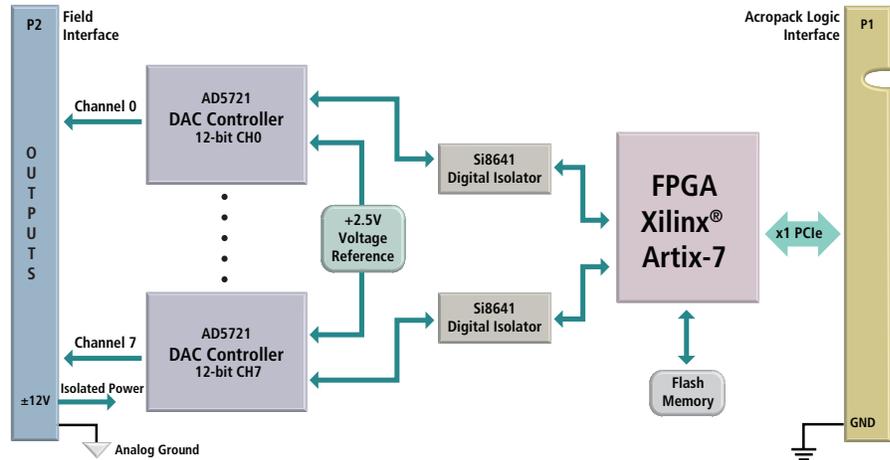
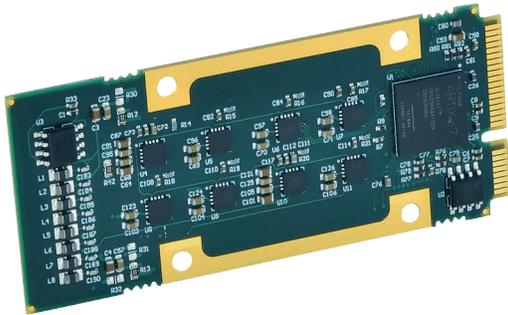


# AcroPack® Modules

## AP226 Series Isolated Analog Voltage Output



12-bit DAC ♦ 8 Channels Voltage Output ♦ Wide Temperature Range ♦ PCIe Bus Interface

### Description

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This **COTS tech-refresh** 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 AP226 outputs analog voltage signals to drive up to 8 devices. When used with a carrier that holds four AcroPack 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 AP226 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 AP226 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
- 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
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support



## AP226 Series Isolated Analog Voltage Output

### Performance Specifications

#### Analog Output

Output configuration  
8 isolated bipolar/unipolar.

D/A Resolution  
AP226-8E-LF: 12 bits.

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

Settling time  
9µs - 20V step to 1 LSB at 12-bit resolution.  
7.5µs - 10V step to 1 LSB at 12-bit resolution.

Maximum throughput rate  
Outputs can be updated simultaneously or individually.  
One channel: 7.5µs/conversion.  
Eight channels simultaneously: 17µs/8 channels.

Calibrated system accuracy  
Linearity error: ±0.5 LSB.  
Offset error: ±0.0625 LSB.  
Gain error: ±0.0625 LSB.  
Total error: ±0.625 LSB (±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 °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 70°C.  
-40 to 85°C. (requires an AcroPack heatsink conduction-cool kit)

Storage temperature  
-55 to 150°C.

Relative humidity  
5 to 95% non-condensing.

MTBF  
Contact the factory.

Power  
See user manual for specifics.

Power Supply Voltage	Current Draw
+3.3V DC ±5%	400mA typical, 480mA maximum.
+12V DC isolated ±5%	70mA typical.
-12V DC isolated ±5%	< 10mA typical.

#### Physical

Length  
70mm.

Width  
30mm.

### Ordering Information

#### AcroPack® Modules

[AP226-8E-LF](#)  
8 isolated voltage outputs, 12-bit DAC

(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 one AcroPack module, air-cooled.

[APCe7020E-LF](#)  
PCIe non-isolated AcroPack carrier, holds two AcroPack modules, air-cooled.

[APCe7040E-LF](#)  
PCIe AcroPack carrier, holds four AcroPack modules, air-cooled.

[VPX4500E-LF](#)  
3U non-isolated VPX AcroPack carrier, holds three AcroPack modules, air-cooled.

[VPX4500-CC-LF](#)  
3U non-isolated VPX AcroPack carrier, holds three AcroPack modules, conduction-cooled.

[XMCAP2020-LF](#)  
XMC non-isolated AcroPack carrier; holds two AcroPack modules, 2-slots out front, air-cooled.

[XMCAP2021-LF](#)  
XMC A non-isolated AcroPack carrier; holds two AcroPack modules, 2-slots out rear, air-cooled.

#### 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).



AP-CC-01 Conduction-Cool Kit

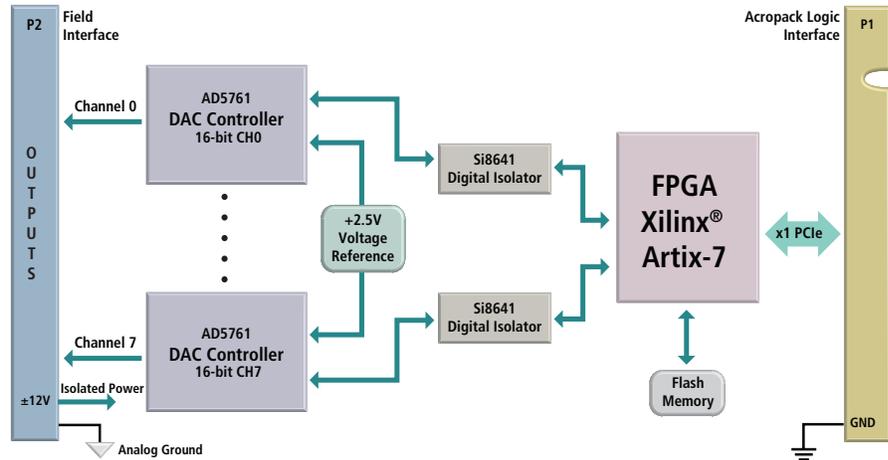
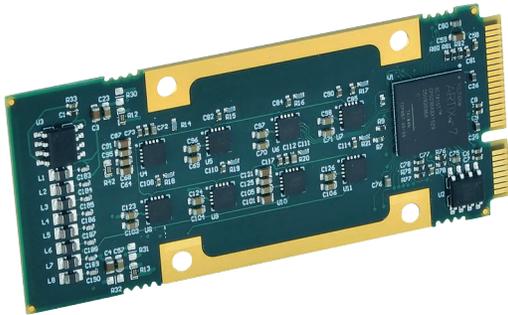
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# AcroPack® Modules

## AP236 Isolated Analog Voltage Output



16-bit DAC ♦ 8 Channels Voltage Output ♦ Wide Temperature Range ♦ PCIe Bus Interface

### Description

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This **COTS tech-refresh** 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 AP236 outputs analog voltage signals to drive up to 8 devices. When used with a carrier that holds four AcroPack modules, up to 32 voltage outputs can be obtained from a single card cage slot.

Each output channel has its own 16-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 AP236 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 AP236 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 16-bit D/A converters per channel
- 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
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support



## AP236 Isolated Analog Voltage Output

### Performance Specifications

#### ■ Analog Output

Output configuration  
8 isolated bipolar/unipolar.

D/A Resolution  
AP236-8E-LF: 16 bits.

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

Settling time  
9µs - 20V step to 1 LSB at 16-bit resolution.  
7.5µs - 10V step to 1 LSB at 16-bit resolution.

Maximum throughput rate  
Outputs can be updated simultaneously or individually.  
One channel: 7.5µs/conversion.  
Eight channels simultaneously: 17µs/8 channels.

Calibrated system accuracy  
Linearity error: ±0.5 LSB.  
Offset error: ±0.0625 LSB.  
Gain error: ±0.0625 LSB.  
Total error: ±0.625 LSB (±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 °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 70°C.  
-40 to 85°C. (requires an AcroPack heatsink conduction-cool kit)

Storage temperature  
-55 to 150°C.

Relative humidity  
5 to 95% non-condensing.

MTBF  
Contact the factory

Power  
See user manual for specifics.

+3.3V DC ±5%	400mA typical, 480mA maximum.
+12V DC isolated ±5%	70mA typical.
-12V DC isolated ±5%	< 10mA typical.

#### ■ Physical

Length  
70mm.

Width  
30mm.

### Ordering Information

#### AcroPack<sup>®</sup> Modules

[AP236-8E-LF](#)  
8 isolated voltage outputs, 16-bit DAC  
(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 one AcroPack module, air-cooled.

[APCe7020E-LF](#)  
PCIe non-isolated AcroPack carrier, holds two AcroPack modules, air-cooled.

[APCe7040E-LF](#)  
PCIe AcroPack carrier, holds four AcroPack modules, air-cooled.

[VPX4500E-LF](#)  
3U non-isolated VPX AcroPack carrier, holds three AcroPack modules, air-cooled.

[VPX4500-CC-LF](#)  
3U non-isolated VPX AcroPack carrier, holds three AcroPack modules, conduction-cooled.

[XMCAP2020-LF](#)  
XMC non-isolated AcroPack carrier; holds two AcroPack modules, 2-slots out front, air-cooled.

[XMCAP2021-LF](#)  
XMC A non-isolated AcroPack carrier; holds two AcroPack modules, 2-slots out rear, air-cooled.

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

[APSW-API-VXW](#)  
VxWorks<sup>®</sup> software support package.

[APSW-API-WIN](#)  
Windows<sup>®</sup> DLL driver software support package.

[APSW-API-LNX](#)  
Linux<sup>®</sup> support (website download only).



AP-CC-01 Conduction-Cool Kit

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