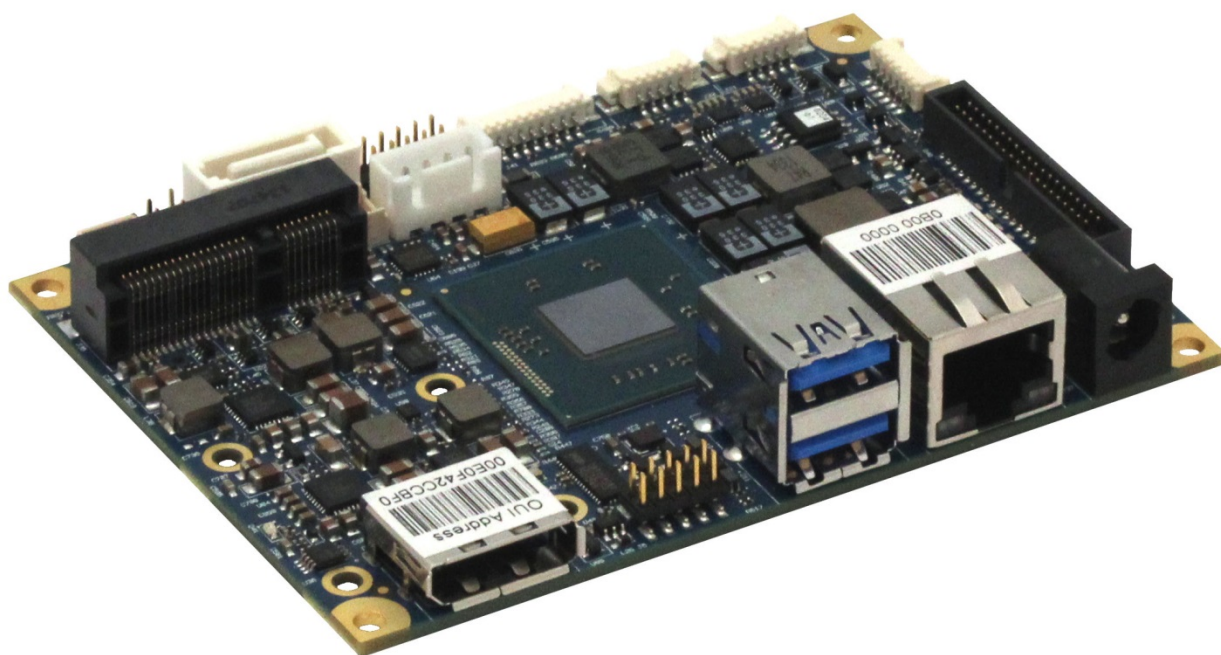


» Kontron User's Guide «



pITX-E38

PRELIMINARY

KTD-N0904-0

Distributed by:



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Revision	Date	By	Comment
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If you have questions about installing or using your KONTRON Technology Product, then please notice that you will find many answers in this Users Guide. To obtain support please contact your local Distributor or Field Application Engineer (FAE).

Before Contacting Support: Please be prepared to provide as much information as possible:

- CPU Board
 1. Type.
 2. Part Number (find PN on label)
 3. Serial Number if available (find SN on label)
- Configuration
 1. DRAM Type and Size.
 2. BIOS Revision (find the version info in the BIOS Setup).
 3. BIOS Settings different than *Default* Settings (refer to the BIOS Setup section).
- System
 1. O/S Make and Version.
 2. Driver Version numbers (Graphics, Network, and Audio).
 3. Attached Hardware: Harddisks, CD-Rom, LCD Panels etc.

If the Kontron Technology product seems to be defect and you want to return it for repair, please follow the guide lines from the following page:

<http://kontron.com/services/rma-information/kontron-technology-a-s/>

1 Introduction

This manual describes the pITX-E38 boards made by KONTRON Technology A/S. In this manual the boards will also be denoted E38.

The E38 boards are based on Intel Atom E38xx SOC (System On Chip) "Intel Bay Trail" and will be available in three versions. The three types of boards are listed in this table:

Feature	pITX-E3815	pITX-E3826	pITX-E3845
Bay Trail SOC	E3815 (1 core)	E3826 (2cores)	E3845 (4 cores)
Core speed	1,46GHz	1,46GHz	1,91GHz
Total Design Power	5W	7W	10W

Use of this Users Guide implies a basic knowledge of PC-AT hard- and software. This manual is focused on describing the E38 board's special features and is not intended to be a standard PC-AT textbook.

New users are recommended to study the short installation procedure stated in the following chapter before switching-on the power.

All configuration and setup of the CPU board is either done automatically or manually by the user via the BIOS setup menus. Only exceptions are the "Clear CMOS" Jumper and the "Always On" jumper.

Latest revision of this manual, datasheet, BIOS, drivers, BSP's (Board Support Packages), Mechanical drawings (2D and 3D) can be downloaded from here: <http://www.kontron.com/products/boards-and-mezzanines/embedded-motherboards/>

2 Installation Procedure

2.1 Installing the Board

To get the board running follow these steps. If the board shipped from KONTRON has already components like RAM and CPU cooler mounted, then relevant steps below can be skipped.

1. Turn off the PSU (Power Supply Unit)



Warning: Turn off PSU (Power Supply Unit) completely (no mains power connected to the PSU) or leave the Power Connectors unconnected while configuring the board. Otherwise components (RAM, LAN cards etc.) might get damaged. Make sure to use +5V single supply only. Alternatively use a standard ATX PSU with suitable cable kit and PS_ON# active.

2. Insert the DDR3L SODIMM module

For a list of approved DDR3L SODIMMs contact your Distributor or FAE. See also chapter "System Memory Support".

3. Cooler Installation

Normally the cooler is premounted, but in case not, then make sure the heat paste etc. on the cooler is intact and cover the full area of the SOC. Connect Cooler Fan electrically to the FAN_CPU connector.

4. Connecting Interfaces

Insert all external cables for hard disk, keyboard etc. A monitor must be connected in order to change BIOS settings.

5. Connect and turn on PSU

Connect PSU to the board by the +5Vin-Internal connector or the +5Vin-External connector. Please note that current limitations apply, see relevant connector description.

6. Power Button

If the board does not start by itself when switching on the ATX PSU AC mains, then follow these instructions to start the board. Install the Always On Jumper in the Always On position or toggle the PWRBTN_IN# signal (available in the FRONTPNL connector), by momentary shorting pins 2 (PWRBTN_IN#) and pin 4 (GND). A "normally open" switch is recommended.

7. BIOS Setup

Enter the BIOS setup by pressing the <F2> key during boot up.

Enter "Exit Menu" and Load Setup Defaults.

Refer to the "BIOS Configuration / Setup" section of this manual for details on BIOS setup. Please note that BIOS may boot in UEFI shell, if so then type exit to activate BIOS menu and select Set-up.

Note: To clear all BIOS settings, including Password protection, activate "Clear CMOS Settings" Jumper for ≈10 sec (without power connected).

8. Mounting the board in chassis



Warning: When mounting the board to chassis etc. please notice that the board contains components on both sides of the PCB which can easily be damaged if board is handled without reasonable care. A damaged component can result in malfunction or no function at all.

When fixing the Motherboard on a chassis it is recommended using screws with integrated washer and a diameter of ≈ 7 mm. Do not use washers with teeth, as they can damage the PCB and cause short circuits.

2.2 Requirements IEC60950

Take care when designing chassis interface connectors in order to fulfil the IEC60950 standard.

When an interface or connector has a VCC (or other power) pin which is directly connected to a power plane like the VCC plane:

To protect the external power lines of the peripheral devices the customer has to ensure:

- Wires have suitable rating to withstand the maximum available power.
- That the enclosure of the peripheral device fulfils the fire protecting requirements of IEC60950.

Lithium battery precautions

CAUTION! Danger of explosion if battery is incorrectly re- placed. Replace only with same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instruc- tions.	VORSICHT! Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch den selben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Anga- ben des Herstellers.
ATTENTION! Risque d'explosion avec l'échange inadéquat de la batterie. Remplacement seulement par le même ou un type équivalent recommandé par le producteur. L'évacuation des batteries usagées conformément à des indications du fabricant.	PRECAUCION! 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.
ADVARSEL! Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.	ADVARSEL! Ekspløsjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.
VARNING! Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.	VAROITUS! Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan latteval- mistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

3 System Specifications

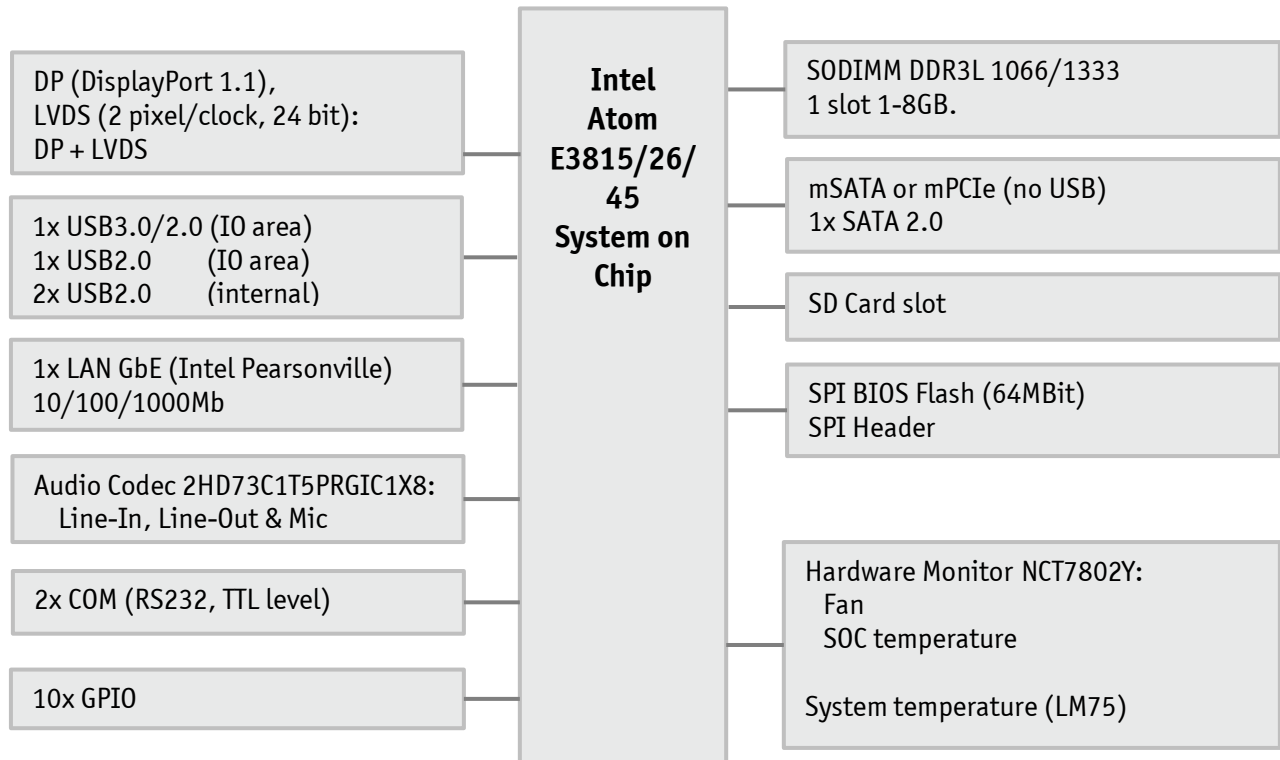
3.1 Component main data

Form factor	pITX (picoITX) 100 mm by 72 mm
Processor	Intel Bay Trail FCBGA1170 Type 3 27x25mm 0.593 Ball Pitch. Three version available: E3815 (1 core), 1,46GHz, 5W E3826 (2 core), 1,46GHz, 7W E3845 (4 core), 1,46GHz, 10W
Memory	1x DDR3L SODIMM socket supporting single-channel unbuffered DDR3L 1066/1333MHz (PC3-8500/PC3-10600). Up to 4GB (Intel specification) however Kontron has qualified 8GB. (ECC not supported).
Lan	1x Gbe LAN Intel I210 "Springville"
DP	DP (DisplayPort) v1.1a Intel® Gen7 Graphics, OpenGL 3.0, OpenCL 1.2, DX11, H.264, MPEG2, MCV, VC-1, VP8
LVDS	LVDS panels up to 2 pixels per clock, 24 bit colors (VESA/JEIDA). Based on DP to LVDS converter type PTN3460BS.
USB	• 1x USB3.0/2.0 (IO area, lower port) • 1x USB2.0 (IO area, upper port) • 2x USB2.0 (internal)
Serial	2x Serial ports (RS232) (TTL only) on internal 5-pin connector
Sata	1x SATA2.0
GPIO	10 x GPIOs (General Purpose I/Os), (via GPIO connector)
SD Card	1x Micro SD Card Slot
mPCIe or mSATA	1x mPCIe (miniPCI Express) or 1x mSATA (miniSATA). Full- or halfsize formfactor. (No USB included)
Hardware Monitor Subsystem	• Fan control system support Thermal cruise (fixed temperature limit, no BIOS setup). • Thermal inputs: PCB near SOC temperature (precision +/- 3°C). • System temperature sensor (precision +/- 0.5°C)
Power Supply Unit	+5V single supply via either Vin-Int. (4-pin connector) or Vin-Ext. connector (DC Connector RA 2mm locking type)
Audio	HDA Codec IDT 92HD73C1T5PRGIC1X8: • 1x Stereo Line in • 1x Stereo Line out • 1x Mic in

Environmental Conditions	Operating: Operating temperature -25°C to 75°C. Relative humidity (non-condensing) TBD Storage: TBD Electro Static Discharge (ESD) / Radiated Emissions (EMI): All Peripheral interfaces intended for connection to external equipment are ESD/ EMI protected. EN 61000-4-2:2000 ESD Immunity EN55022:2006+A1:2007 class B Generic Emission Standard. Safety: TBD IEC 60950-1: 2005, 2nd Edition UL 60950-1 CSA C22.2 No. 60950-1 Product Category: Information Technology Equipment Including Electrical Business Equipment Product Category CCN: NWGQ2, NWGQ8 File number: E194252 Shock: TBD IAW IEC 60068-2-27, Test Ea, shock, 18 shocks 3 per axis, 6 directions. Shock pulse 50g, 11ms halfsine. Bump: TBD IAW IEC 60068-2-29, Test Eb, Bump, 3000 bumps, 500 per axis, 6 directions. Half Sine Waveform Acceleration 2g; Pulse Duration 11ms. Vibration: TBD IAW IEC 60068-2-64, Test Fh, Random Vibration. 90 min per axis, 3 axes, at 1.9 grms, with PSD: 10-20 Hz: 0.05 g²/Hz and 20-500 Hz: -3dB/octave. Theoretical MTBF: 414.670 / 183.190 hours @ 40°C / 75°C. Restriction of Hazardous Substances (RoHS): All boards in the pITX-E38 family are RoHS compliant. Capacitor utilization: Solid Capacitors with Conductive Polymer rated for 105 °C used on board.
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3.2 System overview

The block diagram below shows the architecture and main components of the pITX-E38. The key component on the board is the Intel® Atom E38xx SoC (Bay Trail).

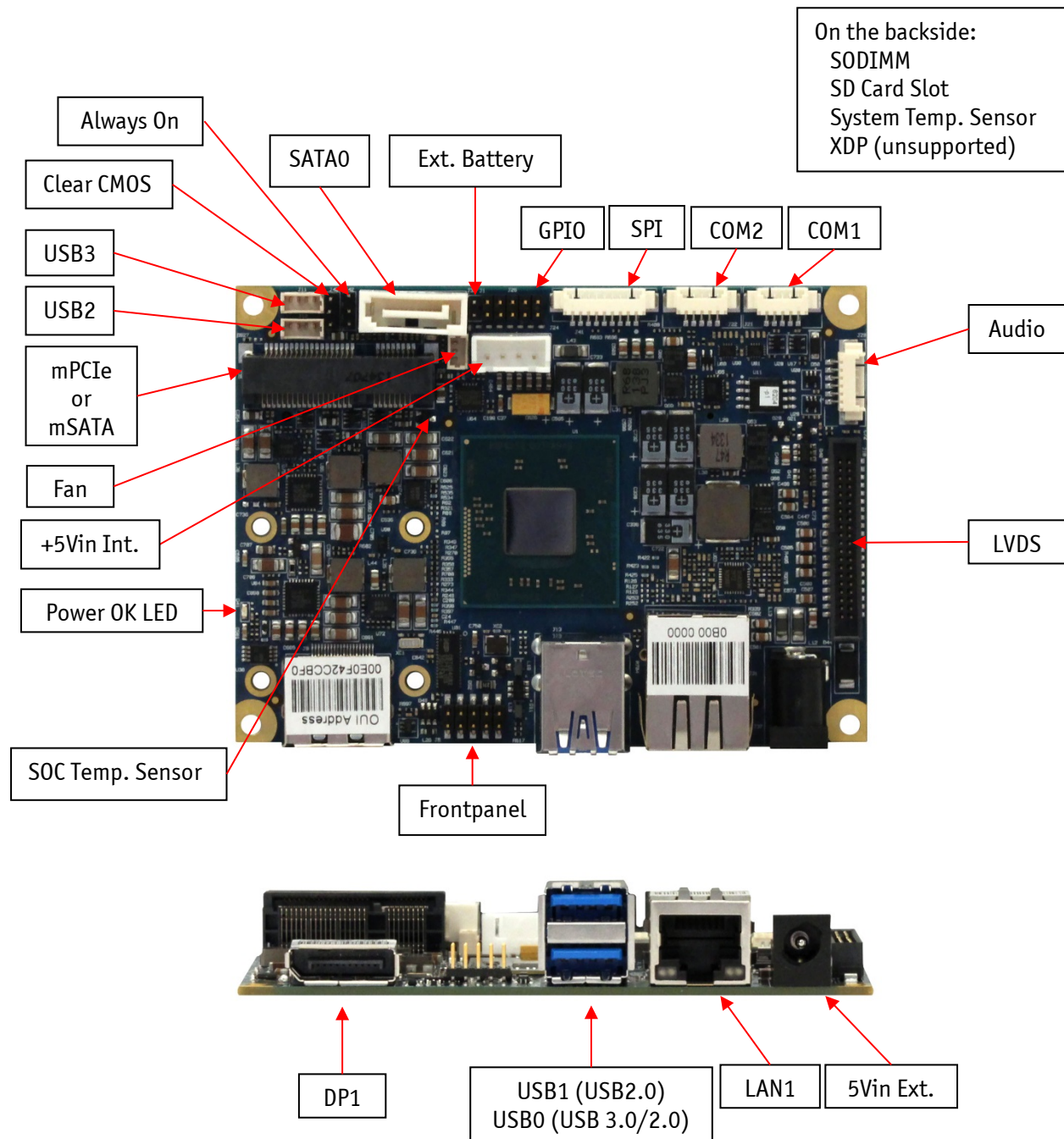


3.1 Power Consumption

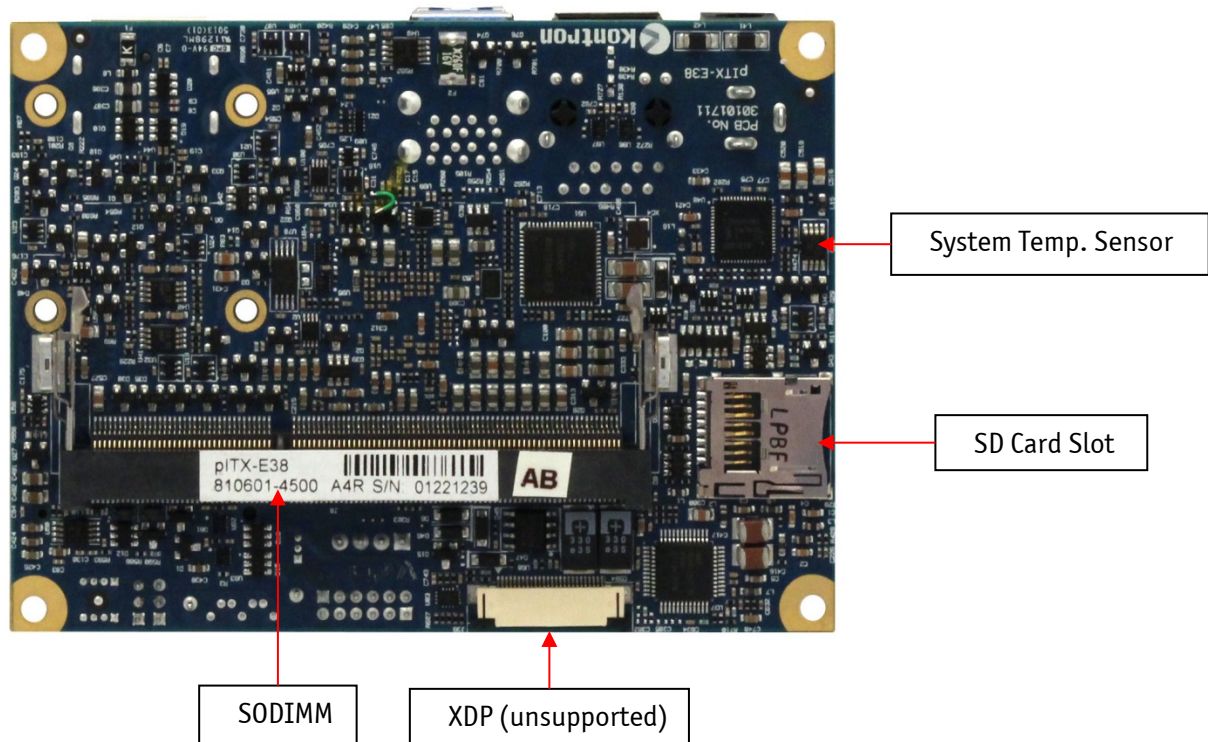
TBD

4 Connector Locations

4.1 pITX-E38 - frontside



4.2 pITX-E38 - backside



5 Connector Definition

The following sections provide pin definitions and detailed description of all on-board connectors.

The connector definitions follow the following notation:

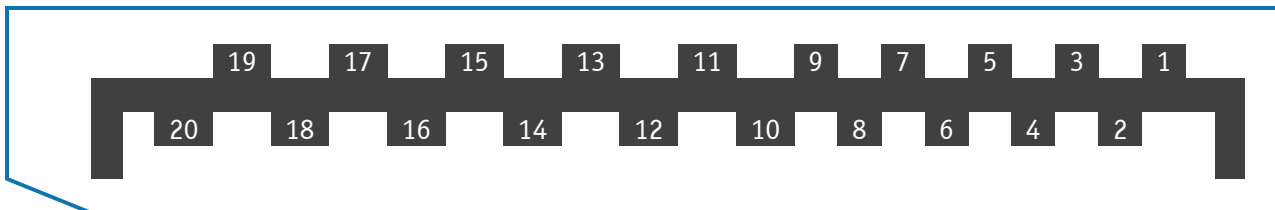
Column name	Description
Pin	Shows the pin-numbers in the connector. The graphical layout of the connector definition tables is made similar to the physical connectors.
Signal	The mnemonic name of the signal at the current pin. The notation "XX#" states that the signal "XX" is active low.
Type	AI: Analogue Input. AO: Analogue Output. I: Input, TTL compatible if nothing else stated. IO: Input / Output. TTL compatible if nothing else stated. IOT: Bi-directional tristate IO pin. IS: Schmitt-trigger input, TTL compatible. IOC: Input / open-collector Output, TTL compatible. IOD: Input / Output, CMOS level Schmitt-triggered. (Open drain output) NC: Pin not connected. O: Output, TTL compatible. OC: Output, open-collector or open-drain, TTL compatible. OT: Output with tri-state capability, TTL compatible. LVDS: Low Voltage Differential Signal. PWR: Power supply or ground reference pins.
	Ioh: Typical current in mA flowing out of an output pin through a grounded load, while the output voltage is > 2.4 V DC (if nothing else stated). Iol: Typical current in mA flowing into an output pin from a VCC connected load, while the output voltage is < 0.4 V DC (if nothing else stated).
Pull U/D	On-board pull-up or pull-down resistors on input pins or open-collector output pins.
Note	Special remarks concerning the signal.

The abbreviation *TBD* is used for specifications which are not available yet or which are not sufficiently specified by the component vendors.

6 IO-Area Connectors

6.1 DP Connectors (DP1)

The DP (DisplayPort) connector is based on standard DP type Foxconn 3VD51203-H7JJ-7H or similar.



Pin	Signal	Description	Type	Note
1	Lane 0 (p)		LVDS	
2	GND		PWR	
3	Lane 0 (n)		LVDS	
4	Lane 1 (p)		LVDS	
5	GND		PWR	
6	Lane 1 (n)		LVDS	
7	Lane 2 (p)		LVDS	
8	GND		PWR	
9	Lane 2 (n)		LVDS	
10	Lane 3 (p)		LVDS	
11	GND		PWR	
12	Lane 3 (n)		LVDS	
13	Config1	Aux or DDC selection	I	Internally pull down (1Mohm). Aux channel on pin 15/17 selected as default (when NC) DDC channel on pin 15/17, If HDMI adapter used (3.3V)
14	Config2	(Not used)	0	Internally connected to GND
15	Aux Ch (p)	Aux Channel (+) or DDC Clk		AUX (+) channel used by DP DDC Clk used by HDMI
16	GND		PWR	
17	Aux Ch (n)	Aux Channel (-) or DDC Data		AUX (-) channel used by DP DDC Data used by HDMI
18	Hot Plug		I	Internally pull down (100Kohm).
19	Return		PWR	Same as GND
20	3.3V		PWR	Fused by 1.5A resetable PTC fuse.

6.2 Ethernet Connector

The pITX-E38 support single channels of 10/100/1000Mb Ethernet based on Intel® Springville i210.

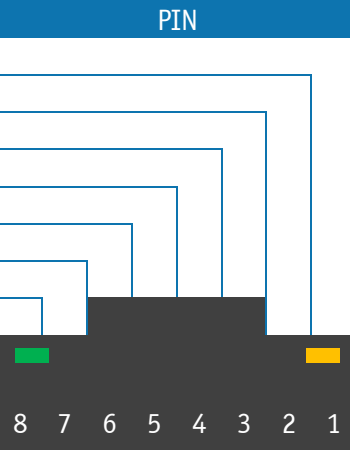
In order to achieve the specified performance of the Ethernet port, Category 5 twisted pair cables must be used with 10/100MB and Category 5E, 6 or 6E with 1Gb LAN networks.

The signals for the Ethernet ports are as follows:

Signal	Description
MDI[0]+ / MDI[0]-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
MDI[1]+ / MDI[1]-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
MDI[2]+ / MDI[2]-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
MDI[3]+ / MDI[3]-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair. In MDI crossover mode, this pair acts as the BI_DC+/- pair.

Note: MDI = Media Dependent Interface.

The pinout of the RJ45 connectors is as follows:

Signal	PIN	Type	Ioh/Iol	Note
MDI0+				
MDI0-				
MDI1+				
MDI2+				
MDI2-				
MDI1-				
MDI3+				
MDI3-				
Flashing => communication				On => 1GB link
	8 7 6 5 4 3 2 1			

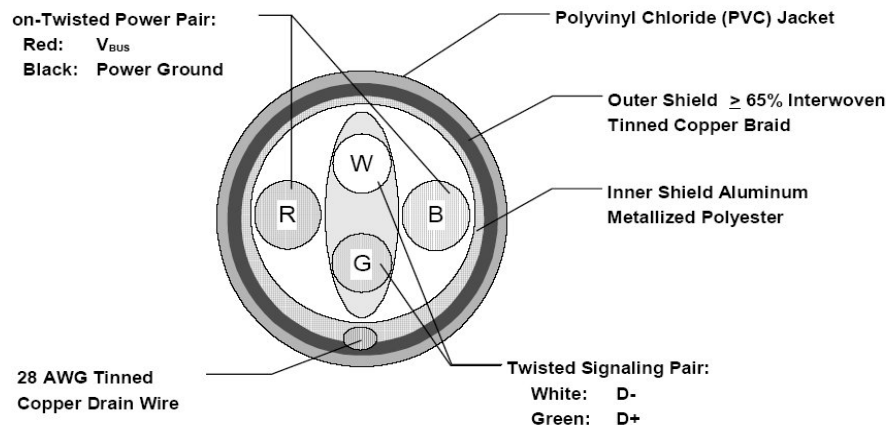
6.1 USB Connectors (IO Area)

The pITX-E38 board contains support for 1 USB3.0/2.0 port (Lower USB port, USB0) and one USB2.0 port (higher USB port, USB1) in the IO area.

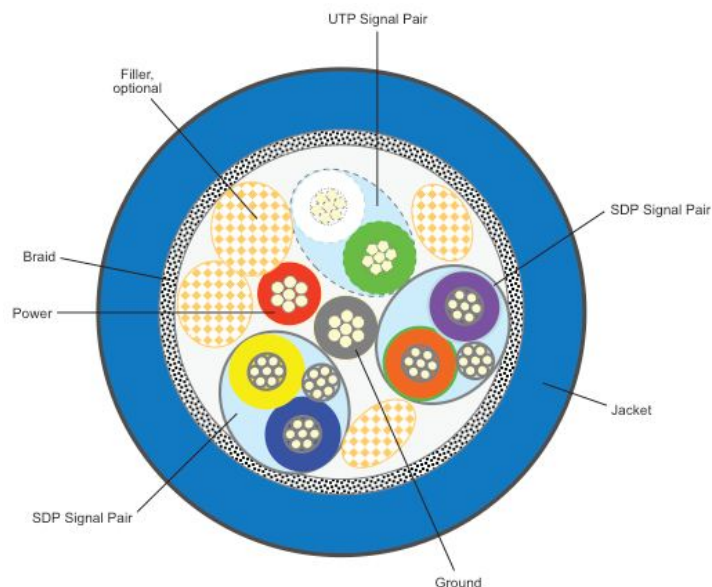
USB 2.0 ports allowing data transfers up to 480Mb/s. The USB 3.0 port allowing data transfers up to 5Gb/s.

(Two internal USB ports are available via internal 4-pin connectors)

For USB2.0 cabling it is required to use only HiSpeed USB cable, specified in USB2.0 standard:



For USB3.0 cabling it is required to use only HiSpeed USB cable, specified in USB3.0 standard:



USB Ports 0 and 1 are mounted together, USB1 (USB2.0) on top of the USB0 (USB3.0/USB2.0).

Note	Type	Signal	PIN				Signal	Type	Note
	IO	USB1-				USB1+			IO
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	-	nc	5	6	7	8	9	nc	-
	-	nc				nc			-
	PWR	GND							
	IO	USB0-				USB0+			IO
1	PWR	5V/SB5V	1	2	3	4	GND	PWR	
	IO	RX0-	5	6	7	8	9	TX0+	IO
	IO	RX0+				TX0-			IO
	PWR	GND							

Note 1: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

Signal	Description
USBn+ USBn- RXn+ RXn- TXn+ TXn- (n= 0,1)	Differential pair works as serial differential receive/transmit data lines.
5V/SB5V	5V supply for external devices. SB5V is supplied during power-down to allow wakeup on USB device activity. Protected by 1.0A current limiting circuit for each USB port.

6.2 DC Power Jack Connector (5Vin Ext.)

Either the DC Power Jack Connector (5Vin Ext.) or the “5Vin Int.” connector must be used to supply the board with +5V +/-5%.

The power connector has Vin to the center pin. Maximum allowed current is 5A.

Header	Pin	Signal	Description
	1	GND	Ground
	2	Vin	Power supply +5V

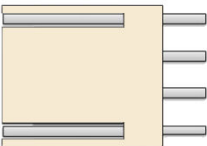
Warning: Hot Plugging power supply is not supported. Hot plugging might damage the board.

Notes: To protect the external power lines of peripheral devices make sure that

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

7 Internal Connectors

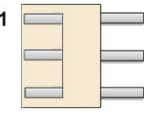
7.1 Internal Power Connector (Vin Int.)

Header		Pin	Signal	Description	Type
1		1	+5V	+5V power input	PWR
		2	+5V	+5V power input	PWR
		3	GND	Power Ground	PWR
		4	GND	Power Ground	PWR

Maximum allowed current on each pin is 3A.

7.2 Fan Connector (Fan)

The Fan can be used to actively cool the heatsink mounted on the board. The fan rotation speed can be monitored and the fan speed controlled by the temperature of the PCB (near SOC).

Header	Pin	Signal	Description	Type
	1	TACHO	Rotation speed	I
	2	PWM	PWM output	0-5V
	3	GND	Ground	PWR

Signal	Description
PWM	PWM output signal for FAN speed control.
TACHO	Tacho input signal from the fan, for rotation speed supervision RPM (Rotation Per Minute). The signal shall be generated by an open collector transistor or similar. Onboard is a pull-up resistor 2K2 to +3.3V. The signal has to be pulsed and onboard circuit is prepared for two (TBD) pulses per rotation.
GND	Power Supply GND signal

7.3 LVDS Flat Panel Connector (LVDS)

The LVDS connector (Flex boards only) is based on 40 pole connector type Samtec SHF-120-01-F-D-SM-K-TR or similar.

Note	Type	Signal	PIN	Signal	Type	Note
Max. 0.5A	PWR	+5V	1 2	+5V	PWR	Max. 0.5A
Max. 0.5A	PWR	+5V	3 4	+5V	PWR	Max. 0.5A
Max. 0.5A	PWR	+5V	5 6	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	+5V	7 8	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	LCDVCC	9 10	LCDVCC	PWR	Max. 0.5A
2K2Ω, 3.3V	OT	DDC CLK	11 12	DDC DATA	OT	2K2Ω, 3.3V
3.3V level	OT	BKLTCTL	13 14	VDD ENABLE	OT	3.3V level
3.3V level	OT	BKLTEN#	15 16	GND	PWR	Max. 0.5A
	LVDS	LVDS A0-	17 18	LVDS A0+	LVDS	
	LVDS	LVDS A1-	19 20	LVDS A1+	LVDS	
	LVDS	LVDS A2-	21 22	LVDS A2+	LVDS	
	LVDS	LVDS ACLK-	23 24	LVDS ACLK+	LVDS	
	LVDS	LVDS A3-	25 26	LVDS A3+	LVDS	
Max. 0.5A	PWR	GND	27 28	GND	PWR	Max. 0.5A
	LVDS	LVDS B0-	29 30	LVDS B0+	LVDS	
	LVDS	LVDS B1-	31 32	LVDS B1+	LVDS	
	LVDS	LVDS B2-	33 34	LVDS B2+	LVDS	
	LVDS	LVDS BCLK-	35 36	LVDS BCLK+	LVDS	
	LVDS	LVDS B3-	37 38	LVDS B3+	LVDS	
Max. 0.5A	PWR	GND	39 40	GND	PWR	Max. 0.5A

Note: The LVDS connector supports single and dual channel, 18/24bit SPWG panels up to a resolution of 1600x1200 or 1920x1080 and with limited frame rate up to 1920x1200.

Signal Description – LVDS Flat Panel Connector:

Signal	Description
LVDS A0..A3	LVDS A Channel data
LVDS ACLK	LVDS A Channel clock
LVDS B0..B3	LVDS B Channel data
LVDS BCLK	LVDS B Channel clock
BKLTCTL	Backlight control (1), PWM signal to implement voltage in the range 0-3.3V
BKLTEN#	Backlight Enable signal (active low) (2)
VDD ENABLE	Output Display Enable.
LCDVCC	VCC supply to the display. 5V or 3.3V (1A Max.) selected in BIOS setup menu. Power sequencing depends on LVDS panel selection. (Shared with eDP connector)
DDC CLK	DDC Channel Clock

Notes: Windows API will be available to operate the BKLTCTL signal. Some Inverters have a limited voltage range 0- 2.5V for this signal: If voltage is > 2.5V the Inverter might latch up. Some Inverters generates noise on the BKLTCTL signal, causing the LVDS transmission to fail (corrupted picture on the display). By adding a 1Kohm resistor in series with this signal, mounted at the Inverter end of the cable kit, the noise is limited and the picture is stable.
If the Backlight Enable is required to be active high then, check the following BIOS Chipset setting: Backlight Signal Inversion = Enabled.

7.4 SATA (Serial ATA) Disk interface (SATA0)

Sata0 connector pinning:

PIN	Signal	Type	Ioh/Iol	Note
1	GND	PWR	-	
2	SATA* TX+			
3	SATA* TX-			
4	GND	PWR	-	
5	SATA* RX-			
6	SATA* RX+			
7	GND	PWR	-	

Signal	Description
SATA0 RX+ / RX-	Host transmitter differential signal pair
SATA0 TX+ / TX-	Host receiver differential signal pair

Available cable kit:



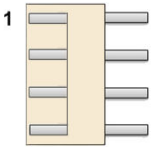
PN 821035 Cable SATA 500mm

7.1 USB Connectors (USB2 and USB3)

The pITX-E38 support two internal USB 2.0 ports (USB2 and USB3) allowing data transfers up to 480Mb/s.

Legacy Keyboard/Mouse and wakeup from sleep states are supported. Over-current detection on all fourteen USB ports is supported.

See chapter “USB Connectors (IO Area)” for more information on USB0 – USB1.

Header	Pin	Signal	Description	Type
	1	GND	Ground	PWR
	2	USBx+		IO
	3	USBx-		IO
	4	5V/SB5V	5V power	PWR

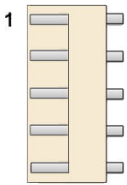
Note1:

Signal	Description
USBx+ USBx-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by 1.0A current limiting circuit for each USB port.

In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

7.1 Serial COM1 – COM2 Ports (COM1, COM2)

Two RS232 serial ports (TTL signals only) are available on the pITX-E38.

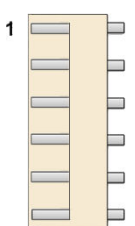
Header	Pin	Signal	Description	Type
	1	TxD	TTL signal	O
	2	RxD	TTL signal	I
	3	RTS	TTL signal	O
	4	CTS	TTL signal	I
	5	GND	Ground	PWR

The typical definition of the signals in the COM ports is as follows:

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (0V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.

7.2 Audio Connector

The on-board Audio circuit implements High Definition Audio with UAA (Universal Audio Architecture), featuring 24-bit stereo DAC and 20-bit stereo ADCs.

Header	Pin	Signal	Description	Type
	1	Line-in left		0
	2	Mic	Microphone	I
	3	Line-in right		0
	4	Line-out left		I
	5	GND	Ground	PWR
	6	Line-out right		0

7.3 Front Panel Connector (FRONTPNL) (J2)

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
	-	-	I	RSTIN#	1 2	PWRBTN_IN#	I	-	-	
	-	-	PWR	GND	3 4	Gnd	PWR	-	-	
	-	-		Beep	5 6	5V	PWR	-	-	
	220R	-	0	3.3V	7 8	3.3V	0	-	220R	
1	-	-	NC	SataLED#	9 10	SuspendLED		-	-	1

Note1, LED output has integrated 220 ohm.

Signal	Description
RSTIN#	Reset Input active low.
PWRBTN_IN#	Power Button In. Toggle this signal low to boot the board or to shut down.
Beep	
+5V	5V maximum load is 500mA.
3.3V	3.3V signal via 220 ohm resistor pullup to 3.3V.
SATA_LED#	SATA Activity LED (active low signal). 3V3 output when passive.
SUS_LED	Suspend Mode LED (active high signal). Output 3.3V via 220Ω.

7.4 GPIO Connector (GPIO)

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
	-	-	PWR	3.3V	1 2	GPIO4	IOT	TBD		
	-	TBD	IOT	GPIO0	3 4	GPIO5	IOT	TBD		
	-	TBD	IOT	GPIO1	5 6	GPIO6	IOT	TBD		
	-	TBD	IOT	GPIO2	7 8	GPIO7	IOT	TBD		
	-	TBD	IOT	GPIO3	9 10	GND	PWR	-	-	

Signal	Description
3.3V	
GPIO0..7	General Purpose Inputs / Output. These Signals may be controlled or monitored through the use of the KT-API-V2 (Application Programming Interface).

7.5 External battery (Ext. Battery)

Pin 1 is Ground, pin 2 is Vbat input.

7.6 Clear CMOS (CLR-CMOS)

Connect jumper to clear CMOS settings. Don't leave the jumper installed.

CMOS1		Description
pin1-2	pin2-3	
-	X	Default position
X	-	Load Default BIOS Settings exclusive erasing Password
-	-	No function.

7.7 “Always On” (Always On)

The “Always On” can be used to implement hardware controlled Always ON by jumper. When “Always On” is selected, then the board will power up automatically when power is connected. It doesn’t matter if “Always On” is not selected in BIOS.

The board can still be shut down by PWRBTN_IN# (power button in) activation (via Front Panel connector).

Always On		Description
pin1-2	pin2-3	
X	-	Always On selection
-	X	Default position
-	-	No function. Note: may load default BIOS settings after several minutes

7.8 SPI Connector (SPI)

TBD

7.9 XDP (XDP)

TBD

8 Slot Connectors (mPCIe, mSATA, SD card)

8.1 mPCIe or mSATA slot

The miniPCIe port support mPCIe, mSATA and LPC POST module.
(No USB is included).



Note	Type	Signal	PIN		Signal	Type	Note
		WAKE#	1	2	+3V3	PWR	
	NC	NC	3	4	GND	PWR	
	NC	NC	5	6	+1.5V	PWR	
1		CLKREQ#	7	8	LPC_Frame#	0	
	PWR	GND	9	10	LPC_AD3	IO	
		PCIE_mini CLK#	11	12	LPC_AD2	IO	
		PCIE_mini CLK	13	14	LPC_AD1	IO	
	PWR	GND	15	16	LPC_A0	IO	
3	0	RST#_LPC	17	18	GND	PWR	
	0	CLK_Debug	19	20	W_Disable#		2
	PWR	GND	21	22	RST#		
		PCIE_RXN	23	24	+3V3 Dual	PWR	
		PCIE_RXP	25	26	GND	PWR	
	PWR	GND	27	28	+1.5V	PWR	
	PWR	GND	29	30	SMB_CLK		
		PCIE_TXN	31	32	SMB_DATA		
		PCIE_TXP	33	34	GND	PWR	
	PWR	GND	35	36	NC	NC	
	PWR	GND	37	38	NC	NC	
	PWR	+3V3 Dual	39	40	GND	PWR	
	PWR	+3V3 Dual	41	42	NC	NC	
	PWR	GND	43	44	NC	NC	
		CLK_MPCIE	45	46	NC	NC	
		DATA_MPCIE	47	48	+1.5V	PWR	
		RST_MPCIE#	49	50	GND	PWR	
		SEL_MSATA	51	52	+3V3 Dual	PWR	

Note 1: 10K ohm pull-up to 3V3.

Note 2: 2K2 ohm pull-up to 3V3 Dual.

Note 2: 10K ohm pull-down to GND.

8.1 SD card slot

TBD

9 On-board - & mating connector types

TBD