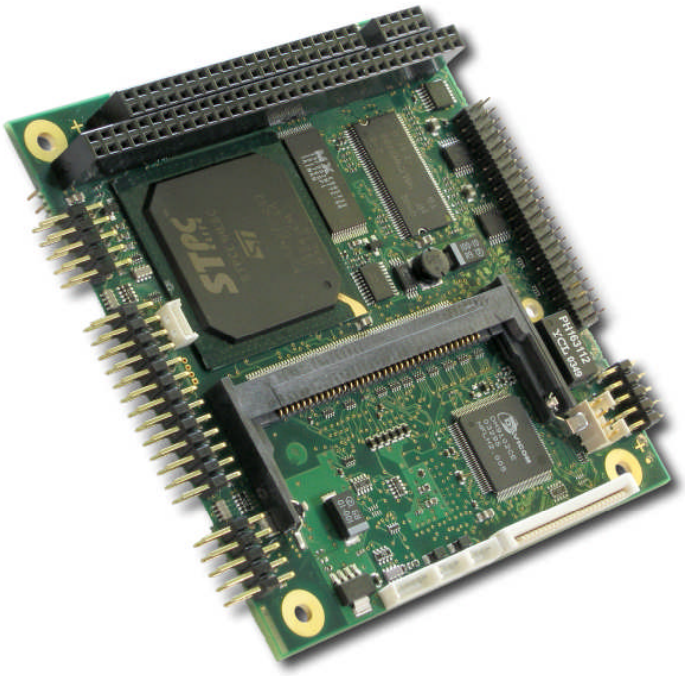

MOPSlcdSE

MOPS/SE

User's Guide

Document Revision 1.4

kontron

CONTENTS

1. USER INFORMATION

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For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

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Technicians and engineers from Kontron Embedded Modules and/or its subsidiaries and official distributors 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 contact your local representative or consult our Web site for the latest product documentation, utilities, and drivers. If the information does not help to solve the problem, contact us by telephone.

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2. INTRODUCTION

2.1 *MOPSlcdSE and MOPS/SE*

MOPSlcdSE and MOPS/SE are both based on the same PCB layout. The only difference between both boards is the onboard graphic controller equipped on every MOPSlcdSE. All MOPS/SE boards come without a graphic controller. Whenever the features of the products MOPSlcdSE and MOPS/SE are identical, this document will refer to the product MOPSlcdSE.

The MOPSlcdSE comes with an STMicroelectronics STPC® Elite embedded microcontroller. The processor runs with an internal clock speed of 100MHz and is fully compatible with standard x86 processors. The processor is combined with a powerful chipset to provide a general purpose PC-compatible subsystem on a single chip. The CPU/chipset does not require a cooler or a fan.

The MOPSlcdSE can be equipped with either 16MB or 32MB SDRAM soldered onboard, which makes this PC/104 processor board especially suitable for use in rugged environments.

There also is a DIMM socket on the top side of the board, which is used as a JUMPtec Intelligent Panel Adaption 2 (JIPA 2) interface to connect LCD flat panels. The onboard Silicon Motion ® LynxEM+ video subsystem with integrated 2MB of graphic memory supports a vast variety of LCD panels. This feature is not available on the MOPS/SE.

Every MOPSlcdSE comes with the PC/104 standard interface (ISA signals).

The MOPSlcdSE is a highly integrated CPU board that features many standard interfaces, including a watchdog timer and a real-time clock. The board integrates the complete functionality of a 80486 motherboard and includes the following features:

- CPU / chipset (single chip)
- System BIOS
- SDRAM controller, which supports up to 32MB SDRAM
- Interrupt controller
- DMA controller
- EIDE controller
- PCI controller (PCI 2.1 compliant)

The following features are provided via the onboard PCI bus:

- Concurrent PCI video processor
- 32-bit PCI Ethernet controller
- PCI-to-USB bridge

Additional peripheral functions include:

- Keyboard controller
- PS/2 mouse support
- Real-time clock
- Watchdog timer (WDT)
- Two serial ports (Both RS-232)
- Parallel port (SPP/EPP/ECP modes)
- Floppy controller

2.2 *The MOPS Family*

MOPS (**M**inimized **O**pen **P**C **S**ystem) PC/104 products represent the “Proven PC Platform for Instant Solutions." Each MOPS module is characterized by the same pinout for the keyboard, COM1 and COM2, 44-pin IDE, LPT, and 1st LAN. These homogeneous features facilitate easy upgrades within the Kontron Embedded Modules GmbH MOPS PC/104 product family.

Whenever a LCD panel is required, MOPS products with onboard graphics controllers serve as the right choice. Display connections are simplified when using these units, which come with a JUMPtec Intelligent LVDS Interface (JILI) and a JUMPtec Intelligent Panel Adapter (JIPA) interface. The two interfaces can recognize which display is connected and then independently set all video parameters. These interfaces are not available on all MOPS products.

All MOPS-PC/104 are plug-and-work enabled to further reduce time-to-market.

As part of the standard features package, all MOPS PC/104 modules come with a JUMPtec Intelligent Device Architecture (JIDA) interface, which is integrated into the BIOS of the PC/104 modules. This interface enables hardware-independent access to the MOPS-PC/104 features that cannot be accessed via standard APIs. Functions such as watchdog timer, brightness and contrast of LCD backlight, and user bytes in the EEPROM can be configured with ease by taking advantage of this standard MOPS PC/104 module feature.

All MOPS PC/104 products can be controlled remotely by using JRC software through a serial port. The software allows you to change, update, and maintain the MOPS products from a host computer via a serial connection.

2.3 PC/104 an Embedded PC Standard

Over the past decade, PC architecture has become an accepted platform for far more than desktop applications. Dedicated and embedded applications for PCs are beginning to appear everywhere.

By standardizing hardware and software around the broadly supported PC architecture, embedded system designers can substantially reduce development costs, risks, and time-to-market.

For these reasons, companies that embed microcomputers as controllers within their products seek ways to reap the benefits of using the PC architecture. However, the standard form factor of a PC bus (12.4" x 4.8") and its associated card cages and backplanes are too bulky and expensive for most embedded control applications.

The only practical way to embed the PC architecture in space-and power-sensitive applications has been to design a PC chip by chip directly into the product. But this runs counter to growing trend away from "reinventing the wheel." Whenever possible, top management now encourages outsourcing of components and technologies to reduce development costs and accelerate product design cycles.

A need has arisen for a more compact implementation of the PC bus, satisfying the reduced space and power constraints of embedded control applications. PC/104 was developed in response to this need. It offers full architecture, hardware and software compatibility with the PC bus but in ultra-compact (3.6" x 3.8") stackable modules. PC/104 is ideally suited to the unique requirements of embedded control applications.

Although configuration and application possibilities with PC/104 modules are practically limitless, there are two ways to use them in embedded system designs:

- ***Standalone module stacks***
  PC/104 modules are self-stacking. The modules are used like ultra-compact bus boards but without a need for backplanes or card cages. Stacked modules are spaced 0.6 inches apart. (The three-module stack measures 3.6 by 3.8 by 2 inches.) Companies using PC/104 module stacks within their products frequently create one or more of their own application-specific PC/104 modules.

- ***Component-line applications***
  In this configuration, the modules function as highly integrated components, plugged into custom carrier boards that contain application-specific interfaces and logic. The modules' self-stacking bus can be useful to install multiple modules in one location. This facilitates product upgrades or options and allows temporary addition of modules during system debug or test.

3. GETTING STARTED

The easiest way to get the MOPSlcdSE board running is to use a starter kit from Kontron Embedded Modules GmbH. Take the following steps:

1. Turn off the power supply (part of the starter kit).
2. Connect the power supply to the starter kit baseboard (part of the starter kit).
3. Plug a graphics-controller board to the PC/104 bus or the ISA bus slots on the starter kit when using the MOPS/SE. (There are starter kits available with and without PC/104 graphics boards included.)
4. Connect the CRT monitor to the graphics controller board when using the MOPS/SE. When using the MOPSlcdSE, connect a CRT monitor to the CRT interface or a LCD panel to the JIPA interface by using the corresponding adapter cable.
5. Plug the MOPSlcdSE to the PC/104 bus stack on the starter kit baseboard.
6. Make all necessary connections from the MOPSlcdSE to the starter kit board. (Cables come with the starter kit). The starter kit board offers various interfaces on standard connectors.
7. Plug a keyboard to the starter kit's keyboard connector.
8. Connect the floppy drive (part of the starter kit) with the data cable (part of the starter kit) to the MOPSlcdSE floppy interface.
9. Connect the power supply to the floppy's power connector.
10. Plug a hard-drive data cable to the MOPSlcdSE hard-disk interface. Attach the hard disk to the connector at the opposite end of the cable.
11. If necessary, connect the power supply to the hard disk's power connector.
12. Make sure all your connections have been made correctly.
13. Turn on the power.
14. Enter the BIOS by pressing the <DEL> key during boot-up. Make all changes in the BIOS setup. See the BIOS chapter of this manual for details.

4. SPECIFICATIONS

4.1 *Functional Specifications*

- **Processor**
  - STMicroelectronics STPC® Elite with 100 MHz internal clock and 8KB unified instruction and data cache (fanless)
- **Chipset**
  - Integrated PCI North / South Bridge controller
- **Power Supply**
  - 5V supply
- **Memory**
  - Onboard soldered 16MB or 32MB SDRAM (100Mhz clock speed)
- **Ethernet: Davicom DM9102A Network Controller**
  - 32-bit Fast Ethernet
  - 100/10BASE-T with auto-negotiation
  - works according to the common criteria of the embedded technology market segment
- **Two Serial Ports, (COM1 and COM2)**
  - Standard RS232C serial ports with FIFO
  - 16550 compatible
- **Parallel Port (LPT)**
  - SPP/ECP/EPP support
- **USB Controller Opti 82C861**
  - Two USB 1.1 compliant OHCI ports
- **Floppy Interface**
- **EIDE Hard-disk Interface (ATA-2 compatible)**
  - PCI IDE port (up to two IDE Devices)
  - Supports PIO Modes and bus master IDE
  - Multiword DMA support and individual drive timing
  - Supports Kontron chipDISK
- **Watchdog Timer**
- **256KB Flash BIOS (AMI)**

- **Real-time Clock**
  - External battery support
- **Keyboard Controller**
- **Onboard Silicon Motion ® Video Subsystem (MOPSlcdSE only)**
  - LynxEM+ LCD VGA Controller with PCI bus interface, including burst-mode support
  - 2MB Video RAM
  - Resolution up to 1280x1024 on panel and CRT
  - Dynamic power management
  - Direct 3D acceleration
  - Simultaneous display on CRT and panel
  - JIPA 2 PNP panel interfacing through SO-DIMM connector supports almost all LCDs
- **PC/104 Extension Bus**

4.2 *Mechanical Specifications*

4.2.1. PC/104 Bus Connector (ISA part)

- **One 2 X 32 pin stackthrough and one 2 X 20 pin stackthrough connector**

4.2.2. Module Dimensions

- **95 x 90 mm (3.7" x 3.5")**

4.2.3. Height

- **23.5 mm max (including PC/104 connector pins)**

4.2.4. Weight

- **90 g (full feature version)**

4.3 *Electrical Specifications*

4.3.1. Supply Voltage

- 5V DC +/- 5%

4.3.2. Supply Voltage Ripple

- 100 mV peak to peak 0 - 20 MHz

4.3.3. Supply Current (Typical, DOS Prompt)

- MOPS/SE with 16MB SDRAM: 630mA
- MOPSlcdSE with 32MB SDRAM: 850mA

4.3.4. Supply Current (Maximum)

- 3.102A (full featured maximum performance version)

(calculated theoretical values from all components maximum supply currents)

4.3.5. External RTC Battery

- External RTC battery voltage: 2.2V to 3.5V (3.0V recommended)
- External RTC battery quiescent current: 2.4µA (max)

4.4 *MTBF*

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

- **System MTBF (hours): 322073**

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

4.5 *Environmental Specifications*

4.5.1. Temperature

- **Operating: 0 to +60 C (*) (with appropriate airflow.)**
- **Nonoperating: -10 to +85 °C (noncondensing)**

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

4.5.2. Humidity

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

5. CPU, CHIPSET AND SUPER-I/O

5.1 CPU and Chipset

The MOPSlcdSE comes with a STMicroelectronics STPC® Elite, which operates with a 100MHz CPU. The processor and chipset provide a general purpose PC-compatible subsystem on a single chip. It is a fully static, 32-bit, 5-stage pipeline, x86 processor. It features an 8KB unified instruction and data cache, as well as a parallel processing, integral-floating point unit, and low-power, system-management modes.

The MOPSlcdSE does not require a cooler or a fan for the STPC Elite.

The chipset integrated in the STPC Elite microcontroller features:

- **Integrated PCI North / South Bridge controller**
- **SDRAM controller (64 bit, 100MHz)**
- **PCI controller (PCI 2.1 compliant)**
  - Integrated PCI arbitration interface
  - PCI-to-ISA translation cycles
  - Translation of ISA master initiated cycles to PCI
- **ISA / Master / Slave / DMA**
  - ISA master / slave supports flash ROM
  - ISA hidden refresh
  - 16bit I/O decoding
- **EIDE controller (ATA-2 compatible)**
- **DMA controller (2x8237/AT compatible)**
- **Interrupt controller (2x8259/AT compatible)**
- **Timer/counters (8254 compatible)**
- **Power Management Unit**

5.2 CPU and Chipset Configuration

See the “Chipset Menu” section of the “Appendix B: BIOS Operation” chapter for information on possible settings.

5.3 *Super I/O Controller*

The MOPSlcdSE uses a Winbond W83977F-A or a compatible Super I/O Controller chip for additional peripheral functions such as:

- **8042 Keyboard Controller with PS/2 Mouse Support**
- **Floppy-disk-drive Controller**
  - For one drive with up to 2.88MB capacity floppy disks
  - Compatible with industry standard 82077/765
- **Two high-speed Serial Communication Ports (UARTs)**
  - 16550 compatible with 16-byte, send-receive FIFOs
  - Baud rates up to 115.2K
- **Parallel Port**
  - Compatible with IBM parallel port
  - Supports PS/2 compatible bi-directional mode, EPP and ECP (IEEE1284 compatible)
- **Watchdog Timer**
- **Real-time Clock**

5.4 *Super I/O Controller Configuration*

See the "SuperIO Configuration Submenu" section of the "Appendix B: BIOS Operation" chapter for information on possible settings of the features included in the I/O controller.

6. SYSTEM MEMORY

The *MOPSlcdSE* is available with different memory configurations. The module can be equipped with onboard soldered 16MB or 32MB of SDRAM. Customers cannot upgrade the memory.

6.1 *Configuration*

There are lots of settings available for timing and memory usage in the BIOS setup utility. See the “Chipset Menu” section of the “Appendix B: BIOS Operation” chapter for details on the memory configuration settings.

7. ISA AND PC/104 BUS EXPANSION

The design of the MOPSlcdSE follows the standard PC/104 form factor and offers ISA bus signals for standard PC/104 adapter cards.

7.1 *PC/104 Bus (ISA part)*

The PC/104 bus consists of two connectors that use 104 pins in total.

- **XT bus Connector (64 pins)**
- **AT bus Connector (40 pins, which is optional for 16-bit, data-bus systems)**

The pinout of the PC/104 bus connectors corresponds to the pinout of ISA bus connectors with some added ground pins. The two PC systems with different form factors are electrically compatible.

The **XT bus connector**, Rows A and B.

The corresponding 64-pin stackthrough header (ISA bus = 62pins) has two added ground pins at the end of the connector (Pin A32 and Pin B32). The pinout between PC/104 bus and XT ISA bus is identical between A1 - A31 and B1 - B31.

The **AT bus extension connector**, Rows C and D.

The corresponding 40-pin stackthrough header (ISA bus = 36 pins) has four added ground pins, two on each side of the connector. To avoid confusion, the first two pins are defined as Pin C0 and Pin D0. The additional ground pins at the end of the connector are defined as C19 and D19. The pinout between PC/104 bus and AT ISA bus is identical between C1 - C18 and D1 - D18.

The MOPSlcdSE features both – XT bus and AT bus extension – on two, dual-row socket connectors with 2.54mm x 2.54mm grid (0.1" x 0.1").

7.1.1. PC/104 Connectors

The PC/104 XT bus is available through the X1 connector. The PC/104 AT bus is available through the X2 connector. To find the location of the PC/104 bus connectors, please see the Appendix E: Connector Layout chapter.

A detailed description of the signals including electrical characteristics and timings is beyond the scope of this document. Please see ISA bus and PC/104 specifications for details.

7.1.2. PC/104 Configuration

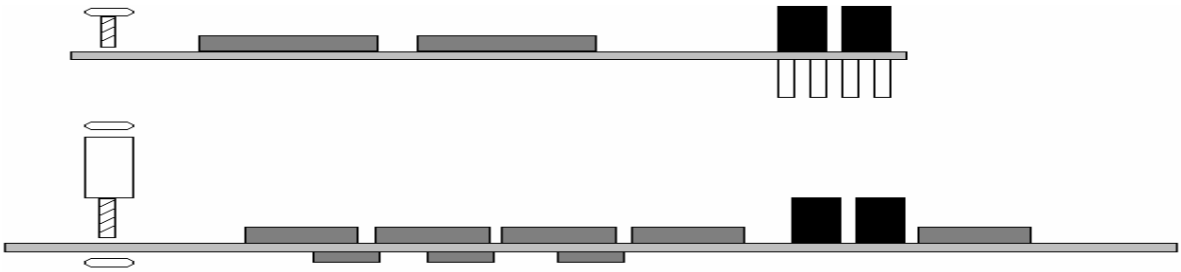
When using add-on boards on the PC/104 bus, make sure that there are no resource conflicts in the system. Carefully choose hardware interrupts, DMA channels, memory and I/O address ranges to avoid resource conflicts, which are often the reason why a board or a feature does not function correctly. See Appendix A: System Resource Allocation for information about the resources already used by the MOPSlcdSE.

You can configure different features for the PC/104 bus in the BIOS setup utility. Please refer to the "ISA Bus Configuration Submenu" section in the "Appendix B: BIOS Operation" chapter.

7.2 *PC/104 Stack*

PC/104 adapter cards are mounted in a stack-through manner. Adapter cards are designed with plugs on their undersides that mate with the PC/104 socket connectors of MOPSlcdSE. PC/104 adapters can support the socket connector version on their topside and allow additional stacking of adapters.

Whenever possible, use the MOPSlcdSE as the top module of the PC/104 stack because the CPU board usually has higher heat-dissipation requirements.



8. GRAPHICS INTERFACE (MOPSlcdSE ONLY)

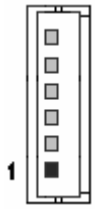
8.1 *Graphics Controller*

The MOPSlcdSE comes with a LynxEM+ PCI graphics controller from Silicon Motion ®. The controller features an LCD and CRT simultaneous true 64-bit graphics engine plus integrated 2MB of video memory. The graphics controller supports CRT monitors and a variety of LCD panels with resolutions up to SXGA (1280x1024). The MOPSlcdSE video BIOS is integrated in the system BIOS ROM chip and supports different panel types, which are identified via the configuration pins on the LCD panel connector (JIPA 2). The MOPSlcdSE can support a variety of panels, which are all configured by a dedicated cable for each panel. Setting jumpers or changing software is not required. Because nearly all LCDs use different connectors, pinout, or LCD voltages, this is the easiest and safest way to configure different panels.

8.2 *CRT Connector*

The CRT monitor is available through the X13 connector (6 pins). To have the signals available on a standard DSUB-15 CRT monitor connector, an adapter cable is required. A 15-pin DSUB cable is available from Kontron (KAB-VGA-2, Part Number 96053-0000-00-0).

The following table shows the pinout:

Header	Pin	Signal Name	Function	DSUB-25
	1	RED	Analog video red	1
	2	GRN	Analog video green	2
	3	BLU	Analog video blue	3
	4	GND	Signal ground	7
	5	VSYNC	Vertical sync	14
	6	HSYNC	Horizontal sync	13

To find the location of the CRT connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

8.3 LCD Panel Connector

The LCD Panel interface is available through the X16 connector on the top of the board. This connector represents the **J**UMPtec **I**ntelligent **P**anel **A**daption 2 (JIPA 2*) interface and is a plug-and-play interface specified by Kontron Embedded Modules GmbH. A variety of cables for different display types are available from Kontron. Please refer to the actual cable list on the Kontron Web site for part numbers and cable names. A detailed description of the JIPA 2 interface standard also is available in a separate document JIPAD???.PDF. The three question marks represent the documents revision number. You can download this document from the Kontron Web site, or contact your local Kontron technical support to receive it.

To find the location of the LCD Panel interface connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

Note: (*) The JIPA 2 interface and the JIPA interface (known from other Kontron Embedded Modules GmbH boards with the CT69000) are NOT 100% compatible. The data mapping of the SMI LynxEM+ and the Asiliant CT69000 differ for some panel types. Therefore, not all JIPA display cables used with the JIPA interface can be used with the JIPA 2 interface. Make sure you have a suitable cable for this board.

8.4 Display Power Considerations

When using a LCD Panel, additional voltages may be required to drive the display's logic, backlight converter, and display contrast.

The display logic may require +5V for standard or +3.3V for low-power LCDs. Contrast voltages for passive displays are normally very different and can range from -30V to +30V. Backlight converters usually are +5V or +12V types. When using a Kontron JIPA cable, you do not need to address configurations. Voltage for display logic and contrast come preconfigured on the JIPA cable. On occasion, backlight voltage has to be adjusted on the cable.

Even though the MOPSlcdSE is a +5V-only board, you need to supply the +12V for the backlight converter additionally when using such a converter type.

The onboard 3.3V-circuitry of the MOPSlcdSE and the +3.3V logic voltage of low-voltage panels are powered by separate voltage regulators. The one for the LCD is mounted on the JIPA adapter cable.

8.5 Connecting a LCD Panel

To determine whether your panel display is supported, check the Kontron Web site for panel lists. Kontron regularly updates a list of panels that have been tested with the MOPSlcdSE.

Many panel adapters for a wide spread variety of displays are available through Kontron. If you use one of those adapters supplied by Kontron, configuration is easy.

1. Check whether you have the correct adapter and cable for the panel you plan to use. Inspect the cable for damages.
2. If you want to drive your backlight inverter through the JIPA cable, check the configuration of the backlight voltage to match your backlight inverter type (+5V or +12V). If necessary, reconfigure the cable for the correct backlight voltage.
3. Disconnect the power from your system.
4. Connect the panel adapter to the LCD Panel connector (JIPA 2 interface*) on the MOPSlcdSE.
5. Connect the other end of the cable to your display.
6. Connect the backlight converter.
7. Supply power to your system.
8. If no image appears on your display, connect a CRT monitor to the CRT connector. If you still do not see improvement, consider contacting the dealer for technical support.

Note: (*) The JIPA 2 interface and the JIPA interface (known from other Kontron Embedded Modules GmbH boards with the CT69000) are NOT 100% compatible. The data mapping of the SMI LynxEM+ and the Asiliant CT69000 differ for some panel types. Not all JIPA display cables used with the JIPA interface can be used with the JIPA 2 interface. Make sure you use a suitable cable for this board.

8.6 Configuration

You can download available drivers for the LynxEM+ graphics controller from the Kontron Web site. For further information read the read-me or help files or contact technical support.

8.7 Graphics Technical Support

If problems occur, you can solve some of them by using the latest drivers for the LynxEM+ graphics controller. Kontron provides you with the latest tested drivers, which can differ from newer ones. For further technical support, contact either Kontron, or obtain support information and downloadable software updates from Silicon Motion.

8.8 Available Video Modes

The following list shows the video modes supported by the graphics controller. When using a LCD panel on the JIPA interface, not all of the video modes listed below may be available. Availability depends upon display capabilities. Different operating systems also may not support all listed modes by the available drivers.

8.8.1. Standard IBM-Compatible VGA Modes

Video Mode	Type	Characters/Pixels	Colors/Gray val.	Refresh Rate
00h/01h	Text	40x25	16	70
02h/03h	Text	80x25	16	70
04h/05h	Graphics	320x200	4	70
06h	Graphics	640x200	2	70
07h	Text	80x25	Mono	70
0Dh	Graphics	320x200	16	70
0Eh	Graphics	640x200	16	70
0Fh	Graphics	640x350	Mono	70
10h	Graphics	640x350	16	70
11h	Graphics	640x480	2	60
12h	Graphics	640x480	16	60
13h	Graphics	320x200	256	70

8.8.2. Low Resolution Modes

Video Mode	Type	Pixels	Colors	Refresh Rate
40h	Graphics	320x200	256	70
41h	Graphics	320x200	64K	70
42h	Graphics	320x240	256	75/60
43h	Graphics	320x240	64K	75/60
44h	Graphics	400x300	256	75/60
45h	Graphics	400x300	64K	75/60
46h	Graphics	512x384	256	75
47h	Graphics	512x384	64K	75
48h	Graphics	640x400	256	70
49h	Graphics	640x400	64K	70

8.8.3. VESA Super VGA Modes and Others

VESA Mode	Extended Mode	Display Mode	Pixels	Colors
101h	50	Graphics	640x480	256
	54	Graphics	640x480	16M
102h	6A	Graphics	800x600	16
103h	55	Graphics	800x600	256
	59	Graphics	800x600	16M
104h	6B	Graphics	1024x768	16
105h	60	Graphics	1024x768	256
107h	65	Graphics	1280x1024	256
111h	52	Graphics	640x480	64K
112h	53	Graphics	640x480	16M
114h	57	Graphics	800x600	64K
115h	58	Graphics	800x600	16M
117h	62	Graphics	1024x768	64K

BIOS support for all nonstandard IBM compatible VGA Modes consists only of the ability to set the mode. Other BIOS calls such as write character, scrolling, and write pixel are not supported. BIOS is used to set modes, not to install or run software applications and drivers.

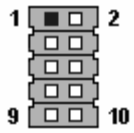
9. SERIAL-COMMUNICATION INTERFACES

Two fully functional serial ports (COMA and COMB) provide asynchronous serial communications. COMA and COMB support RS-232 operation modes and are compatible with the serial-port implementation used on the IBM Serial Adapter. They are 16550 high-speed, UART-compatible and support 16-byte FIFO buffers for transfer rates from 50 baud to 115.2K baud.

9.1 *Connectors*

COMA is available through the X6 connector (10 pins). COMB is available through the X7 connector (10 pins). An adaptor cable is required to have the signals available on standard serial-interface connectors DSUB9 or DSUB25, an adapter cable is required. A 9-pin DSUB cable is available from Kontron (KAB-DSUB9-2, Part Number 96017-0000-00-0).

The following table shows the pinouts for COMA and COMB, as well as connections for DSUB adapters.

Header	Pin	Signal Name	Function	In / Out	DSUB-25	DSUB-9
	1	/DCD	Data Carrier Detect	In	8	1
	2	/DSR	Data Set Ready	In	6	6
	3	RxD	Receive Data	In	3	2
	4	/RTS	Request to Send	Out	4	7
	5	TxD	Transmit Data	Out	2	3
	6	/CTS	Clear to Send	In	5	8
	7	/DTR	Data Terminal Ready	Out	20	4
	8	/RI	Ring Indicator	In	22	9
	9	GND	Signal Ground	--	7	5
	10	VCC (*)	+5V	--	--	--

Notes: (*) To protect the 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-protecting requirements of IEC/EN 60950.

To find the location of the serial ports on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

9.2 *Configuration*

You can set the two serial input/output interfaces to a variety of I/O addresses and IRQ configurations. Settings are changeable from the MOPSlcdSE BIOS setup utility. Refer to the "SuperIO Configuration Submenu" section in the "Appendix B: BIOS Operation" chapter for configuration information.

Note: Most operating systems detect the serial port with the I/O address 3F8h as COM1 and 2F8h as COM2.

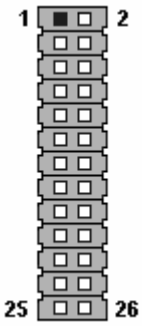
10. PARALLEL-COMMUNICATION INTERFACE

The MOPSlcdSE incorporates an IBM XT/AT compatible parallel port. It can be set to bi-directional and supports EPP and ECP operating modes. The bi-directional functions are compatible with those of an IBM PS/2 style parallel port. This functionality is always available and does not conflict with printer use.

10.1 *Connector*

The parallel port is available through the X5 connector (26 pins). To have the signals available on a standard, parallel-interface connector DSUB-25, an adapter cable is required, which is offered by Kontron (KAB-DSUB25-1, Part Number 96015-0000-00-0).

The following table shows the pinout as well as necessary connections for a DSUB-25 adapter.

Header	Pin	Signal Name	Function	In / Out	DSUB-25
	1	/STB	Strobe	Out	1
	3	PD0	Data 0	I/O	2
	5	PD1	Data 1	I/O	3
	7	PD2	Data 2	I/O	4
	9	PD3	Data 3	I/O	5
	11	PD4	Data 4	I/O	6
	13	PD5	Data 5	I/O	7
	15	PD6	Data 6	I/O	8
	17	PD7	Data 7	I/O	9
	19	/ACK	Acknowledge	In	10
	21	BUSY	Busy	In	11
	23	PE	Paper out	In	12
	25	SLCT	Select out	In	13
	2	/AFD	Autofeed	Out	14
	4	/ERR	Error	In	15
	6	/INIT	Init	Out	16
	8	/SLIN	Select in	Out	17
	26	VCC (*)	+ 5 V	--	NC
	10,12	GND	Signal Ground	--	18 - 25
	14,16	GND	Signal Ground	--	18 - 25
	18,20	GND	Signal Ground	--	18 - 25
	22,24	GND	Signal Ground	--	18 - 25

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

To find the location of the parallel port on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

10.2 *Configuration*

The parallel-port mode, I/O addresses, and IRQs are changeable in the MOPSlcdSE BIOS Setup Utility. You can program the base I/O-address 378h, 3BCh, 278h or disable the interface. You can choose IRQ5 or IRQ7 as the parallel-port interrupt. In ECP mode, you can choose DMA 1 to DMA 3.

Refer to the “SuperIO Configuration Submenu” section in the “Appendix B: BIOS Operation” chapter for configuration information.

11. KEYBOARD AND FEATURE INTERFACE

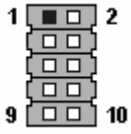
The keyboard and feature connector of the MOPSlcdSE offers five functions. The interface connects the following:

- **Keyboard**
- **Keyboard-lock Switch**
- **Speaker**
- **Battery**
- **Reset Button**

11.1 *Connector*

The keyboard and feature connector is available through Connector X4 (10 pins). An adapter cable is required to connect a standard keyboard to this interface. There are two adapter cables available from Kontron. One can be used for AT keyboard (KAB-KB-1, Part Number 96023-0000-00-0), the other for PS/2 keyboard (KAB-KB-PS2, Part Number 96060-0000-00-0). The adapter cables do not know the other functions on this interface.

The following table shows the pinout as well as necessary connections for adapters.

Header	Pin	Signal Name	Function	5-pin Din (Diode)	6-pin MiniDin (PS2)
	1	Speaker	Speaker output		
	2	GND	Ground		
	3	/RESIN	Reset input		
	4	/KBLOCK	Keyboard lock		
	5	KBDAT	Keyboard data	2	1
	6	KBCLK	Keyboard clock	1	5
	7	GND	Ground	4	3
	8	VCC (*)	+5V	5	4
	9	BATT	Battery in (3,0V)		
	10	PWRGOOD	Powergood		

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

To find the location of the keyboard and feature connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

11.2 Configuration

There are no BIOS configuration entries available for this interface.

11.3 Signal Descriptions

11.3.1. /KBLOCK (Keyboard Lock)

- Input on CPU modules
- Output on any other module
- Input to the keyboard controller input Port 1, Bit 7

11.3.2. /RESIN and PWRGOOD (Reset Inputs)

- Input on CPU modules
- When POWERGOOD goes high, it starts the reset generator on the CPU module to pull the onboard reset line high after a valid reset period. You also can use this pin as a low active hardware reset for modules.

11.3.3. Speaker

- Open collector output on modules that drive a piezo electronic speaker.
- Input on modules that connects a 5V piezo electronic speaker to this pin.
- An 8-Ohm loudspeaker also can be connected between SPEAKER and GND, but because of current limitation, the volume will be low.
- Connect only one speaker to this pin. The CPU usually drives this pin. However, other modules also can use this signal to drive the system speaker.

11.3.4. KBDAT (Keyboard Data)

- Bi-directional I/O pin on CPU modules
- Keyboard data signal

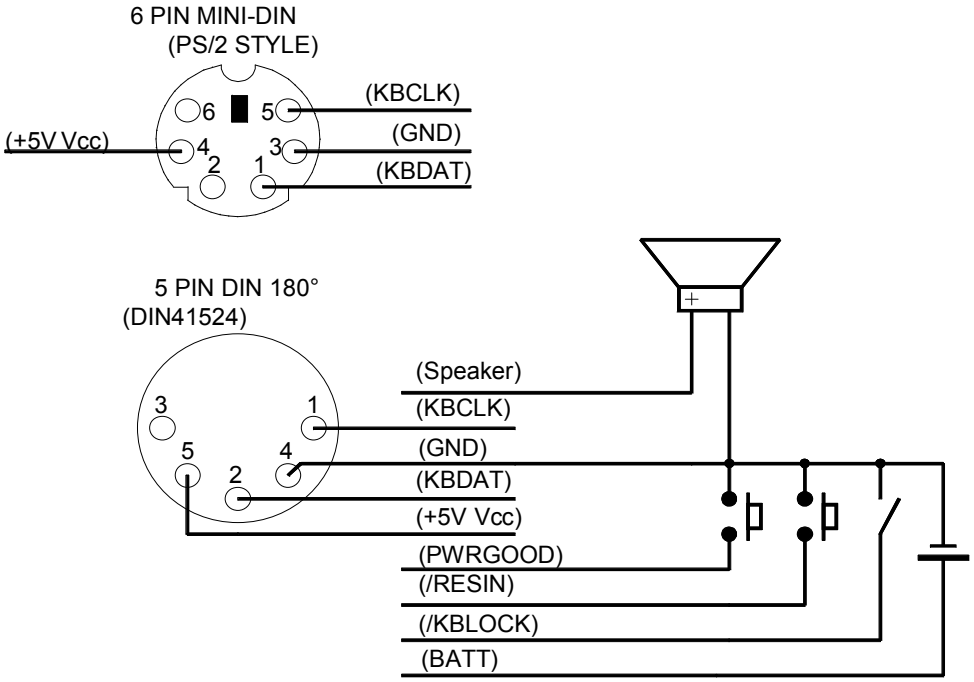
11.3.5. KBCLK (Keyboard Clock)

- Bi-directional I/O pin on CPU modules
- Keyboard clock signal

11.3.6. BATT (System Battery Connection)

- This pin connects a system battery to all modules.
- The battery voltage has to be higher than 2.2V and lower than 3.5. A 3V battery is recommended.
- A battery is not needed to hold CMOS setup data. Your configurations for hard disks, floppy drives, and other peripherals are saved in an onboard DRAM. However, you need a battery to save the CMOS date and time when power supply is turned off.

11.3.7. Example Connection AT-keyboard and Other Functions



12. PS/2 MOUSE INTERFACE

The super I/O controller of the MOPSlcdSE supports a PS/2 mouse.

12.1 *Connector*

The PS/2 mouse interface is available on Connector X14 (4 pins).

An adapter cable is required to connect a standard PS/2 mouse. The cable is available from Kontron (KAB-MOUSE-PS2, Part Number 96062-0000-00-0).

The following table shows the pinout and connections for a PS/2 mouse adapter.

Header	Pin	Signal Name	Function	6-pin MiniDin (PS2)
	1	MSDAT	Mouse data	1
	2	VCC (*)	+5V	4
	3	GND	Ground	3
	4	MSCLK	Mouse clock	5

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

To find the location of the PS/2 mouse connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

12.2 *Configuration*

You can set the PS/2 mouse support to enabled, disabled or auto from the BIOS Setup. If you enable the mouse, IRQ12 is used as the interrupt and is no longer available for other devices. Please refer to the “Boot Settings Configuration Submenu” section in the “Appendix B: BIOS Operation” chapter for information on configuration.

13. USB INTERFACE

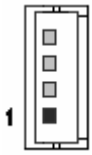
The MOPSlcdSE is equipped with a PCI-to-USB bridge Opti 82C861. It comes with two USB ports, which follow the OHCI specification and are USB-1.1 compliant.

You can expand the amount of USB connections by adding external hubs. You can connect up to 127 USB peripherals to each hub.

13.1 *Connector*

The USB ports are available through the X11 and the X12 connectors (4 pins) each. To have the signals available on the standard USB interface connectors, an adapter cable is required. A USB interface cable is available from Kontron (KAB-USB-1, Part Number 96054-0000-00-0).

The following table shows the pinouts for the USB connector.

Header	Pin	Signal Name	Function
	1	VCC (*)	+5V
	2	USB0	USB-
	3	USB1	USB+
	4	GND	Ground

To find the location of the USB ports on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

13.2 Configuration

This feature does not need to be configured by the BIOS setup utility, nor does it require drivers.

13.3 Limitations

The power contacts for USB devices on Pin 1 and Pin 4 are not protected. They are suitable to supply connected USB devices with a maximum of 500mA power dissipation. Do not supply external USB devices with higher power dissipation through these pins. Always use a fuse for power on external USB connectors, as a defective USB device may damage the MOPSlcdSE. Kontron recommends using a resetable fuse, which follows the USB 1.1 specification, for power on external USB connectors.

14. FLOPPY-DRIVE INTERFACE

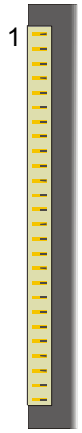
The floppy-drive interface of the MOPSlcdSE uses a 2.88MB super I/O floppy-disk controller and can support one floppy disk drive with densities that range from 360kB to 2.88MB. The controller is 100% IBM compatible.

14.1 *Connector*

The floppy disk interface is available on the flat-foil Connector X8 (26 pins). This type of connector is often used in notebooks to connect a slim-line floppy drive.

Accessories are available for this interface from Kontron. To connect a standard 3.5" floppy drive, use an adapter cable (ADA-FLOPPY-2, Part Number 96001-0000-00-0). If you have a slim-line 3.5" floppy drive, you may need a flat foil cable (KAB-FLOPPY/MOPS-1, Part Number 96019-0000-00-0). It also is possible to get a slim line 3.5" floppy drive with cable from Kontron (FLOPPY-MOPS-1, Part Number 96010-0000-00-0).

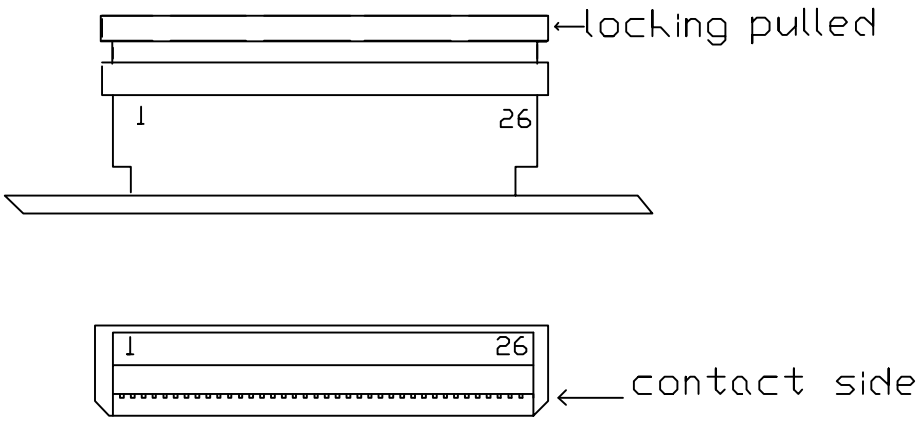
The following table shows the connector pinout.

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	VCC (*)	+5V	2	/IDX	Index
	3	VCC (*)	+5V	4	/DR0	Drive Select 0
	5	VCC (*)	+5V	6	/DSKCHG	Disk Change
	7	NC	Not connected	8	NC	Not connected
	9	NC	Not connected	10	/MTR0	Motor on 0
	11	NC	Not connected	12	/FDIR	Direction Select
	13	NC	Not connected	14	/STEP	Step
	15	GND	Ground	16	/WDATA	Write Data
	17	GND	Ground	18	/WGATE	Write Gate
	19	GND	Ground	20	/TRK0	Track 00
	21	GND	Ground	22	/WRTPRT	Write Protect
	23	GND	Ground	24	/RDATA	Read Data
	25	GND	Ground	26	/HDSEL	Side One Select

To find the location of floppy-drive interface on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

14.1.1. Connector Diagram



14.2 *Configuration*

You can configure the floppy disk interface in the BIOS Setup Utility. You can choose the 3.5" (common) or 5.25" drive types with densities of 360kB, 720kB, 1.2MB, 1.25MB, 1.44MB or 2.88MB. Refer to the "Floppy Configuration Submenu" section of the "Appendix B: BIOS Operation" chapter for more information on configuring the floppy drive.

You also can disable the floppy-disk controller in the "SuperIO Configuration Submenu."

15. IDE INTERFACE

The MOPSlcdSE features one EIDE interface (Ultra DMA 33 mode) that can drive two hard disks. When two devices share a single adapter, they are connected in a master/slave, daisy-chain configuration. If only one drive is in the system, you must set it as the master.

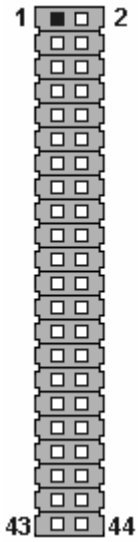
15.1 *Connector*

The IDE interface is available through Connector X9 (44 pins). This interface is designed in 2mm grid for optimal connectivity to a 2.5" hard disk.

There are several accessories available for IDE connectivity. You can use two cables to directly connect a hard disk in a 2.5" form factor (KAB-IDE-2MM, Part Number 96021-0000-00-0) or a 3.5" form factor (KAB-IDE-25, Part Number 96020-0000-00-0).

You can plug a Kontron chipDISK, which is an IDE hard disk that uses Flash technology, into the IDE interface and mechanically mount it by using a mini-spacer on the chipDISK hole. You also can use a chipDISK adapter (chipDISK-ADA1, Part Number 96004-0000-00-0) or compact Flash adapter (CFC-ADA1, Part Number 96004-0000-00-2) for more disk support.

The following table shows the pinout.

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	/RESET	Reset	2	GND	Ground
	3	HDD7	Data 7	4	HDD8	Data 8
	5	HDD6	Data 6	6	HDD9	Data 9
	7	HDD5	Data 5	8	HDD10	Data 10
	9	HDD4	Data 4	10	HDD11	Data 11
	11	HDD3	Data 3	12	HDD12	Data 12
	13	HDD2	Data 2	14	HDD13	Data 13
	15	HDD1	Data 1	16	HDD14	Data 14
	17	HDD0	Data 0	18	HDD15	Data 15
	19	GND	Ground	20	Key (NC)	Key pin
	21	DRQ	IDE DMA Request	22	GND	Ground
	23	/IOW	I/O write	24	GND	Ground
	25	/IOR	I/O read	26	GND	Ground
	27	IOCHRDY	I/O channel ready	28	GND	Ground
	29	/AKJ	Acknowledge	30	GND	Ground
	31	SIRQ	Interrupt	32	NC	Not connected
	33	SA1	Addr 1	34	NC	Not connected
	35	SA0	Addr 0	36	SA2	Addr 2
	37	/CS1	Chip select 1	38	/CS3	Chip select 3
	39	NC	Not connected	40	GND	Ground
	41	VCC (*)	+5V	42	VCC (*)	+5V
	43	GND	Ground	44	NC	Not connected

To find the location of IDE-controller interface on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

Notes: (*)To protect the 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-protecting requirements of IEC/EN 60950.

15.2 *Configuration*

The IDE interface offers several configuration settings. Refer to the “IDE Configuration Submenu” section in the “Appendix B: BIOS Operation” chapter for additional information on configuration.

16. ETHERNET INTERFACE

The MOPSlcdSE uses a Davicom DM9102A PCI Fast Ethernet Controller. The network controller supports a 10/100Base-T interface. The device autonegotiates the use of a 10Mbit/sec or 100Mbit/sec connection. You can enable an onboard LAN RPL ROM to support the boot-up of the system via Ethernet and a PXE boot server.

The Davicom DM9102A provides the following features:

- Integrated Fast Ethernet MAC, Physical Layer, and transceiver on one chip
- Compliance with PCI Specification 2.2
- PCI bus-master architecture
- EEPROM 93C46 interface supports node ID, access-configuration information
- Compliance with IEEE 802.3u 100Base-TX and 802.3 10Base-T
- Compliance with IEEE 802.3u autonegotiation protocol for automatic link-type selection
- Full-duplex/half-duplex capability
- Supports IEEE 802.3x Full Duplex Flow Control
- Digital clock recovery circuit using advanced digital algorithm to reduce jitter
- High-performance 100Mbps clock generator and data-recovery circuit
- Loopback mode for easy system diagnostics

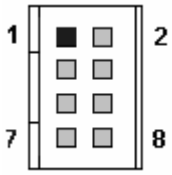
Note: The Ethernet interface works according to the common criteria of the embedded technology market segment.

16.1 Connector

The Ethernet interface is available through Connector X10 (8 pins).

To have the signals of the Ethernet connection available on a standard RJ45 connector, you need an adapter cable, which is offered by Kontron (KAB-MOPS-ETN1, Part Number 96048-0000-00-0).

The following table shows the pinout.

Header	Pin	Signal Name	Function	In/Out
	1	TXD+ (*)	10BASE-T Transmit	Differential Output
	2	TXD- (*)	10BASE-T Transmit	Differential Output
	3	RXD+ (**)	10BASE-T Receive	Differential Input
	4	SHLDGND	Shield Ground	
	5	SHLDGND	Shield Ground	
	6	RXD- (**)	10BASE-T Receive	Differential Input
	7	SPEEDLED (***)	Speed LED	Output
	8	LILED (***)	Link LED	Output

Notes: (*) TXD+, TXD- differential-output pair drives 10- and 100-megabits-per second Manchester-encoded data to 100/10BASE-T transmit lines.
(**) RXD+, RXD- differential-input pair receives 10- and 100-megabits per second Manchester-encoded data from 100/10BASE-T receive lines.
(***) SPEEDLED and LILED have an onboard 470Ohm serial resistor and can directly be connected to a LED's cathode. Connect anode to VCC.

To find the location of the Ethernet interface on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

16.2 Configuration

You can download available drivers and setup utilities from the Kontron Web site. Please refer to the corresponding readme and setup/install files. For further information contact your local technical support.

You can enable/disable the Ethernet controller from the Advanced Menu in the BIOS setup utility or enable the Onboard LAN PXE ROM to boot the system via Ethernet connection from a PXE server. See the "Appendix B: BIOS Operation" chapter for more information.

16.3 Ethernet Technical Support

If problems occur, you can solve some of them by using the latest drivers for the Davicom DM9102A controller. Kontron provides you with the latest in house- tested drivers, which can differ from newer ones. For further technical support, contact either Kontron or get support information and downloadable software updates from Davicom.

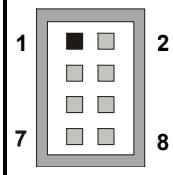
17. POWER CONNECTION

In some applications, the MOPSlcdSE is intended for use as a stand-alone module without a backplane. You need to have a power connector available on the board for direct power supply. The MOPSlcdSE is a +5V-only board. Peripherals can obtain additional voltage from the power connector that is located next to the PC/104 bus. The additional voltages (+12V, -5V and -12V) are not generated onboard the MOPSlcdSE.

17.1 *Connector*

The power connector is available as X3 (8 pins).

The following table shows the pinout.

Header	Pin	Signal Name	Function
	1	GND	Ground
	2	VCC	+5V
	3	BATT	Battery
	4	+12V	+12V
	5	-5V	-5V
	6	-12V	-12V
	7	GND	Ground
	8	VCC	+5V

To find the location of the power connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

17.2 Power Pins

Every power pin on the power connector as well as on the PC/104 bus connectors is limited to a maximum current of 1A per pin.

If a system using a MOPSlcdSE is only supplied from the power connector, the following limitations apply:

Power	Number of Pins	Max. Current
VCC (+5V)	2	2A
+12V	1	1A
-12V	1	1A
-5V	1	1A
GND	2	2A

A system using the MOPSlcdSE also can be supplied from the PC/104 bus connectors. If only those supply voltages pins are used, the following limitations apply:

Power	Number of Pins on ISA Part	Max. Current
VCC (+5V)	4	4A
+12V	2	2A
-12V	2	2A
-5V	2	2A
GND	8	8A

Modules on the PC/104 bus consuming a higher supply current must provide power supply through an additional connector.

Note: The MOPSlcdSE does not replace a backplane. Use all power pins on the power connector and on the PC/104 connectors to supply power to the MOPSlcdSE, and also use all additional power connectors on additional I/O cards if your system exceeds the above limitations. It is not acceptable to use only the power pins of the PC/104 connector to supply power to the full PC/104 stack.

17.3 External Battery

You can connect an external battery to Pin 3 (BATT) of the power connector instead of Pin 9 of the KBD connector. For more information refer to the Keyboard and Feature Interface section.

Note: The two battery inputs are protected against each other by diodes.

17.4 Configuration

The MOPSlcdSE is equipped with an Advanced Power Management system (APM). You can configure lots of options for power-saving states such as doze/sleep, standby, and suspend state. You can specify wake-up events that bring the system back to full-on state. Please refer to the "Power Menu" section in the "Appendix B: BIOS Operation" chapter.

18. GPIO INTERFACE (OPTIONAL)

The MOPSlcdSE can be equipped with a general-purpose I/O interface. However, this interface is not available on standard products. A module with this feature can be requested from Kontron Embedded Modules GmbH.

18.1 *Connector*

The optional GPIO interface is available on Connector X17 (4 pins).

There is no adapter cable available for this interface.

The following table shows the pinout for the GPIO connector.

Header	Pin	Signal Name	Function
	1	GPIO0	General Purpose I/O Pin 0
	2	GPIO1	General Purpose I/O Pin 1
	3	GPIO2	General Purpose I/O Pin 2
	4	GPIO3	General Purpose I/O Pin 3

To find the location of the GPIO connector on the MOPSlcdSE board, please see the Appendix E: Connector Layout chapter.

18.2 *Configuration*

There is no configuration utility for this optional feature. BIOS support is required to set up the GPIO interface. A special BIOS can be developed upon request.

19. WATCHDOG TIMER

The watchdog timer is integrated in the Super I/O controller of the MOPSlcdSE and can reset the system. The watchdog timer circuit has to be triggered within a specified time by application software. If the watchdog timer is not triggered because proper software execution fails or a hardware malfunction occurs, it resets the system.

19.1 *Configuration*

You can set the watchdog timer to enabled or disabled. You can specify the delay time and timeout (trigger period) from 15 seconds up to 30:15 minutes. The delay time is the time after first initialization before the trigger period starts. The timeout is the time the watchdog has to be triggered within. If the watchdog timer is not triggered within the timeout period, the board will be reset. You can make the initialization settings in the BIOS setup utility. Refer to the "Watchdog Submenu" section in the "Appendix B: BIOS Operation" chapter for information on configuration.

19.2 *Programming*

19.2.1. Initialization

You can initialize the watchdog timer from the BIOS setup and out of the application software with help of the JUMPtec Intelligent Device Architecture (JIDA) programmer's interface.

19.2.2. Trigger

The watchdog timer needs to be triggered out of the application software within the specified timeout period. You can only do this in the application software with help of the JIDA programmer's interface.

For information about the JIDA programmer's interface, refer to the JIDA BIOS extension section in the Appendix B: BIOS chapter and separate documents available in the JIDA software packages on the Kontron Web site.

20. APPENDIX A: SYSTEM RESOURCE ALLOCATIONS

20.1 *Interrupt Request (IRQ) Lines*

Please note that Kontron PC/104 devices were designed after the draft of P996 Specification for ISA systems. Because of this, shareable interrupts are not supported. Some PC/104 add-on board manufacturers do not follow the P996 Specification and allow shareable interrupts. If you want to use such PC/104 boards with Kontron devices, contact the manufacturer of the add-on board and ask about switching to non-interrupt sharing.

IRQ #	Used for	Available	Comment
0	Timer0	No	
1	Keyboard	No	
2	Cascade	No	
3	COM B	No	Note (1)
4	COM A	No	Note (1)
5		Yes	Note (2)
6	FDC	No	Note (1)
7	LPT	No	Note (1), Note (2)
8	RTC	No	
9		Yes	
10		Yes	
11		Yes	
12	PS/2 Mouse	No	Note (1)
13	Numeric processor	No	
14	EIDE Channel 1	No	Note (1)
15		Yes	

Notes:
(1) If the „used for“ device is disabled in setup, the corresponding interrupt is available for other devices.
(2) LPT also can be configured for IRQ5.

20.2 Direct Memory Access (DMA) Channels

DMA #	Used for	Available	Comment
0		Yes	
1		Yes	Note (3)
2	FDC	No	Note (1)
3	LPT	No	Note (2)
4	Cascade	No	
5		Yes	
6		Yes	
7		Yes	

Notes:
(1) If the „used for“ device is disabled in setup, the corresponding DMA channel is available for other devices.
(2) The DMA channel is only used in ECP mode of LPT; in other modes it is available.
(3) Possible alternative setting of LPT in ECP mode for used DMA channel.

20.3 I/O Address Map

I/O port addresses of the processor module MOPSlcdSE are functionally identical to a standard PC/AT. All addresses not mentioned in this table should be available. Kontron recommends that you do not use I/O addresses below 0110hex with additional hardware for compatibility reasons, even if available.

I/O Address (h)	Use	Available	Comment
0000 - 001F	DMA Controller 1	No	
0020 - 003F	Interrupt Controller 1	No	
0040 – 0044	Timer	No	
0060 – 006F	Keyboard Controller, Flags	No	
0061	Port B Register	No	
0070	NMI Enable Register	No	
0070 – 0071	Real-time Clock	No	
0072	CMOS Register	No	
0080 - 008F	DMA Page Register	No	
0092	Port A Register (Fast A20 Gate)	No	
00A0 - 00BF	Interrupt Controller 2	No	
00C0 - 00DF	DMA Controller 2	No	
00E0 - 00EF	System Control	No	
00F0 - 00FF	Math Coprocessor	No	
0100-010F	System Control	No	Kontron Control Port
01F0 – 01F7	Fixed Disk	No	
0278-027Fh		Yes	Free in standard configuration but possible address of LPT.
02E8-02EF		Yes	Free in standard configuration but possible address of COM.
02F8-02FF	Serial Port 2	No	Free when serial port is disabled in setup.
0378-037F	Parallel Port 1	No	Free when parallel port is disabled in setup.
03BC-03C4h		Yes	Free in standard configuration but possible address of LPT on system without graphics.
03C0 – 03Df	Video	No	Free when board is not equipped with a graphics controller.
03E8-03EFh		Yes	Free in standard configuration but possible address of COM.
03F0-03F7	Diskette Controller	No	Free when diskette controller is disabled in setup.
03F8-03FF	Serial Port 1	No	Free when serial port is disabled in setup.

20.4 *Memory Map*

The MOPSlcdSE processor module can support up to 32MB of memory. The first 640KB of DRAM are used as main memory.

Using DOS, you can address 1MB of memory directly. Memory area above 1MB (high memory, extended memory) is accessed under DOS via special drivers such as HIMEM.SYS and EMM386.EXE, which are part of the operating system. Please refer to the operating system documentation or textbooks for information about HIMEM.SYS and EMM386.EXE.

Other operating systems (Linux or Windows versions) allow you to address the full memory area directly.

Upper Memory	Use	Available	Comment
A0000h – BFFFFh	VGA Memory	No	Mainly used by graphic adapter cards. If a PCI graphics card is in the system, this memory area is mapped to the PCI bus.
C0000h – CBFFFh	VGA BIOS	No	Free for ISA bus or shadow RAM on board MOPS/SE where no VGA controller is mounted. C0000h – C7FFFh is mainly used by external ISA VGA cards.
CC000h – EFFFFh		Yes	Free for ISA bus or shadow RAM in standard configurations. If onboard LAN RPL ROM is enabled, JRC is used, or LCD-matrix support is enabled, a 16K block is shadowed for BIOS extensions, starting with first free area at D0000h, D4000h, D8000h, DC000h, E0000h, E4000h, E8000h or EC000h. (BIOS extensions do not use the whole shadow block.)
F0000h – FFFFFh	System BIOS	No	

20.4.1. Using Expanded Memory Managers

MOPSlcdSE extension BIOSes may be mapped to an upper memory area. (See the previous table.) Some add-on boards also have optional ROMs or use drivers that communicate with their corresponding devices via memory mapped I/O such as dual-ported RAM. These boards have to share the upper memory area with the EMS frame of the Expanded Memory Manager (EMM). This often causes several problems in the system.

Most EMMs scan the upper memory area for extension BIOSes (optional ROMs) and choose a free memory area for their frame if it is not explicitly set. Normally, they are not always capable of detecting special memory-mapped I/O areas. You need to tell the EMM which memory areas are not available for the EMS frames, which is usually done by using special exclusion parameters.

If the EMM cannot detect extension BIOSes (optional ROMs), make sure you excluded all areas in the upper memory, which are used by extension BIOSes, too. Your instruction in the CONFIG.SYS concerning the Expanded Memory Manager should look like this: (question marks for location of extension BIOS).

MS-DOS Example

```
DEVICE=EMM386.EXE X=????-???? X=F000-FFFF
```

Note: When booting up your system using this configuration under MS-DOS, the exclusion of area F000 to FFFF causes a warning. Microsoft reports that this message will always appear when the F000 segment lies in the shadow RAM. This is a bug of EMM386, not the MOPSlcdSE.

Please read the technical manuals of add-on cards used with the MOPSlcdSE for the memory areas they use. If necessary, also exclude their memory locations to avoid a conflict with the EMM.

21. APPENDIX B: BIOS OPERATION

The MOPSlcdSE comes with the modular AMIBIOS8 of American Megatrends Inc. The BIOS is located in an onboard Flash EEPROM in compressed form. American Megatrends refers to the BIOS setup utility as ezPORT. The device has 8-bit access. The shadow RAM feature provides faster access (16 bits). The onboard Flash EEPROM also holds Kontron BIOS extensions, which are loaded during boot-up if the corresponding feature is enabled.

You can update the BIOS using a Flash utility.

21.1 *Determining BIOS Version*

To determine the BIOS version of the MOPSlcdSE , immediately press the <**Pause/Break**> key on your keyboard as soon as you see the following text display in the upper left corner of your screen:

```
AMIBIOS (C) 2003 American Megatrends, Inc.
BIOS Date: 03/23/04 14:45:21 Ver: 08.00.09
Kontron(R) BIOS Version <PSTER110>
Copyright 2002-2004 Kontron Embedded Modules GmbH
```

Whenever you contact technical support about BIOS issues, providing a BIOS version <PSTER???> is especially helpful.

The system BIOS provides additional information about the board's serial number, CPU, and memory information by displaying information similar to the following:

```
S/N: XL4120150
CPU : SGS Thompson 486DX2
 Speed : 100MHz

Press DEL to run Setup (F4 on Remote Keyboard)
Press F11 for BBS POPUP (F3 on remote Keyboard)
Checking NVRAM..
32MB OK
```

The board's serial number has value to technical support. MOPSlcdSE serial numbers always start with XL and are followed by six or seven digits. The first digit represents the year of manufacturing, the next two digits stand for the lot number, and the last three or four digits are the number of the board in that lot.

In the example above, the board with the serial number XL4120150 was manufactured in 2004, lot 12 of that year, and is board number 150 of that lot.

21.2 *Setup Guide (ezPORT)*

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

The ezPORT setup menus documented in this section represent those found in most models of the MOPSlcdSE. The BIOS setup for specific models can differ slightly.

Note: Selecting incorrect values may cause system boot failure. Load setup failsafe defaults **<F8>** or optimal defaults **<F9>** to recover the system.

21.2.1. Start ezPORT BIOS Setup Utility

To start the ezPORT BIOS Setup Utility, press the **<DEL>** key when the following string appears during boot-up.

```
Press DEL to run Setup
```

The Main Menu then appears. It is the first screen that you can navigate.

21.2.2. General Information

The ezPORT Setup Screen is composed of four sections:

Section	Location	Function
Menu Bar	Top	Lists and selects all top-level menus.
Information Bar	Bottom	Shows version and copyright information.
Menu Window	Left Center	Selection fields for current menu.
Help Window	Right Center	Help for selected menu.

Menu Bar

The menu bar at the top of the window lists different top-level menus. Use the ← and → arrow keys to make a selection.

Information Bar

Here you can see general information about the version of the BIOS as well as copyright information.

Menu Window

The menu window frame on the left center side of the screen displays all the options of the currently selected top-level menu that can be configured. These configurable options are shown in blue. "Grayed-out" options cannot be configured. Use the ↑ or ↓ Arrow key to select an item.

Help Window

The right center frame is the help window and displays the key legend as well as item specific text messages. When an option is selected in the menu window, it is highlighted in white. Often a text message accompanies it.

Hot Keys

The ezPORT setup utility uses a key-based navigation system called hot keys. Most ezPORT BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include **<F1>**, **<F10>**, **<Enter>**, and **<ESC>**.

Hot Keys	Function
<F1>	General Help window.
<Esc>	Discard Changes and Exit window.
<F10>	Save Configuration and Exit window.
← or → Arrow key	Select a top-level menu.
↑ or ↓ Arrow key	Select items in current menu.
<Tab>	Select an items setup field.
<Home> or <End>	Move cursor to top or bottom of current screen.
<PgUp> or <PgDn>	Move cursor to next or previous page.
<+> or <->	Select next or previous value for the current field.
<F7>	Discard changes.
<F8>	Load the failsafe default configuration.
<F9>	Load the optimal default configuration.
<Enter>	Execute command or select submenu.
<F2>/<F3>	Change colors.

Selecting an Item

Use the ↑ or ↓ key to move the cursor to the item you want. Then use the **<+>** and **<->** keys to select a value for that field. Changes you made for the single items keep the new configuration for all the BIOS session, but they are only saved to the CMOS and EEPROM, when the <F10> key is pressed, and the setup is finished.

Displaying Submenus

A pointer (▸) marks all submenus that are available in your current top-level menu. Use the ↑ or ↓ key to move the cursor to the submenu you want. Then press **<Enter>**.

General Help Window

Pressing **<F1>** on any menu brings up the General Help window that describes the hot keys and their functions. Press **<Enter>** to exit the General Help window.

Save Configuration and Exit Window

Pressing the **<F10>** key brings up a window with the question "Save configuration and exit now?". Choose **[OK]** when you want to do this or **[Cancel]** when you want to return to the previous screen. You can select one of the two options by using the arrow keys.

Discard Changes and Exit Window

Pressing the **<ESC>** key brings up a window with the question "Discard changes and exit now?" Choose **[OK]** when you want to do this or **[Cancel]** when you want to return to the previous screen. You can select one of the two options by using the arrow keys. If your choice was **[OK]** , your setup changes will not be saved.

21.3 Main Menu

Feature	Option	Description
System Overview		
AMIBIOS		
Version		Displays the AMIBIOS version code in format XX.XX.XX.
Build Date		Displays the build date of the BIOS in format MM.DD.YY.
ID		Displays Kontron BIOS revision in format PSTE??? (??? Is the revision number).
Processor		
Type		Displays system processor, normally SGS Thompson 486DX2.
Speed		Displays processor's internal clock rate in format, normally 100MHz.
Count	1	Displays amount of processors recognized by the BIOS. The count is always 1, this is not a multi-processor system.
System Memory		
Size		Displays the amount of system's extended memory, normally 16MB or 32MB.
System Time	HH:MM:SS	Set system time. Press <Enter> to move to MM or SS.
System Date	DOW MM/DD/YYYY	Set system date. Press <Enter> to move to DD or YYYY.

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

21.4 Advanced Menu

All entries in this part of the BIOS setup utility are vital to your system. Change settings only if you are sure of what you are doing. Some changes may not be suitable for your complete system and may lead to unwanted system behavior.

Feature	Option	Description
Advanced Settings		
▸ IDE Configuration	Submenu	Opens IDE Configuration submenu, which allows you to configure IDE devices.
▸ Floppy Configuration	Submenu	Opens Floppy Configuration submenu, which allows you to configure the floppy drive.
▸ SuperIO Configuration	Submenu	Opens SuperIO Configuration submenu, which allows you to configure the Winbond 83977 Super I/O controller.
▸ DMI Event Logging	Submenu	Opens DMI Event Logging submenu, which allows you to clear or view event-log statistics.
▸ Panel Control	Submenu	Opens Panel Control submenu, which allows you to set backlight brightness and LCD contrast for your LCD panel.
▸ Watchdog	Submenu	Opens Watchdog submenu, which allows you to configure the watchdog timer.
▸ Remote Access Configuration	Submenu	Opens Remote Access Configuration submenu, which allows you to configure the AMIBIOS remote system. (This is not the Kontron JRC feature!)
Onboard Ethernet	**Enabled** Disabled	Enables/Disables the onboard Davicom DM9102A Ethernet controller.

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

21.4.1. IDE Configuration Submenu

Feature	Option	Description
IDE Configuration		
▸ Primary IDE Master	Submenu	Opens Primary IDE Master submenu.
▸ Primary IDE Slave	Submenu	Opens Primary IDE Slave submenu.
Hard Disk Write Protect	**Disabled** Enabled	Write accesses through the BIOS can be enabled/disabled here; accesses overriding the BIOS are not affected.
IDE Detect Time Out (Sec)	0 to **35**	Enter the timeout value for the detection of ATA/ATAPI devices here. Smaller values can speed up the boot process but increase the risk that a connected device will not be detected. When Type in the Master/slave submenus is set to Auto, set this item to 35.

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

21.4.2. Master or Slave Submenus

Feature	Option	Description
Primary IDE Master/Slave		
Device		Displays the detected type of IDE drive or "Not detected."
Vendor		Displays drive's vendor information.
Size		Displays drive's capacity.
LBA Mode		Displays LBA Mode information of drive. In LBA mode, the maximum capacity is 137GB.
Block Mode		Displays Block Mode information of the drive. With Block Mode capability up to 64KB, data transfer per interrupt is possible.
PIO Mode		Displays highest PIO Mode supported by the drive. The higher the PIO Mode, the less the cycle time.
Async DMA		Displays highest asynchronous DMA mode supported by drive.
Ultra DMA		Displays highest synchronous DMA mode supported by drive.
S.M.A.R.T.		Displays whether drive supports SMART monitoring.
Type	Not Installed **Auto** CDROM ARMD	Selects the type of device connected to the system. Not installed: prevents BIOS from searching a device. Auto: allows BIOS to detect device. CDROM: specifies that a CDROM is attached. ARMD: specifies an ATAPI removable device is attached.
LBA/Large Mode	Disabled **Auto**	Selects the LBA mode capability of the device. Disabled: prevents BIOS from using LBA. Auto: allows BIOS to detect LBA capability.
Block (Multi Sector Transfer)	Disabled **Auto**	Selects multisector transfer capability of the device. Disabled: prevents BIOS from using multisector transfer. Auto: allows BIOS to detect multisector transfer capability.
PIO Mode	**Auto**, 0, 1, 2, 3, 4	Selects the PIO Mode capability of the drive. Auto: allows BIOS to detect the supported PIO mode. 0, 1, 2, 3, 4: sets the PIO mode.
DMA Mode	**Auto** SWDMA0 SWDMA1 SWDMA2 MWDMA0 MWDMA1 MWDMA2 UDMA0 UDMA1 UDMA2	Selects the DMA Mode capability of the drive. Auto: allows BIOS to detect DMA capability. SWDMA0,1,2: sets single word DMA mode. MWDMA0,1,2: sets multiword DMA mode. UDMA0,1,2: sets ultra DMA mode.
S.M.A.R.T.	**Auto** Disabled Enabled	Selects drive's SMART monitoring capability. Auto: allows the BIOS to detect SMART capability. Disabled/Enabled: switch off or on SMART feature.
32Bit Data Transfer	**Disabled** Enabled	Selects 32Bit data transfer option. Disabled/Enabled: switch off or on 32-bit data transfer.

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

21.4.3. Floppy Configuration Submenu

Feature	Option	Description
Floppy Configuration		
Floppy A	Disabled 360KB 5¼ 1.2MB 5¼ 720KB 3½ **1.44MB 3½** 2.88MB 3½	Selects type of floppy drive connected to the system. Disabled: prevents the BIOS from using the selected floppy drive. all others: sets the type of floppy drive connected to the system.

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

21.4.4. SuperIO Configuration Submenu

Feature	Option	Description
Configure Win977F/AF Super IO Chipset		
Onboard Floppy Controller	Disabled **Enabled**	Disabled/enabled: switches onboard floppy controller off or on.
Serial Port 1 Address (*)	Disabled **3F8/IRQ4** 2F8/IRQ3 3E8/IRQ4 2E8/IRQ3	Selects address and IRQ of the physical COM A. Disabled: switches port off. 3F8/IRQ4: set to logical COM 1. 2F8/IRQ3: set to logical COM 2. 3E8/IRQ4: set to logical COM 3. 2E8/IRQ3: set to logical COM 4.
Serial Port 2 Address (*)	Disabled 3F8/IRQ4 **2F8/IRQ3** 3E8/IRQ4 2E8/IRQ3	Selects address and IRQ of the physical COM B. Disabled: switches port off. 3F8/IRQ4: set to logical COM 1. 2F8/IRQ3: set to logical COM 2. 3E8/IRQ4: set to logical COM 3. 2E8/IRQ3: set to logical COM 4.
Parallel Port Address	Disabled **378** 278 3BC	Select address of physical LPT port. Disabled: switches the port off. 378: set to logical LPT 1. 278: set to logical LPT 2. 3BC: set to user LPT port.
Parallel Port Mode	Normal Mode **Bi-Directional** EPP ECP	Selects parallel-port mode. Normal Mode: set to unidirectional printer mode. Bi-Directional: set to bi-directional mode. EPP: set to Enhanced Parallel Port mode. ECP: set to Extended Capability Port mode.
ECP Mode DMA Channel (**)	DMA1 **DMA3**	Sets DMA channel when in ECP mode to DMA1 or DMA3.
Parallel Port IRQ	IRQ5 **IRQ7**	Sets IRQ of the parallel port to IRQ5 or IRQ7.

Notes: In the Option column, bold shows default settings.
(*) If an address is already used by another serial port, it is not visible.
(**) This is only visible if the mode of the parallel port is set to ECP.

21.4.5. DMI Event Logging Submenu

Feature	Option	Description
Event Logging Details		
View Event Log		Displays a window with the view of all unread events in event log. Errors and warnings during boot-up of the BIOS are logged in the event log.
Mark all events as read	**Ok** Cancel	Displays a window with the question "Mark all Events as read now?" Select [Ok] to do so or [Cancel] for not marking all events.
Clear Event Log	**Ok** Cancel	Displays a window with the question "Clear Event Log now?" Select [Ok] to do so or [Cancel] to not clear event log.
Event Log Statistics		Displays a window with event-log statistics such as total size, free size, unread events.

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

21.4.6. Panel Control Submenu

Feature	Option	Description
Screen Expansion Mode	**Disabled** Enabled	Disabled/Enabled: Switches screen expansion mode off or on.
Backlight Brightness (*)	0 to 255	Sets LCD panel backlight brightness from a range of 0 to 255. The manufacturer's default is 128.
Contrast Setting (**)	0 to 63	Sets LCD panel contrast voltage from a range of 0 to 63. The manufacturer's default is 32.

Notes: In the Option column, bold shows default settings.
(*) This feature works if a JIPA cable with backlight brightness support is used and the backlight inverter is driven through the JIPA cable.
(**) This feature works if a JIPA cable with support for contrast setting is used.

21.4.7. Watchdog Submenu

Feature	Option	Description
Configure Watchdog Parameters		
Mode	**Disabled** Enabled	Disabled, Enabled: Switches watchdog reset feature off or on.
Delay (*)	**Disabled** 15s to 30:15m	Selects the delay time for the watchdog in a range from 15 seconds up to 30:15 minutes. The delay time is the time to expire before the watchdog becomes active the first time and starts the timeout period. Disabled: No delay time before timeout starts. All others: sets delay time.
Timeout (*)	**15s** to 30:15m	Selects the timeout time for the watchdog in a range of 15 seconds up to 30:15 minutes. The timeout time is the time the watchdog has been triggered within.

Notes: In the Option column, bold shows default settings.
(*) This is visible only if Mode is enabled.

21.4.8. Remote Access Configuration

This remote access system is an AMIBIOS feature and has nothing to do with the Kontron JRC Remote Control Extension BIOS. The following information describes the differences:

- The AMIBIOS Remote Access feature always sends output data to the specified serial port when enabled. It is not possible to use the port for other devices during the time this feature is enabled. On the other side of the serial connection, a system with terminal software can be used to display the BIOS output information, enter setup, and configure BIOS settings. Terminal software settings and the remote-access configuration setting have to match to establish a working connection between the host and slave. See the configuration settings in the table below.

- The Kontron JRC Remote Control software only becomes active when a JRC connection is detected during the first steps of the boot process. This allows users to have other devices connected to the same serial port instead of the JRC connection - without output affecting them. On the other side of the serial connection a DOS- or Windows-based system running the JRC host software is required. For configuration settings and functional description read the technical manual of the JRC software.

Feature	Option	Description
Configure Remote Access Type and Parameters		
Remote Access	**Disabled** Enabled	Disabled/Enabled: Switches remote-access feature off or on.
Serial Port Number (*)	**COM1** COM2	Sets the serial port used for remote access to COM1 or COM2. Enable the selected port in the Super I/O Configuration submenu.
Serial Port Mode (*)	**115200 8,n,1** 57600 8,n,1 19200 8,n,1	Sets serial port mode for remote access to 115200, 57600 or 19200 Baud. 8-bit data, no parity bit, and one stop bit is used.
Flow Control (*)	**None** Hardware Software	Select flow control. None: No flow control used. Hardware: Hardware handshake used. Software: Software handshake used.
Redirection after BIOS POST (*)	**Disabled** Boot Loader Always (**)	Select redirection after POST. Disabled: Turns off redirection after POST. Boot Loader: Turns on redirection during POST and boot loader. Always: Redirection is always on.
Terminal Type (*)	**ANSI** VT100 VT-UTF8	Selects target-terminal type. ANSI, VT100, or VT-UTF8.
VT-UTF8 Combo Key Support (***)	**Disabled** Enabled	Enable/Disable: Switches off or on VT-UTF8 combination-key support for ANSI and VT100 terminals.

Notes: In the Option column, bold shows default settings.
(*) This is visible only if Remote Access is enabled.
(**) Some operating systems may not work correctly if this is set to always.
(***) This is visible only when Terminal Type is set to ANSI or VT100.

21.5 PCI PnP Menu

All entries in this part of the BIOS setup utility are vital to your system. Change settings only if you are sure of what you are doing. Some changes may not be suitable for your complete system and may lead to unwanted system behavior.

Feature	Option	Description
Advanced PCI/PnP Settings		
Plug & Play OS(*)	**No** Yes	Selects a Plug & Play operating system: No: Lets the BIOS configure all the devices in the system. Yes: Lets the operating system configure plug & play devices.
PCI Latency Timer	32, **64**, 96, 128, 160, 192, 224, 248	Sets value of latency-timer register for the PCI device (in units of PCI clocks).
Palette Snooping	**Disabled** Enabled	Disabled/Enabled: Switches palette snooping feature off or on. When enabled, the PCI graphic adapter is informed about an ISA or a none PnP-PCI graphic adapter. Always check graphic adapter card manual before setting this feature.
PCI IDE BusMaster	**Disabled** Enabled	Selects PCI IDE bus mastering feature: Disabled: Prevents PCI IDE bus mastering. Enabled: Allows PCI IDE bus mastering.
IRQ3	Reserved **Available**	Selects the use of the IRQ resource: Available: this IRQ is available for PCI/PnP devices. Reserved: this IRQ is reserved for use of legacy ISA devices.
IRQ4	Reserved **Available**	See above.
IRQ5	Reserved **Available**	See above.
IRQ7	Reserved **Available**	See above.
IRQ9	Reserved **Available**	See above.
IRQ10	Reserved **Available**	See above.
IRQ11	Reserved **Available**	See above.
IRQ12	Reserved **Available**	See above.
IRQ14	Reserved **Available**	See above.
IRQ15	Reserved **Available**	See above.

Notes: In the Option column, bold shows default settings.
(*) Set this parameter to “no” if you are not sure whether the OS you use meets the PnP specification.

Feature	Option	Description
DMA Channel 0	Reserved **Available**	Selects the use of the DMA resource: Available: this DMA is available for PCI/PnP devices. Reserved: this DMA is reserved for use of legacy ISA devices.
DMA Channel 1	Reserved **Available**	See above.
DMA Channel 3	Reserved **Available**	See above.
DMA Channel 5	Reserved **Available**	See above.
DMA Channel 6	Reserved **Available**	See above.
DMA Channel 7	Reserved **Available**	See above.

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

21.6 *Boot Menu*

Feature	Option	Description
Boot Settings		
‣ Boot Settings Configuration	Submenu	Opens the boot settings configuration submenu. You can configure options for the boot process.
1st Boot Device (*)	Disabled N/A	Selects the boot sequence from the available devices. Disabled: this device will not be used to boot from. All others: devices are listed by their available vendor code.
2nd Boot Device (*)	Disabled N/A	See above.
3rd Boot Device (*)	Disabled N/A	See above.
4th Boot Device (*)	Disabled N/A	See above.
Onboard LAN PXE ROM (**)	**Disabled** Enabled	Disabled/Enabled: Switches the remote boot BIOS extension for the onboard LAN controller off or on.

Note: In the Option column, bold shows default settings.
(*) The availability of these entries depends upon how many boot devices exist in the system. The list of devices is dynamically arranged (none to four devices visible).
(**) When this feature is enabled, boot-up the system again, configure the PXE ROM BIOS settings, and re-enter the ezPORT utility to set boot sequence.

21.6.1. Boot Settings Configuration Submenu

Feature	Option	Description
Boot Settings Configuration		
Quick Boot	Disabled **Enabled**	Disabled/Enabled: Switches the quick boot mode off or on. Enabling quick boot skips certain tests while booting and decreases boot time.
Quiet Boot	**Disabled** Enabled	Selects what is displayed during boot-up. Disabled: displays normal POST messages during boot-up. Enabled: displays dark screen instead of POST messages.
AddOn ROM Display Mode	**Force BIOS** Keep Current	Selects display mode for option ROM.
Bootup Num-Lock	**On** Off	Selects Power-on state for Numlock. On: Numlock for alphanumeric keypad is on. Off: Numlock for alphanumeric keypad is off.
PS/2 Mouse Support	**Auto** Disable Enabled	Selects the way PS/2 Mouse support is handled. Auto: BIOS auto-detects if a PS/2 Mouse is connected. Disabled: PS/2 Mouse support is off (IRQ12 free). Enabled: PS/2 Mouse support is on (IRQ12 used).
Wait for 'F1' If Error	Disabled **Enabled**	Disabled/Enabled: switches the wait function off or on. If enabled, the boot process stops when detecting an error; the user has to press <F1> to continue.
Hit 'DEL' Message Display	Disabled **Enabled**	Disabled/Enabled: switches the Hit DEL message off or on.
Interrupt 19 Capture	**Disabled** Enabled	Disabled/Enabled: Switches the interrupt 19hex capturing off or on. When this feature is enabled, option ROMs are allowed to trap the interrupt 19hex.

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

21.7 Security Menu

Feature	Option	Description
Security Settings		
Supervisor Password		Displays “Installed” or “Not Installed,” depending on whether a password has been set.
User Password		Displays “Installed” or “Not Installed,” depending on whether a password has been set.
Change Supervisor Password		Opens a password dialog in which the new supervisor password has to be entered and confirmed.
User Access Level	No Access View Only Limited **Full Access**	Selects access rights of a user: No Access: prevents user access to the setup utility. View Only: allows views of the setup utility but blocks changes. Limited: allows limited access (such as date and time). Full Access: allows all changes by the user.
Change User Password		Opens a password dialog in which a new user password has to be entered and confirmed.
Clear User Password		Clears user password.
Password Check	**Setup** Always	Selects which condition requires a password: Setup: password is required to enter the setup. Always: password is required to enter setup on every boot.
Boot Sector Virus Protection	**Disabled** Enabled	Disabled/Enabled: Switches the BIOS protection of the boot sector off or on.

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

21.8 Chipset Menu

All entries in this part of the BIOS setup utility are vital to your system. Change settings only if you are sure of what you are doing. Some changes may not be suitable for your complete system and may lead to unwanted system behavior.

Feature	Option	Description
▸ Cache & Shadow Configuration	Submenu	Opens Cache & Shadow Configuration submenu. Users can configure cache and shadow memory areas.
▸ North Bridge Configuration	Submenu	Opens North Bridge Configuration submenu for configuration of the PCI bridge and the memory controller.
▸ ISA Bus Configuration	Submenu	Opens ISA Bus Configuration submenu for configuration the ISA bridge and optimize the ISA bus performance.

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

21.8.1. Cache & Shadow Configuration Submenu

Feature	Option	Description
Internal Cache	Write-Through **Write-Back**	Selects the mode of the internal processor cache: Write-Through: Writes are sent to main memory at once. Write Back: Writes are only sent to main memory until necessary.
Cache Video BIOS	Disabled **Enabled**	Disabled/Enabled: switches caching of video BIOS off or on.
C000, 16K Shadow	Disabled **Enabled**	Disabled/Enabled: switches a 16K memory block shadowing off or on. When shadowing is enabled, all accesses go to the main memory shadow region. When shadowing is disabled, the same accesses would go to the ISA bus addresses.
C400, 16K Shadow	Disabled **Enabled**	See above.
C800, 16K Shadow	**Disabled** Enabled	See above.
CC00, 16K Shadow	**Disabled** Enabled	See above.
D000, 16K Shadow	**Disabled** Enabled	See above.
D400, 16K Shadow	**Disabled** Enabled	See above.
D800, 16K Shadow	**Disabled** Enabled	See above.
DC00, 16K Shadow	**Disabled** Enabled	See above.
E000, 16K Shadow	**Disabled** Enabled	See above.
E400, 16K Shadow	**Disabled** Enabled	See above.
E800, 16K Shadow	**Disabled** Enabled	See above.
EC00, 16K Shadow	**Disabled** Enabled	See above.

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

21.8.2. North Bridge Configuration Submenu

Feature	Option	Description
Refresh Cycle Time	0, 1, 2, 3, 4, 5, 6, 7, **8**, 9, 10, 11, 12, 13, 14, 15	Sets the refresh cycle time for SDRAM. Kontron recommends using the default value of 8.
RActive to Read/Write	0, 1, 2, **3**, 4, 5, 6, 7	Sets the RAS active to read/write time for SDRAM accesses. Kontron recommends using the default value of 3.
CAS Latency	**2**, 3, 4, 5, 6, 7	Sets the CAS latency time for SDRAM accesses. Kontron recommends using the default value of 2.
Read CAS Latency	**2**, 3, 4, 5, 6, 7	Sets the read CAS latency time for SDRAM accesses. Kontron recommends using the default value of 2.
MEM16_OE	**8mA** 16mA	Sets driver current for SDRAM interface. Kontron recommends using the default value of 8mA.
Read Clock Delay Programming	0, 1, 2, 3, 4, 5, 6, 7, **8**, 9, 10, 11, 12, 13, 14, 15	Sets the refresh cycle time for SDRAM. Kontron recommends using the default value of 8.
PCI Standard	PCI 2.0 **PCI 2.1**	Sets the PCI Bus compatibility to standard 2.0 or 2.1. PCI 2.1 is recommended; however, users may need to set some none PCI 2.1 add-on cards to PCI 2.0.
PCI to Host Read Prefetch	Disabled **Enabled**	Disabled/Enabled: Switches read buffering for PCI to Host accesses off or on.
PCI to Host Write Posting	Disabled **Enabled**	Disabled/Enabled: Switches write buffering for PCI to Host accesses off or on.

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

21.8.3. ISA Bus Configuration Submenu

Feature	Option	Description
ISA Clock	14.31818 MHz / 2 **PCICLK/4**	Sets clock rate of ISA bus to 7.16MHz or 8.25MHz.
ISA-PCI Synchronization	Disabled **Enabled**	Disabled/Enabled. Switches ISA-PCI synchronization off or on. Kontron recommends using the default value of Enabled.
ISA Write Posting	Disabled **Enabled**	Disabled/Enabled. Switches the PCI to ISA write buffering off or on. Kontron recommends using the default value of Enabled.
ISA Read Buffer	Disabled **Enabled**	Disabled/Enabled. Switches PCI to ISA read buffering off or on. Kontron recommends using the default value of Enabled.
ISA Extra Wait States	**Disabled** Enabled	Disabled/Enabled. Switches additional ISA wait states off or on. Users can enable this feature with slow ISA extension cards
DMA Clock	**ISACLK / 2** ISACLK	Sets clock of ISA DMA operation. ISACLK is set in this table under feature ISA Clock. Kontron recommends using the default value of ISACLK / 2.
DMA MEMR#-IOW# Delay	**Disabled** Enabled	Disabled/Enabled. Switches the extra delay for DMA accesses off or on. Kontron recommends using the default value of Disabled.
16-bit DMA Wait States	**1**, 2, 3, 4	Sets wait states for 16-bit ISA DMA accesses.
8-bit DMA Wait States	**1**, 2, 3, 4	Sets wait states for 8-bit ISA DMA accesses.

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

21.9 Power Menu

Feature	Option	Description
APM Configuration		
Power Management/APM (*)	**Disabled,** Enabled	Disabled/Enabled. Switches power management system off or on.
Doze/Sleep Timeout	**Disabled,** 50ms, 100ms, 500ms, Reserved, 4s, 8s, 16s	Sets timeout value for the period after which the system goes into doze/sleep state.
Doze Stop Clock Ratio	**Disabled**, 50%, 25%	Selects CPU clock throttle into doze state.
Standby Timeout	Disabled, Reserved, **2m**, 4m, 6m, 8m, 12m, 16m	Sets timeout value for the period after which goes into standby state.
Standby Stop Clock Ratio	Disabled, 50%, 25%, **12.5%**, 6.25%, 3,125%, 1.5625%, Stop CPU Clock	Selects CPU clock throttle in standby state.
Suspend Timeout	Disabled, **4m**, 8m, 12m, 16m, 32m, 48m, 64m	Sets timeout value for the period after which the system goes to suspend state.
Suspend Stop Clock Ratio	Disabled, 50%, 25%, 12.5%, 6.25%, 3,125%, 1.5625%, **Stop CPU Clock**	Selects CPU clock throttle in standby state.
DMA Request Monitor	**Ignore,** Monitor	Selects whether the system monitors this event for wake up or ignores this event and stays in the APM state.
PCI Master Monitor	**Ignore,** Monitor	See above.
Parallel Port Monitor	Ignore, **Monitor**	See above.
Serial Port Monitor	**Ignore,** Monitor	See above.
Keyboard Monitor	Ignore, **Monitor**	See above.
Floppy Disk Monitor	**Ignore,** Monitor	See above.
Hard Disk Monitor	**Ignore,** Monitor	See above.
Display Activity	**Ignore,** Monitor	See above.
IRQ15 Thru 1 Monitor	Ignore, **Monitor**	See above.
IRQ0 Monitor	**Ignore,** Monitor	See above.
NMI Monitor	**Ignore,** Monitor	See above.
Video Power Down Mode	Disabled**, Standby,** Suspend	Selects whether the video is powered down in suspend or standby state, or if it is not powered down.
Green PC Monitor State	Standby, **Suspend**, Mechanical Off	Selects Green PC Monitor State.
Hard Disk Power Down Mode	Disabled**,** Standby**, Suspend**	Selects whether hard disk is powered down in suspend or standby state, or if it is not powered down.
Hard Disk Timeout (Minute)	**Disabled**, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Sets timeout value for the period after which the hard disk goes to power-saving state.

Notes: In the Option column, bold shows default settings.
(*) All other options are only visible when this feature is enabled.

21.10 Exit Menu

Feature	Option	Description
Exit Options		
Save Changes and Exit	**Ok** Cancel	Opens Save Configuration and Exit window. Pressing the <F10> key does the same. Choose [OK] to do so or [Cancel] to return to previous setup screen.
Discard Changes and Exit	**Ok** Cancel	Opens Discard Changes and Exit window. Pressing the <ESC> key does the same. Choose [OK] to do so or [Cancel] to return to previous setup screen.
Discard Changes	**Ok** Cancel	Opens Discard Changes window. Pressing the <F7> key does the same. Choose [OK] to do so or [Cancel] to return to previous setup screen.
Load Optimal Defaults	**Ok** Cancel	Opens Load Optimal Defaults window. Pressing the <F9> key does the same. Choose [OK] to do so or [Cancel] to return to previous setup screen.
Load Failsafe Defaults	**Ok** Cancel	Opens Load Failsafe Defaults window. Pressing the <F8> key does the same. Choose [OK] to do so or [Cancel] to return to previous setup screen.

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

21.11 Kontron BIOS Extensions

Besides the AMIBIOS, the MOPSlcdSE comes with a few BIOS extensions that support additional features. All extensions are located in the onboard Flash EEPROM. Some extensions are permanently available; some are loaded if required during boot-up. Supported features include:

- JIDA standard
- Remote Control feature (JRC)
- Onboard LAN RPL ROM
- DOT-matrix LCD

All enabled BIOS extensions require shadow RAM. They will be loaded into the same 16K shadowed memory block, if possible. However, if the system memory cannot find free memory space because all the memory is already used for add-on peripherals, the BIOS extensions do not load.

21.11.1. JIDA BIOS extension

The JUMPtec Intelligent Device Architecture (JIDA) BIOS extension is not a true extension BIOS. It is part of the system BIOS and is located in the system BIOS segments after boot-up. It is permanently available and supports the JIDA 16-bit standard and the JISA 32-bit standard. The JIDA 16-bit standard is a software interrupt 15hex driven programmer interface and offers lots of board information functions. For detailed information about programming, refer to the JIDA specification and a source code example (JIDAI???.ZIP), which you can find on the Kontron Web site. The three question marks represent the revision number of the file. You also can contact technical support for this file.

For other operating systems, special drivers (JIDAIA??.ZIP) are available. You can download the zip file from the Kontron Web site.

21.11.2. Remote Control Client Extension

You can remotely control the MOPSlcdSE using software available from Kontron (JRC-1, Part Number 96047-0000-00-0). This software tool can communicate with the board via one of the serial ports. During boot-up of the MOPSlcdSE , the system BIOS scans the serial ports for an available JRC connection. If detected, it loads the JRC client BIOS extension into the memory. With the JRC client loaded into the first detected free memory location between D0000hex and EC000hex, a 16K block is shadowed.

For more information on the Remote Control usage, refer to the JRC-1 technical manual or Application Note JRCUsage_E???.PDF, which you can find on the Kontron Web site.

21.11.3. LAN RPL ROM

If the onboard LAN RPL ROM is enabled in the system BIOS setup, an optional ROM for the Ethernet controller loads into memory during boot-up. This optional ROM allows you to boot the MOPSlcdSE over an Ethernet connection. A server with Intel PXE/RPL boot support is required on the other side of the Ethernet connection. The setup and configuration of the server, including PXE/RPL support, is not the responsibility of Kontron.

The RPL ROM extension is loaded into the first free memory area between D0000hex and EC000hex. A 16K block is shadowed.

21.11.4. DOT-Matrix LCD BIOS Extension

The MOPSlcdSE can drive an LCD-DOT matrix display on the parallel port. It can support character LCDs for up to 40 columns and four rows, which are equipped with a Hitachi HD44780 controller or a compatible one. A BIOS extension of the MOPSlcdSE controls the outputs to the display via software interrupt INT10hex. You only can use this feature with DOS.

If the DOT-matrix LCD interface is set up by using software tool ALCDINIT.EXE, the BIOS extension that supports this feature loads during boot-up.

The BIOS extension for the DOT-matrix LCD loads into the first free memory area between D0000hex and EC000hex; a 16K block of memory is shadowed. However, if the system memory cannot find free memory space because all the memory is already used for add-on peripherals, the BIOS extension will not load.

Users can download the software tool ALCDINIT.EXE and a related application note from the Kontron Web site. Programming, detailed configuration, and connectivity information is available in Application Note DotMatrixPC104_E???.PDF. The three question marks represent the document revision number. Users can download the application note from the Kontron Web site, or request it from technical support.

21.12 *Updating or Restoring BIOS*

If your MOPSlcdSE board requires a newer BIOS version or the BIOS is damaged, you may need to update or restore the BIOS.

AMIBIOS allows you to update the BIOS with a newer version or restore a BIOS that is damaged by using a floppy disk without having to install a new ROM chip. There are four items required:

- A floppy disk drive
- A new formatted floppy diskette
- The BIOS ROM file
- A serial update key (only necessary if a keyboard is not available or not working)

The MOPSlcdSE's BIOS ROM chip is equipped with a "Boot Block" that is separated from the real AMI BIOS ROM file. After the MOPSlcdSE is powered on the "Boot Block" is executed first, and it checks the serial port 1 (COM1) for an existing update key. It is also possible to hold down the <CTRL> and the <HOME> key on your keyboard to force a BIOS restore from floppy. If such a key combination or an update key is detected on COM 1 the BIOS flash procedure is automatically started and looks for a valid BIOS ROM file on the floppy disk drive. The BIOS ROM file name has to be "AMIBOOT.ROM". If available the "AMIBOOT.ROM" file is loaded and flashed to the BIOS ROM chip on the MOPSlcdSE.

Note: The whole update process is running before any part of the MOPSlcdSE's video BIOS is executed. Therefore, no video output is available to keep you informed on how far the update process has proceeded.

21.12.1. Serial Update Key

The serial update key is a simple plug with a few shortcuts on some of the RS232 signal lines. The following table shows the necessary connections for the 10pin header of Kontron Embedded Modules GmbH, on a standard DSUB9 adapter cable and on a DSUB25 connector.

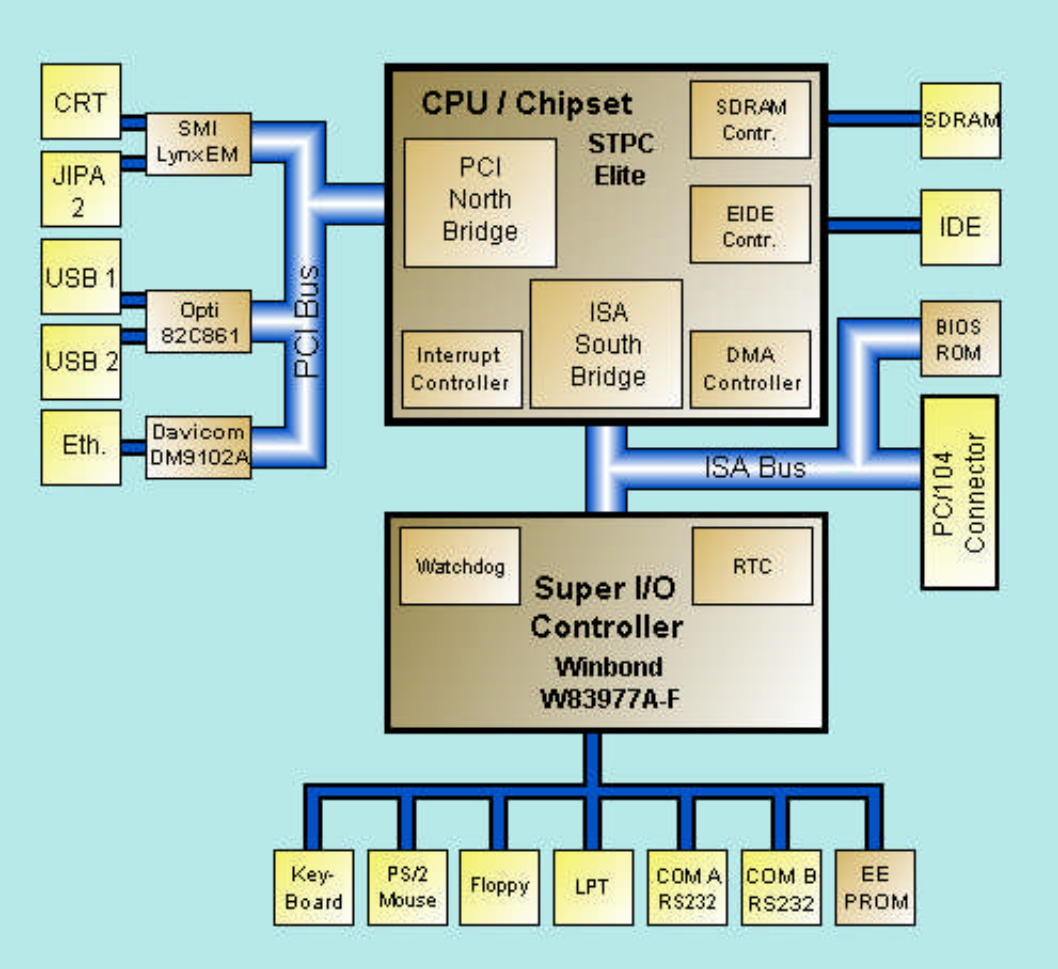
10pin Header	DSUB9	DSUB25	
1	1	8	DCD
2	6	6	DSR
3	2	3	RXD
4	7	4	RTS
5	3	2	TXD
6	8	5	CTS
7	4	20	DTR
8	9	22	RI
9	5	7	GND
10	-	-	VCC

21.12.2. BIOS Update or Recovery Step-by-Step

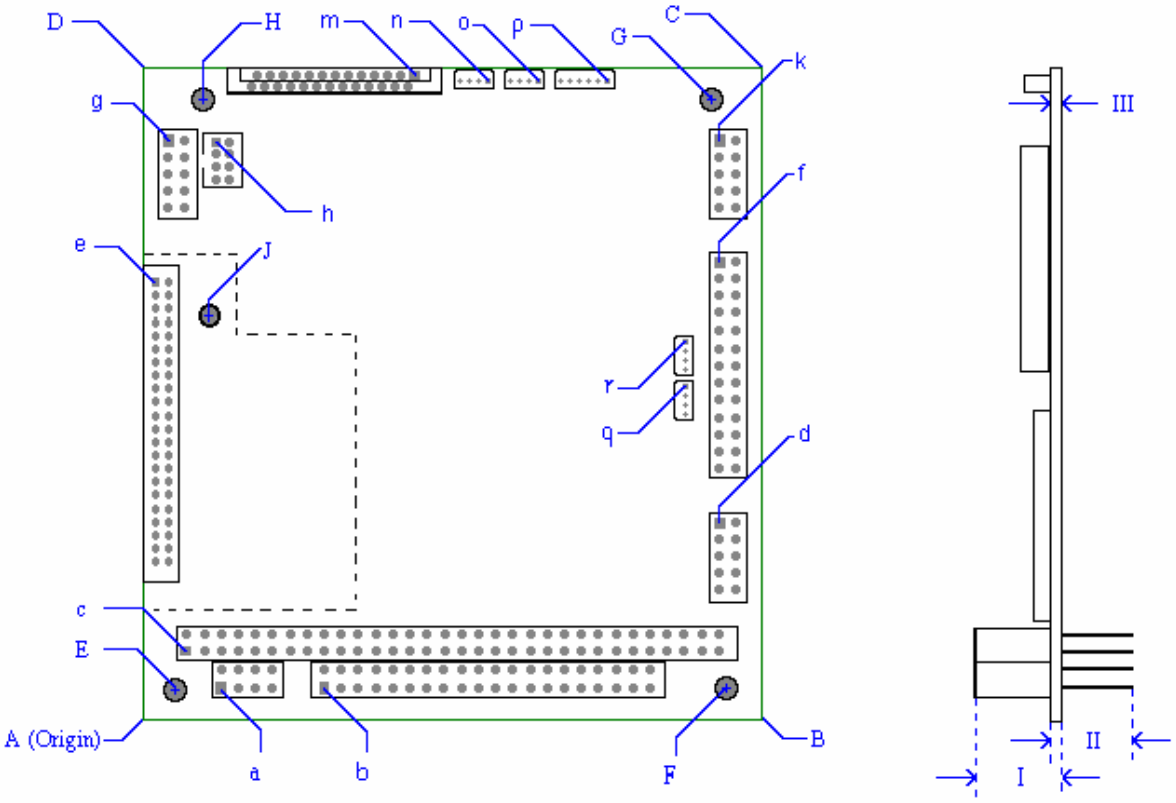
For a BIOS update or recovery please do the following:

1. Take an empty, new formatted floppy diskette and put it into your desktop-PC.
2. Copy the BIOS ROM file you received from Kontron Embedded Modules GmbH to this diskette.
3. If the BIOS ROM file name is not “AMIBOOT.ROM” (e.g. “PSTER111.ROM”), rename the file to “AMIBOOT.ROM”.
4. Prepare the update key following the table for the shortcuts above. This is only necessary when the system has no keyboard or the keyboard does not work.
5. Switch off the power of your MOPSlcdSE system.
6. If the system has no floppy disk drive, connect one to the floppy disk interface.
7. Connect the power supply to the floppy disk drive, if necessary.
8. Insert the diskette holding the “AMIBOOT.ROM” file into the floppy disk drive of the MOPSlcdSE.
9. Plug the update key into serial interface COM 1 or hold down <CTRL> and <HOME> keys on your keyboard simultaneously.
10. Switch on the power of your MOPSlcdSE system.
11. Now the “Boot Block” will detect your update wish, access the floppy disk drive, load the “AMIBOOT.ROM” and flash the BIOS. There will be no outputs to any connected display or monitor during this process.
12. Unplug the update key from the serial interface when floppy access ends to avoid second flashing after a restart.
13. Wait for approximately 2 minutes to make sure flashing of the BIOS is finished. If a speaker is connected to the system 4 short beeps give the information that the update was successful. A PORT80 POST code card will show F5hex after successful update.
14. Switch on the power supply of the system.
15. If everything went right, the system should now come up with the new or recovered BIOS.
16. If the update failed, start again at 9.

22. APPENDIX C: BLOCK DIAGRAM



23. APPENDIX D: MECHANICAL DIMENSIONS



All dimensions in the tables below are relative to the origin location A.

Location	Horizontal (mm)	Vertical (mm)	Horizontal (mil)	Vertical (mil)
PCB Dimensions				
A (Origin)	0	0	0	0
B	90.17	0	3550	0
C	90.17	95.89	3550	3775
D	0	95.89	0	3775
Mounting Holes				
E	5.08	5.08	200	200
F	85.09	5.08	3350	200
G	82.55	90.81	3250	3575
H	8.89	90.81	350	3575
J	9.88	59.28	389	2333.84

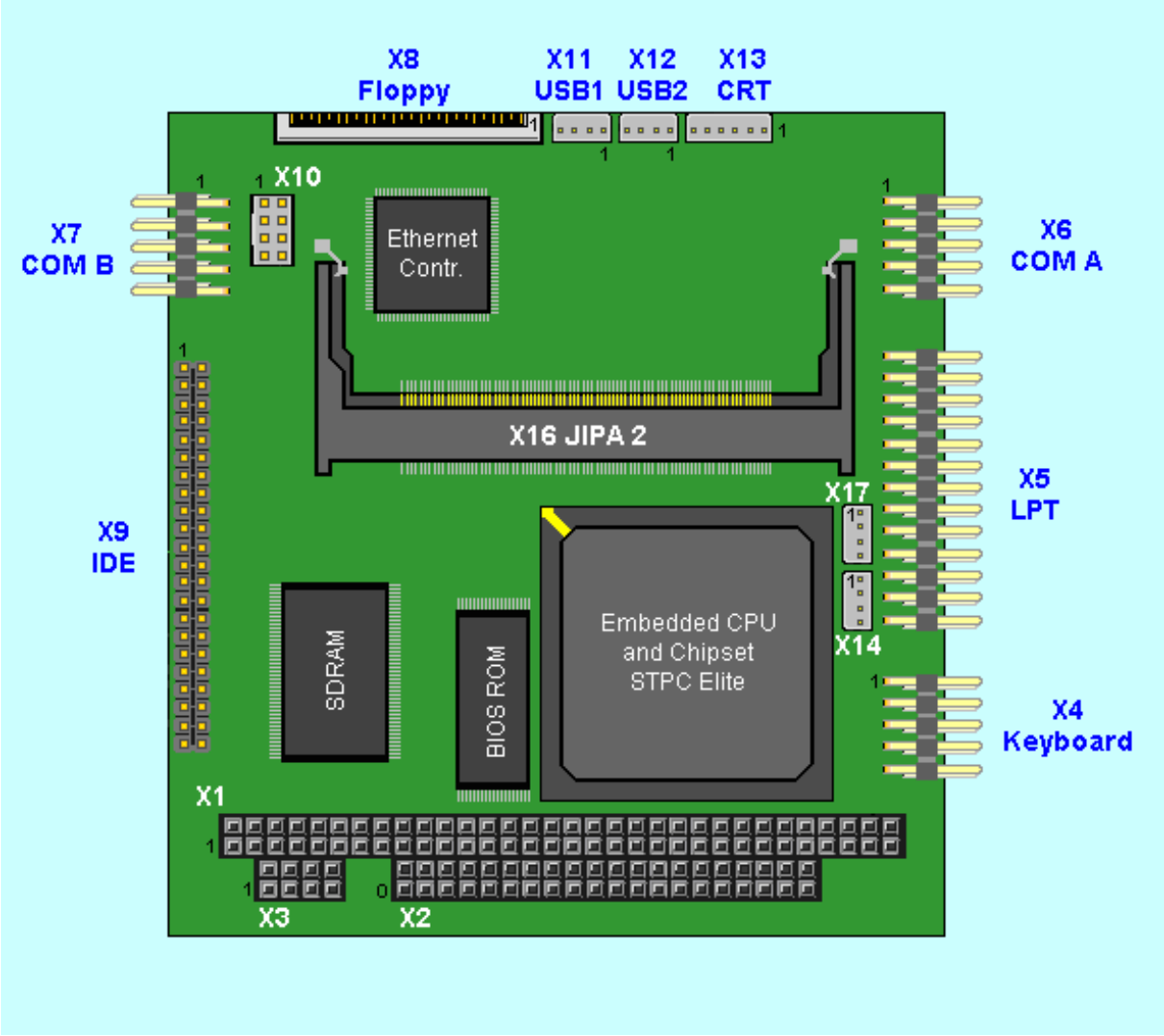
Location	Horizontal (mm)	Vertical (mm)	Horizontal (mil)	Vertical (mil)
Interface Connectors				
a	11.43	5.08	450	200
b	26.67	5.08	1050	200
c	6.35	10.16	250	400
d	83.54	29.24	3289	1151
e	1.75	64.80	69	2551
f	83.54	67.34	3289	2651
g	4.04	85.12	159	3351
h	10.69	84.99	421	3346
k	83.54	85.12	3289	3351
m	40.54	94.89	1596	3736
n	50.80	93.73	2000	3690
o	58.30	93.73	2295	3690
p	67.95	93.73	2675	3690
q	80.59	42.93	3173	1690
r	80.59	50.34	3173	1982

Height	Dimension (mm)	Dimension (mil)
I	13.10	515
II	10.40	410
III	1.70	67

24. APPENDIX E: CONNECTOR LAYOUT

24.1 *Connector Locations*

Pin 1 of any connector is marked with "1" in this drawing and with a rectangular pad at the bottom side of the board's PCB.



24.2 Connector Functions and Interface Cables

The table notes connector functions, as well as mating connectors and available cables.

Connector	Function	Mating Connector	Available Cable	Cable Description
X1	PC/104 Bus (XT-Bus part)	2.54mm 64 pos. (EPT 962-60323-12 or compatible for board to board connection)		
X2	PC/104 Bus (AT-Bus part)	2.54mm 40 pos. (EPT 962-60203-12 or compatible for board to board connection)		
X3	Power Connector	2.54mm 8 pos. (EPT 962-60043-12 or compatible for board to board connection)		
X4	Keyboard and Feature Connector	2.54mm 10 pos. (AMP 1-215882-0 or compatible)	KAB-KB-1 (PN 96023-0000-00-0) or KAB-KB-PS2 (PN 96060-0000-00-0)	For AT-keyboard or PS/2 keyboard.
X5	Parallel Interface LPT Connector	2.54mm 26 pos. (AMP 2-215882-6 or compatible)	KAB-DSUB25-1 (PN 96015-0000-00-0)	For DSUB 25 adaptation.
X6, X7	Serial Interfaces COM A and COM B Connectors	2.54mm 10 pos. (AMP 1-215882-0 or compatible)	KAB-DSUB9-2 (PN 96017-0000-00-0)	For DSUB 9 adaptation.
X8	Floppy Drive Interface Connector		ADA-FLOPPY-2 (PN 96001-0000-00-0) or KAB-FLOPPY/MOPS-1 (PN 96019-0000-00-0)	For 3.5” floppy or slim-line floppy.
X9	IDE Hard Disk Interface Connector	2mm 44 pos. (Berg 89361-144 or compatible)	KAB-IDE-25 (PN 96020-0000-00-0) or KAB-IDE-2MM (PN 96021-0000-00-0)	For 3.5” HDD Or 2.5” HDD.
X10	Ethernet Interface Connector	2mm 8 pos. (Berg 90311-008 or compatible)	KAB-MOPS-ETN1 (PN 96048-0000-00-0)	For RJ45 adaptation.
X11, X12	USB interface Connectors	1.25mm 4 pos. (Molex 51021-0400 or compatible)	KAB-USB-1 (PN 96054-0000-00-0)	For standard USB adaptation.
X13	CRT Monitor	1.25mm 6 pos. (Molex 51021-0600 or compatible)	KAB-VGA-2 (PN 96053-0000-00-0)	For DSUB 15 adaptation.
X14	PS/2 Mouse Interface Connector	1.25mm 4 pos. (Molex 51021-0400 or compatible)	KAB-MOUSE-PS2 (PN 96062-0000-00-0)	For PS/2 mouse.
X16	Display	-	KAB-JIPA-?????	Kontron JIPA cables.
X17	GPIO (optional)	1.25mm 4 pos. (Molex 51021-0400 or compatible)		

24.3 Pinout Table

Pin	PC104 (A) X1	PC104 (B) X1	PC104 (C) X2	PC104 (D) X2
0			GND	GND
1	/IOCHCK	GND	/SBHE	/MEMCS16
2	SD7	RESETDRV	LA23	/IOCS16
3	SD6	VCC (***)	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V	LA18	IRQ14
8	SD1	/0WS	LA17	/DACK0
9	SD0	+12V	/MEMR	DRQ0
10	IOCHRDY	GND (*)	/MEMW	/DACK5
11	AEN	/SMEMW	SD8	DRQ5
12	SA19	/SMEMR	SD9	/DACK6
13	SA18	/IOW	SD10	DRQ6
14	SA17	/IOR	SD11	/DACK7
15	SA16	/DACK3	SD12	DRQ7
16	SA15	DRQ3	SD13	VCC (***)
17	SA14	/DACK1	SD14	/MASTER
18	SA13	DRQ1	SD15	GND
19	SA12	/REFRESH	GND	GND
20	SA11	SYSCLK		
21	SA10	IRQ7		
22	SA9	IRQ6		
23	SA8	IRQ5		
24	SA7	IRQ4		
25	SA6	IRQ3		
26	SA5	/DACK2		
27	SA4	T/C		
28	SA3	BALE		
29	SA2	VCC (***)		
30	SA1	OSC		
31	SA0	GND		
32	GND	GND		

Notes:
(*) - Key pin for PC/104; GND for PC/104+ specification
(***) - To protect the 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 protecting requirements of IEC/EN 60950.

Pin	IDE X9	Floppy X8	LPT X5	Power X3	COM A X6	COM B X7
1	/RESET	VCC (***)	/STB	GND	/DCD1	/DCD2
2	GND	/IDX	/AFD	VCC (***)	/DSR1	/DSR2
3	HDD7	VCC (***)	PD0	BATT	RXD1	RXD2
4	HDD8	/DR0	/ERR	+12V	/RTS1	/RTS2
5	HDD6	VCC (***)	PD1	-5V	TXD1	TXD2
6	HDD9	/DSKCHG	/INIT	-12V	/CTS1	/CTS2
7	HDD5	VCC (***)	PD2	GND	/DTR1	/DTR2
8	HDD10	NC	/SLIN	VCC (***)	/RI1	/RI2
9	HDD4	NC	PD3		GND	GND
10	HDD11	/MTR0	GND		VCC (***)	VCC (***)
11	HDD3	NC	PD4			
12	HDD12	/FDIR	GND			
13	HDD2	NC	PD5			
14	HDD13	/STEP	GND			
15	HDD1	GND	PD6			
16	HDD14	/WDATA	GND			
17	HDD0	GND	PD7			
18	HDD15	/WGATE	GND			
19	GND	GND	/ACK			
20	KEY (NC)	/TRK0	GND			
21	DRQ	GND	BUSY			
22	GND	/WRTPRT	GND			
23	/IOW	GND	PE			
24	GND	/RDATA	GND			
25	/IOR	GND	SLCT			
26	GND	/HDSEL	VCC (***)			
27	IOCHRDY					
28	GND					
29	/AKJ					
30	GND					
31	SIRQ					
32	NC					
33	SA1					
34	NC					
35	SA0					
36	SA2					
37	/CS1					
38	/CS3					
39	NC					
40	GND					
41	VCC (***)					
42	VCC (***)					
43	GND					
44	NC					

Notes:
(*) – Pin normally used as cable select. On the MOPSlcdSE board, it is not connected.
(***) - To protect the 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 protecting requirements of IEC/EN 60950.

Pin	KBD X4	LAN X10	CRT X13	PS/2 Mouse X14	GPIO X17	USB 1 X11	USB 2 X12
1	SPEAKER	TXD+	RED	MSDAT	GPIO0	VCC (***)	VCC (***)
2	GND	TXD-	GRN	VCC (***)	GPIO1	USB00	USB10
3	/RESIN	RXD+	BLU	GND	GPIO2	USB01	USB11
4	/KBLOCK	SHLDGND	GND	MSCLK	GPIO3	GND	GND
5	KBDAT	SHLDGND	VSYNC				
6	KBCLK	RXD-	HSYNC				
7	GND	SPEEDLED					
8	VCC (***)	LILED					
9	BATT						
10	PWRGOOD						

Notes:
(***) - To protect the 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 protecting requirements of IEC/EN 60950.

25. APPENDIX F: PC ARCHITECTURE INFORMATION

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

25.1 *Buses*

25.1.1. 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

25.1.2. PC/104, PCI - Information

- 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, which 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.

25.2 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

25.3 Ports

25.3.1. 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.

25.3.2. ATA

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 system. You can search for information about the working group on the Web.

Kontron recommends that you also search the Web for information on *4.2 I/O cable* if you use hard disks in a DMA3 or PIO4 mode.

25.3.3. USB

USB Specification
The USB Implementers Forum (USB-IF) is a nonprofit corporation founded by the group of companies that developed the Universal Serial Bus specification. USB-IF provides a support organization and forum to advance and adopt Universal Serial Bus technology. You can search for information about the standard on the Web.

25.4 *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

26. APPENDIX G: DOCUMENT-REVISION HISTORY

Revision	Date	Edited by	Changes
PSTEM101	30.03.2004	BHO	First preliminary version.
PSTEM110	21.05.2004	BHO/JL	First official release. Deleted watchdog NMI feature, added front-page photo, and added typical power consumption.
PSTEM111	11.10.2004	BHO	Corrected measurements for mounting hole H, changed connector locations from capital letters to lower case letters, updated support addresses.
PSTEM112	04.09.2005	BHO	Added Ethernet note, new connector drawings, layout changes, added BIOS update and restore information.
PSTEM113	06.12.2005	BHO / JL	New Kontron Logo, added BIOS and restore information, corrected AMIBIOS.ROM to AMIBOOT.ROM
PSTEM114	29.12.2005	BHO	New Asia support address, added MTBF value