

StereoLabs*

Embedded Computer

ZED BOX Mini Series

User Manual

ZBX-4XXXXX

February 2025 - Revision 1.2



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Product Warranty

Stereolabs warrants the original purchaser that the ZED Box Mini will be free from any manufacturing defects (material and/or workmanship) for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Stereolabs, or products that have been subject to misuse, abuse, accident, or improper installation.

Stereolabs assumes no liability under the terms of this warranty as a consequence of such events.
If you believe your product is defective, follow the steps below.

- Gather as much information as possible about the encountered problem. For example, the hardware/software configurations, use cases, description of the issue, when it appears, how it is impacting, anything abnormal displayed when the problem occurs.
- Contact Stereolabs support and explain with all the information collected above the problem.
- If your product is diagnosed as defective by the Stereolabs support, you will be granted access to the return process explained on this webpage : <http://slabs.returnscenter.com>.
- You will then need to carefully pack the defective product and ship it following the steps on the confirmation email you should have received on step 3.
- Wait for Stereolabs support to either repair or replace the defective product before shipping it back to you.

Declaration of Conformity

CE Conformity : This equipment has been tested and found to comply with all applicable European Union (CE) directives low voltage 2014/35/UE and EMC 2014/30/UE.

FCC Conformity : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Safety Instructions

This manual contains information and warnings essential for safe operation of the embedded computer and for maintaining it in safe operating conditions. Before using it, be sure to carefully read the following safety precautions.

- Read these instructions carefully before using the device.
- Keep this manual for future reference.
- Install the device on a stable surface to avoid falls or damage.
- Protect the device from humidity and exposure to extreme temperatures.
- Always use the supplied model A653-1205000DI AC Adapter.
- To avoid electrical accidents and to maintain the safety specifications of this instrument, connect the power cord provided only to a 3-contact (line phase, neutral, ground) outlet.
- Verify that the power supply voltage matches the device's requirements before plugging it in.
- Ensure that the power outlet is easily accessible and located near the device.
- Position the power cord away from high-traffic areas to prevent it from being crushed or damaged.
- If the device will not be used for an extended period, disconnect it to prevent damage from power surges.
- Use only cables and adapters recommended by Stereolabs to prevent malfunctions or fire hazards.
- Avoid static electricity buildup by using an anti-static wrist strap when installing or performing internal maintenance.
- Disconnect the device from all power outlets before cleaning. Use only a soft, dry cloth. Avoid liquids or spray detergents.
- Never pour liquids into the device, as this could cause fire or electric shock.
- Never attempt to open the device; contact qualified personnel for assistance if needed.
- Avoid touching the surface of the device to prevent burns or discomfort. The surface of this embedded PC can become hot during operation and may retain heat.
- Allow Cooling Time: If handling is necessary, wait a few minutes after shutting down to allow the device to cool.
- Contact Stereolabs support if:
 - The power cord or plug is damaged.
 - Liquid has entered the device.
 - The device has been exposed to excessive moisture.
 - The device is malfunctioning or not operating as expected.
 - The device is physically damaged or shows visible signs of breakage.

Safety Symbols



In this manual, this symbol indicates particularly important information that the user should read before using this product.



Indicates AC (Alternating Current).



Indicates DC (Direct Current).



Indicates Hot Surface.

ESD Precautions

When installing or maintaining the equipment, follow the ESD safety precautions to prevent personal injury and equipment damage.

- Do not touch devices with bare hands to prevent damage to the electrostatic sensitive devices (ESSDs) on the circuit boards.
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system.
- Use special ESD bags to carry or transport device components.
- Do not remove any module or component from its anti-static bag before installation.

Service and Maintenance

To ensure your ZED Box Mini performs optimally, please follow these guidelines.

Cleaning

- Make sure the box is properly shutdown by disconnecting the power cord and all other connections before cleaning the system.
- Use a soft, dry cloth to clean the exterior of the device.
- Avoid using solvents or abrasive cleaners.

Ventilation

- Keep the device in a clean, dust-free environment to prevent overheating.

Software Updates

- Periodically check for firmware and software updates from Stereolabs to maintain system security and stability.

Storage and Transport

- If the device is not in use for an extended period, disconnect the power supply.
- Store the device in a cool, dry place.

1. Product Overview

1.1. Introduction

The ZED Box Mini is a compact, cost-effective, and high-performance embedded computing system tailored for camera-based applications. It offers an optimal balance of essential I/O interfaces, lightweight portability, and advanced GMSL2 connectivity. A standout feature of the ZED Box Mini is its ability to seamlessly convert data from GMSL2 or USB 3.0 cameras to Gigabit Ethernet, enabling high-speed, long-distance data streaming with minimal latency.

The ZED Box Mini integrates three Nvidia Jetson processor options, to suit many different application needs. This flexibility allows users to choose the most appropriate processor for your industry:

- The Jetson ORIN NANO™ 4GB module is ideal for long-distance streaming over ethernet and basic single-camera video analytics with low-compute requirements.
- The Jetson ORIN NANO™ 8GB module provides mid-range computational power, enabling efficient depth sensing, and object or people detection.
- The more powerful Jetson ORIN NX™ 8GB module is best suited for high compute or multiple stereo camera processes. Best suited for advanced robotics with real-time decision making, and complex industrial automation.
- The Jetson ORIN NX™ 16GB module delivers maximum performance for intensive AI workloads, multi-sensor fusion, and real-time decision-making. Ideal for advanced robotics, autonomous systems, and high-throughput industrial automation.

Featuring support for advanced perception and depth sensing processing tasks, the ZED Box Mini is well-suited for industrial and outdoor environments. Its compact design allows for easy integration into space-constrained environments without compromising performance.

The device provides multiple I/O ports (USB 3.0, HDMI 2.1, Gigabit Ethernet, GMSL2) for flexible connectivity and can be further enhanced with an optional fan add-on for better cooling during intensive operations. Additionally, the ZED Box Mini supports hardware synchronization for precise multi-camera setups.

Compatible with the JetPack Linux system, the ZED Box Mini offers seamless integration with NVIDIA Jetson platforms, enabling powerful AI Perception and edge computing workloads.

This manual provides detailed instructions for installation, configuration, and maintenance of the ZED Box Mini.

Please read this guide carefully before using the product to ensure optimal performance and safety.

1.2. Features

Flexibility with several NVIDIA Jetson module options to meet your industry needs:

- Jetson ORIN NANO™ 4GB, an entry-level AI module with Ampere GPU, ideal for basic edge applications.
- Jetson ORIN NANO™ 8GB, an efficient Ampere GPU module for moderate AI workloads.
- Jetson ORIN NX™ 8GB, a high-performance AI module for advanced robotics and computing.
- Jetson ORIN NX™ 16GB, a cutting-edge AI module for advanced robotics and computing.

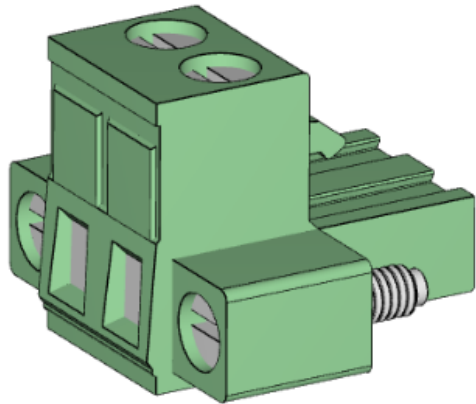
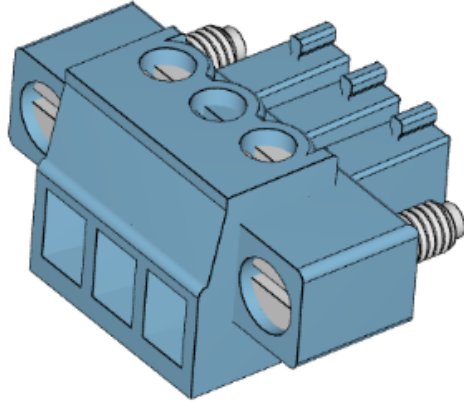
- GMSL2 or USB 3.0 to Gigabit Ethernet converter
- Up to 2 GMSL2 cameras with Fakra-Z connectors
- USB 2.0 for system flashing and OTG entry
- HDMI 2.1 Display port
- Compact design

Support for Jetpack Linux system

Support for multiple Box synchronization

1.3. Package Content

Upon receiving the ZED Box Mini, please carefully check if the package contains all the items listed in the following table. If any item is missing or damaged, please contact us immediately.

Item	Description	3D Model	Usage	Part Number	Qty
1	ZED Box Mini		PC	ZBX-4XXXXXX	1
2	Power Supply Unit		DC-IN	A653-1205000DI	1
3	Power Cord EU or US		DC-IN	XIE KANG XK-06	1
4	DC Input Connector		DC-IN	TBP01P1W-508-02GR	1
5	Synchronization Connectors		SYNC	TBP02P1W-381-02BE	2
6	Fan, Fan Mount and Screws		FAN	ACC-ZBX-M-FAN	1

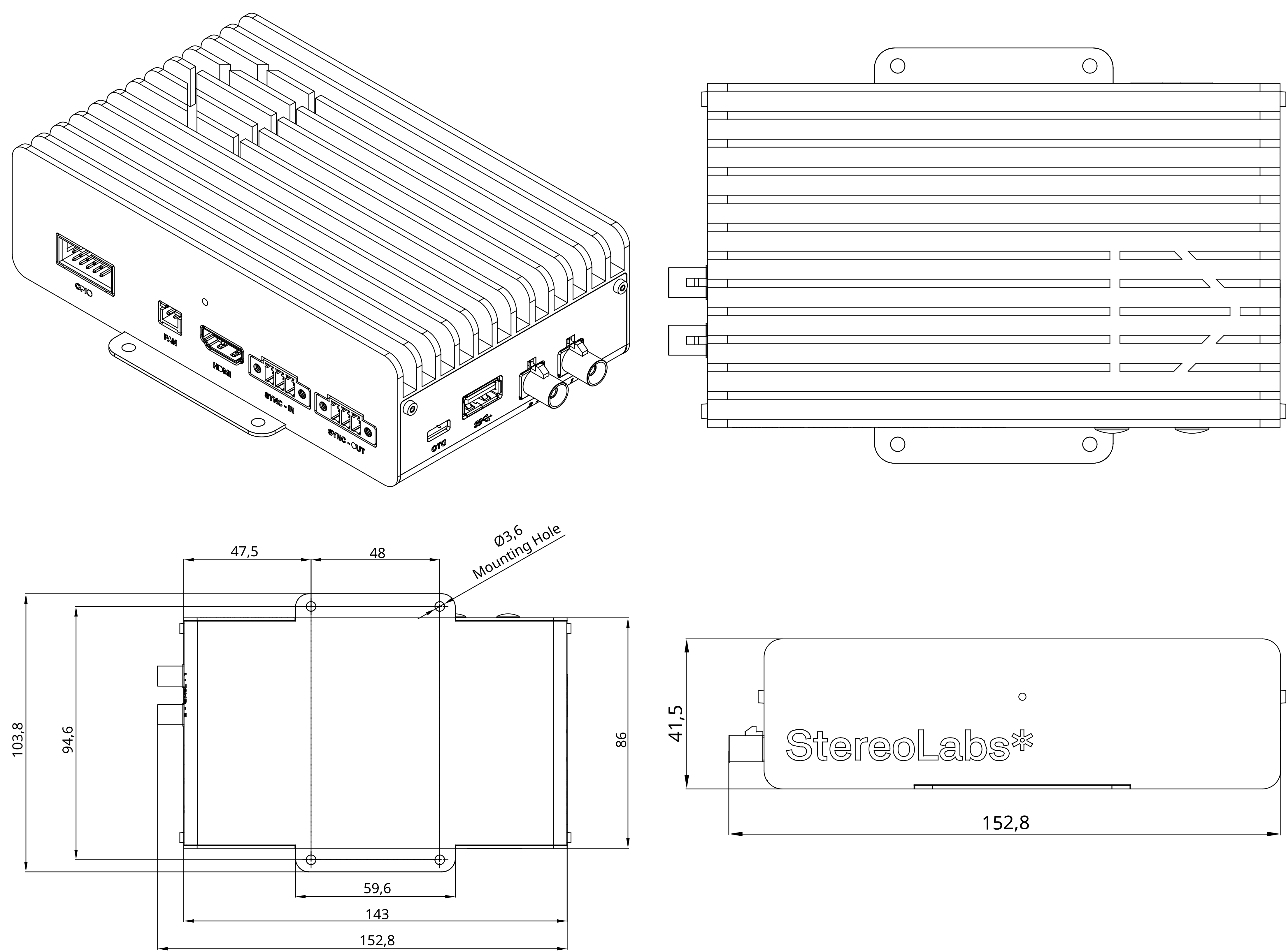


WARNING
If you are using our product from the UK, we recommend using the power supply reference A653-1205000DB from Xinspower that we do not provide.

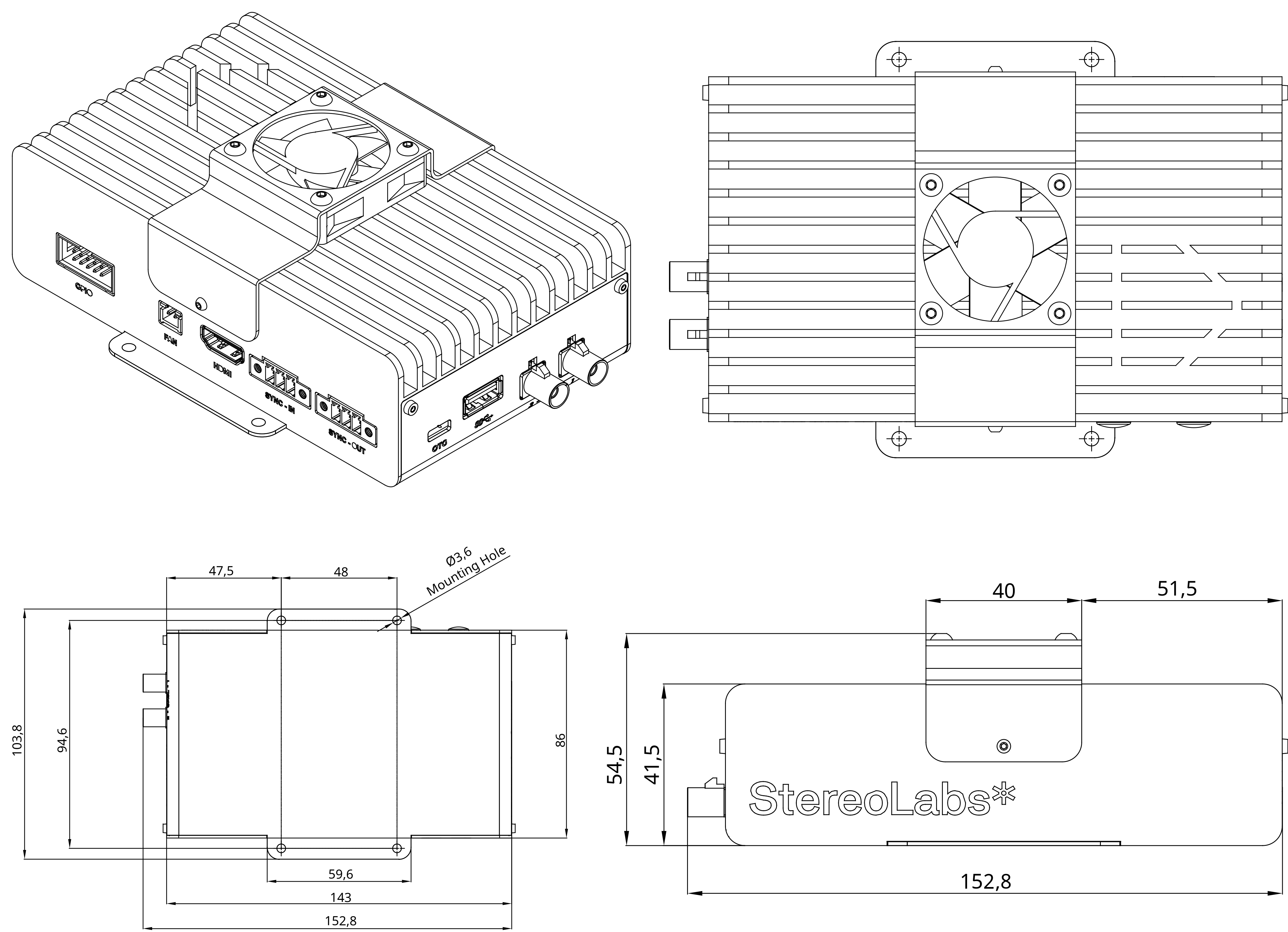
1.4. Product Dimensions

Note that all following dimensions are in millimeters.

ZED Box Mini

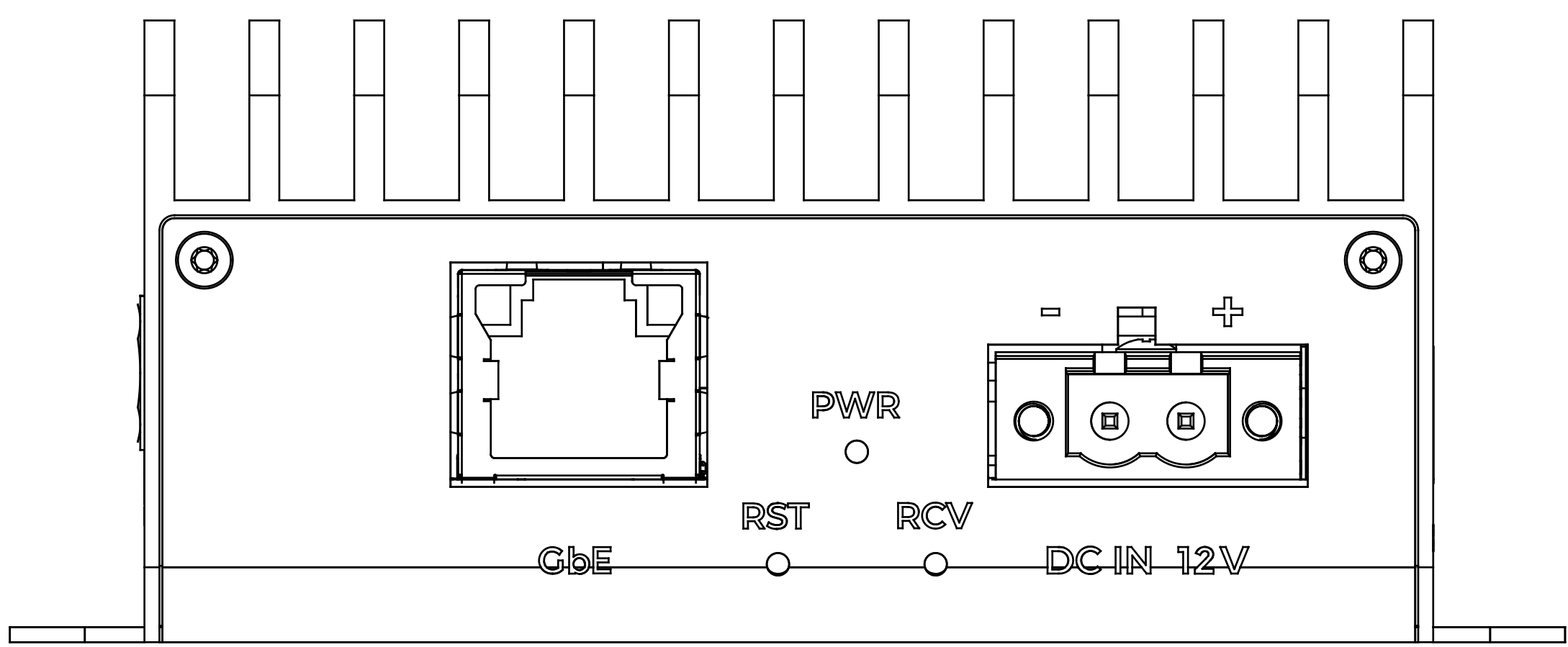


ZED Box Mini with Fan



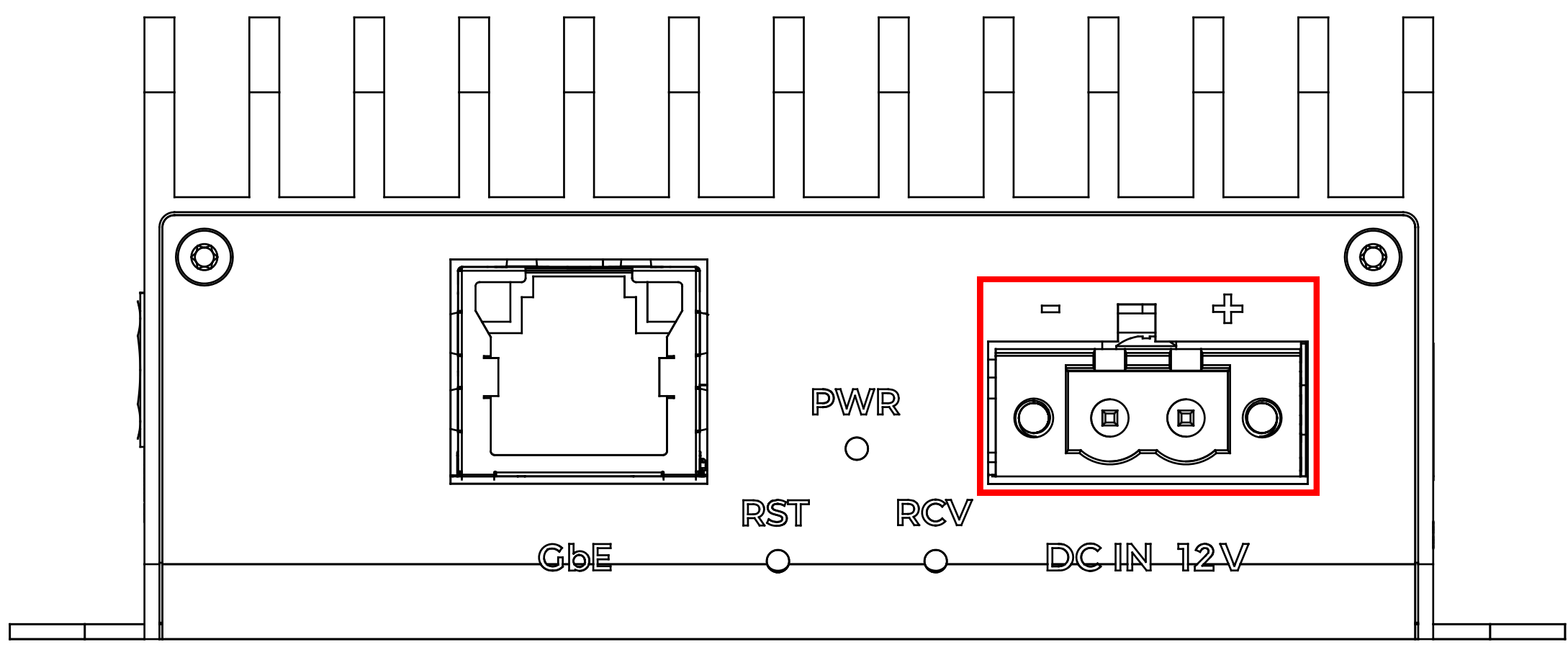
2. Product Interfaces

2.1. Front Panel Interfaces



In the ZED Box Mini series, buttons and indicators are placed on the front panel. The power input and the LAN connection is also located on the front panel.

2.1.1. Power Input Connector



The ZED Box Mini series supports a nominal voltage of 12V (+/- 1.5V) via its dedicated Terminal Block connector.

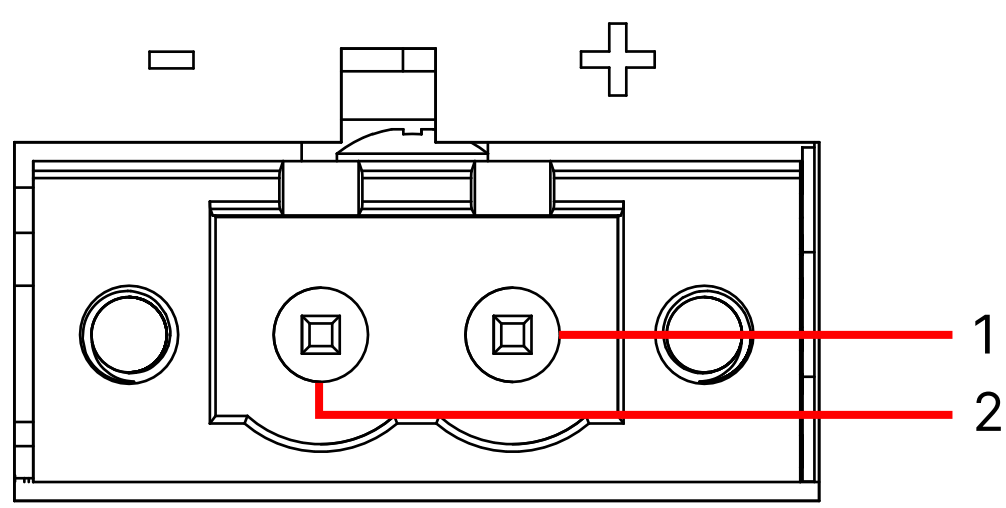
Please note that the device includes an eFuse Protection that will shut down the system if you exceed this voltage range to enter security mode. In order for the system to exit this protection mode, the voltage will have to come back to a proper restart voltage of 12V (+/- 0.5V).



WARNING

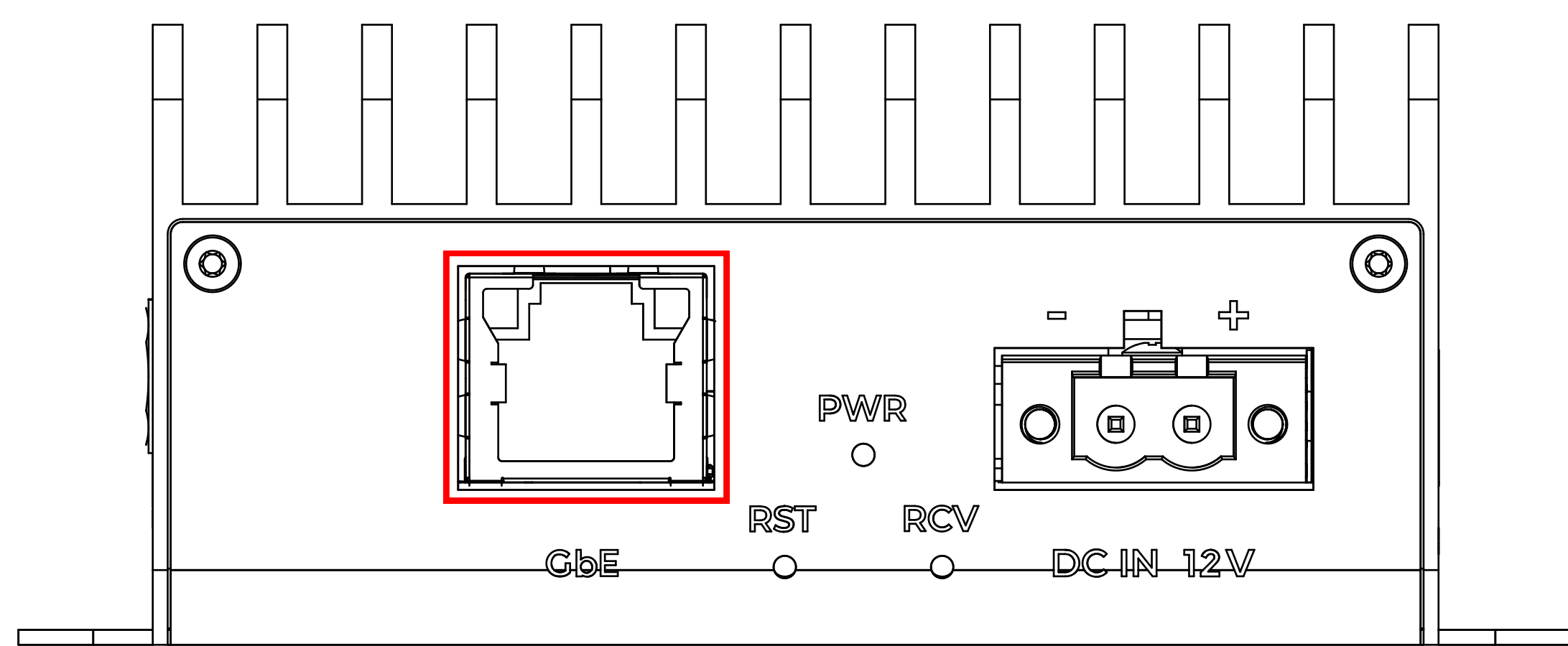
Please make sure that the voltage of DC IN 12V is correct before you connect it to the system. Supplying a voltage over 16V could damage the system.

Connector pinout



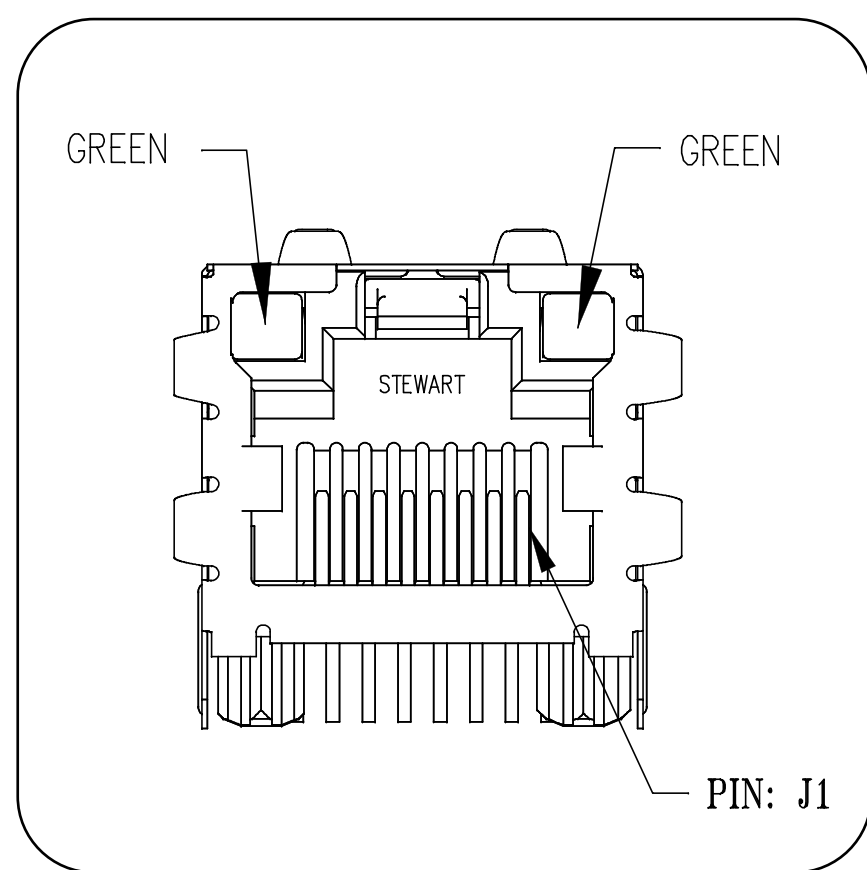
Pin Number	Definition
1	DC IN 12V
2	GND

2.1.2. Ethernet (LAN) Connector



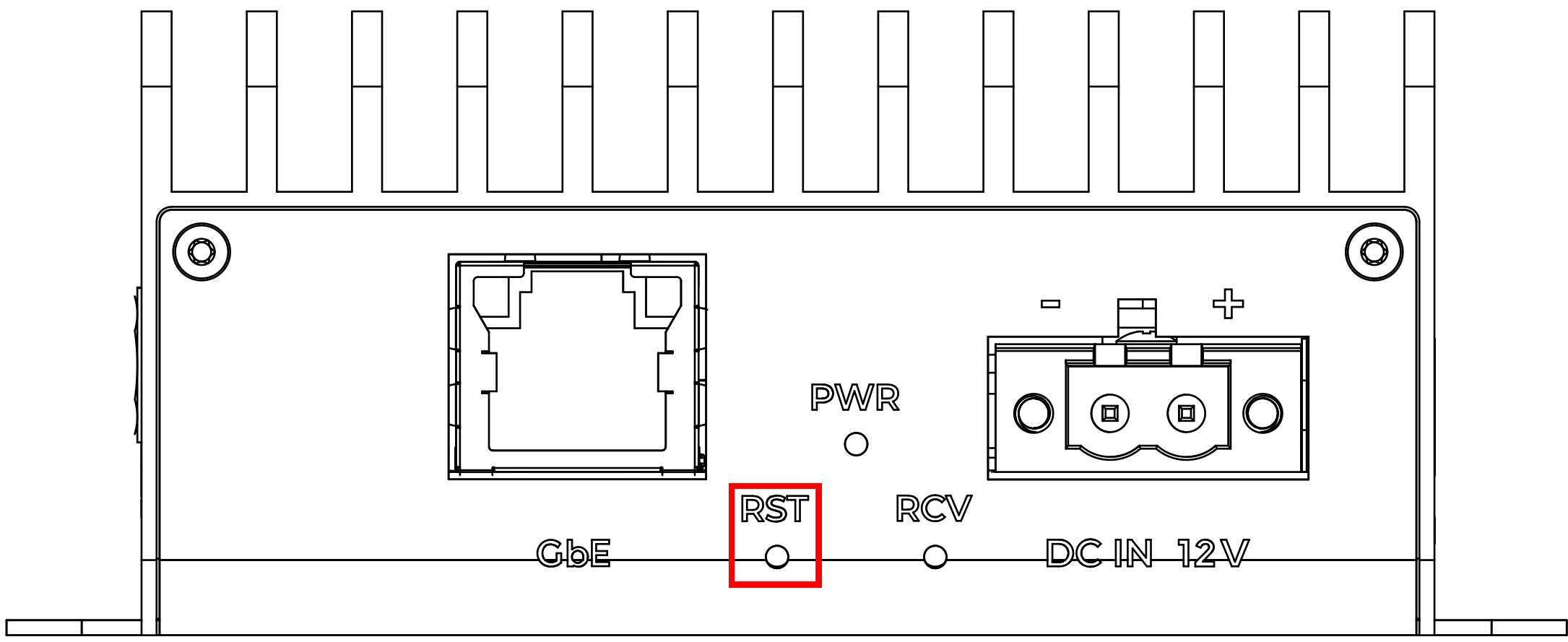
The ZED Box Mini series comes with one Gigabit Ethernet LAN port supporting 10/100/1000 BASE-T with a RJ45 connector. This connector is equipped with two green LEDs, indicating LAN link and activity on this port.

Connector pinout



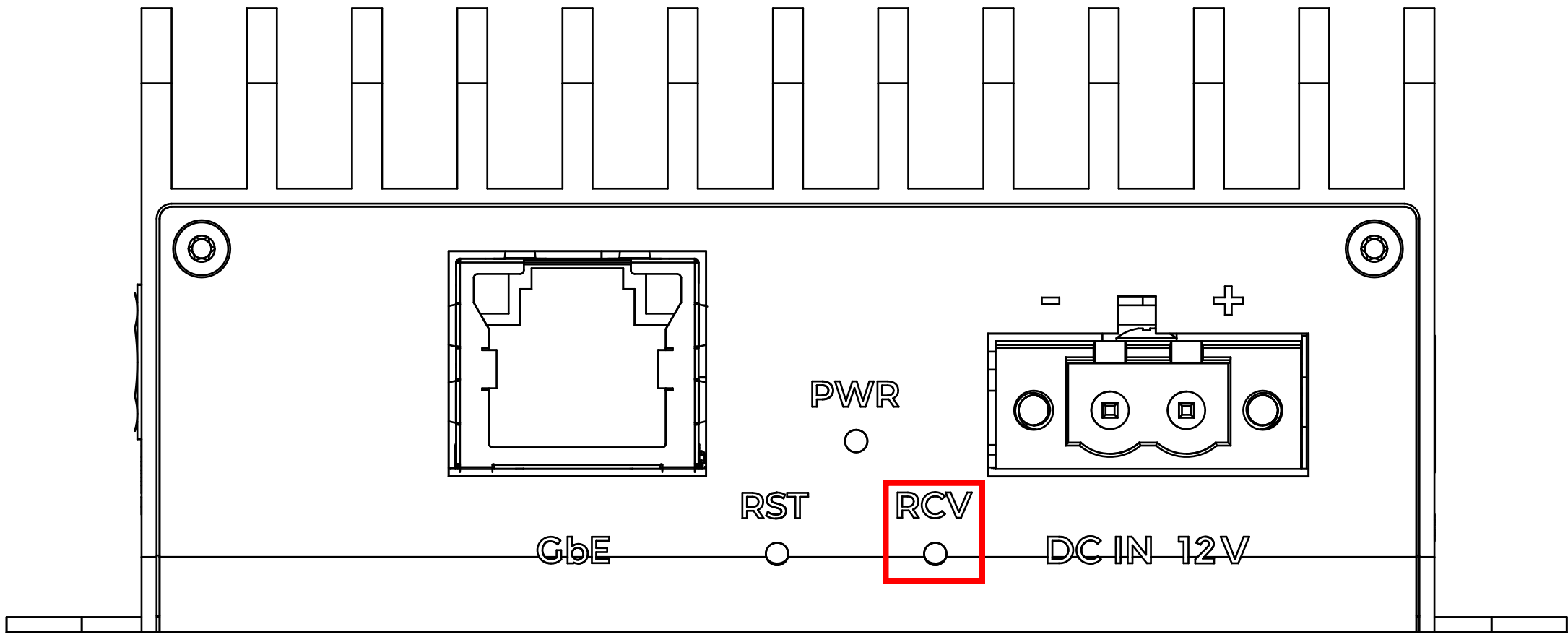
Pin Number	10/100 Base-T	1000 Base-T
1	TX+	MDIO_P
2	TX-	MDIO_N
3	RX+	MDI1_P
4	-	MDI2_P
5	-	MDI2_N
6	RX-	MDI1_N
7	-	MDI3_P
8	-	MDI3_N

2.1.3. Reset Button



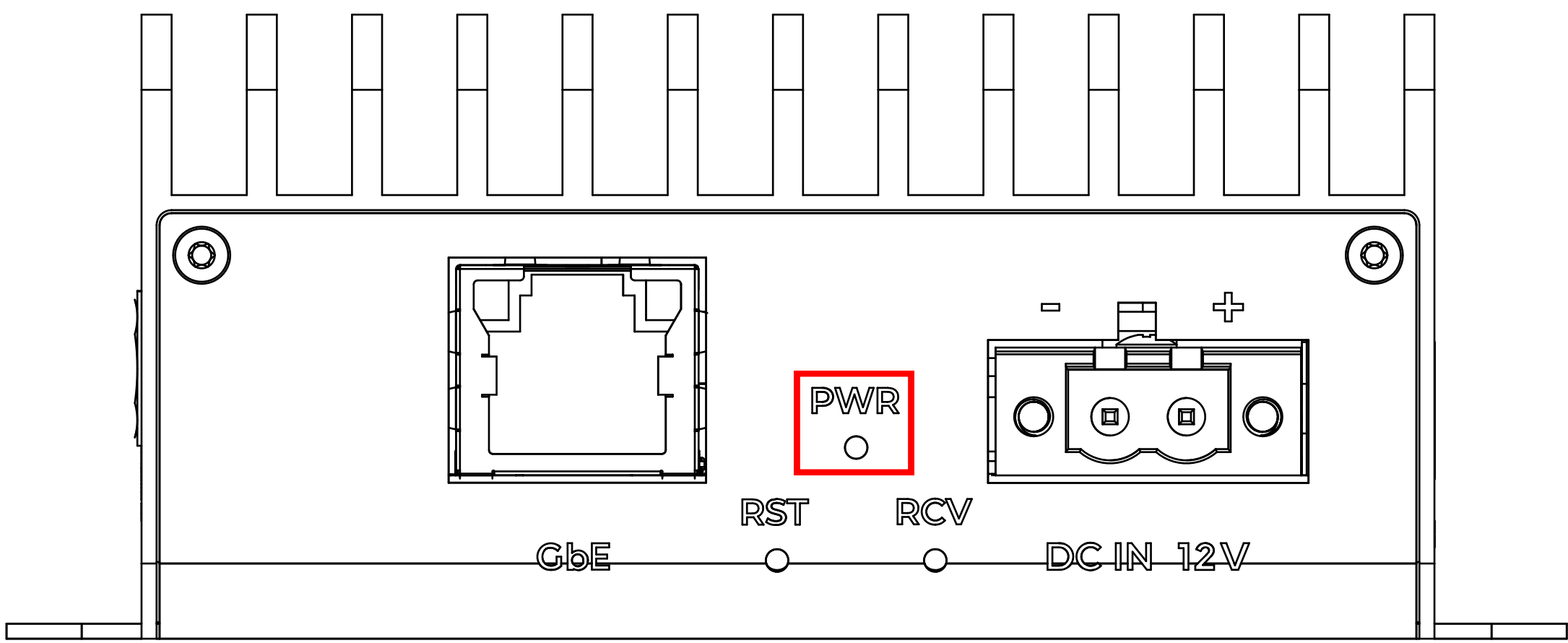
This button is used in order to force in a reset state the Jetson implemented on the ZED Box Mini.

2.1.4. Force Recovery Button



This button is used to enter Force Recovery Mode, by holding it down while powering up the system, or by pressing & releasing the Reset Button while the Recovery button is pressed.

2.1.5. Power LED Indication



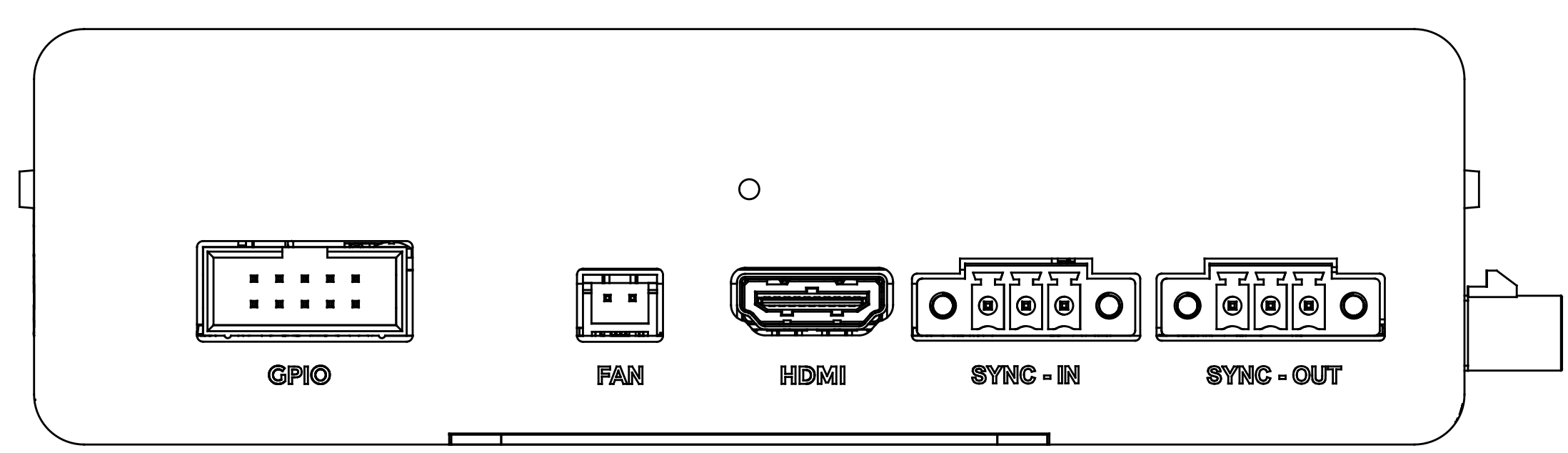
This blue LED should be ON when the Jetson is correctly powered up.

If the blue LED is OFF, it means that the Jetson is:

- In Recovery mode
- Cannot boot properly
- Is not being powered correctly

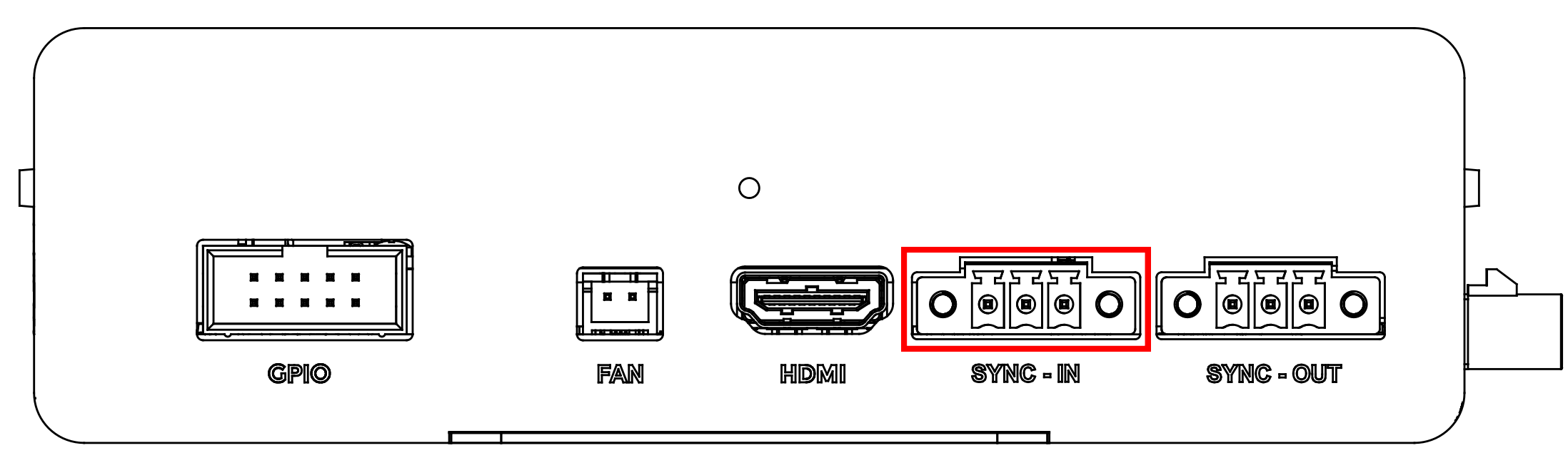
2.2. Side Panel Interfaces

2.2 Side Panel Interfaces



In the ZED BOX MINI series, you will be able to find on the Side Panel many I/O connectors with dedicated functions, such as the synchronization or the Miscellaneous connectors. The FAN and HDMI connectors are also on this Panel.

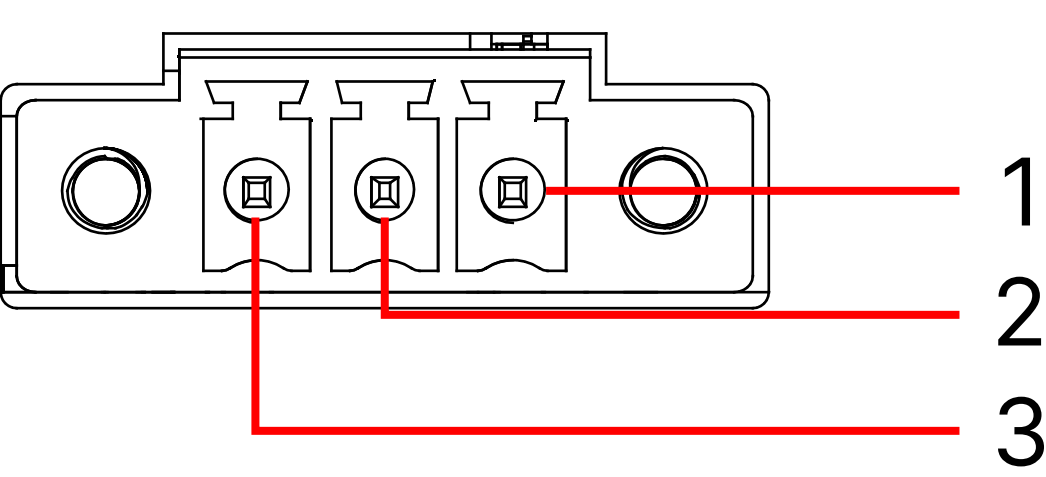
2.2.1. SYNC - IN Connector



The synchronization-input connector is used as a frame-sync trigger input in order to synchronize image acquisition on multiple GMSL cameras connected on different ZED BOX MINI. The connector is a Same Sky (formerly CUI Devices) 3-pin Terminal Block connector, that mates with TBP02P1W-381-03BE.

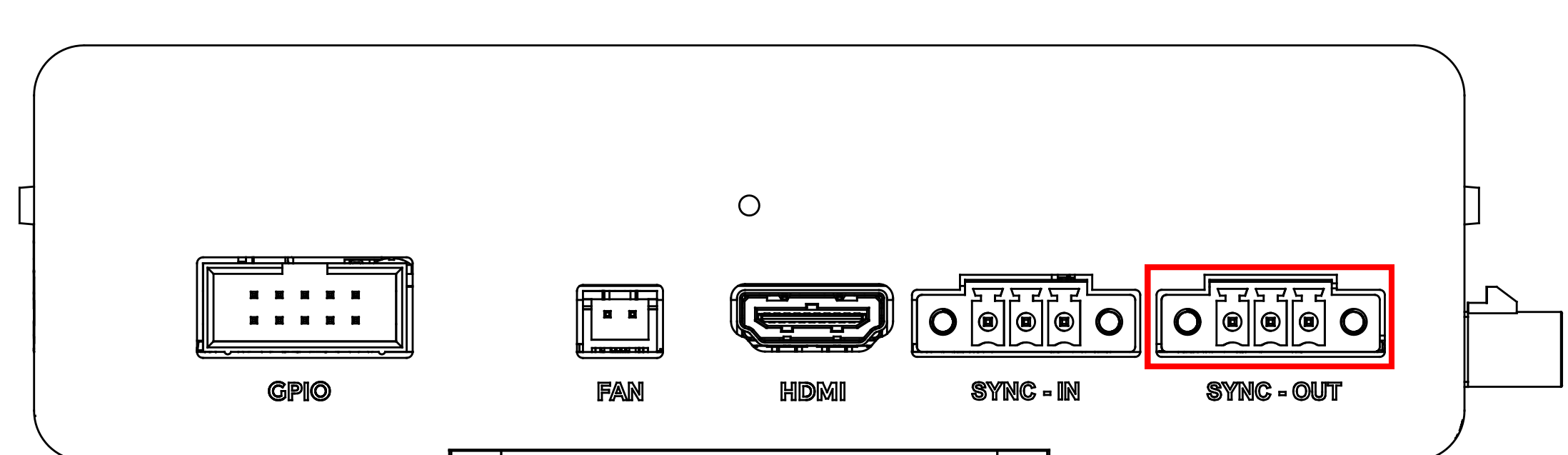
In order to use this feature, you simply have to connect the SYNC-OUT of the “master” box to the SYNC-IN of the “slave” box. If you want to chain more than 2 boxes, repeat this process by wiring the SYNC-OUT of the “slave 1” to the SYNC-IN of the “slave 2” and so on.

Connector pinout



Pin Number	Definition
1	TRIG_INFO
2	GND
3	TRIG_IN

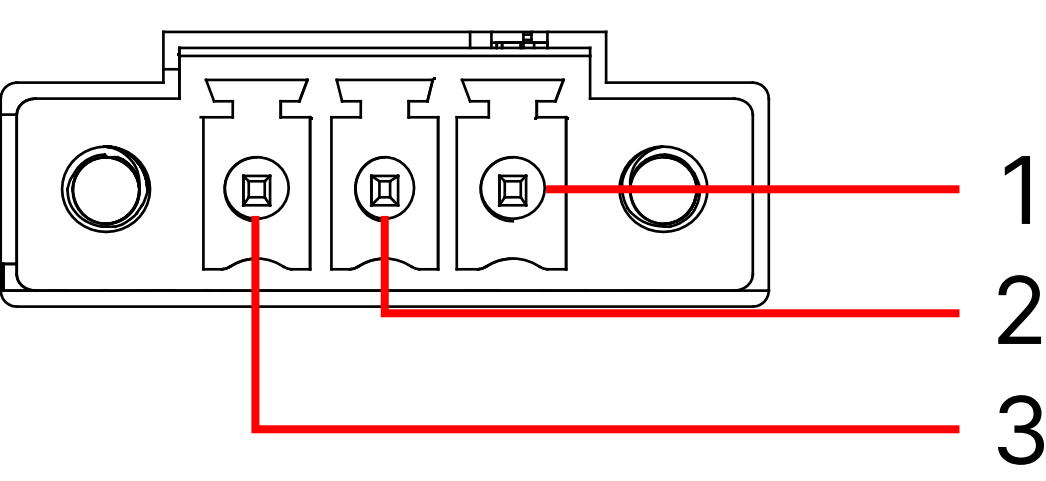
2.2.2. SYNC - OUT Connector



The synchronization-output connector is used as a frame-sync trigger output in order to synchronize image acquisition on multiple GMSL2 cameras connected on different ZED Box Mini. The connector is a Same Sky (formerly CUI Devices) 3-pin Terminal Block connector, that mates with TBP02P1W-381-03BE.

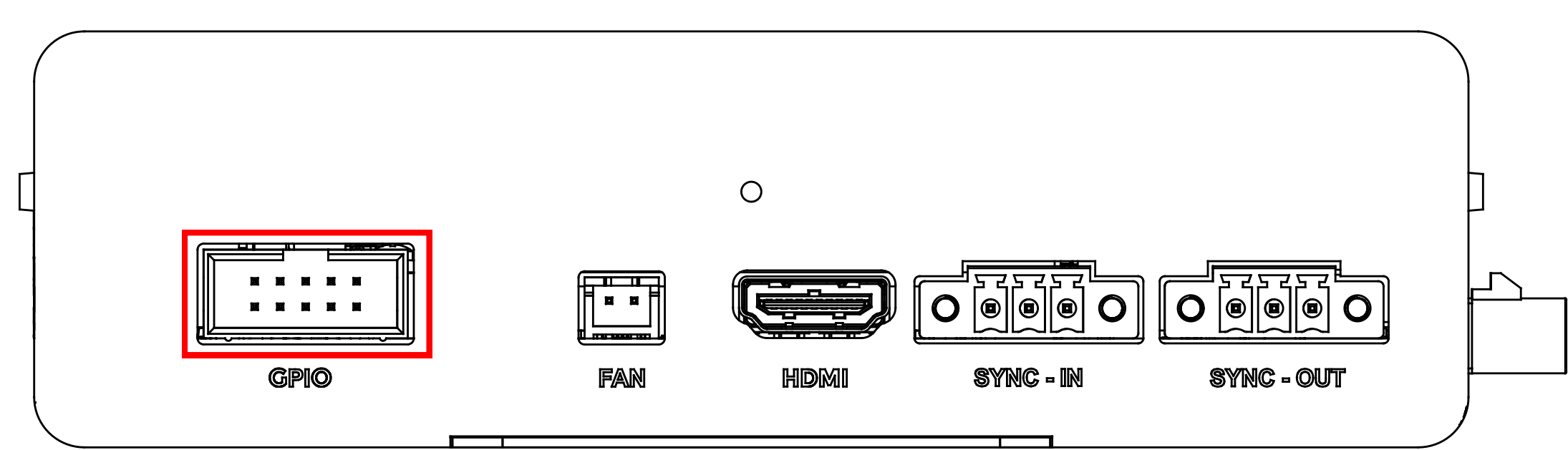
In order to use this feature, you simply have to connect the SYNC-OUT of the “master” box to the SYNC-IN of the “slave” box. If you want to chain more than two boxes, repeat this process by wiring the SYNC-OUT of the “slave 1” to the SYNC-IN of the “slave 2” and so on.

Connector pinout



Pin Number	Definition
1	GND
2	GND
3	TRIG_OUT

2.2.3 MISCELLANEOUS (GPIO) Connector



The Miscellaneous connector, labeled GPIO on the ZED BOX MINI, is mainly used for debug and testing purposes. It exposes the system 5V & 3V3 voltages, along with two dedicated GND pins. It also exposes a UART connection (UART2), a CAN PHY (without dedicated CAN transceiver), and two GPIOs (GPIO11 and GPIO12) on the Jetson side.

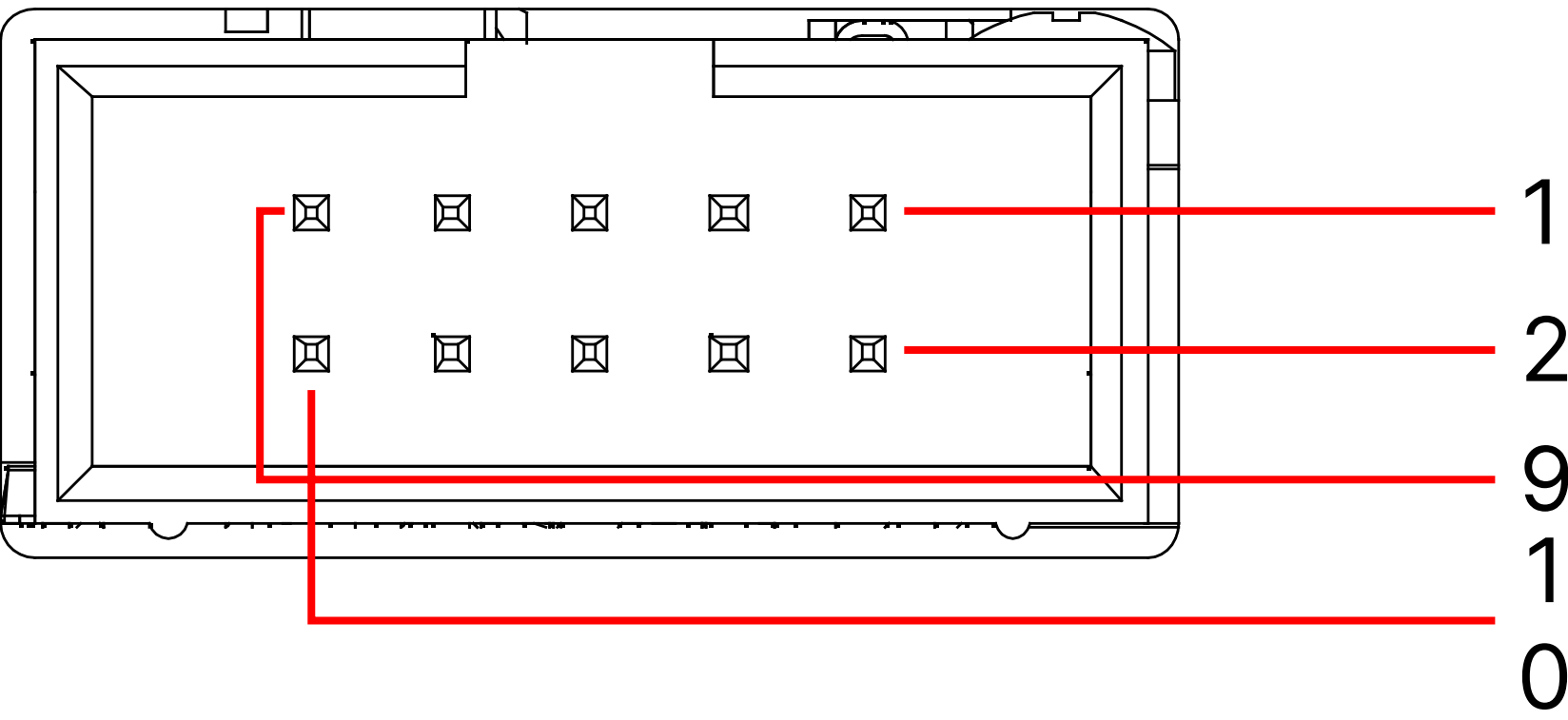


WARNING

The exposed CAN PHY on this connector is coming directly from the jetson used in the system and is 3.3V compliant.

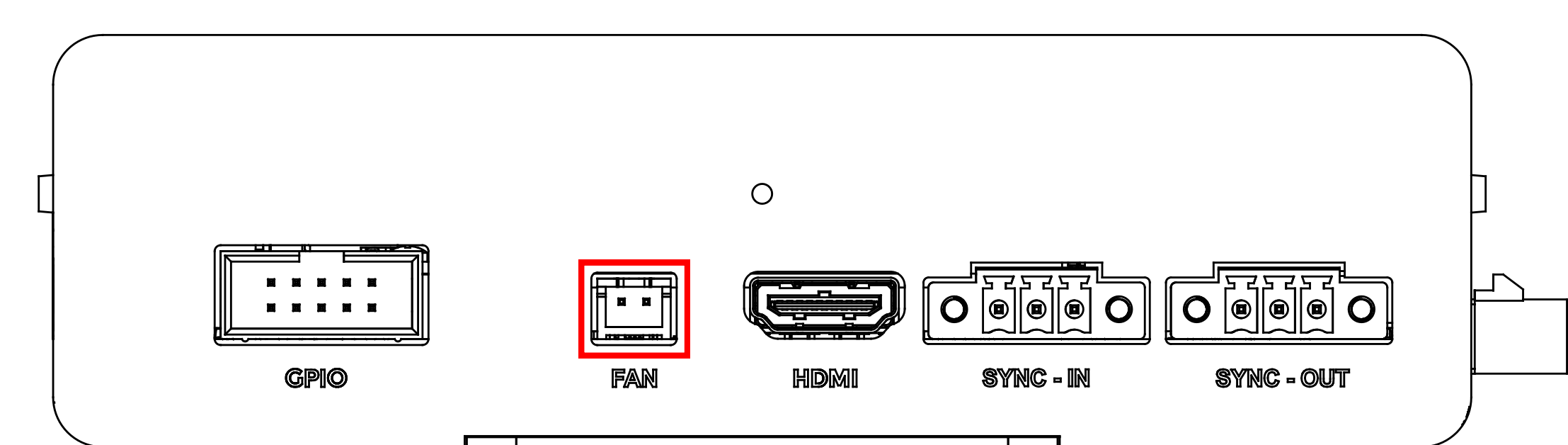
Please make sure to use a dedicated CAN Transceiver on this end of the system, such as the TJA1050 from NXP, before using this connection as a CAN BUS.

Connector pinout

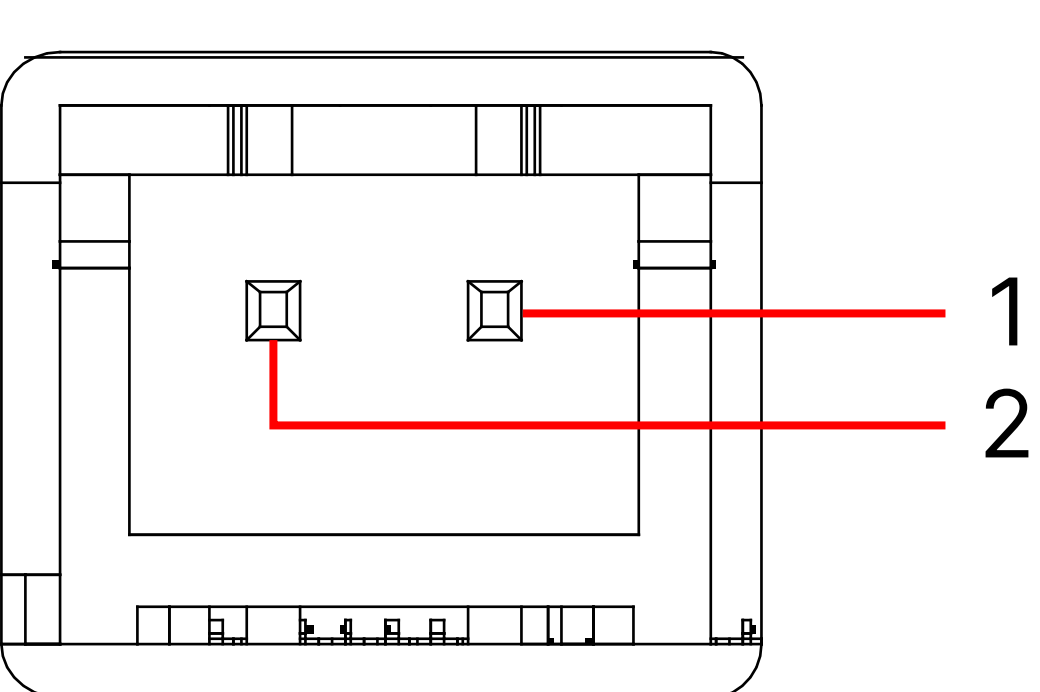


Pin Number	Definition
1	VCC_5V
2	GND
3	GPIO_11
4	GPIO_12
5	CAN_RX
6	CAN_TX
7	VCC_3V3
8	GND
9	UART_RXD
10	UART_TXD

2.2.4 FAN Connector



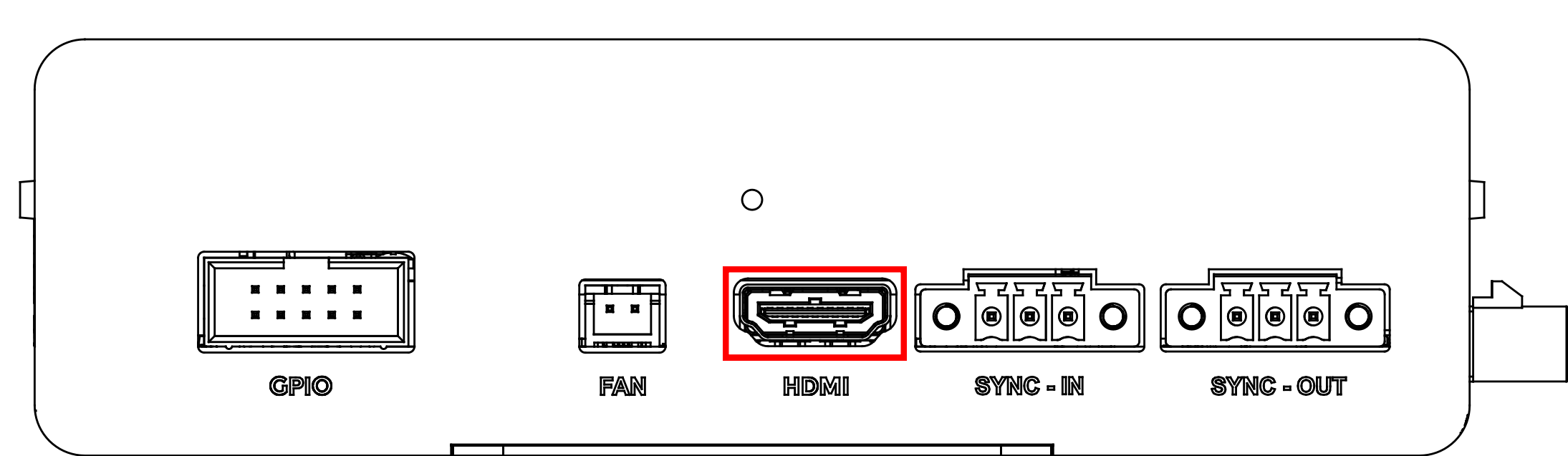
Connector pinout



The ZED BOX MINI features a 12V-compliant FAN connector. The FAN and its mounting plate can be purchased as an optional accessory directly on our website, and is recommended for applications that require a lot of power coming from the chosen Jetson. If any other FAN is used, please make sure that it is 12V rated, and do not draw more than 500mA. Otherwise, the PTC fuse in our carriedboard will end up tripping and the FAN will not function properly.

Pin Number	Definition
1	FAN_12V
2	GND

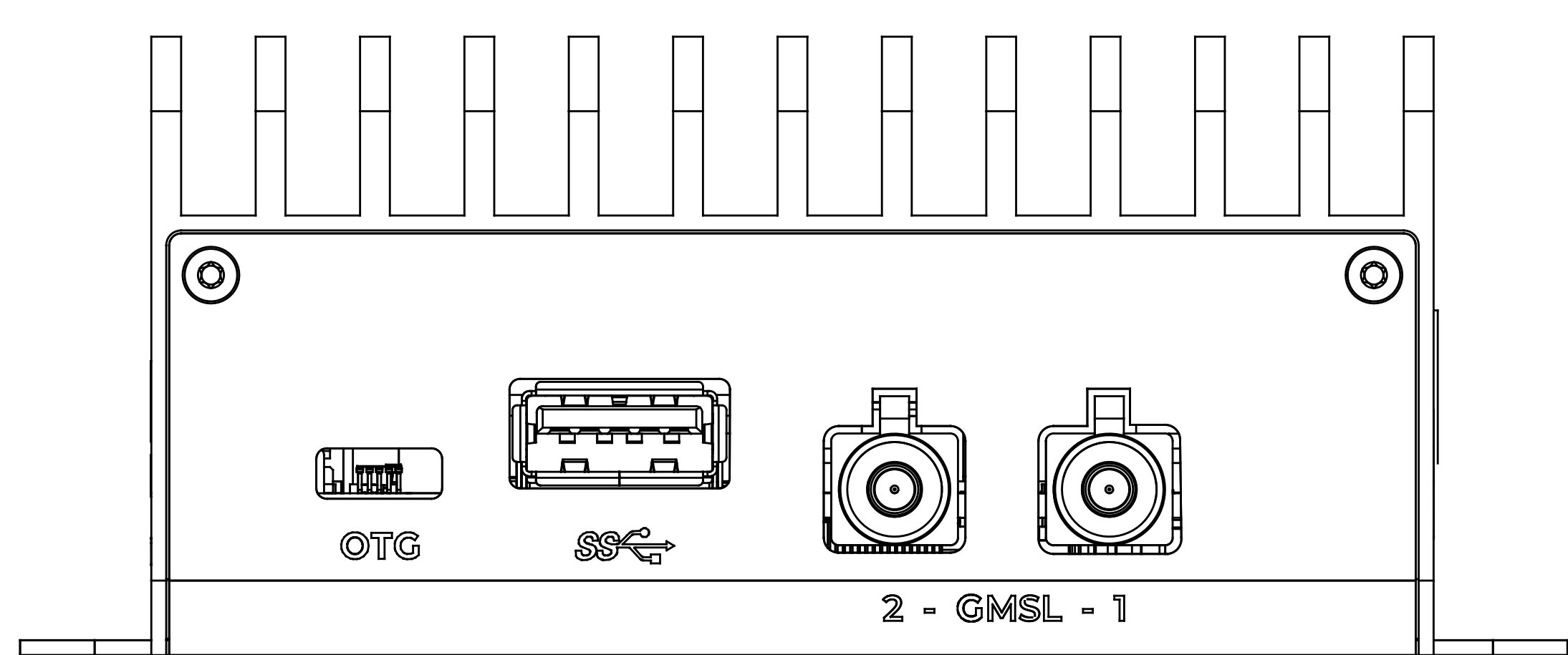
2.2.5 HDMI Connector



The ZED BOX MINI also features an HDMI 1.4 to 2.1 type-A compliant connector, depending on the chosen Jetson for the system, to display video with a maximum resolution of 3840x2160 @60Hz.

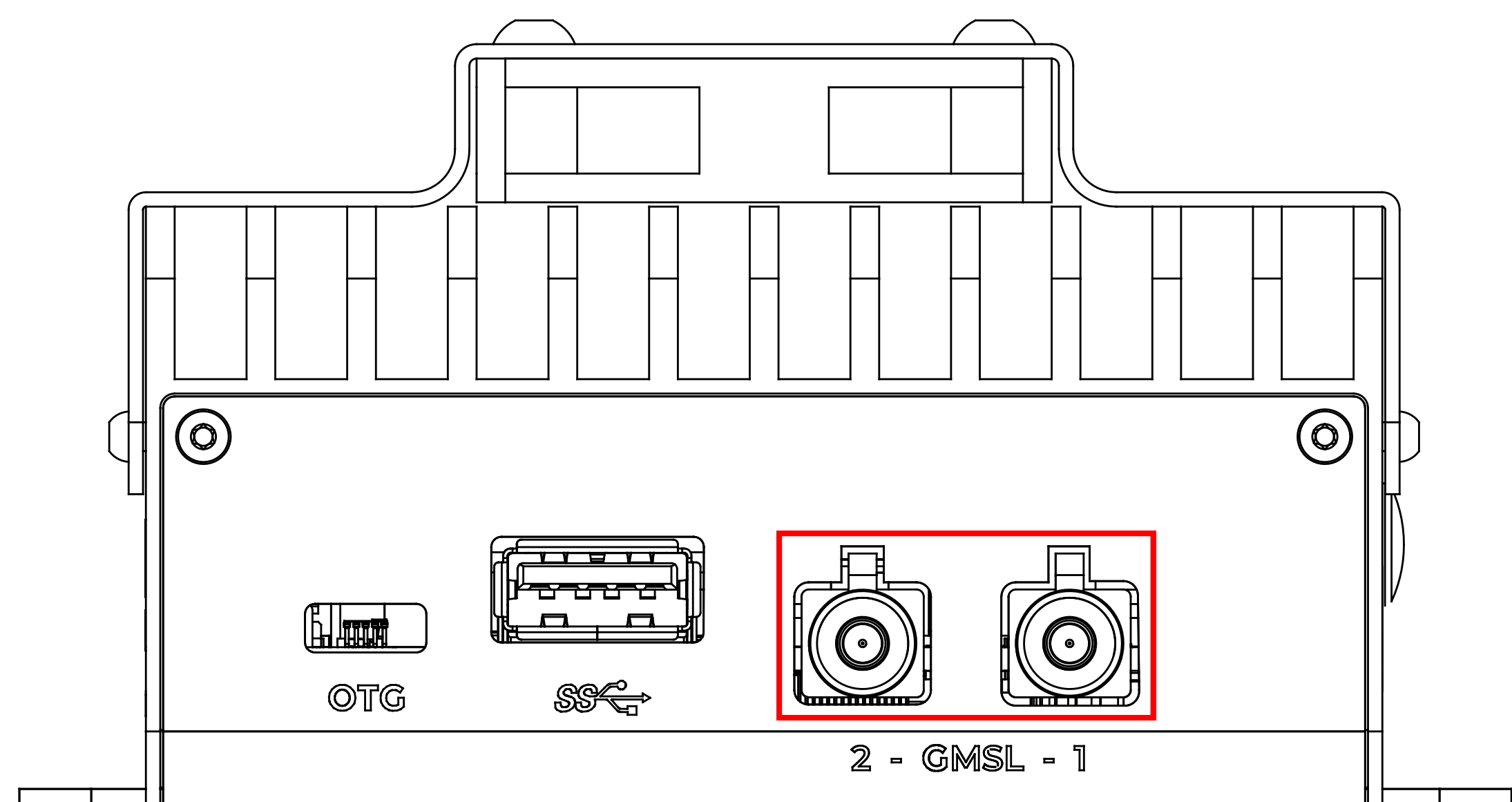
For additional information regarding the pinout, please refer to the HDMI standard.

2.3. Rear Panel Interfaces



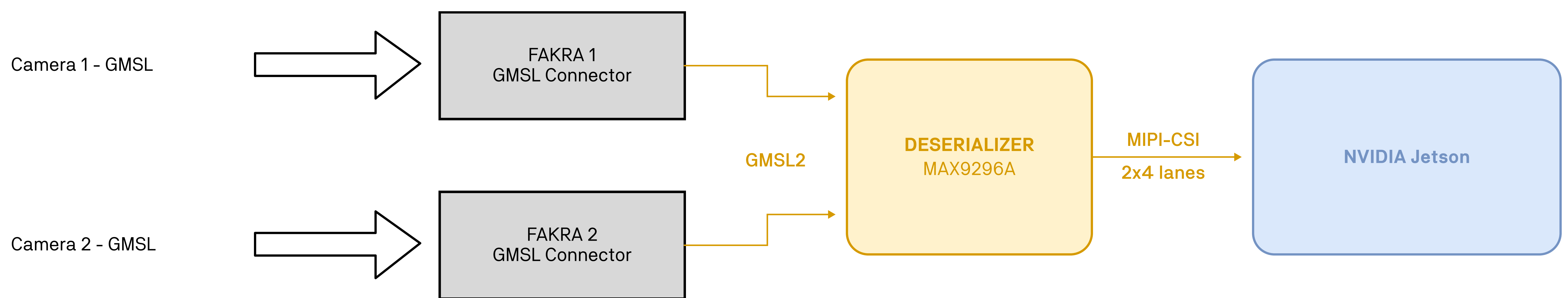
In the ZED BOX MINI series, the 2 available GMSL camera connectors are located on the Rear Panel. The USB Type-Micro OTG as well as the USB3 Type-A connectors are also located on this side of the product.

2.3.1 FAKRA-Z GMSL Connectors

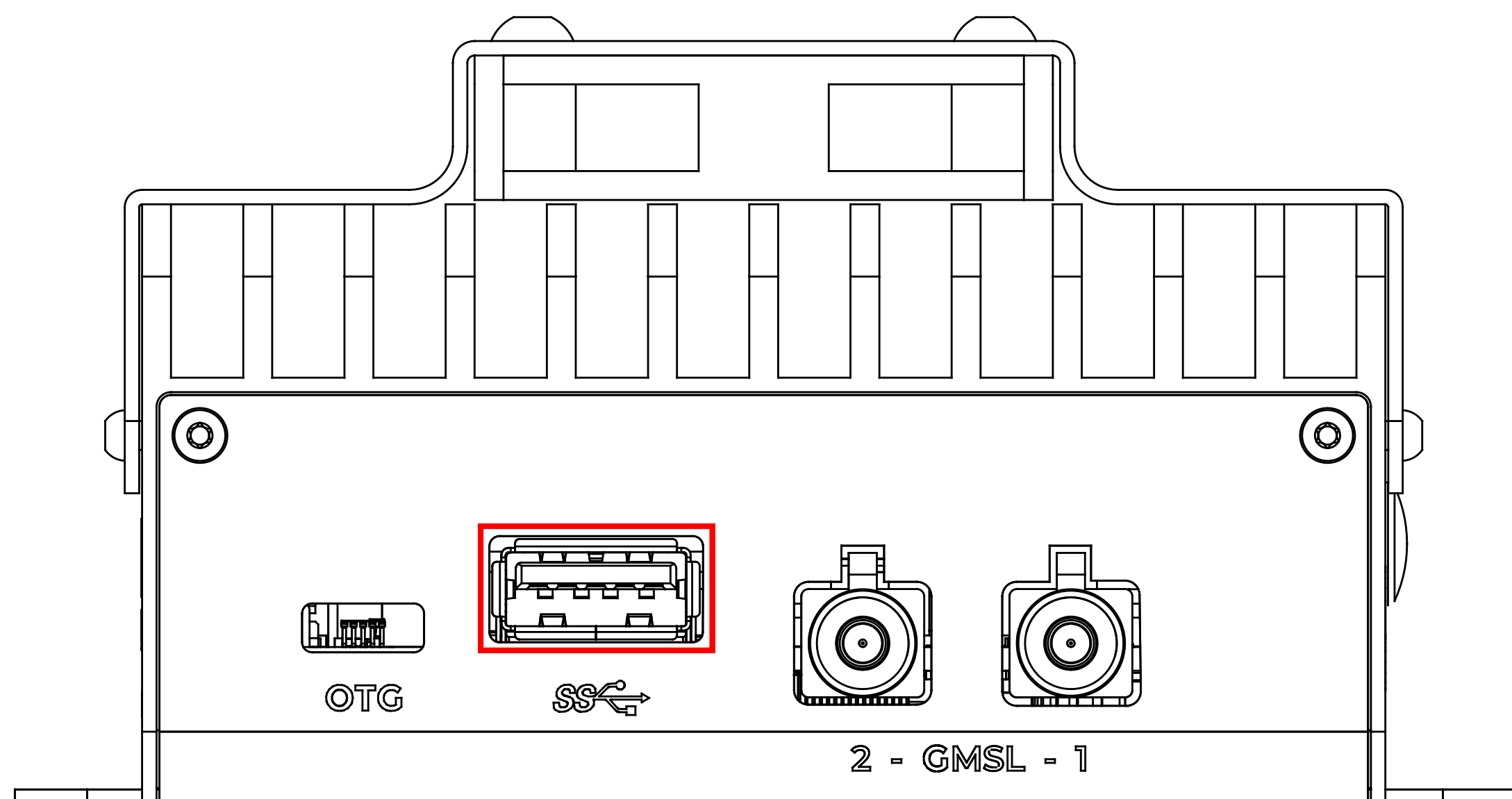


As mentioned above, the ZED BOX MINI offers 2 separated FAKRA connectors. Each GMSL camera connects to the box through a single coaxial cable, available in different lengths on our store.

Using GMSL2 (Gigabit Multimedia Serial Link) connections, the cameras are connected to a two-port deserializer, the MAX9296A, that converts the video flux in MIPI CSI-2 and transmits it to the chosen Jetson.



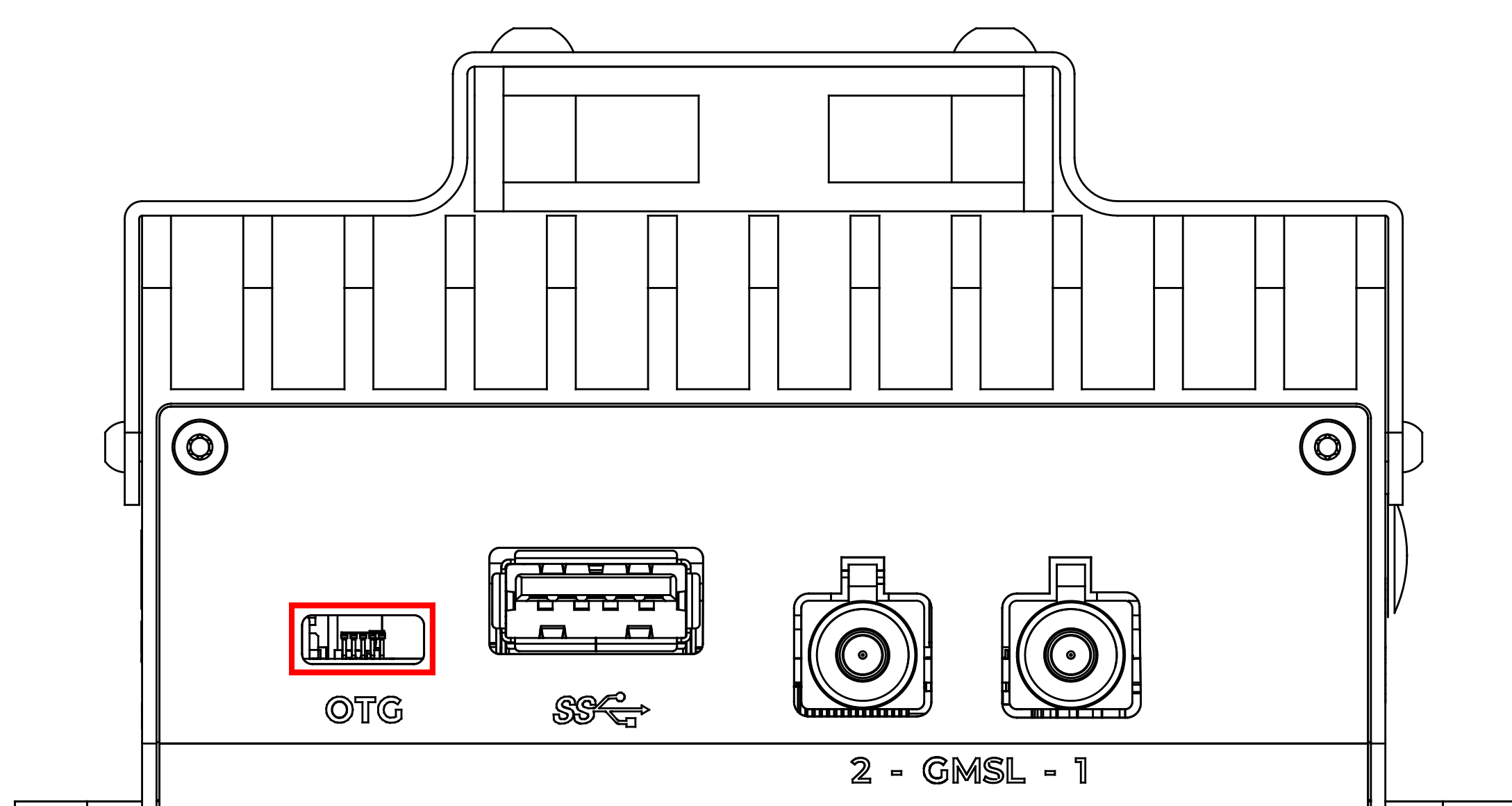
2.3.2 USB3 Type-A Connector



There is also a USB type-A 3.0 connector available supporting up to 5Gbps data rate. It is also compliant with the requirements of Super Speed (SS), High Speed (HS), Full Speed (FS) and Low Speed (LS).

For additional information regarding the pinout, please refer to the USB type-A standard.

2.3.3 USB OTG



The ZED BOX MINI also features a USB type-Micro that can be used for OTG functions, or paired with the use of the Recovery button to be able to flash a new Image on the device.

In non-recovery mode, this OTG port provides a serial output that can be used to monitor and access the device through a serial console.

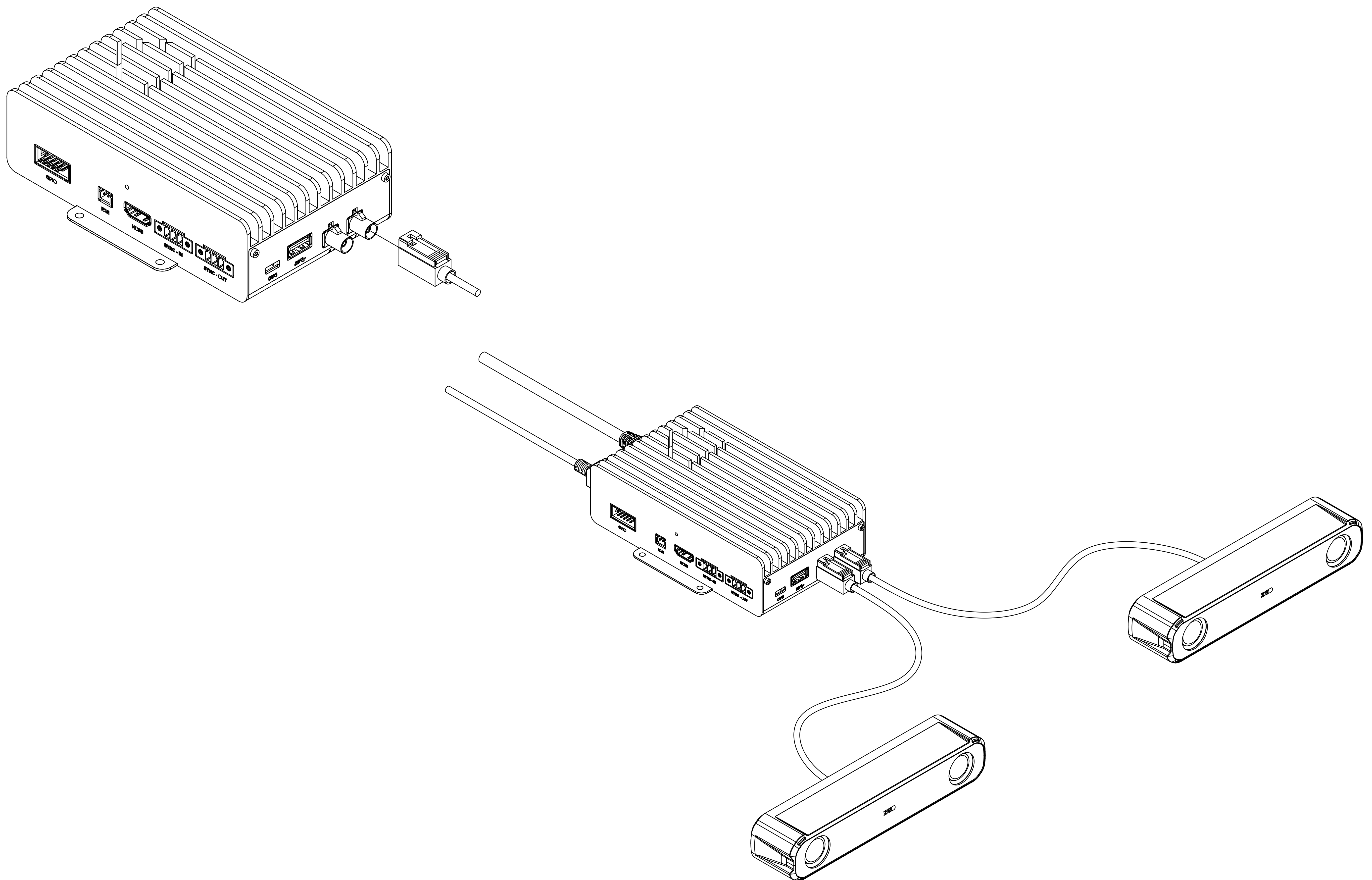
For additional information regarding the pinout, please refer to the USB type-Micro standard.

3. Getting Started

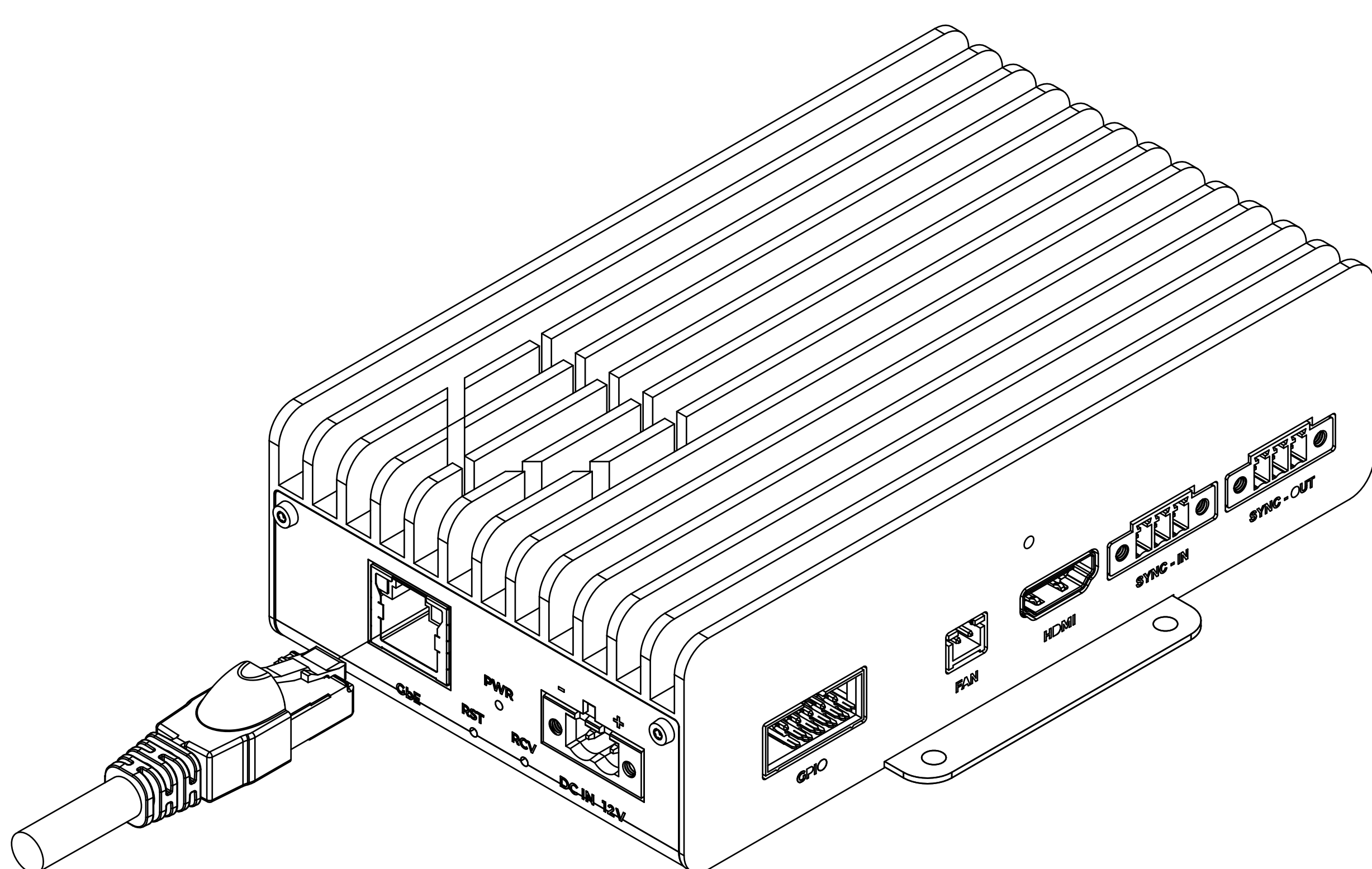
Link to Getting Started Guide - <https://www.stereolabs.com/docs/get-started-with-zed-box-mini>

3.1. Basic Operations

3.1.1. Connect your ZED cameras

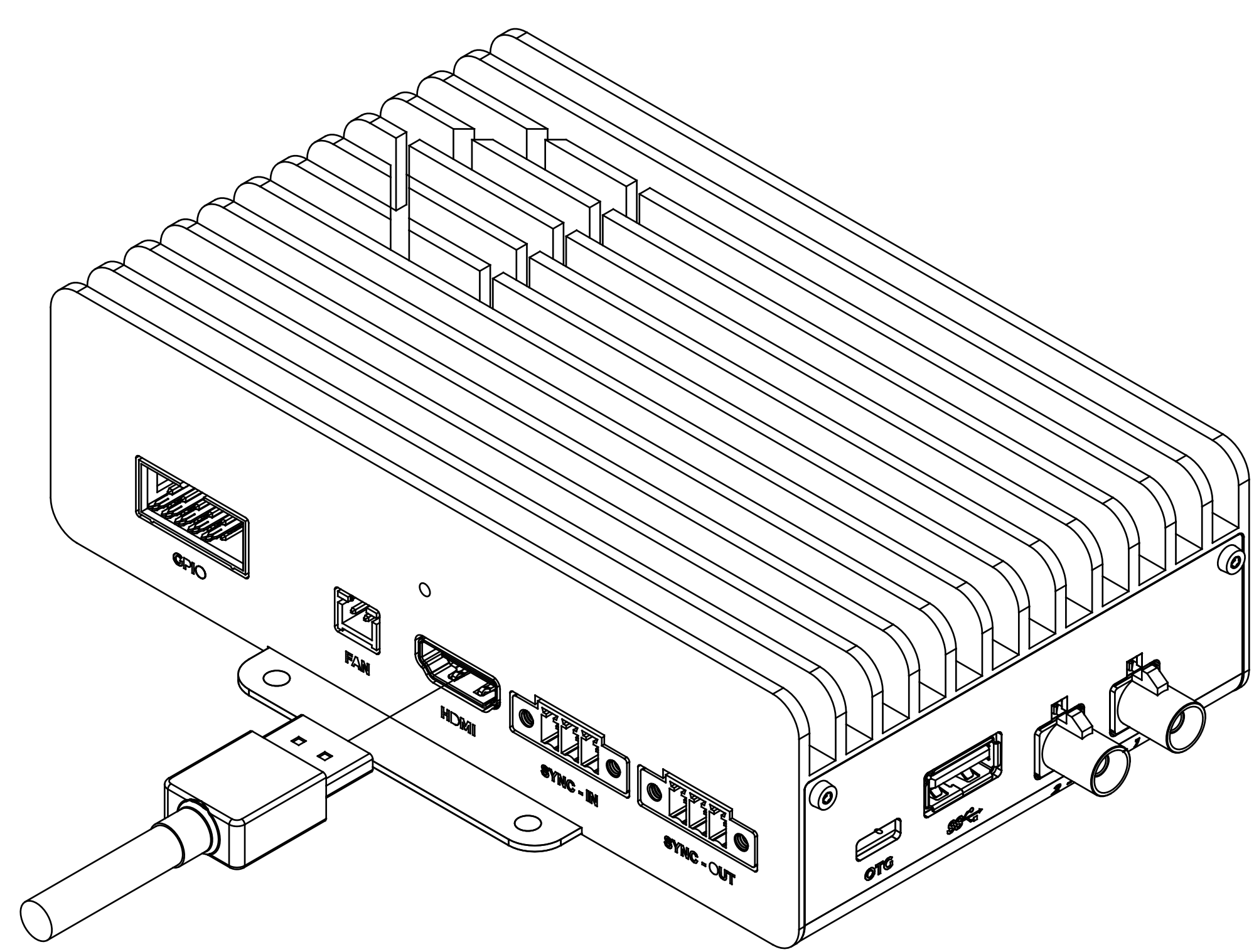


3.1.2. Connect to your network using the Ethernet port



When plugging-in the RJ45 connector, you should be able to see the 2 green leds powering up on the Box side.

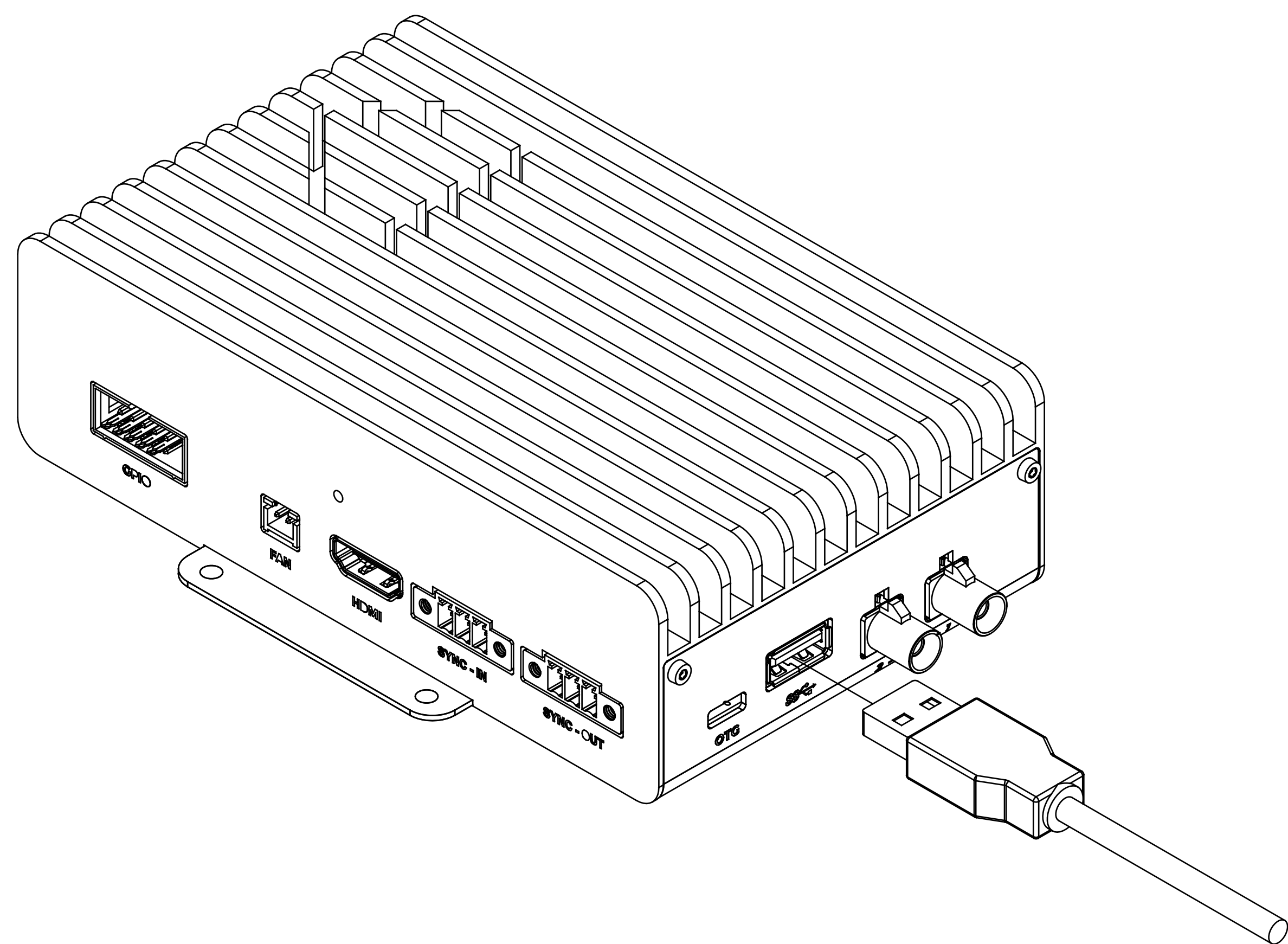
3.1.3. Connect to your display using the HDMI port



The ZED Box Mini features an HDMI 1.4 to 2.1 type-A connector, depending on the chosen Jetson™ for the system, to display video with a maximum resolution of 3840x2160 @60Hz.

You can use the ZED Box Mini without a display in headless mode, controlling it remotely by using ssh or virtual desktop applications. To enable X11 forwarding and run applications requiring OpenGL in headless mode, it is required to use a Dummy HDMI plug to simulate a connected display.

3.1.4. Connect your keyboard and mouse



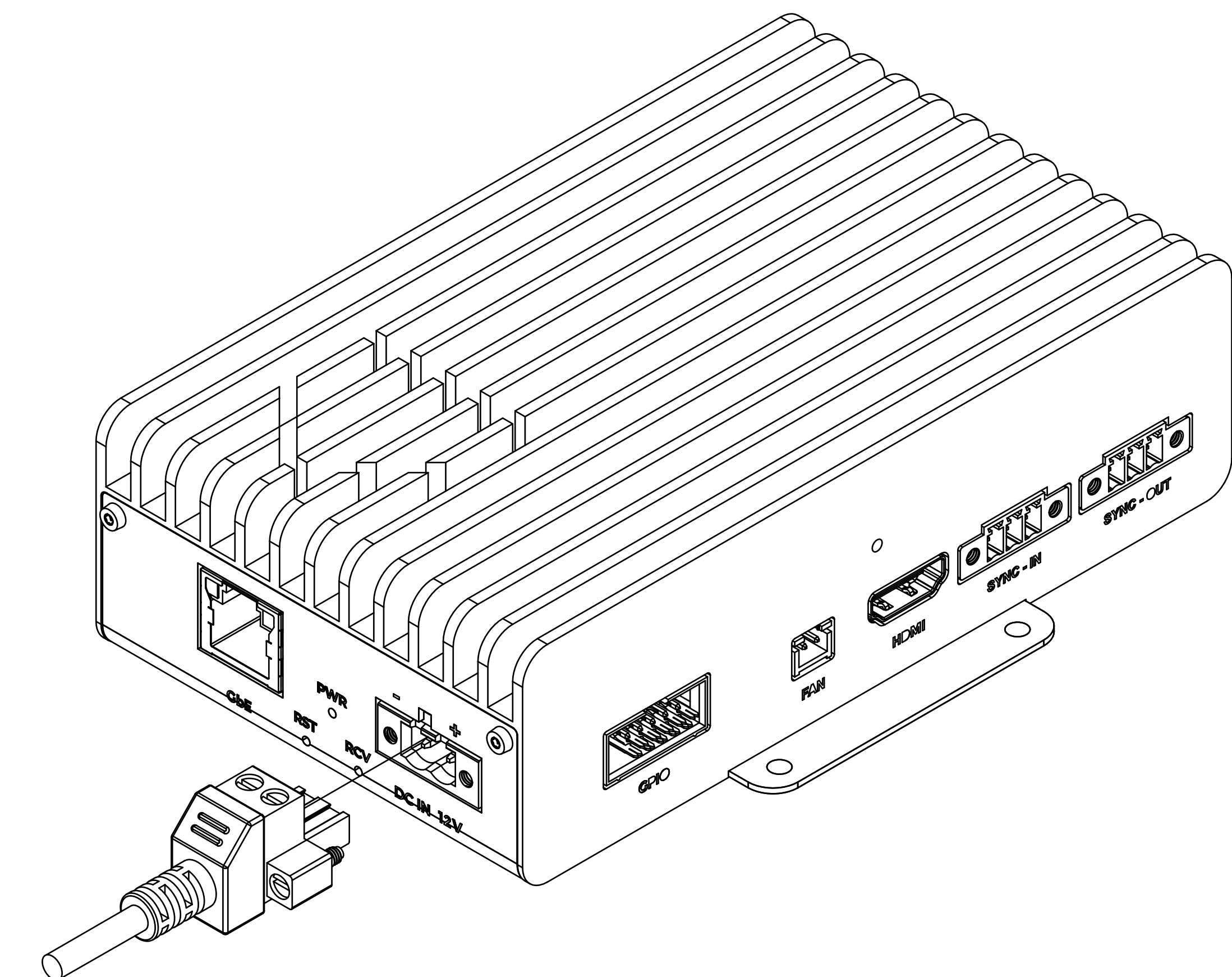
You need a USB hub to connect a mouse and a keyboard to the USB 3 Type A port.

3.1.5. Complete the operating system setup

NVIDIA® Jetson embeds Linux for Tegra.
To access the operating system, use the following access credentials :

Identifier : [user](#)
Password : [admin](#)

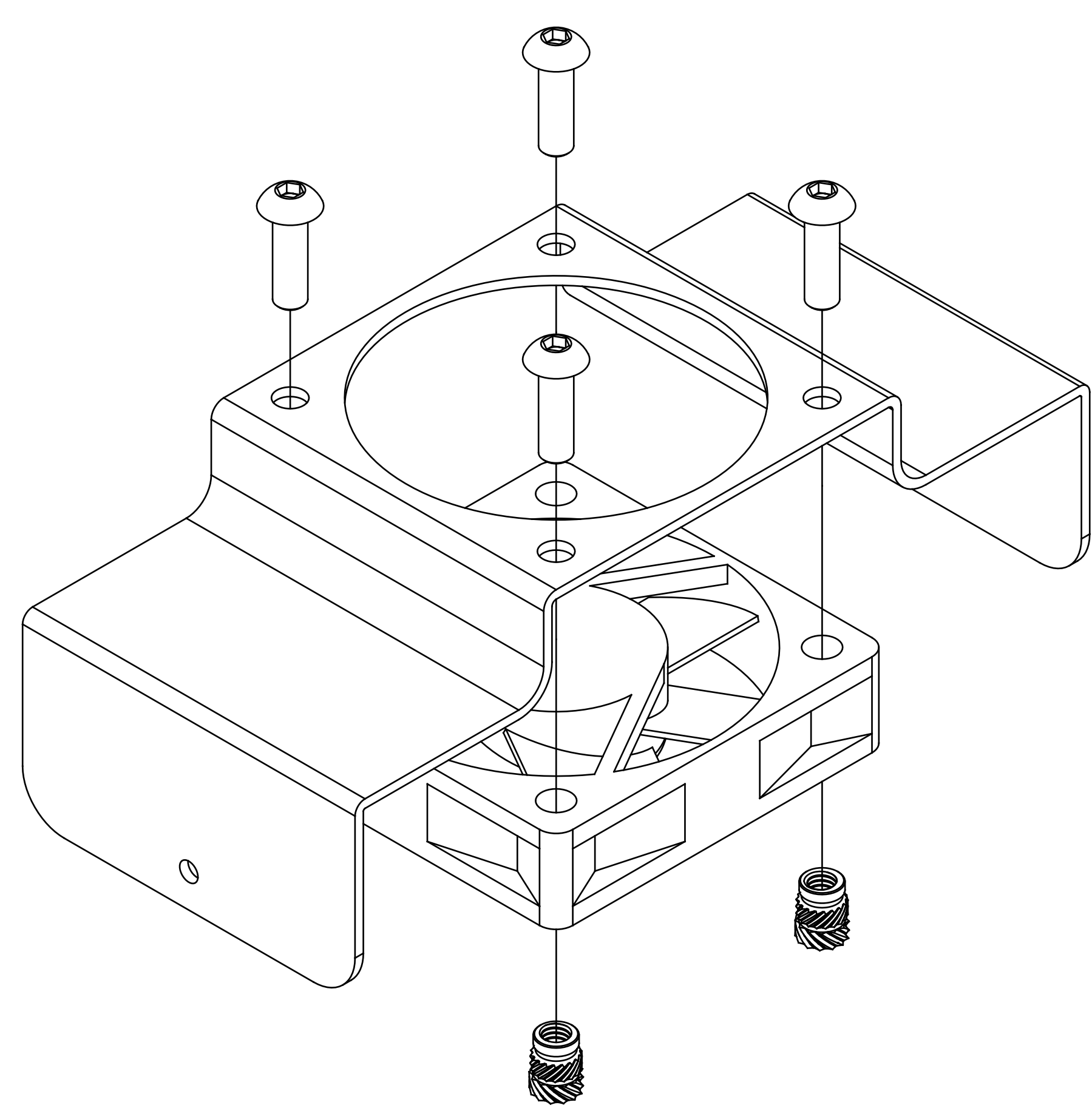
3.1.6 Plug in the power supply



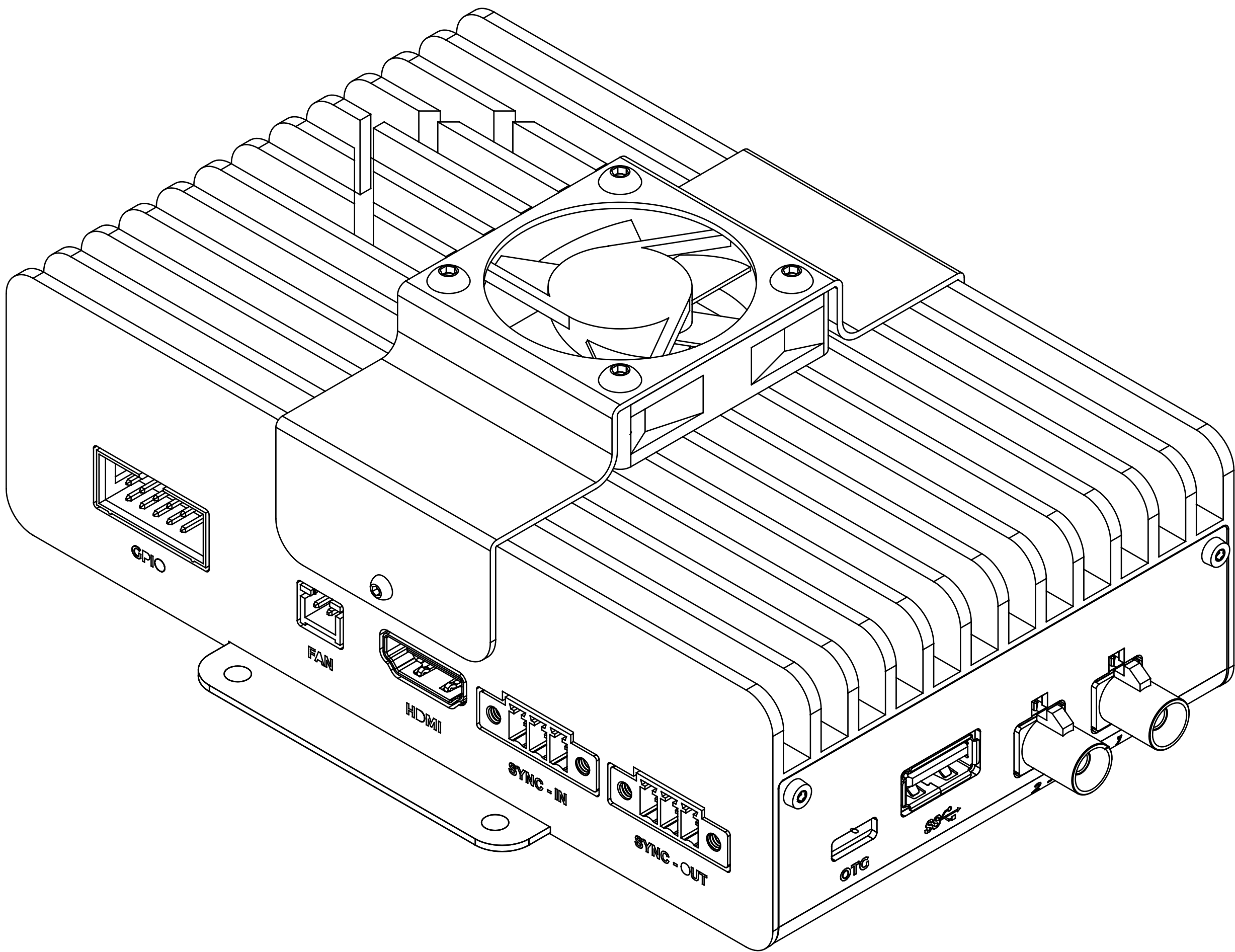
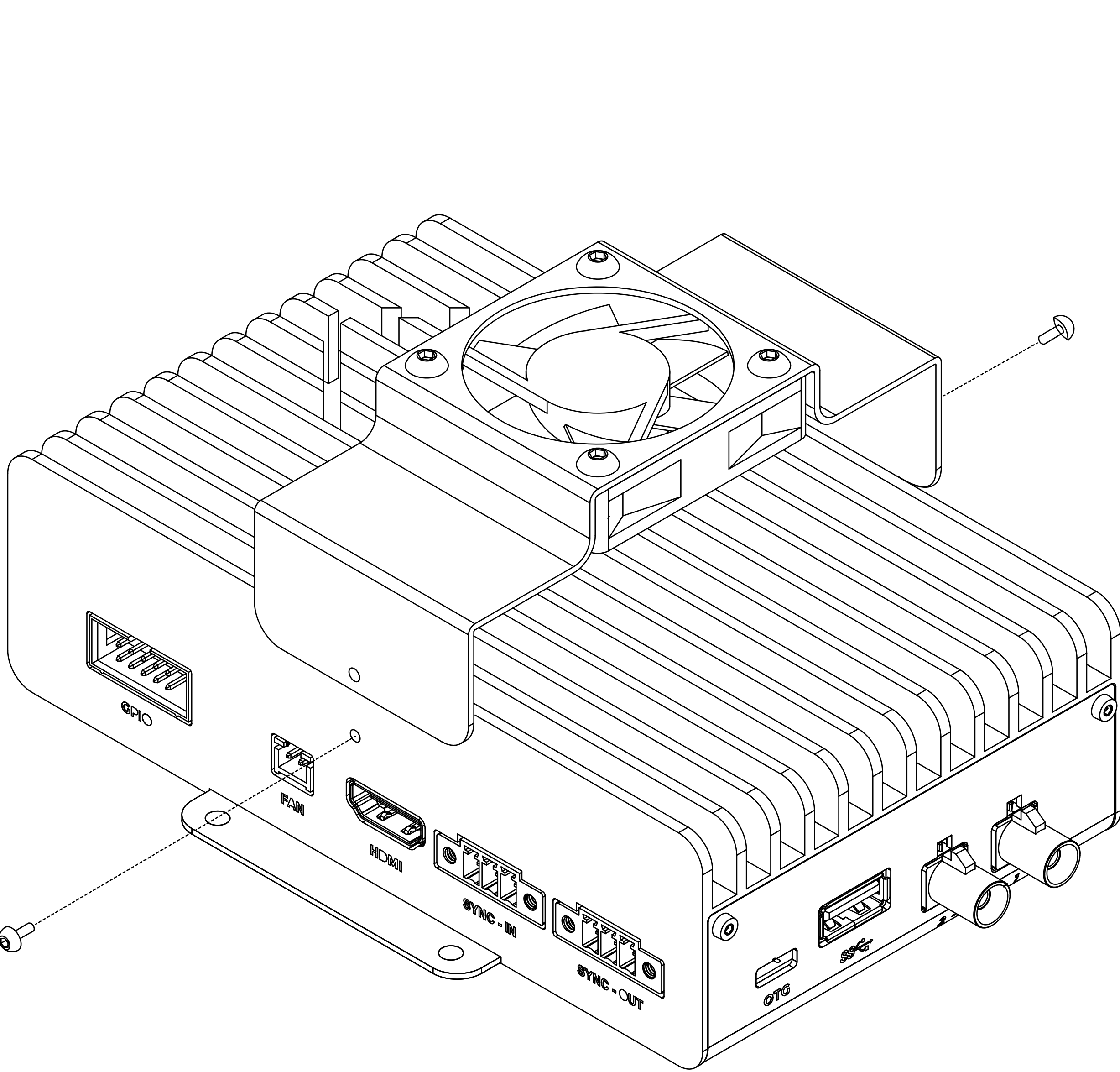
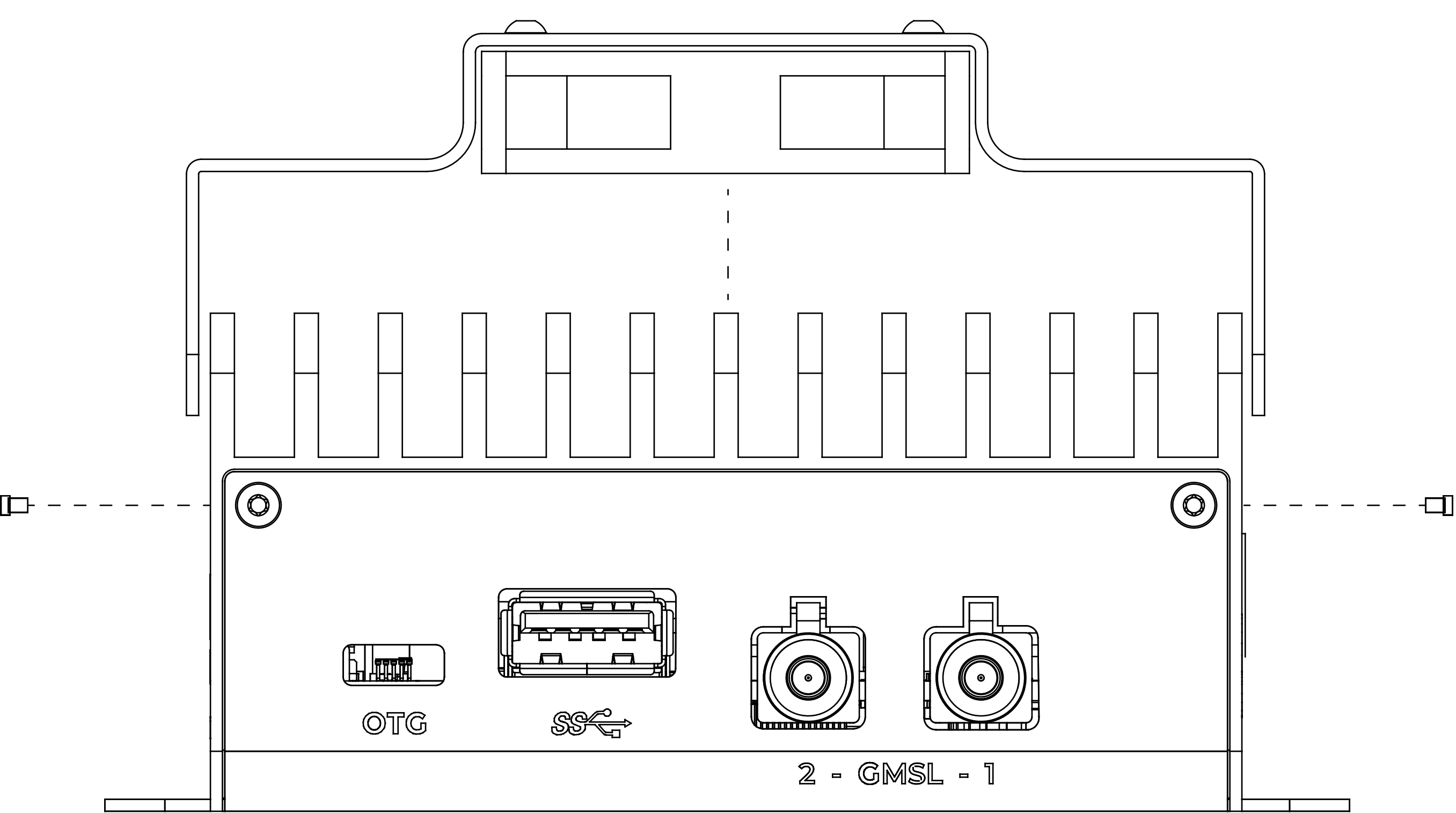
The required DC power for the ZED BOX MINI is 12V. If you are making your own custom cable, please refer to the section 2.1.1 and carefully check the connector polarity before using it to power the system.

3.2. Fan Installation, mandatory for when operating in MAXN SUPER mode

3.2.1. Fan mounting on Fan support

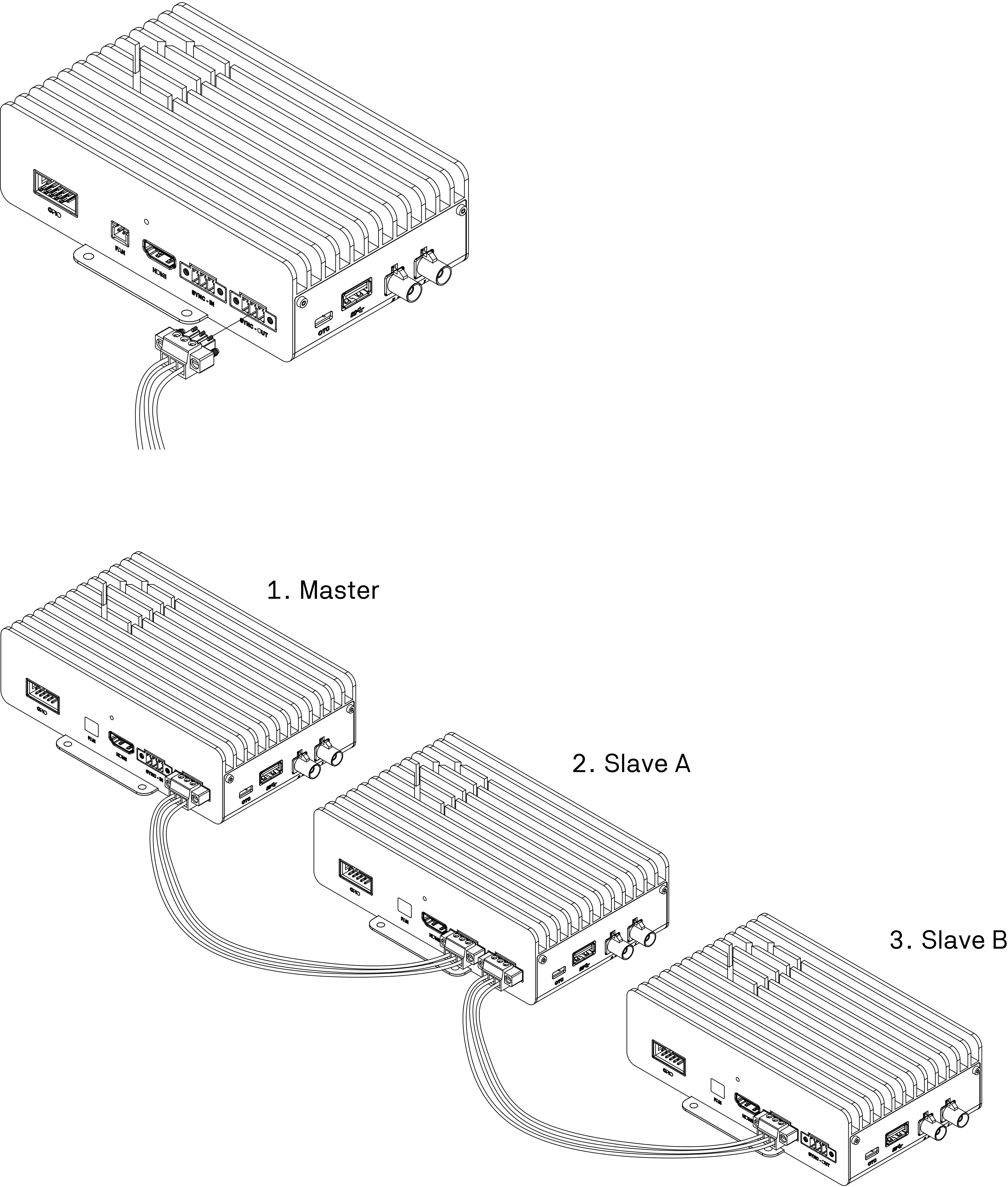


3.2.2. Fan and Fan support mounting on the ZED Box Mini



3.3. Multi-ZED Box Mini Deployment

Coordinating multiple vision systems for large camera deployments is no longer a challenge. The ZED Box Mini's camera synchronization over GMSL interfaces guarantees precise data alignment across multiple ZED Box Mini for the same capture. This makes it the perfect solution for intelligent systems that depend on synchronized multi-camera vision, such as smart infrastructure for entertainment and logistics applications.



1. Master generates and transmits a clock signal, triggering the frame acquisition of the cameras connected to Master.
2. Slave A receives the Master clock signal, triggering the frame acquisition of the cameras connected to Slave A. Slave A transmits the Master Clock to Slave B.
3. Slave B receives in real time the Master clock signal through Slave A, triggering the frame acquisition of the cameras connected to Slave B. Additional ZED Box Mini can be connected the same way, transmitting the Master clock signal in real time.