

# ACX1553-3U-x

One, Two or Four Stream  
MIL-STD-1553A/B  
Test & Simulation Module  
for CompactPCI/ PXI (3U)



General Features

The ACX1553-3U-x is a member of AIM's new fourth generation family of advanced cPCI/ PXI (3U) bus modules for analysing, simulating, monitoring and testing MIL-STD-1553A/B databuses. The ACX1553-3U-x modules concurrently act as the Bus Controller, Multiple Remote Terminals (31) and Chronological/ Mailbox Bus Monitor. The ACX1553-3U-1/2-DS version known as MILScope™, has an onboard A/D Converter on the first MIL-STD-1553 channel. The MILScope™ option provides a unique capability to test & verify the MIL-STD-1553 waveform and detect faulty bus conditions without the need of an external Oscilloscope.

A full range of MIL-STD-1553 protocol errors can be injected/ detected. The ACX1553-3U-x cards can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy.

The ACX1553-3U-x offers an interface for 1, 2 or 4 dual redundant bus streams. All versions are 3U CompactPCI/ PXI card formats. The module can be installed in standard cPCI (3U) slots, legacy PXI slots and PXI hybrid slots. If installed in a PXI slot, PXI Trigger I/O and a PXI System Reference Clock (10MHz) based time tag mode are supported.

The ACX1553-3U-x card uses AIM's 'Next Generation Common Core' (NCC) hardware design utilising multiple RISC processors with up to 16MB of global RAM and 64MB of ASP RAM. An Application Support Processor (ASP) runs the driver

software on the card minimising the host PC interaction. 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 included with sinusoidal output and free wheeling mode for time tag synchronisation on the system level using one or more ACX1553-3U-x cards. The Physical Bus Interface (PBI) Daughter board provides programmable bus coupling modes and variable Output Amplitude to the MIL-STD-1553A/B bus.

The ACX1553-3U-x cards have the capability to stimulate/ monitor up to five General Purpose Discrete I/O (GPIO) signals on Front-I/O. The ACX1553-3U-x cards are available as Full Function, Single Function & Simulator Only versions.

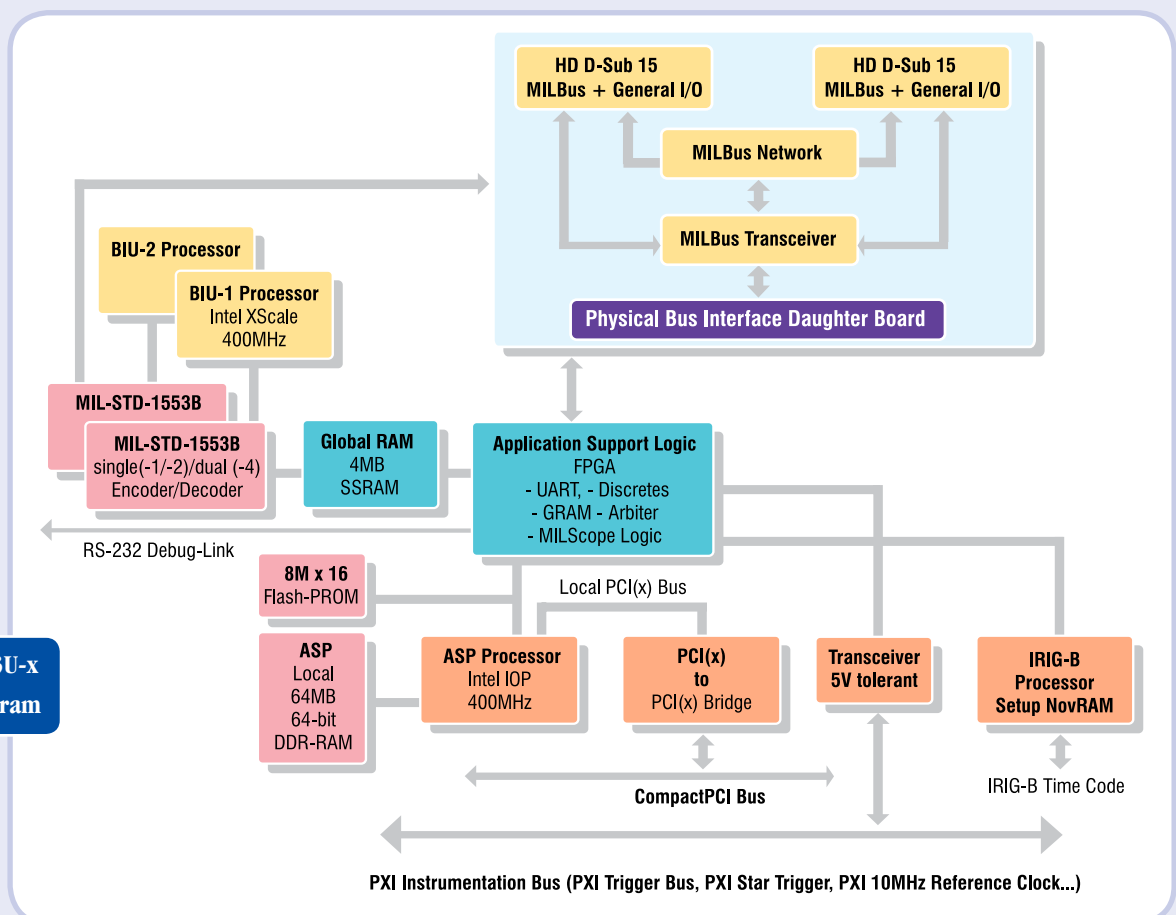
Full function driver software is delivered with the ACX1553-3U-x cards in a comprehensive Board Software Package (BSP). The optional PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) and PBA-2000/ ParaView Databus Analyser/ Visualiser Software (for Windows) can also be purchased for use with ACX1553-3U-x cards.

PBA.pro™ software components are available to support the MILScope™ capability of ACX1553-3U-x-DS cards to view & verify the MIL-STD-1553 waveform. Also off the shelf test scripts are available to support the automatic execution of the 'AS4112 RT Production Test Plan' Protocol and Electrical Waveform Tests.



Right on Target

ACX1553-3U-x Block diagram

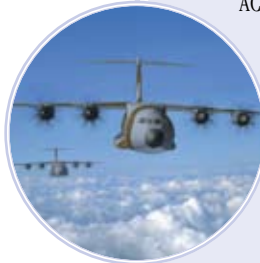


## Bus Controller

The ACX1553-3U-x provides real time Bus Controller (BC) functions on all dual redundant MIL-STD-1553A/B buses concurrently with Multiple RT (31) and Chronological Monitor operation. A 400MHz XScale Processor provides true simulation of Bus Controller operations with minimum host computer interaction.

### Key features of the Bus Controller Mode include:

- Autonomous operation including sequencing of Minor/ Major Frames
- Acyclic message insertion/ deletion
- Programmable BC Retry without host interaction
- Full Error Injection down to word and bit level
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronisation of BC operation to external (frontpanel) or PXI Trigger Inputs
- 4µs Inter Message Gaps
- Start on external Trigger Input or Digital Input



## Multiple Remote Terminal

The ACX1553-3U-x can simulate up to 31 Remote Terminals on each MIL-STD-1553A/B bus stream including all sub-addresses concurrently with BC and Chronological Monitor. Each of the 31 Remote Terminals can operate in a message oriented 'Mailbox Monitor Mode' to monitor non simulated RT's.

### Key features of the Remote Terminal Mode include:

- Programmable Response Time for each RT with fast RT Response at 4µs
- Programmable & Intelligent Response to Mode Codes
- Full Error Injection down to word and bit level
- Multi-Buffering with Real Time Data Buffer Updates

## Chronological Bus Monitor

The ACX1553-3U-x provides full bus monitoring and bus analysis with time tagging of all bus traffic to 1µs and response time and inter message gaps to 250ns. Bus Monitor Mode can operate concurrently with BC and RT simulation modes.

### Key features of the Chronological Monitor include:

- 100% Data Capture on all streams at full bus rates
- Autonomous message synchronisation and Full Error Detection
- Two Dynamic Complex Trigger with sequencing
- Message Filter and Selective Capture
- Bus Activity recording independent from trigger and capture mode
- External Trigger Outputs
- Programmable Response Timeout



## Physical Bus Replay

The ACX1553-3U-x cards can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy. Record files can be selected for Bus Replay. The additional capability to disable any or all RT responses from the MIL-STD-1553A/B replay enables smart systems integration and test to be performed.

## MILScope™ (available as a cost option)

The model ACX1553-3U-1/2-DS integrates on one channel of the PBI, a two channel differential Analogue to Digital Converter (ADC) providing 50Msamples for primary & secondary data acquisition or 100Msamples for either the primary or secondary bus. Accurate measurements of physical bus parameters such as rise/fall time, overshoot, undershoot, pulse width & amplitude, can be triggered by the complex trigger of the Bus Monitor.

## IRIG-B Time Encoder/ Decoder

ACX1553-3U-x modules include an onboard IRIG-B time encoder/ decoder with sinusoidal output and 'free wheeling' mode for time tag synchronisation. This allows synchronisation of multiple ACX1553-3U-x cards to one common IRIG-B time input source or to the onboard time code generator of one ACX1553-3U-x card as the reference for the correlation of data across multiple MIL-STD-1553A/B streams.

If installed in a PXI 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 ACX1553-3U-x is compliant with the PXI Specification Revision 2.2 providing additional triggering and system clock capabilities on the Instrumentation Bus:

- BC, RT and BM Trigger Inputs/ Outputs 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 ACX1553-3U-x is a hybrid slot compatible peripheral module.

## Application Support Processor

The onboard Application Support Processor (ASP) offers processing functions typically provided by the host processor system.

### Operational features include:

- Driver Software Execution onboard
- Dynamic Data Generation
- Possibility of Customer Specific Programming of the ASP
- Runs under Nucleus+ Operating System

## MIL-STD-1553A/B Physical Bus Interface

A Physical Bus Interface (PBI) Daughter board provides software programmable transformer or direct coupling with software programmable variable output transceivers and a terminated bus network to enable the direct connection of a single BC or RT device. The coupling to the external bus is software programmable.

## General Purpose Discrete I/O

The ACX1553-3U-1/2 modules provide five, the ACX1553-3U-4 module two General Purpose Discrete I/O's (GPIO) on the front plate D-Sub connector. The GPIO's can be used as simple discrete inputs or outputs to generate strobes (e.g. to another ACX1553-3U-x card) or to sample external digital input signals (e.g. from another ACX1553-3U-x card).

## Driver Software Support

The Driver Software resides on the ACX1553-3U-1 module. A full function Application Programming Interface (API) is provided compatible with Windows 2000/XP/Vista and Linux. Host Applications can be written in C++, LabWindows/CVI etc. A LabView/VI application interface as well as LabViewRT drivers are provided.

# ACX1553-3U-x

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MIL-STD-1553A/B Test & Simulation  
Module for CompactPCI/ PXI (3U)

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## Technical Data

**Sub-System Interface:** cPCI/ PXI Bus Master & Slave, compliant with PCI-Standard Revision 2.3 and PXI-Specification Revision 2.2 (ECN 1), 33/66 MHz, 32-bit, 5V & 3.3V compatible

**Processors:** One or two 32-bit 400MHz XScale Processors for BIU(s) and 400MHz Intel IOP for ASP

**Memory:** Global RAM: 4MB, additional cost option for 16MB; ASP RAM: 64MB

**Encoder/Decoder:** One MIL-STD-1553A/B Encoder and Decoder per BIU with full error injection & detection

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

**PXI Instrumentation Bus:** PXI Trigger Bus port, PXI STAR Trigger Input, PXI System Reference Clock Input (10MHz)

**Physical Bus Interface (PBI):** 1, 2 or 4 Dual Redundant, MIL-STD-1553B Trapezoidal Transceivers with variable Output Amplitude, Programmable Bus Coupling modes with onboard terminated Bus Network

**Connectors:** For ACX1553-3U-1/2: cPCI/ PXI Bus standard backplane connector, 9-way D-Sub for Bus connections, 26-way High Density D-Sub for Trigger, Time Code I/O and five General Purpose Discrete I/O Signals;

For ACX1553-3U-4: cPCI/ PXI Bus standard backplane connector, 15-way High Density D-Sub for Bus connections, Trigger, Time Code I/O and two General Purpose Discrete I/O Signals

**PXI Module connections:** J1 Connector for standard 32-bit PXI/ cPCI-Bus address, data, control signals; XJ4 (eHM) Connector for instrumentation signals (Trigger Bus, Star Trigger Input, 10MHz System Reference Clock)

**Dimensions:** 100mm x 160mm - cPCI/ PXI Standard 3U card

**Power Consumption:** Two Channel: 10W @ +5VDC typical  
Four Channel: 16W @ +5VDC typical

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

**Storage Temp. Range:** -40°C...+85°C **Humidity:** 0 to 95% non-condensing

**Weight:** ACX1553-3U-2 appr. 240g/ ACX1553-3U-4 appr. 320g

## Ordering Information

**ACX1553-3U-1** Single Stream, Dual Redundant cPCI/ PXI (3U) to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 4MB Global RAM, 64MB ASP RAM; 5 General Purpose Discrete I/O's on Front-I/O

**ACX1553-3U-1-DS** Single Stream, Dual Redundant cPCI/ PXI (3U) to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 4MB Global RAM, 64MB ASP RAM; Digitising Scope for Waveform Analysis & Measurement; 5 General Purpose Discrete I/O's on Front-I/O

**ACX1553-3U-2** Dual Stream, Dual Redundant cPCI/ PXI (3U) to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 4MB Global RAM, 64MB ASP RAM; 5 General Purpose Discrete I/O's on Front-I/O

**ACX1553-3U-2-DS** Dual Stream, Dual Redundant cPCI/ PXI (3U) bus to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 4MB Global RAM, 64MB ASP RAM, Digitising Scope for Waveform Analysis & Measurement (Stream 1); 5 General Purpose Discrete I/O's on Front-I/O

**ACX1553-3U-4** Quad Stream, Dual Redundant cPCI/ PXI (3U) to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 4MB Global RAM, 64MB ASP RAM; 2 General Purpose Discrete I/O's on Front-I/O

**Simulator Only** versions available (except for ACX1553-3U-1/2-DS):

BC, Multi RT Simulator with Mailbox Monitor

**Single Function** versions available (except for ACX1553-3U-1/2-DS):

Chronological Monitor and Mailbox Monitor OR Bus Controller OR Multi-RT and Mailbox Monitor

**ACB-PCI-1** Ready Made Adapter Cable (2.0 m): From D-Sub to two Twinax Connectors for all variants of ACX1553-3U-1 cards

**ACB-PCI-2** Ready Made Adapter Cable (2.0 m): From D-Sub to four Twinax Connectors for all variants of ACX1553-3U-2 cards

**ACB-HD15-2** Ready Made Adapter Cable (2.0 m): From 15-pin HD D-Sub to four Twinax Connectors for all variants of ACX1553-3U-4 cards

**ACB-HD15-2-F** Ready Made Adapter Cable (2.0 m): From 15-pin HD D-Sub to four Twinax Connectors and 9-pin D-Sub Connector for Trigger I/O, IRIG-B and Discrete I/O's for all variants of ACX1553-3U-4 cards

