data sheet

AXC1553-x

Single, Dual or Quad Stream MIL-STD-1553A/B Test & Simulation Modules for XMC

Avionics Databus Solutions

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Right on Target

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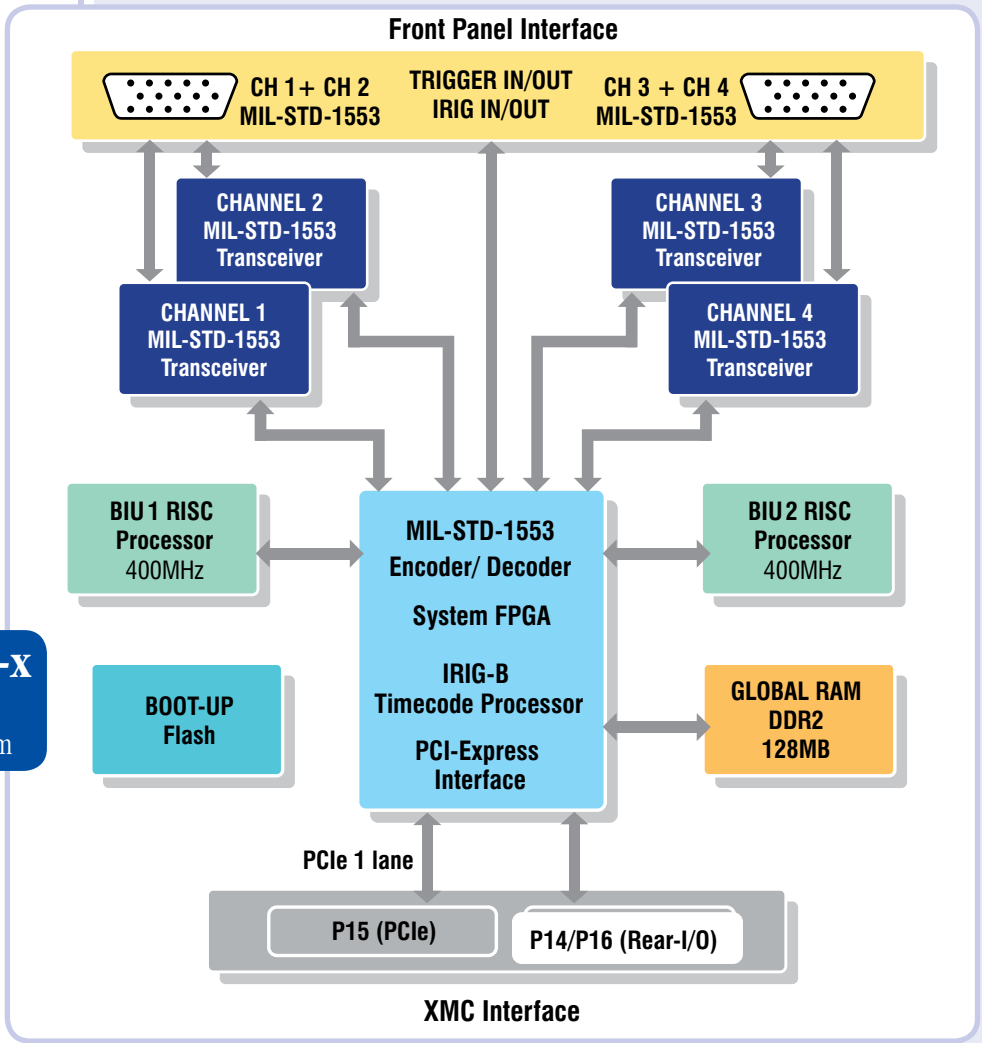
product guide

General Features

The AXC1553 is a member of AIM's new family of PCI Express based XMC-Mezzanine (ANSI/ VITA 42.3) modules targeted to embedded MIL-STD-1553A/B applications. The AXC1553-x full function version concurrently acts as Bus Controller, Multiple Remote Terminals (31) and Chronological/ Mailbox Bus Monitor. Versions with reduced functionality (Single Function or Simulator Only) are available as well as extended temperature range variants. All AXC1553-x cards have the capability to handle eight General Purpose Discrete I/O (GPIO) signals and also offer Trigger-I/O. With the provided onboard flash memory the components boot up autonomously after power up. Therefore the AXC1553-x cards are well prepared for MIL-STD-1760D and other embedded applications requiring fast and autonomous boot up to operational mode.

A full range of MIL-STD-1553 protocol errors can be injected/ detected. The AXC1553-x modules 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 AXC1553-x offers an interface for 1, 2 or 4 dual redundant bus streams. The AXC1553-x module is designed to be installed on either a carrier board to adapt to buses like standard PCI/PCIe, VME/VPX or cPCIe or on an embedded host computer. The AXC1553-x modules use two high performance RISC processors, each supporting one Dual Channel Bus Interface Unit implementing two independent MIL-STD-1553A/B channels. An onboard IRIG-B time encoder/ decoder is included with sinusoidal output and 'free wheeling' mode for time tag synchronisation on system level using one or more AXC1553-x cards.

The Physical Bus Interface (PBI) provides transformer bus coupling and fixed output amplitude to the MIL-STD-1553A/B bus. Full function driver software is delivered with the AXC1553-x cards in comprehensive Board Software Packages (BSP's) for different Operating Systems. The optional PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can also be purchased for use with AXC1553-x modules.



AXC1553-x
Functional Block Diagram

Bus Controller

The AXC1553-x modules provide real time Bus Controller functions on each independent, dual redundant MIL-STD-1553A/B Databus channel, concurrently with Multiple RT and Chronological Bus Monitor operation. Two 400MHz RISC processors, one for each Dual Channel Bus Interface Unit (BIU2), provide true simulation of BC operations without 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 Trigger Inputs*

Multiple Remote Terminal

The AXC1553-x modules simulate up to 31 Remote Terminals, including all sub addresses on each MIL-STD-1553 channel, concurrently with BC and Chronological Monitor operation. Alternatively each of the 31 RT's can operate in message oriented Mailbox Monitor Mode to monitor Non-Simulated RT's.

Key features of the Remote Terminal Simulation Mode include:

- *Programmable Response Time for each RT*
- *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 AXC1553-x modules provide full bus monitoring and analysis with time tagging of all bus traffic with 1μs resolution including response time and gap time measurement down to 250ns concurrently with BC and Multi RT operation.

Key features of the Chronological Bus Monitor:

- *100% Data Capture on each Channel*
- *Autonomous Message Synchronisation and Full Error Detection*
- *Two Dynamic Complex Triggers with Sequencing*
- *Message Filter and Selection Capture*
- *Bus Activity Recording independent from Trigger and Capture Mode*
- *External Trigger Outputs*
- *Programmable Response Timeout*

Physical Bus Replay

The AXC1553-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.

Physical Bus Interface

The AXC1553-x modules provide Transformer Coupling Bus mode for connection to the MIL-STD-1553A/B Bus stub. The amplitude of the MIL-STD-1553A/B output voltage is fixed.

All MIL-STD-1553A/B signals are provided at the Front Panel connectors or Rear-I/O connector. (Direct coupling can be provided instead of Transformer coupling/ configuration options available at time of order).

Trigger-/ General Purpose Discrete I/O Signals

The Front-I/O connectors provide one trigger input and one trigger output (shared between Bus Controller and Bus Monitor) for each MIL-STD-1553A/B channel. Additionally two user programmable General Purpose Discrete I/O signals can be accessed via Front-I/O. The XMC's Rear-I/O Interface provides three separate trigger inputs and three trigger outputs for Bus Controller, Remote Terminal and Bus Monitor for each MIL-STD-1553A/B channel. All eight onboard General Purpose Discrete I/O signals, which are user programmable for input or output can be accessed via Rear-I/O. Voltage levels of all trigger signals and General Purpose Discrete I/O's are TTL compatible whereas the General Purpose Discrete I/O's are designed to handle avionics level as well.

IRIG-B Time Encoder/ Decoder

AXC1553-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 AXC1553-x modules to one common IRIG-B time input source or to the onboard time code generator of one AXC1553-x module as the reference for correlation of data across multiple MIL-STD-1553A/B streams.

Driver Software

The Driver Software is supplied with the AXC1553-x module. A full function Application Programming Interface (API) is provided compatible with Windows XP/XPembedded/Vista/7 and Linux and for embedded VME systems (e.g. VxWorks). Drivers for other embedded applications are available upon request. Please contact the factory for further details on driver availability for a particular operating system and host platform. Host applications can be written in C and C++. A LabView/VI application interface as well as LabViewRT drivers are provided.

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Technical Data

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

Processors: Two 400MHz RISC Processors

Memory: 128MB Global RAM (DDR-RAM), 2x 8M-bit serial flash memory for BIUs, 64M-bit serial flash memory for LCA, 2Kbit I²C EEPROM for XMC specific FRU data

Encoder/ Decoder: Up to four MIL-STD-1553A/B 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: Full Trigger configuration on Rear-I/O connector P14/P16 one Trigger input and Trigger output for each channel available with two General Purpose Discrete I/O's (avionics level) on the front panel connector

Physical Bus Interface: Up to four MIL-STD-1553B Trapezoidal Transceivers; Transformer coupled Stubs, three Trigger-I/O's per channel and 8 General Purpose Discrete I/O's available at Rear-I/O connector:

- Two 15-way (female) HD-Sub
- Four independent MIL-STD-1553A/B channels
- One Trigger Input and Output per channel
- IRIG-B Time Code In/ Out
- 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: 149 x 74 mm Standard XMC format
143.75 x74 mm Conduction cooled format

Thermal Conduction Cooling: Enhanced thermal performance for Conduction Cooling in extended temperature range

Power Consumption: Min. Power: 2.2W (Idle Mode)
Max. Power: 6.5W (100% Bus Operation)
(Typical Values for AXC1553-4)

Operating Temp. Range: Standard 0°C ...+70°C ambient
Extended temperature range -40°C...+85°C
Conduction cooled versions available

Storage Temp: -40°C...+85°C

Humidity: 0 to 95% non-condensing

Ordering Information

AXC1553-1 Single Stream, Dual Redundant MIL-STD-1553A/B PMC Module:
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Decoder, 128MB Global RAM, 8 General Purpose Discrete I/O's

AXC1553-2 Dual Stream, Dual Redundant MIL-STD-1553A/B PMC Module:
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Decoder, 128MB Global RAM, 8 General Purpose Discrete I/O's

AXC1553-4 Quad Stream Dual Redundant MIL-STD-1553A/B PMC Module:
BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Encoder/ Decoder, 128MB Global RAM, 8 General Purpose Discrete I/O's

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

Simulator Only versions available
BC, Multi RT Simulator with Mailbox Monitor

Single Function versions available
Chronological Monitor & Mailbox Monitor OR Bus Controller OR Multi RT and Mailbox Monitor

ACB-HD15-1 Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to two Twinax Connectors

ACB-HD15-1-F Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to two Twinax Connectors and 9-pin D-Sub Connector for Trigger-I/O, IRIG-B and General Purpose Discrete I/O's

ACB-HD15-2 Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to four Twinax Connectors

ACB-HD15-2-F Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to four Twinax Connectors and 9-pin D-Sub Connector for Trigger-I/O, IRIG-B and General Purpose Discrete I/O's

For PCI-Express **Carrier Modules** with one XMC slot please contact the factory