



## MULTIFUNCTION ANALOG I/O PCI EXPRESS MINI CARD DATASHEET

### FEATURES

### MODEL mPCIE-AIO16-16F

- PCI EXPRESS MINI CARD (mPCIE) TYPE F1, WITH LATCHING I/O CONNECTOR
  - 2x 16-BIT, BIPOLAR, DIFFERENTIAL, A/D CONVERTERS SAMPLING AT UP TO 1MHz, SIMULTANEOUSLY
    - SOFTWARE SELECTABLE AS 16+0, 8+4, OR 0+8 (SINGLE-ENDED + DIFFERENTIAL INPUTS)
    - 7 CHANNEL-BY-CHANNEL PROGRAMMABLE DIFFERENTIAL INPUT RANGES FROM  $\pm 0.3125V$  UP TO  $\pm 12V$
    - A/D STARTS VIA SOFTWARE, EXTERNAL INPUT, OR PERIODIC TIMER
    - A/D "SCAN START" MODE OPTIMIZES INTER-CHANNEL TIMING
    - HIGH IMPEDANCE, 16-CHANNEL INPUT: 500 M $\Omega$
    - 32K FIFO PLUS DMA FOR EFFICIENT, ROBUST DATA STREAMING
  - 2x DIGITAL I/O PINS WITH FLEXIBLE SECONDARY FUNCTIONS
  - FOUR 16-BIT ANALOG OUTPUTS
    - 5 PER-CHANNEL PROGRAMMABLE RANGES: 0V TO 5V, 0V TO 10V,  $\pm 2.5V$ ,  $\pm 5V$ ,  $\pm 10V$
    - OUTPUTS DRIVE  $\pm 10mA$  GUARANTEED
  - ONBOARD WATCHDOG WITH STATUS OUTPUT
  - ROHS COMPLIANT STANDARD
- FACTORY OPTIONS INCLUDE
- CURRENT INPUT (4-20mA, 10-50mA)
  - VOLTAGE DIVIDERS PER INPUT
  - EXTENDED TEMP OPERATION



### FUNCTIONAL DESCRIPTION

The mPCIE-AIO16-16F is an ideal solution for adding high-speed analog I/O capabilities to any computer with an mPCIE slot.

The mPCIE-AIO16-16F is a 16-bit resolution A/D & D/A card with two simultaneous 1MHz A/D converters, having a total of either 16 single ended, 8 differential analog inputs, or 8 single ended and 4 differential inputs. Each channel can be independently software configured to accept any of 7 input ranges. Four analog outputs with 5, 10,  $\pm 5$ ,  $\pm 10$ , and  $\pm 2.5V$  ranges are provided. Two Digital I/O bits feature advanced functionality including IRQ generation, External DAC Load, ADC Trigger, and ADC Start, as well as Watchdog Status output.

This tiny analog I/O card provides the user with everything needed to start acquiring and controlling signals in a variety of applications. The mPCIE-AIO16-16F data acquisition board can be used in many current real-world applications such as embedded equipment monitoring, precision PC-based and portable environmental measurements, and mobile data acquisition. The card is designed to be used in rugged industrial environments and is a double sided "F1" sized PCI Express Mini Card.

Applications: Optical Networking, Instrumentation, Multichannel Data Acquisition and system monitoring, Automatic Test Equipment, Process Control and Industrial Automation, Power line monitoring.

### SOFTWARE

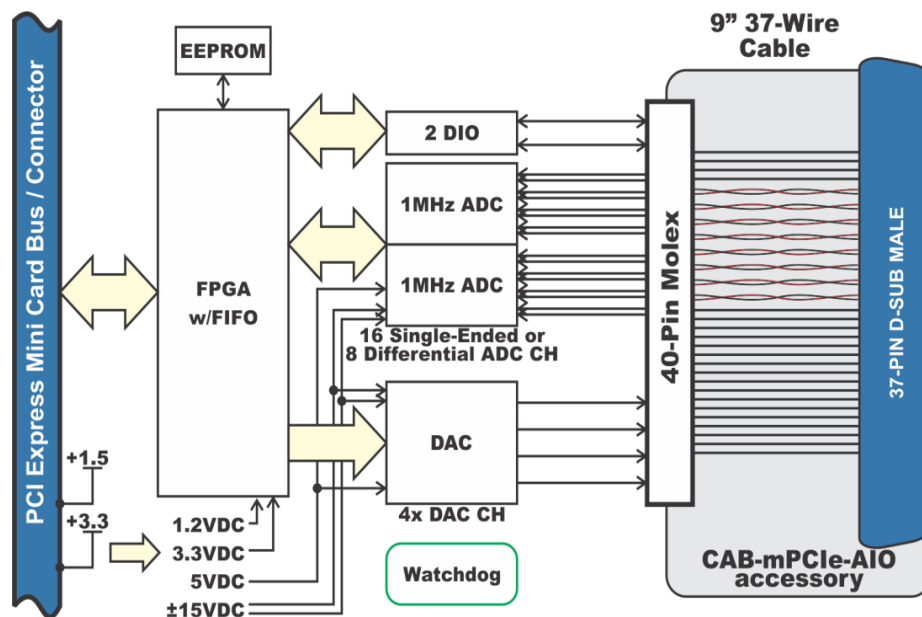
The card is supported for use in most operating systems and includes a free Linux and Windows compatible software package. This package contains sample programs and source code in C# and Delphi for Windows. Also provided is a graphical setup program in Windows. Linux support includes installation files and basic samples for programming from user level via an open source kernel driver. Third party support includes a Windows standard DLL interface usable from the most popular application programs. Embedded OS support includes the family of Windows Operating Systems including IoT. ACCES is also now offering a VxWorks driver/library for the ultimate real-time process monitoring and control solution.

### SPECIAL ORDER

Please contact ACCES with your precise requirement. Examples of special orders would be conformal coating, custom software, custom product labeling, 5-100mA input support, per-channel input-voltage dividers, and more. We will work with you to provide *exactly* what is required.

### AVAILABLE ACCESSORIES INCLUDE

CAB-mPCIE-AIO	Board to DB37M 9" twisted pair cable accessory
mPCIE-HDW-KIT2	Mounting hardware for 2mm
mPCIE-HDW-KIT2.5	Mounting hardware for 2.5mm
ADAP37F-MINI	Direct plug-on terminal board mates with DB37M on CAB-mPCIE-AIO
LF-BRK-P9259-37	Mounting bracket for DB37M on CAB-mPCIE-AIO



## PC Interface

PCI Express Mini Card	Type F1 "Full Length"
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## Analog Inputs

ADC Type	Successive approximation
Resolution	16-bit differential bipolar ADC
Sampling rate	2 MSPS aggregate
Number of channels	16+0, 8+4, or 0+8 (SINGLE-ENDED + DIFFERENTIAL) (software selectable)
Differential Bipolar Ranges (V)	$\pm 12$ , $\pm 10$ , $\pm 5$ , $\pm 2.5$ , $\pm 1.25$ , $\pm 0.625$ , $\pm 0.3125$ V with 0, 0, $\pm 5.12$ , $\pm 7.68$ , $\pm 8.96$ , $\pm 9.60$ , $\pm 9.92$ V common mode rejection, respectively
4-20mA or 10-50mA	Factory options
Int Nonlinearity Error	$\pm 0.6$ LSB to $\pm 1.5$ LSB depending on gain
No Missing Codes	16 bits
Input Impedance	>500M $\Omega$
A/D Start Sources	Software Start, Timer Start, External Start, Externally Triggered Timer Start
A/D Start Types	Single Channel or Scan
Overvoltage Protection	Current limiting through 2 K $\Omega$
Crosstalk	-120dB @ 10kHz

## Analog Outputs

Number	4
Type:	Single-ended
Resolution:	16-bit
Bipolar Ranges:	$\pm 2.5$ V, $\pm 5$ V, $\pm 10$ V
Unipolar Ranges:	0-5V, 0-10V
Settling Time	20 $\mu$ s typical, $\pm 10$ V ( $\pm 1$ LSB at 16 bits)
Output Current	max $\pm 10$ mA per channel

## Environmental

Temperature	Operating	0°C to +70°C -40°C to +85°C (-T option)
	Storage	-40°C to +105°C
Humidity		5% to 95% RH, non-condensing
Dimensions	Length	50.95mm (2.006")
	Width	30.00mm (1.181")

## Digital Input / Output Interface

Digital Bits	2, individually direction controllable
Performance	1 $\mu$ s per transaction max (~3.5 $\mu$ s in non-kernel Windows)
Digital Inputs	Logic High 2.0V to 3.3VDC (5VDC tolerant) Logic Low 0V to 0.8V
Digital Outputs	Logic High 2.0V (min) 24mA source Logic Low 0.55V (max) 24mA sink

## Power

Power required	+3.3VDC @ 225mA (idle) 320mA (full load) (from mPCIe Bus)
	+1.5VDC @ 280mA (idle) 295mA (full load)

## I/O Interface Connectors

On card	Molex 501190-4017 40-pin latching
Mating	Molex 501189-4010
On-cable	Male, D-Sub Miniature, 37-pin
Mating	Female, D-Sub Miniature, 37-pin

## Model Options

-T	Extended Temperature Operation (-40° to +85°C)
-I or -ID	4-20mA inputs (single-ended or differential)
-Sxx	Special configurations (10-50mA inputs, input voltage dividers, conformal coating, etc.)

## Ordering Guide

mPCIe-AIO16-16F	mPCIe, A/D 16-bit, 16-ch, 2x1MHz, 4 D/A
mPCIe-AIO16-16A	mPCIe, A/D 16-bit, 16-ch, 2x500kHz, 4 D/A
mPCIe-AIO16-16E	mPCIe, A/D 16-bit, 16-ch, 2x250kHz, 4 D/A
mPCIe-AI16-16F	mPCIe, A/D 16-bit, 16-ch, 2x1MHz
mPCIe-AI16-16A	mPCIe, A/D 16-bit, 16-ch, 2x500kHz
mPCIe-AI16-16E	mPCIe, A/D 16-bit, 16-ch, 2x250kHz
mPCIe-AIO12-16A	mPCIe, A/D 12-bit, 16-ch, 2x500kHz, 4 D/A
mPCIe-AIO12-16	mPCIe, A/D 12-bit, 16-ch, 2x250kHz, 4 D/A
mPCIe-AIO12-16E	mPCIe, A/D 12-bit, 16-ch, 2x100kHz, 4 D/A
mPCIe-AI12-16A	mPCIe, A/D 12-bit, 16-ch, 2x500kHz
mPCIe-AI12-16	mPCIe, A/D 12-bit, 16-ch, 2x250kHz
mPCIe-AI12-16E	mPCIe, A/D 12-bit, 16-ch, 2x100kHz
CAB-mPCIe-AIO	9 inch panel-mount DB37M twisted pair cable assembly
mPCIe-HDW-KIT2	Mounting hardware for 2mm
mPCIe-HDW-KIT2.5	Mounting hardware for 2.5mm

## Assured Systems

Assured Systems is a leading technology company with over 1,500 regular clients in 80 countries, deploying over 85,000 systems to a diverse customer base in 12 years of business. We offer high-quality and innovative rugged computing, display, networking and data collection solutions to the embedded, industrial, and digital-out-of-home market sectors.

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