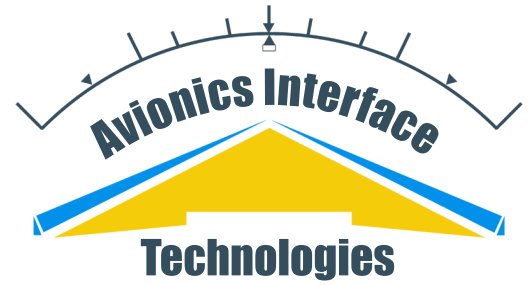


PCIe-C429

Advanced Four, Eight, 16, or 32 Channel ARINC 429 Test & Simulation Module for PCI Express



GENERAL OVERVIEW

AIT's PCIe-C429-4/8/16/32 is a rugged, reliable, full-featured PCI Express module designed to provide a stand-alone, flight-ready ARINC 429 interface for avionics applications. Up to 32 channels are provided on the module. Each channel can be individually configured to Transmit (Tx) or Receive (Rx) and to operate at the high or low bit rates defined by ARINC 429. AIT's PCIe-C429 offers advanced test, simulation, monitoring, and databus analyzer functions.

The PCIe-C429 module utilizes a simple and reliable FPGA-based hardware architecture with a flexible platform that provides the highest data throughput performance in the industry and that can be easily adapted to meet a wide range of application needs. AIT's PCIe-C429 cards are configured with 128 MBytes of onboard memory, providing ample capacity to support high volumes of data and complex simulations.

AIT's PCIe-C429 module is equipped with a single trigger output that can be used for synchronization with external measurement equipment. Additionally, the PCIe-C429 module can be reconfigured to mount on any of AIT's advanced carriers to provide PMC, XMC, PCI, PCI-X, .PC104+, USB, VME, or VXI solutions.

Application software can access the PCIe-C429 module via AIT's common ARINC429 C/C++ Object Wrapper Layer (OWL) high-level application programmer's interface.

APPLICATION INTERFACE

In support of application interfaces to the PCIe-C429, the modules are supplied with AIT's ARINC 429 Object Wrapper Layer (OWL) C/C++ interface library. The OWL provides an intuitive and easy-to-use object-oriented interface to the card. Adaptions supporting C#, Python, and other common programming languages are available upon request. A rich suite of sample application and full documentation is also provided.

KEY FEATURES

- ◆ Four, Eight, 16, or 32 Software Programmable Tx/Rx Channels
- ◆ Programmable High/Low Speed Operation
- ◆ All Tx/Rx Channels can operate concurrently at High Speed rates
- ◆ Full Error Injection and Detection
- ◆ Rate-oriented Label Transmission
- ◆ Label Selective Trigger for Capture/Filtering
- ◆ Sort by SDI field
- ◆ IRIG-B Time Code Encoder/Decoder for Data Correlation
- ◆ Real-Time Recording & Post Analysis of Multiple Channels
- ◆ Application Interface supporting C++, C#, and .net Development
- ◆ Device Driver Support: Windows, Linux, VxWorks, and other operating systems
- ◆ *Flight Simulyzer* ARINC 429 Analyzer Software
- ◆ *Flight Director* Windows-based Parameter Processing Software

TRANSMIT CHANNEL OPERATION

AIT's PCIe-C429 provides real-time simulation of up to 32 ARINC 429 transmitter channels concurrently. Bit transmission rates and duty cycles are selectable for each channel, 12.5 kbits/sec and 100 kbits/sec transmit modes are supported. Associated rise and fall times are in accordance with the ARINC 429 electrical specification.

- ◆ Rate-oriented, block, and acyclic label transmission modes support all simulation needs
- ◆ Error injection for each label transfer: short gap, parity, bit count, coding
- ◆ Programmable gap between labels

TRIGGER OUTPUT

For external notification of ARINC 429 bus events, a TTL trigger output signal is supported. Output signals can be generated on complex conditions of received labels or on the occurrence of transmit simulation events.

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RECEIVER CHANNEL OPERATION

AIT's PCIe-C429 provides real-time simulation of up to 32 ARINC 429 receiver channels concurrently.

- ◆ Label/SDI selective receive, sequential receive modes
- ◆ Multi-buffering with real-time data buffer updates
- ◆ Triggering and filtering:
 - ◆ Upper and lower limit check
 - ◆ Trigger on specific or any error
 - ◆ Label contents and sequential-dependent trigger
- ◆ Label selective and label data contents-dependent filter
- ◆ Label selective and label data contents-dependent interrupts

BUS COUPLING

AIT's PCIe-C429 card has integrated ARINC 429 line transmitter/receivers that are software programmable for Transmit (Tx) or Receive (Rx) mode and selectable transmission rate for each channel independently. All ARINC 429 channels and controls are available at the front panel output connector and the rear input/output connector.

IRIG-B TIME CODE ENCODER/DECODER

An onboard IRIG-B time code encoder and decoder is provided if the optional front panel daughter card is assembled. This allows synchronization of ARINC 429 channels using single or multiple PCIe-C429 modules. Multiple PCIe-C429 modules can be synchronized to one common time IRIG-B time code encoder/decoder allowing synchronized time tagging of multiple ARINC 429 channels. Multiple modules can be synchronized using one common IRIG-B time source or to the free-wheeling onboard time code generator.

SOFTWARE SUPPORT

The PCIe-C429 is delivered with AIT's ARINC 429 Software Development Kit (SDK) which includes software driver support for Windows, Linux, and LabView RT. The SDK provides multiple application interfaces including support for C/C++, C#, and VB.NET. High-level LabView Virtual Instruments (VI) are provided with each module in support of intuitive application development. A simple soft front panel Graphical User Interface (GUI) application is also delivered with each module. The ARINC 429 SDK optionally includes AIT's *Flight Simulyzer* analyzer software and *Flight Director* Windows-based parameter processing software.

PHYSICAL BUS REPLAY

AIT's PCIe-C429 module is able to electronically reconstruct previously recorded ARINC 429 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 ARINC 429 label from the recorded file.

TECHNICAL DATA

Sub-System	
Interface:	64-bit, 33/66MHz PCIe compliant
Memory:	128 MByte DDR2 SDRAM
Encoder/Decoder:	Up to 32 encoders and decoders with error injection and detection
Time Tagging:	14 digit (400 day) absolute IRIG-B Time with 1 μ sec resolution
Physical Bus Interface:	32 ARINC 429 independent and full software programmable (as Tx or Rx) ARINC 429 channels
Connectors:	Front panel 68-pin VHDCI connector All signals also available at rear I/O connector (P14) 4x Standard PCIe connectors
Dimensions:	Standard single wide PCIe 143.7 x 74 mm Hole and connector dimensions and locations per: ANSI/VITA 20-2001 (R2005)
Power Consumption:	5.88 Watts (idle) 10 Watts (active, 32 channels at full rate Tx with 400 Ohm load)
Operating Temp. Standard:	Range: -40° C...+85° C ambient Primary and secondary ANSI/VITA 20-2001 (R2005) interfaces
Storage Temp. Standard:	Range: -40° C...+85° C ambient Humidity: 0 to 95% non-condensing

- ◆ Conduction cooling available

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