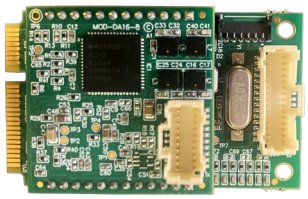
# Multifunction Analog I/O
# PCI Express Mini Card Datasheet

## Features

**Model mPCIe-DAAI16-8F**

- PCI Express Mini Card (mPCIe) type F1, with latching I/O connector (double stack)
- 8× 16-bit DACs capable of Current or Voltage, Waveform streaming at up to 125 kSPS, each
  - Software selectable as Voltage or Current output, per channel
  - 0 to 20, 0 to 24, and 4-20mA current output ranges
  - 5V, 10V, ±5V and ±10V voltage output ranges (with optional 20% overrange)
  - Per-Channel offset/scale calibration
- 16-bit, Bipolar, Differential, A/D sampling at up to 1MHz
  - Software selectable as 8 Single Ended or 4 Differential channels
  - 7 channel-by-channel programmable differential input ranges from ±0.3125V up to ±12V
  - High impedance input: 500 MΩ
  - FIFO plus DMA for efficient, robust data streaming
- 8× Digital I/O pins (4 inputs and 4 outputs)
- Onboard watchdog with status output
- RoHS compliant standard



FACTORY OPTIONS INCLUDE

- One HART channel
- ADC current input (4-20mA, 10-50mA)
- User-supplied DIO VCC
- Voltage dividers per input
- extended temp operation
- Digital Integration Features: Pulse and PWM generation and measurement, edge-specific IRQs and counting.

## Functional Description

The mPCIe-DAAI16-8F is an ideal solution for adding high-speed analog I/O capabilities to any computer with an mPCIe slot.

The mPCIe-DAAI16-8F is a 16-bit resolution D/A & A/D card with 8 DACs, 8 ADC channels, and 8 DIO. Four DAC voltage ranges (with optional 20% overrange) and 3 current ranges, with both current and voltage outputs, are software selectable.

Each ADC channel can be independently software configured to accept any of 7 input ranges.

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-DAAI16-8F 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 with a custom daughter-card stacked on top.

A HART (Highway Addressable Remote Transducer) modem option makes this device suitable for a wide array of large-scale infrastructure projects. Combine with a HART Multiplexer to control and monitor any number of connected devices.

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.

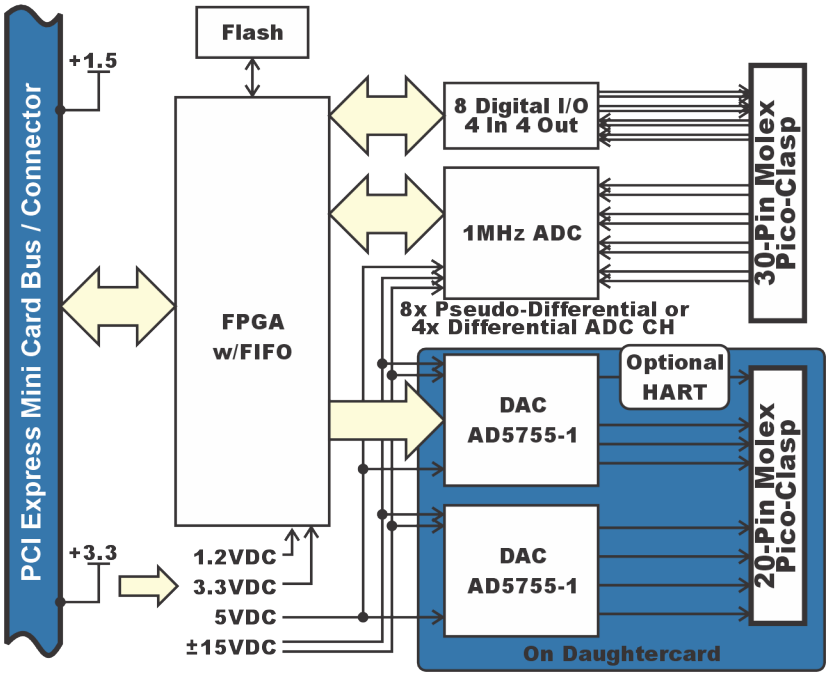
## Special Order

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

| | |
|---|---|
| mPCIe-HDW-KIT2 | Mounting hardware for 2mm |
| mPCIe-HDW-KIT2.5 | Mounting hardware for 2.5mm |

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




## PC Interface

| | |
|---|---|
| PCI Express Mini Card | Type F1 "Full Length", double-stack |

## Analog Outputs

| | |
|---|---|
| Number | 8 |
| Type: | Single-ended Voltage, Current |
| Resolution: | 16-bit |
| Voltage Ranges: | 0-5V, 0-10V, ±5V, ±10V<br>(with software enabled 20% overrange) |
| Current Ranges: | 4-20mA, 0-20mA, 0-24ma |
| Settling Time | 20us typical, +/-10V (+/-1LSB at 16 bits) |
| Output Current | max ±10mA per channel |

## Analog Inputs

| | |
|---|---|
| ADC Type | Successive approximation |
| Resolution | 16-bit differential bipolar ADC |
| Sampling rate | 1 MSPS aggregate |
| Number of channels | 8 SINGLE-ENDED or 4 DIFFERENTIAL (software selectable) |
| Differential Bipolar Ranges (V) | ±12, ±10, ±5, ±2.5, ±1.25, ±0.625, ±0.3125V<br>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 |

## 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") |
| | Height | 0.5 " (2 card stack plus connector) |
| Weight | 12g | |

## Digital Input / Output Interface

| | | |
|---|---|---|
| Digital Bits | | 4 inputs and 4 outputs |
| Performance | | 1 µs per transaction max<br>(~3.5µs in non-kernel Windows, typ.) |
| Digital Inputs | Logic High<br>Logic Low | 2.0V to 3.3VDC (5VDC tolerant)<br>0V to 0.8V |
| Digital Outputs | Logic High<br>Logic Low | 2.0V (min) 24mA source<br>0.55V (max) 24mA sink |

## Power

| | |
|---|---|
| Power required<br>(from mPCIe Bus) | +3.3VDC @ 150mA (idle)<br>+1.5VDC @ 200mA (idle) |

## I/O Interface Connectors

| | | |
|---|---|---|
| DAC | On card | Molex 5011902017 20-pin latching |
| | Mating | Molex 5011892010 20-pin latching |
| ADC + DIO | On card | Molex 5011903017 30-pin latching |
| | Mating | Molex 5011893010 30-pin latching |

## Model Options

| | |
|---|---|
| -T | Extended Temperature Operation (-40° to +85°C) |
| -VCCIO | User supplied DIO VCC (1.8V to 5V) |
| -I or -ID | 4-20mA inputs (single-ended or differential) |
| -Sxx | Special configurations (10-50mA inputs, input voltage dividers, conformal coating, etc.) |
| -H | HART modem on DAC #0 |

## Ordering Guide

| | |
|---|---|
| mPCIe-DAAI16-8F | mPCIe, 8 16-bit D/A with 8 A/D at up to 1 MSPS |
| mPCIe-DAAI16-8A | mPCIe, 8 16-bit D/A with 8 A/D at up to 500 KSPS |
| mPCIe-DAAI16-8E | mPCIe, 8 16-bit D/A with 8 A/D at up to 250 KSPS |
| mPCIe-DAAI12-8A | mPCIe, 8 16-bit D/A with 8 12-bit A/D at up to 500 KSPS |
| mPCIe-DAAI12-8 | mPCIe, 8 16-bit D/A with 8 12-bit A/D at up to 250 KSPS |
| mPCIe-DAAI12-8E | mPCIe, 8 16-bit D/A with 8 12-bit A/D at up to 100 KSPS |