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Astronics Test Systems

PXIe-1802

180/400 MS/s Dual Channel PXI Express Arbitrary Waveform Generator

The Astronics Test Systems PXIe-1802 is a 2-channel Arbitrary Waveform Generator (AWG).

Occupying just one PXI Express periphal slot or hybrid slot, this AWG offers the best speed and performance available for output frequencies up to 125 MHz.

Key Features

- **Dual 14/16-bit Waveform generator configurable as separate or fully synchronized channels**
- **Waveform bandwidths of 90-140 MHz**
- **8-64M waveform memory per channel**
- **External clock input for synchronization up to 180 or 400 MHz**
- **250 µV Measurement Accuracy Noise Floor and Relative Accuracy as low as 0.006%**

Product Information

Built-In Waveforms

Standard waveforms such as Sine, Square, Triangle, Ramp and DC are calculated and loaded into waveform memory automatically based on their specified parameters. Up to 10 waveforms can be stored in internal memory segments. High fidelity waveforms can be specified by choosing to have the waveform calculated in “MxN” fashion where M and N (points and repeats) can be set to be prime numbers for optimal signal reproduction.

Signal Integrity

One of the most important requirements in today’s test and measurement applications is high signal quality. With a typical peak sample clock jitter of 0.5 ps and with exceptionally good SFDR of < 82dB at a 1 MHz carrier, the Astronics Test Systems PXIe-1802 delivers the highest quality signal available. Signal outputs are provided either as single-ended or true differential.

Channel Synchronization

Both AWG channels may be operated independently or in synchronization. Using an external reference clock, waveforms can be triggered from a source tied to the same reference clock with no jitter. A sync pulse is available for each output channel, with programmable location and width, for synchronization with other instruments.

High Density & Modularity

The small size and high performance of the dual channel PXIe-1802 make it ideal for use in high channel-count applications. The module can be synchronized with additional modules in a PXI chassis with hybrid slots. This reduces the size and cost of the system while improving system granularity and maintainability.

Powerful Soft Front Panel

The PXIe-1802 comes with a Soft Front Panel (SFP) which gives you full control of standard waveforms, and also allows for the loading of arbitrary waveform segments. The SFP allows you to preview any specified “MxN” waveforms in the preview window, providing information about the resulting signal parameters in the time domain. The Preview Panel also calculates the DFT or FFT of your signal for display, or to be saved to a file. In this case, the resulting signal parameters are displayed in the frequency domain, including SINAD, THD, harmonics and more.

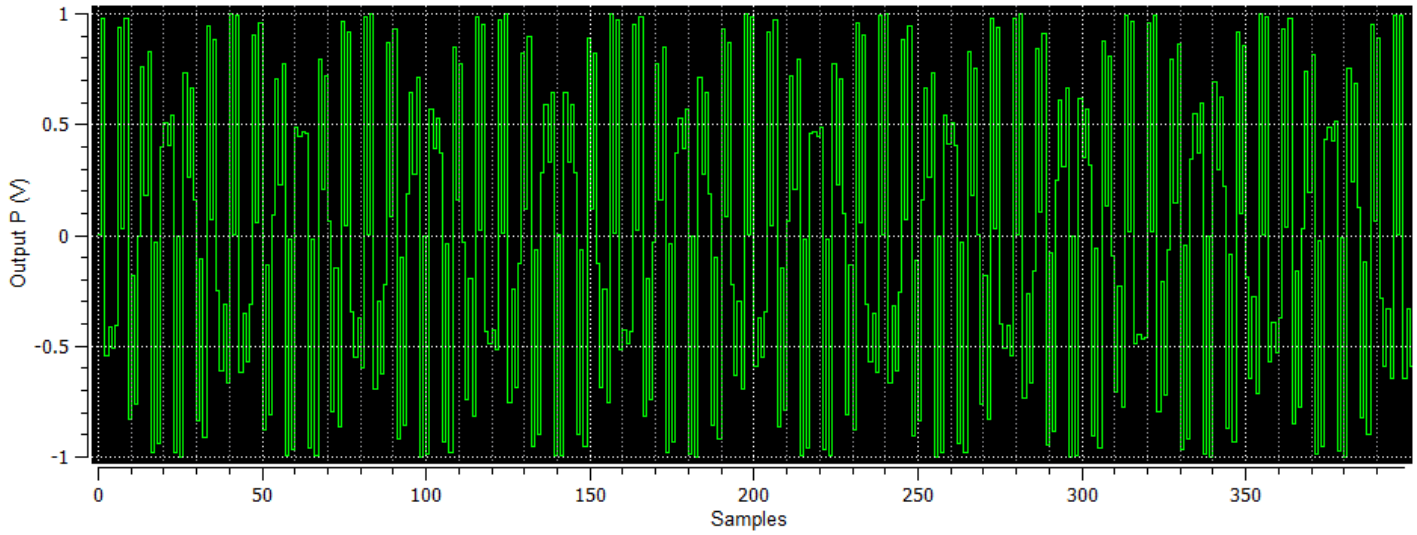
Multiple Environments for Code Development

The PXIe-1802 comes with a complete set of drivers, allowing you to write your application in various environments such as: LabVIEW, LabWindows/CVI or Visual Studio.

ASTRONICS TEST SYSTEMS

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Zoomed Time Domain plot of a dual frequency arbitrary waveform shown in the Analyzer Window

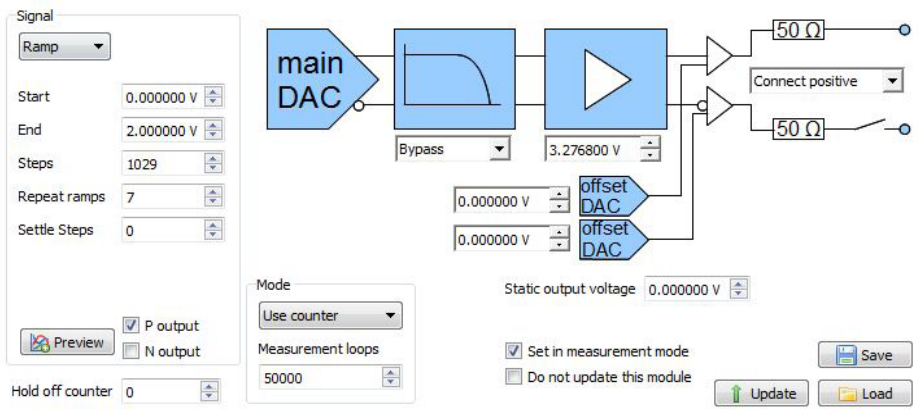
Dynamic calculations

Carrier frequency	8.79 MHz
Carrier level	0.00 dB
SINAD	0.00 dB
ENOB	-0.30 bits
SNR	0.00 dB
THD	-98.54 dB

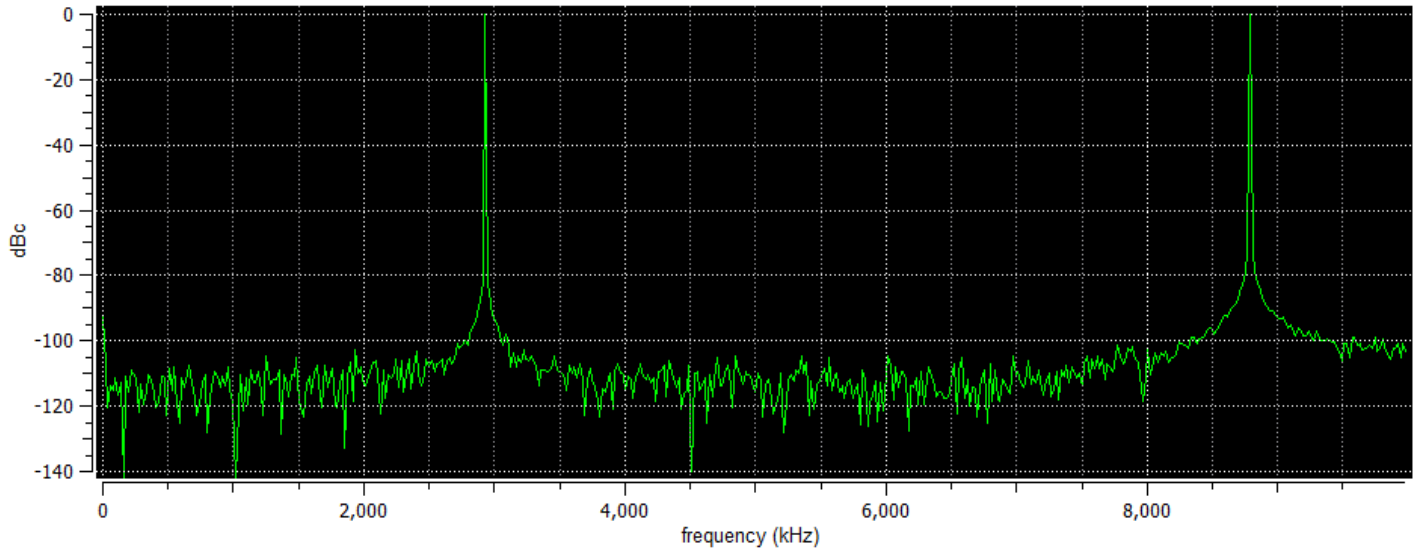
harm	level (dB)	freq (MHz)	bin
2	-109.75	2.42	124
3	-113.68	6.37	326
4	-104.86	4.84	248
5	-107.04	3.95	202
6	-117.01	7.27	372
7	-121.80	1.52	78
8	-101.56	9.69	496

	level (dB)	bin	freq (MHz)
SFDR	0.00	150	2.93
Spur noise	0.00	150	2.93
Peak distortion	-101.56	496	9.69

Dynamic parameters displayed in the Preview Window



Main interactive configuration window for one of the generators



Spectrum plot of a dual frequency arbitrary waveform shown in the Analyzer Window

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Specifications

Note: The Astronics Test Systems policy is one of continuous development and improvement. Consequently, the equipment may vary in detail from the description and specifications in this publication.

Amplitude Characteristics

Output Types
- Single-ended or differential, selectable

Channel Types
- Type 1 (16400): 16-bits, 400 MS/s
- Type 2 (14180): 14-bits, 180 MS/s

Amplitude (Volts Peak to Peak)
- 14180: Full scale ranges of 409.6 mV, 819.2 mV, 1.6384 V and 3.2768 V_{pp} into 50 Ω, double into 1 MΩ
- 16400: Full scale ranges of 320 mV, 425 mV, 640 mV, 850 mV, 1.28 V and 2.56 V_{pp} into 50 Ω, double into 1 MΩ

Resolution/Bandwidth (- 3dB)
- 14180: 14-bits/90 MHz
- 16400: 16-bits/BW Per Range (typical)
  - 320 mV_{pp}: 100 MHz
  - 425 mV_{pp}: 135 MHz
  - 640 mV_{pp}: 125 MHz
  - 850 mV_{pp}: 120 MHz
  - 1.28 V_{pp}: 140 MHz
  - 2.56 V_{pp}: 80 MHz

Accuracy (at 1 kHz)
- Absolute: ±(250 µV + 0.1% of range + 0.1% of value)
- Relative Accuracy
  - 14180: ±0.025%
  - 16400: ±0.006%

DC Offset
- Range: 0 to ±2.56 V
- Resolution: 80 µV

Output Impedance
- 50 Ω, single-ended or differential

Low-Pass Filter (selectable)
- 14180: 15 MHz, 30 MHz, bypass
- 16400: 30 MHz, 60 MHz, bypass

Standby (Output disconnected)
- Output On or Off

Standard Waveforms
(Sine, Triangle, Square, Ramp, DC)

Sine Function

Frequency Range
- 14180: Up to 90 MHz
- 16400: Up to 125 MHz

Phase Range
- 0 to 360º

Signal-Noise Ratio
- 14180 (180 MS/s, 3.2V_{pk} diff.)
  - 68dB @ f_{out}=1MHz (BW: 0-70MHz)
  - 64dB @ f_{out}=10MHz (BW: 0-70MHz)
- 16400 (200 MS/s, 5V_{pp} diff.)
  - 69dB @ f_{out} = 1MHz (BW: 0-80MHz)
  - 67dB @ f_{out} = 10MHz (BW: 0-80 MHz)

Total Harmonic Distortion
- 14180 (180 MS/s, 2.0 V_{PK} diff.)
  - 81dB @ f_{out} = 1MHz
  - 70dB @ f_{out} = 10MHz
- 16400 (200 MS/s, 5 V_{pp} diff.)
  - 84dB @ f_{out} = 1MHz
  - 73dB @ f_{out} = 10MHz

Spurious Free Dynamic Range
- 14180 (180 MS/s, 2 V_{pk} diff.): 82dB @ f_{out} = 1 MHz
- 16400 (200 MS/s, 5 V_{pp} diff.): 82dB @ f_{out} = 1 MHz

Triangle/Ramp/Pulse Function

Frequency Range
- 14180: Up to 18 MHz
- 16400: Up to 40 MHz

Phase Range
- 0 to 360º

Square Wave Function

Frequency Range
- 14180: Up to 30 MHz
- 16400: Up to 50 MHz

Duty Cycle Range
- 1% to 99.99% Rise/Fall Time

Rise/Fall Time
- 14180: 4 ns
- 16400: 2.5 ns

Arbitrary Waveforms

Waveform Memory
- 14180: 64 Meg Words per channel
- 16400: 8 Meg Words per channel

Memory Operation
- Configuration Mode: Memory and settings can be programmed.
- Measurement Mode: Module operates until returning to configuration mode.

Vertical Resolution
- 14180: 14-bits
- 16400: 16-bits

Minimum Segment Size
- 14180: 1 pt to Max in 1 point increments
- 16400: 8 pts to Max in 8 point increments

Segments/Channel
- 10

Sampling Clock
(One Per Channel)

Frequency Resolution
- ~ 4 digits

Jitter
- <0.5 ps peak, typical

SCLK Source Range
- Internal: 2 kHz to 945 MHz
- External: 0 Hz to 500 MHz

External Source Characteristics
- Connector: Front Panel SMB
- Range: -0.5V to +5.5V
- Threshold: 1.02 Volt +/- 5%
- Impedance: 50 Ω
- Function: Sample Clock or 10 MHz PLL Reference, selectable

Reference Clock

Internal Reference
- 10 MHz ± 15 ppm

External Reference
- Connector: Front Panel SMB
- Range: -0.5V to +5.5V
- Threshold: 1.02 Volt +/- 5%
- Impedance: 50 Ω
- Function: Sample Clock or 10 MHz PLL Reference, selectable

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Specifications
continued

Triggering Characteristics
(Per Channel)

Sources
- Internal: Software trigger
- Backplane: PXI_STAR, PXI_TRIG0-6
- External, Connector: Front Panel SMB
  - Range: -0.5V to +5.5V
  - Threshold: 1.02 Volt +/- 5%
  - Impedance: 1 kΩ

Trigger Modes
- Continuous, Triggered, or Burst (1 to 128k cycles)

Trigger Delay
- 0 to 64k points (multiple of 2)

System Delay (Trigger input to waveform output)
- 14180: 4 Sample Clocks
- 16400: 26 Sample Clocks

Interface

PXI Backplane Signal Support
- PXI_TRIG0-6, PXISTAR: Trigger Input
- PXI_TRIG6: Trigger Output
- PXI_CLK10: Time Base

Cooling (10° C Rise)
- Min. Airflow: 0.8 l/s

Peak Current & Power Consumption
- Total Power: 9 Watts

	I_{Pm} (A)	I_{Dm} (A)
+12	0.1	0.08
+3.3	2.3	0.45

Front Panel I/O

AWG Inputs
- Trigger: SMB, 1 kΩ, 0.5 to 5.5V, DC coupled
- Clock: SMB, 50 Ω, 0.5 to 5.5V, DC coupled

AWG Outputs
- CH1, CH1/, CH2, CH2/: SMB, 50 Ω
- SYNC1, SYNC2: SMB, LVTTL

Environmental
(All Environmental Conditions Tested to MIL-PRF-28800F, Class 3)

Temperature
- Operating: 0° C to 50° C
- Storage: -40° C to 71° C

Relative Humidity
- 5% to 95% RH non-condensing ≤30° C
- 5% to 75% RH above 30° C
- 5% to 45% RH above 40° C

Altitude
- Operating: 15,000 ft
- Non-Operating: 15,000 ft

Shock
- 30 g peak, half sine, 11 ms pulse

Vibration
- Random: 5 to 500 Hz

Ordering Information

408636-022 : Astronics Test Systems PXIe-1802-22, 180 MS/s Arbitrary Waveform Generator, Dual Channel
Dual Channel, 180 MS/s, PXI Express AWG

408636-011 : Astronics Test Systems PXIe-1802-11, 400 MS/s Arbitrary Waveform Generator, Dual Channel
Dual Channel, 400 MS/s, PXI Express AWG

408636-012 : Astronics Test Systems PXIe-1802-11, One 400 MS/s Arbitrary Waveform Generator Channel, One 180 MS/s Arbitrary Waveform Generator Channel
Dual Channel, 400 MS/s and 180 MS/s (1 each), PXI Express AWG

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