



## 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

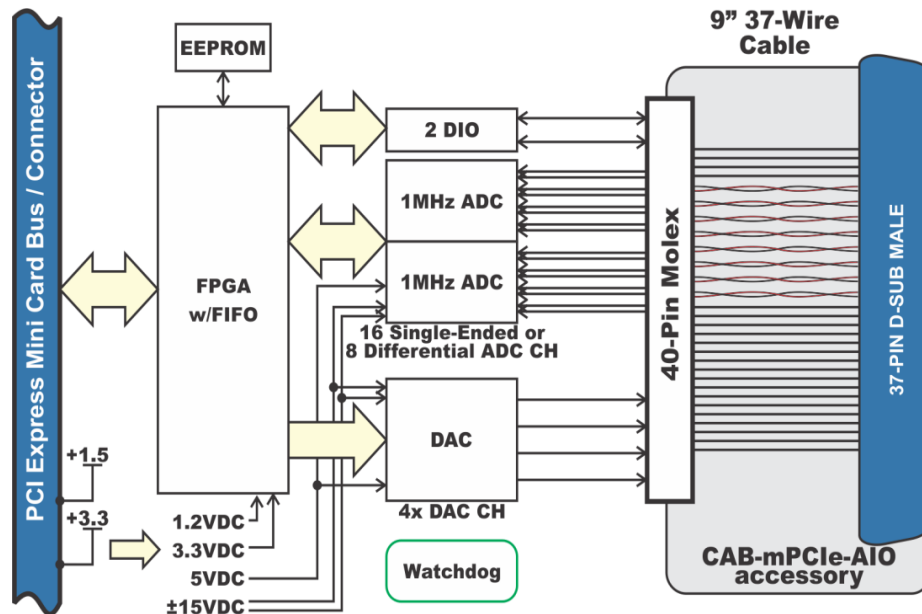
The card is supported for use in most operating systems and includes a free Linux and Windows compatible software package. This package contains sample programs and source code in C# and Delphi for Windows. Also provided is a graphical setup program in Windows. Linux support includes installation files 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" |
|-----------------------|-----------------------|

## 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<br>-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<br>(~3.5 $\mu$ s in non-kernel Windows) |
| Digital Inputs  | Logic High 2.0V to 3.3VDC (5VDC tolerant)<br>Logic Low 0V to 0.8V     |
| Digital Outputs | Logic High 2.0V (min) 24mA source<br>Logic Low 0.55V (max) 24mA sink  |

## Power

|                |  |
|----------------|--|
| Power required | +3.3VDC @ 225mA (idle) 320mA (full load)<br>(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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