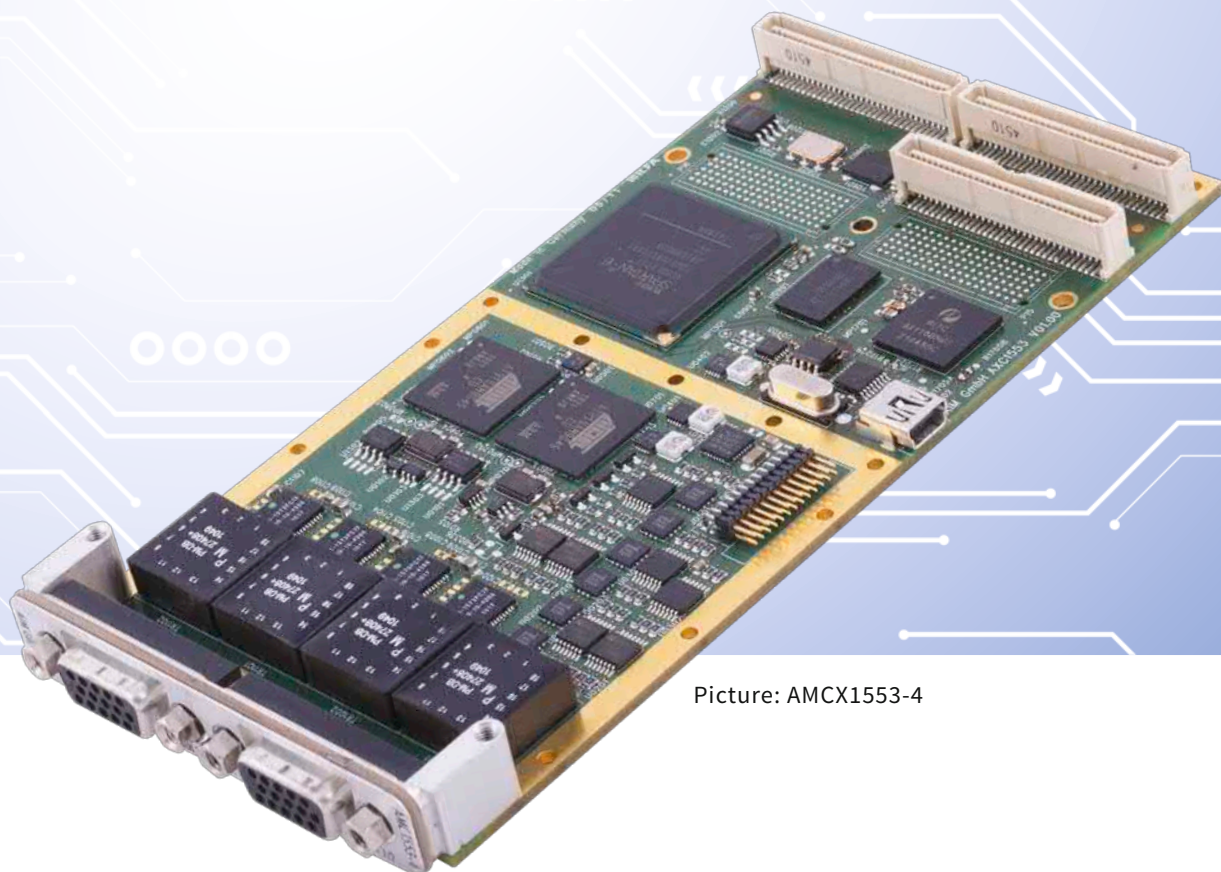


AMCX1553

1, 2 or 4 Stream MIL-STD-1553A/B
Test & Simulation Modules
for PMC

Data
Sheet



Picture: AMCX1553-4

General Features

The AMCX1553 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 AMCX1553 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.

A full range of ► **MIL-STD-1553** protocol errors can be injected/detected. The AMCX1553 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 AMCX1553-n offers an interface for 1, 2 or 4 dual redundant bus streams, the AMCX1553nT provides 1 or 2 dual redundant bus streams.

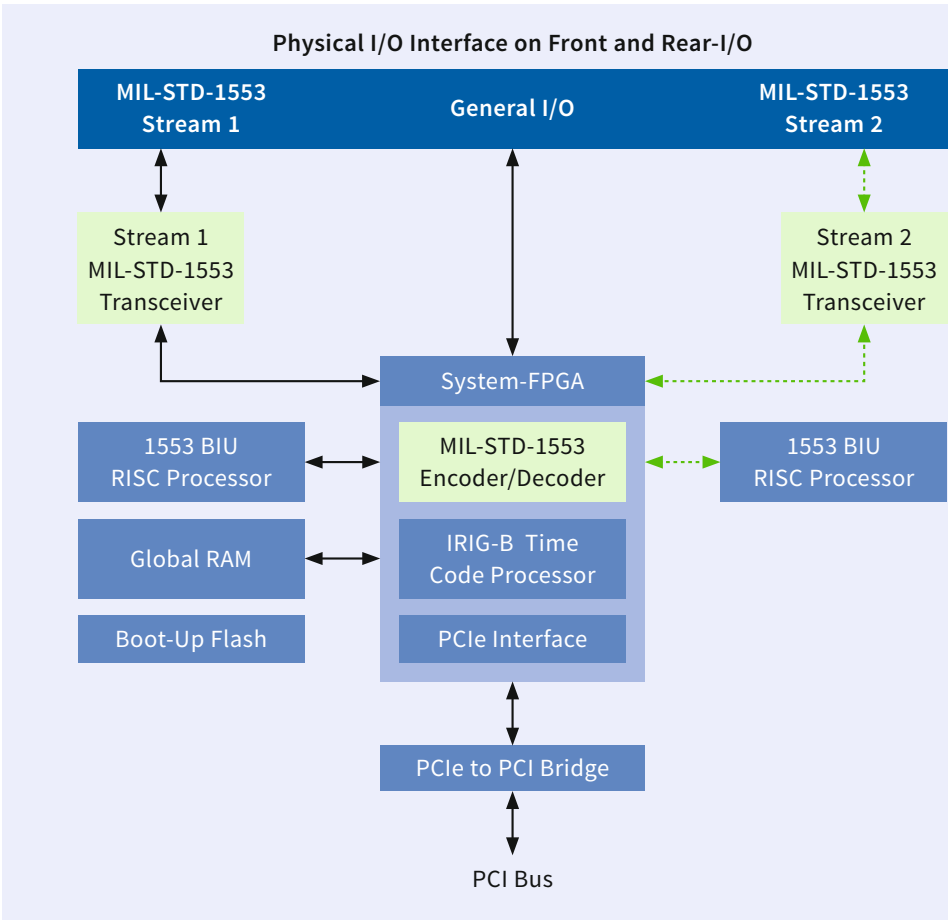
The AMCX1553 modules are designed to be installed on either a carrier board to adapt to buses like standard ► **PCI/PCIe, VME/VPX or CPCle** or on an embedded host computer. An onboard IRIG-B time encoder/decoder is included with sinusoidal output and free-wheeling mode for time tag synchronization on system level using 1 or more AMCX1553 cards.

The Physical Bus Interface (PBI) on the AMCX1553-1/2/4 modules provides transformer bus coupling (direct coupling available on request) and fixed output amplitude to the MIL-STD-1553A/B bus.

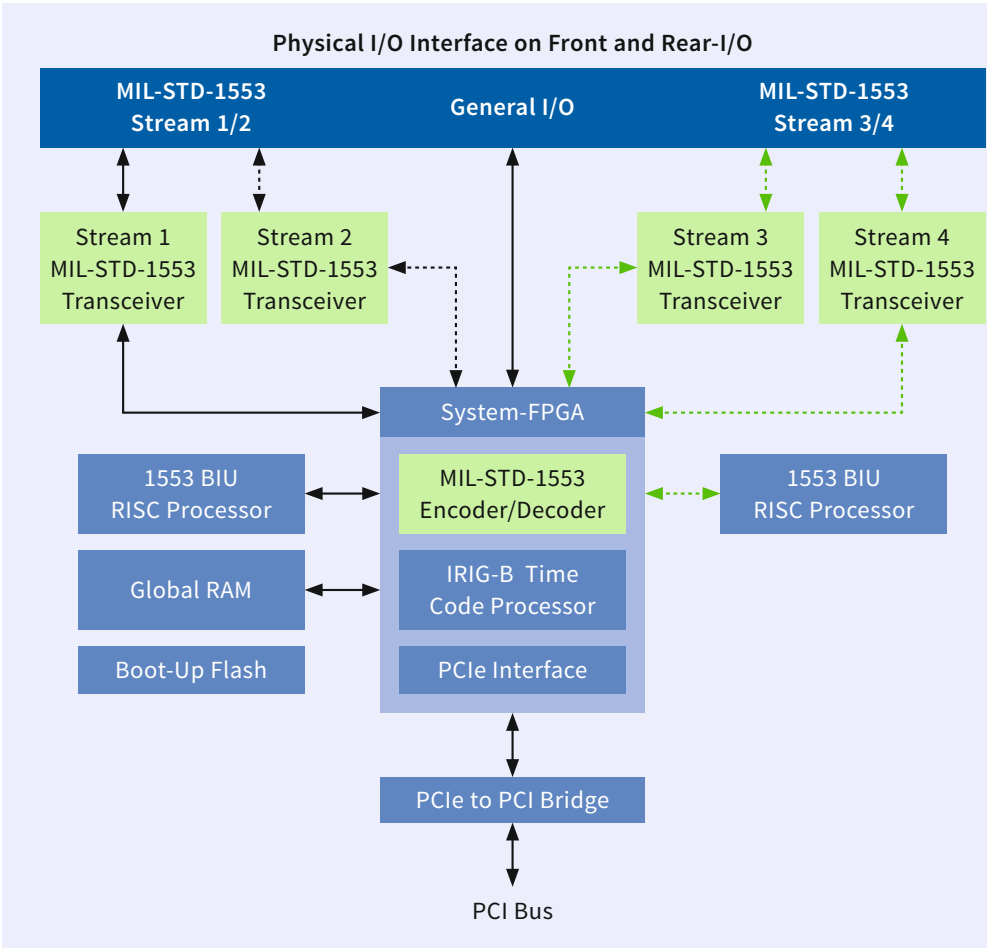
The AMCX1553-1T/2T modules provide programmable Bus Coupling, an onboard Bus Network and variable output amplitude to the MIL-STD-1553A/B bus.

Full function driver software is delivered with the AMCX1553 cards in comprehensive Board Software Packages (BSP's) for different operating systems.

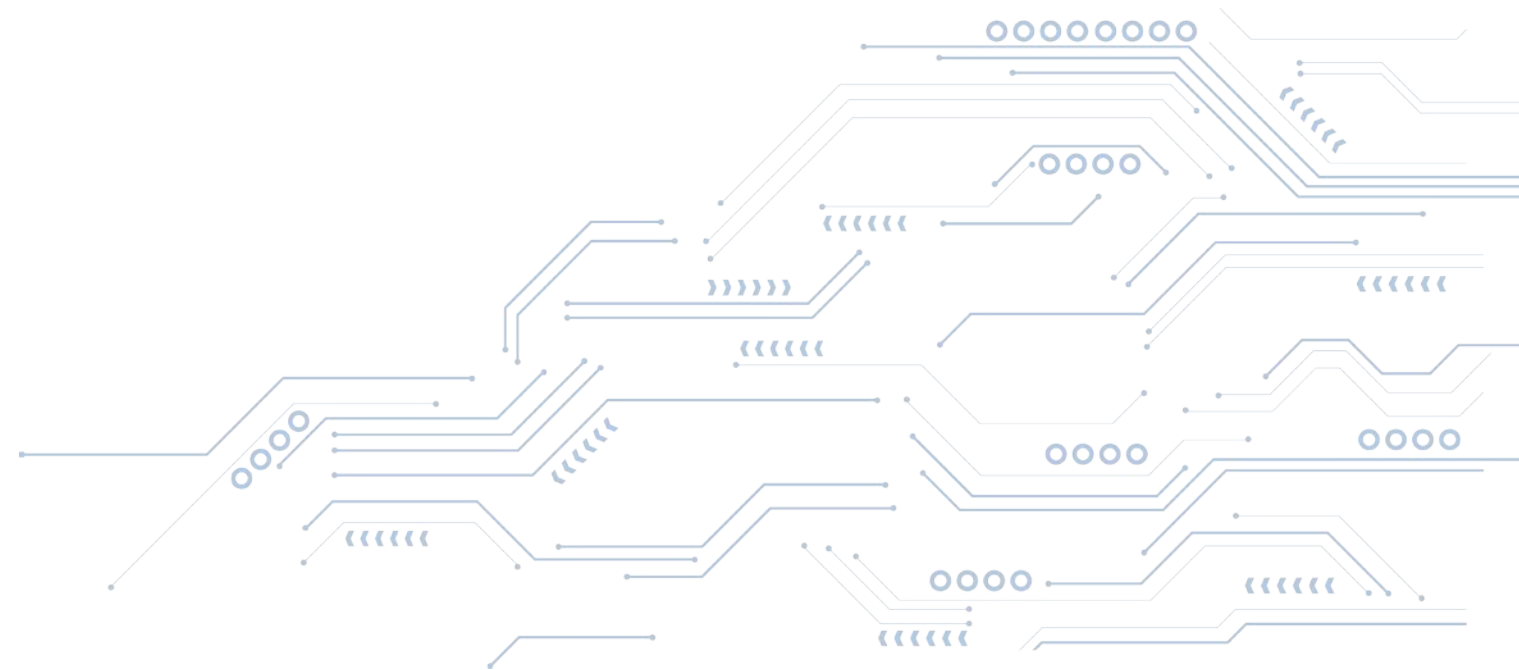
The optional ► **PBA.pro™** Databus Test and Analysis Tool (for Windows and Linux) can also be purchased for use with AMCX1553 modules.



AMCX1553-1T-2T Block Diagram



AMCX1553-1/2/4 Block Diagram



Bus Controller

The AMCX1553 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 multiple Minor and Major Frames
- Support for Acyclic Message Insertion/Deletion
- Programmable BC Retry without Host Interaction
- Full Error Injection down to Word and Bit Level (AS4112 compliant)
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronization of BC Operation to external Trigger Inputs

Multiple Remote Terminal

The AMCX1553 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 orientated Mailbox Monitor Mode to monitor Non-Simulated RT's.

Key Features of the Remote Terminal Simulation Mode include:

- Programmable Response Time for each simulated 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

Chronological Bus Monitor

The AMCX1553 modules provide full bus monitoring and analysis with time tagging of all bus traffic to 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 1 Stream at full Bus Rates
- Autonomous Message Synchronization and Full Error Detection
- 2 Dynamic Complex Trigger with Sequencing
- Message Filter and Selective Capture
- Bus Activity Recording independent from Trigger and Capture Mode
- External Trigger Outputs
- Programmable Response Time-Out

Physical Bus Replay

The AMCX1553 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 systems integration and test to be performed.

Physical Bus Interface

The AMCX1553-1/2/4 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 AMCX1553-1T/2T modules provide programmable Bus Coupling, an onboard Bus Network and variable output amplitude to the MIL-STD-1553A/B bus.

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

Trigger/General Purpose Discrete I/O Signals

The Front-I/O connectors provide 1 Trigger Input and 1 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 AMCX1553-1/2/4 and 6 on the AMCX1553-1T/2T, can be accessed via Front-I/O. The PMC'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

AMCX1553 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 AMCX1553 modules to 1 common IRIG-B time input source or to the onboard time code generator of 1 AMCX1553 module as the reference for correlation of data across multiple MIL-STD-1553A/B streams.

Driver Software Support

The Driver Software is supplied with the AMCX1553 module. A full function Application Programming Interface (API) is provided compatible with Windows, 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

32-bit/33MHz PCIbus (Rev. 2.2) compliant

Processors

1x or 2x 400MHz RISC Processors

Memory

128MB Global RAM (DDR-RAM),
2x 8Mbit serial flash memory for BIU's,
64Mbit serial flash memory for LCA

Encoder/Decoder

Up to 2 (AMCX1553-2T) or up to 4 (AMCX1553-4) MIL-STD-1553A/B Encoder/Decoder with full error injection and detection

Time Tagging

Sinusoidal 46-bit absolute IRIG-B time stamping with 1 μ s resolution

Trigger/General Purpose Discretes

Full Trigger configuration on Rear-I/O PMC connector P14;
1 Trigger Input and Trigger Output for each stream available with 2 (AMCX1553-1/2/4) or 6 (AMCX1553-1T/2T) General Purpose Discrete I/O's (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
- 3x Standard PMC connectors
- P11 and P12 for 32-bit PCI Bus
- P14 for Rear-I/O

AMCX1553-1/2/4:

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

AMCX1553-1T/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

149mm x 74mm standard PMC format
143.75mm x 74mm conduction cooled format for AMCX1553-1/2/4

Thermal Conduction Cooling

Enhanced thermal performance for conduction cooling in extended temperature range for AMCX1553-1/2/4

Power Consumption

Typical Values for AMCX1553-4 @3.3V:

Min. Power: 2.8W (Idle Mode)

Max. Power: 7.3W (100% Bus Operation)

Typical Values for AMCX1553-2T @3.3V:

Min. Power: 3.3W (Idle Mode)

Max. Power: 7.9W (100% Bus Operation)

Operating Temp. Range

Standard 0°C to +70°C ambient

Extended temperature range -40°C to +85°C

Conduction cooled versions available for AMCX1553-1/2/4

Storage Temp. Range

-40°C to +85°C

Humidity

5 up to 95% non-condensing



Ordering Information

AMCX1553-1

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

AMCX1553-1T

Single Stream, Dual Redundant MIL-STD-1553A/B PMC Module: BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Decoder, programmable Bus Coupling and onboard Bus Network, variable output amplitude, 128MB Global RAM, 8 General Purpose Discrete I/O's

AMCX1553-2

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

AMCX1553-2T

Dual Stream, Dual Redundant MIL-STD-1553A/B PMC Module: BC, Multi-RT Simulator with Mailbox & Chronological Monitor; IRIG-B Time Decoder, programmable Bus Coupling and onboard Bus Network, variable output amplitude, 128MB Global RAM, 8 General Purpose Discrete I/O's

AMCX1553-4

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

Simulator Only Versions available

BC, Multi-RT Simulator with Mailbox Monitor

Single Function Versions available

Chronological & Mailbox Monitor or BC and Chronological & Mailbox Monitor or Multi-RT and Chronological & Mailbox Monitor

ACB-HD15-1

Ready Made Adapter Cable (2.0m): from 15-pin High Density D-Sub to 2 Twinax Connectors PL-75

ACB-HD15-1-F

Ready Made Adapter Cable (2.0m): from 15-pin High Density D-Sub to 2 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O and IRIG-B

ACB-PCI-1

Ready Made Adapter Cable (2.0m): from D-Sub to 2 TWINAX Connectors PL-75

ACB-HD15-2

Ready Made Adapter Cable (2.0m): from 15-pin High Density D-Sub to 4 Twinax Connectors PL-75

ACB-HD15-2-F

Ready Made Adapter Cable (2.0m): from 15-pin High Density D-Sub to 4 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O and IRIG-B

ACB-PCI-2

Ready Made Adapter Cable (2.0m): from 15-pin High Density D-Sub to 4 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O and IRIG-B

For all variants of AMCX1553-4 cards use 2 of ACB-HD15-2/ ACB-HD15-2-F Adapter Cables

ACC-1

CompactPCI (3U) Carrier module with 1 PMC slot

AVC-2

VME (6U) Carrier Module with 2 PMC slots

ACP-1

PCI Carrier Module with 1 PMC slot

ACPe-1

CompactPCIe Carrier Module with 1 PMC slot

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General Features

The AVC-2/ AVC-2-CC is a single slot, double height (6U) VME64x, extended VMEbus module with two separate PMC slots. The Carrier Card is available as Air Cooled AVC-2 or Conduction Cooled AVC-2-CC variant. The functionality of both variants is nearly equal, except that the Conduction Cooled Carrier module is mounted with Conduction Cooled Frame compliant to CCPMC (ANSI/VISA 20-2001, R2005) and CCMC (IEEE Std 1101.2-1992, 2001) specification. The AVC-2-CC does not implement a Front Panel Interface rather than the Rear-I/O Interface functionality. The AVC-2/ AVC-2-CC uses an industry standard device providing the bridge between the VMEbus and PCIbus.

The AVC-2 fulfils the requirements of the VME64x extension plus the Interface for Rear-I/O. Each PMC-slot is in conformance with the Draft Standard Physical and Environmental Layers for PCI Mezzanine Cards (P1386.1/Draft 2.4).

Key features of the AVC-2/ AVC-2-CC module:

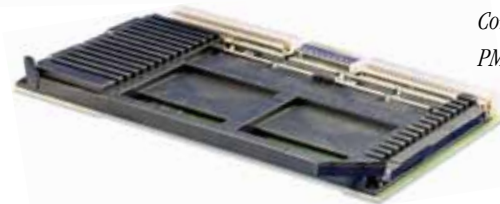
- Easily configured with any combination of PMC modules
- Combine different interface types and functions on one VME card
- User configurable base address
- Front panel LED's for VMEbus/ PCIbus activity/ failure display (only provided @ air cooled variant)
- Fully compliant to VME64x - extended VMEbus
- Hosts PMC modules designed to PMC standard P1386.1/Draft 2.4
- Driver Software Library for VxWorks and LynxOS available

AVC-2/ AVC-2-CC

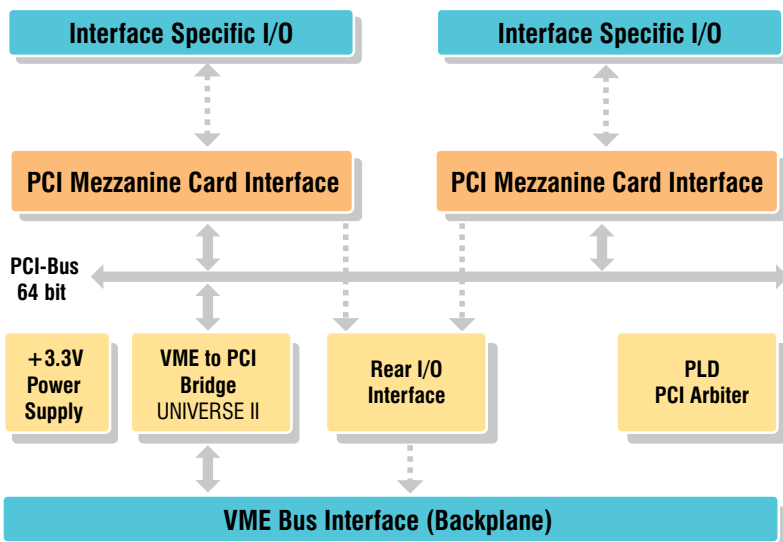
VME Generic Carrier Card for PMC (PCIbus Mezzanine Card) Modules



AVC-2 carrier for
Air Cooled PMC
modules



AVC-2-CC carrier for
Conduction Cooled
PMC modules



PMC Module Interface

The AVC-2/ AVC-2-CC is designed to plug all standard Air Cooled or Conduction Cooled PMC modules with a maximum PCIbus width of 64-bit operating at 33MHz. The AVC-2/ AVC-2-CC carrier board supports the +5.0V PCIbus signaling, hence only +5.0V tolerant devices may be used. The use of a voltage keying pin protects against false PMC assembly.

Avionics Databus Solutions



AVC-2/ AVC-2-CC

*VME Generic Carrier
Card for PMC (PCIbus
Mezzanine Card) modules*

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Technical Data

VME to PCI Bridge: 64-bit VME interface; fully compliant with PCI Standard (Revision 2.1); VME master and slave capability; PCI master and slave capability; Integral FIFOs buffer multiple transactions in both directions; MBLT, BLT, ADOH, RMW and LOCK support; Programmable DMA controller with linked list support; Nine user programmable slave images on both busses; Four mailboxes and location monitor for message oriented systems; Eight semaphores; Full VMEbus system controller functionality; PCIbus burst size of 128bytes; Supports coupled, posted and prefetched cycles on both busses; Provides clock speed of 33MHz with no wait states on PCIbus; Provides flexible mapping of hardware and software interrupts on both busses; Implemented using Industry leading VME to PCI Bridge device (TUNDRA UNIVERSE II)

PCIbus:

Provides the connection between the PMC Interfaces to the VMEbus Interface

Fully compliant to PCIbus Specification Rev 2.1

PCIbus width of 64-bit

PCIbus operation of 33MHz

Priority based PCIbus Arbiter

PMC Slot 1+2:

- Each PMC slot provides 64-bit, 33MHz PCIbus operation
- At AVC-2 Carrier modules, each PMC slot provides the capability for Front- / Rear-I/O (VME64x Mapping) interfaces
- At AVC-2-CC Carrier modules, each PMC slot provides only Rear-I/O (VME64x Mapping) interface

Front Panel (only AVC-2 variant):

The Front Panel provides two breakouts for using the standard PMC- Front Panel bezel

Front Panel LEDs (only AVC-2 variant):

A System Indicator Array is located at the top end of the Front Panel for indicating assertion of the SYSFAIL line, the VMEbus activity, the PCIbus activity and PCIbus errors

Dimensions: Double Height (6U) Board (233mm x 20mm x 160mm), Single-Width, 0.80 pitch

Power Supply: +5VDC, 2W typical without any PMC module installed

Weight:

- AVC-2 (Air Cooled): appr. 290g (without any PMC module installed)
- AVC-2-CC (Conduction Cooled): appr. 640g (without any PMC module installed)

Temperature (all variants): 0 to +45°C Standard Operating

-15 to +60°C Extended Temperature (AVC-2)

-40 to +85°C Extended Temperature (AVC-2-CC)

-40 to +85°C Storage

Humidity: 0 to 95% (non condensing)

Conformal Coating available on request

Ordering Information

AVC-2 VME bus Carrier (6U)

Air Cooled Carrier Module with two PMC slots

Note: Connector P0 will only be assembled upon request, please specify on the order.

Note: VME64x compliant IEEE 1001 Ejector Handles are assembled by default. Original VME ScanBe Handles are available upon request, please specify on the order.

AVC-2-CC VME bus Carrier (6U)

Conduction Cooled Carrier Module with two PMC slots

Note: Connector P0 will be assembled by default (Rear-I/O, PMC-Site 1)

