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Find the *Emerson / Motorola MVME5100* at our website: *Click HERE*

# MVME5100 Series

## VMEbus Processor Module

DATASHEET

MOTOROLA

### KEY FEATURES

MPC7410, MPC750 or MPC755 microprocessor with 32KB/32KB L1 cache

Up to 2MB of secondary backside cache

100 MHz frontside bus

Up to 512MB of on-board ECC SDRAM – expandable up to 1GB with optional RAM500 memory expansion modules

17MB flash memory

Dual IEEE P1386.1 compatible 32/64-bit PMC expansion slots

64-bit PCI expansion mezzanine connector allowing up to four more PMCs

Dual 16550 compatible async serial ports

Dual 10BaseT/100BaseTX Ethernet

32KB NVRAM and time-of-day clock with replaceable battery backup

Four 32-bit timers and one watchdog timer

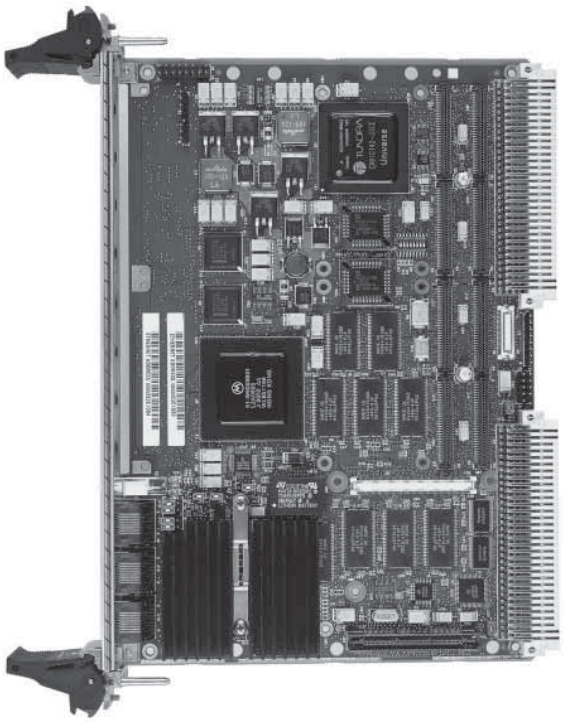
On-board debug monitor

Single VME slot even when fully configured with two PMC modules and both add-on memory mezzanines

The MVME5100 series utilizes the PowerPlus II Architecture to support full PCI throughput of 264MB/s without starving the processor from its memory. The extended temperature versions of the MVME5100 series offer hardware and software compatible products to enhance the existing MVME5100 product. Versions are available that operate at extended temperature ranges of –20° to 71° C vs. 0° to 55° C for the already existing commercial versions.

The temperature range is advantageous to OEMs that require extended operating temperatures for their equipment.

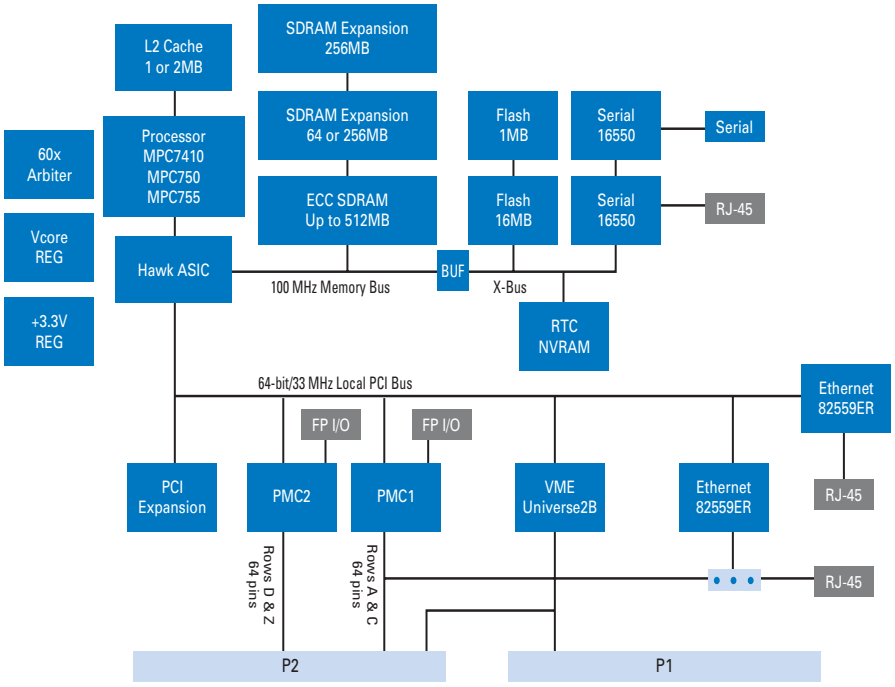
The MVME5100 is designed to meet the needs of OEMs servicing the defense and aerospace, industrial automation and medical market segments.



RoHS 5/6 PB SOLDER EXEMPT

*Commercial Temperature Version*

The Motorola MVME5100 series is the flagship of the Motorola PowerPlus II VME Architecture line, enabling supercomputing levels of performance in a single VMEbus slot. Based on an integrated PCI bridge-memory controller ASIC designed by Motorola, PowerPlus II takes memory performance to new levels with 582MB/s memory read bandwidth and 640MB/s burst write bandwidth.




## OVERVIEW

### I/O COMPATIBILITY

Historically, Motorola has offered two tracks in its PowerPC Architecture VME portfolio. The first track (which includes the MVME2600/2700) provides typical single-board computer I/O features including Ethernet, SCSI, multiple serial ports, a parallel port and a single PMC slot. The on-board I/O is routed to P2 and made available to the user via Motorola MVME761 or MVME712M transition boards. The second track (which includes the MVME2300/2400) offers limited on-board I/O (Ethernet and a single serial port both via the front panel) but provides dual PMC slots enabling maximum user I/O customization.

The MVME5100 merges the best features of both tracks enabling the OEM to support varying I/O requirements with the same base platform, simplifying part number maintenance, technical expertise requirements and sparing.

### P2 I/O MODES

The MVME5100 supports two, jumper-configurable P2 I/O modes; PMC and IPMC. PMC mode is backward compatible with the MVME2300/MVME2400. In PMC mode, 64 pins from PMC slot 1 and 46 pins from PMC slot 2 are available onP2 for PMC rear I/O.

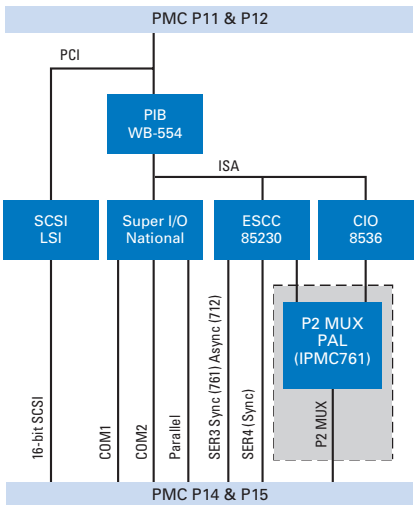
In IPMC mode, the MVME5100 supports legacy MVME761 or MVME712M I/O modules (with limited PMC I/O) when an IPMC761 or IPMC712 PMC card is populated in PMC slot 1. In this configuration, PMC slot 2 contains some signals that are reserved for extended SCSI.

### IPMC MODULES

The IPMC761 and IPMC712 are optional add-on PMC modules that provide backward compatibility with previous-generation Motorola products (such asMVME2600 and MVME2700) using the MVME761 orMVME712M transition board. IPMC modules provide rear I/O support for the following:

- One single-ended Ultra Wide SCSI port
- One parallel port
- Four serial ports (2 or 3 async and 1 or 2 sync/async, depending on module)

With this PMC card configuration, the memory mezzanine, one PMC slot and the PMCspan are still available, providing support for OEM product customization.



## TRANSITION MODULES

The **MVME761** transition module provides industry-standard connector access to the IEEE 1284 parallel port, a 10BaseT or 100BaseT port via an RJ-45 connector, two DB-9 connectors providing access to the asynchronous serial ports configured as EIA-574 DTE and two HD-26 connectors providing access to the sync/async serial ports. These serial ports, labeled as Serial 3 and Serial 4 on the faceplate of the MVME761, are individually user-configurable as EIA-232, EIA-530, V.35, or X.21 DCE or DTE via the installation of Motorola Serial Interface Modules (SIMs). A P2 adapter board provides interface signals to the MVME761 transition module. Two separate P2 adapter boards are available: one for 3-row backplanes and one for 5-row backplanes. The 3-row P2 adapter board provides connection for 8-bit SCSI. A 5-row P2 adapter board supports 16-bit SCSI and PMC I/O.

The **MVME712M** transition module provides industry-standard connector access to the Centronics parallel port, a narrow SCSI port, and four DB-25 connectors providing access to the asynchronous/synchronous serial ports jumper configurable as EIA-232 DCE or DTE. A P2 adapter board provides interface signals to the MVME712M transition module. The 3-row P2 adapter board also provides connection for 8-bit SCSI. To gain access to the additional user-definable I/O pins provided via the 5-row VME64 extension connector, a special P2 adapter board is available. This adapter panel replaces the traditional 3-row P2 adapter board and extends its capability by providing access to the PMC I/O pins.

# SOFTWARE SUPPORT

## FIRMWARE MONITOR

Firmware must fulfill the traditional functions of test and initialization and provide operating system boot support. The MVME5100 firmware monitor exceeds these requirements with a proven monitor from the embedded VME leader. It expands features like power-up tests with extensive diagnostics, as well as a powerful evaluation and debug tool for simple checkout or when high-level development debuggers require additional support. All this is included with the MVME5100 firmware; plus it supports booting both operating systems and kernels.

## OPERATING SYSTEMS AND KERNELS

MVME5100 supports booting a variety of operating systems, including VxWorks from Wind River Systems, Inc., Integrity from Green Hills, and Linux from a variety of partners.

## DIAGNOSTIC SOFTWARE

Motorola Built-In Test (MBIT) is an off-the-shelf software infrastructure designed to verify the correct operation of Motorola hardware and enable the incorporation of system level diagnostics. A comprehensive User Manual with software development guidelines is provided on MBIT's CD-ROM. Two versions of MBIT are available and are compatible with Wind River Systems Tornado 2.1.

**Board-level MBIT** is a comprehensive diagnostic software package designed to verify the performance of board mounted logic devices. All tests can execute at boot-up and selected tests can run continuously in the background of user applications. An API is included to provide access to test results and to modify and control the operation of device tests.

**System-level MBIT** includes all functionality and API function calls of the board level version and enables system-wide testing. System Level MBIT provides a framework and additional API function calls to support the inclusion of software designed to test custom hardware and/or system components.

## PROCESSOR

| | MPC7410 | MPC750 | MPC755 |
|---|---|---|---|
| Clock Frequency: | 500 MHz | 450 MHz | 400 MHz |
| On-chip Cache (I/D): | 32K/32K | 32K/32K | 32K/32K |
| Secondary Cache: | 2MB | 1MB | 1MB |

## MAIN MEMORY

Type: PC100 ECC SDRAM with 100 MHz bus

Capacity: Up to 512MB on-board, expandable to 1GB with RAM500 memory mezzanines

Single Cycle Accesses: 10 Read/5 Write

Read Burst Mode: 7-1-1-1 idle; 2-1-1-1 aligned page hit

Write Burst Mode: 4-1-1-1 idle; 2-1-1-1 aligned page hit

Architecture: 64-bit, single interleave

## FLASH MEMORY

Type: EEPROM, on-board programmable

Capacity: 1MB via two 32-pin PLCC/CLCC sockets; 16MB surface mount

Read Access (16MB port): 70 clocks (32-byte burst)

Read Access (1MB port): 262 clocks (32-byte burst)

## NVRAM

Capacity: 32KB (4KB available for users)

Cell Storage Life: 50 years at 55° C

Cell Capacity Life: 5 years at 100% duty cycle, 25° C

Removable Battery: Yes

## VMEBUS ANSI/VITA 1-1994 VME64 (IEEE STD 1014)

Controller: Tundra Universe

DTB Master: A16–A32; D08–D64, BLT

DTB Slave: A24–A32; D08–D64, BLT, UAT

Arbiter: RR/PRI

Interrupt Handler/Generator: IRQ 1–7/Any one of seven IRQs

System Controller: Yes, jumperable or auto detect

Location Monitor: Two, LMA32

## COUNTERS/TIMERS

TOD Clock Device: M48T37V

Real-Time Timers/Counters: Four, 32-bit programmable

Watchdog Timer: Time-out generates reset

## ETHERNET INTERFACE

Controller: Two Intel® 82559ER

Interface Speed: 10/100Mbps

PCI Local bus DMA: Yes, with PCI burst

Connector: One routed to front panel RJ-45, one routed to front panel RJ-45 or optionally routed to P2, RJ-45 on MVME761

## ASYNCHRONOUS SERIAL PORTS

Controller: 16C550C UART

Number of Ports: Two, 16550 compatible

Configuration: EIA-574 DTE

Async Baud Rate, bps max.: 38.4K EIA-232, 115Kbps raw

Connector: One routed to front panel RJ-45, one on planar for development use

## DUAL IEEE P1386.1 PCI MEZZANINE CARD SLOTS

Address/Data: A32/D32/D64, PMC PN1, PN2, PN3, PN4 connectors

PCI Bus Clock: 33 MHz

Signaling: 5V

Power: +3.3V, +5V, ±12V; 7.5 watts maximum per PMC slot

Module Types: Two single-wide or one double-wide, front panel or P2 I/O

## PCI EXPANSION CONNECTOR

Address/Data: A32/D32/D64

PCI Bus Clock: 33 MHz

Signaling: 5V

Connector: 114-pin connector located on the planar of the MVME5100

## POWER REQUIREMENTS

(not including power required by PMC or IMPC modules)

| | +5 V ± 5% | +12 V ± 10% | –12 V ± 10% |
|---|---|---|---|
| MVME5100 | 3.0 A typ. | 8.0 mA typ. | 2.0 mA typ. |

## BOARD SIZE

Height: 233.4 mm (9.2 in.)

Depth: 160.0 mm (6.3 in.)

Front Panel Height: 261.8 mm (10.3 in.)

Width: 19.8 mm (0.8 in.)

Max. Component Height: 14.8 mm (0.58 in.)

## IPMC MODULES

### PMC INTERFACE

Address/Data: A32/D32/D64, PMC PN1, PN2, PN3, PN4 connectors

PCI Bus Clock: 33 MHz

Signaling: 5V

Module Type: Basic, single-wide; P2 I/O

### SCSI BUS

Controller: Symbios 53C895A

PCI Local Bus DMA: Yes, with PCI local bus burst

Asynchronous (8-bit mode): 5.0MB/s

Ultra SCSI: 20.0MB/s (8-bit mode), 40.0MB/s (16-bit mode)

Note: 16-bit SCSI operation precludes the use of some PMC slot 2 signals.

### SYNCHRONOUS SERIAL PORTS

Controller: 85230/8536

Number of Ports: Two (IPMC761); one (IPMC712)

Configuration: IPMC761: TTL to P2 (both ports), SIM configurable on MVME761; IPMC712: EIA-232 to P2

Baud Rate, bps max.: 2.5M sync, 38.4K async

Oscillator Clock Rate (PCLK): 10 MHz/5 MHz

### ASYNCHRONOUS SERIAL PORTS

Controller: 16C550 UART; 85230/8536

Number of Ports: Two (IPMC761); three (IPMC712)

Configuration: EIA-574 DTE (IPMC761); EIA-232 (IPMC712)

Async Baud Rate, bps max.: 38.4K EIA-232, 115Kbps raw

### PARALLEL PORT

Controller: PC97307

Configuration: 8-bit bi-directional, full IEEE 1284 support; Centronics compatible (minus EPP and ECP on MVME712M)

Modes: Master only

### POWER REQUIREMENTS

(Additional power load placed on MVME5100 series with IPMC installed)

| | +5V ± 5% | +12V ± 10% | –12V ± 10% |
|---|---|---|---|
| MVME5100: | 3.8 A max.<br>3.0 A typ. | 8.0 mA typ. | 2.0 mA typ |
| MVME5106: | 3.8 A max.<br>2.6 A typ. | 8.0 mA typ. | 2.0 mA typ. |
| MVME5107: | 4.7 A max.<br>3.5 A typ. | 8.0 mA typ. | 2.0 mA typ. |
| MVME5110-21xx: | 3.8 A max.<br>3.1 A typ. | 8.0 mA typ. | 2.0 mA typ. |
| MVME5110-22xx: | 4.7 A max.<br>3.5 A typ. | 8.0 mA typ. | 2.0 mA typ. |

## TRANSITION MODULES

### I/O CONNECTORS

| | MVME761 | MVME712M |
|---|---|---|
| Asynchronous Serial Ports: | Two, DB-9 labeled as COM1 and COM2 | Three, DB-25 labeled Serial 1, Serial 2 and Serial 3 |
| Synchronous Serial Ports: | Two, HD-26 labeled as Serial 3 and Serial 4 (user-configurable via installation of SIMs); two 60-pin connectors on MVME761 planar for installation of two SIMs | One, DB-25 labeled as Serial 4 |
| Parallel Port: | HD-36, Centronics compatible | D-36, Centronics compatible |
| Ethernet: | 10BaseT or 100BaseTX, RJ-45 | Not available |
| SCSI: | 8- or 16-bit, 50- or 68-pin connector via P2 adapter | 8-bit, standard SCSI D-50 |

## ENVIRONMENTAL

(Minimum of 400 LFM of forced air cooling is recommended for operation in the higher temperature ranges.)

| | Operating | Non-operating |
|---|---|---|
| Commercial Temperature: | 0° C to +55° C (inlet air temp. w/forced air cooling) | –40° C to +85° C |
| Extended Temperature: | –20° C to +71° C | –40° C to +85° C |
| Humidity (NC): | 5% to 90% | 5% to 90% |
| Vibration: | 2 Gs RMS, 20–2000 Hz random | 6 Gs RMS, 20–2000 Hz random |

## ELECTROMAGNETIC COMPATIBILITY (EMC)

Intended for use in systems meeting the following regulations:

U.S.: FCC Part 15, Subpart B, Class A (non-residential)

Canada: ICES-003, Class A (non-residential)

This product was tested in a representative system to the following standards:

CE Mark per European EMC Directive 89/336/EEC with Amendments; Emissions: EN55022 Class B; Immunity: EN55024

## SAFETY

All printed wiring boards (PWBs) are manufactured with a flammability rating of 94V-0 by UL recognized manufacturers.

## DEMONSTRATED MTBF

(based on a sample of eight boards in accelerated stress environment)

Mean: 190,509 hours

95% Confidence: 107,681 hours

## ORDERING INFORMATION

All models of the MVME51xx are available with either VME Scanbe front panel (-xxx1) or IEEE 1101 compatible front panel (-xxx3).

| Part Number | Description |
|---|---|
| **450 MHz MPC750 Commercial Models** | |
| MVME51005E-0161 | 512MB ECC SDRAM, 17MB flash and 1MB L2 cache Scanbe 5E |
| MVME51005E-0163 | 512MB ECC SDRAM, 17MB flash and 1MB L2 cache IEEE 5E |
| **400 MHz MPC755 Extended Temperature Models** | |
| MVME5106-1161 | 512MB ECC SDRAM, 17MB flash and 1MB L2 cache Scanbe |
| MVME5106-1163 | 512MB ECC SDRAM, 17MB flash and 1MB L2 cache IEEE |
| **500 MHz MPC7410 Commercial Models** | |
| MVME51105E-2161 | 500 MHz MPC7410, 512MB ECC SDRAM, 17MB flash and 2MB L2 cache Scanbe 5E |
| MVME51105E-2163 | 500 MHz MPC7410, 512MB ECC SDRAM, 17MB flash and 2MB L2 cache IEEE 5E |
| MVME51105E-2261 | 500 MHz MPC7410, 512MB ECC SDRAM, 17MB flash and 2MB L2 cache Scanbe 5E |
| MVME51105E-2263 | 500 MHz MPC7410, 512MB ECC SDRAM, 17MB flash and 2MB L2 cache IEEE 5E |
| **500 MHz MPC7410 Extended Temperature Models** | |
| MVME5107-2161 | 512MB ECC SDRAM, 17MB flash and 2MB L2 cache Scanbe |
| MVME5107-2163 | 512MB ECC SDRAM, 17MB flash and 2MB L2 cache IEEE |
| **MVME712M Compatible I/O** | |
| IMPC7126E-002 | Multifunction rear I/O PMC module; 8-bit SCSI, Ultra Wide SCSI, one parallel port, three async and one sync/async serial ports |
| MVME712M6E | Transition module connectors: One DB-25 sync/async serial port, three DB-25 async serial port, one AUI connector, one D-36 parallel port, and one 50-pin 8-bit SCSI; includes 3-row DIN P2 adapter module and cable |
| **MVME761 Compatible I/O** | |
| IPMC7616E-002 | Multifunction rear I/O PMC module; 8-bit SCSI, one parallel port, two async and two sync/async serial ports |
| MVME7616E-001 | Transition module: Two DB-9 async serial port connectors, two HD-26 sync/async serial port connectors, one HD-36 parallel port connector, one RJ-45 10/100 Ethernet connector; includes 3-row DIN P2 adapter module and cable (for 8-bit SCSI) |
| MVME7616E-011 | Transition module: Two DB-9 async serial port connectors, two HD-26 sync/async serial port connectors, one HD-36 parallel port connector, and one RJ-45 10/100 Ethernet connector; includes 5-row DIN P2 adapter module and cable (for 16-bit SCSI); requires backplane with 5-row DIN connectors |
| SIM232DCE5E | EIA-232 DCE Serial Interface Module 5E |
| SIM232DTE5E | EIA-232 DTE Serial Interface Module 5E |
| **Related Products** | |
| PMCSPAN16E-002 | PMCSPAN-002 with original VME Scanbe ejector handles 5E |
| PMCSPAN16E-010 | PMCSAN-010 with original VME Scanbe ejector handles 5E |
| RAM5005E-006 | Stackable (top) 256MB ECC SDRAM mezzanine 5E |
| RAM5005E-016 | Stackable (bottom) 256MB ECC SDRAM mezzanine 5E |
| **Documentation** | |
| V5100A/IH | MVME5100 Installation and Use |
| V5100A/PG | Programmer's Reference Guide |
| VME761A/IH | MVME761 Transition Module Installation and Use |
| VME712MA/IH | MVME712 Transition Module Installation and Use |
| PPCBUGA1/UM<br>PPCBUGA2/UM | PPCBug Firmware Package User's Manual (volumes one and two) |
| PPCDIAA/UM | PPCBug Diagnostics Manual |
| Documentation is available for online viewing and ordering at www.motorola.com/computer/literature | |

**RoHS Status**

The commercial temperature models of this product (MVME5100 and MVME5110) are 5/6 RoHS compliant. Reference the Ordering Information on page 7 for part numbers and options available.

The extended temperature models of this product (MVME5106 and MVME5107) will continue to be offered as a 0/6 RoHS compliant product through March, 2007.

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Munich, Germany +49 89 608 14-0
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Shanghai, China +86 215292 5693
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