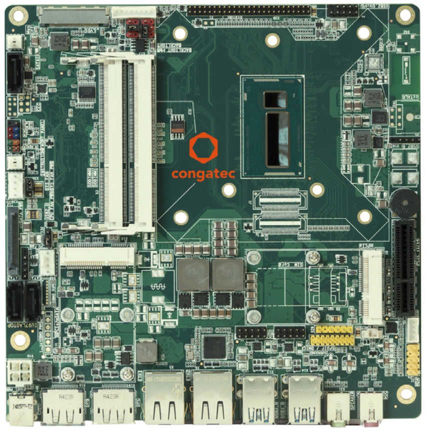


conga-IC87/IC97 Thin Mini-ITX SBC

Detailed Description Of The congatec Thin Mini-ITX Based On Intel 4/5th Generation U-Series SoC

User's Guide

Revision 1.0

Revision History

Revision	Date (yyyy.mm.dd)	Author	Changes
0.1	2015.02.12	AEM	• Preliminary release
0.2	2015.06.19	AEM	• Added note about the minimum storage requirement in section 2.2 "Supported Operating Systems" • Updated section 4 "Cooling Solution". Also removed references to cooling adapter. • Updated section 5.3.2.1 "Stereo Speaker Header". • Updated section 5.5.2 "Serial Ports (COM)". • Deleted section 6.8 "Cooling Adapter". • Added section 9 "conga-IC97 BIOS Setup Description".
1.0	2015.09.10	AEM	• Deleted PN: 052255 from section 1.2.2 "Optional Accessories/cables". Also updated retention frame image in section 4 "Cooling Solution". • Updated section 9 "conga-IC97 BIOS Setup Description". • Updated section 7 "conga-IC87/IC97 Mechanical Drawing". • Deleted section 10.1 "Supported Flash Devices". • Official release.

Preface

This user's guide provides information about the components, features and connectors available on the conga-IC87/IU97 Thin Mini-ITX single board.

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

congatec AG provides no warranty with regard to this user's guide or any other information contained herein and hereby expressly disclaims any implied warranties of merchantability or fitness for any particular purpose with regard to any of the foregoing. congatec AG assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide. In no event shall congatec AG be liable for any incidental, consequential, special, or exemplary damages, whether based on tort, contract or otherwise, arising out of or in connection with this user's guide or any other information contained herein or the use thereof.

Intended Audience

This user's guide is intended for technically qualified personnel. It is not intended for general audiences.

Lead-Free Designs (RoHS)

All congatec AG products are created from lead-free components and are completely RoHS compliant.

Electrostatic Sensitive Device

All electronic parts described in this user's guide are electrostatic sensitive devices and are packaged accordingly. Do not open or handle a carrier board or module except at an electrostatic-free workstation. Additionally, do not ship or store electronic devices near strong electrostatic, electromagnetic, magnetic, or radioactive fields unless the device is contained within its original manufacturer's packaging.

Symbols

The following symbols are used in this user's guide:

Warning

Warnings indicate conditions that, if not observed, can cause personal injury.

Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.

Note

Notes call attention to important information that should be observed.

Connector Type

Describes the connector used on the Single Board Computer.

Copyright Notice

congatec AG has made every attempt to ensure that the information in this document is accurate yet the information contained within is supplied "as-is".

Trademarks

Product names, logos, brands, and other trademarks featured or referred to within this user's guide, or the congatec website, are the property of their respective trademark holders. These trademark holders are not affiliated with congatec AG, our products, or our website.

Warranty

congatec AG makes no representation, warranty or guaranty, express or implied regarding the products except its standard form of limited warranty ("Limited Warranty") per the terms and conditions of the congatec entity, which the product is delivered from. These terms and conditions can be downloaded from www.congatec.com. congatec AG may in its sole discretion modify its Limited Warranty at any time and from time to time.

The products may include software. Use of the software is subject to the terms and conditions set out in the respective owner's license agreements, which are available at www.congatec.com and/or upon request.

Beginning on the date of shipment to its direct customer and continuing for the published warranty period, congatec AG represents that the products are new and warrants that each product failing to function properly under normal use, due to a defect in materials or workmanship or due to non conformance to the agreed upon specifications, will be repaired or exchanged, at congatec's option and expense.

Customer will obtain a Return Material Authorization ("RMA") number from congatec AG prior to returning the non conforming product freight prepaid. congatec AG will pay for transporting the repaired or exchanged product to the customer.

Repaired, replaced or exchanged product will be warranted for the repair warranty period in effect as of the date the repaired, exchanged or replaced product is shipped by congatec, or the remainder of the original warranty, whichever is longer. This Limited Warranty extends to congatec's direct customer only and is not assignable or transferable.

Except as set forth in writing in the Limited Warranty, congatec makes no performance representations, warranties, or guarantees, either express or implied, oral or written, with respect to the products, including without limitation any implied warranty (a) of merchantability, (b) of fitness for a particular purpose, or (c) arising from course of performance, course of dealing, or usage of trade.

congatec AG shall in no event be liable to the end user for collateral or consequential damages of any kind. congatec shall not otherwise be liable for loss, damage or expense directly or indirectly arising from the use of the product or from any other cause. The sole and exclusive remedy against congatec, whether a claim sound in contract, warranty, tort or any other legal theory, shall be repair or replacement of the product only.

Certification

congatec AG is certified to DIN EN ISO 9001 standard.

ISO 9001 CERTIFICATION™
Intertek

Technical Support

congatec AG technicians and engineers are committed to providing the best possible technical support for our customers so that our products can be easily used and implemented. We request that you first visit our website at www.congatec.com for the latest documentation, utilities and drivers, which have been made available to assist you. If you still require assistance after visiting our website then contact our technical support department by email at support@congatec.com

Terminology

Term	Description
PCI Express (PCIe)	Peripheral Component Interface Express – next-generation high speed Serialized I/O bus
PCI Express Lane	One PCI Express Lane is a set of 4 signals that contains two differential lines for Transmitter and two differential lines for Receiver. Clocking information is embedded into the data stream.
x1, x2, x4, x16	x1 refers to one PCI Express Lane of basic bandwidth; x2 to a collection of two PCI Express Lanes; etc.. Also referred to as x1, x2, x4 or x16 link.
PCI Express Mini Card	PCI Express Mini Card add-in card is a small size unique form factor optimized for mobile computing platforms.
MMCplus	MMCplus was defined for first time in MMC System Specification v4.0. MMCplus is backward compatible with MMC. MMCplus has 13 pins.
SDIO card	SDIO (Secure Digital Input Output) is a non-volatile memory card format developed for use in portable devices.
USB	Universal Serial Bus
SATA	Serial AT Attachment: serial-interface standard for hard disks
HDA	High Definition Audio
S/PDIF	S/PDIF (Sony/Philips Digital Interconnect Format) specifies a Data Link Layer protocol and choice of Physical Layer specifications for carrying digital audio signals between devices and stereo components.
HDMI	High Definition Multimedia Interface. Supports standard, enhanced, or high-definition video, plus multi-channel digital audio on a single cable.
TMDS	Transition Minimized Differential Signaling. TMDS is a signaling interface defined by Silicon Image that is used for DVI and HDMI.
DVI	Digital Visual Interface is a video interface standard developed by the Digital Display Working Group (DDWG).
LPC	Low Pin-Count: a low speed interface used for peripheral circuits such as Super I/O controllers, which typically combine legacy device support into a single IC.
I²C Bus	Inter-Integrated Circuit Bus: is a simple two-wire bus with a software-defined protocol that was developed to provide the communications link between integrated circuits in a system.
SM Bus	System Management Bus: is a popular derivative of the I²C-bus.
CAN	Controller Area Network
SPI	Serial Peripheral Interface
GBE	Gigabit Ethernet
LVDS	Low-Voltage Differential Signaling
DDC	Display Data Channel is an I²C bus interface between a display and a graphics adapter.
PN	Part Number - the part number for placing orders.
N.C	Not connected
N.A	Not available
T.B.D	To be determined

Contents

1 Introduction

1.1 Mini-ITX Concept

The Mini-ITX form factor provides enthusiasts and manufacturers with a standardized ultra compact platform for development. With a footprint of 170mm x170mm, this scalable platform promotes the design of highly integrated, energy efficient systems. Due to its small size, the Mini-ITX form factor enables PC appliance designers not only to design attractive low cost devices but also allows them to explore a huge variety of product development options - from compact space-saving designs to fully functional Information Station and Value PC systems. This helps to reduce product design cycle and encourages rapid innovation in system design, to meet the ever-changing needs of the market.

Additionally, the boards can also be passively cooled, presenting opportunities for fanless designs. The Mini-ITX boards are equipped with various interfaces such as PCI Express, SATA, USB 2.0/3.0, Ethernet, Displays and Audio.

1.2 conga-IC87/IC97

The conga-IC87/IC97 is a Single Board Computer designed based on the Thin Mini-ITX specification. The conga-IC87/IC97 SBC features the Intel 4th/5th generation Core U-Series processors. With 15W TDP processors, the SBC offers Ultra Low Power boards with high computing performance and outstanding graphics. Additionally, the SBC supports dual channel DDR3L up to 1600 MT/s for a maximum system memory capacity of 16 GB, multiple I/O interfaces, up to three independent displays and various congatec embedded features.

With smaller board size and lower height keep-out zones, the conga-IC87/IC97 SBC provides manufacturers and enthusiasts with the opportunity to design compact systems for space restricted areas. With appropriate I/O shield, the same conga-IC87/IC97 SBC can be used in either a Thin Mini-ITX or a Mini-ITX design.

The various features and capabilities offered by the conga-IC87/IC97 makes it ideal for the design of compact, energy efficient, performance-oriented embedded systems.

1.2.1 Options Information

The conga-IC87 is currently available in four variants and the conga-IC97 in three variants. This user's guide describes all of these variants. The tables below show the different configurations available. Check for the Part no. that applies to your product. This will tell you what options described in this user's guide are available on your particular module

conga-IC87

Part-No.	052201	052202	052203	052204
Processor	Intel® Core™ i7-4650U 1.7 GHz Dual Core™	Intel® Core™ i5-4300U 1.9 GHz Dual Core™	Intel® Core™ i3-4010U 1.7 GHz Dual Core™	Intel® Celeron® 2980U 1.6 GHz Dual Core™
Intel® Smart Cache	4 MByte	3 MByte	3 MByte	2 MByte
Max. Turbo Frequency	3.3 GHz	2.9 GHz	N.A	N.A
Memory (DDR3L)	1600 MT/s dual channel	1600 MT/s dual channel	1600 MT/s dual channel	1600 MT/s dual channel
Processor Graphics	Intel® HD graphics 5000 (GT3)	Intel® HD graphics 4400 (GT2)	Intel® HD graphics 4400 (GT2)	Intel® HD graphics (GT1)
Graphics Max. Dynamic Freq	1.1 GHz	1.1 GHz	1.0 GHz	1.0 GHz
VGA	No	No	No	No
LVDS	Yes	Yes	Yes	Yes
DisplayPort (DP)	Yes	Yes	Yes	Yes
HDMI	Yes	Yes	Yes	Yes
Processor TDP (Max)	15 W	15 W	15 W	15 W

conga-IC97

Part-No.	052501	052502	052503	052505
Processor	Intel® Core™ i7-5650U 2.2 GHz Dual Core™	Intel® Core™ i5-5350U 1.8 GHz Dual Core™	Intel® Core™ i3-5010U 2.1 GHz Dual Core™	Intel® Celeron® 3765U 1.9 GHz Dual Core™
Intel® Smart Cache	4 MByte	3 MByte	3 MByte	2 MByte
Max. Turbo Frequency	3.2 GHz	2.9 GHz	N.A	N.A
Memory (DDR3L)	1600 MT/s dual channel	1600 MT/s dual channel	1600 MT/s dual channel	1600 MT/s dual channel
Processor Graphics	Intel® HD graphics 6000 (GT3)	Intel® HD graphics 6000 (GT3)	Intel® HD graphics 5500 (GT2)	Intel® HD graphics (GT1)
Graphics Max. Dynamic Freq	1.0 GHz	1.0 GHz	0.9 GHz	0.8 GHz
VGA	No	No	No	No
LVDS	Yes	Yes	Yes	Yes
DisplayPort (DP)	Yes	Yes	Yes	Yes
HDMI	Yes	Yes	Yes	Yes
Processor TDP (Max)	15 W	15 W	15 W	15 W

1.2.2 Optional Accessories/Cables

Accessories	Part No.	Description
conga-IC97/CSA	052252	12V active cooling solution with Thin Mini-ITX height (for conga-IC87/IC97)
conga-IC97/Retention Frame for CSA	052254	Retention frame for conga-IC87/IC97 CSA
conga-IC97/IO Bracket Standard Size	052256	IO shield for conga-IC87/IC97 Mini-ITX height
conga-IC97/IO Bracket Thin Size	052257	IO shield for conga-IC87/IC97 with Thin Mini-ITX height
DDR3L-SODIMM-1600 (2 GB)	068755	Certified 2 GB DDR3L SODIMM memory module with 1600 MT/s (PC3L-12800S)
DDR3L-SODIMM-1600 (4 GB)	068756	Certified 4 GB DDR3L SODIMM memory module with 1600 MT/s (PC3L-12800S)
DDR3L-SODIMM-1600 (8 GB)	068757	Certified 8 GB DDR3L SODIMM memory module with 1600 MT/s (PC3L-12800S)

Cables	Part No.	Description
cab-ThinMini-ITX-SATA-Power	14000120	Power cable for SATA and micro-SATA devices.
cab-ThinMini-ITX-UART	14000121	UART cable with 2x5 pin female housing and D-Sub Male connector.
cab-ThinMini-ITX-USB2.0-Single	14000122	USB 2.0 cable with 1x5 pin female housing and USB 2.0 Type A female connector.
cab-ThinMini-ITX-USB2.0-Twin	14000123	USB 2.0 cable with Twin USB 2.0 Type A female connector and 2x5 pin Housing.
cab-ThinMini-ITX-USB3.0-Twin	14000124	USB 3.0 cable with Twin USB 3.0 Type A female connector and 2x10 pin Housing.
cab-ThinMini-ITX-LVDS-Open End	14000125	ACES 40 pin LVDS cable with open end.
cab-ThinMini-ITX-BKLT	14000127	CHYAO SHIUNN 8 pin Backlight cable with open end.
cab-ThinMini-ITX-LVDS	14000129	ACES 50204-40 LVDS cable for Thin Mini-ITX.
cab-ThinMini-ITX-SATA-Power (50cm lenght)	14000135	50cm SATA power cable with 2x15 pin female connectors.
cab-ThinMini-ITX-SATA-Power (30cm length)	14000136	30cm SATA power cable with 2x15 pin female connectors.
SATA III cable (straight/straight)	48000029	30cm SATA III data cable with straight/straight connectors
SATA III cable (straight/right-angled)	48000030	30cm SATA III data cable with straight/right-angled connectors

2 Specification

2.1 Feature List

Table 1 Feature Summary

Form Factor	Based on Thin Mini-ITX form factor (170 x 170 mm).
Processor	Intel® 4/5th Generation U-Series SoC
Memory	2x SO-DIMM dual channel DDR3L up to 1600 MT/s with 16GB maximum capacity. Sockets located top side of module.
cBC	Multi-stage watchdog, non-volatile user data storage, manufacturing and board information, board statistics, I2C bus, Power loss control.
Chipset	Intel® 8/9 Series PCH-LP integrated in the Multi-Chip Package (MCP).
Audio	Realthek ALC888s 7.1 channel High Definition Audio codec
Ethernet	2x Gigabit Ethernet support via the onboard Intel® I218LM GbE Phy (with AMT 9.5/10 support) and Intel® I210/I211 Phy.
Graphics	Next Generation Intel® HD Graphics (4400/5000/6000) with support for Intel® Clear Video Technology (HD encode/transcode, Blu-ray playback), DirectX Video Acceleration (full AVC/VC1/MPEG2 hardware decode), OpenGL 4.0 and DirectX11.1. Up to 3 independent displays supported (**Must be two DDI's (DP, HDMI/DVI) plus one eDP/LVDS**)
Graphic Interfaces	2x DD1's (DP, HDMI/DVI) and 1x eDP/LVDS
Back Panel I/O Connectors	2x DisplayPort ++ (DP++). Each port supports DP/DVI/HDMI - HDMI 1.4: 2x HDMI ports on digital ports B, C. Multiplexed with DisplayPort (DP)/DVI. Hot-plug detect support. - DVI: 2x DVI ports on digital ports B, C. Multiplexed with HDMI/DP ports. Hot-Plug detect support. 1x Audio MIC 1x Line OUT 2x Gigabit Ethernet (only ETH1 on connector X5 supports AMT) 4x USB 3.0 (Supports also USB 2.0) 1x DC-IN
Onboard I/O Connectors	1x LVDS (top side) 1x Backlight 1x Monitor OFF 1x eDP interface (bottom side) SATA Interfaces - 3x Standard SATA III with RAID support 0/1/5/10 (Celeron variant supports only 2x SATA 6Gb/s). - 1x mini SATA III (shared with mini PCIe Slot 2) - 1x SATA power header connector (3.3V, 5V or 12V) PCI Express Interfaces - 1x PCI Express® (x4 Gen 2 link). - 1x Full/half size mini PCIe with SIM card connector - Slot 1 (shared with x1 PCIe slot) - 1x Full/half size mini PCIe - Slot 2 (shared with mSATA) 4x USB 2.0 1x Surround 1x Front Panel HD Audio 1x Digital microphone 1x Stereo speaker Super IO - 2x COM ports (COM 2 can be used optionally as ccTALK) - 1x CPU Fan with selectable voltage - 1x System Fan with selectable voltage - GPOs on feature connector Feature Connector (GPIOs, SPI, SMB, LPC, LID/SLEEP etc) 1x Front panel header (Power button, reset, LEDs etc) 1x Case Open Intrusion Detection header 1x optional SBM^3 support header 1x Internal power header (12-24V) 1x optional SBM^3 power and 1x optional CEC header

Other Features	Thermal and voltage monitoring CMOS Battery Beeper congatec Standard BIOS (also possible to boot from an external BIOS by triggering the BIOS_DISABLE# signal on the feature connector)
BIOS	AMI Aptio® UEFI 5.x firmware, 8/16 MByte serial SPI with congatec Embedded BIOS features.
Power Management	ACPI 4.0 compliant with battery support. Also supports Suspend to RAM (S3) and Intel AMT 9.5/10. Configurable TDP Ultra low standby power consumption, Deep Sx.
Security	Optional discrete Trusted Platform Module "TPM 1.2/2.0", new AES Instructions for faster and better encryption.

Note

Some of the features mentioned in the above feature summary are optional. Check the article number of your module and compare it to the option information list on page 11 of this user's guide to determine what options are available on your particular module.

2.2 Supported Operating Systems

The conga-IC87/IC97 supports the following operating systems.

- Microsoft® Windows® 8
- Microsoft® Windows® 7
- Microsoft® Windows® Embedded Standard 7/8
- Linux

Note

For the installation of Windows 7/8 and WES7/8, conga-IC89/IC97 requires a minimum storage capacity of 16 GB. congatec will not offer installation support for systems with less than 16 GB storage space.

2.3 Mechanical Dimensions

- 170mm x 170mm
- Height approximately 20mm

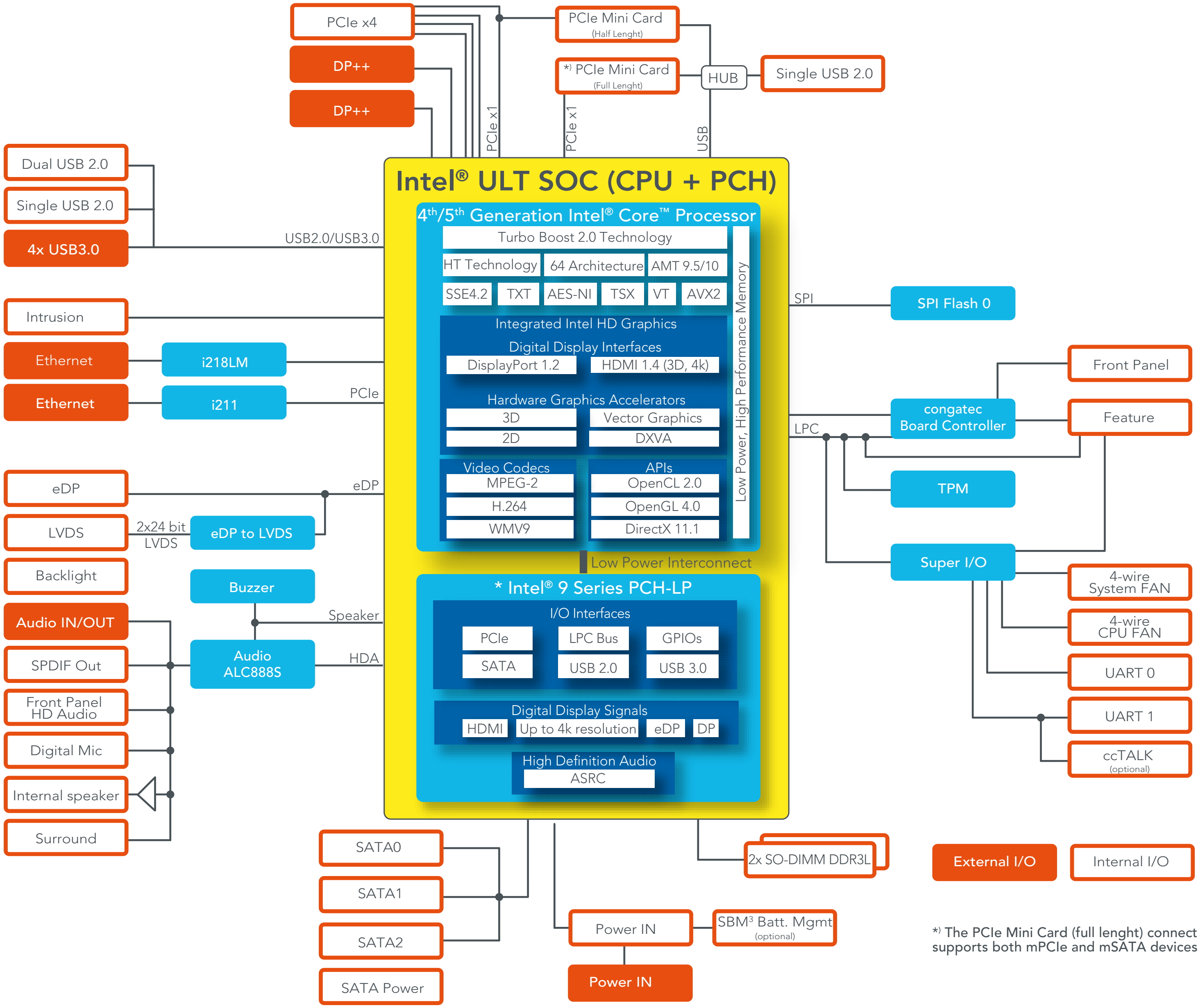
2.4 Environmental Specifications

Temperature	Operation: 0° to 60°C	Storage: -20° to +80°C
Humidity	Operation: 10% to 90%	Storage: 5% to 95%

Note

The above operating temperatures must be strictly adhered to at all times. Humidity specifications are for non-condensing conditions.

3 Block Diagram



*) The PCIe Mini Card (full lenght) connector supports both mPCIe and mSATA devices.

4 Cooling Solution

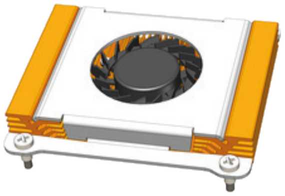
The conga-IC87/IC97 SBC offers Ultra Low Power boards with high computing performance and outstanding graphics. Due to its low power consumption, the SBC generates less heat and therefore requires less active cooling, allowing the use of quieter, lower profile coolers that are better suited to small form factor systems.

Nonetheless, all electronics contain semiconductor devices which have operating temperature ranges that should be adhered to. This means that for reliable operation, the thermal design of the conga-IC87/IC97 must be carefully considered. For this reason, it is imperative to provide sufficient air flow to each of the components, to ensure the specified operating temperature of the conga-IC87/IC97 is maintained.

congatec AG offers two cooling possibilities for the conga-IC87/IC97:

- A congatec customized conga-IC87/IC97 active cooling solution (fan attached with heatsink) in combination with the conga-IC87/IC97 retention frame. This cooling solution is adapted to the Thin Mini-ITX height specification and features a Hi-Flow 225UT pressure sensitive, phase change thermal interface. The retention frame acts as a mounting backplate and also as board reinforcement to prevent PCB deformation. Refer to section 4.2 "Active Cooling Dimensions" for the dimensions of the active cooling solution.
- The use of a custom cooling solution in combination with the conga-IC87/IC97 retention frame.

Retention Frame



Active Cooling Solution

Note

When a passive cooling is used, the end user must ensure that adequate air flow is maintained.

See section 1.2.2 "Optional Accessories/Cables" for the part numbers of the cooling accessories.

4.1 Cooling Installation

Assembly Instruction:

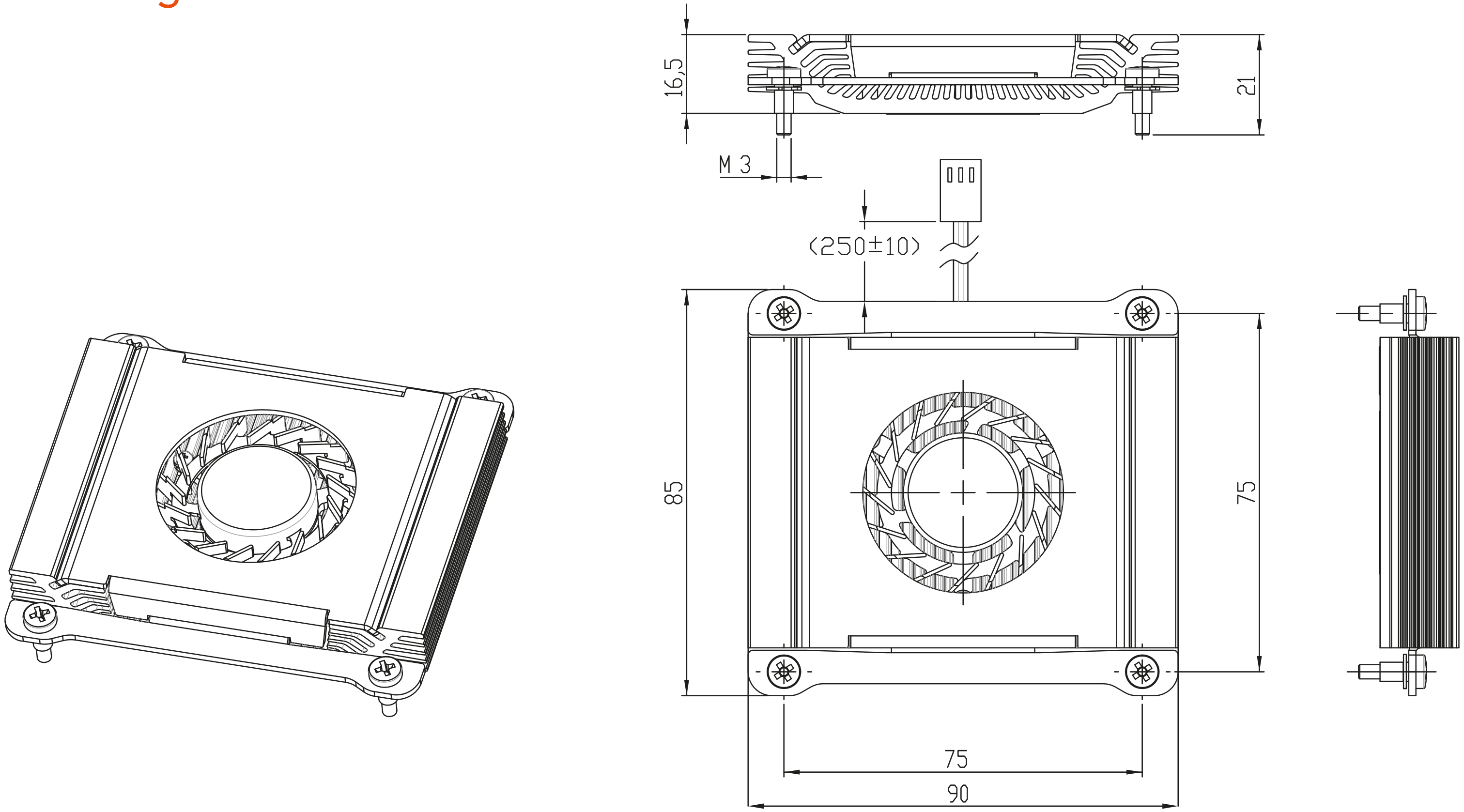
- Flip over the SBC and locate the position of the CPU
- Place retention frame on the bottom side of the board with insulating foil facing the PCB & standoffs inserted to mounting holes in PCB.
- Remove the protection pull tab foil from the phase changer and carefully place the cooling solution.
- Insert assembling screws.
- Slightly tighten each of the screws so that they hold the cooling solution in place. To do so, start with one screw and then slightly tighten the other screws in a crossover pattern.
- Now you can fully tighten the screws. Once again start with one and then continue to tighten the other screws in a crossover pattern.
- Connect the fan's power cable.

Caution

Do not remove the insulating foil of the retention frame. Doing so could damage the board.

congatec cooling solutions have been specifically designed for use within commercial temperature ranges (0° to 60°C) only. It is the responsibility of the end user to design an optimized thermal solution that meets the needs of their application within the industrial environmental conditions it is required to operate in. Attention must be given to the mounting solution used to mount the cooling solution and SBC into the system chassis.

4.2 Active Cooling Dimensions



Note

All measurements are in millimeters. Torque specification for cooling solution screws is 0.6 Nm. Mechanical system assembly mounting shall follow the valid DIN/IS0 specifications.

To replace the fan, use equivalent fan with similar parameters. The replacement fan must be approved by congatec AG.

Caution

When using the heatspreader in a high shock and/or vibration environment, congatec recommends the use of a thread-locking fluid on the cooling solution screws to ensure the above mentioned torque specification is maintained.

5 Connector Description

5.1 Power Supply

You can power the conga-IC87/IC97 SBC with a 4 pin internal power supply (on connector X49) or 12V-24V laptop type DC power supply (on connector X48). Connector X48 also supports a variable D.C voltage range of 12-24V.

Additionally, the SBC offers an optional SBM^3 power connector (only BOM option). When this connector (X47) is populated, you can power the SBC with it.

Note

The supplied voltages must be within a tolerance of ± 10%

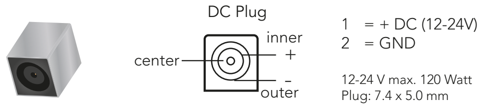
5.1.1 DC Power Jack (Rear I/O)

The conga-IC87/IC97 SBC can be powered from an external power supply connected to the DC power jack on the rear I/O. This power input protects against polarity reversal and over/under voltage.

Connector X48 Pinout Description

Pin	Function
Inner Shell	+12 - 24V
Outer Shell	GND

DC Power Jack - Connector X48



Connector Type

X48 : DC Power Jack, 7.4x5.1mm Diameter

Note

The conga-IC87/IC97 is configured by default to boot up immediately an external power is supplied.

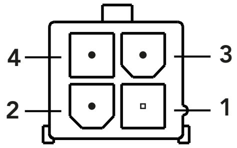
5.1.2 Power Supply (Internal Connector)

The conga-IC87/IC97 offers an internal 4-pin power connector. This connector makes it possible to customize the power supply cables/ connector.

Connector X49 Pinout Description

Pin	Signal	Description
1	GND	Ground
2	GND	Ground
3	+12V - 24V	Power Supply +12V-24V
4	+12V - 24V	Power Supply +12V-24V

Internal Power Connector X49



Connector Type

X49 : 4 Pos, Pitch 4.2mm Internal Power Connector (PN: 41500079).

Mating Connector: A possible mating connector for X49 is the Molex 39-01-2045.

Note

The conga-IC87/IC97 is configured by default to boot up, immediately an external power is supplied.

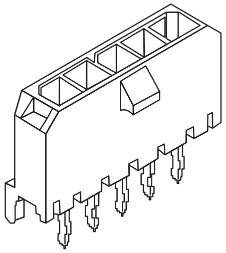
5.1.3 Optional SBM^3 Power Connector (Internal Connector)

You can also power the conga-IC87/IC97 SBC optionally with an SBM battery kit. The battery kit requires two connections - the SBM battery power on connector X46 and the SBM battery signals on connector X47. The SBM^3 feature requires a firmware update.

Connector X47 Pinout Description

Pin	Function
1	+12 - 24V
2	+12 - 24V
3	GND
4	GND
5	N.C

SBM3 Power - Connector X47



Connector Type

X47 : 1x5 Pos, 3mm Pitch Micro-FIT

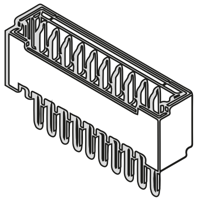
5.1.3.1 Optional SBM3 Signal Connector

As mentioned above, if you need the optional SBM battery power connector (X47), then you need in addition the SBM battery signals connector (X46) for adequate communication between the conga-IC87/IC97 and the battery kit.

Connector X46 Pinout Description

Pin	Function
1	GND
2	I2C_DAT
3	I2C_CLK
4	BATLOW#
5	SUS_STAT#
6	PM_SLP_S3#
7	PM_SLP_S5#
8	PWRBTN#

SBM3 Signal - Connector X46



Connector Type

X46 : 1x8 Pos, 1.25mm Pitch PicoBlade

5.1.4 PWR_OK Signal

The conga-IC87/IC97 generates the PWR_OK signal onboard and additionally provides the PWR_OK signal on the feature connector X38. When the signal goes high, it indicates to the SBC that the supplied power is stable. The SBC then begins with its onboard power sequencing.

When the signal goes low, the SBC is kept in reset until the PWR_OK signal is asserted. This implies that the PWR_OK signal can optionally be used to hold off the SBC from startup.

5.1.5 Power Status LEDs

The conga-IC87/IC97 provides two LED signals (FP_LED1 and P_LED2) on pins 2 and 4 of the front panel connector X39. The signals indicate the different power states of the conga-IC87/IC97. Possible states and corresponding activity of the LEDs are shown below

Double-Color Power LED

LED State	Description	ACPI State
Off	Power-off	S5
Steady Green	Running	S0
Steady Yellow	Sleeping	S3

Single-Color Power LED

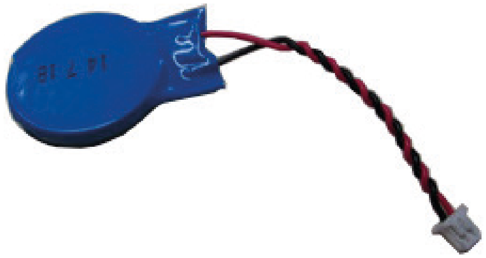
LED State	Description	ACPI State
Off	Sleeping or power-off (not running)	S3, S5
Steady Green	Running	S0

Note

For the front panel pinout description, see section 6.1 "Front Panel Connector".

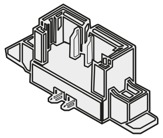
5.2 CMOS Battery/RTC

The conga-IC87/IC97 provides a CMOS battery on connector X44. The CMOS battery supplies the necessary power required to maintain the CMOS settings and configuration data in the UEFI flash chip. The specified battery type is CR2032.



CR2032 Battery with cable and connector

CMOS Battery - Connector X47



Connector Type

X44 : 2x1 Pos, 1.25mm Pitch PicoBlade Header.

Note

congatec offers insulated CR2032 CMOS battery with cable and connector (PN: 46500010). For more information, contact congatec technical *solution department.*

Warning

Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

5.3 Audio Interface

The conga-IC87/IC97 provides audio connectors both internally and on the rear side. The audio line-OUT and MIC-IN connectors are provided on the rear side.

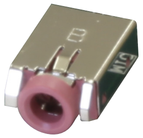
5.3.1 Rear Audio Connectors

The conga-IC87/IC97 has a high definition audio codec (Realtek ALC888S) mounted on it. The line output signals and the MIC signals are routed to connectors X31 (line-OUT) and X29 (MIC-IN) on the rear side respectively. The drivers for this codec can be found in the 'Drivers' section under 'conga-IC87/IC97' on the congatec website at www.congatec.com

MIC-IN (Connector X29) Pinout Description

Pin	Signal	Description
1	MIC1_L	1st Stereo Microphone Analog Input Left Channel
2	A_GND	Analog Ground
3	MIC1_R	1st Stereo Microphone Analog Input Right Channel
4	A_GND	Analog Ground
5	SENSE_A	Jack Detect Pin 1
6	A_GND	Analog Ground

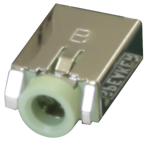
MIC IN - Connector X29



Line-OUT (Connector X31) Pinout Description

Pin	Signal	Description
1	FRONT_L	Front Analog Output Left Channel
2	A_GND	Analog Ground
3	FRONT_R	Front Analog Output Right Channel
4	A_GND	Analog Ground
5	SENSE_A	Jack Detect Pin 1

Line OUT - Connector X31



Pin	Signal	Description
6	A_GND	Analog Ground

Connector Type

X31: 6 Pin, Single Audio Jack - lime color

X29: 6 Pin, Single Audio Jack - pink color

5.3.2 Internal Audio Connectors

The conga-IC87/IC97 provides the front panel HD, stereo speaker, digital microphone, and surround audio connectors internally.

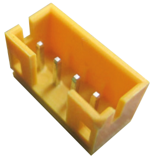
5.3.2.1 Stereo Speaker Header

The first analog line input channels (left and right) of the Realtek ALC888S HDA audio codec are routed via a TPA2012D2 amplifier to internal stereo speaker - connector X30. The amplifier offers a maximum wattage of 2.1W per channel into 4 ohms at 5 V.

Stereo Speaker (Connector X30) Pinout Description

Pin	Signal	Description
1	OUTR+	Right Channel Positive Differential Output
2	OUTR-	Right Channel Negative Differential Output
3	OUTL+	Left Channel Positive Differential Output
4	OUTL-	Left Channel Negative Differential Output

Stereo Speaker - Connector X30



Connector Type

X30: 2mm Crimp Style Connector with 4 Pos.

Mating Connector: A possible mating connector for X30 is Chyao Shiunn JS-1124-04.

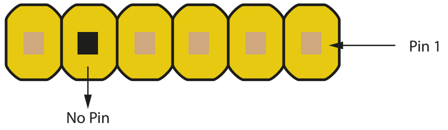
5.3.2.2 Digital Microphone/SPDIF

The Digital Microphone/SPDIF signals of the Realtek ALC888S HDA audio codec are routed to the internal digital microphone/SPDIF connector X28. This connector offers two power supply pins 3,3V and 5V. Power Budget of these pins is limited to 500mA.

Internal Digital Microphone/SPDIF (Connector X28) Pinout Description

Pin	Signal	Description
1	+3.3V	3.3V supply
2	DMIC_DATA	Serial data from digital MIC
3	GND	Ground
4	SPDIFO2	Secondary S/PDIF output
5	KEY	No pin
6	+5V	5V supply

Digital MIC/SPDIF - Connector X28



Connector Type

X28: 2.54mm, 1x6 Pos. Header

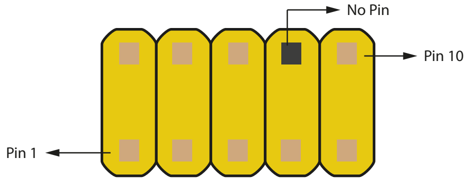
5.3.2.3 Front Panel HD Audio

The front panel HD audio signals of the Realtek ALC888S HDA audio codec are routed to connector X27. The pinout description of the connector is shown below:

Front Panel HD Audio (Connector X27) Pinout Description

Pin	Signal	Description
1	MIC2_L	2nd Analog Stereo Microphone Input - Left Channel
2	GND	Ground
3	MIC2_R	2nd Analog Stereo Microphone Input - Right Channel
4	PRESENCE#	Active low signal that indicates that an Intel HD Audio dongle is connected to the analog header.
5	LINE2_R	2nd Analog Line Input - Right Channel (Headphone)
6	GND_HDA	Audio Ground
7	SENSE_B	Jack Detection Pin 2
8	KEY	No pin
9	LINE2_L	2nd Analog Line Input - Left Channel (Headphone)
10	GND_HDA	Audio Ground

Front Panel Audio - Connector X27



Connector Type

X27: 2.54mm, 2x5 Pin Header

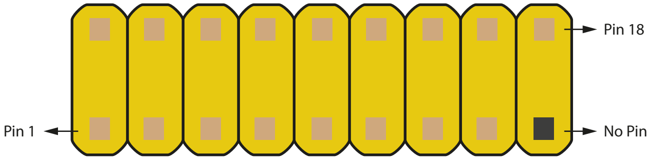
5.3.2.4 Surround header

The surround signals of the Realtek ALC888S HDA audio codec are routed to the internal surround connector.

Surround (Connector X26) Pinout Description

Pin	Signal	Description	Pin	Signal	Description
1	LINE1_L	1st Analog line input left channel	10	A_GND	Analog ground
2	A_GND	Analog ground	11	A_GND	Analog ground
3	A_GND	Analog ground	12	SURR_R	Analog surround out right channel
4	LINE1_R	1st Analog line input right channel	13	CENTER	Analog center output
5	SIDE_L	Analog side output left channel	14	A_GND	Analog ground
6	A_GND	Analog ground	15	A_GND	Analog ground
7	A_GND	Analog ground	16	LFE	Analog low frequency output
8	SIDE_R	Analog side out right channel	17	-	No pin
9	SURR_L	Analog surround out left channel	18	SENSE_A	

Surround - Connector X26



Connector Type

X26: 2mm, 2x9 Pos. Header.

5.4 Communication Bus

The conga-IC87/IC97 supports both SMBus and I2C compliant devices.

5.4.1 SMBus

The SMBus signals are available in different locations on the conga-IC87/IC97, including the feature connector (X38) described in section 6.11 of this document.

5.4.2 I²C Bus

The congatec Board controller provides I²C signals. These signals are available in different locations on the conga-IC87/IC97, including the feature connector (X38) described in section 6.11 of this document.

5.4.3 SPI Bus

The SPI signals are connected to the onboard SPI flash and additionally to the feature connector (X38). The SPI signals on the feature connector provides the ability to boot the conga-IC87/IC97 from external flash. This however requires a customized adapter for triggering the BIOS_DISABLE# signal (pin 46) of the feature connector.

Note

The congatec customized adapter for the feature connector is currently for internal use only.

5.5 LPC Super I/O Device

The conga-IC87/IC97 has an onboard Super I/O controller that provides additional interfaces such as two serial interfaces, optional ccTALK, GPOs, intrusion detection, 4-wire CPU and system fans. The Nutoton NCT6791D Super I/O controller is connected to the LPC Bus of the Intel® SoC.

5.5.1 GPIOs

The GPIO signals are routed to the feature connector (X38) described in section 6.11.

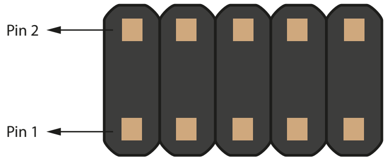
5.5.2 Serial Ports (COM)

The Super IO controller on the conga-IC87/IC97 provides two fully featured RS-232 compliant UART interfaces (COM 1 and 2). The COM 2 interface can be optionally used as ccTALK compliant interface. The COM ports support legacy speeds up to 115.2 kbits/s as well as higher baud rates of 230, 460 or 921 kbits/s for higher speed communication.

Serial Ports (Connectors X34/X37) Pinout Description

Pin	Signal	Description	Pin	Signal	Description
1	DCD	Data Carrier Detect	6	DSR	Data Set Ready
2	RXD	Received Data	7	RTS	Request to Send
3	TXD	Transmit Data	8	CTS	Clear to Send
4	DTR	Data Terminal Ready	9	RI	Ring Indicator
5	GND	Ground	10	N.C	Not connected

COM 1 & 2 - Connectors X34/X37



Connector Type

X34,X37: 2x5 Pin Headers

Note

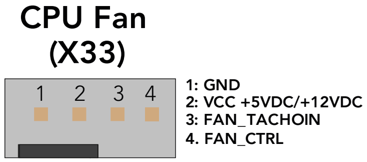
congatec offers the adapter cable for the COM ports (see section 1.2.2 "Optional Accessories/Cables). For more information, contact congatec technical solution department.

5.5.3 CPU/System Fan Connector & Power Configuration

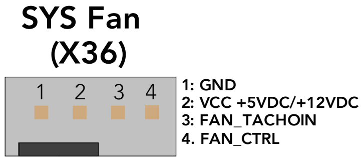
The conga-IC87/IC97 supports the connection of 5V or 12V cooling fans. The signals of the CPU and system fans are routed to 4-pin connectors X33 and X36 respectively. Use jumper X32 to select the CPU fan voltage and jumper X35 to select the system fan voltage.

The following tables describe the pinouts and jumper configuration.

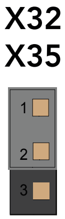
X33 CPU FAN Pin	Signal
1	GND
2	VCC +5VDC/+12VDC
3	FAN_TACHOIN
4	FAN_CTRL



X36 System FAN Pin	Signal
1	GND
2	VCC +5VDC/+12VDC
3	FAN_TACHOIN
4	FAN_CTRL



Jumper X32, X36	Configuration
1 - 2	FAN +12VDC (default)
2 - 3	FAN +5VDC



Connector Type

X33, X36: 4 pin 2.54mm Grid Female Fan Connector.

X32, X35: 2.54mm Grid Jumper.

Note

The maximum power of the CPU fan is approximately 3W while the system fan has a maximum power of approx. 4.5W.

5.6 Universal Serial Bus (USB)

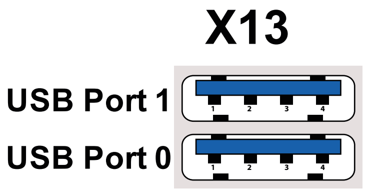
The conga-IC87/IC97 provides 8 USB connectors both on the rear side and internally. The rear and internal connectors have 4 USB ports each.

5.6.1 Rear USB Connectors

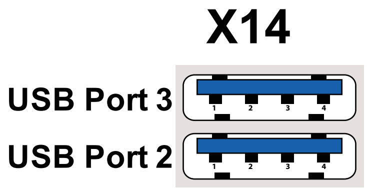
The conga-IC87/IC97 offers 4 USB 3.0 ports (port 0-3) on the rear side. These ports are routed directly from the Intel SoC to dual port ,Type A connectors X13 and X14 on the rear side. The ports support also USB 2.0 devices

USB 3.0 (Connectors X13 and X14) Pinout Descriptions

USB Port 0 - Connector X13 (Lower)			USB Port 1 - Connector X13 (Upper)		
Pin	Signal	Description	Pin	Signal	Description
1	+5V		10	+5V	
2	USB0-		11	USB1-	
3	USB0+		12	USB1+	
4	GND		13	GND	
5	USB3.0_SS0_RX-		14	USB3.0_SS1_RX-	
6	USB3.0_SS0_RX+		15	USB3.0_SS1_RX+	
7	GND		16	GND	
8	USB3.0_SS0_TX-		17	USB3.0_SS1_TX-	
9	USB3.0_SS0_TX+		18	USB3.0_SS1_TX+	



USB Port 2 - Connector X14 (Lower)			USB Port 3 - Connector X14 (Upper)		
Pin	Signal	Description	Pin	Signal	Description
1	+5V		10	+5V	
2	USB2-		11	USB3-	
3	USB2+		12	USB3+	
4	GND		13	GND	
5	USB3.0_SS2_RX-		14	USB3.0_SS3_RX-	
6	USB3.0_SS2_RX+		15	USB3.0_SS3_RX+	
7	GND		16	GND	



8	USB3.0_SS2_TX-		17	USB3.0_SS3_TX-	
9	USB3.0_SS2_TX+		18	USB3.0_SS3_TX+	

Connector Type

X13,X14: Two Type A, Dual Port USB Connectors

Note

The +5V signals of connector X13 and X14 have a maximum current of 1.2A each.

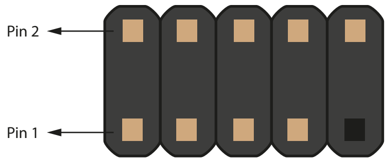
5.6.2 Internal USB Connectors

The conga-IC87/IC97 offers 4 USB ports (ports 4-7) internally. These ports are routed to different connectors on the SBC. Ports 4 and 5 are routed to connector X15, port 6 to connector X16 and port 7 to connector X17. Port 7 is routed to connector X17 via a USB Hub and is shared with mSATA/mPCIe socket 2 (connector X10) and mPCIe socket 1 (connector X8).

Connector X15 Pinout Description

USB Port 4			USB Port 5		
Pin	Signal	Description	Pin	Signal	Description
1	+5V	+5V supply	2	+5V	+5V supply
3	USB4-	USB Port 4, Data-	4	USB5-	USB Port 5, Data-
5	USB4+	USB Port 4, Data+	6	USB5+	USB Port 5, Data+
7	GND	Ground	8	GND	Ground
9	No Pin		10	N.C	Not Connected

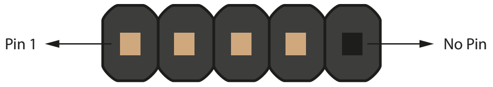
Internal USB - Connectors X15



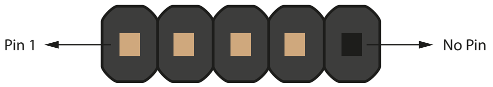
Connectors X16 and X17 Pinout Description

USB Port 6 (connector X16)			USB Port 7 (connector X17)		
Pin	Signal	Description	Pin	Signal	Description
1	+5V	+5V supply	1	+5V	+5V supply
2	USB6-	USB Port 6, Data-	2	USB7-	USB Port 7, Data-
3	USB6+	USB Port 6, Data+	3	USB7+	USB Port 7, Data+
4	GND	Ground	4	GND	Ground

Internal USB - Connectors X16



Internal USB - Connectors X17



Connector Type

X15: 2x5 Pin Header

X16,X17: 1x5 Pin Header

Note

The +5V signals of connector X15, X16 and X17 have maximum current of 0.5A each.

congatec offers adapter cables for the Internal USB connectors (see section 1.2.2 "Optional Accessories/Cables). For more information, contact congatec technical solution department.

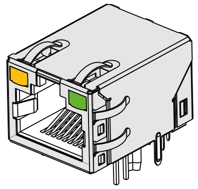
5.7 Ethernet 10/100/1000

The conga-IC87/IC97 provides two Gigabit Ethernet ports (connectors X5 and X6) on the rear side. The Intel Gigabit Ethernet controller i218LM with Intel Active Management Technology, supports the interface on connector X5. The LAN interface on connector X6 is supported via the Intel Gigabit Ethernet controller i211. This interface does not support the Intel AMT.

Connectors X5/X6 Pinout Description

Pin	Description	10base-T	100Base-T	1000Base-T
1	Transmit Data+ or Bidirectional	TX+	TX+	BI_DA+
2	Transmit Data- or Bidirectional	TX-	TX-	BI_DA-
3	Receive Data+ or Bidirectional	RX+	RX+	BI_DB+
4	Not connected or Bidirectional	N.C	N.C	BI_DC+
5	Not connected or Bidirectional	N.C	N.C	BI_DC-
6	Receive Data- or Bidirectional	RX-	RX-	BI_DB+
7	Not connected or Bidirectional	N.C	N.C	BI_DD+
8	Not connected or Bidirectional	N.C	N.C	BI_DD-

Connector X5/X6



LED descriptions

LED Left Side	Description
Off	10 Mbps link speed
Green	100 Mbps link speed
Orange	1000 Mbps link speed

LED Right Side	Description
Off	No link
Steady On	Link established, no activity detected
Blinking	Link established, activity detected

Connector Type

X5/X6: 8 Pin RJ45 Connector with Gigabit Magnetic and LEDs.

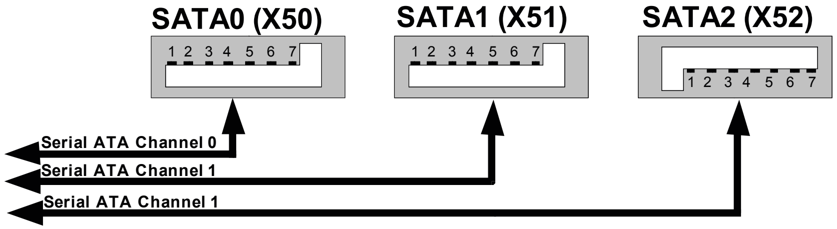
5.8 SATA Interfaces

5.8.1 Standard SATA Ports

The conga-IC87/IC97 provides three SATA ports. The SATA ports are routed to connectors X50-52 and support data rates up to 6GB/s. The SATA LED on the front panel connector (X39) is lit when there is activity on any of the SATA interfaces.

Connectors X50/X51/X52 Pinout Description.

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



Connector Type

X50,X51,X52: Standard SATA Connector

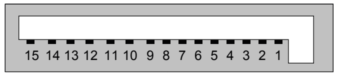
5.8.2 SATA Power

The conga-IC87/IC97 provides an internal SATA power for hard drives on connector X12. This connector supplies 3.3V, 5V and 12V.

Connectors X12 Pinout Description.

Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3V	6	GND	11	GND
2	+3.3V	7	+5V	12	GND
3	+3.3V	8	+5V	13	12V
4	GND	9	+5V	14	12V
5	GND	10	GND	15	12V

SATA Power (X12)



Connector Type

X12: 15 Pos. SATA Connector.

Note

The voltage rails +3.3V, +5V and +12V have maximum current of 2 amps each.

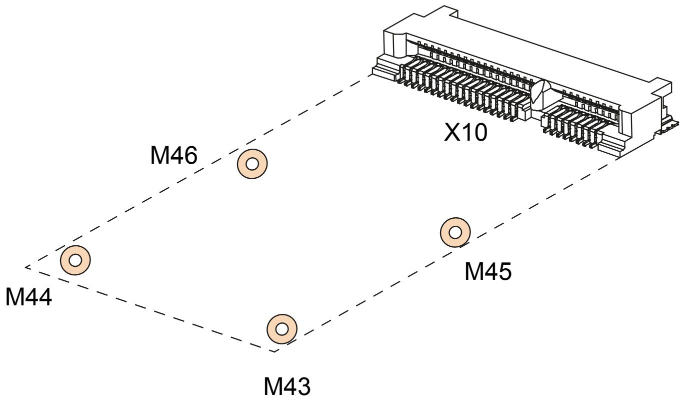
5.8.3 Mini SATA

The mini SATA connector X10 on the conga-IC87/IC97 is used to connect mSATA devices. This connector can also be used for mini PCIe devices. The BIOS automatically detects when an mSATA or mPCIe device is connected to X10.

mSATA/mPCIe (Connector X10) Pin Description.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3Vaux
3	N.C	4	GND
5	N.C	6	+1.5V
7	CLKREQ#	8	N.C
9	GND	10	N.C
11	REFCLK-	12	N.C
13	REFCLK+	14	N.C

mSATA/mPCIe Socket 2
(Connector X10)



Pin	Signal	Pin	Signal
15	GND	16	N.C
17	SUS_CLK	18	GND
19	N.C	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	N.C
43	mSATA_mPCIe_detect	44	N.C
45	CL_CLK	46	N.C
47	CL_DATA	48	+1.5V
49	CL_RST#	50	GND
51	N.C	52	+3.3Vaux
53	GND	54	GND

Connector Type

X10: 0.8mm Pitch, 52 Pos. Mini PCI Socket

5.9 Display Interfaces

The conga-IC87/IC97 supports up to three independent displays. The interfaces supported are two Digital Display Interfaces and one embedded Display or LVDS interface.

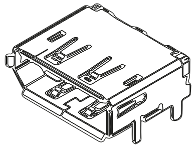
5.9.1 Display Port Interface DP++

The conga-IC87/IC97 SBC has two DP++ connectors (X18 and X19) located at the rear I/O panel. The display ports (B and C) support the connection of DP, HDMI and DVI displays.

Connectors X18 / X19 Pinout Description.

Pin	Signal	Pin	Signal
1	DDI1_TX0+ / DDI2_TX0+	11	GND
2	GND	12	DDI1_TX3- / DDI2_TX3-
3	DDI1_TX0- / DDI2_TX0-	13	GND
4	DDI1_TX1+ / DDI2_TX1+	14	CEC
5	GND	15	DDPB_AUX+ / DDPC_AUX+
6	DDI1_TX1- / DDI2_TX1-	16	GND
7	DDI1_TX2+ / DDI2_TX2+	17	DDPB_AUX- / DDPC_AUX-
8	GND	18	DDPB_HPD / DDPC_HPD
9	DDI1_TX2- / DDI2_TX2-	19	GND
10	DDI1_TX3+ / DDI2_TX3+	20	3.3V

DP++ Connectors X18/X19



5.9.2 LVDS

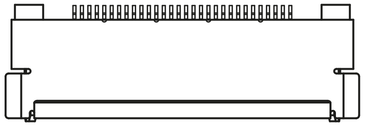
The conga-IC87/IC97 offers LVDS interface on connector X25 - a standard 40 pin LVDS connector. The LVDS signals are sourced from incoming eDP stream via a multiplexer. Depending on the BIOS setup, the multiplexer routes the eDP stream either directly to the eDP connector X20 or to the LVDS connector X25 via an eDP to LVDS bridge. The multiplexer is configured in the BIOS setup by default to route the eDP signals to the eDP to LVDS bridge. The eDP to LVDS bridge processes and converts the eDP stream to LVDS format.

The LVDS interface is found on the top side of the SBC and supports 24 bit single channel, selectable backlight voltage, VESA color mappings, automatic panel detection and resolution up to 1920x1200 in dual LVDS mode.

Connector X25 Pinout Description

Pin	Signal	Pin	Signal
1	LVDS_A3+	21	N.C
2	LVDS_A3-	22	EDID_3.3V
3	LVDS_A2+	23	LCD_GND
4	LVDS_A2-	24	LCD_GND
5	LVDS_A1+	25	LCD_GND
6	LVDS_A1-	26	LVDS_A_CLK+
7	LVDS_A0+	27	LVDS_A_CLK-
8	LVDS_A0-	28	BKLT_GND
9	LVDS_B3+	29	BKLT_GND
10	LVDS_B3-	30	BKLT_GND
11	LVDS_B2+	31	EDID_CLK
12	LVDS_B2-	32	eDP_LVDS_BKLT_EN
13	LVDS_B1+	33	eDP_LVDS_BKLT_CTRL
14	LVDS_B1-	34	LVDS_B_CLK+
15	LVDS_B0+	35	LVDS_B_CLK-
16	LVDS_B0-	36	BKLT_PWR
17	EDID_GND	37	BKLT_PWR
18	LCD_VCC	38	BKLT_PWR
19	LCD_VCC	39	N.C
20	LCD_VCC	40	EDID_DATA

LVDS Connector X25



Connector Type

X25: 0.5mm, 40 Pos. ACES Connector.

Mating Connector: Possible mating connectors for X25 are ACES 88441-40 and ACES 50204-40.

Note

congatec offers cables and adapter for the LVDS interface (see section 1.2.2 "Optional Accessories/Cables"). For more information, contact congatec technical solution department.

5.9.3 Embedded Display Port (eDP)

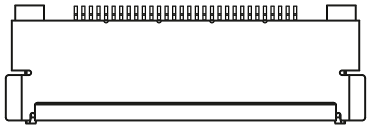
The conga-IC87/IC97 provides eDP interface on connector X20 - a standard 40 pin DisplayPort connector. The eDP signals are sourced from incoming eDP stream via a multiplexer. Depending on the BIOS setup, the multiplexer routes the eDP stream either directly to the eDP connector X20 on the bottom side of the SBC or to the LVDS connector X25 (top side) via an eDP to LVDS bridge. The multiplexer is by default configured in the BIOS setup to route the eDP signals to the eDP to LVDS bridge.

To route eDP signals to connector X20, change the default BIOS setup.

Connector X20 Pinout Description

Pin	Signal	Pin	Signal
1	N.C	11	GND
2	GND	12	eDP_TX0-
3	eDP_TX3-	13	eDP_TX0+
4	eDP_TX3+	14	GND
5	GND	15	eDP_AUX+
6	eDP_TX2-	16	eDP_AUX-
7	eDP_TX2+	17	GND
8	GND	18	VCC_EDP_FILT
9	eDP_TX1-	19	VCC_EDP_FILT
10	eDP_TX1+	20	VCC_EDP_FILT
21	VCC_EDP_FILT	31	GND
22	N.C	32	eDP_LVDS_BKLT_EN
23	GND	33	eDP_LVDS_BKLT_CTRL
24	GND	34	N.C
25	GND	35	N.C
26	GND	36	N.C
27	eDP_DETECT	37	BKLT_PWR
28	GND	38	BKLT_PWR
29	GND	39	BKLT_PWR
30	GND	40	N.C

eDP Connector X20



Connector Type

X20: 0.5mm , 40 Pos. ACES Connector.

Mating Connector: Possible mating connectors for X20 are ACES 88441-40 and ACES 50204-40.

Note

congatec offers cables and adapter for the eDP interface (see section 1.2.2 "Optional Accessories/Cables"). For more information, contact the congatec technical solution department.

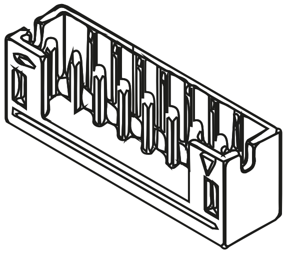
5.9.3.1 Backlight Power Connector

The conga-IC87/IC97 provides backlight power on connector X22.

Connector X22 Pinout Description

Pin	Signal Name	Description
1	eDP_LVDS_BKLT_EN	Backlight enable
2	eDP_LVDS_BKLT_CTRL	Backlight control
3	BKLT_PWR	Backlight inverter power
4	BKLT_PWR	Backlight inverter power
5	GND	Backlight/Brightness Ground
6	GND	Backlight/Brightness Ground
7	Brightness_Up	Flat panel brightness increase
8	Brightness_Down	Flat panel brightness decrease

Backlight Power - Connector X22



Connector Type

X22: 2mm, 8 Pos. Crimp Style Connectors.

Mating Connector: Possible mating connector for X22 is Chyao Shiunn JS-1124-08.

Note

congatec offers an open-end cable for this interface (see section 1.2.2 "Optional Accessories/Cables"). For more information, contact the congatec technical solution department.

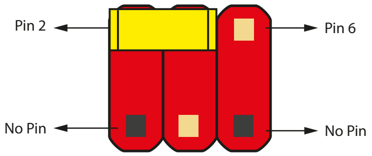
5.9.3.2 Backlight/Panel Power Selection

The conga-IC87/IC97 supports different voltages for the panel and backlight. With jumper X23, you can set the panel voltage to 3,3V, 5V or 12V. With jumper X24, you can set the backlight voltage to 5V or 12V.

Connector X23 Pinout Description

Pin	Signal Name
1	No Pin
2	3,3V
3	12V
4	Selected LCD Power
5	Empty
6	5V

Panel Voltage Selector - Jumper X23

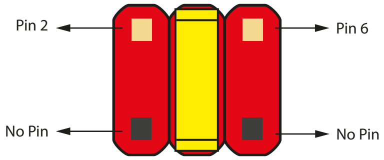


Default Settings:
Pins 2 and 4

Connector X24 Pinout Description

Pin	Signal Name
1	No Pin
2	N.C
3	12V
4	Selected Backlight Power
5	Empty
6	5V

Backlight Voltage Selector - Jumper X24



Default Settings:
Pins 3 and 4

Connector Type

X23, X24: 2.54mm, 2x3 Pos. Connector (without pins 1 and 5)

5.9.3.3 Monitor OFF connector

The monitor OFF connector X21 offers the possibility to switch off the displays attached to LVDS or eDP port.

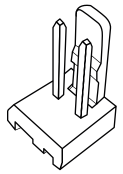
Connector X25 Pinout Description

Pin	Function
1	MONITOR_OFF#
2	GND

Connector Type

X25: 2.54mm, 2 Pos. Molex Connector.

Monitor OFF - Connector X21



5.9.4 PCI Express

The conga-IC87/IC97 provides 3 PCIe interfaces - a x4 PCIe slot on connector X7, a half size mini PCIe (mPCIe) slot on connector X8 and a full size mini PCIe/mini SATA slot on connector X10.

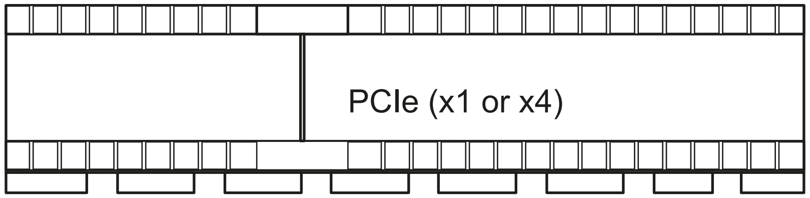
5.9.4.1 x4 PCIe Slot

The conga-IC87/IC97 offers one PCIe x4 slot on connector X7. The first PCIe lane of connector X7 is shared with the mPCIe slot on connector X8 and controlled via a multiplexer. The PCIe slot on connector X7 is configured by default to operate in x4 mode. If an mPCIe card is inserted into the mPCIe connector X8, the multiplexer automatically switches the PCIe signals from connector X7 to connector X8.

x1/ x4 PCIe Slot (Connector X7) Pinout Description

Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	N.C
B6	SMB_DAT	A6	N.C
B7	GND	A7	N.C
B8	+3.3V	A8	N.C

PCIe Slot
(Connector X7)



B9	N.C	A9	+3.3V
B10	+3.3V Aux	A10	+3.3V
B11	WAKE#	A11	PCIE_RST#
	Key		
B12	N.C	A12	GND
B13	GND	A13	PCIE_CLK+
B14	PCIE_TX0+	A14	PCIE_CLK-
B15	PCIE_TX0-	A15	GND
B16	GND	A16	PCIE_RX0+
B17	PRSNT2#	A17	PCIE_RX0-
B18	GND	A18	GND
B19	PCIE_TX1+	A19	N.C
B20	PCIE_TX1-	A20	GND
B21	GND	A21	PCIE_RX1+
B22	GND	A22	PCIE_RX1-
B23	PCIE_TX2+	A23	GND
B24	PCIE_TX2-	A24	GND
B25	GND	A25	PCIE_RX2+
B26	GND	A26	PCIE_RX2-
B27	PCIE_TX3+	A27	GND
B28	PCIE_TX3-	A28	GND
B29	GND	A29	PCIE_RX3+
B30	N.C	A30	PCIE_RX3-
B31	PRSNT#2	A31	GND
B32	GND	A32	RSVD

Connector Type

X7: PCIe x4 Connector

Note

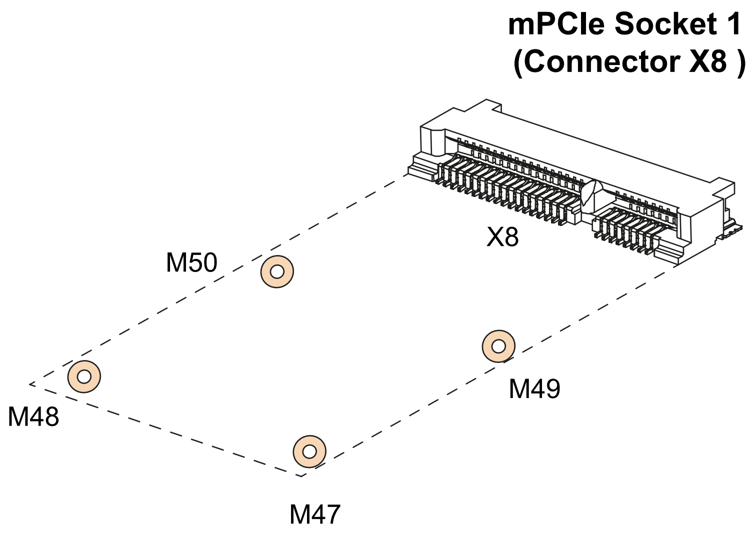
The PCIe x4 slot on connector X7 will not function if you insert a mini PCIe card into the mPCIe slot (connector X8). To use the PCIe x4 slot, do not insert any device into the mPCIe slot.

5.9.4.2 Mini PCIe

The conga-IC87/IC97 is equipped with a PCI Express Mini Card socket. PCI Express Mini Card is a unique small size form factor optimized for mobile computing platforms equipped with communication applications. The small footprint connector can be implemented on SBCs, providing the ability to insert different removable PCI Express Mini Cards. Using this approach gives the flexibility to mount an upgradable, standardized PCI Express Mini Card device to the SBC without additional expenditure of a redesign. The table below lists the default pinout of the PCI Express Mini Card.

mPCIe (Connector X8) Pinout Description

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3Vaux
3	N.C	4	GND
5	N.C	6	+1.5V
7	CLKREQ#	8	N.C
9	GND	10	N.C
11	REFCLK-	12	N.C
13	REFCLK+	14	N.C
15	GND	16	N.C
17	SUS_CLK	18	GND
19	N.C	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	N.C
43	mSATA_mPCIe_detect	44	N.C
45	CL_CLK	46	N.C
47	CL_DATA	48	+1.5V
49	CL_RST#	50	GND



Pin	Signal	Pin	Signal
51	N.C	52	+3.3Vaux
53	GND	54	GND

Connector Type

X8: PCIe Mini Card Socket

Note

The PCIe x4 slot on connector X7 will not function if you insert a mini PCIe card into the mPCIe slot (connector X8). To make use of the PCIe x4 slot, do not insert any device into the mPCIe slot.

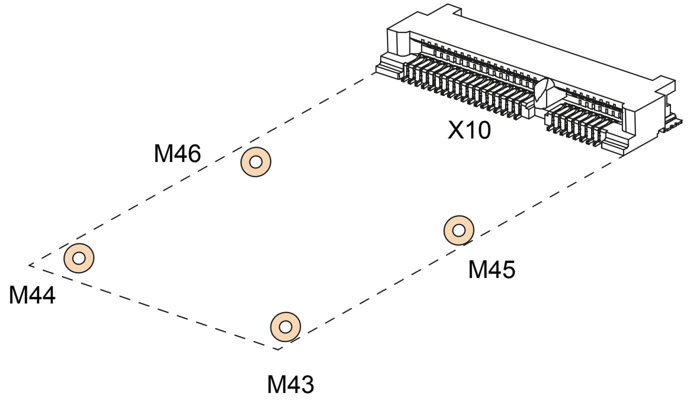
5.9.4.3 Mini PCIe /Mini SATA (Full Size)

The second mini PCIe socket (connector X10) supports both mSATA and mPCIe devices. When an mPCIe or mSATA device is attached to connector X10, the SoC detects the connected device via the signal detect pin (pin 43) and subsequently sets the communication mode to PCIe or SATA.

mSATA/mPCIe (Connector X10) Pinout Description.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3Vaux
3	N.C	4	GND
5	N.C	6	+1.5V
7	CLKREQ#	8	N.C
9	GND	10	N.C
11	REFCLK-	12	N.C
13	REFCLK+	14	N.C
15	GND	16	N.C
17	SUS_CLK	18	GND
19	N.C	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V

mSATA/mPCIe Socket 2
(Connector X10)



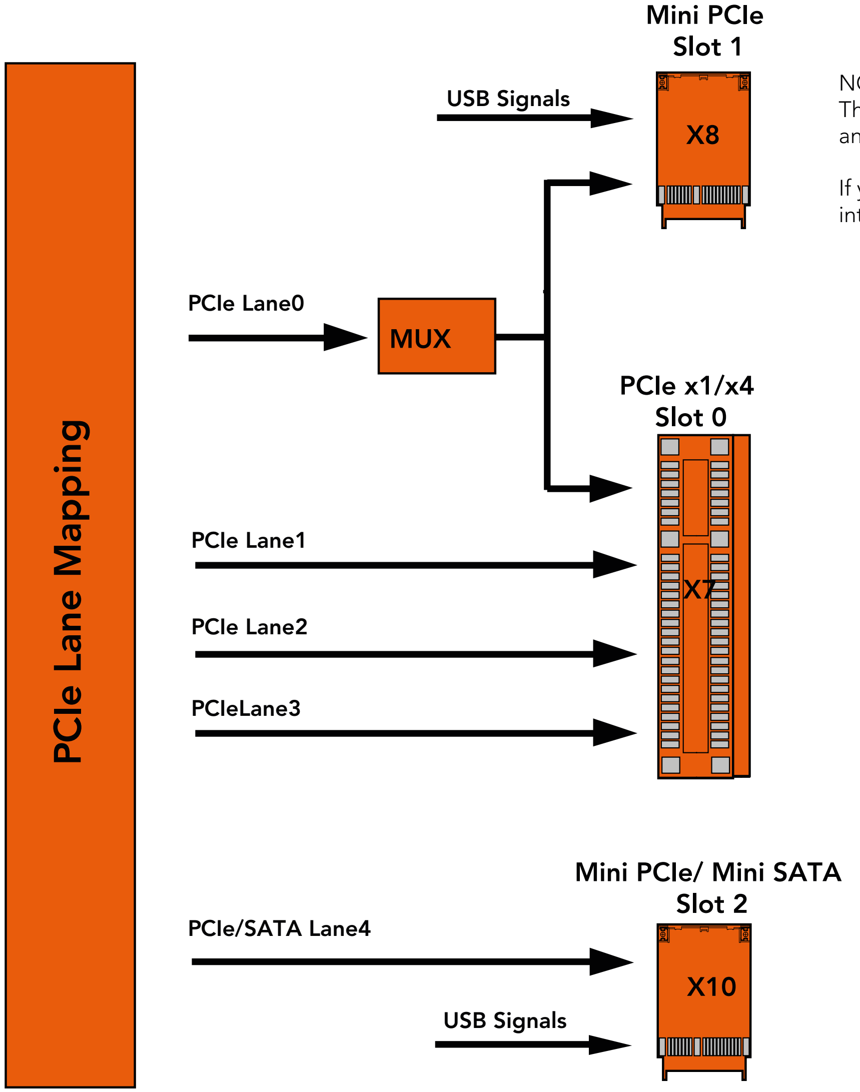
Pin	Signal	Pin	Signal
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	N.C
43	mSATA_mPCIe_detect	44	N.C
45	CL_CLK	46	N.C
47	CL_DATA	48	+1.5V
49	CL_RST#	50	GND
51	N.C	52	+3.3Vaux
53	GND	54	GND

Connector Type

X10: PCIe Mini Card Socket

5.9.4.4 PCI Express Routing

The diagram below shows how the PCIe lanes are routed to the PCIe connectors.



NOTE:
The PCIe x1/x4 Slot 0 will not function if you insert an mPCIe card into Slot 1.

If you intend to use Slot 0, do not insert any device into Slot 1.

6 Additional Features

6.1 Front Panel Connector

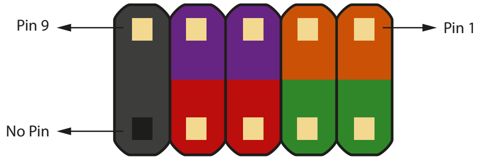
The conga-IC87/IC97 SBC supports front panel features such as power button, status LEDs and reset button via connector X39 - a 10-pin internal header. This connector offers one power supply pin (5V). The signals FP_LED+ and FP_LED- communicates the system states to two LEDs connected to this header.

See section 5.1.5 "Power Status LED" for the possible states and corresponding activity of the LEDs. The pinout of the front panel connector is described below:.

Front Panel (Connector X39) Pinout Description

Pin	Function	Description
1	HDD_POWER_LED+	Hard disk power LED with pull-up resistor to +5V.
2	FP_LED+	Power LED (main color)
3	HDD_LED	Hard disk activity LED
4	FP_LED-	Power LED (alternate color)
5	GND	Ground
6	PWRBTN#	Power Button
7	SYS_RST#	Reset Button
8	GND	Ground
9	+V5S	+5V power supply (500mA power budget)
10	KEY	No pin

Front Panel - Connector X39



Connector Type

X39: 10 Pin Header

6.2 Case Open Intrusion Connector

The conga-IC87/IC97 provides connector X2 for case-open intrusion detection.

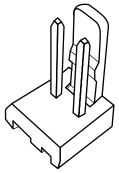
Case Open Intrusion (Connector X2) Pinout Description

Pin	Function
1	GND
2	INTRUDER#

Connector Type

X2 : 2.54mm, 2 Pos Molex Connector.

Case Open Intrusion - Connector X2



6.3 Trusted Platform Module – TPM (Optional)

The conga-IC87/IC97 SBC can optionally be equipped with a TPM 1.2/2.0 compliant security chip. The TPM security chip is connected to the LPC bus provided by the integrated Intel Chipset. The basic TPM chip initialization is performed by the SBC's UEFI Boot firmware.

6.4 congatec Board Controller (cBC)

The conga-IC87/IC97 is equipped with a Texas Instruments Tiva™ TM4E1231H6ZRBI microcontroller. This onboard microcontroller plays an important role for most of the congatec BIOS features. It fully isolates some of the embedded features such as system monitoring or the I²C bus from the x86 core architecture, which results in higher embedded feature performance and more reliability, even when the x86 processor is in a low power mode.

6.4.1 Fan Control

The conga-IC87/IC97 has additional signals and functions to further improve system management. One of these signals is an output signal called FAN_PWMOUT that allows system fan control using a PWM (Pulse Width Modulation) output. Additionally, there is an input signal called FAN_TACHOIN that provides the ability to monitor the system's fan RPMs (revolutions per minute). This signal must receive two pulses per revolution in order to produce an accurate reading. For this reason, a two pulse per revolution fan or similar hardware solution is recommended.

6.4.2 Power Loss Control

The cBC has full control of the power-up of the SBC and therefore can be used to specify the behavior of the system after an AC power loss condition. Supported modes are "Always On", "Remain Off" and "Last State".

6.4.3 Board Information

The cBC provides a rich data-set of manufacturing and board information such as serial number, EAN number, hardware and firmware revisions, and so on. It also keeps track of dynamically changing data like runtime meter and boot counter.

6.5 Embedded BIOS

The conga-IC87/IC97 is equipped with congatec Embedded BIOS, which is based on American Megatrends Inc. Aptio UEFI firmware. The BIOS provides the features described below:

6.5.1 OEM Default Settings and OEM BIOS Logo

This feature allows system designers to create and store their own default configuration and BIOS logo (splash screen) within the BIOS flash device. Customized BIOS development by congatec for these changes is no longer necessary because customers can easily do these changes by themselves using the congatec system utility CGUTIL.

6.5.2 OEM BIOS Code

With the congatec embedded BIOS it is even possible for system designers to add their own code to the BIOS POST process. Except for custom specific code, this feature can also be used to support Window 7 SLIC table, verb tables for HDA codecs, rare graphic modes and Super I/O controllers.

For more information about customizing the congatec embedded BIOS, refer to the congatec system utility user's guide (CGUTLm1x.pdf) and can be found on the congatec AG website at www.congatec.com or contact congatec technical support.

6.5.3 congatec Battery Management Interface

In order to facilitate the development of battery powered mobile systems based on embedded modules, congatec AG defined an interface for the exchange of data between a CPU module (using an ACPI operating system) and a smart battery system. A system developed according to the congatec Battery Management Interface Specification can provide the battery management functions supported by an ACPI-capable operating system (e.g. charge state of the battery, information about the battery, alarms/events for certain battery states, ...) without the need for additional modifications to the system BIOS.

The conga-IC87/IC97 BIOS fully supports this interface. For more information about this subject, visit the congatec website and view the following documents:

- congatec Battery Management Interface Specification
- Battery System Design Guide
- conga-SBM^3 User's Guide

6.5.4 API Support (CGOS)

In order to benefit from the above mentioned non-industry standard feature set, congatec provides an API that allows application software developers to easily integrate all these features into their code. The CGOS API (congatec Operating System Application Programming Interface) is the congatec proprietary API that is available for all commonly used Operating Systems such as Win32, Win64, Win CE and Linux. The architecture of the CGOS API driver provides the ability to write application software that runs unmodified on all congatec CPU modules. All the hardware related code is contained within the congatec embedded BIOS on the module. See section 1.1 of the CGOS API software developers guide, which is available on the congatec website .

6.6 GPIOs

The conga-IC87/IC97 SBC provides eight General Purpose Inputs via the congatec board controller and eight General Purpose Outputs via the onboard Super I/O. The GPIO signals are routed to the feature connector X38.

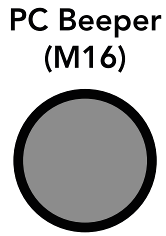
6.7 Thermal/Voltage Monitoring

The conga-IC87/IC97 SBC features three temperature sensors - the CPU, memory and board controller sensors.

The board controller can monitor six different voltages which are main power, 5V (runtime), 5V (standby), 1.05V (runtime), VCORE, 3,3V (runtime) and 3,3V (standby).

6.8 Beeper

The board-mounted speaker (M16) provides audible error code (beep code) information during POST.



6.9 External System Wake Event

The conga-IC87/IC97 supports LAN, USB, PCIe and PWRBTN driven wake up events.

6.10 Feature Connector

The conga-IC87/IC97 provides an internal 50 pol. 2mm pin header as feature connector. The pinout is described below:

Feature Connector X38 Pinout Description

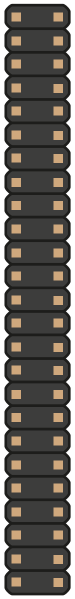
Pin	Signal	Pin	Signal
1	+V5.0A	2	GND
3	LAD0	4	LAD1
5	LAD2	6	LAD3
7	LFRAME#	8	SERIRQ#
9	CLK_PCI_EXT (24MHz)	10	BUF_PLT_RST#
11	SMB_DATA	12	SMB_CLK
13	SMB_ALERT#	14	GND
15	TX_CGBC	16	RX_CGBC
17	GPO0	18	GPO1
19	GPO2	20	GPO3
21	GPO4	22	GPO5
23	GPO6	24	GPO7
25	GPI0	26	GPI1

Pin	Signal	Pin	Signal
27	GPI2	28	GPI3
29	GPI4	30	GPI5
31	GPI6	32	GPI7
33	PM_SLP_S3#	34	PM_SLP_S5#
35	PM_SLP_S4#	36	LID_BTN#
37	SLP_BTN#	38	PM_THRM#
39	WDOUT	40	WDTRIG
41	I2DAT	42	PWR_OK
43	SPI_CS#	44	I2CLK
45	SPI_SO	46	BIOS_DISABLE#
47	SPI_CLK	48	SPI_SI
49	+V5.0A_DSW	50	GND

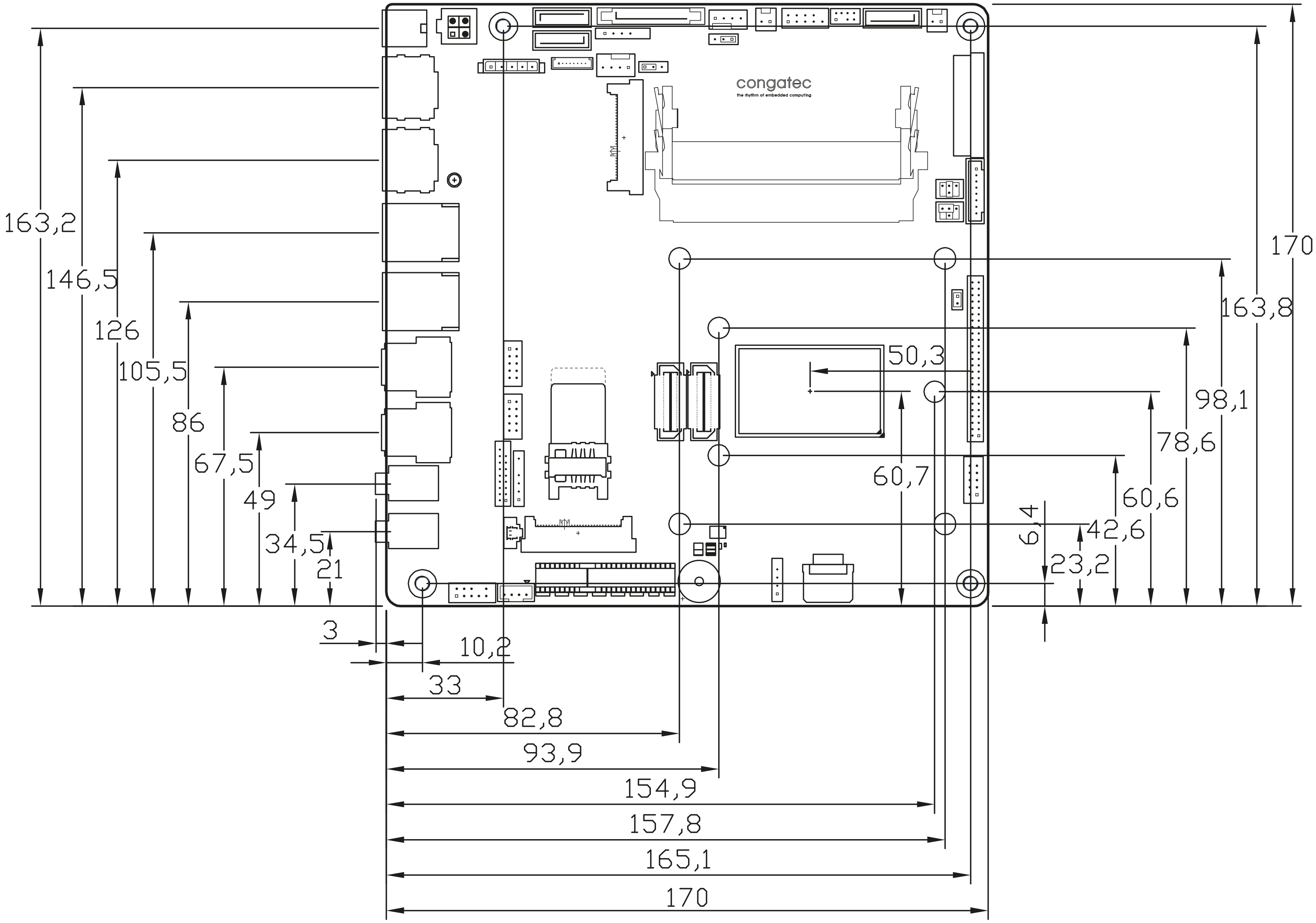
Connector Type

X38: 2mm, 2 x 25 Pos Header.

Feature Connector X38



7 conga-IC87/IC97 Mechanical Drawing



8 conga-IC87 BIOS Setup Description

This section describes the BIOS setup program. The BIOS setup program can be used to view and change the BIOS settings for the module. Only experienced users should change the default BIOS settings.

8.1 Entering the BIOS Setup Program.

The BIOS setup program can be accessed by pressing the <DEL> or <F2> key during POST.

8.1.1 Boot Selection Popup

Press the <F11> key during POST to access the Boot Selection Popup menu. A selection menu displays immediately after POST, allowing the operator to select either the boot device that should be used or an option to enter the BIOS setup program.

8.2 Setup Menu and Navigation

The congatec BIOS setup screen is composed of the menu bar, left frame and right frame. The menu bar is shown below:

Main	Advanced	Chipset	Boot	Security	Save & Exit

The left frame displays all the options that can be configured in the selected menu. Grayed-out options cannot be configured. Only the blue options can be configured. When an option is selected, it is highlighted in white.

The right frame displays the key legend. Above the key legend is an area reserved for text messages. These text messages explain the options and the possible impacts when changing the selected option in the left frame.

Note

Entries in the option column that are displayed in bold indicate BIOS default values.

The setup program uses a key-based navigation system. Most of the keys can be used at any time while in setup. The table below explains the supported keys:

Key	Description
← → Left/Right	Select a setup menu (e.g. Main, Boot, Exit).
↑ ↓ Up/Down	Select a setup item or sub menu.
+ - Plus/Minus	Change the field value of a particular setup item.
Tab	Select setup fields (e.g. in date and time).
F1	Display General Help screen.
F2	Load previous settings.
F9	Load optimal default settings.
F10	Save changes and exit setup.
ESC	Discard changes and exit setup.
ENTER	Display options of a particular setup item or enter submenu.

8.3 Main Setup Screen

When you first enter the BIOS setup, you will enter the main setup screen. The main setup screen reports BIOS, processor, memory and board information and is for configuring the system date and time. You can always return to the main setup screen by selecting the 'Main' tab.

Feature	Options	Description
Main BIOS Version	No option	Displays the main BIOS version.
OEM BIOS Version	No option	Displays the additional OEM BIOS version.
Build Date	No option	Displays the date the BIOS was built.
Product Revision	No option	Displays the hardware revision of the board.
Serial Number	No option	Displays the serial number of the board.
BC Firmware Revision	No option	Displays the firmware revision of the congatec board controller.
MAC Address (1st Ethernet)	No option	Displays the MAC address of the onboard i218 Ethernet controller.
MAC Address (2nd Ethernet)	No option	Displays the MAC address of the onboard i210/i211 Ethernet controller.
Boot Counter	No option	Displays the number of boot-ups. (max. 16777215).
Running Time	No option	Displays the time the board is running [in hours max. 65535].
►Platform Information	Submenu	Opens the platform information submenu.
System Date	Day of week, month/ day/year	Specifies the current system date *Note: The date is in month/day/year format.*
System Time	Hour:Minute:Second	Specifies the current system time. *Note: The time is in 24 hour format.*

8.3.1 Platform Information Submenu

The platform information submenu offers additional hardware and software information.

Feature	Options	Description
Processor Information	No option	Subtitle
Processor Type	No option	Displays the processor ID string. The “Processor Type” text itself is not displayed just the ID string.
Codename	No option	Displays the processor codename
Processor Speed	No option	Displays the processor speed.
Processor Signature	No option	Displays the processor signature.
Stepping	No option	Displays the processor stepping.
Processor Cores	No option	Displays the number of processor cores.
Microcode Revision	No option	Displays the processor microcode revision .
IGD HW Version	No option	Displays the version of the graphics controller.
IGD VBIOS Version	No option	Displays the video BIOS version.
Total Memory	No option	Displays the total amount of installed memory.
PCH Information	No option	Subtitle
Codename	No option	Displays the codename of the platform controller hub (PCH).
PCH SKU	No option	Displays the SKU name of the PCH.
Stepping	No option	Displays the PCH stepping.

8.4 Advanced Setup

Select the advanced tab from the setup menu to enter the advanced BIOS setup screen. The menu is used for setting advanced features and only features described within this user’s guide are listed.

Main	Advanced	Chipset	Boot	Security	Save & Exit
	Graphics				
	Watchdog				
	Hardware Health Monitoring				
	PCI & PCI Express				
	ACPI				
	RTC Wake				
	Trusted Computing				

Main	Advanced	Chipset	Boot	Security	Save & Exit
	CPU				
	SATA				
	Intel® Rapid Start Technology				
	Acoustic Management				
	USB				
	SMART Settings				
	Super IO				
	Serial Port Console Redirection				
	UEFI Network Stack				
	PC Speaker Configuration				
	Intel® Ethernet Connection I218-LM				
	Intel® I211 Gigabit Network Connection				

8.4.1 Graphics Submenu

Feature	Options	Description
Primary Graphics Device	Auto **IGD** PCI/PCIe	Select primary graphics adapter to be used during boot up. Auto: BIOS will select it automatically. IGD: Internal Graphics Device (IGD) located in chipset. PCI/PCIe: PCI/PCIe graphics card attached to some other (not PEG) PCI/PCIe port.
Internal Graphics Device	**Auto** Disabled Enabled	Enable or disable Internal Graphics Device (IGD).
IGD Pre-Allocated Graphics Memory	32M, **64M**, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M, 1024M	Select amount of pre-allocated (fixed) graphics memory used by the Internal Graphics Device.
IGD Total Graphics Memory	128MB **256MB** MAX	Select amount of total graphics memory that may be used by the Internal Graphics Device. Memory above the fixed graphics memory will be dynamically allocated by the graphics driver according to DVMT 5.0 specification. MAX = Use as much graphics memory as possible. Depends on total system memory installed and the operating system used (see DVMT 5.0 specification).

Feature	Options	Description
Primary IGD Boot Display Device	**Auto** LFP EFP EFP2	Select the Primary IGD display device(s) used for boot up. LFP (Local Flat Panel) selects a LVDS panel connected to the integrated LVDS port. EFPx (External Flat Panel) selects a HDMI/DVI or DisplayPort device connected to the Digital Display Interfaces DDI1, DDI2 and DDI3. Examples for EFPx name assignment to DDI1, DDI2, DDI3: 1. If only DDI2 is enabled then the EFP name is assigned to DDI2. 2. If both port DDI1 and DDI2 are enabled then EFP is assigned to DDI1 and EFP2 is assigned to DDI2. EFP selections are valid only when DDI1, DDI2 and/or DDI3 are enabled.
Secondary IGD Boot Display Device	**Disabled** LFP EFP EFP2	Select the Secondary IGD display device(s) used for boot up. VGA modes will be supported only on Primary display. For other details see Primary IGD Boot Display Device.
Active LFP Configuration	No Local Flat Panel **Integrated LVDS** eDP	Select the active local flat panel configuration.
Always Try Auto Panel Detect	**No** Yes	If set to 'Yes' the BIOS will first look for an EDID data set in an external EEPROM to configure the Local Flat Panel. Only if no external EDID data set can be found, the data set selected under 'Local Flat Panel Type' will be used as a fallback data set.
Local Flat Panel Type	**Auto** VGA 640x480 1x18 (002h) VGA 640x480 1x18 (013h) WVGA 800x480 1x24 (01Bh) SVGA 800x600 1x18 (01Ah) XGA 1024x768 1x18 (006h) XGA 1024x768 2x18 (007h) XGA 1024x768 1x24 (008h) XGA 1024x768 2x24 (012h) WXGA 1280x800 1x18 (01Eh) WXGA 1280x768 1x24 (01Ch) SXGA 1280x1024 2x24 (00Ah) SXGA 1280x1024 2x24 (018h) UXGA 1600x1200 2x24 (00Ch) HD 1920x1080 2x24 (01Dh) WUXGA 1920x1200 2x18 (015h) WUXGA 1920x1200 2x24 (00Dh) Customized EDID™ 1 Customized EDID™ 2 Customized EDID™ 3	Select a predefined LFP type or choose Auto to let the BIOS automatically detect and configure the attached LVDS panel. Auto detection is performed by reading an EDID data set via the video I²C bus. The number in brackets specifies the congatec internal number of the respective panel data set. *Note: Customized EDID™ utilizes an OEM defined EDID™ data set stored in the BIOS flash device.*
Backlight Inverter Type	None **PWM** I2C	Select the type of backlight inverter used. PWM = Use IGD PWM signal. I2C = Use I2C backlight inverter device connected to the video I²C bus.
PWM Inverter Polarity	**Normal** Inverted	Select PWM inverter polarity. Only visible if Backlight Inverter Type is set to PWM .
PWM Inverter Frequency (Hz)	**200** - 40000	Set the PWM inverter frequency in Hz. Only visible if Backlight Inverter Type is set to PWM.

Feature	Options	Description
Backlight Setting	0%, 10%, 25%, 40%, 50%, 60%, 75%, 90%, **100%**	Actual backlight value in percent of the maximum setting.
Inhibit Backlight	**No** Permanent Until End Of POST	Decide whether the backlight on signal should be activated when the panel is activated or whether it should remain inhibited until the end of BIOS POST or permanently.
Invert Backlight Setting	**No** Yes	Allow to invert backlight control values if required for the actual I2C type backlight hardware controller.
LVDS SSC	**Disabled**, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%	Configure LVDS spread spectrum clock modulation depth with center spreading and fixed modulation frequency of 32.9kHz.
Digital Display Interface 1 (DDI1)	**Auto Selection** Disabled Display Port HDMI/DVI	Select the output type of the digital display interface.
Digital Display Interface 2 (DDI2)	**Auto Selection** Disabled Display Port HDMI/DVI	Select the output type of the digital display interface.
► GOP Configuration	Submenu	Configure graphics output when using the UEFI Graphics Output Protocol (GOP) driver instead of legacy video BIOS. Only visible if GOP driver is configured to be used in the 'Video Option ROM Launch Policy' setup node.

8.4.1.1 GOP Configuration Submenu

Feature	Options	Description
Output Device	Options depend on detected display devices	Select boot display device in GOP driver mode.
BIST Enable	**Disabled** Enabled	Starts or stops the BIST (built in self test) on the integrated display panel.

8.4.2 Watchdog Submenu

Feature	Options	Description
POST Watchdog	Disabled 30sec 1min 2min 5min 10min 30min	Select the timeout value for the POST watchdog. The watchdog is only active during the power-on-self-test of the system and provides a facility to prevent errors during boot up by performing a reset.

Feature	Options	Description
Stop Watchdog for User Interaction	No **Yes**	Select whether the POST watchdog should be stopped during the popup boot selection menu or while waiting for setup password insertion.
Runtime Watchdog	**Disabled** One-time Trigger Single Event Repeated Event	Selects the operating mode of the runtime watchdog. This watchdog will be initialized just before the operating system starts booting. If set to 'One-time Trigger' the watchdog will be disabled after the first trigger. If set to 'Single Event', every stage will be executed only once, then the watchdog will be disabled. If set to 'Repeated Event' the last stage will be executed repeatedly until a reset occurs.
Delay	**Disabled** 10sec 30sec 1min 2min 5min 10min 30min	Select the delay time before the runtime watchdog becomes active. This ensures that an operating system has enough time to load.
Event 1	ACPI Event **Reset** Power Button	Selects the type of event that will be generated when timeout 1 is reached. For more information about ACPI Event, see note below.
Event 2	**Disabled** ACPI Event Reset Power Button	Selects the type of event that will be generated when timeout 2 is reached.
Event 3	**Disabled** ACPI Event Reset Power Button	Selects the type of event that will be generated when timeout 3 is reached.
Timeout 1	1sec 2sec 5sec 10sec **30sec** 1min 2min 5min 10min 30min	Selects the timeout value for the first stage watchdog event.
Timeout 2	See above	Selects the timeout value for the second stage watchdog event.
Timeout 3	See above	Selects the timeout value for the third stage watchdog event.
Watchdog ACPI Event	**Shutdown** Restart	Select the operating system event that is initiated by the watchdog ACPI event. These options perform a critical but orderly operating system shutdown or restart.

Note

In ACPI mode, it is not possible for a "Watchdog ACPI Event" handler to directly restart or shutdown the OS. For this reason the congatec

BIOS will do one of the following:

For Shutdown: An over temperature notification is executed. This causes the OS to shut down in an orderly fashion.

For Restart: An ACPI fatal error is reported to the OS.

Additionally, the conga-IC87 SBC does not support the watchdog NMI mode.

8.4.3 Hardware Health Monitoring Submenu

Feature	Options	Description
CPU Temperature	No option	Displays the CPU temperature of the actual module in °C.
System Temperature	No option	Displays the system temperature of the actual module in °C.
Board Temperature	No option	Displays the board temperature of the actual module in °C.
DC Input Voltage	No option	Displays the actual voltage of the standard DC power supply.
DC Input Current	No option	Displays the module's input current from DC standard voltage.
5V Standard	No option	Displays the actual voltage of the 5V standard power rail.
5V Standby	No option	Displays the actual voltage of the 5V standby power supply.
3V Standard	No option	Displays the actual voltage of the 3V standard power rail.
3V Standby	No option	Displays the actual voltage of the 3V standby power supply.
1.05V	No option	Displays the actual voltage of the 1.05V power rail.
CPU Fan Speed	No option	Displays the actual CPU fan speed in RPM.
System Fan Speed	No option	Displays the actual system fan speed in RPM.
► CPU & System Fan Control	Submenu	Configure the CPU and system's fan control submenu

8.4.3.1 CPU & System Fan Control Submenu

Feature	Options	Description
Fan Output Step Down Time	1-255 **Default: 1**	Amount of time it takes the fan output to decrease its value by one step (Range: 1-255 in 0.1s units).
Fan Output Step Up Time	1-255 **Default: 1**	Amount of time it takes the fan output to increase its value by one step (Range: 1-255 in 0.1s units).
CPU Fan Mode	Manual Mode **Thermal Cruise Mode** SMART FAN III Mode	Select fan speed control method. Thermal Cruise Mode and SMART FAN III Mode provide options for automatic temperature dependent fan control.

Feature	Options	Description
CPU Fan Manual Mode Options		
CPU Fan PWM Output Value	0-255 **Default: 255**	Set CPU fan PWM output value (Range: 0-255 = 0%-100% of maximum RPM).
CPU Fan Thermal Cruise Mode		
CPU Fan Target Temperature	0-127 **Default: 60**	Set CPU fan control CPU target temperature (Range: 0-127 degrees C).
CPU Fan Temp. Tolerance	0-15 **Default: 3**	Set CPU fan control target temperature tolerance (Range: +/- 0-15 degrees C).
CPU Fan Start-Up Value	0-255 **Default: 128**	In Thermal Cruise mode, the CPU fan output value increases from zero to this value to provide a minimum value to turn on the fan (Range: 0-255).
CPU Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise or SMART FAN III mode, the CPU fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
CPU Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise or SMART FAN III mode, this determines the amount of time it takes the CPU fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).
CPU Fan SMART FAN III Mode		
CPU Fan Target Temperature	0-127 **Default: 60**	Set CPU fan control CPU target temperature (Range: 0-127 degrees C).
CPU Fan Temp. Tolerance	0-15 **Default: 3**	Set CPU fan control target temperature tolerance (Range: +/- 0-15 degrees C).
CPU Fan Max. Output Value	1-255 **Default: 255**	In SMART FAN III mode, the CPU fan output value increases up to this value. This value cannot be zero, and it cannot be lower than the CPU Fan Stop Value (Range: 1-255).
CPU Fan Output Step Value	1-255 **Default: 64**	In SMART FAN III mode, the CPU fan output value decreases or increases by this value, when needed (Range: 1-255).
CPU Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise or SMART FAN III mode, the CPU fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
CPU Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise or SMART FAN III mode, this determines the amount of time it takes the CPU fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).
CPU Fan PWM Input Clock	**24MHz** 180kHz	Select base input clock for CPU fan PWM.
CPU Fan PWM Clock Divider	1-127 **Default: 4**	Addon input clock divider (1-127). PWM output frequency = (Input Clock / 256)/Divider
System Fan Mode	Manual Mode **Thermal Cruise Mode**	Select fan speed control method. Thermal Cruise Mode provides options for automatic temperature dependent fan control.
System Fan Manual Mode Options		

Feature	Options	Description
System Fan PWM Output Value	0-255 **Default: 255**	Set system fan PWM output value (Range: 0-255 = 0%-100% of maximum RPM).
System Fan Thermal Cruise Mode		
System Fan Target Temperature	0-127 **Default: 60**	Set system fan control system target temperature (Range: 0-127 degrees C).
System Fan Temp. Tolerance	0-15 **Default: 3**	Set system fan control target temperature tolerance (Range: +/- 0-15 degrees C).
System Fan Start-Up Value	0-255 **Default: 128**	In Thermal Cruise mode, the system fan output value increases from zero to this value to provide a minimum value to turn on the fan (Range: 0-255).
System Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise mode, the system fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
System Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise mode, this determines the amount of time it takes the system fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).
System Fan PWM Input Clock	**24MHz** 180kHz	Select base input clock for system fan PWM.
System Fan PWM Clock Divider	1-127 **Default: 4**	Addon input clock divider (1-127). PWM output frequency = (Input Clock / 256)/Divider

8.4.4 PCI & PCI Express Submenu

Feature	Options	Description
PCI Settings		
PCI Latency Timer	**32**, 64, 96, 128, 160, 192, 224, 248 PCI Bus Clocks	Select value to be programmed into PCI latency timer register.
VGA Palette Snoop	**Disabled** Enabled	Enable or disable VGA palette registers snooping.
PERR# Generation	**Disabled** Enabled	Enable or disable PCI device to generate PERR#.
SERR# Generation	**Disabled** Enabled	Enable or disable PCI device to generate SERR#.
▶ PCI Express Settings	Submenu	PCI Express device and link settings.
▶ PIRQ Routing & IRQ Reservation	Submenu	Manual PIRQ routing and interrupt reservation for legacy devices.
PCIE Root Port Function Swapping	**Disabled** Enabled	Enable or disable PCI Express root port function swapping.
Subtractive Decode	**Disabled** Enabled	Enable or disable PCI Express subtractive decode.
▶ PCI Express Port 3	Submenu	Controls the onboard i211 ethernet controller

Feature	Options	Description
▶ PCI Express Port 4	Submenu	Controls the onboard PCIe x4 and PCIe mini card slots
▶ PCI Express Port 5	Submenu	Controls the PCIe link on the combined mini PCIe/mini SATA connector.

8.4.4.1 PCI Express Settings Submenu

Feature	Options	Description
Relaxed Ordering	**Disabled** Enabled	Enable or disable PCI Express device relaxed ordering.
Extended Tag	**Disabled** Enabled	If enabled a device may use an 8-bit tag filed as a requester.
No Snoop	Disabled **Enabled**	Enable or disable PCI Express device 'No Snoop' option.
Maximum Payload	**Auto** 128 Bytes 256 Bytes 512 Bytes 1024 Bytes 2048 Bytes 4096 Bytes	Set maximum payload of PCI Express devices or allow system BIOS to select the value.
Maximum Read Request	**Auto** 128 Bytes 256 Bytes 512 Bytes 1024 Bytes 2048 Bytes 4096 Bytes	Set maximum read request size of PCI Express devices or allow system BIOS to select the value.
ASPM	**Disabled** Auto Force L0s	PCI Express Active State Power Management settings.
Extended Synch	**Disabled** Enabled	If enabled, the generation of extended PCI Express synchronization patterns is allowed.
Link Training Retry	Disabled, 2, 3, **5**	Defines number of retry attempts software will take to retrain the link if previous training attempt was unsuccessful.
Link Training Timeout (us)	10-10000 **Default : 100**	Defines number of microseconds software will wait before polling link training bit in the link status register. Value ranges from 10 to 10000 us.
Unpopulated Links	**Keep Link On** Disabled	In order to save power, software will disable unpopulated PCI Express links, if this option is set to disabled.
Restore PCIe Registers	Enabled **Disabled**	On non-PCI Express aware operating systems some devices may not be re-initialized correctly after S3. Setting this node to Enabled restores PCI Express configuration on S3 resume. Warning: Enabling this may cause issues with other hardware after S3 resume.

8.4.4.2 PIRQ Routing & IRQ Reservation Submenu

Feature	Options	Description
PIRQA	**Auto**, IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Set interrupt for selected PIRQ. Please refer to the board's resource list for a detailed list of devices connected to the respective PIRQ. NOTE: These settings will only be effective while operating in PIC (non-IOAPIC) interrupt mode.
PIRQB	Same as PIRQA	Same as PIRQA
PIRQC	Same as PIRQA	Same as PIRQA
PIRQD	Same as PIRQA	Same as PIRQA
PIRQE	Same as PIRQA	Same as PIRQA
PIRQF	Same as PIRQA	Same as PIRQA
PIRQG	Same as PIRQA	Same as PIRQA
PIRQH	Same as PIRQA	Same as PIRQA
Reserve Legacy Interrupt 1	**None**, IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	The interrupt reserved here will not be assigned to any PCI or PCI Express device and thus maybe available for some legacy bus device.
Reserve Legacy Interrupt 2	Same as Reserve Legacy Interrupt 1	Same as Reserve Legacy Interrupt 1

8.4.4.3 PCI Express Port Submenu

Feature	Options	Description
PCI Express Port x	Disabled **Enabled**	Enable or disable the respective PCI Express port x. Note: Unless the Always Enable Port (see below) is enabled as well, an unpopulated port will still be disabled if no PCI Express device is connected.
ASPM	**Disabled** L0s L1 L0sL1 Auto	PCI Express Active State Power Management settings.
L1 Substates	**Disabled** L1.1 L1.2 L1.1 & L1.2	PCI Express L1 substates settings.
URR	**Disabled** Enabled	Enable or disable PCI Express Unsupported Request Reporting.

Feature	Options	Description
FER	**Disabled** Enabled	Enable or disable PCI Express device Fatal Error Reporting.
NFER	**Disabled** Enabled	Enable or disable PCI Express device non-Fatal Error Reporting.
CER	**Disabled** Enabled	Enable or disable PCI Express device Correctable Error Reporting.
CTO	**Disabled** Enabled	Enable or disable PCI Express Completion Timeout timer.
SEFE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on Fatal Error.
SENFE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on non-Fatal Error.
SECE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on Correctable Error.
PME SCI	Disabled **Enabled**	Enable or disable PCI Express PME (power management event) SCI.
Always Enable Port	**Disabled** Enabled	Disabled = Disable the internal PCI Express interface device if no device is detected on the port. Enabled = Enable the internal PCI Express interface device also if no device is detected on the port.

PCIe Speed	**Auto**
	Gen1
		Maximum speed of the PCIe port.
		Auto = Gen1 or Gen2
		Gen1 = 2.5GT/s
		Some older non-compliant PCI Express devices will function only if Gen1 is selected. Some Gen2 devices start up in Gen1 mode and then their OS driver sets them to Gen2 mode.

Detect Non-compliant Device	**Disabled** Enabled	Try to detect also a non-compliant PCI Express device. If enabled, POST time will be longer.
Extra Bus Reserved	0-7 Default : **0**	Extra bus reserved (0-7) for bridges behind this root bridge.
Reserved Memory	1-20 Default : **10**	Reserved memory range for this root bridge.
Prefetchable Memory	1-20 Default : **10**	Prefetchable memory range for this root bridge.
Reserved I/O	4-20 Default : **4**	Reserved I/O range for this root bridge.
PCIe LTR	Disabled **Enabled**	Enable or disable PCI Express Latency Tolerance Reporting (LTR).
PCIe LTR Lock	Disabled **Enabled**	PCIe LTR configuration lock.
Snoop Latency Override	Disabled Manual **Auto**	Snoop latency override for PCH PCIe.

Feature	Options	Description
Snoop Latency Multiplier	1 ns, 32 ns, **1024 ns** 32768 ns, 1048576 ns 33554432 ns	Snoop latency multiplier for PCH PCIe.
Snoop Latency Value	0-252 Default : **60**	Snoop latency value for PCH PCIe.
No-Snoop Latency Override	Disabled Manual **Auto**	No-Snoop latency override for PCH PCIe.
No-Snoop Latency Multiplier	1 ns, 32 ns, 1024 **ns** 32768 ns, 1048576 ns 33554432 ns	No-Snoop latency multiplier for PCH PCIe.
No-Snoop Latency Value	0-252 Default : **60**	No-Snoop latency override for PCH PCIe.

8.4.5 ACPI Submenu

Feature	Options	Description
Hibernation Support	Disabled **Enabled**	Enable or disable system ability to hibernate (operating system S4 sleep state). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled S1 only (CPU Stop Clock) **S3 (Suspend to RAM)** Both S1 and S3 available for OS to choose from	Select the state used for ACPI system sleep/suspend.
Lock Legacy Resources	**Disabled** Enabled	Enable or disable locking of legacy resources.
S3 Video Repost	**Disabled** Enabled	Enable or disable video BIOS re-post on S3 resume. Required by some operating systems.
ACPI Low Power S0 Idle	**Disabled** Enabled	Enable or disable ACPI Low Power S0 Idle support.
Native PCI Express Support	Disabled **Enabled**	Enable or disable native OS PCI Express support.

Native ASPM	**Disabled**
	Enabled
		Enabled = The OS will control the ASPM support of the PCI Express device.
		Disabled = The BIOS will control the ASPM support of the PCI Express device.

ACPI Debug	**Disabled** Enabled	Open a memory buffer for storing debug strings. Use method ADBG to write strings to buffer.
ACPI 5.0 CPPC Support	**Disabled** Enabled	Enable ACPI 5.0 Collaborative Processor Performance Control (CPPC) support. When enabled, platform exposes CPPC interfaces to operating system. When disabled, platform exposes legacy (non-CPPC) processor interfaces to operating system.

Feature	Options	Description
ACPI 5.0 CPPC Platform SCI	**Disabled** Enabled	Enable ACPI 5.0 platform generation of SCI on CPPC command completion. When enabled, platform generates GPE/SCI. When disabled platform does not generate GPE/SCI and OS polls for command completion.
Active Trip Point	Disabled, 15 C, 23 C, 31 C, 39 C, 47 C, 55 C, 63 C, **71 C**, 79 C, 87 C, 95 C, 103 C, 111 C, 119 C	Specifies the temperature threshold at which the ACPI aware OS turns the fan on/off.
Automatic Critical Trip Point	**Disabled** Enabled	Enabled = Configure the critical trip point - the temperature threshold at which the ACPI aware OS performs a critical shutdown - automatically to recommended value. Disabled = Configure the critical trip point manually.
Critical Trip Point Value	71 C, 79 C, 87 C, 95 C, 103 C, **106 C**, 111 C, 119 C, 127 C	Specifies the temperature threshold at which the ACPI aware OS performs a critical shutdown.
Lid Support	**Disabled** Enabled	Configure COM Express LID# Signal to act as ACPI lid.
Sleep Button Support	**Disabled** Enabled	Configure COM Express SLEEP# signal to act as ACPI sleep button.

8.4.6 RTC Wake Submenu

Feature	Options	Description
Wake System At Fixed Time	**Disabled** Enabled	Enable system to wake from S5 using RTC alarm.
Wake up hour		Specify wake up hour. For example, enter “3” for 3am and “15” for 3pm.
Wake up minute		Specify wake up minute.
Wake up second		Specify wake up second.

8.4.7 Trusted Computing Submenu

Feature	Options	Description
Security Device Support	**Disabled** Enabled	Enable or disable TPM support. System reset is required after change.
TPM State	**Disabled** Enabled	Enable or disable TPM chip. Note: System might restart several times during POST to acquire target state.
Pending operation	**None,** Enable Take Ownership, Disable Take Ownership, TPM Clear	Perform selected TPM chip operation. Note: System might restart several times during POST to perform selected operation.

8.4.8 CPU Submenu

Feature	Options	Description
Processor Type	No option	Displays the processor ID string. The "Processor Type" is not displayed, just the ID string.
CPU Signature	No option	Displays the CPU Signature.
Microcode Patch	No option	Displays the revision of the Microcode Patch.
FSB Speed	No option	Displays the FSB Speed.
Max CPU Speed	No option	Displays the Max CPU Speed.
Min CPU Speed	No option	Displays the Min CPU Speed.
CPU Speed	No option	Displays the current CPU Speed.
Processor Cores	No option	Displays the number of the Processor Cores.
Intel HT Technology	No option	Displays whether Intel HT Technology is supported.
Intel VT-x Technology	No option	Displays whether Intel VT-x Technology is supported.
Intel SMX Technology	No option	Displays whether Intel SMX Technology is supported.
64-bit	No option	Displays whether 64-bit is supported.
EIST Technology	No option	Displays whether Enhanced Intel SpeedStep Technology (EIST) is supported.
CPU C3 State	No option	Displays whether CPU C3 State is supported.
CPU C6 State	No option	Displays whether CPU C6 State is supported.
CPU C7 State	No option	Displays whether CPU C7 State is supported.
L1 Data Cache	No option	Displays the size of the L1 Data Cache.
L1 Code Cache	No option	Displays the size of the L1 Code Cache.
L2 Cache	No option	Displays the size of the L2 Cache.
L3 Cache	No option	Displays the size of the L3 Cache.
Set Boot Freq Ratio	8-23 Default : 255	Range: 8 - 23. This sets the boot ratio. If ratio is out of range, maximum ratio is used. Non-ACPI OSes will use this ratio. The range 8-23 is just an example as the possible range depends on processor variant.
Hyper-Threading	Disabled **Enabled**	Enable or Disable Hyper-Threading technology.
Active Processor Cores	All 1 2 3	Set number of cores to be enabled.
Overclocking Lock	**Disabled** Enabled	FLEX_RATIO(194) MSR
Limit CPUID Maximum	**Disabled** Enabled	When enabled, the processor limits the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. When disabled, the processor returns the actual maximum CPUID input value of the processor when queried. Limiting the CPUID input value may be required for older operating systems that cannot handle the extra CPUID information returned when using the full CPUID input value.
Execute Disable Bit	Disabled **Enabled**	Enable or disable the Execute Disable Bit (XD) of the processor. With the XD bit set to enabled, certain classes of malicious buffer overflow attacks can be prevented when combined with a supporting OS.

Feature	Options	Description
Intel Virtualization Technology	Disabled **Enabled**	When enabled, a VMM can utilize the integrated hardware virtualization support.
Hardware Prefetcher	Disabled **Enabled**	Enable or disable the Mid Level Cache (L2) streamer prefetcher.
Adjacent Cache Line Prefetch	Disabled **Enabled**	Enable or disable the Mid Level Cache (L2) prefetching of adjacent cache lines.
CPU AES	Disabled **Enabled**	Enable or disable CPU Advanced Encryption Standard (AES) instructions.
EIST	Disabled **Enabled**	Enable or disable Enhanced Intel SpeedStep Technology (EIST).
Energy Performance	**Performance** Balanced Perform. Balanced Energy Energy Efficient	Optimize between performance and power savings.
Turbo Mode	Disabled **Enabled**	Enable or disable Turbo Mode.
Package Power Limit Lock	Disabled **Enabled**	When enabled, PACKAGE_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
CPU Power Limit1	0-255 **Default : 0**	CPU Power Limit1 value
CPU Power Limit1 Time	0-255 **Default : 0**	Time window in which the Power Limit1 is maintained.
CPU Power Limit2	0-255 **Default : 0**	CPU Power Limit2 value
Platform Power Limit Lock	Disabled **Enabled**	When enabled, PLATFORM_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
CPU Power Limit3	0-255 **Default : 0**	CPU Power Limit3 value
CPU Power Limit3 Time	0-255 **Default : 0**	Time window in which the Power Limit3 is maintained.
CPU Power Limit3 Duty Cycle	0-100 **Default : 0**	Specify in percentage the duty cycle that the CPU is required to maintain over the configured Power Limit3 time windows.
DDR Power Limit1	0-255 **Default : 0**	DDR Power Limit1 value
DDR Power Limit1 Time	0-255 **Default : 0**	Time window in which the DDR Power Limit1 is maintained.
DDR Power Limit2	0-255 **Default : 0**	DDR Power Limit2 value
1-Core Ratio Limit	0-255 **Default : 0**	Limit for 1 active core. 0 means using the factory-configured value.
2-Core Ratio Limit	0-255 **Default : 0**	Limit for 2 active cores. 0 means using the factory-configured value.

Feature	Options	Description
3-Core Ratio Limit	0-255 **Default : 0**	Limit for 3 active cores. 0 means using the factory-configured value.
4-Core Ratio Limit	0-255 **Default : 0**	Limit for 4 active cores. 0 means using the factory-configured value.
VR Current Value Lock	Disabled **Enabled**	Locks VR current value from further writes until a reset.
VR Current Value	0-8191 Default : 0	Voltage regulator current limit. 0 means automatic.
CPU C States	**Disabled** Enabled	Enable or disable CPU C states.
Enhanced C1 State	**Disabled** Enabled	Enhanced C1 state
CPU C3 Report	Disabled **Enabled**	Enable or disable CPU C3 report to OS.
CPU C6 Report	Disabled **Enabled**	Enable or disable CPU C6 report to OS.
C6 Latency	**Short** Long	Configure Short/Long latency for C6.
CPU C7 Report	Disabled CPU C7 **CPU C7s**	Enable or disable CPU C7 report to OS.
C7 Latency	Short **Long**	Configure Short/Long latency for C7.
CPU C8 Report	Disabled **Enabled**	Enable or disable CPU C8 report to OS. Note: Not displayed/supported on all Processors types.
CPU C9 Report	Disabled **Enabled**	Enable or disable CPU C9 report to OS. Note: Not displayed/supported on all Processors types.
CPU C10 Report	Disabled **Enabled**	Enable or disable CPU C10 report to OS. Note: Not displayed/supported on all Processors types.
C1 State Auto Demotion	Disabled **Enabled**	Processor will conditionally demote C3/C6/C7 requests to C1 based on uncore auto-demote information.
C3 State Auto Demotion	Disabled **Enabled**	Processor will conditionally demote C6/C7 requests to C3 based on uncore auto-demote information.
Package C State Demotion	Disabled **Enabled**	Enable or disable package C state demotion.
C1 State Auto Undemotion	Disabled **Enabled**	Enable or disable Un-demotion from demoted C1.
C3 State Auto Undemotion	Disabled **Enabled**	Enable or disable Un-demotion from demoted C3.
Package C State Undemotion	Disabled **Enabled**	Enable or disable package C state undemotion.
C State Pre-Wake	Disabled **Enabled**	Enable or disable C state Pre-Wake feature.

Feature	Options	Description
CFG Lock	Disabled **Enabled**	Configure MSR 0xE2[15], CFG lock bit.
Package C State Limit	C0/C1, C2, C3, C6, C7, C7s, C8, C9, C10, **AUTO**	Set Package C state limit
Lake Tiny Feature	**Disabled** Enabled	Enable or disable Lake Tiny feature for C state configuration.
ACPI CTDP BIOS	**Disabled** Enabled	Enable or disable ACPI CTDP BIOS support.
Configurable TDP Level	**TDP NOMINAL** TDP DOWN TDP UP Disabled	Allow reconfiguration of TDP levels base on current power and thermal delivery capabilities of the system.
Config TDP Lock	**Disabled** Enabled	Lock the config TDP control register.
TCC Activation Offset	0-50 Default : **0**	Offset from the Intel factory Thermal Control Circuit (TCC) activation temperature. TCC activation will lower CPU core and graphics core frequency, voltage or both. The factory TCC activation temperature is normally 100C. By entering 10 for TCC offset, the TCC will be activated at 90C.
Intel TXT(LT) Support	**Disabled** Enabled	Enable or disable Intel(R) TXT(LT) support.
Debug Interface	**Disabled** Enabled	Enable or disable CPU debug feature.
Debug Interface Lock	**Disabled** Enabled	Lock CPU debug feature setting.
IOUT Offset Sign	0-1 **Default : 0**	0 means positive offset. 1 means negative offset.
IOUT Offset	0-625 **Default : 0**	VR IOUT offset configuration The range is 0 - 625.
IOUT Slope	0-1023 **Default : 512**	VR IOUT slope configuration The range is 0 - 1023.

8.4.9 SATA Submenu

Feature	Options	Description
SATA Controller(s)	**Enabled** Disabled	Enable or disable the onboard SATA controller(s).
SATA Mode Selection	**AHCI** RAID	Select SATA controller mode. RAID option is not supported on all chipsets.
SATA Test Mode	Enabled **Disabled**	Should be set to Disabled. Test Mode is used just for verification measurements.

Feature	Options	Description
Aggressive LPM Support	Enabled Disabled	Enable PCH to aggressively enter link power state.

SATA Controller Speed	**Default**
	Gen1
	Gen2
	Gen3
		Indicates the maximum speed the SATA controller can support.
		Default = maximum speed supported by the chipset
		Gen1 = 1.5 Gbit/s
		Gen2 = 3 Gbit/s
		Gen3 = 6 Gbit/s
		
		On conga-IC87, the supported maximum speed is 6 Gbit/s.

► Software Feature Mask Configuration	Submenu	RAID option ROM and Intel Rapid Storage Technology driver will refer to the Software Feature Mask Configuration to enable or disable the storage features.
Alternate ID	Enabled **Disabled**	Report alternate Device ID. Displayed just for RAID SATA Mode.
Serial ATA Port 0, 1, 2, 3	No option	Displays the name of the connected Hard Disk or DVDROM when the port is enabled. Empty is displayed when the port is disabled or when the port is enabled but nothing is connected to it. On conga-IC87 variants equipped with mainstream chipset, the SATA ports 2 and 3 are not available.
Software Preserve	No option	Displays whether the detected drive supports Software Settings Preservation.
SATA Port	Disabled **Enabled**	Enable or disable the relevant SATA port.
Hot Plug	**Disabled** Enabled	Select hot plug support for relevant SATA port.
External SATA	**Disabled** Enabled	Enable or disable external SATA support on relevant SATA port.
SATA Device Type	**Hard Disk Drive** Solid State Drive	Identify if the relevant SATA port is connected to solid state drive or hard disk drive.
Spin Up Device	**Disabled** Enabled	When enabled, the controller runs an initialization sequence for the connected device during startup at the relevant SATA port. Some hard disks and special Solid-state Drives (SSD) will function correctly only when this feature is enabled.

8.4.9.1 Software Feature Mask Configuration Submenu

Feature	Options	Description
RAID0	Disabled **Enabled**	Enable or disable RAID0 feature.
RAID1	Disabled **Enabled**	Enable or disable RAID1 feature.
RAID10	Disabled **Enabled**	Enable or disable RAID10 feature.
RAID5	Disabled **Enabled**	Enable or disable RAID5 feature.

Feature	Options	Description
Intel Rapid Recovery Technology	Disabled **Enabled**	Enable or disable Intel Rapid Recovery Technology.
Option ROM UI and Banner	Disabled **Enabled**	If enabled, then the Option ROM User Interface is shown. Otherwise, no Option ROM banner or information will be displayed if all disks and RAID volumes are normal.
HDD Unlock	Disabled **Enabled**	If enabled, indicates that the HDD password unlock in the OS is enabled.
LED Locate	Disabled **Enabled**	LED locate
IRRT Only on eSATA	Disabled **Enabled**	If enabled, then only Intel Rapid Recovery Technology (IRRT) volumes can span internal and external SATA (eSATA) drives. If disabled, then any RAID volume can span internal and eSATA drives.
Intel Smart Response Technology	Disabled **Enabled**	Enable or disable Intel Smart Response Technology.
Option ROM UI Delay	**2 Seconds** 4 Seconds 6 Seconds 8 Seconds	If enabled, indicates the delay of the option ROM user interface splash screen in a normal status.

8.4.10 Intel(R) Rapid Start Technology Submenu

Feature	Options	Description
Intel(R) Rapid Start Technology	**Disabled** Enabled	Enable or disable Intel(R) Rapid Start Technology.
No valid partition	No option	Warning message when the Intel(R) Rapid Start Technology is not completely set up.
Entry on S3 RTC Wake	Disabled **Enabled**	Rapid Start invocation upon S3 RTC wake.
Entry After	0-120 Default : **10**	Enable RTC wake timer at S3 entry. Value range is from 0 (immediately) to 120 minutes.
Active Page Threshold Support	**Disabled** Enabled	Support RST with small partition.
Active Memory Threshold	0-65535 Default : **0**	Try to support RST when partition size > Active Page Threshold size in MB. Value 0 means automatic mode.
Hybrid Hard Disk Support	**Disabled** Enabled	Hybrid Hard Disk Support
Rapid Start Display Save/ Restore	**Disabled** Enabled	Rapid Start Display Save/Restore
Rapid Start Display Type	**BIOS Save/Restore** Desktop Save/Restore	Rapid Start Display Type

8.4.11 Acoustic Management Submenu

Feature	Options	Description
Automatic Acoustic Management	Enabled **Disabled**	Enable or disable Automatic Acoustic Management (AAM) on optical or hard disk drives.
SATA Port 0 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Acoustic noise level and performance optimization of optical or hard disk drives Bypass: Use drive's preset value. Quiet: Drive is slower, but quieter. Max Performance: Drive is faster, but possibly noisier.
SATA Port 1 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.
SATA Port 2 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.
SATA Port 3 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.

Note

This menu displays only the SATA ports on which the optical or hard disk drive is detected.

8.4.12 USB Submenu

Feature	Options	Description
USB Devices	No option	Displays the detected USB devices.
xHCI Mode	Smart Auto **Auto** Enabled Disabled Manual	Smart Auto – The BIOS will store the USB mode set by the OS and at next boot the BIOS will set this previously used mode. At G3 boot (first boot after mechanical disconnection of the power supply) the USB ports will function identically as in Auto mode. Auto – All USB ports are initially set to operate in USB2.0 Mode and the USB3.0 OS driver (if available) will switch the USB3.0 capable ports to USB3.0 mode. If USB3.0 OS driver is not available then the ports will function correctly but will operate in USB2.0 mode. Enabled – USB2.0 and USB3.0 ports will function correctly in BIOS but will not function at all under OS if the USB3.0 OS driver is not installed. Disabled – All USB ports will function in USB2.0 mode only. No USB3.0 OS driver required. Manual – Using the settings under USB2.0 Pins Routing and USB3.0 Pins, the characteristics of the USB ports can be set individually.
EHCI (Ports USB0-7)	Disabled **Enabled**	Enable or disable EHCI (USB 2.0) controller. One EHCI controller must always be enabled.
USB2.0 Pins Routing	Route Per-Pin **Route all Pins to EHCI** Route all Pins to xHCI	Route USB2.0 pins to EHCI or xHCI controller.
USB2.0 Port 0 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 1 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 2 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 3 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 4 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 5 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 6 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 7 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB3.0 Pins	Select Per-Pin **Disable all Pins** Enable all Pins	Enable or disable xHCI SuperSpeed support.

Feature	Options	Description
USB3.0 Port 0 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
USB3.0 Port 1 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
Overcurrent Protection	**Disabled** Enabled	Enable or disable overcurrent protection chipset handling (e.g send operating system over-current condition information) on all USB ports
► USB Ports Per-Port Disable Control	Submenu	Individual disabling of USB ports
Legacy USB Support	**Enabled** Disabled Auto	Enable USB legacy support. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications and BIOS setup.
xHCI Hand-off	**Enabled** Disabled	This is a workaround for OSes without xHCI hand-off support. The xHCI ownership change should be claimed by xHCI OS driver.
EHCI Hand-off	**Disabled** Enabled	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI OS driver.
USB Mass Storage Driver Support	Disabled **Enabled**	Enable or disable USB mass storage driver support.
USB Transfer Timeout	1 sec 5 sec 10 sec **20 sec**	The timeout value for control, bulk, and interrupt transfers.
Device Reset Timeout	10 sec **20 sec** 30 sec 40 sec	USB mass storage device Start Unit command timeout.
Device Power -Up Delay Selection	**Auto** Manual	Define the maximum time a USB device might need before it properly reports itself to the host controller. Auto selects a default value which is 100ms for a root port or derived from the hub descriptor for a hub port.
Device Power -Up Delay Value	1-40 Default : **5**	Actual power-up delay value in seconds.
USB Mass Storage Device Name (Auto detected USB mass storage devices are listed here dynamically)	**Auto** Floppy Forced FDD Hard Disk CD-ROM	Every USB mass storage device that is enumerated by the BIOS will have an emulation type setup option. This option specifies the type of emulation the BIOS has to provide for the device. Note: The device’s formatted type and the emulation type provided by the BIOS must match for the device to boot properly. Select “Auto” to let the BIOS auto detect the current formatted media. If “Floppy” is selected then the device will be emulated as a floppy drive. “Forced FDD” allows a hard disk image to be connected as a floppy image. Works only for drives formatted with FAT12, FAT16 or FAT32. “Hard disk” allows the device to be emulated as hard disk. “CDROM” assumes the CD-ROM is formatted as bootable media, specified by the ‘El Torito’ Format Specification.

8.4.12.1 USB Ports Per-Port Disable Control Submenu

Feature	Options	Description
USB Ports Per-Port Disable Control	**Disabled** Enabled	Individual disabling of USB ports.
USB Port 0	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 1	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 2	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 3	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 4	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 5	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 6	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 7	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB3.0 Port 0	Disabled **Enabled**	Enable or disable the respective USB3.0 port.
USB3.0 Port 1	Disabled **Enabled**	Enable or disable the respective USB3.0 port.

8.4.13 SMART Settings Submenu

Feature	Options	Description
SMART Self Test	**Disabled** Enabled	Run SMART self test on all hard disk drives during POST. Self-Monitoring, Analysis and Reporting Technology (SMART) predicts hard disk drives degradation and/or faults.

8.4.14 Super I/O Submenu

Feature	Options	Description
SIO Clock	**24MHz** 48MHz	Select Super I/O base clock
PS/2 Keyboard/Mouse Support	**Disabled** Enabled	Enable or disable PS/2 keyboard/mouse controller support.
Serial Port 0	Disabled **Enabled**	Enable or disable serial port 0.
Device Settings	*IO=3F8h; IRQ=4;*	*Fixed configuration of serial port 0 if enabled.*
Serial Port 1	Disabled **Enabled**	Enable or disable serial port 1.
Device Settings	*IO=2F8h; IRQ=3;*	*Fixed configuration of serial port 1 if enabled.*
Parallel Port	**Disabled** Enabled	Enable or disable parallel port.
Device Settings	*IO=378h; IRQ=7;*	*Fixed configuration of the parallel port if enabled.*
Device Mode	**Standard Parallel Mode** EPP Mode ECP Mode EPP Mode & ECP Mode	Set the parallel port mode.

Note

This setup menu is only available if an external Winbond W83627 Super I/O has been implemented on the carrier board.

8.4.15 Serial Port Console Redirection Submenu

Feature	Options	Description
COM0 Console Redirection	**Disabled** Enabled	Enable or disable serial port 0 console redirection.
►Console Redirection Settings	Submenu	Opens console redirection configuration sub menu.
COM1 Console Redirection	**Disabled** Enabled	Enable or disable serial port 1 console redirection.
►Console Redirection Settings	Submenu	Opens console redirection configuration sub menu.

Note

The Serial Port Console Redirection can be enabled (functional) only if an external Super I/O offering UARTs has been implemented on the carrier board

8.4.15.1 Console Redirection Settings Submenu

Feature	Options	Description
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	Select terminal type.
Baudrate	9600, 19200, 38400, 57600, **115200**	Select baud rate.
Data Bits	7, **8**	Set number of data bits.
Parity	**None** Even Odd Mark Space	Select parity.
Stop Bits	**1** 2	Set number of stop bits.
Flow Control	**None** Hardware RTS/CTS	Select flow control.
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable VT-UTF8 combination key support for ANSI/VT100 terminals
Recorder Mode	**Disabled** Enabled	With recorder mode enabled, only text output will be sent over the terminal. This is helpful to capture and record terminal data.
Resolution 100x31	**Disabled** Enabled	Enables or disables extended terminal resolution.
Legacy OS Redirection Resolution	**80x24** 80x25	Number of rows and columns supported for legacy OS redirection.
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.
Redirection After BIOS POST	**Enabled** Disabled	Select whether serial redirection should be continued after POST.

8.4.16 UEFI Network Stack Submenu

Feature	Options	Description
UEFI Network Stack	**Disabled** Enabled	Enable or disable the UEFI network stack.
IPv4 PXE Support	Disabled **Enabled**	Enable IPv4 PXE boot support. If disabled IPv4 PXE boot option will not be created.
IPv6 PXE Support	Disabled **Enabled**	Enable IPv6 PXE boot support. If disabled IPv6 PXE boot option will not be created.

8.4.17 PC Speaker Configuration Submenu

Feature	Options	Description
Debug Beeps	Disabled **Enabled**	Enable or disable general debug/status beep generation.
Input Device Debug Beeps	**Disabled** Enabled	Enable or disable input device debug beeps.
Output Device Debug Beeps	**Disabled** Enabled	Enable or disable output device debug beeps.
USB Driver Beeps	**Disabled** Enabled	Enable or disable USB driver beeps.

8.4.18 Intel® Ethernet Connection I218-LM Submenu

Feature	Options	Description
► NIC Configuration	Submenu	Opens the NIC Configuration submen.
Blink LEDs	0-15 **Default : 0**	Sets how long (in seconds) the ethernet activity LEDs blink.
UEFI Driver	No option	Displays the UEFI Driver version.
Adapter PBA	No option	Displays the Adapter PBA.
Chip Type	No option	Displays the type of the Chip in which the Ethernet controller is integrated.
PCI Device ID	No option	Displays the PCI Device ID of the Ethernet controller.
Bus:Device:Function	No option	Displays the PCI Bus:Device:Function number of the Ethernet controller.
Link Status	No option	Displays the Link Status.
MAC Address	No option	Displays the MAC Address.

Note

The MAC address is also displayed in the submenu title.

8.4.18.1 NIC Configuration Submenu

Feature	Options	Description
Link Speed	**Auto Negotiated** 10 Mbps Half 10 Mbps Full 100 Mbps Half 100 Mbps Full	Specifies the port speed used for the selected boot protocol.
Wake On LAN	Disabled **Enabled**	Enables the server to be powered on using an in-band magic packet.

8.4.19 Intel® I210 Gigabit Network Connection Submenu

Feature	Options	Description
► NIC Configuration	Submenu	Opens the NIC Configuration submen.
Blink LEDs	0-15 **Default : 0**	Sets how long (in seconds) the ethernet activity LEDs blink.
UEFI Driver	No option	Displays the UEFI Driver version.
Adapter PBA	No option	Displays the Adapter PBA.
Chip Type	No option	Displays the type of the Chip in which the Ethernet controller is integrated.
PCI Device ID	No option	Displays the PCI Device ID of the Ethernet controller.
Bus:Device:Function	No option	Displays the PCI Bus:Device:Function number of the Ethernet controller.
Link Status	No option	Displays the Link Status.
MAC Address	No option	Displays the MAC Address.
Virtual MAC Address	No option	Displays the programmatically assignable MAC Address.

Note

The MAC address is also displayed in the submenu title.

8.4.19.1 NIC Configuration Submenu

Feature	Options	Description
Link Speed	**Auto Negotiated** 10 Mbps Half 10 Mbps Full 100 Mbps Half 100 Mbps Full	Specifies the port speed used for the selected boot protocol.
Wake On LAN	Disabled **Enabled**	Enables the server to be powered on using an in-band magic packet.

8.5 Chipset Setup

Select the Chipset tab from the setup menu to enter the Chipset BIOS Setup screen. The menu is used for setting chipset features.

Main	Advanced	Chipset	Boot	Security	Save & Exit
	Platform Controller Hub (PCH)				
	Processor (Integrated Components)				

8.5.1 Platform Controller Hub (PCH) Submenu

Feature	Options	Description
Intel PCH SKU Name	No option	Displays the SKU Name of the PCH.
PCI Express Clock Gating	**Disabled** Enabled	Enable or disable PCI Express clock gating for each root port.
DMI Link ASPM PCH Side	**Disabled** Enabled	Active State Power Management (ASPM) of DMI link PCH side. DMI link is the main bus between the Processor and Platform Controller Hub (PCH).
DMI Link Extended Synch Control	**Disabled** Enabled	The control of extended synch on PCH side of the DMI link.
Isolate SMBus Segments	**Never** During POST Always	Allows to cut off the off-board SMBus segment. This can be a workaround for external SMBus devices that do not conform to specification.
PCIe-USB Glitch W/A	**Disabled** Enabled	PCIe-USB glitch W/A for bad USB device(s) connected behind PCIe/PEG port.
USB Precondition	**Disabled** Enabled	Precondition work on USB host controller and root ports for faster enumeration.
xHCI Idle L1	**Enabled** Disabled	Enable or disable xHCI Idle L1. The xHCI Idle L1 should be set to 'Disabled' for PCH Ax stepping (early prototype) to work around USB3.0 hot plug failure after one hot plug removal.

Feature	Options	Description
BTCG	**Enabled** Disabled	Enable or disable USB related trunk clock gating.
HDA Controller	Disabled Enabled **Auto**	Control activation of the HDA controller device. Disabled = HDA Controller will be unconditionally disabled. Enabled = HDA Controller will be unconditionally enabled. Auto = HDA Controller will be enabled if HDA codec present, disabled otherwise.
HDA PME	**Disabled** Enabled	Enable or disable the power management capability of the audio controller.
PCH LAN Controller	**Enabled** Disabled	Enable or disable the onboard, PCH integrated ethernet controller.
Wake on LAN	**Enabled** Disabled	Enable or disable the wake on LAN capability of the onboard, PCH integrated ethernet controller.
SLP_LAN# Low on DC Power	Disabled **Enabled**	Enable or disable SLP_LAN# low on DC power.

Board Capability	**SUS_PWR_DN_ACK**
	DeepSx
		SUS_PWR_DN_ACK = Send disabled to PCH.
		DeepSx = Show DeepSx policies.

DeepSx Power Policies	**Disabled** Enabled in S5/Battery Enabled in S4-S5/Battery Enabled in S3-S4-S5/Battery Enabled in S5 Enabled in S4-S5 Enabled in S3-S4-S5	Configure the DeepSx mode. Activate DeepSx transition in general or in DC/battery powered mode only for selected Sx state.
GP27 Wake From DeepSx	Disabled **Enabled**	Wake from DeepSx by the assertion of GP27 pin.
PCIe Wake From DeepSx	**Disabled** Enabled	Wake from DeepSx by the assertion of PCIe.
Serial IRQ Mode	Quiet **Continuous**	Configure serial IRQ mode.
SB CRID	**Disabled** Enabled	Enable or disable southbridge compatible revision ID support.
PCH Cross Throttling	**Disabled** Enabled	Enable or disable the PCH cross throttling feature.
SLP_S4 Assertion Width	Disabled 1-2 Seconds 2-3 Seconds 3-4 Seconds **4-5 Seconds**	Select a minimum assertion width of the SLP_S4# signal.
Port 80h Redirection	**LPC Bus** PCIe Bus	Control where the port 80h cycles are sent.

8.5.2 Processor (Integrated Components) Submenu

Feature	Options	Description
Processor Codename	No option	Displays the Processor codename.
VT-d Capability	No option	Displays whether the VT-d is supported by the Processor.
VT-d	Disabled **Enabled**	Enable or disable VT-d support. Displayed only if the VT-d capability is supported by the Processor.
Thermal Device (B0:D4:F0)	Enabled **Disabled**	Enable or disable thermal device.
Audio Device (B0:D3:F0)	**Enabled** Disabled	Enable or disable the integrated audio device in the Processor.
NB CRID	**Disabled** Enabled	Enable or disable Northbridge compatible revision ID support.
BDAT ACPI Table Support	Enabled **Disabled**	Enable support for the BDAT ACPI table.
▶ DMI Configuration	Submenu	Control various DMI functions. DMI link is the main, but exclusively internal bus between the Processor and Platform Controller Hub (PCH).
▶ Memory Configuration	Submenu	Memory configuration parameters
▶ GT - Power Management Control	Submenu	Processor Graphics Controller (GT) power management control options

8.5.2.1 DMI Configuration Submenu

Feature	Options	Description
DMI	No option	Displays the DMI bus characteristics.
DMI Vc1 Control	Enabled **Disabled**	Enable or disable DMI Vc1.
DMI Vcp Control	**Enabled** Disabled	Enable or disable DMI Vcp.
DMI Vcm Control	**Enabled** Disabled	Enable or disable DMI Vcm.
DMI Link ASPM Processor Side	**Disabled** L0s L1 L0sL1	Active State Power Management (ASPM) of the DMI link on the Processor side. DMI link is the main bus between the Processor and Platform Controller Hub (PCH).
DMI Extended Synch Control	Enabled **Disabled**	Enable or disable DMI extended synchronization.
DMI Gen 2	**Auto** Enabled Disabled	Enable or disable DMI Gen2.

Feature	Options	Description
DMI De-emphasis Control	**-6 dB** -3.5 dB	Configure the de-emphasis control on DMI.
DMI IOT	Enabled **Disabled**	Enable or disable DMI IOT.

8.5.2.2 Memory Configuration Submenu

Feature	Options	Description
Memory Frequency	No option	Displays the memory frequency.
Total Memory	No option	Displays the total amount of installed memory.
Memory Voltage	No option	Displays the memory voltage.
DIMM#0 (Bottom)	No option	Displays bottom memory socket DIMM information.
DIMM#2 (Top)	No option	Displays top memory socket DIMM information.
CAS Latency (tCL)	No option	Displays the CAS Latency (tCL).
CAS to RAS (tRCDmin)	No option	Displays the CAS to RAS (tRCDmin).
Row Precharge (tRPmin)	No option	Displays the Row Precharge (tRPmin).
Active to Precharge (tRASmin)	No option	Displays the Active to Precharge (tRASmin).
DIMM Profile	**Default DIMM Profile** Custom Profile XMP Profile 1 XMP Profile 2	Select the DIMM timing profile that should be used. XMP profiles cannot work on current modules and MUST not be selected. **CAUTION:** For congatec internal debugging only. DO NOT CHANGE.
► Custom Profile Control	Submenu	Configure the custom DIMM profile options. **CAUTION:** For congatec internal debugging only. DO NOT CHANGE.
Memory Frequency Limiter	**Auto**, 1067,1333, 1600, 1867, 2133, 2400, 2667	Maximum memory frequency selections in [MHz] (Hidden if DIMM profile is set to 'Custom Profile').
DDR Reset Wait Time	0-3000000 **Default : 0**	The amount of time (in nano seconds) to wait for switch DDR voltage.
Max TOLUD	**Dynamic**, 1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB	Maximum value of TOLUD Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
Enh Interleave Support	Disabled **Enabled**	Enable or disable Enhanced Interleave support.
RI Support	Disabled **Enabled**	Enable or disable Rank Interleave support. Note: RI and HORI cannot be enabled at the same time.
DLL Weak Lock Support	Disabled **Enabled**	Enable or disable DLL weak lock support.

Feature	Options	Description
Mc Lock	Disabled **Enabled**	Enable or disable capacity to lock MC registers or not.
Ch Hash Support	Disabled **Enabled**	Enable or disable channel hash support. Note: Only if memory interleaved mode.
Ch Hash Mask	1-0x3FFF **Default : 0x30CE**	Set the bit(s) to be included in the XOR function. Note: Bit mask corresponds to bits[19:6].
Ch Hash Interleaved Bit	BIT06, **BIT07**, BIT08, BIT09	Select the bit to be used for channel interleaved mode. Note: BIT07 will interleave the channels at a 2 cacheline granularity, BIT08 at 4 and BIT09 at 8.
NMode Support	**Auto** 1N Mode 2N Mode	NMode support option
Memory Scrambler	**Enabled** Disabled	Enable or disable memory scrambler support.
RMT Crosser Support	Enabled **Disabled**	Enable or disable RMT crosser support.
MRC Fast Boot	**Enabled** Disabled	Enable or disable MRC fast boot.
DIMM Exit Mode	**Auto** Slow Exit Fast Exit	DIMM Exit Mode control
Power Down Mode	No Power Down APD PPD PPD-DLLoff APD-PPD Auto	Power Down Mode control Default is: Auto - when DIMM Exit Mode is set to Slow Exit and PPD - when DIMM Exit Mode is set to Fast Exit.
Memory Remap	**Enabled** Disabled	Enable or disable memory remap above 4G.
GDXC Support	Enabled **Disabled**	Enable or disable GDXC support.

8.5.2.3 GT - Power Management Control Submenu

Feature	Options	Description
Processor Graphics Controller Info	No option	Displays the Processor Graphics Controller Info.
RC6 (Render Standby)	Disabled **Enabled**	Check to enable render standby support.

Feature	Options	Description
GT Overclocking Support	**Disabled** Enabled	Enable or disable GT overclocking support.
GT Overclocking Frequency	0-255 **Default : 22**	Overclocked RP0 frequency (MLCClk) in multiples of 50 MHz.
GT Overclocking Voltage	0-255 **Default : 0**	Extra voltage needed above the original RP0 voltage. The unit is 1/256 volt.

8.6 Boot Setup

Select the Boot tab from the setup menu to enter the Boot setup screen.

8.6.1 Boot Settings Configuration

Feature	Options	Description
Quiet Boot	**Disabled** Enabled	*Disabled* displays normal POST diagnostic messages. *Enabled* displays OEM logo instead of POST messages. *Note: The default OEM logo is a dark screen.*
Setup Prompt Timeout	**1** 0 - 65535	Number of seconds to wait for setup activation key. 0 means no wait for fastest boot (not recommended), 65535 means infinite wait.
Bootup NumLock State	**On** Off	Select the keyboard numlock state.
System Off Mode	**G3/Mech Off** S5/Soft Off	Define system state after shutdown when a battery system is present.
Power Loss Control	**Remain Off** Turn On Last State	Specifies the mode of operation if an AC power loss occurs. *Remain Off* keeps the power off until the power button is pressed. *Turn On* restores power to the computer. *Last State* restores the previous power state before power loss occurred. *Note: Only works with an ATX type power supply.*
AT Shutdown Mode	System Reboot **Hot S5**	Determines the behavior of an AT-powered system after a shutdown.
Enter Setup If No Boot Device	No **Yes**	Select whether the setup menu should be started if no boot device is connected.
Enable Popup Boot Menu	No **Yes**	Select whether the popup boot menu can be started.
Boot Priority Selection	UEFI Standard **Type Based**	Set boot priority selection method. UEFI Standard: Determine boot priority by specific device selection. Devices must be present. **Note:** The Priority will change if devices are removed or added. Type Based: Determine boot priority by device type.

Feature	Options	Description
Bootloader Type Priority	UEFI First **Legacy First**	Set the bootloader type with higher priority. The selected bootloader type will be tried first. UEFI First: The UEFI bootloader will be tried first Legacy First: The legacy bootloader devices will be tried first.
1st, 2nd, 3rd, ... Boot Device (Up to 12 boot devices can be prioritized if "UEFI Standard" priority list control is selected. If "Type Based" priority list control is enabled, only 8 boot devices can be prioritized.)	Disabled SATA 0 Drive SATA 1 Drive USB Harddisk USB CDROM Other USB Device Onboard SD Card Storage Onboard LAN External LAN Firmware-based UEFI Bootloader Other Device	This view is only available when in the default "Type Based" mode. When in "UEFI Standard" mode you will only see the devices that are currently connected to the system.
► CSM & Option ROM Control	Submenu	Opens submenu which controls the execution of UEFI and legacy option ROMs.
UEFI Fast Boot	**Disabled** Enabled	Enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS / legacy boot options.
SATA Support	Last Boot HDD Only, All SATA Devices **HDD Only**	
VGA Support	Auto **UEFI Driver**	If set to Auto, the legacy video option ROM will be installed for legacy OS boot; boot logo will NOT be shown during POST. For UEFI OS boot the UEFI GOP driver will be installed.
USB Support	Disabled Full Init **Partial Init**	If set to Disabled, no USB device will be available before OS boot. If set to Partial Init, specific USB ports/devices will NOT be available before OS boot. If set to Enabled, all USB devices will be available during POST and after OS boot.
PS/2 Device Support	Disabled **Enabled**	If set to Disabled, PS/2 devices will be skipped.
Network Stack Driver Support	**Disabled** Enabled	If set to Disabled, the UEFI network stack driver installation will be skipped.

Note

The term 'AC power loss' stands for the state when the module looses the standby voltage on the 5V_SB pins. On congatec modules, the standby voltage is continuously monitored after the system is turned off. If within 30 seconds the standby voltage is no longer detected, then this is considered an AC power loss condition. If the standby voltage remains stable for 30 seconds, then it is assumed that the system was switched off properly.

8.6.1.1 CSM & Option ROM Control Submenu

Feature	Options	Description
Launch CSM	**Enabled** Disabled	Controls the execution of the CSM module. Only disable for pure UEFI operating system support.
Boot Option Filter	**UEFI and Legacy** Legacy Only UEFI Only	Controls which devices / boot loaders the system should boot to.
PXE Option ROM Launch Policy	**Do Not Launch** UEFI ROM Only Legacy ROM Only Legacy ROM First UEFI ROM First	Controls the execution of UEFI and legacy PXE option ROMs.
Storage Option ROM Launch Policy	Do Not Launch UEFI ROM Only **Legacy ROM Only** Legacy ROM First UEFI ROM First	Controls the execution of UEFI and legacy mass storage device option ROMs.
Video Option ROM Launch Policy	Do Not Launch UEFI ROM Only **Legacy ROM Only** Legacy ROM First UEFI ROM First	Controls the execution of UEFI and legacy video option ROMs.
Other Option ROM Launch Policy	**UEFI ROM Only** Legacy ROM Only	Controls the execution of option ROMs for PCI / PCI Express devices other than network, mass storage or video.
GateA20 Active	**Upon Request** Always	Gate A20 control. Upon Request: Gate A20 can be disabled using BIOS services. Always: Do not allow disabling Gate A20 This option is useful when any runtime code is executed above 1MB.
Option ROM Messages	**Force BIOS** Keep Current	Set display mode for option ROMs.
INT19 Trap Response	**Immediate** Postponed	BIOS reaction on INT19 trapping by Option ROM Immediate: Execute the trap right away. Postponed: Execute the trap during legacy boot.

8.7 Security Setup

Select the Security tab from the setup menu to enter the Security setup screen.

8.7.1 Security Settings

Feature	Options	Description
BIOS Password	Enter password	Specifies the BIOS and setup administrator password
BIOS Lock	Disabled **Enabled**	Enable or disable BIOS Lock Enable (BLE) and SMM BIOS Write Protect (SMM_BWP) bits. Once enabled, BIOS flash write accesses are only possible via dedicated BIOS SMM interfaces.
BIOS Update & Write Protection	**Disabled** Enabled	Enable or disable BIOS write protection. When enabled, the congatec flash software will require BIOS password for write and erase operations.
HDD Security Configuration		
List of all detected hard disks supporting the security feature set	Select device to open device security configuration submenu	
► Secure Boot Menu	Submenu	

8.7.1.1 BIOS Security Features

Refer to section 9.6.1.1 for more information.

8.7.1.2 Hard Disk Security Features

Refer to section 9.6.1.2 for more information.

8.8 Save & Exit Menu

Select the Save & Exit tab from the setup menu to enter the Save & Exit setup screen.

You can display a Save & Exit screen option by highlighting it using the <Arrow> keys.

Feature	Description
Save Changes and Exit	Exit setup menu after saving the changes. The system is only reset if settings have been changed.
Discard Changes and Exit	Exit setup menu without saving any changes.
Save Changes and Reset	Save changes and reset the system.

Feature	Description
Discard Changes and Reset	Reset the system without saving any changes.
Save Options	
Save Changes	Save changes made so far to any of the setup options. Stay in setup menu.
Discard Changes	Discard changes made so far to any of the setup options. Stay in setup menu.
Restore Defaults	Restore default values of all the setup options.
▶ **Boot Override**	
List of all boot devices currently detected.	Select device to leave setup menu and boot from the selected device. Only visible and active if Boot Priority Selection setup node is set to "Device Based".

9 conga-IC97 BIOS Setup Description

The following section describes the BIOS setup program. The BIOS setup program can be used to view and change the BIOS settings for the module. Only experienced users should change the default BIOS settings.

9.1 Entering the BIOS Setup Program.

The BIOS setup program can be accessed by pressing the <DEL> or <F2> key during POST.

9.1.1 Boot Selection Popup

Press the <F11> key during POST to access the Boot Selection Popup menu. A selection menu displays immediately after POST, allowing the operator to select either the boot device that should be used or an option to enter the BIOS setup program.

9.2 Setup Menu and Navigation

The congatec BIOS setup screen is composed of the menu bar, left frame and right frame. The menu bar is shown below:

Main Advanced Chipset Security Boot Save & Exit

The left frame displays all the options that can be configured in the selected menu. Grayed-out options cannot be configured. Only the blue options can be configured. When an option is selected, it is highlighted in white.

The right frame displays the key legend. Above the key legend is an area reserved for text messages. These text messages explain the options and the possible impacts when changing the selected option in the left frame.

Note

Entries in the option column that are displayed in bold indicate BIOS default values.

The setup program uses a key-based navigation system. Most of the keys can be used at any time while in setup. The table below explains the supported keys:

Key	Description
← → Left/Right	Select a setup menu (e.g. Main, Boot, Exit).
↑ ↓ Up/Down	Select a setup item or sub menu.
+ - Plus/Minus	Change the field value of a particular setup item.
Tab	Select setup fields (e.g. in date and time).
F1	Display General Help screen.
F2	Load previous settings.
F9	Load optimal default settings.
F10	Save changes and exit setup.
ESC	Discard changes and exit setup.
ENTER	Display options of a particular setup item or enter submenu.

9.3 Main Setup Screen

When you first enter the BIOS setup, you will enter the main setup screen. The main setup screen reports BIOS, processor, memory and board information and is for configuring the system date and time. You can always return to the main setup screen by selecting the 'Main' tab.

Feature	Options	Description
Main BIOS Version	No option	Displays the main BIOS version.
OEM BIOS Version	No option	Displays the additional OEM BIOS version.
Build Date	No option	Displays the date the BIOS was built.
Product Revision	No option	Displays the hardware revision of the board.
Serial Number	No option	Displays the serial number of the board.
BC Firmware Revision	No option	Displays the firmware revision of the congatec board controller.
MAC Address (1st Ethernet)	No option	Displays the MAC address of the onboard Ethernet controller.
MAC Address (2nd Ethernet)	No option	Displays the MAC address of the onboard i210/i211 Ethernet controller.
Boot Counter	No option	Displays the number of boot-ups. (max. 16777215).
Running Time	No option	Displays the time the board is running [in hours max. 65535].
► Platform Information	Submenu	Opens the platform information submenu.
System Date	Day of week, month/ day/year	Specifies the current system date *Note: The date is in month/day/year format.*
System Time	Hour:Minute:Second	Specifies the current system time. *Note: The time is in 24 hour format.*

9.3.1 Platform Information Submenu

The platform information submenu offers additional hardware and software information.

Feature	Options	Description
Processor Information	No option	Subtitle
Processor Type	No option	Displays the processor ID string. The “Processor Type” text itself is not displayed just the ID string.
Codename	No option	Displays the processor codename
Processor Speed	No option	Displays the processor speed.
Processor Signature	No option	Displays the processor signature.
Stepping	No option	Displays the processor stepping.
Processor Cores	No option	Displays the number of processor cores.
Microcode Revision	No option	Displays the processor microcode revision .
IGD HW Version	No option	Displays the version of the graphics controller.
IGD VBIOS Version	No option	Displays the video BIOS version.
Total Memory	No option	Displays the total amount of installed memory.
PCH Information	No option	Subtitle
Codename	No option	Displays the codename of the platform controller hub (PCH).
PCH SKU	No option	Displays the SKU name of the PCH.
Stepping	no option	Displays the PCH stepping
ME FW Version	no option	Displays the ME FW version when available
ME Firmware SKU	no option	Displays the ME Firmware SKU when available

9.4 Advanced Setup

Select the advanced tab from the setup menu to enter the advanced BIOS setup screen. The menu is used for setting advanced features and only features described within this user’s guide are listed.

Main	Advanced	Chipset	Boot	Security	Save & Exit
	Graphics				
	Watchdog				
	Hardware Health Monitoring				
	CPU				
	Trusted Computing				

Main	Advanced	Chipset	Boot	Security	Save & Exit
	RTC Wake				
	ACPI				
	PCH-FW				
	AMT				
	Acoustic Management				
	SMART Settings				
	Super IO				
	Serial Port Console Redirection				
	SATA				
	PCI & PCI Express				
	UEFI Network Stack				
	CSM & Option ROM Control				
	USB				
	PC Speaker				
	Intel(R) Ethernet Connection I218-LM				
	Intel(R) I211 Gigabit Network Connection				
	Intel(R) Rapid Storage Technology				

Note

The PCH-FW and AMT are not displayed if the features are disabled.

The Intel(R) Rapid Storage Technology displays only if the SATA Mode Selection feature in SATA submenu is set to "RAID" and the Storage Option ROM Launch Policy feature in the CSM & Option ROM Control submenu is set to "UEFI ROM Only".

9.4.1 Graphics Submenu

Feature	Options	Description
Primary Graphics Device	**Auto** IGD PCI/PCIe	Select primary graphics adapter to be used during boot up. Auto: BIOS will select it automatically. IGD: Internal Graphics Device (IGD) located in chipset. PCI/PCIe: PCI/PCIe graphics card attached to some other (not PEG) PCI/PCIe port.
Internal Graphics Device	**Auto** Disabled Enabled	Enable or disable Internal Graphics Device (IGD).

Feature	Options	Description
IGD Pre-Allocated Graphics Memory	**32M**, 64M, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M, 1024M	Select amount of pre-allocated (fixed) graphics memory used by the Internal Graphics Device.
IGD Total Graphics Memory	128MB **256MB** MAX	Select amount of total graphics memory that may be used by the Internal Graphics Device. Memory above the fixed graphics memory will be dynamically allocated by the graphics driver according to DVMT 5.0 specification. MAX = Use as much graphics memory as possible. Depends on total system memory installed and the operating system used (see DVMT 5.0 specification).
Primary IGD Boot Display Device	**Auto** LFP EFP EFP2	Select the Primary IGD display device(s) used for boot up. LFP (Local Flat Panel) selects a LVDS panel connected to the integrated LVDS port. EFPx (External Flat Panel) selects a HDMI/DVI or DisplayPort device connected to the Digital Display Interfaces DDI1 and DDI2. Examples for EFPx name assignment to DDI1, DDI2: 1. If only DDI2 is enabled then the EFP name is assigned to DDI2. 2. If both port DDI1 and DDI2 are enabled then EFP is assigned to DDI1 and EFP2 is assigned to DDI2. EFP selections are valid only when DDI1 or/and DDI2 are enabled.
Secondary IGD Boot Display Device	**Disabled** LFP EFP EFP2	Select the Secondary IGD display device(s) used for boot up. VGA modes will be supported only on Primary display. For other details see Primary IGD Boot Display Device.
Active LFP Configuration	No Local Flat Panel **Integrated LVDS** eDP	Select the active local flat panel configuration.
Always Try Auto Panel Detect	**No** Yes	If set to 'Yes' the BIOS will first look for an EDID data set in an external EEPROM to configure the Local Flat Panel. Only if no external EDID data set can be found, the data set selected under 'Local Flat Panel Type' will be used as a fallback data set.

Feature	Options	Description
Local Flat Panel Type	**Auto** VGA 640x480 1x18 (002h) VGA 640x480 1x18 (013h) WVGA 800x480 1x18 (01Fh) WVGA 800x480 1x24 (01Bh) SVGA 800x600 1x18 (01Ah) XGA 1024x768 1x18 (006h) XGA 1024x768 2x18 (007h) XGA 1024x768 1x24 (008h) XGA 1024x768 2x24 (012h) WXGA 1280x800 1x18 (01Eh) WXGA 1280x768 1x24 (01Ch) SXGA 1280x1024 2x24 (00Ah) SXGA 1280x1024 2x24 (018h) UXGA 1600x1200 2x24 (00Ch) HD 1920x1080 2x24 (01Dh) WUXGA 1920x1200 2x18 (015h) WUXGA 1920x1200 2x24 (00Dh) Customized EDID™ 1 Customized EDID™ 2 Customized EDID™ 3	Select a predefined LFP type or choose Auto to let the BIOS automatically detect and configure the attached LVDS panel. Auto detection is performed by reading an EDID data set via the video I²C bus. The number in brackets specifies the congatec internal number of the respective panel data set. *Note: Customized EDID™ utilizes an OEM defined EDID™ data set stored in the BIOS flash device.*
Backlight Inverter Type	None **PWM** I2C	Select the type of backlight inverter used. PWM = Use IGD PWM signal. I2C = Use I2C backlight inverter device connected to the video I²C bus.
PWM Inverter Polarity	**Normal** Inverted	Select PWM inverter polarity. Only visible if Backlight Inverter Type is set to PWM .
PWM Inverter Frequency (Hz)	**200** - 40000	Set the PWM inverter frequency in Hz. Only visible if Backlight Inverter Type is set to PWM.
Backlight Setting	0%, 10%, 25%, 40%, 50%, 60%, 75%, 90%, **100%**	Actual backlight value in percent of the maximum setting.
Inhibit Backlight	**No** Permanent Until End Of POST	Decide whether the backlight on signal should be activated when the panel is activated or whether it should remain inhibited until the end of BIOS POST or permanently.
Invert Backlight Setting	**No** Yes	Allow to invert backlight control values if required for the actual I2C type backlight hardware controller.
LVDS SSC	**Disabled**, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%	Configure LVDS spread spectrum clock modulation depth with center spreading and fixed modulation frequency of 32.9kHz.
Digital Display Interface 1 (DDI1)	**Auto Selection** Disabled Display Port HDMI/DVI	Select the output type of the digital display interface.

Feature	Options	Description
Digital Display Interface 2 (DDI2)	**Auto Selection** Disabled Display Port HDMI/DVI	Select the output type of the digital display interface.
Intel (R) GOP Driver	No option	The Intel (GOP) Driver, Output Device and BIST Enable features are only visible if GOP driver is configured to be used in the 'Video Option ROM Launch Policy' setup node.
Output Device	Options depend on detected display devices	Configure graphics output interface when using the UEFI Graphics Output Protocol (GOP) driver instead of the legacy video BIOS.
BIST Enable	**Disabled** Enabled	Starts or stops the BIST (built in self test) on the integrated display panel.

9.4.2 Watchdog Submenu

Feature	Options	Description
POST Watchdog	**Disabled** 30sec 1min 2min 5min 10min 30min	Select the timeout value for the POST watchdog. The watchdog is only active during the power-on-self-test of the system and provides a facility to prevent errors during boot up by performing a reset.
Stop Watchdog for User Interaction	No **Yes**	Select whether the POST watchdog should be stopped during the popup boot selection menu or while waiting for setup password insertion.
Runtime Watchdog	**Disabled** One-time Trigger Single Event Repeated Event	Selects the operating mode of the runtime watchdog. This watchdog will be initialized just before the operating system starts booting. If set to '*One-time Trigger*' the watchdog will be disabled after the first trigger. If set to '*Single Event*', every stage will be executed only once, then the watchdog will be disabled. If set to '*Repeated Event*' the last stage will be executed repeatedly until a reset occurs.
Delay	**Disabled** 10sec 30sec 1min 2min 5min 10min 30min	Select the delay time before the runtime watchdog becomes active. This ensures that an operating system has enough time to load.
Event 1	ACPI Event **Reset** Power Button	Selects the type of event that will be generated when timeout 1 is reached. For more information about ACPI Event, see note below.

Feature	Options	Description
Event 2	**Disabled** ACPI Event Reset Power Button	Selects the type of event that will be generated when timeout 2 is reached.
Event 3	**Disabled** ACPI Event Reset Power Button	Selects the type of event that will be generated when timeout 3 is reached.
Timeout 1	1sec 2sec 5sec 10sec **30sec** 1min 2min 5min 10min 30min	Selects the timeout value for the first stage watchdog event.
Timeout 2	See above	Selects the timeout value for the second stage watchdog event.
Timeout 3	See above	Selects the timeout value for the third stage watchdog event.
Watchdog ACPI Event	**Shutdown** Restart	Select the operating system event that is initiated by the watchdog ACPI event. These options perform a critical but orderly operating system shutdown or restart.

Note

In ACPI mode, it is not possible for a "Watchdog ACPI Event" handler to directly restart or shutdown the OS. For this reason the congatec BIOS will do one of the following:

For Shutdown: An over temperature notification is executed. This causes the OS to shut down in an orderly fashion.

For Restart: An ACPI fatal error is reported to the OS.

9.4.3 Hardware Health Monitoring Submenu

Feature	Options	Description
CPU Temperature	No option	Displays the CPU temperature of the actual module in °C.
System Temperature	No option	Displays the system temperature of the actual module in °C.
Board Temperature	No option	Displays the board temperature of the actual module in °C.

Feature	Options	Description
DC Input Voltage	No option	Displays the actual voltage of the standard DC power supply.
DC Input Current	No option	Displays the module's input current from DC standard voltage.
5V Standard	No option	Displays the actual voltage of the 5V standard power rail.
5V Standby	No option	Displays the actual voltage of the 5V standby power rail.
3V Standard	No option	Displays the actual voltage of the 3V standard power rail.
3V Standby	No option	Displays the actual voltage of the 3V standby power rail.
1.05V	No option	Displays the actual voltage of the 1.05V power rail.
CPU Fan Speed	No option	Displays the actual CPU fan speed in RPM.
System Fan Speed	No option	Displays the actual system fan speed in RPM.
► CPU & System Fan Control	Submenu	Configure the CPU and system's fan control submenu

9.4.3.1 CPU & System Fan Control Submenu

Feature	Options	Description
Fan Output Step Down Time	1-255 **Default: 1**	Amount of time it takes the fan output to decrease its value by one step (Range: 1-255 in 0.1s units).
Fan Output Step Up Time	1-255 **Default: 1**	Amount of time it takes the fan output to increase its value by one step (Range: 1-255 in 0.1s units).
CPU Fan Mode	Manual Mode **Thermal Cruise Mode** SMART FAN III Mode	Select fan speed control method. Thermal Cruise Mode and SMART FAN III Mode provide options for automatic temperature dependent fan control.
CPU Fan Manual Mode Options		
CPU Fan PWM Output Value	0-255 **Default: 255**	Set CPU fan PWM output value (Range: 0-255 = 0%-100% of maximum RPM).
CPU Fan Thermal Cruise Mode		
CPU Fan Target Temperature	0-127 **Default: 60**	Set CPU fan control CPU target temperature (Range: 0-127 degrees C).
CPU Fan Temp. Tolerance	0-15 **Default: 3**	Set CPU fan control target temperature tolerance (Range: +/- 0-15 degrees C).
CPU Fan Start-Up Value	0-255 **Default: 128**	In Thermal Cruise mode, the CPU fan output value increases from zero to this value to provide a minimum value to turn on the fan (Range: 0-255).
CPU Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise or SMART FAN III mode, the CPU fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
CPU Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise or SMART FAN III mode, this determines the amount of time it takes the CPU fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).

Feature	Options	Description
CPU Fan SMART FAN III Mode		
CPU Fan Target Temperature	0-127 **Default: 60**	Set CPU fan control CPU target temperature (Range: 0-127 degrees C).
CPU Fan Temp. Tolerance	0-15 **Default: 3**	Set CPU fan control target temperature tolerance (Range: +/- 0-15 degrees C).
CPU Fan Max. Output Value	1-255 **Default: 255**	In SMART FAN III mode, the CPU fan output value increases up to this value. This value cannot be zero, and it cannot be lower than the CPU Fan Stop Value (Range: 1-255).
CPU Fan Output Step Value	1-255 **Default: 64**	In SMART FAN III mode, the CPU fan output value decreases or increases by this value, when needed (Range: 1-255).
CPU Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise or SMART FAN III mode, the CPU fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
CPU Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise or SMART FAN III mode, this determines the amount of time it takes the CPU fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).
CPU Fan PWM Input Clock	**24MHz** 180kHz	Select base input clock for CPU fan PWM.
CPU Fan PWM Clock Divider	1-127 **Default: 4**	Addon input clock divider (1-127). PWM output frequency = (Input Clock / 256)/Divider
System Fan Mode	Manual Mode **Thermal Cruise Mode**	Select fan speed control method. Thermal Cruise Mode provides options for automatic temperature dependent fan control.
System Fan Manual Mode Options		
System Fan PWM Output Value	0-255 **Default: 255**	Set system fan PWM output value (Range: 0-255 = 0%-100% of maximum RPM).
System Fan Thermal Cruise Mode		
System Fan Target Temperature	0-127 **Default: 60**	Set system fan control system target temperature (Range: 0-127 degrees C).
System Fan Temp. Tolerance	0-15 **Default: 3**	Set system fan control target temperature tolerance (Range: +/- 0-15 degrees C).
System Fan Start-Up Value	0-255 **Default: 128**	In Thermal Cruise mode, the system fan output value increases from zero to this value to provide a minimum value to turn on the fan (Range: 0-255).
System Fan Stop Value	0-255 **Default: 0**	In Thermal Cruise mode, the system fan output value decreases to this value if the temperature stays below the low temperature limit (Range: 0-255).
System Fan Stop Time	1-255 **Default: 10**	In Thermal Cruise mode, this determines the amount of time it takes the system fan output value to fall from the stop value to zero (Range: 1-255 in 0.1s units).

Feature	Options	Description
System Fan PWM Input Clock	**24MHz** 180kHz	Select base input clock for system fan PWM.
System Fan PWM Clock Divider	1-127 **Default: 4**	Addon input clock divider (1-127). PWM output frequency = (Input Clock / 256)/Divider

9.4.4 CPU Submenu

Feature	Options	Description
Processor Type	no option	Displays the processor ID string. The "Processor Type" is not displayed, just the ID string.
CPU Signature	no option	Displays the CPU Signature.
Microcode Patch	no option	Displays the revision of the Microcode Patch.
Max CPU Speed	no option	Displays the Max CPU Speed.
Min CPU Speed	no option	Displays the Min CPU Speed.
CPU Speed	no option	Displays the current CPU Speed.
Processor Cores	no option	Displays the number of the Processor Cores.
Intel HT Technology	no option	Displays whether Intel HT Technology is supported.
Intel VT-x Technology	no option	Displays whether Intel VT-x Technology is supported.
Intel SMX Technology	no option	Displays whether Intel SMX Technology is supported.
64-bit	no option	Displays whether 64-bit is supported.
EIST Technology	no option	Displays whether Enhanced Intel SpeedStep Technology (EIST) is supported.
CPU C3 State	no option	Displays whether CPU C3 State is supported.
CPU C6 State	no option	Displays whether CPU C6 State is supported.
CPU C7 State	no option	Displays whether CPU C7 State is supported.
L1 Data Cache	no option	Displays the size of the L1 Data Cache.
L1 Code Cache	no option	Displays the size of the L1 Code Cache.
L2 Cache	no option	Displays the size of the L2 Cache.
L3 Cache	no option	Displays the size of the L3 Cache.
L4 Cache	no option	Displays the size of the L4 Cache.
Hyper-Threading	Disabled **Enabled**	Enable or Disable Hyper-Threading technology.
Active Processor Cores	**All** 1 2 3	Set number of cores to be enabled.

Feature	Options	Description
Overclocking Lock	**Disabled** Enabled	FLEX_RATIO(194) MSR
Limit CPUID Maximum	**Disabled** Enabled	When enabled, the processor limits the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. When disabled, the processor returns the actual maximum CPUID input value of the processor when queried. Limiting the CPUID input value may be required for older operating systems that cannot handle the extra CPUID information returned when using the full CPUID input value.
Execute Disable Bit	Disabled **Enabled**	Enable or disable the Execute Disable Bit (XD) of the processor. With the XD bit set to enabled, certain classes of malicious buffer overflow attacks can be prevented when combined with a supporting OS.
Intel Virtualization Technology	Disabled **Enabled**	When enabled, a VMM can utilize the integrated hardware virtualization support.
Hardware Prefetcher	Disabled **Enabled**	Enable or disable the Mid Level Cache (L2) streamer prefetcher.
Adjacent Cache Line Prefetch	Disabled **Enabled**	Enable or disable the Mid Level Cache (L2) prefetching of adjacent cache lines.
CPU AES	Disabled **Enabled**	Enable or disable CPU Advanced Encryption Standard (AES) instructions.
Boot Performance Mode	Max Non-Turbo Performance, Max Battery, **Turbo Performance**	Select the performance state that the BIOS will set before OS handoff.
EIST	Disabled **Enabled**	Enable or disable Enhanced Intel SpeedStep Technology (EIST).
Turbo Mode	Disabled **Enabled**	Enable or disable Turbo Mode.
Energy Performance	**Performance** Balanced Perform. Balanced Energy Energy Efficient	Optimize between performance and power savings.
Package Power Limit Lock	Disabled **Enabled**	When enabled, PACKAGE_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
Platform Power Limit Lock	Disabled **Enabled**	When enabled, PLATFORM_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
CPU Power Limit3	0-255 **Default : 0**	CPU Power Limit3 value
CPU Power Limit3 Time	0-255 **Default : 0**	Time window in which the Power Limit3 is maintained.

Feature	Options	Description
CPU Power Limit3 Duty Cycle	0-100 **Default : 0**	Specify in percentage the duty cycle that the CPU is required to maintain over the configured Power Limit3 time windows.
DDR Power Limit1	0-255 **Default : 0**	DDR Power Limit1 value
DDR Power Limit1 Time	0-255 **Default : 0**	Time window in which the DDR Power Limit1 is maintained.
DDR Power Limit2	0-255 **Default : 0**	DDR Power Limit2 value
1-Core Ratio Limit	0-255 **Default : 0**	Limit for 1 active core. 0 means using the factory-configured value.
2-Core Ratio Limit	0-255 **Default : 0**	Limit for 2 active cores. 0 means using the factory-configured value.
3-Core Ratio Limit	0-255 **Default : 0**	Limit for 3 active cores. 0 means using the factory-configured value.
4-Core Ratio Limit	0-255 **Default : 0**	Limit for 4 active cores. 0 means using the factory-configured value.
VR Current Value Lock	Disabled **Enabled**	Locks VR current value from further writes until a reset.
VR Current Value	0-8191 **Default : 0**	Voltage regulator current limit. 0 means automatic.
CPU C States	**Disabled** Enabled	Enable or disable CPU C states.
Enhanced C1 State	Disabled **Enabled**	Enhanced C1 state
CPU C3 Report	Disabled **Enabled**	Enable or disable CPU C3 report to OS.
CPU C6 Report	Disabled **Enabled**	Enable or disable CPU C6 report to OS.
C6 Latency	**Short** Long	Configure Short/Long latency for C6.
CPU C7 Report	Disabled CPU C7 **CPU C7s**	Enable or disable CPU C7 report to OS.
C7 Latency	Short **Long**	Configure Short/Long latency for C7.
CPU C8 Report	Disabled **Enabled**	Enable or disable CPU C8 report to OS. Note: Not displayed/supported on all Processors types.
CPU C9 Report	Disabled **Enabled**	Enable or disable CPU C9 report to OS. Note: Not displayed/supported on all Processors types.

Feature	Options	Description
CPU C10 Report	Disabled **Enabled**	Enable or disable CPU C10 report to OS. Note: Not displayed/supported on all Processors types.
C9/C10 Voltage Override	**Disabled** 0.7V 0.8V 0.9V 1.0V	Enable or disable C9/C10 override for BDW C9/C10 hard hang issue. This will ensure the Vccin voltage reductions actions for C9/C10 are maintained to selected voltage level (instead of default of 0V) on BDW U and Y SKUs, when enabled.
C1 State Auto Demotion	Disabled **Enabled**	Processor will conditionally demote C3/C6/C7 requests to C1 based on uncore auto-demote information.
C3 State Auto Demotion	Disabled **Enabled**	Processor will conditionally demote C6/C7 requests to C3 based on uncore auto-demote information.
Package C State Demotion	**Disabled** Enabled	Enable or disable package C state demotion.
C1 State Auto Undemotion	Disabled **Enabled**	Enable or disable Un-demotion from demoted C1.
C3 State Auto Undemotion	Disabled **Enabled**	Enable or disable Un-demotion from demoted C3.
Package C State Undemotion	**Disabled** Enabled	Enable or disable package C state undemotion.
C State Pre-Wake	Disabled **Enabled**	Enable or disable C state Pre-Wake feature.
CFG Lock	Disabled **Enabled**	Configure MSR 0xE2[15], CFG lock bit.
Package C State Limit	C0/C1, C2, C3, **C6**, C7, C7s, C8, C9, C10, AUTO	Set Package C state limit
Lake Tiny Feature	**Disabled** Enabled	Enable or disable Lake Tiny feature for C state configuration.
ACPI CTDP BIOS	**Disabled** Enabled	Enable or disable ACPI CTDP BIOS support.
Configurable TDP Level	**TDP NOMINAL** TDP DOWN TDP UP Disabled	Allow reconfiguration of TDP levels base on current power and thermal delivery capabilities of the system.
Config TDP Lock	**Disabled** Enabled	Lock the config TDP control register.

Feature	Options	Description
TCC Activation Offset	0-50 **Default : 0**	Offset from the Intel factory Thermal Control Circuit (TCC) activation temperature. TCC activation will lower CPU core and graphics core frequency, voltage or both. The factory TCC activation temperature is normally 100C. By entering 10 for TCC offset, the TCC will be activated at 90C.
Intel TXT(LT) Support	**Disabled** Enabled	Enable or disable Intel(R) TXT(LT) support.
IOUT Offset Sign	0-1 **Default : 0**	0 means positive offset. 1 means negative offset.
IOUT Offset	0-625 **Default : 0**	VR IOUT offset configuration The range is 0 - 625.
IOUT Slope	0-1023 **Default : 512**	VR IOUT slope configuration The range is 0 - 1023.
Debug Interface	**Disabled** Enabled	Enable or disable CPU debug feature.
Debug Interface Lock	**Disabled** Enabled	Lock CPU debug feature setting.

9.4.5 Trusted Computing Submenu

Feature	Options	Description
Security Device Support	Disabled **Enabled**	Enable or disable BIOS support for security device. Operating System will not show the security device. TCG EFI protocol and INT1A interface will be not available.
Device Select	TPM 1.2 TPM 2.0 **Auto**	TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated.
TPM State	**Disabled** Enabled	Enable or disable TPM chip. Note: System might restart several times during POST to acquire target state.
Pending operation	**None,** Enable Take Ownership, Disable Take Ownership, TPM Clear	Perform selected TPM chip operation. Note: System might restart several times during POST to perform selected operation.

9.4.6 RTC Wake Submenu

Feature	Options	Description
Wake System At Fixed Time	**Disabled** Enabled	Enable system to wake from S5 at the specified time using an RTC alarm.
Wake up hour		Specify wake up hour. For example, enter "3" for 3am and "15" for 3pm.
Wake up minute		Specify wake up minute.
Wake up second		Specify wake up second.

9.4.7 ACPI Submenu

Feature	Options	Description
Hibernation Support	Disabled **Enabled**	Enable or disable system ability to hibernate (operating system S4 sleep state). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled S1 (CPU Stop Clock) **S3 (Suspend to RAM)** Both S1 and S3 available for OS to choose from	Select the state used for ACPI system sleep/suspend.
Lock Legacy Resources	**Disabled** Enabled	Enable or disable locking of legacy resources.
S3 Video Repost	**Disabled** Enabled	Enable or disable video BIOS re-post on S3 resume. Required by some operating systems.
ACPI Low Power S0 Idle	**Disabled** Enabled	Enable or disable ACPI Low Power S0 Idle support
Native PCI Express Support	Disabled **Enabled**	Enable or disable native OS PCI Express support.

Native ASPM	**Disabled**
	Enabled
		Enabled = The OS will control the ASPM support of the PCI Express device.
		Disabled = The BIOS will control the ASPM support of the PCI Express device.

ACPI Debug	**Disabled** Enabled	Open a memory buffer for storing debug strings. Use method ADBG to write strings to buffer.
ACPI 5.0 CPPC Support	**Disabled** Enabled	Enable ACPI 5.0 Collaborative Processor Performance Control (CPPC) support. When enabled, platform exposes CPPC interfaces to operating system. When disabled, platform exposes legacy (non-CPPC) processor interfaces to operating system.
ACPI 5.0 CPPC Platform SCI	**Disabled** Enabled	Enable ACPI 5.0 platform generation of SCI on CPPC command completion. When enabled, platform generates GPE/SCI. When disabled platform does not generate GPE/SCI and OS polls for command completion.

Feature	Options	Description
Automatic Critical Trip Point	**Disabled** Enabled	Enabled = Configure the critical trip point - the temperature threshold at which the ACPI aware OS performs a critical shutdown - automatically to recommended value. Disabled = Configure the critical trip point manually.
Critical Trip Point Value	71 C, 79 C, 87 C, 95 C, 103 C, **106 C**, 111 C, 119 C, 127 C	Specifies the temperature threshold at which the ACPI aware OS performs a critical shutdown.
ACPI CPU Temperature Readout	**Disabled** Enabled	Enable or disable the ACPI CPU temperature readout. Should be set to disabled, if CGOS hardware monitor functions are used. Otherwise CGOS and/or ACPI might provide incorrect values due to conflicting hardware accesses.
Lid Support	**Disabled** Enabled	Configure COM Express LID# Signal to act as ACPI lid.
Sleep Button Support	**Disabled** Enabled	Configure COM Express SLEEP# signal to act as ACPI sleep button.

9.4.8 PCH-FW Submenu

Feature	Options	Description
ME FW Version	no option	Displays ME FW Version.
ME Firmware Mode	no option	Displays ME Firmware Mode.
ME Firmware Type	no option	Displays ME Firmware Type.
ME Firmware SKU	no option	Displays ME Firmware SKU.
PTT Capability / State	no option	Displays PTT Capability / State.
NFC Support	no option	Displays NFC Support.
MDES BIOS Status Code	**Disabled** Enabled	Enable or disable MDES BIOS status code.
ME Unconfig on RTC Clear State	Disabled **Enabled**	Enable or disable ME firmware un-configuration on RTC Clear state.
fTPM Switch Selection	**GPDMA Work-Around** MSFT QFE Solution	Selects the desired fTPM solution to be used.
TPM Device Selection	**dTPM 1.2** PTT	Selects TPM device: PTT or dTPM. PTT - Enables PTT and disables dTPM in SkuMgr. dTPM 1.2 - Enables dTPM 1.2 and disables PTT in SkuMgr. Warning: If you enable PTT, dTPM will be disabled and all data saved on it will be lost. Likewise if you enable dTPM, PTT will be disabled and all data saved on it will be lost.
►Firmware Update Configuration	Submenu	Configure Management Engine technology parameters.

Feature	Options	Description
ME FW Image Re-Flash	**Disabled** Enabled	Enable/Disable ME FW image re-flash function.

Note

The PCH-FW submenu displays only if the feature is enabled.

9.4.9 AMT Submenu

Feature	Options	Description
Intel AMT	Disabled **Enabled**	Enable or disable Intel (R) Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.
BIOS Hotkey Pressed	**Disabled** Enabled	OEMFlag Bit 1: Enable or disable BIOS hotkey press.
MEBx Selection Screen	**Disabled** Enabled	OEMFlag Bit 2: Enable or disable MEBx selection screen.
Hide Un-Configure ME Confirmation Prompt	**Disabled** Enabled	OEMFlag Bit 6: Hide unconfigure ME without password confirmation prompt
MEBx Debug Message Output	**Disabled** Enabled	OEMFlag Bit 14: Enable or disable MEBx debug message output
Un-Configure ME	**Disabled** Enabled	OEMFlag Bit 15: Unconfigure ME without password
AMT Wait Timer	0 - 65535 **Default: 0**	Set timer to wait before sending ASF_GET_BOOT_OPTIONS
Disable ME	**Disabled** Enabled	Set ME to soft temporary enable or disable.
ASF	Disabled **Enabled**	Enable or disable Alert Specification Format
Activate Remote Assistance Process	**Disabled** Enabled	Trigger CIRA boot
USB Configure	Disabled **Enabled**	Enable or disable USB configure function
PET Progress	Disabled **Enabled**	User can enable or disable PET Events progress to receive PET events or not.

Feature	Options	Description
AMT CIRA Timeout	0-255 **Default : 0**	OEM defined timeout for MPS connection to be established. 0 - Use the default timeout value of 60 seconds. 255 - MEBX waits until the connection succeeds.
WatchDog	**Disabled** Enabled	Enable or disable watchdog timer
OS Timer	0 - 65535	Set OS watchdog timer.
BIOS Timer	0 - 65535	Set BIOS watchdog timer.

Note

The AMT submenu displays only if the feature is enabled.

9.4.10 Acoustic Management Submenu

Feature	Options	Description
Automatic Acoustic Management	Enabled **Disabled**	Enable or disable Automatic Acoustic Management (AAM) on optical or hard disk drives.
SATA Port 0 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Acoustic noise level and performance optimization of optical or hard disk drives Bypass: Use drive's preset value. Quiet: Drive is slower, but quieter. Max Performance: Drive is faster, but possibly noisier.
SATA Port 1 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.
SATA Port 2 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.
SATA Port 3 Disk drive name Acoustic Mode	**Bypass** Quiet Max Performance	Same as at SATA Port 0.

Note

This menu displays only the SATA ports on which the optical or hard disk drive is detected.

9.4.11 SMART Settings Submenu

Feature	Options	Description
SMART Self Test	**Disabled** Enabled	Run SMART self test on all hard disk drives during POST. Self-Monitoring, Analysis and Reporting Technology (SMART) predicts hard disk drives degradation and/or faults.

9.4.12 Super I/O Submenu

Feature	Options	Description
Super IO Chip	No option	Displays the Super IO Chip type which is Winbond W8362.
▶ Serial Port 0	Submenu	
Serial Port	Disabled **Enabled**	Enable or disable serial port.
Device Settings	No option	Displays the currently used settings

Change Settings	**Auto**
	IO=3F8h; IRQ=4
	IO=3F8h; IRQ=3,4,5,7,9,10,11,12
	IO=2F8h; IRQ=3,4,5,7,9,10,11,12
	IO=3E8h; IRQ=3,4,5,7,9,10,11,12
	IO=2E8h; IRQ=3,4,5,7,9,10,11,12
		Select the optimal setting for Super IO device

▶ Serial Port 1	Submenu	
Serial Port	Disabled **Enabled**	Enable or disable serial port.
Device Settings	No option	Displays the currently used settings

Change Settings	**Auto**
	IO=3F8h; IRQ=4
	IO=3F8h; IRQ=3,4,5,7,9,10,11,12
	IO=2F8h; IRQ=3,4,5,7,9,10,11,12
	IO=3E8h; IRQ=3,4,5,7,9,10,11,12
	IO=2E8h; IRQ=3,4,5,7,9,10,11,12
		Select the optimal setting for Super IO device

▶Parallel Port	Submenu	
Parallel Port	**Disabled** Enabled	Enable or disable parallel port (LPT/LPTE).
Device Settings	No option	Displays the currently used settings

Feature	Options	Description

Change Settings	**Auto**
	IO=378h; IRQ=5;
	IO=378h; IRQ=5,6,7,9,10,11,12;
	IO=278h; IRQ=5,6,7,9,10,11,12;
	IO=3BCh; IRQ=5,6,7,9,10,11,12;
		Select an optimal setting for Super IO device.

Device Mode	**STD Printer Mode** SPP Mode EPP-1.9 and SPP Mode EPP-1.7 and SPP Mode ECP Mode ECP and EPP 1.9 Mode ECP and EPP 1.7 Mode	Change the parallel port mode.

9.4.13 Serial Port Console Redirection Submenu

Feature	Options	Description
COM0 Console Redirection	**Disabled** Enabled	Enable or disable serial port 0 console redirection.
► Console Redirection Settings	Submenu	Opens console redirection configuration submenu.
COM1 Console Redirection	**Disabled** Enabled	Enable or disable serial port 1 console redirection.
► Console Redirection Settings	Submenu	Opens console redirection configuration submenu.
► Legacy Console Redirection Settings	Submenu	Opens legacy console redirection submenu.
Legacy Serial Redirection Port	COM0 COM1	Select a COM port to display redirection of legacy OS and legacy OPROM messages.
Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS) Console Redirection	**Disabled** Enabled	Enable or disable Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS) Console Redirection
► Console Redirection Settings	Submenu	Opens console redirection configuration sub menu.

Note

The Serial Port Console Redirection can be enabled (functional) only if an external Super I/O offering UARTs has been implemented on the *carrier board*

9.4.13.1 Console Redirection Settings Submenu

Feature	Options	Description
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	Select terminal type.
Baudrate	9600, 19200, 38400, 57600, **115200**	Select baud rate.
Data Bits	7, **8**	Set number of data bits.
Parity	**None** Even Odd Mark Space	Select parity.
Stop Bits	**1** 2	Set number of stop bits.
Flow Control	**None** Hardware RTS/CTS	Select flow control.
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable VT-UTF8 combination key support for ANSI/VT100 terminals
Recorder Mode	**Disabled** Enabled	With recorder mode enabled, only text output will be sent over the terminal. This is helpful to capture and record terminal data.
Resolution 100x31	**Disabled** Enabled	Enables or disables extended terminal resolution.
Legacy OS Redirection Resolution	**80x24** 80x25	Number of rows and columns supported for legacy OS redirection.
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.
Redirection After BIOS POST	**Enabled** Disabled	Select whether serial redirection should be continued after POST.

Note

The Serial Port Console Redirection submenu in section 10.4.13 has three console redirection submenus - COM 0, COM 1 and Out of Band Management/Windows EMS console redirection submenus. Section 10.4.13.1 shows the console redirection submenu for COM 0 and COM 1. The Out of Band Management/Windows EMS console redirection submenu does not have all the features listed above. It however contains an Out-of-Band Management Port Selection feature which is not listed above.

9.4.14 SATA Submenu

Feature	Options	Description
SATA Controller(s)	**Enabled** Disabled	Enable or disable the onboard SATA controller(s).
SATA Mode Selection	**AHCI** RAID	Select SATA controller mode. RAID option is not supported on all chipsets.
PCIe NAND Configuration	**Disabled** Enabled	Enable or disable PCIe NAND remapping. Displayed only for RAID SATA mode.
PCIe NAND Port Selection	Auto Port 1 Port 5 **Port 6**	Select PCIe NAND port. Displayed only for RAID SATA mode. Note: The available options may vary depending on the module.
PCIe NAND Config Access Lockdown	**Disabled** Enabled	Enable or disable PCIe NAND remapping configuration access index/data lockdown. Displayed only for RAID SATA mode.
SATA Test Mode	Enabled **Disabled**	Should be set to disabled. Test Mode is used just for verification measurements.
Aggressive LPM Support	Enabled **Disabled**	Enable PCH to aggressively enter link power state.

SATA Controller Speed	**Default**
	Gen1
	Gen2
	Gen3
		Indicates the maximum speed the SATA controller can support.
		Default = maximum speed supported by the chipset
		Gen1 = 1.5 Gbit/s
		Gen2 = 3 Gbit/s
		Gen3 = 6 Gbit/s
		
		The supported maximum speed for conga-IC97 is 6 Gbit/s

► Software Feature Mask Configuration	Submenu	RAID option ROM and Intel Rapid Storage Technology driver will refer to the Software Feature Mask Configuration to enable or disable the storage features.
Alternate ID	Enabled **Disabled**	Report alternate device ID. Displayed just for RAID SATA mode.
Serial ATA Port 0, 1, 2, 3	No option	Displays the name of the connected Hard Disk or DVD ROM when the port is enabled. Nothing is displayed when the port is disabled or when the port is enabled but without a device connected. On conga-IC97 variants equipped with base chipset, SATA ports 2 and 3 are not available.

Feature	Options	Description
Software Preserve	No option	Displays whether the detected drive supports Software Settings Preservation.
SATA Port	Disabled **Enabled**	Enable or disable the relevant SATA port. Not possible in Native IDE mode.
Hot Plug	**Disabled** Enabled	Select hot plug support for relevant SATA port. Not possible in Native IDE mode.
External SATA	**Disabled** Enabled	Enable or disable external SATA support on relevant SATA port. Not possible in Native IDE mode.
SATA Device Type	**Hard Disk Drive** Solid State Drive	Identify if the relevant SATA port is connected to solid state drive or hard disk drive. Not possible in Native IDE mode.
Spin Up Device	**Disabled** Enabled	When enabled, the controller runs an initialization sequence for the connected device during startup at the relevant SATA port. Some hard disks and special Solid-state Drives (SSD) function correctly only when this feature is enabled. Not possible in Native IDE mode.

9.4.14.1 Software Feature Mask Configuration Submenu

Feature	Options	Description
RAID0	Disabled **Enabled**	Enable or disable RAID0 feature.
RAID1	Disabled **Enabled**	Enable or disable RAID1 feature.
RAID10	Disabled **Enabled**	Enable or disable RAID10 feature.
RAID5	Disabled **Enabled**	Enable or disable RAID5 feature.
Intel Rapid Recovery Technology	Disabled **Enabled**	Enable or disable Intel Rapid Recovery Technology.
Option ROM UI and Banner	Disabled **Enabled**	If enabled, then the Option ROM User Interface is shown. Otherwise, no Option ROM banner or information will be displayed if all disks and RAID volumes are normal.
HDD Unlock	Disabled **Enabled**	If enabled, indicates that the HDD password unlock in the OS is enabled.
LED Locate	Disabled **Enabled**	LED locate
IRRT Only on eSATA	Disabled **Enabled**	If enabled, then only Intel Rapid Recovery Technology (IRRT) volumes can span internal and external SATA (eSATA) drives. If disabled, then any RAID volume can span internal and eSATA drives.
Intel Smart Response Technology	Disabled **Enabled**	Enable or disable Intel Smart Response Technology.

Feature	Options	Description
Option ROM UI Delay	**2 Seconds** 4 Seconds 6 Seconds 8 Seconds	If enabled, indicates the delay of the option ROM user interface splash screen in a normal status.

9.4.15 PCI & PCI Express Submenu

Feature	Options	Description
PCI Settings		
PCI Latency Timer	**32**, 64, 96, 128, 160, 192, 224, 248 PCI Bus Clocks	Select value to be programmed into PCI latency timer register.
PCI-X Latency Timer	32, **64**, 96, 128, 160, 192, 224, 248 PCI Bus Clocks	Select value to be programmed into PCI latency timer register.
VGA Palette Snoop	**Disabled** Enabled	Enable or disable VGA palette registers snooping.
PERR# Generation	**Disabled** Enabled	Enable or disable PCI device to generate PERR#.
SERR# Generation	**Disabled** Enabled	Enable or disable PCI device to generate SERR#.
Above 4G Decoding		
Don't Reset VC-TC Mapping		
▶ PCI Hot-Plug Settings	Submenu	Change PCI Express Hot-Plug and standard HP controller settings.
▶ PIRQ Routing & IRQ Reservation	Submenu	Manual PIRQ routing and interrupt reservation for legacy devices.
PCIE Root Port Function Swapping	**Disabled** Enabled	Enable or disable PCI Express root port function swapping. Its value is enabled when PCIe NAND Configuration is set to "Enabled".
Subtractive Decode	**Disabled** Enabled	Enable or disable PCI Express subtractive decode.
▶ PCI Express Port 0	Submenu	Opens the PCI Express Port submenu.
▶ PCI Express Port 3	Submenu	Controls the onboard i211 Ethernet controller.
▶ PCI Express Port4	Submenu	Controls the onboard PCIe x4 slot and onboard PCIe mini card slot.
▶ PCI Express Port 5	Submenu	Controls PCIe link on the mSATA/mPCIe connector.

9.4.15.1 PCI Hot-Plug Settings Submenu

Feature	Options	Description
BIOS Hot-Plug Support	Disabled **Enabled**	Enable or disable BIOS built in hot plug support. Use this feature if OS does not support PCI Express and SHPC hot plug natively.
PCI Buses Padding	Disabled **1**,2,3,4,5	Padd PCI buses behind the bridge for hot plug.
I/O Resources Padding	Disabled **4K,** 8K, 16K, 32K	Padd PCI I/O resources behind the bridge for hot plug.
MMIO 32 bit Resources Padding	Disabled 1M, 2M, 4M, 8M, **16M**, 32M, 64M, 128M	Padd PCI MMIO 32 bit resources behind the bridge for hot plug
PFMMIO 32 bit Resources Padding	Disabled 1M, 2M, 4M, 8M, **16M**, 32M, 64M, 128M	Padd PCI MMIO 32 bit prefetchable resources behind the bridge for hot plug

9.4.15.2 PIRQ Routing & IRQ Reservation Submenu

Feature	Options	Description
PIRQA	**Auto**, IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Set interrupt for selected PIRQ. Please refer to the board's resource list for a detailed list of devices connected to the respective PIRQ. NOTE: These settings will only be effective while operating in PIC (non-IOAPIC) interrupt mode.
PIRQB	Same as PIRQA	Same as PIRQA
PIRQC	Same as PIRQA	Same as PIRQA
PIRQD	Same as PIRQA	Same as PIRQA
PIRQE	Same as PIRQA	Same as PIRQA
PIRQF	Same as PIRQA	Same as PIRQA
PIRQG	Same as PIRQA	Same as PIRQA
PIRQH	Same as PIRQA	Same as PIRQA
Reserve Legacy Interrupt 1	**None**, IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	The interrupt reserved here will not be assigned to any PCI or PCI Express device and thus maybe available for some legacy bus device.

Feature	Options	Description
Reserve Legacy Interrupt 2	Same as Reserve Legacy Interrupt 1	Same as Reserve Legacy Interrupt 1

9.4.15.3 PCI Express Port Submenu

Feature	Options	Description
PCI Express Port x	Disabled **Enabled**	Enable or disable the respective PCI Express port x. Note: Unless the Always Enable Port (see below) is enabled as well, an unpopulated port will still be disabled if no PCI Express device is connected.
ASPM	**Disabled** L0s L1 L0sL1 Auto	PCI Express Active State Power Management settings.
L1 Substates	**Disabled** L1.1 L1.2 L1.1 & L1.2	PCI Express L1 substates settings.
URR	**Disabled** Enabled	Enable or disable PCI Express Unsupported Request Reporting.
FER	**Disabled** Enabled	Enable or disable PCI Express device Fatal Error Reporting.
NFER	**Disabled** Enabled	Enable or disable PCI Express device non-Fatal Error Reporting.
CER	**Disabled** Enabled	Enable or disable PCI Express device Correctable Error Reporting.
CTO	**Disabled** Enabled	Enable or disable PCI Express Completion Timeout timer.
SEFE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on Fatal Error.
SENFE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on non-Fatal Error.
SECE	**Disabled** Enabled	Enable or disable Root PCI Express System Error on Correctable Error.
PME SCI	Disabled **Enabled**	Enable or disable PCI Express PME (power management event) SCI.
Always Enable Port	**Disabled** Enabled	Disabled = Disable the internal PCI Express interface device if no device is detected on the port. Enabled = Enable the internal PCI Express interface device also if no device is detected on the port.

Feature	Options	Description

PCIe Speed	**Auto**
	Gen1
		Maximum speed of the PCIe port.
		Auto = Gen1 or Gen2
		Gen1 = 2.5GT/s
		Some older non-compliant PCI Express devices will function only if Gen1 is selected. Some Gen2 devices start up in Gen1 mode and then their OS driver sets them to Gen2 mode.

Detect Non-compliant Device	**Disabled** Enabled	Try to detect also a non-compliant PCI Express device. If enabled, POST time will be longer.
Extra Bus Reserved	0-7 **Default : 0**	Extra bus reserved (0-7) for bridges behind this root bridge.
Reserved Memory	1-20 **Default : 10**	Reserved memory range for this root bridge.
Prefetchable Memory	1-20 **Default : 10**	Prefetchable memory range for this root bridge.
Reserved I/O	0-20 **Default : 4**	Reserved I/O range for this root bridge.
PCIe LTR	Disabled **Enabled**	Enable or disable PCI Express Latency Tolerance Reporting (LTR).
PCIe LTR Lock	Disabled **Enabled**	PCIe LTR configuration lock.
Snoop Latency Override	Disabled Manual **Auto**	Snoop latency override for PCH PCIe.
Snoop Latency Multiplier	1 ns, 32 ns, **1024 ns** 32768 ns, 1048576 ns 33554432 ns	Snoop latency multiplier for PCH PCIe.
Snoop Latency Value	0-252 **Default : 60**	Snoop latency value for PCH PCIe.
No-Snoop Latency Override	Disabled Manual **Auto**	No-Snoop latency override for PCH PCIe.
No-Snoop Latency Multiplier	1 ns, 32 ns, **1024 ns** 32768 ns, 1048576 ns 33554432 ns	No-Snoop latency multiplier for PCH PCIe.
No-Snoop Latency Value	0-255 **Default : 60**	No-Snoop latency value for PCH PCIe.

9.4.16 UEFI Network Stack Submenu

Feature	Options	Description
UEFI Network Stack	**Disabled** Enabled	Enable or disable the UEFI network stack.
IPv4 PXE Support	Disabled **Enabled**	Enable IPv4 PXE boot support. If disabled IPv4 PXE boot option will not be created.
IPv6 PXE Support	Disabled **Enabled**	Enable IPv6 PXE boot support. If disabled IPv6 PXE boot option will not be created.
PXE Boot Wait Time	0-5 **Default : 0**	Wait time to press ESC key to abort the PXE boot.
Media Detect Count	1-5 **Default : 1**	Number of times to check the presence of media.

9.4.17 CSM & Option ROM Control Submenu

Feature	Options	Description
CSM Support	**Enabled** Disabled	Controls the execution of the CSM module. Only disable for pure UEFI Operating System support.
GateA20 Active	**Upon Request** Always	Gate A20 control. Upon Request: Gate A20 can be disabled using BIOS services. Always: Do not allow disabling Gate A20 This option is useful when any runtime code is executed above 1MB.
Option ROM Messages	**Force BIOS** Keep Current	Set display mode for option ROMs.
Boot Option Filter	**UEFI and Legacy** Legacy Only UEFI Only	Controls which devices / boot loaders the system should boot to.
PXE Option ROM Launch Policy	**Do Not Launch** UEFI ROM Only Legacy ROM Only	Controls the execution of UEFI and legacy PXE option ROMs.
Storage Option ROM Launch Policy	Do Not Launch UEFI ROM Only **Legacy ROM Only**	Controls the execution of UEFI and legacy mass storage device option ROMs.
Video Option ROM Launch Policy	Do Not Launch UEFI ROM Only **Legacy ROM Only**	Controls the execution of UEFI and legacy video option ROMs.

Feature	Options	Description
Other Option ROM Launch Policy	Do Not Launch **UEFI ROM Only** Legacy ROM Only	Controls the execution of option ROMs for PCI / PCI Express devices other than network, mass storage or video.

9.4.18 USB Submenu

Feature	Options	Description
USB Controllers	No option	Displays the number of enabled EHCI (USB2.0) and xHCI (USB3.0) controllers.
USB Devices	No option	Displays the detected USB devices.
xHCI Mode	Smart Auto **Auto** Enabled Disabled Manual	Smart Auto – The BIOS will store the USB mode set by the OS and at next boot the BIOS will set this previously used mode. At G3 boot (first boot after mechanical disconnection of the power supply) the USB ports will function identically as in Auto mode. Auto – All USB ports are initially set to operate in USB2.0 Mode and the USB3.0 OS driver (if available) will switch the USB3.0 capable ports to USB3.0 mode. If USB3.0 OS driver is not available then the ports will function correctly but will operate in USB2.0 mode. Enabled – USB2.0 and USB3.0 ports will function correctly in BIOS but will not function at all under OS if the USB3.0 OS driver is not installed. Disabled – All USB ports will function in USB2.0 mode only. No USB3.0 OS driver required. Manual – Using the settings under USB2.0 Pins Routing and USB3.0 Pins, the characteristics of the USB ports can be set individually.
EHCI (Ports USB0-7)	Disabled **Enabled**	Enable or disable EHCI (USB 2.0) controller. One EHCI controller must always be enabled.
USB2.0 Pins Routing	Route Per-Pin **Route all Pins to EHCI** Route all Pins to xHCI	Route USB2.0 pins to EHCI or xHCI controller.
USB2.0 Port 0 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 1 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 2 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 3 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 4 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.

Feature	Options	Description
USB2.0 Port 5 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 6 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB2.0 Port 7 Pins	**Route to EHCI** Route to xHCI	Route the respective USB2.0 port to EHCI or xHCI controller.
USB3.0 Pins	Select Per-Pin **Disable all Pins** Enable all Pins	Enable or disable xHCI SuperSpeed support.
USB3.0 Port 0 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
USB3.0 Port 1 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
USB3.0 Port 2 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
USB3.0 Port 3 Pins	**Disabled** Enabled	Enable or disable the xHCI SuperSpeed support on respective USB port.
Overcurrent Protection	**Disabled** Enabled	Enable or disable overcurrent protection on all USB ports.
► USB Ports Per-Port Disable Control	Submenu	Individual disabling of USB ports
Legacy USB Support	**Enabled** Disabled Auto	Enable legacy USB support. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications and BIOS setup.
External USB Controllers Support	Disabled **Enabled**	Enable or disable BIOS support for external USB controllers.
xHCI Hand-off	Disabled **Enabled**	This is a workaround for OSes without xHCI hand-off support. The xHCI ownership change should be claimed by xHCI OS driver.
EHCI Hand-off	**Disabled** Enabled	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI OS driver.
USB Mass Storage Driver Support	Disabled **Enabled**	Enable or disable USB mass storage driver support.
USB Transfer Timeout	1 sec 5 sec 10 sec **20 sec**	The timeout value for control, bulk, and interrupt transfers.

Feature	Options	Description
Device Reset Timeout	10 sec **20 sec** 30 sec 40 sec	USB mass storage device Start Unit command timeout.
Device Power-up Delay Selection	**Auto** Manual	Define the maximum time a USB device might need before it properly reports itself to the host controller. Auto selects a default value which is 100ms for a root port or derived from the hub descriptor for a hub port.
Device Power-up Delay Value	1-40 **Default : 5**	Actual power-up delay value in seconds.
USB Mass Storage Device Name (Auto detected USB mass storage devices are listed here dynamically)	**Auto** Floppy Forced FDD Hard Disk CD-ROM	Every USB mass storage device that is enumerated by the BIOS will have an emulation type setup option. This option specifies the type of emulation the BIOS has to provide for the device. *Note: The device's formatted type and the emulation type provided by the BIOS must match for the device to boot properly.* Select *AUTO* to let the BIOS auto detect the current formatted media. If Floppy is selected then the device will be emulated as a floppy drive. *Forced FDD* allows a hard disk image to be connected as a floppy image. Works only for drives formatted with FAT12, FAT16 or FAT32. *Hard disk* allows the device to be emulated as hard disk. *CDROM* assumes the CD-ROM is formatted as bootable media, specified by the 'El Torito' Format Specification.

9.4.18.1 USB Ports Per-Port Disable Control Submenu

Feature	Options	Description
USB Ports Per-Port Disable Control	**Disabled** Enabled	Individual disabling of USB ports.
USB Port 0	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 1	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 2	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 3	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 4	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 5	Disabled **Enabled**	Enable or disable the respective USB2.0 port.
USB Port 6	Disabled **Enabled**	Enable or disable the respective USB2.0 port.

Feature	Options	Description
USB Port 7	Disabled **Enabled**	Enable or disable the respective USB2.0 port.

9.4.19 PC Speaker Configuration Submenu

Feature	Options	Description
Debug Beeps	Disabled **Enabled**	Enable or disable general debug/status beep generation.
Input Device Debug Beeps	**Disabled** Enabled	Enable or disable input device debug beeps
Output Device Debug Beeps	**Disabled** Enabled	Enable or disable output device debug beeps
USB Driver Beeps	**Disabled** Enabled	Enable or disable USB driver beeps.

9.4.20 Intel (R) Ethernet Connection I218-LM Submenu

Feature	Options	Description
▶ NIC Configuration	Submenu	Opens the NIC Configuration submen.
Blink LEDs	0-15 **Default : 0**	The Ethernet LEDs will blink so many seconds long as entered.
UEFI Driver	No option	Displays the UEFI Driver version.
Adapter PBA	No option	Displays the Adapter PBA.
Chip Type	No option	Displays the type of the Chip in which the Ethernet controller is integrated.
PCI Device ID	No option	Displays the PCI Device ID of the Ethernet controller.
PCI Address	No option	Displays the PCI Bus:Device:Function number of the Ethernet controller.
Link Status	No option	Displays the Link Status.
MAC Address	No option	Displays the MAC Address.

9.4.20.1 NIC Configuration Submenu

Feature	Options	Description
Link Speed	**Auto Negotiated** 10 Mbps Half 10 Mbps Full 100 Mbps Half 100 Mbps Full	Specifies the port speed used for the selected boot protocol.
Wake On LAN	Disabled **Enabled**	Enables the server to be powered on using an in-band magic packet.

9.4.21 Intel® I210 Gigabit Network Connection Submenu

Feature	Options	Description
▶ NIC Configuration	Submenu	Opens the NIC Configuration submen.
Blink LEDs	0-15 **Default : 0**	Sets how long (in seconds) the ethernet activity LEDs blink.
UEFI Driver	No option	Displays the UEFI Driver version.
Adapter PBA	No option	Displays the Adapter PBA.
Chip Type	No option	Displays the type of the Chip in which the Ethernet controller is integrated.
PCI Device ID	No option	Displays the PCI Device ID of the Ethernet controller.
PCI Address	No option	Displays the PCI Bus:Device:Function number of the Ethernet controller.
Link Status	No option	Displays the Link Status.
MAC Address	No option	Displays the MAC Address.
Virtual MAC Address	No option	Displays the programmatically assignable MAC Address.

9.4.21.1 NIC Configuration Submenu

Feature	Options	Description
Link Speed	**Auto Negotiated** 10 Mbps Half 10 Mbps Full 100 Mbps Half 100 Mbps Full	Specifies the port speed used for the selected boot protocol.
Wake On LAN	Disabled **Enabled**	Enables the server to be powered on using an in-band magic packet.

9.4.22 Intel(R) Rapid Start Technology Submenu

Feature	Options	Description
Intel(R) Rapid Start Technology	**Disabled** Enabled	Enable or disable Intel(R) Rapid Start Technology.
No valid partition	No option	Warning message when the Intel(R) Rapid Start Technology is not completely set up.
Entry on S3 RTC Wake	Disabled **Enabled**	Rapid Start invocation upon S3 RTC wake.
Entry After	0-120 **Default : 10**	Enable RTC wake timer at S3 entry. Value range is from 0 (immediately) to 120 minutes.
Active Page Threshold Support	**Disabled** Enabled	Support RST with small partition.
Active Memory Threshold	0-65535 **Default : 0**	Try to support RST when partition size > Active Page Threshold size in MB. Value 0 means automatic mode.
Hybrid Hard Disk Support	**Disabled** Enabled	Hybrid Hard Disk Support
Rapid Start Display Save/ Restore	**Disabled** Enabled	Rapid Start Display Save/Restore
Rapid Start Display Type	**BIOS Save/Restore** Desktop Save/Restore	Rapid Start Display Type

9.5 Chipset Setup

Select the Chipset tab from the setup menu to enter the Chipset BIOS Setup screen. The menu is used for setting chipset features.

Main	Advanced	Chipset	Boot	Security	Save & Exit
		Processor (Integrated Components)			
		Platform Controller Hub (PCH)			

9.5.1 Processor (Integrated Components) Submenu

Feature	Options	Description
Processor Codename	No option	Displays the Processor codename.
VT-d Capability	No option	Displays whether the VT-d is supported by the Processor.
VT-d	Disabled **Enabled**	Enable or disable VT-d support. Displays only if the processor supports VT-d capability.
Thermal Device (B0:D4:F0)	Enabled **Disabled**	Enable or disable thermal device.
Audio Device (B0:D3:F0)	**Enabled** Disabled	Enable or disable the integrated audio device in the Processor.
Audio Vanilla Mode	**Enabled** Disabled	Enable or disable SA Audio Vanilla Mode.
NB CRID	**Disabled** Enabled	Enable or disable northbridge compatible revision ID support.
Above 4GB MMIO BIOS Assignment	**Enabled** Disabled	Enable or disable above 4GB Memory-mapped I/O BIOS assignment.
BDAT ACPI Table Support	Enabled **Disabled**	Enable support for the BDAT ACPI table.
Graphics Turbo IMON Current	14-31 **Default : 31**	Graphics turbo IMON current values supported (14-31)
► DMI/OPI Configuration	Submenu	Control various DMI functions. DMI link is the main, but exclusively internal bus between the Processor and Platform Controller Hub (PCH).
► Memory Configuration	Submenu	Memory configuration parameters
► Memory Thermal Configuration	Submenu	Memory thermal configuration options
► GT - Power Management Control	Submenu	Processor Graphics Controller (GT) power management control options

9.5.1.1 DMI/OPI Configuration Submenu

Feature	Options	Description
DMI	No option	Displays the DMI bus characteristics.
DMI Vc1 Control	Enabled **Disabled**	Enable or disable DMI Vc1.
DMI Vcp Control	**Enabled** Disabled	Enable or disable DMI Vcp.
DMI Vcm Control	**Enabled** Disabled	Enable or disable DMI Vcm.
DMI Link ASPM Processor Side	**Disabled** L0s L1 L0sL1	Active State Power Management (ASPM) of the DMI link on the Processor side. DMI link is the main bus between the Processor and Platform Controller Hub (PCH).
DMI Extended Synch Control	Enabled **Disabled**	Enable or disable DMI extended synchronization.
DMI Gen 2	Enabled Disabled	Enable or disable DMI Gen2.
DMI De-emphasis Control	-6 dB -3.5 dB	Configure the de-emphasis control on DMI.
DMI IOT	Enabled **Disabled**	Enable or disable DMI IOT.

9.5.1.2 Memory Configuration Submenu

Feature	Options	Description
Memory Frequency	No option	Displays the memory frequency.
Total Memory	No option	Displays the total amount of installed memory.
Memory Voltage	No option	Displays the memory voltage.
DIMM#0 (Bottom)	No option	Displays bottom memory socket DIMM information.
DIMM#2 (Top)	No option	Displays top memory socket DIMM information.
CAS Latency (tCL)	No option	Displays the CAS Latency (tCL).
CAS to RAS (tRCDmin)	No option	Displays the CAS to RAS (tRCDmin).
Row Precharge (tRPmin)	No option	Displays the Row Precharge (tRPmin).
Active to Precharge (tRASmin)	No option	Displays the Active to Precharge (tRASmin).

Feature	Options	Description
DIMM Profile	**Default DIMM Profile** Custom Profile XMP Profile 1 XMP Profile 2	Select the DIMM timing profile that should be used. XMP profiles cannot work on current modules and MUST not be selected. **CAUTION:** For congatec internal debugging only. DO NOT CHANGE.
► Custom Profile Control	Submenu	Configure the custom DIMM profile options. **CAUTION:** For congatec internal debugging only. DO NOT CHANGE.
Memory Frequency Limiter	**Auto**, 1067,1333, 1600, 1867, 2133, 2400, 2667, 2933, 3200	Maximum memory frequency selections in [MHz] (Hidden if DIMM profile is set to 'Custom Profile').
Max TOLUD	**Dynamic**, 1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB	Maximum value of TOLUD Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
Enh Interleave Support	Disabled **Enabled**	Enable or disable Enhanced Interleave support.
RI Support	Disabled **Enabled**	Enable or disable Rank Interleave support. Note: RI and HORI cannot be enabled at the same time.
DLL Weak Lock Support	Disabled **Enabled**	Enable or disable DLL weak lock support.
Enable RH Prevention	Disabled **Enabled**	Actively prevent Row Hammer.
Row Hammer Solution	**Hardware RHP** 2x Refresh	Type of method used to prevent Row Hammer.
RH Activation Probability	**1/2^14** 1/2^13 1/2^12 1/2^11	Used to adjust MC for hardware RHP.
Enable RH Keep Seeds	**Disabled** Enabled	Keep LFSR seeds on warm boots for hardware RHP.
Mc Lock	Disabled **Enabled**	Enable or disable capacity to lock or not MC registers.
Ch Hash Support	Disabled Enabled **Auto**	Enable or disable channel hash support. Note: Only in memory interleaved mode.
Ch Hash Mask	1-16383 **Default : 12494**	Set the bit(s) to be included in the XOR function. Note: Bit mask corresponds to bits[19:6].
Ch Hash Interleaved Bit	BIT06, **BIT07**, BIT08, BIT09	Select the bit to be used for channel interleaved mode. Note: BIT07 will interleave the channels at a 2 cacheline granularity, BIT08 at 4 and BIT09 at 8.

Feature	Options	Description
NMode Support	**Auto** 1N Mode 2N Mode	NMode support option
Memory Scrambler	**Enabled** Disabled	Enable or disable memory scrambler support.
RMT Crosser Support	Enabled **Disabled**	Enable or disable RMT crosser support.
MRC Fast Boot	**Enabled** Disabled	Enable or disable MRC fast boot.
DIMM Exit Mode	**Auto** Slow Exit Fast Exit	DIMM Exit Mode control
Power Down Mode	No Power Down APD PPD PPD-DLLoff Auto	Power Down Mode control Default is: Auto - when DIMM Exit Mode is set to Slow Exit and PPD - when DIMM Exit Mode is set to Fast Exit.
Memory Remap	**Enabled** Disabled	Enable or disable memory remap above 4G.
GDXC Support	Enabled **Disabled**	Enable or disable GDXC support.

9.5.1.3 Memory Thermal Configuration

Feature	Options	Description
►Memory Power and Thermal Throttling	Submenu	Memory power and thermal throttling options
DDR PowerDown and Idle Counter	**BIOS** PCODE	BIOS: BIOS is in control of DDR CKE mode and idle timer value. PCODE: pcode will manage the modes.
Refresh 2x Support	**Disabled** Enabled for WARM or HOT Enabled HOT Only	Enable or disable refresh 2x support.
LPDDR Thermal Sensor	Disabled **Enabled**	When enabled, MC uses MR4 to read LPDDR thermal sensors.
SelfRefresh Enable	Disabled **Enabled**	Enable or disable SelfRefresh.
SelfRefresh IdleTimer	512-65535 **Default: 512**	Range [64K-1;512] in DLCK800s

Feature	Options	Description
Throttler CKEMin Defeature	**Disabled** Enabled	Enable or disable Throttler CKEMin
Throttler CKEMin Timer	0-255 **Default: 48**	Timer value for CKEMin, range[255;0].
Memory Thermal Management	**Disabled** Enabled	Enable or disable memory thermal management.
Virtual Temperature Sensor (VTS)	**Disabled** Enabled	Enable or disable Virtual Temperature Sensor (VTS).

9.5.1.4 GT - Power Management Control Submenu

Feature	Options	Description
Processor Graphics Controller Info	No option	Displays the Processor Graphics Controller Info.
RC6 (Render Standby)	Disabled Enabled	Check to enable render standby support.
GT Overclocking Support	**Disabled** Enabled	Enable or disable GT overclocking support.
GT Overclocking Frequency	0-255 **Default : 22**	Overclocked RP0 frequency (MLCClk) in multiples of 50 MHz.
GT Overclocking Voltage	0-255 **Default : 0**	Extra voltage needed above the original RP0 voltage. The unit is 1/256 volt.

9.5.2 Platform Controller Hub (PCH) Submenu

Feature	Options	Description
Intel PCH SKU Name	No option	Displays the SKU Name of the PCH.
PCI Express Clock Gating	**Disabled** Enabled	Enable or disable PCI Express clock gating for each root port.
DMI Link ASPM PCH Side	**Disabled** Enabled	Active State Power Management (ASPM) of DMI link PCH side. DMI link is the main bus between the Processor and Platform Controller Hub (PCH).
DMI Link Extended Synch Control	**Disabled** Enabled	The control of extended synch on PCH side of the DMI link.

Feature	Options	Description
Isolate SMBus Segments	**Never** During POST Always	Allows isolating the off-module/external SMBus segment from the on-module SMBus segment. This can be a workaround for non spec conform external SMBus devices. This can be a workaround for external SMBus devices that do not conform to specification.
PCIe-USB Glitch W/A	**Disabled** Enabled	PCIe-USB glitch W/A for bad USB device(s) connected behind PCIe/PEG port.
USB Precondition	**Disabled** Enabled	Precondition work on USB host controller and root ports for faster enumeration.
BTCG	**Enabled** Disabled	Enable or disable USB related trunk clock gating.
HDA Controller	Disabled Enabled **Auto**	Control activation of the HDA controller device. Disabled = HDA Controller will be unconditionally disabled. Enabled = HDA Controller will be unconditionally enabled. Auto = HDA Controller will be enabled if HDA codec present, disabled otherwise.
Onboard Had Codec Configuration	**Auto** High Definition Front Panel Legacy Front Panel Disable	Select diferent output configuation verb tables for the onboard Had codec
HDA PME	**Disabled** Enabled	Enable or disable the power management capability of the audio controller.
PCH LAN Controller	**Enabled** Disabled	Enable or disable the onboard, PCH integrated ethernet controller.

LAN PHY Drives GPIO27	**Disabled**
	Enabled
		Enable = LAN Phy drives GPIO27
		Disable = Platform drives GPIO27

Wake on LAN	**Enabled** Disabled	Enable or disable the wake on LAN capability of the onboard, PCH integrated ethernet controller.
SLP_LAN# Low on DC Power	**Disabled** Enabled	Enable or disable SLP_LAN# low on DC power.

Board Capability	SUS_PWR_DN_ACK
	DeepSx
		SUS_PWR_DN_ACK = Send disabled to PCH.
		DeepSx = Show DeepSx policies.

DeepSx Power Policies	**Disabled** Enabled in S5/Battery Enabled in S4-S5/Battery Enabled in S3-S4-S5/Battery Enabled in S5 Enabled in S4-S5 Enabled in S3-S4-S5	Configure the DeepSx mode configuration. Activate DeepSx transition generally or in DC/battery powered mode only for selected Sx state.
GP27 Wake From DeepSx	Disabled **Enabled**	Wake from DeepSx by the assertion of GP27 pin.

Feature	Options	Description
PCIe Wake From DeepSx	**Disabled** Enabled	Wake from DeepSx by the assertion of PCIe.
Serial IRQ Mode	Quiet **Continuous**	Configure serial IRQ mode.
X2APIC Support	Disabled **Enabled**	Enable or disable X2APIC interrupt controller support.
SB CRID	**Disabled** Enabled	Enable or disable southbridge compatible revision ID support.
PCH Cross Throttling	**Disabled** Enabled	Enable or disable the PCH corss throttling feature.
SLP_S4 Assertion Width	Disabled 1-2 Seconds 2-3 Seconds 3-4 Seconds **4-5 Seconds**	Select a minimum assertion width of the SLP_S4# signal.
Port 80h Redirection	**LPC Bus** PCIe Bus	Control where the port 80h cycles are sent.

9.6 Security Setup

Select the Security tab from the setup menu to enter the Security setup screen.

9.6.1 Security Settings

Feature	Options	Description
BIOS Password	enter password	Specifies the BIOS and setup administrator password
BIOS Lock	Disabled **Enabled**	Enable or disable BIOS Lock Enable (BLE) and SMM BIOS Write Protect (SMM_BWP) bits. Once enabled, BIOS flash write accesses are only possible via dedicated BIOS SMM interfaces.
BIOS Update & Write Protection	**Disabled** Enabled	congatec flash software will require BIOS password to perform write or erase operations.

HDD Security Configuration		
List of all detected hard disks supporting the security feature set	Select device to open device security configuration submenu	
► Secure Boot Menu	Submenu	

9.6.1.1 BIOS Security Features

BIOS Password/ BIOS Write Protection

A BIOS password protects the BIOS setup program from unauthorized access. This ensures that end users cannot change the system configuration without authorization. With an assigned BIOS password, the BIOS prompts the user for a password on a setup entry. If the password entered is wrong, the BIOS setup program will not launch.

The congatec BIOS uses a SHA256 based encryption for the password, which is more secured than the original AMI encryption. The BIOS password is case sensitive with a minimum of 3 characters and a maximum of 20 characters. Once a BIOS password has been assigned, the BIOS activates the grayed out 'BIOS Update and Write Protection' option. If this option is set to 'enabled', only authorized users (users with the correct password) can update the BIOS. To update the BIOS, use the congatec system utility cgutlcmd.exe with the following syntax:

```
CGUTLCMD BFLASH <BIOS file> /BP: <password> where <password> is the assigned BIOS password.
```

For more information about "Updating the BIOS" refer to the congatec system utility user's guide, which is called CGUTLm1x.pdf and can be found on the congatec AG website at www.congatec.com.

With the BIOS password protection and the BIOS update and write protection, the system configuration is completely secured. If the BIOS is password protected, you cannot change the configuration of an end application without the correct password.

Note

Use cgutlcmd.exe version 1.5.3 or later.

Built in BIOS recovery is disabled in the congatec BIOS firmware to prevent the BIOS from updating itself due to the user pressing a special key combination or a corrupt BIOS being detected. congatec considers such a recovery update a security risk because the BIOS internal update process bypasses the implemented BIOS security explained above.

Only the congatec utility interface to the SMI handler of the BIOS flash update is enabled. Other interfaces to the SMI handler are disabled to prevent non congatec tools from writing to the BIOS flash. As a result of this restriction, flash utilities supplied by AMI or Intel will not work .

UEFI Secure Boot

Secure Boot is a security standard defined in UEFI specification 2.3.1 that helps prevent malicious software applications and unauthorized operating systems from loading during system start up process. Without secure boot enabled (not supported or disabled), the computer simply hands over control to the bootloader without checking whether it is a trusted operating system or malware. With secure boot supported and enabled, the UEFI firmware starts the bootloader only if the bootloader's signature has maintained integrity and also if one of the following conditions is true:

- The bootloader was signed by a trusted authority that is registered in the UEFI database.
- The user has added the bootloader's digital signature to the UEFI database. The BIOS provides the key management setup sub-menu for this purpose.

Note

The congatec BIOS by default enables CSM (Compatibility Support Module) and disables secure boot because most of the industrial computers today boot in legacy (non-UEFI) mode. Since secure boot is only enabled when booting in native UEFI mode, you must therefore disable the CSM (compatibility support module) in the BIOS setup to enable Secure Boot.

A full description of secure boot is beyond the scope of this users guide. For more information about how secure boot leverages signature databases and keys, see the secure boot vverview in the windows deployment options section of the Microsoft TechNet Library at http://technet.microsoft.com.

9.6.1.2 Hard Disk Security Features

Hard Disk Security uses the Security Mode feature commands defined in the ATA specification. This functionality allows users to protect data using drive-level passwords. The passwords are kept within the drive, so data is protected even if the drive is moved to another computer system.

The BIOS provides the ability to 'lock' and 'unlock' drives using the security password. A 'locked' drive will be detected by the system, but no data can be accessed. Accessing data on a 'locked' drive requires the proper password to 'unlock' the disk.

The BIOS enables users to enable/disable hard disk security for each hard drive in setup. A master password is available if the user cannot remember the user password. Both passwords can be set independently however the drive will only lock if a user password is installed. The max length of the passwords is 32 bytes.

During POST each hard drive is checked for security mode feature support. In case the drive supports the feature and it is locked, the BIOS prompts the user for the user password. If the user does not enter the correct user password within four attempts, the user is notified that the drive is locked and POST continues as normal. If the user enters the correct password, the drive is unlocked until the next reboot.

In order to ensure that the ATA security features are not compromised by viruses or malicious programs when the drive is typically unlocked, the BIOS disables the ATA security features at the end of POST to prevent their misuse. Without this protection it would be possible for viruses or malicious programs to set a password on a drive thereby blocking the user from accessing the data.

Note

If the user enables password support, a power cycle must occur for the hard drive to lock using the new password. Both user and master password can be set independently however the drive will only lock if a user password is installed.

9.7 Boot Setup

Select the Boot tab from the setup menu to enter the Boot setup screen.

9.7.1 Boot Settings Configuration

Feature	Options	Description
Quiet Boot	**Disabled** Enabled	*Disabled* displays normal POST diagnostic messages. *Enabled* displays OEM logo instead of POST messages. *Note: The default OEM logo is a dark screen.*
Setup Prompt Timeout	0 - 65535 **Default: 1**	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting. 0 means no wait (not recommended).
Bootup NumLock State	**On** Off	Select the keyboard numlock state.
System Off Mode	**G3/Mech Off** S5/Soft Off	Define system state after shutdown when a battery system is present.
Power Loss Control	Remain Off **Turn On** Last State	Specifies the mode of operation if an AC power loss occurs. Remain Off keeps the power off until the power button is pressed. Turn On restores power to the computer. Last State restores the previous power state before power loss occurred. *Note: Only works with an ATX type power supply.*
Enter Setup If No Boot Device	No **Yes**	Select whether the setup menu should be started if no boot device is connected.
Enable Popup Boot Menu	No **Yes**	Select whether the popup boot menu can be started.
Boot Priority Selection	UEFI Standard **Type Based**	Set boot priority selection method. UEFI Standard: Determine boot priority by specific device selection. Devices must be present, priority will be changed if devices are removed or added. Type Based: Determine boot priority by device type.
Boot Option Sorting Method	**Legacy First** UEFI First	Set boot option sorting method. Legacy First: Tries all legacy boot option first before UEFI boot option. UEFI First tries all UEFI boot options before first legacy boot option.

Feature	Options	Description
1st, 2nd, 3rd, ... Boot Device (Up to 12 boot devices can be prioritized if device based priority list control is selected. If "Type Based" priority list control is enabled only 8 boot devices can be prioritized.)	Disabled SATA 0 Drive SATA 1 Drive USB Harddisk USB CDROM Other USB Device Onboard SD Card Storage Onboard LAN External LAN Firmware-based UEFI Bootloader Other Device	This view is only available when in the default "Type Based" mode. When in "UEFI Standard" mode you will only see the devices that are currently connected to the system.
UEFI Fast Boot	**Disabled** Enabled	Enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS / legacy boot options.
SATA Support	Last Boot HDD Only, **All SATA Devices**	
VGA Support	Auto **UEFI Driver**	If set to Auto, the legacy video option ROM will be installed for legacy OS boot; boot logo will NOT be shown during POST. For UEFI OS boot the UEFI GOP driver will be installed.
USB Support	Disabled Full Init **Partial Init**	If set to Disabled, no USB device will be available before OS boot. If set to Partial Init, specific USB ports/devices will NOT be available before OS boot. If set to Enabled, all USB devices will be available during POST and after OS boot.
PS/2 Device Support	Disabled **Enabled**	If set to Disabled, PS/2 devices will be skipped.
Network Stack Driver Support	**Disabled** Enabled	If set to Disabled, the UEFI network stack driver installation will be skipped.

Note

1. *The term 'AC power loss' stands for the state when the module looses the standby voltage on the 5V_SB pins. On congatec modules, the standby voltage is continuously monitored after the system is turned off. If within 30 seconds the standby voltage is no longer detected, then this is considered an AC power loss condition. If the standby voltage remains stable for 30 seconds, then it is assumed that the system was switched off properly.*

2. *Inexpensive ATX power supplies often have problems with short AC power sags. When using these ATX power supplies it is possible that the system turns off but does not switch back on, even when the PS_ON# signal is asserted correctly by the module. In this case, the internal circuitry of the ATX power supply has become confused. Usually another AC power off/on cycle is necessary to recover from this situation.*

9.8 Save & Exit Menu

Select the Save & Exit tab from the setup menu to enter the Save & Exit setup screen.

You can display a Save & Exit screen option by highlighting it using the <Arrow> keys.

Feature	Description
Save Changes and Exit	Exit setup menu after saving the changes. The system is only reset if settings have been changed.
Discard Changes and Exit	Exit setup menu without saving any changes.
Save Changes and Reset	Save changes and reset the system.
Discard Changes and Reset	Reset the system without saving any changes.
Save Options	
Save Changes	Save changes made so far to any of the setup options. Stay in setup menu.
Discard Changes	Discard changes made so far to any of the setup options. Stay in setup menu.
Restore Defaults	Restore default values of all the setup options.
▶ **Boot Override** *List of all boot devices currently detected.*	Select device to leave setup menu and boot from the selected device. Only visible and active if Boot Priority Selection setup node is set to "Device Based".

10 Additional BIOS Features

The conga-IC87/IC97 uses a congatec/AMI AptioEFI that is stored in an onboard Flash Rom chip and can be updated using the congatec System Utility (version 1.5.0 and later), which is available in a DOS based command line, Win32 command line, Win32 GUI, and Linux version.

The BIOS displays a message during POST and on the main setup screen identifying the BIOS project name and a revision code. The initial production BIOS is identified as IV87R1xx or IU87R1xx for conga-IC87 and as IV97R1xx or IU97R1xx for conga-IC97where:

- IV87 or IV97 is the BIOS for modules with premium SoC
- IU87 or IU97 is the BIOS for modules with mainstream SoC
- R is the identifier for a BIOS ROM file, 1 is the so called feature number and xx is the major and minor revision number.

The IV87/IV97 BIOS binary size is 16MB. The IU87/IU97 BIOS binary size is 8MB.

10.1 Updating the BIOS

BIOS updates are often used by OEMs to correct platform issues discovered after the board has been shipped or when new features are added to the BIOS.

For more information about "Updating the BIOS" refer to the user's guide for the congatec System Utility, which is called CGUTLm1x.pdf and can be found on the congatec AG website at www.congatec.com.

11 Industry Specifications

The list below provides links to industry specifications that apply to congatec AG modules.

Specification	Link
Low Pin Count Interface Specification, Revision 1.0 (LPC)	http://developer.intel.com/design/chipsets/industry/lpc.htm
Universal Serial Bus (USB) Specification, Revision 2.0	http://www.usb.org/home
PCI Specification, Revision 2.3	http://www.pcisig.com/specifications
Serial ATA Specification, Revision 3.0	http://www.serialata.org
Intel Thin Mini ITX	http://www.intel.com/content/dam/www/public/us/en/documents/product-specifications/thin-mini-itx-based-pc-system-design-guide-rev-1-2.pdf
PCI Express Base Specification, Revision 2.0	http://www.pcisig.com/specifications