

# Ensemble® 3000 Series OpenVPX CCM3011 PMC/XMC 3U Carrier Module



Expanded I/O Capabilities for OpenVPX Platforms



- Designed for use with OpenVPX™ data plane
- Air-cooled and conduction-cooled modules available
- Advanced system management
- Architected to meet OpenVPX standards

The Ensemble® 3000 Series OpenVPX™ CCM3011 PMC/XMC Carrier Module from Mercury Systems expands the capabilities of processing modules, such as the Ensemble 3000 Series OpenVPX Intel® 3<sup>rd</sup> Generation Core i7 SBC3512 3U Single-Board Computer (SBC), by providing them with high-bandwidth access to an additional mezzanine site. The CCM3011 connects to the processing modules via the OpenVPX data plane, supporting bi-directional high-bandwidth I/O data from sensor to the SBC or as a high-performance offload engine from the SBC to a co-processor. With air-cooled and conduction-cooled variants available, the CCM3011 module can be deployed in a variety of environments with confidence.

The CCM3011 module is supported by the rich set of features available from the MultiCore Plus® software infrastructure, which allows ease of portability while offering an open software development architecture.

## OpenVPX Data Plane

The CCM3011 module is the first OpenVPX carrier card designed specifically to utilize the data plane. In OpenVPX systems, the data plane is intended to allow SBCs or signal or image processing modules to expand their logical control to adjunct modules. In the case of

the CCM3011, a backplane PCIe® interface allows a physically distinct processing module to expand its PCIe infrastructure to encompass the additional resources available on the CCM3011.

## Mezzanine Card Flexibility

The standard PMC/XMC site on the CCM3011 module can be configured with off-the-shelf mezzanine cards using either PCI-X® or PCIe protocols. PMC cards are supported with a PCI®/PCI-X interface at up to 133 MHz on each site, with PMC user-defined I/O mapped to the backplane as specified by OpenVPX. XMCs are supported with x8, x4 and x1 PCIe interfaces, linked via the J15 connector per the VITA 42.3 standard. The PCIe interfaces are capable of both Gen1 and Gen2 PCIe data rates. XMC user I/O is mapped to the backplane via the J16 connector.

The CCM3011 provides ample power to each PMC/XMC site, allowing it to support high-powered mezzanines capable of drawing 30+ watts. By separating these high-powered mezzanines from a module with on-board processing capabilities, the dissipation of thermal energy can be balanced at the system level, maintaining high Mean-Time-Between-Failure (MTBF) figures and removing the need for costly thermal management designs. The CCM3011 supports these cost-saving design considerations while simplifying software design, because it is configured as a simple logical extension of the support software on the neighboring compute module.

*Mercury Systems is a best-of-breed provider of commercially developed, open sensor and Big Data processing systems, software and services for critical commercial, defense and intelligence applications.*



ACQUIRE



DIGITIZE



PROCESS



STORAGE



EXPLOIT



DISSEMINATE

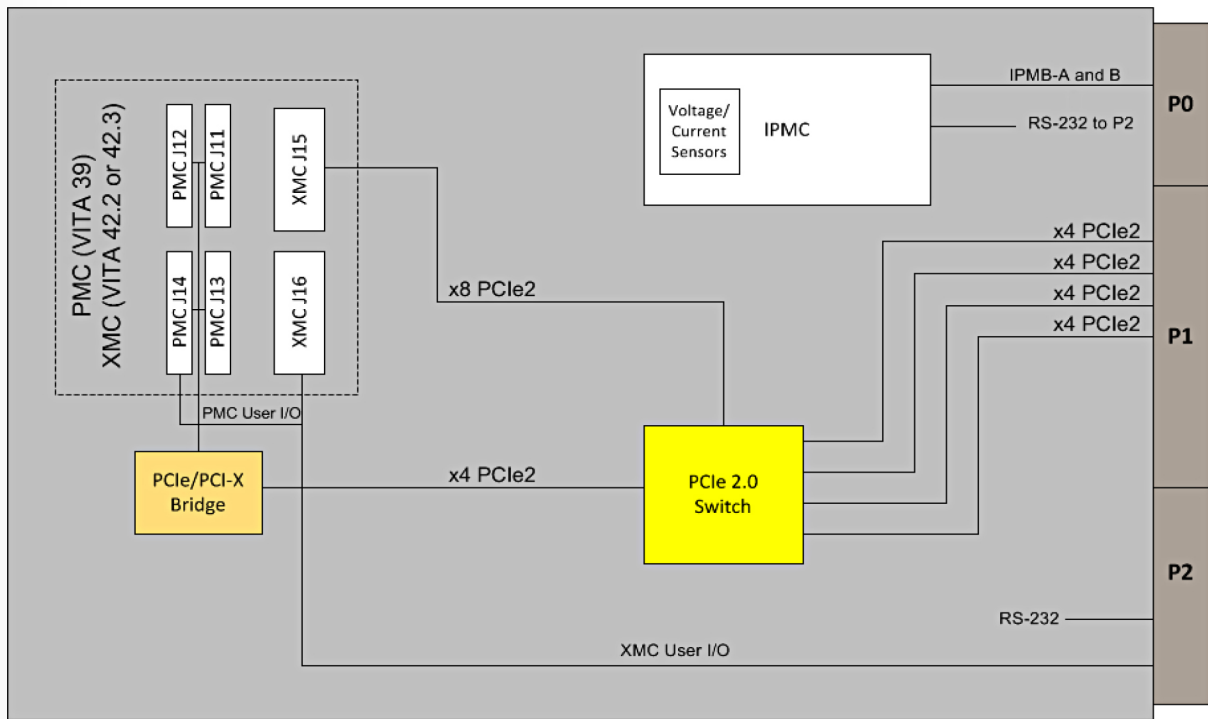


Figure 1. CCM3011 Module block diagram

## System Management

The CCM3011 module implements the advanced system management functionality architected in the OpenVPX standard to enable remote monitoring, alarm management and hardware revision and health status.

Using the standard I2C bus and Intelligent Platform Management Interface (IPMI) protocol, the on-board system-management block implements the IPMC, in accordance with the VITA 46.11 standard.

This allows the CCM3011 module to:

- Report sensor values
- Report and set sensor thresholds, allowing an application to react to thermal, voltage or current variations that exceed those thresholds
- Reset the entire module
- Power up/down the entire module
- Retrieve module Field Replaceable Unit (FRU) information
- Be managed remotely by a Chassis Management Controller at the system level, such as implemented on the OpenVPX SFM3010 module

## VPX-REDI

The VPX (VITA 46) standard defines 6U and 3U board formats with a modern high-performance connector set capable of supporting today's high-speed fabric interfaces, such as Serial RapidIO®. VPX is most attractive when paired with the Ruggedized Enhanced Design Implementation standard – REDI (VITA 48).

The CCM3011 module is implemented as a 3U conduction-cooled implementation of VPX-REDI, with air-cooled variants in the same VPX form factor available for less rugged environments.

Targeted primarily for harsh-environment embedded applications, VPX-REDI offers extended mechanical configurations supporting higher functional density, such as Two-Level Maintenance (2LM). 2LM allows relatively unskilled maintenance personnel to replace a failed module and restore the system to an operational state in a limited time period, minimizing the potential of damage to the board.

## Open Standards Mean Interoperability and Planning for the Future

The OpenVPX Industry Working Group is an industry initiative launched by defense prime contractors and Commercial-Off-The-Shelf (COTS) system developers, to take a proactive approach to solving the interoperability issues associated with the VITA 46 (VPX) family of specifications. This group has created an overarching System Specification defining VPX system architecture through pinout definitions to establish a limited set of application-specific reference solutions. These OpenVPX standard solutions provide clear design guidance to COTS suppliers and the user community, assuring interoperability across multi-vendor implementations. The OpenVPX System standard was ratified by the VSO in February 2010.

## Specifications

### Module

PMC/XMC sites 1  
On-board 32-lane PCIe switch  
Backplane PCIe interface to data plane  
System management capabilities in accordance with draft VITA 46.11 standard  
Air-cooled or conduction-cooled

### PMC-X/XMC Sites

PMC-X sites: 1  
PCI-X-to-PCIe bridge  
Connects PMC site to on-board PCIe switch  
PCI support 33 and 66 MHz  
PCI-X support 66, 100 and 133 MHz  
PMC user-defined I/O from J14 to backplane PCIe XMC site per VITA 42.3  
Supports x8, x4 or x1 PCIe interfaces from XMC to on-board PCIe switch  
XMC user-defined I/O from J16 to backplane

### Management Plane

I2C interface to backplane  
On-board IPMC  
Thermal and voltage sensors

### I/O

RS-232 serial interface from IPMC to front-panel interface  
Routed to the backplane on conduction-cooled configurations

### Environmental

Commercial and rugged air-cooled and conduction-cooled variants available.



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