SBC
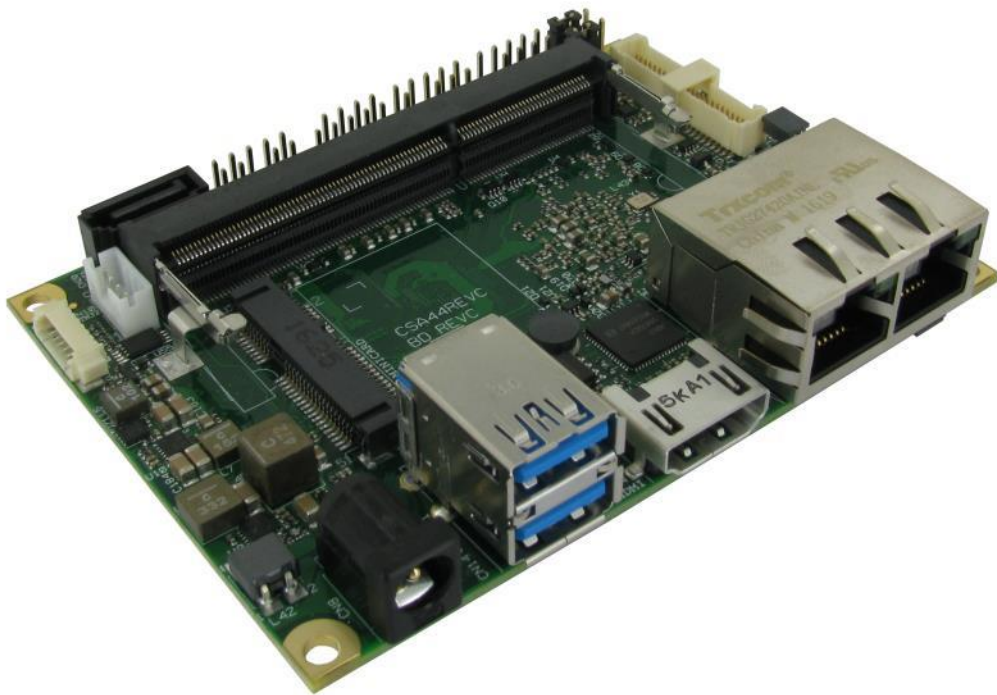
User Manual

SBC-A44-pITX

Single Board Computer
with the Intel® Atom™ E3800 family SOCs
and ECC DDR3L memory
on picoITX form factor

SECO

REVISION HISTORY

Revision	Date	Note	Ref
1.0	4th February 2016	First Official Release.	SB
1.1	25th February 2016	VGA connector removed	SB
1.2	18th November 2016	Typo corrected in par. 2.3.2. BIOS Section updated. Changes for rev. C of the PCB: • µSD + SIM Combo slot changed to µSD only • minicard slot (CN6) pinout updated • added GPI/O connector	SB
1.3	18th January 2017	BIOS Section updated	SB
1.4	5th May 2017	BIOS Section updated	SB
1.5	11th September 2017	BIOS Section updated	SB

For further information on this module or other SECO products, but also to get the required assistance for any and possible issues, please contact us using the dedicated web form available at http://www.seco.com (registration required).

Our team is ready to assist.

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Chapter 1.
INTRODUCTION

- Warranty
- Information and assistance
- RMA number request
- Safety
- Electrostatic discharges
- RoHS compliance
- Terminology and definitions
- Reference specifications

1.1 Warranty

This product is subject to the Italian Law Decree 24/2002, acting European Directive 1999/44/CE on matters of sale and warranties to consumers.

The warranty on this product lasts for 1 year.

Under the warranty period, the Supplier guarantees the buyer assistance and service for repairing, replacing or credit of the item, at the Supplier's own discretion.

Shipping costs that apply to non-conforming items or items that need replacement are to be paid by the customer.

Items cannot be returned unless previously authorized by the supplier.

The authorization is released after completing the specific form available on the web-site http://www.seco.com/en/prerma (RMA Online). The RMA authorization number must be put both on the packaging and on the documents shipped with the items, which must include all the accessories in their original packaging, with no signs of damage to, or tampering with, any returned item.

The error analysis form identifying the fault type must be completed by the customer and has must accompany the returned item.

If any of the above mentioned requirements for the RMA is not satisfied, the item will be shipped back and the customer will have to pay any and all shipping costs.

Following a technical analysis, the supplier will verify if all the requirements, for which a warranty service applies, are met. If the warranty cannot be applied, the Supplier will calculate the minimum cost of this initial analysis on the item and the repair costs. Costs for replaced components will be calculated separately.

⚠️ **Warning!**
All changes or modifications to the equipment not explicitly approved by SECO S.r.l. could impair the equipment's functionalities and could void the warranty

1.2 Information and assistance

What do I have to do if the product is faulty?

SECO S.r.l. offers the following services:

- SECO website: visit http://www.seco.com to receive the latest information on the product. In most cases it is possible to find useful information to solve the problem.
- SECO Sales Representative: the Sales Rep can help to determine the exact cause of the problem and search for the best solution.
- SECO Help-Desk: contact SECO Technical Assistance. A technician is at disposal to understand the exact origin of the problem and suggest the correct solution.

> E-mail: technical.service@seco.com
>
> Fax (+39) 0575 340434

- Repair centre: it is possible to send the faulty product to the SECO Repair Centre. In this case, follow this procedure:
  - Returned items must be accompanied by a RMA Number. Items sent without the RMA number will be not accepted.
  - Returned items must be shipped in an appropriate package. SECO is not responsible for damages caused by accidental drop, improper usage, or customer neglect.

Note: Please have the following information before asking for technical assistance:

- Name and serial number of the product;

- Description of Customer's peripheral connections;

- Description of Customer's software (operating system, version, application software, etc.);

- A complete description of the problem;

- The exact words of every kind of error message encountered.

1.3 RMA number request

To request a RMA number, please visit SECO's web-site. On the home page, please select "RMA Online" and follow the procedure described.

A RMA Number will be sent within 1 working day (only for on-line RMA requests).

1.4 Safety

The SBC-A44-pITX board uses only extremely-low voltages.

While handling the board, please use extreme caution to avoid any kind of risk or damages to electronic components.

! Always switch the power off, and unplug the power supply unit, before handling the board and/or connecting cables or other boards.

Avoid using metallic components - like paper clips, screws and similar - near the board when connected to a power supply, to avoid short circuits due to unwanted contacts with other board components.

If the board has become wet, never connect it to any external power supply unit or battery.

1.5 Electrostatic discharges

The SBC-A44-pITX board, like any other electronic product, is an electrostatic sensitive device: high voltages caused by static electricity could damage some or all the devices and/or components on-board.

! Whenever handling a SBC-A44-pITX board, ground yourself through an anti-static wrist strap. Placement of the board on an anti-static surface is also highly recommended.

1.6 RoHS compliance

The SBC-A44-pITX board is designed using RoHS compliant components and is manufactured on a lead-free production line. It is therefore fully RoHS compliant.

1.7 Terminology and definitions

ACPI	Advanced Configuration and Power Interface, an open industrial standard for the board's devices configuration and power management
AHCI	Advanced Host Controller Interface, a standard which defines the operation modes of SATA interface
API	Application Program Interface, a set of commands and functions that can be used by programmers for writing software for specific Operating Systems
BIOS	Basic Input / Output System, the Firmware Interface that initializes the board before the OS starts loading
CEC	Consumer Electronics Control, an HDMI feature which allows controlling more devices connected together by using only one remote control
CRT	Cathode Ray Tube. Initially used to indicate a type of monitor, this acronym has been used over time to indicate the analog video interface used to drive them.
DDC	Display Data Channel, a kind of I2C interface for digital communication between displays and graphics processing units (GPU)
DDR	Double Data Rate, a typology of memory devices which transfer data both on the rising and on the falling edge of the clock
DDR3	DDR, 3rd generation
EHCI	Enhanced Host Controller interface, a high-speed controller for USB ports, able to support USB2.0 standard
FFC/FPC	Flexible Flat Cable / Flat Panel Cable
GBE	Gigabit Ethernet
Gbps	Gigabits per second
GND	Ground
GPI/O	General purpose Input/Output
HD Audio	High Definition Audio, most recent standard for hardware codecs developed by Intel® in 2004 for higher audio quality
HDMI	High Definition Multimedia Interface, a digital audio and video interface
I2C Bus	Inter-Integrated Circuit Bus, a simple serial bus consisting only of data and clock line, with multi-master capability
LVDS	Low Voltage Differential Signaling, a standard for transferring data at very high speed using inexpensive twisted pair copper cables, usually used for video applications
Mbps	Megabits per second
MMC/eMMC	MultiMedia Card / embedded MMC, a type of memory card, having the same interface as the SD card. The eMMC is the embedded version of the MMC. They are devices that incorporate the flash memories on a single BGA chip.
N.A.	Not Applicable
N.C.	Not Connected
OpenCL	Open Computing Language, a software library based on C99 programming language, conceived explicitly to realise parallel computing using Graphics Processing Units (GPU)

OpenGL	Open Graphics Library, an Open Source API dedicated to 2D and 3D graphics
OS	Operating System
PCI-e	Peripheral Component Interface Express
PSU	Power Supply Unit
PWM	Pulse Width Modulation
PWR	Power
PXE	Preboot Execution Environment, a way to perform the boot from the network ignoring local data storage devices and/or the installed OS
SATA	Serial Advance Technology Attachment, a differential full duplex serial interface for Hard Disks
SD	Secure Digital, a memory card type
SDHC	Secure Digital Host Controller
SIM	Subscriber Identity Module, a card which stores all data of the owner necessary to allow him accessing to mobile communication networks
SM Bus	System Management Bus, a subset of the I2C bus dedicated to communication with devices for system management, like a smart battery and other power supply-related devices
SPI	Serial Peripheral Interface, a 4-Wire synchronous full-duplex serial interface which is composed of a master and one or more slaves, individually enabled through a Chip Select line
TBM	To be measured
TMDS	Transition-Minimized Differential Signaling, a method for transmitting high speed serial data, normally used on DVI and HDMI interfaces
UEFI	Unified Extensible Firmware Interface, a specification defining the interface between the OS and the board's firmware. It is meant to replace the original BIOS interface
UIM	User Identity Module, an extension of SIM modules.
USB	Universal Serial Bus
V_REF	Voltage reference Pin
xHCI	eXtensible Host Controller Interface, Host controller for USB 3.0 ports, which can also manage USB 2.0 and USB1.1 ports

1.8 Reference specifications

Here below it is a list of applicable industry specifications and reference documents.

Reference	Link
ACPI	http://www.acpi.info
AHCI	http://www.intel.com/content/www/us/en/io/serial-ata/ahci.html
DDC	http://www.vesa.org
Gigabit Ethernet	http://standards.ieee.org/about/get/802/802.3.html
HD Audio	http://www.intel.com/content/dam/www/public/us/en/documents/product-specifications/high-definition-audio-specification.pdf
HDMI	http://www.hdmi.org/index.aspx
I2C	http://www.nxp.com/documents/other/UM10204_v5.pdf
Intel® Front Panel I/O connectivity DG	http://www.formfactors.org/developer/specs/A2928604-005.pdf
LVDS	http://www.ti.com/lit/ml/snla187/snla187.pdf
MMC/eMMC	http://www.jedec.org/committees/jc-649
OpenCL	http://www.khronos.org/opencl
OpenGL	http://www.opengl.org
PCI Express	http://www.pcisig.com/specifications/pciexpress
PCI Express mini cards	http://www.pcisig.com/specifications/pciexpress/specifications/specifications/pciexpress/base2/#MCEM2
SATA	https://www.sata-io.org
SD Card Association	https://www.sdcard.org/home
SM Bus	http://www.smbus.org/specs
TMDS	http://www.siliconimage.com/technologies/tmds
UEFI	http://www.uefi.org
USB 2.0 and USB OTG	http://www.usb.org/developers/docs/usb_20_070113.zip
USB 3.0	http://www.usb.org/developers/docs/usb_30_spec_070113.zip
Intel® Atom™ Bay Trail family	http://ark.intel.com/products/codename/55844/Bay-Trail#@Embedded

Chapter 2.
OVERVIEW

- Introduction
- Technical specifications
- Electrical specifications
- Mechanical specifications
- Block diagram

2.1 Introduction

SBC-A44-pITX is a Single Board Computer in pico-ITX form factor (just 100 x 72mm) based on the Intel® Atom™ family of System-on-Chips (SOCs) formerly coded as Bay Trail, a series of Single/ Dual / Quad Core SOCs with 64-bit instruction set.

These SOCs embed all the features usually obtained by combination of CPU + platform Controller hubs, all in one single IC, which allows, therefore, the system minimisation and performance optimisation, which is essential for boards with sizes so reduced as for picoITX SBCs, which offers all functionalities of standard PC boards in just 100x72mm.

This single chip solution includes the memory controller, which gives support for up to 8GB of DDR3L-1333 **ECC** SODIMM Memory. *Please be aware that only ECC SO-DIMM modules are supported, non-ECC modules will not work and* could lead to board's failures.

All SOCs (except for E3805) embed an Intel® HD Graphics 4000 series controller, which offer high graphical performances, with support for Microsoft® DirectX11, OpenGL 3.0, OpenCL 1.2, OpenGLES 2.0 and HW acceleration for video decoding of H.264, MPEG2, MVG, VC-1, VP8 and MJPEG video standards (for H.264, MPEG2 and MVG also HW encoding is offered). This embedded GPU is able to drive two independent displays, by using the HDMI and/or LVDS interfaces. Any combinations of these video interfaces are supported. It is also available with the Intel Atom E3805 Processor for headless applications and IoT smart gateways.

Further features, managed directly by the E3800 Atom™ SOCs and included in SBC-A44-pITX board, are two SATA Channels (one used for common SATA disks, the other used to implement a mSATA interface), microSD card slot, five USB ports (two USB 3.0 and three USB 2.0 only), HD Audio and three PCI Express lanes (two PCI express lanes are used for the implementation of two Gigabit Ethernet interfaces, the other is carried out on half size miniCard express slot, which is shared with mSATA interface).

Born for the industrial market with native -40° to +85 °C temperature range and ECC memory support, this SBC is specifically designed for harsh environments and is ideal for critical applications such as automotive and outdoor solutions where data coherence and security is crucial. This full-industrial SBC also offers a broad range of video and native serial connectivity options, along with SATA and PCI-e.

The board is directly available in EXTREME configuration, with all the components mounted onboard certified for industrial temperature ranges.

Please refer to following chapter for a complete list of all peripherals integrated and characteristics.

2.2 Technical specifications

SOC

Intel® Atom™ E3845, Quad Core @1.91GHz, 2MB Cache, 10W TDP
Intel® Atom™ E3827, Dual Core @1.75GHz, 1MB Cache, 8W TDP
Intel® Atom™ E3826, Dual Core @1.46GHz, 1MB Cache, 7W TDP
Intel® Atom™ E3825, Dual Core @1.33GHz, 1MB Cache, 6W TDP
Intel® Atom™ E3815, Single Core @1.46GHz, 512KB Cache, 5W TDP
Intel® Atom™ E3805, Dual Core @1.33GHz, 1MB Cache, 3W TDP

Memory

Up to 8GB on DDR3L-1333 ECC SO-DIMM Slot *
(DDR3L-1333 with E3845 and E3827, DDR3L-1067 the others)

Graphics (not for E3805)

Integrated Intel® HD Graphics 4000 series controller
Dual independent display support
HW decoding of H.264, MPEG2, MVC, VC1, VP8, MJPEG formats
HW encoding of H.264, MPEG2 and MVC formats

Video Interfaces

HDMI connector
Single/Dual Channel 18-/24-bit LVDS connector

Video Resolution

HDMI, resolution up to 1080p @ 60Hz
LVDS, resolution up to 1920 x 1200

Mass Storage

Optional eMMC drive on-board
1 x standard S-ATA connector
mini mSATA interface on miniCard slot (shared with miniPCI-e)
microSD Card slot

Networking

Dual Gigabit Ethernet connector

Please notice that total amount of 8GB would be usable only with 64-bit OS. Total amount of memory available with a 32-bit OS depends on the OS itself (it will be less than 4GB, however).

USB

2 x USB 3.0 Host ports on Dual Type-A socket
2 x USB 2.0 Host port on internal pin header
1 x USB 2.0 host port on miniPCI-e slot

Audio

Optional HD Audio Codec Cirrus Logic CS4207
Mic In, Line out internal pin header connector

Serial Ports

2 x optional RS-232 / RS-422 / RS-485 Serial ports on internal pin Header

Other Interfaces

Half-miniCard slot (accepts both Half-mini PCI-e cards and mSATA disks)
8 x GPIOs
FAN connector
Switch/LED Front Header
I2C connector with INT and RST# signals

Power supply voltage: +12V$_{DC}$ ± 5%
RTC Battery with lead cable and connector

Operating temperature: 0°C ÷ +60°C** (Commercial temperature)
-40° ÷ +85°C (Industrial temperature)

Dimensions: 72 x 100 mm (2.83" x 3.93").

Supported Operating Systems:

Microsoft® Windows® 7 (32/64 bit)
Microsoft® Windows® 8.1 (32/64 bit)
Microsoft® Windows® 10 (32/64 bit)
Microsoft® Windows® 10 IoT
Microsoft® Windows® Embedded Standard 7 /8 (32/64 bit)
Microsoft® Windows® Embedded Compact 7
Linux (32/64 bit)

! *** Temperatures indicated are the maximum temperature that the heatspreader / heatsink can reach in any of its parts. This means that it is customer's responsibility to use any passive cooling solution along with an application-dependent cooling system, capable to ensure that the heatspreader / heatsink temperature remains in the range above indicated. Please also check paragraph 5.1*

2.3 Electrical specifications

SBC-A44-pITX needs to be supplied only with an external $12V_{DC}$ ± 5% power supply, minimum 40W for basic functionalities recommended.

This voltage can be supplied through a standard 6.3mm (internal pin, diameter 2.0 mm) Power Jack (CN8).

Internal pin is V_{IN} power line.
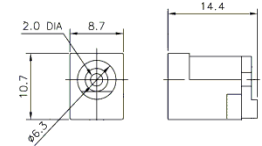
Optional Power connector - CN22	
Pin	Signal
1	GND
2	V_{IN}

As an alternative, the board can be equipped with an internal straight "mini-Fit" connector, type MOLEX p/n 39-28-1023 or equivalent, which can be used for the connection of an external PSU.
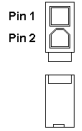
2.3.1 Power available

When powering SBC-A44-pITX with a PSU with characteristics greater or equal to the one described at beginning of previous paragraph, please consider well what is the typical scenario for using the board (i.e., which peripherals will be connected)

Internal power section is able to supply a maximum of 8A@5V for external devices supplied directly by the module (i.e. USB devices, optionally SSD or SATA disks, display).

Consider that each USB 2.0 port requires 500mA, and USB 3.0 ports need 0.9A each, so if all 5 USB ports are used, then the 5V power section would be able to supply further 4.7A (about 24W) to other peripherals, like SATA Disk and/or LVDS display. Anyway, if all this current is needed by external peripherals, a 40W PSU cannot supply further power tor internal circuitry of the board.

Since all the power must be supplied by an external PSU only, please balance well the typical final configuration, considering both the power consumption of the board itself (in paragraph 2.3.2 are detailed current consumption for possible different SOCs) and the power consumption of external devices.

This way it is possible to calculate preliminarily if a 40W PSU can be sufficient for system needing or if most powerful PSUs are required.

2.3.2   Power consumption

Using the following setup, and using all possible SOCs offered for SBC-A44-pITX board, the current consumption has been measured on +12VDC V_{IN} power line.

- O.S. Windows 10 Professional
- 4GB DDR3L-133MHz ECC SODIMM (ADATA p/n ADDH1600W4G11-BMIE)
- 16GB eMMC onboard
- USB mouse and keyboard connected
- HDMI display connected, resolution 1920x11080.
- Network connection plugged to Gigabit Ethernet Network.
- Optional adapter module for audio jacks, pushbuttons and status LEDs connected.
- Bios Release 1.09 Rc03.
- No FAN connected.

Status	SOC			
	E3845	E3827	E3825	E3815
Idle, power saving configuration	390mA	356mA	324mA	312mA
OS Boot, power saving configuration	1040mA	1020mA	702mA	760mA
Video reproduction@720p, power saving configuration	633mA	660mA	567mA	509mA
Video reproduction@1080p, power saving configuration	800mA	722mA	626mA	545mA
3DMark2006 benchmark, power saving configuration	931mA	853mA	718mA	619mA
3DMark2006 benchmark, maximum performance	1030mA	928mA	730mA	635mA

Independently by the SOC mounted onboard, the following power consumptions are common to all boards:

Battery Backup power consumption: 2,5µA
Soft-Off State power consumption: 88mA (wake on LAN enabled)
Suspend State power consumption: 100mA (resume from LAN + Resume from USB enabled)

2.3.3 RTC Battery

For the occurrences when the module is not powered with an external power supply, on board there is a cabled coin Lithium Battery to supply, with a 3V voltage, the Real Time Clock embedded inside the Intel® Atom™ SOC.

Battery used is a cabled CR2032-LD Lithium coin-cell battery, with a nominal capacity of 220mAh.

Battery connector - CN2	
Pin	**Signal**
1	V_{RTC}
2	GND

The battery is not rechargeable, and can be connected to the board using dedicated connector CN5 which is a 2-pin p1.27 mm type MOLEX p/n 53398-0271 or equivalent, with pinout shown in the table on the left.

Mating connector: MOLEX 51021-0200 receptacle with MOLEX 50079-8000 female crimp terminals.

In case of exhaustion, the battery should only be replaced with devices of the same type. Always check the orientation before inserting and make sure that they are aligned correctly and are not damaged or leaking.

Never allow the batteries to become short-circuited during handling.

> **!** **CAUTION**: handling batteries incorrectly or replacing with not-approved devices may present a risk of fire or explosion.

Batteries supplied with SBC-A44-pITX are compliant to requirements of European Directive 2006/66/EC regarding batteries and accumulators. When putting out of order SBC-A44-pITX, remove the batteries from the board in order to collect and dispose them according to the requirement of the same European Directive above mentioned. Even when replacing the batteries, the disposal has to be made according to these requirements.

2.3.4 Power rails naming convention

In all the tables contained in this manual, Power rails are named with the following meaning:

_S: Switched voltages, i.e. power rails that are active only when the board is in ACPI's S0 (Working) state. Examples: +3.3V_S, +5V_S.

_A: Always-on voltages, i.e. power rails that are active both in ACPI's S0 (Working), S3 (Standby) and S5 (Soft Off) state. Examples: +5V_A, +3.3V_A.

_U: unswitched ACPI S3 voltages, i.e. power rails that are active both in ACPI's S0 (Working) and S3 (Standby) state. Examples: +1.5V_U

Other suffixes are used for application specific power rails, which are derived from same voltage value of voltage switched rails, if it is not differently stated (for example, +5V$_{HDMI}$ is derived from +5V_S, and so on).

2.4 Mechanical specifications

According to picoITX form factor, board dimensions are: 72 x 100 mm (4.53" x 6.50").

The printed circuit of the board is made of ten layers, some of them are ground planes, for disturbance rejection.
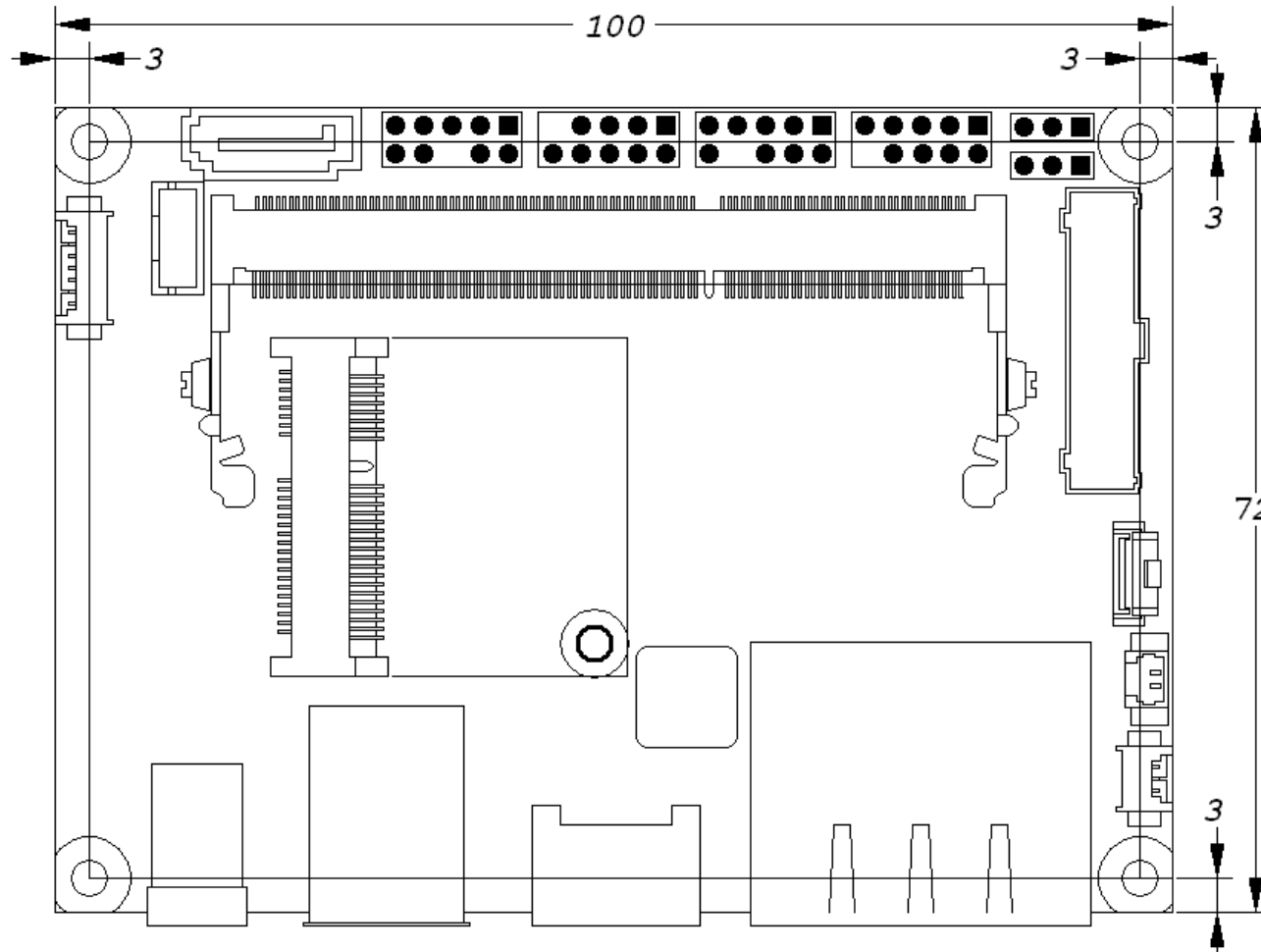
2.5 Block diagram
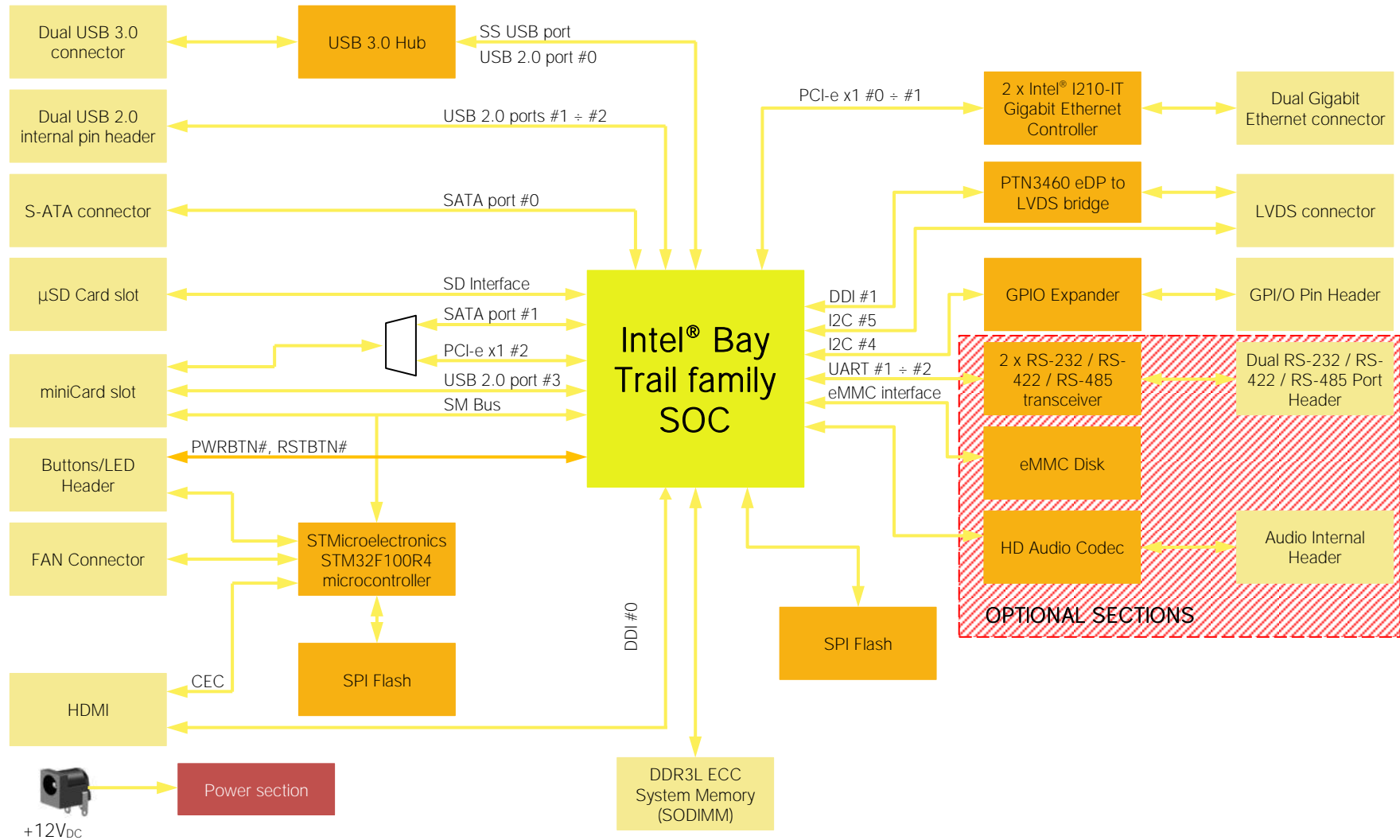
Chapter 3.
CONNECTORS

- Introduction
- Connectors overview
- Connectors description

3.1 Introduction

On SBC-A44-pITX board, there are several connectors located on the upper plane. Standard connectors are placed on the same side of PCB, so that it is possible to place them on a panel of an eventual enclosure.

> ! Please be aware that, depending on the configuration purchased, the appearance of the board could be slightly different from the following pictures.

TOP SIDE

SATA Power

SATA Port #0

Optional Dual RS-232 / RS-422 / RS-485

USB 2.0 Front Ports #1 #2

Optional HD Audio Front Panel interface

Buttons / LED Header

Manufacturer

ECC DDR3L SO-DIMM Slot

Half-mini Card (PCI-e / mSATA) slot

LVDS + backlight + T/S

GPI/O Pin Header

Battery Holder

FAN

Power In Jack

Double USB 3.0 type A

HDMI

Dual Gigabit Ethernet #0 / #1

BOTTOM SIDE

µSD slot
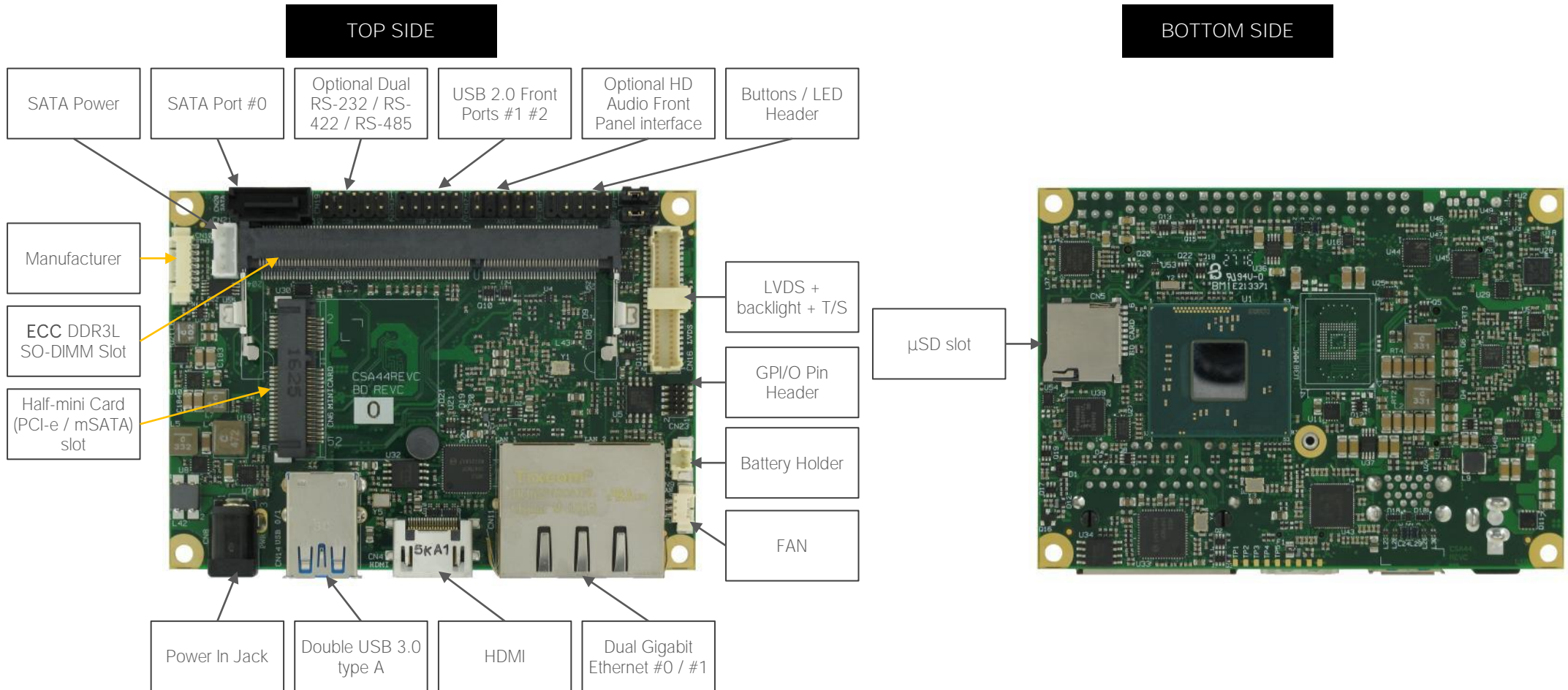
3.2 Connectors overview

Name	Description	Name	Description
CN2	Battery holder connector	CN13	USB 2.0 ports #1 - #2 pin header
CN3	ECC DDR3L SO-DIMM Memory Slot	CN14	USB 3.0 ports type A double receptacle
CN4	HDMI connector	CN16	LVDS + backlight + T/S connector
CN5	µSD Slot	CN17	Optional HD Audio Front Panel Interface
CN6	miniCard slot	CN19	Optional dual RS-232/RS-422/RS485 pin header
CN7	Buttons / LED Header	CN20	S-ATA connector
CN8	Power In Jack	CN21	S-ATA Power connector
CN9	FAN connector	CN22	Optional Power In "Mini-Fit" connector
CN10	Manufacturer connector (reserved)	CN23	GPIO Pin Header
CN11	Dual Gigabit Ethernet ports #0 / #1		

3.3 Connectors description

3.3.1 Ethernet connectors

Dual Gigabit Ethernet Ports #0 / #1 - CN11			
Pin	**Signal**	**Pin**	**Signal**
A1	GBE0_MDI0+	A5	GBE0_MDI2-
A2	GBE0_MDI0-	A6	GBE0_MDI1-
A3	GBE0_MDI1+	A7	GBE0_MDI3+
A4	GBE0_MDI2+	A8	GBE0_MDI3-
B1	GBE1_MDI0+	B5	GBE1_MDI2-
B2	GBE1_MDI0-	B6	GBE1_MDI1-
B3	GBE1_MDI1+	B7	GBE1_MDI3+
B4	GBE1_MDI2+	B8	GBE1_MDI3-

On board, there are two Gigabit Ethernet connections, for the use of two different LANs. Both connections use a dedicated Intel I210 (or equivalent) controller.

Both connections are available on a double port RJ-45 socket type TRXCOM p/n TRJG27420AINL or equivalent, with 2kV decoupling capacitors.

On the connectors there are also two LEDs for each port. Left LED is bicolor (Green /Yellow) and shows 10/100 or 1000 connection: green means 100Mbps connection, yellow means 1000Mpbs connection, when the LED is Off then 10Mpbs or no connection is available. The right LED is Green and shows ACTIVITY presence.

These two interfaces are compatible both with Gigabit Ethernet (1000Mbps) and with Fast Ethernet (10/100Mbps) Networks. They will configure automatically to work with the existing network.

Please be aware that they will work in Gigabit mode only in case that they are connected to Gigabit Ethernet switches/hubs/routers. For the connection, cables category Cat5e or better are required. Cables category Cat6 are recommended for noise reduction and EMC compatibility issues, especially when the length of the cable is significant.

It is also possible to use both Gigabit Ethernet interface simultaneously to perform the link aggregation, useful to increase the throughput of the netwrok connection and to provide also redundancy.

GBEx_MDI0+/GBEx_MDI0-: Ethernet Controller #x Media Dependent Interface (MDI) I/O differential pair #0. It is the first differential pair in Gigabit Ethernet mode, and the Transmit differential pair in 10/100 Mbps modes.

GBEx_MDI1+/GBEx_MDI1-: Ethernet Controller #x Media Dependent Interface (MDI) I/O differential pair #1. It is the second differential pair in Gigabit Ethernet mode, and the Receive differential pair in 10/100 Mbps modes.

GBEx_MDI2+/GBEx_MDI2-: Ethernet Controller #x Media Dependent Interface (MDI) I/O differential pair #2. It is the third differential pair in Gigabit Ethernet mode; it is not used in 10/100Mbps modes.
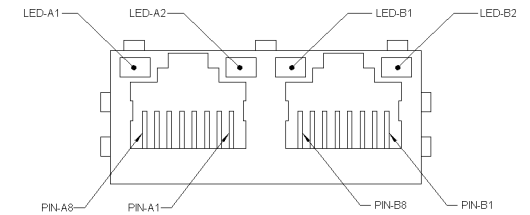
GBEx_MDI3+/GBEx_MDI3-: Ethernet Controller #x Media Dependent Interface (MDI) I/O differential pair #3. It is the fourth differential pair in Gigabit Ethernet mode; it is not used in 10/100Mbps modes.

3.3.2 USB ports

USB 3.0 ports Type-A double receptacle - CN14

Pin	Signal	Pin	Signal
1	$+5V_{USB0}$	10	$+5V_{USB1}$
2	USB_H1-	11	USB_H2-
3	USB_H1+	12	USB_H2+
4	GND	13	GND
5	USB_SSRX1-	14	USB_SSRX2-
6	USB_SSRX1+	15	USB_SSRX2+
7	GND	16	GND
8	USB_SSTX1-	17	USB_SSTX2-
9	USB_SSTX1+	18	USB_SSTX2+

Intel® Bay trail family of SOCs embed one xHCI and one EHCI controllers, which can manage one Superspeed port (i.e. USB 3.0 compliant) and up to four USB 1.x / 2.0 Host ports.

On SBC-A44-pITX board there is one USB 3.0 Hub (Cypress Semiconductor CYUSB3304-68LTXC) that, interfaced to USB 2.0 port #0 and to the native USB 3.0 (SuperSpeed) port, makes available two USB 3.0 ports, which are then carried out on a standard double USB Type-A connector, CN14, which is placed near the Gigabit Ethernet connectors.
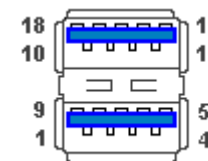
The connector used is a double type-A USB 3.0 receptacle, type Würth Elektronik p/n 692141030100 or equivalent.

Since this connector is a standard type receptacle, it can be connected to all types of USB 1.1 / USB 2.0 / USB 3.0 devices using Standard-A USB 3.0 or USB 2.0 plugs.

For USB 3.0 connections it is mandatory the use of SuperSpeed certified cables, whose SuperSpeed differential pairs are individually shielded inside the global cable's external shielding.

USB 2.0 ports #1-#2 internal pin header - CN13

Pin	Signal	Pin	Signal
1	$+5V_{USB2}$	2	$+5V_{USB3}$
3	USB_P1-	4	USB_P2-
5	USB_P1+	6	USB_P2+
7	GND	8	GND
		10	---

Managed by the EHCI Controller, there are also two additional USB 2.0 ports, which are hosted on a 9-pin p2.54mm pin headers ,h= 6mm, type NELTRON p/n 2213S-10G-E9 or equivalent, with the pinout shown in the tables on the left (it is a common pinout for USB headers in PC motherboards).

All USB ports' voltages ($+5V_{USBx}$) are derived from +5V_A standby voltages. This means that the ports can be powered also when the OS is in Suspend-to-RAM (S3) state in order to support (if enabled) e the "Wake-Up on USB" functionality.

For the connection of standard devices to this pin headers, it is needed an adapter cable. SECO can optionally provide for such an adapter cable, as a part of the accessory kit p/n CABKITA44 (please check chapter 5.2.1 for further details).

Signal description:

USB_H1+/USB_H1-: USB 2.0 Port #1 differential pair; it is managed by Intel® ATOM™ xHCI controller's USB 2.0 Port **#0** through the USB Hub downstream USB 2.0 Port #1.

USB_SSRX1+/USB_SSRX1-: USB Super Speed Port #1 receive differential pair; it is managed by xHCI controller through the USB Hub downstream Superspeed Port #1.

USB_SSTX1+/USB_SSTX1-: USB Super Speed Port #1 transmit differential pair; it is managed by xHCI controller through the USB Hub downstream Superspeed Port #1.

USB_H2+/USB_H2-: USB Port #2 differential pair; it is managed by Intel® ATOM™ xHCI controller's USB 2.0 Port **#0** through the USB Hub downstream USB 2.0 Port # 2.

USB_SSRX2+/USB_SSRX2-: USB Super Speed Port #2 receive differential pair; it is managed by xHCI controller through the USB Hub downstream Superspeed Port #2.

USB_SSTX2+/USB_SSTX2-: USB Super Speed Port #2 transmit differential pair; it is managed by xHCI controller through the USB Hub downstream Superspeed Port #2.

USB_P1+/USB_P1-: USB Port #1 differential pair; it is managed by Intel® ATOM™ EHCI controller's USB 2.0 Port **#1**.

USB_P2+/USB_P2-: USB Port #2 differential pair, it is managed by Intel® ATOM™ EHCI controller's USB 2.0 Port **#2**.

Common mode chokes are placed on all USB differential pairs for EMI compliance.

For ESD protection, on all data and voltage lines are placed clamping diodes for voltage transient suppression.

!   Please be aware that Windows® 7 OS doesn't have native support for USB 3.0 functionalities. They will be supported only after installing chipset's driver. This could lead to problems during OS installation, since during this phase USB keyboard and mouse will not work, if connected to the standard USB 3.0 ports available on connector CN14.

To perform Windows® 7 installation, therefore, it is suggested to connect USB mouse and keyboard to the internal ports available on connectors CN13 (one adapter cable, contained inside the accessories kit CABKITA44, is required).

Alternatively, it is possible to disable USB 3.0 functionalities by entering "InsydeH2O Setup utility" ("Advanced" menu → "USB Configuration" submenu → "USB 3.0", see paragraph 4.3.3) before performing Windows® 7 and chipset's driver installation

3.3.3 LVDS + backlight + T/S connector

LVDS + backlight + T/S connector - CN16			
Pin	Signal	Pin	Signal
1	GND	2	GND
3	LVDS_ODD_TX3+	4	LVDS_EVEN_TX3+
5	LVDS_ODD_TX3-	6	LVDS_EVEN_TX3-
7	LVDS_ODD_TX2+	8	LVDS_EVEN_TX2+
9	LVDS_ODD_TX2-	10	LVDS_EVEN_TX2-
11	LVDS_ODD_TX1+	12	LVDS_EVEN_TX1+
13	LVDS_ODD_TX1-	14	LVDS_EVEN_TX1-
15	LVDS_ODD_TX0+	16	LVDS_EVEN_TX0+
17	LVDS_ODD_TX0-	18	LVDS_EVEN_TX0-
19	GND	20	GND
21	LVDS_ODD_CLK+	22	LVDS_EVEN_CLK+
23	LVDS_ODD_CLK-	24	LVDS_EVEN_CLK-
25	GND	26	GND
27	LVDS_DDC_CLK	28	BKLT_EN
29	LVDS_DDC_DATA	30	BKLT_PWM
31	+3.3V_S	32	PVCC_EN
33	LCD_PWR	34	BKLT_PWR
35	LCD_PWR	36	BKLT_PWR
37	LCD_PWR	38	BKLT_PWR
39	GND	40	GND
41	GND	42	GND
43	GND	44	GND
45	TOUCH_RST#	46	TOUCH_SCL
47	TOUCH_INT#	48	TOUCH_SDA
49	+3.3V_A	50	GND

SBC-A44-pITX can be interfaced to LCD displays using its LVDS interface, which allows connecting 18 or 24 bit, single or dual channel displays.

The LVDS interface, which is frequently used in many application fields, is not directly supported by the SOC, it is implemented using an eDP to LVDS bridge (NXP PTN3460), which allow the implementation of a Dual Channel LVDS, with a maximum supported resolution of 1920x1200 @ 60Hx (dual channel mode). Such an interface is derived from Intel® Atom™ E38xx SOCs' Digital Display Interface #1.

For the connection, a connector type HR A1014WVA-S-2x25P or equivalent (2 x 25p, male, straight, P1, low profile, polarised) is provided, with the pin-out indicated in the following table (different configurations are shown).

Mating connector: HR A1014H-2X25P with HR A1014-T female crimp terminals.

Alternative mating connector, MOLEX 501189-5010 with crimp terminals series 501334.

On the same connectors, are also implemented signals for direct driving of display's backlight: voltages (LCD_PWR and BKLT_PWR) and control signals (LCD enable signal, PVCC_EN, Backlight enable signal, BKLT_EN, and Backlight Brightness Control signal, BKLT_PWM).

There are also the signals necessary for driving I2C touchscreens (I2C signals, reset and interrupt request signals).

When building a cable for connection of LVDS displays, please take care of twist as tight as possible differential pairs' signal wires, in order to reduce EMI interferences. Shielded cables are also recommended.

Here following the signals related to LVDS management:

LVDS_ODD_TX0+/ LVDS_ODD_TX0-: LVDS Odd Channel differential data pair #0.

LVDS_ODD_TX1+/ LVDS_ODD_TX1-: LVDS Odd Channel differential data pair #1.
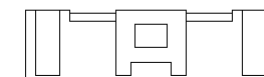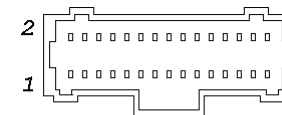
LVDS_ODD_TX2+/ LVDS_ODD_TX2-: LVDS Odd Channel differential data pair #2.

LVDS_ODD_TX3+/ LVDS_ODD_TX3-: LVDS Odd Channel differential data pair #3.

LVDS_ODD_CLK+/LVDS_ODD_CLK-: LVDS Odd Channel differential Clock.

LVDS_EVEN_TX0+/ LVDS_EVEN_TX0-: LVDS Even Channel differential data pair #0.

LVDS_EVEN_TX1+/ LVDS_EVEN_TX1-: LVDS Even Channel differential data pair #1.

LVDS_EVEN_TX2+/ LVDS_EVEN_TX2-: LVDS Even Channel differential data pair #2.

LVDS_EVEN_TX3+/ LVDS_EVEN_TX3-: LVDS Even Channel differential data pair #3.

LVDS_EVEN_CLK+/LVDS_EVEN_CLK-: LVDS Even Channel differential Clock.

LVDS_DDC_DAT: DisplayID DDC Data line for LVDS flat Panel detection. Bidirectional signal, electrical level +3.3V_S with a 4k7Ω pull-up resistor.

LVDS_DDC_CLK: DisplayID DDC Clock line for LVDS flat Panel detection. Bidirectional signal, electrical level +3.3V_S with a 4k7Ω pull-up resistor.

BKLT_EN: +3.3V_S electrical level Output, Backlight Enable signal. It can be used to turn On/Off the backlight's lamps of connected displays.

PVCC_EN: +3.3V_S electrical level Output, Panel Power Enable signal. It can be used to turn On/Off the connected display.

BKLT_PWM: this signal can be used to adjust the backlight brightness in displays supporting Pulse Width Modulated (PWM) regulations (+3.3V_S electrical level).

TOUCH_SCL: I2C Bus clock line. Bidirectional signal, electrical level +3.3V_A with a 2K2Ω pull-up resistor. It is managed by Intel® Atom™ E38xx SOCs' I2C controller #5.

TOUCH_SDA: I2C Bus data line. Bidirectional signal, electrical level +3.3V_A with a 2K2Ω pull-up resistor. It is managed by Intel® Atom™ E38xx SOCs' I2C controller #5.

TOUCH_RST#: +1.8V_A electrical level output with a 10kΩ pull-up resistor. This signal can be used to drive a reset of an eventual external Touch Screen connected to the dedicated I2C interface. It is also possible to use this signal as a GPIO (GPIO_S54 signal of Intel® Atom™ E38xx SOC).

TOUCH_INT#: +1.8V_A electrical level input with a 10kΩ pull-up resistor. This signal can be used to serve the interrupt request of an eventual external Touch Screen connected to the dedicated I2C interface. It is also possible to use this signal as a GPIO (GPIO_S53 signal of Intel® Atom™ E38xx SOC).

JP1 position	LCD_PWR voltage value
1-2	+3.3V_A
2-3	+5V_A

LCD_PWR: LCD Voltage rail. Its value can be set to +3.3V_A or +5V_A by using dedicated jumper JP1, which is a standard pin header, P2.54mm, 1x3 pin.

JP2 position	BKLT_PWR voltage value
1-2	+5V_A
2-3	+12V_A

BKLT_PWR: Backlight Voltage rail. Its value can be set to +5V_A or +12V_A by using dedicated jumper JP2, which is another standard pin header, P2.54mm, 1x3 pin.

As an alternative, especially for applications where vibrations are a problem, it is possible to set LCD_PWR and BKLT_PWR voltage values by closing the circuit breakers that are located under the pin headers (they are normally not accessible on samples, due to the presence of the pin header, but could be requested for mass productions).

3.3.4 HDMI connector

**HDMI Connector - CN4**
Pin	**Signal**	**Pin**	**Signal**
1	TMDS_LANE2+	2	GND
3	TMDS_LANE2-	4	TMDS_LANE1+
5	GND	6	TMDS_LANE1-
7	TMDS_LANE0+	8	GND
9	TMDS_LANE0-	10	TMDS_CLK+
11	GND	12	TMDS_CLK-
13	CEC	14	---
15	SCL	16	SDA
17	GND	18	+5V$_{HDMI}$
19	HPD		

The Intel® Atom™ E38xx family of SOCs offer two Digital Display Interfaces, configurable to work in HDMI/DVI/DP++/eDP modes.

Digital Display Interface #0, in particular, is used to implemented HDMI interface.

For this reason, on SBC-A44-pITX board there is the possibility of connecting directly one HDMI displays, using a standard certified HDMI connector, type A, model HIROSE p/n MD60-19P.

Signals involved in HDMI management are the following:

TMDS_CLK+/TMDS_CLK-: TMDS differential Clock.

TMDS_LANE0+/TMDS_LANE0-: TMDS differential pair #0

TMDS_LANE1+/TMDS_LANE1-: TMDS differential pair #1

TMDS_LANE2+/TMDS_LANE2-: TMDS differential pair #2

SDA: DDC Data line for HDMI panel. Bidirectional signal, electrical level +5V$_{HDMI}$ with a 2k2Ω pull-up resistor.

SCL: DDC Clock line for HDMI panel. Output signal, electrical level +5V$_{HDMI}$ with a 2k2Ω pull-up resistor.
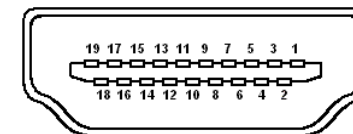
CEC: HDMI Consumer Electronics Control (CEC) Line. Bidirectional signal, electrical level +3.3V_A with a 27kΩ pull-up resistor.

HPD: Hot Plug Detect Input signal. +3.3V_S electrical level signal with 100kΩ pull-down resistor

For ESD protection, on all data and voltage lines are placed clamping diodes for voltage transient suppression.

Always use HDMI-certified cables for the connection between the board and the HDMI display; a category 2 (High-Speed) cable is recommended for higher resolutions, category 1 cables can be used for 720p resolution.

3.3.5 Audio interface

Optional HD Audio Front Panel Interface - CN17			
Pin	Signal	Pin	Signal
1	Mic_Left	1	GND_Audio
3	Mic_Right	4	---
5	LineOut_Right	6	Mic_Jack_Detect
7	GND_Audio		
9	LineOut_Left	10	LineOut_Jack_Detect

In order to reduce the space dedicated to connectors, SBC-A44-pITX board doesn't offer any standard audio jack.

However, SBC-A44-pITX can optionally embed a High Definition Audio Codec, Cirrus Logic CS4207-CNZ, that makes basic audio connection available on dedicated connector CN17, which is a 9-pin pin header, p2.54 mm h= 6mm, type NELTRON p/n 2213S-10G-E8 or equivalent, with the pinout shown in the table on the left.

The pinout of this connector complies with Intel® Front Panel I/O connectivity Design Guide, High Definition Audio section, chapter 2.5.

Using this dedicated connector, it will be possible to connect any Azalia compliant panel audio jack to remote audio connectors in the preferred position.

Alternatively, it is also possible to buy SECO's dedicated front panel module, which offers two standard audio jacks, two pushbuttons (for reset and power on) and two LEDs, for SATA activity and Power status signalling.

This adapter module is also contained inside the dedicated accessories kit p/n CABKITA44 for SBC-A44-pITX board. Please also check chapter 5.2.1 for further details.

Signals Description

Mic_Left: Analog Port 1 - Microphone Left Channel.

Mic_Right: Analog Port 1 - Microphone Right Channel.

Mic_Jack_Detect: Analog Port 1 - Jack detection return signal.

LineOut_Left: Analog Port 2 - Headphone Left Channel.

LineOut_Right: Analog Port 2 - Headphone Right Channel.

LineOut_Jack_Detect: Analog Port 2 - Jack detection return signal.

3.3.6 Buttons / LED header

Buttons / LED Header - CN7			
Pin	Signal	Pin	Signal
1	HD_LED_P	2	FP PWR_P/SLP_N
3	HD_LED_N	4	FP PWR_N/SLP_P
5	RST_SW_N	6	PWR_SW_P
7	RST_SW_P	8	PWR_SW_N
9	---		

To allow the integration of a SBC-A44-pITX based system inside a box PC-like, there is a connector on the board that allows to remote signals for the Power Button (to be used to put the system in a Soft Off State, or awake from it), for the Reset Button, and the signal for optional LED signaling activity on SATA Channel and Power On states.

The pinout of this connector complies with Intel® Front Panel I/O connectivity Design Guide, Switch/LED Front Panel section, chapter 2.2. It is shown in the table on the left.

Connector CN7 is an internal 9-pin standard male pin header, p 2.54 mm, 5+4 pin, h= 6mm, type NELTRON p/n 2213S-10G-E10 or equivalent.

As already written in the previous paragraph dedicated to Audio interface, it is possible to buy SECO's dedicated front panel module, which offers standard connections: two standard audio jacks, two pushbuttons (for reset and power on) and two LEDs, for SATA activity and Power status signaling.

This adapter module is also contained inside the dedicated cable kit (CABKITA44) for SBC-A44-pITX board. Please also check chapter 5.2.1for further details.

Signals Description

HD_LED_P: Hard Disk Activity LED signal's pull-up to +5V_S voltage (510Ω pull-up).

HD_LED_N: Hard Disk Activity LED output signal

RST_SW_N: Reset Button GND

RST_SW_P: Reset button input signal. This signal has to be connected to an external momentary pushbutton (contacts normally open). When the pushbutton is pressed, the pulse of Reset signal will cause the reset of the board. +3.3V_A electrical level with 10kΩ pull-up.

PWR_SW_P: Power button input signal, +3.3V_A electrical level with 10kΩ pull-up. This signal has to be connected to an external momentary pushbutton (contacts normally open). Upon the pressure of this pushbutton, the pulse of this signal will let the switched voltage rails turn on or off.

PWR_SW_N: Power button GND

FP PWR_P/SLP_N: Power/Sleep messaging LED terminal 1 with 510Ω pull-up resistor to +5V_A voltage. Connect it to an extremity of a dual-color power LED for power ON/OF, sleep and message waiting signaling. Please refer to Intel® Front Panel I/O connectivity Design Guide, chapter 2.2.4, for LED functionalities and signal meaning.

FP PWR_N/SLP_P: Power/Sleep messaging LED terminal 2 with 510Ω pull-up resistor to +5V_A voltage. Connect it to the other extremity of the dual-color power LED above mentioned.

3.3.7 Optional multi-standard serial ports

Optional Dual RS-232/RS-422/RS-485 pin header- CN19			
Pin	Signal RS-232 mode	Signal RS-422 mode	Signal RS-485 mode
1	COM1_RxD	COM1_Rx+	
2	COM2_RxD	COM2_Rx+	
3	COM1_TxD	COM1_Tx-	COM1_Data-
4	COM2_TxD	COM2_Tx-	COM2_Data-
5	GND	GND	GND
7	COM1_RTS#	COM1_Tx+	COM1_Data+
8	COM2_RTS#	COM2_Tx+	COM2_Data+
9	COM1_CTS#	COM1_Rx-	
10	COM2_CTS#	COM2_Rx-	

The Intel® Atom™ E38xx SOCs embed two different high speed UART controllers, which support COM ports with flow control (RTS# and CTS# signals).

These two ports are carried, on SBC-A44-pITX board to as many multistandard RS-23/RS-422/RS-485 transceivers, allowing the implementation of two multistandard serial ports.

These ports are available on dedicated connector CN19, which is an internal 9-pin standard male pin header, p 2.54 mm, 5+4 pin, h= 6mm, type NELTRON p/n 2213S-10G-E06 or equivalent.

Signals Description

COM1_RxD/COM2_RxD: COM port #1 / #2 RS-232 Receive data

COM1_TxD/COM2_TxD: COM port #1 / #2x RS-232 Transmit data

COM1_RTS#/COM2_RTS#: COM port #1 / #2 RS-232 Request to Send handshaking signal.

COM1_CTS#/COM2_CTS#: COM port #1 / #2x RS-232 Clear To Send handshaking signal

COM1_RX+/COM1_RX-: COM port #1 RS-422 receive differential pair

COM1_TX+/COM1_TX-: COM port #1 RS-422 Transmit differential pair

COM2_RX+/COM2_RX-: COM port #2 Full Duplex RS-485 (RS-422) Receive differential pair

COM2_TX+/COM2_TX-: COM port #2 Full Duplex RS-485 (RS-422) Transmit differential pair

COM1_Data+/COM1_Data-: COM Port #1 Half Duplex RS-485 Differential Pair

COM2_Data+/COM2_Data-: COM Port #2 Half Duplex RS-485 Differential Pair

Please be aware that for proper RS-485 working, the RTS# signals coming out form the Intel® Atom™ E38xx SOC must be used as an handshaking signal, i.e. it is used to control the data flow direction. When RTS# signal is driven low, then the RS-485 port is in receiving mode, when RTS# signal is driven high then the RS-458 port is in transmitting mode.

For Debug Purposes, COM2_TxD and COM2_RxD signals can be switched with Debug Uart (PCU UART) Tx and Rx signals, respectively. When the UART #2 is disabled, by default the Debug UART (which can work exclusively in RS-232 mode) will be available on connector CN19, pins 2 and 4.

Please check paragraphs 4.3.5, 4.3.6 and 4.3.11 for further details on serial ports enabling and console redirection

3.3.8 µSD slot

µSD Slot - CN5			
Pin	**Signal**	**Pin**	**Signal**
1	SD_DATA2	5	SD_CLK
2	SD_DATA3	6	SD_CMD
3	SD_CMD	7	SD_DATA0
4	SD_PWR	8	SD_DATA1

The Intel® Atom™ E38xx family of SOCs offer one SD Card controller, able to support SD Card 3.0 interface. Such an SD controller complies with SD Host Controller Standard Specification version 3.0, and can work in 1-bit and 4-bit mode.

For this reason, on SBC-A44-pITX board there is also a socket, for the use of standard microSD cards, which can be used as Mass Storage and/or Boot Devices.

The connector is a microSD connector, push-push type, H=1.8 mm, type WELLCO p/n TFWF1 or equivalent.

Pinout here reported is related only to signal routing on specific connector; internally the pin-out is the same of any standard SD 3.0 cards.

For ESD protection, on all signal lines are placed clamping diodes for voltage transient suppression.

Signals related to UIM (SIM) card are described in paragraph 3.3.10. Signals related to SD cards are the following:

SD_CD#: Card Detect Input.

SD_CLK: SD Clock Line (output).

SD_CMD: Command/Response bidirectional line.

SD_DATA[0÷3]: SD Card data bus. SD_DATA0 signal is used for all communication modes. SD_DATA[1÷3] signals are required for 4-bit communication mode.

SD_PWR: +3.3V_S SD dedicated Power rail
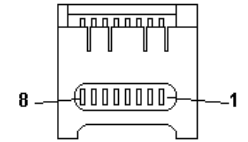
3.3.9   S-ATA connectors

S-ATA Connector - CN20

Pin	Signal
1	GND
2	SATA0_Tx+
3	SATA0_Tx-
4	GND
5	SATA0_Rx-
6	SATA0_Rx+
7	GND

The Intel® Atom™ E38xx SOCs embed a SATA Controller, which offers a SATA II, 3.0 Gps interface, able to drive up to two external devices.

The first SATA channel is carried out to a standard male S-ATA connector, CN20. (the second SATA channel is available on the minicard slot, CN6, please check par. 3.3.10).

Here following the signals related to SATA interface:

SATA0_TX+/SATA0_TX-: Serial ATA Channel #0 Transmit differential pair

SATA0_RX+/SATA0_RX-: Serial ATA Channel #0 Receive differential pair

10nF AC series decoupling capacitors are placed on each line of SATA differential pairs.
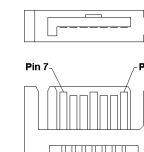
S-ATA Power Connector - CN21

Pin	Signal
1	+12V_S
2	GND
3	GND
4	+5V_S

A dedicated power connector, CN21, can be used to give supply to external Hard Disks (or Solid State Disks) connected to the SATA male connector.

The dedicated power connector is a 4-pin male connector, type MOLEX p/n 89400-0420 or equivalent, with pinout shown in the table on the left.

Mating connector: MOLEX 87369-0400 crimp housing with MOLEX 50212 crimp terminals.

An adapter cable for powering SATA disks from this connector is also contained inside the dedicated cable kit (CABKITA44) for SBC-A44-pITX board. Please also check chapter 5.2.1for further details.
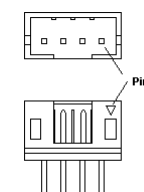
3.3.10 miniCard slot

miniCard Slot - CN6			
Pin	Signal	Pin	Signal
1	PCIE_WAKE#	2	+3.3V_A
3	N.C.	4	GND
5	N.C.	6	+1.5V_S
7	CLKREQ#	8	N.C.
9	GND	10	N.C.
11	PCIE_CLK_REF-	12	N.C.
13	PCIE_CLK_REF+	14	N.C.
15	GND	16	N.C.
17	N.C.	18	GND
19	N.C.	20	N.C.
21	mCARD_XSD(*)	22	PCIE_RST#
23	PCIe2_RX- / SATA1_Rx+	24	+3.3V_A
25	PCIe2_RX+ / SATA1_Rx-	26	GND
27	GND	28	+1.5V_S
29	GND	30	SMB_CLK
31	PCIe2_TX- / SATA1_Tx-	32	SMB_DAT
33	PCIe2_TX+ / SATA1_Tx+	34	GND
35	GND	36	USB_P3-
37	GND	38	USB_P3+
39	+3.3V_A	40	GND
41	+3.3V_A	42	N.C.
43	mCARD_SEL(*)	44	N.C.
45	N.C.	46	N.C.
47	N.C.	48	+1.5V_S
49	N.C.	50	GND
51	N.C.	52	+3.3V_A

In order to expand the possibilities offered by SBC-A44-pITX, it is available a half-mini PCI-express Slot, which can also be used to connect mSATA Solid State Disks.

Due to the reduced dimensions of the board itself, on the SBC-A44-pITX board it is only possible to insert Half-Size miniPCI express cards / mSATA Mini disks.

On the slot are also available the signals for interfacing to SIM cards, so that it is possible to use miniPCI Express modems.

The connector is CN6, which is a standard 52pin miniPCI Express connector, type MMT p/n MINIPCIE6001-Rt52GF, H=4mm, with the pinout shown in the table on the left.

PCI express Gen 2.0 (5Gbps) is supported.

On the same connector, PCI Express is multiplexed with SATA channel #1. Switching betweeen PCI-express and SATA interface is automatic, the system will configure properly depending on the type of the module inserted.

Signals carried to the miniCard slot are the following:

PCIe2_TX+/PCIe2_TX-: PCI Express lane #2, Transmitting Output Differential pair, multiplexed with SATA Transmitting Output Differential pair

PCIe2_RX+/PCIe2_RX-: PCI Express lane #2, Receiving Input Differential pair, multiplexed with SATA Receive Input Differential pair

PCIE_CLK_REF+ / PCIE_CLK_REF+: PCI Express Reference Clock for lane #2, Differential Pair

PCIE_WAKE#: Board's Wake Input, it must be externally driven by the module inserted in the slot when it requires waking up the system.

PCIE_RST#: Reset Signal that is sent from SECOμSBC-i.MX6 board to the miniPCI-e module. It is a 3.3V active-low signal.

SATA1_TX+/SATA1_TX-: Serial ATA Channel #1 Transmit differential pair, multiplexed with PCI Express Lane #2 Transmitting Output Differential pair

SATA1_RX+/SATA1_RX-: Serial ATA Channel #0 Receive differential pair, multiplexed with PCI Express Lane #2 Receive Output Differential pair
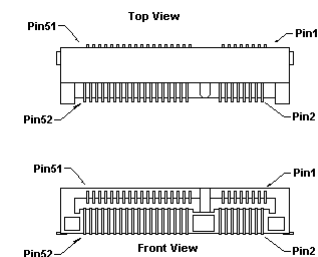
SMB_CLK: SM Bus control clock line for System Management. Output signal, electrical level +3.3V_A with a 2k2Ω pull-up resistor.

SMB_DATA: SM Bus control data line for System Management. Bidirectional signal, electrical level +3.3V_A with a 2k2Ω pull-up resistor.

USB_P3+ / USB_P3-: USB Port #3 differential pair, it is managed by Intel® ATOM™ EHCI controller's USB 2.0 Port #3.

mCARD_XSD: this signal allows setting in high-impedance state the differential pairs available on pins 23/25 and 31/33. When signal is LOW, then normal operation of the slot is enabled, and selection between miniPCI Express and mSATA working mode is made using signal mCARD_SEL. When mCARD_XSD signal is HIGH, then these interfaces on the slot are disabled and power consumption is reduced. Please consider that even if these interfaces are disabled, the slot can still be used with USB interface. Input signal, electrical level +3.3V_A with a 32k4Ω pull-up resistor. Enabling of these interfaces is automatic upon insertion of miniPCI-e or mSATA modules, since both of them, according to respective specifications, must tie this pin to GND.

mCARD_SEL: this signal is needed for selection between SATA and PCI-express interface: when mSATA_SEL is LOW, then PCI-express is available. When mCARD_SEL is HIGH, then SATA interface is available. Input signal, electrical level +3.3V_A with a 32k4Ω pull-up resistor. Selection is automatic since, according to their respective specifications, miniPCI-express modules have to tie to GND this signal, while mSATA modules must left it unconnected (this means that the signal goes automatically high, due to on-board pull-up).

3.3.11 GPI/O connector

Interfaced to the I2C interface #4 coming from the Intel® Bay trail family of SoCs, there is a device, Fairchild Semiconductor® FXL6408UMX, which is able to provide 8 General Purpose I/O pins.

GPI/O connector – CN23			
Pin	Signal	Pin	Signal
1	+3.3V_S	2	GND
3	GPIO_0	4	GPIO_7
5	GPIO_1	6	GPIO_6
7	GPIO_2	8	GPIO_5
9	GPIO_3	10	GPIO_4

The device acts as a slave according to I2C protocol, and can be addressed at address 1000011 binary.

It is possible to select the voltage reference level of these GPI/Os, which can be adjusted to be referred to +3.3V_A or to +5V_A voltage.

Access to these extended I/O comes through a dual-row 10-pin SMT male pin-header, p. 1.27mm, type NELTRON 2199SB-10G-SM-3021-CRor equivalent, with pinout shown in the table on the left.

GPIO_[0..7]: I/O Expander Input/Output [0..7], voltage reference level: +3.3V_S

> **!** Please be aware that GPI/O connector CN32 is available only on boards with PCB revision C or higher.

3.3.12 FAN connector

FAN Connector - CN9	
Pin	**Signal**
1	GND
2	FAN_POWER
3	FAN_TACHO_IN

Depending on the usage model of SBC-A44-pITX, for critical applications/environments on SBC-A44-pITX it is available a 3-pin dedicated connector for an external +12VDC FAN.

FAN Connector is a 3-pin single line SMT connector, type MOLEX 53261-0371 or equivalent, with pinout shown in the table on the left.

Mating connector: MOLEX 51021-0300 receptacle with MOLEX 50079-8000 female crimp terminals.

Please be aware that the use of an external fan depends strongly on customer's application/installation.
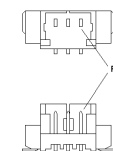
Please refer to chapter 5.1 for considerations about thermal dissipation.

FAN_POWER: +12V$_{IN}$ derived power rail for FAN, managed by the embedded microcontroller via PWM signal

FAN_TACHO_IN: tachometric input from the fan to the embedded microcontroller, +3.3V_S electrical level signal with 10kΩ pull-up resistor.

3.3.13 SO-DIMM DDR3L ECC Slot

The SBC-A44-pITX board supports ECC DDR3L memories up to 1067MHz (up to 1333MHz with E3845 and E3827).

For use of these memories, on board there is one SO-DIMM DDR3L socket (CN3), type LOTES p/n AAA-DDR-111-K01 or equivalent, a right angle, high profile socket, used for high speed system memory applications.

Chapter 4.
BIOS SETUP

- InsydeH2O setup Utility
- Main setup menu
- Advanced menu
- Security menu
- Power menu
- Boot menu
- Exit menu

4.1 InsydeH2O setup Utility

Basic setup of the board can be done using Insyde Software Corp. "InsydeH2O Setup Utility", that is stored inside an onboard SPI Serial Flash.

It is possible to access to InsydeH2O Setup Utility by pressing the <ESC> key after System power up, during POST phase. On the splash screen that will appear, select "SCU" icon.

On each menu page, on left frame are shown all the options that can be configured.

Grayed-out options are only for information and cannot be configured.

Only options written in blue can be configured. Selected options are highlighted in white.

Right frame shows the key legend.

KEY LEGEND:

← / →   Navigate between various setup screens (Main, Advanced, Security, Power, Boot...)

↑ / ↓   Select a setup item or a submenu

<F5> / <F6>   <F5> and <F6> keys allows to change the field value of highlighted menu item

<F1>   The <F1> key allows displaying the General Help screen.

<F9>   <F9> key allows loading Setup Defaults for the board. After pressing <F9> BIOS Setup utility will request for a confirmation, before saving and exiting. By pressing <ESC> key, this function will be aborted

<F10>   <F10> key allows save any changes made and exit Setup. After pressing <F10> key, BIOS Setup utility will request for a confirmation, before saving and exiting. By pressing <ESC> key, this function will be aborted

<ESC>   <Esc> key allows discarding any changes made and exit the Setup. After pressing <ESC> key, BIOS Setup utility will request for a confirmation, before discarding the changes. By pressing <Cancel> key, this function will be aborted

<ENTER>   <Enter> key allows to display or change the setup option listed for a particular setup item. The <Enter> key can also allow display the setup sub-screens.

4.2 Main setup menu

When entering the Setup Utility, the first screen shown is the Main setup screen. It is always possible to return to the Main setup screen by selecting the Main tab.

In this screen, are shown details regarding BIOS version, Processor type, Bus Speed and memory configuration.

Only two options can be configured:

4.2.1   System Time / System Date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values directly through the keyboard, or using + / - keys to increase / reduce displayed values. Press the <Enter> key to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

The system date is in the format mm/dd/yyyy.

4.3 Advanced menu

Menu Item	Options	Description
Boot Configuration	See submenu	Configures settings for Boot Phase
PCI Express Configuration	See submenu	PCI Express Configuration Settings
USB Configuration	See submenu	Configures USB Section
Audio Configuration	See submenu	Configures Audio Section
LPSS & SCC Configuration	See submenu	Configures LPSS (Low-Power Sub-System, i.e. DMA, PWM, UART and I2C interfaces) and SCC (Storage Control Cluster) devices
Miscellaneous Configuration	See submenu	Enable / Disable Misc. features
Security configuration (TXE)	See submenu	Trusted Execution Environment Security Configurations
Video Configuration	See submenu	Configures the options for video section
Chipset Configuration	See submenu	Configure Chipset's parameters
SATA Configuration	See submenu	Select the SATA controller and hard disk drive type installed in the system
Console Redirection	See submenu	Configures the parameters for Console redirection
ACPI Table / Features Control	See submenu	Configures the parameters for ACPI management
INT/IRQ Configuration	See submenu	Configures PCI INT and IRQ assignments

4.3.1 Boot configuration submenu

Menu Item	Options	Description
Numlock	On / Off	Allows to choose whether NumLock Key at system boot must be turned On or Off

4.3.2 PCI Express configuration submenu

Menu Item	Options	Description
PCI Express Root Port 0 (LAN1) PCI Express Root Port 1 (LAN2) PCI Express Root Port 2 (MiniCard)	See submenu	

4.3.2.1 PCI Express Root Port #x configuration submenus

Menu Item	Options	Description
PCI Express Root Port #0 PCI Express Root Port #1 PCI Express Root Port #2	Disabled / Enabled	Enable or Disable single PCI Express Root Port #x. PCI Express Root Port #0 ÷ #1 are internally connected to Intel® Gigabit Ethernet Controllers I210. Disabling this port will result in disabling Ethernet interface.
PCI Express Port #x Speed	Auto / Gen1 / Gen2	This menu item is available only when corresponding Root Port is set to Enabled. Set PCI-e ports link speed/capability. Not available for PCI Express Root Port #3
PCI Express Port #x ASPM	Disabled / L0s / L1 / L0s & L1 / Auto	This menu item is available only when corresponding Root Port is set to Enabled. Manages PCI Express L0s and L1 power states, for OSs able to handle Active State Power Management (ASPM). Not available for PCI Express Root Port #3

4.3.3 USB configuration submenu

Menu Item	Options	Description
USB BIOS Support	Disabled / Enabled / UEFI Only	Sets the support for USB keyboard / mouse / storage under UEFI and DOS environment. When set to UEFI only, then it will support exclusively UEFI environment.
xHCI Mode	Disabled Enabled Auto Smart Auto Best Auto	Mode of operation of xHCI controller Disabled: USB 3.0 functionalities are always disabled, USB 3.0 devices will work in High Speed Mode Enabled: USB 3.0 functionalities are available both in BIOS and in OS (also for booting, provided that the xHCI driver is installed). Auto: USB 3.0 devices will work only when OS has started provided that hcSwitch and xHCI drivers are installed. In BIOS and during boot USB 3.0 devices will work in High Speed mode

		Smart Auto: when starting from a Mechanical Off (G3) state, USB 3.0 functionalities are available both in BIOS and in OS (also for booting, provided that the hcSwitch and xHCI driver is installed). When the system boots from a different ACPI state, USB 3.0 devices will be managed by xHCI or EHCI controller depending on the last used configuration. Best Auto: always route to xHCI
Win7 Uninstall xHCI driver workaround	Disabled / Enabled	Enable / Disable Windows 7 Uninstall xHCI driver workaround. When enabled, Windows 7 USB (EHCI mode) will still work after uninstalling xHCI driver, but the WHCK test will fail
xHCI Controller	Disabled / Enabled	Enable/Disable xHCI Controller for USB 3.0 functionalities support
USB2 Link Power Management	Disabled / Enabled	Enable/Disable the USB2 Link Power Management, i.e. the management of different Link Power (Lx) States of connected USB devices depending on the workload of the device itself.
xHCI Streams	Disabled / Enabled	Enable/Disable the xHCI Stream Support.
EHCI Controller	Disabled / Enabled	Controls the USB EHCI (USB 2.0) functionalities. One EHCI controller must always be enabled.
USB EHCI debug	Disabled / Enabled	Can be changed only when "EHCI Controller" Is Enabled Enable / Disable PCH EHCI debug capability
USB Per-Port Control	Disabled / Enabled	Allows to enable / disable singularly each of USB ports #0 ÷ #3
Dual USB 3.0 Plug Internal USB Port #1 Internal USB Port #2 MiniCard USB Port	Disabled / Enabled	Available only when "USB Per-Port Control" is Enabled. Allows to enable / disable individually each USB port. "Dual USB 3.0 Plug" are the USB ports available on the USB 3.0 dual Type-A receptacle (CN14), while the Internal USB ports #1 and #2 are those available on the internal pin header CN13
Ignore MiniCard Detect	Disabled / Enabled	Per default behaviour, miniCard USB port (USB #3) is enabled only if a miniPCIe card is detected. When this item is enabled, it will be possible to use this USB port even without card detection.
USB Ignore Settings	See Submenu	Allows excluding BIOS support for single USB Devices/Ports/Hosts.
USB Ignore Request Timeout (sec.)	0÷9	When enabled (i.e., timeout greater than zero), for each USB bootable device it is required the user confirmation. Without any action, when the timeout expires the USB device is ignored. If the timeout is set to zero, it means that this feature is disabled, and the boot sequence works in the standard way. When enabled, the Confirm Dialog Box is displayed only for disks with a valid MBR.
Display USB Device's Name	Disabled / Enabled	Available only when "USB Ignore request Timeout (Sec.)" is Set. Allows enabling / disabling the disabling of USB Device's name in the timeout string.

4.3.3.1 USB Ignore Settings submenu

Using this submenu, it is possible to define up to four (4) rules for the USB ports to be ignored from BIOS support, if desired. Each rule will offer the following options:

Menu Item	Options	Description
Host Controller	None / All / Int. xHCI (USB3.0) / Int. EHCI (USB2.0)	Select the Host Controller to ignore
Port	None / All / Port 0 / Port 1 / Port 2 / Port 3	Select the USB Port to ignore
USB Class	None / All / Hid / Mass Storage	Select the USB Class of Devices to ignore. HID: Touch Controllers, Mouses Keyboards Mass Storage: USB disks, CD/DVD, Floppy Disks
Vendor ID	0x0001 ÷ 0 x FFFE	Specify the Vendor ID to ignore. 0xFFFF = Ignore All 0xFFFE = Ignore None
Device ID	0x0001 ÷ 0 x FFFE	Specify the Device ID to ignore. 0xFFFF = Ignore All 0xFFFE = Ignore None

> **!** If the BIOS support is excluded for all ports and/or all HID devices, it will be impossible to enter in the Setup Configuration utility using USB keyboards.
> Please be careful before changing these settings.

4.3.4 Audio configuration submenu

Menu Item	Options	Description
Audio Controller	Disabled / Enabled	Controls the detection of the HD Audio Controller Disabled: the Audio controller will be unconditionally Disabled Enabled: the Audio controller will be unconditionally Enabled
VC1 Enable	Disabled / Enabled	Available only when "Audio Controller" is Enabled Enable or Disable Virtual Channel 1 of Audio Controller
HDMI Codec	Disabled / Enabled	Enable or Disable internal HDMI Codec for audio

4.3.5 LPSS & SCC configuration submenu

Menu Item	Options	Description
LPSS & SCC Devices Mode	ACPI Mode PCI Mode	Allows setting the Working mode of LPSS (Low-Power Sub-System) and SCC (Storage Control Cluster) devices. Use PCI mode for Windows® 7, use ACPI mode for Android and Windows® 8
LPSS & SCC Auto Switch	Enable / Disable	Available only when "LPSS & SCC Devices Mode" is set to ACPI Mode. Auto switches LPSS and SCC devices from ACPI mode to PCI mode when the OS doesn't support ACPI mode.
Hide unsupported LPSS devices	Enable / Disable	Available only when "LPSS & SCC Devices Mode" is set to ACPI Mode. Hide unsupported LPSS devices when in ACPI mode.
SCC eMMC Boot Controller	Disable / Enable	Disable or enable the eMMC Boot controller
DDR50 Capability Support for eMMC	Disable / Enable	When "SCC eMMC Boot Controller" is Enabled, this item allows to enable or disable the DDR50 support for eMMC 4.5
HS200 Capability Support	Disable / Enable	Can be changed only when "SCC eMMC Boot Controller" is Enabled. Enable or disable the HS200 support for eMMC 4.5
Re Tune Timer Value	0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15	When "SCC eMMC Boot Controller" is Enabled and "DDR 50 Capability Support" is Disabled, this item allows to set the retune timer value
SCC SD Card Support	Disabled / Enabled	Enable/ Disable SD Card Support
DDR50 Capability Support	Disable / Enable	Enable or disable the DDR50 support for UHS-I 4-bit SD cards (frequency up to 50MHz, sampled on both clock edges, data transfer rate up to 50MB/s)
LPSS DMA #1 Support	Disabled / Enabled	Allows to enable first DMA Channel, used to support the UART interface and the SPI Bus
LPSS HSUART #1 Support	Disabled / Enabled	Enable / Disable the UART interface #1 available on connector CN19
HSUART #1 Interface	RS-232 / RS-422 / RS-485	When "LPSS HSUART #2 Support" is Enabled, this item allows to select the interface of UART #1
LPSS HSUART #2 Support	Disabled / Enabled	Enable / Disable the UART interface #2 available on connector CN19
HSUART #2 Interface	RS-232 / RS-422 / RS-485	When "LPSS HSUART #2 Support" is Enabled, this item allows to select the interface of UART #2
LPSS DMA #2 Support	Disabled / Enabled	Allows to enable second DMA Channel, used to support the I2C Channel
GPIO Expander I2C Support	Disabled / Enabled	Enable / Disable the I2C Bus connected to the GPIO Expander
LVDS I2C Support	Disabled / Enabled	Enable / Disable the I2C Bus available on LVDS connector CN16

4.3.6 Miscellaneous Configuration submenu

Menu Item	Options	Description
HPET - HPET Support	Enabled / Disabled	If this feature is enabled, the High Precision Event Timer table will be added into ACPI Tables.
Clock Spread Spectrum	Enabled / Disabled	Allows enabling Clock Chip's Spread Spectrum feature.
PCU UART Debug	Enabled / Disabled	Enable or disable the PCU UART for Debug Purposes. This item is ignored (always disabled) in case that the LPSS HSUART #2 is enabled
Debug LPC Test Point Signals	Enabled / Disabled	Enabled (default) or disables the LPC signals on the dedicated debug test points
BIOS Lock	Enabled / Disabled	Enable or disable BIOS SPI region write protect.
PCI MMIO Size	0.75GB 1.5GB 2GB	Setup PCI Memory Mapped IO Space, 0.75GB, 1.5GB or 2GB. Note: to avoid system hangs caused by insufficient memory allocation, reducing this value may lead to the reduction of the IGD aperture size set in Advanced Menu → Video Configuration submenu.
Memory optimization for 32-bit Windows OS	Enabled / Disabled	When using Windows 32-bit versions, enabling this feature will allow a better memory resource allocation.
PCI Express Dynamic Clock Gating	Enabled / Disabled	Enable or Disable PCI Express Dynamic Clock Gating.
Force Legacy Free	Enable / Disable	When enabled, this item will force the Legacy Free mode (it will disable the KBC).
Intel I210/I211 Led1	Default Activity	Intel I210/I211 GbEthernet controller LED1 behaviour. Default setting makes LED1 active on link. Setting only activity makes LED1 active only when network traffic is present.
Keyboard reset timeout	1 ÷ 15	Value in tenth of seconds allowed for keyboard reset

4.3.7 Security configuration (TXE) submenu

Please notice that all these items can be modified only with Celeron® SOCs. With Atom™ SOCs, these items cannot be modified.

Menu Item	Options	Description
TXE	Disabled / Enabled	Enable or Disable the Intel® Trusted Execution Engine (TXE, available only on Celeron CPUs)
TXE HMRFP0	Disabled / Enabled	Enable this option to remove temporarily the flash protection, in order to program the Intel® TXE region
TXE Firmware update	Disabled / Enabled	Enable this option to require a re-flashing of TXE Firmware Image
TXE EOP Message	Disabled / Enabled	Send EOP (End of POST) Message before entering OS
TXE Unconfiguration Perform	Yes / No	Only selectable on CPUs with the TXE feature. Allows to revert TXE settings to the factory defaults

4.3.8 Video configuration submenu

Menu Item	Options	Description
VBIOS Selection	Default Intel ISG Optimized	Allows selecting an optimized Video BIOS to solve an issue present on Linux Kernels which causes video configuration wrong detection.
DDI0	Disabled / Enabled	Enable / Disable DDI0 Video Output
DDI1	Disabled / Enabled	Enable / Disable DDI1 Video Output
Primary Display	DDI0 / DDI1 / None	Select the Primary Display for the use in WEC7 operating System
Secondary Display	DDI0 / DDI1 / None	Select the Secondary Display for the use in WEC7 operating System
Display Mode	Single / Extended / Extended Vertical / Clone	Select the Display Mode for the use in WEC7 operating System
LFP	Custom / 640x480 / 800x480 / 800x600 / 1024x600 / 1024x768 / 1280x720 / 1280x800 / 1280x1024 / 1366x768 / 1400x900 / 1600x900 / 1680x1050 / 1920x1080	Select a software resolution (EDID settings) to be used for the internal flat panel.
LFP custom parameters	See submenu	This menu item is available only when "LFP" is set to custom
LFP Color Mode	VESA 24bpp / JEIDA 24bpp / 18 bpp	Select the color depth of LVDS interface. For 24-bit color depth, it is possible to choose also the color mapping on LVDS channels, i.e. if it must be VESA-compatible or JEIDA compatible.
LFP Interface	Single Channel Dual Channel	Allows configuration of LVDS interface in Single or Dual channel mode
LFP Default brightness (%)	0 ÷ 100	LFP Default brightness percentage. Valid values are in the range 0-100, where 0 means backlight OFF. This setup configuration, during the BIOS boot, is valid only with a single LFP connected (no multi-monitor).
LFP Max ACPI Brightness (%)	0 ÷ 100	Maximum ACPI Brightness percentage allowed with an ACPI aware OS
LVDS Advanced Options	See submenu	Advanced options for LVDS panel configuration
Integrated Graphics Device	Disabled / Enabled	Enabled: enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disabled: always disable IGD. Warning: when the IGD is disabled, there will be no video output at all (unless there is an external PCIe graphic card selected as Primary Display) and restoring BIOS options to default values will be possible only by moving blindly in the setup menu.

Primary Display	Auto / IGD / PCIe	Select which of IGD or external PCI-e Graphic Controller should be the Primary display
RC6(Render Standby)	Disabled / Enabled	Permits to enable the render standby features, which allows the onboard graphics entering in standby mode to decrease power consumption
PAVC	Disabled / LITE Mode / SERPENT Mode	Allows enabling the hardware acceleration of decoding of Protected Audio Video streams. When not disabled, it is possible to choose between LITE encryption and SERPENT encryption modes.
Power Management Lock	Disabled / Enabled	Enable / Disable Power Management Lock
DOP CG	Disabled / Enabled	Enable / Disable DOP Clock Gating
GTT Size	1MB / 2MB	Select the GTT (Graphics Translation Table) Size
Aperture Size	128MB / 256MB / 512MB	Use this item to set the total size of Memory that must be left to the GFX Engine
IGD - DVMT Pre-Allocated	64M / 96M / 128M / 160M / 192M / 224M / 256M / 288M / 320M / 352M / 384M / 416M / 448M / 480M / 512M	Select DVMT5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphic Device
IGD - DVMT Total Gfx Mem	128M / 256M / MAX	Select the size of DVMT (Dynamic Video Memory) 5.0 that the Internal Graphics Device will use
IGD Turbo	Auto / Enabled / Disabled	Enable or Disable IGD Turbo mode
IGD Thermal	Disabled / Enabled	Enabled or disable Thermal Control of IGD
Spread Spectrum clock	Disabled / Enabled	Enable or disable Spread Spectrum Clock on DDI interface
Backlight Control	Auto PWM-inverted PWM-Normal	Backlight control setting

4.3.8.1 LFP Custom submenu

Using this submenu, it is possible to set all the following parameters to meet the LVDS display requirements.

Menu Item	Options	Description
Pixel Clock / 10000	6350 ÷ 22400	Working Frequency in 10kHz units, e.g 6350 ➔ 63.5MHz. Allowed range from 2500 (25MHz) to 22400 (224MHz)
Horizontal Active	Numeric Value	Horizontal Addressable Video in pixels, a.k.a. Horizontal resolution (e.g. 1024 on a 1024x768 LFP)
Horizontal Blank	Numeric Value	Horizontal Blanking in pixels, equals to Horizontal Total (Horizontal Active + Horizontal Front Porch + Horizontal Black Porch)
Vertical Active	Numeric Value	Vertical Addressable Video in pixels, a.k.a. Vertical resolution (e.g. 768 on a 1024x768 LFP)

Vertical Blank	*Numeric Value*	Vertical Blanking in pixels, equals to Vertical Total (Vertical Active + Vertical Front Porch + Vertical Black Porch)
Horizontal Offset	*Numeric Value*	Horizontal Front Porch in pixels
Horizontal Pulse	*Numeric Value*	Horizontal Sync Pulse Width in pixels
Vertical Offset	*Numeric Value*	Vertical Front Porch in pixels
Vertical Pulse	*Numeric Value*	Vertical Sync Pulse Width in pixels
Horizontal Polarity	Negative / Positive	Sync Signal Polarity: Default is Negative (Active Low)
Vertical Polarity	Negative / Positive	Sync Signal Polarity: Default is Negative (Active Low)

4.3.8.2 LFP Advanced options submenu

Using this submenu, it is possible to set all the following parameters to meet the LVDS display requirements.

Menu Item	Options	Description
LFP Spreading Depth	No Spreading / 0.5% / 1.0% / 1.5% / 2.0% / 2.5%	Sets percentage of bandwidth of LVDS clock frequency for spreading spectrum
LFP Output Swing	150 mV / 200 mV / 250 mV / 300 mV / 350 mV / 400 mV / 450 mV	Sets the LVDS differential output swing
T3 Timing	0 ÷ 255	Minimum T3 timing of panel power sequence to enforce (expressed in units of 50ms). Default is 10 (500ms)
T4 Timing	0 ÷ 255	Minimum T4 timing of panel power sequence to enforce (expressed in units of 50ms). Default is 2 (100ms)
T12 Timing	0 ÷ 255	Minimum T12 timing of panel power sequence to enforce (expressed in units of 50ms). Default is 20 (1s)
T2 Delay	Enabled / Disabled	When Enabled, T2 is delayed by 20ms ± 50%
T5 Delay	Enabled / Disabled	When Enabled, T5 is delayed by 20ms ± 50%
P/N Pairs Swapping	Enabled / Disabled	Enable or disable LVDS Differential pairs swapping (Postive ⟺ Negative)
Pairs Order Swapping	Enabled / Disabled	Enable or disable channel differential pairs order swapping (A ⟺ D, B ⟺ CLK, C ⟺ C)
LVDS BUS Swapping	Enabled / Disabled	Enable or disable Bus swapping (Odd ⟺ Even)

4.3.9 Chipset configuration submenu

Menu Item	Options	Description
PCI 64-bit Decode	Enabled / Disabled	Allow system to support 64-bit BAR (Base Address Register) for PCI devices.
CRID	Enabled / Disabled	Enable / Disable CRID (Configured Revision ID) register.

4.3.10 SATA configuration submenu

Menu Item	Options	Description
SATA Controller	Enabled / Disabled	Disabled: Disables SATA Controller. All following items will be disabled Enabled: Enables SATA Controller
Sata Port 0	Enabled / Disabled	Enables or disable SATA Port #0
Sata Port 1	Enabled / Disabled	Enables or disable SATA Port #1
Chipset SATA Mode	IDE AHCI	Set SATA Configuration type With AHCI, is not possible to install/boot UEFI O.S., only Legacy OS can be installed (a simpler driver is required). Setting to IDE, the controller is managed as a PCI device, so addresses reallocation and INT line sharing is possible.
SATA Speed	Gen1 / Gen2	Select SATA speed
SATA Port 0 Hot Plug Capability SATA Port 1 Hot Plug Capability	Enabled / Disabled	These items will be available only when "Chipset SATA Mode" is set to AHCI. If enabled, SATA port will be reported as Hot Plug Capable
IDE Max Transfer Mode	Auto Ultra ATA/100 Ultra ATA/66 Ultra ATA/33 PIO Mode	This item will be available only when "Chipset SATA Mode" is set to IDE. Sets the IDE Interfaces' maximum Transfer Rate
IDE Mode	Native IDE Legacy IDE	This item will be available only when "Chipset SATA Mode" is set to IDE. Sets the IDE Working Mode
Serial ATA Port 0 / 1		Shows information related to eventual devices connected to SATA ports 0 or 1

4.3.11 Console Redirection submenu

Menu Item	Options	Description
Console Serial Redirect	Enabled / Disabled	Enable or disable Console redirection. When enabled, all the submenus of the following paragraph will appear
Terminal Type	VT_100 / VT_100+ / VT_UTF8 / PC_ANSI	Set Console Redirection terminal type
Baud rate	115200 / 57600 / 38400 / 19200 / 9600 / 4800 / 2400 / 1200	Set Console Redirection baud rate
Data Bits	7 bits / 8 bits	Set Console Redirection data bits
Parity	None / Even / Odd	Set Console Redirection parity bits
Stop Bits	1 bit / 2 bits	Set Console Redirection stop bits
Flow Control	None RTS/CTS XON/XOFF	Set Console Redirection flow control type
Information Wait Time	0 Seconds / 2 Seconds / 5 Seconds / 10 Seconds / 30 Seconds	Set Console Redirection port information display time
C.R. After Post	Yes / No	Console Redirection continues to work even after Bios POST.
AutoRefresh	Enabled / Disabled	When enabled, the screen will auto refresh once after detecting the connection of a remote terminal
FailSafeBaudRate	Enabled / Disabled	This feature will auto detect remote terminal baud rate and connect C.R serial device with detected baud rate
ACPI SPCR Table	Enabled / Disabled	Serial Port Console Redirection Table. When this feature is enabled, the SPCR table will be add-into ACPI tables.
Serial Port 0 - *Addr* IRQy	See following menu items	These voices will be available only when Console Serial Redirect is Enabled. This item will show the parameters of the PCU UART, with its address and assigned IRQ. For this port it will be possible to set the parameters shown in the following lines
PortEnable	Enable / Disabled	Enable / Disable serial Port 0 for the console redirection
UseGlobalSetting	Enable / Disaled	Use or not global settings for Serial Port 0 for the console Redirection
Terminal Type	VT_100 / VT_100+ / VT_UTF8 / PC_ANSI	Set Console Redirection terminal type

Baud rate	115200 / 57600 / 38400 / 19200 / 9600 / 4800 / 2400 / 1200	Set Console Redirection baud rate
Data Bits	7 bits / 8 bits	Set Console Redirection data bits
Parity	None / Even / Odd	Set Console Redirection parity bits
Stop Bits	1 bit / 2 bits	Set Console Redirection stop bits
Flow Control	None RTS/CTS XON/XOFF	Set Console Redirection flow control type

4.3.12 ACPI Table/features submenu

Menu Item	Options	Description
FACP - RTC S4 wakeup	Enabled / Disabled	Enable or disable FACP (Fixed ACPI Description Table) support for S4 wakeup from RTC
DSDT - ACPI S3	Enabled / Disabled	Enable or disable DSDT (Differentiated System Description Table) support for ACPI S3 State
DSDT - ACPI S4	Enabled / Disabled	Enable or disable DSDT (Differentiated System Description Table) support for ACPI S4 State
BGRT - ACPI BGRT	Enabled / Disabled	Enable or disable the support for ACPI Boot Graphics Resource Table

4.3.13 INT/IRQ configuration submenu

Menu Item	Options	Description
INT A IRQ / INT B IRQ / INT C IRQ / INT D IRQ / INT E IRQ / INT F IRQ / INT G IRQ / INT H IRQ	3 / 4 / 5 / 6 / 7 / 10 / 11 / 14 / 15	Allows the selection of the IRQ o be assigned to single PCI INT lines

4.4 Security menu

Menu Item	Options	Description
Set Supervisor Password		Install or Change the password for supervisor. Length of password must be greater than one character.
Power on Password	Enabled / Disabled	Available only when Supervisor Password has been set. Enabled: System will ask to input a password during P.O.S.T. phase. Disabled: system will ask to input a password only for entering Setup utility
User Access Level	View Only / Full	Available only when Supervisor Password has been set. View Only: Access to UEFI BIOS Setup utility is allowed but the field cannot be changed Full: any field can be changed except the password
Set User Password		Available only when Supervisor Password has been set. Install or Change the password for the User. Length of password must be greater than one character.
USB Disks Signature Option	See Submenu	Allow to enable or disable USB boot from signed USB disks only

4.4.1   USB Disk Signature Option submenu

Menu Item	Options	Description
USB Disks Signature Check	Enabled / Disabled	Enable the USB disk signature check. When enabled, if the USB disk used is not signed it will be removed from the boot devices list.
One Time Signature Check Disable	Enabled / Disabled	USB disk signature check one-time disable. When enabled, for the next boot (and only for that) the USB disk signature check will be automatically disabled.
Signature Byte 0	0 ÷ 255	Set the value for byte 0 of USB disks signature. The disk's signature check is always on 4 bytes.
Signature Byte 1	0 ÷ 255	Set the value for byte 1 of USB disks signature. The disk's signature check is always on 4 bytes.
Signature Byte 2	0 ÷ 255	Set the value for byte 2 of USB disks signature. The disk's signature check is always on 4 bytes.
Signature Byte 3	0 ÷ 255	Set the value for byte 3 of USB disks signature. The disk's signature check is always on 4 bytes.
USB Password	Installed / Not Installed	This item shows the state of USB Disk Password for Boot
Set USB Disks Password		When a USB Disk password is set, the system will first check if the USB disk is signed. If it is not signed, then the system will ask for a password, in order to continue booting from the USB disk.

4.5 Power menu

Menu Item	Options	Description
Advanced CPU Control	See submenu	These items control various CPU parameters
EC Watchdog Configuration	See submenu	Embedded Controller Watchdog Configuration Settings
Thermal Zone configuration	See submenu	Thermal Zone Configuration: Active and Passive Cooling Settings.
Wake on PME	Enabled / Disabled	Determines whether the system must wake up or not when the system power is off and occurs a PCI Power Management Enable wake-up event (e.g. to enable Wake on LAN feature).
Auto Wake on S5	Disabled By Every Day By Day of Month	Auto Wake from Soft Off State. It can be set to wake every day at the same hour, or only a precise Day of Month
Wake from S5 time	hh:mm:ss	Only available when "Auto Wake on S5" is not set to disabled. Allows selecting the exact hour, minute and seconds for the automatic wake of the board
Day of Month	0 ÷ 31	Only available when "Auto Wake on S5" is set to "By Day of Month" Allows selecting the day of month when the automatic wake must occur
Power Fail Resume Type	Always ON Always OFF Last State	Determine the System Behavior after a power failure event. In case the option is "Always ON", the board will start every time the power supply is present. When the option is "Always OFF", the board will not start automatically when the power supply returns. Finally, if this option is set to "Last State", the board will remember the state it had when the power supply went down: so, if the board was on, it will start again when the power returns, and will remain off if the board was in this state when the power went down.
ACPI Power off management	Enabled / Disabled	When enabled, the board will automatically switch itself to S5 state after OS shutdown. When disabled, a manual Power off is required

4.5.1 Advanced CPU control submenu

Menu Item	Options	Description
Use XD Capability	Enabled / Disabled	Enable or disable processor XD (Execute Disable) capability, it allows to enable or disable the hardware feature needed for data execution prevention
Limit CPUID Max Value	Enabled / Disabled	Set this option to enabled for use with older O.S. that are not able to manage the CPUID value higher than 03h, which was typical for Intel® Pentium 4 with Hyper Threading Technology Leave disabled for newer O.S. able to manage actual CPUID value.
Bi-Directional PROCHOT#	Enabled / Disabled	PROCHOT# is the signal used to start thermal throttling. This signal can be driven by any processor cores' to signal that the processor will begin thermal throttling. If bi-directional signalling is enabled, then external components can also drive PROCHOT# signal in order to start throttling.
VTX-2	Enabled / Disabled	Enable or Disable Intel® Virtualization Technology, allowing hardware-assisted virtual machine management.
TM1 and TM2	Enabled / Disabled	Enable or Disable TM1 and TM2 Thermal management modes.
AESNI Feature	Enabled / Disabled	Enable or Disable AESNI (Advanced Encryption Standard New Instructions) set of instructions, which are used to improve the speed of applications performing encryption and decryption using the Advanced Encryption Standard (AES).
Active Processor Cores	1 / 2/ 3 / ALL	Number of cores to enable in each processor package. 1 means that multicore processing is disabled.
P-States (IST)	Enabled / Disabled	Enable or disable processor management of performance states (P-states)
Boot Performance Mode	Max Performance Low Power	Only available when P-states are enabled Allows to select which performance state must be set by BIOS before starting OS loading.
Turbo Mode	Auto / Enabled / Disabled	Only available when P-states are enabled Enable processor Turbo Mode
Force CPU Speed	Disabled *List of speeds supported by the SOC used*	Only available when P-states are enabled Force CPU speed After boot. When this feature is enabled, P-State APCI Table will be disabled. The list of the speeds shown depends on the SOC mounted on the module
C-States	Enabled / Disabled	Enable processor idle power saving states (C-States).
Max C-States	C1 / C6 / C7	Allows selection of the maximum C-State that must be supported by the OS.

4.5.2 EC Watchdog Configuration submenu

Menu Item	Options	Description
Watchdog	Enabled / Disabled	Enable or Disable the Watchdog
Watchdog Action	System reset Power Button 1s Power Button 4s (shutdown)	This submenu is available only when "Watchdog" is set to Enabled. Specifies the action that must be performed when Watchdog timeout occurs. With System Reset, the module will reset itself With "Power Button 1s", the system will simulate the pressure for 1 sec. of Power button, which will lead the O.S. to close all his tasks then shutdown. With "Power Button 4s", the system will simulate the pressure for 4 secs. of Power button, which will lead to the immediate shutdown of the module
Delay to start (sec.)	0 ÷ 600	This item can be changed only when "Watchdog" is enabled. Seconds of delay before the watchdog timer starts counting
Timeout (sec.)	20 ÷ 600	This item can be changed only when "Watchdog" is enabled. Watchdog Timeout.

4.5.3 Thermal Zone configuration submenu

Menu Item	Options	Description
Critical temperature (°C)	95 / 100 / 105 / 110 / 115	Use this item to set the maximum temperature that the CPU can reach. Above this temperature value, the system will perform a critical shutdown
Passive Cooling temperature (°C)	70 / 75 / 80 / 85 / 90	Use this item to set the temperature threshold for the CPU. Above this threshold, an ACPI aware OS will start to lower the CPU frequency.
AC0 Temperature (°C)	50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 / 95 / 100 / 105 / 110 / 115	Select the highest temperature above which the onboard fan must work always at Full Speed
AC1 Temperature (°C)	25 / 30 / 35 / 40 / 45 / 50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 / 95 / 100 / 105 / 110 / 115	Select the lowest temperature under which the onboard fan must be OFF.
FAN Duty Cycle (%) Above AC1	50 / 75 / 100	Use this item to set the Duty Cycle for the fan when the CPU temperature is between AC1 and AC0 threshold. Above AC0, the fan will run at full speed.

4.6 Boot menu

Menu Item	Options	Description
Boot type	Dual boot Type Legacy Boot Type UEFI Boot Type	Allows to select if the OS must be booted using Legacy Boot Mode, UEFI Boot mode or indifferently using both modalities (depending on the OS)
Quick Boot	Enabled / Disabled	Skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot	Enabled / Disabled	Disables or enables booting in Text Mode.
Display ESC Key Strings	Enabled / Disabled	Display or Hide the "ESC key" strings during the BIOS boot. Disabling this configuration, no information on how to enter Setup Configuration Utility will be displayed.
Display Boot Logo	Enabled / Disabled	Enable or display the visualization of a logo during Boot phase
Logo persistence Time (s)	0 ÷ 10	This submenu is available only when "Display Boot Logo" is set to Enabled. Forced wait time in seconds during the boot logo visualization. 0 means boot as fast as possible. Even with 0 wait time. UEFI OSes supporting BGRT table will display the logo while booting.
Network Stack	Enabled / Disabled	This submenu is available only when "Boot Type" is set to "UEFI Boot type" or "Dual Boot type". When enabled, this option will make available the following Network Stack services: UEFI IPv4 PXE Legacy PXE OpROM
PXE Boot Capability	Disabled UEFI: IPv4 Legacy	This submenu is available only when "Network Stack" is Enabled Specifies the PXE (Preboot Execution Environment) Boot possibilities. When Disabled, Network Stack is supported For UEFI, it supports IPv4 In Legacy mode, only Legacy PXE OpROM is supported
PXE Boot to LAN	Enabled / Disabled	This submenu is available only when "Boot Type" is set to "Legacy Boot type". Disables or enables the possibility for the PXE to perform the boot from LAN.
Power Up in Standby Support	Enabled / Disabled	Disable or enable Power Up in Standby Support. The PUIS feature set allows devices to be powered-up in the Standby power management state to minimize inrush current at power-up and to allow the host to sequence the spin-up of devices.
Add Boot options	First / Last / Auto	Specifies the position in Boot Order for Shell, Network and Removable Disks
ACPI selection	Acpi1.0B / Acpi3.0 / Acpi4.0 / Acpi5.0	Using this menu item is possible to select to which specifications release the ACPI tables must be compliant.

CD/DVD Rom Boot	Enabled / Disabled	Disables or enables booting from CD/DVD
Floppy Disk Boot	Enabled / Disabled	Disables or enables booting from Floppy Disks.
USB Boot	Enabled / Disabled	Disables or enables booting from USB boot devices.
EFI/Legacy Device Order	EFI device first Legacy device first Smart Mode	This submenu is available only when "Boot Type" is set to Dual Boot Type. Determine if boot must happen first through EFI devices or through legacy devices, or in Smart Mode.
Windows® 8 Fast Boot	Enabled / Disabled	This submenu is available only when "Boot Type" is set to UEFI Boot Type. If enabled, the system firmware does not initialize keyboard and check for firmware menu key.
USB Hot Key Support	Enabled / Disabled	Available only when "Boot Type" is set to UEFI Boot Type and "Windows® 8 Fast Boot" is Enabled. Enable or disable the support for USB HotKeys while booting. This will decrease the time needed to boot the system
Timeout	0 ÷ 60	The number of seconds that the firmware will wait before booting the original default boot selection.
Reset On No Boot Device Found	Enabled / Disabled	When this option is enabled, the system will reset itself each time that doesn't find any valid boot device, instead of waiting indefinitely that a Boot device is plugged.
Touch Controller To Enter SCU	Enabled / Disabled	When this option is enabled, it will be possible to use a Touch screen to enter the Setup Configuration Utility, avoiding using additional external keyboard. The Touch detection will be used as hotkey
Legacy Devices Fixed Order	Enabled / Disabled	Disable or Enable legacy fixed order by physical device. Takes effect from the next boot.
Fixed Legacy Boot Order Settings	See Submenu	This submenu is available only when "Legacy Devices Fixed Order" is Enabled Entering the submenu, will allow setting the fixed boot order of Legacy Devices
EFI	See Submenu	This submenu is available only when "Boot Type" is not set to "Legacy Boot type". The submenu will show a list of EFI boot devices. Use F5 and F6 key to change order for boot priority.
Legacy	See Submenu	This submenu is available only when "Boot Type" is not set to "UEFI Boot type". Allows setting of Legacy Boot Order

4.6.1 Fixed Legacy Boot Order Settings Submenu

Menu Item	Options	Description
First / Second / Third / Fourth / Fifth / Sixth / Seventh	LAN / EHCI / xHCI / SATA0 / SATA1 / eMMC / SD / NONE	Allows selecting the boot order of the possible boot devices. If it is necessary to force the boot from a specific device only, please set is as a first boot device, and set to NONE all other devices.

4.6.2 Legacy submenu

Menu Item	Options	Description
Boot Menu	Normal / Advance	When set to Normal, this submenu will allow configuring all possible options for Legacy boot. When set to Advance, it will be possible to configure Boot Order only for bootable devices found in the system
Boot Type Order	Floppy Drive / Hard Disk Drive CD/DVD-ROM Drive / USB / Other	This voice will be selectable only when "Boot menu" is set to "Normal". The list shown under this item will allows selecting the boot from different devices. Use the + and - Keys to change the boot order priority
Hard Disk Drive	*List of HD Drives found connected*	This voice will be selectable only when "Boot menu" is set to "Normal". The list shown under this item will show different Disk drives found connected to the module, therefore changing the boot priority for them. Use the + and - Keys to change the boot order priority
USB	*List of USB Disks found connected*	This voice will be selectable only when "Boot menu" is set to "Normal". The list shown under this item will show different USB disks found connected to the module, therefore changing the boot priority for them. Use the + and - Keys to change the boot order priority

4.7 Exit menu

Menu Item	Options	Description
Exit Saving Changes		Exit system setup after saving the changes. F10 key can be used for this operation.
Save Change Without Exit		Save all changes made, but doesn't exit from setup utility.
Exit Discarding Changes		Exit system setup without saving any changes. ESC key can be used for this operation.
Load Optimal Defaults		Load Optimal Default values for all the setup items. F9 key can be used for this operation.
Load Custom Defaults		Load Custom Default values for all the setup items.
Save Custom Defaults		Save Custom Default values for all the setup items.
Discard Changes		Discard Changes but doesn't exit from setup utility.

Chapter 5.
APPENDICES

- Thermal Design
- Accessories

5.1 Thermal Design

A parameter that has to be kept in very high consideration is the thermal design of the system.

Highly integrated modules, like SBC-A44-pITX board, offer to the user very good performances in minimal spaces, therefore allowing the system's minimization. On the counterpart, the miniaturizing of IC's and the rise of operative frequencies of processors lead to the generation of a big amount of heat, that must be dissipated to prevent system hang-off or faults.

The board can be used along with specific heatspreaders, but please remember that they will act only as thermal coupling device between the board itself and an external dissipating surface/cooler. The heatspreader also needs to be thermally coupled to all the heat generating surfaces using a thermal gap pad, which will optimize the heat exchange between the module and the heatspreader.

The heatspreader is not intended to be a cooling system by itself, but only as means for transferring heat to another surface/cooler, like heatsinks, fans, heat pipes and so on.

When using SBC-A44-pITX boards, it is necessary to consider carefully the heat generated by the module in the assembled final system, and the scenario of utilization.

Until the board is used on a laboratory shelf, on free air, just for software development and system tuning, then a heatsink with integrated fan could be sufficient for board's cooling. Anyhow, please remember that all depends also on the workload of the processor. Heavy computational tasks will generate much heat with all SOCs versions.

Therefore, it is always necessary that the customer studies and develops accurately the cooling solution for his system, by evaluating processor's workload, utilization scenarios, the enclosures of the system, the air flow and so on.

SECO can provide SBC-A44-pITX specific heatspreaders, passive heatsinks and heatsinks with fan, but please remember that their use must be evaluated accurately inside the final system, and that they should be used only as a part of a more comprehensive ad-hoc cooling solutions.

The customer shall always ensure that the heatspreader/heatsink surface temperature remains in the range 0 ÷ 60 °C.

Ordering Code	Description
SA44-DISS-1	SBC-A44-pITX Heatspreader Kit
SA44-DISS-2	SBC-A44-pITX Heatsink Kit
SA44-DISS-3	SBC-A44-pITX Heatsink with integrated FAN Kit

5.2 Accessories

SECO can offer various accessories in completion of SBC-A44-pITX functionalities

5.2.1 Accessories kit CABKITA44

This accessories kit includes the following items

- *Dual USB 2.0 Type A adapter with standard PC mounting plate*. Can be used to carry out the signals of internal USB ports #1-#2 (connector CN13) to standard USB 2.0 Type A receptacles

- *Front Panel I/O board* V995, which allows the integration on a panel of an optional enclosure of two Audio jacks (Earphone and Mic in), Reset Button, Power button and two LED (for SATA activity and Power Status of the board itself).

For fixing of the front panel I/O board to the external enclosure's panel, the module is equipped with two brackets and screws for the fixing of the brackets to the module.

- Cables for connection of the Front Panel I/O board to SBC-A44-pITX board.

Connection cable CV-837/30 is needed for audio functionalities; it has to be connected to SBC-A44-pITX board's connector CN17 and to V995 module's connector CN2.

Connection cable CV-836/30 is needed for connection of power and reset pushbuttons and SATA / power LEDs; it has to be connected to SBC-A44-pITX board's connector CN7 and to V995 module's connector CN1.

- Serial adapter cable CV-904/20. It can be used to carry out the signals of RS-232/RS-422/RS-485 signals available on the connector CN19 to two standard DB-9 male connectors.

- SATA power cable, for connection of power rails of external SATA disks / SSDs to internal SATA power connector CN21.

5.2.2 USB-to-Serial port converter modules

This optional module has been designed to convert one of the internal USB ports available on connector CN13 into a serial port, which can be of RS-232, RS-422 or RS-485 type (fixed configuration).

Depending on the type of serial port needed, different module configurations are available; moreover, the output of the module can be available on standard DB-9 male connector or on RJ-45 sockets.

All modules type mounts an FTDI FT232R USB-to-Serial UART interface IC; RS-232 converter module then mounts a Serial Port RS-232 Transceiver with 15kV ESD protection. Instead, the other converters mount and RS-485/RS-422 transceiver.

Modules with DB-9 connector				Modules with RJ-45 socket			
Pin	Signal RS-232 converter	Signal RS-422 converter	Signal RS-485 converter	Pin	Signal RS-232 converter	Signal RS-422 converter	Signal RS-485 converter
1	DCD#	N.C.	N.C.	1	DTR#	N.C.	N.C.
2	RX	RX-	N.C.	2	CTS#	RX+	N.C.
3	TX	TX-	RX- / TX-	3	N.C.	N.C.	N.C.
4	DTR#	N.C.	N.C.	4	RX	RX-	N.C.
5	GND	GND	GND	5	N.C.	N.C.	N.C.
6	DSR#	N.C.	N.C.	6	TX	TX-	RX- / TX-
7	RTS#	TX+	RX+ / TX+	7	GND	GND	GND
8	CTS#	RX+	N.C.	8	RTS#	TX+	RX+ / TX+
9	RI#	N.C	N.C.				

In the table on the left are shown the pinout of DB-9 connector and of RJ-45 socket for all kind of modules.

120Ω termination resistors on differential pairs are available both on RS-422 and on RS-485 modules.
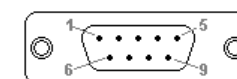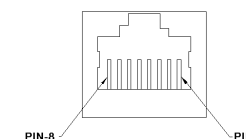
Ordering Code	Description
VA13-0000-1100-C0	USB to RS232 serial port converter with DB9 connector
VA13-0000-1200-C0	USB to RS422 serial port converter with DB9 connector
VA13-0000-1300-C0	USB to RS485 serial port converter with DB9 connector
VA13-0000-2100-C0	USB to RS232 serial port converter with RJ-45 connector
VA13-0000-2200-C0	USB to RS422 serial port converter with RJ-45 connector
VA13-0000-2300-C0	USB to RS485 serial port converter with RJ-45 connector

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