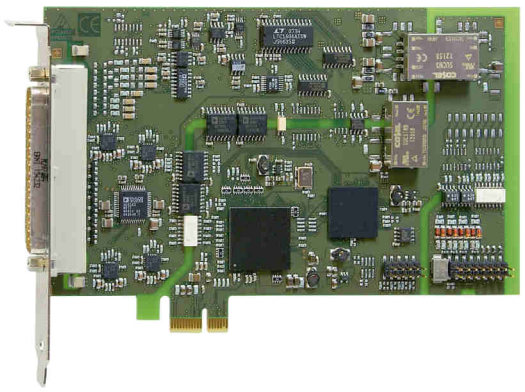
Multifunction board, optically isolated, 16 SE / 8 differential inputs, 4/8 analog outputs, 16-bit



APCIe-3121

PCI Express interface

16 single-ended / 8 differential inputs, 16-bit

8/4 analog outputs, 16-bit

Optical isolation of inputs and outputs, 500 V

PCI Express DMA, programmable gain

Trigger functions

8 digital I/O, 24 V, optically isolated, timer, watchdog

RoHS 2002/95/EC

Also for PCI
see APCI-3120, page 192

Also for CompactPCI™
see CPCI-3120, page 250

Also for CompactPCI™ Serial
see CPCIs-3121, page 236

Windows
64/32-bit drivers

LabVIEW™

LabWindows/CVI™

Features

Analog inputs
- 16 single-ended / 8 differential inputs
- 16-bit resolution
- Optical isolation 500 V
- Throughput: 100 kHz
- Input ranges: 0-10 V, ±10 V, 0-5 V, ±5 V, 0-2 V, ±2 V, 0-1 V, ±1 V, 0-20 mA (option) freely programmable through software for each channel
- Gain PGA x1, x2, x5, x10 freely programmable through software for each channel
- PCI Express DMA for analog data acquisition
- Overvoltage protection
- Input filters: 159 kHz

Analog acquisition
- One single channel, several channels, several channels through scan list
- Automatic analog acquisition through cyclic timer control
- Acquisition through scan list: up to 16 entries with gain, channel, unipolar/bipolar
- Acquisition triggered through software, timer, external event
- Trigger functions:
  Software trigger or external trigger: the analog acquisition (single or sequence) is started through signal switching from 0 V to 24 V at the digital input 0.
- Interrupt: end of single channel, end of multichannel, end of scan list

Analog outputs
- 8 or 4 analog outputs, optically isolated 500 V
- Voltage or current outputs
- 16-bit resolution (15-bit for 0-10 V)
- Output voltage: ± 10 V, 0-10 V (through software)
- Output voltage after reset: 0 V
- Each output has its own ground line (without optical isolation)
- Output current ± 5 mA max. for voltage outputs
- Current outputs: 0-20 mA, min. load 10 Ω, max. load 560 Ω, at 20 mA
- EMI filters

Digital
- 4 dig. inputs including 1 interruptible input
- 4 dig. outputs, 24 V, optically isolated

Timer / Watchdog
- 2 timers, incl. 1 which can be used as a watchdog

Safety features

- Optical isolation 500 V min.
- Creeping distance IEC 61010-1
- Overvoltage protection ± 40 V, analog inputs
- Protection against high-frequency EMI
- Input filters: 159 kHz
- Noise neutralisation of the PC supply

Applications

- Industrial process control
- Industrial measurement and monitoring
- Multichannel data acquisition
- Control of chemical processes
- Factory automation
- Acquisition of sensor data, current measurement
- Laboratory equipment, instrumentation

Software drivers

A CD-ROM with the following software and programming samples is supplied with the board.

Standard drivers for:
- Linux
- 32-bit drivers for Windows 8 / 7 / Vista / XP / 2000
- Signed 64-bit drivers for Windows 8 / 7 / XP
- Real-time use with Linux and Windows on request

Drivers and samples for the following compilers and software packages:
- .NET
- Microsoft VC++ • Borland C++
- Visual Basic • Delphi
- LabVIEW • LabWindows/CVI

ADDIPACK functions
- Analog input • Analog output • Digital input
- Digital output • Watchdog • Timer

On request:
Further operating systems, compilers and samples.

Driver download: www.addi-data.com/downloads

Phone: +49 7229 1847-0 info@addi-data.com
Fax: +49 7229 1847-222 www.addi-data.com

ADDI-DATA®
SPIRIT OF EXCELLENCE

Specifications

Analog inputs

Number of inputs:	16 single-ended / 8 differential inputs
Resolution:	16-bit
Optical isolation:	500 V through opto-couplers from PC to peripheral
Input ranges:	0-10 V, ± 10 V, 0-5 V, ± 5 V, 0-2 V, ± 2 V, 0-1 V, ± 1 V, 0(4)-20 mA (optional), software-programmable for each channel
Throughput:	100 kHz
Gain:	Software programmable (x1, x2, x5, x10)
Relative precision (INL):	± 2 LSB max. (A/D converter)
Diff. non-linearity (DNL):	± 1 LSB max. (A/D converter)
Bandwidth (–3 dB):	Limited to 159 kHz with low-pass filter
Trigger:	Through software, timer, external event (24 V input)
Data transfer:	Data to the PC through FIFO memory, I/O commands, interrupt at EOC (End Of Conversion) and EOS (End of Scan), DMA transfer at EOC
Interrupts:	End of conversion, at timer overrun, End of scan

Analog outputs

Number of outputs:	8 or 4
Resolution:	16-bit
Optical isolation:	500 V through opto-couplers
Output range:	0-10 V, ± 10 V switchable through software (0-20 mA optional)
Overvoltage protection:	± 15 V
Max. output current / load:	± 5 mA, 2 kΩ
Short-circuit current:	± 35 mA (short time)
Output voltage after reset:	0 V
Current outputs	
Resolution:	15-bit
Output range:	0-20 mA
LSB:	610.35 nA
Load (at 20 mA):	10 Ω min., 560 Ω max.
Output current after reset:	0 mA

Digital I/O

Number of I/O channels:	4 digital inputs, 4 digital high-side outputs, 24 V
Optical isolation:	1000 V through opto-couplers
Input current at 24 V:	10 mA typ.
Input range:	0-30 V
Supply voltage:	8-32 V
Max. switching current:	65 mA typ.

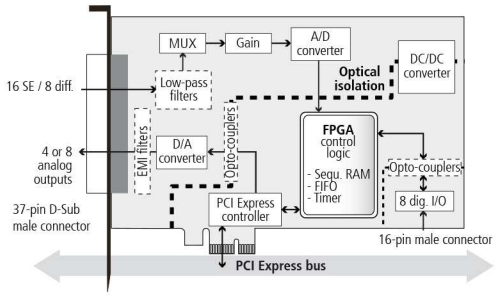
EMC – Electromagnetic compatibility

The product complies with the European EMC directive. The tests were carried out by a certified EMC laboratory in accordance with the norm from the EN 61326 series (IEC 61326). The limit values as set out by the European EMC directive for an industrial environment are complied with. The respective EMC test report is available on request.

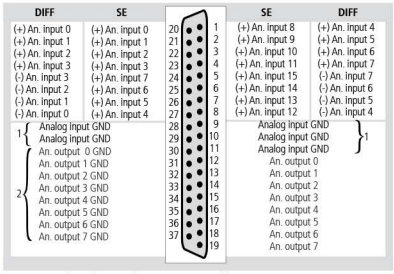
Physical and environmental conditions

Dimensions:	168 x 99 mm
System bus:	Acc. to PCI Express base specification, Revision 1.0a (PCI Express 1.0a)
Space required:	1-/4-/8-/16-lane PCI Express slot
Operating voltage:	+3.3 V, +12 V from PC
Front connector:	37-pin D-Sub male connector
Temperature range:	0 to 60 °C (with forced cooling)

Simplified block diagram

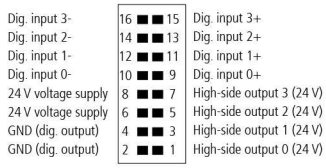


Pin assignment – 37-pin D-Sub male connector

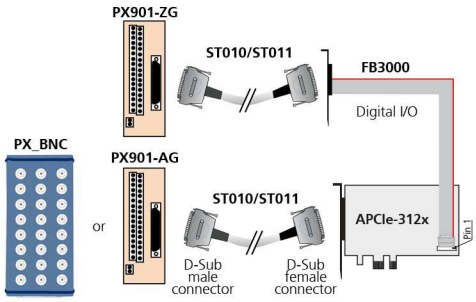


1: The analog inputs have a common ground line
2: Each analog output has its own ground line

Pin assignment – 16-pin male connector



ADDI-DATA connection



Ordering information

APCIe-3121

Multifunction board, optically isolated, 16 SE/8 differential inputs, 4/8 analog outputs, 16-bit, for PCI Express. Incl. techn. description and software drivers.

Versions

Voltage

APCIe-312x-16-8	Version with 16 SE / 8 diff. inputs, 8 analog outputs
APCIe-312x-16-4	Version with 16 SE / 8 diff. inputs, 4 analog outputs
APCIe-312x-8-8	Version with 8 SE / 4 diff. inputs, 8 analog outputs
APCIe-312x-8-4	Version with 8 SE / 4 diff. inputs, 4 analog outputs

Current

APCIe-3121-16-8C	Version with 16 SE / 8 diff. inputs, 8 analog outputs
APCIe-3121-16-4C	Version with 16 SE / 8 diff. inputs, 4 analog outputs
APCIe-3121-8-8C	Version with 8 SE / 4 diff. inputs, 8 analog outputs
APCIe-3121-8-4C	Version with 8 SE / 4 diff. inputs, 4 analog outputs

Options

Please indicate the number of channels

Option SF:	Precision filter for 1 single-ended channel
Option DF:	Precision filter for 1 diff. channel
Option PC:	Current input 0(4)-20 mA for 1 channel
	PC-SE: for single-ended **PC-Diff:** for differential

Accessories

PX901-A:	Screw terminal panel for connecting the analog I/O
PX901-AG:	Same as PX901-A with housing for DIN rail
PX_BNC:	BNC connection box for connecting the analog I/O
PX901-ZG:	Screw terminal panel for connecting the dig. I/O
ST010:	Standard round cable, shielded, twisted pairs, 2 m
ST011:	Standard round cable, shielded, twisted pairs, 5 m
FB3000:	Ribbon cable for digital I/O