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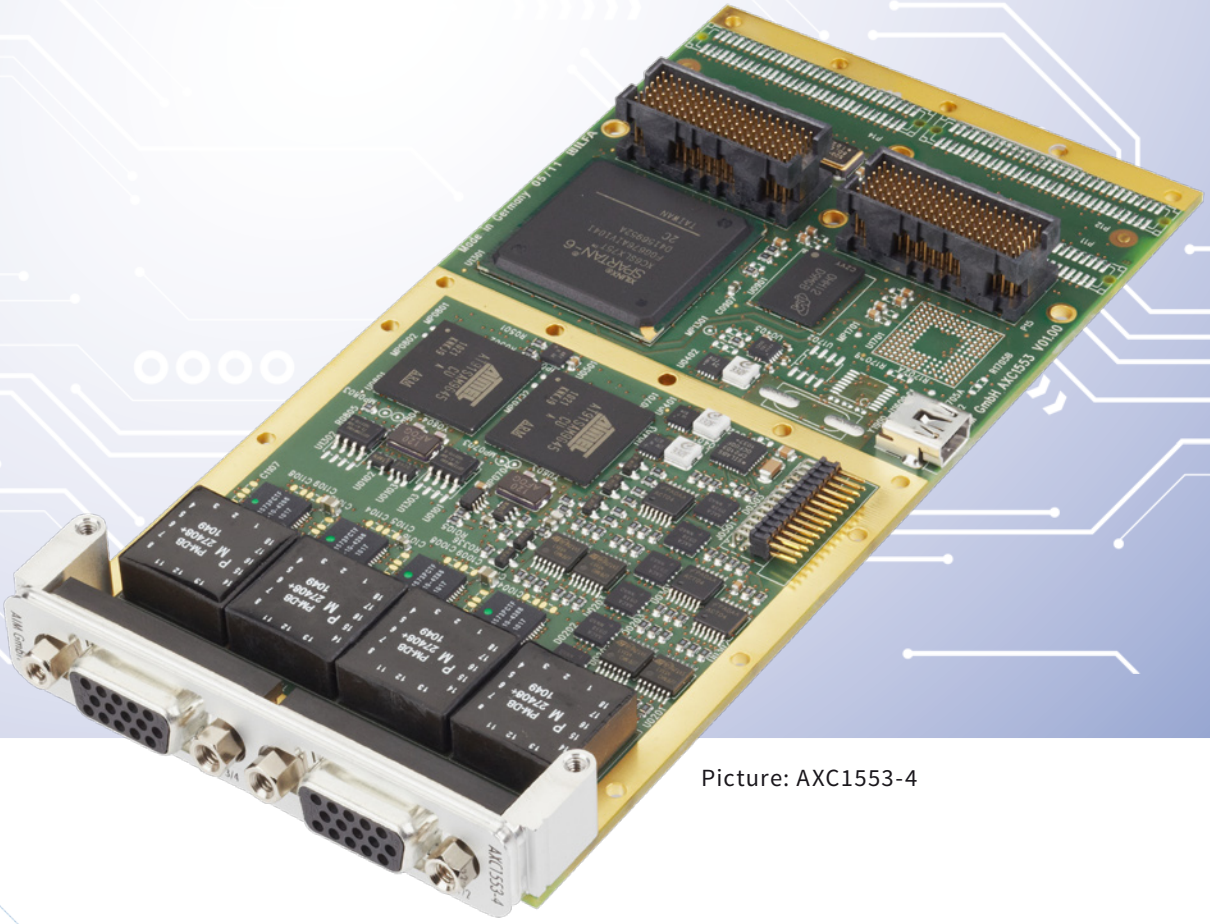
Avionics Databus Solutions

AXC1553-x

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

Data Sheet



Picture: AXC1553-4

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AXC1553-x

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

General Features

The ► **AXC1553-x** 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 8 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-nT provides 1 or 2 dual redundant bus streams. The AXC1553-x modules are 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.

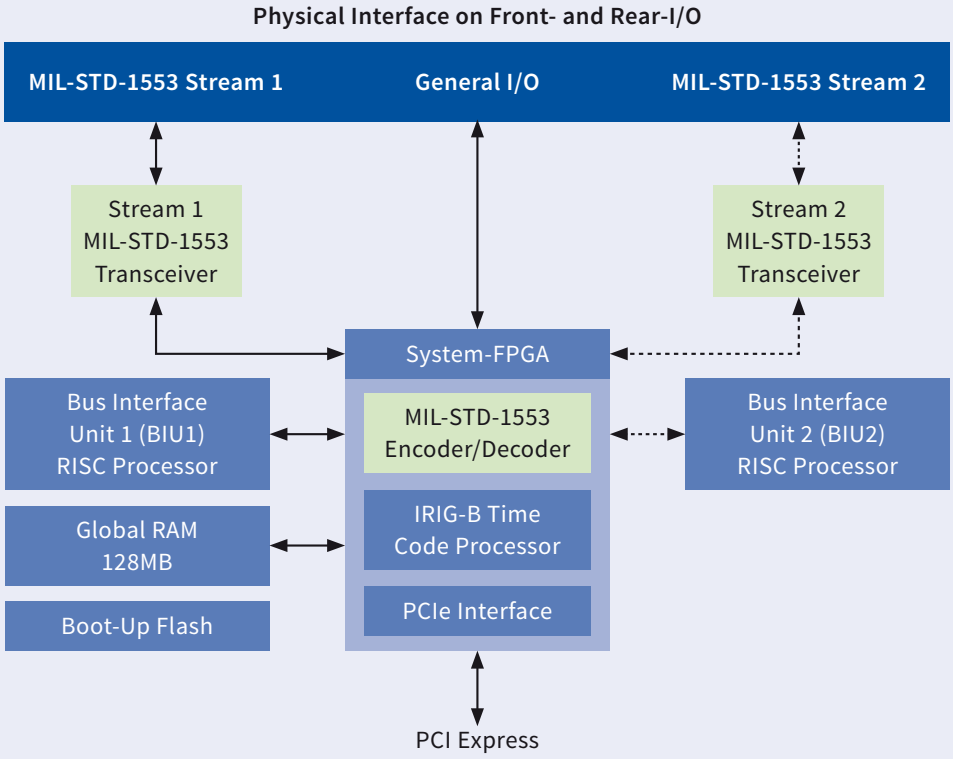
An onboard IRIG-B time encoder/decoder is included with sinusoidal output and free-wheeling mode for time tag synchronization on system level using one or more AXC1553-x cards.

The Physical Bus Interface (PBI) on the AXC1553-1/2/4 modules provides transformer bus coupling (direct coupling on request) and fixed output amplitude to the MIL-STD-1553A/B bus.

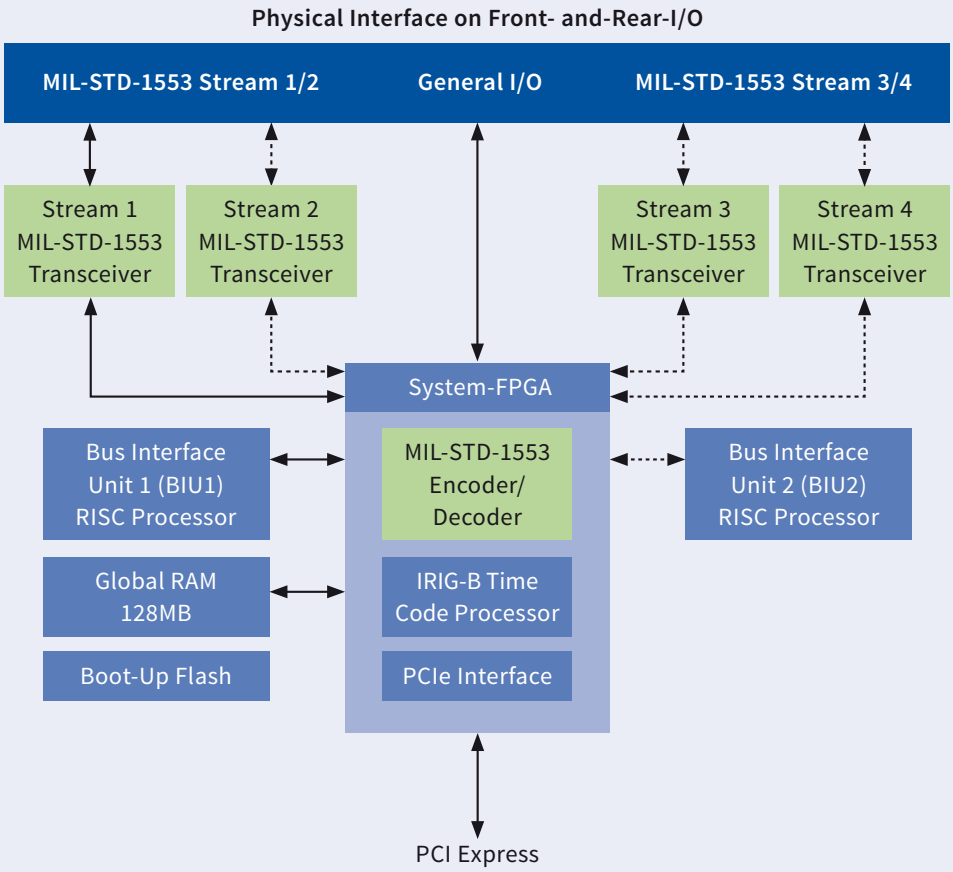
The AXC1553-1T/2T modules provide programmable Bus Coupling, an onboard Bus Network and variable output amplitude to the MIL-STD-1553A/B bus.

Full function driver software is delivered with the AXC1553-x cards in comprehensive Board Software Packages (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 AXC1553-x modules.



AXC1553-1T/2T
Block Diagram



AXC1553-1/2/4
Block Diagram

Bus Controller

The AXC1553-x modules provide real time Bus Controller functions on each independent, dual redundant MIL-STD-1553A/B Databus stream, concurrently with Multiple RT and Chronological Bus Monitor operation.

The 400MHz RISC processor provides 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
- Synchronization 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-1553A/B stream, 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 and Intelligent Response to Mode Codes
- Full Error Injection down to Word and Bit Level
- Multi-Buffering with Real Time Data Buffer Updates

Physical Bus Replay

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. 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 system integration and test to be performed.

Physical Bus Interface

The modules provide Transformer Bus Coupling (Direct Coupling can be provided instead of transformer coupling/configuration options available at time of order) and fixed output amplitude for connection to the MIL-STD-1553A/B Bus stub.

The AXC1553-1T/2T modules provide programmable Bus Coupling, an onboard Bus Network and variable output amplitude to the MIL-STD-1553A/B.

All MIL-STD-1553A/B signals are provided at the Front Panel connectors or Rear-I/O connector.

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 include:

- 100% Data Capture on each Stream
- Autonomous Message Synchronization and Full Error Detection
- 2 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

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 stream.

Additionally user programmable Discrete I/O signals, 2 on the AXC1553-1/2/4 and 6 on the AXC1553-1T/2T, can be accessed via Front-I/O.

The XMC's Rear-I/O Interface provides 3 separate trigger inputs and 3 trigger outputs for Bus Controller, Remote Terminal and Bus Monitor for each MIL-STD-1553A/B stream.

All 8 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 synchronization.

This allows synchronization of multiple AXC1553-x modules to 1 common IRIG-B time input source or to the onboard time code generator of 1 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 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 application can be written in C and C++. A LabView/VI application interface is provided.

Technical Data

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

Processors
1x or 2x 400MHz RISC Processors

Memory
128MB Global RAM (DDR-RAM),
2x 8MBit serial flash memory for BIUs,
64MBit serial flash memory for LCA

Encoder/Decoder
Up to 2 (AXC1553-2T) or up to 4 (AXC1553-4) 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; 1 Trigger input and Trigger output for each stream available with 2 (AXC1553-1/2/4) or 6 (AXC1553-1T/-2T) General Purpose Discrete I/Os (avionics level) on the Front Panel connector

Physical Bus Interface
MIL-STD-1553B Trapezoidal Transceivers;
3 Trigger-I/O's per stream and 8 General Purpose Discrete I/O's available at Rear-I/O connector; 1 Trigger Input and Output per stream available at front panel connector:

- IRIG-B Time Code In/Out
- 2x Standard XMC connectors
- 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 (please specify on the order);

AXC1553-1/2/4: Transformer Bus Coupling (Direct coupling can be provided instead of Transformer coupling/configuration options available at time of order);
2x 15-way (female) High Density D-Sub;
Up to 4 independent MIL-STD-1553A/B streams.
AXC1553-1T/2T: Programmable Bus coupling (Isolated, Direct, Transformer, Onboard Bus Network);
1x 9-way (female) D-sub and 1x 15-way (female) High Density D-Sub; Up to 2 independent MIL-STD-1553A/B streams

Dimensions
149 x 74mm Standard XMC format
143.75 x 74mm conduction cooled format for AXC1553-1/2/4

Thermal Conduction Cooling
Enhanced thermal performance for Conduction Cooling in extended temperature range for AXC1553-1/2/4

Power Consumption
Min. Power: 2.2W (Idle Mode)
Max. Power: 6.5W (100% Bus Operation)
Typical Values for AXC1553-2T @3.3V:
Min. Power: 2.9W (Idle Mode)
Max. Power: 7.5W (100% Bus Operation)

Operating Temperature Range
Standard: 0°C to +70°C ambient
Extended: -40°C to +85°C
Conduction cooled versions available for AXC1553-1/2/4

Storage Temperature
-40°C to +85°C

Humidity
0 to 95% non-condensing

Ordering Information

AXC1553-1
Single Stream, Dual Redundant MIL-STD-1553A/B XMC Module:

BC, Multi-RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Encoder/Decoder,
128MB Global RAM,
8 General Purpose Discrete I/O's

AXC1553-1T
Single Stream, Dual Redundant MIL-STD-1553A/B XMC Module:

BC, Multi-RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Encoder/Decoder,
128MB Global RAM, 8 General Purpose Discrete I/O's, programmable Bus Coupling and onboard Bus Network, variable output Amplitude

AXC1553-2
Dual Stream, Dual Redundant MIL-STD-1553A/B XMC Module:

BC, Multi-RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Encoder/Decoder,
128MB Global RAM,
8 General Purpose Discrete I/O's

AXC1553-2T
Dual Stream, Dual Redundant MIL-STD-1553A/B XMC Module:

BC, Multi-RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Encoder/Decoder,
128MB Global RAM, 8 General Purpose Discrete I/O's, programmable Bus Coupling and onboard Bus Network, variable output Amplitude

AXC1553-4
Quad Stream, Dual Redundant MIL-STD-1553A/B XMC 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)

ACB-HD15-1
Ready Made Adapter Cable (2.0m): from 15-pin HD-Sub to 2 Twinax Connectors PL-75

ACB-HD15-1-F
Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to 2 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O, IRIG-B

ACB-HD15-2
Ready Made Adapter Cable (2.0m): from 15-pin HD-Sub to 4 Twinax Connectors PL-75

ACB-HD15-2-F
Ready Made Adapter Cable (2.0m): from 15-pin HD-Sub to 4 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O, IRIG-B

ACB-PCI-1
Ready Made Adapter Cable (2.0m): From D-Sub to 2 Twinax Connectors PL-75

ACB-PCI-2
Ready Made Adapter Cable (2.0m): From D-Sub to 4 Twinax Connectors PL-75

For Carrier Modules with one XMC slot please contact the factory

► 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 Trevose, PA 19053
Phone 267-982-2600
Fax 215-645-1580
sales@aim-online.us