

## 25MHz TRUE DUAL CHANNEL ARBITRARY FUNCTION GENERATOR



### Equivalent Dual-Channel Provides Augmented Value for Customers

GW Instek is launching AFG-2225, its first basic level dual-channel arbitrary function generator, which provides superior features in its class. Both channels are equipped with same characteristics to fit dual-signal applications such as differential or IQ signaling. 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 1uHz 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.

### Full-Functions equipped Dual-channel Signal Output Capability

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 can not meet the requirements of reality.

### Correlated Functions of Dual-channel Outputs

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.

### High-flexibility of Arbitrary Waveforms Editing

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 GW Instek 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 GW Instek 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.

AFG-2225

## AFG-2225

### FEATURES

- Wide Frequency Ranges From 1  $\mu$ Hz ~ 25MHz (sine wave)
- 1  $\mu$ Hz 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



Front Panel

### APPLICATIONS

- Power Supply/Transformer Simulations
- Traditional/Motor Power Applications
- Laboratory and Educational Research
- Pulse Signal as Trigger or Synchronization
- Automotive Electronics Applications

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SPECIFICATIONS			
		CH1	CH2
<b>WAVEFORMS</b>		Sine, Square, Ramp, Pulse, Noise, ARB	
<b>ARBITRARY FUNCTION</b>	<b>Sample Rate</b> <b>Repetition Rate</b> <b>Waveform Length</b> <b>Amplitude Resolution</b> <b>Non-Volatile Memory</b>	120MSa/s 60MHz 4k point 10 bit 4k points	
<b>FREQUENCY CHARACTERISTICS</b>	<b>Range</b> <b>Resolution</b> <b>Accuracy</b> <b>Stability</b> <b>Aging</b> <b>Tolerance</b>	1µHz ~ 25MHz 1MHz 1µHz ±20ppm ±1ppm, per 1 year ±1mHz	
<b>OUTPUT CHARACTERISTICS</b>	<b>Amplitude</b> <b>Accuracy</b> <b>Resolution</b> <b>Flatness</b> <b>Units</b> <b>Offset</b> <b>Waveform Output</b> <b>Impedance</b> <b>Protection</b>	1mVpp~10Vpp(into 50Ω), 2mVpp~20Vpp(open-circuit) 1mVpp~5Vpp(into 50Ω) for 20MHz~25MHz; 2mVpp~10pp(open-circuit) for 20MHz~25MHz ±2% of setting ±1mVpp(at 1kHz) 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) 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 + 5mV+ 0.5% of amplitude 50Ω typical (fixed); >10MΩ (output disabled) Short-circuit protected; Overload relay automatically disables main output	
<b>SINE WAVE CHARACTERISTICS</b>	<b>Harmonic Distortion</b>	≤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	
<b>SQUARE WAVE CHARACTERISTICS</b>	<b>Rise/Fall Time</b> <b>Overshoot</b> <b>Asymmetry</b> <b>Variable Duty Cycle</b>	≤ 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	
<b>RAMP CHARACTERISTICS</b>	<b>Linearity</b> <b>Variable Symmetry</b>	< 0.1% of peak output 0%~100% (0.1% Resolution)	
<b>PULSE CHARACTERISTICS</b>	<b>Period</b> <b>Pulse Width</b> <b>Overshoot</b> <b>Jitter</b>	40ns ~ 2000s 20ns ~ 1999.9s <5% 20ppm + 5ns	
<b>AM MODULATION</b>	<b>Carrier Waveforms</b> <b>Modulating Waveforms</b> <b>Modulating Frequency</b> <b>Depth</b> <b>Source</b>	Sine, Square, Ramp, Pulse, Arb Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 120.0% Internal / External	Sine, Square, Ramp, Pulse, Arb Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 120.0% Internal / External
<b>FM MODULATION</b>	<b>Carrier Waveforms</b> <b>Modulating Waveforms</b> <b>Modulating Frequency</b> <b>Peak Deviation</b> <b>Source</b>	Sine, Square, Ramp Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) DC ~ Max Frequency Internal / External	Sine, Square, Ramp Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) DC ~ Max Frequency Internal / External
<b>PM</b>	<b>Carrier Waveforms</b> <b>Modulating Waveforms</b> <b>Modulating Frequency</b> <b>Phase Deviation</b> <b>Source</b>	Sine, Square, Ramp Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0° ~ 360° Internal / External	Sine, Square, Ramp Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0° ~ 360° Internal / External
<b>FSK</b>	<b>Carrier Waveforms</b> <b>Modulating Waveforms</b> <b>Modulating Frequency</b> <b>Phase Deviation</b> <b>Source</b>	Sine, Square, Ramp, Pulse 50% duty cycle square 2mHz ~ 100 kHz (INT); DC ~ 100 kHz(EXT) 1µHz ~ Max Frequency Internal / External	Sine, Square, Ramp, Pulse 50% duty cycle square 2mHz ~ 100 kHz (INT); DC ~ 100 kHz(EXT) 1µHz ~ Max Frequency Internal / External
<b>SUM</b>	<b>Carrier Waveforms</b> <b>Modulating Waveforms</b> <b>Modulating Frequency</b> <b>Phase Deviation</b> <b>Source</b>	Sine, Square, Ramp, Pulse, Noise Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 100.0% Internal / External	Sine, Square, Ramp, Pulse, Noise Sine, Square, Triangle, Up ramp, Dn ramp 2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT) 0% ~ 100.0% Internal / External
<b>SWEEP</b>	<b>Waveforms</b> <b>Type</b> <b>Start/Stop Freq</b> <b>Sweep Time</b> <b>Source</b>	Sine, Square, Ramp Linear or Logarithmic 1µHz to Max Frequency 1ms ~ 500s Internal / External/Manual	Sine, Square, Ramp Linear or Logarithmic 1µHz to Max Frequency 1ms ~ 500s Internal / External/Manual
<b>BURST</b>	<b>Waveforms</b> <b>Frequency</b> <b>Burst Count</b> <b>Start/Stop Phase</b> <b>Internal Period</b> <b>Gate Source</b> <b>Trigger Source</b> <b>N-Cycle, Infinite</b>	Sine, Square, Ramp 1µHz ~ 25MHz 1 ~ 65535 cycles or Infinite -360 ~ +360 1ms ~ 500s External Trigger Single, External or Internal Rate 0s ~ 655350ns	Sine, Square, Ramp 1µHz ~ 25MHz 1 ~ 65535 cycles or Infinite -360 ~ +360 1ms ~ 500s External Trigger Single, External or Internal Rate 0s ~ 655350ns
<b>FREQUENCY COUNTER</b>	<b>Range</b> <b>Accuracy</b> <b>Time Base</b> <b>Resolution</b> <b>Input Impedance</b> <b>Sensitivity</b>	5Hz ~ 150MHz Time Base accuracy: 1count ±20ppm (23°C ± 5°C) after 30 minutes warm up The maximum resolution is : 100nHz for 1Hz, 0.1Hz for 100MHz 1kΩ/1pf 35mVrms ~ 30Vrms (5Hz ~ 150MHz)	
<b>DUAL CHANNEL FUNCTION</b>	<b>Phase</b> <b>Tracking</b> <b>Coupling</b> <b>DSOLink</b>	-180° ~ 180°, Synchronize phase CH2=CH1 Frequency(Ratio or Difference)Amplitude & DC Offset ✓	-180° ~ 180°, Synchronize phase CH1=CH2 Frequency(Ratio or Difference)Amplitude & DC Offset ✓
<b>EXTERNAL TRIGGER INPUT</b>	<b>Type</b> <b>Input Level</b> <b>Slope</b> <b>Pulse Width</b> <b>Input Impedance</b>	For FSK, Burst, Sweep TTL Compatibility Rising or Falling(Selectable) >100ns 10kΩ, DC coupled	
<b>EXTERNAL MODULATION INPUT</b>	<b>Type</b> <b>Voltage Range</b> <b>Input Impedance</b> <b>Frequency</b>	For AM, FM, PM, SUM ±5V full scale 10kΩ DC ~ 20kHz	
<b>TRIGGER OUTPUT</b>	<b>Type</b> <b>Level</b> <b>Pulse Width</b> <b>Maximum Rate</b> <b>Fan-out</b> <b>Impedance</b>	For Burst, Sweep, Arb TTL Compatible into 50Ω >450ns 1MHz ≥4 TTL Load 50Ω Typical	
<b>Save/RECALL</b>	10 Groups of Setting Memories		
<b>INTERFACE</b>	USB (Host & Device)		
<b>DISPLAY</b>	3.5" TFT LCD		
<b>POWER SOURCE</b>	AC100 ~ 240V, 50 ~ 60Hz		
<b>POWER CONSUMPTION</b>	25W (Max.)		
<b>OPERATING ENVIRONMENT</b>	Temperature to satisfy the specification: 18~28°C; Operating temperature: 0~40°C; Relative Humidity: ≤80%, 0~40°C; ≤70%, 35~40°C;		
<b>OPERATING ALTITUDE</b>	Installation category: CAT II		
<b>STORAGE TEMPERATURE</b>	2000 meters		
<b>DIMENSIONS &amp; WEIGHT</b>	-10~70°C, Humidity: ≤70%		
	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.

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