

» Kontron User's Guide «



MOPS-PM

KTD-S0007-0

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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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No part of this document may be reproduced or transmitted in any form or by any means, electronically or mechanically, for any purpose without the express written permission of KONTRON Technology A/S.

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 MOPS-PM Overview

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

Article number	CPU Frequency	CPU Core	CPU: Celeron® M	CPU: Pentium® M
01060-0000-06-3	600 MHz	Banias	✓	
01060-0000-10-2	1.0 GHz	Dothan	✓	
01060-0000-14-2	1.4 GHz	Dothan		✓

3 Specifications

3.1 Functional Specifications

Processor: Intel® Celeron® M or Pentium® M

- ❑ Celeron® M: 64 kB L1 cache and 512 kB L2 cache, FSB 400 MHz
- ❑ Pentium® M: 64 kB L1 cache and 2.0 MB L2 cache, FSB 533 MHz

Chipset: Intel® 855GM or 852GME (GMCH)

- ❑ 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 32 MB video RAM (UMA)

Chipset: Intel® 82801DB (ICH4)

- ❑ External PCI bus with 32 bit / 33 MHz operation (PCI V2.2 compliant)
- ❑ One parallel ATA PCI IDE controller
- ❑ Six USB channels (UHCI/EHCI), only two channels available
- ❑ One LAN controller with LAN connect interface (LCI)

Onchip Video Graphics Array (VGA)

- ❑ CRT monitor interface (resolution: up to 1920x1440 pixel)
- ❑ LVDS flatpanel interface supports dual clock with 18/24 bit color depth (resolution: max. 1600x1200 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 (UHCI) and USB2.0 (EHCI)

Onchip LAN Controller (Ethernet)

- ❑ Full duplex operation at 10/100 Mbps, fully compliant with IEEE 802.3 and IEEE 802.3u
- ❑ Using Intel® 82562EZ as compliant physical layer interface

Super-I/O (LPC): Winbond W83627HF

- ❑ Two serial ports (RS-232 compatible)
- ❑ One parallel port configurable as enhanced parallel port (EPP) and extended capabilities port (ECP) with bidirectional capability
- ❑ PS/2 keyboard and mouse controller
- ❑ Watchdog timer
- ❑ Hardware monitor to control temperature and voltages

External ISA bus (PCI): ITE IT8888F

- ❑ One PC/104 bus connector, 8/16 bit I/O and memory access
- ❑ All ISA interrupts and DMA signals available

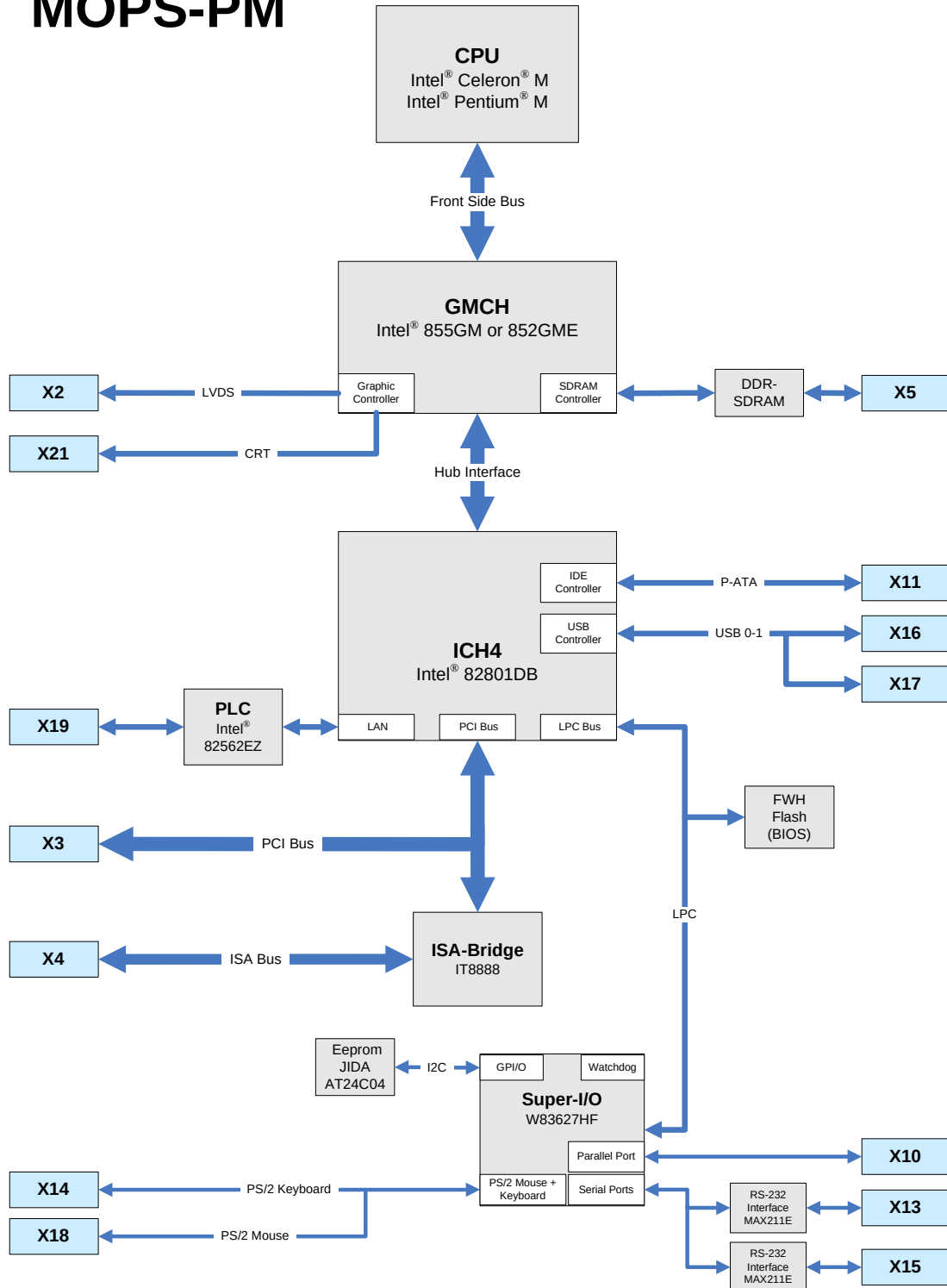
External PCI bus

- ❑ One PCI-104 bus connector, only +3.3V signal output level, +5V tolerant

BIOS: Phoenix, 1024 kb Flash BIOS**Real-Time Clock (RTC) with CMOS RAM**

3.2 Block Diagram

MOPS-PM



3.3 Mechanical Specifications

Dimensions

- 96 x 90 mm (3.77" x 3.55")
- Height on top approx. 11.7 mm
- Height on bottom approx. 10.7 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).

Celeron® M 600 MHz				Celeron® M 1.0 GHz				Pentium® M 1.4 GHz			
Full Load		Soft Off S5		Full Load		Soft Off S5		Full Load		Soft Off S5	
[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]
2.00	10.00	tbd	tbd	2.20	11.00	tbd	tbd	2.80	14.00	tbd	tbd

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 3D 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).

Celeron® M 600 MHz					
Full Load		Idle		Standby S3	
[A]	[W]	[A]	[W]	[A]	[W]
tbd	tbd	tbd	tbd	tbd	tbd

Celeron® M 1.0 GHz					
Full Load		Idle		Standby S3	
[A]	[W]	[A]	[W]	[A]	[W]
tbd	tbd	tbd	tbd	tbd	tbd

Pentium® M 1.4 GHz					
Full Load		Idle		Standby S3	
[A]	[W]	[A]	[W]	[A]	[W]
tbd	tbd	tbd	tbd	tbd	tbd

3.5 External Real-Time Clock Battery

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

English:

CAUTION ! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Deutsch:

VORSICHT ! 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.

French:

ATTENTION ! 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.

Danish:

ADVARSEL ! Lithiumbatteri – Eksplosionsfare ved fejlagtig Håndtering. Udskifting må kun ske med batteri af samme fabrikant og type. Lever det brugte batteri tilbage til leverandøren.

Finnish:

VAROITUS ! Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Havita käytetty paristo valmistajan ohjeiden mukaisesti.

Spanish:

Precaución ! 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.

The battery of this product is not considered to be accessible by the end user. Therefore the safety instructions are only given in english, german, french, danish, finish and spanish language.

If the battery of this product however is accessible by the end user, it is in the responsibility of the customer to give the corresponding safety instructions in the required language(s).

3.6 Environmental Specifications

Temperature

Operating: (with appropriate airflow):

- Ambient temperature: 0 to +60°C ¹⁾
- Non-operating: -10 to +85°C

Note: 1) The maximum operating temperature is the maximum measurable temperature on any spot on a module's surface. You must maintain the temperature according to the above specification.

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.) 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 MOPS-PM is very easy. Take the following steps:

- ❶ Plug a suitable DDR-SDRAM memory module into the RAM socket.
- ❷ Plug the MOPS-PM to the PC/104 bus connector on the starter kit baseboard.
- ❸ Make all necessary connections from the MOPS-PM 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 F2 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 MOPS-PM 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 MOPS-PM. The Unified Memory Architecture (UMA) manages the sharing of system memory between graphic controller and processor. Therefore the full memory size is not available for software applications. Up to 32 MB of system memory are used as graphic memory.

Article number	CPU Frequency	Chipset	DDR200	DDR266	DDR333
01060-0000-06-3	600 MHz	852GME	✓	✓	
01060-0000-10-2	1.0 GHz	855GM	✓	✓	✓
01060-0000-14-2	1.4 GHz	855GM	✓	✓	✓

Note: Thicker memory modules can't be mountet correctly because the WINBOND-IC is located under the memory modul. Memory chips soldered onto the bottom side of the module may not be higher than 1.4mm.

6 ISA Bus Expansion

The design of the MOPS-PM 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 MOPS-PM 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 X4A connector. The PC/104 AT bus is available through the X4B 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 MOPS-PM. PC/104 adapters can support the socket connector version on their topside and allow additional stacking of adapters.

Whenever possible use the MOPS-PM 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 X3.

If you intend to use +3.3V powered PCI-104 adapter cards (must be +5V tolerant) the +3.3V has to be supplied separately because it is not generated onboard of the MOPS-PM. $V_{I/O}$ is fixed to +5V.

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.

Attention: *Four slots are available via the connector X3 (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 or dual clock, color depths of 18/24 bit and resolutions up to 1920x1440 for CRT and UXGA (1600x1200) for LCD.

8.1 CRT Connector

The CRT monitor interface is available through the X21 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).

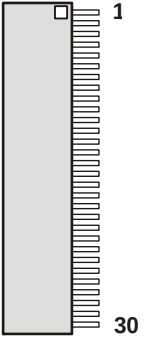
Header	Pin	Signal Name	Function	DSUB15
	1	RED	Red video signal	1
	2	GRN	Green video signal	2
	3	BLU	Blue video signal	3
	4	GND	Ground	5 - 8
	5	VSNC	Vertical sync	14
	6	HSNC	Horizontal sync	13

8.2 Flat Panel Connector

The LVDS interface for the flat panel is available through the X2 connector (30 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. The MOPS-PM 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 MOPS-PM and the +3.3V logic voltage of low-voltage panels share the same voltage regulator.

8.2.1 Connector

Header	Pin	Signal Name	Function
	1	FTX0-	First channel data output 0 (negative)
	2	FTX0+	First channel data output 0 (positive)
	3	FTX1-	First channel data output 1 (negative)
	4	FTX1+	First channel data output 1 (positive)
	5	FTX2-	First channel data output 2 (negative)
	6	FTX2+	First channel data output 2 (positive)
	7	GND	Ground
	8	FTXC-	First channel clock output (negative)
	9	FTXC+	First channel clock output (positive)
	10	FTX3-	First channel data output 3 (negative)
	11	FTX3+	First channel data output 3 (positive)
	12	STX0-	Second channel data output 0 (negative)
	13	STX0+	Second channel data output 0 (positive)
	14	GND	Ground
	15	STX1-	Second channel data output 1 (negative)
	16	STX1+	Second channel data output 1 (positive)
	17	GND	Ground
	18	STX2-	Second channel data output 2 (negative)
	19	STX2+	Second channel data output 2 (positive)
	20	STXC-	Second channel clock output (negative)
	21	STXC+	Second channel clock output (positive)
	22	STX3-	Second channel data output 3 (negative)
	23	STX3+	Second channel data output 3 (positive)
	24	GND	Ground
	25	SDA	I2C data line
	26	DATAENA	Data enable output
	27	SCL	I2C clock line
	28 - 30	VCC ¹⁾	Power +3.3V or +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.

8.3 Connecting a Flat Panel

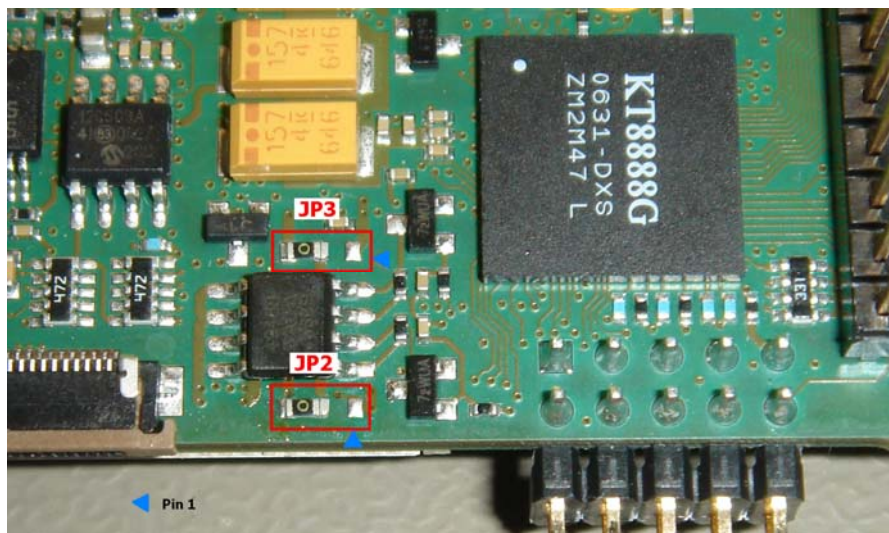
To determine whether your flat panel is supported check the KONTRON website for panel lists. We regularly update the list of panels that have been tested with the MOPS-PM.

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

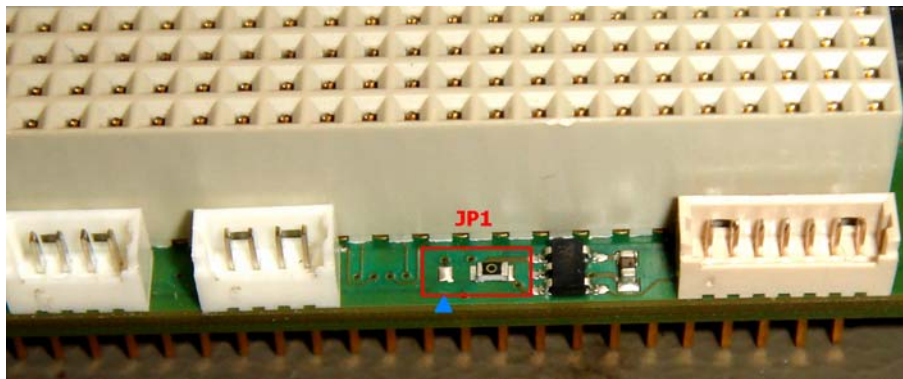
- ❶ Check whether you have the correct adapter and/or cable for the panel you plan to use. Inspect the cable for damages. Disconnect the power from your system.
- ❷ Check jumper JP2 for correct panel voltage (**Pos. 1-2 = 5V 2-3 = 3.3V**).
- ❸ Check jumper JP3 for correct backlight voltage (**Pos. 1-2 = 5V 2-3 = 12V**).
- ❹ Check jumper JP1 for correct backlight on/off polarity (**Pos. 1-2 = Low 2-3 = High**)
- ❺ Connect the cable to the flat panel connector X2 on the MOPS-PM and connect the other end to your display.
- ❻ Connect the backlight converter.
- ❼ Supply power to your system.
- ❽ If no image appears on your display connect a CRT monitor to the CRT connector.
- ❾ If you still do not see improvement consider contacting the dealer for technical support.

8.4 Flat Panel Jumper

Jumper JP2 and JP3 (bottom side):



Jumper JP1 (top side):



8.5 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
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

8.6 Extended VESA Modes

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
111h	Graphic	640 x 480	64k
112h	Graphic	640 x 480	16M
114h	Graphic	800 x 600	64k
115h	Graphic	800 x 600	16M
117h	Graphic	1024 x 768	64k
118h	Graphic	1024 x 768	16M
11Ah	Graphic	1280 x 1024	64k
11Bh	Graphic	1280 x 1024	16M
13Ah	Graphic	1600 x 1200	256
14Bh	Graphic	1600 x 1200	64k
15Ah	Graphic	1600 x 1200	16M

8.7 Backlight Connector

Backlight is available through the X9 connector (7 pins). Backlight voltage and backlight on/off polarity are controlled through the jumper JP1 and JP3.

Header	Pin	Signal Name	Function
	1	N.C.	Not connected
	2	BKLTADJ	Brightness control (0V - 5V)
	3	GND	Ground
	4	VCC¹⁾	Power +5V or +12V
	5	VCC¹⁾	Power +5V or +12V
	6	GND	Ground
	7	BKLTON	Backlight on/off

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.

8.8 Limitations

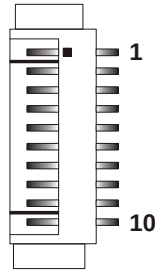
- ISA graphic cards are not supported
- When a PCI graphic card is used the chipset graphic controller must be disabled

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 X13 connector (10 pins) and **COMB** through the X15 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	/DCD	Data carrier detect	1
	2	/DSR	Data set ready	6
	3	RXD	Receive data	2
	4	/RTS	Request to send	7
	5	TXD	Transmit data	3
	6	/CTS	Clear to send	8
	7	/DTR	Data terminal ready	4
	8	/RI	Ring indicator	9
	9	GND	Ground	5
	10	VCC ¹⁾	Power +5V	---

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

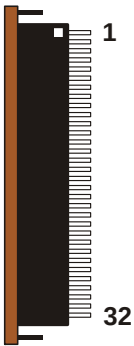
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

10 Parallel Port Interface

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

10.1 Connector

The parallel port is available through the X10 connector (32 pins). To have the signals available on a standard parallel interface connector DSUB25 an adapter cable is required which is offered by KONTRON (KAB-DSUB25-2, part number 61033).

Header	Pin	Signal Name	Function	DSUB25
	1	VCC ¹⁾	Power +5V	N.C.
	12	/AFD	Autofeed	14
	13	/STB	Strobe	1
	14	/ERR	Error	15
	15	D0	Data 0	2
	16	/INIT	Init	16
	18	D1	Data 1	3
	19	/SLIN	Select in	17
	20	D2	Data 2	4
	21	D3	Data 3	5
	23	D4	Data 4	6
	24	D5	Data 5	7
	25	D6	Data 6	8
	26	D7	Data 7	9
	28	/ACK	Acknowledge	10
	29	/BUSY	Busy	11
	30	PE	Paper out	12
	31	/SLCT	Select out	13
	2, 11	GND	Ground	18 - 25
	17, 22	GND	Ground	18 - 25
	27, 32	GND	Ground	18 - 25

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.

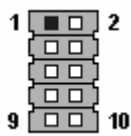
11 PS/2 Keyboard Interface

The keyboard and feature connector of the MOPS-PM offers four functions:

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

11.1 Connector

The keyboard and feature connector is available through connector X14 (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	SPKR	Speaker	
	2	GND	Ground	
	3	/RESIN	Reset input	
	4	/KBLOCK	Keyboard lock	
	5	KBDAT	Keyboard data	1
	6	KBCLK	Keyboard clock	5
	7	GND	Ground	3
	8	VCC ¹⁾	Power +5V	4
	9	BATT	Battery	
	10	PWRGD	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.

11.2 Signal Description

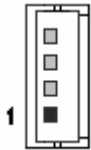
- When **POWERGD** goes high it starts the reset generator on the CPU module to pull the onboard reset line high after a valid reset period. You also can use this pin as a low active hardware reset for modules
- A battery (signal **BATT**) is not needed to hold CMOS setup data. Your configurations for 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 MOPS-PM supports a PS/2 mouse.

12.1 Connector

The PS/2 mouse interface is available on connector X18 (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	6 pin PS/2
	1	MSDAT	Mouse data	2
	2	VCC ¹⁾	Power +5V	4
	3	GND	Ground	3
	4	MSCLK	Mouse clock	6

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

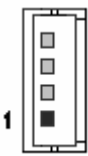
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

13 USB Interface

The USB interface comes with two USB ports which follow the UHCI/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 X16 and X17 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-1, part number 96054-0000-00-0).

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

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.

13.2 Limitations

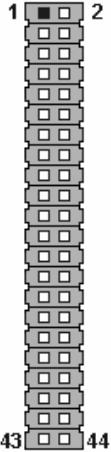
The power contacts for USB devices on pin 1 and pin 4 are protected. They are suitable to supply connected USB devices with a maximum of 500 mA power dissipation. Do not supply external USB devices with higher power dissipation through these pins.

14 EIDE Interface (P-ATA)

The MOPS-PM 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.

14.1 Connector

The EIDE interface is available through connector X11 (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	/RESET	Reset	2	GND	Ground
	3	D7	Data 7	4	D8	Data 8
	5	D6	Data 6	6	D9	Data 9
	7	D5	Data 5	8	D10	Data 10
	9	D4	Data 4	10	D11	Data 11
	11	D3	Data 3	12	D12	Data 12
	13	D2	Data 2	14	D13	Data 13
	15	D1	Data 1	16	D14	Data 14
	17	D0	Data 0	18	D15	Data 15
	19	GND	Ground	20	Key (N.C.)	Key pin
	21	DRQ	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	CSEL ²⁾	Cable select
	29	/DACK	DMA acknowledge	30	GND	Ground
	31	IRQ	Interrupt request	32	N.C.	Not connected
	33	SA1	Address 1	34	ATAD	UDMA detection
	35	SA0	Address 0	36	SA2	Address 2
	37	/CS1	Chip select 1	38	/CS3	Chip select 3
	39	N.C.	Not connected	40	GND	Ground
	41	VCC ¹⁾	Power +5V	42	VCC ¹⁾	Power +5V
	43	GND	Ground	44	N.C.	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.

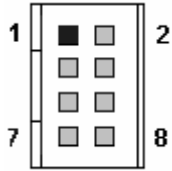
15 LAN Controller

The Ethernet interface of the MOPS-PM uses the ICH4 integrated 32-bit PCI LAN controller in combination with the Intel® 82562 platform LAN connect device. The LAN controller support 10/100 Base-T interfaces. The devices auto-negotiate the use of a 10 Mbit/sec. or 100 Mbit/sec. 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.

15.1 Connector

The LAN interface is available through the connector X19 (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	TXD+	10/100 transmit (positive)
	2	TXD-	10/100 transmit (negative)
	3	RXD+	10/100 receive (positive)
	4	GND	Ground (shield)
	5	GND	Ground (shield)
	6	RXD-	10/100 receive (negative)
	7	GND	Ground (shield)
	8	GND	Ground (shield)

16 Fan Interface

Some MOPS-PM can be equipped with a fan. If a fan has to be changed or added use this interface to connect a fan to cool off the CPU. The onboard system controller monitors the fan speed. The connector supports 5V fans only. A three pin fan includes a pulse output (sense) which allows the control of fan speed.

16.1 Connector

The fan interface is available through connector X20 (3 pins).

Header	Pin	Signal Name	Function
	1	Sense	Speed monitoring
	2	VCC ¹⁾	Power +5V
	3	GND	Ground

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

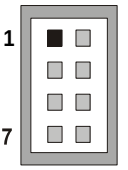
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

17 Power Supply

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

17.1 Connector

The power connector is available as X4C (8 pins).

Header	Pin	Signal Name	Function
	1	GND	Ground
	2	VCC ¹⁾	Power supply +5V
	3	BATT	Battery
	4	+12V ¹⁾	Power supply +12V
	5	N.C.	Not connected
	6	N.C.	Not connected
	7	GND	Ground
	8	VCC ¹⁾	Power supply +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.

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
VCC (+5V)	2	1A
+12V	1	1A

Note: The MOPS-PM 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 MOPS-PM 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.

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.*

18 Setup Guide

The PHOENIX 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 <PD0TR??> is especially helpful.

18.1 Start PHOENIX BIOS Setup Utility

To start the PHOENIX BIOS Setup utility press <F2> when the following string appears during boot-up.

Press <F2> to enter Setup

The main menu then appears.

The Setup screen is composed of several sections:

Setup Screen	Location	Function
Menu Bar	Top	Lists and selects all top level menus
Legend Bar	Bottom	Lists Setup navigation keys
Item Specific Help Window	Right	Help for selected item

Menu Bar

The menu bar at the top 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.

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

18.2 Info Menu

Feature	Option	Description
BIOS Version	N/A	Shows the actual BIOS version
BIOS Date	N/A	Shows the BIOS production date
Board Name	N/A	Shows the KONTRON specific board name
Board Class	N/A	Shows the KONTRON specific board class
Serial Number	N/A	Shows the KONTRON specific serial number
Manufacturing Date	N/A	Shows the KONTRON specific manufacturing date
Hardware Revision	N/A	Shows the KONTRON specific hardware revision
Boot Counter	N/A	Shows the actual boot counter
CPU Type	N/A	Shows the CPU type
CPU Speed	N/A	Shows the CPU speed
Microcode	N/A	Shows the Microcode version
System 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
Shadow RAM	N/A	Displays shadow part of BIOS components (including D-segment)

18.3 Main Menu

Feature	Option	Description
System Time	HH:MM:SS	Sets system time
System Date	MM/DD/YYYY	Sets system date
► Primary Master	Submenu	Displays result of IDE autotyping
► Primary Slave	Submenu	Displays result of IDE autotyping
SMART Device Monitoring	Disabled Enabled	Turns on <u>S</u> elf <u>M</u> onitoring <u>A</u> nalysis <u>R</u> eporting <u>T</u> echnology which monitors the condition of the hard drive
Hard Disk Pre-Delay	Disabled, 3 Sec., 6 Sec. 9 Sec., 12 Sec., 15 Sec. 21 Sec., 30 Sec.	Adds a delay before the first access of a IDE drive by the BIOS

18.3.1 Primary Master or Slave Submenu

Feature	Option	Description
Type	Auto, User ATAPI Removable, CD-ROM IDE Removable, Other ATAPI	Defines the IDE drive ATAPI Removable = read- and writeable media e.g. LS120 and USB-ZIP Other ATAPI = for ATAPI devices not supported by other HDD features
Cylinders	N/A	Number of cylinders CHS mode
Heads	N/A	Number of read/write heads CHS mode
Sectors	N/A	Number of sectors per track CHS mode
Maximum Capacity	N/A	Displays the calculated size CHS mode
Total Sectors	N/A	Number of total sectors LBA mode
Maximum Capacity	N/A	Displays the calculated size LBA mode
Multi-Sector Transfers	Disabled, 2 Sect., 4 Sect. 8 Sect., 16 Sectors	Any selection except Disabled determines the number of sectors transferred per block
LBA Mode Control	Disabled Enabled	Enabling LBA causes Logical Block Addressing to be used in place of CHS
32 Bit I/O	Disabled Enabled	Enables 32-bit communication between CPU and IDE controller
Transfer Mode	Standard, Fast PIO 1 Fast PIO 2, Fast PIO 3 Fast PIO 4, FPIO 3 / DMA 1 FPIO 4 / DMA 2	Selects the method for transferring the data between the hard disk and system memory
Ultra DMA Mode	Disabled, Mode 0, Mode 1 Mode 2, Mode 3 Mode 4, Mode 5	Selects the UDMA mode to move data to/from the drive. Autotype the drive to select the optimum transfer mode. This feature is autodetected
SMART Monitoring	N/A	Shows whether a disk supports SMART

18.4 Advanced Menu

Feature	Description
▸ Advanced Chipset Control	Opens advanced chipset control submenu
▸ PCI/PNP Configuration	Opens PCI/PNP config submenu
▸ Memory Cache	Opens cache control submenu
▸ I/O Device Configuration	Opens peripheral config submenu
▸ Keyboard Features	Opens keyboard features submenu
▸ Hardware Monitor	Shows hardware monitor current state
▸ Watchdog Settings	Opens watchdog config submenu
▸ Display Control	Opens display control submenu
▸ Miscellaneous	Opens submenu with miscellaneous options

18.4.1 Advanced Chipset Control Submenu

Feature	Option	Description
Enable Memory Gap	Disabled Extended	Allows enabling a 1 MB memory gap for add-on cards at 15 MB
Graphics Engine 1	Disabled Enabled	Enable or disable the integrated graphics device by setting the desired value
Graphics Engine 2	Disabled Enabled	Enable or disable the integrated graphics device by setting the desired value
Graphics Memory	UMA = 1MB, UMA = 8MB UMA = 16MB, UMA = 32MB	Select the amount of main memory that the integrated graphics device will use
Max. supported Memory Frequency	DDR200, DDR266 DDR333	Defines the maximum memory speed
Serial Interrupt Mode	Quiet Continuous	Defines the mode of the SERIRQ signal

18.4.2 PCI/PNP Configuration Submenu

Feature	Option	Description
PNP OS installed	No Yes	If your system has a PnP OS select Yes to let the OS configure PnP devices not required for booting
Reset Configuration Data	No Yes	Yes erases all config. data in ESCD, which stores the configuration settings for plug-in devices
Secured Setup Configuration	No Yes	Yes prevents a plug and play OS from changing the system settings
► PCI Device, Slot #x	Submenu	Opens submenu to configure slot x PCI device
PCI IRQ Line 1 PCI IRQ Line 2 PCI IRQ Line 3 PCI IRQ Line 4 Onboard LAN IRQ Line Onboard USB EHCI IRQ Line	Disabled Auto Select IRQ 3, 4, 5, 7, 9, 10 IRQ 11, 12, 14, 15	Select IRQs for external PCI interrupts A/B/C/D and the onboard LAN and USB 2.0 host controller. Select Auto to let the BIOS assign the IRQ
► PCI/PNP ISA UMB Region Exclusion	Submenu	Opens UMB Region Exclusion submenu
► PCI/PNP ISA IRQ Resource Exclusion	Submenu	Opens ISA IRQ Exclusion submenu
Default Primary Video Adapter	PCI AGP	In a system with an AGP and a PCI video adapter the user can select the adapter which will be initialized
Assign IRQ to SMB	Disabled Enabled	Determines whether the integrated SMBus host controller gets an IRQ assigned

18.4.2.1 PCI Device, Slot #x Submenu

Feature	Option	Description
Option ROM Scan	Enabled Disabled	Initialize the device expansion ROM
Enable Master	Disabled Enabled	Enables the device as a PCI bus master
Latency Timer	Default , 20h, 40h, 60h, 80h, A0h, C0h, E0h	Minimum guaranteed time slice allocated for bus master in units of PCI bus clocks. A high priority, high throughput device may benefit from a greater value

18.4.2.2 PCI/PNP ISA UMB Region Exclusion Submenu

Feature	Option	Description
CC00 - CFFF	Available Reserved	Reserves the specified block of upper memory for use by legacy ISA devices
D000 - D3FF	Available Reserved	See above
D400 - D7FF	Available Reserved	See above
D800 - DBFF	Available Reserved	See above
DC00 - DFFF	Available Reserved	See above

18.4.2.3 PCI/PNP ISA IRQ Resource Exclusion Submenu

Feature	Option	Description
IRQ 3, IRQ 4 IRQ 5, IRQ 7 IRQ 9, IRQ 10 IRQ 11, IRQ 12 IRQ 15	Available Reserved	Reserves the specified IRQ for use by legacy ISA devices. IRQ9 is used for SCI in ACPI mode. Do not use IRQ9 for legacy ISA devices when ACPI is enabled. IRQ15 is only visible when secondary IDE is disabled

18.4.3 Memory Cache Submenu

Feature	Option	Description
Memory Cache	Disabled Enabled	Enables or disables L2 cache
Cache System BIOS Area	Uncached Write Protect	Controls caching of System BIOS area
Cache Video BIOS Area	Uncached Write Protect	Controls caching of Video BIOS area
Cache Base 0-512k	Uncached Write Through Write Protect Write Back	Controls caching of 512 kB base memory
Cache Base 512k-640k	Uncached Write Through Write Protect Write Back	Controls caching of 512 kB to 640 kB base memory
Cache Extended Memory Area	Uncached Write Through Write Protect Write Back	Controls caching of system memory above 1 MB
Cache D000 - D3FF Cache D400 - D7FF Cache D800 - DBFF Cache DC00 - DFFF	Disabled Write Through Write Protect Write Back	Disabled: block is not cached Write Through: writes are cached and sent to main memory at once Write Protect: writes are ignored Write Back: writes are cached but not sent to main memory until necessary

18.4.4 I/O Device Configuration Submenu

Feature	Option	Description
Local Bus IDE Adapter	Disabled Primary Secondary Both	Enables onboard PCI IDE channels
► USB Options	Submenu	Opens the USB submenu
► LAN Options	Submenu	Opens the LAN submenu
► SIO Options	Submenu	Opens the Super-I/O submenu

18.4.4.1 USB Options Submenu

Feature	Option	Description
USB UHCI Host Controller 1	Disabled Enabled	Enable or disable the UHCI host controller for port 1
USB UHCI Host Controller 2	Disabled Enabled	Enable or disable the UHCI host controller for port 2
USB EHCI Host Controller	Disabled Enabled	Controls USB 2.0 (EHCI) functionality
Legacy USB Support	Enabled in POST Enabled Disabled	Enable support for USB keyboard and mice and boot from USB 1.1 mass storage devices
EHCI Legacy Support	Disabled Enabled	Enable USB 2.0 support for boot from USB 2.0 mass storage devices
EHCI Handoff Patch	Disabled Enabled	Operating systems before XP SP2 have problems gaining control over EHCI ports. In this case enable the patch

18.4.4.2 LAN Options Submenu

Feature	Option	Description
LAN MAC Address	N/A	Shows the LAN controller MAC address
Onboard LAN Controller	Enabled Disabled	Enables the chipset internal LAN controller
Onboard LAN PXE ROM	Disabled Enabled	Enables the PXE BIOS extension for the onboard LAN controller

18.4.4.3 SIO Options Submenu

Feature	Option	Description
Serial Port A, B	Disabled, Enabled, Auto	Enabled requires the end user to enter the base I/O address and the IRQ Auto makes the BIOS configure the port
Base I/O Address	3F8 (A), 2F8 (B) 3E8, 2E8	Selects the I/O base of the serial ports
Interrupt	IRQ3 (B), IRQ4 (A)	Selects the IRQ of the serial ports
Onboard LPT	Disabled, Enabled, Auto	See description of serial port A, B
Mode	Output only, Bi-directional EPP, ECP	Sets the mode of the parallel port
Base I/O Address	378 , 278, 3BC	Selects the I/O base of the parallel port
Interrupt	IRQ5, IRQ7	Selects the IRQ of the parallel port
DMA Channel	DMA1, DMA3	Selects the DMA channel of the parallel port

18.4.5 Keyboard Features Submenu

Feature	Option	Description
NumLock	Auto On Off	On or Off turns NumLock on or off at boot-up Auto turns NumLock on if it finds a numeric key pad
Key Click	Disabled Enabled	Turns audible key click on
Keyboard Auto-Repeat Rate	30/sec , 26.7/sec 21.8/sec, 18.5/sec 13.3/sec, 10/sec 6/sec, 2/sec	Sets the number of times to repeat a keystroke per second if you hold the key down
Keyboard Auto-Repeat Delay	$\frac{1}{4}$ sec, $\frac{1}{2}$ sec $\frac{3}{4}$ sec, 1 sec	Sets the delay time after the key is held down before it begins to repeat the keystroke
PS/2 Scanner Workaround	Disabled Enabled	Workaround for some PS/2 scanners that require to be enabled after a reset

18.4.6 Hardware Monitor Submenu

Feature	Option	Description
VCC 3.3V Voltage	N/A	3.3V power plane
5Vsb Voltage	N/A	5V standby voltage
CPU Core Voltage	N/A	CPU core voltage
Battery Voltage	N/A	Battery voltage
CPU Temperature	N/A	CPU temperature in °C and °F
CPU Fan Speed	N/A	CPU fan speed in rpm No Function will be displayed on boards with passive cooling
Edges per Fan Revolution	1, 2, ... 14, 15	Sets the proper correlation for fan speed

18.4.7 Watchdog Settings Submenu

Feature	Option	Description
Mode	Disabled RESET, NMI	Selects operation mode
Timeout	1s, 5s, 10s, 30s 1min, 5.5min 10.5min, 30.5min	Selects maximum trigger period
Delay	1s, 5s, 10s, 30s 1min, 5.5min 10.5min, 30.5min	Selects time until the watchdog counter starts the counting. Useful to handle longer boot times

18.4.8 Display Control Submenu

Feature	Option	Description
Display Mode	CRT only LFP only CRT+LFP	Selects display mode
JDA Revision	N/A	Displays the revision of the JILI Data Area image
Flat Panel Type	VGA 1x18 SVGA 1x18 XGA 1x18 XGA 1x24 SXGA 2x18 SXGA 2x24 UXGA 2x18 Enter PAID Enter FPID	Select Auto to let the BIOS automatically detect the panel type or use one of the predefined fixed panel types Choose Enter PAID or Enter FPID to manually set JILI3 ID values
PAID/FPID	0 - FFFF, default 0	Only visible if Enter PAID or Enter FPID are selected
Flat Panel Scaling	Centered Stretched	Selects scaling mode
Flat Panel Backlight	0 - 255, default 128	Only visible if the panel adapter is equipped with a MAX5362 DAC for backlight control

18.4.9 Miscellaneous Submenu

Feature	Option	Description
Summary Screen	Disabled Enabled	If enabled a summary screen is displayed just before booting the OS to let see the configuration
Quick Boot Mode	Disabled Enabled	Allows system to skip certain tests while booting. This decreases the time needed to boot the system
Extended Memory Testing	Just zero it None	Determines which type of tests will be performed on memory above 1 MB. The option Normal is not visible when QuickBoot is enabled
Dark Boot	Enabled Disabled	If enabled system comes up with a blank screen instead of the diagnostic screen during boot-up
Halt on Errors	No Yes	Determines if post errors cause the system to halt
PS/2 Mouse	Disabled Enabled Auto Detect	Selecting Disabled prevents any installed PS/2 mouse from functioning but frees up IRQ12. Selecting Auto Detect frees IRQ12 if no mouse is detected
Large Disk Access Mode	Other DOS	A large disk is one that has more than 1024 cylinders, more than 16 heads or more than 63 sectors
Spread Spectrum	Disabled Enabled	Controls the spread spectrum feature of the clock generator
CMOS Backup Type	No Backup Restore every Boot Restore if CMOS invalid	It allows the user to define how often the CMOS should be restored
Enable SMBIOS UUID	Enabled Disabled	Enables the <u>U</u> nique <u>U</u> niversal <u>I</u> Dentifier

18.5 Security Menu

Feature	Option	Description
Supervisor Password is	Clear Set	Displays whether password is set
User Password is	Clear Set	Displays whether password is set
Set Supervisor Password	Up to seven alphanumeric characters	Pressing <Enter> displays the dialog box for entering the supervisor password. In related systems this password gives full access to Setup
Set User Password	Up to seven alphanumeric characters	Pressing <Enter> displays the dialog box for entering the user password. In related systems this password gives restricted access to Setup
Fixed Disk Boot Sector	Normal Write Protect	Write protect the boot sector on the hard disk for virus protection. Requires a password for FORMAT or FDISK program
Virus Check Reminder	Disabled Daily Weekly Monthly	Displays a message during boot asking (Y/N) if you backed up the system or scanned for a virus. Message returns on each boot until you respond with Y Daily displays the message on the first boot of the day, Weekly on the first boot after sunday and Monthly on the first boot of the month
System Backup Reminder	Disabled Daily Weekly Monthly	See description of Virus Check Reminder
Password on Boot	Disabled Enabled	Enabled requires a password on boot. Requires prior setting of the supervisor password. If supervisor password is set and this option is disabled BIOS assumes user is booting
Password on Bootmenu	Disabled Enabled	Enabled requires a password on the bootmenu. Requires prior setting of the supervisor password

18.6 Power Menu

Feature	Option	Description
Enable ACPI	No Yes	Enables or disables the ACPI BIOS (Advanced Configuration and Power Interface)
► ACPI Control	Submenu	Opens the ACPI submenu
► Thermal Management	Submenu	Defines thermal management values
Power Savings	Disabled Customized Max. Power Savings Max. Performance	Maximum options select predefined values. Select Customized to make your own selections from the following fields. Disabled turns off all power management
Standby Timeout	Off, 1min, 2min 4min, 8min	Inactivity period required to put system in standby mode (partial power shutdown)
Auto Suspend Timeout	Off, 5min, 10min 15min, 20min 30min, 40min, 60min	Inactivity period required after standby to suspend mode (maximum power shutdown)
Hard Disk Timeout	Disabled, 10 sec – 15 min	Inactivity period of hard disk required before standby (motor off)
► Wake Up Events	Submenu	Defines wake up events
Resume on Modem Ring	Off On	Enabled wakes the system on incoming calls detected by modem (RI)
Resume on Time	Off On	Enabled wakes the system at a specific time
Resume Time	00:00:00	Specifies the time when the system is to wake

18.6.1 ACPI Control Submenu

Feature	Option	Description
APIC - IO APIC Mode	Disabled Enabled	This item is valid only for Windows XP. Also a fresh install of the OS must occur when APIC Mode is desired
Native IDE Support	Disabled Enabled	Enable native IDE support for WIN XP by setting this item. The NATA package will be created if this item is enabled
Deepest Sleep State for Standby	None S1	Defines ACPI sleep state

18.6.2 Thermal Management Submenu

Feature	Option	Description
Automatic Thermal Control Circuit	Disabled TM1 TM2	Enables the thermal control circuit (TCC) of the thermal monitor feature of the Pentium-M CPU TM1 = 50% duty cycle TM2 = Geyserville III Automatic TTC must be enabled to ensure that the processor operates within specification
Passive Cooling Trip Point	Disabled 40°C ... 100°C	Determines the temperature of the ACPI passive trip point - the point at which the OS will turn on/off CPU clock throttling
Passive TC1 Value	1 , 2, 3, ... 15, 16	Determines the TC1 (temperature coefficient 1) value for the ACPI passive cooling formula
Passive TC2 Value	1, 2, ... 5 , ... 15, 16	Determines the TC2 (temperature coefficient 2) value for the ACPI passive cooling formula
Passive TSP Value	2, 4, 6, 8, 10 , ... 30	Determines the TSP (sampling period) value for the ACPI passive cooling formula
Critical Trip Point	40°C ... 110°C	This value controls the temperature of the ACPI critical trip point - the point at which the OS will shut the system off
Active Trip Point	Disabled 40°C, ... 65°C , ... 100°C	Determines the temperature of the ACPI active trip point - the point at which the OS will turn on/off the CPU fan

18.6.3 Wake Up Events Submenu

Feature	Option	Description
Wake on PS/2 Mouse Activity	Disabled Enabled	Mouse generates a wake up event
Wake on PS/2 Keyboard Activity	Disabled Enabled	Keyboard generates a wake up event

18.7 Exit Menu

Feature	Option	Description
Exit Saving Changes	Yes No	Saves selections and exits Setup. The next time the system boots the BIOS configures the system according to the Setup selection stored in CMOS
Exit Discarding Changes	Yes No	Exits Setup without storing in CMOS any new selections you may have made. The selections previously in effect remain in effect
Load Setup Defaults	Yes No	Sets default values for all the Setup menus
Discard Changes	Yes No	If you change your mind about changes you have made and have not yet saved the values to CMOS you can restore the values you saved to CMOS
Save Changes	Yes No	Saves all the selection without exiting Setup. You can return to the other menus to review and change your selection

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	PCI IRQ	Yes	
6		Yes	Note (1)
7	Parallel Port (LPT1)	No	Note (1)
8	Real Time Clock (RTC)	No	
9	ACPI	Yes	Note (2)
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) / PCI	No	Dynamic (BIOS default), Note (3)

Note: 1) If the **Used for** device is disabled in the BIOS Setup the corresponding interrupt is free.
 2) Not available if ACPI is used.
 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	Parallel Port (LPT1)	Yes	Note (1)
2		Yes	
3	Parallel Port (LPT1)	Yes	Note (1)
4	Cascade	No	
5		Yes	
6		Yes	
7		Yes	

Note: 1) Possible setting for LPT1 if configured for ECP mode.

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 - CFFFFh	VGA BIOS / PXE ROM	No	
D0000h - DFFFFh		Yes	
E0000h - FFFFFh	System BIOS	No	

A.4 I/O Address Map

The I/O-port addresses of the MOPS-PM 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)
0274h - 0279h	PnP Configuration		
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
03F6h	IDE Controller (P-ATA)	No	Note (1)
03F8h - 03FFh	Serial Port 1	No	Note (1)
04D0h - 04D8h	PIC Extension	No	Chipset
0600h - 060Fh	System Resource	No	Chipset
0678h - 067Fh	LPT ECP Mode	Yes	Used if ECP enabled and address 278h
0778h - 077Fh	LPT ECP Mode	Yes	Used if ECP enabled and address 378h
0A78h - 0A7Fh	PnP Configuration	No	
0CF8h - 0CFFh	PCI Configuration	No	Chipset
1000h - 107Fh	Power Management	No	Chipset
1180h - 11BFh	Power Management	No	Chipset
1800h - 1807h	PCI VGA Controller	No	Chipset
1C00h - 1C1Fh	PCI USB Controller	No	Chipset, Note (1)
2000h - 201Fh	PCI USB Controller	No	Chipset, Note (1)
2400h - 240Fh	PCI IDE Controller	No	Chipset, Note (1)
2800h - 281Fh	PCI SMBus Controller	No	Chipset
3000h - 303Fh	PCI LAN Controller	No	Chipset, Note (1)

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

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
DDR SDRAM Controller	None	Chipset
Configuration Process Control	None	Chipset
VGA Graphics	INTA	Chipset
Graphics Controller	None	Chipset
PCI to PCI Bridge	None	Chipset
ISA Bridge	None	Chipset
IDE Controller	INTA	Chipset
USB 1.1 Controller 1	INTA	Chipset
USB 1.1 Controller 2	INTB	Chipset
USB 2.0 Controller	INTD	Chipset
SMBus Controller	INTB	Chipset
LAN Controller	INTA	Chipset
ISA Bridge	None	External IT8888F bridge (normally hidden)

A.6 System Management Bus (SMBus)

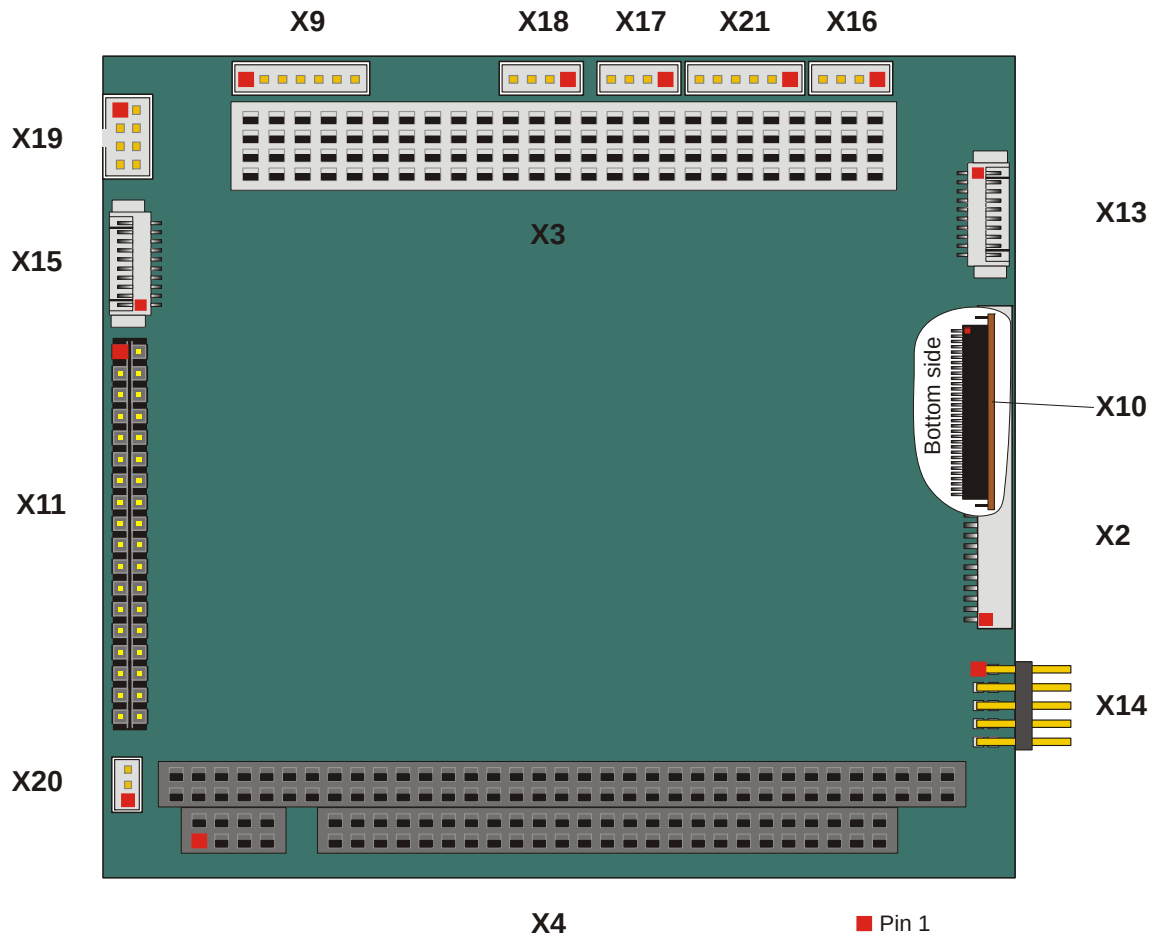
The MOPS-PM uses an onboard System Management Bus (SMBus). This bus is not available on a peripheral connector and therefore cannot be used for external SMBus devices.

SMBus Address	Device	Comment
10h / 11h	SMBus Host	Chipset
A0h / A1h	SPD EEPROM (DDR-SDRAM)	Part of the DDR RAM module

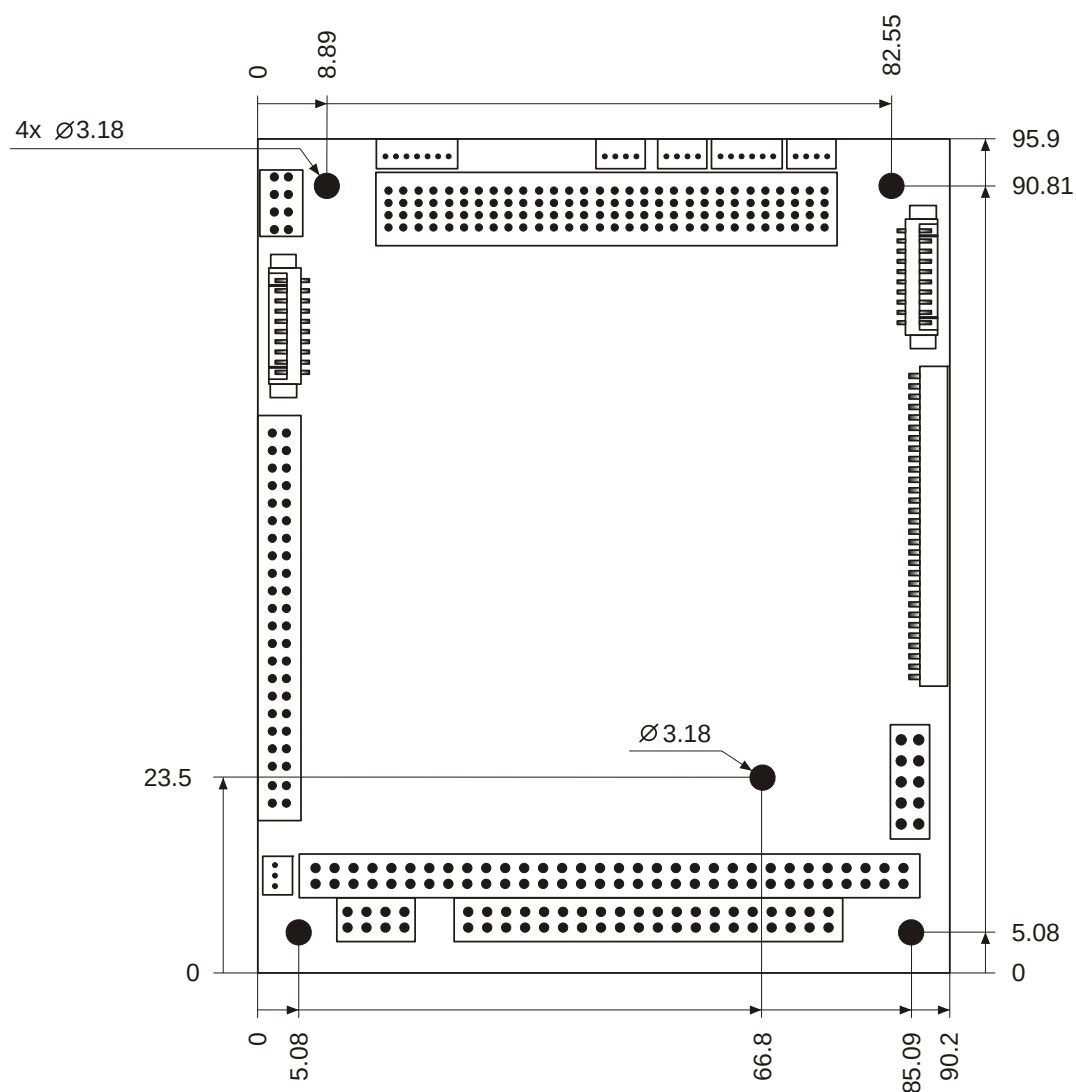
Warning: *There are more devices connected to the SMBus than listed in this table but access to these devices is not permitted. Don't access any other device addresses except those listed above.*

Appendix B: Connector Layout

B.1 Connector Locations

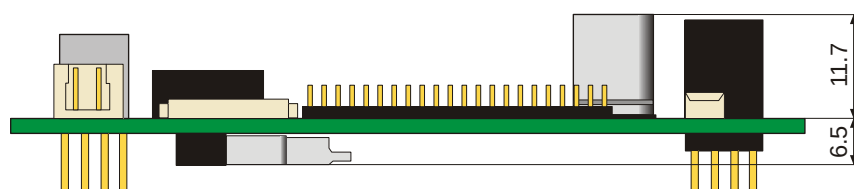


B.2 Mechanical Dimensions



Side view

Attention: The height of the components on the top and bottom side are violating the PC/104 specification.



(all dimensions in mm)

B.3 Mating Connectors

The table notes mating connectors.

Identifier	Mating Connector	Comment
X21	1.25 mm 6 pin (MOLEX 51021-0600 or comp.)	for DSUB15 adaptation (CRT)
X18	1.25 mm 4 pin (MOLEX 51021-0400 or comp.)	for PS/2 mouse
X13 X15	1.25 mm 10 pin (MOLEX 51021-1000 or comp.)	for DSUB9 adaption (COMA, COMB)
X14	2.54 mm 10 pin (AMP 1-215882-0 or comp.)	for keyboard/feature connector
X11	2 mm 44 pin (Berg 89361-144 or comp.)	for IDE connector
X16 X17	1.25 mm 4 pin (MOLEX 51021-0400 or comp.)	for USB connectors
X19	2 mm 8 pin (Berg 90311-008 or comp.)	for RJ45 adaption
X9	1.25 mm 7 pin (MOLEX 51021-0700 or comp.)	for backlight connector
X20	1.25 mm 3 pin (MOLEX 51021-0300 or comp.)	for fan adaptation

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 ²⁾	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	N.C.	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	N.C.	LA18	IRQ14
8	SD1	/OWS	LA17	/DACK0
9	SD0	+12V ²⁾	/MEMR	DRQ0
10	IOCHRDY	GND ¹⁾	/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 ²⁾
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	VCC5 ²⁾		
30	SA1	OSC		
31	SA0	GND		
32	GND	GND		

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

Pin	P-ATA X11	LPT X10	JILI30 X2
1	/RESET	VCC ²⁾	FTX0-
2	GND	GND	FTX0+
3	D7	N.C.	FTX1-
4	D8	N.C.	FTX1+
5	D6	N.C.	FTX2-
6	D9	N.C.	FTX2+
7	D5	N.C.	GND
8	D10	N.C.	FTXC-
9	D4	N.C.	FTXC+
10	D11	N.C.	FTX3-
11	D3	GND	FTX3+
12	D12	/AFD	STX0-
13	D2	/STB	STX0+
14	D13	/ERR	GND
15	D1	D0	STX1-
16	D14	/INIT	STX1+
17	D0	GND	GND
18	D15	D1	STX2-
19	GND	/SLIN	STX2+
20	KEY (N.C.)	D2	STXC-
21	DRQ	D3	STXC+
22	GND	GND	STX3-
23	/IOW	D4	STX3+
24	GND	D5	GND
25	/IOR	D6	SDA
26	GND	D7	DATAENA
27	IOCHRDY	GND	SCL
28	CSEL	/ACK	VCC ²⁾
29	/DACK	/BUSY	VCC ²⁾
30	GND	PE	VCC ²⁾
31	IRQ	/SLCT	
32	N.C.	GND	
33	SA1		
34	ATAD		
35	SA0		
36	SA2		
37	/CS1		
38	/CS3		
39	N.C.		
40	GND		
41	VCC ²⁾		
42	VCC ²⁾		
43	GND		
44	N.C.		

Pin	PS/2 Keyb. X14	PS/2 Mouse X18	Fan X20	COM A X13	COM B X15
1	SPKR	MSDAT	SENSE	/DCD	/DCD
2	GND	VCC ²⁾	VCC ²⁾	/DSR	/DSR
3	/RESIN	GND	GND	RXD	RXD
4	/KBLOCK	MSCLK		/RTS	/RTS
5	KBDAT			TXD	TXD
6	KBCLK			/CTS	/CTS
7	GND			/DTR	/DTR
8	VCC ²⁾			/RI	/RI
9	BATT			GND	GND
10	PWRGD			VCC ²⁾	VCC ²⁾

Pin	CRT X21	Backlight X9	LAN X19	USB A X16	USB B X17
1	RED	N.C.	TXD+	VCC ²⁾	VCC ²⁾
2	GRN	BKLTADJ	TXD-	USB-	USB-
3	BLU	GND	RXD+	USB+	USB+
4	GND	VCC ²⁾	GND	GND	GND
5	VSYNC	VCC ²⁾	GND		
6	HSYNC	GND	RXD-		
7		BKLTON	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.

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

Appendix D: Document Revision History

Revision	Date	Author	Changes
S0007-0	01/08/10	M. Hüttmann	Adapted to KONTRON Technology A/S guidelines
1.6	02/18/08	M. Hüttmann	Change serial port connector pinning, adds battery notifications
1.5	12/03/07	M. Hüttmann	Adds notes in chapter 'System Memory', 'Power Management' and 'Mechanical Specifications'
1.4	10/22/07	M. Hüttmann	Change part number of KAB-DSUB25-2
1.3	08/30/07	M. Hüttmann	Change panel jumper and backlight connector pinning
1.2	08/28/07	M. Hüttmann	Adds side view (Mechanical Dimensions Appendix C) and Power Management Hints
1.1	08/13/07	M. Hüttmann	Minor changes (e.g. I/O addresses, graphics hints, IDE limitations)
1.0	06/05/07	M. Hüttmann	First revision

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