

# PCI/PXI-9816/9826/9846

## 4-CH 16-Bit 10/20/40 MS/s Digitizers with 512 MB Memory



PCI-9816/9826/9846



PXI-9816/9826/9846

### Features

- PXI specifications Rev.2.2 compliant (PXI-98x6)
- Supports 5 V and 3.3 V PCI signals
- Supports the 32-bit /66 MHz PCI interface
- 4 channels of simultaneous single-ended analog input
- 16-bit high resolution A/D converter
- Up to 10 MS/s, 20 MS/s, and 40 MS/s per channel
- 512 MB on-board memory for data storage
- Software selectable 50 Ω or 1 MΩ input impedance
- Programmable input voltage range: ±0.2 V / ±1 V or ±1 V / ±5 V
- 5.1 MHz, 9.6 MHz, and 20 MHz analog input bandwidth for the PCI/PXI-9816, PCI/PXI-9826 and PCI/PXI-9846, respectively
- Multiple module synchronization via the PXI trigger bus or SSI (System Synchronization Interface)
- Supports scatter-gather DMA transfer
- 89 dBc SFDR, 79 dBc SINAD and 12.9-bit ENOB (PXI-9816)
- Fully auto-calibration
- Supported Operating System
  - Windows 7/8 x64/x86, Linux
- Driver and SDK
  - LabVIEW, MATLAB, C/C++, Visual Basic, Visual Studio.NET
- Software Utility
  - AD-Logger

### Introduction

The ADLINK PCI/PXI-9816/9826/9846 are 10 MS/s, 20 MS/s, 40 MS/s sampling 16-bit 4-CH digitizers designed for digitizing high frequency and wide dynamic range signals with an input frequency up to 20 MHz. The analog input range can be programmed via software to ±1 V / ±0.2 V or ±5 V / ±1 V, based on the model. With a deep onboard acquisition memory up to 512 MB, the PXI/PXI-9816/9826/9846 are not limited by the data transfer rate of the PCI bus to enable the recording of waveforms for extended periods of time.

The PXI/PXI-9816/9826/9846 are equipped with four high linearity 16-bit A/D converters ideal for demanding applications with a high dynamic range such as radar, ultrasound, and software-defined radio.

### Specifications

#### Analog Input

- Number of channels: 4 single-ended channels
- Input impedance: 50 Ω or 1 MΩ, software selectable
- Input coupling: DC
- Input range: (±0.2 V, ±1 V) or (±1 V, ±5 V), depends on model type
- ADC resolution: 16 bits, 1 in 65536
- Crosstalk: <-80 dB from DC to 1 MHz, for all input ranges
- System noise, unit in LSB<sub>RMS</sub>:

| Input Range | PXI-9816D | PXI-9826D | PXI-9846D | PXI-9846W | PXI-9846D |
|-------------|-----------|-----------|-----------|-----------|-----------|
| ±0.2 V      | 5.0       | 6.0       | 8.0       | 15.0      | 8.0       |
| ±1 V        | 3.0       | 4.0       | 5.0       | 7.0       | 5.0       |

| Input Range | PXI-9816H | PXI-9826H | PXI-9846H | PXI-9846H |
|-------------|-----------|-----------|-----------|-----------|
| ±1 V        | 5.0       | 6.0       | 8.0       | 8.0       |
| ±5 V        | 3.0       | 4.0       | 5.0       | 5.0       |

- Offset error:

| Model Name   | PXI-9816D/9826D/9846D/9846W, PCI-9846D |
|--------------|--|
| Offset error | ±0.2 mV                                |
| Model Name   | PXI-9846H, PCI-9816H/9826H/9846H       |
| Offset error | ±0.3 mV                                |

- Gain error:

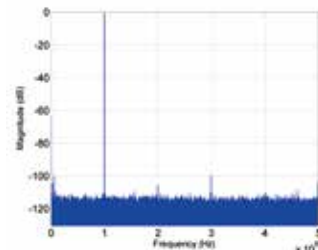
| Input Range | PXI-9816D/9826D/9846D/9846W, PCI-9846D |
|-------------|--|
| ±0.2 V      | ±0.1%                                  |
| ±1 V        | ±0.05%                                 |
| Input Range | PXI-9846H, PCI-9816H/9826H/9846H       |
| ±1 V        | ±0.1%                                  |
| ±5 V        | ±0.06%                                 |

- -3dB Bandwidth, typical:

| Input Range                     | PXI-9816D | PXI-9826D | PXI-9846D/PCI-9846D | PXI-9846DW                       |
|---------------------------------|-----------|-----------|---------------------|----------------------------------|
| @ 50 Ω and 1 MΩ input impedance |           |           |                     |                                  |
| ±0.2 V, ±1 V                    | 5.1 MHz   | 9.6 MHz   | 20 MHz              | 80 MHz (±1 V)<br>55 MHz (±0.2 V) |
| Input Range                     | PCI-9816H | PCI-9826H | PXI-9846H/PCI-9846H | ---                              |
| @ 50 Ω input impedance          |           |           |                     |                                  |
| ±1 V, ±5 V                      | 5.1 MHz   | 9.6 MHz   | 20 MHz              | ---                              |
| @ 1 MΩ input impedance          |           |           |                     |                                  |
| ±1 V, ±5 V                      | 90 KHz    |           |                     | ---                              |

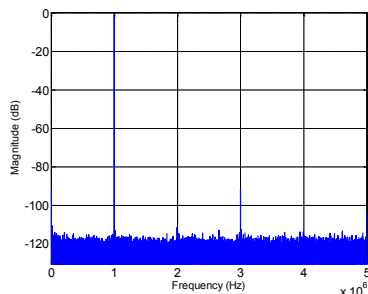
- Spectral Characteristics

- Model: PXI-9816D/512
- Input Range: ±0.2 V
- Sampling Rate: 10 MS/s
- SINAD: 76.56 dBc
- SNR: 76.59 dBc
- THD: -95.91 dBc
- ENOB: 12.42 bit
- SFDR: 99.73 dBc





- Model: PXI-9816D/512
- Input Range:  $\pm 1$  V
- Sampling Rate: 10 MS/s
- SINAD: 79.80 dBc
- SNR: 80.19 dBc
- THD: -88.61 dBc
- ENOB: 12.96 bit
- SFDR: 89.08 dBc



- Typical values are measured using 1 MHz sine wave input at 10 MS/s with amplitude at -1 dB at full scale on a  $\pm 1$  V and  $\pm 0.2$  V range using the PXI-9816. Acquired data lengths are in 64 K point, calculated with Hanning window FFT.
- Note that these dynamic parameters may vary from one module to another, with different input signal frequencies and signal amplitudes selected.
- For detailed dynamic test results of other modules, please refer to the user manual or visit the ADLINK website.

#### Timebase

- Sample clock sources
  - Internal: on-board oscillator
  - External: CLK IN (front panel SMB connector), PXI Trigger Bus[0..7], PXI 10 MHz, PXI Star, SSI Bus
- Timebase frequency range
  - PCI/PXI-9816: 1 MHz - 10 MHz
  - PCI/PXI-9826: 1 MHz - 20 MHz
  - PCI/PXI-9846: 1 MHz - 40 MHz

#### Dedicated External Clock Input From Panel

- Connector type: SMB
- Clock type: sine wave or square wave
- Input impedance: 50  $\Omega$
- Input coupling: AC
- Input range: 1 V<sub>pp</sub> to 2 V<sub>pp</sub>
- Overvoltage protection: 2.5 V<sub>pp</sub>

#### Triggering

- Trigger sources:
  - software
  - TRG IO (front panel SMB connector)
  - Analog trigger from CH0 - CH3
  - PXI Star (PXI version)
  - PXI Trigger Bus[0..7] (PXI version)
  - SSI (PCI version)
- Trigger modes: Pre-trigger, post-trigger, middle-trigger, delay-trigger

#### Data Storage and Transfer

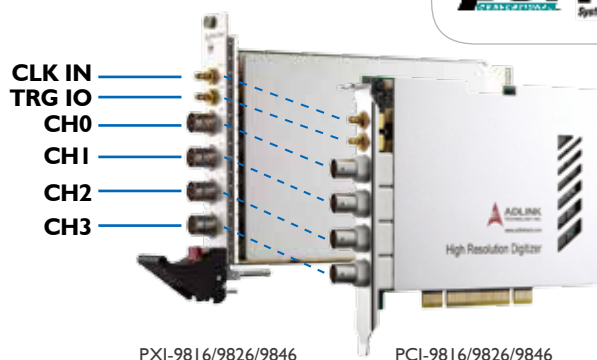
- On-board memory: 512 MB, shared among the four AI channels
- Data transfer: scatter-gather DMA

#### On-board Reference

- On-board reference voltage: +5 V
- Temperature drift: < 3 ppm/ $^{\circ}$ C
- Recommended warm-up time: 15 minutes

#### General Specifications

- I/O Connector
  - BNC X4 for analog inputs
  - SMB X2 for external digital trigger and external timebase input
- Dimensions (not including connectors)
  - PCI-98x6: 167.6 mm (W) x 107 mm (H) (6.53" x 4.17")
  - PXI-98x6: 160 mm (W) x 100 mm (H) (6.24" x 3.9")



- PCI Bus Interface
  - PCI signaling: support 3.3 V and 5 V signaling
  - PCI interface: 32-bit, 33/66 MHz
- Ambient temperature (Operational):
  - 0 $^{\circ}$ C to 55 $^{\circ}$ C (32 $^{\circ}$ F to 131 $^{\circ}$ F) (PXI version)
  - 0 $^{\circ}$ C to 50 $^{\circ}$ C (32 $^{\circ}$ F to 122 $^{\circ}$ F) (PCI version)
- Ambient temperature (Storage): -20 $^{\circ}$ C to 80 $^{\circ}$ C (-4 $^{\circ}$ F to 176 $^{\circ}$ F)
- Relative humidity: 10% to 90% non-condensing
- Power Requirement, typical:

| Power Rails | PXI/PCI-9816 | PXI/PCI-9826 | PXI/PCI-9846 |
|-------------|--------------|--------------|--------------|
| 3.3 V       | 0.8 A        | 0.8 A        | 0.8 A        |
| 5 V         | 1.4 A        | 1.5 A        | 2.0 A        |
| 12 V        | 0.3 A        | 0.3 A        | 0.3 A        |

#### Certifications

- EMC/EMI: CE, FCC Class A

#### Multi-Module Synchronization

- For PXI version of digitizer modules, they can be synchronized through PXI trigger bus, PXI Star and PXI 10 MHz.
- For PCI version of digitizer modules, they can be synchronized through a dedicate interface, SSI (System Synchronized Interface).



SSI bus cable for multiple module synchronization

#### Cable Accessories

- SMB-SMB-1M  
1 meter SMB to SMB cable
- SMB-BNC-1M  
1 meter SMB to BNC cable
- ACL-SSI-2  
SSI Bus cable for 2 devices

#### Ordering Information

| Model Name     | Sampling Rate | Input Range            | Max. -3dB Bandwidth |
|----------------|---------------|------------------------|---------------------|
| PCI-9816H/512  | 10 MS/s       | $\pm 5$ V, $\pm 1$ V   | 5.1 MHz             |
| PCI-9826H/512  | 20 MS/s       | $\pm 5$ V, $\pm 1$ V   | 9.6 MHz             |
| PCI-9846H/512  | 40 MS/s       | $\pm 5$ V, $\pm 1$ V   | 20 MHz              |
| PCI-9846D/512  | 40 MS/s       | $\pm 1$ V, $\pm 0.2$ V | 20 MHz              |
| PXI-9816D/512  | 10 MS/s       | $\pm 1$ V, $\pm 0.2$ V | 5.1 MHz             |
| PXI-9816H/512  | 10 MS/s       | $\pm 5$ V, $\pm 1$ V   | 5.1 MHz             |
| PXI-9826D/512  | 20 MS/s       | $\pm 1$ V, $\pm 0.2$ V | 9.6 MHz             |
| PXI-9846D/512  | 40 MS/s       | $\pm 1$ V, $\pm 0.2$ V | 20 MHz              |
| PXI-9846DW/512 | 40 MS/s       | $\pm 1$ V, $\pm 0.2$ V | 80 MHz              |
| PXI-9846H/512  | 40 MS/s       | $\pm 5$ V, $\pm 1$ V   | 20 MHz              |

Note: For special features or specifications, such as higher input range or higher bandwidth options, please contact ADLINK for more details.



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