

User Guide

Thorium

Reliable and extremely powerful embedded system accelerated by NVIDIA® Jetson AGX Thor™ that is ideal for AI-supported applications - whether for robotics, industrial automation or aerospace. Thanks to its flexible interfaces and robust design, it is the perfect choice for powerful edge computing in any environment.

Revision 1.0

Date 01.09.2026



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1. Legal Notice

This manual contains information that must be observed for your personal safety and to prevent damage to property. PCB Arts GmbH assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

1.1 Qualified Personnel

The product/system described in this documentation may only be used by personnel qualified for the task in question. Qualified personnel must observe the associated documentation for the respective task, in particular the safety and warning instructions contained therein. Resulting from their training and experience, qualified personnel is capable of recognizing risks and avoiding possible hazards when handling these products/systems.

1.2 Disclaimer

PCB Arts has checked the contents of the manual for conformity with the hardware and software described. Nevertheless, deviations cannot be ruled out, so complete conformity cannot be guaranteed. The information in this publication is checked regularly and any necessary corrections are included in subsequent editions.

1.3 Contact Information

Logistic Address	PCB Arts GmbH Kurgartenstraße 37, 90762 Fürth, Germany
Support E-Mail	support@pcb-arts.com
Contact Information	mail@pcb-arts.com

1.4 Limited Product Warranty

PCB Arts GmbH provides a one-year warranty for this product. Should this product fail, when it's installed correctly during the warranty period, PCB Arts GmbH will repair or replace this product at no charge. If the product has been subjected to abuse, misuse, accident, disaster or purchased from non-authorized companies, PCB Arts will add a charge for repair or replacements.

The above warranty is the only warranty authorized by PCB Arts GmbH. Under no circumstances will PCB Arts GmbH be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

1.5 Trademark Acknowledgement

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1.6 Copyright Notice

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1.7 ESD Warning

Electronic components and circuits are sensitive to electrostatic discharge (ESD). When handling Thorium with the enclosure opened — for example when installing M.2 modules or the RTC battery coin cell — always observe ESD precautions: wear a grounded wrist strap and work on a grounded, static-dissipative surface. Do not touch connector pins or exposed circuitry. Damage caused by electrostatic discharge is not covered by the warranty.

2. Revision History

Revision	Date	Changes
0.1	13.08.2026	Initialization of the document
1.0	01.09.2026	First release

3. Introduction

Thorium is a ruggedized high-end edge AI embedded system accelerated by the NVIDIA® Jetson AGX Thor™ product family. The Thorium is a full embedded system with Jetson Thor T4000 (64 GB RAM) or T5000 (128 GB RAM) compatibility. It comes pre-flashed with the latest JetPack released from NVIDIA. With purchasing this product, you accept the [EULA](#) from NVIDIA.

- **NVIDIA® Jetson AGX Thor™ T4000 / T5000: up to 2070 TOPS** AI computing power
- **Camera interfaces:** 16x GMSL2 (V7 variants) or 16x Gigabit Ethernet with PoE PSE (V128 variants)
- **Rugged connectivity:** 1x 10 Gigabit Ethernet (M12), 1x Gigabit Management Ethernet (M12), 2x USB 3.2 Gen 2 USB-C Screwable (10Gbit/s)
- **Robust design:** IP67 protection class, waterproof and dustproof, shock-resistant
- **Choice of connectivity:** M.2 E-Key for e.g WiFi, M.2 B-Key for e.g 4G or 5G, 2x M.2 M-Key for NVMe storage (256 GB SSD included)
- **Compliance for 24/7 Operation:** Build for 24/7 operations

More information about Thorium: <https://www.pcb-arts.com/en/thorium>

3.1 Ordering Information

Part Number	Description
T4-D2-V128	Thorium with Jetson Thor T4000, 256GB SSD, 16x PoE
T4-D2-V7	Thorium with Jetson Thor T4000, 256GB SSD, 16x GMSL2
T5-D2-V128	Thorium with Jetson Thor T5000, 256GB SSD, 16x PoE
T5-D2-V7	Thorium with Jetson Thor T5000, 256GB SSD, 16x GMSL2
H-DBG	USB-C Adapter for UART & USB 3.2 Communication
T-FAN	Thorium FAN Option (Degrades IP67 rating)
PSU-002	PSU for GMSL Version with CONNECTOR 24V 360W GST360A36-C6P
PSU-003	PSU for PoE Version with CONNECTOR 24V 450W ATM 450A2-P240
CABLE-001	M12 (X-Coded) to RJ45 LAN Cable (3m)
CABLE-005	FAKRA to FAKRA Cable for GMSL (5m)
CABLE-006	FAKRA to FAKRA Cable for GMSL (10m)
CABLE-007	FAKRA to FAKRA Cable for GMSL (15m)
ANT-001	WiFi/BT Antenna
ANT-002	LTE Antenna
CABLE-008	GPIO Cable — M12 12-Pin to Open End (8x Opto-GPIO)
CABLE-009	Sensor Cable — M12 12-Pin to Open End (PWR-CTRL/2xCAN/I ² C)

3.2 Scope of delivery

When ordering a sample unit, the scope of delivery depends on the ordered variant:

Thorium with PoE (T4-D2-V128 / T5-D2-V128):

- 1x PSU with M12 A-Coded Output 24V 450W (PSU-003)
- 5x M12 (X-Coded) to RJ45 LAN Cable, 3m (CABLE-001)
- 1x Sensor Cable — M12 12-Pin to Open End, PWR-CTRL / 2x CAN / I²C (CABLE-009)
- 1x GPIO Cable — M12 12-Pin to Open End, 8x Opto-GPIO (CABLE-008)
- 1x Thorium FAN Option (T-FAN)

Thorium with GMSL (T4-D2-V7 / T5-D2-V7):

- 1x PSU with M12 A-Coded Output 24V 360W (PSU-002)
- 1x M12 (X-Coded) to RJ45 LAN Cable, 3m (CABLE-001)
- 1x Sensor Cable — M12 12-Pin to Open End, PWR-CTRL / 2x CAN / I²C (CABLE-009)
- 1x GPIO Cable — M12 12-Pin to Open End, 8x Opto-GPIO (CABLE-008)
- 4x FAKRA to FAKRA Cable for GMSL, 5m (CABLE-005)
- 1x Thorium FAN Option (T-FAN)

Just the Sample Unit of Thorium will be delivered with accessories. All other Thorium versions won't be delivered with any accessories. In both versions, sealing caps will be delivered in the package to cover unused IO's.

4. Technical Specifications

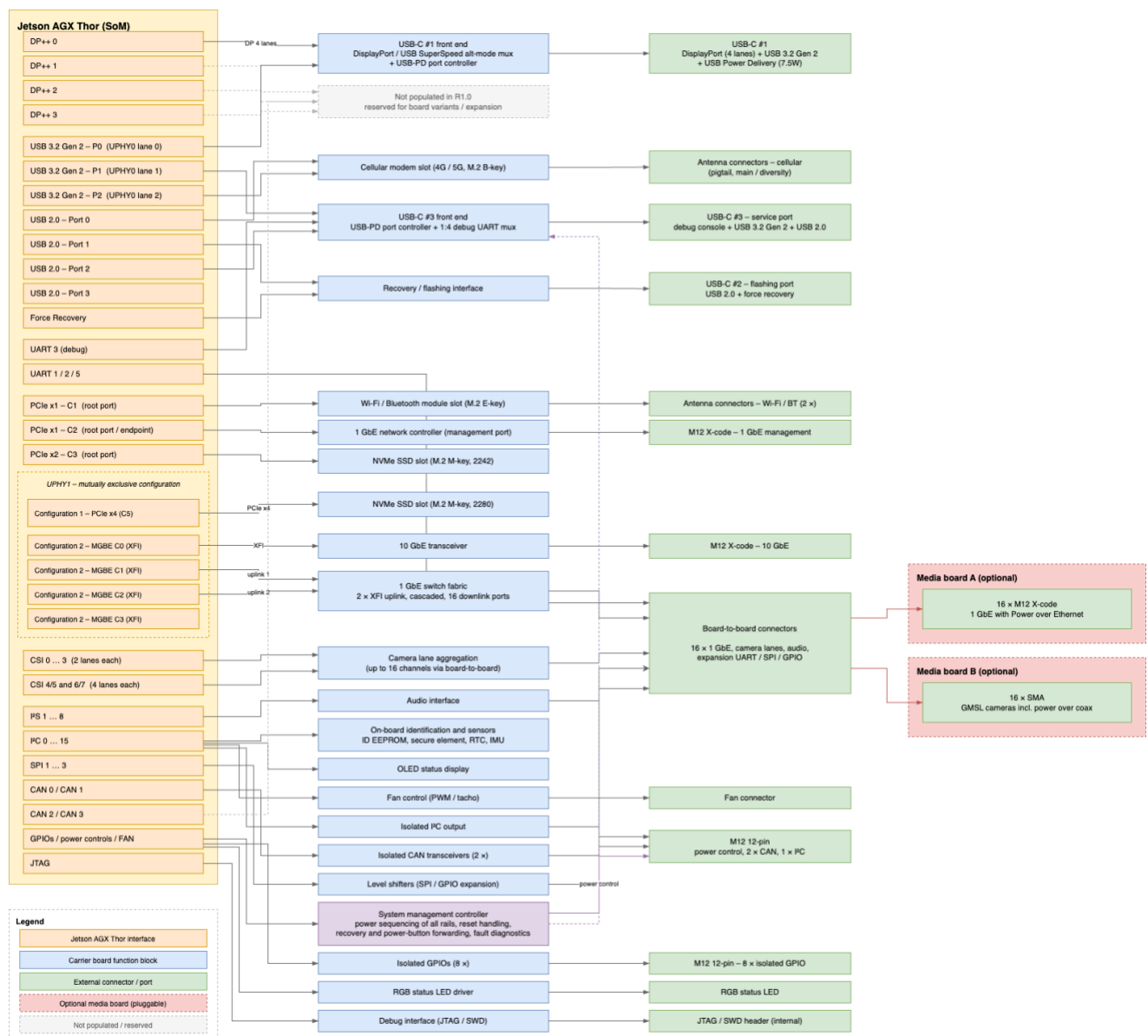
Specifications				
Product Name	Thorium T4-D2-V128	Thorium T4-D2-V7	Thorium T5-D2-V128	Thorium T5-D2-V7
NVIDIA Jetson SOM	AGX Thor T4000 (64 GB)	AGX Thor T4000 (64 GB)	AGX Thor T5000 (128 GB)	AGX Thor T5000 (128 GB)
AI Performance	1200 TOPS	1200 TOPS	2070 TOPS	2070 TOPS
GPU	1536-core NVIDIA Blackwell GPU with 64 Tensor Cores	2560-core NVIDIA Blackwell GPU with 96 Tensor Cores		
CPU	12-Core Arm® Neoverse®-V3AE			14-Core Arm® Neoverse®-V3AE
NVIDIA Jetson Power Modes	40W - 70W		40W - 130W	
USB	2x USB 3.2 Gen 2, 10Gbit/s (Connector: Type-C with Screw Terminal, 1x with DisplayPort), 1x USB 2.0 for flashing (Connector: Type-C)			
Camera Interfaces	V7 variants: 16x GMSL2 (total 40 Gbit/s); V128 variants: 16x Gigabit Ethernet with PoE PSE, IEEE 802.3af (Connector: M12 X-Code)			
Networking	1x Gigabit Management Ethernet (Connector: M12 X-Code), 1x 10 Gigabit Ethernet (Connector: M12 X-Code)			
Wireless Expansion	1x M.2 E-Key 2230 PCIe Gen 5 x1 for WiFi (no USB), 1x M.2 B-Key 2242/2252 USB 3.2 for LTE/5G (Antenna connectors: TBD)			
Power Input	+24V to +48V DC Power Input, max. 450 W (Connector: M12 L-Coded)			
I/O	8x Opto Isolated GPIOs, 1x Isolated I2C, 1x 1,54" OLED Display, 1x RGB LED T5000 Only (T5) Models: Additional 2x Isolated CAN			
RTC Battery	Battery Holder prepared for MS621 3V Cell i.e. Seiko Instruments Inc. MS621T			
Video Output	DisplayPort over USB-C			
Debug	Over USB-C			
Storage	256GB NVMe SSD (M.2 M-Key 2280, PCIe Gen 5 x4), 1x M.2 M-Key 2242 (PCIe Gen 5 x2) for expansion			
Operating System	Ubuntu 24.04 (JetPack 7.2)			
IP Class	IP67 with passive cooling			
Dimensions	210 x 103 x 48,5 mm (LxWxH) without active cooling; 210 x 130 x 66,5 mm with active cooling			
Weight	TBD			
Operating Temperature	-20°C to +60°C			
Mounting Options	Wall Mounting and DIN-rail Mounting			
Case	Anodized aluminium case			
Certifications	CE, EMC, RoHS			

4.1 Block Diagramm

Thorium is built as a modular system: a carrier board hosting the NVIDIA Jetson AGX Thor SOM, the power supply stages, the system management controller and all standard interfaces, plus an exchangeable media board that defines the variant-specific front-end.

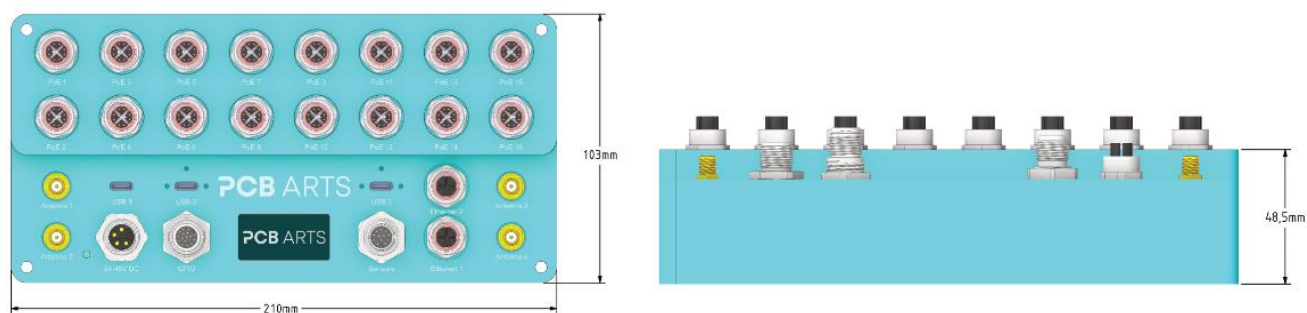
Two media board variants are available: the M12 Ethernet media board (V128 variants) provides 16x Gigabit Ethernet ports with PoE PSE (IEEE 802.3af), fed by four internal 4-port Ethernet switches which connect upstream to the Jetson's multi-gigabit Ethernet interfaces. The GMSL media board (V7 variants) provides 16x GMSL2 camera inputs through four GMSL2 deserializers (MAX96724) connected to the Jetson's CSI interfaces, including a Power-over-Coax (PoC 12V) injection network.

An integrated system management controller supervises the power-up and power-down sequencing of all voltage rails, monitors input power and thermal alerts, and signals fault conditions via the status LED.

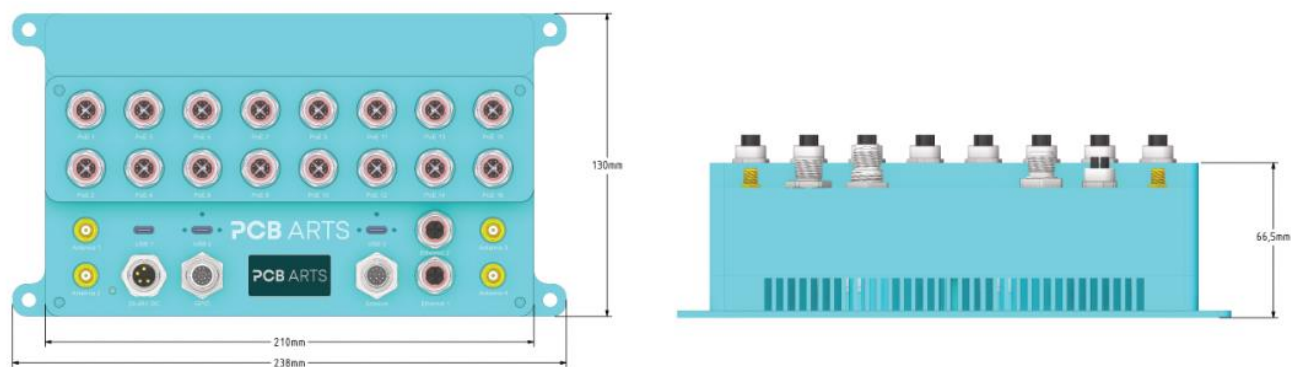


4.2 Dimensions

4.2.1 Dimensions Thorium without active cooling



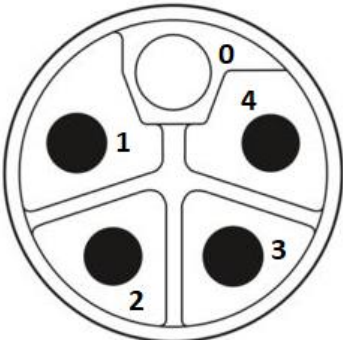
4.2.2 Dimensions Thorium with wall mount cooling



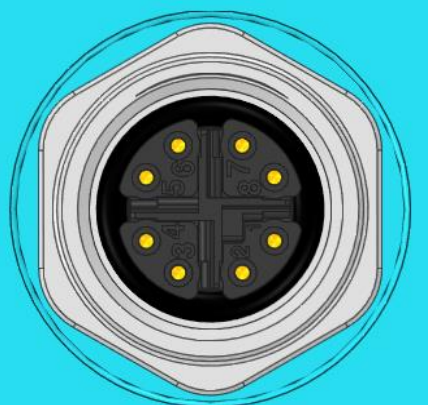
4.3 External Connectors

Location	External Connector	Description
Front	24 – 48V DC	+24V to +48V DC power input
Front	V7 variants: Cam 1 – Cam 16	16x GMSL2 camera connectors incl. PoC 12 V supply — GMSL variants (T4-D1-V7 / T5-D1-V7) only
Front	V128 variants: PoE 1 – PoE 16	16x Gigabit Ethernet with PoE PSE, IEEE 802.3af (M12 X-Code) — PoE variants (T4-D1-V128 / T5-D1-V128) only
Front	Ethernet 1	Gigabit Ethernet Connector
Front	Ethernet 2	10 Gigabit Ethernet Connector
Front	USB 1	USB 2.0 with Screw Terminal & Flashing
Front	USB 2	USB 3.2 Gen 2 Type-C Connector with Screw Terminal and DFP (Debug)
Front	USB 3	USB 3.2 Gen 2 with Screw Terminal and DisplayPort (10 Gbit/s)
Front	Antennas	SMA connectors for WiFi, LTE or 5G Antennas
Front	GPIOs	8x Opto Isolated GPIOs
Front	Sensors	Power Control, 2x Isolated CAN, 1x Isolated I2C
Front	OLED Display	1,54" OLED status display
Back	FAN Terminal	Fan adaption interface with I2C. If want to use, please get in touch with PCB Arts.

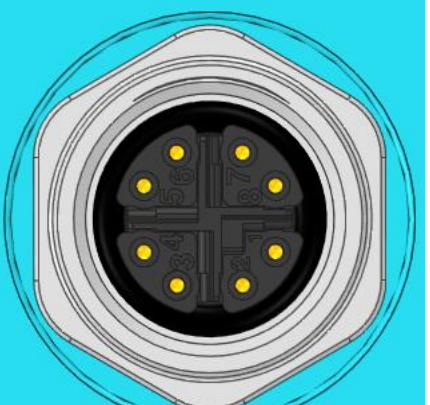
4.3.1 DC-In

Function	Description	 View into Thorium Connector
Type	M12 L-Coded	
Pinout	Pin 0 = Power Negative Pin 1 = Power Negative Pin 2 = Power Positive Pin 3 = Power Positive	
Mating Connector	MURR-Elektronik 7000-P4221-P040150	
Notes	The power supply input of the Thorium allows 24V-48V $\pm 10\%$. The overvoltage protection threshold is $>55V$. The input voltage is reverse polarity protected.	

4.3.2 Management Ethernet

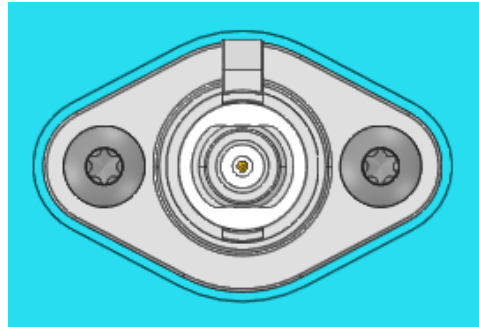
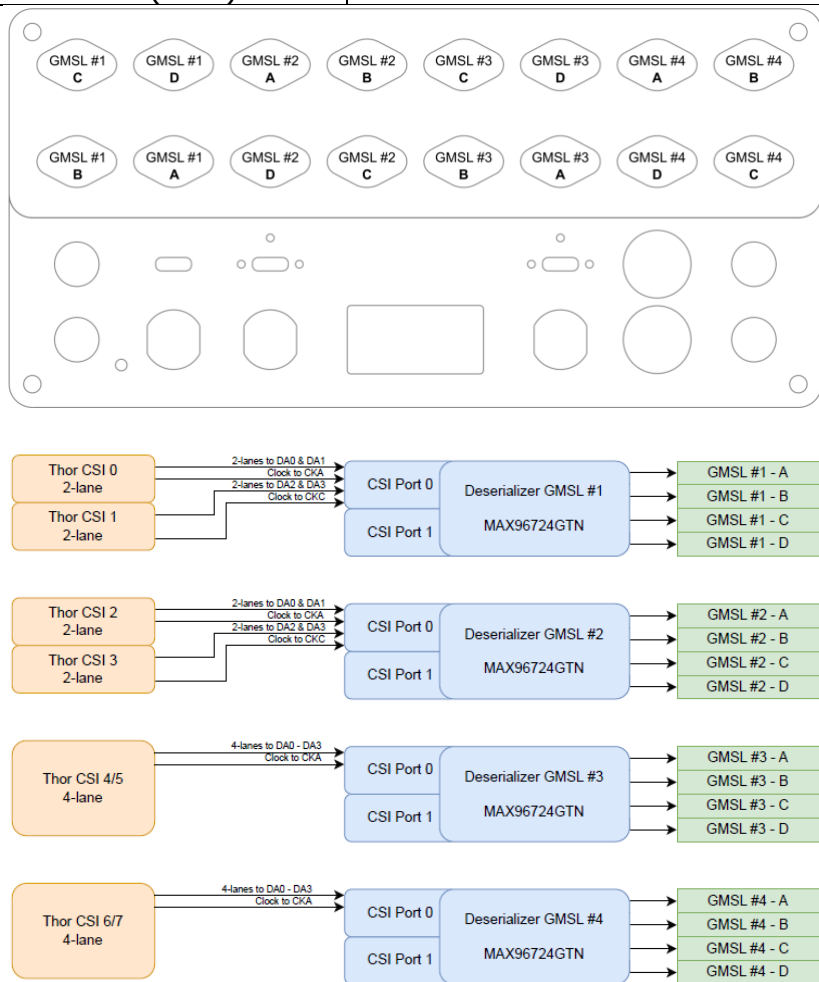
Function	Description	
Type	M12 X-Coded 8 pin	
Connector	Sealed 8pin M12 X-Code	
Pinout	IEEE-802.3 specification	
Mating Cable	Standard M12 X-Code to RJ45 CAT 6	
Notes	The Management Ethernet is a dedicated Gigabit Ethernet port intended for device management. It is connected to the Jetson via PCIe@1 (pcie@a808400000) through a dedicated Gigabit Ethernet NIC.	

4.3.3 10G Ethernet

Function	Description	 Ethernet 2
Type	M12 X-Coded 8 pin	
Connector	Sealed 8pin M12 X-Code	
Pinout	IEEE-802.3 specification	
Mating Cable	Standard M12 X-Code to RJ45 min. CAT 6A	

Notes	The 10G Ethernet port is directly attached to mgbe0_0 of the NVIDIA Jetson AGX Thor multi-gigabit Ethernet interfaces via a 10 Gigabit Ethernet PHY.
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4.3.4 Camera Ports (GMSL2 — V7 variants)

Function	Description	
Type	V7 variants: FAKRA sealed connectors (Cam 1 – Cam 16)	
I2C DSER Mapping	GMSL #1 DSER = I2C0 GMSL #2 DSER = I2C1 GMSL #3 DSER = I2C12 GMSL #4 DSER = I2C3	
Mating Cable	FAKRA to FAKRA cable for GMSL: CABLE-005 (5 m), CABLE-006 (10 m), CABLE-007 (15 m)	
Overview internal mapping		
Notes	The 16 camera inputs are served by four GMSL2 deserializers connected to the Jetson CSI interfaces, with a total throughput of up to 40 Gbit/s. The PoC (Power over Coax) voltage (12V) is enabled by default and can be disabled for all ports at once via GPIO, e.g. to reset	

	the connected cameras. The power good of the PoC supply can also be read back via GPIO. The maximum PoC output power per camera Port is 5W. There are supported partners directly available by PCB Arts, with drivers and compatibilities already built into the BSP. Please contact support@pcb-arts.com for a list of supported cameras partners.
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4.3.5 PoE Ethernet Ports (V128 variants)

Function	Description	
Type	M12 X-Coded 8 pin, sealed (PoE 1 – PoE 16)	
Connector	16x sealed M12 X-Code, Gigabit Ethernet with PoE PSE (IEEE 802.3af)	
Pinout	IEEE-802.3 specification	
Mating Cable	Standard M12 X-Code to RJ45 CAT 6 (CABLE-001)	
Notes	The 16 Gigabit Ethernet ports are provided by four internal 4-port Ethernet switches, connected upstream to the Jetson via two 10 Gbit/s links (Ports 1–8 on network interface mgbe1_0, Ports 9–16 on mgbe2_0). Each of the two upstream interfaces therefore carries one IP address for the eight ports behind it. PoE power per port is limited to IEEE 802.3af (max. 15,4 W); IEEE 802.3at (PoE+) classification is not supported. The total PoE budget is approx. 260 W. Attention: Do not connect multiple of the 16 Ethernet ports to the same external switch without proper network configuration, this can cause spanning-tree errors.	

4.3.6 Antennas

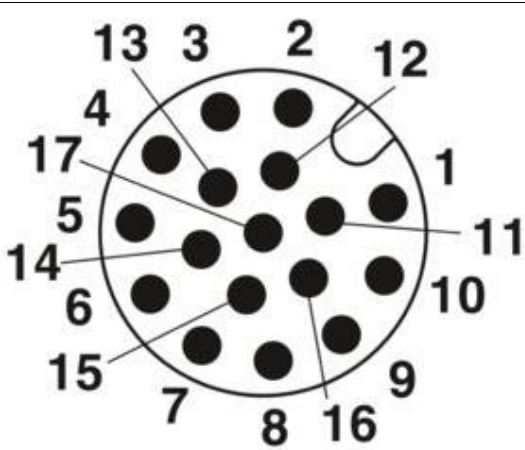
Function	Description	
Type	SMA Sealed Connector	
Pinout	Antenna 1 = WiFi RP SMA Antenna 2 = WiFi RP SMA Antenna 3 = LTE STD SMA Antenna 4 = LTE STD SMA	
Mating Antenna	TBD	

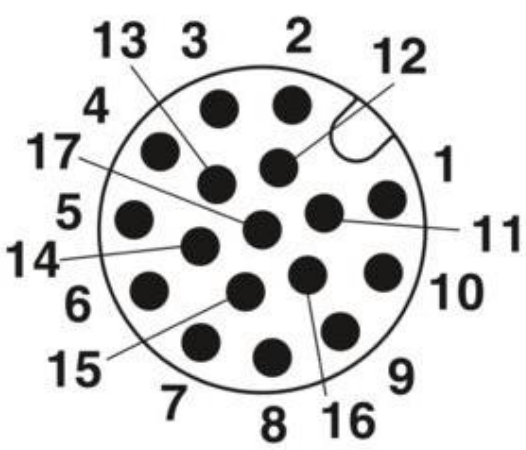
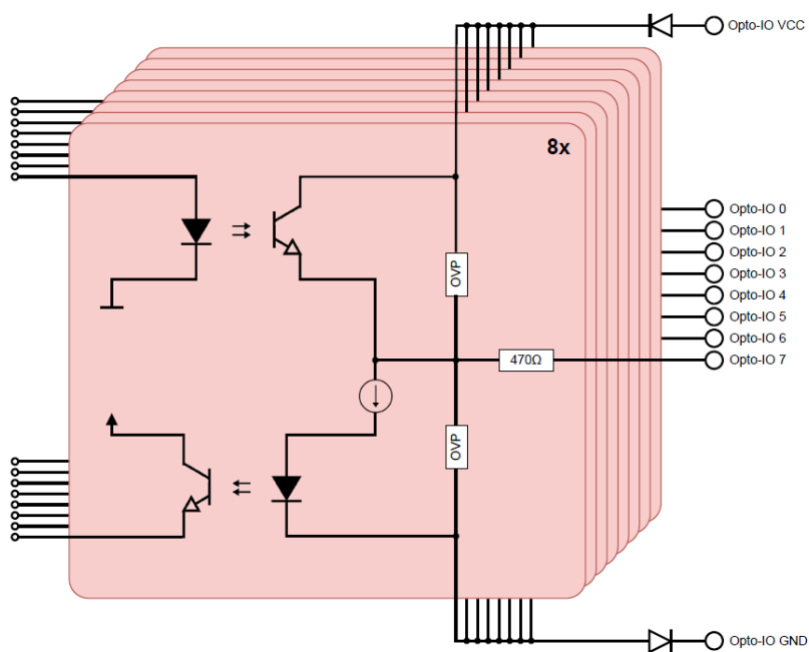
Notes	The antenna connectors will be pre-configured at every Thorium, that can be connected directly to M.2 wireless connectivity modules. Either WiFi and 4G or 5G is possible.
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4.3.7 USB-C

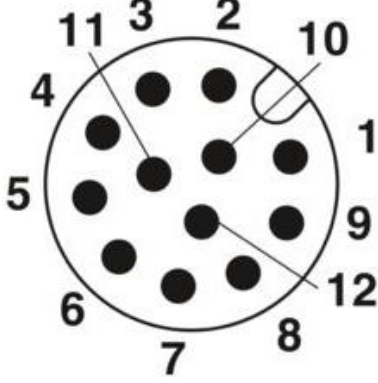
Function	Description	
Type	Sealed USB Type C	
Pinout	Universal Serial Bus Type-C Cable and Connector Specification	
Mating Cable	Standard USB 3.2 Gen 2 Type C. Optional: with screw terminal	
Notes	Thorium provides three USB-C ports: USB 1 (Flashing USB), USB2 (USB 3.2 Gen 2, 10 Gbit/s, screw terminal, with UART Debugging) and USB 3 (USB 3.2 Gen 2, 10 Gbit/s, screw terminal and Display Port). The maximum PD (Power delivery) for Port 2 & 3 is 7.5W (5V @ 1.5A).	

4.3.8 GPIOs

Function	Description	
Type	M12 A Coded 17-Pin	
Pinout	Pin 1 - Opto-IO 0 Pin 2 - Opto-IO 1 Pin 3 - Opto-IO 2 Pin 4 - Opto-IO 3 Pin 5 - n.c. Pin 6 - n.c. Pin 7 - Opto-IO VCC Pin 8 - Opto-IO GND Pin 9 - n.c. Pin 10 - n.c. Pin 11 - Opto-IO 4 Pin 12 - Opto-IO 5 Pin 13 - Opto-IO 6 Pin 14 - Opto-IO 7 Pin 15 - n.c. Pin 16 - n.c. Pin 17 - n.c.	
Mating Cable	CABLE-008	

Function	Description	
Type	M12 A Coded 17-Pin	
Pinout	Pin 1 - Opto-IO 0 Pin 2 - Opto-IO 1 Pin 3 - Opto-IO 2 Pin 4 - Opto-IO 3 Pin 5 - n.c. Pin 6 - n.c. Pin 7 - Opto-IO VCC Pin 8 - Opto-IO GND Pin 9 - n.c. Pin 10 - n.c. Pin 11 - Opto-IO 4 Pin 12 - Opto-IO 5 Pin 13 - Opto-IO 6 Pin 14 - Opto-IO 7 Pin 15 - n.c. Pin 16 - n.c. Pin 17 - n.c.	
Mating Cable	CABLE-008	
		
Notes	The input GPIOs can be driven by a voltage up to 48 V DC. The driving source must be capable to drive 5mA per input. The high going threshold voltage is 2.5V, the low going threshold voltage is 1.5V The output are bipolar Transistor Outputs, no power is delivered through these outputs. The inputs and Outputs are Overvoltage Protected at 55V from Opto-IO-GND to Opto-IO-VCC. The Opto IO Supply is polarity protected both for the Inputs and the outputs. The outputs are short circuit protected over the whole voltage range by the series resistors.	

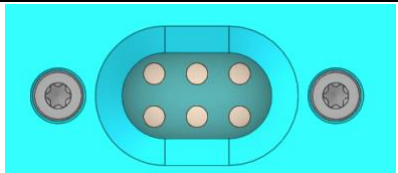
4.3.9 Sensors

Function	Description	
Type	M12 A Coded 12-Pin	
Pinout	Pin 1 - CAN0_H Pin 2 - CAN0_L Pin 3 - CAN1_H Pin 4 - CAN1_L Pin 5 - PWR-CTRL_Signal Pin 6 - PWR-CTRL_GND Pin 7 - I2C_VCC Pin 8 - I2C_SDA Pin 9 - I2C_SCL Pin 10 - CAN0_GND Pin 11 - CAN1_GND Pin 12 - I2C_GND	
Mating Cable	CABLE-009	
Notes	PWR-CTRL: Pulling the signal to GND switches the device off. Left floating or unconnected, the device operates normally. CAN: Both CAN interfaces are isolated up to 48 V and use the ISOW1044 transceiver. They are available as standard CAN devices (can0, can1); the transceivers must be enabled via GPIO before use — see GPIO, CAN & LED Control. I2C: The isolated I2C interface supplies unregulated 3.3 V up to 100 mA and is likewise isolated up to 48 V. Thresholds are $V_{IL} = 0.3 \times V_{CC}$ and $V_{IH} = 0.5 \times V_{CC}$. The transceiver used is the ISO1640BD-Q1.	

4.3.10 OLED Display

Function	Description	
Type	OLED Driver SSD1309	
Notes	1,54" OLED status display (128x32/64 pixel), connected via I2C and controllable from user space. It's connected via I2C-7 with the I2C Address 0x3C.	

4.3.11 FAN Terminal

Function	Description	
Type	Custom Sealed Adaption PCB	
Pinout	Get in touch with PCB Arts.	

Notes	This Interface is meant for a FAN adaptation of the Thorium, please do not use this pins for own adaptations without consulting PCB Arts in advance.
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4.4 Cooling Solutions

Thorium has two different cooling possibilities: with an active fan, directly available from PCB Arts as DIN-rail or wall-mount solution (IP67 is no longer possible), or with a custom designed heat-sink. Since every use-case is different there is this flexibility with the custom heatsink to adapt into customer's solution. Either the customer designs a heatsink himself, or PCB Arts can support with that. In case of an assistance request, please contact support@pcb-arts.com.

To design a custom heat-sink please go to the [Thorium Website](#) or [Webshop](#), where PCB Arts provides a STP file for the enclosure of Thorium. Also be aware of the maximum power of the different NVIDIA Jetsons, mentioned in the specifications above.

4.5 Power Consumption & Thermals

Thorium is supplied with +24V to +48V DC; the input stage is filtered and protected (up to 20 A). The maximum total power consumption of the system is 450 W. The internal max. power budget is distributed as follows:

- NVIDIA Jetson Thor SOM: 40 W to 130 W depending on the selected power mode (T4000: 40-70 W, T5000: 40-130 W)
- The Mainboard itself with its USB PD functionalities and all active components has up to 60W
- PoE supply (V128 variants): up to approx. 260 W in total, max. 15,4 W per port (IEEE 802.3af)
- PoC supply (V7 variants): up to 5 W per camera port at 12 V (approx. 80 W in total)

5. Installation

Thorium comes with a pre-installed 128 GB NVMe SSD in the M.2 M-Key 2280 slot, the remaining M.2 Interfaces are empty to allow put in M.2 Modules. When planning to install radio interfaces into Thorium, please get in touch with PCB Arts before ordering, therefore antenna connectors will be prepared and installed into the housing. For shipping safety reasons, also no battery will be installed into the battery coin cell holder.

M.2 Interfaces:

- M-Key 2280 (NVMe) PCIe Gen 5 x4 – 128GB SSD pre-installed (Transcend TS128GMTE110S)
- M-Key 2242 (NVMe) PCIe Gen 5 x2 – empty
- E-Key 2230 (WiFi) PCIe Gen 5 x1 (no USB)
- B-Key 2242 or 2252 (4G, 5G) USB 3.2

5.1 Insert M.2 Modules

Please contact support@pcb-arts.com

Verified modules: WiFi (M.2 E-Key): AW-XB560NF-NV — the officially supported WiFi card for the Jetson Thor platform. LTE/5G (M.2 B-Key): Telit LN920 (4G & GPS).

5.2 Insert Battery coin cell

Please contact support@pcb-arts.com

6. Operations

6.1 First Bootup

To boot up Thorium, please plug the DC-In into the device, after that it automatically boots up. Also, when powering down the device, it will automatically power itself up. It's build for 24/7 operations. When not having a sample unit with an active fan, please make sure a proper cooling solution is installed.

When first booting up Thorium, it's recommended to use a USB-C docking station for Display Port, keyboard and mouse. Also, it's possible to access via SSH / Ethernet. The hostname in the network has the following scheme: thorium-X where X is the serial number, engraved on the Thorium.

E.g. Thorium S/N: 00000001, then the hostname is: thorium-1

Thorium can be connected via network with "ssh thorium@thorium-1".

To access the operating system upon first start-up, use the following default access credentials:

- **Username:** thorium
- **Password:** thorium

Important: For security reasons it is recommended to change the default password after the first boot.

6.2 Re-flash Thorium

For re-flashing Thorium please plug Thorium via USB-C 3 (USB 2.0 flashing port) to the host computer, it automatically detects it's device mode. Then power on the device, by plugging in the DC-In. It is in flashing mode when the Power LED is blue. For getting the supported JetPack Version and for a detailed flashing instruction please visit the [online-documentation](#).

6.3 Build in functionalities

Thorium has build-in sensors and functionalities for different applications, which are user-adaptable. Included in every Thorium are:

Part	Description
8x Opto Isolated GPIOs	Opto Isolated IO's which can be used as Input or Output.
IMU ICM-42670-P	A 3-axis gyroscope and 3-axis accelerometer which can be read out via I2C.
Crypto Chip ATSHA204A	A crypto security chip to encrypt the software, which is running on Thorium.
External RTC	An external RTC for keeping the time without access to an NTP server.
GMSL Deserializer (V7 variants)	Four GMSL2 deserializers serving the 16 camera ports (4 ports each), connected to the Jetson CSI interfaces with a total throughput of up to 40 Gbit/s.
2x Isolated CAN	Two isolated CAN interfaces, available as standard CAN devices (can0, can1). The transceivers must be enabled via GPIO before use — see GPIO, CAN & LED Control.
1x Isolated I2C	One isolated I2C interface for connecting external peripherals.
1,54" OLED Display	OLED status display (128x32/64 pixel), connected via I2C and controllable from user space.
1x RGB LED	User-configurable RGB status LED, controllable via GPIO.

For a detailed software-documentation please visit the [online-documentation](#).

6.4 GPIO, CAN & LED Control

The built-in interfaces can be used directly from user space (JetPack / Linux) with the standard libgpiod tools. Read an input with `gpioget $(gpiofind "<GPIO>")` and set an output with `gpioset $(gpiofind "<GPIO>")=1`.

Opto-isolated I/O mapping — each I/O can be used as input or output (shared connector pin):

I/O	Input GPIO	Output GPIO
IO 0	PP.06	PV.06
IO 1	PQ.01	PW.01
IO 2	PP.07	PV.07
IO 3	PQ.00	PW.00
IO 4	RSVD	RSVD
IO 5	PR.01	PY.05
IO 6	PQ.07	PY.03
IO 7	PS.00	PY.04

CAN control — enable the isolated CAN transceivers via GPIO before configuring the interfaces with SocketCAN (e.g. `sudo ip link set can0 type can bitrate 500000`):

Signal	GPIO	Function
CAN0 EN	PZ.07	Set to 1 to enable CAN0
CAN0 STB	PAA.00	Set to 0 for normal operation
CAN1 EN	PU.03	Set to 1 to enable CAN1
CAN1 STB	PL.04	Set to 0 for normal operation

RGB LED and M.2 module control:

Function	GPIO
RGB LED Red	PDD.07
RGB LED Green	PDD.04
RGB LED Blue	PDD.03
M.2 B-Key Power Off	PDD.06
M.2 B-Key WDIS	PDD.05
M.2 E-Key Disable 1	PL.01
M.2 E-Key Disable 2	PM.01

6.5 UART Debugging

For UART Debugging the USB-C 2 Port can be used, with the USB-C Adapter for UART & USB 3.2 Communication (**H-DBG**), which is available at the online Webshop of PCB Arts. There are two USB-C Ports, one with a UART to USB Converter, which can be directly plugged into a computer. The BAUD Rate is 115200. The other USB-C Port can be used as a normal USB 3.2 Port and plug in cameras, mouse, keyboards etc..

Attention: When a device with a video output is connected to the H-DBG, then no UART communication is possible!

6.6 IP67 Rating

The IP67 Rating is just matched, when the ports are either connected or the delivered caps are screwed on the connectors. When USB-C is plugged, then no IP67 rating is achievable anymore. The USB-C doesn't need a cap to be IP67 rated.