

TEKTRONIX

AFG3102

The Tektronix AFG3102 is a high-performance 100 MHz dual-channel Arbitrary Function Generator belonging to the versatile AFG3000 series. Featuring a 1 GS/s sample rate and 14-bit vertical resolution, it enables exact recreation of waveforms and precise signal generation. Designed with a 5.6-inch color TFT display, it provides an intuitive user interface reminiscent of the popular TDS3000 series oscilloscopes, making it an essential bench tool for engineers, educators, and researchers.

SPECIFICATIONS

General

Interfaces	USB, GPIB, LAN
Display	5.6-inch color TFT LCD, 320 × 240 resolution

Physical

Power Supply	100 V to 240 V AC, 47 Hz to 63 Hz / 115 V AC, 360 Hz to 440 Hz, < 120 W
Operating Temperature	0 °C to +50 °C °C
Dimensions (W×H×D)	329.0 mm × 156.3 mm × 168.0 mm mm
Weight	4.5 kg kg

Channel and Waveform Configurations

Number of Channels	2
Standard Waveforms	Sine, Square, Pulse, Ramp, Triangle, Sin(x)/x, Exponential Rise, Exponential Decay, Gaussian, Lorentz, Haversine, Noise, DC
Arbitrary Waveform Length	128,000 points (128 Kpts)
Vertical Resolution	14 bits
Sampling Rate	1 GS/s
Waveform Output Impedance	50 Ω

Frequency Characteristics

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

Amplitude and Output Characteristics

Amplitude Range (into 50 Ohms)	20 mVp-p to 10 Vp-p (≤ 50 MHz), 20 mVp-p to 8 Vp-p (> 50 MHz)
Amplitude Range (into Open Circuit)	40 mVp-p to 20 Vp-p (≤ 50 MHz), 40 mVp-p to 16 Vp-p (> 50 MHz)
Amplitude Accuracy	$\pm(1\%$ of setting + 1 mV) at 1 kHz
Amplitude Resolution	0.1 mVp-p, 0.1 mVrms, 1 mV, or 4 digits
Amplitude Units	Vp-p, Vrms, dBm
DC Offset Range (into 50 Ohms)	± 5 Vpk (AC + DC)
DC Offset Accuracy	$\pm(1\%$ of setting + 5 mV + 0.5% of amplitude)
DC Offset Resolution	1 mV

Signal Purity and Pulse Specifications

Rise/Fall Time (Square/Pulse)	≤ 5.0 ns
Overshoot	$< 5\%$
Pulse Width Range	8.0 ns to 999.9 s
Pulse Period Range	20 ns to 1000 s
Pulse Duty Cycle Range	0.001% to 99.999%
Pulse Edge Time Range	5.0 ns to 625 s (leading/trailing set independently)
Pulse Delay Range	0 ns to 1000 s
Ramp Symmetry Range	0.0% to 100.0%
Total Harmonic Distortion (THD)	$< 0.2\%$ (at 1 Vp-p, 10 Hz to 20 kHz, typical)
Phase Noise (10 MHz)	< -110 dBc/Hz (at 10 kHz offset, typical)

Modulation, Sweep, and Burst

Modulation Types	AM, FM, PM, FSK, PWM
Internal Modulation Source Frequency	2 mHz to 50.00 kHz
External Modulation Input Range	± 1 V full scale
AM Modulation Depth	0.0% to 120.0%
FM Frequency Deviation	Up to 50 MHz
PM Phase Deviation	0.0° to 180.0°
PWM Duty Cycle Deviation	0.0% to 50.0% of pulse period
FSK Keying Rate	2 mHz to 1.000 MHz
Sweep Type	Linear, Logarithmic
Sweep Time	1 ms to 300 s
Sweep Direction	Up, Down
Burst Count Range	1 to 1,000,000 cycles, or Infinite
Burst Phase Range	-360.0° to $+360.0^\circ$
Internal Trigger Period	1.000 μ s to 500.0 s

Auxiliary Inputs and Outputs

External Trigger Input Level	TTL compatible
External Trigger Input Impedance	10 k Ω
External Trigger Slope	Positive or Negative
Trigger Output Level	TTL compatible into ≥ 1 k Ω
Trigger Output Impedance	50 Ω
10 MHz Reference Clock Input	Yes
10 MHz Reference Clock Output	Yes
External Modulation Input Impedance	10 k Ω
External Summing Input (Add Input)	Yes

System, Control, and Connectivity

Front-Panel USB Host Port	1x USB 1.1 Host port
Rear-Panel USB Port	1x USB 2.0 Device port
Programming Language SCPI Compatibility	Yes

Physical, Environmental, and Power

Storage Temperature Range	-30 °C to +70 °C
Operating Humidity	At +9 °C to +30 °C: 5% to 95% RH, At +30 °C to +40 °C: 5% to 75% RH, At +40 °C to +50 °C: 5% to 45% RH
Operating Altitude	Up to 3,000 m (10,000 ft)
Warm-up Time	20 minutes
Safety Certifications	UL 61010-1, CAN/CSA-C22.2 No. 61010-1, EN 61010-1
Electromagnetic Compatibility (EMC)	EN 61326-1

Ordering Information and Accessories

Standard Accessories Included	Quick-start user manual, Power cord, USB cable, CD-ROM with programmer manual, service manual, and ArbExpress software
Warranty Period	3 years

Display

Display Resolution	320 × 240 pixels (QVGA)
Display Size	5.6 inches (142 mm) diagonal
Display Type	Color TFT LCD

Power

Power Consumption	< 120 W
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Sine Wave Performance

Sine Wave Flatness (1 Vp-p, relative to 1 kHz, <10 MHz)	±0.15 dB
Sine Wave Flatness (1 Vp-p, relative to 1 kHz, 10 MHz to 100 MHz)	±0.3 dB
Sine Harmonic Distortion (10 Hz to 1 MHz, 1 Vp-p)	<-60 dBc
Sine Harmonic Distortion (1 MHz to 5 MHz, 1 Vp-p)	<-40 dBc
Sine Harmonic Distortion (5 MHz to 10 MHz, 1 Vp-p)	<-37 dBc
Sine Harmonic Distortion (10 MHz to 100 MHz, 1 Vp-p)	<-30 dBc
Sine Spurious Noise (10 Hz to 1 MHz, 1 Vp-p, non-harmonic)	<-60 dBc
Sine Spurious Noise (1 MHz to 100 MHz, 1 Vp-p, non-harmonic)	<-50 dBc

Channel-to-Channel Characteristics

Channel-to-Channel Phase Range	-180° to +180°
Channel-to-Channel Phase Resolution	0.01°
Channel-to-Channel Crosstalk	<-80 dB at 1 MHz
Channel-to-Channel Skew (typical)	<250 ps

Arbitrary Waveform Characteristics

Non-volatile Arbitrary Waveform Storage	4 waveforms
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Pulse Wave Characteristics

Pulse Jitter (typical)	<100 ps (RMS)
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Environmental

Acoustic Noise (typical)	<50 dBA
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Trigger

External Trigger Jitter (typical)	< 500 ps (rms)
External Trigger Delay Range	0 ns to 85 s
External Trigger Minimum Pulse Width	100 ns

Inputs & Outputs

External Modulation Input Bandwidth	DC to 25 kHz
External Summing Input Bandwidth	DC to 10 MHz (-3 dB)
Reference Clock Input Lock Range	10 MHz ± 35 kHz
Reference Clock Input Amplitude Range	100 mVp-p to 5 Vp-p
Reference Clock Input Impedance	1 kΩ (AC coupled)
Reference Clock Output Amplitude	1.2 Vp-p into 50 Ω
Reference Clock Output Impedance	50 Ω (AC coupled)

Memory & Storage

Non-volatile Setup Storage	10 setups
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Software

Included Waveform Editing Software	ArbExpress™
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Power & Environmental

Mains Voltage	100 V to 240 V AC (±10%)
Mains Frequency	47 Hz to 63 Hz (100 V to 240 V AC), 360 Hz to 440 Hz (100 V to 127 V AC)
Storage Altitude	Up to 9,144 m (30,000 ft)

TECHNOLOGY

Direct Digital Synthesis (DDS)

APPLICATIONS

Electronic design, sensor simulation, functional testing, education, and training

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