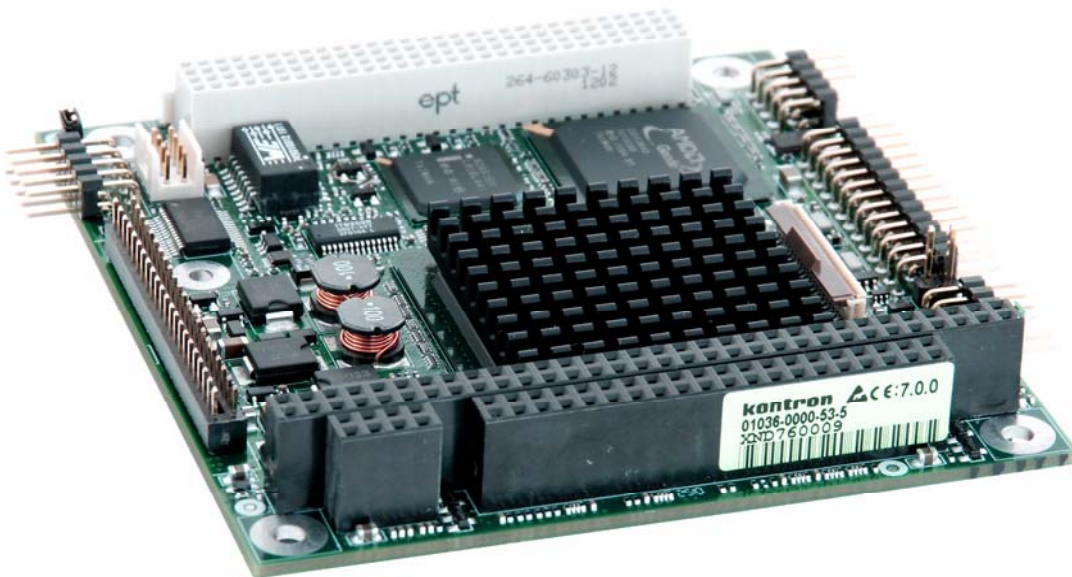


# » Kontron User's Guide «



**MOPSlcdLX**

**KTD-S0005-B**

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# 1 User Information

## 1.1 About This Document

This document provides information about products from KONTRON Technology A/S and/or its subsidiaries. No warranty of suitability, purpose or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate the information contained within is supplied 'as-is' - no liability is taken for any inaccuracies. Manual is subject to change without prior notice.

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

## 1.2 Copyright Notice

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## 1.3 Trademarks

Brand and product names are trademarks or registered trademarks of their respective owners.

## 1.4 Standards

KONTRON Technology A/S is certified to ISO 9000 standards.

## 1.5 Warranty

This product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period KONTRON Technology A/S will at its discretion decide to repair or replace defective products.

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

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

KONTRON Technology A/S will not be responsible for any defects or damages to third party products that are caused by a faulty KONTRON Technology A/S product.

## 1.6 Life Support Policy

KONTRON Technology's products are not for use as critical components in life support devices or systems without express written approval of the general manager of KONTRON Technology A/S.

As used herein:

Life support devices or systems are devices or systems which

- a) are intended for surgical implant into body or
- b) support or sustain life and whose failure to perform, when properly used in accordance with instructions for use provided in the labelling, can be reasonably expected to result in significant injury to the user.

A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

## 1.7 Technical Support

Please consult our Web site at <http://www.kontron.com/support> for the latest product documentation, utilities, drivers and support contacts. In any case you can always contact your board supplier for technical support.

Before contacting support please be prepared to provide as much information as possible:

### Board identification:

- Type
- Part number (find PN on label)
- Serial number (find SN on label)

### Board configuration:

- DRAM type and size
- BIOS revision (find in the BIOS Setup)
- BIOS settings different than default settings (refer to the BIOS Setup section)

### System environment:

- O/S type and version
- Driver origin and version
- Attached hardware (drives, USB devices, LCD panels ...)

## 2 Introduction

### 2.1 MOPS Embedded Line Family

Each MOPS is a member of the PC/104 SBC family of KONTRON Technology A/S.

MOPS embedded line modules are characterized by interfaces for 2 x USB, Fast LAN, PS/2 keyboard and mouse connector, an ISA bus, CRT interface as well as serial and parallel ports.

These homogeneous features facilitate easy upgrades within the MOPS embedded line product family. Connection of LCD panels is simplified when using the onboard standard JILI (40 pins) or JILI30 interface.

As part of the standard features package all MOPS modules come with a JIDA interface which is integrated into the BIOS of the SBC modules. This interface enables hardware independent access to the MOPS features that can't be accessed via standard APIs. Functions such as watchdog timer, brightness of panel backlight and user bytes in EEPROM can be configured with ease by taking advantage of this standard MOPS module feature.

### 2.2 MOPSlcdLX Overview

Please refer to the following matrix to choose the product that suits your needs best.

Article number	ISA bus	PCI bus
01036-0000-53-4	✓	
01036-0000-53-5	✓	✓

## 3 Specifications

### 3.1 Functional Specifications

#### Processor: AMD Geode™ LX800

- ❑ 64 kB data and 64 kB instruction L1 cache
- ❑ 128 kB L2 cache
- ❑ Integrated memory controller run with one DDR200 to DDR333 unbuffered DDR-SDRAM (SO-DIMM form factor) up to 1GB
- ❑ Integrated display controller with dual display support (CRT/TFT) and up to 254 MB video RAM (UMA)

#### Chipset: AMD Geode™ CS5536

- ❑ 64 bit, 66 MHz GeodeLink™ interface
- ❑ External PCI bus with 32 bit / 33 MHz operation (PCI V2.2 compliant)
- ❑ One parallel ATA PCI IDE controller
- ❑ Four USB channels (OHCI/EHCI), only two channels available

#### Onchip Video Graphics Array (VGA)

- ❑ CRT monitor interface (resolution: up to 1920x1440 pixel)
- ❑ LVDS flatpanel interface supports single clock with 18/24 bit color depth (resolution: max. 1024x768 pixel)

#### Onchip Parallel-ATA (P-ATA)

- ❑ Supports PIO mode, Multiword DMA and Ultra DMA up to UDMA5

#### Onchip Universal Serial Bus (USB)

- ❑ Two ports are capable to handle USB1.1 (OHCI) and USB2.0 (EHCI)

#### Super-I/O (LPC): Winbond W83627DHG

- ❑ Two serial ports (RS-232 compatible)
- ❑ One parallel port configurable as enhanced parallel port (EPP) with bidirectional capability
- ❑ One legacy floppy interface
- ❑ PS/2 keyboard and mouse controller
- ❑ Watchdog timer

**Fast Ethernet (PCI): Intel® 82551ER**

- ❑ Full duplex operation at 10/100 Mbps
- ❑ Fully compliant with IEEE 802.3 and IEEE 802.3u

**External ISA bus (LPC): Fintek F85226F**

- ❑ One PC/104 bus connector, 8/16 bit I/O and memory access
- ❑ All ISA interrupts and 8 bit DMA signals available (16 bit DMA not supported)
- ❑ Bus master mode not supported

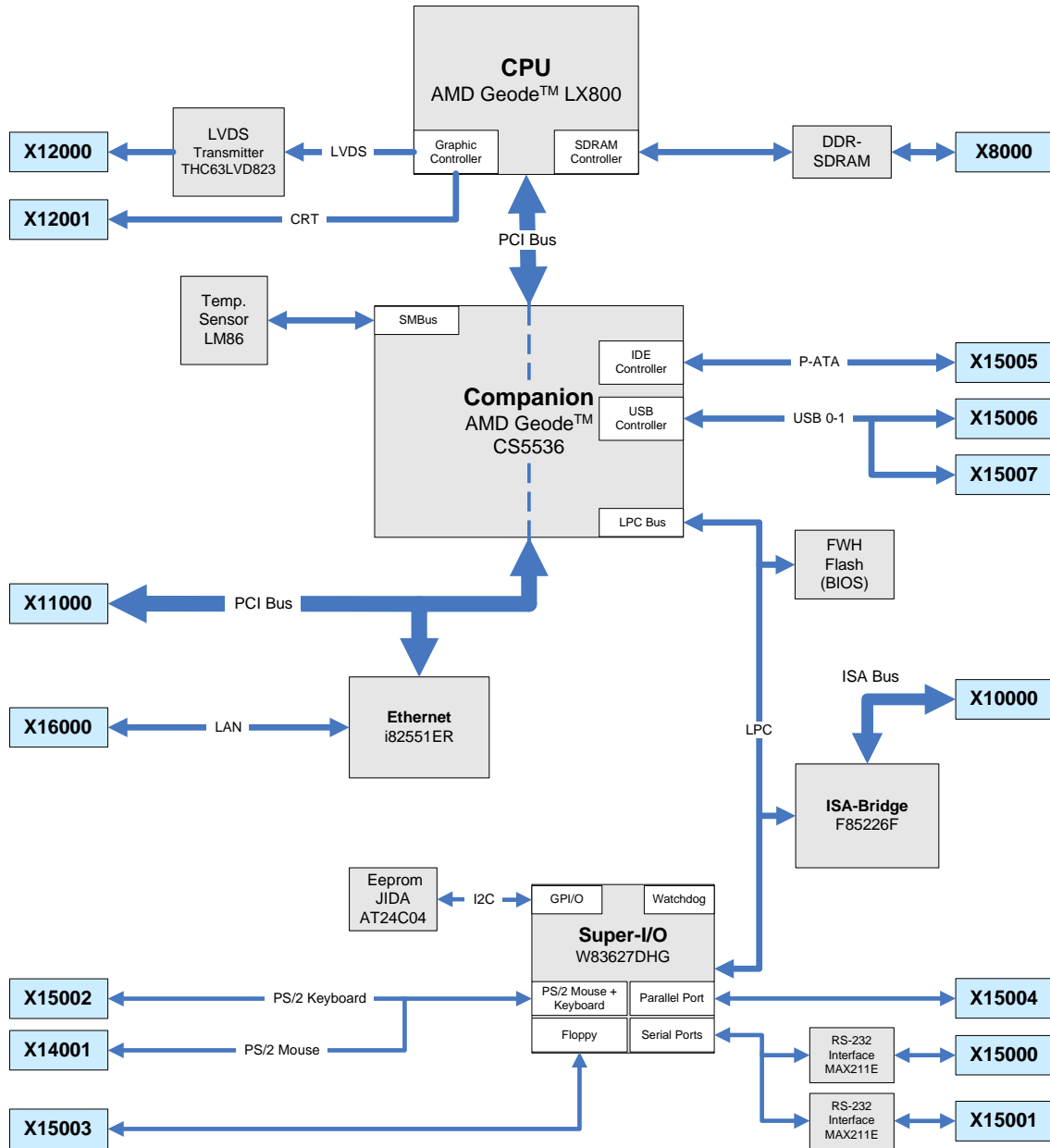
**External PCI bus**

- ❑ One PCI-104 bus connector, only 3.3V PCI cards supported

**BIOS: AWARD, 512 kb Flash BIOS****Real-Time Clock (RTC) with CMOS RAM**

### 3.2 Block Diagram

# MOPSIcdLX



### 3.3 Mechanical Specifications

#### Dimensions

- 96 x 90 mm (3.77" x 3.55")
- Height on top approx. 11.5 mm
- Height on bottom approx. 10.5 mm

### 3.4 Electrical Specifications

#### Supply Voltage

- +5V DC  $\pm$  5%

#### Supply Voltage Ripple

- Maximum 100mV peak to peak 0 – 20 MHz

#### Supply Current (DOS prompt)

Power consumption tests were executed during the DOS prompt with 256 MB DDR SDRAM, CRT monitor, USB keyboard and CF card as boot device (default BIOS settings).

Full Load		Soft Off S5	
[A]	[W]	[A]	[W]
1.10	5.50	0.20	1.00

#### Supply Current (Windows® XP SP3)

The power consumption tests were executed during Windows® XP SP3 by using a tool to stress the CPU (100% load) and extensive 2D graphic. The boards were ran with 256 MB DDR SDRAM, CRT monitor, PS/2 keyboard, USB mouse and a CF card as boot device (default BIOS settings).

Full Load		Idle	
[A]	[W]	[A]	[W]
1.45	7.25	0.95	4.75

### 3.5 External Real-Time Clock Battery

- Voltage range: +2.4V - +3.6V (typ. +3.0V)
- Maximum current 10µA @ +3.0V

Lithium battery precautions

<p style="text-align: center;"><b>CAUTION!</b></p> <p>Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.</p>	<p style="text-align: center;"><b>VORSICHT!</b></p> <p>Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch den selben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.</p>
<p style="text-align: center;"><b>ATTENTION!</b></p> <p>Risque d'explosion avec l'échange inadéquat de la batterie. Remplacement seulement par le même ou un type équivalent recommandé par le producteur. L'évacuation des batteries usagées conformément à des indications du fabricant.</p>	<p style="text-align: center;"><b>PRECAUCION!</b></p> <p>Peligro de explosión si la batería se sustituye incorrectamente. Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante. Disponga las baterías usadas según las instrucciones del fabricante.</p>
<p style="text-align: center;"><b>ADVARSEL!</b></p> <p>Lithiumbatteri – Eksplosjonsfare ved feilagtig håndtering. Utskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.</p>	<p style="text-align: center;"><b>ADVARSEL!</b></p> <p>Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.</p>
<p style="text-align: center;"><b>WARNING!</b></p> <p>Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.</p>	<p style="text-align: center;"><b>VAROITUS!</b></p> <p>Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laltevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.</p>



**ATTENTION:** Do not connect the RTC battery to the MOPSLcdLX until just before the supply power is to be applied to the system. When the battery is connected without power applied to the system the battery current might be in some cases higher than normal (refer to: AMD Geode™ CS5536 Companion Device Silicon Revision B1 Specification Update). This can lead to a shorter lifetime of the RTC battery. After the supply power has been applied to the system once after connecting the RTC battery the regular current is drained from the battery again.

## 3.6 Environmental Specifications

### Temperature

Operating (with original KONTRON heat-sink):

- Ambient temperature: 0 to +60°C <sup>1)</sup>

Non operating:

- Ambient temperature: -10 to +85°C

---

**Note:** 1) *It is the customer's responsibility to provide sufficient airflow around each of the components to keep them within the allowed temperature range.*

---

### Humidity

- Operating: 10% to 90% (non condensing)
- Non operating: 5% to 95% (non condensing)

## 3.7 MTBF

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

- System MTBF (hours): tbd

---

**Note:** *Fans usually shipped with KONTRON Technology A/S products have 50.000-hour typical operating life. The above estimation assumes no fan but a passive heat sinking arrangement. Estimated RTC battery life (as opposed to battery failures) is not included in the MTBF calculation. The RTC battery lifetime has to be considered separately. Battery life depends on both temperature and operating conditions. When the KONTRON unit has external power; the only battery drain is from leakage paths.*

---

## 4 Getting Started

Getting started with the MOPSlcdLX is very easy. Take the following steps:

- ❶ Plug a suitable DDR-SDRAM memory module into the RAM socket.
- ❷ Plug the MOPSlcdLX to the PC/104 bus connector on the starter kit baseboard.
- ❸ Make all necessary connections from the MOPSlcdLX to the starter kit board (cables come with the starter kit). The starter kit board offers various interfaces on standard connectors.
- ❹ Connect the CRT monitor to the CRT interface or a LCD panel to the JILI interface by using the corresponding adapter cable.
- ❺ Plug a keyboard and/or mouse to the PS/2 connectors.
- ❻ Plug a data cable to the hard disk interface. Attach the hard disk to the connector at the opposite end of the cable. If necessary connect the power supply to the hard disk's power connector.
- ❼ Make sure all your connections have been made correctly. Turn on the power.
- ❽ Enter the BIOS by pressing the Del key during boot-up. Make all changes in the BIOS Setup. See the BIOS Setup chapter of this manual for details.

## 5 System Memory

The MOPSLcdLX uses only 200 pin Small Outline Dual Inline Memory Modules (SODIMMs). One socket is available for 2.5V unbuffered DDR200 up to DDR333 SDRAM of up to 1 GB.

The total amount of memory available on the SDRAM module is used for main memory and graphic memory on the MOPSLcdLX. Shared Memory Architecture (SMA) manages the sharing of system memory between graphic controller and processor. Therefore the full memory size is not available for software applications. Up to 254 MB of system memory are used as graphic memory.

---

**Attention:** *DDR400 modules can only be operated with the DDR333 timing*

---

## 6 ISA Bus Expansion

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

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 system)

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

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

The corresponding 64 pin stackthrough header (ISA bus = 62 pins) 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**, row 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.

### 6.1 Connector

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

The PC/104 XT bus is available through the X10000A connector. The PC/104 AT bus is available through the X10000B connector.

### 6.2 Hints

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 MOPSlcdLX. PC/104 adapters can support the socket connector version on their topside and allow additional stacking of adapters.

Whenever possible use the MOPSlcdLX as top module of the PC/104 stack as the CPU board is normally the board with the highest heat dissipation.

## 7 PCI Bus Expansion

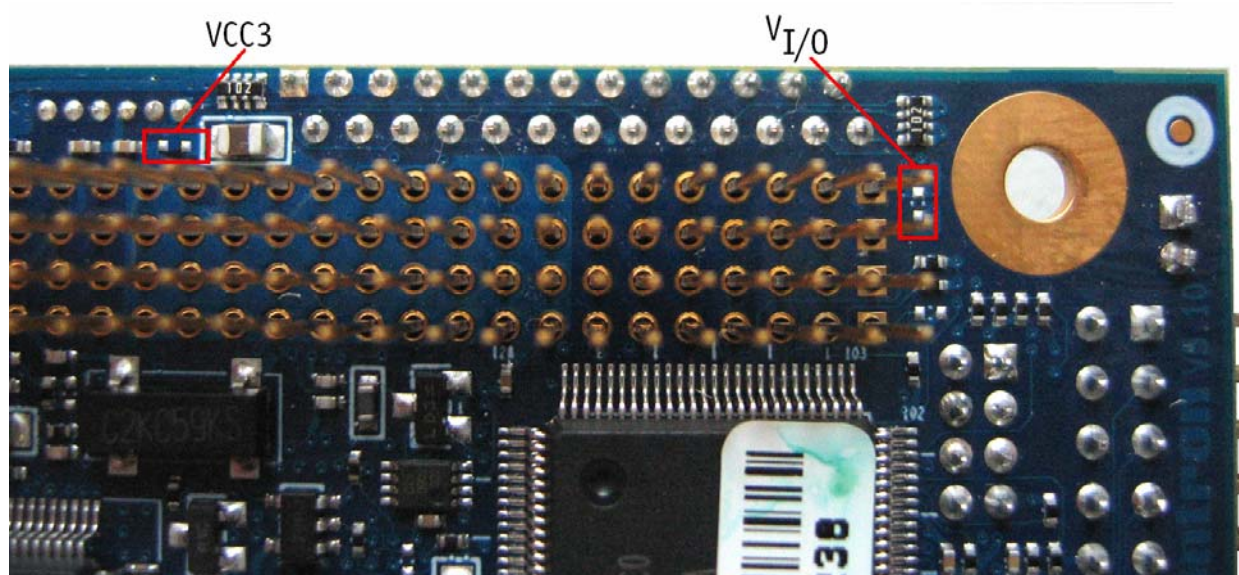
A quad-row socket trough-hole connector with a 2 x 2 mm (0.79" x 0.79") pitch implements the standard 32 bit PCI bus signals. The PCI-104 bus is available through the standard connector X11000.

A description of signals, including electrical characteristics and timings, is beyond the scope of this document. Please refer to the official PCI bus and PC/104-plus specifications for more details.

Under no circumstances 5V PCI cards may be used on the MOPSLcdLX board. Only Universal and 3.3V add on cards are permitted.  $V_{I/O}$  and VCC are open (default) or set to 3.3V on the PCI bus. 5V PCI add on cards can irretrievably damage the MOPSLcdLX board due to a short circuit with  $V_{I/O}$  or VCC. Before using a PCI add on card please make absolutely sure that this card is conform to these requirements. The LX chipset does only support a 3.3V PCI bus.

### 7.1 Configuration of $V_{I/O}$

The default settings for  $V_{I/O}$  and VCC are not connected. If it is ensured that the PCI expansion cards are types of 3.3V only zero-ohm bridges can be set.



---

**Attention:** 5V PCI expansion cards can damage the board. Please note that the +5V supply voltage is routed to the connector. Four slots are available via the connector X11000 (IDSEL, /IRQ) but only three slots are busmaster capable.


---

## 8 Graphics Interface

The graphics accelerator supports CRT monitors and a variety of LCD panels with single clock, color depths of 18/24 bit and resolutions up to 1920x1440 for CRT and XGA (1024x768) for LCD.

### 8.1 CRT Connector

The CRT monitor interface is available through the X12001 connector (6 pins). To have the signals available on a standard DSUB15 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).

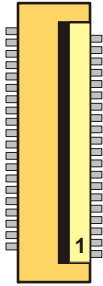
Header	Pin	Signal Name	Function	DSUB15
	1	<b>HSYNC</b>	Horizontal sync	13
	2	<b>VSYNC</b>	Vertical sync	14
	3	<b>GND</b>	Ground	5 - 8
	4	<b>BLUE</b>	Blue video signal	3
	5	<b>GREEN</b>	Green video signal	2
	6	<b>RED</b>	Red video signal	1

### 8.2 Flat Panel Connector

The LVDS interface for the flat panel is available through the X12000 connector (40 pins) on the top side of the board. The implementation of this subsystem complies with the JILI specification of KONTRON Technology A/S. A variety of cables for different display types are available from KONTRON. Please refer to the actual cable list on the KONTRON website for part numbers and cable names.

When using a LCD additional voltages may be required to drive the displays logic and supply the backlight converter. The display logic may require +5V or +3.3V, backlight converters usually are +5V or +12V types. When using a KONTRON JILI cable you do not need to determine such configurations. Display logic voltage come preconfigured on the JILI cable. On occasion backlight voltage has to be adjusted on the cable. Even though the MOPSLcdLX is a +5V only board you need to supply the +12V for the backlight converter additionally when using such a converter type.

## 8.2.1 Connector

Header	Pin	Signal Name	Function
	1	N.C.	Not connected
	2	FTX0-	First channel data output 0 (negative)
	3	FTX0+	First channel data output 0 (positive)
	4	ENAVCC	Enable panel power
	5	FTX1-	First channel data output 1 (negative)
	6	FTX1+	First channel data output 1 (positive)
	7	N.C.	Not connected
	8	FTX2-	First channel data output 2 (negative)
	9	FTX2+	First channel data output 2 (positive)
	10	GND	Ground
	11	FTXC-	First channel clock output (negative)
	12	FTXC+	First channel clock output (positive)
	13	GND	Ground
	14	FTX3-	First channel data output 3 (negative)
	15	FTX3+	First channel data output 3 (positive)
	16	SDA	I2C data line
	17	RSVD	Reserved
	18	RSVD	Reserved
	19	SCL	I2C clock line
	20	RSVD	Reserved
	21	RSVD	Reserved
	22	N.C.	Not connected
	23	RSVD	Reserved
	24	RSVD	Reserved
	25	GND	Ground
	26	RSVD	Reserved
	27	RSVD	Reserved
	28	GND	Ground
	29	RSVD	Reserved
	30	RSVD	Reserved
	31 - 34	VCC <sup>1)</sup>	Power +5V
	35	BKLTON	Backlight on
	36 - 37	GND	Ground
	38 - 40	VDD <sup>1)</sup>	Power +12V if voltage is connected

**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

### 8.3 Connecting a Flat Panel

To determine whether your flat panel is supported check the KONTRON website for panel lists. We regularly update the list of panels that have been tested with the MOPSLcdLX.

If you use one of those adapters supplied by KONTRON configuration is easy:

- ❶ Check whether you have the correct adapter and cable for the panel you plan to use. Inspect the cable for damages. Disconnect the power from your system.
- ❷ Connect the cable to the flat panel connector X12000 on the MOPSLcdLX and connect the other end to your JILI adapter - connect the JILI adapter and the display.
- ❸ Connect the backlight converter.
- ❹ Supply power to your system.
- ❺ If no image appears on your display connect a CRT monitor to the CRT connector.
- ❻ If necessary program the EEPROM on the JILI cable with the matching configuration data.
- ❼ If you still do not see improvement consider contacting the dealer for technical support.

### 8.4 Available Video Modes

The following list shows the video modes supported by the graphics controller with maximum frame buffer size. When configured for smaller frame buffers and/or using a flat panel on the JILI interface not all of the video modes listed below may be available. Capability depends on system configuration and on display capabilities. Different operating systems also may not support all listed modes by the available drivers.

Video Mode	Type	Characters/Pixels	Colors
00h/01h	Text	40 x 25	16
02h/03h	Text	80 x 25	16
04h/05h	Graphic	320 x 200	4
06h	Graphic	640 x 200	2
07h	Text	80 x 25	2
0Dh	Graphic	320 x 200	16
0Eh	Graphic	640 x 200	16
0Fh	Graphic	640 x 350	2
10h	Graphic	640 x 350	4
11h	Graphic	640 x 480	2
12h	Graphic	640 x 480	16
13h	Graphic	320 x 200	256

## 8.5 Extended VESA Modes

Test program: SciTech VBETest (VESA BIOS Extensions Compliance Test).

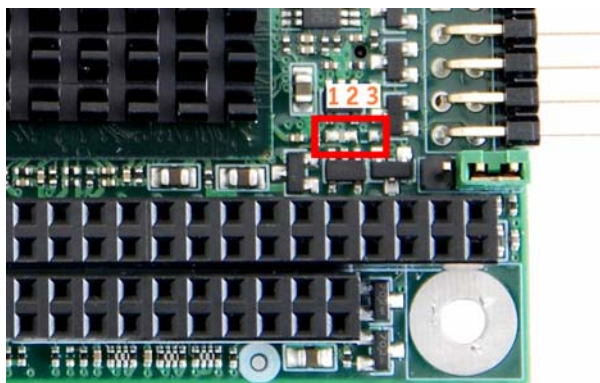
VESA Mode	Type	Pixels	Colors
101h	Graphic	640 x 480	256
103h	Graphic	800 x 600	256
105h	Graphic	1024 x 768	256
107h	Graphic	1280 x 1024	256
110h	Graphic	640 x 480	32k
111h	Graphic	640 x 480	64k
112h	Graphic	640 x 480	16M (32 bit)
113h	Graphic	800 x 600	32k
114h	Graphic	800 x 600	64k
115h	Graphic	800 x 600	16M (32 bit)
116h	Graphic	1024 x 768	32k
117h	Graphic	1024 x 768	64k
118h	Graphic	1024 x 768	16M (32 bit)
119h	Graphic	1280 x 1024	32k
11Ah	Graphic	1280 x 1024	64k
11Bh	Graphic	1280 x 1024	16M (32 bit)
131h	Graphic	1600 x 1200	256
133h	Graphic	1600 x 1200	64k
134h	Graphic	1600 x 1200	16M (32 bit)

## 8.6 Backlight Enable Polarity

Use a zero-ohm bridge to define the backlight enable polarity.

**Position 1-2 = low active**

**Position 2-3 = high active**



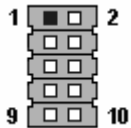
## 9 Serial Port Interfaces

Two fully functional serial ports (COMA and COMB) provide asynchronous serial communications. COMA and COMB support RS-232 operation modes. They are 16550 high-speed UART compatible and support 16-byte FIFO buffers for transfer rates from 50 Baud to 115.2 KBaud.

### 9.1 Connector

**COMA** is available through the X15000 connector (10 pins) and **COMB** through the X15001 connector (10 pins). To have the signals available on the standard serial interface connector DSUB9 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 necessary connections for DSUB adapters.

Header	Pin	Signal Name	Function	DSUB9
	1	<b>/DCD</b>	Data carrier detect	1
	2	<b>/DSR</b>	Data set ready	6
	3	<b>RXD</b>	Receive data	2
	4	<b>/RTS</b>	Request to send	7
	5	<b>TXD</b>	Transmit data	3
	6	<b>/CTS</b>	Clear to send	8
	7	<b>/DTR</b>	Data terminal ready	4
	8	<b>/RI</b>	Ring indicator	9
	9	<b>GND</b>	Ground	5
	10	<b>VCC <sup>1)</sup></b>	Power +5V	---

---

**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

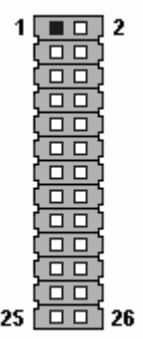
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## 10 Parallel Port Interface

The MOPSLcdLX incorporates a parallel port that can be set to uni-/bidirectional and supports EPP operating modes.

### 10.1 Connector

The parallel port is available through the X15004 connector (26 pins). To have the signals available on a standard parallel interface connector DSUB25 an adapter cable is required which is offered by KONTRON (KAB-DSUB25-1, part number 96015-0000-00-0).

Header	Pin	Signal Name	Function	DSUB25
	1	/STB	Strobe	1
	2	/AFD	Autofeed	14
	3	D0	Data 0	2
	4	/ERR	Error	15
	5	D1	Data 1	3
	6	/INIT	Init	16
	7	D2	Data 2	4
	8	/SLIN	Select in	17
	9	D3	Data 3	5
	10	GND	Ground	18
	11	D4	Data 4	6
	12	GND	Ground	19
	13	D5	Data 5	7
	14	GND	Ground	20
	15	D6	Data 6	8
	16	GND	Ground	21
	17	D7	Data 7	9
	18	GND	Ground	22
	19	/ACK	Acknowledge	10
	20	GND	Ground	23
	21	/BUSY	Busy	11
	22	GND	Ground	24
	23	PE	Paper out	12
	24	GND	Ground	25
	25	/SLCT	Select out	13
	26	VCC <sup>1)</sup>	Power +5V	---

**Note:** 1) To protect the external power lines of peripheral device make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

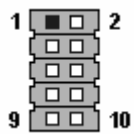
## 11 PS/2 Keyboard Interface

The keyboard and feature connector of the MOPSLcdLX offers four functions:

- PS/2 Keyboard
- Speaker
- Battery
- Reset button

### 11.1 Connector

The keyboard and feature connector is available through connector X15002 (10 pins). An adapter cable is required to connect a standard keyboard to this interface. There is an adapter cable for the PS/2 keyboard available from KONTRON (KAB-KB-PS2, part number 96060-0000-00-0). The adapter cables do not know the other functions on this interface.

Header	Pin	Signal Name	Function	6 pin PS/2
	1	<b>SPKR</b>	Speaker	
	2	<b>GND</b>	Ground	
	3	<b>/RESIN</b>	Reset input	
	4	<b>RSVD</b>	Reserved	
	5	<b>KBDAT</b>	Keyboard data	1
	6	<b>KBCLK</b>	Keyboard clock	5
	7	<b>GND</b>	Ground	3
	8	<b>VCC</b> <sup>1)</sup>	Power +5V	4
	9	<b>BATT</b>	Battery	
	10	<b>PWRGD</b>	Power good	

---

**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

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### 11.2 Signal Description

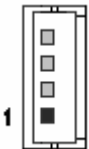
- When **POWERGD** goes high it starts the reset generator on the CPU module to pull the onboard reset line high after a valid reset period. You also can use this pin as a low active hardware reset for modules
- A battery (signal **BATT**) is not needed to hold CMOS setup data. Your configurations for hard disks, floppy drives and other peripherals are saved in an onboard EEPROM. However you need a battery to save the CMOS date and time when power supply is turned off
- **SPKR** is an output to drive a piezo electronic speaker

## 12 PS/2 Mouse Interface

The Super-I/O of the MOPSLcdLX supports a PS/2 mouse.

### 12.1 Connector

The PS/2 mouse interface is available on connector X14001 (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).

Header	Pin	Signal Name	Function
	1	<b>MSCLK</b>	Mouse clock
	2	<b>GND</b>	Ground
	3	<b>VCC</b> <sup>1)</sup>	Power +5V
	4	<b>MSDAT</b>	Mouse data

---

**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

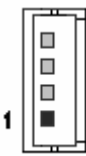
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## 13 USB Interface

The USB interface comes with two USB ports which follow the OHCI/EHCI specification and are USB 2.0 compliant. You can expand the amount of USB connections by adding external hubs.

### 13.1 Connector

The USB ports are available through the X15006 and X15007 connectors (each 4 pins). To have the signals available on the standard USB interface connectors an adapter cable is required. An USB interface cable is available from KONTRON (KAB-USB-2, part number 96054-0000-00-2).

Header	Pin	Signal Name	Function
	1	<b>GND</b>	Ground
	2	<b>USB+</b>	USB port (positive)
	3	<b>USB-</b>	USB port (negative)
	4	<b>VCC</b> <sup>1)</sup>	Power +5V

---

**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

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### 13.2 Limitations

The power contacts for USB devices on pin 1 and pin 4 are protected. They are suitable to supply connected USB devices with a maximum of 500 mA power dissipation. Do not supply external USB devices with higher power dissipation through these pins.


## 14 Floppy Drive Interface

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

### 14.1 Connector

The floppy disk interface is available on the flat-foil connector X15003 (26 pins). This type of connector is often internally used in notebooks to connect a 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 (FLOPPY-MOPS-1, part number 96010-0000-00-0).

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	VCC <sup>1)</sup>	Power +5V	2	/IDX	Index
	3	VCC <sup>1)</sup>	Power +5V	4	/DRO	Drive select 0
	5	VCC <sup>1)</sup>	Power +5V	6	/DSKCHG	Disk change
	7	N.C.	Not connected	8	N.C.	Not connected
	9	N.C.	Not connected	10	/MTRO	Motor on 0
	11	N.C.	Not connected	12	/FDIR	Direction select
	13	N.C.	Not connected	14	/STEP	Step
	15	GND	Ground	16	/WDATA	Write data
	17	GND	Ground	18	/WGATE	Write gate
	19	GND	Ground	20	/TRKO	Track 0
	21	GND	Ground	22	/WRTPRT	Write protect
	23	GND	Ground	24	/RDATA	Read data
	25	GND	Ground	26	/HSEL	Side one select

**Note:** 1) To protect the external power lines of peripheral devices make sure that

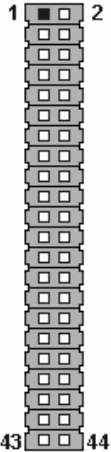
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

## 15 EIDE Interface (P-ATA)

The MOPSLcdLX features one EIDE interface (UDMA33/66 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 connected you must set it as master.

### 15.1 Connector

The EIDE interface is available through connector X15005 (44 pins). This interface is designed in 2 mm grid for optimal connectivity to a 2.5" hard disk. 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).

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	<b>/RESET</b>	Reset	2	<b>GND</b>	Ground
	3	<b>D7</b>	Data 7	4	<b>D8</b>	Data 8
	5	<b>D6</b>	Data 6	6	<b>D9</b>	Data 9
	7	<b>D5</b>	Data 5	8	<b>D10</b>	Data 10
	9	<b>D4</b>	Data 4	10	<b>D11</b>	Data 11
	11	<b>D3</b>	Data 3	12	<b>D12</b>	Data 12
	13	<b>D2</b>	Data 2	14	<b>D13</b>	Data 13
	15	<b>D1</b>	Data 1	16	<b>D14</b>	Data 14
	17	<b>D0</b>	Data 0	18	<b>D15</b>	Data 15
	19	<b>GND</b>	Ground	20	<b>Key (N.C.)</b>	Key pin
	21	<b>DRQ</b>	DMA request	22	<b>GND</b>	Ground
	23	<b>/IOW</b>	I/O write	24	<b>GND</b>	Ground
	25	<b>/IOR</b>	I/O read	26	<b>GND</b>	Ground
	27	<b>IOCHRDY</b>	I/O channel ready	28	<b>CSEL <sup>2)</sup></b>	Cable select
	29	<b>/DACK</b>	DMA acknowledge	30	<b>GND</b>	Ground
	31	<b>IRQ</b>	Interrupt request	32	<b>N.C.</b>	Not connected
	33	<b>SA1</b>	Address 1	34	<b>ATAD</b>	UDMA detection
	35	<b>SA0</b>	Address 0	36	<b>SA2</b>	Address 2
	37	<b>/CS1</b>	Chip select 1	38	<b>/CS3</b>	Chip select 3
	39	<b>N.C.</b>	Not connected	40	<b>GND</b>	Ground
	41	<b>VCC <sup>1)</sup></b>	Power +5V	42	<b>VCC <sup>1)</sup></b>	Power +5V
	43	<b>GND</b>	Ground	44	<b>N.C.</b>	Not connected

- Note:**
- 1) To protect the external power lines of peripheral devices make sure that
    - the wires have the right diameter to withstand the maximum available current.
    - to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.
  - 2) Pin 28 is connected with 470Ω to Ground for Cable Select IDE devices.

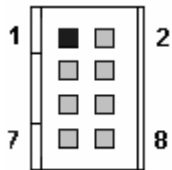
## 16 LAN Controller

The MOPSLcdLX uses an Intel® 82551ER PCI Fast Ethernet controller. The controller support 10/100 Base-T interfaces. The devices auto-negotiates the use of a 10 or 100 Mbps connection.

Additionally it is possible to enable the LAN PXE Boot in the BIOS Setup to allow the system to boot up via a network connection from a PXE server.

### 16.1 Connector

The LAN interface is available through the connector X16000 (8 pins). To have the signals 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).

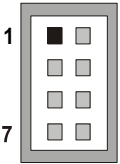
Header	Pin	Signal Name	Function
	1	<b>TXD+</b>	10/100 transmit (positive)
	2	<b>TXD-</b>	10/100 transmit (negative)
	3	<b>RXD+</b>	10/100 receive (positive)
	4	<b>GND</b>	Ground (shield)
	5	<b>GND</b>	Ground (shield)
	6	<b>RXD-</b>	10/100 receive (negative)
	7	<b>GND</b>	Ground (shield)
	8	<b>GND</b>	Ground (shield)

## 17 Power Supply

In some applications the MOPSLcdLX 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 MOPSLcdLX is a +5V only board. Peripherals can obtain additional voltage from the power connector next to the PC/104 bus. The additional voltages (+12V, -5V and -12V) are not generated onboard.

### 17.1 Connector

The power connector is available as X10000C (8 pins).

Header	Pin	Signal Name	Function
	1	<b>GND</b>	Ground
	2	<b>VCC</b> <sup>1)</sup>	Power supply +5V
	3	<b>BATT</b>	Battery
	4	<b>+12V</b> <sup>1)</sup>	Power supply +12V
	5	<b>-5V</b> <sup>1)</sup>	Power supply -5V
	6	<b>-12V</b> <sup>1)</sup>	Power supply -12V
	7	<b>GND</b>	Ground
	8	<b>VCC</b> <sup>1)</sup>	Power supply +5V

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**Note:** 1) To protect the external power lines of peripheral devices make sure that

- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

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### 17.2 Power Pins

Every power pin on the power connector supplement is limited to a maximum current and the following limitations apply:

Power	Number of Pins	Max. Current per Pin
<b>VCC (+5V)</b>	2	1A
<b>-5V</b>	1	1A
<b>+12V</b>	1	1A
<b>-12V</b>	1	1A

---

**Note:** The MOPSLcdLX is not a replacement for a backplane. Use all power pins on the power connector and on the PC/104 connectors for power supply to the MOPSLcdLX 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 for power supply to the full PC/104 stack.

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## 17.3 External Battery

You can connect an external battery to pin 3 (BATT) of the power connector instead of pin 9 of the keyboard connector. For more information refer to the keyboard chapter of this manual.

---

**Attention:** *Pin 3 (power connector) and pin 9 (keyboard connector) are connected to the same signal. The pins are not decoupled, therefore do not connect two batteries.*

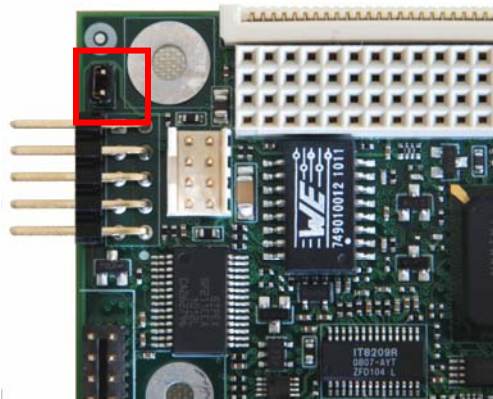
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## 18 Crisis Management

Modifying parameters in the BIOS Setup implies the risk of leaving your system in a unbootable state. In case this happens two jumper exists to reset the settings to 'Fail-Safe values'.

In case no battery is connected then follow these five steps:

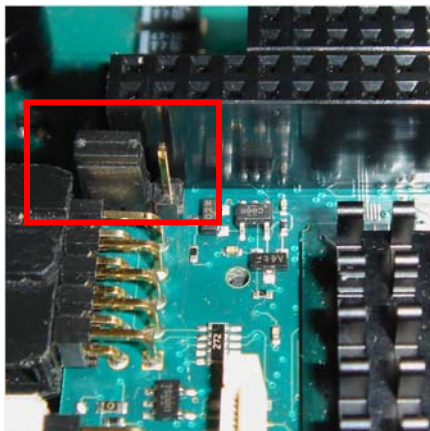
- ❶ Power down the system
- ❷ Remove the tagged jumper JP14002 (see the picture)
- ❸ Power up the system and enter the BIOS Setup
- ❹ Before saving your new settings with 'Save & Exit' put the jumper back
- ❺ The board should be functional now



In case there is a backup battery for the real time clock:

- ❶ Power down the system
- ❷ Switch the second jumper JP7000 as depicted and wait for 3 seconds
- ❸ Put the jumper back as it was before

Then continue with the steps from the no battery case.



## 19 CPU/Memory Speed

Not every combination of CPU and memory clock frequency is possible. To ensure functionality of the board please make sure to use only combinations from the following table.

CPU Speed	Memory Speed
200 MHz	DDR200
333 MHz	DDR200
333 MHz	DDR266
333 MHz	DDR333
400 MHz	DDR200
400 MHz	DDR266
400 MHz	DDR333
433 MHz	DDR266
433 MHz	DDR333
500 MHz	DDR266
500 MHz	DDR333

## 20 Special Hardware Hints

### 20.1 ISA Bus Limitations

The ISA bus implementation has the following four restrictions:

- 16 bit DMA cycles (located at DMA5 – DMA7) are not supported
- An ISA device may take control of the bus (ISA bus master mode). This mode is not supported
- Simultaneous usage of standard legacy floppy and DMA cycles is not possible
- Using ISA graphic cards certain high color depth graphic modes may show disturbances i.e. vertical lines. This is due to non optimum timings in the FINTEK ISA bridge which cannot be fixed

### 20.2 PCI Bus Limitations

The PCI bus implementation has the following three restrictions:

- Only 3.3V PCI boards/cards are supported (do not use 5V PCI boards/cards without level-shifter)
- Only PCI boards/cards with speed of 33 MHz will be run
- Some problems exists when using the KONTRON ADA9 Evaluation Board (referring to PCI slots). KONTRON cannot guarantee that all PCI cards runs error-free

### 20.3 Security Block

The standard version of AMD LX800 doesn't contain an EEPROM for storing a hidden key. Please contact KONTRON for further information.

## 21 Setup Guide

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

Whenever you contact technical support about BIOS issues providing a BIOS version <PLX8R??> is especially helpful.

### 21.1 Start PHOENIX/AWARD BIOS Setup Utility

To start the PHOENIX/AWARD BIOS Setup utility press <DEL> when the following string appears during boot-up.

***Press <DEL> to enter Setup***

The main menu then appears.

The Setup screen is composed of several sections:

Setup Screen	Location	Function
<b>Menu Bar</b>	Upper half	Lists and selects all top level menus
<b>Legend Bar</b>	Near bottom or bottom	Lists Setup navigation keys
<b>Item Specific Help Window</b>	Bottom or left side	Help for selected item

#### Menu Bar

The menu bar at the upper half of the window lists different menus. Use the arrow keys to make a selection.

#### Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu.

#### Selecting an Item

Use the ↑ or ↓ key to move the cursor to the field you want. Then use the + and – keys to select a value for that field.

#### Displaying Submenus

Use the arrow keys to move the cursor to the submenu you want. Then press <Enter>. A pointer ( ▶ ) marks all submenus.

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

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## 21.2 Menu Bar

Feature	Description
Standard CMOS Features	Defines time, date, harddisk and floppy type
Advanced BIOS Features	Defines virus warning, boot sequence, keyboard and mouse parameters
Advanced Chipset Features	Defines clocks, video settings, LAN, USB and watchdog features
Integrated Peripherals	Defines IDE global settings and onboard devices (COM, LPT)
PnP/PCI Configuration	Defines graphic boot device and PCI/memory resources
PC Health Status	Shows temperatures/voltages and defines shutdown temperature
Board Information	Shows BIOS version/date, serial number and others
Load Fail-Safe Defaults	Overwrite Setup values with fail-safe values
Load Optimized Defaults	Overwrite Setup values with optimized values
Set Supervisor Password	Change, set or disable supervisor password
Set User Password	Change, set or disable user password
Save & Exit Setup	Saves Setup values to CMOS and exit Setup
Exit Without Saving	Discards all Setup values and exit Setup

## 21.3 Main Menu

Feature	Option	Description
Date	MM/DD/YYYY	Sets system date
Time	HH:MM:SS	Sets system time
► IDE Master Drive	Submenu	Displays result of IDE autotyping
► IDE Slave Drive	Submenu	Displays result of IDE autotyping
Drive A	<b>None</b> , 360 kBits 5¼ " 1.2 MBits 5¼ " , 720 kBits 3½ " 1.44 MBits 3½ " , 2.88 MBits 3½ "	Sets type of floppy disk drive
Halt On	All Errors, No Errors <b>All, But Keyboard</b> All, But Diskette All, But Disk/Key	Determines if errors detected during boot-up cause system to halt
Base Memory	N/A	Displays amount of conventional memory detected during boot-up
Extended Memory	N/A	Displays amount of extended memory detected during boot-up Extended memory = capacity of memory module – selected frame buffer memory size
Total Memory	N/A	Displays amount of total memory detected during boot-up

### 21.3.1 IDE Master or Slave Submenu

Feature	Option	Description
HDD Auto-Detection	Press Enter	Executes HDD auto-detection
Master/Slave Drive	None <b>Auto</b> Manual	None = disable drive Auto = auto-detection, the drive itself supplies the information Manual = user supplies the HDD information
Access Mode	CHS LBA Large <b>Auto</b>	CHS = physically 28bit addressing mode LBA = mode with logical block numbers Large = for drives that do not support LBA and have more than 1024 cylinders Auto = auto-detection, the drive itself supplies the information
Capacity	N/A	Displays the calculated size of the drive
Cylinder	N/A	Number of cylinders
Head	N/A	Number of read/write heads
Precomp	N/A	Write precompensation cylinder number
Landing Zone	N/A	Defines the head park position
Sector	N/A	Number of sectors per track

### 21.4 Advanced BIOS Features

Feature	Option	Description
Security Option	<b>Setup</b> System	Setup = password required for Setup System = password required for system boot
CPU Internal Cache	Disabled <b>Enabled</b>	Enables or disables internal cache
JRC Extension	Enabled <b>Disabled</b>	Enables or disables the JRC extension (remote control)
Darkboot / Custom Logo	<b>Disabled</b> Enabled	If enabled normally darkboot will be active. For custom logo contact KONTRON
Virus Warning	Enabled <b>Disabled</b>	Enables or disables the virus warning for IDE harddisk boot sector
First Boot Device Second Boot Device Third Boot Device	Floppy <b>Harddisk 0 (First)</b> Harddisk 1 CDROM USB FDD USB-ZIP USB-CDROM <b>USB-HDD (Second)</b> LAN <b>Disabled (Third)</b>	Standard legacy diskette drive IDE hard drive IDE hard drive Standard CDROM or DVD drive USB diskette drive USB ZIP drive (e.g. IOMEGA) USB CDROM drive USB hard drive LAN controller with LAN Boot-ROM Disables boot device

<b>PXE LAN Boot</b>	<b>Disabled</b> Enabled	Enables or disables the LAN boot option
<b>Boot Up Numlock Status</b>	Off <b>On</b>	On or Off turns NumLock on or off at boot-up (keyboard feature)
<b>Gate A20 Option</b>	Normal <b>Fast</b>	Normal = keyboard controller checks Gate A20 Fast = lets chipset control Gate A20
<b>Typematic Rate Setting</b>	<b>Disabled</b> Enabled	Enables or disables manual adjustability
<b>Typematic Rate</b>	6, 8, 10, 12, 15,20, 24, 30 chars/sec.	Sets number of times to repeat a keystroke per second if you hold the key down
<b>Typematic Delay</b>	250, 500, 750, 1000 ms	Sets delay time after key is held down before it begins to repeat the keystroke
<b>PS/2 Mouse Function</b>	<b>Disabled</b> Enabled	Disabled prevents installed PS/2 mouse from functioning but frees IRQ12 Enabled forces the PS/2 mouse port to be enabled regardless if a mouse is present
<b>Video BIOS Shadow</b>	Disabled <b>Enabled</b>	Controls shadowing of Video BIOS
<b>C8000-CBFFF Range</b> <b>CC000-CFFFF Range</b> <b>D0000-D3FFF Range</b> <b>D4000-D7FFF Range</b> <b>D8000-DBFFF Range</b> <b>DC000-DFFFF Range</b>	<b>ISA/PCI Bus</b> Shadow RAM Reserved Memory	ISA/PCI bus = enables normal ISA or PCI bus access. Reads an extension ROM from external bus (slow access) Shadow RAM = shadows an extension ROM on ISA or PCI bus (fast access) Reserved Memory = sets the range as memory (no ISA or PCI access possible)
<b>Shadow Read/Write</b>	<b>Disabled</b> Enabled	Normally shadow area only readable. Use this option to enable write operation
<b>Memory Hole at 15M-16M</b>	<b>Disabled</b> Enabled	Enables or disables the memory hole at 15MB for ISA bus access

## 21.5 Advanced Chipset Features

Feature	Option	Description
CPU Frequency	Auto, 200 MHz, 333 MHz 400 MHz, 433 MHz, <b>500 MHz</b>	Selects CPU frequency (Auto uses board strap options)
Memory Speed	DDR200, <b>DDR266</b> , DDR333	Selects memory speed
Video Memory Size	<b>8</b> , 16, 32, 64, 128, 254 MB	Defines Video memory size. The Video memory shares system memory
Output Display	<b>CRT</b> , LCD, LCD&CRT	Selects display boot devices. CRT&LCD is the simultaneous mode
LCD Resolution	Auto, VGA, <b>SVGA</b> , XGA	VGA to XGA provides standard timings for panel resolutions. Auto loads a DisplayID record
Record Protocol	<b>UDS (EDID)</b> DisplayID	UDS = not longer supported ! DisplayID = VESA specification Only valid if LCD Resolution = Auto
Color Depth	<b>18 Bit</b> 24 Bit	Defines the LCD color depth
Color Mode	<b>FPDI</b> LDI	FPDI = Flat Panel Display Interface LDI = LVDS Display Interface Only valid of Color Depth = 24 Bit
Backlight Value	0, 10, 20, 30, <b>40</b> , 50, 60 70, 80 100, 120, 150, 180 210, 230, 250	Chooses a value to adjust backlight of the LCD 0 = 0 V and 250 = nearly maximal voltage
Security Block	<b>Disabled</b> Enabled	Enables or disables the internal Security Block
LAN Controller	<b>Enabled</b> Disabled	Enables or disables the external PCI LAN controller
USB Controller	<b>Enabled</b> Disabled	Enables or disables the internal USB controller
Watchdog Mode	<b>Disabled</b> Generate RESET	Selects operation mode
Watchdog Timeout	1 sec ... <b>30 sec</b> 1 min ... 30.5 min	Selects maximum trigger period
Watchdog Delay	1 sec ... <b>30 sec</b> 1 min ... 30.5 min	Selects time until the watchdog counter starts the counting

## 21.6 Integrated Peripherals

Feature	Option	Description
Master/Slave Drive PIO Mode	<b>Auto</b> , Mode 0, Mode 1 Mode 2, Mode 3, Mode 4	Selects HDD PIO mode or Auto for optimum transfer mode
Master/Slave Drive UDMA	Disabled <b>Auto</b>	Disables UDMA or selects the optimum transfer mode
Bus Master Mode	Disabled <b>Enabled</b>	Enables or disables IDE bus master mode
HDD Block Mode	Disabled <b>Enabled</b>	Enables or disables IDE block mode. If the harddrive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector
Keyboard Input Clock	6 , 8, 12, 16 MHz	Selects the keyboard clock
Floppy Controller	Disabled <b>Enabled</b>	Enables or disables the floppy controller
Serial Port 1/2	Disabled <b>3F8/IRQ4 (Port 1)</b> <b>2F8/IRQ3 (Port 2)</b> 3E8/IRQ4 2E8/IRQ3	Selects I/O base and IRQ of serial port respectively disables the port
Parallel Port	Disabled <b>378/IRQ7</b> 278/IRQ5 3BC/IRQ7	Selects I/O base and IRQ of serial port respectively disables the port
Parallel Port Mode	<b>Standard</b> EPP	Standard = bidirectional EPP = Enhanced Parallel Port specification
EPP Mode Select	EPP1.9, <b>EPP1.7</b>	Selects the EPP specification

## 21.7 PnP/PCI Configurations

Feature	Option	Description
Init Display First	<b>Onboard</b> ISA Slot PCI Slot	Defines the search strategy for the primary graphic controller
Reset Configuration Data	<b>Disabled</b> Enabled	Enabled erases all configuration data in Extended System Configuration Data (ESCD)
Resources Controlled by	<b>Auto (ESCD)</b> Manual	Manual allows user configuration of PCI IRQs
First PCI IRQ Second PCI IRQ	IRQ3, IRQ4, IRQ5, IRQ7 <b>IRQ10 (First)</b> <b>IRQ11 (Second)</b> IRQ12, IRQ15	The system BIOS must have two PCI IRQs. PCI interrupts own the highest priority and disabling legacy (ISA) IRQs, also internal serial and parallel ports

## 21.8 PC Health Status

Feature	Option	Description
System Temp. (Local)	N/A	Local temperature
CPU Die Temp. (Remote)	N/A	Temperature of CPU
Shutdown Temperature	<b>Disabled</b> 60°C / 65°C 70°C / 75°C 80°C / 85°C 90°C / 95°C 100°C	Defines the shutdown temperature
Board Voltage +Vcore	N/A	+Vcore voltage (generated onboard)
Board Voltage +3.3V	N/A	+3.3V voltage (generated onboard)
System Voltage +5V	N/A	+5V voltage (external power supply)
System Voltage +12V	N/A	+12V voltage (external power supply)

## 21.9 Board Information

Feature	Option	Description
BIOS Version	N/A	Shows the actual BIOS version
BIOS Date	N/A	Shows the BIOS production date
LX800 Chip Rev.	N/A	Shows the Northbridge (LX800) chip revision
CS5536 Chip Rev.	N/A	Shows the Southbridge (CS5536) chip revision
CPLD Revision	N/A	Shows the CPLD revision
Board Class	N/A	Shows the KONTRON specific board class
Board Name	N/A	Shows the KONTRON specific board name
Hardware Version	N/A	Shows the KONTRON specific hardware version
Manufacturing Date	N/A	Shows the KONTRON specific manufacturing date
Serial Number	N/A	Shows the KONTRON specific serial number
Boot Counter	N/A	Shows the actual boot counter

## Appendix A: System Resources

### A.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. Please ensure that the chosen interrupt is not already in use by PCI devices.

IRQ #	Used for	Available	Comment
0	Timer 0	No	
1	Keyboard	No	
2	8259 Slave (Cascade)	No	
3	Serial Port 2 (COM2)	No	Note (1)
4	Serial Port 1 (COM1)	No	Note (1)
5		Yes	Note (2)
6	Floppy Controller	No	Note (1)
7	Parallel Port (LPT1)	No	Note (1)
8	Real Time Clock (RTC)	No	
9		Yes	
10	PCI IRQ	for PCI	Dynamic (BIOS default)
11	PCI IRQ	for PCI	Dynamic (BIOS default)
12	PS/2 Mouse	No	Note (1)
13	Floating Point Unit (FPU)	No	
14	IDE Controller (Primary)	No	Note (1)
15	IDE Controller (Secondary)	No	Note (3)

- 
- Note:**
- 1) If the **Used for** device is disabled in the BIOS Setup the corresponding interrupt is free.
  - 2) The parallel port also can be configured for IRQ5.
  - 3) Not usable in Windows® since a PCI IDE controller uses always two channels.
-

## A.2 Direct Memory Access (DMA) Channels

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

---

**Note:** 1) If the **Used for** device is disabled in the BIOS Setup the corresponding DMA channel is free.  
2) 16 bit DMA channels not available.

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## A.3 Memory Area

The first 640 kB of DRAM are used as main memory. DOS can address 1 MB of memory directly. Memory area above 1 MB (high memory, extended memory) is accessed under DOS via special drivers such as HIMEM.SYS. Other operating systems (Linux or Windows® versions) allow you to address the full memory area directly.

Memory Range	Used for	Available	Comment
C0000h - C7FFFh	VGA BIOS	No	
C8000h - CFFFFh		Yes	if onboard graphic controller is used
D0000h - DFFFFh		Yes	
E0000h - E7FFFh		Yes	Free for ISA bus
E8000h - FFFFFh	System BIOS	No	

## A.4 I/O Address Map

The I/O-port addresses of the MOPSlcdLX are functionally identical to a standard PC/AT. All addresses not mentioned in this table should be available. We recommend that you do not use I/O addresses below 0100h with additional hardware for compatibility reasons even though they are available.

I/O Address	Used for	Available	Comment
01F0h - 01F7h	IDE Controller (P-ATA)	No	Note (1)
0278h - 027Fh		Yes	Possible address of LPT2
0290h - 0297h	Hardware Monitor	No	
02E8h - 02EFh		Yes	Possible address of COM4
02F8h - 02FFh	Serial Port 2	No	Note (1)
0378h - 037Fh	Parallel Port 1	No	Note (1)
03BCh - 03C4h		Yes	Possible address of LPT3
03B0h - 03DFh	Graphic Controller	No	
03E8h - 03EFh		Yes	Possible address of COM3
03F0h - 03F7h	Floppy Controller	No	Note (1)
03F8h - 03FFh	Serial Port 1	No	Note (1)
0480h - 048Fh	DMA Extension	No	Chipset
04D0h - 04D8h	PIC Extension	No	Chipset
0A78h - 0A7Fh	PnP Configuration	No	
0CF8h - 0CFFh	PCI Configuration	No	Chipset
6000h - 63FFh	AMD PCI ISA-Bridge	No	Chipset
9C00h - 9FFFh	AMD PCI ISA-Bridge	No	Chipset
AC1Ch - AC1Fh	AMD PCI Host Bridge	No	Chipset
FE00h - FE0Fh	AMD PCI IDE Controller	No	Chipset
FF00h - FF3Fh	Intel® LAN Controller	No	External PCI device

---

**Note:** 1) If the **Used for** device is disabled in the BIOS Setup the corresponding address is free.

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## A.5 PCI Devices

All devices follow the Peripheral Component Interconnect 2.2 (PCI 2.2) specification. Please see the specification for more details.

PCI Device	PCI IRQ	Comment
Host Bridge	None	Chipset
Graphics Controller	INTA	Chipset
ISA Bridge	None	Chipset
IDE Controller	None	Chipset
USB Controller 1	INTD	Chipset
USB Controller 2	INTD	Chipset
Encryption Controller	INTA	Chipset
LAN Controller	INTA	PCI bus (AD19)

## A.6 System Management Bus (SMBus)

The MOPSLcdLX uses an onboard System Management Bus (SMBus). This bus is not available on a peripheral connector and therefore cannot be used for external SMBus devices.

SMBus Address	Device	Comment
98h / 99h	Temperature Sensor	LM86
A0h / A1h	SPD EEPROM (DDR-SDRAM)	Part of the DDR RAM module

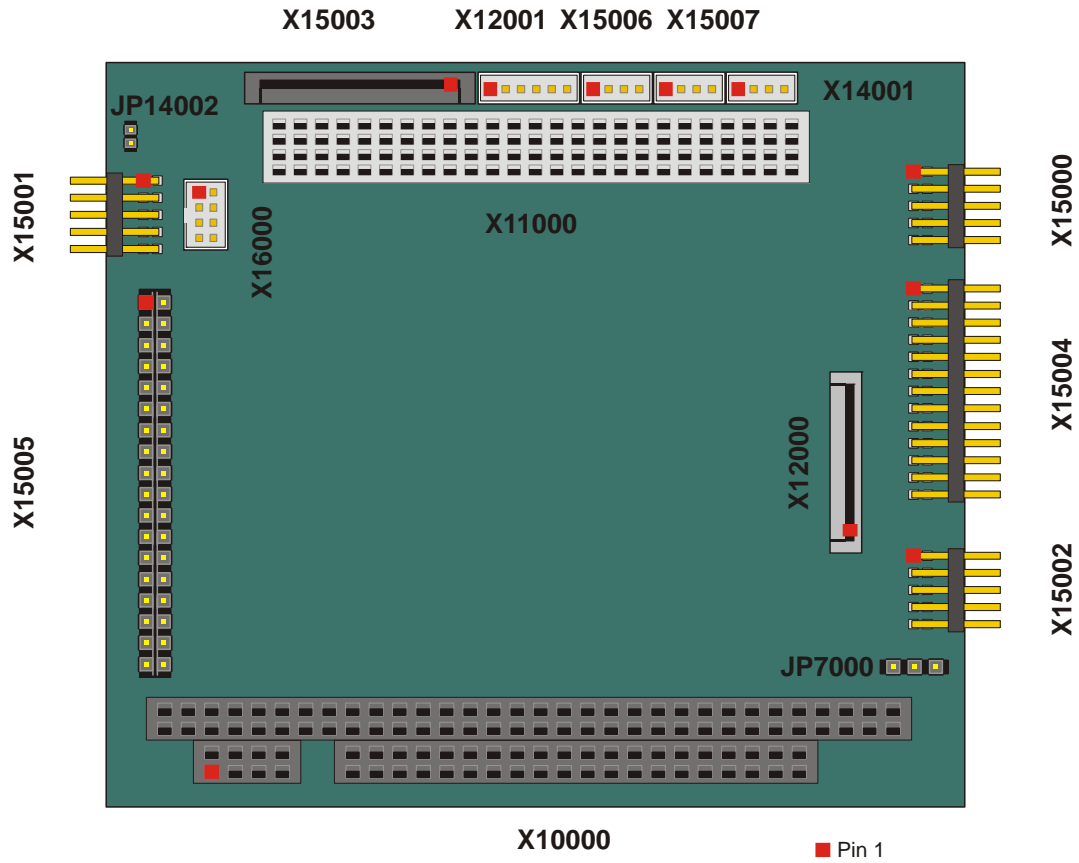
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**Warning:** *There are more devices connected to the SMBus than listed in this table but access to these devices is not permitted. Don't access any other device addresses except those listed above.*

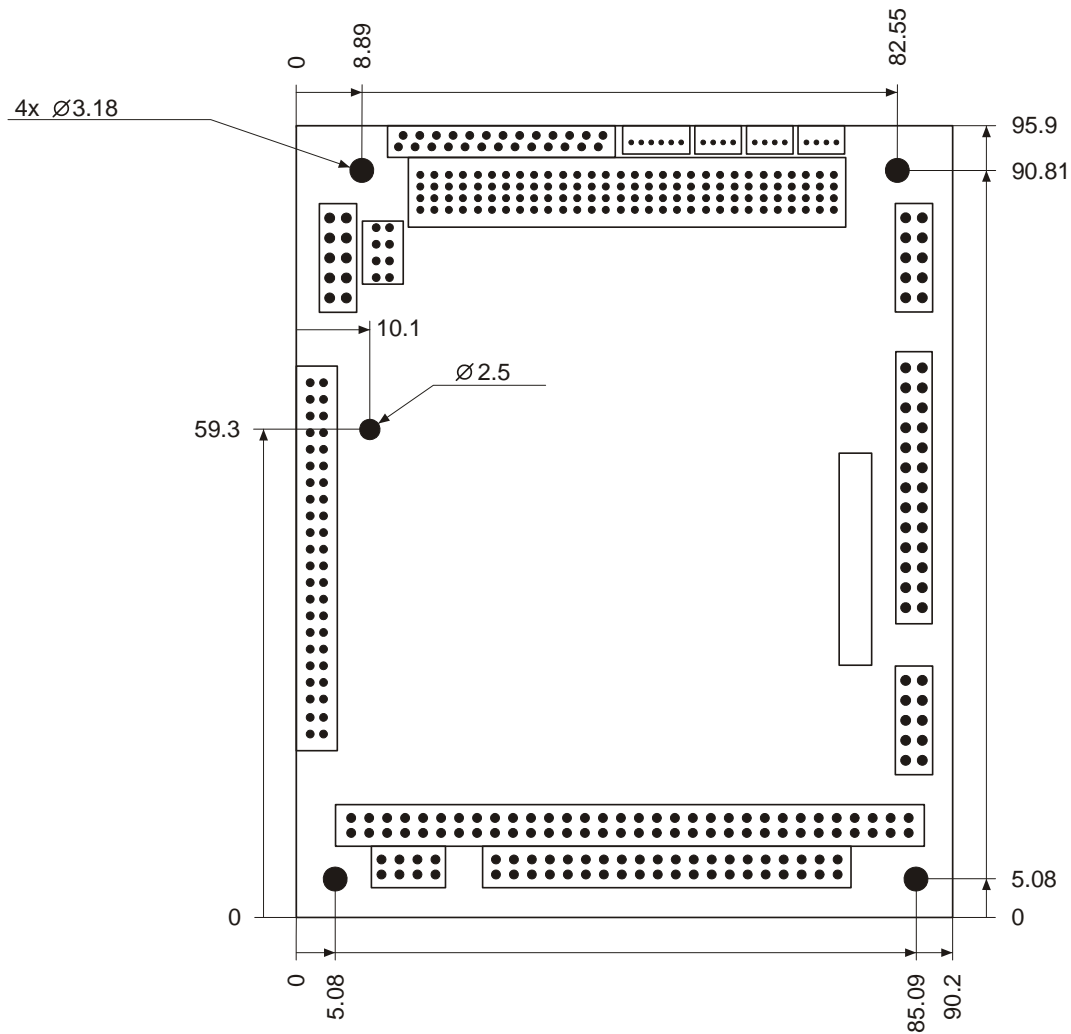
---

# Appendix B: Connector Layout

## B.1 Connector Locations



## B.2 Mechanical Dimensions



### B.3 Mating Connectors

The table notes mating connectors.

Identifier	Mating Connector	Comment
<b>X12001</b>	1.25 mm 6 pin (MOLEX 51021-0600 or comp.)	for DSUB15 adaptation (CRT)
<b>X14001</b>	1.25 mm 4 pin (MOLEX 51021-0400 or comp.)	for PS/2 mouse
<b>X15000</b> <b>X15001</b>	2.54 mm 10 pin (AMP 1-215882-0 or comp.)	for DSUB9 adaption (COMA, COMB)
<b>X15002</b>	2.54 mm 10 pin (AMP 1-215882-0 or comp.)	for keyboard/feature connector
<b>X15004</b>	2.54 mm 26 pin (AMP 2-215882-6 or comp.)	for DSUB25 adaption (LPT)
<b>X15005</b>	2 mm 44 pin (Berg 89361-144 or comp.)	for IDE connector
<b>X15006</b> <b>X15007</b>	1.25 mm 4 pin (MOLEX 51021-0400 or comp.)	for USB connectors
<b>X16000</b>	2 mm 8 pin (Berg 90311-008 or comp.)	for RJ45 adaption

## B.4 Pinout Tables

Pin	PC/104 (A)	PC/104 (B)	PC/104 (C)	PC/104 (D)
0			GND	GND
1	/IOCHCK	GND	/SBHE	/MEMCS16
2	SD7	RESET	LA23	/IOCS16
3	SD6	VCC5 <sup>2)</sup>	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V <sup>2)</sup>	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V <sup>2)</sup>	LA18	IRQ14
8	SD1	/OWS	LA17	/DACK0
9	SD0	+12V <sup>2)</sup>	/MEMR	DRQ0
10	IOCHRDY	GND <sup>1)</sup>	/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	VCC5 <sup>2)</sup>
17	SA14	/DACK1	SD14	/MASTER
18	SA13	DRQ1	SD15	GND
19	SA12	/REFRESH	N.C.	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	VCC5 <sup>2)</sup>		
30	SA1	OSC		
31	SA0	GND		
32	GND	GND		

Pin	PCI-104 (A)	PCI-104 (B)	PCI-104 (C)	PCI-104 (D)
1	N.C.	Reserved	VCC5 <sup>2)</sup>	AD0
2	V <sub>I/O</sub> <sup>2)</sup>	AD2	AD1	VCC5 <sup>2)</sup>
3	AD5	GND	AD4	AD3
4	C/BE0	AD7	GND	AD6
5	GND	AD9	AD8	GND
6	AD11	V <sub>I/O</sub> <sup>2)</sup>	AD10	Reserved
7	AD14	AD13	GND	AD12
8	VCC3 <sup>2)</sup>	C/BE1	AD15	VCC3 <sup>2)</sup>
9	SERR <sup>3)</sup>	GND	Reserved	PAR
10	GND	PERR <sup>3)</sup>	VCC3 <sup>2)</sup>	Reserved
11	STOP	VCC3 <sup>2)</sup>	LOCK <sup>3)</sup>	GND
12	VCC3 <sup>2)</sup>	TRDY	GND	DEVSEL
13	FRAME	GND	IRDY	VCC3 <sup>2)</sup>
14	GND	AD16	VCC3 <sup>2)</sup>	C/BE2
15	AD18	VCC3 <sup>2)</sup>	AD17	GND
16	AD21	AD20	GND	AD19
17	VCC3 <sup>2)</sup>	AD23	AD22	VCC3 <sup>2)</sup>
18	IDSEL0 (AD20)	GND	IDSEL1 (AD21)	IDSEL2 (AD22)
19	AD24	C/BE3	V <sub>I/O</sub> <sup>2)</sup>	IDSEL3 (AD24)
20	GND	AD26	AD25	GND
21	AD29	VCC5 <sup>2)</sup>	AD28	AD27
22	VCC5 <sup>2)</sup>	AD30	GND	AD31
23	REQ0	GND	REQ1	V <sub>I/O</sub> <sup>2)</sup>
24	GND	REQ2	VCC5 <sup>2)</sup>	GNT0
25	GNT1	V <sub>I/O</sub> <sup>2)</sup>	GNT2	GND
26	VCC5 <sup>2)</sup>	CLK0	GND	CLK1
27	CLK2	VCC5 <sup>2)</sup>	CLK3	GND
28	GND	INTD	VCC5 <sup>2)</sup>	RST
29	+12V <sup>2)</sup>	INTA	INTB	INTC
30	-12V <sup>2)</sup>	Reserved	Reserved	GND

Pin	P-ATA X15005	Floppy X15003	LPT X15004	JILI X12000
1	/RESET	VCC5 <sup>2)</sup>	/STB	N.C.
2	GND	/IDX	/AFD	FTX0-
3	D7	VCC5 <sup>2)</sup>	D0	FTX0+
4	D8	/DRO	/ERR	ENAVCC
5	D6	VCC5 <sup>2)</sup>	D1	FTX1-
6	D9	/DSKCHG	/INIT	FTX1+
7	D5	N.C.	D2	N.C.
8	D10	N.C.	/SLIN	FTX2-
9	D4	N.C.	D3	FTX2+
10	D11	/MTR0	GND	GND
11	D3	N.C.	D4	FTXC-
12	D12	/FDIR	GND	FTXC+
13	D2	N.C.	D5	GND
14	D13	/STEP	GND	FTX3-
15	D1	GND	D6	FTX3+
16	D14	/WDATA	GND	SDA
17	D0	GND	D7	RSVD
18	D15	/WGATE	GND	RSVD
19	GND	GND	/ACK	SCL
20	KEY (N.C.)	/TRKO	GND	RSVD
21	DRQ	GND	/BUSY	RSVD
22	GND	/WRTprt	GND	N.C.
23	/IOW	GND	PE	RSVD
24	GND	/RDATA	GND	RSVD
25	/IOR	GND	/SLCT	GND
26	GND	/HdSEL	VCC5 <sup>2)</sup>	RSVD
27	IOCHRDY			RSVD
28	CSEL			GND
29	/DACK			RSVD
30	GND			RSVD
31	IRQ			VCC5 <sup>2)</sup>
32	N.C.			VCC5 <sup>2)</sup>
33	SA1			VCC5 <sup>2)</sup>
34	ATAD			VCC5 <sup>2)</sup>
35	SA0			BKLT0N
36	SA2			GND
37	/CS1			GND
38	/CS3			+12V <sup>2)</sup>
39	N.C.			+12V <sup>2)</sup>
40	GND			+12V <sup>2)</sup>
41	VCC5 <sup>2)</sup>			
42	VCC5 <sup>2)</sup>			
43	GND			
44	N.C.			

Pin	PS/2 Keyb. X15002	PS/2 Mouse X14001	COM A X15000	COM B X15001
1	SPKR	MSCLK	/DCD	/DCD
2	GND	GND	/DSR	/DSR
3	/RESIN	VCC5 <sup>2)</sup>	RXD	RXD
4	RSVD	MSDAT	/RTS	/RTS
5	KBDAT		TXD	TXD
6	KBCLK		/CTS	/CTS
7	GND		/DTR	/DTR
8	VCC5 <sup>2)</sup>		/RI	/RI
9	BATT		GND	GND
10	PWRGD		VCC5 <sup>2)</sup>	VCC5 <sup>2)</sup>

Pin	CRT X12001	LAN X16000	USB A X15006	USB B X15007
1	HSYNC	TXD+	GND	GND
2	VSYNC	TXD-	USB0+	USB0+
3	GND	RXD+	USB0-	USB0-
4	BLU	GND	VCC5 <sup>2)</sup>	VCC5 <sup>2)</sup>
5	GRN	GND		
6	RED	RXD-		
7		GND		
8		GND		

- 
- Note:**
- 1) Key pin for PC/104; GND for PC/104+ specification.
  - 2) To protect the external power lines of peripheral devices make sure that
    - the wires have the right diameter to withstand the maximum available current.
    - to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.
  - 3) Not supported on the MOPSlcdLX board.
-

## Appendix C: Reference Documents

KONTRON Technology A/S can't guarantee the availability of internet addresses.

Document	Internet Address
Advanced Configuration and Power Interface (ACPI)	<a href="http://www.acpi.info/spec.htm">http://www.acpi.info/spec.htm</a>
AT Attachment Storage Interface Specification (ATA)	<a href="http://t13.org">http://t13.org</a>
Digital Visual Interface (DVI)	<a href="http://www.ddwg.org">http://www.ddwg.org</a>
High Definition Audio Specification (HD Audio)	<a href="http://www.intel.com/standards/hdaudio">http://www.intel.com/standards/hdaudio</a>
High Speed Serialized AT Attachment (S-ATA)	<a href="http://www.sata-io.org/developers">http://www.sata-io.org/developers</a>
IEEE 802.3 Specification (Ethernet)	<a href="http://standards.ieee.org/getieee802">http://standards.ieee.org/getieee802</a>
Low Pin Count Interface Specification (LPC-Bus)	<a href="http://developer.intel.com/design/chipsets/industry/lpc.htm">http://developer.intel.com/design/chipsets/industry/lpc.htm</a>
Open LVDS Display Interface Standard Spec. (Open LDI)	<a href="http://www.national.com/analog/displays/open_ldi">http://www.national.com/analog/displays/open_ldi</a>
PC/104 Specifications	<a href="http://www.pc104.org/pc104_specs.php">http://www.pc104.org/pc104_specs.php</a>
PCI Express Base Specification (PCI Express)	<a href="http://www.pcisig.com/specifications">http://www.pcisig.com/specifications</a>
SD Specification (SD Card)	<a href="http://www.sdcard.org/developers/tech/sdio/sdio_spec">http://www.sdcard.org/developers/tech/sdio/sdio_spec</a>
System Management Bus Specification (SMBus)	<a href="http://www.smbus.org/specs">http://www.smbus.org/specs</a>
Universal Serial Bus Specification (USB)	<a href="http://www.usb.org/developers/docs">http://www.usb.org/developers/docs</a>

## Appendix D: Document Revision History

Revision	Date	Author	Changes
S0005-B	01/24/11	M. Hüttmann	Changed picture in chapter 'PCI Bus Expansion' (PCI V <sub>I/O</sub> and VCC), added warning in chapter 'External Real-Time Clock Battery'
S0005-A	08/10/10	M. Hüttmann	Changes for pcb rev. 5.00 and swap the pins of X12001, X15006, X15007 and X14001.
S0005-0	12/16/09	M. Hüttmann	Adapted to KONTRON Technology A/S guidelines
2.6	10/13/08	D. Zernikow	Remove the chapter ISA Bus Timing
2.5	06/30/08	M. Hüttmann	Added chapter ISA Bus Timing, chapter UDS and DisplayID specification and the entry Board Information in the Setup Guide
2.4	02/27/08	M. Hüttmann	Added Memory Hole 15M-16M in the Setup Guide
2.3	09/25/07	M. Hüttmann	Delete DDR333 entry
2.2	09/17/07	M. Hüttmann	Added I/O address range 290h-297h as reserved
2.1	07/20/07	M. Hüttmann	Added some memory (DDR-SDRAM) remarks and other minor changes
2.0	05/04/07	M. Hüttmann	Added chapter Color Mode and Crisis Management. Added new BIOS features from R109. Change Design
1.9	01/08/07	M. Hüttmann	New KONTRON Design
1.8	01/03/07	M. Hüttmann	Delete restriction of PCI-clock-signals (PC104+ connector)
1.7	12/07/06	M. Hüttmann	Change chapter Special BIOS Hints
1.6	11/07/06	M. Hüttmann	Added chapter KONTRON BIOS Extension and some Setup entries
1.5	09/04/06	M. Hüttmann	Change font, added chapter Memory Issues
1.4	08/17/06	M. Hüttmann	Added some chapters (e.g. CPU, Chipset and Super I/O / Modification of panel parameters / Memory speed)
1.3	07/25/06	M. Hüttmann	Added chapter Watchdog Timer and Onboard Device Configuration
1.2	07/12/06	M. Hüttmann	Minor changes
1.1	07/07/06	S. Laudan M. Hüttmann	Basic reworking
1.0	05/16/06	S. Laudan	First revision

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