

COMe Ref. Carrier-i T6 TMI

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▶ COME REF. CARRIER-I T6 TMI - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue	Author/ Editor
1.0	Initial issue	24-Jun-2016	MB
1.1	Update of table numbers Included 1.4 Accessories	05-Aug-2016	CW
1.2	2.1.1 SPI Flash update 2.3.14 DIP Switch update of Table 16, Poition 6	23-Aug-2017	CW
1.3	2.3.15 Added Power connector (J1) mating connector information	15-Apr-2019	CW
1.4	Removed the Value and Entry variants and added the carrier EEPROM address	16-July-2020	CW
1.5	Added RTC voltage range 2.0 V to 3.3V	30-Sept-2020	CW

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Symbols

The following symbols may be used in this user guide

⚠ 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.

NOTICE

NOTICE indicates a property damage message.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of products. 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.



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.



Laser!

This symbol inform of the risk of exposure to laser beam and light emitting devices (LEDs) from an electrical device. Eye protection per manufacturer notice shall review before servicing.



This symbol indicates general information about the product and the user guide.

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.

⚠ CAUTION

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

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. Carrier Overview

The COMe Reference Carrier-i Type 6 Thin-MiniITX is a COM Express® pinout Type 6, Thin-mITX form factor-compliant reference carrier designed to accommodate a basic/compact Type 6 COM Express® Computer-on-Module compliant with the PICMG COM.0 specification Rev 2.1.



COMe Ref. Carrier-i T6 TMIP refers to the COMe Reference Carrier-i Type 6 Thin-MiniITX Professional (P/N 38115-0000-00-0).

The following table lists the COMe Ref. Carrier-i T6 TMIP features.

Table 1: COMe Ref. Carrier-i T6 TMIP Features

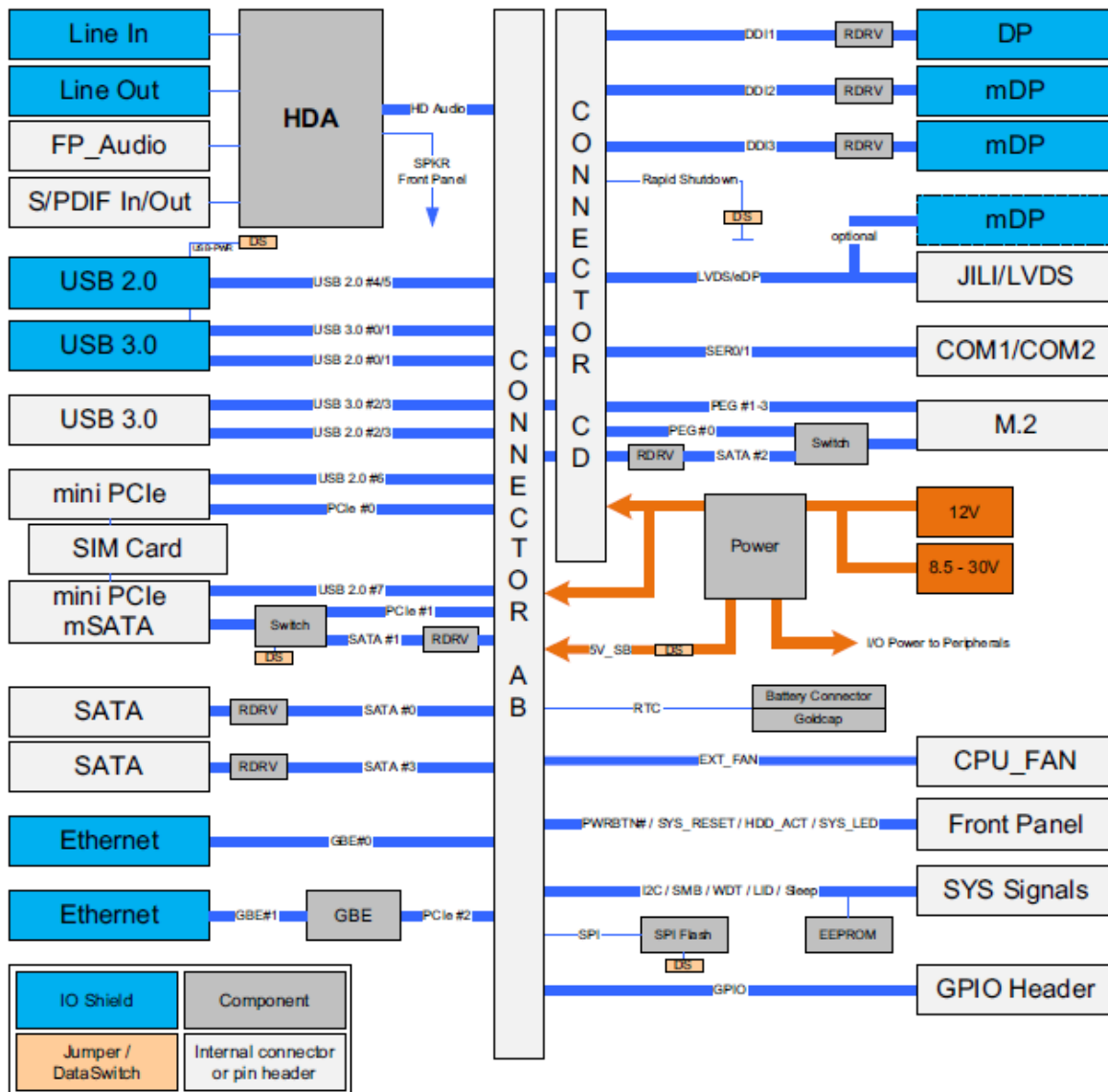
Feature	COMe Ref. Carrier-I T6 TMIP (P/N 38115-0000-00-0)
SPI BIOS Socket	✓
Carrier EEPROM	✓
DDI1 - DP++	✓
DDI2 - mDP++	✓
DDI3 - mDP++	✓
LVDS	✓
mPCIe0	✓
mPCIe1 / mSATA	✓
GBLan0 (Module)	✓
GBLan1 (Carrier)	✓
SATA0 (top)	✓
SATA3 (bottom)	✓
M.2	✓
USB 2.0 / 3.0 I/O	✓
USB 3.0 Pin Header	✓
HDA Codec	✓
Line-In/Out	✓
FP Audio	✓
S/PDIF	✓
SER0/1	✓
GPIO	✓
SIM	✓
System Signals	✓
System Panel	✓
CPU Fan	✓
RTC Connector	✓
Goldcap 2.5F	✓
12V Input	✓
8.5 - 30V Input	✓
Rubber Feet	✓

1.2. Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

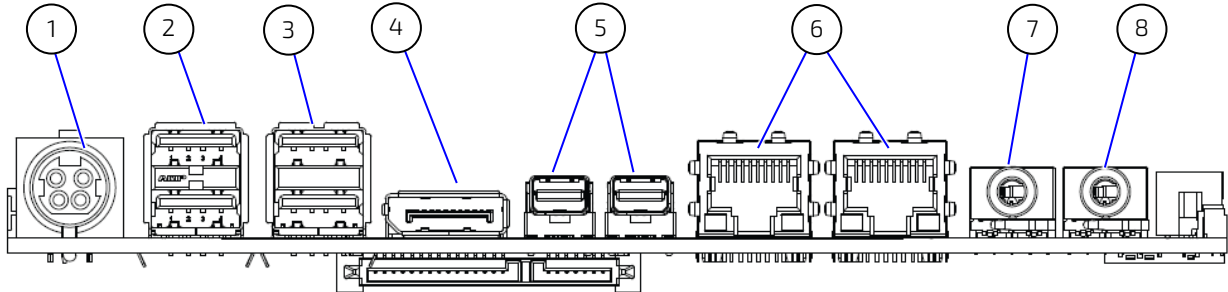
1.2.1. Functional Block Diagram

Figure 1: COMe Ref. Carrier-i T6 TMIP Functional Block Diagram



1.2.2. Rear Panel

Figure 2: COMe Ref. Carrier-i T6 TMIP Rear Panel



- | | | | |
|---|---------------|---|----------------|
| 1 | Voltage Input | 5 | mDP |
| 2 | USB 2.0 | 6 | LAN |
| 3 | USB 3.0/2.0 | 7 | Audio Line-in |
| 4 | DP | 8 | Audio Line-out |

1.2.3. Board layout

Figure 3: COMe Ref. Carrier-i T6 TMIP Layout - Top View

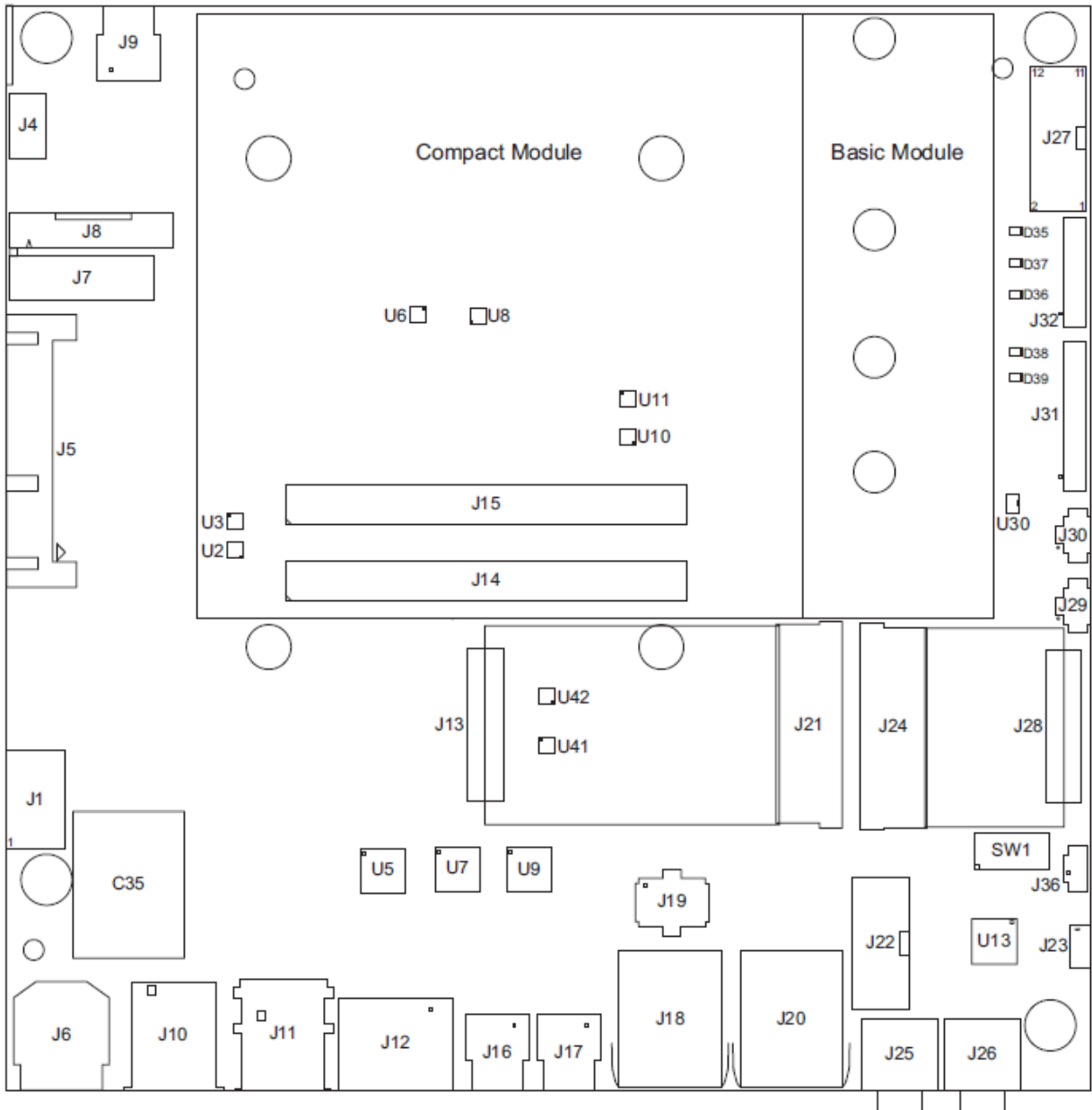
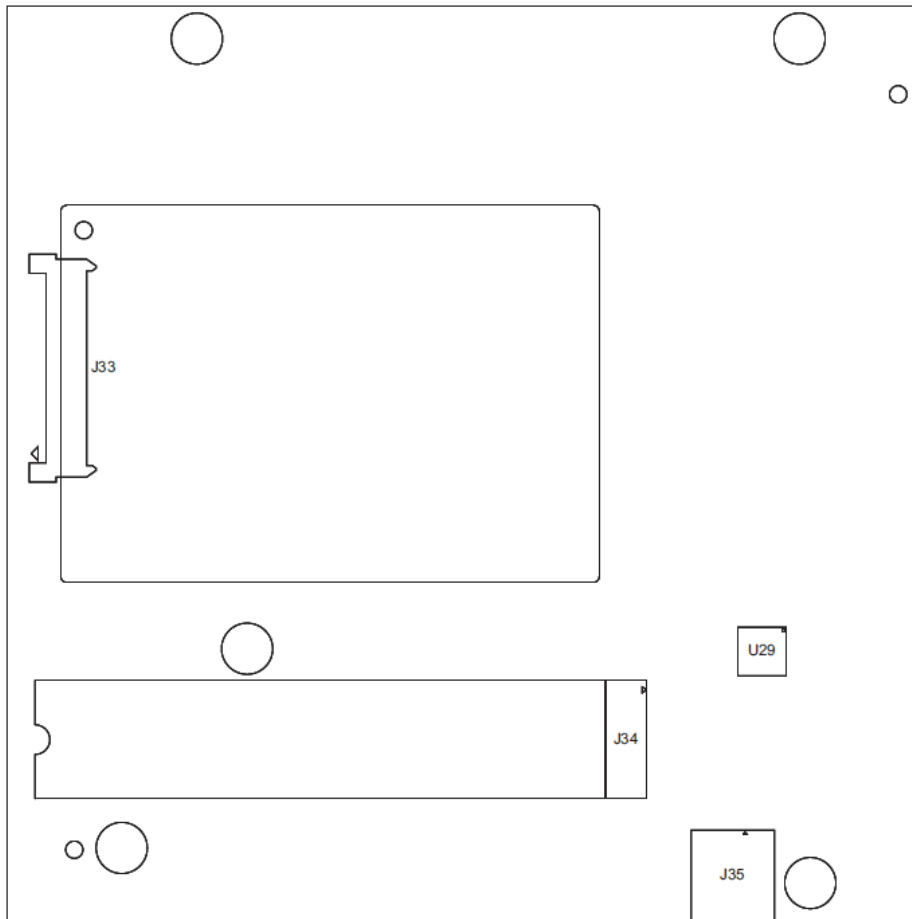


Figure 4: COMe Ref. Carrier-i T6 TMIP Layout - Bottom View



1.2.4. Component Overview

Table 2: Component Overview

Component	Description
C35	Goldcap
D35	Status LED: SUS_S3
D36	Status LED: SUS_S4
D37	Status LED: SUS_S5
D38	Status LED: V12_S5
D39	Status LED: V5.0_V3.3_PG00D
J1	Power connector (8.5V – 30V input voltage)
J4	PWM fan connector
J5	SATA plug connector (with power connector)
J6	DC jack (12V only)
J7	USB 3.0/2.0 pin header
J8	LVDS / J11 connector
J9	Mini DisplayPort++ connector (eDP option)

Component	Description
J10	USB 2.0 double-stack connector
J11	USB 3.0/2.0 double-stack connector
J12	DisplayPort++ connector (DDI1)
J13	Mini PCIe card latch (full-size) / mSATA socket
J14	COMe connector (Row A and B)
J15	COMe connector (Row C and D)
J16	Mini DisplayPort++ connector (DDI3)
J17	Mini DisplayPort++ connector (DDI2)
J18	RJ45 Ethernet connector
J19	SPI BIOS socket
J20	RJ45 Ethernet connector
J21	Mini PCIe card slot (full-size) / mSATA socket
J22	Front panel HD audio header
J23	S/PDIF Header
J24	Mini PCIe card slot (half-size)
J25	Rear panel line-in connector
J26	Rear panel SPK / line-out connector
J27	Front panel connector
J28	Mini PCIe card latch (half-size)
J29	COM port pin header (COM2/SER1)
J30	COM port pin header (COM1/SER0)
J31	SYS_Signals / embedded interfaces pin header
J32	GPIO pin header
J33	SATA receptacle connector (with power connector)
J34	M.2 socket
J35	SIM card slot
J36	CMOS battery connector
SW1	DIP switch
U2	Redriver IC for SATA interfacing (SATA#0)
U3	Redriver IC for SATA interfacing (SATA#0)
U5	Redriver IC for DP interfacing (DDI1)
U6	Redriver IC for SATA interfacing (SATA#3)
U7	Redriver IC for DP interfacing (DDI3)
U8	Redriver IC for SATA interfacing (SATA#3)
U9	Redriver IC for DP interfacing (DDI2)
U10	Redriver IC for SATA interfacing (SATA#1)
U11	Redriver IC for SATA interfacing (SATA#1)
U13	HD Audio Codec IDT / Tempo Semi 92HD73C
U29	Intel® Ethernet Controller I210-IT
U30	Carrier EEPROM (FRUPROM)
U41	Redriver IC for SATA interfacing (SATA#2)
U42	Redriver IC for SATA interfacing (SATA#2)

1.3. Technical Specification

Table 3: COMe Ref. Carrier-i T6 TMIP Main Specifications

Features		Specification
CPU	Processor & Chipset	Via COMe basic/compact Type 6 module
Memory	System Memory	Via COMe basic/compact Type 6 module
	Flash Memory	One SPI BIOS socket for SPI flash ICs with up to 16 MB flash memory
	EEPROM	EEPROM with 32 kbit on the carrier (FRUPROM)
Graphical Interfaces	Digital Display Interfaces	Three digital display interfaces (DDI): <ul style="list-style-type: none"> ▶ DDI1: DisplayPort++ connector from COMe DDI1 with redriver IC, J12 ▶ DDI2: Mini DisplayPort++ connector from COMe DDI2 with redriver IC, J17 ▶ DDI3: Mini DisplayPort++ connector from COMe DDI3 with redriver IC, J16
	LVDS	LVDS / J1LI connector (24-bit, dual-channel LVDS), J8
	Embedded DisplayPort	Mini DisplayPort++ connector via eDP (optional, instead of LVDS), J9
	PEG	Four PEG lanes (PEG#[0-3]) used for the M.2 interface
System Interfaces	PCI Express	Three PCIe interfaces: <ul style="list-style-type: none"> ▶ PCIe#0 for Mini PCIe 2.0 half-size card slot connected to the SIM card slot, J24 ▶ PCIe#1 for Mini PCIe 2.0 full-size card slot muxed with SATA#1 (mSATA) and connected to the SIM card slot, J21 ▶ PCIe#2 for the onboard Gigabit Ethernet controller
	SATA	Four SATA 6 Gb/s interfaces: <ul style="list-style-type: none"> ▶ SATA#0 via the 22-pin SATA plug connector (with redriver ICs), J5 ▶ SATA#1 for the mSATA socket / Mini PCIe full-size card slot (with redriver ICs), J21 ▶ SATA#2 muxed with PEG#0 for the M.2 interface (with redriver ICs) ▶ SATA#3 via the 22-pin SATA receptacle connector (with redriver ICs), J33
	M.2	M.2 socket via PEG#[0-3] and SATA#2 (muxed with PEG#0), J34
	Ethernet	Two Gigabit Ethernet interfaces: <ul style="list-style-type: none"> ▶ GbE#0 on RJ45 connector, J18, via COMe basic/compact Type 6 module ▶ GbE#1 on RJ45 connector, J20, via the onboard GbE controller (Intel® Ethernet Controller I210-IT)
	USB 2.0	Eight USB 2.0 interfaces: <ul style="list-style-type: none"> ▶ Two USB 2.0 interfaces (USB#[0;1]) for USB 3.0/2.0 double-stack connector, J11 ▶ Two USB 2.0 interfaces (USB#[2;3]) for USB 3.0/2.0 pin header, J7 ▶ Two USB 2.0 interfaces (USB#[4;5]) for USB 2.0 double-stack connector, J10 ▶ One USB 2.0 interface (USB#6) for PCIe#0 (Mini PCIe half-size interface) ▶ One USB 2.0 interface (USB#7) for PCIe#1 (Mini PCIe full-size/mSATA interface)
	USB 3.0	Four USB 3.0 interfaces: <ul style="list-style-type: none"> ▶ Two USB 3.0 interfaces (USB_SS#[0;1]) for USB 3.0/2.0 double-stack connector, J11 ▶ Two USB 3.0 interfaces (USB_SS#[2;3]) for USB 3.0/2.0 pin header, J7

Features		Specification
System Interfaces	HD Audio	Four HD Audio interfaces: <ul style="list-style-type: none"> ▶ Rear panel line-in connector, J25 ▶ Rear panel SPK/line-out connector, J26 ▶ Front panel HD audio header, J22 ▶ S/PDIF header, J23
	UART	Two RS-232 COM ports (RX/TX only) via pin headers: <ul style="list-style-type: none"> ▶ J30 (COM1/SER0) ▶ J29 (COM2/SER1)
	GPIO	Four GPIs and four GPOs via the 10-pin GPIO pin header, J32
	SIM	SIM card slot connected to both Mini PCIe interfaces, J35
	I2C	I2C interface via 15-pin SYS_Signals / embedded interfaces pin header, J31
	SMBus	SMBus interface via 15-pin SYS_Signals / embedded interfaces pin header, J31
	LID/SLEEP	LID/SLEEP signals via 15-pin SYS_Signals / embedded interfaces pin header, J31
	CPU Fan	One 4-pin PWM fan connector, J4
	LEDs	Two status LEDs available via the front panel connector, J27: <ul style="list-style-type: none"> ▶ Power LED ▶ HDD Activity LED
Switch	Dip Switch	One 8-position DIP switch SW1, for board configuration
Power	Power Supply	Power input 1: 12 V only Power input 2: 8.5 V – 30 V wide input range
	Power/Reset Button	Available via the front panel connector, J27
	RTC	RTC Voltage: 2.0 V to 3.3 V range 2-pin connector for external CMOS battery, J36 Goldcap for RTC backup, C35
General	BIOS	Via COMe basic/compact Type 6 module
	Temperature Range	Operational: -40°C to +85°C Storage: -40°C to +85°C Note: When additional components are installed, refer to their operational specifications as this will influence the operational and storage temperature of the COMe Ref. Carrier-i T6 TMIP
	Climatic Humidity	93% RH at 40 °C, non-condensing (acc. to IEC 60068-2-78)
	Form Factor	COM Express® carrier, pinout Type 6, Thin-mITX form factor
	Dimensions	170 mm x 170 mm (mITX) Max. component height: Top side: 16.2 mm Bottom side: 5.4 mm

1.4. Accessories

The following accessories are available for the COMe Ref. Carrier-i T6 TMIP.

Table 4: COMe Ref. Carrier-i T6 TMIP Accessories

Part Number	Part Name	Description
96006-0000-00-2	COMe Post T6	NFCB POST Code / Debug card
38019-0000-00-0	ADA-COMe-Height-Dual	EERC height adapter
38017-0000-00-5	COMe Mount Kit 5 mm 1 set	Mounting Kit for 1 module including screws for 5 mm connectors
38017-0100-00-5	COMe Mount Kit 5 mm 100 sets	Mounting Kit for 100 modules including screws for 5 mm connectors
38017-0000-00-0	COMe Mount Kit 8 mm 1 set	Mounting Kit for 1 module including screws for 8 mm connectors
38017-0100-00-0	COMe Mount Kit 8 mm 100 sets	Mounting Kit for 100 modules including screws for 8 mm connectors
9-5000-0352	ADA-LVDS_DVI 18 bit	18 bit LVDS to DVI converter
9-5000-0353	ADA-LVDS_DVI 24 bit	24 bit LVDS to DVI converter
96006-0000-00-8	ADA-DP-LVDS	DP to LVDS adapter
96082-0000-00-0	KAB-ADAPT-DP-DVI	DP to DVI adapter cable
96083-0000-00-0	KAB-ADAPT-DP-VGA	DP to VGA adapter cable
96084-0000-00-0	KAB-ADAPT-DP-HDMI	DP to HDMI adapter cable

1.5. Standards

This product complies with the requirements of the following standards.

Table 5: Standards

Type	Aspect	Standard	Comment
CE	Emission	EN61000-6-3, EN55022	
	Electrical Safety	Directive 2014/35/EU	Low Voltage Directive (LVD)
		EN60950-1	
	Product Safety	Directive 2001/95/EC	General Product Safety Directive
EMC	Directive 2014/30/EU	Electromagnetic Compatibility	
Environmental	Climatic Humidity	IEC60068-2-78 ^[1]	
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS 2	Directive 2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment
Environmental	Vibration (Sinusoidal)	IEC60068-2-6	Test parameters: 9-150 (Hz) frequency range 1 (g) acceleration 1 (oct/min) sweep rate 10 cycles/axis 3 axes
	Single Shock	IEC60068-2-27	Test parameters: 15 (g) acceleration 11 (ms) shock duration half sine 3 number of shocks per direction (total: 18) 6 directions 5 (s) recovery time

^[1]Customers desiring to perform further environmental testing of the COMe Ref. Carrier-i T6 TMIP must contact Kontron for assistance prior to performing any such testing.

Boards without conformal coating must not be exposed to a change of temperature that can lead to condensation, as it may cause irreversible damage especially when the board is powered up again.

Kontron does not accept any responsibility for damage to products resulting from destructive environmental testing.

1.6. Related Publications

The following publications contain information relating to this product.

Table 6: Related Publications

Product	Publication
COM Express®	COM Express® Carrier Design Guide Rev 2.0 COM Express® Module Base Specification Rev 2.1
SATA	Serial ATA Specification Revision 3.0
PCI Express	PCI Express Base Specification Rev 2.0 PCI Express M.2 Specification Rev 1.0
DisplayPort	Display Port 1.1a Standard Display Port 1.2 Standard
USB	Universal Serial Bus (USB) 2.0 Specification Rev 2.0 Universal Serial Bus (USB) 3.0 Specification Rev 1.0
I ² C	I2C Bus Specification Version 4.0
SMBus	SMBus Specification Version 2.0
ACPI	ACPI spec Rev 5.0

2/ Functional Description

2.1. Memory

2.1.1. SPI Flash

The COMe Ref. Carrier-i T6 TMIP provides one SPI BIOS socket, J19, for SPI flash ICs with up to 16 MB flash memory for use with an external Carrier BIOS. Depending on the COMe module used the recommended SPI flash ICs include:

- ▶ Winbond W25Q64FVSSIG (8 MB)
- ▶ W25Q128FVSSIG (16 MB)

Booting from the Carrier SPI flash can be enabled or disabled via the onboard DIP switch SW1.

2.1.2. Carrier EEPROM

The COMe Ref. Carrier-i T6 TMIP comes with an onboard 32-kbit I²C EEPROM, U30, for storage of manufacturer records or COMe module information. The address of the carrier EEPROM U30 is 0x52.

2.2. Graphics Interfaces

2.2.1. Digital Display Interfaces

The COMe Ref. Carrier-i T6 TMIP provides the following digital display interfaces (DDIs):

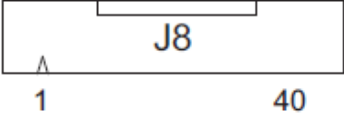
- ▶ DDI1 from the COMe module is directly mapped to the DisplayPort++ connector, J12, through a redriver IC, U5
- ▶ DDI2 from the COMe module is directly mapped to the Mini DisplayPort++ connector, J17, through a redriver IC, U9
- ▶ DDI3 from the COMe module is directly mapped to the Mini DisplayPort++ connector, J16, through a redriver IC, U7

2.2.2. LVDS/eDP Interface

The COMe Ref. Carrier-i T6 TMIP supports a 24-bit, dual-channel LVDS interface via the LVDS/JILI connector, J8.

The following table provides pinout information for the LVDS/JILI connector, J8.

Table 7: LVDS/JILI Connector J8 Pinout

LVDS/JILI Connector (J8)	Pin	Signal	Pin	Signal
	1	LVDS_BKLT_CTRL	21	LVDS_B1+
	2	LVDS_A0-	22	GND
	3	LVDS_A0+	23	LVDS_B2-
	4	LVDS_VDD_EN	24	LVDS_B2+
	5	LVDS_A1-	25	GND
	6	LVDS_A1+	26	LVDS_B_CK-
	7	NC	27	LVDS_B_CK+
	8	LVDS_A2-	28	GND
	9	LVDS_A2+	29	LVDS_B3-
	10	GND	30	LVDS_B3+
	11	LVDS_A_CK-	31	+5V
	12	LVDS_A_CK+	32	+5V
	13	GND	33	+5V
	14	LVDS_A3-	34	+5V
	15	LVDS_A3+	35	LVDS_BKLT_EN
	16	LVDS_I2C_DAT	36	GND
	17	LVDS_B0-	37	GND
	18	LVDS_B0+	38	+12V
	19	LVDS_IC2_CK	39	+12V
	20	LVDS_B1-	40	+12V

If eDP support is required, the COMe Ref. Carrier-i T6 TMIP may optionally be equipped with a Mini DisplayPort++ connector, J9, instead of the LVDS/JILI connector, J8.



To use the eDP interface, the COMe module installed must also support eDP.

2.2.3. PEG Lanes

The COMe Ref. Carrier-i T6 TMIP provides four PEG lanes (PEG#[0-3]) used for the M.2 socket, J34. PEG#0 is muxed with SATA#2.

2.3. System Interfaces

2.3.1. PCI Express Interfaces

The COMe Ref. Carrier-i T6 TMIP provides three general-purpose PCI Express (PCIe) lanes:

- ▶ PCIe#0 for the Mini PCIe half-size card slot, J24, connected to the SIM card socket, J35
- ▶ PCIe#1 for Mini PCIe full-size card slot, J21, muxed with SATA#1 (mSATA), connected to the SIM card socket, J35. Mini PCIe may be enabled via the onboard DIP switch SW1.
- ▶ PCIe#2 for onboard Gigabit Ethernet Controller, U29

2.3.2. SATA Interfaces

The COMe Ref. Carrier-i T6 TMIP supports up to four SATA 6 Gb/s interfaces:

- ▶ SATA#0 via the 22-pin SATA plug connector, J5, through the redriver ICs, U2 and U3
- ▶ SATA#1 for the mSATA socket / Mini PCIe full-size card slot, J21, through the redriver ICs, U10 and U11, muxed with PCIe#1 (Mini PCIe). mSATA may be enabled via the onboard DIP switch, SW1.
- ▶ SATA#2 through the redriver ICs, U41 and U42, muxed with PEG#0 for the M.2 interface, J34
- ▶ SATA#3 via the 22-pin SATA receptacle connector, J33, through the redriver ICs, U6 and U8, for the SATA 2.5" HDD mounting.

2.3.3. M.2 Interface

The COMe Ref. Carrier-i T6 TMIP provides an M.2 socket, J34, via PEG#[0-3] and SATA#2 (muxed with PEG#0), which supports 3M key pinning and 2242, 2260 and 2280 M.2 modules

2.3.4. Gigabit Ethernet Interfaces

The COMe Ref. Carrier-i T6 TMIP provides up to two Gigabit Ethernet interfaces via two single RJ45 connectors:

- ▶ GBE#0 on RJ45 Ethernet connector, J18, directly via the COMe basic / compact Type 6 module
- ▶ GBE#1 on RJ45 Ethernet connector, J20, via the onboard Intel® Ethernet Controller I210-IT, U29 (on PCIe#2)

The Ethernet connector LEDs have the following states:

- ▶ LINK (green): Ethernet Link
- ▶ ACT (green): 1000BASE-T Ethernet Speed
- ▶ ACT (yellow): 100BASE-TX Ethernet Speed ACT (off) + LINK (on): 10BASE-T Ethernet Speed

2.3.5. USB 2.0 Interfaces

The COMe Ref. Carrier-i T6 TMIP supports eight high-speed USB 2.0 interfaces used as host:

- ▶ USB#[0;1] are used for USB 3.0/2.0 double-stack connector, J11.
- ▶ 5V standby power for wake events may be enabled and disabled via the onboard DIP switch, SW1.
- ▶ USB#[2;3] are used for USB 3.0/2.0 pin header, J7
- ▶ USB#[4;5] are routed to the USB 2.0 double-stack connector, J10.
- ▶ 5V Standby Power for wake events may be enabled or disabled via the onboard DIP switch, SW1.

- ▶ USB#6 is used for MiniPCIe half-size interface to enable usage of USB 2.0 high-speed Mini PCIe form factor devices.
- ▶ USB#7 is used for Mini PCIe full-size / mSATA interface to enable usage of USB 2.0 high-speed Mini PCIe form factor devices.

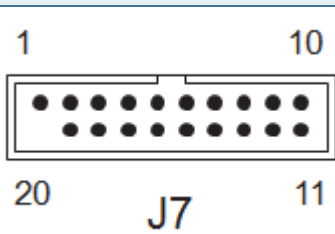
2.3.6. USB 3.0

The COMe Ref. Carrier-i T6 TMIP supports four super-speed USB 3.0 interfaces used as host:

- ▶ USB_SS#[0;1] are routed to the USB 3.0/2.0 double-stack connector, J11.
- ▶ USB_SS#[2;3] are routed to the 20-pin USB 3.0/2.0 pin header, J7.

The following table provides pinout information for the USB 3.0/2.0 pin header, J7.

Table 8: USB 3.0/2.0 Pin Header J7 Pinout

USB 3.0/2.0 Pin Header (J7)	Pin	Signal	Pin	Signal
	1	Power	20	
	2	SSRX2-	19	Power
	3	SSRX2+	18	SSRX3-
	4	GND	17	SSRX3+
	5	SSTX2-	16	GND
	6	SSTX2+	15	SSTX3-
	7	GND	14	SSTX3+
	8	USB2-	13	GND
	9	USB2+	12	USB3-
	10	NC	11	USB3+

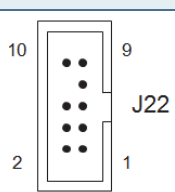
2.3.7. HD Audio Interfaces

The COMe Ref. Carrier-i T6 TMIP provides HD Audio via the industrial grade HD Audio Codec IDT / Tempo Semi 92HD73C (U13) through the following analog and digital audio connectors:

- ▶ Rear panel line-in connector, J25
- ▶ Rear panel SPK / line-out connector, J26
- ▶ Front panel HD audio header, J22
- ▶ S/PDIF header, J23

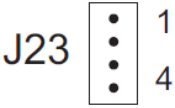
The following table provides pinout information for the front panel HD audio header, J22.

Table 9: Front Panel HD Audio Header J22 Pinout

Front Panel HD Audio Header (J22)	Pin	Signal	Pin	Signal
	10	LINE2_JD	9	LINE2_L
	8		7	SENSE
	6	MIC2_JD	5	LINE2_R
	4	PRESENCE#	3	MIC2_R
	2	GND	1	MIC2_L

The following table provides pinout information for the S/PDIF header, J23.

Table 10: S/PDIF header J23.Pinout

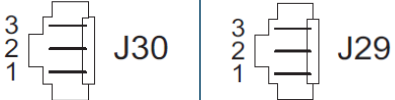
S/PDIF Header (J23)	Pin	Signal
	1	SPDIF_OUT
	2	GND
	3	SPDIF_IN
	4	GND

2.3.8. UART Interfaces

The COMe Ref. Carrier-i T6 TMIP provides two RS232 COM ports (RX/TX only) via the pin headers J30 (COM1/SER0) and J29 (COM2/SER1).

The following table provides pinout information for the pin headers J30 (COM1/SER0) and J29 (COM2/SER1).

Table 11: Pin Headers J30 (COM1/SER0) and J29 (COM2/SER1) Pinouts

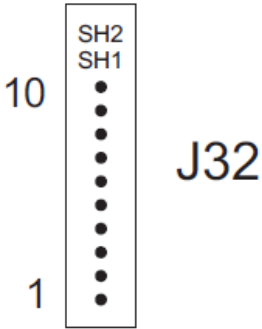
COM/SER Pin Headers (J30) & (J29)	Pin	Signal (J30)	Signal (J29)
	3	GND	GND
	2	SER0_RX	SER1_RX
	1	SER0_TX	SER1_TX

2.3.9. GPIO Interfaces

The COMe Ref. Carrier-i T6 TMIP provides four GPIs and four GPOs via a 10-pin GPIO pin header, J32.

The following table provides pinout information for the GPIO pin header J32.

Table 12: GPIO Pin Header J32 Pinout

GPIO Pin Header (J32)	Pin	Signal
	10	GND
	9	GPO3
	8	GPO2
	7	GPO1
	6	GPO0
	5	GPI3
	4	GPI2
	3	GPI1
	2	GPI0
	1	VCC 3.3V

2.3.10. SIM Interface

The COMe Ref. Carrier-i T6 TMIP provides a SIM card socket, J35, connected to both Mini PCIe interfaces, PCIe#0 and PCIe#1, to support radio-based services on Mini PCIe.

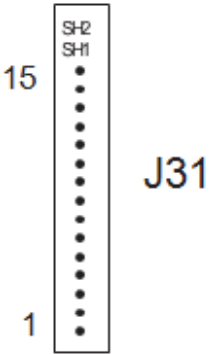
2.3.11. SYS_Signals / Embedded Interfaces

On the COMe Ref. Carrier-i T6 TMIP, a pin header for various SYS_Signals / embedded interfaces, J31, is available and provides access to the following I/Os:

- ▶ I2C
- ▶ SMBus
- ▶ Watchdog
- ▶ LID
- ▶ SLEEP

The following table provides pinout information for the pin header J31.

Table 13: SYS_Signals / Embedded Interfaces Header (J31) Pinout

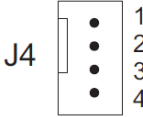
SYS_Signals / Embedded Interfaces Header (J31)	Pin	Signal
	15	GND
	14	GND
	13	GND
	12	RAPID_SHDWN_IN
	11	THRM#
	10	LPC_SERIRQ
	9	SLEEP#
	8	LID#
	7	WAKE1#
	6	WDT
	5	SMB_ALERT#
	4	SMB_DAT
	3	SMB_CK
	2	I2C_DAT
	1	I2C_CK

2.3.12. CPU Fan Interface

The COMe Ref. Carrier-i T6 TMIP provides a 4-pin PWM fan connector, J4, directly controlled by the module fan output.

The following table provides pinout information for the PWM fan connector J4.

Table 14: PWM Fan Connector J4 Pinout

PWM Fan Connector (J4)	Pin	Signal
	1	GND
	2	12V
	3	SENSE
	4	PWM Control

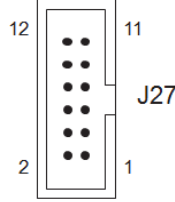
2.3.13. Front Panel Interface

The COMe Ref. Carrier-i T6 TMIP provides a front panel connector, J27, with access to the following signals:

- ▶ HDD activity LED
- ▶ Power LED
- ▶ Power button
- ▶ Reset button
- ▶ Speaker -out (Beep)

The following table provides pinout information for the front panel connector J27.

Table 15: Front Panel Connector (J27) Pinout

Front Panel Connector (J27)	Pin	Signal	Pin	Signal
	12	BEEP#	11	GND
	10	GND	9	SYS_RESET#
	8	GND	7	GND
	6	BEEP+	5	PWRBTN#
	4	GND	3	ATA_ACT#
	2	Power_LED+	1	HDD_LED+

2.3.14. DIP Switch

The COMe Ref. Carrier-i T6 TMIP provides one 8-position DIP switch, SW1, for board configuration.



The DIP switch default settings are indicated in Table 16: DIP Switch SW1 Functionality in bold.

Table 16: DIP Switch SW1 Functionality

DIP Switch (SW1)	Pin	Setting	Functionality
	1	ON	Disable rapid shutdown support for Kontron RXT modules
		OFF	Enable rapid shutdown support for Kontron RXT modules
	2	ON	Enable 5V standby power supply on COMe module for ATX (S-States)
		OFF	Disable 5V standby power supply on COMe module for ATX (S-States)
	3	ON	Enable 5V standby power to USB ports USB#[4;5] for wake events
		OFF	Disable 5V standby power to USB ports USB#[4;5] for wake events
	4	ON	Enable 5V standby power to USB ports USB#[0;1] for wake events
		OFF	Disable 5V standby power to USB ports USB#[0;1] for wake events
	5	ON	Enable mSATA on full-size Mini PCIe / mSATA interface
		OFF	Disable mSATA on full-size MiniPCIe / mSATA interface
	6	ON	Enable booting from COMe module SPI Flash
		OFF	Disable booting from COMe module SPI Flash-Carrier BIOS enabled
	7	ON	Wireless disable for Mini PCIe
		OFF	Wireless enable for Mini PCIe
	8	ON	Reserved
		OFF	

2.3.15. Power Supply and Management

The COMe Ref. Carrier-i T6 TMIP supports fixed input voltage (12V only) as a standard feature via the DC jack, J6, and also supports a wide input voltage range (8.5V - 30V) by default via a wired power connector, J1. The COMe Ref. Carrier-i T6 TMIP can be powered up either through the J1 or the J6 connector.

WARNING

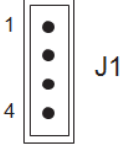
Powering up the COMe Ref. Carrier-i T6 TMIP through both power connectors (J1 & J6) at the same time may result in damage to the power supply unit/power adapter.

The following 12V power supply unit is recommended for use with the COMe Ref. Carrier-i T6 TMIP:

- ▶ DELTA ELECTRONICS. MDS-150AAS12B

The following table provides pinout information for the wired power connector, J1.

Table 17: Power Connector J1 Pinout

Power Connector (J1)	Pin	Signal
	1	V_IN
	2	V_IN
	3	GND
	4	GND

The following mating power connectors are recommended for use with the COMe Ref. Carrier-i T6 TMIP:

- ▶ Würth Electronics, Part Numbers: 691361100004 / 691363110004
- ▶ TE Connectivity AMP Connectors, Part Numbers: 284506-4 / 1986692-4 / 1986693-4

2.3.16. RTC

The COMe Ref. Carrier-i T6 TMIP provides a 2-pin connector, J36, for an external CMOS battery (2 V to 3.3 V) and provides a 2.5F goldcap, (C35), for RTC backup.

3/ 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)
- ▶ Carrier's revision
- ▶ Operating System and Kernel/Build version
- ▶ Software modifications
- ▶ Addition connected hardware/full description of hardware set up

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



Product ID, Serial Number and Revision are located on the carrier's bottom side.

3.1. 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>

2. Download the RMA Request sheet for **Kontron Europe GmbH- Deggendorf** 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.
3. 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

4. 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.

5. 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.

4/Warranty

Kontron defines product warranty in accordance with regional warranty definitions. Claims are at Kontron's discretion and limited to the defect being of a material nature. To find out more about the warranty conditions and the defined warranty period for your region, follow the steps below:

1. Visit Kontron's Term and Conditions webpage.
<http://www.kontron.com/terms-and-conditions>
1. Click on your region's General Terms and Conditions of Sale.

4.1. Limitation/Exemption from Warranty Obligation

In general, Kontron shall not be required to honor the warranty, even during the warranty period, and shall be exempted from the statutory accident liability obligations in the event of damage caused to the product due to failure to observe the following:

- ▶ Safety instructions within this user guide
- ▶ Warning Instructions within this user guide
- ▶ Information and hints within this user guide

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.

Appendix: List of Acronyms

Table 18: List of Acronyms (Example)

BIOS	Basic Input Output System
Carrier Board	Application specific circuit board that accepts a COM Express® module
COM	Computer-on-Module
COMe-b	COM Express® b=basic 125 mm x 95 mm module form factor
COMe-c	COM Express® c=compact 95 mm x 95 mm module form factor
COMe-m	COM Express® m=mini 84 mm x 55 mm module form factor
DDI	Digital Display Interface –
DP	DisplayPort (digital display interface standard)
DVI	Digital Visual Interface
EEPROM	Electrically Erasable Programmable Read-Only Memory
eDP	Embedded Display Port
EMC	Electromagnetic Compatibility (EMC)
ESD	Electro Sensitive Device
Gb	Gigabit
GBE	Gigabit Ethernet
GPI	General Purpose Input
GPIO	General Purpose Input Output
GPO	General Purpose Output
HDA	High Definition Audio (HD Audio)
HD/HDD	Hard Disk /Drive
HDMI	High Definition Multimedia Interface
HWM	Hardware Monitor
I²C	Inter integrated Circuit Communications
IOT	Internet of Things
IPMI	Intelligent Platform Management Interface
ISA	Industry Standard Architecture
LAN	Local Area Network
LPC	Low Pin-Count Interface:
LVDS	Low Voltage Differential Signaling
MLC	Multi Level Cell
MTBF	Mean Time Before Failure
NA	Not Available
NC	Not Connected
NTC	Negative Temperature Coefficient
OS	Operating System

PCI	Peripheral Component Interface
PCIe	PCI-Express
PECI	Platform Environment Control Interface
PEG	PCI Express Graphics
PICMG®	PCI Industrial Computer Manufacturers Group
PHY	Ethernet controller physical layer device
Pin-out Type	COM Express® definitions for signals on COM Express® Module connector pins.
pSLC	pseudo Single Level Cell
PSU	Power Supply Unit
RoHS	Restriction of the use of certain Hazardous Substances
RTC	Real Time Clock
SATA	Serial AT Attachment:
SEL	System Event Log
SLC	Single Level Cell
SMB	System Management Bus
SoC	System on a Chip
SPD	Serial Presence Detect
SPI	Serial Peripheral Interface
SSD	Solid State Drive
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
VGA	Video Graphics Adapter
WDT	Watch Dog Timer
WEEE	Waste Electrical and Electronic Equipement (directive)



About Kontron

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As a part of technology group S&T, Kontron, together with its sister company S&T Technologies, offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information, please visit: www.kontron.com



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