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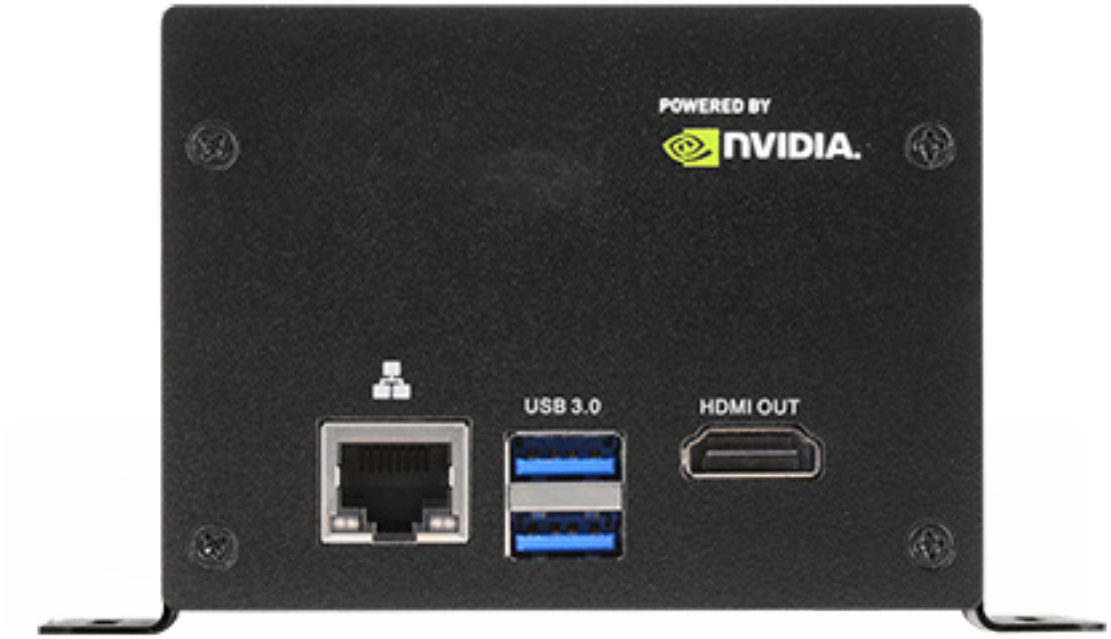


# EC102-XNX

Vision Embedded System
User's Manual

Preliminary

ver.0_...7-1521_19-23

## Copyright


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Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.



## Trademarks

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

## FCC and DOC Statement on Class B

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 when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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 the 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.

## Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

# Table of Contents

## About this Manual

This manual can be downloaded from the website. The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

## Warranty

1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.

2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.

3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.

4. We will not be liable for any indirect, special, incidental or consequencial damages to the product that has been modified or altered.

## About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One EC102-XNX

The system and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

## Optional Items

The system and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

## Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

**Important:**
Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

## Safety Precautions

- Use the correct DC / AC input voltage range.
- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging in the power cord.
- There is danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent specifications of batteries recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humid environments.
- Make sure the system is placed or mounted correctly and stably to prevent the chance of dropping or falling may cause damage.
- The openings on the system shall not be blocked and shall be kept in distance from other objects to make sure of proper air ventilation to protect the system from overheating.
- Dress the cables, especially the power cord, so they will not be stepped on, in contact with high temperature surfaces, or cause any tripping hazards.
- Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and is compliant with the voltage and current ranges required by the system's electrical specifications.
- If the system is to be unused or stored for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- If one of the following occurs, consult a service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated the system.
  - The system has been exposed to moisture.
  - The system is not working properly.
  - The system is physically damaged.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace the outlet.
- Disconnect the system from the electricity outlet before cleaning. Use a damp cloth for cleaning the surface. Do not use liquid or spray detergents for cleaning.
- Before connecting, make sure that the power supply voltage is correct. The device is connected to a power outlet which should be grounded connection.


The system may burn fingers while running.

Wait for 30 minutes to handle electronic parts after power off.

# Chapter 1 - Introduction

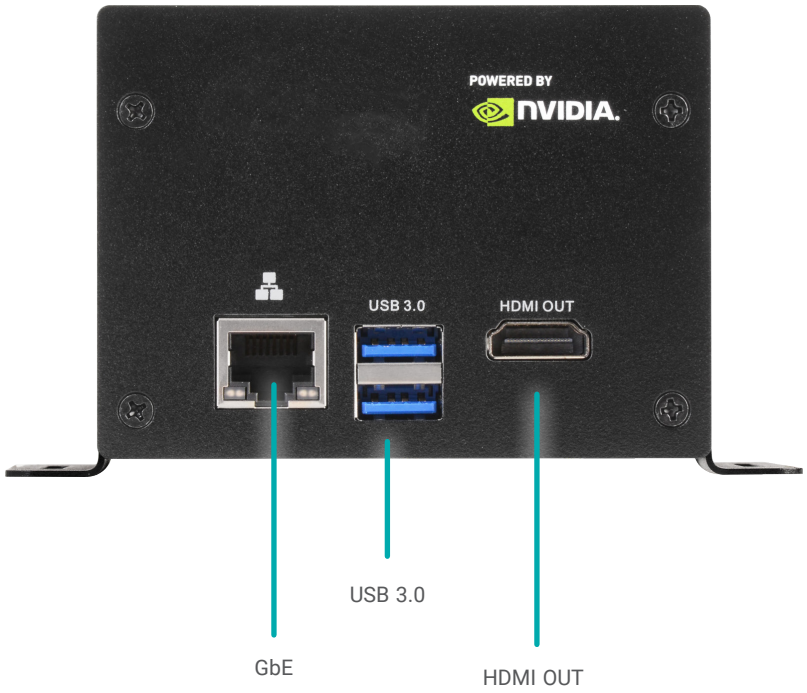
## ▶ Specifications

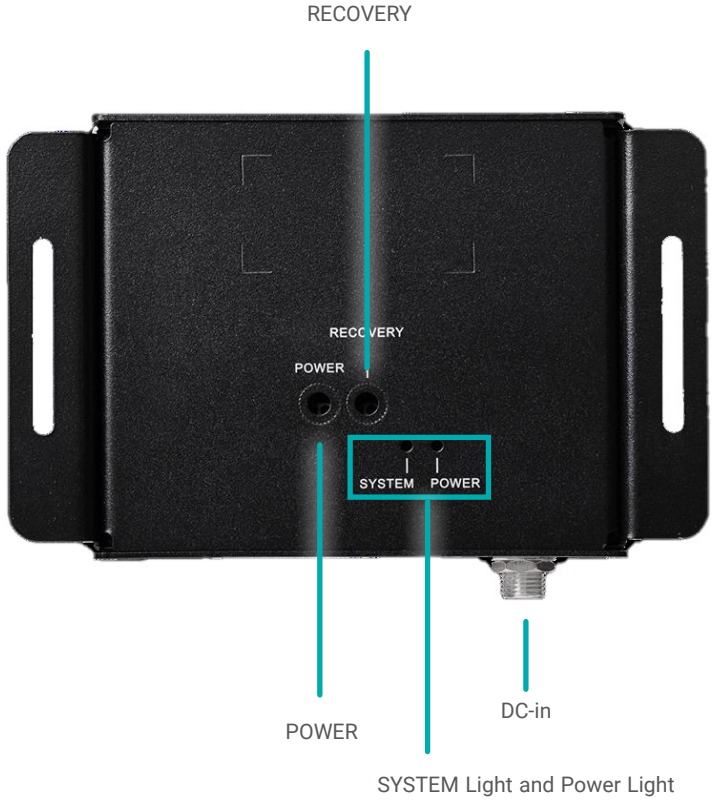
| | | | |
|---|---|---|---|
| **NVIDIA GPU SoC MODULE** | **GPU** | NVIDIA® Jetson Xavier™ NX module | |
| **STORAGE** | **External** | 1 x micro-SD card slot | |
| **EXPANSION** | **GPIO** | 20 pins:<br>1 x 3.3V UART<br>2 x I2C<br>9 x GPIOs | |
| **ETHERNET** | **Interface** | 1 x GbE RJ-45 | |
| **LED** | **Indicators** | 1 x Power LED<br>1 x Recovery LED | RGB tri-color LED |
| **I/O** | **Ethernet** | 1 x GbE RJ-45 | |
| | **Display** | 1 x HDMI 2.0a/b Type-A | HDMI: resolution up to 3840 x 2160 @ 60Hz |
| | **USB** | 1 x USB 2.0 Micro-B for Recovery<br>2 x USB 3.0 Type-A (USB 3.2 Gen1 x 1)<br>1 x mPCIe (Host Interface: USB 2.0) | |
| | **Buttons** | 1 x Power Button<br>1 x Recovery Button | |
| | **(Internal) MIPI Camera Inputs** | 2 x 2 Lane MIPI CSI-2, 15 pin FPC 1mm Pitch Connector (Compatible on NVIDIA® Jetson Xavier™ NX Developer Kit)<br>1 x 4 Lane MIPI CSI-2, 36 pin FPC 0.5mm Pitch Connector | |
| **WATCHDOG TIMER** | **Output & Interval** | System Reset, Programmable via Software from 1 to 255 Seconds | |
| **POWER** | **Type** | 12V/5A<br>(9V~19V is recommended) | |
| | **RTC Battery** | Support RTC Battery and Battery Life Monitoring by MCU | |
| **COOLING** | **Fan** | Heat sink with fan | |
| **ENVIRONMENT** | **Operating Temperature** | 0°C ~ 60°C | |
| | **Storage Temperature** | -40°C ~ 85°C | |
| | **Relative Humidity** | Relative Humidity 40 °C @ 95%, Non-Condensing | |
| **MECHANICAL** | **Dimensions (W x H x D)** | 91.4mm(W) x 70mm(H) x 76.6mm(D)<br>(3.60” x 2.76” x 3.02”) | |
| | **Weight** | 480g | |
| **STANDARDS AND CERTIFICATIONS** | **Certification** | CE, FCC | |

# Chapter 2 - Hardware Installation

## ▶ Overview

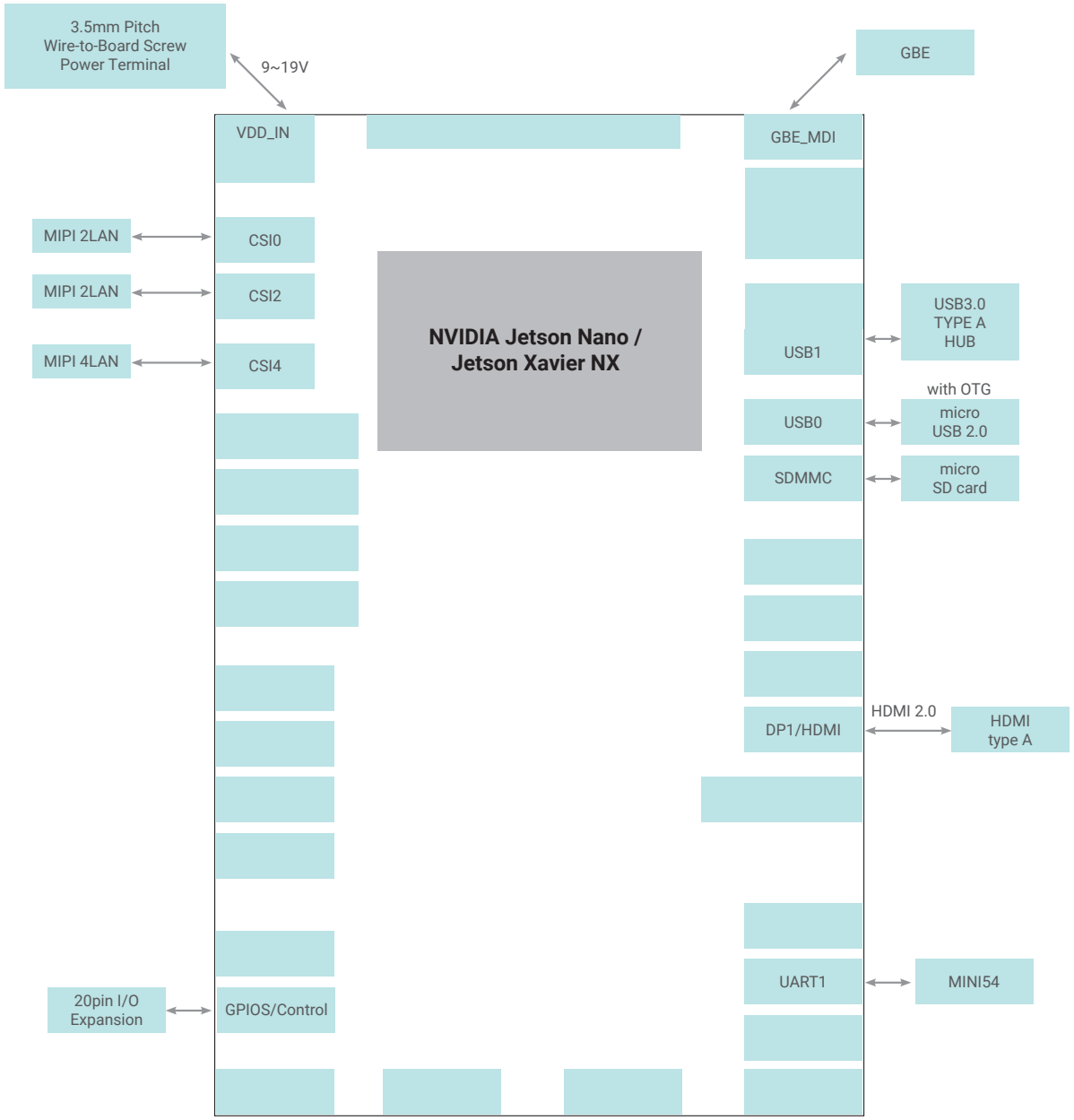
### Front Panel (4 x LAN, 2 x USB)



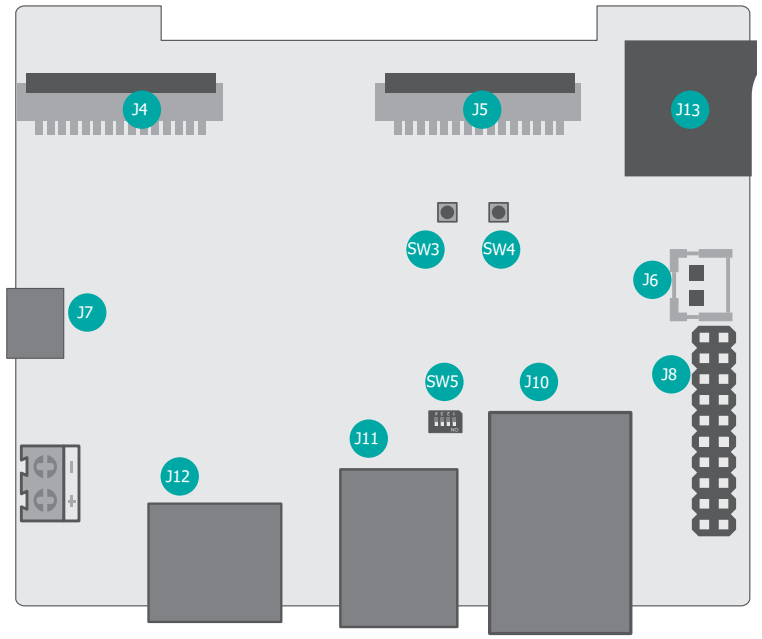

MicroSD
Card

## ▶ Block Diagram



## ▶ Board Layout

### Front Side

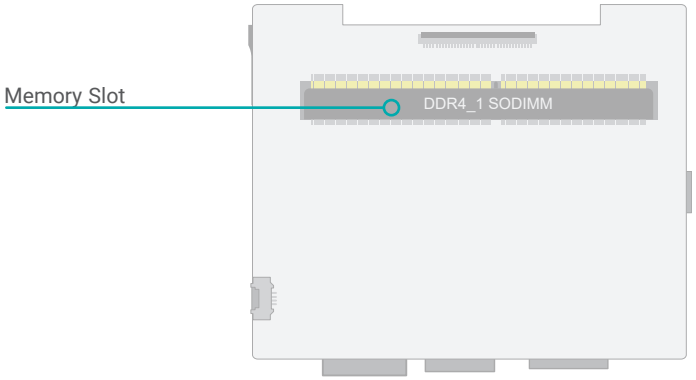




- J4 MIPI camera module connector
- J7 OTG programming recovery
- J12 HDMI output connector
- J11 USB 3.1 Gen 1 Type
- SW5 Fan PWM controller / Auto Power on
- SW3 RECOVERY button
- J10 GbE
- J8 20 Pin GPIO expansion
- J6 RTC battery for module
- J13 Micro SD Card
- J5 MIPI camera module connector
- SW4 POWER on button

- J1 MIPI camera module connector
- J2 SOCKET_DDR4
- J3 Fan Power Connector

## ▶ System Memory



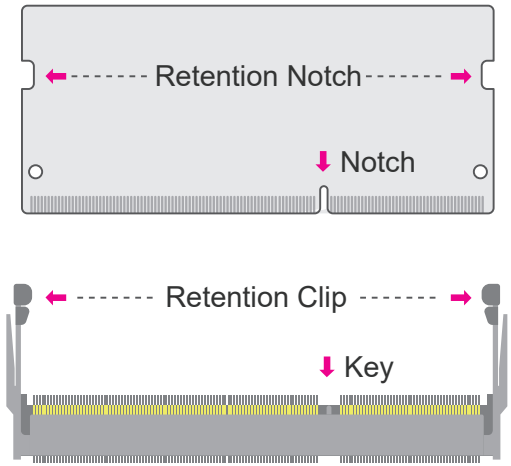

The system board supports the following memory interface.

Single Channel (SC)
Data will be accessed in chunks of 64 bits from the memory channels.

### Installing the SO-DIMM Module

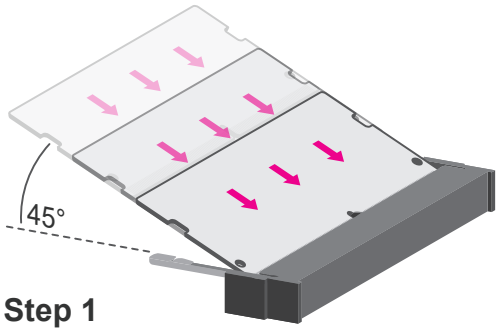
Before installing the memory module, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SO-DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.

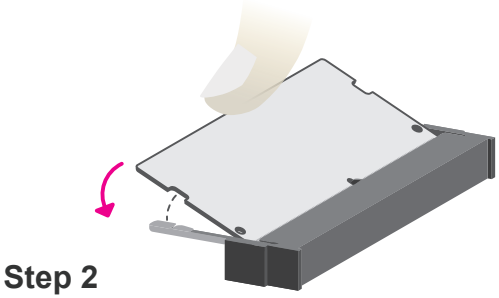


## System Memory

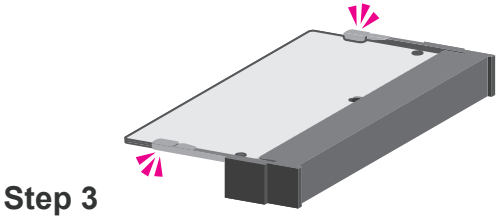
Please follow the steps below to install the memory card into the socket.




Step 1:
Insert the memory card into the slot while making sure 1) the notch and the key are aligned, and 2) the non-connector end rises approximately 45 degrees horizontally. Press the card firmly into the socket while applying and maintaining even pressure on both ends.



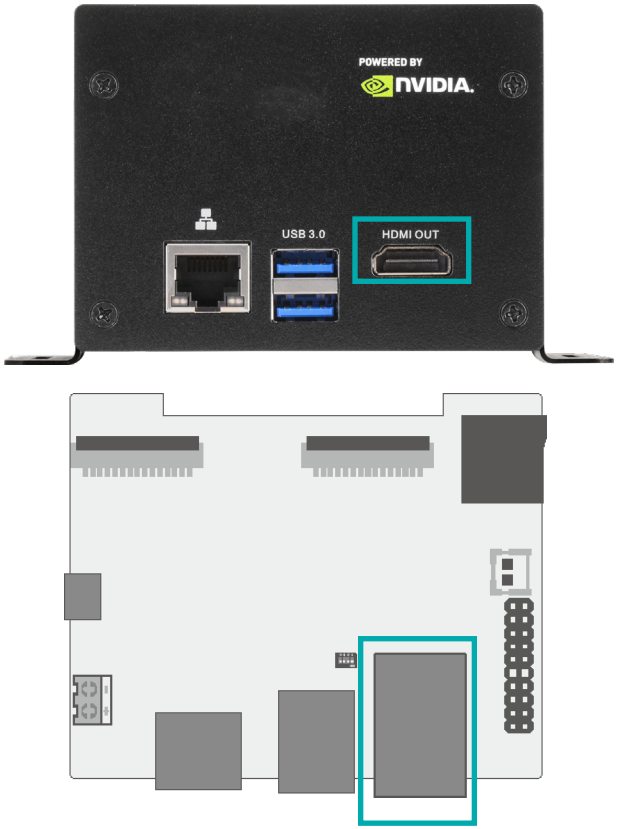

Step 2:
Press the end of the card far from the socket down while making sure the retention notch and the clip align as indicated by the dotted line in the illustration. If the retention notch and the clip do not align, please remove the card and re-insert it. Press the card all the way down.




Step 3:
The clips snap automatically and abruptly to the retention notches of the card sounding a distinctive click, and lock the card in place. Inspect that the clip sits in the notch. If not, please pull the clips outward, release and remove the card, and mount it again.

## ▶ I/O Ports

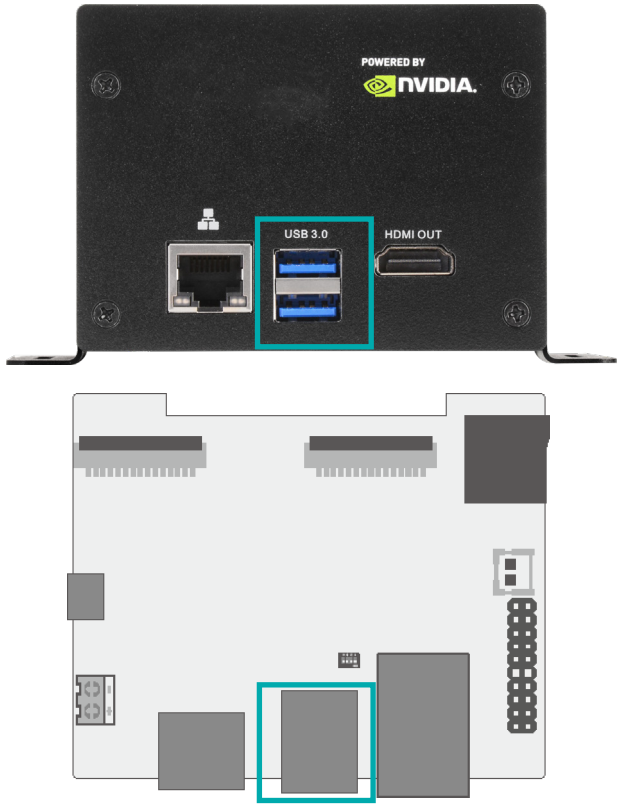
### Graphics Display




#### HDMI

The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port.

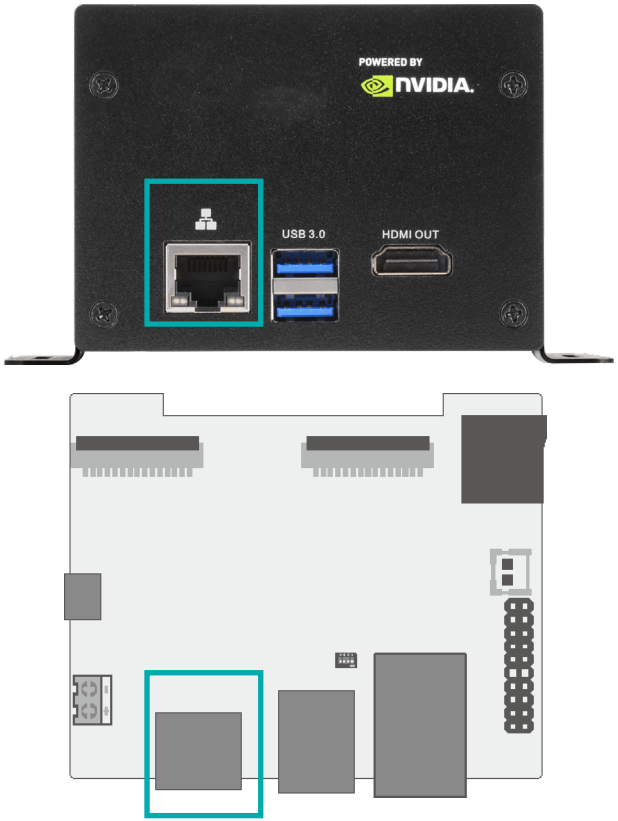
### USB Ports




#### USB 3.0

USB allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

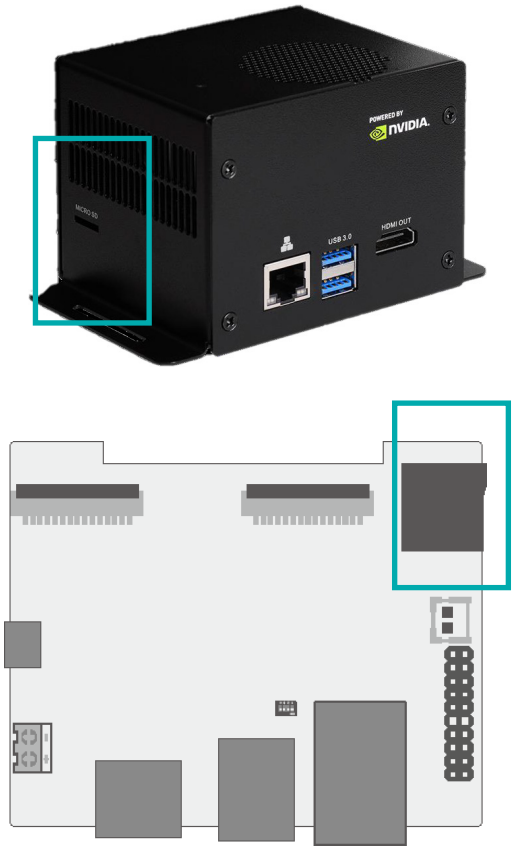
## RJ45 LAN Ports




The LAN port allows the system board to connect to a local area network by means of a network hub.



## Micro SD Card Slot




For MicroSD Card.

## Battery

The battery supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off.

### Safety Measures

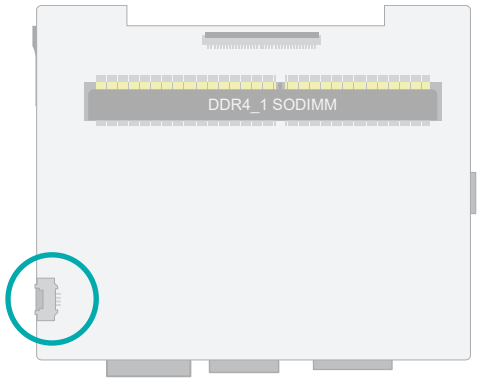
- There exists explosion hazard if the battery is incorrectly installed.
- Replace only with the same or equivalent type recommended by the manufacturer.
- Dispose of used batteries according to local ordinances.

### Battery Pin Assignment

| Pin | Define |
|---|---|
| 1 | 3V Power |
| 2 | GND |



## Fan Power and Control

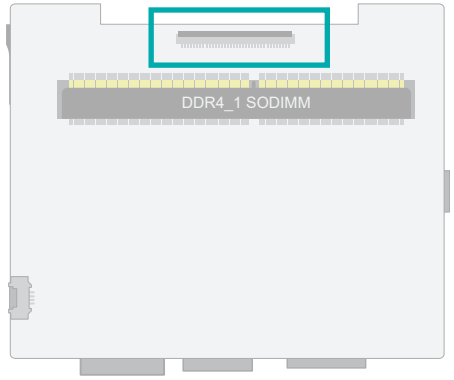



The fan connector is used to power a cooling fan. Cooling fans will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components. The 4-pin fans provide PWM to modulate fan speed.

### Fan Pin Assignment

| Pin | Define |
|---|---|
| 1 | GND |
| 2 | Power +5V |
| 3 | FAN_TACH |
| 4 | FAN_PWM |

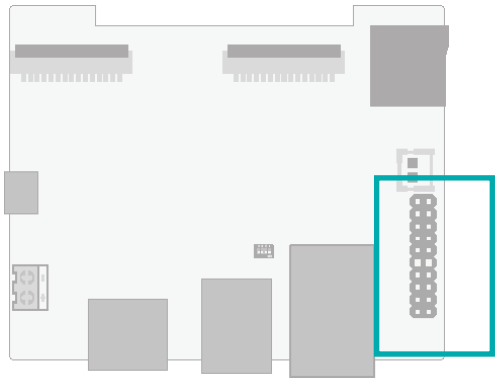
## Expansion Slots - MIPI camera module connector




■ Pin Assignment

| Pin | Define | Pin | Define |
|---|---|---|---|
| 1 | +5V MIPI | 19 | GND |
| 2 | +5V MIPI | 20 | CSI4_D2_P |
| 3 | +1V8 | 21 | CSI4_D3_N |
| 4 | +3.3V MIPI | 22 | GND |
| 5 | +3.3V MIPI | 23 | N/A |
| 6 | +3.3V MIPI | 24 | N/A |
| 7 | GND | 25 | N/A |
| 8 | CSI4_D0_P | 26 | MIPI4_PWDN |
| 9 | CSI4_D0_N | 27 | CSI4_I2C_SDA |
| 10 | GND | 28 | CSI4_I2C_SCL |
| 11 | CSI4_CLK_P | 29 | GND |
| 12 | CSI_CLK_N | 30 | N/A |
| 13 | GND | 31 | N/A |
| 14 | GND | 32 | N/A |
| 15 | CSI4_D1_N | 33 | N/A |
| 16 | GND | 34 | GND |
| 17 | CSI4_D2_P | 35 | CAM4_MCLK |
| 18 | CSI4_D3_P | 36 | GND |

## Expansion Slots - 20 Pin GPIO expansion



2x I2C, 1x UART, 9x GPIOs

### Pin Assignment

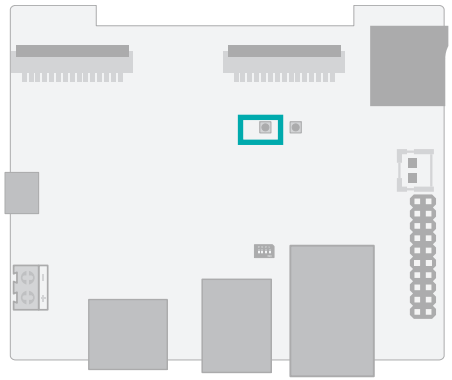
| Pin | Define | Address | Pin | Define | Address |
|---|---|---|---|---|---|
| 1 | +3V3 | | 2 | +5V | |
| 3 | GND | | 4 | GND | |
| 5 | I2C1_SDA | /dev/i2c-1 | 6 | UART2_TXD_3V3 | Debug Console /dev/ttyS0 |
| 7 | I2C1_SCL | | 8 | UART2_RXD_3V3 | |
| 9 | I2C0_SDA | /dev/i2c-0 | 10 | GND | |
| 11 | I2C0_SCL | | 12 | SPI1_SCK | gpio14 |
| 13 | I2S0_SCLK | gpio79 | 14 | SPI1_MISO | gpio13 |
| 15 | I2S0_DOUT | gpio78 | 16 | SPI1_MOSI | gpio12 |
| 17 | I2S0_DIN | gpio77 | 18 | SPI1_CS0 | gpio15 |
| 19 | I2S0_FS | gpio76 | 20 | SPI1_CS1 | gpio232 |



## OTG programming recovery

This port is for OTG programming, any USB standard Micro type interface cable or device fits the port.

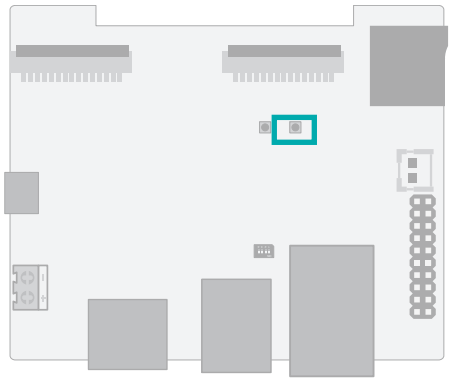
## Force recovery



This button is for force recovery.

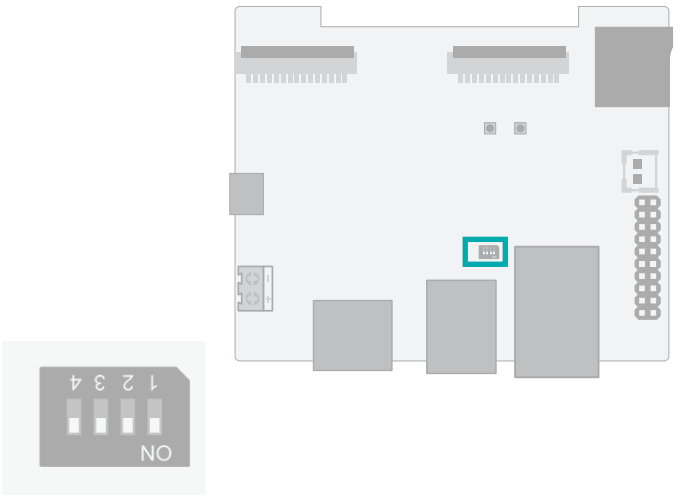


## Power control button



This button is for Power ON/OFF the machine.

## Fan PWM controller / Auto Power on




■ Switch

| Switch | Define (OFF) | ON |
|---|---|---|
| 1 | Fan PWM controller | Fan always on |
| 2 | N/A | N/A |
| 3 | Auto power on | Auto power on disabled |
| 4 | Test mode off | Test mode on (for the factory use) |

# Chapter 3 - First-time Use & Maintenance

## ▶ First-time Use

1. Check and ensure all the external system power supplies are turned off.
2. Install the Micro USB2.0 cable to OTG connector.
3. Press and hold on the Recover button.
4. Connect the power cord to the box IPC.

## ▶ Force Recovery Mode

USB 3.l/OTG port can be used to re-program NVIDIA® Jetson NANO /Xavier NX by using the other host system running NVIDIA Jetpack, as the procedure described below.

1. Power off the system. Ensure the system power must be completely OFF, instead of staying in the suspend mode or the sleep mode.

2. Connect a USB cable from OTG USB port to the other host system which will be used to re-program the new system file into NVIDIA® Jetson Nano/ Xavier NX.

3. Press and hold down Force Recovery Button and then power on the carrier board.

4. After three seconds, release Force Recovery Button.

5. NVIDIA® Jetson Nano/Xavier NX will show up on the USB list of the host system as a new NVIDIA target device.

6. After the system software is updated successfully, please ensure to power off the system. A clean power-on will then revert OTG port back to the host mode.