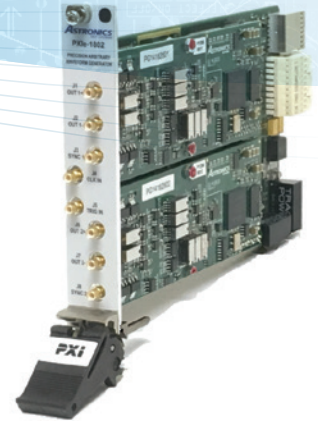


# PXIe-1802

## 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 peripheral slot or hybrid slot, this AWG offers the best speed and performance available for output frequencies up to 125 MHz



### 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. Trigger delays in increments of 160 ps are available for synchronization with external events.

#### 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,

### 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  $\mu$ V Measurement Accuracy Noise Floor and Relative Accuracy as low as 0.006%

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.

### 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

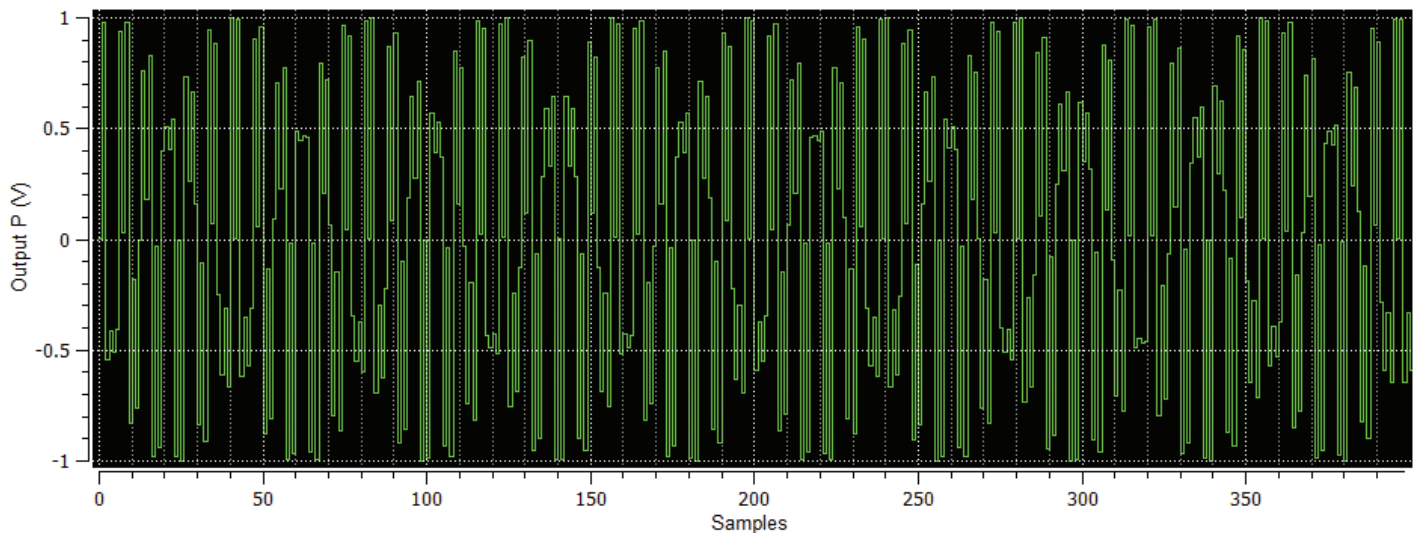
- Single-ended or differential, selectable

### Channel Types

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

### Amplitude (Volts Peak to Peak)

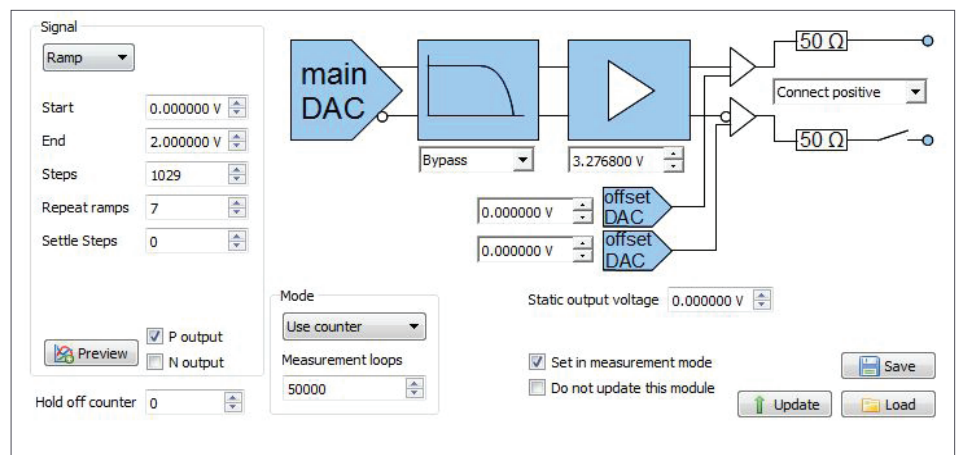
- 14180: Full scale ranges of 409.6 mV, 819.2 mV, 1.6384 V and 3.2768 V<sub>pp</sub> into 50 Ω, double into 1 MΩ
- 16400: Full scale ranges of 320 mV, 425 mV, 640 mV, 850 mV, 1.28 V and 2.56 V<sub>pp</sub> into 50 Ω, double into 1 MΩ



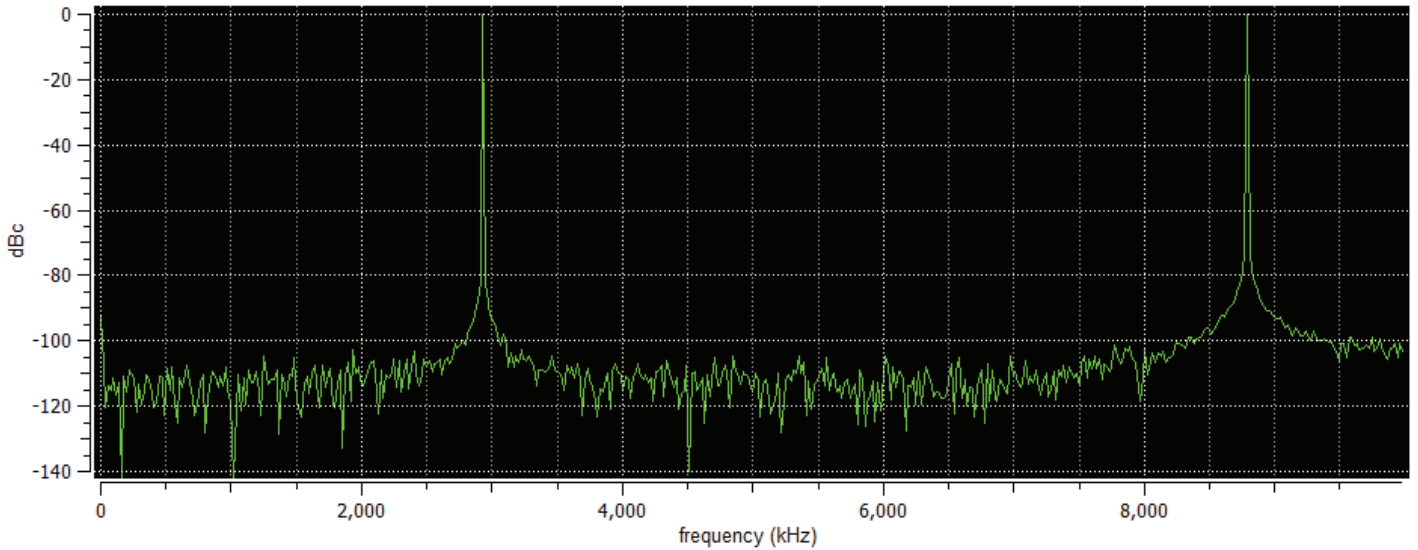
*Zoomed Time Domain plot of a dual frequency arbitrary waveform shown in the Analyzer Window*

Dynamic calculations			
<b>Carrier frequency</b>	8.79 MHz		
<b>Carrier level</b>	0.00 dB		
<b>SINAD</b>	0.00 dB		
<b>ENOB</b>	-0.30 bits		
<b>SNR</b>	0.00 dB		
<b>THD</b>	-98.54 dB		
<b>harm</b>	<b>level (dB)</b>	<b>freq ( MHz)</b>	<b>bin</b>
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
<b>SFDR</b>	<b>level (dB)</b>	<b>bin</b>	<b>freq ( MHz)</b>
<b>Spur noise</b>	0.00	150	2.93
<b>Peak distortion</b>	-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*

### Resolution/Bandwidth (- 3dB)

- 14180: 14-bits/90 MHz
- 16400: 16-bits/BW Per Range (typical)
  - 320 mV<sub>pp</sub>: 100 MHz
  - 425 mV<sub>pp</sub>: 135 MHz
  - 640 mV<sub>pp</sub>: 125 MHz
  - 850mV<sub>pp</sub>: 120 MHz
  - 1.28 V<sub>pp</sub>: 140 MHz
  - 2.56 V<sub>pp</sub>: 80 MHz

### Accuracy (at 1 kHz)

- Absolute:  $\pm(250 \mu\text{V} + 0.1\%$  of range + 0.1% of value)
- Relative Accuracy
  - 14180:  $\pm 0.025\%$
  - 16400:  $\pm 0.006\%$

### DC Offset

- Range: 0 to  $\pm 2.56$  V
- Resolution: 80  $\mu\text{V}$

### Output Impedance

- 50  $\Omega$ , 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 360°

#### Signal-Noise Ratio

- 14180 (180 MS/s, 3.2V<sub>pk</sub> diff.)
  - 68dB @ f<sub>out</sub>=1MHz (BW: 0-70MHz)
  - 64dB @ f<sub>out</sub>=10MHz (BW: 0-70MHz)
- 16400 (200 MS/s, 5V<sub>pp</sub> diff.)
  - 69dB @ f<sub>out</sub> = 1MHz (BW: 0-80MHz)
  - 67dB @ f<sub>out</sub> = 10MHz (BW: 0-80 MHz)

#### Total Harmonic Distortion

- 14180 (180 MS/s, 2.0 V<sub>PK</sub> diff)
  - 81dB @ f<sub>out</sub>= 1MHz

- 70dB @ f<sub>out</sub> = 10MHz

- 16400 (200 MS/s, 5 V<sub>pp</sub> diff.)
  - 84dB @ f<sub>out</sub>= 1MHz
  - 73dB @ f<sub>out</sub> = 10MHz

### Spurious Free Dynamic Range

- 14180 (180 MS/s, 2 V<sub>pk</sub> diff.): 82dB @ f<sub>out</sub> = 1 MHz
- 16400 (200 MS/s, 5 V<sub>pp</sub> diff.): 82dB @ f<sub>out</sub> = 1 MHz

### Triangle/Ramp/Pulse Function

#### Frequency Range

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

#### Phase Range

- 0 to 360°

### 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

**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**

- Fine: 160 ns resolution, 0 to 64k steps
- Coarse: 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, PXI\_STAR: 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 <sub>Pm</sub> (A)	I <sub>Dm</sub> (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, LVTTTL

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

**Temperature**

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

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

**Relative Humidity**

- 5% to 95% RH non-condensing  $\leq 30^{\circ}$  C
- 5% to 75% RH above  $30^{\circ}$  C
- 5% to 45% RH above  $40^{\circ}$  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



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**ORDERING INFO**

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

*Dual Channel, 180MS/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-1802-12, 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*