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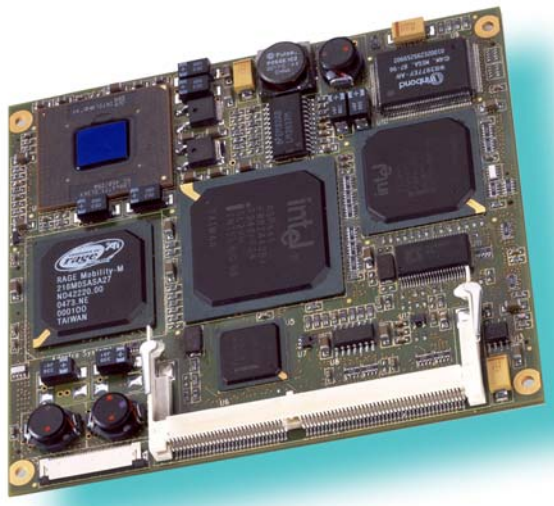
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ETX Component SBC™

ETX-P3/C3 User's Guide

Document Revision 2.1

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1. USER INFORMATION

1.1 About This Manual

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Kontron Embedded Modules is certified to ISO 9000 standards.

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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-P3/C3*

The *ETX-P3/C3* is an Intel® Pentium® III or Celeron™ processor-based ETX module. This module uses low-power (mobile) processors, eliminating the need for active cooling in many applications.

The *ETX-P3/C3* includes onboard sound, Ethernet, and high-speed AGP graphics subsystems, and a full complement of standard PC/AT I/Os. The SoundBlaster™ compatible sound chip is supported by most operating systems. The Intel 10/100BaseT Ethernet controller also has extensive operating system support. The ATI Rage Mobility AGP video controller operates cathode ray tube (CRT) monitors as well as Low Voltage Differential Signaling (LVDS) liquid crystal display (LCD) panels.

Additional onboard communication interfaces include two serial transistor-transistor logic (TTL ports), an enhanced parallel port (EPP) and enhanced capability port (ECP), and two universal serial bus (USB) ports. Access to all I/O signals is through the ETX board-to-board interface connectors. The ETX interface also includes full Industry Standard Architecture (ISA) and Peripheral Component Interconnect (PCI) buses.

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-P3* and *ETX-C3* modules. 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-P3*: Mobile Pentium® III processor – 400/500/700MHz
  - *ETX-C3*: Celeron™ processor – 400MHz
- **Bus: 100 MHz front side bus**
- **Chipset: Intel 440BX AGPset**
- **Super I/O: Winbond W83977EF**
- **Cache: On-CPU 256K (Pentium III) or 128K (Celeron™)**
- **Memory**
  - One 144-pin SO-DIMM
  - 3.3V PC-100 unbuffered synchronous dynamic random access memory (SDRAM), up to 256MB
- **Two Serial Ports (COM1 and COM2)**
  - Transistor-to-transistor (TTL) signals only
- **Infrared Device Association (IrDA) 1.0 SIR interface**
- **Parallel Port (LPT1)**
  - Enhanced Parallel Port (EPP) and Extended Capabilities Port (ECP) with bi-directional capability
- **Floppy: Floppy over parallel-port capability**

- **Enhanced Intelligent Drive Electronics (EIDE): Two Peripheral Component Interconnect (PCI) Bus Master, IDE-port support (up to four devices):**

  - Ultra 33 Direct Memory Access (DMA) mode, up to Mode 2 timing (33Mbps)
  - Supports parallel input/output (PIO) modes up to Mode 4 timings and Multiword DMA mode 0,1,2 with independent timing

- **USB Ports**

  - Two USB 1.1 ports (UHCI)
  - USB legacy keyboard support
  - USB floppy-boot support

- **Ethernet: Intel 82559ER PCI, 10BASE-T/100BASE-TX LAN**

- **Onboard video graphics array (VGA): Ati Rage Mobility AGP Controller**

  - 4/8MB
  - Video RAM
  - CRT interface and LVDS LCD interface

- **Audio: ESS ES1938 PCI**

  - SoundBlaster and Windows Sound System compatible

- **BIOS: Phoenix, 512KB Flash BIOS**

  - NV-EEPROM for CMOS setup retention without battery

- **PS/2 keyboard controller**

- **PS/2 mouse interface**

- **Watchdog timer (WDT)**

- **Real-time clock (requires external battery)**

3.2 *Mechanical Specifications*

3.2.1. Dimensions

- 95 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

- 100 mV peak to peak 0 – 20MHz

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 64MB SDRAM.

ETX-P3

CPU Clock	400MHz 500-063 Rev.C.1, Bios Rev. 121			500MHz 500-063 Rev.A.2, Bios Rev. 121		
Mode	Full On	Standby	Suspend	Full On	Standby	Suspend
Power Consumption	2.2 A	1.3 A	1.2 A	2.5 A	1.3 A	1.2 A

CPU Clock	700MHz 500-063 Rev.C.0, Bios Rev. 122		
Mode	Full On	Standby	Suspend
Power Consumption	2.9 A	1.4 A	1.3 A

ETX-C3

CPU Clock	400MHz 500-063 Rev.C.0, Bios Rev. 122		
Mode	Full On	Standby	Suspend
Power Consumption	2.2 A	1.3 A	1.2 A

3.3.4. CMOS Battery Power Consumption

RTC @ 20°C	Voltage	Current
Winbond W83977EF-AW	2.5V	1.97 µA
	3.0V	2.96 µA

Max. current	Max. voltage
50µA	3.6V

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 Winbond W83977EF-AW datasheet.

3.3.5. APM1.2 Support

Power management implementations of the *ETX-P3* and *ETX-C3* are identical.

In standby mode, the internal CPU clock is stopped while the external CPU clock is still present.

In suspend mode, the PCI clock and the external CPU clock are stopped. A clock synthesizer, which is affected by power management, controls both clocks.

Also, the north bridge receives notification when the system goes into suspend mode. Consequently, the north bridge then closes internal functions.

3.4 *Environmental Specifications*

3.4.1. Temperature

- Operating (with Kontron Embedded Modules heatspreader-plate assembly):
  - Ambient temperature: 0 to +60 °C
  - Maximum heatspreader plate temperature: 0 to +60 °C (*)
- Nonoperating: -10 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 Systems heatspreader-plate assembly):
  - Maximum operating temperature: 0 to +60 °C (**)
- Nonoperating: -10 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)

4. CPU, CHIPSET, AND SUPER I/O

4.1 CPU

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

- Mobile Intel Pentium III (400MHz/500MHz/700MHz).
  The Intel Pentium III contains 256KB of integrated L2 cache.
- Mobile Celeron Processor (400MHz).
  The Celeron contains 128KB of integrated L2 cache.

4.2 Chipset

The *ETX-P3/C3* uses the Intel® 440BX AGPset chipset, which consists of:

- 82443BX or 82443ZX AGP Host Bridge Controller (north bridge)
- Intel 82371EB PCI-ISA Bridge Controller (south bridge)

4.3 Super I/O

The super I/O device is the W83977EF from Winbond Electronics Corp.

5. SYSTEM MEMORY

The *ETX-P3/C3* uses 144-pin Small Outline Dual Inline Memory Modules (SO-DIMMs). One socket is available for a 3.3V, unbuffered PC-100 SDRAM module of 8, 16, 32, 64, 128 or 256MB capacity.

The *ETX-P3/C3* cannot use SO-DIMMs based on 256-Megabit memory parts. This is a limitation of the Intel 440BX chipset.

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

A UHCI type USB host controller resides in the Intel PII-X4 south bridge device. The controller implements a root hub with two USB ports. The USB controller complies with version 1.1 of the USB standard.

6.2.1. Configuration

The USB controller is a PCI bus device. Required system resources are automatically allocated by BIOS during PCI device configuration.

6.3 Audio

The *ETX-P3/C3* PCI audio interface is based on the ES1938 audio driver chip from ESS Technology. The audio controller is compatible with SoundBlaster Pro™ and Windows Sound System™ interfaces.

6.3.1. Configuration

The audio controller is a PCI bus device. Required system resources are automatically allocated by BIOS during PCI device configuration.

6.4 Serial Interrupt Request

External serial interrupt request signals are connected to the serial interrupt request input on the Intel PII-X4 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-P3* offers the ability to connect 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 at 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-P3/C3* graphics subsystem uses a Rage Mobility Graphics Controller from ATI Corp. The controller is implemented on the AGP bus. It can drive both cathode ray tube (CRT) monitors and flat-panel displays. The controller comes with an integrated 4MB video RAM.

Some versions of the *ETX-P3/C3* use an 8MB version of the Rage Mobility Graphics Controller. The larger frame buffer allows the use of larger displays or greater color depths. The 4MB and 8MB controllers are software-compatible and use the same drivers.

- Max. resolution CRT
  - 1920x1440 (4MB=256 colors, 8MB=64k colors)
- Max. resolution LCD
  - UXGA 1600x1200 (16M colors)
  - Bits/Pixels supported 1x18, 2x18, 1x24, and 2x24

8.1.1. Configuration

The graphics controller requires the following resources:

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

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 JUMP*tec* 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 on the Kontron Embedded Modules Web site for additional information.

8.3 *Digital Flat Panel Interface (JIDI)*

The *ETX-P3/C3* does not support the JUMP*tec* Intelligent Digital Interface (JIDI).

8.4 Television Output

The *ETX-P3/C3* supports S-Video and Composite Video outputs, using a special BIOS. See the *ETX Design Guide* for design-level information.

8.5 Serial Ports (1 and 2)

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

8.5.1. Configuration

The serial communication interface uses I/O and IRQ resources. These resources are allocated by BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change parameters for the serial communication interface from the BIOS setup.

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 those documents for additional information.

8.6.1. Configuration

The keyboard uses I/O and IRQ resources. These resources are allocated by BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change parameters for the keyboard from the BIOS setup.

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 those documents for additional information.

8.7.1. Configuration

The mouse uses I/O and IRQ resources. These resources are allocated by BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change parameters for the mouse from the BIOS setup.

8.8 IrDA

The *ETX-P3/C3* is capable of IrDA SIR operation. This feature is implemented in the Winbond W83977 super I/O device. Please contact Kontron Embedded Modules Technical Support 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 those documents for additional information.

8.9.1. Configuration

The parallel communication interface uses I/O, IRQ and DMA resources. The resources are allocated by BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change parameters for the parallel communication interface from 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 those documents for additional information.

8.10.1. Configuration

The floppy disk controller uses I/O, IRQ, and (in some modes) DMA resources. These resources are allocated by BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change parameters for the floppy disk interface from the BIOS setup.

9. CONNECTOR X4 SUBSYSTEMS

9.1 *IDE Ports*

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

The primary and secondary IDE host adapters are PCI bus devices. They are automatically configured by the BIOS during PCI device configuration. You can disable them using the BIOS setup screen. The resources used by the primary and secondary IDE host adapters are set to be 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 on *ETX-P3/C3* uses an Intel 82559ER controller. This 32-bit PCI controller is a fully integrated 10BASE-T/100BASE-TX LAN solution.

9.2.1. Configuration

The Ethernet interface requires an external transformer. See the *ETX Design Guide* for suggestions on transformer selection. The Ethernet interface is a PCI device. It is automatically configured by the BIOS during PCI device configuration.

9.3 Power Control

9.3.1. Power Good / Reset Input

The *ETX-P3/C3* 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 those documents for additional information.

9.4 Power Management

9.4.1. ATX PS Control

The *ETX-P3/C3* 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 those documents 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, on the *ETX-P3E/C3E*, there are at least two current-limiting devices (resistor and diode) between the battery and the consuming component.

9.5.3. I²C Bus

The I²C bus is implemented using general purpose I/O in the Winbond W83977EF Super I/O device.

You can access the I²C Bus via JUMP*tec* Intelligent Device Architecture (JIDA) BIOS functions in versions of the *ETX-P3/C3* that support the JIDA BIOS extensions.

For additional information refer to the *ETX Design Guide*. I²C application notes and the JIDA specification are available on the Kontron Embedded Modules Web site.

9.5.4. SM Bus

SM bus signals are connected to the SM bus controller, which is located in the Intel PIIX4 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 the Winbond W83977EF super I/O device. The watchdog timer (WDT) can be configured in BIOS Setup to start after a set amount of time after power-on boot. Once started, the application software strobes the WDT to prevent its timeout. Upon timeout, the watchdog timer will reset and restart the system. This provides a means to recover from program crashes or lockups.

10.1.1. Configuration

The timeout period for the watchdog timer can be programmed 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 assembly is available from Kontron Embedded Modules for the *ETX-P3/C3*. The heat-spreader plate on top of this assembly is NOT a heat sink. It is intended as an ETX-standard thermal interface to be used 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.

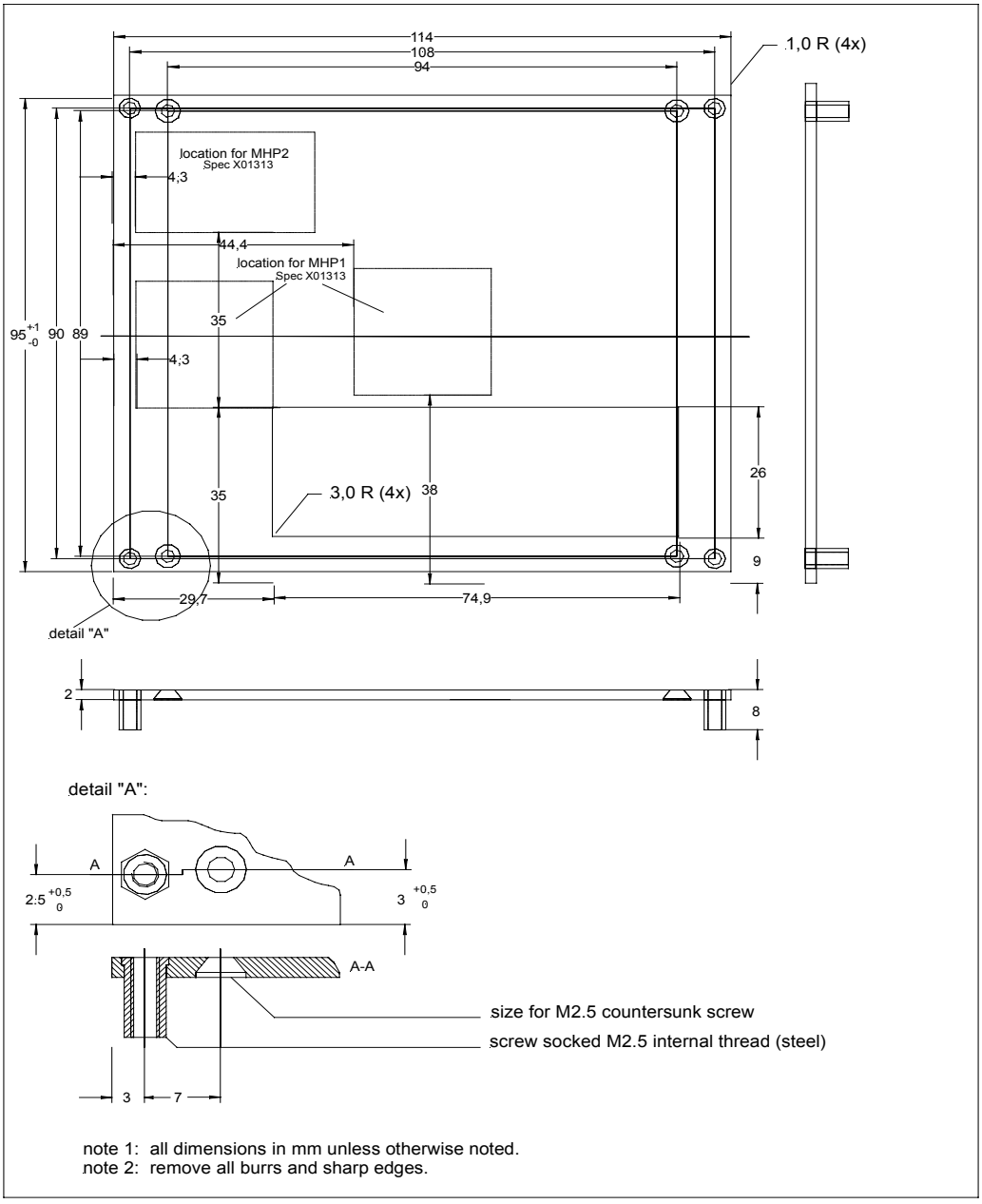
The aluminum slugs and thermal pads on the underside of the heat-spreader assembly implement thermal interfaces between the heat spreader plate and the major heat-generating components on the *ETX-P3/C3*. About 80% of the power dissipated within the module is conducted to the heat spreader plate and can be removed from it by the cooling solution.

For the 400 and 500MHz modules, the heat dissipated into the spreader plate is in the 10 to 12 watt range. It is recommended that the cooling solution be designed for a heat spreader plate heat load of 20 watts to accommodate future *ETX-P3/C3* modules with faster processors.

For 700MHz modules, the heat dissipated into the plate ranges from 16 to 18 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-P3/C3* modules.

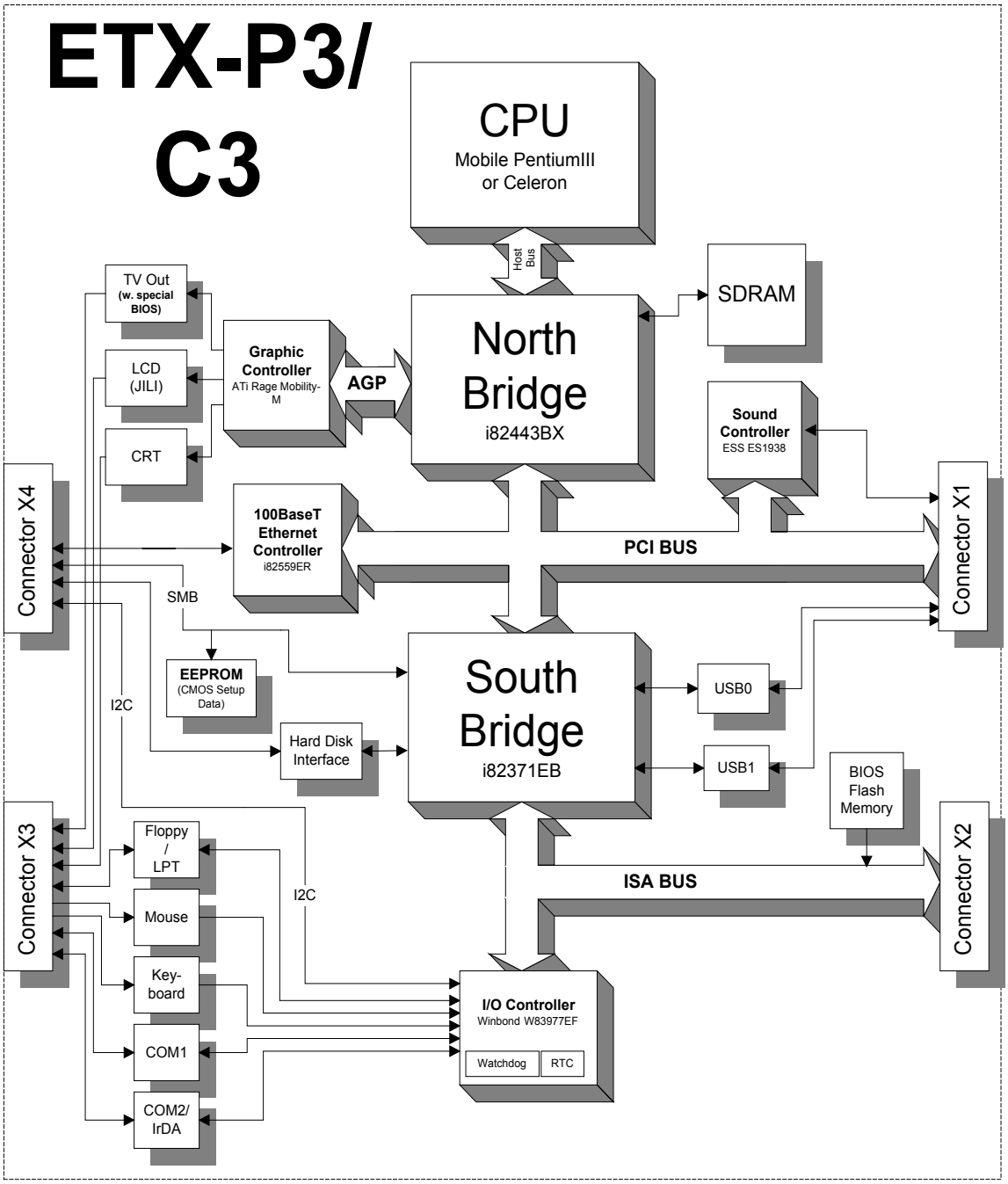
Many thermal-management solutions can be used with the heat-spreader plate, including active and passive approaches. The optimum cooling solution varies depending on the ETX application and environmental conditions. Please see the *ETX Design Guide* for further thermal-management information.

11.2 Heat-spreader Dimensions



note 1: all dimensions in mm unless otherwise noted.
note 2: remove all burrs and sharp edges.

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	LPT2	Yes	Note (1, 2)
6	FDC	No	Note (1)
7	LPT1	No	Note (1)
8	RTC	No	
9	-	Yes	
10	COM4	No	Note (1, 2)
11	COM3	No	Note (1, 2)
12	PS/2 Mouse	No	Note (1)
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.

13.2 Direct Memory Access (DMA) Channels

DMA #	Used for	Available	Comment
0		Yes	
1		Yes	
2	FDC	No	Note (1)
3	LPT	No	Not available when LPT is used in ECP mode
4	Cascade	No	
5		Yes	
6		Yes	
7		Yes	

Note: [1] If the "Used For" device is disabled in setup, the corresponding interrupt is available for other devices.

13.3 Memory Area

Upper Memory	Used for	Available	Comment
C0000h – CBFFFh	VGA BIOS	No	
CC000h – 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-P3* 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.

13.5 Peripheral Component Interconnect (PCI) Devices

You can use the REQ0/GNT0 and REQ1/GNT1 pairs for external PCI devices.

PCI Device	Busmaster	PCI Interrupt	Comment
Sound	REQ2 / GNT2	INTC	REQ2/GNT2 available if a CPU board without Sound is used.
Ethernet	REQ3 / GNT3	INTD	REQ3/GNT3 available if a CPU board without Ethernet is used.
AGP Graphic	-	INTA	

13.6 Inter-IC (I^2C) Bus

I2C Address	Used For	Available
A0h	Reserved	No
B0h	Reserved	No
58h	Reserved	No

13.7 System Management (SM) Bus

You can use the following SM Bus addresses for external devices.

SM Bus Address	SM Device
14h	SMART_SELECTOR
16h	SMART_BATTERY
30h	Temp. Sensor (MAX1617)

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

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. Faster access (16 bit) is provided by the shadow RAM feature. 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 1985-2001 Phoenix Technology Ltd.
All Rights Reserved
Kontron® BIOS Version <MOD6R124>
© Copyright 2003 Kontron Embedded Modules GmbH
```

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-P3/C3*. 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
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.

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 the system time. Press <Enter> to move to MM or SS.
System Date	MM/DD/YYYY	Set the system date. Press <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 the type of floppy disk drive installed in the system.
Legacy Diskette B	See above **Disabled**	See above.
‣ Primary Master	Auto detected drive	Displays result of PM autotyping.
‣ Primary Slave	Auto detected drive	Displays result of PS autotyping.
‣ Secondary Master	Auto detected drive	Displays result of SM autotyping.
‣ Secondary Slave	Auto detected drive	Displays result of SS autotyping.
‣ System Shadow	Submenu	Opens System 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 ATAPI Removable Other ATAPI	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.
Cylinders	1 to 65,536	Number of cylinders.
Heads	1 to 16	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	Displays the total number of sectors in LBA.
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. The 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 FPIO3 / DMA1 FPIO4 / DMA2	Selects the method for transferring the data between the hard disk and system memory. Autotype the drive to select the optimum transfer mode.
Ultra DMA Mode	**Disabled** Mode 0 Mode 1 Mode 2	Selects the Ultra DMA Mode for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.

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

14.3.2. System Shadow Submenu

Feature	Option	Description
CC00 – CFFF	**Disabled** Enabled	Access to this upper memory region goes to the ISA bus if Disabled or to local memory if Enabled.
D000 – D3FF	**Disabled** Enabled	See above.
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 Protect**	Caches system BIOS to improve performance.
Cache Video BIOS area	Uncached **Write Protect**	Caches video BIOS to improve performance.
Cache Extended Memory area	Uncached Write Through Write Protect Write Back	Controls caching of system memory above 1MB.
CC00 – CFFF	**Disabled** Write Through Write Protect Write Back	Disabled: This block is not cached. Write Trough: Writes 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.
D000 – D3FF	See above.	See above.
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 Advanced Menu

Feature	Option	Description
‣ Advanced Chipset Control	Submenu	Opens Advanced Chipset Control submenu.
Plug & Play OS	**Yes** No	If your system has a PNP OS (Win95) 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 a PNP OS from changing system settings.
‣ PCI Configuration	Submenu	Opens PCI Advanced submenu.
PS/2 Mouse	**Autodetect** Enabled Disabled	Selecting Disabled prevents installed PS/2 mouse form functioning, but frees up IRQ12. Selecting Autodetect frees IRQ12 if no mouse is detected.
‣ Keyboard Features	Submenu	Opens Keyboard Features submenu.
‣ I/O Device Configuration	Submenu	Opens I/O Device Configuration 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.
SMART Device Monitoring	**Disabled** Enabled	Enables SMART warnings of imminent failure of drive.
Halt On Errors	**Yes** No	Determines if post errors cause the system to halt.

Notes: 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
Graphics Aperture	4, 8, 16, 32, **64**, 128, 256MB	Select size of graphics aperture for AGP video device.
Enable Memory Gap	**Disabled** Conventional Extended	Turns system RAM off and frees address space (512kB-640kB or 15MB16MB) for use with an option card.
ECC Config	**Disabled** EC ECC ECC Scrup	If all memory in the system support ECC (x72), this selects from no ECC, checking only, checking and correction, or checking and correction with scrubbing.
SERR Signal Condition	None Single bit Multiple bit Both	Select the ECC conditions in which SERR# will be asserted.
8 bit I/O Recovery	3.5, 11.5, **4.5**, 5.5, 6.5, 7.5, 8.5, 9.5, 10.5	ISA clock cycles inserted between 8bit, back-to-back I/O.
16 bit I/O Recovery	3.5, 6.5, **4.5**, 5.5, 7.5	ISA clock cycles inserted between 16bit, back-to-back I/O.

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

14.4.2. PCI Configuration Submenu

Feature	Option	Description
PCI IRQ line 1	Disabled **Auto** IRQ3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Select IRQ for PIC interrupt INTA. Select Auto to let the BIOS assign the IRQ.
PCI IRQ line 2	See above	Select IRQ for PIC interrupt INTB. Select Auto to let the BIOS assign the IRQ.
PCI IRQ line 3	See above	Select IRQ for PIC interrupt INTC. Select Auto to let the BIOS assign the IRQ.
PCI IRQ line 4	See above	Select IRQ for PIC interrupt INTD. Select Auto to let the BIOS assign the 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 an end user can select the adapter that the BIOS will initiate.
ISA graphics device installed	**No** Yes	PCI devices may need to know if an ISA graphics device is installed in the system to enable that card to function correctly.
Assign IRQ to PCI VGA	No Yes	Determines if a PCI VGA device obtains an IRQ assigned. Win98SE has shutdown problems if a PCI VGA controller does not have an IRQ assigned.

Notes: In the Option column, bold indicates the default setting.
PCI add-in cards are initialized with option ROM scan enabled, PCI bus master enabled (if supported), and latency timer set to 40h.

14.4.3. PCI/PNP ISA UMB Region Exclusion Submenu

Feature	Option	Description
CC00 – CFFF	**Available** Reserved	Reserves specified block of upper memory for legacy ISA devices.
D000 – D3FF	See above.	See above.
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.

14.4.4. PCI/PNP ISA IRQ Exclusion Submenu

Feature	Option	Description
IRQ3	**Available** Reserved	Reserves specified IRQ for use by 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)

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

14.4.5. 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 keypad.
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.

14.4.6. 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 the backplane.*
Base I/O address	***Primary*** *Secondary*	*Selects base address of the FDC controller. (Primary = 3F0h, Secondary = 370)*
Serial Port A Serial Port B	Disabled Enabled **Auto**	Disabled turns off port. Enabled requires end user to enter the base I/O address and the IRQ. Auto makes the BIOS configure the port. OS Controlled lets the PNP OS configure the port after bootup.
Mode	**Normal** IrDA ASK-IR	Sets mode of Serial Port B.
Serial Port C *Serial Port D*	***Disabled*** *Enabled* *Auto*	*Disabled turns off port.* *Enabled requires end user to enter base I/O address and IRQ.* *Auto makes BIOS configure the port.*
Mode	***Normal*** *IrDA* *ASK-IR*	*Sets mode for Serial Port D.*
IrDA Pins	***Standard*** *Alternate*	*Selects which pins of the SMC669 to use for the IrDA interface.*
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**	Disabled turns off the port. Enabled requires end user to enter base I/O address and IRQ. Auto makes BIOS configure port.
*Mode	Output only **Bi-directional** ECP EPP	Sets mode for 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	***Disabled*** *Enabled*	*Disabled turns off the port.* *Enabled requires end user to enter the base I/O address and the IRQ.*
Mode	*Output only* ***Bi-directional*** *EPP*	*Set the mode for the Parallel Port 2.* *Note: ECP is not supported on LPT2*

Feature	Option	Description
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.
▸ Watchdog Settings	Submenu.	Opens Watchdog Settings submenu.

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

The options noted in *italics* 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. Either 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.

To use the USB floppy boot feature, enable Legacy USB Support.

A 16KB UMB area is used for USB BIOS Legacy Support. The BIOS scans from DFFFFh to CC000h to find a free area.

14.4.7. Watchdog Settings Submenu

Feature	Option	Description
Mode	**Disabled** Reset	Select watchdog operation mode.
Timeout	10s, 20s, **30s**, 1m, 2m, 3m, 5m, 10m	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** submenu to specify whether an activity can terminate a Standby or Suspend state and restore Full On.

Feature	Option	Description
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.
Idle Mode	**Off** On	Turns on or off the idle mode power savings. Idle mode slows down the CPU during brief periods of inactivity.
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 output device required before the screen is turned off.
Resume On Time	**Off** On	Allows the system to wake up at the specific time.
Resume Time	[hh:mm:ss]	Specifies the time when the system is to wake.

Notes: In the Option column, bold indicates default setting.
Unmasked IRQs resume the system from suspend mode.
IRQ1, IRQ12, and COMA activity resume the system from standby and trigger the standby timer.

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 the system to skip certain tests while booting. This will decrease the time needed to boot the system.
Dark Boot	**Disabled** Enabled	If enabled, system comes up with a blank screen instead of the diagnostic screen during bootup.
▸ Boot Device Priority	Submenu	Opens boot device priority submenu.
Onboard LAN RPL ROM	**Disabled** Enabled	Enables the Intel PXE ROM of the onboard LAN controller.
▸ Display Control	Submenu	Opens display control sub menu.

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

14.7.1. Boot Device Priority Submenu

This submenu 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.

The selections on this menu each may represent the first of a class of items. For example, if there is more than one hard disk drive, Hard Drive represents the first of such drives as specified in the Hard Drive menu described below.

To change the order select the device to change and press <-> to decrease or <+> to increase priority.

Feature	Option	Description
▸ Hard Drive	Boot priority & submenu	Sets boot priority of hard disks as described in the respective submenu.
▸ Removable Devices	Boot priority & submenu	Sets boot priority of removable devices as described in the respective submenu.
ATAPI CD-ROM Drive	Boot priority	Sets boot priority of ATAPI CD-ROM drives.
▸ Network Boot	Boot priority & submenu	Sets boot priority of network adapters as described in the respective submenu.

14.7.2. Display Control Submenu

This submenu is only available in BIOS revisions MOD6R124 or later. It allows you to select your type of display monitor as well as the flat panel type. You can also enter values for backlight and contrast if your application supports these features.

Feature	Option	Description
Display Mode	LCD only CRT only **Simultan**	Select the mode of display.
JDA Revision	N/A	Displays the revision of the JILI Data Area
Flat Panel Type	**Auto Detect** VGA SVGA XGA Enter PAID Enter FPID	Select Auto Detect to automatically detect the panel type or use VGA, SVGA, or XGA for fixed panel types. Choose Enter PAID or Enter FPID to manually set JILI3 ID values.
ID [1]	0-FFFFh **Default 0**	Enter the JILI3 ID.
LCD Backlight [2]	0-255 **Default 128**	Enter a value to adjust backlight of the LCD.
LCD Contrast [3]	0-63 **Default 32**	Enter a value to adjust contrast of the LCD.

Notes: [1] Only available if Flat Panel Type (Enter PAID) or (Enter FPID) are selected.
[2] Only available if the DAC (MAX5362) is on the OEM backplane or the panel adapter.
[3] Only available if the digitally controlled potentiometer (Xicor X9429) is on the OEM backplane or the panel adapter

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. MultiBoot

Multiboot allows you to select the following boot device:

- Hard disk
- Floppy disk
- CD-ROM
- Network card

You can make the selections from Setup, or by selecting the boot device in the BootFirst Menu.

Note: *ETX-P3/C3* supports booting from an USB floppy.

MultiBoot consists of the following submenus:

- Setup Boot
- Boot Device Priority
- Removable Devices
- Hard Drive
- Network Boot Priority
- Boot First

14.8.3. Removable Devices Menu

If there is more than one Removable Media drive, select **Removable Devices** and press <**Enter**> to display the Removable Media menu and choose which drive is represented in the boot-order menu.

Note: The standard 1.44MB floppy drive is referenced as Legacy Floppy Drives.

14.8.4. Hard Drive Priority Menu

If there is more than one bootable hard drive, select **Hard Drive** and press <**Enter**> to display the Fixed Disk Menu and choose a boot priority.

14.8.5. Network Boot Priority Menu

If there is more than one bootable network adapter in the system, select **Network Boot** and press <**Enter**> to display available network adapters and choose the boot priority.

14.8.6. 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 reverts 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 by using a floppy disk without having to install a new ROM chip.

1) Download Phoenix Phlash as a compressed file, CRISMOD6.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 CRISMOD6.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).

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 actual 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 manager are present.
```

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).

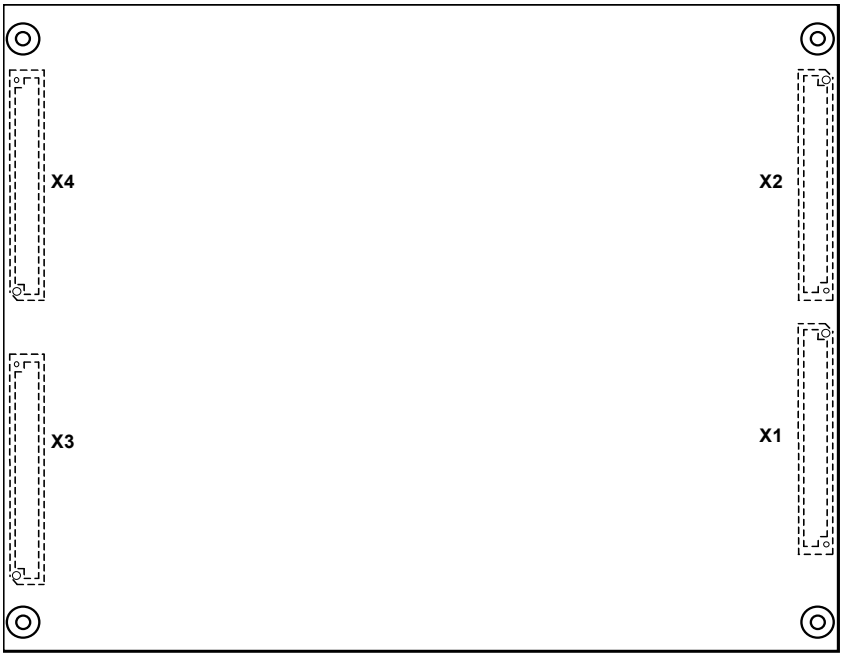
Additionally, the end user can insert an update key into the serial port (COM1 only) to force initiating the recovery routine for the boot block.

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

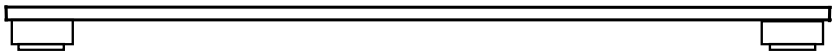
15. APPENDIX D: ETX CONNECTOR PINOUTS

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
** This signal is not supported on the *ETX-P3/C3*.
*** This pin is not supported on standard ETX-P3/C3 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-P3/C3 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-P3/C3*.

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

Floppy Support Mode Pinout			
Pin	**Signal**	**Pin**	**Signal**
51	LPT/FLPY#	52	RESERVED
53	VCC *	54	GND
55	RESERVED	56	DENSEL
57	RESERVED	58	RESERVED
59	IRRX	60	HDSEL#
61	IRTX	62	RESERVED
63	RXD2	64	DIR#
65	GND	66	GND
67	RTS2#	68	RESERVED
69	DTR2#	70	STEP#
71	DCD2#	72	DSKCHG#
73	DSR2#	74	RDATA#
75	CTS2#	76	WP#
77	TXD2	78	TRK0#
79	RI2#	80	INDEX#
81	VCC *	82	VCC *
83	RXD1	84	DRV
85	RTS1#	86	MOT
87	DTR1#	88	WDATA#
89	DCD1#	90	WGATE#
91	DSR1#	92	MSCLK
93	CTS1#	94	MSDAT
95	TXD1	96	KBCLK
97	RI1#	98	KBDAT
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	SMBALRT#**		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	GPE2# **	90	CBLID_P**
41	BATLOW# **	42	GPE1# **		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-P3/C3*.

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 a 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
1.0	22.05.01		Document created.
1.1	10.10.01		Operating temperature specification changed.
1.2	20.02.02	BB	Reformatted.
1.3	09.12.02	GDA and JL	Editing, reformatting and updating throughout.
1.4	14.03.03	GDA	Added Display Control Submenu to BIOS Appendix
1.5	31.03.03	GDA	Changed X3 connector pin 77 to high active from low active.
1.6	22.04.03	GDA	Added Max. resolution values for CRT and LCD and changed Display Control Submenu selections to reflect current BIOS features. Updated Document Revision History table
1.7	16.10.03	GDA	Added note to IDE Ports configuration section. Fixed table headers in power consumption tables
1.8	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.
1.9	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#.
2.0	06.08.04	GDA	Added Max. current and Max. voltage to section 3.3.4 as well as additional information.
2.1	28.10.04	GDA	Added more information about serial interrupt request to section 6.4.

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