sec adjustable(**)			
Mode					Lin./Log. switch selector			
AMPLITUDE MODULATION								
Depth & Modulation	—				0～100% ; 400Hz(INT),			
Frequency					DC～1MHz(EXT)			
Carrier BW					100Hz～5MHz(-3dB)			
EXT Modulation Sensitivity					≤10Vpp for 100%modulation			
FREQUENCY MODULATION								
Deviation & Modulation	—				≥±50kHz,center at 1MHz,			
Frequency					400Hz fixed(INT),1kHz fixed(EXT)			
EXT Modulation Sensitivity					≤10Vpp for 10% modulation(center at 1kHz)			
FREQUENCY COUNTER								
Range	—				5Hz～150MHz			
Accuracy					Time base accuracy±1count			
Time base					±20ppm(23℃±5℃)after 30 minutes warm up			
Resolution					100nHz for 1Hz ; 0.1Hz for 100MHz			
Input Impedance					1MΩ/150pf			
Sensitivity					≤35mVrms (5Hz~100MHz) ≤45mVrms (100MHz~150MHz)			

NOTE : 1.(*) In order to get the maximum sweep span, the sweep time needs to be tuned on when adjusting the sweep span.
2.(**) When the sweep time is too long, the stop frequency will reach and stay at the maximum frequency of the instrument until the end of the sweep cycle.

SFG-2100 Series

Rear Panel

SPECIFICATIONS

	SFG-2000 Series				SFG-2100 Series			
	SFG-2004	SFG-2007	SFG-2010	SFG-2020	SFG-2104	SFG-2107	SFG-2110	SFG-2120
STORE/RECALL FUNCTION								
	10 groups of panel settings							
POWER SOURCE								
	AC115V±10%, AC230V+10%/-15%, 50/60Hz							
DIMENSION & WEIGHT								
	266(W)x107(H)x293(D) mm; Approx. 3.1kg				266(W)x107(H)x293(D) mm; Approx. 3.2kg			

ORDERING INFORMATION

SFG-2004 4MHz DDS Function Generator
SFG-2007 7MHz DDS Function Generator
SFG-2010 10MHz DDS Function Generator
SFG-2020 20MHz DDS Function Generator
SFG-2104 4MHz DDS Function Generator with Counter, Sweep & AM, FM Modulation
SFG-2107 7MHz DDS Function Generator with Counter, Sweep & AM, FM Modulation
SFG-2110 10MHz DDS Function Generator with Counter, Sweep & AM, FM Modulation
SFG-2120 20MHz DDS Function Generator with Counter, Sweep & AM, FM Modulation

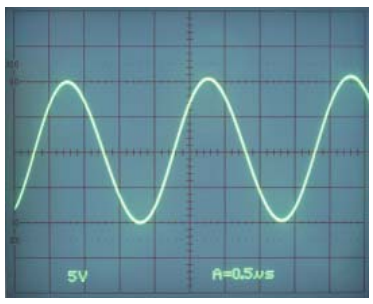
ACCESSORIES :
User manual x 1, Power Cord x 1
GTL-101 test lead x 1 (SFG-2000 Series)
GTL-101 test lead x 2 (SFG-2100 Series)

SELECTION GUIDE

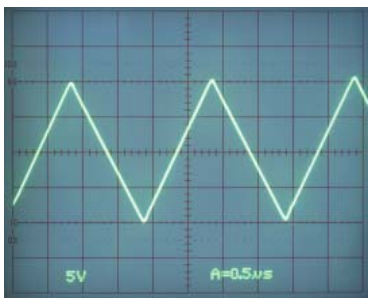
FREQUENCY RANGE	4MHz		7MHz		10MHz		20MHz	
MODEL	SFG-2004	SFG-2104	SFG-2007	SFG-2107	SFG-2010	SFG-2110	SFG-2020	SFG-2120
DUTY	✓	✓	✓	✓	✓	✓	✓	✓
TTL/CMOS	✓	✓	✓	✓	✓	✓	✓	✓
DC OFFSET	✓	✓	✓	✓	✓	✓	✓	✓
LIN/LOG SWEEP		✓		✓		✓		✓
AM/FM MODULATION		✓		✓		✓		✓
EXT COUNTER		✓		✓		✓		✓

20MHz/10MHz/7MHz/4MHz DDS Function Generator

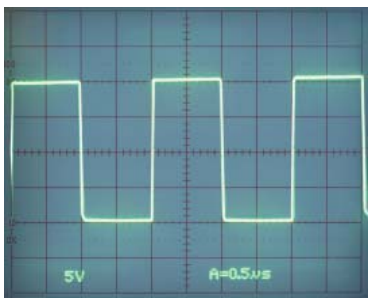
A. OUTPUT WAVEFORM



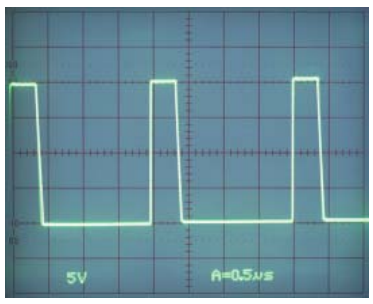
Sine Waveform



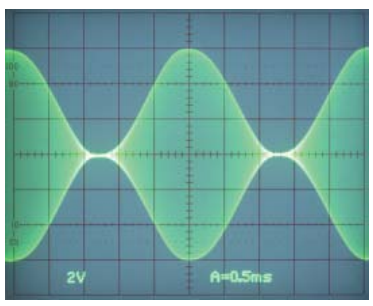
Triangle Waveform



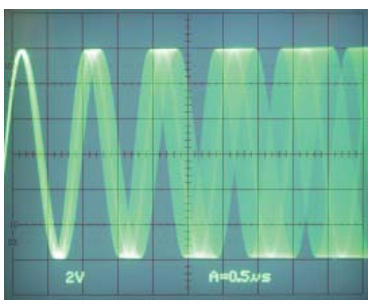
Square Waveform



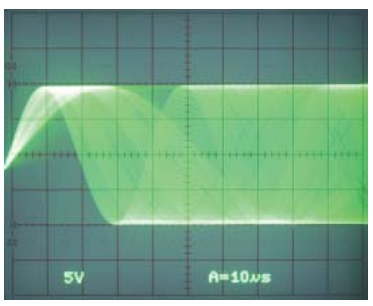
Pulse Waveform



AM Modulated Waveform



FM Modulated Waveform

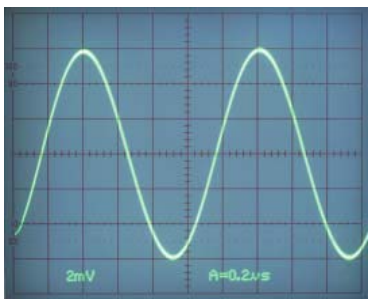


Sweep Waveform

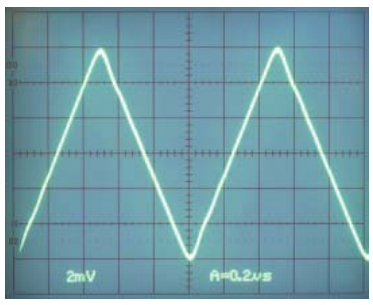
The SFG-2000/2100 Series provide Sine, Triangle and Square waveforms with DC offset and variable duty cycle at± 20ppm frequency stability and accuracy. The low drift rate and -55dBc low sine wave distortion output significantly extend product application range in various market sectors.

The TTL/CMOS output is also available for fulfilling various requirements. In addition to the basic functions, The SFG-2100 Series provide advanced functions such as AM/FM modulation, sweep mode, and Built-In Frequency Counter.

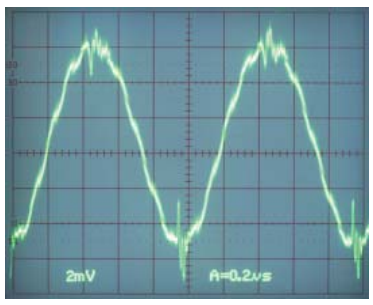
B. DDS FG VS. CONVENTIONAL FG

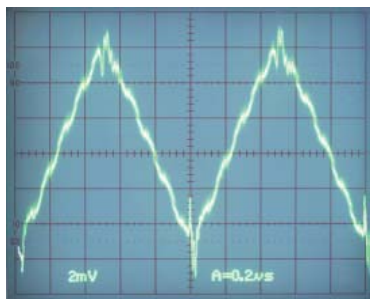


GW Instek SFG DDS Sine Wave & Triangle Wave



Conventional Function Generator Sine Wave & Triangle Wave





The SFG-2000/2100 Series generates signals by continuously delivering a series of sampling values from a sine waveform table (stored in RAM) to DAC (Digital to Analog Converter) for waveform construction. With a low pass filter circuit to filter out the harmonics of the DAC output and smooth the signal, the SFG-2000/2100 Series is able to provide a stable output with very low waveform distortion. This is very different from the way a conventional FG generates a signal. Since a conventional FG needs to obtain its signal by switching current sources between positive and negative directions all the time, the "Ringing" distortion occurs at the peak of the signal waveform where the switching is activated. This distortion is especially serious when the output amplitude is low. For the SFG-2000/2100 DDS FG, however, the waveform distortion remains low even when the output amplitude is at only 2mVpp.