

Motorola MVME2604

## VME64 Processor Module, 200 MHz, 32 MB RAM



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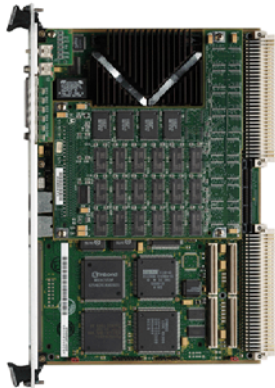
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## MVME2600 Series

### VME Processor Modules

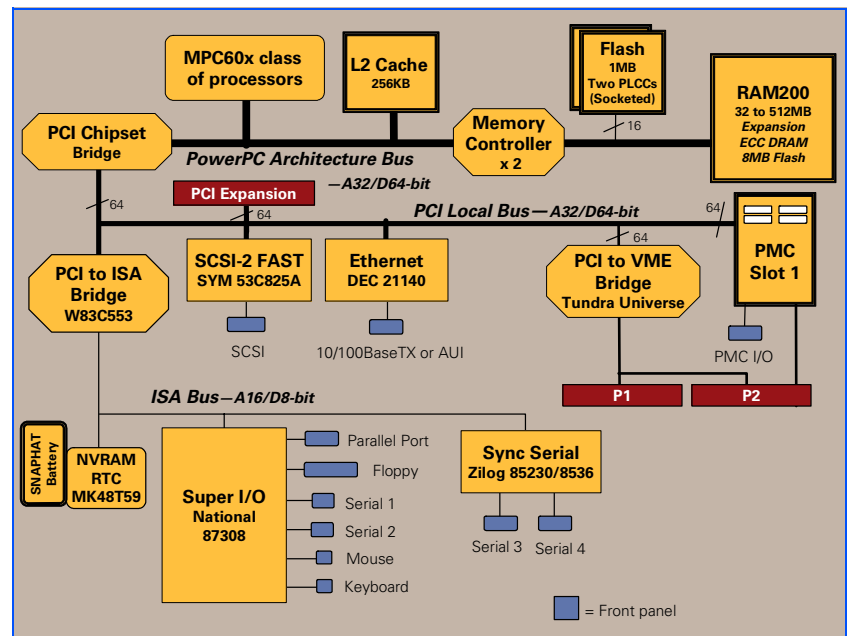


- MPC60x class of microprocessors
- 16KB/16KB or 32KB/32KB L1 cache
- 256KB L2 cache
- Up to 512MB ECC DRAM on-board memory
- 8MB on-board Flash, 1MB socketed
- 64-bit PCI mezzanine connector
- On-board debug monitor with self-test diagnostics
- IEEE P1386.1 compatible 32/64-bit PMC expansion slot
- Two or three async, one or two sync/async serial ports
- Ethernet transceiver interface with 32-bit PCI local bus DMA
- 8- or 16-bit Fast SCSI-2 bus interface
- Parallel, floppy, keyboard, and mouse interfaces
- 8KB x 8 NVRAM and time-of-day clock with replaceable battery backup
- Four 32-bit timers, one watchdog timer

#### PMC expansion combined with a high-performance VME processor

The MVME2600 series is a family of VME processor modules based on the Motorola PowerPlus VME architecture with PowerPC architecture-compatible microprocessors. The flexibility of the MVME2600 provides an excellent base platform that can be quickly and easily customized for a variety of industry-specific applications.

Designed to meet the needs of military and aerospace, industrial automation, and medical imaging market segments, the MVME2600 applies to a variety of applications. DRAM expansion mezzanines enable memory upgrades to the maximum 512MB of ECC DRAM without requiring additional VME slots.



**PCI Expansion**

MVME2600 modules have a 64-bit PCI connection to support PCI expansion carriers such as Motorola PMCs. Design details for the connector and electrical specifications are available from your local Motorola sales representative.

**Memory Modules**

The MVME2600 series has a modular memory design. Mezzanine arrays support up to 512MB.

**Transition Modules**

Two artwork variants of the MVME2600 are available. One series provides backward compatibility with the MVME712M transition module I/O, while the other series accepts the MVME761 transition module featuring an additional sync/async serial port, a 10/100BaseTX Ethernet interface, Fast 16-bit SCSI, and an IEEE 1284 compatible parallel port.

**MVME761**

The MVME761 transition module provides industry-standard connector access to the IEEE 1284 parallel port, a 10BaseT or 100BaseTX Ethernet 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 face plate of the MVME761, are individually user configurable as EIA-232, EIA-530, V.35, or X.21 DCE/DTE via the installation of Motorola serial interface modules (SIMs).

A P2 adapter provides interface module signals to the MVME761 transition module. The 3-row P2 adapter can be used for 8-bit SCSI. A 5-row P2 adapter supports 16-bit SCSI and PMC I/O.

**MVME712M**

The MVME712M transition module provides industry-standard connector access to the Centronics parallel port, an AUI 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 provides interface signals to the MVME712M transition module. The 3-row P2 adapter can be used 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 and extends its capability by providing access to the PMC I/O pins.

Several other variations of the MVME712M are available for combinations of I/O and connectors.

**Firmware Monitor**

Firmware must fulfill the traditional functions of test and initialization, in addition to operating system boot support. The MVME2600 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 MVME2600 firmware, plus it supports booting both operating systems and kernels.

**Operating Systems and Real-Time Kernels**

|                                       |              |
|---------------------------------------|--------------|
| <b>Motorola Computer Group:</b>       | AIX          |
| <b>Integrated Systems, Inc.:</b>      | pSOSystem    |
| <b>Lynx Real-Time Systems, Inc.:</b>  | LynxOS       |
| <b>Microware Systems Corporation:</b> | OS-9/OS-9000 |
| <b>Microtec:</b>                      | VRTX32       |
| <b>Wind River Systems, Inc.:</b>      | VxWorks      |

## SPECIFICATIONS

### Processor

|                             |                        |                        |                        |
|-----------------------------|------------------------|------------------------|------------------------|
| <b>Microprocessor:</b>      | MPC603                 | MPC604                 | MPC604                 |
| <b>Clock Frequency:</b>     | 200 MHz                | 333 MHz                | 400 MHz                |
| <b>On-chip Cache (I/D):</b> | 16K/16K                | 16K/16K                | 16K/16K                |
| <b>Memory Type:</b>         | 60 ns FPM or 50 ns EDO | 60 ns FPM or 50 ns EDO | 60 ns FPM or 50 ns EDO |

### Memory

|                                    |                                                         |
|------------------------------------|---------------------------------------------------------|
| <b>MAIN MEMORY:</b>                | Dynamic RAM                                             |
| <b>Capacity (60ns FPM):</b>        | 32MB on RAM200                                          |
| <b>Capacity (50ns EDO):</b>        | 128, 256, or 512MB on RAM200                            |
| <b>Single Cycle Accesses:</b>      | 9 read/4 write                                          |
| <b>Read Burst Mode (60ns FPM):</b> | 9-1-2-1 idle; 3-1-2-1 aligned page hit                  |
| <b>Read Burst Mode (50ns EDO):</b> | 8-1-1-1 idle; 2-1-1-1 aligned page hit                  |
| <b>Write Burst Mode:</b>           | 4-1-1-1 idle; 3-1-1-1 aligned page hit                  |
| <b>Architecture:</b>               | 128-bit, two-way interleaved                            |
| <b>Parity/ECC:</b>                 | No/Yes                                                  |
| <b>L2 CACHE:</b>                   | 256KB                                                   |
| <b>Cache Bus Clock Frequency:</b>  | Processor clock divided by 2                            |
| <b>FLASH:</b>                      | On-board programmable                                   |
| <b>Capacity:</b>                   | 1MB via two 32-pin PLCC/CLCC sockets; 8MB surface mount |
| <b>Read Access (8MB port):</b>     | 68 clocks (32 byte burst)                               |
| <b>Read Access (1MB port):</b>     | 260 clocks (8 byte burst)                               |
| <b>Write Access (1MB/8MB):</b>     | 19 clocks (2 bytes/8 bytes)                             |
| <b>NVRAM:</b>                      | 8KB (4KB available for users)                           |
| <b>Cell Storage Life:</b>          | 50 years at 55° C                                       |
| <b>Cell Capacity Life:</b>         | 10 years at 100% duty cycle                             |
| <b>Removable Battery:</b>          | Yes                                                     |

### PCI Expansion Connector

|                       |                                                                           |
|-----------------------|---------------------------------------------------------------------------|
| <b>Address/Data:</b>  | A32/D32/D64                                                               |
| <b>PCI Bus Clock:</b> | 33 MHz                                                                    |
| <b>Signaling:</b>     | 5 V                                                                       |
| <b>Connector:</b>     | 114-pin connector located on the planar of the MVME2600 between P1 and P2 |

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

|                                     |                                |
|-------------------------------------|--------------------------------|
| <b>Controller:</b>                  | Tundra Universe                |
| <b>DTB Master:</b>                  | A16–A32; D08–D64, BLT          |
| <b>DTB Slave:</b>                   | A24–A32; D08–D64, BLT, UAT     |
| <b>Arbiter:</b>                     | RR/PRI                         |
| <b>Interrupt Handler/Generator:</b> | IRQ 1–7/Any one of seven IRQs  |
| <b>System Controller:</b>           | Yes, jumperable or auto detect |
| <b>Location Monitor:</b>            | Two, LMA32                     |

### Ethernet Interface

|                           | MVME761                        | MVME712M                            |
|---------------------------|--------------------------------|-------------------------------------|
| <b>Controller:</b>        | DEC 21140                      | DEC 21140                           |
| <b>Interface Speed:</b>   | 10/100Mb/s                     | AUI (10Mb/s)                        |
| <b>PCI Local bus DMA:</b> | Yes, with PCI burst            | Yes, with PCI burst                 |
| <b>Connector:</b>         | Routed to P2, RJ-45 on MVME761 | Routed to P2, DB-15 AUI on MVME712M |

### SCSI Interface

|                           | MVME761                                       | MVME712M                                      |
|---------------------------|-----------------------------------------------|-----------------------------------------------|
| <b>Controller:</b>        | Symbios 53C825A                               | Symbios 53C825A                               |
| <b>PCI Local Bus DMA:</b> | Yes, with PCI local bus burst                 | Yes, with PCI local bus burst                 |
| <b>Asynchronous:</b>      | 5.0MB/s                                       | 5.0MB/s                                       |
| <b>Synchronous:</b>       | 10.0MB/s (8-bit mode), 20.0MB/s (16-bit mode) | 10.0MB/s (8-bit mode), 20.0MB/s (16-bit mode) |
| <b>Connector:</b>         | Routed to P2, 50- or 68-pin on MVME761EXT     | Routed to P2, SCSI D-50 on MVME712M           |

### Asynchronous Serial Ports

|                                   | MVME761                       | MVME712M                                 |
|-----------------------------------|-------------------------------|------------------------------------------|
| <b>Controller:</b>                | PC87308                       | PC87308, 85230/8536                      |
| <b>Number of Ports:</b>           | Two, 16550 compatible         | Two, 16550 compatible and one 85230/8536 |
| <b>Configuration:</b>             | EIA-574 DTE                   | EIA-232 DCE/DTE                          |
| <b>Async Baud Rate, bps max.:</b> | 38.4K EIA-232, 115Kb/s raw    | 38.4K EIA-232, 115Kb/s raw               |
| <b>Connector:</b>                 | Routed to P2, DB-9 on MVME761 | Routed to P2, DB-25 on MVME712M          |

## Synchronous Serial Ports

|                                              | MVME761                                   | MVME712M                           |
|----------------------------------------------|-------------------------------------------|------------------------------------|
| <b>Controller:</b>                           | 85230/8536                                | 85230/8536                         |
| <b>Number of Ports:</b>                      | Two                                       | One                                |
| <b>Configuration:</b>                        | TTL to P2 (both ports),<br>SIM on MVME761 | EIA-232 DCE/DTE                    |
| <b>Baud Rate, bps max.:</b>                  | 2.5MB sync, 38.4KB<br>async               | 2.5MB sync, 38.4KB<br>async        |
| <b>Oscillator<br/>Clock Rate<br/>(PCLK):</b> | 10 MHz/5 MHz                              | 10 MHz/5 MHz                       |
| <b>Connector:</b>                            | Routed to P2, HD-26 on<br>MVME761         | Routed to P2, DB-25 on<br>MVME712M |

## Parallel Port

|                       | MVME761                                                                  | MVME712M                                               |
|-----------------------|--------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Controller:</b>    | PC87308                                                                  | PC87308                                                |
| <b>Configuration:</b> | 8-bit bidirectional, full<br>IEEE 1284 support;<br>Centronics compatible | 8-bit bidirectional, IEEE<br>1284 minus EPP and<br>ECP |
| <b>Modes:</b>         | Master only                                                              | Master only                                            |
| <b>Connector:</b>     | Routed to P2, HD-36 on<br>MVME761                                        | Routed to P2, D-36 on<br>MVME712M                      |

## Counters/Timers

|                                       |                           |
|---------------------------------------|---------------------------|
| <b>TOD Clock Device:</b>              | M48T18; 8KB NVRAM         |
| <b>Real-Time<br/>Timers/Counters:</b> | Four, 32-bit programmable |
| <b>Watchdog Timer:</b>                | Time-out generates reset  |

## Floppy

|                                |                                     |
|--------------------------------|-------------------------------------|
| <b>Controller:</b>             | PC87308                             |
| <b>Compatible Controllers:</b> | DP8473, 765A, N82077                |
| <b>Configuration:</b>          | 3.5" 2.88MB and 1.44MB; 5.25" 1.2MB |
| <b>Connector:</b>              | HD-50 on front panel                |

## Mouse Interface

|                    |                                                  |
|--------------------|--------------------------------------------------|
| <b>Controller:</b> | PC87308                                          |
| <b>Connector:</b>  | 6-pin circular female mini DIN on front<br>panel |

## Keyboard Interface

|                    |                                                  |
|--------------------|--------------------------------------------------|
| <b>Controller:</b> | PC87308                                          |
| <b>Connector:</b>  | 6-pin circular female mini DIN on front<br>panel |

## IEEE P1386.1 PCI Mezzanine Card Slot

|                       |                                                                                                                                              |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Address/Data:</b>  | A32/D32/D64, PMC PN1, PN2, PN3, PN4<br>connectors                                                                                            |
| <b>PCI Bus Clock:</b> | 33 MHz                                                                                                                                       |
| <b>Signaling:</b>     | 5 V                                                                                                                                          |
| <b>Power:</b>         | +3.3 V, +5 V, $\pm 12$ V; 7.5 watts maximum<br>per PMC slot                                                                                  |
| <b>Module Types:</b>  | Basic, single-wide, front panel I/O or P2<br>I/O (Note: P2 I/O is only accessible to<br>systems equipped for VME64 extension<br>connectors.) |

## Board Size

|                                   |                     |
|-----------------------------------|---------------------|
| <b>Height:</b>                    | 233.4 mm (9.2 in.)  |
| <b>Depth:</b>                     | 160.0 mm (6.3 in.)  |
| <b>Front Panel Height:</b>        | 261.8 mm (10.3 in.) |
| <b>Width:</b>                     | 19.8 mm (0.8 in.)   |
| <b>Max. Component<br/>Height:</b> | 14.8 mm (0.58 in.)  |

## Miscellaneous

Reset and abort switches on front panel; six LEDs for FAIL, CHKSTP, CPU, PCI, SCON and FUSE

## Transition Module

## I/O Connectors

|                                   | MVME761                                                                                                                                                                | MVME712M                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Asynchronous Serial Ports:</b> | Two, DB-9 labeled as COM1 and COM2                                                                                                                                     | Three, DB-25 labeled as Serial 1, Serial 2 and Serial 3 |
| <b>Synchronous Serial Ports:</b>  | Two, HD-26 labeled as Serial 3 and Serial 4 (user<br>configurable via installation of SIMs;<br>two 60-pin connectors on MVME761 planar for<br>installation of two SIMs | One, DB-25 labeled as Serial 4                          |
| <b>Parallel Port:</b>             | HD-36, Centronics compatible                                                                                                                                           | D-36, Centronics compatible                             |
| <b>Ethernet:</b>                  | 10BaseT or 100BaseTX RJ-45                                                                                                                                             | 10Mb/s Ethernet;<br>DB-15 AUI                           |
| <b>SCSI:</b>                      | 8- or 16-bit, 50- or 68-pin connector via P2 adapter                                                                                                                   | 8-bit, standard SCSI D-50                               |

## Board Size

|                            |                     |
|----------------------------|---------------------|
| <b>Height:</b>             | 233.4 mm (9.2 in.)  |
| <b>Depth:</b>              | 80.0 mm (3.1 in.)   |
| <b>Front Panel Height:</b> | 261.8 mm (10.3 in.) |
| <b>Width:</b>              | 19.8 mm (0.8 in.)   |

## All Modules

## Power Requirements

(not including power required by PMC or external AUI transceiver)

|                        | +5 V ±5%                  | +12 V ±10%                 | –12 V ±10%                 |
|------------------------|---------------------------|----------------------------|----------------------------|
| <b>MVME2603-1161C:</b> | 6.75 A typ.<br>8.5 A max. | 250 mA typ.<br>500 mA max. | 100 mA typ.<br>250 mA max. |
| <b>MVME2604-1361:</b>  | 8.0 A typ.<br>10.0 A max. | 250 mA typ.<br>500 mA max. | 100 mA typ.<br>250 mA max. |
| <b>MVME2604-4361:</b>  | 7.5 A typ.<br>9.5 A max.  | 250 mA typ.<br>500 mA max. | 100 mA typ.<br>250 mA max. |

–12 V power is not used on the MVME2600 but is supplied for use by other devices (such as PMC); requirements vary by device

## Demonstrated MTBF

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

|                        |               |
|------------------------|---------------|
| <b>Mean:</b>           | 190,509 hours |
| <b>95% Confidence:</b> | 107,681 hours |

## Environmental

|                       | Operating                             | Nonoperating                   |
|-----------------------|---------------------------------------|--------------------------------|
| <b>Temperature:</b>   | 0° C to +55° C,<br>forced air cooling | –40° C to +85° C               |
| <b>Humidity (NC):</b> | 10% to 80%                            | 10% to 90%                     |
| <b>Vibration:</b>     | 2 Gs RMS,<br>20–2000 Hz random        | 6 Gs RMS,<br>20–2000 Hz random |

## Safety

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

## 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

## ORDERING INFORMATION

| Part Number                       | Description                                                                                                                                                                                                                                              |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MVME2600 with MVME761 I/O</b>  |                                                                                                                                                                                                                                                          |
| (All modules include 9MB Flash.)  |                                                                                                                                                                                                                                                          |
| <b>MVME2603-1161C</b>             | 200 MHz MPC603, 256MB ECC DRAM, MCG1101 front panel with injector/ejector handles                                                                                                                                                                        |
| <b>MVME2603-3161</b>              | 200 MHz MPC603, 256MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                              |
| <b>MVME2604-1361</b>              | 333 MHz MPC604e, 256MB ECC DRAM, MCG1101 front panel with injector/ejector handles                                                                                                                                                                       |
| <b>MVME2604-3361</b>              | 333 MHz MPC604e, 256MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                             |
| <b>MVME2604-1471</b>              | 400 MHz MPC604e, 512MB ECC DRAM, MCG1101 front panel with injector/ejector handles                                                                                                                                                                       |
| <b>MVME2604-3471</b>              | 400 MHz MPC604e, 512MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                             |
| <b>MVME2600 with MVME712 I/O</b>  |                                                                                                                                                                                                                                                          |
| (All modules include 9MB Flash.)  |                                                                                                                                                                                                                                                          |
| <b>MVME2603-4151</b>              | 200 MHz MPC603, 128MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                              |
| <b>MVME2603-5131</b>              | 200 MHz MPC603, 32MB ECC DRAM, MCG1101 front panel with injector/ejector handles                                                                                                                                                                         |
| <b>MVME2604-4361</b>              | 333 MHz MPC604e, 256MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                             |
| <b>MVME2604-4471</b>              | 400 MHz MPC604, 512MB ECC DRAM, original VME Scanbe front panel and handles                                                                                                                                                                              |
| <b>MVME761 Transition Module</b>  |                                                                                                                                                                                                                                                          |
| <b>MVME761-001</b>                | 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                                               |
| <b>MVME761-011</b>                | 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 5-row DIN P2 adapter module and cable; requires backplane with 5-row DIN connectors |
| <b>MVME761P2-011</b>              | 5-row DIN P2 adapter compatible with MVME761; connectors for 16-bit (wide) SCSI and PMC I/O; requires backplane with 5-row DIN connectors                                                                                                                |
| <b>MVME761EXT</b>                 | MVME761 I/O extension module, connectors for Ethernet, SCSI and PMC I/O                                                                                                                                                                                  |
| <b>SIM232DCE or DTE</b>           | EIA-232 DCE or DTE serial interface module                                                                                                                                                                                                               |
| <b>SIM530DCE or DTE</b>           | EIA-530 DCE or DTE serial interface module                                                                                                                                                                                                               |
| <b>SIMV35DCE or DTE</b>           | V.35 DCE or DTE serial interface module                                                                                                                                                                                                                  |
| <b>SIMX21DCE or DTE</b>           | X.21 DCE or DTE serial interface module                                                                                                                                                                                                                  |
| <b>MVME712M Transition Module</b> |                                                                                                                                                                                                                                                          |
| <b>MVME712M</b>                   | One DB-25 sync/async serial port connector, three DB-25 async serial port connectors, one AUI connector for Ethernet, one D-36 parallel port connector and one 50-pin 8-bit SCSI connector; includes 3-row DIN P2 adapter module and cable               |

| Part Number                                                                                                                                                         | Description                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Products</b>                                                                                                                                             |                                                                                                                                                                                                                      |
| <b>PMCSPAN-001</b>                                                                                                                                                  | Primary 32-bit PCI expansion, mates directly to the MVME2600 providing slots for either two single-wide or one double-wide PMC card, accepts optional PMCSPAN-010, MCG1101 front panel with injector/ejector handles |
| <b>PMCSPAN1-001</b>                                                                                                                                                 | PMCSPAN-001 with original VME Scanbe front panel and handles                                                                                                                                                         |
| <b>PMCSPAN-010</b>                                                                                                                                                  | Secondary 32-bit PCI expansion, plugs directly into PMCSPAN-001 providing two additional PMC slots; for MCG1101 handles                                                                                              |
| <b>PMCSPAN1-010</b>                                                                                                                                                 | PMCSPAN-010 with original VME Scanbe front panel and handles                                                                                                                                                         |
| <b>Documentation</b>                                                                                                                                                |                                                                                                                                                                                                                      |
| <b>V2600A/IH</b>                                                                                                                                                    | MVME2600 Installation and Use                                                                                                                                                                                        |
| <b>V2600A/PG</b>                                                                                                                                                    | MVME2600/2700 Programmer's Reference Guide                                                                                                                                                                           |
| <b>VME761A/IH</b>                                                                                                                                                   | MVME761 Transition Module Installation and Use                                                                                                                                                                       |
| <b>VME712A/IH</b>                                                                                                                                                   | MVME712 Transition Module Installation and Use                                                                                                                                                                       |
| <b>PPCBUGA1/UM and PPCBUGA2/UM</b>                                                                                                                                  | PPCBug Firmware Package User's Manual                                                                                                                                                                                |
| <b>PPCDIAA/UM</b>                                                                                                                                                   | PPCBug Diagnostics Manual                                                                                                                                                                                            |
| Documentation is available for online viewing and ordering at <a href="http://www.motorola.com/computer/literature">http://www.motorola.com/computer/literature</a> |                                                                                                                                                                                                                      |

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