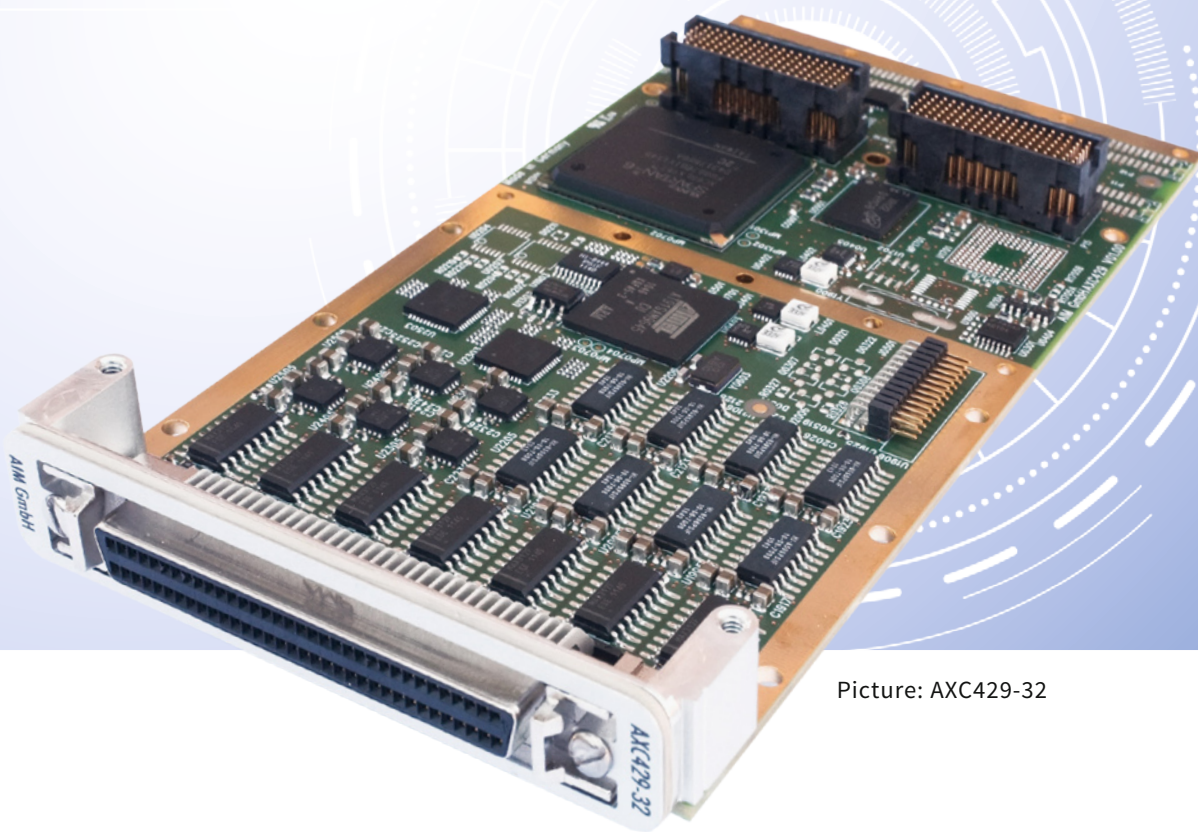# AXC429-x

8, 16 or 32 Channel
ARINC429 Test & Simulation
Modules for XMC

**Data
Sheet**

Picture: AXC429-32

AXC429-x

8, 16 or 32 Channel
ARINC429 Test & Simulation
Modules for PMC

General Features

The ► **AXC429-x** is a member of AIM's new family of PCI Express based XMC-Mezzanine (ANSI/VITA 42.3) modules targeted to embedded ► **ARINC429** applications.

The AXC429-x offers full function test, simulation, monitoring and databus ana-lyzer capabilities and is available in configurations with 8, 16 or 32 independent ARINC429 channels, fully software program-mable for Receive (Rx) or Transmit (Tx) mode and configurable for high/low bit rates.

8 channels are available on the AXC429-8, 16 channels on the AXC429-16 module and 32 channels on the AXC429-32.

The AXC429-8/16/32 also supports up to 8 discrete inputs and 8 discrete outputs which can be monitored or generated.

The AXC429-x is designed to be installed on either a host carrier board to adapt to buses like standard PCI/PCIe, VME/VPX, cPCI/cPCIe or on an embedded host computer.

The AXC429-x modules use a high perform-ance RISC processor with 128MB of Global RAM whereby all channels can operate concurrently at ARINC429 high or low bit rates with the intelligence to process data in real time.

An onboard IRIG-B time encoder/decoder provides a sinusoidal output and free-wheeling mode for time tag synchroniza-tion on the system level when using one or more AXC429-x or other AIM databus and network interfaces.

Full function driver software is delivered with the AXC429-x cards in comprehensive Board Software Packages (BSP's) for differ-ent Operating Systems.

The optional ► **PBA.pro**™ Databus Test and Analysis Tool (for Windows and Linux) can also be purchased for use with AXC429-x cards.
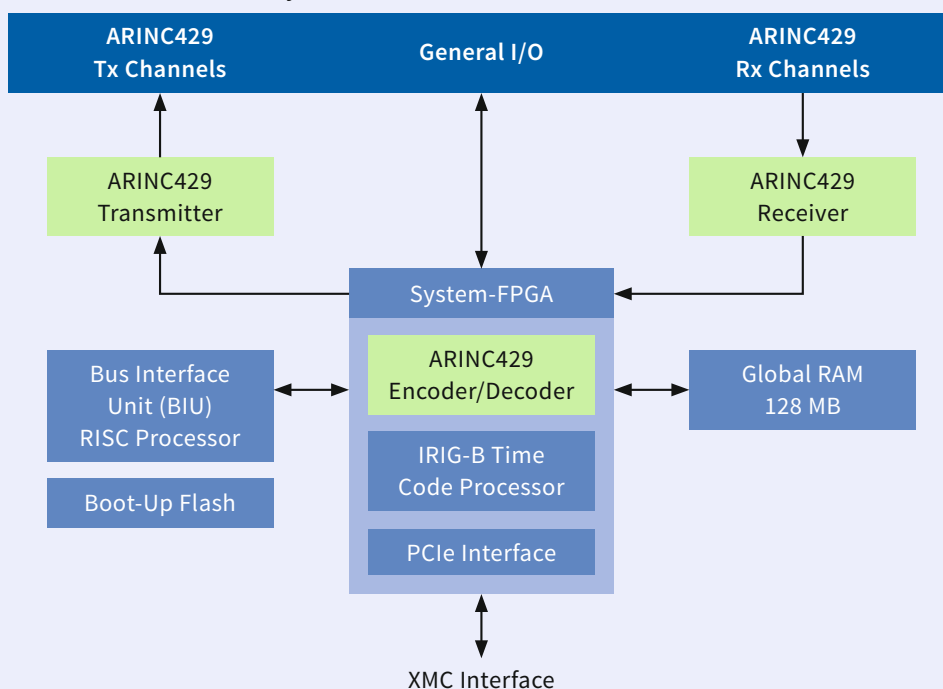
Transmit Channel Operation

AXC429-x modules provide real time simu-lation of up to 32 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.
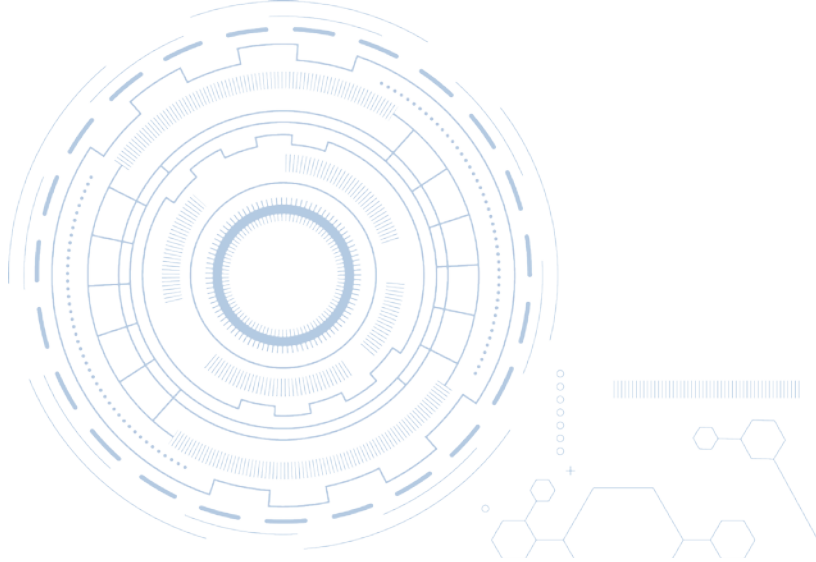
Key Features of the Bus Controller Mode include:
- Cyclic/Acyclic Label Transmission and Channel Loop Mode
- Error Injection for each Label Transfer: Short Gap, Parity, Bit Count, Coding
- Programmable Gap between Labels: 0 to 255-bit
- Simulate Zero-Jitter Scenarios using Virtual Label Transfers
- Multi-Buffering with Real Time Update supported per individual Label Transfer
- Reconstruction of previously recorded ARINC429 Traffic physically to the Bus with excellent Timing Accuracy (Physical Replay)
- Interrupt Generation on Label Transmit (configurable per Label Transfer)

Physical Interface on Front- and Rear-I/O

ARINC429 Tx Channels	General I/O	ARINC429 Rx Channels

ARINC429 Transmitter

ARINC429 Receiver

System-FPGA

Bus Interface Unit (BIU) RISC Processor

ARINC429 Encoder/Decoder

Global RAM 128 MB

Boot-Up Flash

IRIG-B Time Code Processor

PCIe Interface

XMC Interface

AXC429-x Block Diagram

Receive Channel Operation

AXC429-x modules provide real time monitoring of up to 32 ARINC429 Receiver channels concurrently controlled by an onboard RISC processor.

Key Features of the Remote Terminal Simulation Mode include:
- Label Oriented Receive Mode (individual Buffers for each Label with Multi-Buffering and Real Time Updates)
- Chronological Receive Mode per Channel with 1µs Resolution Time Stamping
- Chronological Mode concurrent to Label Oriented Receive Mode
- Local (one Buffer per Channel) or Global Monitoring (one Buffer all Channels)
- Continuous or Single Shot Capturing Modes
- Support of SDI Handling
- Interrupt Generation on Label Reception (configurable per Label/SDI)
- Complex Triggering and Filtering Functions
- Loop of received Data to configurable Transmit Channel with Label Data Modification Capability
- High Accuracy FPGA based Label Time Stamping

Discretes

AXC429-x modules provide up to 8 General Purpose Discrete I/O's (GPIO's). GPIOs can be used as simple digital inputs/outputs or to sample a digital output of an external system or to generate strobes to an external system.

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.

Physical Bus Replay

The AXC429-x cards can electrically re-construct and replay previously recorded ARINC429 channels physically to the ARINC429 bus with excellent timing accuracy.

Record files can be selected for bus replay. The additional capability to disable any or all ARINC429 labels from the replay enables smart systems integration and test to be performed.

Physical Bus Interface

AXC429-x cards have integrated ARINC429 line transmitters/receivers and selectable transmission rate for each channel independently. All ARINC429 channels are available at the front plate output connector or at the Rear-I/O connector.

IRIG-B Time Encoder/Decoder

AXC429-x cards include an onboard IRIG-B time encoder/decoder with sinusoidal output and free-wheeling mode for time tag synchronization.
This allows synchronization of multiple AMCX429-x cards or any IRIG-B compatible modules to one common external IRIG-B time input source or to the onboard time code generator of one AMCX429-x card as the reference for the correlation of data across multiple ARINC429 channels.

Driver Software

The Driver Software is supplied with the AXC429-x module. A full function Applica-tion Programming Interface (API) is provided compatible with Windows and Linux. Host applications can be written in C and C++ or C#. A LabView/VI application interface is provided.
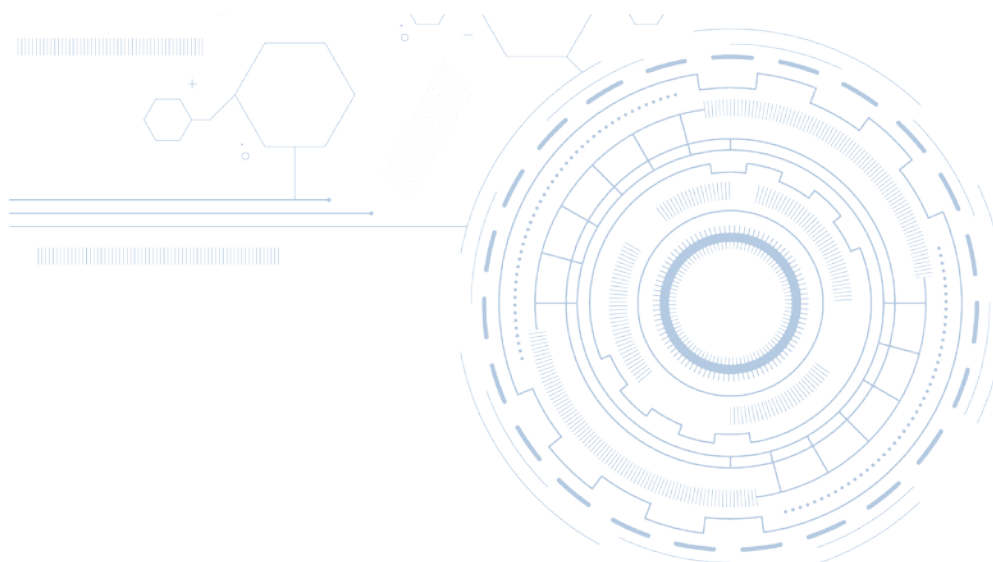
Technical Data

System Interface
3 Single Lane (PCIe x1),
2.5Gb/s PCI Express V1.1 compliant;
Compliance: ANSI/VITA 42.3 - 2006

Processors
1x 400MHz RISC Processor

Memory
128MB Global RAM (SSRAM),
2x8Mbit serial flash memory for BIU,
64Mbit serial flash memory for LCA

Encoder/Decoder
Up to 32 encoders/decoders with full
error injection and detection

Time Tagging
Sinusoidal 46-bit absolute IRIG-B time
stamping with 1µs resolution

Trigger/General Purpose Discretes
AXC429-/8/16:
4 Trigger Inputs and 4 Trigger Outputs,
8 General Purpose Discrete Inputs,
8 General Purpose Discrete Outputs
(Discretes with avionics level
for In and Out).
All I/O's available on Front- and
Rear-I/O connector
AXC429-32:
1 Trigger Output available on front
and XMC Rear-I/O connector

Ordering Information

AXC429-8
8 Channel ARINC429 PMC Module:
Software Programmable Receiver/
Transmitter Channels;
IRIG-B Time Encoder/Decoder,
128MB Global RAM, 4 Trigger Inputs
and 4 Trigger Outputs, 8 General
Purpose Discrete In- and Outputs

AXC429-16
16 Channel ARINC429 PMC Module:
Software Programmable Receiver/
Transmitter Channels;
IRIG-B Time Encoder/Decoder,
128MB Global RAM, 4 Trigger Inputs
and 4 Trigger Outputs, 8 General
Purpose Discrete In- and Outputs

AXC429-32
32 Channel ARINC429 PMC Module:
Software Programmable Receiver/
Transmitter Channels;
IRIG-B Time Encoder/Decoder,
128MB Global RAM, 1 Trigger Output
available on Front and XMC Rear-I/O
connector

Note: please select Rear-I/O connector
on the order (XMC connector P16
or PMC connector P14)

Physical Bus Interface
Up to 32 ARINC429 transmitters and
32 ARINC429 line receivers for a total
of 32 channels. All channels are user
programmable RX or TX

Connectors
68-pin, Mini D-Sub for ARINC429;
XMC connector P15 for single Lane
2.5Gb/s PCI Express Bus;
XMC connector P16 for Rear-I/O or
PMC connector P14 for Rear-I/O

Dimensions
149mm x 74mm standard XMC format

Power Consumption
3 to 5W idle
3.3 to 9W operating
Depending on number of channels
and individual load

Operating Temperature Range
Standard: 0°C to +70°C ambient
Extended: -40°C to +85°C
Conduction cooling available

Storage Temperature
-40°C to +85°C

Humidity
0 to 95% non-condensing

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