ENGLISH

# Datasheet
# Arbitrary Function Generator

| Stock No. : | Model : | | | | |
|---|---|---|---|---|---|
| 123-3529 | AFG-21005 | 124-0226 | AFG-21112 | 123-3532 | AFG-21112 |
| 123-3530 | AFG-21012 | 123-3531 | AFG-21105 | 123-3533 | AFG-21125 |


CE USB PC Software

## FEATURES

- 0.1Hz ~ 5/12/25 MHz with in 0.1Hz Resolution
- Sine, Square, Ramp, Noise and Arbitrary Waveform
- 20MSa/s Sampling Rate, 10 bit Vertical Resolution and 4k point Memory for Arbitrary Waveform
- 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- Waveform Parameter Setting Through Numeric Keypad Entry & Knob Selection
- Amplitude, DC Offset and Other Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
- AM/FM/FSK Modulation, Sweep, and Frequency Counter Functions (AFG-21025/21105/21125 only)
- USB Device Interface for Remote Control and Waveform Editing
- PC Arbitrary Waveform Editing Software

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# Innovation and Value in Waveform Design

The AFG-21000 Series Arbitrary Function Generators are DDS based signal generators covering the output of Sine, Square, Ramp, Noise and 20MSa/s Arbitrary waveform. The 0.1Hz resolution and 1% ~ 99% adjustable duty cycle of Square(Pulse) waveform greatly extend its application range in various fields.

The AFG-21000 Series includes 6 models in three frequency bands of 5MHz, 12MHz and 25MHz. Besides the features of AFG-21000 Series also carries additional features of AM/FM/FSK Modulation, Sweep and Frequency Counter. The 3.5" color LCD will clearly display the digital waveform parameters set through front panel. The entire Series is equipped with USB Device interface for remote control and importing waveform data from PC.

### Built-In Arbitrary Waveform Function

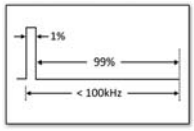
20MSa/s sampling rate, 10 bit vertical resolution and 4k point memory equip AFG-21000 Series the arbitrary waveform capacity. User can create waveform by mean of either point by point input from front panel or PC software.

### Amplitude and DC Offset Display

In addition to the setting parameters, the amplitude, DC offset values are also displayed on the LCD screen. Three amplitude units, Vpp, Vrms and dBm, can be selected and exchanged.

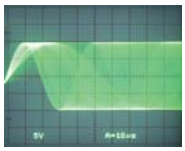

### 1% Adjustable Duty Cycle of Square Wave

The AFG-21000 Series provides 1% ~ 99% variable duty cycle for its square waveform output. This feature allows generating the pulse waveform to simulate a spike signal or a transient signal.


### AM/FM/FSK, Sweep, Counter(AFG-2100 only)

AFG-21025/21105/21125 models are equipped with additional AM/FM/FSK Modulation, Sweep and Frequency Counter functions. The 150MHz frequency counter saves user the cost of purchasing a standalone frequency counter.

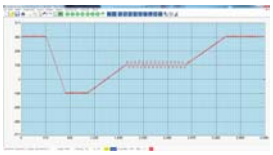


### Fully Digital Entry Design

The fully digital entry design of AFG-21000 Series Series improves the setting uncertainty of conventional Function Generator and therefore significantly increases the accuracy of its waveform output. The 3.5" LCD screen allows user to see the parameter value change in detail when the adjustment is in progress.

### Arbitrary Waveform Editing Software

A free arbitrary waveform editing software is available which is used to edit the arbitrary waveform on PC. After completing the waveform editing, it can be downloaded to AFG through USB interface for waveform output.



## APPLICATIONS

- **Audio Products Frequency Characteristics Measurement**
- **Pulse Signal as Trigger or Synchronization Signal for Electronic Product Testing**
- **Pulse Noise Simulation**
- **Reference Clock Signal of Electronic Device**
- **Vibration Signal Simulation**
- **Noise Simulation for Communication System Educational Lab**

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## SPECIFICATIONS

| MODELS | | | AFG-21005 | AFG-21012 | AFG-21112 | AFG-21105 | AFG-21112 | AFG-21125 |
|---|---|---|---|---|---|---|---|---|
| WAVEFORMS | | | Sine, Square, Ramp, Noise, Arbitrary Waveform | | | | | |
| ARITRARY FUNCTION | Sample Rate | | 20MSa/s | | | | | |
| | Repetition Rate | | 10MHz | | | | | |
| | Waveform Length | | 4k point | | | | | |
| | Amplitude Resolution | | 10 bit | | | | | |
| FREQUENCY CHARACTERISTICS | Range | Sine/Square | 0.1Hz~5MHz | 0.1Hz~12MHz | 0.1Hz~25MHz | 0.1Hz~5MHz | 0.1Hz~12MHz | 0.1Hz~25MHz |
| | | Ramp | 0.1Hz ~ 1MHz | | | | | |
| | Resolution | Sine,Square,Ramp | 0.1Hz | | | | | |
| | Accuracy | Stability | ±20ppm | | | | | |
| | | Aging | ±1ppm, per 1 year | | | | | |
| | | Tolerance | ≤10mHz | | | | | |
| OUTPUT CHARACTERISTICS | Amplitude | Range | 1mVpp~10Vpp(into 50Ω), 0.1Hz~20MHz; 2mVpp~20Vpp(open-circuit), 0.1Hz~20MHz<br>1mVpp~5Vpp(into 50Ω), 20MHz~25MHz; 2mVpp~10 pp(open-circuit), 20MHz~25MHz | | | | | |
| | | Accuracy | ±2% of setting ±1mVpp; (sine wave relative to 1 kHz/into 50Ω) | | | | | |
| | | Resolution | 1mV or 3digits | | | | | |
| | | Flatness | ±1%(0.1dB)≤ 100kHz; ±3%(0.3dB)≤ 5MHz; ±4%(0.4dB)≤ 12MHz; ±20%(2dB)≤ 20MHz;<br>±5%(0.4dB)≤ 25MHz; (at 1kHz/into 50Ω without DC offset) | | | | | |
| | | Units | Vpp, Vrms, dBm | | | | | |
| | Offset | Range | ±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 | | | | | |
| | | Accuracy | 2% of setting + 10mV+ 0.5% of amplitude | | | | | |
| | Waveform Output | Impedance | 50Ω typical (fixed); >300kΩ(output disabled) | | | | | |
| | | Protection(main output) | Short-circuit protected ; Overload relay auto matically disables main output | | | | | |
| | SYNC Output | Level | TTL-compatible into >1kΩ | | | | | |
| | | Impedance | 50Ω nominal | | | | | |
| | | Rise or Fall Time | ≤ 25ns | | | | | |
| SINE WAVE CHARACTERISTICS | Harmonic Distortion | | –55 dBc DC ~ 200kHz, Ampl > 0.1Vpp; –50 dBc 200kHz ~ 1MHz, Ampl > 0.1Vpp<br>–35 dBc 1MHz ~ 5MHz, Ampl > 0.1Vpp; –30 dBc 5MHz ~ 25MHz, Ampl > 0.1Vpp | | | | | |
| SQUAREWAVE CHARACTERISTICS | Rise/Fall Time | | ≤ 25ns at maximum output (into 50Ωload) | | | | | |
| | Overshoot | | < 5% | | | | | |
| | Asymmetry | | 1% of period+1 ns | | | | | |
| | Variable Duty Cycle | | 1%~99%≤ 100kHz ; 20.0%~80.0%≤ 5MHz ; 40.0%~60.0%≤10MHz ; 50%≤ 25MHz<br>(1% Resolution for full Frequency Range) | | | | | |
| RAMP CHARACTERISTICS | Linearity | | < 0.1% of peak output | | | | | |
| | Variable Symmetry | | 0%~100%(0.1% Resolution) | | | | | |
| AM MODULATION | Carrier Waveforms | | Sine, Square, Triangle | | | – | | |
| | Modulating Waveforms | | Sine, Square, Triangle | | | | | |
| | Modulating Frequency | | 2 mHz~20 kHz (Int); DC~20KHz (Ext) | | | | | |
| | Depth | | 0%~120.0% | | | | | |
| | Source | | Internal/External | | | | | |
| FM MODULATION | Carrier Waveforms | | Sine, Square, Triangle | | | – | | |
| | Modulating Waveforms | | Sine, Square, Triangle | | | | | |
| | Modulating Frequency | | 2 mHz~20 kHz (Int); DC~20KHz (Ext) | | | | | |
| | Deviation | | DC to Max Frequency | | | | | |
| | Source | | Internal/External | | | | | |
| SWEEP | Waveforms | | Sine, Square, Triangle | | | – | | |
| | Type | | Linear or Logarithmic | | | | | |
| | Start/Stop Frequency | | 0.1Hz to Max Frequency | | | | | |
| | Sweep Time | | 1ms~500s | | | | | |
| | Source | | Internal/External | | | | | |
| FSK | Carrier Waveforms | | Sine, Square, Triangle | | | – | | |
| | Modulating Waveforms | | 50% duty cycle square | | | | | |
| | Internal Rate | | 2mHz~20kHz | | | | | |
| | Modulation Rate | | 2mHz~100kHz(INT); DC~100kHz(Ext) | | | | | |
| | Frequency Range | | 0.1Hz~Max Frequency | | | | | |
| | Source | | Internal/External | | | | | |
| FREQUENCY COUNTER | Range | | 5Hz~150MHz | | | – | | |
| | Accuracy | | Time Base accuracy ± 1count | | | | | |
| | Time base | | ±20ppm(23°C±5°C)after 30minutes warm up | | | | | |
| | Resolution | | 100nHz for 1Hz, 0.1Hz for 100MHz | | | | | |
| | Input Impedance | | 1KΩ/1pf | | | | | |
| | Sensitivity | | 35mVrms~30Vms (5Hz~150MHz) | | | | | |
| STORE/RECALL | 10 Groups of Setting Memories | | | | | | | |
| INTERFACE | USB(Device) | | | | | | | |
| DISPLAY | LCD | | | | | | | |
| POWER SOURCE | AC100~240V , 50~60Hz | | | | | | | |
| POWER CONSUMPTION | 25 VA | | | | | | | |
| OPERATING ENVIRONMENT | Temperature to satisfy the specification: 18~28°C; Operating temperature: 0~40°C<br>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 | | | | | | | |

Specifications subject to change without notice.

## ORDERING INFORMATION

**AFG-21005** 5MHz Arbitrary Waveform Function Generator
**AFG-21012** 12MHz Arbitrary Waveform Function Generator
**AFG-21112** 25MHz Arbitrary Waveform Function Generator
**AFG-21105** 5MHz Arbitrary Waveform Function Generator
**AFG-21112** 12MHz Arbitrary Waveform Function Generator
**AFG-21125** 25MHz Arbitrary Waveform Function Generator

## ACCESSORIES

Quick Start Guide x 1, Power cord x 1
AFG-21025/21105/21125 - GTL-101 Test Lead x 2, Instruction Manual x 1, Power cord x 1
AFG-21005/21012/21112 - GTL-101 Test Lead x 1, Instruction Manual x 1, Power cord x 1

## OPTIONAL ASSESSORIES

**GTL-246** USB Cable, USB 2.0 Type A - Type B, 4P

## FREE DOWNLOAD

**PC Software** FreeWave software **Driver** USB driver

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