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PRODUCT DATASHEET



SPMC/DPMC-211

CANbus, Utility Bus, and Discrete Digital I/O Module

Features

- Two independent CANbus 2.0-compliant interfaces
  - Based on Intel 82527 CANbus controller IC with on-chip RAM
  - CANbus physical layer compatible with ISO 11898 standard
  - CANbus transceivers galvanically isolated from rest of module
- US Army Utility Bus interface (optional)
- 16 bits of discrete digital I/O
- PCI 2.1-compliant 32-bit, 33 MHz interface
- Needs only 5V from the basecard, no other voltages required
- Available in three ruggedization levels, level 0 air-cooled, level 200 air-cooled, and level 200 conduction-cooled

Introduction



The SPMC/DPMC-211 is a fully compliant PMC mezzanine module, complementing our line of high performance Single Board Computers. It adds CANbus, the US Army standard Utility Bus, 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.

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Architecture

Figure 1 illustrates the internal architecture of the PMC-211. A 32-bit, 33 MHz PCI-to-local-bus bridge interfaces two CANbus 2.0-compliant controllers and a Utility Bus Interface Chip (UBIC) to the PCI bus. Each CANbus controller also provides 8 bits of discrete TTL I/O, for a total of 16. The contents of a serial EEPROM are loaded into the PCI bridge at power-up to configure PCI configuration header space parameters such as base address size and range. A CPLD device provides address decoding for the CANbus controllers and UBIC device. 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.

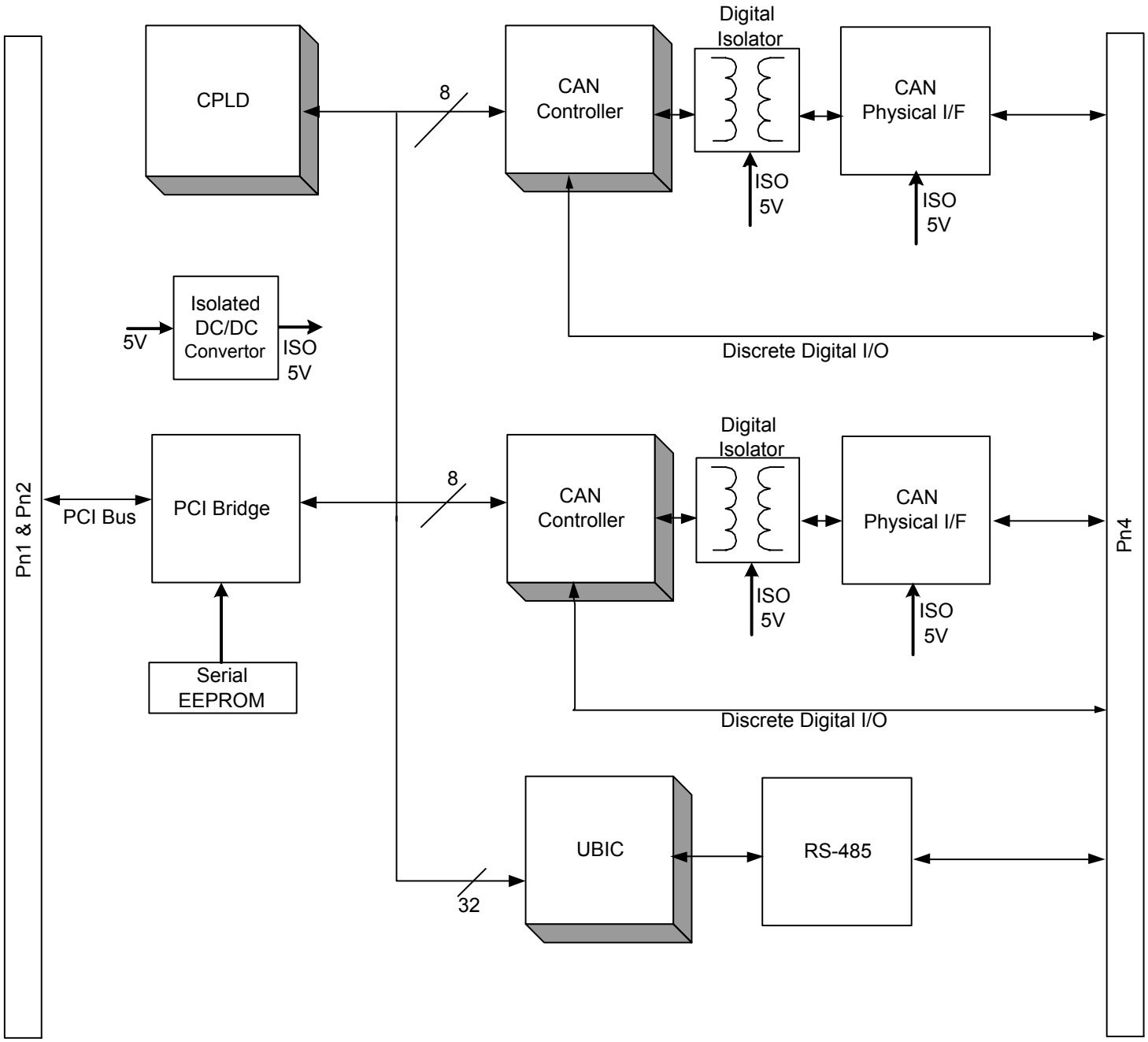


Figure 1: Architecture

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Dual CANbus Interfaces

The PMC-211 provides two independent CANbus interfaces compliant to the CAN Specification 2.0, Part B protocol (standard and extended message formats) and the ISO 11898:1993 CAN High-Speed physical interface levels. Galvanic isolation is provided between the CANbus physical interfaces and the power and ground planes of the main part of the 211 module. CANbus speeds of 250K, 500K, and 1Mbit/sec are supported.

The CANbus protocol is implemented with Intel's proven 82527 CANbus protocol controller, a highly integrated device that provides all CANbus communication functions with minimal interaction from the host processor. The 82527 supports both standard and extended message frames defined in CAN specification 2.0 Part B; as such, it is capable of transmitting, receiving, and message filtering of both standard message frames with an 11 bit identifier and extended message frames with a 29 bit identifier.

Each 82527 device includes internal RAM buffers, termed message objects, for 15 CANbus messages. Each message object holds control and status information and up to 8 bytes of data. Fourteen of the message objects can be configured to transmit or receive a message with a specific CANbus identifier. The 15th message object is receive-only and compares the message identifier of incoming messages to its Message ID bits through a local mask register. This local mask allows a large number of infrequent messages to be received.

To further provide the application developer with flexibility in selecting which messages will be received, the 82527 device performs global masking of message identifiers. This means that selected bits within the message identifier of incoming messages can be made to be "don't care" with respect to comparisons with the message ID bits of each message object.

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-211 provides galvanic isolation between the CANbus I/O signals and the primary onboard power and ground rails. Digital isolators are used between the CANbus controller and the transceivers. The digital isolators and the transceivers are powered by an isolated DC/DC converter.

Key characteristics of the isolation components are as follows:

- digital isolator is Analog Devices type ADuM1100AR, which is rated by the manufacturer to provide isolation of 2500 Vrms for 1 minute per UL1577
- isolated DC/DC converter is Burr Brown/Texas Instruments DCR010505U, which is rated by the manufacturer to provide isolation of 1000 Vrms for 1 minute per UL1950

Utility Bus Interface

The PMC-211 can be optionally equipped with a Utility Bus Interface Chip (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-211 is the MIC device from Vetronix Research Corporation. The PMC-211 design augments the inherent capabilities of the MIC device in two important ways:

- separate enables are provided for each 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

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The Utility Bus physical interface on the PMC-211 consists of EIA-485-compliant transceivers, allowing serial data speeds of up to 3 Mbps. The Utility Bus I/O lines as well as 5 module address bits are routed to the PMC-211'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-211.

Discrete Digital I/O

The PMC-211 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 10K 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-211'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, 33 MHz
- 5 volt signaling level, independent of Vio inputs which are unused
- PMC INTA* interrupt used
- PCI-to-local-bus bridge is V3 Semiconductor V360EPC

Mechanical Format

The PMC-211 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 20-2001, Conduction-Cooled PCI Mezzanine Card Standard. The cooling surfaces provided are the Primary Thermal Interface Region and the side 1 Secondary Thermal Interface Regions.

Older conduction-cooled versions of the PMC-211 as integrated with the DMV-178 single board computer do not include the side 1 Secondary Thermal Interface Regions.

Available Software

We provide a Tornado 2/VxWorks 5.4 compatible driver for the CANbus interface and the discrete digital I/O. See separate datasheet for details.

Accessories

CBL-211-001 is an I/O extension cable compatible with the our 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 interface, the UBIC, and the discrete digital I/O.

Specifications

Ruggedization Levels*		
Air Cooled Modules	0 and 200	
Conduction Cooled Module	200	
Power Requirements	**Maximum**	**Typical**
+ 5 V	1.0 A	0.6 A
+/- 12 V, 3.3 V	Not used	Not used
Dimensions and Weight	**Size**	**Weight**
Air Cooled Module	per IEEE 1386, 1386.1	< 200 g
Conduction Cooled Module	per VITA 20-200x incorporates VITA 20 Primary Thermal Interface Region and side 1 Secondary Thermal Interface Regions	< 200 g

*Refer to Ruggedization Guidelines datasheet for more details.

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