

TEKTRONIX

AWG5014

The Tektronix AWG5014 is a high-performance Arbitrary Waveform Generator (AWG) in the AWG5000 Series, providing mixed-signal generation capabilities. Equipped with 4 analog channels, 14-bit DAC resolution, and a sample rate of up to 1.2 GS/s, it delivers versatile and precise performance for demanding applications like MIMO testing, IQ, and IF signal generation. The system integrates a full PC platform with a 10.4-inch touchscreen display, extensive physical connectivity, and optional digital channels.

SPECIFICATIONS

General

Interfaces	USB 2.0 (6 ports: 2 front, 4 rear), LAN (10/100/1000Base-T, RJ-45), GPIB (IEEE-488.2), VGA, DVI-D, PS/2 keyboard/mouse
Display	10.4-inch color TFT LCD with touch screen, 1024 × 768 (XGA) resolution
Calibration Interval	1 year

Physical

Power Supply	100 to 240 V AC, 47 to 63 Hz, 450 W maximum
Operating Temperature	10 to 40 °C °C
Dimensions (W×H×D)	423 mm × 268 mm × 462 mm mm
Weight	19.5 kg

Channel Configuration & Core Architecture

Number of Channels	4 analog channels
DAC Resolution	14 bits
Maximum Sample Rate	1.2 GS/s
Minimum Sample Rate	10 MS/s
Analog Outputs	4 (BNC on front panel)
Marker Outputs	8 (BNC on front panel, 2 per channel)
Run Modes	Continuous, Triggered, Gated, Sequence

Arbitrary Waveform Performance

Waveform Memory Depth (Standard)	16M points per channel (16,200,000 points)
Waveform Memory Depth (Optional)	32M points per channel (32,400,000 points) with Option 01
Waveform Granularity	1 point
Analog Bandwidth (Normal Output)	230 MHz (-3 dB, typical)
Analog Bandwidth (Direct Output)	300 MHz (-3 dB, typical)
Rise/Fall Time (Normal Output)	≤ 1.4 ns (20% to 80%)
Rise/Fall Time (Direct Output)	≤ 950 ps (20% to 80%)
Sample Rate Resolution	8 digits

Standard Waveform Performance

Standard Waveform Shapes	Sine, Square, Pulse, Ramp, Triangle, Noise, DC, Sinc, Exponential Rise, Exponential Decay, Gaussian, Lorentz
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Output Characteristics

Output Impedance	50 Ω
Normal Output Amplitude Range (50 Ω)	50 mVp-p to 2.0 Vp-p
Normal Output Amplitude Range (Open Circuit)	100 mVp-p to 4.0 Vp-p
Direct Output Amplitude Range (50 Ω)	50 mVp-p to 1.0 Vp-p
Direct Output Amplitude Range (Open Circuit)	100 mVp-p to 2.0 Vp-p
Normal Output DC Offset Range (50 Ω)	-1.0 V to +1.0 V
Normal Output DC Offset Range (Open Circuit)	-2.0 V to +2.0 V
Amplitude Accuracy	$\pm(1.5\%$ of setting + 2 mV) at 1 kHz
DC Offset Accuracy	$\pm(1\%$ of setting + 10 mV)
Amplitude Resolution	1 mV
DC Offset Resolution	1 mV
Deskew Range	-5 ns to +5 ns
Deskew Resolution	1 ps

Sequencing & Modulation

Sequence Advance Modes	Auto, Triggered, Event
Loop Count Range	1 to 65,536 or Infinite

Trigger & Synchronization

Trigger Sources	External, Internal, Manual
External Trigger Input Impedance	50 Ω or 1 k Ω (selectable)
External Trigger Threshold Range	-5.0 V to +5.0 V
External Trigger Threshold Resolution	0.1 V
External Trigger Input Range	-5.0 V to +5.0 V
External Reference Input Frequency	10 MHz, 20 MHz, 100 MHz (within ± 10 ppm)
External Reference Input Range	0.2 Vp-p to 3.0 Vp-p (into 50 Ω)
Reference Output Frequency	10 MHz
Reference Output Amplitude	1.2 Vp-p into 50 Ω
Marker Output Amplitude Range (50 Ω)	Level: -1.0 V to 2.4 V
Marker Output Resolution	10 mV
Marker Output Rise/Fall Time	< 150 ps (20% to 80%)
Internal Clock Stability	± 1 ppm per year

System Connectivity & Control

Operating System	Windows XP Professional
Removable Hard Drive Capacity	≥ 80 GB
CD/DVD Drive	Built-in CD-RW/DVD-ROM
Front Panel Controls	Keypad, rotary knob, touch screen, USB ports, power switch
Keyboard/Mouse Ports	USB
Video Outputs	VGA (D-Sub 15-pin) and DVI-D

Power & Environmental Specifications

Storage Temperature Range	-20 $^{\circ}\text{C}$ to +60 $^{\circ}\text{C}$
Operating Humidity Range	5% to 80% RH (non-condensing, up to 30 $^{\circ}\text{C}$)
Storage Humidity Range	5% to 90% RH (non-condensing, up to 40 $^{\circ}\text{C}$)
Operating Altitude	Up to 3,000 m (10,000 ft)
Storage Altitude	Up to 12,192 m (40,000 ft)

Physical Characteristics & Compliance

Form Factor	Benchtop
Safety Certifications	UL61010-1, CAN/CSA-C22.2 No. 61010-1, EN61010-1, IEC61010-1
Electromagnetic Compatibility (EMC)	EN61326, IEC61326

Spectral Purity

SFDR (10 MHz signal, 1.2 GS/s, Direct Out)	-56 dBc (typical)
SFDR (100 MHz signal, 1.2 GS/s, Direct Out)	-46 dBc (typical)
Harmonic Distortion (10 MHz signal, 1.2 GS/s, Direct Out)	<-55 dBc (typical)
Harmonic Distortion (100 MHz signal, 1.2 GS/s, Direct Out)	<-45 dBc (typical)
Non-Harmonic Spurious (10 MHz signal, 1.2 GS/s, Direct Out)	<-60 dBc
Phase Noise (10 MHz carrier, 10 kHz offset, 1.2 GS/s)	<-110 dBc/Hz (typical)

Jitter

Random Jitter (Normal Output)	5 ps rms (typical)
Random Jitter (Direct Output)	2 ps rms (typical)

Trigger Specs

Trigger Delay to Analog Output (Normal Output)	260 ns (typical)
Trigger Delay to Analog Output (Direct Output)	240 ns (typical)

Trigger

Trigger Holdoff Range	83.3 ns to 103.1 s
Trigger Holdoff Resolution	8.33 ns

Clock

External Clock Input Frequency Range	10 MHz to 1.2 GHz
External Clock Input Amplitude	0.4 Vp-p to 2.0 Vp-p
External Clock Input Impedance	50 Ω (AC coupled)

Waveform

Minimum Waveform Length	240 points
Maximum Sequence Steps	8,000

Auxiliary Outputs

Auxiliary DC Outputs	4 channels
Auxiliary DC Output Voltage Range	-3.0 V to +5.0 V
Auxiliary DC Output Resolution	10 mV

Environmental

Operating Vibration	0.27 Grms (5 Hz to 500 Hz)
Non-Operating Vibration	2.28 Grms (5 Hz to 500 Hz)
Acoustic Noise	50 dBA

TECHNOLOGY

Arbitrary Waveform Synthesis

APPLICATIONS

Mixed-signal design, MIMO testing, IQ/IF signal generation, wireless communication, and academic research

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