

- XEC-NX-3P-X2G3
Embedded carrier board

- Ximea accessories
- Technical Manual
- Version v241018

Introductions

About this manual

Dear customer,

Thank you for purchasing a product from XIMEA.

We hope that this manual can answer your questions, but should you have any further queries or if you wish to claim a service or warranty case, please contact your local dealer or refer to XIMEA Support on our website:

www.ximea.com/support

The purpose of this document is to provide a description of Ximea accessories and to describe the correct way to install related software, drivers and run it successfully. Please read this manual thoroughly before operating your new Ximea accessories for the first time. Please follow all instructions and observe the warnings.

This document is subject to change without notice.

About XIMEA

XIMEA is one of the worldwide leaders for innovative camera solutions with a 30-year history of research, development and production of digital image acquisition systems. Based in Slovakia, Germany and the US, with a global distributor network, XIMEA offers their cameras worldwide. In close collaboration with customers XIMEA has developed a broad spectrum of technologies and cutting-edge, highly competitive products.

XIMEA's camera centric technology portfolio comprises a broad spectrum of digital technologies, from data interfaces such as USB 2.0, USB 3.1 and PCIe to cooled digital cameras with CCD, CMOS and sCMOS sensors, as well as X-ray cameras.

XIMEA has three divisions – generic machine vision and integrated vision systems, scientific imaging and OEM/custom.

Our broad portfolio of cameras includes thermally stabilized astronomy and x-ray cameras, as well as specialty cameras for medical applications, research, surveillance and defense.

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1 General description

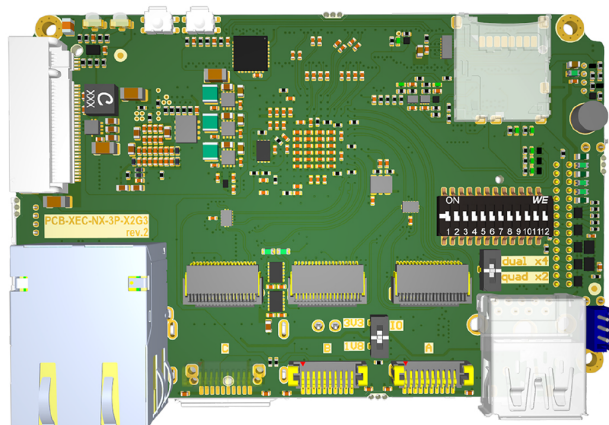


Figure 1: XEC-NX-3P-X2G3 carrier board

Embedded carrier board is designed to connect your xiX cameras to the NVIDIA® Jetson Xavier NX™ module. Board is equipped with three Firefly PCIe connectors, a high-speed 10 Gbit/s Ethernet port, and an M.2 slot for NVMe SSDs, this device is tailored to the special requirements of an embedded imaging system.

- **NVIDIA Jetson NX carrier board**
- Ideal for the operation and synchronization of 3 cameras and more
- 3x PCIe Firefly and 1x M.2 connector configurable in two options:
 - 3x ports for xiX-X2G2 camera and 1x for M.2 (NVMe) streaming 10 Gbits
 - 1x port for xiX-X4G3 camera and 1x for M.2 (NVMe) streaming 32 Gbits
- Peripherals: Ethernet, USB3 Type A, M.2, microSD, GPIO, Display port
- The Host system should be running Ubuntu 18.04, 20.04 or Ubuntu 22.04
- Optional version combined with Orin NX module and fan
- For use with cameras from: **xiX**, **xiX-XL** and **xiX-Xtreme** family

Embedded GPU system with an option to connect several cameras for:

360 panorama, Augmented or Virtual Reality (AR, VR), Autonomous self-driving vehicles, Street/city mapping, Deep learning tasks, Stereo camera systems, portable medical devices, 3D scanning, Photogrammetry, FACS scanning, Face recognition, Motion capture, UAV / UAS (drones), Videogrammetry and more.

Compatible Jetson modules

Module	Note
Jetson Orin NX	SD card slot disabled
Jetson Orin nano	SD card slot disabled
Jetson Xavier NX	Ethernet speed limited to 6 Gbit/s

Table 1: Compatible Jetson modules

1.1 Accessories

Mandatory accessories

Name	Description
CBL-XEC2-PWR-0M15	Power cable
TP-XEC-NX-SET	Thermal pad pack

Table 2: Accessories

3rd party accessories

Name	Description
SEED STUDIO 110991904	Heatsink for Jetson modules ¹
GST90A19-P1M AC/DC adapter	Power adapter for Jetson kits
CR1220 battery	For RTC clock usage with Jetson Orin NX/nano, must not be used with Xavier NX
VL1120/fcn battery	For RTC clock usage with Jetson Xavier NX, non-standard usage
OTG adapter ²	For using the microUSB port in OTG mode. (For connecting keyboard, mouse, etc.)

¹We recommend using this one as some heatsinks have cables that are too short for this carrier board.

²USB 2.0 microUSB B (male) to USB A (female)

Table 3: 3rd party accessories

1.2 LEDs

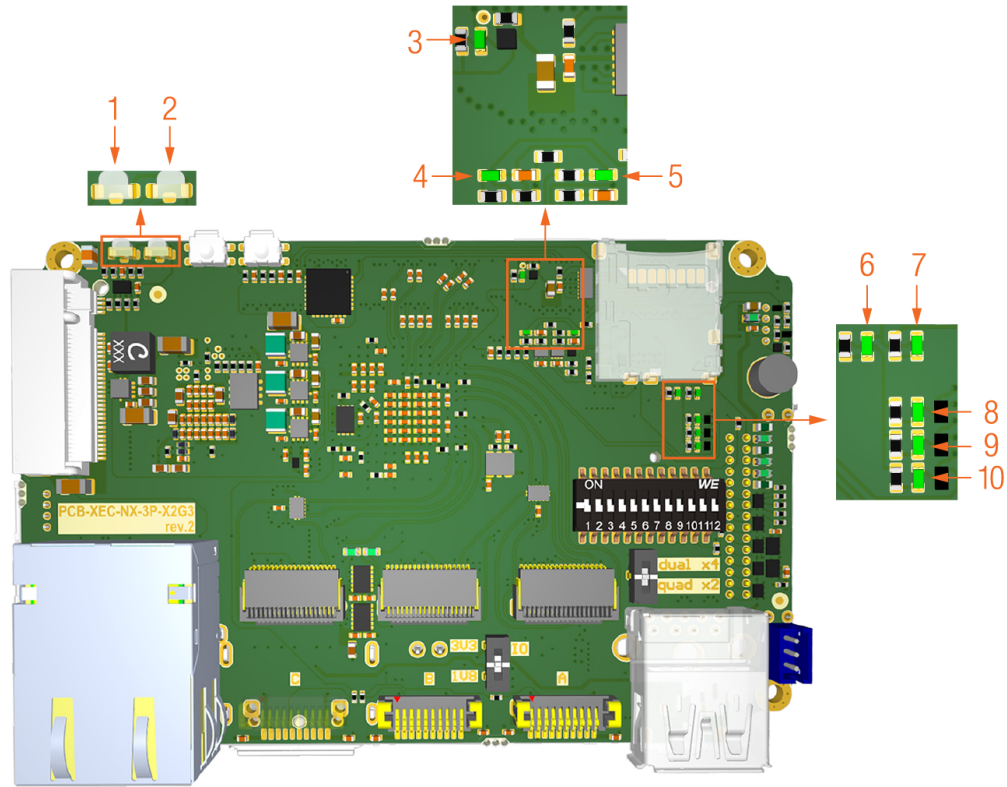


Figure 2: XEC-NX-3P-X2G3 LEDs location

Number	Color	Light ON	Note
1	Red / Green	GPIO 9 is log 0 / GPIO 11 is log 0	-
2	Red / Green	GPIO 2 is log 0 / GPIO 1 is log 0	-
3	Green	PERST of PCIe 0 is active	This lane is PERST lane for FF ports and M.2 port
4	Green	5 V lane is active	-
5	Green	NOP in current revision	-
6	Green	Regulated input voltage is active	Voltage from the power connector after Over/undercurrent protection
7	Green	Unregulated input voltage is active	Voltage from the power connector
8	Green	Jetson is not in a reset state	RST lane of the Jetson module is in log 1, log 0 to reset the Jetson
9	Green	Power enable lane to the Jetson is active	-
10	Green	5 V lane is active	-

Table 4: LEDs description

2 Dimensional drawings

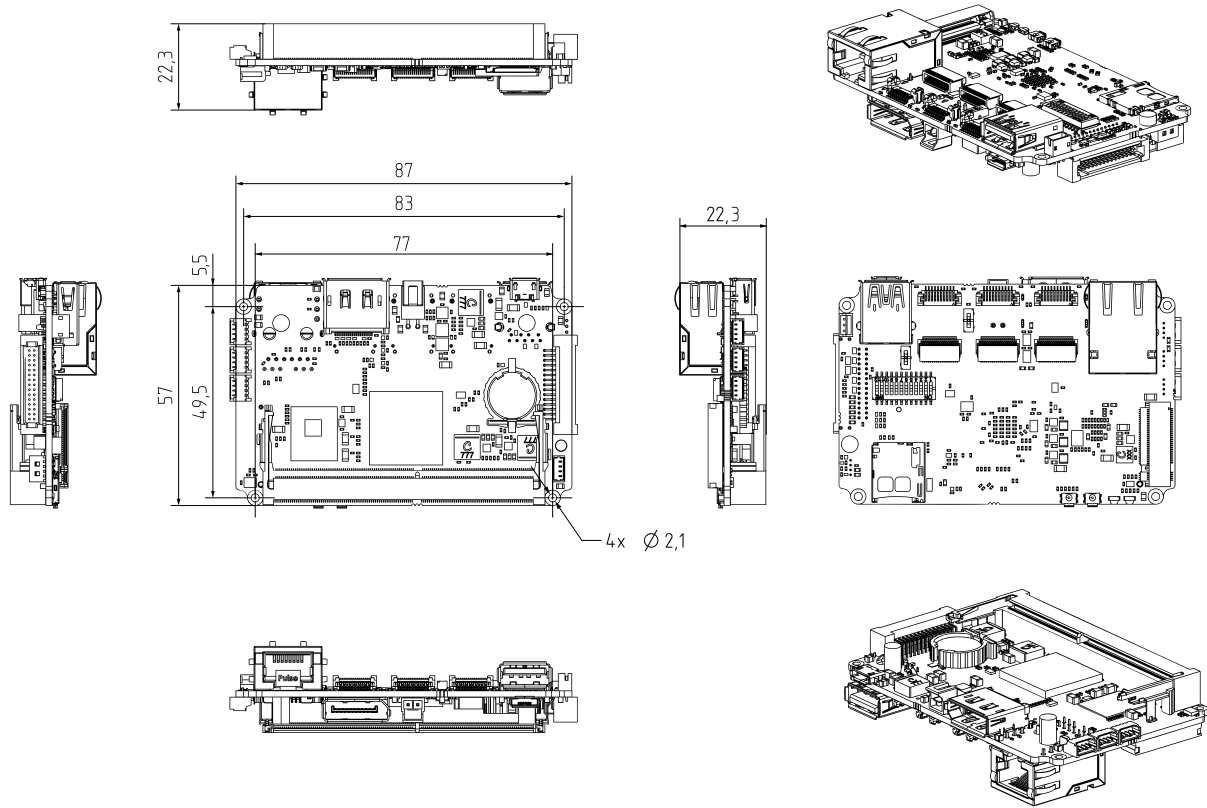


Figure 3: Dimensional drawing of XEC-NX-3P-X2G3

Width [W]	Height [H]	Depth [D]	Mass [M]
87 mm	57 mm	22.3 mm	52 g

Table 5: Parameters

3 Configuration

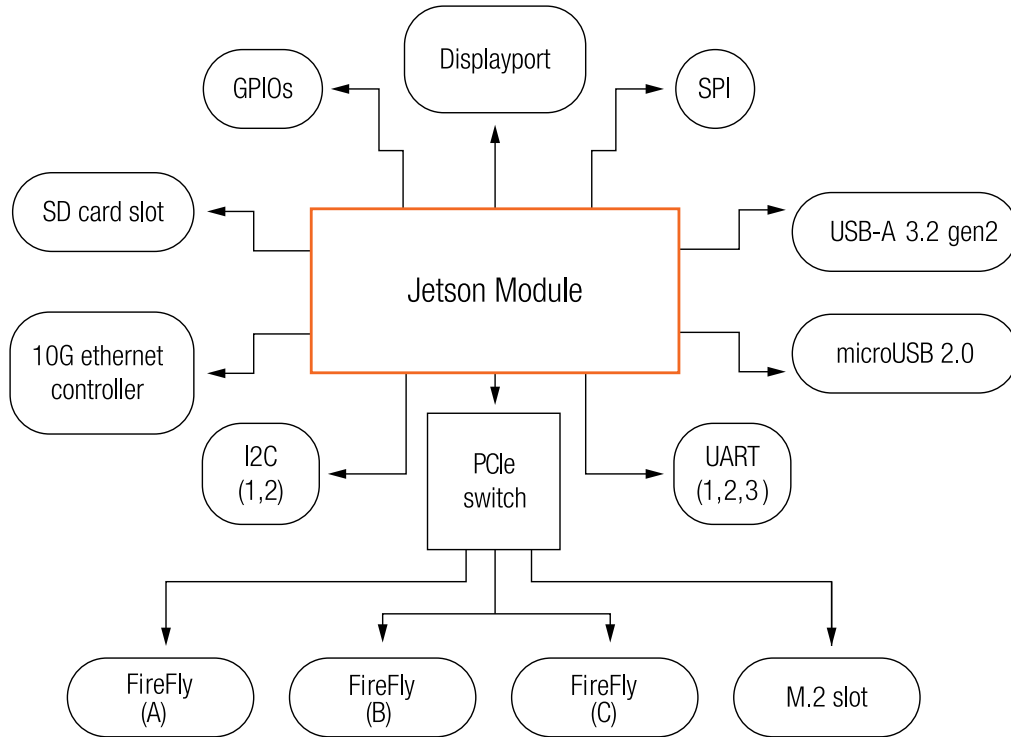


Figure 4: Functional schematic

3.1 DIP switches

3.1.1 SW-DIP-12POS

SW-DIP-12POS consists of 12 individual switches:

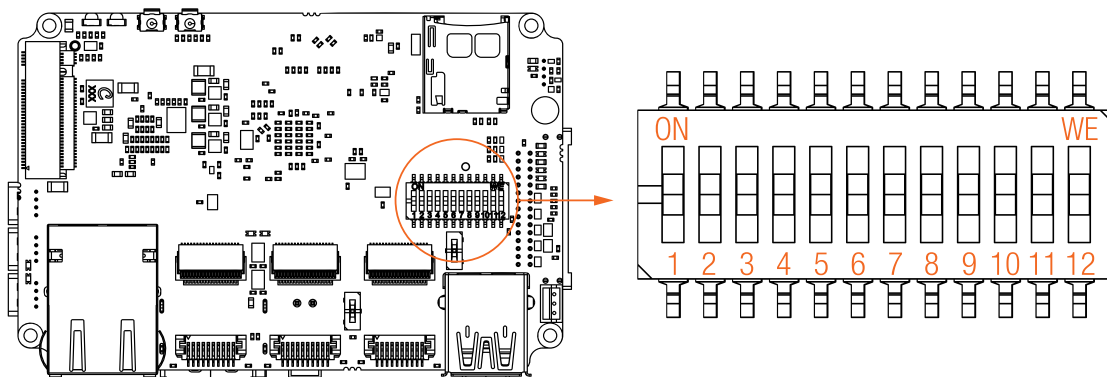


Figure 5: DIP switch 1

DIP switch	UP	DOWN	Description
1	ISO GND -> GND	NC	Connects common ISO GND pin of FireFly (FF) ports to board GND
2	FF-A GPO ISO -> FF-A GPO 5 V	NC	Connects GPO ISO pin from FF-A to GPO lane ¹
3	FF-B GPO ISO -> FF-B GPO 5 V	NC	Connects GPO ISO pin from FF-B to GPO lane ¹
4	FF-C GPO ISO -> FF-C GPO 5 V	NC	Connects GPO ISO pin from FF-C to GPO lane ¹
5	FF-A GPO 5 V -> FF-C GPO 5 V	NC	Connects GPO 5 V lane from FF-A ² to GPI ISO lane of FF-A
6	FF-B GPO 5 V -> FF-C GPO 5 V	NC	Connects GPO 5 V lane from FF-A ² to GPI ISO lane of FF-B
7	FF-C GPO 5 V -> FF-C GPO 5 V	NC	Connects GPO 5 V lane from FF-A ² to GPI ISO lane of FF-C
8	GPI07 5 V -> FF-A GPI ISO	NC	Connects GPIO 7 ³ to GPI ISO pin of Firefly A
9	GPI07 5 V -> FF-B GPI ISO	NC	Connects GPIO 7 ³ to GPI ISO pin of Firefly B
10	GPI07 5 V -> FF-C GPI ISO	NC	Connects GPIO 7 ³ to GPI ISO pin of Firefly C
11	Force recovery mode	NC	Puts the Jetson into Force recovery mode (ready for flashing) ⁴
12	GPI013 log0	NC	Connects GPIO13 pin to ground

¹stepped up to 5 V push-pull logic

²from DIP switch 2

³stepped up to 5 V logic

⁴The pin is scanned during powerup.

Table 6: DIP switch 1 description

3.1.2 Port configuration switch

The Port configuration switch can be used to configure the PCIe ports. There are two possible settings:

Dual x4 – only Firefly port A and M.2 are enabled with four lanes each

Quad x2 – all ports enabled with two lanes each

The XEC-NX-3P-X2G3's PCIe ports offer two configurations: "Dual x4" mode activates the M.2 and Firefly port A with PCIe x4 bandwidth, disabling Firefly ports B and C. In "Quad x2" mode, all ports are enabled with PCIe x2 bandwidth.

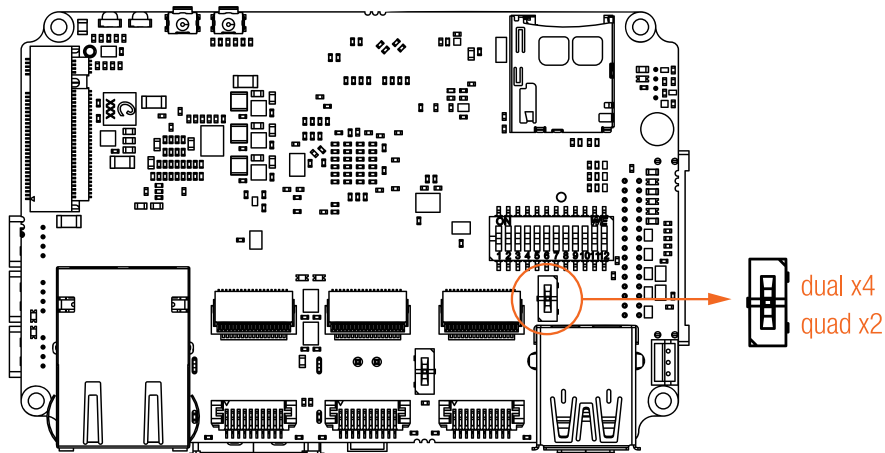


Figure 6: Port configuration switch

DIP switch position	Mode	Description
Pos. UP	PCIe ports x4 mode	In UP position M.2 port and Firefly A are enabled, using PCIe x4 each
Pos. DOWN	PCIe ports x2 mode	In DOWN position M.2 port and all Firefly ports are enabled, each using PCIe x2

Table 7: Port configuration switch description

3.1.3 SPI Voltage switch

The SPI voltage switch configures the voltage for the SPI interface of the Jetson module, which can be set to either 1.8 V or 3.3 V.

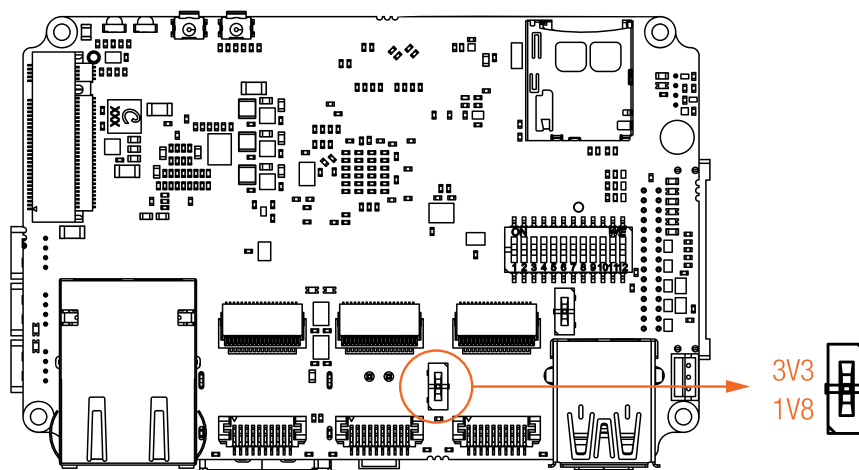


Figure 7: SPI voltage switch

DIP switch	Pos. UP	Pos. DOWN	Notes
1	SPI 3 V 3 level	SPI 1 V 8 level	Changes voltage level of SPI bus

Table 8: SPI voltage switch description

4 Connectors

4.1 Location of connectors

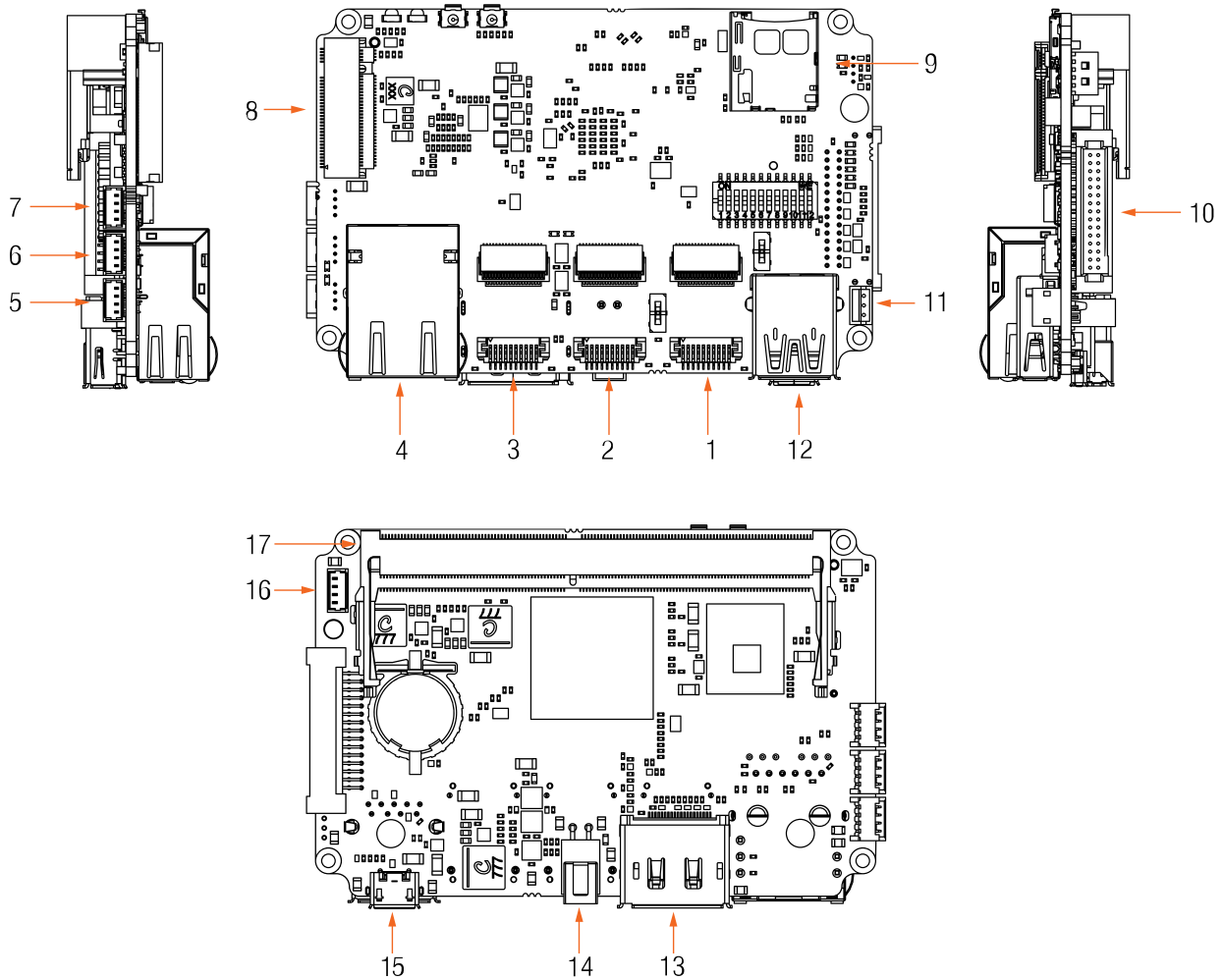


Figure 8: Connectors location

Num.	Connector	Num.	Connector
1	FireFly connector A (FF-A)	10	Jetson GPIO connector
2	FireFly connector B (FF-B)	11	Debug UART header
3	FireFly connector C (FF-C)	12	USB 3.2 gen 2 type A port (10 Gbit)
4	LAN port	13	Display port
5	GPIO for FF connector A	14	Power connector
6	GPIO for FF connector B	15	microUSB 2.0 type B port
7	GPIO for FF connector C	16	Jetson fan connector header
8	M.2 key M port for SSD (form factor 2280)	17	SODIMM connector for Jetson modules
9	SD card slot		

Table 9: Connectors description

4.2 Data interfaces

4.2.1 FireFly connectors

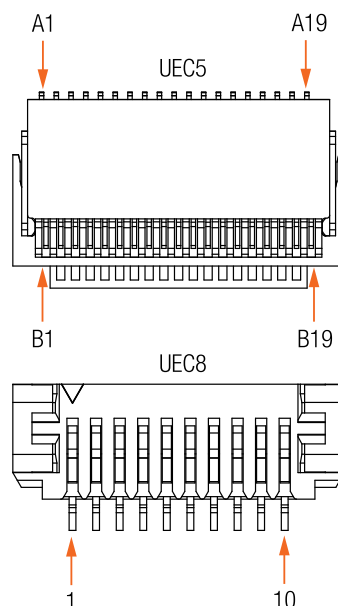


Figure 9: Firefly connectors pinout

Pin	Name	Type	Pin	Name	Type
A1	GND	Signal and power ground	B1	GND	Signal and power ground
A2	PCle_PETN_2	PCle TX differential pair 2	B2	PCle_PETN_3	PCle TX differential pair 3
A3	PCle_PETP_2	PCle TX differential pair 2	B3	PCle_PETP_3	PCle TX differential pair 3
A4	GND	Signal	B4	GND	Signal and power ground
A5	PCle_PETN_1	PCle TX differential pair 1	B5	PCle_PETN_0	PCle TX differential pair 0
A6	PCle_PETP_1	PCle TX differential pair 1	B6	PCle_PETP_0	PCle TX differential pair 0
A7	GND	Signal and power ground	B7	GND	Signal and power ground
A8	IN1	Optically isolated Digital Input (IN)	B8	OUT1	Optically isolated Digital Output (OUT)
A9	IN1_GND	Ground for opto-isolated Input 1	B9	OUT1_GND	Ground for opto-isolated Output 1
A10	GND	Signal and power ground	B10	GND	Signal and power ground
A11	PCle_RST0_N_IN	PCle reset	B11	PWR	Power input
A12	NC	None	B12	PWR	Power input
A13	GND	Signal and power ground	B13	GND	Signal and power ground
A14	PCle_PERP_2	PCle RX differential pair 2	B14	PCle_PERN_3	PCle RX differential pair 3
A15	PCle_PERN_2	PCle RX differential pair 2	B15	PCle_PERP_3	PCle RX differential pair 3
A16	GND	Signal and power ground	B16	GND	Signal and power ground
A17	PCle_PERP_1	PCle RX differential pair 1	B17	PCle_PERN_0	PCle RX differential pair 0
A18	PCle_PERN_1	PCle RX differential pair 1	B18	PCle_PERP_0	PCle RX differential pair 0
A19	GND	Signal and power ground	B19	GND	Signal and power ground

Table 10: FireFly connector (UEC5) pin assignment

Pin	Name	Type
1	VCC_TX	Power output
2	GND	Ground
3	NC	None
4	NC	None
5	PCle_RST0_N_IN	PCle reset
6	NC	None
7	NC	None
8	NC	None
9	OUT1	Optically isolated Digital Output (OUT)
10	VCC_RX	Power output

Table 11: FireFly connector (UEC8) pin assignment

4.2.2 Debug UART connector JST B3B-ZR(LF)(SN)

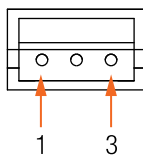


Figure 10: Debug UART connector pinout

Pin	Name	Description
1	UART2 TX	UART transmitter
2	GND	Ground
3	UART2 RX	UART receiver

Table 12: Debug UART connector pin assignment

4.2.3 Fan connector MOLEX 0530470410

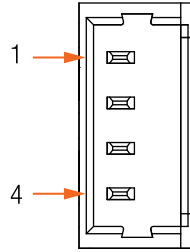


Figure 11: Fan connector pinout

Pin	Name	Description
1	GND	Ground
2	5 V	Power input (5V)
3	TACH	Tachometric signal
4	PWM	Pulse width modulation

Table 13: Fan connector pin assignment

4.2.4 Power connector Molex 1053131202

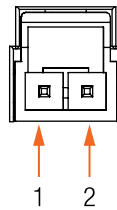


Figure 12: Power connector pinout

Pin	Name	Description
1	12-24 V	Power input (12 to 24 V)
2	GND	Ground

Table 14: Power connector connector pin assignment

4.2.5 SODIMM connector for Jetson modules

Insert Jetson module into this connector.

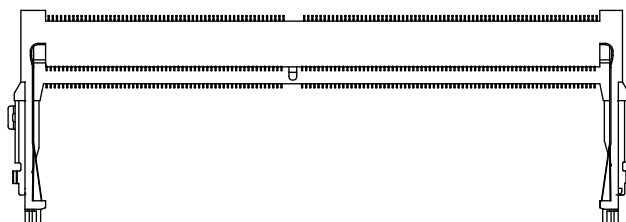


Figure 13: SODIMM connector

4.2.6 GPIOs

Jetson GPIOs

The GPIO connector is a Samtec TigerEye TFM Header (TFM-115-01-S-D-RE1-W) with 30 positions. It gives users access to the GPIOs of the Jetson module and the supply voltages on the board.

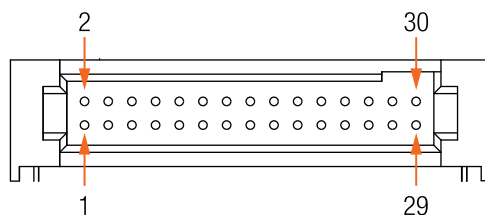


Figure 14: IO connector pinout

Pin	Name	Description	Pin	Name	Description
1	VCC_CONN	Voltage from the input power connector (12 to 24 V)	16	UART0_1V8_RTS	UART 0 RTS (1.8 V)
2	VCC_CONN	Voltage from the input power connector (12 to 24 V)	17	UART0_1V8_CTS	UART 0 CTS (1.8 V)
3	VCC5V0	5 V	18	UART0_1V8_RX	UART 0 RX (1.8 V)
4	GND	Ground	19	UART0_1V8_TX	UART 0 TX (1.8 V)
5	VCC3V3	3.3 V	20	UART1_1V8_RX	UART 1 RX (1.8 V)
6	GND	Ground	21	UART1_1V8_TX	UART 1 TX (1.8 V)
7	VCC1V8	1.8 V	22	SPI_MISO	SPI MISO
8	TX_RTC_BAT	Voltage from RTC battery	23	SPI_CLK	SPI CLK
9	NC	-	24	SPI_MOSI	SPI MOSI
10	GPIO7_5V0	GPIO 7 (stepped up to 5 V logic)	25	SPI_CS0#	SPI CS 0
11	GPIO 3		26	SPI_CS1#	SPI CS 1
12	GPIO 4		27	I2C1_3V3_SCL	I2C 1 SCL (3.3 V)
13	GPIO 5		28	I2C1_3V3_SDA	I2C 1 SDA (3.3 V)
14	GPIO 6		29	I2C2_1V8_SCL	I2C 2 SCL (1.8 V)
15	GPIO 7		30	I2C2_1V8_SDA	I2C 2 SDA (1.8 V)

Table 15: IO pin assignment

Camera GPIOs

Molex Picoblade 0530480410

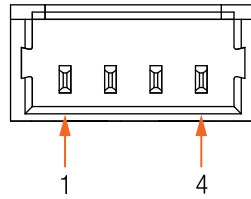


Figure 15: IO (for FF connectors) connector pinout

Pin	Name	Type
1	GPO ISO	Opto-isolated output
2	ISO GND	Isolated ground for the IO subsystem
3	GPI ISO	Opto-isolated input
4	GPO 5 V	Opto-isolated output (GPO ISO stepped up to 5 V push pull logic)

Table 16: FF GPIO pin assignment

5 Usages

5.1 Buttons

5.1.1 Front buttons

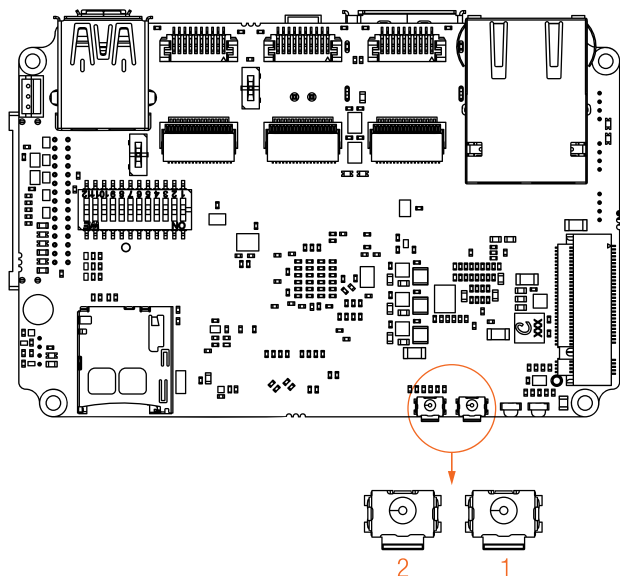


Figure 16: Front buttons location

Number	Pressed	NOT Pressed
1	GPIO 10 is log 0	GPIO 10 is log 1
2	GPIO 12 is log 0	GPIO 12 is log 1

Table 17: Buttons description

5.2 LAN connector

Jetson modules Orin NX and Orin nano have integrated 1G Realtek ethernet controller. The 10G ethernet controller on the carrier board can be bypassed in favour of the integrated one, if you so desire. Basic soldering equipment is required.

6 Additional information

6.1 PCIe system overview

6.2 Known issues

- Most NVMe SSDs will heat up quickly and throttle down when used without additional cooling.
- Some SSDs are not properly detected when the board is configured to Quad x2 mode.
- In Jetpack 5.X.X there is a known issue which causes PCIe devices behind PCIe switches to have lower than expected bandwidth. This affects the write speed on SSDs.

Issue: On Jetpack 6.X.X a device connected to microUSB (OTG) port can only be detected if the USB 3.2 port is active

Reason: The OS is auto-suspending the USB 2.0 port

Solution: Disable auto-suspend by:

```
sudo su
echo on > /sys/bus/usb/devices/usb1/power/control
```

For a permanent solution append file `/etc/systemd/nv.sh` with:

```
echo on | sudo tee /sys/bus/usb/devices/usb1/power/control
```

7 Quickstart guide

7.1 Hardware setup

7.1.1 Essential components

- Jetson module with fan attached
- The carrier board itself
- M2 screws
- TP-XEC-NX-SET thermal pack (provided)
- CBL-XEC2-PWR-0M15 power cable
- (Optional) NVME SSD
- A power adapter of sufficient voltage
- USB2.0 USB A -> microUSB B cable
- x86_x64 PC with Ubuntu 18, 20 or 22 (Ubuntu 20 allows for the widest amount of JetPack versions, as of 2024)
- Other optional accessories as per Technical manual

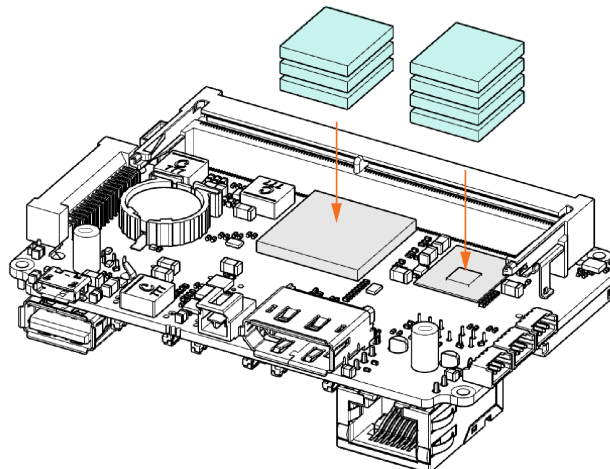
You will need an NVIDIA Jetson module with an appropriate heatsink as the central component of your system. A 24 V power supply unit that can supply at least 2.5 A is also required, though actual power consumption may vary with use. If expanded storage is needed, an NVMe SSD tailored to your use case will be suitable.

For flashing the operating system onto the Jetson module, a separately procured USB micro-B cable will be necessary. Your host system should be running Ubuntu 18.04 or newer, with internet access to download required software packages.

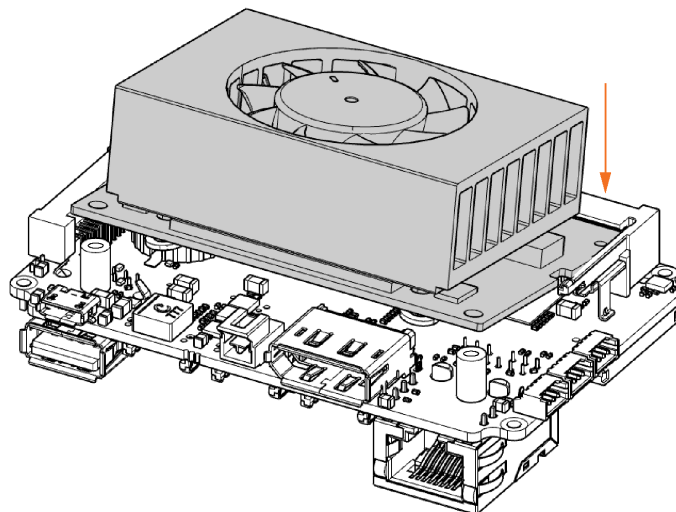
7.1.2 Connecting the components

Assembly

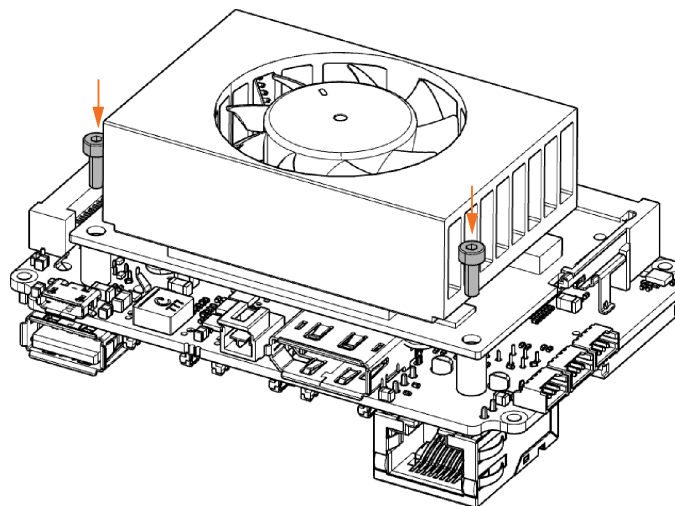
- Place thermal pads from TP-XEC-NX-SET on the (left) PEX switch (3x 1x1 cm) and the (right) ethernet controller (4x 1 x 1 cm)



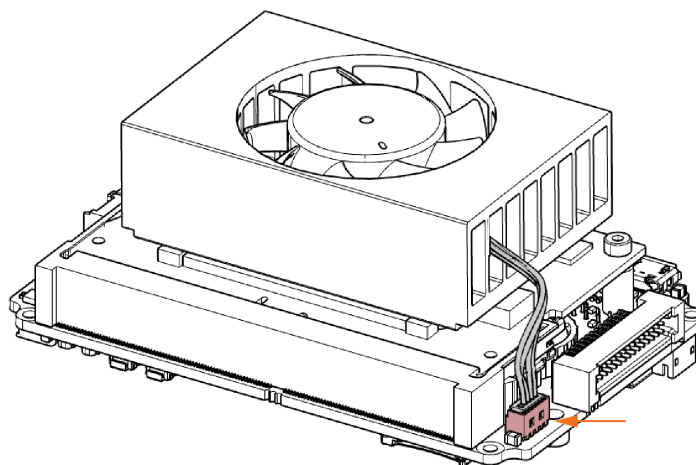
- Insert the Jetson module into the SODIMM slot



- Push down on the Jetson module until you hear a click sound and screw the Jetson module in place

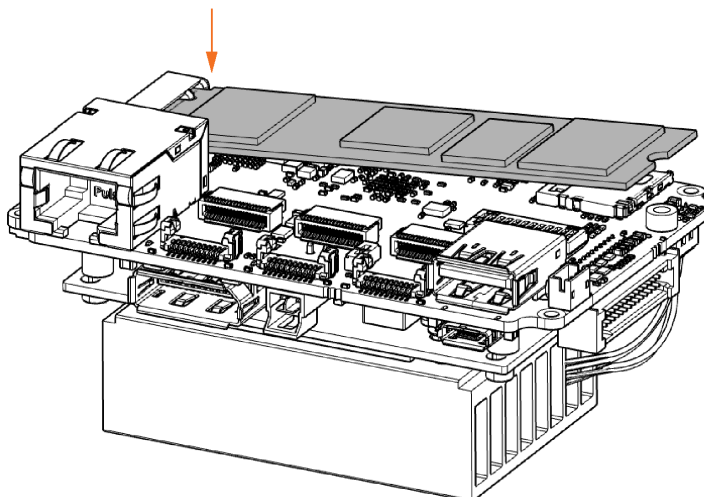


- Connect the fan to the carrier board

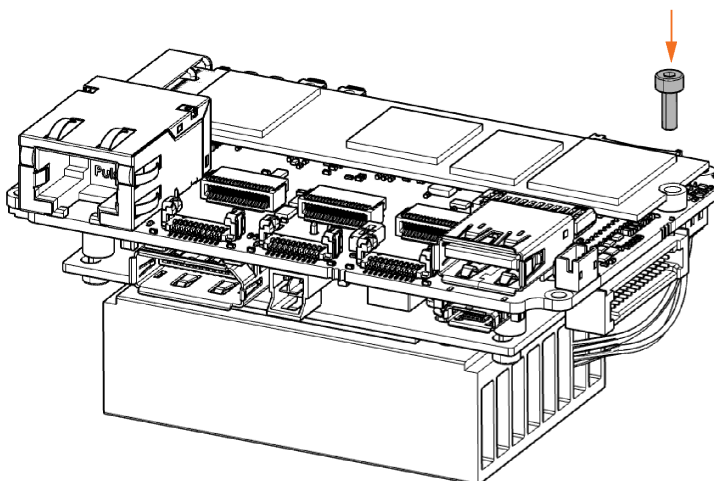


(Optional) Insert NVMe SSD into the M.2 slot.

- Turn the Carrier board over on its bottom side and insert the SSD into the M.2 slot

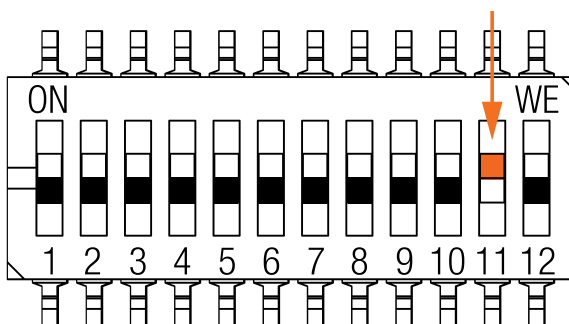


- Press down the SSD and screw it in place

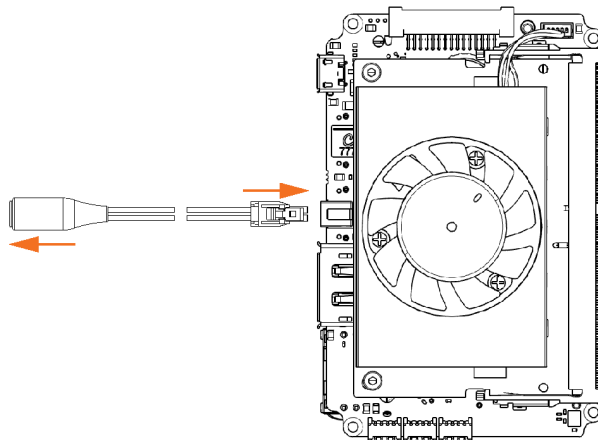


7.1.3 Flashing OS (hardware setup)

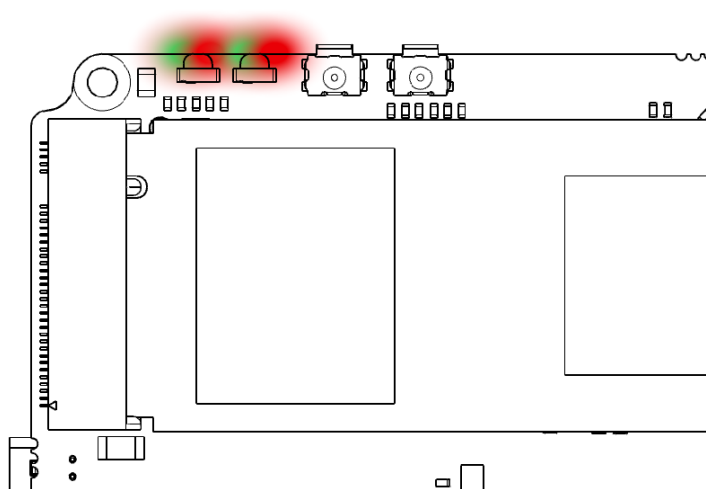
- Put the Jetson into Force recovery mode -> put DIP switch number 11 into the UP position



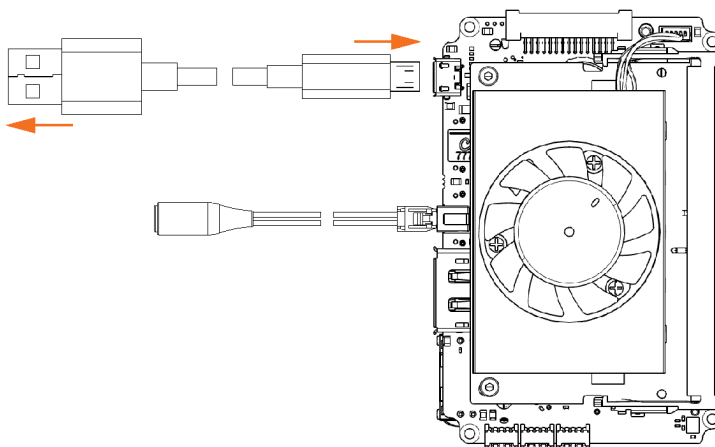
- Insert CBL-XEC2-PWR-0M15 into the power connector
- Plug the carrier board into the power adapter



- Both front LEDs should be on, shining both (Orin) or partially (Xavier) red and green



- Plug the USB 2.0 cable into the microUSB port
- Plug the other end into your x86_x64 PC running Ubuntu



The Jetson should be now recognised by the pc.

7.2 Software setup

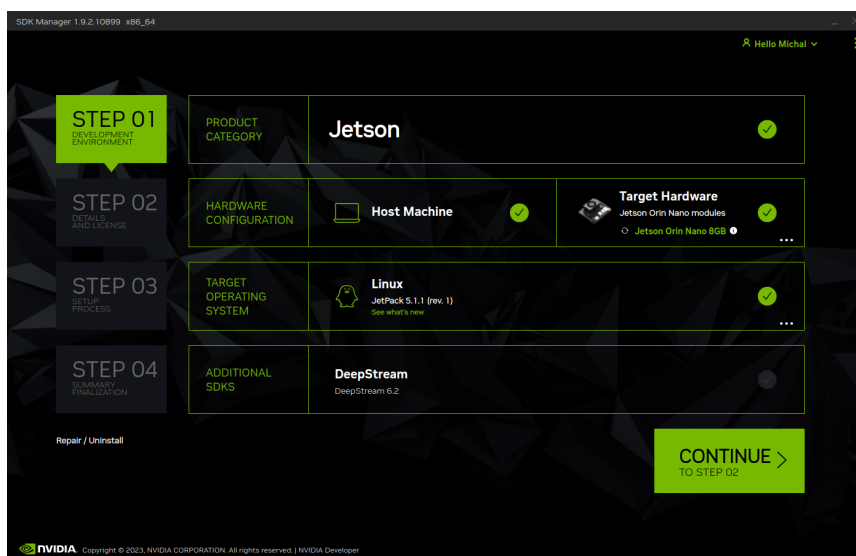
7.2.1 Flashing OS (software setup)

- Run in terminal -> lsusb

Output:

```
ximea@ximea-HP-Compaq-6000-Pro-SFF-PC: ~/nvidia/nvidia_sdk/JetPack_4.6.2_Linux_JETSON_...
File Edit View Search Terminal Help
ximea@ximea-HP-Compaq-6000-Pro-SFF-PC:~/nvidia/nvidia_sdk/JetPack_4.6.2_Linux_JETSON_XAVIER_NX_TARGETS/Linux_for_Tegra/bootloader/t186ref$ lsusb
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 008 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 007 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 006 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 001 Device 013: ID 0955:7e19 NVidia Corp.
Bus 001 Device 017: ID 045e:0745 Microsoft Corp. Nano Transceiver v1.0 for Bluetooth
Bus 001 Device 016: ID 046d:c31c Logitech, Inc. Keyboard K120
Bus 001 Device 015: ID 3418:0189
Bus 001 Device 014: ID 05e3:0608 Genesys Logic, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 005 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 004 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 003 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
ximea@ximea-HP-Compaq-6000-Pro-SFF-PC:~/nvidia/nvidia_sdk/JetPack_4.6.2_Linux_JETSON_XAVIER_NX_TARGETS/Linux_for_Tegra/bootloader/t186ref$
```

- Open Nvidia SDK manager



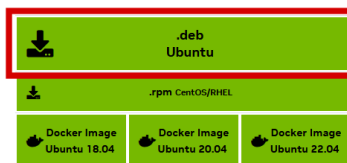
In case it is not already installed, download the SDK manager package from: [SDK Manager](#)

SDK Manager

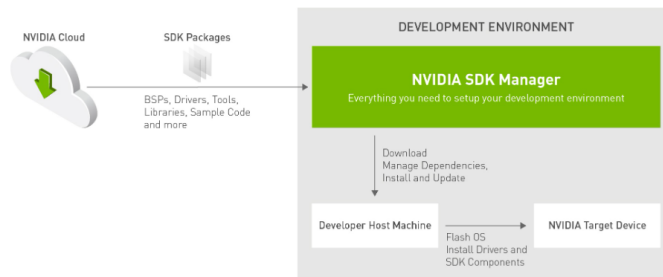
Everything You Need to Set Up Your Development Environment

NVIDIA SDK Manager provides an end-to-end development environment setup solution for NVIDIA's Jetson, Holoscan, Rivermax, DeepStream, Aerial Research Cloud (ARC-OTA), Ethernet Switch, RAPIDS, DRIVE and DOCA SDKs for both host and target devices.

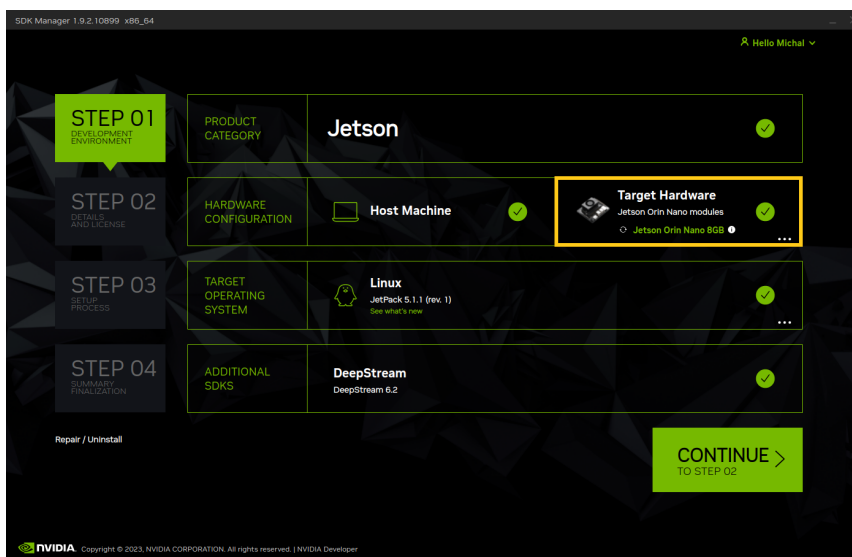
Download NVIDIA SDK Manager 2.1.0



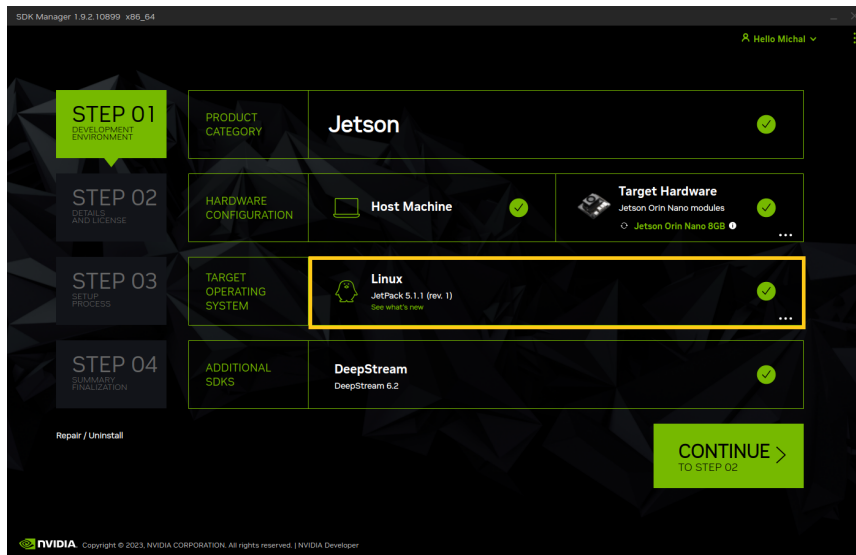
[SDK Manager User Guide](#)



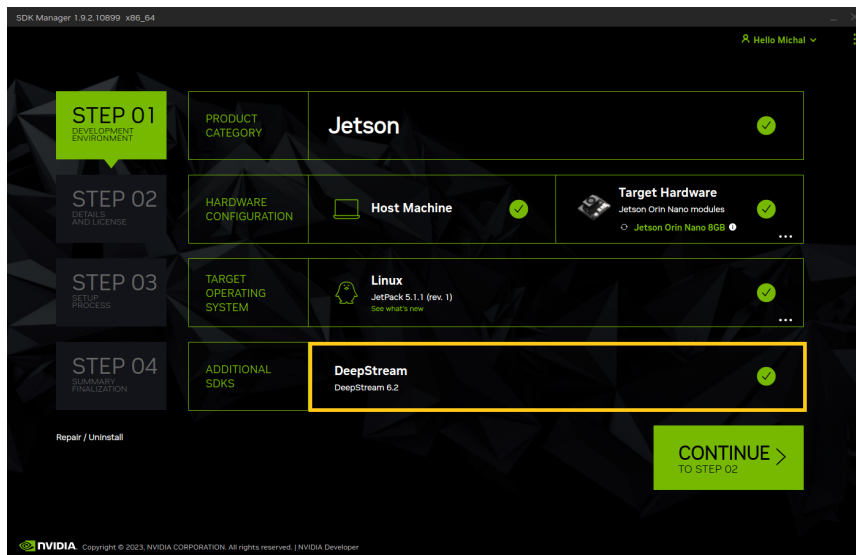
- Install it with running in terminal -> `sudo dpkg -i [name of the downloaded package]`
- Manually choose the type of your Jetson in case it has not been done in the previous step



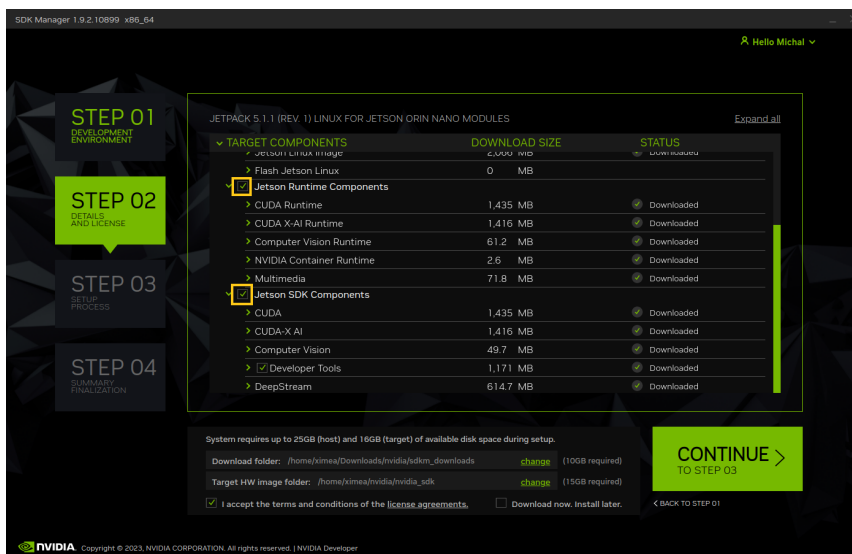
- Select the appropriate Jetpack version



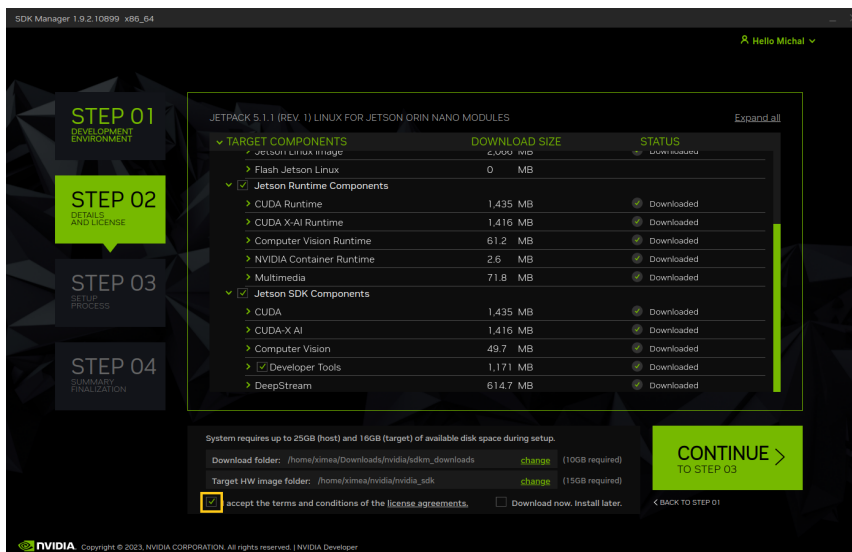
- Tick/untick additional SDK components



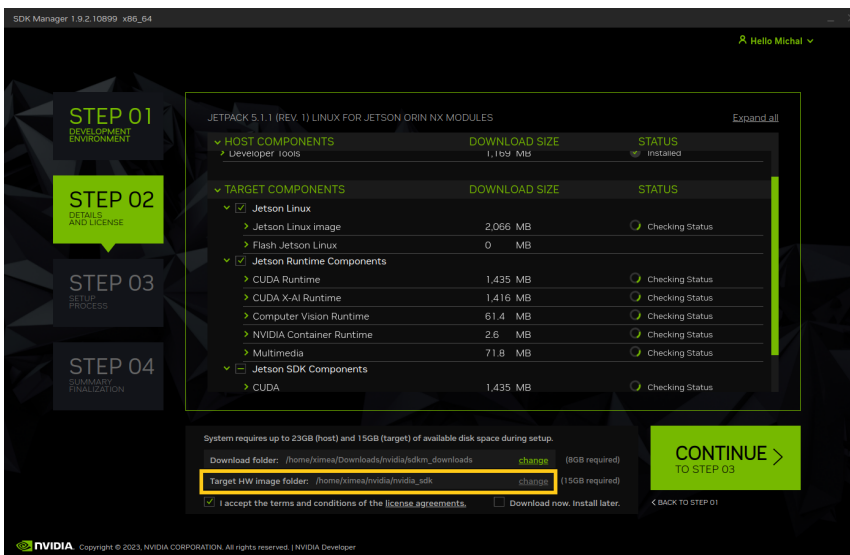
- Press Continue to step 2
- Tick/untick SDK components you want/don't want to install



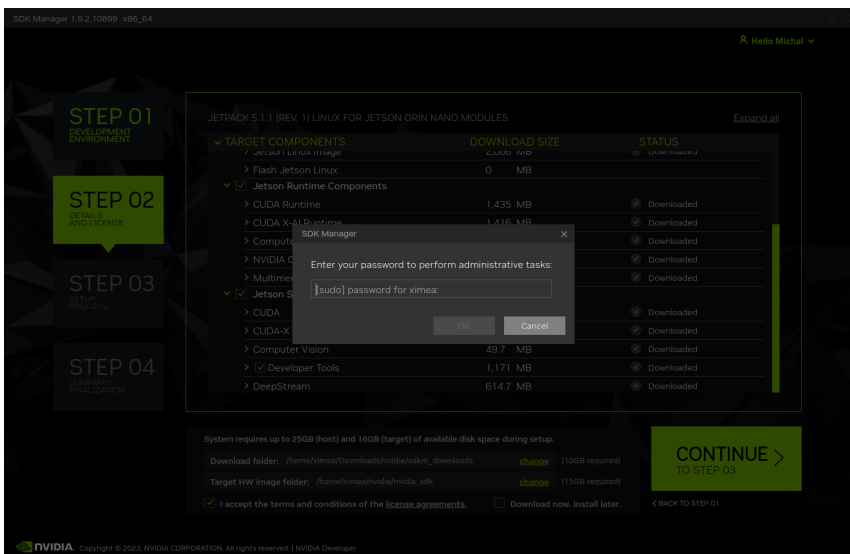
- Accept terms and conditions



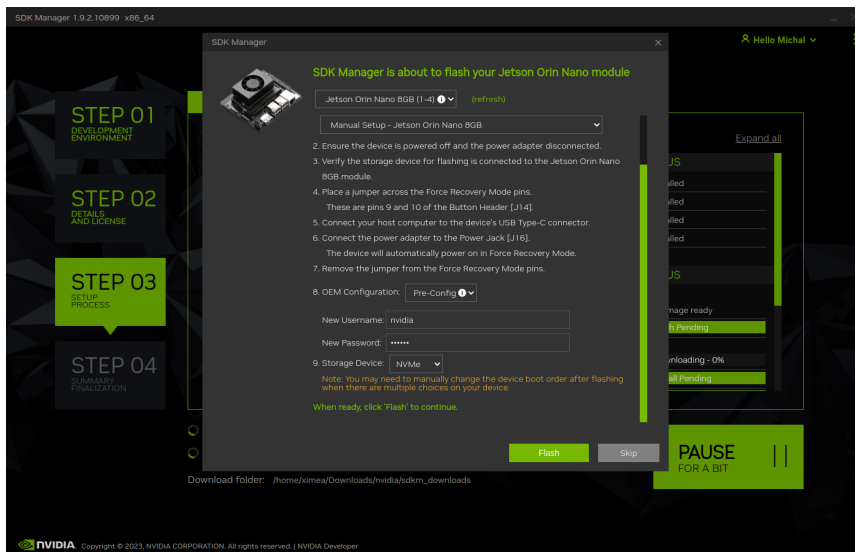
- Note down the location of Target HW image folder



- Press Continue to step 3
- Insert password



- Wait until the SDK manager is ready for flashing
- A prompt should now appear



Now we can do some modifications to the ready-for-flashing OS image:

For Jetson Orin:

- (Mandatory) Modify settings for carrier board eeprom as there isn't any
- (Optional) Activate USB on-the-go mode for the microUSB port
- (Optional) Enable usage of GPIO6 pin

For Jetson Xavier:

- (Mandatory) Use our all-in-one OS image modification that activates Displayport, USB on-the-go and the SD card slot

- After the modifications, input username & password and select appropriate Storage Device.

Device name	Note
SD card	Only available on Orin nano devkit version (SKU 0005)
NVMe	Using M.2 SSD as a storage device
USB	Using USB storage device

Table 18: Selecting storage device

- Click Flash

7.2.2 Modifying OS image

The OS image is in the following location:

<Target HW image folder>/<JetPack version>_<Target Hardware>_TARGETS/Linux_for_Tegra

e.g.

/home/ximea/nvidia/nvidia_sdk/JetPack_5.1.3_Linux_JETSON_ORIN_NANO_TARGETS/Linux_for_Tegra

EEPROM settings (Jetson Orin)

- Go to the Linux for Tegra folder with the OS image
 - If using Jetpack 6.X.X -> `cd ./bootloader/generic/BCT/`
 - If using Jetpack 5.X.X -> `cd ./bootloader/t186ref/BCT/`
- Open file `tegra234-mb2-bct-misc-p3767-0000.dts` in a text editor and modify line 13 (or equivalent line)
 - from -> `cvb_eeprom_read_size = <0x100>;`
 - to -> `cvb_eeprom_read_size = <0x0>;`

Result:

```

/dts-v1/;

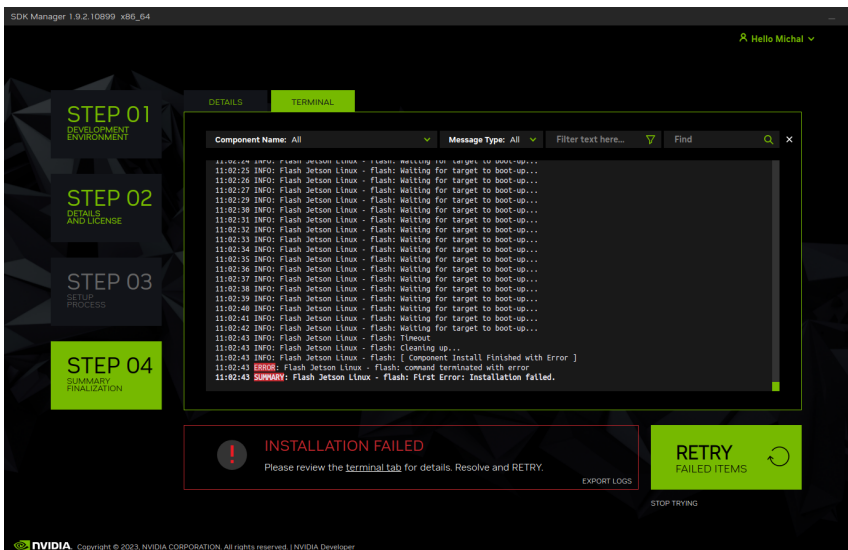
#include "tegra234-mb2-bct-common.dtsi"

/ {
    mb2-misc {
        eeprom {
            cvm_eeprom_i2c_instance = <0>;
            cvm_eeprom_i2c_slave_address = <0xa0>;
            cvm_eeprom_read_size = <0x100>;
            cvb_eeprom_i2c_instance = <0x0>;
            cvb_eeprom_i2c_slave_address = <0xae>;
            cvb_eeprom_read_size = <0x0>;
        };
    };
};

```

Not applying this modification leads to the following errors:

Jetpack 5.X.X:



Jetpack 6.X:

```

09:56:07 INFO: Flash Jetson Linux - flash: [ 0.9409 ] BR_CID: 0x8001234470500457040000008FE8180
09:56:07 INFO: Flash Jetson Linux - flash: [ 0.9550 ] Sending bct_br
09:56:17 ERROR: Flash Jetson Linux - flash: [ 0.9703 ] ERROR: might be timeout in USB write.
09:56:17 INFO: Flash Jetson Linux - flash: Command tegrarcm_v2 --new_session --chip 0x23 0 --uid --download bct_br br_bct_BR.bc
t --download mbi_mbi_t234_prod_aligned_sigheader.bin.encrypt --download psc_b11 psc_b11_t234_prod_aligned_sigheader.bin.encrypt
--download bct_mbi_mbi_bct_MBI_sigheader.bct.encrypt
09:56:17 ERROR: Flash Jetson Linux - flash: --- Error: Reading board information failed.
09:56:17 ERROR: Flash Jetson Linux - flash: command terminated with error
09:56:17 SUMMARY: Flash Jetson Linux - flash: First Error: Installation failed.

```

7.2.3 USB on-the-go (Jetson Orin)

Identify which device tree file is used by your Jetson module:

Device name	Device SKU	JetPack 6.X.X device tree filename	JetPack 5.X.X device tree filename
Orin NX 16 GB	0000	tegra234-p3768-0000+p3767-0000-nv.dtb	tegra234-p3767-0000-p3768-0000-a0.dtb
Orin NX 8 GB	0001	tegra234-p3768-0000+p3767-0001-nv.dtb	tegra234-p3767-0001-p3768-0000-a0.dtb
Orin Nano 8 GB	0003	tegra234-p3768-0000+p3767-0003-nv.dtb	tegra234-p3767-0003-p3768-0000-a0.dtb
Orin Nano 4 GB	0004	tegra234-p3768-0000+p3767-0004-nv.dtb	tegra234-p3767-0004-p3768-0000-a0.dtb
Orin Nano 8 GB ¹	0005	tegra234-p3768-0000+p3767-0005-nv.dtb	tegra234-p3767-0003-p3768-0000-a0.dtb

¹developer kit version

Table 19: Jetson modules

Note down the device tree filename for your Orin module and JetPack version.

- Go to -> `Linux_for_Tegra/kernel/dtb`

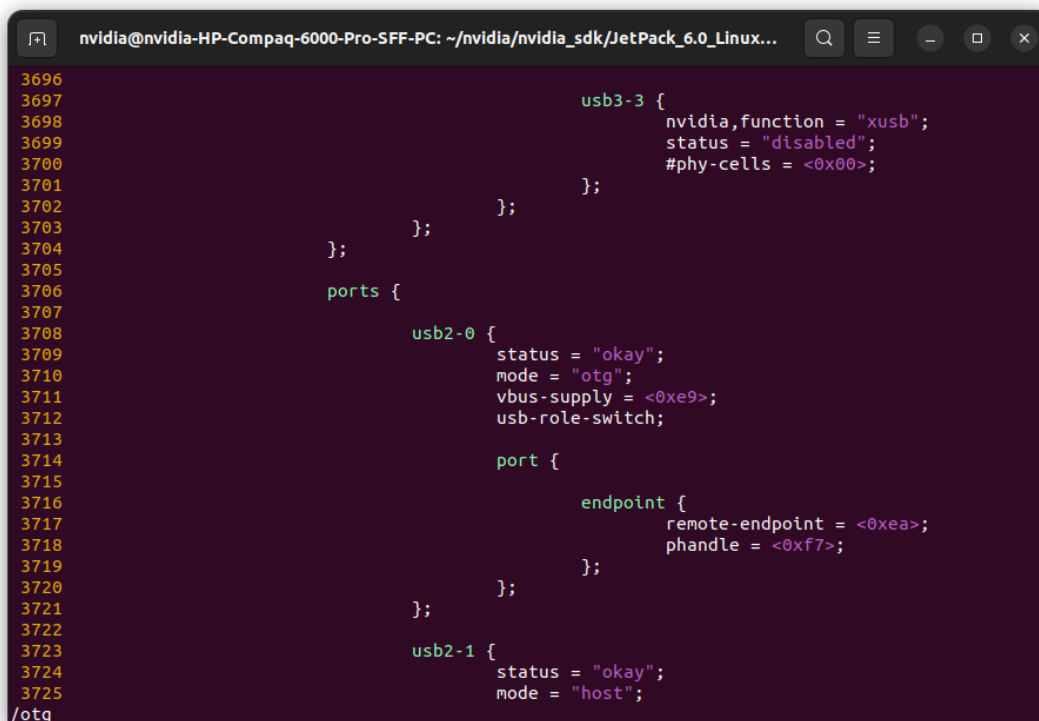
- Decompile the appropriate device tree

```
dtc <noted filename> -o temp.dts
```

e.g. for Jetson Orin nano 8 GB on JetPack 5.1.3:

```
dtc tegra234-p3767-0003-p3768-0000-a0.dtb -o temp.dts
```

- Open the decompiled device tree in a text editor and find line with `otg`



```

3696
3697
3698
3699
3700
3701
3702
3703
3704
3705
3706
3707
3708
3709
3710
3711
3712
3713
3714
3715
3716
3717
3718
3719
3720
3721
3722
3723
3724
3725
/otg
usb3-3 {
    nvidia,function = "xusb";
    status = "disabled";
    #phy-cells = <0x00>;
};
};
};
ports {
    usb2-0 {
        status = "okay";
        mode = "otg";
        vbus-supply = <0xe9>;
        usb-role-switch;

        port {

            endpoint {
                remote-endpoint = <0xea>;
                phandle = <0xf7>;
            };
        };
    };
};
usb2-1 {
    status = "okay";
    mode = "host";
}

```


If using Jetpack 6.X.X, insert the following lines:

```
connector {
    compatible = "gpio-usb-b-connector";
    label = "micro-USB";
    type = "micro";
    vbus-gpio = <0xe5 0x99 0x01>;
};
```

Result:

```
usb2-0 {
    status = "okay";
    mode = "otg";
    vbus-supply = <0xe9>;
    usb-role-switch;

    connector {
        compatible = "gpio-usb-b-connector";
        label = "micro-USB";
        type = "micro";
        vbus-gpio = <0xe5 0x99 0x01>;
    };

    port {

        endpoint {
            remote-endpoint = <0xea>;
            phandle = <0xf7>;
        };
    };
};
```

- Rename the original device tree file to something else (as a backup)

```
mv <noted filename> <different filename>
```

e.g. `mv tegra234-p3767-0003-p3768-0000-a0.dtb tegra234-p3767-0003-p3768-0000-a0_old.dtb`

- Compile the modified device tree

```
dtc temp.dts -o <noted filename>
```

e.g. `dtc temp.dts -o tegra234-p3767-0003-p3768-0000-a0.dtb`

If using Jetpack 5.X.X, insert the following lines:

```
connector {
    compatible = "gpio-usb-b-connector";
    label = "micro-USB";
    type = "micro";
    vbus-gpio = <0x50 0x99 0x01>;
    id-gpio = <0x50 0x84 0x00>;
};
```

Result:

```
usb2-0 {
    status = "okay";
    mode = "otg";
    vbus-supply = <0x2b6>;
    usb-role-switch;

    connector {
        compatible = "gpio-usb-b-connector";
        label = "micro-USB";
        type = "micro";
        vbus-gpio = <0x50 0x99 0x01>;
        id-gpio = <0x50 0x84 0x00>;
    };

    port {

        endpoint {
            remote-endpoint = <0x2b7>;
            phandle = <0x69>;
        };
    };
};
```

- Rename the original device tree file to something else (as a backup)

```
mv <noted filename> <different filename>
```

e.g. mv tegra234-p3767-0003-p3768-0000-a0.dtb tegra234-p3767-0003-p3768-0000-a0_old.dtb

- Compile the modified device tree

```
dtc temp.dts -o <noted filename>
```

e.g. dtc temp.dts -o tegra234-p3767-0003-p3768-0000-a0.dtb

7.2.4 Enable usage of GPIO6 (Jetson Orin, Jetpack 5.X.X)

GPIO6 is by default being used by i2c cam muxer, a feature which is not implemented on this carrier board - GPIO6 is used as a standard GPIO pin. Therefore, a modification of the i2c cam muxer settings is needed.

- Follow steps 1-3 from the [USB on-the-go \(Jetson Orin\)](#) section
- In the decompiled device tree, find line with `mux-gpios`

```
cam_i2cmux {
    compatible = "i2c-mux-gpio";
    #address-cells = <0x01>;
    #size-cells = <0x00>;
--> mux-gpios = <0x51 0x13 0x00>;
    i2c-parent = <0x2c6>;
    status = "okay";
```

```
    i2c@0 {
        reg = <0x00>;
        #address-cells = <0x01>;
        #size-cells = <0x00>;
        status = "okay";
        phandle = <0x48d>;
```

- Modify this line to `-> mux-gpios = <0x51 0x16 0x00>;`

Result:

```
cam_i2cmux {
    compatible = "i2c-mux-gpio";
    #address-cells = <0x01>;
    #size-cells = <0x00>;
    mux-gpios = <0x51 0x16 0x00>;
    i2c-parent = <0x2c6>;
    status = "okay";
```

```
    i2c@0 {
        reg = <0x00>;
        #address-cells = <0x01>;
        #size-cells = <0x00>;
        status = "okay";
        phandle = <0x48d>;
```

7.2.5 Enable usage of GPIO6 (Jetson Orin, Jetpack 6.X.X)

- Go to `Linux_for_Tegra/kernel/dtb`
- Decompile file -> `dtc tegra234-p3768-0000+p3767-0000-dynamic.dtbo -o temp2.dts`
- Open the decompiled file in a text editor and find line with `mux-gpios`

```
bus@0 {
    cam_i2cmux {
        status = "okay";
        compatible = "i2c-mux-gpio";
        #address-cells = <0x01>;
        #size-cells = <0x00>;
        i2c-parent = <0xffffffff>;
-->        mux-gpios = <0xffffffff 0x13 0x00>;

        i2c@0 {
            status = "okay";
            reg = <0x00>;
            #address-cells = <0x01>;
            #size-cells = <0x00>;

            rbpcv2_imx219_a@10 {
                reset-gpios = <0xffffffff 0x3e 0x00>;
            };
        };
    };
};
```

- Modify this line to -> `mux-gpios = <0xffffffff 0x16 0x00>;`

Result:

```
cam_i2cmux {
    status = "okay";
    compatible = "i2c-mux-gpio";
    #address-cells = <0x01>;
    #size-cells = <0x00>;
    i2c-parent = <0xffffffff>;
    mux-gpios = <0xffffffff 0x16 0x00>;

    i2c@0 {
        status = "okay";
        reg = <0x00>;
        #address-cells = <0x01>;
        #size-cells = <0x00>;

        rbpcv2_imx219_a@10 {
            reset-gpios = <0xffffffff 0x3e 0x00>;
        };
    };
};
```

- Rename the original file to something else (as a backup)
`mv tegra234-p3768-0000+p3767-0000-dynamic.dtbo <different filename>`
- Compile the modified file
`dtc temp2.dts -o tegra234-p3768-0000+p3767-0000-dynamic.dtbo`

7.2.6 Enable direction change of GPIOs on Jetpack 6 with custom pinmux

On Jetpack 6, the GPIO pins need to have specified allowed directions via pinmux. We generated a custom pinmux file for this carrier board to allow full control of available GPIOs - `tegra234-mb1-bct-pinmux-p3767-dp-a03.dtsi`

Install it with:

- Go to `Linux_for_Tegra/bootloader/generic/BCT`
- Rename the existing pinmux to a different name for backup

```
mv tegra234-mb1-bct-pinmux-p3767-dp-a03.dtsi <different filename>
```

e.g.

```
mv tegra234-mb1-bct-pinmux-p3767-dp-a03.dtsi tegra234-mb1-bct-pinmux-p3767-dp-a03_old.dtsi
```

- Copy the downloaded pinmux file into `Linux_for_Tegra/bootloader/generic/BCT` and `Linux_for_Tegra/bootloader`, replacing any existing files with the same name.

7.2.7 All-in-one OS modification for Jetson Xavier

This OS modification is based and tested on Jetpack 5.1.4.

- Download the necessary files:

Modified device tree files

- `tegra194-p3668-0000-p3509-0000.dtb`
- `tegra194-p3668-0001-p3509-0000.dtb`
- `tegra194-p3668-all-p3509-0000.dtb`
- `tegra194-p3668-p3509-overlay.dtbo`

Modified pinmux

- `tegra19x-mb1-padvoltage-p3668-a01.cfg`
- `tegra19x-mb1-pinmux-p3668-a01.cfg`

- In `Linux_for_Tegra/kernel/dtb` folder replace the original files

```
tegra194-p3668-0000-p3509-0000.dtb
tegra194-p3668-0001-p3509-0000.dtb
tegra194-p3668-all-p3509-0000.dtb
tegra194-p3668-p3509-overlay.dtbo
```

with the ones downloaded (the modified device tree files)

- In `Linux_for_Tegra/bootloader/t189ref/BCT` replace the original files:

```
tegra19x-mb1-padvoltage-p3668-a01.cfg
tegra19x-mb1-pinmux-p3668-a01.cfg
```

with the files downloaded (the modified pinmux files).

Now you can continue flashing with sdk manager as usual.

Note: This OS patch is designed to enable SD card as a storage device, but not as a boot device.

7.2.8 Installing the XIMEA Software Package

Once the installation is finished, you will be able to login to the Jetson system. You can do so either with a directly attached keyboard and monitor or via ssh. To install the XIMEA Software package on the Jetson, follow the installation instructions provided on the [XIMEA website](#).

For more information about XEC-NX-3P-X2G3 please contact: sales@ximea.com.

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