Tektronix®

Arbitrary Waveform Generators

AWGSYNC01 Synchronization Hub Datasheet

The AWGSYNC01 enables the multi-instrument synchronization of up to four AWG70001A or AWG70002A units allowing up to eight channels to be aligned to the same clock, pattern jump and trigger inputs. The AWGSYNC01 requires no additional software and allows for the rapid and consistent synchronization of multiple devices. The AWGSYNC01 provides calibration ports to deskew up to four AWG70000 instruments to within ±10ps. After the deskew process the AWGSYNC01 can repeatedly return to within ≤5 ps of the same deskew point.

Key performance specifications

- Random Jitter (typical): 315 fs_{RMS}
- Total jitter (typical): 13 ps_{p-p} at 12.5 Gb/s
- Instrument to instrument skew: ±10 ps
- Skew repeatability/accuracy: ≤5 ps

Key features

- Synchronize signal output from two to four AWG70000 instruments (providing two to eight signal outputs)
- Synchronize to within ±10 ps
- Trigger all channels to the same resolution

Applications

- Wideband RF/MW for communications and defense electronics
- Validation and compliance testing of high speed silicon and communications devices
- Coherent optical research
- Leading edge research in electronics, physics and chemistry

High speed serial

For high-speed serial applications the AWG70000A Series offers the industry's best solution for addressing challenging signal stimulus issues faced by digital designers who need to verify, characterize, and debug complex digital designs. The file-based architecture uses direct synthesis to create complex data streams and gives users a simple, repeatable, and flexible way to solve the toughest signal generation challenges in high-speed serial communication applications. The AWGSYNC01 lets users synchronize multiple AWG instruments to output signals for complex or multi-lane standards such as HDMI and MIPI.

Coherent optical

Today's high speed and increasingly Web-driven world is pushing the demand for short and long haul coherent optical development. Phase modulation, high baud rate, high sample rate, bandwidth, and resolution are all critical to optical applications. Tektronix understands the challenges and inconsistencies of coherent optical testing and offers a reliable, easy to set up and high performance tool set for optical testing, waveform generation and calibration.

Generating the desired signal is only the first challenge in coherent optical. The quality of the signal, low EVM's, and having a clear, open eye is crucial. Complex quadrature modulations, such as PAM-4, require synchronized output from multiple AWG70000 instruments.

The AWGSYNC01 can synchronize multiple single-channel AWG70000 instruments, at the maximum 50 Gs/s sample rate, to output synchronized baseband signals with low EVM and 32 Gbaud performance. The AWGSYNC01 streamlines the complex multiple instrument signal synchronization alignment process, resulting in synchronized signals with a high rate of repeatability and with low jitter.

Research applications

Advanced research applications such as quantum computing, mass spectroscopy, MEMS, NEMS, and particle physics often demand the precise alignment of multiple simultaneous triggering, precompensation, or I/Q generation signals, all with low jitter. AWG70000 series instruments, used with the AWGSYNC01 Synchronization Hub, provide fast and repeatable results. Day to day experimental setups require no additional equipment for synchronization.

The AWGSYNC01 comes with all required phase-stable and delay-matched calibration and clock cabling needed to start synchronizing straight out the box. You can use the clock out signal from the Master AWG70000 instrument to synchronize the output signals, or use an external clock reference signal for higher precision when needed.

Performance you can count on

Depend on Tektronix to provide you with performance you can count on. In addition to industry-leading service and support, this product comes backed by a standard one-year warranty.

Specifications

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

General specifications

Jitter	
Random Jitter (typical)	315 fs RMS
Total jitter (typical)	13 ps_{p-p} at 12.5 Gb/s
Skew	
Instrument to instrument skew	±10 ps
Skew repeatability/accuracy	≤5 ps
	After changes of sample rate or power cycle and within ±5 °C from deskew calibration.

Inputs, outputs

Calibration Ports	Four SMA type connectors used to deskew the instrument signal delays. Only use the supplied matched silver calibration cables with these connectors when deskewing the AWG70000 instrument signal outputs.
Trigger Inputs (A, B)	External trigger inputs
Connector	SMA
Number of trigger inputs	2
Impedance	50 Ω or 1 kΩ selectable
Polarity	Positive or negative selectable
Input voltage range	50 Ω: <5 VRMS
	1 kΩ: ±10 VRMS
Threshold range	-5.0 V to 5.0 V
Threshold resolution	0.1 V
Minimum trigger pulse width	20 ns
Trigger holdoff	>1.4 µs
Trigger delay to analog output	Asynchronous trigger mode: 32,480 / (2 * fclk) ±20 ns
	Synchronous trigger mode: 30,880 / (2 * fclk) ±20 ns
	fclk is the frequency of the DAC sampling clock
	The DAC sampling clock frequency is displayed on the clock settings tab when the external clock output is enabled.
Trigger asynchronous jitter	80/sampling clock frequency
	The asynchronous jitter performance is directly proportional the sync clock out frequency. The sync clock out is derived from the DAC sampling clock. The DAC sampling clock frequency is displayed on the clock settings tab when the external clock output is enabled.
Trigger synchronous jitter	Clock In = 12.5 GHz: 300 fs_{RMS}, 4.2 ps RJ_{p-p} BER@10^{-12}
	Variable Reference In = 156.25 MHz: 400 fs_{RMS}, 5.6 ps RJ_{p-p} BER@10^{-12}
	Fixed Reference In = 10 MHz: 1.7 ps_{RMS}, 23.8 ps RJ_{p-p} BER@10^{-12}
	Sample rate = 25 GS/s

Inputs, outputs

Sync to AWG (1-4)	Communication ports used by to synchronize all connected AWG70000 instruments. The AWG70000 connected to Port 1 is the Master AWG70000, which sets up and controls synchronization of the connected instruments. You must connect an AWG70000 to Port 1. AWG70000 instruments connected to Ports 2 through 4 are Slave AWG70000 instruments. Use the supplied orange cable assemblies to connect these ports to the AWG70000 instruments.
Clock in from Master AWG	Synchronizing clock signal input from the master AWG70000 Clock Out port, or from an external clock signal source.
Connector	SMA
Input impedance	50 Ω, AC coupled
Input frequency range	6.25 GHz to 12.5 GHz
Input amplitude	+5 dBm to +10 dBm
Clock Out to AWG Clock In	
Connector	SMA
Impedance	50 Ω, AC coupled
Frequency range	6.25 GHz to 12.5 GHz
Output amplitude	+5 dBm to +10 dBm
Sync Clock Out	
Connector	SMA
Impedance	50 Ω, AC coupled
Frequency	10 MHz ±(1 ppm + aging)
Output amplitude	1.0 V ±150 mV_{p-p}
Pattern Jump In	
Number of jump destinations	256
Connector	15-pin D-sub female connector on rear panel
Input levels	3.3 V LVCMOS 5 V TTL compliant (input impedance pull up to 5 V by 1 kΩ resistor)
Strobe	Polarity: Data is clocked in on negative edge Minimum pulse width: 64 ns
Latency to analog output	102,125/fclk +20 ns ± 20 ns The DAC sampling clock frequency is displayed on the clock settings tab when the external clock output is enabled
Holdoff time	>18 µs Strobe hold off is the amount of delay required at the end of a waveform before another strobe pulse can be processed

Physical characteristics

Dimensions	
Height	44.45 mm (1.75 in)
Width	460.5 mm (18.13 in)
Depth	603 mm (23.76 in)
Weight	
Instrument only	5.4 kg (12 lb)
With packaging	9.1 kg (20 lb)

Physical characteristics

Cooling clearance	
Top, bottom, left, right	0 mm (0 in)
Rear	50 mm (2 in)
Power	
AC line input	100 to 240 V AC, 50/60 Hz
Consumption	110 W

Environment

Temperature	
Operating	0 °C to +50 °C (+32 °F to +122 °F)
Nonoperating	-20 °C to +60 °C (-4.0 °F to +140 °F)
Humidity	
Operating (noncondensing)	5% to 90% relative humidity (% RH) at up to 30 °C
	5% to 45% relative humidity above 30 °C up to 50 °C
Nonoperating (noncondensing)	5% to 90% relative humidity (% RH) at up to 30 °C
	5% to 45% relative humidity above 30 °C up to 60 °C
Altitude	
Operating	Up to 3,000 meters (9,843 feet)
	Derate maximum operating temperature by 1 °C per 300 meters above 1500 meters
Nonoperating	Up to 12,000 meters (39,370 feet)
Regulatory	
Safety	UL61010-1, CAN/CSA-22.2, No.61010-1, EN61010-1, IEC61010-1
EMC Emissions	IEC61326, EN55011 (Class A), IEC61000-3-2, IEC61000-3-3
EMC Immunity	IEC61326, IEC61000-4-2/3/4/5/6/11
Regional certifications	Europe: EN61326
	Australia/New Zealand: AS/NZS 2064

Ordering information

Models

AWGSYNC01	Synchronizes signal output on up to four AWG70001A and/or AWG70002A instruments

Standard Accessories

Standard accessories

071-3292-xx	AWGSYNC01 Safety and Installation Instructions
174-6157-xx	AWG synchronization communication cable (orange)
174-6568-xx	Phase stable clock cable (blue)
174-6606-xx	Calibration deskew cables (set of 4 cables, silver)
Power cord	Specify power cord option at time of order

Warranty

One year parts and labor

Options

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. 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. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
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. R3DW	Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of instrument purchase
Opt. R5	Repair Service 5 Years (including warranty)
Opt. R5DW	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase
Opt. S1	On-site Service 1 Year
Opt. S3	On-site Service 3 Years (with R or C options)

Cables and accessories are not covered by the instrument warranty and Service Offerings.

Recommended accessories

AWGRACK	Rack mount kit for AWG70000A Series instruments and AWGSYNC01

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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

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