» Kontron User's Guide «

*p*ITX-SP
Document Revision 0.2

.::Pico™

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1 User Information

1.1 About This Document

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1.5 Warranty

This Kontron Embedded Modules GmbH product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules GmbH 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.

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1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

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.

2 Introduction

2.1 pITX Embedded Line Family

Each *p*ITX is a member of the 2.5" SBC family of Kontron Embedded Modules GmbH based on the Pico-ITX^{TM} specification from the Small Form Factor Special Interest Group (SFF-SIG).

*p*ITX embedded line modules are characterized by the same front-line pin-outs 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.

*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 (**J**umptec® **I**ntelligent **L**VDS **I**nterface).

As part of the standard features package, all *p*ITX embedded line modules come with a JIDA interface (**J**umptec® **I**ntelligent **D**evice **A**rchitecture), 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.

Article number	CPU Clock	LVDS (JILI30)	P-ATA	S-ATA	USB	GPIO	microSD/SDIO	TPM
03001-0000-11-1	1.1 GHz		✔		✘ [1]			
03001-0000-11-2	1.1 GHz	✔		✔	✔		✘ [2]	
03001-0000-16-0	1.6 GHz	✔	✔	✔	✔	✔	✔	✔
03001-0000-16-2	1.6 GHz	✔		✔	✔		✘ [2]	

Note: [1]   *Only two USB ports available*
              [2]   *Only one microSD (SDIO) 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 (six channels available)
- ❑ Two PCI Express ports (x1 lanes)
- ❑ Integrated Intel® High Definition Audio controller
- ❑ Three Secure Digital I/O / Multimedia Card (SDIO/MMC) controller (two controller available)

Onchip Video Graphics Array (VGA):

- ❑ Intel® Serial Digital Video Out (SDVO) with DVI monitor interface (maximal 160 MHz pixel clock)
- ❑ Low Voltage Differential Signaling (LVDS) flatpanel interface supports single clock (maximal 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 USB1.1 (UHCI) and USB2.0 (EHCI), two ports only USB2.0
- ❑ 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 Ethernet (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 (TPM): Infineon SLB9635 TT

- ❒ Chipset LPC-Bus supports TPM 1.2 devices

Temperature Monitoring: Winbond W83L771W

- ❒ One onchip thermal sensor and one remote temperature sensor (CPU) with ±1°C accuracy

Digital I/O:

- ❒ Four Inputs and four Outputs, +3.3V signal level

Watchdog Timer (WDT)

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

BIOS: AMI, 1 MB Flash BIOS

Real-Time Clock (RTC) with CMOS RAM

- ❒ Requires an external battery

3.2 Block Diagram

*p*ITX-SP

```
                                    ┌─────────────────┐
                                    │      CPU        │
                                    │ Intel® Z510 (1.1 GHz)│
                                    │ Intel® Z530 (1.6 GHz)│
                                    └─────────────────┘
```

CPU
Intel® Z510 (1.1 GHz)
Intel® Z530 (1.6 GHz)

Eeprom JILI30 (EDID) — I2C —

Front Side Bus

DDR2-SDRAM — **J1100**

Temp. Sensor W83L771 — SMB — RAM

I2C Bus
SMBus

SDRAM Controller

J3201

IDE Controller — P-ATA — **J3400**

J3200 — SDIO 0-1 — SDIO/MMC Controller

USB Controller — USB 0-5 — **J3300** / **J3301** / **J3302**

Chipset
Intel® US15W
(Poulsbo)

HDA

J2900 — Audio Codec ALC888 — HD Audio Controller

J2901

Graphic Controller

PCI Express Ports

LPC Bus

SDVO

J3100 — SDVO to DVI CH7307

PCI Express

FWH Flash (BIOS)

LVDS

J1802

LPC

Ethernet Intel® 82574L

S-ATA JMB362

S-ATA 0-1 — **J3401** / **J3402**

LAN

J2000

Watchdog

CPLD

Fan   GPIO

J3203

74LVCH244 — **J3202**

3.3   Mechanical Specifications

Dimensions

- ➤ Pico-ITX form factor 100 x 72 mm (complete with all connectors 104 x 78 mm)
- ➤ Height approx. 24 mm

3.4   Electrical Specifications

Supply Voltage

- ➤ +5V DC ±5%

Supply Voltage Ripple

- ➤ Maximum 100mV peak to peak 0 – 20 MHz

3.5   External Real-Time Clock Battery

➤   Voltage range: +2.0V - +3.6V (typ. +3.0V)

➤   Maximum current   5µA @ +3.0V

3.6   Environmental Specifications

Temperature

Operating: (with original Kontron heat-spreader plate assembly):

➤   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 Embedded Modules GmbH 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 *p*ITX-SP is very easy. Take the following steps:

❶ Connect the power supply to the *p*ITX-SP power supply connector.

❷ Plug a suitable DDR2-SDRAM memory module into the RAM socket.

❸ Connect a DVI monitor to the DVI connector.

❹ Plug a keyboard and/or mouse to the USB connector(s).

❺ 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.

❻ Make sure all your connections have been made correctly. Turn on the power.

❼ Enter the BIOS by pressing the Del key during boot-up. Make all changes in the BIOS Setup. See the BIOS Setup chapter of this manual for details.

5   System Memory

The *p*ITX-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	CPU Clock	FSB	Allowed Modul
03001-0000-11-1	1.1 GHz	400 MHz	DDR2-400
03001-0000-11-2	1.1 GHz	400 MHz	DDR2-400
03001-0000-16-0	1.6 GHz	533 MHz	DDR2-533
03001-0000-16-2	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 *p*ITX-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. Up to 8 MB of system memory are used as graphic memory.
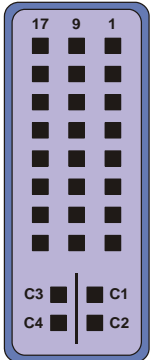
Attention: *Kontron Embedded Modules GmbH can't guarantee the correct functionality of the pITX-SP when a DDR2-667 or a DDR2-533 (for article number 03001-0000-11-1/2) RAM module is used.*

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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
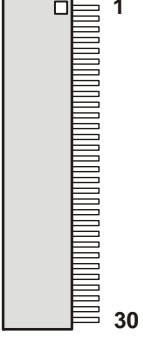
Header	Pin	Signal Name	Function
	1	TMDS2-	TMDS data 2 (negative)
	2	TMDS2+	TMDS data 2 (positive)
	3	GND	Ground
	4	N.C.	Not connected
	5	N.C.	Not connected
	6	DDC_CLK	DDC clock
	7	DDC_DATA	DDC data
	8	N.C.	Not connected
	9	TMDS1-	TMDS data 1 (negative)
	10	TMDS1+	TMDS data 1 (positive)
	11	GND	Ground
	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 (**J**UMPtec **I**ntelligent **L**VDS **I**nterface). The implementation of this subsystem complies with the JILI specification of Kontron Embedded Modules GmbH. A variety of cables for different display types are available from Kontron. Please refer to the actual cable list on the Kontron website for part numbers and cable names.

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	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.

Warning: *Check jumper JP1803 (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 Kontron website for panel lists. We regularly update the list of panels that have been tested with the *p*ITX-SP.

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

❶   Check whether you have the correct adapter and cable for the panel you plan to use. Inspect the cable for damages. Disconnect the power from your system.

❷   Check Jumper JP1803 for correct Panel voltage (**Pos. 1-2 = +3.3V   2-3 = +5V**).

❸   Connect an external power supply for the correct Backlight voltage.

❹   Connect the cable to the flat panel connector J1802 on the *p*ITX-SP and connect the other end to your display.

❺   Connect a DVI monitor to the DVI-D connector. <u>Hint:</u> The default boot display setting in the BIOS setup is DVI.

❻   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*'.

❼   If you still do not see improvement, consider contacting the dealer for technical support.

6.4   Flat Panel Jumper
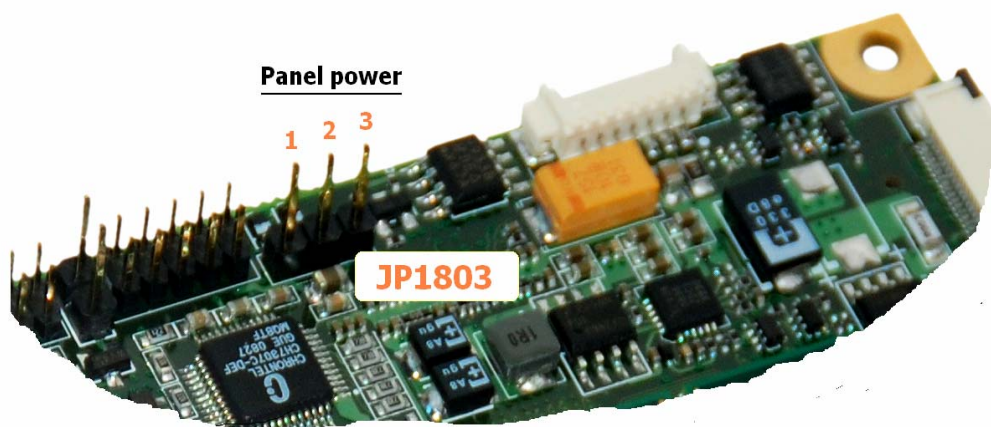
6.5   Available Video Modes

The following list shows the video modes supported by the graphics controller with maximum frame buffer size. When configured for saller frame buffers and/or using a flat panel on the JILI30 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.
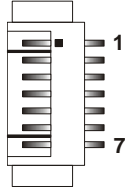
Video Mode	Type	Characters/Pixels	Colors
00h/01h	Text	40 x 25	16
02h/03h	Text	80 x 25	16
04h/05h	Graphic	320 x 200	4
06h	Graphic	640 x 200	2
0Dh	Graphic	320 x 200	16
0Eh	Graphic	640 x 200	16
0Fh	Graphic	640 x 350	2
10h	Graphic	640 x 350	4
11h	Graphic	640 x 480	2
12h	Graphic	640 x 480	16
13h	Graphic	320 x 200	256

6.6   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
111h	Graphic	640 x 480	64k
114h	Graphic	800 x 600	64k
117h	Graphic	1024 x 768	64k

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	RSVD [1]	Reserved
	5	RSVD [1]	Reserved
	6	GND	Ground
	7	BKLTON	Backlight on/off

Note: 1)   Don't use these pins.

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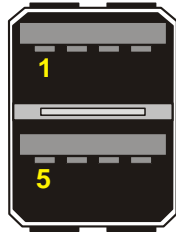
On the first boot-up a DVI monitor must be connected to the *p*ITX-SP. The simultaneous mode is not supported by Intel®. During the boot process respectively DOS mode the VGA BIOS only allows a DVI monitor or a flat panel.

7 USB Interface

The USB interface comes with four 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 two 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 and J3302 (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	USBn-	USB port n (negative)
	3	USBn+	USB port n (positive)
	4	GND	Ground

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.

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   EIDE Interface (P-ATA)

The *p*ITX-SP features one EIDE interface (Primary channel, up to UDMA5 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.

8.1   Connector

The EIDE interface is available through connector J3400 (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	ACT	Drive activity	40	GND	Ground
	41	VCC [1]	Power +5V	42	VCC [1]	Power +5V
	43	GND	Ground	44	N.C.	Not connected
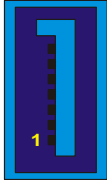
Note: 1)   *To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
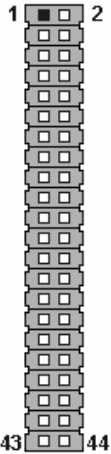*- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.*
2)   *Pin 28 is connected with 470Ω to Ground for Cable Select IDE devices.*

9 Serial-ATA Interface (S-ATA)

The *p*ITX-SP has realized two S-ATA II ports. Serial-ATA connections boost the data 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. A RAID (Redundant Array of Independent Disks) configuration is <u>not</u> possible.

9.1 Connector

The S-ATA interface is available through the standard L-type connectors J3401 and J3402 (7 pins).
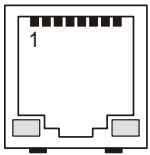
Header	Pin	Signal Name	Function
	1	GND	Ground
	2	TX+	Transmit (positive)
	3	TX-	Transmit (negative)
	4	GND	Ground
	5	RX-	Receive (negative)
	6	RX+	Receive (positive)
	7	GND	Ground

10 Ethernet Controller

The *p*ITX-SP uses an Intel® 82574L Gigabit PCI Express LAN controller. The network controllers support 10/100/1000 Base-T interfaces. The devices 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 Ethernet 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 respectivly 1 Gbit; two color LED).

LED10 (orange)

LED100 (orange)
LED1000 (green)
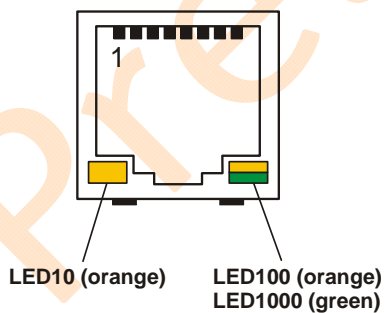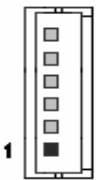
11 Audio Interface

The chipset supports a High Definition Audio Codec with 24 bit resolution and 192 kHz sample rate. The interface includes LINE OUT (DACs with 97 dB SNR), LINE IN (ADCs with 90 dB SNR), MICROPHONE IN and a digital S/PDIF output. Normally the codec manages following resolutions and sample rates: 16/20/24 bit with 44.1/48/96/192 kHz (LINE OUT, S/PDIF) and 16/20 bit with 44.1/48/96 kHz (LINE IN). The S/PDIF output drives 12mA @ 75Ω.

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®).
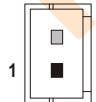
11.1 Analog Connector

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

11.2 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 Interface
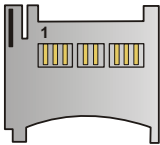
The SDIO/MMC interface comes with two controllers, one microSD Card socket (only Memory Cards available) and one pin strip for using a standard SDIO connector (9 pins), miniSD Card connector (11 pins) or a second microSD Card connector (8 pins). Both controllers supports SDIO revision 1.1 and MMC revision 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, low active) of connector J3201 must be connected. The signal line /WP (Write Protect, low active) is optional (default: write enabled).

Both controllers have some restrictions: they doesn't support zero block size transfers and the Multiple Transfer mode (DMA and PIO mode).
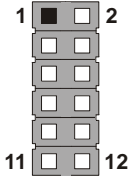
12.1 microSD Card Connector

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.

13 Digital I/O Interface

The *p*ITX-SP features four digital inputs and four digital outputs. All inputs/outputs are LVTTL compatible. 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
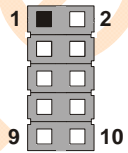
Parameter	Min.	Typ.	Max.	Units
Input LOW voltage			0.8	V
Input HIGH voltage	2.0		5.5	V

Digital Outputs

Parameter	Min.	Typ.	Max.	Units
Output LOW voltage			0.55	V
Output HIGH voltage	2.0		3.3	V
Output LOW/HIGH current			24	mA

13.2 Connector

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

Header	Pin	Signal Name	Function
	1	VCC [1]	Power +3.3V
	2	OUT1	Digital output 1
	3	IN1	Digital input 1
	4	OUT2	Digital output 2
	5	IN2	Digital input 2
	6	OUT3	Digital output 3
	7	IN3	Digital input 3
	8	OUT4	Digital output 4
	9	IN4	Digital input 4
	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.

14 Power Supply

The *p*ITX-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).

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 (positive)
	6	RSVD	Reserved
	7	HDD_LED-	Harddisk LED (negative)
	8	RSVD	Reserved
	9	RSVD	Reserved
	10	RSVD	Reserved

14.3   Harddisk LED

The following picture illustrates the onboard wiring.

+3.3V

300R

Harddisk LED

Connector

+

−
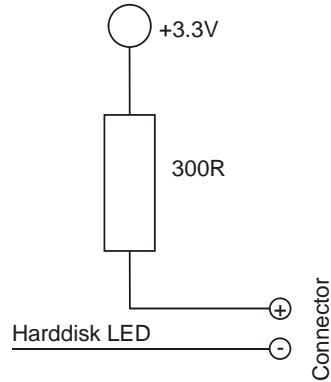
14.4   Battery Connector

An external battery is only necessary if time and date should be saved when the board is turned off. For the BIOS settings no battery is needed as these settings are also stored in the BIOS flash.
The battery interface is available through the pin strip J1800 (2 pins)

Header	Pin	Signal Name	Function
1 ▪ □	1	VBAT [1]	Battery input voltage +3V
	2	GND	Ground

Note: 1)   *To protect the external power lines of peripheral devices, make sure that*
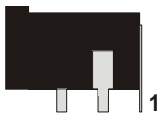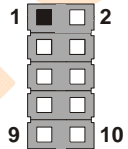   *- the wires have the right diameter to withstand the maximum available current.*
          - to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

15   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.

15.1   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   : ??/??/??

15.2   Start AMI® BIOS Setup Utility

To start the AMI® BIOS setup utility, press <DEL> when the following string appears during boot-up.

Press <DEL> to enter Setup

The Main Menu then appears.

The Setup Screen is composed of several sections:

Setup Screen	Location	Function
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.

15.3 Menu Bar

Feature	Description
Main	Define time and date and show service information
Advanced	Configuration of all onboard devices (e.g. CPU, IDE, LAN, USB, Display)
PCIPnP	Define PCI/Legacy IRQs and other PnP settings
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

15.4 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

15.4.1 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
System Memory Size	N / A	Display amount of conventional memory detected during boot-up

15.5   Advanced Menu

Feature	Option	Description
▸ CPU Configuration	Submenu	Configure special CPU features
▸ Onboard Device Configuration	Submenu	Configure most onboard devices (e.g. IDE, 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

15.5.1   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)
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 C6 represents the saving modes

15.5.2 Onboard Device Configuration Submenu

Feature	Option	Description
▸ Chipset Configuration	Submenu	Set chipset options (SDIO, Audio)
▸ IDE Configuration	Submenu	Configure the IDE devices (P-ATA)
▸ LAN Configuration	Submenu	Configure the PCI Express LAN controller
▸ USB Configuration	Submenu	Configure the USB support

15.5.2.1 Chipset Configuration Submenu

Feature	Option	Description
SDIO Controller	**Disabled** Enabled	Enable or disable the SDIO/MMC expansion ports
Audio Controller	Disabled **Enabled**	Enable or disable the HD Audio controller
Serial IRQ Mode	Continuous **Quiet**	Defines the serial IRQ mode (Quiet = the chipset transfers only if an IRQ is triggered)

15.5.2.2 IDE Configuration Submenu

Feature	Option	Description
Parallel-ATA Controller	Disabled **Enabled**	Enable or disable the P-ATA IDE 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., 5 Sec. 10 Sec., 15 Sec. 20 Sec., 25 Sec. 30 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

15.5.2.2.1 Parallel-ATA Master/Slave Submenu

Feature	Option	Description
Device	Not Detected Hard Disk ATAPI CDROM ARMD	Shows the type of IDE drive ARMD = ATAPI Removable Media Device
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. (Self Monitoring, Analysis and Reporting Technology)
Type	Not Installed, **Auto** CD/DVD, ARMD	Defines the type of the IDE drive
LBA/Large Mode	Disabled **Auto**	LBA causes Logical Block Addressing
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

15.5.2.3 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

15.5.2.4 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 controller (UHCI)
USB 2.0 Controller	Disabled **Enabled**	Enable or disable the USB 2.0 controller (EHCI)
USB 2.0 Controller Mode	FullSpeed **HiSpeed**	Set the USB 2.0 controller to HiSpeed (480 Mbps) or FullSpeed (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 EHCI ownership
▸ USB Mass Storage Device Configuration	Submenu	Display the status of USB mass storage devices

15.5.2.4.1 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

15.5.3 Display Configuration Submenu

Feature	Option	Description
VGA BIOS Revision	N / A	Show the VGA BIOS revision
JDA Revision	N / A	Show the JDA revision (JILI Data Area)
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 Enter PAID Enter FPID **Auto**	Select a predefined flat panel resolution. Use **PAID** (Panel Adapter ID) or **FPID** (Flat Panel ID) to manually enter a panel record (Kontron specific). If **Auto** the board is searching for a JILI3 (Kontron) or EDID (VESA) record
PAID/FPID	N / A	Enter the wanted number
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)

15.5.4 ACPI Configuration Submenu

Feature	Option	Description
ACPI Version	ACPI 2.0 **ACPI 3.0**	Select the desired ACPI specification (OS depending)
Suspend Mode	**S3 (STR)**	Define the power down mode (STR = Suspend to RAM)
ACPI APIC Support	Disabled **Enabled**	APIC supports more IRQs and faster interrupt handling
Repost Video on S3 Resume	**No** Yes	Determines whether to invoke the VGA BIOS post on suspend event (resume)
AMI OEMB Table	Disabled **Enabled**	Include the AMI OEMB table pointer. The OEMB table is used to fill in POST data in AML code during ACPI OS operations
Headless Mode	**Disabled** Enabled	Indicate support for headless operation, that means without keyboard, mouse and/or monitor. The OS must support the headless mode

15.5.5 Miscellaneous Submenu

Feature	Option	Description
▸ Temperature Monitor	Submenu	Display the CPU and board temperature

15.5.5.1 Temperature Monitor Submenu

Feature	Option	Description
CPU Temperature	N / A	Show the CPU temperature
Board Temperature	N / A	Show the board temperature

15.6   PCIPnP Menu

Feature	Option	Description
Clear NVRAM	**No** Yes	Clear NVRAM (None Volatile RAM) during system boot
PCI Latency Timer	32, **64**, 96, 128, 160, 192, 224, 248	Set this value to allow the master latency timer to be adjusted. This option sets the latency of most PCI devices
IRQ3 IRQ4 IRQ5 IRQ6 IRQ7 IRQ9 IRQ10 IRQ11 IRQ15	**Available** Reserved	**Reserved** means that this interrupt is a legacy IRQ (not shared). **Available** defines that this interrupt can be used as a PCI IRQ

15.7   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

15.7.1 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
AddOn ROM Display Mode	**Force BIOS** Keep Current	**Keep Current** keeps the current display mode. **Force BIOS** switches to BIOS mode before an AddOn ROM is called
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 *Press DEL to run Setup* after memory initialization, otherwise this message is suppressed
Interrupt 19h Capture	**Disabled** Enabled	If enabled AddOn ROMs can be trapped interrupt 19h (Boot IRQ)

15.8 Security Menu

Feature	Option	Description
Supervisor Password	Not Installed Installed	Show state of supervisor password
User Password	Not Installed Installed	Show 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

15.9   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

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.

IRQ #	Used For	Available	Comment
0	Timer 0	No	
1	Keyboard	No	
2	8259 Slave (Cascade)	No	
3		Yes	
4		Yes	
5	PCI IRQ [C]	for PCI	USB 1.1 Controller Port 5/6 Note (1)
6		Yes	
7		Yes	
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	IDE Controller (P-ATA)	No	
15	PCI IRQ [D]	for PCI	USB 2.0 Controller Note (1)

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 *p*ITX-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	IDE 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 - 0CFFh	PCI Configuration	No	Chipset
C080h - C083h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express device
C480h - C483h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express device
C880h - C883h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express device
CE80h - CE8Fh	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express device
CF00h - CF03h	Serial-ATA Controller (S-ATA)	No	Onboard PCI Express device
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	IDE 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 details.

PCI Device	PCI IRQ	Comment
Host Bridge / Memory Controller	None	Chipset
Graphics Controller	INTA	Chipset
HD Audio 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
IDE 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 *p*ITX-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 in not permitted. Don't access any other device addresses except those listed above.*
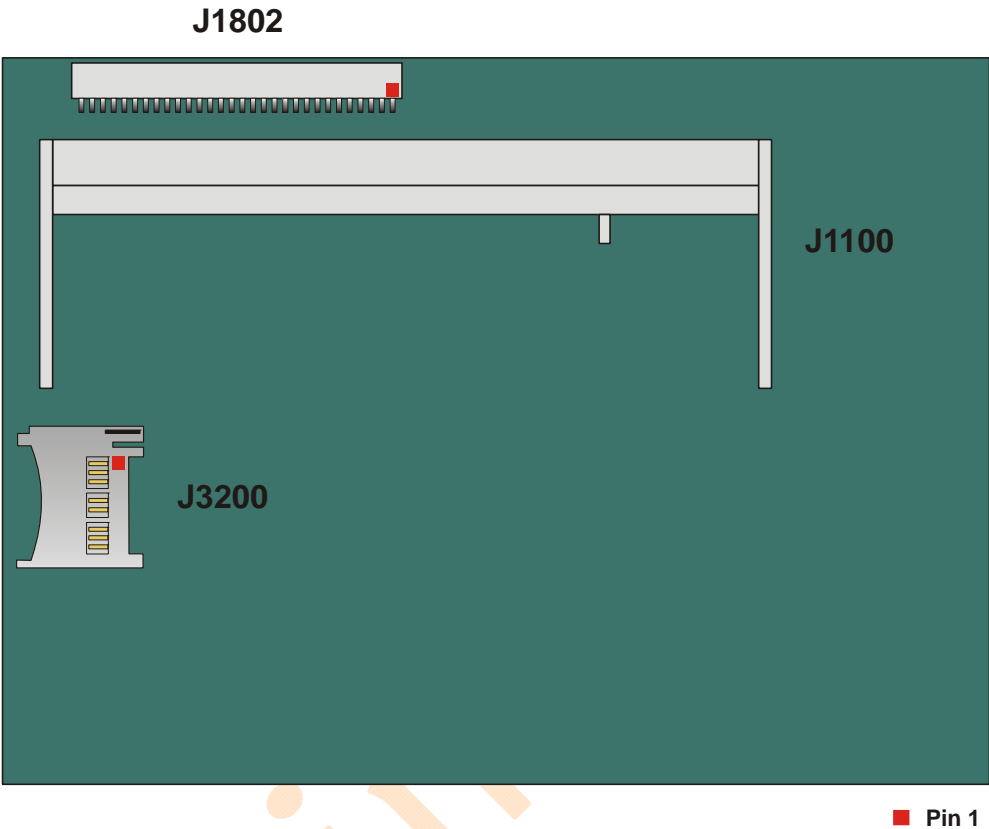
Appendix B: Connector Layout

B.1   Connector Locations

B.1.1   Top Side

B.1.2   Bottom Side

J1802

J1100

J3200

■ **Pin 1**
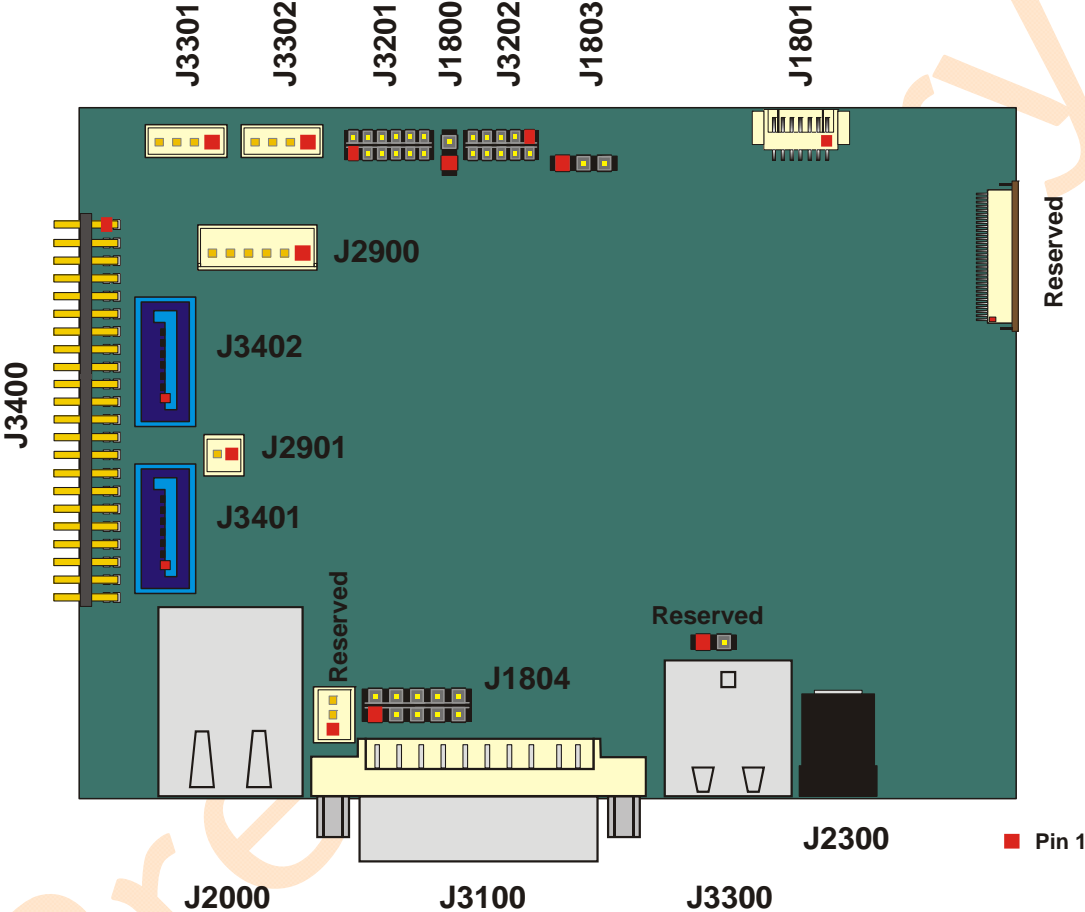
B.2   Pinout Tables

Pin	IDE (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	VCC	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.	VCC
29 / C5	/DACK	GND	VCC
30	GND		VCC
31	IRQ		VCC
32	N.C.		
33	SA1		
34	ATAD		
35	SA0		
36	SA2		
37	/CS1		
38	/CS3		
39	ACT		
40	GND		
41	VCC		
42	VCC		
43	GND		
44	N.C.		

Pin	microSD Socket J3200	SDIO Pin Strip J3201	Digital In/Out J3202
1	DAT2	VCC	VCC
2	CD / DAT3	N.C.	OUT1
3	CMD	DAT0	IN1
4	VCC	N.C.	OUT2
5	CLK	DAT1 / IRQ	IN2
6	GND	GND	OUT3
7	DAT0	DAT2 / RW	IN3
8	DAT1	/WP	OUT4
9		CD / DAT3	IN4
10		/CD	GND
11		CMD	
12		CLK	

Pin	Ethernet J2000	USB Standard J3300	USB Extension J3301/02
1	TXD+ / BI_D1+	VCC	VCC
2	TXD- / BI_D1-	USB0-	USBn-
3	RXD+ / BI_D2+	USB0+	USBn+
4	BI_D3+	GND	GND
5	BI_D3-	VCC	
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: Document Revision History

Revision	Date	Author	Changes
0.1	05/14/09	M. Hüttmann	Created preliminary manual
0.2	05/18/09	M. Hüttmann	Some little corrections

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