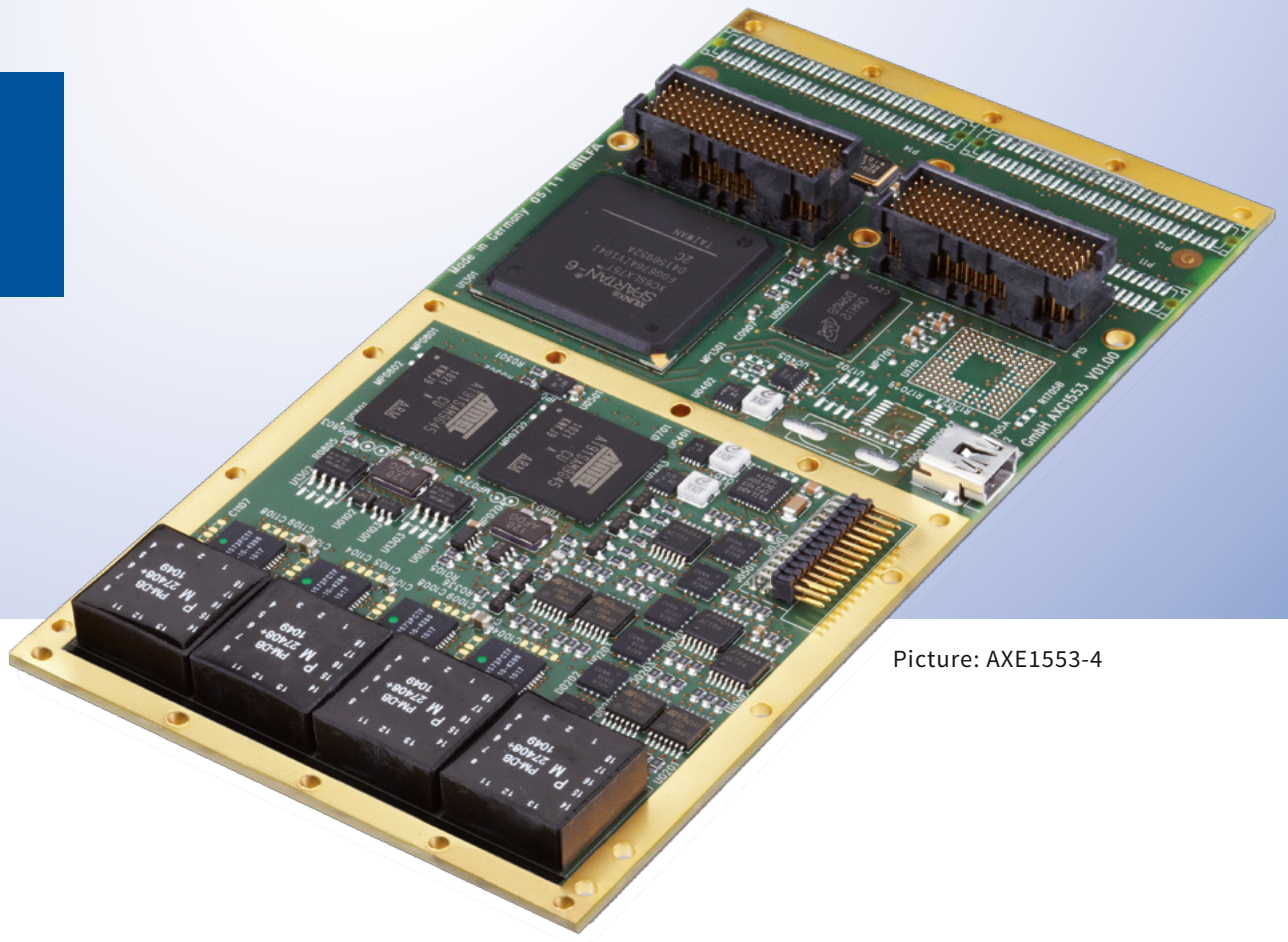# AXE1553-x

Rugged Embedded MIL-STD-1553
Conduction Cooled XMC Card

Data Sheet

Picture: AXE1553-4

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 autono-mous boot up to operational mode. An onboard IRIG-B analogue 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 connectors with support for VITA 46.9
- 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
  – MIL-STD-1760D support with autonomous RT Auto Boot
  – 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
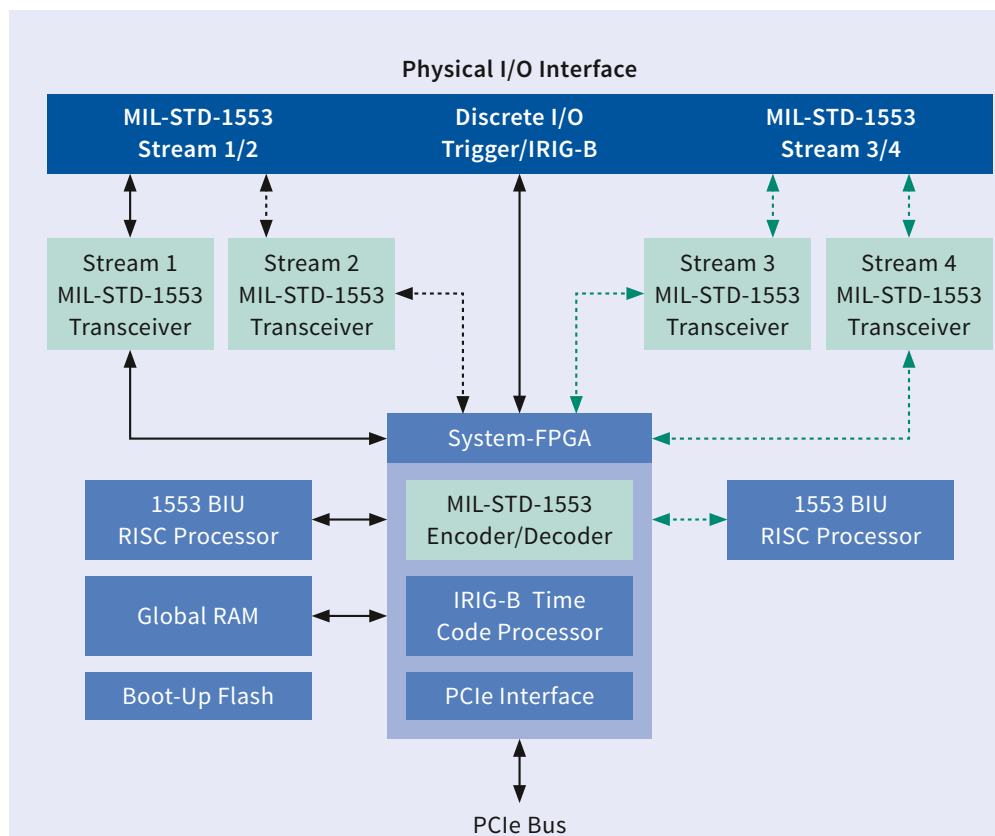
Bus Controller

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 & 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 analogue 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 low level 32-/64bit operating system specific drivers for Windows 7/8/10, Linux and VxWorks.

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)

Ordering Information

AXE1553-1
Single Stream, Dual Redundant MIL-STD-1553 XMC Module
AXE1553-2
Dual Stream, Dual Redundant MIL-STD-1553 XMC Module
AXE1553-4
Quad Stream, Dual Redundant MIL-STD-1553 XMC Module

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 PMC P16 Rear I/O connector, extended Temperature Range, Conduction Cooled.

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

Options:
Tx Inhibit
Available as assembly option, add suffix -I to Part Number
Solder
RoHS (default);
for leaded solder option please contact the factory
Conformal Coating
Available as costed option, add suffix -COAT to Part Number

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
-55°C to +105°C
Humidity
0 to 95% non-condensing

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