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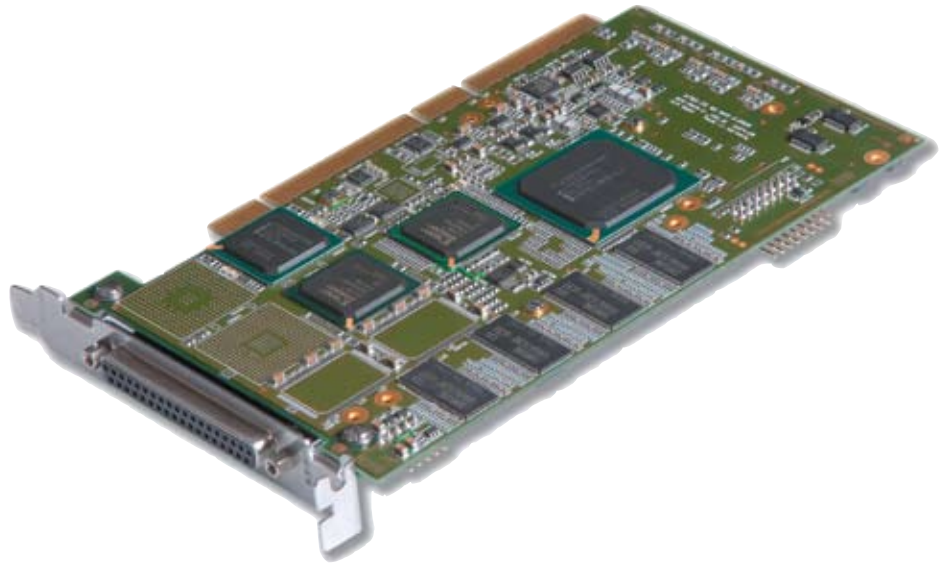
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AIM-USA

# APX429



**4, 8 and 16 Channel  
ARINC429 Test & Simulation  
Module for PCI-X**



# APX429

4, 8 and 16 Channel  
ARINC429 Test &  
Simulation Module  
for PCI-X

## General Features

The APX429 is a member of AIM's new 4th generation of advanced PCI-X modules for analysing, simulating, monitoring and testing of ARINC429 channels providing up to 16 channels on a 'Short Length PCI-X' standard module format.

4 channels are available on the APX429-4, 8 channels on the APX429-8 and 16 channels on the APX429-16 module. All channels are software programmable for Receive (Rx) or Transmit (Tx) mode. The lower 8 transmit channels provide variable output amplitudes, whereas upper 8 transmit channels are of fixed amplitude. APX429-4 and APX429-8 versions provide separate Tx and Rx pins on all channels and are pin compatible to previous generation API429-4 and API429-8 modules.

Additional versions APX429-8R4 and APX429-16R8 do offer a mix of software programmable channels and dedicated receiver channels.

The APX429 also supports 8 General Purpose Discrete I/O's, which can be monitored or generated. For access of Discrete I/O's an optional breakout panel can be supplied occupying a slot bracket position of the PC.

An on-board IRIG-B time encoder/ decoder allows users to accurately synchronise single or multiple APX429 modules to a common time source.

The APX429 modules use AIM's Next Generation 'Common Core' (NCC) hardware design utilising multiple RISC processors whereby all channels can operate concurrently at ARINC429 high or low bit rates with the intelligence to process data in real time.

The use of an Application Support Processor (ASP) executing the driver software allows users specific test routines to be processed onboard, significantly off-loading the host processor. The APX429 cards are configured with 1Mbyte of global memory and 128Mbyte of ASP memory.

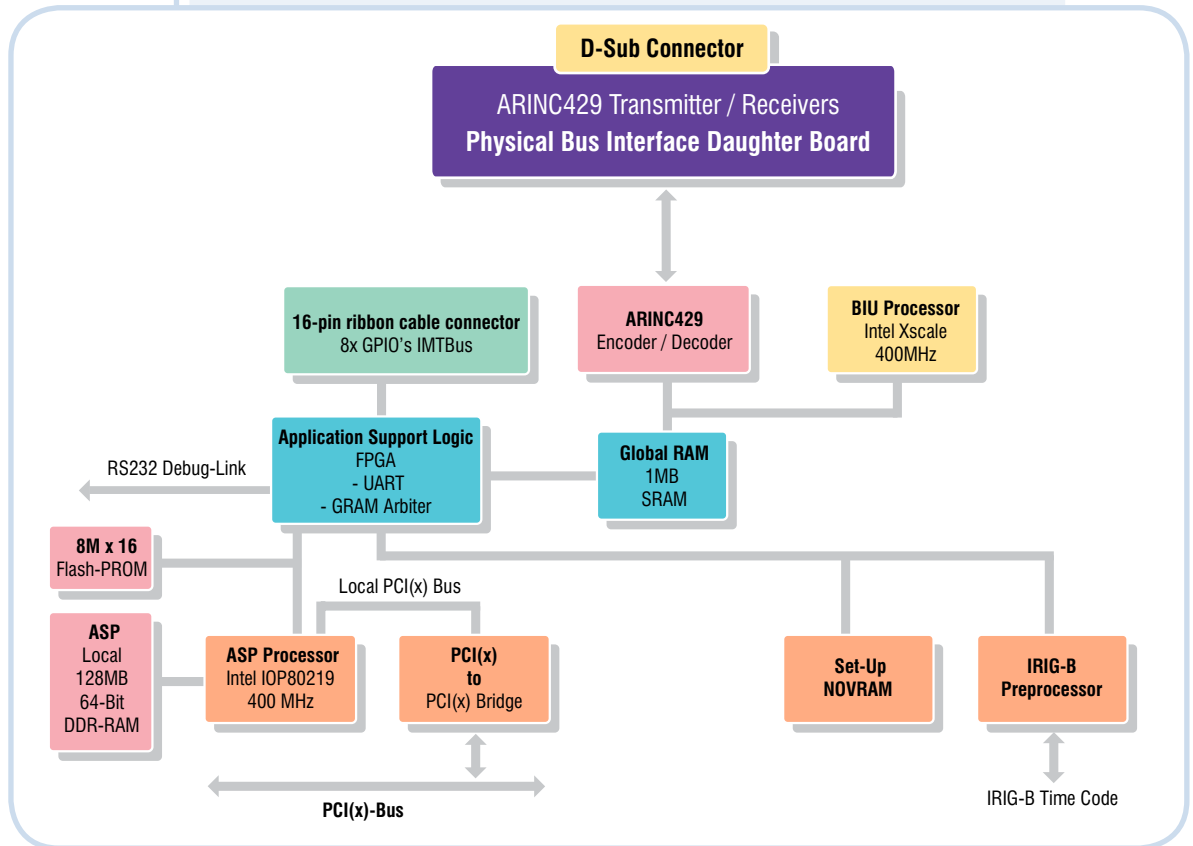
Full function driver software is delivered with the APX429 cards. Optional Databus Test & Analysis Software can also be purchased for use with APX429 cards.



product guide



**APX429**  
Functional  
Block Diagram



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## Receiver Channel Operation

APX429 modules provide real time monitoring of up to 16 ARINC429 Receiver Channels concurrently controlled by an on-board RISC Processor.

- *Triggering and Filtering*
- *Upper & Lower Limit Check*
- *Trigger on Specific or on any Error*
- *Label Content & Sequential Dependent Trigger*
- *Label selective & Label Data Contents Dependant Interrupt*
- *Label selective & Label Data Contents Dependant Filter*
- *Multi-Buffering with Real Time Data Buffer Updates*

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## Transmit Channel Operation

APX429 modules provide real time simulation of up to 16 ARINC429 Transmitter Channels concurrently controlled by the on-board RISC Processor via instruction lists. Transmission rates are selectable for each channel at 12.5kbit/s or 100kbit/s with the associated rise/ fall time in accordance with the ARINC429 electrical specification.

- *Cyclic/ Acyclic Label Transmission Mode & support for File Transfer Protocols*
- *Error Injection for each Label Transfer: Short Gap, Parity, Bit Count, Coding*
- *Programmable Gap between Labels: 0 to 255 Bits*
- *Transmit Operation Controlled by Instruction Lists*
- *Comprehensive Instruction Set: JUMP, CALL, COND-JUMP, TRANSFER*
- *Loop-back & Pollution Mode*



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## Discretes

APX429 modules provide eight General Purpose Discrete I/O's (GPIO's). GPIO's can be used as simple digital inputs/ outputs for a board-to-board connection inside the PC or to sample a digital output of an external system or to generate strobes to an external system. For external use access to GPIO's can be provided through a breakout panel (BOP) offering a wide range of input/ output levels as well as open collector outputs. BOP does occupy a separate slot bracket position of the PC.

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## IRIG-B Time Code Decoder

APX429 cards have an on-board 'IRIG-B' time Encoder/ Decoder with a sinusoidal output and a free wheeling mode for time tag synchronization. This allows synchronization of multiple APX429 or other AIM avionics cards to one common IRIG-B time source. Alternatively the on board Time Code generator of one APX429 module can act as the reference for the correlation of data across multiple ARINC429 channels.

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## Physical Bus Interface

APX429 cards have integrated ARINC429 line Transmitter/ Receivers and selectable Transmission rate for each channel independently. Variable output amplitude is provided on the lower 8 channels. All ARINC429 channels are available at the front plate connector.

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## Loop-back & Pollution Mode

Receive and Transmit Channels can be paired to form a 'Loop-back' couple. Data received from the receiver channel are automatically transmitted on the selected transmitter channel with minimum delay. A special receiver Function Block mode can be used to modify (pollute) the received label prior to its re-transmission.

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## Physical Bus Replay

The APX429 module is able to electrically reconstruct previously recorded ARINC429 data traffic physically to the bus with excellent timing accuracy. Recorded data files can be selected for physical bus replay to perform systems integration and test with the ability to disable any or all ARINC429 labels from the recorded file.

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## Application Support Processor

A 400MHz Intel Xscale Application Support Processor (ASP) provides unique on-board processing functions typically provided by host processing systems.

- *Driver Software Execution on the board*
- *Dynamic Data Generation*
- *Automatic Test Sequence Generation*

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## Driver Software

The APX429 modules are supplied with an Application Programming Interface (API) and Driver Software compatible with WIN 2000/XP, LabVIEW/VI's, & LabWIN/CVI's, Linux.

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## Technical Data

### Sub-System Interface:

PCI-X bus Master & Slave, Compatible with PCI-Standard Rev.2.3 and PCI-X Addendum Rev.1.0a, 33/66/100/133MHz, 32/64-Bit, 5V & 3.3V compatible

### Processors:

Two 400MHz Intel XScale processors for BIU and ASP

### Memory:

1Mbyte Global RAM, 128Mbyte ASP RAM

### Encoder/Decoder:

Up to 16 ARINC429 Encoders/Decoders with Error Injection and Detection

### Time Tagging:

46 Bit absolute IRIG-B Time, 1µsec resolution, sinusoidal output and 'Free Wheeling' mode

### Physical Bus Interface (PBI):

Up to 16 ARINC429 Line Transmitters and 16 ARINC429 Line Receivers for a total of 16 Channels  
Channels are either user programmable Rx or Tx, or dedicated Receiver Channels  
Transmitter Channels 1-8 with variable output amplitude, Transmitter Channels 9-16 with fixed output amplitude

### Connectors:

PCI-X bus standard edge connector  
37-pin (female) D-Sub Connector for ARINC429 Signals, Trigger & IRIG-B  
Board-to-board connector for 16-pin ribbon cable

**Dimensions:** 174.6mm x 106.7 mm Short Length PCI Format

### Power Consumption:

10.5 - 11.2 Watts Idle  
10.7 - 18.4 Watts Operating  
depending on number of channels and individual load

**Operating Temp. Range:** Standard 0°C...+45°C. Extended -15°C...+60°C ambient

**Storage Temp. Range:** -40°C...+85°C ambient

**Humidity:** 0 to 85% non-condensing

## Ordering Information

### APX429-4

4 Channel ARINC429 to PCI-X bus Module.  
Software Programmable Rx/ Tx Channels with variable Output Amplitude.  
IRIG-B Time Encoder/ Decoder.  
8 General Purpose Discrete I/O's.  
1Mbyte Global RAM, 128Mbyte ASP RAM.  
37-pin D-Sub Connector with separate Tx and Rx pins (fully compatible to API429-4).

### APX429-8R4

8 Channel ARINC429 to PCI-X bus Module.  
4 Software Programmable Rx/ Tx Channels with variable Output Amplitude, Plus 4 Dedicated Receiver Channels.  
IRIG-B Time Encoder/ Decoder.  
8 General Purpose Discrete I/O's.  
1Mbyte Global RAM, 128Mbyte ASP RAM.  
37-pin D-Sub Connector with shared Tx and Rx pins for programmable Channels (Ch.1 thru 4).

### APX429-8

8 Channel ARINC429 to PCI-X bus Module.  
Software Programmable Rx/ Tx Channels with variable Output Amplitude.  
IRIG-B Time Encoder/ Decoder.  
8 General Purpose Discrete I/O's  
1Mbyte Global RAM, 128Mbyte ASP RAM.  
37-pin D-Sub Connector with separate Tx and Rx pins (fully compatible to API429-8).

### APX429-16R8

16 Channel ARINC429 to PCI-X bus Module.  
8 Software Programmable Rx/ Tx Channels with variable Output Amplitude, Plus 8 Dedicated Receiver Channels.  
IRIG-B Time Encoder/ Decoder.  
8 General Purpose Discrete I/O's.  
1Mbyte Global RAM, 128Mbyte ASP RAM.  
37-pin D-Sub Connector with shared Tx and Rx pins for programmable Channels (Ch.1 thru 8).

### APX429-16

16 Channel ARINC429 to PCI-X bus Module.  
8 Software Programmable Rx/ Tx Channels with variable Output Amplitude, 8 Software Programmable Rx/ Tx Channels with fixed Output Amplitude.  
IRIG-B Time Encoder/ Decoder.  
8 General Purpose Discrete I/O's.  
1Mbyte Global RAM, 128Mbyte ASP RAM.  
37-pin D-Sub Connector with shared Tx and Rx pins.

### BOP-APX

Breakout Panel for APX Series Modules.  
26-pin High Density D-Sub Connector for Discrete I/O's.  
Includes Ribbon Cable to connect to APX Mainboard.  
Note: BOP-APX occupies one slot bracket position of the PC.