

conga-IC175 Thin Mini-ITX SBC

Detailed Description Of The congatec Thin Mini-ITX Based On 7th Generation Intel U-Series SoC

User's Guide

Revision 1.5

Revision History

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0.1	2017-01-18	AEM	Preliminary release
0.2	2017-12-05	AEM	 Updated section 5.8.1 "Standard SATA Connectors" Updated table 43 "Feature Connector X38 Pinout Description" Added content to section 8 "BIOS Setup Description"
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1.5	2021-07-31	AEM	 Added Software License Information Changed congatec AG to congatec GmbH Changed and updated section 6.8 "OEM BIOS Customization" Updated section 6.9 "congatec Battery Management Interface"

Preface

This user's guide provides information about the components, features and connectors available on the conga-IC175 Thin Mini-ITX single board.

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5

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Describes the connector used on the Single Board Computer.

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Terminology

Description
Peripheral Component Interface Express
congatec Board Controller
Secure Digital Input Output
Universal Serial Bus
Serial AT Attachment
High Definition Audio
Sony/Philips Digital Interconnect Format
Low Pin-Count
Inter-Integrated Circuit Bus
System Management Bus
Serial Peripheral Interface
Gigabit Ethernet
Low-Voltage Differential Signaling
Display Data Channel
Part Number
Not connected
Not available
To be determined

Contents

1	Introduction
1.1 1.2 1.2.1 1.2.2	Mini-ITX Concept.10conga-IC17510Options Information.11Optional Accessories11
2	Specification13
2.1 2.2 2.3 2.4 2.5 2.6 2.7	Feature List13Supported Operating Systems14Mechanical Dimensions14Supply Voltage Power15Power Consumption15Supply Voltage Battery Power16Environmental Specifications17
3	Block Diagram
4	Cooling Solution
4.1 4.2	Active Cooling Dimensions
5	Connector Description
5.1.1 5.1.2 5.1.3 5.1.3.1 5.1.4 5.2 5.3 5.3.1 5.3.2 5.3.2 5.3.3	DC Power Supply22DC Power Jack (Rear I/O)22Power Supply (Internal Connector)23Optional SBM3 Power Connector (Internal Connector)23Optional SBM3 Signal Connector24Power Status LEDs24CMOS Battery/RTC25PCI Express26PCIe x4 Slot26Full/half-size Mini PCIe27PCI Express Routing29
5.3.3 5.4	Display Interfaces
5.4.1	DisplayPort

5.4.2	LVDS	30
5.4.3	Embedded DisplayPort (eDP)	32
5.4.3.1	Backlight Power Connector	33
5.4.3.2	Backlight/Panel Power Selection	33
5.4.3.3	Monitor OFF connector	34
5.5	USB	34
5.5.1	Rear USB Connectors	34
5.5.2	Internal USB Connectors	35
5.6	SATA Interfaces	36
5.6.1	Standard SATA Ports	36
5.6.2	SATA Power	37
5.6.3	M.2 Slot	38
5.7	Ethernet	40
5.8	Audio Interface	40
5.8.1	Rear Audio Connectors	40
5.8.2	Internal Audio Connectors	41
5.8.2.1	Stereo Speaker Header	41
5.8.2.2	Digital Microphone/SPDIF	42
5.8.2.3	Front Panel (HD Audio/AC97)	42
5.8.2.4	Surround header	43
5.9	SMBus	43
5.10	SPI Bus	43
5.11	I ² C Bus	44
5.12	LPC Super I/O Device	44
5.12.1	GPIOs.	44
5.12.2	Serial Ports (COM)	44
5.12.3	CPU/System Fan Connector & Power Configuration	45
6	Additional Features	46
6.1	Front Panel Connector	46
6.2	Micro-SIM Card	47
6.3	Micro-SD Card	47
6.4	Integrated Sensor Hub	48
6.5	Case Open Intrusion Connector	49
6.6	Optional TPM	49
	1	-



67	congates Board Controller (cBC) 49	6 10
0.7		0.10
6.7.1	Fan Control	6.11
6.7.2	Power Loss Control	6.12
6.7.3	Board Information50	6.13
6.8	OEM BIOS Customization	7
6.8.1	OEM Default Settings	/
6.8.2	OEM Boot Logo	8
6.8.3	OEM POST Logo	0
6.8.4	OEM BIOS Code/Data51	8.1
6.8.5	OEM DXE Driver	8.2
6.9	congatec Battery Management Interface	8.3
6.9.1	API Support (CGOS)	8.4

Thermal/Voltage Monitoring Beeper	. 52
External System Wake Event Feature Connector	. 52 . 53
Mechanical Drawing	. 55
BIOS Setup Description	. 56
Navigating the BIOS Setup Menu BIOS Versions	. 56 . 56
Updating the BIOS Supported Flash Devices	. 57 . 57

List of Tables

Table 1	conga-IC175 Variants11
Table 2	Cooling/IO Shield
Table 3	Cables
Table 4	Adapters
Table 5	Feature Summary
Table 6	Measurement Description15
Table 7	Power Consumption Values
Table 8	CMOS Battery Power Consumption16
Table 9	Cooling Solution Variants19
Table 10	Connector X48 Pinout Description
Table 11	Connector X49 Pinout Description
Table 12	Connector X47 Pinout Description
Table 13	Connector X46 Pinout Description
Table 14	LED States
Table 15	PCIe x4 Slot (Connector X7) Pinout Description
Table 16	mPCle (Connector X8) Pinout Description
Table 17	Connector X25 Pinout Description
Table 18	Connector X20 Pinout Description
Table 19	Connector X22 Pinout Description
Table 20	Connector X23 Pinout Description
Table 21	Connector X24 Pinout Description
Table 22	Connector X21 Pinout Description
Table 23	Connector X16 Pinout Description
Table 24	Connector X15 Pinout Description
Table 25	Connector X12 Pinout Description
Table 26	Connector X10 Pinout Description (Revision B.x and later) 38
Table 27	LED Description
Table 28	MIC-IN (Connector X29) Pinout Description
Table 29	Line-OUT (Connector X31) Pinout Description
Table 30	Stereo Speaker (Connector X30) Pinout Description
Table 31	HDA/AC97 Front Panel (Connector X27) Pinout Description 42
Table 32	Surround (Connector X26) Pinout Description
Table 33	Serial Ports (Connectors X34/X37) Pinout Description
Table 34	CPU/SYS Fan Pinout
Table 35	Front Panel (Connector X39) Pinout Description
Table 36	Connector X11 Pinout Description
\frown	·

Table 37	Connector X60 Pinout Description	47
Table 38	ISH (Connector X61) Pinout Description	48
Table 39	Case Open Intrusion (Connector X2) Pinout Description	49
Table 40	Feature Connector X38 Pinout Description	53
	1	

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 170 mm x 170 mm, 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-IC175

The conga-IC175 is a Single Board Computer designed based on the Thin Mini-ITX specification. The conga-IC175 SBC features the 7th Generation Intel Core U-Series processors. With 15W base TDP, the SBC offers Ultra Low Power boards with high computing performance and outstanding graphics. Additionally, the SBC supports dual channel DDR4 up to 2133 MT/s for a maximum system memory capacity of 32 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-IC175 SBC provides manufacturers and system designers with the opportunity to design compact systems for space restricted areas. With appropriate I/O shield, the same conga-IC175 SBC can be used in either a Thin Mini-ITX or a Mini-ITX design.

The various features and capabilities offered by the conga-IC175 makes it ideal for the design of compact, energy efficient, performanceoriented embedded systems.

1.2.1 **Options Information**

The conga-IC175 is currently available in four variants. The table below shows the different configurations available.

Table 1 conga-IC175 Variants

Part-No.	052900	052901	052902	052903
Processor	Intel® Core™ i5-7300U	Intel [®] Core™ i3-7100U	Intel [®] Celeron [®] 3965U	Intel® Core™ i7-7600U
	2.6 GHz Dual Core™	2.4 GHz Dual Core™	2.2 GHz Dual Core	2.8 GHz Dual Core™
Intel [®] Smart Cache	3 MB	3 MB	2 MB	4 MB
Max. Turbo Frequency	3.5 GHz	N.A	N.A	3.9 GHz
Processor Graphics	Intel [®] HD Graphics 620	Intel [®] HD Graphics 620	Intel [®] HD Graphics 610	Intel [®] HD Graphics 620
	(GT2)	(GT2)	(GT1)	(GT2)
Graphics Max. Dynamic Freq	1.1 GHz	1.0 GHz	0.9 GHz	1.1 GHz
Memory (DDR4)	2133 MT/s dual channel	2133 MT/s dual channel	2133 MT/s dual channel	2133 MT/s dual channel
LVDS	Yes	Yes	Yes	Yes
DP++	Yes	Yes	Yes	Yes
Processor TDP (cTDP)	15 (7.5) W	15 (7.5) W	15 (10) W	15 (7.5) W

Optional Accessories 1.2.2

Cooling/IO Shield Table 2

Accessories	Part No.	Description
conga-IC87/CSA	052252	Active cooling solution for conga-IC87/IC97/IC170/IC175 and with 12 V fan and Thin Mini-ITX height
conga-IC87/Retention Frame	052254	Retention frame for standard cooling (PN: 052252) for conga-IC87/IC97/IC170/IC175
conga-IC170 IO Shield - Standard Size	052751	IO shield with standard Mini-ITX height for conga-IC175
conga-IC170 IO Shield - Thin Size	052752	IO shield with Thin Mini-ITX height for conga-IC175

Table 3 Cables

Cables Part No.		Description	
cab-ThinMini-ITX-SATA-Power	14000120	SATA power cable for congatec Thin Mini-ITX family. One end 15-pin SATA connector to 3x15-pin SATA connector	
cab-ThinMini-ITX-UART	14000121	UART cable with 9-pin DSUB connector for congatec Thin Mini-ITX family	
cab-ThinMini-ITX-USB20-Single	14000122	Single USB 2.0 cable for congatec Thin Mini-ITX family	
cab-ThinMini-ITX-USB20-Twin	14000123	Dual USB 2.0 cable for congatec Thin Mini-ITX family	
cab-ThinMini-ITX-LVDS-OE	14000125	LVDS cable with open end for congatec Thin Mini-ITX family. Can be used also for eDP with open end	
cab-ThinMini-ITX-BKLT	14000127	Backlight cable for congatec Thin Mini-ITX family	



Cables	Part No.	Description
cab-ThinMini-ITX-eDP 1-1	14000129	eDP 1-1 cable for congatec Thin Mini-ITX family. Both sides are with 40pin ACES eDP connector plug
SATA III Cable 30 cm, Down/Straight	48000030	SATA III cable with 30cm length, shielded, end connectors down/straight

Table 4 Adapters

Adapters	Part No.	Description
conga-Thin MITX/eDP to DP Adapter	052231	eDP to standard DisplayPort evaluation adapter for congatec Thin Mini-ITX boards
conga-Thin MITX/LVDS Adapter	052233	LVDS pin header evaluation adapter for congatec Thin Mini-ITX boards

2 Specification

2.1 Feature List

Table 5Feature Summary

Form Factor	Based on Thin Mini-ITX form factor (170 x 170 mm)					
Processor	7 th Generation Intel® Core™ i7,i5, i3 and Celeron Single Chip Ultra Low TDP Processors					
Memory	Two memory sockets (located on the top side of the conga-IC175). Supports SO-DIMM non-ECC DDR4 modules Data rates up to 2133 MT/s Maximum 32 GB capacity (16 GB each) 					
congatec Board Controller	Multi-stage watchdog, non-volatile user data storage, manufacturing and board information, board statistics, hardware monitoring, fan control, I2C bus, Power loss control					
Chipset	Intel® 100 Series PCH-LP integrated in the Multi-Chip Package					
Audio	Realtek ALC888S-VD 7.1 channel High Definition Audio codec					
Ethernet	2x Gigabit Ethernet support via the onboard Intel® I219LM GbE PHY (wi	th AMT 11 support) and Intel® I211 GbE controller				
Graphic Interfaces	es Next Generation Intel® HD (610/620). Supports: API (DirectX 12, OpenGL 5.0, OpenCL 2.1) Intel® QuickSync & Clear Video Technology HD (hardware accelerated video decode/encode/processing/transcode) Hybrid graphics Up to 3 independent displays 2x DP++					
Back Panel I/O	2x DP++	2x Gigabit Ethernet (only connector X5 supports AMT)				
Connectors	1x Mic IN 1x Line OUT	4x USB 3.0 (supports also USB 2.0 devices) 1x DC-IN				
Onboard I/O	4x USB 2.0	1x Integrated Sensor Hub (ISH) header				
Connectors	SATA Interfaces:	1x Internal power connector (12-24V)				
	- 2x Standard SATA 3.0	1x Surround 1x Front Popul HD Audio				
	 1x SATA power header connector (3.3V.5V or 12V) 	1x SPDIE out or Digital MIC				
	PCI Express Interfaces:	1x Stereo speaker				
	- 1x PCle x4 slot (Gen. 3)	Super IO				
	- 1x M.2 slot (type 3042/2242, key B)	 2x COM ports (COM 2 can be used optionally as ccTALK) 1x CPU for with coloritation voltage 				
	1x IVDS (top side)	 1x System fan with selectable voltage 				
	1x Backlight	- GPOs on feature connector				
	1x Monitor OFF	Feature Connector (GPIOs, SPI, SMB, LPC, LID/SLEEP etc)				
	1x eDP interface (bottom side)	1x Front panel header (power button, reset, LEDs)				
	1x Micro-SIM card slot 1x Micro-SD card slot (bottom side)	1x Intrusion detection header (case open)				

Optional Onboard Interfaces	1x SBM ³ support header 1x SBM ³ power 1x CEC header 1x ccTalk
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 sleep
Security	Optional discrete TPM 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 part number of your SBC and compare it to the option information list on page 11 to determine what options are available on your particular SBC.

2.2 Supported Operating Systems

The conga-IC175 supports the following operating systems.

- Microsoft[®] Windows[®] 10
- Linux 3.x/4.x

Note

The Intel® Kaby Lake SoC supports only 64-bit operating systems.

2.3 Mechanical Dimensions

- 170 mm x 170 mm
- Height approximately 20 mm

2.4 Supply Voltage Power

• $12 - 24 \text{ V DC} \pm 5 \%$

2.5 Power Consumption

The power consumption values were measured using the following test setup:

- Input voltage +12 V
- conga-IC175 SBC
- conga-IC175 cooling solution
- Microsoft Windows 10 (64 bit)

Note

The CPU was stressed to its maximum workload.

Table 6 Measurement Description

The power consumption values were recorded during the following system states:

System State	Description	Comment
S0: Minimum value	Lowest frequency mode (LFM) with minimum core voltage during desktop idle	
S0: Maximum value	Highest frequency mode (HFM/Turbo Boost)	The CPU was stressed to its maximum frequency
S0: Peak current	Highest current spike during the measurement of "S0: Maximum	Consider this value when designing the system's power supply, to
S3	SBC is powered by 12 V	ensure sufficient power is supplied during worst case scenarios
S5	SBC is powered by 12 V	

Note

1. The fan and SATA drives were powered externally.

2. All other peripherals except the LCD monitor were disconnected before measurement.

Table 7Power Consumption Values

The tables below provide additional information about the conga-IC175 power consumption. The values are recorded at various operating mode.

Part	Memory	H.W	BIOS	OS (64 bit)	CPU				C	urrent (A))	
No.	Size	Rev.	Rev.		Variant	Cores	Freq. /Max. Turbo	S0: Min	S0: Max	S0: Peak	S3	S5
052900	2 x 4 GB	B.0	R000	Windows 10	Intel® Core™ i5-7300U	2	2.6 /3.0 GHz	0.58	2.29	3.29	0.05	0.03
052901	2 x 4 GB	B.0	R000	Windows 10	Intel® Core™ i3-7100U	2	2.4 GHz/N.A	0.55	2.17	2.99	0.05	0.03
052902	2 x 4 GB	B.0	R000	Windows 10	Intel [®] Celeron [®] 3965U	2	2.2 Ghz /N.A	0.44	2.17	3.00	0.04	0.03
052903	2 x 4 GB	B.0	R000	Windows 10	Intel® Core™ i7-7100U	2	2.8 /3.9 GHz	0.53	2.40	3.22	0.05	0.03

Note

With a fast input voltage rise time, the inrush current may exceed the measured peak current.

2.6 Supply Voltage Battery Power

Table 8	CMOS	Battery	Power	Consumpt	ion
---------	------	---------	-------	----------	-----

RTC @	Voltage	Current
-10°C	3V DC	1.44 µA
20°C	3V DC	1.57 μA
70°C	3V DC	1.91 μA

Note

- 1. Do not use the CMOS battery power consumption values listed above to calculate CMOS battery lifetime.
- 2. Measure the CMOS battery power consumption in your customer specific application in worst case conditions (for example, during high temperature and high battery voltage).
- 3. Consider also the self-discharge of the battery when calculating the lifetime of the CMOS battery. For more information, refer to application note AN9_RTC_Battery_Lifetime.pdf on congatec GmbH website at www.congatec.com/support/application-notes.

2.7 Environmental Specifications

Temperature	Operation: 0° to 60°C	Storage: -20° to +70°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



4 Cooling Solution

The conga-IC175 supports the cooling solutions listed in the table below. The dimensions of the cooling solutions are shown in the sub-sections. All measurements are in millimeters.

Table 9Cooling Solution Variants

	Cooling Solution	Part No.	Description
1	congatec CSA	052252	Active cooling solution with integrated heatsink and congatec retention frame (PN: 052254)
2	Custom cooling solution	N.A	Custom cooling solution in combination with the congatec retention frame

Note

- 1. The retention frame acts as mounting backplate and board reinforcement.
- 2. We recommend a maximum torque of 0.4 Nm for SBC mounting screws and 0.5 Nm for CPU mounting screws.
- 3. With passive or custom cooling solution, the end user must make sure that adequate air flow is maintained.
- 4. The congatec conga-IC175 cooling solutions support maximum TDP of 15 W. For applications with higher TDP, you need a custom cooling solution or additional cooling components.



- 1. The congatec heatspreaders/cooling solutions are tested only within the commercial temperature range of 0° to 60°C. Therefore, if your application that features a congatec heatspreader/cooling solution operates outside this temperature range, ensure the correct operating temperature of the SBC is maintained at all times. This may require additional cooling components for your final application's thermal solution.
- 2. For adequate heat dissipation, use the mounting holes on the cooling solution to attach it to the SBC. Apply thread-locking fluid on the screws if the cooling solution is used in a high shock and/or vibration environment. To prevent the standoff from stripping or cross-threading, use non-threaded carrier board standoffs to mount threaded cooling solutions.
- 3. For applications that require vertically-mounted cooling solution, use only coolers that secure the thermal stacks with fixing post. Without the fixing post feature, the thermal stacks may move.
- 4. Do not exceed the recommended maximum torque. Doing so may damage the SBC.

4.1 Active Cooling Dimensions













Note

To replace the fan, use equivalent fan with similar parameters.



4.2 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. Make sure the retention frame is placed correctly, without touching surrounding components.
- Remove the protection pull tab foil from the phase changer and carefully place the cooling solution. Ensure the cooling solution cable is in position A as shown below.
- Slightly tighten each of the screws so that they hold the cooling solution in place. 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 to the power connector.





Wrong placement of the retention frame may damage some electronic components. Before you tighten the cooling solution to the retention frame, ensure the retention frame is alligned properly.

5 Connector Description

5.1 Power Supply

You can power the conga-IC175 SBC with a 12 V – 24 V laptop type DC power supply (on connector X48) or a 4-pin internal power supply (on connector X49).

Additionally, the SBC offers an optional SBM³ power connector (only BOM option). When this connector (X47) is populated, you can power the SBC with it.



The supplied voltages must be within a tolerance of \pm 5%.

5.1.1 DC Power Jack (Rear I/O)

You can power the conga-IC175 SBC with a laptop-type DC power supply, connected to the DC power jack on the back panel. The power input protects against polarity reversal and under/over voltage.

Table 10 Connector X48 Pinout Description

DC Power Jack - Connector X48

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



Note

The conga-IC175 turns on immediately you connect a power supply. To change this behavior, set the "Power Loss Control" in the BIOS Boot Settings Configuration menu to "Remain OFF".



X48 : DC power jack, 7.4 x 5.1 mm diameter

5.1.2 **Power Supply (Internal Connector)**

The conga-IC175 offers an internal 4-pin power connector. This connector makes it possible to use customized power supply cables or connectors. The power input protects against under voltage or over voltage.

Table 11 Connector X49 Pinout Description

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

Internal Power Connector X49



Note

The conga-IC175 turns on immediately you connect a power supply. To change this behavior, set the "Power Loss Control" in the BIOS Boot Settings Configuration menu to "Remain OFF".

Connector Type

X49 : 2x2-pin, 4.2 mm pitch connector Possible Mating Connector: Molex 87427-0442

5.1.3 Optional SBM³ Power Connector (Internal Connector)

You can also power the conga-IC175 SBC optionally (BOM option) with an SBM battery kit. This option requires:

- Connector X47 SBM battery power connector
- Connector X46 SBM battery signals connector

Table 12 Connector X47 Pinout Description

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

Connector Type

X47: 1x5-pin, 3 mm pitch Molex Micro-FIT connector

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SBM3 Power - Connector X47



5.1.3.1 Optional SBM3 Signal Connector

For designs that require SBM battery kit, you need the optional power connector X47 and the signal connector X47. The signal connector ensures the conga-IC175 communicates flawlessly with the battery kit.

Table 13 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_S4#
8	PWRBTN#

Connector Type

X46 : 8-pin, 1.25 mm pitch Molex PicoBlade connector

5.1.4 Power Status LEDs

The conga-IC175 provides two LED signals (FP_LED+ and P_LED-) on pins 2 and 4 of the front panel connector X39. The signals indicate the different power states of the conga-IC175.

Table 14 LED States

State	FP_LED+	FP_LED-
SO	1	0
S3	0	1
S5	1	1

Note

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



SBM3 Signal - Connector X46

5.2 CMOS Battery/RTC

The conga-IC175 provides a board-mounted battery holder (M60) for CMOS battery. 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

The conga-IC175 offers an optional connector (X44) for external CMOS battery. .

M60 (Battery Holder)



Optional connector X44





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.



X44 : 2-pin, 1.25mm pitch Molex PicoBlade header

5.3 PCI Express

The conga-IC175 provides 3 PCIe interfaces—a PCIe M.2 slot on connector X10 (see section 5.6.3), a PCIe x4 slot on connector X7 and a full/ half size mini PCIe slot on connector X8.

5.3.1 PCIe x4 Slot

The conga-IC175 offers a PCIe x4 slot on connector X7.

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
B9	N.C	A9	+3.3V
B10	+3.3V Aux	A10	+3.3V
B11	WAKE#	A11	PCIE_RST#
	Кеу		
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: PCle x4 connector

5.3.2 Full/half-size Mini PCIe

The conga-IC175 offers a mini PCIe socket on connector X8. This socket is optimized for mobile computing platforms and provides the ability to insert different removable mini PCIe cards. This approach makes it possible to upgrade standard PCIe mini card devices on the SBC, without extra cost of a redesign.

Table 16	mPCle ((Connector	X8) Pinc	out Description
----------	---------	------------	----------	-----------------

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3V
3	N.C	4	GND
5	N.C	6	+1.5V
7	CLKREQ#	8	N.C *1
9	GND	10	N.C *1
11	REFCLK-	12	N.C *1
13	REFCLK+	14	N.C *1
15	GND	16	N.C
17	N.C	18	GND
19	N.C	20	W_DISABLE#
21	GND	22	PERST#



Pin	Signal	Pin	Signal
23	PERn0	24	+3.3V
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	РЕТр0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3V	40	GND
41	+3.3V	42	N.C
43	GND	44	LED_WLAN# (optional)
45	CL_CLK	46	N.C
47	CL_DATA	48	+1.5V
49	CL_RST#	50	GND
51	N.C	52	+3.3V
53	GND	54	GND



*¹ The micro-SIM card slot (connector X11) can optionally be connected to these pins (UIM interface).

Connector Type

X8: PCIe mini card socket

5.3.3 PCI Express Routing

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



5.4 Display Interfaces

The conga-IC175 supports up to three independent displays—two DP++ and one LVDS or eDP display.

5.4.1 DisplayPort

The conga-IC175 SBC has two DP++ connectors (X18 and X19) located at the rear I/O panel.

DP++ Connectors X18/X19





X18,X19: Standard DisplayPort connector

5.4.2 LVDS

The conga-IC175 offers a 40-pin LVDS connector (X25). The LVDS signals are sourced from incoming eDP stream, via a multiplexer. The multiplexer routes the eDP signals to LVDS connector X25 (via an eDP to LVDS bridge) by default.

The LVDS interface is on the top side of the SBC and supports:

- 24 bit single channel
- selectable backlight voltage
- VESA color mappings
- automatic panel detection
- resolution up to 1920 x 1200 in dual LVDS mode.

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

Table 17 Connector X25 Pinout Description

Note

The maximum output current for LCD and backlight power rails is 2 A.

Connector Type

X25: 0.5 mm, 40-pin ACES connector Possible Mating Connector: ACES 88441-40 or ACES 50204-40

LVDS Connector X25



5.4.3 Embedded DisplayPort (eDP)

The conga-IC175 provides a 40-pin eDP connector (X20). The eDP signals are multiplexed with LVDS. To use the eDP connector, change the 'Active LFP Configuration" in the BIOS setup menu to 'eDP'.

The eDP interface is on the bottom side of the SBC.

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

Table 18 Connector X20 Pinout Description

Connector Type

X20: 0.5 mm, 40-pin ACES connector

Possible Mating Connector: ACES 88441-40 or ACES 50204-40

eDP Connector X20



5.4.3.1 Backlight Power Connector

The conga-IC175 provides backlight power on connector X22.

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 ground
6	GND	Backlight ground
7	Brightness_Up	Flat panel brightness increase
8	Brightness_Down	Flat panel brightness decrease

Table 19 Connector X22 Pinout Description

Connector Type

X22: 2 mm, 8-pin crimp style connector Possible Mating Connector: Chyao Shiunn JS-1124-08

5.4.3.2 Backlight/Panel Power Selection

The conga-IC175 supports different voltages for the panel and backlight. With jumper X23, you can set the panel voltage to 3,3 V, 5 V or 12 V. With jumper X24, you can set the backlight voltage to 5 V or 12 V.

Table 20 Connector X23 Pinout Description

Jumper Position	LCD Voltage
2-4	+3.3 V
3-4	+12 V
4-6	+5 V

Backlight Power - Connector X22



Panel Voltage Selector - Jumper X23



Table 21 Connector X24 Pinout Description

Jumper Position	Backlight Voltage
2-4	N.A
3-4	+12 V
4-6	+5 V

Connector Type

X23, X24: 2.54 mm, 2x3-pin header (without pins 1 and 5)

5.4.3.3 Monitor OFF connector

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

Table 22 (Connector X21	Pinout Description
------------	---------------	--------------------

Pin	Function
1	GND
2	MONITOR_OFF#

Connector Type

X21: 2.54 mm, 2-pin Molex KK series connector

5.5 USB

The conga-IC175 provides 10 USB ports—four on the rear connectors, four internally and two on the mini-PCIe and M.2 connectors.

5.5.1 Rear USB Connectors

The conga-IC175 offers four USB 3.0 ports (port 1-4) on the rear side. These ports are routed directly from the SoC to connectors X13 and X14. The ports support also USB 2.0 devices.



Monitor OFF - Connector X21





Note

The +5V signals of connector X13 and X14 have a maximum current of 1 A each.

Connector Type

X13,X14: Dual USB 3.0 type A (stacked) connector

5.5.2 Internal USB Connectors

The conga-IC175 offers four USB ports (ports 7-10) internally. Ports 7 and 8 are routed to connector X16 while ports 9 and 10 are routed to connector X15.



- 1. Each port (ports 7-10) has a maximum current of 0.5 A.
- 2. Connector X16 supports Wake-on-USB feature.

Table 23 Connector X16 Pinout Description

USB	Port 7		USB Port 8		
Pin	Signal	Description	Pin	Signal	Description
1	+5V	+5 V supply	2	+5V	+5 V supply
3	USB7-	USB Port 7, Data-	4	USB8-	USB Port 8, Data-
5	USB7+	USB Port 7, Data+	6	USB8+	USB Port 8, Data+
7	GND	Ground	8	GND	Ground
9	No Pin	Empty	10	N.C	Not Connected





Table 24 Connector X15 Pinout Description

USE	Port 9		USB Port 10		
Pin	Signal	Description	Pin	Signal	Description
1	+5V	+5 V supply	2	+5V	+5 V supply
3	USB9-	USB Port 9, Data-	4	USB10-	USB Port 10, Data-
5	USB9+	USB Port 9, Data+	6	USB10+	USB Port 10, Data+
7	GND	Ground	8	GND	Ground
9	No Pin	Empty	10	N.C	Not Connected

Internal USB - Connector X15



Connector Type

X15, X16: 2.54 mm, 2x5-pin header

5.6 SATA Interfaces

5.6.1 Standard SATA Ports

The conga-IC175 provides three SATA ports—two standard SATA connectors (X51 and X52) and one M.2 connector (X10). The SATA ports support data rates up to 6 Gbps. The SATA LED on the front panel connector lights when there is activity on any of the SATA interface.



Note

- 1. The conga-IC175 offers an additional standard SATA connector (X50) via an assembly option (customized variant).
- 2. Connector X51 supports eSATA devices.
- 3. Connector X52 supports SATADOM devices on hardware revision A.x and later.

Connector Type

X50,X51,X52: Standard SATA connector

5.6.2 SATA Power

The conga-IC175 provides an internal SATA power for hard drives on connector X12. This connector supplies 3.3 V, 5 V and 12 V.

Table 25	Connector 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

Note

1. Do not power more than two devices at the same time.

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

Connector Type

X12: 15-pin standard SATA power connector

SATA Power (X12)

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

5.6.3 M.2 Slot

The conga-IC175 offers an M.2, type 3042/2242 slot (X10) for connecting SATA or PCIe x2 SSDs and WWAN devices.

Table 26	Connector X10	Pinout Descript	ion (Revision B.	x and later)
----------	---------------	-----------------	------------------	--------------

Pin	Signal	Pin	Signal
1	CONFIG_3	2	+3.3V
3	GND	4	+3.3V
5	GND	6	FULL_CARD_PWROFF#
7	USB_D+	8	W_DISABLE_1#
9	USB_D-	10	LED1 (optional)
11	GND	12	
13	Кеу	14	Кеу
15		16	
17	Кеу	18	Кеу
19		20	N.C
21	CONFIG_0	22	N.C
23	WoWWAN#	24	N.C
25	N.C	26	W_DISABLE_2#
27	GND	28	N.C
29	PER1-	30	UIM_RESET
31	PER1+	32	UIM_CLK
33	GND	34	UIM_DATA
35	PET1-	36	UIM_PWR
37	PET1+	38	DEVSLP
39	GND	40	GNSS_SCL
41	PER0-/SATA_B+	42	GNSS_SDA
43	PER0+/SATA_B-	44	GNSS_IRQ
45	GND	46	N.C
47	PET0-/SATA_A-	48	N.C
49	PET0+/SATA_A+	50	RESET#
51	GND	52	CLKREQ#
53	REFCLK-	54	PEWAKE#
55	REFCLK+	56	N.C

M.2 Type B Slot - Connector X10



Pin	Signal	Pin	Signal
57	GND	58	N.C
59	N.C	60	N.C
61	N.C	62	N.C
63	N.C	64	N.C
65	N.C	66	N.C
67	RESET#	68	SUSCLK
69	CONFIG_1	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	CONFIG_2		



- 1. On hardware revision A.x and earlier, the M.2 slot supports SATA SSD and WWAN (USB 2.0) devices by default, and PCIe x1 devices via a customized BIOS.
- 2. Micro-SIM card slot (connector 11) is connected to the UIM Interface of the M.2 slot by default.

Connector Type

X10: M.2 type B slot (compatible with card size 3042 or 2242)

5.7 Ethernet

The conga-IC175 provides two Gigabit Ethernet ports (connectors X5 and X6) on the rear side. Only the LAN interface on connector X5 supports Intel AMT technology

LED Description Table 27

LED Left Side	Description	LED Right Side	Description
Off	10 Mbps link speed	Off	No link
Green	100 Mbps link speed	Steady On	Link established, no activity detected
Orange	1000 Mbps link speed	Blinking	Link established, activity detected

Connector X5/X6



Note

Connector X6 does not support Wake on LAN from S5 mode in Windows 10.

Connector Type

X5/X6: 8-pin RJ45 connector with gigabit magnetic and LEDs

5.8 Audio Interface

The conga-IC175 provides audio connectors internally and on the rear side. The internal audio connectors are stereo speaker, digital microphone/ SPDIF and front Panel HD audio. The rear audio connectors are Line-OUT and Mic-IN.

5.8.1 **Rear Audio Connectors**

The conga-IC175 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. You can find the drivers for this codec at:

http://www.congatec.com/en/products/mini-itx-single-board-computer/conga-ic175.html

Table 28	MIC-IN (Connector X29) Pinout Description
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Pin	Jack	Signal	Description	
1	Tip	MIC1_L	Microphone - left channel	
2	Ring	MIC1_R	Microphone - right channel	
3	Sleeve	A_GND	Analog ground	

MIC IN - Connector X29







Table 29 Line-OUT (Connector X31) Pinout Description

Pin	Jack	Signal	Description
1	Тір	LINE_L	Line-OUT - left channel
2	Ring	LINE_R	Line-OUT - right channel
3	Sleeve	A_GND	Analog ground

Connector Type

X29, X31: 3-pin, 3.5 mm single audio jack

5.8.2 Internal Audio Connectors

The conga-IC175 provides the stereo speaker, digital microphone/SPDIF, front panel HD and surround audio connectors internally.

5.8.2.1 Stereo Speaker Header

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

Table 30 Stereo Speaker (Connector X30) Pinout Description

Pin	Signal	Description
1	FRONT_L-	Analog front left (differential negative)
2	FRONT_L+	Analog front left (differential positive)
3	FRONT_R+	Analog front right (differential positive)
4	FRONT_R-	Analog front right (differential negative)

Connector Type

X30: 2 mm, 4-pin crimp style connector Possible Mating Connector: Chyao Shiunn JS-1124-04

Stereo Speaker - Connector X30



Jack (Line-IN)



Line OUT - Connector X31



5.8.2.2 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 (3,3 V and 5 V). Power Budget of these pins is limited to 500 mA.

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/DMIC_CLK	S/PDIF output or Digital MIC serial clock (configurable)	
5	KEY	No pin	
6	+5V	5 V supply	

Digital MIC/SPDIF - Connector X28



Connector Type

X28: 2.54 mm, 1x6-pin header

5.8.2.3 Front Panel (HD Audio/AC97)

The front panel HD audio signals of the Realtek ALC888S HDA audio codec are routed to connector X27.

Table 31 HDA/AC97 Front Panel (Connector X27) Pinout Description

Pin	Signal	Description	
1	MIC2_L	2nd analog stereo microphone input - left channel	Fror
2	GND_HDA	Audio ground	1101
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 output - right channel (headphone)	
6	MIC2_JD	Microphone jack detection	
7	SENSE	Jack detection for HDA codec	Pin 1
8	KEY	No pin	
9	LINE2_L	2nd analog line output - left channel (headphone)	
10	LINE2_JD	Line output jack detection	

Front Panel Audio - Connector X27



Connector Type

X27: 2.54 mm, 2x5-pin header

5.8.2.4 Surround header

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

Table 32	Surround	(Connector	X26)	Pinout	Description
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Pin	Signal	l Description		Signal	Description	
1	LINE1_L	1st Analog line input left channel	2	A_GND	Analog ground	
3	A_GND	Analog ground	4	LINE1_R	1st Analog line input right channel	
5	SIDE_L	Analog side output left channel	6	A_GND	Analog ground	
7	A_GND	Analog ground	8	SIDE_R	Analog side out right channel	
9	SURR_L	Analog surround out left channel	10	A_GND	Analog ground	
11	A_GND	Analog ground	12	SURR_R	Analog surround out right channel	D
13	CENTER	Analog center output	14	A_GND	Analog ground	PI
15	A_GND	Analog ground	16	LFE	Analog low frequency output	
17	-	No pin	18	SENSE	Jack detection for HDA codec	



Connector Type

X26: 2 mm, 2x9-pin header

5.9 SMBus

The SMBus signals are available in different locations on the conga-IC175, including the feature connector (X38) described in section 6.12.

5.10 SPI Bus

The SPI signals are connected to the onboard SPI flash and the feature connector (X38). With the SPI signals on the feature connector, you can start the conga-IC175 from an external flash. This however requires a customized adapter to trigger the BIOS_DISABLE# signal (pin 46) of the feature connector.

Note

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

5.11 I²C Bus

The congatec board controller provides I²C signals. These signals are available in different locations on the conga-IC175, including the feature connector (X38) described in section 6.12 of this document.

5.12 LPC Super I/O Device

The conga-IC175 has an onboard Super I/O controller. The controller is connected to the SoC's LPC bus and provides additional interfaces such as two serial interfaces, optional ccTALK, GPOs, 4-wire CPU and system fans. .

5.12.1 GPIOs

The conga-IC175 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) described in section 6.12 "Feature Connector".

5.12.2 Serial Ports (COM)

The Super I/O controller on the conga-IC175 provides two fully featured RS-232 compliant UART interfaces (COM 1 and 2). The COM ports support data rates up to 250 kbps with worst-case loads of 3kΩ, in parallel with 1nF.

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

Table 33 Serial Ports (Connectors X34/X37) Pinout Description

COM 1 & 2 - Connectors X34/X37



• Note

The conga-IC175 offers an optional ccTALK interface. This interface uses transmit and receive signals of COM 2. If this option is implemented, COM 2 will not be available.

Connector Type

X34,X37: 2.54 mm, 2x5-pin headers

5.12.3 CPU/System Fan Connector & Power Configuration

The conga-IC175 supports 5 V or 12 V CPU and system fans. The signals of the CPU and system fans are routed to connectors X33 and X36 respectively. Use jumper X32 to select the voltage of the CPU fan and jumper X35 to select the voltage of the system fan.

Table 34 CPU/SYS Fan Pinout

X33/X36 Pin	Signal
1	GND
2	VCC +5 VDC/+12 VDC
3	FAN_TACHOIN
4	FAN_CTRL

Jumper X32, X35	Configuration	
1 - 2	FAN +12 VDC (default)	
2 - 3	FAN +5 VDC	

Note

The maximum power of both CPU and SYS fan is 5 W.

Connector Type

X33, X36: 2.54 mm, 4-pin grid female fan connector X32, X35: 2.54 mm grid jumper



6 Additional Features

6.1 Front Panel Connector

The conga-IC175 SBC supports front panel features such as power button, status LEDs and reset button via connector X39—a 10-pin internal header. The FP_LED+ and FP_LED- signals communicate the system states to two LEDs connected to this header.

See section 5.1.4 "Power Status LED" for the possible power states and corresponding LED status.

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

 Table 35
 Front Panel (Connector X39) Pinout Description

Front Panel - Connector X39



Connector Type

X39: 2.54 mm,10-pin header

6.2 Micro-SIM Card

The conga-IC175 offers a micro-SIM slot on connector X11 for inserting SIM card.

Table 36 Connector X11 Pinout Description

Pin	Signal	Description
C1	PWR	Power
C2	RST	Reset
C3	CLK	Clock
C4	N.A	Not available
C5	GND	Ground
C6	VPP	Programming voltage input
C7	I/O	Data
C8	N.A	Not available



SIM Slot - Connector X11

Note

1. The micro-SIM card slot is connected to the UIM interface of the M.2 slot by default.

2. The slot can optionally be connected to the UIM interface of the mPCIe slot.

Connector Type

X11: Micro-SIM card socket (Molex 78800 series)

6.3 Micro-SD Card

The conga-IC175 offers a micro-SD slot on connector X60. The SD card slot complies with SDXC card specification 3.0 with support for up to 104 MBps data rate. Micro-SD Slot (Connector X60)

Table 37 Connector X60 Pinout Description

Pin	Signal	Description	
1	SD_D2	Data line (bit 2)	
2	SD_D3	Data line (bit 3)	
3	SD_CMD	Command response	





Pin	Signal	Description	
4	+3.3V	Supply voltage	
5	SD_CLK	Serial clock	
6	GND	Ground	
7	SD_D0	Data line (bit 0)	
8	SD_D1	Data line (bit 1)	

Connector Type

X60: Micro-SD card slot

6.4 Integrated Sensor Hub

The conga-IC175 offers an Integrated Sensor Hub (ISH) on connector X61.

Table 38	ISH (Connector X61) Pinout Description
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Pin	Signal	Pin	Signal
1	+3.3V	2	+5V
3	+3.3V	4	RSVD
5	N.C	6	I2C0_SDA
7	N.C	8	I2C0_SCL
9	GND	10	I2C1_SDA
11	UARTO_RXD	12	I2C1_SCL
13	UART0_TXD	14	GND
15	UARTO_RTS	16	GPIO0
17	UARTO_CTS	18	GPIO1
19	GND	20	GPIO2
21	UART1_RXD	22	GPIO3
23	UART1_TXD	24	GPIO4
25	UART1_RTS	26	N.C
27	UART1_CTS	28	N.C
29	GND	30	N.C

Connector Type

X61: 2 mm, 2x15-pin header





6.5 Case Open Intrusion Connector

The conga-IC175 provides connector X2 for case-open intrusion detection.

Table 39 Case Open Intrusion (Connector X2) Pinout Description

Pin	Function
1	GND
2	INTRUDER#

Connector Type

X2: 2.54 mm, 2-pin Molex KK series connector

6.6 Optional TPM

The conga-IC175 SBC can be equipped optionally with a TPM 2.0 compliant security chip. The chip is connected to the LPC bus provided by the integrated Intel chipset.

The UEFI boot firmware on the SBC initializes the TPM chip.

6.7 congatec Board Controller (cBC)

The conga-IC175 is equipped with a Texas Instruments Tiva[™] 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.

6.7.1 Fan Control

The conga-IC175 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.



6.7.2 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".

6.7.3 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.

6.8 OEM BIOS Customization

The conga-IC175 is equipped with congatec Embedded BIOS, which is based on American Megatrends Inc. Aptio UEFI firmware. The congatec Embedded BIOS allows system designers to modify the BIOS. For more information about customizing the congatec Embedded BIOS, refer to the congatec System Utility user's guide CGUTLm1x.pdf on the congatec website at www.congatec.com or contact technical support.

The customization features supported are described below:

6.8.1 OEM Default Settings

This feature allows system designers to create and store their own BIOS default configuration. Customized BIOS development by congatec for OEM default settings is no longer necessary because customers can easily perform this configuration by themselves using the congatec system utility CGUTIL. See congatec application note AN8_Create_OEM_Default_Map.pdf on the congatec website for details on how to add OEM default settings to the congatec Embedded BIOS.

6.8.2 OEM Boot Logo

This feature allows system designers to replace the standard text output displayed during POST with their own BIOS boot logo. Customized BIOS development by congatec for OEM Boot Logo is no longer necessary because customers can easily perform this configuration by themselves using the congatec system utility CGUTIL. See congatec application note AN11_Create_And_Add_Bootlogo.pdf on the congatec website for details on how to add OEM boot logo to the congatec Embedded BIOS.

6.8.3 OEM POST Logo

This feature allows system designers to replace the congatec POST logo displayed in the upper left corner of the screen during BIOS POST with their own BIOS POST logo. Use the congatec system utility CGUTIL 1.5.4 or later to replace or add the OEM POST logo.

6.8.4 OEM BIOS Code/Data

With the congatec embedded BIOS, system designers can add their code to the BIOS POST process. The congatec Embedded BIOS first calls the OEM code before handing over control to the OS loader. Except for custom specific code, this feature can also be used to support verb tables for HDA codecs, PCI/PCIe OpROMs, bootloaders and rare graphic modes.

• Note

The OEM BIOS code of the new UEFI based firmware is called only when the CSM (Compatibility Support Module) is enabled in the BIOS setup menu. Contact congatec technical support for more information on how to add OEM code.

6.8.5 OEM DXE Driver

This feature allows designers to add their own UEFI DXE driver to the congatec embedded BIOS. Contact congatec technical support for more information on how to add an OEM DXE driver.

6.9 congatec Battery Management Interface

To facilitate the development of battery powered mobile systems based on embedded modules, congatec GmbH 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 (for example, charge state of the battery, information about the battery, alarms/events for certain battery states and so on) without the need for additional modifications to the system BIOS.

In addition to the ACPI-Compliant Control Method Battery mentioned above, the latest versions of the conga-IC175 BIOS and board controller firmware also support LTC1760 battery manager from Linear Technology and a battery only solution (no charger). All three battery solutions are supported on the I2C bus and the SMBus. This gives the system designer more flexibility when choosing the appropriate battery sub-system.

For more information about the supported Battery Management Interface, contact your local sales representative.

6.9.1 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 .

6.10 Thermal/Voltage Monitoring

The conga-IC175 SBC features three temperature sensors - the CPU, memory and board controller sensors. The board controller monitors the +12 V rail.

6.11 Beeper

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

Beeper (M16)



6.12 External System Wake Event

The conga-IC175 supports LAN, USB, PCIe and PWRBTN driven wake up events.

6.13 Feature Connector

The conga-IC175 provides an internal 50-pin, 2mm pin header as feature connector. The pinout is described below:

Pin#	Signal Name	Pin Type	Voltage Level	Onboard Termination	Description	Feature Connector X38
1	+5V	Power	5V		+5V runtime power output (500 mA max).	
2	GND	Ground				
3	LAD0	I/O	3.3V		LPC command, address, data 0	
4	LAD1	I/O	3.3V		LPC command, address, data 1	
5	LAD2	I/O	3.3V		LPC command, address, data 2	
6	LAD3	I/O	3.3V		LPC command, address, data 3	
7	LFRAME#	Output	3.3V		LPC frame (start of cycle)	
8	SERIRQ#	I/O	3.3V	PU 10k	Serial Interrupt Request	
9	LPC_CLK (24 MHz)	Output	3.3V		24 MHz clock signal for external LPC device	
10	PLT_RST#	Output	3.3V standby		System reset, active low	
11	SMB_DAT	I/OD	3.3V standby	PU 4k7	SMBus data	
12	SMB_CLK	OD	3.3V standby	PU 4k7	SMBus clock output, up to 100 kHz	
13	SMB_ALERT#	Input	3.3V standby	PU 2k2	SMBus Alert (system wake or SMI), active low	
14	GND	Ground				
15	TX_CGBC	Output	3.3V standby		UART transmit port from congatec board controller (a debug port	
16	RX_CGBC	Input	3.3V standby	PU 10k	UART receive port from congatec board controller (a debug port)	
17	GPO0	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
18	GPO1	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
19	GPO2	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
20	GPO3	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
21	GPO4	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
22	GPO5	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
23	GPO6	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
24	GPO7	Output	3.3V	PU 4k7	General purpose output from Super IO (LPC)	
25	GPI0	Input	3.3V	PU 10k	General purpose input to Board controller	_
26	GPI1	Input	3.3V	PU 10k	General purpose input to congatec Board controller	
27	GPI2	Input	3.3V	PU 10k	General purpose input to congatec Board controller	

Table 40Feature Connector X38 Pinout Description



28	GPI3	Input	3.3V	PU 10k	General purpose input to congatec Board controller
29	GPI4	Input	3.3V	PU 10k	General purpose input to congatec Board controller
30	GPI5	Input	3.3V	PU 10k	General purpose input to congatec Board controller
31	GPI6	Input	3.3V	PU 10k	General purpose input to congatec Board controller
32	GPI7	Input	3.3V	PU 10k	General purpose input to congatec Board controller
33	SLP_S3#	Output	3.3V standby	PD 100k	S3 sleep control (suspend to RAM), active low
34	SLP_S5#	Output	3.3V standby		S5 sleep control (Soft Off), active low
35	SLP_S4#	Output	3.3V standby	PD 100k	S4 sleep control (suspend to Disk), active low
36	LID_BTN#	Input	3.3V standby	PU 10k	Connect directly to LID switch, active low
37	SLP_BTN#	Input	3.3V standby	PU 10k	Connect directly to sleep button, active low
38	THRM#	Input	3.3V	PU 10k	External thermal event, active low. Use open drain configuration on external device
39	WDOUT	Output	3.3V	PD 10k	Watchdog output event (board controller)
40	WDTRIG#	Input	3.3V	PU 10k	Watchdog trigger input (board controller), timer reset, active low. Use open drain configuration on external device
41	I2C_DAT	I/OD	3.3V standby	PU 2k2	I2C data bus from board controller (general use)
42	PWR_OK (optional)	Input	VIN	PU 470k PD 150k	Assembly option only. Power good signal from external PSU or voltage monitor. Use open drain configuration on external device. Onboard power rails are disabled if signal is low.
43	SPI_CS#	Output	3.3V standby	PU 10k	SPI chip select for external SPI flash
44	I2C_CLK	OD	3.3V standby	PU 2k2	I2C clock bus from board controller (general use)
45	SPI_MISO	Input	3.3V standby		External SPI flash data output
46	BIOS_DIS#	Input	3.3V standby	PU 10k	External SPI flash enable (boot from external SPI flash), active low
47	SPI_CLK	Output	3.3V standby		External SPI flash clock input
48	SPI_MOSI	Output	3.3V standby		External SPI flash data input
49	+5V standby	Power	5V standby		+5V standby power, 500mA max
50	GND	Ground			

Connector Type

X38: 2 mm, 2x25-pin header

7 Mechanical Drawing



8 BIOS Setup Description

The BIOS setup description of the conga-IC175 can be viewed without having access to the module. However, access to the restricted area of the congatec website is required in order to download the necessary tool (CgMIfViewer) and Menu Layout File (MLF).

The MLF contains the BIOS setup description of a particular BIOS revision. The MLF can be viewed with the CgMlfViewer tool. This tool offers a search function to quickly check for supported BIOS features. It also shows where each feature can be found in the BIOS setup menu.

For more information, read the application note "AN42 - BIOS Setup Description" available at www.congatec.com.

Note

If you do not have access to the restricted area of the congatec website, contact your local congatec sales representative.

8.1 Navigating the BIOS Setup Menu

The BIOS setup menu shows the features and options supported in the congatec BIOS. To access and navigate the BIOS setup menu, press the or <F2> key during POST. 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.

8.2 BIOS Versions

The BIOS displays the BIOS project name and the revision code during POST, and on the main setup screen. The initial production BIOS for conga-IC175 is identified as IVKLR1xx or IUKLR1xx, where:

- R is the identifier for a BIOS ROM file
- 1 is the feature number
- xx is the major and minor revision number

The IVKL binary size is 16 MB. The IUKL binary size is 8 MB.

8.3 Updating the BIOS

BIOS updates are recommeded to correct platform issues or enhance the feature set of the module. The conga-IC175 features a congatec/AMI AptioEFI firmware on an onboard flash ROM chip. You can update the firmware with the congatec System Utility. The utility has five versions—UEFI shell, DOS based command line¹, Win32 command line, Win32 GUI, and Linux version.

For more information about "Updating the BIOS" refer to the user's guide for the congatec System Utility "CGUTLm1x.pdf" on the congatec website at www.congatec.com.



^{1.} Deprecated.



The DOS command line tool is not officially supported by congatec and therefore not recommended for critical tasks such as firmware updates. We recommend to use only the UEFI shell for critical updates.

8.4 Supported Flash Devices

The conga-IC175 supports the following flash devices for external BIOS:

- Winbond W25Q128JVSIQ (16 MB)
- Winbond W25Q64JVSSIQ (8 MB)

For more information about external BIOS support, refer to the Application Note "AN7_External_BIOS_Update.pdf" on the congatec website at http://www.congatec.com.