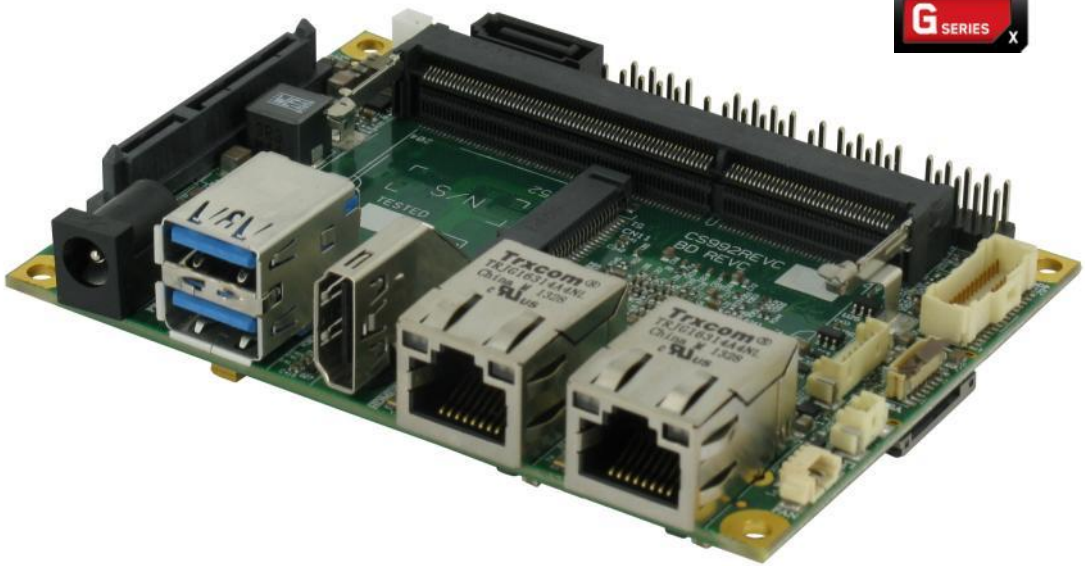
SBC

User Manual



SBC-992-plTX

Single Board Computer
with AMD Embedded G-Series SOC
on picoITX form factor

www.seco.com

REVISION HISTORY

Revision	Date	Note	Ref
1.0	26th November 2013	First Official Release.	SB
1.1	4th March 2014	BIOS section updated	SB
1.2	14th July 2014	Crimp terminal code corrected on description of connector CN15 Photos updated to rev C of the PCB	SB
1.3	9th February 2015	BIOS section updated	SB
2.0	17th February 2016	BIOS section updated. 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.

Some of the information found in the BIOS SETUP Chapter has been extracted from the following copyrighted Insyde Software Corp. documents:

- InsydeH2O™ Setup Utility - User Reference Guide

For further information on this module or other SECO products, but also for getting the proper 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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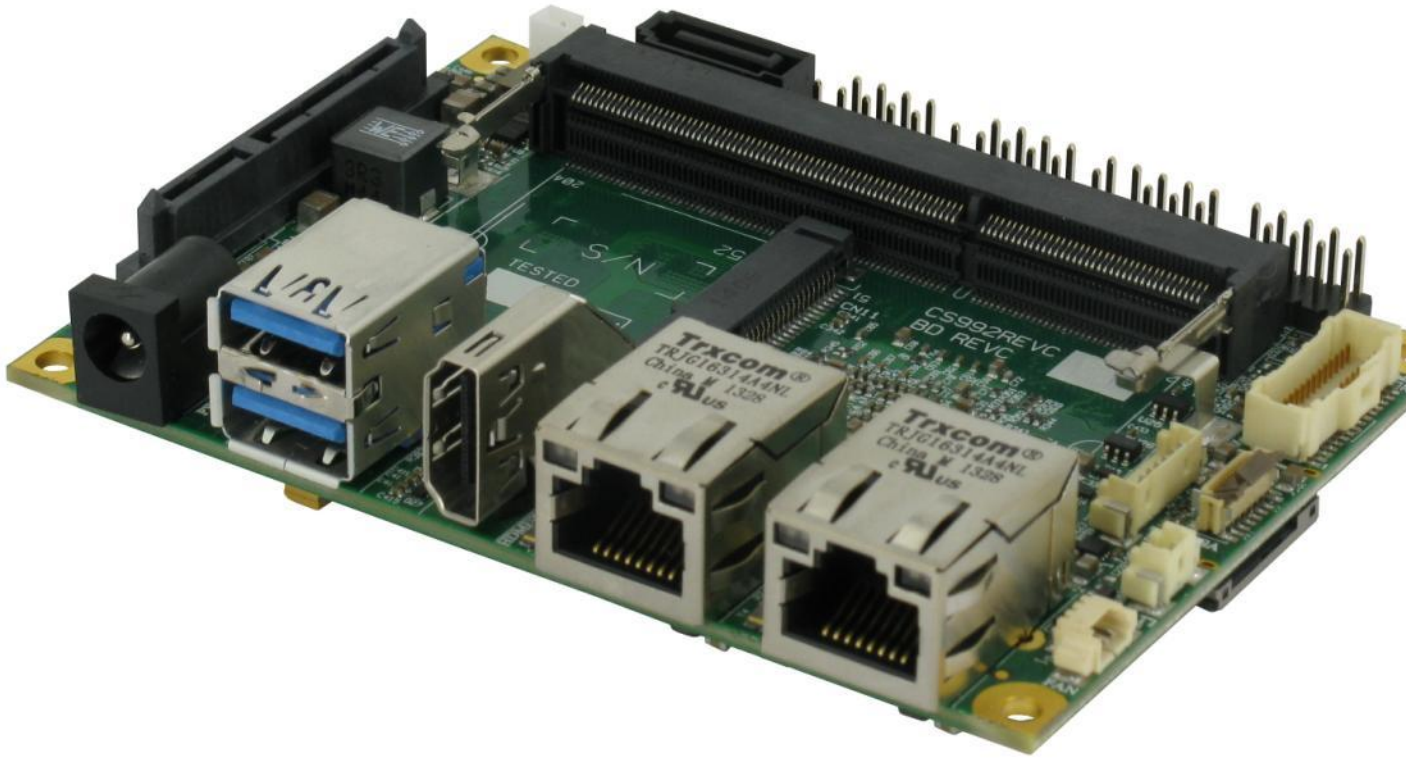
Chapter 1.
INTRODUCTION

- 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 functionality and could void the warranty

1.2 Information and assistance

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

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

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

  E-mail: technical.service@seco.com

  Fax (+39) 0575 340434
- Repair centre: it is possible to send the faulty product to the SECO Repair Centre. In this case, follow this procedure:
  - Returned items must be accompanied by a RMA Number. Items sent without the RMA number will be not accepted.
  - Returned items must be shipped in an appropriate package. SECO is not responsible for damages caused by accidental drop, improper usage, or customer neglect.

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

- Name and serial number of the product;
- Description of Customer's peripheral connections;
- Description of Customer's software (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-992-pITX board uses only extremely-low voltages.

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

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

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

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

1.5 Electrostatic discharges

The SBC-992-pITX board, like any other electronic product, is an electrostatic sensitive device: high voltages caused by static electricity could damage some or all the devices and/or components on-board.

Whenever handling a SBC-992-pITX board, ground yourself through an anti-static wrist strap. Placement of the board on an anti-static surface is also highly recommended.

1.6 RoHS compliance

The SBC-992-pITX board is designed using RoHS compliant components and is manufactured on a lead-free production line. It is therefore fully RoHS compliant.

1.7 Terminology and definitions

AC'97	Audio Codec'97, a standard for audio hardware codecs developed by Intel® in 1997
ACPI	Advanced Configuration and Power Interface, an open industrial standard for the board's devices configuration and power management
AHCI	Advanced Host Controller Interface, a standard which defines the operation modes of SATA interface
API	Application Program Interface, a set of commands and functions that can be used by programmers for writing software for specific Operating Systems
BIOS	Basic Input / Output System, the Firmware Interface that initializes the board before the OS starts loading
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
CPLD	Complex Programmable Logic Device, types of programmable logical devices with complexity lower than that of FPGAs
CRT	Cathode Ray Tube. Initially used to indicate a type of monitor, this acronym has been used over time to indicate the analog video interface used to drive them.
DDC	Display Data Channel, a kind of I2C interface for digital communication between displays and graphics processing units (GPU)
DDR	Double Data Rate, a typology of memory devices which transfer data both on the rising and on the falling edge of the clock
DDR3	DDR, 3rd generation
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
EHCI	Enhanced Host Controller interface, a high-speed controller for USB ports, able to support USB2.0 standard
FFC/FPC	Flexible Flat Cable / Flat Panel Cable
FPGA	Field-programmable gate array, a device designed to be fully programmed by customers in order to implement different functionalities
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

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 Signaling, a standard for transferring data at very high speed using inexpensive twisted pair copper cables, usually used for video applications
Mbps	Megabits per second
MMC/eMMC	MultiMedia Card / embedded MMC, a type of memory card, having the same interface of SD. The eMMC is the embedded version on 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
OHCI	Open Host Controller Interface, full-speed and low-speed controller for support of USB 1.1 ports
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
PCI-e	Peripheral Component Interface Express
PSU	Power Supply Unit
PWM	Pulse Width Modulation
PWR	Power
PXE	Preboot Execution Environment, a way to perform the boot from the network ignoring local data storage devices and/or the installed OS
SATA	Serial Advance Technology Attachment, a differential full duplex serial interface for Hard Disks
SD	Secure Digital, a memory card type
SDHC	Secure Digital Host Controller
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 of a master and one or more slaves, individually enabled through a Chip Select line

TBM	To be measured
TMDS	Transition-Minimized Differential Signaling, a method for transmitting high speed serial data, normally used on DVI and HDMI interfaces
TTL	Transistor-transistor Logic
UEFI	Unified Extensible Firmware Interface, a specification defining the interface between the OS and the board's firmware. It is meant to replace the original BIOS interface
UIM	User Identity Module, an extension of SIM modules.
USB	Universal Serial Bus
V_REF	Voltage reference Pin
VGA	Video Graphics Array. An analog computer display standard, commonly referred to also as CRT.
xHCI	eXtensible Host Controller Interface, Host controller for USB 3.0 ports, which can also manage USB 2.0 and USB1.1 ports

1.8 Reference specifications

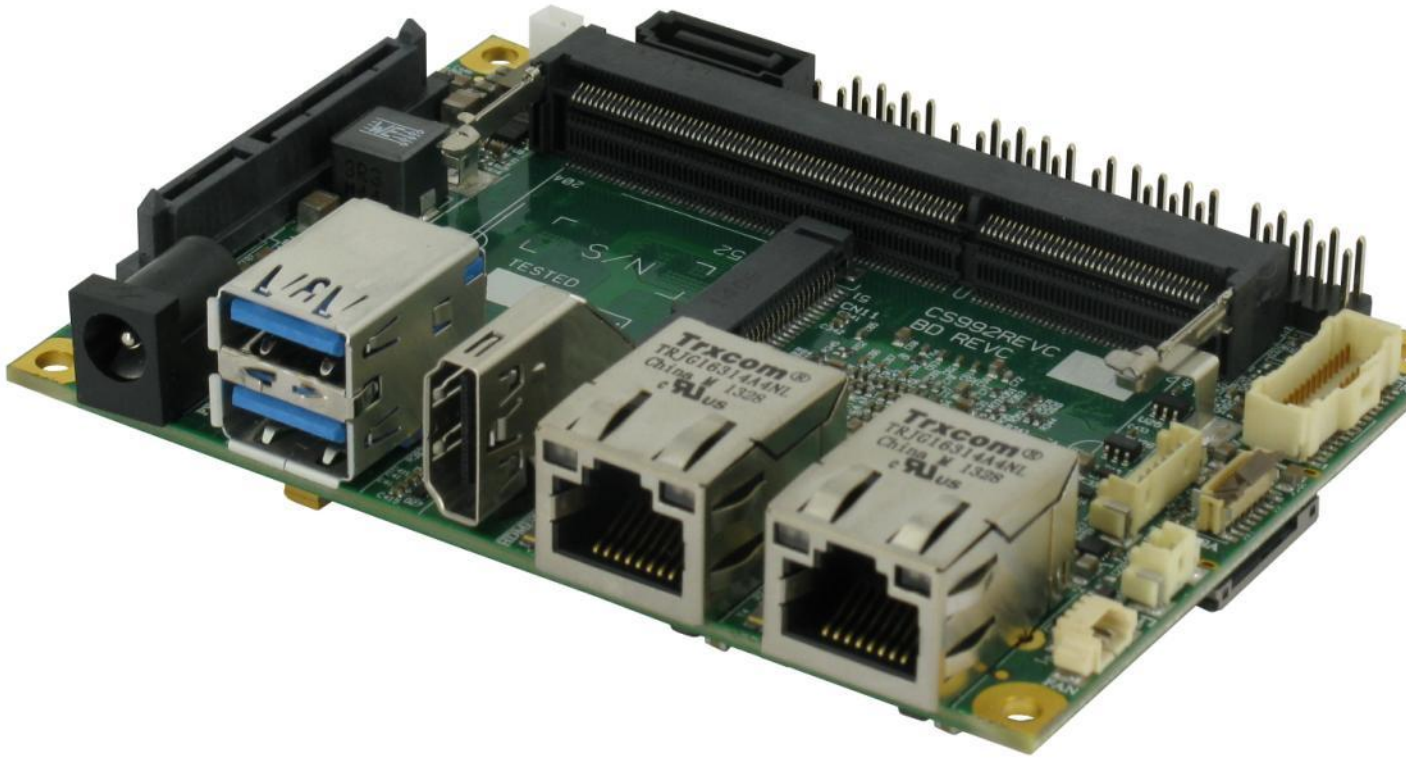
Here below it is a list of applicable industry specifications and reference documents.

Reference	Link
AC'97	http://download.intel.com/support/motherboards/desktop/sb/ac97_r23.pdf
ACPI	http://www.acpi.info
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
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
Intel® Front Panel I/O connectivity DG	http://www.formfactors.org/developer/specs/A2928604-005.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
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
PCI Express	http://www.pcisig.com/specifications/pciexpress
PCI Express mini cards	http://www.pcisig.com/specifications/pciexpress/specifications/specifications/pciexpress/base2/#MCEM2
SATA	https://www.sata-io.org
SD Card Association	https://www.sdcard.org/home

SDIO	https://www.sdcard.org/developers/overview/sdio
SM Bus	http://www.smbus.org/specs
TMDS	http://www.siliconimage.com/technologies/tmds
UEFI	http://www.uefi.org
USB 2.0 and USB OTG	http://www.usb.org/developers/docs/usb_20_070113.zip
USB 3.0	http://www.usb.org/developers/docs/usb_30_spec_070113.zip
AMD GX SOC	http://www.amd.com/US/PRODUCTS/EMBEDDED/PROCESSORS/Pages/g-series.aspx

Chapter 2.
OVERVIEW

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



2.1 Introduction

SBC-992-pITX is a Single Board Computer in pico-ITX form factor (just 100 x 72mm) based on the newest AMD Embedded G-Series System on Chip (SOC), a family of Dual/Quad Core x86 CPU with integrated discrete-class GPU and I/O controller on a single Chip.

Such a level of integration allows realizing a PC Desktop-like architecture in an extremely reduced space, with low power consumption and high performances.

This single chip solution include the memory controller, which gives support for up to 8GB of DDR3 SODIMM Memory, and also a high performance GPU, able to drive up to two independent display using native interfaces available on the module: HDMI, LVDS / embedded Display Port and CRT.

Graphic section is embedded in the SOC; which offers an embedded AMD HD Radeon GPU, able to support dual independent displays using native LVDS / embedded Display Port, CRT or HDMI interface. Any combinations of these video interfaces are supported. GPUs embedded in the SOC also support DirectX® 11.1, OpenGL® rel.4.2 and OpenCL™ rel. 1.2.

Further features, managed directly by the G-Series SOC and included in SBC-992-pITX board, are two SATA Channels, SDIO interface, six USB ports (two USB 3.0 and four USB 2.0), HD Audio interface and three PCI Express lanes; two PCI express lanes are then used for the implementation of up to two Gigabit Ethernet interfaces (one of them is offered as a factory option), the other is carried out on half size miniPCI express slot. This latest slot is also connected to a mini-SIM card slot, so that the SBC-992-pITX board can also be equipped with miniPCI-express modems.

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

2.2 Technical specifications

SOC

AMD GX-420CA, Quad Core @ 2.0GHz, 2MB L2 Cache, TDP 25W
AMD GX-415GA, Quad Core @ 1.5GHz, 2MB L2 Cache, TDP 15W
AMD GX-217GA, Dual Core @ 1.65GHz, 1MB L2 Cache, TDP 15W
AMD GX-210HA, Dual Core @ 1.0GHz, 1MB L2 Cache, TDP 9W
AMD GX-210JA, Dual Core @ 1.0GHz, 1MB L2 Cache, TDP 6W

Memory

Up to 8GB on DDR3 1600MHz SO-DIMM @1.5V *
(DDR3-1333MHz with GX-210HA, DDR3-1066MHz with GX-210JA)

Graphics

Embedded AMD HD RADEON GPUs
HD8400E @ 600MHz (GX-420CA), HD8330E @ 500MHz (GX-415GA)
HD8280E @ 450MHz (GX-217GA), HD8210E @ 300MHz (GX-210HA)
HD8180 @ 225MHz (GX-210JA),
Dual independent display support
Supports DirectX® 11.1, OpenGL rel. 4.2 and OpenCL™ rel. 1.2

Video Interfaces

HDMI connector
Single Channel 18bit LVDS connector **or** embedded Display Port connector
CRT interface (requires external Video Adapter)

Video Resolution

HDMI, resolution up to 1920 x 1200
LVDS, resolution up to 1600 x 900 (up to 1920 x 1200 through external adapter)
eDP, resolution up to 2560 x 1600
CRT, resolution up to 2048 x 1536

Mass Storage

2 x standard S-ATA connectors
microSD Card slot (combo connector)

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

Networking

Up to 2 x Gigabit Ethernet connector

USB

2 x standard USB 3.0 Type A
4 x internal USB 2.0 ports
USB 2.0 interface on miniPCI-e Slot

Audio

HD Audio Codec Realtek ALC886

Mic In, Line out internal pin header connector

PCI Express

Half miniPCI-e slot

Other interfaces

miniSIM slot (combo connector)
FAN connector
Front Header Expansion connector

Power supply voltage: $+12V_{DC}$ ± 10%
RTC Battery with lead cable and connector

Operating temperature: 0°C ÷ +60°C**

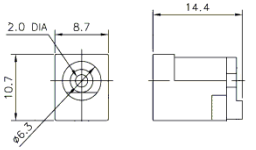
Dimensions: 72 x 100 mm (2.83" x 3.94")

Supported Operating Systems:

Microsoft® Windows 7, 32-bit and 64-bit
Microsoft® Windows 8.1, 32-bit and 64-bit
Microsoft® Windows 10, 32-bit and 64-bit
Microsoft® Windows Embedded Standard 7 (32/64 bit)
Microsoft® Windows Embedded Standard 8 (32/64 bit)
Linux, 32-bit and 64-bit

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

2.3 Electrical specifications



SBC-992-pITX needs to be supplied only with an external $12V_{DC}$ ± 10% power supply, minimum 40W for basic functionalities recommended.

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

Internal pin is V_{IN} power line.

2.3.1 Power available

When powering SBC-992-pITX with a PSU with characteristics greater or equal to the one described at beginning of previous paragraph, please consider well what is the typical scenario for using the board (i.e., which peripherals will be connected)

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

Consider that each USB 2.0 port requires 500mA, and USB 3.0 ports need 0.9A each, so if all 6 USB ports are used, then the 5V power section would be able to supply further 4.2A (about 21W) to other peripherals, like SATA Disk and/or LVDS display. Anyway, if all this current is needed by external peripherals, a 40W PSU cannot supply further power tor internal circuitry of the board.

Since all the power must be supplied by an external PSU only, please balance well the typical final configuration, considering both the power consumption of the board itself (up to 20W, depending on the SOC used and the total memory soldered onboard. In paragraph 2.3.2 are detailed current consumption for possible different SOCs) and the power consumption of external devices.

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

2.3.2 Power consumption

Using the following setup, and using all possible SOCs offered for SBC-992-pITX board, the current consumption has been measured on +12VDC V_{IN} power line.

- O.S. Windows 7 ultimate SP1
- 2GB DDR3 1066MHz CL7 SODIMM (Transcend p/n TS256MSK64V1U)
- 32GB SSD (p/n SandDisk SDSSDRC-032G) directly plugged on connector CN14.
- USB mouse and keyboard connected
- HDMI display connected, resolution 1920x1200.
- Both Network connections plugged to Gigabit Ethernet Network.
- Optional adapter module for audio jacks, pushbuttons and status LEDs connected.
- Bios Release. Rc00.101.
- No FAN connected.

Status	SOC				
	GX-210JA	GX-210HA	GX-217GA	GX-415GA	GX-420CA
Idle, power saving configuration	350mA	380mA	388mA	400mA	420mA
OS Boot, power saving configuration	650mA	670mA	935mA	950mA	1455mA
Video reproduction@720p, power saving configuration	664mA	700mA	930mA	950mA	1170mA
Video reproduction@1080p, power saving configuration	720mA	730mA	950mA	970mA	1220mA
3DMark2005 benchmark, power saving configuration	760mA	840mA	975mA	1110mA	1400mA
3DMark2005 benchmark, maximum performance	810mA	860mA	1200mA	1230mA	1540mA

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

Battery Backup power consumption: 3,5µA
Soft-Off State power consumption: 46mA (wake on LAN enabled)
Suspend State power consumption: 64mA (resume from LAN + Resume from USB enabled)

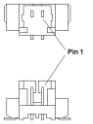
2.3.3 RTC Battery

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

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

Battery connector - CN5	
Pin	**Signal**
1	V_{RTC}
2	GND

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



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

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

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

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

Batteries supplied with SBC-992-pITX are compliant to requirements of European Directive 2006/66/EC regarding batteries and accumulators. When putting out of order SBC-992-pITX, remove the batteries from the board in order to collect and dispose them according to the requirement of the same European Directive above mentioned. Even when replacing the batteries, the disposal has to be made according to these requirements.

2.3.4 Power rails naming convention

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

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

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

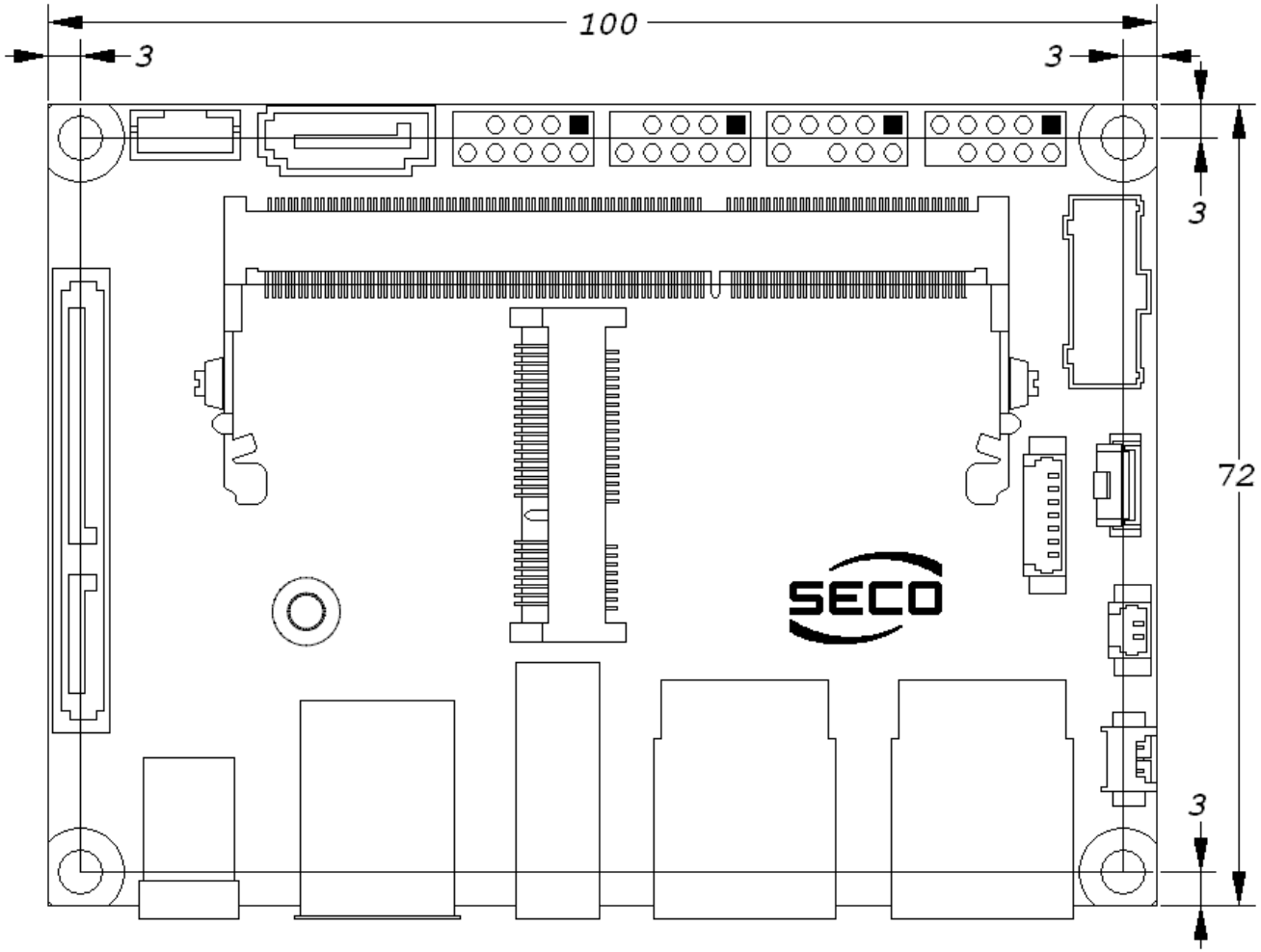
_U: unswitched ACPI S3 voltages, i.e. power rails that are active both in ACPI's S0 (Working) and S3 (Standby) state. Examples: +1.5V_U

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

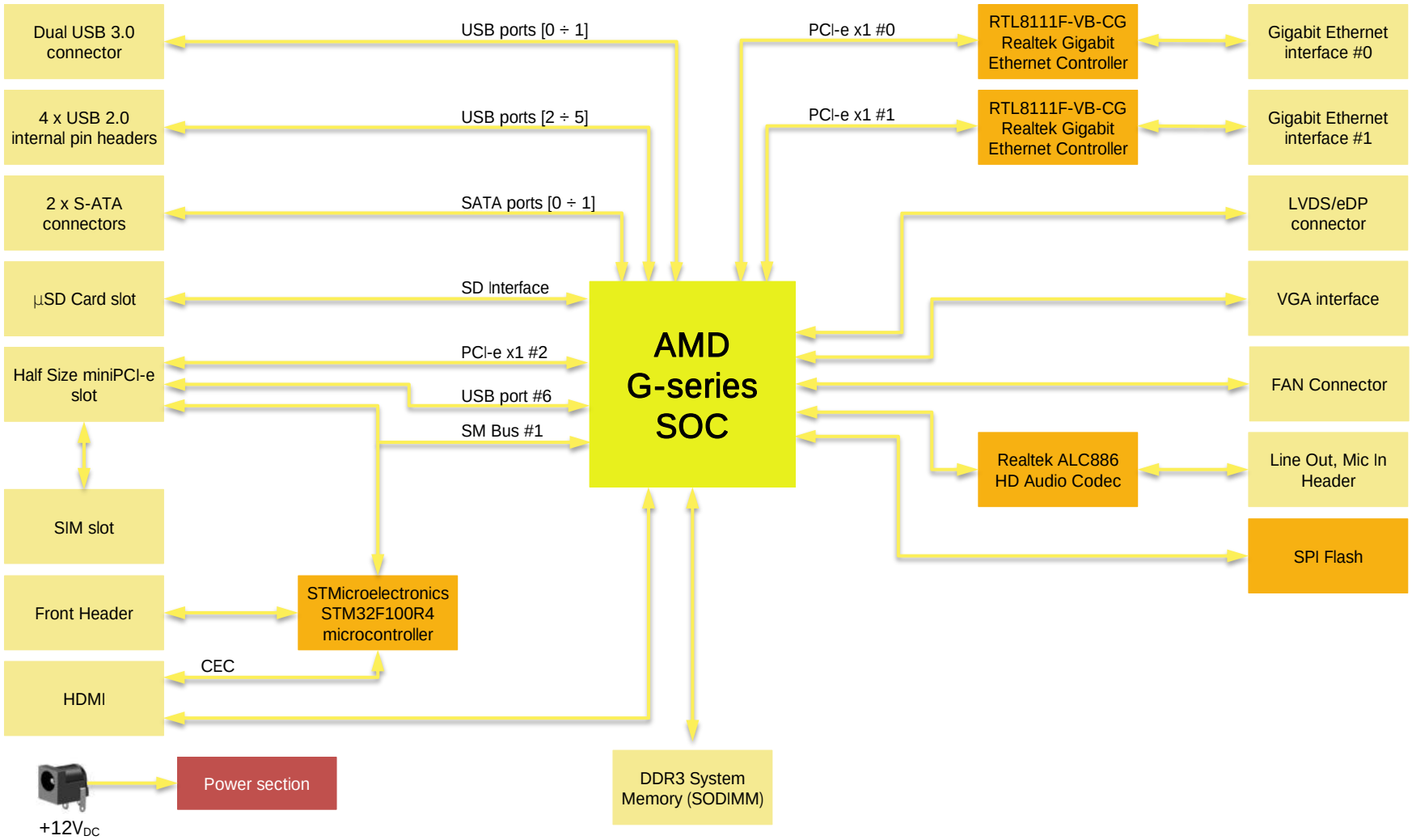
2.4 Mechanical specifications

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

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

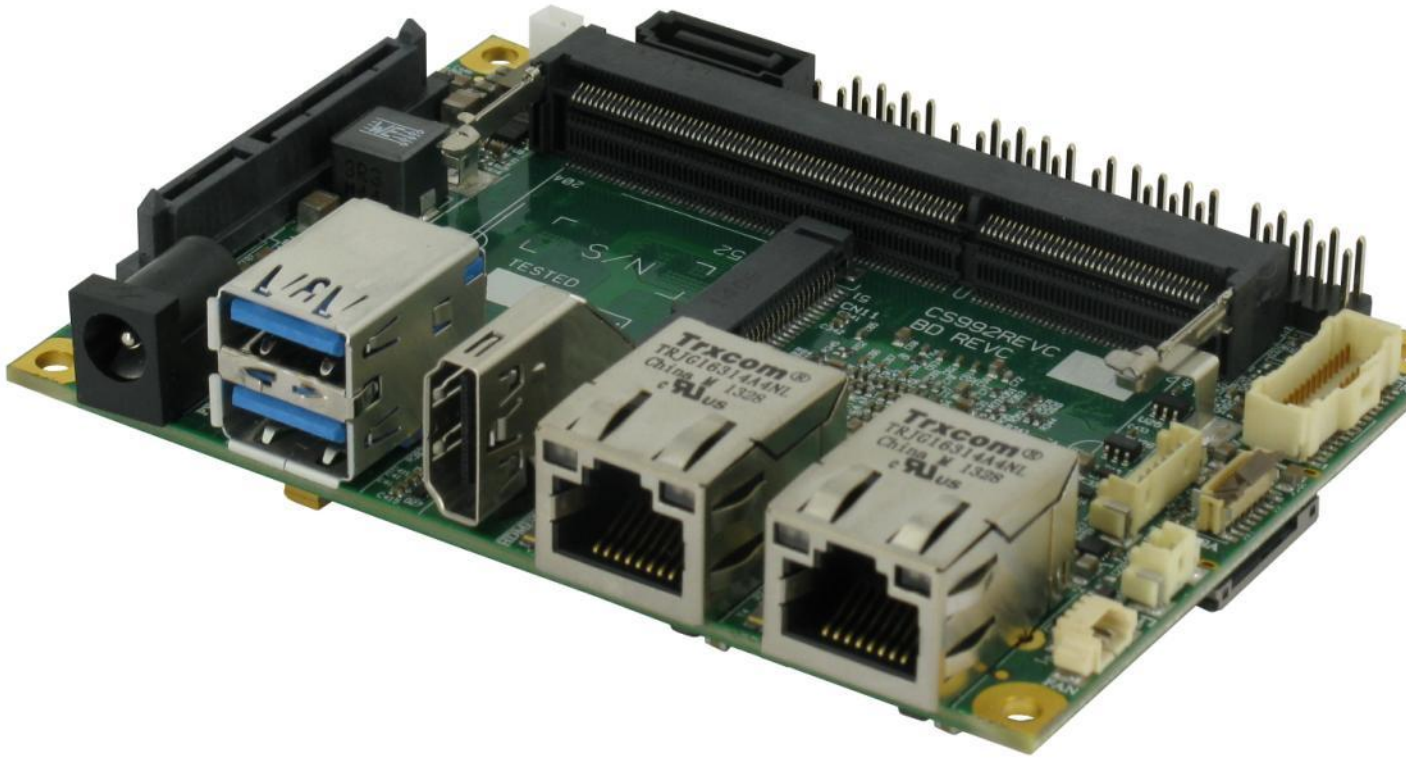


2.5 Block diagram



Chapter 3.
CONNECTORS

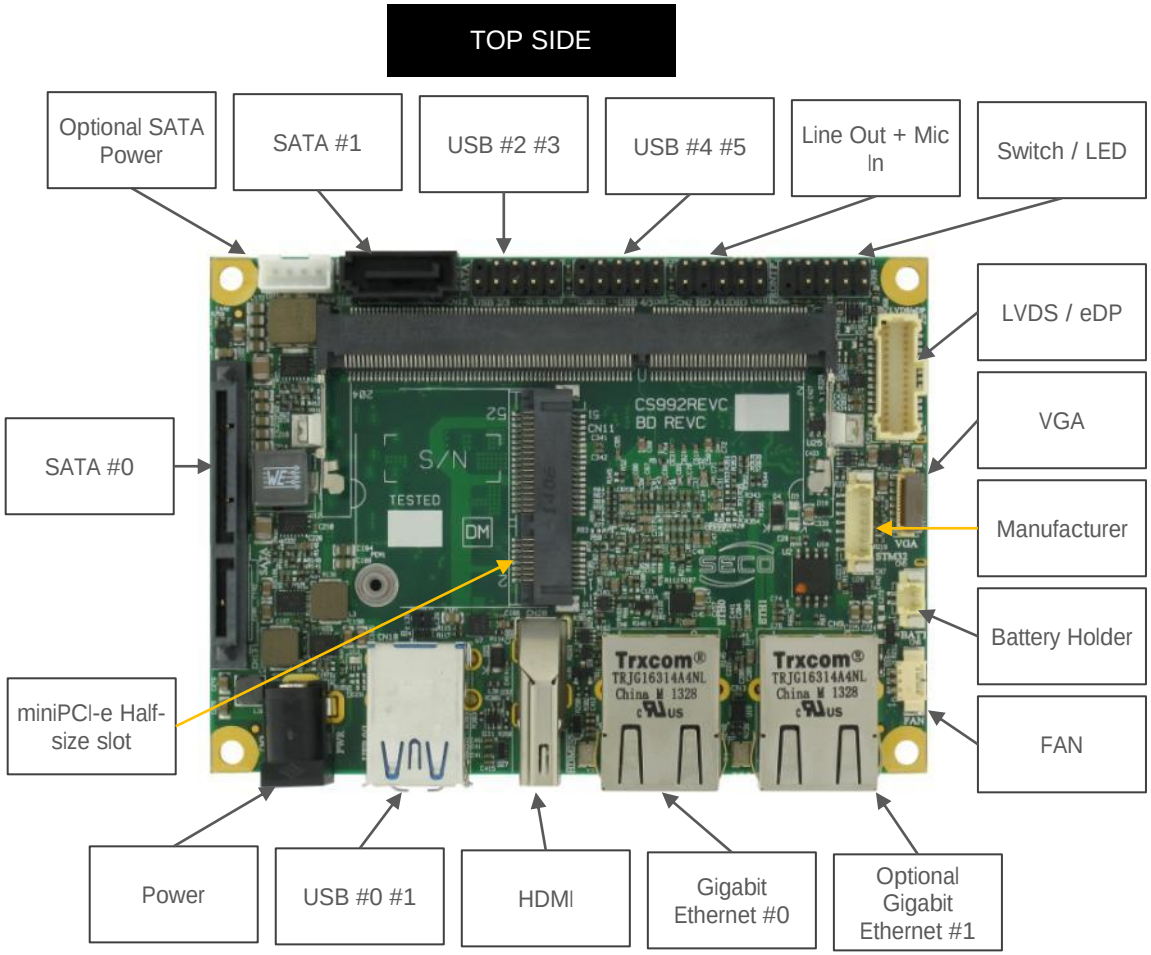
- Introduction
- Connectors overview
- Connectors description

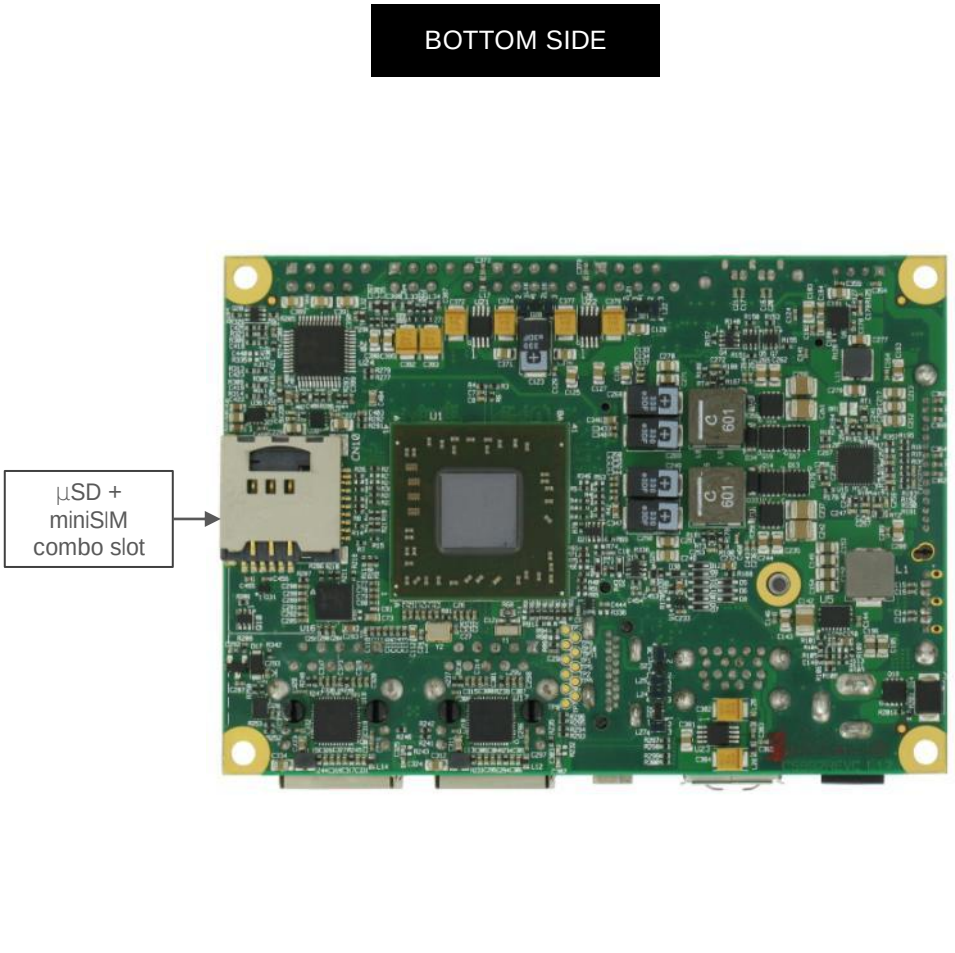


3.1 Introduction

On SBC-992-pITX board, there are several connectors located on the upper plane. Standard connectors are placed on the same side of PCB, so that it is possible to place them on a panel of an eventual enclosure.

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





3.2 Connectors overview

Name	Description	Name	Description
CN1	VGA Interface	CN12	SATA port#1 male connector
CN2	SO-DIMM DDR3 Memory Slot	CN13	Optional SATA port#0 male connector
CN3	Power In Jack	CN14	Optional SATA port#0 + power female connector
CN4	Switch / LED interface	CN15	Optional power connector for SATA #0 male
CN5	Battery holder connector	CN16	USB 2.0 ports #4-5 pin header
CN6	FAN connector	CN17	USB 2.0 ports #2-3 pin header
CN7	Manufacturer connector (reserved)	CN18	USB 3.0 type A ports #0 / #1
CN8	Gigabit Ethernet port #0	CN19	Mic In + Line Out Audio interface
CN9	Optional Gigabit Ethernet port #1	CN20	HDMI connector
CN10	µSD + miniSIM Combo Slot	CN21	LVDS / eDP connector
CN11	miniPCI-e slot		

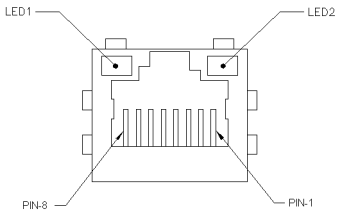
3.3 Connectors description

3.3.1 Ethernet connectors

Gigabit Ethernet Port #0 - CN8			
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 - CN9			
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. Both connections use a dedicated Realtek RTL8111F (or equivalent) controller.



Please consider that first Gigabit Ethernet is always available (on dedicated connector CN8), while the second Gigabit Ethernet controller (on dedicated connector CN9) is optional, it depends on the version of SBC-992-pITX module purchased.

Both connectors are RJ-45 sockets type LINK-PP p/n LPJG16314A4NL or equivalent, with 2kV decoupling capacitor, 100 Ohm impedance.

On the connectors there are also two bicolor 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.

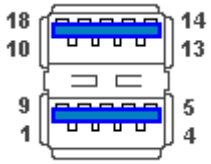
3.3.2 USB ports

Double USB 3.0 type A receptacle - CN18			
Pin	**Signal**	**Pin**	**Signal**
1	$+5V_{USB0}$	10	$+5V_{USB1}$
2	USB_P0-	11	USB_P1-
3	USB_P0+	12	USB_P1+
4	GND	13	GND
5	USB_SSRX0-	14	USB_SSRX1-
6	USB_SSRX0+	15	USB_SSRX1+
7	GND	16	GND
8	USB_SSTX0-	17	USB_SSTX1-
9	USB_SSTX0+	18	USB_SSTX1+

AMD G-Series SOC is able to manage up to 10 USB ports, which are managed by three EHCI/OHCI controllers (for USB 2.0 and USB 1.1 functionalities) and one xHCI controller (which manages two ports able to work in USB 3.0 / USB 2.0 and USB 1.1 mode).

On SBC-992-pITX board, four USB 2.0 ports and the two USB 3.0 ports are used for standard type A connectors.

USB 3.0 ports are available on a double USB connector, CN18, which is placed near the Gigabit Ethernet connectors.



The connector used is a double type-A USB 3.0 receptacle, type Winning p/n WDU3R-18F1B4PBUW3 or equivalent.

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

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

USB 2-3 pin header - CN17			
Pin	**Signal**	**Pin**	**Signal**
1	$+5V_{USB2}$	2	$+5V_{USB3}$
3	USB_P2-	4	USB_P3-
5	USB_P2+	6	USB_P3+
7	GND	8	GND
		10	---

USB 4-5 pin header - CN16			
Pin	**Signal**	**Pin**	**Signal**
1	$+5V_{USB4}$	2	$+5V_{USB5}$
3	USB_P4-	4	USB_P5-
5	USB_P4+	6	USB_P5+
7	GND	8	GND
		10	---

Managed by OHCI Controller #1, there are also four additional USB 2.0 ports, which are hosted on two 9-pin p2.54mm pin headers ,h= 6mm, type NELTRON p/n 2213S-10G-E9 or equivalent, with the pinout shown in the tables on the left (it is a common pinout for USB headers in PC motherboards).

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

For the connection of standard devices to this pin headers, it is needed an adapter cable. SECO can optionally provide for such an adapter cable, as a part of the accessory kit p/n CABKIT992 (please check chapter 5.2.1 for further details).

Signal description:

USB_P0+/USB_P0-: USB Port #0 differential pair; it is managed by OHCI #3 / EHCI #3 / xHCI controllers (depending on BIOS settings).

USB_SSRX0+/USB_SSRX0-: USB Super Speed Port #0 receive differential pair; it is managed by xHCI controller.

USB_SSTX0+/USB_SSTX0-: USB Super Speed Port #0 transmit differential pair; it is managed by xHCI controller.

USB_P1+/USB_P1-: USB Port #1 differential pair; it is managed by OHCI #3 / EHCI #3 / xHCI controllers (depending on BIOS settings).

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

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

USB_P2+/USB_P2-: USB Port #2 differential pair; it is managed by OHCI #1 and EHCI #1 internal controllers.

USB_P3+/USB_P4-: USB Port #3 differential pair; it is managed by OHCI #1 and EHCI #1 internal controllers.

USB_P4+/USB_P4-: USB Port #4 differential pair; it is managed by OHCI #1 and EHCI #1 internal controllers.

USB_P5+/USB_P5-: USB Port #5 differential pair; it is managed by OHCI #1 and EHCI #1 internal controllers.

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

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

!

Please be aware that Windows® 7 OS doesn't have native support for USB 3.0 functionalities. They will be supported only after installing chipset's driver. This could lead to problems during OS installation, since during this phase USB keyboard and mouse will not work, if connected to the standard USB 3.0 ports available on connector CN18.

To perform Windows® 7 installation, therefore, it is suggested to connect USB mouse and keyboard to the internal ports available on connectors CN16 or CN17 (one adapter cable, contained inside the accessories kit CABKIT992, is required).

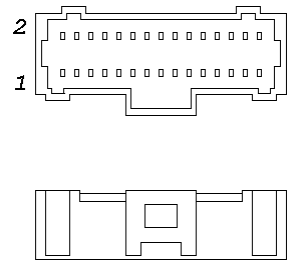
Alternatively, it is possible to disable USB 3.0 functionalities by entering "InsydeH2O Setup utility" ("Advanced" menu → "Peripheral Configuration" submenu → "xHCI (USB 0/1)", see paragraph 4.3.2) before performing Windows® 7 and chipset's driver installation

3.3.3 LVDS / eDP + backlight connector

SBC-992-plTX can be interfaced to LCD displays using its LVDS or embedded Display Port interface (only one interface is available, depending on the factory configuration of the board purchased).

LVDS / eDP connector - CN21							
LVDS Interface				eDP Interface			
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+12V$_{LCD}$	2	+12V$_{LCD}$	1	+12V$_{LCD}$	2	+12V$_{LCD}$
3	+3.3V$_{LCD}$	4	+5V$_{LCD}$	3	+3.3V$_{LCD}$	4	+5V$_{LCD}$
5	+3.3V$_{LCD}$	6	+5V$_{LCD}$	5	+3.3V$_{LCD}$	6	+5V$_{LCD}$
7	GND	8	GND	7	GND	8	GND
9	LVDS_A0-	10	LVDS_A0+	9	eDP0_TX2-	10	eDP0_TX2+
11	GND	12	GND	11	GND	12	GND
13	LVDS_A1-	14	LVDS_A1+	13	eDP0_TX1-	14	eDP0_TX1+
15	GND	16	GND	15	GND	16	GND
17	LVDS_A2-	18	LVDS_A2+	17	eDP0_TX0-	18	eDP0_TX0+
19	GND	20	GND	19	GND	20	GND
21	---	22	---	21	+3.3V_S	22	eDP_HPD
23	GND	24	GND	23	GND	24	GND
25	LVDS_CLK-	26	LVDS_CLK+	25	eDP0_TX3-	26	eDP0_TX3+
27	BKLT_EN	28	BLT_CTRL	27	BKLT_EN	28	BLT_CTRL
29	LVDS_DDC_CLK	30	LVDS_DDC_DAT	29	eDP0_AUX-	30	eDP0_AUX+

With LVDS interface, it is possible to connect 18 bit single channel displays, while embedded Display Port allows use of 18-, 24- and 30-bit displays.



For the connection, a connector type HR A1014WVA-S-2x15P or equivalent (2 x 15p, male, straight, P1, low profile, polarised) is provided, with the pin-out indicated in the following table (different configurations are shown).

Mating connector: HR A1014H-2X15P with HR A1014-T female crimp terminals.

Alternative mating connector, MOLEX 501189-30120 with crimp terminals series 501334.

On the same connectors, are also implemented signals for direct driving of display's backlight: voltages (+12V$_{LCD}$, +5V$_{LCD}$ and +3.3V$_{LCD}$) and control signals (Backlight enable signal @ 5V, BKLT_EN, and Backlight Brightness Control signal, BLT_CTRL).

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

Here following the signals related to LVDS management:

LVDS_A0+/LVDS_A0-: LVDS Channel #0 differential data pair #0.

LVDS_A1+/LVDS_A1-: LVDS Channel #0 differential data pair #1.

LVDS_A2+/LVDS_A2-: LVDS Channel #0 differential data pair #2.

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

LVDS_DDC_DAT: DisplayID DDC Data line for LVDS flat Panel detection. Bidirectional signal, electrical level +3.3V_S with a 2k2Ω pull-up resistor.

LVDS_DDC_CLK: DisplayID DDC Clock line for LVDS flat Panel detection. Output signal, electrical level +3.3V_S with a 2k2Ω pull-up resistor.

Boards configured for embedded Display Port (eDP) interface, instead, will have the following signals:

eDP0_TX0+/eDP0_TX0-: embedded DP differential data pair #0.

eDP0_TX1+/eDP0_TX1-: embedded DP differential data pair #1.

eDP0_TX2+/eDP0_TX2-: embedded DP differential data pair #2.

eDP0_TX3+/eDP0_TX3-: embedded DP differential data pair #3.

eDP0_AUX+/eDP0_AUX-: embedded DP auxiliary channel differential data pair.

eDP_HPD: embedded DP Hot Plug Detect. +3.3V_S electrical level signal with 100kΩ pull-down resistor

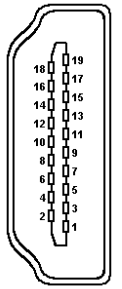
In both configurations, the following signals are used to manage the backlight:

BKLT_EN: +5V_S electrical level Output, 10kΩ pull-up resistor, Backlight Enable signal. It can be used to turn On/Off the backlight's lamps of connected displays.

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

3.3.4 HDMI connector

HDMI Connector - CN20			
Pin	**Signal**	**Pin**	**Signal**
1	TMDS_LANE2+	2	GND
3	TMDS_LANE2-	4	TMDS_LANE1+
5	GND	6	TMDS_LANE1-
7	TMDS_LANE0+	8	GND
9	TMDS_LANE0-	10	TMDS_CLK+
11	GND	12	TMDS_CLK-
13	CEC	14	---
15	SCL	16	SDA
17	GND	18	$+5V_{HDMI}$
19	HPD		



AMD G-series SOC offers a HDMI 1.4a compliant interface.

For this reason, on SBC-992-pITX board there is the possibility of connecting directly one HDMI displays, using a standard certified HDMI connector, type A, model TYCO Electronics p/n 2007435-1.

Signals involved in HDMI management are the following:

TMDS_CLK+/TMDS_CLK-: TMDS differential Clock.

TMDS_LANE0+/TMDS_LANE0-: TMDS differential pair #0

TMDS_LANE1+/TMDS_LANE1-: TMDS differential pair #1

TMDS_LANE2+/TMDS_LANE2-: TMDS differential pair #2

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

SCL: DDC Clock line for HDMI panel. Output signal, electrical level $+5V_{HDMI}$ with a 2k2Ω pull-up resistor.

CEC: HDMI Consumer Electronics Control (CEC) Line. Bidirectional signal, electrical level +3.3V_A with a 27kΩ pull-up resistor.

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

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

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

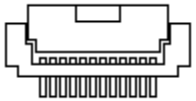
3.3.5 VGA Connector

VGA Connector - CN1			
Pin	**Signal**	**Pin**	**Signal**
1	CRT_RED	7	CRT_HSYNC
2	GND	8	CRT_VSYNC
3	CRT_GREEN	9	+5V_S
4	GND	10	CRT_DDC_CLK
5	CRT_BLUE	11	CRT_DDC_DATA
6	GND	12	GND

In addition to LVDS/eDP and HDMI, SBC-992-pITX board also offers an additional VGA interface.

Considering that integrated AMD HD Radeon GPUs are able to manage up to two independent displays, it is possible this way to have many possible combinations of display, using VGA, LVDS and HDMI connectors.

VGA connector is an FFC/FPC connector, top contacts, type HIROSE FH12-12S-0.5SV(55), with pinout shown in the table on the left.



Connector mates with 0.5mm pitch 12-poles FFC cables.

Here following the VGA signals' description:

CRT_RED: G-series SOC internal DAC's Red Signal video output. A 150Ω pull-down resistor is placed on the line.

CRT_GREEN: G-series SOC internal DAC's Green Signal video output. A 150Ω pull-down resistor is placed on the line.

CRT_BLUE: G-series SOC internal DAC's Blue Signal video output. A 150Ω pull-down resistor is placed on the line.

CRT_HSYNC: G-series SOC internal DAC's Horizontal Synchronization output signal.

CRT_VSYNC: G-series SOC internal DAC's Vertical Synchronization output signal.

CRT_DDC_CLK: internal DAC's DDC Clock line for VGA displays detection. Output signal, electrical level +3.3V_S.

CRT_DDC_DATA: internal DAC's DDC Clock line for VGA displays detection. Bidirectional signal, electrical level +3.3V_S

Please be aware that for the connection to external VGA displays, adapter circuitry is needed; it will provide for ESD protection, voltage level shifting for DDC, filtering for reduction of noise and EMI, and so on.

Optionally, SBC-992-pITX board can be supplied with a dedicated VGA adapter, able to carry out the signals coming out from connector CN20 to a standard DB-15 HD VGA connector. The adapter is also provided with necessary FFC cable, length 20cm. Please check chapter 5.2.2 for further details.

3.3.6 Audio interface

HD Audio Front Panel Interface - CN19			
Pin	**Signal**	**Pin**	**Signal**
1	Mic_Left	1	GND_Audio
3	Mic_Right	4	---
5	LineOut_Right	6	Mic_Jack_Detect
7	GND_Audio		
9	LineOut_Left	10	LineOut_Jack_Detect

In order to reduce the space dedicated to connectors, SBC-992-pITX board doesn't offer any standard audio jack.

However, SBC-992-pITX integrates a High Definition Audio Codec, Realtek ALC886GR, that makes basic audio connection available on dedicated connector CN19, which is a 9-pin pin header, p2.54 mm h= 6mm, type NELTRON p/n 2213S-10G-E8 or equivalent, with the pinout shown in the table on the left.

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

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

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

This adapter module is also contained inside the dedicated accessories kit p/n CABKIT992 for SBC-992-pITX board. Please also check chapter 5.2.1 for further details.

Signals Description

Mic_Left: Analog Port 1 - Microphone Left Channel.

Mic_Right: Analog Port 1 - Microphone Right Channel.

Mic_Jack_Detect: Analog Port 1 - Jack detection return signal.

LineOut_Left: Analog Port 2 - Headphone Left Channel.

LineOut_Right: Analog Port 2 - Headphone Right Channel.

LineOut_Jack_Detect: Analog Port 2 - Jack detection return signal.

3.3.7 Switch / LED header interface

Switch / LED Header Interface - CN4			
Pin	**Signal**	**Pin**	**Signal**
1	HD_LED_P	2	FP PWR_P/SLP_N
3	HD_LED_N	4	FP PWR_N/SLP_P
5	RST_SW_N	6	PWR_SW_P
7	RST_SW_P	8	PWR_SW_N
9	---		

To allow the integration of a SBC-992-pITX based system inside a box PC-like, there is a connector on the board that allows to remote signals for the Power Button (to be used to put the system in a Soft Off State, or awake from it), for the Reset Button, and the signal for optional LED signaling activity on SATA Channel and Power On states.

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

Connector CN4 is an internal 9-pin standard male pin header, p 2.54 mm, 5+4 pin, h= 6mm, type NELTRON p/n 2213S-10G-E10 or equivalent.

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

This adapter module is also contained inside the dedicated cable kit (CABKIT992) for SBC-992-pITX board. Please also check chapter 5.2.1for further details.

Signals Description

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

HD_LED_N: Hard Disk Activity LED output signal

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

PWR_SW_N: Power 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-color power LED for power ON/OF, sleep and message waiting signaling. Please refer to Intel® Front Panel I/O connectivity Design Guide, chapter 2.2.4, for LED functionalities and signal meaning.

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

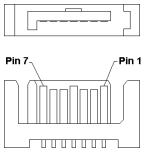
3.3.8 S-ATA connectors

S-ATA Connector - CN12	
Pin	**Signal**
1	GND
2	SATA1_Tx+
3	SATA1_Tx-
4	GND
5	SATA1_Rx-
6	SATA1_Rx+
7	GND

AMD G-series SOC embeds a SATA Controller, which offers a SATA II, 3.0 Gps interface, able to drive up to two external devices.

For this reason, for the connection of external Mass Storage Devices, there are two standard S-ATA connectors.

A male S-ATA connector, CN12, is always available, independently by the version of SBC-992-pITX board purchased.



Optional male S-ATA Connector - CN13	
Pin	**Signal**
1	GND
2	SATA0_Tx+
3	SATA0_Tx-
4	GND
5	SATA0_Rx-
6	SATA0_Rx+
7	GND

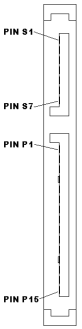
Optional S-ATA female Connector - CN14			
Pin	**Signal**	**Pin**	**Signal**
S1	GND	P5	GND
S2	SATA0_Tx+	P6	GND
S3	SATA0_Tx-	P7	+5V_S
S4	GND	P8	+5V_S
S5	SATA0_Rx-	P9	+5V_S
S6	SATA0_Rx+	P10	GND
S7	GND	P11	GND
P1	---	P12	GND
P2	---	P13	+12V_S
P3	---	P14	+12V_S
P4	GND	P15	+12V_S

A second SATA port is factory available in two different versions:

A) SATA male connector CN13

B) SATA female connector CN14 with integrated connector for direct SATA disk powering.

In first case, on board there will be available a second SATA male connector, CN13, identical to the other..



Second factory alternative offers a unique standard female 22 poles S-ATA connector, which can be used also for direct powering of SATA Hard Disk Drive.

Please be aware that S-ATA connector CN14 doesn't provide +3.3V power rail, so SATA disks requiring such a voltage cannot be used with this board.

Connector used is type MOLEX p/n 87779-1001 or equivalent, with pinout shown in the dedicated table on the left.

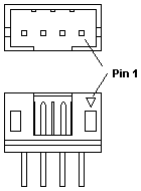
S-ATA Power Connector - CN15	
Pin	**Signal**
1	+12V_S
2	GND
3	GND
4	+5V_S

A dedicated power connector, CN 15, can be used to give supply to external Hard Disks (or Solid State Disks) connected to one of the two SATA male connectors.

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

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

An adapter cable for powering SATA disks from this connector is also contained inside the dedicated cable kit (CABKIT992) for SBC-992-pITX board. Please also check chapter 5.2.1for further details.



Here following the signals related to SATA interface:

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

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

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

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

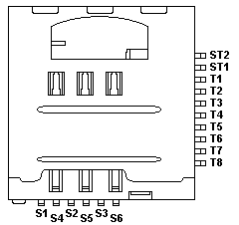
10nF AC series decoupling capacitors are placed on each line of SATA differential pairs.

3.3.9 µSD + miniSIM combo card slot

µSD + miniSIM Combo Card Slot - CN10			
Pin	**Signal**	**Pin**	**Signal**
S1	UIM_PWR	T3	SD_CMD
S2	UIM_RST	T4	+3.3V_S
S3	UIM_CLK	T5	SD_CLK
S4	GND	T6	GND
S5	UIM_SPU	T7	SD_DATA0
S6	UIM_DATA	T8	SD_DATA1
T1	SD_DATA2	ST1	SD_CD#
T2	SD_DATA3	ST2	GND

AMD G-Series SOC embeds a SD 3.0 compliant Host controller, supporting SDxc UHS-1 cards (speed transfer up to 104 MB/S with 4.bit SD cards). For this reason, on SBC-992-pITX board there is also a socket, for the use of standard microSD cards, which can be used as Mass Storage and/or Boot Devices.

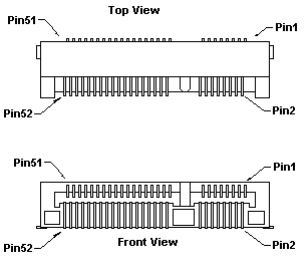
Moreover, SBC-992-pITX board is designed to accept also miniSIM cards, for use of miniPCI Express modems. These cards can be inserted in the dedicated slot of connector CN10, which is a combo µSD/MMC + miniSIM connector, push-push type, 2.7 mm global height, type AVX p/n 009162006501150 or equivalent. Pinout here reported is related only to signal routing on specific connector; internally the pin-out is the same of any standard SD 3.0 and SIM card.



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

3.3.10 miniPCI-express slot

miniPCI-express Slot - CN11			
Pin	**Signal**	**Pin**	**Signal**
1	PCIE_WAKE#	2	+3.3V_A
3	N.C.	4	GND
5	N.C.	6	+1.5V_S
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	PCIE2_Clock-	12	UIM_CLK
13	PCIE2_Clock+	14	UIM_RST
15	GND	16	UIM_SPU
17	N.C.	18	GND
19	N.C.	20	W_DISABLE#
21	GND	22	PCIE_RESET#
23	PCIE2_RX-	24	+3.3V_A
25	PCIE2_RX+	26	GND
27	GND	28	+1.5V_S
29	GND	30	SMB_CLK
31	PCIE2_TX-	32	SMB_DATA
33	PCIE2_TX+	34	GND
35	GND	36	USB_P6-
37	GND	38	USB_P6+
39	+3.3V_A	40	GND
41	+3.3V_A	42	N.C.
43	GND	44	N.C.



To add communications functionality, or other features not available on SBC-992-pITX board, it is possible to use Half-size mini-PCI Express cards, using the dedicate connector, CN11, which is a standard 52pin miniPCI Express connector, type TYCO 1775861-1 or equivalent, H=4mm, with the pinout shown in the table on the left.

Due to the reduced dimensions of the board itself, on the SBC-992-pITX board it is only possible to insert Half-Size miniPCI express cards.

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

PCI express Gen 2.0 is supported.

Signals carried to miniPCI-express slots are the following:

PCIE2_TX+/PCIE2_TX-: PCI Express lane #2, Transmitting Output Differential pair

PCIE2_RX+/PCIE2_RX-: PCI Express lane #2, Receiving Input Differential pair

PCIE2_Clock+ / PCIE2_Clock-: 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_RESET#: Reset Signal that is sent from G-Series SOC to all PCI-e devices available on the board (i.e. the GbE controllers) and on the miniPCI-e module. It is a 3.3V active-low signal.

CLKREQ#: 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 G-Series SOC makes available the reference clock.

SMB_CLK: SM Bus control clock line for System Management. Output signal, electrical level +3.3V_S with a 2k2Ω pull-up resistor.

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

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

USB_P6+ / USB_P6-: USB Port #4 differential pair; it is managed by OHCI #2 and EHCI #2 internal controllers.

W_DISABLE#: Wireless Disable signal, managed by a G-Series SOC GPIO signal. It is provided for those Wireless miniPCI-express cards able to manage the software switching on/off.

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

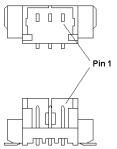
UIM_SPU: UIM Standard or Proprietary Use signal

Please be aware that all signals related to User Identity Modules are managed directly by the miniPCI-express card circuitry, they don't involve AMD G-series SOC's management. The SBC-992-pITX board embeds only clamping diodes for ESD protection on UIM signal and voltage lines.

3.3.11 FAN connector

FAN Connector - CN6	
Pin	**Signal**
1	GND
2	FAN_POWER
3	FAN_TACHO_IN

Depending on the usage model of SBC-992-pITX, for critical applications/environments on SBC-992-pITX it is available a 3-pin dedicated connector for an external +12VDC FAN.



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

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

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

Please refer to chapter 5.1 for considerations about thermal dissipation.

FAN_POWER: +12V_{IN} derived power rail for FAN, managed by AMD G-Series SOC via PWM signal

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

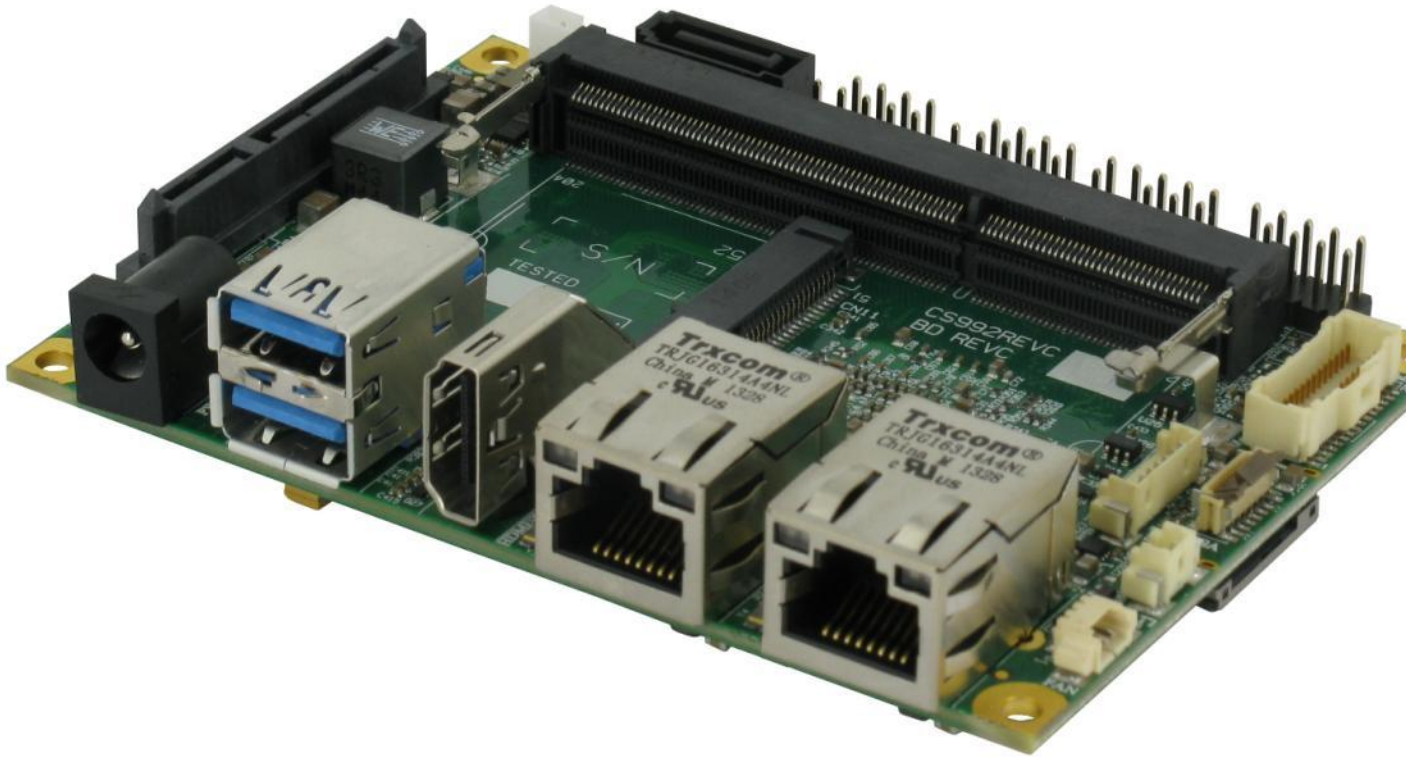
3.3.12 SO-DIMM DDR3 Slot

Depending on the version of the SOC used, the SBC-992-pITX board supports DDR3 memories up to 1600MHz. Please refer to Technical Specifications chapter for a detail of memory speeds supported by each type of AMD G-Series SOC.

For use of these memories, on board there is one SO-DIMM DDR3 socket (CN2), type LOTES p/n AAA-DDR-111-K01 or equivalent, a right angle, high profile socket, used for high speed system memory applications.

Chapter 4.
BIOS SETUP

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



4.1 InsydeH2O setup Utility

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

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

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

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

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

Right frame shows the key legend.

KEY LEGEND:

← / →	Navigate between various setup screens (Main, Advanced, Security, Power, Boot...)
↑ / ↓	Select a setup item or a submenu
<F5> / <F6>	<F5> and <F6> keys allows to change the field value of highlighted menu item
<F1>	The <F1> key allows displaying the General Help screen.
<F9>	<F9> key allows loading Setup Defaults for the board. After pressing <F9> BIOS Setup utility will request for a confirmation, before saving and exiting. By pressing <ESC> key, this function will be aborted
<F10>	<F10> key allows save any changes made and exit Setup. After pressing <F10> key, BIOS Setup utility will request for a confirmation, before saving and exiting. By pressing <ESC> key, this function will be aborted
<ESC>	<Esc> key allows discarding any changes made and exit the Setup. After pressing <ESC> key, BIOS Setup utility will request for a confirmation, before discarding the changes. By pressing <Cancel> key, this function will be aborted
<ENTER>	<Enter> key allows to display or change the setup option listed for a particular setup item. The <Enter> key can also allow display the setup sub-screens.

4.2 Main setup menu

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

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

Only two options can be configured:

4.2.1 System Time / System Date

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

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

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

4.3 Advanced menu

Menu Item	Options	Description
Boot Configuration	See submenu	Configures settings for Boot Phase
Peripheral Configuration	See submenu	Configures the peripherals
SATA configuration	See submenu	Select the SATA controller and hard disk drive type installed in the system
Video Configuration	See submenu	Configures the options for video section
Chipset Configuration	See submenu	Configure Chipset's parameters
ACPI Table / Features Control	See submenu	Configures the parameters for ACPI management
CPU Related settings	See submenu	Configures CPU related parameters
Memory Configurations	See submenu	Configures Memory Controller features and memory clock
SDIO Configuration	See submenu	SDIO Configuration submenu

4.3.1 Boot configuration submenu

Menu Item	Options	Description
Numlock	On / Off	Allows to choose whether NumLock Key at system boot must be turned On or Off
USB High Speed BIOS Support	Disabled / Enabled	USB emulation at high speed for capable devices
USB BIOS Support	Disabled / Enabled / UEFI only	USB keyboard / mouse / storage support under UEFI and legacy environments

4.3.2 Peripheral configuration submenu

Menu Item	Options	Description
OHCI 1 (USB 2/3/4/5)	Disabled / Enabled	Enabled: Enable the OHCI controller 1 (for USB 1.1 support), which manages USB ports available on pin headers CN16 & CN17 Disabled: Disable the OHCI Controller 1
EHCI 1 (USB 2/3/4/5)	Disabled / Enabled	Enabled: Enable the EHCI controller 1 (for USB 2.0 support), which manages USB ports available on pin headers CN16 & CN17 Disabled: Disable the EHCI Controller 1

OHCI 2 (port 4 on miniPCIE slot)	Disabled / Enabled	Enabled: Enable the OHCI controller 2 (for USB 1.1 support), which manages USB port available on miniPCI-e slot Disabled: Disable the OHCI Controller 2
EHCI 2 (port 4 on miniPCIE slot)	Disabled / Enabled	Enabled: Enable the EHCI controller 2 (for USB 2.0 support), which manages USB port available on miniPCI-e slot Disabled: Disable the EHCI Controller 2
OHCI 3 (USB 0/1)	Disabled / Enabled	Can be changed only when "xHCI (USB 0/1)" is disabled Enable or disable the selected OHCI controller, which is needed for driving USB 1.1 devices connected to CN18 at Low Speed / Full Speed.
EHCI 3 (USB 0/1)	Disabled / Enabled	Can be changed only when "xHCI (USB 0/1)" is disabled Enable or disable the selected EHCI controller, which is needed for driving USB 2.0 devices connected to CN18 at High Speed.
xHCI (USB 0/1)	Disabled / Enabled	Enable or disable the internal xHCI controller, which is needed for driving USB 3.0 devices at SuperSpeed. It can also handle slower devices without OHCI3/EHCI3 enabling.
HD Audio	Disabled / Enabled	Enabled: Enable the HD Audio Codec Disabled: Disable the internal HD Audio Controller
SATA	Disabled / Enabled	Enabled: Enable the SATA controller. Disabled: Disable the SATA controller

4.3.3 SATA configuration submenu

Menu Item	Options	Description
SATA Configure As	IDE AHCI IDE → AHCI AMDAHCI IDE → AMDAHCI	Set SATA Configuration type With AHCI, is not possible to install/boot UEFI O.S., only Legacy OS can be installed (a simpler driver is required). Setting to IDE, the controller is managed as a PCI device, so addresses reallocation and INT line sharing is possible. With IDE → AHCI, it is possible to install both UEFI and Legacy OS, it uses IDE to avoid the need for an UEFI driver. With AMDAHCI, AHCI ID will be 7804 (not 7801) so that Windows7 will install an AMD AHCI specific driver instead of default AHCI driver Using IDE → AMDAHCI, the behavior will be similar to IDE → AHCI, but will use AHCI ID 7804 like described for AMDAHCI
Serial ATA Port 0 / 1	Disabled / Enabled	Shows information related to eventual devices connected to SATA ports 0 or 1

4.3.4 Video configuration submenu

Menu Item	Options	Description
UMA Frame buffer Size	Auto / 64 MB / 128 MB / 256 MB / 384 MB / 512 MB / 1 GB / 2 GB	Set UMA Frame buffer Size
HDMI Audio	Disabled / Enabled	Enable or Disable Audio on HDMI
LFP	Disabled / External EDID / 640x480 / 800x480 / 800x600 / 1024x600 / 1024x768 / 1280x720 / 1280x800 / 1280x1024 / 1366x768 / 1440x900 / 1600x900 / 1680x1050 / 1920x1080	Select a software resolution (EDID settings) to be used for the internal flat panel. Using External EDID, LVDS display resolution is taken by external EDID interface Resolutions above 1600x900 are available only using eDP interface, please take care if the board purchased offers LVDS or eDP.
LFP Color Mode	VESA 24 bpp JEIDA 24 bpp 18 bpp	This item is effective only for boards factory configured with eDP video output on connector CN21, and an external eDP-to-LVDS module is used. Select the color depth of LVDS interface. For 24-bit color depth, it is possible to choose also the color mapping on LVDS channels, i.e. if it must be VESA-compatible or JEIDA compatible.
LFP Bus Mode	Single Channel Dual Channel	This item is effective only for boards factory configured with eDP video output on connector CN21, and an external eDP-to-LVDS module is used. Allows configuration of LVDS interface in Single or Dual channel mode
LFP Default Brightness	0 ÷ 100	Set the booting LVDS brightness percentage. Please be aware that a very low brightness level could make the panel not visible.
LFP BackLight Frequency	0 ÷ 20000	Set the LVDS Backlight Frequency in Hertz

4.3.5 Chipset configuration submenu

Menu Item	Options	Description
PCI Express Configurations	See submenu	
PCI Latency timer	32 / 64 / 96 / 128 / 160 / 192 / 224 / 248	Set this value to allow the PCI Latency Timer to be adjusted. This option sets the latency of all PCI devices on the PCI bus. Values are in units of PCI clocks.
Adaptive S4	Enabled / Disabled	Enable/Disable Adaptive S4 Power management

4.3.5.1 PCI Express Configurations submenu

Menu Item	Options	Description
PSPP Policy	Disabled / Performance / Balanced High / Balanced Low/ Power Saving / Auto	PCIe Speed Power policy: the processor can dynamically support the changing to the link frequency due to changes in system configuration and power policy.
Internal LAN0 configuration Internal LAN1 configuration Half Mini PCIE slot configuration	See following options	These menu are to be used to set single PCI express ports features, see the following menu items
GPP Enabled	Disabled / Enabled / Auto	Use this item to enable this GPP. For Half Mini PCIE slot it is also available the “Auto” possibility.
Link ASPM	Disabled / L0s / L1 / L0s & L1	Manages PCI Express L0s and L1 power states, for OSs able to handle Active State Power Management (ASPM)
Speed Mode	Auto / Gen1 / Gen2	This menu item is available only for Half Mini PCIE slot, when “GPP Enabled” is set to Enabled. Set PCI-e ports link speed/capability

4.3.6 ACPI Table/features submenu

Menu Item	Options	Description
FACP - C2 Latency Value	Enabled / Disabled	Allows definition of C2 latency value to be defined in FACP Table. Values smaller than 100 mean C2 Enabled, values larger than 100 mean C2 Disabled
FACP - C3 Latency Value	Enabled / Disabled	Allows definition of C3 latency value to be defined in FACP Table. Values smaller than 1000 mean C3 Enabled, values larger than 1000 mean C3 Disabled
FACP - RTC S4 wakeup	Enabled / Disabled	Enable or disable FACP support for S4 wakeup from RTC
HPET - HPET Support	Enabled / Disabled	High Precision Event Timer is supported in Windows Vista or above. HPET controller should not been seen in Windows XP, no matter if enabled/disabled in SCU. If this feature is enabled, the HPET table will be added into ACPI Tables.
_OSC Support	Enabled / Disabled	Enable or Disable ACPI Operating System Capabilities (_OSC) Method to communicate to the O. S. which features available in the system can be controlled by the operating system
Fusion Utility	Enabled / Disabled	Enable/Disable AMD Fusion Utility Support
Acpi Time Wake Alarm Device	Enabled / Disabled	Enable/Disable Acpi Time Wake Alarm Device

4.3.7 CPU related setting submenu

Menu Item	Options	Description
CPU P-State Setting	Auto / Lowest Speed	Sets the CPU P-States behavior, if AUTOmatic or fixed at lowest speed
SVM support	Enabled / Disabled	Enable or Disable Secure Virtual Machine Mode (SVM) support, for users who require to use Virtual Machines
SMM Code Lock	Enabled / Disabled	Enable or disable locking of the SMM (System Management Mode) code segment / registers for preventing changes to the internal code/registers

4.3.8 Memory configurations submenu

Menu Item	Options	Description
Memory clock setting mode select	Auto / Limited	This item allows selecting the memory clock settings. In Auto mode, the clock will run according to SPD data. In limited mode, if SPD clock is higher than the limit, then memory clock will follow limit clock
Select memory clock value	800 MHz / 1066 MHz / 1333 MHz / 1600 MHz	This menu item is available only when “Memory clock setting mode select” is not set to Auto. Specifies the memory clock limit or set a specific memory clock, according to previous setting

! Please be aware that changing Memory clock settings could lead to system instability.

4.3.9 SDIO Configuration submenu

Menu Item	Options	Description
SD Mode	Disabled / ADMA / DMA / PIO	Select the data transfer method that must be used by the Host Controller driver. It can be PIO Mode, DMA mode or Advanced DMA mode, as described in SD Host Controller Specifications
SD HC Version	SD 2.0 / SD 3.0	SD Host Controller Version

4.4 Security menu

Menu Item	Options	Description
Set Supervisor Password		Install or Change the password for supervisor. Length of password must be greater than one character.
Password Storage	C-MOS RAM BIOS Flash	Available only when Supervisor Password has been set. Select the location where the password will be saved. C-MOS RAM is erased each time the RTC battery is not present (or it has discharged).
Power on Password	Enabled / Disabled	Available only when Supervisor Password has been set. Enabled: System will ask to input a password during P.O.S.T. phase. Disabled: system will ask to input a password only for entering Setup utility

4.5 Power menu

Menu Item	Options	Description
Advanced CPU Control	See submenu	These items control various CPU parameters
Thermal Zone configuration	See submenu	Thermal Zone Configuration: Active and Passive Cooling Settings.
Clocks & Voltages Optimizations	See submenu	Change Clocks and voltages Settings
Watchdog Configuration	See submenu	Watchdog Configuration Settings
ACPI S3	Enabled / Disabled	Enable or Disable ACPI S3 Sleep State
Power Fail Resume Type	Always OFF Last State Always ON	Determine the System Behavior after a power failure event. In case the option is “Always ON”, the board will start every time the power supply is present. When the option is “Always OFF”, the board will not start automatically when the power supply returns. Finally, if this option is set to “Last State”, the board will remember the state it had when the power supply went down: so, if the board was on, it will start again when the power returns, and will remain off if the board was in this state when the power went down.
Wake on PME	Enabled / Disabled	Determines whether the system must wake up or not when the system power is off and it occurs a PCI Power Management Enable wake-up event.
Auto Wake on S5	Disabled By Every Day By Day of Month	Auto wake up from S5 state, it can be set to happen “By Day of month” or at a “Fixed time of every day”.
Wake on S5 time	[hh:mm:ss]	This menu item is available only when “Auto Wake on S5” is not set to Disabled. Set time of the day when the board must wake up automatically
Day of month	1 ÷ 31	This menu item is available only when “Auto Wake on S5” is set to “By Day of Month” This is the help for the day field. Valid range is from 1 to 31. Error checking will be done against month/day/year combinations that are not supported. Use + / - to Increase / reduce

4.5.1 Advanced CPU control submenu

Menu Item	Options	Description
Cool N' Quiet Support	Enabled / Disabled	Enable or Disable "Cool N' Quiet" power saving and speed throttling technology for CPU idle states.
Multi CORE support	Auto / Disabled	Enable / Disable Multi CORE Support
CPU C-States	Auto / Disabled	C-State ACPI Management

4.5.2 Thermal Zone configuration submenu

Menu Item	Options	Description
Onboard FAN	Enabled / Disabled	Enable or Disable Onboard FAN
Low Threshold (°C)	0 °C ÷ 115 °C	This submenu is available only when "Onboard FAN" is set to Enabled. Select the lowest temperature under which the onboard FAN must be Off
High Threshold (°C)	0 °C ÷ 115 °C	This submenu is available only when "Onboard FAN" is set to Enabled. Select the highest temperature above which the onboard FAN must work always at Full Speed
Mid Duty Cycle	0 ÷ 100	This submenu is available only when "Onboard FAN" is set to Enabled. Use this item to set the Duty Cycle for the FAN when the APU temperature is between Low and High threshold. Values that can be accepted are between 0 (0% OFF) and 100 (100%Full Speed)
Passive Cooling Threshold (°C)	0 °C ÷ 115 °C	Use this item to set the temperature threshold for the CPU. Above this temperature value, the CPU swill start to lower its frequency.
Critical temperature (°C)	0 °C ÷ 115 °C	Use this item to set the maximum temperature that the CPU can reach. Above this temperature value, the system will perform a critical shutdown

4.5.3 Clocks and Voltages Optimizations submenu

Menu Item	Options	Description
LVDS Spread Spectrum Percentage	0 ÷ 1000	LVDS Spread Spectrum Percentage (Downspread) in 0.01% units. For example: 0 = No Spread Spectrum, 40 = -0.40 spread spectrum
HDMI Spread Spectrum Percentage	0 ÷ 1000	HDMI Spread Spectrum Percentage (Downspread) in 0.01% units. For example: 0 = No Spread Spectrum, 40 = -0.40 spread spectrum
PCIE Spread Spectrum Percentage	0 ÷ 1000	PCIE Spread Spectrum Percentage (Downspread) in 0.001% units. For example: 0 = No Spread Spectrum, 375 = -0.375 spread spectrum
DisplayPort Fixed Voltage Swing	0.4V 0dB / 0.6V 0dB / 0.8V 0dB 1.2V 0dB / 0.4V 3.5dB / 0.6V 3.5dB 0.8V 3.5dB/ 0.4V 6dB / 0.6V 6dB / 0.4V 5dB	Display Port Fixed Voltage Swing

4.5.4 Watchdog Configuration submenu

Menu Item	Options	Description
Watchdog	Enabled / Disabled	Enable / Disable Watchdog.
Watchdog Action	System Reset Power Button 1s Power Button 4s (Shutdown)	This submenu is available only when “Watchdog” is set to Enabled. Specifies the action that must be performed when Watchdog timeout occurs. With System Reset, the module will reset itself With “Power Button 1s”, the system will simulate the pressure for 1 sec. of Power button, which will lead the O.S. to close all his tasks then shutdown. With “Power Button 1s”, the system will simulate the pressure for 1 sec. of Power button, which will lead to the immediate shutdown of the module
Delay To Start (sec.)	0 ÷ 600	This submenu is available only when “Watchdog” is set to Enabled. This menu item specifies the seconds of delay, after system power up, before the watchdog timeout starts counting
Timeout (sec.)	20 ÷ 600	This submenu is available only when “Watchdog” is set to Enabled. This menu item specifies the seconds of delay before the watchdog timeout expires

4.6 Boot menu

Menu Item	Options	Description
Boot type	Dual boot Type Legacy Boot Type UEFI Boot Type	Allows to select if the OS must be booted using Legacy Boot Mode, UEFI Boot mode or indifferently using both modalities (depending on the OS)
Quick Boot	Enabled / Disabled	Skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot	Enabled / Disabled	Disables or enables booting in Text Mode.
Display ESC String	Enabled / Disabled	Display or Hide the “ESC key” strings during the BIOS boot. Disabling this configuration, no information on how to enter Setup Configuration Utility will be displayed.
Network Stack	Enabled / Disabled	This submenu is available only when “Boot Type” is set to “UEFI Boot type” or “Dual Boot type”. When enabled, this option will make available the following Network Stack services: Windows 8 BitLocker Unlock UEFI IPv4/IPv6 PXE Legacy PXE OpROM
PXE Boot Capability	Disabled UEFI: IPv4 UEFI: IPv6 UEFI: IPv4/IPv6 Legacy	This submenu is available only when “Network Stack” is Enabled Specifies the PXE (Preboot Execution Environment) Boot possibilities. When Disabled, Network Stack is supported For UEFI, it is possible to support IPv4, IPv6 or both of them In Legacy mode, only Legacy PXE OpROM is supported
PXE Boot to LAN	Enabled / Disabled	This submenu is available only when “Boot Type” is set to “Legacy Boot type”. Disables or enables the possibility for the PXE to perform the boot from LAN.
Add Boot options	First / Last / Auto	Specifies the position in Boot Order for Shell, Network and Removable Disks
ACPI selection	Acpi1.0B / Acpi3.0 / Acpi4.0 / Acpi5.0	Using this menu item is possible to select to which specifications release the ACPI tables must be compliant.
USB Boot	Enabled / Disabled	Disables or enables booting from USB boot devices.
EFI Device First	Enabled / Disabled	Determine if boot must happen first through EFI devices or through legacy devices. When enabled, it will happen first from EFI devices. When disabled, it will happen first from Legacy devices.
Windows® 8 Fast Boot	Enabled / Disabled	This submenu is available only when “Boot Type” is set to UEFI Boot Type. If enabled, the system firmware does not initialize keyboard and check for firmware menu key.

USB Hot Key Support	Enabled / Disabled	This submenu is available only when “Boot Type” is set to UEFI Boot Type and “Windows® 8 Fast Boot” is Enabled. Enable or disable the support for USB HotKeys while booting. This will decrease the time needed to boot the system
Timeout	0 ÷ 300	The number of seconds that the firmware will wait before booting the original default boot selection.
Automatic Failover	Enabled / Disabled	When this item is enabled, if boot from the default device fails, then the system will attempt directly to boot from the next device on the Boot devices list When this item is disabled, in case of failure from booting from the first boot device, then a Warning Message will pop up and subsequently enter into Firmware UI.
EFI	See Submenu	This submenu is available only when “Boot Type” is not set to “Legacy Boot type”. Entering the submenu, will show a list of EFI boot devices. Use F5 and F6 key to change order for boot priority.
Legacy	See Submenu	This submenu is available only when “Boot Type” is not set to “UEFI Boot type”.

4.6.1 Legacy submenu

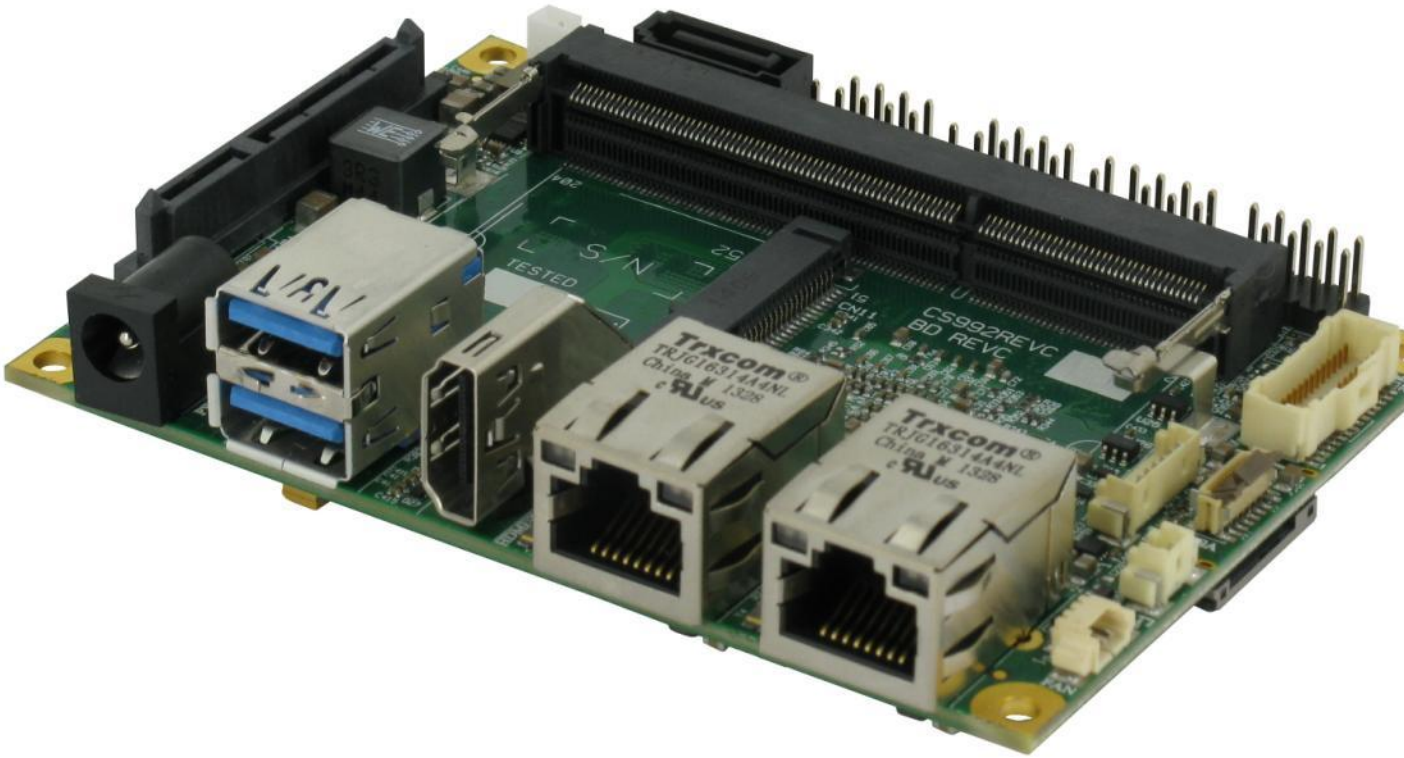
Menu Item	Options	Description
Boot Menu	Normal / Advance	When set to Normal, this submenu will allow configuring all possible options for Legacy boot. When set to Advance, it will be possible to configure Boot Order only for bootable devices found in the system
Boot Type Order	Floppy Drive / Hard Disk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

4.7 Exit menu

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

Chapter 5.
APPENDICES

- Thermal Design
- Accessories



5.1 Thermal Design

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

Highly integrated modules, like SBC-992-pITX board, offer to the user very good performances in minimal spaces, therefore allowing the system's minimization. On the counterpart, the miniaturizing of IC's and the rise of operative frequencies of processors lead to the generation of a big amount of heat, that must be dissipated to prevent system hang-off or faults.

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

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

When using SBC-992-pITX boards, it is necessary to consider carefully the heat generated by the module in the assembled final system, and the scenario of utilization.

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

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

SECO can provide SBC-992-pITX specific heatspreaders, passive heatsinks and heatsinks with fan, but please remember that their use must be evaluated accurately inside the final system, and that they should be used only as a part of a more comprehensive ad-hoc cooling solutions.

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

Ordering Code	Description
S992-DISS-1	SBC-992-pITX Heatspreader Kit
S992-DISS-2	SBC-992-pITX Heatsink Kit
S992-DISS-3	SBC-992-pITX Heatsink with integrated FAN Kit

5.2 Accessories

SECO can offer various accessories in completion of SBC-992-pITX functionalities

5.2.1 Accessories kit CABKIT992

This accessories kit includes the following items

- 2 x *Dual USB 2.0 Type A adapters with standard PC mounting plate*. Can be used to carry out the signals of internal USB ports #2-#3 and #4-#5 to standard USB 2.0 Type A receptacles
- *Front Panel I/O board* V995, which allows the integration on a panel of an optional enclosure of two Audio jacks (Earphone and Mic in), Reset Button, Power button and two LED (for SATA activity and Power Status of the board itself).

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

- Cables for connection of the Front Panel I/O board to SBC-992-pITX board.

Connection cable CV-837/30 is needed for audio functionalities; it has to be connected to SBC-992-pITX board's connector CN19 and to V995 module's connector CN2.

Connection cable CV-836/30 is needed for connection of power and reset pushbuttons and SATA / power LEDs; it has to be connected to SBC-992-pITX board's connector CN4 and to V995 module's connector CN1.

- SATA power cable, for connection of power rails of external SATA disks / SSDs to internal SATA power connector CN15.

5.2.2 VGA Adapter module M908

Due to the reduced space available, on SBC-992-pITX board the VGA interface is not available through a standard DB-15 HD connector, which is commonly used for connection of common VGA monitors. Instead, this interface is available through a FFC/FPC connector.

SECO can offer an optional VGA adapter module, ordering code M908, which can be used for the connection of standard VGA displays.

The Adapter module is equipped directly with a 20cm long FFC cable for its connection to SBC-992-pITX board's connector CN1.

DB-15 HD CRT connector is VESA VGA DDC2 compliant.

5.2.3 USB-to-Serial port converter modules

This optional module has been designed to convert one of the internal USB ports (available on connectors CN16 and CN17) into a serial port, which can be of RS-232, RS-422 or RS-485 type.

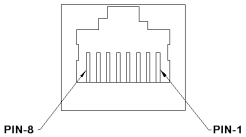
Depending on the type of serial port needed, different module configurations are available; moreover, the output of the module can be available on standard DB-9 male connector or on RJ-45 sockets.

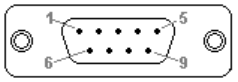
All modules type mounts an FTDI FT232R USB-to-Serial UART interface IC; RS-232 converter module then mounts a Serial Port RS-232 Transceiver with 15kV ESD protection. Instead, the other converters mount and RS-485/RS-422 transceiver.

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

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

120Ω termination resistors on differential pairs are available both on RS-422 and on RS-485 modules.





Ordering Code	Description
VA13-0000-1100-C0	USB to RS232 serial port converter with DB9 connector
VA13-0000-1200-C0	USB to RS422 serial port converter with DB9 connector
VA13-0000-1300-C0	USB to RS485 serial port converter with DB9 connector
VA13-0000-2100-C0	USB to RS232 serial port converter with RJ-45 connector
VA13-0000-2200-C0	USB to RS422 serial port converter with RJ-45 connector
VA13-0000-2300-C0	USB to RS485 serial port converter with RJ-45 connector

SECO Srl - Via Calamandrei 91
52100 Arezzo - ITALY
Ph: +39 0575 26979 - Fax: +39 0575 350210
www.seco.com