

TEKTRONIX

AFG3101

The Tektronix AFG3101 is a high-performance 1-channel Arbitrary/Function Generator from the AFG3000 Series. Offering a 100 MHz sine wave frequency range, 1 GS/s sampling rate, and 14-bit vertical resolution, it delivers unmatched performance and versatility. With its intuitive 5.6-inch color TFT display and integrated ArbExpress software, this instrument facilitates rapid waveform design and generation for educational, engineering, and manufacturing applications.

SPECIFICATIONS

General

Interfaces	USB Host (front panel), USB Device (rear panel), LAN (10/100 Base-T, LXI Class C), GPIB (IEEE 488.2)
Display	5.6 in. Color TFT LCD, 320 × 240 resolution
Warm-up Time	20 minutes
Instrument Setup Memory	10 setups

Physical

Power Supply	100 V to 240 V AC, 47 Hz to 63 Hz (and 115 V AC, 360 Hz to 440 Hz), <120 W power consumption
Operating Temperature	0 °C to +50 °C °C
Dimensions (W×H×D)	329.6 mm × 156.3 mm × 168.0 mm mm
Weight	4.5 kg kg

Channel Characteristics

Number of Channels	1
Operating Modes	Continuous, Modulation, Sweep, Burst

Waveform Generation

Standard Waveforms	Sine, Square, Pulse, Ramp, Triangle, Sin(x)/x, Exponential Rise, Exponential Decay, Gaussian, Lorentz, Haversine, Noise, DC
Arbitrary Waveform Length	2 to 131,072 points (128 K)
Sampling Rate	1 GS/s
Vertical Resolution	14 bits
Non-Volatile Memory Capacity	4 waveforms

Frequency Specifications

Sine Frequency Range	1 mHz to 100 MHz
Square Frequency Range	1 mHz to 50 MHz
Pulse Frequency Range	1 mHz to 50 MHz
Ramp/Triangle Frequency Range	1 mHz to 1 MHz
Arbitrary Waveform Frequency Range	1 mHz to 50 MHz
Noise Bandwidth	100 MHz
Frequency Resolution	1 μ Hz or 12 digits
Aging Rate	± 1 ppm per year

Sine Wave Distortion and Purity

Harmonic Distortion (10 Hz to 20 kHz)	<-70 dBc at 1 Vpp
Harmonic Distortion (20 kHz to 1 MHz)	<-60 dBc at 1 Vpp
Harmonic Distortion (1 MHz to 10 MHz)	<-50 dBc at 1 Vpp
Harmonic Distortion (10 MHz to 25 MHz)	<-40 dBc at 1 Vpp
Harmonic Distortion (25 MHz to 100 MHz)	<-37 dBc at 1 Vpp
Total Harmonic Distortion (THD)	<0.2% (10 Hz to 20 kHz, 1 Vpp, typical)
Spurious Noise (10 Hz to 1 MHz)	<-70 dBc at 1 Vpp
Spurious Noise (1 MHz to 25 MHz)	<-60 dBc at 1 Vpp
Phase Noise	<-110 dBc/Hz at 10 kHz offset (10 MHz, 1 Vpp, typical)

Pulse & Square Wave Characteristics

Rise/Fall Time	≤ 5.0 ns
Overshoot	< 5%
Pulse Width Range	8.0 ns to 999.9 s
Duty Cycle Range	0.001% to 99.999%
Pulse Edge Transition Time Range	5.0 ns to 625 s
Jitter (RMS)	<100 ps (typical)

Amplitude and Output Characteristics

Amplitude Range (into 50 Ω , ≤ 10 MHz)	20 mVpp to 10 Vpp
Amplitude Range (into Open Circuit, ≤ 10 MHz)	40 mVpp to 20 Vpp
Amplitude Accuracy	$\pm(1\%$ of setting + 1 mV) at 1 kHz, 0 V offset, >10 mVpp
Amplitude Resolution	0.1 mVpp, 0.1 mVrms, 1 mV, 0.1 dBm, or 4 digits
Amplitude Units	Vpp, Vrms, dBm
DC Offset Range (into 50 Ω , ≤ 10 MHz)	± 5 Vpk
DC Offset Accuracy	$\pm(1\%$ of setting + 5 mV + 0.5% of amplitude)
Output Impedance	50 Ω
Output Protection	Short-circuit protected
Main Output Connector Type	BNC (front panel)

Modulation, Sweep, and Burst

Modulation Types	AM, FM, PM, FSK, PWM
Internal Modulation Sources	Sine, Square, Triangle, Ramp, Noise, ARB
AM Modulation Depth	0.0% to 120.0%
FM Deviation Range	1 mHz to 50 MHz
PM Phase Deviation Range	0.0° to 180.0°
FSK Keying Rate	2 mHz to 1 MHz
PWM Duty Cycle Deviation Range	0.0% to 50.0% of pulse period
Sweep Type	Linear, Logarithmic
Sweep Time Range	1 ms to 300 s
Burst Type	Triggered, Gated
Burst Count Range	1 to 1,000,000 cycles, or infinite

Clock, Trigger, and Synchronization

Internal Reference Stability	± 1 ppm per year
External Reference Input Frequency Range	10 MHz $\pm$ 35 kHz
External Reference Input Level	1.4 Vpp to 5 Vpp
External Reference Output Frequency	10 MHz
External Reference Output Level	1.2 Vpp into 50 Ω
Trigger Input Level	TTL compatible (Min high 2.0 V, Max low 0.8 V)
Trigger Output Voltage Level	TTL compatible into >1 k Ω
Sync Output Level	TTL compatible

Connectivity and Programming

Programming Language	SCPI (Standard Commands for Programmable Instruments)
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Performance

Sine Wave Amplitude Flatness (< 5 MHz)	±0.15 dB (1 Vp-p, relative to 1 kHz)
Sine Wave Amplitude Flatness (5 MHz to 20 MHz)	±0.3 dB (1 Vp-p, relative to 1 kHz)
Sine Wave Amplitude Flatness (20 MHz to 50 MHz)	±0.5 dB (1 Vp-p, relative to 1 kHz)
Sine Wave Amplitude Flatness (50 MHz to 100 MHz)	±1.0 dB (1 Vp-p, relative to 1 kHz)
Amplitude Range (into 50 Ω, > 10 MHz to ≤ 50 MHz)	10 mVp-p to 5 Vp-p
Amplitude Range (into 50 Ω, > 50 MHz to ≤ 100 MHz)	10 mVp-p to 2 Vp-p
Amplitude Range (into Open Circuit, > 10 MHz to ≤ 50 MHz)	20 mVp-p to 10 Vp-p
Amplitude Range (into Open Circuit, > 50 MHz to ≤ 100 MHz)	20 mVp-p to 4 Vp-p
DC Offset Range (into 50 Ω, > 10 MHz to ≤ 50 MHz)	±2.5 V pk AC + DC
DC Offset Range (into 50 Ω, > 50 MHz to ≤ 100 MHz)	±1 V pk AC + DC
DC Offset Range (into Open Circuit, ≤ 10 MHz)	±10 V pk AC + DC
DC Offset Range (into Open Circuit, > 10 MHz to ≤ 50 MHz)	±5 V pk AC + DC
DC Offset Range (into Open Circuit, > 50 MHz to ≤ 100 MHz)	±2 V pk AC + DC
Phase Range	-180.00° to +180.00°
Phase Resolution	0.01°

Frequency

Sin(x)/x (Sinc) Frequency Range	1 mHz to 1 MHz
Exponential Rise/Fall Frequency Range	1 mHz to 1 MHz
Cardiac Frequency Range	1 mHz to 1 MHz
Lorentz Frequency Range	1 mHz to 1 MHz

Modulation

Internal Modulating Frequency Range	2 mHz to 50.00 kHz
FSK Internal Rate Range	2.000 mHz to 1.000 MHz
External Modulation Input Impedance	10 kΩ
External Modulation Input Range	±1 V full scale
External Modulation Input Bandwidth	DC to 100 kHz

Sweep

Sweep Hold Time Range	0.000 s to 3,600.000 s
Sweep Return Time Range	0.000 s to 3,600.000 s

Trigger

Trigger Delay Range	0 ns to 85.000 s
Trigger Input Impedance	10 k Ω
Trigger Output Impedance	50 Ω
Sync Output Impedance	50 Ω

Reference

External Reference Input Impedance	1 k Ω (AC coupled)
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Inputs & Outputs

External Add Input Impedance	50 Ω
External Add Input Range	-1 V to +1 V (DC to 10 MHz)
Maximum Float Voltage (BNC to Chassis Ground)	± 42 Vpk

Power

Power Consumption	120 VA max
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Environmental

Operating Humidity	5% to 90% RH (0 to 40 °C), 5% to 45% RH (40 to 50 °C)
Operating Altitude	Up to 3,000 m (10,000 ft)
Non-operating Altitude	Up to 12,000 m (40,000 ft)
Storage Temperature Range	-30 °C to +70 °C
Storage Humidity Range	5% to 90% RH
Acoustic Noise	<50 dBA

Waveforms

Ramp Symmetry Range	0% to 100%
Ramp Symmetry Resolution	0.1%

Compliance & Safety

Safety Compliance	UL 61010-1:2004, CAN/CSA-C22.2 No. 61010-1:2004, EN 61010-1:2001, IEC 61010-1:2001
EMC Compliance	EN 61326:1997 +A1:1998 +A2:2001 +A3:2003

TECHNOLOGY

Direct Digital Synthesis (DDS)

APPLICATIONS

Electronic Design and Test, Sensor Simulation, Functional Test, Education and Training

