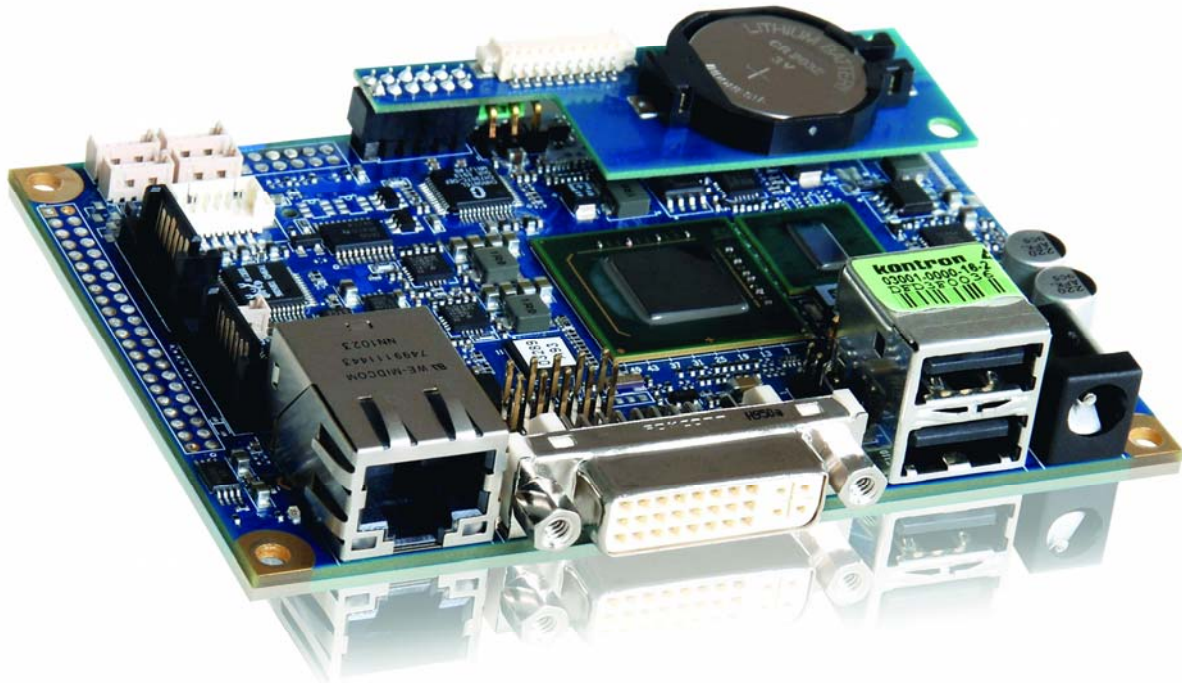


» Kontron User's Guide «



pITX-SP
KTD-S0002-I

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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](#) or use the special e-mail address sbc-support@kontron.com for a technical problem. 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 *p*ITX Embedded Line Family

Each *p*ITX is a member of the 2.5" SBC family of KONTRON Technology A/S based on the Pico-ITX™ specification from the Small Form Factor Special Interest Group (SFF-SIG).

*p*ITX embedded line modules are characterized by the same front-line pinouts and interfaces for reset logic and simple power supply, 2 x USB, Gigabit LAN, S-ATA, Audio, GPIOs, DVI and LVDS interface. These embedded line family features allow to use of the same chassis over the whole product line and maximize design reuse.

The *p*ITX embedded line modules allow the use of standard laptop memories.

These homogeneous features facilitate easy upgrades within the *p*ITX embedded line product family. Connection of LCD panels is simplified when using the onboard standard JILI30 interface.

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

2.2 *p*ITX-SP Overview

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

(Note: **03001-0000-11-0** and **03001-0000-16-1** only available on request)

Article Number	Variant	Clock	LVDS/JILI30	P-ATA	S-ATA	USB	SDIO	TPM
03001-0000-11-0	Plus	1.1 GHz	✓	✓	✓	✓	✓	✓
03001-0000-11-1	Basic	1.1 GHz		✓		✗ ¹⁾		
03001-0000-11-2	Standard	1.1 GHz	✓		✓	✓	✗ ²⁾	
03001-0000-16-0	Plus	1.6 GHz	✓	✓	✓	✓	✓	✓
03001-0000-16-1	Basic	1.6 GHz		✓		✗ ¹⁾		
03001-0000-16-2	Standard	1.6 GHz	✓		✓	✓	✗ ²⁾	

Note: 1) Only two USB ports available
2) Only one SDIO (microSD socket) port available

3 Specifications

3.1 Functional Specifications

Processor: Intel® ATOM™ Z510 (1.1 GHz) or Z530 (1.6 GHz)

- 24 kB data and 32 kB instruction L1 cache
- 256/512 kB L2 cache

Chipset: Intel® US15W (Poulsbo)

- 400/533 MHz Front Side Bus (FSB)
- One DDR2-400 / DDR2-533 unbuffered DDR-SDRAM (SODIMM form factor) up to 2 GB
- Integrated Intel® GMA500 graphic controller with dual independent display support
- One Parallel-ATA PCI IDE controller
- Eight USB channels (UHCI/EHCI) with one client interface (only six channels available)
- Two PCI Express® ports (x1 lanes)
- Integrated Intel® High Definition audio controller (HD audio)
- Three Secure Digital I/O / MultiMedia Card (SDIO/MMC) controller (only two controller available)

Onchip Video Graphics Array (VGA)

- Intel® Serial Digital Video Out (SDVO) with DVI monitor interface (max. 160 MHz pixel clock)
- Low Voltage Differential Signaling (LVDS) flatpanel interface supports single clock (max. 112 MHz) with 18/24 bit color depth
- Full hardware acceleration of following video decode standards: H.264, MPEG2, MPEG4, VC1 and WMV9

Onchip Parallel-ATA (P-ATA)

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

Onchip Universal Serial Bus (USB)

- Six ports are capable to handle USB 1.1 (UHCI) and USB 2.0 (EHCI)
- One port alternatively supports USB client functionality as a peripheral mass storage volume or RNDIS device

Onchip High Definition Audio

- ❑ Up to 24 bit sample resolution with 192 kHz sample rate
- ❑ Use the onboard HD audio codec ALC888 (Realtek)
- ❑ Supports LINE OUT, LINE IN, MICROPHONE IN and S/PDIF output

Onchip Secure Digital I/O / Multimedia Card (SDIO/MMC)

- ❑ Fully compliant with SDIO revision 1.1 and MMC revision 4.0
- ❑ Supports the SDHC feature from revision 2.0 (capacity > 2 GB)

Gigabit LAN (PCI Express®): Intel® 82574L

- ❑ Full duplex operation at 10/100/1000 Mbps
- ❑ Fully compliant with IEEE 802.3, IEEE 802.3u and IEEE 802.3ab

Serial-ATA (PCI Express®): JMicron JMB362

- ❑ The controller supports native and AHCI mode for up to two devices
- ❑ Complies with Serial-ATA specification rev. 1.0a (Serial-ATA II)

Trusted Platform Module (LPC): Infineon SLB9635TT

- ❑ Chipset LPC bus supports TPM 1.2 devices

Temperature Monitoring (SMBus™): Winbond W83L771W

- ❑ One onchip thermal sensor and one remote temperature sensor (CPU)

Digital I/O (CPLD)

- ❑ Eight bidirectional I/O lines, +3.3V signal level

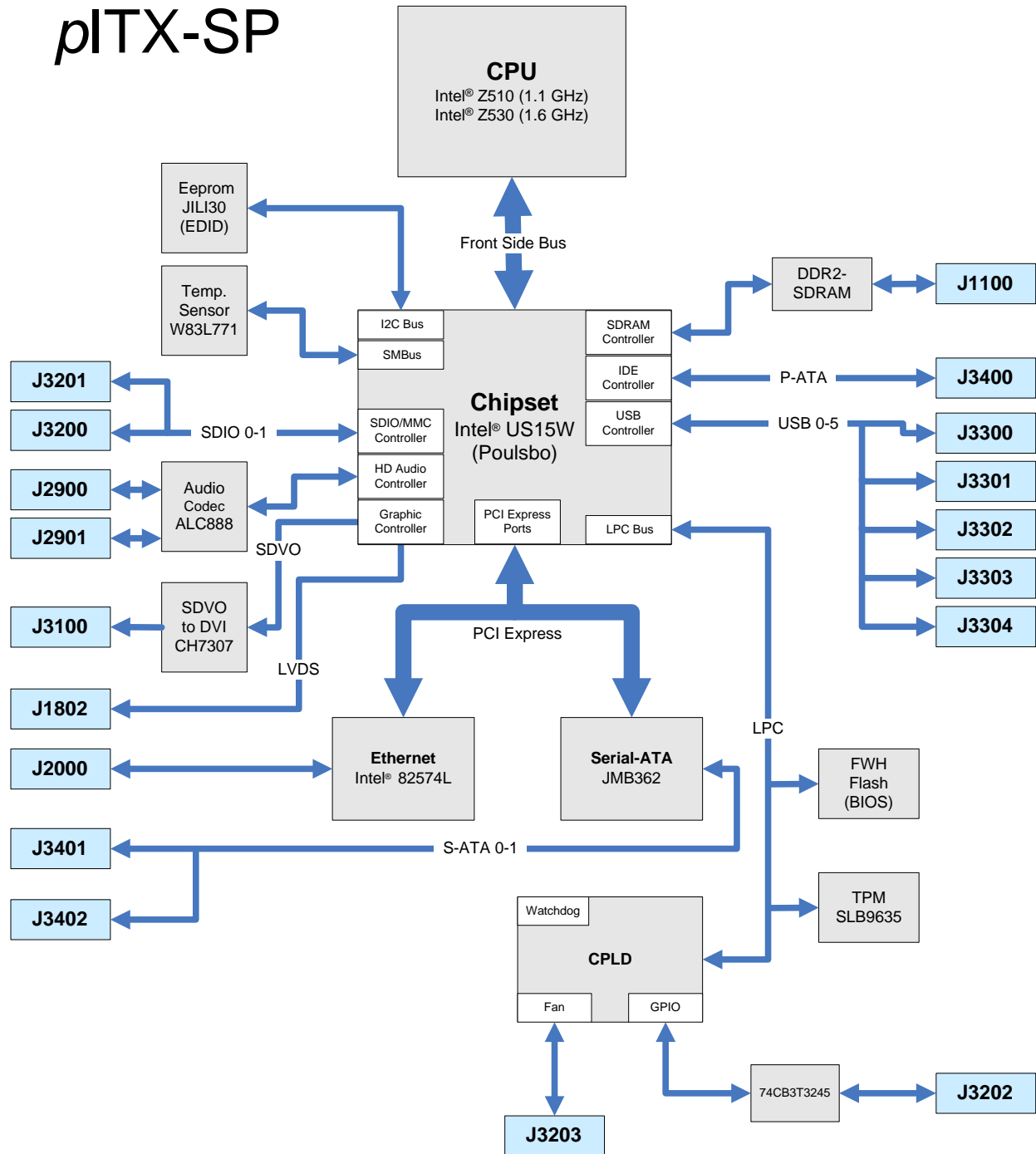
Watchdog Timer (CPLD)

- ❑ Seven discrete time-out values from 1 second to 10 minutes

BIOS: AMI®, 1 MB Flash BIOS

Real-Time Clock (RTC) with CMOS RAM and battery

3.2 Block Diagram



3.3 Mechanical Specifications

Dimensions

- Pico-ITX™ form factor 100 x 72 mm ±0.2 mm (complete with all connectors 104 x 78 mm)
- Height approx. 26 mm

3.4 Electrical Specifications

Supply Voltage

- +5V DC ±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 1 GB DDR2 SDRAM, DVI monitor, USB keyboard and CF-card or USB key (standard variant) as boot device (default BIOS settings).

- 🔌 CPU clock **1.1 GHz** (article number **03001-0000-11-1** and **03001-0000-11-2**)

Variant: Standard				Variant: Basic			
Full Load		Soft Off S5		Full Load		Soft Off S5	
[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]
tbd.	tbd.	tbd.	tbd.	1.10	5.50	0.08	0.40

- 🔌 CPU clock **1.6 GHz** (article number **03001-0000-16-0** and **03001-0000-16-2**)

Variant: Plus				Variant: Standard			
Full Load		Soft Off S5		Full Load		Soft Off S5	
[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]
1.70	8.50	0.08	0.40	1.50	7.50	0.08	0.40

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 1 GB DDR2 SDRAM, DVI monitor, USB keyboard & mouse and a CF-card or S-ATA harddisk (standard variant) as boot device (default BIOS settings).

Note: CPU clock 1.6 GHz with additional active cooler.

- ☛ CPU clock **1.1 GHz** (article number **03001-0000-11-1** and **03001-0000-11-2**)

Variant: Standard						Variant: Basic					
Full Load		Idle		Standby S3		Full Load		Idle		Standby S3	
[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]
tbd.	tbd.	tbd.	tbd.	tbd.	tbd.	1.50	7.50	0.90	4.50	0.08	0.40

- ☛ CPU clock **1.6 GHz** (article number **03001-0000-16-0** and **03001-0000-16-2**)

Variant: Plus						Variant: Standard					
Full Load		Idle		Standby S3		Full Load		Idle		Standby S3	
[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]	[A]	[W]
2.20	11.00	1.40	7.00	0.08	0.40	2.10	10.50	1.40	7.00	0.08	0.40

3.5 Real-Time Clock Battery

- Voltage range: +2.4V - +3.6V (typ. +3.0V)
- Maximum current: 5µA @ +3.0V

Lithium battery precautions

<p style="text-align: center;">CAUTION!</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;">VORSICHT!</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;">ATTENTION!</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;">PRECAUCION!</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;">ADVARSEL!</p> <p>Lithiumbatteri – Eksplosjonsfare ved feilagtig håndtering. Udsiftingning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.</p>	<p style="text-align: center;">ADVARSEL!</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;">WARNING!</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;">VAROITUS!</p> <p>Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laltevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.</p>

3.6 Environmental Specifications

Temperature

Operating (with original KONTRON heat-spreader plate and heat-sink):

- Ambient temperature: 0 to +60°C ¹⁾

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): 221379

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 *pITX-SP* is very easy. Take the following steps:

- ❶ Plug a suitable DDR2-SDRAM memory module into the RAM socket.
- ❷ Connect a DVI monitor to the DVI connector.
- ❸ Plug a keyboard and/or mouse to the USB connector(s).
- ❹ Plug a data cable to the harddisk interface. Attach the harddisk to the connector at the opposite end of the cable. If necessary connect the power supply to the harddisk's power connector.
- ❺ Make sure all your connections have been made correctly. Connect the power supply to the *pITX-SP* power supply connector.
- ❻ Turn on the board by shortening the power button pins on power front panel header (J1804) or use the autostart jumper (J1200).
- ❼ Enter the BIOS by pressing the Del key during boot-up. Make all changes in the BIOS Setup. See chapter **BIOS Setup** for further details.

5 System Memory

The pITX-SP uses only 200 pin Small Outline Dual Inline Memory Modules (SODIMMs). One socket is available for +1.8V unbuffered DDR2-400 / DDR2-533 SDRAM of up to 2 GB.

To reduce the design complexity and minimize power the chipset maintains a fixed relationship to the FSB (Front Side Bus) clock frequency. The relation is described in the following table:

Article Number	Variant	CPU Clock	FSB	Allowed Modul
03001-0000-11-0	Plus	1.1 GHz	400 MHz	DDR2-400
03001-0000-11-1	Basic	1.1 GHz	400 MHz	DDR2-400
03001-0000-11-2	Standard	1.1 GHz	400 MHz	DDR2-400
03001-0000-16-0	Plus	1.6 GHz	533 MHz	DDR2-533
03001-0000-16-1	Basic	1.6 GHz	533 MHz	DDR2-533
03001-0000-16-2	Standard	1.6 GHz	533 MHz	DDR2-533

Differing from this overview also DDR2-667 RAM modules can be used with all article numbers. RAM modules above DDR2-667 however shouldn't be used.

The total amount of memory available on the SDRAM module is used for main memory and graphic memory on the pITX-SP. Shared Memory Architecture (SMA) manages the sharing of the system memory between graphic controller and processor. Therefore the full memory size is not available for software applications.

When RAM modules with 16 chips are used special Bios settings might be required (example: SAMSUNG M470T2953EZ3-CE6). For additional information and support contacts see chapter [Technical Support](#).

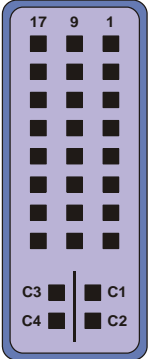
Attention: KONTRON Technology A/S can't guarantee the correct functionality of the pITX-SP when a DDR2-667 or a DDR2-533 (for article number 03001-0000-11-1/2) RAM module is used.

6 Graphics Interface

The graphics accelerator supports a SDVO interface combined with a SDVO/DVI converter up to 160 MHz and a variety of LCD panels with single clock, color depths of 18/24 bit and pixel clocks up to 112 MHz.

6.1 DVI-D Connector

The DVI interface is available through the standard 29 pin D style DVI connector J3100.

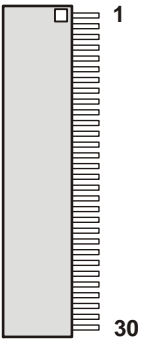
Header	Pin	Signal Name	Function
	1	TMDS2-	TMDS data 2 (negative)
	2	TMDS2+	TMDS data 2 (positive)
	3	GND	Ground
	4	N.C.	Not connected
	5	N.C.	Not connected
	6	DDC_CLK	DDC clock
	7	DDC_DATA	DDC data
	8	N.C.	Not connected
	9	TMDS1-	TMDS data 1 (negative)
	10	TMDS1+	TMDS data 1 (positive)
	11	GND	Ground
	12	N.C.	Not connected
	13	N.C.	Not connected
	14	VCC ¹⁾	Power +5V
	15	GND	Ground
	16	TMDS_HPD	Hot plug detect
	17	TMDS0-	TMDS data 0 (negative)
	18	TMDS0+	TMDS data 0 (positive)
	19	GND	Ground
	20	N.C.	Not connected
	21	N.C.	Not connected
	22	GND	Ground
	23	TMDS_CLK+	TMDS clock (positive)
	24	TMDS_CLK-	TMDS clock (negative)
	C1 - C4	N.C.	Not connected
	C5	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.

6.2 Flat Panel Connector (JILI30)

The LVDS interface for the flat panel is available through the J1802 connector (30 pins) on the bottom side of the board. This connector represents the JILI interface. 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 *Display Cable Guide* on the same product web site.

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	N.C.	Not connected
	13	N.C.	Not connected
	14	GND	Ground
	15	N.C.	Not connected
	16	N.C.	Not connected
	17	GND	Ground
	18	N.C.	Not connected
	19	N.C.	Not connected
	20	N.C.	Not connected
	21	N.C.	Not connected
	22	N.C.	Not connected
	23	N.C.	Not connected
	24	GND	Ground
	25	SDA	I2C data line
	26	DATAENA	Panel power output
	27	SCL	I2C clock line
	28 - 30	VCC¹⁾	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.

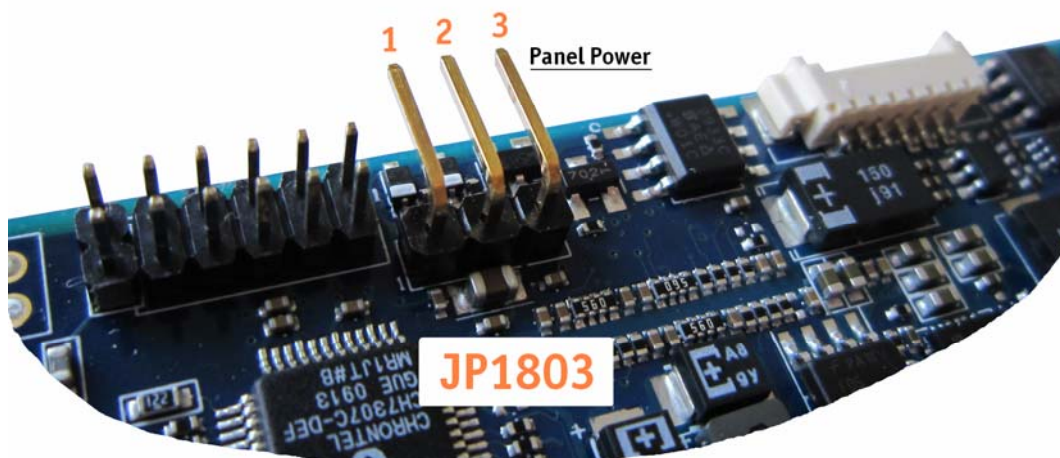
Warning: Check jumper J1803 (Panel Power) for correct settings for your panel – not doing so might cause permanent damage to your panel.

6.3 Connecting a Flat Panel

To determine whether your flat panel is supported check the [Display Cable Guide](#) on the KONTRON web site. If you use one of those adapters supplied by KONTRON configuration is easy:

- 1 Check whether you have the correct adapter and cable for the panel you plan to use. Inspect the cable for damages. Disconnect the power from your system.
- 2 Check jumper J1803 for correct panel voltage (**Pos. 1-2 = +3.3V 2-3 = +5V**).
- 3 Connect an external power supply for the correct backlight voltage.
- 4 Connect the cable to the flat panel connector J1802 on the pITX-SP and connect the other end to your display.
- 5 Connect a DVI monitor to the DVI-D connector. Hint: the default boot display setting in the BIOS Setup is DVI.
- 6 Supply power to your system. Enter the BIOS Setup and choose the option 'LCD Only' at menu 'Advanced/Display Configuration/Boot Display Device' and in addition set the desired display resolution at 'Flat Panel Type'.
- 7 If you still do not see improvement consider contacting the dealer for technical support.

6.4 Flat Panel Jumper



6.5 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 JILI30 interface not all of the video modes listed below may be available.

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

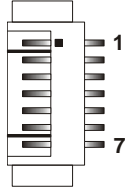
6.6 Extended VESA Modes

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
111h	Graphic	640 x 480	64k
112h	Graphic	640 x 480	16M (32 bit)
114h	Graphic	800 x 600	64k
115h	Graphic	800 x 600	16M (32 bit)
117h	Graphic	1024 x 768	64k
118h	Graphic	1024 x 768	16M (32 bit)
11Ah	Graphic	1280 x 1024	64k
11Bh	Graphic	1280 x 1024	16M (32 bit)
160h	Graphic	800 x 480	256
161h	Graphic	800 x 480	64k
162h	Graphic	800 x 480	16M (32 bit)
163h	Graphic	1280 x 800	256
164h	Graphic	1280 x 800	64k
165h	Graphic	1280 x 800	16M (32 bit)

6.7 Backlight Connector

Backlight is available through the J1801 connector (7 pins). An external voltage source must be used to supply the backlight with +5V or +12V.

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

6.8 Display Default Settings

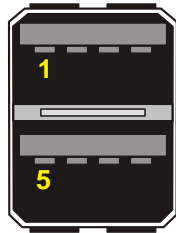
On the first boot-up a DVI monitor must be connected to the pITX-SP. The simultaneous mode is not supported by Intel®. During the boot process respectively DOS mode the VGA BIOS only allows a DVI monitor or a flat panel.

7 USB Interface

The USB interface comes with six 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. Two ports are available on a standard connector and more ports on four extension connectors.

7.1 Standard Connector

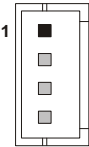
Two USB ports are available through the standard USB connector J3300 (8 pins).

Header	Pin	Signal Name	Function
	1	VCC ¹⁾	Power +5V
	2	USB0-	USB port 0 (negative)
	3	USB0+	USB port 0 (positive)
	4	GND	Ground
	5	VCC ¹⁾	Power +5V
	6	USB1-	USB port 1 (negative)
	7	USB1+	USB port 1 (positive)
	8	GND	Ground

7.2 Extension Connectors

The other USB ports are available through the extension connectors J3301 to J3304 (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)

Hint: USB Client functionality is available on connector J3303.

Header	Pin	Signal Name	Function
	1	GND	Ground
	2	USBn+	USB port n (positive)
	3	USBn-	USB port n (negative)
	4	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.

7.3 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 input current of 500mA. Do not supply external USB devices with higher power dissipation through these pins.

7.4 USB Client Interface

Following steps are necessary to prepare a connection:

- 1 Invoke the BIOS Setup and set *Advanced/Onboard Device Configuration/USB Configuration/USB Client Controller* to *Enabled*.
- 2 Use following cable wiring.

Pin pITX-SP (J3303)	Pin Host Computer	Comment
1	1	GND
3	2	USB-
2	3	USB+
4	---	Don't connect these pin

- 3 Use *USB_Client.zip*, start *Setup.exe* from the directory *XPPro* and install the client software on the pITX-SP. For more information see the including documentation *USBC_ReleaseNotes.pdf*.
- 4 Use *USB_Client.zip*, start *Setup.exe* from the directory *XPPro/hostwizard* and install the host software on the host computer.
- 5 The only operating mode which is approved by KONTRON is RNDIS-only mode.

8 Parallel-ATA Interface (P-ATA)

The *pITX-SP* features one Parallel-ATA interface (up to UDMA5 mode) that can drive two harddisks. 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.

8.1 Connector

The P-ATA interface is available through connector J3400 (44 pins). This interface is designed in 2 mm grid for optimal connectivity to a 2.5" harddisk.

You can use two cables to directly connect a harddisk 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	ACT	Drive activity	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 P-ATA devices.

8.2 CF Card Application Note

A relatively compact system can be build up using a CF card. KONTRON offers a fitting adapter with DMA support. CF cards 600x theoretically reach transfer rates up to 90 MB/sec.



KONTRON CF card adapter (CF-CARD-adapt-MOPS, part number 40404)



The following table gives an overview about some common CF cards.

Reference board: **03001-0000-16-0** (1.6 GHz, Plus variant)
 Operating system: Windows® XP SP3
 Test programs: HDTune Vers. 2.55 or HDTach Vers. 3.0.4.0

For comparison in advance some values for other harddisk types respectively interfaces.

Manufacturer / Type	Interface	Speed (Average)
Western Digital WD10EADS 1 TB	S-ATA	70 MB/s
Seagate ST300003U2 160 GB	USB 2.0	26 MB/s
Samsung SP0842N 80 GB	P-ATA (80 pin cable)	52 MB/s

CF card table:

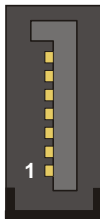
Manufacturer / Type	Speed (Average)
SANDISK Extreme IV 4 GB	25 MB/s
SANDISK Extreme Ducati 4 GB	30 MB/s
KINGSTON 266x 2 GB	24 MB/s
SONY 300x 2 GB	16 MB/s
LEXAR 300x 2 GB	24 MB/s
PRETEC 433x 8 GB	40 MB/s
PRETEC 667x 8 GB	39 MB/s

9 Serial-ATA Interface (S-ATA)

The *pITX-SP* has realized two S-ATA II ports. Serial-ATA connections boost the transfer rate theoretically up to 300 MB/sec. In addition it changes the parallel interface requiring 40 separate wires to a serial interface requiring only 6 wires.

9.1 Connector

The S-ATA interface is available through the standard L-type connectors J3401 and J3402 (7 pins).

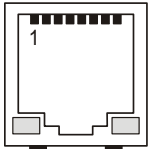
Header	Pin	Signal Name	Function
	1	GND	Ground
	2	TX+	Transmit (positive)
	3	TX-	Transmit (negative)
	4	GND	Ground
	5	RX-	Receive (negative)
	6	RX+	Receive (positive)
	7	GND	Ground

10 LAN Controller

The *pITX-SP* uses an Intel® 82574L Gigabit PCI Express® LAN controller. The controller support 10/100/1000 Base-T interfaces. The device auto-negotiates the use of a 10, 100 or 1000 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.

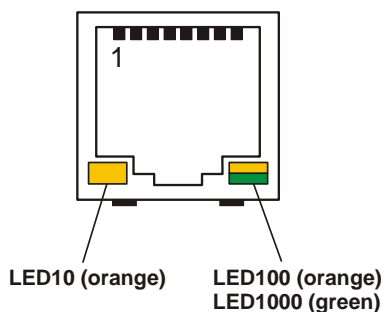
10.1 Connector

The LAN interface is available through the standard RJ45 connector J2000 (8 pins).

Header	Pin	Signal Name	Function
	1	TXD+ / BI_D1+	10/100 transmit / 1000 pair 1 (positive)
	2	TXD- / BI_D1-	10/100 transmit / 1000 pair 1 (negative)
	3	RXD+ / BI_D2+	10/100 receive / 1000 pair 2 (positive)
	4	BI_D3+	1000 pair 3 (positive)
	5	BI_D3-	1000 pair 3 (negative)
	6	RXD- / BI_D2-	10/100 receive / 1000 pair 2 (negative)
	7	BI_D4+	1000 pair 4 (positive)
	8	BI_D4-	1000 pair 4 (negative)

10.2 Connector LED Definition

The network transmission rate and activity are indicated by two LEDs. LED10 (10 Mbit; single color LED) and LED100/LED1000 (100 Mbit respectively 1 Gbit; two color LED).



11 Audio Interface

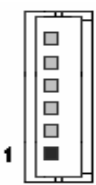
The chipset supports a HD audio codec with 24 bit resolution and 192 kHz sample rate. The interface includes LINE OUT, LINE IN, MICROPHONE IN and a digital S/PDIF output. The HD audio controller is a bus mastering PCI device which is physically connected to one or more codecs via the HD audio link. It contains one or more DMA engines. For signal levels see the High Definition audio specification (Intel®).

11.1 Hardware Features

Parameter	Values	Units
Output resolution (LINE OUT, S/PDIF)	16/20/24	bit
Output sample rate (LINE OUT, S/PDIF)	44.1/48/96/192	kHz
Output signal-to-noise ratio (LINE OUT)	97	dB
Output current (S/PDIF)	12 @ 75Ω	mA
Input resolution (LINE IN)	16/20	bit
Input sample rate (LINE IN)	44.1/48/96	kHz
Input signal-to-noise ratio (LINE IN)	90	dB

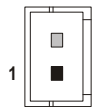
11.2 Analog Connector

The analog audio interface is available through the connector J2900 (6 pins). A prototype adapter cable (open ended) is deliverable from KONTRON (KAB-SOUND-CMP-2, part number 96063-0000-00-1).

Header	Pin	Signal Name	Function
	1	LINE_OUT_R	Line output right
	2	GND	Ground
	3	LINE_OUT_L	Line output left
	4	LINE_IN_R	Line input right
	5	MIC_IN	Microphone input
	6	LINE_IN_L	Line input left

11.3 Digital Connector (S/PDIF)

The digital audio output is available through the connector J2901 (2 pins).

Header	Pin	Signal Name	Function
	1	GND	Ground
	2	SPDIF_OUT	S/PDIF output

12 Secure Digital I/O and Multimedia Card

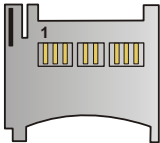
The SDIO/MMC interface comes with two controllers: one microSD card socket (only memory cards available) and one pin strip for using a standard SDIO connector (9 pins), miniSD Card connector (11 pins) or a second microSD Card connector (8 pins). Both controllers supports SDIO revision 1.1 and MMC revision 4.0. Exception: SD memory cards with a capacity greater than 2 GB can be used (feature from SDHC revision 2.0). The data bus width accounts one or four bits, the SDIO transfer rate can be up to 24 MHz and MMC rate up to 48 MHz.

The signal line /CD (Card Detect, active low) of connector J3201 must be connected. The signal line /WP (Write Protect, active low) is optional (default: write enabled). A BIOS Setup setting allows write protection of the microSD card socket (J3200).

Both controllers have some restrictions: they doesn't support zero block size transfers and the multiple transfer mode (DMA and PIO mode).

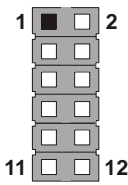
12.1 microSD Card Connector

The microSD card socket is named J3200 (8 pins).

Header	Pin	Signal Name	Function
	1	DAT2	Data bit 2
	2	CD / DAT3	Card detect / Data bit 3
	3	CMD	Command line
	4	VCC ¹⁾	Power +3.3V
	5	CLK	Clock
	6	GND	Ground
	7	DAT0	Data bit 0
	8	DAT1	Data bit 1

12.2 Pin Strip

The second port is available through the connector J3201 (12 pins).

Header	Pin	Signal Name	Function
	1	VCC ¹⁾	Power +3.3V
	2	N.C.	Not connected
	3	DAT0	Data bit 0
	4	N.C.	Not connected
	5	DAT1 / IRQ	Data bit 1 / Interrupt
	6	GND	Ground
	7	DAT2 / RW	Data bit 2 / Read wait
	8	/WP	Write protect (optional)
	9	CD / DAT3	Card detect / Data bit 3
	10	/CD	Card detect
	11	CMD	Command line
	12	CLK	Clock

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.

12.3 SD Card Application Note

The Windows[®] SD memory card driver does not define the SD memory card as a standard harddisk. This leads to approximate benchmark results. The size of the cards is shown with 8 MB and the information for cylinders, sectors and headers is not reported correctly.

The following table gives an overview about some common SD cards.

Reference board: **03001-0000-16-0** (1.6 GHz, Plus variant)
 Operating system: Windows[®] 7
 Test programs: HDTune Pro Vers. 4.01

For comparison in advance some values for other harddisk types respectively interfaces.

Manufacturer / Type	Interface	Speed (Average)
Western Digital WD10EADS 1 TB	S-ATA	70 MB/s
Seagate ST300003U2 160 GB	USB 2.0	26 MB/s
Samsung SP0842N 80 GB	P-ATA (80 pin cable)	52 MB/s

SD card table:

Manufacturer / Type	Type	Speed (Average)
KINGSTON Ultimate 120x 2 GB	SDIO	14.5 MB/s
SANDISK HC2 4 GB	microSD	14.0 MB/s
SANDISK Mobile Ultra HC4 8 GB	microSD	14.0 MB/s
TRANSCEND 2 GB	microSD	14.5 MB/s
TRANSCEND HC6 8 GB	microSD	12.5 MB/s

13 Digital I/O Interface

The *pITX-SP* features eight bidirectional I/O lines. All I/O lines are TTL tolerant. Inputs can be driven from either +3.3V or +5V devices. This feature allows a mixed +3.3V / +5V system environment.

13.1 Electrical Specifications

Digital Inputs

Parameter	Min.	Typ.	Max.	Units
Input LOW voltage			+0.8	V
Input HIGH voltage	+1.7		+5.5	V
Input rate (direct access)			100	kHz

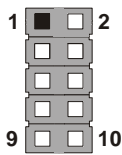
Digital Outputs

Parameter	Min.	Typ.	Max.	Units
Output LOW voltage			+0.45	V
Output HIGH voltage	+2.4		+3.3	V
Output LOW/HIGH current			16	mA
Switching rate (direct access)			100	kHz

13.2 Connector

The digital I/O interface is available through the connector J3202 (10 pins).

Hint: the bidirectional I/Os are not available before hardware revision 4.00 (PCB revision).

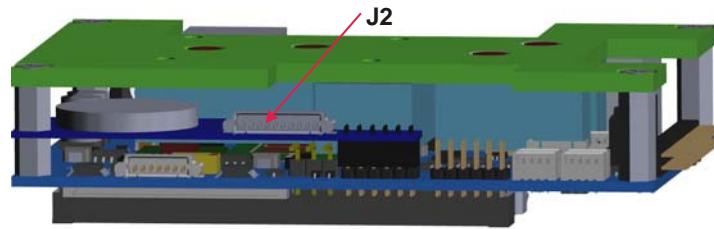
Header	Pin	Signal Name	Function
	1	VCC ¹⁾	Power +3.3V
	2	GPI04	Bidirectional I/O 4
	3	GPI00	Bidirectional I/O 0
	4	GPI05	Bidirectional I/O 5
	5	GPI01	Bidirectional I/O 1
	6	GPI06	Bidirectional I/O 6
	7	GPI02	Bidirectional I/O 2
	8	GPI07	Bidirectional I/O 7
	9	GPI03	Bidirectional I/O 3
	10	GND	Ground

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.

13.3 Connector Redirection

When the board is shipped the digital I/O pins are routed to a 10 pin Molex connector on the RTC battery module.



The digital I/O interface is available through the Molex connector J2 (10 pins).

Header	Pin	Signal Name	Function
	1	VCC ¹⁾	Power +3.3V
	2	GPI04	Bidirectional I/O 4
	3	GPI00	Bidirectional I/O 0
	4	GPI05	Bidirectional I/O 5
	5	GPI01	Bidirectional I/O 1
	6	GPI06	Bidirectional I/O 6
	7	GPI02	Bidirectional I/O 2
	8	GPI07	Bidirectional I/O 7
	9	GPI03	Bidirectional I/O 3
	10	GND	Ground

13.4 Special I/O Modes

The special I/O modes are not available before hardware revision 4.00 (PCB revision).

13.4.1 IRQ Mode

All eight I/O lines can be configured to trigger an interrupt on the falling edge of the signal. However for the interrupt handling only IRQ7 is available even when more lines are used. This allocation cannot be modified. If more IRQs should be used the identification of the source must be done by sampling the input pins.

Attention: Set the entry *Advanced/Onboard DeviceConfiguration/Chipset Configuration/Serial IRQ Mode* to *Continuous*.

13.4.2 Tri-State Mode


In tri-state mode the pins are automatically configured as output pins. In contrast to a standard output pin the tri-state pin can also be used as an input pin (i.e. acknowledge from I2C-Bus).

14 Power Supply

The pITX-SP SBC has a power input voltage range from +4.75 to +5.25V DC. All other voltages are generated onboard (e.g. +3.3V system and +1.8V memory voltage).

14.1 Connector

The power supply is injected through the connector J2300 (3 pins, DC power jacket 2.1mm).

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

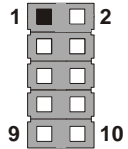
Note: 1) To protect the external power lines of peripheral devices make sure that

- 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.

Warning: Don't overload the onboard system voltage +3.3V (microSD card socket, SDIO pin strip and Digital I/O connector). The maximum current shouldn't exceed 250mA.

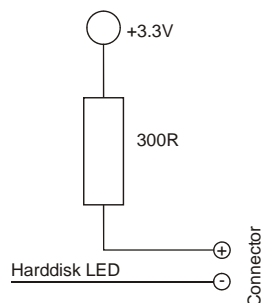
14.2 Power Front Panel Header

The power button and other power signals are available through the pin strip J1804 (10 pins). The harddisk LED implies P-ATA and S-ATA.

Header	Pin	Signal Name	Function
	1	RST_BTN+	Reset button (positive)
	2	PWR_BTN+	Power button (positive)
	3	RST_BTN-	Reset button (negative)
	4	PWR_BTN-	Power button (negative)
	5	HDD_LED-	Harddisk LED (negative)
	6	RSVD	Reserved
	7	HDD_LED+	Harddisk LED (positive)
	8	RSVD	Reserved
	9	RSVD	Reserved
	10	RSVD	Reserved

14.2.1 Harddisk LED

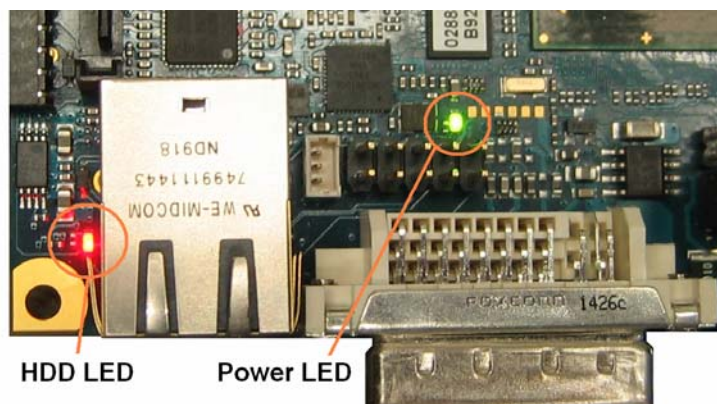
The following picture illustrates the onboard wiring.



14.3 Onboard Status LEDs


Two additional LEDs indicate the power and the harddisk status. The power LED can take the following states.

Power State	LED Display
S0	Continuous ON
S3	Blinking
S5	Continuous OFF



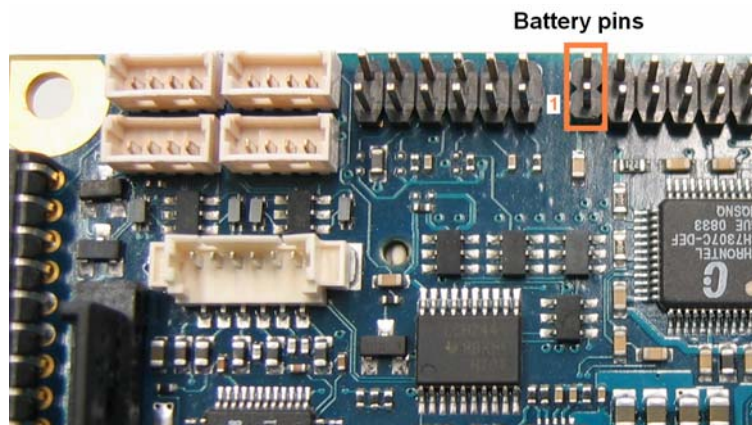
14.4 Battery Connector

The battery interface is available through the pin strip J1800 (2 pins).

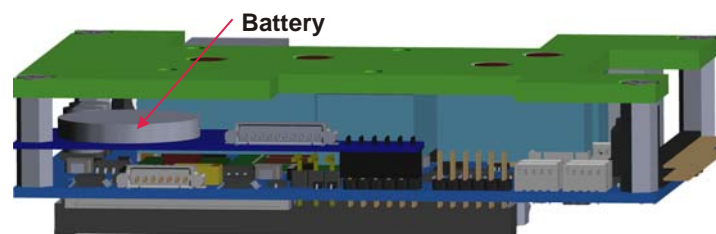
Header	Pin	Signal Name	Function
1  2	1	VBAT ¹⁾	Battery input voltage +3V
	2	GND	Ground

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.



When the board is shipped the RTC battery is mounted on the RTC battery module.



**If you remove the battery module
Kontron Technology A/S cannot
guarantee an error-free operation**

15 Crisis Management

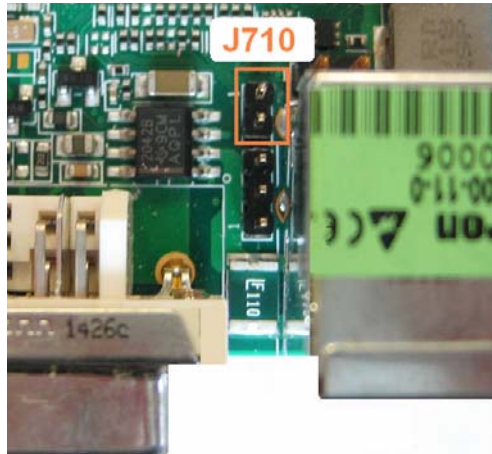
If the board is not booting up there are two options to fix this.

15.1 Wrong BIOS Settings

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

Take the following steps:

- ❶ Power down the system.
- ❷ Put a jumper on J710.
- ❸ Power up the board and enter the BIOS Setup.
- ❹ Remove the jumper on J710.
- ❺ Saving your settings with '*Save Changes and Exit*'. The board should be functional now.



15.2 Repair Failed BIOS Update

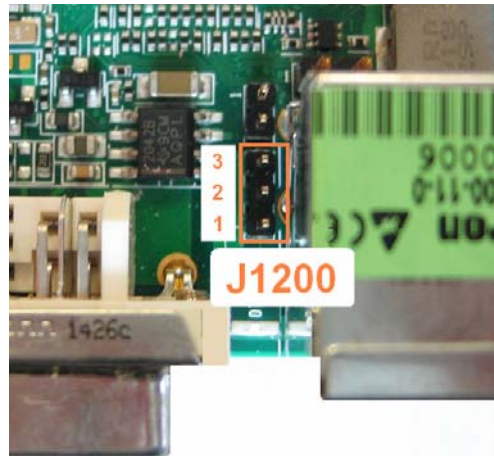
Take the following steps:

- ❶ Power down the system.
- ❷ Copy the BIOS named '**IPSP.ROM**' to a floppy disk or to a USB key formatted as super-floppy.
- ❸ Connect a USB floppy drive with the disk or the USB key.
- ❹ Power up the board and press the '**CTRL**' + '**HOME**' keys on the USB keyboard.
- ❺ The BIOS bootblock starts the recovery process and loads the new BIOS.
- ❻ During the flash programming the power LED is blinking (whatever happens do not power down the board). If you don't see the power LED wait approximately two minutes.
- ❼ After the programming the BIOS performs a reset.

16 Autostart Function

When the *pITX-SP* should start directly when the power is applied (without a power button signal) the autostart jumper J1200 must be set.

- ⇒ Position **1 - 2**: autostart function enabled
- ⇒ Position **2 - 3**: park position for unused jumper



Attention: The autostart function requires hardware revision 3.00 (PCB revision) or greater.

17 Power and Thermal Management

17.1 Cooling Options

A heat-spreader plate is already mounted. External cooling must be provided to maintain the heat-spreader plate at proper operating temperatures. Under worst case conditions the cooling mechanism must maintain an ambient air temperature of 60°C or less.

The aluminum slugs and thermal pads on the underside of the heat-spreader plate implement thermal interfaces between the heat-spreader plate and the major heat generating components on the pITX-SP.

You can use many thermal management solutions with the heat-spreader plates including active and passive approaches. The optimum cooling solution varies - depending on the application and environmental conditions.

Attention: *After the heat-sink has been mounted it cannot be removed anymore because after the warming up of the board the thermal-foil between the both components will melt and bond the heat-sink to the heat-spreader plate.*

17.2 SpeedStep Technology

The Intel® Atom processor offers the Intel® Enhanced SpeedStep™ technology that automatically switches between maximum performance mode and battery optimized mode depending on the needs of the application being run. When powered by a battery or running in idle mode the processor drops to lower frequencies conserving battery life while maintaining a high level of performance. The previous frequency is set back automatically when the operating mode changes.

17.3 C-State Control

The Intel® chipset US15W (Poulsbo) has been implemented the control for dynamically starting and stopping system clocks and power. The states are passing through C0 (full on) to C4 one after another. The C-state ends when a break event occurs (e.g. an IRQ or SMI).

17.4 Throttling Mode

Throttling can minimize power consumption when the processor works in C-state C0 (full on). This mode enables software controlled STPCLK throttling - other C-states turn off this feature (each re-entry to C0 restores the previous state). Seven steps are available (12.5%, 25%, 37.5%, ..., 87.5%).

17.5 Hyper-Threading Technology

Intel® Hyper-Threading technology boosts system performance without higher clock rates or adding more processors which is also an optimization of the power consumption. Hyper-Threading works by duplicating instructions streams, called threads. This allows a CPU to pretend to be two logical processors on the operating system which must support this technology. Individually the logical processors can be halted or interrupted or can execute a thread independently of the other logical unit.

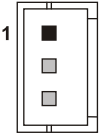
Important: *Hyper-Threading is only supported on the 1.6 GHz version (Article no.: 03001-0000-16-0 and 03001-0000-16-2)*

17.6 Fan Interface

If a fan is added use this interface to connect a fan to cool off the CPU. The connector only supports 5V fans. A three pin fan includes a pulse output (sense) which allows the control of fan speed.

17.6.1 Connector

The fan interface is available through connector J3203.

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.*

18 Setup Guide

The module is equipped with AMI® BIOS which is located in an onboard flash memory. You can update the BIOS using a flash utility.

18.1 Determining the BIOS Version

Whenever you contact technical support about BIOS issues providing a BIOS version <IPSPR??> is especially helpful. To determine the AMI® BIOS version press the DEL key on your keyboard during boot-up and looks at main menu (additional information are available with submenu [Board Information](#)):

```
Bios Information
BIOS Version : IPSPR??
Build Date   : ??/??/??
```

18.2 Start AMI® BIOS Setup Utility

To start the AMI® BIOS Setup utility press when the following string appears during boot-up.

Press to run 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	Right side bottom	Lists Setup navigation keys
Item Specific Help Window	Right side top	Help for selected item
Menu Window	Left center	Selection fields for current menu
General Help Window	Overlay (center)	Help for selected menu

Menu Bar

The menu bar at the top of the window lists different menus. Use the left/right arrow keys to make a selection.

Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The table below describes the legend keys and their alternates.

Key	Function
<F1> or <Alt-H>	General help window
<Esc>	Exit menu
← or → Arrow key	Select a menu
↑ or ↓ Arrow key	Select fields in current menu
<Home> or <End>	Move cursor to top or bottom of current window
<PgUp> or <PgDn>	Move cursor to next or previous page
<F9>	Load the default configuration values for this menu
<F10>	Save and exit
<Enter>	Execute command or select submenu
<Alt-R>	Refresh screen

Selecting an Item

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

Displaying Submenus

Use the ← or → key to move the cursor to the submenu you want. Then press <Enter>. A pointer (▶) marks all submenus.

Item Specific Help Window

The help window on the right side of each menu displays the help text for the selected item. It updates as you move the cursor to each field.

General Help Window

Pressing <F1> or <Alt-F1> on a menu brings up the general help window that describes the legend keys and their alternates. Press <Esc> to exit the general help window.

18.3 Menu Bar

Feature	Description
Main	Define time and date and show service information
Advanced	Configuration of all onboard devices (e.g. CPU, P-ATA, LAN, USB, Display)
PCIPnP	Define PCI/Legacy IRQs
Boot	Define the boot sequence and special boot settings
Security	Change, set or disable supervisor/user passwords
Exit	Exit Setup with/without saving or set default values

18.4 Main Menu

Feature	Option	Description
BIOS Version	N / A	Show the actual BIOS release
Build Date	N / A	Show the BIOS build date
▶ Board Information	Submenu	Show additional service information
Time	HH:MM:SS	Set the system time
Date	MM/DD/YYYY	Set the system date

18.4.1 Board Information Submenu

Feature	Option	Description
Board Name	N / A	Show the KONTRON specific board name
Board Class	N / A	Show the KONTRON specific board class
Serial Number	N / A	Show the KONTRON specific serial number
Manufacturing Date	N / A	Show the KONTRON specific manufacturing date
Hardware Version	N / A	Show the KONTRON specific hardware version
Boot Counter	N / A	Display the boot counter
Processor Name	N / A	Show the processor identifier
Processor Speed	N / A	Show the actual CPU boot speed
Chipset Revision	N / A	Show the chipset (US15W = Poulsbo) revision
Board/CPLD Revision	N / A	Show the KONTRON specific board and CPLD revision
System Memory Size	N / A	Display amount of conventional memory detected during boot-up

18.5 Advanced Menu

Feature	Option	Description
▶ CPU Configuration	Submenu	Configure special CPU features
▶ Onboard Device Configuration	Submenu	Configure most onboard devices (e.g. P-ATA, LAN, USB)
▶ Display Configuration	Submenu	Set the display features (including panel parameters)
▶ ACPI Configuration	Submenu	Set some ACPI defaults
▶ Miscellaneous	Submenu	Configure additional important settings

18.5.1 CPU Configuration Submenu

Feature	Option	Description
Processor Name	N / A	Show the processor identifier
Frequency	N / A	Show the actual CPU boot speed
FSB Speed	N / A	Show the speed of the Front Side Bus
Cache L1	N / A	Display the L1 cache size
Cache L2	N / A	Display the L1 cache size
CPU Performance	Low Middle High	Set the CPU ratio/speed
Execute-Disable Bit Capability	Disabled Enabled	This option can help to prevent certain classes of buffer overflow errors (AMD® NX-bit or Intel® XD-bit)
Hyper-Threading Technology	Disabled Enabled	Only visible on 1.6 GHz boards. Enable or disable the two logical processor mode
Intel(R) SpeedStep(tm)	Disabled Enabled	Let customize performance computing. The processor can drop to a lower frequency and voltage
Intel(R) C-STATE Technology	Disabled Enabled	Enable or disable power saving modes (a C-STATE is an idle state). C0 is the operational state, C1 to C4 represents the saving modes
Throttling (STPCLK)	Disabled 12.5%, 25.0% 37.5%, 50.0% 67.5%, 75.0% 87.5%	Enable the STPCLK throttling. This mode can minimize power consumption when the processor works in C-state C0 (full on)
Fast Gate A20	Disabled Enabled	Enable Gate A20 on port 92h otherwise no Gate A20 function is available

18.5.2 Onboard Device Configuration Submenu

Feature	Option	Description
▸ Chipset Configuration	Submenu	Set chipset options (e.g. audio)
▸ IDE Configuration	Submenu	Configure the IDE devices (P-ATA, S-ATA)
▸ SDIO Configuration	Submenu	Configure the SDIO ports
▸ LAN Configuration	Submenu	Configure the PCI Express® LAN controller
▸ USB Configuration	Submenu	Configure the USB support
▸ GPIO Configuration	Submenu	Configure the GPIO port

18.5.2.1 Chipset Configuration Submenu

Feature	Option	Description
Audio Controller	Disabled Enabled	Enable or disable the HD audio controller
Serial IRQ Mode	Continuous Quiet	Define the serial IRQ mode (Quiet = the chipset transfers only if an IRQ is triggered)
Linux Reboot Fix	Disabled Enabled	Fix the reboot issue on Linux operating systems. Might cause side effects

18.5.2.2 IDE Configuration Submenu

Feature	Option	Description
Serial-ATA Controller	Disabled Enabled	Enable or disable the S-ATA controller
Serial-ATA Type	Native IDE RAID/AHCI	Both modes needs the Option ROM
Serial-ATA Option ROM	Disabled Enabled	If disabled legacy operating systems not available (only Windows® and Linux working). Save boot time
Parallel-ATA Controller	Disabled Enabled	Enable or disable the P-ATA controller
Parallel-ATA BusMaster	Disabled Enabled	If enabled improves the performance of the IDE interface for some operating systems (e.g. DOS)
▸ Parallel-ATA Master	Submenu	Display the status of autodetection (Master drive)
▸ Parallel-ATA Slave	Submenu	Display the status of autodetection (Slave drive)
Hard Disk Write Protect	Disabled Enabled	Allows the write protection of harddisk devices. Only valid if the device is accessed through the BIOS
ATA(PI) Detect Time Out	0 Sec. ... 35 Sec.	Select the time out value for the detection of ATA(PI) devices
ATA(PI) 80Pin Cable Detection	Host&Device Host Device	Select the mechanism for detecting 80 pin cable

18.5.2.2.1 Parallel-ATA Master/Slave Submenu

Feature	Option	Description
Device	Not Detected Hard Disk ATAPI CDROM ARMD	Show the type of IDE drive ARMD = <u>A</u> TAPI <u>R</u> emovable <u>M</u> edia <u>D</u> evice
Vendor	N / A	Show the IDE drive manufacturer and drive name
Size	N / A	Display the calculated size of the drive
LBA Mode	Supported Not Supported	Show whether a disk uses LBA
Block Mode	N / A	Display the block size (in sectors) or 'Not Supported'
PIO Mode	Not Supported, 0, 1, 2, 3, 4	Display the highest supported PIO mode
Async DMA	Not Supported SingleWord DMA0 - 2 MultiWord DMA0 - 2	Display the highest supported Async DMA mode
Ultra DMA	Not Supported Ultra DMA0 - 6	Display the highest supported Ultra DMA mode
S.M.A.R.T.	Supported Not Supported	Show whether a disk uses S.M.A.R.T. (<u>S</u> elf <u>M</u> onitoring, <u>A</u> nalysis and <u>R</u> eporting <u>T</u> echnology)
Type	Not Installed, Auto CD/DVD, ARMD	Define the type of the IDE drive
LBA/Large Mode	Disabled Auto	LBA causes <u>L</u> ogical <u>B</u> lock <u>A</u> ddressing
Block (Multi-Sector Transfer)	Disabled, Auto	Block mode enables Multi-Sector transfer and increase the performance
PIO Mode	Auto 0, 1, 2, 3, 4	Define the PIO mode if DMA not possible. Auto selects the optimum transfer mode
DMA Mode	Auto , SWDMA0 - 2 MWDMA0 - 2, UDMA0 - 6	Define the Async or Ultra DMA mode. Auto selects the optimum transfer mode
S.M.A.R.T.	Auto Disabled Enabled	Show if the device is capable of using the error prediction tool
32Bit Data Transfer	Disabled Enabled	Enable 32 bit communication between CPU and IDE controller

18.5.2.3 SDIO Configuration Submenu

Feature	Option	Description
Module Version	N / A	Show SDIO module version
SDIO Devices Enabled	N / A	Show detected SDIO devices
SDIO Controller	Disabled Enabled	Enable or disable both SDIO controller
Data Access Mode	Auto DMA PIO	Auto selects the optimum access mode (sets PIO mode if DMA not possible)
microSD Write Protect	Disabled Enabled	If enabled the device in the microSD Card socket is write protected
► SDIO Mass Storage Device Configuration	Submenu	Display the status of SDIO mass storage devices

18.5.2.3.1 SDIO Mass Storage Device Configuration Submenu

Feature	Option	Description
Device	N / A	Show the device identifier
Emulation Type	Auto Floppy Forced FDD Hard Disk	Define the emulation type. Forced FDD can be used to force a HDD formatted drive to boot as FDD

18.5.2.4 LAN Configuration Submenu

Feature	Option	Description
MAC Address	N / A	Show the programmed MAC address
LAN Controller	Disabled Enabled	Enable or disable the onboard PCIe LAN controller
PXE LAN Boot	Disabled Enabled	Enable or disable the option ROM to allow LAN boot functionality

18.5.2.5 USB Configuration Submenu

Feature	Option	Description
Module Version	N / A	Show USB module version
USB Devices Enabled	N / A	Show detected USB devices
USB 1.1 Controller	Disabled 2 Ports 4 Ports 6 Ports	Enable or disable the USB 1.1 controllers (UHCI)
USB 2.0 Controller	Disabled 2 Ports 4 Ports 6 Ports	Enable or disable the USB 2.0 controllers (EHCI)
USB Client Controller	Disabled Enabled	Enable or disable the USB client controller
USB 2.0 Controller Mode	FullSpeed HiSpeed	Set the USB 2.0 controllers to HiSpeed (480 Mbps) or Full-Speed (12 Mbps) for legacy mode
BIOS USB 2.0 Hand-Off	Disabled Enabled	This patch must be allied for operating systems before WIN XP which have problems gaining control over USB 2.0 ports. If enabled this provides a simple semaphore based mechanism for exchanging USB 2.0 (EHCI) ownership
► USB Mass Storage Device Configuration	Submenu	Display the status of USB mass storage devices

18.5.2.5.1 USB Mass Storage Device Configuration Submenu

Feature	Option	Description
USB Mass Storage Reset Delay	10 Sec. 20 Sec. 30 Sec. 40 Sec.	Set the initialization delay time
Device	N / A	Show the device identifier
Emulation Type	Auto Floppy Forced FDD Hard Disk CDROM	Define the emulation type. Forced FDD can be used to force a HDD formatted drive to boot as FDD

18.5.2.6 GPIO Configuration Submenu

Feature	Option	Description
GPIO Pin 0	Input	Define the GPIO type (Tri-State also output)
GPIO Pin 1	IRQ Input	
GPIO Pin 2	Output	
GPIO Pin 3	Tri-State	
GPIO Pin 4	Input	Define the GPIO type (Tri-State also output)
GPIO Pin 5	IRQ Input	
GPIO Pin 6	Output	
GPIO Pin 7	Tri-State	
Default Output State	Low High	Define the default level of all outputs (including Tri-State)

18.5.3 Display Configuration Submenu

Feature	Option	Description
VGA BIOS Revision	N / A	Show the VGA BIOS revision
JDA Revision	N / A	Show the JDA revision (<u>J</u> ILI <u>D</u> ata <u>A</u> rea)
Protocols	N / A	Show supported protocols (e.g. JILI3, EDID, DisplayID)
Frame Buffer Size	1 MB 4 MB 8 MB	Select the amount of system memory used by the onchip graphic controller
Boot Display Device	DVI Only LCD Only	Control the boot display
Flat Panel Type	VGA 640x480 1x18 SVGA 800x600 1x18 XGA 1024x768 1x18 XGA 1024x768 1x24 WXGA 1280x768 1x24 WVGA 800x480 1x18 WXGA 1366x768 1x24 WXGA 1280x800 1x18 Auto	Select a predefined flat panel resolution. If Auto the board is searching for a JILI3 (KONTRON), EDID (VESA) or a DisplayID (VESA) record
Flat Panel Scaling	Centered Stretched	Stretched display the screen content at the maximum size otherwise the content is centered
Backlight Brightness	0 %, 10 %, 20 % 30 %, 40 %, 50 % 60 %, 70 %, 80 % 90 %, 100 %	Set the backlight value (0% = 0V, 100% = +5V)

18.5.4 ACPI Configuration Submenu

Feature	Option	Description
ACPI Version	ACPI 2.0 ACPI 3.0	Select the desired ACPI specification (OS depending)
Suspend Mode	Disabled S3 (STR)	Define the power down mode (STR = <u>S</u> uspend <u>I</u> o <u>R</u> AM)
ACPI APIC Support	Disabled Enabled	APIC supports more IRQs and faster interrupt handling
Repost Video on S3 Resume	No Yes	Determine whether to invoke the VGA BIOS post on suspend event (resume)
Headless Mode	Disabled Enabled	Indicate support for headless operation that means without keyboard, mouse and/or monitor. The OS must support the headless mode
LAN Wakeup from S3	Disabled Enabled	Enable LAN wake event
USB Wakeup from S3	Disabled Enabled	Enable USB wake event
▶ ACPI Cooling Options	Submenu	Settings for thermal management

18.5.4.1 ACPI Cooling Options Submenu

Feature	Option	Description
Cooling Mode	Passive Cooling Active Cooling Active & Passive	Set the cooling method
Passive Trip Point	Disabled, 40°C 45°C , ... 95°C	Determine the temperature of passive trip point - the point at which the OS will turn on/off the CPU clock throttling
Passive TC1 Value	1 , 2, ... 5, ... 16	Determine TC1 (<u>T</u> emperature <u>C</u> oefficient <u>1</u>) value
Passive TC2 Value	1, 2, ... 5 , ... 16	Determine TC2 (<u>T</u> emperature <u>C</u> oefficient <u>2</u>) value
Passive TSP Value	2, 4, ... 10 , ... 30	Determine TSP (<u>T</u> emperature <u>S</u> ampling <u>P</u> eriod) value
Active Trip Point	Disabled, 40°C 45°C , ... 95°C	Determine the temperature of active trip point - the point at which the OS will turn on/off the CPU fan
Active Hysteresis	1°C, 2°C, ... 5°C 6°C ... 10°C	Set the hysteresis for the active trip point
Polling Time	5 Sec., 10 Sec. 15 Sec., .. 30 Sec. 35 Sec, 40 Sec. 50 Sec., 60 Sec.	Define the thermal zone polling time
Critical Trip Point	Disabled, 70°C 75°C ... 100°C	This value controls the temperature of the point at which the OS will shut off the system

18.5.5 Miscellaneous Submenu

Feature	Option	Description
▶ Temperature Monitor	Submenu	Display the CPU and board temperature
▶ Fan Speed Control	Submenu	Control the fan speed

18.5.5.1 Temperature Monitor Submenu

Feature	Option	Description
CPU Temperature	N / A	Show the CPU temperature
Board Temperature	N / A	Show the board temperature
DTS Temperature	N/A	Show the <u>D</u> igital <u>T</u> hermal <u>S</u> ensor temperature

18.5.5.2 Fan Speed Control Submenu

Feature	Option	Description
Fan Speed	Off, 12.5% 25%, 37.5% 50%, 62.5% 75%, 87.5% Full	Set the fan speed

18.6 PCIPnP Menu

Feature	Option	Description
IRQ3	Available	Reserved means that this interrupt is a legacy IRQ (not shared). Available defines that this interrupt can be used as a PCI IRQ
IRQ4	Reserved	
IRQ5		
IRQ6		
IRQ9		
IRQ10		
IRQ11		
IRQ15		

18.7 Boot Menu

Feature	Option	Description
▶ Boot Settings Configuration	Submenu	Define some special boot settings
▶ Boot Device Priority	Submenu	Specify the boot order
▶ Hard Disk Devices	Submenu	Boot order for harddisks
▶ Removable Device	Submenu	Boot order for removable devices
▶ CD/DVD Drives	Submenu	Boot order for CD/DVD drives

18.7.1 Boot Settings Configuration Submenu

Feature	Option	Description
Dark Boot	Disabled Enabled	If disabled the BIOS generates the normal messages otherwise an OEM logo can be displayed
Autostart S5 Behavior	Restart Do Nothing	Restart means automatic restart after soft-off (S5). Do Nothing cause no action after soft-off
Bootup Num-Lock	Off On	Off doesn't enable the keyboard Num-Lock automatically
Wait For 'F1' If Error	Disabled Enabled	Enabled allows the BIOS to wait for any error. If an error is detected pressing <F1> will enter the Setup and the BIOS settings can be adjusting to fix the problem
'Press DEL' Message Display	Disabled Enabled	Enabled allows the BIOS to display the message <i>Press DEL to run Setup</i> after memory initialization otherwise this message is suppressed
Interrupt 19h Capture	Disabled Enabled	If enabled 'Addon ROMs' can be trapped interrupt 19h (boot IRQ)

18.8 Security Menu

Feature	Option	Description
Supervisor Password	Not Installed Installed	Show the state of supervisor password
User Password	Not Installed Installed	Show the state of user password
Change Supervisor Password	N / A	Press 'Enter' to change the supervisor password
Change User Password	N / A	Press 'Enter' to change the user password
Boot Sector Virus Protection	Disabled Enabled	If a program or a virus accesses the boot sector a warning appears if the option is enabled

18.9 Exit Menu

Feature	Option	Description
Save Changes and Exit	Ok Cancel	Save selections and exits Setup. The next time the system boots the BIOS configures the system according to the Setup selection stored in CMOS
Discard Changes and Exit	Ok Cancel	Exit Setup without storing in CMOS any new selections you may have made
Discard Changes	Ok Cancel	If during a Setup session 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
Load Optimal Defaults	Ok Cancel	Load the optimal default values
Load Failsafe Defaults	Ok Cancel	Load the failsafe default values

19 BIOS/CPLD Changes

Some BIOS options are only available with a corresponding CPLD version (see BIOS Setup entry Main/Board Information). The following table shows an overview:

Option	CPLD Version
ACPI Suspend to RAM (S3)	0x0C
Gate A20 Control Power LED Blinking during S3	0x0E
Wake On USB	0x0F
Enable/Disable Wake On LAN	0x10
GPIO Control (IRQ Input, Tri-State Output) Windows [®] Automatic Thermal Control Power LED Blinking during Recovery	0x11

Appendix A: System Resources

A.1 Interrupt Request (IRQ) Lines

Please ensure that the chosen interrupt is not already in use by PCI devices. This table is only valid in legacy mode (e.g. DOS) - most operating systems are using the APIC assignment.

Legacy mode

IRQ #	Used for	Available	Comment
0	Timer 0	No	
1	Keyboard	No	
2	8259 Slave (Cascade)	No	
3	PCI IRQ [D]	for PCI	USB 2.0 controller Note (1)
4		Yes	
5	PCI IRQ [C]	for PCI	USB 1.1 controller port 5/6 Note (1)
6		Yes	
7	GPIO IRQ	No	
8	Real Time Clock (RTC)	No	
9	ACPI Power Management	No	
10	PCI IRQ [A]	for PCI	
11	PCI IRQ [B]	for PCI	
12		Yes	
13	Floating Point Unit (FPU)	No	
14	Parallel-ATA Controller (P-ATA)	No	
15		Limited	Second P-ATA channel (e.g. WIN XP)

APIC mode

IRQ #	Used for	Available	Comment
0	Timer 0	No	
1	Keyboard	No	
2	8259 Slave (Cascade)	No	
3		Yes	
4		Yes	
5		Yes	
6		Yes	
7	GPIO IRQ	No	
8	Real Time Clock (RTC)	No	
9	ACPI Power Management	No	
10		Yes	
11		Yes	
12		Yes	
13	Floating Point Unit (FPU)	No	
14	Parallel-ATA Controller (P-ATA)	No	
15		Limited	Second P-ATA channel (e.g. WIN XP)
16	PCI IRQ [A]	for PCI	
17	PCI IRQ [B]	for PCI	
18	PCI IRQ [C]	for PCI	USB 1.1 controller Port 5/6 Note (1)
19	PCI IRQ [D]	for PCI	USB 2.0 controller Note (1)
20		Yes	
21		Yes	
22		Yes	
23		Yes	

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

A.2 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	No	
D0000h - DFFFFh		Yes	
E0000h - FFFFFh	System BIOS	No	

A.3 I/O Address Map

The I/O port addresses of the pITX-SP 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	Parallel-ATA Controller (P-ATA)	No	Note (1)
03B0h - 03DFh	Graphic Controller	No	
0400h - 043Fh	SMBus™	No	Chipset
0480h - 04BFh	GPIO	No	Chipset
04D0h - 04D1h	PIC Extension	No	Chipset
0900h - 091Fh	Power Management	No	Chipset
09C0h - 09FFh	GPE	No	Chipset
0A80h - 0A81h	System Extension	No	CPLD
0CF8h - 0CFh	PCI Configuration	No	Chipset
C080h - C083h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express® device Note (1)
C480h - C483h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express® device Note (1)
C880h - C883h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express® device Note (1)
CE80h - CE8Fh	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express® device Note (1)
CF00h - CF03h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express® device Note (1)
D880h - D887h	LAN Controller	No	Onboard PCI Express® device Note (1)
E080h - E09Fh	USB Controller	No	Chipset Note (1)
E480h - E49Fh	USB Controller	No	Chipset Note (1)
E880h - E887h	Graphic Controller	No	Chipset
EF00h - EF1Fh	USB Controller	No	Chipset Note (1)
FFA0h - FFAFh	Parallel-ATA Controller (P-ATA)	No	Chipset Note (1)

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

A.4 PCI Devices

All devices follow the PCI Express® base specification revision 1.0a and the PCI local bus specification revision 2.3. Please see the specifications for more details.

PCI Device	PCI IRQ	Comment
Host Bridge / Memory Controller	None	Chipset
Graphics Controller	INTA	Chipset
HD Audio Controller	INTA	Chipset
USB Client Controller	INTA	Chipset
PCI Express® Bridge	INTA	Chipset
PCI Express® Bridge	INTB	Chipset
USB 1.1 Controller 1	INTA	Chipset
USB 1.1 Controller 2	INTB	Chipset
USB 1.1 Controller 3	INTC	Chipset
USB 2.0 Controller	INTD	Chipset
SDIO/MMC Controller 1	INTA	Chipset
SDIO/MMC Controller 2	INTB	Chipset
ISA Bridge / LPC Controller	None	Chipset
Parallel-ATA Controller (P-ATA)	None	Chipset
Serial-ATA Controller (S-ATA)	INTA	Onboard PCI Express® device
LAN Controller	INTB	Onboard PCI Express® device

A.5 System Management Bus (SMBus™)

The pITX-SP 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.

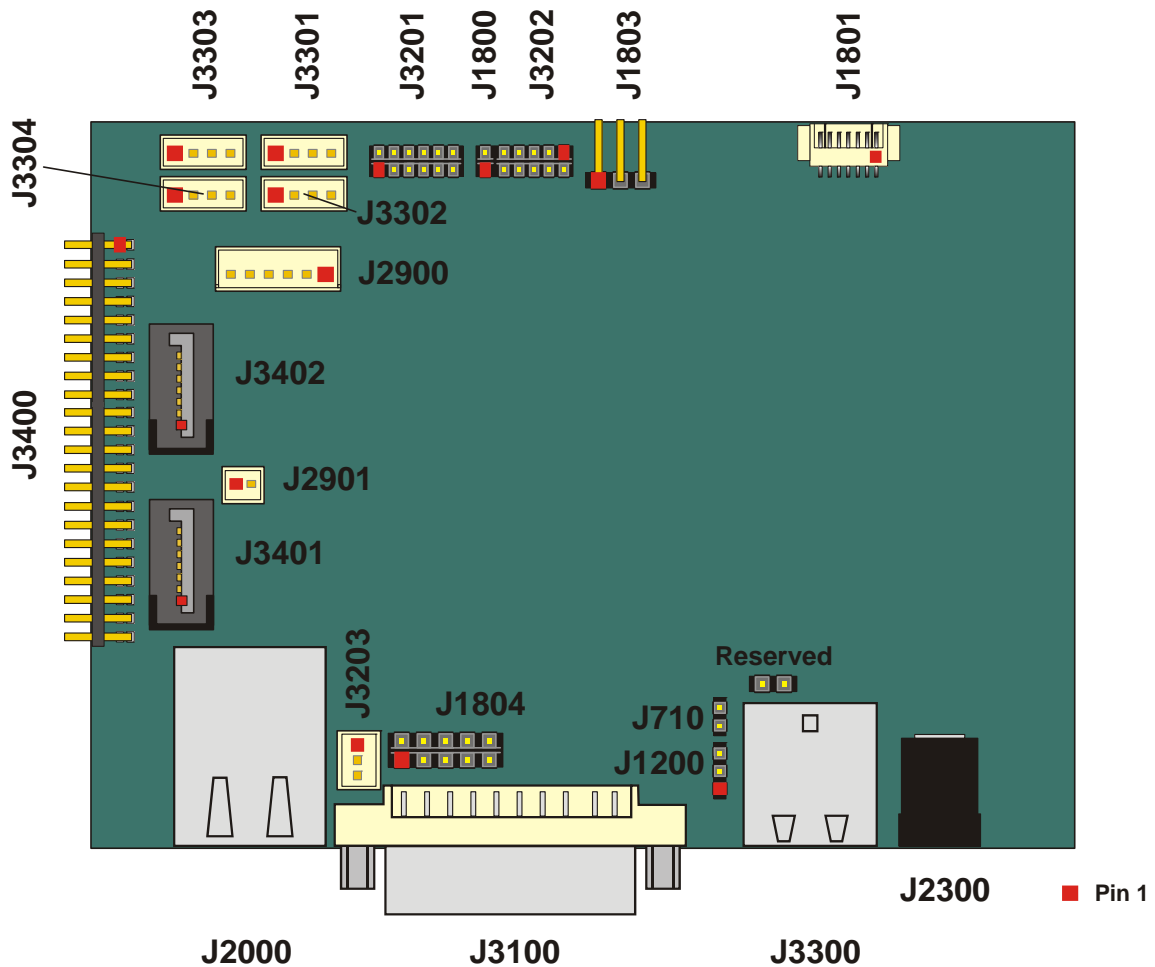
SMBus™ Address	Device	Comment
98h / 99h	Temperature sensor	
A0h / A1h	SPD Eeprom (DDR2-SDRAM)	

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.

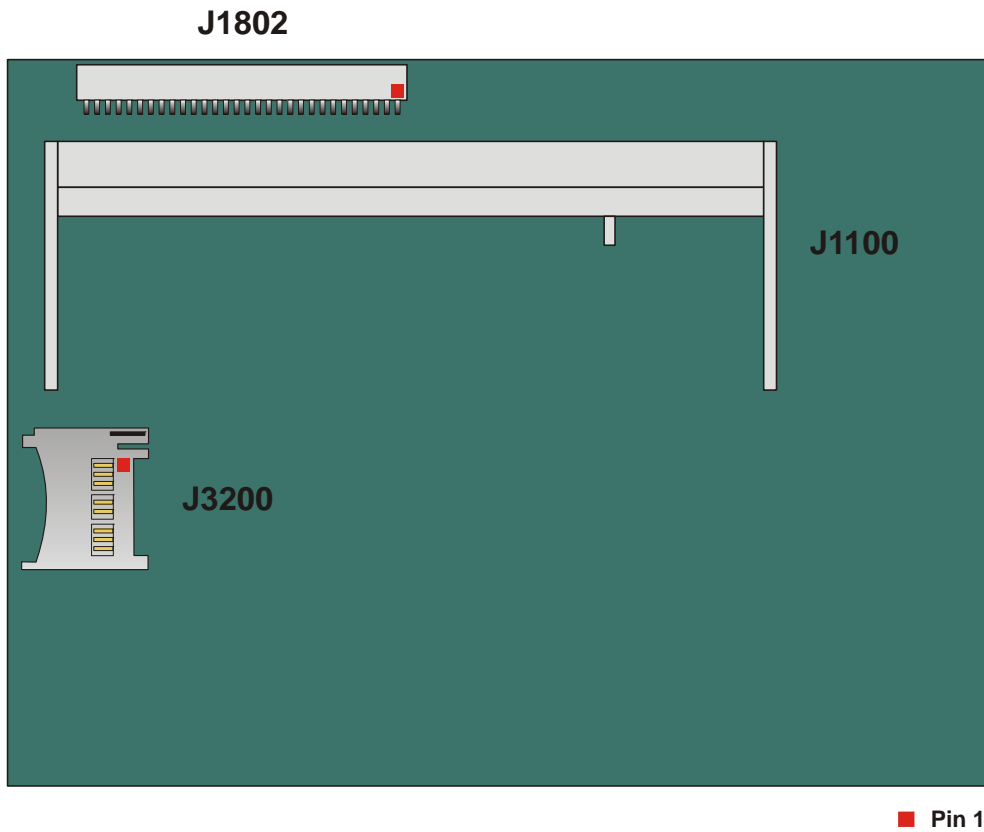
Appendix B: Connector Layout

B.1 Connector Locations

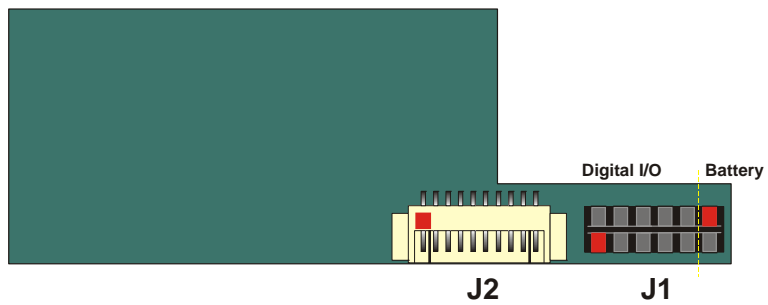
B.1.1 Top Side



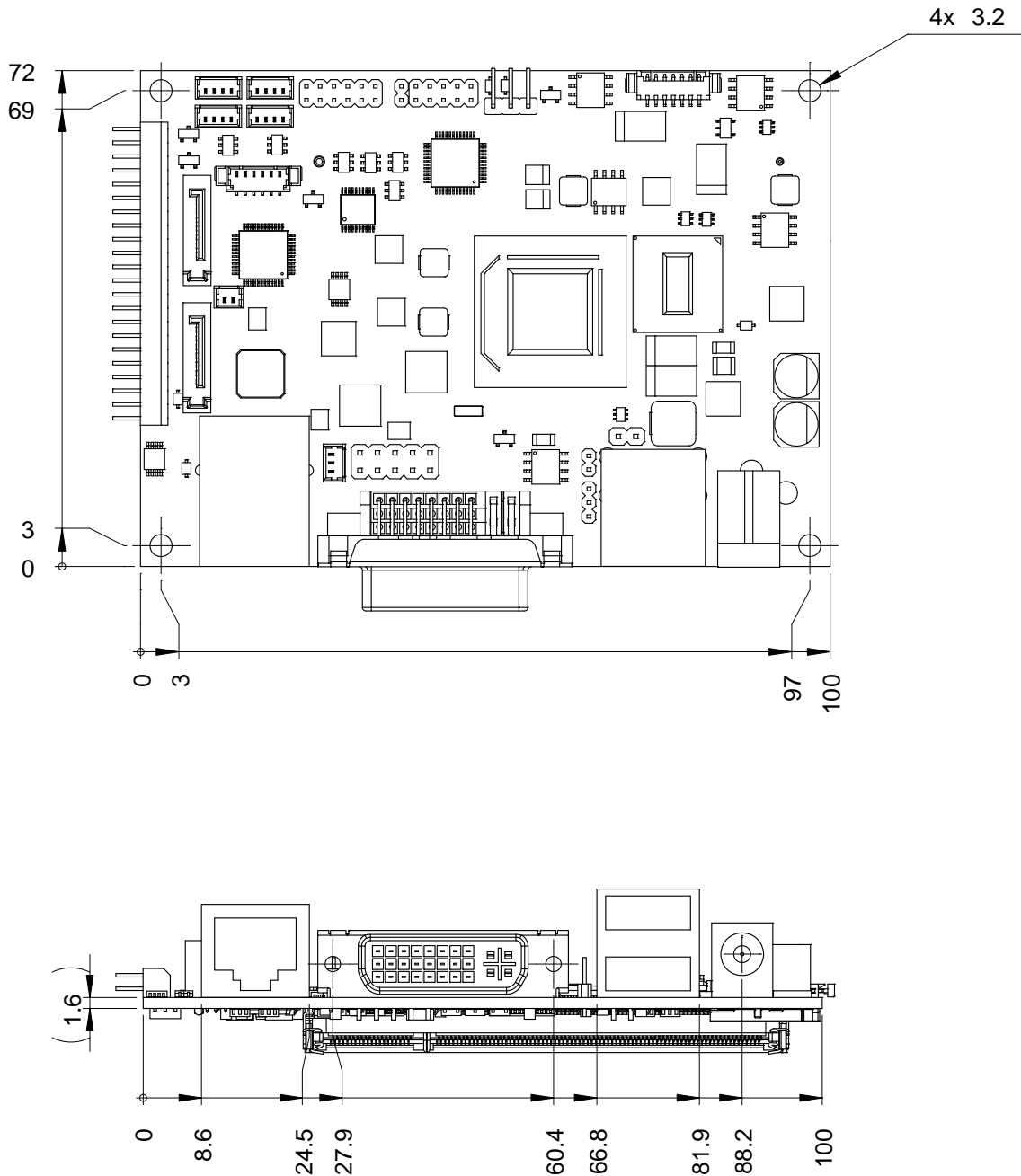
B.1.2 Bottom Side



B.1.3 Battery Module



B.2 Mechanical Dimensions



B.3 Mating Connectors

The table notes mating connectors.

Identifier	Mating Connector	Comment
J1801	1.25 mm 7 pin (MOLEX 51021-0700 or comp.)	for backlight cables
J2900	1.25 mm 6 pin (MOLEX 51021-0600 or comp.)	for audio support (Line in, Line out and Microphone)
J2901	1.25 mm 2 pin (MOLEX 51021-0200 or comp.)	for S/PDIF support
J3301 - J3304	1.25 mm 4 pin (MOLEX 51021-0400 or comp.)	for USB adapter

B.4 Pinout Tables

Pin	P-ATA J3400	DVI-D J3100	JILI30 (LVDS) J1802
1	/RESET	TMDS2-	FTX0-
2	GND	TMDS2+	FTX0+
3	D7	GND	FTX1-
4	D8	N.C.	FTX1+
5	D6	N.C.	FTX2-
6	D9	DDC_CLK	FTX2+
7	D5	DDC_DATA	GND
8	D10	N.C.	FTXC-
9	D4	TMDS1-	FTXC+
10	D11	TMDS1+	FTX3-
11	D3	GND	FTX3+
12	D12	N.C.	N.C.
13	D2	N.C.	N.C.
14	D13	VCC5	GND
15	D1	GND	N.C.
16	D14	TMDS_HPD	N.C.
17	D0	TMDS0-	GND
18	D15	TMDS0+	N.C.
19	GND	GND	N.C.
20	KEY (N.C.)	N.C.	N.C.
21	DRQ	N.C.	N.C.
22	GND	GND	N.C.
23	/IOW	TMDS_CLK+	N.C.
24	GND	TMDS_CLK-	GND
25 / C1	/IOR	N.C.	SDA
26 / C2	GND	N.C.	DATAENA
27 / C3	IOCHRDY	N.C.	SCL
28 / C4	CSEL	N.C.	VCC3/VCC5
29 / C5	/DACK	GND	VCC3/VCC5
30	GND		VCC3/VCC5
31	IRQ		
32	N.C.		
33	SA1		
34	ATAD		
35	SA0		
36	SA2		
37	/CS1		
38	/CS3		
39	ACT		
40	GND		
41	VCC5		
42	VCC5		
43	GND		
44	N.C.		

Pin	microSD Socket J3200	SDIO Pin Strip J3201	Digital I/O J3202
1	DAT2	VCC3	VCC3
2	CD / DAT3	N.C.	GPI04
3	CMD	DAT0	GPI00
4	VCC3	N.C.	GPI05
5	CLK	DAT1 / IRQ	GPI01
6	GND	GND	GPI06
7	DAT0	DAT2 / RW	GPI02
8	DAT1	/WP	GPI07
9		CD / DAT3	GPI03
10		/CD	GND
11		CMD	
12		CLK	

Pin	LAN J2000	USB Standard J3300	USB Extension J3301 - J3304
1	TXD+ / BI_D1+	VCC5	GND
2	TXD- / BI_D1-	USB0-	USBn+
3	RXD+ / BI_D2+	USB0+	USBn-
4	BI_D3+	GND	VCC5
5	BI_D3-	VCC5	
6	RXD- / BI_D2-	USB1-	
7	BI_D4+	USB1+	
8	BI_D4-	GND	

Pin	S-ATA J3401/02	HD Audio J2900	S/PDIF J2901
1	GND	LINE_OUT_R	GND
2	TX+	GND	SPDIF_OUT
3	TX-	LINE_OUT_L	
4	GND	LINE_IN_R	
5	RX-	MIC_IN	
6	RX+	LINE_IN_L	
7	GND		

Pin	Power Header J1804	Backlight J1801	Battery J1800
1	RST_BTN+	N.C.	VBAT
2	PWR_BTN+	BKLTADJ	GND
3	RST_BTN-	GND	
4	PWR_BTN-	RSVD	
5	HDD_LED-	RSVD	
6	RSVD	GND	
7	HDD_LED+	BKLTON	
8	RSVD		
9	RSVD		
10	RSVD		

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
S0002-I	12/14/12	M. Hüttmann	Changes related to the presence of the RTC battery module
S0002-H	02/08/12	M. Hüttmann	Changed the polarity of HDD-LED
S0002-G	07/22/11	M. Hüttmann	Short supplement for 16 chips modules in chapter System Memory
S0002-F	09/17/10	M. Hüttmann	Added a note to the new Display Cable Guide
S0002-E	07/01/10	M. Hüttmann	Added chapter Digital I/O - Connector Redirection and other small changes
S0002-D	06/14/10	M. Hüttmann	Added battery precautions, added chapter USB Client Interface, Special I/O Modes, Fan Interface and SD Card Application Note, supplement chapter CF Card Application Note, Cooling Options and Crisis Management
S0002-C	04/19/10	M. Hüttmann	Correction USB connectors J3301 - J3304 and pin 1 (USB chapter / locations)
S0002-B	01/29/10	M. Hüttmann	Added battery pin and LED picture
S0002-A	01/21/10	M. Hüttmann	Added autostart function, complete VESA modes
S0002-0	12/18/09	M. Hüttmann	Adapted to KONTRON Technology A/S guidelines
0.3	07/28/09	M. Hüttmann	Basic reworking (e.g. changes for hardware revision V2.00)
0.2	05/18/09	M. Hüttmann	Some little corrections
0.1	05/14/09	M. Hüttmann	Created preliminary manual

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