

USB/LPCI/LPCle-3488A

High-Performance IEEE-488 GPIB Interface for USB/PCI/PCI Express

Features

- Fully compatible with the IEEE-488 standard
- Support 32-bit 3.3 V or 5 V PCI bus (LPCI-3488A)
- Up to 1.5 MB/s data transfer rates (USB-3488A and LPCI-3488A)
- Built-in FIFO for read/write operations
- Provide APIs compatible with NI-488.2 driver software*
- Support industrial-standard VISA library
- Interactive utility for testing and diagnostics

USB-3488A

- USB 2.0 compatible
- 2 M USB cable attached for instrument connection
- No external power required
- Easy GPIB connectively for laptops

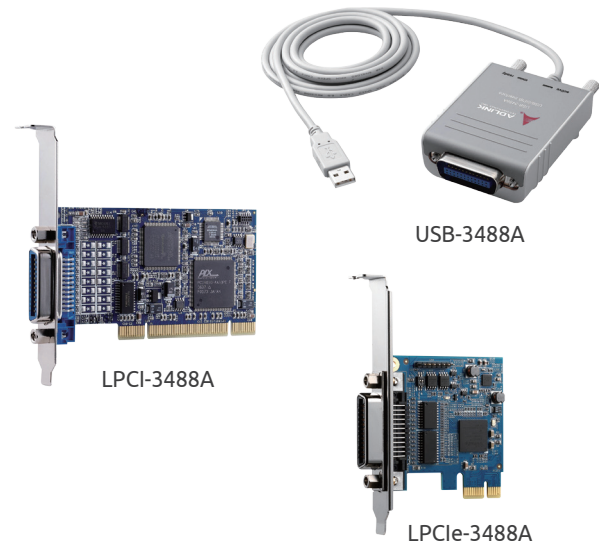
Introduction

The IEEE-488 standard, also known as GPIB, is a bus interface that connects instruments with a computer to form an ATE system. Today, GPIB is still the most popular interface between computer and instruments. ADLINK's USB-3488A, LPCI-3488A and LPCle-3488A controller interface cards are fully compatible with the IEEE-488.2 instrumentation control and communication standard and are capable of controlling up to 14 stand-alone instruments via IEEE-488 cables (Figure 1)*. The USB-3488A, LPCI-3488A and LPCle-3488A are designed to meet the requirements of high performance and maximum programming portability.

With APIs that are compatible with NI-488.2* driver software and VISA support, the USB-3488A, LPCI-3488A and LPCle-3488A offer the best compatibility with your existing applications and instrument drivers. ADLINK has also implemented GPIB interface on our PXI/PXIe controller product line. (Please refer to page 1-5 ~ 1-10)

ADLINK's LPCI-3488A with low-profile PCI form factor, supports both 3.3 V and 5 V PCI buses and can be adapted to most industrial and desktop computers. A built-in FIFO between the GPIB bus and PCI controller buffers GPIB read/write operations. The maximum GPIB transfer rates of LPCI-3488A and USB-3488A up to 1.5 MB/s. (Figure 2)

*Devices can be connected in linear or star configuration, or a combination of the two topologies.



Supported Operating System

- Windows XP, Windows 7/8 x64/x86

Driver and SDK

- Visual Studio.NET/BCB
- LabVIEW™*
- MATLAB®*

Ordering Information

- **USB-3488A**
High-Performance IEEE-488 GPIB interface for USB
- **LPCI-3488A**
High-Performance IEEE-488 GPIB interface card for low-profile PCI bus
- **LPCle-3488A**
High-Performance IEEE-488 GPIB interface card for low-profile PCI Express bus
- **ACL-IEEE488-1**
IEEE-488 standard cable, 1 meter length
- **ACL-IEEE488-2**
IEEE-488 standard cable, 2 meter length
- **ACL-IEEE488-4**
IEEE-488 standard cable, 4 meter length

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

*NI, LabVIEW, and LabWindows CVI are trademarks or registered trademarks of National Instruments Corporation or its subsidiaries in the United States and other countries.

*MATLAB® is Copyright of the MathWorks, Inc.

Specifications

	LPCI-3488A	USB-3488A
GPIB Bus Specifications	Up to 14 instruments connected	
	Maximum 1.5 MB/s data transfer rate (USB-3488A and LCPI-3488A) Maximum 1.2 MB/s data transfer rate (LPCle-3488A)	
	Cable length -2 meters between each instrument (suggested) -20 meters total cable length	
	Data transfer mode: 8 bits parallel	
	Handshake: 3 wire handshake, reception of each data byte is acknowledged	
Certifications	EMC/EMI: CE, FCC Class A	
Software Compatibility	Visual Studio.NET/BCB	
	LabVIEW™*	
	MATLAB®*	
External Indicators (USB-3488A)	Ready : Green for active device	
	Active : Blinking amber for data transferring	
General Specifications	Operating temperature : 0°C to 55°C (32°F to 131°F)	
	Storage temperature : -20°C to +80°C (-4°F to 176°F)	
	Relative humidity : 5% to 95%, non-condensing	
	Power requirements	
	+5 V	+5 V
	250 mA (typical) 300 mA (maximum)	190 mA (typical) 500 mA (maximum)
Dimensions (not including connectors)	LPCI-3488A: 120 mm x 64 mm (4.68" x 2.49")	
	USB-3488A: 81.7 mm (L) x 66.1 mm (W) x 27.8 mm (H) (3.2" x 2.57" x 1.1")	
I/O Connectors	GPIB: IEEE-488 standard 24 pin	
	USB: USB standard series A plug (USB-3488A)	

PCIe-9814

4-CH 12-Bit 80 MS/s PCI Express Digitizer

NEW



Introduction

The ADLINK PCIe-9814 is a PCI Express digitizer providing speedy, high quality data acquisition. Each of the four input channels supports up to 80MS/s sampling, with 12-bit resolution A/D converter. This allows simultaneous recording of signals on all channels with no interchannel phase delay. The extremely large on-board memory enables long recording times even at the highest sampling rates.

Unlike parallel PCI buses, PCI Express slots utilize serial point-to-point connection. Each connection pair (lane) can achieve burst connection speeds of 250MB/s. The PCIe-9814, based on x4 lane slot PCI Express technology, provides a clear advantage in that direct connection of each slot allows full transfer bandwidth for each individual card. The ADLINK PCIe-9814 x4 digitizer can be used in any standard PCI Express slot, x4, x8, or x16.

Features

- Up to 80 MS/s sampling
- 4 simultaneous analog inputs
- High resolution 12-bit ADC
- Up to 40 MHz bandwidth for analog input
- 1 GB onboard storage memory
- Programmable input voltage range of $\pm 0.5V$, $\pm 1V$, $\pm 5V$, or $\pm 10V$
- Scatter-Gather DMA data transfer for high speed data streaming
- Provide 10 or 20 MHz digital onboard filter (FPGA)
- Provide PLL module for precise synchronization (PCIe-9814P only)
- Support for:
 - One external digital trigger input
 - One external clock input
 - Three SDI inputs
- Full auto-calibration
- Supported Operating Systems
 - Windows 7/8 x64/x86, Linux
- Driver and SDK
 - LabVIEW, MATLAB, C/C++, Visual Basic, Visual Studio.NET

Specifications

Analog Input

- Number of channels: 4 single-ended
- Input impedance: 50Ω or $1M\Omega$, software selectable
- Input coupling: DC
- Input signal range: $\pm 0.5V$, $\pm 1V$, $\pm 5V$, or $\pm 10V$
- Overvoltage protection: $\pm 30V@ 1M\Omega$, $\pm 10V$ and $\pm 5V$; $\pm 10V@ 1M\Omega$, $\pm 1V$ and $\pm 0.5V$; $\pm 10V$ sine wave/7 Vrms@ 50Ω , all ranges
- ADC resolution: 12 bits
- Bandwidth: 40MHz
- Offset Error:

Range	Offset Error
$\pm 0.5V$, $\pm 1V$	± 0.5 mV
$\pm 5V$	± 4 mV
$\pm 10V$	± 10 mV

- Gain Error:

Input Impedance	Range	Gain Error
50Ω	All Range	$\pm 1\%$
$1M\Omega$	$\pm 0.5V$, $\pm 1V$, $\pm 5V$	$\pm 0.5\%$
	$\pm 10V$	$\pm 1\%$

- Crosstalk: from DC to 10 MHz

Range	Crosstalk
$\pm 0.5V$	-80 dB
$\pm 1V$, $\pm 5V$, $\pm 10V$	-90 dB

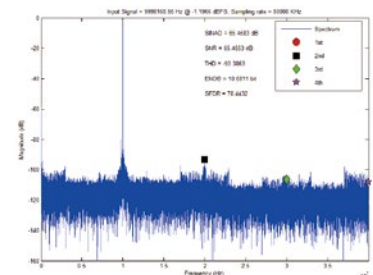
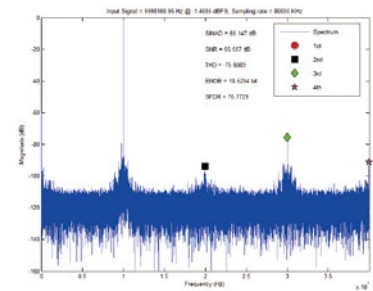
- System Noise:

Range	System Noise (RMS)
$\pm 0.5V$	150 μV
$\pm 1V$	300 μV
$\pm 5V$	1.5 mV
$\pm 10V$	2.5 mV

- Spectral Characteristics:

Sampling rate: 80MS/s, 10MHz -1dBFS input signal

Input Range	SNR	THD	SFDR
50 Ω with digital filter OFF			
$\pm 0.5V$, $\pm 1V$, $\pm 5V$	64 dB	-74 dB	76 dB
50 Ω with digital filter ON			
$\pm 0.5V$, $\pm 1V$, $\pm 5V$	65 dB	-93 dB	78 dB
1M Ω with digital filter OFF			
$\pm 0.5V$, $\pm 1V$	64 dB	-71 dB	72 dB
$\pm 5V$	64 dB	-73 dB	74 dB
$\pm 10V$	64 dB	-75 dB	76 dB
1M Ω with digital filter On			
All Range	65 dB	-93 dB	78 dB



Trigger

- Trigger Sources
 - Software
 - External digital trigger
 - Analog trigger from CH0 ~ CH3
 - SSI
- Trigger Modes
 - Post-trigger
 - Pre-trigger
 - Middle trigger
 - Delay trigger
- External Digital Trigger Input
 - Source: Front panel SMB connector
 - Compatibility: 3.3V TTL, 5V tolerance
 - Input high threshold: 2.0V
 - Input low threshold: 0.8V
 - Maximum input overload: -0.5 V to +5.5 V
 - Trigger polarity: rising or falling edge
 - Pulse width: 20 ns minimum

Timebase

- Sample clock source
 - Internal: onboard clock (oscillator)
 - External: CLK IN (front panel)
- Sample clock frequency
 - Internal: 1.22K Hz ~ 80M Hz
 - External: 20M Hz ~ 80M Hz (CLK IN)
 - Internal timebase accuracy: < ± 25 ppm
- External sample clock input range : 1Vpp ~ 5Vpp
- External reference clock source
 - SDIO (Front panel, only PCIe-9814P)
- External reference clock frequency: 10M Hz
- External reference clock input range : 3.3V ~ 5V TTL

Data Storage and Transfer

- 1 GB onboard memory, shared among four analog inputs
- Scatter-Gather DMA data transfer Onboard Reference

Onboard Reference

- +1.8V, +0.9V and +0.45V onboard reference voltage
- < 3 ppm/°C reference temperature drift
- 15 minutes recommended warm-up

Ordering Information

- **PCIe-9814**
4-CH 12-Bit 80 MS/s PCI Express Digitizer
- **PCIe-9814P**
4-CH 12-Bit 80 MS/s PCI Express Digitizer with PLL module

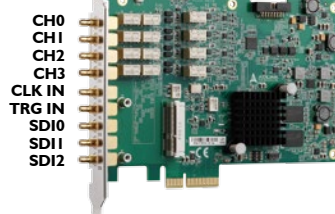
General Specifications

- I/O Connector:
 - SMB x 4 for analog inputs
 - SMB x 1 for external trigger input
 - SMB x 1 for external sample clock input
 - SMB x 3 for synchronous digital input
(SDIO can be shared with Ref clock input, only PCIe-9814P)
- Dimensions (not including connectors):
 - 167.64 (W) x 106.68 (H) mm (6.53" x 4.16")
- Bus Interface:
 - PCI Express gen 1 x4
- Ambient Temperature (Operational):
 - 0°C to 50°C (32°F to 122°F)
- Ambient Temperature (Storage):
 - -20°C to 80°C (-4°F to 176°F)
- Relative Humidity:
 - 10% to 90%, non-condensing Certifications
- Power Consumption:

Power Rail	PCIe-9814		PCIe-9814P	
	Standby (mA)	Full load (mA)	Standby (mA)	Full load (mA)
+3.3V	20	20	20	20
+12V	425	505	655	715
Total Power(W)	5.116	6.126	7.926	8.646

Certifications

- EMC/EMI: CE, FCC Class A

IO connector definition**SSI Bus Cables (for multiple card synchronization)**

- **ACL-eSSI-2/3/4**
SSI bus cable for two, three, and four devices



PCIe-9814/9834

4-CH 12/16-Bit 80 MS/s PCI Express Digitizer

Features

- Up to 80 MS/s sampling
- 4 simultaneous analog inputs
- High resolution 12-bit ADC (PCIe-9814)/ 16-bit ADC (PCIe-9834)
- Up to 40 MHz bandwidth for analog input
- 1 GB onboard storage memory
- Programmable input voltage range of $\pm 0.5V$, $\pm 1V$, $\pm 5V$, or $\pm 10V$
- Scatter-Gather DMA data transfer for high speed data streaming
- Provide 10 or 20 MHz digital onboard filter (FPGA)
- Provide PLL module for precise synchronization (PCIe-9814P/PCIe-9834P only)
- Support for:
 - One external digital trigger input
 - One external clock input
 - Three SDI inputs(PCIe-9814/9814P only)
- Full auto-calibration



Introduction

The ADLINK PCIe-9814/9834 are PCI Express digitizer providing speedy, high quality data acquisition. Each of the four input channels supports up to 80MS/s sampling, with 12/16-bit resolution A/D converter. This allows simultaneous recording of signals on all channels with no interchannel phase delay. The extremely large on-board memory enables long recording times even at the highest sampling rates.

Unlike parallel PCI buses, PCI Express slots utilize serial point-to-point connection. Each connection pair (lane) can achieve burst connection speeds of 250MB/s. The PCIe-9814/9834, based on x4 lane slot PCI Express technology, provides a clear advantage in that direct connection of each slot allows full transfer bandwidth for each individual card. The ADLINK PCIe-9814/9834 PCI Express Gen1 x4 digitizers can be used in any standard PCI Express

Supported Operating System

- Windows XP/7/8/10, x64/x86, Linux

Driver and SDK

- LabVIEW, MATLAB, Visual Studio, Visual Studio.NET

Ordering Information

- **PCIe-9814**
4-CH 12-Bit 80 MS/s PCI Express Digitizer
- **PCIe-9814P**
4-CH 12-Bit 80 MS/s PCI Express Digitizer with PLL module
- **PCIe-9834**
4-CH 16-Bit 80 MS/s PCI Express Digitizer
- **PCIe-9834P**
4-CH 16-Bit 80 MS/s PCI Express Digitizer with PLL module

Specifications

Analog Input

- Number of channels: 4 single-ended
- Input impedance: 50 Ω or 1M Ω , software selectable
- Input coupling: DC
- Input signal range: $\pm 0.5V$, $\pm 1V$, $\pm 5V$, or $\pm 10V$ ($\pm 10V$ only support input impedance 1M Ω)
- Overvoltage protection: $\pm 30V@ 1M\Omega$, $\pm 10V$ and $\pm 5V$; $\pm 10V@ 1M\Omega$, $\pm 1V$ and $\pm 0.5V$; $\pm 10V$ sine wave/7 Vrms@ 50 Ω , $\pm 5V$, $\pm 1V$ and $\pm 0.5V$
- ADC resolution: 12 bits (PCIe-9814)/ 16 bits (PCIe-9834)
- Bandwidth: 40MHz
- Offset Error:

Range	PCIe-9814	PCIe-9834
$\pm 0.5V$	± 0.5 mV	± 0.1 mV
$\pm 1V$	± 0.5 mV	± 0.2 mV
$\pm 5V$	± 4 mV	± 0.5 mV
$\pm 10V$	± 10 mV	± 0.5 mV

- Gain Error:

Input Impedance	Range	PCIe-9814	PCIe-9834
50 Ω	$\pm 0.5V$, $\pm 1V$, $\pm 5V$	$\pm 1\%$	$\pm 0.15\%$
1M Ω	$\pm 0.5V$, $\pm 1V$, $\pm 5V$ $\pm 10V$	$\pm 0.5\%$ $\pm 1\%$	$\pm 0.15\%$ $\pm 0.15\%$

- Crosstalk: from DC to 10 MHz

Range	PCIe-9814	PCIe-9834
$\pm 0.5V$	-80 dB	-80 dB
$\pm 1V$, $\pm 5V$, $\pm 10V$	-90 dB	-90 dB

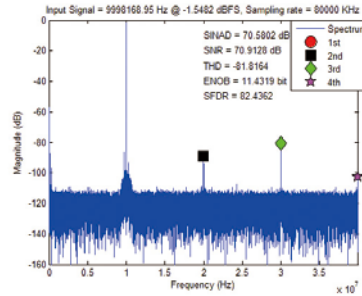
- System Noise:

Range	PCIe-9814 (mVrms)	PCIe-9834 (mVrms)
$\pm 0.5V$	0.15	0.1
$\pm 1V$	0.3	0.15
$\pm 5V$	1.5	1
$\pm 10V$	2.5	1.5

• Spectral Characteristics:

Sampling rate: 80MS/s, 10MHz -1dBFS input signal

Range	PCIe-9814	PCIe-9834
SNR	64 dB	67 dB
THD	-73 dB	-78 dB
SFDR	-74 dB	78 dB



Trigger

• Trigger Sources

- Software
- External digital trigger
- Analog trigger from CH0 ~ CH3
- SSI

• Trigger Modes

- Post-trigger
- Pre-trigger
- Middle trigger
- Delay trigger

• External Digital Trigger Input

- Source: Front panel SMB connector
- Compatibility: 3.3V TTL, 5V tolerance
- Input high threshold: 2.0V
- Input low threshold: 0.8V
- Maximum input overload: -0.5 V to +5.5 V
- Trigger polarity: rising or falling edge
- Pulse width: 20 ns minimum

Timebase

• Sample clock source

- Internal: onboard clock (oscillator)
- External: CLK IN (front panel)

• Sample clock frequency

- Internal: 1.22K Hz ~ 80M Hz
- External: 20M Hz ~ 80M Hz (CLK IN)
- Internal timebase accuracy: < ±25 ppm

• External sample clock input range : 1Vpp ~ 5Vpp

• External reference clock source

- SDIO (Front panel, only PCIe-9814P)
- REF_CLK (Front panel, only PCIe-9834P)

• External reference clock frequency: 10M Hz

• External reference clock input range : 3.3V ~ 5V TTL

Data Storage and Transfer

- 1 GB onboard memory, shared among four analog inputs
- Scatter-Gather DMA data transfer Onboard Reference

Onboard Reference

- +1.8V, +0.9V and +0.45V onboard reference voltage
- < 3 ppm/°C reference temperature drift
- 15 minutes recommended warm-up

General Specifications

• PCIe-9814 I/O Connector:

- SMB x 4 for analog inputs
- SMB x 1 for external trigger input
- SMB x 1 for external sample clock input
- SMB x 3 for synchronous digital input (SDIO can be shared with Ref clock input, only PCIe-9814P)

• PCIe-9834 I/O Connector:

- SMB x 4 for analog inputs
- SMB x 1 for external trigger input
- SMB x 1 for external sample clock input
- SMB x 1 for External reference clock source input (only PCIe-9834P)

• Dimensions (not including connectors):

- 167.64 (W) x 106.68 (H) mm (6.53" x 4.16")

• Bus Interface:PCI Express gen 1 x4

• Ambient Temperature (Operational):0°C to 50°C (32°F to 122°F)

• Ambient Temperature (Storage):-20°C to 80°C (-4°F to 176°F)

• Relative Humidity:10% to 90%, non-condensing Certifications

• Power Consumption:

	PCIe-9814		PCIe-9814P	
Power Rail	Standby (mA)	Full load (mA)	Standby (mA)	Full load (mA)
+3.3V	20	20	20	20
+12V	425	505	655	715
Total Power(W)	5.116	6.126	7.926	8.646

	PCIe-9834		PCIe-9834P	
Power Rail	Standby (mA)	Full load (mA)	Standby (mA)	Full load (mA)
+3.3V	18	18	18.7	21.4
+12V	450	470	675	697
Total Power(W)	5.459	5.699	8.162	8.435

Certifications

- EMC/EMI: CE, FCC Class A

SSI Bus Cables (for multiple card synchronization)

- ACL-eSSI-2/3/4

SSI bus cable for two, three, and four devices

