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1. USER INFORMATION

1.1 *About This Manual*

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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.

Asia	Europe	North/South America
Kontron Asia	Kontron Embedded Modules	Kontron Americas
5F-1, 341, Sec 4 Chung Hsiao E. Road Taipei, Taiwan	Brunnwiesenstr. 16 94469 Deggendorf – Germany	3988 Trust Way Hayward, CA 94545
Tel: +886 2 2751 7192	Tel: +49 (0) 991-37024-0	Tel: +1 (510)-732-6900
Fax: +886 2 2772 0314	Fax: +49 (0) 991-37024-109	Fax: +1 (510)-732-7655

2. INTRODUCTION

2.1 *ETX-VE*

ETX-VE component SBC modules support the VIA Eden™ Embedded System Platform. The ETX-VE 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-VE* supports four USB ports, up to 512MB SDRAM, 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-VE*. The other two references, which are available from the Kontron Embedded Modules Website 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-VE: VIA Eden™ Embedded System Platform (ESP) Processor 300/400/600 MHz
 - ETX-VE: VIA C3 Processor 800MHz
- **Bus**
 - 66/100/133MHz 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 64kB**
- **Memory**
 - One 144-pin SO-DIMM
 - 3.3V PC-133 or PC-100 unbuffered SDRAM, up to 512MB
- **Two Serial Ports (COM1 and COM2)**
 - Transistor-to-transistor (TTL) signals only
 - Standard RS232C
 - 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 or digital signals (JIDI).
- **Audio: Integrated in VIA VT82C686B**
 - SoundBlaster™ AC97, Windows Sound System™ compatible
- **Optional onboard IDE compatible Flash hard disk between 16MB and 128MB. Master on secondary IDE(contact your local Kontron sales representative about this option)**
- **Television output via a VT1621 TV encoder**
- **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

- 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.

USB legacy support was set to "Disabled" in the BIOS.

ETX-VE 3

CPU Clock	300MHz		
Revisions	Layout 111, Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.0 A	1.6 A	1.0 A

ETX-VE 4

CPU Clock	400MHz		
Revisions	Layout 111, BIOS Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	1.9 A	1.4 A	.80 A

ETX-VE 6

CPU Clock	600MHz		
Revisions	Layout 111, Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.3 A	1.4 A	.80 A

ETX-VE-C3 8

CPU Clock	C3 800MHz		
Revisions	Layout 111, Bios Rev. 110		
Mode	Full On	Standby	Suspend
Power Consumption	2.9 A	1.5 A	.80 A

ETX-VE 10

CPU Clock	1000MHz		
Revisions	Layout 112, Bios Rev. 111		
Mode	Full On	Standby	Suspend
Power Consumption	2.7 A	1.7 A	.90 A

3.3.4. CMOS Battery Power Consumption

RTC	Voltage	Current
Integrated in south bridge	2.5V	1.10 μ A
	3.0V	2.36 μ A

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 use these values to calculate the CMOS battery lifetime.

3.4 Environmental Specifications

3.4.1. Temperature

- Operating (with Kontron Embedded Modules heat-spreader plate assembly):
 - Ambient temperature: 0 to +60 °C
 - Maximum heatspreader-plate temperature: 0 to +60 °C (*)
- Nonoperating: -40 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):
 - Maximum operating temperature: 0 to +60 °C (**)
- Nonoperating: -40 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 a:

- VIA Eden™ Embedded System Platform Processor, which contains 64kB of integrated L2 cache.

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-VE* 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 8, 16, 32, 64, 128, 256, or 512MB capacity.

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-VE* 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-VE* 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 $\pm 5\%$ 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*, I²C 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-VE* 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 JUMPtect Intelligent LVDS Interface (JILI) or a parallel digital flat-panel interface called JUMPtect Intelligent Digital Interface (JIDI). 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
- Max. recommended resolution LCD Digital
 - VGA 640x480
 - Bits/Pixels supported 1x18

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 JUMPtect 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)***

Optionally, the *ETX-VE* supports the JUMPtec Intelligent Digital Interface (JIDI). Please contact Kontron Embedded Modules Technical Support for more information.

8.4 ***Television Output***

The *ETX-VE* supports television output via a VT1621 TV encoder with up to 800x600 pixel resolution.

8.5 ***Serial Ports (1 and 2)***

The *ETX-VE* 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. 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-VE* 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.

9.3 *Power Control*

9.3.1. Power Good / Reset Input

The *ETX-VE* 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-VE* 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. **I²C Bus**

The I²C Bus is implemented by using general purpose I/O.

You also can access the I²C Bus via JUMPt^{ec}'s Intelligent Device Architecture (JIDA) BIOS functions.

For additional information, refer to the *ETX Design Guide*, I²C application notes, and JIDA specifications, which are available at the Kontron Embedded Modules 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.

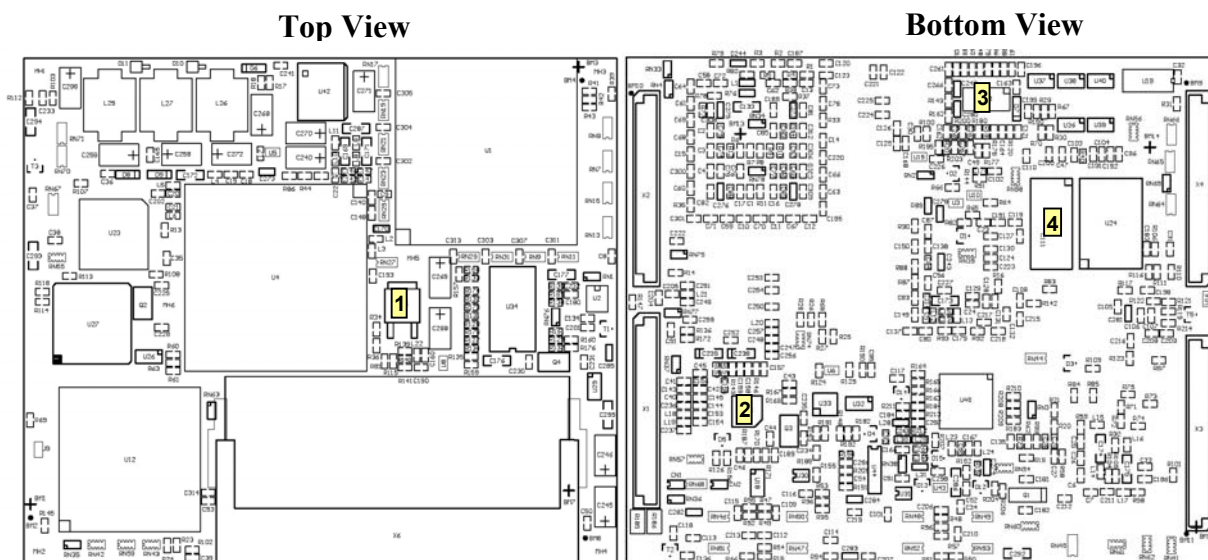
11. DESIGN CONSIDERATIONS

11.1 Thermal Management

A heat-spreader plate assembly is available from Kontron Embedded Modules for the *ETX-VE*. 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-VE*. 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. Special attention must be paid to the devices shown and listed below when designing a cooling solution. It is the user's responsibility to maintain an operating temperature within the temperature specification that is described in the [Environmental Specifications](#) section of this document.

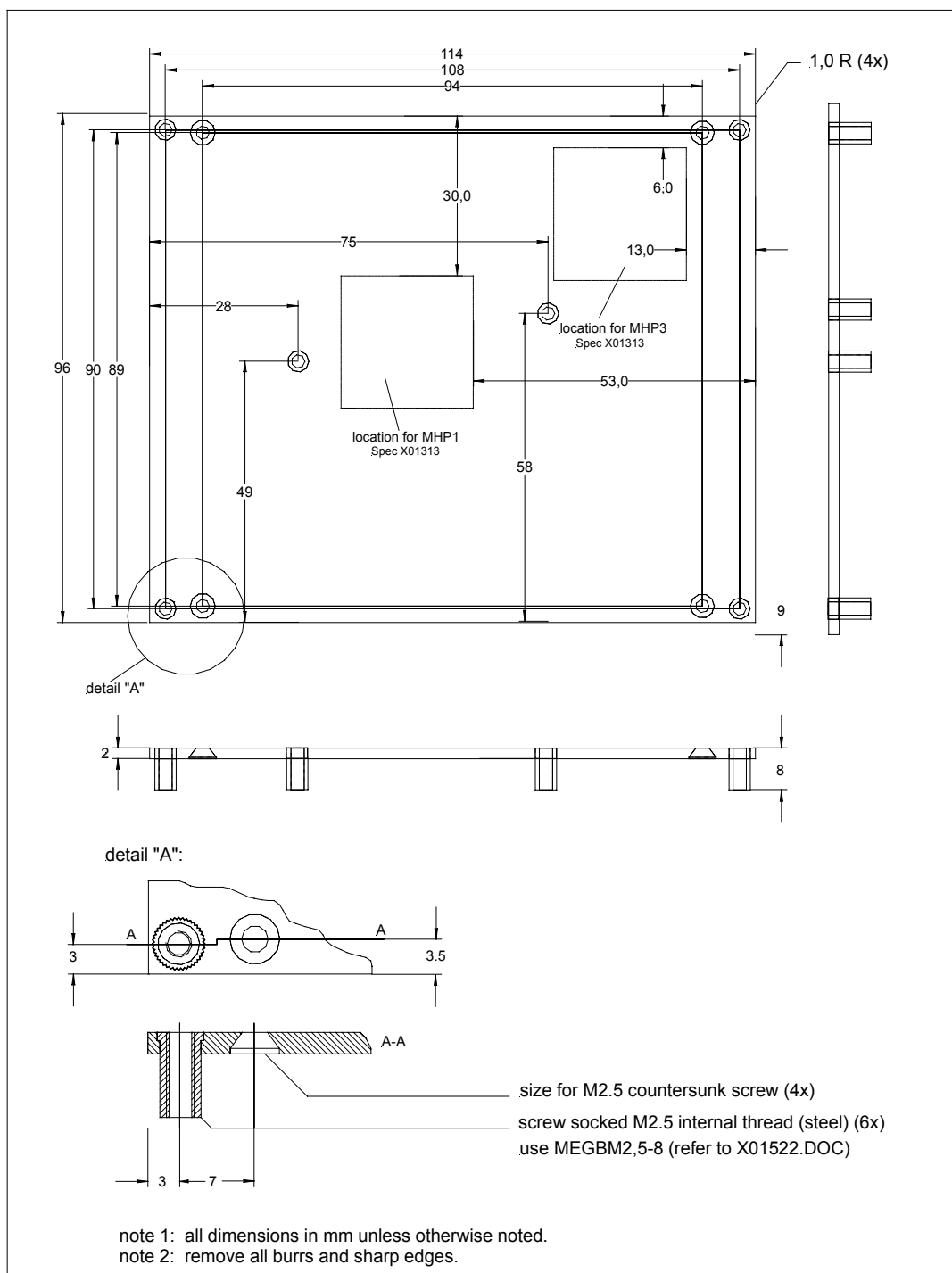


Measure point	Device	Max. operating case temperature
1	FAN1084	+ 85°C
2	CS4299	+ 70°C
3	LTC1702	+ 85°C
4	29F040B	+ 70°C

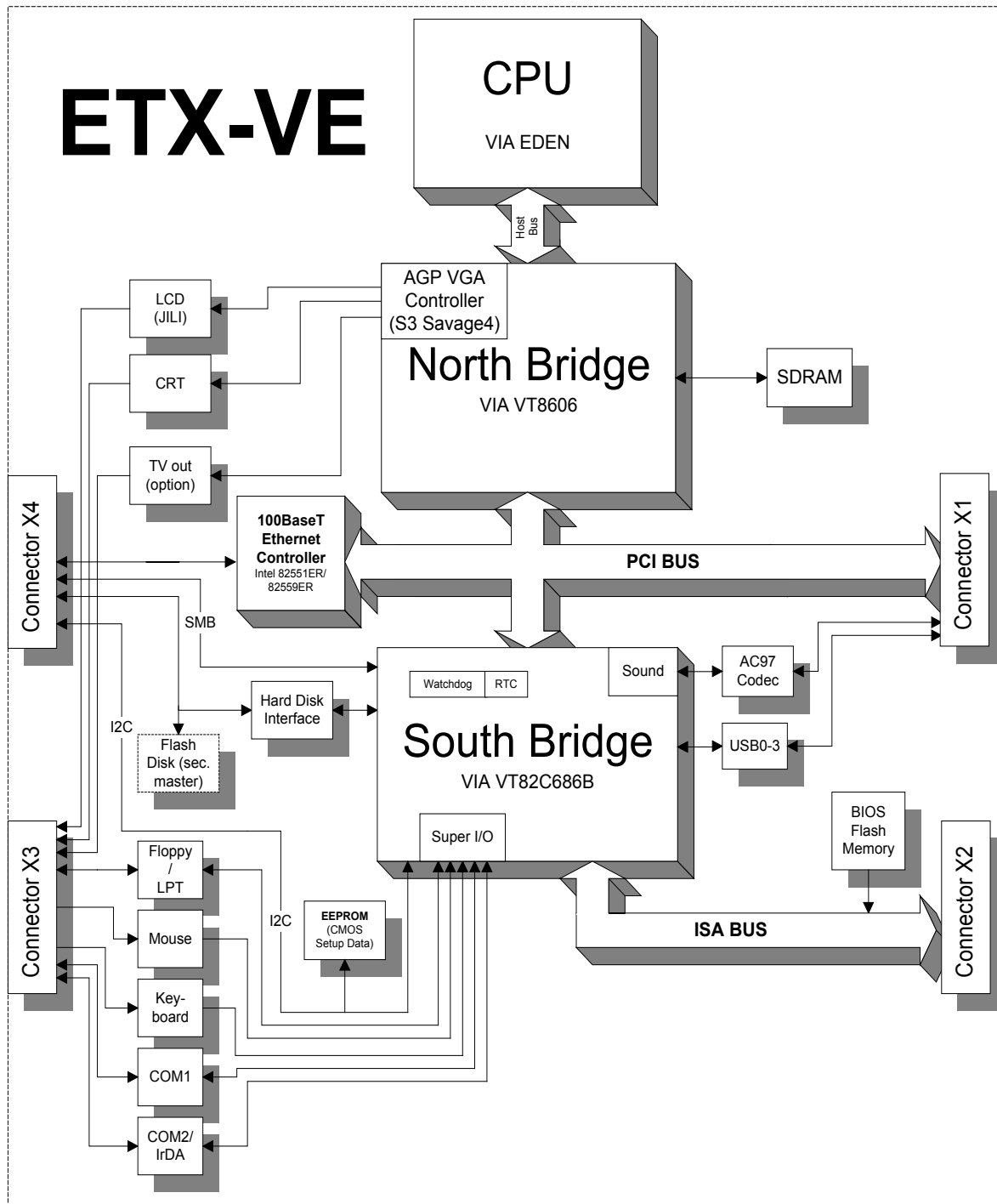
For 800MHz modules, the heat dissipated into the plate ranges from 12 to 19 watts. Design a cooling solution to dissipate the heat load on a heat-spreader plate at a minimum of 19 watts to accommodate all *ETX-VE* modules.

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



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-VE* 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	-	INTC	Integrated in the VIA chipset. No REQx/GNTx, INTx needed.
Ethernet	-	INTD	Uses separate REQx/GNTx pair.
AGP Graphic	-	INTA	

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

13.6 Inter-IC (I²C) Bus

I2C Address	Used For	Available	Comment
A0h	EEPROM	No	EEPROM for CMOS data.
B0h	Reserved	No	Reserved for internal use.
58h	Reserved	No	Reserved for internal use.

13.7 *System Management (SM) Bus*

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

SM Bus Address	SM Device	Comment
12h	SMART_CHARGER	
14h	SMART_SELECTOR	
16h	SMART_BATTERY	
4Eh	Temp. Sensor (LM84)	Onboard temperature sensor. Do not connect offboard.

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.

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 1985-2002 Phoenix Technology Ltd.  
Kontron® BIOS Version <MOD9R110>  
© 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-VE*. 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 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 from 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.

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
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 will be initialized by the BIOS.
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 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 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	Uni-directional 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 (~1.50V)
Vcore	Core voltage
V(2.5)	2.5V power plane
V(5)	5V power plane
T(lm84)	Temperature of onboard LM84 sensor (local temp)
T(cpu)	Temperature of CPU die (lm84 remote temp)

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
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 ACPI Resume Events listed 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.

14.6.1. ACPI Resume Events

ETX-VE 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.
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 Type	ATX AT	Select the power supply in use.
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.

14.7.1. Display Control Submenu

This submenu 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. The display of the JDA Revision and the two options Enter PAID and Enter FPID are only available in BIOS revisions MOD9R111 or later.

Feature	Option	Description
Display Mode	TV+CRT 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.

14.7.2. 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 Drives	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.

14.8 *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-VE supports booting from USB floppy and Mass Storage Device (MSD).

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 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, CRDxMOD7.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 WINCRISIS.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 CRDxMOD7.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 manager 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).

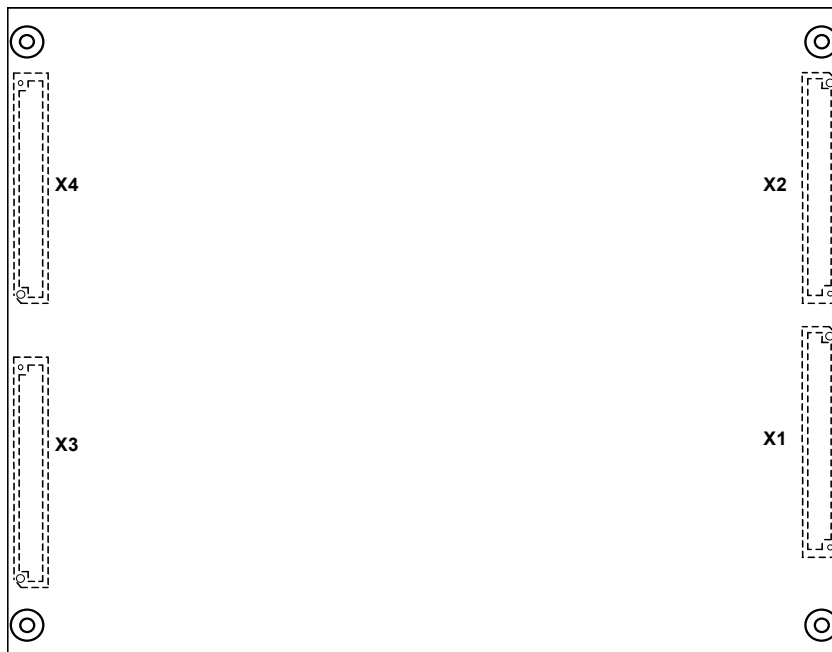
Additionally, the end user can insert an update key into the serial port (COM1 only) to force initiating the recovery routine for the boot block.

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>

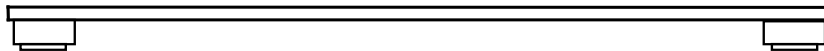
15. APPENDIX D: ETX CONNECTOR PINOUTS

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.
** This pin is not supported on standard ETX-VE 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-VE modules can implement the following flat-panel interfaces:

- a LVDS flat-panel interface called JUMPtec Intelligent LVDS Interface (JILI)
- a parallel digital flat-panel interface called JUMPtec Intelligent Digital Interface (JIDI)

Alternative pinouts for the two flat-panel interfaces are shown below.

LVDS Interface Pinout (JILI)				Digital Interface Pinout (JIDI)			
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	GND	1	GND	2	GND
3	R	4	B	3	R	4	B
5	HSY	6	G	5	HSY	6	G
7	VSY	8	DDCK	7	VSY	8	DDCK
9	DETECT#**	10	DDDA	9	DETECT#**	10	DDDA
11	LCDDO16	12	LCDDO18**	11	B4	12	SHFCLK
13	LCDDO17	14	LCDDO19**	13	B5	14	EN
15	GND	16	GND	15	GND	16	GND
17	LCDDO13	18	LCDDO15	17	B1	18	B3
19	LCDDO12	20	LCDDO14	19	B0	20	B2
21	GND	22	GND	21	GND	22	GND
23	LCDDO8**	24	LCDDO11	23	G2	24	G5
25	LCDDO9**	26	LCDDO10	25	G3	26	G4
27	GND	28	GND	27	GND	28	GND
29	LCDDO4	30	LCDDO7	29	R4	30	G1
31	LCDDO5	32	LCDDO6	31	R5	32	G0
33	GND	34	GND	33	GND	34	GND
35	LCDDO1	36	LCDDO3	35	R1	36	R3
37	LCDDO0	38	LCDDO2	37	R0	38	R2
39	VCC *	40	VCC *	39	VCC *	40	VCC *
41	JILI_DAT	42	LTGIO0**	41	JILI_DAT	42	VSYN
43	JILI_CLK	44	BLON#	43	JILI_CLK	44	BLON#
45	BIASON	46	DIGON	45	HSYN	46	DIGON
47	COMP	48	Y	47	COMP	48	Y
49	SYNC	50	C	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-VE.

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	OVCN#	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-VE.

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.

Notes: 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	27.03.03	GDA	Initial Release
0.2	22.05.03	GDA	Added Max. resolution values for CRT and LCD. Added Thermal Management Information.
0.3	05.06.03	GDA	Added preliminary power consumption numbers
0.4	16.06.03	GDA	Added Display Control Submenu features. Added 66MHz bus speed to reflect C3 800 version.
1.0	25.08.03	GDA	Official release of ETX-VE user guide.
1.1	16.10.03	GDA	Added note to IDE Ports configuration section.
1.2	20.11.03	GDA	Changed reference to Application note in section 14.11 from JAP0034 to Phlash_EC_E110.pdf. Changed status of Pins 47-50 in X3 pinout table.
1.3	12.02.04	GDA	Added web site link to Technical Support section. Added information about LCD Digital output option. Changed reference to Application note in section 14.11 from Phlash_EC_E110.pdf to Phlash_EC_E1xx.pdf.
1.4	08.03.04	GDA	Changed signal name of pin 11 on connector X4 from WDTRG to RSMRST#.
1.5	26.05.04	GDA	Removed references to TV out being an option on ETX-VE modules. TV out is now a standard feature. Added additional module tables and values to power consumption section.
1.6	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#.
1.7	28.10.04	GDA	Changed Non-operating temperature in section 3.4.1 to -40-85+. Added more information about serial interrupt request to section 6.4.