

# 1 GS/sec Arbitrary Waveform Generator

## AWG 2041

[Features](#)  
[Characteristics](#)

**This product is discontinued.**  
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### Characteristics

#### STANDARD WAVESHAPES

Sine, square, triangle, ramp, pulse, arbitrary, linked sequence, and DC.

#### ARBITRARY WAVEFORMS

**Execution Memory** - Waveform: 1 Mwords (4 Mwords with Option 01). Marker: (2) 1 Mwords (4 Mwords x 2-Bits with Option 01). Waveform size: 32 points to 1 MU (4 MU with Option 01) in multiples of 32.

**Real Time Sequencer Memory** - 8 K individual waveforms.

**Loop Counter** -

Waveform: 1 to 64 K Sequence: 1 to 64 K repeats.

#### CATALOG MEMORY CLOCK

**Frequency Range** - 1.000000 kHz to 1.024000 GHz.

**Resolution** - 7 digits.

**Stability** - 1 ppm/year (+15°C to ± 25°C).

#### OPERATING MODES

**Continuous** - Output waveform/sequence continuous at programmed waveshape, frequency, amplitude, and offset.

**Triggered** - Output quiescent until triggered by an external, GPIB, or manual trigger; generates a waveform/sequence only one time.

**Burst** - Output quiescent until triggered by an external, GPIB, or manual trigger; then generates a waveform/sequence up to 65,536 times.

**Gated** - Same as continuous mode except period is executed only for the duration of the gated signal until the sequence started is completed.

**Waveform Advance** - Output quiescent until triggered by an external, GPIB, or manual trigger, then generates the waveform/sequence in the Sequence file. When the scan count reaches value, output stops and waits for next trigger.

**Auto Step** - Continuously outputs the waveform/sequence in the Auto Step file; the next Auto Step Trigger (rear panel) advances the waveform/sequence.

**Slave** - Receives clock from a master arbitrary waveform generator for parallel operation.

## MAIN OUTPUTS - CH 1 & COMPLIMENT

**Digital-to-Analog Converter Resolution** - 8-Bits.

**Output Impedance** - 50 Ohm.

**Output Voltage** - 2.0 V to +2.0 V into 50 Ohm (L/V differential).

**Amplitude** - Range: 20 mV to 2 V into 50 Ohm.  
Resolution: 1 mV.

**Offset** - Range: -1.000 V to 1.000 V into 50 Ohm.  
Resolution: 1 mV. Accuracy (20 mV Amplitude, 7F waveform data):  $\pm (1\% \text{ of offset} + 5 \text{ mV})$ .

**Rise Time** - Amplitude >1.0 V,  $\leq 2.5 \text{ ns}$ ; Amplitude  $\leq 1.0 \text{ V}$ ,  $\leq 1.5 \text{ ns}$ .

**Fall Time** - Amplitude >1.0 V,  $\leq 2.5 \text{ ns}$ ; Amplitude  $\leq 1.0 \text{ V}$ ,  $\leq 1.7 \text{ ns}$ .

**Aberrations (at full BW)** - Amplitude >1.0 V, within  $\pm 10\%$ ; Amplitude  $\leq 1.0 \text{ V}$ , within  $\pm 7\%$ .

**Flatness** - Within  $\pm 3\%$  after 50 ns from rise/fall edges.

**Sinewave Characteristics (1 GHz clock, 32 waveform points, 31.25 MHz frequency, 1.0 V amplitude, no offset, no filter)** - Harmonics:

$\leq 45 \text{ dBc}$ , DC to 400 MHz. Noise:  $\leq 50 \text{ dBc}$ , DC to 400 MHz.

## FILTERS

**Type** - Bessel low pass

**Risetime** - 10 MHz: 35 ns, 20 MHz: 17 ns. 50 MHz: 7.0 ns. 100 MHz: 3.5 ns.

**Delay from Marker** - 10 MHz: 42 ns. 20 MHz: 22 ns. 50 MHz: 12 ns. 100 MHz: 7.0 ns. Through: 2.5 ns.

## AUXILIARY OUTPUTS

**Marker** - Number of Markers: 2. Level: Hi/Lo, -2.0 V to 2.0 V into 50 Ohm, -4.0 V to 4.0 V into 1 megaohm; Resolution, 0.1 V Accuracy: within  $\pm 0.1 \text{ V}$ . Rise/Fall Time:  $< 1 \text{ ns}$  (at 1 V p-p). Connector: BNC.

**Busy** - Level: Positive TTL pulse (0 V to 5.0 V into 1 megaohm). Delay:  $< 60 \text{ ns}$  from Ext. Trig;  $< 150 \text{ ns}$  from CH 1. Output Resistance: 51 Ohm. Connector: SMB

**Sync** - Level: Positive TTL pulse (0 V to 5.0 V into 1 megaohm). Delay:  $< 60 \text{ ns}$  from Ext. Trig. Duration: 100 ns. Output Resistance: 51 Ohm. Connector: SMB.

**Master Clock** - Level: ECL compatible (-1.620 to -0.810 into 50 Ohm). Connector: SMB.

**8-Bit ECL Digital Out (Option 03)** - Output Signals: D0 to D7, Clock. Level: ECL compatible (-1.81 V to -0.810 V into 50 Ohm). Skew Between Data:  $\pm 250 \text{ ps}$ . Delay: Data to Marker: 2.0 ns; Clock to Data: 2.5 ns.

## AUXILIARY INPUTS

**Trigger** - Threshold: Level, -5 V to +5 V; Resolution: 0.1 V; Accuracy:  $-(5\% \times \text{Level} + 0.1 \text{ V})$ . Pulse Width: 10 ns minimum (0.2 V amplitude). Sensitivity: 0.2 V minimum (1 MHz square wave). Maximum Input:  $\pm 10 \text{ V p-p}$  when 1 kilohm selected;  $\pm 5 \text{ V}$  when 50 Ohm selected. Impedance: 1 kilohm or 50 Ohm. Trigger Holdoff: 500 ns maximum.

**Stop Trig** - Threshold Level: TTL Level. Pulse Width: 100 ns minimum. Maximum Input Volts: +5 V to 0 V. Delay: 100 ns maximum. Impedance: 10 kilohm. Connector: SMB.

**Auto Step Trig** - Threshold Level: TTL Level. Pulse Width: 100 ns minimum. Maximum Input Volts: +5 V to 0 V. Delay: 100 ms maximum. Impedance: 10 kilohm. Connector: SMB.

**External Clock** - Sensitivity: 400 mV p-p (-4.0 dBm). Maximum Input Volts: 1.0 V p-p (+4.0 dBm) DC  $\pm$  20 V. Frequency: 10 MHz to 1.0 GHz. Delay External Clock to Marker: 13 ns.

**Slave Clock** - Threshold: ECL compatible (100 K). Maximum Input Volts: -2.0 V to 0.0 V. Frequency: 650 MHz to 1.0 GHz. Delay External Clock to Marker: 13 ns.

## FUNCTION GENERATOR

**Waveform Shape (predefined 100-point waveforms)** - Sine, Triangle, Square, Ramp, Pulse (50 MHz filter is inserted when Sine is selected). Frequency: 1.000000 Hz to 10.00000 MHz. Accuracy: 1 ppm. Amplitude: 20 mV to 2 V into 50 Ohm. Offset: -1.000 V to 1.000 V into 50 Ohm. Polarity: Normal, Invert. Duty Cycle: 0% to 100%, Pulse only. Sine Flatness: Within -1 dB referenced to 100 kHz.

## PROGRAMMABLE INTERFACE

**GPIB** - IEEE 488.2-1987 compatible.

**RS-232** - 9-Pin D connector.



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



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