

### FEATURES

### MODEL M.2-AIO16-16F

- M.2 TYPE 2280/2260, WITH LATCHING I/O CONNECTOR
- 2× 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
- 2× 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
  - FDS MODELS SUPPORT WAVEFORM PLAYBACK ON 1, 2, 3, OR 4 DACs SIMULTANEOUSLY AT UP TO 1MHz (AGGREGATE)
- FDS MODELS INCLUDE ADC CH 0 LOW/HIGH THRESHOLD ALARMS / IRQs
- ONBOARD WATCHDOG WITH STATUS OUTPUT
- ROHS COMPLIANT STANDARD

### FACTORY OPTIONS INCLUDE

- CURRENT INPUT (4-20mA, 10-50mA)
- VOLTAGE DIVIDERS PER INPUT
- EXTENDED TEMP OPERATION
- DIGITAL INTEGRATION FEATURES: PULSE AND PWM GENERATION AND MEASUREMENT, EDGE-SPECIFIC IRQs AND COUNTING.

### FUNCTIONAL DESCRIPTION

The M.2-AIO16-16F is an ideal solution for adding high-speed analog I/O capabilities to any computer with an mPCIe slot.

The M.2-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 M.2-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

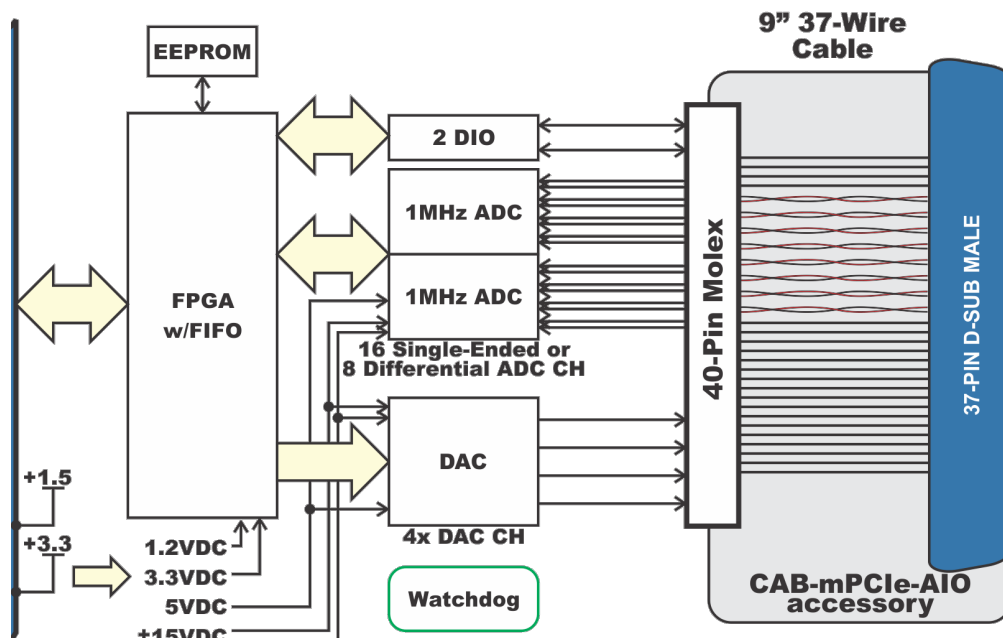
The card is supported for use in most operating systems and includes a free Linux and Windows compatible software package. This package contains sample programs and source code in C# and Delphi for Windows. Also provided is a graphical setup program in Windows. Linux support includes installation files 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-M.2-AIO	Board to DB37M 9" twisted pair cable accessory
M.2-HDW-KIT2	Mounting hardware for 2mm
M.2-HDW-KIT2.5	Mounting hardware for 2.5mm
ADAP37F-MINI	Direct plug-on terminal board mates with DB37M on CAB-M.2-AIO
LF-BRK-P9259-37	Mounting bracket for DB37M on CAB-M.2-AIO



### PC Interface

M.2 type	2280 with break-away to convert to 2260
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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)	±12, ±10, ±5, ±2.5, ±1.25, ±0.625, ±0.3125V with 0, 0, ±5.12, ±7.68, ±8.96, ±9.60, ±9.92V common mode rejection, respectively
4-20mA or 10-50mA	Factory options
Int Nonlinearity Error	±0.6 LSB to ±1.5 LSB depending on gain
No Missing Codes	16 bits
Input Impedance	>500MΩ
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 KΩ
Crosstalk	-120dB @ 10kHz

### Analog Outputs

Number	4
Type:	Single-ended
Resolution:	16-bit
Bipolar Ranges:	±2.5V, ±5V, ±10V
Unipolar Ranges:	0-5V, 0-10V
Slew Rate	5V / μs
Settling Time	20μs typical, +/-10V (+/-1LSB at 16 bits)
Waveform Update Rate	1 MSPS + Number of DACs streaming (FDS models only)
Output Current	max ±10mA 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	80 mm; breakaway for 60 mm
	Width	22 mm
Weight		6.2 grams

### Digital Input / Output Interface

Digital Bits	2, individually direction controllable
Performance	1 μs per transaction max (~3.5μs 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 (from M.2 Bus)	+3.3VDC @ 505mA (idle) 615mA (full load)
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### 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

M.2-AIO16-16F	M.2, A/D 16-bit, 16-ch, 2x1MHZ, 4 D/A
M.2-AIO16-16A	M.2, A/D 16-bit, 16-ch, 2x500KHZ, 4 D/A
M.2-AIO16-16E	M.2, A/D 16-bit, 16-ch, 2x250KHZ, 4 D/A
M.2-AI16-16F	M.2, A/D 16-bit, 16-ch, 2x1MHZ
M.2-AI16-16A	M.2, A/D 16-bit, 16-ch, 2x500KHZ
M.2-AI16-16E	M.2, A/D 16-bit, 16-ch, 2x250KHZ
M.2-AIO12-16A	M.2, A/D 12-bit, 16-ch, 2x500KHZ, 4 D/A
M.2-AIO12-16	M.2, A/D 12-bit, 16-ch, 2x250KHZ, 4 D/A
M.2-AIO12-16E	M.2, A/D 12-bit, 16-ch, 2x100KHZ, 4 D/A
M.2-AI12-16A	M.2, A/D 12-bit, 16-ch, 2x500KHZ
M.2-AI12-16	M.2, A/D 12-bit, 16-ch, 2x250KHZ
M.2-AI12-16E	M.2, A/D 12-bit, 16-ch, 2x100KHZ
CAB-M.2-AIO	9 inch panel-mount DB37M twisted pair cable assembly