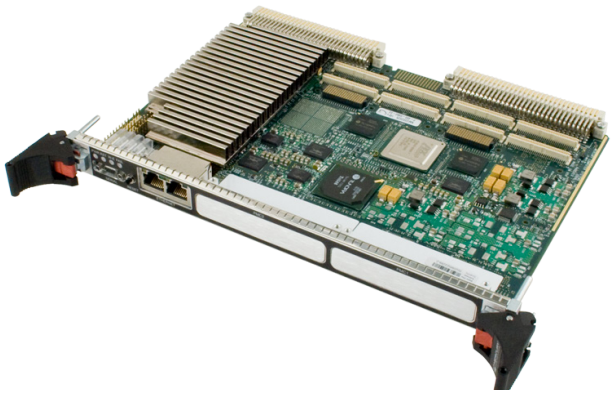
Ensemble™

DATASHEET

MERCURY COMPUTER SYSTEMS™

Ensemble 4000 Series VME SBC4120 Module

BLow-Power, Low-Cost Single-Board Computer with Flexible I/O



- VME64 6U air-cooled SBC
- 1.06 GHz dual-core, low-power MPC8640D processor
- Optimized for legacy 5V-only VME systems
- Identical software infrastructure across Mercury products
- Flexible I/O supported on dual PMC/XMC sites

The Ensemble 4000 Series SBC4120 Module from Mercury Computer Systems combines high-performance Power Architecture™ processing technology with balanced I/O from dual PMC/XMC sites, designed for easy insertion into legacy VME systems. This MPC8640D dual-core single-board computer (SBC) requires only 5V power supplied from the backplane, and can operate safely with the lower airflow rates often found in such systems. The SBC4120 provides the features of a single-board computer with a software environment that is identical to the software infrastructure across Mercury products.

Low-Power Processor

The Freescale™ MPC8640D dual-core processor integrates two standard e600 processor cores, two DDR2 memory controllers, 1 MB of L2 cache, and a flexible system-on-chip I/O subsystem. The MPC8640D processor is an enhancement to the industry-standard MPC8641D processor and maintains the performance of the MPC8641D while lowering its overall power draw. The dual e600 cores that make up the heart of the chip are inherited from the MPC7448 processor, and each retains the high-performance AltiVec ™ vector processing unit. Algorithms optimized for the AltiVec engine port seamlessly to the MPC8640D. Increased bandwidth between both memory and external I/O and the processing cores allows efficient processing beyond that available with prior families of Freescale processors.

Mezzanine Card Flexibility

Each of the standard PMC/XMC sites 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 the primary site, and up to 100 MHz on the secondary site. PMC user-defined I/O is mapped to the backplane on one of the two PMC sites. XMCs are supported with x8, x4, x2, and x1 PCIe mezzanine cards per the VITA 42.3 standard.

Support for Legacy Systems

The SBC4120 incorporates several features that simplify insertion into legacy VME systems. Many legacy VME backplanes supply only +5V, +12V, and -12V power inputs for payload modules and any mezzanines mounted on them. The SBC4120 does not require any additional voltages beyond 5V to function. The module is also optimized for high mean-time between failures (MTBF) in lower airflow environments. The integrated 2eSST VMEbus interface allows fast data movement among 2eSST-enabled modules on the same legacy VME backplane.

Full-Featured SBC

The SBC4120 balances processing power with flexible I/O via built-in serial and Gigabit Ethernet and dual PMC/XMC mezzanine sites. In addition to the sophisticated management subsystem and fabric interconnect, the SBC4120 provides users with a toolkit enabling many different application use cases.

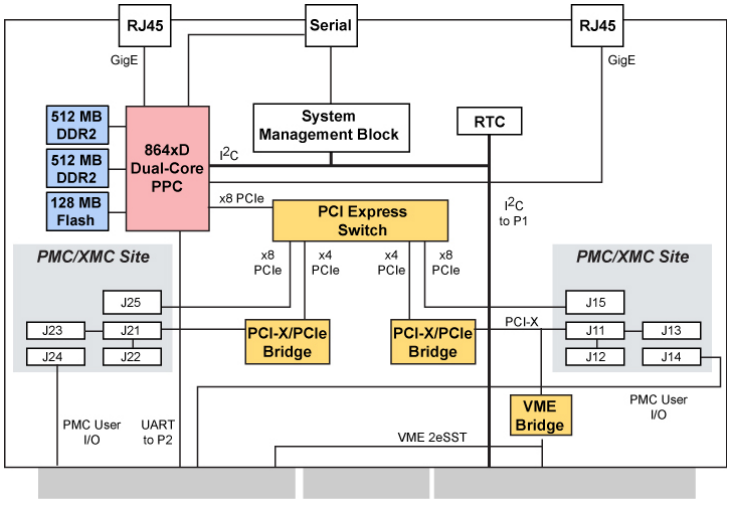


***Figure 1**. VME SBC4120 Module functional block diagram*

Features

- 128 MB of write-protectable boot/application flash per processor with protected boot vector to avoid accidental erasure
- Thermal and voltage sensors integrated onboard
- System management block capable of managing firmware updates, reading and writing sensor thresholds, reading sensor values, retrieval of module information and power control, and reset for the module
- RS-232 serial interface ports per processor to the front panel with an additional interface optionally routed to the backplane
- Real-time clock with granularity to 1 ms and time measurement of up to 30 years
- General-purpose timers are used for synchronization
- Watchdog timer can interrupt each processor upon expiration.
- Open board architecture that supports network booting, as well as booting from the onboard flash memory

Open Software Environment

For over 25 years, Mercury has been leveraging multicomputer-software expertise, including multicore processor expertise, across its many platforms. This strategy is fully applied to the SBC4120. Because the processor, memory, and surrounding technologies are leveraged across product lines, software developed on the SBC4120 can interface seamlessly with other Mercury products. The same Linux® or VxWorks® development and run-time environment is implemented on the SBC4120 as on other Mercury systems, such as the Ensemble 7100 Series and the HCD5220.

The MultiCore Plus® open software environment gives the SBC4120 access to a wide ecosystem of stacks, middleware, libraries, and tools. The Scientific Algorithm Library (SAL) is optimized for the onboard AltiVec engine, giving the SBC4120 industry-leading signal processing performance. The architecture of the board supports network booting, as well as booting from the onboard flash memory.

Specifications

Module

One dual-core MPC8640D processor
Two PMC/XMC sites (XMC configured for VITA 42.3 support)
Air-cooled
5V Input voltage

Power dissipation, typical (without PMC/XMC card)

Without AltiVec	40W (estimated)
With AltiVec	45W (estimated)

Note: For power supply requirements and thermal design guidelines, use 20% more than the above numbers or consult factory, if your requirements do not allow the 20% margin.

Processor Node

Dual-core 8640D	1.06 GHz
Cores per device	2
DDR2 SDRAM	1 GB per processor at 533 MHz

PMC-X/XMC Sites

Two PMC-X sites
PCI-X-to-PCI Express bridge
Connects PMC sites to onboard PCI Express switch

PCI support	33 MHz and 66 MHz

PCI-X support

Primary site	66, 100, and 133 MHz
Secondary site	66 and 100 MHz

PMC user-defined I/O from P4 to VME P2 connector
PCI Express XMC sites per VITA 42.3

VME Interface

2eSST capable via Tundra® TSi148™

I/O

Two front-panel 10/100/1000BASE-TX Ethernet ports
RS-232 serial interface to front-panel interface
RS-232 serial interface to VME P2 connector

Additional Resources

Onboard 128-MB boot/application flash per processor
Real-time clock
Watchdog timer
General-purpose 32-bit timers/counters
System management block
Thermal and voltage sensors

Environmental

Please refer to Mercury publication "Environmental Protections for Operation at the Tactical Edge" for specific ruggedness levels and cooling options.

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