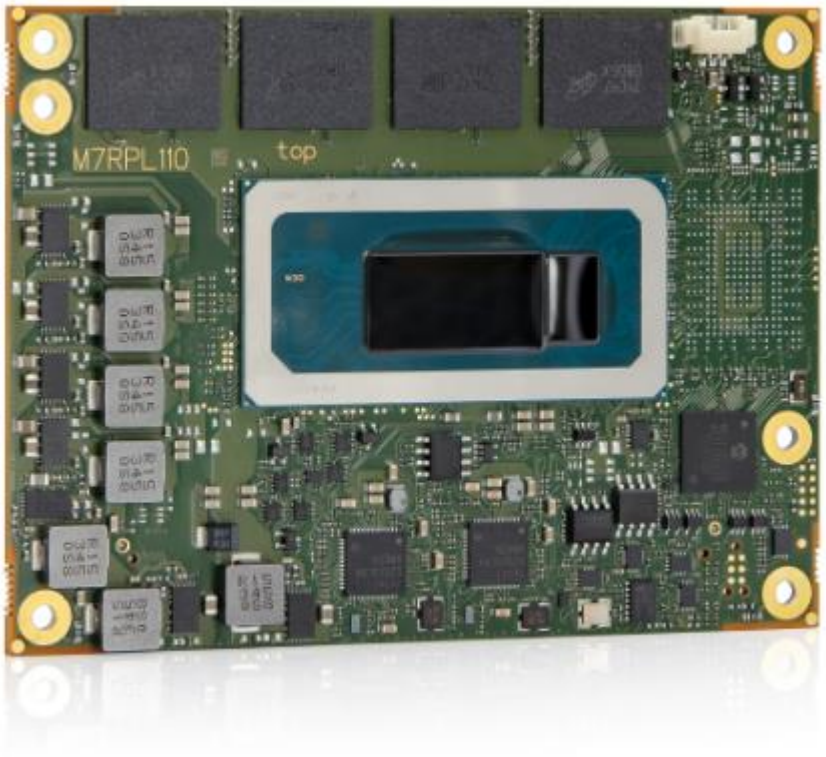

COMh-m7RP (E2)

Rev 1.0

JUMPtec

User Guide - COMh-m7RP (E2)

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Disclaimer

JUMPtec would like to point out that the information contained in this user guide may be subject to alteration, particularly as a result of the constant upgrading of JUMPtec products. This document does not entail any guarantee on the part of JUMPtec with respect to technical processes described in the user guide or any product characteristics set out in the user guide. JUMPtec assumes no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright or mask work rights to these products and makes no representations or warranties that these products are free from patent, copyright or mask work right infringement unless otherwise specified. Applications that are described in this user guide are for illustration purposes only. JUMPtec makes no representation or warranty that such application will be suitable for the specified use without further testing or modification. JUMPtec expressly informs the user that this user guide only contains a general description of processes and instructions which may not be applicable in every individual case. In cases of doubt, please contact JUMPtec.

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Intended Use

This device and associated software are not designed, manufactured or intended for use or resale for the operation of nuclear facilities, the navigation, control or communication systems for aircraft or other transportation, air traffic control, life support or life sustaining applications, weapons systems, or any other application in a hazardous environment, or requiring fail-safe performance, or in which the failure of products could lead directly to death, personal injury, or severe physical or environmental damage (collectively, "high risk applications").

You understand and agree that your use of JUMPtec devices as a component in High Risk Applications is entirely at your risk. To minimize the risks associated with your products and applications, you should provide adequate design and operating safeguards. You are solely responsible for compliance with all legal, regulatory, safety, and security related requirements concerning your products. You are responsible to ensure that your systems (and any JUMPtec hardware or software components incorporated in your systems) meet all applicable requirements. Unless otherwise stated in the product documentation, the JUMPtec device is not provided with error-tolerance capabilities and cannot therefore be deemed as being engineered, manufactured or setup to be compliant for implementation or for resale as device in High Risk Applications. All application and safety related information in this document (including application descriptions, suggested safety measures, suggested JUMPtec products, and other materials) is provided for reference only.

NOTICE	You find the most recent version of the "General Safety Instructions" online in the download area of this product on our JUMPtec website.

NOTICE	This product is not intended for use or suited for storage or operation in corrosive environments, in particular under exposure to sulfur and chlorine and their compounds. For information on how to harden electronics and mechanics against these stress conditions, contact JUMPtec Support.

Revision History

Revision	Brief Description of Changes	Date of Issue	Author
1.0	Release	25.07.2025	IH

Terms and Conditions

JUMPtec warrants products in accordance with defined regional warranty periods. For more information about warranty compliance and conformity, and the warranty period in your region, visit https://www.jumptec.com/en/terms-and-conditions.
JUMPtec sells products worldwide and declares regional General Terms & Conditions of Sale, and Purchase Order Terms & Conditions. Visit https://www.jumptec.com/en/terms-and-conditions.
For contact information, refer to the corporate offices contact information on the last page of this user guide or visit our website CONTACT US.

Customer Support

Find JUMPtec contacts by visiting https://www.jumptec.com/en/service-support.

Customer Service

As a trusted technology innovator and global solutions provider, JUMPtec extends its embedded market strengths into a services portfolio allowing companies to break the barriers of traditional product lifecycles. Proven product expertise coupled with collaborative and highly-experienced support enables JUMPtec to provide exceptional peace of mind to build and maintain successful products.
For more details on JUMPtec's service offerings such as: enhanced repair services, extended warranty, JUMPtec training academy, and more visit https://www.jumptec.com/en/service-support.

Customer Comments

If you have any difficulties using this user guide, discover an error, or just want to provide some feedback, contact JUMPtec 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 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 **ATTENTION** indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées.
	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.
	Caution: HOT Surface! Do NOT touch! Allow to cool before servicing. Attention : Surface CHAUDE ! Ne pas toucher ! Laissez refroidir avant de procéder à l'entretien.
	Caution: 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 JUMPtec 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 JUMPtec 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 JUMPtec 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" 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 lithium battery.

⚠CAUTION	Risk of Explosion if the lithium Battery is replaced by an incorrect Type. Dispose of used lithium batteries According to the instructions. Risque d'explosion si la pile au lithium est remplacée par une pile de type incorrect. Éliminez les piles au lithium usagées conformément aux instructions.

General Instructions on Usage

In order to maintain JUMPtec'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 JUMPtec and described in this user guide or received from JUMPtec 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

JUMPtec 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 JUMPtec's quality and environmental responsibilities, visit https://www.jumptec.com/en/about-jumptec/quality.

Disposal and Recycling

JUMPtec'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 JUMPtec. JUMPtec follows the WEEE directive You are encouraged to return our products for proper disposal.

Table of Contents

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1/General Safety Instructions

Please read this passage carefully and take careful note of the instructions, which have been compiled for your safety and to ensure to apply in accordance with intended regulations. If the following general safety instructions are not observed, it could lead to injuries to the operator and/or damage of the product; in cases of non-observance of the instructions JUMPtec is exempt from accident liability, this also applies during the warranty period.

The product has been built and tested according to the basic safety requirements for low voltage (LVD) applications and has left the manufacturer in safety-related, flawless condition. To maintain this condition and to also ensure safe operation, the operator must not only observe the correct operating conditions for the product but also the following general safety instructions:

- The product must be used as specified in the product documentation, in which the instructions for safety for the product and for the operator are described. These contain guidelines for setting up, installation and assembly, maintenance, transport or storage.
- The on-site electrical installation must meet the requirements of the country's specific local regulations.
- If a power cable comes with the product, only this cable should be used. Do not use an extension cable to connect the product.
- To guarantee that sufficient air circulation is available to cool the product, please ensure that the ventilation openings are not covered or blocked. If a filter mat is provided, this should be cleaned regularly. Do not place the product close to heat sources or damp places. Make sure the product is well ventilated.
- Only connect the product to an external power supply providing the voltage type (AC or DC) and the input power (max. current) specified on the JUMPtec Product Label and meeting the requirements of the Limited Power Source (LPS) and Power Source (PS2) of UL/IEC 62368-1 .
- Only products or parts that meet the requirements for Power Source (PS1) of UL/IEC 62368-1 may be connected to the product’s available interfaces (I/O).
- Before opening the product, make sure that the product is disconnected from the mains.
- Switching off the product by its power button does not disconnect it from the mains. Complete disconnection is only possible if the power cable is removed from the wall plug or from the product. Ensure that there is free and easy access to enable disconnection.
- The product may only be opened for the insertion or removal of add-on cards (depending on the configuration of the product). This may only be carried out by qualified operators.
- If extensions are being carried out, the following must be observed:
- all effective legal regulations and all technical data are adhered to
- the power consumption of any add-on card does not exceed the specified limitations
- the current consumption of the product does not exceed the value stated on the product label

- Only original accessories that have been approved by JUMPtec can be used.
- Please note: safe operation is no longer possible when any of the following applies:
- the product has visible damages or
- the product is no longer functioning
  In this case the product must be switched off and it must be ensured that the product can no longer be operated.

- Handling and operation of the product is permitted only for trained personnel within a work place that is access controlled.
- CAUTION: Risk of explosion if the lithium battery is replaced incorrectly (short-circuited, reverse-poled, wrong lithium battery type). Dispose of used lithium batteries according to the manufacturer’s instructions.
- This product is not suitable for use in locations where children are likely to be present

Additional Safety Instructions for DC Power Supply Circuits

- To guarantee safe operation, please observe that:
- the external DC power supply must meet the criteria for LPS and PS2 (UL/IEC 62368-1)
- no cables or parts without insulation in electrical circuits with dangerous voltage or power should be touched directly or indirectly

- a reliable functional earth connection is provided
- a suitable, easily accessible disconnecting device is used in the application (e.g. overcurrent protective device), if the product itself is not disconnect able
- a disconnect device, if provided in or as part of the product, shall disconnect both poles simultaneously
- interconnecting power circuits of different products cause no electrical hazards

- A sufficient dimensioning of the power cable wires must be selected – according to the maximum electrical specifications on the product label – as stipulated by EN62368-1 or VDE0100 or EN60204 or UL61010-1 regulations.

For the General Safety Instruction in German or French, visit JUMPtec's product web page> Downloads> Manuals> General Safety Instructions.

1.1. Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Therefore, proper packaging and grounding techniques are necessary precautions to prevent damage.
Always take the following precautions:

ESD Sensitive Device!
Keep electrostatic sensitive parts in their containers until they arrive at the ESD-safe workplace. Always be properly grounded when touching a sensitive board, component, or assembly.

For more Information, see the Special Handling and Unpacking Instruction within this user guide and the following Chapter Grounding Methods.

1.2. Grounding Methods

The following measures help to avoid electrostatic damages to the device:

- Cover workstations with approved antistatic material. Always wear a wrist strap connected to the workplace, as well as properly grounded tools and equipment.
- Use antistatic mats, heel straps, or air ionizers for more protection.
- Always handle electrostatically sensitive components by their edge or by their casing.
- Avoid contact with pins, leads, or circuitry.
- Switch off power and input signals before inserting and removing connectors or connecting test equipment.
- Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and styrofoam.
- Use field service tools such as cutters, screwdrivers, and vacuum cleaners that are conductive.
- Always place drives and boards with the PCB-assembly-side down on the foam.

1.3. Instructions for Lithium Battery

If the product is equipped with a lithium battery, there is a risk of explosion if the lithium battery is replaced incorrectly (short-circuited, reverse-poled, wrong lithium battery type). Dispose of used batteries according to the manufacturer's instructions.

⚠CAUTION

Risk of Explosion if the lithium battery is replaced by an incorrect Type. Dispose of used batteries according to the instructions.

Risque d'explosion si la pile au lithium est remplacée par une pile de type incorrect. Éliminez les piles au lithium usagées conformément aux instructions

Do not dispose of lithium batteries in general trash collection. Dispose of the lithium battery according to the local regulations dealing with the disposal of these special materials, (e.g. to the collecting points for dispose of batteries).

2/Product Introduction

This user guide describes the COM-HPC® Mini Computer-On-Module COMh-m7RP (E2) feature set. JUMPtec recommends users to study this user guide before powering on the module.

2.1. Product Naming Clarification

Table 1: COM-HPC® Product Naming Clarification

Standard short form	Type	Module size	Processor family identifier	Available temperature variants
COMh-	m = mini c = client s = server	7 = Size: 95mm x 70mm a = Size A: 95mm x 120mm b = Size B: 120mm x 120mm c = Size C: 160mm x 120mm d = Size D: 160mm x 160mm e = Size E: 200mm x 160mm	ID = IceLake D AP = AlderLake P AS = AlderLake S etc.	none = Commercial E1 = Extended -25°C up to + 75°C E2 = Industrial -40°C up to + 85°C E2S = Screened industrial -40°C up to + 85°C

2.2. Product Description

The COMh-m7RP (E2) is a COM-HPC® Mini Computer-On-Module designed for flexible implementation within multiple embedded industrial environments. It is based on a 13th Gen Intel® Core™ processor supporting up to 10 cores and 12 threads with Intel® Hybrid technology. The COMh-m7RP (E2) features an optimized power-performance ratio with a power consumption of 15 - 45W TDP (Thermal Design Power). The module also comes with up to 64 GB of LPDDR5 soldered memory and up to 2x 2.5 Gbit Ethernet. As storage medium, a NVME SSD up to 1 TB can be optionally integrated onboard.

Key features are:

- COM-HPC® Size Mini small form factor – 95 mm x 70 mm
- Up to 16x PCIe Gen lanes
- Up to 2x 2.5 Gbit Ethernet with TSN support
- Memory: Max 64GB LPDDR5 soldered
- Optional onboard storage NVMe
- Industrial temperature versions
- Embedded management controller

2.3. COM-HPC® Documentation

The COM-HPC® specification defines the COM-HPC® module form factor, pinout and signals. For more COM-HPC® specification information, please visit the PCI Industrial Computer Manufacturers Group (PICMG®) website.

2.4. COM-HPC® Mini Functionality

The COM-HPC® Mini modules are populated with one 400-pin connector: J1 with 4 rows called A to D.
The COM-HPC® Mini module features the following maximum amount of interfaces according to the PICMG module pinout type.

Table 2: COM-HPC® Mini and COMh-m7RP (E2) functionality

Interfaces	COM-HPC Mini Min / Max	COMh-m7RP (E2)	Comments
NBASE-T	1 / 2	up to 2	1 / 2.5 GBASE-T via i226
Ethernet SGMII ports	0 / 2	2 as option	
I2C2 / MDIO (for SGMII PHY setup)	0 / 1	1	
SATA	0 / 2	2 as option	
PCIe 0:15	1 / 16	16	Two PCIe Reference Clock output pairs required on the Mini
PCIe Target on Module Support	0 / 1	N/A	
USB 2.0 Ports 0:7	6 / 8	8	
USB 3.2 Gen 1 or Gen 2	0 / 4	up to 4	depends on the defined config
USB 4.0 Support	0 / 4	up to 3	depends on the defined config
eDP	0 / 1	1	
Asynchronous Serial Ports	0 / 2	2	
Boot SPI Interface	1 / 1	1	
BIOS Select Options	1 / 1	1	
Digital Display Interfaces (DDI)	0 / 2	up to 2	depends on the defined config
eSPI	0 / 1	1	
Soundwire Audio	0 / 2	2	HDA is default
I2S Audio / 2nd Soundwire / HDA	0 / 1	1	I2S / 2x Soundwire on request (untested feature)
I2C Ports	2 / 3	3	3rd I2C = I2C2 / ETH_MDIO
General Purpose SPI Port	1 / 1	1	
Power and System Management e.g. TAMPER#, LID#, SLEEP#..	1 / 1	1	
Thermal Protection CARRIER_HOT# THERMTRIP#	1 / 1	1	
System Management Bus	1 / 1	1	
GPIO	12 / 12	12	
FuSa set of signals	0 / 1	0	
Module Type Pin Support	1 / 1	1	
Watchdog Timer	0 / 1	1	
Secondary Fan Tach and PWM	1 / 1	1	
CAN Bus	0 / 1	1	on request (untested feature)
FFC connectors for MIPI-CSI	0 / 2	0	

2.5. COM-HPC® Benefits

COM-HPC® defines a Computer-On-Module (COM), with all the components necessary for a bootable host computer, packaged as a highly integrated computer. All JUMPtec COM-HPC® modules are very compact and feature a standardized form factor and a standardized connector layout that carry a specified set of signals. Each COM module is based on the COM-HPC® specification. This standardization allows designers to create a single-system carrier board that can accept present and future COM-HPC® modules. The carrier board designer can optimize exactly how each of these functions implements physically. Designers can place connectors precisely where needed for the application, on a carrier board optimally designed to fit a system's packaging. A single carrier board design can use a range of COM-HPC® modules with different sizes and pinouts. This flexibility differentiates products at various price and performance points and provides a built-in upgrade path when designing future-proof systems. The modularity of a COM-HPC® solution also ensures against obsolescence when computer technology evolves. A properly designed COM-HPC® carrier board can work with several successive generations of COM-HPC® modules. A COM-HPC® carrier board 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.

3/Product Specification

3.1. Module Variants

3.1.1. Industrial Temperature Grade Modules (E2, -40°C to +85°C)

Table 3: Product Number for Industrial Grade Modules (-40°C to +85°C)

Part Number	CPU	LPDDR5 memory down	ETH	DDI	USB 4.0	USB 3.2 Gen2	Flash - NVMe
HM702-3200-80-7	i7-13800HRE	32 GB	2 x2.5GbE	2	None	4	no
HM702-1600-60-5	i5-13600HRE	16 GB	2 x2.5GbE	2	None	4	no
HM702-1600-30-3	i3-13300HRE	16 GB	2 x2.5GbE	2	None	4	no
HM702-3200-70-7	i7-1370PRE	32 GB	2 x2.5GbE	2	None	4	no
HM702-1600-50-5	i5-1350PRE	16 GB	2 x2.5GbE	2	None	4	no
HM702-1600-20-3	i3-1320PRE	16 GB	2 x2.5GbE	2	None	4	no
HM702-1600-65-7	i7-1365URE	16 GB	2 x2.5GbE	2	None	4	no
HM702-1600-45-5	i5-1345URE	16 GB	2 x2.5GbE	2	None	4	no
HM702-0800-15-3	i3-1315URE	8 GB	2 x2.5GbE	2	None	4	no

3.2. Accessories

Accessories are product specific, COM-HPC® specific or general COM accessories. For more information, contact your local JUMPtec Sales Representative or JUMPtec Inside Sales.

3.2.1. Cooling

A standard heat spreader solutions can be used, which are available in a threaded and non-threaded (through hole) version.

Table 4: Cooling Equipment for COMh-m7RP (E2)

Product Number	Product Name	Description
HM702-0000-99-0	HSP COMh-m7RP (E2) THREAD	Heatspreader for COMh-m7RP commercial and E2, Cu-core, threaded mounting holes
HM702-0000-99-1	HSP COMh-m7RP (E2) THROUGH	Heatspreader for COMh-m7RP commercial and E2, Cu-core, through mounting holes
HM799-0000-99-0	COMh Mini active uni cooler (w/o HSP)	COM-HPC® Universal Active Cooler for Heatspreader Mounting
HM799-0000-99-1	COMh Mini passive uni cooler (w/o HSP)	COM-HPC ® Universal Passive Cooler for Heatspreader Mounting

3.2.2. Evaluation Carrier

Table 5: Evaluation Carrier

Product Number	Product Name	Description
HMT01-0000-10-0	COM-HPC Mini Eval Carrier 10mm	COM-HPC Mini Carrier with 10mm Connector Height
HMT01-0000-00-1	COM-HPC Mini SuperSpeed - ADA-CFG1	Adapter Card for COM-HPC/Mini Eval-Carrier supporting 2xDP, 4x USB Type A (USB 3.2 Gen2), 2x USB 2.0
HMT01-0000-00-3	COM-HPC Mini SuperSpeed - ADA-CFG3	Adapter Card for COM-HPC/Mini Eval-Carrier supporting 1xDP, 2xUSB Type C (USB 4), 2x USB Type C (USB 3.2 Gen2), 2x USB 2.0

3.2.3. Various

Table 6: Various

Product Number	Product Name	Description
HXX17-0000-00-0	COM-HPC Universal Mounting Kit	COM-HPC® Universal Mounting Kit - 1x set
96079-0000-00-0	KAB-HSP 200 mm	Cable adapter for FAN to module connection with cable length 200mm
96079-0000-00-2	KAB-HSP 400 mm	Cable adapter for FAN to module connection with cable length 40mm

3.3. Functional Specification

3.3.1. Technical Data

Table 7: Technical Data

Function	Definition
Compliance	COM-HPC® Mini
Dimension (H X W)	95 mm x 70 mm
CPU	Intel® 13th Generation Core™ family (U-Series, P-Series, H-Series)
Chipset	Integrated in SOC
Main memeory	Up to 64 GByte LPDDR5 6000 MT/s memory down (In-Band ECC)
Graphics Controller	SOC: Intel® Iris® Xe Graphics on i7/i5 processors; Intel® UHD Graphics on i3/Pentium® processors
Ethernet Controller	2x Intel® i226-IT
Ethernet	2x 2.5 Gb Ethernet with TSN
Storage	Optional: 2x SATA 6Gb/s
Flash onboard	Up to 1 TByte NVMe SSD (on request)
PCI Express®	Default: 8x PCIe Gen3 (8 x1 / 4 x2 / 2 x4) + 8x PCIe Gen4 (2 x4) On request with H-Series: 8x PCIe Gen3 (8 x1 / 4 x2 / 2 x4) + 8x PCIe Gen5 (1 x8)
Display / USB	Default: Config1: 2x DDI, no USB 4.0, 4x USB 3.2 Gen2 On request: Config2: 1x DDI, 1x USB 4.0, 4x USB 3.2 Gen2 On request: Config3: 1x DDI, 2x USB 4.0, 2x USB 3.2 Gen2 On request: Config4: no DDI, 3x USB 4.0, 2x USB 3.2 Gen2 8x USB 2.0 (USB2.0 part of USB 4.0 and USB 3.2) 1x eDP
Serial	2x serial interface (RX/TX/RTS/CTS)
Audio	Intel® High Definition Audio
Other Features	CAN, (G) SPI, SMB, Fast I²C, Staged Watchdog, RTC
Special Features	Industrial grade temperature
Features on request	NVMe up to 1TByte, with H-Series: 8x PCIe Gen5 instead of Gen4
Power Management	ACPI 6.0
Power Supply	8.0 V – 20 V Wide Range, Single Supply Power
BIOS	AMI Aptio V
Operating System	Windows 10 Enterprise LTSC (later Windows 11), Linux
Temperature	COMh-m7RP E2 - industrial temperature: -40° C to +85° C operating, -40° C to +85° C non-operating
Humidity	93% relative Humidity at 40°C, non-condensing (according to IEC 60068-2-78)

3.3.2. Block Diagram

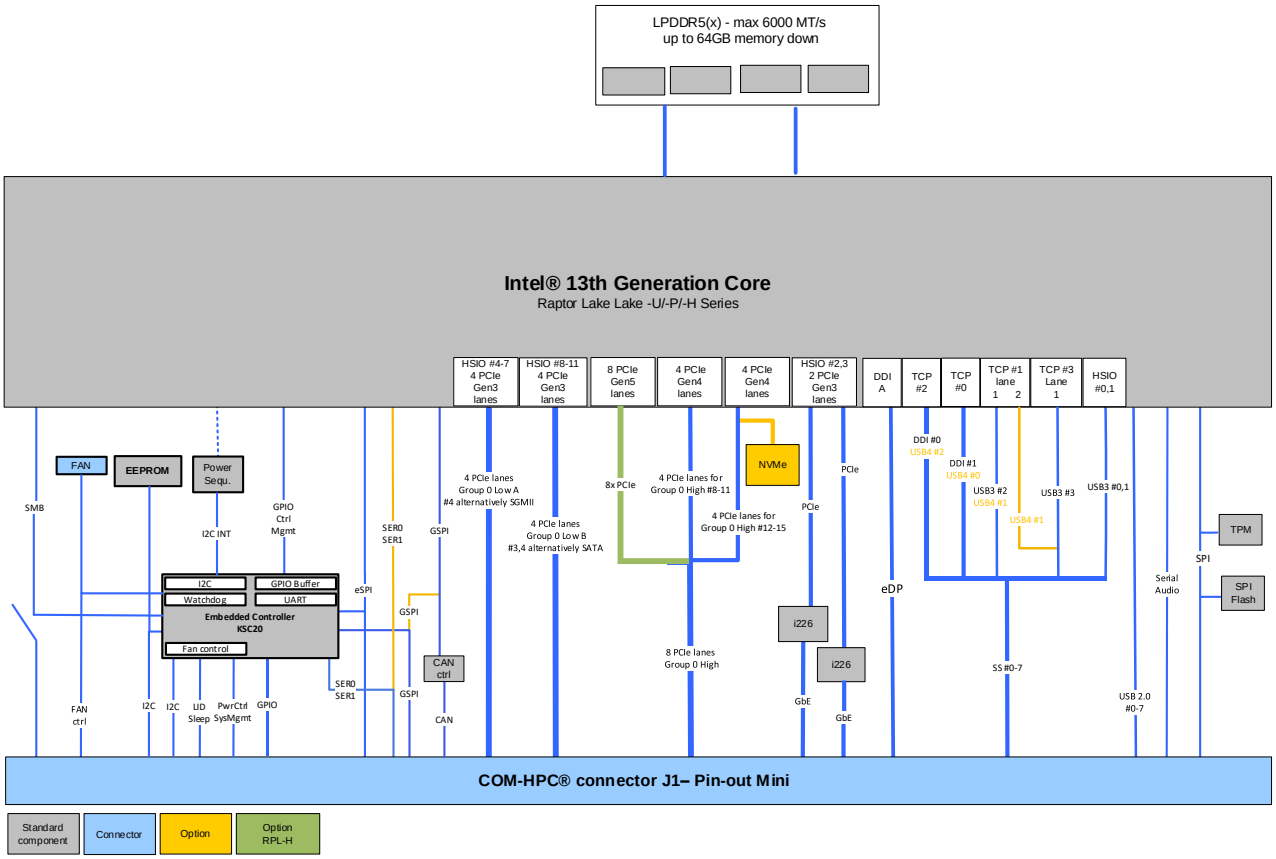

Figure 1: COMh-m7RP (E2) Block Diagram

3.3.3. Top Side

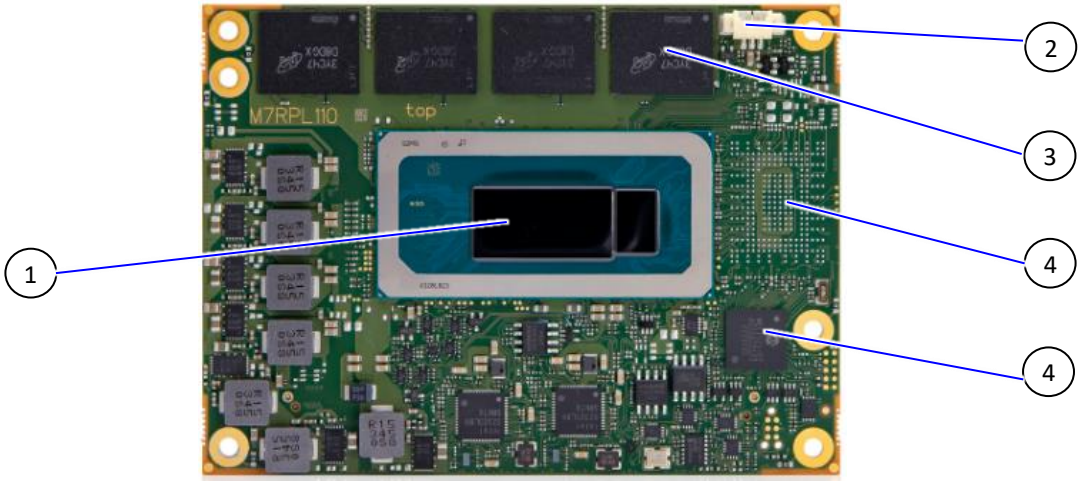

Figure 2: COMh-m7RP (E2) Front Side

1. Processor
2. Fan Connector
3. Memory down
4. NVME (optional)
5. Embedded Controller KSC20

3.3.4. Bottom Side

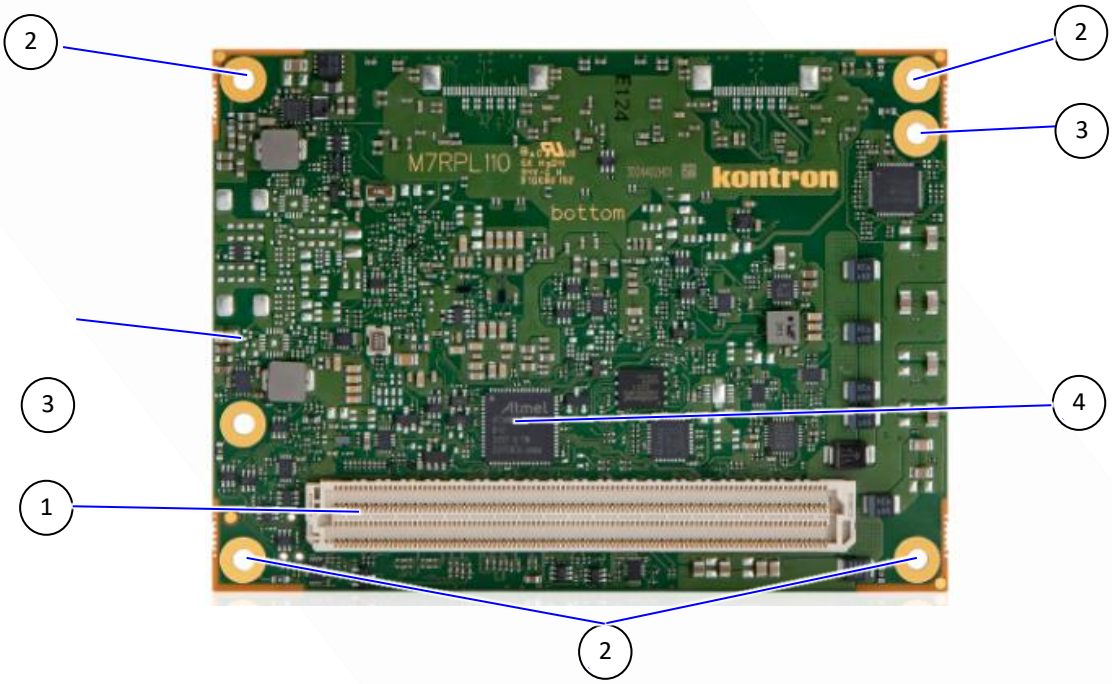

Figure 3: COMh-m7RP (E2) Bottom Side

1. COM-HPC connector J1
2. Four mounting holes - for heatspreader to module, module to carrier mounting
3. Two mounting holes - for heatsink mounting to heatspreader (JUMPtec specific)
4. Power Sequence Controller

3.3.5. Processor (CPU)

The 13th Gen Intel® Core™ mobile processors combine power efficiency, performance, flexibility, and industrial-grade features to drive success for demanding AI, graphics, and rugged edge use cases.
This new generation offers a performance hybrid architecture with up to 14 cores and flexible processor base power from 15W to 45W.
13th Gen Intel Core mobile processors also offer enhanced Intel® Iris® Xe Graphics for fast, powerefficient parallel AI processing and immersive visual experiences. And with industrial-grade features and ruggedized SKUs, this lineup will enable advanced intelligence and real-time performance in the most-challenging environments.

Key features are:

- Intel® 7 process technology
- Up to 14 cores, up to 20 threads in IoT SKUs
- Up to 24 MB Intel® Smart Cache
- Processor base power range of 15W to 45W
- Intel® Iris® Xe Graphics with up to 96 execution units (EUs)
- Support for up to four concurrent displays at up to 4K resolution or one display at 8K resolution
- Pipelock video synchronization for Windows, graphics and display virtualization
- Intel® Deep Learning Boost (Intel® DL Boost) with VNNI instructions
- Support for Intel® TCC/TSN on ind. SKUs
- IBECC memory on ind. SKUs

› Extended temperature (-40°C to 100°C Tj)

Table 8: 13th Gen Intel® Core™ Processor Family H-Series

	13th GEN RAPTOR LAKE H-SERIES (45W)		
CPU	i7-13800HRE	i5-13600HRE	i3-13300HRE
Cores	14	12	8
Number of P-Cores	6	4	4
Frequency Base/Turbo (P-Cores)	2.5/5.0 GHz	2.7/4.8 GHz	2.1/4.6 GHz
Number of E-Cores	8	8	4
Frequency Base/Turbo (E-Cores)	1.8/4.0 GHz	1.9/3.6 GHz	1.5/3.4 GHz
TDP	45/35 W		
Cache	24 MByte	18 MByte	12 MByte
IBECC	yes		
TCC/TSN	yes		
Tjunction min	-40°C		
Tjunction max	100°C		
Use condition	Embeddded / Industrial*		

Table 9: 13th Gen Intel® Core™ Processor Family P-Series

	13th GEN RAPTOR LAKE P-SERIES (28W)		
CPU	i7-1370PRE	i5-1350PRE	i3-1320PRE
Cores	14	12	8
Number of P-Cores	6	4	4
Frequency Base/Turbo (P-Cores)	1.9/4.8 GHz	1.8/4.6 GHz	1.7/4.5 GHz
Number of E-Cores	8	8	4
Frequency Base/Turbo (E-Cores)	1.2/3.7 GHz	1.3/3.4 GHz	1.2/3.3 GHz
TDP	28/20 W		
Cache	24 MByte	12 MByte	12 MByte
IBECC	yes		
TCC/TSN	yes		
Tjunction min	-40°C		
Tjunction max	100°C		
Use condition	Embeddded / Industrial*		

Table 10: 13th Gen Intel® Core™ Processor Family U-Series

	13th GEN RAPTOR LAKE U-SERIES (15W)		
CPU	i7-1365URE	i5-1345URE	i3-1315URE
Cores	10	10	6
Number of P-Cores	2	2	2
Frequency Base/Turbo (P-Cores)	1.7/4.9 GHz	1.4/4.6 GHz	1.2/4.5 GHz
Number of E-Cores	8	8	4
Frequency Base/Turbo (E-Cores)	1.2/3.7 GHz	1.1/3.4 GHz	0.9/3.3 GHz
TDP	15/12 W		
Cache	12 MByte	12 MByte	10 MByte
IBECC	yes		
TCC/TSN	yes		
Tjunction min	-40°C		
Tjunction max	100°C		
Use condition	Embeddded / Industrial*		

*For Industrial use condition the turbo frequency needs to be disabled

For this processor family the Dynamic Temperature Range (DTR) behavior applies. DTR is the temperature range the processor can operate in. The temperature range starts with the temperature of the processor (Tj = junction

temperature) at boot time (TBoot) and can transition to a lower and/or higher temperature within the Tj min and Tj max limits.

E.g.: Tj min = -40°, the Tj max = 100°C and the DTR = +-90°C

- TBoot = -40°C: the processor can operate from -40°C up to + 50°C
- TBoot = -20°C: the processor can operate from -40°C up to + 70°C
- TBoot = +20°C: the processor can operate from -40°C up to + 100°C

A Tj outside of the DTR range requires a cold reset but is not enforced by the hardware.

The behavior is described in Intel whitepaper #814861 as DTR = Dynamic Temperature Range and in Intel document #735978, which is not public.

Please contact JUMPtec Support for further information.

Table 11: DTR Table

CPU Use Condition	Extended Temp: Embedded / Industrial
CPU Tj min.	-40°C
CPU Tj max.	100°C
DTR (Cold to Hot Transition)	TBoot + 110°C
DTR (Hot to Cold Transition)	TBoot - 110°C

3.3.6. System Memory

The COMh-m7RP (E2) uses a Dual-Channel LPDDR5 memory down configuration with up to 4 x128Gbit chips which enables a maximum system memory capacity of 64 GByte. Depending on the internal structure of used RAM chips a maximum transfer rate of 6000 MT/s can be achieved. IBECC (In-Band error-correcting code) is supported by the integrated PCH of the 13th Gen Intel® Core™ mobile SoCs. The following table summarizes the specific system memory features:

Table 12: System Memory

Type	LPDDR5
Densities	32 Gbit, 64 Gbit, 128 Gbit
Channels	2
Capacity (max.)	64 GByte
Speed (max.)	6000 MT/s

3.3.7. High-Speed Interface Overview

The integrated SoC PCH supports 12x HSIO (High-Speed IO) lanes #0-11, which can be configured as PCIe Gen 3.0 lanes with a maximum of 6 PCIe root ports. The HSIO PCIe lanes are partly multiplexed with USB3.2 / SATA and SGMII.

Table 13: HSIO Mapping

PCH-HSIO	Interface	Default-Usage	Default PCIe-Config	On req.	On req.	On req.
0	USB	COM-HPC Connector				
1	USB	COM-HPC Connector				
2	PCIe Gen 3.0	Onboard i226	X1	X1	X1	X1
3	PCIe Gen 3.0	Onboard i226	X1	X1	X1	X1
4	PCIe #0 Gen 3.0	COM-HPC Connector Group 0 Low A	X1	X2	X2	X4
5	PCIe #1 Gen 3.0		X1			
6	PCIe #2 Gen 3.0 / SGMII		X1	X2	X2	
7	PCIe #3 Gen 3.0 / SGMII		X1			
8	PCIe #4 Gen 3.0	COM-HPC Connector Group 0 Low B	X4	X4	X2	X4
9	PCIe #5 Gen 3.0					
10	PCIe #6 Gen 3.0 / SATA 1				X2	
11	PCIe #7 Gen 3.0 / SATA 0					

A BIOS-Package including different PCIe-configs is available on the Customer Section
To support SATA a custom BIOS is required - please contact JUMPtec Support

3.4. Interfaces

3.4.1. PCIe

COM-HPC Mini allows for up to 16 PCIe lanes. The PCIe lanes are divided into following Groups:

- Group 0 Low A: PCIe lanes 0:3
- Group 0 Low B: PCIe lanes 4:7
- Group 0 High: PCIe lanes 8:15

The SoC PCH provides 8x PCIe Gen 3.0 lanes on COM-HPC Group 0 Low A and Group 0 Low B.
Further information see Chapter 3.3.7 High Speed Interface Overview.

In addition the SoC CPU offers 8x PCIe Gen 4.0 lanes on COM-HPC Group 0 High.
CPU SKUs of the Processor Family H-Series can provide alternatively 8x PCIe Gen 5.0 lanes

Table 14: CPU PCIe Lanes

Processor Series H/P/U PCIe Gen 4.0				Processor Series H only PCIe Gen 5.0	
Default	**On request**	**Lane Config**		**On request**	**Lane Config**
Group 0 High #8	Group 0 High #8	x4		Group 0 High #8	x8
Group 0 High #9	Group 0 High #9			Group 0 High #9	
Group 0 High #10	Group 0 High #10			Group 0 High #10	
Group 0 High #11	Group 0 High #11			Group 0 High #11	
Group 0 High #12	Onboard NVMe	x4		Group 0 High #12	
Group 0 High #13				Group 0 High #13	
Group 0 High #14				Group 0 High #14	
Group 0 High #15				Group 0 High #15	

3.4.2. Super Speed Lanes

The COM-HPC Mini specification defines eight Super Speed Lanes which can be configured as DDI / USB 4.0 / USB 3.2 inclusing USB 2.0 ports. Five different configurations for these eight Super Speed Lanes are defined.

Table 15: COM-HPC Mini Super Speed Lane Configuration and USB 2.0 Assignments - Overview

SS Lanes	Config 1 Default	Config 2 On request	Config 3 On request	Config 4 On request	Config 5 On request	USB 2.0 Support for USB4	USB 2.0 Support for USB3.2
SS Lane 0	DDI #0	DDI #0	DDI #0	USB4 #2	USB4 #2	USB2 #2	
SS Lane 1							
SS Lane 2	DDI #1	USB4 #0	USB4 #0	USB4 #0	USB4 #0	USB2 #0	
SS Lane 3							
SS Lane 4	USB3 #3	USB3 #3	USB4 #1	USB4 #1	USB4 #1	USB2 #1	USB2 #1
SS Lane 5	USB3 #2	USB3 #2					USB2 #4
SS Lane 6	USB3 #1	USB3 #1	USB3 #1	USB3 #1	USB4 #3	USB3 #3	USB2 #3
SS Lane 7	USB3 #0	USB3 #0	USB3 #0	USB3 #0			USB2 #5

The COMh-m7RP (E2) supports configuration #1 - #4, whereas configuration #1 is the default configuration.

To test configuration #1 and #3 JUMPtec offers together with the COM-HPC Mini evaluation carrier an according adapter card.

Configuration #2 -#4 are available on request . Please contact JUMPtec Support for further information.

3.4.3. SATA

The COM-HPC Mini specification defines two SATA ports as alternative signal usage instead of COM-HPC Mini PCIe #7 and #6.

The COMh-m7RP (E2) supports following SATA interfaces (see also Chapter 3.3.7 High Speed Interface Overview):

Table 16: SATA Port Connections

COM-HPC Connector	HSIO Lane #	Description
SATA 0	11	SATA Gen 3, 6 Gb/s
SATA 1	10	SATA Gen 3, 6 Gb/s

To support SATA a custom BIOS is required - please contact JUMPtec Support

3.4.4. Ethernet

For a COM-HPC Mini module two NBASE-T Ethernet ports are defined.

The COMh-m7RP (E2) supports two 1/2.5GBASE-T ports.
HSIO lane #2 and #3 of the integrated SoC PCH are used as PCIe Gen 3.0 lane for the two onboard 1/2.5 GbE Controller Intel i226 (see Chapter 3.3.7 High Speed Interface Overview).

3.4.5. Graphics Interface

See Chapter 3.4.2 Super Speed Lanes

3.4.6. Audio Interface

The COMh-m7RP (E2) uses SoundWire DMIC and HDA Audio interface connect to the COM-HPC connector.

Table 17: SoundWire

COM-HPC Connector	SoundWire
SNDW_DMIC_CLK0	Clock for SoundWire 0 transactions
SNDW_DMIC_DAT0	Bi-directional PCM audio data for SoundWire 0
SNDW_DMIC_CLK1	Clock for SoundWire 1 transactions
SNDW_DMIC_DAT1	Bi-directional PCM audio data for SoundWire 1

Table 18: SoundWire / HDA / I2S Pin-Sharing

COM-HPC Connector	HDA / I2C (CPU pin-sharing) - default		SoundWire - on request
I2S_CLK/SNDW_CLK2/HDA_BCLK	HDA serial data clock	I2S Clock	SoundWire 2 clock
I2S_DIN/SNDW_DAT2/HDA_SDI	HDA serial TDM data input	I2S Data In	Bi-directional SoundWire 2 data
I2S_DOUT/SNDW_DAT3/HDA_SDO	HDA serial TDM data output	I2S_DOUT	Bi-directional SoundWire 3 data
I2S_LRCLK/SNDW_CLK3/HDA_SYNC	HDA sample synchronization signal	I2S L/R Clock	SoundWire 3 clock
I2S_MCLK/HDA_RST#	HDA reset output	I2S Master Clock	-

3.4.7. UART

Two 3.3V logic level asynchronous serial ports, designated UART0 and UART1 are defined by COM-HPC.
Each port has TX and RX signals for data use and RTS# and CTS# signals for optional handshake / flow control use. For logic level use, the TX and RX signals are active high and the RTS# and CTS# signals are active low. Some data sheets omit the trailing '#' signal but the logic level handshake signals are active low nonetheless. The idle state, or 'mark' state, of the logic level TX line is high, or 1.8V in the COM-HPC Mini case.
These ports may be used directly as logic level asynchronous serial connections between COM-HPC Module and Carrier based devices, or between COM-HPC Module and Carrier based mezzanine devices such as certain Mini-PCIe or M.2 cards. Care has to be taken that the logic I/O levels match up.

The UART interfaces on the COMh-m7RP (E2) are supported by default via the EC (embedded controller). It can be reconnected to the SoC's PCH's UARTs on request.

Table 19: UART interfaces on COMh-m7RP (E2)

COM-HPC Connector	EC (Default)	SoC PCH (Optional)
UART0_TX	UART0_TX	option on request
UART0_RX	UART0_RX	
UART0_RTS#	UART0_RTS#	
UART0_CTS#	UART0_CTS#	
UART1_TX	UART1_TX	option on request
UART1_RX	UART1_RX	
UART1_RTS#	UART1_RTS#	
UART1_CTS#	UART1_CTS#	

3.4.8. CAN

The COMh-m7RP (E2) supports a discrete CAN controller providing a CAN interface to the COM-HPC connector.

3.4.9. General Purpose SPI Interface

The COM-HPC Mini module can support a General Purpose SPI interface (GP_SPI) to connect multiple peripherals.

The COM-HPC GP_SPI interface on the COMh-m7RP (E2) is handled by the EC (embedded controller).

Table 20: GP_SPI on COMh-m7RP (E2)

COM-HPC Connector	EC
GP_SPI_CLK	EC_GP_SPI_CLK
GP_SPI_MOSI	EC_GP_SPI_MOSI
GP_SPI_MISO	EC_GP_SPI_MISO
GP_SPI_CS0#	EC_GP_SPI_CS0#
GP_SPI_CS1#	EC_GP_SPI_CS1#
GP_SPI_CS2#	EC_GP_SPI_CS2#
GP_SPI_CS3#	EC_GP_SPI_CS3#
GP_SPI_ALERT#	EC_GP_SPI_ALERT#

3.4.10. Boot SPI Interface

The Boot SPI interface is used to support loading all or parts of the system BIOS from a Module or Carrier based SPI (Serial Peripheral Interface) flash. The SPI flash device has a capacity of 32 MB (256 Mb).
Alternatively there may be a flash device on the Carrier and / or on the Module, for a combined total of up to 64 MB. In most situations, only one flash device, either on the Module or on the Carrier, is used.

An external BIOS ROM can be placed on the carrier and connected via SPI. Boot source is selected by pulling BSEL [2:0] pins low on the COM-HPC carrier (pull-up on module). BSEL is decoded by the EC (embedded controller) which controls a multiplexer IC via SPI_CS_SEL[1:0] to assign the chip selects from the PCH to their designation.

Table 21: Boot SPI interface

COM-HPC Connector	Signal PCH	Description
BOOT_SPI_CS#	SPI0_CS0#	Chip select for Carrier Board SPI
BOOT_SPI_IO0	SPI0_MOSI	Get serial data into the flash device
BOOT_SPI_IO1	SPI0_MISO	Get serial data from the flash device
BOOT_SPI_IO2	SPI0_IO2	Bidirectional data path for Carrier SPI flash
BOOT_SPI_IO3	SPI0_IO3	Bidirectional data path for Carrier SPI flash
BOOT_SPI_CLK	SPI0_CLK	Clock from Module chipset to Carrier SPI
VCC_BOOT_SPI	-	Connected to V_1V8_S5
BSEL[0:2]	-	Boot select pins. These pins distinguish between a SPI or eSPI BIOS boot and between an on-Module or off-Module BIOS. Passed through KSC

Table 22: BIOS Boot options

Usage	BSEL Coding			EC Control Outputs		PCH CS Assignment	
	BSEL 2	BSEL 1	BSEL 0	SPI_CS_SEL1	SPI_CS_SEL0	SPI_CS1#	SPI_CS0#
Internal Boot	1	1	1	1	0	Carrier	Module
External Boot	1	1	0	0	1	Module	Carrier
Do not use	1	0	1	1	0	Carrier	Module
Do not use	1	0	0	1	0	Carrier	Module
Do not use	0	1	1	1	0	Carrier	Module
Do not use	0	1	0	1	0	Carrier	Module
Do not use	0	0	1	1	0	Carrier	Module
Do not use	0	0	0	1	0	Carrier	Module

3.4.11. eSPI

COM-HPC Mini supports an eSPI port for general purpose I/O. The eSPI interface (like LPC before it) can be useful for general purpose devices such as Carrier Super I/O devices, Carrier CPLDs or FPGAs, hardware monitoring devices, and others. It is also possible to boot the BIOS over eSPI. The eSPI bus runs from a 1.8V supply. COM-HPC Mini does not support LPC.

The COMh-m7RP (E2) supports following eSPI interface:

Table 23: eSPI interface on the COMh-m7RP (E2)

COM-HPC Connector (Slave 1)	SOC (Master)	EC (Slave 0)
ESPI_CLK	ESPI_CLK	ESPI_CLK
ESPI_RST#	ESPI_RESET#	ESPI_RESET#
ESPI_IO[0:3]	ESPI_IO_[0:3]	ESPI_IO[0:3]
-	ESPI_CS0#	ESPI_CS#
ESPI_CS1#	ESPI_CS1#	-
-	ESPI_ALERT0#	ESPI_ALERT#
ESPI_ALERT1#	ESPI_ALERT1#	-

ESPI_CS1# and ESPI_ALERT1# on the COM-HPC Mini connector are just terminated but not connected to other platform devices.

3.4.12. I2C

Three general purpose I2C ports are defined for COM-HPC Mini. A third I2C port or alternatively an MDIO port to support SGMII operation may be implemented on COM-HPC Mini Modules.

On the COMh-m7RP (E2) three I2C interfaces are supported, provided by the EC (embedded controller). Alternatively the third I2C interface can offered as a MDIO interface.

Table 24: I2C interfaces on the COMh-m7RP (E2)

COM-HPC Connector	EC	CPU	Description
I2C0_CLK	I2C03_SCL		General purpose I2C with 1.8V Power Rail
I2C0_DAT	I2C03_SDA		
I2C1_CLK	I2C06_SCL		General purpose I2C with 1.8V Power Rail
I2C1_DAT	I2C06_SDA		
I2C2_CLK / ETH_MDIO_CLK	I2C05_SCL	MDIO_CLK	General purpose I2C2 port or for MDIO with 1.8V Power Rail
I2C2_DAT / ETH_MDIO_DAT	I2C05_SDA	MDIO_DAT	

The following table specifies the devices connected to the accessible I2C0 bus including the I2C address.

Table 25: I2C0 addresses

8-bit Address	7-bit Address	Device
0xA0	0x50	Module Embedded EEPROM (JIDA EEPROM)
0xAE	0x57	Carrier EEPROM (optional)

3.4.13. GPIO

The COMh-m7RP (E2) offers 12 GPIO pins on the dedicated pins of COM-HPC Mini connector. The type of termination resistor used sets the direction of the GPIO; where GPI terminations are pull-up resistors, and GPO terminations are pull-down resistors.
Due to the fact that both the pull-up and pull-down termination resistors are weak, it is possible to override the termination resistors using external pull-ups, pull-downs or IOs. Overriding the termination resistors means that the 12 GPIO pins can be considered as bi-directional since there are no restrictions whether you use the available GPIO pins in the in-direction or out-direction.

3.4.14. SMB

The System Management Bus (SMBus) is a simple 2-wire bus for low-speed system management communication with an optional ALERT-signal. The SoC PCH controls the SMBus.

Table 26: SMBus interface on the COMh-m7RP (E2)

COM-HPC	Description
SMB_CLK	System Management Bus, 3.3V Power Rail
SMB_DATA	
SMB_ALERT#	

Table 27: Reserved onboard SMBus address

8-bit Address	7-bit Address	Device
0xE6	0x73	Onboard embedded controller

3.5. Features

3.5.1. ACPI Power States

ACPI enables the system to power down, save power when not required (suspend) and wake up when required (resume).
ACPI controls the power states S0-S5, where S0 has the highest priority and S5 the lowest priority.

Table 28: ACPI Power States Function

S0	Working state
S1	Sleep (typically not supported anymore)
S2	Deep Sleep (typically not supported anymore)
S3	Suspend-to-RAM
S4	Suspend-to-disk / Hibernate
S5	Soft-off state

Not all ACPI defined power states are available.
The COMh-m7RP (E2) supports ACPI 6. 5 and the power states S0, S3, S4, S5 only.

To power on from state S3, S4 and S5 use: Power Button

3.5.2. Embedded Controller - Hardware Monitor

The embedded controller (EC) provides a broad set of functionality:

- monitoring the module's processor temperature, power supply voltages (VCC), battery voltage V_BAT
- monitoring and configuring the on-board and external fans
- acting as hub or super-IO for low speed interfaces such as UART, I2C/SMB, GSPI, GPIO
- supporting watchdog functions

The EC is accessible through the API in the Board Support Package.

3.5.3. Trusted Platform Module

The COMh-m7RP (E2) supports a TPM chip which is directly connected to a dedicated SPI interface from the SOC-PCH.

3.5.4. Watchdog

The COMh-m7RP (E2) supports an independently programmable dual-stage software watchdog timer.
The watchdog functionality is accessible through the API of the Embedded Controller (EC) in the related Board Support Package. The watchdog is able to generate IRQ (SWI), SMI and SCI dependent on the implementation.

Please find more information about the watchdog implementation in the according API user guide for the EC implementation.

Time-out event	Description
No action	Stage is off and will be skipped
Reset	Restarts the module and starts a new POST and operating system
NMI	A non-maskable interrupt (NMI) is a computer processor interrupt that cannot be ignored by standard interrupt masking techniques in the system. It is used typically to signal attention for non-recoverable hardware errors.
SMI	A system management interrupt (SMI) makes the processor entering the system management mode (SMM). As such, specific BIOS code handles the interrupt. The current BIOS handler for the watchdog SMI currently does nothing. For special requirements, contact JUMPtec Support
SCI	A system control interrupt (SCI) is a OS-visible interrupt to be handled by the OS using AML code
Delay	Might be necessary when an operating system must be started and the time for the first trigger pulse must be extended.

The software watchdog functionality can be combined with enabling/disabling the activity of the COM-HPC WD-OUT watchdog signal pin.

Table 29: Watchdog signal on COM-HPC connector

COM-HPC	EC	Description
WD_OUT	GPIO036	Passed through Embedded Controller. Output indicating that a watchdog time-out event has occurred. The watchdog timer interupt (WD_OUT) is a hardware or software timer implemented by the module to the carrier board if there is a fault condition in the main program; the watchdog triggers a system reset or other corrective actions after a specific time, with the aim to bring the system back from a non-responsive to normal state.
WD_STROBE#	GPIO035	Passed through Embedded Controller. Strobe input to watchdog timer, may be periodially driven by carrier hardware to keep the watchdog from timing out.

3.5.5. Real-Time Clock (RTC)

The RTC keeps track of the current time accurately. The RTC's low power consumption enables the RTC to continue operation and keep time using a lower secondary source of power while the primary source of power is switched off or unavailable.
The COMh-m7RP (E2) supports typical RTC values of 3 V and less than 10 µA. When powered by the main power supply on-module regulators generate the RTC voltage, to reduce RTC current draw. The RTC's battery voltage range is 2.8 V to 3.47 V.

It is not recommended to run a system without a RTC battery on the carrier board. Even if the RTC battery is not required to keep the actual time and date when main power is off, a missing RTC battery will cause other side effects such as longer boot times. Intel processor environments are generally designed to rely on RTC battery voltage.

3.5.6. NVME

As BOM option an NVMe SDD (BGA) can be populated on the COMh-m7RP (E2) - see also Chapter 3.4.1 PCIe.
The NVMe is based on TLC technology and can be configured as pSLC as well. Configuring the TLC NVMe as pSLC results in dividing the capacity by three.

3.5.7. Boot EEPROM

The SPI interface, which is routed to the COM-HPC Mini connector, supports onboard the serial flash (for BIOS firmware) and the TPM chip.
Following Flash Device is supported by the BIOS:

- W25Q256JWPIQ

3.5.8. Embedded EEPROM

The module's 32 kbit serial EEPROM (formerly known as JIDA EEPROM) device is attached to the I2C bus (I2C_EXT) from the Embedded Controller and accessible via I2C bus 8-bit address 0x0A (see Chapter 3.4.11. I2C)

3.5.9. Features on Request

On the COMh-m7RP (E2) following optional features are available on request:

Table 30: Features on Request

Optional Features (on request)	
H-Series CPU only	PCIe Gen 5.0: 1 x8 PCIe lanes on COM-HPC PCIe Group 0 High
NVMe SSD	Up to 1 TByte NVMe PCIe SSD NAND Flash TLC technology - configuration as pSLC can be offered
UART	2 UART serial RX/TX ports from SOC (PCIe based, non-legacy) instead of Embedded Controller
DDI / USB 4 / USB 3.2	Configuration options 2 - 4; according to COM-HPC Mini specification
SATA	2x SATA ports instead of COM-HPC Mini PCIe #7 and #6 - a custom BIOS is required - please contact JUMPtec Support

3.6. Electrical Specification

The module powers on by connecting to a carrier board via the COM-HPC interface connectors.
The COM-HPC interface connector pins on the module limit the amount of power received.

⚠CAUTION Before connecting the module's interface connector to the carrier board's corresponding connector, ensure that the carrier board is switched off and disconnected from the main power supply. Failure to disconnect the main power supply could result in personal injury and damage to the module and/or carrier board.

⚠CAUTION Observe that only trained personnel aware of the associated dangers connect the module, within an access controlled ESD-safe workplace

3.6.1. Power Supply Specification

The power specification of the module supports a supply voltage of 12 V, a wide input voltage range of 8.5 V to 20 V and 3.3 V RTC battery input.
VCC_5V_SBY known from COM-HPC Client specifications is not defined for COM-HPC Mini.

Table 23: Power Supply Specification

Supply Voltage Range (VCC)	8.0 V to 20 V
Supply Voltage (VCC)	12 V ± 5%
RTC Voltage (VCC_RTC)	2.8 V to 3.3 V

⚠CAUTION Only connect to an external power supply delivering the specified input rating and complying with the requirements of Safety Extra Low Voltage (SELV) and Limited Power Source (LPS) of UL/IEC 60950-1 or (PS2) of UL/IEC 62368-1.

To protect external power lines of peripheral devices, make sure that the wires have the right diameter to withstand the maximum available current and the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN 62368-1.

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 must be measured individually for each case.

3.6.1.1. Power Supply Voltage Rise Time

The input voltage rise time is 0.1 ms to 20 ms from input voltage ≤10% to nominal input voltage. To comply with the ATX specification there must be a smooth and continuous ramp of each DC input voltage from 10 % to 90 % of the DC input voltage final set point.

3.6.1.2. Power Supply Voltage Ripple

The maximum power supply voltage ripple and noise is 100 mV peak-to-peak measured over a frequency bandwidth of 0 MHz to 20 MHz. The voltage ripple, must not cause the input voltage range to be exceeded.

3.6.1.3. Power Supply Inrush Current

The maximum inrush current at 5 V standby is 2 A. From states G3 (module is mechanically completely off, with no power consumption) or S5 (module appears to be completely off) to state S0 (module is fully usable) the maximum inrush current meets the SFX Design Guide.

3.6.2. Power Management

The Advanced Configuration and Power Interface (ACPI) 6.5 hardware specification supports features such as power button and suspend states. The power management options are available within the BIOS set up menu: **Advanced>ACPI Settings>**

3.6.2.1. Suspend States

The module supports the following ACPI suspend-states:

- Suspend to RAM (S3)
- Suspend to Disk (S4)
- Soft-off (S5)

3.6.2.2. Power Supply Control Signals

Power supply control settings are set in the BIOS and enable the module to shut down, reset and wake from standby.

Table 31: Power Supply Control Signals

COM-HPC Signal	Pin	Description
Power Button (PWRBTN#)	B2	A PWRBTN# falling edge signal creates power button event (50 ms ≤ t < 4 s, typical 400 ms) at low level). Power button events can be used to bring a system out of S5 soft-off and other suspend states, as well as powering the system down. Pressing the power button for at least four seconds turns off power to the module Power Button Override.
Power Good (VIN_PWR_OK)	C6	Indicates that all power supplies to the module are stable within specified ranges. PWR_OK signal goes active and module internal power supplies are enabled. PWR_OK can be driven low to prevent module from powering up until the carrier is ready and releases the signal. PWR_OK should not be deactivated after the module enters S0 unless there is a power fail condition.
Reset Button (RSTBTN#)	C2	Reset button input. The RSTBTN# may be level sensitive (active low) or may be triggered by the falling edge of the signal. There are some situations in which it is desirable for a sustained low state of the RSTBTN# to keep the CPU Module unit in a reset condition. This situation comes up with large Carrier or module based FPGAs that need more time to be loaded and configured than the CPU boot time allows. Therefore, COM-HPC Module designs should either keep the CPU Module in a reset state while RSTBTN# is low, or they should pause the boot process in an early state while RSTBTN# is low. This can be done by the Module BIOS monitoring the RSTBTN# line through an I/O port. The BIOS should be paused in an early point, before PCIe and USB enumerations take place. Additionally, the Module PLTRST# signal (below) should not be released (driven or pulled high) while the RSTBTN# is low. For situations when RSTBTN# is not able to reestablish control of the system, VIN_PWR_OK or a power cycle may be used.
Platform Reset (PLTRST#)	D5	Platform Reset: output from Module to Carrier Board. Active low. Issued by Module chipset and may result from a low RSTBTN# input, a low VIN_PWR_OK input, a VCC power input that falls below the minimum specification, a watchdog timeout, or may be initiated by the Module software. PLTRST# should remain asserted (low) while the RSTBTN# is low.
Suspend to RAM (SUS_S3#)	B8	Indicates system is in Suspend to RAM state. Active low output. An inverted copy of SUS_S3# on the Carrier Board should be used to enable the non-standby power on a typical ATX supply. Even in single input supply system implementations (AT mode, no standby input), the SUS_S3# Module output should be used disable any Carrier voltage regulators when SUS_S3# is low, to prevent bleed leakage from Carrier circuits into the Module.
Suspend to Disk (SUS_S4_S5#)	C8	Indicates system is in Suspend to Disk (S4) or Soft Off (S5) state. Active low output.
Suspend Clock (SUS_CLK)	A87	32.768 kHz +/- 100 ppm clock used by Carrier peripherals such as M.2 cards in their low power modes.
PCIe Wake UP (WAKE0#)	D10	PCI Express wake up signal.
GP Wake UP (WAKE1#)	D11	General purpose wake up signal.
Battery Low (BATLOW#)	C10	Indicates that external battery is low. This port provides a battery-low signal to the Module for orderly transitioning to power saving or power cut off ACPI modes.
Lid detection (LID#)	B45	LID switch. Low active signal used by the ACPI operating system for a LID switch.
Sleep button (SLEEP#)	B46	Sleep button. Low active signal used by the ACPI operating system to bring the system to sleep state or to wake it up again.
Tamper Signal (TAMPER#)	B6	Tamper or Intrusion detection line on VCC_RTC power well. Carrier hardware pulls this low on a Tamper event.
No power (AC_PRESENT)	D34	Driven hard low on Carrier if system AC power is not present.
Resume Reset (RSMRST_OUT#)	B86	This is a buffered copy of the internal Module RSMRST# (Resume Reset, active low) signal. The internal Module RSMRST# signal is an input to the chipset or SOC and when it transitions from low to high it indicates that the suspend well power rails are stable. USB devices on the Carrier that are to be active in S5 / S3 / S0 should not have their 5V supply applied before RSMRST_OUT# goes high. RSMRST_OUT# shall be a 3.3V CMOS Module output, active in all power states.

3.7. Thermal Management

3.7.1. Heatspreader Plate Assembly

A heatspreader plate assembly is available from JUMPtec for the COMh-m7RP (E2).
The heatspreader plate assembly is NOT a heat sink. The heatspreader plate transfers heat as quickly as possible from the processor using a copper core positioned directly above the processor and a Thermal Interface Material (TIM).
The heatspreader plate is factory prepared with a TIM screen printed on the contacts and may be fasten to the module without additional user actions.
The heatspreader plate works as a COM-HPC standard thermal interface and must be used with a heatsink or external cooling devices to maintain the heatspreader plate at proper operating temperatures.
Under worst-case conditions, the cooling mechanism must maintain an ambient air and heatspreader plate temperature on any spot of the heatspreader's surface according the module's specification:

- 60°C for commercial temperature grade modules
- 75°C for extended temperature grade modules (E1)
- 85°C for industrial temperature grade modules (E2)

3.7.2. Active/Passive Cooling Solutions

Both active and passive thermal management approaches can be used with the heatspreader plate.
The optimum cooling solution depends on the application and environmental conditions. JUMPtec's active or passive cooling solutions are designed to cover the power and thermal dissipation for a commercial temperature range used in housing with a suitable airflow.

3.7.3. Operating with JUMPtec Heatspreader Plate (HSP) Assembly

The operating temperature requirements are:

- Maximum ambient temperature with ambient being the air surrounding the module
- Maximum measurable temperature on any part on the heatspreader's surface

Table 32: Heatspreader Temperature Specification

Temperature Grade	Requirements
Commercial Grade	at 60°C HSP temperature on MCP @100% load; needs to run at nominal frequency
Extended Grade(E1)	at 75°C HSP temperature the MCP @ 75% load; is allowed to start throttling for thermal protection
Industrial Grade (E2)	at 85°C HSP temperature the MCP @ 50% load; is allowed to start throttling for thermal protection

3.7.4. Operating without JUMPtec Heatspreader Plate (HSP) Assembly

The operating temperature is the maximum measurable temperature on any spot of the module's surface.

3.7.5. Temperature Sensors

The modules's processor is capable of reading its internal temperature. The on-module Hardware Monitor (HWM), located in the embedded controller (EC), uses an on-chip temperature sensor to measure the modules's temperature on the board.

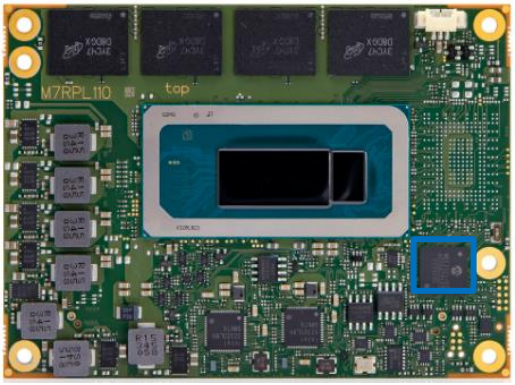

Figure 4: Module Temperature Sensor inside Embedded Controller

3.7.6. On-Module Fan Connector

The module's fan connector powers, controls and monitors an external fan. To connect a standard 3-pin connector fan to the module, use JUMPtec's fan cables:

- KAB-HSP 200 mm (96079-0000-00-0)
- KAB-HSP 400 mm (96079-0000-00-2)

Position of the fan connector see Chapter 3.3.3

Table 33: Fan Connector (3-Pin) Pin Assignment

Pin	Signal	Description	Type
1	Fan_Tach_IN#	Fan input voltage from COMh connector	Input
2	V_FAN	12 V ±10% (max.) across module input range	PWR
3	GND	Power GND	PWR

NOTICE Always check the fan specification according to the limitations of the supply current and supply voltage.

3.8. Mechanical Specification

3.8.1. Module Dimensions

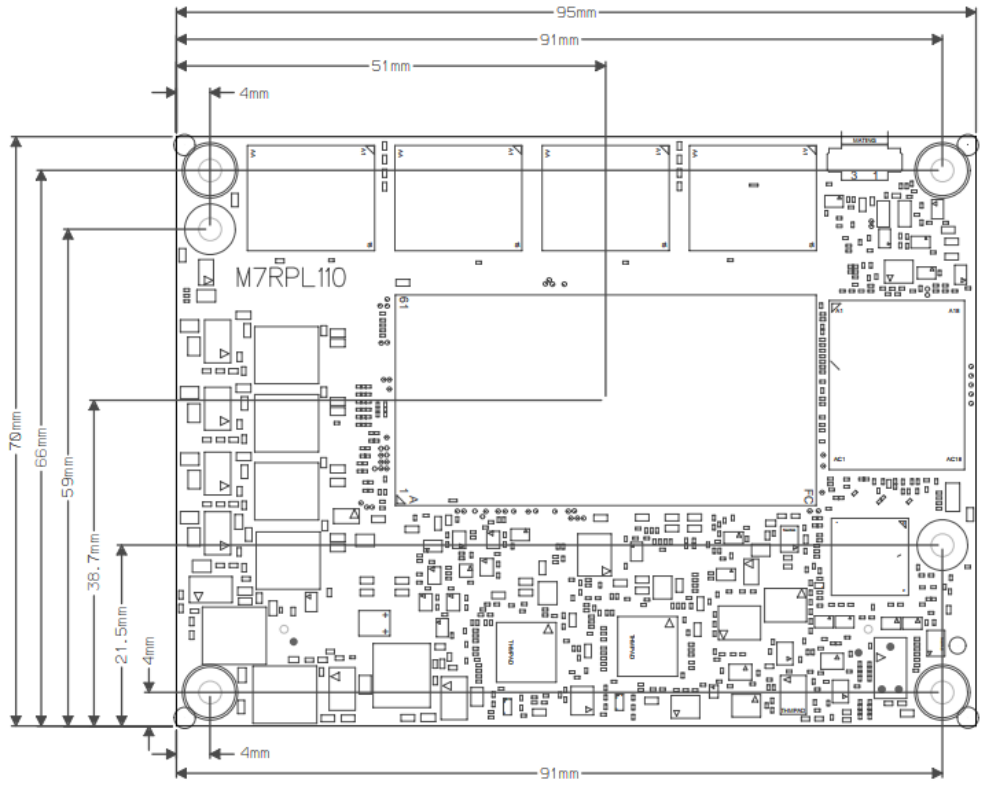

Figure 5: Module Dimensions

3.8.2. Module Height

The COM-HPC/Server specification defines a module height of approximately 18mm, when measured from the bottom of the module's PCB board to the top of the heatspreader. The overall height of the module and carrier board depends on:

- which carrier board connectors are used (5mm and 10mm height are available)
- which cooling solution is used. The height of the cooling solution is not specified in the COM-HPC specification

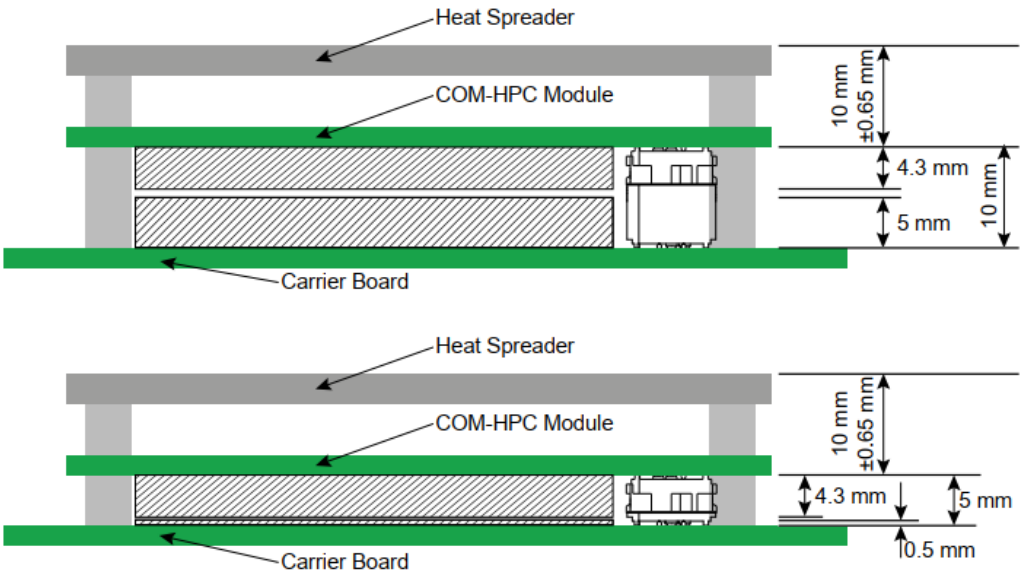

Figure 6: Module and Carrier Height with 5 and 10mm connector height

3.8.3. Heatspreader Plate Assembly Dimension

Please check our Customer Section for Heatspreader 3D models and drawings

3.9. Environmental Specification

The COMh-m7RP (E2) supports commercial and industrial temperature grades. As standard order numbers only industrial temperature grades are defined.

Table 34: Environmental Specification

Environmental		Description
Commercial Grade	Operating	0°C to +60°C (32°F to 140°F)
	Non-operating	-30°C to +85°C (-22°F to 185°F)
Industrial Grade (E2)	Operating	-40°C to +85°C (-40°F to 185°F)
	Non-operating	-40°C to +85°C (-40°F to 185°F)
Relative Humidity		93 % @40°C, non-condensing
Shock (according to IEC / EN 60068-2-27)		Non-operating shock test (half-sinusoidal, 11ms, 15g)
Vibration (according to IEC / EN 60068-2-6)		Non-operating vibration (sinusoidal, 10 Hz to 2000 Hz, +/- 0.15 mm, 2 g)

3.10. Compliance

The COMh-m7RP (E2) complies with the following or the latest status thereof. If modified, the prerequisites for specific approvals may no longer apply. For more information, contact JUMPtec Support.

Table 35: Compliance CE Mark

Europe - CE Mark	
Directives	2014/30/EU: Electromagnetic Compatibility 2014/35/EU: Low Voltage 2011/65/EU: RoHS II 2001/95/EC: General Product Safety
EMC	EN 55032 Class B: Electromagnetic compatibility of multimedia equipment - Emission Requirements Class A EN 61000-6-2: Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity standard for industrial environments
Safety	EN 62368-1: Audio/video, information and communication technology equipment - Part 1: Safety requirements

Table 36: Country Compliance

USA/Canada	
Safety	UL 62368-1 & CSA C22.2 No. 62368-1 (Component Recognition): Audio/video, information and communication technology equipment - Part 1: Safety requirements Recognized by Underwriters Laboratories Inc. Representative samples of this component have been evaluated by UL and meet applicable UL requirements. UL listings: AZOT2.E547070 AZOT8.E547070
UK CA Mark	
EMC	BS EN 55032 Class B: Electromagnetic compatibility of multimedia equipment - Emission Requirements Class A BS EN 61000-6-2: Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity standard for industrial environments
Safety	BS EN 62368-1: Audio/video, information and communication technology equipment - Part 1: Safety requirements
CB scheme (for international certifications)	
Safety	IEC 62368-1: Audio/video, information and communication technology equipment - Part 1: Safety requirements

If the product is modified, the prerequisites for specific approvals may no longer apply.

JUMPtec is not responsible for any radio television interference caused by unauthorized modifications of the delivered product or the substitution or attachment of connecting cables and equipment other than those specified by JUMPtec. The correction of interference caused by unauthorized modification, substitution or attachment is the user's responsibility.

3.11. MTBF

The MTBF (Mean Time Before Failure) values were calculated using a combination of the manufacturer's test data (if available) and the Telcordia (Bellcore) issue 2 calculation for the remaining parts.
The Telcordia calculation used is "Method 1 Case 3" in a ground benign, controlled environment. This particular method takes into account varying temperature and stress data and the system is assumed to have not been burned-in. Other environmental stresses (such as extreme altitude, vibration, saltwater exposure) lower MTBF values.

	MTBF (hours)	Part Number
MTBF Value @40°C	tbd	HM702-6400-80-7

Table 37: MTBF

The MTBF estimated value above assumes no fan, but a passive heat sinking arrangement. Estimated RTC battery life (as opposed to battery failures) is not accounted for and needs to be considered separately. Battery life depends on both temperature and operating conditions. When the module is connected to external power, the only battery drain is from leakage paths.

4/COM-HPC Interface Connector

The COMh-m7RP (E2) is a COM-HPC® Mini module populated with one 400-pin connector J1 with 4 rows called A to D.

Figure 7: COM-HPC Interface Connector

4.1. Connecting COM-HPC Interface Connector to Carrier Board

The COM-HPC interface connector (J1) is inserted into the corresponding connector on the carrier board and secured using the mounting points and standoffs. The height of the standoffs depends on the height of the carrier board's connector.

⚠CAUTION	The module is powered on by connecting to the carrier board using the interface connector. Before connecting the module's interface connector to the carrier board's corresponding connector, ensure that the carrier board is switch off and disconnected from the main power supply. Failure to disconnect the main power supply could result in personal injury and damage to the module and/or carrier board. Observe that only trained personnel aware of the associated dangers connect the module, within an access controlled ESD-safe workplace.

	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/EN 62368.

4.2. J1 Signals

The type of an interface pin consists of the pin type and the buffer type.

Table 38: J1 Pin Types

Pin Types	Description
I	Input to the Module
O	Output from the Module
I/O	Bi-directional input / output signal
OD	Open drain output
REF	Analog reference voltage output – low voltage (GND min, 3.3V max)

Table 39: J1 Buffer Types

Buffer Types	Description
CMOS	Logic input or output. Input thresholds and output levels shall be at or over 80% of supply rail for the high side and at or under 20% of the relevant supply rail for the low side.
LV_DIFF	Low voltage differential signals – may include DP, TMDS, DP_AUX, MIPI D-PHY and HCSL (High Speed Current Steering Logic) used for PCIe clock pairs. Exact details for these variants differ, but the all of these signals are well under 3.3V and the LV_DIFF type label serves well to describe them as a group.
KR	Ethernet 25GBASE-KR or 10GBASE-KR compatible signal.
KX	Ethernet 1000BASE-KX compatible signal.
DP	Display Port compatible signal. Used for DDI interfaces.
MDI	Media Dependent Interface, used for NBASE-T signaling.
NFET	N channel FET output, drain pin, Module can pull low to GND or float.
PCIE	PCI Express compatible differential signals. Includes signaling up to PCIe Gen 5.
PDS	Pull-down strap. Module either pulls these lines to GND or leaves them open.
SATA	SATA compatible differential signals.
USB	USB 2.0 compliant differential signals.
USB_SS	USB Super Speed compliant signals; includes USB 3.0, USB 3.1, USB 3.2 and USB4.

Table 40: J1 Other Notation

Other Notation	Description
PD	Pull-Down
PU	Pull-Up
2K2	2.2 Kohm resistor (and so on for other values)

4.3. Connector J1

Table 41: Connector J1 Pins A1 - A100

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
A1	VCC	Main Input Voltage (8-20V)	Power		
A2	VCC	Main Input Voltage (8-20V)	Power		
A3	VCC	Main Input Voltage (8-20V)	Power		
A4	VCC	Main Input Voltage (8-20V)	Power		
A5	RAPID_SHUTDOWN	Trigger for Rapid Shutdown	I CMOS	5.0V Suspend/ 5.0V	
A6	FUSA_SPI_ALERT	Active high alert output	O CMOS	1.8V / 1.8V	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
A7	FUSA_STATUS0	Two bit FuSa staus / error indication outputs	O CMOS	1.8V / 1.8V	
A8	FUSA_STATUS1	Two bit FuSa staus / error indication outputs	O CMOS	1.8V / 1.8V	
A9	PCIe_PERST_IN0#	Reset signals into Module to reset Module PCIe Targets.	I CMOS	1.8V	PD 100K
A10	GND	Ground - DC power and signal and AC signal return path.	GND		
A11	PCIe_REFCLKIN0-	Reference clock inputs	I LV_DIFF	NC	
A12	PCIe_REFCLKIN0+	Reference clock inputs	I LV_DIFF	NC	
A13	GND	Ground - DC power and signal and AC signal return path.	GND		
A14	USB7-	USB 2.0 differential pairs, channel 7-	I/O USB 2.0	USB 2.0 level Active in Suspend	
A15	USB7+	USB 2.0 differential pairs, channel 7+	I/O USB 2.0	USB 2.0 level Active in Suspend	
A16	GND	Ground - DC power and signal and AC signal return path.	GND		
A17	USB6-	USB 2.0 differential pairs, channel 6-	I/O USB 2.0	USB 2.0 level Active in Suspend	
A18	USB6+	USB 2.0 differential pairs, channel 6+	I/O USB 2.0	USB 2.0 level Active in Suspend	
A19	GND	Ground - DC power and signal and AC signal return path.	GND		
A20	SS23_SDA_AUX-	DisplayPort Aux channel USB4 Aux channel	LV_DIFF	AC coupled off Module	
A21	SS23_SCL_AUX+	DisplayPort Aux channel USB4 Aux channel	LV_DIFF	AC coupled off Module	
A22	GND	Ground - DC power and signal and AC signal return path.	GND		
A23	SS2_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
A24	SS2_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
A25	GND	Ground - DC power and signal and AC signal return path.	GND		
A26	SS2_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
A27	SS2_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
A28	GND	Ground - DC power and signal and AC signal return path.	GND		
A29	SS3_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
A30	SS3_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
A31	GND	Ground - DC power and signal and AC signal return path.	GND		
A32	SS3_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
A33	SS3_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
A34	GND	Ground - DC power and signal and AC signal return path.	GND		
A35	eDP_AUX-	eDP AUX channel differential pair	I/O LV_DIFF	AC coupled off Module (eDP only)	
A36	eDP_AUX+	eDP AUX channel differential pair	I/O LV_DIFF	AC coupled off Module (eDP only)	
A37	GND	Ground - DC power and signal and AC signal return path.	GND		
A38	eDP_TX0-	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A39	eDP_TX0+	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A40	GND	Ground - DC power and signal and AC signal return path.	GND		
A41	eDP_TX1-	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A42	eDP_TX1+	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A43	GND	Ground - DC power and signal and AC signal return path.	GND		
A44	eDP_TX2-	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A45	eDP_TX2+	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A46	GND	Ground - DC power and signal and AC signal return path.	GND		
A47	eDP_TX3-	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A48	eDP_TX3+	eDP / DSI differential data pairs	O LV_DIFF	AC coupled off Module (eDP only)	
A49	GND	Ground - DC power and signal and AC signal return path.	GND		
A50	eSPI_IO0	eSPI Master Data Input / Outputs	I/O CMOS	1.8V Suspend / 1.8V	
A51	eSPI_IO1	eSPI Master Data Input / Outputs	I/O CMOS	1.8V Suspend / 1.8V	
A52	eSPI_IO2	eSPI Master Data Input / Outputs	I/O CMOS	1.8V Suspend / 1.8V	
A53	eSPI_IO3	eSPI Master Data Input / Outputs	I/O CMOS	1.8V Suspend / 1.8V	
A54	eSPI_CLK	eSPI Master Clock Output	O CMOS	1.8V Suspend / 1.8V	
A55	GND	Ground - DC power and signal and AC signal return path.	GND		
A56	PCIe_CLKREQ0_LO#	PCIe reference clock request signal	Bi-Dir OD CMOS	1.8V	PU 10K
A57	PCIe_CLKREQ0_HI#	PCIe reference clock request signal	Bi-Dir OD CMOS	1.8V	PU 10K
A58	PCIe_CLKREQ_OUT0#	PCIe reference clock request signal	Bi-Dir OD CMOS	1.8V	PU 10K
A59	NBASET1_LINK_MAX#	NBASE-T Ethernet Controller MAX Speed Link indicator, active low.	OD	3.3V Suspend / 3.3V	
A60	NBASET1_CTREF	Reference voltage for Carrier Board NBASET Ethernet channel 0 magnetics center tap.	CMOS	GND min 3.3V max	
A61	GND	Ground - DC power and signal and AC signal return path.	GND		
A62	PCIe08_TX-	PCI Express Differential Transmit Pairs 8-	O PCIe	AC coupled on Module	
A63	PCIe08_TX+	PCI Express Differential Transmit Pairs 8+	O PCIe	AC coupled on Module	
A64	GND	Ground - DC power and signal and AC signal return path.	GND		

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
A65	PCIe09_TX-	PCI Express Differential Transmit Pairs 9-	O PCIe	AC coupled on Module	
A66	PCIe09_TX+	PCI Express Differential Transmit Pairs 9+	O PCIe	AC coupled on Module	
A67	GND	Ground - DC power and signal and AC signal return path.	GND		
A68	PCIe10_TX-	PCI Express Differential Transmit Pairs 10-	O PCIe	AC coupled on Module	
A69	PCIe10_TX+	PCI Express Differential Transmit Pairs 10+	O PCIe	AC coupled on Module	
A70	GND	Ground - DC power and signal and AC signal return path.	GND		
A71	PCIe11_TX-	PCI Express Differential Transmit Pairs 11-	O PCIe	AC coupled on Module	
A72	PCIe11_TX+	PCI Express Differential Transmit Pairs 11+	O PCIe	AC coupled on Module	
A73	GND	Ground - DC power and signal and AC signal return path.	GND		
A74	PCIe12_TX-	PCI Express Differential Transmit Pairs 12-	O PCIe	AC coupled on Module	
A75	PCIe12_TX+	PCI Express Differential Transmit Pairs 12+	O PCIe	AC coupled on Module	
A76	GND	Ground - DC power and signal and AC signal return path.	GND		
A77	PCIe13_TX-	PCI Express Differential Transmit Pairs 13-	O PCIe	AC coupled on Module	
A78	PCIe13_TX+	PCI Express Differential Transmit Pairs 13+	O PCIe	AC coupled on Module	
A79	GND	Ground - DC power and signal and AC signal return path.	GND		
A80	PCIe14_TX-	PCI Express Differential Transmit Pairs 14-	O PCIe	AC coupled on Module	
A81	PCIe14_TX+	PCI Express Differential Transmit Pairs 14+	O PCIe	AC coupled on Module	
A82	GND	Ground - DC power and signal and AC signal return path.	GND		
A83	PCIe15_TX-	PCI Express Differential Transmit Pairs 15-	O PCIe	AC coupled on Module	
A84	PCIe15_TX+	PCI Express Differential Transmit Pairs 15+	O PCIe	AC coupled on Module	
A85	GND	Ground - DC power and signal and AC signal return path.	GND		
A86	VCC_RTC	Real-time clock circuit-power input. Nominally +3.0V.	Power		
A87	SUS_CLK	32.768 kHz +/- 100 ppm clock used by Carrier peripherals	O CMOS	1.8V Suspend / 1.8V	
A88	GPIO_00	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A89	GPIO_01	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A90	GPIO_02	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A91	GPIO_03	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A92	GPIO_04	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A93	GPIO_05	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A94	GPIO_06	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A95	GPIO_07	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A96	GPIO_08	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A97	GPIO_09	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A98	GPIO_10	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
A99	GPIO_11	General purpose input / output pins.	I/O CMOS	1.8V Suspend / 1.8V	PU 100K
A100	PINOUT_TYPE0	The TYPE pins indicate to the Carrier Board the Pin-out Type that is implemented on the Module.	PDS		

Table 42: Connector J1 Pins B1 - B100

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
B1	VCC	Main Input Voltage (8-20V)	Power		
B2	PWRBTN#	A falling edge creates a power button event.	I CMOS	1.8V Suspend / 1.8V	PU 10K
B3	VCC	Main Input Voltage (8-20V)	Power		
B4	THERMTRIP#	Active low output indicating that the CPU has entered thermal shutdown.	O CMOS	1.8V / 1.8V	
B5	CAN_TX	CAN bus 1.8V logic level transmit signal.	O CMOS	1.8V / 1.8V	
B6	TAMPER#	Tamper or Intrusion detection line on VCC_RTC power well.	I CMOS	VCC_RTC / 3.3V	PU 1M
B7	PROCHOT#	Active low output indicating a temperature excursion event on the COM-HPC Module	O CMOS	1.8V	
B8	SUS_S3#	Indicates system is in Suspend to RAM state.	O CMOS	1.8V Suspend / 1.8V	
B9	FUSA_VOLTAGE _ERR#	Active low output indicating an over- or under voltage or over-current condition	O CMOS	1.8V / 1.8V	
B10	WD_STROBE#	Strobe input to watchdog timer.	I CMOS	1.8V / 1.8V	PU 10K
B11	WD_OUT	Output indicating that a watchdog time-out event has occurred.	O CMOS	1.8V / 1.8V	
B12	GND	Ground - DC power and signal and AC signal return path.	GND		
B13	USB5-	USB 2.0 differential pairs, channel 5-	I/O USB 2.0	USB 2.0 level Active in Suspend	
B14	USB5+	USB 2.0 differential pairs, channel 5+	I/O USB 2.0	USB 2.0 level Active in Suspend	
B15	GND	Ground - DC power and signal and AC signal return path.	GND		
B16	USB4-	USB 2.0 differential pairs, channel 4-	I/O USB 2.0	USB 2.0 level Active in Suspend	
B17	USB4+	USB 2.0 differential pairs, channel 4+	I/O USB 2.0	USB 2.0 level Active in Suspend	
B18	GND	Ground - DC power and signal and AC signal return path.	GND		
B19	I2S_LRCLK/SND W_CLK3/HDA_S YNC	I2S L/R Clock	O	1.8V Suspend / 1.8V	
B20	I2S_DOUT/SND W_DAT3/HDA_S DO	I2S Data Out	I/O	1.8V Suspend / 1.8V	
B21	I2S_MCLK/HDA_ RST#	I2S Master Clock	O	1.8V Suspend / 1.8V	
B22	I2S_DIN/SNDW_ DAT2/HDA_SDI	I2S Data In	I/O	1.8V Suspend / 1.8V	
B23	I2S_CLK/SNDW_ CLK2/HDA_BCLK	I2S Clock	O	1.8V Suspend / 1.8V	
B24	RSVD	Reserved pins.			
B25	USB67_OC#	USB over-current sense, USB channels 6,7	I CMOS	1.8V Suspend / 1.8V	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
B26	USB45_OC#	USB over-current sense, USB channels 4,5	I CMOS	1.8V Suspend / 1.8V	
B27	USB23_OC#	USB over-current sense, USB channels 2,3	I CMOS	1.8V Suspend / 1.8V	
B28	USB01_OC#	USB over-current sense, USB channels 0,1	I CMOS	1.8V Suspend / 1.8V	
B29	SML1_CLK	Clock lines for System Management Links 0 and 1.	Bi-Dir OD	1.8V Suspend / 1.8V	PU 768R
B30	SML1_DAT	Data line for I2C data based System Management Links	Bi-Dir OD	1.8V Suspend / 1.8V	PU 768R
B31	PMCALERT#	Active low Alert signal associated with the SML1	I	1.8V / 1.8V	
B32	SML0_CLK	Clock lines for System Management Links 0 and 1.	Bi-Dir OD	1.8V Suspend / 1.8V	PU 768R
B33	SML0_DAT	Data line for I2C data based System Management Links	Bi-Dir OD	1.8V Suspend / 1.8V	PU 768R
B34	USB_PD_ALERT#	Active low Alert signal from USB Power Delivery Controller	I	1.8V Suspend / 1.8V	
B35	USB_PD_I2C_CLK	I2C clock line	Bi-Dir OD	1.8V Suspend / 1.8V	PU 10K
B36	USB_PD_I2C_DAT	I2C data line	Bi-Dir OD	1.8V Suspend / 1.8V	PU 10K
B37	USB_RT_ENA	Power Enable for Carrier based USB Retimers	O	1.8V	
B38	USB3_LSRX	Sideband RX interface for USB4 Alternate modes	I	1.8V	PD 100K
B39	USB3_LSTX	Sideband TX interface for USB4 Alternate modes	O	1.8V	PD 100K
B40	USB2_LSRX/ DDI0_DDC_AUX_SEL	Sideband RX interface for USB4 Alternate modes/Selects the function of DDI[0:2]_SCL_AUX+ and DDI[0:2]_SDA_AUX.	I/I CMOS	1.8V	PD 1M
B41	USB2_LSTX/ DDI0_HPD	Sideband TX interface for USB4 Alternate modes/DDI Hot-Plug Detect	O/I CMOS	1.8V	PD 100K
B42	GND	Ground - DC power and signal and AC signal return path.	GND		
B43	USB1_AUX-	DisplayPort Aux channel for USB4 DP modes	LV_DIFF	AC coupled off Module	
B44	USB1_AUX+	DisplayPort Aux channel for USB4 DP modes	LV_DIFF	AC coupled off Module	
B45	LID#	LID switch.	I CMOS	1.8V Suspend / 1.8V	PU 10K
B46	SLEEP#	Sleep button.	I CMOS	1.8V Suspend / 1.8V	PU 10K
B47	VCC_BOOT_SPI	Power supply for Carrier Board SPI	Power (Out from Module)	1V8 Suspend	
B48	BOOT_SPI_CS#	Chip select for Carrier Board SPI	O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
B49	BSEL0	Boot Select pins	I	Module Specific Leave Open on Carrier or pull hard to GND on Carrier	
B50	BSEL1	Boot Select pins	I	Module Specific Leave Open on Carrier or pull hard to GND on Carrier	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
B51	BSEL2	Boot Select pins	I	Module Specific Leave Open on Carrier or pull hard to GND on Carrier	
B52	eSPI_ALERT0#	eSPI pins used by eSPI slave	I CMOS	1.8V Suspend / 1.8V	PU 20K
B53	eSPI_ALERT1#	eSPI pins used by eSPI slave	I CMOS	1.8V Suspend / 1.8V	PU 20K
B54	eSPI_CS0#	eSPI Master Chip Select Outputs	O CMOS	1.8V Suspend / 1.8V	
B55	eSPI_CS1#	eSPI Master Chip Select Outputs	O CMOS	1.8V Suspend / 1.8V	PU 20K
B56	eSPI_RST#	eSPI Reset - resets the eSPI interface	O CMOS	1.8V Suspend / 1.8V	
B57	PCIe_WAKE_OUT0#	Wake request signal Module based PCIe Target	OD CMOS	1.8V Suspend / 1.8V	
B58	NBASET1_LINK_MID#	NBASE-T Ethernet Controller MID Speed Link indicator, active low.	O CMOS	3.3V Suspend / 3.3V	
B59	NBASET1LINK_ACT#	NBASE-T Ethernet Controller activity indicator, active low.	O CMOS	3.3V Suspend / 3.3V	
B60	GND	Ground - DC power and signal and AC signal return path.	GND		
B61	PCIe08_RX-	PCI Express Differential Receive Pairs 8-	I PCIe	AC coupled off Module	
B62	PCIe08_RX+	PCI Express Differential Receive Pairs 8+	I PCIe	AC coupled off Module	
B63	GND	Ground - DC power and signal and AC signal return path.	GND		
B64	PCIe09_RX-	PCI Express Differential Receive Pairs 9-	I PCIe	AC coupled off Module	
B65	PCIe09_RX+	PCI Express Differential Receive Pairs 9+	I PCIe	AC coupled off Module	
B66	GND	Ground - DC power and signal and AC signal return path.	GND		
B67	PCIe10_RX-	PCI Express Differential Receive Pairs 10-	I PCIe	AC coupled off Module	
B68	PCIe10_RX+	PCI Express Differential Receive Pairs 10+	I PCIe	AC coupled off Module	
B69	GND	Ground - DC power and signal and AC signal return path.	GND		
B70	PCIe11_RX-	PCI Express Differential Receive Pairs 11-	I PCIe	AC coupled off Module	
B71	PCIe11_RX+	PCI Express Differential Receive Pairs 11+	I PCIe	AC coupled off Module	
B72	GND	Ground - DC power and signal and AC signal return path.	GND		
B73	PCIe12_RX-	PCI Express Differential Receive Pairs 12-	I PCIe	AC coupled off Module	
B74	PCIe12_RX+	PCI Express Differential Receive Pairs 12+	I PCIe	AC coupled off Module	
B75	GND	Ground - DC power and signal and AC signal return path.	GND		
B76	PCIe13_RX-	PCI Express Differential Receive Pairs 13-	I PCIe	AC coupled off Module	
B77	PCIe13_RX+	PCI Express Differential Receive Pairs 13+	I PCIe	AC coupled off Module	
B78	GND	Ground - DC power and signal and AC signal return path.	GND		
B79	PCIe14_RX-	PCI Express Differential Receive Pairs 14-	I PCIe	AC coupled off Module	
B80	PCIe14_RX+	PCI Express Differential Receive Pairs 14+	I PCIe	AC coupled off Module	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
B81	GND	Ground - DC power and signal and AC signal return path.	GND		
B82	PCIe15_RX-	PCI Express Differential Receive Pairs 15-	I PCIe	AC coupled off Module	
B83	PCIe15_RX+	PCI Express Differential Receive Pairs 15+	I PCIe	AC coupled off Module	
B84	GND	Ground - DC power and signal and AC signal return path.	GND		
B85	TEST#	Module input to allow vendor specific Module test mode(s).	I OD CMOS	1.8V Suspend	PU 10K
B86	RSMRST_OUT#	This is a buffered copy of the internal Module RSMRST#	O CMOS	1.8V Suspend / 1.8V	
B87	UART1_TX	Logic level asynchronous serial port transmit signal	O CMOS	1.8V Suspend / 1.8V	
B88	UART1_RX	Logic level asynchronous serial port receive signal	I CMOS	1.8V Suspend / 1.8V	PU 10K
B89	UART1_RTS#	Logic level asynchronous serial port Request to Send signal, active low	O CMOS	1.8V Suspend / 1.8V	
B90	UART1_CTS#	Logic level asynchronous serial port Clear to Send input, active low	I CMOS	1.8V Suspend / 1.8V	PU 10K
B91	I2C2_CLK/ ETH_MDIO_CLK	Clock I/O line for the general purpose I2C2 port or for MDIO clock	I/O OD CMOS /O CMOS	1.8V Suspend / 1.8V	PU 2K2
B92	I2C2_DAT/ ETH_MDIO_DAT	Data I/O line for the general purpose I2C2 port or for MDIO data	I/O OD CMOS / I/O CMOS	1.8V Suspend / 1.8V	PU 2K2
B93	GP_SPI_MOSI	Serial data from the COM-HPC Module	O CMOS	1.8V / 1.8V	
B94	GP_SPI_MISO	Serial data into the COM-HPC Module	I CMOS	1.8V / 1.8V	PU 10K
B95	GP_SPI_CS0#	GP_SPI chip selects, active low	O CMOS	1.8V / 1.8V	
B96	GP_SPI_CS1#	GP_SPI chip selects, active low	O CMOS	1.8V / 1.8V	
B97	GP_SPI_CS2#	GP_SPI chip selects, active low	O CMOS	1.8V / 1.8V	
B98	GP_SPI_CS3#	GP_SPI chip selects, active low	O CMOS	1.8V / 1.8V	
B99	GP_SPI_CLK	Clock from the Module	O CMOS	1.8V / 1.8V	
B100	GP_SPI_ALERT#	Alert (interrupt) from a Carrier GP_SPI device to the Module	I CMOS	1.8V / 1.8V	PU 10K

Table 43: Connector J1 Pins C1 - C100

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
C1	VCC	Main Input Voltage (8-20V)	Power		
C2	RSTBTN#	Reset button input.	I CMOS	1.8V Suspend / 1.8V	PU 10K
C3	VCC	Main Input Voltage (8-20V)	Power		
C4	CARRIER_HOT#	Input from off-Module temp sensor indicating an over-temp situation.	I CMOS	1.8V / 1.8V	PU 10K
C5	CAN_RX	CAN bus 1.8V logic level receive signal.	I CMOS	1.8V / 1.8V	PU 10K
C6	VIN_PWROK	Power OK from main power supply.	I CMOS	1.8V Suspend / 1.8V	PU 10K
C7	CATERR#	Active low output indicating a catastrophic error on the COM-HPC CPU or SOC	O CMOS	1.8V	
C8	SUS_S4_S5#	Indicates system is in Suspend to Disk (S4) or Soft Off (S5) state.	O CMOS	1.8V Suspend / 1.8V	
C9	FUSA_ALERT#	Active low output from the COM-	O CMOS	1.8V / 1.8V	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
		HPC Module			
C10	BATLOW#	Indicates that external battery is low.	I CMOS	1.8V Suspend / 1.8V	PU 10K
C11	FAN_PWMOUT	Fan speed control for a secondary system fan	O CMOS	1.8V / 1.8V	
C12	FAN_TACHIN	Fan tachometer input for a fan	I OD CMOS	1.8V / 1.8V	PU 10K
C13	GND	Ground - DC power and signal and AC signal return path.	GND		
C14	USB3-	USB 2.0 differential pairs, channel 3-	I/O USB 2.0	USB 2.0 level Active in Suspend	
C15	USB3+	USB 2.0 differential pairs, channel 3+	I/O USB 2.0	USB 2.0 level Active in Suspend	
C16	GND	Ground - DC power and signal and AC signal return path.	GND		
C17	USB2-	USB 2.0 differential pairs, channel 2-	I/O USB 2.0	USB 2.0 level Active in Suspend	
C18	USB2+	USB 2.0 differential pairs, channel 2+	I/O USB 2.0	USB 2.0 level Active in Suspend	
C19	GND	Ground - DC power and signal and AC signal return path.	GND		
C20	SNDW_DMIC_CLK1	Clock for Soundwire transactions	O	1.8V Suspend / 1.8V	
C21	SNDW_DMIC_DAT1	Bi-directional PCM audio data	I/O	1.8V Suspend / 1.8V	
C22	GND	Ground - DC power and signal and AC signal return path.	GND		
C23	SNDW_DMIC_CLK0	Clock for Soundwire transactions	O	1.8V Suspend / 1.8V	
C24	SNDW_DMIC_DAT0	Bi-directional PCM audio data	I/O	1.8V Suspend / 1.8V	
C25	GND	Ground - DC power and signal and AC signal return path.	GND		
C26	USB0_LSRX/ DDI1_DDC_AUX_SEL	Sideband RX interface for USB4 Alternate modes/Selects the function of DDI[0:2]_SCL_AUX+ and DDI[0:2]_SDA_AUX-	I/I CMOS	1.8V	PD 1M
C27	USB1_LSRX	Sideband RX interface for USB4 Alternate modes	I	1.8V	PD 100K
C28	USB0_LSTX/ DDI1_HPD	Sideband TX interface for USB4 Alternate modes/DDI Hot-Plug Detect	O/I CMOS	1.8V	PD 100K
C29	USB1_LSTX	Sideband TX interface for USB4 Alternate modes	O	1.8V	PD 100K
C30	eDP_HPD	eDP: Detection of Hot Plug	I CMOS	1.8V	PD 100K
C31	eDP_VDD_EN	eDP / DSI power enable	O CMOS	1.8V	
C32	eDP_BKLT_EN	eDP / DSI backlight enable	O CMOS	1.8V	
C33	eDP_BKLTCTL	EDP / DSI backlight brightness control	O CMOS	1.8V	
C34	GND	Ground - DC power and signal and AC signal return path.	GND		
C35	USB3_AUX-	DisplayPort Aux channel for USB4 DP modes	LV_DIFF	AC coupled off Module	
C36	USB3_AUX+	DisplayPort Aux channel for USB4 DP modes	LV_DIFF	AC coupled off Module	
C37	GND	Ground - DC power and signal and AC signal return path.	GND		
C38	SS6_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on	

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
				Carrier or off Module	
C39	SS6_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C40	GND	Ground - DC power and signal and AC signal return path.	GND		
C41	SS7_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C42	SS7_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C43	GND	Ground - DC power and signal and AC signal return path.	GND		
C44	SS4_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C45	SS4_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C46	GND	Ground - DC power and signal and AC signal return path.	GND		
C47	SS5_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C48	SS5_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
C49	GND	Ground - DC power and signal and AC signal return path.	GND		
C50	BOOT_SPI_IO0	Bidirectional 4 bit data path out of and into a Carrier SPI flash	I/O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
C51	BOOT_SPI_IO1	Bidirectional 4 bit data path out of and into a Carrier SPI flash	I/O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
C52	BOOT_SPI_IO2	Bidirectional 4 bit data path out of and into a Carrier SPI flash	I/O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
C53	BOOT_SPI_IO3	Bidirectional 4 bit data path out of and into a Carrier SPI flash	I/O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
C54	BOOT_SPI_CLK	Clock from Module chipset to Carrier SPI	O CMOS	VCC_BOOT_SPI / VCC_BOOT_SPI	
C55	GND	Ground - DC power and signal and AC signal return path.	GND		
C56	PCIe_REFCLK0_HI-	Reference clock pair for PCIe lanes [8:15]	O LV_DIFF	PCIE	
C57	PCIe_REFCLK0_HI+	Reference clock pair for PCIe lanes [8:15]	O LV_DIFF	PCIE	
C58	GND	Ground - DC power and signal and AC signal return path.	GND		
C59	PCIe_REFCLK0_LO-	Reference clock pair for PCIe lanes [0:7]	O LV_DIFF	PCIE	
C60	PCIe_REFCLK0_LO+	Reference clock pair for PCIe lanes [0:7]	O LV_DIFF	PCIE	
C61	GND	Ground - DC power and signal and AC signal return path.	GND		

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
C62	PCIe00_RX-	PCI Express Differential Receive Pairs 0-	I PCIe	AC coupled off Module	
C63	PCIe00_RX+	PCI Express Differential Receive Pairs 0+	I PCIe	AC coupled off Module	
C64	GND	Ground - DC power and signal and AC signal return path.	GND		
C65	PCIe01_RX-	PCI Express Differential Receive Pairs 1-	I PCIe	AC coupled off Module	
C66	PCIe01_RX+	PCI Express Differential Receive Pairs 1+	I PCIe	AC coupled off Module	
C67	GND	Ground - DC power and signal and AC signal return path.	GND		
C68	PCIe02_RX- /SGMII1_RX-	PCI Express Differential Receive Pairs 2-	I PCIe	AC coupled off Module	
C69	PCIe02_RX+/ SGMII1_RX+	PCI Express Differential Receive Pairs 2+	I PCIe	AC coupled off Module	
C70	GND	Ground - DC power and signal and AC signal return path.	GND		
C71	PCIe03_RX-/ SGMII0_RX-	PCI Express Differential Receive Pairs 3-	I PCIe	AC coupled off Module	
C72	PCIe03_RX+/ SGMII0_RX+	PCI Express Differential Receive Pairs 3+	I PCIe	AC coupled off Module	
C73	GND	Ground - DC power and signal and AC signal return path.	GND		
C74	PCIe04_RX-	PCI Express Differential Receive Pairs 4-	I PCIe	AC coupled off Module	
C75	PCIe04_RX+	PCI Express Differential Receive Pairs 4+	I PCIe	AC coupled off Module	
C76	GND	Ground - DC power and signal and AC signal return path.	GND		
C77	PCIe05_RX-	PCI Express Differential Receive Pairs 5-	I PCIe	AC coupled off Module	
C78	PCIe05_RX+	PCI Express Differential Receive Pairs 5+	I PCIe	AC coupled off Module	
C79	GND	Ground - DC power and signal and AC signal return path.	GND		
C80	PCIe06_RX- /SATA1_RX-	PCI Express Differential Receive Pairs 6-/Serial ATA Channel 1 receive differential pair 1-	I PCIe/I SATA	AC coupled off Module/ AC coupled on Module	
C81	PCIe06_RX+/ SATA1_RX+	PCI Express Differential Receive Pairs 6+/Serial ATA Channel 1 receive differential pair 1+	I PCIe/I SATA	AC coupled off Module/ AC coupled on Module	
C82	GND	Ground - DC power and signal and AC signal return path.	GND		
C83	PCIe07_RX- /SATA0_RX-	PCI Express Differential Receive Pairs 7-/Serial ATA Channel 0 receive differential pair 0-	I PCIe/I SATA	AC coupled off Module/ AC coupled on Module	
C84	PCIe07_RX+/ SATA0_RX+	PCI Express Differential Receive Pairs 7+/Serial ATA Channel 0 receive differential pair 0+	I PCIe/I SATA	AC coupled off Module/ AC coupled on Module	
C85	GND	Ground - DC power and signal and AC signal return path.	GND		
C86	SMB_CLK	System Management Bus bidirectional clock line.	I/O OD CMOS	1.8V Suspend / 1.8V	PU 3k9
C87	SMB_DAT	System Management Bus bidirectional data line.	I/O OD CMOS	1.8V Suspend / 1.8V	PU 3k9

Pin	Signal	Description	Type	Power Rail /Tolerance	Termination
C88	SMB_ALERT#	System Management Bus Alert	I CMOS	1.8V Suspend / 1.8V	PU 2k26
C89	UART0_TX	Logic level asynchronous serial port transmit signal	O CMOS	1.8V Suspend / 1.8V	
C90	UART0_RX	Logic level asynchronous serial port receive signal	I CMOS	1.8V Suspend / 1.8V	PU 10K
C91	UART0_RTS#	Logic level asynchronous serial port Request to Send signal, active low	O CMOS	1.8V Suspend / 1.8V	
C92	UART0_CTS#	Logic level asynchronous serial port Clear to Send input, active low	I CMOS	1.8V Suspend / 1.8V	PU 10K
C93	I2C0_CLK	Clock I/O line for the general purpose I2C0 port	I/O OD CMOS	1.8V Suspend / 1.8V	PU 2K2
C94	I2C0_DAT	Data I/O line for the general purpose I2C0 port	I/O OD CMOS	1.8V Suspend / 1.8V	PU 2K2
C95	I2C0_ALERT#	Alert input / interrupt for I2C0	I CMOS	1.8V Suspend / 1.8V	PU 2K2
C96	I2C1_CLK	Clock I/O line for the general purpose I2C1 port	I/O OD CMOS	1.8V Suspend / 1.8V	PU 2K2
C97	I2C1_DAT	Data I/O line for the general purpose I2C1 port	I/O OD CMOS	1.8V Suspend / 1.8V	PU 2K2
C98	NBASET0_SDP	NBASE-T Ethernet Controller 0 Software-Definable Pin.	I/O CMOS	3.3V Suspend / 3.3V	
C99	NBASET0_CTREF	Reference voltage for Carrier Board NBASET Ethernet channel 0 magnetics center tap.	REF	GND min 3.3V max	
C100	PINOUT_TYPE1	The TYPE pins indicate to the Carrier Board the Pin-out Type that is implemented on the Module.	PDS		

Table 44: Connector J1 Pins D1 - D100

Pin	Signal	Description	Type	Power Rail/Tolerance	Termination
D1	VCC	Main Input Voltage (8-20V)	Power		
D2	VCC	Main Input Voltage (8-20V)	Power		
D3	VCC	Main Input Voltage (8-20V)	Power		
D4	VCC	Main Input Voltage (8-20V)	Power		
D5	PLTRST#	Platform Reset	O CMOS	1.8V Suspend / 1.8V	
D6	FUSA_SPI_CS#	Active low chip select into the COM-HPC Module	I CMOS	1.8V / 1.8V	PU 100K
D7	FUSA_SPI_CLK	Clock into the COM-HPC Module	I CMOS	1.8V / 1.8V	PU 100K
D8	FUSA_SPI_MISO	Serial data into the Carrier FuSa SPI Master	O CMOS	1.8V / 1.8V	
D9	FUSA_SPI_MOSI	Serial data from the Carrier FuSa SPI Master	I CMOS	1.8V / 1.8V	PU 100K
D10	WAKE0#	PCI Express wake up signal.	I/O CMOS	1.8V Suspend / 1.8V	PU 10K
D11	WAKE1#	General purpose wake up signal.	I CMOS	1.8V Suspend / 1.8V	PU 10K
D12	GND	Ground - DC power and signal and AC signal return path.	GND		
D13	USB1-	USB 2.0 differential pairs, channel 1-	I/O USB 2.0	USB 2.0 level Active in Suspend	
D14	USB1+	USB 2.0 differential pairs, channel 1+	I/O USB 2.0	USB 2.0 level Active in Suspend	
D15	GND	Ground - DC power and signal and AC signal return path.	GND		
D16	USB0-	USB 2.0 differential pairs, channel 0-	I/O USB 2.0	USB 2.0 level Active in Suspend	
D17	USB0+	USB 2.0 differential pairs, channel	I/O USB	USB 2.0 level	

Pin	Signal	Description	Type	Power Rail/Tolerance	Termination
		0+	2.0	Active in Suspend	
D18	GND	Ground - DC power and signal and AC signal return path.	GND		
D19	SS01_SDA_AUX-	DisplayPort Aux channel USB4 Aux channel	LV_DIFF	AC coupled off Module	
D20	SS01_SCL_AUX+	DisplayPort Aux channel USB4 Aux channel	LV_DIFF	AC coupled off Module	
D21	GND	Ground - DC power and signal and AC signal return path.	GND		
D22	SS0_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D23	SS0_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D24	GND	Ground - DC power and signal and AC signal return path.	GND		
D25	SS0_RX-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
D26	SS0_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
D27	GND	Ground - DC power and signal and AC signal return path.	GND		
D28	SS1_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D29	SS1_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D30	GND	Ground - DC power and signal and AC signal return path.	GND		
D31	SS1_RX1-	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
D32	SS1_RX+	Super Speed differential pair	I USB SS	Shall be AC coupled on Carrier or off Module	
D33	GND	Ground - DC power and signal and AC signal return path.	GND		
D34	ACPRESENT	Driven hard low on Carrier if system AC power is not present	I CMOS	1.8V Suspend / 1.8V	PU 10K
D35	NBASET1_SDP	NBASE-T Ethernet Controller 0 Software-Definable Pin.	I/O CMOS	3.3V Suspend / 3.3V	
D36	GND	Ground - DC power and signal and AC signal return path.	GND		
D37	SS6_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D38	SS6_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off	

Pin	Signal	Description	Type	Power Rail/Tolerance	Termination
				Module	
D39	GND	Ground - DC power and signal and AC signal return path.	GND		
D40	SS7_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D41	SS7_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D42	GND	Ground - DC power and signal and AC signal return path.	GND		
D43	SS4_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D44	SS4_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D45	GND	Ground - DC power and signal and AC signal return path.	GND		
D46	SS5_TX-	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D47	SS5_TX+	Super Speed differential pair	O USB SS	Shall be AC coupled on Carrier or off Module	
D48	GND	Ground - DC power and signal and AC signal return path.	GND		
D49	NBASET1_MDI0-	Ethernet Media Dependent Interface 0 -	I/O MDI	3.3V Suspend / 3.3V	
D50	NBASET1_MDI0+	Ethernet Media Dependent Interface 0 +	I/O MDI	3.3V Suspend / 3.3V	
D51	GND	Ground - DC power and signal and AC signal return path.	GND		
D52	NBASET1_MDI1-	Ethernet Media Dependent Interface 1 -	I/O MDI	3.3V Suspend / 3.3V	
D53	NBASET1_MDI1+	Ethernet Media Dependent Interface 1 +	I/O MDI	3.3V Suspend / 3.3V	
D54	GND	Ground - DC power and signal and AC signal return path.	GND		
D55	NBASET1_MDI2-	Ethernet Media Dependent Interface 2 -	I/O MDI	3.3V Suspend / 3.3V	
D56	NBASET1_MDI2+	Ethernet Media Dependent Interface 2 +	I/O MDI	3.3V Suspend / 3.3V	
D57	GND	Ground - DC power and signal and AC signal return path.	GND		
D58	NBASET1_MDI3-	Ethernet Media Dependent Interface 3 -	I/O MDI	3.3V Suspend / 3.3V	
D59	NBASET1_MDI3+	Ethernet Media Dependent Interface 3 +	I/O MDI	3.3V Suspend / 3.3V	
D60	GND	Ground - DC power and signal and AC signal return path.	GND		
D61	PCIe00_TX-	PCI Express Differential Transmit Pairs 0-	O PCIe	AC coupled on Module	
D62	PCIe00_TX+	PCI Express Differential Transmit Pairs 0+	O PCIe	AC coupled on Module	

Pin	Signal	Description	Type	Power Rail/Tolerance	Termination
D63	GND	Ground - DC power and signal and AC signal return path.	GND		
D64	PCIe01_TX-	PCI Express Differential Transmit Pairs 1-	O PCIe	AC coupled on Module	
D65	PCIe01_TX+	PCI Express Differential Transmit Pairs 1+	O PCIe	AC coupled on Module	
D66	GND	Ground - DC power and signal and AC signal return path.	GND		
D67	PCIe02_TX- /SGMII1_TX-	PCI Express Differential Transmit Pairs 2-	O PCIe	AC coupled on Module	
D68	PCIe02_TX+/ SGMII1_TX+	PCI Express Differential Transmit Pairs 2+	O PCIe	AC coupled on Module	
D69	GND	Ground - DC power and signal and AC signal return path.	GND		
D70	PCIe03_TX- /SGMII0_TX-	PCI Express Differential Transmit Pairs 3-	O PCIe	AC coupled on Module	
D71	PCIe03_TX+/ SGMII0_TX+	PCI Express Differential Transmit Pairs 3+	O PCIe	AC coupled on Module	
D72	GND	Ground - DC power and signal and AC signal return path.	GND		
D73	PCIe04_TX-	PCI Express Differential Transmit Pairs 4-	O PCIe	AC coupled on Module	
D74	PCIe04_TX+	PCI Express Differential Transmit Pairs 4+	O PCIe	AC coupled on Module	
D75	GND	Ground - DC power and signal and AC signal return path.	GND		
D76	PCIe05_TX-	PCI Express Differential Transmit Pairs 5-	O PCIe	AC coupled on Module	
D77	PCIe05_TX+	PCI Express Differential Transmit Pairs 5+	O PCIe	AC coupled on Module	
D78	GND	Ground - DC power and signal and AC signal return path.	GND		
D79	PCIe06_TX- /SATA1_TX-	PCI Express Differential Transmit Pairs 6-/Serial ATA Channel 1 transmit differential pair 1-	O PCIe/O SATA	AC coupled on Module	
D80	PCIe06_TX+/ SATA1_TX+	PCI Express Differential Transmit Pairs 6+/Serial ATA Channel 1 transmit differential pair 1+	O PCIe/O SATA	AC coupled on Module	
D81	GND	Ground - DC power and signal and AC signal return path.	GND		
D82	PCIe07_TX- /SATA0_TX-	PCI Express Differential Transmit Pairs 7-/Serial ATA Channel 0 transmit differential pair 0-	O PCIe/O SATA	AC coupled on Module	
D83	PCIe07_TX+/SAT A0_TX+	PCI Express Differential Transmit Pairs 7+/Serial ATA Channel 0 transmit differential pair 0+	O PCIe/O SATA	AC coupled on Module	
D84	GND	Ground - DC power and signal and AC signal return path.	GND		
D85	NBASET0_MDI0-	Ethernet Media Dependent Interface 0 -	I/O MDI	3.3V Suspend / 3.3V	
D86	NBASET0_MDI0+	Ethernet Media Dependent Interface 0 +	I/O MDI	3.3V Suspend / 3.3V	
D87	GND	Ground - DC power and signal and AC signal return path.	GND		
D88	NBASET0_MDI1-	Ethernet Media Dependent Interface 1 -	I/O MDI	3.3V Suspend / 3.3V	
D89	NBASET0_MDI1+	Ethernet Media Dependent Interface 1 +	I/O MDI	3.3V Suspend / 3.3V	
D90	GND	Ground - DC power and signal and AC signal return path.	GND		

Pin	Signal	Description	Type	Power Rail/Tolerance	Termination
D91	NBASET0_MDI2-	Ethernet Media Dependent Interface 2 -	I/O MDI	3.3V Suspend / 3.3V	
D92	NBASET0_MDI2+	Ethernet Media Dependent Interface 2 +	I/O MDI	3.3V Suspend / 3.3V	
D93	GND	Ground - DC power and signal and AC signal return path.	GND		
D94	NBASET0_MDI3-	Ethernet Media Dependent Interface 3 -	I/O MDI	3.3V Suspend / 3.3V	
D95	NBASET0_MDI3+	Ethernet Media Dependent Interface 3 +	I/O MDI	3.3V Suspend / 3.3V	
D96	GND	Ground - DC power and signal and AC signal return path.	GND		
D97	NBASET0_LINK_ MAX#	NBASE-T Ethernet Controller MAX Speed Link indicator, active low.	O CMOS	3.3V Suspend / 3.3V	
D98	NBASET0_LINK_ MID#	NBASE-T Ethernet Controller MID Speed Link indicator, active low.	O CMOS	3.3V Suspend / 3.3V	
D99	NBASET0_LINK_ ACT#	NBASE-T Ethernet Controller activity indicator, active low.	O CMOS	3.3V Suspend / 3.3V	
D100	PINOUT_TYPE2	The TYPE pins indicate to the Carrier Board the Pin-out Type that is implemented on the Module.	PDS		

5/UEFI BIOS

5.1. Starting the UEFI BIOS

The COMh-m7RP (E2) uses a JUMPtec-customized, pre-installed and configured version of AMI Aptio® V BIOS based on the Unified Extensible Firmware Interface (UEFI) specification and the Intel® Platform Innovation Framework for EFI.
The UEFI BIOS provides a variety of new and enhanced functions specifically tailored to the hardware features of the COMh-sdID.

This chapter provides an overview of the BIOS and its setup. A more detailed listing and description of all BIOS setup nodes can be found in the BIOS file package available on our Customer Section. Please register there to get access to BIOS downloads and Product Change Notifications.

The UEFI BIOS comes with a Setup program that provides quick and easy access to the individual function settings for control or modification of the default configuration. The Setup program allows access to various menus resp. sub-menus that provide the specific functions.

To start the UEFI BIOS Setup program, follow the steps below:

1. Power on the board
2. Wait until the first characters appear on the screen (POST messages or splash screen)
3. Press the <DEL> key
4. If the UEFI BIOS is password-protected, a request for password will appear. Enter either the User Password or the Supervisor Password (see Security Setup Menu), press <RETURN>, and proceed with step 5.
5. The Setup menu appears

5.2. Navigating the UEFI BIOS

The COMh-m7RP (E2) UEFI BIOS Setup program uses a hot key navigation system. The hot key legend bar is located at the bottom of the Setup screens. The following table provides a list of navigation hot keys available in the legend bar.

Table 45: Navigation Hot Keys Available in the Legend Bar

Sub-screen	Description
<F1>	<F1> key invokes the General Help window
<->	<Minus> key selects the next lower value within a field
<+>	<Plus> key selects the next higher value within a field
<F2>	<F2> key loads previous values
<F3>	<F3> key loads optimized defaults
<F4>	<F4> key Saves and Exits
<→> or <←>	<Left/Right> arrows selects major Setup menus on menu bar, for example, Main or Advanced
<↑> or <↓>	<Up/Down> arrows select fields in the current menu, for example, Setup function or sub-screen
<ESC>	<ESC> key exits a major Setup menu and enters the Exit Setup menu Pressing the <ESC> key in a sub-menu displays the next higher menu level
<RETURN>	<RETURN> key executes a command or selects a submenu

5.3. Setup Menus

The Setup utility features a selection bar at the top of the screen that lists the menus.

Figure 8: Setup Menu Selection Bar

The Setup menus available for the COMh-m7RP (E2) are:

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

The currently active menu and the currently active UEFI BIOS Setup item are highlighted in white. Use the left and right arrow keys to select the Setup menus.
Each Setup menu provides two main frames. The left frame displays all available functions. Configurable functions are displayed in blue. Functions displayed in grey provide information about the status or the operational configuration.

5.4. Getting Help

The right frame displays a Help window providing an explanation of the respective function.

5.5. UEFI Shell

The JUMPtec UEFI BIOS features a built-in and enhanced version of the UEFI Shell. For a detailed description of the available standard shell scripting, refer to the EFI Shell User Guide. For a detailed description of the available standard shell commands, refer to the EFI Shell Command Manual. Both documents can be downloaded from the EFI and Framework Open Source Community homepage:
http://sourceforge.net/projects/efi-shell/files/documents/

JUMPtec UEFI BIOS does not provide all shell commands described in the EFI Shell Command Manual.

5.5.1. Entering the UEFI Shell

To enter the UEFI Shell, follow the steps below:

1. Power on the board
2. Press the <F7> key (instead of <DEL>) to display a choice of boot devices
3. Select 'UEFI: Built-in EFI shell'

```
UEFI Interactive Shell v2.2
EDK II /JUMPtec add-on v0.3
UEFI v2.80 (American Megatrands, 0x0005001A)
map: No mapping found.
```

4. Press the <ESC> key within 5 seconds to skip startup.nsh or any other key to continue.
5. The output produced by the device-mapping table can vary depending on the board's configuration.
6. If the <ESC> key is pressed before the 5 second timeout elapses, the shell prompt is shown:

```
Shell>
```

5.5.2. Exiting the UEFI Shell

To exit the UEFI Shell, follow one of the steps below:

1. Use the exit UEFI Shell command to select the boot device, in the Boot menu, that the OS boots from
2. Reset the board using the *reset* UEFI Shell command
3. Press the reset button of the board or power down/up the board

5.6. UEFI Shell Scripting

5.6.1. Startup Scripting

If the <ESC key is not pressed and the timeout has run out then the UEFI Shell automatically tries to execute some startup scripts. It searches for scripts and executes them in the following order:

1. Initially searches for JUMPtec flash-stored startup script.
2. If there is no JUMPtec flash-stored startup script present, then the UEFI-specified **startup.nsh** script is used. This script must be located on the root of any of the attached FAT formatted disk drive.
3. If none of the startup scripts are present or the startup script terminates then the default boot order is continued.

5.6.2. Create a Startup Script

Startup scripts can be created using the UEFI Shell built-in editor edit or under any OS with a plain text editor of your choice.

5.6.3. Example of Startup Scripts

Execute Shell Script on other Harddrive

This example (**startup.nsh**) executes the shell script named **bootme.nsh** located in the root of thefirst detected disk drive (**fs0**).

```
fs0:
bootme.nsh
```

5.7. Firmware Update

Firmware updates are typically delivered as a ZIP archive. Please find the latest available BIOS-ZIP archive on JUMPtec's Customer Section. Further information about the firmware update procedure can be found in the included "flash_instruction.txt”-file.

Register to JUMPtec's Customer Section to get access to BIOS downloads, additional documentation and Product Change Notification service.

6/Technical Support

For technical support contact our Support Department:

- E-mail: techsupport@jumptec.com

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

- Product ID Number (PN),
- Serial Number (SN) Module's revision
- Operating System and Kernel/Build version
- Software modifications
- Additional connected hardware/full description of hardware set up

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

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

6.1. 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 lithium battery, for example.

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

6.2. Returning Defective Merchandise

All equipment returned to JUMPtec must have a Return of Material Authorization (RMA) number assigned exclusively by JUMPtec. JUMPtec 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 JUMPtec's designated facility. JUMPtec 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 JUMPtec.

1. Visit the RMA Information website: https://www.jumptec.com/en/support/rma-information
2. **Download the RMA Request sheet for JUMPtec 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.
3. Send the completed RMA-Request form to the email address given at JUMPtec GmbH. JUMPtec will provide an RMA-Number.
4. The goods for repair must be packed properly for shipping, considering shock and ESD protection.

Goods returned to JUMPtec 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 JUMPtec RMA Support.

7/Storage and Transportation

7.1. Storage

If the product is not in use for an extended period time, disconnect the power plug from the power supply. If it is necessary to store the product then re-pack the product as originally delivered to avoid damage. The storage facility must meet the products environmental storage requirements as stated within this user guide. JUMPtec recommends keeping the original packaging material for future storage or warranty shipments.

7.2. Transportation

To ship the product use the original packaging, designed to withstand impact and adequately protect the product. When packing or unpacking products always take shock and ESD protection into consideration and use an EOS/ESD safe working area.

About JUMPtec

JUMPtec specializes its technical expertise in designing both - standard and highly customized compute products. Our newly optimized structure enables us to take customers from prototyping and design through to mass production faster than ever before.
We are uniquely positioned to leverage our global design and manufacturing expertise alongside Kontron's extensive worldwide network. While JUMPtec remains a fully owned subsidiary of Kontron, we benefit from their global distribution capabilities and work closely with Kontron's other solution businesses. With more OEMs seeking to mitigate risk and outsource complex manufacturing, the shift to modular solutions is becoming more prevalent. JUMPtec, backed by Kontron, is well-positioned to support customers in implementing this modular approach, offering high-quality, scalable solutions without compromising on size or capability.

JUMPtec serves a diverse range of markets, providing innovative solutions tailored to the unique needs of each industry. Find out more about our offering!

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

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