Acromag
THE LEADER IN INDUSTRIAL I/O

mPCIe-based Rugged I/O Modules

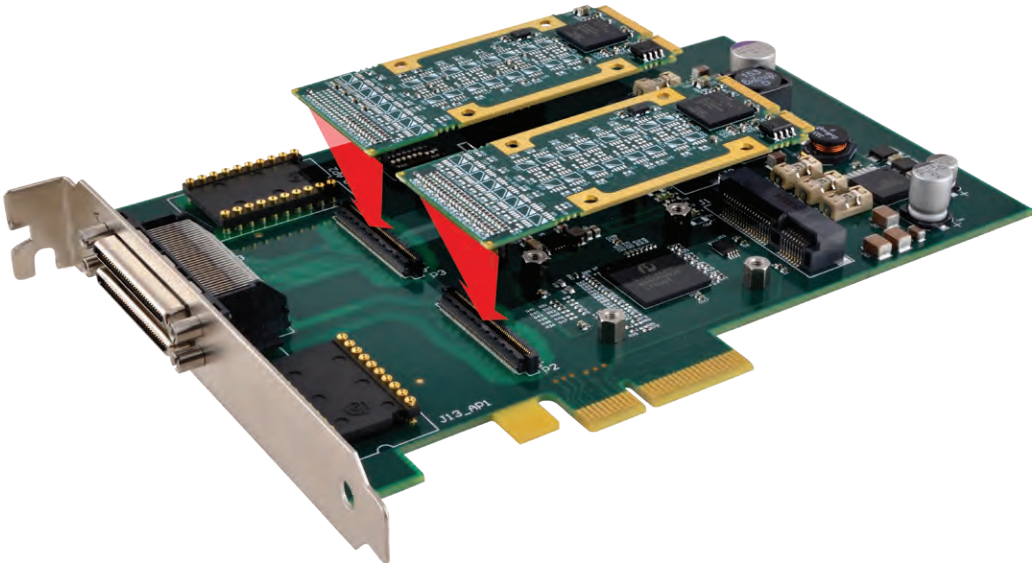
AcroPack® Series Brochure

High-Density

High-Reliability

High-Performance

Low-Cost



Industrial / Military Ready
mPCIe-based Mezzanine Modules

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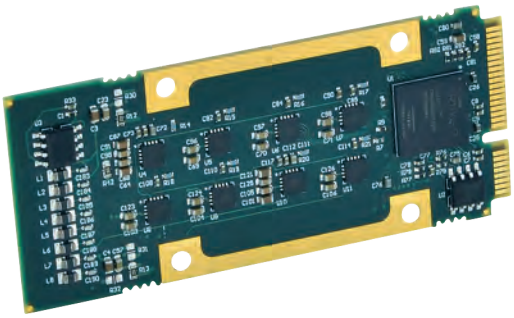
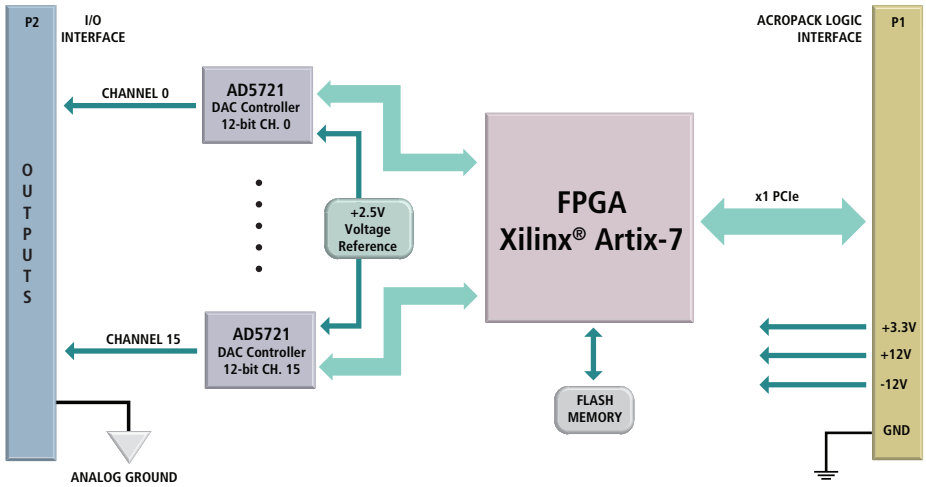
Bulletin #8400-939ah

AcroPack® Modules

AP200 Series Analog Voltage Output





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

Description

Model: AP220-16E-LF

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 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
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Output

Output configuration
16 non-isolated bipolar/unipolar differential outputs. Each channel is paired with a signal return reference.

D/A Resolution
12 bits.

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

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

Maximum throughput rate
Outputs can be updated simultaneously or individually.
One channel: 7.5µS/conversion.
Sixteen channels simultaneously: 17µS/16 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
4,094,686 hrs. at 25°C, MIL-HDBK-217F, notice 2.

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

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP220-16E-LF
16 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

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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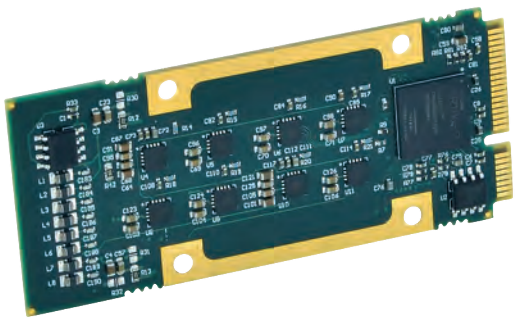
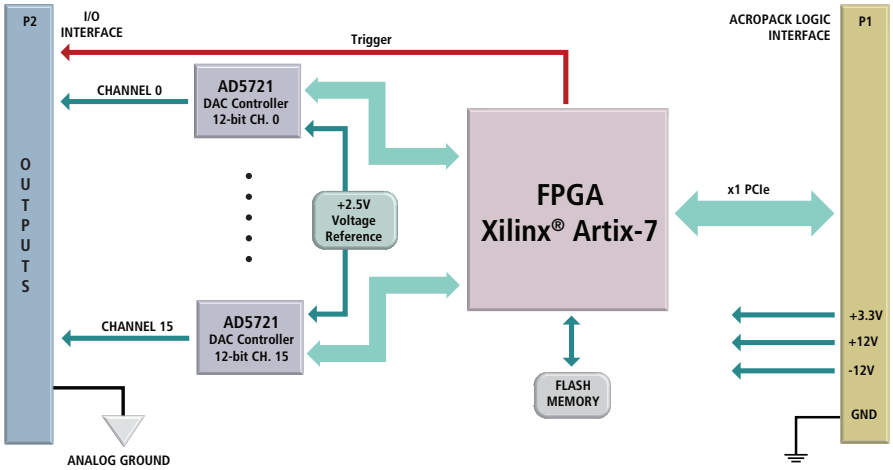
AcroPack® Modules

AP200 Series Analog Voltage Output





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

Description

Model: AP225-16E-LF

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 and low-cost I/O in a rugged form factor. Combine different AcroPack modules on one carrier for a simplified modular approach to system assembly.

The AP225 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. The AP225 is ideal for waveform generation application that require high speed capabilities.

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. A 64K sample memory is provided for waveform storage on board. This memory is shared between the sixteen channels. Waveforms can be continuously output from onboard memory without host intervention. Additionally, a DMA controller is provided for streaming waveform data from host memory.

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 AP225 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 AP225 supports 6 independent software selectable output ranges.

Key Features & Benefits

- PCI Express Generation 1 interface
- Independent 12-bit D/A converters per channel
- Waveforms can be continuously output from onboard memory without host intervention
- DMA controller provides for streaming waveform data from host memory
- Mix countless I/O combinations in a single slot
- Per channel configurability of bipolar and unipolar output ranges
- Sample software and diagnostics
- Configurable FIFO sizes up to 64K samples offer flexible waveform lengths
- Built-in calibration coefficients
- Flexible trigger, operating modes, and memory allocation
- Independent selectable output ranges
- Outputs reset to 0 volts
- Internally stored calibration coefficients ensure accuracy.
- Synchronization of multiple modules using an external trigger
- Solid-down connector I/O interface

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

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, ±-3V, ±5V, ±10V.

Output rate
100kS/s

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

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

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
1MB space required.
1 base address register.

Environmental

Operating temperature
-40 to 70°C.
-40 to 75°C.
(requires an AcroPack heatsink conduction-cool kit)

Storage temperature
-55 to 150°C.

Relative humidity
5 to 95% non-condensing.

MTBF
Please contact the factory.

Power
+3.3 VDC ±5% 0.5A typical, 1A maximum.
+12 VDC ±5% 85mA typical, 275mA maximum.
-12 VDC ±5% 50mA typical, 200mA maximum.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP225-16E-LF
16 voltage outputs, 12-bit DAC with waveform generation capabilities.

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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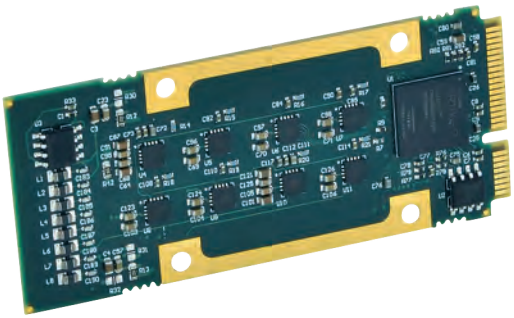
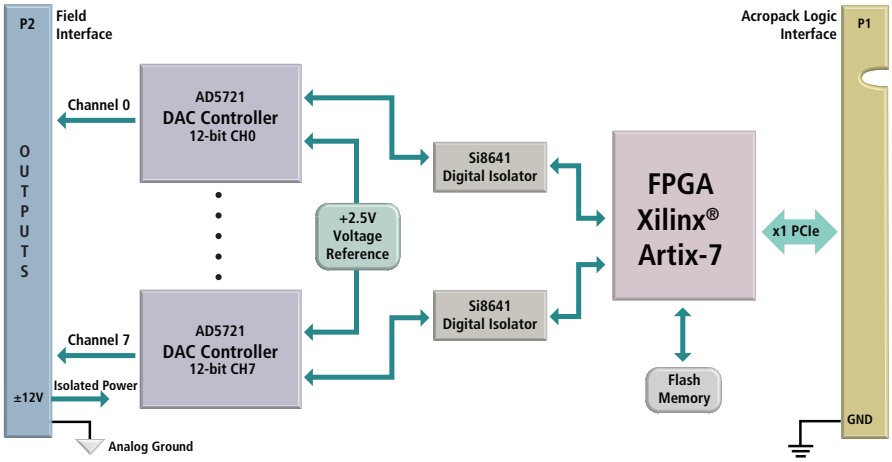
AcroPack® Modules

AP200 Series Analog Voltage Output

CE 2 YEAR WARRANTY RoHS Compliant





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

Description

Model: AP226-8E-LF

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

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

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
9uS - 20V step to 1 LSB at 12-bit resolution.
7.5uS - 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

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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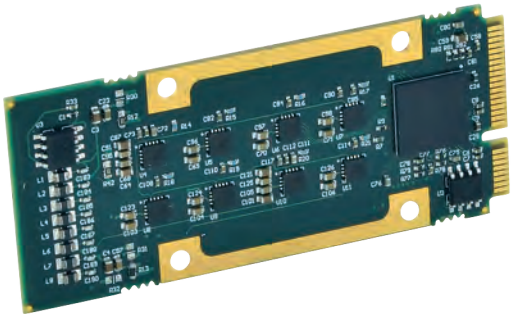
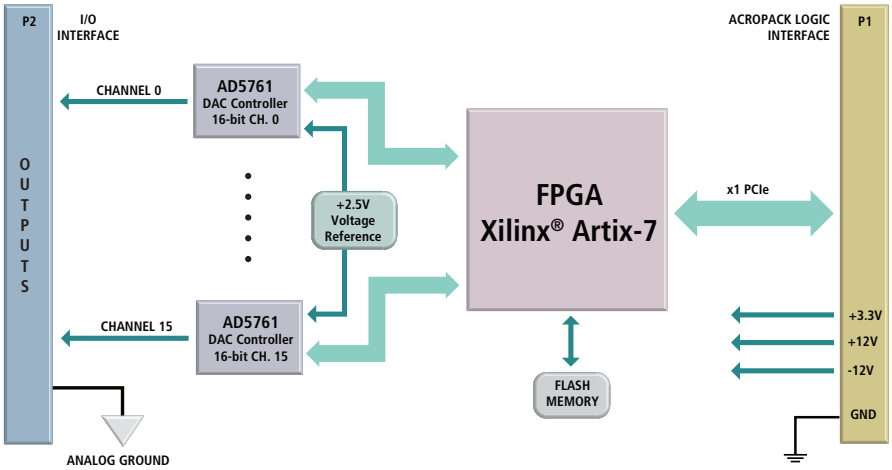
AcroPack® Modules

AP200 Series Analog Voltage Output





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

Description

Model: AP231-16E-LF

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 AP231 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 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 AP231 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 AP231 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
- 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
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Output

Output configuration
16 non-isolated bipolar/unipolar differential outputs. Each channel is paired with a signal return reference.

D/A Resolution
16 bits.

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

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

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

Calibrated system accuracy
Linearity error: ±2 LSB.
Offset error: ±0.0625 LSB.
Gain error: ±0.0625 LSB.
Total error: ±2.125 LSB (±0.0032% 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 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
4,094,686 hrs. at 25°C, MIL-HDBK-217F, notice 2.

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

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP231-16E-LF
16 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

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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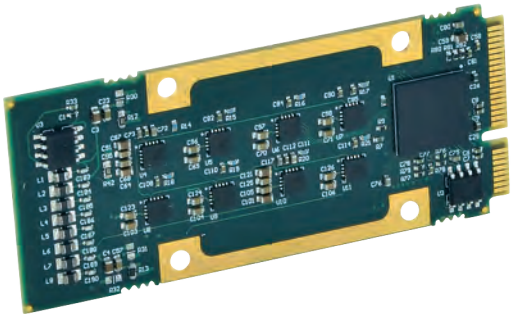
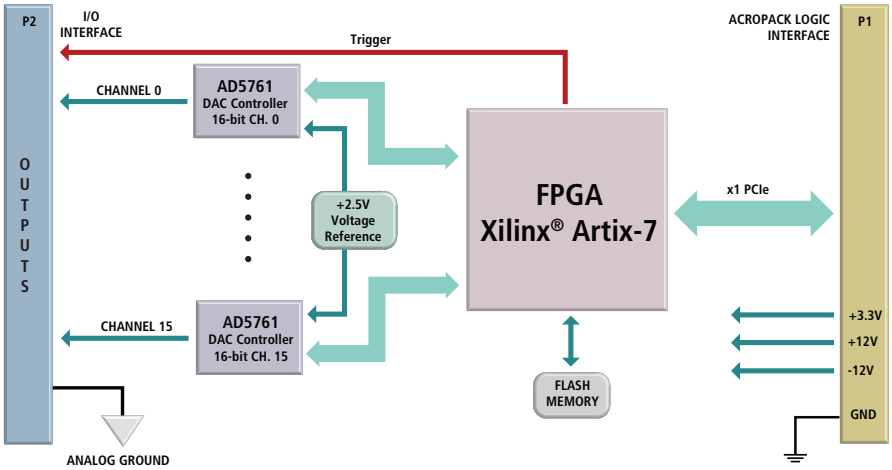
AcroPack® Modules

AP200 Series Analog Voltage Output





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

Description

Model: AP235-16E-LF

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 and low-cost I/O in a rugged form factor. Combine different AcroPack modules on one carrier for a simplified modular approach to system assembly.

The AP235 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. The AP235 is ideal for waveform generation application that require high speed capabilities.

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. A 64K sample memory is provided for waveform storage on board. This memory is shared between the sixteen channels. Waveforms can be continuously output from onboard memory without host intervention. Additionally, a DMA controller is provided for streaming waveform data from host memory.

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 AP235 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 AP235 supports 6 independent software selectable output ranges.

Key Features & Benefits

- PCI Express Generation 1 interface
- Independent 16-bit D/A converters per channel
- Waveforms can be continuously output from onboard memory without host intervention
- DMA controller provides for streaming waveform data from host memory
- Mix countless I/O combinations in a single slot
- Per channel configurability of bipolar and unipolar output ranges
- Sample software and diagnostics
- Configurable FIFO sizes up to 64K samples offer flexible waveform lengths
- Built-in calibration coefficients
- Flexible trigger, operating modes, and memory allocation
- Independent selectable output ranges
- Outputs reset to 0 volts
- Internally stored calibration coefficients ensure accuracy.
- Synchronization of multiple modules using an external trigger
- Solid-down connector I/O interface

Acromag® THE LEADER IN INDUSTRIAL I/O

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Output

Output configuration
16 non-isolated bipolar/unipolar.

D/A Resolution
16 bits.

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

Output rate
100kS/s

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

Maximum throughput rate
Outputs can be updated simultaneously or individually.
7.5µS/conversion.

Calibrated system accuracy
Linearity error: ±0.2 LSB.
Offset error: ±0.0625 LSB.
Gain error: ±0.0625 LSB.
Total error: ±2.125 LSB (±0.0032% 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.

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
1MB space required.
1 base address register.

Environmental

Operating temperature
-40 to 70°C.
-40 to 75°C. *Requires an AcroPack heatsink conduction-cool kit.*

Storage temperature
-55 to 150°C.

Relative humidity
5 to 95% non-condensing.

MTBF
Please contact factory.

Power
+3.3 VDC ±5% 0.5A typical, 1A maximum.
+12 VDC ±5% 85mA typical, 275mA maximum.
-12 VDC ±5% 50mA typical, 200mA maximum.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP235-16E-LF
16 voltage outputs, 16-bit DAC with waveform generation capabilities.

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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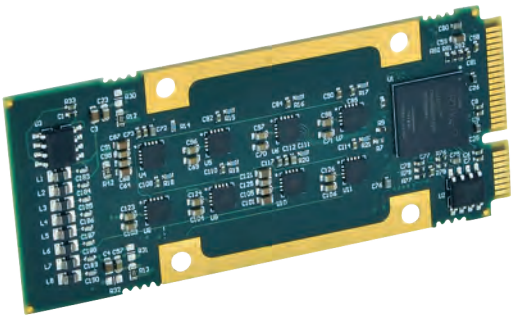
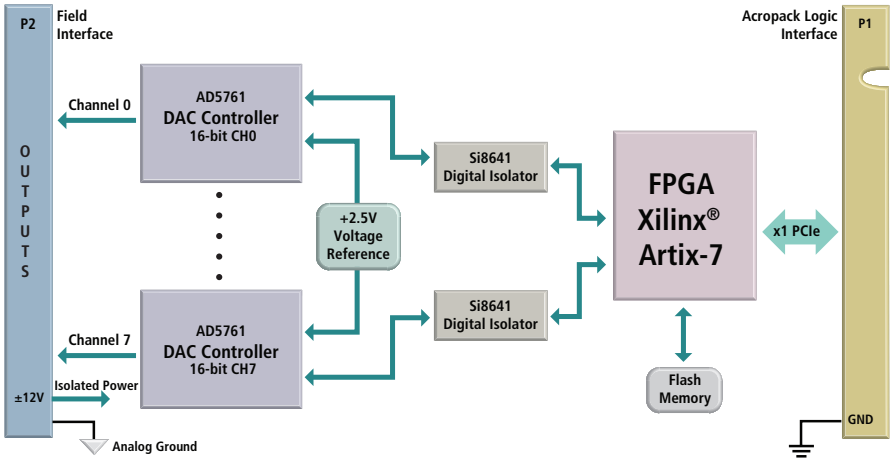
AcroPack® Modules

AP200 Series Analog Voltage Output





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

Description

Model: AP236-8E-LF

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

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

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
9uS - 20V step to 1 LSB at 16-bit resolution.
7.5uS - 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® 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

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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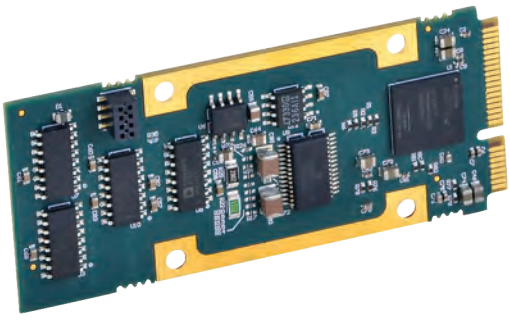
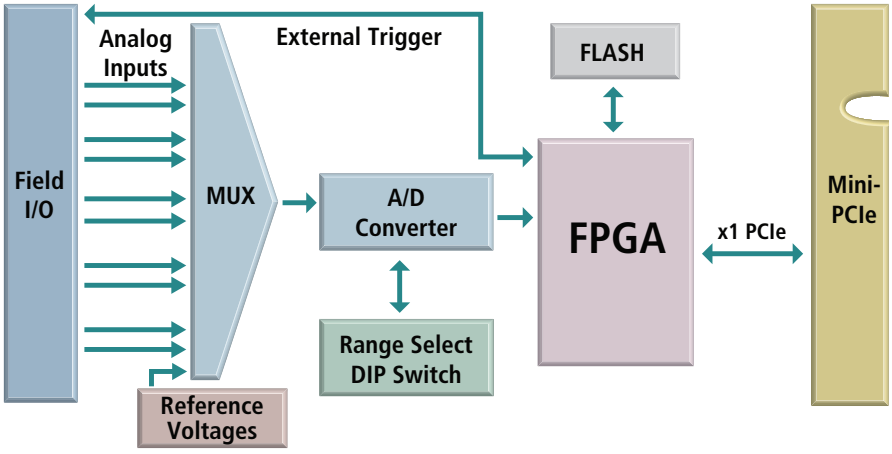
AcroPack® Modules

AP300 Series High-Density Analog Input

CE 2 YEAR WARRANTY RoHS Compliant





16-bit ADC ◆ 20 Differential or 40 Single-Ended Channels ◆ Wide Temp. Range ◆ PCIe Bus Interface

Description

Model: AP323E-LF

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 in a rugged form factor. Combine different AcroPack modules on one carrier for a simplified modular approach to system assembly.

AP323E-LF AcroPack model monitors 20 differential or 40 single-ended input channels. When used with a carrier that holds four AP modules, up to 160 inputs can be obtained from a single card cage slot.

Software or an external hardware input can trigger A/D conversions for synchronization to external events.

On-board, precision voltage references enable accurate software calibration of the module without external instruments.

Designed for COTS applications these analog input 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 AP323E-LF 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 mates with the carrier card. Fifty of these signals are available as field I/O signals.

Key Features & Benefits

- PCI Express Generation 1 interface
- 20 differential or 40 single-ended inputs
- Mix and match countless I/O combinations in a single slot.
- Flexible scan control
- 8µs conversion time
- FIFO buffer with 16K sample memory
- Interrupt upon FIFIO threshold condition
- FIFO full, empty and threshold reached flags
- Programmable channel conversion control
- Programmable conversion timer
- Several scanning modes
- External trigger
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Input

Input configuration
20 differential or 40 single-ended.

A/D Resolution
16 bits.

Input range (dip switch-selectable)
Bipolar ±5V or ±10V
Unipolar 0 to +5V or 0 to +10V

Data sample memory
16K sample FIFO buffer.

Maximum throughput rate
200KHz (5µS/conversion).

A/D triggers
External, and software.

System accuracy
2.4 LSB (0.014%)

Maximum overall calibrated error at 25°C

Input Range (Volts)	ADC Range (Volts)	Maximum Error ±LSB (%span)	Typical Error ±LSB (%span)
±5	±5	±8.6 LSB (0.013%)	±4 LSB (0.006%)
±10	±10	±9.4 LSB (0.014%)	±3 LSB (0.005%)

Data format
Binary two's compliment and straight binary.

Input overvoltage protection
Power on: -20V to +40V.
Power off: -35V to +55V

Common mode rejection ratio (60Hz)
96dB typical.

Channel-to-channel rejection ratio (60Hz)
96dB typical.

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
-40 to 85°C.

Relative humidity
5 to 95% non-condensing.

Power
3.3 VDC ±5% 400mA typical, 500mA maximum.
5.0 VDC ±5% 20mA typical, 30mA maximum.
±12 VDC ±5% 0.7mA typical, 1.4mA maximum.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP323E-LF
20 differential or 40 singel-ended inputs, 16-bit

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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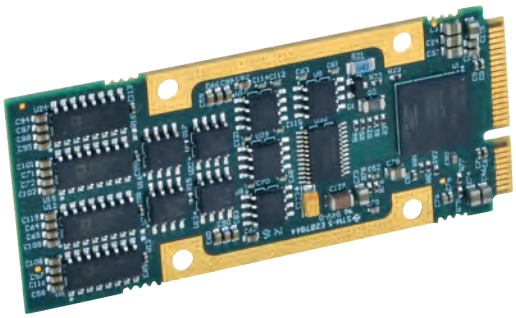
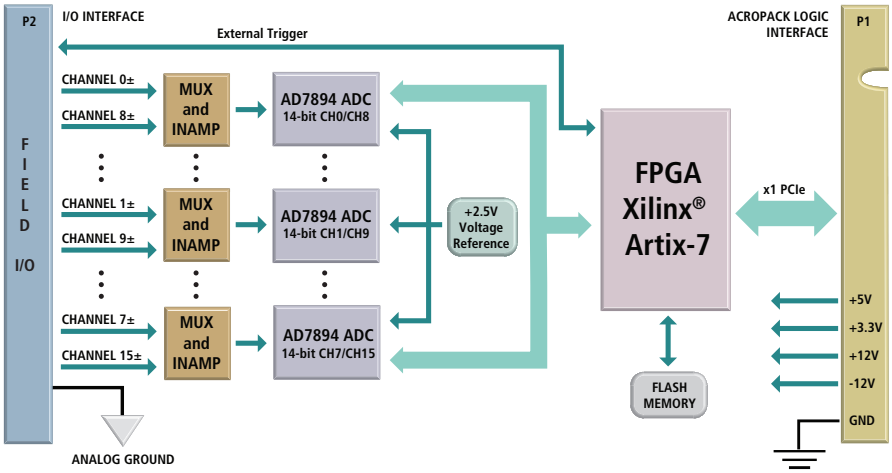
AcroPack® Modules

AP300 Series High-Density Analog Input





14-bit ADC with Simultaneous Multi-channel Conversion ◆ Wide Temp. Range ◆ PCIe Bus Interface

Description

Model: AP341E-LF

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.

AP341E-LF AcroPack provides fast, high resolution, simultaneous A/D conversion of up to eight channels. Simultaneous channel conversion and on-board memory enable megahertz throughput rates. Programmable interrupts simplify data acquisition by providing greater control.

These modules have sixteen differential analog inputs which are sampled as two eight-channel banks. Eight A/D converters (ADCs) permit simultaneous conversion of up to eight channels in a bank. A FIFO buffer holds the first bank's data while the second bank is converted. Conversion of each bank requires only 8µS, and all 16 channels can be sampled in just 16µs.

Flexible configuration options give you extensive control over the conversion process. The channels or bank to be converted, timing, scan mode, and other parameters are user-programmable. Interrupt support adds further control to flag a FIFO that is full or filled to a user-defined threshold level.

Designed for COTS applications these analog input 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 AP341E-LF 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 they 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.

Key Features & Benefits

- PCI Express Generation 1 interface
- Eight 14-bit A/D converters with simultaneous multi-channel conversion
- 16 differential inputs with ±10VDC input range
- Mix and match countless I/O combinations in a single slot
- 8µs conversion time (125kHz) for 8-ch. bank
- FIFO buffer with 1025 sample memory
- Interrupt upon FIFIO threshold condition
- FIFO full, empty and threshold reached flags
- Programmable channel conversion control
- Programmable conversion timer
- Continuous and single-cycle conversion modes
- External trigger input and output
- Calibration constants for gain and offset correction stored on-board
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Input

Input configuration
16 differential.

ADC Resolution
14 bits.

Input range
±10V.

Data sample memory
1025 sample FIFO buffer.

Maximum throughput rate
Eight channels can be simultaneously acquired.
One channel: 125KHz (8µS/conversion)
8 channels (same bank): 1MHz (8µS/8 channels)
16 channels (high & low banks): 1MHz (16µS/16 ch. at minimum 2.2K ohm source resistance).

ADC triggers
Internal timer, external, and software.

System accuracy
2.8 LSB (0.017%).

Data format
Binary two's compliment.

Input overvoltage protection
±25V with power on, ±40V with power off.

Common mode rejection ratio (60Hz)
96dB typical.

Channel-to-channel rejection ratio (60Hz)
96dB typical.

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
128k 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.

Power
+3.3 VDC ±5% 500mA typical, 580mA max.

+5 VDC ±5% 35mA typical, 70 mA max.

+12 VDC ±5% 14mA typical, 40mA max.

-12 VDC ±5% 7mA typical, 20mA max.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP341E-LF
14-bit ADC simultaneous sample and hold.

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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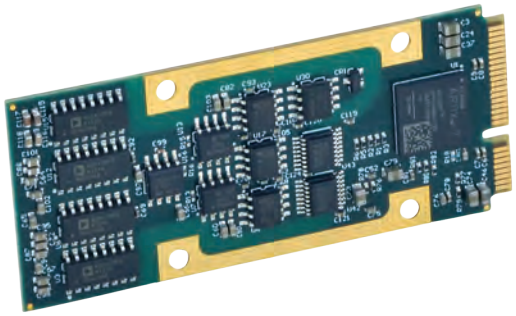
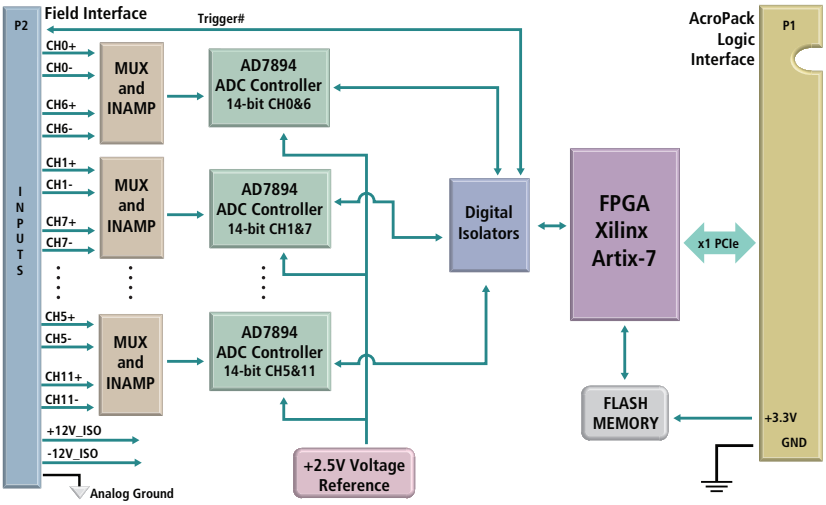
AcroPack® Modules

AP300 Series High-Density Analog Input





14-bit ADC with Simultaneous Multi-channel Conversion ◆ 12 Differential Channels ◆ PCIe Bus Interface

Description

Model: AP342E-LF

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.

AP342E-LF AcroPack provides fast, high resolution, simultaneous A/D conversion of up to six channels. Simultaneous channel conversion and on-board memory enable megahertz throughput rates. Programmable interrupts simplify data acquisition by providing greater control.

These modules have twelve differential analog inputs which are sampled as two six-channel banks. Six A/D converters (ADCs) permit simultaneous conversion of up to six channels in a bank. A FIFO buffer holds the first bank's data while the second bank is converted. Conversion of each bank requires only 8µS, and all 12 channels can be sampled in just 16µs.

Flexible configuration options give you extensive control over the conversion process. The channels or bank to be converted, timing, scan mode, and other parameters are user-programmable. Interrupt support adds further control to flag a FIFO that is full or filled to a user-defined threshold level.

Designed for COTS applications these analog input 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 AP342E-LF 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 they 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.

Key Features & Benefits

- PCI Express Generation 1 interface
- Six 14-bit A/D converters with simultaneous multi-channel conversion
- 12 differential inputs with ±10VDC input range
- Mix and match countless I/O combinations in a single slot
- 8µs conversion time (125kHz) for 6-ch. bank
- FIFO buffer with 1025 sample memory
- Interrupt upon FIFO threshold condition
- FIFO full, empty and threshold reached flags
- Programmable channel conversion control
- Programmable conversion timer
- Continuous and single-cycle conversion modes
- External trigger input and output
- Calibration constants for gain and offset correction stored on-board
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Analog Input

Input configuration
12 differential.

ADC Resolution
14 bits.

Input range
±10V.

Data sample memory
1025 sample FIFO buffer.

Maximum throughput rate
Eight channels can be simultaneously acquired.
One channel: 125KHz (8µS/conversion).
6 channels (same bank): 750kHz (8µS/6 channels).
12 channels (high and low banks): 750kHz (16µS/12 channel at minimum 2.2K ohm source resistance).

ADC triggers
Internal timer, external, and software.

System accuracy
2.8 LSB (0.017%).

Data format
Binary two's compliment.

Input overvoltage protection
±25V with power on, ±40V with power off.

Common mode rejection ratio (60Hz)
96dB typical.

Channel-to-channel rejection ratio (60Hz)
96dB typical.

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
128k 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 125°C.

Relative humidity
5 to 95% non-condensing.

Power

Power Supply Voltage	Current Draw (typical)
+3.3 VDC ±5%	470mA 550mA max.
+12 VDC isolated ±5%	60mA 75mA max.
-12 VDC isolated ±5%	7mA 20mA max.

Isolation Voltage
250V field I/O to FPGA logic
60V field I/O to field I/O

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP342E-LF
14-bit ADC simultaneous sample and hold.

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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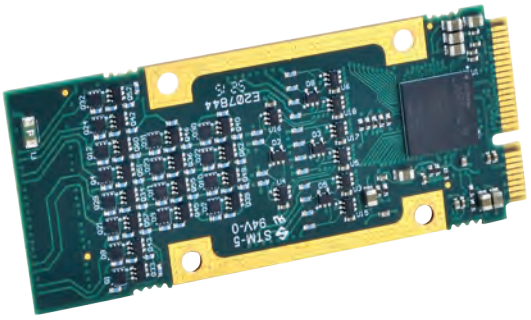
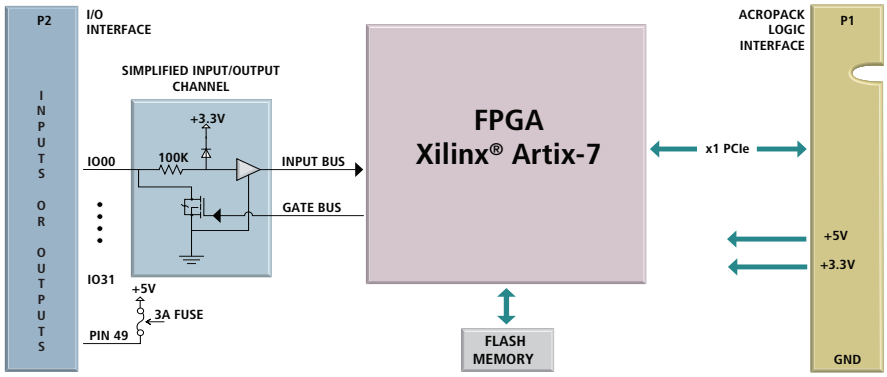
AcroPack® Modules

AP400 Series High Voltage Digital Input/Output





32 Digital I/O Channels ◆ High impedance ◆ PCIe Bus Interface

Description

Model: AP408E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

The AP408 monitors or controls the on/off (high/low) status of up to 32 devices. Each channel can be used as an input or output.

All 32 input channels can be configured with interrupts for a change of state or level detection of any bit. The TTL input threshold includes hysteresis for increasing noise immunity.

In order to ensure safe, reliable control under all conditions, output operation is "fail-safe." That is, the outputs are always off upon power-up and are automatically cleared following a software reset.

Loopback monitoring of critical control signals is easy since the input and output circuitry are connected in tandem to each channel.

The AP408 is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board width is the same as mPCIe board of 30mm and uses 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. Pin spacing and signal assignments will allow for 100V of signal to signal isolation.

The AP408 maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- 32 digital input/output channels
- 0 to 60V DC input range, 60V DC low-side switch outputs
- Outputs sink up to 1A per channel
- TTL-compatible input threshold with hysteresis
- Change-of-state/level interrupts (up to 32)
- Buffered inputs include hysteresis to increase noise immunity.
- Interrupts are software-programmable for a change of state or level detection.
- Loopback monitoring enables self-test and fault diagnostics to detect open output switches or shorts.
- High impedance inputs prevent loading of the input source and minimize current.
- Individual outputs sink up to 1A DC continuous. No deration of output current required at elevated temperatures.

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Digital Inputs

Input channel configuration
32 noninverting buffered inputs with a common connection

Input signal voltage range
0 to 60V DC, maximum

Input signal threshold
TTL compatible. Limited to TTL levels of 0.8V DC (max.low level) and 2.0V DC (minimum high level)

Interrupts
Change-of-state and level on channels 0-31

Digital Outputs

Channel configuration
32 open-drain MOSFETs with common source connection

Output ON current range
0 to 1A DC, continuous per channel (5A total for all channels combined). No deration required at elevated ambients

Output Rds ON Resistance
0.1 Ω maximum

PCI Express Base Specification

Conforms to 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
-40 to 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) — 400mA typical 600mA maximum
+5V (±5%) — 20mA typical 50mA maximum

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP408E-LF
32 bidirectional input/output channels

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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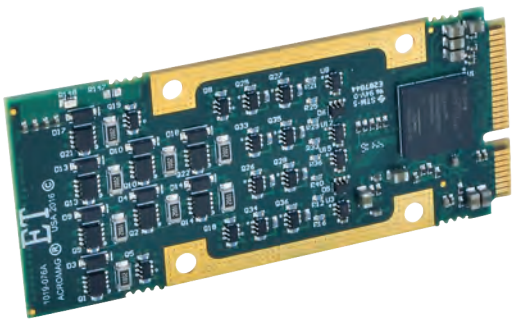
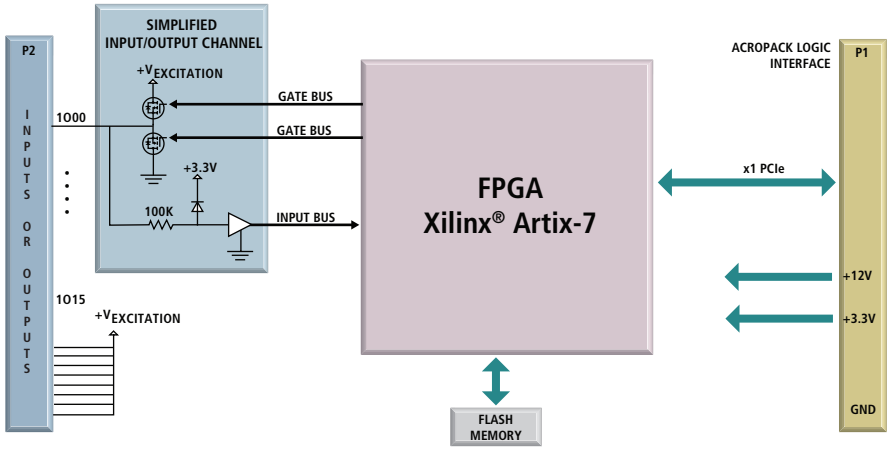
AcroPack® Modules

AP400 Series High Voltage Digital Input/Output





16 Digital I/O Channels ◆ High impedance ◆ PCIe Bus Interface

Description

Model: AP418E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

The AP418 monitors or controls the on/off (high/low) status of up to 16 devices. Each channel can be used as an input or output.

All 16 input channels can be configured with interrupts for a change of state or level detection of any bit. The TTL input threshold includes hysteresis for increasing noise immunity.

In order to ensure safe, reliable control under all conditions, output operation is "fail-safe." That is, the outputs are always off upon power-up and are automatically cleared following a software reset.

Loopback monitoring of critical control signals is easy since the input and output circuitry are connected in tandem to each channel.

Designed for COTS applications these digital I/O 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 AP418 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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 AP418 maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- 16 digital input/output channels
- 0 to 60V DC input range, 60V DC low-side or high-side switch outputs
- Outputs sink up to 2A per channel
- TTL-compatible input threshold with hysteresis
- Change-of-state/level interrupts (up to 16)
- Buffered inputs include hysteresis to increase noise immunity.
- Interrupts are software-programmable for a change of state or level detection.
- Loopback monitoring enables self-test and fault diagnostics to detect open output switches or shorts.
- High impedance inputs prevent loading of the input source and minimize current.
- Individual outputs sink up to 2A DC continuous. No deration of output current required at elevated temperatures.

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Digital Inputs

Input channel configuration
16 noninverting buffered inputs with a common connection

Input signal voltage range
0 to 60V DC, maximum

Input signal threshold
TTL compatible. Limited to TTL levels of 0.8V DC (max.low level) and 2.0V DC (minimum high level)

Interrupts
Change-of-state and level on channels 0-15

Digital Outputs

Channel configuration
Each output can be configured to be a low-side switch or a high-side switch.

Low-side switch has open-drain output with source connected to common.

High-side switch has open-drain output with source connected to excitation voltage source.

Output ON current range
0 to 2A DC, per channel (5A total). No deration required at elevated ambients

Output Rds ON Resistance
Low-side switch - 0.1 ohm Max.

High-side switch - 0.2 ohm Max.

PCI Express Base Specification

Conforms to 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
-40 to 125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3V (±5%) -400mA typical 600mA maximum.
+12V (±5%) -20mA typical 50mA maximum.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP418E-LF
16 bidirectional input/output channels

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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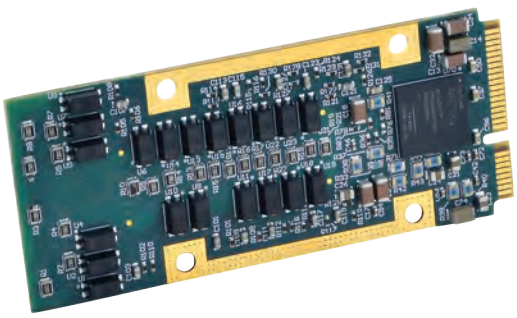
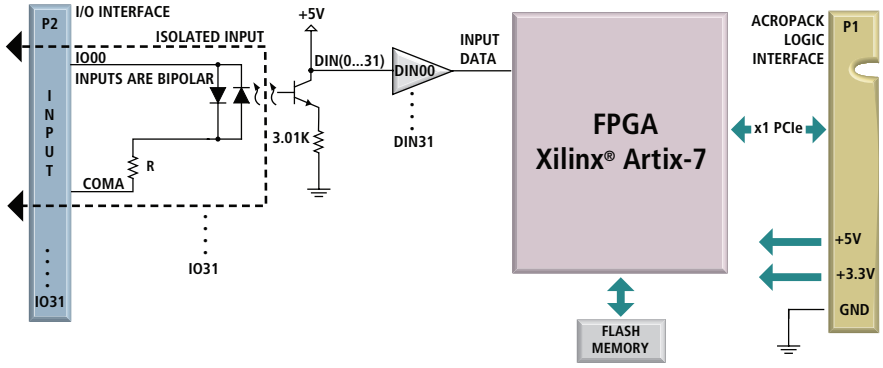
AcroPack® Modules

AP400 Series High Voltage Digital Input/Output





32 Isolated Digital Input Channels ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Models

AP441-1E-LF: ±4 to ±18V DC or AC peak input
AP441-2E-LF: ±16 to ±40V or AC peak input
AP441-3E-LF: ±38 to ±60 or AC peak input

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality of the existing IP modules and a rugged form factor.

AP441-XE-LF modules provide 32 optically isolated inputs to safely monitor a wide range of digital input voltage levels.

Isolation protects your computer system from noise, transient signals, and field wiring faults. The inputs are grouped into four 8-channel ports. Ports are isolated from the logic and each other.

Change-of-state, high-to-low and low-to high interrupts are individually programmable for each channel. Debounce eliminates spurious interrupts from noise and switching transients for error-free edge detection

Closed-loop monitoring of critical control signals is easily accomplished using the AP441-XE-LF in conjunction with Acromag's AP445E-LF digital output module.

The AP441 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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.

Pin spacing and signal assignments will allow for 100V of port to port isolation. Logic and field lines are isolated from each other for voltages up to 250V AC or DC on a continuous basis.

The AP441 series maintains the same functionality of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

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

Key Features & Benefits

- PCI Express Generation 1 interface
- 2.5 Gbps bus speed with one lane in each direction
- 32 port-isolated input channels
- Interrupt support for each channel
- Programmable event interrupts (change-of-state, low-to-high or high-to-low transitions)
- Programmable debounce
- Input hysteresis
- Reverse polarity protection
- Software configuration (no jumpers or switches)
- Software configuration allows "on-the-fly" changes without removing modules.
- Pins are compatible with AP445E-LF output module for loopback monitoring
- Loopback monitoring enables self-test and fault diagnostics to detect open switches or shorts.
- Extended temperature range

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Digital Inputs

Input channel configuration
32 optically isolated inputs

Isolation
Logic and field connections are optically isolated. Individual ports are also isolated from each other. Input lines of individual ports share a common connection and are not isolated from each other. Logic and field lines are isolated from each other for voltages up to 250V AC rms 250V DC on a continuous basis (unit will withstand a 1250V AC dielectric strength test for one minute without breakdown).

Bipolar input voltage range
AP441-1E-LF: ±4 to ±18V DC or AC peak
AP441-2E-LF: ±16 to ±40V DC or AC peak
AP441-3E-LF: ±38 to ±60V DC or AC peak

Input low-to-high threshold
AP441-1E-LF: ±4V maximum
AP441-2E-LF: ±16V maximum
AP441-3E-LF: ±38V maximum

Input response time
On to off: 15µS typical
Off to on: 35µS typical

Interrupts: 32 channels configurable as below
High-to-low transitions
Low-to-high transitions
Change-of-state

Debounce
Selectable for 4µS, 64µS, 1mS, or 8mS

PCI Express Base Specification

Conforms to 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
+1.5 VDC (±5%) not used
+3.3 VDC (±5%) 0.48 A Typical, 0.63 A maximum
+5 VDC (±5%) 0.048 A Typical, 0.052 A maximum
+12 VDC (±5%) not used
-12 VDC (±5%) not used

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP441-1E-LF
Digital input, ±4 to ±18V

AP441-2E-LF
Digital input, ±16 to ±40V input range

AP441-3E-LF
Digital input, ±38 to ±60V input range

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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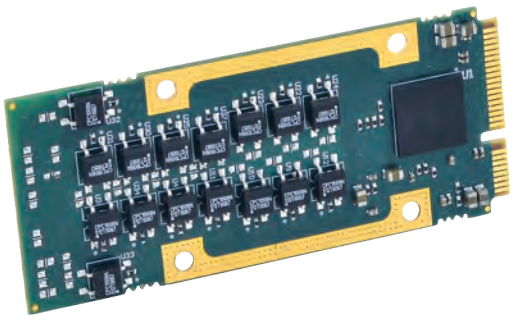
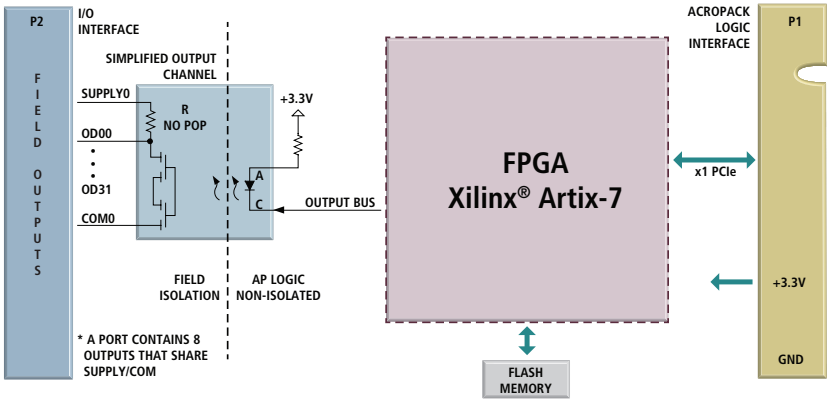
AcroPack® Modules

AP400 Series High Voltage Digital Input/Output





When used together, the AP441 input module and AP445 output module simplify loop-back monitoring of your critical signals.

32 bipolar solid-state relays ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP445E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing IP modules and a rugged form factor.

AP445 modules provide 32 isolated solid-state relay outputs to safely control discrete devices.

A major AP445 advantage is its flexibility. The module supports wide range bipolar (AC or DC) voltage switching. Each port can be configured for high or low-side switches. The outputs are TTL-compatible when configured as low-side switches and populating on board pull up resistors or using external pull-ups.

Isolation protects your computer system from noise, transient signals, and field wiring faults. Outputs are grouped into four 8-channel ports. Ports are isolated via solid-state relays from the logic and from each other.

Readback buffers simplify output status monitoring. And for easy closed-loop monitoring of critical control signals, use the AP445 with an AP440 input module.

The AP445 series modules are 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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. Pin spacing and signal assignments will allow for 100V of port to port isolation. Logic and field lines are isolated from each other for voltages up to 250V AC or DC on a continuous basis.

The AP445 series maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- 32 bipolar solid state relays
- High/low-side switch configuration
- Port-isolated output channels
- ±60V AC/DC voltage range
- High speed processing
- TTL-compatible
- Failsafe power-up and system reset
- Output readback function
- On board pull-up resistors can be populated for low-side switching applications
- Unique ground reference points for each port permits AC and DC switching on one module.
- Pins are compatible with AP440 input module for loopback monitoring.

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AcroPack® Modules

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AS9100
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Performance Specifications

Digital Outputs

Output channel configuration
32 isolated solid-state relays support AC or DC (high/low-side switching) operation.

Isolation
Logic and field connections are optically isolated by solid-state relays. Individual ports are also isolated from each other. Output lines of an individual port share a common connection and are not isolated from each other. IP Logic and field lines are isolated from each other for voltages up to 250V AC or 354V DC on a continuous basis (unit will withstand a 1450V AC dielectric strength test for one minute without breakdown).

Voltage range
0 to ±60V DC or peak AC

Output ON current range
150mA maximum continuous (up to 1A total per port)

Turn on time
1ms typical, 2ms maximum

Turn off time
0.2ms typical, 1ms maximum

Output pull-up resistors
Not populated, consult factory

PCI Express Base Specification

Conforms to 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
-40 to 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) all outputs off: 495mA typical
+3.3V (±5%) all outputs on: 675mA typical

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP445E-LF
Isolated digital output module

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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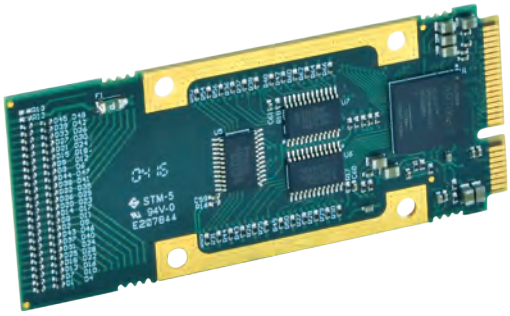
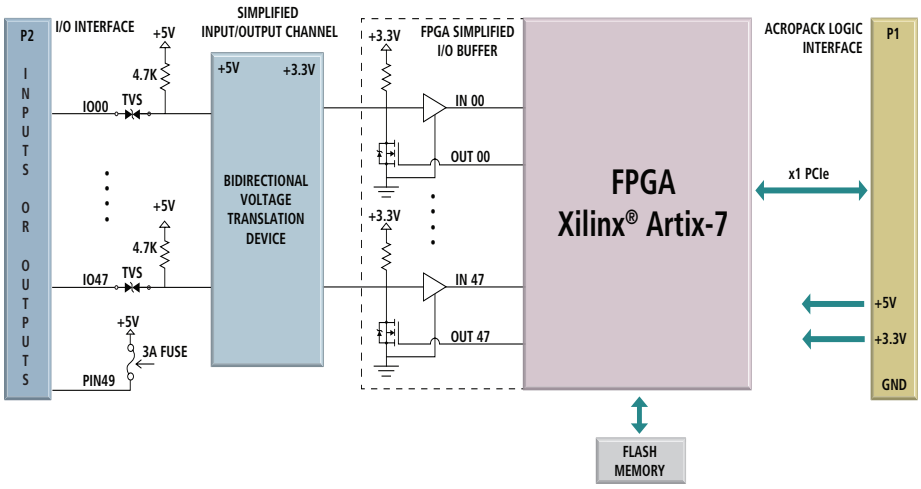
AcroPack® Modules

AP400 Series High Voltage Digital Input/Output





48 bidirectional input/output channels ◆ Digital I/O ◆ Wide Temperature Range ◆ PCIe Bus Interface

Description

Model: AP471E-LF

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

AP471 AcroPack I/O (AP) modules provide 48 general-purpose, bidirectional I/O points to economically monitor and control a large quantity of digital devices.

Each channel has interrupt capability for detecting low-to-high or high-to-low transitions. Change-of-state interrupts are supported using paired channels. Debounce eliminates interrupts from noise and switching transients for error-free edge detection.

AP471 outputs are full-featured. They provide closed-loop readback status monitoring. TTL level thresholds and 15mA sink capability allow a direct interface to standard relay racks. For safety, outputs go to a failsafe state upon power-up/reset without any instantaneous toggling to prevent false alarms.

Designed for COTS applications these TTL level digital I/O 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 AP471 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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 AP471 maintains the same functionality of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- 48 bidirectional input/output channels
- Mix and match countless I/O combinations in a single slot.
- Sample software and diagnostics
- TTL-compatible inputs
- CMOS-compatible open-drain outputs
- Interrupt support for each channel
- Input debounce
- Electronic overvoltage protection on individual channels
- Open drain outputs
- Output readback registers - Output readback capability eliminates the need for additional input channels to verify the output channel state
- Output channels do not "glitch" after a power-up/reset to eliminate false alarms
- Solid-down connector I/O interface
- Wide temperature range
- XMC, VPX and PCIe carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

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Performance Specifications

Digital Inputs

Input channel configuration
48 buffered inputs.

Input voltage range
0 to 5V DC.

Input signal threshold
1.5V typical.

Digital Outputs

Output channel configuration
48 open-drain CMOS outputs.

Voltage range
0 to 5V DC.

Output ON current range
0 to 15mA DC.

Output pull-ups
4.7k Ω internal pull-ups installed on board.

PCI Express Base Specification

Conforms to 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.

Power
+3.3V (±5%): 400mA typical 600mA max.
+5V (±5%): 60mA all outputs ON w/4.7K Ω pull-ups
0.5mA all outputs OFF.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP471E-LF
48-channel digital I/O module

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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

Acromag®
THE LEADER IN INDUSTRIAL I/O

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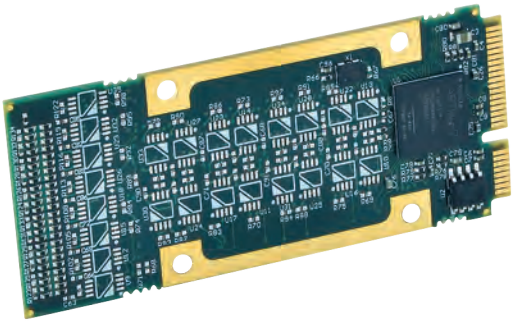
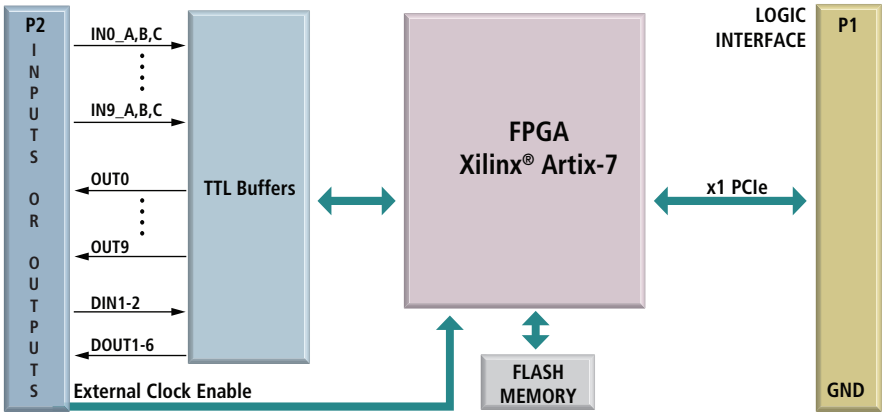
AcroPack® Modules

AP480 Series Counter/Timers





Ten 32-bit Multi-Function Counters ◆ TTL I/O ◆ Wide Temperature Range ◆ PCIe Bus Interface

Description

Model: AP482E-LF

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

Support for internal or external triggering simplifies the synchronization of operations to specific events.

Designed for COTS applications these general purpose I/O modules deliver high-speed and high resolution TTL communication.

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

The AP482 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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 AP482 maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- Ten 32-bit counter/timers
- Mix and match countless I/O combinations in a single slot.
- Sample software and diagnostics
- 62.5MHz clock time base
- Single counter/timer modes:
  - Event counting
  - Frequency measurement
  - Period/pulse-width measurement
  - Quadrature position measurement
  - Pulse width modulated output
  - Watchdog timer
  - One shot pulse output
- Configuration is handled by a single register which minimizes programming.
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Counter/timers

Counter/timer configuration:
AP482: Ten 32-bit counters – TTL I/O

Counter Input:
Each counter has an InA, InB, and InC input port. These TTL or RS485 input ports are used to control Start/Stop, Reload, Event Input, External Clock, Trigger, and Up/Down operations.

Clock frequency
Selectable internal clock frequencies: 1.95MHz, 3.9MHz, 7.81MHz, 15.62MHz, or 62.5MHz.

Minimum input event
32nS.

Minimum pulse measurement
32nS.

Minimum period measurement
64nS.

Minimum gate/trigger pulse
32nS.

Interrupts
Supported for watchdog timer time-out, event count complete, pulse width or periodic rate measurement complete, pulse wave complete (one-shot mode), successive waveform generation (continuous).

Triggering/gate
Programmable via register write or external trigger. Minimum pulse width 32nS. Line may be used for gating of counter.

Counter trigger
Interface for triggering counter functions. Input level is TTL digital.

Counter input
Interface for events and pulse/period measurements. Also triggers load of watchdog timer register. Level is TTL digital.

TTL compatibility
VIH = 2.0V and VIL = 0.8V. inputs are buffered and include 4.7K pull-ups to +3.3V.

Counter output
Each counter has an output port. These TTL or RS485 output ports are used for waveform output, watchdog active indicator, or 1.73 µs pulse upon counter function completion. Counter output is programmable as active high or low.

PCI Express Base Specification

Conforms to 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.

Power
3.3V DC ± 5.
1.6A typical, 2.0A maxium.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP482E-LF
Ten 32-bit TTL counters

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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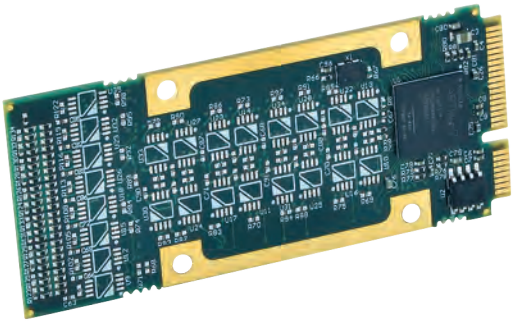
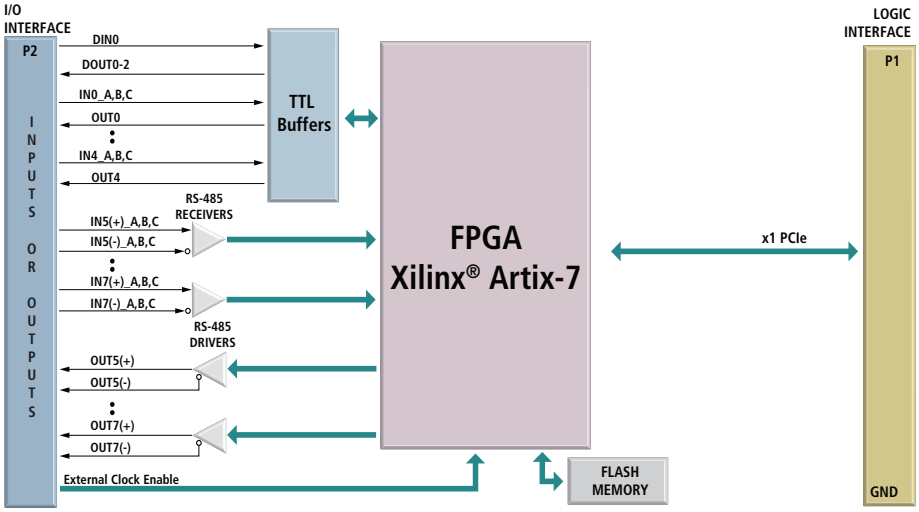
AcroPack® Modules

AP480 Series Counter/Timers





Eight 32-bit Counters ◆ TTL and RS422/RS485 I/O ◆ Wide Temperature Range ◆ PCIe Bus Interface

Description

Model: AP483E-LF

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

Support for internal or external triggering simplifies the synchronization of operations to specific events.

Designed for COTS applications these RS422/ RS485 & TTL counter/timers deliver high-speed and high-performance.

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

The AP483 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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 AP483 maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- Mix and match countless I/O combinations in a single slot.
- Sample software and diagnostics
- Available with both TTL and RS422/RS485 driver interface
- 62.5MHz clock time base
- Single counter/timer modes:
  - Event counting
  - Frequency measurement
  - Period/pulse-width measurement
  - Quadrature position measurement
  - Square wave/pulse train generation
  - Time/period interrupter
  - Pulse width generation
- Most configuration is handled by a single register which minimizes programming.
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Counter/timers

Counter/timer configuration:
AP483: Five 32-bit counters – TTL
Three 32-bit counters – RS422/RS485

Clock frequency
Selectable internal clock frequencies: 1.95MHz, 3.9MHz, 7.81MHz, 15.62MHz, or 62.5MHz.

Minimum input event
32nS.

Minimum pulse measurement
32nS.

Minimum period measurement
64nS.

Minimum gate/trigger pulse
32nS.

Interrupts
Supported for watchdog timer time-out, event count complete, pulse width or periodic rate measurement complete, pulse wave complete (one-shot mode), successive waveform generation (continuous).

Triggering/gate
Programmable via register write or external trigger. Minimum pulse width 32nS. Line may be used for gating of counter.

Counter trigger
Interface for triggering counter functions. Input level is TTL and RS422 differential digital.

Counter input
Interface for events and pulse/period measurements.Also triggers load of watchdog timer register. Level is TTL and RS422 differential digital.

TTL compatibility
VIH = 2.0V and VIL = 0.8V. inputs are buffered and include 4.7K pull-ups to +3.3V.

Counter output
Level is TTL and RS422 differential digital.

PCI Express Base Specification

Conforms to 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.

Power
3.3V DC ± 5%.

1.6A Typical, 2.0A Maxium.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP483E-LF
Five 32-bit TTL and three 32-bit RS422/RS485 counters

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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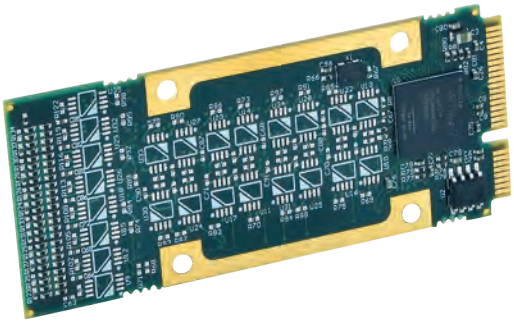
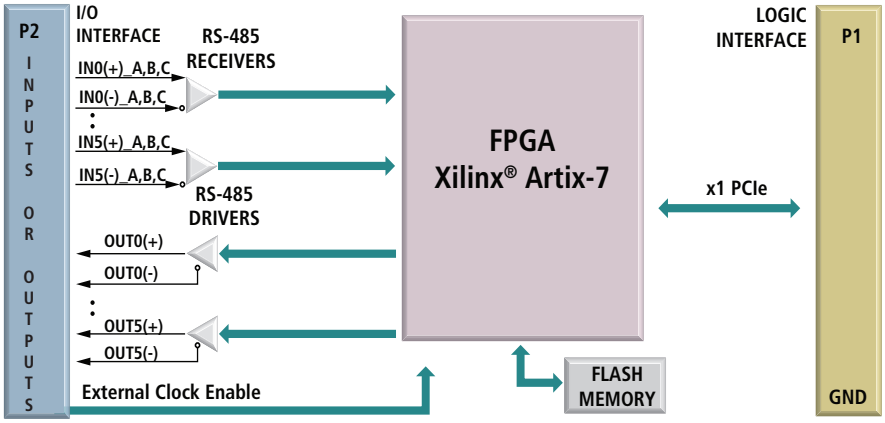
AcroPack® Modules

AP480 Series Counter/Timers





Six 32-bit Counters ◆ RS422/RS485 I/O ◆ Wide Temperature Range ◆ PCIe Bus Interface

Description

Model: AP484E-LF

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

Support for internal or external triggering simplifies the synchronization of operations to specific events.

Designed for COTS applications these RS422/RS485 counter/timers deliver high-speed and high-performance.

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

The AP484 module is 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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 AP484 maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- Mix and match countless I/O combinations in a single slot.
- Sample software and diagnostics
- 62.5MHz clock time base
- Single counter/timer modes:
  - Event counting
  - Frequency measurement
  - Period/pulse-width measurement
  - Quadrature position measurement
  - Square wave/pulse train generation
  - Time/period interrupter
  - Pulse width generation
- Most configuration is handled by a single register which minimizes programming
- Solid-down connector I/O interface
- Wide temperature range
- PCIe, VPX and XMC carriers
- Linux®, Windows®, and VxWorks® support

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Counter/timers

Counter/timer configuration:
AP484: Six 32-bit counters – RS422/RS485.

Clock frequency
Selectable internal clock frequencies: 1.95MHz, 3.9MHz, 7.81MHz, 15.62MHz, or 62.5MHz.

Minimum input event
32nS.

Minimum pulse measurement
32nS.

Minimum period measurement
64nS.

Minimum gate/trigger pulse
32nS.

Interrupts
Supported for watchdog timer time-out, event count complete, pulse width or periodic rate measurement complete, pulse wave complete (one-shot mode), successive waveform generation (continuous).

Triggering/gate
Programmable via register write or external trigger. Minimum pulse width 32nS. Line may be used for gating of counter.

Counter trigger
Interface for triggering counter functions. Input level is RS422 differential digital.

Counter input
Interface for events and pulse/period measurements.Also triggers load of watchdog timer register. Level is RS422 differential digital.

Counter output
Level is RS422 differential digital.

PCI Express Base Specification

Conforms to 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.

Power
3.3V DC ± 5%.

1.6A typical, 2.0A maxium.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP484E-LF
Six 32-bit RS422 counters

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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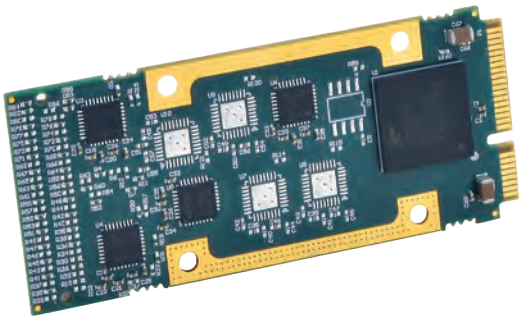
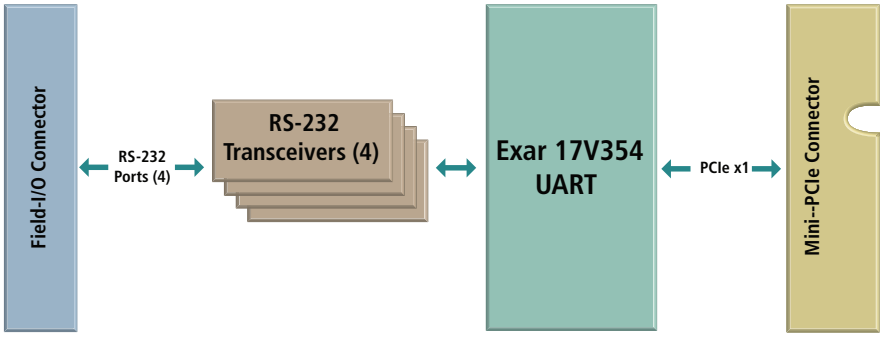
AcroPack® Modules

AP500 Series Communication

CE 2 YEAR WARRANTY RoHS Compliant





Four RS232 Serial Ports ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP500E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

The AP500 modules provide four asynchronous serial communication interfaces for your system. Software-configuration helps you quickly set baud rates, character-sizes, stop bits, and parity. Full signal support for modem control is also included.

For more efficient data processing, each serial port is equipped with 256-character FIFO buffers on the transmit and receive lines.

The data ports generate individually controlled transmit, receive, line status, and data set interrupts. All interrupts can be read from a single register.

The AP500 series modules are 70mm long, this is 19.05mm longer than the full-length mini-PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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. Pin spacing and signal assignments will allow for 100V of signal to signal isolation.

The AP500 series maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- Four RS232E serial ports
- 256-byte FIFO buffers
- Programmable baud rate (up to 500Kbps)
- Individual modem control signals on each channel
- Handshake lines (RTS, CTS, DTR, DSR, DCD, RI)
- Line-break and false start-bit detection
- 16550 compatible register set
- 256-byte FIFO buffers minimize CPU interaction for improved system performance.
- Each serial channel provides full handshake support to simplify interfacing with modems.
- Extended temperature range

Acromag® THE LEADER IN INDUSTRIAL I/O

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

RS232E Serial Ports

Configuration
Independent, non-isolated serial ports with a common single return connection and configured as a DTE device.

Data Rate
Programmable up to 500K bits/second using internal baud rate generator.

Max. Cable Length
15 meters (50 feet) typical, limited to a cable capacitive load of 2500pF

Character size
5 to 8 bits, software-programmable

Parity
Odd, even, or no parity; software-programmable.

Stop bits
1, 1-1/2, or 2 bits; software-programmable

Data register buffers
256-byte receive FIFO buffer and 256-byte transmit FIFO buffer.

Interrupts
Receiver line status (overrun, parity, framing error, or break interrupt); received data available (FIFO level reached) or character time-out; transmitter holding register empty ; or modem status (CTS, DSR, RI, or DCD).

PCI Express Base Specification

Conforms to revision 2.0

Lanes
1 lane in each direction

Bus Speed
2.5 Gbps (Generation 1)

Memory
8k 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 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) 100mA typical

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP500E-LF
Four RS232E serial ports

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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

Acromag®
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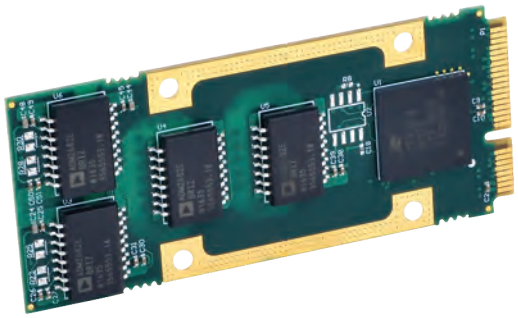
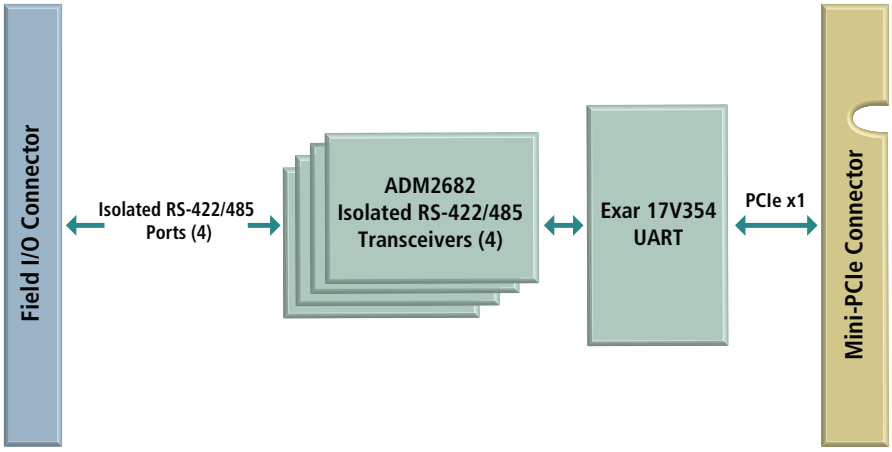
AcroPack® Modules

AP500 Series Communication

CE 2 YEAR WARRANTY RoHS Compliant





Four Isolated RS422/485 Serial Ports ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP512E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

These modules provide four isolated serial communication ports from a single AP carrier slot for a high-densigy solution. Software-configuration helps you quickly set baud rates, character-sizes, stop bits, and parity.

For more efficient data processing, each serial port is equipped with 256-character FIFO buffers on the transmit and receive lines.

The data ports generate individually controlled transmit, receive, line status, data set, and flow control interrupts. All interrupts can be read from a single register.

The AP512 series modules are 70mm long. This is 19.05mm longer than the full length mini PCIe card at 50.95mm. The boards width is the same as mPCIe board of 30mm and they use the same mPCIe standard board hold down standoff and screw keep out areas.

A down facing 100 pin Samtec connector mates with the carrier card. Fifty of these pins are available for field I/O signals. Pin spacing and signal assignments will allow for 100V of port to port isolation.

The AP512 series maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- Four isolated full duplex RS422B serial ports (supports RS485)
- Ports are isolated to 250V from digital and 100V from each other
- 256-byte transmit FIFO buffers
  256-byte receive FIFO buffers
- Programmable baud rate (up to 16Mbps)
- Line-break and false start-bit detection
- Failsafe receivers
- 16550 compatible register set
- High-density design lowers per-port costs and saves IP carrier card slots for other functions.
- 256-byte FIFO buffers minimize CPU interaction for improved system performance.
- Extended temperatures deliver dependable operation in extreme conditions.

Acromag® THE LEADER IN INDUSTRIAL I/O

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Serial Ports

Configuration
Independent, isolated serial ports.

Data Rate
16M bits/second, maximum

Max. Cable Length
1200 meters (4000 feet) typical

Character size
5 to 8 bits, software-programmable

Parity
Odd, even, or no parity; software-programmable.

Stop bits
1, 1-1/2, or 2 bits; software-programmable

Data register buffers
256-byte FIFO buffer

Interrupts
Receiver line status (overrun, parity, framing error, or break interrupt); receive/transmit FIFO level reached or character time-out; Xon/Xoff or special character detected.

PCI Express Base Specification

Conforms to revision 2.0

Lanes
1 lane in each direction

Bus Speed
2.5 Gbps (Generation 1)

Memory
8k 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 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) 450mA typical

Internal Isolated Power
Isolated power is created onboard using ADM2882E Full Duplex RS-485 transceivers, so isolated power does not need to be supplied externally.

MTBF (Mean Time Between Failure)
MTBF in hours using MIL-HDBK-217F, Fn2. Per MIL-HDBK-217, Ground Benign, Controlled, G_BG_C.

25°C:
6,460,240 MTBF hours (737.5 MTBF years).
154.8 failure rate (FIT[1]).

40°C:
3,982,636 MTBF hours (454.6 MTBF years).
251.1 failure rate (FIT[1]).

Note 1: FIT if Failures in 10^9 hours.

Physical

Size
Length: 70mm (2.76 in).
Width: 30mm (1.18 in).
Height: 12.5mm (0.492 in).

Weight
Unit weight: 8.3g (0.293 oz).

Ordering Information

AcroPack® Modules

AP512E-LF
Four Isolated RS422/485 serial ports

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

Accessories

AP-CC-01
Conduction-cool kit

5028-609
Cable, 68-pin VHDCI to four maile DE-9, 7″ long.

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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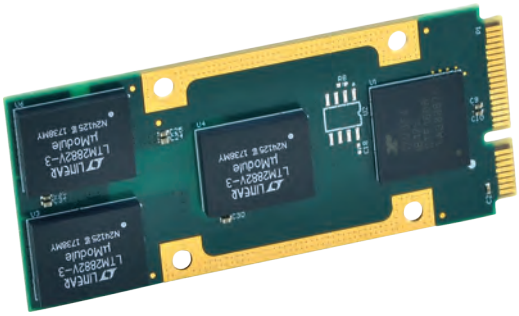
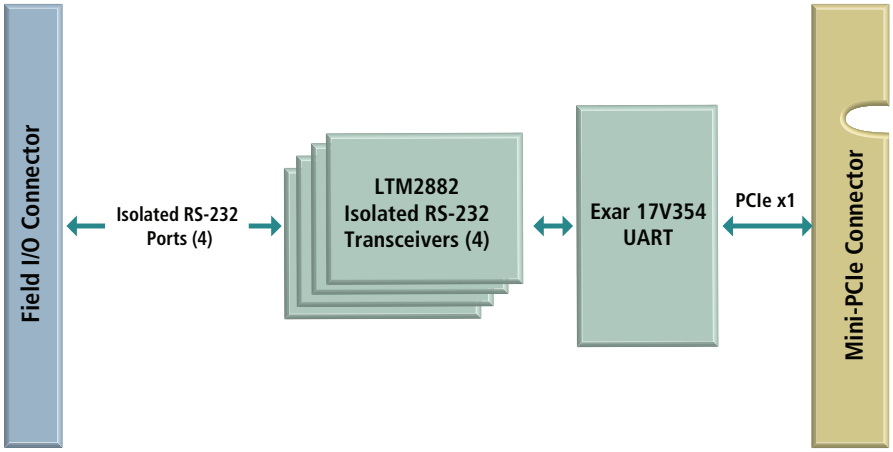
AcroPack® Modules

AP500 Series Communication





Four Isolated RS232 Serial Ports ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP513E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality of the existing Industry Pack modules and a rugged form factor.

These modules provide four isolated serial communication ports from a single AP carrier slot for a high-density solution. Software-configuration helps you quickly set baud rates, character-sizes, stop bits, and parity. RTS/CTS handshake support for modem control is also included.

For more efficient data processing, each serial port is equipped with 256-character FIFO buffers on the transmit and receive lines. The large buffers minimize CPU interaction for improved system performance

The data ports generate individually controlled transmit, receive, line status, data set, and flow control interrupts. All interrupts can be read from a single register.

AcroPack modules are only 30mm wide and 70mm long. This is just 19.05mm longer than a full length mini PCIe card but the same width. AcroPacks also use standard mPCIe board hold down standoffs and screw keep out areas.

A down facing 100 pin Samtec connector mates with the carrier card. Fifty of these pins are available for field I/O signals. Pin spacing and signal assignments will allow for 100V of port to port isolation.

Key Features & Benefits

- Four isolated RS232 serial ports
- Each port isolated (250V) from digital circuitry and (100V) from the other 3 ports
- Internal isolated power created onboard
- Exar Quad UART with 16550-compatible register set
- 256-byte TX and RX FIFOs with programmable triggers for improved system performance
- Programmable baud rate (up to 1Mbps) on each channel with fractional divisors
- Interrupt support with individually controlled transmit, receive, line status, and data set interrupts
- Each channel provides handshake support (RTS, CTS) to simplify interfacing with modems
- General purpose 16-bit timer/counter with internal 125MHz clock supporting single-shot, re-trigger, and interrupts
- Line-break and false start-bit detection

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

AP500 Series Communication

Performance Specifications

Serial Ports

Configuration
Four independent, isolated RS232 serial communication ports configured as a DTE device.

Isolation
Each port has 250V of isolation from digital circuitry and100V of isolation from the other 3 ports.

UART
16550-compatible Exar 17v354.

Transceivers
Four Analog Devices LTM2882 galvanically isolated dual RS232 transceivers compatible with the TIA/EIA-232-F standard.

Data Rate
Programmable up to 1M bits/second using internal baud rate generator.

Max. Cable Length
15 meters (50 feet) typical, limited to a cable capacitive load of 2500pF.

Character size
5 to 8 bits, software-programmable.

Parity
Odd, even, or no parity; software-programmable.

Stop bits
1, 1-1/2, or 2 bits; software-programmable

Data register buffers
256-byte receive FIFO buffer and 256-byte transmit FIFO buffer.

Interrupts
Receiver line status (overrun, parity, framing error, or break interrupt); received data available (FIFO level reached) or character time-out; transmitter (FIFO level reached); or modern status (CTS).

PCI Express Base Specification

Conforms to revision 2.0

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 with minimum airflow of 200LFM.

(Conduction-cooled applications require heatsink kit, Model AP-CC-01)

Storage temperature
-55 to 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) 130mA idle, 200mA typical.

Internal Isolated Power
Isolated power is created onboard using LTM2882 Isolated Transceiver + Power, so isolated power does not need to be supplied externally.

MTBF (Mean Time Between Failure)
MTBF in hours using MIL-HDBK-217F, FN2. Per MIL-HDBK-217, Ground Benign, Controlled, GBGC.

25°C:
6,957,683 MTBF hours (794.3 MTBF years).
143.7 failure rate (FIT[1]).

40°C:
4,548,928 MTBF hours (519.3 MTBF years).
219.8 failure rate (FIT[1]).

Note 1: FIT is Failures in 10^9 hours.

Physical

Size
Length: 70.0mm (2.76 in)
Width: 30.0mm (1.18 in).
Height: 12.5mm (0.4921 in).

Weight
Unit weight: 10.8g (0.382 oz).

Ordering Information

AcroPack® Modules

AP513E-LF
Four Isolated RS232 serial ports

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

Accessories

AP-CC-01
Conduction-cool kit

5028-609
Adapter cable, 68-pin VHDCI to four male DSUB-9 connectors, 7″ long.

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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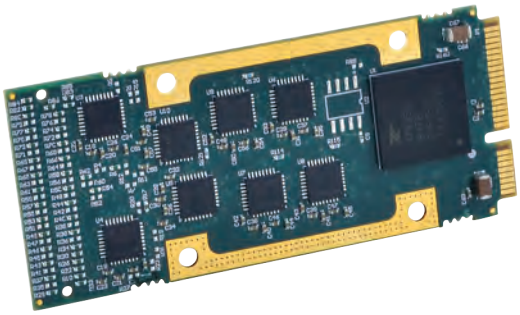
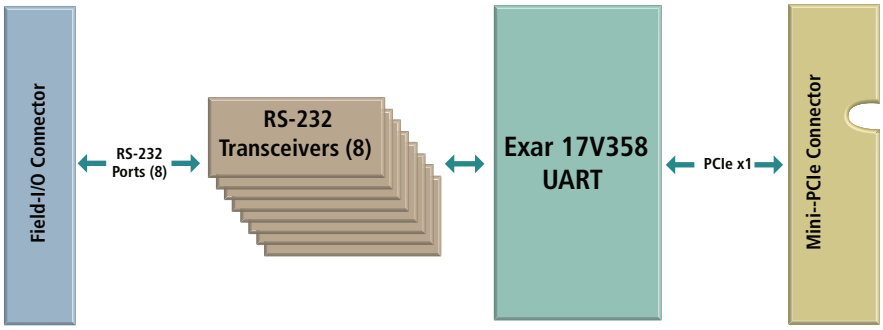
AcroPack® Modules

AP500 Series Communication

CE 2 YEAR WARRANTY RoHS Compliant





Eight RS232 serial ports ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP520-64E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

The AP520 modules provide eight asynchronous serial communication ports from a single AP carrier slot for a high-densigy solution. Software-configuration helps you quickly set baud rates, character-sizes, stop bits, and parity. Signal support for RTS/CTS handshaking is also included..

For more efficient data processing, each serial port is equipped with 256-character FIFO buffers on the transmit and receive lines.

The data ports generate individually controlled transmit, receive, line status, and data set interrupts. All interrupts can be read from a single register.

The AP520 series modules are 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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. Pin spacing and signal assignments will allow for 100V of signal to signal isolation.

The AP520 series maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- PCI Express Generation 1 interface
- Eight RS232E serial ports
- 256-byte transmit FIFO buffers
  256-byte receive FIFO buffers
- Programmable baud rate (up to 500Kbps)
- Individual handshake lines (RTS, CTS) on each channel
- Line-break and false start-bit detection
- 16550 compatible register set
- High-density design lowers per-port costs and saves IP carrier card slots for other functions
- 256-byte FIFO buffers minimize CPU interaction for improved system performance.
- Each serial channel provides handshake support to simplify interfacing with modems.
- Extended temperature range

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

RS232E Serial Ports

Configuration
Independent, non-isolated serial ports with a common single return connection and configured as a DTE device.

Data Rate
Programmable up to 500K bits/second using internal baud rate generator. Consult factory for custom baud rates up to 512K baud

Max. Cable Length
15 meters (50 feet) typical, limited to a cable capacitive load of 2500pF

Character size
5 to 8 bits, software-programmable

Parity
Odd, even, or no parity; software-programmable.

Stop bits
1, 1-1/2, or 2 bits; software-programmable

Data register buffers
256-byte FIFO buffer

Interrupts
Receiver line status (overrun, parity, framing error, or break interrupt); received data available
(FIFO level reached) or character time-out; transmitter (FIFO level reached); or modern status (CTS)

PCI Express Base Specification

Conforms to revision 2.0

Lanes
1 lane in each direction

Bus Speed
2.5 Gbps (Generation 1)

Memory
8k 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 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) 110mA typical

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP520-64E-LF
Eight RS422/485 serial ports

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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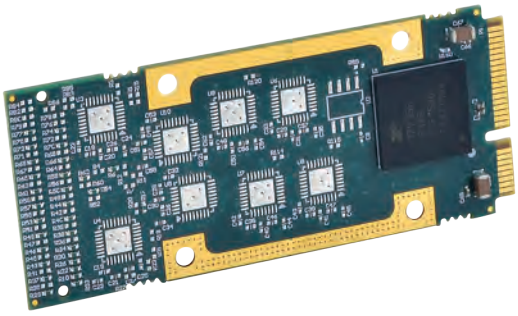
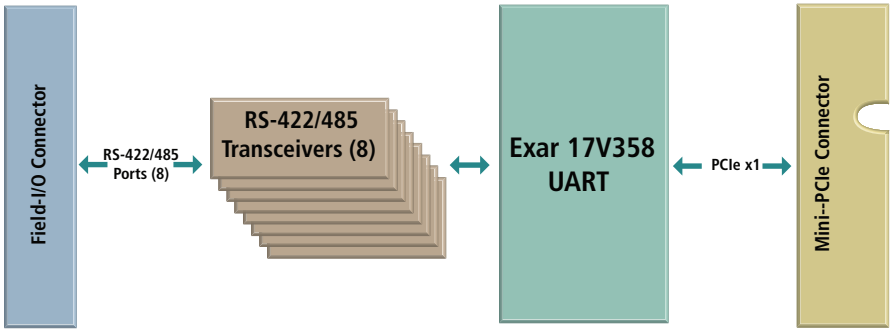
AcroPack® Modules

AP500 Series Communication

CE 2 YEAR WARRANTY RoHS Compliant





Eight RS422/485 serial ports ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Model: AP522E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules and a rugged form factor.

These modules provide eight asynchronous serial communication ports from a single AP carrier slot for a high-densigy solution. Software-configuration helps you quickly set baud rates, character-sizes, stop bits, and parity.

For more efficient data processing, each serial port is equipped with 256-character FIFO buffers on the transmit and receive lines.

The data ports generate individually controlled transmit, receive, line status, data set, and flow control interrupts. All interrupts can be read from a single register.

The AP522 series modules are 70mm long, this is 19.05mm longer than the full length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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. Pin spacing and signal assignments will allow for 100V of signal to signal isolation.

The AP522 series maintains the same functionality and memory map of the existing Industry Pack modules providing a smooth transition to the AcroPack I/O modules.

Key Features & Benefits

- Eight asynchronous, full duplex RS422B serial ports (supports RS485)
- 256-byte transmit FIFO buffers
  256-byte receive FIFO buffers
- Programmable baud rate (up to 20Mbps)
- Individual handshake lines (RTS, CTS) on each channel
- Line-break and false start-bit detection
- Failsafe receivers
- Built-in termination and bias resistors
  Consult factory for no termination
- 16550 compatible register set
- High-density design lowers per-port costs and saves IP carrier card slots for other functions.
- 256-byte FIFO buffers minimize CPU interaction for improved system performance.
- Extended temperatures deliver dependable operation in extreme conditions.

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

Serial Ports

Configuration
Independent, non-isolated serial ports with a common single return connection.

Data Rate
20M bits/second, maximum

Max. Cable Length
1200 meters (4000 feet) typical

Character size
5 to 8 bits, software-programmable

Parity
Odd, even, or no parity; software-programmable.

Stop bits
1, 1-1/2, or 2 bits; software-programmable

Data register buffers
256-byte FIFO buffer

Interrupts
Receiver line status (overrun, parity, framing error, or break interrupt); receive/transmit FIFO level reached or character time-out; Xon/Xoff or special character detected.

PCI Express Base Specification

Conforms to revision 2.0

Lanes
1 lane in each direction

Bus Speed
2.5 Gbps (Generation 1)

Memory
8k space required
1 base address register

Environmental

Operating temperature
-40 to 85°C
a conduction cooled application with an AcroPack requires heatsink model AP-CC-01

Storage temperature
-55 to 125°C

Relative humidity
5 to 95% non-condensing

Power
+3.3V (±5%) 150mA typical
+5V (±5%) 40mA typical

Physical

Length
70mm

Width
30mm

Ordering Information

AcroPack® Modules

AP522E-LF
Eight RS422/485 serial ports

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

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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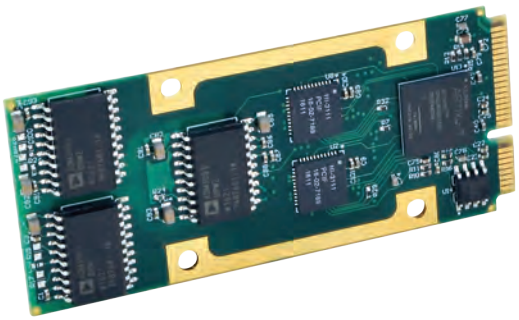
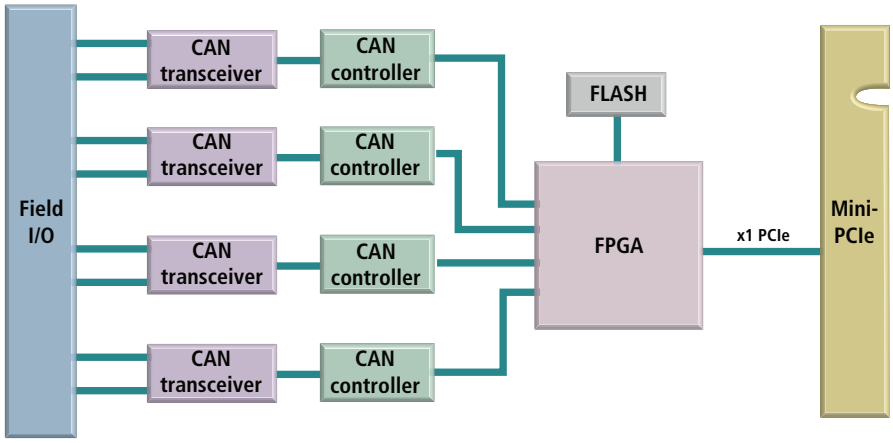
AcroPack® Modules

AP500 Series Communication

CE 2 YEAR WARRANTY RoHS Compliant





Four CAN bus channels with isolation ◆ CAN 2.0A/B ◆ ARINC 825 ◆ CANaerospace

Description

Model: AP560E-LF

AP560 modules provide four independent CAN bus interface channels. Each channel has a Holt H13111 CAN controller with an ADM3053 transceiver. The advantage of this design is that it has the ability to transmit, receive and perform message filtering on extended and standard messages.

This module offers an effective solution for avionics and other applications implementing the CAN 2.0A/B specification. The controller is configurable to comply with both the ARINC 825 and CANaerospace standards. High channel density and high-level isolation make this rugged module well-suited for use in a variety of challenging environments.

The AcroPack CAN module is RoHS compliant and ideal for the following applications:

- Avionics and aerospace
- Defense vehicles
- Marine control and navigation systems

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality of the existing Industry Pack modules and a rugged form factor.

The AP560 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.

Key Features & Benefits

- Four isolated CAN channels
- H13111 CAN bus controller with high-speed ADM3053 CAN transceiver
- 1000V isolation, channel-to-channel and channel-to-host
- ISO 11898 compliance for Part A (11-bit) and Part B extended (29-bit) arbitration IDs
- CAN 2.0A/B protocol with programmable bit rate up to 1Mbit/sec. ISO 11898-5 compliant
- Configurable to support ARINC 825 and CANaerospace Standards
- Standard, Extended and Remote frames supported
- 8 maskable identifier filters
- Filtering on ID and first two data bytes for both Standard and Extended Identifiers
- Monitor (Listen-only) mode
- 8-message Transmit and Receive FIFOs
- Internal 16-bit free running counter for time tagging of transmitted or received messages
- Re-transmission disable capability

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AcroPack® Modules

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Performance Specifications

General

Power

Power Supply	Idle*	Max**
+3.3V	480 mA	500 mA
+5V	66 mA	680 mA

* Idle current draw was measured with no external loop-backs or termination installed and no active communication on any port.

** Max is with all four ports transmitting at 1Mbps.

CAN Bus

Configuration
Four independent CAN bus channels.
Holt H13111 CAN controller with ADM3053 transceiver.

ISO 11898 standard
Supports the standard data and remote frame as well as the extended data and remote frame according to CAN specification 2.0 Part A and Part B.

Isolation
1kV DC isolation.

Maximum data rate
1Mb/S.

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
2K space required.
1 base address register.

Environmental

Operating temperature
-40 to 71°C.
Temperatures above 65°C will require a heatsink model AP-CC-01.

See user manual for airflow specifications.

Storage temperature
-55 to 125°C.

Relative humidity
5 to 95% non-condensing.

Operating Vibration
Designed to comply with IEC 60068-2-64: 10-500Hz, 5G-rms, 2 hours/axis.

Operating Shock
Designed to comply with IEC 60068-2-27: 30G, 11ms half sine, 50G, 3mS half sine, 18 shocks at 6 orientations for both test levels.

EMC Directive
Conforms to EMC Directive 2004/108/EC.

Physical

Length
70mm

Width
30mm

Ordering Information

Model

AP560E-ISO-LF
Quad-channel isolated CAN bus interface module.
(Note: AcroPack modules are compatible only with AcroPack carriers)

Accessories

AP-CC-01
Conduction-cool kit

5028-609
Adapter cable, 68-pin VHDCI to four male DSUB-9 connectors, 7″ long.

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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).

5028-609

AP-CC-01 Conduction-Cool Kit

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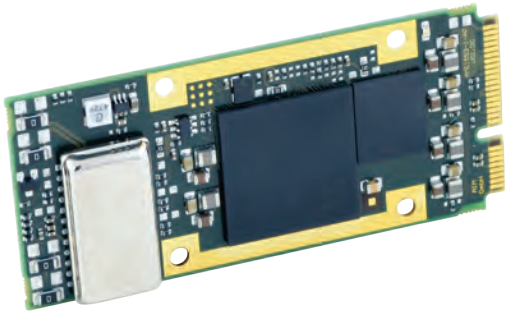
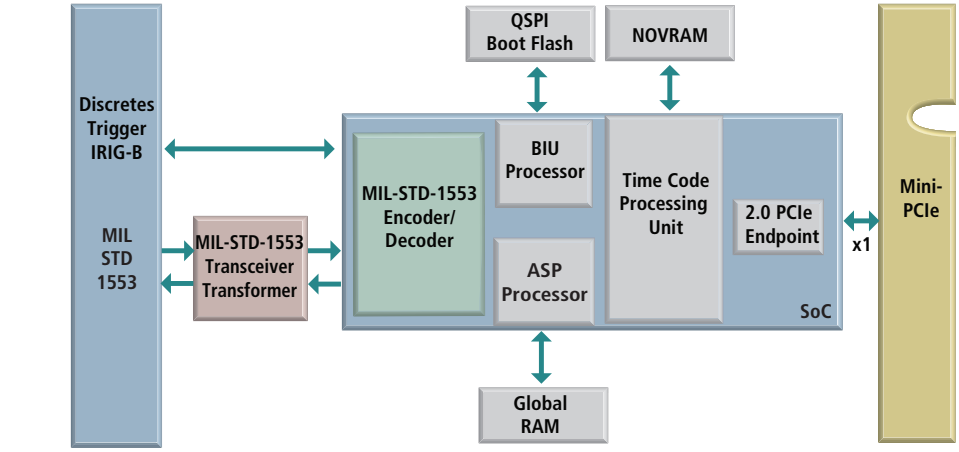
AcroPack® Modules

AP500 Series Communication





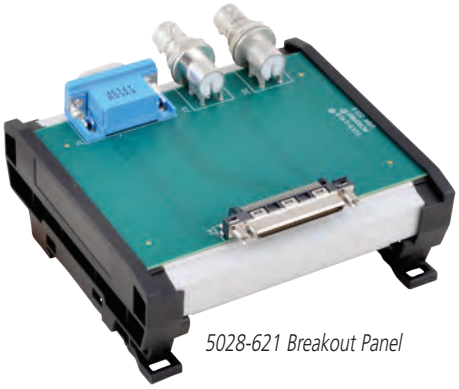
One Dual Redundant MIL-STD-1553 Channel ◆ Extended Temperature ◆ PCIe Bus Interface

Description

Models
AP571-000: Single function MIL-STD-1553.
AP572-000: Full multi-function MIL-STD-1553.

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, and a rugged form factor. Combining different AcroPack module types on one CompactPCi Serial, XMC, VPX, or PCIe carrier allows for a simplified modular approach to system assembly.

These modules provide a dual redundant MIL-STD-1553 channel with four open/ground avionics level (+35V) discrete I/O signals in addition to IRIG-B input and Trigger I/O. Hard wired RT address signal input pins are also available at the connector.



5028-621 Breakout Panel

This Acropack card utilizes the latest AIM Common Hardware Core derived from the field proven MIL-STD-1553 interface to deliver low power consumption and high performance for rugged environments and embedded applications.

Designed for COTS applications these avionics communication mezzanine modules deliver high-density, high-reliability, and high-performance at a low cost.

The AP570 series modules are 70mm long, which is 19.05mm longer than the full-length mini PCIe card at 50.95mm. The board's width is the same as an mPCIe board of 30mm and uses the same mPCIe standard board hold down standoff and screw keep-out areas.

A down-facing 100-pin Samtec connector mates with the carrier card. This ensures a secure connection for your I/O without the vulnerabilities of cabling.

Key Features & Benefits

- Very small form factor at 70mm x 30mm
- One dual redundant MIL-STD-1553 channel
- Transformer or direct coupling options
- IRIG-B input
- 4 open/ground avionics level (+35V) discrete I/O
- 2 digital discrete inputs
- 1 trigger input, 1 trigger output
- RT address inputs
- 128MB global RAM onboard for data scheduling and buffering
- -40°C to +85°C operating temperature
- High performance RISC processors onboard
- Host CPU offload for low CPU utilization
- Hard real time precision and timing
- DMA engine for optimized bus transfers and low PCIe bus utilization
- Flexible & upgradeable firmware design provides full control of obsolescence and configuration management

Acromag® THE LEADER IN INDUSTRIAL I/O

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Features

BC Features

- Autonomous operation including sequencing of multiple minor and major frames.
- Support for acyclic message insertion/deletion.
- Support for instructions for synchronization to external events and timing control.
- Programmable BC retry without host interaction.
- Multi-buffering with real time data buffer updates.
- Synchronization of BC operation to external trigger inputs and outputs.
- 4µs intermessage gaps.
- Interrupt generation on BC transfer events.

Multi-RT Features

- Programmable RT response time down to 4µs for each simulated RT.
- Programmable & intelligent response to mode codes.
- Multi-buffering with real time data buffer updates.
- Mailbox monitor mode.
- Interrupt generation on RT events.

MT Features

- 100% data capture on 1 stream at full bus rates.
- Single shot, continuous or selective capture modes.
- Autonomous message synchronization and full error detection.
- Static/dynamic complex triggers with sequencing.
- Message filter and selective capture.
- Bus activity recording independent from trigger and capture mode.
- Time tagging: – All bus traffic to 1µs – intermessage gaps & response time to 250ns.
- External Trigger Inputs and Outputs.
- Programmable response time.

IRIG-B Time Encoder/Decoder

- Onboard, free wheeling IRIG-B formatted time encoder/decoder for time tagging.
- Amplitude modulated sinusoidal IRIG-B output.
- Synchronization with multiple AIM modules or any IRIG-B compatible module.

Discrete I/O

- 4 bi-directional open/ground +35V avionics discrete I/O signals.
- 2 additional LVTTL digital discrete inputs.
- 6 signals above can be used for hard-wired RT address input support.

Driver Software Support

- Common application programming interface (API) supports C and C#.
- Drivers for 32/64-bit Linux and 32/64-bit Windows7/8/8.1/10.

Performance Specifications

X1 Lane PCIe Interface
Compatible with PCI-Express Standard (Release 2.0).

Memory
128MB RAM.

Processor
SoC device with 2x 400MHz processors.

Time Tagging
46-bit absolute IRIG-B formatted.

Discrete I/O
4 open/ground avionics level discrete I/O. 2 LVTTL digital discrete inputs. 6 signals listed above can be used for RT address inputs.

Trigger I/O
1 BC/BM trigger Input and 1 BC/BM trigger output.

Encoder/Decoder
1x MIL-STD-1553 Encoder/decoder with full error detection bus support.

Physical Bus Interface
Transformer coupled MIL-STD-1553 bus or optional direct coupled MIL-STD-1553 bus.

Connector
100 pin board to board samtec connector.

Dimensions
70mm x 30mm.

Operating Temperature Range
-40°C to +85°C for conduction cooled applications measured at FPGA component case.

-40°C to +70°C for air cooled applications measured at ambient air with 200lfm airflow.

Storage Temperature Range
-55 to +125.

Relative Humidity
5 to 95% non-condensing.

Operational Shock
Tested to IEC 60068-2-27: 30G, 11ms half sine, 50G, 3mS half, 18 shocks at 6 orientations for both test levels.

Sinusoidal Operating Vibration
Tested to IEC 60068-2-6: 10-500Hz, 5G, 2 hours/axis.

Random Operating Vibration
Tested to IEC 60068-2-64: 10-500Hz, 5G-rms, 2 hours/axis.

Ordering Information

AcroPack® Modules

AP571-000
One dual redundant single function MIL-STD-1553 channel (BC + BM or multi-RT + BM operation).

AP572-000
One dual redundant full multi-function MIL-STD-1553 ch. (BC + multi-RT + BM simultaneous operation).

Options (Contact factory for ordering)

- Direct coupled MIL-STD-1553 Bus.
- Safety critial monitoring only (Tx inhibit).
- Polyurethane conformal coating.

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

Accessories

5028-621
Breakout panel for AP570 series. Converts 68-pin CHAMP to two TRB jacks and one DB15 connector.

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

Software *(see software documentation for details)*

See Acromag.com for board support packages

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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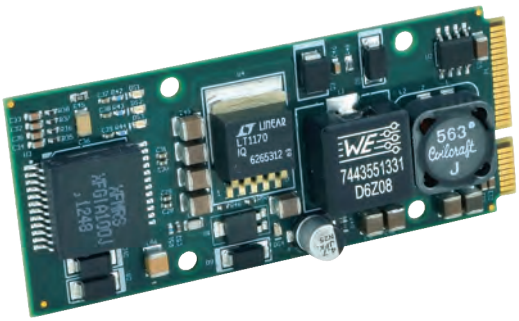
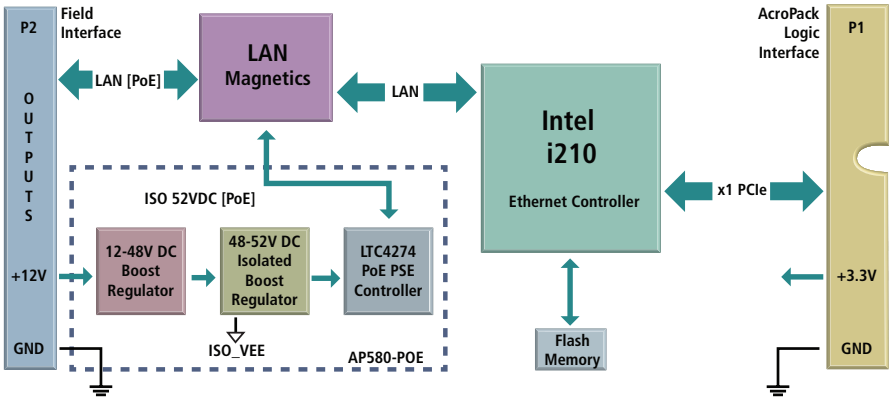
AcroPack® Modules

AP500 Series Communication





1Gb Ethernet ◆ Optional Power Over Ethernet ◆ PCIe Bus Interface

Description

Models

AP580E-LF: S1Gb Ethernet board.
AP580E-POE-LF: 1Gb Ethernet with Power Over Ethernet.

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, and a rugged form factor. Combining different AcroPack module types on one XMC, VPX, or PCIe carrier allows for a simplified modular approach to system assembly.

These modules provide a single port Ethernet which is capable of speeds of 10, 100 or 1000 Mbps data rates.

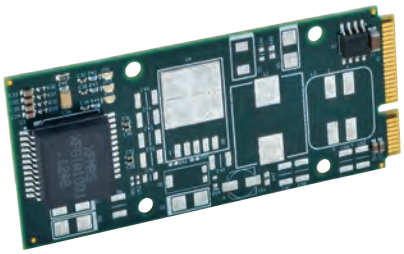
The AP580E-POE-LF offers an option which makes the AP580E a power sourcing equipment device (PSE) that provides 52V DC up to 10 watts of power to powered devices (PD) such as a video camera and VOIP phones or any other PD device. This allows a user to connect point to point without contending with any other traffic on a network.

Designed for COTS applications these Ethernet communication mezzanine modules deliver high-density, high-reliability, and high-performance at a low cost.

The AP580 series modules are 70mm long, this is 19.05mm longer than the full-length mini PCIe card at 50.95mm. The board's width is the same as mPCIe board of 30mm and they 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. This ensures a secure connection for your I/O.

Fifty of these signals are available as field I/O signals.



Model AP580E-LF

Key Features & Benefits

- Power over Ethernet as a power sourcing device
- Supports Intel i210 Ethernet controller PROset drivers
- Small form factor
- Intel 1Gb i210 Ethernet Controller
- Single port
- Failsafe receivers
- Audio Video bridging
- Jumbo frames
- Interrupt moderation, VLAN support and IP checksum offload
- PCIe optimized system power management
- Four transmit and four receive queues
- RSS and MSI-X to lower CPU utilization in multi-core systems
- Advanced cable diagnostics, auto MDI-X
- Error correcting memory in packet buffers
- CE compliant

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

General

Power

Power Supply Voltage	Current Draw
+3.3V DC ±5%	115 mA (max.)
1.5V DC	Not used
5.0V DC	Not used
+12V DC	1.5A (min.)*
-12V DC	Not used

*AP580E-POE-LF only

AP580E-POE-FL Output Power
52V DC at 0.193A (max.) 10 watts.

Isolation
POE output voltage, 100V DC.

PCI Express Base Specification

Conforms to revision 2.1

Lanes
1 lane.

Bus Speed
2.5 Gbps (Generation 1).

Memory
4K required.

Environmental

Operating temperature
-40 to 70°C.

Storage temperature

-55 to 125°C

Relative humidity
5 to 95% non-condensing.

Operating Vibration
Designed to comply to MIL-STD-810G, method 514.6.

Operating Shock
Designed to comply to MIL-STD-810G, method 516.6.

EMC Directive
Conforms to EMC Directive 2004/108/EC.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

AP580E-LF
1Gb Ethernet board.

AP580E-POE-LF
1Gb Ethernet with Power Over Ethernet.

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

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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).

AP580POE shown with AP580

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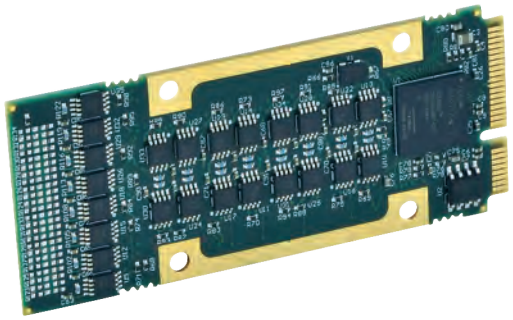
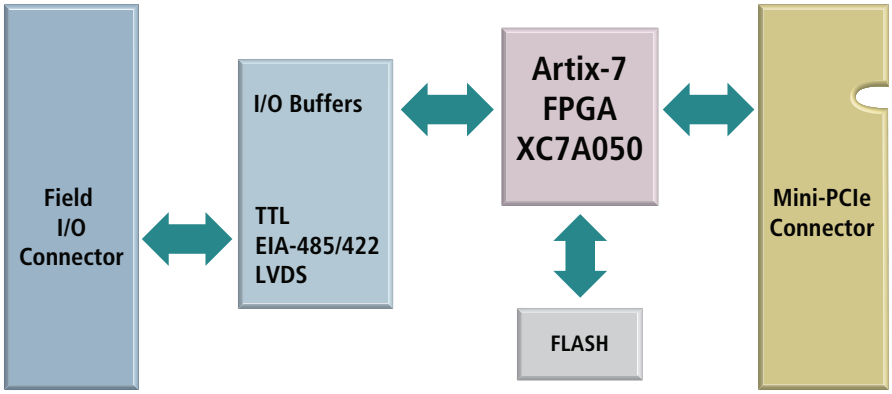
AcroPack® Modules

APA7 Series User-Configurable Artix®-7 FPGA I/O Modules

CE 2 YEAR WARRANTY RoHS Compliant





Reconfigurable Xilinx® Artix®-7 FPGA ◆ Conduction or Air Cooled ◆ PCIe Bus Interface

Description

Models

APA7-501E-LF: 48 TTL channels
APA7-502E-LF: 24 EIA-485/422 channels
APA7-503E-LF: 24 TTL and 12 EIA-485/422 channels
APA7-504E-LF: 24 LVDS channels

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality as the existing Industry Pack modules and a rugged form factor.

The APA7-500 series provides a FPGA based user-configurable bridge between a host processor and a custom digital interface via PCI Express. These boards feature a best in class Artix®-7 interface to deliver the industry's lowest power and high performance.

Designed for COTS applications these FPGA based digital I/O modules deliver user-customizable I/O, high-density, high-reliability, and high-performance at a low cost.

The APA7-500 series modules are 70mm long. This is 19.05mm longer than the full length mini PCIe card at 50.95mm. The boards width is the same as mPCIe board of 30mm and they use the same mPCIe standard board hold down standoff and screw keep out areas.

A down facing 100 pin Samtec connector mates with the carrier card. Fifty of these pins are available for field I/O signals.

The Engineering Design Kit provides users with basic information required to develop custom FPGA firmware for download to the Xilinx FPGA. Example FPGA design code is provided as a Vivado IP Integrator project for functions such as a one-lane PCI Express interface, DMA, digital I/O control register, and more. Users should be fluent in the use of Xilinx Vivado design tools.

Key Features & Benefits

- PCI Express Generation 1 interface
- Reconfigurable Xilinx® FPGA
- High channel count digital interface: RS485, LVDS and TTL interface options.
- 32Mb quad serial Flash memory
- 52,160 logic cells
- 65,200 Flip flops
- 2,700 kb block RAM
- 120 DSP slices
- External LVTTL clock input
- Long distance data transmission
- Example design
- Power up and systemd reset is failsafe
- Conduction-cooled options

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

FPGA

FPGA device
Xilinx Artix-7 FPGA Model XC7A50T.

FPGA configuration
Download via flash memory.

Example FPGA program
IP integrator block diagram provided for PCIe bus 1 lane Gen 1 interface, DMA controller, on chip block RAM, flash memory and control of field I/O.
See EDK kit.

I/O Processing

Field I/O Interface
PCIe bus 1 lane Gen 1 interface .

I/O Connector
100 pin field I/O connector.

Engineering Design Kit

Provides user with basic information required to develop a custom FPGA program. Kit must be ordered with the first purchase of a APA7-500 series module (see www.acromag.com for more information).

PCI Express Base Specification

Conforms to revision 2.0

Lanes
1 lane in each direction.

Bus Speed
2.5 Gbps (Generation 1).

Memory
128k space required.
1 base address register.

Environmental

Operating temperature

Air Cooled with heat sink
-40 to 80°C.

Air Cooled without heat sink
-40 to 70°C.

Conduction Cooled
-40 to 85°C.

A conduction cooled application with an AcroPack requires heatsink model AP-CC-01.

Storage temperature
-55 to 125°C .

Relative humidity
5 to 95% non-condensing.

Power
+3.3V (±5%) 500mA typical.

Physical

Length
70mm.

Width
30mm.

Ordering Information

AcroPack® Modules

APA7-501E-LF
48 TTL channels.

APA7-502E-LF
24 EIA-485/422 channels.

APA7-503E-LF
24 TTL & 12 EIA-485/422 channels.

APA7-504E-LF
24 LVDS channels.

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

Accessories

AP-CC-01
Conduction-cool kit.

APA7-EDK
Engineering design kit. *(One kit required)*

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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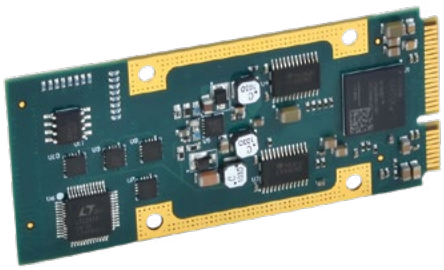
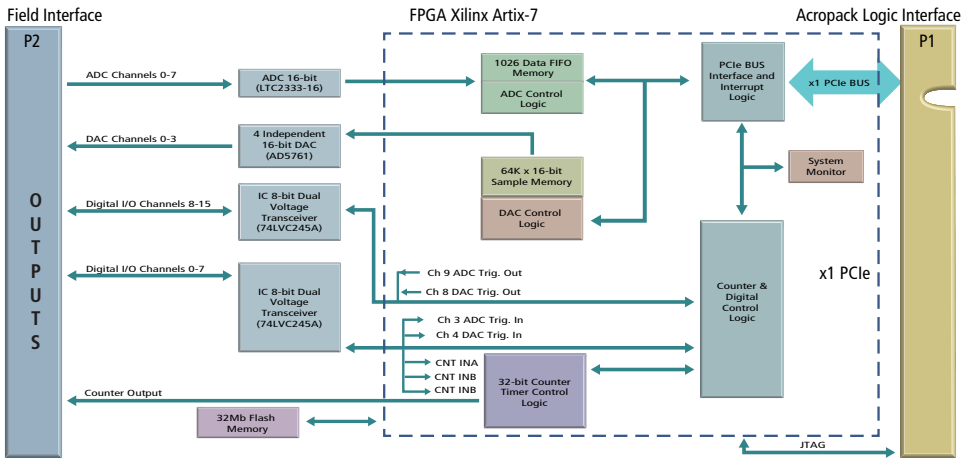
AcroPack® Modules

AP700 Series Multi-function I/O





Analog input ◆ Analog output ◆ Digital I/O ◆ Counter/timers ◆ PCIe Bus Interface

Models

AP730E-LF: Multi-function I/O

The AP730 mini PCIe-based interface board provides a variety of I/O functions on a single plug-in card. This new high-density module performs both high-speed and high resolution A/D and D/A conversions. It also includes digital I/O and counter/timer functions.

Now you can conserve your precious AcroPack slots and still get all the I/O functionality you need. The AP730 is designed for extreme versatility with many deluxe features to meet most applications. However, the AP730 is still very budget-friendly.

The AP730 modules are 70mm long (19.05mm longer than the full-length mini PCIe card at 50.95mm). The board's width is the same as an mPCIe board at 30mm and uses the same standard board hold down standoff and screw keep out areas.

A down facing 100 pin Samtec connector will mate with the carrier card. This ensures a secure connection for your I/O. Fifty of these signals are available as field I/O signals.

Key Features & Benefits

Analog Inputs

- Eight differential input channels (±10.24V, ±10.0V, ±5.12V, ±5.0V, 0 to 10.24V, 0 to 10.0V, 0 to 5.12V ranges)
- 16-bit ADC with integral sample-and-hold and reference
- 1.264µS conversion time (791KHz rate)
- 1026 sample FIFO buffer
- Programmable FIFO threshold conditions for interrupts, DMA transfers, and flags
- User-programmable channel conversion sequence and timing
- External trigger input or output
- Factory calibration constants stored in on-board flash memory for error correction

Analog Outputs

- Four analog output channels (±3V, ±5V, ±10V, -2.5 to +7.5V, 0-5V, and 0-10V ranges)
- Individual 16-bit DACs per channel with 7.5µS settling time
- Flexible operating mode, trigger, and memory allocation
- Configurable for direct access, single burst, continuous, or streaming (FIFO) output
- Reliable software calibration with coefficients stored on-board
- FIFO for waveform generation
- Interrupt on user-programmable FIFO threshold
- Shared 64K x 16-bit sample memory

Digital I/O

- 16 bidirectional input/output channels (direction configured in 8-channel groups)
- TTL-compatible thresholds
- Programmable change-of-state/level interrupts
- Failsafe power-up and system reset

Counter/Timers

- Multi-function 32-bit counter/timer
  - Quadrature Position measurement
  - Pulse Width modulation
  - Watchdog timer
  - Event counter
  - Frequency measurement
  - Pulse-width or period measurement
- One-shot and repetitive one-shot pulse waveform generation
- Programmable interface polarity
- Internal or external triggering
- CMOS compatible thresholds

General

- DMA transfer support to move data between module memory and PCIe bus
- Software development tools for VxWorks®, Linux®, and Windows® environments

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AcroPack® Modules

ISO9001
AS9100
MADE IN USA

Performance Specifications

General

Power Supply Voltage	Current Draw
3.3 VDC ±5%	250mA typ., 300mA max.
1.5 VDC ±5%	260mA typ., 300mA max.
5.0 VDC ±5%	85mA typ., 280mA max.
+12 VDC ±5%	22mA typ., 30mA max.
-12 VDC ±5%	3.5mA typ., 15mA max.

Analog Input

Input channels
8 differential, voltage (non-isolated).

Resolution
16 bits.

Conversion rate
791,139.24Hz maximum.

Settling time
Full-scale step 420 ns to 0.005% of FSR.

Input ranges
Software-selectable on a per channel basis.
Bipolar: ±10.24V, ±10.0V ±5.12V, ±5.0V.
Unipolar: 0 to 10.24V, 0 to 10.0V, 0 to 5.12V.

Calibrated error
±3.125 LSB max. (0 to 5.12V).
±2.125 LSB max. (all other ranges).

Analog Output

Output channels
4 single-ended voltage (non-isolated).

Resolution
16 bits.

Settling Time
12.5 µs 20 V step to 1 LSB maximum.
8.5 µs 10 V step to 1 LSB maximum.
7.5 µs typical.

Output ranges (software-selectable)
Bipolar: ±10V, ±5V, ±3V, -2.5 to +7.5V.
Unipolar: 0 to 10V, 0 to 5V.

Output current: ± 10mA maximum (minimum load resistance of 1KΩ with a 10V output).

Calibrated error: ±2.125 LSB (±0.0032% FSR) max.

Digital I/O

Input/output range
0 to 5V.

Signal thresholds
VIH: 2.0V minimum.
VIL: 0.8V maximum.
IOH: 24 mA maximum.
IOL: 24mA maximum.
VOH: 3.7V minimum VCCA.
VOL: 0.55V maximum VCCA.

Minimum pulse
32nS.

Debounce
Filters signals with duration 4.0 µs.

Counter/Timer

Configuration: 32-bit timer.

Counter input: TTL input port.

Counter output: MOSFET output port.

Counter output pull-up voltage:
+5V with 1K pull-up.

Internal clock: 62.5MHz, 15.625MHz, 7.8125MHz, 3.90625MHz, 1.953125MHz.

PCIe Compliance

Conforms to revision 2.1

Lanes
1 lane.

Bus Speed
2.5 Gbps (Generation 1).

Memory
1MB required.

Environmental

Operating temperature
-40 to 85°C.
Temperatures above 70°C requires an AcroPack heatsink conduction-cool kit, model AP-CC-01.

Storage temperature
-55 to 100°C.

Relative humidity
5 to 95% non-condensing.

Operating Vibration
Designed to comply with IEC 60068-2-64: 10-500Hz, 5G-rms, 2 hours/axis.

Operating Shock
Designed to comply with IEC 60068-2-27: 30G, 11ms half sine, 50G, 3mS half sine, 18 shocks at 6 orientations for both test levels.

EMC Directive
Conforms to EMC Directive 2004/108/EC.

Physical

Length
70mm

Width
30mm

Ordering Information

Model

AP730E-LF
Multi-function I/O module.

Accessories

AP-CC-01
Conduction-cool kit

Carrier Cards

See Acromag.com/AcroPack-Carriers for a full list of AcroPack carrier cards.

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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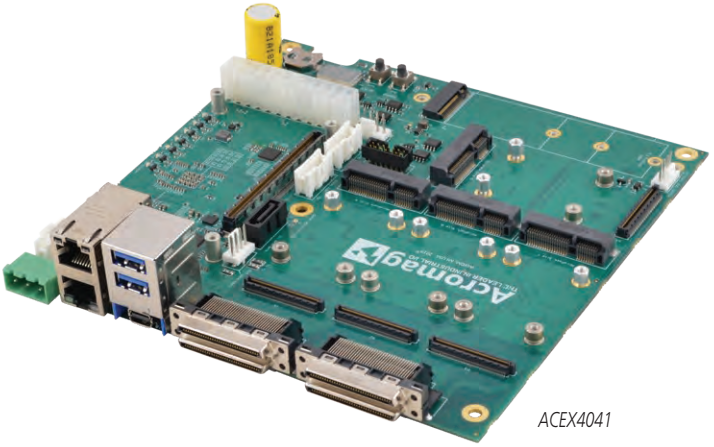
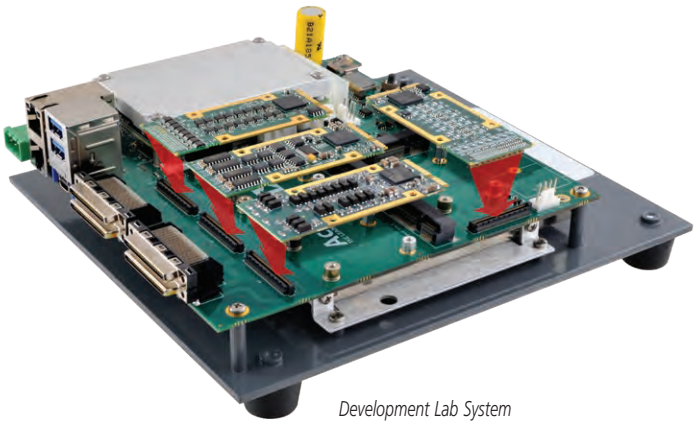
COM Express AcroPack® I/O Carriers

ACEX4040 Carrier for COM Express Type 10 and AcroPack I/O modules

CE 2 YEAR WARRANTY RoHS Compliant



ACEX4041



Development Lab System
AcroPack modules sold separately

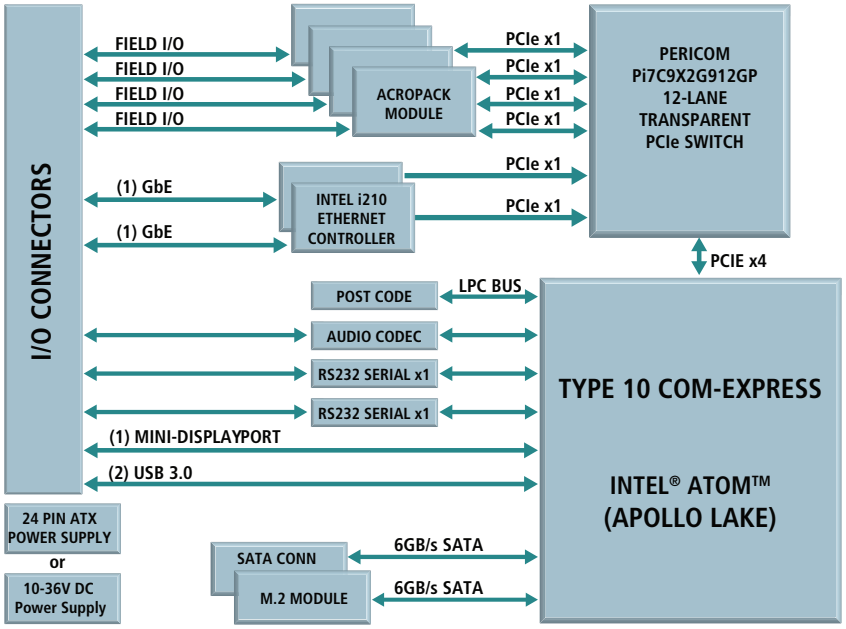
Mini ITX form factor ◆ COM Express Type 10 site ◆ Four I/O expansion slots (AcroPack® or MiniPCIe)

Description

The ACEX4040 carrier card allows you to quickly combine a COM Express Type 10 CPU module with a mix of I/O modules for custom computing applications. With its rugged design and compact Mini-ITX form factor, this carrier card is easily mounted in a variety of enclosures for rapid development. High-density I/O connectors and numerous ports simplify interfacing to field devices and peripherals.

Select from 25+ AcroPack modules to install any combination of analog I/O, digital I/O, serial I/O, communication, and FPGA processor functions.

Designed for use in systems with size, weight, power and cost restrictions (SWaP-C), this carrier card provides a flexible solution for a broad range of signal processing tasks. The COM Express site supports high-performance, low-power Intel Atom CPU modules. The four I/O slots interface Acromag's rugged AcroPack modules or Mini PCIe cards enabling a powerful mix of measurement, control, and communication capabilities. An M.2 slot offers flexible on-board storage while a SATA connector provides additional data storage options.



Key Features & Benefits

- Mini-ITX format for easy mounting
- Support for COM Express Type 10 Intel Atom CPU (Apollo Lake)
- Four AcroPack / mini PCIe slots for field I/O
  - A/D and D/A analog I/O
  - Digital I/O and counter/timers
  - Serial communication
  - Ethernet communication
  - CANbus communication
  - Mil-STD 1553 and ARINC 429
  - FPGA signal processing
  - Many more
  - Ports available
    - Four field I/O 68-pin CHAMP
    - Two GbE RJ45 ports
    - Mini-DisplayPort
    - Two USB 3.0 ports
    - Two COM RS232 ports
- One M.2 site
- One SATA connector
- -40 to 85°C extended temperature range
- Redundant auto-switch power capability using ATX and 10-36V DC power supplies

Acromag® THE LEADER IN INDUSTRIAL I/O

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Bulletin #8400-989b

COM Express AcroPack® I/O Carriers

Performance Specifications

Processor Interface

Compatibility
Provides an electrical and mechanical interface for an industry standard COM Express Type 10 Mini (55mm x 84mm) CPU module.

CPU module must have four PCIe lanes configured as an x4 port for optimal performance.

CPU Option
Intel® Atom™ E3950 quad-core, 1x4 PCIe configuration, 1.6/2.0GHz (Turbo) , 4GB RAM, 12W.

Interface
COM Express module provides CPU, memory, PCIe bus, SATA, USB, serial communication, graphics, and other computing functions.

PCIe Switch
9-port 12-lane PCIe Gen 2 switch expands the single host PCIe x4 port to 6 independent x1 ports (one for each AcroPack site and one for each Ethernet controller).

I/O Interfaces

AcroPack / Mini PCIe Expansion I/O
Four slots for plug-in I/O modules. Two isolated slots. Field I/O routed to 68-pin VHDCI connectors.

Ethernet Interfaces
Two Intel i210 Gigabit Ethernet Controllers. Two RJ-45 ports supporting 10/100/1000BASE-T.

Data Storage
M.2: Expansion site supports SATA III devices, speeds up to 6Gb/s. Accepts 2242, 2260 and 2280 SSD Socket 2/3 (mechanical Key B/M) modules.

SATA: Data and power connectors for use of a Solid-State Disk Drive. Supports SATA III devices, speeds up to 6Gb/s.

Serial Communication
Two ports with standard UART (RX/TX) RS-232 signal levels.

USB
Two USB 3.0 ports with speeds up to 5Gb/s.

Audio
Realtek HD Audio CODEC with line in / line out.

Video
Mini DisplayPort for high-resolution graphics.

JTAG
14-pin Xilinx JTAG header for programming and debugging FPGA AcroPack modules.

Electrical / Mechanical

Form Factor
Mini-ITX form factor.

Size: 6.692 x 6.692 inches (170 x 170mm).
Weight: .6.698 oz. (189.9 g).

PCI Express
Complies with PCI Express Specification, Rev. 2.1.

PICMG
Complies with PICMG COM Express COM.0 Specification Rev. 3.0. Conforms to COM Express Carrier Design Guide Rev. 2.0.

Power Requirement
Accepts powered from a standard 24-pin ATX power supply or a 10-36V DC power supply. Carrier will auto-switch between power sources.

+3.3 Volts (±5 %) 0.383A, typical.
+12 Volts (±8 %) 0.175A, typical.

Fuses
Individually fused +1.5V, +3.3V, +5V, +12V, and -12V DC power.

Environmental

Temperature Range
Operation: -40 to 85°C (200 lfm airflow min.)
Storage: -55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Shock, Operating
Designed to comply with IEC 60068-2-27. 30G, 11ms half sine, 50G, 3mS half sine, 18 shocks at 6 orientations for both test levels.

Vibration, Operating
Sinusoidal: Designed to comply with IEC 60068-2-6. 10-500Hz, 5G, 2 Hours/axis.

Random: Designed to comply with IEC 60068-2-64. 10-500Hz, 5G-rms, 2 Hours/axis.

Certifications
CE compliant.

Coating / Sealant
Conformal coating available on request.

MTBF
According to MIL-HDBK-217 FN2, GBGC.

25°C: Contact factory.
40°C: Contact factory.

Software Support

Operating Systems
AcroPack series products require support drivers specific to your operating system. Supported operating systems include Linux®, Windows®, and VxWorks®.

Power ON Self-Test (POST)
POST codes output to 2-digit LED for debugging.

Ordering Information

Carrier Boards

ACEX4041: Mini-ITX carrier board for COM Express Type 10 CPU and AcroPack modules

ACEX4041-2000: Mini-ITX carrier board with COM Express Type 10 Intel Atom E3950-4G CPU

DLS4041-2110: Development Lab System includes ACEX4041 mounted on a panel and populated with Type 10 CPU module, 500GB M.2 module, and 500GB 2.5" SSD

Accessories

For more information, see www.acromag.com.

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long

5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long

5028-617: Audio cable

5028-618: Serial COM cable

5028-622: ACEX4041 long finned CPU heatsink

5028-623: ACEX4041 short finned CPU heatsink

5028-624: ACEX4041 CPU heatsink with fan

5028-628: ACEX4041 Cable shutdown

5028-629: I/O panel with overlay

Software

See software documentation for details.

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

APSW-API-VXW: VxWorks software support package

APSW-API-WIN: Windows DLL driver software support pkg

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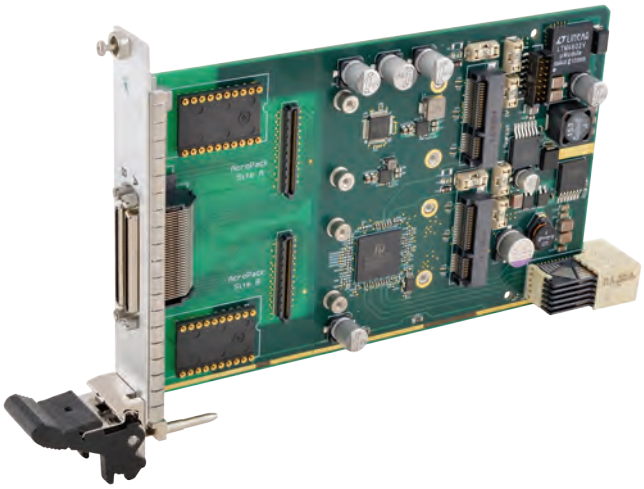
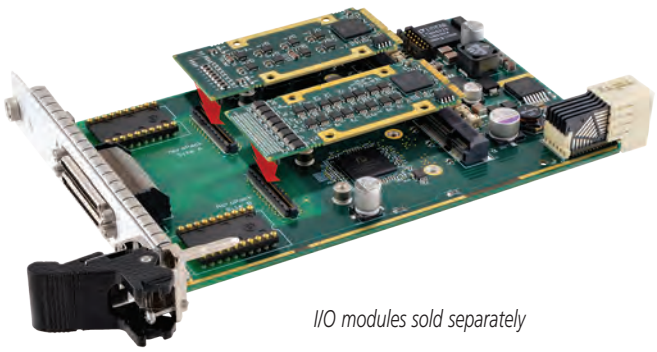
AcroPack® Carriers

ACPS3300 Series CompactPCI® Serial Carrier Cards for AcroPack Modules

CE 2 YEAR WARRANTY RoHS Compliant





I/O modules sold separately

3U CompactPCI Serial ◆ Two isolated I/O expansion slots (AcroPack or mPCIe) ◆ Front I/O access

Description

Model: ACPS3310

The ACPS3310 is a 3U CompactPCI Serial carrier card for Acromag's AcroPack mezzanine modules. Two isolated I/O expansion slots interface AcroPack or mini PCIe modules to the PCIe bus. All connections to field signals are made through front panel connectors on the carrier board which passes them to the individual AcroPack modules.

Select from 25+ AcroPack modules to install any combination of analog I/O, digital I/O, serial I/O, communication, and FPGA processor functions. This modular approach allows the user to create a board which is customized to the application, thus saving slots and reducing costs.

The AcroPack product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact, low-cost I/O solution with the same functionality and memory map of the original Industry Pack mezzanine modules. New modules offer additional capabilities such as FPGA computing, Ethernet, CAN bus, and avionics interfaces.

These carriers are ideal for high-performance systems in aerospace, defense, transportation, oil/gas, test/measurement, manufacturing, and scientific research applications. End-users and system integrators benefit from a broad range of I/O functions in a small form factor.

Key Features & Benefits

General

- Two AcroPack or mini-PCIe module slots support any combination of I/O functions
- PCI Express Version 2.1 compliant carrier
- Compliant with PICMG CPCI-S.0 R2.0 standard
- PCIe switch allows two devices to share a single 4HP peripheral board slot in a CPCI-S chassis
- Geographical addressing identifies carrier location on the backplane
- Front panel 68-pin VHDCI CHAMP 0.8mm connectors for field I/O signals
- Isolated power supply option for use with isolated AcroPack modules
- Fused +1.5V, +3.3V, +5V, +12V, -12V DC power. A fuse is present on each supply line serving each AcroPack module.
- JTAG header for programming and debugging AcroPack modules with an FPGA
- Extended temperature range
- Software development tools for VxWorks, Linux, and Windows environments

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AcroPack® Carriers

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Performance Specifications

Interfaces

CompactPCI Serial
CompactPCI Serial (CPCI-S.0) peripheral slot card with P1 connector. PCIe x4. Geographical addressing (GA0-GA3).

PCI Express
PCIe Gen 2 switch expands host PCIe port to two ports, one for each AcroPack site. The host port has one or four PCIe lanes (depending on CPCI-S slot). Each AcroPack site has one lane.

AcroPack / Mini PCIe Mezzanine
Two AcroPack or mPCIe (full-length) slots. PCIe x1.
Site B includes USB 2.0 interface.

Front panel interface: Each AcroPack module routes to a 68-pin VHDCI CHAMP connector (stacked).

Rear interface: Both AcroPack modules have a PCIe x1 link (via switch) to the CPCI-S P1 connector.

Isolation: Host logic and field I/O isolated from each other up to 250V AC/DC continuous (1500V AC for one minute). Optional isolated DC/DC converter is required for use with isolated AcroPack modules. Carrier also provides 100VAC/DC continuous isolation between AcroPack module signals. Isolation between adjacent pins/signals on front I/O cable is 30V.

Compliance

CompactPCI Serial
Meets or exceeds PICMG® CPCI-S.0 R2.0.

PCI Express
PCI Express Version 2.1 compliant carrier.

EMC
Designed to comply with EMC Directive 2004/108/EC.
Immunity: EN 61000-6-2.
Emissions: EN 61000-6-4, Class A.

Electrical / Mechanical

Power Requirements
+12V supply (±10%): 290mA typical with no AcroPacks installed.

The ACPS3310 has four DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface.
The +5V, +3.3V, +1.5V and -12V supplies are sourced from the +12V host power.

Dimensions
3U CompactPCI Serial 4HP.
Size: 100 x 160 mm (3.937 x 6.299 inches).
Weight: 158 g.

Environmental

Operating / Storage Temperature Range
Operation: -40 to 85°C (200 LFM airflow).
Storage: -55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Shock, Operating
Designed to comply with IEC 60068-2-27: 30G, 11ms half sine, 50G, 3mS half sine, 18 shocks at 6 orientations for both test levels.

Vibration, Operating
Sinusoidal: Designed to comply with IEC 60068-2-6: 10-500Hz, 5G, 2 Hours/axis.

Random: Designed to comply with IEC 60068-2-64: 10-500Hz, 5G-rms, 2 Hours/axis.

Certifications
CE compliant.

Coating/Sealant
Conformal coating available on request.

MTBF
According to MIL-HDBK-217 FN2, GBGC.
25°C: Contact factory.
40°C: Contact factory.

Software Support

Operating Systems
Drivers available for Linux®, Windows® and VxWorks®.

Ordering Information

Carrier Boards

ACPS3310: 3U CPCI-S carrier, two AcroPack/mPCIe sites, front I/O, air-cooled

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long

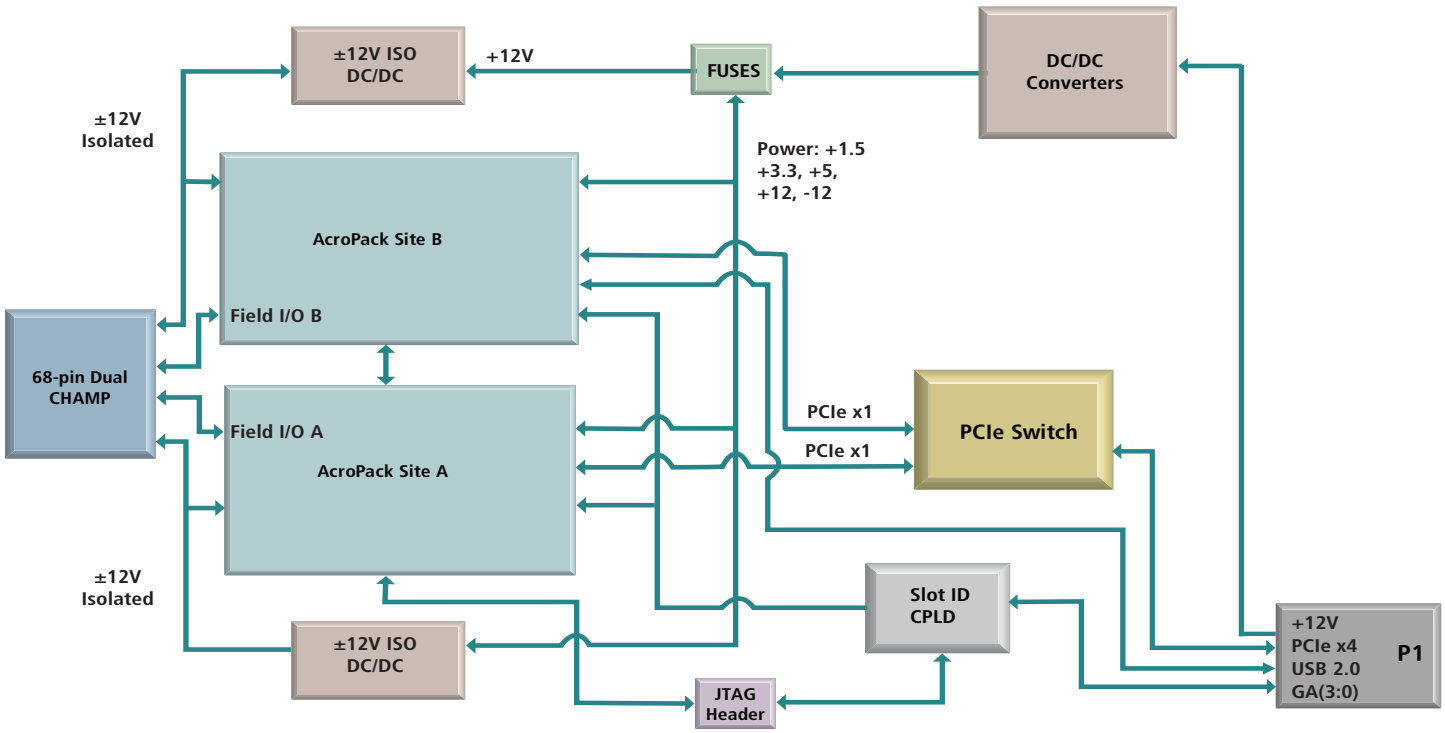
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long

Software *(see software documentation for details)*

APSW-API-LNX: Linux® support (website download only)

APSW-API-VXW: VxWorks software support package

APSW-API-WIN: Windows DLL driver software support pkg



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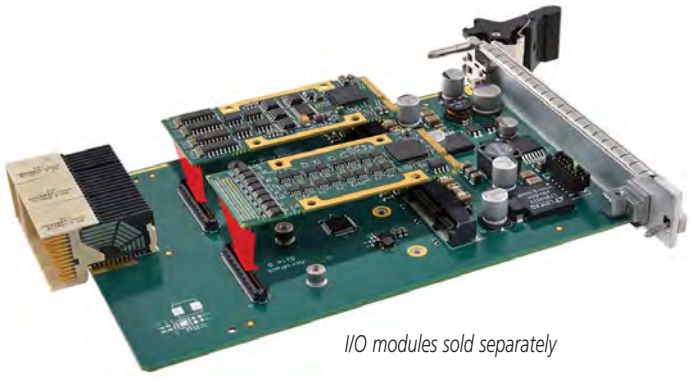
AcroPack® Carriers

ACPS3300 Series CompactPCI® Serial Carrier Cards for AcroPack Modules

CE 2 YEAR WARRANTY RoHS Compliant



I/O modules sold separately

3U CompactPCI Serial ◆ Two I/O expansion slots (AcroPack or mPCIe) ◆ Rear I/O access

Description

Model: ACPS3320

The ACPS3320 is a 3U CompactPCI Serial carrier card for Acromag's AcroPack mezzanine modules. Two I/O expansion slots interface AcroPack or mini PCIe modules to the PCIe bus. All connections to field signals are made through rear backplane connectors on the carrier board which passes them to the individual AcroPack modules.

Select from 25+ AcroPack modules to install any combination of analog I/O, digital I/O, serial I/O, communication, and FPGA processor functions. This modular approach allows the user to create a board which is customized to the application, thus saving slots and reducing costs.

The AcroPack product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact, low-cost I/O solution with the same functionality of the original Industry Pack mezzanine modules. New modules offer additional capabilities such as FPGA computing, Ethernet, CAN bus, and avionics interfaces.

These carriers are ideal for high-performance systems in aerospace, defense, transportation, oil/gas, test/measurement, manufacturing, and scientific research applications. End-users and system integrators benefit from a broad range of I/O functions in a small form factor.

Key Features & Benefits

General

- Two AcroPack or mini-PCIe module slots support any combination of I/O functions
- PCI Express Version 2.1 compliant carrier
- Compliant with PICMG CPCI-S.0 R2.0 standard
- PCIe switch allows two devices to share a single 4HP peripheral board slot in a CPCI-S chassis
- Geographical addressing identifies carrier location on the backplane
- Fused +1.5V, +3.3V, +5V, +12V, -12V DC power. A fuse is present on each supply line serving each AcroPack module.
- JTAG header for programming and debugging AcroPack modules with an FPGA
- Extended temperature range
- Software development tools for VxWorks®, Linux®, and Windows® environments

ACPS3320-RTM

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AcroPack® Carriers

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Performance Specifications

Interfaces

CompactPCI Serial
CompactPCI Serial (CPCI-S.0) peripheral slot card with P1 connector. PCIe x4. Geographical addressing (GA0-GA3).

PCI Express
PCIe Gen 2 switch expands host PCIe port to two ports, one for each AcroPack site. The host port has one or four PCIe lanes (depending on CPCI-S slot). Each AcroPack site has one lane.

AcroPack / Mini PCIe Mezzanine
Two AcroPack or mPCIe (full-length) slots. PCIe x1.
Site B includes USB 2.0 interface.

Rear interface: Both AcroPack modules have a PCIe x1 link (via switch) to the CPCI-S P1 connector.

Field I/O
Fifty field I/O signals from each AcroPack are brought out to CPCI-S backplane connectors P2 and P3.

Compliance

CompactPCI Serial
Meets or exceeds PICMG® CPCI-S.0 R2.0.

PCI Express
PCI Express Version 2.1 compliant carrier.

EMC
Designed to comply with EMC Directive 2004/108/EC.
Immunity: EN 61000-6-2.
Emissions: EN 61000-6-4, Class A.

Electrical / Mechanical

Power Requirements
+12V supply (±10%): 290mA typical with no AcroPacks installed.

The ACPS3320 has four DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface.
The +5V, +3.3V, +1.5V and -12V supplies are sourced from the +12V host power.

Dimensions
3U CompactPCI Serial 4HP.
Size: 100 x 160 mm (3.937 x 6.299 inches).
Weight: 163 g.

Environmental

Operating / Storage Temperature Range
Operation: -40 to 85°C (200 LFM airflow).
Storage: -55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Shock, Operating
Designed to comply with IEC 60068-2-27: 30G, 11ms half sine, 50G, 3mS half sine, 18 shocks at 6 orientations for both test levels.

Vibration, Operating
Sinusoidal: Designed to comply with IEC 60068-2-6: 10-500Hz, 5G, 2 Hours/axis.

Random: Designed to comply with IEC 60068-2-64: 10-500Hz, 5G-rms, 2 Hours/axis.

Certifications
CE compliant.

Coating/Sealant
Conformal coating available on request.

Software Support

Operating Systems
Drivers available for Linux®, Windows® and VxWorks®.

Ordering Information

Carrier Boards

ACPS3320: 3U CPCI-S carrier, two AcroPack/mPCIe sites, rear I/O, air-cooled

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

ACPS3320-RTM: Rear transition module, 68-pin CHAMP

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long

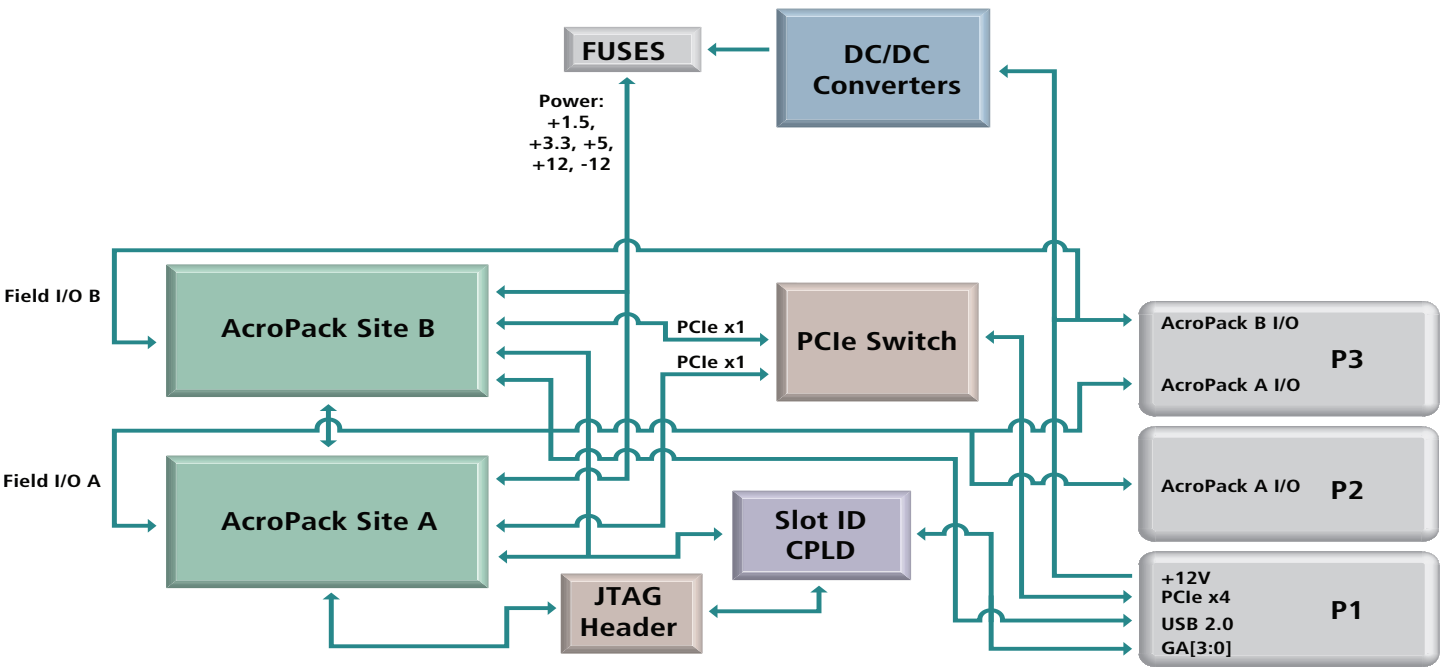
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long

Software *(see software documentation for details)*

APSW-API-LNX: Linux® support (website download only)

APSW-API-VXW: VxWorks software support package

APSW-API-WIN: Windows DLL driver software support pkg



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AcroPack® Carriers

APCe7000 Series PCI Express Carrier Cards for AcroPack® Modules

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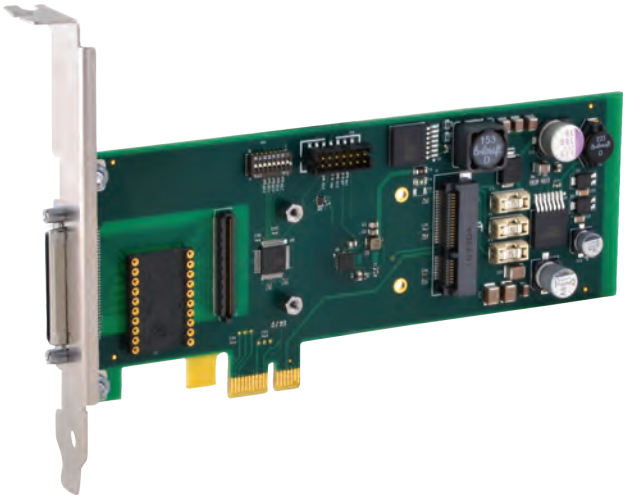

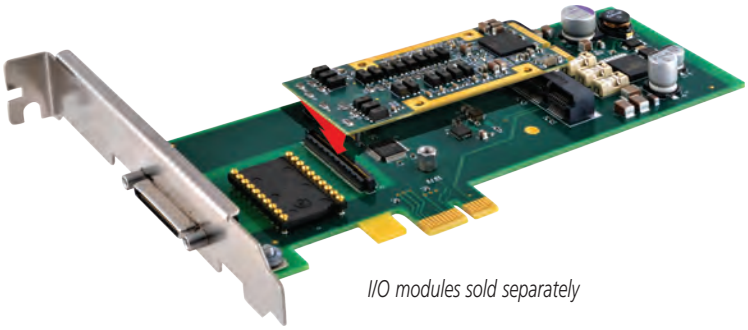

I/O modules sold separately

One AcroPack or mini-PCIe mezzanine module slot ◆ Low-profile PCIe carrier card

Description

Model: APCe7012E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules.

This board interfaces one AcroPack mezzanine module to a PCI Express bus on a PC-based computer system.

Select I/O modules from Acromag's offering or use most third-party mPCIe compliant modules.

Key Features & Benefits

- One AcroPack or mini-PCIe module slot
- PCI Express compliant
- Plug-and-play carrier configuration and interrupt support
- Fused +1.5V, +3.3V, +5V, +12V, and -12V DC power is provided. A fuse is present on each supply line serving each AcroPack module.
- Front panel 68-pin CHAMP 0.8mm connectors for field I/O signals
- Optional isolated power supplies. Support for AcroPacks requiring ±12 Volt isolated power.
- Extended temperature range
- DIP switch card identification
- Standard 14-pin Xilinx JTAG programming header
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

The host port consists of one PCIe lane, each of the mini-PCIe sites have one lane each.

I/O Interface

Connectors
P1 (PCIe Bus): PCIe V2.1.
J3 (Carrier Field I/O): 68-pin, CHAMP
(TE Connectivity 5796055-1).
P2,(AcroPack Field I/O): 100-pin socket
(Samtec SS5-50-3.00-L-D-K-RT).
J1, (Mini-PCIe): 52-pin socket
(TE Connectivity 1759547-1).
P3 (JTAG): 14-pin header (Molex 87832-1420).

Gold plating in the connection area, M2.5 screws and spacers provide excellent connection integrity and stability for harsh environments.

Ease of Use

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules.

Physical

Physical Configuration
PCIe x1 low-profile
Length: 6.3 inches (160 mm).
Height: 2.711 inches (68.86 mm).
Includes standard and low-profile brackets.

Environmental

Operating temperature
-40 to +85°C

Storage temperature
-55 to +125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3 Volts (±10%): 0.55mA typical
+12 Volts (±5%): 25mA Typical

The APCe7012E-LF has DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface. The +1.5 Volt supply is sourced from the +3.3 Volt host power. The +5 Volt and -12 Volt supply is sourced from +12 Volt host power.

Ordering Information

Carrier Card

APCe7012E-LF: AcroPack carrier card for AcroPack or mPCIe modules, one module slot.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals.

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long.

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long.

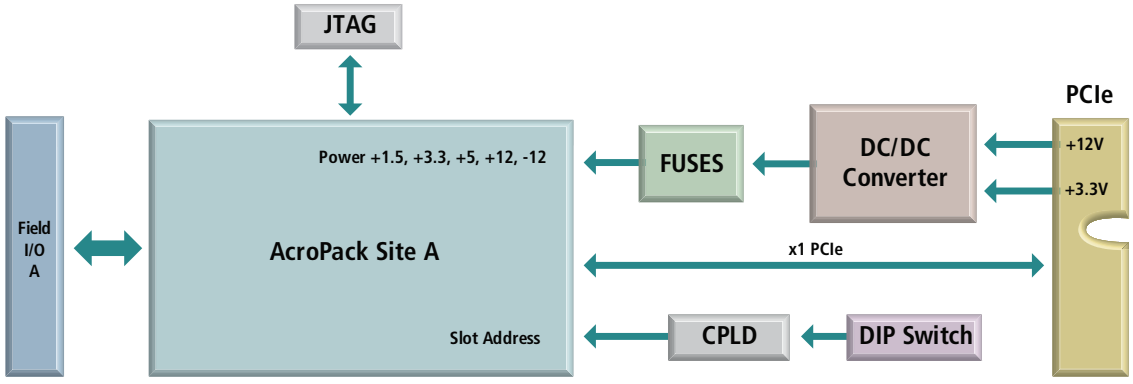
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long.

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks software support package

APSW-API-WIN: Windows DLL driver software support pkg

APSW-API-LNX: Linux® support (website download only)



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AcroPack® Carriers

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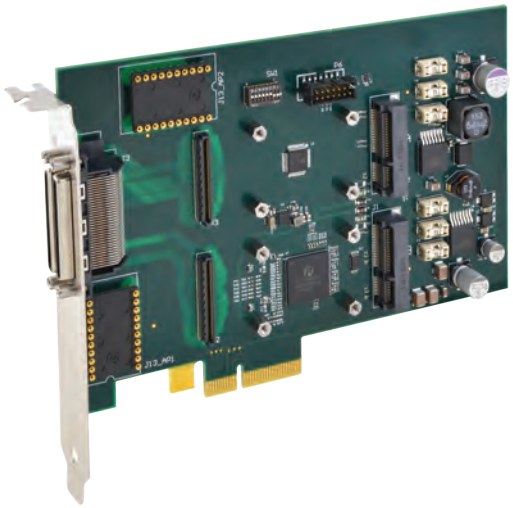

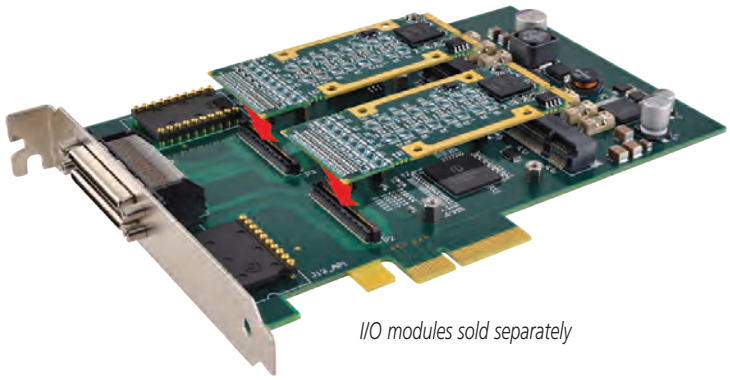

I/O modules sold separately

Two AcroPack or mini-PCIe mezzanine module slots ◆ Non-Intelligent carrier card ◆ PCIe x4 interface

Description

Model: APCe7022E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules.

This board interfaces two AcroPack mezzanine modules to a PCI Express bus on a PC-based computer system.

Two AcroPack module slots give you the freedom to mix a variety of I/O functions (A/D, D/A, digital in, digital out, serial I/O, etc.) on a single board. Or, combine modules of the same type for almost one hundred channels on a single card. Either way, the APCe7022 saves your precious card slots and reduces your costs.

Select I/O modules from Acromag's offering or use most third-party mPCIe compliant modules.

Key Features & Benefits

- Two AcroPack or mini-PCIe module slots support any combination of I/O functions
- PCI Express compliant
- Plug-and-play carrier configuration and interrupt support
- Fused +1.5V, +3.3V, +5V, +12V, and -12V DC power is provided. A fuse is present on each supply line serving each AcroPack module.
- Front panel 68-pin CHAMP 0.8mm connectors for field I/O signals
- Extended temperature range
- DIP switch card identification
- Standard 14-pin Xilinx JTAG programming header
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

Includes a PCIe Gen 2 switch to expand the single host PCIe port to two ports, one to each device (AcroPack or mini-PCIe).

The host port consists of four PCIe lanes, each of the mini-PCIe sites have one lane each.

I/O Interface

Connectors
P1 (PCIe Bus): PCIe V2.1 x4 lane (PCIe Gen 2 Switch).
J3 (Carrier Field I/O): 68-pin, stacked, CHAMP (TE Connectivity 5787962).
P2, 3 (AcroPack Field I/O): 100-pin socket (Samtec SS5-50-3.00-L-D-K-RT).
J1, 2 (Mini-PCIe): 52-pin socket (TE Connectivity 1759547-1).
P6 (JTAG): 14-pin header (Molex 87832-1420).

Gold plating in the connection area, M2.5 screws and spacers provide excellent connection integrity and stability for harsh environments.

Ease of Use

A unique carrier and site number can be set for each AcroPack site by a DIP switch. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the two AcroPack modules are daisy-chained.

Physical

Physical Configuration
PCIe x4 lane.
Length: 6.3 inches (160.02 mm).
Height: 4.375 inches (111.12 mm).

Environmental

Operating temperature
-40 to +85°C with 200 LFM airflow.

Storage temperature
-55 to +125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3 Volts (±5%): 0.5 A typical.
+12 Volts (±8%): 27mA Typical.

The APCe7022E-LF has three DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface. The +1.5 Volt supply is sourced from the +3.3 Volt host power. The +5 Volt and -12 Volt supply is sourced from +12 Volt host power.

Ordering Information

Carrier Card

APCe7022E-LF: AcroPack carrier card for AcroPack or mPCIe modules, plus extended temperature range.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals.

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long.

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long.

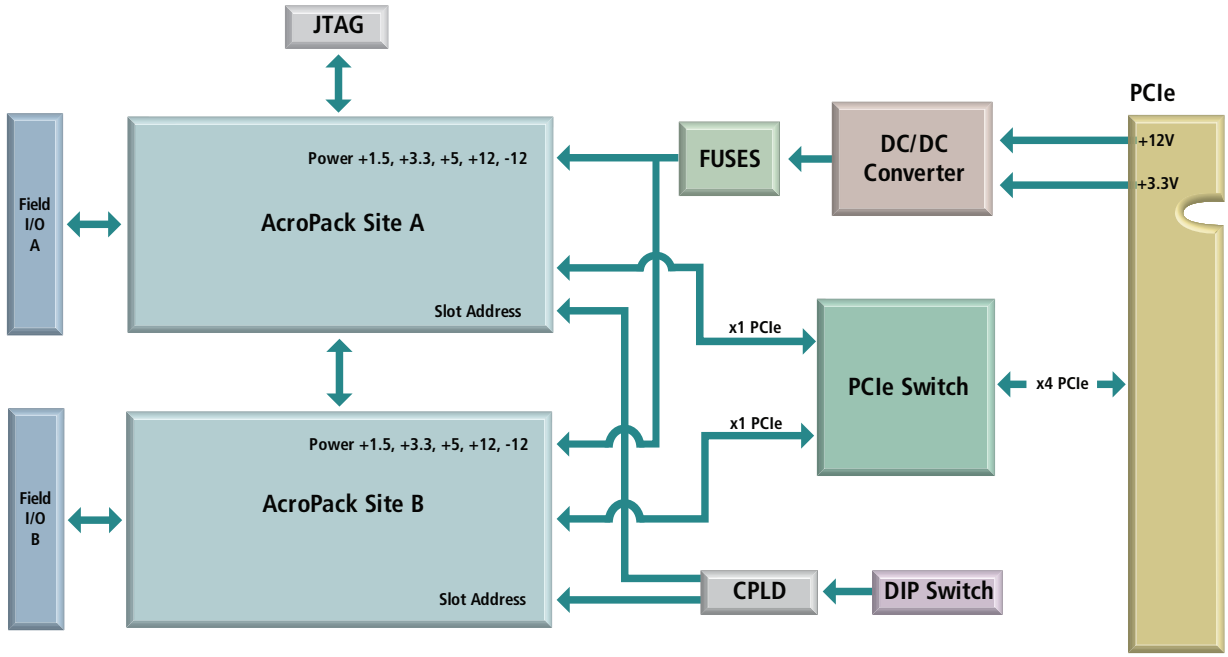
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long.

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks software support package.

APSW-API-WIN: Windows DLL driver software support pkg.

APSW-API-LNX: Linux® support (website download only).



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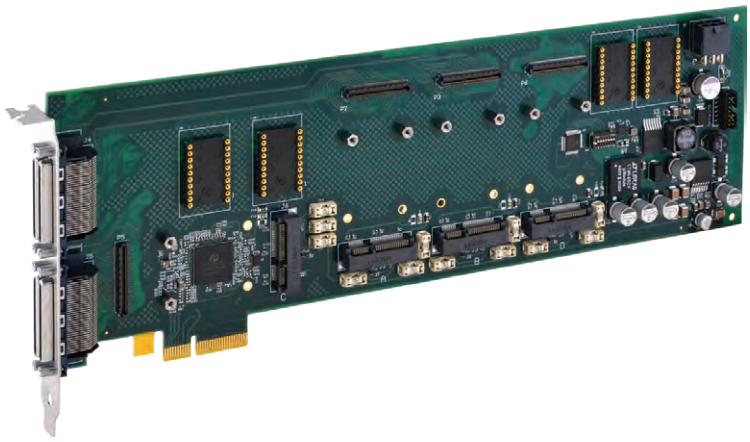
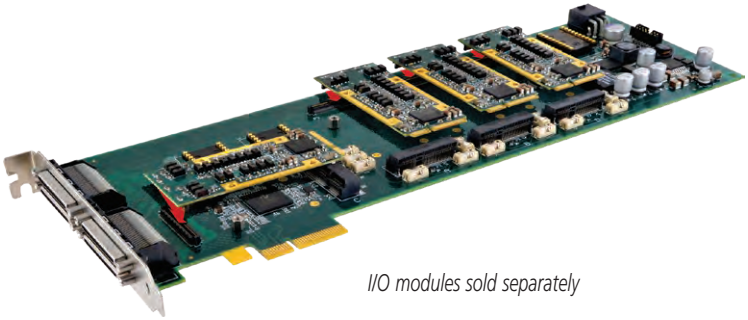
AcroPack® Carriers

APCe7000 Series PCI Express Carrier Cards for AcroPack® Modules

CE 2 YEAR WARRANTY RoHS Compliant





I/O modules sold separately

Four AcroPack or mini-PCIe mezzanine module slots ◆ Non-Intelligent carrier card ◆ PCIe x4 interface

Description

Model: APCe7040E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules.

This board interfaces four AcroPack mezzanine modules to a PCI Express bus on a PC-based computer system. It is designed to provide isolation between the AcroPack field I/O signals and the host when used with an isolated AcroPack module.

Four AcroPack module slots give you the freedom to mix a variety of I/O functions (A/D, D/A, digital in, digital out, serial I/O, FPGA, etc.) on a single board. Or, combine modules of the same type for almost two hundred channels on a single card. Either way, the APCe7040 saves your precious card slots and reduces your costs.

Select I/O modules from Acromag's offering or use most third-party mPCIe compliant modules.

Key Features & Benefits

- Four AcroPack or mini-PCIe module slots support any combination of I/O functions
- PCI Express 2.1 compliant
- Plug-and-play carrier configuration and interrupt support
- Fused +1.5V, +3.3V, +5V, +12V, and -12V DC power is provided. A fuse is present on each supply line serving each AcroPack module.
- Front panel 68-pin VHDC1 CHAMP 0.8 connectors for field I/O signals
- Optional isolated power supplies. Support for AcroPacks requiring ±12 V isolated power.
- Extended temperature range
- DIP switch card identification
- Standard 14-pin Xilinx JTAG programming header
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

Includes a PCIe Gen 2 switch to expand the single host PCIe port to four ports, one to each device (AcroPack or mini-PCIe).

The host port consists of four PCIe lanes, each of the mini-PCIe sites have one lane each.

I/O Interface

Front I/O
Connector: Four 68-pin CHAMP cable connections. Pin assignments are defined by the installed AcroPack module.

The field side connector of the AcroPack I/O module mates to a Samtec SS5-50-3.00-L-D-K-TR socket connector P2 on the carrier board.

Gold plating in the connection area, M2.5 screws and spacers provide excellent connection integrity and stability for harsh environments.

Ease of Use

A unique carrier and site number can be set for each AcroPack site by a DIP switch. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the four AcroPack modules are daisy-chained.

Physical

Physical Configuration
PCIe x4 lane.
Length: 12.283 inches (312.0 mm).
Height: 4.375 inches (111.12 mm).

Environmental

Operating temperature
-40 to +85°C.

Storage temperature
-55 to +125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3 Volts (±10%): 0.383mA typical.
+12 Volts (±5%): 0.175mA typical.

The APCe7040E-LF has four DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface. The +1.5 Volt supply is sourced from the +3.3 Volt host power. The +5 Volt, +3.3 Volt and -12 Volt supply is sourced from +12 Volt host power.

Ordering Information

Carrier Card

APCe7040E-LF: AcroPack carrier card for AcroPack or mPCIe modules, four module slots.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals.

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long.

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long.

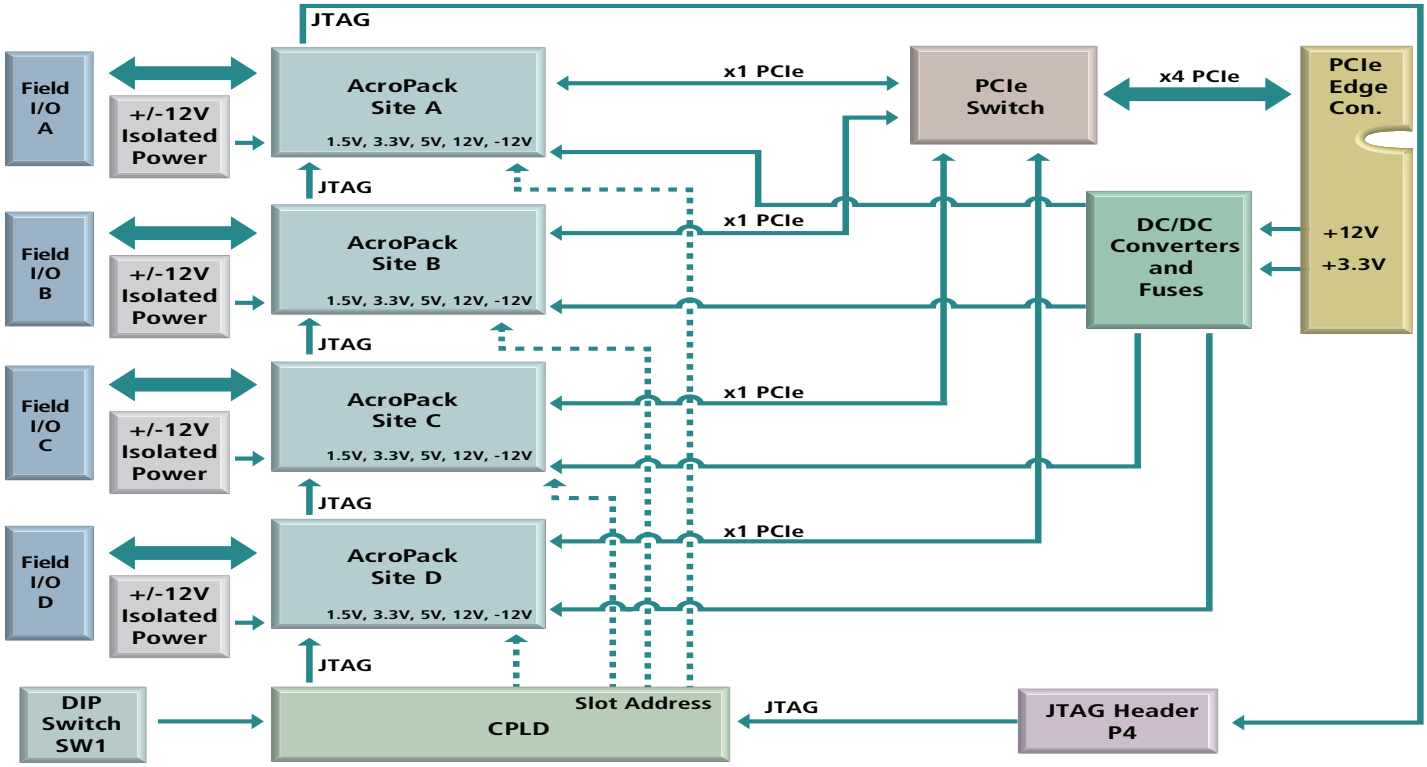
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long.

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks software support package.

APSW-API-WIN: Windows DLL driver software support pkg.

APSW-API-LNX: Linux® support (website download only).



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AcroPack® Carriers

APCe7000 Series PCI Express Carrier Cards for AcroPack® Modules

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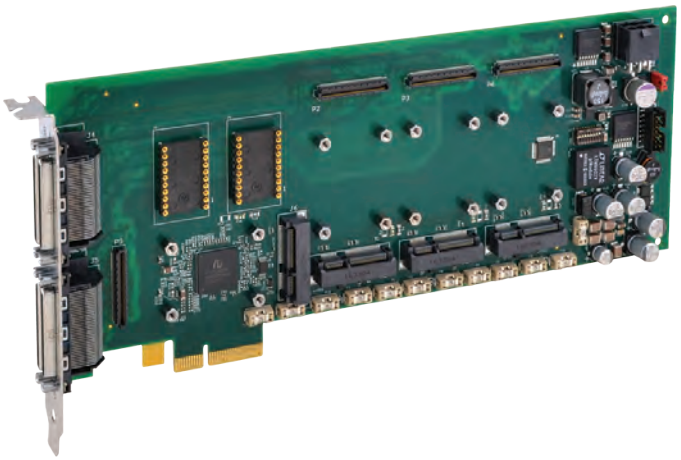

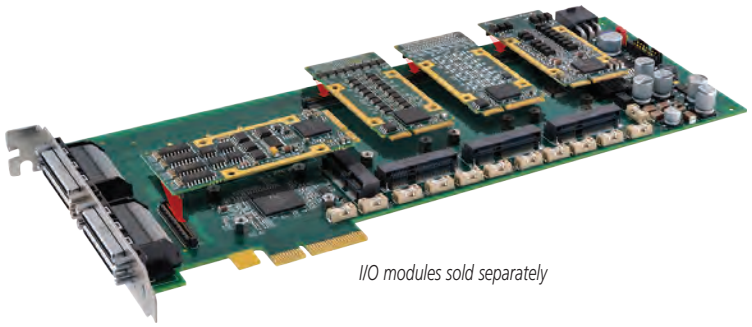

I/O modules sold separately

Four AcroPack or mini-PCIe mezzanine module slots ◆ Non-Intelligent carrier ◆ 3/4-length PCIe x4 interface

Description

Model: APCe7043E-LF

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules.

This board interfaces four AcroPack mezzanine modules to a PCI Express bus on a PC-based computer system. It is designed to provide isolation on two slots between the AcroPack field I/O signals and the host when used with an isolated AcroPack module.

Four AcroPack module slots give you the freedom to mix a variety of I/O functions (A/D, D/A, digital in, digital out, serial I/O, FPGA, etc.) on a single board. Or, combine modules of the same type for almost two hundred channels on a single card. Either way, the APCe7043 saves your precious card slots and reduces your costs.

Select I/O modules from Acromag's offering or use most third-party mPCIe compliant modules.

Key Features & Benefits

- Four AcroPack or mini-PCIe module slots support any combination of I/O functions
- 3/4-length PCIe card (10 inches)
- PCI Express 2.1 compliant, x4 interface
- Plug-and-play carrier configuration and interrupt support
- Fused +1.5V, +3.3V, +5V, +12V, and -12V DC power is provided. A fuse is present on each supply line serving each AcroPack module.
- Front panel 68-pin VHDC1 CHAMP 0.8 connectors for field I/O signals
- Optional isolated power supplies on two slots. Support for AcroPacks requiring ±12 V isolated power.
- Extended temperature range
- DIP switch card identification
- Standard 14-pin Xilinx JTAG programming header
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

Includes a PCIe Gen 2 switch to expand the single host PCIe port to four ports, one to each device (AcroPack or mini-PCIe).

The host port consists of four PCIe lanes, each of the mini-PCIe sites have one lane each.

I/O Interface

Front I/O
Connector: Four 68-pin CHAMP cable connections. Pin assignments are defined by the installed AcroPack module.

The field side connector of the AcroPack I/O module mates to a Samtec SS5-50-3.00-L-D-K-TR socket connector P2 on the carrier board.

Gold plating in the connection area, M2.5 screws and spacers provide excellent connection integrity and stability for harsh environments.

Ease of Use

A unique carrier and site number can be set for each AcroPack site by a DIP switch. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the four AcroPack modules are daisy-chained.

Physical

Physical Configuration
PCIe x4 lane.
Length: 10.0 inches (253.99 mm).
Height: 4.375 inches (111.12 mm).

Environmental

Operating temperature
-40 to +85°C.

Storage temperature
-55 to +125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3 Volts (±10%): 0.383mA typical.
+12 Volts (±5%): 0.175mA typical.

Ordering Information

Carrier Card

APCe7043E-LF: AcroPack carrier card for AcroPack or mPCIe modules, four module slots.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, DIN-rail mountable, SCSI-3 connector, 68 screw terminals.

5028-420: Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP. 0.8mm, 2 meters long.

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long.

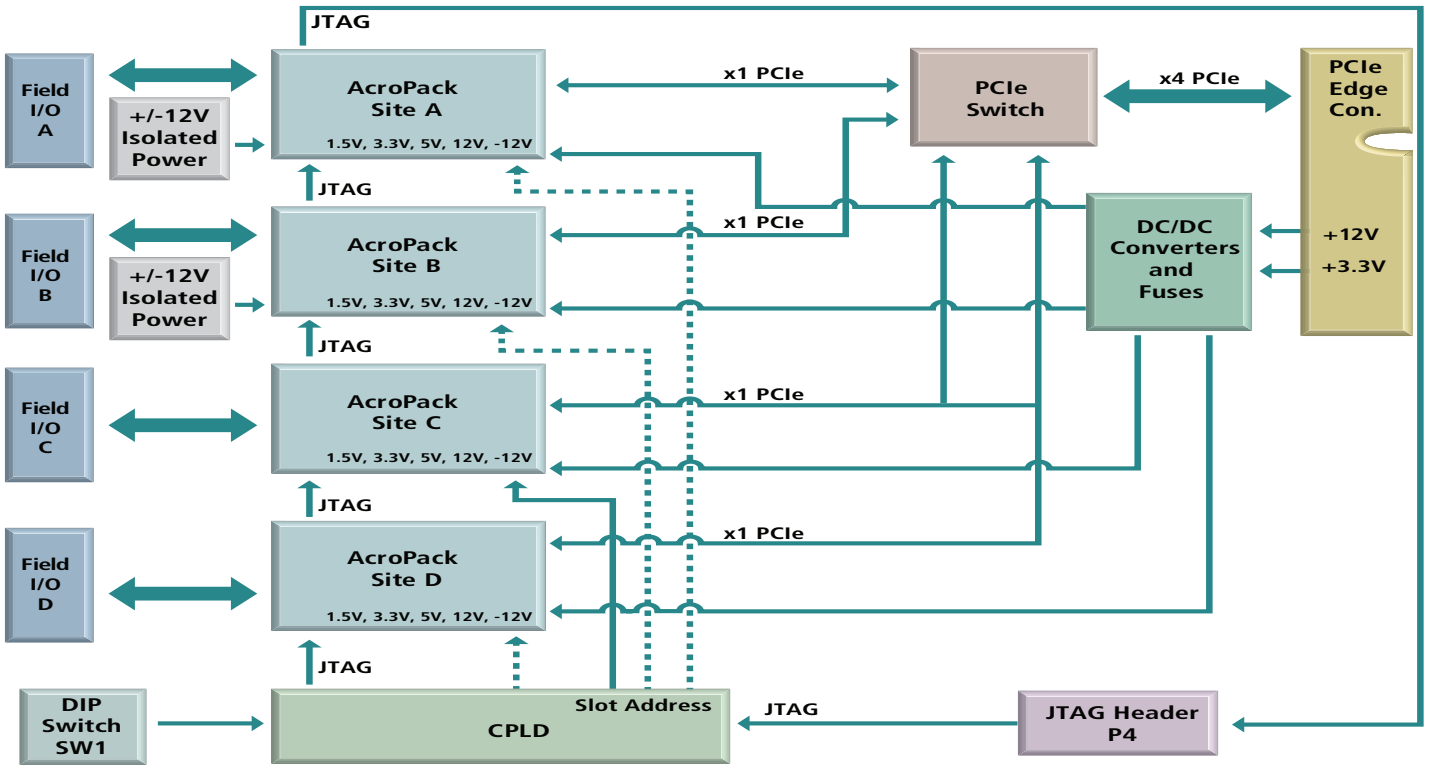
5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long.

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks software support package.

APSW-API-WIN: Windows DLL driver software support pkg.

APSW-API-LNX: Linux® support (website download only).



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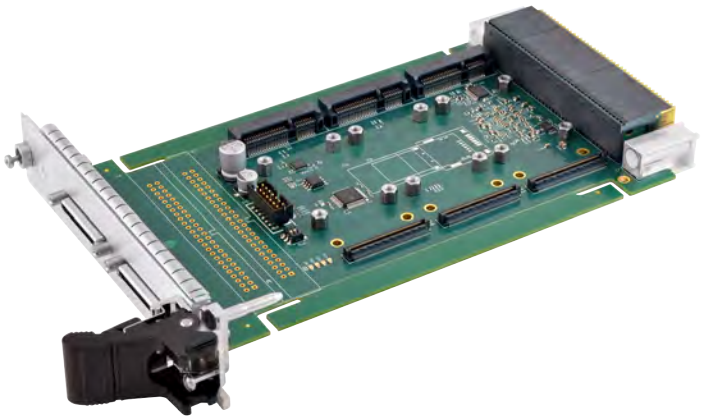
AcroPack® Carriers

VPX4500 Series VPX Carrier Cards for AcroPack® Modules

CE 2 YEAR WARRANTY RoHS Compliant



Air-cooled and conduction-cooled versions ◆ 3U Format ◆ Three AcroPack slots ◆ PCIe Gen 1 interface

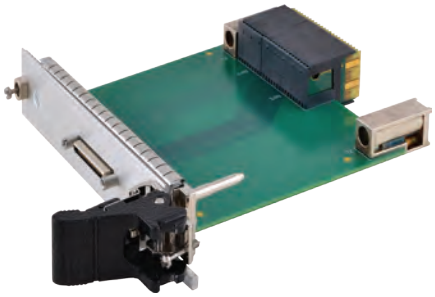
Description

Models
VPX4500E-LF: Air-cooled
VPX4500-CC-LF: Conduction-cooled

The VPX4500 is a 3U VPX carrier for Acromag AcroPack (AP) mezzanine modules.

The carrier board provides a modular approach to system assembly since each carrier can be populated with any combination of analog input/output, digital input/output, communication, AcroPack or some third-party mPCIe compliant modules.

The modularity allows the user to create a board which is customized to the application. This saves money and space; a single carrier board populated with AP modules may replace several dedicated function VPX boards. The VPX4500 carrier board provides impressive functionality at low cost.



VPX4500-RTM-LF

Model VPX4500E-LF is an air-cooled product that supports three AcroPack sites. Two of the sites provide field I/O connections through front panel mounted 50 pin shielded connectors. The third site provides field I/O connections through the VPX backplane.

Model VPX4500-CC-LF is a conduction-cooled product that supports three AcroPack sites. Two of the sites provide field I/O connections through 50 pin ribbon cable connectors. The third site provides field I/O connections to the VPX backplane.

Model VPX4500-RTM-LF is a rear transition module used with both the VPX4500E-LF and the VPX4500-CC-LF carriers to provide access to the slot C AcroPack field I/O signals.

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack mezzanine modules.

Key Features & Benefits

- Three AcroPack or mini-PCIe module slots support any combination of I/O functions.
- PCI Express version 2.1 compliant.
- Fused +1.5V, +3.3V, +5V, +12V, and -12V DC power is provided. A fuse is present on each supply line serving each AcroPack module.
- Front panel SCSI-2 connectors for the field I/O signals using VPX4500E-LF.
- Extended temperature range.
- Standard 14-pin Xilinx JTAG programming header.
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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Bulletin #8400-900e

AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

Includes a PCIe Gen 2 switch to expand the single host PCIe port to three ports, one to each device. (AcroPack or mini-PCIe).

The host port consists of four PCIe lanes, each of the mini-PCIe sites have one lane each.

Ease of Use

A unique carrier and site number is set via slot address. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the two AcroPack modules are daisy-chained.

General

Form Factor
3U VPX bus 6.299" (160mm) x 3.937" (100.0mm).

Pitch
VPX4500-LF (air-cooled): 1" pitch.
VPX4500-CC-LF (conduction-cooled): 1" pitch.

VPX Carrier Interface
Compatible VITA 65 module / slot profiles:
FRU EEPROM with temperature monitor.

AcroPack Interface
One AcroPack module in single VPX slot.

3.3V, 5V and ±12V provided for AcroPack modules via the VPX backplane.

Power Requirements

Power
+3.3 Volts (±10%): 0.55mA typical.

+12 Volts (±5%): 25mA Typical.

The VPX4500 has two DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface. The +1.5 Volt supply is sourced from the 5 Volt host power.
The -12 Volt supply is sourced from +12 Volt host power.

Physical

Physical Configuration
PCIe x4 lane.

Field I/O Connector
VPX4500-CC-LF: Two 50-pin male headers.

VPX4500-LF: Two 50-pin Champ 0.8mm connectors.

Environmental

Operating temperature
-40 to +85°C.

Storage Temperature Range
-55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Vibration
0.05g RMS (20 - 2000Hz) random, operating 6g RMS per Hz spectrum.

Shock
30g each axis, 11ms.

Ordering Information

Carrier Cards

VPX4500-LF: VPX carrier card, 3U, three AcroPack slots.

VPX4500-CC-LF: Conduction-cooled version of VPX-4500.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

VPX4500-RTM-LF: Rear transition module

5028-378: Termination panel, SCSI-2 connector, 50 screw terminals

5025-552: Termination panel, DIN-rail mountable panel

5025-550-x: Non-shielded flat 50-pin female to 50-pin female cable. x = length in feet, 12 ft. max.

5025-550-4: Non-shielded flat 50-pin female to 50-pin female cable. 4 feet long

5025-550-7: Non-shielded flat 50-pin female to 50-pin female cable. 7 feet long

5025-550-10: Non-shielded flat 50-pin female to 50-pin female cable. 10 feet long

5028-372: Round cable, shielded, SCSI-2 to CHAMP. 0.8mm, 2 meters long.

5028-619: Cable, 50-pin CHAMP to pigtail, 36 inches long

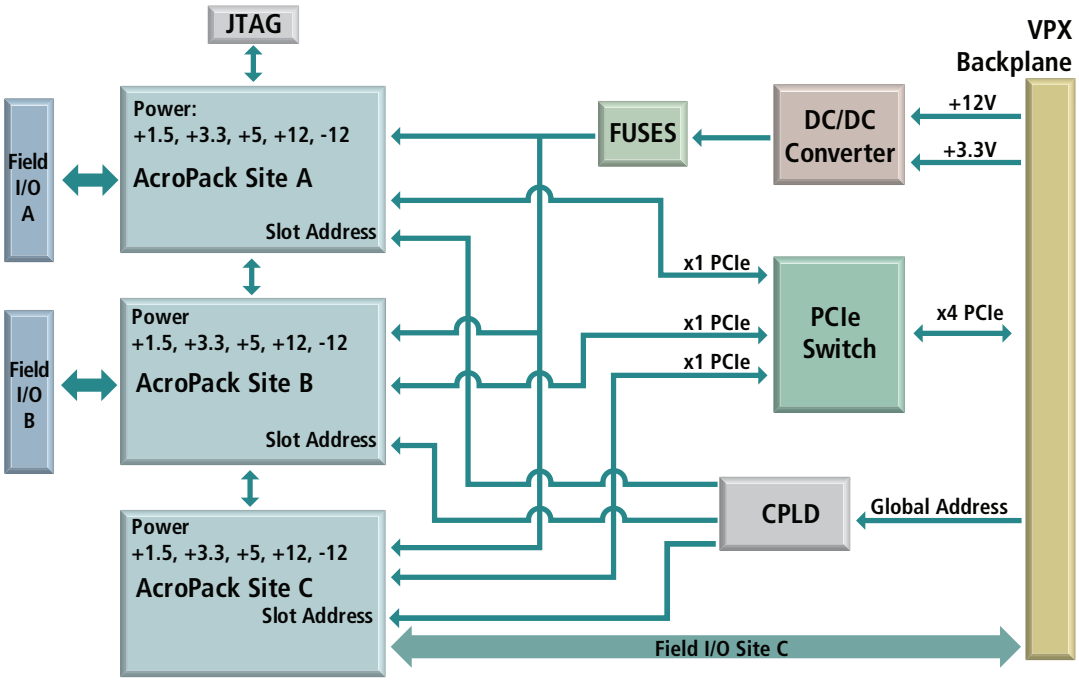
5028-620: Cable, 50-pin CHAMP to pigtail, 70 inches long

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks software support package

APSW-API-WIN: Windows DLL driver software support pkg

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



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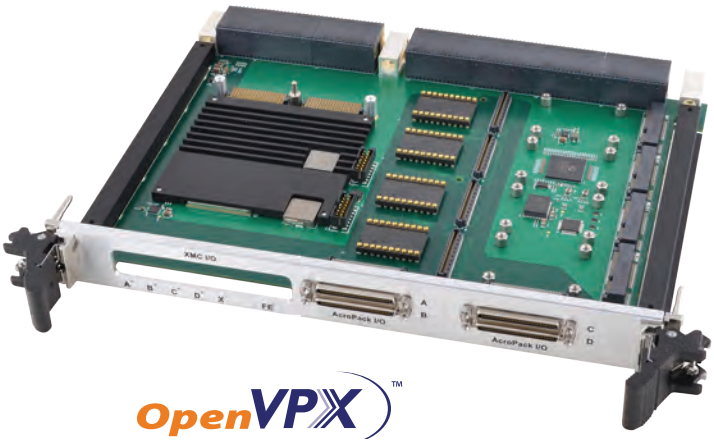
AcroPack® Carriers

VPX4500 Series VPX Carrier Cards for XMC and AcroPack® Modules

CE 2 YEAR WARRANTY RoHS Compliant



OpenVPX™

PCIe x16 Gen 3 interface via Expansion plane ◆ One XMC and Four AcroPack slots ◆ 6U form factor

Description

Models

VPX4520-42-20: Vita 42, Air-cooled.
VPX4520-42-30: Vita 42, Air-cooled, Ext. Temp.
VPX4520-42-50: Vita 42, Conduction-cooled.
VPX4520-61-20: Vita 61, Air-cooled.
VPX4520-61-30: Vita 61, Air-cooled, Ext. Temp.
VPX4520-61-50: Vita 61, Conduction-cooled.

The VPX4520 carrier card provides a simple and cost-effective solution for interfacing one XMC and four AcroPack modules to a VPX computer system.

Connect to the OpenVPX™ compatible system via Expansion plane for a direct PCIe connection over the VPX backplane. This allows host processors access to a high-performance, low latency interconnect to the AcroPack and XMC modules on the carrier card.

By inserting AcroPack or XMC industrial I/O developers can now leverage hundreds of available functions currently unavailable in a VPX platform.

These carriers are ideal for high-performance industrial, defense, scientific research, and telephony systems requiring high-speed I/O expansion. The VPX4520 is available in two versions: air-cooled and conduction-cooled.

The VPX4520 is a member of a 6U OpenVPX mezzanine carrier card family that supports a simple and cost-effective solution for interfacing XMC or AcroPack modules to OpenVPX computer systems.

Key Features & Benefits

- OpenVPX™ compatible via expansion plane connection
- Support upstream/downstream PCIe links
- Supports use of prXMC single board computers
- Optional backplane configuration for one 16-lane port, two 8-lane ports, or four 4-lane ports
- Supports standard VITA 42 and rugged VITA 61 XMC modules on 25W mezzanine site
- XMC site supports PCIe x8 Gen 3 interface
- 68 pin HD CHAMP front I/O connectors
- Supports 78-bits (39 pairs) of XMC I/O to backplane per pattern X38s+X8d+X12d of VITA 46.9
- Conforms to VITA 42.0, 42.3, 46.0, 46.4, 48, 65
- Supports front or rear panel XMC I/O
- Supports front or rear panel AcroPack I/O
- ±12V AUX power to XMC site

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AcroPack® Carriers

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AS9100
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Performance Specifications

NOTE: Specifications below only for VPX4520 carrier. See AcroPack and XMC data sheets for additional specifications.

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express Base specifications per revision 3.1.

Includes a PCIe Gen 3 capable PCIe switch used to expand backplane PCIe port to multiple ports supporting various expansion cards. (AcroPack or mini-PCIe).

Downstream PCIe switch used to provide four one-lane PCIe ports to AcroPack devices.

Ease of Use

A unique carrier and site number is set via slot address. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the four AcroPack modules are daisy-chained together.

There is a separate 14-pin Xilinx JTAG header provided for accessing devices on an XMC mezzanine module.

General

Form Factor
6U VPX bus 6.299" (160mm) x 9.173" (233.0mm).

Pitch
1".

VPX Carrier Interface
Compatible VITA 65 module / slot profiles:
MOD6-PER-1Q-12.3.5-n Expansion Plane PCIe Gen1/2/3.

FRU EEPROM with temperature monitor.

Mezzanine Sites
One VITA 42 or VITA 61 XMC module.

XMC site is PCIe Gen 3 and 8 lanes wide.

Front panel I/O support for each AcroPack site with 68-pin CHAMP connector (air-cooled only).

Front panel I/O support for XMC module (air-cooled only).

Rear I/O support for the AcroPack site with 50 I/O lines. (conduction-cooled only).

XMC rear I/O compliance is P3w3-X38s+P4w1-X12d+x8d.

Power Requirements

Power For Carrier Board Only
+12V (VS1) - 0.9A typical, 1.5A maximum.

Environmental

Air-Cooled Operating Temperature
Standard models: 0 to 70°C.
Extended temperature models: -40 to 85°C.

Conduction-Cooled Operating Temperature Range
-40 to 85°C (board must operate in a fully-installed conduction-cooled rack).

Storage Temperature Range
-55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Vibration
Designed to comply with VITA 47 Class V1.

Shock
Designed to comply with VITA 47 Class OS1.

Ordering Information

Carrier Cards

VPX4520-42-20
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 42 XMC, air-cooled.

VPX4520-42-30
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 42 XMC, extended temp.

VPX4520-42-50
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 42 XMC, conduction-cooled.

VPX4520-61-20
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 61 XMC, air-cooled.

VPX4520-61-30
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 61 XMC, extended temp.

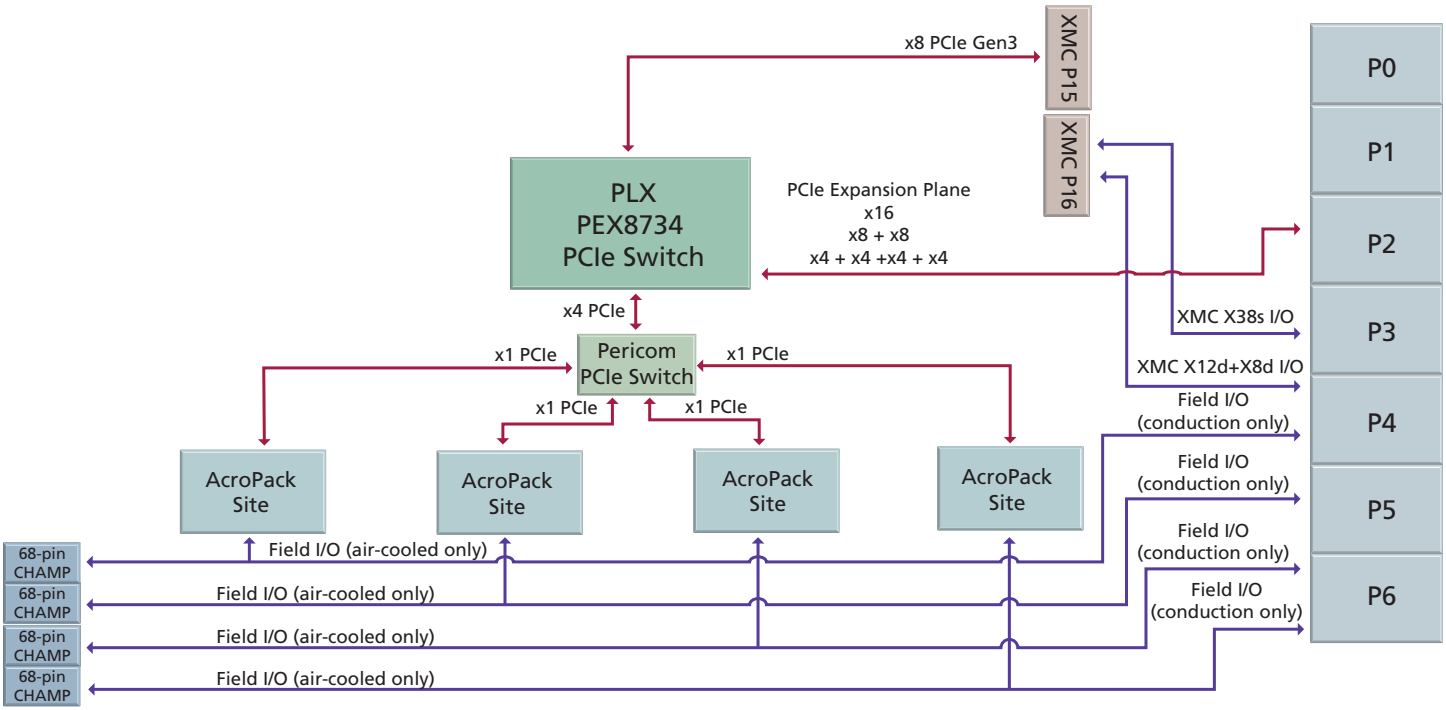
VPX4520-61-50
VPX 6U carrier, expansion plane, hosts four AcroPacks and one Vita 61 XMC, conduction-cooled.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288
Termination panels, DIN-rail mountable, SCSI-3 connector, 68 screw terminals

5028-420
Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP 0.8mm, 2 meters long.



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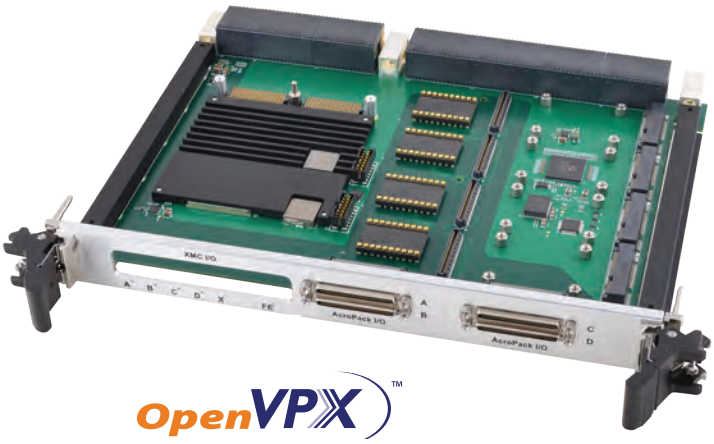
AcroPack® Carriers

VPX4500 Series VPX Carrier Cards for XMC and AcroPack Modules

CE 2 YEAR WARRANTY RoHS Compliant



OpenVPX™

PCIe x16 Gen 3 interface via Data plane ◆ One XMC and Four AcroPack slots ◆ 6U form factor

Description

Models

VPX4521-42-20: Vita 42, Air-cooled.
VPX4521-42-30: Vita 42, Air-cooled, Ext. temp.
VPX4521-42-50: Vita 42, Conduction-cooled.
VPX4521-61-20: Vita 61, Air-cooled.
VPX4521-61-30: Vita 61, Air-cooled, Ext. temp.
VPX4521-61-50: Vita 61, Conduction-cooled.

The VPX4521 carrier card provides a simple and cost-effective solution for interfacing one XMC and four AcroPack modules to a VPX computer system.

Connect to the OpenVPX™ compatible system via Data plane for a direct PCIe connection over the VPX backplane. This allows host processors access to a high-performance, low latency interconnect to the AcroPack and XMC modules on the carrier card.

By inserting AcroPack or XMC industrial I/O and configurable FPGA modules, developers can now leverage hundreds of available functions currently unavailable in a VPX platform.

These carriers are ideal for high-performance industrial, defense, scientific research, and telephony systems requiring high-speed I/O expansion. The VPX4521 is available in two versions: air-cooled and conduction-cooled.

The VPX4521 is a member of a 6U OpenVPX mezzanine carrier card family that supports a simple and cost-effective solution for interfacing XMC or AcroPack modules to OpenVPX computer systems.

Key Features & Benefits

- OpenVPX™ compatable Data plane connection
- Support for upstream/downstream PCIe links
- Supports use of prXMC single board computers
- Optional backplane configuration for one 16-lane port, two 8-lane ports, or four 4-lane ports
- Supports standard VITA 42 and rugged VITA 61 XMC modules on 25W mezzanine site
- XMC site supports PCIe x8 Gen 3 interface
- 68 pin HD CHAMP front I/O connectors
- Supports 78-bits (39 pairs) of XMC I/O to backplane per pattern X38s+X8d+X12d of VITA 46.9
- Conforms to VITA 42.0, 42.3, 46.0, 46.4, 48, 65
- Supports front or rear panel XMC I/O
- Supports front or rear panel AcroPack I/O
- ±12V AUX power to XMC site

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AcroPack® Carriers

ISO9001
AS9100
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Performance Specifications

NOTE: Specifications below only for VPX4521 carrier. See AcroPack and XMC data sheets for additional specifications.

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express Base specifications per revision 3.1.

Includes a PCIe Gen 3 capable PCIe switch used to expand backplane PCIe port to multiple ports supporting various expansion cards. (AcroPack or mini-PCIe).

Downstream PCIe switch used to provide four one-lane PCIe ports to AcroPack devices.

Ease of Use

A unique carrier and site number is set via slot address. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

A standard 14-pin Xilinx JTAG programming header is provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the four AcroPack modules are daisy-chained together.

There is a separate 14-pin Xilinx JTAG header provided for accessing devices on an XMC mezzanine module.

General

Form Factor
6U VPX bus 6.299″ (160mm) x 9.173″ (233.0mm).

Pitch
1″.

VPX Carrier Interface
Compatible VITA 65 module / slot profiles:
MOD6-PER-4F-12.3.1-n Data Plane PCIe Gen1/2/3.

FRU EEPROM with temperature monitor.

Mezzanine Sites
One VITA 42 or VITA 61 XMC module.

XMC site is PCIe Gen 3 and 8 lanes wide.

Front panel I/O support for each AcroPack site with 68-pin CHAMP connector (air-cooled only).

Front panel I/O support for XMC module (air-cooled only).

Rear I/O support for the AcroPack site with 50 I/O lines. (conduction-cooled only).

XMC rear I/O compliance is P3w3-X38s+P4w1-X12d+x8d.

Power Requirements

Power For Carrier Board Only
+12V (VS1) - 0.9A typical, 1.5A maximum.

Environmental

Air-Cooled Operating Temperature
Standard models: 0 to 70°C.
Extended temperature models: -40 to 85°C.

Conduction-Cooled Operating Temperature Range
-40 to 85°C (board must operate in a fully-installed conduction-cooled rack).

Storage Temperature Range
-55 to 125°C.

Relative Humidity
5 to 95% non-condensing.

Vibration
Designed to comply with VITA 47 Class V1.

Shock
Designed to comply with VITA 47 Class OS1.

Ordering Information

Carrier Cards

VPX4521-42-20
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 42 XMC, air-cooled.

VPX4521-42-30
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 42 XMC, extended temp.

VPX4521-42-50
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 42 XMC, conduction-cooled.

VPX4521-61-20
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 61 XMC, air-cooled.

VPX4521-61-30
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 61 XMC, extended temp.

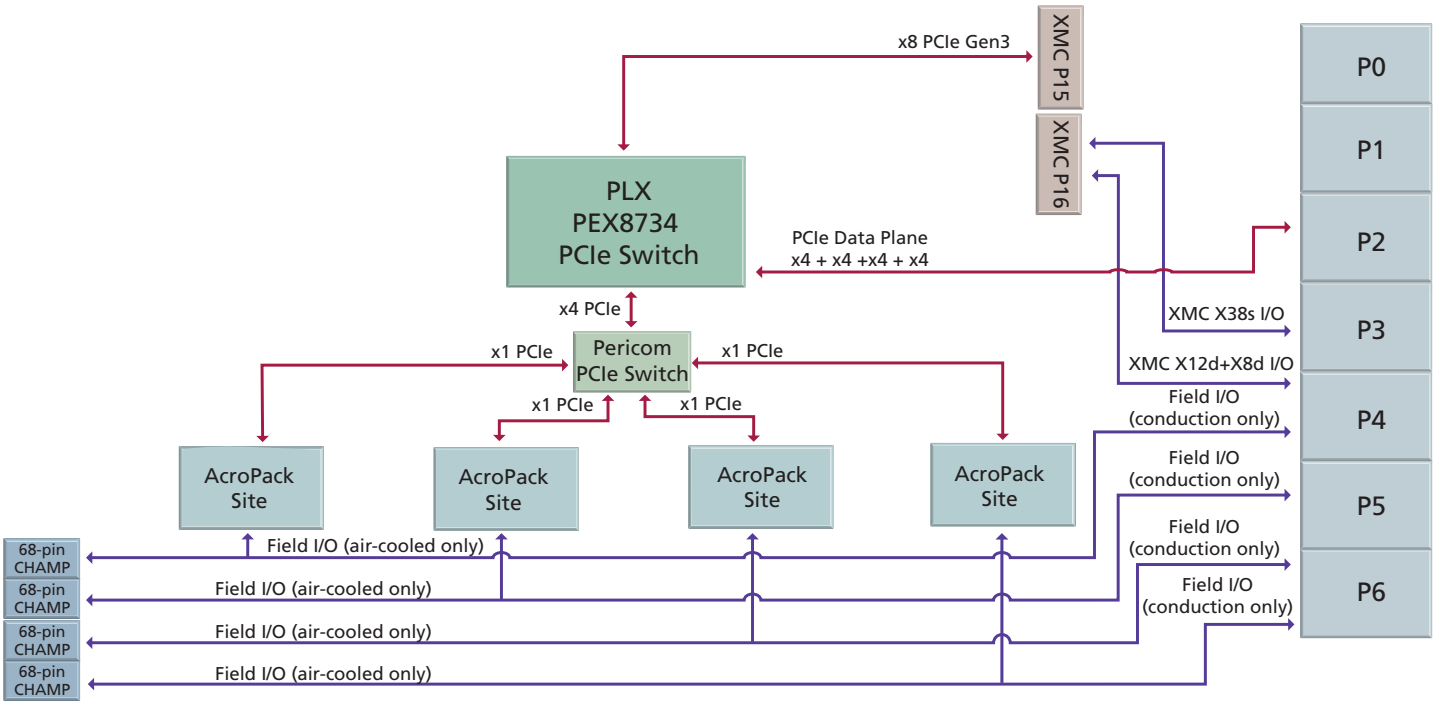
VPX4521-61-50
VPX 6U carrier, data plane, hosts four AcroPacks and one Vita 61 XMC, conduction-cooled.

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288
Termination panels, DIN-rail mountable, SCSI-3 connector, 68 screw terminals

5028-420
Round cable, shielded, male SCSI-3 connector to 68-pin CHAMP 0.8mm, 2 meters long.



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AcroPack® Carriers

XMCAP2000 Series XMC Carrier Cards for AcroPack® Modules

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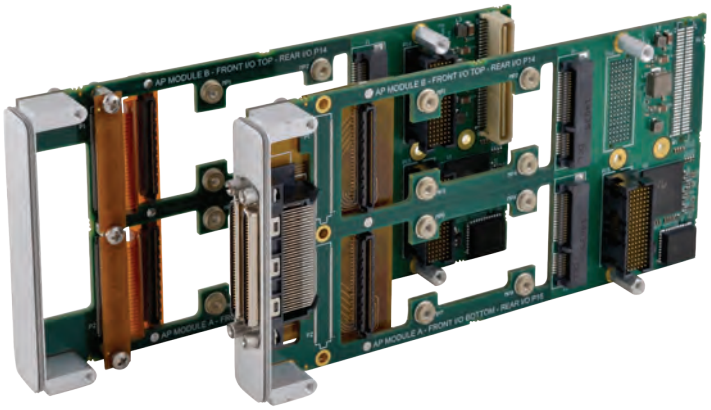

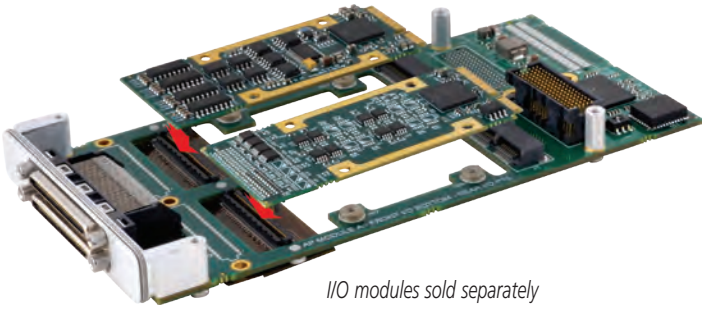

I/O modules sold separately

Two AcroPack or mini-PCIe mezzanine module slots ◆ Non-Intelligent carrier card ◆ PCIe x4 interface

Description

Models:
XMCAP2020-LF: Front I/O
XMCAP2021-LF: Rear I/O
XMCAP2022-LF: For use with ARCX-4000 rugged computers

The AcroPack® product line updates our popular Industry Pack I/O modules with a PCIe interface format. This tech-refresh design offers a compact size, low-cost I/O, the same functionality and memory map of the existing Industry Pack modules.

This board interfaces two AcroPack mezzanine modules to a PCI Express bus on an air-cooled XMC carrier.

Two AcroPack module slots give you the freedom to mix a variety of I/O functions (A/D, D/A, digital in, digital out, serial I/O, etc.) on a single board. Or, combine modules of the same type for almost one hundred channels on a single card. Either way, the XMCAP2020/2021 saves your precious card slots and reduces your costs.

Select I/O modules from Acromag's offering or use most third-party mPCIe compliant modules.

Key Features & Benefits

- Two AcroPack or mini-PCIe module slots support any combination of I/O functions
- PCI Express compliant
- Plug-and-play carrier configuration and interrupt support
- Front panel 68-pin CHAMP 0.8mm connectors for field I/O
- Rear P14 and P16 connectors for field I/O
- DIP switch and/or geographical addressing for card identification
- VITA 42.0, 42.3 complaint
- JTAG programming through XMC P15 connector or through onboard micro connector
- Software development tools for VxWorks®, Linux®, and Windows® environments.

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AcroPack® Carriers

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Performance Specifications

PCI Express Bus Compliance

This device meets or exceeds all written PCI Express specifications per revision 2.1.

Includes a PCIe Gen 2 switch to expand the single host PCIe port to two ports, one to each device (AcroPack or mini-PCIe).

The host port consists of four PCIe lanes, each of the mini-PCIe sites have one lane each.

Field I/O Connectors

Front I/O

XMCAP2020-LF: Two 68-pin 0.8mm Champ cable connection.Pin assignments are defined by the installed AcroPack or mini-PCIe module.

Rear I/O

XMCAP2021-LF: One AcroPack routed to rear P14 connector and one AcroPack routed to rear P16 connection.

XMCAP2022-LF: One AcroPack routed to P16 and the second to P14. Intended for ARCX-4000 applications only.

Ease of Use

A unique carrier and site number can be set for each AcroPack site by a DIP switch or geographical addressing. This provides the capability to distinguish a particular AcroPack module from others when multiple instances of the same module are used in a system.

JTAG signal are provided for programming and debugging the FPGA on some AcroPack modules. The JTAG ports of the two AcroPack modules are daisy-chained.

Physical

Physical Configuration
PCIe x4 lane
Length: 5.866 inches (149 mm)
Height: 2.9134 inches (74 mm)

Conforms to VITA 42 air-cooled XMC specification.

Environmental

Operating temperature
-40 to +70°C

Storage temperature
-55 to +125°C.

Relative humidity
5 to 95% non-condensing.

Power
+3.3 Volts (±5%): 140mA typical
VPWR: +5 Volts (± 5%): 200mA typical
VPWR: +12 Volts (± 8%): <100 mA typical

The XMCAP2020/2021 has four DC/DC converters to provide the power supply voltages to the AcroPack modules that are not present at the host interface. The +1.5 Volt supply is sourced from the VPWR host power. The +5 Volt and ±12 Volt supplies are sourced from +3.3 Volt host power.

Ordering Information

Carrier Card

XMCAP2020-LF: AcroPack carrier card for AcroPack or mPCIe modules, front I/O, air-cooled, two AcroPack slots.

XMCAP2021-LF: AcroPack carrier card for AcroPack or mPCIe modules, rear I/O, air-cooled, two AcroPack slots.

XMCAP2022-LF: AcroPack carrier card, rear I/O, two AcroPack slots, for ARCX-4000 applications (consult factory).

See Acromag.com/AcroPacks for a full list of I/O modules.

Accessories

5025-288: Termination panel, SCSI-3 connector, 68 screw terminals.

5028-420: VHDCI 68-pin, round cable, shielded, SCSI-3 to CHAMP. 0.8mm, 2 meters long.

5028-615: Cable, 68-pin CHAMP to pigtail, 36 inches long

5028-616: Cable, 68-pin CHAMP to pigtail, 70 inches long

Heatsinks for ARCX-4000 *(consult factory)*

AP-CC-02: Heat sink for two generic AP modules (left rail or single wide ARCX)

AP-CC-03: Heat sink for AP57x and generic AP modules (left rail or single wide ARCX)

AP-CC-05: Heat sink for two generic AP modules (right rail)

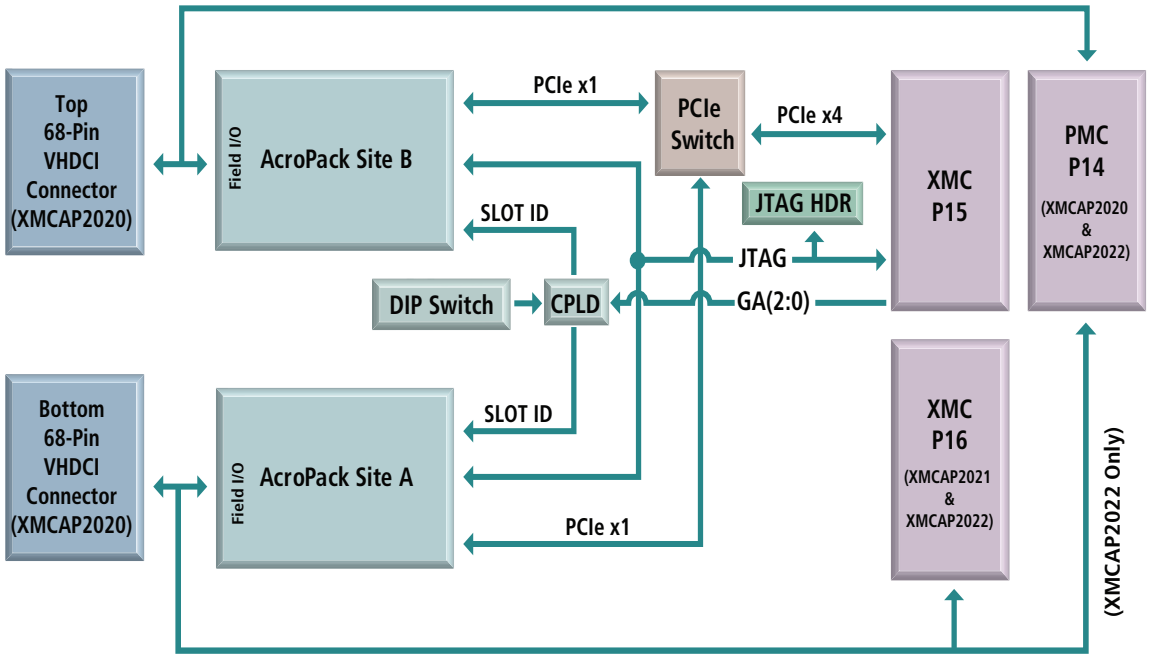
See User Manual for compatible AP modules.

Software *(see software documentation for details)*

APSW-API-VXW: VxWorks® software support package

APSW-API-WIN: Windows® DLL driver software support pkg

APSW-API-LNX: Linux® support (website download only)



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Support Software

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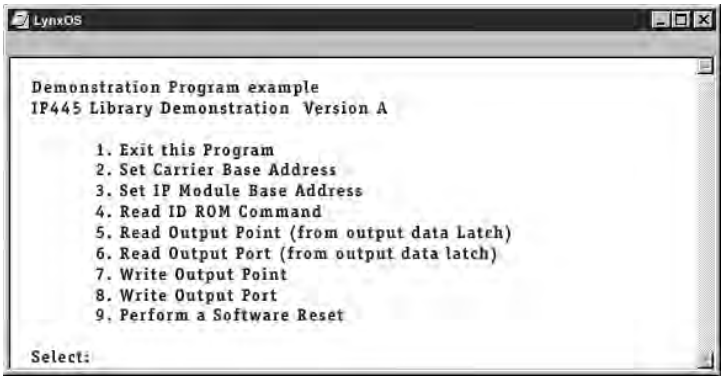
Linux® Libraries I/O Function Routines



This free software utility is available for download from Acromag's website.

Simplify interfacing between Acromag I/O boards and your software ◆ Demonstration Program

Description

IPSW-API-LNX
Support for Industry Pack modules and carriers

PCISW-API-LNX
Support for PCI/CompactPCI boards and PMC modules

APSW-API-LNX
Support for AcroPack® modules and carriers

Application Programming Interface (API)

Acromag's software development tools greatly simplify the interface between the I/O boards and your software application program. The Linux libraries are supplied as "C"source code. These libraries provide easy-to-use function routines that quickly integrate with your application. Function routines are ready for use "as-is," but they are also easily customized for your unique application.

Demonstration Program
This powerful program lets you fully exercise the libraries and your hardware before running the actual application. These diagnostics will save you hours troubleshooting and debugging your applications. You can set addresses, set up registers, read real-world inputs, or drive outputs. The demonstration program steps you through the exact functions that are called in your application.

Key Features & Benefits

- Easy installation procedure
- Readme files with step-by-step instructions
- Programming tools for most Acromag I/O boards (excludes serial I/O and VME products)
- Demonstration program
- Downloadable at no charge from the Acromag website
- Source code provided to ensure maximum flexibility in implementing your driver
- Verify operation of your I/O modules and carrier cards with a demonstration program to ensure proper hardware operation before attaching your application

Ordering Information

NOTE: This unsupported software is available ONLY by download from Acromag's website.

IPSW-API-LNX
Linux example libraries for Industry Pack modules and PCI/CompactPCI carrier cards

PCISW-API-LNX
Linux example libraries for PCI, CompactPCI, and PMC modules.

APSW-API-LNX
Linux example libraries for AcroPack® modules and carriers.

IPSW-VME-LNX
Linux example libraries, works with TSI148 chipset for models XVME-6300, XVME-6400, Industry Pack modules, and VME carriers.

IPSW-A7VME-LNX
VxWorks® 7.0 64-bit, software support package for Acromag Series XVME6500 and XVME6700 SBC when used with Industry Pack modules and VME carriers. Supplied on CD-ROM.

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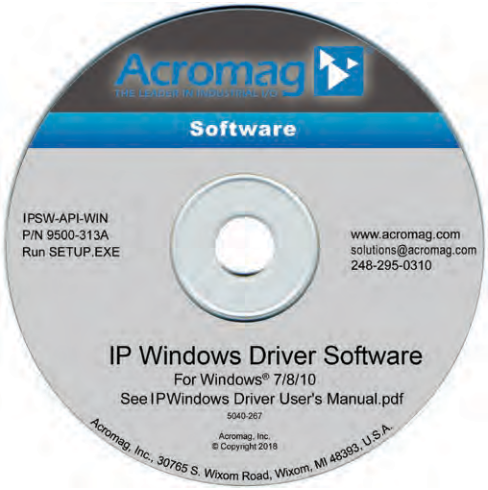
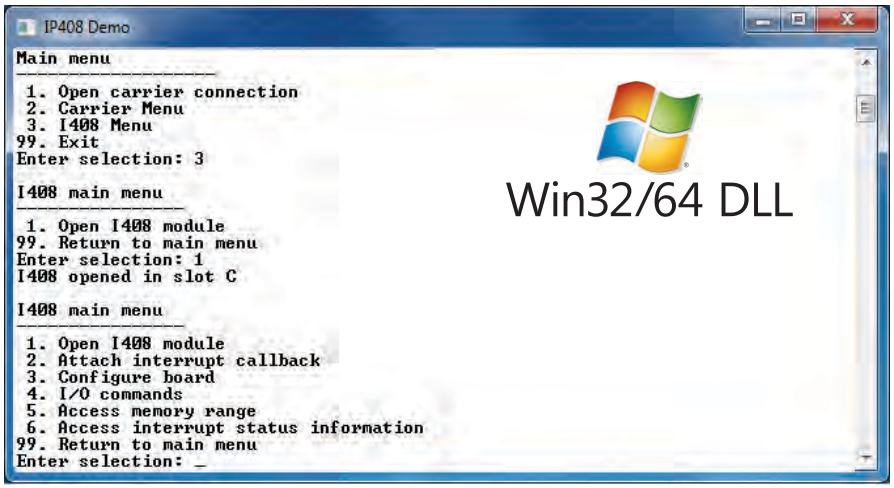
Bulletin #8400-400f

Software Support

IPSW AcroPack® and Industry Pack Driver Software for Windows® Operating Systems





For Windows 10 / 8 / 7 ◆ Supports Acromag AcroPack & Industry Pack modules & carriers ◆ Includes DLLs

Description

Application Programming Interface

Acromag's software development tools greatly simplify the interface between the I/O boards and your Windows-based application program. These packages provide DLL driver level support for Acromag's line of Industry Pack products. In addition, "C" source demonstration programs provide easy-to-use tools to test the operation of the module.

Demonstration Programs

Powerful programs let you fully exercise your hardware before developing the actual application. These diagnostics will save you hours troubleshooting and debugging your applications. You can set addresses, set up registers, read real-world inputs, or drive outputs. The demonstration programs step you through the exact functions that are called in your application.

Windows Embedded Standard

Microsoft Visual Studio

Key Features & Benefits

- Easy installation procedure
- Documentation with step-by-step instructions
- Support for active Acromag Industry Pack I/O and Industry Pack FPGA modules and carriers
- Support for 32-bit and 64-bit systems
- Demonstration Programs
- Driver level support for desktop and embedded Windows level programming environments
- Compatible with Windows Embedded Standard applications
- Verifies operation of your I/O boards with a demonstration program to ensure proper hardware performance before attaching your application

User-Friendly Licensing

Acromag's PCI Windows driver software is provided with a full site license. This allows anyone at your location to use this software without any additional charges. No run-time license is required.

You do not need to order additional software for different models within the family.

Ordering Information

Software

For more information, see www.acromag.com.

APSW-API-WIN
64-bit and 32-bit Windows® DLL driver and demonstration software for AcroPack Modules and PCIe carriers on CD ROM.

IPSW-API-WIN
64-bit and 32-bit Windows® DLL driver and demonstration software for Industry Pack Modules, PCI, and cPCI carriers.

IPSW-VME-WIN
64-bit and 32-bit Windows® driver software package for Industry Pack modules with DLLs and demonstration programs for VME carrier models . Works with TSI148 chipset including the XVME-6300 and XVME-6400. Supplied on CD-ROM.

IPSW-A7VME-WIN
64-bit and 32-bit Windows software package for Industry Pack modules and VME carriers . Works with Acromag Series XVME6500 and XVME6700 SBCs. Supplied on CD-ROM.

NOTE: For PMC, XMC, PCI, and cPCI modules and carrier cards support software, please refer to PCISW-API-WIN.

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Support Software

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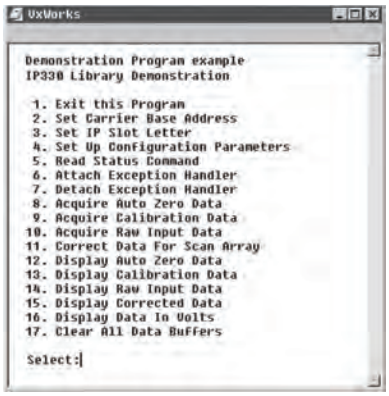
VxWorks® Libraries I/O Function Routines

VxWorks®

WIND™



The VxWorks software libraries provide a simple API to quickly integrate Acromag's I/O boards with your application program.

Supports any CPU target with quick modification ◆ API easily convertible for any operating system

Description

Application Programming Interface (API)

Acromag's software development tools greatly simplify the interface between the I/O boards and your software application program. VxWorks libraries are supplied as "C" source code. These libraries provide easy-to-use function routines that quickly integrate with your application. Function routines are ready for use "as-is," but they are also easily customized for your unique application.

This powerful program lets you fully exercise the libraries and your hardware before running the actual application. These diagnostics will save you hours troubleshooting and debugging your applications. You can set addresses, set up registers, read real-world inputs, or drive outputs. The demonstration program steps you through the exact functions that are called in your application.

Target any CPU

Acromag provides direct support for VxWorks when using PowerPC, x86 and 68000 CPU boards. The VxWorks C Library includes support for x86 PCI, MV167 and MV2700 CPU boards. Each library contains detailed information on integrating with the CPU's Board Support Package (BSP). The libraries also include instructions for implementing this software with other manufacturer's CPU board BSPs. Use with Industry Pack carriers from third-party board vendors is also supported.

The IPSW-API-VXW library package offers support for Acromag carriers. Other carriers are compatible, but require some minor modifications. Acromag uses a very innovative modular programming technique. This allows new carrier files to be created without affecting any of the complex IP module files or interrupt service routines.

User-Friendly Licensing

Acromag's VxWorks software libraries are provided with a full site license. This allows anyone at your location to use this software without any additional charges. Additionally, no run-time license is required either.

The VxWorks software libraries include support for the full family of boards or modules, not just certain models unless otherwise noted.

Key Features & Benefits

- Easy installation procedure
- Readme files with step-by-step instructions
- Quickly creates libraries
- Targeted support for Power PC, x86, and 68000 series CPUs
- Supports any CPU target with quick modification
- API easily convertible for any operating system
- Source code provided to ensure maximum flexibility in implementing your application
- Ability to verify operation of your modules and carriers with a demonstration program to ensure proper hardware operation before attaching your application

Ordering Information

APSW-API-VXW
VxWorks software support package for AcroPack modules and carriers.

IPSW-A7VME-VXW
VxWorks software support package for Acromag VME SBC Series XVME6500 and XVME6700 when used with Industry Pack modules.

IPSW-API-VXW
VxWorks software support package for Industry Pack modules and carriers.

PMCSW-API-VXW
VxWorks software support package for XMC, PMC, PCI, and CompactPCI products (supports all Acromag PMC modules and PCI or cPCI boards except IP carriers).

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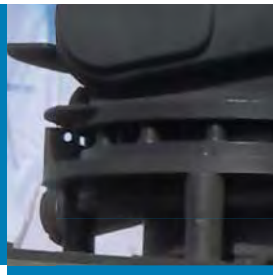

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