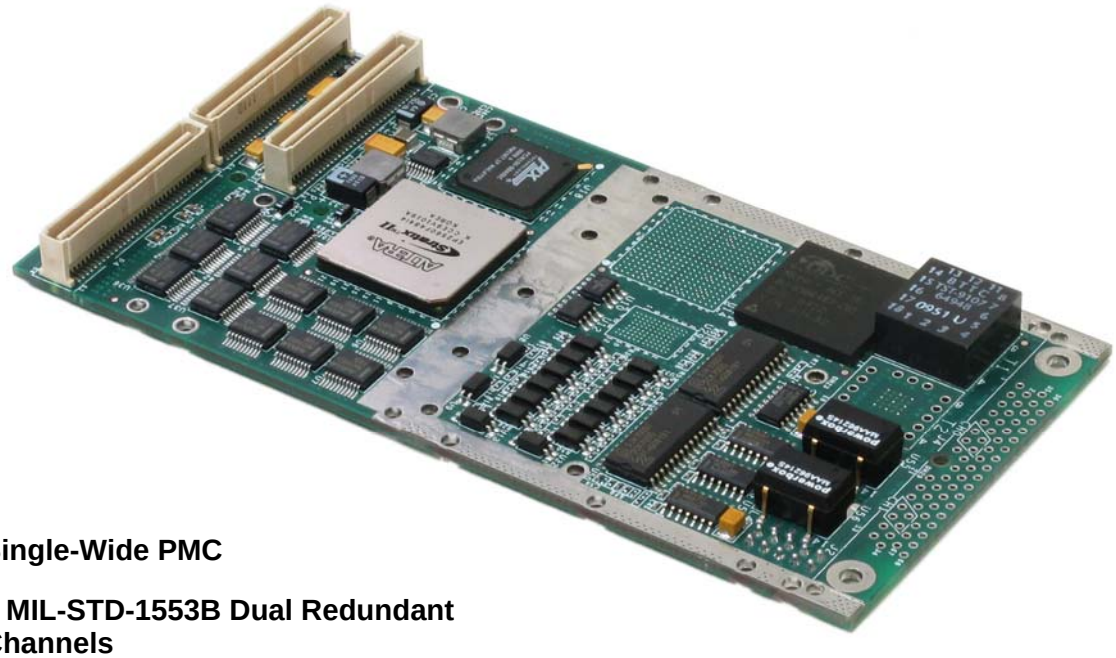
M706

Avionic Communications PMC



- Single-Wide PMC
- 2 MIL-STD-1553B Dual Redundant Channels
  - Full Support for BC/RT/MT Operation Modes
  - 64k x 16 Shared DPRAM per Channel
- ARINC-429 Channels
  - 16 ARINC-429 Receive Channels
  - 8 ARINC-429 Transmit Channels
  - High/Low-Speed Support
- 12 Serial Channels
  - Complete UART Operation
  - Support for RS-232/422/485 Physical Interface
  - 6 Channels are Configurable for Modem Hardware Flow Control (RS-232 only)
- Opto-isolated Discrete I/O Channels
  - 6 GND/OPEN Inputs/Outputs
  - 2 GND/OPEN Inputs
  - 2 28V/OPEN Outputs
- 2 Opto-Isolated CANbus 2.0B Interface
- 32-bit @ 66 MHz PCI operation Compliant with PCI 2.2 Specification
- IEEE P1386 (Air-Cooled) or VITA 20-2001 (Conduction-Cooled)
- Front/Rear I/O
- Hardware BIT Capabilities
- Drivers for
  - Windows™
  - Linux®
  - VxWorks®
  - INTEGRITY®
- Military Level Ruggedization
- Vibration and Shock Resistant

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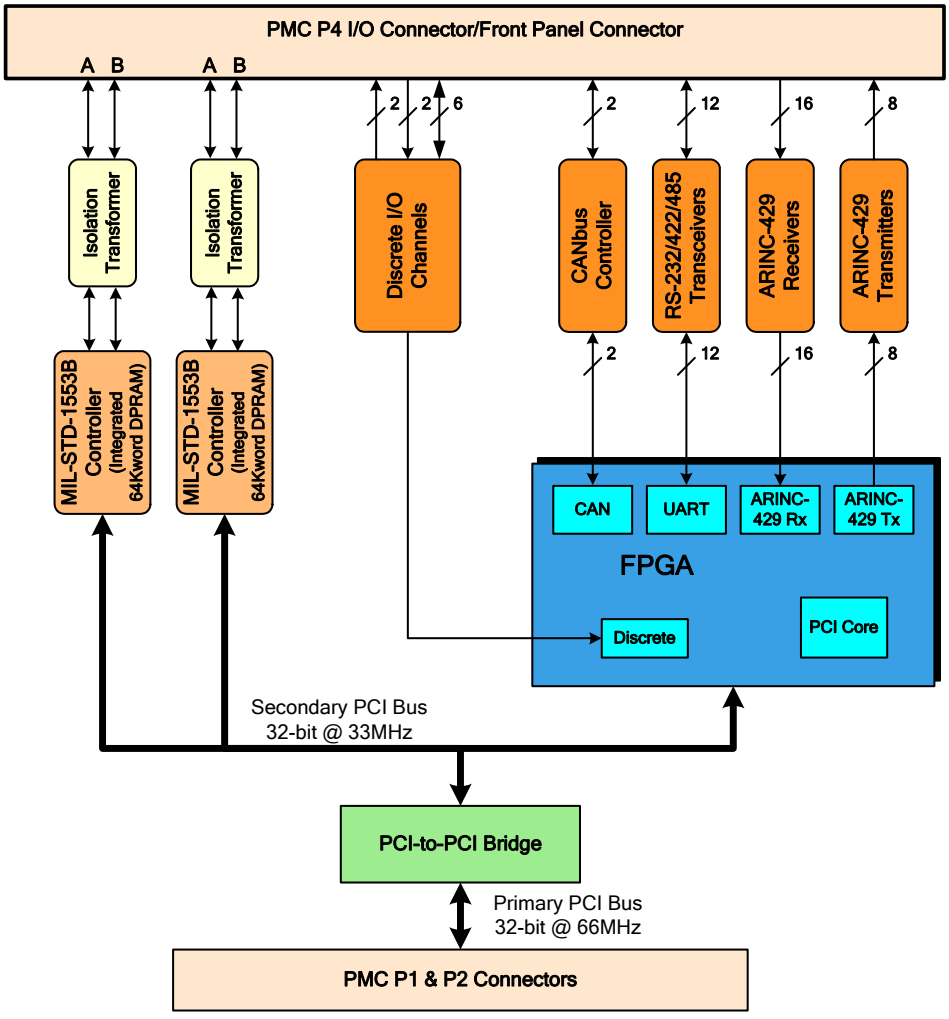
Overview

The M706 Avionic Communications PMC provides multiple avionics style communication protocols (MIL-STD-1553, ARINC-429, CANbus, and Serial I/O), all packed into a small single-width PMC form factor specifically designed for harsh environments. It offers a complete and unique solution for applications requiring diverse multiple avionics communication ports, eliminating the need for multiple cards and providing high flexibility for system integrators. The M706 integrates 2 dual redundant MIL-STD-1553 channels, 16 ARINC-429 receive channels, 8 ARINC-429 transmit channels, 2 CANbus, and up to 12 UART ports.

MIL-STD-1553B ports support BC/RT/MT operation modes, Serial ports support RS-422/RS-232/RS-485 physical layer. 6 of the 12 serial ports can be configured to provide modem hardware flow control (flow control signals support RS-232 only).

The M706 also features 6 opto-isolated digital discrete input/output channels, which may be used to externally assign a unique RT address to one of the MIL-STD-1553B ports. In additional the M706 provides two special ground/open inputs and two 28V/open outputs.

M706 I/O signals can be routed to either the P4 or front panel connectors, according to the configuration.



M706 Block Diagram

Features

Architecture

The M706 is a single-width PMC utilizing multiple diverse I/O interfaces. All its on-board I/O resources are PCI devices, and a PCI-PCI bridge interconnects the M706 sub-system to the host PCI system. The M706 sub-system implements a secondary 32-bit PCI bus operating at 33 MHz, while the primary PCI bus operates at 66 MHz to maintain high-speed PCI operation of the host PCI system.

MIL-STD-1553B

The M706 provides two independent dual redundant MIL-STD-1553B ports. Each controller features:

- Complete BC, RT, and MT operation, STANAG 3838 compliant
- Integrated 64K DPRAM with parity protection
- Simultaneous RT/Monitor mode
- Automatic BC frame retries
- Programmable BC gap timing
- Integrated built-in test capability
- Internal FIFOs for PCI burst transfers optimization
- Software programmable RT address
- Transformer coupling

ARINC-429

The M706 PMC provides 16 ARINC-429 receivers and 8 transmitters. All channels fully comply with the AEEC adoptions of the ARINC-429 specification.

ARINC-429 Receivers

- Accept serial data and construct legal words (messages)
- Software control over all operation parameters
- High and low speed operation – 12.5 and 100 kbps
- Programmable time gap and timeout identification between consecutive words
- Programmable filters for incoming data by label/SAL and SDI
- Support for flip label order
- Status and error mechanism – damaged word, parity, partial word, sync loss
- Received data stored in 2 kB FIFO per channel
- Software control over FIFO operation – queue status, threshold level, interrupt generation
- Programmable interrupt with mask options

ARINC-429 Transmitters

- Construct and transmit serial data from received words (messages) transferred by the host processor
- Software control over all operation parameters
- High and low speed operation – 12.5 and 100 kbps
- Programmable time gap and timeout identification between consecutive words
- Support for flip label order
- Software programmable parity data calculation and transmission
- Channel status mechanism
- Transmitted data stored in 2 kB FIFO per channel
- Software control over FIFO operation – queue status, threshold level, interrupt generation
- Programmable interrupt with mask options

Serial I/O

The M706 can be configured to provide up to 12 serial ports, all of which implement the UART protocol:

- All ports support software programmable physical layer – RS-422/RS-232/RS-485
- 6 of the 12 transceivers can be configured to provide full modem flow control – RTS, CTS, DTR, and DSR (flow control signals support RS-232 physical layer only).
- Global interrupt source register for all 12 UART ports
- General purpose 16-bit timer/counter
- Each UART port features:
  - 16C550 compatible register set
  - 16-byte transmit and receive FIFOs
  - Transmits and receives FIFO level counters
  - Programmable Tx and Rx FIFO trigger level
  - Programmable data rate with Prescaler
- PCI data transfer in double-word
- Burst support (target only) for PCI data transfer

Opto-Isolated CANbus 2.0B Interface

The M706 includes two opto-isolated CAN ports, implemented using SJA1000 stand-alone Controller Area Network (CAN) controllers.

Two different modes of operation are implemented:

- BasicCAN mode
- PeliCAN mode with extended features

The CAN controller supports the full CAN 2.0B protocol specification.

Opto-Isolated Discrete I/O Interface

The M706 includes 6 GND/Open discrete input/output channels, two additional GND/Open inputs, and two 28V/Open outputs. These are general-purpose discrete channels, but their primary objective is to externally assign an RT address to one of the MIL-STD-1553B ports. These channels connect to the FPGA and accessible to software.

- Six GND/Open discrete input/output
- Two GND/Open inputs
- Two 28V/Open outputs
- Implemented through opto-isolated couplers

PCI Bus Interface

The M706 supports 32-bit PCI bus operation at 66 MHz, and is fully compliant with PCI Rev. 2.2.

The M706 is a universal PMC that supports both +5 V and +3.3 V PCI I/O signaling levels.

I/O Routing

- The conduction-cooled M706 version routes all I/O signals to the PMC P4 I/O connector.
- Air-cooled versions of the M706 may be equipped with one or more front panel connectors, to which the I/O signals are routed.

  Two front panel connector configurations are available:
  - Four mini twinax connectors providing two dual redundant MIL-STD-1553B channels
  - One 68-pin connector providing all I/O
- The M706 is available in several configurations. One of these configurations is largely compatible with the Aitech M703 and M705 PMCs, and can be used as a drop-in replacement for many applications (refer to the M706 User's Guide for further detail). Other configurations provide various combinations of I/O. All standard configurations are described in the ordering information section. Custom configurations not listed may be available to meet specific customer requests and program requirements.

Software Drivers

The M706 PMC is delivered with a complete software package supporting all on-board resources.

Currently supported OS (Operating Systems):

- Microsoft Windows™
- Linux®
- WindRiver VxWorks®
- Green Hills INTEGRITY®

Mechanical Design and Format

The M706 PMC is a single-width PMC available in two mechanical formats:

- Air-cooled per IEEE 1386-2001 for installation on commercial and rugged air-cooled carrier boards
- Conduction-cooled per ANSI/VITA20-2001 for installation on IEEE 1101.2 conduction-cooled carrier boards

The M706 high power components are cooled through aluminum heatsinks. This applies to both mechanical formats – air-cooled and conduction-cooled.

Dimensions

Air-cooled:	per IEEE 1386-2001
Conduction-cooled:	per ANSI/VITA 20-2001

Power Requirements

Typical total power consumption (highest power configuration): 5.5 W

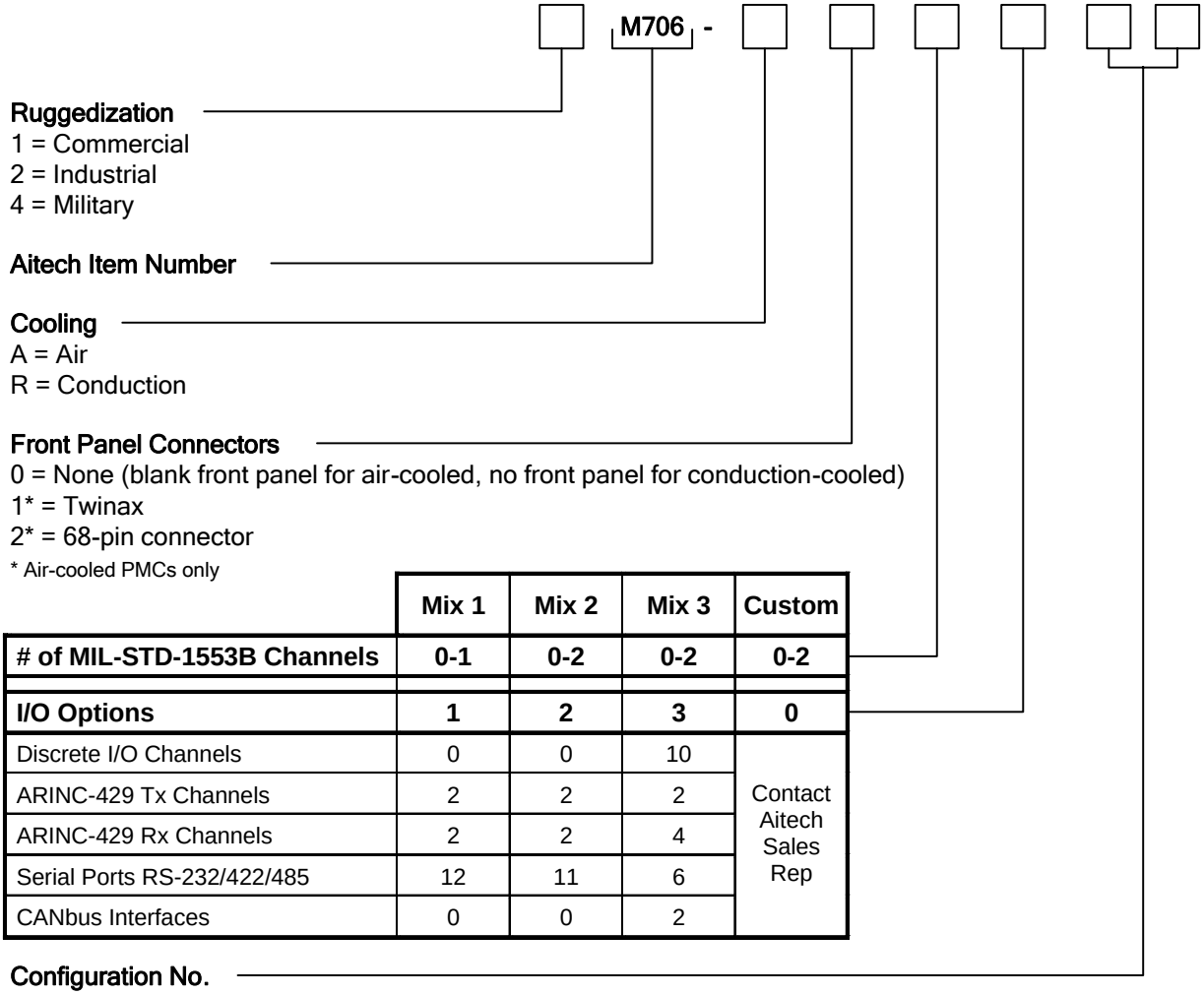
+5 V	0.4 A
+3.3 V	0.6 A
+12 V	0.06 A *
-12 V	0.06 A *

* ±12 V is used for ARINC-429 only. M706 configurations that do not provide ARINC-429 I/O do not require a ±12 V supply.

Environmental Features

Please refer to the Aitech ruggedization datasheet.

Ordering Information for the M706



Ruggedization
1 = Commercial
2 = Industrial
4 = Military

Aitech Item Number

Cooling
A = Air
R = Conduction

Front Panel Connectors
0 = None (blank front panel for air-cooled, no front panel for conduction-cooled)
1* = Twinax
2* = 68-pin connector
* Air-cooled PMCs only

	Mix 1	Mix 2	Mix 3	Custom
# of MIL-STD-1553B Channels	**0-1**	**0-2**	**0-2**	**0-2**
I/O Options	**1**	**2**	**3**	**0**
Discrete I/O Channels	0	0	10	Contact Aitech Sales Rep
ARINC-429 Tx Channels	2	2	2	
ARINC-429 Rx Channels	2	2	4	
Serial Ports RS-232/422/485	12	11	6	
CANbus Interfaces	0	0	2	

Configuration No.
To be assigned by Aitech

Example: 4M706-R011-00

For more information about the M706 or any Aitech product, please contact Aitech Defense Systems sales department at (888) Aitech-8 (248-3248).

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