COM Express™ conga-TEVAL

Detailed description of the congatec COM Express™ Type 6 evaluation carrier board

User's Guide

Revision 1.1

Revision History

Revision	Date (yyyy.mm.dd)	Author	Changes
1.0	2012.01.16	GDA/SRO	• Official release
1.1	2015.05.26	AEM	• Corrected the signals for pins 5 and 6 in section 4.3.8 “Serial ATA”. • Updated the whole manual to reflect the changes in conga-TEVAL revisions B and C.

Preface

This user's guide provides information about the components, features and connectors available on the congatec COM Express™ Type 6 evaluation carrier board.

Disclaimer

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

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

Intended Audience

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

Lead-Free Designs (RoHS)

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

Electrostatic Sensitive Device

All congatec AG products are electrostatic sensitive devices and are packaged accordingly. Do not open or handle a congatec AG product except at an electrostatic-free workstation. Additionally, do not ship or store congatec AG products near strong electrostatic, electromagnetic, magnetic, or radioactive fields unless the device is contained within its original manufacturer's packaging. Be aware that failure to comply with these guidelines will void the congatec AG Limited Warranty.

Symbols

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

Warning

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

Caution

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

Note

Notes call attention to important information that should be observed.

Connector Type

Describes the connector that must be used with the congatec COM Express™ evaluation carrier board, not the connector found on the congatec COM Express™ evaluation 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 8 of this document.

Copyright Notice

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

Trademarks

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

Warranty

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

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

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

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

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

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

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

Certification

congatec AG is certified to DIN EN ISO 9001 standard.

Technical Support

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

Terminology

Term	Description
PCIe	Peripheral Component Interface Express (PCI Express)
ExpressCard	A PCMCIA standard built on the latest USB 2.0 and PCI Express buses.
PCI Express Mini Card	PCI Express Mini Card add-in card is a small size unique form factor optimized for mobile computing platforms.
MMCplus	MMCplus was defined for first time in MMC System Specification v4.0. MMCplus is backward compatible with MMC. MMCplus has 13 pins.
SDIO card	Secure Digital Input Output is a non-volatile memory card format developed for use in portable devices.
USB	Universal Serial Bus
SATA	Serial AT Attachment. A serial-interface standard for hard disks
HDA	High Definition Audio
S/PDIF	S/PDIF (Sony/Philips Digital Interconnect Format) specifies a Data Link Layer protocol and choice of Physical Layer specifications for carrying digital audio signals between devices and stereo components.
HDMI	High Definition Multimedia Interface. HDMI supports standard, enhanced, or high-definition video, plus multi-channel digital audio on a single cable.
TMDS	Transition Minimized Differential Signaling. TMDS is a signaling interface defined by Silicon Image that is used for DVI and HDMI.
DVI	Digital Visual Interface is a video interface standard developed by the Digital Display Working Group (DDWG).
LPC	Low Pin-Count: a low speed interface used for peripheral circuits such as Super I/O controllers, which combine legacy device support into a single IC.
I²C Bus	Inter-Integrated Circuit Bus: is a simple two-wire bus with a software-defined protocol that was developed to provide the communications link between integrated circuits in a system.
SM Bus	System Management Bus: is a popular derivative of the I²C-bus.
GBE	Gigabit Ethernet
LVDS	Low-Voltage Differential Signaling
SDVO	Serial Digital Video Out is a proprietary technology introduced by Intel® to add additional video signaling interfaces to a system.
DDC	Display Data Channel is an I²C bus interface between a display and a graphics adapter.
N.C.	Not connected
N.A.	Not available
T.B.D.	To be determined

Contents

1 Introduction

1.1 COM Express™ Concept

COM Express™ is an open industry standard defined specifically for COMs (computer on modules). Its creation makes it possible to smoothly transition from legacy interfaces to the newest technologies available today.

A Computer On Module integrates all the core components and standard I/O interfaces of a common PC onto an application specific carrier board. The key advantage of the COM in the embedded computer industries is that all the highly integrated, high speed components such as CPU, chipsets and memory are combined on a small module form factor for easy adaptation into different applications across multiple market segments.

COM Express™ modules have standardized form factors and specified pinouts on the two system connectors that remain the same regardless of the vendor. The COM Express™ module reflects the functional requirements for a wide range of embedded applications. These functions include, but are not limited to, PCI Express, PCI, Graphics, High Definition Audio, parallel ATA, serial ATA, Gigabit Ethernet and USB ports. Two ruggedized, shielded connectors provide the carrier board interface and carry all the I/O signals to and from the COM Express™ module.

Carrier board designers can use as little or as many of the I/O interfaces as deemed necessary. The carrier board can therefore provide all the interface connectors required to attach the system to the application specific peripherals. This versatility allows the designer to create a dense and optimized package, which results in a more reliable product while simplifying system integration. Most importantly, COM Express™ modules are scalable, which means once an application has been created there is the ability to diversify the product range through the use of different performance class or form factor size modules. Simply unplug one module and replace it with another; no redesign is necessary.

1.2 conga-TEVAL

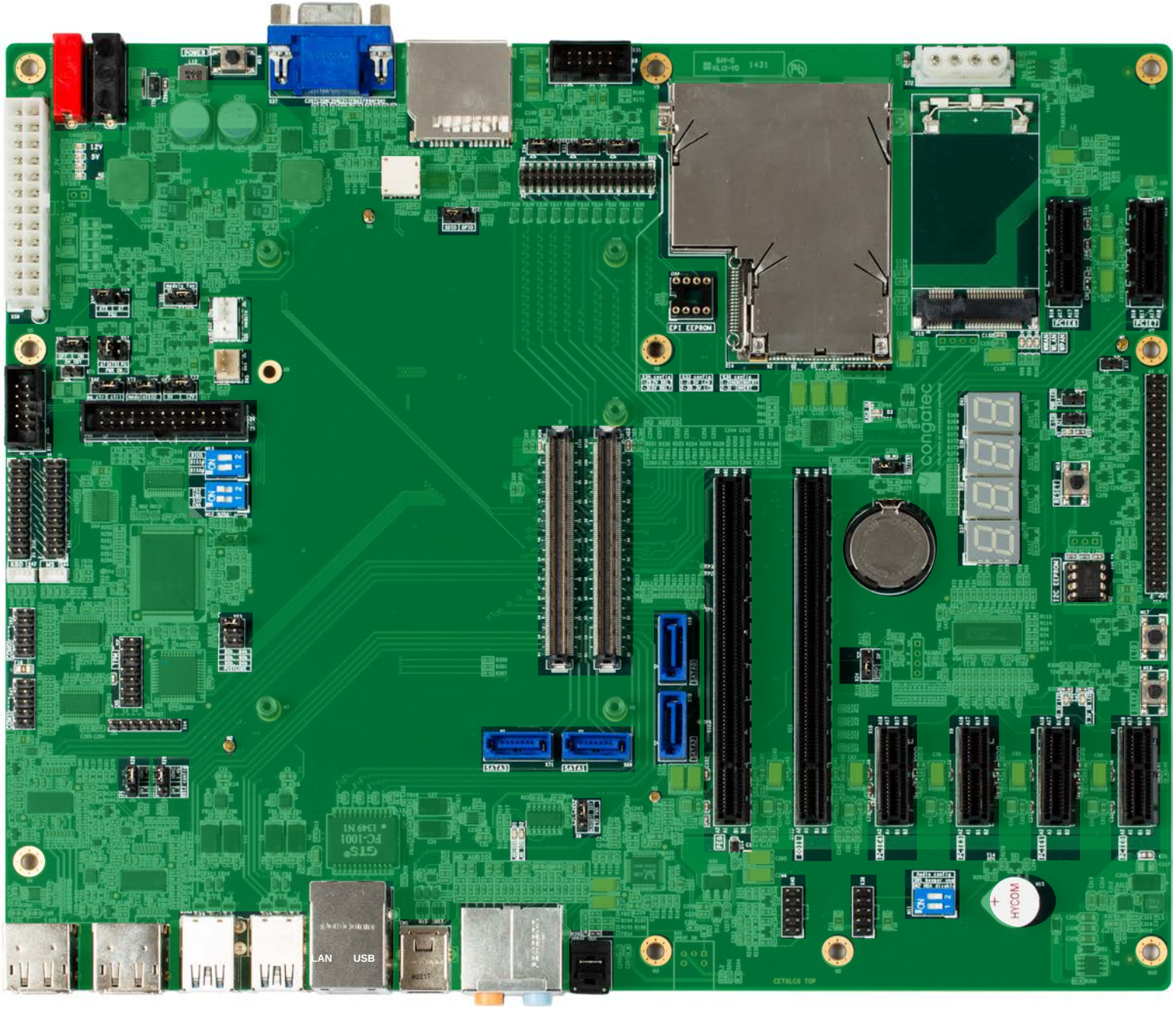
The conga-TEVAL carrier board is designed based on the Type 6 pinout definition and complies with COM Express Carrier Design Guide 2.0 specification. The conga-TEVAL provides most of the functional requirements for any application. These functions include, but are not limited to a rich complement of contemporary high bandwidth serial interfaces such as PCI Express, Serial ATA, USB 2.0, and Gigabit Ethernet. To ensure stable data throughput, the carrier board is equipped with two high performance connectors in accordance with the COM Express specification.

By combining the scalability of COM Express modules, the conga-TEVAL carrier board provides manufacturers and developers with a platform to jump-start the development of systems and applications based on COM Express 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-TEVAL makes it ideal for the integration of Compact and Basic form factor CPU modules.

2 Connector Layout

The connector layout picture below shows each connector and its name designator. Jumpers and their respective Pin 1 are also shown. Select the Adobe 'Zoom-In-Tool' and zoom in on a given component to see its designator. Hover over the component and the 'Zoom-In-Tool' will change indicating there is a link. Click on the link to navigate to the area in the document where the component is described. Use the mouse icon in the top left hand corner of the destination page to return to the connector layout picture.



3 Specifications

3.1 Mechanical Dimensions

- 294.0 mm x 244.0 mm
- Height approximately 43.0mm (top side)

3.2 Environmental Specifications

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

Note

The above operating temperatures must be strictly adhered to at all times. The maximum operating temperature refers to any measurable spot on the modules surface.

Humidity specifications are for non-condensing conditions.

3.3 Power Supply

You can power the conga-TEVAL with a standard 24 pin ATX (connector X59) or a 12V DC power supply (connectors M22 and M23).

3.3.1 ATX Power Supply

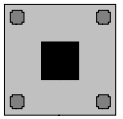
When using an ATX power supply, the COM Express™ module starts after the power-on button M19 is pressed. The ATX power supply can also be used in AT mode. In this case the module will start after the power switch on the power supply is turned on.

With jumper X58, the conga-TEVAL power supply is configured to ATX or AT mode..

Jumper X58	Configuration
1-2	ATX Power supply (default)
2-3	ATX Power supply runs in AT mode

Jumper X58

Pwr On (M19)



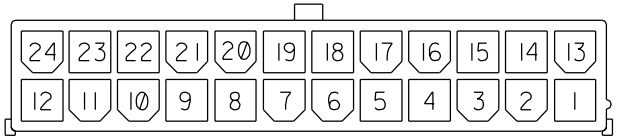
Connector Type

X58: 2.54mm grid jumper

In ATX mode, the +3.3V and +5V used by some devices on the COM Express™ evaluation carrier board is derived from the ATX power supply. If a 12V DC power supply is used via connectors M22 and M23, the onboard DC/DC regulator will generate the 3.3V and 5V.

The following table lists the pinout for connector X59.

ATX Power Connector X59



Pin	Signal	Description	Pin	Signal	
1	+3.3V	Power Supply +3.3VDC	13	+3.3V	Power Supply +3.3VDC
2	+3.3V	Power Supply +3.3VDC	14	-12V	Power Supply -12VDC
3	GND	Power Ground	15	GND	Power Ground
4	+5V	Power Supply +5VDC	16	PS_ON#	Power Supply On (active low). Short this pin to GND to switch power supply ON, disconnect from GND to switch OFF.
5	GND	Power Ground	17	GND	Power Ground
6	+5V	Power Supply +5VDC	18	GND	Power Ground
7	GND	Power Ground	19	GND	Power Ground
8	PWR_OK	Power Ok: A status signal generated by the power supply to notify the computer that the DC operating voltages are within the ranges required for proper computer operation.	20	N.C.	
9	5V_SB	Standby Power Supply +5VDC	21	+5V	Power Supply +5VDC
10	+12V	Power Supply +12VDC	22	+5V	Power Supply +5VDC
11	+12V	Power Supply +12VDC	23	+5V	Power Supply +5VDC
12	+3.3V	Power Supply +3.3VDC	24	GND	Power Ground

Note

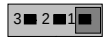
The -5V power output of the ATX power supply is not used.

Even though it is strongly recommended to use a 24 pin ATX 2.0 compliant power supply, usage of ATX 1.1 compliant power supplies with 20 pin connector is still possible.

With jumper X60, the 5V standby voltage can be disconnected from the whole system.

Jumper X60	Configuration
1-2	5V Standby Connected (Default)
2-3	5V Standby Disconnected

Jumper X60



Connector Type

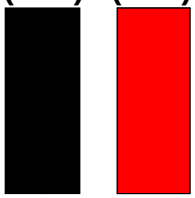
X60: 2.54mm grid jumper

3.3.2 DC Power Supply (12V)

The conga-TEVAL can also be used with 12V DC power supply (connector M22 and M23).

Connector	Description
M22	Ground
M23	+12VDC (11,4 – 12,6V)

GND (M22) **+12V (M23)**



Connector Type

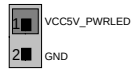
M22,M23: 4mm diameter plug

3.3.3 Status LEDs D33-D36 D40 D42

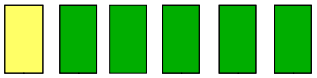
The four status LEDs D33, D34, D35 and D36 indicate different power states of the conga-TEVAL. An external power LED can be connected to pin header X54. Refer to the following table for detailed information.

LEDs D33-D36	Power state
All Off	No power applied.
D33 only	The yellow LED D33 alone indicates that the ATX power supply is mechanically switched on and only 5V standby power is applied to the conga-TEVAL.
D40, D42	D40 indicates the onboard 1.5V is present and D42 indicates that onboard 3.3V standby is present.
All On	ATX power supply is running and 3.3V, 5V and 12V are stable. LED D34 indicates 12V, LED D35 5V and LED D36 indicates 3.3V.
D34, D35 and D36	The LEDs D34,D35 and D36 indicate main power rails when the system is switched on. LED D34 indicates +12V, D35 indicates +5V and D36 indicates +3.3V.

Pin Header X54



D33 D34 D35 D36 D40 D42

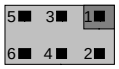


3.3.4 PWR_OK Signal

The COM Express™ specification defines the signal PWR_OK, which is a HIGH active input from the main power supply to the module and indicates whether the power is good.

Jumper X57	Configuration
1 - 2	Add 3.3V Pullup with 1kΩ to signal PWR_OK.
3 - 4	Connect PWRGOOD of ATX power supply. (default)
5 - 6	Connect PWRGOOD of onboard DC/DC regulator.

PWR_OK Config. (X57)



Connector Type

X57: 2.54mm grid jumper

3.3.5 Power-Up Control

The Power-up control is responsible for switching the ATX power supply on or off. The native system power-up support of congatec modules uses the 'SUS_S3#' signal to control the 'PS_ON#' signal, which is used to switch the ATX power supply on or off. When using the SUS_S3#' signal the COM Express™ module is capable of supporting Suspend to RAM (S3).

When the system goes to Suspend to RAM (S3) or Soft Off (S5), the 'SUS_S3#' signal is asserted by the chipset of the module. Through the use of an inverter, the low active 'PS_ON#' signal goes high and switches off the ATX power supply. Vice versa, if the system resides in a power-down system state, any system wake-up event invokes the chipset of the module to deassert the 'SUS_S3#' signal. This results in a system transition to Full On (S0).

3.3.6 Power Consumption Measurement

In conga-TEVAL revisions B.x and later, pin headers X75 and X76 were added. These pin headers enable users to optionally measure the power consumption on the COM Express module.

X75	Configuration	X76	Configuration
1	VCC12V	1	VCC5V_SBY
2	VCC12V_COME	2	VCC5V_SBY_COME

X75

X76

Connector Type

X75,X76: 2.54mm, 1x2 pin header

3.3.7 Module Type Detection

The COM Express™ Specification includes four signals to determine the pinout type of the module connected to the carrier board. The pins 'TYPE0#', 'TYPE1#', 'TYPE2#' and 'TYPE10#' are either left open (NC), strapped to ground (GND) or connected to 12V by the module to encode the pinout type according to the following table. For more information about this subject refer to the COM Express™ Specification.

Module Type	Pin TYPE0#	Pin TYPE1#	Pin TYPE2#	Pin TYPE10#	Comment
Module Type 1	X (don't care)	X (don't care)	X (don't care)	12V / NC	COM.0 Rev 1.0 / 2.0
Module Type 10	X (don't care)	X (don't care)	X (don't care)	47k PD	COM.0 Rev 2.0
Module Type 2	NC	NC	NC	12V / NC	COM.0 Rev 1.0 / 2.0
Module Type 3	NC	NC	GND	12V / NC	COM.0 Rev 1.0 / 2.0
Module Type 4	NC	GND	NC	12V / NC	COM.0 Rev 1.0 / 2.0
Module Type 5	NC	GND	GND	12V / NC	COM.0 Rev 1.0 / 2.0
Module Type 6	GND	NC	NC	NC	COM.0 Rev 2.0

Note

If an incompatible module pinout type is detected on the conga-TEVAL, an onboard logic will prevent the board from powering up the whole system by controlling the 'PS_ON#' signal of the ATX power supply.

3.4 CMOS Battery

The conga-TEVAL includes a battery that supplies the RTC and CMOS memory of the COM Express™ CPU module. To fulfill the requirements of the EN60950, the conga-TEVAL incorporates two current-limiting devices (resistor and diode) in the battery power supply path. The battery needs to provide a 3V of power. The specified battery type is CR2032.

In conga-TEVAL revision C.x, jumper X80 was implemented. With this jumper you can connect or disconnect the RTC battery.

Jumper X80 Pins	Configuration
1 - 2	Connect RTC battery (default)
2 - 3	Disconnect the RTC battery

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.

4 Subsystems of COM Express™ Connector Rows A&B

4.1 Connector Pinout - Rows A and B

Module Type 6 Connector Pinout Rows A and B

Pin	Row A	Pin	Row B	Pin	Row A	Pin	Row B
A1	GND(FIXED)	B1	GND(FIXED)	A56	PCIE_TX4-	B56	PCIE_RX4-
A2	GBE0_MDI3-	B2	GBE0_ACT#	A57	GND	B57	GPO2
A3	GBE0_MDI3+	B3	LPC_FRAME#	A58	PCIE_TX3+	B58	PCIE_RX3+
A4	GBE0_LINK100#	B4	LPC_AD0	A59	PCIE_TX3-	B59	PCIE_RX3-
A5	GBE0_LINK1000#	B5	LPC_AD1	A60	GND(FIXED)	B60	GND(FIXED)
A6	GBE0_MDI2-	B6	LPC_AD2	A61	PCIE_TX2+	B61	PCIE_RX2+
A7	GBE0_MDI2+	B7	LPC_AD3	A62	PCIE_TX2-	B62	PCIE_RX2-
A8	GBE0_LINK#	B8	LPC_DRQ0#	A63	GPI1	B63	GPO3
A9	GBE0_MDI1-	B9	LPC_DRQ1#	A64	PCIE_TX1+	B64	PCIE_RX1+
A10	GBE0_MDI1+	B10	LPC_CLK	A65	PCIE_TX1-	B65	PCIE_RX1-
A11	GND(FIXED)	B11	GND(FIXED)	A66	GND	B66	WAKE0#
A12	GBE0_MDI0-	B12	PWRBTN#	A67	GPI2	B67	WAKE1#
A13	GBE0_MDI0+	B13	SMB_CK	A68	PCIE_TX0+	B68	PCIE_RX0+
A14	GBE0_CTREF	B14	SMB_DAT	A69	PCIE_TX0-	B69	PCIE_RX0-
A15	SUS_S3#	B15	SMB_ALERT#	A70	GND(FIXED)	B70	GND(FIXED)
A16	SATA0_TX+	B16	SATA1_TX+	A71	LVDS_A0+	B71	LVDS_B0+
A17	SATA0_TX-	B17	SATA1_TX-	A72	LVDS_A0-	B72	LVDS_B0-
A18	SUS_S4#	B18	SUS_STAT#	A73	LVDS_A1+	B73	LVDS_B1+
A19	SATA0_RX+	B19	SATA1_RX+	A74	LVDS_A1-	B74	LVDS_B1-
A20	SATA0_RX-	B20	SATA1_RX-	A75	LVDS_A2+	B75	LVDS_B2+
A21	GND(FIXED)	B21	GND(FIXED)	A76	LVDS_A2-	B76	LVDS_B2-
A22	SATA2_TX+	B22	SATA3_TX+	A77	LVDS_VDD_EN	B77	LVDS_B3+
A23	SATA2_TX-	B23	SATA3_TX-	A78	LVDS_A3+	B78	LVDS_B3-
A24	SUS_S5#	B24	PWR_OK	A79	LVDS_A3-	B79	LVDS_BKLT_EN
A25	SATA2_RX+	B25	SATA3_RX+	A80	GND(FIXED)	B80	GND(FIXED)
A26	SATA2_RX-	B26	SATA3_RX-	A81	LVDS_A_CK+	B81	LVDS_B_CK+

Pin	Row A	Pin	Row B	Pin	Row A	Pin	Row B
A27	BATLOW#	B27	WDT	A82	LVDS_A_CK-	B82	LVDS_B_CK-
A28	(S)ATA_ACT#	B28	AC/HDA_SDIN2	A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL
A29	AC/HDA_SYNC	B29	AC/HDA_SDIN1	A84	LVDS_I2C_DAT	B84	VCC_5V_SBY
A30	AC/HDA_RST#	B30	AC/HDA_SDIN0	A85	GPI3	B85	VCC_5V_SBY
A31	GND(FIXED)	B31	GND(FIXED)	A86	RSVD	B86	VCC_5V_SBY
A32	AC/HDA_BITCLK	B32	SPKR	A87	RSVD	B87	VCC_5V_SBY
A33	AC/HDA_SDOUT	B33	I2C_CK	A88	PCIE_CLK_REF+	B88	BIOS_DIS1#
A34	BIOS_DIS0#	B34	I2C_DAT	A89	PCIE_CLK_REF-	B89	VGA_RED
A35	THRMTRIP#	B35	THRM#	A90	GND(FIXED)	B90	GND(FIXED)
A36	USB6-	B36	USB7-	A91	SPI_POWER	B91	VGA_GRN
A37	USB6+	B37	USB7+	A92	SPI_MISO	B92	VGA_BLU
A38	USB_6_7_OC#	B38	USB_4_5_OC#	A93	GPO0	B93	VGA_HSYNC
A39	USB4-	B39	USB5-	A94	SPI_CLK	B94	VGA_VSYNC
A40	USB4+	B40	USB5+	A95	SPI_MOSI	B95	VGA_I2C_CK
A41	GND(FIXED)	B41	GND(FIXED)	A96	TPM_PP	B96	VGA_I2C_DAT
A42	USB2-	B42	USB3-	A97	TYPE10#	B97	SPI_CS#
A43	USB2+	B43	USB3+	A98	SER0_TX	B98	RSVD
A44	USB_2_3_OC#	B44	USB_0_1_OC#	A99	SER0_RX	B99	RSVD
A45	USB0-	B45	USB1-	A100	GND(FIXED)	B100	GND(FIXED)
A46	USB0+	B46	USB1+	A101	SER1_TX	B101	FAN_PWMOUT
A47	VCC_RTC	B47	EXCD1_PERST#	A102	SER1_RX	B102	FAN_TACHIN
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	A103	LID#	B103	SLEEP#
A49	EXCD0_CPPE#	B49	SYS_RESET#	A104	VCC_12V	B104	VCC_12V
A50	LPC_SERIRQ	B50	CB_RESET#	A105	VCC_12V	B105	VCC_12V
A51	GND(FIXED)	B51	GND(FIXED)	A106	VCC_12V	B106	VCC_12V
A52	PCIE_TX5+	B52	PCIE_RX5+	A107	VCC_12V	B107	VCC_12V
A53	PCIE_TX5-	B53	PCIE_RX5-	A108	VCC_12V	B108	VCC_12V
A54	GPI0	B54	GPO1	A109	VCC_12V	B109	VCC_12V
A55	PCIE_TX4+	B55	PCIE_RX4+	A110	GND(FIXED)	B110	GND(FIXED)

4.2 SM Bus

The SM Bus signals are available on the feature connector (X53) described in section 6.8 of this document.

On the COM Express™ module, the System Management Bus (SMB) is powered by the standby power rail in order to have control over the system during the system states S0-S5. The devices on the conga-TEVAL (e.g. PCI Express clock buffer or PCI Express connectors) using the SMB are normally powered by the 3.3V main power. To avoid current leakage between the main power of the carrier board and the standby power of the module, the SMB on the conga-TEVAL is separated by a FET switch from the SMB of the module.

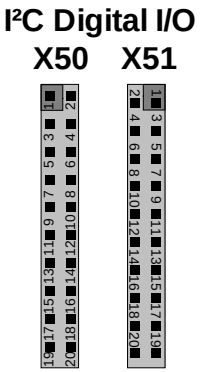
4.3 I²C Bus

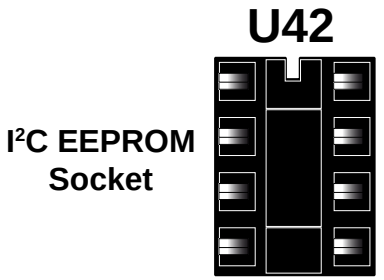
The I²C signals are available in different locations on the conga-TEVAL including the feature connector (X53) described in section 6.8 of this document.

The conga-TEVAL includes a socket for an I²C EEPROM (U42) that can be used for test purposes during the system development. This 8 pin DIP socket can be used with different 2-wire serial EEPROMS (for example 24C04 / 08 / 16 ...) and can be accessed easily by using the I²C control commands implemented in the congatec CGOS API driver. Refer to the COM Express™ module's user's guide and CGOS manual for details.

Furthermore, the conga-TEVAL includes an I²C application implemented by a PCA9555 device from Philips, a 16-bit I²C I/O port with interrupt. This device provides 16 bits of eneral purpose parallel Input/Output (GPIO) expansion for I²C applications. It provides the ability to read different byte configurations via the I²C digital I/O jumper connectors X50 and X51. For more information, contact congatec support team.

Pin	X50/X51 Signals	Pin	X50/X51 Signals
1	GND	11	GND
2	I2C_IO	12	I2C_IO
3	GND	13	GND
4	I2C_IO	14	I2C_IO
5	GND	15	GND
6	I2C_IO	16	I2C_IO
7	GND	17	BATLOW#/I2C_INT#
8	I2C_IO	18	I2C_INT#/BATLOW#
9	GND	19	3.3V
10	I2C_IO	20	3.3V





Connector Type

X50,X51: 2.54mm female pin header; 2 rows, 20 pins.

4.4 Audio Interfaces

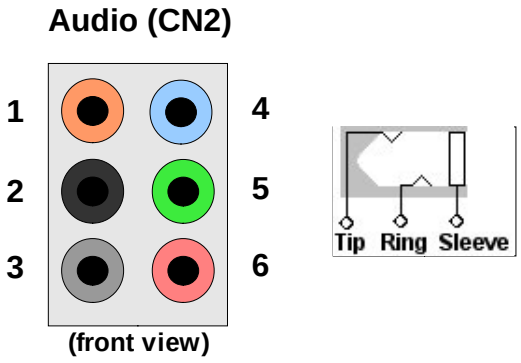
COM Express™ modules can support up to 3 audio codecs in parallel. The onboard audio codec is connected to AC_SDIN0. AC_SDIN2 is available at the HDA header (X38). There is also a DIP switch (M11) on the conga-TEVAL that allows you to disable the onboard audio codec (SW2) and to enable the onboard BEEPER (SW1). See section 6.2 of this document for more information about DIP switch M11.

4.4.1 Rear Audio Connectors

4.4.1.1 7.1 Channel Audio

The conga-TEVAL has a HDA audio codec (Realtek ALC888) mounted on it. The 7.1 audio output interface of this codec is available on connector CN2 described below. The Windows driver for this audio codec can be found on the congatec website at www.congatec.com in the 'Products' section under 'Accessories'

Stereo Jack 1	Signal	Stereo Jack 4	Signal
Tip	Center	Tip	Line Input Left
Ring	LFE	Ring	Line Input Right
Sleeve	Analog Ground	Sleeve	Analog Ground
Stereo Jack 2	**Signal**	**Stereo Jack 5**	**Signal**
Tip	Surround Left	Tip	Line Output Left
Ring	Surround Right	Ring	Line Output Right
Sleeve	Analog Ground	Sleeve	Analog Ground
Stereo Jack 3	**Signal**	**Stereo Jack 6**	**Stereo Mode**
Tip	Side Surround Left	Tip	Microphone Input Left
Ring	Side Surround Right	Ring	Microphone Input Right
Sleeve	Analog Ground	Sleeve	Analog Ground



Connector Type

CN2: 6 dedicated 3.5mm audio jacks (7.1 channel)

4.4.1.2 S/PDIF OUT

S/PDIF OUT (X39)

The conga-TEVAL can also be connected to an audio system utilizing an optical S/PDIF interface.

Connector Type

X39: TOSLINK optical audio output (JIS F05)

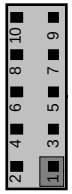
4.4.2 Internal Audio Connectors

4.4.2.1 Front Panel Header

The onboard HDA front panel header X40 enables connection of front panel line and MIC connectors. The following table describes the pinout of connector X40.

Pin	Signal	Description	Pin	Signal	Description
1	Microphone 2 Input Left	Microphone 2 Left ChannelInput	2	Analog Ground	Analog Ground
3	Microphone 2 Input Right	Microphone 2 Right Channel Input	4	HDA_PRESENCE#	Presence signal to HDA CODEC, active low.
5	Line 2 Output Right	Line 2 Right Channel Output	6	Microphone 2 Sense	Jack detection for MIC2
7	Analog Ground	Analog Ground	8	N.C.	
9	Line 2 Output Left	Line2 Left Channel Output	10	Line 2 Sense	Jack detection for Line2

HDA Front Header (X40)



Connector Type

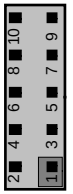
X40: 10 pin, 2 row 2.54mm grid female

4.4.2.2 HDA Header

The conga-TEVAL additionally includes a HDA header (X38), which allows the connection of other AC'97/HDA solutions. By attaching a solution to this connector the onboard codec will be switched off and the connected application can be operated. congatec has developed a HDA evaluation sound board that features the VIA VT1708 HDA codec. Contact the congatec AG support team for more information about this product. The following table describes the pinout of connector X38.

Pin	Signal	Description	Pin	Signal	Description
1	+12V (750 mA fuse)	Power Supply +12VDC	2	+3.3V (750 mA fuse)	Power Supply +3.3VDC
3	HDA/AC_SYNC	48kHz fixed-rate, sample-synchronization signal to the CODEC(s).	4	HDA/AC_RST#	Reset output to AC'97 CODEC, active low.
5	HDA/AC_SDIN2	Serial TDM data inputs from up to 3 CODECs.	6	HDA/AC_BITCLK	12.228 MHz serial data clock generated by the external CODEC(s).
7	HDA/AC_SDOUT	Serial TDM data output to the CODEC.	8	CODECSET (Input 3.3V)	Onboard codec disable input. Pull high to disable onboard audio codec.
9	GND	Power Ground	10	GND	Power Ground

HDA Header (X38)



Connector Type

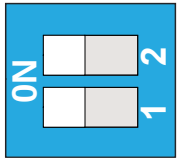
X38: 10 pin, 2 row 2.54mm grid female

4.4.3 LPC Super I/O Device

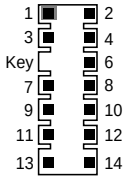
The conga-TEVAL integrates a Super I/O controller that provides additional interfaces such as PS/2 keyboard and mouse, two serial ports and a parallel port. The Winbond W83627DHG controller is connected to the LPC Bus of the COM Express™ module and the module must support these interfaces in order for them to function. Refer to the module's user's guide for information about supported features.

The LPC Super I/O and it's PS/2 functionality can be disabled by using DIP switch M12.

M12



TPM Header (CN5)



DIP Switch M12	Configuration
SW1 – ON	Enable Super I/O (default)
SW1 – OFF	Disable Super I/O
SW2 – ON	Enable PS/2 Keyboard & Mouse (default)
SW2 – OFF	Disable PS/2 Keyboard & Mouse

Note

In revision B.x, an LPC header (2x7 pin header) was added. The LPC header was replaced with a TPM header (connector CN5) in revision C.x.

Pin	CN5 Signals	Pin	CN5 Signals
1	GND	2	LPC_FRAME#
3	LPC_CLK	4	LPC_AD3
5	KEY	6	LPC_AD2
7	SIO_RESET_BUF#	8	LPC_AD1

Pin	CN5 Signals	Pin	CN5 Signals
9	VCC3V3	10	LPC_AD0
11	NC	12	LPC_SERIRQ
13	VCC3V3_SBY	14	LPC_DRQ0#

Connector Type

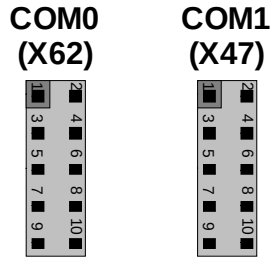
M12: DIP switch

CN5: 2.54mm, 2x7 pin header.

4.4.3.1 Serial Ports (COM Ports)

The Super I/O controller provides two serial ports - COM0 on connector X62 and COM1 on connector X47. The serial ports are compliant to the RS232 standard and are only supported on modules that support LPC bus.

Pin	COM0 X62	COM1 X47
1	DCD#	DCD#
2	DSR	DSR
3	RXD	RXD
4	RTS#	RTS#
5	TXD	TXD
6	CTS#	CTS#
7	DTR#	DTR#
8	RI#	RI#
9	GND	GND
10	+5V (750mA fuse)	+5V (750mA fuse)



Connector Type

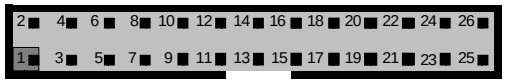
X47, X62: 10 pin, 2 row 2.54mm grid female

4.4.3.2 Parallel Port (LPT)

The Super I/O controller provides a parallel port on connector X48.

Pin	Signal	Pin	Signal
1	STROBE#	14	GND
2	AFD#	15	PD6
3	PD0	16	GND
4	ERR#	17	PD7
5	PD1	18	GND
6	INIT#	19	ACK#
7	PD2	20	GND
8	SLIN#	21	BUSY
9	PD3	22	GND
10	GND	23	PE
11	PD4	24	GND
12	GND	25	SLCT
13	PD5	26	GND

LPT (X48)



Connector Type

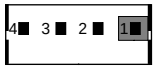
X48: 26 pin, 2 row 2.54mm grid female

4.4.3.3 KBC Interface

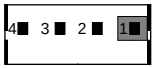
The Super I/O controller provides keyboard interface via connector X42 and mouse interface via connector X44. The PS2 mouse and keyboard are connected to the KBC interface of the Super I/O controller

Pin	Mouse X44	Keyboard X42
1	MSCLK	KBDCLK
2	GND	GND
3	+5V	+5V
4	MSDAT	KBDDAT

Keyboard (X42)



Mouse (X44)



Connector Type

X42, X44: Molex Picoblade 51021-0400 (1.25mm pitch, crimp housing)

4.4.3.4 Auxiliary Fan

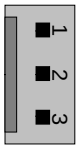
The conga-TEVAL supports a 3 pin FAN connector (X45) for auxiliary fans via the Super I/O controller. With Jumpers X43 and X46, you can control a fan connected to X45.

In conga-TEVAL revion B.x and later, jumper X73 was added. With this jumper, you can drive the auxiliary fan either from the carrier board (Super I/O) or from the COM Express module.

AUX Fan Pinout.

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

AUX Fan (X45)

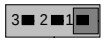


1: GND
2: VCC +5VDC/+12VDC
3: Sense

Jumper X43.

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

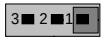
Jumper X43



Jumper X46.

Pin	Configuration
1-2	Enable fan speed control (default)
2-3	Disable fan speed control

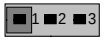
Jumper X46



Jumper X73.

Pin	Configuration
1-2	Fan speed control via Super I/O located on the conga-CET6 (default)
2-3	Fan speed control via the COM Express module

Jumper X73



Connector Type

X45: 2.54mm Standard 3pin Housing for Fan.

X43, X46, X73: 2.54mm grid jumper

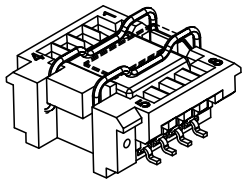
4.4.4 SPI Flash

The conga-TEVAL offers the possibility to boot the COM Express™ CPU module using an external BIOS instead of the module's onboard BIOS. This can be very useful when a customized BIOS must be evaluated.

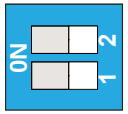
Located on the conga-TEVAL is a 8 pin SO8W socket for a SPI flash (socket U43). DIP Switches at M13 allow the user to configure which flash devices the COM Express™ CPU module should boot from. The following table shows the different switch settings for M13 that are necessary to either boot from the off-board SPI flash on the conga-TEVAL or to boot from the onboard flash on the COM Express™ CPU module.

DIP Switch M13		Configuration
SW 1	SW 2	
OFF	OFF	Boot from on-module firmware (default)
OFF	ON	Boot from carrier SPI Flash
ON	OFF	Boot from external FWH (not supported)
ON	ON	Boot from on-module firmware, but load management data from carrier SPI

SO8W Socket (U43)



M13



Connector Type

M13: DIP switch

4.4.5 Universal Serial Bus (USB)

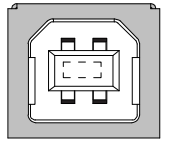
The conga-TEVAL supports 8 USB ports. Six of these ports (ports 0-4,7) are routed to USB Type A connectors - four USB 3.0 and two USB 2.0. The remaining two ports (ports 5 & 6) are each routed to mini PCIe (X15) and ExpressCard (X14) connectors. Additionally, the conga-TEVAL provides a USB 2.0 Type B connector. The USB Type B connector (CN1) shares the USB signals with USB port 7. For this reason, if a USB Type B port is used, then USB port 7 will not function.

4.4.5.1 USB 2.0 Ports

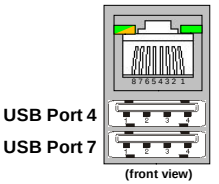
USB ports 4 and 7 found on connector X5 are supplied by suspend power and can be used to test "wake up via USB" functionality. In addition, USB 7 is shared with CN1 via a signal switch. If the conga-TEVAL is connected to a USB host device as a client device, the signal switch automatically connects the USB 7 lines to the USB-B connector (CN1), otherwise USB 7 is available at X5.

Pin	Signal
1	+5V
2	DATA-

USB Client (CN1)



X5



3	DATA+
4	GND

Note

For USB client (CN1) to function, the COM Express module must support USB client

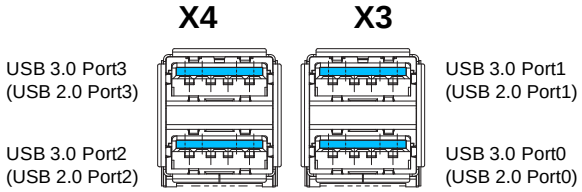
Connector Type

X5: Dual USB connector with RJ45 connector (without magnetics)

CN1: USB Type B

4.4.5.2 USB 3.0 Ports

The conga-TEVAL is designed to support up to 4 USB 3.0 ports, the maximum count specified by the COM Express™ specification for Type 6 modules. Each of the 4 USB 3.0 Ports is composed of Super Speed Signals and its USB 2.0 counterpart.



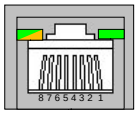
Connector Type

X3, X4: Dual USB 3.0 connector (Type A)

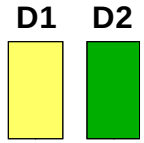
4.4.6 LAN 10/100/1000

Pin	Signal	Pin	Signal
1	MDI[0]+	2	MDI[0]-
3	MDI[1]+	4	MDI[1]-
5	MDI[2]+	6	MDI[2]-
7	MDI[3]+	8	MDI[3]-

X5

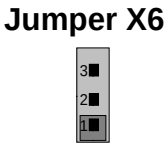


LEDs	Description
Yellow	Activity
Green	Link
D1	LINK1000#
D2	LINK100#



Jumper X6 sets the power rail, driving the Status LEDs of the RJ45 connector.

Jumper X6	Configuration
1-2	Status LEDs are standby powered
2-3	Status LEDs are only powered in S0

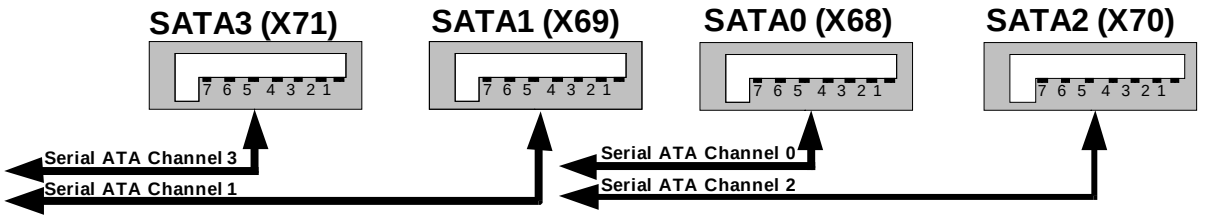


Connector Type

X5: 8 pin RJ45 plug; X6: 2.54mm grid jumper

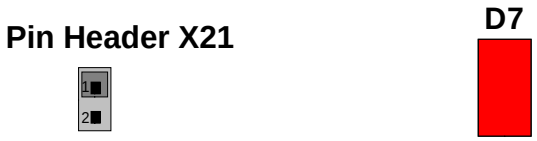
4.4.7 Serial ATA™

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



An external HDD LED can be connected to pin header X21. The red LED D7 indicates activity on each SATA interface

Pin	Signal
1	Anode
2	Cathode



Connector Type

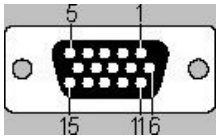
X21: 2.54mm grid jumper

4.4.8 VGA

A monitor that supports VGA can be connected using the X37 connector. The following table describes the pinout of connector X37.

Pin	Signal	Pin	Signal
1	RED	9	DDC Power
2	GREEN	10	GND
3	BLUE	11	N.C.
4	N.C.	12	DDC DAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

X37



(front view)

Connector Type

VGA (X37): 15 pin, high density DSUB male

4.4.9 LVDS Flat Panel Interface

The conga-TEVAL provides a LVDS flat panel interface via connector X65.

Pin	LVDS Output	Description	Pin	LVDS Output	Description
1	LVDS_I2C_DAT	I²C data line for LVDS display use	2	LVDS_I2C_CK	I²C clock output for LVDS display use
3	N.C.		4	N.C.	
5	GND	Power Ground	6	LVDS_A0-	LVDS Channel A differential pairs
7	LVDS_A0+	LVDS Channel A differential pairs	8	LVDS_VDD_EN	LVDS panel power enable
9	LVDS_A1-	LVDS Channel A differential pairs	10	LVDS_A1+	LVDS Channel A differential pairs
11	LVDS_BKLT_EN	LVDS panel backlight enable. (see jumper X4)	12	LVDS_A2+	LVDS Channel A differential pairs
13	LVDS_A2-	LVDS Channel A differential pairs	14	N.C.	
15	LVDS_A_CK-	LVDS Channel A differential clock	16	LVDS_A_CK+	LVDS Channel A differential clock
17	N.C.		18	LVDS_A3+	LVDS Channel A differential pairs
19	LVDS_A3-	LVDS Channel A differential pairs	20	GND	
21	LVDS_B0-	LVDS Channel B differential pairs	22	LVDS_B0+	LVDS Channel B differential pairs
23	GND	Power Ground	24	LVDS_B1-	LVDS Channel B differential pairs

LCD (X65)

25	LVDS_B1+	LVDS Channel B differential pairs	26	GND	Power Ground
27	LVDS_B2-	LVDS Channel B differential pairs	28	LVDS_B2+	LVDS Channel B differential pairs
29	GND	Power Ground	30	LVDS_B_CK+	LVDS Channel B differential clock
31	LVDS_B_CK-	LVDS Channel B differential clock	32	N.C.	
33	LVDS_B3+	LVDS Channel B differential pairs	34	LVDS_B3-	LVDS Channel B differential pairs

With jumper X36, you can change the polarity of the backlight enable signal LVDS_BKLT_EN from the COM Express™ module.

Jumper X36	Configuration
1-2	Backlight enable non-inverted (default)
2-3	Backlight enable inverted

Jumper X36

Note

See 4.4.9.2 "Flat Panel and Backlight Power Supply Connection" for information about connection possibilities for the Backlight Polarity Config. jumper X36.

Connector Type

X36: 2.54mm grid jumper

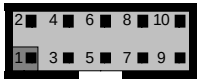
X65: 34 pin, 2 row 2mm grid female.

4.4.9.1 Flat Panel and Backlight Power Supply

The power supply for flat panels and their backlight inverter is available on connector X35. The following table describes the pinout of connector X35.

Pin	Signal	Pin	Signal
1	SW_VDD (1.5A Fuse)	2	SW_BKLT (2.0A Fuse)
3	+5V (1.5A Fuse)	4	+12V (2.0A Fuse)
5	DIGON	6	BKLT_ON
7	BKLT_CTRL (DAC)	8	BKLT_CTRL
9	GND	10	GND

LCD Power (X35)

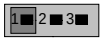


Jumper X33	Configuration
1-2	5V LCD Voltage (default)
2-3	3.3V LCD Voltage

Jumper X33

Jumper X34	Configuration
1-2	12V Backlight Voltage (default)
2-3	5V Backlight Voltage

Jumper X34



Note

See section 4.4.9.2 "Flat Panel and Backlight Power Supply Connection" for information about connection possibilities for the LCD Power X35 connector.

Connector Type

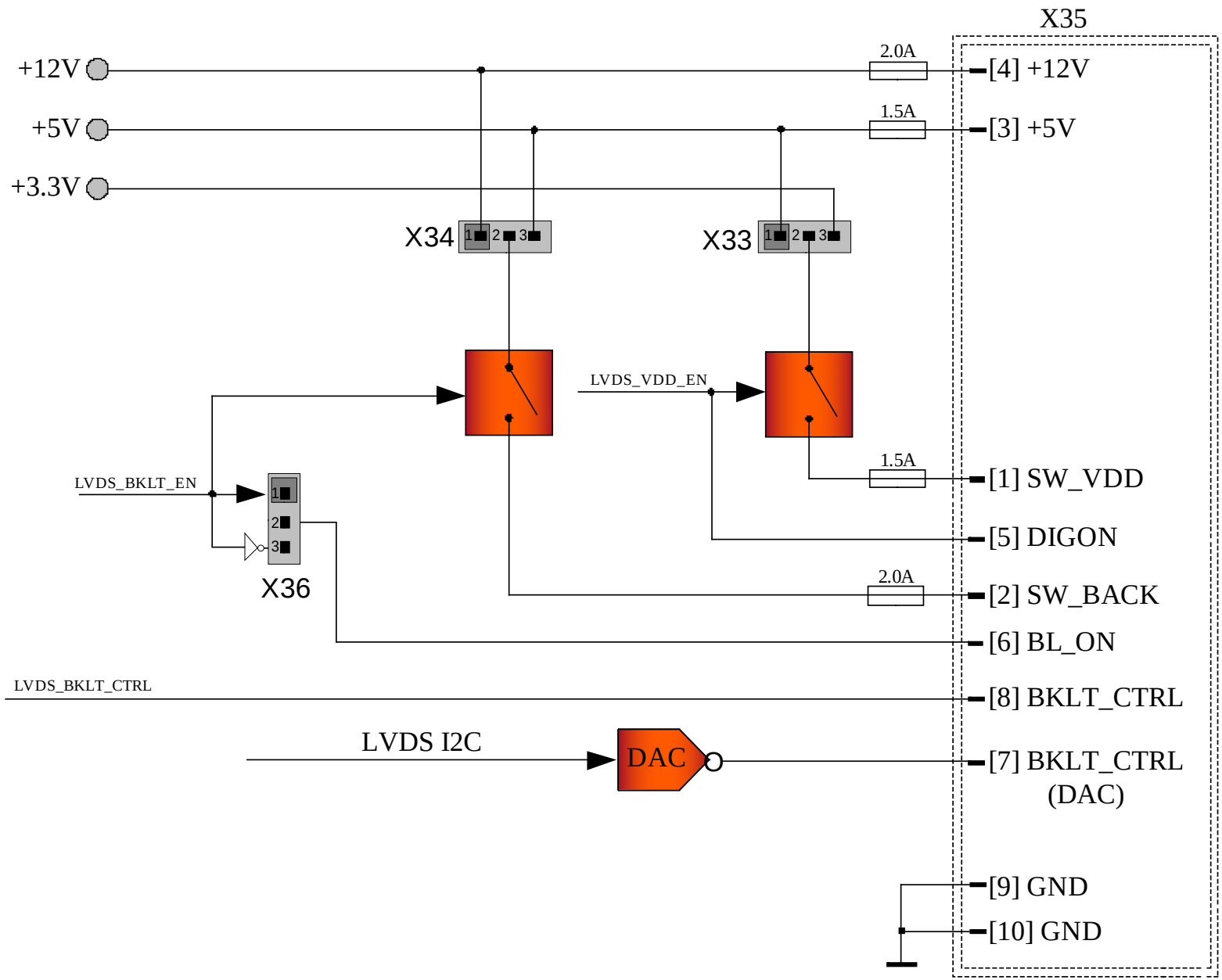
X35: 10 pin, 2 row 2.54 mm grid female.

X33, X34: 2.54mm grid jumper

4.4.9.2 Flat Panel and Backlight Power Supply Connection

The following diagram shows a typical connection possibility for powering panel/backlight by either the SW_VDD/SW_BKLT power rails or by using DIGON/BKLT_ON for external power switches.

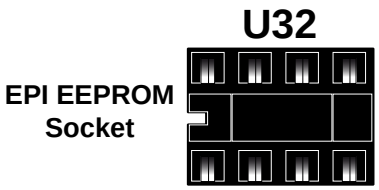
- Signals 1-10 correspond to signals 1-10 found on the X35 connector.
- X33, X34 and X36 represent jumpers X33, X34 and X36 found on the conga-TEVAL.
- The conga-TEVAL carrier board is equipped with a Maxim MAX5362 device referred to in the diagram below as "DAC"



4.4.9.3 Flat Panel Configuration Data

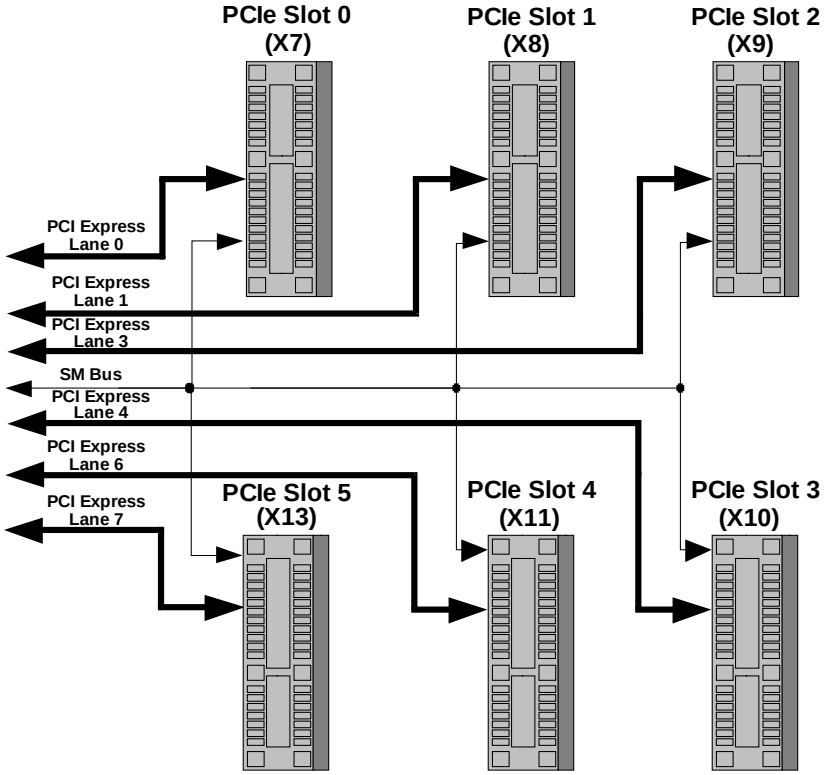
The flat panel configuration data (EPI extended EDID™ 1.3 file) for most common displays is included in the congatec COM Express™ CPU module's system BIOS. The customer also has the possibility to use a customized EPI extended EDID™ 1.3 file that can be stored in a serial EEPROM located on the conga-TEVAL (DIL 8 socket U32).

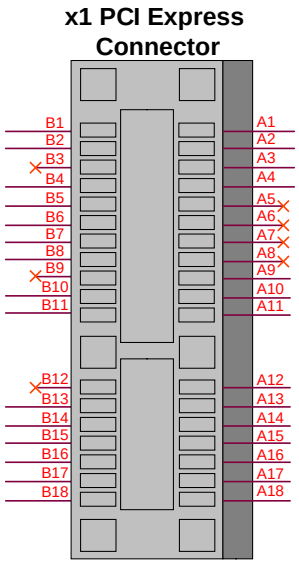
Supported EEPROMs: 24C02, 24C04 and 24C16 at address A0h.



4.4.10 PCI Express x1 Connectors

The conga-TEVAL is equipped with 6 x1 PCI Express Slots. The following tables describe the pinouts for each of these slots.





PCI Express Slot 0/Lane 0 Connector X7			
Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	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 Standby	A10	+3.3V
B11	WAKE0#	A11	PCIE_RST#
B12	N.C.	A12	GND
B13	GND	A13	PCIE0_CLK+
B14	PCIE_TX0+	A14	PCIE0_CLK-
B15	PCIE_TX0-	A15	GND
B16	GND	A16	PCIE_RX0+
B17	PCIE0_CLKREQ#	A17	PCIE_RX0-
B18	GND	A18	GND

PCI Express Slot 1/Lane 1 Connector X8			
Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	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 Standby	A10	+3.3V
B11	WAKE0#	A11	PCIE_RST#
B12	N.C.	A12	GND
B13	GND	A13	PCIE1_CLK+
B14	PCIE_TX1+	A14	PCIE1_CLK-
B15	PCIE_TX1-	A15	GND
B16	GND	A16	PCIE_RX1+
B17	PCIE1_CLKREQ#	A17	PCIE_RX1-
B18	GND	A18	GND

PCI Express Slot 2/Lane 3 Connector X9			
Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	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 Standby	A10	+3.3V

PCI Express Slot 3/Lane 4 Connector X10			
Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	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 Standby	A10	+3.3V

B11	WAKE0#	A11	PCIE_RST#	B11	WAKE0#	A11	PCIE_RST#
B12	N.C.	A12	GND	B12	N.C.	A12	GND
B13	GND	A13	PCIE3_CLK+	B13	GND	A13	PCIE4_CLK+
B14	PCIE_TX3+	A14	PCIE3_CLK-	B14	PCIE_TX4+	A14	PCIE4_CLK-
B15	PCIE_TX3-	A15	GND	B15	PCIE_TX4-	A15	GND
B16	GND	A16	PCIE_RX3+	B16	GND	A16	PCIE_RX4+
B17	PCIE3_CLKREQ#	A17	PCIE_RX3-	B17	PCIE4_CLKREQ#	A17	PCIE_RX4-
B18	GND	A18	GND	B18	GND	A18	GND

PCI Express Slot 4/Lane 6 Connector X11

Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	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 Standby	A10	+3.3V
B11	WAKE0#	A11	PCIE_RST#
B12	N.C.	A12	GND
B13	GND	A13	PCIE6_CLK+
B14	PCIE_TX6+	A14	PCIE6_CLK-
B15	PCIE_TX6-	A15	GND
B16	GND	A16	PCIE_RX6+
B17	PCIE6_CLKREQ#	A17	PCIE_RX6-
B18	GND	A18	GND

PCI Express Slot 5/Lane 7 Connector X13

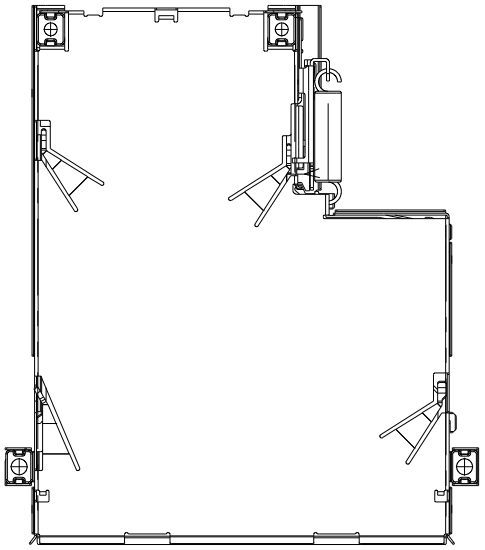
Pin	Signal	Pin	Signal
B1	+12V	A1	GND
B2	+12V	A2	+12V
B3	N.C.	A3	+12V
B4	GND	A4	GND
B5	SMB_CK	A5	N.C.
B6	SMB_DAT	A6	N.C.
B7	GND	A7	N.C.
B8	+3.3V	A8	N.C.
B9	N.C.	A9	+3.3V
B10	+3.3V Standby	A10	+3.3V
B11	WAKE0#	A11	PCIE_RST#
B12	N.C.	A12	GND
B13	GND	A13	PCIE7_CLK+
B14	PCIE_TX7+	A14	PCIE7_CLK-
B15	PCIE_TX7-	A15	GND
B16	GND	A16	PCIE_RX7+
B17	PCIE7_CLKREQ#	A17	PCIE_RX7-
B18	GND	A18	GND

4.4.11 ExpressCard®

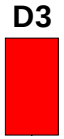
The conga-TEVAL is equipped with a ExpressCard® slot (connector X14). ExpressCard® is a small, modular add-in card designed to replace common PCMCIA and PC Cards. It takes advantage of the scalable, high-bandwidth serial PCI Express and USB 2.0 interfaces to provide much higher data rates. COM Express™ modules offer support for up to two ExpressCard® slots. More information about the ExpressCard® Standard can be found at http://www.expresscard.org.

The ExpressCard utilizes USB port 6 and PCI Express lane 2. The following table lists the default pinout of the ExpressCard slot.

Pin	Signal	Pin	Signal
1	GND	14	+3.3V
2	USB6-	15	+3.3V
3	USB6+	16	PCIE2_CLKREQ#
4	CPUSB#	17	EXCD0_CPPE#
5	RSVD	18	PCIE_CLKC0-
6	RSVD	19	PCIE_CLKC0+
7	SMB_CK	20	GND
8	SMB_DAT	21	PCIE_RX2-
9	+1.5V	22	PCIE_RX2+
10	+1.5V	23	GND
11	WAKE0#	24	PCIE_TX2-
12	+3.3V Standby	25	PCIE_TX2+
13	EXCD0_PERST#	26	GND



The red LED (D3) indicates that an 'Overcurrent Event' has occurred in the ExpressCard® slot.

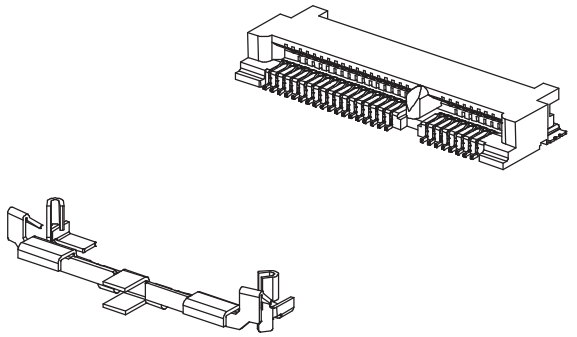


4.4.12 PCI Express® Mini Card

The conga-TEVAL is equipped with a PCI Express® Mini Card socket (X15). PCI Express® Mini Card is a unique small size form factor optimized for mobile computing platforms equipped with communication applications such as Wireless LAN. The small footprint connector can be implemented on carrier board designs providing the ability to insert different removable PCI Express® Mini Cards. Using this approach gives the flexibility to mount an upgradable, standardized PCI Express® Mini Card device to the carrier board without additional expenditure of a redesign.

The PCI Express® Mini Card utilizes USB port 5 and PCI Express lane 5. The following table lists the default pinout of the PCI Express Mini Card.

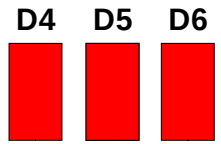
Pin	Signal	Pin	Signal
1	WAKE0#	2	+3.3V
3	RSVD	4	GND
5	RSVD	6	+1.5V
7	PCIE5_CLKREQ#	8	N.C.
9	GND	10	N.C.
11	PCIE5_CLK-	12	N.C.
13	PCIE5_CLK+	14	N.C.
15	GND	16	N.C.
17	RSVD	18	GND
19	RSVD	20	RSVD
21	GND	22	PCIE_RST#
23	PCIE_RX5-	24	+3.3V Standby
25	PCIE_RX5+	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CK
31	PCIE_TX5-	32	SMB_DAT
33	PCIE_TX5+	34	GND
35	GND	36	USB5-
37	RSVD	38	USB5+
39	RSVD	40	GND
41	RSVD	42	LED_WWAN#
43	RSVD	44	LED_WLAN#
45	RSVD	46	LED_WPAN#
47	RSVD	48	+1.5V



Pin	Signal	Pin	Signal
49	RSVD	50	GND
51	RSVD	52	+3.3V

The PCI Mini Card socket has three different red LEDs to indicate the presence of certain area network types. They are as follows:

LED	Description
D4	Wireless Wide Area Network
D5	Wireless Local Area Network
D6	Wireless Personal Area Network



In revision B.x and later, pin header X77 was added measuring/debugging PCIE_WAKE# and CB_RESET# signals.

Pin	Signal
1	CB_RESET#
2	PCIE_WAKE

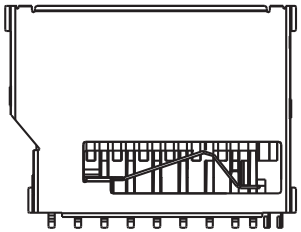
Pin Header X77

4.4.13 SDIO

The GPIOs on a COM Express™ Type 6 modules may also be used as SDIO signals. The de-multiplexing is handled on conga-TEVAL by Jumper X22, connecting GPIOs to either SD/MMC slot (CN3) or feature connector (X53)

Jumper X22	Configuration
1-2	SDIO
2-3	GPIO (default)

Jumper X22



Connector Type

X22: 2.54mm grid jumper

5 Subsystems of COM Express™ Connector Rows C&D

5.1 Connector Pinout - Rows C and D

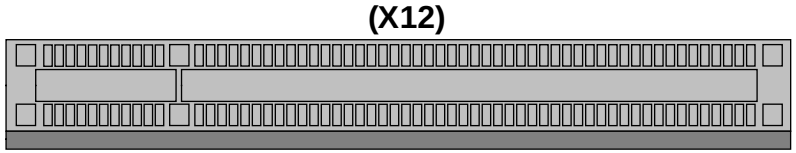
Module Type 6 Connector Pinout Rows C and D

Pin	Row C	Pin	Row D	Pin	Row C	Pin	Row D
C1	GND(FIXED)	D1	GND(FIXED)	C56	PEG_RX1-	D56	PEG_TX1-
C2	GND	D2	GND	C57	TYPE1#	D57	TYPE2#
C3	USB_SSRX0-	D3	USB_SSTX0-	C58	PEG_RX2+	D58	PEG_TX2+
C4	USB_SSRX0+	D4	USB_SSTX0+	C59	PEG_RX2-	D59	PEG_TX2-
C5	GND	D5	GND	C60	GND(FIXED)	D60	GND(FIXED)
C6	USB_SSRX1-	D6	USB_SSTX1-	C61	PEG_RX3+	D61	PEG_TX3+
C7	USB_SSRX1+	D7	USB_SSTX1+	C62	PEG_RX3-	D62	PEG_TX3-
C8	GND	D8	GND	C63	RSVD	D63	RSVD
C9	USB_SSRX2-	D9	USB_SSTX2-	C64	RSVD	D64	RSVD
C10	USB_SSRX2+	D10	USB_SSTX2+	C65	PEG_RX4+	D65	PEG_TX4+
C11	GND(FIXED)	D11	GND(FIXED)	C66	PEG_RX4-	D66	PEG_TX4-
C12	USB_SSRX3-	D12	USB_SSTX3-	C67	RSVD	D67	GND
C13	USB_SSRX3+	D13	USB_SSTX3+	C68	PEG_RX5+	D68	PEG_TX5+
C14	GND	D14	GND	C69	PEG_RX5-	D69	PEG_TX5-
C15	DDI1_PAIR6+	D15	DDI1_CTRLCLK_AUX+	C70	GND(FIXED)	D70	GND(FIXED)
C16	DDI1_PAIR6-	D16	DDI1_CTRLDATA_AUX-	C71	PEG_RX6+	D71	PEG_TX6+
C17	RSVD	D17	RSVD	C72	PEG_RX6-	D72	PEG_TX6-
C18	RSVD	D18	RSVD	C73	GND	D73	GND
C19	PCIE_RX6+	D19	PCIE_TX6+	C74	PEG_RX7+	D74	PEG_TX7+
C20	PCIE_RX6-	D20	PCIE_TX6-	C75	PEG_RX7-	D75	PEG_TX7-
C21	GND(FIXED)	D21	GND(FIXED)	C76	GND	D76	GND
C22	PCIE_RX7+	D22	PCIE_TX7+	C77	RSVD	D77	RSVD
C23	PCIE_RX7-	D23	PCIE_TX7-	C78	PEG_RX8+	D78	PEG_TX8+
C24	DDI1_HPD	D24	RSVD	C79	PEG_RX8-	D79	PEG_TX8-
C25	DDI1_PAIR4 +	D25	RSVD	C80	GND(FIXED)	D80	GND(FIXED)
C26	DDI1_PAIR4-	D26	DDI1_PAIR0+	C81	PEG_RX9+	D81	PEG_TX9+

Pin	Row C	Pin	Row D	Pin	Row C	Pin	Row D
C27	RSVD	D27	DDI1_PAIR0-	C82	PEG_RX9-	D82	PEG_TX9-
C28	RSVD	D28	RSVD	C83	TPM_PP	D83	RSVD
C29	DDI1_PAIR5+	D29	DDI1_PAIR1+	C84	GND	D84	GND
C30	DDI1_PAIR5-	D30	DDI1_PAIR1-	C85	PEG_RX10+	D85	PEG_TX10+
C31	GND(FIXED)	D31	GND(FIXED)	C86	PEG_RX10-	D86	PEG_TX10-
C32	DDI2_CTRLCLK_AUX+	D32	DDI1_PAIR2+	C87	GND	D87	GND
C33	DDI2_CTRLDATA_AUX-	D33	DDI1_PAIR2-	C88	PEG_RX11+	D88	PEG_TX11+
C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL	C89	PEG_RX11-	D89	PEG_TX11-
C35	RSVD	D35	RSVD	C90	GND(FIXED)	D90	GND(FIXED)
C36	DDI3_CTRLCLK_AUX+	D36	DDI1_PAIR3+	C91	PEG_RX12+	D91	PEG_TX12+
C37	DDI3_CTRLDATA_AUX-	D37	DDI1_PAIR3-	C92	PEG_RX12-	D92	PEG_TX12-
C38	DDI3_DDC_AUX_SEL	D38	RSVD	C93	GND	D93	GND
C39	DDI3_PAIR0+	D39	DDI2_PAIR0+	C94	PEG_RX13+	D94	PEG_TX13+
C40	DDI3_PAIR0-	D40	DDI2_PAIR0-	C95	PEG_RX13-	D95	PEG_TX13-
C41	GND(FIXED)	D41	GND(FIXED)	C96	GND	D96	GND
C42	DDI3_PAIR1+	D42	DDI2_PAIR1+	C97	RSVD	D97	RSVD
C43	DDI3_PAIR1-	D43	DDI2_PAIR1-	C98	PEG_RX14+	D98	PEG_TX14+
C44	DDI3_HPD	D44	DDI2_HPD	C99	PEG_RX14-	D99	PEG_TX14-
C45	RSVD	D45	RSVD	C100	GND(FIXED)	D100	GND(FIXED)
C46	DDI3_PAIR2+	D46	DDI2_PAIR2+	C101	PEG_RX15+	D101	PEG_TX15+
C47	DDI3_PAIR2-	D47	DDI2_PAIR2-	C102	PEG_RX15-	D102	PEG_TX15-
C48	RSVD	D48	RSVD	C103	GND	D103	GND
C49	DDI3_PAIR3+	D49	DDI2_PAIR3+	C104	VCC_12V	D104	VCC_12V
C50	DDI3_PAIR3-	D50	DDI2_PAIR3-	C105	VCC_12V	D105	VCC_12V
C51	GND(FIXED)	D51	GND(FIXED)	C106	VCC_12V	D106	VCC_12V
C52	PEG_RX0+	D52	PEG_TX0+	C107	VCC_12V	D107	VCC_12V
C53	PEG_RX0-	D53	PEG_TX0-	C108	VCC_12V	D108	VCC_12V
C54	TYPE0#	D54	PEG_LANE_RV#	C109	VCC_12V	D109	VCC_12V
C55	PEG_RX1+	D55	PEG_TX1+	C110	GND(FIXED)	D110	GND(FIXED)

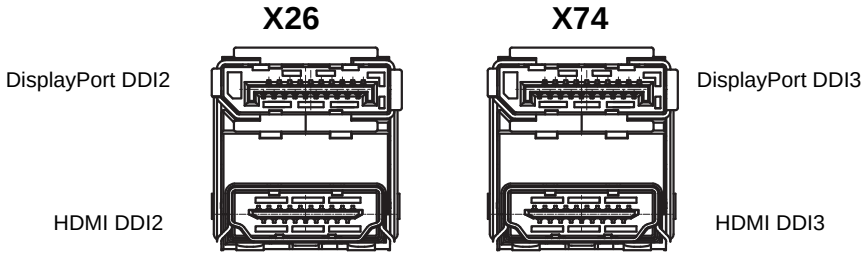
5.2 PCI Express® Graphics (PEG)

The PEG Port (connector X12) utilizes 16 PCI Express lanes and is suitable to drive a x16 link for an external high-performance PCI Express® graphics card. It supports a theoretical bandwidth of up to 15.75 GB/s (Gen 3). For information about the pinout of the PEG port connector refer to the PCI Express Card Electromechanical Specification.

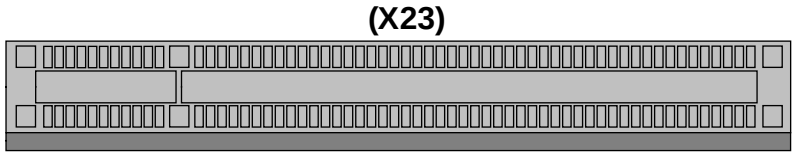


5.3 Digital Display Interfaces

The conga-TEVAL supports three Digital Display Interfaces (DDI) (connectors X23, X26, X74). COM Express™ Type 6 Modules can provide up to three Digital Display Interfaces, each capable of containing TMDS (HDMI/DVI) or Display Port signals. In addition, DDI1 can also carry SDVO signals.



To provide a freedom of choice, DDI1 is routed to a PCIe x16 Slot (X23). This slot does not support any PCI Express® graphic cards, but is suitable for use with the conga-HDMI/DisplayPort adapter and conventional SDVO ADD2 cards.



Jumper X24 needs to be set accordingly, to allow the usage of DisplayPort or SDVO/TMDS adapters.

Jumper X24	Configuration
1-2	DDI1 used for DisplayPort (default)
2-3	DDI1 used for HDMI/DVI/SDVO

Jumper X24

DDI2 and DDI3 are connected onboard to demultiplexer, allowing users to simply connect HDMI, DVI or Display Port monitors. Each of these two demultiplexers can be configured in conga-TEVAL revisions B.x and later, via a jumper - X28 for DDI1 and X29 for DDI2.

Jumper X28	Configuration
1-2	Sets DDI2 output to DVI 1.0 compliant
2-3	Sets DDI2 output to HDMI 1.4b compliant (default)

Jumper X28

Jumper X29	Configuration
1-2	Sets DDI3 output to DVI 1.0 compliant
2-3	Sets DDI3 output to HDMI 1.4b compliant (default)

Jumper X29

In revision A.x, each of the these demultiplexers can be configured via two jumpers - X25 and X28 for DDI2; X29 and X32 for DDI3.

Note

If jumper X24 is configured for DisplayPort (position 1-2), then the pin positions of jumpers X28 and X29 are irrelevant.

Connector Type

X24,X28,X29: 2.54mm grid jumper

6 Additional Features

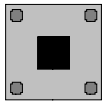
6.1 Buttons

The conga-TEVAL features four different buttons. These are power, reset, LID and sleep buttons.

6.1.1 Power

When using an ATX power supply, the COM Express™ module starts after the power-on button M19 is pressed.

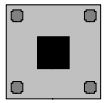
Pwr On (M19)



6.1.2 Reset

The COM Express™ module and all connected components will perform a hard reset when this button is pressed. The Reset button is connected to the COM Express™ module's SYS_RESET# signal.

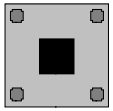
Reset (M16)



6.1.3 LID

You can trigger the LID# signal by pressing the LID button M17. The system's behaviour depends on the ACPI settings of the Operating System.

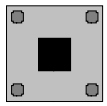
LID (M17)



6.1.4 Sleep

You can trigger the SLEEP# signals by pressing the SLEEP button M18. The system's behaviour depends on the ACPI settings of the Operating System.

Sleep (M18)

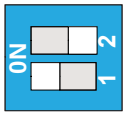


6.2 PC Speaker

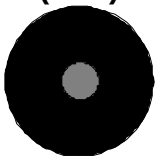
The board-mounted speaker provides audible error code (beep code) information during POST. The speaker M15 is connected to the COM Express™ module's SPEAKER signal and can be disabled via DIP switch M11 SW1.

DIP Switch M11	Configuration
SW1 – ON	Enable beeper (default)
SW1 – OFF	Disable beeper
SW2 – ON	Disable audio codec
SW2 – OFF	Enable audio codec (default)

M11



Speaker (M15)



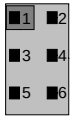
6.3 Debug Display

During the POST (Power On Self Test), the BIOS generates diagnostic progress codes (POST-codes) to different I/O ports (usually port 80h). If the POST fails, execution stops and the last POST code generated is left at the respective port. This code is useful for determining the point where an error occurred. The conga-TEVAL decodes these ports and displays their contents on a 4 seven-segment display (D37 - D39 and D41).

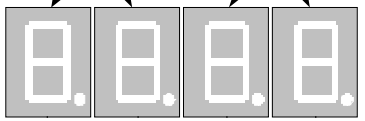
A list of the POST codes and associated POST test and initialization routines for the BIOS used on congatec COM Express™ modules is available at www.congatec.com.

Jumper X63	Configuration
1 - 2	Port 80h and port 84h output (default)
3 - 4	Port 80h and port 90h output
5 - 6	Port 90h and port 94h output

Jumper X63



Port 80/90 **Port 84/90/94**



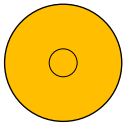
Connector Type

X63: 2.54mm grid jumper

6.4 Ground Test Points

The conga-TEVAL provides 4 test points that are connected to Ground Potential (M1 to M4). These test points make it easier to connect oscilloscope probes and/or multimeter lines to ground when performing measurements on the COM Express™ module.

Test Points (M1-M4)

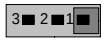


6.5 Fan Connector and Power Configuration

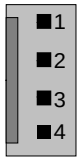
The conga-TEVAL provides the ability to connect 5V or 12V cooling fans for the CPU module and system. The following tables describe the pinouts and jumper configuration possibilities for the fan connected to the COM Express™ module.

Jumper X55	Configuration
1-2	12 Volt Fan (default)
2-3	5 Volt Fan

Jumper X55



CPU Fan (X56)



1: GND
2: VCC +5VDC/+12VDC
3: FAN_TACHOIN
4. FAN_CTRL

Connector Type

X56: 4 pin 2.54mm grid fan connector

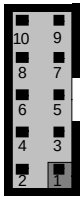
X55: 2.54mm grid jumper

6.6 Smart Battery Management Module

Connector X52 provides the ability to connect the conga-TEVAL to a congatec SMART Battery Management Module evaluation kit. The following table describes the pinout of the X52 connector.

Pin	Signal	Pin	Signal
1	I2CLK	2	I2DAT
3	PWRBTN#_EXT	4	BATLOW#
5	PS_ON#	6	*SUS_S45# (see note below)
7	VCC	8	5V_SB
9	SUS_STAT#	10	GND

SBM (X52)



Connector Type

X52: 10 pin, 2 row 2.54 mm grid female

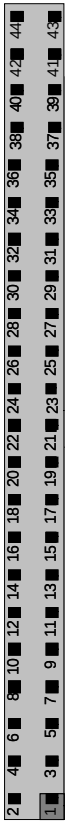
Note

Signal SUS_S45# is a logical ANDing of both signals SUS_S4# and SUS_S5#.

6.7 Feature Connector

Pin	Signal	Description	Pin	Signal	Description
1	+5V (750 mA fuse)		2	5V_SB (750 mA fuse)	
3	330R PU to +5V (for LED anode)		4	Hard Disk Activity	Shows activity on hard disk interface
5	I2DAT	General purpose I²C port data I/O line.	6	SMBCLK_SB	System Management Bus bidirectional clock line.
7	I2CLK	General purpose I²C port clock output.	8	SMBDATA_SB	System Management Bus bidirectional data line.
9	Internal use		10	GPO0	
11	Internal use		12	GPO1	
13	PS_ON#	Power Supply On (active low).	14	GPO2	
15	SUS_S3#	Indicates system is in Suspend to RAM state. Active low output.	16	GPO3	
17	GND	Power Ground	18	GND	Power Ground
19	THRMTRIP#	Active low output indicating that the CPU has entered thermal shutdown.	20	SMBALERT#	System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system.
21	GPI1		22	SUS_S4#	Indicates systems is in Suspend to Disk state. Active low output.
23	SUS_STAT#	Indicates imminent suspend operation; used to notify LPC devices.	24	GPI0	
25	GPI2		26	SUS_S5#	Indicates systems is in Soft Off state.
27	WDTRIG		28	THRM#	Input from off-module temp sensor indicating an over-temp situation.
29	GPI3		30	LID#	Module input signal, generation a LID close or open event
31	BATLOW#	Indicates that external battery is low.	32	WAKE1#	General purpose wake up signal. May be used to implement wake-up on PS2 keyboard or mouse activity.
33	TPM_PP	Physical presence pin, indication signal to TPM chip	34	PEG_LANE_RV#	PCI Express Graphics lane reversal input strap.
35	SLEEP#	Sleep signal, to bring system to a predefined sleep state	36	SYS_RESET#	Reset Button Input. Active low input. System is held in hardware reset while this input is low and comes out of reset upon release.
37	GND	Power Ground	38	GND	Power Ground

Feature (X53)



39	PWBTN#	Power Button to bring system out of S5 (soft off), active on rising edge.	40	PWR_OK	Power OK from main power supply. A high value indicates that the power is good. For additional information refer to PWRGOOD Config connector X11.
41	SER0_TX	Serial Port 0 Transmit Line of COM Express Module	42	SER1_TX	Serial Port 1 Transmit Line of COM Express Module
43	SER0_RX	Serial Port 0 Receive Line of COM Express Module	44	SER1_RX	Serial Port 1 Receive Line of COM Express Module

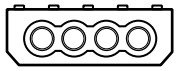
Connector Type

X53: 44 pin, 2 row 2.54 mm grid female

6.8 Disk Drive Power Connector

When powering a system with a single voltage source, it's very helpful to be able to reuse the onboard generated voltages to power peripherals such as hard disks or optical drives. The Disk Drive Power Connector X72 provides the ability to do this. Simply connect a standard extension cable from conga-TEVAL to your hard drive/optical drive. Do not connect more than one peripheral device to X72.

X72 - Disk Drive Connector



Caution

The 12V supply on connector X72 is directly connected to M23. Over-voltage can damage the conga-TEVAL or the connected peripheral.

Connector Type

X72: 4 pin, 5.08mm pitch female connector

6.9 Programming Header - Internal Use Only

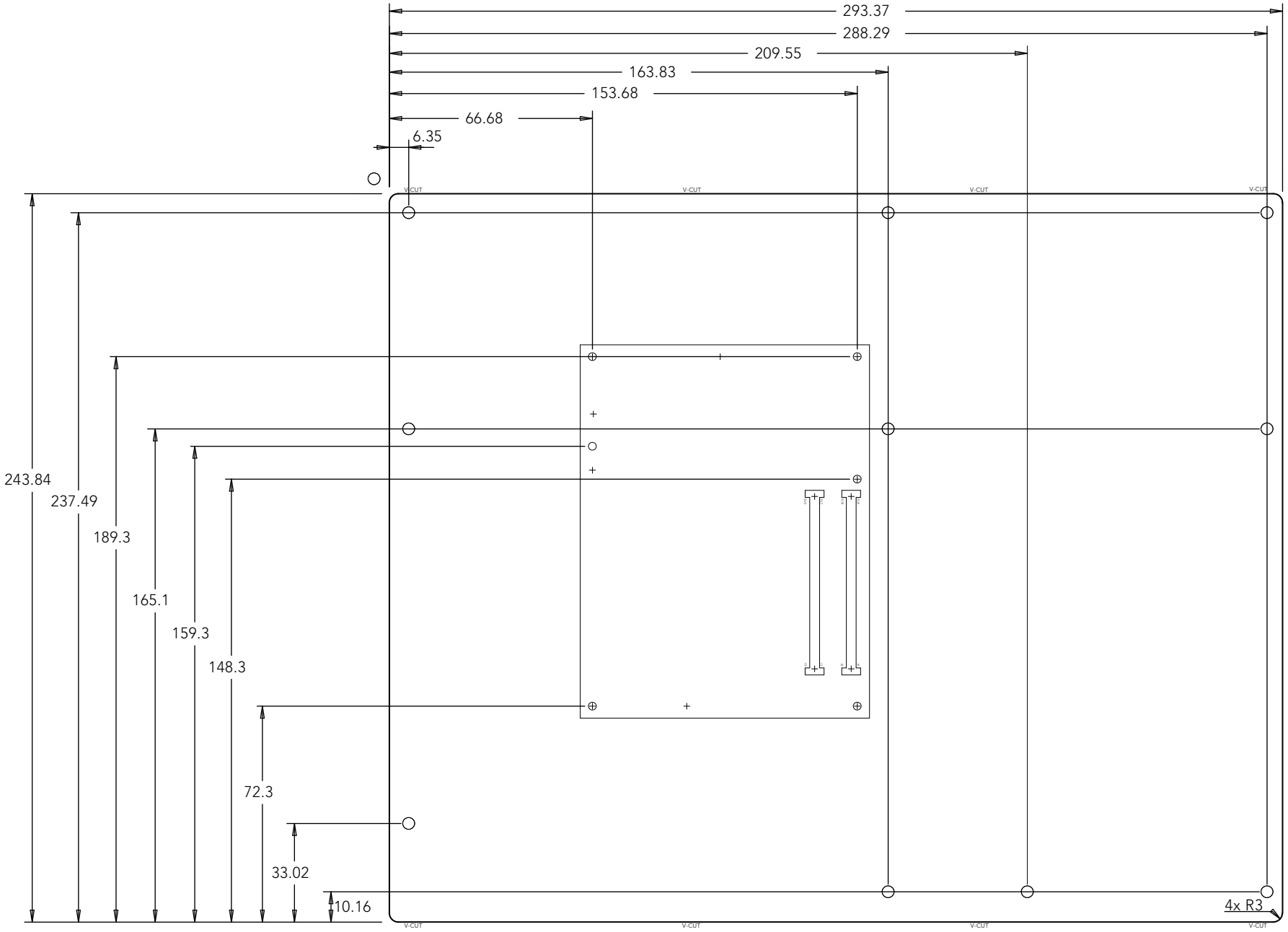
Connector X64 is used for programming the CPLD. This connector is designated for internal use only.

X64

Connector Type

X64: 2.54mm pitch, 1x7 pin header

7 Mechanical Dimensions



8 Industry Specifications

The list below provides links to industry specifications that should be used as reference material when designing a COM Express™ carrier board.

Specification	Link
PICMG® COM Express Module™ Base Specification	http://www.picmg.org/
PCI Express Base Specification	http://www.pcisig.com/specifications
Universal Serial Bus (USB) Specification	http://www.usb.org/home
Serial ATA Specification	http://www.serialata.org
Low Pin Count Interface Specification (LPC)	http://developer.intel.com/design/chipsets/industry/lpc.htm
High Definition Audio Specification	http://www.intel.com/content/www/us/en/standards/high-definition-audio-specification.html
LVDS Owner's Manual	http://www.ti.com/lit/ml/snla187/snla187.pdf
Extended Display Identification Data Standard (EDID™)	http://www.vesa.org
Enhanced Display Data Channel Specification (DDC)	http://www.vesa.org
IEEE standard 802.3ab 1000BASE T Ethernet	http://www.ieee.org/portal/site
Advanced Configuration and Power Interface Specification	http://www.acpi.info/