

While the exact amount of airflow required for cooling depends on the ambient air temperature and the type, number, and location of boards and other heat sources, adequate cooling can usually be achieved with 10 CFM and 490 LFM flowing over the module. Less airflow is required to cool the module in environments having lower maximum ambients. Under more favorable thermal conditions, it may be possible to operate the module reliably at higher than 55° C with increased airflow. It is important to note that there are several factors, in addition to the rated CFM of the air mover, which determine the actual volume and speed of air flowing over a module.

EMC Regulatory Compliance

The MVME2300SC was tested in an EMC-compliant chassis and meets the requirements for Class B equipment. Compliance was achieved under the following conditions:

- ❑ Shielded cables on all external I/O ports.
- ❑ Cable shields connected to chassis ground via metal shell connectors bonded to a conductive module front panel.
- ❑ Conductive chassis rails connected to chassis ground. This provides the path for connecting shields to chassis ground.
- ❑ Front panel screws properly tightened.
- ❑ All peripherals EMC-compliant.

For minimum RF emissions, it is essential that the conditions above be implemented. Failure to do so could compromise the FCC compliance of the equipment containing the module.

The MVME2300SC is a board-level product and meant to be used in standard VME applications. As such, it is the responsibility of the OEM to meet the regulatory guidelines as determined by its application.

Solving Startup Problems

In the event of difficulty with your MVME2300SC VME processor module, try the simple troubleshooting steps on the following pages before calling for help or sending the board back for repair. Some of the procedures will return the board to the factory debugger environment. (The board was tested under these conditions before it left the factory.) The self-tests may not run in all user-customized environments.

Table B-1. Troubleshooting MVME2300SC Modules

Condition	Possible Problem	Try This:
I. Nothing works, no display on the terminal.	A. If the CPU LED is not lit, the board may not be getting correct power.	<ol style="list-style-type: none">1. Make sure the system is plugged in.2. Check that the board is securely installed in its backplane or chassis.3. Check that all necessary cables are connected to the board, per this manual.4. Check for compliance with Installation Considerations, per this manual.5. Review the Installation and Startup procedures, per this manual. They include a step-by-step powerup routine. Try it.
	B. If the LEDs are lit, the board may be in the wrong slot.	<ol style="list-style-type: none">1. The VME processor module should be in the first (leftmost) slot.2. Also check that the “system controller” function on the board is enabled, per this manual.
	C. The “system console” terminal may be cabled or configured incorrectly.	Configure and cable the system console terminal as described in this manual.

Table B-1. Troubleshooting MVME2300SC Modules (Continued)


Condition	Possible Problem	Try This:
II. There is a display on the terminal, but input from the keyboard (and/or mouse, if present) has no effect.	A. The keyboard or mouse may be connected incorrectly.	Recheck the keyboard and/or mouse connections and power.
	B. Board jumpers may be configured incorrectly.	Check the board jumpers per this manual.
	C. You may have invoked flow control by pressing a HOLD or PAUSE key, or by typing: <CTRL>-S	Press the HOLD or PAUSE key again. If this does not free up the keyboard, type in: <CTRL>-Q
III. Debug prompt PPC1-Bug> does not appear at powerup, and the board does not autoboot.	A. Debugger Flash may be missing	<ol style="list-style-type: none"> 1. Disconnect <i>all</i> power from your system. 2. Check that the proper debugger devices are installed. 3. Reconnect power. 4. Restart the system by “double-button reset”: press the RST and ABT switches at the same time; release RST first, wait seven seconds, then release ABT. 5. If the debug prompt appears, go to step IV or step V, as indicated. If the debug prompt does not appear, go to step VI.
	B. The board may need to be reset.	
IV. Debug prompt PPC1-Bug> appears at powerup, but the board does not autoboot.	A. The initial debugger environment parameters may be set incorrectly.	<ol style="list-style-type: none"> 1. Start the onboard calendar clock and timer. Type: set mmdyyhmm <CR> where the characters indicate the month, day, year, hour, and minute. The date and time will be displayed. <div style="text-align: center; margin: 10px 0;">  <p>Caution</p> </div> <p>Performing the next step (env;d) will change some parameters that may affect your system’s operation.</p> <p style="text-align: right;">(continues>)</p>
	B. There may be some fault in the board hardware.	

Table B-1. Troubleshooting MVME2300SC Modules (Continued)

Condition	Possible Problem	Try This:
IV. <i>Continued</i>		<p>2. At the command line prompt, type in: env;d <CR> This sets up the default parameters for the debugger environment.</p> <p>3. When prompted to Update Non-Volatile RAM, type in: y <CR></p> <p>4. When prompted to Reset Local System, type in: y <CR></p> <p>5. After clock speed is displayed, immediately (within five seconds) press the Return key: <CR> or BREAK to exit to the System Menu. Then enter a 3 for “Go to System Debugger” and Return: 3 <CR> Now the prompt should be: PPC1-Diag></p> <p>6. You may need to use the cnfg command (see your board Debugger Manual) to change clock speed and/or Ethernet Address, and then later return to: env <CR> and step 3.</p> <p>7. Run the selftests by typing in: st <CR> The tests take as much as 10 minutes, depending on RAM size. They are complete when the prompt returns. (The onboard selftest is a valuable tool in isolating defects.)</p> <p>8. The system may indicate that it has passed all the selftests. Or, it may indicate a test that failed. If neither happens, enter: de <CR> Any errors should now be displayed. If there are any errors, go to step VI. If there are no errors, go to step V.</p>
V. The debugger is in system mode and the board autoboots, or the board has passed selftests.	A. No apparent problems — troubleshooting is done.	No further troubleshooting steps are required.

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Table B-1. Troubleshooting MVME2300SC Modules (Continued)

Condition	Possible Problem	Try This:
VI. The board has failed one or more of the tests listed above, and cannot be corrected using the steps given.	A. There may be some fault in the board hardware or the on-board debugging and diagnostic firmware.	1. Document the problem and return the board for service. 2. Phone 1-800-222-5640.
TROUBLESHOOTING PROCEDURE COMPLETE.		

Related Documentation

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Motorola Computer Group Documents

The Motorola publications listed below are referenced in this manual. You can obtain paper or electronic copies of Motorola Computer Group publications by:

- ❑ Contacting your local Motorola sales office
- ❑ Visiting MCG's World Wide Web literature site,

Document Title	Publication Number
MVME2300SC VME Processor Module Installation and Use	V2300SCA/IH
MVME2300-Series VME Processor Module Installation and Use	V2300A/IH
MVME2300-Series VME Processor Module Programmer's Reference Guide	V2300A/PG
PPCbug Firmware Package User's Manual (Parts 1 and 2)	PPCBUGA1/UM PPCBUGA2/UM
PPCbug Diagnostics Manual	PPCDIAA/UM
PMCspan PMC Adapter Carrier Module Installation and Use	PMCSANA/IH

To locate and view the most up-to-date product information in PDF or HTML format, visit .

Manufacturers' Documents

For additional information, refer to the following table for manufacturers' data sheets and user's manuals. For your convenience, a source for the listed document is also provided.

It is important to note that in many cases, the information shown is preliminary and the revision levels of the documents are subject to change without notice.

Document Title and Source	Publication Number
PowerPC 604™ RISC Microprocessor Technical Summary Literature Distribution Center for Motorola Telephone: 1-800- 441-2447 FAX: (602) 994-6430 or (303) 675-2150 "" ""	MPC604E/D
PowerPC 604™ RISC Microprocessor User's Manual Literature Distribution Center for Motorola Telephone: 1-800- 441-2447 FAX: (602) 994-6430 or (303) 675-2150 "" "" OR IBM Microelectronics PowerPC604e User Manual "" ""	MPC604EUM/AD G522-0330-00
PowerPC™ Microprocessor Family: The Programming Environment for 32-Bit Microprocessors Literature Distribution Center for Motorola Telephone: 1-800- 441-2447 FAX: (602) 994-6430 or (303) 675-2150 "" ""	MPCFPE/AD

Document Title and Source	Publication Number
OR IBM Microelectronics Programming Environment Manual Web Site: ...	G522-0290-01
PC16550 UART National Semiconductor Corporation Customer Support Center (or nearest Sales Office) 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, California 95052-8090 Telephone: 408-721-5000 Telephone: 1-800-272-9959 ...	PC16550DV
21140 Fast Etherworks PCI 10-Flash-100 Ethernet Adapter Compaq Computer Corporation Telephone: 1-800.at.compaq	EK-DE500-OM

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Document Title and Source	Publication Number
<p>W83C553 Enhanced System I/O Controller with PCI Arbiter (PIB) Winbond Electronics Corporation Winbond Systems Laboratory 2727 North First Street San Jose, CA 95134 Telephone: (408) 943-6666 FAX:(408) 544-1798 ...</p>	<p>W83C553F</p>
<p>M48T559 CMOS 8K x 8 TIMEKEEPER™ SRAM Data Sheet STMicroelectronics 1000 East Bell Road Phoenix, Arizona 85022 Telephone: (602) 485-6100 Fax: 602 485-6102 ...</p>	<p>M48T559</p>
<p>Universe User Manual Tundra Semiconductor Corporation 603 March Road Kanata, ON K2K 2M5, Canada Telephone: 1-800-267-7231 ...</p> <p>OR</p> <p>101-1265 Montecito Ave. Mountain View, California 94043, USA Telephone: (650) 960-0282 FAX: (650) 960-0321</p>	<p>Universe Part Number 9000000.MD303.01</p>

Related Specifications

For additional information, refer to the following table for related specifications. For your convenience, a source for the listed document is also provided. It is important to note that in many cases, the information is preliminary and the revision levels of the documents are subject to change without notice.

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Document Title and Source	Publication Number
Versatile Backplane Bus: VMEbus Institute of Electrical and Electronics Engineers, Inc. Web Site: http://standards.ieee.org/catalog/ OR Microprocessor System Bus for 1 to 4 Byte Data Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembe Geneva, Switzerland	ANSI/IEEE Standard 1014-1987 IEC 821 BUS
IEEE - Common Mezzanine Card Specification (CMC) Institute of Electrical and Electronics Engineers, Inc. Web Site: http://standards.ieee.org/catalog/	P1386 Draft 2.0
IEEE - PCI Mezzanine Card Specification (PMC) Institute of Electrical and Electronics Engineers, Inc. Web Site: http://standards.ieee.org/catalog/	P1386.1 Draft 2.0
Bidirectional Parallel Port Interface Specification Institute of Electrical and Electronics Engineers, Inc. Web Site: http://standards.ieee.org/catalog/	IEEE Standard 1284

C

Document Title and Source	Publication Number
Peripheral Component Interconnect (PCI) Local Bus Specification, Revision 2.0 PCI Special Interest Group ...	PCI Local Bus Specification
PowerPC Reference Platform (PRP) Specification, Third Edition, Version 1.0, Volumes I and II International Business Machines Corporation	MPR-PPC-RPU-02
PowerPC Microprocessor Common Hardware Reference Platform: A System Architecture (CHRP), Version 1.0 Literature Distribution Center for Motorola Telephone: 1-800- 441-2447 FAX: (602) 994-6430 or (303) 675-2150 OR Morgan Kaufmann Publishers, Inc. Telephone: (415) 392-2665 Telephone: 1-800-745-7323	
Interface Between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange Electronic Industries Alliance (for publications)	TIA/EIA-232 Standard

Glossary

10Base-5	An Ethernet implementation in which the physical medium is a doubly shielded, 50-ohm coaxial cable capable of carrying data at 10 Mbps for a length of 500 meters (also referred to as thicknet). Also known as thick Ethernet.
10Base-2	An Ethernet implementation in which the physical medium is a single-shielded, 50-ohm RG58A/U coaxial cable capable of carrying data at 10 Mbps for a length of 185 meters (also referred to as AUI or thinnet). Also known as thin Ethernet.
10Base-T	An Ethernet implementation in which the physical medium is an unshielded twisted pair (UTP) of wires capable of carrying data at 10 Mbps for a maximum distance of 185 meters. Also known as twisted-pair Ethernet.
100Base-TX	An Ethernet implementation in which the physical medium is an unshielded twisted pair (UTP) of wires capable of carrying data at 100 Mbps for a maximum distance of 100 meters. Also known as fast Ethernet.
AIX	Advanced Interactive eXecutive (IBM version of UNIX).
architecture	The main overall design in which each individual hardware component of the computer system is interrelated. The most common uses of this term are 8-bit, 16-bit, or 32-bit architectural design systems.
ASCII	American Standard Code for Information Interchange; a 7-bit code used to encode alphanumeric information. In the IBM-compatible world, this is expanded to eight bits to encode a total of 256 alphanumeric and control characters.
ASIC	Application-Specific Integrated Circuit.
AUI	Attachment Unit Interface.
BBRAM	Battery Backed-up Random Access Memory.
bi-endian	Having big-endian and little-endian byte ordering capability.

big-endian	A byte-ordering method in memory where the address n of a word corresponds to the most significant byte. In an addressed memory word, the bytes are ordered (left to right) 0, 1, 2, 3, with 0 being the most significant byte.
BLT	BLock Transfer.
bus	The pathway used to communicate between the CPU, memory, and various input/output devices, including floppy and hard disk drives. Available in various widths (8-, 16-, and 32-bit), with accompanying increases in speed.
cache	A high-speed memory that resides logically between a central processing unit (CPU) and the main memory. This temporary memory holds the data and/or instructions that the CPU is most likely to use over and over again and avoids accessing the slower hard or floppy disk drive.
CAS	Column Address Strobe. The clock signal used in dynamic RAMs to control the input of column addresses.
CISC	Complex-Instruction-Set Computer. A computer whose processor is designed to sequentially run variable-length instructions, many of which require several clock cycles, that perform complex tasks and thereby simplify programming.
CPU	Central Processing Unit. The master computer unit in a system.
DCE	Data Circuit-terminating Equipment.
DIMM	Dual Inline Memory Module.
DMA	Direct Memory Access. A method by which a device may read or write to memory directly without processor intervention. DMA is typically used by block I/O devices.
DRAM	Dynamic Random Access Memory. A memory technology that is characterized by extreme high density, low power, and low cost. It must be more or less continuously refreshed to avoid loss of data.
DTE	Data Terminal Equipment.
ECC	Error Correction Code
EEPROM	Electrically Erasable Programmable Read-Only Memory. A memory storage device that can be written repeatedly with no special erasure fixture. EEPROMs do not lose their contents when they are powered down.

EIDE	Enhanced Integrated Drive Electronics. An improved version of IDE , with faster data rates, 32-bit transactions, and DMA. Also known as Fast ATA-2 .
EISA (bus)	Extended Industry Standard Architecture (bus) (IBM). An architectural system using a 32-bit bus that allows data to be transferred between peripherals in 32-bit chunks instead of 16-bit or 8-bit that most systems use. With the transfer of larger bits of information, the machine is able to perform much faster than the standard ISA bus system.
EPROM	Erasable Programmable Read-Only Memory. A memory storage device that can be written once (per erasure cycle) and read many times.
ESD	Electro-Static Discharge/Damage
Ethernet	A local area network standard that uses radio frequency signals carried by coaxial cables.
Falcon	The DRAM controller chip developed by Motorola for the MVME2600 and MVME3600 series of boards. It is intended to be used in sets of two to provide the necessary interface between the Power PC60x bus and the 144-bit ECC DRAM (system memory array) and/or ROM/Flash.
fast Ethernet	See 100Base-TX.
FDDI	Fiber Distributed Data Interface. A network based on the use of optical-fiber cable to transmit data in non-return-to-zero, invert-on-1s (NRZI) format at speeds up to 100 Mbps.
firmware	The program or specific software instructions that have been more or less permanently burned into an electronic component, such as a ROM (read-only memory) or an EPROM (erasable programmable read-only memory).
hardware	A computing system is normally spoken of as having two major components: hardware and software. Hardware is the term used to describe any of the physical embodiments of a computer system, with emphasis on the electronic circuits (the computer) and electromechanical devices (peripherals) that make up the system.
IDE	Integrated Drive Electronics. A disk drive interface standard. Also known as ATA (Advanced Technology Attachment) .
IEEE	Institute of Electrical and Electronics Engineers

ISA (bus)	Industry Standard Architecture (bus). The de facto standard system bus for IBM-compatible computers until the introduction of VESA and PCI. Used in the reference platform specification. (IBM)
ISASIO	ISA Super Input/Output device
ISDN	Integrated Services Digital Network. A standard for digitally transmitting video, audio, and electronic data over public phone networks.
LAN	Local Area Network
LED	Light-Emitting Diode
little-endian	A byte-ordering method in memory where the address n of a word corresponds to the least significant byte. In an addressed memory word, the bytes are ordered (left to right) 3, 2, 1, 0, with 3 being the most significant byte.
MPC604	Motorola's component designation for the PowerPC 604 microprocessor.
MPIC	Multi-Processor Interrupt Controller
MPU	MicroProcessing Unit
nonvolatile memory	A memory in which the data content is maintained whether the power supply is connected or not.
NVRAM	Non-Volatile Random Access Memory
OEM	Original Equipment Manufacturer
OS	Operating System. The software that manages the computer resources, accesses files, and dispatches programs.
parallel port	A connector that can exchange data with an I/O device eight bits at a time. This port is more commonly used for the connection of a printer to a system.
PCI (local bus)	Peripheral Component Interconnect (local bus) (Intel). A high-performance, 32-bit internal interconnect bus used for data transfer to peripheral controller components, such as those for audio, video, and graphics.
PCMCIA (bus)	Personal Computer Memory Card International Association (bus). A standard external interconnect bus which allows peripherals adhering to the standard to be plugged in and used without further system modification.

PHB	PCI Host Bridge
physical address	A binary address that refers to the actual location of information stored in secondary storage.
PIB	PCI-to-ISA Bridge
PMC	PCI Mezzanine Card
POWER	Performance Optimized With Enhanced RISC architecture (IBM)
PowerPC™	The trademark used to describe the Performance Optimized With Enhanced RISC microprocessor architecture for Personal Computers developed by the IBM Corporation. PowerPC is superscalar, which means it can handle more than one instruction per clock cycle. Instructions can be sent simultaneously to three types of independent execution units (branch units, fixed-point units, and floating-point units), where they can execute concurrently, but finish out of order. PowerPC is used by Motorola, Inc. under license from IBM.
RAM	Random-Access Memory. The temporary memory that a computer uses to hold the instructions and data currently being worked with. All data in RAM is lost when the computer is turned off.
RAS	Row Address Strobe. A clock signal used in dynamic RAMs to control the input of the row addresses.
Raven	The PowerPC-to-PCI local bus bridge chip developed by Motorola for the MVME2600 and MVME3600 series of boards. It provides the necessary interface between the PowerPC 60x bus and the PCI bus, and acts as interrupt controller.
Reduced-Instruction-Set Computer (RISC)	A computer in which the processor's instruction set is limited to constant-length instructions that can usually be executed in a single clock cycle.
RFI	Radio Frequency Interference
ROM	Read-Only Memory
RTC	Real-Time Clock
SBC	Single Board Computer

SCSA	Signal Computing System Architecture. A hardware model for computer telephony servers. A key SCSA element is a TDM (time division multiplexed) telephony bus for voice and video signals, known as the SCbus™ in VME implementations of this architecture.
SCSI	Small Computer Systems Interface. An industry-standard high-speed interface primarily used for secondary storage. SCSI-1 provides up to 5 Mbps data transfer.
SCSI-2 (Fast/Wide)	An improvement over plain SCSI; and includes command queuing. Fast SCSI provides 10 Mbps data transfer on an 8-bit bus. Wide SCSI provides up to 40 Mbps data transfer on a 16- or 32-bit bus.
serial port	A connector that can exchange data with an I/O device one bit at a time. It may operate synchronously or asynchronously, and may include start bits, stop bits, and/or parity.
SIM	Serial Interface Module
SIMM	Single Inline Memory Module. A small circuit board with RAM chips (normally surface mounted) on it designed to fit into a standard slot.
SIO	Super I/O controller
SMT	Surface Mount Technology. A method of mounting devices (such as integrated circuits, resistors, capacitors, and others) on a printed circuit board, characterized by not requiring mounting holes. Rather, the devices are soldered to pads on the printed circuit board. Surface-mount devices are typically smaller than the equivalent through-hole devices.
software	A computing system is normally spoken of as having two major components: hardware and software. Software is the term used to describe any single program or group of programs, languages, operating procedures, and documentation of a computer system. Software is the real interface between the user and the computer.
SRAM	Static Random Access Memory
TDM	Time Division Multiplexing. A multiplexing scheme in which individual I/O ports or channels share slices of time on an aggregate channel. Receivers and transmitters are synchronized. The SCbus™ is a TDM implementation that provides up to 2048 time slots, the equivalent of 1024 voice conversations at 64 Kbps.
thick Ethernet	See 10base-5.

thin Ethernet	See 10base-2.
twisted-pair Ethernet	See 10Base-T.
UART	U niversal A synchronous R eceiver/ T ransmitter
Universe	ASIC developed by Tundra in consultation with Motorola which provides the complete interface between the PCI bus and the VMEbus.
VESA (bus)	V ideo E lectronics S tandards A ssociation (or VL bus). An internal interconnect standard for transferring video information to a computer display system.
virtual address	A binary address issued by a CPU that indirectly refers to the location of information in primary memory, such as main memory. When data is copied from disk to main memory, the physical address is changed to the virtual address.
VL bus	See V ESA L ocal bus (VL bus).
volatile memory	A memory in which the data content is lost when the power supply is disconnected.

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