Technical Reference Manual

# NVIDIA Jetson Orin Reference Design

## 2 Channel MIPI CSI-2 Carrier Board with Jetson Orin NX SoM

### CBM-NVA-ONX-16-128-V2

THE IMAGINGSOURCE
TECHNOLOGY BASED ON STANDARDS

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**Technical Reference Manual**

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# 1. About this document

Welcome to the **Technical Reference Manual for the 2 Channel MIPI CSI-2 Carrier Board with Jetson Orin NX SoM (CBM-NVA-ONX-16-128-V2)**. This comprehensive guide provides detailed technical information, specifications, and operational guidance for working with this carrier board.

## 1.1 Purpose

The primary objective of this manual is to offer a structured and detailed reference to enhance understanding, efficiency, and best practices when working with the carrier board. Whether you are an engineer, developer, or system integrator, this guide provides valuable insights, procedural instructions, and technical specifications to support your work.

## 1.2 Disclaimer



## 1.3 Revision history

The following versions of this manual have been published:

| Version | Comment |
|---|---|
| February 2025, Revision -01 (Board Revision 4.1) | First issue of document |
| | |
| | |

# 2. Overview

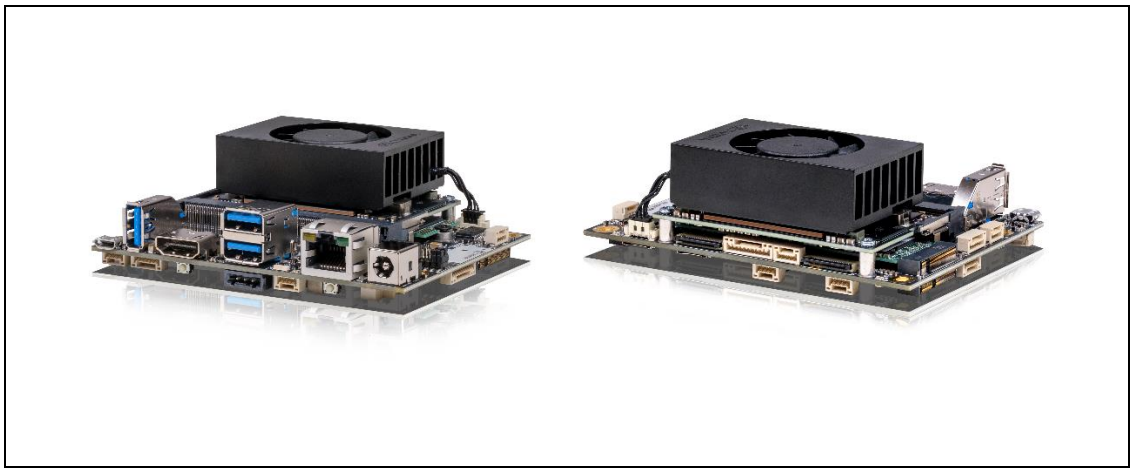

*Figure 1: NVIDIA Jetson Orin Reference Design,*
*2-Channel MIPI CSI-2 Carrier Board with Jetson Orin NX 16 GB SoM.*

## 2.1 JNX42 carrier board

The JNX42 carrier board has been designed for the Jetson Orin Nano and Orin NX primarily.

The JNX42 supports low level remote system management features:

- remote power cycle
- change of boot device
  - Orin:
    primary: SSD
    secondary: USB
  - Nano/TX2NX/Xavier NX:
    primary eMMC
    secondary: SSD or vice versa
- Limited remote debugging

Easy integration into passively cooled systems

- Easy flashing: just connect a USB OTG cable (Auto Flash)
- High performance storage: M.2 NVME PCIe x4

## 2.2 JNX42 features and comparison

| Description | JNX42-LC (optional) | JNX42-LM (optional) | JNX42-M2 (default) |
|---|---|---|---|
| Power | 6V – 12 V<br>(barrel connector) | 6V – 12 V<br>(barrel connector) | 6V – 12 V<br>(barrel connector) |
| NX powering | 5V 8A power supply | 5V 8A power supply | 5V 8A power supply |
| DP | No | No | No |

| Description | JNX42-LC (optional) | JNX42-LM (optional) | JNX42-M2 (default) |
|---|---|---|---|
| HDMI | Yes | Yes | Yes |
| Fan connector | Yes | Yes | Yes |
| M.2 NVME Key M | Yes | Yes | Yes |
| Micro-S card | No | No | No |
| M.2 Key E | No | Yes (PCIe) | Yes (USB + PCIe) |
| CAN RX / TX | 1x requires external transceiver | 1x requires external transceiver | 1x requires external transceiver |
| USB 3.x | 1x USB 3.1 (native – full performance) | 1x USB 3.1 (native – full performance) | 1x USB 3.1 (native – full performance) |
| Micro USB | 1 x Micro USB (device mode[1]) | 1x Micro USB (host[2] and device mode) | 1x Micro USB (host and device mode) |
| Auto flashing | Yes (plug in host cable and flash) | Yes (plug in host cable and flash) | Yes (plug in host cable and flash) |
| USB 2.0 | No | 1x USB 2.0 (JST-GH, J8, J23) | |
| Ethernet | Gigabit RJ45 (one LED) | Gigabit RJ45 (one LED) | Gigabit RJ45 (one LED) |
| PoE option | Yes, add-on module required | Yes, add-on module required | Yes, add-on module required |
| CSI | 2x CSI-2 (4 lanes) plus camera LED | 2x CSI-2 (4 lanes) plus camera LED (hardware sync available) | 2x CSI-2 (4 lanes) plus camera LED |
| UART[3] | 1x (UART2) | 2x (UART 0+2) | |
| I2C | (CSI-2 only) | 3x | 3x |
| Is” | – | 1x (1.8V) | |
| SPI | – | 1x (1.8V) | |

[1] Device mode: the USB port is in “slave” mode to support connection to host PC (e.g. flashing or remote access – virtual network connection - 192.168.55.1)

[2] Host mode: peripheral devices like mouse and keyboard may be connected

[3] UART0: user UART port with RTS and CTS (1.8V level); UART2: console UART port (only available with rev 3)

## 2.3 Technical specifications

| Parameter | Description |
|---|---|
| HDMI | standard HDMI connector (2.0) |
| USB 3.1 | 10Gb/s |
| Physical size | 80x 104.6mm |
| Mounting holes | 4x 3.2mm (for M3) |
| Temperature range | 0 to 70°C (extended range optional) |
| Humidity | noncondensing |
| Longevity | no temperature sensitive components |

## 2.4 Model pictures

### 2.4.1 JNX42-M2 (Default)

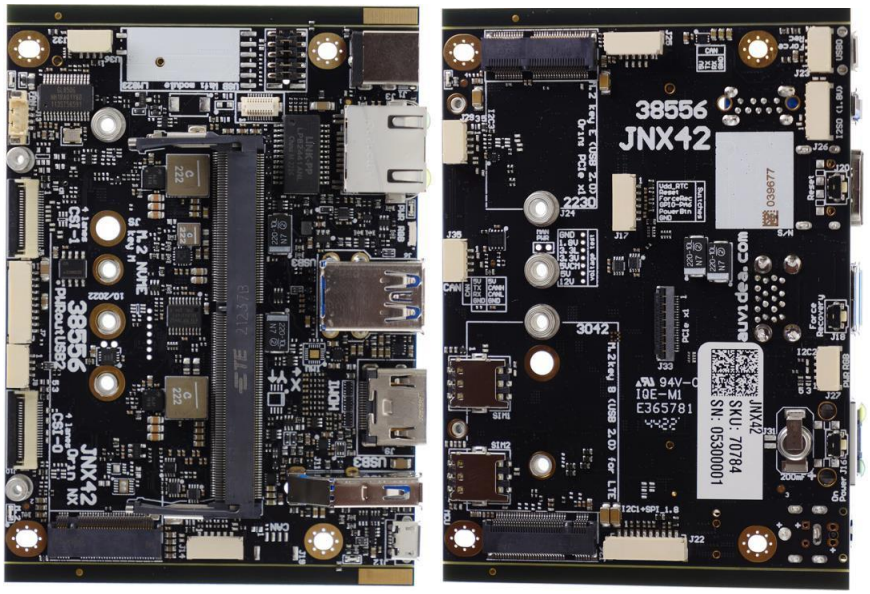


*Figure 2: JNX42-M2 Top-side (left) and bottom side (right) view*

### 2.4.2 JNX42-LC (optional)

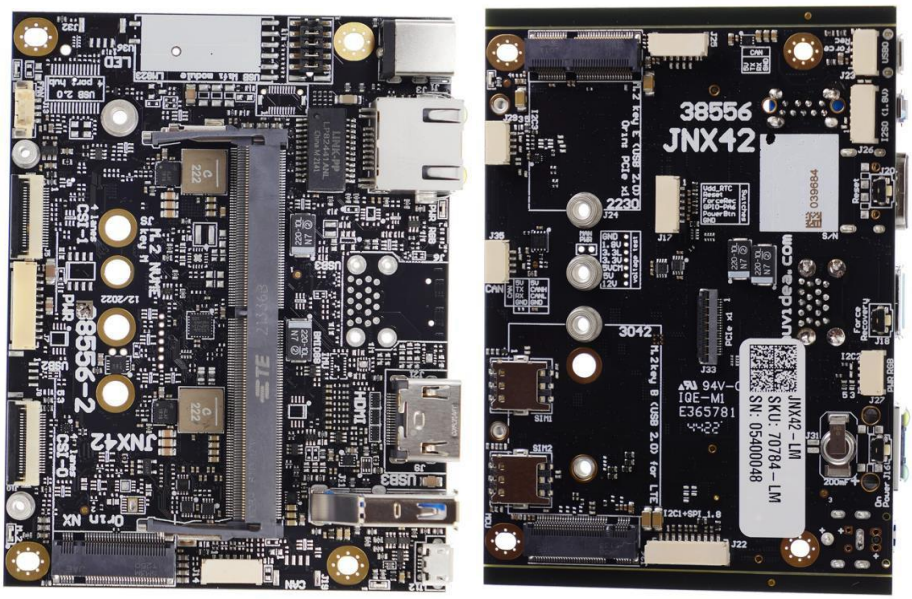


*Figure 3: JNX42-LM (symbol image)*

### 2.4.3 JNX42-LM (optional)

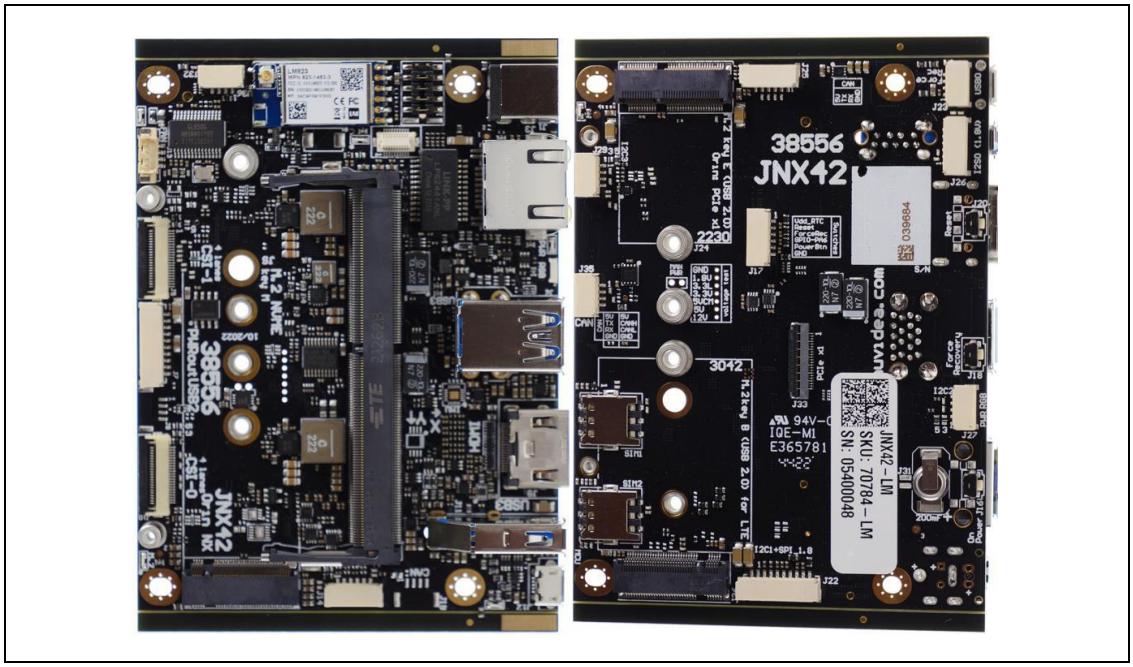


*Figure 4: JNX42-LM Top-side (left) and bottom side (right) view*

## 2.5 Power consumption

| Parameter | Value |
|---|---|
| Carrier board logic | < 1 watt |
| 3.3/5V power converter efficiency | > 90% |
| Power in converter efficiency | > 90% |

## 2.6 Differentiating features

- Flexible design and manufacturing
- designed and manufactured in Germany
- special configuration possible with minimum purchase of 25 pcs
  (display port, M.2, PoE, 48V power in, super cap option, 2 RPi camera module connectors, SPI, I2C, switches and more)

## 2.7 CBM-NVA-ONX-16-128-V2 (article number)

CBM-NVA-ONX-16-128-V2 stands for the article number of the carrier board at The Imaging Source Europe GmbH. The number is composed as follows:

| Parameter | Description |
|---|---|
| CB | Carrier Board |
| M | Module (no housing) |
| NVA | NVIDIA |
| ONX | Jetson Orin NX |
| 16 | 16 GB RAM |
| 128 | 128 GB SSD |
| V | Power Board (support for voltages > 12V) |
| 2 | JNX42 Carrier Board (2x MIPI CSI-2 ports) |

# 3. Features

## 3.1 Crypto chip (optional)

The crypto chip is optional.

Model: ATSHA204A-MAHDA-T

📖 Please check the data sheet of the manufacturer for details:
https://ww1.microchip.com/downloads/en/DeviceDoc/ATSHA204A-Data-Sheet-40002025A.pdf

## 3.2 MCU chip

An on board MCU for watchdog and low level system management functions (via LTE). The MCU can receive text messages via an UART connection to compatible LTE M.2 cards (e.g. Simcom SIM7600). With these messages low level system management can be performed. Please note that this requires an optional MCU firmware.

The source code to this firmware may be licensed.

- power cycle or reset
- change of boot order

## 3.3 USB 2.0 hub

The LM and M2 versions feature a 4 port USB 2.0 hub controller (GL850G).

Uplink: USB1 (115/117) of the Jetson

| Port | Description |
|---|---|
| Port 1 | USB 2.0 of dual USB 3 connector (lower port) |
| Port 2 | USB 2.0 of dual USB 3 connector (upper port) |
| Port 3 | M.2 key B LTE slot |
| Port 4 | LM module (LM) or M.2 key E slot (M2) plus J8 (shared) |

### ❒ Compatibility issue

Potential issues with the Xavier NX compute module. USB 2.0 hub will not be initialized. Please do a warm reboot to fix that issue.

Issue is fixed with Revision 3.1.

# 4. Pinout description top side

Please note that the software GPIO number differs from the socket pin number. This number must be computed with a special formula and differs between the various compute modules.

See Appendix B: GPIO for details.

## 4.1 J1 - Power input jack

5.5/2.5mm barrel jack

| Pin | Description | Note |
|---|---|---|
| 1 | 12V | 12V nominal (absolute max. 15V)<br>recommend power supply 12V 36W or higher<br>extra features: populate optional power module |
| 2 | GND | |

If no power module is plugged in, the supply voltage must be bridged by inserting 5 or 6 2mm jumpers. If no jumpers are plugged, then power is not applied.

Optionally, the J34 Molex power connector (436500216) may be populated. Optionally power may be supplied via J7 (2 pins)

J34: Molex power connector (optional – J1 must not be populated)

To support an extended power input range (12V – 48V), please order the P10 power module.

## 4.2 J37 - Harting power connector (LM and M2 versions)

Harting: 3-pin power input connector (Harting 14110313002000):

| Pin | Description | Note |
|---|---|---|
| 1 | 12V | input power (always on) |
| 2 | 12V | ignition power<br>(Jetson: pin 228 – inverted, MCU: PB4) – weak pullup to 3.3V) |
| 2 | GND | |

To implement ignition-controlled powering, the MCU firmware must be enhanced. MCU firmware support is planned. If this pin is left open /floating, the internal pullup will initiate a power up (auto start).

Connect to GND to disable auto start and to manually power up the system.

- MCU should monitor the pin to turn on power to the Jetson.
- The Jetson should monitor this pin to gracefully turn off the system.

## 4.3 J3 - Ethernet (GbE)

Standard RJ45 pinout with PoE capable magnetics class 3 and 4 (PD or PSE). Connected to the Ethernet controller on the compute module. PoE power is routed to the optional power module.

## 4.4 J4 - M.2 PCIEx4 NVME SSDs

Please note that only NVME SSDs are supported. SATA SSDs are not supported.

We recommend the 128GB Transcend SSDs (TS128GMTE110S). This SSD is standard in TIS embedded systems.

## 4.5 J5 - CSI-2 CD

22-pin 0.5mm pitch FPC connector (contacts down)

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 3.3V | | Power: connected with bead to 3.3V<br>(5V optional if bead is moved) |
| 2 | SDA | 215 | CAM-I2C via multiplexer (3.3V) |
| 3 | SCL | 213 | CAM-I2C via multiplexer (3.3V) |
| 4 | GND | | |
| 5 | MCLK | | IN: wired'OR to control CAM_LED |
| 6 | CAM1_PWDN | 120 | OUT: LC (1.8V), LM/M2: 3.3V (rev 1: pin 114) |
| 7 | GND | | |
| 8 | CSI_F_D1_P | 35 | |
| 9 | CSI_F_D1_N | 33 | |
| 10 | GND | | |
| 11 | CSI_F_D0_P | 23 | |
| 12 | CSI_F_D0_N | 21 | |
| 13 | GND | | |
| 14 | CSI_E_CLK_P | 30 | |
| 15 | CSI_E_CLK_N | 28 | |
| 16 | GND | | |
| 17 | CSI_E_D1_P | 36 | |
| 18 | CSI_E_D1_N | 34 | |
| 19 | GND | | |
| 20 | CSI_E_D0_P | 24 | |
| 21 | CSI_E_D0_N | 22 | |
| 22 | GND | | |

Please note that on the JNX42 implements the I2C bus multiplexer. This setup is identical to the NVIDIA dev kit.

This CSI-2 connector has the same 22 pin pinout as the 22-pin connector on the Raspberry Pi Zero and Raspberry Pi compute module dev kit board. With adapter cable it may connect to Raspberry Pi camera 2.1 and Vision Component camera modules. Alvium cameras require the Alivium adapter. Some global shutter Vision Component camera modules use the MCLK pin to synchronize multiple cameras.

Optional configuration: the pin 5s of all CSI-2 connectors are OR'ed together and drive the CAM LED output.

This CSI-2 port (J5) is only supported with Orin compute modules.

Pin 5 can be alternatively connected to CAM1_MCLK (122) of the Jetson (LC: 1.8V, LM/M2: 3.3V). This is a custom configuration.

## 4.6 J10 - CSI-2 AB

22-pin 0.5mm pitch FPC connector (contacts down)

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 3.3V | | Power: connected with bead to 3.3V<br>(5V optional if bead is moved) |
| 2 | SDA | 215 | CAM-I2C via multiplexer (3.3V) |
| 3 | SCL | 213 | CAM-I2C via multiplexer (3.3V) |
| 4 | GND | | |
| 5 | MCLK | | IN: wired'OR to control CAM_LED |
| 6 | CAM1_PWDN | 114 | OUT: LC (1.8V), LM/M2: 3.3V (rev 1: pin 120) |
| 7 | GND | | |
| 8 | CSI_B_D1_P | 17 | |
| 9 | CSI_B_D1_N | 15 | |
| 10 | GND | | |
| 11 | CSI_B_D0_P | 5 | |
| 12 | CSI_B_D0_N | 3 | |
| 13 | GND | | |
| 14 | CSI_A_CLK_P | 12 | |
| 15 | CSI_A_CLK_N | 10 | |
| 16 | GND | | |
| 17 | CSI_A_D1_P | 18 | |
| 18 | CSI_A_D1_N | 16 | |
| 19 | GND | | |
| 20 | CSI_A_D0_P | 6 | |

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 21 | CSI_A_D0_N | 4 | |
| 22 | GND | | |

For description on details, see chapter “J5 - CSI-2 CD”.

Pin 5 can be alternatively connected to CAM1_MCLK (122) of the Jetson (LC: 1.8V, LM/M2: 3.3V). This is a custom configuration.

## 4.7 J6 USB 3.0 – 3.1

USB 3.0

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | USB power | | 5V 1.0A (power switch enable: pin 220 – 0: enable) |
| 2 | USB2-D_N | | USB 2.0 hub chip port 1 |
| 3 | USB2-D_P | | |
| 4 | GND | | |
| 5 | USB3_RX2_N | 51 | |
| 6 | USB3_RX2_P | 53 | |
| 7 | GND | | |
| 8 | USB3_TX2_N | 57 | |
| 9 | USB3_TX2_P | 59 | |
| 10 | USB power | | 5V 1.0A (power switch enable: pin 224 – 0: enable) |
| 11 | USB22-D_N | | USB 2.0 hub chip port 2 |
| 12 | USB22-D_P | | |
| 13 | GND | | |
| 14 | USB3_RX1_N | 39 | |
| 15 | USB3_RX1_P | 41 | |
| 16 | GND | | |
| 17 | USB3_TX1_N | 45 | |
| 18 | USB3_TX1_P | 47 | |
| 19 | GND | | |

## 4.8 J7 – Power out

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | PWR_IN | | connected to the power input jack (J1) and (J34) |
| 2 | PWR_IN | | connected to the power input jack (J1) and (J34) |
| 3 | 12V out | | provided by power in or output of power module |
| 4 | 12V out | | provided by power in or output of power module |
| 5 | 12V out | | provided by power in or output of power module |
| 6 | 12V out | | provided by power in or output of power module |
| 7 | GND | | |
| 8 | GND | | |
| 9 | GND | | |
| 10 | GND | | |

## 4.9 J8 - USB 2.0

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | USB power | | 5V 1A max (no current limiter) |
| 2 | USB2_D_N | 121 | |
| 3 | USB2_D_P | 123 | |
| 4 | GND | | |

Internal USB 2.0 JST-GH connector to connect to internal USB 2.0 add-on modules (like U100, U110, U120 and more). This connector is only available in selected configurations.

## 4.10 J9 - HDMI

Standard pinout. CEC is not supported (pin 13 of HDMI connector).

Power pin 18 is current limited by PTC fuse (5V 50mA)

## 4.11 J11 - USB 3.0 – 3.1

USB 3.0 Type A standard pinout

See Appendix B for documentation on how to configure and use GPIOs.

USB 3.0

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | USB power | | 5V 1.5A (power switch enable: pin 126 – 0: enable) |
| 2 | USB2-D1_N | 121 | |
| 3 | USB2-D1_P | 123 | |
| 4 | GND | | |
| 5 | USB3_RX_N | 161 | |
| 6 | USB3_RX_P | 163 | |
| 7 | GND | | |
| 8 | USB3_TX_N | 166 | |
| 9 | USB3_TX_P | 168 | |
| 10 | GND | | |

## 4.12 J12 - Micro USB

Standard pinout

OTG support (to flash the compute module)

See Appendix B: GPIO on how to configure and use GPIOs.

## 4.13 J14 – UART Connector

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | reserved | | do not connect |
| 2 | LTE TX | | UART connection between M.2 LTE card and MCU - do not drive this line - this is just for debugging purposes |
| 3 | LTE RX | | UART connection between M.2 LTE card and MCU - do not drive this line - this is just for debugging purposes |
| 4 | SWCLK | | programming of MCU |
| 5 | SWDIO | | programming of MCU |
| 6 | GND | | |

The UART connection of the MCU to the LTE modem is used for a feature to let the MCU receive text messages via LTE for low level system control (like power cycle) or system management.

In addition, the UART0 (debug UART port) is connected to the MCU. Thus, the MCU can be a watchdog to monitor the Jetson via UART0. By using a second UART, the MCU is connected to the LTE module and thereby it can communicate via LTE to the user.

| NOTICE | These signals are 1.8V. We have developed a small (16x18mm) level changer module to translate the UART from 1.8V to 3.3V (38583) |
|---|---|

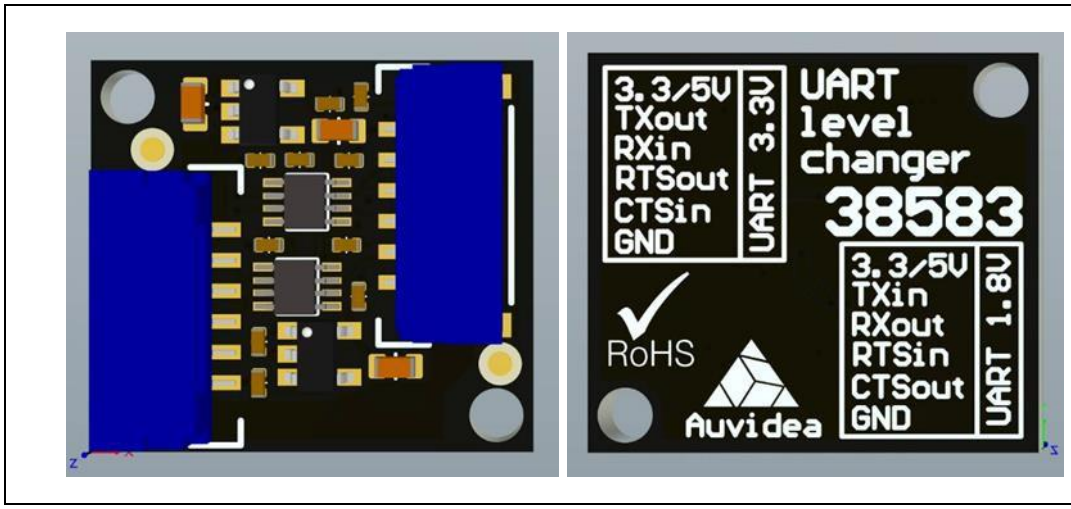


*Figure 5: 38583L UART level changer (top side, bottom side)*

## 4.14 J19 – CAN

JST-GH 1.25mm (LC version only)

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 5 V | | 5V 1A max (no current limiter) |
| 2 | CAN_TX | 145 | |
| 3 | CAN_RX | 143 | |
| 4 | GND | | |

CAN_RX and CAN_TX:
Do not connect them directly to the CAN Bus, since the Jetson compute module might be damaged.

For CAN_RX and CAN_TX, an external CAN transceiver module must be used. Our carrier boards are populated with the transceiver: TJA 1051 (58V).

If you need an isolated CAN, you can use the 38477 add-on module.

## 4.15 J20 - Reset Button

Press to reset the compute module.

## 4.16 J22 – SPI

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 3.3 V | | 3.3V 1A max (no current limiter) |
| 2 | 1.8 V | | 1.8V (current depending on version: 100 or 500mA) |
| 3 | SPI1_SCK | 106 | 1.8V (may be reconfigured as GPIO) |
| 4 | SPI1_MISO | 108 | 1.8V (may be reconfigured as GPIO) |
| 5 | SPI1_MOSI | 104 | 1.8V (may be reconfigured as GPIO) |
| 6 | SPI1_CS0 | 110 | 1.8V (may be reconfigured as GPIO) |
| 7 | SPI1_CS1 | 112 | 1.8V (may be reconfigured as GPIO) |
| 8 | GEN1_I2C_SCL | 185 | 3.3 V (pull up on Jetson) |
| 9 | GEN1 I2C_SDA | 187 | 3.3 V (pull up on Jetson) |
| 10 | GND | | |

## 4.17 J25 UART0

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 5V | | |
| 2 | UART0_TXD | | 1.8V level |
| 3 | UART0_RXD | | 1.8V level |
| 4 | UART0_RTS | | 1.8V level |
| 5 | UART0_CTS | | 1.8V level |
| 6 | GND | | |

## 4.18 J27 I2C

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 5V | | 5V 1A max (no current limiter) |
| 2 | I2C1_SCL | 191 | 3.3V level |
| 3 | I2C1_SDA | 189 | 3.3V level |
| 4 | GND | | |

## 4.19 J29 I2C

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 5V | | 5V 1A max (no current limiter) |
| 2 | CAM_I2C_SCL | 213 | 3.3V level |

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 3 | CAM_I2C_SDA | 215 | 3.3V level |
| 4 | GND | | |

## 4.20 J32 – CAM LED

JST-GH 1.25mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | 12V | | 12V 1A (no current limiter) |
| 2 | 12V | | 12V 1A (no current limiter) |
| 3 | CAM_LED | 218 | Inverted GPIO, wired OR CSI-MCLKs<br>OUT: open drain (3.3V to 12V) |
| 4 | CAM_LED | 218 | Inverted GPIO, wired OR CSI-MCLKs<br>OUT: open drain (3.3V to 12V) |

CAM_LED:
open drain output to drive cathode of camera LED. Controlled by 3 signals which are OR ‘red together:

J5 pin 5 (CSI CD camera) J10 pin 5 (CSI AB camera)

Compute module GPIO_12: (socket pin 218)

- 0: LED off
- 1: LED on
- float: LED on

CAM_LED flash signal can be used to control external camera LED. When using external LED, please limit current with external resistor. Connect cathode to CAM_LED pin and anode to 3.3V to 12V power. Maximum current 2A.

## 4.21 J33 PCIe X1

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | GND | | |
| 2S | GPIO_05 | 128 | |
| 3S | PCIE_Wake_L | 179 | |
| 4 | GND | | |
| 5S | PEX_L1_CRQ | 182 | |
| 6S | PEX_L1_RST | 183 | |
| 7 | GND | | |
| 8S | PEX_RX0_N | 167 | |

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 9S | PEX_RX0_P | 169 | |
| 10 | GND | | |
| 11S | PEX_TX0_N | 172 | |
| 12S | PEX_TX0_P | 174 | |
| 13 | GND | | |
| 14S | PEX_CLK2_N | 173 | |
| 15S | PEX_CLK2_P | 175 | |
| 16 | GND | | |
| 17S | 3.3 V power | | |
| 18S | 3.3 V power | | |
| 19 | GND | | |
| 20S | 5 V power | | |
| 21S | 5 V power | | |
| 22 | GND | | |

## 4.22 J35 CAN

JST-GH 1.25mm (LM and M2)

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | PWR | | 5V 1A (no current limiter) |
| 2 | CAN_H | CAN | Integrated CAN transceiver (TJA1051) |
| 3 | CAN_L | CAN | Integrated CAN transceiver (TJA1051) |
| 4 | GND | | |

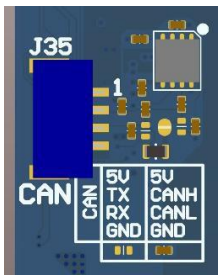


*Figure 6: J35 CAN*

### ❒ CAN_RX/ CAN_TX output option

CAN_RX and CAN_TX:
Do not connect them directly to the CAN Bus, since the Jetson compute module might be damaged.

For CAN_RX and CAN_TX, an external CAN transceiver module must be used. Our carrier boards are populated with the transceiver: TJA 1051 (58V).

If you need an isolated CAN, you can use the 38477 add-on module.

To enable the output of the native RX/TX CAN signals, 4 resistors have to be moved. This is a hardware strapping option.

## 4.23 J13 - Fan connector

Pico blade 1.5mm

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | GND | | |
| 2 | 5V | | 1A max |
| 3 | TACH | - | Not connected |
| 4 | PWM | 230 | |

## 4.24 PoE and Power module connector

These 2 connectors allow you to fit the JNX42 with an optional power module, in order to extend the power input capabilities of the JNX42.

### 4.24.1 J28: PoE extension connector

For normal operation without any power module installed, 5 or 6 2mm jumpers need to be installed, to bridge the power input to the internal power rails (see Figure 7).

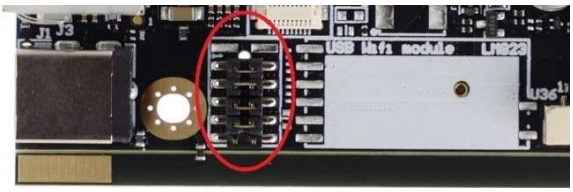

*Figure 7: Installation of jumpers*

#### ❒ Standard options

- P10 power module for 12-24V power in or 12-48V power in (38515-x)
- P12 isolated PoE input module (25W PoE PD, 802.3at, class 4) (38568-x)
- 4PPoE on request (40-70W PoE PD, 802.3bt, class 5-8) J28: PoE extension connector

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 1 | VDD_RTC | 235 | RTC power supply for Jetson |
| 2 | I2C1_SDA | 191 | 3.3V level |

| Pin | Description | Socket pin | Note |
|---|---|---|---|
| 3 | PFO_INT | 212 | 1.8V level |
| 4 | I2C1_SDA | 189 | 3.3V level |
| 5 | GPIO_04 | 127 | 1.8V level |
| 6 | nc | | reserved for future use |
| 7 | 1.8 V | | |
| 8 | nc | | reserved for future use |
| 9 | 3.3 V | | |
| 10 | 5 V | | |
| 11 | PFO | | Power fail (to MCU pin PA0) – 3.3V level |
| 12 | FAN_TACH | 208 | |
| 13 | 3.3 V_LDO | | 3.3V (from LDO, 50mA max) |
| 14 | FAN_PWM | 230 | |
| 15 | GND | | |
| 16 | GND | | |
| 17 | M1 | | Ethernet center pin of magnetics (for PoE) |
| 18 | M3 | | Ethernet center pin of magnetics (for PoE) |
| 19 | M2 | | Ethernet center pin of magnetics (for PoE) |
| 20 | M4 | | Ethernet center pin of magnetics (for PoE) |

### ❒ Optional I/O module:

The J15 and J28 can be used to create a wide variety of I/O and power modules:

- GPIO extender
- ADC or DAC converter (for analog inputs or outputs)
- PWM controller
- LED controller
- fan controller
- motion (IMU), temperature and other sensors
- RTC supply
- Special power supplies (including UPS)
- and many more

## 4.24.2 J15

J15: power module header (10 or 12-pin 2mm pin header - male)

| Pins | Description |
|---|---|
| 1,3,5 | DC input (2A max per pin) |
| 7,9,11 | GND input (2A max per pin) |
| 2,4,6 | DC supply to carrier board (2A max per pin) |
| 8,10,12 | GND to carrier board (2A max per pin) |

## 4.25 U10 – IMU BMI088

The BMI088 is a high-performance 6-axis inertial sensor that allows for highly accurate measurement of orientation and detection of motion along three orthogonal axes. Consisting of a 16-bit digital, triaxial accelerometer and a 16-bit digital, triaxial gyroscope, the BMI088 is unique in the class of high-performance IMUs used in harsh environments such as those ones in drones and robotics applications.

| | |
|---|---|
| I2C bus | I2C1 (183/185) |
| Accelerator | 0x18 Gyro: 0x68 |
| Link | https://www.bosch-sensortec.com/products/motion-sensors/imus/bmi088/ |

## 4.26 LED - PWR

GPIO socket pin 178 on[1]/off[0], default: off[0]. Pinout description bottom side. This GPIO pin is supported by the NANO. Other SOMs may not be able to control this GPIO.

## 4.27 LED - Eth

Green LED (Link):
The green LED on the LAN port indicates that there is a connection.

Yellow LED (Activity):
The yellow indicates that there is activity here, so there is data traffic.

# 5. Appendix A: Connecting MIPI CSI-2 cameras

MIPI CSI-2 cameras can connect to J5-CSI-2-CD and J19–CSI-2-AB connector.

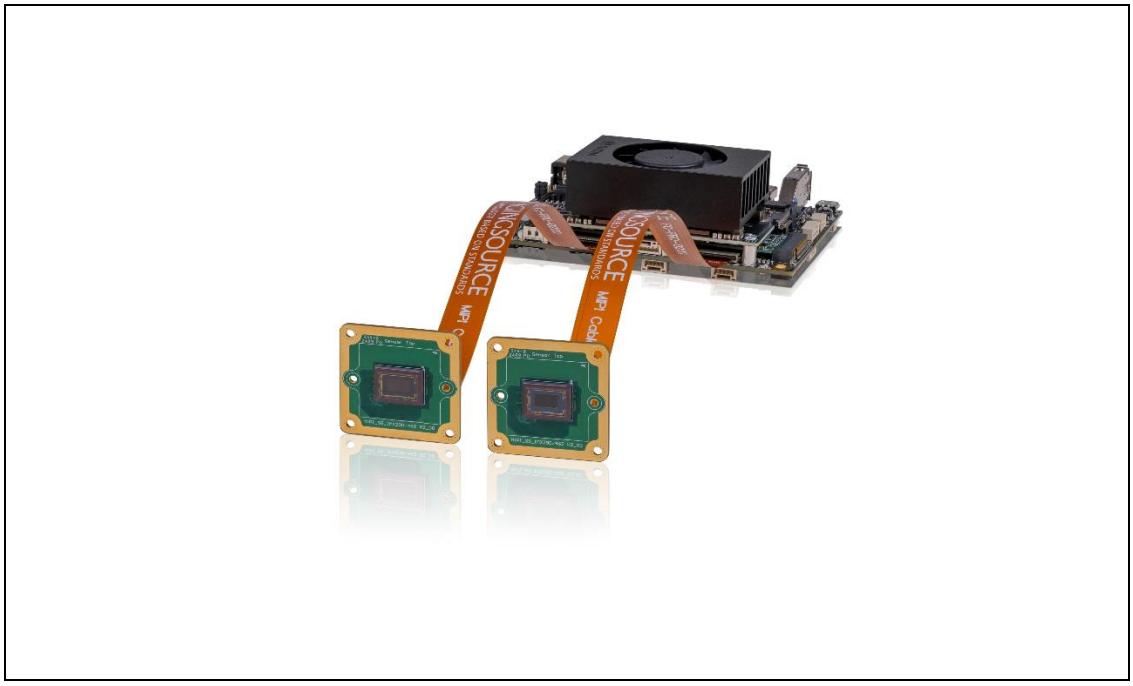

*Figure 8: Connection of two MIPI CSI-2 cameras via a 22-pin 0,2 mm FFC cable*

*Figure 9: Connection of two MIPI CSI-2 cameras via a 22-pin 0,2 mm FFC cable incl. lens mount holder and M-12 lenses*

# 6. Appendix B: GPIO

## 6.1 GPIO control

This example shows how to set and readout GPIO 414. For different GPIO numbers replace 414 accordingly.

### 6.1.1 Export GPIO

```
nvidia@nvidia-desktop:~$ echo 414 > /sys/class/gpio/export
nvidia@nvidia-desktop:~$
```

### 6.1.2 Change direction to in

```
nvidia@nvidia-desktop:~$ echo in > /sys/class/gpio/gpio414/direction
nvidia@nvidia-desktop:~$
```

### 6.1.3 Change direction to out

```
nvidia@nvidia-desktop:~$ echo out > /sys/class/gpio/gpio414/direction
nvidia@nvidia-desktop:~$
```

### 6.1.4 Set GPIO low

```
nvidia@nvidia-desktop:~$ echo 0 > /sys/class/gpio/gpio414/value
nvidia@nvidia-desktop:~$
```

### 6.1.5 Set GPIO high

```
nvidia@nvidia-desktop:~$ echo 1 > /sys/class/gpio/gpio414/value
nvidia@nvidia-desktop:~$
```

### 6.1.6 Readout GPIO value

```
nvidia@nvidia-desktop:~$ cat /sys/class/gpio/gpio414/value 0
nvidia@nvidia-desktop:~$ cat /sys/class/gpio/gpio414/value 1
```

## 6.2 Pin to GPIO reference sheet for Xavier-NX/Nano/TX2-NX

| Pin number (Socket number) | Xavier NX GPIOname | Xavier NX GPIOnumber | Xavier NX Pin direction | Nano GPIO-name | Nano GPIOnumber | Nano Pin direction | TX2 NX GPIOname | TX2 NX GPIOnumber | TX2 NX Pin direction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | |
| 87 | GPIO3_PZ.01 | 489 | Bidirectional | GPIO3_PCC.04 | 228 | Bidirectional | GPIO3_PL.04 | 412 | Bidirectional |
| 88 | GPIO3_PM.00 | 384 | Input | GPIO3_PCC.06 | 230 | Input | GPIO3_PP.00 | 440 | Input |
| 89 | GPIO3_PZ.05 | 493 | Not Assigned | GPIO3_PC.00 | 16 | Input | GPIO3_PH.02 | 378 | Input |
| 91 | GPIO3_PZ.03 | 491 | Not Assigned | GPIO3_PC.02 | 18 | Input | GPIO3_PH.00 | 376 | Input |
| 93 | GPIO3_PZ.04 | 492 | Not Assigned | GPIO3_PC.01 | 17 | Input | GPIO3_PH.01 | 377 | Input |
| 94 | GPIO3_PM.04 | 388 | Bidirectional | GPIO3_PCC.00 | 224 | Bidirectional | GPIO3_PP.02 | 442 | Bidirectional |
| 95 | GPIO3_PZ.06 | 494 | Not Assigned | GPIO3_PC.03 | 19 | Input | GPIO3_PH.03 | 379 | Input |
| 96 | GPIO3_PM.01 | 385 | Input | GPIO3_PCC.01 | 225 | Input | GPIO3_PP.01 | 441 | Input |
| 97 | GPIO3_PZ.07 | 495 | Not Assigned | GPIO3_PC.04 | 20 | Input | GPIO3_PY.03 | 515 | Input |
| 99 | GPIO3_PX.04 | 476 | Output | GPIO3_PD.01 | 25 | Output | GPIO3_PX.00 | 504 | Output |
| 101 | GPIO3_PX.05 | 477 | Input | GPIO3_PD.02 | 26 | Input | GPIO3_PX.01 | 505 | Input |
| 103 | GPIO3_PX.06 | 478 | Output | GPIO3_PD.03 | 27 | Output | GPIO3_PX.02 | 506 | Output |
| 104 | GPIO3_PY.02 | 482 | Not Assigned | GPIO3_PB.04 | 12 | Input | GPIO3_PV.03 | 491 | Input |
| 105 | GPIO3_PX.07 | 479 | Input | GPIO3_PD.04 | 28 | Input | GPIO3_PX.03 | 507 | Input |
| 106 | GPIO3_PY.00 | 480 | Not Assigned | GPIO3_PB.06 | 14 | Input | GPIO3_PV.01 | 489 | Input |
| 108 | GPIO3_PY.01 | 481 | Not Assigned | GPIO3_PB.05 | 13 | Input | GPIO3_PV.02 | 490 | Input |
| 110 | GPIO3_PY.03 | 483 | Not Assigned | GPIO3_PB.07 | 15 | Input | GPIO3_PV.04 | 492 | Input |
| 112 | GPIO3_PY.04 | 484 | Not Assigned | GPIO3_PDD.00 | 232 | Input | GPIO3_PC.03 | 339 | Input |
| 114 | GPIO3_PP.04 | 412 | Output | GPIO3_PS.07 | 151 | Output | GPIO3_PN.00 | 424 | Output |
| 116 | GPIO3_PP.00 | 408 | Output | GPIO3_PS.00 | 144 | Output | GPIO3_PO.00 | 432 | Output |
| 118 | GPIO3_PQ.05 | 421 | Input | GPIO3_PS.05 | 149 | Input | GPIO3_PN.01 | 425 | Input |
| 120 | GPIO3_PP.05 | 413 | Output | GPIO3_PT.00 | 152 | Output | GPIO3_PN.03 | 427 | Output |
| 122 | GPIO3_PP.01 | 409 | Output | GPIO3_PS.01 | 145 | Output | GPIO3_PO.01 | 433 | Output |
| 124 | GPIO3_PQ.03 | 419 | Input | GPIO3_PH.06 | 62 | Input | GPIO3_PL.01 | 409 | Input |
| 126 | GPIO3_PCC.00 | 264 | Output | GPIO3_PI.02 | 66 | Output | GPIO3_PL.02 | 410 | Output |
| 127 | GPIO3_PCC.01 | 265 | Input | GPIO3_PI.01 | 65 | Output | GPIO3_PL.03 | 411 | Output |
| 128 | GPIO3_PCC.02 | 266 | Output | GPIO3_PH.07 | 63 | Output | GPIO3_PL.00 | 408 | Output |
| 130 | GPIO3_PCC.03 | 267 | Output | GPIO3_PI.00 | 64 | Output | GPIO3_PC.04 | 340 | Output |
| 143 | GPIO3_PAA.03 | 251 | Input | | | | GPIO3_PZ.02 | 522 | Output |
| 145 | GPIO3_PAA.02 | 250 | Output | | | | GPIO3_PZ.03 | 523 | Input |
| 178 | | | | GPIO3_PA.06 | 6 | Output | | | |
| 179 | GPIO3_PL.02 | 378 | Input | GPIO3_PA.02 | 2 | Input | GPIO3_PA.02 | 322 | Input |
| 180 | | | | GPIO3_PA.01 | 1 | Input | GPIO3_PA.01 | 321 | Bidirectional |
| 181 | | | | GPIO3_PA.00 | 0 | Output | GPIO3_PA.00 | 320 | Output |
| 182 | GPIO3_PK.02 | 370 | Bidirectional | | | | GPIO3_PA.06 | 326 | Bidirectional |
| 183 | GPIO3_PK.03 | 371 | Output | | | | GPIO3_PA.05 | 325 | Output |
| 185 | GPIO3_PCC.07 | 271 | Bidirectional | GPIO3_PJ.01 | 73 | Bidirectional | GPIO3_PC.05 | 341 | Bidirectional |
| 187 | GPIO3_PDD.00 | 272 | Bidirectional | GPIO3_PJ.00 | 72 | Bidirectional | GPIO3_PC.06 | 342 | Bidirectional |
| 189 | | | | GPIO3_PJ.02 | 74 | Bidirectional | GPIO3_PEE.00 | 288 | Bidirectional |
| 191 | | | | GPIO3_PJ.03 | 75 | Bidirectional | GPIO3_PEE.01 | 289 | Bidirectional |
| 193 | GPIO3_PT.06 | 446 | Not Assigned | GPIO3_PJ.06 | 78 | Input | GPIO3_PJ.01 | 393 | Input |
| 195 | GPIO3_PT.07 | 447 | Not Assigned | GPIO3_PJ.05 | 77 | Input | GPIO3_PJ.02 | 394 | Input |
| 197 | GPIO3_PU.00 | 448 | Not Assigned | GPIO3_PJ.04 | 76 | Input | GPIO3_PJ.03 | 395 | Input |
| 199 | GPIO3_PT.05 | 445 | Not Assigned | GPIO3_PJ.07 | 79 | Input | GPIO3_PJ.00 | 392 | Input |
| 203 | GPIO3_PR.02 | 426 | Output | GPIO3_PG.00 | 48 | Output | GPIO3_PW.02 | 498 | Output |
| 205 | GPIO3_PR.03 | 427 | Input | GPIO3_PG.01 | 49 | Input | GPIO3_PW.03 | 499 | Input |
| 206 | GPIO3_PR.00 | 424 | Input | GPIO3_PV.00 | 168 | Input | GPIO3_PU.00 | 480 | Input |
| 207 | GPIO3_PR.04 | 428 | Not Assigned | GPIO3_PG.02 | 50 | Input | GPIO3_PW.04 | 500 | Input |
| 208 | GPIO3_PQ.02 | 418 | Input | GPIO3_PZ.02 | 202 | Input | GPIO3_PX.04 | 508 | Input |
| 209 | GPIO3_PR.05 | 429 | Not Assigned | GPIO3_PG.03 | 51 | Input | GPIO3_PW.05 | 501 | Input |
| 211 | GPIO3_PS.04 | 436 | Not Assigned | GPIO3_PBB.00 | 216 | Input | GPIO3_PJ.04 | 396 | Input |
| 212 | GPIO3_PQ.01 | 417 | Input | GPIO3_PV.01 | 169 | Input | GPIO3_PC.01 | 337 | Input |
| 213 | GPIO3_PP.02 | 410 | Bidirectional | GPIO3_PS.02 | 146 | Bidirectional | GPIO3_PO.02 | 434 | Bidirectional |
| 214 | GPIO3_PG.00 | 336 | Input | GPIO3_PX.06 | 190 | Input | GPIO3_PFF.01 | 529 | Input |
| 215 | GPIO3_PP.03 | 411 | Bidirectional | GPIO3_PS.03 | 147 | Bidirectional | GPIO3_PO.03 | 435 | Bidirectional |
| 216 | GPIO3_PQ.06 | 422 | Input | GPIO3_PZ.00 | 200 | Input | GPIO3_PEE.02 | 290 | Input |
| 218 | GPIO3_PCC.04 | 268 | Not Assigned | GPIO3_PY.02 | 194 | Input | GPIO3_PC.02 | 338 | Input |
| 219 | GPIO3_PO.02 | 402 | Bidirectional | GPIO3_PP.05 | 125 | Bidirectional | GPIO3_PG.02 | 370 | Bidirectional |
| 220 | GPIO3_PT.02 | 442 | Output | GPIO3_PE.02 | 34 | Bidirectional | GPIO3_PM.03 | 419 | Output |
| 221 | GPIO3_PO.03 | 403 | Bidirectional | GPIO3_PP.04 | 124 | Bidirectional | GPIO3_PG.03 | 371 | Bidirectional |
| 222 | GPIO3_PT.03 | 443 | Input | GPIO3_PE.01 | 33 | Input | GPIO3_PM.00 | 416 | Input |
| 223 | GPIO3_PO.04 | 404 | Bidirectional | GPIO3_PP.03 | 123 | Bidirectional | GPIO3_PG.04 | 372 | Bidirectional |
| 224 | GPIO3_PT.04 | 444 | Bidirectional | GPIO3_PE.00 | 32 | Bidirectional | GPIO3_PM.01 | 417 | Bidirectional |
| 225 | GPIO3_PO.05 | 405 | Bidirectional | GPIO3_PP.02 | 122 | Bidirectional | GPIO3_PG.05 | 373 | Bidirectional |
| 226 | GPIO3_PT.01 | 441 | Bidirectional | GPIO3_PE.03 | 35 | Bidirectional | GPIO3_PM.02 | 418 | Bidirectional |
| 227 | GPIO3_PO.01 | 401 | Bidirectional | GPIO3_PP.01 | 121 | Bidirectional | GPIO3_PG.01 | 369 | Bidirectional |
| 228 | GPIO3_PN.01 | 393 | Input | GPIO3_PE.06 | 38 | Input | GPIO3_PU.05 | 485 | Input |
| 229 | GPIO3_PO.00 | 400 | Output | GPIO3_PP.00 | 120 | Output | GPIO3_PG.00 | 368 | Output |
| 230 | GPIO3_PH.01 | 345 | Output | GPIO3_PE.07 | 39 | Output | GPIO3_PV.06 | 494 | Output |
| 232 | GPIO3_PI.03 | 355 | Bidirectional | GPIO3_PF.00 | 40 | Bidirectional | GPIO3_PW.00 | 496 | Bidirectional |
| 234 | GPIO3_PI.04 | 356 | Bidirectional | GPIO3_PF.01 | 41 | Bidirectional | GPIO3_PW.01 | 497 | Bidirectional |
| 236 | GPIO3_PCC.05 | 269 | Output | GPIO3_PU.00 | 160 | Output | GPIO3_PT.00 | 472 | Output |
| 238 | GPIO3_PCC.06 | 270 | Input | GPIO3_PU.01 | 161 | Input | GPIO3_PT.01 | 473 | Input |
| 240 | GPIO3_PEE.04 | 284 | Input | GPIO3_PX.05 | 189 | Input | GPIO3_PFF.00 | 528 | Input |

This Information is provided as is from TIS. TIS does not guarantee correctness but believes the numbers are correct. If you see any wrong information's, please let us know so we can correct the documentation.

## 6.3 How to calculate GPIOs

The above list should include every GPIO there is. This "how to" may help you find errors we did in our documentation or to calculate GPIOs for upcoming models as the NVIDIA Jetson Orin.

### 6.3.1 GPIOnumber

The basic formular is:

```
GPIOnumber = GPIOletter*8 + GPIOnumber + GPIOoffset
```

### 6.3.2 GPIOletter

The GPIOletter is located between [GPIO3_P] and [.*number*]

| GPIOname | GPIOletter | GPIOletter (referenced) |
|---|---|---|
| GPIO3_PO.01 | O | 14 (for Xavier NX) |
| GPIO3_PCC.04 | CC | 2 (for Xavier NX) |

This letter needs to be referenced to a number.

This number is individual to every Jetson module and can be found in the "tegra-gpio.h" (name may differ depending on module).

📖 Please also see the example table shown in GPIOoffset.

### 6.3.3 GPIOnumber

The GPIOnumber is easiest to get and can be extracted directly from the name: GPIO3_PO.[GPIOnumber]

| GPIOname | GPIOnumber |
|---|---|
| GPIO3_PO.01 | 1 |
| GPIO3_PCC.04 | 4 |

### 6.3.4 GPIOoffset

The offset is connected to the GPIOletter. The same GPIOletter has always the same GPIOoffset for one specific module and only differs for AON cores.

GPIOoffsets are listed later in the table.

### 6.3.5 Example

Calculating GPIO number GPIO3_PO.01 for Jetson Xavier NX:

```
GPIOnumber = GPIOletter*8 + GPIOnumber + GPIOoffset
GPIOnumber = 401 = 14*8 + 1 + 288
```

### 6.3.6 Table

| Jetson Xavier NX | | | |
|---|---|---|---|
| Alpha Key | Value | Offset | Note |
| A. | 0 | 288 | |
| B. | 1 | 288 | |
| C. | 2 | 288 | |
| D. | 3 | 288 | |
| E. | 4 | 288 | |
| F. | 5 | 288 | |
| G. | 6 | 288 | |
| H. | 7 | 288 | |
| I. | 8 | 288 | |
| J. | 9 | 288 | |
| K. | 10 | 288 | |
| L. | 11 | 288 | |
| M. | 12 | 288 | |
| N. | 13 | 288 | |
| O. | 14 | 288 | |
| P. | 15 | 288 | |
| Q. | 16 | 288 | |
| R. | 17 | 288 | |
| S. | 18 | 288 | |
| T. | 19 | 288 | |
| U. | 20 | 288 | |
| V. | 21 | 288 | |
| W. | 22 | 288 | |
| X. | 23 | 288 | |
| Y. | 24 | 288 | |
| Z. | 25 | 288 | |
| AA | 0 | 248 | AON GPIO |
| BB | 1 | 248 | AON GPIO |
| CC | 2 | 248 | AON GPIO |
| DD | 3 | 248 | AON GPIO |
| EE | 4 | 248 | AON GPIO |
| FF | 26 | 288 | |
| GG | 27 | 288 | |

| Jetson Nano | | |
|---|---|---|
| Alpha Key | Value | Offset |
| A. | 0 | 0 |
| B. | 1 | 0 |
| C. | 2 | 0 |
| D. | 3 | 0 |
| E. | 4 | 0 |
| F. | 5 | 0 |
| G. | 6 | 0 |
| H. | 7 | 0 |
| I. | 8 | 0 |
| J. | 9 | 0 |
| K. | 10 | 0 |
| L. | 11 | 0 |
| M. | 12 | 0 |
| N. | 13 | 0 |
| O. | 14 | 0 |
| P. | 15 | 0 |
| Q. | 16 | 0 |
| R. | 17 | 0 |
| S. | 18 | 0 |
| T. | 19 | 0 |
| U. | 20 | 0 |
| V. | 21 | 0 |
| W. | 22 | 0 |
| X. | 23 | 0 |
| Y. | 24 | 0 |
| Z. | 25 | 0 |
| AA | 26 | 0 |
| BB | 27 | 0 |
| CC | 28 | 0 |
| DD | 29 | 0 |
| EE | 30 | 0 |
| FF | 31 | 0 |

| Jetson TX2 NX | | | |
|---|---|---|---|
| Alpha Key | Value | Offset | Note |
| A. | 0 | 320 | |
| B. | 1 | 320 | |
| C. | 2 | 320 | |
| D. | 3 | 320 | |
| E. | 4 | 320 | |
| F. | 5 | 320 | |
| G. | 6 | 320 | |
| H. | 7 | 320 | |
| I. | 8 | 320 | |
| J. | 9 | 320 | |
| K. | 10 | 320 | |
| L. | 11 | 320 | |
| M. | 12 | 320 | |
| N. | 13 | 320 | |
| O. | 14 | 320 | |
| P. | 15 | 320 | |
| Q. | 16 | 320 | |
| R. | 17 | 320 | |
| S. | 18 | 320 | |
| T. | 19 | 320 | |
| U. | 20 | 320 | |
| V. | 21 | 320 | |
| W. | 22 | 320 | |
| X. | 23 | 320 | |
| Y. | 24 | 320 | |
| Z. | 25 | 320 | |
| AA | 0 | 256 | AON GPIO |
| BB | 1 | 256 | AON GPIO |
| CC | 2 | 256 | AON GPIO |
| DD | 3 | 256 | AON GPIO |
| EE | 4 | 256 | AON GPIO |
| FF | 26 | 320 | |
| GG | 27 | 320 | |

# 7. Appendix C: I2C

## 7.1 I2C device bus

I2C Examples of configurations and how to use.

| Bus | GEN1_I2C | GEN2_I2C | GEN3_I2C | CAM_I2C |
|---|---|---|---|---|
| Pins | 185 and 187 | 189 and 191 | 232 and 234 | 213 and 215 |
| Voltage (native) | 3.3V | 3.3V | 1.8V | 3.3V |
| Nano device | | | | 6 |
| TX2 NX device | 0 | | | |
| Xavier NX device | 1 | | | 2 |
| Crypto chip | | ATSHA204A | | |
| CSI-2 camera | CSI-CD | CSI-E | CSI-F | CSI-AB |
| GPIO header | 27 and 28 | 3 and 5 | | |
| EEPROM | | 24LC024 | | |

## 7.2 I2C usage of devices and registers

### 7.2.1 List i2c devices on a specific bus

Syntax: i2cdetect [options] <busNr>

```
test@test-desktop:~$ i2cdetect -y -r 8
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- 76 --
test@test-desktop:~$
```

### 7.2.2 Dump i2c device registers

Syntax: i2cdump [options] <busNr> <deviceAddress>

```
test@test-desktop:~$ i2cdump -y -f 8 0x76
No size specified (using byte-data access)
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f 0123456789abcdef
00: 00 00 ff ff 00 00 ff ff XX XX XX XX XX XX XX XX .......XXXXXXXX
10: XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XXXXXXXXXXXXXXXX
20: XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XXXXXXXXXXXXXXXX
...
d0: XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XXXXXXXXXXXXXXXX
e0: XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XXXXXXXXXXXXXXXX
f0: XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XXXXXXXXXXXXXXXX
test@test-desktop:~$
```

### 7.2.3 Set register value:

Syntax: i2cset [options] <busNr> <deviceAddress> <register> <address> <value>

```
@test-desktop:~$ sudo i2cset -y -f 8 0x76 0x06 0x00
test@test-desktop:~$
```

### 7.2.4 Read register value:

Syntax: i2cget [options] <busNr> <deviceAddress> <register> <address>

```
test@test-desktop:~$ sudo i2cget -y -f 8 0x76 0x06 0x00
test@test-desktop:~$
```