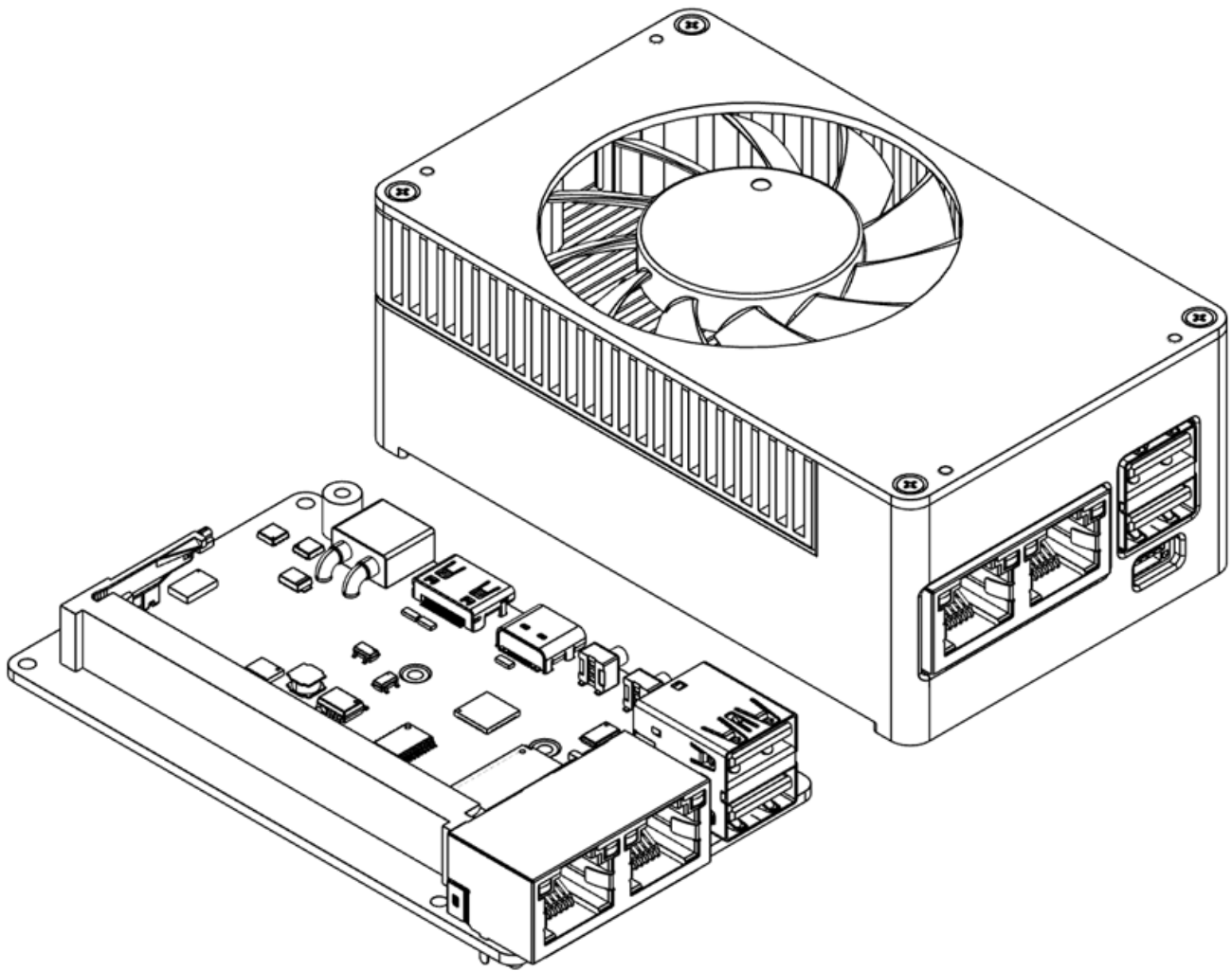
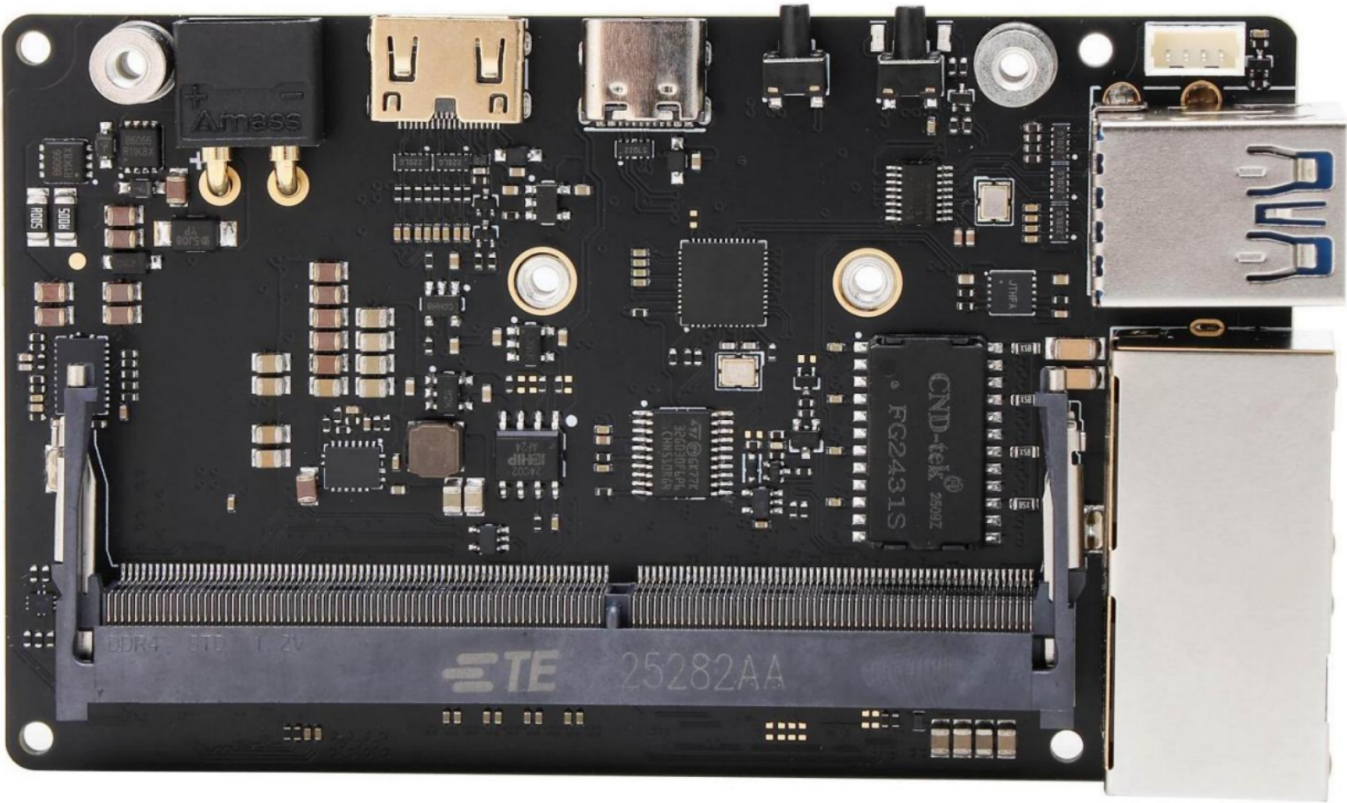


# C2401 Introduction

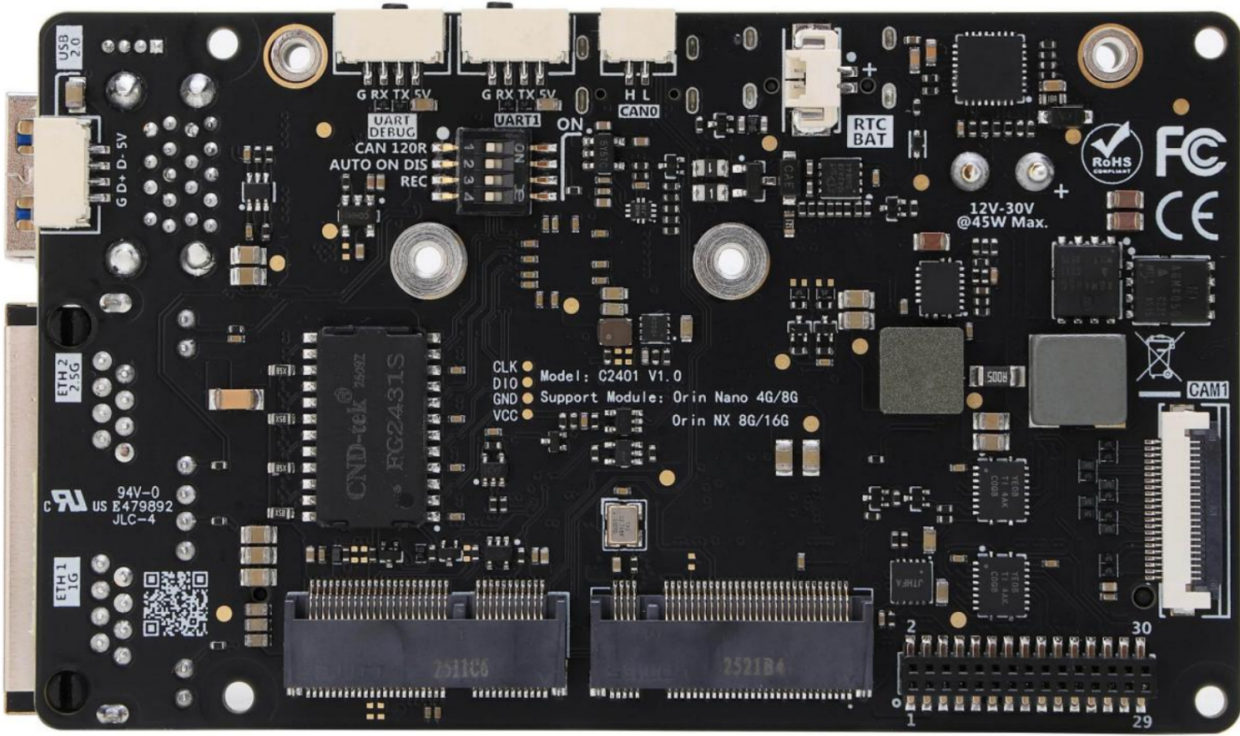


## Introduction

The **C2401** is a compact, high-density carrier board designed for **NVIDIA Jetson Orin Nano/NX** modules. It boasts comprehensive connectivity options, including dual Ethernet ports, dual USB ports, and expansion support for 4G/5G modules. Its space-saving stacked design ensures excellent ease of integration.



11



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# Features

- Equipped with an advanced automotive-grade E-fuse chip, providing comprehensive protection against over-voltage, under-voltage, short-circuit, over-current, and reverse polarity.
- Utilizes an ultra-low-resistance Buck chip, matched with an advanced alloy flat-wire inductor, featuring low heat generation and high saturation current characteristics to ensure stable power supply to the module.
- Features an 8-layer, 2u gold-plated, via-in-pad (VIP) process PCB, combined with a compact, high-density design, resulting in an external dimension of only 55x92mm.
- Rich peripheral interfaces, including dual USB 3.0 ports and dual network ports (Ethernet). One of the 2.5G ports supports the PTP (Precision Time Protocol) and high-density jumbo frames up to 16K bytes.
- The M.2 interface is designed on the same side for excellent accessibility and practicality. This allows for the replacement of the Wi-Fi card or solid-state drive (SSD) without needing to dismantle the module. It also includes a secondary development interface for expansion, such as 4G/5G network adapter.

## ????

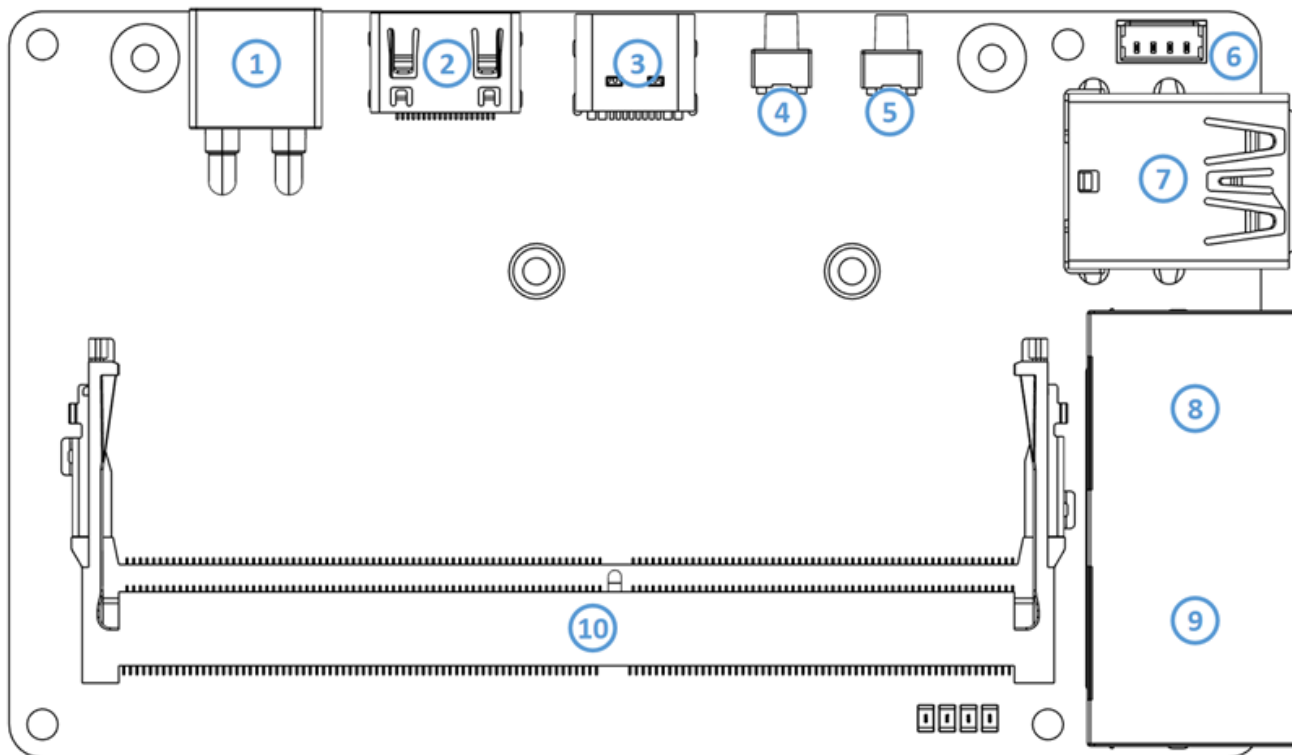
|                       |                                                                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Supply Voltage        | 12V (compatible with 9.5V-30V)                                                                                                                |
| Power Connector       | XT30 interface                                                                                                                                |
| Supported Module      | Orin Nano 4G/8G<br>Orin NX 8G/16G                                                                                                             |
| Ethernet              | 1x Gigabit Ethernet Socket (RJ45) , supports 9KB jumbo frames<br>1x 2.5G Ethernet Socket (RJ45) , supports 16KB jumbo frames and PTP protocol |
| Wireless Network      | 1x M.2 Key E?2230?                                                                                                                            |
| External Storage      | 1x M.2 Key M (2230 NVME SSD)                                                                                                                  |
| DisplayPort           | 1x Mini HDMI V2.1                                                                                                                             |
| USB                   | 2x USB3.2 (10Gbps)<br>1xUSB2.0(GH1.25-4p)                                                                                                     |
| USB-C                 | 1x Type C (USB 2.0) for firmware flashing                                                                                                     |
| Camera                | 1x CSI-22P                                                                                                                                    |
| Other                 | UART, CAN, I2C                                                                                                                                |
| RTC                   | 1x RTC backup clock battery interface                                                                                                         |
| Operating Temperature | 0?~45?                                                                                                                                        |

- | The carrier board requires a 12V(compatible with 9.5-30V) DC power supply. To ensure normal system operation, a power adapter with sufficient current output must be used. Additionally, under high load conditions with an input voltage exceeding 15V, adequate heat dissipation must be provided to prevent overheating.
- | This product includes reverse-polarity protection. Nevertheless, do not connect the power supply in reverse.
- | The overcurrent protection (OCP) threshold for all USB ports is 2.5A. Exceeding this limit will trigger an automatic power-off.
- | In contrast to the original M.2 2230 interface, the backplane's network interface now features a symmetrical layout.

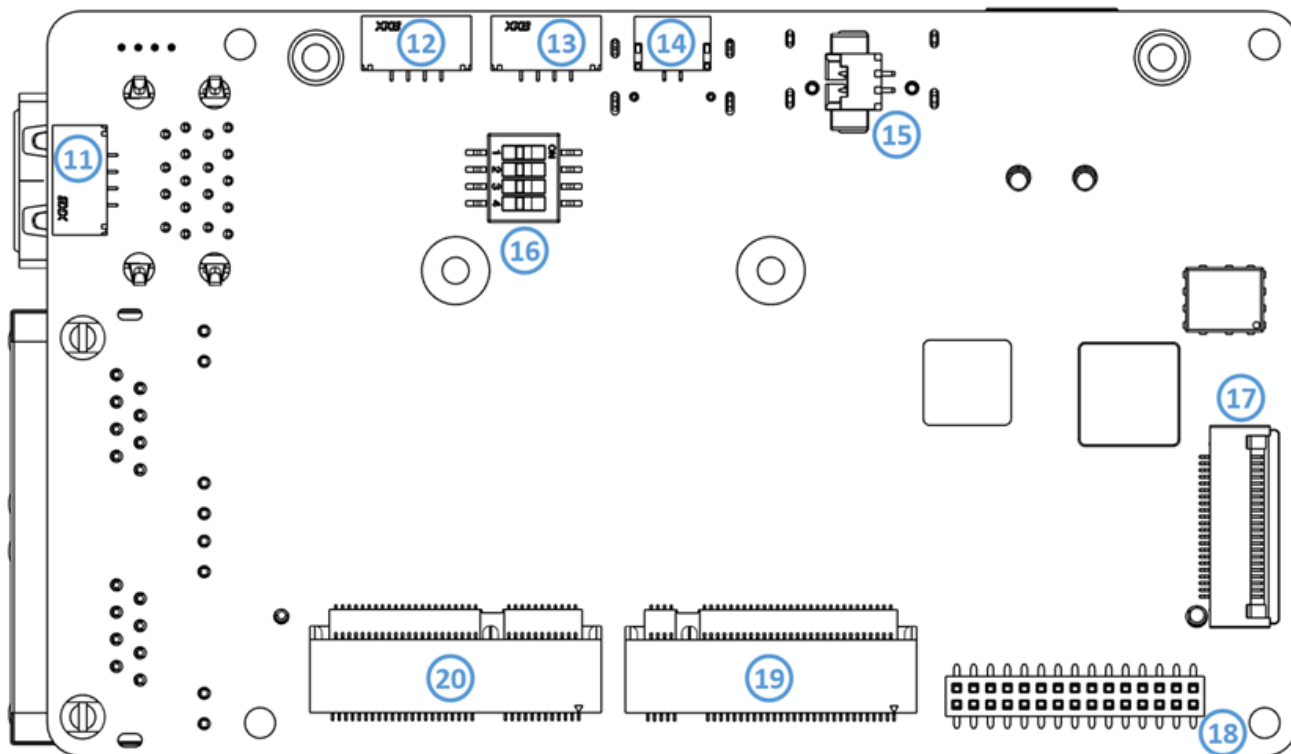
**Do not hot-swap the module. Always power off the board before inserting or removing the module. Failure to do so may damage the module and the carrier board. Damage caused by improper operation is not covered under warranty.**

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## Interface Layout



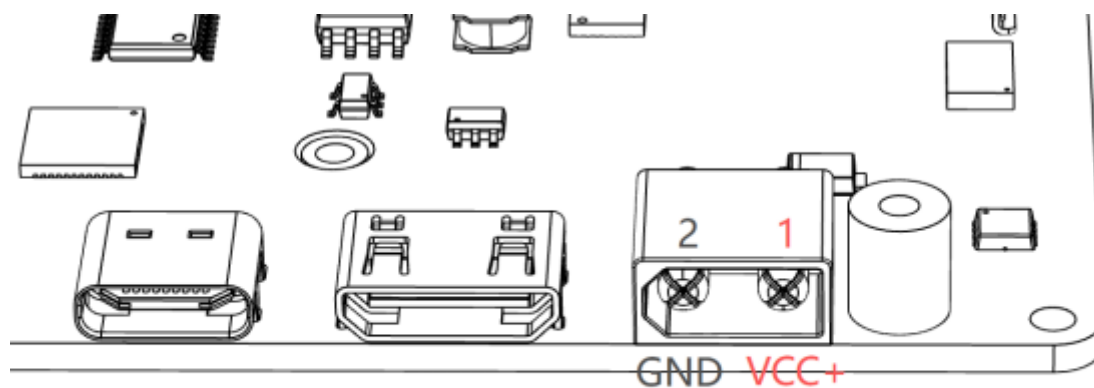
| □         | □                                     | □         | □                                 |
|-----------|---------------------------------------|-----------|-----------------------------------|
| <b>1</b>  | XT30 Power Jack                       | <b>11</b> | USB2.0 Connector (GH1.25 4p)      |
| <b>2</b>  | Mini HDMI                             | <b>12</b> | UART2 Connector (GH1.25 4p)       |
| <b>3</b>  | USB Type C (USB2.0)                   | <b>13</b> | UART1 Connector (GH1.25 4p)       |
| <b>4</b>  | REC Button                            | <b>14</b> | CAN Bus (GH1.25 2p)               |
| <b>5</b>  | Power Button                          | <b>15</b> | RTC                               |
| <b>6</b>  | PWM Fan                               | <b>16</b> | 4Pin Switch                       |
| <b>7</b>  | USB 3.0 Type A                        | <b>17</b> | Camera (#1) Connector 22pin 0.5mm |
| <b>8</b>  | RJ45 1 (2.5G)                         | <b>18</b> | 30Pin Expansion Interface         |
| <b>9</b>  | RJ45 2 (1000M)                        | <b>19</b> | M.2 M-key (2230)                  |
| <b>10</b> | Jetson Orin Module Interface (SODIMM) | <b>20</b> | M.2 E-key (2230)                  |



## Partial Features and Interfaces

### Power interface (1)

The power interface uses the XT30PW-M36 connector, paired with the XT30U-F connector, as defined below.



! The recommended input voltage is 12V, and the supported voltage range is 10V-30V. The under-voltage protection(UVP) voltage is 9.5V, and the over-voltage protection(OVP) is 31V.

! The interface has reverse protection, but always verify the power polarity before connecting the power supply.



When using the ORIN NANO series, ensure the input power supply has a minimum output capacity of 45W. For the ORIN NX series, ensure the input power supply has a minimum output capacity of 60W.

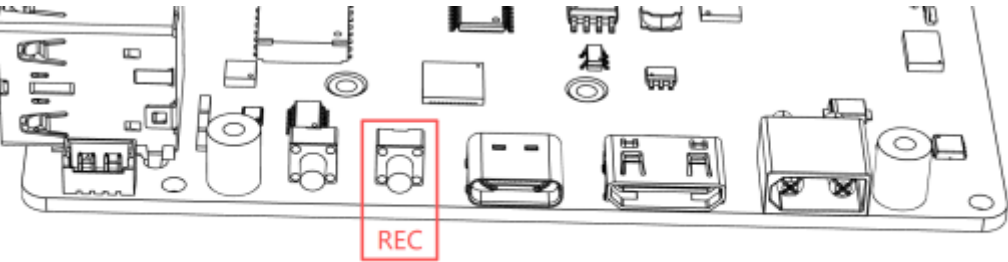
| Module          | Recommended power output | USB-C PD Supported Power Modes |
|-----------------|--------------------------|--------------------------------|
| ORIN NANO 4G/8G | 45W                      | Minimum 20V 2.25A protocol     |
| ORIN NX 8G/16G  | 60W                      | Minimum 20V 3A protocol        |

REC Button (4)

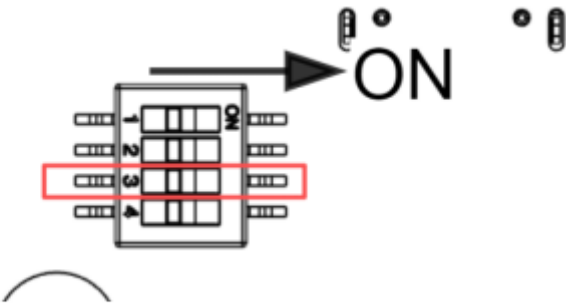
The C2401 carrier board supports two methods for entering recovery mode

- When the power is off, press the REC button and turn on the power to enter recovery mode for operations like flashing.

(Note: Recovery mode lasts only 60 seconds. The system will automatically resume normal startup after detecting no connection.)



- Set the DIP switch 3 on the back of the carrier board to ON, enabling the system to automatically enter recovery mode upon each power-on.

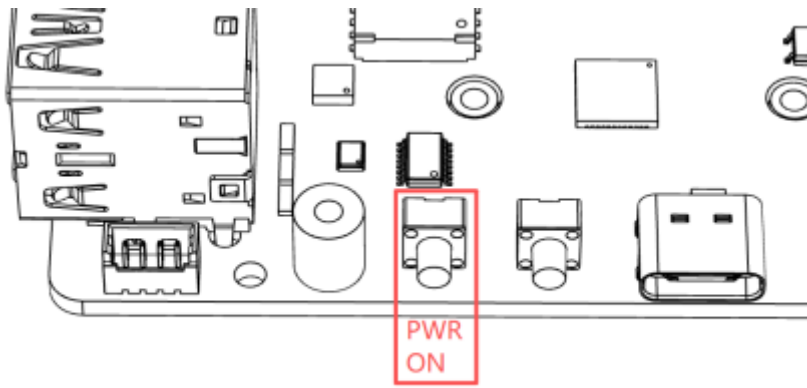


Power Button (5)

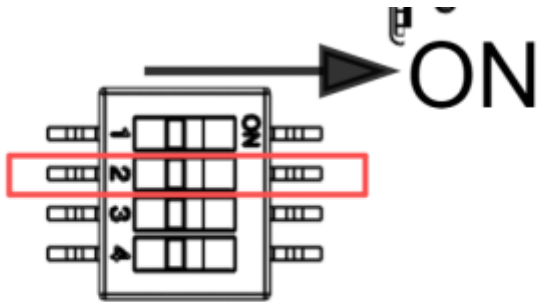
The C2401 unit is equipped with a power button (5) that performs the following functions:

When the system starts: Press once to enter the shutdown interface, and hold for 10 seconds to force shutdown.

When the system is shutting down: press once to start up.

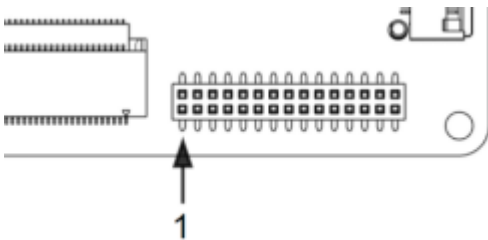


- Disable automatic startup: Set the DIP switch 2 on the back of the board to ON to disable automatic power-on. Manually press the power button to power on.



## Expansion Header (18)

This is a **2x15-pin, 1.27mm pitch female header**. Pin 1 location and pin definitions are as follows:

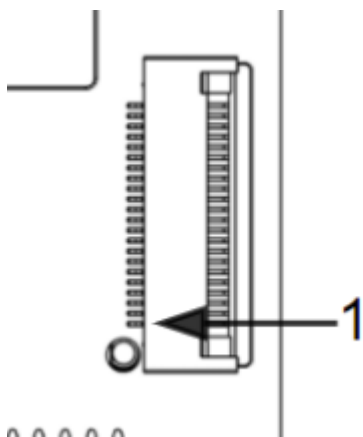




|             |    |    |           |
|-------------|----|----|-----------|
| VCC_IN      | 1  | 2  | VCC_IN    |
| VCC_IN      | 3  | 4  | VCC_IN    |
| GND         | 5  | 6  | GND       |
| USB_N       | 7  | 8  | VDD_5V    |
| USB_P       | 9  | 10 | VDD_5V    |
| GND         | 11 | 12 | VDD_3V3   |
| USBSS_RX_N  | 13 | 14 | GPIO_13   |
| USBSS_RX_P  | 15 | 16 | GPIO_07   |
| GND         | 17 | 18 | SPI0_CS1  |
| USBSS_TX_N  | 19 | 20 | SPI0_CS0  |
| USBSS_TX_P  | 21 | 22 | SPI0_MOSI |
| GND         | 23 | 24 | SPI0_MISO |
| PG          | 25 | 26 | SPI0_SCK  |
| CAM_I2C_SCL | 27 | 28 | UART0_TXD |
| CAM_I2C_SDA | 29 | 30 | UART0_RXD |

- l The VCC IN voltage matches the input voltage (Pass-through), with a max current of 3A. **VDD\_5V** and **VDD\_3V3** provide up to 1A each.
- l The I2C, GPIO, SPI, and UART pins operate at **3.3V**..
- l PG signal: Outputs a high level (Active High) when the **module** is operating normally.
- l USB 3.0 ports 13, 15, 19, and 21 are disabled by default in the official firmware. To enable them, please refer to the tutorial at: <https://www.linkzeelabs.com/wiki/books/jetson-orin-nano/page/orin-nanonx-usb>

## CSI Interface (17)



| Pin # | Module Pin Name | Module Pin # | Usage/Description                                                                                                                                                                                                                    | Type/Dir     |
|-------|-----------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1     | -               | -            | +3.3V                                                                                                                                                                                                                                | Power        |
| 2     | CAM_I2C_SDA     | 215          | Camera I2C. 2.2 kΩ pull-ups on module. The module CAM_I2C pins connect to an I2C mux. The camera connector #1 (J21) receives the I2C from the mux (second output). The I2C signals on the camera side of the mux have 1 kΩ pull-ups. | Bidir, 3.3V  |
| 3     | CAM_I2C_SCL     | 213          |                                                                                                                                                                                                                                      | Output, 3.3V |
| 4     | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 5     | CAM1_MCLK       | 122          | Camera #0 Primary Clock                                                                                                                                                                                                              | Output, 1.8V |
| 6     | CAM1_PWDN       | 120          | Camera #0 Power-down                                                                                                                                                                                                                 | Output, 1.8V |
| 7     | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 8     | CSI3_D1_P       | 35           | CSI 3 Data 1                                                                                                                                                                                                                         | Input        |
| 9     | CSI3_D1_N       | 33           |                                                                                                                                                                                                                                      |              |
| 10    | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 11    | CSI3_D0_P       | 23           | CSI 3 Data 0                                                                                                                                                                                                                         | Input        |
| 12    | CSI3_D0_N       | 21           |                                                                                                                                                                                                                                      |              |
| 13    | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 14    | CSI2_CLK_P      | 30           | CSI 2 Clock                                                                                                                                                                                                                          | Input        |
| 15    | CSI2_CLK_N      | 28           |                                                                                                                                                                                                                                      |              |
| 16    | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 17    | CSI2_D1_P       | 36           | CSI 2 Data 1                                                                                                                                                                                                                         | Input        |
| 18    | CSI2_D1_N       | 34           |                                                                                                                                                                                                                                      |              |
| 19    | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |
| 20    | CSI2_D0_P       | 24           | CSI 2 Data 0                                                                                                                                                                                                                         | Input        |
| 21    | CSI2_D0_N       | 22           |                                                                                                                                                                                                                                      |              |
| 22    | -               | -            | Ground                                                                                                                                                                                                                               | Ground       |

**Note:** In the Type/Dir column, Output is to camera module. Input is from camera module. Bidir is for bidirectional signals.

**Legend**

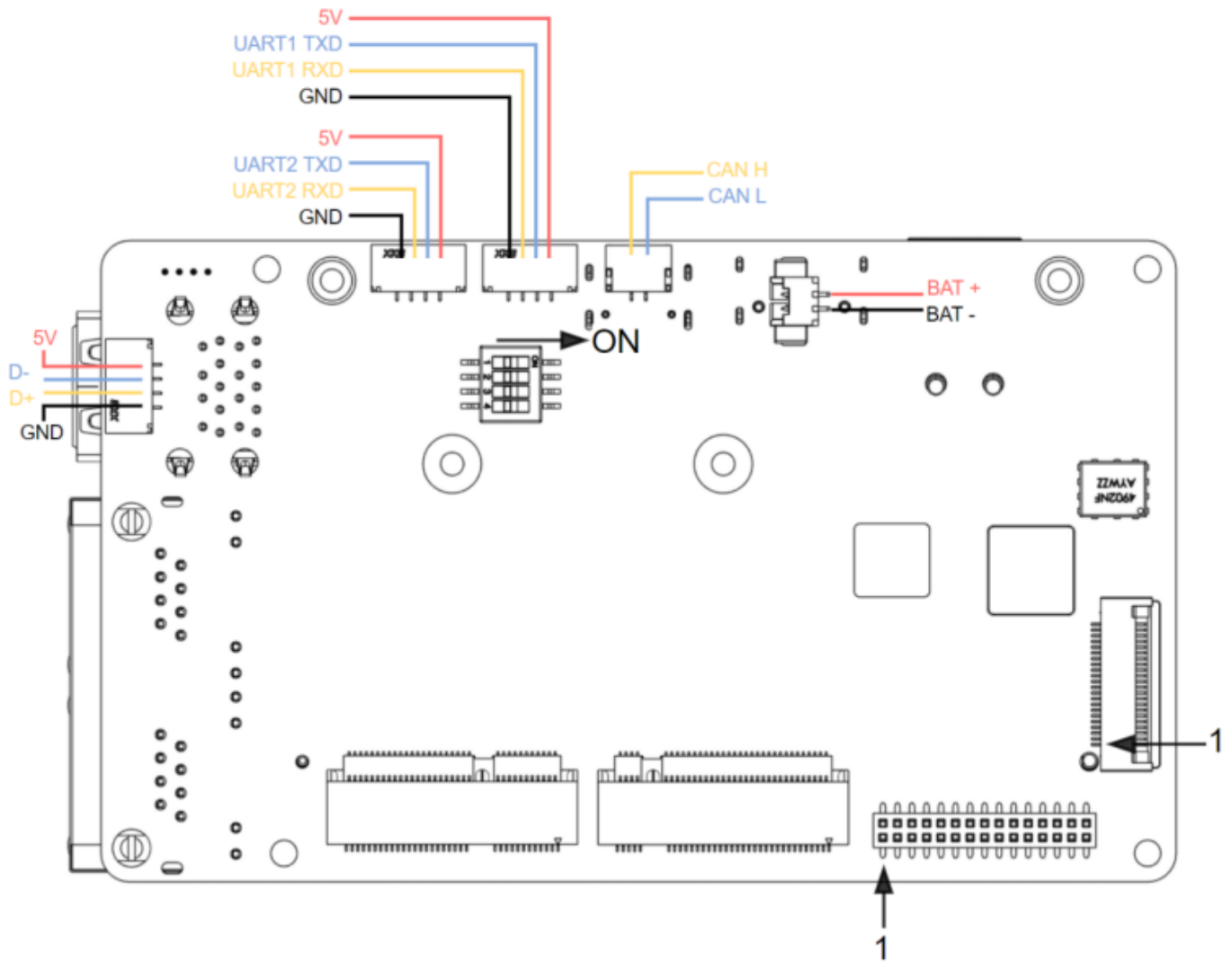
Ground

Power

Reserved

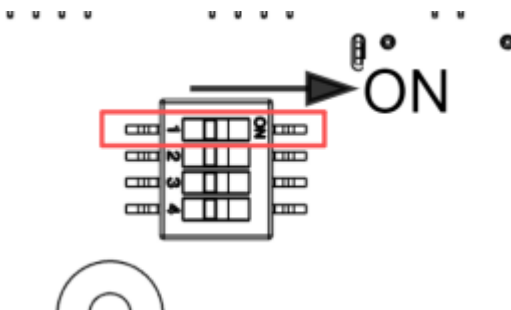
For the CSI camera interface usage tutorial, please refer to: <https://www.linkzeelabs.com/wiki/books/jetson-orin-nano/page/b534b>

## USB, Serial Port, and CAN



- RTC battery port (15): MX1.25-2P connector. When installing a battery, ensure correct polarity. **Note:** Software configuration is required to enable the **RTC** after installation.

I The CAN interface (14): GH1.25-2P connector. Default state: No termination resistor. Set DIP switch 1 to ON to **enable the built-in 120 $\Omega$**  termination resistor.



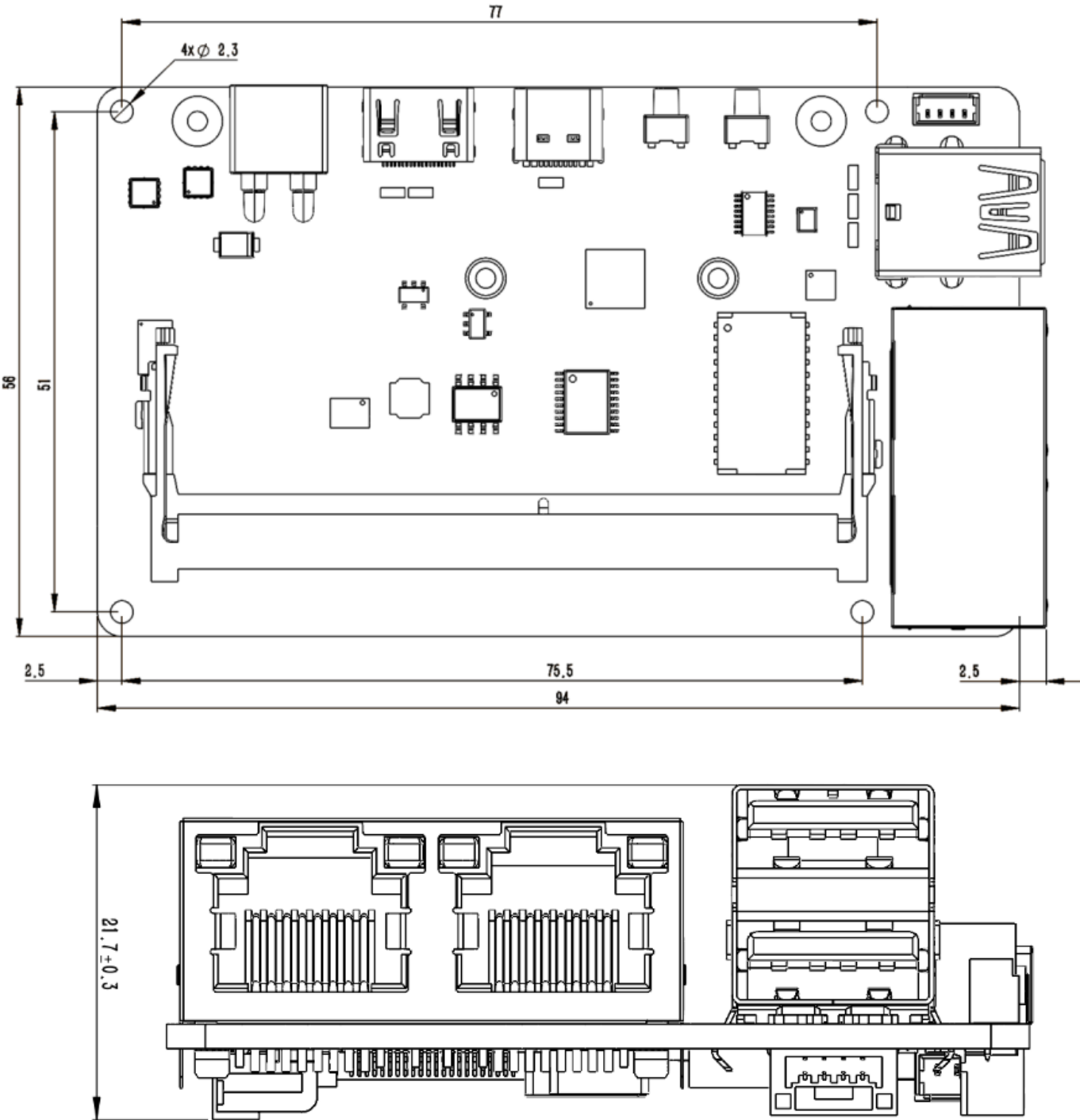
- UART (12) and (13): GH1.25-4P connectors with **3.3V logic levels**. UART2 is reserved for **DEBUG mode**. The 5V output supports a maximum current of 0.5A.
- The USB2.0 port (11): GH1.25-4P connector. Supports a maximum 5V output current of 0.5A.

For details on RTC configuration and UART interface usage, please refer to <https://www.linkzeelabs.com/wiki/books/jetson-orin-nano/page/3c778>

RJ45??

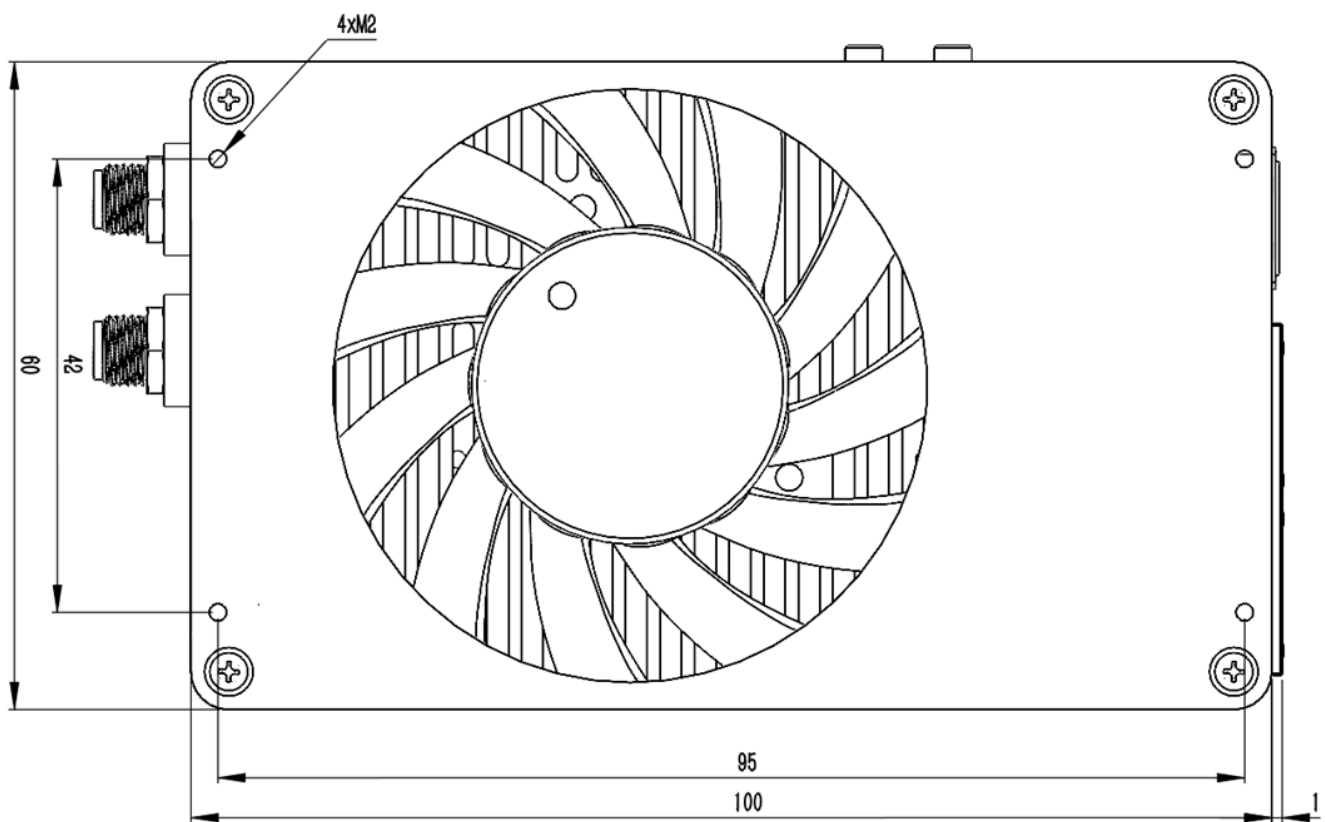
-  (8)  **RTL8111**  
  - **2.5G**  (9)   **RTL8125 2.5G**          
-  

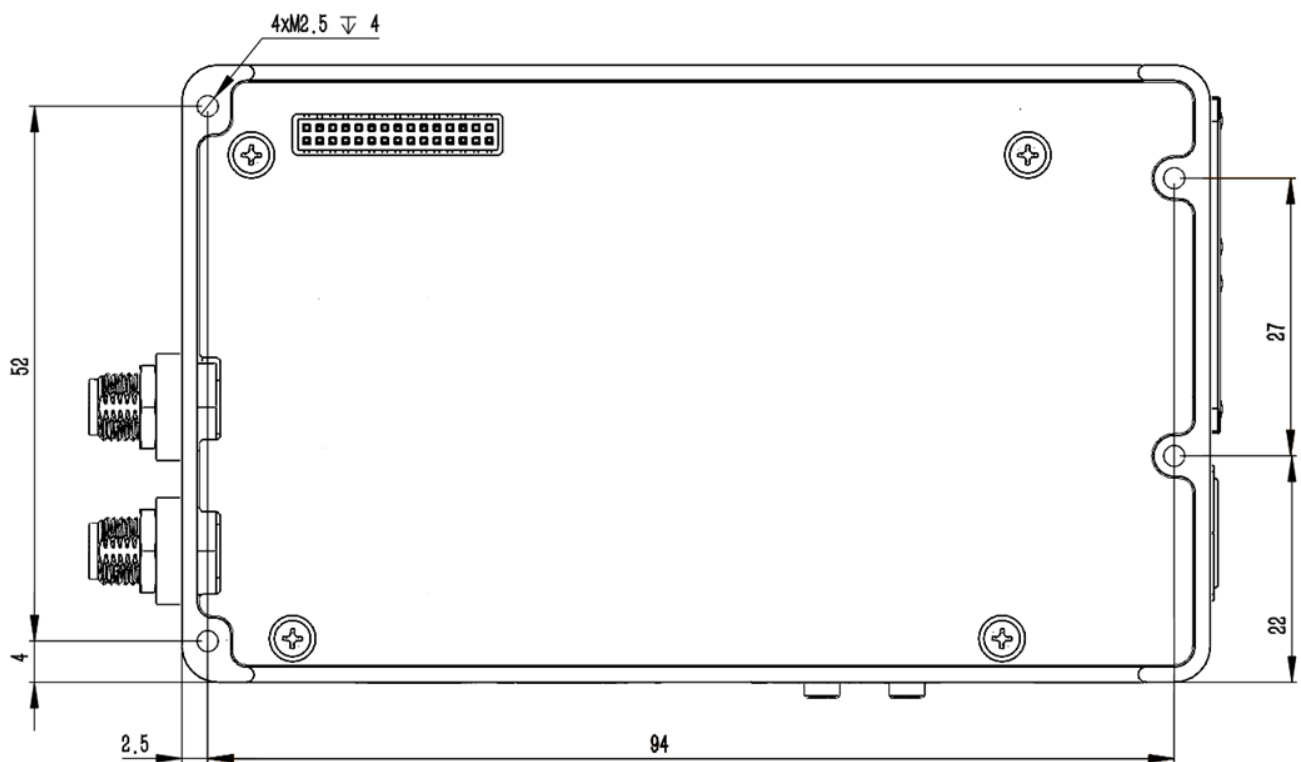
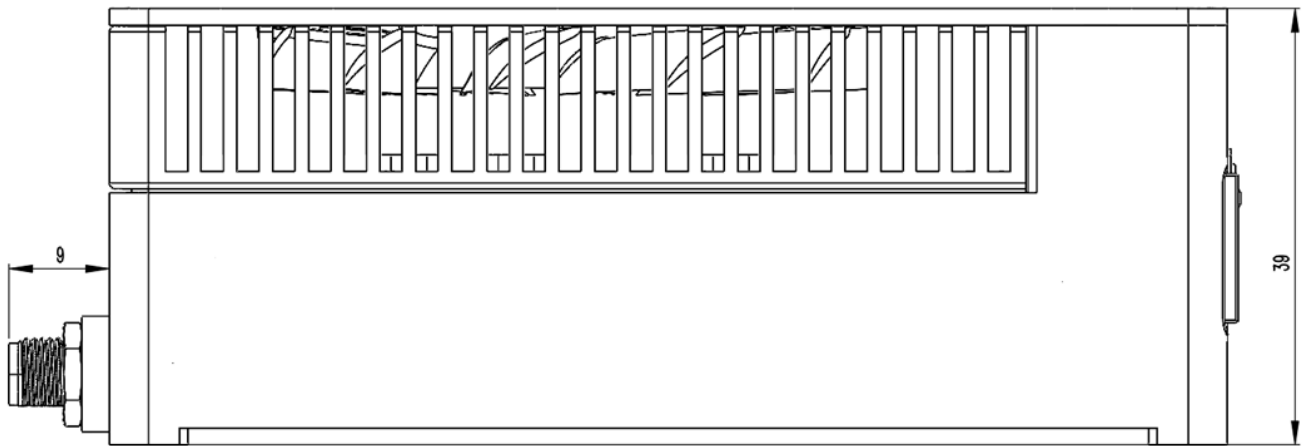
Mechanical Dimensions (Unit: mm)



| Screw Location?              | Recommended Specification? | Note?                                                        |
|------------------------------|----------------------------|--------------------------------------------------------------|
| Carrier Board Mounting Holes | M2 screws or standoffs     | The diameter of the screw or standoff must not exceed 4.5mm. |
| Module                       | M2.5 × 4 pan head screws   | The diameter of the screw or standoff must not exceed 5mm.   |
| Hard Drive & Network Card    | M2.5 × 4 pan head screws   | Pan head screws are recommended.                             |

## Kit Dimensions (Unit: mm)





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- [Jetson Orin C2401](#) ☐
- [Jetson](#) ☐
- [JetPack](#) ☐
- [Jetson AI](#) ☐
- [Jetson](#) ☐

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