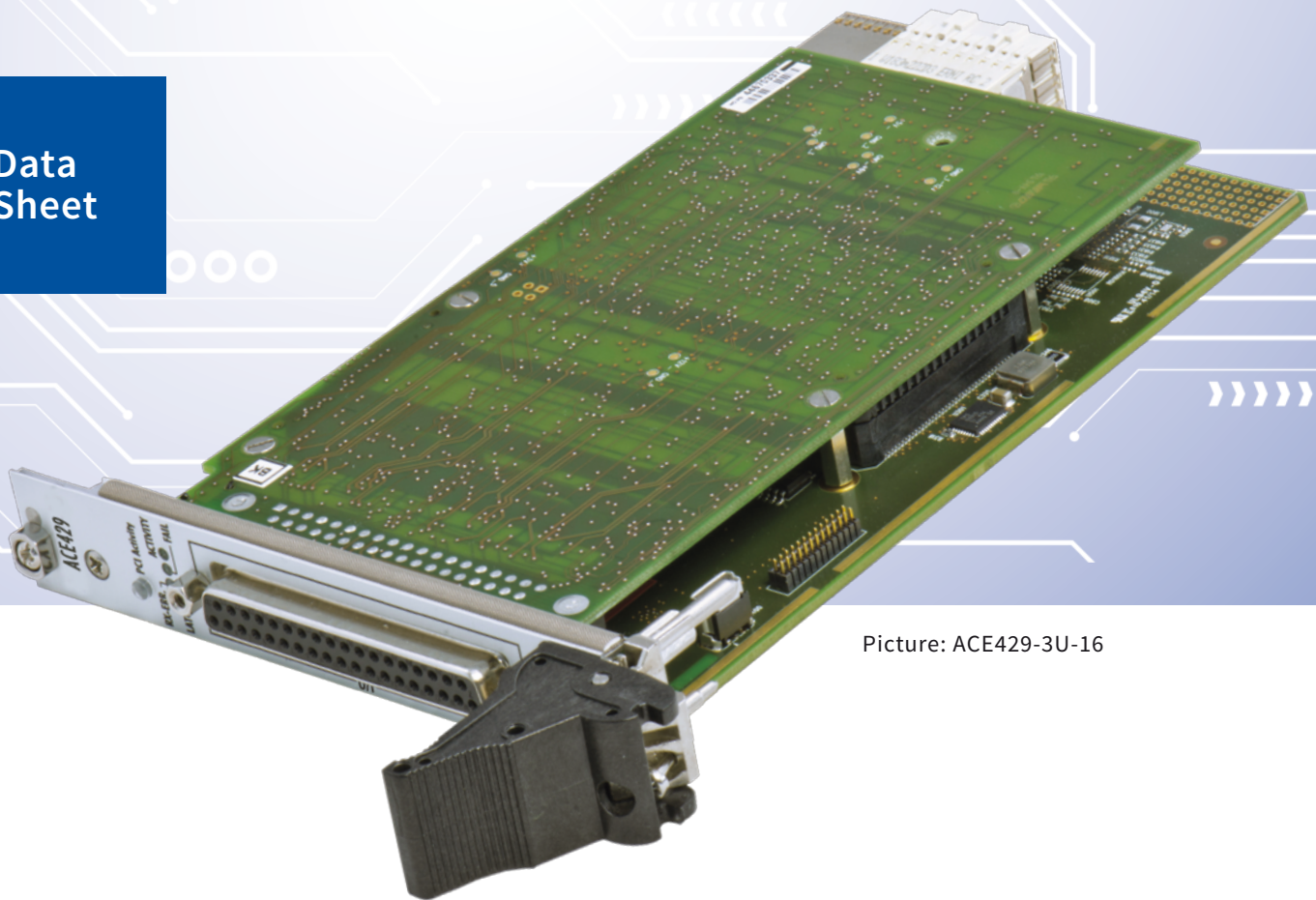


# ACE429-3U-x

4, 8, 16 and 32 Channels  
ARINC429 Test & Simulation  
Module CompactPCI-Express/  
PXI-Express (3U)

Data  
Sheet



Picture: ACE429-3U-16

# ACE429-3U-x

## 4, 8, 16 and 32 Channels ARINC429 Test & Simulation Module CompactPCI-Express/ PXI-Express (3U)

### General Features

The ► **ACE429-3U-x** card is a member of AIM's new family of CompactPCI-Express/PXI-Express (3U) modules for analysis, simulation, monitoring and testing of ► **ARINC429** channels providing up to 32 channels on a 3U module form factor.

4 channels are available on the ACE429-3U-4, 8 channels on the ACE429-3U-8, 16 channels on the ACE429-3U-16 and 32 channels on the ACE429-3U-32 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 (-4,-8,-16 Versions). On the ACE429-3U-32 variant all 32 Transmit channels are of fixed amplitude. The ACE429-3U-4 and the ACE429-3U-8 variants provide separate Transmit (Tx) and Receive (Rx) pins on all channels, whereas the ACE429-3U-16 and the ACE429-3U-32 variants provide shared Tx and Rx pins.

The ACE429-3U-x modules use AIM's 'Common Core' hardware design utilising multiple RISC processors with 128MB of Global RAM and 128MB of ASP RAM. An onboard ASP (Application Support Processor) based on a SoC (System on Chip) hardware device is running under Linux OS. This offers a scalable and flexible platform for hosting various on-board applications.

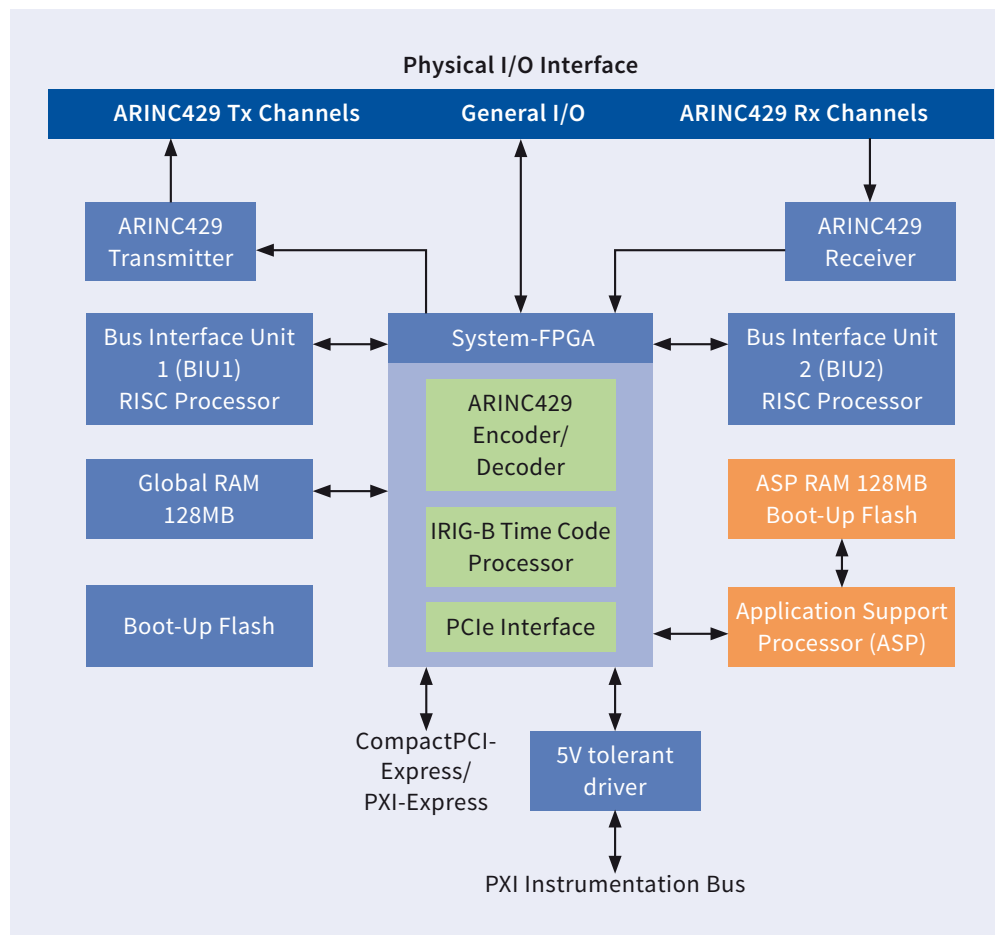
The use of onboard processing and large memory enables autonomous operation with minimal interaction with the host PC for real time applications.

An onboard IRIG-B time Encoder/Decoder is provided with sinusoidal output and free-wheeling mode for time tag synchronization on system level using one or more ACE429-3U-x cards.

Full function driver software is delivered with the ACE429-3U-x cards in comprehensive Board Software Packages (BSPs) for different Operating Systems. The optional

► **PBA.pro™** Databus Test and Analysis Tool (for Windows and Linux) can also be purchased for use with ACE429-3U-x modules.

The module can be installed in a standard cPCIe (3U) peripheral/hybrid slot or in a PXIe peripheral/hybrid slot. If installed in a PXIe slot, 8 PXI Trigger I/O and a PXI System Reference Clock (10MHz) based time tag mode are supported.



ACE429-3U-x Block Diagram

## Receive Channel Operation

ACE429-3U-x modules provide real time monitoring of up to 32 ARINC429 Receiver Channels concurrently controlled by 1 or 2 onboard RISC Processors.

- Label Oriented Receive Mode (individual Buffers for each Label with Multi-Buffering and Real Time Updates)
- Chronological Receive Mode per channel with 1 $\mu$ s Resolution Time Stamping
- Chronological Receive Mode concurrent to Label Oriented Receive Mode
- Local (1 Buffer per channel) or Global Monitoring (1 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

## Transmit Channel Operation

AXE429-x modules provide real time simulation of up to 32 ARINC429 Transmitter Channels concurrently controlled by the onboard 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 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 Bus Interface

ACE429-3U-x cards have integrated ARINC429 line Transmitter/Receiver and selectable transmission rate for each channel independently. Variable output amplitude is provided on the lower 8 channels (-4,-8,-16 Versions). The ACE429-3U-32 variant implements 32 fixed amplitude transmit channels. All ARINC429 channels are available at the front plate connector.

## Physical Bus Replay

The ACE429-3U-x cards can electrically reconstruct 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.

## 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.

## IRIG-B Time Encoder/Decoder

The ACE429-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 ACE429-3U-x cards or any IRIG-B compatible modules to 1 common external IRIG-B time input

source or to the onboard time code generator of 1 ACE429-3U-x card as the reference for the correlation of data across multiple ARINC429 channels. If installed in a PXIe peripheral/hybrid slot the input source can alternatively be switched from IRIG-B to the PXI System Reference Clock (10MHz) on the Instrumentation Bus to have a Time Tag synchronous to the PXI System Reference Clock.

## PXI Instrumentation Bus

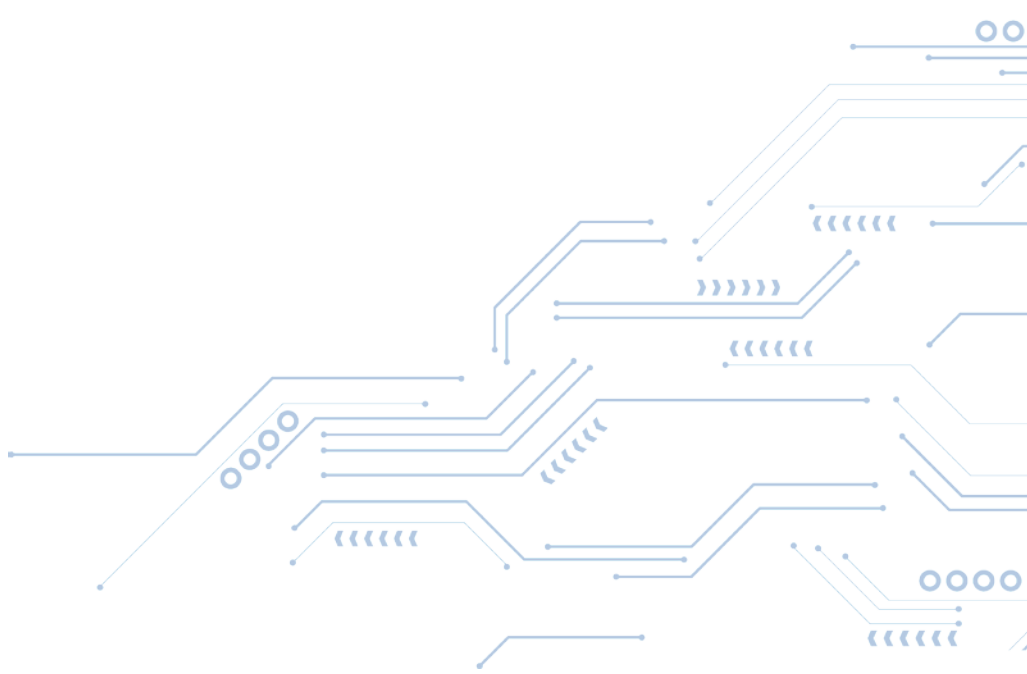
The PXI Hardware Specification adds electrical features for instrumentation by providing additional triggering and system clock capabilities. The ACE429-3U-x is compliant with the PXI-Express Hardware Specification Revision 1.0 providing additional triggering and system clock capabilities on the Instrumentation Bus.

### Operational features include:

- 1 Trigger input and 1 Trigger output are available on the PXI Trigger Bus (software programmable)
  - PXI System Reference Clock synchronous Time Tag Mode
  - Time Tag Clear via PXI STAR Trigger Input
- The ACE429-3U-x is a hybrid slot compatible peripheral module.

## Driver Software

The Driver Software is supplied with the ACE429-3U-x module. A full function Application Programming Interface (API) is provided compatible with Windows and Linux. Host applications can be written in C/C++ or C#. A LabView/VI application interface as well as LabViewRT drivers are provided.



# Technical Data

## System Interface

cPCIe/PXIe Bus Master and Slave, compliant with Single Lane, 2.5Gb/s PCI-Express V1.1

## Processors

2x 400MHz RISC Processors for the BIUs and 1x 400MHz RISC Processors for the ASP

## Memory

128MB Global RAM (DDR2-RAM),  
128MB ASP RAM (DDR2-RAM),  
2x 8MBit serial flash memory for BIUs,  
64MBit serial flash memory for LCA  
and 256MB flash memory of the ASP

## Encoder/Decoder

Up to 32 ARINC429 Encoders/Decoders with Error Injection and Detection

## Time Tagging

Sinusoidal 46-bit absolute IRIG-B Time stamping with 1µs resolution, sinusoidal IRIG-B output and free-wheeling mode; PXI System Reference Clock time tag mode

## Trigger

1 Trigger input and 1 Trigger output on the front panel connector

## Physical Bus Interface

Up to 32 ARINC429 Line Transmitter and 32 ARINC429 Line Receiver for a total of 32 Channels; Channels are user programmable for Rx or Tx; Transmitter Channels 1-8 with variable output amplitude, Transmitter Channels 9-16 with fixed output amplitude (-4,-8,-16 Versions). The ACE429-3U-32 Version has 32 fixed amplitude channels

## Connectors

37-pin (female) D-Sub connector for ARINC429 signals, Trigger and IRIG-B (-4,-8,-16 Versions);  
68-pin (female) SCSI-3 HD-Sub connector for ARINC429 signals, Trigger and IRIG-B (-32 Version)

# Ordering Information

## ACE429-3U-4

4 Channel cPCIe/PXIe (3U) to ARINC429 Interface: Software programmable Receiver/Transmitter Channels with Variable Output Amplitude, IRIG-B Time Encoder/Decoder, 128MB Global RAM, 128MB ASP RAM, 37-pin D-Sub Connector with separate Tx and Rx pins (fully compatible to ACX429-4)

## ACE429-3U-8

8 Channel cPCIe/PXIe (3U) to ARINC429 Interface: Software programmable Receiver/Transmitter Channels with Variable Output Amplitude, IRIG-B Time Encoder/Decoder, 128MB Global RAM, 128MB ASP RAM, 37-pin D-Sub Connector with separate Tx and Rx pins (fully compatible to ACX429-8)

## ACE429-3U-16

16 Channel cPCIe/PXIe (3U) to ARINC429 Interface: 8 Software programmable Receiver/Transmitter Channels with Variable Output Amplitude plus 8 Software programmable Receiver/Transmitter Channels with fixed Output Amplitude, IRIG-B Time Encoder/Decoder, 128MB Global RAM, 128MB ASP RAM, 37-pin D-Sub Connector with shared Tx and Rx pins

## ACE429-3U-32

32 Channel cPCIe/PXIe (3U) to ARINC429 Interface: 32 Software programmable Receiver/Transmitter Channels with Fixed Output Amplitude, IRIG-B Time Encoder/Decoder, 128MB Global RAM, 128MB ASP RAM, 68-pin (female) SCSI-3 HD-Sub connector with shared Tx and Rx pins

## PXIe Module connections

XJ3 High-Speed Advanced Differential Fabric (ADF) connector for PXIe/cPCIe-Bus interface;  
XJ4 (eHM) Connector for instrumentation signals (Trigger Bus, Star Trigger Input, 10MHz System Reference Clock)

## Dimensions

100mm x 160mm – cPCIe/PXIe  
Standard 3U card

## Power Consumption

ACE429-3U-4: 3.9W (idle)  
ACE429-3U-8: 4.3W (idle)  
ACE429-3U-16: 5.7W (idle)  
ACE429-3U-32: 7.1W (idle)

## Operating Temperature Range

Standard 0°C to +45°C ambient  
Extended temperature range  
-15°C to +65°C

## Storage Temperature Range

-40°C to +85°C

## Humidity

0 to 95% non-condensing

## ► AIM Office Contacts:

### AIM GmbH

Sasbacher Str. 2  
D-79111 Freiburg / Germany  
Phone +49 (0)761 4 52 29-0  
Fax +49 (0)761 4 52 29-33  
sales@aim-online.com

### AIM GmbH – Munich Sales Office

Terofalstr. 23a  
D-80689 München / Germany  
Phone +49 (0)89 70 92 92-92  
Fax +49 (0)89 70 92 92-94  
salesgermany@aim-online.com

### AIM UK Office

Cressex Enterprise Centre, Lincoln Rd.  
High Wycombe, Bucks. HP12 3RB / UK  
Phone +44 (0)1494-446844  
Fax +44 (0)1494-449324  
salesuk@aim-online.com

### AIM USA LLC

Seven Neshaminy Interplex  
Suite 211 Trevoise, PA 19053  
Phone 267-982-2600  
Fax 215-645-1580  
sales@aim-online.us