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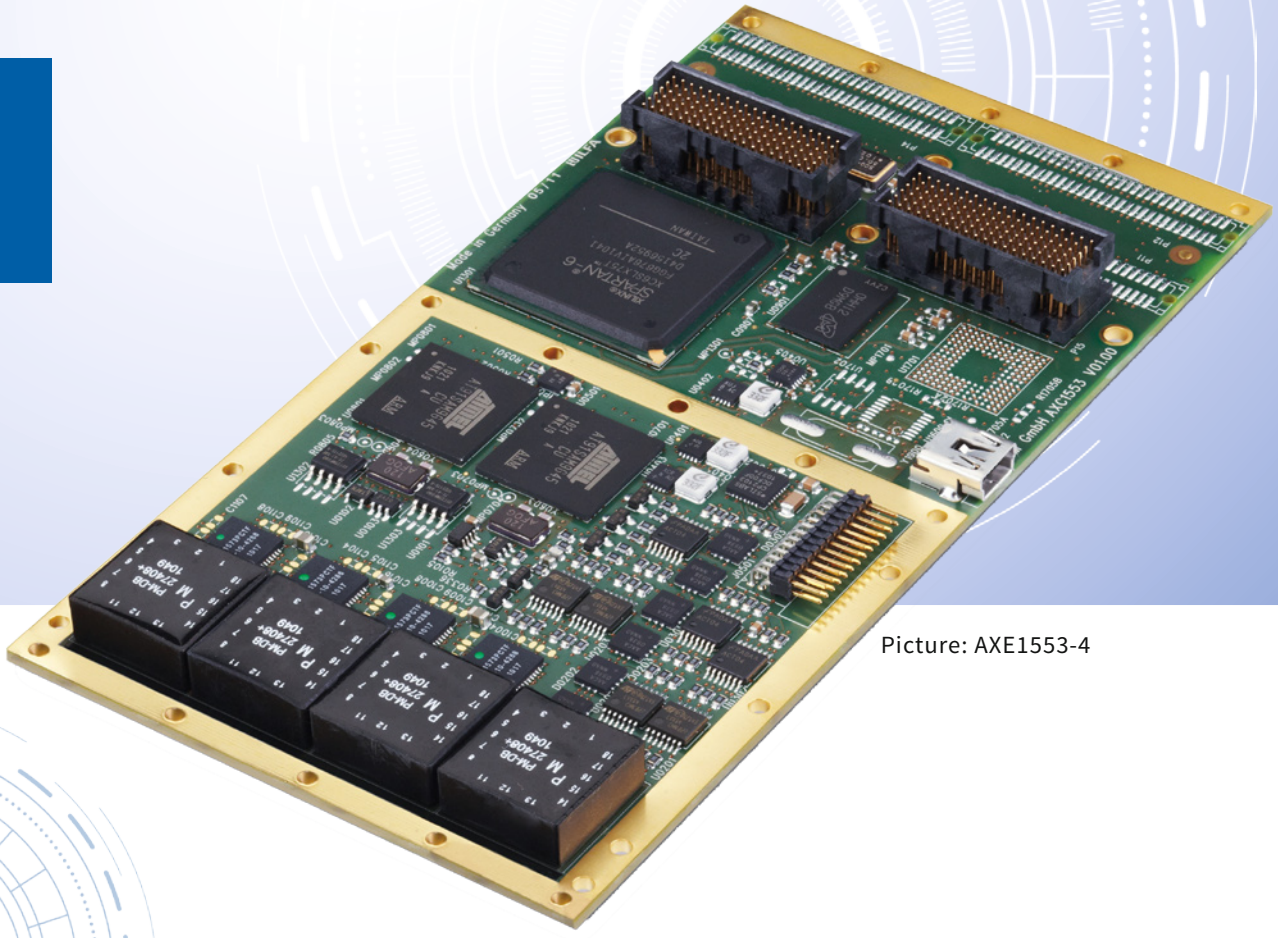
Avionics Databus
Solutions

AXE1553-x

Rugged Embedded MIL-STD-1553
Conduction Cooled XMC Card

Data Sheet



Picture: AXE1553-4

www.aim-online.com

AXE1553-x

Rugged Embedded MIL-STD-1553 Conduction Cooled XMC Card

General Features

The card is a member of AIM's family of PCI Express based XMC-Mezzanine (ANSI/VITA 42.3) modules targeted for embedded MIL-STD-1553A/B applications.

The card is designed to meet or exceed vibration requirements as specified in ANSI/VITA 47 for class V3. It is also designed to meet the shock requirements specified in ANSI/VITA 47 for class OS2.

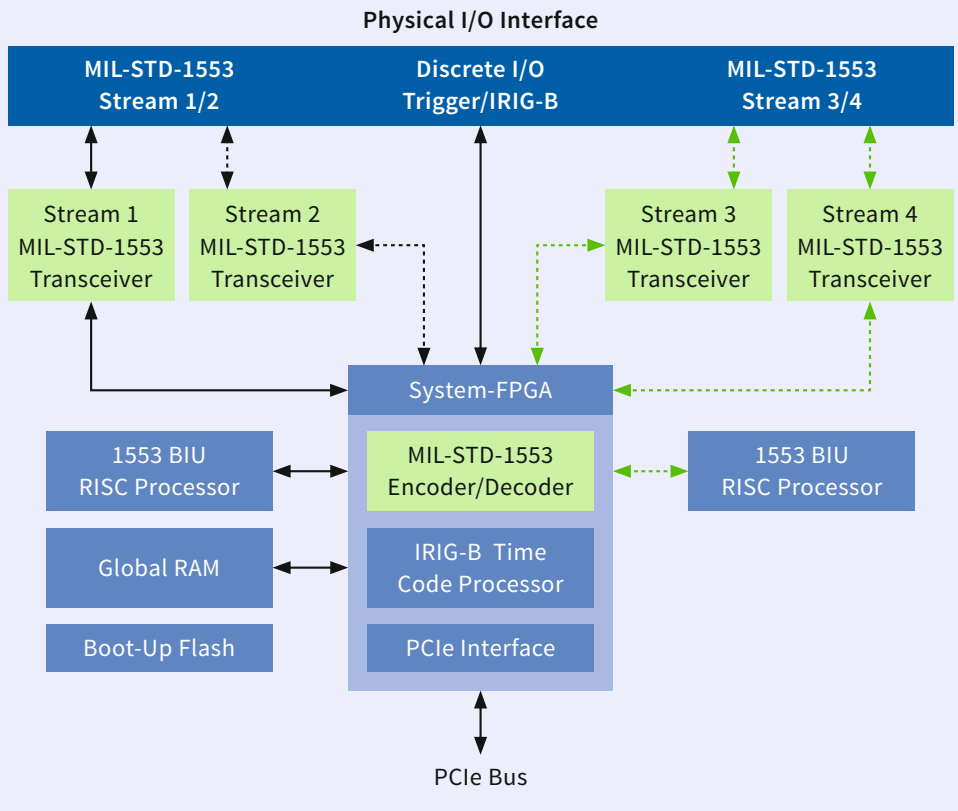
All cards are conduction cooled Rear I/O cards and have the capability to handle up to 4 dual redundant ▸ **MIL-STD-1553** streams with 8 Open/Ground Avionics Level (+35V) Discrete I/O signals in addition to Trigger I/O. With the provided onboard flash memory the components boot up autonomously after power up.

Therefore the cards are well prepared for MIL-STD-1760D and other embedded applications requiring fast and autonomous boot up to operational mode.
An onboard IRIG-B analog time decoder is included with free-wheeling mode for time tag synchronization.

AIM's XMC card utilizes the latest AIM ▸ **Common Hardware Core** derived from the existing AXC1553-x MIL-STD-1553 test and simulation interface, to deliver low power consumption and high performance for rugged environments and embedded applications.

Key Features

- Low Power Consumption -4.8W Max. @50% duty cycle for 4 streams MIL-STD-1553
- -40°C to +85°C operating temperature range
- VITA 47 shock and vibration qualified
- P16 Rear I/O XMC connector with support for VITA 46.9
- SOSA compliant XMC User I/O Mapping
- High performance RISC processors onboard:
  - Host CPU offload for low CPU utilization
  - Hard Real Time Precision and Timing
- DMA Engine for optimized bus transfers and low PCIe bus utilization
- 128MB Global RAM onboard for data scheduling and buffering
- Flexible and upgradeable firmware design provides full control of Obsolescence and Configuration Management
- Up to 4 Dual Redundant MIL-STD-1553 streams:
  - No limitation on transmitter duty cycle
  - Supports MIL-STD-1553A/B and MIL-STD-1760
  - BC Disable for RT Only Applications
  - Tx Inhibit for Monitoring Only Applications (assembly option)
- 8 Open/Ground Avionics/Digital Discrete I/O
- 3 digital Trigger Inputs and 3 digital Trigger Outputs per 1553 stream
- IRIG-B Input



▸ **AXE1553-x**
Block Diagram

Bus Controller

The 400MHz RISC processor provides true BC operations without host computer interaction to guarantee all MIL-STD-1553 timing is met.

Key Features:
- Autonomous Operation
- Sequencing of Minor/Major Frames
- Acyclic Message Insertion/Deletion
- Programmable BC Retry without Host Interaction
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronization of BC Operation to external Trigger Inputs

Multiple Remote Terminals

The card supports up to 31 Remote Terminals including all sub addresses on each stream. Each of the 31 RT's can also operate concurrently with Mailbox Bus Monitor Mode to provide the latest data per RT Address/SA.

Key Features:
- Programmable Response Time for each RT
- Programmable and Intelligent Response to Mode Codes
- Multi-Buffering with Real Time Data Buffer Updates

Chronological Bus Monitor

The card provides 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.

Key Features :
- Mailbox Bus Monitor or Chronological Bus Monitor
- 100% Data Capture on each stream
- Autonomous Message Synchronization
- Full Error Detection
- Dynamic Complex Trigger with Sequencing
- Message Filter and Selection Capture
- Bus Activity Recording independent from Trigger and Capture Mode
- Programmable Response Timeout

Trigger & Discrete I/O Signals

The boards provide 8 Open/Ground Avionics/Digital (+35V) level Discrete I/O signals as well as 3 separate Trigger Inputs and 3 separate Trigger Outputs for each MIL-STD-1553 stream.

IRIG-B Time Decoder

The card provides an analog IRIG-B input and a time decoder with free-wheeling mode for time tag synchronization of multiple cards to 1 common IRIG-B time input source.

Driver Software

An Application Programming Interface (API) is provided along with drivers for Windows, Linux and VxBus.

Please contact your local sales representative for other operating systems.
Host applications can be written in C, C++, or C#. LabVIEW/VI application interfaces as well as LabVIEW-RT drivers are also provided.

Technical Data

System Interface
XMC Single Lane, 2.5Gb/s PCIe 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 FPGA

Encoder/Decoder
Up to 4 MIL-STD-1553A/B Encoder/Decoder with full error detection

Time Tagging
46bit absolute IRIG-B Time stamping with 1µs resolution, derived from IRIG-B-122 Input or free-wheeling

Trigger/General Purpose Discrete I/O
3 Trigger Inputs, 3 Trigger Outputs per MIL-STD-1553 stream,
8 Open/Ground Avionics (+35V)/Digital level Discrete I/O

Physical Bus Interface
MIL-STD-1553B Trapezoidal Transceiver, fixed Output Amplitude, Transformer coupled (default), Direct Coupling (on request)

Dimensions
143.75 x 74mm Conduction Cooled format

Power Consumption
1 stream @3.3V:
Min. 2.2W (Idle Mode), Max. 2.9W
(50% Bus Operation), @5V: < 0.5W

2 streams @3.3V:
Min. 2.2W (Idle Mode), Max. 3.5W
(50% Bus Operation), @5V: < 0.5W
4 streams @3.3V:
Min. 2.2W (Idle Mode), Max. 4.8W
(50% Bus Operation), @5V: < 0.5W

Operating Temperature Range
Extended: -40°C to +85°C

Storage Temperature Range
-40°C to +85°C

Humidity
0 to 95% non-condensing

Ordering Information

AXE1553-2
Dual Stream, Dual Redundant
MIL-STD-1553 XMC Module

AXE1553-4
Quad Stream, Dual Redundant
MIL-STD-1553 XMC Module

Single Function versions available:
Chronological & Mailbox Monitor Or
BC and Chronological & Mailbox Monitor Or
Multi-RT and Chronological & Mailbox Monitor

Common Features:
BC, Multi-RT Simulator with Mailbox & Chronological Monitor;
IRIG-B Time Decoder, 128MB Global RAM,
8 General Purpose Discrete I/O's;
All I/O via XMC P16 Rear I/O connector with x8d + x12d + x24s pinout pattern (default), extended Temperature Range, Conduction Cooled.

Options:

Tx Inhibit
Available as assembly option,
add suffix -I to Part Number

X12d
All I/O via XMC P16 Rear I/O connector with SOSA compliant x12d + x8d +x24s pinout pattern

Conformal Coating
Available as costed option,
add suffix -COAT to Part Number

Qualified to ANSI/VITA 47-2005 (R2007) Environmental Conditions List

- Operating Temperature Class CC3 in Conduction Cooled and Class AC3/FC3 in Air Cooled Applications
- Vibration Class V3 according to MIL-STD-810G, Method 514.6, Procedure I
- Operating Shock Class according to MIL-STD-810G, Method 516.6, Procedure I
- Operating Humidity according to MIL-STD-810G, Method 507.5, Procedure II
- Altitude Test according to MIL-STD-810G, Method 500.5, Procedure II

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