Ensemble™

DATASHEET

MERCURY COMPUTER SYSTEMS™

Ensemble 7100 Platform SFM7180 Module

Serial RapidIO®/GigE Connectivity and Extreme Performance

- Unprecedented performance with 30 GB/s max bisection bandwidth and 120 GB/s bandwidth per system
- Versatility with Serial RapidIO® and Gigabit Ethernet connectivity among 24 payload slots
- Option for streaming sensor I/O and PMCs
- Three external 1 Gigabit Ethernet connections for control and data I/O

The SFM7180 Module (Switch Fabric Module) from Mercury Computer Systems is an integral part of the Ensemble™ 7100 Platform. Each Switch Fabric Module provides 24 connections intended for data-plane use across the passive backplane to the processing module slots. Up to four of these Switch Fabric Modules can be interconnected within a system. The full configuration provides 120 GB/s of aggregate and bisection bandwidth through the backplane with Switch Fabric Modules that enable one of the industry's most powerful image and signal processing platforms.

The RapidIO® interconnect is an open standard certified by ISO and IEC. As the pioneer of heterogeneous switch fabric-based computing and co-developer of RapidIO technology, Mercury is uniquely equipped with the system and application expertise, and the support and consulting resources to craft RapidIO-based systems that achieve unprecedented performance for individual customer requirements.

Standards-Based Mezzanines

Eight mezzanine card sites are available on the SFM7180 Module to support standards-based extensibility for functionality such as sensor I/O and inter-chassis communications. The four mezzanine sites along the front panel of each module can accept IEEE 1386.1 standard PMC or XMC cards. (The pending VITA 42.2 standard addresses XMC cards with Serial RapidIO communications.) The four mezzanine sites at the back of the modules are XMC sites, with optical connections available to the front panel.

The SFM7180 Module includes an MPC8640D dual-core microprocessor that runs Linux® for I/O control and driver support for the PMC/XMC sites. It includes 512 MB of flash memory for fast booting.

Ethernet Connections

The SFM7180 Module has 24 connections of 1 Gigabit Ethernet to the backplane, which implement the control plane, and three external Gigabit Ethernet ports. Two of the high-bandwidth external Gigabit Ethernet ports are directly connected to the MPC8640D processor, which can be used as a gateway to the internal nodes. The third external Gigabit Ethernet port is directly connected to an onboard 24-port Gigabit Ethernet switch that provides connectivity to the 24 processing slots and to the other SFM7180 Modules for data movement and standard I/O. Two 2.5 Gigabit Ethernet connections to the backplane form a connectivity ring among the SFM7180 Modules.

The 100 Mbit Ethernet port is connected to a 100 Mbit Ethernet switch that provides connectivity to the MPC8640D processor, to other SFM7180 Modules, and to the local shelf manager for platform management.

In a full Ensemble 7100 Platform configuration of four SFM7180 Modules, twelve 1-Gigabit Ethernet connections and four 100-Mbit Ethernet connections are available for external use.

Sensor Data I/O

The Ensemble 7100 Platform provides the option for streaming sensor data I/O through serial front-panel data port (SFPDP) ANSI/VITA 17.1-2003 connections. This industry standard enables SFPDP communications over fiber media. Up to

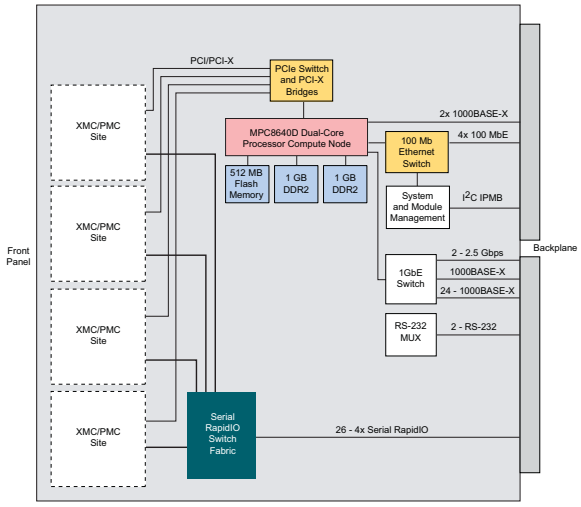

***Figure 1**. SFM7180 Module functional block diagram*

four Mercury RapidIO-connected serial SFPDP XMC mezzanine cards can be mounted in front positions on each SFM7180 Module, for up to 16 cards within the Ensemble 7100 Platform.

Each Mercury XMC card provides two bi-directional I/O ports per card, each with a peak data rate of 250 MB/s and a sustained data rate of 247 MB/s per port. With up to 8 GB/s of streaming I/O in the system, the Ensemble 7100 Platform matches I/O performance to its exceptional computational power. These XMCs can also be used to provide additional output bandwidth.

PMC Sites

The four front mezzanine card sites support 32/64-bit PCI at 33/67 MHz, or 32/64-bit PCI-X at 67/100 MHz. This equates to a bandwidth of 800 MB/s peak per site (but not all at once in the same direction). The sites have 50% more PCI bandwidth than the previous generation of mezzanine card sites.

Built for RAS Deployments

The Ensemble 7100 Platform is designed to satisfy the reliability, availability, and serviceability (RAS) needs of field applications. Internally, the SFM7180 Module implements system management functions based on the PICMG® MicroTCA®.0 and AMC®.0 standards to enable proactive management. The system event log (SEL) captures system management function information in volatile memory.

PICMG 2.9 IPMI (Intelligent Platform Management Interface) over LAN (100 Mbit Ethernet) is the out-of-band fabric (IPMB) for system control and monitoring, fault isolation, and recovery. The application software can also access system configuration, FRU data, monitoring, and reset. Warnings and failures are indicated locally through front-panel status LEDs.

The system automatically monitors fan failure, power supply failure, and chassis intrusion. Optional monitoring is available for under/over temperature and airflow. Normally, faults cause the system to power down immediately or after a warning, or they prevent system power-up. The system can be configured to override certain of these faults or allow the user to override them using the Environmental Bypass switch.

Serviceability

During power-on self-test (POST), diagnostics run out of the flash on each module. The results of these diagnostics are available out-of-band before the modules are joined together to form a multicomputer. This testing from the inside out provides excellent fault isolation. Slot keying ensures proper replacement of boards during service.

2050.01E-0610-DS-SFM7180

Specifications

Serial RapidIO switching function

Protocol
- 4x Serial RapidIO (ISO/IEC DIS 18372) at 3.125 Gbaud

Bandwidth
- 1.25 GB/s peak per link in each direction for payload slots
- 30.0 GB/s peak to the backplane

Industry-Standard Mezzanine Sites

Number
- 4 PMC or XMC in front row
- 4 XMC in the rear row (optional use)

PMC type
- IEEE 1386.1-2001
- Support for 32/64-bit PCI at 33/67 MHz or 32/64-bit PCI-X at 67/100 MHz

XMC type VITA 42.2, 4x Serial RapidIO at 3.125 Gbaud

I/O Processor

Number	1 Freescale MPC8640D at 1.067 GHz
DRAM	1-GB DDR2-533 per SDRAM, ECC per controller (total of 2 GB)
DRAM bandwidth	8.6 GB/s peak
Flash memory size	512 MB (application flash)

Gigabit Ethernet control plane

Protocol 1000BASE-X (IEEE 802.3)

Ethernet connections

Ethernet connections to the backplane

4	100-Mbit Ethernet (1 external for system management)
27	1-Gigabit Ethernet (3 external ports for I/O)
2	2.5-Gigabit Ethernet

Electrical

Input voltages
- 48.0 VDC ±5%, main power
- 5.0 VDC ±5%, management power

Input voltages measured at the backplane pins inclusive of all ripple. Mercury strongly recommends that system-level power designs use a ±2% margin to avoid any potential issues with respect to the system-level operating characteristics and operating environment.

Power (estimate)
- 221 W per module (with eight 8W mezzanine cards)

Weight 4 lb

Environmental

Commercial

Minimum airflow/slot	38 CFM at sea level
Temperature* - operating	0°C to 35°C
Altitude* - operating	Sea-level to 10,000 ft

MBTF
- Calculated using MIL Standard 217F
- (Consult the factory for Mil 217F reliability data)

*As altitde increases, air density decreases and, therefore, the cooling effect of a particular number of CFM decreases. Different limits can be achieved by trading among altitude, temperature, performance, and airflow. Contact Mercury for more information.

MERCURY COMPUTER SYSTEMS™

Corporate Headquarters
201 Riverneck Road
Chelmsford, MA 01824-2820 USA
+1 (978) 967-1401 • +1 (866) 627-6951
Fax +1 (978) 256-3599
www.mc.com

Europe
Mercury Computer Systems, Ltd.
Unit 1 - Easter Park, Benyon Road • Silchester, Reading • RG7 2PQ UNITED KINGDOM
+ 44 0 1189 702050 • Fax + 44 0 1189 702321

Asia
Nihon Mercury Computer Systems K.K.
No. 2 Gotanda Fujikoshi Bldg. 4F • 5-23-1 Higashi Gotanda • Shinagawa-ku, Tokyo 141-0022 JAPAN
+81 3 3473 0140 • Fax +81 3 3473 0141

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