SFG2000/2100 DDS Function Generator Announcement letter

GWinstek, one of the main suppliers of Function Generators in the global market, is announcing a new series of Direct Digital Synthesis Function Generator SFG-2000/2100 developed based on DDS and FPGA technologies. ***The*** SFG-2000/2100 ***series are built to provide excellent quality waveforms at conventional Function Generator price.*** In the world of signal sources, there is always a tradeoff between price and signal quality; however, SFG-2000/2100 well fit in a very unique position to offer the best performance/price choice among all the similar products available in the market today.

When you choose a Conventional Function Generator (FG) as your signal source, you have to tolerate the ***Frequency Drifts & Signal Distortion*** all the time. Without synthesized generator circuit, a conventional FG just couldn't stop its frequency drift even after hours of warm-up. More over, the ringing distortion, normally found at the peak of the waveform, makes the signal output of a conventional FG far from a perfect signal source. If you tend to look for a stable frequency & low distortion source, you have to go for either PLL (phase-locked loop) based equipment or an AWG (arbitrary waveform generator) with DDS design. In either case, a high price is the cost for you to get a good source, which sometimes exceeds what you really need for not-so-complicated applications. In the light of our market survey, there are huge demands for Accurate & Low Distortion Function Generators, which fit the non-programmable applications in various market sectors. The SFG-2000/2100 DDS Function Generators are built to meet these market requirements at an extremely competitive price. Both SFG-2000 series and SFG-2100 series include three members in each family at the bandwidths of 4MHz, 7MHz and 10MHz respectively. The three SFG-2000 models are equipped with basic features of DDS Function Generator, whereas the three SFG-2100 models are advanced products with additional functions of Sweep, AM/FM Modulation, and External Counter. In consequence of the ±20ppm stability and accuracy of the output frequency, SFG-2000/2100 well fit a wide variety of applications, such as signal generator for experiment labs, reference signal for PLL(Phase Locked Loop), and calibration and adjustment source for electronic devices.

Enclosed please find the detailed SFG-2000/2100 information including the sections of Outlook, Front Panel, Rear Panel, Main Features, Selection Guide, DDS Principle, Waveform Comparison, Applications, Specifications and After service. Please note that SFG-2000/2100 series are designed to meet high accuracy but non-programmable applications at an affordable price. There will be neither programmable interface, nor software support available for this series of products. In the application areas where programmability is needed, SFG-830 will be a good choice instead of SFG-2000/2100.

You will find the high performance/price value the key momentum to move SFG-2000/2100 series DDS Function Generators into the market. Should you need any further information or support from us for SFG-2000/2100 promotion, please don't hesitate to let us know.

Marketing Department, Good Will Instrument **E-mail:** marketing@goodwill.com.tw

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SFG-2000/2100

Outlook

SFG-2000 series

SFG-2100 series

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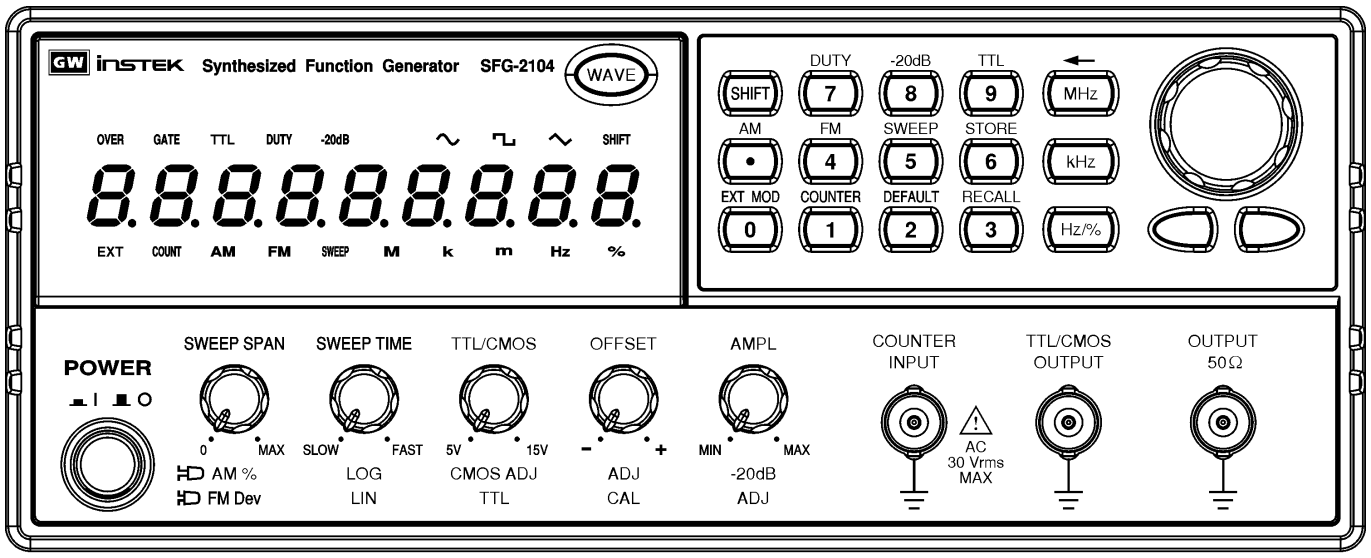
Front panel (SFG-2104)



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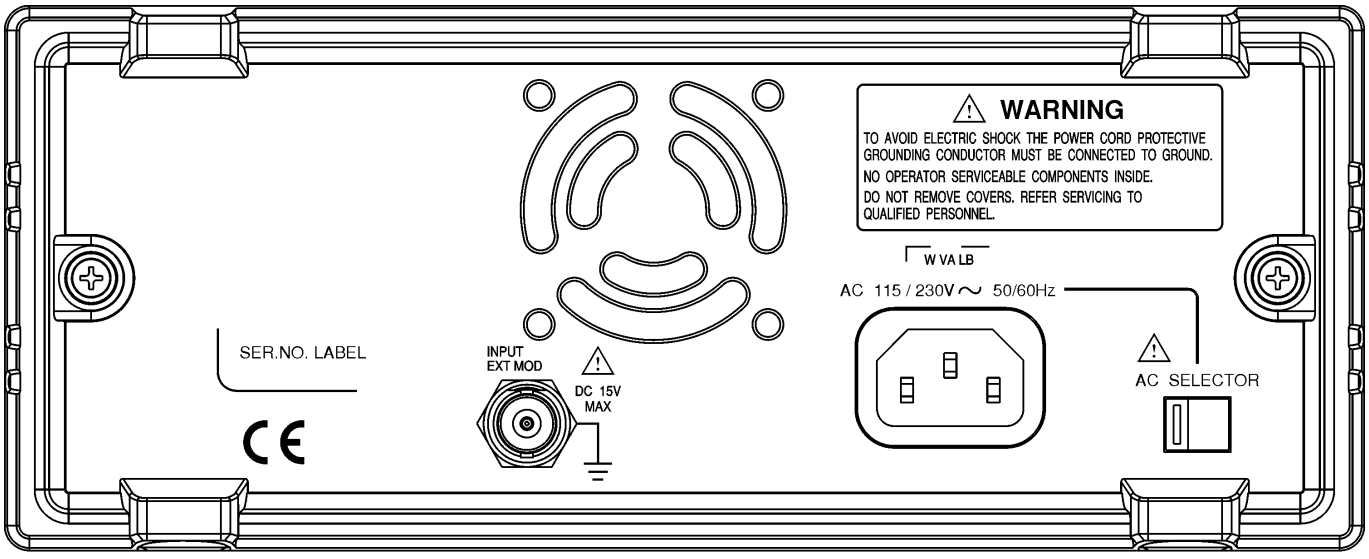
Rear Panel



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Main Features

- DDS technology and FPGA design
- Frequency Range: 0.1Hz to 4/7/10 MHz
- Frequency Accuracy and Stability: ±20 ppm
- Frequency Resolution: 100mHz
- Low Distortion: -55dBc, 0.1Hz to 200kHz, sine wave
- Front panel setting Save/Recall up to 10 memories
- Variable DC offset control
- Two built-in 20dB Attenuators
- Output overload protection
- TTL/CMOS output
- Digital user interface for frequency and duty operations
- 150MHz, 9 digit frequency counter (SFG-2100 only)
- AM/FM, INT/EXT Modulation (SFG-2100 only)
- LIN/LOG Sweep Mode (SFG-2100 only)

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Selection Guide

The following table shows the output frequency range and key features of each individual product of SFG-2000/2100 series. The SFG-20xx models are DDS FG with basic features, and the SFG-21xx models are advanced FG with additional features of Sweep, AM/FM Modulation, and External Frequency Counter. The last two digits of each product nomenclature indicate the frequency range of the unit. xx04 is for 4MHz, xx07 is for 7MHz and xx10 is for 10MHz respectively.

MODEL / Features	SFG-2004	SFG-2007	SFG-2010	SFG-2104	SFG-2107	SFG-2110
Frequency	4MHz	7MHz	10MHz	4MHz	7MHz	10MHz
Duty Cycle Control	●	●	●	●	●	●
TTL/CMOS	●	●	●	●	●	●
DC Offset	●	●	●	●	●	●
AM/FM				●	●	●
Sweep				●	●	●
Counter				●	●	●

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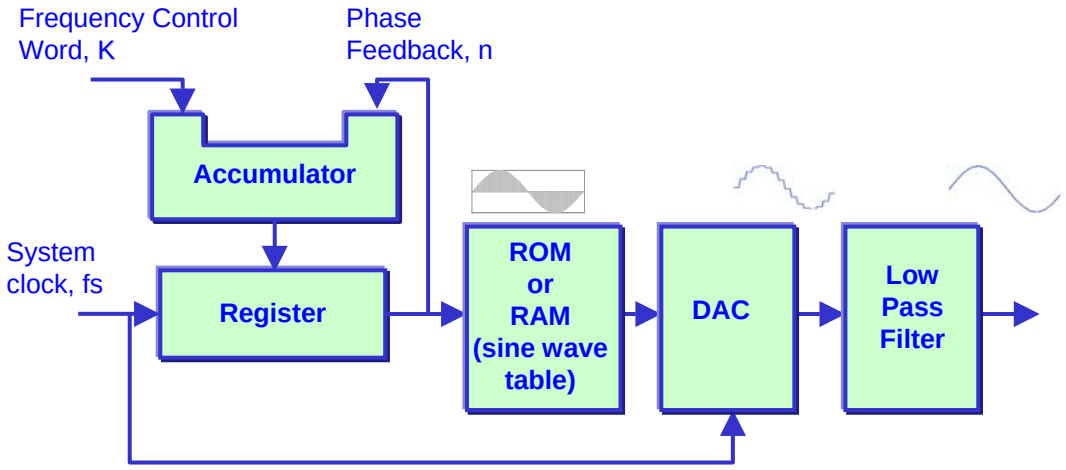
DDS Circuit Blocks & Principle



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DDS frequency synthesizer consists of Phase Accumulator, lookout table (ROM or RAM), Digital-to-Analog Converter (DAC) and Low Pass Filter (LPF). The K factor is the figure to decide the frequency of signal output. In the beginning of each waveform cycle (the first waveform point), the phase accumulator starts with K & 0 inputs and K+(0)K= 1K output. The accumulator then adds 1K with its output for the next clock cycle (fs). The output of the accumulator becomes K+(1)K= 2K for the second clock cycle. When time goes on the accumulator output will be in a stream of 1K, 2K, 3K….(n)K. The Accumulator output is used to position the data in the lookout table and form a data word stream. The DAC will convert this data word stream into analog waveform with staircase envelope. The following LPF then smoothes the staircase envelope by filtering out the clock signal to form the pure sine wave.

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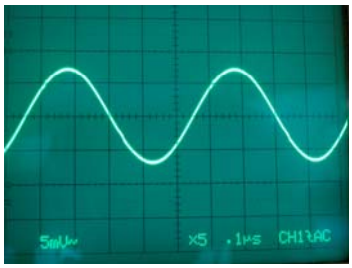
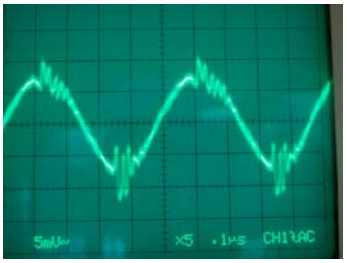
Waveform Comparison

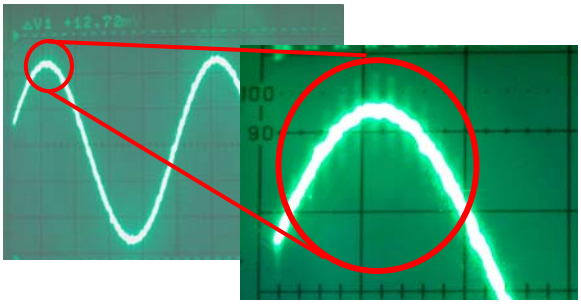
Pure Sine Wave



Ringing Noises



Digital Spikes (Agilent 33250A)



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Applications for SFG-2000/2100

- Reference signal of PLL system
- Source of Vibration Test
- Electronic Circuit/ Device testing
- Ultrasonic Device and Servo System testing
- Training School

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Specifications

MODEL	SFG-2000 SERIES			SFG-2100 SERIES		
	2004	2007	2010	2104	2107	2110
1. Main						
Output Function	Sine, Square, Triangle					
Frequency Range (For Sine, Square)	0.1Hz | 4MHz	0.1Hz | 7MHz	0.1Hz | 10MHz	0.1Hz | 4MHz	0.1Hz | 7MHz	0.1Hz | 10MHz
Frequency Range (For Triangle)	0.1Hz | 1MHz					
Resolution	0.1Hz					
Stability	±20ppm					
Accuracy	±20ppm					
Aging	±5ppm/year					
Amplitude Range	10Vp-p (into 50Ω load)					
Impedance	50Ω±10%					
Attenuator	-20dB±1dB×2					
DC Offset	＜-5V to ＞5V (into 50Ω load)					
Duty Control Range	20% to 80% below 1MHz (for square wave only)					
Resolution	1%					
Display	9-digit LED display					
2. Sine Wave						
Harmonics Distortion	From Amplitude control at maximum position without any attenuation to its 1/10 of any combination setting, TTL/COMS off. ≧-55dBc, 0.1Hz to 200kHz ≧-40dBc, 0.2MHz to 4MHz ≧-30dBc, 4MHz to 10MHz					
Flatness (relative to 1kHz)	＜±0.3dB, 0.1Hz to 1MHz ＜±0.5dB, 1MHz to 4MHz ＜±2dB, 4MHz to 10MHz					
3. Triangle Wave						
Linear	≧98%, 0.1Hz to 100kHz ≧95%, 100kHz to 1MHz					
4. Square Wave						
Symmetry	±1% of period + 4ns to 0.1Hz to 100kHz					
Rise or Fall Time	≦25ns at maximum output. (into 50Ω load)					
5. CMOS Output						
Level	4 ± 1Vp-p to 14.5 ± 0.5Vp-p, adjustable					
Rise or Fall Time	≦120ns					
6. TTL Output						
Level	≧3Vp-p					
Fan Out	20 TTL load					
Rise r Fall Time	≦25ns					

MODEL	SFG-2000 SERIES			SFG-2100 SERIES		
	2004	2007	2010	2104	2107	2110
7. Sweep Operation						
Sweep Rate	----------			100:1 ratio maximum adjustable **(Note 1)**		
Sweep Time	----------			1 to 30 seconds adjustable **(Note2)**		
Sweep Mode	----------			Linear and Logarithmic mode selector		
8. Amplitude Modulation						
Depth	----------			0 to 100%		
Modulating Frequency	----------			400Hz (internal), DC to 1MHz (external)		
Carrier BW	----------			100Hz to 5MHz (-3dB)		
External Modulating Sensitivity	----------			≦10Vp-p for 100% modulation		
9. Frequency Modulation						
Deviation	----------			0 to ±5% (center at 1MHz)		
Modulating Frequency	----------			**400Hz fixed (internal) 1kHz fixed (external)**		
External Modulating Sensitivity	----------			≦10Vp-p, for 10% modulation (center at 1MHz)		
10.Frequency Counter						
Range	----------			5Hz to 150MHz		
Accuracy	----------			Time base accuracy ±1count		
Time base	----------			±20ppm (23℃ ± 5℃) after 30 minutes warm up		
Resolution	----------			The maximum resolution is: 100nHz for 1Hz, 0.1Hz for 100MHz.		
Input Impedance	----------			1MΩ/150pf		
Sensitivity	----------			≦35mVrms (5Hz to 100MHz) ≦45mVrms (100MHz to 150MHz)		
11. Store/Recall Function						
Size	10 groups of setting memories					
12. General						
Power Source	AC115V, 230V + 10%, -15%, 50/60Hz					
Storage Temperature & Humidity	-10℃ to 70℃. 70% (Maximum).					
Accessories	GTL-101×1 Instruction manual×1			GTL-101×2 Instruction manual×1		
Dimension	107(W)×266(H)×293(D) mm					
Weigh	Approx. 3.1kg			Approx. 3.2kg		

Note 1: In order to get the maximum sweep span, the sweep time needs to be adjusted to reach the highest sweep frequency.

Note: 2: When the sweep time is too long, the sweep frequency will stop and stay at the maximum frequency until the end of the sweep cycle.

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After Service

The SFG-2000/2100 series products carry 1 year standard warranty.

A service manual of the products will be available to facilitate the service job whenever a defect is found and the product is returned from the customer for repair.

- Component level repair

  The component level repair could be done on some of the circuit blocks like power amplifier, which is also the most fragile part of a product. A spare part list will be provided upon request for service capability building at the distributor site.

- Firmware upgrade

  Should the firmware upgrade on the product is needed, a special cable (JTAG) will be available to make this job done. Please contact GW service department for ordering this cable.

- Board swapping repair

  The whole circuitry of SFG-2000/2100, except keyboard and display, is based on a one-board design with high-density component layout. Once the defect is found on the critical part of the circuitry, the main board can be easily disassembled and replaced.

All the service support procedures for defective product repair of SFG-2000/2100 series will be based on the service policy of Good Will Instrument. Please contact our service department for service consultation and support by E-mail: **service@goodwill.com.tw**

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