AFG-125/125P/225/225P

USB Modular Arbitrary Function Generator

FEATURES

- Output Amplitude Range From 1mVpp to 2.5Vpp (into 50Ω)
- Wide Frequency Ranges From 1μHz ~ 25MHz (sine wave)
- 1μHz Resolution in Full Range
- Built-in Standard 120MSa/s, 10bit, 4k Points Arbitrary Function for Both Channels
- True Dual-Channel Output, CH2 Provides the Same Characteristics as CH1
- Dual-Channel Supports Couple, Tracking, Phase Operations
- 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- User Friendly for Easy Parameter Setting and Parameters Display
- Multiple Editing Methods to Edit Arbitrary Waveform Easily
- Built-in Standard AM/FM/PM/FSK/SUM/Sweep/Burst
- USB Device Interface for Remote Control and Waveform Editing

GW INSTEK
Simply Reliable

The brand new AFG-100/200 Series 25MHz USB modular arbitrary function generator has four models for selections. The AFG-100/200 Series arbitrary function generator with many unique features such as light weight, handy, and USB interface compatible is an ideal choice for the applications at the general laboratories in applying stand-alone operation or collocation with the GDS-2000A Series digital oscilloscope.

The main features of the AFG-100/200 Series are output amplitude of 2.5Vpp (connecting with a load of 50 ohms), frequency range reaching 25MHz, frequency resolution of 1uHz, and built-in sine waveform, square waveform, triangle waveform, and noise signal. Square waveform can adjust the duty cycle from 1% to 99% and it can be utilized as pulse signal. Users, via the GDS-2000A FG APP, can select from the 66 built-in function waveforms to conduct arbitrary waveform editing. The AFG-100/200 series, with functions of AM/FM/PM/FSK/SUM modulation, frequency sweep, burst and coupling, is suitable for various communications applications.

The AFG-100/200 Series collocates with the FG APP of GDS-2000A digital oscilloscope through USB interface. While conducting stand-alone operation, the AFG-100/200 Series utilizes USB interface, which allows users to quickly set up their required tests by the simple connection feature. AWES (arbitrary waveform editing software) PC software is provided to enter settings speedily and easily for measurement. Users can select required waveforms from arbitrary waveform editor.

The model, channel, and power arrangements of the AFG-100/200 Series are as follows :

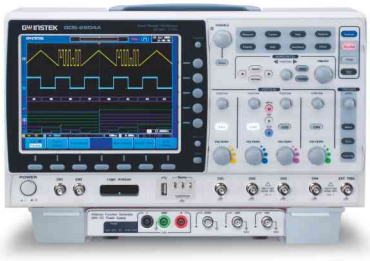
	AFG-125	AFG-125P	AFG-225	AFG-225P
Channels	1	1	2	2
DC Power	NA	Yes	NA	Yes

DC power selections include 2.5V, 3.3V, and 5V.

Power Supply Methods for the AFG-100/200 Series are as Follows :

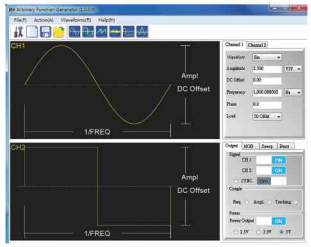
- For stand-alone operation, an external 5V power supply (GPA-501 is optional) is required.
- The USB interface of the GDS-2000A Series DSO provides power when AFG-125/225 collocates with GDS-2000A digital oscilloscope.
- An external 5V power supply (GPA-501 is optional) is required when AFG-125P/225P collocates with GDS-2000A digital oscilloscope.

A. FLEXIBILITY OF ARBITRARY WAVEFORM EDITING



5-in-1 Multi-Functional Test System

Power Adapter Option



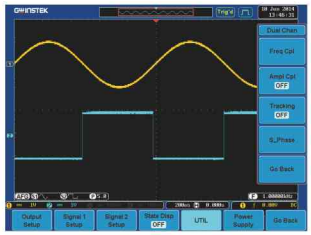
Stand-alone Operation With PC Software

The AFG-100/200 Series provides arbitrary waveform sampling rate of 120 MSa/s, 10 bit resolution and the arbitrary waveform editing function with 4k point memory. The easy-to-use external AWES PC software interface allows users to quickly and conveniently operate the AFG-100/200 Series. Arbitrary waveforms can be produced through four methods as follows :

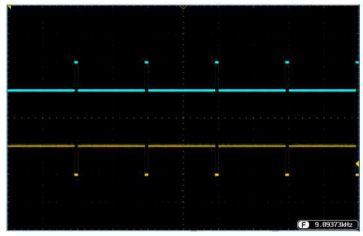
* The AFG-100/200 series collocates with the FG APP of GDS-2000A Series DSO to produce point-by-point output arbitrary waveforms.
* The AFG-100/200 series collocates with GDS-2000A series DSO to directly duplicate and produce retrieved waveform signals.
* Edit complicated waveforms via AWES PC software.
* Support programs such as MATLAB and Excel to upload CSV files into AWES PC software.

A seamless connection between the AFG-100/200 Series and the GDS-2000A Series DSO fulfills the possibility of realizing the five-in-one multi-functional test system, which includes oscilloscope, logic analyzer, digital voltage meter, function generator and power supply. The compact design of the AFG-100/200 Series truly saves a lot of laboratory space.

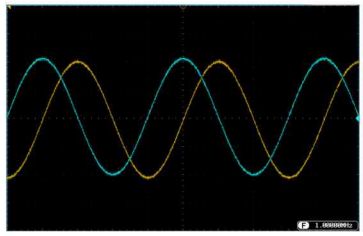
B. CORRELATED FUNCTIONS OF DUAL-CHANNEL OUTPUT



Equivalent Function in Dual-Channel



Differential Signal



Quadrature (Sine and Cosine) Signal

AFG-225/225P dual channel models support independent channel or correlated channel applications. Three correlated functions are coupling, tracking and phase.

* The coupling function allows users to freely set ratio and offset values for frequency and amplitude of both channels to realize that all parameters are simultaneously effective for both channels. The measurement of the Third-Order Intercept Point for an amplifier and the simulations of two different frequency oscillators outputting signals are two application examples for the coupling function.
* The tracking function can produce 180 degree phase offset differential signals with same frequency and amplitude.
* The phase function allows users to freely set phase parameters for both channels such as sine and cosine waveform signals.

The sum modulation function can sum up two signals into one and output this signal via one channel. One of the related applications is to sum up sine waveform and noise to execute speaker distortion tests.

USB MODULAR ARBITRARY FUNCTION GENERATOR SOLUTION FOR ORDERING

MODEL / MAIN FUNCTION	AFG-225P	AFG-225	AFG-125P	AFG-125
Stand-alone Operation	GPA-501/502 option GTL-246 option	GPA-501/502 option GTL-246 option	GPA-501/502 option GTL-246 option	GPA-501/502 option GTL-246 option
Collocation with GDS-2000A Series DSO	DS2-FH1 option GPA-501/502 option	DS2-FH1 option	DS2-FH1 option GPA-501/502 option	DSH2-FH1 option

AFG-225P

AFG-225

AFG-125P

AFG-125

USB MODULAR ARBITRARY FUNCTION GENERATOR SELECTION GUIDE

MODEL / MAIN FUNCTION	AFG-225P	AFG-225	AFG-125P	AFG-125
Analog Channel	2	2	1	1
Frequency Range	25MHz	25MHz	25MHz	25MHz
Frequency Resolution	1 μ Hz	1 μ Hz	1 μ Hz	1 μ Hz
Sample Rate	120MSa/s	120MSa/s	120MSa/s	120MSa/s
Vertical Resolution	10-bit	10-bit	10-bit	10-bit
Memory Length	4k Points	4k Points	4k Points	4k Points
Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
Sine/Square/Pulse	✓	✓	✓	✓
Triangle/Ramp	✓	✓	✓	✓
Noise	✓	✓	✓	✓
Burst	✓	✓	✓	✓
TTL/Sync Output	✓	✓	✓	✓
Sweep	✓	✓	✓	✓
AM/FM/PM/FSK	✓	✓	✓	✓
USB Device	✓	✓	✓	✓
SUM	✓	✓	–	–
DC Power Supply	✓	–	✓	–

PANEL INTRODUCTION

SPECIFICATIONS

MODEL		AFG-125/AFG-125P	AFG-225/AFG-225P
OUTPUT CHANNELS		1	2
WAVEFORMS		Sine, Square, Ramp, Pulse, Noise, ARB	
ARBITRARY FUNCTIONS	Sample Rate	120 MSa/s	
	Repetition Rate	60MHz	
	Waveform Length	4k points	
	Amplitude Resolution	10 bits	
	Non-Volatile Memory	4k points	
FREQUENCY CHARACTERISTICS	Range Sine/Square	1μHz~25MHz	
	Ramp	1μHz~1MHz	
	Resolution	1μHz	
	Accuracy	±20 ppm	
	Stability	±1 ppm, per 1 year	
	Aging	⩽1 mHz	
	Tolerance		
OUTPUT CHARACTERISTICS	Amplitude Range	GPA-501 power supply:1mVpp~2.5Vpp(into 50Ω),2mVpp~5Vpp(open-circuit);USB power supply:1mVpp~2Vpp(into 50Ω),2mVpp~4Vpp(open-circuit)	
	Accuracy	±2% of setting ±1 mVpp (at 1 kHz)	
	Resolution	1mV or 3 digits	
	Flatness	±1%(0.1dB)⩽100kHz, ±3%(0.3 dB)⩽5MHz, ±5%(0.4 dB)⩽12MHz, ±10%(0.9dB)⩽25MHz (sine wave relative to 1kHz)	
	Units	Vpp, Vrms, dBm	
	Offset Range	GPA-501 power supply: ±1.25 Vpk ac +dc (into 50Ω), ±2.5Vpk ac +dc (Open circuit)	
		USB power supply: ±1 Vpk ac +dc (into 50Ω), ±2 Vpk ac +dc (Open circuit)	
	Accuracy	2% of setting + 10mV+ 0.5% of amplitude	
WAVEFORM OUTPUT	Impedance	50Ω typical (fixed), > 10MΩ (output disabled)	
	Protection	Short-circuit protected. Overload relay automatically disables main output	
SINE WAVE CHARACTERISTICS	Harmonic Distortion	⩽-50 dBc DC ~ 1MHz, Ampl >1Vpp	
		⩽-35 dBc 1MHz ~ 5MHz, Ampl >1Vpp ; ⩽-30 dBc 5MHz ~ 25MHz, Ampl > 1Vpp	
SQUARE WAVE CHARACTERISTICS	Rise/Fall Time	⩽10ns at maximum output. (into 50 Ω load)	
	Overshoot	<2%	
	Asymmetry	1% of period +5 ns	
	Variable duty Cycle	1.0% ~ 99.0% ⩽100kHz; 10% to 90% ⩽ 1MHz, 50% ⩽ 25MHz	
RAMP CHARACTERISTICS	Linearity	< 0.1% of peak output	
	Variable Symmetry	0% to 100% (0.1% Resolution)	
PULSE CHARACTERISTICS	Period	40ns ~ 2000s	
	Pulse Width	20ns ~ 1999.9s	
	Overshoot	<2%	
	Accuracy	0.1%+20ns	
	Jitter	20ppm +10ns	
AM MODULATION	Carrier Waveforms	Sine, Square, Ramp, Pulse, Arb	
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	
	Modulating Frequency	2mHz ~ 20kHz	
	Depth	0% ~ 120.0%	
	Source	Internal	
FM MODULATION	Carrier Waveforms	Sine, Square, Ramp,	
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	
	Modulating Frequency	2mHz ~ 20kHz	
	Peak Deviation	DC to Max Frequency	
	Source	Internal	
SWEEP	Waveforms	Sine, Square, Ramp,	
	Type	Linear or Logarithmic	
	Start/Stop Freq	1μHz to Max Frequency	
	Sweep Time	1ms ~ 500s	
	Source	Internal / Manual	
FSK	Carrier Waveforms	Sine, Square, Ramp, Pulse	
	Modulating Waveforms	50% duty cycle square	
	Modulation Rate	2mHz ~ 100 kHz	
	Frequency Range	1μHz to Max Frequency	
	Source	Internal	
PM	Carrier Waveforms	Sine, Square, Ramp	
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	
	Modulation Frequency	2mHz ~ 20kHz	
	Phase deviation	0° ~ 360°	
	Source	Internal	
SUM	Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise	
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	
	Modulation Frequency	2mHz to 20kHz	
	SUM Depth	0% ~ 100.0%	
	Source	Internal	
SYNC OUTPUT	Type	Sync, Sweep Marker, Burst Marker or Arbitrary Waveform Marker	
	Level	TTL Compatible into 50Ω	
	Assignment	Channel 1 or Channel 2	
	Polarity	Normal or Inverted	
	Fan-out	⩾4 TTL Load	
	Impedance	50Ω Typical	
DUAL CHANNEL FUNCTION	Phase	-180° ~180° (Square and Pulse can not be change, Phase is 0°), Synchronize phase	
	Track	CH2=CH1 OR CH1=CH2	
	Coupling	Frequency(Ratio or Difference), Amplitude & DC Offset	
BURST	Waveforms	Sine, Square, Ramp, Arb	
	Frequency	1uHz~15 MHz(sine), 1uHz~15 MHz(Square), 1uHz~1 MHz (Ramp)	
	Burst Count	1 ~ 65535 cycles or Infinite	
	Start/Stop Phase	-360 ~ +360	
	Internal Period	1ms ~ 500s	
	Gate Source	External Trigger	
	Trigger Source	Single or Internal Rate	
TRIGGER DELAY	N-Cycle, Infinite	0s to 655350ns	
SAVE/RECALL		10 Groups of Setting Memories	
POWER OUTPUT	Only AFG-125P/AFG-225P	Output Voltage : (2.5V/3.3V/5V)±5%, Output Current : 0.6A	
INTERFACE		USB (Device)	
GENERAL SPECIFICATIONS	Power Source	DC 5V	
	Power Consumption	10 W (Max)	
	Operating Environment	Temperature to satisfy the specification:18~28°C,Operating temperature:0~40°C;Relative Humidity:<80%,0~40°C,Installation category:CAT II	
	Operating Altitude	2000 Meters	
	Storage Temperature	-10~70°C, Humidity : ⩽70%	
DIMENSIONS & WEIGHT		215(W) x 35 (H) x 107(D) mm, Approx. 1kg	

Specifications subject to change without notice. AFG-100200GD1BH

ORDERING INFORMATION

AFG-125 25MHz Single Channel USB Modular Arbitrary Function Generator
AFG-225 25MHz Dual Channel USB Modular Arbitrary Function Generator
AFG-125P 25MHz Single Channel USB Modular Arbitrary Function Generator Plus Power Supply
AFG-225P 25MHz Dual Channel USB Modular Arbitrary Function Generator Plus Power Supply

ACCESSORIES

Quick Start Guide x 1, CD-ROM with AFG Software and User Manual x 1
GTL-101 BNC-Alligator Test Lead x 1 (only AFG-125/125P)
GTL-101 BNC-Alligator Test Lead x 2 (only AFG-225/225P)
GTL-105A Test Lead x 1 (only AFG-125P/225P)

OPTIONAL ASSESSORIES

DS2-FH1 Module extension bay & USB Type A to Type A/B cable
GPA-501 Power Adapter
GPA-502 Universal Power Adaptor
GTL-246 USB Type A to Type B cable
GTL-201A Ground lead

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