



conga-HPC/3.5-Mini

COM-HPC® 1.20 Mini Application Carrier Board

User's Guide

Revision 1.00

Revision History

Revision	Date (yyyy-mm-dd)	Author	Changes
0.01	2024-07-24	BEU	<ul style="list-style-type: none">Preliminary release
0.02	2025-03-06	BEU	<ul style="list-style-type: none">Added reference to additional documents in preface sectionUpdated orientation of SATA connector X31 in section "Connector Layout"Added links to connectors in section "Connector Layout"Added "Relative" to "Relative Humidity" in section 3.1 "Feature List"Corrected COM-HPC connector designator X1 to X54 in section 4 "Connectors and Features"Updated connector images X9, X11, X13 in sections 4.2 "M.2 Key B (X11) + micro-SIM Card Slot (X12)", 4.3 "M.2 Key E (X13)", and 4.4 "M.2 Key M (X9)"Corrected X51 pinout in section 4.14 "General Purpose SPI Port"Corrected X52 pinout in section 4.21 "GPIO Pin Header"Renamed section 6 to "Mechanical Drawing"
0.03	2025-09-16	BEU	<ul style="list-style-type: none">Updated product image on title pageUpdated reference to additional documents in Preface sectionChanged supported voltage to 10 V - 20 V in sections 2.1 "Feature List" and 4.1 "4-Pin ATX Power Connector"Updated humidity ranges in section 2.1 "Feature List"Removed Power Management in section 2.1 "Feature List"Corrected section numbering 4.1.1 "4-Pin ATX Power Connector" to 4.1 "4-Pin ATX Power Connector"Updated section 4.7 "USB Type-C Port (USB4 #0)"Changed default to alternate boot option for SPI BIOS flash in section 4.13 " SPI BIOS Flash"
1.00	2025-11-20	BEU	<ul style="list-style-type: none">Final release

Preface

This user's guide provides information about the components, features, and connectors available on the conga-HPC/3.5-Mini application carrier board.

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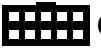


Caution

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



Notes call attention to important information that should be observed.



Connector Type

Describes the connector that must be used with the congatec application carrier board, not the connector found on the congatec application carrier board.



Link to connector layout diagram

This link icon is located in the top left corner of each page. It provides a direct link to the connector layout diagram on page 13 of this document.

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Terminology

Term	Description
PCIe	Peripheral Component Interface Express
SDIO	Secure Digital Input Output
USB	Universal Serial Bus
SATA	Serial AT Attachment
HDA	High Definition Audio
I ² C Bus	Inter-Integrated Circuit Bus
SM Bus	System Management Bus
GbE	Gigabit Ethernet
LVDS	Low Voltage Differential Signaling
GPIO	General Purpose Input/Output
eDP	Embedded DisplayPort
LVDS	Low Voltage Differential Signaling
N.C.	Not connected
N.A.	Not available
TBD	To be determined

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1 Introduction

1.1 COM-HPC® Concept

COM-HPC® is an open standard defined specifically for high performance Computer-on-Modules (COMs) for embedded systems. The defined module types are client module with fixed input voltage, client module with variable input voltage and server module with fixed input voltage.

The COM-HPC® modules are available in the following form factors:

- Mini 95 mm x 70 mm
- Size A 95 mm x 120 mm
- Size B 120 mm x 120 mm
- Size C 160 mm x 120 mm
- Side D 160 mm x 160 mm
- Side E 200 mm x 160 mm

Table 1 COM-HPC® Interface Summary

Features	Classification	Mini Module Min/Max	Client Module Min/Max	Server Module Min/Max	Comment
Ethernet	NBASE-T	1 / 2	1 / 2	1 / 1	
	KR/KX	N.A	0 / 2	2 / 8	
	SGMII	0 / 2	N.A	N.A	
Storage	SATA	0 / 2	0 / 2	0 / 2	Pin is shared with PCIe on mini module
PCIe	Lane 0-47	1 / 16	4 / 48	8 / 48	Two PCIe reference clock output pairs required on mini module
	Lane 48-63	N.A	N.A	0 / 16	
	BMC	N.A	0 / 1	1 / 1	
USB	USB 2.0 Ports 0-7	6 / 8	4 / 8	4 / 8	Ports 0-5 (mini module) or ports 0-3 (server/client module) are used for USB 3.2 and USB4 if implemented.
	USB 3.2 Gen 1 or Gen 2	0 / 5	0 / 4	0 / 2	Requires one SuperSpeed Tx pair and one Rx pair per port
	USB 3.2 Gen 2x2	0 / 4	0 / 4	0 / 2	Requires two SuperSpeed Tx pairs and two Rx pairs per port
	USB4	0 / 4	0 / 4	0 / 2	USB4 ports use USB 3.2 Gen 2x2 ports



Features	Classification	Mini Module Min/Max	Client Module Min/Max	Server Module Min/Max	Comment
SPI	eSPI	0 / 1	0 / 1	0 / 1	
	Boot SPI	1 / 1	1 / 1	1 / 1	
	General Purpose SPI	1 / 1	1 / 1	1 / 1	
BIOS Select	-	1 / 1	1 / 1	1 / 1	
Display	DDI	0 / 2	1 / 3	N.A.	Additional display outputs may be available on the USB4 interface. On mini module, DDI pins are shared with USB4.
	eDP	0 / 1	0 / 1	N.A.	
MIPI	DSI	0 / 1	0 / 1	N.A.	
	CSI	N.A. ¹	0 / 2	N.A.	¹ Optional FFC connectors for MIPI-CSI on the mini module.
Audio	SoundWire	0 / 2	0 / 2	N.A.	I2S pins may be used for one HDA port or two additional SoundWire ports for a total of up to four SoundWire ports.
	I2S	0 / 1	0 / 1	N.A.	
Other Serial Ports	I2C	2 / 3	2 / 2	2 / 2	I2C0 and I2C1 for client and server modules. The mini module supports a third I2C port (I2C2/MDIO (for SGMII PHY setup).
	SMBus	1 / 1	1 / 1	1 / 1	
	IPMB	N.A.	0 / 1	0 / 1	
UART		0 / 2	0 / 2	1 / 2	
GPIO	-		12 / 12	12 / 12	
Miscellaneous	Watchdog Timer	0 / 1	0 / 1	0 / 1	
	Fan (PWM and tachometer)	1 / 1	1 / 1	1 / 1	
FuSa	FuSa set of signals	0 / 1	0 / 1	0 / 1	
Power Rails	VCC	12 / 12	28 / 28	28 / 28	
	VCC_5V-SBY	N.A.	0 / 2	0 / 2	The mini module does not have 5V standby pins.
	VCC_RTC	1 / 1	1 / 1	1 / 1	
	GND	All	All	All	All available GND pins shall be used.
Connector	J1	1 / 1	1 / 1	1 / 1	
	J2	N.A.	0 / 1	1 / 1	



1.2 conga-HPC/3.5-Mini

The conga-HPC/3.5-Mini carrier board is designed for COM-HPC® Mini modules.

The conga-HPC/3.5-Mini provides most of the functional requirements for any embedded PC application. These functions include, but are not limited to a rich complement of contemporary high bandwidth serial interfaces such as PCI Express®, Serial ATA, USB4®, and Gigabit Ethernet. To ensure stable data throughput, the carrier board is equipped with high performance connectors in accordance with the COM-HPC® specification.

By combining the scalability of COM-HPC® Mini modules, the conga-HPC/3.5-Mini carrier board provides manufacturers and developers with a platform to jump-start the development of systems and applications based on COM-HPC® specification. This helps to reduce product design cycle and encourages rapid innovation in system design, to meet the ever-changing needs of the market.

The various features and capabilities offered by the conga-HPC/3.5-Mini carrier board makes it ideal for the integration of COM-HPC® Mini modules.

1.3 Order Number

Table 2 Order Description

Part Number	Product Name	Description
065630	conga-HPC/3.5-Mini	Application carrier board suitable for congatec COM-HPC® Mini modules. Supports HDA.

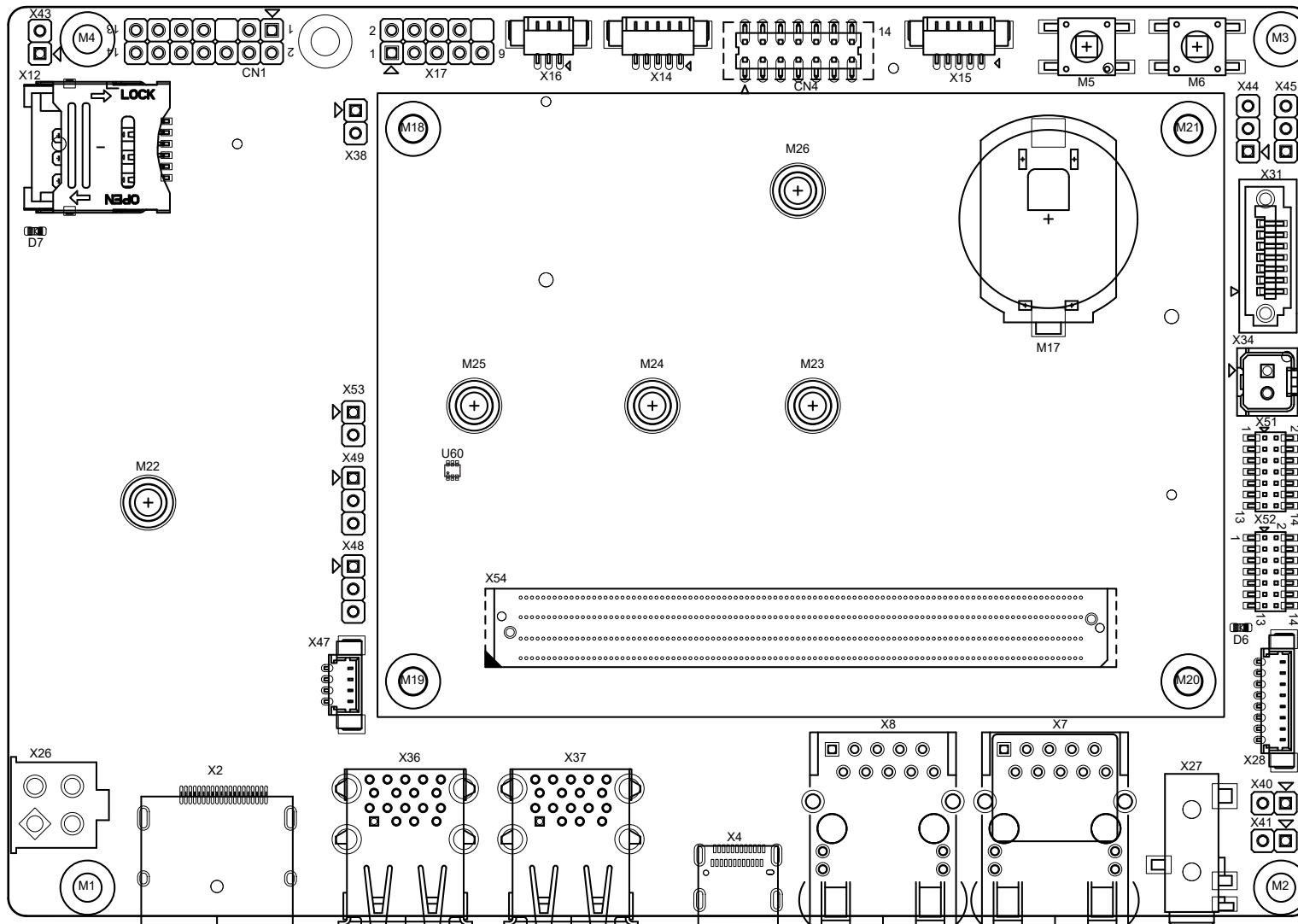


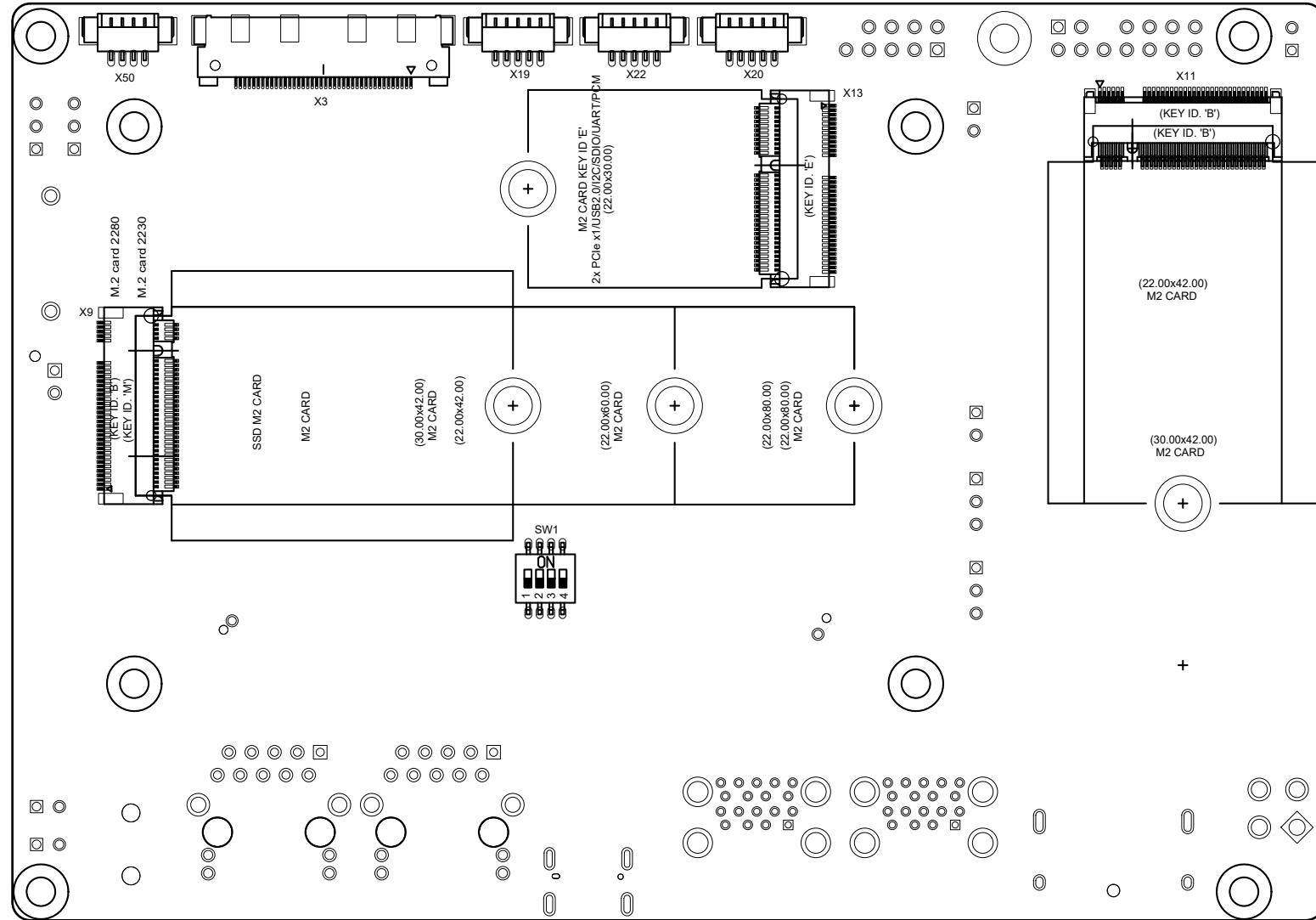
2 Connector Layout

The layout below (top-view) and next page (bottom-view) show the location of the components described in this user's guide.

Click on the component to navigate to the area in the document where the component is described.

Every page has a mouse icon in the top left corner. Click on the mouse icon to return to this layout.







3 Specifications

3.1 Feature List

Table 3 Feature Summary

Form Factor	3.5"	
Board Type	Application Carrier Board for COM-HPC Mini Type Modules	
Internal IO	M.2 Key M 2242/3042/2260/2280 (PCIe x4) M.2 Key B 2242/3042 (USB2, PCIe x2, SIM) M.2 Key E 2230 (USB2, 2x PCIe) USB2 header SATA III Audio header (Mic + Line in) default via HDA codec build option for I2S Sound Wire header 2x UART CAN header GP SPI header	eSPI header 12x GPIO by header Feature header Front Panel header SMB header 2x I2C header 4pin Fan SPI boot flash RTC CMOS battery holder ATX power connector 4-pin
External IO	2x 2.5GbE RJ45 2x Dual USB 3.2 Type A USB Type-C DP++ Audio Jack 4-pin	
Power Specification	DC-In 10 V - 20 V	
Operating Systems	Microsoft® Windows 11 Microsoft® Windows 11 IoT Enterprise Microsoft® Windows 10 Microsoft® Windows 10 IoT Enterprise Linux Yocto	
Hypervisor	RTS Real-Time Hypervisor	
Temperature Range	Operation -40°C to 85°C Storage -40°C to 85°C	
Relative Humidity	Operation 10% to 85% r. H. non cond. Storage 5% to 85% r. H. non cond.	
Size	approx. 146 x 102 mm	
Article	conga-HPC/3.5-Mini COM-HPC Client 3.5" carrier board suitable for congatec COM-HPC Mini modules PN 065630	



1. The module must also support the features for them to function. Refer to the module's user's guide for information about supported features.
2. The carrier board is designed for cooling solutions with bore-hole standoffs.



4 Connectors and Features

Carrier Connector P1 (X54)

Table 4 Connector P1 (X54) Pinout

Pin	Row A	Pin	Row B	Pin	Row C	Pin	Row D
A01	VCC	B01	VCC	C01	VCC	D01	VCC
A02	VCC	B02	PWRBTN#	C02	RSTBTN#	D02	VCC
A03	VCC	B03	VCC	C03	VCC	D03	VCC
A04	VCC	B04	THERMTRIP#	C04	CARRIER_HOT#	D04	VCC
A05	RAPID_SHUTDOWN ¹	B05	CAN_TX	C05	CAN_RX	D05	PLTRST#
A06	FUSA_SPI_ALERT ²	B06	TAMPER# ²	C06	VIN_PWR_OK	D06	FUSA_SPI_CS# ²
A07	FUSA_STATUS0 ²	B07	PROCHOT# ²	C07	CATERR# ²	D07	FUSA_SPI_CLK ²
A08	FUSA_STATUS1 ²	B08	SUS_S3#	C08	SUS_S4_S5#	D08	FUSA_SPI_MISO ²
A09	PCIe_PERST_IN0# ²	B09	FUSA_VOLTAGE_ERR# ²	C09	FUSA_ALERT# ²	D09	FUSA_SPI莫斯I ²
A10	GND	B10	WD_STROBE#	C10	BATLOW#	D10	WAKE0#
A11	PCIe_REFCLKIN0- ²	B11	WD_OUT	C11	FAN_PWMOUT	D11	WAKE1#
A12	PCIe_REFCLKIN0+ ²	B12	GND	C12	FAN_TACHIN	D12	GND
A13	GND	B13	USB5-	C13	GND	D13	USB1-
A14	USB7-	B14	USB5+	C14	USB3-	D14	USB1+
A15	USB7+	B15	GND	C15	USB3+	D15	GND
A16	GND	B16	USB4-	C16	GND	D16	USB0-
A17	USB6-	B17	USB4+	C17	USB2-	D17	USB0+
A18	USB6+	B18	GND	C18	USB2+	D18	GND
A19	GND	B19	I2S_LRCLK/SNDW_CLK3/HDA_SYNC	C19	GND	D19	SS01_SDA_AUX-
A20	SS23_SDA_AUX-	B20	I2S_DOUT/SNDW_DAT3/HDA_SDO	C20	SNDW_DMIC_CLK1	D20	SS01_SCL_AUX+
A21	SS23_SCL_AUX+	B21	I2S_MCLK/HDA_RST#	C21	SNDW_DMIC_DAT1	D21	GND
A22	GND	B22	I2S_DIN/SNDW_DAT2/HDA_SDI	C22	GND	D22	SS0_TX-
A23	SS2_TX-	B23	I2S_CLK/SNDW_CLK2/HDA_BCLK	C23	SNDW_DMIC_CLK0	D23	SS0_TX+
A24	SS2_TX+	B24	RSVD ¹	C24	SNDW_DMIC_DAT0	D24	GND
A25	GND	B25	USB67_OC#	C25	GND	D25	SS0_RX-
A26	SS2_RX-	B26	USB45_OC#	C26	USB0_LSRX/DDI1_DDC_AUX_SEL	D26	SS0_RX+
A27	SS2_RX+	B27	USB23_OC#	C27	USB1_LSRX ¹	D27	GND
A28	GND	B28	USB01_OC#	C28	USB0_LSTX/DDI1_HPD	D28	SS1_TX-
A29	SS3_TX-	B29	SML1_CLK	C29	USB1_LSTX ¹	D29	SS1_TX+
A30	SS3_TX+	B30	SML1_DAT	C30	eDP_HPD	D30	GND
A31	GND	B31	PMCALERT#	C31	eDP_VDD_EN	D31	SS1_RX1
A32	SS3_RX-	B32	SML0_CLK	C32	eDP_BKLT_EN	D32	SS1_RX+
A33	SS3_RX+	B33	SML0_DAT	C33	eDP_BKLTCTL	D33	GND
A34	GND	B34	USB_PD_ALERT#	C34	GND	D34	ACPRESENT



A35	eDP_AUX-	B35	USB_PD_I2C_CLK	C35	USB3_AUX- ¹	D35	NBASET1_SD ^P ²
A36	eDP_AUX+	B36	USB_PD_I2C_DAT	C36	USB3_AUX+ ¹	D36	GND
A37	GND	B37	USB_RT_ENA	C37	GND	D37	SS6_TX-
A38	eDP_TX0-	B38	USB3_LSRX ¹	C38	SS6_RX-	D38	SS6_TX+
A39	eDP_TX0+	B39	USB3_LSTX ¹	C39	SS6_RX+	D39	GND
A40	GND	B40	USB2_LSRX/DDI0_DDC_AUX_SEL	C40	GND	D40	SS7_TX-
A41	eDP_TX1-	B41	USB2_LSTX/DDI0_HPD	C41	SS7_RX-	D41	SS7_TX+
A42	eDP_TX1+	B42	GND	C42	SS7_RX+	D42	GND
A43	GND	B43	USB1_AUX- ¹	C43	GND	D43	SS4_TX-
A44	eDP_TX2-	B44	USB1_AUX+ ¹	C44	SS4_RX-	D44	SS4_TX+
A45	eDP_TX2+	B45	LID#	C45	SS4_RX+	D45	GND
A46	GND	B46	SLEEP#	C46	GND	D46	SS5_TX-
A47	eDP_TX3-	B47	VCC_BOOT_SPI	C47	SS5_RX-	D47	SS5_TX+
A48	eDP_TX3+	B48	BOOT_SPI_CS#	C48	SS5_RX+	D48	GND
A49	GND	B49	BSEL0	C49	GND	D49	NBASET1_MDI0-
A50	eSPI_IO0	B50	BSEL1	C50	BOOT_SPI_IO0	D50	NBASET1_MDI0+
A51	eSPI_IO1	B51	BSEL2	C51	BOOT_SPI_IO1	D51	GND
A52	eSPI_IO2	B52	eSPI_ALERT0#	C52	BOOT_SPI_IO2	D52	NBASET1_MDI1-
A53	eSPI_IO3	B53	eSPI_ALERT1#	C53	BOOT_SPI_IO3	D53	NBASET1_MDI1+
A54	eSPI_CLK	B54	eSPI_CS0#	C54	BOOT_SPI_CLK	D54	GND
A55	GND	B55	eSPI_CS1#	C55	GND	D55	NBASET1_MDI2-
A56	PCIe_CLKREQ0_LO#	B56	eSPI_RST#	C56	PCIe_REFCLK0_HI-	D56	NBASET1_MDI2+
A57	PCIe_CLKREQ0_HI#	B57	PCIe_WAKE_OUT0# ²	C57	PCIe_REFCLK0_HI+	D57	GND
A58	PCIe_CLKREQ_OUT0#	B58	NBASET1_LINK_MID#	C58	GND	D58	NBASET1_MDI3-
A59	NBASET1_LINK_MAX#	B59	NBASET1LINK_ACT#	C59	PCIe_REFCLK0_LO-	D59	NBASET1_MDI3+
A60	NBASET1_CTREF	B60	GND	C60	PCIe_REFCLK0_LO+	D60	GND
A61	GND	B61	PCIe08_RX-	C61	GND	D61	PCIe00_TX-
A62	PCIe08_TX-	B62	PCIe08_RX+	C62	PCIe00_RX-	D62	PCIe00_TX+
A63	PCIe08_TX+	B63	GND	C63	PCIe00_RX+	D63	GND
A64	GND	B64	PCIe09_RX-	C64	GND	D64	PCIe01_TX-
A65	PCIe09_TX-	B65	PCIe09_RX+	C65	PCIe01_RX-	D65	PCIe01_TX+
A66	PCIe09_TX+	B66	GND	C66	PCIe01_RX+	D66	GND
A67	GND	B67	PCIe10_RX-	C67	GND	D67	PCIe02_TX-/SGMII1_RX-
A68	PCIe10_TX-	B68	PCIe10_RX+	C68	PCIe02_RX-/SGMII1_RX-	D68	PCIe02_TX+/SGMII1_RX+
A69	PCIe10_TX+	B69	GND	C69	PCIe02_RX+/SGMII1_RX+	D69	GND
A70	GND	B70	PCIe11_RX-	C70	GND	D70	PCIe03_TX-/SGMII0_RX-
A71	PCIe11_TX-	B71	PCIe11_RX+	C71	PCIe03_RX-/SGMII0_RX-	D71	PCIe03_TX+/SGMII0_RX+
A72	PCIe11_TX+	B72	GND	C72	PCIe03_RX+/SGMII0_RX+	D72	GND
A73	GND	B73	PCIe12_RX- ¹	C73	GND	D73	PCIe04_RX- ¹
A74	PCIe12_TX- ¹	B74	PCIe12_RX+ ¹	C74	PCIe04_RX- ¹	D74	PCIe04_RX+ ¹
A75	PCIe12_TX+ ¹	B75	GND	C75	PCIe04_RX+ ¹	D75	GND



A76	GND	B76	PCIe13_RX- ¹	C76	GND	D76	PCIe05_TX- ¹
A77	PCIe13_TX- ¹	B77	PCIe13_RX+ ¹	C77	PCIe05_RX- ¹	D77	PCIe05_TX+ ¹
A78	PCIe13_TX+ ¹	B78	GND	C78	PCIe05_RX+ ¹	D78	GND
A79	GND	B79	PCIe14_RX- ¹	C79	GND	D79	PCIe06_TX-/SATA1_RX- ¹
A80	PCIe14_TX- ¹	B80	PCIe14_RX+ ¹	C80	PCIe06_RX-/SATA1_RX- ¹	D80	PCIe06_TX+/SATA1_RX+ ¹
A81	PCIe14_TX+ ¹	B81	GND	C81	PCIe06_RX+/SATA1_RX+ ¹	D81	GND
A82	GND	B82	PCIe15_RX- ¹	C82	GND	D82	PCIe07_TX-/SATA0_RX-
A83	PCIe15_TX- ¹	B83	PCIe15_RX+ ¹	C83	PCIe07_RX-/SATA0_RX-	D83	PCIe07_TX+/SATA0_RX+
A84	PCIe15_TX+ ¹	B84	GND	C84	PCIe07_RX+/SATA0_RX+	D84	GND
A85	GND	B85	TEST# ¹	C85	GND	D85	NBASET0_MDI0-
A86	VCC_RTC	B86	RSMRST_OUT#	C86	SMB_CLK	D86	NBASET0_MDI0+
A87	SUS_CLK	B87	UART1_TX	C87	SMB_DAT	D87	GND
A88	GPIO_00	B88	UART1_RX	C88	SMB_ALERT#	D88	NBASET0_MDI1-
A89	GPIO_01	B89	UART1_RTS#	C89	UART0_TX	D89	NBASET0_MDI1+
A90	GPIO_02	B90	UART1_CTS#	C90	UART0_RX	D90	GND
A91	GPIO_03	B91	I2C2_CLK/ETH_MDIO_CLK ²	C91	UART0_RTS#	D91	NBASET0_MDI2-
A92	GPIO_04	B92	I2C2_DAT/ETH_MDIO_DAT ²	C92	UART0_CTS#	D92	NBASET0_MDI2+
A93	GPIO_05	B93	GP_SPI_MOSI	C93	I2C0_CLK	D93	GND
A94	GPIO_06	B94	GP_SPI_MISO	C94	I2C0_DAT	D94	NBASET0_MDI3-
A95	GPIO_07	B95	GP_SPI_CS0#	C95	I2C0_ALERT#	D95	NBASET0_MDI3+
A96	GPIO_08	B96	GP_SPI_CS1#	C96	I2C1_CLK	D96	GND
A97	GPIO_09	B97	GP_SPI_CS2#	C97	I2C1_DAT	D97	NBASET0_LINK_MAX#
A98	GPIO_10	B98	GP_SPI_CS3#	C98	NBASET0_SD ²	D98	NBASET0_LINK_MID#
A99	GPIO_11	B99	GP_SPI_CLK	C99	NBASET0_CTREF	D99	NBASET0_LINK_ACT#
A100	PINOUT_TYPE0	B100	GP_SPI_ALERT#	C100	PINOUT_TYPE1	D100	PINOUT_TYPE2

1. Not connected

2. Not supported

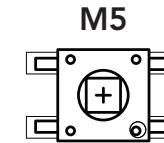
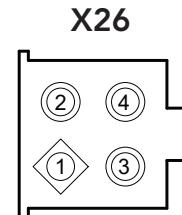


4.1 4-Pin ATX Power Connector

The conga-HPC/3.5-Mini provides a standard 4-pin ATX power connector (X26) for an ATX power supply. The COM-HPC® module starts after the power-on button (M5) is pressed.

Table 5 X26 - 4-Pin ATX Power Connector Pinout

Pin	Signal	Description
1	GND	Power ground
2	GND	Power ground
3	+10 V to 20 V	Power supply +10 VDC to +20 VDC
4	+10 V to 20 V	Power supply +10 VDC to +20 VDC

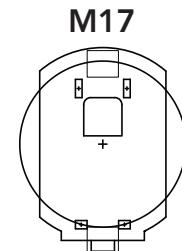


Connector Type

X26: Standard 4-pin ATX power connector

4.2 CMOS Battery Holder

The conga-HPC/3.5-Mini provides battery holder M17 for a CR2032 battery. The battery supplies power to the RTC and CMOS memory.



Warning

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

Connector Type

M17: CR2032 battery



4.3

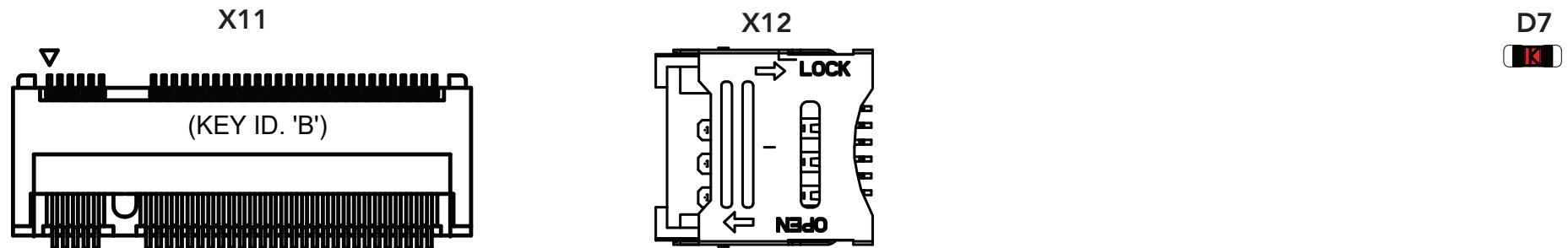
M.2 Key B (X11) + micro-SIM Card Slot (X12)

The conga-HPC/3.5-Mini provides M.2 Key B socket X11 for 2242 and 3042 cards.

This socket provides the module's PCIe lanes [2:3] and USB 2.0 port USB2. It also supports COEX with the M.2 Key E socket (X13).

WDISABLE1# of this socket is connected to jumper X43. Place a jumper to disable radio.

LED_1# of this socket is connected to LED D7. It lights red when there is activity.



The UIM interface of the M.2 Key B (X11) socket is connected to micro-SIM card slot X12.

Connector Type

X11: M.2 Key B card size 2242 and 3042

X12: micro-SIM card

Note

The congatec Application Note 43 "M.2™ Pinout Descriptions and Reference Designs" provides the pinout description, reference design and design notes for each of the three M.2™ sockets commonly implemented on embedded systems (Socket 1 – Key E, Socket 2 – Key B, and Socket 3 – Key M).



4.4

M.2 Key E (X13)

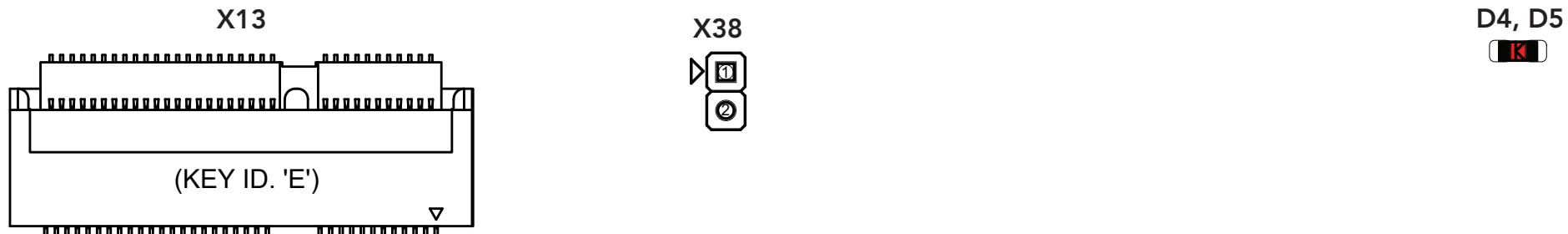
The conga-HPC/3.5-Mini provides a standard M.2™ Key E socket (X13) for 2242 cards.

This socket provides the module's PCIe lanes [0:1] and USB 2.0 port USB6. It also supports COEX with the M.2™ Key B socket (X11).

WDISABLE1# of this socket is connected to jumper X38. Place a jumper to disable radio.

LED_1# of this socket is connected to LED D4. It lights red when there is activity.

LED_2# of this socket is connected to LED D5. It lights red when there is activity.



Connector Type

X13: M.2™ Key E card size 2242

X38: 2.54 mm pitch, 2x1-pin jumper

Note

The congatec Application Note 43 "M.2™ Pinout Descriptions and Reference Designs" provides the pinout description, reference design and design notes for each of the three M.2™ sockets commonly implemented on embedded systems (Socket 1 – Key E, Socket 2 – Key B, and Socket 3 – Key M).



4.5

M.2 Key M (X9)

The conga-HPC/3.5-Mini provides a standard M.2 Key M socket (X9) for 2242, 3042, 2260, and 2280 cards.

The socket provides the module's PCIe lanes [8:11].

DAS of this socket is connected to LED D6. It lights red when there is activity. The signal is also reversed and routed to the front panel header X17 as M2M_ACT# (see section 4.26 "Front Panel Header").



Connector Type

X9: M.2 Key M card size 2242, 3042, 2260, and 2280

Note

The congatec Application Note 43 "M.2™ Pinout Descriptions and Reference Designs" provides the pinout description, reference design and design notes for each of the three M.2™ sockets commonly implemented on embedded systems (Socket 1 – Key E, Socket 2 – Key B, and Socket 3 – Key M).



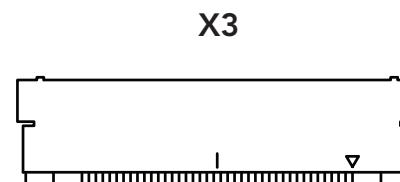
4.6

eDP

The conga-HPC/3.5-Mini provides one eDP connector (X3) on the bottom side.

Table 6 X3 - eDP Pinout

Pin	Signal	Pin	Signal
1	N.C.	21	PANEL_PWR
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	PANEL_PWR	38	BKLT_PWR
19	PANEL_PWR	39	BKLT_PWR
20	PANEL_PWR	40	N.C.



Connector Type

X3: 0.5 mm, 40 Pos. (ACES 50203-04001-001 or compatible)

The conga-HPC/3.5-Mini supports different voltages for the panel and backlight. Follow the descriptions in the tables below to set the panel and backlight voltages.



Table 7 X44 - Flat Panel Voltage Settings

Pin	Description
1-2	5 V panel power
2-3	3.3 V panel power (default)

X44



Table 8 X45 - Backlight Voltage Settings

Pin	Description
1-2	5 V backlight Power
2-3	12 V backlight Power (default)

X45

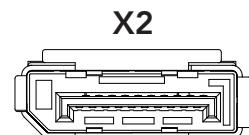


Connector Type

X44, X45: 2.54 mm pitch, 2x1-pin jumper

4.7 DP++

The conga-HPC/3.5-Mini provides one DP++ port (X2). This port is routed directly to the COM-HPC® connector.



Connector Type

X2: Standard DP plug



4.8

USB Type-C Port (USB4 #0)

The conga-HPC/3.5-Mini provides one USB Type-C® port (X4). Depending on the module, this port can support up to 40 Gbps operation and DisplayPort Alternate Mode. This port also supports Dual-Role Power (DRP).

The USB Type-C® port supports 5V with up to 3A as source and 12V to 20V with up to 3A as sink.^{1,2}

The USB Type-C® port is routed from the USB4 #0 signals of the COM-HPC® connector via a retimer (Intel® JHL9040R)³ and Power Delivery (PD) controller (TI TPS65992D)⁴.



3. Ensure the USB cable is rated for the intended power profile.
4. The conga-HPC/3.5-Min can be powered via this port. The board will not turn on if less than 12V are supplied. The required current depends on the module.
5. For SML0, use address 0x55 on your module. Otherwise, the retimer on the conga-HPC/3.5-Mini will not work.
6. For SML1, use address 0x48 on your module. Otherwise, the PD controller on the conga-HPC/3.5-Mini will not work.
7. The PD controller bus address on USB_PD_I2C is 0x22 (7-bit).

The PD controller flash (address 0x50) can be programmed via header X48:

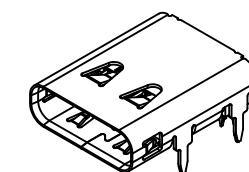
Table 9 X48 - Programming Header for PD Controller

Pin	Description
1	SDA
2	GND
3	SCL

X48



X4



X4: USB Type-C plug

X48: 3-pin, 2.54 mm grid female header



4.9

USB 3.2 Type-A Ports (USB3 #0,1,2,3)

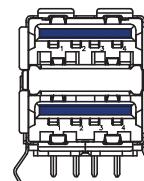
The conga-HPC/3.5-Mini provides four USB 3.2 Type-A ports via two dual-stacked connectors (X36, X37).

The ports are routed to the COM-HPC® signals listed in the table below:

Table 10 X36, X37 - USB 3.2 Gen 2x1 Type-A Port Signals

Connector	COM-HPC USB Port	SuperSpeed Lane	USB 2.0
X36 Bottom	USB3 #0	SS7	USB5
X36 Top	USB3 #1	SS6	USB3
X37 Bottom	USB3 #2	SS5	USB4
X37 Top	USB3 #3	SS4	USB1

X36, X37



X36, X37: USB Type-A plug

4.10

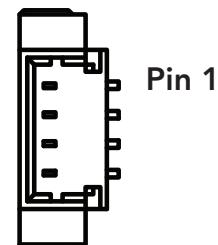
USB 2.0 Type-A Port

The conga-HPC/3.5-Mini provides header X47 for one USB 2.0 port. This port is routed to the COM-HPC® USB7 signals.

Table 11 X47 - USB 2.0 Header Pinout

Pin	Signal
1	+5 V
2	USB7-
3	USB7+
4	GND

X47



X47: 1.25 mm pitch, 4x1-pin (Molex 53261-0471); Possible Mating Connector: Molex 51021-0400



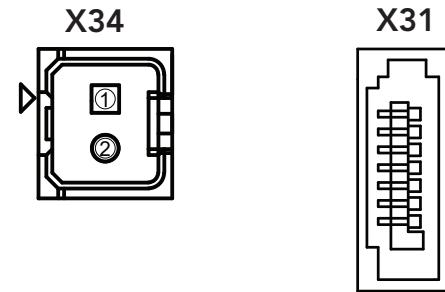
4.11 SATA

The conga-HPC/3.5-Mini provides the module's SATA0 port on connector (X31) with support for up to 6 Gbps.

SATA power is provided by connector X34.

Table 12 X34 - SATA Power Pinout

Pin	Signal
1	+V5.0 (1.5 A fuse; resettable)
2	GND



Connector Type

X31: SATA DOM device

X34: 2.50 mm pitch, 2-pin female connector (Molex Mini-Lock)

4.12 Ethernet Ports

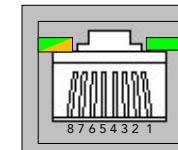
The conga-HPC/3.5-Mini provides two RJ45 ethernet ports capable of 2.5 Gbps:

- NBASET0 port on connector X7
- NBASET1 port on connector X8

Table 13 X7, X8 - Ethernet Status LEDs Description

Color (LED)	Signal	Description
Green (right LED)	NBASETx_LINK_ACT#	Link activity
Off (left bicolor LED)	-	100 Mbit
Green (left bicolor LED)	NBASETx_LINK_MID#	Half speed (Module specific)
Yellow (left bicolor LED)	NBASETx_LINK_MAX#	Full speed (Module specific)

X7, X8



Connector Type

X7, X8: RJ45 plug



4.13 Audio Interfaces

The conga-HPC/3.5-Mini features a high definition audio (HDA) codec (Realtek ALC888S-VD) by default. Optionally, an I2S codec (Cirrus Logic WM8904) can be featured instead (assembly option). Both codecs support the front audio header (X28) and 4-pole audio jack (X44). SoundWire® signals are provided on header X53.

4.13.1 Front Audio Header

The conga-HPC/3.5-Mini features a front audio header (X28).

Table 14 X28 - Front Audio Header Pinout Description

Pin	Signal	Description
1	LINE2_R	Analog line / headphone output - right channel
2	LINE2_L	Analog line / headphone output - left channel
3	A_GND	Analog ground
4	SENSE_B_HPOUT	Headphone jack detection
5	SENSE_B_MIC	MIC jack detection
6	A_GND	Analog ground
7	MIC2_L	Analog microphone input - left channel
8	MIC2_R	Analog microphone input - right channel



Connector Type

X28: 1.25 mm pitch, 8x1-pin female connector

4.13.2 Audio Jack (4-Pole)

The conga-HPC/3.5-Mini features a 4-pole audio jack (X27) for a 3.5 mm CTIA standard plug.

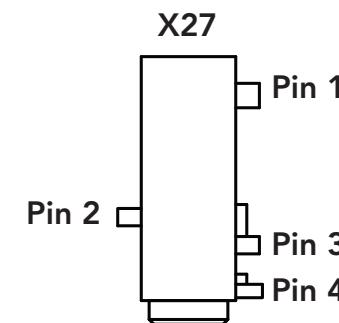
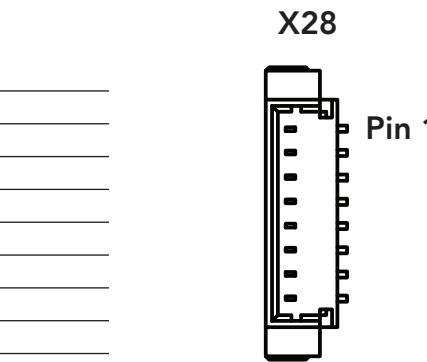
Table 15 X27 - Audio Jack Pinout

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

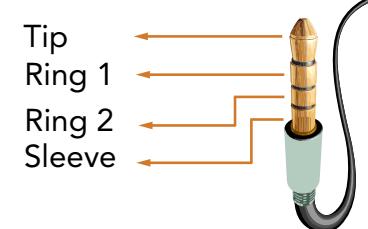


Connector Type

X27: 3.5 mm, 4-pole CTIA standard plug



CTIA Standard Plug





4.13.3 SoundWire

The conga-HPC/3.5-Mini provides the module's SoundWire® signals on header X53.

Table 16 X53 - SoundWire Header Pinout

Pin	Signal
1	SNDW_DMIC_CLK0
2	SNDW_DMIC_DAT0

X53



Connector Type

X53: 2.54 mm pitch, 2x1-pin female connector

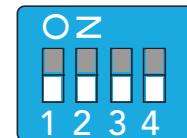
4.14 SPI BIOS Flash

The conga-HPC/3.5-Mini provides an onboard SPI BIOS flash memory chip (U10) set as alternate boot option.

The boot select pins BSEL[2:0] are routed to DIP SW1:

- BSEL0 to DIP SW1.1 (default: OFF)
- BSEL1 to DIP SW1.2 (default: OFF)
- BSEL2 to DIP SW1.3 (default: OFF)
- DIP SW1.4 is not connected

SW1



For the BIOS select options via these DP switches, refer to the table below:



Table 17 BIOS Select Options

BSEL [2:0]	Chipset eSPI1_CS1# (If Available on chipset)	Chipset eSPI_CS2# (If Available on chipset)	Chipset SPI_CS0#	Chipset SPI_CS1#	Chipset eSPI0_CS0#	Boot Option	Use Case	Boot Option and CS# Routing Details
111	Carrier J1.B54 COM-HPC eSPI_CS0#	Carrier J1.B55 COM-HPC eSPI_CS1#	Module	Module	Module	MAFS on Module	Most Common Usage	CSME / DT on Chipset SPI0 device on Module BIOS on SPI0 or SPI1 on Module
						SAFS on Module	Module EC/MMC with SAFS BIOS on far side of EC/MMC	CSME / DT on Slave Attached Flash on Module BIOS on Module SAFS
110	Carrier J1.B54	Carrier J1.B55	Carrier J1.B48	Module	Module	MAFS on Carrier	Casino Gaming Removable BIOS option on Carrier	CSME / DT on Chipset SPI0 device on Carrier BIOS on SPI0 on Carrier or on SPI1 on Module
101	Carrier J1.B54	Carrier J1.B55	Module	Carrier J1.B48	Module	MAFS on Module	Casino Gaming Removable BIOS option on Carrier Alternate version	CSME / DT on Chipset SPI0 device on Module BIOS on SPI0 on Module or on SPI1 on Carrier
011	Module	Carrier J1.B55	Module	Module	Carrier J1.B54 COM-HPC eSPI_CS0#	MAFS on Module	Same as 111 except eSPI_CS routing	CSME / DT on Chipset SPI0 device on Module BIOS on SPI0 or SPI1 on Module
010	Module	Carrier J1.B55	Module	Module	Carrier J1.B54	SAFS on Carrier	BIOS totally under Carrier BMC control	CSME / DT on Carrier SAFS BIOS on Carrier SAFS
001	Module	Carrier J1.B55	Module	Module	Carrier J1.B54	MAFS on Module and SAFS on Carrier	BIOS mostly under Carrier BMC control	CSME / DT on Chipset SPI0 device on Module BIOS on Carrier SAFS



For the conga-HPC/3.5-Mini, the default for BSEL[2:0] is 111.

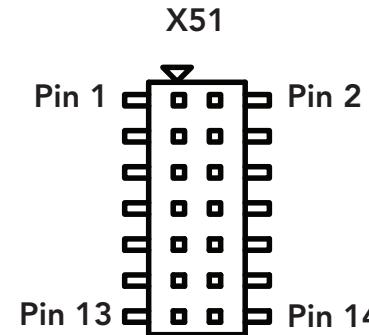


4.15 General Purpose SPI Port

The conga-HPC/3.5-Mini provides General Purpose SPI signals on header X51.

Table 18 X51 - General Purpose SPI Port Pinout

Pin	Signals	Pin	Signals
1	GND	2	GPSPI_MOSI
3	GPSPI_CLK_R	4	GPSPI_MISO
5	GPSPI_ALERT#	6	GPSPI_CS0#
7	PLTRST#	8	GPSPI_CS1#
9	N.C.	10	GPSPI_CS2#
11	+V1.8_S0	12	GPSPI_CS3#
13	+V3.3_S0	14	GND



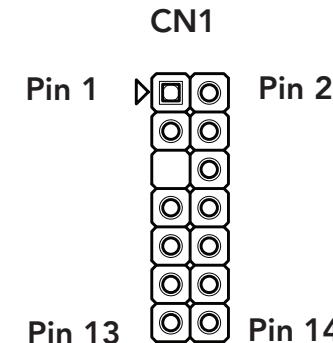
X51: 1.27 mm pitch, 8x2-pin female connector

4.16 eSPI Header

The conga-HPC/3.5-Mini provides eSPI signals on header CN1.

Table 19 CN1 - eSPI Header Pinout

Pin	Signals	Pin	Signals
1	GND	2	ESPI_CS0#
3	ESPI_CLK	4	ESPI_IO3
5	KEY	6	ESPI_IO2
7	SIO_RST#	8	ESPI_IO1
9	+V3.3_S0	10	ESPI_IO0
11	ESPI_RST#	12	ESPI_CS1#
13	+V3.3_S5	14	ESPI_ALERT0#



CN1: 2.54 mm pitch, 2x7-pin female connector

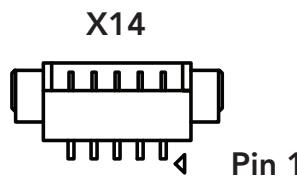


4.17 UART0 Port

The conga-HPC/3.5-Mini provides the module's UART0 port on header X14. The port supports RS-232 I/O voltage levels.

Table 20 X14 - UART0 Pinout

Pin	Signals
1	GND
2	UART0_TX
3	UART0_RTS
4	UART0_CTS
5	UART0_RX



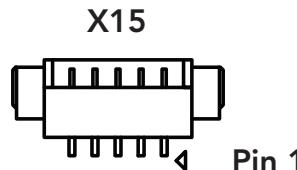
X14: 1.25 mm pitch, 5x1-pin (Molex 53261-0571); Possible Mating Connector: Molex 51021-0500

4.18 UART1 Port

The conga-HPC/3.5-Mini provides the module's UART1 port on header X15. The port supports RS-232 I/O voltage levels.

Table 21 X15 - UART1 Pinout

Pin	Signals
1	GND
2	UART1_TX
3	UART1_RTS
4	UART1_CTS
5	UART1_RX



X15: 1.25 mm pitch, 5x1-pin (Molex 53261-0571); Possible Mating Connector: Molex 51021-0500



4.19 CAN Port

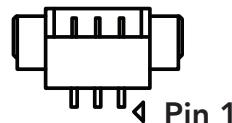
The conga-HPC/3.5-Mini provides the module's CAN bus signals via a transceiver (Microchip Inc. MCP2562FD) on header X16. The CAN bus does not have resistor termination.

For CAN bus termination, use a cable adapter with internal resistor termination.

Table 22 X16 - CAN Pinout

X16

Pin	Signals
1	CAN_H
2	CAN_L
3	GND



X16: 1.25 mm pitch, 3x1-pin (Molex 53261-0371); Possible Mating Connector: Molex 51021-0300

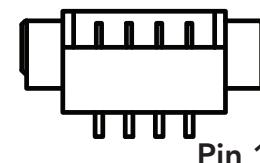
4.20 System Fan Header

The conga-HPC/3.5-Mini provides a 4-pin fan connector (X50) for a system fan.

Table 23 X50 - System Fan Header Pinout

X50

Pin	Signal
1	GND
2	+VDD (12V/5V)
3	Sense
4	Control



Use jumper X49 to set the fan's supply voltage level.

Table 24 X49 - System Fan Voltage Control

X49

Pin	Configuration
1-2	12 V supply voltage (default)
2-3	5 V supply voltage





Connector Type

X50: 1.25 mm, 4-pin fan plug

X49: 2.54 mm grid jumper

4.21 Feature Connector

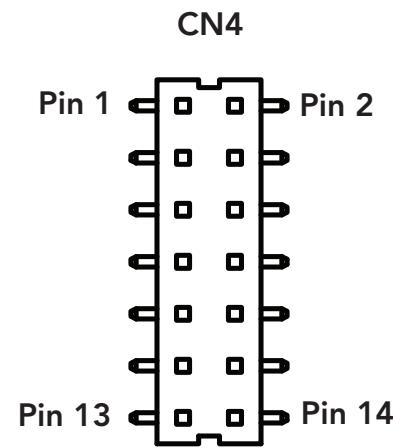
The conga-HPC/3.5-Mini provides pins with various signals on feature connector CN4.

Table 25 CN4 - Feature Connector Pinout

Pin	Signal	Description	Pin	Signal	Description
1	+V5S	5V main supply (0.75 A resettable fuse)	2	BATLOW#	Indicates that external battery is low.
3	VIN_PWR_OK	Power OK from main power supply. A high value indicates that the power is good.	4	THERMTRIP#	Active low output indicating that the CPU has entered thermal shutdown.
5	SUS_S3#	Suspend to RAM state. Active low output.	6	CARRIER_HOT#	Input from off -Module temp sensor indicating an over-temp situation.
7	SUS_S4_S5#	Indicates system is in Suspend to Disk (S4) or Soft Off (S5) state. Active low output.	8	PLTRST#	Platform Reset: output from Module to Carrier Board. Active low.
9	AC_PRESENT	Driven hard low on Carrier if system AC power is not present.	10	WAKE0#	PCI Express wake up signal.
11	WD_OUT	Output indicating that a watchdog time-out event has occurred.	12	WAKE1#	General purpose wake up signal. May be used to implement wake-up on PS2 keyboard or mouse activity.
13	WD_STROBE#	Strobe input to watchdog timer. Periodic strobing prevents the watchdog, if enabled, from timing out.	14	GND	Power ground

Connector Type

CN4: 2 mm pitch, 2x7-pin female connector



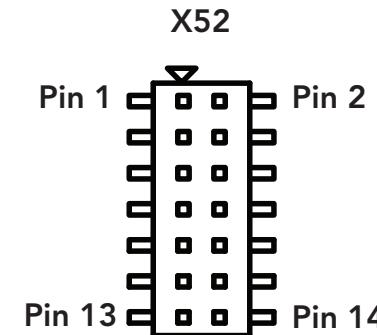


4.22 GPIO Pin Header

The conga-HPC/3.5-Mini provides 12 GPIO pins on header X52.

Table 26 X52 - GPIO Header Pinout

Pin	Signal	Pin	Signal
1	+V1.8_S5	2	GPIO_00
3	GPIO_01	4	GPIO_02
5	GPIO_03	6	GPIO_04
7	GPIO_05	8	GPIO_06
9	GPIO_07	10	GPIO_08
11	GPIO_09	12	GPIO_10
13	GPIO_11	14	GND



X52: 1.27 mm, 2x7-pin female connector



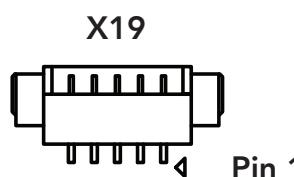
4.23 I2C0 Pin Header

The conga-HPC/3.5-Mini provides I2C0 pins on header X19.

An onboard EEPROM is connected to the I2C0 bus with the address 0xAE. Use the I²C control commands implemented in the congatec CGOS API driver to access the EEPROM. For more information, refer to the CGOS manual and the user's guide of the COM-HPC® module. An onboard temperature sensor U60 is also connected to the I2C0 bus with the address 0x48.

Table 27 X19 - I2C0 Pinout

Pin	Signals
1	+V1.8_S5 (0.75 A resettable fuse)
2	I2C0_DAT
3	I2C0_CLK
4	I2C0_ALERT#
5	GND



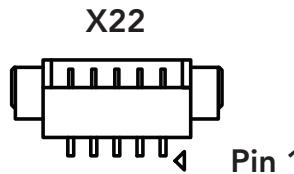
X19: 1.25 mm pitch, 5x1 pin (Molex 53261-0571); Possible Mating Connector: Molex 51021-0500

4.24 I2C1 Pin Header

The conga-HPC/3.5-Mini provides I2C1 pins on header X22.

Table 28 X22 - I2C1 Pinout

Pin	Signals
1	+V1.8_S5 (0.75 A resettable fuse)
2	I2C1_DAT
3	I2C1_CLK
4	N.C.
5	GND



X22: 1.25 mm pitch, 5x1 pin (Molex 53261-0571); Possible Mating Connector: Molex 51021-0500

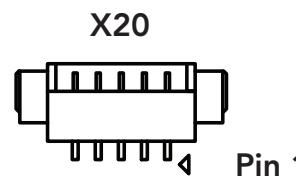


4.25 SMBus Pin Header

The conga-HPC/3.5-Mini provides SMBus pins on header X20.

Table 29 X20 - SMBus Header Pinout

Pin	Signal
1	+V1.8_S5 (0.75 A resettable fuse)
2	SMB_DAT
3	SMB_CLK
4	SMB_ALERT#
5	GND



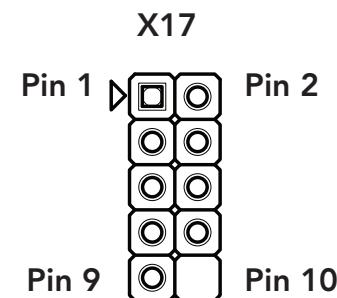
X20: 1.25 mm pitch, 5x1 pin (Molex 53261-0571); Possible Mating Connector: Molex 51021-0500

4.26 Front Panel Header

The conga-HPC/3.5-Mini provides front panel pins on header X17. As COM-HPC® does not support SATA activity LED, the signals are used for the M.2 Key M activity LED instead (see section 4.5 "M.2 Key M (X9)").

Table 30 X17 - Front Panel Header Pinout

Pin	Signal	Pin	Signal
1	+V3.3_S0 (M2M_ACT_LED+)	2	+V3.3_S0 (PWR_LED+)
3	M2M_ACT#	4	GND
5	GND	6	PWRBTN#
7	RSTBTN#	8	GND
9	NC	10	No pin



X17: 2.54 mm, 2x5 pin female connector



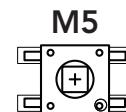
5 Additional Features

5.1 Buttons

The conga-HPC/3.5-Mini features onboard power and reset buttons. LID and sleep buttons can be connected via header X40 and X41.

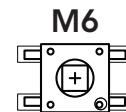
5.1.1 Power

When you press the power button M5, it triggers the module's PWRBTN# signal. The triggered event usually initiates a transition from one power state to another (for example, from S5 to S0). However, the system's behavior depends on the ACPI settings of the Operating System.



5.1.2 Reset

When you press the reset button M6, it triggers the module's RSTBTN# signal. The triggered event usually invokes a system warm reset. This behavior however depends on the configuration of the module.



5.1.3 LID

When you press the lid button X40, it triggers the module's LID# signal. The system's behavior depends on the ACPI settings of the Operating System.

Table 31 X40 - LID Pinout

Pin	Signal
1	LID_BTN#
2	GND



Connector Type

X40: 2.54 mm pitch, 2x1 pin jumper



5.1.4 Sleep

When you press the sleep button X41, it triggers the module's SLEEP# signal. The system's behavior depends on the ACPI settings of the Operating System.

Table 32 X41 - Sleep Pinout

Pin	Signal
1	LID_BTN#
2	GND



X41: 2.54 mm pitch, 2x1 pin jumper

5.1.5 Temperature Sensor

The conga-HPC/3.5-Mini features onboard temperature sensor U60 (TI TMP1075N) connected to I2C0 with the address 0x48 - 7-bit (1001 000x).



6 Mechanical Drawing

