SPMC/DPMC-214
CANbus, MilCAN, Utility Bus, and Discrete Digital I/O Module

Features

- ◆ Four CANbus 2.0-compliant/MilCAN interfaces
  - - Based on dual ColdFire 5485 processors with dual FlexCan interfaces
  - - Protocol Stack off-load of CANbus and MilCAN stacks
  - - CANbus physical layer compatible with ISO 11898 standard
  - - CANbus transceivers galvanically isolated from rest of module
- ◆ US Army Utility Bus Interface Controller (optional)
- ◆ 16-bits of discrete digital LVTTL I/O
- ◆ PCI 2.1-compliant 32-bit, 66 MHz interface
- ◆ Needs only 5 V from the basecard, no other voltages required
- ◆ Available in three ruggedization levels:
  - - Level 0 Air-cooled
  - - Level 100 Air-cooled
  - - Level 200 Conduction-cooled

Introduction

The SPMC/DPMC-214 is a fully compliant PMC mezzanine module, complementing our line of high-performance single board computers (SBCs). It supports CANbus, MilCAN, the US Army standard Utility Bus Interface Controller (MIC-320 device from Vetronix Research), and TTL I/O functionality for use in military and aerospace embedded computing applications. As a member of our comprehensive range of ruggedized PMC modules it is available in both air-cooled and conduction-cooled versions, and is supported by our commitment to long-term availability, provision of life-cycle management services and comprehensive after-sales technical support.

Architecture

Figure 1 illustrates the internal architecture of the PMC-214. A 32-bit, 66 MHz PCI-to-local-bus bridge interfaces two ColdFire 5485 processors. Each ColdFire provides two CANbus 2.0-compliant controllers/MilCAN interfaces. One ColdFire processor also provides control of 16 TTL I/O and a Utility Bus Interface Controller (UBIC) to the PCI bus. Each ColdFire processor executes the CANbus or MilCAN protocol stacks to off-load the host card. All I/O is routed to the Pn4 connector for routing to the backplane connectors when the module is placed on processor cards or carrier cards that support backplane PMC I/O.

MilCAN
Subsystem Control, Integration & Diagnostics

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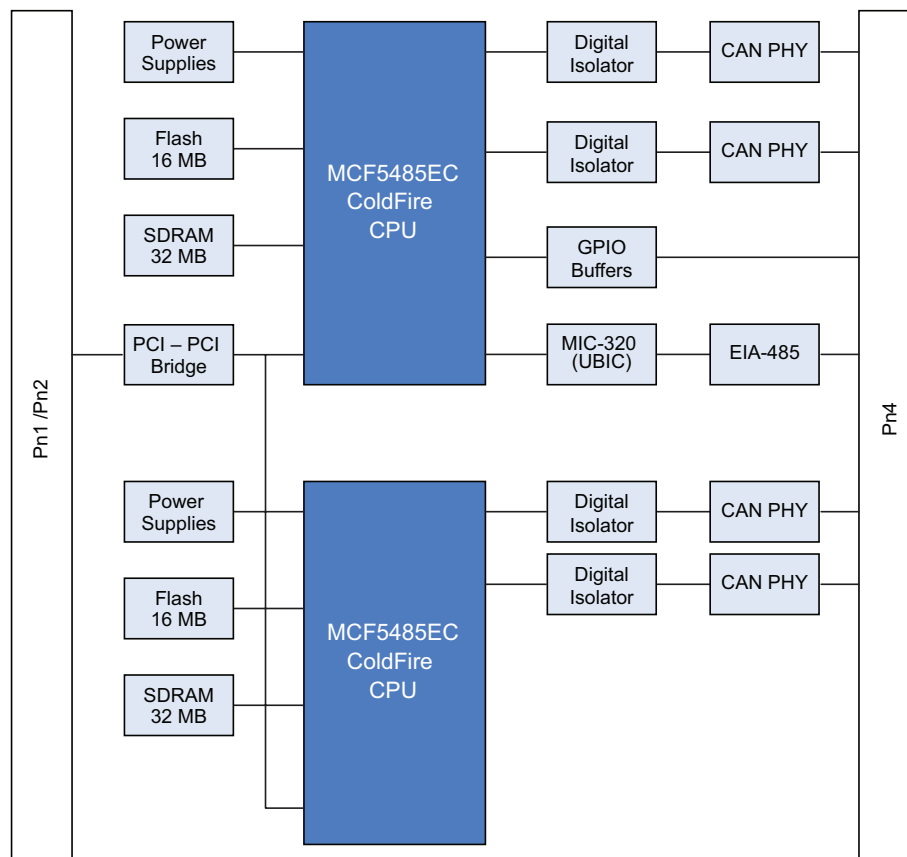
CANbus/MilCAN Interfaces

The PMC-214 provides four independent CANbus/MilCAN interfaces compliant to the CAN Specification 2.0, Part B protocol (standard and extended message formats), the ISO 11898:1993 CAN high-speed physical interface levels and MilCAN A MWG-MILA-001 Specification. Galvanic isolation is provided between the CANbus physical interfaces and the power and ground planes of the main part of the PMC-214 module. CANbus speeds of 250-Kbits/s, 500-Kbits/s and 1-Mbit/s are supported.

The PMC-214 makes used of the ColdFire FlexCAN interfaces to provide the CANbus and MilCAN interfaces. Separate power supplies are used for each pair of CANbus/MilCAN interfaces including the ColdFire CPUs and associated memory devices.

The FlexCAN module of the ColdFire supports:

- Full implementation of the CAN protocol specification version 2.0B

  - Standard data and remote frames (up to 109-bits long)
  - Extended data and remote frames (up to 127-bits long)
  - 0–8 bytes data length
  - Programmable bit rate up to 1 MB/s
  - Content-related addressing

- Up to 16 flexible message buffers of 0–8 bytes data length, each configurable as Rx or Tx, all supporting standard and extended messages

- Programmable transmission priority scheme: lowest ID or lowest buffer number

Figure 1: SPMC/DPMC-214 Architecture

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- Time-stamp based on 16-bit free-running timer

- Global network time, synchronized by a specific message

- Programmable I/O modes

(Note: All these features may not be supported by the 214)

The software API for the PMC-214 has been designed to be backwards compatible the PMC-211, so as to make porting to the 214 a simpler task.

Variants of the PMC-214 support either the CANbus protocol or the MilCAN protocol only.

Galvanic Isolation of CANbus I/O Signals

To increase data integrity on the CANbus network and to provide protection from power faults and ground loop effects, the PMC-214 provides galvanic isolation between the CANbus I/O signals and the primary onboard power and ground rails. Analog Devices ADUM5201 digital isolators are used between the CPU's FlexCAN and CANbus contoller and the CANbus transceivers, to isolate the CANbus signals and system ground available at the Pn4 connector from the on-card CANbus signals and digital ground.

Utility Bus Interface

The PMC-214 can be optionally equipped with a Utility Bus Interface Controller (UBIC) providing an interface to the Utility Bus commonly used in US Army Vetronics applications. The Utility Bus is sometimes referred to as the Multiplexed Electrical Power Control & Monitoring (MEPCAM) Interface. It is a time-division multiplexed serial data bus ideally suited to providing communications between a vehicle management computer and remote modules such as power distribution panels. The Utility Bus protocol is designed to allow remote modules to be implemented without needing to incorporate a microprocessor. A Utility Bus controller can address up to 64 remote modules.

Key features of the utility bus protocol include:

- Messages can be transmitted or received simultaneously on a dual-redundant set of data busses and interface transceivers

- Manchester encoding/decoding provides built-in immunity to much of the electromagnetic interference found in armored vehicle environments

- Several integrity checks are included to ensure that commands are received and implemented as intended by the sender

The Utility Bus controller device used on the PMC-214 is the MIC device from Vetronix Research Corporation. The PMC-214 design augments the inherent capabilities of the MIC device in two important ways:

- Separate enables are provided for each of the two receive channels. This improves module testability by enabling user software to test receive channels individually, which is otherwise impossible because the Utility Bus protocol requires transmission and reception on both busses simultaneously

- A board-level interrupt mask register is provided to allow software to selectively disable unwanted MIC interrupts

The Utility Bus physical interface on the PMC-214 consists of EIA-485-compliant transceivers, allowing serial data speeds of up to 3 MB/s. The Utility Bus I/O lines as and five module address bits are routed to the PMC-214's Pn4 I/O connector for availability on the P2 or P0 backplane connector, of VME-64x compatible PMC host cards. One module ID bit is grounded onboard the PMC-214.

Discrete Digital I/O

The PMC-214 provides a total of 16-bits of TTL-compatible discrete digital I/O. Each bit is individually selectable to be an input or an output. A 10 K ohm pull-up resistor is provided on each line to allow direct connection to simple switch-closure inputs. In addition a 27 ohm series current-limiting resistor is provided on each pin to resist against damage from short circuits. All digital I/O lines are routed to the PMC-214's Pn4 I/O connector for availability on the P2 or P0 backplane connector, of VME64x compatible PMC host cards.

PCI Specifications

- PCI Rev 2.1 compliant 32-bit, 66 MHz

- 3.3 V signaling level, 5 V tolerant

- PMC INTA* and INTB* interrupts are used, one from each ColdFire processor

Mechanical Format

The PMC-214 is a single width PMC module. Air-cooled modules are designed in accordance with the IEEE 1386 and 1386.1 specifications. All I/O is through the Pn4 connector; there is no I/O from the front of the module. A standard blank front panel is installed.

Conduction-cooled modules are designed in accordance with VITA 20-2005, conduction-cooled PCI Mezzanine Card Standard. The cooling surfaces provided are the Primary Thermal Interface Region and the Secondary Thermal Interface Regions.

Available Software

Software drivers will provided for Tornado™ 2/VxWorks® 5.5, VxWorks 6.x/Workbench® 2.x, Linux®, LynxOS®, and Windows®.

Accessories

CBL-214-001 is an I/O extension cable compatible with the standard 78-way PMC I/O connector found on basecard cable sets. It mates with the 78-way connector and provides separate standard connectors for each CANbus/MilCAN interface, the UBIC, and the discrete digital I/O.

Table 1: Specifications

Ruggedization Levels*			
Air-cooled	Level 0 and 100		
Conduction-cooled	Level 200		
Power Requirements	Configuration	Typical	Max
+5 V	2x CAN/Mil	4.6 W	5.6 W
	4x CAN/Mil	6.2 W	7.5 W
	4x CAN/Mil + UBIC	6.8 W	8.1 W
+/-12 V, 3.3 V	Not used		
Dimensions & Weight	Size		Weight
Air-cooled	per IEEE 1386, 1386.1		< 200 g
Conduction-cooled	per VITA 20-200x		< 200 g
	Incorporates VITA 20 Primary Thermal Interface and Secondary Thermal Interface Regions		

*Refer to Ruggedization Guidelines fact sheet for more details.

Table 2: Supported Variants

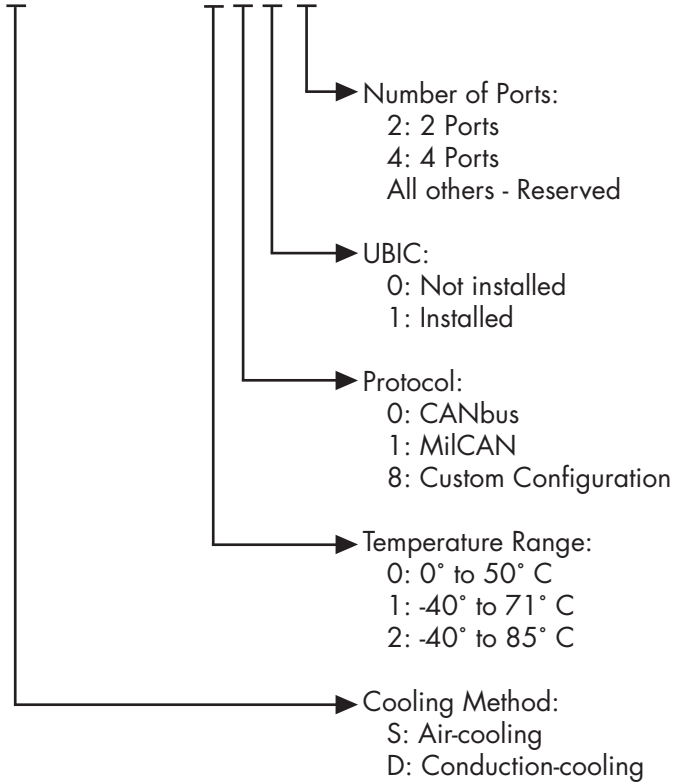| Standard Product Variants	Cooling	Level	Protocol	UBIC	Number Ports
SPMC-214-0002	Air	0	CANbus	0	2
SPMC-214-0004	Air	0	CANbus	0	4
SPMC-214-0104	Air	0	MilCAN	0	4
SPMC-214-1002	Air	1	CANbus	0	2
SPMC-214-1004	Air	1	CANbus	0	4
SPMC-214-1104	Air	1	MilCAN	0	4
DPMC-214-2002	Conduction	2	CANbus	0	2
DPMC-214-2004	Conduction	2	CANbus	0	4
DPMC-214-2104	Conduction	2	MilCAN	0	4

Notes:
1. Variants identified as CANbus only support the CANbus protocol.
2. Variants identified as MilCAN only support the MilCAN protocol.

Part Numbers

xPMC - 214 - C P U N

Number of Ports:
2: 2 Ports
4: 4 Ports
All others - Reserved

UBIC:
0: Not installed
1: Installed

Protocol:
0: CANbus
1: MilCAN
8: Custom Configuration

Temperature Range:
0: 0° to 50° C
1: -40° to 71° C
2: -40° to 85° C

Cooling Method:
S: Air-cooling
D: Conduction-cooling

Note that not all combinations of the variants are available as standard products.

Please check with your CWCEC sales representative for availability of specific part numbers.

Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative, please visit:

Website: www.cwcembedded.com/sales

Email: sales@cwcembedded.com

Technical Support

For technical support, please visit:

Website: www.cwcembedded.com/support1

Email: support1@cwcembedded.com

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