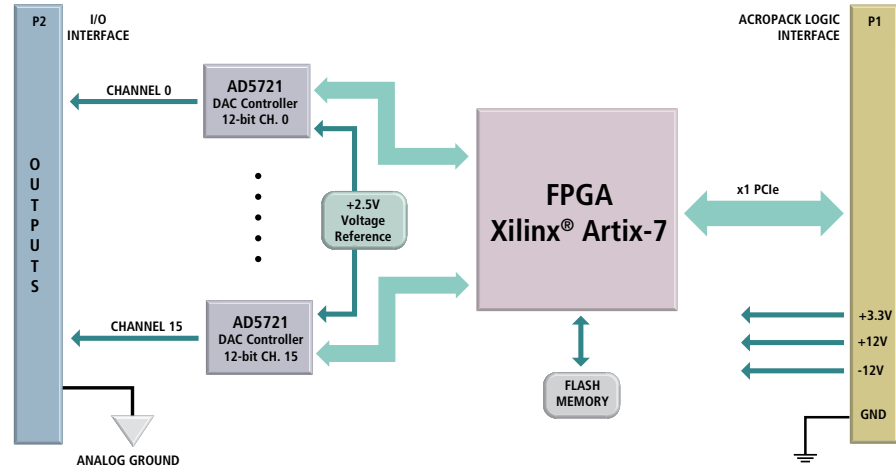
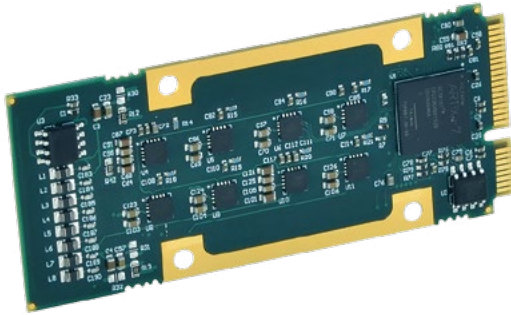


# AcroPack™ Modules

## AP220 Analog Voltage Output



12-bit DAC ♦ 16 Channels Voltage Output ♦ Wide Temperature Range ♦ PCIe Bus Interface

### Description

#### Models

#### AP220-16E-LF: 16 voltage outputs

The AcroPack™ product line updates our popular Industry Pack I/O modules with a PCIe interface format. This COTS tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing IP modules in a rugged form factor. Combine different AcroPack modules on one carrier for a simplified modular approach to system assembly.

The AP220 outputs analog voltage signals to drive up to 16 devices. When used with a carrier that holds two AcroPack AP modules, up to 32 voltage outputs can be obtained from a single card cage slot.

Each output channel has its own 12-bit D/A converter (DAC). Individual DACs are faster, and they eliminate glitches typically caused by the re-acquisition process of sample and holds found on multiplexed output boards.

Individual channels also have double-buffered data latches. You can select to update each output when it is written to, or to update all outputs simultaneously. Simultaneous outputs better simulate linear movements in motion processes.

Designed for COTS applications these analog output modules deliver high-density, high-reliability, and high-performance at a low cost.

AcroPack modules are ROHS compliant and ideal for military, defense, automation, aerospace, scientific, and development labs industries.

The AP220 modules are 70mm long, 19.05mm longer than the full length mini PCIe card. The board's width is the same as mPCIe board and use the same mPCIe standard board hold down standoff and screw keep out areas.

A down facing 100 pin Samtec connector will mate with the carrier card. Fifty of these signals are available as field I/O signals.

The AP220 supports 6 independent software selectable output ranges plus capabilities to monitor the status of each output.

### Key Features & Benefits

- PCI Express Generation 1 interface
- Independent 12-bit D/A converters per channel
- Mix and match countless I/O combinations in a single slot.
- Sample software and diagnostics
- Double-buffered DACs
- Built-in calibration coefficients
- Independent selectable output ranges
- Outputs reset to 0 volts
- Internally stored calibration coefficients ensure accuracy.
- Software provides easy selection of transparent or simultaneous output modes.
- Double-buffered DACs allow new data to be written to each channel before the simultaneous trigger updates the outputs.
- Alarm function
- Solid-down connector I/O interface
- Wide temperature range
- VPX and PCIe carriers
- Linux®, Windows®, and VxWorks® support



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## AP220 Analog Voltage Output

### Performance Specifications

#### ■ Analog Output

Output configuration  
16 non-isolated bipolar/unipolar.

D/A Resolution  
12 bits.

Output ranges  
Unipolar: 0V to 5V, 0V to 10V.  
BiPolar: -2.5V to 7.5V,  $\pm 3V$ ,  $\pm 5V$ ,  $\pm 10V$ .

Settling time  
9 $\mu$ S - 20V step to 1 LSB at 16-bit resolution.  
7.5 $\mu$ S - 10V step to 1 LSB at 16-bit resolution.

Maximum throughput rate  
Outputs can be updated simultaneously or individually.  
One channel: 7.5 $\mu$ S/conversion.  
Sixteen channels simultaneously: 17 $\mu$ S/16 channels.

Calibrated system accuracy  
Linearity error:  $\pm 0.5$  LSB.  
Offset error:  $\pm 0.0625$  LSB.  
Gain error:  $\pm 0.0625$  LSB.  
Total error:  $\pm 0.625$  LSB ( $\pm 0.0152\%$  FSR) maximum.

Data format (left-justified)  
Straight Binary or Two's Complement.

Output at reset  
0 volts.

Output current  
10mA (maximum). This corresponds to a minimum load resistance of 1K ohms with a 10V output.

Short circuit protection  
Indefinite at 25°C.

Alarm function  
Software readable for brownout, short-circuit and temperature exceeding 150 degrees C conditions.

#### ■ PCI Express Base Specification

Conforms to PCIe base specification  
Revision 2.1.

Lanes  
1 lane in each direction.

Bus Speed  
2.5 Gbps (Generation 1).

Memory  
4k space required.  
1 base address register.

#### ■ Environmental

Operating temperature  
-40 to 85°C.

Storage temperature  
-55 to 150°C.

Relative humidity  
5 to 95% non-condensing.

MTBF  
4,094,686 hrs. at 25°C, MIL-HDBK-217F, notice 2.

Power  
+3.3 VDC  $\pm 5\%$  400mA Typical, 480mA Maximum.  
+12 VDC  $\pm 5\%$  85mA Typical, 275mA Maximum.  
-12 VDC  $\pm 5\%$  50mA Typical, 200mA Maximum.

#### ■ Physical

Length  
70mm.

Width  
30mm.

### Ordering Information

#### AcroPack™ Modules

AP220-16E-LF  
Sixteen voltage outputs.

*(Note: Acropack modules are compatible only with the carriers listed below)*

#### Accessories

AP-CC-01  
Conduction-cool kit

#### Carrier Cards

APCe7010E-LF  
PCIe AcroPack carrier, holds 1 AP board

APCe7020E-LF  
PCIe AcroPack carrier, holds 2 AP boards

VPX4500E-LF  
3U VPX AcroPack carrier, holds 3 AP boards

**Software** (see software documentation for details)

APSW-API-VXW  
VxWorks® software support package

APSW-API-WIN  
Windows® DLL driver software support package

APSW-API-LNX  
Linux™ support (website download only)