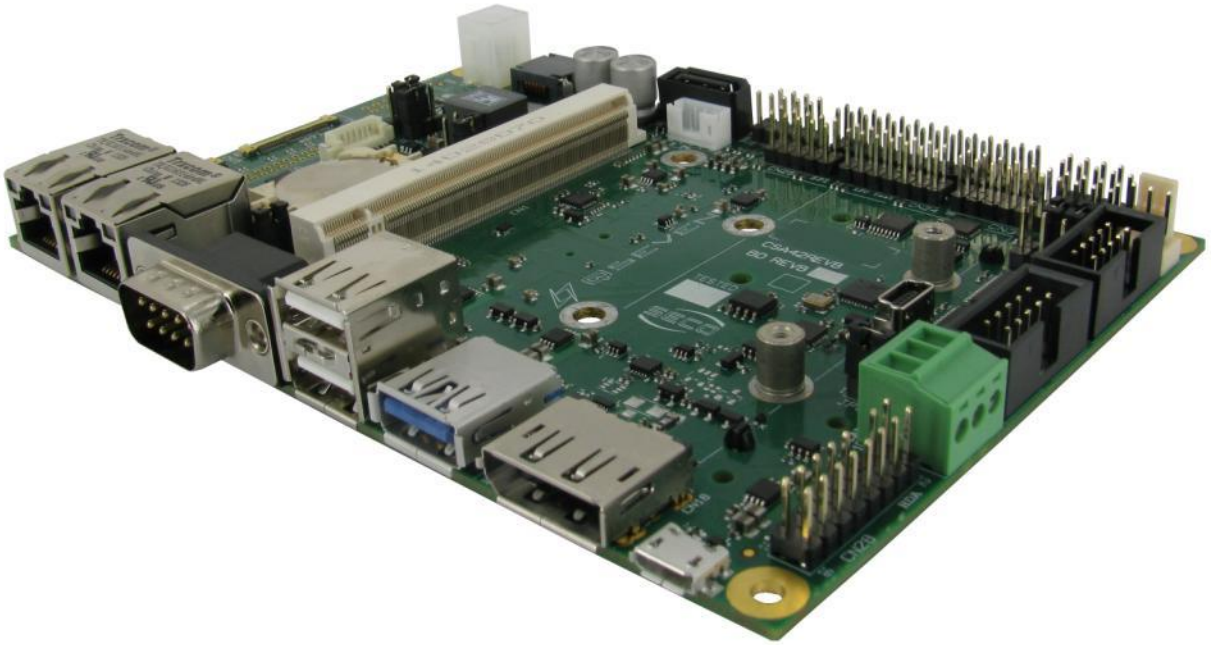
Qseven

User Manual



CQ7-A42

Carrier Board for Qseven® Rel. 2.0
Compliant Modules on 3.5” form factor

SECO

www.seco.com

REVISION HISTORY

Revision	Date	Note	Rif
1.0	17th October 2014	First official release	SB
1.1	9th February 2015	Minor corrections. CN21 pinout table corrected	SB
1.2	3rd March 2015	Optional LVDS connector CN16 description updated (warning added)	SB
1.3	8th June 2015	Audio modules added. Minor corrections	SB
2.0	26th January 2016	Product Name Change	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 you.

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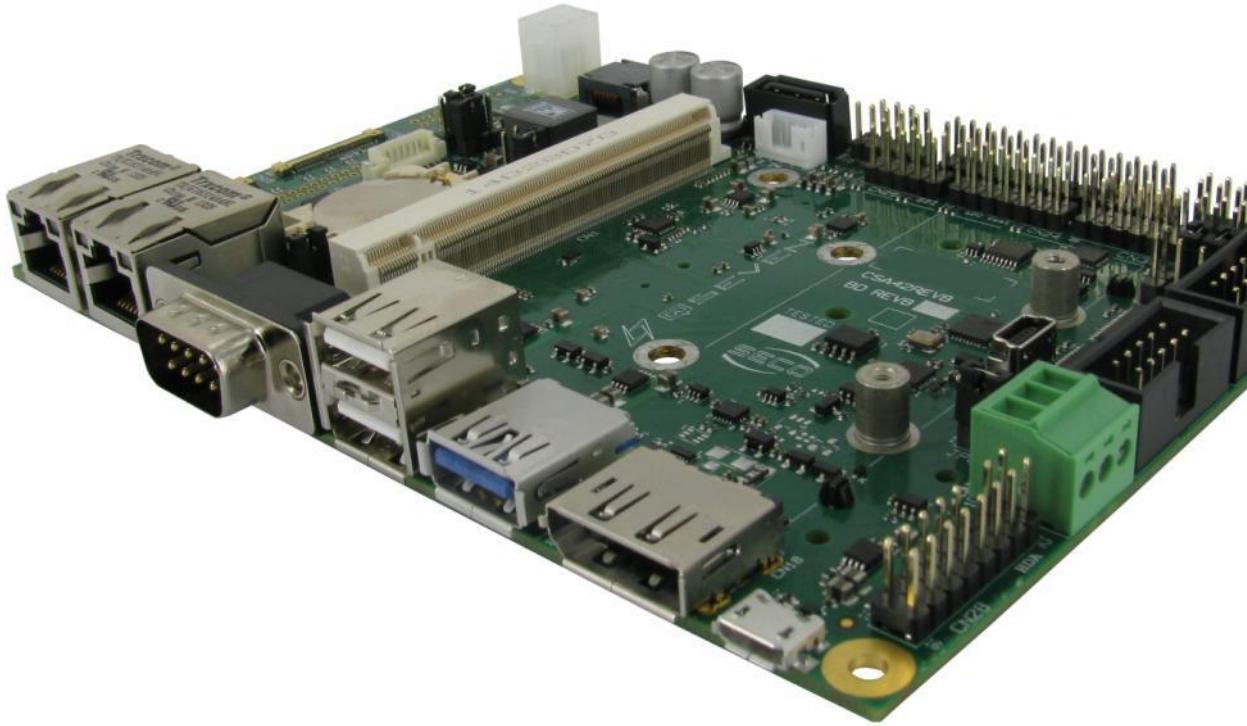
Chapter 1.
INTRODUCTION

- 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 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 authorised by the supplier.

The authorisation is released after completing the specific form available on the web-site http://www.seco.com/en/prerma (RMA Online). The RMA authorisation 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 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 supplierwill 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 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 requesting 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 released within 1 working day (only for on-line RMA requests).

1.4 Safety

The CQ7-A42 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 CQ7-A42 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 CQ7-A42 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 CQ7-A42 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
AC'97	Audio Codec'97, a standard for audio hardware codecs developed by Intel® in 1997
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
DDC	Display Data Channel, a kind of I2C interface for digital communication between displays and graphics processing units (GPU)
DP	Display Port, a type of digital video display interface
DVI	Digital Visual interface, a type of digital video display interface
eDP	embedded Display Port, a type of digital video display interface developed especially for internal connections between boards and digital displays
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
I2S	Inter-Integrated Circuit Sound, an audio serial bus protocol interface developed by Philips (now NXP) in 1986
JTAG	Joint Test Action Group, common name of IEEE1149.1 standard for testing printed circuit boards and integrated circuits through the Debug port
LPC Bus	Low Pin Count Bus, a low speed interface based on a very restricted number of signals, deemed to management of legacy peripherals
LVDS	Low Voltage Differential Signalling, a standard for transferring data at very high speed using inexpensive twisted pair copper cables, usually used for video applications
Mbps	Megabits per second
N.A.	Not Applicable
N.C.	Not Connected
OS	Operating System
PCI-e	Peripheral Component Interface Express

PSU	Power Supply Unit
PWM	Pulse Width Modulation
PWR	Power
SATA	Serial Advance Technology Attachment, a differential half duplex serial interface for Hard Disks
SD	Secure Digital, a memory card type
SDIO	Secure Digital Input/Output, an evolution of the SD standard that allows the use of the same SD interface to drive different Input/Output devices, like cameras, GPS, Tuners and so on
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 a master and one or more slaves, individually enabled through a Chip Select line
TBM	To be measured
TMDS	Transition-Minimized Differential Signalling, a method for transmitting high speed serial data, normally used on DVI and HDMI interfaces
TTL	Transistor-transistor Logic
UIM	User Identity Module, an extension of SIM modules.
USB	Universal Serial Bus
V_REF	Voltage reference Pin

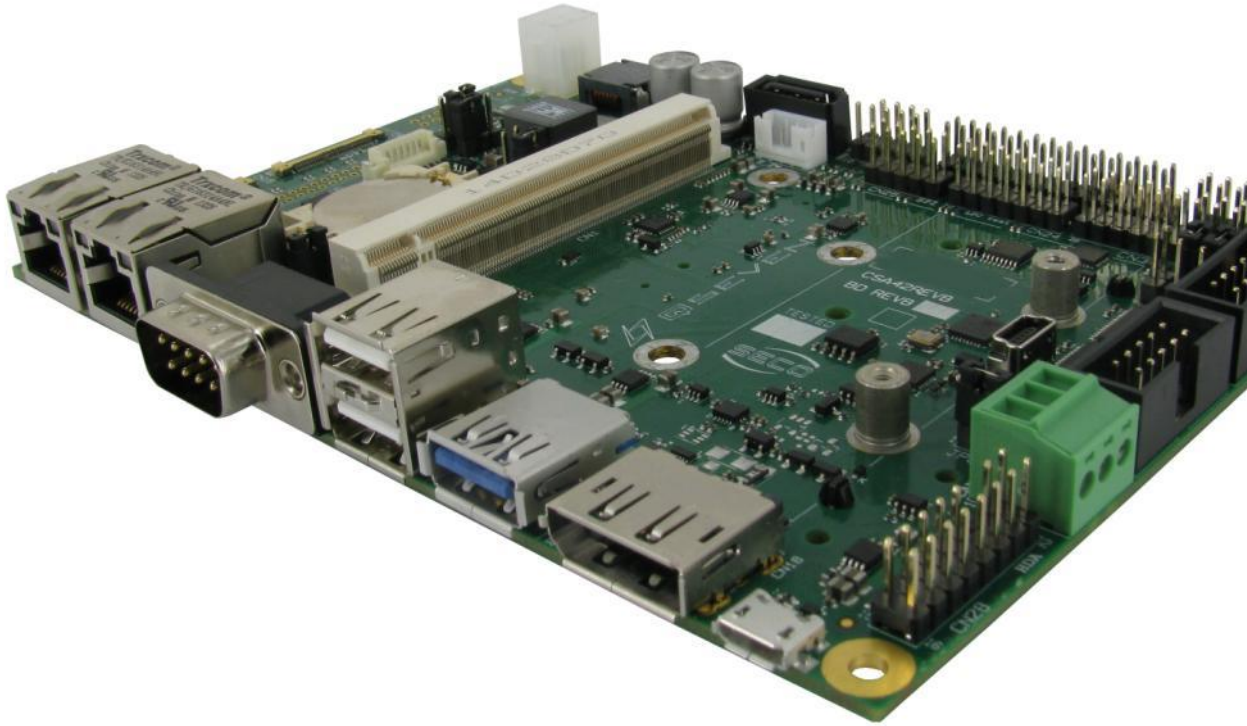
1.8 Reference specifications

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

Reference	Link
ACPI	http://www.acpi.info
AC'97	http://download.intel.com/support/motherboards/desktop/sb/ac97_r23.pdf
DDC	http://www.vesa.org
DP, eDP	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
I2S	https://www.sparkfun.com/datasheets/BreakoutBoards/I2SBUS.pdf
LPC Bus	http://www.intel.com/design/chipsets/industry/lpc.htm
LVDS	http://www.ti.com/ww/en/analog/interface/lvds.shtml http://www.ti.com/lit/ml/snla187/snla187.pdf
PCI Express	http://www.pcisig.com/specifications/pciexpress
Qseven® specifications	http://www.sget.org/uploads/media/Qseven-Spec_2.0_SGET.pdf
Qseven® Errata to Rel. 2.0	http://www.sget.org/uploads/media/Qseven-Spec_2.0_SGET_errata_sheet_E2.00-001.pdf
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
USB 3.0	http://www.usb.org/developers/docs/usb_30_spec_070113.zip

Chapter 2.
OVERVIEW

- Introduction
- Technical Specifications
- Electrical Specifications
- Mechanical Specifications
- Block Diagram



2.1 Introduction

CQ7-A42 is a carrier board for Qseven® rel. 2.0 compliant modules, in 3.5" mechanical Form Factor. It is specifically designed to support all features introduced with release 2.0 of the specifications, including those introduced with the Errata to rel. 2.0 published by SGET consortium.

Qseven® is a form factor designed to minimize space consumption, since it integrates in only 70x70mm of space all core components of a common PC architecture (CPU, RAM, Graphic, audio, etc.). All the functionalities are made available through a standardized card edge connector, from which all signals can be taken and carried to the appropriate external connector in the carrier board and/or to other internal component, to implement more functionalities other than included in the standard Qseven® bus interface.

The connection to the Qseven® board is implemented through a standardized MXM connector, which is a proven high speed signal interface connector.

The board has been specifically designed for taking advantage of all possible features that can be offered by x86 and/or ARM architectures on Qseven® modules.

All the features on the CQ7-A42 board are implemented according to the Qseven® standard bus interface, thus the board is fully Qseven® Rel. 2.0 compliant and compatible with Qseven® Spec. 2.0 modules.

The list of features that are effectively available depends on the configuration of the carrier board and of the Qseven® module used.

CQ7-A42 board is specially designed for being both an advanced development board, for skilled users who want to design their own carrier boards, and a good solution for mass production, for customers whose needing are satisfied by this compact and versatile Carrier Board.

All the components mounted onboard are certified for industrial temperature range.

2.2 Technical Specifications

Supported Modules

Qseven® Rel. 2.0 compliant modules

Mass Storage interfaces

1 x S-ATA connector with HDD Power connector

1 x mSATA Slot

microSD Slot on combo microSD + SIM connector

Video Interfaces

LVDS Dual Channel 24-bit + backlight connectors **or** 2 x eDP connectors

Multimode Display Port **or** HDMI Connector

Audio

Audio interface on internal pin header

USB

1 x USB3.0 Host port on type-A socket

2 x USB2.0 Host ports on double Type-A sockets

2 x USB2.0 Host ports on internal pin header

1 x USB 2.0 OTG port on micro-AB socket (USB port shared with miniPCI-e slot)

PCI Express

miniPCI-e slot Full/Half Size, combined with SIM card slot

Networking

Up to 2 x Gigabit Ethernet connectors

Serial Ports

4-wires RS-232/RS-422/RS-485 configurable serial port on DB9 male connector

2 x RS-232 Full-modem serial ports on internal header (need LPC interface from Qseven® module)

CAN interface on PCB terminal block

Other Interfaces

SPI internal pin header

LPC Bus internal pin header

SM Bus / I2C GPIO expander, makes available 16 x GPIOs on internal pin header

Front Panel Header

1 x 28 pin connector for additional features (I2C, ACPI signals, SM Bus, Watch Dog, Thermal Management)

+12V Tachometric FAN connector

Optional Debug USB port on miniB socket

Optional MFG connector for JTAG programming of Qseven® module

Power supply voltage: +12V_{DC} Mini-fit Standard ATX power connector
Coin cell battery Holder for CMOS and RTC

Operating temperature: -40°C ÷ +85°C (industrial temperature range)

Dimensions: 146 x 102 mm (5.75" x 4.02")

! ** Temperature ranges indicated mean that all components available onboard are certified for working with a Tcase included in these temperature ranges. This means that it is customer's responsibility to ensure that all components' Tcases remain in the range above indicated. Please also check paragraph 4.1.*

2.3 Electrical Specifications

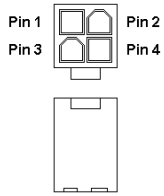
CQ7-A42 board needs to be supplied using a standard ATX Power Supply (only +12V_{DC} ± 5% voltage is needed).

Power Connector is type Molex Mini-Fit Jr., p/n 39-28-1043, or equivalent, with the pinout indicated in the following table.

Power Connector - CN21			
Pin	**Signal**	**Pin**	**Signal**
1	GND	3	+12V_A
2	GND	4	+12V_A

Mating Connector, MOLEX p/n 39-01-2040 or equivalent, with female crimp terminal MOLEX series 5566. The use of wires with section 18 AWG or 20AWG is recommended, in order to ensure the proper amperage of the power section.

All remaining voltages needed for board's working are derived internally from +12V_A power rail.



When choosing the power supply for CQ7-A42 board, 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 12A @ 5V and 4A @ 3.3V for Qseven module and for the external devices supplied directly by the carrier board (i.e. USB devices, optionally SSD or SATA disks, display).

Since also 12V voltage can be drawn from the carrier board to supply other external peripherals (like Audio adapter modules, HDD, display Backlight, FAN), it is very important to balance well the typical final configuration, summing all possible power consumptions.

This way it is possible to choose a PSU capable to supply enough current for the whole system.

2.3.1 RTC Battery

For the occurrences when the system (Carrier Board + Qseven® module) is not powered with an external power supply, on board there is a horizontal battery holder, for the use of standard coin battery type BR2032 with a nominal capacity of 220mAh, to supply, with a 3V voltage, the Real Time Clock and CMOS memory mounted on the Qseven® module.

The batteries 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 CQ7-A42 board are compliant to requirements of European Directive 2006/66/EC regarding batteries and accumulators. When putting out of order CQ7-A42 board, 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 meanings

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

2.4 Mechanical Specifications

The board dimensions: 147 x 102 mm (5.79" x 4.02").

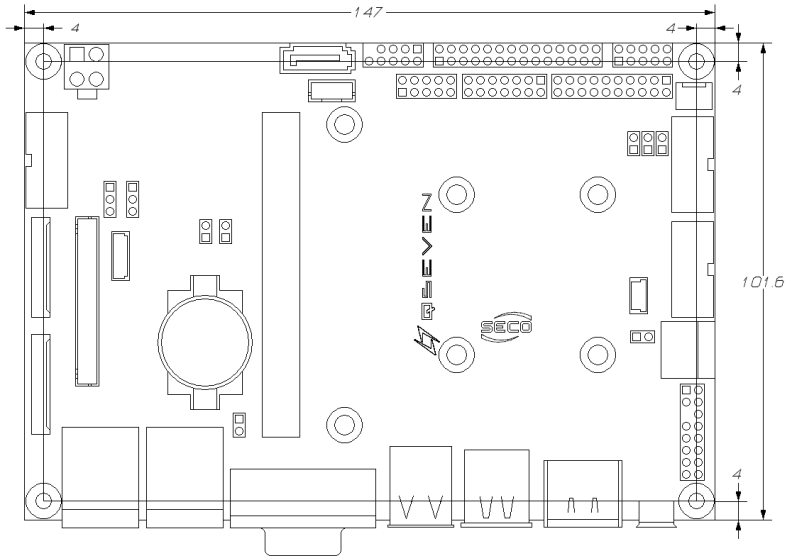
Printed circuit of the board is made of eight layers, some of them are ground planes, for disturbance rejection.

In order to fix the Qseven® module to the carrier board, on CQ7-A42 are soldered two metallic spacers (those farthest from MXM connector), height 7mm, 2.5mm diameter, that can be used for the fixing of standard size Qseven® modules.

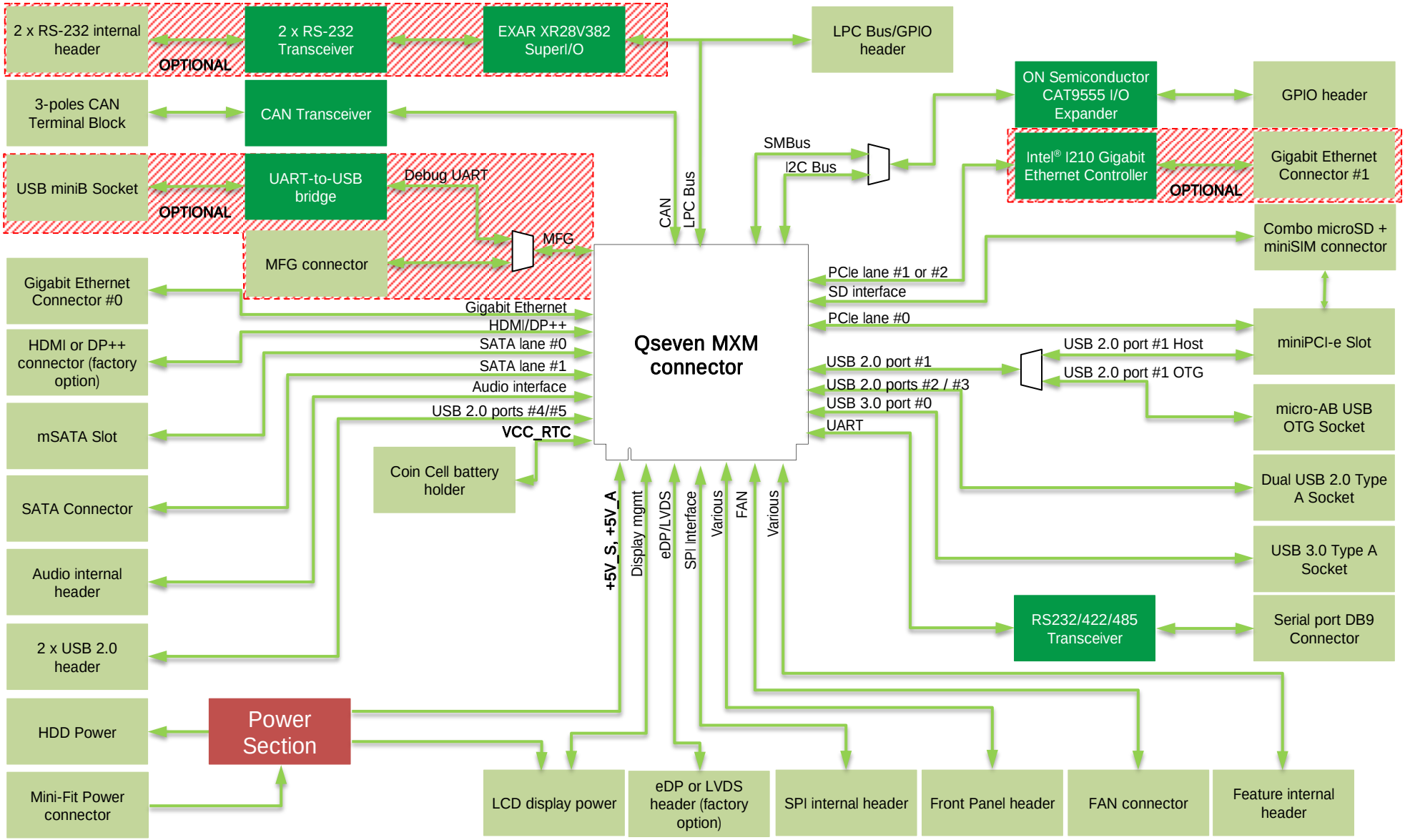
As a factory alternative, it is possible to solder two spacers for fixing of µQseven® modules: this factory alternative has been done since the spacers needed for fixing of µQseven® modules would interfere with electronic devices soldered on standard Qseven® modules.

Optionally, other two metallic spacers (those nearest to the MXM connector) can be soldered on the carrier board, in order to have four fixing points and improve the mechanical stability of the system

Considering possible application scenarios, please take notice of what kind of modules it could be possible to use, before purchasing one of the possible configurations.

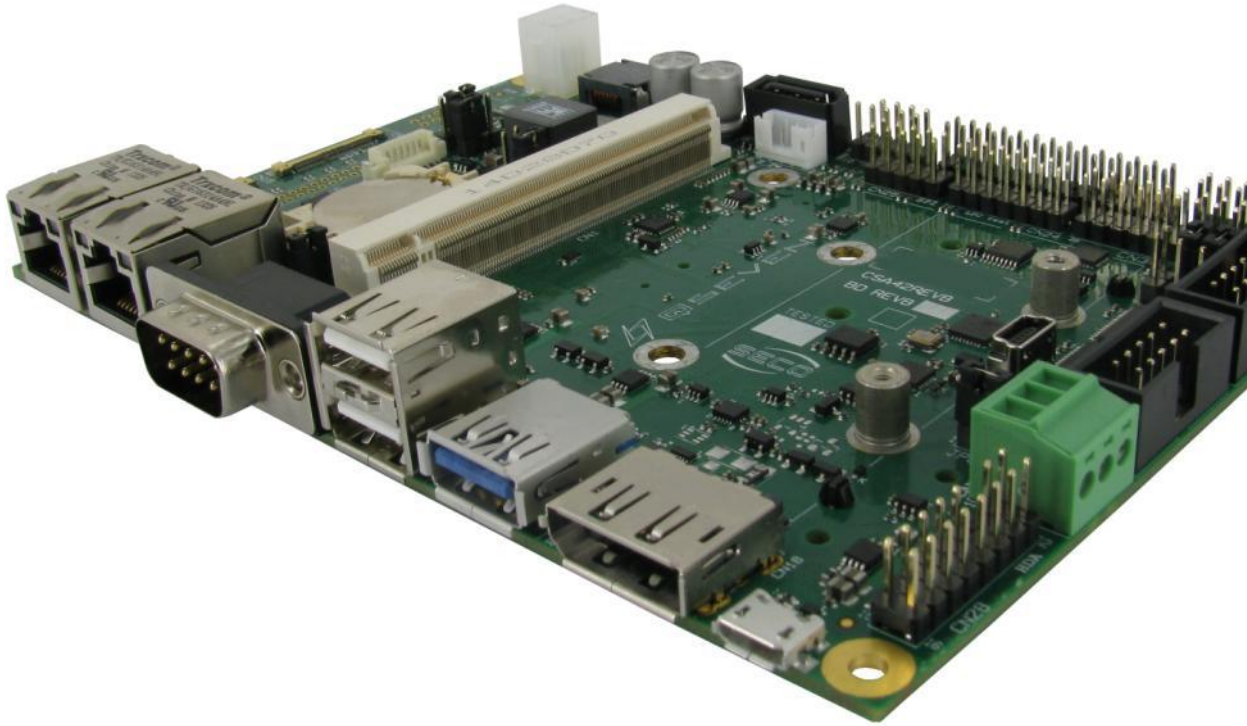


2.5 Block Diagram



Chapter 3.
CONNECTORS

- Connectors placement
- Connectors overview
- Connectors description

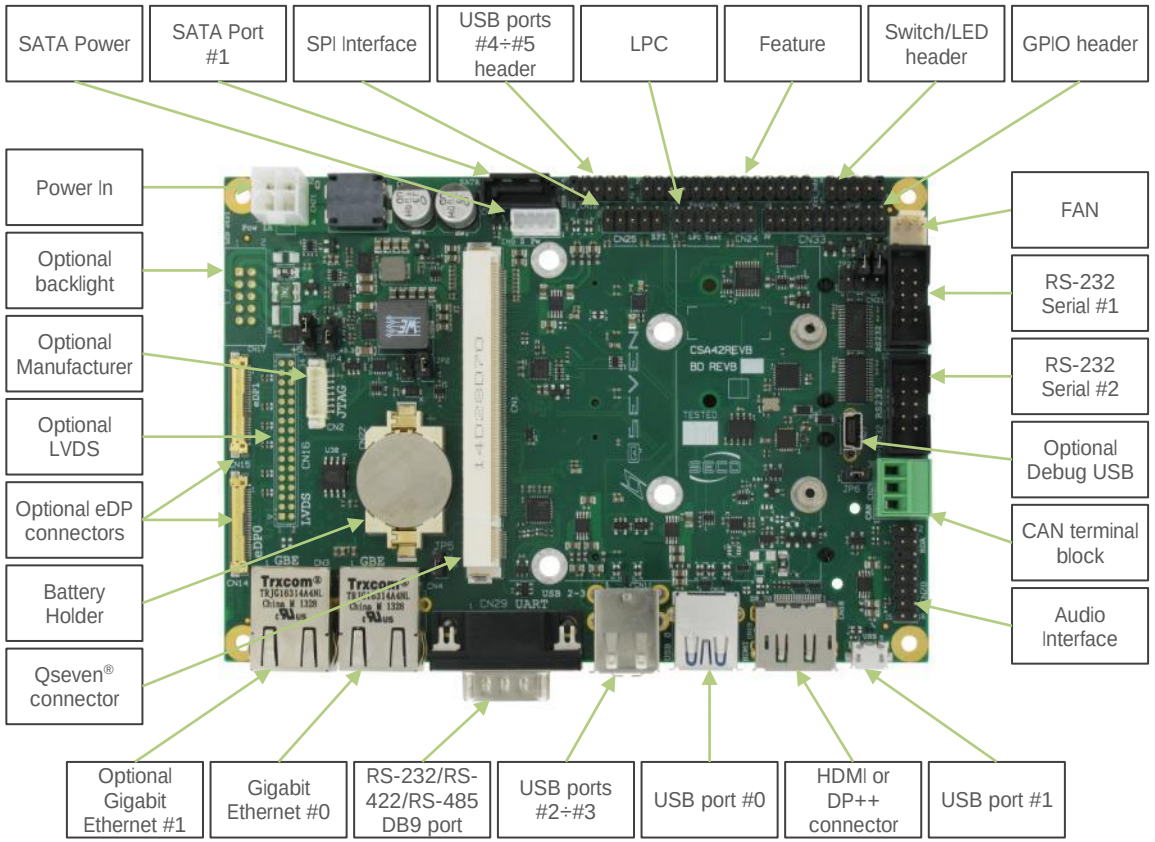


3.1 Connectors placement

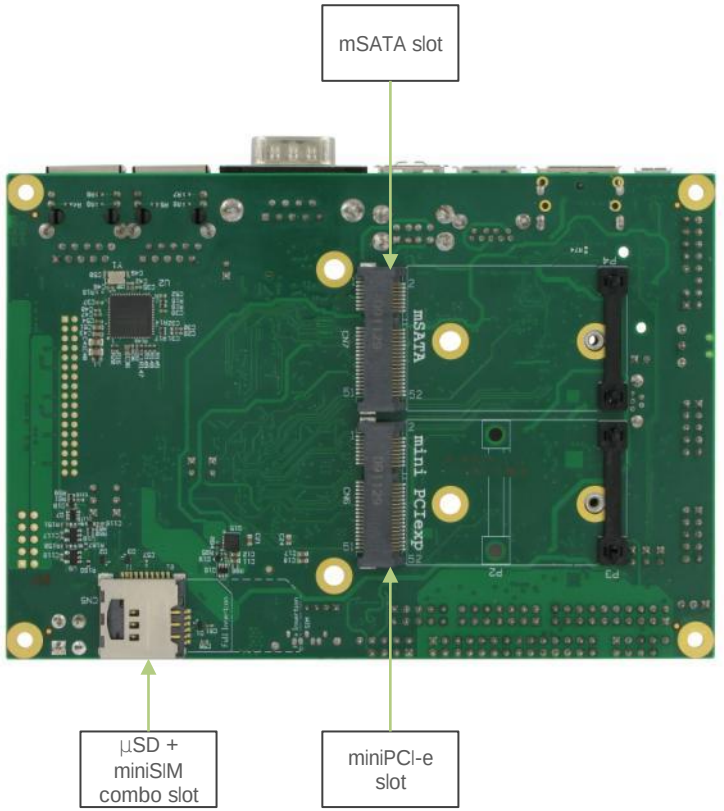
On CQ7-A42 carrier board, there are several connectors. Standard connectors are placed on the same side of PCB, so that it is possible to place them on a panel of an eventual enclosure.

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

TOP SIDE



BOTTOM SIDE



3.2 Connectors overview

3.2.1 Connectors list

Name	Description	Name	Description
CN1	Qseven® connector	CN18	Optional multimode Display Port connector
CN2	Manufacturer connector (reserved)	CN19	Optional HDMI connector
CN3	Optional Gigabit Ethernet port #1	CN20	Switch / LED Header Interface
CN4	Gigabit Ethernet port #0	CN21	Power In connector
CN5	µSD + miniSIM Combo Slot	CN22	Battery holder
CN6	miniPCI-e slot	CN23	FAN connector
CN7	mSATA slot	CN24	LPC internal Pin Header
CN8	SATA port#1 male connector	CN25	SPI internal Pin Header
CN9	Power connector for SATA #1 male	CN26	CAN terminal block
CN10	USB 2.0 ports #4-5 pin header	CN27	Optional Debug USB port
CN11	USB 2.0 type A ports #2 / #3	CN28	Audio interface internal pin header
CN12	USB 3.0 type A port #0	CN29	DB9 male configurable RS-232 / RS-422 / RS-485 serial port
CN13	USB 2.0 type micro-AB port #1	CN30	Feature internal pin header
CN14	Optional embedded Display Port #0	CN31	RS-232 Serial Port #1 internal pin header
CN15	Optional embedded Display Port port#1	CN32	RS-232 Serial Port #2 internal pin header
CN16	Optional LVDS interface	CN33	GPIO internal pin header
CN17	Optional backlight connector		

3.2.2 Jumpers list

Name	Description	Name	Description
JP1	JTAG or Debug UART selector	JP6	CAN termination
JP2	USB port#1 routing (OTG connector or miniPCI-e slot)	JP7	RS-232/RS-485 selector
JP3	Backlight Voltage selector	JP8	RS-485 Half/Full Duplex selector
JP4	LCD Voltage selector	JP9	GPIO Bus interface selection
JP5	Boot_Alternate# Jumper		

3.3 Connectors description

3.3.1 Qseven® Connector

According to Qseven® specifications, all interface signals are reported on the card edge connector, which is a 230-pin Card Edge that can be inserted into standard 230 pin MXM connectors, as described in Qseven® specifications.

Not all signals contemplated in Qseven® standard are implemented on MXM connector, due to the functionalities really implemented on CQ7-A42 CPU module. Therefore, please refer to the following table for a list of effective signals reported on MXM connector. Please be aware that on signals' description, Input and Output (if specifically written) are referred to the Qseven® module, i.e. they are inputs and outputs of the module itself, not of the carrier board (where they are, respectively, outputs and inputs).

NOTE: Even pins are available on top side of Qseven® module; odd pins are available on bottom side of Qseven® module.

Qseven® Connector - CN1

BOTTOM SIDE			TOP SIDE		
Description	**Pin name**	**Pin nr.**	**Pin nr.**	**Pin name**	**Description**
Power Ground	GND	1	2	GND	Power Ground
Gigabit Ethernet differential pair 3-	GBE_MDI3-	3	4	GBE_MDI2-	Gigabit Ethernet differential pair 2-
Gigabit Ethernet differential pair 3+	GBE_MDI3+	5	6	GBE_MDI2+	Gigabit Ethernet differential pair 2+
Ethernet 100Mb/s link indicator	GBE_LINK100#	7	8	GBE_LINK1000#	Ethernet 1000Mb/s link indicator
Gigabit Ethernet differential pair 1-	GBE_MDI1-	9	10	GBE_MDI0-	Gigabit Ethernet differential pair 0-
Gigabit Ethernet differential pair 1+	GBE_MDI1+	11	12	GBE_MDI0+	Gigabit Ethernet differential pair 0+
	N.C.	13	14	GBE_ACT#	Ethernet Activity indicator
Ethernet Reference Voltage	GBE_CTREF	15	16	SUS_S5#	Soft Off (S5) output Signal
Wake Input	WAKE#	17	18	SUS_S3#	Suspend to RAM (S3) output signal
Suspend Status Output	SUS_STAT#	19	20	PWRBTN#	Power Button Input
Sleep Button Input	SLP_BTN#	21	22	LID_BTN#	LID Button Input
Power Ground	GND	23	24	GND	Power Ground
Power Ground	GND	25	26	PWGIN	QSeven® module Power Good Input
Battery Low Input	BATLOW#	27	28	RSTBTN#	Reset Button Input
Serial ATA Channel 0 Transmit +	SATA0_TX+	29	30	SATA1_TX+	Serial ATA Channel 1 Transmit +

Serial ATA Channel 0 Transmit -	SATA0_TX-	31	32	SATA1_TX-	Serial ATA Channel 1 Transmit -
Serial ATA Activity LED output	SATA_ACT#	33	34	GND	Power Ground
Serial ATA Channel 0 Receive +	SATA0_RX+	35	36	SATA1_RX+	Serial ATA Channel 1 Receive +
Serial ATA Channel 0 Receive -	SATA0_RX-	37	38	SATA1_RX-	Serial ATA Channel 1 Receive -
Power Ground	GND	39	40	GND	Power Ground
Module alternate Boot Input	BIOS_DISABLE#/BOOT_ALT#	41	42	SDIO_CLK	SDIO Clock
SDIO Card Detect Input	SDIO_CD#	43	44	N.C.	
SDIO Command/Response (Bidir)	SDIO_CMD	45	46	SDIO_WP	SDIO Write Protect, tied to GND (disabled)
SDIO Power Enable output	SDIO_PWR#	47	48	SDIO_DAT1	SDIO Data Line 1
SDIO Data Line 0	SDIO_DAT0	49	50	SDIO_DAT3	SDIO Data Line 3
SDIO Data Line 2	SDIO_DAT2	51	52	N.C.	
	N.C.	53	54	N.C.	
	N.C.	55	56	USB_DRIVE_VBUS	USB Power Enable for USB Port #1
Power Ground	GND	57	58	GND	Power Ground
Audio Synchronization output signal	HDA_SYNC/I2S_WS	59	60	SMB_CLK	System Management Bus Clock
Audio Codec Reset, output	HDA_RST#/I2S_RST#	61	62	SMB_DAT	System Management Bus Data
Audio Bit Clock output	HDA_BCLK/I2S_CLK	63	64	SMB_ALERT#	System Management Bus Alert
Audio Serial Data Input	HDA_SDI/I2S_SDI	65	66	GP0_I2C_CLK	I^2C Bus Clock Line
Audio Serial Data Output	HDA_SDO/I2S_SDO	67	68	GP0_I2C_DAT	I^2C Bus Data Line
Thermal Alarm Input	THRM#	69	70	WDTRIG#	Watchdog Trigger Input
Thermal Trip Output	THRMTRIP#	71	72	WDOUT	Watchdog event indicator Output
Power Ground	GND	73	74	GND	Power Ground
USB SuperSpeed Port #0 transmit -	USB_SSTX0-	75	76	USB_SSRX0-	USB SuperSpeed Port #0 receive -
USB SuperSpeed Port #0 transmit +	USB_SSTX0+	77	78	USB_SSRX0+	USB SuperSpeed Port #0 receive +
	N.C.	79	80	USB_4_5_OC#	USB ports 4/5 overcurrent detect
USB Data Port #5 -	USB_P5-	81	82	USB_P4-	USB Data Port #4 -
USB Data Port #5 +	USB_P5+	83	84	USB_P4+	USB Data Port #4 +
USB ports 2/3 overcurrent detect	USB_2_3_OC#	85	86	USB_0_1_OC#	USB ports 0/1 overcurrent detect
USB Data Port #3 -	USB_P3-	87	88	USB_P2-	USB Data Port #2 -
USB Data Port #3 +	USB_P3+	89	90	USB_P2+	USB Data Port #2 +

USB VBus Input	USB_VBUS	91	92	USB_ID	USB Port 1 mode configuration output
USB Data Port #1 -	USB_P1-	93	94	USB_P0-	USB Data Port #0 -
USB Data Port #1 +	USB_P1+	95	96	USB_P0+	USB Data Port #0 +
Power Ground	GND	97	98	GND	Power Ground
LVDS or eDP primary channel pair 0 +	LVDS_A0+ / eDP0_TX0+	99	100	LVDS_B0+ / eDP1_TX0+	LVDS or eDP secondary channel pair 0 +
LVDS or eDP primary channel pair 0 -	LVDS_A0- / eDP0_TX0-	101	102	LVDS_B0- / eDP1_TX0-	LVDS or eDP secondary channel pair 0 -
LVDS or eDP primary channel pair 1 +	LVDS_A1+ / eDP0_TX1+	103	104	LVDS_B1+ / eDP1_TX1+	LVDS or eDP secondary channel pair 1 +
LVDS or eDP primary channel pair 1 -	LVDS_A1- / eDP0_TX1-	105	106	LVDS_B1- / eDP1_TX1-	LVDS or eDP secondary channel pair 1 -
LVDS or eDP primary channel pair 2 +	LVDS_A2+ / eDP0_TX2+	107	108	LVDS_B2+ / eDP1_TX2+	LVDS or eDP secondary channel pair 2 +
LVDS or eDP primary channel pair 2 -	LVDS_A2- / eDP0_TX2-	109	110	LVDS_B2- / eDP1_TX2-	LVDS or eDP secondary channel pair 2 -
LCD Panel Power Enable	LVDS_PPEN	111	112	LVDS_BLEN	LCD Panel Backlight Enable
LVDS or eDP primary channel pair 3 +	LVDS_A3+ / eDP0_TX3+	113	114	LVDS_B3+ / eDP1_TX3+	LVDS or eDP secondary channel pair 3 +
LVDS or eDP primary channel pair 3 -	LVDS_A3- / eDP0_TX3-	115	116	LVDS_B3- / eDP1_TX3-	LVDS or eDP secondary channel pair 3 -
Power Ground	GND	117	118	GND	Power Ground
LVDS primary channel Clock + or eDP primary auxiliary channel +	LVDS_A_CLK+ / eDP0_AUX+	119	120	LVDS_B_CLK+ / eDP1_AUX+	LVDS secondary channel Clock + or eDP secondary auxiliary channel +
LVDS primary channel Clock + or eDP primary auxiliary channel -	LVDS_A_CLK- / eDP0_AUX-	121	122	LVDS_B_CLK- / eDP1_AUX-	LVDS secondary channel Clock - or eDP secondary auxiliary channel -
LCD Panel brightness control	LVDS_BLT_CTRL	123	124	GP_1-Wire_Bus	General Purpose 1-Wire bus interface
LVDS DisplayID Data Line	LVDS_DID_DAT	125	126	eDP0_HPD#	Primary eDP Hotplug detection
LVDS DisplayID Clock Line	LVDS_DID_CLK	127	128	eDP1_HPD#	Secondary eDP Hotplug detection
CAN Port Transmit line	CAN_TX	129	130	CAN_RX	CAN Port Receive line
TMDS Clock + or DP Data Line 3+	TMDS_CLK+ / DP_LANE3+	131	132	N.C.	
TMDS Clock - or DP Data Line 3-	TMDS_CLK- / DP_LANE3-	133	134	N.C.	
Power Ground	GND	135	136	GND	Power Ground
TMDS Data Line 1+ or DP Data Line 1+	TMDS_LANE1+ / DP_LANE1+	137	138	DP_AUX+	Display Port auxiliary channel +
TMDS Data Line 1- or DP Data Line 1-	TMDS_LANE1- / DP_LANE1-	139	140	DP_AUX-	Display Port auxiliary channel -
Power Ground	GND	141	142	GND	Power Ground
TMDS Data Line 0+ or DP Data Line 2+	TMDS_LANE0+ / DP_LANE2+	143	144	N.C.	
TMDS Data Line 0- or DP Data Line 2-	TMDS_LANE0- / DP_LANE2-	145	146	N.C.	

Power Ground	GND	147	148	GND	Power Ground
TMDS Data Line 2+ or DP Data Line 0+	TMDS_LANE2+ / DP_LANE0+	149	150	HDMI_CTRL_DAT	HDMI I^2C Control Data Line
TMDS Data Line 2- or DP Data Line 0-	TMDS_LANE2- / DP_LANE0-	151	152	HDMI_CTRL_CLK	HDMI I^2C Control Clock Line
HDMI Hot Plug Detect Input	HDMI_HPD#	153	154	DP_HPD#	Display Port Hot Plug Detect Input
PCI-E Reference Clock +	PCIE_CLK_REF+	155	156	PCIE_WAKE#	Wake signal from ext. devices
PCI-E Reference Clock -	PCIE_CLK_REF-	157	158	PCIE_RST#	Reset signal to external devices
Power Ground	GND	159	160	GND	Power Ground
	N.C.	161	162	N.C.	
	N.C.	163	164	N.C.	
Power Ground	GND	165	166	GND	Power Ground
PCI-E Channel 2 Transmit +	PCIE2_TX+	167	168	PCIE2_RX+	PCI-E Channel 2 Receive +
PCI-E Channel 2 Transmit -	PCIE2_TX-	169	170	PCIE2_RX-	PCI-E Channel 2 Receive -
TTL Serial Port Transmit	UART0_TX	171	172	UART0_RTS#	TTL Serial Port Request To Send output
PCI-E Channel 1 Transmit +	PCIE1_TX+	173	174	PCIE1_RX+	PCI-E Channel 1 Receive +
PCI-E Channel 0 Transmit -	PCIE1_TX-	175	176	PCIE1_RX-	PCI-E Channel 1 Receive -
TTL Serial Port Receive signal	UART0_RX	177	178	UART0_CTS#	TTL Serial Port Clear To Send input
PCI-E Channel 0 Transmit +	PCIE0_TX+	179	180	PCIE0_RX+	PCI-E Channel 0 Receive +
PCI-E Channel 0 Transmit -	PCIE0_TX-	181	182	PCIE0_RX-	PCI-E Channel 0 Receive -
Power Ground	GND	183	184	GND	Power Ground
LPC Bus Address/Data 0	LPC_AD0	185	186	LPC_AD1	LPC Bus Address/Data 1
LPC Bus Address/Data 2	LPC_AD2	187	188	LPC_AD3	LPC Bus Address/Data 3
LPC Bus Clock	LPC_CLK	189	190	LPC_FRAME#	LPC Bus Frame signal
LPC Serialised Interrupt	SERIRQ	191	192	LPC_LDRQ#	LPC DMA Request
Battery Power Line for RTC	VCC_RTC (+3.3V_A)	193	194	SPKR	Speaker output
FAN Tachometric Input	FAN_TACHOIN	195	196	FAN_PWMOUT	Fan speed control, PWM output
Power Ground	GND	197	198	GND	Power Ground
SPI Master Output / Slave Input	SPI_MOSI	199	200	SPI_CS0#	SPI Chip Select 0
SPI Master Input / Slave Output	SPI_MISO	201	202	SPI_CS1#	SPI Chip Select 1
SPI Clock	SPI_CLK	203	204	MFG_NC4	Manufacturer Reserved Pin
Standby Power Supply Line	+5V_A	205	206	+5V_A	Standby Power Supply Line

Manufacturer Reserved Pin #0	MFG_NC0	207	208	MFG_NC2	Manufacturer Reserved Pin
Manufacturer Reserved Pin #1	MFG_NC1	209	210	MFG_NC3	Manufacturer Reserved Pin
Switched Power Supply Line	+5V_S	211	212	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	213	214	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	215	216	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	217	218	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	219	220	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	221	222	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	223	224	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	225	226	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	227	228	+5V_S	Switched Power Supply Line
Switched Power Supply Line	+5V_S	229	230	+5V_S	Switched Power Supply Line

3.3.2 Boot alternate jumper

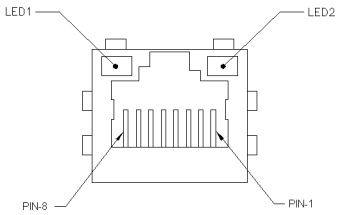
Connected to pin #41 of the card edge connector, there is a two-way P 2.54mm jumper, JP5, which allows to select different booting option (which depend on the Qseven® module installed. Please refer to the Qseven® module's User Manual for more details about the meaning of this signal).

JP5 position	BIOS_DISABLE#/BOOT_ALT# signal
Not inserted	Floating
Inserted	Tied to GND

3.3.3 Ethernet connectors

Gigabit Ethernet Port #0 - CN4			
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-

Optional Gigabit Ethernet Port #1 - CN3			
Pin	Signal	Pin	Signal
1	GBE1_MDI0+	5	GBE1_MDI2-
2	GBE1_MDI0-	6	GBE1_MDI1-
3	GBE1_MDI1+	7	GBE1_MDI3+
4	GBE1_MDI2+	8	GBE1_MDI3-



On board, there can be up to two Gigabit Ethernet connections, for the use of up to two different LANs.

The first Gigabit Ethernet is always available, while the second Gigabit Ethernet interface is optional (it depends on the version of CQ7-A42 module purchased).

CN4 provide direct access to the Gigabit Ethernet signals directly managed by the Qseven® modules, while the second optional Gigabit Ethernet interface, available on connector CN3, is managed by a dedicated Intel® I210 controller, interfaced to PCI-express lane #1 (the carrier board can also be configured to use PCI-express lane #2, if necessary).

Please be aware that only Qseven® modules offering PCI-Express lane #1 or #2 can exploit the second Gigabit Ethernet interface.

On the connectors there are also two bicolour Green/Yellow LEDs: LED1 (Left LED) 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. LED2 (Right LED) 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.

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.

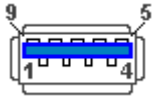
3.3.4 USB connectors

CQ7-A42 carrier board offers the possibility of connecting multiple USB devices, exploiting the USB lanes that can come out from Qseven® module.

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.

USB 3.0 type A receptacle - CN12			
Pin	**Signal**	**Pin**	**Signal**
1	+5V_A	5	USB_SSRX0-
2	USB_P0-	6	USB_SSRX0+
3	USB_P0+	7	GND
4	GND	8	USB_SSTX0-
		9	USB_SSTX0+

USB 3.0 port is available on a single USB connector, CN12, which is placed near the Gigabit Ethernet connectors.



The connector used is a type-A USB 3.0 receptacle.

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.

!

Please be aware that USB 3.0 connectivity can be obtained only in case that it is supported by the Qseven® module plugged into the MXM connector.

In case the Qseven® module used doesn't offer USB 3.0 ports, it will be always possible to use USB 2.0 port #0, simply by plugging an USB 2.0 cable.

Avoid using USB 3.0 cables if the Qseven® module used doesn't offer such an interface.

USB 2.0 type A receptacle - CN11			
Pin	**Signal**	**Pin**	**Signal**
1	+5V_A	5	+5V_A
2	USB_P2-	6	USB_P3-
3	USB_P2+	7	USB_P3+
4	GND	8	GND

Other two USB 2.0 ports, USB port #2 and USB port #3, coming out from Qseven® module, are carried out on a standard double Type-A receptacle.

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

USB 4-5 pin header - CN10			
Pin	Signal	Pin	Signal
1	+5V_A	2	+5V_A
3	USB_P4-	4	USB_P5-
5	USB_P4+	6	USB_P5+
7	GND	8	GND
		10	---

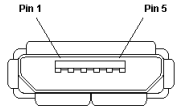
Other than the USB ports available through the standard connectors CN11 and CN12, and to the USB port available on miniPCI-express slot CN6 (which is shared with USB OTG port), there are other two USB ports (#4 and #5) coming out from Qseven® module that can be used for the connection of external devices.

They are available on an internal 9-pin standard male pin header (CN10), p 2.54 mm, 4+ 5 pin, h= 6mm, with the pinout shown in the table on the left.

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 CABKITA42 (please check chapter 4.2.1 for further details).

Micro-AB USB connector - CN13	
Pin	Signal
1	USB_VBUS
2	USB_OTG-
3	USB_OTG+
4	USB_ID
5	GND

According to Qseven® specification, USB Port #1, coming out from Qseven® module, could support OTG functionalities (it depends on the functionalities offered by the Qseven® module used, however). For this reason, this port is carried out through a standard micro-AB connector, described in the table on the left.



Depending on the support offered by the Qseven® module, and from the needed use of the system, it is necessary to connect micro-A or micro-B USB cables to connector CN13.

A micro-A USB cable has to be used when the system has to work in Host mode. In this case, USB_VBUS is a power output of CQ7-A42 Carrier Board for the connected device.

When a micro-B USB cable is used, its USB_ID pin is floating; this way, the board acknowledges that it must configure itself to work as a Client. In this case, USB_VBUS is an input of the carrier board from the external Host.

!

When the system (Carrier board + Qseven® module) is working in client mode (i.e., an external Host is connected to port CN13), please avoid disconnecting and reconnecting main power supply of the carrier board.

In case main power supply is disconnected, it is necessary to disconnect also the external Host from CN13 before reconnecting again the main PSU, otherwise the system will not boot.

Signal description of this port:

USB_OTG+/USB_OTG-: USB Port #1 differential pair, switched to the micro-AB connector CN13 using the dedicated jumper JP2.

USB_VBUS: USB voltage rail. It is an input for USB port working in Client mode, an output for Host mode.

USB_ID: Client/Host identification signal. This signal is high when the USB port works in client mode, is low when works in Host mode.

Please be aware that the USB OTG port has been designed according to, published by SGET consortium, that foresee the use of signal USB_DRIVE_VBUS, present on formerly reserved pin #56.

Correct USB OTG functionalities, therefore, are ensured only for modules developed according to Qseven® Specifications rel. 2.0 Errata Sheet.

JP2 position	USB_P1 routed to
Not inserted	miniPCI-e slot (CN6)
Inserted	USB micro-AB connector (CN13)

Please be aware that USB Port #1, coming out from Qseven module, will be available on USB OTG port only in case that the jumper JP2 is configured properly, according to the table on the left.

3.3.5 DP++/HDMI connectors

The CQ7-A42 carrier board is offered in two alternative configurations, which allow the connection of external monitors through a standard HDMI connector or a multimode Display Port connector.

Please remember that the effective support of this kind of displays depends only by the Qseven® module used with the carrier board, it is not a feature dependent from the carrier board itself.

This means that Qseven® modules offering TMDS interface (which is common to HDMI and DVI displays) should be used with CQ7-A42 carrier boards equipped with HDMI connector, while Qseven® modules offering DP or DP++ interface should be used with carrier board with DP connector mounted.

Optional DP++ connector - CN18

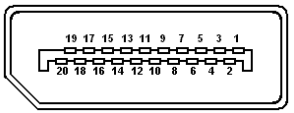
Pin	Signal	Pin	Signal
1	DP_LANE0+	2	GND
3	DP_LANE0-	4	DP_LANE1+
5	GND	6	DP_LANE1-
7	DP_LANE2+	8	GND
9	DP_LANE2-	10	DP_LANE3+
11	GND	12	DP_LANE3-
13	CAD	14	HDMI_CEC
15	HDMI_CTRL_CLK / DP_AUX+	16	GND
17	HDMI_CTRL_DAT / DP_AUX-	18	DP_HPD
19	GND	20	+3.3V_S

DP_LANE1+/DP_LANE1-: Display Port differential pair #1.

DP_LANE2+/DP_LANE2-: Display Port differential pair #2.

A first possible configuration is to have the carrier board with a Display Port connector mounted.

In this case, the connector mounted will be type WinWin p/n WDPE-20F3L1BU3 or equivalent, with the pinout shown in the table on the left.



Such a pinout allows the implementation of a DP++ interface, i.e. an interface able to support both DP and HDMI/DVI displays (by using dedicated adapters). Please be aware that this feature is possible only in the case the Qseven® module used supports it.

When a DP cable is connected, then this interface will recognize it, and on pins 15/17 there will be the Display Port Auxiliary channel signals. Instead, when a DP-to-HDMI adapter is mounted, it will drive opportunely the CAD signal, which will make available HDMI_CTRL_CLK and HDMI_CTRL_DAT signals on the same pins.

Further signals involved in DP management are the following (please check the Qseven® connector's description table for a correspondence between DP lanes and TMDS lanes):

DP_LANE0+/DP_LANE0-: Display Port differential pair #0.

DP_LANE3+/DP_LANE3-: Display Port differential pair #3.

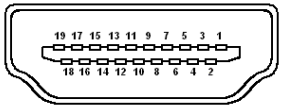
DP_HPD: Hot Plug Detect Input signal.

HDMI_CEC: HDMI Consumer Electronics Control (CEC) Line. This signal is used only for HDMI compatibility when a HDMI adapter is connected to the DP connector. According to Qseven® specifications, the signal is, in reality, a General Purpose 1_wire bus interface, that can be used for implementation of HDMI_CEC. In case the Qseven® module used doesn't support the HDMI_CEC functionality, then this signal could be not available or have a different utilisation. Please refer to the User Guide of the Qseven® module used for more information on this signal.

Optional HDMI connector - CN19

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	HDMI_CEC	14	---
15	HDMI_CTRL_CLK	16	HDMI_CTRL_DAT
17	GND	18	$+5V_{HDMI}$
19	HDMI_HPD		

The second possible configuration is to have the carrier board with a HDMI connector mounted.



In this case, the connector mounted will be a standard certified HDMI connector, type A, model FCI Connect p/n 10029449-111RLF, with the pinout shown in the table on the left.

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.

HDMI_CTRL_DAT: DDC Data line for HDMI panel.

HDMI_CTRL_CLK: DDC Clock line for HDMI panel.

HDMI_CEC: HDMI Consumer Electronics Control (CEC) Line. As already described in the description of optional DP connector, this signal is, in reality, a General Purpose 1_wire bus interface, that can be used for implementation of HDMI_CEC functionality. The support of such functionality depends on the Qseven® module used.

HDMI_HPD: Hot Plug Detect Input signal.

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.

3.3.6 Embedded LCD displays connectors

It is possible to purchase the CQ7-A42 carrier board with two alternative configurations, with referral to the embedded LCD displays options.

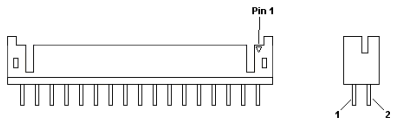
The first option includes a unique internal connector for LVDS connections. This allows the connection of displays with a colour depth of 18 or 24 bit, single or dual channel.

Please notice that the effective support of this kind of displays depends only by the Qseven® module used with the carrier board, it is not a feature dependent from the carrier board itself. The pin-out of this connector is given according to Qseven® specifications, so that the carrier board is ready for the use of any Qseven® module that follows those specifications. Please refer to the CPU module's User manual for the details regarding the panels supported and the availability of the eDP/LVDS signals.

Optional LVDS connector - CN16

Pin	Signal	Pin	Signal
2	LVDS_DID_DAT	1	LVDS_DID_CLK
4	+3.3V_S	3	+3.3V_S
6	GND	5	LVDS_A0-/eDP0_TX0-
8	LVDS_A0+/eDP0_TX0+	7	LVDS_VDD_EN
10	LVDS_A1-/eDP0_TX1-	9	LVDS_A1+/eDP0_TX1+
12	LVDS_BACKLIGHT_EN	11	LVDS_A2+/eDP0_TX2+
14	LVDS_A2-/eDP0_TX2-	13	eDP0_HPD
16	LVDS_A_CLK-/eDP0_AUX-	15	LVDS_A_CLK+/eDP0_AUX+
18	LVDS_BLT_CTRL	17	LVDS_A3+/eDP0_TX3+
20	LVDS_A3-/eDP0_TX3-	19	GND
22	LVDS_B0-/eDP1_TX0-	21	LVDS_B0+/eDP1_TX0+
24	GND	23	LVDS_B1-/eDP1_TX1-
26	LVDS_B1+/eDP1_TX1+	25	GND
28	LVDS_B2-/eDP1_TX2-	27	LVDS_B2+/eDP1_TX2+
30	GND	29	LVDS_B_CLK+/eDP1_AUX+
32	LVDS_B_CLK-/eDP1_AUX-	31	eDP1_HPD
34	LVDS_B3+/eDP1_TX3+	33	LVDS_B3-/eDP1_TX3-

For the connection, a connector type JST B34B-PHDSS or equivalent (2 x 17p, male, straight, P2, low profile, polarised) is provided, with the pin-out shown in the table on the left. Mating connector: JST p/n PHDR-34VS with HR SPHD-002T-P0.5 female crimp terminals.



Display Data Channel signals are also provided, in case that the Qseven® module used supports them.

Most of the signals available on this connector come out directly from the Qseven® connector; please check the related table for a description of the signals.

eDP0_HPD and eDP1_HPD are derived by the signals available on Qseven® connector's signals eDP0_HPD# and eDP1_HPD#, simply by inverting their polarity.

LVDS_BACKLIGHT_EN is the signal used for Backlight enabling, is the logical conjunction (i.e. AND) of the signal LVDS_BLEN# and the signal PLT_RST#.

LVDS_VDD_EN is the signal used for LCD enabling, is the logical conjunction (i.e. AND) of the signal LVDS_PPEN# and the signal PLT_RST#.

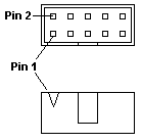
These operations on signals LVDS_BACKLIGHT_EN and LVDS_VDD_EN have been done so that at each reset of the module, the eventually connected backlight and display will also turn off themselves.

! +3.3V_S power rail available on pins 3 and 4 can be used only for the connection of an external EDID (max 500mA); it MUST NOT be used to supply the digital section of the connected LCD.

Use instead the connector CN17 for the power in rails of the connected display.

Optional Backlight and LCD PSU connector - CN17			
Pin	**Signal**	**Pin**	**Signal**
1	SW_VDD_FUSE	2	SW_BACK_FUSE
3	+5V_S (Fuse protected)	4	+12V_S (Fuse protected)
5	LVDS_VDD_EN	6	LVDS_BACKLIGHT_EN
7	N.C.	8	LVDS_BLT_CTRL
9	GND	10	GND

When the board is configured with the optional LVDS connector CN16, then there will be a dedicated backlight / LCD PSU connector, too.



The connector, CN17, is an IDC connector, dual row, 10 pin, p2.54 mm connector, type MOLEX p/n 70246-1004 or equivalent.

Mating connector: MOLEX p/n 22-25-2102 with 70058 series female crimp terminals.

SW_VDD_FUSE and SW_BACK_FUSE mean Switched_VDD and Switched_Backlight, i.e., these are the voltages that can be supplied to LCD and backlight, respectively, and are enabled/disabled via the signals LVDS-PPEN and LVDS_BLEN, respectively. The suffix _FUSE means that these voltages are protected by a polyswitch resettable fuse.

JP4 position	SW_VDD_FUSE Voltage
1-2	+5V_A
2-3	+3.3V_A

LCD software-driven voltage, i.e. signal SW_VDD_FUSE, can also be regulated to be connected to +5V_A or +3.3V_A, using jumper JP4, which is a standard pin header, P2.54mm, 1x3 pin.

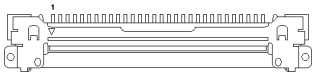
JP3 position	SW_BACK_FUSE Voltage
1-2	+12V_A
2-3	+5V_A

Similarly, backlight software-driven voltage, signal SW_BACK_FUSE, can be regulated to be connected to +12V_A or +5V_A, using jumper JP3, which is another standard pin header, P2.54mm, 1x3 pin.

N.B. Jumpers JP3 and JP4 are always present, independently by the configuration of the board purchased (with LVDS or with eDP connectors).

Optional eDP #0 connector CN14		Optional eDP #1 connector CN15	
Pin nr.	Pin name	Pin nr.	Pin name
1	N.C.	1	N.C.
2	SW_BACK_FUSE	2	SW_BACK_FUSE
3	SW_BACK_FUSE	3	SW_BACK_FUSE
4	SW_BACK_FUSE	4	SW_BACK_FUSE
5	SW_BACK_FUSE	5	SW_BACK_FUSE
6	N.C.	6	N.C.
7	N.C.	7	N.C.
8	LVDS_BLT_CTRL	8	LVDS_BLT_CTRL
9	LVDS_BACKLIGHT_EN	9	LVDS_BACKLIGHT_EN
10	GND	10	GND
11	GND	11	GND
12	GND	12	GND
13	GND	13	GND
14	eDP0_HPD	14	eDP1_HPD
15	GND	15	GND
16	GND	16	GND
17	N.C.	17	N.C.
18	SW_VDD_FUSE	18	SW_VDD_FUSE
19	SW_VDD_FUSE	19	SW_VDD_FUSE
20	GND	20	GND
21	LVDS_A_CLK-/eDP0_AUX-	21	LVDS_B_CLK-/eDP1_AUX-
22	LVDS_A_CLK+/eDP0_AUX+	22	LVDS_B_CLK+/eDP1_AUX+
23	GND	23	GND
24	LVDS_A0+/eDP0_TX0+	24	LVDS_B0+/eDP1_TX0+
25	LVDS_A0-/eDP0_TX0-	25	LVDS_B0-/eDP1_TX0-
26	GND	26	GND
27	LVDS_A1+/eDP0_TX1+	27	LVDS_B1+/eDP1_TX1+
28	LVDS_A1-/eDP0_TX1-	28	LVDS_B1-/eDP1_TX1-
29	GND	29	GND
30	N.C.	30	N.C.

The other factory configuration for embedded LCD displays includes two separated connectors for embedded Display Port displays, with pinout shown in the tables on the left.



These two connectors are VESA® certified connectors for Display Port interface, type I-PEX p/n 20455-030E-02. Mating connector is I-PEX p/n 20454-030T.

Signals available on these two connectors are a subset of those available on LVDS and backlight connectors; please refer to those connectors for a signal description.

Please be aware that even for eDP connectors, jumpers JP3 and JP4, previously described, have to be used for setting SW_BACK_FUSE and SW_VDD_FUSE voltage values.

3.3.7 Audio Interface

Audio Interface - CN28			
Pin	**Signal**	**Pin**	**Signal**
1	GND	2	GP0_I2C_DAT
3	+3.3V_S	4	GP0_I2C_CLK
		6	SPKR
7	+12V_S	8	HDA_SDI/I2S_SDI
9	+3.3V_S	10	HDA_SDO/I2S_SDO
11	GND	12	HDA_SYNC/I2S_WS
13	+3.3V_A	14	HDA_RST#/I2S_RST#
15	GND	16	HDA_BCLK/I2S_CLK

Since Qseven® modules can have three different audio standard interfaces (AC'97, HD audio, I2S), then on CQ7-A42 carrier board there isn't any Audio codec.

Instead, the audio signals coming out from Qseven® module are carried out directly, without further elaborations, on dedicated connector CN28, which is a 15-pin pin header, p2.54 mm h= 6mm, type NELTRON p/n 2213S-16G-E5 or equivalent, with the pinout shown in the table on the left.

This connector can be used to connect external audio codec modules, specific for the kind of interface offered by the Qseven® module used.

Signals available on the connector are the following:

HDA_SDI/I2S_SDI: HD Audio / AC'97 / I2S Serial Data Input signal.

HDA_SDO/I2S_SDO: HD Audio / AC'97 / I2S Serial Data Output signal.

HDA_SYNC/I2S_WS: HD Audio / AC'97 Serial Bus Synchronization or I2S Word Select signal.

HDA_RST#/I2S_RST#: HD Audio / AC'97 / I2S Codec Reset signal.

HDA_BCLK/I2S_CLK: HD Audio / AC'97 24MHz Serial Bit Clock or I2S Serial Data Clock signal.

SPKR: Speaker output

GP0_I2C_DAT: General Purpose I2C data line.

GP0_I2C_CLK: General Purpose I2C clock line.

Please be aware that using CQ7-A42 carrier board, audio functionalities are not directly supported.

If the system's application needs audio support, it is necessary to provide external Audio codec modules, suited to the audio interface offered by the Qseven® module used.

SECO can provide for optional Audio modules with HD Audio Codec or I2S audio codec onboard. Please check paragraphs 4.2.2 and 4.2.3 for further details.

3.3.8 Switch / LED header interface

Switch / LED Header Interface - CN20			
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 CQ7-A42 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 signalling activity on SATA Channel and Power On states.

Connector CN20 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.

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.

Here following the signals description, and also an example schematic for a possible utilisation of them:

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 Switch GND.

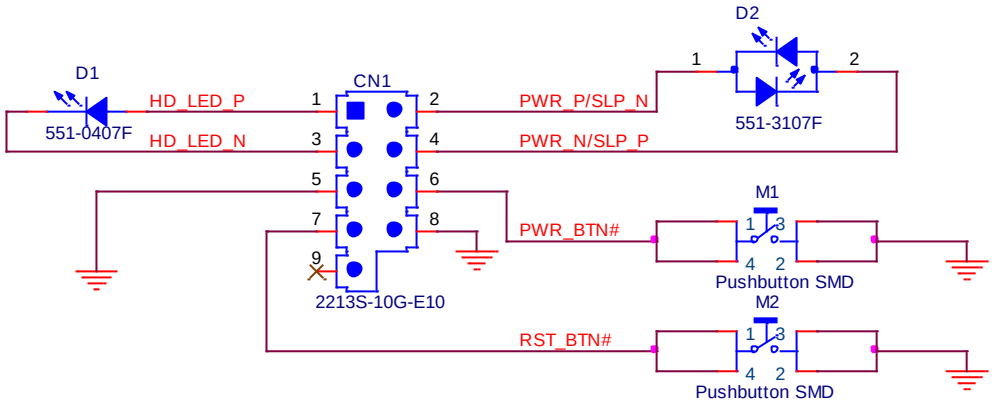
RST_SW_P: Reset switch input signal. This signal has to be connected to an external momentary pushbutton (contacts normally open). When the pushbutton is pressed, the pulse of Reset signal will cause the reset of the board.

PWR_SW_P: 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, the pulse of this signal will let the switched voltage rails turn on or off.

PWR_SW_N: Power Switch 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-colour power LED for power ON/OF, sleep and message waiting signalling. 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-colour power LED above mentioned.



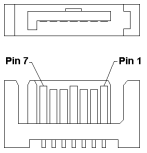
3.3.9 S-ATA connectors

S-ATA #1 Connector - CN8	
Pin	**Signal**
1	GND
2	SATA1_Tx+
3	SATA1_Tx-
4	GND
5	SATA1_Rx-
6	SATA1_Rx+
7	GND

For the connection of external Mass Storage Devices, there is a standard male S-ATA connector, CN8.

This connector carries out directly SATA port#1 signals coming from Qseven® module's connector.

Please notice that S-ATA connectors will work only in case the Qseven® module carries out SATA Channel #1 on Qseven® connector (pins 30, 32, 36, 38). In case the Qseven® module used doesn't have these signals connected, then this connector will not be usable.



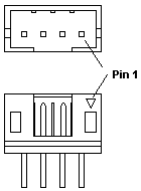
S-ATA Power Connector - CN9	
Pin	**Signal**
1	+12V_S
2	GND
3	GND
4	+5V_S

A dedicated power connector, CN 9, 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 51021 crimp terminals.

An adapter cable for powering SATA disks from this connector is also contained inside the dedicated cable kit (CABKITA42) for CQ7-A42 carrier board. Please also check chapter 4.2.1for further details.



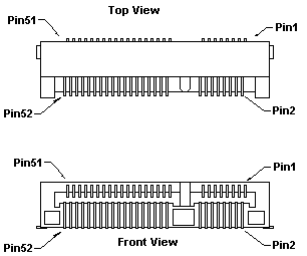
Here following the signals related to SATA interface:

SATA1_TX+/SATA1_TX-: Serial ATA Channel #1 Transmit differential pair.

SATA1_RX+/SATA1_RX-: Serial ATA Channel #1 Receive differential pair.

3.3.10 mSATA slot

mSATA Slot - CN7			
Pin	**Signal**	**Pin**	**Signal**
1	N.C.	2	+3.3V_S
3	N.C.	4	GND
5	N.C.	6	N.C.
7	N.C.	8	N.C.
9	GND	10	N.C.
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	N.C.
17	N.C.	18	GND
19	N.C.	20	N.C.
21	GND	22	N.C.
23	SATA0_RX+	24	+3.3V_S
25	SATA0_RX-	26	GND
27	GND	28	N.C.
29	GND	30	N.C.
31	SATA0_TX-	32	N.C.
33	SATA0_TX+	34	GND
35	GND	36	N.C.
37	GND	38	N.C.
39	+3.3V_S	40	GND
41	+3.3V_S	42	N.C.
43	GND	44	N.C.
45	N.C.	46	N.C.
47	N.C.	48	N.C.
49	N.C.	50	GND
51	N.C.	52	+3.3V_S



To increase mass storage possibilities, it is possible to use mSATA Solid State Disks, using the dedicate connector, CN7, which is a standard 52pin miniPCI Express connector, type TE 1775861-4 or equivalent, H=4.0mm, with the pinout shown in the table on the left.

Signals carried to mSATA slot are the following:

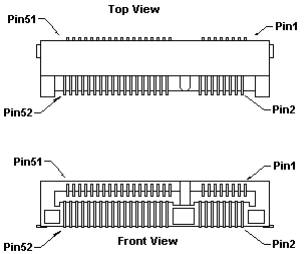
SATA0_TX+/SATA0_TX-: Serial ATA Channel #0 Transmit differential pair.

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

Please be aware that mSATA slot will work only in case the Qseven® module carries out SATA Channel #0 on Qseven® connector (pins 29, 31, 35, 37). In case the Qseven® module used doesn't have these signals connected, then this slot will not be usable.

3.3.11 miniPCI-express slot

miniPCI-e 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	PCIE0_CLOCK_REQUEST#	8	UIM_PWR
9	GND	10	UIM_DATA
11	PCIE0_CLK-	12	UIM_CLK
13	PCIE0_CLK+	14	UIM_RESET
15	GND	16	UIM_SPU
17	N.C.	18	GND
19	N.C.	20	N.C.
21	GND	22	PCIE_RST#
23	PCIE0_RX-	24	+3.3V_A
25	PCIE0_RX+	26	GND
27	GND	28	+1.5V_S
29	GND	30	SMB_CLK
31	PCIE0_TX-	32	SMB_DAT
33	PCIE0_TX+	34	GND
35	GND	36	USB_PCIE-
37	GND	38	USB_PCIE+
39	+3.3V_A	40	GND
41	+3.3V_A	42	N.C.
43	N.C.	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



To add communications functionality, or other features not already available, it is possible to use Half-/ Full-size mini-PCI Express cards, using the dedicate connector, CN6, which is a standard 52pin miniPCI Express connector, type TE 1775861-4 or equivalent, H=4.0mm, with the pinout shown in the table on the left.

CQ7-A42 carrier board allows inserting both Half-mini and Full-mini PCI express cards. Support for both form factors is ensured by the possibility, for the customer, of moving the mechanical latch in the position necessary to support Half-miniPCI-e cards or Full-miniPCI-e cards.

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

Signals carried to miniPCI-express slot are the following:

PCIE0_TX+/PCIE0_TX-: PCI Express lane #0, Transmitting Output Differential pair.

PCIE0_RX+/PCIE0_RX-: PCI Express lane #0, Receiving Input Differential pair.

PCIE0_CLK+ / PCIE0_CLK-: PCI Express Reference Clock for lane #2, Differential Pair.

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

PCIE_RST#: Reset Signal that is sent from Qseven® module to all PCI-e devices available on the board (i.e. the optional additional GbE controller) and on the miniPCI-e module. It is a 3.3V active-low signal.

PCIE0_CLOCK_REQUEST# PCI Express Clock Request Input. This signal shall be driven correctly by any module inserted in the miniPCI express slot, in order to ensure that the PCI-e clock buffer available on the carrier board makes available the reference clock for the miniPCI-e slot.

SMB_CLK: SM Bus control clock line for System Management, managed by the Qseven® module.

SMB_DATA: SM Bus control data line for System Management, managed by the Qseven® module.

USB_PCIE+ / USB_PCIE-: USB Port #1 differential pair, switched to the miniPCI-e slot by

using the dedicated jumper JP2. Please check par. 3.3.4 for details about jumper JP2 working.

UIM_PWR: Power line for UIM module.

UIM_DATA: Bidirectional Data line between miniPCI-express card and UIM module.

UIM_CLK: Clock line, output from miniPCI-express card to the UIM module.

UIM_RESET: Reset signal line, sent from miniPCI-express card to the UIM module.

UIM_SPU: UIM Standard or Proprietary Use signal.

Please be aware that all signals related to User Identity Modules are managed directly by the miniPCI-express card circuitry, they don't involve neither carrier board's nor Qseven® module's management. The CQ7-A42 carrier board embeds only clamping diodes for ESD protection on UIM signal and voltage lines.

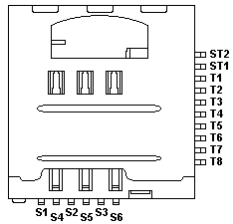
3.3.12 µSD + miniSIM combo card slot

µSD + miniSIM Combo Card Slot - CN5			
Pin	**Signal**	**Pin**	**Signal**
S1	UIM_PWR	T3	SDIO_CMD
S2	UIM_RESET	T4	+3.3V_S
S3	UIM_CLK	T5	SDIO_CLK#
S4	GND	T6	GND
S5	UIM_SPU	T7	SDIO_DAT0
S6	UIM_DATA	T8	SDIO_DAT1
T1	SDIO_DAT2	ST1	SDIO_CD#
T2	SDIO_DAT3	ST2	GND

Since Qseven® standard contemplates signals for Secure Digital Input/Output and MultiMedia Cards, on CQ7-A42 carrier board there is also a socket, for the use of standard SD or MMC cards, to be used as Mass Storage Device and/or Boot Device (if the Qseven® module used with this carrier board implements this functionality).

Please refer to the User Manual of the used Qseven® module for information about Card types supported by the chipset.

Moreover, as already stated in par. 3.3.11, CQ7-A42 carrier board can accept also miniSIM cards, for use of miniPCI Express modems. These cards can be inserted in the dedicated slot of connector CN5, which is a combo µSD/MMC + miniSIM connector, push-push type, 2.7 mm global height, type AVX p/n 009162006501150 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/MMC 4.0 and miniSIM card.



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

Signals related to UIM (SIM) card have already been described in previous paragraph 3.3.11. Signals related to SDIO/MMC cards are the following:

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.

3.3.13 Serial ports

With release 2.0 of Qseven® specifications, it has been introduced the possibility of having a serial port directly on Qseven® card edge connector.

This interface (eventually managed by the processor/chipset of the Qseven® module used), is at TTL electrical level, i.e. it cannot be used directly for the connection of common PCs or consumer peripherals.

For this reason, on CQ7-A42 carrier board has been introduced a multistandard transceiver, which allows using the serial port interface offered by the Qseven® module in RS-232, RS-422 or RS-485 mode.

JP7 position	JP8 position	Serial Port #0 working
Not Inserted	Not Inserted	RS-485 Half Duplex mode
Not Inserted	Inserted	RS-485 Full Duplex mode (RS-422)
Inserted	Not relevant	RS-232 mode

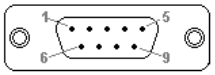
Selection of working mode is made using jumpers JP7 and JP8, which are standard pin headers, P2.54mm, 1x2 pin.

Please refer to the table on the left for the selection of working mode of the serial port coming out from Qseven® connector.

Such a serial port is available on connector CN29, which is a standard DB-9 male connector.

According to the working mode selected via jumpers JP7 and JP8, the pinout of the connector will be as described in the following table.

Serial port #0 connector - CN29			
Pin	Signal RS-232 mode	Signal RS-485 Full Duplex mode	Signal RS-485 Half Duplex mode
1	N.C.	N.C.	N.C.
2	RxD_0	RX+	---
3	TxD_0	TX-	RX-/TX-
4	N.C.	N.C.	N.C.
5	GND	GND	GND
6	N.C.	N.C.	N.C.
7	RTS_0#	TX+	RX+/TX+
8	CTS_0#	RX-	---
9	N.C.	N.C.	N.C.



Please consider that RS-232 signals RxD_0, TxD_0, RTS_0# and CTS_0# are obtained from signals UART0_RX, UART0_TX, UART0_RTS# and UART0_CTS# coming out from Qseven® card edge connector.

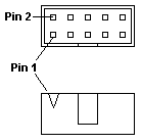
If the Qseven® module used doesn't support the UART interface in those pins, then serial port #0 on connector CN29 will not be usable, neither in RS-232 nor in RS-485 (Half and Full Duplex) modes.

RS-232 serial port #1 connector - CN31			
Pin	Signal	Pin	Signal
1	DCD_1#	2	DSR_1#
3	RxD_1	4	RTS_1#
5	TxD_1	6	CTS_1#
7	DTR_1#	8	RI_1#
9	GND	10	N.C.

RS-232 serial port #2 connector - CN32			
Pin	Signal	Pin	Signal
1	DCD_2#	2	DSR_2#
3	RxD_2	4	RTS_2#
5	TxD_2	6	CTS_2#
7	DTR_2#	8	RI_2#
9	GND	1	N.C.

Other two serial port interfaces are offered by the LPC to UART bridge XR28V382IL-32-F, which allows the implementation of two further serial ports full-modem. These serial ports are carried out externally through two dedicated RS-232 transceiver, and are available on connectors CN31 and CN32, which are two IDC connectors, dual row, 10 pin, p2.54 mm connector, type MOLEX p/n 70246-1004 or equivalent.

Mating connectors: MOLEX p/n 22-25-2102 with 70058 series female crimp terminals.



SECO can provide adapter cables specifically realized for carrying out these two serial port interfaces to standard panel's DB-9 male connectors.

Such cables are also contained inside the dedicated cable kit (CABKITA42) for CQ7-A42 carrier board. Please also check chapter 4.2.1 for further details.

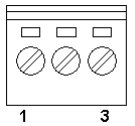
! Please be aware that only Qseven® modules offering LPC interface will be able to drive correctly the serial ports available on conectors CN31 and CN32.

Furthermore, it is necessary that the LPC-to-UART Bridge is supported by module's BIOS / BSP.

3.3.14 CAN terminal block

CAN Terminal block - CN26	
Pin	Signal
1	CAN_H
2	GND
3	CAN_L

According to Qseven® specifications, the modules can optionally offer a CAN interface, since many architectures offer this kind of interface natively.



For this reason, on CQ7-A42 carrier board there is a CAN transceiver, which allows the system to be interfaced directly to any CAN Network.

The interface is available on connector CN26, which is a terminal block, type Phoenix p/n MKDSFW 1 5/ 3-3, particularly suited for this kind of application.

JP6 position	120Ω CAN Termination
Not Inserted	Termination disconnected
Inserted	Termination present

CAN interface can optionally be terminated with a 120Ω Resistor, in case CQ7-A42 carrier is at one of the extremities of the CAN line. To enable this termination, is necessary to use jumper JP6, which is a standard pin header, P2.54mm, 1x2 pin, according to the table on the left.

3.3.15 LPC/GPIO Pin header

LPC/GPIO Pin Header - CN24			
Pin	**Signal**	**Pin**	**Signal**
1	LPC_LDRQ#	2	LPC_AD0
3	FAN_TACHOIN	4	LPC_AD1
5	SERIRQ	6	LPC_AD2
7	LPC_FRAME#	8	LPC_AD3
9	PLT_RST#	10	GND
11	LPC_CLK	12	GND
13	+3.3V_S	14	+3.3V_S

It is possible to increase furthermore connectivity possibilities of CQ7-A42 carrier board using the LPC signals coming out from Qseven® card edge connector, which are then carried out on a dual row, 14 pin, P2.54mm standard pin header, with the pinout shown in the table on the left.

Please remember that Qseven® specifications rel.2.0 share, on the same pins of the card edge connector, the LPC signals with eight general Purpose I/Os; this means that whatever interface is offered by the Qseven® module, it will be available on the pins of this pin header connector.

In addition to LPC/GPIO signals, on this pin header is also available the Platform reset signal, and the FAN_TACHOIN signal, which, according to the Qseven® specification, could be used also as a General Purpose Timer Input.

Please refer to the User Manual of the Qseven® module used for a description of effective signals available on this pin header, considering the correspondence with the card edge connector.

3.3.16 SPI Pin header

SPI Pin Header - CN25			
Pin	**Signal**	**Pin**	**Signal**
1	+3.3V_S	2	+3.3V_S
3	SPI_CS0#	4	SPI_MOSI
5	SPI_CS1#	6	SPI_MISO
7	GP_1-Wire_Bus	8	SPI_CLK
9	GND	10	GND

It is possible to use SPI interface, coming out from Qseven® card edge connector, for the connection of external SPI Devices (like EEPROM or Flash devices, but any kind of SPI device can be connected).

For this purpose, it is available a dual row, 10 pin, P2.54mm standard pin header, with the pinout shown in the table on the left.

On this pin header is also available the General Purpose 1-Wire signal. Please be aware, to avoid malfunctioning, that this signal could have been used for implementation of HDMI_CEC functionality (please check par. 3.3.5)

Please refer to the User Manual of the Qseven® module used for a description of allowed uses of the signals available on this pin header.

3.3.17 Feature internal pin header

For further expandability of the system, on board there is an expansion connector, which carries out the signals related to Watch Dog, I2C bus, SM Bus, thermal and power management. These signals allow implementing, through external expansion modules, further functionalities that are not already realised by the carrier board.

Feature internal pin header - CN30

Pin	Signal	Pin	Signal
1	+3.3V_A	2	+3.3V_S
3	SMB_CLK	4	GP0_I2C_CLK
5	SMB_DAT	6	GP0_I2C_DAT
7	SMB_ALERT#	8	LID_BTN#
9	BATLOW#	10	SLP_BTN#
11	N.C.	12	WAKE#
13	GND	14	GND
15	+3.3V_A	16	+3.3V_S
17	WDTRIG#	18	SUS_S3#
19	N.C.	20	N.C.
21	THRMTRIP#	22	SUS_S5#
23	THRM#	24	SUS_STAT#
25	WDOUT	26	PWGIN
27	GND	28	GND

For this purpose, it is available a dual row, 28 pin, P2.54mm standard pin header, with the pinout shown in the table on the left.

All the signals available on this connector come out directly from the Qseven® connector; please check the related table for a description of the signals.

3.3.18 GPIO internal pin header

GPIO internal pin header - CN33			
Pin	Signal	Pin	Signal
1	+3.3V_A	2	+3.3V_A
3	GPIO_0	4	GPIO_8
5	GPIO_1	6	GPIO_9
7	GPIO_2	8	GPIO_10
9	GPIO_3	10	GPIO_11
11	GPIO_4	12	GPIO_12
13	GPIO_5	14	GPIO_13
15	GPIO_6	16	GPIO_14
17	GPIO_7	18	GPIO_15
19	GND	20	GND

Interfaced to SM Bus of CQ7-A42 carrier board there is a device, ON Semiconductors® PCA9655E, which provides 16 General Purpose I/O pins.

Each of these pins can be individually configured to be an input or an output. By default, all signals are configured as 3.3V inputs, with a 100kOhm internal pull-up resistor. It is possible, by programming the internal registers of PCA9655E, change the direction of every single bit, making them work as outputs.

All these signals are available on a dual row, 20 pin, P2.54mm standard pin header, with the pinout shown in the table on the left.

The PCA9655E I/O Port Expander device can be interfaced to SM Bus or I2C line coming out from Qseven® connector. The selection is made by using the dedicated jumper JP9 which is a standard pin header, P2.54mm, 1x2 pin, according to the table on the right.

JP9 position	I/O Port Expander Connected to:
Not Inserted	I2C Bus
Inserted	SM Bus

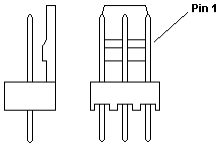
When the I/O Port Expander is connected to SM Bus, then its interrupt line is connected to SMBALERT# signal, otherwise it is connected to FAN_TACHOIN signal.

3.3.19 FAN Connector

FAN Connector - CN23	
Pin	Signal
1	GND
2	FAN_POWER
3	FAN_TACHO_IN

Depending on the usage model of systems based on CQ7-A42 carrier board, for critical applications/environments it is available a 3-pin dedicated connector for an external +12V_{DC} FAN.

FAN Connector is a 3-pin single line SMT connector, type MOLEX 22-27-2031 or equivalent, with pinout shown in the table on the left.



Mating connector: MOLEX 22-01-2035 receptacle with MOLEX 2759 or 4809 KK® crimp terminals.

Please be aware that the use of an external fan depends strongly on customer's application/installation.

Please refer to chapter 4.1 for considerations about thermal dissipation.

FAN_POWER: +12V_A derived power rail for FAN, managed by PWM signal FAN_PWMOUT coming from Qseven® connector.

FAN_TACHO_IN: tachometric input from the fan to the Qseven® module.

3.3.20 Optional Manufacturer and Debug Connectors

According to Qseven® specifications, on MXM connector there are some pins that are reserved for manufacturing and debugging purposes (MFG_NC0÷MFG_NC4).

These signals are reserved to the manufacturer of the Qseven CPU module, so it is not recommended to use them. Anyway, as a factory option, they can be available on two different connectors.

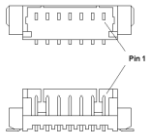
MFG_NCx signals can be used, by the Qseven® module, as a JTAG port or Debug UART. Please refer to the User manual of the Qseven® module for information about the proper assignment of JTAG / UART signals to the MFG_NCx signals (although the assignment shall correspond to that defined by the Qseven® specifications).

JP1 position	MFG_NC1 and MFG_NC2 routed to
Not inserted	Manufacturer connector CN2
Inserted	Debug USB port CN27

Moreover, debug UART signals (available on MFG_NC1 and MFG_NC2 pins of Qseven® card edge connector), can be routed to a standard connector or to an USB-to-UART bridge, which will allow the implementation of a more useful debug USB port. Selection is made using jumper JP1, according to the table on the left.

Manufacturer Connector - CN2	
Pin	**Signal**
1	+3.3V_A
2	MFG_NC3
3	MFG_NC0
4	MFG_NC1
5	MFG_NC2
6	MFG_NC4
7	GND

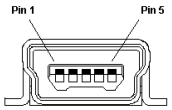
The first optional connector, CN2, is a 1.25mm pitch connector, type MOLEX p/n 53398-0771 or equivalent.



Mating connector: MOLEX 51021-0700 receptacle with MOLEX 50058 or 50079 crimp terminals.

Please be aware that Debug UART, when routed to this connector (on pins dedicated to signals MFG_NC1 and MFG_NC2) will be available at TTL level, i.e. it cannot be used for a direct connection to a common RS-232 serial port (like those available on PCs).

The second optional connector, CN27, is a standard mini-B USB receptacle, which will give access to the debug USB port. This is obtained by converting the debug UART signals to USB, using a Silicon Labs® CP2104 USB-to-UART bridge.

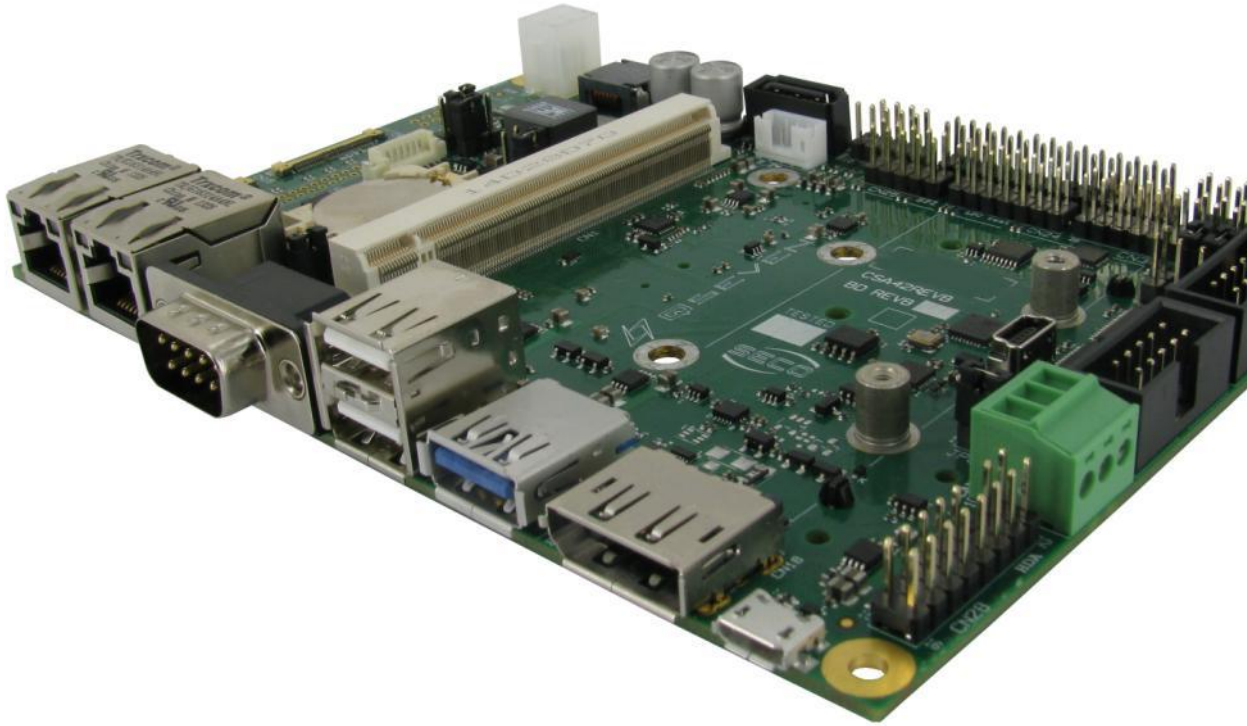


For this purpose, it is necessary that debug UART signals are routed to the bridge, by using the jumper JP1, as specified in the table above.

By using Silicon Labs® VCP drivers, available at http://www.silabs.com/products/interface/usbtouart/Pages/usb-to-uart-bridge.aspx, the debug USB port will be exploitable by any COM port application, running on the Qseven® module, exactly like if it were a standard serial port. Please remember that Qseven® module will have to work in device (i.e. client) mode.

Chapter 4.
Appendices

- Thermal Design
- Accessories



4.1 Thermal Design

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

Highly integrated modules, like Qseven® modules, offer to the user very good performances in minimal spaces, therefore allowing the systems' minimisation. On the counterpart, the miniaturising 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.

Qseven® specifications take into account the use of a heatspreader, which will act only as thermal coupling device between the Qseven® module 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 optimise 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.

Conversely, heatsinks in some situation can represent the cooling solution. Until the modules are used on a development Carrier board, on free air, just for software development and system tuning, then a finned heatsink could be sufficient for modules' cooling. Anyhow, please remember that all depends also on the workload of the processor. Heavy computational tasks will generate much heat.

Indeed, when using CQ7-A42 carrier board with any Qseven® module, it is necessary to consider carefully the global heat generated by the system, and the scenario of utilisation.

Therefore, it is always necessary that the customer study and develop accurately the cooling solution for his system, by evaluating processor's workload, utilisation scenarios, the enclosures of the system, the air flow and so on. This is particularly needed for industrial grade modules.

SECO can provide Qseven® modules' specific heatspreaders and heatsinks, but please remember that their use must be evaluated accurately inside the final system (electronics + mechanics), and that they should be used only as a part of a more comprehensive ad-hoc cooling solutions, which also keeps the surface temperature of all carrier board's components in the temperature range specified for the specific carrier board configuration (industrial or commercial grade).

4.2 Accessories

SECO can offer the following accessories in completion of CQ7-A42 functionalities

4.2.1 Accessories kit CABKITA42

This accessories kit includes the following items

- Dual USB 2.0 Type A adapters with standard PC mounting plate. Can be used to carry out the signals of internal USB ports #4-#5 to standard USB 2.0 Type A receptacles
- SATA power cable, for connection of power rails of external SATA disks / SSDs to internal SATA power connector CN9
- 4-wire Power cable, for the adapting of external PSU to Power In connector CN21
- 2 x DB-9 male serial port adapter cables, for the connection of external devices with standard RS-232 interface to carrier board's connectors CN31 and CN32

4.2.2 HD Audio Adapter module VA67

According to the Qseven® standard, the Qseven® modules can implement HD Audio, AC'97 or I2S Audio interface. For this reason, the CQ7-A42 carrier board doesn't have any audio codec onboard, and it is therefore not able to offer directly a PC-like audio interface.

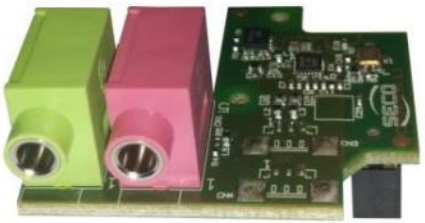
Instead, on the Carrier Board's connector CN28 are carried out the generic audio signals coming out from the Qseven® module.

For the Qseven® modules offering HD Audio interface, it is possible to use an HD Audio adapter module, which can be mounted directly on carrier board's connector CN28 (piggyback connection).

The module embeds a Cirrus Logic CS4207 HD Audio Codec, and makes available two audio interfaces on standard 3.5mm stereo audio jacks. The lime audio jack carries out the amplified Headphone interface, while the pink audio jack carries out the Mic Input interface.

This audio module can be purchased as a separated accessory for the CQ7-A42 carrier board, and it is also included in the "Cross Platform Starter Kit 2.0".

4.2.3 I2S Audio Adapter module VA74



For the Qseven® modules offering I2S Audio interface, it is possible to use an I2S Audio adapter module, which can be mounted directly on carrier board's connector CN28 (piggyback connection).

The module embeds a Freescale SGTL5000 Audio Codec, and makes available two audio interfaces on standard 3.5mm stereo audio jacks. The lime audio jack carries out the amplified headphone interface, while the pink audio jack carries out the Mic Input interface.

This audio module can be purchased as a separated accessory for the CQ7-A42 carrier board, and it is also included in the "Cross Platform Starter Kit 2.0".

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