Ensemble™

DATASHEET

MERCURY COMPUTER SYSTEMS™

Ensemble 6000 Series OpenVPX CCM6020 PMC/XMC Carrier Module

Expanded I/O Capabilities for OpenVPX Platforms

- Designed for use with OpenVPX™ expansion plane
- Air-cooled and conduction-cooled models available
- Advanced system management built in
- Architected to meet OpenVPX design principles

The Ensemble™ 6000 Series OpenVPX™ CCM6020 PMC/XMC Carrier Module from Mercury Computer Systems expands the capabilities of processing modules such as the HCD6220 or HCD6410 by providing them with high-bandwidth access to additional mezzanine sites. The CCM6020 connects to the processing modules via the OpenVPX expansion plane, allowing data to flow into a system without interrupting traffic on the main data plane. With air-cooled and conduction-cooled variants available, the CCM6020 module can be deployed in a variety of environments with confidence.

The CCM6020 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 Expansion Plane

The CCM6020 module is the first OpenVPX carrier card designed specifically to utilize the expansion plane. In OpenVPX systems, the expansion plane is intended to allow single-board computers (SBCs) or signal or image processing modules to expand their logical control to adjunct modules. In the case of the CCM6020, a back-plane PCI Express® interface allows a physically distinct processing module to expand its PCI Express infrastructure to encompass the additional resources available on the CCM6020.

Mezzanine Card Flexibility

Each of the standard PMC/XMC sites on the CCM6020 module can be configured with off-the-shelf mezzanine cards using either PCI-X or PCI Express 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 Open-VPX. XMCs are supported with x8, x4, and x1 PCIe interfaces, linked via the Jn5 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 Jn6 connector.

The CCM6020 provides ample power to each PMC/XMC site, allowing each site to support high-powered mezzanines capable of drawing 30+ watts each. 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 CCM6020 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.

System Management Plane

The CCM6020 module implements the advanced system management functionality architected in the OpenVPX Specification to enable remote monitoring, alarm management, and hardware revision and health status.

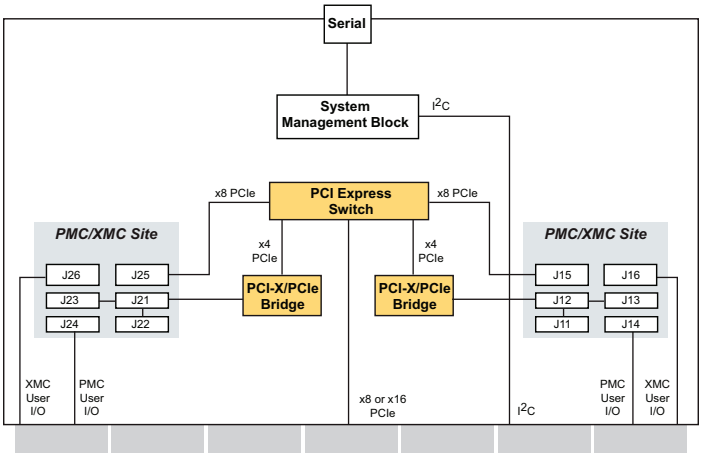

Figure 1. CCM6020 Module block diagram

Using the standard I2C bus and IPMI protocol, the on-board system-management block implements the Intelligent Platform Management Controller (IPMC), in accordance with the VITA 46.11 standard. This allows the CCM6020 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 FRU (field replaceable unit) information
- Be managed remotely by a Chassis Management Controller at the system level, such as implemented on the OpenVPX SFM6100 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 RapidIO®. VPX is most attractive when paired with the Ruggedized Enhanced Design Implementation standard – REDI (VITA 48). The CCM6020 module is implemented as a 6U 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 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 Specification was ratified by the VSO in February 2010.

Specifications

Module

PMC/XMC sites 2
On-board 48-lane PCI Express switch
Backplane PCI Express interface to expansion plane
System management capabilities in accordance with draft VITA 46.11 standard
Air-cooled or conduction-cooled

PMC-X/XMC Sites

PMC-X sites	2
PCI-X-to-PCI-e bridge	Connects PMC sites to on-board PCI Express switch
PCI support	33 and 66 MHz
PCI-X support	66, 100, and 133 MHz

PMC user-defined I/O from Jn4 to backplane
PCIe XMC sites per VITA 42.3
Supports x8, x4, or x1 PCIe interfaces from XMC to on-board PCI Express switch
XMC user-defined I/O from Jn6 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-cool and conduction-cooled variants available.

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MERCURY COMPUTER SYSTEMS™

INNOVATION THAT MATTERS™

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