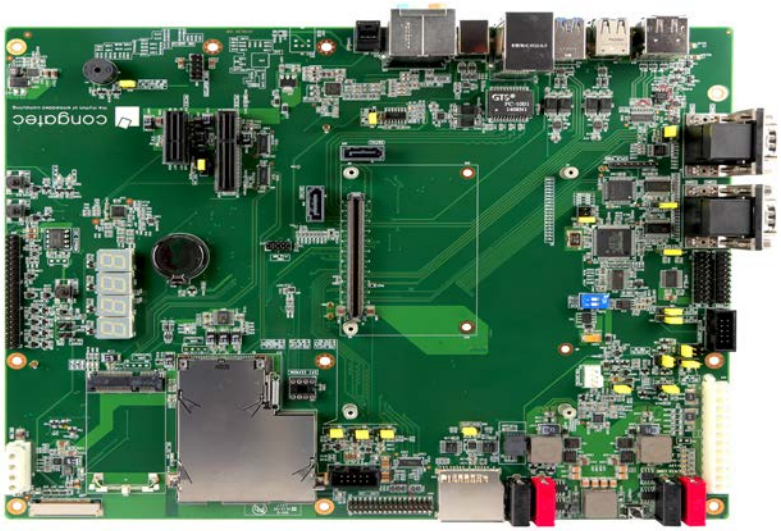
# COM Express™ conga-MEVAL



Detailed description of the congatec COM Express™ Type 10 evaluation carrier board

***User's Guide***

Revision 1.3

congatec

# Revision History

| Revision | Date (yyyy-mm-dd) | Author | Changes |
|---|---|---|---|
| 1.0 | 2014-10-03 | AEM | • Official release. |
| 1.1 | 2016-03-30 | AEM | • Corrected DIP M13 table in section 5.2.5 "SPI Flash".<br>• Updated the whole document. |
| 1.2 | 2019-04-11 | AEM | • Updated the information about handling electrostatic sensitive devices in preface section<br>• Added note about clock buffer influencing signal integrity in section 5.2.11 "PCI Express Connectors" |
| 1.3 | 2021-08-02 | AEM | • Added Software License Information<br>• Changed congatec AG to congatec GmbH<br>• Corrected the storage temperature in section 4.2 "Environmental Specifications"<br>• Deleted section 8 "Industry Specifications" |

# Preface

This user's guide provides information about the components, features and connectors available on the congatec COM Express™ Type 10 evaluation carrier board.

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**Caution**

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**Note**

Notes call attention to important information that should be observed.

**Connector Type**

Describes the connector that must be used with the conga-MEVAL 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 conga-MEVAL connector layout diagram.

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# Terminology

| Term | Description |
|---|---|
| GB | Gigabyte (1,073,741,824 bytes) |
| GHz | Gigahertz (one billion hertz) |
| kB | Kilobyte (1024 bytes) |
| MB | Megabyte (1,048,576 bytes) |
| Mbit | Megabit (1,048,576 bits) |
| kHz | Kilohertz (one thousand hertz) |
| MHz | Megahertz (one million hertz) |
| I²C Bus | Inter-Integrated Circuit Bus |
| PCIe | PCI Express |
| SATA | Serial ATA |
| DDC | Display Data Channel |
| SPI Bus | Serial Peripheral Bus |
| LVDS | Low-Voltage Differential Signaling |
| Gbe | Gigabit Ethernet |
| eMMC | Embedded Multi-media Controller |
| SM Bus | System Management Bus |
| LPC | Low Pin-Count Interface |
| HDA | High Definition Audio |
| cBC | congatec Board Controller |
| I/F | Interface |
| N.C. | Not connected |
| N.A. | Not available |
| TBD | To be determined |

# Contents

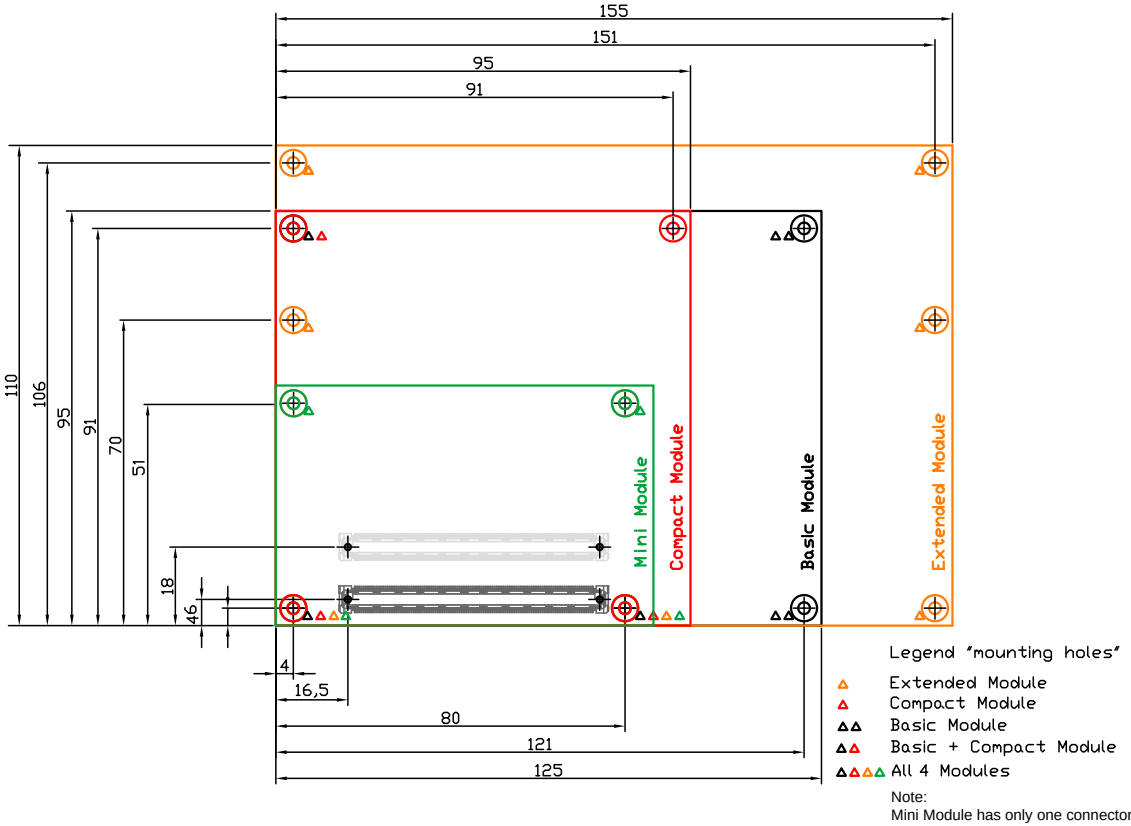
# 1 COM Express™ Specification Overview

## 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. COM Express™ modules are available in following form factors:

- Mini 84mm x 55mm
- Compact 95mm x 95mm
- Basic 125mm x 95mm
- Extended 155mm x110mm

**Compact, Basic and Extended Form Factor**



The COM (computer on module) integrates all the core components and is mounted onto an application specific carrier board. COM modules are legacy-free design (no Super I/O, PS/2 keyboard and mouse) and provide 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. The Type 10 pinout provides the ability to offer PCI Express, Serial ATA, and LPC options thereby expanding the range of potential peripherals. The robust thermal and mechanical concept, combined with extended power-management capabilities, is perfectly suited for all applications.

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 Module Types Overview

The COM Express™ specification 2.1 defines seven different pinout types.

**COM Express™ Specification 2.1 Pinout Types Definitions**

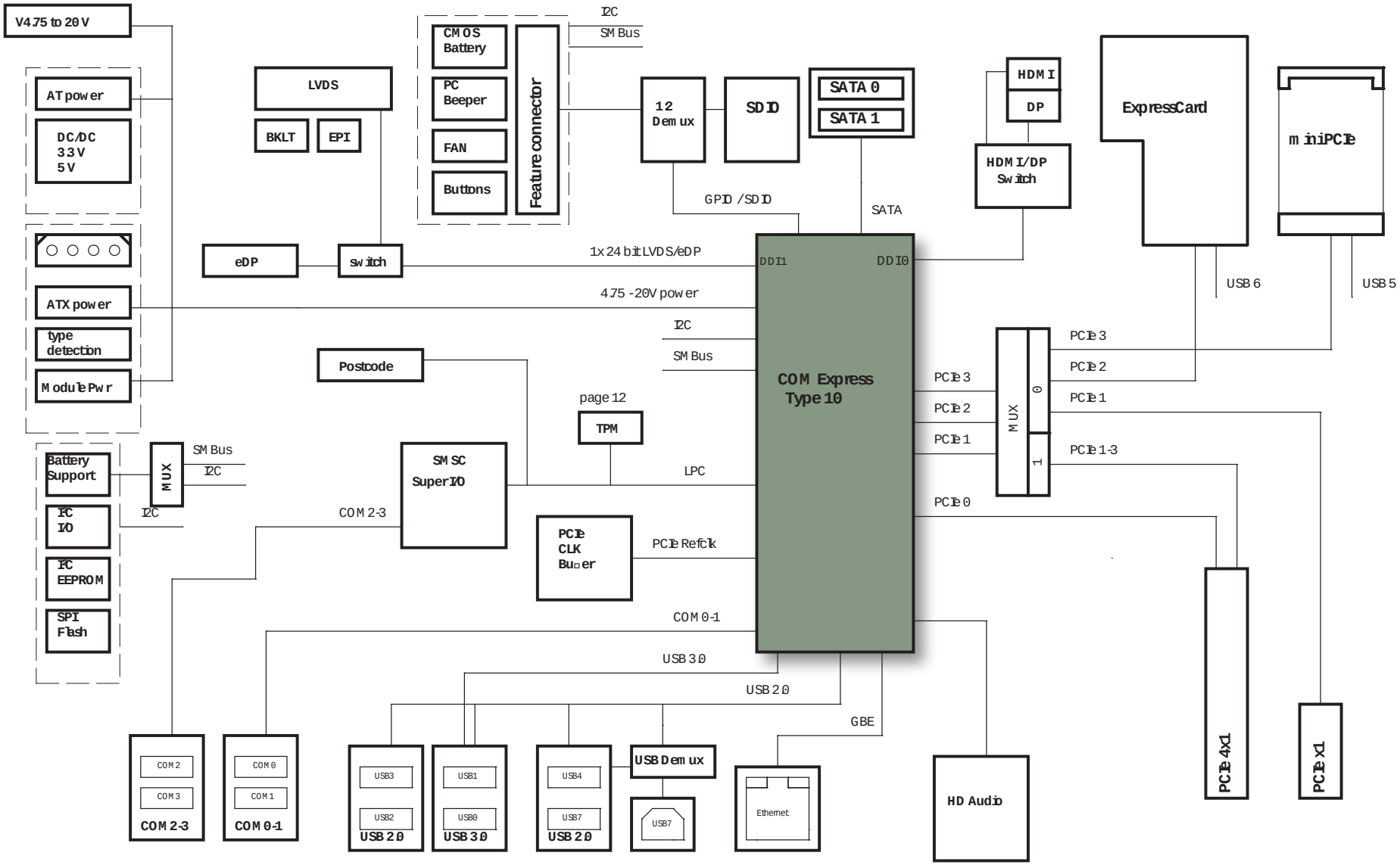
| Types | Connector Rows | PCI Express Lanes | PEG/ SDVO | PCI | IDE Ports | SATA Ports | LAN Ports | USB 2.0/ SuperSpeed USB | Display Interfaces |
|---|---|---|---|---|---|---|---|---|---|
| Type 1 | A-B | Up to 6 | | | | 4 | 1 | 8/0 | VGA, LVDS |
| Type 2 | A-B C-D | Up to 22 | 1/2 | 32 bit | 1 | 4 | 1 | 8/0 | VGA, LVDS, PEG/SDVO |
| Type 3 | A-B C-D | Up to 22 | 1/2 | 32 bit | | 4 | 3 | 8/0 | VGA, LVDS, PEG/SDVO |
| Type 4 | A-B C-D | Up to 32 | 1/2 | | 1 | 4 | 1 | 8/0 | VGA, LVDS, PEG/SDVO |
| Type 5 | A-B C-D | Up to 32 | 1/2 | | | 4 | 3 | 8/0 | VGA, LVDS, PEG/SDVO |
| Type 6 | A-B C-D | Up to 24 | 1/- | | | 4 | 1 | 8/4 | 3xDDI, PEG, VGA, LVDS/eDP |
| Type 10 | A-B | Up to 4 | -/1 | | | 2 | 1 | 8/0 | 1xDDI, LVDS/eDP |

The conga-MEVAL evaluation board uses the Type 10 pinout definition. The Type 10 pinout features the following:

- Single 220 pin connector (A-B)
- Up to 8 USB 2.0 ports
- Up to 2 USB 3.0 ports

- Up to 2 Serial ATA
- Up to 4 PCI Express lanes (Gen1/Gen2)
- Support pins for up to 2 ExpressCards
- Single 24-bit LVDS channels with option to overlay with eDP
- 1 DDI interface
- HDA/AC ‘97 digital audio interface
- Gigabit Ethernet
- LPC interface
- 2 TX/RX serial pairs
- SPI
- Fan control
- TPM support
- 8 GPIO pins or 4 bit SDIO card interface

# 2 Block Diagram

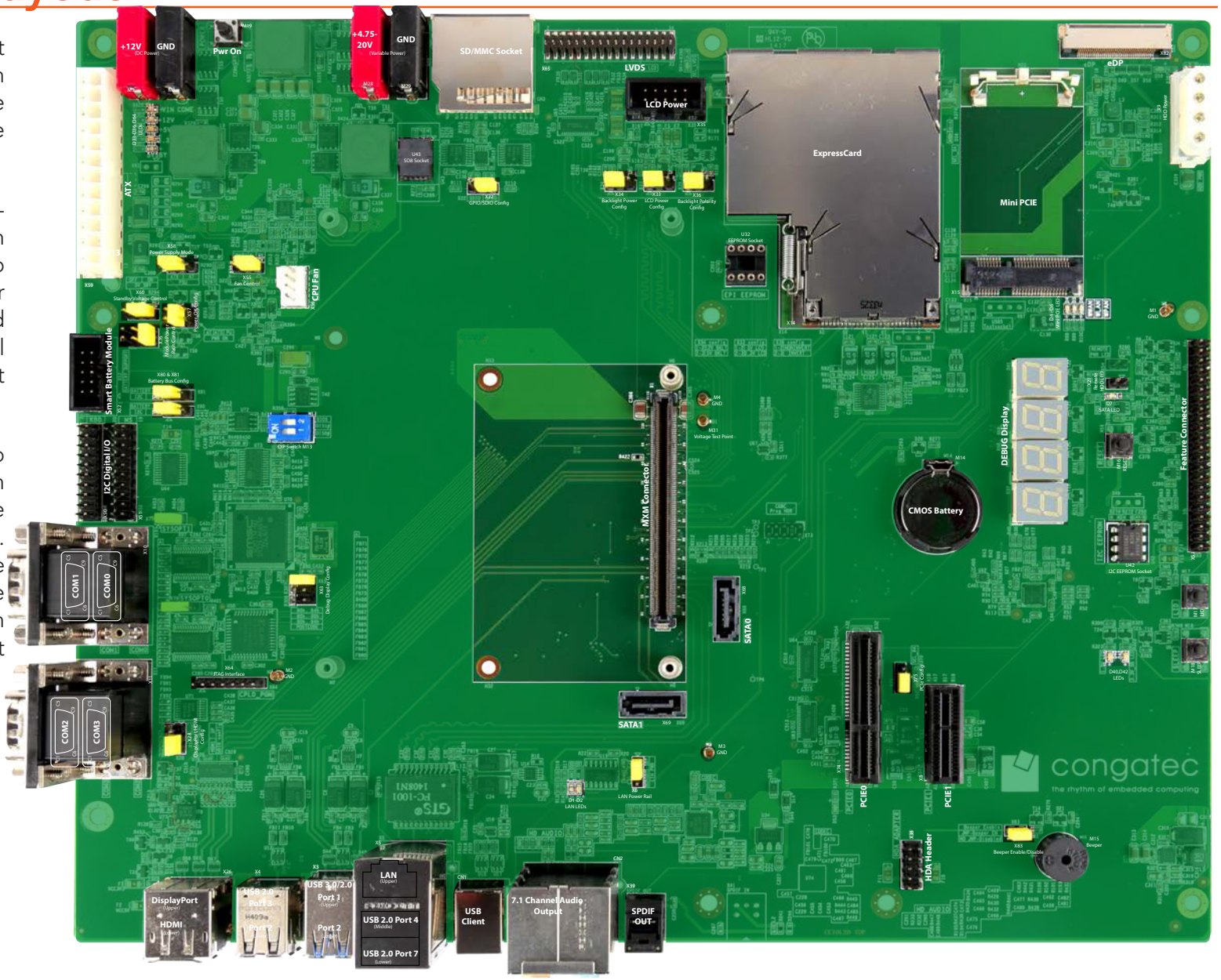


# 3 Connector Layout

The connector layout picture shows each connector and its name designator. Jumpers 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 that 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.



# 4 Specifications

## 4.1 Mechanical Dimensions

- 294 mm x 244 mm
- Height approximately 43 mm (top side)

## 4.2 Environmental Specifications

| | | |
|---|---|---|
| Temperature | Operation: -40° to +85°C | Storage: -40° to +85°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 carrier board's surface.*

*Humidity specifications are for non-condensing conditions.*

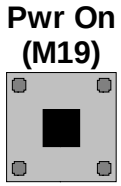
## 4.3 Power Supply

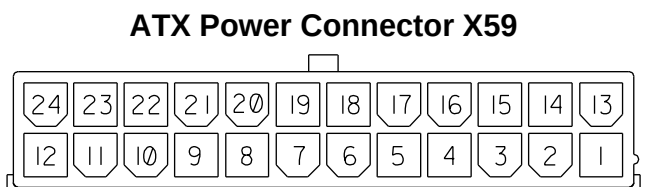
You can power the conga-MEVAL with a standard 24 pin ATX power supply (Connector X59), a 12V DC power supply (connector M22 and M23) or a variable input power supply (connector M29 and M30)

### 4.3.1 AT/ATX Power Supply

When the conga-MEVAL is powered with 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 starts after the power switch on the power supply is turned on. To run the ATX power supply in AT mode, set Jumper X58 to position 2-3.

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

### Connector Type

*X58: 2.54mm grid jumper*

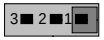
*X5: 24-pin ATX 2.0 power connector*

When using an ATX power supply, the +3.3V and +5V used by some devices on the COM Express™ evaluation carrier board are 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 3.3 V and 5 V. The -5 V power output of the ATX power supply is not used.

With jumper X60, you can disconnect the 5V standby voltage from the whole system.

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

**Standby Voltage Control**
**Jumper X60**




### Connector Type

*X60: 2.54mm grid jumper*

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

The following table lists the pinout for 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. | Not Connected |
| 9 | 5V_SB | Standby Power Supply +5VDC | 21 | +5V | Power Supply +5VDC |

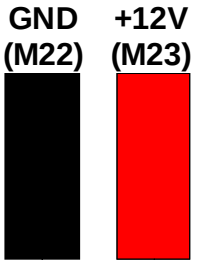
| | | | | | |
|---|---|---|---|---|---|
| 10 | +12V | Power Supply +12VDC | 22 | +5V | Power Supply +5VDC |
| 11 | +12V | Power Supply +12VDC | 23 | +5V | Power Supply +5VDC |
| 12 | +3.3V | Power Supply +3.3VDC | 24 | GND | Power Ground |

**Note**

*Do not use both the 12V DC and the ATX power supplies at the same time*

### 4.3.2 DC Power Supply

The conga-MEVAL can also be powered with a 12V DC power supply (connector M22 and M23).



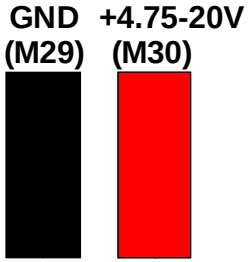

| Connector | Configuration |
|---|---|
| M22 | Ground |
| M23 | +12VDC (11,4 – 12,6V) |

**Connector Type**

*4mm diameter plug*

### 4.3.3 Variable Power Input

The conga_MEVAL is capable of supplying separate variable power to the module. The input voltage varies between +4.75V and 20V.




| Connector | Configuration |
|---|---|
| M29 | Ground |
| M30 | +4.75 - 20V |

**Connector Type**

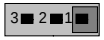
*4mm diameter plug*

With Jumper X76, you can select the input voltage of the COM Express module. Set the jumper to position 1-2 to run the COM Express module on 12V supply from the carrier board. Set the jumper to position 2-3 to run the COM Express module on the variable voltage from connectors M29 and M30. Module standby voltage if available is supplied by conga-MEVAL.

| Jumper X76 | Configuration |
|---|---|
| 1-2 | Force COM Express module to run on the on-carrier 12V supply (Default) |
| 2-3 | Force COM Express module to run on external 4.75 - 20 V supply |

**Module Power Path Control**

**Jumper X76**




**Connector Type**

*X76: 2.54mm grid jumper*

**Note**

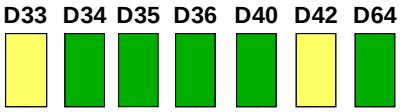
*With variable power input, you can easily measure the module power. To enable variable voltage power to the module, the conga-MEVAL power must be on.*

### 4.3.4 Status LEDs

The status LEDs indicate the different power states of the conga-MEVAL. Refer to the following table for detailed information:

D33= standby 5V, D34= 12 V, D35= 5V, D36= 3.3V, D40= 1.5V, D42= 3.3V Standby, D64 =Vin_CA

| LEDs | Power state |
|---|---|
| All Off | No power applied. |
| D33 and D42 | The yellow LEDs D33 and D42 indicate that the ATX power supply is mechanically switched on.<br>D33 indicates that 5V standby power is applied to the conga-MEVAL.<br>D42 indicates that 3.3V standby power is applied to the conga-MEVAL |
| D34, D35, D36, D40 | D34 indicates that 12V is present.<br>D35 indicates that 5V is present<br>D36 indicates that 3.3V is present<br>D40 indicates that 1.5V is present |
| D42 | D42 indicates that onboard 3.3V standby is present. |
| D64 | Indicates that power is delivered to the COM Express module |
| All On | ATX power supply is running and 1.5V, 3.3V, 3.3V Standby, 5V, 5V Standby and 12V are present. |

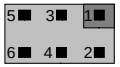


## 4.3.5 PWR_OK Signal

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 | PWR_OK of ATX power supply. (default) |
| 5 - 6 | PWR_OK of onboard DC/DC regulator (only in single 12V mode) |

**PWR_OK Config. (X57)**




**Connector Type**

*X57: 2.54mm grid jumper*

## 4.3.6 Power-Up Control

The Power-up control switches 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. The COM Express™ module is can support Suspend to RAM (S3) when SUS_S3#' signal is used.

When the system goes to Suspend to RAM (S3) or Soft Off (S5), the chipset of the module asserts the 'SUS_S3#' signal. 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 transitions the system to Full On (S0).

## 4.3.7 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 (N.C.), 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 | Pin TYPE0# | Pin TYPE1# | Pin TYPE2# | Pin TYPE1 # | Comment |
|---|---|---|---|---|---|
| Module Type 1 | X (don't care) | X (don't care) | X (don't care) | 12V / N.C. | 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 | N.C. | N.C. | N.C. | 12V / N.C. | COM.0 Rev 1.0 / 2.0 |
| Module Type 3 | N.C. | N.C. | GND | 12V / N.C. | COM.0 Rev 1.0 / 2.0 |
| Module Type 4 | N.C. | GND | N.C. | 12V / N.C. | COM.0 Rev 1.0 / 2.0 |

| | | | | | |
|---|---|---|---|---|---|
| Module Type 5 | N.C. | GND | GND | 12V / N.C. | COM.0 Rev 1.0 / 2.0 |
| Module Type 6 | GND | N.C. | N.C. | N.C. | COM.0 Rev 2.0 |

**Note**

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

## 4.4 CMOS Battery

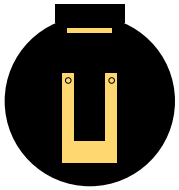
The conga-MEVAL includes a battery that supplies the RTC and CMOS memory of the COM Express™ CPU module. The battery needs to provide a 3V of power. The specified battery type is BR2032.

**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.*

*To fulfill the requirements of the EN60950, the conga-MEVAL incorporates two current-limiting devices (resistor and diode) in the battery power supply path.*

**CMOS Battery Holder (M14)**



# 5 Connector Descriptions

## 5.1 Connector Pinout Rows A and B

Module Type 10 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 | RSVD | B56 | RSVD |
| 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 | eDP_TX2+/LVDS_A0+ | B71 | DDI0_PAIR0+ |
| A17 | SATA0_TX- | B17 | SATA1_TX- | A72 | eDP_TX2-/LVDS_A0- | B72 | DDI0_PAIR0- |
| A18 | SUS_S4# | B18 | SUS_STAT# | A73 | eDP_TX1+/LVDS_A1+ | B73 | DDI0_PAIR1+ |
| A19 | SATA0_RX+ | B19 | SATA1_RX+ | A74 | eDP_TX1-/LVDS_A1- | B74 | DDI0_PAIR1- |
| A20 | SATA0_RX- | B20 | SATA1_RX- | A75 | eDP_TX0+/LVDS_A2+ | B75 | DDI0_PAIR2+ |
| A21 | GND(FIXED) | B21 | GND(FIXED) | A76 | eDP_TX0-/LVDS_A2- | B76 | DDI0_PAIR2- |
| A22 | USB_SSRX0- | B22 | USB_SSTX0- | A77 | eDP/LVDS_VDD_EN | B77 | DDI0_PAIR4+ (*) |
| A23 | USB_SSRX0+ | B23 | USB_SSTX0+ | A78 | LVDS_A3+ | B78 | DDI0_PAIR4- (*) |
| A24 | SUS_S5# | B24 | PWR_OK | A79 | LVDS_A3- | B79 | eDP/LVDS_BKLT_EN |
| A25 | USB_SSRX1- | B25 | USB_SSTX1- | A80 | GND(FIXED) | B80 | GND(FIXED) |
| A26 | USB_SSRX1+ | B26 | USB_SSTX1+ | A81 | eDP_TX3+/LVDS_A_CK+ | B81 | DDI0_PAIR3+ |

| Pin | Row A | Pin | Row B | Pin | Row A | Pin | Row B |
|---|---|---|---|---|---|---|---|
| A27 | BATLOW# | B27 | WDT | A82 | eDP_TX3-/LVDS_A_CK- | B82 | DDI0_PAIR3- |
| A28 | (S)ATA_ACT# | B28 | AC/HDA_SDIN2 (*) | A83 | eDP_AUX+/LVDS_I2C_CK | B83 | eDP/LVDS_BKLT_CTRL |
| A29 | AC/HDA_SYNC | B29 | AC/HDA_SDIN1 (*) | A84 | eDP_AUX-/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 | eDP_HPD | 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 | DD0_HPD |
| A35 | THRMTRIP# | B35 | THRM# | A90 | GND(FIXED) | B90 | GND(FIXED) |
| A36 | USB6- | B36 | USB7- | A91 | SPI_POWER | B91 | DDI0_PAIR5+ (*) |
| A37 | USB6+ | B37 | USB7+ | A92 | SPI_MISO | B92 | DDI0_PAIR5- (*) |
| A38 | USB_6_7_OC# | B38 | USB_4_5_OC# | A93 | GPO0 | B93 | DDI0_PAIR6+ (*) |
| A39 | USB4- | B39 | USB5- | A94 | SPI_CLK | B94 | DDI0_PAIR6- (*) |
| A40 | USB4+ | B40 | USB5+ | A95 | SPI_MOSI | B95 | DDI0_DDC_AUX_SEL |
| A41 | GND(FIXED) | B41 | GND(FIXED) | A96 | TPM_PP | B96 | RSVD |
| A42 | USB2- | B42 | USB3- | A97 | TYPE10# | B97 | SPI_CS# |
| A43 | USB2+ | B43 | USB3+ | A98 | SER0_TX | B98 | DDI0_CTRLCLK_AUX+ |
| A44 | USB_2_3_OC# | B44 | USB_0_1_OC# | A99 | SER0_RX | B99 | DDI0_CTRLDATA_AUX- |
| 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 | RSVD | B52 | RSVD | A107 | VCC_12V | B107 | VCC_12V |
| A53 | RSVD | B53 | RSVD | A108 | VCC_12V | B108 | VCC_12V |
| A54 | GPI0 | B54 | GPO1 | A109 | VCC_12V | B109 | VCC_12V |
| A55 | RSVD | B55 | RSVD | A110 | GND(FIXED) | B110 | GND(FIXED) |

## 5.2 COM Express™ Connector Rows A&B

### 5.2.1 SM Bus

The SM Bus signals are available on the feature connector (X53) described in section 6.9 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-MEVAL (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-MEVAL is separated by a FET switch from the SMB of the module.

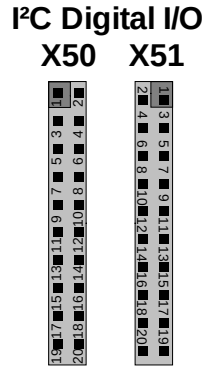
### 5.2.2 I²C Bus

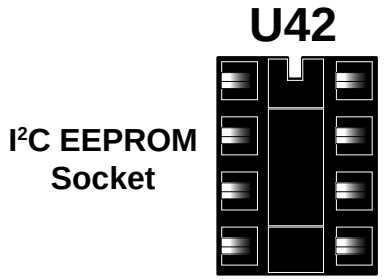
The I²C signals are available in different locations on the conga-MEVAL including the feature connector (X53) described in section 6.9 of this document.

The conga-MEVAL 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-MEVAL 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 general 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.

Contact the congatec AG support team for more information.



## 5.2.3 AC'97/HDA Audio

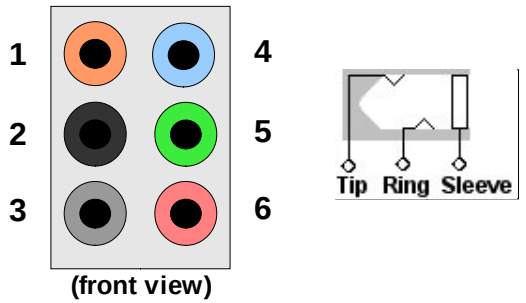
COM Express™ modules can support up to 3 audio codecs in parallel. The onboard audio codec is connected to AC_SDIN0. AC_SDIN2 is available at the HDA header (X38).

The conga-MEVAL has a HDA audio codec (Cirrus CS4207) 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 at www.congatec.com in the 'Products' section under 'Accessories'.

### Connector CN2 Pinout

| Stereo Jack 1 | Signal | Stereo Jack 4 | Signal |
|---|---|---|---|
| Tip | Microphone Input 1 with Power (Left) | Tip | Line Input 1 Left |
| Ring | Microphone Bias Voltage | Ring | Line Input 1 Right |
| Sleeve | Analog Ground | Sleeve | Analog Ground |
| Stereo Jack 2 | Signal | Stereo Jack 5 | Signal |
| Tip | Line Output 2 Left | Tip | Line Output 1 Left |
| Ring | Line Output 2 Right | Ring | Line Output 1 Right |
| Sleeve | Analog Ground | Sleeve | Analog Ground |
| Stereo Jack 3 | Signal | Stereo Jack 6 | Stereo Mode |
| Tip | Headphone Output Left | Tip | Microphone Input 1 Left |
| Ring | Headphone Output Right | Ring | Microphone Input 1 Right |
| Sleeve | Analog Ground | Sleeve | Analog Ground |

**Audio (CN2)**




**Connector Type**

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

With connector X39, you can connect the conga-MEVAL to an audio system that has an optical S/PDIF interface.

**Connector Type**

*X39: S/PDIF optical audio output*

**S/PDIF OUT (X39)**

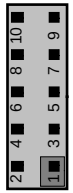
### 5.2.3.1 HDA Header

The conga-MEVAL provides an HDA header (X38) for connecting AC'97/HDA modules. By attaching a module to this connector, the onboard codec switches off and the connected application begins operation.

Connector X38 Pinout

| 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 | N.C. | Not Connected |
| 9 | GND | Power Ground | 10 | GND | Power Ground |

**HDA Header (X38)**




**Connector Type**

*X38: 10 pin, 2 row 2.54mm grid female*

## 5.2.4 LPC Super I/O Device

The conga-MEVAL integrates a Super I/O controller that provides fully featured serial ports. The controller (SMSC SCH3114) is connected to the LPC Bus of the COM Express™ module. The COM Express module must however support these additional features in order for them to function. Refer to the module's user's guide for information about supported features.

The conga-MEVAL also supports a TPM module (Atmel AT97SC3204) on the LPC bus.

### 5.2.4.1 COM Ports

The conga-MEVAL offers four serial ports via connector X10 (COM 0-1) and connector X11 (COM 2-3). The COM ports on connector X10 are fully featured COM ports (with control signals) and are routed from the Super I/O on the carrier board. The COM ports on connector X11 are partially featured COM ports (without control signals) and are routed from the COM Express module.

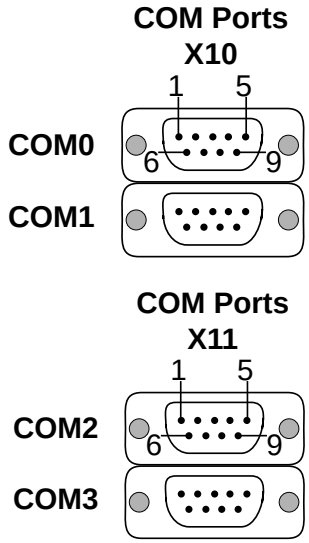
The pinouts of the serial ports are shown below:

Connector X10

| Pin | COM1 | Pin | COM0 |
|---|---|---|---|
| 1 | DCD# | 1 | DCD# |
| 2 | RXD | 2 | RXD |
| 3 | TXD | 3 | TXD |
| 4 | DTR# | 4 | DTR# |
| 5 | GND | 5 | GND |
| 6 | DSR# | 6 | DSR# |
| 7 | RTS# | 7 | RTS# |
| 8 | CTS# | 8 | CTS# |
| 9 | RI# | 9 | RI# |

Connector X11

| Pin | COM3 | Pin | COM2 |
|---|---|---|---|
| 1 | NC | 1 | NC |
| 2 | RXD | 2 | RXD |
| 3 | TXD | 3 | TXD |
| 4 | NC | 4 | NC |
| 5 | GND | 5 | GND |
| 6 | NC | 6 | NC |
| 7 | NC | 7 | NC |
| 8 | NC | 8 | NC |
| 9 | NC | 9 | NC |



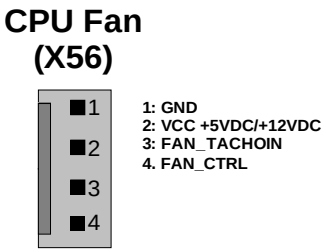

**Connector Type**

*X10, X11: 2x 9 pin D-SUB female*

### 5.2.4.2 Fan Control

The 4-pin fan connector (X56) on the conga-MEVAL provides users with the ability to connect cooling fan for the module. With Jumper X55, you can set the supply voltage of the attached cooling fan to 5V or 12V.

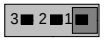
| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | +VDD (12V*/5V) |
| 3 | Sense |
| 4 | PWM |



Jumper 55 auxiliary fan voltage configuration.

| Jumper X55 | Configuration |
|---|---|
| 1-2 | 12 V supply voltage for CPU fan (default) |
| 2-3 | 5 V supply voltage for CPU fan |

**Jumper X55**




**Connector Type**

*X56: 2.54mm Standard 4-pin Fan Housing.*

*X55: 2.54mm grid jumper*

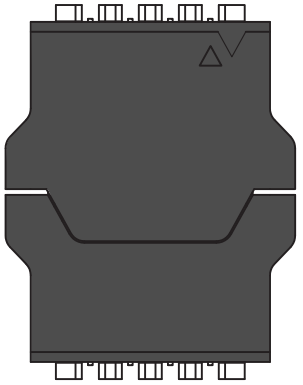
## 5.2.5 SPI Flash

On the conga-MEVAL, you can boot the COM Express™ CPU module with an external BIOS instead of the module's onboard BIOS. This can be useful when the user plans to evaluate a customized BIOS.

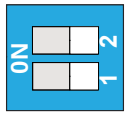
Located on the conga-MEVAL is an 8-pin SOIC8 socket for SPI flash (socket U43). With DIP Switch M13, you can select whether to boot from the attached module's SPI flash or from the carrier board's SPI flash. The table below shows the different M13 DIP switch settings that are necessary to either boot from the off-board SPI flash on the conga-MEVAL or from the onboard flash on the COM Express™ CPU module. An example of an SPI flash is the Winbond W25Q64FVSSIG

| Dip Switch M13 | | Configuration |
|---|---|---|
| SW 1 | SW 2 | |
| OFF | OFF | Boot from on-module firmware (default) |
| OFF | ON | Boot from carrier board SPI firmware |
| ON | OFF | Boot from carrier board LPC firmware (not supported) |
| ON | ON | Boot from on-module firmware, but load management data from carrier board SPI |

**SO8W Socket (U43)**



**M13**




**Connector Type**

*M13: DIP Switch*

## 5.2.6 Universal Serial Bus (USB)

The conga-MEVAL supports up to 8 USB ports on the COM Express connector. Six of these ports (ports 0-4 and port 7) are routed to onboard USB connectors while ports 5 and 6 are routed to mini PCIe and ExpressCard connectors respectively. The USB port 7 shares its signals with a USB Client (Type B port) found on connector CN1 via a demultiplexer.

The conga-MEVAL has seven USB connectors onboard - six Type A connectors (4x USB 2.0 and 2x USB 3.0) and one Type B connector (1x USB 2.0). The Type B connector (CN1) shares its signals with USB port 7 of connector X5.

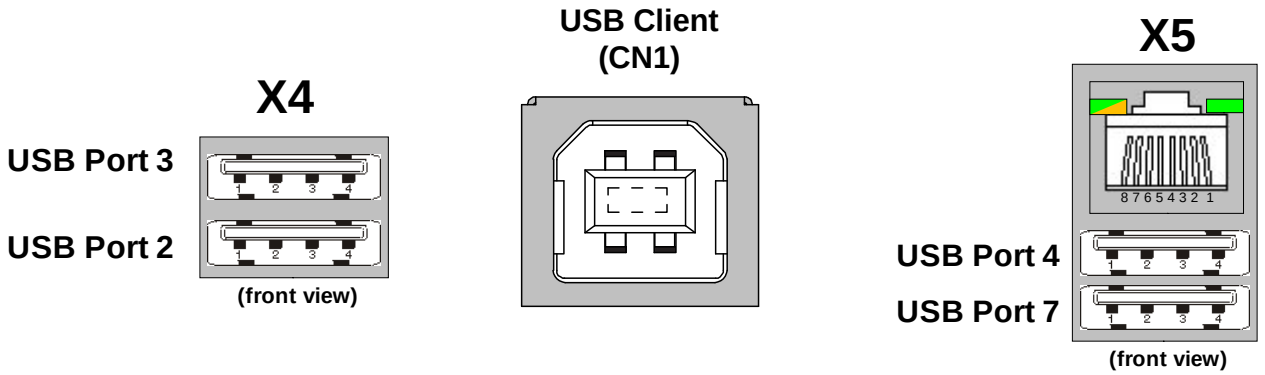
### 5.2.6.1 USB 2.0 Ports

The conga-MEVAL provides five USB 2.0 connectors onboard- four Type A connectors and one Type B connector. The Type A connectors are X4 (port 2-3) and X5 (port 4 and 7). The Type B connector CN1 (USB Client) shares its signals via a demultiplexer with USB port 7 on connector X5. The demultiplexer automatically routes the USB data signals from USB port 7 to connector CN1 when the conga-MEVAL is connected as a client device to a USB host; otherwise the USB data signals are available at connector X5 (USB port 7).

Ports 4 and 7 on connector X5 are supplied by suspend power and can be used to test “wake up via USB” functionality..

**USB 2.0 Pin Description**

| Pin | Signal |
|---|---|
| 1 | +5V |
| 2 | DATA- |
| 3 | DATA+ |
| 4 | GND |

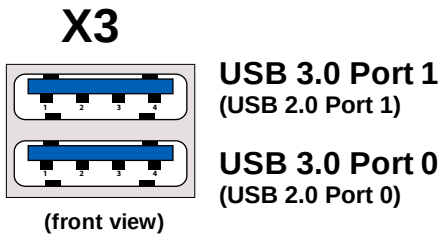


### 5.2.6.2 USB 3.0 Ports

The conga-MEVAL is designed to support up to 2 USB 3.0 ports - the maximum count specified by the COM Express™ specification for Type 10 modules. The two USB 3.0 ports (connector X3) also support USB 2.0 devices

**USB 3.0 Pin Description**

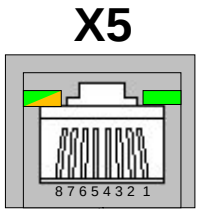
| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | +5V | 5 | USB_SSRX- |
| 2 | DATA- | 6 | USB_SSRX+ |
| 3 | DATA+ | 7 | GND |
| 4 | GND | 8 | USB_SSTX- |
| | | 9 | USB_SSTX+ |



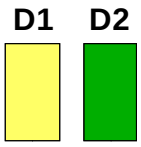

## 5.2.7 LAN 10/100/1000

The conga-MEVAL provides a Gigabit Ethernet port on connector X5. The yellow and green LEDs indicate the Activity and Link Status respectively.

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | MDI0+ | 2 | MDI0- |
| 3 | MDI1+ | 4 | MDI2+ |
| 5 | MDI2- | 6 | MDI1- |
| 7 | MDI3+ | 8 | MDI3- |




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

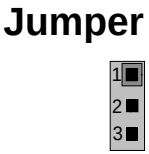



**Connector Type**

*8 pin RJ45 plug*

Jumper X6 sets the Gigabit Ethernet power rail.

| Jumper X6 | Configuration |
|---|---|
| 1-2 | LAN controller is powered from standby voltage (default) |
| 2-3 | LAN controller is powered from main voltage |



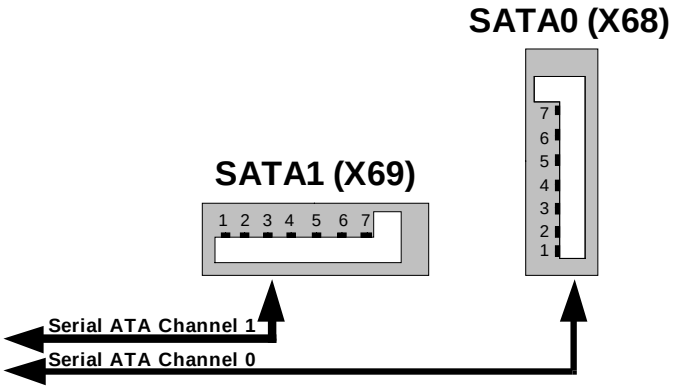

**Connector Type**

*X6: 2.54mm grid jumper*

## 5.2.8 Serial ATA™

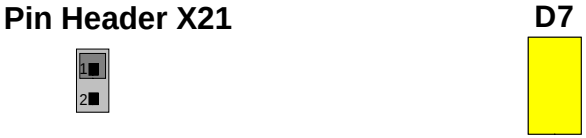
The conga-MEVAL provides two SATA ports on connectors X68 and X69.

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




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

| Pin | Signal |
|---|---|
| 1 | Anode |
| 2 | Cathode |




**Connector Type**

*X21: 2.54mm grid jumper*

## 5.2.9 Digital Display Interface (DDI)

The conga-MEVAL supports one Digital Display Interface (DDI0) on connector X26. This connector has two receptacles - the bottom receptacle for HDMI and the top receptable for DisplayPort. Connector X26 supports either DisplayPort or HDMI but not both at the same time. The connector supports DisplayPort by default. To support HDMI, set Jumper X28 to position "2-3".

Jumper X28 configuration is shown below:

| Jumper X28 | Configuration |
|---|---|
| 1-2 | Select DisplayPort (default) |
| 2-3 | Select HDMI |

**Jumper X28**

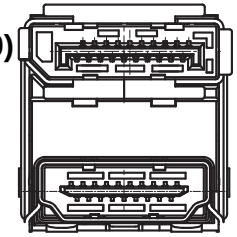

**Connector Type**

*X28: 2.54mm grid jumper*

**X26**

**DisplayPort (DDI0)**

**HDMI (DDI0)**



## 5.2.10 eDP/LVDS

The conga-MEVAL is designed to support eDP or LVDS signals. The eDP/LVDS signals are routed to either eDP connector (X82) or LVDS connectors (X65 and CN6) via a high performance differential switch

### 5.2.10.1 Embedded Display Port (eDP)

The conga-MEVAL provides eDP interface on connector X82 - a standard 40 pin DisplayPort connector. The eDP signals which are overlayed on LVDS channel A of the COM Express connector are routed via a high performance differential switch.

The overlayed signals are switched to eDP when an eDP display is connected to X82. If a module with LVDS interface is attached to conga-MEVAL, the module then overrides the eDP interface by forcing pin A87 low.

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|---|---|
| 1 | N.C. | 11 | GND | 21 | VCC_EDP_FILT | 31 | GND | 43 | GND |
| 2 | GND | 12 | eDP_TX0- | 22 | N.C. | 32 | eDP_LVDS_BKLT_EN | 44 | GND |
| 3 | eDP_TX3- | 13 | eDP_TX0+ | 23 | GND | 33 | eDP_LVDS_BKLT_CTRL | 45 | GND |
| 4 | eDP_TX3+ | 14 | GND | 24 | GND | 34 | N.C. | 46 | GND |
| 5 | GND | 15 | eDP_AUX+ | 25 | GND | 35 | N.C. | 47 | GND |
| 6 | eDP_TX2- | 16 | eDP_AUX- | 26 | GND | 36 | VDD_BKLT | 48 | GND |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7 | eDP_TX2+ | 17 | GND | 27 | eDP_DETECT | 37 | VDD_BKLT | | |
| 8 | GND | 18 | VCC_EDP_FILT | 28 | GND | 38 | VDD_BKLT | | |
| 9 | eDP_TX1- | 19 | VCC_EDP_FILT | 29 | GND | 39 | VDD_BKLT | | |
| 10 | eDP_TX1+ | 20 | VCC_EDP_FILT | 30 | GND | 40 | N.C. | | |

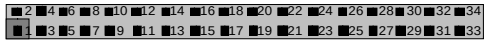
### 5.2.10.2 LVDS Flat Panel Interface

The conga-MEVAL provides two different connectors for LVDS interface - connectors X65 and CN6 (CN6 is located on the bottom side of the conga-MEVAL). The LVDS/eDP signals on the COM Express connector are routed to the LVDS or eDP connector via a high performance differential switch. The switch by default routes the LVDS/eDP signals to the LVDS connectors.

The LVDS interface supports single channel 24 bit LVDS. The pinout descriptions of connectors X65 and CN6 are shown below:

| 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. | Not Connected | 4 | N.C. | Not Connected |
| 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. | Not Connected |
| 15 | LVDS_A_CK- | LVDS Channel A differential clock | 16 | LVDS_A_CK+ | LVDS Channel A differential clock |
| 17 | N.C. | Not Connected | 18 | LVDS_A3+ | LVDS Channel A differential pairs |
| 19 | LVDS_A3- | LVDS Channel A differential pairs | 20 | GND | |
| 21 | N.C. | Not Connected | 22 | N.C. | Not Connected |
| 23 | GND | Power Ground | 24 | N.C. | Not Connected |
| 25 | N.C. | Not Connected | 26 | GND | Power Ground |
| 27 | N.C. | Not Connected | 28 | N.C. | Not Connected |
| 29 | GND | Power Ground | 30 | N.C. | Not Connected |
| 31 | N.C. | Not Connected | 32 | N.C. | Not Connected |
| 33 | N.C. | Not Connected | 34 | N.C. | Not Connected |

**LVDS Connector (Top Side) (X65)**



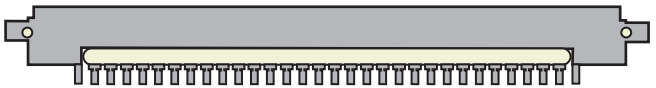

**Connector Type**

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

Connector CN6 Pin Description

| Pin | LVDS Output | Pin | LVDS Output | Pin | LVDS Output | Pin | LVDS Output |
|---|---|---|---|---|---|---|---|
| 1 | GND | 11 | LVDS_A3- | 21 | N.C. | 31 | VDD_LCD |
| 2 | LVDS_A0- | 12 | LVDS_A3+ | 22 | N.C. | 32 | GND |
| 3 | LVDS_A0+ | 13 | N.C. | 23 | N.C. | | |
| 4 | LVDS_A1- | 14 | N.C. | 24 | N.C. | | |
| 5 | LVDS_A1+ | 15 | GND | 25 | GND | | |
| 6 | LVDS_A2- | 16 | N.C. | 26 | LVDS_I2C_DAT | | |
| 7 | LVDS_A2+ | 17 | N.C. | 27 | eDP_LVDS_VDD_EN | | |
| 8 | GND | 18 | GND | 28 | LVDS_I2C_CLK | | |
| 9 | LVDS_A_CLK- | 19 | N.C. | 29 | VDD_LCD | | |
| 10 | LVDS_A_CLK+ | 20 | N.C. | 30 | VDD_LCD | | |

**LVDS Connector (Bottom Side) (CN6)**



### Connector Type

*CN6: JAE FI-X30SSL-HF, 32 pin, single row, 1mm pitch spacing (compatible with JILI30)*

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

| Jumper X36 | Configuration |
|---|---|
| 1-2 | Backlight enable HIGH active (default) |
| 2-3 | Backlight enable LOW active |

**Jumper X36**


### Connector Type

*X36: 2.54mm grid jumper*

### Note

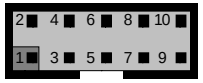
*See section 5.2.10.4 "Flat Panel and Backlight Power Supply Connection" for more information.*

### 5.2.10.3 Flat Panel and Backlight Power Supply

The power supply for flat panels and their backlight inverter is available on connector X35. See section 5.2.10.4 “Flat Panel and Backlight Power Supply Connection” for more information.

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | VDD_LCD (1.5A Fuse) | 2 | VDD_BKLT (2.0A Fuse) |
| 3 | +5V (1.5A Fuse) | 4 | +12V (2.0A Fuse) |
| 5 | LVDS_VDD_EN | 6 | LVDS_BKLT_EN |
| 7 | LVDS_BKLT_VREF | 8 | LVDS_BKLT_CTRL |
| 9 | GND | 10 | GND |

**LCD Power (X35)**

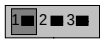



**Connector Type**

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

| Jumper X33 | Configuration |
|---|---|
| 1-2 | 5V LCD supply voltage (default) |
| 2-3 | 3.3V LCD supply voltage |

**Jumper X33**




| Jumper X34 | Configuration |
|---|---|
| 1-2 | 12V backlight voltage (default) |
| 2-3 | 5V backlight voltage |

**Jumper X34**

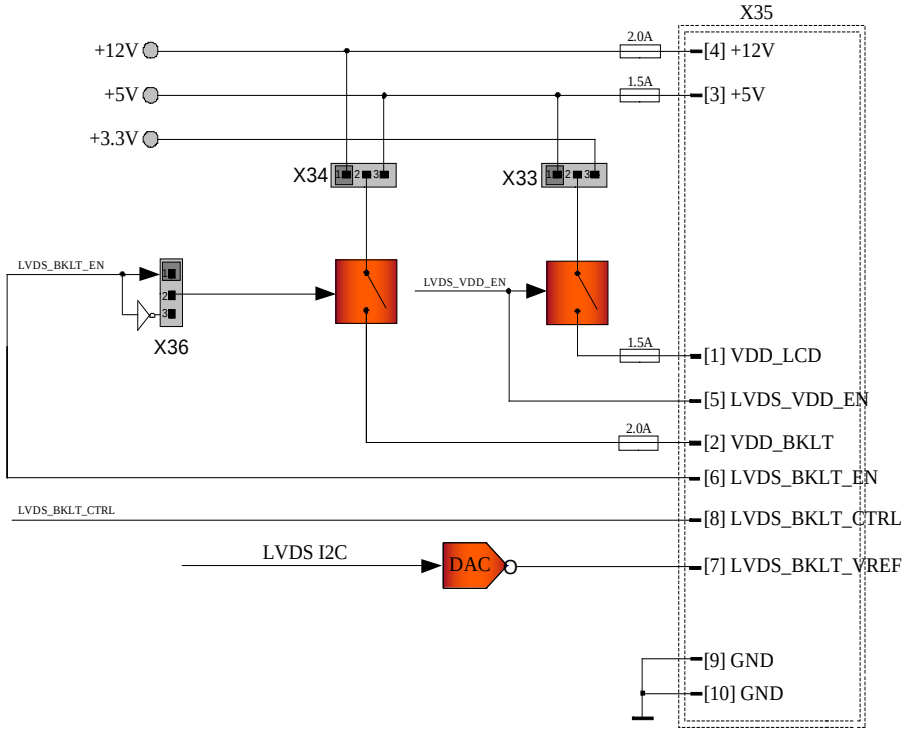

**Connector Type**

*X33, X34: 2.54mm grid jumper*

### 5.2.10.4 Flat Panel and Backlight Power Supply Connection

The following diagram shows a typical connection possibility for powering panel/backlight by either the VDD_LCD/VDD_BKLT signals or by using LVDS_VDD_EN/LVDS_BKLT_EN for external power switches.

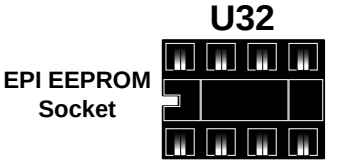
- Signals 1-10 correspond to signals 1-10 found on the X35 connector.
- X33, X34 and X36 represent jumpers X33, X34 and X36 found on the conga-MEVAL.
- The conga-MEVAL carrier board is equipped with a Maxim MAX5362 device referred to in the diagram below as “DAC”.




### 5.2.10.5 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-MEVAL (DIL 8 socket U32).

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



## 5.2.11 PCI Express Connectors

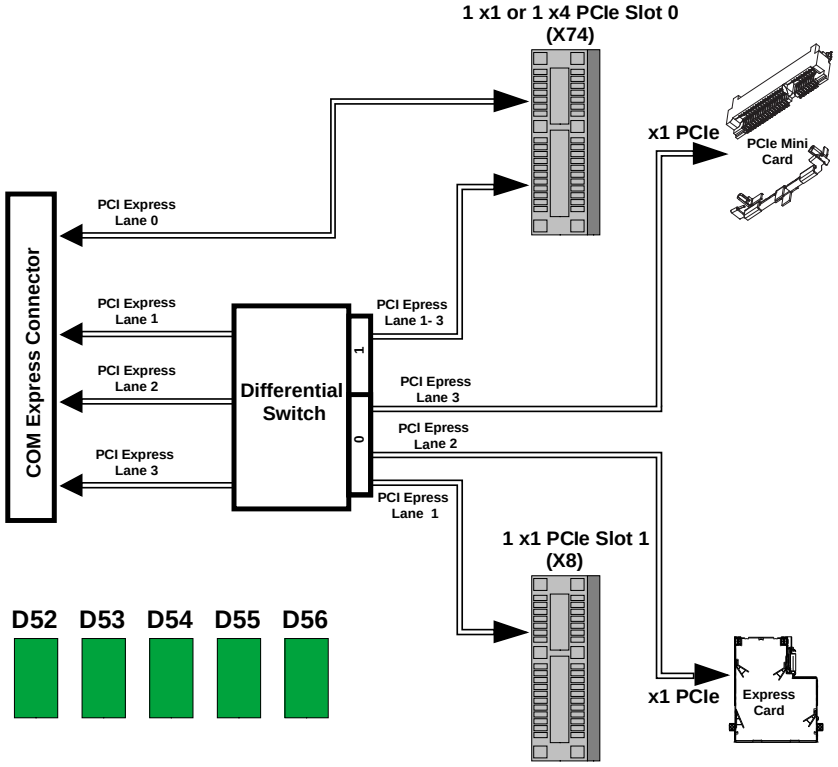
The conga-MEVAL supports up to 4 PCI Express lanes on the COM Express connector. PCIe lane 0 is routed directly to PCIe Slot 0 (X74) while Lanes 1-3 are routed via a differential switch. The output of the differential switch depends on the configuration of Jumper X75. When the Jumper is set to position 1-2, the switch routes lane 1 to PCIe Slot 1 (X8), lane 2 to ExpressCard and lane 3 to miniPCIe. With this setup, the conga-MEVAL is configured to support 4 x1 PCIe links and the green LEDs D52, D53, D55, D56 are lit when the four x1 PCIe links are active.

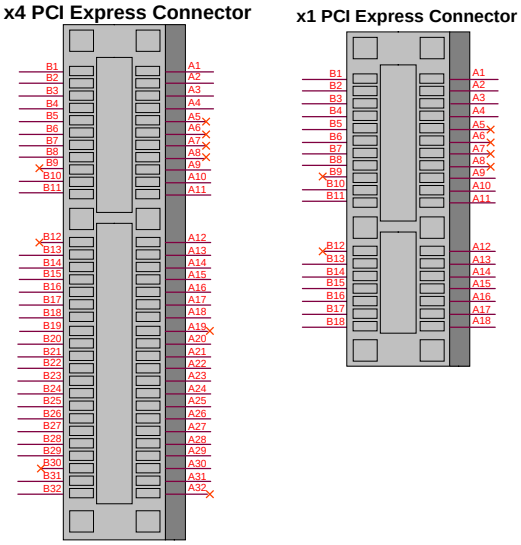
**Note**

*PCI Express clock buffers influence signal integrity. Therefore, test the PCI Express compliance of new carrier board designs. The conga-MEVAL carrier board revision A.1 only passed compliance tests if PLL bandwith was set to low. This was fixed in revision A.2.*

When the Jumper is set to position 2-3, the switch routes PCIe lanes 1-3 to PCIe Slot 0. This setting configures the conga-MEVAL to support a 1 x4 PCIe link on Slot 0. LED D54 is lit when the X4 PCIe link is active.

The illustration below depicts the PCI Express routing from the COM Express connector.





Jumper X75

| | |
|---|---|
| 1-2 | 4 x1 configuration(default) |
| 2-3 | 1 x4 configuration |

The table below lists the pinouts for each of these slots.

| PCI Express Slot 0/Lane 0 Connector X74 | | | | PCI Express Slot 1/Lane 1 Connector X8 | | | |
|---|---|---|---|---|---|---|---|
| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
| B1 | +12V | A1 | GND | B1 | +12V | A1 | GND |
| B2 | +12V | A2 | +12V | B2 | +12V | A2 | +12V |
| B3 | +12V | A3 | +12V | B3 | N.C. | A3 | +12V |
| B4 | GND | A4 | GND | B4 | GND | A4 | GND |
| B5 | SMB_CK | A5 | N.C. | B5 | SMB_CK | A5 | N.C. |
| B6 | SMB_DAT | A6 | N.C. | B6 | SMB_DAT | A6 | N.C. |
| B7 | GND | A7 | N.C. | B7 | GND | A7 | N.C. |
| B8 | +3.3V | A8 | N.C. | B8 | +3.3V | A8 | N.C. |
| B9 | N.C. | A9 | +3.3V | B9 | N.C. | A9 | +3.3V |
| B10 | +3.3V Standby | A10 | +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 | PCIE0_CLK+ | B13 | GND | A13 | PCIE1_CLK+ |
| B14 | PCIE_TX0+ | A14 | PCIE0_CLK- | B14 | PCIE_TX1+ | A14 | PCIE1_CLK- |
| B15 | PCIE_TX0- | A15 | GND | B15 | PCIE_TX1- | A15 | GND |
| B16 | GND | A16 | PCIE_RX0+ | B16 | GND | A16 | PCIE_RX1+ |
| B17 | PCIE0_CLKREQ# | A17 | PCIE_RX0- | B17 | PCIE1_CLKREQ# | A17 | PCIE_RX1- |
| B18 | GND | A18 | GND | B18 | GND | A18 | GND |
| B19 | PCIE_TX1+ | A19 | N.C | | | | |
| B20 | PCIE_TX1- | A20 | GND | | | | |
| B21 | GND | A21 | PCIE_RX1+ | | | | |
| B22 | GND | A22 | PCIE_RX1- | | | | |
| B23 | PCIE_TX2+ | A23 | GND | | | | |
| B24 | PCIE_TX2- | A24 | GND | | | | |
| B25 | GND | A25 | PCIE_RX2+ | | | | |
| B26 | GND | A26 | PCIE_RX2- | | | | |
| B27 | PCIE_TX3+ | A27 | GND | | | | |
| B28 | PCIE_TX3- | A28 | GND | | | | |
| B29 | GND | A29 | PCIE_RX3+ | | | | |
| B30 | N.C | A30 | PCIE_RX3- | | | | |

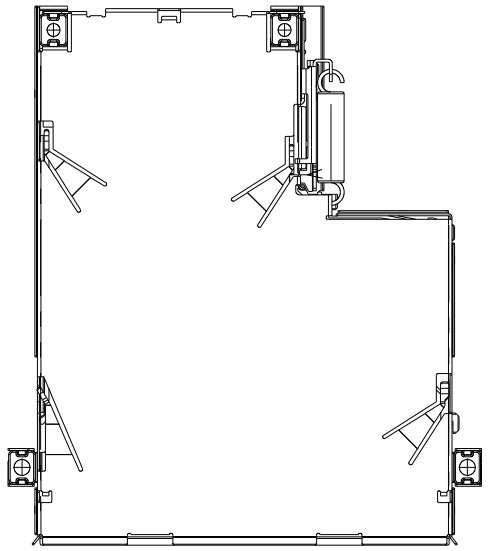
| | | | | | | |
|---|---|---|---|---|---|---|
| B31 | PCIE0_CLKREQ# | A31 | GND | | | |
| B32 | GND | A32 | N.C | | | |

### 5.2.11.1 ExpressCard

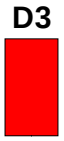
ExpressCard® is a small, modular add-in card designed to replace common PCMCIA and PC Cards. It takes advantage of the scalable, high-bandwidth serial PCI Express and USB 2.0 interfaces to provide much higher data rates. More information about the ExpressCard Standard can be found at http://www.expresscard.org.

The conga-MEVAL is equipped with an ExpressCard slot (connector X14). The ExpressCard slot uses PCI Express lane 2 and USB port 6. The table below lists the 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 | N.C | 18 | PCIE_CLK- |
| 6 | N.C | 19 | PCIE_CLK+ |
| 7 | SMB_CLK | 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 |



LED D3 is a red LED that indicates that an 'Overcurrent Event' has occurred in the ExpressCard slot.

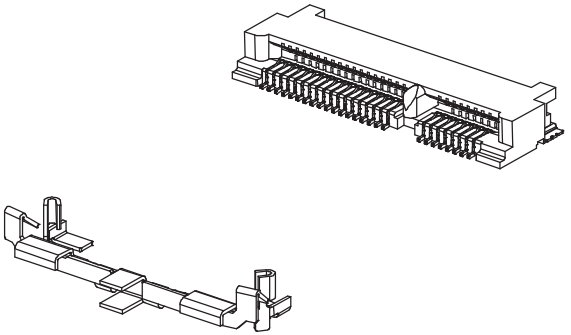


### 5.2.11.2 PCI Express® Mini Card

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 conga-MEVAL is equipped with a PCI Express® Mini Card socket (X15). The PCI Express® Mini Card uses PCI Express lane 3 and USB port 5. The following table lists the pinout of the PCI Express Mini Card socket.

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | WAKE0# | 2 | +3.3V |
| 3 | N.C | 4 | GND |
| 5 | N.C | 6 | +1.5V |
| 7 | PCIE3_CLKREQ# | 8 | N.C. |
| 9 | GND | 10 | N.C. |
| 11 | PCIE3_CLK- | 12 | N.C. |
| 13 | PCIE3_CLK+ | 14 | N.C. |
| 15 | GND | 16 | N.C. |
| 17 | N.C | 18 | GND |
| 19 | N.C | 20 | N.C |
| 21 | GND | 22 | PCIE_RST# |
| 23 | PCIE_RX3- | 24 | +3.3V Standby |
| 25 | PCIE_RX3+ | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PCIE_TX3- | 32 | SMB_DAT |
| 33 | PCIE_TX3+ | 34 | GND |
| 35 | GND | 36 | USB5- |
| 37 | GND | 38 | USB5+ |
| 39 | +3.3V Standby | 40 | GND |
| 41 | +3.3V Standby | 42 | LED_WWAN# |
| 43 | GND | 44 | LED_WLAN# |
| 45 | N.C | 46 | LED_WPAN# |
| 47 | N.C | 48 | +1.5V |



| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 49 | N.C | 50 | GND |
| 51 | N.C | 52 | +3.3V |

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

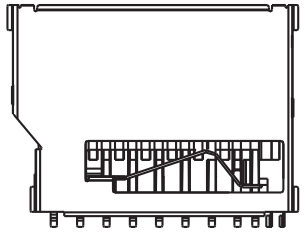
| LED | Indicates |
|---|---|
| D4 | Wireless Wide Area Network |
| D5 | Wireless Local Area Network |
| D6 | Wireless Personal Area Network |


## 5.2.12 SDIO

The GPIOs on a COM Express™ Type 10 modules may also be used as SDIO signals. The de-multiplexing is handled on conga-MEVAL by Jumper X22, connecting GPIOs to either SD/MMC slot (CN3) or feature connector (X53).

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

**Jumper X22**

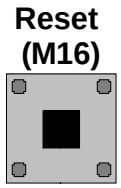
**Connector Type**

*X22: 2.54mm grid jumper*

# 6 Additional Features

## 6.1 Reset

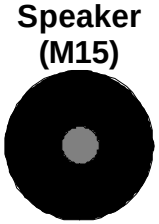
When the Reset button (M16) is pressed, the COM Express™ module and all connected components performs a hard reset. The Reset button is connected to the SYS_RESET# signal of the COM Express™ module.




## 6.2 PC Speaker

The board-mounted speaker provides audible error code (beep code) information during POST. The speaker (M15) is connected to the SPKR signal of the COM Express™ module and can be disabled via Jumper X83.

| Jumper X83 | Configuration |
|---|---|
| 1-2 | Enable beeper (default) |
| 1-X | Disable beeper |

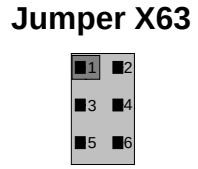



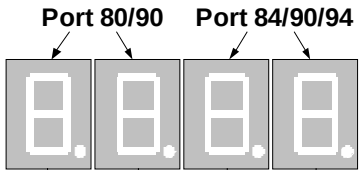

## 6.3 Debug Display

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-MEVAL decodes these ports and displays their contents on a 4 seven-segment display (D37- D39, 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 |




**Connector Type**

*X63: 2.54mm grid jumper*

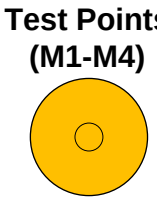
## 6.4 JTAG Interface

The conga-MEVAL provides a JTAG interface on connector X64. The interface is used for in-circuit testing.

| Pin | Signal |
|---|---|
| 1 | 3.3V |
| 2 | GND |
| 3 | TCK |
| 4 | N.C |
| 5 | TDO |
| 6 | TDI |
| 7 | TMS |

## 6.5 Ground Test Points

The conga-MEVAL provides four 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.




## 6.6 Voltage Test Point

The conga-MEVAL provides a voltage test point M31 (+VIN_COME) near the COM Express connector to measure the input voltage on the module.

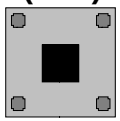
**Caution**

*Do not use this point as a ground connection.*

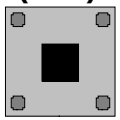
## 6.7 LID and Sleep

LID# and SLEEP# signals can be easily triggered by pressing the LID button (M17) or the SLEEP button (M18). The system's behavior depends on the ACPI settings of the operating system.

**LID (M17)**



**Sleep (M18)**

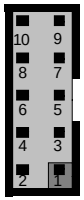


## 6.8 Smart Battery Management Module

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

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | I2C_CLK | 2 | I2C_DAT |
| 3 | PWRBTN# | 4 | BATLOW# |
| 5 | PS_ON# | 6 | *SUS_S45# (see note below) |
| 7 | VCC (5V) | 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#.*

### 6.8.1 Battery Communication Selection

The conga-MEVAL provides two Jumpers (X80 and X81) for selecting the smart battery communication bus. Set both Jumpers X80 and X81 to position 1-2 for I2C bus communication or 2-3 for SM bus communication.

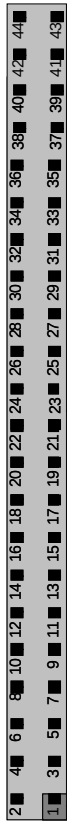
| Jumper X80 | Configuration |
|---|---|
| 1-2 | Select I2C Bus for battery data signal(default) |
| 2-3 | Select SM Bus for battery data signal |

| Jumper X81 | Configuration |
|---|---|
| 1-2 | Select I2C Bus for battery clock signal (default) |
| 2-3 | Select SM Bus for battery clock signal |

## 6.9 Feature Connector

| Pin | Signal | Description | Pin | Signal | Description |
|---|---|---|---|---|---|
| 1 | +5V (750 mA fuse) | | 2 | 5V_SB (750 mA fuse) | |
| 3 | +5V | | 4 | Hard Disk Activity | Shows activity on hard disk interface |
| 5 | I2C_DAT | General purpose I²C port data I/O line. | 6 | SMB_CLK | System Management Bus bidirectional clock line. |
| 7 | I2C_CLK | General purpose I²C port clock output. | 8 | SMB_DATA | System Management Bus bidirectional data line. |
| 9 | Internal use | | 10 | GPO0 | General Purpose Output 0 |
| 11 | Internal use | | 12 | GPO1 | General Purpose Output 1 |
| 13 | PS_ON# | Power Supply On (active low). | 14 | GPO2 | General Purpose Output 2 |
| 15 | SUS_S3# | Indicates system is in Suspend to RAM state. Active low output. | 16 | GPO3 | General Purpose Output 3 |
| 17 | GND | Power Ground | 18 | GND | Power Ground |
| 19 | THRMTRIP# | Active low output indicating that the CPU has entered thermal shutdown. | 20 | SMB_ALERT# | System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system. |
| 21 | GPI1 | General Purpose Input 1 | 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 | General Purpose Input 0 |
| 25 | GPI2 | General Purpose Input 2 | 26 | SUS_S5# | Indicates systems is in Soft Off state. |
| 27 | WDT | Watch Dog Timer | 28 | THRM# | Input from off-module temp sensor indicating an over-temp situation. |
| 29 | GPI3 | General Purpose Input 3 | 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 | N.C | Not Connected |

**Feature (X53)**



| | | | | | |
|---|---|---|---|---|---|
| 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 |
| 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 | N.C | Not Connected | 42 | N.C | Not Connected |
| 43 | N.C | Not Connected | 44 | N.C | Not Connected |

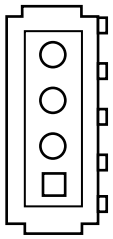
**Connector Type**

*X53: 44 pin, 2 row 2.54 mm grid female*

## 6.10 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 X9 provides the ability to do this. Simply connect a standard extension cable from conga-MEVAL to your hard drive/optical drive. Do not connect more than one peripheral device to X9.

**X9**
**HDD Power**



**Caution**

*The 12V supply on connector X9 is directly connected to M23. Over-voltage can damage the connected peripheral.*

# 7 Mechanical Dimensions