

AFG-4000 Series Arbitrary Function Generator



GW INSTEK
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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)	25MHz		25MHz	35MHz	60MHz	80MHz	100MHz	250MHz
Sample Rate (Sa/s)	125M			500M				1.25G
Amplitude Resolution	14 bits			16 bits				
Memory Length	16k/CH		10M/CH					
Touch Panel	N/A			Yes				
Communication Interface	USB(Host, Device)			USB(Host, Device), LAN				

*AFG-4125AE built-in power amplifier function

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 : 1 μ Hz
- * 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

AFG-4000 series arbitrary function signal generators, which provide 25MHz ~ 250MHz bandwidth, single-channel and dual-channel designs, and feature 1 μ Hz 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 250MHz model provides 1.25GSa/s sample rate; the mid-range models ranging from 35MHz ~ 100MHz provide 500MSa/s sample rate; and the 25MHz entry-level models have a sample rate of 125MSa/s. For vertical resolution, the 35MHz ~ 250MHz models feature 16-bit resolution, and 25MHz 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 35MHz are equipped with the touch screen function. For communications interfaces, models above 35MHz are built-in USB and LAN communications interfaces.

APPLICATIONS

- * Educational Institutions
- * Automotive Electronics
- * Electronic Products and Parts

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	Built-in									
ARB Function	Built-in									
Sample Rate(*1)	125MSa/s		500MSa/s				1.25GSa/s			
Repetition Rate (Arbitrary Wave)	15MHz		30MHz							
Waveform Length	2 ~ 16k points		2 ~ 10M points							
Amplitude Resolution	14 bits		16 bits							
Minimum Rise and Fall Time	< 10 ns		< 8ns				< 5ns			
Jitter			8ns				32MB			
Non-Volatile Memory			8ns				32MB			
User-defined Output Section	From point 2 ~ 16,384		From point 2 ~ 10,240,000							
User-defined Output Marker Section	From point 2 ~ 16,384		From point 2 ~ 10,240,000							
Output Mode	1 ~ 1,000,000 cycles or infinite mode									
Frequency Characteristics										
Sine	25MHz		35MHz		60MHz		80MHz		100MHz	
Square	5MHz		15MHz		30MHz		60MHz		100MHz	
Pulse	5MHz		15MHz		30MHz		60MHz		100MHz	
Triangle, Ramp	1MHz		3MHz		6MHz		12MHz		25MHz	
Noise (-3dB)	25MHz BW		35MHz BW		60MHz BW		80MHz BW		100MHz BW	
Harmonic Wave	12.5MHz		17.5MHz		30MHz		40MHz		50MHz	
Resolution	1 μHz or 10 significant figures									
Accuracy Stability	±2 ppm at 25°C ±5°C				±1 ppm at 0 ~ 40°C					
Aging					±1 ppm, per 1 year					
Tolerance					±1 ppm					
Output Characteristics(*2)										
Output Amplitude	Into 50Ω		1mVpp ~ 10Vpp, for ≤ 25MHz; 1mVpp ~ 5Vpp, for ≤ 60MHz; 1mVpp ~ 2.5Vpp, for ≤ 100MHz				1mVpp ~ 10Vpp, for ≤ 40MHz; 1mVpp ~ 5Vpp, for ≤ 80MHz; 1mVpp ~ 2.5Vpp, for ≤ 120MHz; 1mVpp ~ 1Vpp, for ≤ 250MHz			
	Open-circuit		2mVpp ~ 20 Vpp, for ≤ 25MHz; 2mVpp ~ 10 Vpp, for ≤ 60MHz; 2mVpp ~ 5 Vpp, for ≤ 100MHz				2mVpp ~ 20 Vpp, for ≤ 40MHz; 2mVpp ~ 10 Vpp, for ≤ 80MHz; 2mVpp ~ 5 Vpp, for ≤ 120MHz; 2mVpp ~ 2 Vpp, for ≤ 250MHz			
Bandwidth Flatness	≤10MHz: ±0.2dB; ≤60MHz: ±0.3dB; ≤100MHz: ±0.5dB; (relative to 100 kHz Sine wave, 1 Vpp, 50Ω)									
Accuracy	± (2% of setting + 1 mVpp)(1kHz sine, 0V offset, >10mVpp)									
Resolution	0.1mVpp or 4 digits (The amplitude ≥ 1Vpp is 1mVpp)									
Output Impedance	50Ω (Typical)									
Output protection	Short circuit protection, the output will be automatically turned off when overloaded									
DC Offset	± (10 Vpk - Amplitude Vpp / 2), (High resistance)									
Range	± (3 % of [setting] + 5 mV + amplitude Vpp * 0.5%)									
Accuracy	± (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-1MHz: <65dBc; 1MHz-10MHz: <60dBc; 10MHz-60MHz: <55dBc; 60MHz-100MHz: <50dBc Typical (0dBm)				DC-1MHz: <65dBc; 1MHz-10MHz: <60dBc; 10MHz-120MHz: <50dBc; 120MHz-250MHz: <45dBc Typical (0dBm)					
Total Harmonic Distortion	< 0.05 %, 10 Hz to 20 kHz, 1 Vpp									
Non-harmonic Distortion	≤10MHz: <70dBc; >10MHz: <70dBc + 6dB/sound interval; Typical (0dBm)									
Phase Noise	10MHz: ≤-110dBc/Hz Typical (0dBm, 10kHz offset)									
Square Wave Characteristics										
Rise/Fall Time	< 30ns		< 8ns				< 5ns			
Overshoot	Typical (100 kHz, 1 Vpp) < 5%, (1 Vpp, 50Ω)		Typical (100 kHz, 1 Vpp) < 3%, (1 Vpp, 50Ω)							
Duty Cycle	50.00% (fixed)									
Ramp Wave Characteristics										
Linearity	< 0.1% of peak output (typical 1 kHz, 1 Vpp, symmetry 50%)									
Symmetry	0.0% ~ 100.0%									
Pulse Wave Characteristics										
Period	200ns-1000ks		66.667ns-1000ks		40ns-1000ks		20ns-1000ks			
Pulse Width	≥ 48ns		≥ 18ns		≥ 12ns		≥ 7ns			
Duty cycle	0.1% ~ 99.9% (limited by the frequency setting)									
Rise and fall time	≥ 32ns (limited by the pulse width setting)		≥ 8ns (limited by the pulse width setting)				≥ 7ns (limited by the pulse width setting)			
Overshoot	Typical (100 kHz, 1 Vpp) < 5%		Typical (100 kHz, 1 Vpp) < 3%							
Jitter	< 2ns		≤5MHz: 2ppm + 300ps, >5MHz: 300ps (rms), typical (1Vpp, 50Ω)							
Noise Wave Characteristics										
Types	Gaussian white noise									
Bandwidth (-3dB)	25MHz BW		35MHz BW		60MHz BW		80MHz BW		100MHz BW	
Harmonic Wave Characteristics										
Harmonic number	≤16									
Frequency Range	1μHz-12.5MHz		1μHz-17.5MHz		1μHz-30MHz		1μHz-40MHz		1μHz-50MHz	
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 ~ 1000,000 cycles), Infinite, gated									
Counter Function	Support frequency range: 100 mHz ~ 200 MHz									
Power Amplifier Function	-									
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 x 480 Vertical pixels							
	Color		65,536 colors, 16 bits, TFT							
	Touch Screen Capacitive		-							
Communication Interface	USB Host, USB Device		Multi-touch							
Power	Source		100 ~ 240 V (±10%), 50/60 Hz							
	Power Consumption		Less than 50VA							
	Fuse		250V, F2AL							
Operating Environment	Temperature to Satisfy		18 °C ~ 28 °C							
	Operating Temperature		0 °C ~ 40 °C							
	Relative Humidity		Less than 35°C: ≤ 90% relative humidity; 35°C ~ 40°C: ≤ 60% relative humidity							
	Installation Category		CAT II							
	Operating Altitude		Operating 3,000 meters; Non-operation 12,000 meters							
Storage Temperature	-20 °C ~ 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) x 177 (H) x 90 (D) mm; Approx. 2.5kg									

Note: *1. The User's available range of the sample rate is from 1 μSa/s to 75 MSa/s. (AFG-4125E/4125AE/4225E is from 1 μSa/s to 30MSa/s) Specifications subject to change without notice. AFG-4000D1_E_DH_202411
*2. Not specifically labeled, the load defaults to 50Ω. *3. DC offset set to zero.

ORDERING INFORMATION	
AFG-4125E	25MHz, 1-Channel Arbitrary Function Generator
AFG-4125AE	25MHz, 1-Channel Arbitrary Function Generator, Plus Power Amplifier
AFG-4225E	25MHz, 2-Channel Arbitrary Function Generator
AFG-4235	35MHz, 2-Channel Arbitrary Function Generator
AFG-4260	60MHz, 2-Channel Arbitrary Function Generator
AFG-4280	80MHz, 2-Channel Arbitrary Function Generator
AFG-4210H	100MHz, 2-Channel Arbitrary Function Generator
AFG-4225H	250MHz, 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. 1100mm
GTL-110	BNC Cable, BNC (P/M) to BNC (P/M), approx. 1000mm

