

TEKTRONIX

AFG3021C

The Tektronix AFG3021C is a high-performance 25 MHz single-channel arbitrary function generator, offering a 250 MS/s sample rate, 14-bit vertical resolution, and 128 kpoint arbitrary waveform memory. Engineered for versatility, it features standard USB and LAN interfaces, an optional GPIB interface, and a vibrant 5.6-inch color display, making it an essential bench tool for design, testing, and education.

SPECIFICATIONS

General

Interfaces	USB Host, USB Device, LAN (10/100 Base-T, LXI Class C), GPIB (optional via Option GL)
Display	5.6-inch Color TFT LCD, 320 × 240 resolution

Physical

Power Supply	100 V to 240 V AC, 50 Hz to 60 Hz, or 115 V AC, 400 Hz, power consumption < 120 W
Operating Temperature	0 to +50 °C °C
Dimensions (W×H×D)	329.5 mm × 156.0 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, Noise, DC, Sin(x)/x, Gaussian, Lorentz, Exponential Rise, Exponential Decay, Haversine
Sampling Rate	250 MS/s
Vertical Resolution	14 bits
Arbitrary Waveform Length	2 to 128,000 points
Non-Volatile Memory Capacity	4 user waveforms

Frequency Specifications

Sine Frequency Range	1 μ Hz to 25 MHz
Square Frequency Range	1 μ Hz to 12.5 MHz
Pulse Frequency Range	1 mHz to 12.5 MHz
Ramp Frequency Range	1 μ Hz to 250 kHz
Arbitrary Waveform Frequency Range	1 mHz to 12.5 MHz
Noise Bandwidth	25 MHz (-3 dB)
Frequency Resolution	1 μ Hz or 12 digits
Frequency Accuracy	± 1 ppm of setting (0 $^{\circ}$ C to 50 $^{\circ}$ C)
Aging Rate	± 1 ppm per year

Sine Wave Distortion and Purity

Total Harmonic Distortion (THD)	< 0.2% (10 Hz to 20 kHz, 1 Vp-p)
Spurious Noise (Non-Harmonic)	<-70 dBc (10 Hz to 1 MHz), <-60 dBc (1 MHz to 25 MHz) @ 1 Vp-p
Phase Noise	<-110 dBc/Hz at 10 kHz offset (10 MHz, 0 dBm)

Pulse & Square Wave Characteristics

Rise/Fall Time	≤ 18 ns
Overshoot	< 5%
Duty Cycle Range (Square)	20% to 80% (up to 10 MHz), 40% to 60% (10 MHz to 12.5 MHz)
Pulse Width Range	30.0 ns to 999.9 s
Pulse Width Resolution	10 ps or 5 digits

Amplitude and Output Characteristics

Amplitude Range (into 50 Ω)	10 mVp-p to 10 Vp-p
Amplitude Range (into Open Circuit)	20 mVp-p to 20 Vp-p
Amplitude Accuracy	$\pm(1\%$ of setting + 1 mV) at 1 kHz, 50 Ω load, without offset
Amplitude Resolution	0.1 mVp-p, mVrms, dBm, Vp-p, or 4 digits
DC Offset Range (into 50 Ω)	± 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	Front-panel BNC

Modulation, Sweep, and Burst

Modulation Types	AM, FM, PM, FSK, PWM, Sweep, Burst
Internal Modulation Sources	Sine, Square, Ramp, Noise, ARB
AM Modulation Depth	0.0% to 120.0%
FM Deviation Range	1 μ Hz to 12.5 MHz
PM Phase Deviation Range	0.0° to 180.0°
FSK Keying Rate	2 mHz to 1 MHz
PWM Duty Cycle Deviation	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 Timebase Reference Accuracy	± 1 ppm (0 °C to 50 °C)
External Reference Input Frequency Range	10 MHz ± 10 kHz
Trigger Input Level	TTL compatible
Trigger Output Level	TTL compatible into ≥ 1 k Ω

Connectivity and Programming

USB Interface Type	USB 2.0 Host (Front Panel) & USB 2.0 Device (Rear Panel)
LAN Interface / LXI Compliance	10/100 Base-T, LXI Class C Compliance
GPIB Interface	IEEE-488.2 compatible
Web User Interface Support	Yes, built-in LAN web server
Programming Command Language	SCPI

Physical and Environmental

Storage Temperature Range	-30 °C to +70 °C
Operating Humidity Range	0 °C to 30 °C: $\leq 95\%$, 30 °C to 40 °C: $\leq 75\%$, 40 °C to 50 °C: $\leq 45\%$

Compliance and Standards

Safety Certificates	UL 61010-1, CAN/CSA-C22.2 No. 61010-1, EN 61010-1, IEC 61010-1
EMC Compliance Standards	EN 61326-1:2006, Class A
Calibration Interval	1 year

Sine Wave Performance

Sine Wave Amplitude Flatness	< 5 MHz: ± 0.15 dB, 5 MHz to 25 MHz: ± 0.3 dB (1 V _{p-p} , relative to 1 kHz)
Sine Wave Harmonic Distortion	10 Hz to 20 kHz: < -70 dBc, 20 kHz to 1 MHz: < -60 dBc, 1 MHz to 5 MHz: < -50 dBc, 5 MHz to 25 MHz: < -40 dBc (1 V _{p-p})

Pulse Performance

Pulse Jitter (RMS)	< 100 ps (typical)
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Square Performance

Square Jitter (RMS)	< 100 ps (typical)
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Arbitrary Waveform Performance

Arbitrary Waveform Jitter (RMS)	< 4 ns (typical)
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Ramp Performance

Ramp Linearity	< 0.1% of peak output (10% to 90%, 1 kHz, 1 Vp-p, typical)
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Amplitude & Output

Amplitude Units	Vp-p, Vrms, dBm (sine only), High Level, Low Level
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Inputs & Outputs

External Modulation Input Bandwidth	DC to 25 kHz (1 dB bandwidth)
External Modulation Input Impedance	10 k Ω
External Modulation Input Range	± 1.0 V full scale
External Reference Input Impedance	1 k Ω , AC coupled
External Reference Input Voltage Range	100 mVp-p to 5 Vp-p
External Reference Output Frequency	10 MHz
External Reference Output Level	1.2 Vp-p into 50 Ω (typical)
Trigger Input Impedance	10 k Ω
Trigger Input Minimum Pulse Width	100 ns
Trigger Output Impedance	50 Ω

Display & User Interface

Display Resolution	320 $\times$ 240 pixels
Display Size	5.6 in (142 mm) diagonal

Environmental

Operating Altitude	Up to 3,000 m (10,000 ft)
Non-Operating Altitude	Up to 12,192 m (40,000 ft)

General Specifications

Warm-up Time	20 minutes (typical)
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Performance

Phase Adjustment Range	-180.00° to +180.00°
Phase Adjustment Resolution	0.01°

Trigger

Trigger Source	Internal, External, Manual
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Modulation

Additive Noise Range	0% to 100% of amplitude setting
Additive Noise Resolution	1%

Standard Waveforms

Noise Type	White Gaussian
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Sweep

Sweep Direction	Up / Down
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Outputs

Floating Voltage	Max. ± 42 Vpk device ground to earth ground
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Interfaces

Front Panel USB Port	USB 2.0 Host (Type A)
Rear Panel USB Port	USB 2.0 Device (Type B)

Software & Control

Waveform Editing Software Compatibility	ArbExpress™
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Power

Max Power Consumption	120 W
AC Input Voltage Range	100 V to 240 V ($\pm 10\%$)
AC Input Frequency Range	50 Hz to 60 Hz (100 V to 240 V), 400 Hz (115 V, $\pm 10\%$)

TECHNOLOGY

Arbitrary/Function Generator (DDS & True Arb)

APPLICATIONS

Electronic Design, Device Characterization, Sensor Simulation, Education and Training, Manufacturing Test

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