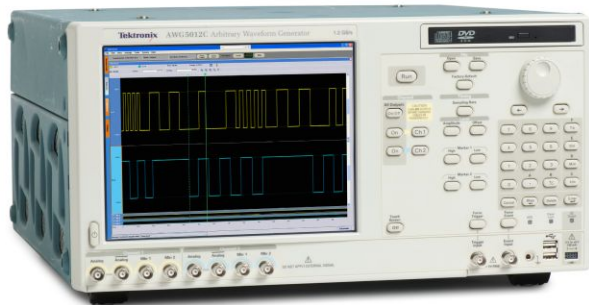


Arbitrary Waveform Generators

AWG5000 Series Data Sheet



The AWG5000 Series of arbitrary waveform generators offers the industry's best solution to the challenging signal stimulus issues faced by designers who need to verify, characterize, and debug sophisticated electronic designs.

With an excellent dynamic range over all modulation bandwidths, the AWG5000 Series models provide a 14-bit DAC, sample rates up to 1.2 GS/s, 2 to 4 output channels, synchronized 4 to 8 digital marker outputs, and 28 channels of digital data outputs. These instruments easily solve the toughest measurement challenges in wireless communications, defense electronics, digital consumer product design, data conversion equipment, test system synchronization, and semiconductor design and test.

The open windows (Windows 7) based instruments are easy, convenient to use, and connect with peripherals and other third-party software.

Key performance specifications

- 480 MHz carrier, high dynamic range RF signals
- High dynamic range IF signals with up to 180 MHz modulation bandwidth
- 180 MHz modulation bandwidth with -58 dBc SFDR

Key features

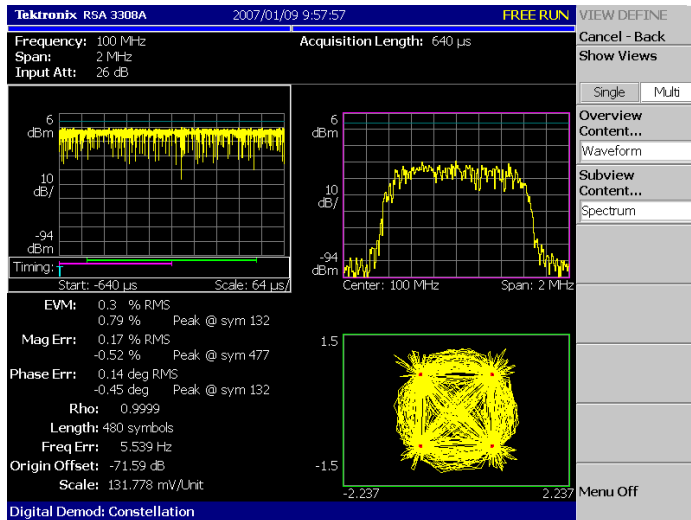
- Only stand-alone AWG with 4 channels simplifies test setup and reduces uncertainty
- RFXpress software enables quick creation of digitally modulated and radar signals
- Waveform sequencing and sub-sequencing
 - Enables creation of infinite waveform loops, jumps, and conditional branches
 - Enhance the ability to replicate real-world signal behavior

- Dynamic jump capability
 - Enables the creation of complex waveforms that respond to changing external environment
- 2 or 4 differential/single-ended outputs provide testing flexibility
- Up to 8 marker outputs ideal for system synchronization
- 28 digital output channels create highly precise digital signals
- Deep memory enables the creation of long complex waveform sequences
- Playback of signals captured on scopes and real-time spectrum analyzers allows for simulation of real-world environments
- Down to 800 ps resolution edge timing shift control
- 8,000 steps real-time sequencing creates infinite waveform loops, jumps, and conditional branches
- Easy to use and learn, shortens test time
- Convenient bench-top form factor
- Integrated PC supports network integration and provides a built-in DVD, removable hard drive, LAN, and USB ports

Applications

- High-resolution wireless communications and defense electronics
- Education and research
- ADC/DAC testing
- Mixed-signal design and test
- Real-world, ideal, or distorted signal generation – including all the glitches, anomalies, and impairments
- System synchronization and timing control for large-scale test systems

Industry's best mixed signal stimulus solution for today's complex measurement challenges



EVM/Constellation Measurement

The AWG5000 series delivers the optimal combination of sample rate, vertical resolution, signal fidelity, and waveform memory length, all in an easy-to-use self-contained package.

The capabilities of the series are further enhanced by the addition of key features:

Equation Editor

The Equation Editor is an ASCII text editor that uses text strings to create waveforms by loading, editing, and compiling equation files. The editor provides control and flexibility to create more complex waveforms using customer-defined parameters.

Waveform sequencing and sub-sequencing

Real-time sequencing creates infinite waveform loops, jumps, and conditional branches for longer pattern-length generation suitable for replicating real-world behavior of serial transmitters.

Dynamic Jump

The Dynamic Jump capability enables the creation of complex waveforms by enabling the ability to dynamically jump to any predefined index in a waveform sequence. Users can define up to 16 distinct jump indexes that respond to changing external environments.

LXI Class C

Using the LXI Web Interface, you can connect to the AWG5000 Series through a standard web browser by simply entering the AWG's IP address in the address bar of the browser. The web interface enables viewing of instrument status and configuration, as well as status and modification of network settings. All web interaction conforms to the LXI Class C specification.

Wireless I/Q wideband and IF signal generation

The AWG5000 Series provides good SFDR over modulation bandwidths up to 180 MHz, meeting the demands of IQ and IF signal generation.

The RFXpress (RFX100) software package utilizes the raw AWG performance to simplify the creation of RF signals. Supporting a wide range of modulation schemes, the software is flexible enough to create either generic or propriety signals for digital communication systems. Power ramping, frequency hopping, and impairments can easily be added to generate the desired signal.

Radar signal creation

Radar Signal Creation is a software module for RFXpress that gives you the ultimate flexibility in creating pulsed radar waveforms. It gives you the ability to build your own radar pulse suite starting from pulse-to-pulse trains to pulse groups. It supports a variety of modulation schemes including LFM, Barker and Polyphase Codes, User-defined Codes, Step FM, Nonlinear FM, User-defined FM, and Custom modulation. It also has the ability to generate pulse trains with staggered PRI to resolve range and doppler ambiguity, frequency hopping for Electronic Counter-Counter Measures (ECCM), and pulse-to-pulse amplitude variation to simulate Swerling target models including antenna scan patterns, clutter, and multipath effects. RFXpress is a powerful easy-to-use software package to synthesize IQ and IF signals for arbitrary waveform generators. It runs as an integral part of the AWG5000 Series or from an external PC.

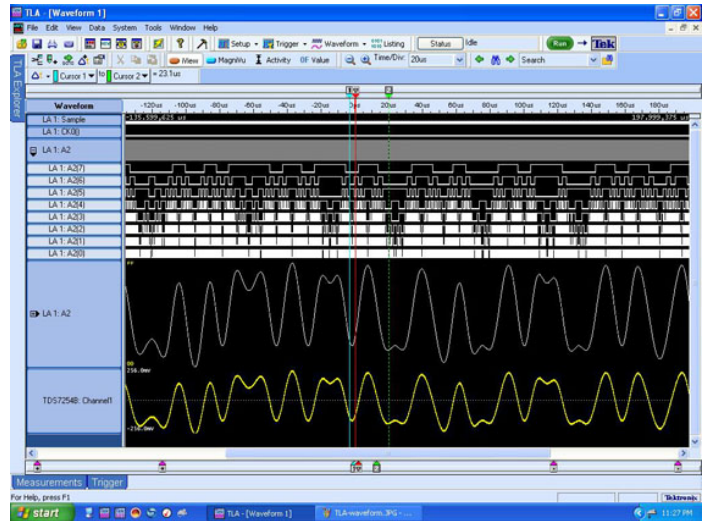
Environment signal generation

Radar signals must coexist with other commercial standard signals sharing the same spectrum, yet are still expected to perform with no performance degradation. This isn't unreasonable given its mission-critical operations. To meet this expectation, a radar designer has to thoroughly test all the corner cases at the design/debug stage. The AWG5000 and RFXpress Environment plug-in offers extreme flexibility to define and create these worst-case scenarios.

You can specify up to 25 signals to define your environment, including WiMAX, WiFi, GSM, GSM-EDGE, EGPRS 2A, EGPRS2B, CDMA, W-CDMA, DVB-T, Noise, and CW Radar. This plug-in also allows you to seamlessly import signals from other RFXpress plug-ins (including Radar, Generic Signal, etc.), as well as from Matlab® and from Tektronix spectrum analyzers and oscilloscopes, into your environment. You can also configure PHY parameters of your standard-specific signals. You can define the carrier frequency, power, start time, and duration for all the signals in your environment, so you have full control over the way these signals interact/interfere with each other.

Mixed-signal generation

The AWG5012 and AWG5002 models have optional 28 digital output channels with high-resolution edge placement, making them a great solution for digital signal generation applications, such as digital design and validation, system synchronization, and ADC/DAC testing.



Mixed-signal test by TDS/TLA iView.

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Model overview

	AWG5014C	AWG5012C	AWG5002C
Digital to analog converter			
Sample rate	10 MS/s to 1.2 GS/s		10 MS/s to 600 MS/s
Resolution	14 bit		
Sin (x)/x roll-off			
Sin (x)/x (-1 dB)	300 MHz		150 MHz
Sin (x)/x (-3 dB)	520 MHz		260 MHz

Frequency domain characteristics

Effective frequency output	F _{maximum} (specified) is determined as "sample rate / oversampling rate" or "SR/2.5"		
F_{maximum}	AWG5014C, AWG5012C	AWG5002C	
	480 MHz	240 MHz	
F_{maximum} (typical)	540 MHz		275 MHz

Effective frequency switching time, standard	Minimum frequency switching time from selected frequencies F ₁ to F ₂ is determined as "1/F _{maximum} ".		
T_s	AWG5014C, AWG5012C	AWG5002C	
	2.1 ns	4.2 ns	
T_s (typical)	1.8 ns		3.7 ns

Modulation bandwidth	Modulation bandwidth is a combination of sin(x)/x and rise time bandwidths, defined as the lower of the sin(x)/x bandwidth or the calculated percentage of rise time bandwidth (as shown).		
-1 dB BW = 0.932 × (-1 dB TrBW), typical	AWG5014C, AWG5012C	WG5002C	
	Normal: Up to 130 MHz Direct: Up to 180 MHz	Normal: Up to 100 MHz Direct: Up to 130 MHz	
-3 dB BW = 0.913 × (-3 dB TrBW), typical	Normal: Up to 230 MHz Direct: Up to 300 MHz		Normal: Up to 180 MHz Direct: Up to 230 MHz

Output amplitude	Amplitude levels are measured as single-ended outputs. Amplitude level will be 3 dBm higher when using differential (both) outputs.		
Range (typical)	Normal: -30 dBm to 17 dBm Direct: -30 dBm to 0 dBm		
Resolution (typical)	0.01 dB		
Accuracy (typical)	At 0 dBm level, with no offset, ±0.3 dB		

Output flatness, typical	Mathematically corrected for characteristic Sin (x)/x roll-off, uncorrected by external calibration methods. ±1.0 dB, from 10 MHz to 480 MHz		
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Frequency domain characteristics

Digital data out (option 3)

Number of outputs	14-bit output on Ch1 and Ch2 (28 total)
Output connector	SMB (rear panel), single ended
Output impedance	50 Ω

Digital data out levels (into 50 Ω)

Window	-1.0 V to 2.7 V
Amplitude	0.1 V _{p-p} to 3.7 V _{p-p}
Resolution	10 mV
Accuracy	$\pm(10\%$ of setting + 120 mV)
Current (max)	± 54 mA per channel
Rise/fall time (20% to 80%)	300 ps (1.0 V _{p-p} , Hi: 1.0 V, Lo: 0 V)
Delay from marker	-41 ns to -82 ns
Skew between outputs	<400 ps

Time domain characteristics

Data rate Bit rate is determined as "sample rate / 4 points per cycle", allowing full impairment generation

Bit rate (typical)	AWG5014C, AWG5012C	AWG5002C
	300 Mb/s	150 Mb/s

Rise/fall time Rise/fall time measured at 10% to 90% levels

Tr/Tf	Normal: 1.4 ns Direct: 0.95 ns
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Rise time bandwidth Rise-time bandwidth converted from rise-time ($0.34/T_r$, assumed Gaussian transition) characteristics through analog output circuitry and cabling.

Tr bandwidth (-1 dB) (typical)	Normal: 140 MHz Direct: 210 MHz
	Tr bandwidth (-3 dB) (typical)

Low-pass filter Normal: Bessel type, 50 and 100 MHz

Output amplitude Amplitude levels are measured between differential outputs (+) and (-). For single-ended output (+) the amplitude level will be one-half the levels below.

Range	Normal: 40 mV _{p-p} to 9.0 V _{p-p} Direct: 40 mV _{p-p} to 1.2 V _{p-p}
	Resolution
Accuracy	At 0.5 V, with no offset, $\pm(2\%$ of amplitude ± 2 mV)

Offset

Range	Normal: ± 2.25 V
Resolution	1.0 mV
Accuracy	At minimum amplitude, $\pm(2.0\%$ of offset ± 10 mV)

Output distortion characteristics

Spurious Free Dynamic Range (SFDR), direct, typical

SFDR is determined as a function of the directly generated carrier frequency. Harmonics not included

DC to 10 MHz carrier	AWG5014C, AWG5012C Clock: 1.2 GS/s, 14-bit operation Frequency: 10 MHz to 480 MHz Level: 4 dBm (1 V _{p-p}) Offset: None	AWG5002C Clock: 0.6 GS/s, 14-bit operation Frequency: 10 MHz to 240 MHz Level: 4 dBm (1 V _{p-p}) Offset: None
	-70 dBc	-74 dBc
10 to 20 MHz carrier	-70 dBc	-70 dBc
20 to 40 MHz carrier	-62 dBc	-62 dBc
40 to 80 MHz carrier	-62 dBc	-57 dBc
80 to 150 MHz carrier	-58 dBc	-54 dBc
150 to 300 MHz carrier	-58 dBc	-54 dBc
300 to 480 MHz carrier	-56 dBc	

Spurious Free Dynamic Range (SFDR), direct, typical

When viewed as a modulation bandwidth and used with external frequency up-conversion, the specifications will hold and be independent of carrier frequency with proper conversion circuitry design. Harmonics not included

DC to 10 MHz carrier	AWG5014C, AWG5012C Clock: 1.2 GS/s, 14-bit operation Modulation Bandwidth: Up to 180 MHz Level: 4 dBm (1 V _{p-p}) Offset: None	AWG5002C Clock: 0.6 GS/s, 14-bit operation Modulation Bandwidth: Up to 130 MHz Level: 4 dBm (1 V _{p-p}) Offset: None
	-70 dBc	-74 dBc
DC to 20 MHz carrier	-70 dBc	-70 dBc
DC to 40 MHz carrier	-62 dBc	-62 dBc
DC to 80 MHz carrier	-62 dBc	-57 dBc
DC to 150 MHz carrier	-58 dBc	-54 dBc
DC to 180 MHz carrier	-58 dBc	

Harmonic distortion

Harmonics

AWG5014C, AWG5012C Clock: 1.2 GS/s, 14-bit operation 32-point waveform 37.5 MHz output Normal: 10 dBm (2.0 V _{p-p}) Direct: 0 dBm (0.6 V _{p-p}) Offset: None	AWG5002C Clock: 0.6 GS/s, 14-bit operation 32-point waveform 18.7 MHz output Normal: 10 dBm (2.0 V _{p-p}) Direct: 0 dBm (0.6 V _{p-p}) Offset: None
Normal: <40 dBc Direct: <49 dBc	Normal: <46 dBc Direct: <55 dBc

Non-harmonic distortion

Spurious

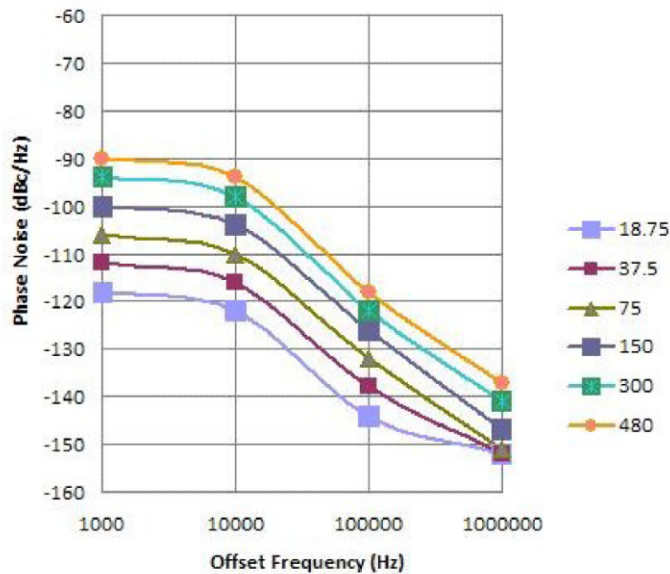
AWG5014C, AWG5012C Clock: 1.2 GS/s, 14-bit operation Frequency: 10 MHz to 480 MHz Level: 4 dBm (1 V _{p-p}) Offset: None	AWG5002C Clock: 0.6 GS/s, 14-bit operation Frequency: 10 MHz to 240 MHz Level: 4 dBm (1 V _{p-p}) Offset: None
< -60 dBc	

Output distortion characteristics

Phase noise distortion

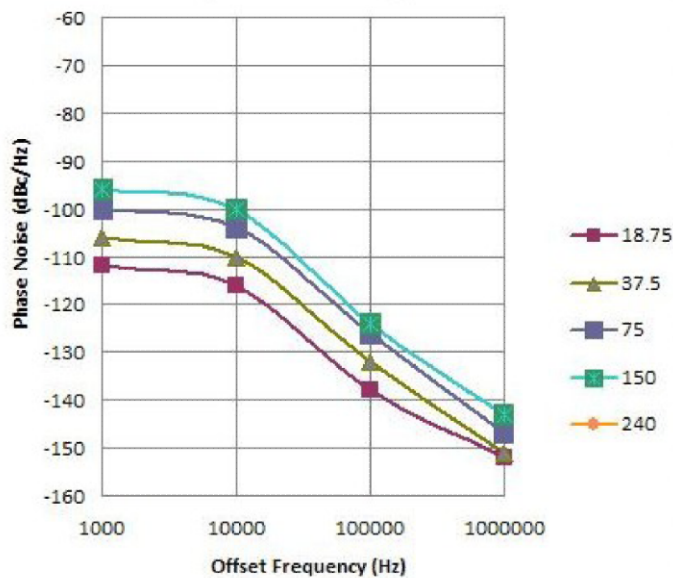
AWG5014C, AWG5012C	AWG5002C
Clock: 1.2 GS/s, 14-bit operation 32-point waveform 37.5 MHz output Amplitude: 10 dBm (2 V _{p-p}) at 0 offset, < -85 dBc/Hz at 10 kHz offset	Clock: 0.6 GS/s, 14-bit operation 32-point waveform 18.7 MHz output Amplitude: 10 dBm (2 V _{p-p}) at 0 offset, < -85 dBc/Hz at 10 kHz offset

AWG5014C / 5012C
Sample Rate - 1.2 GS/s



AWG5014C/AWG5012C phase noise (typical)

AWG5002C
Sample Rate - 600 MS/s



AWG5002C phase noise (typical)

Output distortion characteristics

Jitter

Random jitter (typical)	1010 clock pattern, RMS value Normal: 5.0 ps
Total jitter (typical)	2 ¹⁵ - 1 data pattern (at 10 ⁻¹² BER), peak-peak value Normal: 150 ps at 0.5 Gb/s

Hardware characteristics

Number of outputs	AWG5014C, AWG5012C: 4 channels AWG5002C 2 channels
Output connector	Differential, BNC (front panel)
Output impedance	50 Ω

Waveform length	Standard - to 16M points Extended memory - to 32M points
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Number of waveforms	1 to 16,200
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Sequence length/counter	1 to 8,000 steps 1 to 65,536 count
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Run modes

Continuous	Waveform is iteratively output. If a sequence is defined, the sequence order and repeat functions are applied.
Triggered	Waveform is output only once when an internal, external, programmatic (GPIB, LAN), or manual trigger is received.
Gated	Waveform begins output when gate is "True" and resets when gate is "False".
Sequence	Waveform is output as defined by the sequence selected.
Jump	Synchronous and asynchronous.

Sampling clock

Resolution	8 digits
Accuracy	Within ±(1 ppm + Aging) Aging: Within ±1 ppm per year

Internal trigger generator

Range	1.0 μs to 10.0 s
Resolution	3 digits, 0.1 μs minimum

Output skew control

Range	-5 ns to 5 ns
Resolution	5 ps

Software characteristics

Operating system / peripherals / IO	Windows 7 4 GB memory CD/DVD drive (front panel) 300 GB Solid State Drive (std) / 1 TB Mechanical Hard Disk Drive (opt) (rear-panel removable, optional front mount kit) USB compact keyboard and mouse USB 2.0 compliant ports (6 total - 2 front, 4 rear) PS/2 mouse and keyboard connections (rear panel) RJ-45 Ethernet connector (rear panel) supports 10/100/1000BASE-T eSATA (rear panel) DVI/I Video (rear panel)
Display characteristics	LED backlit monitor with touch screen, 10.4 in. (264 mm) 1024 × 768 (V) XGA
Waveform file import capability	Import waveform format by series: *.AWG file created by Tektronix AWG5000 or AWG7000 Series *.PAT, *.SEQ, *.WFM, and *.EQU file formats created by Tektronix arbitrary waveform generators such as the AWG400/500/600/700 Series *.TIQ and *.IQT files created by Tektronix real-time spectrum analyzers *.TFW file created by Tektronix AFG3000 Series arbitrary/function generators *.DTG file created by Tektronix DTG5000 Series data timing generators *.WFM or *.ISF file created by Tektronix TDS/DPO Series oscilloscopes text file (*.TXT)
Waveform file export capability	Export waveform format by series: Tektronix AWG400/500/600/700 (*.wfm or *.pat) and text format
Software driver for third-party applications	IVI-COM driver, MATLAB library
Instrument control / data transfer	
 GPIB	Remote control and data transfer (conforms to IEEE-Std 488.1, compatible with IEEE-Std 488.2 and SCPI-1999.0)
 Ethernet	Remote control and data transfer (conforms to IEEE-Std 802.3)
 TekLink	Remote control and data transfer (proprietary bus for Tektronix product high-speed interconnection and communication)
LAN eXtensions for Instrumentation (LXI)	Class LXI Class C, version 1.3

Auxiliary output characteristics

Markers

Number	AWG5014C: Total of 8 (2 per channel) AWG5012C, AWG5002C: Total of 4 (2 per channel)
Style	Single-ended
Connector	BNC (front panel)
Impedance	50 Ω

Auxiliary output characteristics

Level (into 50 Ω)

Amplitude levels are measured between differential outputs (+) to (-). Single-ended output amplitude level will be one-half the voltage levels below.

Window	-2.0 V to 5.4 V
Amplitude	0.2 V _{p-p} to 7.4 V _{p-p}
Resolution	10 mV
Accuracy	±(10% of setting + 120 mV)
Rise/fall time (20% - 80%)	300 ps (1.0 V _{p-p} , Hi: 1.0 V, Lo: 0.0 V)

Timing skew

Range	0 to 1000 ps
Resolution	50 ps

Delay control

Range	0 to 300 ps
Resolution	1 ps
Accuracy	±(5% of setting + 50 ps)

Jitter

Random RMS (typical)	5 ps
Total p - p (typical)	80 ps (2 ¹⁵ - 1 PN pattern at 10 ⁻¹² BER)

10 MHz reference out

Amplitude	1.2 V _{p-p} into 50 Ω, maximum 2.5 V open
Connector	BNC (rear panel)
Impedance	50 Ω, AC coupled

Clock output (VCO)

Range	600 MHz, 1.2 GHz
Amplitude	0.4 V _{p-p} into 50 Ω to ground
Connector	BNC (rear panel)
Impedance	50 Ω, AC coupled

DC outputs

Number	4, independently controlled
Range	-3.0 V to 5.0 V
Resolution	10 mV
Accuracy	±(3% of setting + 120 mV)
Connector	2×4 pin header (front panel)
Current (max)	±100 mA

Auxiliary input characteristics

Trigger / gate in

Polarity	Pos or neg
Range	50 Ω: ±5 V 1 kΩ: ±10 V
Jitter (typical)	2.0 ns to 4.5 ns
Connector	BNC (front panel)
Impedance	50 Ω, 1 kΩ
Threshold	Level: -5.0 V to 5.0 V Resolution: 0.1 V

Auxiliary input characteristics

Trigger to output uncertainty Asynchronous (typical):
Between internal/external clock and trigger timing: 2.0 ns to 4.5 ns

Trigger mode	Minimum pulse width	20 ns
	Trigger hold-off	160 × sampling period - 200 ns
	Delay to output	48 × sampling period + 500 ns
Gated mode	Minimum pulse width	1024 × sampling period + 10 ns
	Delay to output	240 × sampling period + 500 ns

Event in

Polarity Pos or neg
Range 50 Ω: ±5 V
1 kΩ: ±10 V
Connector BNC (front panel)
Impedance 50 Ω, 1 kΩ
Threshold Level: -5.0 V to 5.0 V
Resolution: 0.1 V

Sequence mode	Minimum pulse width	20 ns
	Event hold-off	200 × sampling period + 500 ns
	Delay to output	260 × sampling period + 300 ns (Jump timing: asynchronous jump)

External clock in

Input voltage range 0.2 V_{p-p} to 0.8 V_{p-p}, -10 dBm to 2 dBm
Frequency range 600 MHz to 1.2 GHz (acceptable frequency drift of ±5%)
Clock divider 1/1, 1/2, 1/4...1/256
Connector BNC (rear panel)
Impedance 50 Ω, AC coupled

Fixed reference clock in

Input voltage range 0.2 V_{p-p} to 3.0 V_{p-p}, -10 dBm to 14 dBm
Frequency range 10 MHz, 20 MHz, 100 MHz (within ±0.1%)
Connector BNC (rear panel)
Impedance 50 Ω, AC coupled

Phase lock in

Input voltage range 0.2 V_{p-p} to 3.0 V_{p-p}, -10 dBm to 14 dBm
Frequency range 5 MHz to 600 MHz (acceptable frequency drift is ±0.1%)
Multiplier rate 1 to 240
Connector BNC (rear panel)
Impedance 50 Ω, AC coupled

Add in

Input voltage range ±1.0 V
DC gain 1
Bandwidth DC to 100 MHz (-3 dB)

Auxiliary input characteristics

Connector	BNC (rear panel)
Impedance	50 Ω, AC coupled

Physical characteristics

Dimensions

Height	mm	inches
	245	9.6
Width	465	18.0
Depth	500	19.7

Weight

Net (instrument)	kg	lb.
	19.5	43
Net (with packaging)	28.5	62.7

Mechanical cooling

Clearance

Top/bottom	cm	inches
	2	0.8
Side	15	6
Rear	7.5	3

Power supply

Rating	100 to 240 V AC, 47 to 63 Hz
Consumption	450 Watts

EMC environment and safety

Temperature

Operational	10 to 40 °C
Non-operational	20 to 60 °C

Humidity

Operational	5% to 80% relative humidity (% RH) at up to 30 °C, 5% to 45% relative humidity above 30 °C up to 50 °C
Non-operational	5% to 90% relative humidity (% RH) at up to 30 °C, 5% to 45% relative humidity above 30 °C up to 50 °C

Altitude

Operational	Up to 10,000 ft. (3,048 m)
Non-operational	Up to 40,000 ft. (12,192 m)

Vibration

Sine	Operational	0.33 mm p-p (0.013 in p-p) constant displacement, 5 to 55 Hz
	Non-operational	NA
Random	Operational	0.27 g RMS, 5 to 500 Hz, 10 minutes per axis
	Non-operational	2.28 g RMS, 5 to 500 Hz, 10 minutes per axis

EMC environment and safety

Mechanical

Operational	Half-sine mechanical shocks, 30 g peak, 11 ms duration, 3 drops in each direction of each axis
Non-operational	Half-sine mechanical shocks, 10 g peak, 11 ms duration, 3 drops in each direction of each axis

Regulatory

Safety	UL61010-1, CAN/CSA-22.2, No.61010-1-04, EN61010-1, IEC61010-1
Emissions	EN55011 (Class A), IEC61000-3-2, IEC61000-3-3
Immunity	IEC61326, IEC61000-4-2/3/4/5/6/8/11

Regional certifications

Europe	EN61326
Australia/New Zealand	AS/NZS 2064

Ordering information

Arbitrary waveform generator mainframe

AWG5014C	1.2 GS/s, 14-bit resolution, 16M point per channel, 4-channel arbitrary waveform generator
AWG5012C	1.2 GS/s, 14-bit resolution, 16M point per channel, 2-channel arbitrary waveform generator
AWG5002C	600 MS/s, 14-bit resolution, 16M point per channel, 2-channel arbitrary waveform generator

Instrument options

Product options

AWG5014C, AWG5012C, AWG5002C

Opt. 01	Waveform record length expansion (from 16M point to 32M point)
Opt. 05	Removable mechanical HDD (1 TB)
Opt. 09	Sub-sequencing and Dynamic Jump option (sub-sequencing files created for legacy AWG400, AWG500, AWG600, and AWG700 instrument are compatible with this option)
Opt. RFX	Adds RFXpress (RFX100) software to the AWG
Opt. RDR	Adds radar signal generation to RFXpress ¹
Opt. SPARA	Adds S-parameter emulation to RFXpress ¹
Opt. OFDM	Adds OFDM signal generation to RFXpress ¹
Opt. ENV	Adds environment signal generation to RFXpress ¹
Opt. ENV01	Bundling option - Opt. ENV + Opt. RDR ¹
Opt. ENV02	Bundling option - Opt. ENV + Opt. RDR + Opt. OFDM ¹
Opt. ENV03	Bundling option - Opt. ENV + Opt. RDR + Opt. OFDM + Opt. SPARA ¹
Opt. ENV04	Bundling option - Opt. ENV + Opt. RDR + Opt. OFDM + Opt. SPARA + Opt. UWBC ¹
Opt. UWBCF	Adds UWB-WiMedia conformance signal generation to RFXpress ¹
Opt. UWBC	Adds UWB-WiMedia custom and conformance signal generation to RFXpress ¹

AWG5012C, AWG5002C

Opt. 03	28-bit digital data outputs (digital data of CH1 and CH2) Note: Must be ordered at time of purchase
Opt. 0309	Combination of Opt. 03 and Opt. 09 Note : Must be ordered at time of purchase

¹ Requires Opt. RFX

Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A99	No power cord

Language options

Opt. L0	English manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual
Opt. L8	Traditional Chinese manual
Opt. L10	Russian manual

Language options include translated front-panel overlay for the selected language(s).

Application software

SDX100	Jitter-generation software package (includes USB dongle)
Opt. ISI	S-parameter and ISI creation (requires SDX100 as prerequisite)
Opt. SSC	Spread Spectrum Clock addition option (requires SDX100 as prerequisite)

Service options

Opt. CA1	Single calibration or functional verification
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

Post sales service options (e.g. AWG5014C-CA1)

CA1	Single calibration or functional verification
R3DW	Repair service coverage 3 years
R5DW	Repair service coverage 5 years

- R2PW Repair service coverage 2 years post warranty
- R1PW Repair service coverage 1 year post warranty

Product upgrade options

AWG50CUP

Option	Product	Description
M01	AWG5002C models	Waveform record length expansion from 16M point to 32M point
M02	AWG5012C models	Waveform record length expansion from 16M point to 32M point
M03	AWG5014C models	Waveform record length expansion from 16M point to 32M point
D01	All AWG5000C models	Additional removable disk - solid state
D02	All AWG5000C models	Additional removable disk - mechanical

Note: To add any RFXpress software as an upgrade, please refer to the RFX100 data sheet.

Standard accessories

Accessories

- xxx-xxxx-xx Accessory pouch
- xxx-xxxx-xx Front cover
- xxx-xxxx-xx USB mouse
- xxx-xxxx-xx Compact USB keyboard
- xxx-xxxx-xx Lead set for DC output
- xxx-xxxx-xx AWG5000C Series product software CD and instructions
- xxx-xxxx-xx Documentation CD with browser
- xxx-xxxx-xx Installation and safety manual
- Certificate of calibration
- Power cord
- one year warranty

Warranty

One-year parts and labor.

Recommended accessories

Item	Description	Part number
Pin header		
SMA cable	40 in. (102 cm)	012-1690-xx
SMB cable	20 in. (51 cm)	012-1503-xx
Rackmount kit	Rackmount kit with instructions	016-1983-xx
Front removable HDD bay	Front removable HDD bay	016-1979-xx
Quick Start user manual	English	071-2481-xx
	Japanese	071-2482-xx
	Simplified Chinese	071-2483-xx
	Traditional Chinese	071-2484-xx
	Russian	020-2971-xx
Programmer manual	English	077-0061-xx
Opt. 09 user manual	English	020-2971-xx
Service manual	English	Visit Tektronix website



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Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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