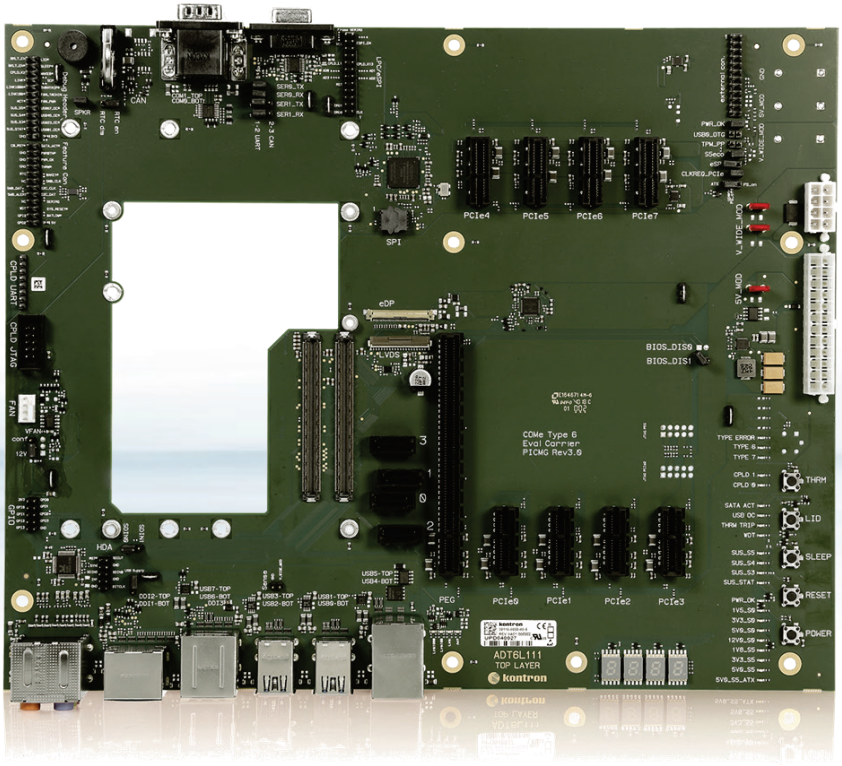
USER GUIDE



COMe Eval Carrier2 T6 (ADT6)

Doc. Rev 1.2

Doc.-ID: 1065-4472

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COMe Eval Carrier2 T6 (ADT6)

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⚠CAUTION

Handling and operation of the product is permitted only for trained personnel within a work place that is access controlled. Please follow the "General Safety Instructions for IT Equipment" supplied with the system.

Revision History

Revision	Brief Description of Changes	Date of Issue	Author
1.0	Initial issue	2019-Sept-23	hjs
1.1	Introduction modified, corrected signals 5V_MOD and V_WIDE_MOD	2020-Jan-27	hjs
1.2	variant 38116-0000-00-5 removed	2020-July-21	hjs

Terms and Conditions

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If you have any difficulties using this user guide, discover an error, or just want to provide some feedback, contact Kontron_support. Detail any errors you find. We will correct the errors or problems as soon as possible and post the revised user guide on our website.

Symbols

The following symbols may be used in this manual

⚠DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message.
	Electric Shock! This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material. Please refer also to the "High-Voltage Safety Instructions" portion below in this section.
	ESD Sensitive Device! This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.
	HOT Surface! Do NOT touch! Allow to cool before servicing.
	This symbol indicates general information about the product and the user manual. This symbol also indicates detail information about the specific product configuration.
	This symbol precedes helpful hints and tips for daily use.

For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions

As a precaution and in case of danger, the power connector must be easily accessible. The power connector is the product's main disconnect device.

⚠CAUTION

Warning

All operations on this product must be carried out by sufficiently skilled personnel only.

⚠CAUTION

Electric Shock!

Before installing a non hot-swappable Kontron product into a system always ensure that your mains power is switched off. This also applies to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair, and maintenance operations on this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing any work on this product.

Earth ground connection to vehicle's chassis or a central grounding point shall remain connected. The earth ground cable shall be the last cable to be disconnected or the first cable to be connected when performing installation or removal procedures on this product.

Special Handling and Unpacking Instruction

NOTICE

ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the product is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the product.

Lithium Battery Precautions

If your product is equipped with a lithium battery, take the following precautions when replacing the battery.

⚠CAUTION

Danger of explosion if the battery is replaced incorrectly.

- Replace only with same or equivalent battery type recommended by the manufacturer.
- Dispose of used batteries according to the manufacturer's instructions.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the product, that are not explicitly approved by Kontron and described in this user guide or received from Kontron Support as a special handling instruction, will void your warranty.

This product should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This also applies to the operational temperature range of the specific board version that must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, only follow the instructions supplied by the present user guide.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the product then re-pack it in the same manner as it was delivered.

Special care is necessary when handling or unpacking the product. See Special Handling and Unpacking Instruction.

Quality and Environmental Management

Kontron aims to deliver reliable high-end products designed and built for quality, and aims to complying with environmental laws, regulations, and other environmentally oriented requirements. For more information regarding Kontron's quality and environmental responsibilities, visit http://www.kontron.com/about-kontron/corporate-responsibility/quality-management.

Disposal and Recycling

Kontron's products are manufactured to satisfy environmental protection requirements where possible. Many of the components used are capable of being recycled. Final disposal of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

WEEE Compliance

The Waste Electrical and Electronic Equipment (WEEE) Directive aims to:

- Reduce waste arising from electrical and electronic equipment (EEE)
- Make producers of EEE responsible for the environmental impact of their products, especially when the product become waste
- Encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- Improve the environmental performance of all those involved during the lifecycle of EEE

Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

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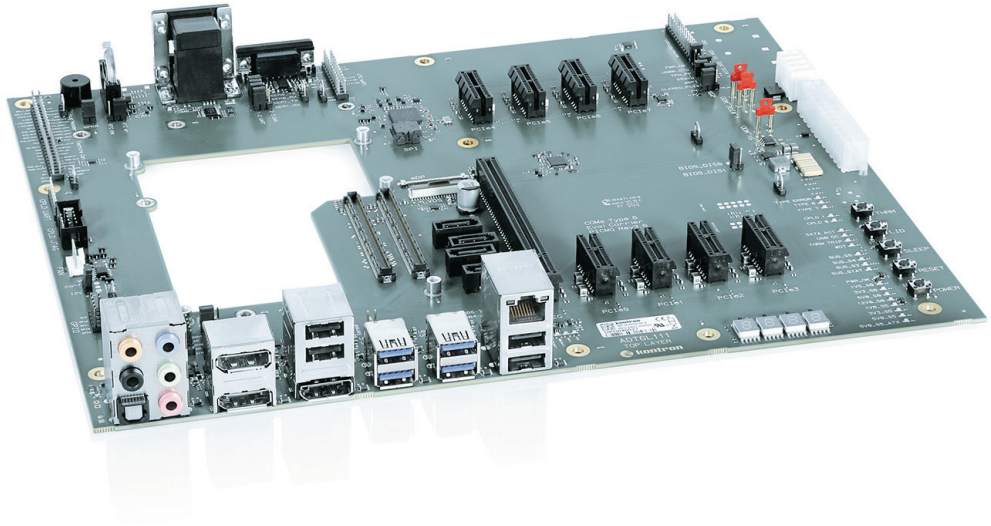
1/ Introduction

1.1. Product Description

The COMe Eval Carrier2 T6 is being developed as an evaluation, testing and validation carrier board (baseboard) in ATX form factor for COM Express® Type 6 modules. It offers a testing platform for a huge variety of interfaces. Main purpose of this carrier board is to bring out all the signals from COM Express® connector of COMe Type6 modules to industry standard interfaces. The key features are:

- 1x 1000Base-T interface
- 4x USB 3.1 Interface, up to 8x USB 2.0
- 9x PCIe slot (1x x16 + 8x x1)
- 4x SATA standard interface,
- External fan connector
- Pin headers for COM Express® specific signals enabling measurement like GPIOs, I2C, SMBus and Feature connector
- External BIOS flash socket

Figure 1: COMe Eval Carrier2 T6



1.2. Product Naming Clarification

The product names for Kontron COM Express® Computer-on-Modules consist of a short form of the industry standard (COMe-), the form factor (b=basic, c=compact, m=mini), the capital letters for the CPU and Chipset Codenames (XX) and the pin-out type (#) followed by the CPU Name.

COM Express® defines a Computer-On-Module, or COM, with all components necessary for a bootable host computer, packaged as a super component.

- COMe-bXX# modules are Kontron's COM Express® modules in basic form factor (125 mm x 95 mm)
- COMe-cXX# modules are Kontron's COM Express® modules in compact form factor (95 mm x 95 mm)
- COMe-eXX# modules are Kontron's COM Express® modules in extended form factor (155 mm x 110 mm)

The COMe Eval Carrier2 T6 fits all three types of modules.

1.3. Understanding COM Express® Functionality

All Kontron COM Express® extended, basic and compact modules contain two 220pin connectors; each of it has two rows called Row A & B on primary connector and Row C & D on secondary connector. The COM Express® Computer-On-Module (COM) features the following maximum amount of interfaces according to the PCI Industrial Computer Manufacturers Group (PICMG) module Pin-out type.

Table 1: Features

Feature	COMe Eval Carrier2 T6
Serial ATA	4x
PCI Express x16	1x
PCI Express x1	8x
USB 3.1	4x
GPIO	10x
FAN PWM out	1x
Ethernet	1x

1.4. COM Express® Documentation

The COM Express® Specification defines the COM Express® module form factor, pin-out, and signals. This document is available at the PICMG® website by filling out the order form.

1.5. COM Express® Benefits

COM Express® modules are compact and highly integrated computers. All modules feature a standardized form factor and connector layout which carry a specified set of signals. Each COM is based on the COM Express® specification. This standardization allows designers to create a single-system baseboard that can accept present and future COM Express® modules.

The baseboard designer can optimize exactly how each of these functions implements physically. Designers can place connectors precisely where needed for the application on a baseboard designed to optimally fit a system's packaging.

A single baseboard design can use a range of COM Express® modules with different sizes and pin-outs. This flexibility can differentiate products at various price/performance points. The modularity of a COM Express® solution also ensures against obsolescence when computer technology evolves. A properly designed COM Express® baseboard can work with several successive generations of COM Express® modules.

A COM Express® baseboard design has many advantages of a customized computer-board design and, additionally, delivers better obsolescence protection, heavily reduced engineering effort, and faster time to market.

2/ System specifications

2.1. Component Main Data

The table below summarizes the features of the motherboard.

Table 2: Component Main Data

COMe Eval Carrier2 T6	
Form factor	Testing Hardware with 244.0 mm x 305.0 mm (ATX)
Memory	
EEPROM System (U13)	JILI EEPROM
External I/O	
LAN	1x Gbit-Ethernet port
USB	4x USB 3.1 + 4x USB 2.0 double stack
Internal I/O	
SATA	4x Gen3 slots
Feature Connector	1x connector with 2x12 pins
PCIe	1x x16, 8x x1
LEDs	SMD LEDs e.g. for VCC/Type/Ethernet/HDD/USB_OC/CPLD0,1/THRMTRIP/SUS_STAT,S3,S4,S5
GPIO	GPIO Header with 10 pins
I2C	Feature Connector (J57)
Battery	CR2032 battery holder
Fan	4-pin fan connector, Voltage can be 5 V or 12 V (default 4-pole)
Carrier Board Power	
Power input	Carrier is powered from standard ATX power supply with ATX 24-pin and8-pin connectors.
Single Supply Support	carrier requires ATX power
S-States	S3, S4, S5
S5 Eco Mode	yes
Kontron Features	
M.A.R.S. support	no
Watchdog support	Triple Staged
Miscellaneous	
Miscellaneous	2x UART, 7-Segment Postcode Display
Graphics	
DisplayPort DP	3x DP
VGA	1x VGA
LVDS	1x LVDS, 1x eDP

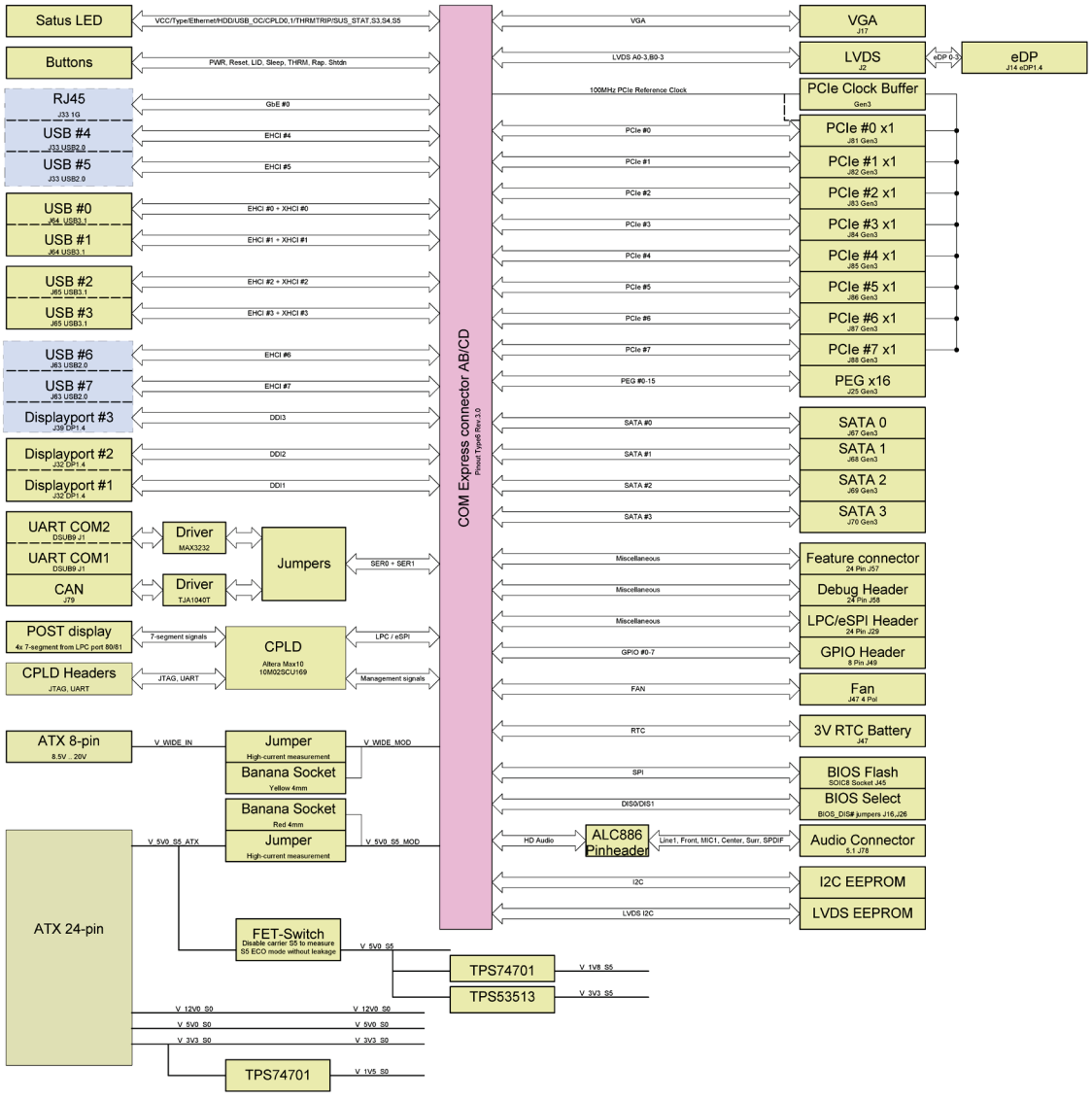
⚠CAUTION

Danger of explosion if the lithium 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

2.2. Block diagram

Figure 2: Block Diagram COMe-Type6 Eval Carrier



2.3. Product Variants

Table 3: Product Variants

Product Number	Description
38116-0000-00-5	COMe height: 5mm

2.4. Environmental Conditions

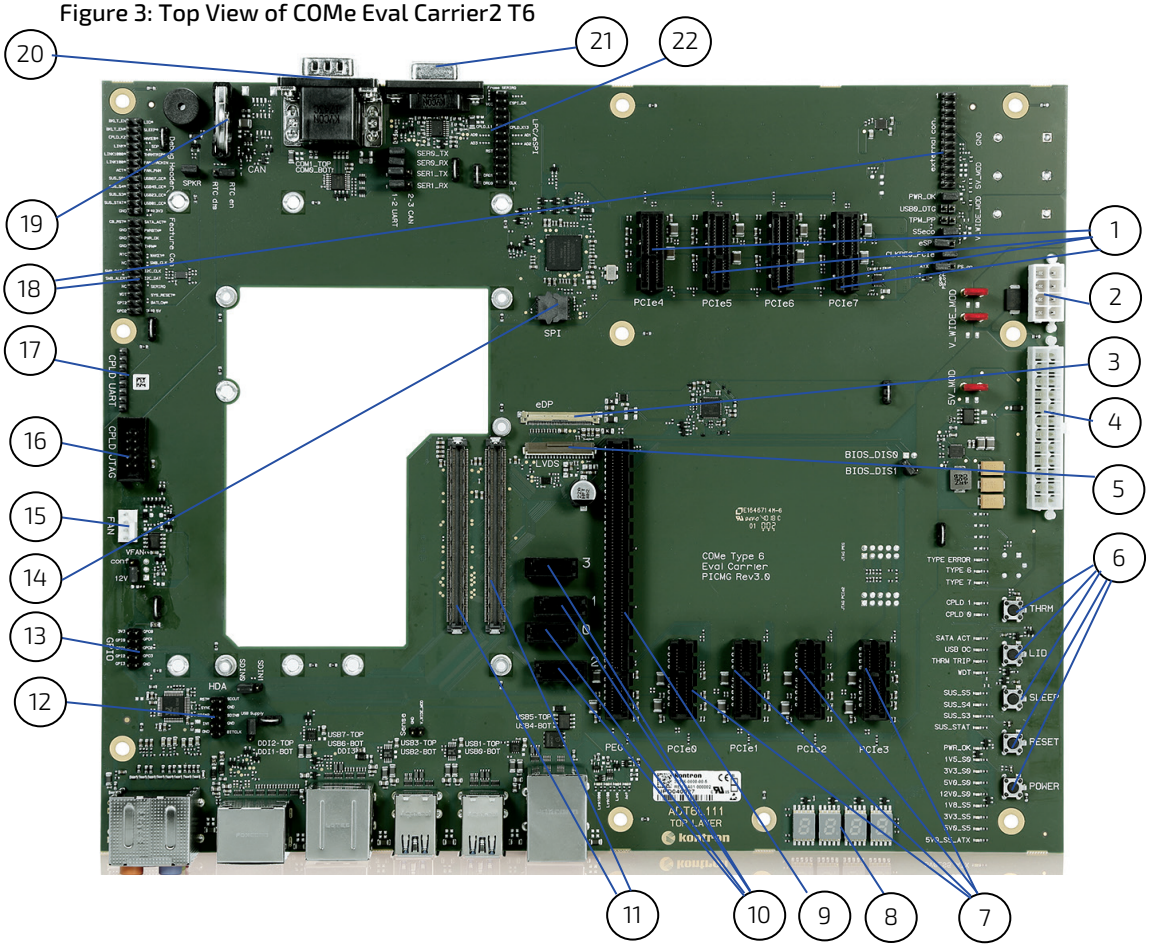
Table 4: Environmental Conditions

Operating	-40°C to +85°C Some connectors and Codecs has operating temperature only 0°C to +70°C, relative humidity (non-condensing) 10 % to 93 % at 40°C
Storage	-40°C to +85°C relative humidity (non-condensing) 10 % to 93 % at 40°C
Waste Electrical and Electronic Equipment (WEEE)	Components and materials of the product must not contain lead, mercury, cadmium, hexavalent, chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). (Directive 2002/95/EC)
RoHS II Compliance	The product will comply with the European Council Directive on the approximation of the laws of the member states relating to Directive 2011/65/EU or the last status thereof.
Theoretical MTBF	not applicable
Compliance	▶ CE marked according to low voltage directive 2006/95/EC EN60950 ▶ Customer specific requirements based on EN 62368-1:2014 (Second Edition) ▶ EMC according to IEC 61000-6-2:2005 (Second Edition) and IEC 61000-6-3:2006 (Second Edition) + A1:2010 in reference system ▶ Reach compliance

3/ Mainboard Views

3.1. Top View

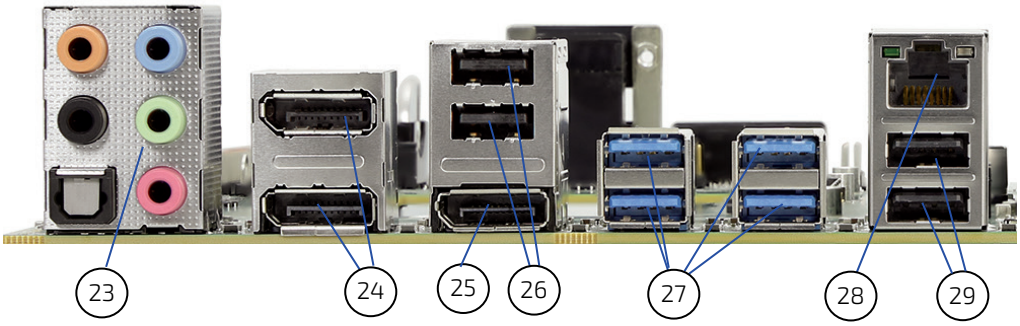
Figure 3: Top View of COMe Eval Carrier2 T6



1. 4x PCI x1 (J85/J86/J87/J88)
2. Power Connector (J99)
3. eDP (J14)
4. ATX Power Connector (J5)
5. LVDS (J2)
6. Button Switches
7. 4x PCI x1 (J81/J82/J83/J84))
8. POST Code Display
9. PCIe x16
10. 4x SATA
11. 2x COMe (J61)
12. HDA (J48)
13. GPIO (J49)
14. SPI (J45)
15. Fan (J93)
16. CPLD/JTAG (J15)
17. CPLD/UART (J62)
18. Jumper
19. Battery (J20)
20. COM Port (J1)
21. VGA (J17)
22. LPC/eSPI (J29)

3.2. Front panel

Figure 4: Front Panel



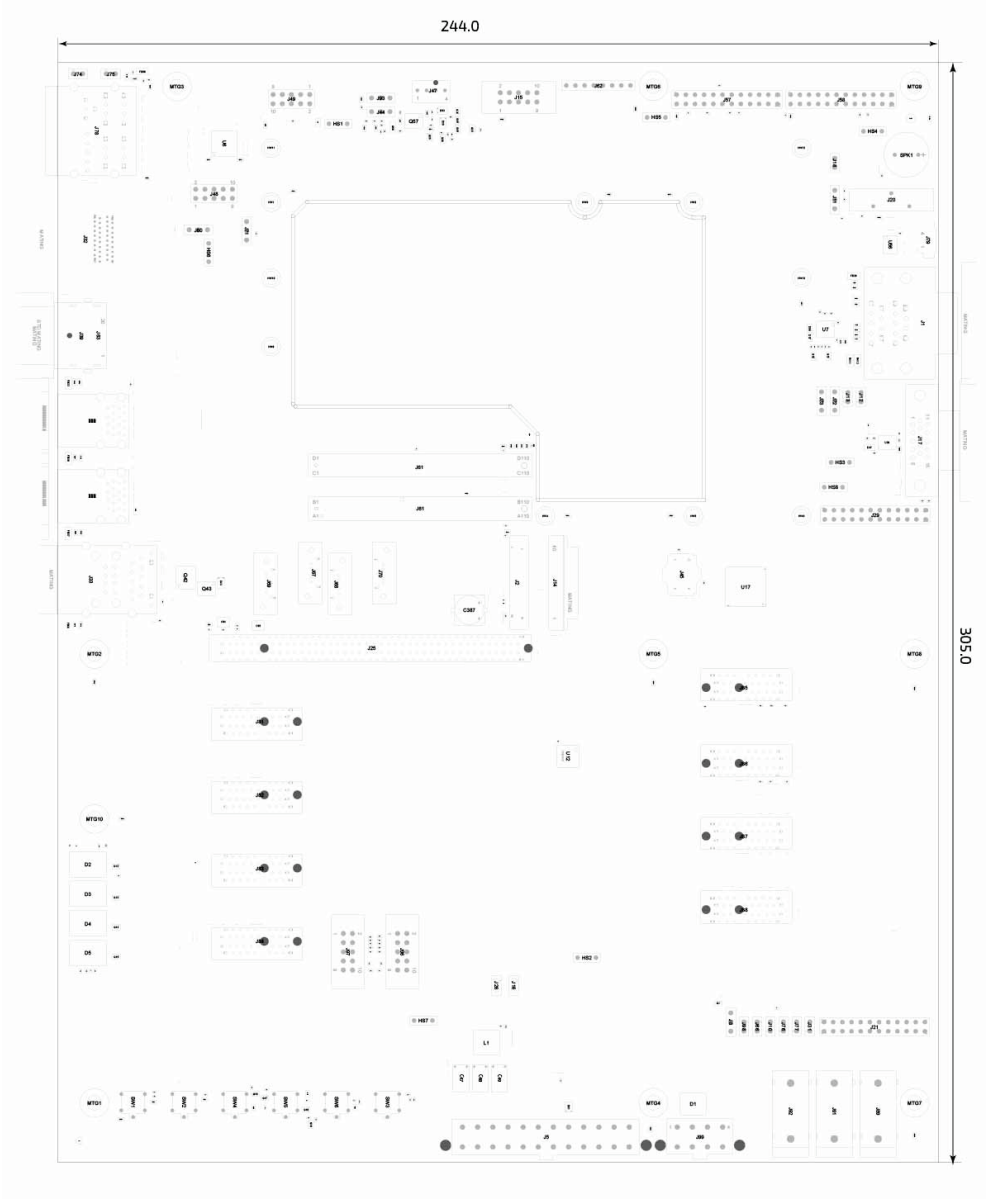
23. 5x Audio Connectors (J78)
24. 2x DP (J32)
25. 1x DP (J39)
26. 2x USB (J63)
27. 4x USB 3.0
28. 1x GE Connector (J33)
29. 2x USB

4/ Mechanical Specification

4.1. Dimensions

The dimensions of the carrier board are 244.0 mm x 305.0 mm.

Figure 5: Board Dimensions



5/ Interfaces and Connectors

5.1.1. 1000Base-T Connector (J33)

Figure 6: 1000Base-T connector

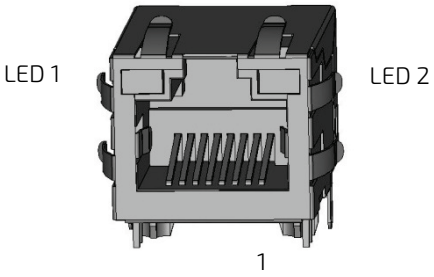


Table 5: 1000Base-T connector

Pin	Signal	Ethernet 10 BaseT/100BaseT	Gigabit-Ethernet
1	MDI0+	TX+	DA+
2	MDI0-	TX-	DA-
3	MDI1+	RX+	DB+
4	MDI1-		DC+
5	MDI2+		DC-
6	MDI2-	RX-	DB-
7	MDI3+		DD+
8	MDI3-		DD-

Table 6: Signals

LED	Signal	
1	Off	No Link
	Steady On	Link established, no activity
	Blinking	Link established, activity detected
2	Off	10 Mb Link
	Steady On	100 Mb Link
	Blinking	1000 Mb Link

5.1.2. USB Connectors (J64, J65, J33, J63)

For every USB 3.1 port, one USB2 and one USB31 lane has to be bonded. Therefore the number of available USB 2.0 ports decreases with every used 3.1 port. Available are:

- up to 8x USB 2.0
- 4x USB 3.1

Figure 7: USB Double Connector

Table 7: USB Double Connector

Connector	COMe USB 2.0	COMe USB 3.1
J64 Bottom	USB0	USB_SS0
J64 Top	USB1	USB_SS1
J65 Bottom	USB2	USB_SS2
J65 Top	USB3	USB_SS3
J33 Bottom	USB4	
J33 Top	USB5	
J63 Bottom	USB6	
J63 Top	USB7	

Intel starts counting USB Ports with 1 while COMe Specification starts counting with 0

NOTICE

USB Overcurrent: USB_OC_LED# indicates Overcurrent event on USB_OC_0_1#, USB_OC_2_3#, USB_OC_4_5#, USB_OC_6_7#. Overcurrent event can be measured on Debug Header. USB0_HOST_PRSNT can be pulled up by J77. USB OTG / Client not supported.

5.1.3. Graphic Interfaces (J32, J39, J2, J14, J17)

Table 8: Graphic Interfaces

COMe Signal	Connector
DDI1	J32
DDI2	J32
DDI3	J39
LVDS	J2
eDP	J14
VGA	J17

Table 9: Graphic Interfaces DDI

COMe Connector DDI1	COMe Connector DDI2	COMe Connector DDI3
DDI1_PAIR[0:3]	DDI2_PAIR[0:3]	DDI3_PAIR[0:3]
DDI1_PAIR[4:6]	DDI2_PAIR[4:6]	DDI3_PAIR[4:6]
DDI1_CTRLCLK_AUX+	DDI2_CTRLCLK_AUX+	DDI3_CTRLCLK_AUX+
DDI1_CTRLDATA_AUX-	DDI2_CTRLDATA_AUX-	DDI3_CTRLDATA_AUX-
DDI1_DDC_AUX_SEL	DDI2_DDC_AUX_SEL	DDI3_DDC_AUX_SEL
DDI1_HPD	DDI2_HPD	DDI3_HPD

Table 10: Graphic Interfaces LVDS and eDP

COMe Connector LVDS	COMe Connector eDP
LVDS_A*	LVDS_A_CK
LVDS_B*	LVDS_A2
LVDS_I2C_CK	LVDS_A1
LVDS_I2C_DAT	LVDS_A0
LVDS_VDD_EN	LVDS_I2C_CK
LVDS_BKLT_EN	LVDS_I2C_DAT
LVDS_BKLT_CTRL	EDP_HPD
	LVDS_VDD_EN
	LVDS_BKLT_EN
	LVDS_BKLT_CTRL

5.1.3.1. VGA (J17)

Table 11: Graphic Interfaces VGA

Signal	Pin	HDSUB 15	Description	I/O	Comment
VGA_RED	B89	1	Red component of analog DAC monitor	O Analog	Analog output
VGA_GRN	B91	2	Green component of analog DAC monitor	O Analog	Analog output
VGA_BLU	B92	3	Blue component of analog DAC monitor	O Analog	Analog output
VGA_HSYNC	B93	13	Horizontal sync output to VGA monitor.	O 3.3V CMOS	
VGA_VSYNC	B94	14	Vertical sync output to VGA monitor.	O 3.3V CMOS	
VGA_I2C_CK	B95	15	DDC clock line	O 3.3V CMOS	Level shifter
VGA_I2C_DA T	B96	12	DDC data line	I/O 3.3V CMOS	Level shifter
GND		5..8, 10	Analog and Digital GND		
DDC_POWER		9	5 V DDC supply voltage for monitor EEPROM		Power
N.C.		4, 11	Not Connected		

5.1.4. HD Audio (J78)

HDA Audio Codec is U6 ALC886.

Figure 8: HD Audio

Table 12: Colorsceme HD Audio

Color	Connector
Light Blue	Analog line level audio input
Lime	Analog line level audio output for the main stereo signal (front speakers or headphones)
Pink	Analog microphone audio input
Orange	Analog line level audio output for center channel speaker and subwoofer
Black	Analog line level audio output for surround speakers, typically rear stereo

Table 13: HD Audio

Pin	Connector
1	HDA_BITCLK
4	HDA_SDIN1
5	HDA_SDIN0
6	HDA_SDIN2
8	HDA_SYNC
9	HDA_SDOUT
10	HDA_RST#

5.1.5. HD Audio Internal (J48)

HDA Audio Codec is U6 ALC886.

Figure 9: HD Audio 10-pin

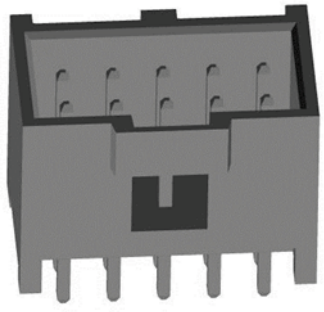


Table 14: HD Audio internal

Pin	Connector
1	HDA_BITCLK
4	HDA_SDIN1
5	HDA_SDIN0
6	HDA_SDIN2
8	HDA_SYNC
9	HDA_SDOUT
10	HDA_RST#

5.1.6. COM Ports

Table 15: COM Ports

COMe Signal	EC/kCPLD function
SER0_TX	po_uart_tx[0]
SER0_RX	po_uart_rx[0]
SER1_TX	po_uart_tx[1]
SER1_RX	po_uart_rx[1]

NOTICE

Jumper J72 to 2/3 for CAN (J79) option. Disconnect Jumper to measure SER0/SER1.

5.1.7. I2C and SMBus (J57 and FPGA U17)

I2C is connected to EEPROM U32 (24C32), Feature Connector J57 and FPGA U17. VGA I2C connected to VGA connector and can be measured on MTP72 and MTP12. LVDS_I2C is connected to LVDS connector J2 and eDP connector J14

Table 16: SMBus

COMe (3.3V, EN_SMB_EXT)	Feature Connector J57	PEG, PCIe0-7	PICe clkbuffer U12	FPGA U12
SMB_CLK	Pin 13	B5	SMB_CLK_S0_CKBUF	M10
SMB_DAT	Pin 12	B6	SMB_CLK_S0_CKBUF	L10
SMB_Alert#	Pin 10	-	-	J8

5.1.8. PCIe Slots (J25, J81 – J88)

The slot for PCI Express Graphics is J25 with up to x16 Gen3.

Table 17: PCIe Slots

COMe connector	Lane width	PCIe connector
PEG	x16	J25
PCIE0	x1	J81
PCIE1	x1	J82
PCIE2	x1	J83
PCIE3	x1	J84
PCIE4	x1	J85
PCIE5	x1	J86
PCIE6	x1	J87
PCIE7	x1	J88

5.1.8.1. PCI Express Reference Clock

Place bypass resistors for Reference Clock measurements. For x4/x8/x16 PCIe cards it might be necessary to place J98 to output the reference clock on all x1 slots.

5.1.9. GPIO (General Purpose Input and Output((J49)

Figure 10: GPIO

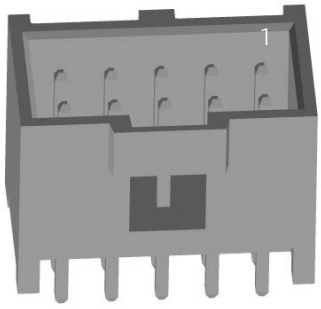


Table 18: GPIO with 10 pins

Pin	Signal	Pin	Signal
P1	V_3V3_S0_GPIO	P2	GPIO_GPO0
P3	GPIO_GPI0	P4	GPIO_GPO1
P5	GPIO_GPI1	P6	GPIO_GPO2
P7	GPIO_GPI2	P8	GPIO_GPO3
P9	GPIO_GPI3	P10	GND

Figure 11: Configuring GPIO Pins using JIDA32/K-Station

The GPI and GPO pins can be configured using JIDA32/K-Station.

Please refer to the JIDA32/K-Station manual in the driver download packet on our EMD Customer Section.

5.1.10. Serial ATA 3.0

Table 19: SATA 3.0

COMe Port	PCIe connector
SATA0	J67

COMe Port	PCIe connector
SATA1	J68
SATA2	J69
SATA3	J70

SATA_ACT# LED D42 indicates SATA activity.

5.1.11. Feature Connector (J57)

Figure 12: Feature Connector with 24 pins

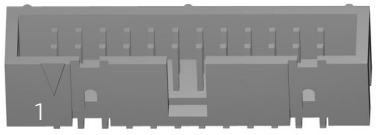


Table 20: Feature Connector with 24 pins

Pin	Signal	Pin	Signal
P1	V_5V0_S0	P2	GPO
P3	BATLOW#	P4	GPI
P5	SYS_RESET#	P6	WDT
P7	LPC_SERIRQ	P8	NC
P9	I2C_DAT	P10	SMB_ALERT#
P11	I2C_CLK	P12	SMB_DAT
P13	SMB_CLK	P14	NC
P15	WAKE#	P16	V_3V0_RTC
P17	THRM#	P18	GND
P19	PWR_OK	P20	GND
P21	PWRBTN#	P22	GND
P23	SATA_ACT#	P24	CB_RESET#

5.1.12. External Connector (J21)

Figure 13: External Connector with 24 pins

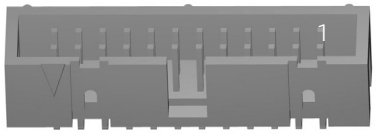


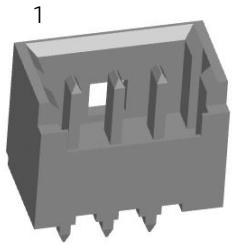
Table 21: External Connector with 24 pins

Pin	Signal	Pin	Signal
P1	PWRBTN_EXT#	P2	GND
P3	SYS_RESET_EXT#	P4	GND
P5	THRM_EXT#	P6	GND
P7	SLEEP_EXT#	P8	GND
P9	LID_EXT#	P10	GND

Pin	Signal	Pin	Signal
P11	LED_PWROK_J	P12	PWR_OK_CPLD_OUT
P13	SATA_ACT_R_J#	P14	SATA_ACT#
P15	CPLD_DEBUG_L11	P16	CPLD_DEBUG_N12
P17	RAPID_SHUTDOWN_5V0_EXT	P18	V_5V0_S5
P19	V_3V3_S5	P20	V_1V8_S5
P21	V_12V0_S0	P22	V_5V5_S0
P23	V_3V3_S0	P24	V_1V5_S0

5.1.13. Fan 3-Pin/4-Pin Jumper (J93)

Figure 14: Fan 3-Pin/4-Pin Jumper with 3 pins



NOTICE

J93 Jumpered to 2/3: Regulated 3 Pole Fan, J93 Jumpered to 1/2: 4 Pole Fan with 12 V

The analog output voltage on this connector is generated via a discrete linear voltage regulator from the PWM signal of the HWM. V_FAN voltage range can be varied from 0 V to 12 V.

5.1.14. Fan Connector (J47)

Figure 15: Fan Connector with 4 pins

1

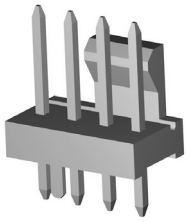


Table 22: Fan Connector with 4 pins (J47)

Pin	Description
1	GND
2	V_Fan Power (12V/5V switchable)
3	FAN_TACH_CON (sense)
4	FAN_PWM_CON (drive)

5.1.15. 24-pin ATX Power connector (J5)

Figure 16: ATX Power connector with 24 pins

1

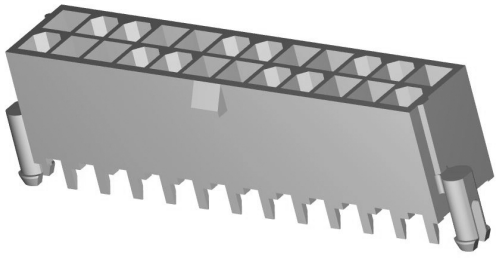


Table 23: : ATX Power connector with 24 pins

Pin	Signal	Cable Colour
1	3,3 V	Orange
2	3,3 V	Orange
3	GND	Black
4	5 V	Red
5	GND	Black
6	5 V	Red
7	GND	Black
8	PWR_OK	Grey
9	5 VSB	Purple
10	12 V	Yellow
11	12 V	Yellow

Pin	Signal	Cable Colour
12	3,3 V	Orange
13	3,3 V/ 3.3 V sense	Orange/ Brown
14	–12 V	Blue
15	GND	Black
16	Power ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	Reserved	None
21	5 V	Red
22	5 V	Red
23	5 V	Red
24	GND	Black

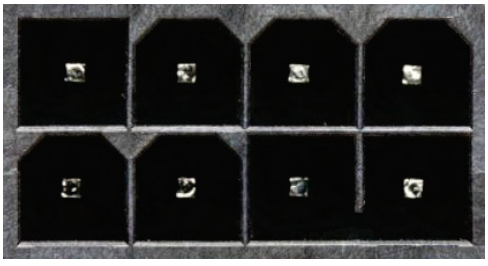
NOTICE

If any of the supply voltages drops below the allowed operating level longer than the specified hold-up time, all the supply voltages should be shut down and left OFF for a time long enough to allow the internal board voltages to discharge sufficiently.
If the OFF time is not observed, parts of the board or attached peripherals may work incorrectly or even suffer a reduction of MTBF.
The minimum OFF time depends on the implemented PSU model and other electrical factors and needs to be measured individually for each case.

5.1.16. 8-pin ATX Power connector (J99)

Figure 17: ATX Power connector with 8 pins

1



4

Table 24: ATX Power connector with 8 pins

Pin	Signal
1	+12 V
2	+12 V
3	+12 V
4	+12 V

Pin	Signal
5	GND
6	GND
7	GND
8	GND

NOTICE

Jumpers "V_WIDE_MOD": If these two Jumpers are closed, the Wide Range input Voltage (J99) is provided to the Com Express Module. If these Jumpers are removed, the Module won't start. Each Jumper can handle up to 8 A, because there are two Jumpers in Parallel a input current up to 16 A can be delivered. If the Input Current should be measured, this should be done at this place.

5.1.17. SPI BIOS (J45)

SOIC8 Socket J45 for external BIOS Flash.

Table 25: SPI BIOS

COMe Signal	Description
SPI_CS#	SPI_CS# logic implemented in EC
SPI_MISO	
SPI_MOSI	
SPI_POWER	connected to V_3V3_S5
BIOS_DIS0#	input to control SPI_CS# logic
BIOS_DIS1#	input to control SPI_CS# logic

Table 26: Features as SAFS together with eSPI

BIOS_ DIS1# J26	BIOS_ DIS0# J16	MODULE_ CS#	COME_CS#	BIOS entry	Description
1	1	SPI0_CS0#	'1'	Module	
1	0	SPI0_CS0#	'1'	(Module)	Not Supported, was FWH, works as module SPI
0	1	SPI0_CS1#	SPI0_CS0#	Carrier	
0	0	SPI0_CS0#	SPI0_CS1#	Module	

5.1.18. LPC/eSPI (J29)

Close J66 for 1V8 eSPI mode, 0pen J66 for 3V3 LPC mode.

Figure 18: LPC/eSPI (J29)

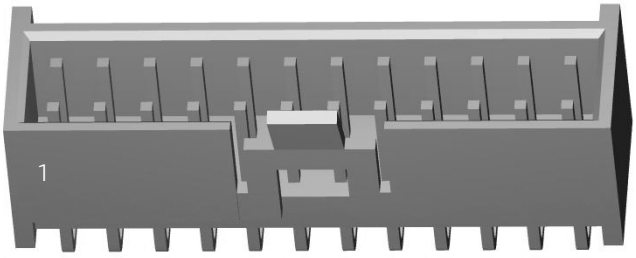


Table 27: LPC/eSPI (J29)

COMe Connector	Pin
LPC_AD[0:3]	14, 13, 11, 12
LPC_FRAME#	24
LPC_DRQ[0:1]#	2, 4
LPC_SERIRQ	SERIRQ
LPC_CLK	1
ESPI EN#	21

6/ Accessories

Table 28: General Accessories List

Product Number	Mounting	Description
38017-0000-00-5	COMe Mount KIT 5mm 1set	Mounting Kit for 1 module including screws for 5mm connectors
38017-0000-00-0	COMe Mount KIT 8mm 1set	Mounting Kit for 1 module including screws for 8mm connectors
Product Number	**Cables**	**Description**
96079-0000-00-0	KAB-HSP 200mm	Cable adapter to connect FAN to module (COMe basic/compact)
96079-0000-00-2	KAB-HSP 40mm	Cable adapter to connect FAN to module (COMe basic/compact)
96061-0000-00-0	KAB-DSUB9-3	Adapter cable from 10pin molex connector to DSUB9 male connector

7/ Electrical Specification

7.1. Supply Voltage

- one ATX Main Power 24pin

Power supply for the module: the ATX_12V P4 connector provides a wide range of input, depending on module specification

7.2. Power Supply Rise time

- The input voltages shall rise from ≤10% of nominal to within the regulation ranges within 0.1ms to 20ms.
- There must be a smooth and continuous ramp of each DC input voltage from 10% to 90% of its final set-point following the ATX specification

NOTICE

If any of the supply voltages drops below the allowed operating level longer than the specified hold-up time, all the supply voltages should be shut down and left OFF for a time long enough to allow the internal board voltages to discharge sufficiently.
If the OFF time is not observed, parts of the board or attached peripherals may work incorrectly or even suffer a reduction of MTBF.
The minimum OFF time depends on the implemented PSU model and other electrical factors and needs to be measured individually for each case.

Laboratory power supply connector: V_5V0_S5_MOD Banana Jack J91 V_WIDE_S0_MOD (12V), Banana Jack J92, Ground Banana Jack J89.

7.3. Supply Voltage Ripple

Maximum 100 mV peak to peak: 0-20MHz

8/ Features

8.1. Rapid Shutdown (J21, Pin17)

Kontron has implemented a rapid shutdown function. It works as follows:

1. An active-high shutdown signal to S3 is asserted by the COMe Eval Carrier2 T6 (ADT6) carrier through button switch SW5. The characteristics of the shutdown signal are as follows:

- Amplitude 5.0V +/- 5%
- Source impedance < = 50 ohms
- Rise time ⇐ 1 µs
- Duration >= 20 µs

The assertion of this signal causes all power regulators to be disabled and the internal power supply rails to be discharged by crowbar circuits. The shutdown circuitry provides internal energy storage that maintains crowbar activation for at least 2 ms following the de-assertion of the shutdown signal.

2. Simultaneously with the leading edge of shutdown, the 12 V (main) input power to the module is removed and these input power pins are externally clamped to ground though a crowbar circuit located on the COM Express carrier board. This external clamping circuit must maintain a maximum resistance of approximately 1 ohm and be activated for a minimum of 2 ms.
3. Simultaneously with the leading edge of shutdown, the 5 V (standby) input power to the module is removed, if present. External clamping on these pins is not necessary (but recommended) because it is clamped through the module by the main 12 V rail.

NOTICE

Use J21, Pin17 to trigger Rapid Shutdown.

8.2. Wake Signals

Table 29: Wake Signals

COMe Signal	Description	Debug Header	Feature Connector	FPGA U12	PEG, PCIe0-7
WAKE0#	PCI Express wake signal	Pin19	-	B2	B11
WAKE1#	General purpose wake signal	-	Pin15	A2	-

8.3. LEDs and indicators

Indicators and LEDs indicate only presence of voltage on certain signal, but not necessarily a correct shape and level of the voltage. This is important especially for power supplies – power good signal would provide more accurate indication, but it is not possible to provide this for all signals (for example ATX power signals share one power good).

Table 30: LEDs

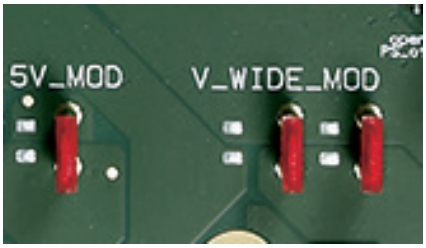
LED	Signal	Description
D39	V_5V0_S5_ATX	Power LED
D8	V_5V0_S5	
D7	V_3V3_S5	
D48	V_12V0_S0	
D50	V_5V0_S0	
D49	V_3V3_S0	
D9	PG_1V5_S0#	
D10	PWR_OK#	
D11	PG_1V8_S5#	
D12	SUS_S3#	Suspend LED
D13	SUS_S4#	
D14	SUS_S5#	
D15	SUS_STAT#	
D18	TYPE1# (not used)	Type LED
D19	TYPE2# (not used)	
D20	TYPE3# (not used)	
D21	TYPE4# (not used)	
D22	TYPE Error#	
D23	TYPE6#	
D24	TYPE7#	
D16	WDT#	
D17	THRMTRIP#	
D44	USB_OC#	
D42	SATA_ACT#	
D40	CPLD1	For Debug usage, not implemented in ADT6P200
D41	CPLD0	For Debug usage, not implemented in ADT6P200

8.4. Jumper

Table 31: Jumper

Connector	1-2	2-3	Open
J3-J4	Connect 5V_S5 to module (default)	-	Disconnect 5V_S5 from module
J6-J7	Connect 12V_S0 to module (default)	-	Disconnect 12V_S0 from module
J100-J101	Connect 12V_S0 to module (default)	-	Disconnect 12V_S0 from module
J8	AT Mode (Always on)	ATX mode (default)	No PS_ON
J10	Connect 5V0_S5 with carrier (default)	-	S5eco mode. Disconnect 5V0_S5 form carrier.
J18	Enable buzzer (default)	-	Disable buzzer
J12	Enable UART0 (default)	-	Measure SER0
J13	Enable UART0 (default)	-	Measure SER0
J72	Enable UART1 (default)	Enable CAN	Measure SER1
J73	Enable UART1 (default)	Enable CAN	Measure SER1
J11	Connect 3V0 RTC to module (default)	Discharge RTC	Measure RTC current
J93	4-POL Fan (default)	3-POL Fan adjustable	Measure FAN_PWM FAN off
J71	Connect SDIN0 to audio codec (default)	Connect SDIN1 to audio codec	Disconnect SDIN from audio codec
J26	Enable external SPI (BIOS)	-	Enable module SPI (BIOS) (Default)
J76	PullUp TPM_PP	-	
J77	USB0 Client	-	USB0 Host
J66	1V8 eSPI mode	-	3V3 LPC mode
J16	BIOS DIS0		
J26	BIOS DIS1 Boot Carrier SPI BIOS		Boot module SPI BIOS
J75	HDA_SPDIF_IN		
J74	HDA_SPDIF_OUT		
J98	Enable PCIe Clk even if no PCIe card is plugged		

Figure 19: Jumpers 5V_MOD and V_WIDE_MOD



NOTICE

Jumper "5V_MOD": If this Jumper is closed, the V_5V0_S5 voltage is provided to the Com Express Module. If the Module should run at Single Supply Mode, this Jumper has to be removed.

NOTICE

Jumpers "V_WIDE_MOD": If these two Jumpers are closed, the Wide Range input Voltage (J99) is provided to the Com Express Module. If these Jumpers are removed, the Module won't start. Each Jumper can handle up to 8 A, because there are two Jumpers in Parallel a input current up to 16 A can be delivered. If the Input Current should be measured, this should be done at this place.

8.5. Button Switches

Figure 20: Button Switches

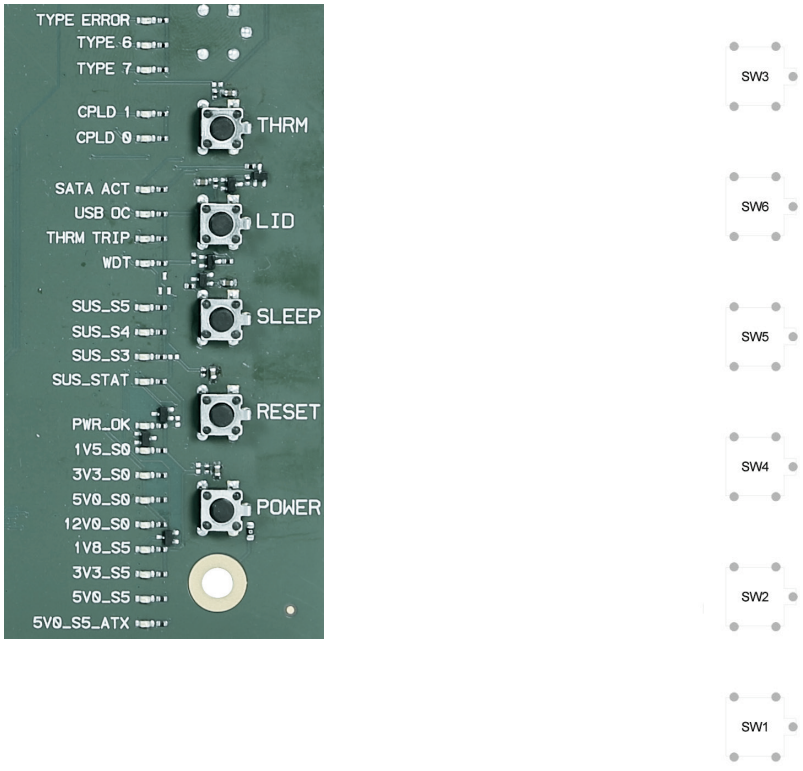
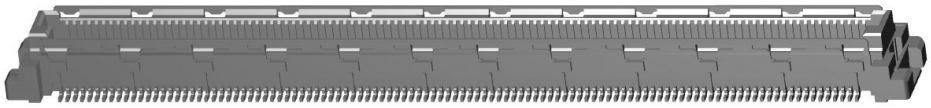


Table 32: Buttons

Button Switch	Function
SW1	Powerbutton
SW2	Sys_Reset
SW3	Rapid Shutdown (optional)
SW4	Sleep
SW5	LID
SW6	THRM#

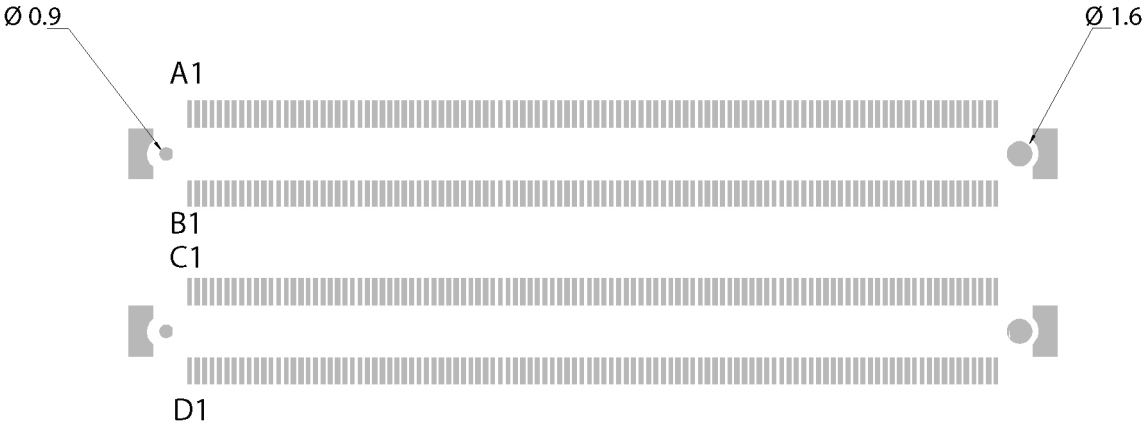
9/ COMe Connector Pin-out (J61)

Figure 21: COMe Connector with 220 pins



This table lists the pins and signals according to the PICMG specification COM.0 Rev 3.0 Type 6 standard.

Figure 22: COMe Connector Pinout



NOTICE

To protect external power lines of peripheral devices, make sure that: the wires have the right diameter to withstand the maximum available current the enclosure of the peripheral device fulfills the fire-protection requirements of IEC/EN60950.

Table 33: Pin-out List

Pin	Row A	Row B	Row C	Row D
1	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
2	GBE0_MDI3-	GBE0_ACT#	GND	GND
3	GBE0_MDI3+	LPC_FRAME#/ESPI_CS0#	USB_SSRX0-	USB_SSTX0-
4	GBE0_LINK100#	LPC_AD0/ESPI_IO_0	USB_SSRX0+	USB_SSTX0+
5	GBE0_LINK1000#	LPC_AD1/ESPI_IO_1	GND	GND
6	GBE0_MDI2-	LPC_AD2/ESPI_IO_2	USB_SSRX1-	USB_SSTX1-
7	GBE0_MDI2+	LPC_AD3/ESPI_IO_3	USB_SSRX1+	USB_SSTX1+

Pin	Row A	Row B	Row C	Row D
8	GBE0_LINK#	LPC_DRQ0#/ESPI_ALERT0#	GND	GND
9	GBE0_MDI1-	LPC_DRQ1#/ESPI_ALERT1#	USB_SSRX2-	USB_SSTX2-
10	GBE0_MDI1+	LPC_CLK/ESPI_CK	USB_SSRX2+	USB_SSTX2+
11	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
12	GBE0_MDI0-	PWRBTN#	USB_SSRX3-	USB_SSTX3-
13	GBE0_MDI0+	SMB_CK	USB_SSRX3+	USB_SSTX3+
14	GBE0_CTREF	SMB_DAT	GND	GND
15	SUS_S3#	SMB_ALERT#	DDI1_PAIR6+	DDI1_CTRLCLK_AUX+
16	SATA0_TX+	SATA1_TX+	DDI1_PAIR6-	DDI1_CTRLDATA_AUX-
17	SATA0_TX-	SATA1_TX-	RSVD	10
18	SUS_S4#	SUS_STAT#/ESPI_RESET#	RSVD	10
19	SATA0_RX+	SATA1_RX+	PCIE_RX6+	PCIE_TX6+
20	SATA0_RX-	SATA1_RX-	PCIE_RX6-	PCIE_TX6-
21	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
22	SATA2_TX+	SATA3_TX+	PCIE_RX7+	PCIE_TX7+
23	SATA2_TX-	SATA3_TX-	PCIE_RX7-	PCIE_TX7-
24	SUS_S5#	PWR_OK	DDI1_HPD	RSVD
25	SATA2_RX+	SATA3_RX+	DDI1_PAIR4	+
26	SATA2_RX-	SATA3_RX-	DDI1_PAIR4-	DDI1_PAIR0+
27	BATLOW#	WDT	RSVD	10
28	(S)ATA_ACT#	HDA_SDIN2	RSVD	10
29	HDA_SYNC	HDA_SDIN1	DDI1_PAIR5+	DDI1_PAIR1+
30	HDA_RST#	HDA_SDIN0	DDI1_PAIR5-	DDI1_PAIR1-
31	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
32	HDA_BITCLK	SPKR	DDI2_CTRLCLK_AUX+	DDI1_PAIR2+

Pin	Row A	Row B	Row C	Row D
33	HDA_SDOUT	I2C_CK	DDI2_CTRLDATA_AUX-	DDI1_PAIR2-
34	BIOS_DIS0#/ESPI_SAFS	I2C_DAT	DDI2_DDC_AUX_SEL	DDI1_DDC_AUX_SEL
35	THRMTRIP#	THRM#	RSVD	10
36	USB6-	USB7-	DDI3_CTRLCLK_AUX+	DDI1_PAIR3+
37	USB6+	USB7+	DDI3_CTRLDATA_AUX-	DDI1_PAIR3-
38	USB_6_7_OC#	USB_4_5_OC#	DDI3_DDC_AUX_SEL	RSVD
39	USB4-	USB5-	DDI3_PAIR0+	DDI2_PAIR0+
40	USB4+	USB5+	DDI3_PAIR0-	DDI2_PAIR0-
41	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
42	USB2-	USB3-	DDI3_PAIR1+	DDI2_PAIR1+
43	USB2+	USB3+	DDI3_PAIR1-	DDI2_PAIR1-
44	USB_2_3_OC#	USB_0_1_OC#	DDI3_HPD	DDI2_HPD
45	USB0-	USB1-	RSVD	10
46	USB0+	USB1+	DDI3_PAIR2+	DDI2_PAIR2+
47	VCC_RTC	ESPI_EN#	DDI3_PAIR2-	DDI2_PAIR2-
48	RSVD	10	USB0_HOST_PRSNT	RSVD
49	GBE0_SDP	SYS_RESET#	DDI3_PAIR3+	DDI2_PAIR3+
50	LPC_SERIRQ/ESPI_CS1#	CB_RESET#	DDI3_PAIR3-	DDI2_PAIR3-
51	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
52	PCIE_TX5+	PCIE_RX5+	PEG_RX0+	PEG_TX0+
53	PCIE_TX5-	PCIE_RX5-	PEG_RX0-	PEG_TX0-
54	GPI0	GPO1	TYPE0#	PEG_LANE_RV#
55	PCIE_TX4+	PCIE_RX4+	PEG_RX1+	PEG_TX1+
56	PCIE_TX4-	PCIE_RX4-	PEG_RX1-	PEG_TX1-
57	GND	GPO2	TYPE1#	TYPE2#
58	PCIE_TX3+	PCIE_RX3+	PEG_RX2+	PEG_TX2+

Pin	Row A	Row B	Row C	Row D
59	PCIE_TX3-	PCIE_RX3-	PEG_RX2-	PEG_TX2-
60	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
61	PCIE_TX2+	PCIE_RX2+	PEG_RX3+	PEG_TX3+
62	PCIE_TX2-	PCIE_RX2-	PEG_RX3-	PEG_TX3-
63	GPI1	GPO3	RSVD	10
64	PCIE_TX1+	PCIE_RX1+	RSVD	10
65	PCIE_TX1-	PCIE_RX1-	PEG_RX4+	PEG_TX4+
66	GND	WAKE0#	PEG_RX4-	PEG_TX4-
67	GPI2	WAKE1#	RAPID_SHUTDOWN	GND
68	PCIE_TX0+	PCIE_RX0+	PEG_RX5+	PEG_TX5+
69	PCIE_TX0-	PCIE_RX0-	PEG_RX5-	PEG_TX5-
70	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
71	LVDS_A0+	LVDS_B0+	PEG_RX6+	PEG_TX6+
72	LVDS_A0-	LVDS_B0-	PEG_RX6-	PEG_TX6-
73	LVDS_A1+	LVDS_B1+	GND	GND
74	LVDS_A1-	LVDS_B1-	PEG_RX7+	PEG_TX7+
75	LVDS_A2+	LVDS_B2+	PEG_RX7-	PEG_TX7-
76	LVDS_A2-	LVDS_B2-	GND	GND
77	LVDS_VDD_EN	LVDS_B3+	RSVD	10
78	LVDS_A3+	LVDS_B3-	PEG_RX8+	PEG_TX8+
79	LVDS_A3-	LVDS_BKLT_EN	PEG_RX8-	PEG_TX8-
80	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
81	LVDS_A_CK+	LVDS_B_CK+	PEG_RX9+	PEG_TX9+
82	LVDS_A_CK-	LVDS_B_CK-	PEG_RX9-	PEG_TX9-
83	LVDS_I2C_CK	LVDS_BKLT_CTRL	RSVD	10
84	LVDS_I2C_DAT	VCC_5V_SBY	GND	GND
85	GPI3	VCC_5V_SBY	PEG_RX10+	PEG_TX10+
86	RSVD	VCC_5V_SBY	PEG_RX10-	PEG_TX10-
87	eDP_HPD	VCC_5V_SBY	GND	GND

Pin	Row A	Row B	Row C	Row D
88	PCIE_CLK_REF+	BIOS_DIS1#	PEG_RX11+	PEG_TX11+
89	PCIE_CLK_REF-	VGA_RED	PEG_RX11-	PEG_TX11-
90	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
91	SPI_POWER	VGA_GRN	PEG_RX12+	PEG_TX12+
92	SPI_MISO	VGA_BLU	PEG_RX12-	PEG_TX12-
93	GPO0	VGA_HSYNC	GND	GND
94	SPI_CLK	VGA_VSYNC	PEG_RX13+	PEG_TX13+
95	SPI_MOSI	VGA_I2C_CK	PEG_RX13-	PEG_TX13-
96	TPM_PP	VGA_I2C_DAT	GND	GND
97	TYPE10#	SPI_CS#	RSVD	10
98	SER0_TX	RSVD	10	PEG_RX14+
99	SER0_RX	RSVD	10	PEG_RX14-
100	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)
101	SER1_TX	FAN_PWMOUT	PEG_RX15+	PEG_TX15+
102	SER1_RX	FAN_TACHIN	PEG_RX15-	PEG_TX15-
103	LID#	SLEEP#	GND	GND
104	VCC_12V	VCC_12V	VCC_12V	VCC_12V
105	VCC_12V	VCC_12V	VCC_12V	VCC_12V
106	VCC_12V	VCC_12V	VCC_12V	VCC_12V
107	VCC_12V	VCC_12V	VCC_12V	VCC_12V
108	VCC_12V	VCC_12V	VCC_12V	VCC_12V
109	VCC_12V	VCC_12V	VCC_12V	VCC_12V
110	GND(FIXED)	GND(FIXED)	GND(FIXED)	GND(FIXED)

10/ Technical Support

For technical support contact our Support department:

E-mail: support@kontron.com

Phone: +49-821-4086-888

Make sure you have the following information available when you call:

Product ID Number (PN),

Serial Number (SN)

The serial number can be found on the Type Label, located on the product's rear side.

Be ready to explain the nature of your problem to the service technician.

10.1. Warranty

Due to their limited service life, parts that by their nature are subject to a particularly high degree of wear (wearing parts) are excluded from the warranty beyond that provided by law. This applies to the CMOS battery, for example.

If there is a protection label on your product, then the warranty is lost if the product is opened.

10.2. Returning Defective Merchandise

All equipment returned to Kontron must have a Return of Material Authorization (RMA) number assigned exclusively by Kontron. Kontron cannot be held responsible for any loss or damage caused to the equipment received without an RMA number. The buyer accepts responsibility for all freight charges for the return of goods to Kontron's designated facility. Kontron will pay the return freight charges back to the buyer's location in the event that the equipment is repaired or replaced within the stipulated warranty period. Follow these steps before returning any product to Kontron.

1. Visit the RMA Information website:
http://www.kontron.com/support-and-services/support/rma-information

   Download the RMA Request sheet for **Kontron Europe GmbH** and fill out the form. Take care to include a short detailed description of the observed problem or failure and to include the product identification Information (Name of product, Product number and Serial number). If a delivery includes more than one product, fill out the above information in the RMA Request form for each product.

2. Send the completed RMA-Request form to the fax or email address given below at Kontron Europe GmbH. Kontron will provide an RMA-Number.

   Kontron Europe GmbH
   RMA Support
   Phone: +49 (0) 821 4086-0
   Fax: +49 (0) 821 4086 111
   Email: service@kontron.com

3. The goods for repair must be packed properly for shipping, considering shock and ESD protection.

Goods returned to Kontron Europe GmbH in non-proper packaging will be considered as customer caused faults and cannot be accepted as warranty repairs.

4. Include the RMA-Number with the shipping paperwork and send the product to the delivery address provided in the RMA form or received from Kontron RMA Support.

List of Acronyms

ACPI	Advanced Configuration & Power Interface
BMC	Base Management Controller
COMe	COM Express® - Computer on Module Express
EMC	ElectroMagnetic Compatibility
JIDA	JUMPtec Intelligent Device Architecture. Standard. JIDA is essentially an EEPROM, a data structure for the EEPROM, and a software definition.
ME	Management Engine
NC-SI	Network controller sideband interface
PCIe	PCI-Express
PICMG	PCI Industrial Computer Manufacturers Group
POR	Power-On Reset
PSU	Power Supply Unit
RTC	Real Time Clock
S0	ACPI OS System State 0. Indicates fully on operating state.
S3	ACPI OS System State 3. Indicates Suspend to RAM.
S5	ACPI OS System State 5. Indicates Soft Off operating state.
SIO	Super I/O
SSD	Solid-State Drive
SMB	System Management Bus.
SMBIOS	System Management BIOS
SMI	System Management Interrupt
SPD	Serial Presence Detect: A standardized way to automatically access information about a computer memory module.
WEEE	Waste Electrical and Electronic Equipment