

VP22 microATX Motherboard

Installation and Use

VP22A/IH1

June 2001 Edition

© Copyright 2001 Motorola Inc.

All rights reserved.

Printed in the United States of America.

Motorola[®] and the Motorola symbol are registered trademarks of Motorola, Inc.

Pentium[®] is a registered trademark and Celeron[™] is a trademark of Intel Corporation.

VxWorks[®] is a registered trademark of Wind River Systems, Inc.

Linux[®] is a registered trademark of Linus Torvalds.

Windows[®] and Windows NT[®] are registered trademarks of Microsoft in the U.S. and other countries.

All other products mentioned in this document are trademarks or registered trademarks of their respective holders.

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

The safety precautions listed below represent warnings of certain dangers of which Motorola is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the Instrument.

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. If the equipment is supplied with a three-conductor AC power cable, the power cable must be plugged into an approved three-contact electrical outlet, with the grounding wire (green/yellow) reliably connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards and local electrical regulatory codes.

Do Not Operate in an Explosive Atmosphere.

Do not operate the equipment in any explosive atmosphere such as in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment could result in an explosion and cause injury or damage.

Keep Away From Live Circuits Inside the Equipment.

Operating personnel must not remove equipment covers. Only Factory Authorized Service Personnel or other qualified service personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment. Service personnel should not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, such personnel should always disconnect power and discharge circuits before touching components.

Use Caution When Exposing or Handling a CRT.

Breakage of a Cathode-Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, do not handle the CRT and avoid rough handling or jarring of the equipment. Handling of a CRT should be done only by qualified service personnel using approved safety mask and gloves.

Do Not Substitute Parts or Modify Equipment.

Do not install substitute parts or perform any unauthorized modification of the equipment. Contact your local Motorola representative for service and repair to ensure that all safety features are maintained.

Observe Warnings in Manual.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions which you deem necessary for the operation of the equipment in your operating environment.



To prevent serious injury or death from dangerous voltages, use extreme caution when handling, testing, and adjusting this equipment and its components.

Flammability

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

EMI Caution



This equipment generates, uses and can radiate electromagnetic energy. It may cause or be susceptible to electromagnetic interference (EMI) if not installed and used with adequate EMI protection.

Lithium Battery Caution

This product contains a lithium battery to power the clock and calendar circuitry.



Danger of explosion if battery is replaced incorrectly. Replace battery only with the same or equivalent type recommended by the equipment manufacturer. Dispose of used batteries according to the manufacturer's instructions.



Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.



Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

CE Notice (European Community)

Motorola Computer Group products with the CE marking comply with the EMC Directive (89/336/EEC). Compliance with this directive implies conformity to the following European Norms:

EN55022 “Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment”; this product tested to Equipment Class B

EN55024 “Information technology equipment—Immunity characteristics—Limits and methods of measurement”

Board products are tested in a representative system to show compliance with the above mentioned requirements. A proper installation in a CE-marked system will maintain the required EMC performance.

In accordance with European Community directives, a “Declaration of Conformity” has been made and is available on request. Please contact your sales representative.

Notice

While reasonable efforts have been made to assure the accuracy of this document, Motorola, Inc. assumes no liability resulting from any omissions in this document, or from the use of the information obtained therein. Motorola reserves the right to revise this document and to make changes from time to time in the content hereof without obligation of Motorola to notify any person of such revision or changes.

Electronic versions of this material may be read online, downloaded for personal use, or referenced in another document as a URL to the Motorola Computer Group website. The text itself may not be published commercially in print or electronic form, edited, translated, or otherwise altered without the permission of Motorola, Inc.

It is possible that this publication may contain reference to or information about Motorola products (machines and programs), programming, or services that are not available in your country. Such references or information must not be construed to mean that Motorola intends to announce such Motorola products, programming, or services in your country.

Limited and Restricted Rights Legend

If the documentation contained herein is supplied, directly or indirectly, to the U.S. Government, the following notice shall apply unless otherwise agreed to in writing by Motorola, Inc.

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data clause at DFARS 252.227-7013 (Nov. 1995) and of the Rights in Noncommercial Computer Software and Documentation clause at DFARS 252.227-7014 (Jun. 1995).

Motorola, Inc.
Computer Group
2900 South Diablo Way
Tempe, Arizona 85282

Contents

About This Manual

Overview of Contents	xiii
Comments and Suggestions	xiv
Conventions Used in This Manual	xv

CHAPTER 1 Hardware Preparation and Installation

Introduction	1-1
Overview	1-2
Unpacking Guidelines	1-2
Hardware Configuration	1-3
VP22 Motherboard Preparation	1-3
CMOS Clear Header (JPI)	1-5
Hardware Installation	1-6
Installation Preliminaries	1-6
VP22 Motherboard Installation	1-7
DIMM Memory Installation	1-8
PCI Adapter Board Installation (Optional)	1-9
Connection to Peripherals	1-11
Completing the Installation	1-13
Processor Removal and Replacement	1-13
Replacing Lithium Batteries	1-14

CHAPTER 2 Functional Description

Introduction	2-1
Features	2-2
General Description	2-3
VP22 Processor	2-4
System Memory	2-4
L2 Cache	2-4
Universal Serial Bus	2-4
PCI Expansion Slots	2-5
Ethernet Interface	2-5
Super I/O Device	2-6
Asynchronous Serial Ports	2-6

Peripheral Parallel Port	2-6
PS/2 Floppy Port	2-6
Keyboard and Mouse Ports	2-6
Interval Timers	2-7
Real-Time Clock and NVRAM	2-7
BIOS	2-7
Audio Interface	2-7
Video Interface	2-8
Reset	2-8
Environmental Monitoring	2-8
CPU Temperature Monitor	2-8
Open Chassis Alarm	2-8
Watchdog Timer	2-9

CHAPTER 3 Connector Pin Assignments

Connector Pin Assignments	3-1
---------------------------------	-----

APPENDIX A Specifications

Specifications	A-1
----------------------	-----

APPENDIX B Thermal Analysis

Thermally Significant Components	B-1
Component Temperature Measurement	B-3
Preparation	B-3
Measuring Junction Temperature	B-4
Measuring Case Temperature	B-4
Measuring Local Air Temperature	B-6

APPENDIX C Related Documentation

Motorola Computer Group Documents	C-1
Manufacturers' Documents	C-1
Related Specifications	C-2
URLs	C-3

List of Figures

Figure 1-1. VP22 Motherboard Layout	1-4
Figure 2-1. VP22 Block Diagram	2-1
Figure B-1. Thermally Significant Components—Primary Side	B-3
Figure B-2. Mounting a Thermocouple Under a Heatsink	B-5
Figure B-3. Measuring Local Air Temperature	B-6

List of Tables

Table 1-1. Startup Overview	1-2
Table 1-2. VP22 Jumper Settings	1-3
Table 1-3. VP22 Board Connectors	1-12
Table 2-1. VP22 Motherboard Features Summary	2-2
Table 2-2. Ethernet LED Functions	2-5
Table 3-1. SVGA Connector (CN1)	3-1
Table 3-2. COM1 Serial Port Connector (CN2)	3-1
Table 3-3. Keyboard/Mouse Connector (CN3)	3-2
Table 3-4. Parallel Port Connector (CN4)	3-2
Table 3-5. Ethernet Connector (CN5)	3-3
Table 3-6. USB 0, 1 Connector (CN5)	3-3
Table 3-7. CD-IN Connector (CN6)	3-3
Table 3-8. COM2 Serial Port Connector (CN7)	3-4
Table 3-9. Secondary/Primary IDE Connector (CN8/CN10)	3-4
Table 3-10. Temperature Sensor Connector (CN9)	3-5
Table 3-11. ATX Power Connector (CN11)	3-5
Table 3-12. Floppy Disk Drive Connector (CN12)	3-6
Table 3-13. IrDA Connector (CN13)	3-6
Table 3-14. Front Panel Connector (CN14)	3-7
Table 3-15. Open Chassis Alarm Connector (CN15)	3-8
Table 3-16. Compact Floppy Disk Drive Connector (CN16)	3-8
Table 3-17. Internal USB 2 Connector (CN17)	3-9
Table 3-18. CPU Fan Connector (FN1)	3-9
Table 3-19. Chassis Fan Connector (FN2)	3-9
Table 3-20. Second Fan Connector (FN3)	3-9
Table 3-21. Audio MIC IN Connector (PH1)	3-10
Table 3-22. Audio LINE IN Connector (PH2)	3-10
Table 3-23. Audio LINE OUT Connector (PH3)	3-10
Table A-1. VP22 Power Requirements	A-1
Table A-2. VP22 Specifications	A-2
Table B-1. Thermally Significant Components	B-2
Table C-1. Motorola Computer Group Documents	C-1
Table C-2. Manufacturers' Documents	C-2
Table C-3. Related Specifications	C-3

About This Manual

This manual provides information on hardware preparation and installation for the VP22 microATX motherboard (hereinafter referred to as the VP22). In addition, it also provides the features and specifications applicable to the motherboard.

For BIOS information and programming details for the VP22 motherboard, refer to the *VP22 microATX Motherboard BIOS and Programmer's Reference Guide*, listed in [Appendix C, Related Documentation](#).

The information in this manual applies to model numbers listed in the following table.

Model Number	Description
All models include: Ethernet, three DIMM sockets, four PCI slots, two EIDE ports, video and audio interfaces, two async serial ports and two USB ports.	
VP22-566C	566 MHz Celeron processor with heatsink option
VP22-733P	733 MHz Pentium III processor with heatsink option
VP22-866P	866 MHz Pentium III processor with heatsink option

Overview of Contents

This manual is divided into the following chapters and appendices:

[Chapter 1, Hardware Preparation and Installation](#), provides information on hardware preparation and installation for the VP22 motherboard.

[Chapter 2, Functional Description](#), describes the VP22 motherboard computer on a block diagram level.

[Chapter 3, *Connector Pin Assignments*](#), summarizes the pin assignments for I/O and power cable interconnect signals on the VP22 motherboard.

[Appendix A, *Specifications*](#), lists the power requirements and other specifications for the VP22 motherboard.

[Appendix B, *Thermal Analysis*](#), provides information to conduct thermal evaluations and identifies thermally significant components along with their maximum allowable operating temperatures.

[Appendix C, *Related Documentation*](#), lists all documentation related to the VP22 motherboard.

Comments and Suggestions

Motorola welcomes and appreciates your comments on its documentation. We want to know what you think about our manuals and how we can make them better. Mail comments to:

Motorola Computer Group
Reader Comments DW164
2900 S. Diablo Way
Tempe, Arizona 85282

You can also submit comments to the following e-mail address:
reader-comments@mcg.mot.com

In all your correspondence, please list your name, position, and company. Be sure to include the title and part number of the manual and tell how you used it. Then tell us your feelings about its strengths and weaknesses and any recommendations for improvements.

Conventions Used in This Manual

The following typographical conventions are used in this document:

bold

is used for user input that you type just as it appears; it is also used for commands, options and arguments to commands, and names of programs, directories and files.

italic

is used for names of variables to which you assign values. Italic is also used for comments in screen displays and examples, and to introduce new terms.

`courier`

is used for system output (for example, screen displays, reports), examples, and system prompts.

<Enter>, **<Return>** or **<CR>**

represents the carriage return or Enter key.

Ctrl

represents the Control key. Execute control characters by pressing the Ctrl key and the letter simultaneously, for example, Ctrl-d.

Hardware Preparation and Installation

1

Introduction

The VP22 is a standard microATX form factor motherboard that supports a single Pentium® III or Celeron™ processor (66/100/133 MHz processor-side bus) on the Intel 815E chipset with integrated graphics. This motherboard is targeted to run Windows NT®, Windows® 2000, Linux® and VxWorks®.

Features of the full-function VP22 include the following:

- Single Intel PGA370 Pentium III or Celeron microprocessor
- Intel 815E chipset with support for 66/100/133 processor-side bus
- 256MB of L2 cache (Pentium III), 128MB of L2 cache (Celeron)
- Three 168-pin DIMM sockets for 32MB to 512MB PC133 SDRAM
- Four 32-bit, 33 MHz PCI expansion slots
- One 10BaseT/100BaseTX Ethernet port
- Two EIDE Ultra DMA/100 hard drive ports
- Video and audio interfaces
- Two asynchronous serial ports
- One peripheral parallel port
- Floppy port, keyboard port, mouse port and IrDA header
- Three Universal Serial Bus (USB) ports
- Hardware monitor
- Jumper-less operation for selection of processor types and bus speeds
- Supported by industry-standard operating systems such as Windows NT, Windows 2000, Linux and VxWorks

Overview

The following table lists the things you will need to do before you can use this board and tells where to find the information you need to perform each step. Be sure to read this entire chapter, including all cautions and warnings, before you begin.

Table 1-1. Startup Overview

What you need to do...	Refer to...
Unpack the hardware.	Unpacking Guidelines on page 1-2
Configure the hardware by setting jumpers on the motherboard.	VP22 Motherboard Preparation on page 1-3
Install the motherboard in the chassis.	VP22 Motherboard Installation on page 1-7
Ensure that DIMM memory module(s) are properly installed on the motherboard.	DIMM Memory Installation on page 1-8
If applicable, install a PCI adapter board on the motherboard.	PCI Adapter Board Installation (Optional) on page 1-9
Connect other equipment you will be using.	Connection to Peripherals on page 1-11
	For more information on optional devices and equipment, refer to the documentation provided with the equipment.
Verify the hardware is installed.	Completing the Installation on page 1-13
Power up the equipment.	Refer to the <i>VP22 microATX Motherboard BIOS and Programmer's Reference Guide</i> , listed in Appendix C, Related Documentation .

Unpacking Guidelines

Note If the shipping carton is damaged upon receipt, request that the carrier's agent be present during the unpacking and inspection of the equipment.

Unpack the equipment from the shipping carton. Refer to the packing list and verify that all items are present. Save the packing material for storing and reshipping of equipment.



Avoid touching areas of integrated circuitry; static discharge can damage circuits.

Hardware Configuration

To produce the desired configuration and ensure proper operation of the VP22 motherboard, you may need to carry out certain hardware modifications before installing the motherboard.

The VP22 provides software control over all but one option, CMOS clear. This option is controlled through the manual installation or removal of a header jumper.

VP22 Motherboard Preparation

[Figure 1-1](#) illustrates the placement of the header, connectors and various other components on the VP22 motherboard. The only manually configurable header on the motherboard is listed in [Table 1-2](#). The header's default setting is enclosed in brackets. For the connector pin assignments on the VP22, refer to [Chapter 3, Connector Pin Assignments](#).

Table 1-2. VP22 Jumper Settings

Jumper	Function	Settings	
JP1	CMOS Clear	[1-2] 2-3	Normal CMOS clear

Note Items in brackets are factory default settings.

The VP22 is factory tested and shipped with the configuration described in the following section.

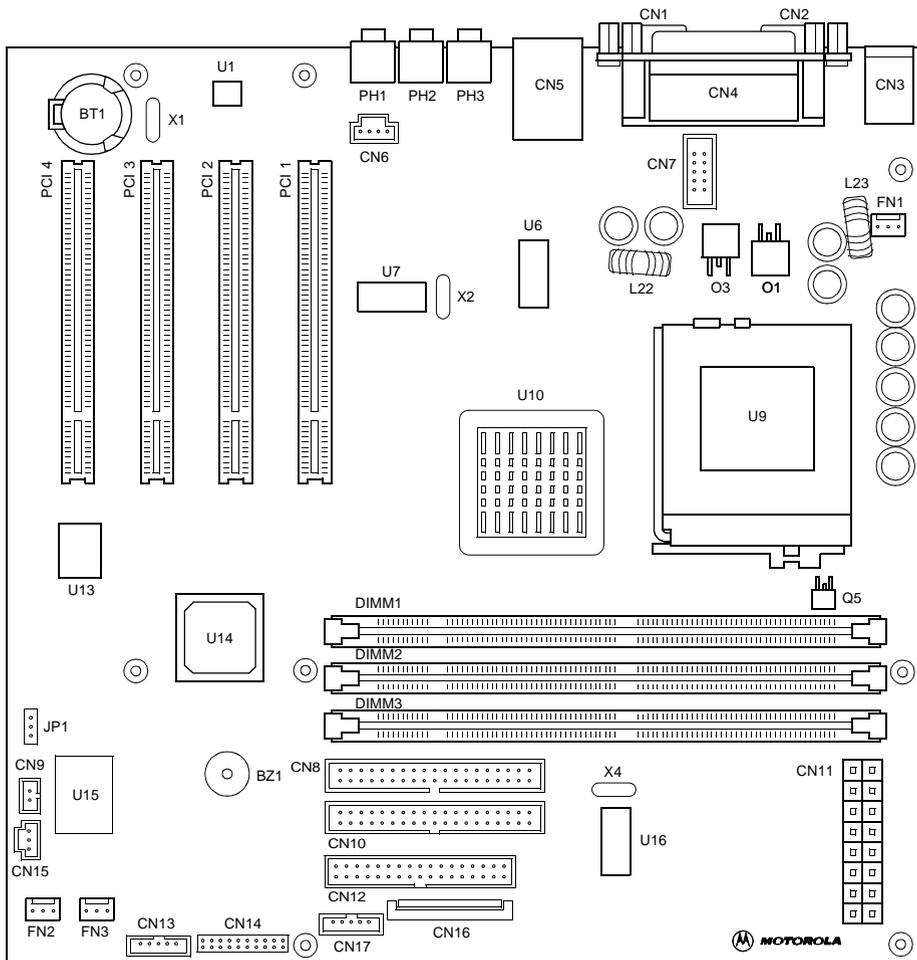


Figure 1-1. VP22 Motherboard Layout

CMOS Clear Header (JP1)

The CMOS Clear function is controlled by a 3-pin header. Putting a jumper on JP1 pins 1-2 is the normal setting and putting a jumper on JP1 pins 2-3 clears the CMOS. The default setting is with a jumper installed on pins 1-2.



If you encounter any of the following, you can reconfigure the system with the default values stored in the ROM BIOS.

- CMOS data becomes corrupted
- You forgot the supervisor or user password
- You are unable to boot-up the computer system because the processor's clock/ratio was incorrectly set in the BIOS

To load the default values stored in the ROM BIOS, follow the steps below:

1. Power off the system.
2. Remove jumper from JP1 pins 1-2 and put on JP1 pins 2-3. Wait for a few seconds and set JP1 back to its default setting, pins 1-2.
3. Power on the system.
4. After powering on the system, press **** to enter the BIOS setup utility. Refer to the *VP22 microATX Motherboard BIOS and Programmer's Reference Guide* for more information.

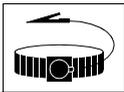
Hardware Installation

The following sections discuss the placement of adapter boards on the VP22 motherboard, the installation of the complete VP22 assembly into an ATX chassis, and the system considerations relevant to the installation. Before installing the VP22 board, ensure that the header jumper is configured as desired.

Installation Preliminaries

This section applies to all hardware installations you may perform on VP22 motherboards.

Use ESD



Wrist Strap

Motorola strongly recommends that you use an antistatic wrist strap and a conductive foam pad when installing or upgrading a system. Electronic components, such as disk drives, computer boards, and memory modules, can be extremely sensitive to electrostatic discharge (ESD). After removing the component from its protective wrapper or from the system, place the component flat on a grounded, static-free surface (and, in the case of a board, component side up). Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available at electronics stores) that is attached to an active electrical ground. Note that a system chassis may not be grounded if it is unplugged.



To prevent serious injury or death from dangerous voltages, before connecting peripherals, disconnect the power cord from the power source. Only qualified, experienced electronics personnel should access the interior of a system.

VP22 Motherboard Installation

To install a VP22 motherboard in your chassis, follow the procedure below.

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to an electrical ground (refer to *Installation Preliminaries*). The ESD strap must be secured to your wrist and to ground throughout the procedure.
2. Ensure that the AC or DC power is switched off and remove the AC cord or DC power lines from the system.



Inserting or removing modules with power applied may result in damage to module components.



Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.

3. Remove the chassis cover. If necessary, loosen or temporarily remove chassis components (power supply, fans, etc.) as needed for access to the interior of the chassis.
4. Install metal standoffs on the floor of the chassis in alignment with the VP22 motherboard mounting holes. Use as many standoffs as feasible.

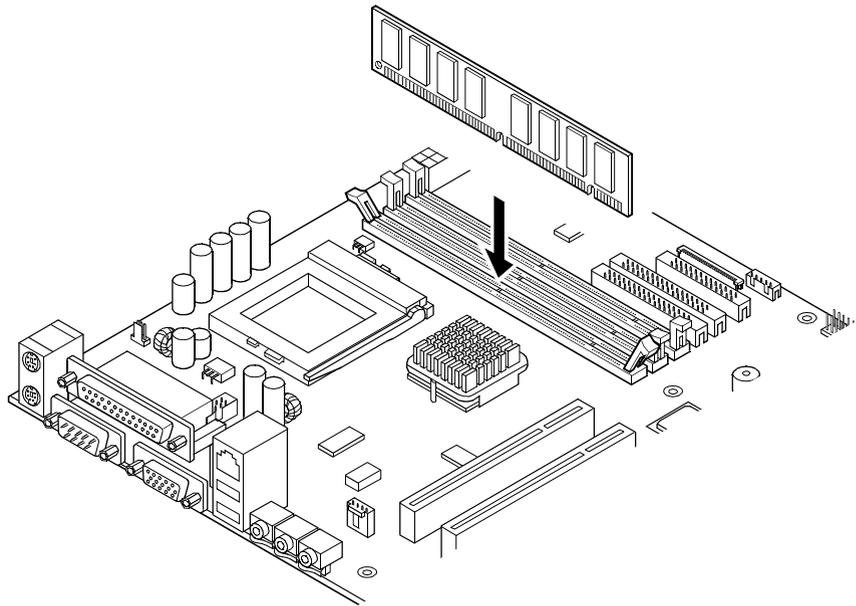


Avoid touching areas of integrated circuitry; static discharge can damage these circuits.

5. Set the VP22 motherboard on the chassis standoffs and start the screw(s) provided into the standoffs, without tightening them completely.
6. With all screws in place, tighten them snugly.

DIMM Memory Installation

DIMM modules install into the DIMM 1, DIMM 2 and DIMM 3 sockets on the VP22 motherboard. To install the DIMM memory, refer to the procedure and figure below.



1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to the chassis as a ground (refer to [Installation Preliminaries on page 1-6](#)). The ESD strap must be secured to your wrist and to ground throughout the procedure.
2. Perform an operating system shutdown. Turn the AC or DC power off and remove the AC cord or DC power lines from the system. Remove chassis or system cover(s) as necessary for access to the motherboard.



Removing modules with power applied may result in damage to module components.

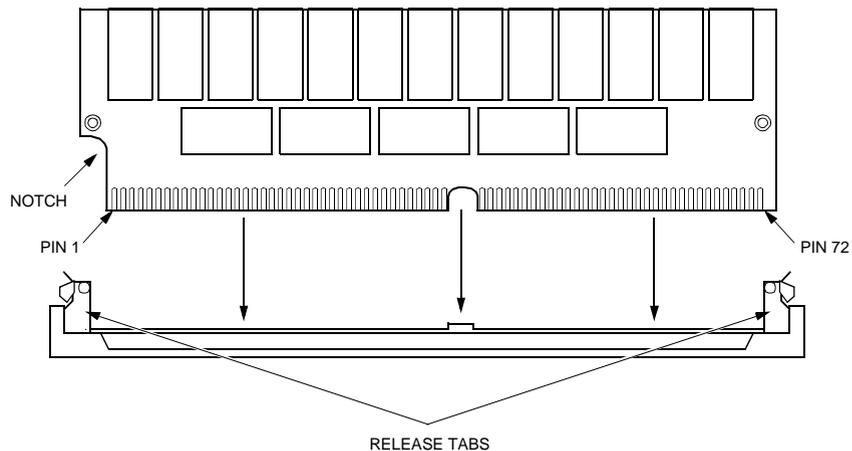


Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.



Avoid touching areas of integrated circuitry; static discharge can damage these circuits.

3. Gently spread the release tabs on each side of the memory socket.



4. Gently press the DIMM into the memory socket until the tabs snap into place.
5. Repeat this procedure for all other DIMMs you want to install.

PCI Adapter Board Installation (Optional)

PCI adapter boards are installed into PCI 1, PCI 2, PCI 3, and PCI 4 slots on the VP22 motherboard. To install PCI adapter boards, proceed as follows:

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to the chassis as a ground (refer to *Installation Preliminaries on*

[page 1-6](#)). The ESD strap must be secured to your wrist and to ground throughout the procedure.

2. Perform an operating system shutdown. Turn the AC or DC power off and remove the AC cord or DC power lines from the system. Remove chassis or system cover(s) as necessary for access to the motherboard.



Inserting or removing modules with power applied may result in damage to module components.



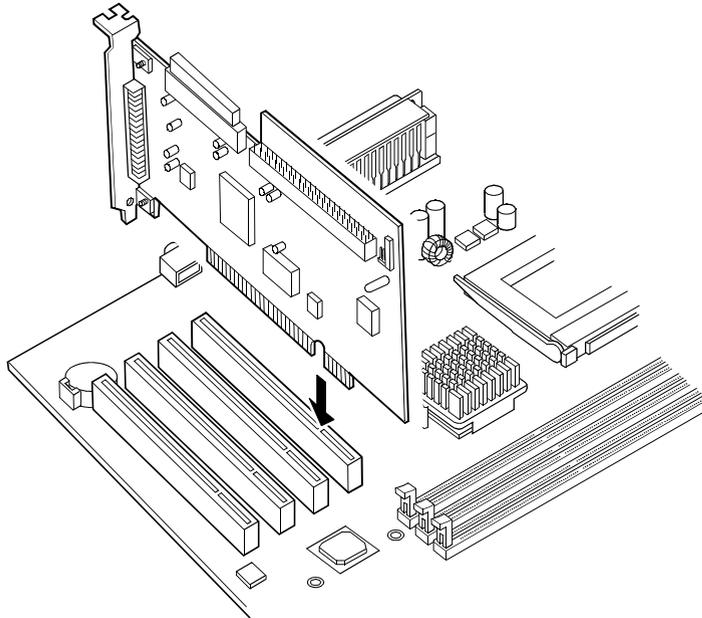
Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting



Avoid touching areas of integrated circuitry; static discharge can damage these circuits.

3. Remove the PCI filler from the chassis.

4. Install the PCI adapter board into one of the PCI slots.



Connection to Peripherals

When the VP22 motherboard is installed in a chassis and modules are installed on the VP22, you are ready to connect peripherals and apply power to the board.

[Figure 1-1 on page 1-4](#) shows the locations of the various cable connectors. They are also listed in [Table 1-3](#) with the rest of the connectors.

For the pin assignments of the connectors listed, refer to [Chapter 3, Connector Pin Assignments](#).

Table 1-3. VP22 Board Connectors

Connector	Function
I/O Panel Connectors	
CN1	SVGA panel connector
CN2	COM1 serial port panel connector
CN3	Keyboard/mouse panel connectors
CN4	Parallel port panel connector
CN5	Dual Universal Serial Bus (USB) panel connectors Ethernet panel connector
PH1	Audio MIC IN panel connector
PH2	Audio LINE IN panel connector
PH3	Audio LINE OUT panel connector
Board Surface Connectors	
CN6	CD-IN board connector
CN7	COM2 serial board connector
CN8	Secondary IDE board connector
CN9	Temperature sensor board connector
CN10	Primary IDE board connector
CN11	ATX power board connector
CN12	Floppy disk drive board connector
CN13	IrDA board connector
CN14	Front panel board connector
CN15	Open chassis alarm board connector
CN16	Compact floppy disk drive board connector
CN17	Internal Universal Serial Bus (USB) board connector

Table 1-3. VP22 Board Connectors (continued)

Connector	Function
DIMM 1	DIMM socket
DIMM 2	DIMM socket
DIMM 3	DIMM socket
FN1	CPU fan board connector
FN2	Chassis fan board connector
FN3	Second fan board connector
PCI 1	PCI expansion slot
PCI 2	PCI expansion slot
PCI 3	PCI expansion slot
PCI 4	PCI expansion slot

Completing the Installation

Verify that hardware is installed and the power/peripheral cables connected are appropriate for your system configuration.

Replace the chassis or system cover, reconnect the system to the AC or DC power source, and turn the equipment power on.

Processor Removal and Replacement

Microprocessors in Motorola board products are factory-installed and tested to ensure proper operation under board-specific BIOS software within specified power and cooling requirements. *Field replacement of the processor is not recommended.* A processor of a different type or with a different stepping mask may not be supported by the BIOS. Also, faster processors may alter cooling and power requirements beyond specifications.

Motorola is continually improving its products to use the latest processor speeds and technologies as they become available. If your application requires a different processor, consult your local Motorola representative.

Replacing Lithium Batteries

Follow these safety rules for proper battery operation and to reduce equipment and personal injury hazards when handling lithium batteries. Use the battery for its intended application only.

Note Do not recharge, open, puncture or crush, incinerate, expose to high temperatures or dispose of in your general trash collection.

To replace the lithium battery, observe the following guidelines and follow the steps below.

Note When replacing the battery, power must be applied to the board to prevent data loss.



To prevent serious injury or death from dangerous voltages, use extreme caution when handling, testing, and adjusting this equipment and its components.



Lithium batteries incorporate flammable materials such as lithium and organic solvents. If lithium batteries are short-circuited or exposed to high temperature or pressure, they may burst open and ignite, possibly resulting in injury and/or fire. When dealing with lithium batteries, carefully follow the precautions listed below in order to prevent accidents.

- Do not short-circuit.
- Do not disassemble, deform, or apply excessive pressure.
- Do not heat or incinerate.
- Do not apply solder directly.
- Do not use different models, or new and old batteries together.

- Do not charge.
- Always check proper polarity.



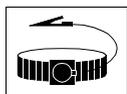
Danger of explosion if battery is replaced incorrectly.

Replace battery only with the same or equivalent type recommended by the equipment manufacturer. Dispose of used batteries according to local regulations and manufacturer's instructions.



Avoid touching areas of integrated circuitry; static discharge can damage circuits.

Use ESD



Wrist Strap

Attach an ESD strap to your wrist. Attach the other end of the ESD strap to an electrical ground. (Note that the system chassis may not be grounded if it is unplugged.) The ESD strap must be secured to your wrist and to ground throughout the procedure.

1. To remove the battery from the module, carefully pull the battery from the socket.
2. Before installing a new battery, ensure that the battery pins are clean.
3. Note the battery polarity and press the new battery into the socket.

Note When the battery is in the socket, no soldering is required.

4. Recycle or dispose of the old battery according to local regulations and manufacturer's instructions.

Introduction

This chapter describes the VP22 motherboard on a block diagram level. The *General Description* provides an overview of the VP22, followed by a detailed description of several blocks of circuitry. Figure 2-1 shows a block diagram of the overall board architecture.

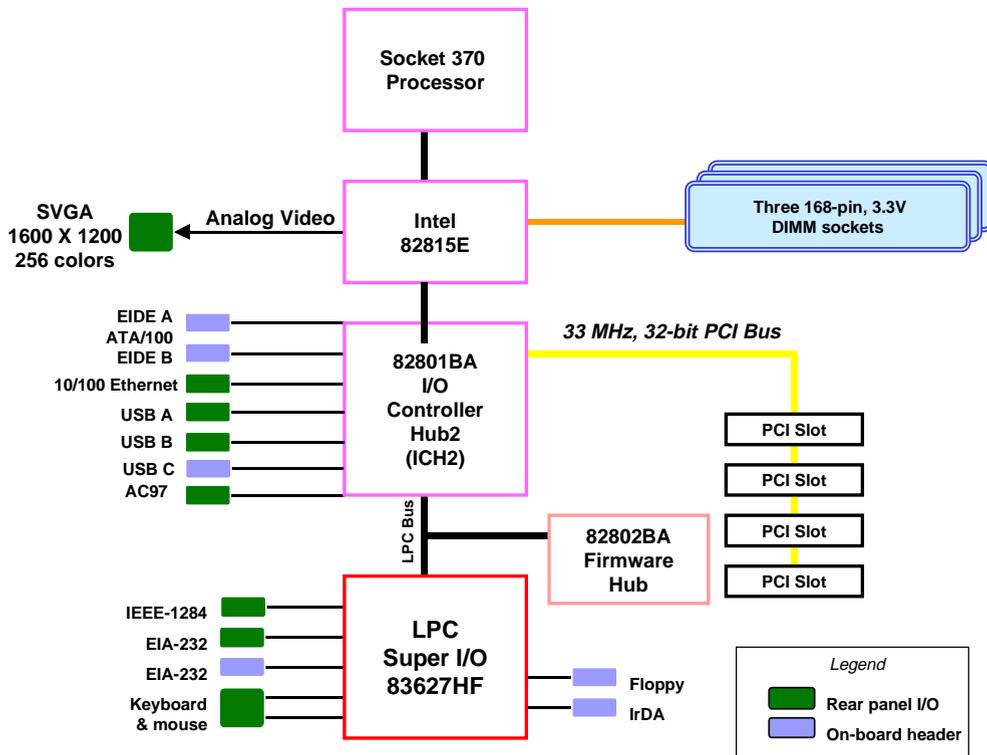


Figure 2-1. VP22 Block Diagram

Features

The following table lists the features of the VP22 motherboard.

Table 2-1. VP22 Motherboard Features Summary

Feature	Description
Microprocessor	<ul style="list-style-type: none"> –Single Intel PGA370 socket Pentium III or Celeron processor –66/100/133 MHz front-side bus (FSB) frequency
L2 cache memory	<ul style="list-style-type: none"> –256KB on-die Advanced Transfer Cache (ATC) for the Pentium III processor –128KB on-die ATC for the Celeron processor
DRAM	<ul style="list-style-type: none"> –Three 168-pin DIMM sockets, 3.3V, with serial presence detect (SPD) –SDRAM (PC133) at 133 MHz FSB –Unbuffered, non-ECC (no parity) –Supports 16/32/64/128/256MB DIMM types
Intel 815E chipset	<ul style="list-style-type: none"> –Intel 82802BA Firmware Hub (FWH) –Intel 82815 Graphics Memory Controller Hub (GMCH) –Intel 82801BA I/O Controller Hub2 (ICH2)
Environmental Monitoring	<ul style="list-style-type: none"> –Hardware monitor (83627HF) allowing software to monitor temperature, fans and voltage
PCI interface	<ul style="list-style-type: none"> –Four PCI expansion slots –32-bit data, 33 MHz operation
Audio	<ul style="list-style-type: none"> –AC '97 compliance
Graphics	<ul style="list-style-type: none"> –SVGA interface at rear I/O
Form Factor	<ul style="list-style-type: none"> –Standard microATX

Table 2-1. VP22 Motherboard Features Summary (continued)

Feature	Description
BIOS	–Support for 4/8 Mbit in 82802BA Firmware Hub
Timers	–Three interval timers
Onboard Peripheral Support	<ul style="list-style-type: none"> –Two EIDE Ultra DMA/100 hard drive ports –Two asynchronous serial ports –10BaseT/100BaseTX Ethernet interface –IEEE-1284 parallel port –PS/2 keyboard/mouse ports –Floppy drive port –Three USB ports –IrDA header
Miscellaneous	<ul style="list-style-type: none"> –Reset switch input on planar header –Open chassis alarm connector –Three fan connectors

General Description

The VP22 is a microATX form factor motherboard. It hosts the Pentium III or Celeron processor with the Intel 815E chipset for cost-effective performance. Standard onboard payload includes four 32-bit, 33 MHz PCI expansion slots, three 168-pin DIMM sockets for PC133 SDRAM, one 10/100BaseTX Ethernet port, a peripheral parallel port, one asynchronous serial port, video and audio ports, keyboard/mouse and two USB ports.

There are headers on the board for an asynchronous serial port, floppy port, IrDA port, internal USB port and two EIDE ports.

As implemented on the VP22, the 815E chipset includes a Graphics Memory Controller Hub (GMCH), an I/O Controller Hub2 (ICH2) and a Firmware Hub (FWH).

VP22 Processor

The VP22 motherboard supports a single Intel PGA370 socket Pentium III or Celeron processor. The Pentium III has a FSB speed of 100/133 MHz and the Celeron has a FSB speed of 66 MHz. The 815E chipset keeps the FSB operation at 66/100/133 MHz (auto-selected).

System Memory

The VP22 motherboard supports synchronous DRAM memory and accepts the standard (unbuffered) SDRAM DIMM memory. SDRAM speed, type and size is determined by the BIOS reading the DIMM presence detect bits on the SMBus (System Management Bus). The SDRAM timing register, which provides the DRAM speed control for the entire array, must be programmed to use the timings of the slowest DRAMs installed.

This motherboard supports up to 512MB of SDRAM memory with three 168-pin DIMM sockets. It supports 3.3 V single- or double-sided DIMMs and the individual SDRAMs on the DIMMs must be (x8) or (x16) parts; (x4) parts are not supported. The DIMM sockets can be populated in any order. SDRAM operation at 133MHz and 100MHz is supported.

L2 Cache

The Pentium III has an on-die 256KB L2 Advanced Transfer Cache (ATC). The on-die cache has a 256-bit data bus from the processor core. The Celeron has 128KB L2 ATC.

Universal Serial Bus

Three Universal Serial Bus (USB) ports are supported on the VP22 motherboard; two USB ports are located at the rear panel and one 5-pin header is onboard for internal use. USB allows for the easy addition of peripherals such as a mouse, keyboard, speakers, etc. Transfer rates up to 12Mb/s are supported. The 12Mb/s high-speed connection requires shielded cables.

The VP22 provides the standard 0.5 A at 5 V to the peripherals. Power on each USB port is protected by a single polyswitch fuse (size 6 V/1.1 A, this current rating allows for inrush currents). Additional ports can be added through the use of an external USB hub.

PCI Expansion Slots

The VP22 supports four 32-bit, 33 MHz PCI expansion slots. These are +5 V signaling slots that accommodate either +5 V or universal PCI boards.

Ethernet Interface

The VP22 provides a 10/100BaseTX Ethernet transceiver interface using an Intel 82562EM integrated Ethernet device. The Ethernet interface is accessed via an industry-standard, rear-panel-mounted RJ-45 connector.

The 82562EM chip is assigned an Ethernet Station Address. The address is unique for each board (assembly) and is displayed on a label affixed to the board. In addition, the Ethernet address is stored in the configuration ROM interfaced to the 82562EM Ethernet device.

The Ethernet interface on the rear panel of the VP22 motherboard is accompanied by two LED indicators. [Table 2-2](#) details the functionality of each indicator.

Table 2-2. Ethernet LED Functions

Indicator	Status	Function
LED 1: Activity (Amber)	Blinking	Data transfer in progress
	OFF	No data transfer
LED 2: Link Status (Green)	ON	Link
	OFF	Off line

Super I/O Device

The VP22 uses the Super I/O (SIO) device to provide two asynchronous serial ports, a peripheral parallel port, a PS/2 floppy port, PS/2 keyboard/mouse ports and an IrDA header.

Asynchronous Serial Ports

Two 16550-compatible asynchronous serial ports are supported on the VP22 motherboard. The EIA-232 drivers and receivers reside onboard. COM1 is routed to an industry-standard DB-9 connector accessible from the rear panel and COM2 is routed to an optional 10-pin header. Both ports are configured as DTE. Maximum data rate on any port is 115.2K baud.

Firmware initializes the two serial ports as COM1 and COM2 with ISA I/O base addresses of 3F8h and 2F8h respectively. This default configuration also assigns COM1 to IRQ4 and COM2 to IRQ3.

Peripheral Parallel Port

All parallel I/O interface signals are routed to an industry-standard DB-25 connector, accessible from the rear panel. This port supports the full IEEE-1284 capability, which provides the basic printer interface. Firmware initializes the parallel port as LPT1 with ISA I/O base address of 378h. This default configuration also assigns the parallel port to IRQ7.

PS/2 Floppy Port

The floppy port is configured for PS/2 compatibility and supports both the legacy 34-pin header and the compact floppy disk drive (FDD) connector. Up to two floppy drives are supported.

Keyboard and Mouse Ports

Two 6-pin circular DIN connectors are located on the rear panel of the VP22 motherboard for the keyboard and mouse connections. The power provided to the keyboard and mouse is protected by a polyswitch rated at 1.1 A.

Interval Timers

The voltage regulator has three counters that are typically programmed to provide the following functions:

- ❑ Counter 0 is associated with IRQ0 and can be used for system timing functions, such as timer interrupt for a time-of-day.
- ❑ Counter 1 is used to generate a refresh request signal for ISA memory every 15.6 μ s.
- ❑ Counter 2 is typically programmed to provide a speaker tone.

Real-Time Clock and NVRAM

The real-time clock provides a century calendar, as well as a time-of-day function. In addition, 256 bytes of battery-backed RAM is available for use by the BIOS. A separate 3 V coin cell battery provides battery-backup.

BIOS

The VP22 supports the Intel 82802BA Firmware Hub (FWH). A boot block device allows recovery of the BIOS in the event of a catastrophic failure (power fail during BIOS update). Flash write protection is implemented under software control and this bit must be set to 1 before any write is allowed to the BIOS Flash. For more information on the VP22 motherboard's BIOS, refer to the *VP22 microATX Motherboard BIOS and Programmer's Reference Guide*, listed in [Appendix C, Related Documentation](#).

Audio Interface

The VP22 provides a two channel, multimedia audio device capable of Audio Codec '97 (AC '97). Three connectors are available on the rear panel: MIC IN, LINE IN and LINE OUT.

Video Interface

Standard SVGA analog output is available on the rear I/O panel. The video function is provided via the Intel 82815 Graphics Memory Controller Hub (GMCH). The BIOS must have a selection in the CMOS setup to disable the onboard video to allow the user to use a PCI video as the primary video controller. The BIOS must also have a selection in the CMOS setup to disable the onboard video to allow the user to reclaim the memory for applications without having to add another video card.

Reset

The VP22 has a circuit that monitors system power and provides the PWROK signal to the 82801BA I/O Controller Hub2 (ICH2). This circuit distributes the reset to the rest of the board by generating the CPU, PCI and IDE resets. This board can also be reset by an external switch that is connected to an onboard header.

Environmental Monitoring

The Winbond 83627HF hardware monitor device on the VP22 motherboard provides a number of useful system management features. These features include temperature, fan and voltage monitoring. The hardware monitor allows software to monitor voltages with its analog-to-digital converters. An alarm sounds when the system voltage is ± 10 percent.

CPU Temperature Monitor

An internal Pentium III thermal sensor monitors microprocessor temperature. An overtemperature condition produces an alarm signal.

Open Chassis Alarm

The VP22 implements an open chassis circuit that can latch an open chassis event even when the system is turned off, as long as battery or standby power is still present. The open chassis interrupt is fed into the 83627HF hardware monitor chip. This circuit can only be reset via

software using SMI# Mask Register 2, as described in the 83627HF data sheet that is listed in [Appendix C, Related Documentation](#).

Watchdog Timer

A watchdog timer is embedded in the 83627HF hardware monitor chip. The watchdog timer is an 8-bit counter with one second resolution. The watchdog has either a one second granularity up to 255 seconds or a one minute granularity up to 255 minutes. The watchdog output is connected to reset.

Connector Pin Assignments

3

Connector Pin Assignments

This section summarizes the pin assignments for I/O and power cable connectors on the VP22 motherboard.

Table 3-1. SVGA Connector (CN1)

Pin #	Function	Function	Pin #
1	Red	Green	2
3	Blue	VCC	4
5	Ground	Ground	6
7	Ground	Ground	8
9	VCC	Ground	10
11	VCC	5VCDA	12
13	5HSYNC-	5VSYNC-	14
15	5VCLK		

Table 3-2. COM1 Serial Port Connector (CN2)

Pin #	Function	Function	Pin #
1	Data Carrier Detect	Receive Data	2
3	Transmit Data	Data Terminal Ready	4
5	Ground	Data Set Ready	6
7	Request to Send	Clear to Send	8
9	Ring Indicate		

Table 3-3. Keyboard/Mouse Connector (CN3)

Pin #	Function	Function	Pin #
Keyboard = pins 1 to 6, Mouse = pins 7 to 12			
1	Keyboard Data	NC	2
3	Ground	VCC	4
5	Keyboard Clock	NC	6
7	Mouse Data	NC	8
9	Ground	VCC	10
11	Mouse Clock	NC	12

Table 3-4. Parallel Port Connector (CN4)

Pin #	Function	Function	Pin #
1	Strobe	Data 0	2
3	Data 1	Data 2	4
5	Data 3	Data 4	6
7	Data 5	Data 6	8
9	Data 7	Acknowledge	10
11	Busy	Paper Error	12
13	Select	Auto Feed	14
15	Error	Initialize	16
17	Select In	Ground	18
19	Ground	Ground	20
21	Ground	Ground	22
23	Ground	Ground	24
25	Ground		

Table 3-5. Ethernet Connector (CN5)

Pin #	Function	Function	Pin #
1	Transmit Data (+)	Transmit Data (-)	2
3	Receive Data (+)	Termination	4
5	Termination	Receive Data (-)	6
7	Termination	Termination	8

Table 3-6. USB 0, 1 Connector (CN5)

Pin #	Function
L1 (lower)	VCC
L2	-Data
L3	+Data
L4	Ground
U1 (upper)	VCC
U2	-Data
U3	+Data
U4	Ground

Table 3-7. CD-IN Connector (CN6)

Pin #	Function
1	Left
2	Ground
3	Ground
4	Right

Table 3-8. COM2 Serial Port Connector (CN7)

Pin #	Function	Function	Pin #
1	Data Carrier Detect	Data Set Ready	2
3	Receive Data	Request to Send	4
5	Transmit Data	Clear to Send	6
7	Data Terminal Ready	Ring Indicate	8
9	Ground		10

Table 3-9. Secondary/Primary IDE Connector (CN8/CN10)

Pin #	Function	Function	Pin #
1	Reset	Ground	2
3	Data 7	Data 8	4
5	Data 6	Data 9	6
7	Data 5	Data 10	8
9	Data 4	Data 11	10
11	Data 3	Data 12	12
13	Data 2	Data 13	14
15	Data 1	Data 14	16
17	Data 0	Data 15	18
19	Ground	NC	20
21	Request	Ground	22
23	I/O Write	Ground	24
25	I/O Read	Ground	26
27	I/O Ready	Cable Select	28
29	DMA Acknowledge	Ground	30
31	Interrupt Request	NC	32

Table 3-9. Secondary/Primary IDE Connector (CN8/CN10)

Pin #	Function	Function	Pin #
33	Device Address 1	ATA 66/100 Detection	34
35	Device Address 0	Device Address 2	36
37	Chip Select 1	Chip Select 3	38
39	Device Active	Ground	40

Table 3-10. Temperature Sensor Connector (CN9)

Pin #	Function
1	VCC
2	Ground

Table 3-11. ATX Power Connector (CN11)

Pin #	Function	Function	Pin #
1	3.3 V	3.3 V	2
3	Ground	+5 V	4
5	Ground	+5 V	6
7	Ground	PW-OK	8
9	5 VSB	+12 V	10
11	3.3 V	-12 V	12
13	Ground	PS-ON_L	14
15	Ground	Ground	16
17	Ground	-5 V	18
19	+5 V	+5 V	20

Table 3-12. Floppy Disk Drive Connector (CN12)

Pin #	Function	Function	Pin #
1	Ground	Extended Density	2
3	Ground	NC	4
5	NC	Data Rate	6
7	Ground	Index	8
9	Ground	Motor A Select	10
11	Ground	Drive B Select	12
13	Ground	Drive A Select	14
15	Ground	Motor B Select	16
17	Ground	Step Direction	18
19	Ground	Step Pulse	20
21	Ground	Write Data	22
23	Ground	Write Gate	24
25	Ground	Track 0	26
27	Ground	Write Protect	28
29	Ground	Read Data	30
31	Ground	Side 1	32
33	Ground	Disk Change	34

Table 3-13. IrDA Connector (CN13)

Pin #	Function
1	VCC
2	NC
3	IRRX
4	Ground
5	IRTX

Table 3-14. Front Panel Connector (CN14)

Item	Pin #	Function
Chassis Speaker	1	Speaker signal
	3	NC
	5	NC
	7	VCC (5 V)
Reset Button	2	Ground
	4	Reset signal
	6	NC
	9	NC
Power Switch	8	Ground
	10	Power-on signal
Keylock	11	Ground
	13	Keyboard lock
	12	NC
	14	NC
Power LED	15	Power LED signal
	17	NC
	19	Power LED pull-up
Hard Disk LED	16	Hard Disk LED signal
	18	Hard Disk LED pull-up
	20	NC

Table 3-15. Open Chassis Alarm Connector (CN15)

Pin #	Function
1	VCC
2	CSOPEN
3	Ground

Table 3-16. Compact Floppy Disk Drive Connector (CN16)

Pin #	Function	Function	Pin #
1	Power	Index	2
3	Power	Drive A Select	4
5	Power	Disk Change	6
7	NC	Data Rate	8
9	Extended Density	Motor A Select	10
11	NC	Step Direction	12
13	NC	Step Pulse	14
15	Ground	Write Data	16
17	Ground	Write Gate	18
19	NC	Track 0	20
21	NC	Write Protect	22
23	Ground	Read Data	24
25	Ground	Side 1	26

Table 3-17. Internal USB 2 Connector (CN17)

Pin #	Function
1	VCC
2	-Data
3	+Data
4	Ground
5	Ground

Table 3-18. CPU Fan Connector (FN1)

Pin #	Function
1	Ground
2	Power
3	Sense

Table 3-19. Chassis Fan Connector (FN2)

Pin #	Function
1	Ground
2	Power
3	Sense

Table 3-20. Second Fan Connector (FN3)

Pin #	Function
1	Ground
2	Power
3	Sense

Table 3-21. Audio MIC IN Connector (PH1)

Pin #	Function
1	Ground
2	MIC
3	Ground
4	Ground
5	MIC

Table 3-22. Audio LINE IN Connector (PH2)

Pin #	Function
1	Ground
2	INR
3	Ground
4	Ground
5	INL

Table 3-23. Audio LINE OUT Connector (PH3)

Pin #	Function
1	Ground
2	OUTR
3	Ground
4	Ground
5	OUTL

Specifications

[Table A-1](#) lists the power requirements for the VP22 motherboard. [Table A-2](#) lists the environmental specifications, along with the board dimensions and rear I/O connectors.

Specifications for related components, peripherals and networks can be ordered from the sources listed in [Appendix C, Related Documentation](#).

Table A-1. VP22 Power Requirements

Processor Type	Specifications
566 MHz Celeron processor	0.63 A typ. at +5V, 3.3 A max. at +5V 0.05 A typ. at -5V, 0.05 A max. at -5V 0.12 A typ. at +12V, 0.12 A max. at +12V 0.10 A typ. at -12V, 0.10 A max. at -12V 1.9 A typ. at +3.3V, 1.9 A max. at +3.3V 0.03 A typ. at 5VSB, 0.03 A max. at 5VSB
733 MHz Pentium III processor	1.15 A typ. at +5V, 5.0 A max. at +5V 0.05 A typ. at -5V, 0.05 A max. at -5V 0.24 A typ. at +12V, 0.24 A max. at +12V 0.24 A typ. at -12V, 0.24 A max. at -12V 1.84 A typ. at +3.3V, 1.83 A max. at +3.3V 0.07 A typ. at 5VSB, 0.07 A max. at 5VSB
866 MHz Pentium III processor	0.73 A typ. at +5V, 9.7 A max. at +5V 2.12 A typ. at +3.3V, 9.2 A max. at +3.3V 22 mA max. at +12V 28 mA max. at -12V

Table A-2. VP22 Specifications

Characteristics		Specifications
Environmental Parameters		
Temperature	Operating	0° C to 60° C (32° F to 140° F)
	Non-operating	-40° C to 85° C (-40° F to 185° F)
Altitude	Operating	-500 to 5,000 m (-1,640 to 16,404 ft.)
	Non-operating	-500 to 15,000 m (-1,640 to 49,213 ft.)
Relative Humidity	Operating	5% to 95% (noncondensing)
	Non-operating	5% to 95% (noncondensing)
Vibration	Operating	0.5 G peak from 10 to 1000 Hz random
	Nonoperating	6.0 G peak from 10 to 1000 Hz random
Physical Dimensions		
Motherboard	Width	9.6 inches (244 mm)
	Length	9.6 inches (244 mm)
Motherboard Rear I/O Connectors		
Ethernet interface		One RJ-45 connector on rear panel
Serial port interface (asynchronous)		One DB-9 connector on rear panel and one 10-pin header
Parallel port interface		One 25-pin D-sub on rear panel
USB interface		Two Type A connectors on rear panel and one header onboard
Keyboard interface		6-pin D-sub on rear panel
Mouse interface		6-pin D-sub on rear panel

Board component temperatures are affected by ambient temperature, air flow, board electrical operation, and software operation. In order to evaluate the thermal performance of a circuit board assembly, it is necessary to test the board under actual operating conditions. These operating conditions vary depending on system design.

While Motorola Computer Group (MCG) performs thermal analysis in a representative system to verify operation within specified ranges (see [Appendix A, Specifications](#)), you should evaluate the thermal performance of the board in your application.

This appendix provides systems integrators with information which can be used to conduct thermal evaluations of the board in their specific system configuration. It identifies thermally significant components and lists the corresponding maximum allowable component operating temperatures. It also provides example procedures for component-level temperature measurements.

Thermally Significant Components

The following table summarizes components that exhibit significant temperature rises. These are the components that should be monitored in order to assess thermal performance. The table also supplies the component reference designator and the maximum allowable operating temperature.

You can find components on the board by their reference designators as shown in [Table B-1](#) and [Figure B-1](#). Versions of the board that are not fully populated may not contain some of these components.

The preferred measurement location for a component may be *junction*, *case*, or *air* as specified in the table. Junction temperature refers to the temperature measured by an on-chip thermal device. Case temperature

refers to the temperature at the top, center surface of the component. Air temperature refers to the ambient temperature near the component.

Table B-1. Thermally Significant Components

Reference Designator	Generic Description	Max. Allowable Component Temperature (deg. C)	Measurement Location
U1	ALC200 Audio Codec	110	Case
U7	82562EM Platform LAN Connect Device	135	Case
U9	566MHz FC-PGA Celeron Processor	90	Junction
	733MHz FC-PGA PIII Processor	80	Junction
	866MHz FC-PGA PIII Processor	80	Junction
U10	82815 Graphics and Memory Controller Hub (GMCH)	116	Case
U14	Intel 82801BA IO Controller Hub 2 (ICH2)	109	Case
U15	Winbond 83627HF Hardware Monitor and Super IO Device	70	Case

Note All of the thermally significant components are located on the primary side of the VP22 motherboard.

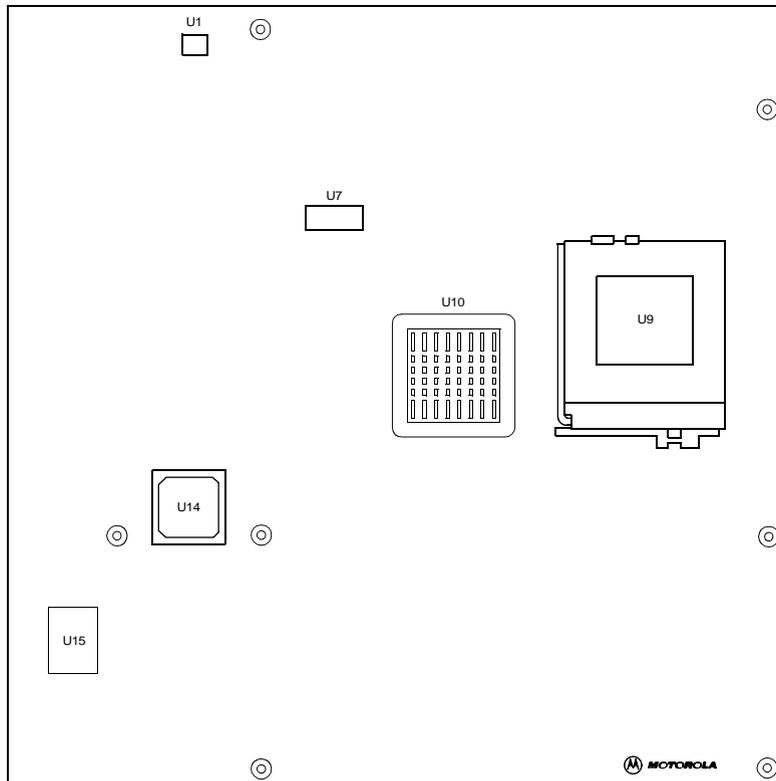


Figure B-1. Thermally Significant Components—Primary Side

Component Temperature Measurement

The following sections outline general temperature measurement methods. For the specific types of measurements required for thermal evaluation of this board, see [Table B-1](#).

Preparation

We recommend 40 AWG (American wire gauge) thermocouples for all thermal measurements. Larger gauge thermocouples can wick heat away from the components and disturb air flowing past the board.

Allow the board to reach thermal equilibrium before taking measurements. Most circuit boards will reach thermal equilibrium within 30 minutes. After the warm up period, monitor a small number of components over time to assure that equilibrium has been reached.

Measuring Junction Temperature

Some components have an on-chip thermal measuring device such as a thermal diode. For instructions on measuring temperatures using the onboard device, refer to the component manufacturer's documentation listed in [Appendix C, Related Documentation](#).

Measuring Case Temperature

Measure the case temperature at the center of the top of the component. Make sure there is good thermal contact between the thermocouple junction and the component. We recommend you use a thermally conductive adhesive such as Loctite 384.

If components are covered by mechanical parts such as heatsinks, you will need to machine these parts to route the thermocouple wire. Make sure that the thermocouple junction contacts *only* the electrical component. Also make sure that heatsinks lay flat on electrical components. The following figure shows one method of machining a heatsink base to provide a thermocouple routing path.

Note Machining a heatsink base reduces the contact area between the heatsink and the electrical component. You can partially compensate for this effect by filling the machined areas with thermal grease. The grease should not contact the thermocouple junction.

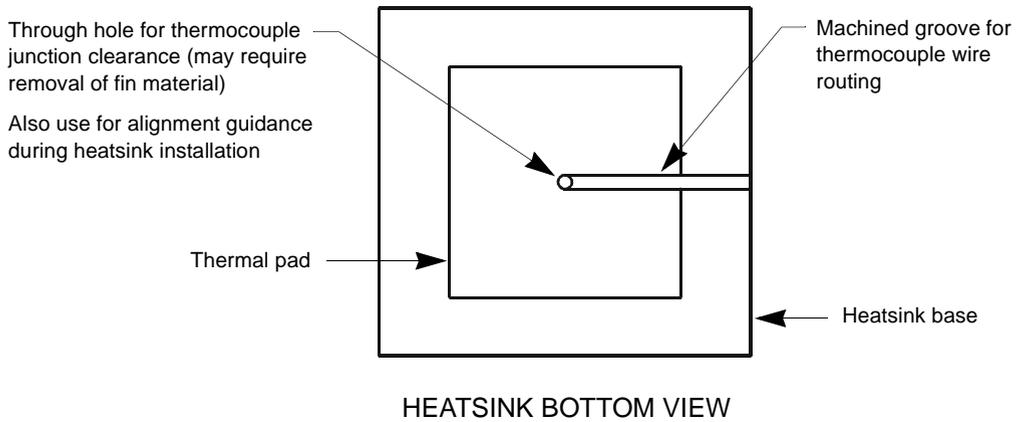
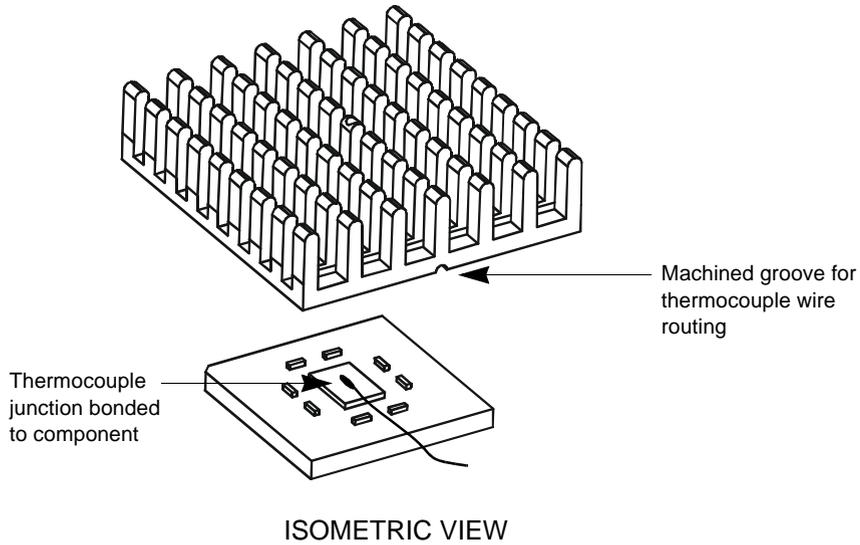


Figure B-2. Mounting a Thermocouple Under a Heatsink

B**Measuring Local Air Temperature**

Measure local component ambient temperature by placing the thermocouple downstream of the component. This method is conservative since it includes heating of the air by the component. The following figure illustrates one method of mounting the thermocouple.

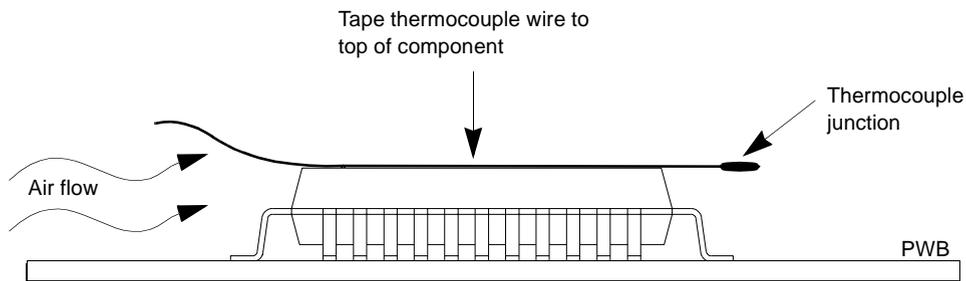


Figure B-3. Measuring Local Air Temperature



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 Motorola Computer Group's World Wide Web literature site, <http://www.motorola.com/computer/literature>

Table C-1. Motorola Computer Group Documents

Document Title	Motorola Publication Number
VP22 microATX Motherboard BIOS and Programmer's Reference Guide	VP22BIOSA/RM

To obtain the most up-to-date product information in PDF or HTML format, visit <http://www.motorola.com/computer/literature>.

Manufacturers' Documents

For additional information, refer to the following table for manufacturers' data sheets or user's manuals. As an additional help, a source for the listed

document is provided. Please note that, while these sources have been verified, the information is subject to change without notice.

C

Table C-2. Manufacturers' Documents

Document Title	Publication Number
Celeron Processor Data Sheet; Intel Corporation http://developer.intel.com/design/celeron/datashts/243658.htm	24365815.pdf
Pentium III Processor for the PGA370 socket at 500 MHz to 1.0B GHz— Datasheet; Intel Corporation; http://developer.intel.com/design/pentiumiii/datashts/245264.htm	24526406.pdf
Intel 815 Series Chipset: 82815 Graphics and Memory Controller (GMCH)—Datasheet; Intel Corporations; http://developer.intel.com/design/chipsets/datashts/290688.htm	29068801.pdf
Intel 82801BA I/O Controller Hub2 (ICH2)—Datasheet; Intel Corporation; http://developer.intel.com/design/chipsets/datashts/290687.htm	29068702.pdf
Intel 815E Chipset Platform Design Guide—Datasheet; Intel Corporation; http://developer.intel.com/design/chipsets/designex/298234.htm	29823401.pdf
Winbond W83627HF Hardware Monitor—Datasheet; http://www.winbond.com/PDF/sheet/w83627hf.pdf	w83627hf.pdf

Related Specifications

For additional information, refer to the following table for related specifications. As an additional help, a source for the listed document is

provided. Please note that, while these sources have been verified, the information is subject to change without notice.

Table C-3. Related Specifications

Document Title and Source	Publication Number
Peripheral Component Interconnect (PCI) Local Bus Specification, Revision 2.0, 2.1, 2.2; PCI Special Interest Group; http://www.picmg.com/	PCI Local Bus Specification
IEEE – PCI Mezzanine Card Specification (PMC) Institute of Electrical and Electronics Engineers, Inc.	P1386.1 Draft 2.0
Universal Serial Bus (USB) Intel Corporation; http://www.intel.com/design/litcentr/	297773-001
Accelerated Graphics Port Interface Specification, Revision 2.0; Intel Corporation; http://www.intel.com/technology/agp/agp_index.htm	agp10.pdf

URLs

The following URLs (uniform resource locators) may provide helpful sources of additional information about this product, related services, and development tools. Please note that, while these URLs have been verified, they are subject to change without notice.

- ❑ Motorola Computer Group, <http://www.motorola.com/computer>
- ❑ Motorola Computer Group OEM Services,
<http://www.motorola.com/computer/support>
- ❑ Intel Corporation, <http://www.intel.com>

Index

A

altitude [A-2](#)
ambient temperature, measuring [B-6](#)
ambient temperatures [B-2](#)
asynchronous serial ports [2-6](#)
audio interface [2-7](#)

B

battery
 handling [1-14](#)
 replacing onboard [1-14](#)
battery backup
 onboard [1-14](#)
BIOS [2-7](#)
block diagram, VP22 [2-1](#)
board
 component temperatures [B-1](#)
board connectors [1-12](#)
board dimensions [A-2](#)

C

cache memory [2-4](#)
comments, sending [xiv](#)
completing the installation [1-13](#)
connector pin assignments [3-1](#) to [3-10](#)
connectors
 ATX power (CN11) [3-5](#)
 audio LINE IN (PH2) [3-10](#)
 audio LINE OUT (PH3) [3-10](#)
 audio MIC IN (PH1) [3-10](#)
 CD-IN (CN6) [3-3](#)
 chassis fan (FN2) [3-9](#)
 COM1 (CN2) [3-1](#)
 COM2 (CN7) [3-4](#)
 compact floppy disk drive (CN16) [3-8](#)
 CPU fan (FN1) [3-9](#)
 Ethernet (CN5) [3-3](#)

 floppy disk drive (CN12) [3-6](#)
 front panel (CN14) [3-7](#)
 internal USB 2 (CN17) [3-9](#)
 IrDA (CN13) [3-6](#)
 keyboard/mouse (CN3) [3-2](#)
 open chassis alarm (CN15) [3-8](#)
 parallel (CN4) [3-2](#)
 second fan (FN3) [3-9](#)
 secondary/primary IDE (CN8/10) [3-4](#)
 SVGA (CN1) [3-1](#)
 temperature sensor (CN9) [3-5](#)
 USB0, 1 (CN5) [3-3](#)

controllers

 Intel 82562EM (Ethernet) [2-5](#)
 Intel 82801BA (I/O hub) [2-2](#), [2-8](#)
 Intel 82802BA (firmware hub) [2-2](#), [2-7](#)
 Intel 82815 (graphics/memory hub) [2-2](#),
 [2-8](#)
 Winbond 83627HF [2-8](#)

conventions used in the manual [xv](#)

counters [2-7](#)

CPU temperature monitor [2-8](#)

D

dimensions [A-2](#)
DIMM memory, installation [1-8](#)
documents, Motorola Computer Group [C-1](#)

E

environmental monitoring [2-8](#)
ESD precautions [1-6](#)
Ethernet [2-5](#)
 LED functions [2-5](#)
evaluating thermal performance [B-1](#)

F

features, hardware [1-1](#), [2-2](#)

firmware 2-7
floppy port 2-6

H

hardware features 1-1, 2-2
hardware monitor 2-8
hardware preparation 1-3
header, setting 1-3
heatsink, machining B-4
humidity A-2

I

I/O connectors A-2
installation
 completing 1-13
 DIMM memory 1-8
 PCI adapter board 1-9
 processor 1-13
 replacement battery 1-14
installation preliminaries 1-6
interface
 audio 2-7
 Ethernet 2-5
 floppy 2-6
 keyboard 2-6
 parallel 2-6
 serial 2-6
 USB 2-4
 video 2-8

J

jumper
 JP1, CMOS clear 1-5
jumper settings 1-3

K

keyboard port 2-6

L

L2 cache 2-4
LED functions, Ethernet 2-5
lithium battery 1-14
lithium battery precautions 1-14

M

manual conventions xv
manufacturers' documents C-1
memory 2-4
motherboard
 installation 1-7
 preparation 1-3
mouse port 2-6

N

non-volatile RAM (NVRAM) 2-7

O

onboard battery
 replacing 1-14
open chassis alarm 2-8
operating temperatures, maximum B-1

P

parallel port 2-6
PCI adapter board, installation 1-9
PCI slots 2-5
pin assignments 3-1 to 3-10
 ATX power connector 3-5
 audio LINE IN connector 3-10
 audio LINE OUT connector 3-10
 audio MIC IN connector 3-10
 CD-IN connector 3-3
 chassis fan connector 3-9
 COM1 serial port connector 3-1
 COM2 connector 3-4
 compact floppy disk drive
 connector 3-8
 CPU fan connector 3-9
 Ethernet connector 3-3
 floppy disk drive connector 3-6
 front panel connector 3-7
 internal USB 2 connector 3-9
 IrDA connector 3-6
 keyboard/mouse connector 3-2
 open chassis alarm connector 3-8
 parallel port connector 3-2

- second fan connector [3-9](#)
- secondary/primary IDE connector [3-4](#)
- SVGA connector [3-1](#)
- temperature sensor connector [3-5](#)
- USB0, 1 connector [3-3](#)

pinouts [3-1](#) to [3-10](#)

power requirements [A-1](#)

processor [2-4](#)

- remove and replace [1-13](#)

R

- real-time clock [2-7](#)
- rear I/O connectors [A-2](#)
- related documentation [C-1](#)
- related specifications [C-2](#)
- relative humidity [A-2](#)
- reset circuit [2-8](#)

S

- SDRAM [2-4](#)
- serial ports [2-6](#)
- shielded cables [2-4](#)
- specifications, board [A-1](#)
- specifications, related [C-2](#)
- startup overview [1-2](#)

- suggestions, submitting [xiv](#)

T

- temperature measurement [B-1](#), [B-3](#), [B-4](#)
- temperature monitor, CPU [2-8](#)
- temperature range [A-2](#)
- temperatures, component [B-1](#)
- thermal performance [B-1](#)
- thermocouple, mounting [B-5](#)
- timers, programmable [2-7](#)
- typeface, meaning of [xv](#)

U

- unpacking guidelines [1-2](#)
- URLs (uniform resource locators) [C-3](#)
- USB (universal serial bus) [2-4](#)

V

- vibration [A-2](#)
- video interface [2-8](#)

W

- watchdog timer [2-9](#)
- Winbond 83627HF [2-8](#)