AFG-4000 Series

Arbitrary Function Generator

CE | USB Host | USB Device | LAN

GW INSTEK
Simply Reliable

Model	AFG-4125E	AFG-4125AE*	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
No. of Channel	Single		Dual					
Frequency Range (Sine)	25 MHz		25 MHz	35 MHz	60 MHz	80 MHz	100 MHz	250 MHz
Sample Rate (Sa/s)	125 M		500 M					1.25 G
Amplitude Resolution	14 bits		16 bits					
Memory Length	16 k/CH		10 M/CH					
Touch Panel	N/A		Yes					
Communication Interface	USB(Host, Device)		USB(Host, Device), LAN					

*AFG-4125AE built-in power amplifier function

AFG-4000 series arbitrary function signal generators, which provide 25 MHz to 250 MHz bandwidth, single-channel and dual-channel designs, and feature 1 µHz high-resolution in the whole frequency bandwidth. The series has built-in standard signals including sine wave, square wave, triangle wave, pulse wave, noise wave, harmonic wave, etc.

The highest bandwidth 250 MHz model provides 1.25 GSa/s sample rate; the mid-range models ranging from 35 MHz to 100 MHz provide 500 MSa/s sample rate; and the 25 MHz entry-level models have a sample rate of 125MSa/s. For vertical resolution, the 35 MHz to 250 MHz models feature 16-bit resolution, and 25 MHz entry-level models provide 14-bit resolution.

In addition, the AFG-4000 series provides the modulation signal outputs of AM, DSB-AM, FM, PM, PWM, ASK, PSK, BPSK, QPSK, FSK, 3FSK, 4FSK, OSK, SUM, signal sweep outputs, and the Burst and Counter functions. AFG-4125AE has the built-in amplifier function.

The AFG-4000 series has the built-in 50 ohm/high impedance switching function, and is equipped with an 8-inch high-resolution TFT LCD, and the models above 35 MHz are equipped with the touch screen function. For communications interfaces, models above 35 MHz are built-in USB and LAN communications interfaces.

FEATURES

* Provide Single-channel or Dual-channel Output
  Single Channel : AFG-4125E/4125AE(25MHz)
  Dual Channel : AFG-4225E/4235/4260/4280/4210H/4225H(25/35/60/80/100/250MHz)
* Built-in Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic Wave, Arbitrary Wave
* Min. Resolution : 1µHz
* Sampling Rate : AFG-4225H : 1.25GSa/s; AFG-4235/4260/4280/4210H : 500MSa/s; AFG-4125E/4125AE/4225E : 125MSa/s
* Amplitude Resolution : AFG-4125E/4125AE/4225E : 14bits; AFG-4235/4260/4280/4210H/4225H : 16bits
* Memory Length : AFG-4225E/4235/4260/4280/4210H/4225H : 10M/per channel; AFG-4125E/4125AE : 16k/per Channel
* Modulation : AM, DSB-AM, FM, PM, PWM, ASK, PSK, BPSK, QPSK, FSK, 3FSK, 4FSK, OSK, SUM
* Built-in Sweep, Burst, Counter Function
* AFG-4125AE Built-in Power Amplifier Function
* Communication Interface : AFG-4235/4260/4280/4210H/4225H Provide USB, LAN Interface; AFG-4125E/4125AE/4225E Provide USB Interface
* 8" TFT LCD Display, 800 x 480 Resolution
* Multi-Touch Display : AFG-4235/4260/4280/4210H/4225H

APPLICATIONS

* Educational Institutions
* Automotive Electronics
* Electronic Products and Parts

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SPECIFICATIONS

Models		AFG-4125E	AFG-4125AE	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
Channels									
		1		2					
Waveforms									
		Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic wave, Arbitrary wave							
Arbitrary Functions									
ARB Function		Built-in							
Sample Rate (*1)		125 MSa/s			500 MSa/s				1.25 GSa/s
Repetition Rate (Arbitrary Wave)		15 MHz			30 MHz				
Waveform Length		2 to 16 K points		2 to 10 M points					
Amplitude Resolution		14 bits			16 bits				
Minimum Rise and Fall Time		< 10 ns			< 8 ns				< 5ns
Jitter		8 ns							
Non-Volatile Memory		32 MB							
User-defined Output Section		From point 2 to 16,384		From point 2 to 10,240,000					
User-defined Output Marker Section		From point 2 to 16,384		From point 2 to 10,240,000					
Output Mode		1 to 1,000,000 cycles or infinite mode							
Frequency Characteristics									
Sine		25 MHz			35 MHz	60 MHz	80 MHz	100 MHz	250 MHz
Square		5 MHz			15 MHz	30 MHz			50 MHz
Pulse		5 MHz			15 MHz	25 MHz			
Triangle, Ramp		1 MHz			3 MHz				5 MHz
Noise (-3 dB)		25 MHz BW			35 MHz BW	60 MHz BW	80 MHz BW	100 MHz BW	120 MHz BW
Harmonic Wave		12.5 MHz			17.5 MHz	30 MHz	40 MHz	50 MHz	125 MHz
Resolution		1 µHz or 10 significant figures							
Accuracy Stability		±2 ppm at 25 °C ± 5 °C							±1 ppm at 0 to 40 °C
Aging		±1 ppm, per 1 year							
Tolerance		±1 ppm							
Output Characteristics(*2)									
Output Amplitude	Into 50 Ω	1 mVpp to 10 Vpp, for ≤ 25 MHz ; 1 mVpp to 5 Vpp, for ≤ 60 MHz ; 1 mVpp to 2.5 Vpp, for ≤ 100 MHz							1 mVpp to 10 Vpp, for ≤ 40 MHz ; 1 mVpp to 5 Vpp, for ≤ 80 MHz 1 mVpp to 2.5 Vpp, for ≤ 120 MHz ; 1 mVpp to 1 Vpp, for ≤ 250 MHz
	Open-circuit	2 mVpp to 20 Vpp, for ≤ 25 MHz ; 2 mVpp to 10 Vpp, for ≤ 60 MHz ; 2mVpp to 5 Vpp, for ≤ 100 MHz							2 mVpp to 20 Vpp, for ≤ 40 MHz ; 2 mVpp to 10 Vpp, for ≤ 80 MHz 2 mVpp to 5 Vpp, for ≤ 120 MHz ; 2 mVpp to 2 Vpp, for ≤ 250 MHz
Bandwidth Fatness		≤10 MHz: ±0.2 dB ; ≤60 MHz: ±0.3 dB ; ≤100 MHz: ±0.5 dB ; (relative to 100 kHz Sine wave, 1 Vpp,50 Ω)							≤10 MHz:±0.2 dB;≤60 MHz:±0.3 dB;≤100 MHz:±0.5 dB;≤160 MHz:±1 dB; ≤250 MHz: ±1.5 dB ; (relative to 1 kHz Sine wave, 1 Vpp, 50 Ω)
Accuracy		±(2% of setting + 1 mVpp)(1 kHz sine, 0 V offset, >10 mVpp)							
Resolution		0.1 mVpp or 4 digits (The amplitude ≥ 1 Vpp is 1 mVpp)							
Output Impedance		50 Ω (Typical)							
Output Protection		Short circuit protection, the output will be automatically turned off when overloaded							
DC Offset	Range	± (10 Vpk – Amplitude Vpp / 2),(High resistance)							
	Accuracy	± (3 % of |setting| + 5 mV + amplitude Vpp * 0.5 %)		± (1 % of |setting| + 5 mV + amplitude Vpp * 0.5 %)					
	Resolution	0.1 mVpp or 4 digits (The amplitude > 1 Vpp is 1 mVpp)							
Sine Wave Characteristics									
Harmonic Distortion(*3)		DC to 1 MHz: <-65 dBc ; 1 MHz to 10 MHz: <-60 dBc ; 10 MHz to 60 MHz: <-55 dBc ; 60 MHz to 100 MHz: <-50 dBc Typical (0 dBm)							DC to 1 MHz: <-65 dBc ; 1 MHz to 10 MHz: <-60 dBc 10 MHz to 120 MHz:<-50 dBc;120 MHz to 250 MHz:<-45 dBc Typical(0 dBm)
Total Harmonic Distortion		< 0.05%, 10 Hz to 20 kHz, 1 Vpp							
Non-harmonic Distortion		≤10 MHz: <-70 dBc; >10 MHz: <-70 dBc + 6 dB/sound interval; Typical (0 dBm)							
Phase Noise		10 MHz: ≤-110 dBc/Hz Typical (0 dBm, 10 kHz offset)							
Square Wave Characteristics									
Rise/Fall Time		< 30 ns			< 8 ns				< 5 ns
Overshoot		Typical (100 kHz, 1 Vpp) < 5 %, (1 Vpp, 50 Ω)			Typical (100 kHz, 1 Vpp) < 3 %, (1 Vpp, 50 Ω)				
Duty Cycle		50.00 % (fixed)							
Ramp Wave Characteristics									
Linearity		< 0.1 % of peak output (typical 1 kHz, 1 Vpp, symmetry 50 %)							
Symmetry		0.0 % to 100.0 %							
Pulse Wave Characteristics									
Period		200 ns to 1000 ks			66.667 ns to 1000 ks	40 ns to 1000 ks			20 ns to 1000 ks
Pulse Width		≥ 48 ns			≥ 18 ns	≥ 12 ns			≥7 ns
Duty Cycle		0.1 % to 99.9 % (limited by the frequency setting)							
Rise and Fall Time		≥ 32 ns (limited by the pulse width setting)			≥ 8 ns (limited by the pulse width setting)				≥7 ns (limited by the pulse width setting)
Overshoot		Typical (100 kHz, 1 Vpp) < 5 %			Typical (100 kHz, 1 Vpp) < 3 %				
Jitter		< 2 ns			≤5 MHz: 2 ppm + 300 ps , >5 MHz: 300 ps (rms), typical (1 Vpp, 50 Ω)				
Noise Wave Characteristics									
Types		Gaussian white noise							
Bandwidth (-3 dB)		25 MHz BW			35 MHz BW	60 MHz BW	80 MHz BW	100 MHz BW	120 MHz BW
Harmonic Wave Characteristics									
Harmonic Number		≤16							
Frequency Range		1 µHz to 12.5 MHz			1µ Hz to 17.5 MHz	1 µHz to 30 MHz	1 µHz to 40 MHz	1 µHz to 50 MHz	1 µHz to 125 MHz
Harmonic Type		Odd, even, sequential, custom							
Harmonic Amplitude		Each harmonic amplitude can be set							
Harmonic Phase		Each harmonic phase can be set							
Advanced Waveform Characteristics									
Modulation Function		AM, DSB-AM, FM, PM, PWM, ASK, PSK, BPSK, QPSK, FSK, 3FSK, 4FSK, OSK, SUM							
Sweep Function		Support type: Linear, logarithmic, Step							
Burst Function		Support type: count (1 to 1000,000 cycles), Infinite, gated							
Counter Function		Support frequency range: 100 mHz to 200 MHz							
Power Amplifier Function		-	Support	-					
Input/Output Characteristics									
Channel Coupling		Channel copy, amplitude syn, frequency syn, align phase							
Input		External modulation input, External trigger input, External clock input							
Output		Internal clock output, Sync output							
General Specifications									
Display	Type	8-inch color LCD display							
	Resolution	800 Horizontal × 480 Vertical pixels							
	Color	65,536 colors, 16 bits, TFT							
	Touch Screen Capacitive	-			Multi-touch				
Communication Interface		USB Host, USB Device			USB Host, USB Device, LAN				
Power	Source	100 to 240 V (±10%), 50/60 Hz							
	Power Consumption	Less than 50 VA							
	Fuse	250V, F2AL							
Operating Environment	Temperature to Satisfy	18 °C to 28 °C							
	Operating Temperature	0 °C to 40 °C							
	Relative Humidity	Less than 35 °C : ≤ 90 % relative humidity ; 3 5°C to 40 °C : ≤ 60% relative humidity							
	Installation Category	CAT II							
	Operating Altitude	Operating 3,000 meters ; Non-operation 12,000 meters							
Storage Temperature		-20 °C to 60 °C, Humidity : ≤70 %							
Pollution Degree		IEC 61010 degree 2, Indoor use							
Safety Designed		EN61010-1							
Cooling Method		Smart fan cooling							
Dimensions & Weight		340 (W) × 177 (H) × 90 (D) mm ; Approx. 2.5 kg							

Note : *1. The User's available range of the sample rate is from 1 µ Sa/s to 75 MSa/s. (AFG-4125E/4125AE/4225E is from 1 µ Sa/s to 30 MSa/s)
*2. Not specifically labeled, the load defaults to 50 Ω. *3. DC offset set to zero.

Specifications subject to change without notice. AFG-4000D1_E_DS_202502

ORDERING INFORMATION

AFG-4125E	25 MHz, 1-Channel Arbitrary Function Generator
AFG-4125AE	25 MHz, 1-Channel Arbitrary Function Generator, Plus Power Amplifier
AFG-4225E	25 MHz, 2-Channel Arbitrary Function Generator
AFG-4235	35 MHz, 2-Channel Arbitrary Function Generator
AFG-4260	60 MHz, 2-Channel Arbitrary Function Generator
AFG-4280	80 MHz, 2-Channel Arbitrary Function Generator
AFG-4210H	100 MHz, 2-Channel Arbitrary Function Generator
AFG-4225H	250 MHz, 2-Channel Arbitrary Function Generator

ACCESSORIES

USB Cable x 1, Power Cord x 1
AFG-4125E/4125AE: Test Lead, BNC to Alligator Clips Cable x 1
AFG-4225E/4235: Test Lead, BNC to Alligator Clips Cable x 2
AFG-4260/4280/4210H/4225H: Test Lead, BNC Cable x 2

OPTIONAL ACCESSORIES

GTL-101	Test Lead, BNC (P/M) to Alligator, approx. 1100 mm
GTL-110	BNC Cable, BNC (P/M) to BNC (P/M), approx. 1000 mm

GOOD WILL INSTRUMENT CO., LTD.
No.7-1, Jhongsing Road, Tucheng Dist., New Taipei City 236, Taiwan
T +886-2-2268-0389 **F** +886-2-2268-0639
E-mail: marketing@goodwill.com.tw

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