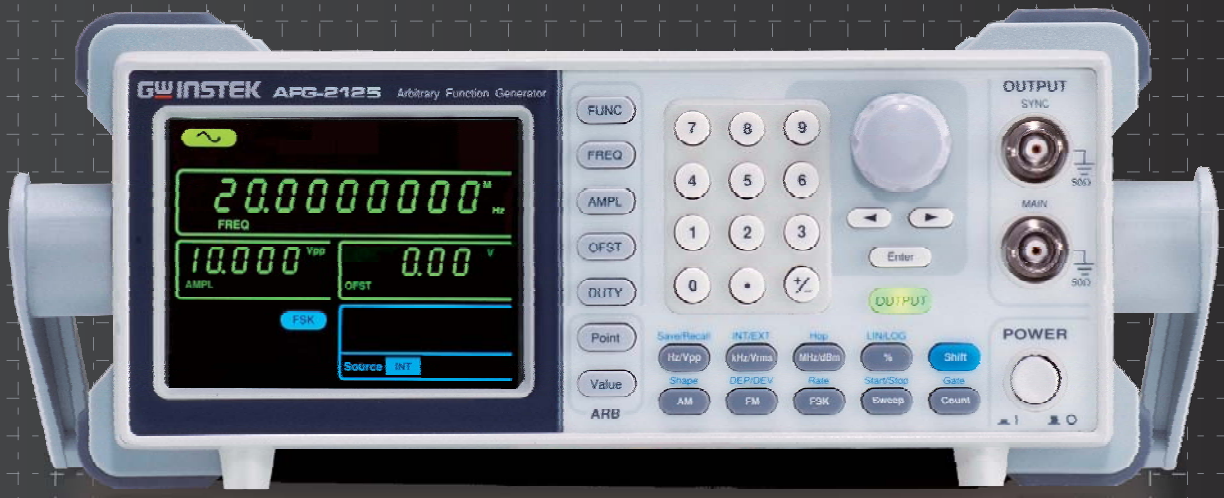


AFG-2000 Series

Arbitrary Function Generator

FEATURES

- 0.1Hz ~ 5/12/25 MHz with 0.1Hz Resolution
- Sine, Square, Pulse, Ramp, Triangle, Noise, DC and Arbitrary Waveform
- 20MSa/s Sampling Rate, 10 bit Vertical Resolution and 4k point Memory for Arbitrary Waveform
- 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- Waveform Parameter Setting Through Numeric Keypad Entry & Knob Selection
- Amplitude, DC Offset and Other Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
- AM/FM/FSK Modulation, Sweep, and Frequency Counter Functions (AFG-2100 only)
- USB Device Interface for Remote Control and Waveform Editing
- PC Arbitrary Waveform Editing Software

GW INSTEK

Simply Reliable

PANEL INTRODUCTION

CE USB PC Software

1. 3 Color LCD Panel
2. General Function Keys
3. Arbitrary Function Keys
4. Number Pad
5. Scroll Knob & Selection Key
6. Output Terminals
7. Main Output Switch
8. Power Switch
9. Operation Keys
10. Trigger, Modulation & Counter Input
11. Modulation Output
12. USB Device

Innovation and Value in Waveform Design

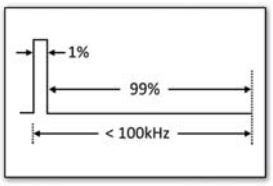
The AFG-2100/2000 Series Arbitrary Function Generator is a DDS (Direct Digital Synthesized) based signal generator designed to accommodate the educational and basic industrial requirements for an accurate and affordable signal source covering the output of Sine, Square (Pulse), Ramp (Triangle), Noise and Arbitrary waveforms. The 20MSa/s sampling rate, 10 bit vertical resolution and 4k point memory of the AFG-2100/2000 Series provide users with a flexible environment for creating the specific waveform output as needed. The 0.1Hz resolution of Sine, Square and Triangle waveforms and the 1% ~ 99% adjustable duty cycle of Square (Pulse) waveform are the remarkable features to greatly extend its application range in various fields. The AFG-2100/2000 Series includes 6 models in three frequency bands of 5MHz, 12MHz and 25MHz. Besides the basic features of the whole AFG-2100/2000 Series, AFG-2100 carries additional features of AM/FM/FSK Modulation, Sweep, and Frequency Counter.

The friendly human interface of AFG-2100/2000 Series allows users to set waveform parameters, including waveform type, frequency, amplitude, DC offset, modulation type, and duty cycle, through keypad entry and/or the knob selection, and display the set parameters on the 3.5" LCD screen. The AFG-2100/2000 Series is equipped with a USB Device interface for remote control and waveform editing through a PC. A waveform editing software is provided to facilitate the waveform creation on the PC. After the waveform editing is done, the user is able to download the waveform data from PC to the AFG-2100/2000 Series for signal output.

A. BUILT-IN ARBITRARY WAVEFORM FUNCTION

In addition to the high accuracy and high stability DDS Function Waveforms-Sine, Square and Ramp, the AFG-2100/2000 Series also provides the feature to generate Arbitrary Waveforms as what user wants. The 20MSa/s sampling rate, 10 bit vertical resolution and 4k point waveform memory allow user to create the needed waveform point by point through keypad entry on the front panel, or to do waveform editing on the PC and download the waveform data to the AFG-2100/2000 Series, for arbitrary waveform output.

B. 1% ADJUSTABLE DUTY CYCLE OF SQUARE WAVE



1% Duty Cycle of Square Wave Setting

For most conventional Function Generators, the adjustable duty cycle falls in a limited 20% ~ 80% range, which may not fit the demands of specific applications. The AFG-2100/2000 is able to provide a 1%~99% variable duty cycle for its Square waveform and 0%~100% variable symmetry for the Ramp. This allows the AFG-2100/2000 to be used as a Pulse Generator to create pulse waveform simulating a spike signal or a transient signal.

C. FULLY DIGITAL ENTRY DESIGN

Fully Digital Keypad Operation

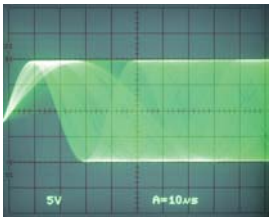
The conventional analog knob is not accurate enough for precision setting of waveform parameters, and may generate noise to interfere the system operation. The keypad entry design of AFG-2100/2000 improves the setting uncertainty and therefore significantly increases the accuracy of its waveform output. Besides, there is a Main Output switch which controls the main signal ON/OFF status. When a parameter, like output amplitude, is intended to be changed, user can turn off the output signal to avoid damaging the DUT.

D. AMPLITUDE & DC OFFSET DISPLAY

Parameter Display

With the 3.5" LCD, the AFG-2100/2000 is able to show output waveform amplitude, DC offset and other key setting information simultaneously. This provides the convenience for user to know what signal is being sent out at the output terminal without the need to check the waveform through an oscilloscope.

E. AM/FM/FSK MODULATION, SWEEP & FREQUENCY COUNTER



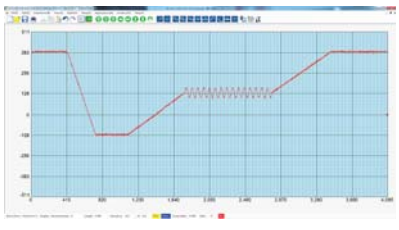
Sweep Waveform

All AFG-2100 models are equipped with additional AM/FM/FSK Modulation, Sweep & Frequency Counter functions. The AM/FM modulated signal provides a means for basic modulation circuit tests and experiments, and the FSK modulated signal offers the signal source of the most common digital modulation signal. The Sweep function adequately fits a lot of basic applications such as sweep-tone test for the speaker in audio frequency range. The built-in frequency counter is able to measure the frequency of an external signal up to 150MHz, which saves the cost of purchasing a frequency counter.

F. USB INTERFACE & ARBITRARY WAVEFORM EDITING PC SOFTWARE

USB Device Interface

The AFG-2100/2000 Series provides a USB Device Interface, which allows the programming of remote control or ATE of the product. An arbitrary waveform editing PC software can generate the waveform by hand drawing, recalling and tailoring waveforms including Rayleigh, Gaussian, Normal Noise, Pseudo Ternary, Bipolar AMI, Manchester, Differential Manchester, RS-232C, and NRZ etc. from the library.



Arbitrary Waveform Editing PC Software

Besides, this software can import CSV format file as waveform data which is created by the other tools. After the waveform editing is completed on the PC, the waveform data can be downloaded through USB Interface to the AFG-2100/2000 for arbitrary waveform output. The software fits for both AFG-2100/2000 and 3000 series and can be downloaded from GWInstek's website. (www.gwinstek.com)

SPECIFICATIONS

			AFG-2100 Series			AFG-2000 Series		
MODELS			**AFG-2105**	**AFG-2112**	**AFG-2125**	**AFG-2005**	**AFG-2012**	**AFG-2025**
WAVEFORMS			Sine, Square, Ramp, Noise, Arbitrary Waveform					
ARITRARY FUNCTION	**Sample Rate**		20MSa/s					
	Repetition Rate		10MHz					
	Waveform Length		4k point					
	Amplitude Resolution		10 bit					
FREQUENCY CHARACTERISTICS	**Range**	**Sine/Square**	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz
		Ramp	0.1Hz ~ 1MHz					
	Resolution	**Sine,Square,Ramp**	0.1Hz					
	Accuracy	**Stability**	±20ppm					
		Aging	±1ppm, per 1 year					
		Tolerance	≤ 10mHz					
OUTPUT CHARACTERISTICS	**Amplitude**	**Range**	≤ 20MHz : 1mVpp~10Vpp(50Ω); 2mVpp~20Vpp(open-circuit) ≤ 25MHz : 1mVpp~5Vpp(50Ω); 2mVpp~10Vpp(open-circuit)					
		Accuracy	±2% of setting ±1mVpp;(at 1kHz/into 50Ω without DC offset)					
		Resolution	1mV or 3digits					
		Flatness	±1%(0.1dB)≤ 100kHz; ±3%(0.3dB)≤ 5MHz; ±4%(0.4dB)≤ 12MHz; ±20%(2dB)≤ 20MHz; ±5%(0.4dB)≤ 25MHz; (sine wave relative to 1 kHz/into 50Ω)					
		Units	Vpp, Vrms, dBm					
	Offset	**Range**	±5Vpk ac+dc(into 50Ω); ±10Vpk ac+dc(open circuit); ±2.5Vpk ac+dc(into 50Ω) for 20MHz~25MHz; ±5Vpk ac+dc(open circuit) for 20MHz~25MHz					
		Accuracy	2% of setting+10mV+0.5% of amplitude					
	Waveform Output	**Impedance**	50Ω typical (fixed); >300kΩ (output disabled)					
		Protection(main output)	Short-circuit protected ; Overload relay auto matically disables main output					
	SYNC Output	**Level**	TTL-compatible into >1kΩ					
		Impedance	50Ω nominal					
		Rise or Fall Time	≤ 25ns					
SINE WAVE CHARACTERISTICS	**Harmonic Distortion**		–55 dBc DC ~ 200kHz, Ampl > 0.1Vpp; –50 dBc 200kHz ~ 1MHz, Ampl > 0.1Vpp –35 dBc 1MHz ~ 5MHz, Ampl > 0.1Vpp; –30 dBc 5MHz ~ 25MHz, Ampl > 0.1Vpp					
SQUAREWAVE CHARACTERISTICS	**Rise/Fall Time**		≤ 25ns at maximum output (into 50Ωload)					
	Overshoot		< 5%					
	Asymmetry		1% of period+1 ns					
	Variable Duty Cycle		1%~99%≤ 100kHz ; 20.0%~80.0%≤ 5MHz ; 40.0%~60.0%≤ 10MHz ; 50%≤ 25MHz (1% Resolution for full Frequency Range)					
RAMP CHARACTERISTICS	**Linearity**		< 0.1% of peak output					
	Variable Symmetry		0%~100%(0.1% Resolution)					
AM MODULATION	**Carrier Waveforms**		Sine, Square, Triangle			–		
	Modulating Waveforms		Sine, Square, Triangle					
	Modulating Frequency		2 mHz~20 kHz (Int); DC~20KHz (Ext)					
	Depth		0%~120.0%					
	Source		Internal/External					
FM MODULATION	**Carrier Waveforms**		Sine, Square, Triangle			–		
	Modulating Waveforms		Sine, Square, Triangle					
	Modulating Frequency		2 mHz~20 kHz (Int); DC~20KHz (Ext)					
	Deviation		DC to Max Frequency					
	Source		Internal/External					
SWEEP	**Waveforms**		Sine, Square, Triangle			–		
	Type		Linear or Logarithmic					
	Start/Stop Frequency		0.1Hz~Max Frequency					
	Sweep Time		1ms~500s					
	Source		Internal/External					
FSK	**Carrier Waveforms**		Sine, Square, Triangle			–		
	Modulating Waveforms		50% duty cycle square					
	Modulation Rate		2mHz~100kHz(Int); DC~100kHz(Ext)					
	Frequency Range		0.1Hz~Max Frequency					
	Source		Internal/External					
FREQUENCY COUNTER	**Range**		5Hz~150MHz			–		
	Accuracy		Time Base accuracy ± 1count					
	Time base		±20ppm(23°C±5°C)after 30minutes warm up					
	Resolution		100nHz for 1Hz, 0.1Hz for 100MHz					
	Input Impedance		1KΩ					
	Sensitivity		35mVrms~30Vrms (5Hz~150MHz)					
STORE/RECALL	10 Groups of Setting Memories							
INTERFACE	USB(Device)							
DISPLAY	LCD							
POWER SOURCE	AC100~240V , 50~60Hz							
POWER CONSUMPTION	25 VA							
OPERATING ENVIRONMENT	Temperature to satisfy the specification: 18~28°C; Operating temperature: 0~40°C Relative Humidity: ≤80%, 0~40°C; ≤70%, 35~40°C; Installation category: CAT II							
OPERATING ALTITUDE	2000 meters							
STORAGE TEMPERATURE	-10~70°C, Humidity: ≤70%							
DIMENSIONS & WEIGHT	266(W)×107(H)×293(D) mm ; Approx. 2.5 kg							

Specifications subject to change without notice. FG-2000GD3BH

ORDERING INFORMATION

AFG-2005	5MHz Arbitrary Waveform Function Generator
AFG-2105	5MHz Arbitrary Waveform Function Generator
AFG-2012	12MHz Arbitrary Waveform Function Generator
AFG-2112	12MHz Arbitrary Waveform Function Generator
AFG-2025	25MHz Arbitrary Waveform Function Generator
AFG-2125	25MHz Arbitrary Waveform Function Generator

ACCESSORIES

CD (user manual + software) × 1, Quick Start Guide x 1, Power cord × 1
AFG-2100 Series - GTL-101 Test Lead × 2, Instruction Manual × 1, Power cord × 1
AFG-2000 Series - GTL-101 Test Lead × 1, Instruction Manual × 1, Power cord × 1

OPTIONAL ASSESSORIES

GTL-246 USB Cable, USB 2.0 Type A - Type B, 4P

FREE DOWNLOAD

PC Software Arbitrary Waveform Editing Software **Driver** USB driver

Global Headquarters
GOOD WILL INSTRUMENT CO., LTD.
T +886-2-2268-0389 **F** +886-2-2268-0639

China Subsidiary
GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.
T +86-512-6661-7177 F +86-512-6661-7277

Malaysia Subsidiary
GOOD WILL INSTRUMENT (SEA) SDN. BHD.
T +604-6111122 **F** +604-6115225

Europe Subsidiary
GOOD WILL INSTRUMENT EURO B.V.
T +31(0)40-2557790 **F** +31(0)40-2541194

U.S.A. Subsidiary
INSTEK AMERICA CORP.
T +1-909-399-3535 **F** +1-909-399-0819

Japan Subsidiary
TEXIO TECHNOLOGY CORPORATION.
T +81-45-620-2305 **F** +81-45-534-7181

Korea Subsidiary
GOOD WILL INSTRUMENT KOREA CO., LTD.
T +82-2-3439-2205 **F** +82-2-3439-2207

GW INSTEK
Simply Reliable

www.gwinstek.com www.facebook.com/GWInstek