The AWG400 Series performs a wide range of modulated (I&Q) and mixed signal simulations (analog and digital) for wireless and wired data communication, in addition to semiconductor device characterization. The AWG400 Series is ideal for design or manufacturing test engineers who need to replicate marginal and erroneous analog and mixed signal conditions. The only product in its class offering 200 MS/s, 16-Bit vertical resolution, 2 or 3 channel configurations and optional digital outputs (32 or 48). The AWG400 Series is a superior choice for those who need an additional channel, longer memory or higher vertical resolution. The color display, graphical user interface and stand-alone Microsoft Windows-based waveform creating utility (ArbExpress™) supports quick creation, editing and output of custom or imported waveforms.

**Features & Benefits**
- 2 or 3 Independent Waveform Channels
- 16-Bit Vertical Resolution
- 200 MS/s Sample Rate
- Up to 16 M Point Record Length
- Optional 32/48-Bit, 100 MHz (CMOS) Digital Data Generator for Mixed-signal Device Testing
- 4 or 6 Digital Marker Outputs
- Independent Channel Internal Noise Generator
- Independent Channel Skew Control
- Independent Channel External Signal ADD-INPUT
- External Clock and External Reference Inputs

**Applications**

**Designing, Testing and Deploying:**
- Quadrature Digitally Modulated I&Q Signals and Displays
- Mixed (Analog/Digital) Signals
- Stimulus Signals for Imaging Display and Recording Devices (CCD, LCD)
- Enhanced/Corrupted Playback of DSO Captured Signals
- Simulation Waveform Vectors Imported from Mathcad, Matlab, Excel and others

**Network Communications Physical Layer Testing:**
- ITU-T (E1, E2, E3)
- T1.102 (DS1, DS1A, DS1C)
- Fibre Channel (FCI33E)
- SDH/SONET (OC1/STM0, OC3/STM1)
- D2
- 100Base-TX
Arbitrary Waveform Generators

AWG400 Series

- Signal Sources • www.tektronix.com/signal_sources

Characteristics

Modulation Standards and Display Types

- Modulation Types –
  - BPSK
  - QPSK
  - OQPSK
  - $\pi$/4DQPSK
  - 8PSK
  - 16QAM
  - 64QAM
  - User defined

- Modulation Displays –
  - $I(t)$, $Q(t)$
  - $R(t)$, $\phi(t)$
  - Eye Diagram $I$
  - Eye Diagram $Q$
  - Vector Diagram
  - Constellation
  - Magnitude Spectrum
  - Phase Spectrum

Arbitrary Waveforms

- Waveform Length – 64 to 4,050,000 points (64 to 16,200,000 points with Opt. 01).
- Waveform Segment Length – ≥ 64 points, in multiple of 1.
- Sequence Steps – One to 8,000 steps (All channels operate the same sequence).
- Repeat Counter – One to 65,536 or infinite.

Function Generator Waveforms

- Operation Mode – Continuous mode only.
- Waveform Shape – Sin, Triangle, Square, Ramp, Pulse or DC.
- Frequency – 1.000 Hz to 10.00 MHz.

Clock Generator

- Sample Frequency – 10.0000 kHz to 200.0000 MS/s.
- Resolution Accuracy – 7 digits/±2 ppm (±0.0002%).
- Period Jitter (rms) – 7 ps at 200 MHz (typical).
- Cycle Jitter (rms) – 12 ps at 200 MHz (typical).

Main Analog Output

- Number of Outputs – AWG430: 3, AWG420: 2.
- Output Style – Complementary (standard), Single-ended (Opt. 05).
- Output Connector/Impedance – BNC front panel (50 Ω).
- Vertical Resolution – 16-Bit.
- D/A Converter (DNL/INL) – ±0.5 LSB at 25 °C /±0.5 LSB at 25 °C.
- Skew Time Between Channels – ≤0.100 ps (Relative to Ch 1).
- Variable Delay (Range/Resolution/Accuracy) –
  - –2.52 ns to ±2.52 ns/70 ps /±70 ps at 25 °C.

Complementary Output

- Amplitude/Range – 2.0 V to +2.0 V into 50 Ω (Offset = 0 V).
- Resolution/DC Accuracy –
  - 1 mV/±0.5% of setting + 2 mV
  - 1 mV/±1.5% of setting + 2 mV
- Step Response (10% to 90%) –
  - 1 mV/±0.2% (Filter: "Through")
  - 1 mV/±1% (Filter: "Through")
- Rise Time:
  - ≤4.0 ns.
- Fall Time:
  - ≤4.0 ns.

Offset

- Range/Resolution –
  - –1.00 V to +1.00 V into 50 Ω/1 mV
- Accuracy –
  - ±0.5% of reading + 10 mV
  - ±1% of reading + 10 mV

Filter

- Type – Bessel low pass filter
  - 1 MHz, 5 MHz, 20 MHz, 50 MHz.
- Rise Time (10% to 90%) –
  - 350 ns, 70 ns, 18 ns, 7 ns.
- Delay From Trigger –
  - 350 ns, 70 ns, 18 ns, 7 ns (group delay).

Direct Output (Standard)

- Range/Ampitude –
  - –0.25 V to +0.25 V into 50 Ω/20 mV to 0 V into 50 Ω.
- Resolution/DC Accuracy/Offset –
  - 1 mV/±0.5% of setting + 2 mV
  - 1 mV/±1% of setting + 2 mV
- Step Response (10% to 90%) –
  - Filter: "Through"
  - Rise/Fall Time: ≤3.0 ns/≤3.0 ns.
**Arbitrary Waveform Generators** ▶ AWG400 Series

**Single-ended Output (Opt. 05)**
- **Range/Amplitude**
  - -5.0 V to +5.0 V (into 50 Ω), ±0.5 V (into 50 Ω).
- **Resolution/DC Accuracy**
  - ±1 mV/±0.1% (amplitude > 1.0 V).
- **Time/Banding Accuracy**
  - ±200 ps/±0.1%.
- **Settling Time**
  - ±500 ps (after 50 ns from rise/fall edges).
- **Frequency/Output Connector**
  - 10 MHz Reference Input (Voltage): ±10 V or ±5.0 V (50 Ω).
  - ±2.5 Vp-p (into 50 Ω).
- **Output Connector**
  - 74LVC541A output driver/50 Ω BNC rear panel.
- **Digital Data (Output from P4116, Opt. 03).**
- **Number of Outputs**
  - Ch1: 1, Ch2: 2, Ch3: 3.
- **Output Level/Impedance**
  - ±0.3 V/50 Ω.
- **Power Supply**
  - 11 ms duration (three time each axis).
  - ±2.5 Vp-p (into 50 Ω).
  - ±2.500 V to +2.500 V (into 50 Ω).
  - ±5.0 V to +5.0 V.
  - 380 VA/48 to 63 Hz.
- **Dimensions**
  - AWG420: net 14.1 in. and 10.0 GB.
  - AWG430: net 14.4 in. and 160 GB.
- **Physical Characteristics**
  - AWG420 Dimensions: Height: 193 mm, Width: 433 mm, Depth: 508 mm.
  - AWG430 Dimensions: Height: 193 mm, Width: 433 mm, Depth: 508 mm.
  - Weight: 15 kg (33 lb).
  - Power Supply: 100 to 240 VAC to 250 VAC.
- **Data Storage**
  - 128 MB.
  - 10.0 GB.
- **GPIB Interface**
  - GPIB, Ethernet: 10/100Base-T, RJ-45.
- **Display Area/Resolution**
  - Horizontal: 13.06 cm (5.14 in.), Vertical: 9.70 cm (3.81 in.).
  - 640x480.
  - 160x400.
- **Temperature**
  - Vibration: Operating/Nonoperating: 0.27 Gpeak, 5 Hz to 500 Hz.
  - Shock: Nonoperating: 294 m/s² (30 G), half-sine, 11 ms duration (three time each axis).
  - Safety: UL 1411-1, CSA C22.2 No. 1010.1, EN61010-1, IEC61010-1.
- **Shock Ordinate**
  - 3.5’, 1.44 MB.
- **Continuous, Triggered, Gated, Enhanced**
  - Arbitrary Waveform Generators
Arbitrary Waveform Generators

AWG400 Series

Ordering Information

AWG420
200 MS/s, 16-Bit, Two-channel Arbitrary Waveform Generator.

AWG430
200 MS/s, 16-Bit, Three-channel Arbitrary Waveform Generator.

All Include: User/Programmer manual 070-A809-00, GPIB programming examples 062-A258-00, sample waveform library disk 062-A257-00, performance verification 062-A270-00, Cal. Certificate no charge, AXW100 ArbExpress™ Software Utility CD (063-3763-00), power cord.

Please specify power plug when ordering.

Recommended Accessories

Protective Cover – Order 200-3696-01.
ArbExpress™ – PC-based stand-alone waveform creation utility.

Options

Opt. 01 – 16 M point waveform memory.
Opt. 03 – CMOS Digital Data Outputs – 32/48-Bit (number of digital output bit depends on AWG400 model).
Opt. 05 – Single-ended output (alternative for standard complementary output).

Note: Option 10 is for ATE and system usage needing 24x7 hour operation. Also adds capability to power on/off by rear panel main switch.

Opt. 1R – Rackmount.

Power Plug Options

Opt. AC – China Power.

Service

Opt. C5 – Calibration Service 5 Years.

Warranty

One year parts and labor.

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Our most up-to-date product information is available at:
www.tektronix.com

Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.

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