Neousys Technology Inc.

PCIe-NX15x Series

User Manual

Revision 1.1

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Legal Information

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Neousys Technology Inc. may modify, update or upgrade the software, firmware or any accompanying user documentation without prior notice. Neousys Technology Inc. will provide access to these new software, firmware or documentation releases from download sections of our website or through our service partners.

Before installing any software, applications or components provided by a third party, customer should ensure that they are compatible and interoperable with Neousys Technology Inc. product by checking in advance with Neousys Technology Inc.. Customer is solely responsible for ensuring the compatibility and interoperability of the third party's products. Customer is further solely responsible for ensuring its frame grabber cards, software, and data are adequately backed up as a precaution against possible failures, alternation, or loss.

For questions in regards to hardware/ software compatibility, customers should contact Neousys Technology Inc. sales representative or technical support.

To the extent permitted by applicable laws, Neousys Technology Inc. shall NOT be responsible for any interoperability or compatibility issues that may arise when (1) products, software, or options not certified and supported; (2) configurations not certified and supported are used; (3) parts intended for one frame grabber card is installed in another frame grabber card of different make or model.

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FCC Conformity	This equipment has been tested and found to comply with the limits for a Class A 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 commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
CE Conformity	The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer frame grabber cards to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Safety Precautions

Read these instructions carefully before you install, operate, or transport the frame grabber card.

- Install the frame grabber card or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the frame grabber card where it is easily accessible
- Secure each frame grabber card module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic.
- Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the frame grabber card and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the frame grabber card is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

- ONLY qualified personnel should service the frame grabber card
- Shutdown the frame grabber card, disconnect the power cord and all other connections before servicing the frame grabber card
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module's frame/ heat sink.
- Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the frame grabber card
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

About This Manual

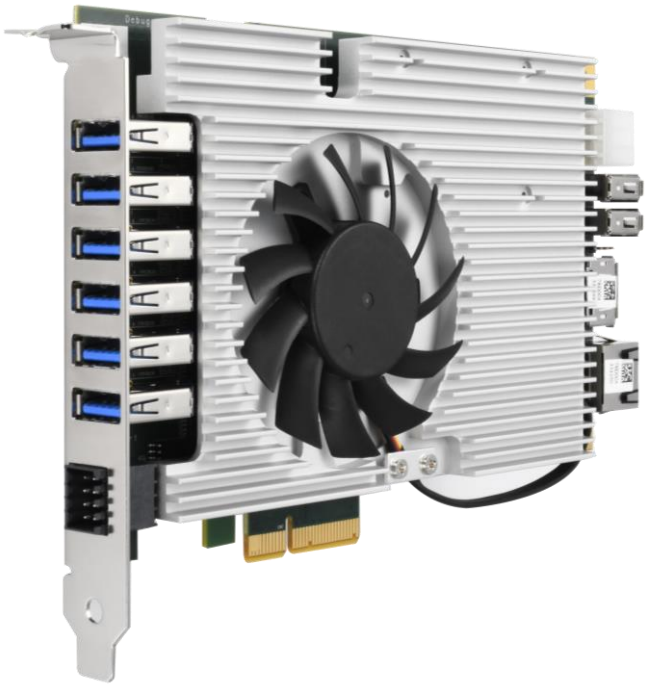
This manual introduces and describes how to setup/ install Neousys Technology PCIe-NX15x frame grabber card series. It is a turnkey industrial-grade frame grabber solution with AI computation capabilities that incorporates drivers for selected Ethernet/ GigE cameras with video streaming sample codes.

Revision History

Version	Date	Description
1.0	May. 2024	Initial release
1.1	Dec. 2025	Updated Ethernet specifications

1 Introduction

PCIe-NX15x are frame grabber cards fueling 100 TOPS AI inference performance for modern vision inspection, intelligent video analytics and security/ security applications. Powered by NVIDIA's Jetson Orin NX frame grabber card-on-module, the frame grabber card delivers 100 INT8 TOPS AI performance via its 1024 CUDA cores, 32 Tensor cores and 2 NVDLA® engines.



PCIe-NX156U3

PCIe-NX154PoE

With PCIe-NX154PoE featuring four 2.5GbE ports with PoE+ offering a total 50W power budget to connect and power industrial GigE cameras or IP cameras; and PCIe-156U3 consisting of two USB3.2 Gen2 (10Gbps) and four USB3.2 Gen1 (5Gbps) connectors, and up to 1500mA current for USB camera connectivity.

With Windows and Linux compatibility, the PCIe-NX15x series the perfect upgrade for legacy machine vision frame grabber cards to leverage deep learning-based image processing such as object detection, classification, tracking, facial recognition, etc. It’s a revolutionary frame grabber card with intelligence for next-generation computer vision applications.

1.1 PCIe-NX156U3 Specification

System Core	
Processor	Supporting NVIDIA® Jetson Orin™ NX frame grabber card-on-module (SOM), comprising NVIDIA® Ampere GPU and ARM Cortex CPU
Memory	8GB/ 16GB LPDDR5 @ 3200 MHz on SOM
Storage Interface	
M.2 NVMe	1x M.2 2242 M key socket (PCIe Gen4 x2) for NVMe SSD
Deployment I/O Interface	
Bus Interface	x1, Gen2 PCI Express
USB3	2x USB 3.2 Gen2 (10Gbps) ports 4x USB 3.2 Gen1 (5Gbps) ports
Serial Port	1x RS-232 port and 1x isolated RS-485 port
Development I/O Interface	
Ethernet port	1x Gigabit Ethernet
USB	2x USB 2.0 ports 1x micro USB (OTG)
Video Port	1x DisplayPort, supporting 3840x2160 at 60Hz
DC Input	12V DC power input (for standalone development, or when total power consumption exceeds 66W)
Mechanical	
Dimension	167.7 mm (W) x 111 mm (H)
Weight	0.4kg
Environmental	
Operating Temperature	-25°C to 60°C with airflow (20W TDP mode) *
Storage Temperature	-40°C to 85°C
Humidity	10% to 90%, non-condensing
EMC	CE/FCC Class A, according to EN 55032/55035

* For sub-zero and over 60°C operating temperature, a wide temperature NVMe is required.

1.2 PCIe-NX154PoE Specification

System Core	
Processor	Supporting NVIDIA® Jetson Orin™ NX frame grabber card-on-module (SOM), comprising NVIDIA® Ampere GPU and ARM Cortex CPU
Memory	8GB/ 16GB LPDDR5 @ 3200 MHz on SOM
Storage Interface	
M.2 NVMe	1x M.2 2242 M key socket (PCIe Gen4 x2) for NVMe SSD
Deployment I/O Interface	
Bus Interface	x1, Gen2 PCI Express
PoE	4x IEEE 802.3at PoE+ Max 25.5W per port. Total 50W power budge for 4 ports
Ethernet	4x 2.5GBASE-T Ethernet ports by Intel® I226-IT/ I225-IT
Serial Port	1x RS-232 port and 1x isolated RS-485 port
Development I/O Interface	
Ethernet port	1x Gigabit Ethernet
USB	2x USB 2.0 ports 1x micro USB (OTG)
Video Port	1x DisplayPort, supporting 3840x2160 at 60Hz
DC Input	12V DC power input (for standalone development, or when total power consumption exceeds 66W)
Mechanical	
Dimension	167.7 mm (W) x 111 mm (H)
Weight	0.4kg
Environmental	
Operating Temperature	-25°C to 60°C with airflow (20W TDP mode) *
Storage Temperature	-40°C to 85°C
Humidity	10% to 90%, non-condensing
EMC	CE/FCC Class A, according to EN 55032/55035

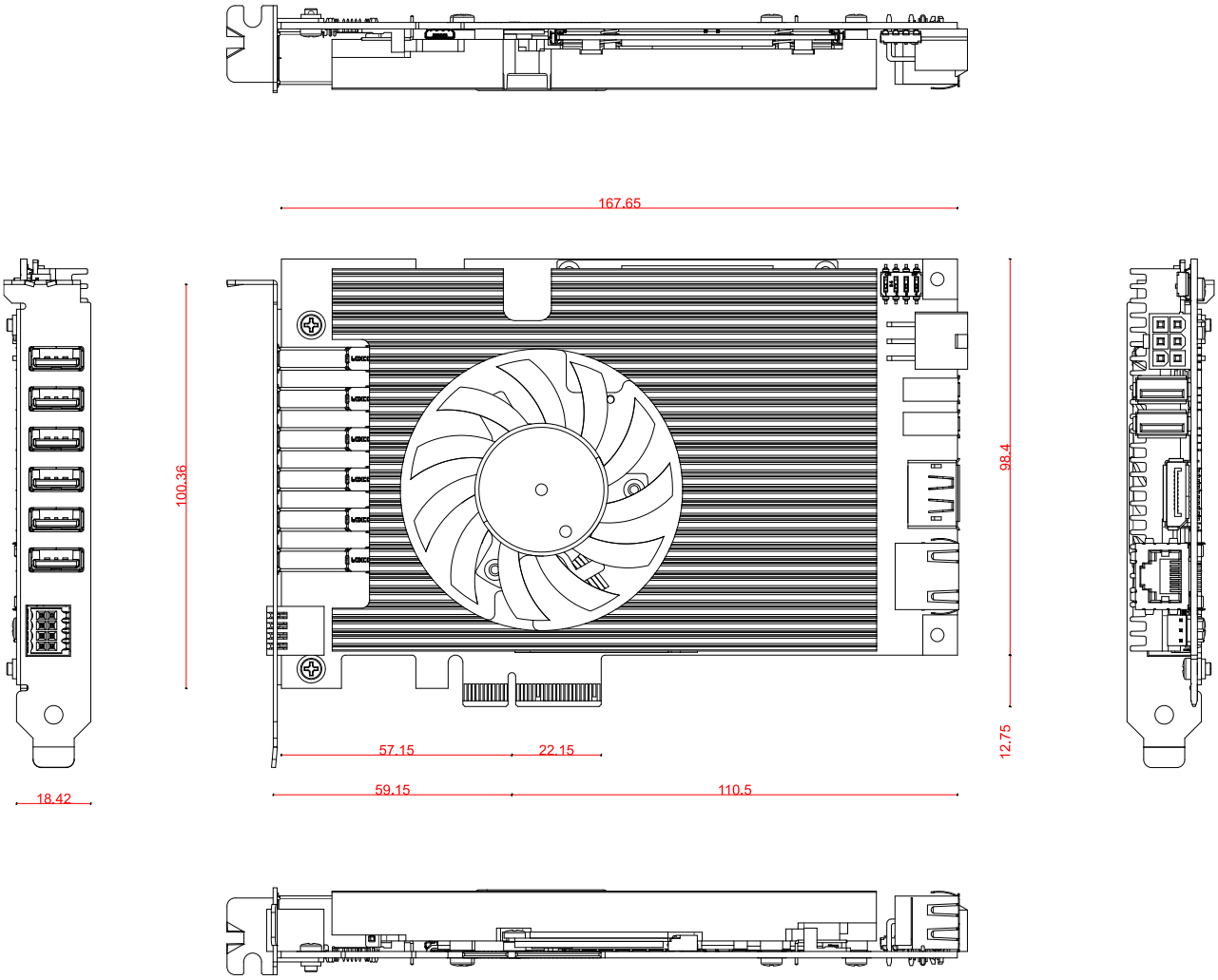
* For sub-zero and over 60°C operating temperature, a wide temperature NVMe is required.

1.3 Dimensions of PCIe-NX15x Series

NOTE

Both PCIe-NX156U3 and PCIe-NX154PoE share the same dimensions. Therefore, only PCIe-NX156U3 will be shown for demonstration purposes.

All measurements are in millimeters (mm).



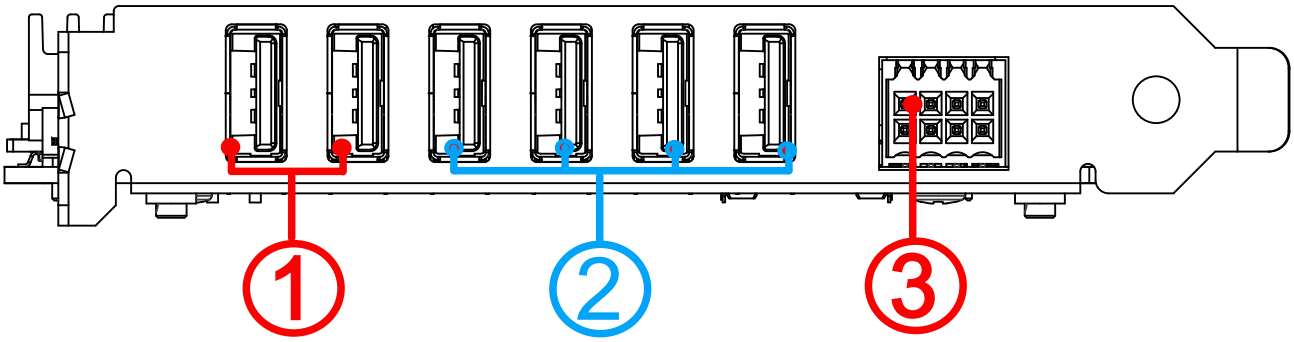
2 Setting Up Your PCIe-NX15x

2.1 Unpacking Your PCIe-NX15x Frame Grabber Card

Upon receiving the PCIe-NX15x frame grabber card, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neousys Technology.

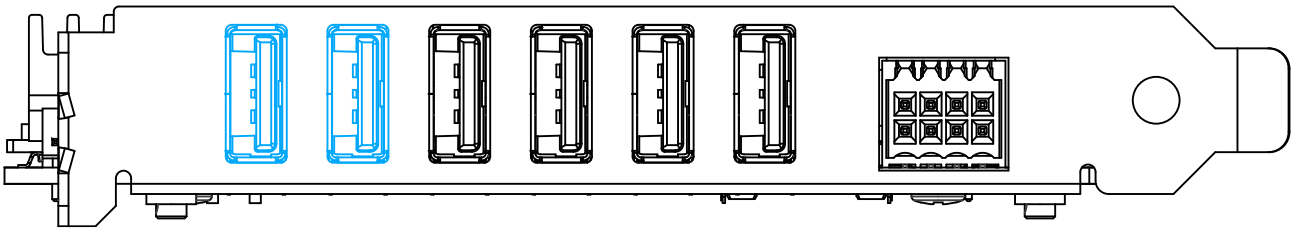
Item	Description	Qty
1	PCIe-NX15x frame grabber	1
2	6P(2x3) 4.2mm wafer to 2x cord end terminal 20cm cable for development	1
3	Inline splicing connector for development	2
4	Push-in 8-pole(2x4) terminal block for COM port on the PCIe bracket	1
5	Standoff, M3-5,H20 _ for multiple PCIe-NX15x installation	2
6	Standoff, M3,H20,L6 _ for multiple PCIe-NX15x installation	2
7	Screw pack	1

2.2 PCIe-NX156U3 I/O Panel



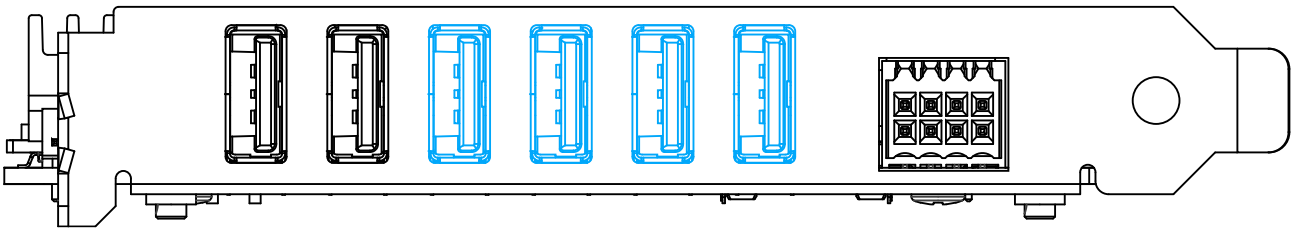
No.	Item	Description
1.	USB 3.2 Gen 2 ports	USB 3.2 Gen 2 port (SuperSpeed+) offers up to 10Gbps, twice the bandwidth over existing SuperSpeed USB3.1 Gen. 1 connection. They are backward compatible with USB3.2 Gen1 and USB2.0.
2.	USB 3.2 Gen 1 ports	USB 3.2 Gen 1 offers up to 5Gbps of data-throughput performance. They are backward compatible with USB2.0.
3.	8-pin terminal block	The 8-pin terminal includes 1x RS-232 and 1x isolated RS-485.

2.2.1 USB 3.2 Gen 2 Ports



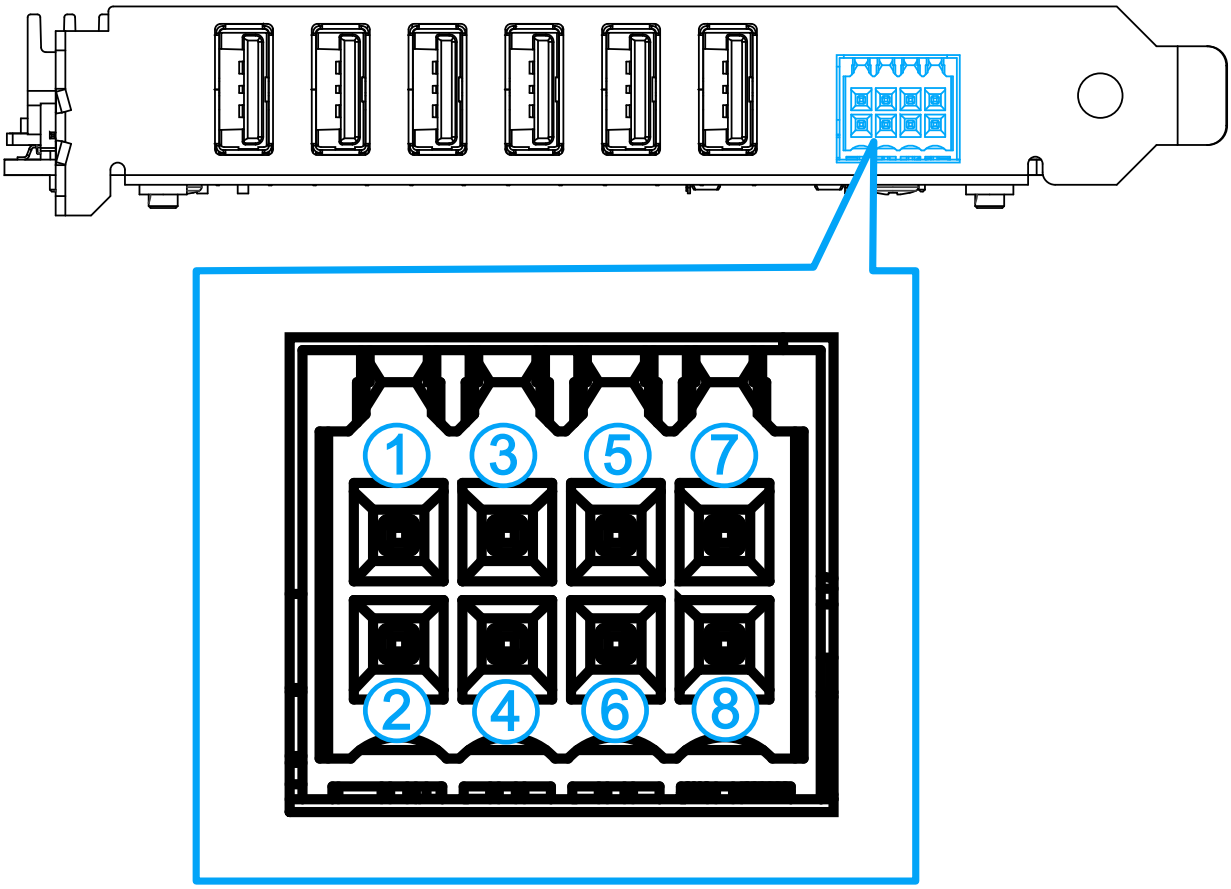
The frame grabber card's USB 3.2 Gen 2 ports (10Gbps) are backward compatible with USB3.2 Gen.1 USB 2.0, USB 1.1 and USB 1.0 devices.

2.2.2 USB 3.2 Gen 1 Ports



The frame grabber card's USB 3.2 Gen1x1 ports (5Gbps) are backward compatible with USB 2.0, USB 1.1 and USB 1.0 devices.

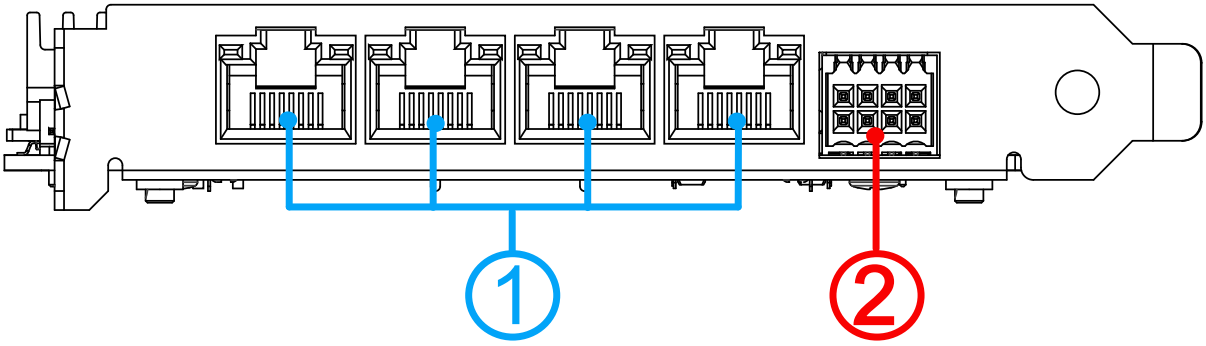
2.2.3 8-pin Terminal Block



The terminal includes isolated signals for a RS-232 and an isolated RS-485 COM. For pin definitions, please refer to the following table:

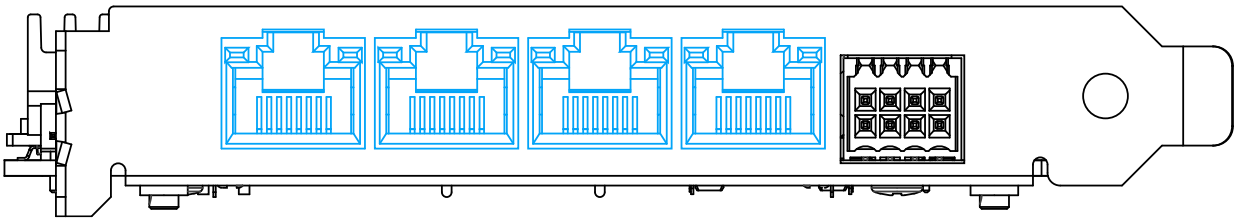
Pin	Description	Pin	Description
1	-	5	RS-485_GND
2	-	6	RS-232_GND
3	RS-485_DATA+	7	RS-232_TX
4	RS-485_DATA-	8	RS-232_RX

2.3 PCIe-NX154PoE I/O Panel



No.	Item	Description
1.	Gigabit Power Over Ethernet ports	4x 2.5GBASE-T Ethernet ports in compliance with IEEE 802.3at PoE+, maximum 25.5W per port, and a total 50W power budget for 4 ports
2.	8-pin terminal block	The 8-pin terminal includes 1x RS-232 and 1x isolated RS-485.

2.3.1 Gigabit Power over Ethernet Ports



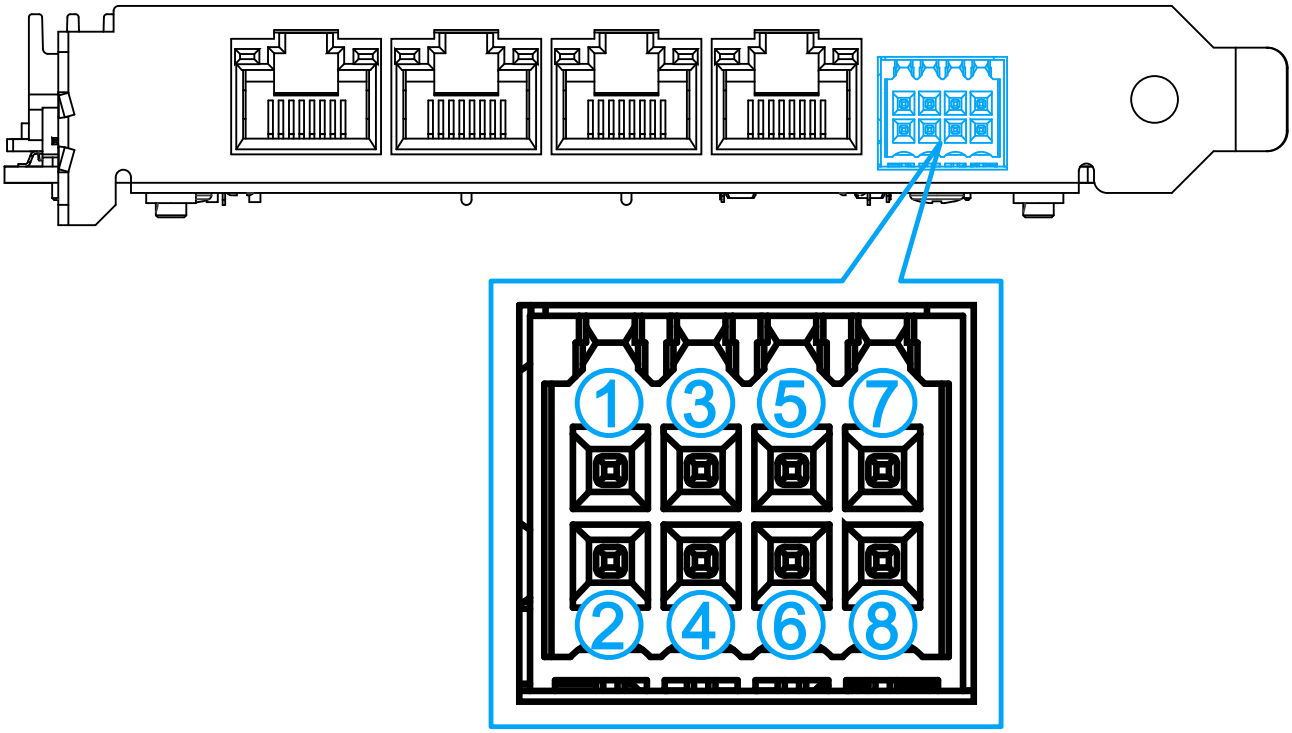
The PCIe-NX154PoE series offers four 2.5Gb Ethernet ports with Power over Ethernet (PoE) functionality.

Power over Ethernet (PoE) supplies electrical power and data on a standard CAT-5/ CAT-6 Ethernet cable. Acting as a PoE PSE (Power Sourcing Equipment), compliant with IEEE 802.3at, each PoE port delivers up to 25W to a Powered Device (PD). The four ports have a total 50W power budget. PoE ports can automatically detect and determine if the connected device requires power or not, so it is compatible with standard Ethernet devices as well. Please refer to the following LED indicators for port statuses.

LAN Speed	LED Status	LED Color/ Behavior
10Mbps	Link/ Active	Orange (blinking)
	Speed	Off
100Mbps	Link/ Active	Orange (blinking)
	Speed	Off
1.0Gbps	Link/ Active	Orange (blinking)
	Speed	Green
2.5Gbps	Link/ Active	Orange (blinking)
	Speed	Orange
No link	Link/ Active	Off
	Speed	Off

.

2.3.2 8-pin Terminal Block



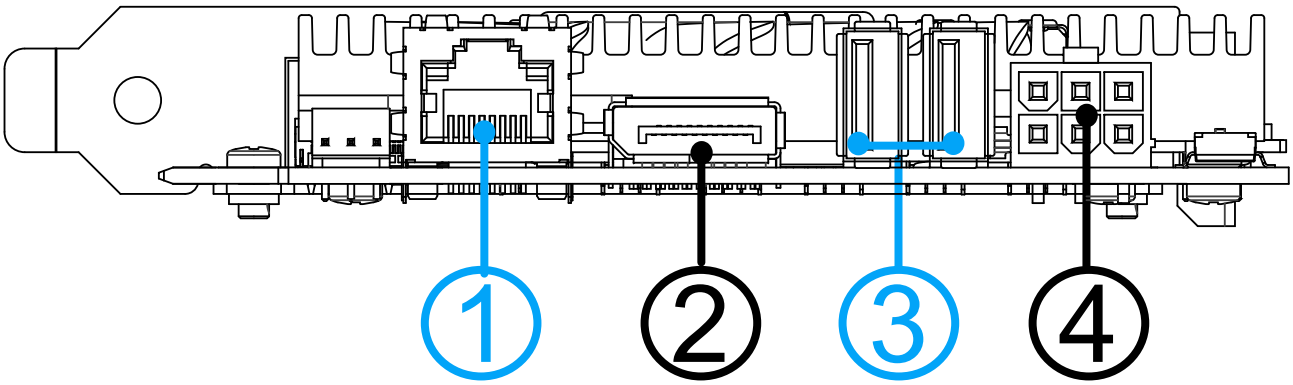
The terminal includes signals for a RS-232 and an isolated RS-485 COM. For pin definitions, please refer to the following table:

Pin	Description	Pin	Description
1	-	5	RS-485_GND
2	-	6	RS-232_GND
3	RS-485_DATA+	7	RS-232_TX
4	RS-485_DATA-	8	RS-232_RX

2.4 Onboard System Connectivity

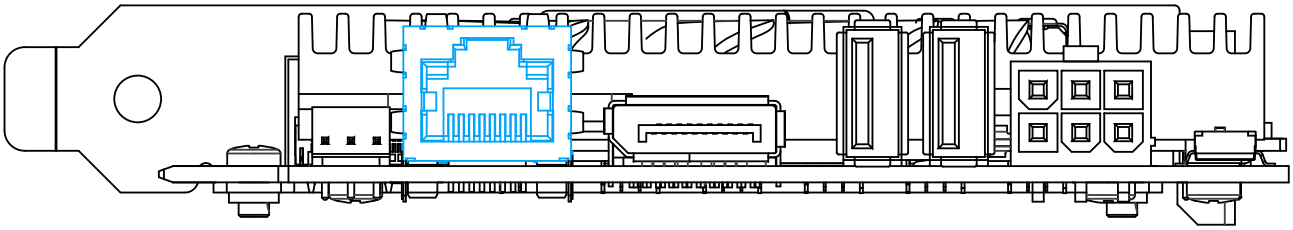
NOTE

PCIe-NX15x frame grabber cards share the same onboard frame grabber card connectivity.



No.	Item	Description
1.	Gigabit Ethernet	The Ethernet ports support 10/ 100/ 1000Mbps network connections.
2.	DisplayPort	Support display resolutions up to 3840 x 2160. Compatible with HDMI/ DVI via an **active** adapter/ cable (support resolution may vary).
3	USB2.0 ports	The USB 2.0 ports are compatible with USB 1.1 / 1.0.
4	6-pin 12V DC input	When NX154PoE series is not installed in a computer (without PCIe supplying power), the 6-pin supports 12V DC input as power source for independent development use.

2.4.1 Ethernet Port

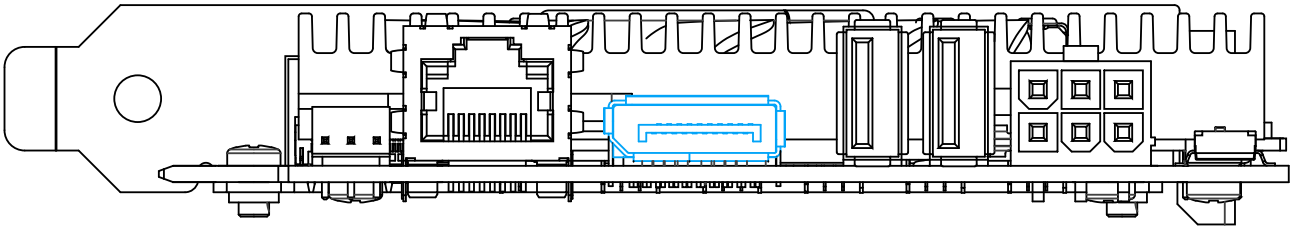


There is an Ethernet port that is compatible with 1000/ 100/ 10 Mbit link speeds. Relevant drivers may need to be installed before you can utilize the port.

Please refer to the table below for LED connection statuses.

LAN Speed	LED	LAN
10 Mbps	Link/Active	Orange (blink)
	Speed	Off
100 Mbps	Link/Active	Orange (blink)
	Speed	Off
1.0 Gbps	Link/Active	Orange (blink)
	Speed	Orange
No Link	Link/Active	Off
	Speed	Off

2.4.2 DisplayPort



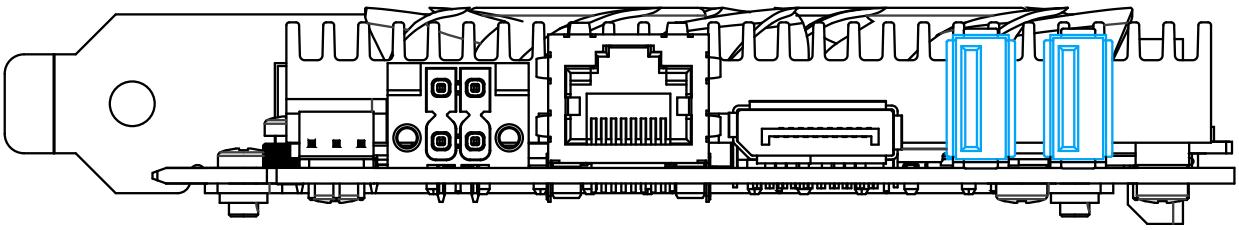
The frame grabber card has a DisplayPort (DP) output which is a digital display interface that mainly connect video source and carry audio to a display device. It can deliver up to 3840 x 2160 in resolution and is designed to support **active** DP adapter/ cable. You can connect to display devices using DP-to-HDMI cable or DP-to-DVI cable.

Relevant drivers may need to be installed before you can utilize the port.

DP-to-HDMI

DP-to-DVI

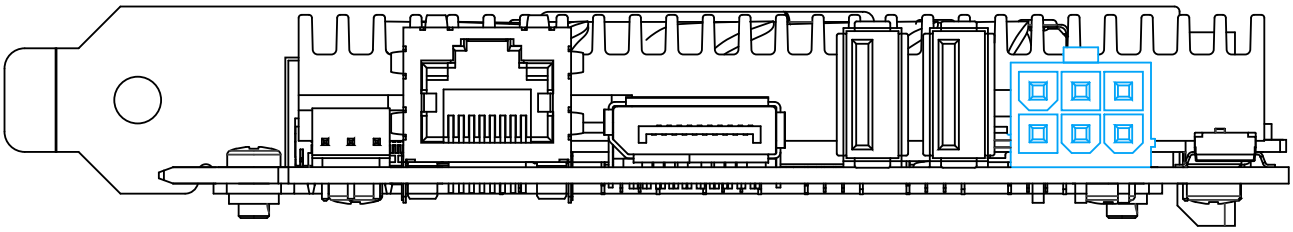
2.4.3 USB2.0 Port



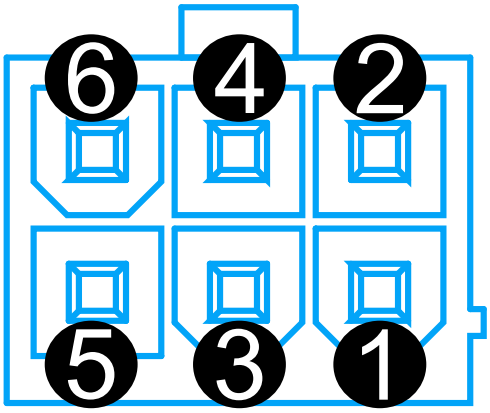
The USB2.0 ports are backward compatible with USB 1.1 and USB 1.0 devices.

Relevant drivers may need to be installed before you can utilize the port.

2.4.4 6-pin 12V DC Input



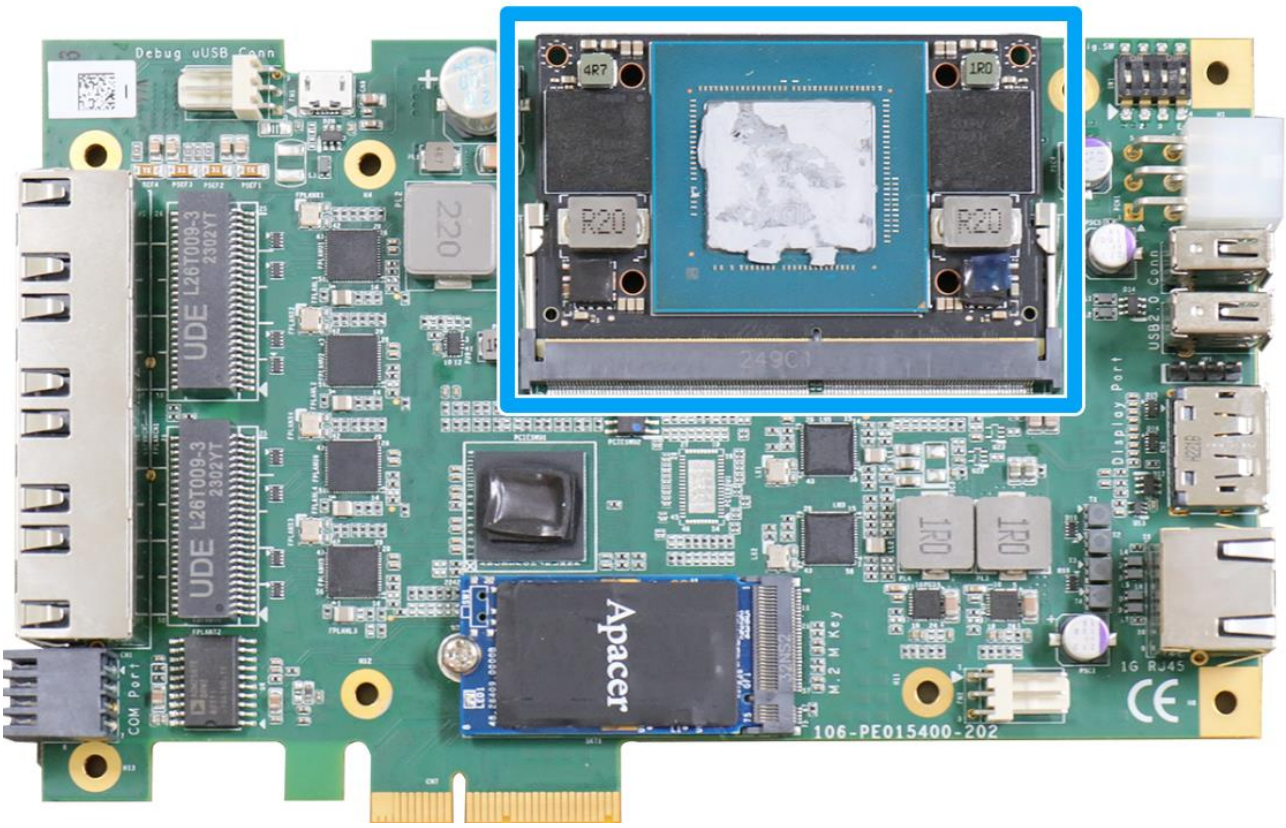
The 4-pin plug can support 12V DC input as the power source.



Pin Definition

Pin	Description
1	12V
2	GND
3	12V
4	GND
5	12V
6	GND

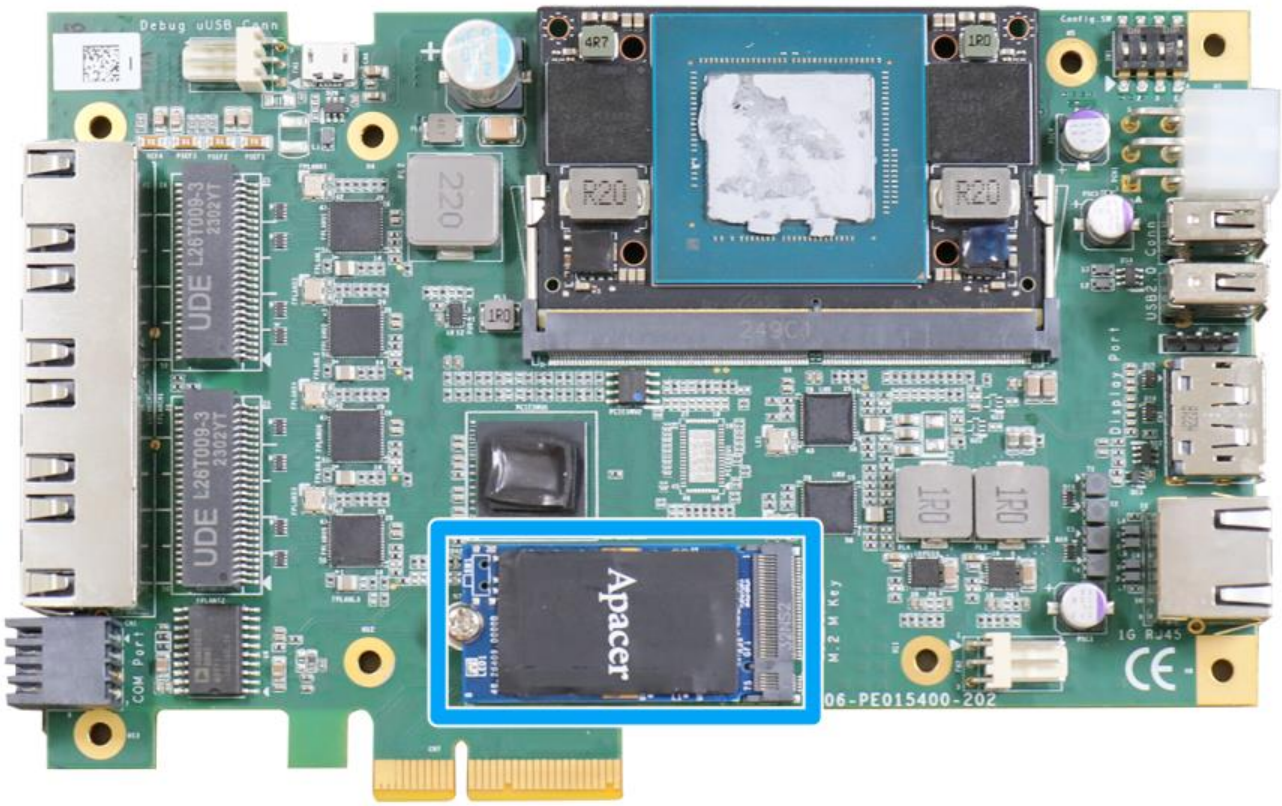
2.5 Onboard NVIDIA Jetson Orin NX Module



The frame grabber card features a dedicated slot for NVIDIA Jetson Orin NX module .

> NOTE
>
> *If your frame grabber card came with an NVIDIA Jetson Orin NX preinstalled, the thermal pad protection film (for the SoM and NVMe SSD) at the bottom of the heatsink will be removed during the factory installation process.*

2.6 Onboard M.2 2242 M Key Slot for NVMe SSD

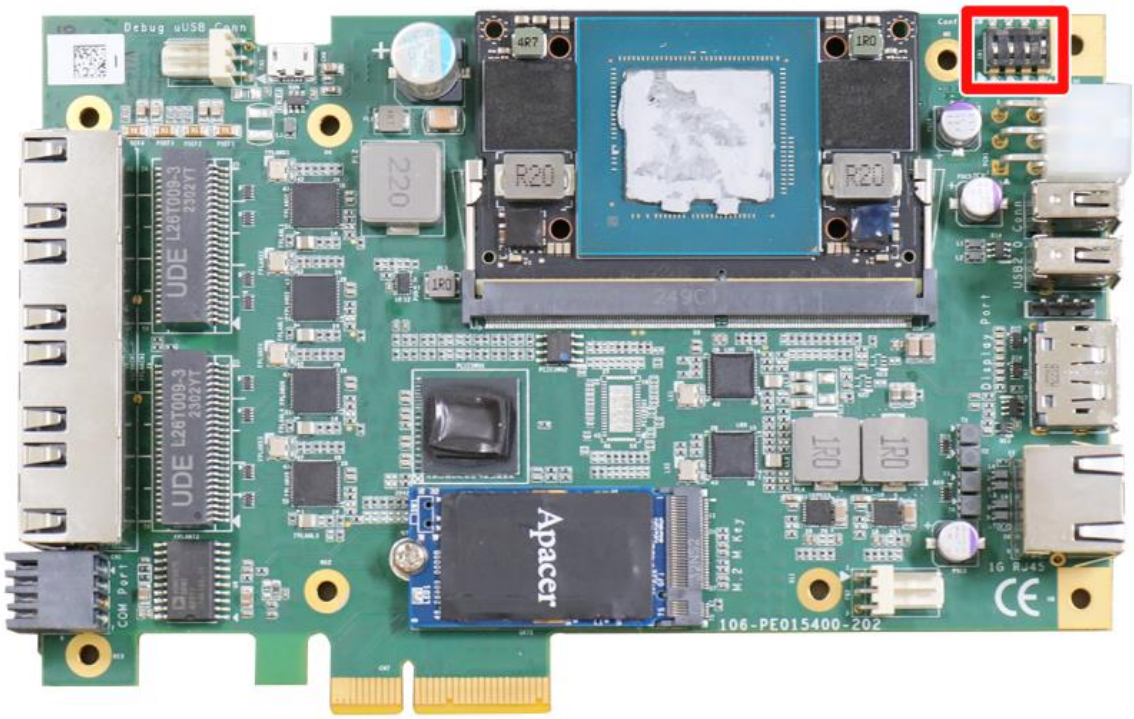


The frame grabber card has a Gen4 x2 PCIe M.2 2242 slot for you to install an NVMe SSD. The M.2 NVMe SSD offers significantly better frame grabber card performances when compared to a 2.5” SSD.

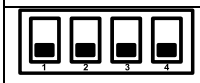
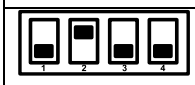
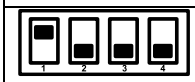
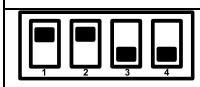
NOTE

If your frame grabber card came with an NVIDIA Jetson Orin NX preinstalled, the thermal pad protection film (for the SoM and NVMe SSD) at the bottom of the heatsink will be removed during the factory installation process.

2.7 DIP Switch



The frame grabber card has a DIP switch (indicated in **red**) on the top right corner of the card. By configuring the DIP 1/2 swtiches, you can manually set the default IP of the card (NX side), allowing up to four cards to be installed into the same host computer. For DIP switch settings, please refer to the table on the right:

DIP 1/ DIP 2	NX Side IP	Host Side IP
	150.150.50.50	150.150.50.51
	150.150.51.50	150.150.51.51
	150.150.52.50	150.150.52.51
	150.150.53.50	150.150.53.51

By configuring DIP 3/4 switches, you can set the card to boot into OS, recovery mode, power by PCIe or via 6-pin (12V). Please refer to the table on the right:

DIP Switch	Off	On
1	Board ID, High Bit = 0	Board ID, High Bit = 1
2	Board ID, Low Bit = 0	Board ID, Low Bit = 1
3	Boots into OS	Boots in recovery mode
4	Power by PCIe	Power by 6-pin (12V) input

3 System Installation

Before you install PCIe-NX15x into the host computer, it is recommended that you setup the onboard ID via the DIP switch, and install the NVMe SSD before installing PCIe-NX15x into the host computer.

Once you have set up the DIP switch ID of your PCIe-NX15x for multi-card installation, and the NVMe SSD, then you are ready to install the it into the host computer frame grabber card. Please refer to the following installation procedures.

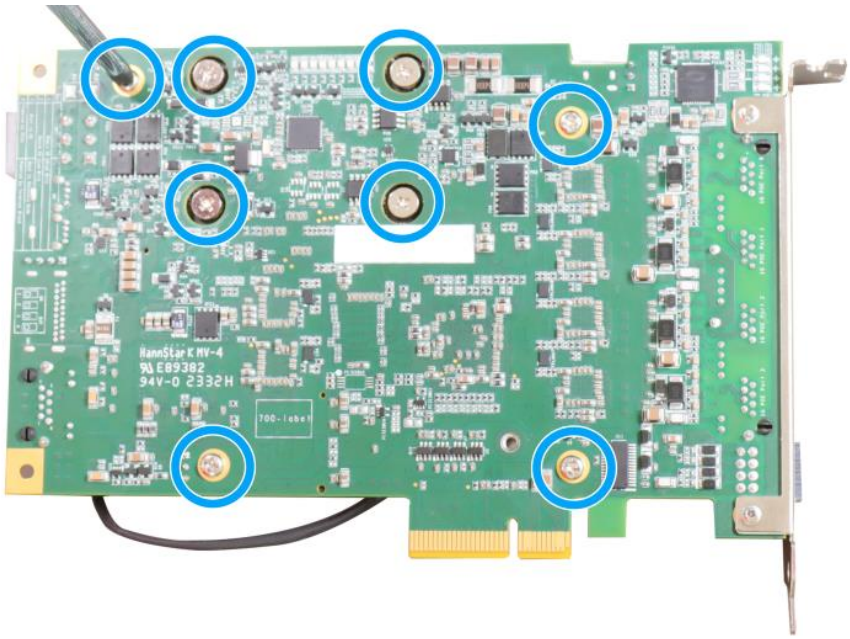
Before disassembling the host computer enclosure and installing the frame grabber card, please read the following instructions:

- **DO NOT** remove the card out of the anti-static until you are ready to install it into the host computer.
- It is recommended that only qualified service personnel should install and service this product to avoid injury or damage to the frame grabber card.
- Please observe all ESD procedures at all times to avoid damaging the equipment.
- Before disassembling your host computer, please make sure the host computer has powered off, all cables and antenna (power, video, data, etc.) are disconnected.
- Place the host computer on a flat and sturdy surface (remove from mounts or out of server cabinets) before proceeding with the installation/ replacement procedure.

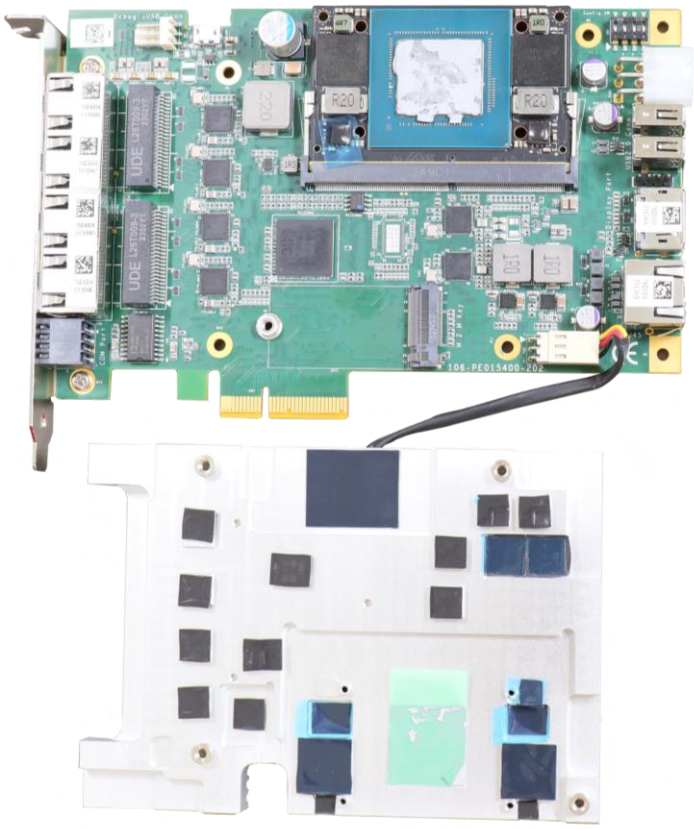
3.1 Accessing SoM and Expansion Slots

To access the SoM and M.2 slot, the heatsink and fan must be separated from the PCB. To do so, please remove the screws indicated in the illustration shown below.

1. Remove the screws indicated at the bottom of the PCB board.



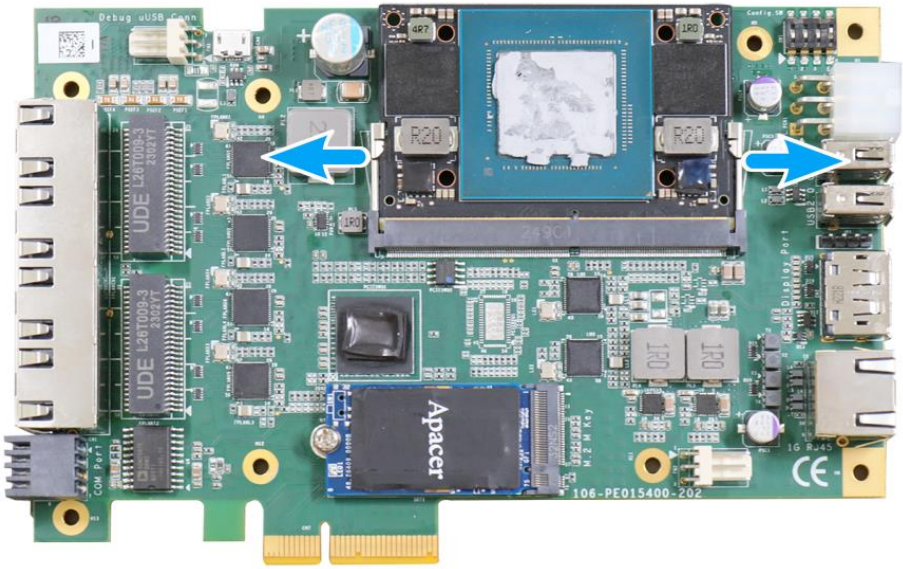
2. Gently separate the fan/ heatsink from the PCB board.



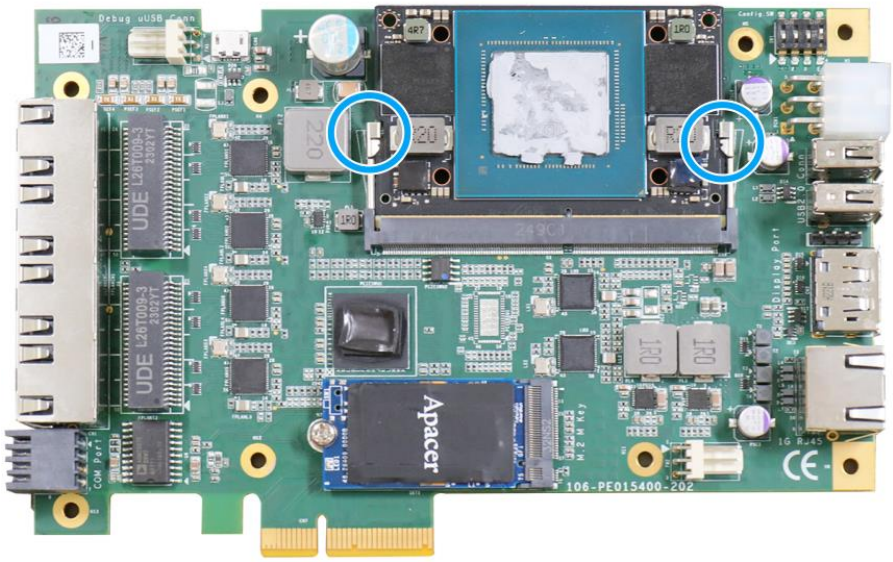
3.2 NVIDIA Jetson SoM

The NVIDIA Jetson Orin NX frame grabber card on module (SoM) should already be installed in your frame grabber card. Should you need to uninstall/ install the SoM, please refer to the following instructions:

1. To remove the heatsink, please refer to Accessing SoM and Expansion Slots.
2. Turn the PCB board back around and push the two retaining clips on the side outward and the SoM should lift away from the PCB automatically.



3. Remove the original SoM and insert the new SoM into the slot on a 45-degree angle. Gently press the SoM module towards the PCB until the retaining clips click onto the SoM.



4. Reinstall the heatsink when done.

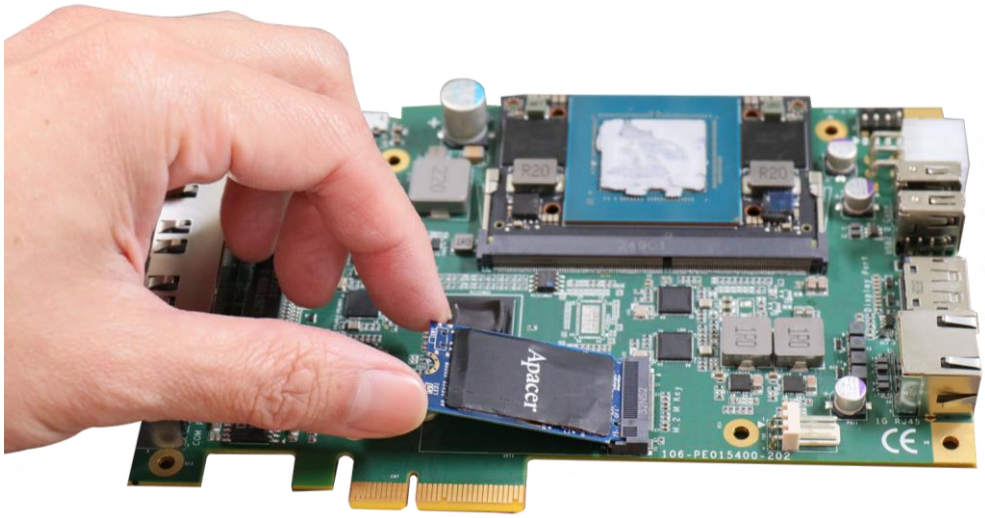
For other installation procedures, please refer to respective sections.

3.3 M.2 2242 M Key NVMe SSD Installation

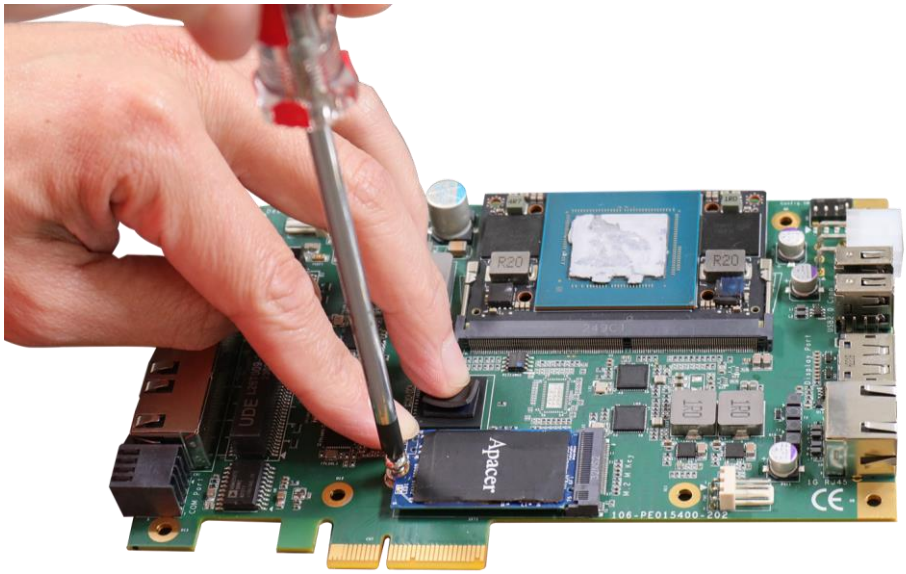
To install the M.2 2242 M key NVMe SSD, please refer to the following instructions:

1. To remove the heatsink, please refer to Accessing SoM and Expansion Slots.

2. Insert the M.2 2242 NVMe SSD on a 45-degree angle into the slot.



3. Press the SSD down and secure it with a screw.



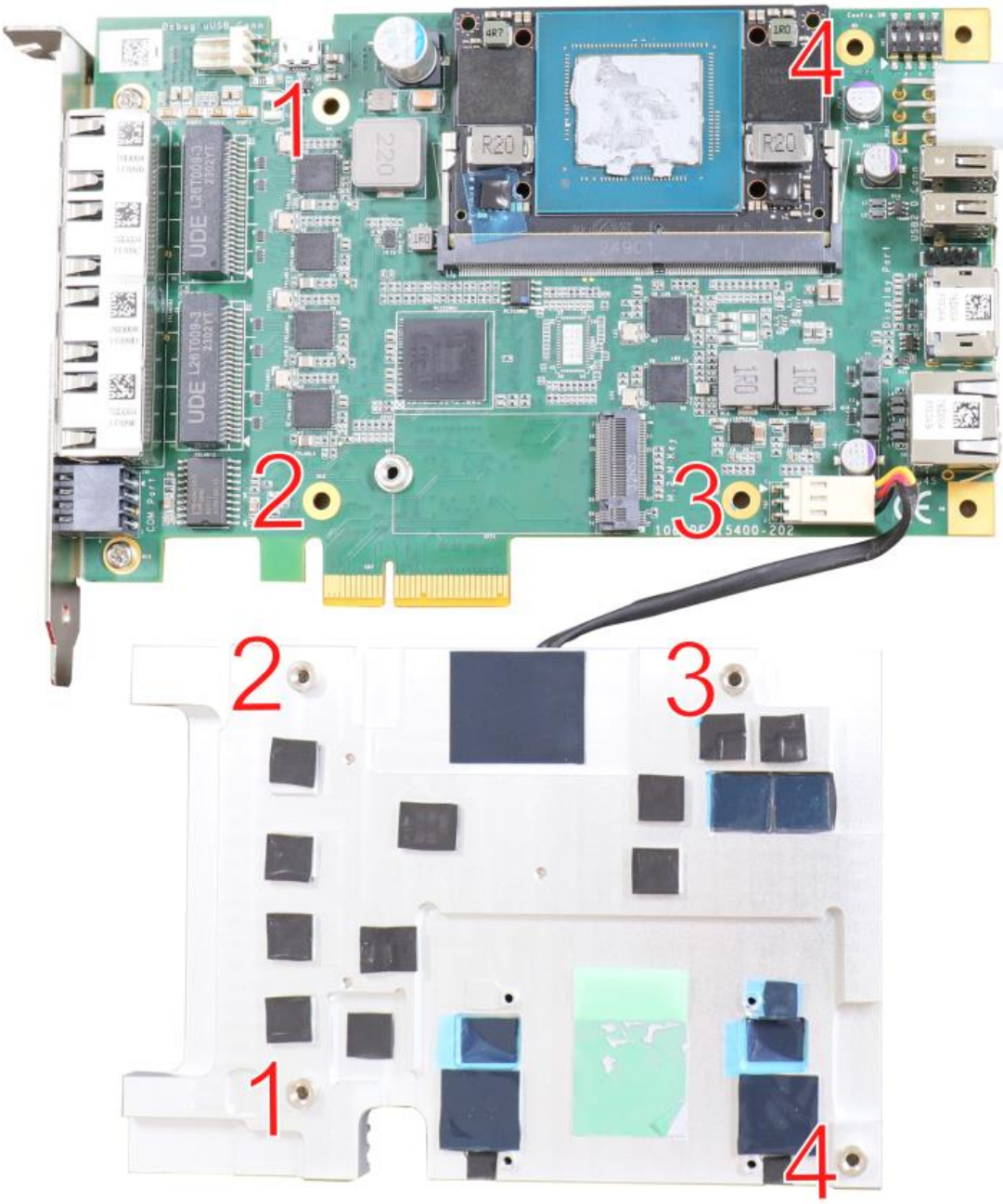
4. Remove the thermal pad protective film at the bottom of the heatsink.

5. Reinstall the heatsink when done.

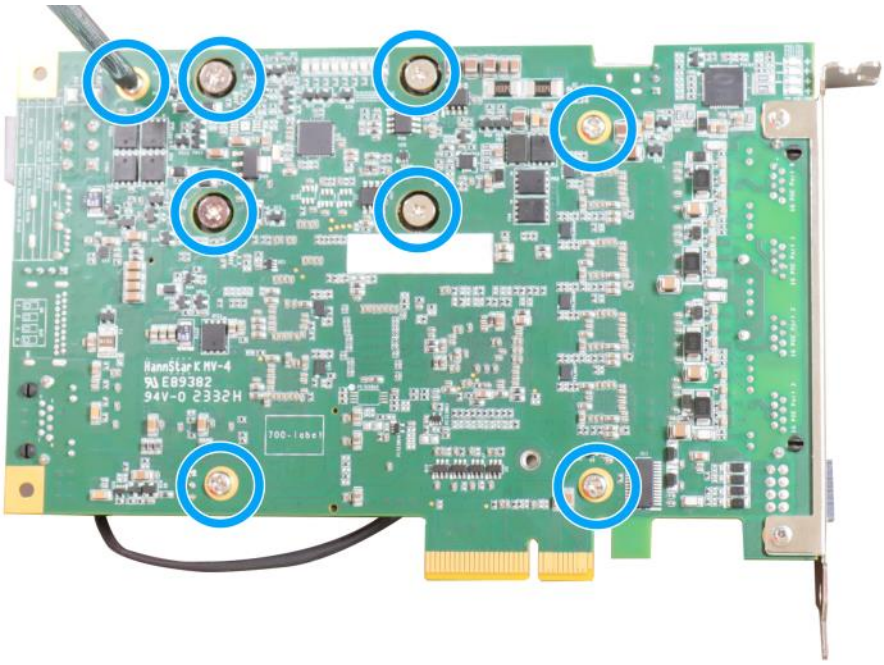
For other installation procedures, please refer to respective sections.

3.4 Reinstalling the Heatsink

1. Matching the screw locations, place the heatsink back onto the PCB board, and turn them upside-down.



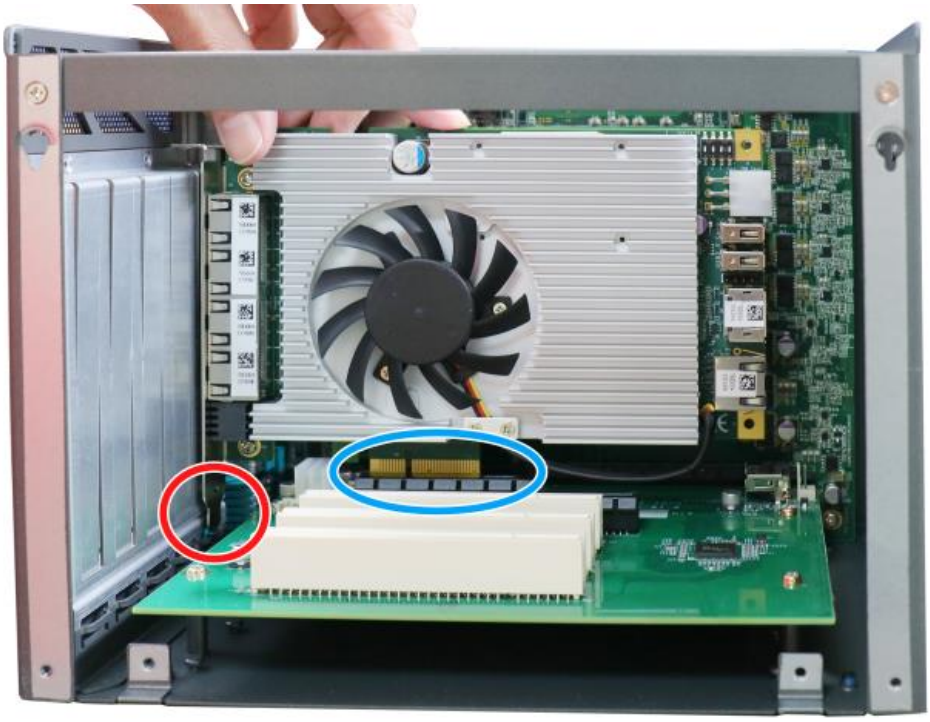
2. Secure the screws indicated to complete the heatsink installation process.



3.5 Installing PCIe-NX15x into the Host Computer

To install the PCIe-NX15x into the host computer, please refer to the following instructions:

1. Save and close all work in progress on the host computer.
2. Power off and unplug the power cable from the host computer you wish to install to.
3. Open the chassis (side panel) of the host computer you wish to install into. Please refer to the host computer's user manual.
4. Locate the x4 PCIe slot or a spare and compatible x16/ x8 PCIe slot.
5. Align and insert PCIe-NX15x gold finger into the PCIe slot (indicated in **blue**) while making sure the I/O bezel is properly inserted (indicated in **red**).



6. Secure PCIe-NX15x to the chassis with a screw.

7. Reinstall the host computer's chassis (panel) to complete the installation process.

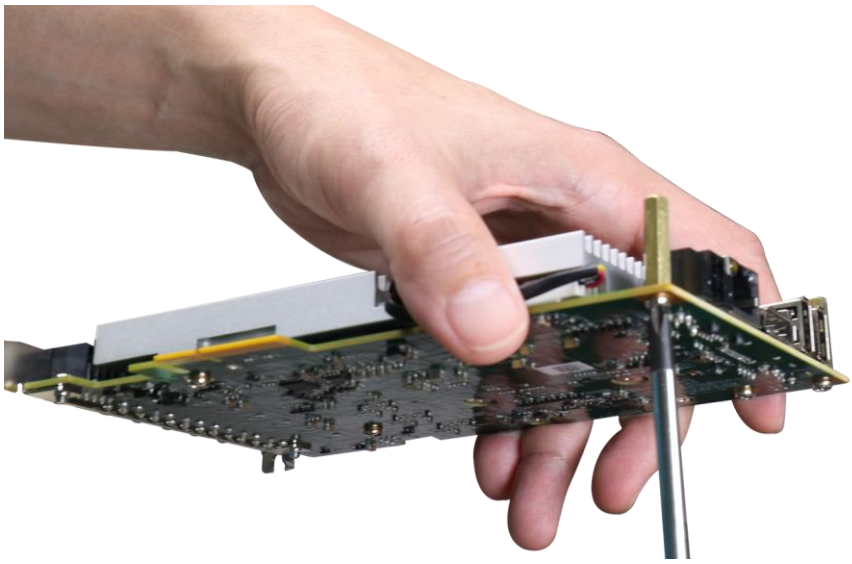
3.6 Installing Multiple Cards into the Host Computer

NOTE

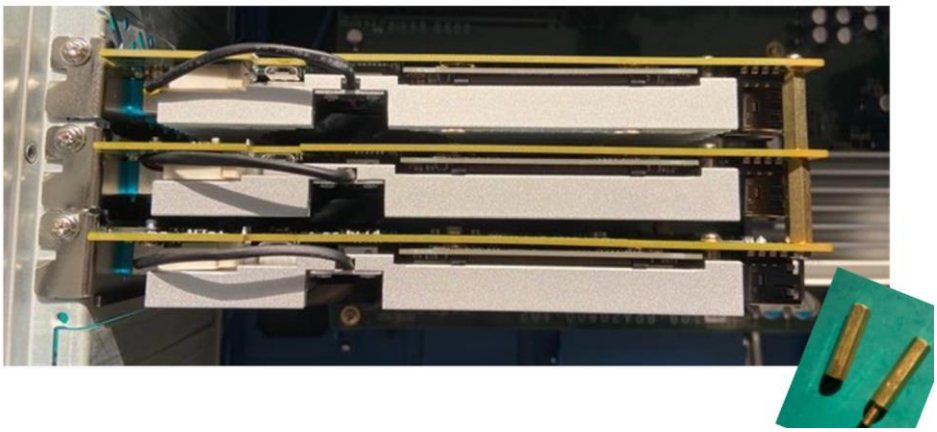
Before setting up and installing multiple PCIe-NX15x cards, please make sure the PCIe slots on your host computer's motherboard can accommodate such configuration, and board ID has been set via the DIP switches.

To install multiple cards, copper stands need to be installed onto the PCB to ensure proper spacing. Please refer to the following instructions:

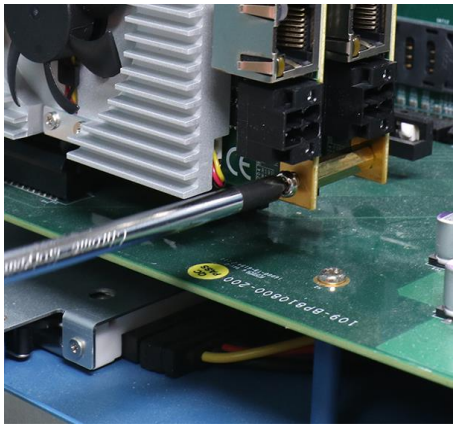
1. To install two cards, please utilize the female-female 20mm copper stands provided, and secure with a screw.



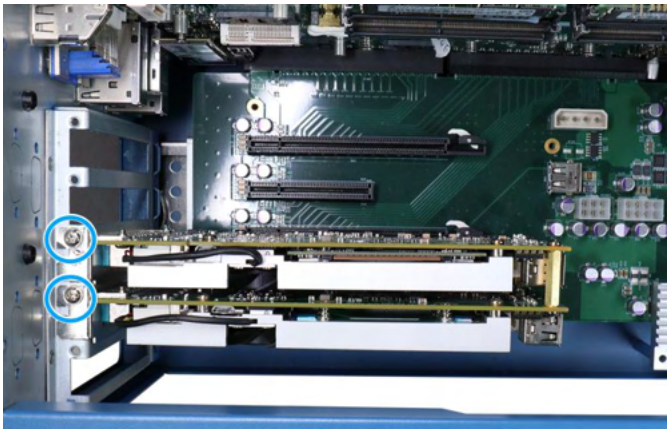
2. To install more than two PCIe-GL26 cards, the cards positioned in the middle need to use the male-female copper stands. Please make sure the PCIe slots on the motherboard is positioned to accommodate three PCIe cards.



3. Once the copper stands have been installed, gently lower the cards into the host computer frame grabber card's PCIe slots.



Make sure the copper stands are properly secured



Superior view – secure the cards to the host computer with the screws indicated.

4. Reinstall the frame grabber card's chassis (panel) to complete the hardware installation process

4 Reflashing the PCIe-NX15x

PCIe-NX15x is shipped with JetPack 5.x installed as a turnkey solution. If you are familiar and experienced with the platform, you can skip this section and start your development.

This section will show you how to reflash the frame grabber card with a pre-built frame grabber card image by Neousys. Just like Jetson Orin NX Developer Kit, the PCIe-NX15x series can't install its frame grabber card by itself. In other words, you will need another computer, **Host Machine**, to reflash the PCIe-NX15x via a microUSB to USB type A cable.

For detailed reflash process procedure, please refer to this link.