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ETX Component SBC™

ETX-P3M User's Guide

Document Revision 1.9

kontron

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1. User Information

1.1 About This Manual

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JUMP*tec* Industrielle Computertechnik AG and Kontron Embedded Computers AG merged in July 2002. JUMP*tec* is now known as Kontron Embedded Modules GmbH. Products labeled and sold under the Kontron Embedded Modules name (formerly JUMP*tec*) are now considered Kontron products for all practical purposes, including warranty and support.

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- Microsoft is a registered trademark of Microsoft Corp.
- Intel is a registered trademark of Intel Corp.
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1.4 Standards

Kontron Embedded Modules is certified to ISO 9000 standards.

1.5 Warranty

This Kontron Embedded Modules product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron Embedded Modules will not be responsible for any defects or damages to other products not supplied by Kontron Embedded Modules that are caused by a faulty Kontron Embedded Modules product.

1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Before contacting Kontron Embedded Modules technical support, please consult our Web site at http://www.kontron-em.com/index-en.html for the latest product documentation, utilities, and drivers. If the information does not help solve the problem, contact us by telephone.

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2. Introduction

2.1 ETX-P3M

ETX-P3M component SBC modules support the Mobile Intel® Pentium® III Processor-M and the Mobile Intel® Celeron® Processor. The ETX-P3M features a VIA VT8606/VT82C686B core chip set and provides ProSavage 4 AGP4x graphics and VIA-enhanced audio.

In addition to standard ETX features, the *ETX-P3M* supports four USB ports, up to 1GB SDRAM (with custom module), 10/100Base-TX Ethernet, keyboard/mouse controllers, a real-time clock, and a watchdog timer.

2.2 ETX Documentation

This product manual serves as one of three principal references for an ETX design. It documents the specifications and features of *ETX-P3M*. The other two references, which are available from the Kontron Embedded Modules Web site include:

- The *ETX Component SBC™ Specification* defines the ETX module form factor, pinout, and signals. You should read this first.
- The *ETX Component SBC™ Design Guide* serves as a general guide for baseboard design, with a focus on maximum flexibility to accommodate a range of ETX modules.

2.3 ETX Benefits

Embedded technology extended (ETX) modules are very compact (~100mm square, 12mm thick), highly integrated computers. All ETX modules feature a standardized form factor and a standardized connector layout that carry a specified set of signals. This standardization allows designers to create a single-system baseboard that can accept present and future ETX modules.

ETX modules include common personal computer (PC) peripheral functions such as:

- Graphics
- Parallel, Serial, and USB ports
- Keyboard/mouse
- Ethernet
- Sound
- IDE

The baseboard designer can optimize exactly how each of these functions implements physically. Designers can place connectors precisely where needed for the application on a baseboard designed to optimally fit a system's packaging.

Peripheral PCI or ISA buses can be implemented directly on the baseboard rather than on mechanically unwieldy expansion cards. The ability to build a system on a single baseboard using the computer as one plug-in component simplifies packaging, eliminates cabling, and significantly reduces system-level cost.

A single baseboard design can use a range of ETX modules. This flexibility can differentiate products at various price/performance points, or to design future proof systems that have a built-in upgrade path. The modularity of an ETX solution also ensures against obsolescence as computer technology evolves. A properly designed ETX baseboard can work with several successive generations of ETX modules.

An ETX baseboard design has many advantages of a custom, computer-board design but delivers better obsolescence protection, greatly reduced engineering effort, and faster time to market.

3. Specifications

3.1 Functional Specifications

- **Processor**
  - *ETX-P3M*: Mobile Intel® Pentium® III Processor-M-800/933/1000/1200MHz
  - Mobile Intel® Celeron® Processor-400/650/1200MHz (µPGA478 socketed CPU, µBGA478 SMT CPU models)
- **Bus**
  - 100/133MHz CPU bus
  - 133MHz memory bus
- **Chipset: VIA VT8606/VT82C686B (north bridge/south bridge)**
- **Super I/O: Integrated in VIA VT82C686B (south bridge)**
- **Cache: On-die Second level 512kB/256kB**
- **Memory**
  - One 144-pin SO-DIMM
  - 3.3V PC-133 or PC-100 unbuffered SDRAM, up to 512MB (up to 1GB with custom module)
- **Two Serial Ports (COM1 and COM2)**
  - Transistor-to-transistor (TTL) signals only
  - 16550 compatible
- **Infrared Device Association (IrDA) interface**
- **One Parallel Port (LPT1)**
  - Shared with Floppy signals
  - Enhanced Parallel Port (EPP) and Extended Capabilities Port (ECP) with bi-directional capability
- **Floppy: Shared with LPT signals**
- **Enhanced Intelligent Drive Electronics (EIDE): Two Peripheral Component Interconnect (PCI) Bus Master IDE ports (up to four devices) support:**
  - Ultra 33 Direct Memory Access (DMA) mode
  - Programmed Input/Output (PIO) modes up to Mode 4 timing
  - Multiword DMA Mode 0,1,2 with independent timing
- **Universal Serial Bus (USB)**
  - Four USB 1.1 ports (UHCI)
  - USB legacy keyboard support
  - USB floppy-boot support

- **Onboard Ethernet: Intel 82551 or Intel 82559 10/100 Mbps Fast Ethernet controller**
  - Integrated IEEE 802.3 10BASE-T and 100BASE-TX compatible PHY
- **Onboard video graphics array (VGA): Integrated in VIA VT8606:**
  - 4x AGP, ProSavage 4 controller
  - Up to 32MB Video RAM (UMA)
  - Cathode ray tube (CRT) and low voltage differential signaling (LVDS) liquid-crystal display (LCD) interfaces
- **Audio: Integrated in VIA VT82C686B**
  - SoundBlaster™ AC97, Windows Sound System™ compatible
- **Television output via a VT1621 TV encoder (available only on revisions B.0 and later)**
- **BIOS: Phoenix, 512KB Flash-BIOS**
  - NV-EEPROM for CMOS-setup retention without battery
- **PS/2 keyboard controller**
- **PS/2 mouse interface**
- **Watchdog timer (WDT) with PIC**
- **Real-time clock (requires external battery)**
- **BIOS support for additional super I/O devices (COM3, COM4, LPT, and Floppy)**

3.2 Mechanical Specifications

3.2.1 Dimensions

- 95.0 mm x 114.0 mm (3.75" x 4.5")
- Height approx. 12 mm (0.4")

3.3 Electrical Specifications

3.3.1 Supply Voltage

- 5V DC +/- 5%

3.3.2 Supply Voltage Ripple

- Maximum 100 mV peak to peak 0 – 20 MHz

3.3.3 Supply Current (typical, DOS prompt)

Power-consumption tests were executed during the DOS prompt and without a keyboard. Using a keyboard takes an additional 100 mA.

All tested boards were fully equipped –AL boards. All boards were equipped with 64-MB SDRAM.

For modules that support the "CPU Speedstep" feature in the BIOS, the corresponding table displays both LOW and HIGH speed power consumption figures.

ETX-P3M 1.2GHz

CPU Clock	1.2 GHz		
Revisions	Bios Rev. 111		
Mode	Full On	Standby	Suspend
Power Consumption LOW	2.5 A	.90 A	.80 A
Power Consumption HIGH	4.3 A	1.3 A	1.2 A

ETX-P3M 1.0GHz

CPU Clock	1.0 GHz		
Revisions	Bios Rev. 111		
Mode	Full On	Standby	Suspend
Power Consumption LOW	2.2 A	1.5 A	0.8 A
Power Consumption HIGH	3.3 A	1.7 A	0.9 A

ETX-P3M Celeron 1.2GHz

CPU Clock	Celeron 1.2 GHz		
Revisions	Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	3.9 A	1.9 A	1.1 A

ETX-P3M 933MHz

CPU Clock	933 MHz		
Revisions	Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.6 A	2.4 A	0.9 A

ETX-P3M 800MHz

CPU Clock	800 MHz		
Revisions	Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.5 A	2.3 A	0.9 A

ETX-P3M Celeron 650MHz

CPU Clock	Celeron 650 MHz		
Revisions	Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.1 A	1.5 A	0.7 A

ETX-P3M Celeron 400MHz

CPU Clock	Celeron 400 MHz		
Revisions	Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	1.7 A	1.4 A	0.7 A

3.3.4 CMOS Battery Power Consumption

RTC @ 20°C	Voltage	Current
Integrated in south bridge	2.5 V	1.73 µA
	3.0 V	3.32 µA

Max. current	Voltage Range
50µA	2.0 V - 3.6 V

CMOS battery power consumption was measured with an ETX module on a standard Kontron ETX evaluation board. The system was turned off and the battery was removed from the evaluation board. The 2.5 V or 3.0 V of power was supplied from a DC power supply. Do not rely only on the above measured values to calculate the CMOS battery lifetime. We recommend that you measure the current using a complete application in a worst case scenario setting (high temperature / high battery voltage). When calculating CMOS battery lifetime you must also consider the self-discharge of the battery. For detailed information see the VIA VT82C686 datasheet.

3.4 Environmental Specifications

3.4.1 Temperature

- Operating: (with Kontron Embedded Modules heat-spreader plate assembly):
  - Pentium III and Celeron 1200MHz modules: Ambient temperature: 0 to +50 °C
  - All other ETX-P3M modules: Ambient temperature: 0 to +60 °C
  - Pentium III and Celeron 1200MHz modules: Maximum heatspreader-plate temperature: 0 to +50 °C (*)
  - All other ETX-P3M modules: Maximum heatspreader-plate temperature: 0 to +60 °C (*)
- Nonoperating: -30 to +85 °C

See the **Thermal Management** chapter for additional information.

Note: *The maximum operating temperature with the heatspreader plate is the maximum measurable temperature on any spot on the heatspreader's surface. You must maintain the temperature according to the above specification.

- Operating (without Kontron Embedded Modules heat-spreader plate assembly):
  - Pentium III and Celeron 1200MHz modules: Maximum operating temperature: 0 to +50 °C (**)
  - All other ETX-P3M modules: Maximum operating temperature: 0 to +60 °C (**)
- Nonoperating: -30 to +85 °C

See the **Thermal Management** chapter for additional information.

Note: **The maximum operating temperature is the maximum measurable temperature on any spot on a module's surface. You must maintain the temperature according to the above specification.

3.4.2 Humidity

- Operating: 10% to 90% (noncondensing)
- Nonoperating: 5% to 95% (noncondensing)

3.5 MTBF

The following MTBF (Mean Time Between Failure) values were calculated using a combination of manufacturer's test data, if the data was available, and a Bellcore calculation for the remaining parts. The Bellcore calculation used is "Method 1 Case 1". In that particular method the components are assumed to be operating at a 50 % stress level in a 40° C ambient environment and the system is assumed to have not been burned in. Manufacturer's data has been used wherever possible. The manufacturer's data, when used, is specified at 50° C, so in that sense the following results are slightly conservative. The MTBF values shown below are for a 40° C in an office or telecommunications environment. Higher temperatures and other environmental stresses (extreme altitude, vibration, salt water exposure, etc.) lower MTBF values.

- **System MTBF (hours) :** **130.992 (socket CPU)**
- **System MTBF (hours):** **146,574 (soldered BGA)**

Notes: Fans usually shipped with Kontron Embedded Modules GmbH products have 50,000-hour typical operating life. The above estimates assume no fan, but a passive heat sinking arrangement.
Estimated RTC battery life (as opposed to battery failures) is not accounted for in the above figures and need to be considered for separately. Battery life depends on both temperature and operating conditions. When the Kontron unit has external power; the only battery drain is from leakage paths.

4. CPU, Chipset, and Super I/O

4.1 CPU

The central processing unit (CPU) consists of either a:

- Mobile Intel® Pentium® III Processor-M, which contains 512kB of integrated L2 cache.
- Mobile Intel® Celeron® Processor, which contains 256kB of integrated L2 cache.

The Mobile Intel® Pentium® III Processor-M supports Intel®'s SpeedStep function, which is explained in the BIOS section.

4.2 Chipset

The VIA Technologies' Twister-T chipset consists of:

- VT8606 controller (north bridge)
- VT82C686B controller (south bridge)

4.3 Super I/O

The super I/O device is integrated in the south bridge of the VIA chipset, the VT82C686B.

5. System Memory

The *ETX-P3M* uses 144-pin Small Outline-Dual Inline Memory Modules (SO-DIMMs). One socket is available for a 3.3-volt, unbuffered PC-133 or PC-100 SDRAM module of 16, 32, 64, 128, 256, or 512MB capacity. For a custom 1GB module, please contact Kontron sales.

6. Connector X1 Subsystems

6.1 PCI Bus

The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

6.2 USB

Two UHCI-type USB host controllers are on the VIA VT82C686B south bridge device. The USB controllers comply with Version 1.1 of the USB standard. The two controllers implement a root hub, which have two USB ports each.

6.2.1 Configuration

The USB controllers are PCI bus devices. The BIOS allocates required system resources during configuration of the PCI bus.

6.3 Audio

The *ETX-P3M* PCI audio controller is integrated in the VIA VT82C686B south bridge device. The audio codec is compatible with AC97 and SoundBlaster Pro™.

6.3.1 Configuration

The audio controller is a PCI bus device. The BIOS allocates required system resources during configuration of the PCI device.

6.4 Serial Interrupt Request

External serial interrupt request signals are connected to the serial interrupt request input on the VT82C686B south bridge device. In some cases, this is a useful alternative to ISA/PCI interrupts. Please note that a hardware modification and customized BIOS are required in order to use this feature. Please contact Kontron Embedded Modules Technical Support for information on using this feature.

6.5 3.3V Power Supply for External Components

The *ETX-P3M* offers the ability to connect external 3.3V devices to the onboard-generated supply voltage. Pin 12 and Pin 16 of Connector X1 are used to connect to the +3.3V ±5% power supply. The maximum external load is 500mA. Contact Kontron Embedded Systems Technical Support for help with this feature.

WARNING **Do not connect 3.3V pins to an external 3.3V supply.**

For additional information, refer to the *ETX Design Guide*, I^2C application notes, and JIDA specifications, all of which are available on the Kontron Embedded Systems Web site.

7. Connector X2 Subsystems

7.1 ISA Bus Slot

The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8. Connector X3 Subsystems

8.1 VGA Output

The *ETX-P3M* graphics subsystem is integrated in the VIA VT8606 north bridge device and is based on an S3 ProSavage4 AGP 4x core. It conforms to the requirements of Revision 2.0 of the accelerated graphics port (AGP) interface specification. It can drive cathode ray tube (CRT) monitors and flat-panel displays, using the JUMPtec Intelligent LVDS Interface (JILI). You can program the graphics controller to use up the 32MB of unified memory architecture (UMA) memory as its video memory.

- Max. resolution CRT
  - 1920x1440 (64k colors)
  - UXGA 1600x1200 (4G colors)
- Max. resolution LCD
  - UXGA 1600x1200 (4G colors)
  - Bits/Pixels supported 1x18, 2x18

8.1.1 Configuration

The graphics controller requires the following resources:

- An IRQ
- Several I/O addresses
- Memory-address blocks in high memory

The BIOS allocates the resources during AGP configuration. Many resources are set for compatibility with industry-standard settings.

8.2 LVDS Flat Panel Interface (JILI)

The user interface for flat panels is the JUMPtec Intelligent LVDS Interface (JILI). The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.3 Digital Flat Panel Interface (JIDI)

The *ETX-P3M* does not support the JUMPtec Intelligent Digital Interface (JIDI).

8.4 Television Output

The *ETX-P3M* offers an option for television output via a VT1621 TV encoder.

8.5 Serial Ports (1 and 2)

The *ETX-P3M* supports two serial interfaces (TTL). You can use COM2 for IrDA SIR operation. This feature is implemented in the super I/O device, which is integrated in the VIA VT82C686B south bridge.

The implementation of the serial interface complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.5.1 Configuration

The serial-communication interface uses I/O and IRQ resources. The resources are allocated by the BIOS during POST configuration and are set to be compatible with common PC/AT settings. Use the BIOS setup to change some parameters that relate to the serial-communication interface.

8.6 PS/2 Keyboard

The implementation of the keyboard interface complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.6.1 Configuration

The keyboard uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings. Use the BIOS setup to change some keyboard-related parameters.

8.7 PS/2 Mouse

The implementation of the mouse interface complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.7.1 Configuration

The mouse uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings. You can change some mouse-related parameters from the BIOS setup.

8.8 IrDA

The *ETX-P3M* is capable of IrDA SIR operation. This feature is implemented in the south bridge of the VIA chipset, the VT82C686B super I/O device. Contact Kontron Embedded Systems for help with this feature.

8.9 Parallel Port

The parallel-communication interface shares signals with the floppy-disk interface. The implementation of this parallel port complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.9.1 Configuration

The parallel-communication interface uses I/O, IRQ, and DMA resources. The resources are allocated by the BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change some parameters of the parallel-communication interface through the BIOS setup.

8.10 Floppy

The floppy-disk interface shares signals with the parallel-communication interface. The floppy interface is limited to one drive (drive_1). A standard floppy cable has two connectors for floppy drives. One connector has a non-twisted cable leading to it, the other has a twisted cable leading to it. When using the floppy interface you must connect the floppy drive to the connector (drive_1) that has the non-twisted cable leading to it.

The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

8.10.1 Configuration

The floppy-disk controller uses I/O, IRQ, and direct memory access (DMA) resources. These resources are allocated by BIOS during POST configuration and are compatible with common PC/AT settings. You can change some parameters of the parallel-communication interface through the BIOS setup.

9. Connector X4 Subsystems

9.1 IDE Ports

The IDE host adapter is capable of DMA-33 operation. The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to those documents for additional information.

9.1.1 Configuration

Primary and secondary IDE host adapters are PCI bus devices. They are configured by the BIOS during PCI device configuration. You can disable them in setup. Resources used by the primary and secondary IDE host adapters are compatible with the PC/AT.

Note: PHOENIX BIOS will not recognize a Slave device on an IDE port if there is no Master device connected to the same IDE port.

9.2 Ethernet

The Ethernet interface is based on the Intel 82551 or 82559 Fast Ethernet PCI controller. This 32-bit PCI controller is a fully integrated 10/100BASE-TX LAN solution.

The Ethernet interface requires an external transformer. See the *ETX Design Guide* for suggestions on transformer selection.

9.2.1 Configuration

The Ethernet interface is a PCI device. The BIOS setup automatically configures it during configuration of the PCI device.

Note: The Ethernet interface works according to the common criteria of the embedded technology market segment.

9.3 Power Control

9.3.1 Power Good / Reset Input

The *ETX-P3M* provides an external input for a power-good signal or a manual- reset pushbutton. The implementation of this subsystem complies with the *ETX Specification*. Implementation

information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

9.4 Power Management

9.4.1 ATX PS Control

The *ETX-P3M* can control the main power output of an ATX-style power supply. The implementation of this subsystem complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

9.4.2 External SMI Interrupt

Contact Kontron Embedded Modules technical support for information on this feature.

9.5 Miscellaneous Circuits

9.5.1 Speaker

The implementation of the speaker output complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

9.5.2 Battery

The implementation of the battery input complies with the *ETX Specification*. Implementation information is provided in the *ETX Design Guide*. Refer to the documentation for additional information.

In compliance with EN60950, there are at least two current-limiting devices (resistor and diode) between the battery and the consuming component.

9.5.3 I^2C Bus

The I^2C Bus is implemented by using general purpose I/O.

You also can access the I^2C Bus via JUMP*tec*'s Intelligent Device Architecture (JIDA) BIOS functions.

For additional information, refer to the *ETX Design Guide*. I^2C application notes and JIDA specifications which are available at the Kontron Web site.

9.5.4 SM Bus

System Management (SM) bus signals are connected to the SM bus controller, which is located in the VIA VT82C686B south bridge device. For more information about the SM bus, please see the System Management (SM) Bus section in the Appendix A: System Resources chapter.

10. Special Features

10.1 Watchdog Timer

This feature is implemented in a microcontroller. You can configure the Watchdog Timer (WDT) in BIOS setup to start after a set amount of time after power-on boot. The application software should strobe the WDT to prevent its timeout. Upon timeout, the WDT resets and restarts the system. This provides a way to recover from program crashes or lockups.

10.1.1 Configuration

You can program the timeout period for the watchdog timer in two ranges:

- 1-second increments from 1 to 255 seconds
- 1-minute increments from 1 to 255 minutes

Contact Kontron Embedded Modules technical support for information on programming and operating the WDT.

11. Design Considerations

11.1 Thermal Management

A heat-spreader plate assembly is available from Kontron Embedded Modules for the *ETX-P3M*. The heat-spreader plate on top of this assembly is NOT a heat sink. It works as an ETX-standard thermal interface to use with a heat sink or other cooling device.

External cooling must be provided to maintain the heat-spreader plate at proper operating temperatures. Under worst-case conditions, the cooling mechanism must maintain an ambient air and heat-spreader plate temperature of 60° C or less.

The aluminum slugs and thermal pads on the underside of the heat-spreader assembly implement thermal interfaces between the heat spreader plate and the major heat-generating components on the *ETX-P3M*. About 80 percent of the power dissipated within the module is conducted to the heat-spreader plate and can be removed by the cooling solution.

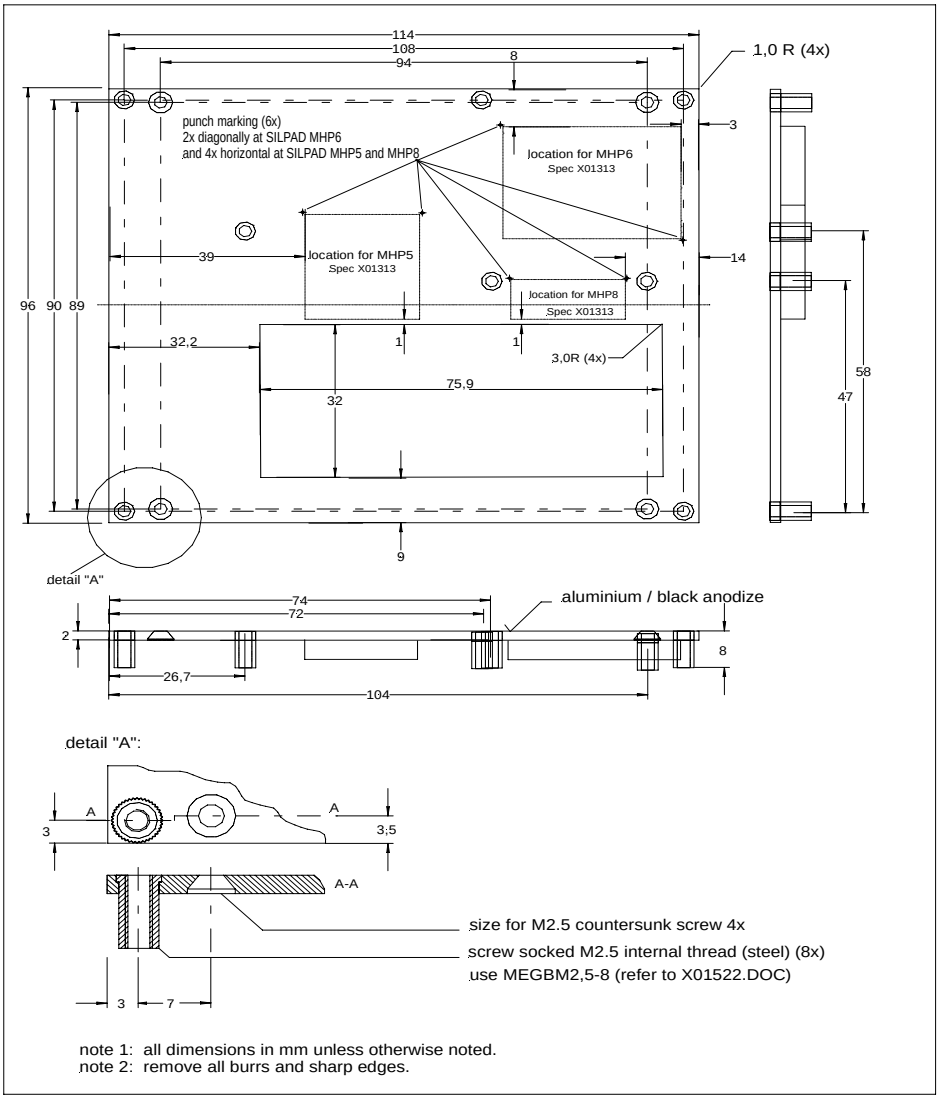
For 1200MHz modules, the heat dissipated into the plate ranges from 18 to 20 watts. Design a cooling solution to dissipate the heat load on a heat-spreader plate at a minimum of 20 watts to accommodate all *ETX-P3M* modules.

You can use many thermal-management solutions with the heat-spreader plates, including active and passive approaches. The optimum cooling solution varies, depending on the ETX application and environmental conditions. Please see the *ETX Design Guide* for further information on thermal management.

11.2 Heat-spreader Dimensions

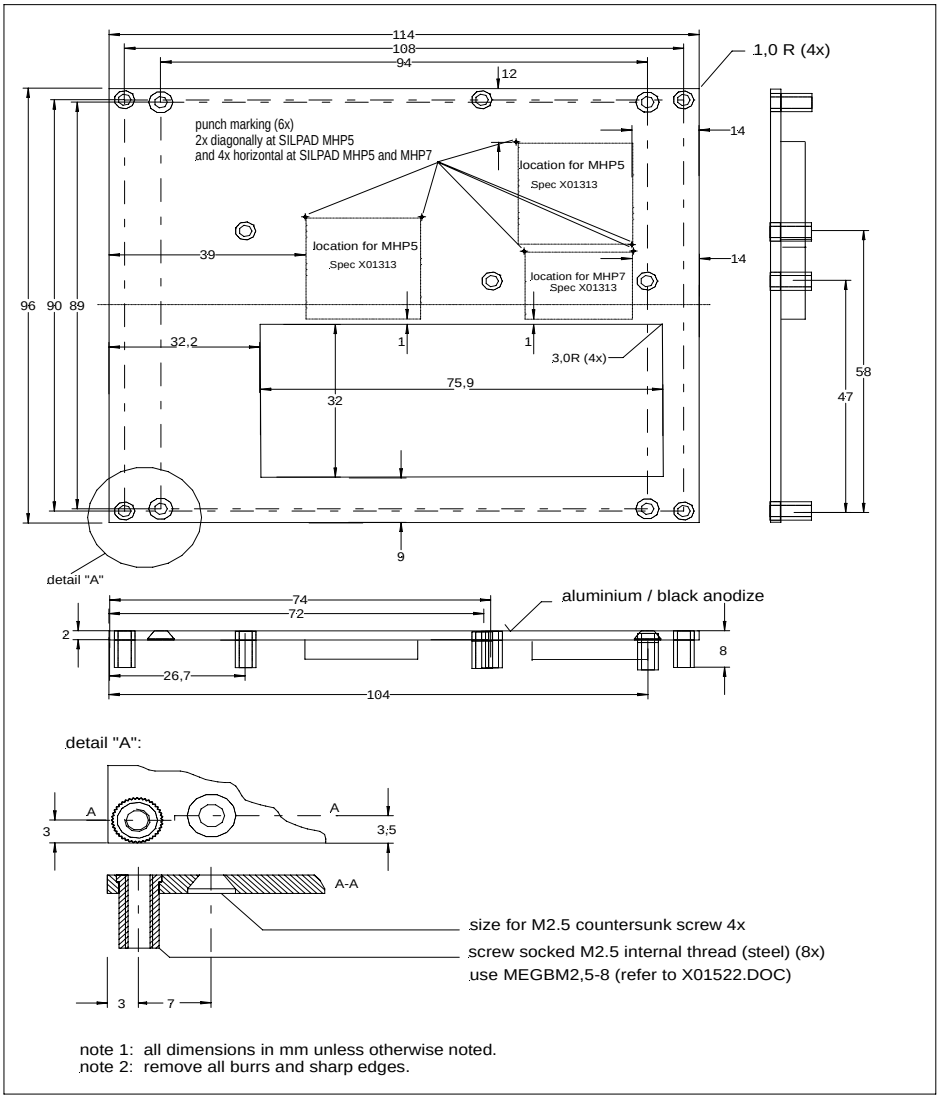
11.2.1 Socketed CPU

This is the backside view of the heatspreader plate with pads marked for the heat generating components.

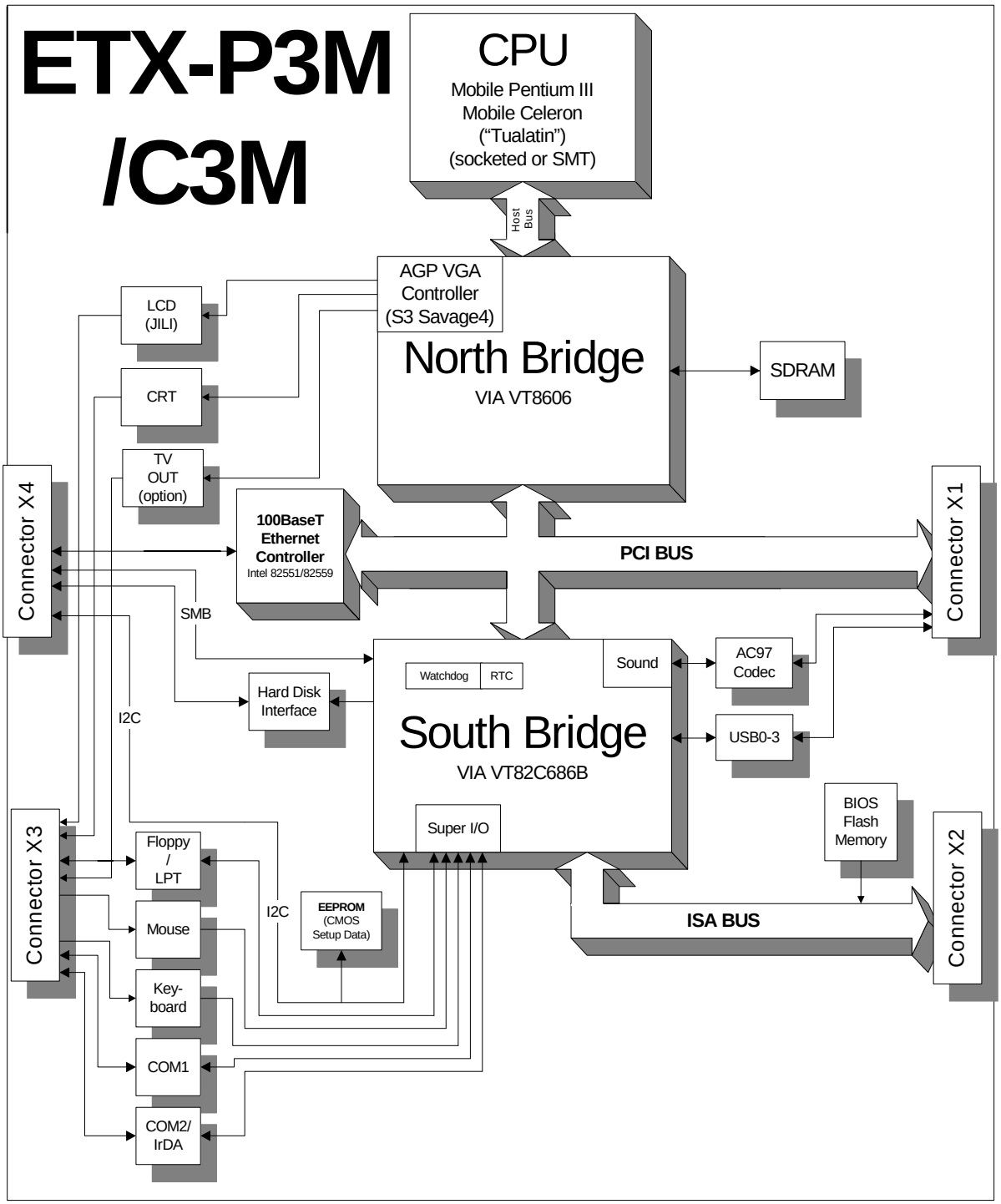


11.2.2 Embedded CPU

This is the backside view of the heatspreader plate with pads marked for the heat generating components.



12. Appendix a: block diagram



13. Appendix B: System Resources

13.1 Interrupt Request (IRQ) Lines

IRQ #	Used For	Available	Comment
0	Timer0	No	
1	Keyboard	No	
2	Slave 8259	No	
3	COM2	No	Note (1)
4	COM1	No	Note (1)
5	Audio Controller/LPT2	No	Note (2, 4)
6	Floppy Drive Controller	No	Note (1)
7	LPT1	No	Note (1)
8	RTC	No	
9	PCI / SCI	Yes	Note (3)
10	PCI / COM3	Yes	Note (2)
11	PCI / COM4	Yes	Note (2)
12	PS/2 Mouse	No	Note (1)(5)
13	FPU	No	
14	IDE0	No	Note (1)
15	IDE1	No	Note (1)

Notes: [1] If the "Used For" device is disabled in setup, the corresponding interrupt is available for other devices.
[2] Unavailable if baseboard is equipped with an I/O controller SMC FDC37C669, and the device is enabled in setup.
[3] Unavailable in Advanced Configuration and Power Interface (ACPI) mode. Used as System Control Interrupt (SCI) in ACPI mode.
[4] Can be used by Legacy Audio (Sound Blaster device).
[5] Not available for use by an external ISA device.

13.2 Direct Memory Access (DMA) Channels

DMA #	Used for	Available	Comment
0		Yes	
1		Yes	Unavailable if Sound Blaster is enabled with default configuration.
2	FDC	No	If the "used-for" device is disabled in setup, the corresponding DMA channel is available for other devices.
3	LPT	Yes	Unavailable if LPT is used in ECP mode.
4	Cascade	No	
5		Yes	
6		Yes	
7		Yes	

13.3 Memory Area

Upper Memory	Used for	Available	Comment
C0000h – CFFFFh	VGA BIOS	No	
D0000h – DFFFFh		Yes	ISA bus or shadow RAM
E0000h – FFFFFh	System BIOS	No	

13.4 I/O Address Map

The I/O-port addresses of the *ETX-P3M* are functionally identical with a standard PC/AT.

The following I/O ports are used:

I/O Address	Used for	Available	Comment
2E8-2Efh	COM4	No	Available if external I/O controller not used.
370-371h	Configuration space for SMC controller	No	Available if external I/O controller not used.
3E8-3Efh	COM3	No	Available if external I/O controller not used.
1000h >	PCI	No	I/O ports 1000h and above might be allocated by PCI devices or onboard hardware.

13.5 Peripheral Component Interconnect (PCI) Devices

PCI Device	Busmaster	PCI Interrupt	Comment
Sound	Yes	INTC	Integrated in the VIA chipset. No REQx/GNTx, INTx needed.
USB 1 & 2	Yes	INTD	Integrated in the VIA chipset. No REQx/GNTx, INTx needed.
Ethernet	Yes	INTD	Uses separate REQx/GNTx pair.
AGP Graphic	Yes	INTA	Uses internal arbitration mechanism.

You can use REQ0/GNT0, REQ1/GNT1, REQ2/GNT2 and REQ3/GNT3 pairs for external PCI devices.

Note: REQ2/GNT2 is available on ETX-P3M modules with Rev. > B.0.

13.6 Inter-IC (I^2C) Bus

I2C Address	Used For	Available	Comment	JIDA-Bus-Nr.
A0h	JIDA-EEPROM	No	EEPROM for CMOS data.	0
A2h	JIDA-EEPROM	No		0
B0h	WD-PIC	No	Reserved for internal use.	1

13.7 System Management (SM) Bus

Following SM bus addresses are reserved.

SM Bus Address	SM Device	Comment	JIDA-Bus-Nr.
12h	SMART_CHARGER	Not to be used with any SM bus device except a charger	2
14h	SMART_SELECTOR	Not to be used with any SM bus device except a selector	2
16h	SMART_BATTERY	Not to be used with any SM bus device except a battery	2
9Ch	Temp. Sensor (LM84)	Onboard temperature sensor. Do not connect offboard.	2
A0h	SPD	SDRAM EEPROM	2
D2h	Clock generator	Do not use under any circumstances.	2
5Ah	Reserved	Do not use	2

The SMB interface uses battery-monitoring tools. Battery monitoring and management tools, which need to use the APM 1.2 interface, cannot be used to access Smart Battery Systems. If you require further information about this topic, please contact Kontron Embedded Modules Technical Support.

13.8 JILI-I^2C Bus

I2C Address	Used For	Available	Comment	JIDA-Bus-Nr.
A0h	JILI-EEPROM	No	EEPROM for JILI-Data	3

14. Appendix C: BIOS Operation

The module is equipped with a Phoenix BIOS, which is located in an onboard Flash EEPROM. The device has 8-bit access. The shadow RAM feature provides faster accesses (16 bit). You can update the BIOS using a Flash utility.

14.1 Determining the BIOS Version

To determine the PhoenixBIOS version, immediately press the Pause key on your keyboard as soon as you see the following text display in the upper left corner of your screen:

```
PhoenixBIOS 4.0 Release 6.0
Copyright 1985-2002 Phoenix Technology Ltd.
Kontron® BIOS Version <MOD8R110>
© Copyright 2003 Kontron Embedded Modules GmbH.
```

Another way to determine the BIOS version is to go into setup. The version of the BIOS is displayed on the right-hand side of the header line of the setup screen.

Note: The above feature is only available on ETX-P3M modules that have BIOS version MOD8R114 or later.

14.2 Setup Guide

The PhoenixBIOS Setup Utility changes system behavior by modifying the BIOS configuration. The setup program uses a number of menus to make changes and turn features on or off.

The BIOS setup menus documented in this section represent those found in most models of the *ETX-P3M*. The BIOS Setup for specific models can differ slightly.

Note: Selecting incorrect values may cause system boot failure. Load setup-default values to recover by pressing <F9>. It might also be necessary to use the "reset configuration data" option in the BIOS setup and set it to "yes". In certain circumstances this may also help to recover from system boot failure or a resource conflict.

14.2.1 Start Phoenix BIOS Setup Utility

To start the PhoenixBIOS setup utility, press **<F2>** when the following string appears during bootup.

```
Press <F2> to enter Setup
```

The Main Menu then appears.

The **Setup Screen** is composed of several sections:

Setup Screen	Location	Function
Header Bar	Top	Project name (left-hand side) and BIOS revision (right-hand side).
Menu Bar	Top	Lists and selects all top level menus.
Legend Bar	Bottom	Lists setup navigation keys.
Item Specific Help Window	Right	Help for selected item.
Menu Window	Left Center	Selection fields for current menu.
General Help Window	Overlay (center)	Help for selected menu.

Header Bar

The header bar contains the BIOS project name on the left-hand side and the BIOS version on the right-hand side of the line.

Note: The BIOS identification feature is only available on ETX-P3M modules that have BIOS version MOD8R118 or later.

Menu Bar

The menu bar at the top of the window lists different menus. Use the left/right arrow keys to make a selection.

Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The table below describes the legend keys and their alternates.

Key	Function
<F1> or <Alt-H>	General Help window.
<Esc>	Exit menu.
← or → Arrow key	Select a menu.
↑ or ↓ Arrow key	Select fields in current menu.
<Tab> or <Shift-Tab>	Cycle cursor up and down.
<Home> or <End>	Move cursor to top or bottom of current window.
<PgUp> or <PgDn>	Move cursor to next or previous page.
<F5> or <->	Select previous value for the current field.
<F6> or <+> or <Space>	Select next value for the current field.
<F9>	Load the default configuration values for this menu.
<F10>	Save and exit.
<Enter>	Execute command or select submenu.
<Alt-R>	Refresh screen.

Selecting an Item

Use the ↑ or ↓ key to move the cursor to the field you want. Then use the + and – keys to select a value for that field. The **Save Value** commands in the **Exit** menu save the values displayed in all the menus.

Displaying Submenus

Use the ← or → key to move the cursor to the submenu you want. Then press <Enter>. A pointer (▸) marks all submenus.

Item Specific Help Window

The Help window on the right side of each menu displays the Help text for the selected item. It updates as you move the cursor to each field.

General Help Window

Pressing **<F1>** or **<ALT-F1>** on a menu brings up the General Help window that describes the legend keys and their alternates. Press **<Esc>** to exit the General Help window.

14.3 Main Menu

Feature	Option	Description
System Time	HH:MM:SS	Set system time. Use <Enter to move to MM or SS.
System Date	MM/DD/YYYY	Set system date. Use <Enter to move to DD or YYYY.
Legacy Diskette A	360 kB, 5 ¼ “ 1.2 MB, 5 ¼ “ 720 kB, 3 ½ “ 1.44/1.25 MB, 3 ½ “ 2.88 MB, 3 ½ “ **Disabled**	Select type of floppy disk drive installed in system.
Legacy Diskette B	See above. **Disabled**	See above.
▸ Primary Master	Autodetected drive	Displays result of PM autotyping.
▸ Primary Slave	Autodetected drive	Displays result of PS autotyping.
▸ Secondary Master	Autodetected drive	Displays result of SM autotyping.
▸ Secondary Slave	Autodetected drive	Displays result of SS autotyping.
▸ Memory Shadow	Submenu	Opens Memory Shadow submenu
▸ Memory Cache	Submenu	Opens Memory Cache submenu.
System Memory	N/A	Displays amount of conventional memory detected during bootup.
Extended Memory	N/A	Displays amount of extended memory detected during bootup.

Note: In the Option column, bold shows default settings.

14.3.1 Master or Slave Submenus

Feature	Option	Description
Type	None User **Auto** CD-ROM	None = Autotyping is not able to supply the drive type or end user has selected None, disabling any drive that may be installed. User = End user supplies the hdd information. Auto = Autotyping, the drive itself supplies the information. CD-RO = CD-ROM drive.
Cylinders	1 to 65,536	Number of cylinders.
Heads	1 to 256	Number of read/write heads.
Sectors	1 to 63	Number of sectors per track.
Maximum Capacity	N/A	Displays the calculated size of the drive in CHS
Total Sectors	N/A	number of total sectors in LBA mode
Maximum Capacity	N/A	Displays the calculated size of the drive in LBA
Multi-Sector Transfer	Disabled Standard 2 sectors 4 sectors 8 sectors **16 sectors**	Any selection except Disabled determines the number of sectors transferred per block. Standard is 1 sector per block.
LBA Mode Control	Disabled **Enabled**	Enabling LBA causes Logical Block Addressing to be used in place of CHS.
32-Bit I/O	**Disabled** Enabled	Enables 32-bit communication between CPU and IDE card. Requires PCI or Local Bus.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 **Fast PIO 3** Fast PIO 4	Selects the method for transferring the data between the hard disk and system memory.
Ultra DMA Mode	Disabled MOD0 MOD1 MOD2	Selects the UDMA mode used for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.
SMART Device Monitoring	**Disabled** Enabled	Enables SMART warnings of imminent failure of drive.

Note: In the Option column, bold shows default settings.

14.3.2 Memory Shadow Submenu

Feature	Option	Description
D000 – D3FF	**Disabled** Enabled	Accesses to this upper memory region go to the ISA bus if Disabled or to local memory if Enabled.
D400 – D7FF	**Disabled** Enabled	See above.
D800 – DBFF	**Disabled** Enabled	See above.
DC00 – DFFF	**Disabled** Enabled	See above.

Note: In the Option column, bold shows default settings.

14.3.3 Memory Cache Submenu

Feature	Option	Description
Memory Cache	Disabled **Enabled**	Enables or Disables L2 cache.
Cache System BIOS area	Uncached **Write Protected**	Controls caching of system BIOS area.
Cache Video BIOS area	Uncached **Write Protected**	Controls caching of system BIOS area.
Cache Extended Memory area	Uncached Write Through Write Protected **Write Back**	Controls caching of system memory above 1MB.
D000 – D3FF D400 – D7FF D800 – DBFF DC00 – DFFF	**Disabled** Write Through Write Protected Write Back	Disabled: block is not cached. Write Thru: Write are cached and sent to main memory at once. Write Protect: Writes are ignored. Write Back: Writes are cached, but not sent to main memory until necessary.

Note: In the Option column, bold shows default settings.

14.4 Advanced Menu

Feature	Option	Description
‣ Advanced Chipset Control	Submenu	Opens Advanced Chipset Control submenu.
Plug & Play OS	**No *** Yes	If your system has a PNP OS (e.g. Win9x) select Yes to let the OS configure PNP devices not required for boot. No makes the BIOS configure them.
Reset Configuration Data *	**No** Yes	Yes erases all configuration data in ESCD, which stores the configuration settings for plug-in devices. Select Yes when required to restore the manufacturer's defaults.
Secured Setup Configuration	**Yes** No	Yes prevents Plug and Play OS from changing system settings.
‣ PCI Configuration	Submenu	Opens PCI Advanced submenu.
PS/2 Mouse	**Autodetect** Enabled Disabled	Selecting Disabled prevents any installed PS/2 mouse form functioning, but frees up IRQ12. Selecting Autodetect frees IRQ12 if no mouse was detected.
‣ Keyboard Features	Submenu	Opens Keyboard Features submenu.
‣ I/O Device Configuration	Submenu	Opens I/O Device Configuration submenu.
‣ Hardware Monitor	Submenu	Opens Hardware monitor submenu.
Large Disk Access Mode	**DOS** Other	Select DOS if you have DOS. Select Other if you have another OS such as UNIX. A large disk is one that has more than 1024 cylinders, more than 16 heads or more than 63 sectors per track.
Halt On Errors	**Yes** No	Determines if post errors cause the system to halt.

Note: In the Option column, bold shows default settings.
* Setting this option to "yes", under certain circumstances, may help to recover from system boot failure or a resource conflict.

14.4.1 Advanced Chipset Control Submenu

Feature	Option	Description
Delayed Transaction	Disabled **Enabled**	Latches PCI-to-ISA cycles into buffer to free the PCI bus.
Aperture Size	2, 4, 8, 16, 32, **64**, 128, 256 MB	Select size of the AGP graphics aperture.
Frame Buffer Size	None **8MB** 16MB 32MB	Select size of the VGA UMA frame buffer.
Spread Spectrum Modulation	**Disabled** 0.25% 0.5%	Enables spread-spectrum modulation of clock synthesizer.

Note: In the Option column, bold shows default settings.

14.4.2 PCI Configuration Submenu

Feature	Option	Description
‣ PCI Device, Slot #x	Submenu	Opens submenu to configure slot x PCI device.
PCI IRQ line 1 PCI IRQ line 2 PCI IRQ line 3 PCI IRQ line 4	Disabled **Auto** IRQ3, 4, 5, 7, 9, 10, 11, 12, 14,15	Select IRQs for PIC interrupts INTA/B/C/D. Select Auto to let BIOS assign IRQ.
‣ PCI/PNP ISA UMB Region Exclusion	Submenu	Opens UMB Region Exclusion submenu.
‣ PCI/PNP ISA IRQ Resource Exclusion	Submenu	Opens IRQ Exclusion submenu.
Default Primary Video Adapter	**AGP** PCI	In a system with an AGP and a PCI video adapter, end user can select the adapter, which BIOS initializes.
Assign IRQ to PCI VGA	No **Yes**	Determines if a PCI VGA device receives an IRQ assigned. Win98SE has shutdown problems if a PCI VGA controller does not have an IRQ assigned.

Note: In the Option column, bold shows default settings.

14.4.3 PCI Device, Slot # x Submenu

Feature	Option	Description
Option ROM Scan	Disabled **Enabled**	Initialize device expansion ROM.
Enable Master	Disabled **Enabled**	Enables device in slot as a PCI bus master, not every device can function as a master. Check device documentation.
Latency Timer	20h, **40h**, 60h, 80h, A0h, C0h, E0h	Minimum guaranteed time slice allocated for bus master in units of PCI bus clocks. A high-priority, high-throughput device may benefit from a greater value.

Note: In the Option column, bold shows default settings.

14.4.4 PCI/PNP ISA UMB Region Exclusion Submenu

Feature	Option	Description
D000 – D3FF	**Available** Reserved	Reserves specified block of upper memory for legacy ISA devices.
D400 – D7FF	See above.	See above.
D800 – DBFF	See above.	See above.
DC00 – DFFF	see above.	See above.

Note: In the Option column, bold shows default settings.

14.4.5 PCI/PNP ISA IRQ Exclusion Submenu

Feature	Option	Description
IRQ3	**Available** Reserved	Reserves specified IRQ legacy ISA devices.
IRQ4	See above.	See above.
IRQ5	See above.	See above.
IRQ7	See above.	See above.
IRQ9	See above.	See above.
IRQ10	See above.	See above.
IRQ11	See above.	See above.
IRQ12	See above.	See above.
IRQ14	See above.	See above. (Visible only if primary IDE disabled)
IRQ15	See above.	See above. (Visible only if secondary IDE disabled)

Notes: In the Option column, bold shows default settings.
IRQ9 is used for SCI in ACPI mode. Do not use IRQ9 for legacy ISA devices.

14.4.6 Keyboard Features Submenu

Feature	Option	Description
Numlock	**Auto** On Off	On or Off turns NumLock on or off at bootup. Auto turns NumLock on if it finds a numeric key pad.
Key Click	**Disabled** Enabled	Turns audible key click on.
Keyboard auto-repeat rate	**30/sec**, 26.7/sec, 21.8/sec, 13.3/sec, 10/sec, 6/sec, 2/sec	Sets number of times to repeat a keystroke per second if you hold the key down.
Keyboard auto-repeat delay	¼ sec, **½ sec**, ¾ sec, 1 sec	Sets delay time after the key is held down before it begins to repeat the keystroke.

Note: In the Option column, bold shows default settings.

14.4.7 I/O Device Configuration Submenu

Feature	Option	Description
Local Bus IDE adapter	Disabled Primary Secondary **Both**	Enables onboard PCI IDE device.
*Onboard FDC	**Disabled** Enabled	Enables onboard FDC controller.
External FDC	***Disabled*** *Enabled* *Auto*	*Enables FDC controller on backplane.*
Serial Port A Serial Port B	Disabled Enabled	Disabled turns off port. Enabled requires user to enter base I/O address and IRQ.

Feature	Option	Description
	Auto OS Controlled	Auto makes BIOS configure the port. OS Controlled lets PNP OS configure port after bootup.
Mode	**Normal,** IrDA, ASK-IR	Set mode for Serial Port B.
Serial Port C *Serial Port D*	***Disabled*** *Enabled* *Auto*	*Disabled turns off port.* *Enabled requires user to enter base I/O address and IRQ.* *Auto makes BIOS configure the port.*
Base I/O address	3F8h, 2F8h, 3E8h, 2E8h	Select I/O base of port.
IRQ (Port A and B)	IRQ 3, IRQ 4	Select IRQ of port A and B.
IRQ (Port C and D)	*IRQ 10, IRQ 11*	*Select IRQ of port C and D.*
*Onboard LPT	Disabled Enabled **Auto** OS Controlled	Disabled turns off port. Enabled requires user to enter base I/O address and IRQ. Auto makes BIOS configure the port. OS Controlled lets the PNP OS configure port after bootup.
*Mode	**Unidirectional** EPP ECP	Set mode for the parallel port.
*Base I/O address	**378h**, 278h, 3BCh	Select I/O base of port.
*IRQ	IRQ 5, **IRQ 7**	Select IRQ of parallel port.
*DMA	DMA1, **DMA3**	Select DMA channel of port if in ECP mode.
External LPT	*See above.*	*See above.*
Mode	*Output only* ***Bi-directional*** *EPP*	*Set mode for the Parallel Port 2.* *ECP not supported on LPT2*
Base I/O address	*378h, **278h**, 3BCh*	*Select I/O base of LPT Port 2.*
IRQ	***IRQ 5**, IRQ 7*	*Select IRQ of Parallel Port 2.*
Legacy USB Support	Disabled **Enabled**	Enable or Disable support for USB keyboard and mice. Enable for use with non-USB aware Oses such as UNIX and DOS.
Onchip USB 2 Device	**Enabled** Disabled	Enable/ Disable USB ports 2-3.
Onboard Legacy Audio	**Disabled** Enabled	Disable/Enable legacy audio devices Sound Blaster, MPU401.
Sound Blaster	**Disabled** Enabled	Enable and configure Sound Blaster device.
MPU-401	**Disabled** Enabled	Enable and configure MPU-104 device.
‣ Watchdog Settings	Submenu	Opens Watchdog Settings submenu.

Notes: In the Option column, bold shows default settings.
Italic printed options are only visible if an additional I/O controller (SMSC669) is on the OEM backplane.
The FDC and LPT settings marked with an asterisk (*) are mutually exclusive. The FDC or the LPT settings are visible, depending on a configuration resistor on the OEM backplane. If FDC is selected, the FDC signals are available at the LPT port (external floppy). Only Drive B (MOD1/DRV1) is supported, but the drives are internally swapped to let the drive appear as Drive A.
If you want to use the USB boot feature, enable **USB BIOS Legacy Support**.

14.4.8 Hardware Monitor Submenu

This submenu shows the current voltages and temperatures of the system.

V(3.3)	3.3V power plane
Vgtl	GTL (Gunning Transceiver Logic) bus voltage (~1.25V)
Vcore	Core voltage (depends on CPU)
V(2.5)	2.5V power plane
V(5)	5V power plane
T(sens)	Temperature of onboard sensor (LM84/LM90 local temp)
T(cpu)	Temperature of CPU die (l LM84/LM90 remote temp)

Feature	Option	Description
Auto Thermal Throttling	**Disabled** Enabled	Enable and configure thermal auto throttling.
CPU Performance	13% 25% **50%** 75%	Performance state in which the CPU will be switched by reaching the temperature threshold.
Temperature	75°, 80°, 85°, **90°**, 95°, 100°, 105°, 110°	Threshold value in degree Celsius. Auto throttling start at this temperature.
Hysteresis	3°, 4°, **5°**, 6°	Hysteresis in degree Celsius.

Note: In the Option column, bold shows default settings.

14.4.9 Watchdog Settings Submenu

Feature	Option	Description
Mode	**Disabled** Reset NMI	Select watchdog operation mode.
Delay	1s, 5s, 10s, **30s**, 1min, 5min, 10min, 30min	The time until the watchdog counter starts counting. Useful to handle longer boot times.
Timeout	0.4s, 1s, 5s, 10s, **30s**, 1min, 5min, 10min	Maximum trigger period.

Note: In the Option column, bold shows default settings.

14.5 Security Menu

Feature	Option	Description
Set User Password	Up to seven alphanumeric characters	Pressing <Enter> displays the dialog box for entering the user password. In related systems, this password gives restricted access to setup.
Set Supervisor Password	Up to seven alphanumeric characters	Pressing <Enter> displays the dialog box for entering the user password. In related systems, this password gives full access to setup.
Password on boot	**Disabled** Enabled	Enabled requires a password on boot. Requires prior setting of the supervisor password. If supervisor password is set and this option is disabled, BIOS assumes user is booting.
Diskette access	User **Supervisor**	Enabled requires supervisor password to access floppy disk.
Fixed disk boot sector	**Normal** Write protected	Write protect the boot sector on the hard disk for virus protection. Requires a password to format or Fdisk the hard disk.
Virus check reminder System backup reminder	**Disabled** Daily Weekly Monthly	Displays a message during bootup asking (Y/N) if you backed up the system or scanned for viruses. Message returns on each boot until you respond with „Y“. Daily displays the message on the first boot of the day, Weekly on the first boot after Sunday, and Monthly on the first boot of the month.

Notes: In the Option column, bold shows default settings.
Enabling Supervisor Password requires a password for entering Setup.
Passwords are not case sensitive.
User and Supervisor passwords are related.
A User password is possible only if a Supervisor password exists.

14.6 Power Menu

A power management system reduces the amount of energy used after specified periods of inactivity. The setup menu supports:

- Full On state
- Standby state with partial power reduction
- Suspend state with full power reduction

Use the **Advanced Options** menu to specify whether an activity can terminate a Standby or Suspend state and restore Full On.

Feature	Option	Description
CPU Speed *	**Low** High	CPUs supporting Intel SpeedStep Technology can be set to low speed (battery-optimized) or high speed (maximum-performance) mode.
Power Savings	**Disabled** Customized Maximum Power Saving Maximum Performance	Maximum options select predefined values. Select Customized to make your own selections from the following fields. Disabled turns off all power management.
Enable ACPI	**No** Yes (see note below)	Enables/Disables ACPI BIOS (Advanced Configuration and Power Interface). IRQ9 is used for SCI (System Control Interrupt). Do not use for ISA bus devices.
‣ Wake Up Events	Submenu	Opens advanced options submenu.
Idle Mode	**Off** On	Idle mode slows down CPU during inactive periods.
Standby Timeout	**Off**, 1min, 2min, 4min, 6min, 8min, 12min, 16min	Inactivity period required to put system in Standby mode (partial power shutdown).
Auto Suspend Timeout	**Off**, 5min, 10min, 15min, 20min, 30min, 40min, 60min	Inactivity period required after Standby to Suspend mode (maximum power shutdown).
Hard Disk Timeout	**Disabled**, 10 sec – 15 min	Inactivity period of hard disk required before standby (motor off).
Video Timeout	**Disabled**, 10 sec – 15 min	Inactivity period of user input device before the screen is turned off.
Resume on Modem Ring	**Off** On	Enabled wakes the system on incoming calls detected by mode (RI).
Resume on Time	**Off** On	Enabled wakes the system at a specific time.
Resume Time	00:00:00	Specifies the time when the system is to wake.

Notes: In the Option column, bold indicates default setting.
Only visible if the board is equipped with a CPU supporting IST.

14.6.1 ACPI Resume Events

ETX-P3M supports S1 state only, no S3 (S2R) and S4 (S2D). The following events resume the system from S1:

- Power button
- PME#
- IRQs set in Wake Up Event submenu
- USB resume event

14.6.2 Wakeup Events Submenu

This menu allows you to enable or disable IRQs as activities and resume event.

14.7 Boot Menu

Feature	Option	Description
Floppy Check	**Disabled** Enabled	Enabled verifies floppy type on boot; disabled speeds boot.
Summary Screen	**Disabled** Enabled	If enabled, a summary screen is displayed just before booting the OS to let the end user see the system configuration.
QuickBoot Mode	Disabled **Enabled**	Allows system to skip certain tests while booting. This will decrease the time needed to boot the system.
Extended Memory Testing	**Just zero it** None	If set to none, the extended memory (above 1M) will not be tested at all. This can be useful to speed up the POST time.
Dark Boot	**Disabled** Enabled	If enabled, system comes up with a blank screen instead of the diagnostic screen during bootup.
ATX AC Power On Mode*	**Server** Desktop	Select Server Mode if you want the board to boot immediately when AC power is supplied. Selecting Desktop Mode will require the power button to be pressed.
Power Supply**	**ATX** AT	Select the connected power supply type
Onboard LAN RPL ROM	**Disabled** Enabled	Enables Remote Program Load ROM of onboard LAN controller. Supports Intel PXE. Check Intel Web site for more information.
‣ Boot Device Priority	Submenu	Opens boot device priority submenu.
‣ Display Control	Submenu	Opens display control submenu.

Notes: In the Option column, bold represents default settings.
*A CMOS backup battery must be present for this selection to work properly.
**ACPI mode requires an ATX type of power supply.

14.7.1 Display Control Submenu

Feature	Option	Description
Display Mode	TV+CRT *** CRT only LCD only **CRT+LCD**	Select display boot devices.
JDA Revision	X.X	Displays the revision number of the JILI Data Area (JDA) included in the BIOS.
TV Type ***	NTSC Japan NTSC US **PAL**	Select TV mode.
Plat Panel Type	**Auto Detect** VGA SVGA XGA SXGA UXGA	Set either a fixed panel type or auto detects the panel via JILI adapter information.
LCD Backlight *	0 – 255	Enter a value to adjust backlight of the LCD.
LCD Contrast **	0 – 63	Enter a value to adjust contrast of the LCD.

Notes: In the Option column, bold represents default settings.
* Only visible if the panel adapter is equipped with a MAX5362 DAC for backlight control.
** Only visible if the panel adapter is equipped with a Xicor (removed e) X9429 digital potentiometer for contrast control.
******* Only visible if a VT1621 TV encoder is on the board.

14.7.2 Boot Device Priority Submenu

This submenu shows two lists, the boot priority list and the exclude from boot order list. It allows you to select the order of devices from which the BIOS will attempt to boot the OS. During POST, if BIOS is unsuccessful at booting from one device, it will try the next one.

To change the order select the device to change and press <-> to decrease or <+> to increase priority. <x> excludes or includes a device from the boot priority list. <Shift+1> enables or disables a device. Use <1> - <4> to load one of four default boot sequences. Press <f> to specify a device as fixed and <r> for removable.

The sample below shows the default configuration.

Boot Priority order:	**Item Specific Help**
1. IDE0: <primary master device> 2. IDE1: <primary slave device> 3. IDE2: <secondary master device> 4. IDE3: <secondary slave device> 5. IDE CD: <ATAPI CD-ROM> 6. USB Key: <USB stick> 7. USB CDROM: <USB CD-ROM device> 8. Exclude from boot order: USB FDC: <USB Floppy drive> USB HDD: <USB Hard Drive device> USB ZIP: <USB ZIP drive> USB LS-120: <USB CDROM device> PCI BEV: <PCI LAN device> PCI SCSI: <PCI SCSI device> Bootable Add-in Cards	Keys used to view or configure devices: Up and Down arrows select a device. <+> and <-> moves the device up or down. <f> and <r> specifies the device fixed or removable. <x> exclude or include the device to boot. <Shift + 1> enables or disables a device. <1 – 4> Loads default boot sequence.

Notes: The standard 1.44MB floppy drive is referenced as Legacy Floppy Drives.
If more than one device of a group is installed a new entry for the category will be added to the end of the exclude from boot order list. For example, if two ATAPI CDROMs are connected another IDE CD entry will be added to the end of the exclude list.
The BIOS only tries to boot from the devices (max 8) in the Boot Priority Order list.
The above menu is only available on ETX-P3M modules that have BIOS version MOD8R116.wph or later.

14.8 Boot Utilities

14.8.1 QuietBoot

Upon turn on or reset, QuietBoot displays a graphical logo instead of a text-based POST screen, which displays diagnostic messages.

The graphical logo is visible until just before the OS-load unless:

- <**Esc**> is pressed to display the POST screen
- <**F2**> is pressed to enter Setup
- POST issues an error message
- The BIOS or an option ROM requests keyboard input

14.8.2 Boot First Menu

Display the **Boot First Menu** by pressing <**Esc**> during POST. In response, the BIOS displays the message `Entering Boot Menu` and then displays the Boot Menu at the end of POST.

Use the menu to select a following option:

- Override the existing boot sequence (for this boot only) by selecting another boot device. If the specified device does not load the OS, the BIOS reverts to the previous boot sequence.
- Enter Setup.
- Press <**Esc**> to continue with the existing boot sequence.

14.9 Exit Menu

The following sections describe the five options in **Exit Menu**. Pressing **<Esc>** does not exit this menu. You must select an item from the menu to exit.

Exit Saving Changes

Saves all selections and exits setup. Upon reboot, the BIOS configures the system according to the Setup selection stored in CMOS.

Exit Discarding Changes

Use this option to exit Setup without storing new selections in CMOS. Previous selections remain in effect.

Load Setup Defaults

Select to display the default values for all Setup menus.

Discard Changes

Discards changes made during a Setup session and revert to values previously saved in CMOS.

Save Changes

Saves all selections without exiting Setup.

14.10 Updating or Restoring BIOS

Phoenix Phlash allows you to update or restore the BIOS with a newer version or restore a corrupt BIOS by using a floppy disk without having to install a new ROM chip.

1) Download Phoenix Phlash as a compressed file, CRDxMOD8.ZIP, from the Kontron Embedded Modules Web site. It contains the following files:

File	Purpose
MAKEBOOT.EXE	Creates the custom boot sector on the Crisis Recovery Diskette.
CRISBOOT.BIN	Serves as the Crisis Recovery boot sector code.
MINIDOS.SYS	Allows the system to boot in Crisis Recovery Mode.
PHLASH.EXE	Programs the Flash ROM.
WINCRISIS.EXE	Creates the Crisis Recovery Diskette from Windows.
WINCRISIS.HLP	Serves as the help file of WINCRISES.EXE.
PLATFORM.BIN	Performs platform-dependent functions.
BIOS.ROM	Serves as the actual BIOS image to be programmed into Flash ROM.

2) To install Phoenix Phlash on a hard disk, unzip the content of CRDxMOD8.ZIP into a local directory such as C:\PHLASH.

Note: Crisis Recovery requires an external floppy disk controller (ISA adapter card) or a floppy drive connected to the LPT interface (external floppy drive_1) or an USB floppy drive.

3) To create a Crisis Recovery Diskette, insert a blank diskette into Drive A: or B: and execute WINCRISIS.EXE. This copies four files onto the Crisis Recovery Diskette.

File	Purpose
MINIDOS.SYS	Allows the system to boot in Crisis Recovery Mode.
PHLASH.EXE	Programs the Flash ROM.
PLATFORM.BIN	Performs platform-dependent functions.
BIOS.ROM	Serves as the BIOS image to be programmed into Flash ROM.

4) If the BIOS image (BIOS.ROM) changes because of an update or bug fix, copy the new BIOS.ROM image onto the diskette.

5) Phoenix Phlash runs in one of two modes: Command Line or Crisis Recovery. Use the Command Line mode to update or replace a BIOS. To execute Phlash in this mode, move to the Crisis Recovery Disk and type PHLASH. Phoenix Phlash will update the BIOS. Phlash can fail if the system uses memory managers. If this occurs, the utility displays the following message:

```
Cannot flash when memory managers are present.
```

If you see this message after you execute Phlash, disable the memory manager or use parameter /x for Phlash.exe.

14.11 Preventing Problems When Updating or Restoring BIOS

Updating the BIOS represents a potential hazard. Power failures or fluctuations that may occur during updating the Flash ROM can damage the BIOS code, making the system unbootable.

To prevent this potential hazard, many systems come with a boot-block Flash ROM. The boot-block region contains a fail-safe recovery routine. If the boot-block code finds a corrupted BIOS (checksum fails), it boots into the crisis recovery mode and loads a BIOS image from a crisis diskette (see above).

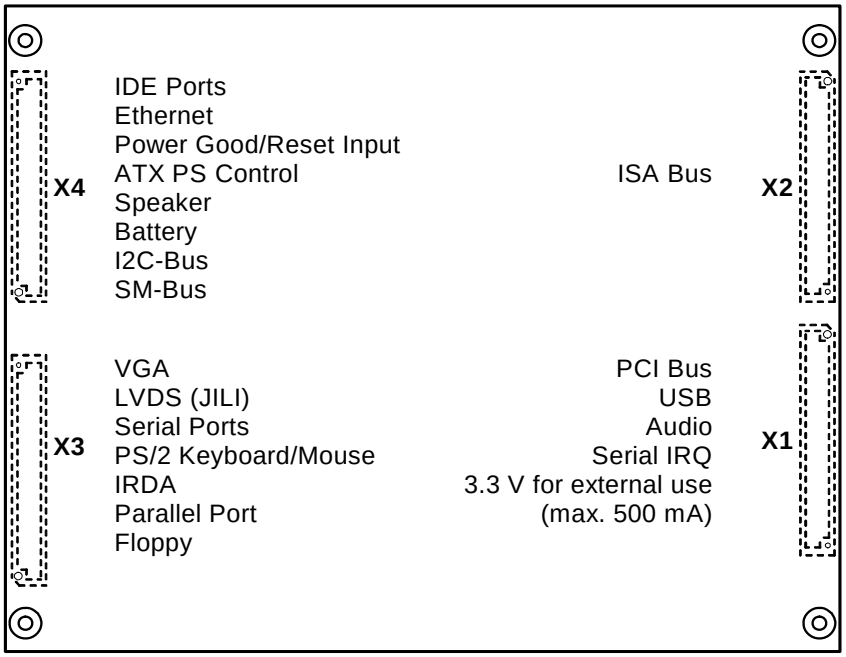
Additionally, the end user can insert an update key into the serial port (COM1 only) to force initiating the recovery routine for the boot block.

For further information on the update key and the crisis diskette, see application note Phlash_EC_E1xx.pdf, which is available from the Kontron Web site at http://www.kontron-em.com/index-en.html.

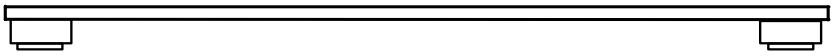
15. Appendix D: ETX Connector Pinouts

The pinouts for ETX Interface Connectors X1, X2, X3, and X4 are documented for convenient reference. Please see the *ETX Specification* and *ETX Design Guide* for detailed, design-level information.

15.1 Connector Locations



top view
(connectors only)



side view
(connectors only)

15.2 Connector X1 (PCI Bus, USB, Audio)

Pin	Signal	Pin	Signal		Pin	Signal	Pin	Signal
1	GND	2	GND		51	VCC *	52	VCC *
3	PCICLK3	4	PCICLK4		53	PAR	54	SERR#
5	GND	6	GND		55	GPERR#	56	RESERVED
7	PCICLK1	8	PCICLK2		57	PME#	58	USB2#
9	REQ3#	10	GNT3#		59	LOCK#	60	DEVSEL#
11	GNT2#**	12	3V		61	TRDY#	62	USB3#
13	REQ2#**	14	GNT1#		63	IRDY#	64	STOP#
15	REQ1#	16	3V		65	FRAME#	66	USB2
17	GNT0#	18	RESERVED		67	GND	68	GND
19	VCC *	20	VCC *		69	AD16	70	CBE2#
21	SERIRQ***	22	REQ0#		71	AD17	72	USB3
23	AD0	24	3V		73	AD19	74	AD18
25	AD1	26	AD2		75	AD20	76	USB0#
27	AD4	28	AD3		77	AD22	78	AD21
29	AD6	30	AD5		79	AD23	80	USB1#
31	CBE0#	32	AD7		81	AD24	82	CBE3#
33	AD8	34	AD9		83	VCC *	84	VCC *
35	GND	36	GND		85	AD25	86	AD26
37	AD10	38	AUXAL		87	AD28	88	USB0
39	AD11	40	MIC		89	AD27	90	AD29
41	AD12	42	AUXAR		91	AD30	92	USB1
43	AD13	44	ASVCC		93	PCIRST#	94	AD31
45	AD14	46	SNDL		95	INTC#	96	INTD#
47	AD15	48	ASGND		97	INTA#	98	INTB#
49	CBE1#	50	SNDR		99	GND	100	GND

Notes: * To protect external power lines of peripheral devices, make sure that:
the wires have the right diameter to withstand the maximum available current.
the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950.
** Currently not available on ETX-P3M modules.
*** This pin is not supported on standard ETX-P3M versions. Please refer to section 6.4 for more information.

15.3 Connector X2 (ISA Bus)

Pin	Signal	Pin	Signal		Pin	Signal	Pin	Signal
1	GND	2	GND		51	VCC *	52	VCC *
3	SD14	4	SD15		53	SA6	54	IRQ5
5	SD13	6	MASTER#		55	SA7	56	IRQ6
7	SD12	8	DREQ7		57	SA8	58	IRQ7
9	SD11	10	DACK7#		59	SA9	60	SYSCLK
11	SD10	12	DREQ6		61	SA10	62	REFSH#
13	SD9	14	DACK6#		63	SA11	64	DREQ1
15	SD8	16	DREQ5		65	SA12	66	DACK1#
17	MEMW#	18	DACK5#		67	GND	68	GND
19	MEMR#	20	DREQ0		69	SA13	70	DREQ3
21	LA17	22	DACK0#		71	SA14	72	DACK3#
23	LA18	24	IRQ14		73	SA15	74	IOR#
25	LA19	26	IRQ15		75	SA16	76	IOW#
27	LA20	28	IRQ12		77	SA18	78	SA17
29	LA21	30	IRQ11		79	SA19	80	SMEMR#
31	LA22	32	IRQ10		81	IOCHRDY	82	AEN
33	LA23	34	IO16#		83	VCC *	84	VCC *
35	GND	36	GND		85	SD0	86	SMEMW#
37	SBHE#	38	M16#		87	SD2	88	SD1
39	SA0	40	OSC		89	SD3	90	NOWS#
41	SA1	42	BALE		91	DREQ2	92	SD4
43	SA2	44	TC		93	SD5	94	IRQ9
45	SA3	46	DACK2#		95	SD6	96	SD7
47	SA4	48	IRQ3		97	IOCHK#	98	RSTDRV
49	SA5	50	IRQ4		99	GND	100	GND

Notes: * To protect external power lines of peripheral devices, make sure that:
the wires have the right diameter to withstand the maximum available current
the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950

15.4 Connector X3 (VGA, LCD, Video, COM1 and COM2, LPT/Floppy, Mouse, Keyboard)

15.4.1 Flat-Panel Interfaces

ETX-P3M modules can implement an LVDS flat-panel interface called JUMP*tec* Intelligent LVDS Interface (JILI). These modules do not implement a parallel digital flat-panel interface called JUMP*tec* Intelligent Digital Interface (JIDI).

LVDS Interface Pinout (JILI)			
Pin	**Signal**	**Pin**	**Signal**
1	GND	2	GND
3	R	4	B
5	HSY	6	G
7	VSY	8	DDCK
9	DETECT#**	10	DDDA
11	LCDDO16	12	LCDDO18**
13	LCDDO17	14	LCDDO19**
15	GND	16	GND
17	LCDDO13	18	LCDDO15
19	LCDDO12	20	LCDDO14
21	GND	22	GND
23	LCDDO8**	24	LCDDO11
25	LCDDO9**	26	LCDDO10
27	GND	28	GND
29	LCDDO4	30	LCDDO7
31	LCDDO5	32	LCDDO6
33	GND	34	GND
35	LCDDO1	36	LCDDO3
37	LCDDO0	38	LCDDO2
39	VCC *	40	VCC *
41	JILI_DAT	42	LTGIO0**
43	JILI_CLK	44	BLON#
45	BIASON	46	DIGON
47	COMP**	48	Y**
49	SYNC**	50	C**

Notes: *To protect external power lines of peripheral devices, make sure that:
the wires have the right diameter to withstand the maximum available current
the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950.
**This signal is not supported on the *ETX-P3M*.

15.4.2 Parallel Port / Floppy Interfaces

You can configure ETX parallel port interfaces as conventional PC parallel ports or as an interface for a floppy-disk drive. You can select the operating mode in the BIOS settings or by a hardware mode-select pin.

If Pin X3-51 (LPT/FLPY#) is grounded at boot time, the floppy support mode is selected. If the pin is left floating or is held high, parallel-port mode is selected. The mode selection is determined at boot time. It cannot be changed until the next boot cycle.

Parallel Port Mode Pinout					Floppy Support Mode Pinout			
Pin	**Signal**	**Pin**	**Signal**		**Pin**	**Signal**	**Pin**	**Signal**
51	LPT/FLPY#	52	RESERVED		51	LPT/FLPY#	52	RESERVED
53	VCC *	54	GND		53	VCC *	54	GND
55	STB#	56	AFD#		55	RESERVED	56	DENSEL
57	RESERVED	58	PD7		57	RESERVED	58	RESERVED
59	IRRX	60	ERR#		59	IRRX	60	HDSEL#
61	IRTX	62	PD6		61	IRTX	62	RESERVED
63	RXD2	64	INIT#		63	RXD2	64	DIR#
65	GND	66	GND		65	GND	66	GND
67	RTS2#	68	PD5		67	RTS2#	68	RESERVED
69	DTR2#	70	SLIN#		69	DTR2#	70	STEP#
71	DCD2#	72	PD4		71	DCD2#	72	DSKCHG#
73	DSR2#	74	PD3		73	DSR2#	74	RDATA#
75	CTS2#	76	PD2		75	CTS2#	76	WP#
77	TXD2	78	PD1		77	TXD2	78	TRK0#
79	RI2#	80	PD0		79	RI2#	80	INDEX#
81	VCC *	82	VCC*		81	VCC *	82	VCC *
83	RXD1	84	ACK#		83	RXD1	84	DRV
85	RTS1#	86	BUSY		85	RTS1#	86	MOT
87	DTR1#	88	PE		87	DTR1#	88	WDATA#
89	DCD1#	90	SLCT#		89	DCD1#	90	WGATE#
91	DSR1#	92	MSCLK		91	DSR1#	92	MSCLK
93	CTS1#	94	MSDAT		93	CTS1#	94	MSDAT
95	TXD1	96	KBCLK		95	TXD1	96	KBCLK
97	RI1#	98	KBDAT		97	RI1#	98	KBDAT
99	GND	100	GND		99	GND	100	GND

Notes: *To protect external power lines of peripheral devices, make sure that:
the wires have the right diameter to withstand the maximum available current
the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950

15.5 Connector X4 (IDE 1, IDE 2, Ethernet, Miscellaneous)

Pin	Signal	Pin	Signal		Pin	Signal	Pin	Signal
1	GND	2	GND		51	SIDE_IOW#	52	PIDE_IOR#
3	5V_SB	4	PWGIN		53	SIDE_DRQ	54	PIDE_IOW#
5	PS_ON	6	SPEAKER		55	SIDE_D15	56	PIDE_DRQ
7	PWRBTN#	8	BATT		57	SIDE_D0	58	PIDE_D15
9	KBINH#**	10	LILED#		59	SIDE_D14	60	PIDE_D0
11	RSMRST#	12	ACTLED#		61	SIDE_D1	62	PIDE_D14
13	ROMKBCS#	14	SPEEDLED#		63	SIDE_D13	64	PIDE_D1
15	EXT_PRG**	16	I2CLK		65	GND	66	GND
17	VCC*	18	VCC*		67	SIDE_D2	68	PIDE_D13
19	OVCR#	20	GPCS#**		69	SIDE_D12	70	PIDE_D2
21	EXTSMI#	22	I2DAT		71	SIDE_D3	72	PIDE_D12
23	SMBCLK	24	SMBDATA		73	SIDE_D11	74	PIDE_D3
25	SIDE_CS3#	26	RESERVED		75	SIDE_D4	76	PIDE_D11
27	SIDE_CS1#	28	DASP_S		77	SIDE_D10	78	PIDE_D4
29	SIDE_A2	30	PIDE_CS3#		79	SIDE_D5	80	PIDE_D10
31	SIDE_A0	32	PIDE_CS1#		81	VCC	82	VCC
33	GND	34	GND		83	SIDE_D9	84	PIDE_D5
35	PDIAG_S	36	PIDE_A2		85	SIDE_D6	86	PIDE_D9
37	SIDE_A1	38	PIDE_A0		87	SIDE_D8	88	PIDE_D6
39	SIDE_INTRQ	40	PIDE_A1		89	RESERVED	90	RESERVED
41	RESERVED	42	RESERVED		91	RXD#	92	PIDE_D8
43	SIDE_AK#	44	PIDE_INTRQ		93	RXD	94	SIDE_D7
45	SIDE_RDY	46	PIDE_AK#		95	TXD#	96	PIDE_D7
47	SIDE_IOR#	48	PIDE_RDY		97	TXD	98	HDRST#
49	VCC*	50	VCC*		99	GND	100	GND

Notes: *To protect external power lines of peripheral devices, make sure that:
the wires have the right diameter to withstand the maximum available current
the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950
**This signal is not supported on the *ETX-P3M*.

16. Appendix E: JIDA Standard

Every board with an on-board BIOS extension supports the following function calls, which supply information about the board. Jump*tec* Intelligent Device Architecture (JIDA) functions are called via Interrupt 15h. Functions include:

- AH=Eah
- AL=function number
- DX=4648h (security word)
- CL=board number (starting with 1)

The interrupt returns a CL≠0 if a board with the number specified in CL does not exist. CL will equal 0 if the board number exists. In this case, the content of DX determines if the operation was successful. DX=6B6Fh indicates success; other values indicate an error.

16.1 JIDA Information

To obtain information about boards that follow the JIDA standard, use the following procedure.

1) Call Get BIOS ID with CL=1.
   The name of the first device installed will be returned.
   If you see the result **Board exists** (CL=0), increment CL, and call **Get BIOS ID** again.

2) Repeat until you see **Board not present** (CL≠0).
   You now know the names of all boards within your system that follow the JIDA standard.

3) You can find out more information about a specific board by calling the appropriate inquiry function with the board's number in CL.

Note: Association between board and board number may change because of configuration changes. Do not rely on any association between board and board number. Always use the procedure described above to determine the association between board and board number.

Refer to the JIDA manual in the jidai110.zip folder, which is available from the Kontron Embedded Modules Web site, for further information on implementing and using JIDA calls with C sample code.

17. Appendix F: PC Architecture Information

The following sources of information can help you better understand PC architecture.

17.1 Buses

17.1.1 ISA, Standard PS/2 – Connectors

- AT Bus Design: Eight and Sixteen-Bit ISA, E-ISA and EISA Design, Edward Solari, Annabooks, 1990, ISBN 0-929392-08-6
- AT IBM Technical Reference Vol 1&2, 1985
- ISA & EISA Theory and Operation, Edward Solari, Annabooks, 1992, ISBN 0929392159
- ISA Bus Specifications and Application Notes, Jan. 30, 1990, Intel
- ISA System Architecture, Third Edition, Tom Shanley and Don Anderson, Addison-Wesley Publishing Company, 1995, ISBN 0-201-40996-8
- Personal Computer Bus Standard P996, Draft D2.00, Jan. 18, 1990, IEEE Inc
- Technical Reference Guide, Extended Industry Standard Architecture Expansion Bus, Compaq 1989

17.1.2 PCI/104

- Embedded PC 104 Consortium
  The consortium provides information about PC/104 and PC/104-Plus technology. You can search for information about the consortium on the Web.
- PCI SIG
  The PCI-SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI-SIG. You can search for information about the SIG on the Web.
- *PCI & PCI-X Hardware and Software Architecture & Design*, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- *PCI System Architecture,* Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

17.2 General PC Architecture

- *Embedded PCs*, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)

- *Hardware Bible*, Winn L. Rosch, SAMS, 1997, 0-672-30954-8
- *Interfacing to the IBM Personal Computer*, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- *The Indispensable PC Hardware Book*, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9
- *The PC Handbook: For Engineers, Programmers, and Other Serious PC Users, Sixth Edition*, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

17.3 Ports

17.3.1 RS-232 Serial

- EIA-232-E standard
  The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer. You can search for information about the standard on the Web.
- *RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems*, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3
- National Semiconductor
  The Interface Data Book includes application notes. Type “232” as search criteria to obtain a list of application notes. You can search for information about the data book on National Semiconductor’s Web site.

17.3.2 Serial ATA

Serial AT Attachment (ATA) Working Group. This X3T10 standard defines an integrated bus interface between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system. You can search for information about the working group on the Web. We recommend you also search the Web for information on *4.2 I/O cable*, if you use hard disks in a DMA3 or PIO4 mode.

17.3.3 USB

USB Specification.

USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. You can search for information about the standard on the Web.

17.4 Programming

- *C Programmer's Guide to Serial Communications*, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0
- *Programmer's Guide to the EGA, VGA, and Super VGA Cards*, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4
- *The Programmer's PC Sourcebook,* Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X
- *Undocumented PC, A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas*, Frank van Gilluwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

18. APPENDIX G: DOCUMENT-REVISION HISTORY

Revision	Date	Edited by	Changes
0.1	14.04.03	IK and SM	Created preliminary manual.
0.2	16.04.03	GDA	Added power consumption tables and values
0.3	05.06.03	GDA	Added Max. resolution values for CRT and LCD. Added heatspreader diagrams for embedded and socketed versions. Changed non-operating temperature values.
0.4	18.06.03	GDA	Changed non-operating temperature values. Added additionally supported modules to feature list. Updated heatspreader diagrams. Updated power consumption tables.
1.0	25.08.03	GDA	Added new spec heatspreader diagrams. Changed Environmental Specifications section for 1200MHz modules. Official release.
1.1	16.10.03	GDA	Updated heatspreader diagrams. Added note to IDE Ports configuration section. Added power consumption values for 933MHz version.
1.2	12.02.04	GDA	Added web site link to Technical Support section. Changed reference to Application note in section 14.11 from JAP0034 to Phlash_EC_E1xx.pdf. Removed reference to REQ2/GNT2 being available for external PCI devices.
1.3	08.03.04	GDA	Changed signal name of pin 11 on connector X4 from WDTRG to RSMRST#.
1.4	08.07.04	GDA	Added notes to section 14.2 and 14.4. Changed Pin description of Parallel Port Mode Pinout Table pin 86 BUSY# to BUSY. Changed Pin descriptions of X4 Connector Pinout Table pins 9 KBINH, 10 LILED, 12 ACTLED, and 14 SPEEDLED to KBINH#, LILED#, ACTLED#, and SPEEDLED#.
1.5	10.08.04	GDA	Added Max. current and Max. voltage to section 3.3.4 as well as additional information.
1.6	25.08.04	GDA	Added information to Appendix C: Bios Operation to describe new features available in the current and future BIOS releases.
1.7	28.10.04	GDA	Added more information about serial interrupt request to section 6.4.
1.8	08.06.05 09.09.05 29.09.05	GUL HRU GUL	Updated I2C- and SM-Bus addresses Added note for Ethernet limitation Updated JIDA-Bus-numbers for I2C-Bus Released for WEB
1.9	10.01.06 12.01.06 30.01.06	GUL GUL GUL	Changed contact address of Kontron America Corrected address of JILI-I2C-Bus Updated Kontron layout Added Voltage Range for Battery Added MTBF Updated ETX connector locations

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