SBC

User Manual

SBC-A62-J

Single Board Computer
with NXP i.MX6 Processor

www.seco.com

REVISION HISTORY

Revision	Date	Note	Ref
1.0	18th May 2015	First Official Release.	SB
1.1	11th June 2015	J29 connector pinout corrected	SB
1.2	9th September 2015	J27 jumper description added. Minor corrections.	SB
2.0	17th February 2016	Product name change. Power rail names updated.	SB
2.1	28th July 2016	Expansion connector configuration's description updated.	SB
2.2	10th May 2017	Specifications updated (i.MX6Dual Plus added) Typo corrected in paragraph 3.3.17 Expansion header pinout assignment corrected for pins 11 and 13 (it doesn't affect the standard board's configurations)	SB
2.3	4th August 2017	Typo corrected in paragraph 3.3.2 (wrong mating connector's part number)	SB

Every effort has been made to ensure the accuracy of this manual. However, SECO S.r.l. accepts no responsibility for any inaccuracies, errors or omissions herein. SECO S.r.l. reserves the right to change precise specifications without prior notice to supply the best product possible.

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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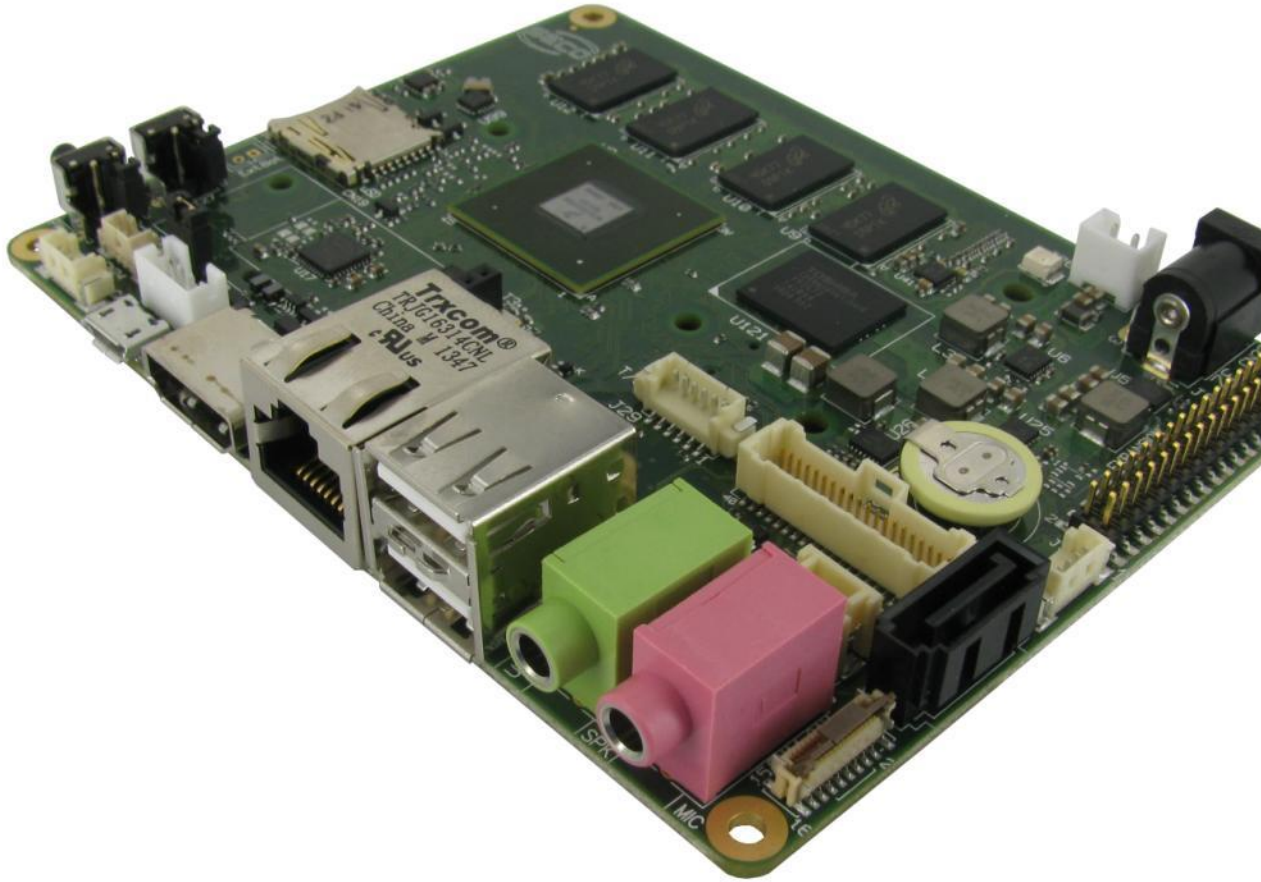
Chapter 1.
INTRODUCTION

- 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 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 of the 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 center: 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 (operative 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-A62-J 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-A62-J 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-A62-J 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-A62-J 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

AC'97	Audio Codec'97, a standard for audio hardware codecs developed by Intel® in 1997
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
CAN Bus	Controller Area network, a protocol designed for in-vehicle communication
CEC	Consumer Electronics Control, an HDMI feature which allows controlling more devices connected together by using only one remote control
CSI2	MIPI Camera Serial Interface, 2nd generation standard regulating communication between a peripheral device (camera) and a host processor
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
FFC/FPC	Flexible Flat Cable / Flat Panel Cable
GBE	Gigabit Ethernet
Gbps	Gigabits per second
GND	Ground
GPI/O	General purpose Input/Output
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 pairs copper cables, usually used for video applications
MAC	Medium Access Controller, the hardware implementing the Data Link Layer of ISO/OSI-7 model for communication systems
Mbps	Megabits per second
MIPI	Mobile Industry Processor Interface Alliance
MMC/eMMC	MultiMedia Card / embedded MMC, a type of memory card, having the same interface of SD. The eMMC are the embedded version of the MMC. They are devices that incorporate both the memory controller and 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
OpenVG	Open Vector Graphics, an Open Source API dedicated to hardware accelerated 2D vector graphics
OS	Operating System
OTG	On-the-Go, a specification that allows to USB devices to act indifferently as Host or as a Client, depending on the device connected to the port
PHY	Abbreviation of Physical, it is the device implementing the Physical Layer of ISO/OSI-7 model for communication systems
PSU	Power Supply Unit
PWM	Pulse Width Modulation
PWR	Power
RGMII	Reduced Gigabit Media Independent Interface, a particular interface defining the communication between an Ethernet MAC and a PHY
SATA	Serial Advance Technology Attachment, a differential half duplex serial interface for Hard Disks
SD	Secure Digital, a memory card type
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 contemplates 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
TTL	Transistor-transistor Logic
USB	Universal Serial Bus
uSDHC	Ultra Secure Digital Host Controller
V_REF	Voltage reference Pin

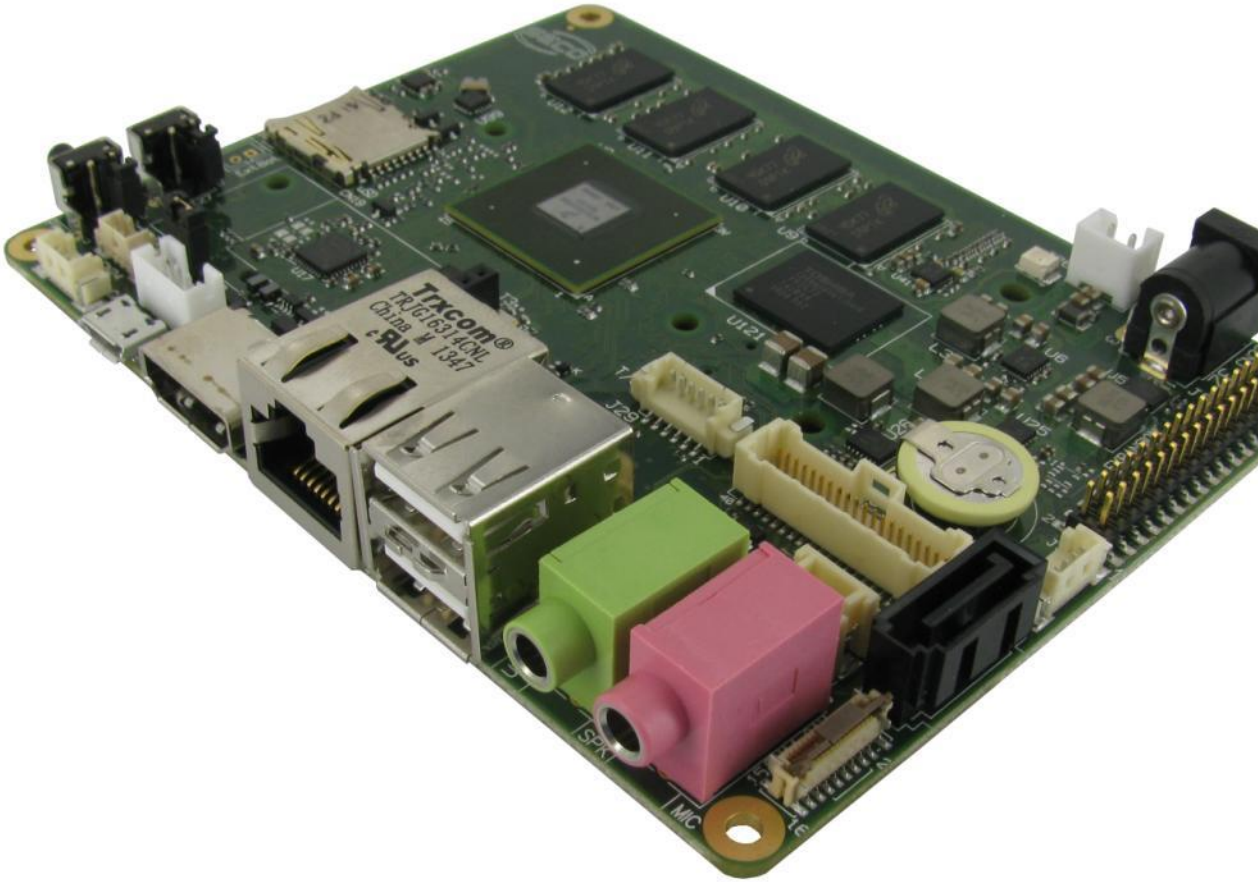
1.8 Reference specifications

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

Reference	Link
AC'97	http://download.intel.com/support/motherboards/desktop/sb/ac97_r23.pdf
AHCI	http://www.intel.com/content/www/us/en/io/serial-ata/ahci.html
CAN Bus	http://www.bosch-semiconductors.de/en/ubk_semiconductors/safe/ip_modules/can_literature/can_literature.html
CSI	http://www.mipi.org/specifications/camera-interface
Gigabit Ethernet	http://standards.ieee.org/about/get/802/802.3.html
HDMI	http://www.hdmi.org/index.aspx
I2C	http://www.nxp.com/documents/other/UM10204_v5.pdf
LVDS	http://www.ti.com/ww/en/analog/interface/lvds.shtml http://www.ti.com/lit/ml/snla187/snla187.pdf
MIPI	http://www.mipi.org
MMC/eMMC	http://www.jedec.org/committees/jc-649
OpenCL	http://www.khronos.org/opencl
OpenGL	http://www.opengl.org
OpenVG	http://www.khronos.org/openvg
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
USB 2.0 and USB OTG	http://www.usb.org/developers/docs/usb_20_070113.zip
NXP i.MX6 processor	http://www.nxp.com/products/microcontrollers-and-processors/arm-processors/i.mx-applications-processors-based-on-arm-cores/i.mx-6-processors:IMX6X_SERIES?cof=0&am=0

Chapter 2.
OVERVIEW

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



2.1 Introduction

SBC-A62-J is a Single Board Computer, measuring just 110 x 86.5 mm (4.5" x 3.7") based on embedded NXP i.MX6 processors, an ARM® Cortex®-A9 processor, Single-, Dual- and Quad-Core, with frequencies up to 1GHz, which is ideal for applications requiring multimedia capabilities and/or high levels of parallel computing maintaining advantages offered by low-power consuming ARM architecture in an extremely reduced space.

Graphics features of the board are managed directly by NXP i.MX6 processors, which integrate up to three separated accelerators for 2D, OpenGL® ES2.0 3D and OpenVG™, giving the processor incredible graphical performances (OpenVG™ accelerator is not available with i.MX6 Solo and Dual Lite processors).

The board is able to support up to 3 independent displays (with i.MX6DP Dual Core and i.MX6Q Quad core processor), which can be driven through the HDMI connector and/or the LVDS connector. LVDS interface is also able to drive one 18/24 bit Single / Dual Channel display as well as two independent 18/24 bit Single Channel displays. Using i.MX6 Dual Lite and Solo processors, support is limited to 2 independent displays.

The board is completed with up to 1GB DDR3L (up to 512MB with i.MX6 Solo) directly soldered on board, and one eMMC Flash Disk, directly accessible like any standard Hard Disk, with up to 16GB of capacity. Mass storage capabilities are completed by the SATA connector (with i.MX6DP and i.MX6Q processors only), which can be used to connect any external SATA disk, and a microSD Card slot.

RGMII i.MX6 native interface is internally carried to a Micrel KSZ9031RN Ethernet Transceiver, allowing the implementation of a Gigabit Ethernet interface.

USB native port is carried to an USB2.0 USB Hub controller, which allows implementing two standard USB 2-0 Type A ports, an internal USB port on dedicated connector, and another USB port on a 6-pin or 7-pin female header, intended for the connection of optional WiFi modules.

The i.MX6 OTG port, instead, is carried to a USB micro-B connector, thus supporting the client mode only functionality.

An embedded AC'97 Audio Codec, then, manages two audio jacks for LineOut and Mic in.

The standard functionalities of this board are then completed by a 32-pin expansion connector, which carries out directly 28 signals coming from the i.MX6 processor. These signals can all be used as Generic Purpose Input/Outputs (GPIOs). Due to the pin multiplexing possibilities offered by the i.MX6 processor, however, it is possible to use some groups of these pins to implement other functionalities, like 3 x UARTs (which can also be offered with RS-232 or RS-485 interface), SPI, 2 x CAN interfaces and more.

It is possible to have the board in EXTREME version, where all the components mounted onboard are certified to work in industrial range, therefore the board is specifically developed to work in range -40°C ÷ +85°C..

Please refer to following chapter for a complete list of all peripherals integrated and characteristics. Not all combinations of these features are offered simultaneously; please visit SECO's website for a description of standard configuration modules offered. Configurations different from the standard offered must be evaluated singularly; please contact a SECO's sales representative / distributor for this.

2.2 Technical specifications

Processors

NXP i.MX6 Family, based on ARM® CORTEX-A9 processors
- i.MX6S Solo - Single core up to 1GHz
- i.MX6DL Dual Lite - Dual core up to 1GHz per core
- i.MX6DP Dual Plus - Dual core up to 1GHz per core
- i.MX6Q Quad - Quad core up to 1GHz per core

Memory

Soldered down DDR3L memory
i.MX6DP: 2GB 64-bit interface
i.MX6Q, i.MX6DL: 1GB 64-bit interface
i.MX6S: up to 512MB 32-bit

Graphics

Dedicated 2D Hardware accelerator
Dedicated 3D Hardware accelerator, supports OpenGL® ES2.0 3D
Dedicated Vector Graphics accelerator, supports OpenVG™ (only i.MX6DP and i.MX6Q)
Supports up to 3 independent displays with i.MX6DP and i.MX6Q
Supports 2 independent displays with i.MX6DL and i.MX6S

Video Interfaces

1 x LVDS Dual Channel or 2 x LVDS Single Channel 18/24 bit interface
HDMI Interface
MIPI-CSI Camera connector

Video Resolution

LVDS, up to 1920x1200
HDMI, resolution up to 1080p

Mass Storage

Optional on-board eMMC Disk, up to 16GB *
SATA connector (only i.MX6DP and i.MX6Q)
microSD card slot
SPI Flash soldered onboard

** Please consider that for HDD and Flash Disk manufacturers, 1GB = 10^9 Byte. Some OS (like, for example, Windows) intends 1GB = 1024^3 byte, so global capacity shown for Disk Properties will be less than expected. Please also consider that a portion of disk capacity will be used by internal Flash Controller for Disk management, so final capacity will be lower*

Networking

Gigabit Ethernet connector

USB

2 x standard USB 2.0 Type A
Internal USB 2.0 connector
1 x USB micro-B client connector

Audio

AC'97 Audio Codec Realtek ALC655
Mic In, Line out Audio jacks

Serial Ports

Optional CAN Bus connector

Other interfaces

I2C touch Connector
32-pin expansion connector, configurable to offer:
- Up to 28 GPIO
- SPI interface
- SPDIF Audio interface
- 2 x CAN interface (TTL level)
- SDIO interface
- 3 x PWM
- 2 x I2C
- 3 x UARTs (TTL, RS-232, RS-485 modes)

Debug UART on dedicated connector
Power and reset buttons

Power supply voltage: +12V_{DC} ± 10%

Embedded additional RTC circuitry for lowest power consumption

Operating temperature: 0°C ÷ +60°C** (commercial version)
-40°C ÷ +85°C** (industrial version)

Dimensions: 110 x 86.5 mm (4.5" x 3.7").

Supported Operating Systems:

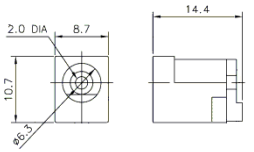
Linux
Android

! *** is to be considered at any point of the heatspreader/heatsink. Actual temperature will widely depend on application, enclosure and/or environment. It's up to the customer to consider specific cooling solutions for the final system.*
Please also check paragraph 4.1

2.3 Electrical specifications

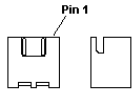
SBC-A62-J needs to be supplied only with an external $12V_{DC}$ ± 10% power supply, with a minimal 35W power rating.

This voltage can be supplied through an optional standard 6.3mm (internal pin, diameter 2.0 mm) Power Jack. Internal pin is V_{IN} power line.



Power In Connector - J26	
Pin	**Signal**
1	V_{IN}
2	GND

As an alternative, $+12V_{DC}$ can also be supplied using dedicated internal connector J26, which is a JST XH series connector or equivalent, p/n B2B-XH-A(LF)(SN), 3A max current per contact, with pinout shown in the table on the left.



Mating connector: JST XHP-2 receptacle with JST SXH-001T-P0.6 series of female crimp terminals.

2.3.1 RTC Battery

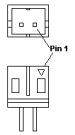
The SBC-A62-J board can be equipped with an optional low-power Real Time Clock embedded on the module (which is a NXP PCF2123). In this case, the board also mounts a soldered horizontal 3V coin cell lithium battery to supply such a RTC.

The battery used is a not-rechargeable Panasonic BR-1225HCN Lithium coin-cell battery, with a nominal capacity of 48mAh.

As a factory alternative, it is possible to connect external cabled RTC batteries to supply the RTC clock embedded on the i.MX6 processor.

Battery connector - J1	
Pin	**Signal**
1	V_{RTC}
2	GND

The battery used for this purpose must be not rechargeable, and can be connected to the board using dedicated connector, J1, which is a 2-pin p1.27 mm type MOLEX p/n 89400-0220 or equivalent, with pinout shown in the table on the left.



Mating connector: MOLEX 87369-0200 receptacle with MOLEX 50212-8000 female crimp terminals.

Please be aware that such a connector is optional, it will be present only in case that there isn't the additional low-power external RTC

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-A62-J are compliant to requirements of European Directive 2006/66/EC regarding batteries and accumulators. When putting out of order SBC-A62-J, 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.

2.3.2 Power rails

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

V_{IN}: +12V_{DC} voltage directly coming from the Power Supply connectors CN22 or J26

V_{RTC}: +3V external voltage for supplying the RTC clock embedded on the i.MX6.

+5V_SB: +5V stand-by voltage directly derived from V_{IN} voltage

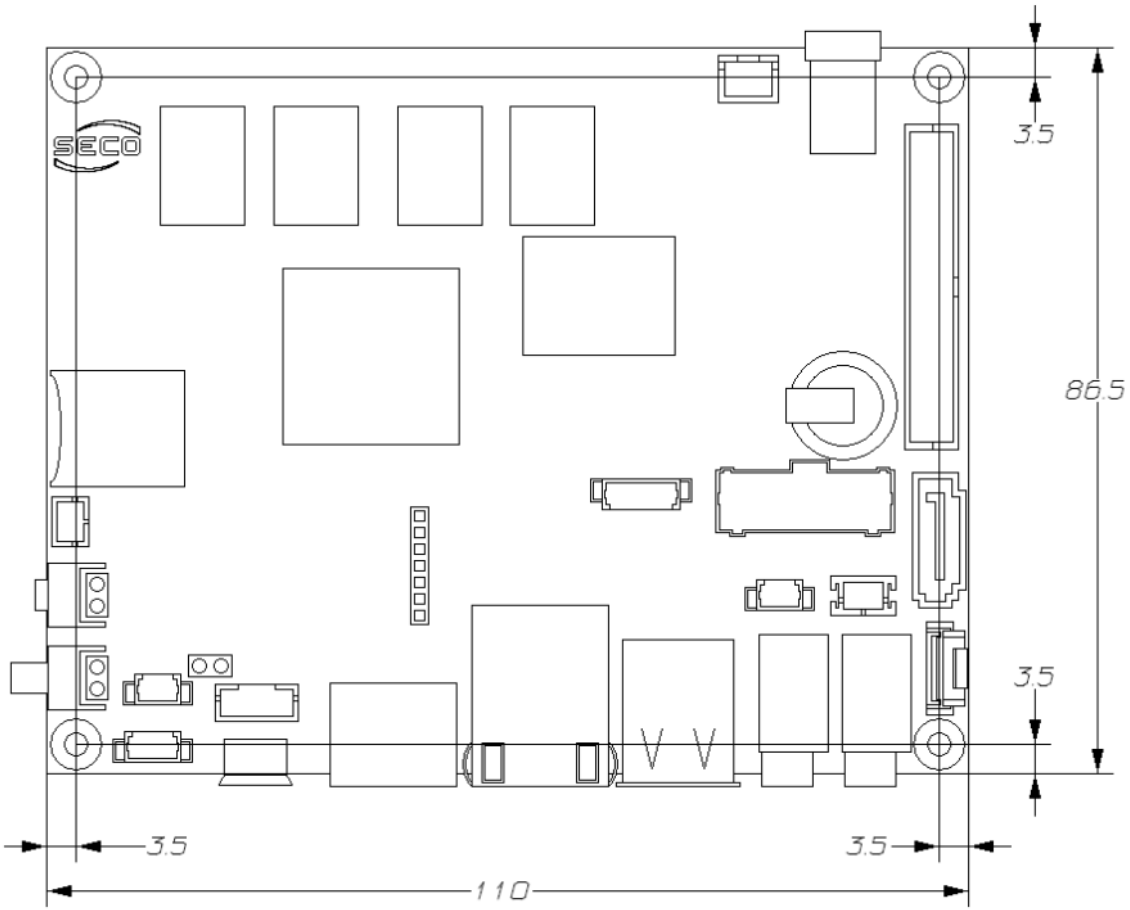
+3P3V_SB: +3.3V stand-by voltage derived from V_{IN} voltage after that +5V_SB Power Good has been asserted.

3P3V: +3.3V voltage derived from V_{IN} voltage after that +3P3V_SB Power Good has been asserted.

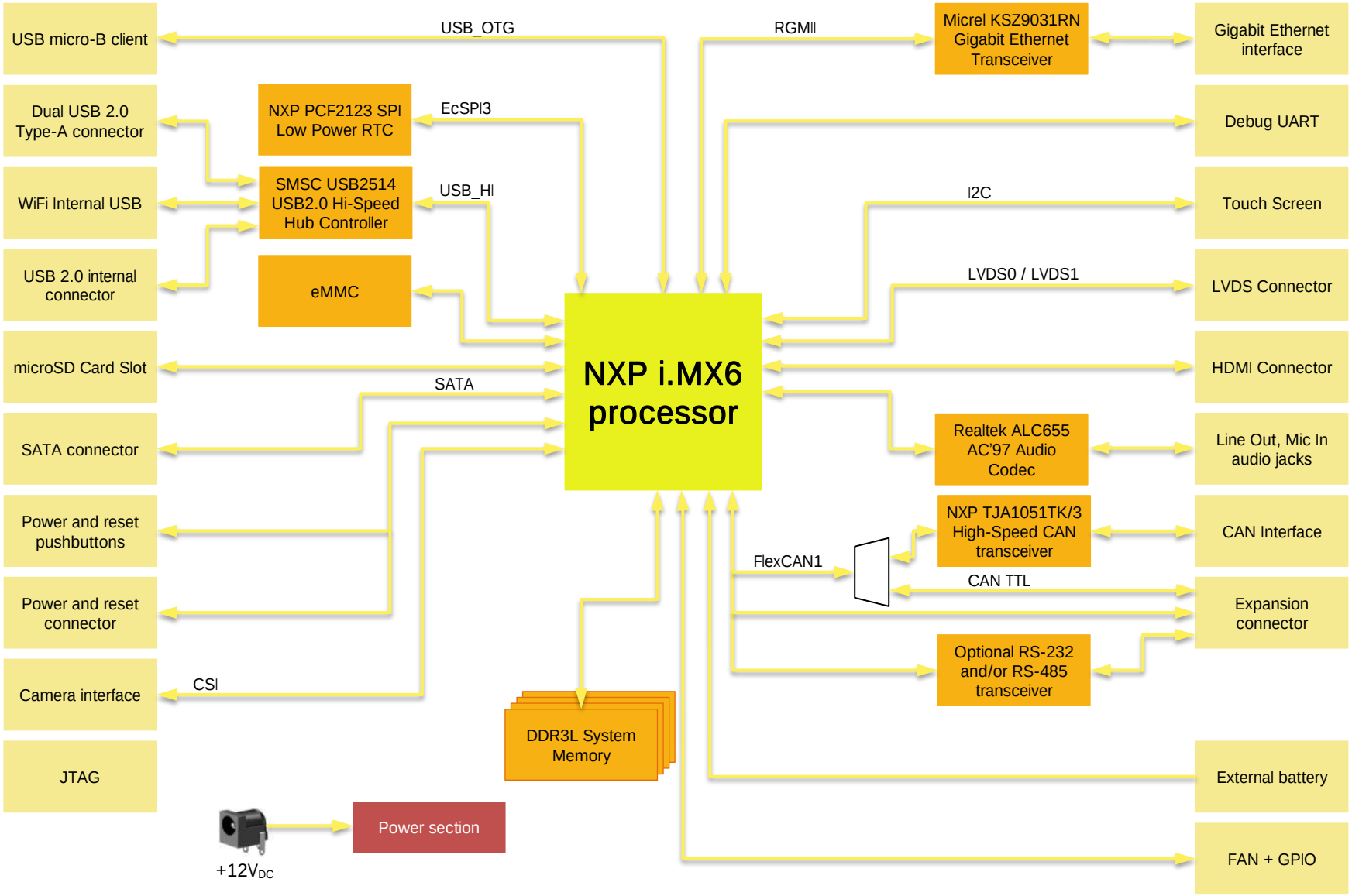
2.4 Mechanical specifications

Board dimensions are 110 x 86.5 mm (4.33” x 3.41”).

The printed circuit of the board is made of ten layers, some of them are ground planes, for disturbance rejection.

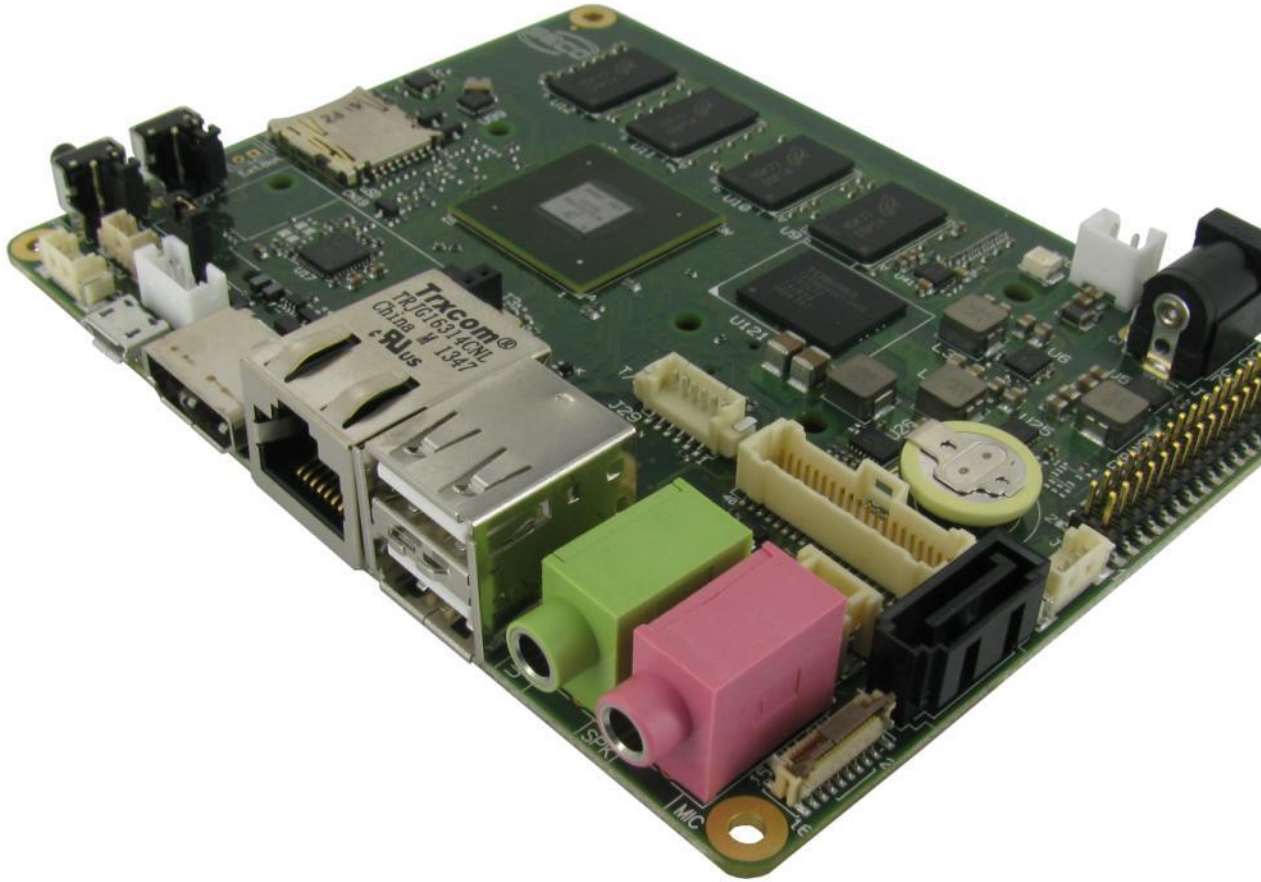


2.5 Block diagram



Chapter 3.
CONNECTORS

- Introduction
- Connectors overview
- Connectors description

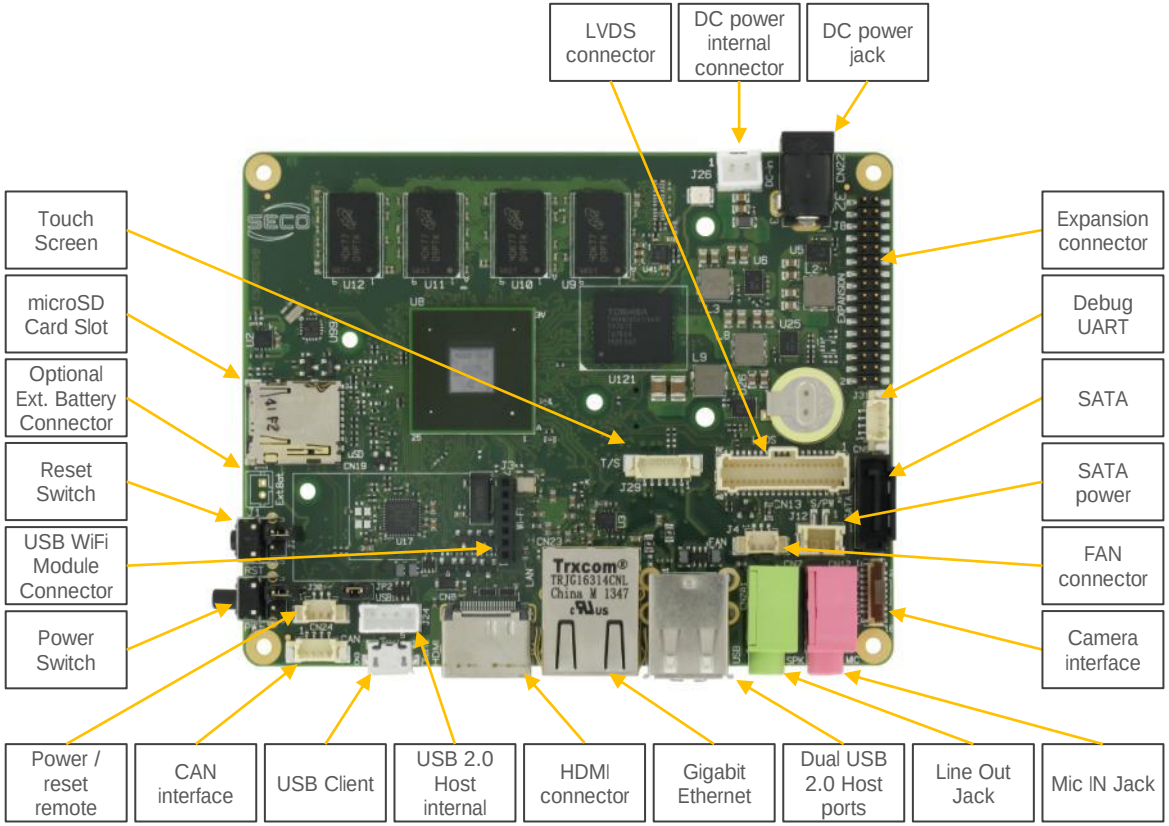


3.1 Introduction

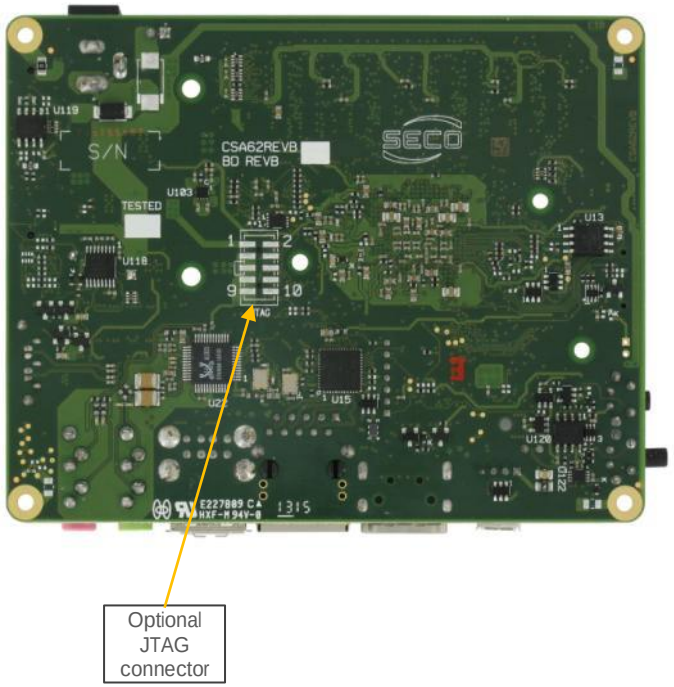
On SBC-A62-J board, there are several connectors located on the upper plane. Standard connectors are placed on the same side of PCB, so that it is possible to place them on a panel of an eventual enclosure.

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

TOP SIDE



BOTTOM SIDE



3.2 Connectors overview

Name	Description	Name	Description
CN2A1	USB 2.0 type A ports #1 / #2	J1	Optional external battery connector
CN3	USB client micro-B connector	J3	Optional internal USB header for WiFi module
CN7	Optional Line Out jack	J4	Optional FAN/GPIO Connector
CN8	Optional HDMI connector	J8	Expansion connector
CN9	SATA 7p connector (i.MX6DP and i.MX6Q versions only)	J12	SATA Power connector (i.MX6DP and i.MX6Q versions only)
CN11	Optional Camera connector	J17	Optional JTAG Connector
CN12	Optional Mic In jack	J24	Optional USB 2.0 port #4 internal header
CN13	LVDS connector	J26	Auxiliary Power In connector
CN19	microSD Card slot	J27	Boot Selection jumper
CN22	Optional Power In Jack	J29	Touch Screen Connector
CN23	Gigabit Ethernet port	J30	Power / Reset remote buttons
CN24	Optional CAN bus connector	J31	Debug UART

3.3 Connectors description

3.3.1 LVDS + backlight connector

SBC-A62-J board can be interfaced to LCD displays using its LVDS interface, which allows the connection of displays with a colour depth of 18 or 24 bit, single or dual channel.

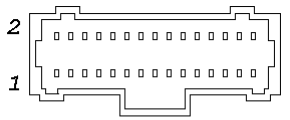
Optional LVDS connector - CN13

Pin	Signal	Pin	Signal
1	V_{IN}	2	V_{IN}
3	$+3.3V_{LCD}$	4	$+5V_{LCD}$
5	$+3.3V_{LCD}$	6	$+5V_{LCD}$
7	LVDS1_TX0-	8	LVDS0_TX0-
9	LVDS1_TX0+	10	LVDS0_TX0+
11	GND	12	GND
13	LVDS1_TX1-	14	LVDS0_TX1-
15	LVDS1_TX1+	16	LVDS0_TX1+
17	GND	18	GND
19	LVDS1_TX2-	20	LVDS0_TX2-
21	LVDS1_TX2+	22	LVDS0_TX2+
23	GND	24	GND
25	LVDS1_TX3-	26	LVDS0_TX3-
27	LVDS1_TX3+	28	LVDS0_TX3+
29	GND	30	GND
31	LVDS1_CLK-	32	LVDS0_CLK-
33	LVDS1_CLK+	34	LVDS0_CLK+
35	LVDS_BLT_EN	36	LVDS_BLT_CTRL
37	GND	38	GND
39	GND	40	GND

It is possible to configure LVDS output so that it can be used as:

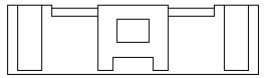
- One single channel (18 or 24 bit) output, max resolution supported 1366 x 768 @ 60fps
- One dual channel (18 or 24 bit) output, max resolution supported 1920 x 1200 @ 60fps
- Two identical single channel outputs, max resolution supported 1366 x 768 @ 60fps
- Two independent single channel outputs, max resolution supported 1366 x 768 @ 60fps on each channel

For the connection, a connector type HR A1014WVB-S-2x20P or equivalent (2 x 20p, male, straight, P1, low profile, polarized) can be provided, with the pin-out shown in the table below.



Mating connector: HR A1014H-2X20P with HR A1014-T female crimp terminals.

On the same connectors, are also implemented signals for direct driving of display's backlight: voltages (VIN, $+5V_{LCD}$ and $+3.3V_{LCD}$) and control signals (Backlight enable signal, LVDS_BLT_EN, and Backlight Brightness Control signal, LVDS_BLT_CTRL).



V_{IN} voltage, available on pins 1-2, is the Power Voltage that is supplied to the board though DC Jack CN22 or Power in connector J26 ($+12V_{DC}$ is supported).

$+5V_{LCD}$ is derived from +5V_SB power rail. $+3.3V_{LCD}$ is derived from +3P3V_SB power rail. Both voltages are switched on and off via SW.

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:

LVDS0_TX0+/LVDS0_TX0-: LVDS Channel #0 differential data pair #0.

LVDS0_TX1+/LVDS0_TX1-: LVDS Channel #0 differential data pair #1.

LVDS0_TX2+/LVDS0_TX2-: LVDS Channel #0 differential data pair #2.

LVDS0_TX3+/LVDS0_TX3-: LVDS Channel #0 differential data pair #3.

LVDS0_CLK+/LVDS0_CLK-: LVDS Channel #0 differential Clock.

LVDS1_TX0+/LVDS1_TX0-: LVDS Channel #1 differential data pair #0.

LVDS1_TX1+/LVDS1_TX1-: LVDS Channel #1 differential data pair #1.

LVDS1_TX2+/LVDS1_TX2-: LVDS Channel #1 differential data pair #2.

LVDS1_TX3+/LVDS1_TX3-: LVDS Channel #1 differential data pair #3.

LVDS1_CLK+/LVDS1_CLK-: LVDS Channel #1 differential Clock.

LVDS_BLT_EN: 3P3V electrical level Output with a 10kΩ pull-down resistor, Panel Backlight Enable signal. It can be used to turn On/Off the backlight's lamps of connected LVDS display.

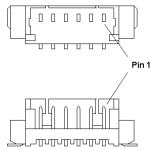
LVDS_BLT_CTRL: this signal can be used to adjust the backlight brightness in displays supporting Pulse Width Modulated (PWM) regulations (3P3V electrical level with a 10kΩ pull-down resistor).

3.3.2 I2C Touch Screen Connector

Touch Screen Connector - J29	
Pin	**Signal**
1	3P3V
2	TOUCH_IRQ
3	I2C3_SDA
4	I2C3_SCL
5	TOUCH_RST#
6	GND

On-board, connector J29 carries out signals to the I2C interface which can be used for I2C Touch Screen controller connection.

The connector is a 6-pin MOLEX p/n 53398-0671 or equivalent, with pinout shown in the table on the left. Mating connector: MOLEX 51021-0600 receptacle with MOLEX 50079-8000 female crimp terminals.



Signals' description:

I2C3_SCL: I2C Bus clock line. Bidirectional signal, electrical level 3P3V with a 4k7Ω pull-up resistor. It is managed by i.MX6 processor's I2C3 controller.

I2C3_SDA: I2C Bus data line. Bidirectional signal, electrical level 3P3V with a 4k7Ω pull-up resistor. It is managed by i.MX6 processor's I2C3 controller.

TOUCH_IRQ: Touch Screen IRQ line, 3P3V electrical level with a 10kΩ pull-up resistor.

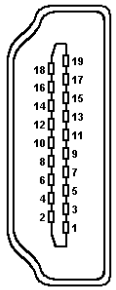
TOUCH_RST: Touch Screen Reset signal, 3P3V electrical level with a 10kΩ pull-down resistor.

3.3.3 Optional HDMI connector

In addition to LVDS interface, NXP i.MX6 processor also has an embedded HDMI Tx module, which provides a HDMI standard interface for HDMI1.4a compliant displays. By using HDMI interface along with two LVDS single channel interfaces, it is possible to drive up to 3 independent displays.

Optional HDMI Connector - CN8			
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	N.C.
15	SCL	16	SDA
17	GND	18	$+5V_{HDMI}$
19	HPD		

For this reason, on SBC-A62-J board there is the possibility of connecting directly one HDMI display, using a certified HDMI connector type A, model WinWin p/n WHDM-19F3L1BN5U4.



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 2k7Ω pull-up resistor.

SCL: DDC Clock line for HDMI panel. Output signal, electrical level $+5V_{HDMI}$ with a 2k7Ω pull-up resistor.

CEC: HDMI Consumer Electronics Control (CEC) Line. Bidirectional signal, electrical level 3P3V with 27kΩ pull-up resistor.

HPD: Hot Plug Detect Input signal. $+5V_{HDMI}$ with 20kΩ pull-down resistor.

$+5V_{HDMI}$ is derived from +5V_SB power rail.

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

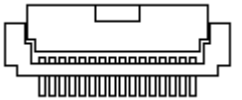
Always use HDMI-certified cables for the connection between the board and the HDMI display; a category 2 (High-Speed) cable is recommended for higher resolutions, category 1 cables can be used for 720p resolution.

3.3.4 Optional Camera connector

Optional Camera connector - CN11			
Pin	**Signal**	**Pin**	**Signal**
1	CSI_D1_DN	9	CSI_D0_DP
2	CSI_D1_DP	10	GND
3	GND	11	PWRON
4	GND	12	CSI0_MCLK
5	CSI_CLK0_DN	13	I2C3_SCL
6	CSI_CLK0_DP	14	I2C3_SDA
7	GND	15	RESET
8	CSI_D0_DN	16	3P3V

NXP i.MX6 Processor includes an Image Processing Subsystem, that can be used for video applications, like video-preview, video recording and frame grabbing.

It is possible to access to the video input port through an FFC/FPC connector, type HIROSE p/n FH12-16S-0.5SV(55) which is able to accept 16 poles 0.5mm pitch FFC cables.



The pinout of this connector is shown in the table on the left.

Signals' description

CSI_D0_DN/CSI_D0_DP: CSI first input differential pair. It is managed by i.MX6 CSI_D0 differential pair.

CSI_D1_DN/CSI_D1_DP: CSI second input differential pair. It is managed by i.MX6 CSI_D1 differential pair.

CSI_CLK0_DN/CSI_CLK0_DP: CSI Clock input differential pair. It is managed by i.MX6 CSI_CLK0 differential pair.

CSI0_MCLK: Master Clock, it is managed by i.MX6 pad P4. It is suggested, however, to use camera modules with onboard crystal / oscillator, and avoid using this signal. Indeed, it could cause problems for EMI compliance requirements.

PWRON: external camera module Power enable signal. Managed by i.MX6 CSI0_DAT18 pin, it is a signal at electrical level 3P3V with a 4k7Ω pull-up resistor.

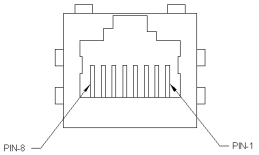
RESET: external camera module reset signal output. Managed by i.MX6 pad M6, it is a signal at electrical level 3P3V with a 4k7Ω pull-up resistor.

I2C3_SCL: general purpose I2C Bus clock line. Output signal, electrical level 3P3V with a 4k7Ω pull-up resistor. It is managed by i.MX6 processor's I2C3 controller. It is the same signal that is available also on Touch Connector J29.

I2C3_SDA: general purpose I2C Bus data line. Bidirectional signal, electrical level 3P3V with a 4k7Ω pull-up resistor. It is managed by i.MX6 processor's I2C3 controller. It is the same signal that is available also on Touch Connector J29.

3.3.5 Ethernet connector

Gigabit Ethernet Port - CN23			
Pin	**Signal**	**Pin**	**Signal**
1	GBE0_MDI0+	5	GBE0_MDI2-
2	GBE0_MDI0-	6	GBE0_MDI1-
3	GBE0_MDI1+	7	GBE0_MDI3+
4	GBE0_MDI2+	8	GBE0_MDI3-



On board, there is one Gigabit Ethernet connector, made available by a Micrel KSZ9031RN Gigabit Ethernet Transceiver interfaced to NXP processor's RGMII interface.

Connector is type TRXCOM p/n TRJG16314CNL or equivalent, with 2kV decoupling capacitor, 100 Ohm impedance.

This interface is compatible both with Gigabit Ethernet (1000Mbps) and with Fast Ethernet (10/100Mbps) Networks. It will configure automatically to work with the existing network. Theoretical maximum speed of 1Gbps, however, cannot be reached, due to a known limitation of i.MX6 Gb Ethernet MAC (ENET), which is limited only to 470Mbps (also check NXP Errata ERR004512 for i.MX6 processors).

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.

GBE0_MDI0+/GBE0_MDI0-: Ethernet Controller 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.

GBE0_MDI1+/GBE0_MDI1-: Ethernet Controller 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.

GBE0_MDI2+/GBE0_MDI2-: Ethernet Controller 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.

GBE0_MDI3+/GBE0_MDI3-: Ethernet Controller 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.

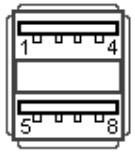
3.3.6 USB ports

The i.MX6 family of processors offer a native USB 2.0 Host port and a USB 2.0 OTG interface. Depending on the factory option purchased, the SBC-A62-J board can be equipped with a SMSC USB2514 USB 2.0 Hi-Speed Hub Controller, so that the total amount of USB 2.0 Host ports can be four instead of the native one only.

Double USB 2.0 type A receptacle - CN2A1

Pin	Signal	Pin	Signal
1	$+5V_{USB1}$	5	$+5V_{USB2}$
2	USB_P1-	6	USB_P2-
3	USB_P1+	7	USB_P2+
4	GND	8	GND

Lined to the ETHERNET connector, there is a double USB connector, CN6, which is a standard double USB Type A socket, shielded.



This connector can carry out the i.MX6 native USB 2.0 Host port, or the USB ports #1 and #2 coming out from theoptional SMSC USB2514 USB 2.0 Hi-Speed Hub Controller.

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

Signals description:

USB_P1+/USB_P1-: USB Port #1 differential pair; it can be the i.MX6 native USB 2.0 Host port or it can be managed by optional SMSC USB2514 Hub controller's Downstream Port #1.

USB_P2+/USB_P2-: USB Port #2 differential pair; it is managed by SMSC USB2514 Hub controller's Downstream Port #2 (when available).

$+5V_{USB1}$ and $+5V_{USB2}$ voltages are derived from +5V_SB power rail through two dedicated 500mA fuses.

Optional USB WiFi module connector - J3

Pin	7-pin WiFi Module Signal	6-pin WiFi Module Signal
1	WiFi_TX	N.C.
2	+5V_SB	
3	USB_P3-	
4	USB_P3+	
5	GND	
6	N.C.	WiFi_TX
7	WiFi_WPS	N.C.

The USB 2.0 Port #3 of the same optional USB hub is carried to an internal female pin Header, located on the bottom of the board, which is intended for the connection of optional WiFi module (obviously, it can also be used as a standard USB2.0 port).

Pin Header is a standard 7-pin p 2.54 mm female header, h=4.5mm.

Please notice that this optional connector can be offered with two independent pinouts, depending on the optional USB Wi-Fi module that will be used (the pinout is shown in the table on the left).

Signals description:

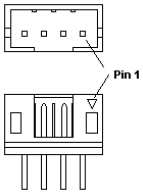
USB_P3+/USB_P3-: USB Port #3 differential pair; managed by SMSC USB2514 Hub controller's Downstream Port #3.

WiFi_TX: WiFi enable output signal, +3P3V_SB electrical level with a 4K7Ω pull-up resistor.

WiFi_WPS: WiFi WPS function enable, +3P3V output signal.

Optional USB internal connector - J24	
Pin	**Signal**
1	$+5V_{USB4}$
2	USB_P4-
3	USB_P4+
4	GND

Port#4 of SMSC USB2514 Hub controller is carried to an internal (optional) connector which can be used for the connection of an optional USB adapter cable.



The dedicated 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.

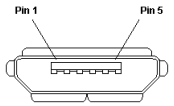
Signals description:

USB_P4+/USB_P4-: USB Port #4 differential pair; managed by SMSC USB2514 Hub controller's Downstream Port #4.

$+5V_{USB}$ voltage is derived from +5V_SB power rail through a dedicated 500mA fuse.

Micro-B Client connector - CN3	
Pin	**Signal**
1	$+5V_{CLIENT}$
2	USB_OTG-
3	USB_OTG+
4	USB_ID
5	GND

Finally, USB On-The-Go interface, native for NXP i.MX6 processor, is carried out through a standard micro-B connector, described in the table on the left.



Since the connector is micro-B type, the USB port available on it can be used only on Client mode.

This means that, $+5V_{CLIENT}$ is a power input of SBC-A62-J board from the external Host.

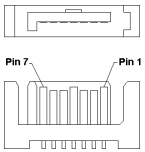
USB_OTG-/USB_OTG+: USB OTG differential pair, directly managed by NXP i.MX6 USB OTG port.

USB_ID: USB Identification pin. 3P3V electrical level with a 4K7Ω pull-up resistor

3.3.7 S-ATA connectors (i.MX6DP and i.MX6Q versions only)

S-ATA Connector - CN9	
Pin	**Signal**
1	GND
2	SATA_TXM
3	SATA_TXP
4	GND
5	SATA_RXM
6	SATA_RXP
7	GND

The NXP i.MX6DP and i.MX6Q processors embed a SATA Controller, which offers a SATA II, 3.0 Gps interface.



Therefore, on boards equipped with these processors there is a standard male S-ATA connector for the connection of external Mass Storage Devices.

Here following the signals related to SATA interface:

SATA_TXM/SATA_TXP: Serial ATA ChannelTransmit differential pair

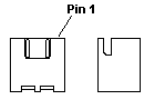
SATA_RXM/SATA_RXP: Serial ATA ChannelReceive differential pair

10nF AC series decoupling capacitors are placed on each line of SATA differential pairs.

S-ATA Power Connector - J12	
Pin	**Signal**
1	+5V_SB
2	GND

A dedicated power connector, J12, 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 2-pin male connector, type JST p/n B2B-PH-SM4-TB or equivalent, with pinout shown in the table on the left.



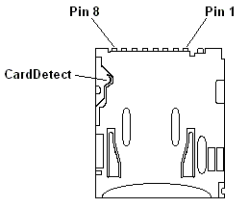
Mating connector: JST PHR-2 crimp housing with JST SPH-002T-P0.5L crimp terminals.

3.3.8 µSD card slot

µSD Card Slot - CN19	
Pin	**Signal**
1	SDIO_DAT2
2	SDIO_DAT3
3	SDIO_CMD
4	$+3.3V_{SDIO}$
5	SDIO_CLK
6	GND
7	SDIO_DAT0
8	SDIO_DAT1
CardDetect	SDIO_CD#

The NXP i.MX6 family of processors embeds four Ultra Secured Digital Host controllers (uSDHC), able to support SD / SDIO / MMC Cards.

For this reason, on SBC-A62-J 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=1.68 mm, type JST DM3AT-SF-PEJM5 or equivalent.

SDIO_CD#: Card Detect Input.

SDIO_CLK: SD Clock Line (output).

SDIO_CMD: Command/Response bidirectional line.

SDIO_DAT[0÷3]: SD Card data bus. SDIO_DAT0 signal is used for all communication modes. SDIO_DAT[1÷3] signals are required for 4-bit communication mode.

$+3.3V_{SDIO}$ voltage is derived from 3P3V power rail. It can be switched on and off via SW (SPIO_PWR signal, managed using the i.MX6 pad B18).

3.3.9 Optional Audio Jacks

Optionally, SBC-A62-J board can be equipped with an optional AC'97 Audio Codec, Realtek ALC655.

In this case, the module will have two standard stereo audio jacks.

The light green audio jack will be the Headphone out (not amplified), while Pink Audio jack is the Mic In Jack.

3.3.10 CAN Bus connector

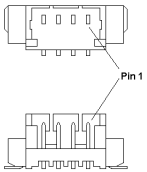
The i.MX6 processor includes two Flexible Controller Area Network (FlexCAN).

For this reason, as a factory option, on the SBC-A62-J board it is possible to have a CAN transceiver, for the direct connection of the board to a CAN Bus network.

Optional CAN Bus Connector - CN24	
Pin	**Signal**
1	V_{IN}
2	CAN_H
3	GND
4	CAN_L

This interface is compliant to CAN specifications rel. 2.0 part B. The transceiver used is designed for high-speed (up to 1Mbps) CAN applications, and also offers improved EMC and ESD performances.

CAN Bus Connector is a 4-pin single line SMT connector, type MOLEX 53398-0471 or equivalent, with pinout shown in the table on the left. Mating connector: MOLEX 51021-0400 receptacle with MOLEX 50079-8000 female crimp terminals.



CAN_H: High-Level CAN bus line.

CAN_L: Low-Level CAN bus line.

A 120Ω termination resistor is placed between CAN_H and CAN_L signals. It can be connected or disconnected from the line by using JP2 jumper (Jumper inserted = termination connected).

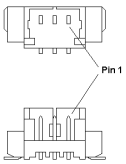
When the CAN transceiver is not mounted as a factory option, it is possible to use the FlexCAN1 interface, at TTL level, through the expansion connector J8, port #3. Please notice that the CAN transceiver + connector CN24 and the availability of CAN interface on J8 are mutually exclusive. Please also check par. 3.3.15.

3.3.11 Optional FAN/GPIO connector

Optional FAN/GPIO Connector - J4	
Pin	**Signal**
1	V_{IN}
2	FAN_EN#
3	GPIO1_11

To allow the integration of a SBC-A62-J based system inside a box PC-like, there is an optional connector on the carrier board that can be used to drive an external FAN, if needed.

The dedicated connector is a 3-pin male connector, type MOLEX p/n 53398-0371 or equivalent, with pinout shown in the table on the left.



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

This connection is rated for a maximum current of 300mA.

GPIO1_11 is the signal, managed by i.MX6 processor's pad F19, which can be used as a tachometric fan input.

3.3.12 Recovery jumper JP1

On board, there is a 2-way jumper (JP1) that can be used to force i.MX6 processor in recovery mode.

For normal working of the board, this jumper must not be inserted. It has to be plugged only in case the system must be reprogrammed.

3.3.13 Boot Selection jumper J27

The onboard 2-way jumper J27 can be used to select boot source for the SBC-A62-J module.

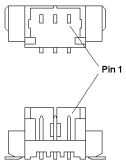
When the jumper is inserted, then the boot will be performed from the uSD Card, otherwise, if the jumper is not placed, the boot will be performed from the internal eMMC.

3.3.14 Power and Reset buttons

Power and Reset Connector - J30	
Pin	**Signal**
1	ON_OFF
2	GND
3	RESET#

To allow the integration of a SBC-A62-J based system inside a box PC-like, there is an optional connector on the carrier board that allows to remote signals for the Power Button and for the Reset Button.

The dedicated connector is a 3-pin male connector, type MOLEX p/n 53398-0371 or equivalent, with pinout shown in the table on the left.



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

Signals Description:

ON_OFF: Power switch input signal, open drain. This signal has to be connected to an external momentary pushbutton (contacts normally open). Upon the pressure of this pushbutton (i.e., the signal is connected to GND), the pulse of this signal will let the switched voltage rails turn on or off.

RESET#: Reset switch input signal. This signal has to be connected to an external momentary pushbutton (contacts normally open). When the pushbutton is pressed (i.e., the signal is connected to GND), the pulse of Reset signal will cause the reset of the board.

Please be aware that the power switch input signal and the reset switch input signal are also managed directly on the carrier board by the two pushbuttons SW2 and SW1 (respectively), so it is not mandatory to connect them externally using J30. Anyway, reset switch SW1 is optional.

3.3.15 Expansion connector

The SBC-A62-J board offers the possibility of accessing directly to some of the various features offered by i.MX6 processor through the pin multiplexing.

This means that onboard there is a dedicated 32-pin connector, J8, which is a standard dual-way male pin header, p=2mm, h= 4mm, type Townes P1022-2*16MGF or equivalent.

The pinout of this connector is shown in the following table. In there, near each pin name, it is also indicated the possible uses of those pins, according to the pin multiplexing possibilities of i.MX6 processors. Port numbering is written only for easier identification, but each pin can be individually set, independently from the use of the other pins of the same port.

Due to the various pin multiplexing possibilities offered by i.MX6 processor, in the following table are shown the features supported by SECO's BSP. It is also shown the i.MX6 pad name connected to each pin of connector J8, for the users who want to explore different configurations not directly managed by the BSP provided.

Expansion Connector - J8						
Pin nr.	**Pin Name**	**Pinout configuration Option**			**Port Number**	**i.MX6 Pad Name**
1	+5V_SB					---
2	3P3V					----
3	GND					---
4	EXP_GPIO_1		GPIO1_IO09		1	GPIO_9
5	EXP_GPIO_2	ECSPI2_MISO	GPIO2_IO25		2	EIM_OE
6	EXP_GPIO_3	ECSPI2_SCLK	GPIO2_IO23		2	EIM_CS0
7	EXP_GPIO_4	ECSPI2_MOSI	GPIO2_IO24		2	EIM_CS1
8	EXP_GPIO_5	ECSPI4_SS0	GPIO3_IO29		2	EIM_D29
9	EXP_GPIO_6	FLEXCAN1_TX	GPIO1_IO07		3	GPIO_7
10	EXP_GPIO_7	FLEXCAN1_RX	GPIO1_IO08		3	GPIO_8
11	EXP_GPIO_8	UART4_CTS_B	GPIO6_IO02		4	CSI0_DAT16
12	EXP_GPIO_9	UART4_TX_DATA	GPIO5_IO30		4	CSI0_DAT12
13	EXP_GPIO_10	UART4_RTS_B	GPIO6_IO03		4	CSI0_DAT17
14	EXP_GPIO_11	UART4_RX_DATA	GPIO5_IO31		4	CSI0_DAT13
15	EXP_GPIO_12		GPIO3_IO28	I2C1_SDA	5	EIM_D28
16	EXP_GPIO_13	SPDIF_IN	GPIO3_IO21	I2C1_SCL	5	EIM_D21
17	EXP_GPIO_14	SPDIF_OUT1	GPIO4_IO05		5	GPIO_19

18	EXP_GPIO_15	SD1_CMD	GPIO1_IO18	PWM4_OUT	6	SD1_CMD
19	EXP_GPIO_16	SD1_CLK	GPIO1_IO20		6	SD1_CLK
20	EXP_GPIO_17	SD1_DATA0	GPIO1_IO16		6	SD1_DAT0
21	EXP_GPIO_18	SD1_DATA1	GPIO1_IO17	PWM3_OUT	6	SD1_DAT1
22	EXP_GPIO_19	SD1_DATA2	GPIO1_IO19	PWM2_OUT	6	SD1_DAT2
23	EXP_GPIO_20	SD1_DATA3	GPIO1_IO21		6	SD1_DAT3
24	EXP_GPIO_21	I2C3_SDA	GPIO7_IO11		7	GPIO_16
25	EXP_GPIO_22	I2C3_SCL	GPIO1_IO03		7	GPIO_3
26	EXP_GPIO_23	UART1_RX_DATA	GPIO5_IO29		8	CSI0_DAT11
27	EXP_GPIO_24	UART1_TX_DATA	GPIO5_IO28		8	CSI0_DAT10
28	EXP_GPIO_25	UART5_RX_DATA	GPIO6_IO01		9	CSI0_DAT15
29	EXP_GPIO_26	UART5_TX_DATA	GPIO6_IO00		9	CSI0_DAT14
30	EXP_GPIO_27	UART5_RTS_B	GPIO4_IO14	FLEXCAN2_TX	10	KEY_COL4
31	EXP_GPIO_28	UART5_CTS_B	GPIO4_IO15	FLEXCAN2_RX	10	KEY_ROW4
32	GND					

The pins of Port Number #3 will be connected (and usable as CAN Bus at TTL level or as two General Purpose IOs) only in case that the board is not configured with dedicated CAN transceiver, accessible through connector CN24. Please check also par. 3.3.10.

Moreover, As a factory option, it is possible to have UART4 (port #4) configured with TTL or RS-232 interface, UART1 (ports #8) with TTL or RS-485 interface and UART5 with TTL level or RS-232 interface (Tx and Rx signals only). All possible factory configurations are described in the table below.

Please consider that the pins dedicated to UART1, UART4 and UART5 can be used as General Purpose I/Os exclusively in the case that the corresponding UART is at TTL level (which means with no RS-232 or RS-485 transceiver interposed). This is the situation of the first configuration described in the following table.

Port number#	Configuration #1	Configuration #2	Configuration #3	Configuration #4	Configuration #5	Configuration #6
Port #4	UART4 TTL level Full	UART4 RS-232 Full	UART4 RS-232 Full	UART4 RS-232 (Tx, Rx only)	UART4 RS-232 (Tx, Rx only)	UART4 TTL level Full
Port #8	UART1 (Tx,Rx) TTL	UART1 (Tx,Rx) TTL	UART1 RS-485	UART1 RS-485	UART1 (Tx,Rx) TTL	UART1 RS-485
Port #9	UART5 TTL level Full	UART5 TTL level Full	UART5 TTL level Full	UART5 RS-232 (Tx, Rx only)	UART5 RS-232 (Tx, Rx only)	UART5 TTL level Full

Configuration #5 is the standard offered with SBC-A62-J modules with i.MX6S (Solo) and i.MX6DL (Dual Lite) processor.

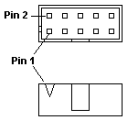
Configuration #4 is the standard offered with SBC-A62-J modules with i.MX6DP (Dual Plus) and i.MX6Q (Quad) processor.

Configurations different from the standard offered must be evaluated singularly; please contact a SECO's sales representative / distributor for this.

3.3.16 Optional JTAG connector

Optional JTAG connector - J17			
Pin	Signal	Pin	Signal
1	+3P3V_SB	2	JTAG_TMS
3	GND	4	JTAG_TCK
5	GND	6	JTAG_TDO
7	GND	8	JTAG_TDI
9	GND	10	JTAG_TRSTB

On customer specific request, the board can be equipped with a connector reporting the JTAG signals coming from the i.MX6 processor, which can be useful for software debugging and tracing in development phase. This optional connector is a 10-pin dual row male connector, type MOLEX p/n 87832-1020 or equivalent, with pinout shown in the table on the left.



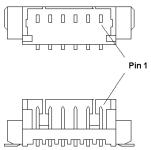
Mating connector: MOLEX 51110-1050 crimp housing with MOLEX 50394 series crimp terminals.

All these JTAG signals are directly connected to i.MX6 pins with same name. Please refer to i.MX6 processor's documentation for a description of the signals and their usage.

3.3.17 Debug UART connector

Debug UART Connector - J31	
Pin	Signal
1	3P3V
2	DUART_RX
3	DUART_TX
4	GND

Onboard, the connector J31 carries out signals related to Debug Serial Port, which is managed by NXP i.MX6 UART2 internal controller, with signals available at TTL level..



The connector is a 4-pin MOLEX p/n 53398-0471 or equivalent, with pinout shown in the table on the left. Mating connector: MOLEX 51021-0400 receptacle with MOLEX 50079-8000 female crimp terminals.

Signals' description:

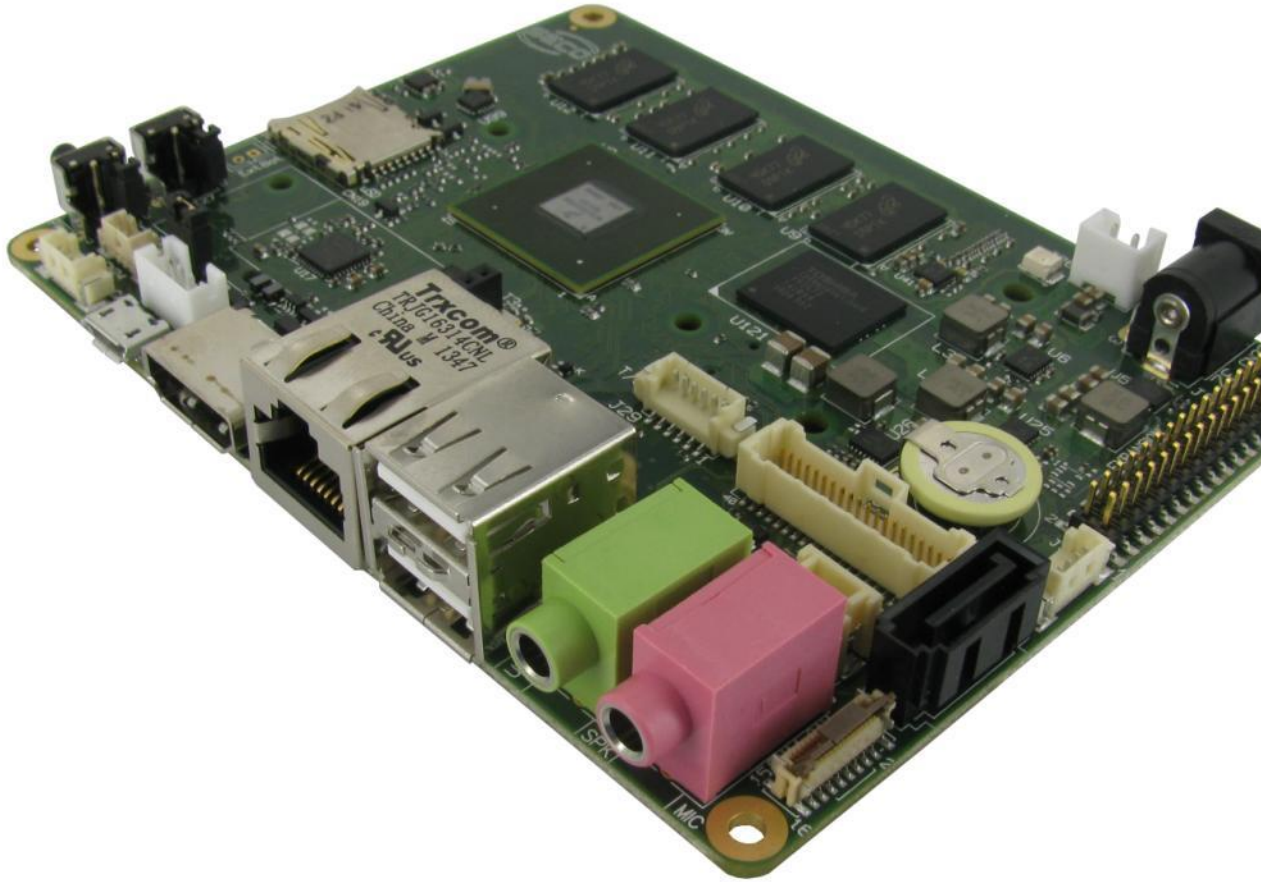
DUART_TX: Debug UART Interface, Serial data Transmit (output) line, 3P3V electrical level.

DUART_RX: Debug UART Interface, Serial data Receive (input) line, 3P3V electrical level.

Please consider that UART debug interface is at TTL electrical level; therefore, please evaluate well the typical scenario of application. If it isn't explicitly required to interface directly at TTL level, for connection to standard serial ports commonly available (like those offered by common PCs, for example) it is necessary to use an RS-232 transceiver module. SECO can provide such an adapter, which is part of the optional accessories of the board. Please also check paragraph 4.2.1.

Chapter 4.
APPENDICES

- Thermal Design
- Accessories



4.1 Thermal Design

Highly integrated systems, like the SBC-A62-J board, offer the user excellent performance in a much reduced space, therefore allowing the system's minimization. On the other hand, the miniaturizing of IC's and the increase of clock frequencies of the processors lead to the generation of a big amount of heat that must be dissipated to prevent critical operating conditions, system hang-off or failures.

It is extremely important to note that, for this reason, a critical design parameter always to be kept in very high consideration is the thermal design and analysis of the final assembled system. It is necessary to carefully consider the heat generated by the module in the final assembled system and the application.

The customer must always ensure that the heatspreader/heatsink surface temperature remain within the declared operating temperature range at any point of the cooling element.

SECO can provide the customer with SBC-A62-J specific passive heatsinks, which can be useful during the phase of development, in a laboratory, in free - air conditions or just for software development and system tuning.

Please always keep in mind that heavy computational tasks will generate much heat, on all versions of the processor.

Therefore, it is always necessary that the customer studies and develops a specifically tailored cooling solution for the final system by evaluating processor's workload, application environment, system enclosure, air flow and so on. Please remember that the use of SECO heat-dissipation components must be accurately evaluated within the final system and that they should be part of a more comprehensive ad-hoc cooling solution.

Please contact SECO for ordering part numbers.

4.2 Accessories

SECO can offer various accessories in completion of SBC-A62-J functionalities

4.2.1 RS-232 programming kit

This kit is necessary to connect Debug programming port, available on connector J31, to a standard PC serial port through a null-modem serial cable..

The kit is made of:

- TTL-to-RS232 serial port adapter
- Connection cable between SBC-A62-J board and TTL-to-RS-232 adapter

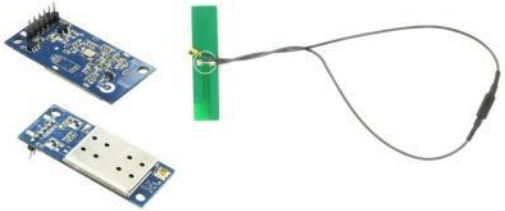
To use this kit, connect the cable to connector J31 on SBC-A62-J board and to connector CN3 on the TTL-to-RS232 adapter module. The debug serial port will now be available, at RS-232 level, on the module's connector CN1, which is a standard DB-9 male connector.

4.2.2 WiFi Modules

As stated in paragraph 3.3.6, on the SBC-A62-J there is an internal USB port, on a 6- or 7-pin female header, which has been purposely designed for the connection of USB WiFi modules, although it can be used for any USB 2.0 compliant device.

SECO can offer two different WiFi modules on USB pin header. Both of them are IEEE 802.11 b/g/n compliant, FCC Part 15 and CE compliant, 150Mbps maximum data rate, security support for 64/128 bit WEP, WPA, WPA2, TKIP, AES.

The first module has an integrated PCB antenna, and is based on Ralink RT5370 chipset. It has a 7-pin USB interface



The second module, instead, is based on Ralink RT3070 Chipset, and it is supplied with an external 50Ω 2.4GHZ antenna. This module has a 6-pin USB interface.

> **!** Please be aware that the two modules have an USB interface with a different number of pins. Each module therefore has to be paired with a board with the corresponding number of pins. Please keep in mind the modules desired when ordering a WiFi module and/or a SBC-A62-J board.

Obviously, these are not the only WiFi modules that can work combined with the SBC-A62-J board. The customer can choose any USB WiFi module. However, please remember that SECO cannot support customers if they choose to use modules different from those provided by SECO, and whose drivers are already included in SECO's provided BSPs.

Please contact SECO for ordering p/n.

4.2.3 Cabled RTC battery.

As stated in paragraph 2.3.1, for the occurrences when the module is not powered with an external power supply, it is possible to connect a cabled coin 3V Lithium Battery to supply the Real Time Clock embedded inside i.MX6 Processor.

SECO can provide for an optional cabled RTC battery, which is a Li-MnO_2 cylindrical battery, 3V 2500mAh, with a 100mm long connecting cable.

Please contact SECO for ordering p/n.

4.2.4 CSI Dongle Camera VA09

This optional module offer the possibility of connecting a commercial camera module, which is KLT Auto-Focus 5MP Camera module JAL-2721, based on the image sensor OV5640 manufactured by Omnivision Technologies, Inc.

Such a commercial camera module is perfectly integrated in the module VA09, which also includes a 15cm, 16-poles FFC cable necessary to connect the module to SBC-A62-J (connector CN11).

By using this combined camera module, it will be possible to capture images with a resolution up to 2592x1944 at a frame rate of 15fps (FullHD at 30fps), and many other advanced features.

More info about the camera CMOS Sensor can be found at http://www.ovt.com/products/sensor.php?id=93.

More info about the camera module is available at http://www.kailaptech.com/product.aspx?id=832&l1=512.

Please contact SECO for ordering p/n.

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