

Ensemble 3000 Series

OpenVPX SFM3000 RapidIO Data-Plane Switch Module

High-Bandwidth Fabric Switching for 3U VPX Systems

- Supports low-latency, deterministic RapidIO® communications
- Provides a 10-Gbps full-duplex channel to each of 8 payload slots
- Rugged conduction-cooled version for deployment in harsh environments
- Architected to meet OpenVPX™ design principles



The Ensemble™ 3000 Series OpenVPX SFM3000 RapidIO® Data-Plane Switch Module from Mercury Computer Systems is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles. The SFM3000 is a critical component within Mercury’s powerful Ensemble 3000 Series 3U VPX Systems, enabling a high-bandwidth data-plane switch fabric.

Serial RapidIO Switching

The SFM3000 RapidIO switch module provides low-latency, non-blocking, deterministic switching among the eight payload modules, with the channel to each module consisting of 10Gbps full-duplex serial RapidIO (4 x 3.125 Gbps, with 8/10 encoding). This style of high-bandwidth, RapidIO-based interprocessor communication is commonly used to achieve maximum throughput in applications where a single math operation, like an FFT, is divided among multiple processors.

On each SFM3000 module are two Tundra™ serial RapidIO switches that support the RapidIO rev 1.3 functionality for data-plane communication. In addition to supporting the payload module channels in the backplane, the SFM3000 also enables chassis to chassis serial RapidIO communications via two front-panel high speed connectors. The module leverages RapidIO’s multicast capability to build scalable multiprocessor systems. It also enables RapidIO traffic management across the system using programmable buffers and traffic-shaping features. Programmable per-port buffer management ensures dedicated bandwidth for high-priority packets. Ensemble 3000 3U VPX systems may be configured with two SFM3000 modules.

Ensemble 3000 Series 3U VPX Systems

Each of the modules in Mercury’s Ensemble 3000 Series 3U VPX product family was designed at the system level. The modules were designed to deliver optimized high-density, high-performance, real-time processing, tailored for use in applications with extreme space, weight, and power (SWaP) limitations. These systems are capable of being deployed in harsh environments, with both conduction-cooled and air-cooled options. The conduction-cooled version of the SFM3000 supports two-level maintenance (2LM).

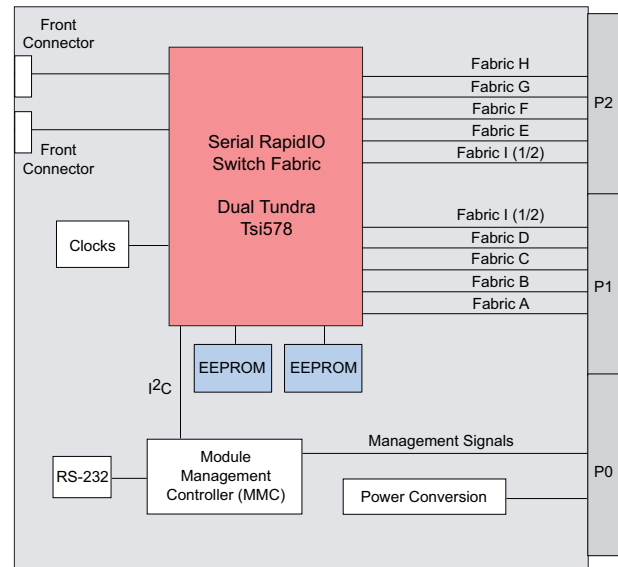


Figure 1. SFM3000 Module block diagram

With up to eight processing modules, Ensemble 3000 Series 3U VPX Systems can be configured with a variety of compute options, including the Xilinx® Virtex™-5 LX-330T FPGA, and multicore PPC processors such as the Freescale™ 1.067-GHz MPC8640D. System communications among these modules are partitioned into a Gigabit Ethernet control plane, an IPMI-based management plane, and high-bandwidth data planes for direct support of multi-stage processing. This system architecture mirrors that of the Ensemble ATCA® and MicroTCA® systems.

Open Standards Means Interoperability and Planning for the Future

The OpenVPX™ Industry Working Group is an industry initiative launched by defense primes 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 is actively collaborating to create an overarching System Specification defining VPX system architecture through pin outs definition to establish a limited set of application specific reference solutions. These OpenVPX™ standard solutions will provide clear design guidance to COTS suppliers and the user community, assuring interoperability across multi-vendor implementations. The OpenVPX™ System Specifications will be introduced into the VSO for ratification to replace the current VITA 46 base and dot specifications in the fall of CY2009.

Advanced Reliability, Maintainability, and Availability

The IPMI-based management plane communications support a range of sophisticated functions, including voltage and temperature monitoring. The SFM3000 has an onboard Module Management Controller (MMC), which communicates with the rest of the system over the management plane.

Specifications

Form factor 3U VPX

Tundra Serial RapidIO Switch (2)

Eight 4x backplane connections, one per payload slot
3.125 Gbps per lane, 10 Gbps per connection
(8/10 encoding, full-duplex)
Two 4x front-panel connection
3.125 Gbps per lane, 10 Gbps per connection
(8/10 encoding, full-duplex)

Auxiliary Clock (AUX_CLK+/-)

M-LVDS front-panel connector to backplane
Pass-through or clock generator output
MMC-controlled direction/source

Module Management Controller IPMI backplane connection

Debug RS-232 connection to management processor

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1979.01E-0809-DS-3uvpx-sfm3000



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