AFG-2225

25MHz True Dual Channel Arbitrary Function Generator

FEATURES

- Wide Frequency Ranges From 1µHz ~ 25MHz (sine wave)
- 1 µHz 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
- Friendly User Interface 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 and Frequency Counter
- USB Host/Device Interface for Remote Control and Waveform Editing

GW INSTEK

Simply Reliable

Equivalent Dual-Channel Provides Augmented Value for Customers

AFG-2225 is the first basic level dual-channel arbitrary function generator, which provides superior features in its class. Both channels are equipped with same characteristics to adapt dual-signal applications such as differential signaling or IQ modulation. The outstanding cost-performance value makes the AFG-2225 a practical instrument to accelerate the development process.

The major features for both channels include 10Vpp output amplitude; 25MHz frequency bandwidth with 1μHz resolution; built-in waveforms of Sine, Square, Ramp (Triangle) and Noise. As to the 1%~99% adjustable duty cycle of Square waveform can be used as pulse signal sources. For the arbitrary waveform, user can edit the 66 built-in waveforms or create a whole new one. Moreover, AFG-2225 carries features of AM/FM/PM/FSK/SUM Modulation, Sweep, Burst and Frequency Counter, which can be applied to various communication fields.

In addition to the intuitive and friendly user interface, the 3.5-inch color LCD displays the comprehensive operation information including the true waveform presented at the output. USB Host and Device interfaces are equipped to link the AFG-2225 with other devices, which provide the flexibility of waveform generation for more practical usages. With link to GW Instek GDS-series Digital Storage Oscilloscopes (DSOs), the waveforms of interest can be captured and reconstructed. User can also use the arbitrary waveform PC software to edit the waveform and then send to AFG-2225 directly, or save the waveform into flash drive and then transfer to AFG-2225.

A. FREQUENCY RANGES AND OFFERS MULTIPLE STANDARD WAVEFORMS
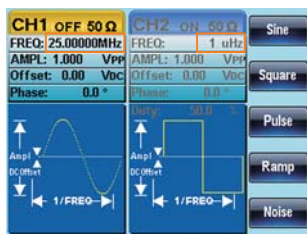
Wide Frequency Range

AFG-2225 offers signal output by DDS technique. The maximum frequency is 25 MHz and offers full-range 1μHz frequency resolution. The built-in functions include Sine, Square, Ramp/Triangle, Pulse, and Noise.

B. FULL-FUNCTIONS EQUIPPED DUAL-CHANNEL SIGNAL OUTPUT CAPABILITY
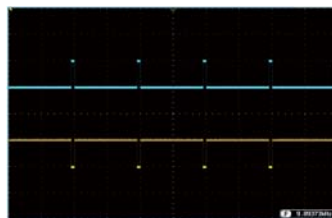

The Equivalent Function in Dual-Channel

In most two-channel signals applications, such as digital modulation and vehicle electronic simulation signals, the similar or identical waveform capabilities are required for both channel outputs. Unlike other dual-channel AFG in this class, AFG-2225 is fully equipped with equal capabilities on dual outputs. Most of dual-channel arbitrary waveform generators in this basic level cluster offer one major channel and one minor channel, in which the minor channel only provides less functions or inferior performances. This sort of non-full-function dual-channel AFGs cannot meet the requirements of reality.
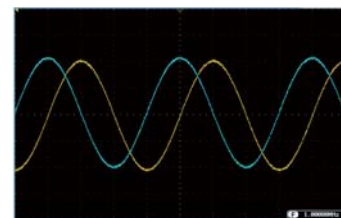
C. CORRELATED FUNCTIONS OF DUAL-CHANNEL OUTPUTS

Correlated Functions of Dual-Channel

Differential Signals

Quadrature (Sine and Cosine) Signals
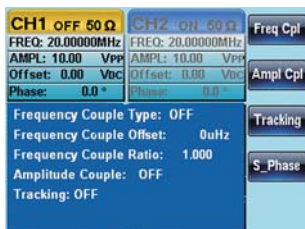
The two channels can be used in either independent or correlated configuration. AFG-2225 provides three correlated functions which are Couple, Tracking and Phase functions. For Couple function, two signals with a ratio or offset in amplitude or frequency can be generated. One of two signals with adjustable offset frequency is an example which can form the two-tone signals for testing the third order inter-modulation distortion of an amplifier. With Tracking function, two differential signals with equal-frequency, equal-amplitude but inverted phase can be produced. Examples such as PECL, LVPECL and LVDS digital signals or automotive sensors like temperature, speed signals are all able to be simulated by tracking function. The Phase function is designed to create two signals with specified phase offset. When user wants to create two quadrature (sine and cosine) signals, the phase offset is set to be 90 degrees in the Phase function. In conclusion, compared with other arbitrary function generators only equipped with phase function, AFG-2225 provides great convenience to fulfill the various challenges coming from modern electronic industries.
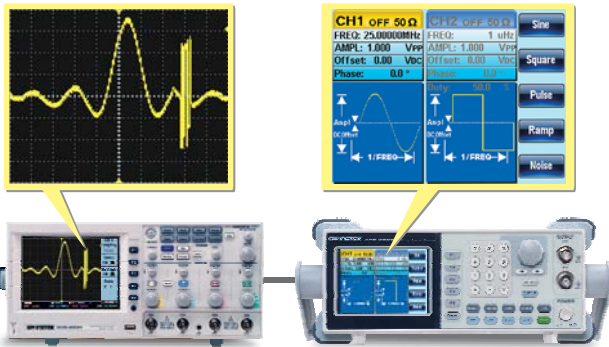
D. HIGH-FLEXIBILITY OF ARBITRARY WAVEFORMS EDITING
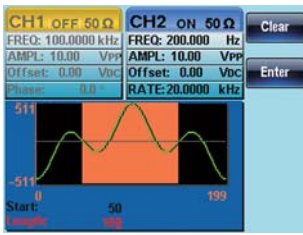
Direct Panel Operation

Supports CSV file upload

Direct Waveform Reconstruction (DWR) Capability
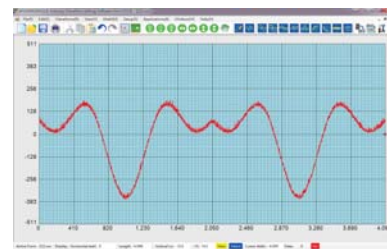
Arbitrary Waveform Editing PC Software

AFG-2225 provides 120MSa/s sampling rate, 10-bit vertical resolution, 4k-point waveform length, and the maximum waveform repeated rate of 60MHz, regarded as an outstanding arbitrary waveform capability. There are four ways for AFG-2225 to generate customized arbitrary waveforms, which are editing waveform via PC software, point-by-point editing on the panel, loading CSV file and loading the captured waveform from GWInstek GDS-Series Oscilloscopes.
The PC software editing and point-by-point editing particularly provide the way to create the user-defined and post-modification waveform.

CSV file loading capability allows AFG-2225 to produce the waveforms with complicated math operation result. Engineer can use PC math software to process the integral and then send the results in CSV format to AFG-2225. With the link to GWInstek GDS-Series Digital Storage Oscilloscopes (DSOs), the waveforms of interest can be captured by DSO and then reconstructed by AFG-2225. User can capture the waveform during the operation and then reconstructed by AFG-2225 for further analysis or diagnosis in the laboratory. Thus, plus the dual-channel feature, numerous derivative applications of capturing signal can be achieved.

E. 1%~99% ADJUSTABLE DUTY CYCLE OF SQUARE WAVE

1% Duty Cycle of Square Wave

Inheriting the advantage of AFG-2000 Series, AFG-2225 provides a 1%~99% variable duty cycle for its Square waveform within 100kHz bandwidth, which is considered practical for the tests such as simulating pulse and transient signals without purchasing extra advanced function generator and pulse generator.

F. FRIENDLY OPERATING INTERFACES AND INSTANT PARAMETER DISPLAY
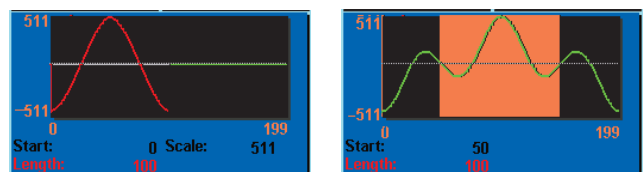
High-Flexable Editing/Output Method

AFG-2225 provides friendly panel operation setting as well as What You See Is What You Get operating way. From editing to output, the process can be manipulated via panel. Besides equipped with highly-flexible editing method, the immediate diagram is capable for users to understand the current waveform status and the output waveform contents under the storage/output setup.

G. 66 BUILT-IN ARBITRARY WAVEFORMS

66 frequently used function waveforms in all fields are built in arbitrary waveform memory for user's selection. They are categorized into four groups, Common, Math, Window and Engineer. The trigonometric derivative functions, Blackman, Chebyshev, Bessel, Gamma, Gauss ... can be selected and developed by further editing.

H. IMPEDANCE SWITCH FUNCTION

50Ω / High Z Impedance Switch Function

Majority of users are using oscilloscope to observe the waveforms of function generators. However, the differences of input impedance of function generators and oscilloscopes are not the same, and the oscilloscope will not necessarily be equipped with built-in input impedance switch function; the correct amplifier can only be received through computing. AFG-2225 provides 50Ω and high-input impedance switching modes, which can efficiently enhance the accuracy while users reading the results.
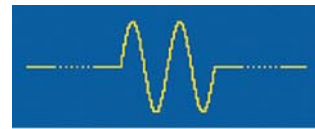
I. SUPPORT MULTI-CHANGE SIGNAL APPLICATION
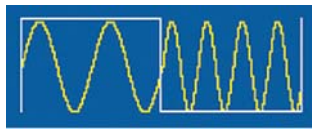
FSK
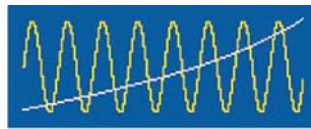
Sweep

Burst

AFG-2225 owns built-in functions, such as Modulation, Sweep, Burst, and RF Counter. The modulation waveforms contain AM, FM, PM, FSK, SUM, and either an internal signal or an external signal can be selected to perform the modulation. Sweep Function includes two sweep ways, linear and log mode, which can also perform sweep function in internal or external. Burst function supports two modes, Gate and N-Cycle, which can be used to control parameters such as phase angles, duration frequency, and duration time. The built-in Frequency Counter is available to provide the maximum 150MHz frequency range without additional purchase.

J. PROVIDE USB HOST/DEVICE INTERFACE
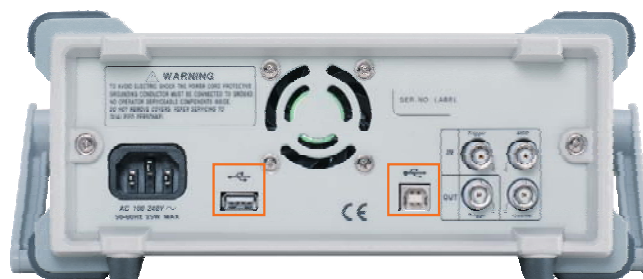
USB Host & USB Device

The USB Host/Device Interfaces are located at the rear panel of AFG-2225. The USB Host is mainly used for directly reconstruction of waveforms of GW Instek GDS-Series Oscilloscope, thus, it can be stored and recalled at portable USB Flash Drive; as to USB Device, which is used to connecting with PC, besides controlling through software on PC, USB Device also supports IEEE488.2 Command List for users to process customized functional control.

PANEL INTRODUCTION

1. LCD Display
2. Function Keys, Return Key
3. Scroll Wheel
4. Arrow Keys
5. Output Terminals
6. Channel Select Key
7. Power Switch
8. Output key
9. Operation Keys
10. Number Pad
11. Power Socket Input
12. Fan
13. Input Terminals
14. Trigger Output
15. USB Host Port
16. USB Device Port

SPECIFICATIONS

		CH1	CH2
WAVEFORMS		Sine, Square, Ramp, Pulse, Noise, ARB	
ARITRARY FUNCTION	Sample Rate Repetition Rate Waveform Length Amplitude Resolution Non-Volatile Memory	120MSa/s 60MHz 4k points 10 bits 4k points	

FREQUENCY CHARACTERISTICS	Range Sine/Square
	       Ramp
	Resolution
	Accuracy Stability
	       Aging
	       Tolerance
		1µHz ~ 25MHz
		1MHz
		1µHz
		±20ppm
		±1ppm, per 1 year
		≤1mHz	

OUTPUT CHARACTERISTICS	Amplitude Range
	
	       Accuracy
	       Resolution
	       Flatness
	
	       Units
	Offset Range
	
	       Accuracy
	Waveform Output Impedance
	       Protection
		1mVpp~10Vpp(into 50Ω), 2mVpp~20Vpp(open-circuit)
		1mVpp~5Vpp(into 50Ω)for 20MHz~25MHz; 2mVpp~10 Vpp(open-circuit)for 20MHz~25MHz
		±2% of setting ±1mVpp(at 1kHz/into 50Ω without DC offset)
		1mV or 3digits
		±1% (0.1dB) ≤100kHz, ±3% (0.3 dB) ≤5MHz, ±5% (0.4 dB) ≤12MHz, ±10%(0.9dB)≤25MHz
		(sine wave relative to 1kHz/into 50Ω)
		Vpp, Vrms, dBm
		±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
		2% of setting+20mV+0.5% of amplitude
		50Ω typical (fixed); >10MΩ (output disabled)
		Short-circuit protected ; Overload relay automatically disables main output	

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	
SQUARE WAVE CHARACTERISTICS	Rise/Fall Time Overshoot Asymmetry Variable Duty Cycle	≤ 25ns at maximum output (into 50Ω load) 5% 1% of period + 5 ns 1.0%~99%≤100kHz ; 10.0%~90.0%≤1MHz ; 50.0%≤ 25MHz	
RAMP CHARACTERISTICS	Linearity Variable Symmetry	< 0.1% of peak output 0%~100%(0.1% Resolution)	
PULSE CHARACTERISTICS	Period Pulse Width Overshoot Jitter	40ns ~ 2000s 20ns ~ 1999.9s <5% 20ppm + 5ns	
AM MODULATION	Carrier Waveforms Modulating Waveforms Modulating Frequency Depth Source	Sine, Square, Ramp, Pulse, Arb Sine, Square, Triangle, Upramp, Dnramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 120.0% Internal / External	Sine, Square, Ramp, Pulse, Arb Sine, Square, Triangle, Upramp, Dnramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 120.0% Internal / External

SPECIFICATIONS

		CH1	CH2
FM MODULATION	**Carrier Waveforms**	Sine, Square, Ramp	Sine, Square, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
	Peak Deviation	DC ~ Max Frequency	DC ~ Max Frequency
	Source	Internal / External	Internal / External
PM	**Carrier Waveforms**	Sine, Square, Ramp	Sine, Square, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
	Phase Deviation	0˚ ~ 360˚	0˚ ~ 360˚
	Source	Internal / External	Internal / External
FSK	**Carrier Waveforms**	Sine, Square, Ramp, Pulse	Sine, Square, Ramp, Pulse
	Modulating Waveforms	50% duty cycle square	50% duty cycle square
	Modulation Frequency	2mHz ~ 100 kHz (INT); DC ~ 100 kHz(EXT)	2mHz ~ 100 kHz (INT); DC ~ 100 kHz(EXT)
	Phase Deviation	1µHz ~ Max Frequency	1µHz ~ Max Frequency
	Source	Internal / External	Internal / External
SUM	**Carrier Waveforms**	Sine, Square, Ramp, Pulse, Noise	Sine, Square, Ramp, Pulse, Noise
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
	Phase Deviation	0% ~ 100.0%	0% ~ 100.0%
	Source	Internal / External	Internal / External
SWEEP	**Waveforms**	Sine, Square, Ramp	Sine, Square, Ramp
	Type	Linear or Logarithmic	Linear or Logarithmic
	Start/Stop Freq	1µHz to Max Frequency	1µHz to Max Frequency
	Sweep Time	1ms ~ 500s	1ms ~ 500s
	Source	Internal / External / Manual	Internal / External / Manual
BURST	**Waveforms**	Sine, Square, Ramp	Sine, Square, Ramp
	Frequency	1µHz ~ 25MHz	1µHz ~ 25MHz
	Burst Count	1 ~ 65535 cycles or Infinite	1 ~ 65535 cycles or Infinite
	Start/Stop Phase	-360 ~ +360	-360 ~ +360
	Internal Period	1ms ~ 500s	1ms ~ 500s
	Gate Source	External Trigger	External Trigger
	Trigger Source	Single, External or Internal Rate	Single, External or Internal Rate
	N-Cycle, Infinite	0s ~ 655350ns	0s ~ 655350ns
FREQUENCY COUNTER	**Range**	5Hz ~ 150MHz	
	Accuracy	Time Base accuracy±1count	
	Time Base	±20ppm (23˚C ± 5˚C) after 30 minutes warm up	
	Resolution	The maximum resolution is : 100nHz for 1Hz, 0.1Hz for 100MHz	
	Input Impedance	1kΩ/1pf	
	Sensitivity	35mVrms ~ 30Vms (5Hz ~ 150MHz)	
DUAL CHANNEL FUNCTION	**Phase**	-180˚ ~ 180˚, Synchronize phase	-180˚ ~ 180˚, Synchronize phase
	Tracking	CH2=CH1	CH1=CH2
	Coupling	Frequency(Ratio or Difference)Amplitude & DC Offset	Frequency(Ratio or Difference)Amplitude & DC Offset
	DSOlink	√	√
EXTERNAL TRIGGER INPUT	**Type**	For FSK, Burst, Sweep	
	Input Level	TTL Compatibility	
	Slope	Rising or Falling(Selectable)	
	Pulse Width	>100ns	
	Input Impedance	10kΩ, DC coupled	
EXTERNAL MODULATION INPUT	**Type**	For AM, FM, PM, SUM	
	Voltage Range	±5V full scale	
	Input Impedance	10kΩ	
	Frequency	DC ~ 20kHz	
TRIGGER OUTPUT	**Type**	For Burst, Sweep, Arb	
	Level	TTL Compatible into 50Ω	
	Pulse Width	>450ns	
	Maximum Rate	1MHz	
	Fan-out	≥4 TTL Load	
	Impedance	50Ω Typical	
SAVE/RECALL	10 Groups of Setting Memories		
INTERFACE	USB(Host & Device)		
DISPLAY	3.5" TFT LCD		
POWER SOURCE	AC100 ~ 240V , 50 ~ 60Hz		
POWER CONSUMPTION	25W (Max.)		
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		

* The specifications apply when the function generator is powered on for at least 30 minutes under +18°C~+28°C.　　　Specifications subject to change without notice.　FG-2225GD1BH

ORDERING INFORMATION

AFG-2225　25MHz True Dual Channel Arbitrary Function Generator

ACCESSORIES

User Manual CD x 1, Quick Start Manual x 1, GTL-101 Test Lead x 2, Power Cord x 1

OPTIONAL ASSESSORIES

GTL-110　BNC(M)-BNC(M) RF Cable
GTL-246　USB Cable, USB 2.0 Type A – Type B, 4P

FREE DOWNLOAD

PC Software　Arbitrary Waveform Editing Software

GW INSTEK

Simply Reliable

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