

# PMC1553

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



## GENERAL OVERVIEW

The PMC1553 module is a rugged, reliable, full-featured PCI Mezzanine (PMC) module designed to provide a stand-alone, flight-ready MIL-STD-1553A/B interface for avionics applications. Up to four independent, dual-redundant MIL-STD-1553A/B databus streams are provided on the PMC1553 module. Additionally, the PMC1553 offers full-function test, simulation, monitoring, and databus analyzer functions for MIL-STD-1553A/B applications.

The PMC1553 module utilizes a simple, reliable, high performance FPGA-based hardware architecture featuring an embedded PowerPC and the highest data throughput in the industry on a flexible platform that can be easily adapted to meet a wide range of application needs. The PMC1553 cards are configured with two 128 MBytes banks of onboard memory, providing ample capacity to support high volumes of data and complex simulations. An onboard IRIG-B time code decoder and generator allows users to accurately synchronize single or multiple PMC1553 modules to a common IRIG-B time source.

The PMC1553 offers both transformer and direct coupling to the data buses and can be mounted on any of AIT's family of advanced carriers to provide PCI, PCI-X PCIe, PXI, cPCI, VME, and VXI solutions. Ten fully programmable (as input or output) TTL discrete I/O lines are provided. Discrete output voltage levels can be set up to 30 volts using an external power source.

Application software can access the PMC1553 module via AIT's common MIL-STD-1553A/B C/C++ Object Wrapper Layer (OWL) high-level application programmer's interface.



## KEY FEATURES

- ◆ Dual redundant, single, dual, or quad stream configurations
- ◆ Concurrent BC, Multi-RTs, and BM operation
- ◆ Full error injection/detection capabilities
- ◆ Multi-level Trigger for Capture/Filtering
- ◆ IRIG-B Time Encoder/Decoder
- ◆ Real-Time Recording and Physical Bus Replay
- ◆ ANSI Application Interface supporting C, C++, C#, and .net Development
- ◆ Device Driver Support: Windows, Linux, VxWorks, LabView, and other operating systems
- ◆ *Flight Simulyzer* 1553 Bus Analyzer Software
- ◆ *Flight Director* Windows-based Parameter Processing Software

## DRIVER SOFTWARE SUPPORT

The PMC1553 module is supplied with device drivers and a product-specific Software Development Kit (SDK) for various operating systems, including:

- ◆ Windows 7/XP/Vista
- ◆ Linux
- ◆ VxWorks
- ◆ Green Hills Integrity
- ◆ LynxOS

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## BUS CONTROLLER

The PMC1553 provides real-time Bus Controller (BC) functions on one, two, or four dual-redundant MIL-STD-1553A/B buses concurrently with multiple Remote Terminal (RT) and Chronological Monitor (BM) operation.

- ♦ Autonomous operation including sequencing of minor/major frames
- ♦ Support for acyclic message insertion/deletion during BC operation
- ♦ Programmable BC Retry without host interaction
- ♦ Full error injection down to word and bit level
- ♦ Multiple BC queue lists
- ♦ Synchronization of BC operation to trigger outputs
- ♦ 4  $\mu$ sec intermessage gaps

## REMOTE TERMINALS

The PMC1553 simulates up to 31 Remote Terminals (RT) including all sub-addresses on one, two, or four MIL-STD-1553A/B buses concurrently with BC and CM operation. Alternatively, each RT can operate in a passive receive only mode to monitor non-simulated RTs.

- ♦ Programmable response time for each RT with fast RT response at 4  $\mu$ secs
- ♦ Full mode code support
- ♦ Full error injection down to word and bit level
- ♦ Multiple RT queue lists

## CHRONOLOGICAL BUS MONITOR

The PMC1553 offers full bus monitoring and analysis with time tagging of all bus traffic to 1  $\mu$ sec resolution, including response and gap time measurements down to 8 nsec on one, two, or four MIL-STD-1553A/B buses concurrently with BC and RT operation.

- ♦ 100% data capture at full bus rates
- ♦ Full error injection/detection
- ♦ Complex triggers with sequencing
- ♦ Filtering for selective capture
- ♦ Bus activity statistics
- ♦ External trigger outputs
- ♦ Programmable data logging

## IRIG-B TIME CODE DECODER

An onboard IRIG-B time code decoder and generator allows synchronized time tagging of multiple MIL-STD-1553A/B streams using single or multiple PMC1553 modules. PMC1553 cards can be synchronized to one common external IRIG-B time source or to the free-wheeling onboard time code generator.

## APPLICATION INTERFACE

In support of application program interfaces to the PMC1553, the module is supplied with AIT's MIL-STD-1553 Object Wrapper Layer (OWL) C/C++ interface library. The OWL provides an intuitive and easy-to-use object-oriented interface to the module. Adaptions supporting C#, Python, and other common programming languages are available upon request. A rich suite of sample application and full documentation is also provided.

## TECHNICAL DATA

System Interface: 64-bit 33/66MHz PCIbus (Rev 2.2) compliant

Processors: Embedded PowerPC (250MHz)  
Memory: Two banks of 128 MByte DDR2 SDRAM (one for Tx/Rx buffers, one for PowerPC)

Encoder/Decoder: One, two, or four MIL-STD-1553A/B encoder/decoder with full error injection and detection capability  
Time Tagging: 14 Digit (400 days) absolute IRIG-B time, 1  $\mu$ sec resolution

Physical Bus Interface: One, two, or four MIL-STD-1553A/B trapezoidal transceivers, direct coupled stubs and transformer coupled stubs available at front panel or back panel connector

Connectors: 68-pin VHDCI at front panel connector  
All signals also available at rear I/O connector

I/O: 4x Standard PMC connectors  
Ten software programmable TTL I/O lines supporting up to 30V signaling with external reference supply

Dimensions: Standard single wide PMC 143.7 x 74 mm  
Hole and connector dimensions and locations per: ANSI/VITA 20-2001 (R2005)

Temp. Range: -40° C to +85° C ambient  
designed for extended temperature operations

Storage Temp: -40° C to +85° C ambient  
Humidity: 0 to 95% non-condensing

- ♦ Conduction-cooling available, primary and secondary ANSI/VITA-20-2001 (R2005) interfaces, rear I/O access only
- ♦ Conformal coating available

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