Arbitrary Waveform Function Generator

NEW

NEW



AFG-2100 Series



AFG-2000 Series

CE	USB	PC
		SOILW

FEATURES

SIGNAL SOURCES

- * 0.1Hz ~ 5/12/25 MHz with in 0.1Hz
 Resolution
 * Sine, Square, Ramp, Noise 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

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 user 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 user 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.

SPECIFICATIONS							
		AFG-2100 Series AFG-2000 Series			ries		
Models					AEC 2005	AEC 2012	AEC 2025
	OBME	AFG-2105	AFG-2112	AFG-2125	AFG-2003	AFG-2012	AFG-2025
WAVER	ORIVIS	C:	Dama Maina /				
		Sirie, Square,	Ramp, Noise, P	Arbitrary wavelo	orrri		
ARITRA	RY FUNCTION						
Sample	Rate	20MSa/s					
Repetition	on Rate	IUMHZ Ali a siist					
Amplitu	m Length do Bosolution	4k point					
FREQUE		TO DIL					
FREQU	ENCT CHARACI	ERISTICS	0.111	0.311 051411			0.111 051411
Range	Sine/Square	0.1HZ~5WHZ	0.1Hz~5MHz 0.1Hz~12MHz 0.1Hz~25MHz 0.1Hz~5MHz 0.1Hz~12MHz 0.1Hz~25MHz				
	Ramp 0.1Hz ~ 1MHz						
Resoluti	ion Sine,Square,Ramp	0.1Hz					
Accurac	y Stability	±20ppm	1				
	Aging	±1ppm, per	l year				
	Tolerance	SIMHZ					
OUTPU	CHARACTERIS	SIICS					
Amplitu	de Range	1m/n= 10//-	n (into 500) 0 1		n/nn 20//n= (non circuit) 0	14- 20144-
	Kange	1mVpp~10vp	p(into 5002), 0.1	HZ~20101HZ; Zr	nvpp~20vpp(c	peri-circuit), 0	
	Accuracy	+2% of sottin	(1110 3022), 2010	$1 \square Z \sim Z J V I \square Z, Z I$	uvbb~10 bb(o	pen-circuit), 20	
	Resolution	0 1mV or 3 di	ng ±1111vpp,(at 11 nite	(112,>10111vpp)			
	Eletross	+1%(0.1dB)<	5100kHz·+3%(0	3dB)< 5MH7.	⊾4%(0 4dB)<1	2MHz· +20%(24B)< 20MH
	Flathess	±1/0(0.1dB)	25MHz: (sine u	(ave relative to)	1 kH7)	2101112, ±20/0(2	2010)_20101112,
	Unito	±576(0.40B)	Pm	ave relative to	i ki i 2)		
0	Units	vpp, vnns, u	DIII				
Unset	Range	\pm 5Vpk act delints 500V \pm 10Vpk act delenon circuitV \pm 25Vpk act delints 500V for					
	itunge	±3 vpk ac+dc(into 3012); ±10vpk ac+dc(open circuit); ±2.3 vpk ac+dc(into 5012) for 20MHz~25MHz					
	Accuracy	2% of setting + 5mV+ 0.5% of amplitude					
Wavefor	m Output	2/0 of Setting 1 Shirt 1 0.5/0 of amplitude					
Impe	dance	50Ω typical (fixed): >300kQ (output disabled)					
Protec	ction(main output)	Short-circuit protected : Overload relay auto matically disables main output					
SYNC O	utput	short circuit protected, Overload relay auto matically disables main output					
	Level	TTL-compatible into >1k Ω					
	Impedance	50Ω nominal					
	Rise or Fall Time	le ≤25ns					
SINEWAVE CHARACTERISTICS							
Harmor	nic Distortion	-55dBc DC~200kHz, Ampl>0.1Vpp; -50dBc 200kHz~1MHz, Ampl>0.1Vpp;					
COLLAR	-35dBc IMHz~5MHz, Ampi>0.1Vpp; -30dBc 5MHz~25MHz, Ampi>0.1Vpp,			pp,			
SQUAR							
Rise/Fai	i i ime	≥ 25 ns at max	kimum output (i	nto 50Ωload)			
Acumm		< 5%					
Variable	Duty Cycle	170 01 period + 1 NS 19/ 009/5100/4 = 20.09/ 80.09/55044 = 20.09/51044 = 509/525044 =					
variable	Duty Cycle	1%~>>>%~>>100KHZ; 20.0%~>0.0%>>101HZ; 40.0%~60.0%>10MHZ; 50%>25MHZ					
DAMO							
RAMPC	HARACIERISTI		1				
Linearity	y Cumum atms	< 0.1% of pea	ak output				
Variable	Symmetry	0%~100%(0.	1% Resolution)				
AM MO	DULATION						
Carrier \	Waveforms	Sine, Square,	Triangle				
Modula	ting Waveforms	ns Sine, Square, Triangle					
Modula	ting Frequency 2 mHz~20 kHz (Int); DC~20KHz (Ext)						
Depth		0%~120.0%					
Source		Internal/Exte	rnal				
FM MO	DULATION	I			1		
Carrier \	Waveforms	Sine, Square,	Triangle				
Modula	ting Waveforms	Sine, Square,	Triangle				
Modula	ting Frequency	2 mHz~20 kH	Hz (Int); DC~20H	(Hz (Ext)		-	
Deviatio	on	DC to Max Fr	equency				
Source		Internal/Exte	rnal				

SPECIFICATIONS						
	A	AFG-2100 Series			FG-2000 Se	ries
Models	AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
SWEEP						
Waveforms	Sine Square	Triangle				
	Linear or Log	arithmic				
Start/Stop Frequency	0.1Hz to Max	Frequency			-	
Sweep Time	1ms~500s	Ims~500s				
Source	Internal/Exte	rnal				
FSK						
Carrier Waveforms	Sine, Square,	Triangle				
Modulating Waveforms	50% duty cyc	le square				
Internal Rate	2mHz~20kH	Z			_	
Modulation Rate	2mHz~100kl	Hz(INT); DC~10	0kHz(Ext)		_	
Frequency Range	0.1Hz~Max H	requency				
		IIIdi		1		
PREQUENCE COUNTER		_		1		
Accuracy	5HZ~ISUMH	Z curacy + lcount				
Time base	+20nnm/23°	Curacy ± rcouric C+5℃)after 30mi	nutes warm un			
Resolution	100nHz for 1	Hz. 0.1Hz for 10	0MHz		-	
Input Impedance	1KΩ/1pf	,				
Sensitivity	35mVrms~30	0Vms (5Hz~150M	ИНz)			
STORE/RECALL						
10 Groups of Setting Me	mories					
INTERFACE						
USB (Device)						
Display						
LCD						
POWER SOURCE						
AC100~240V, 50~60F	Hz					
POWER CONSUMPTION						
OPERATING ENVIRONMENT						
Iemperature 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 ALTITIDE						
2000 meters						
STORAGE TEMPERATURE						
-10-70°C. Humidity: ≤70%						
DIMENSIONS & WEIGHT						
266(W)×107(H)×293(D) mm : Approx. 2.5 kg						
() () (–)	, rr	0				
			NEORMA			
AFG-2005 5MHz Arbitrary Waveform Function Generator						
AFG-2105 5MHz Arbitrary Waveform Function Generator						
AFG-2012 12MHz Arbitrary Waveform Function Generator						
AFG-2112 12MHz Arbi	AFG-2112 12MHz Arbitrary Waveform Function Generator					
AFC-2025 25MHz Arbitran Waveform Function Congrator						

AFG-2012	12IVIAZ 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
ACCESSOR	ES :
CD (user n AFG-2100 S AFG-2000 S	nanual + software) \times 1, Quick Start Guide x 1, Power cord > Series - GTL-101 \times 2, Instruction Manual \times 1, Power cord \times Series - GTL-101 \times 1, Instruction Manual \times 1, Power cord \times
OPTIONA	L ASSESSORIES

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

PC Software FreeWave software USB driver

SELECTION GUIDE

MODEL	AFG-2005	AFG-2105	AFG-2012	AFG-2112	
FREQUENCY RANGE	5MHz	5MHz	12MHz	12MHz	
ARBITRARY WAVEFORM	1	1	~	~	
DUTY	1	1	1	~	
ΠL	\checkmark	1	1	\checkmark	
DC OFFSET	1	1	1	√	
USB INTERFACE	1	1	1	~	
LIN/LOG SWEEP		1		~	
AM/FM/FSK MODULATION		1		√	
EXT COUNTER		1		1	

AFG-2000 Series Rear Panel



AFG-2100 Series Rear Panel



FG-2025	AFG-2125
5MHz	25MHz
~	1
1	1
√	1
√	√
~	√
	1
	√
	√





AFG-2100 Series



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 $20\% \sim 80\%$ 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. 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.

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



AM Modulated 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

USB Interface & Arbitrary Waveform Editing PC Software F.



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.

D. 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.



Sweep Waveform

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.



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)

