Technical Reference Manual

NVIDIA Jetson Orin Reference Design

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

CBM-NVA-ONX-16-128-V4-M2

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 4-Channel MIPI CSI-2 Carrier Board with Jetson Orin NX SoM (CBM-NVA-ONX-16-128-V4-M2)**.

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

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The Imaging Source Company reserves the right to make changes in specifications, function or design at any time and without prior notice.

1.3 Revision history

The following versions of this manual have been published:

Version	Comment
April 2026, Revision -01 (Board Revision V1.20)	First issue of document

2. Overview

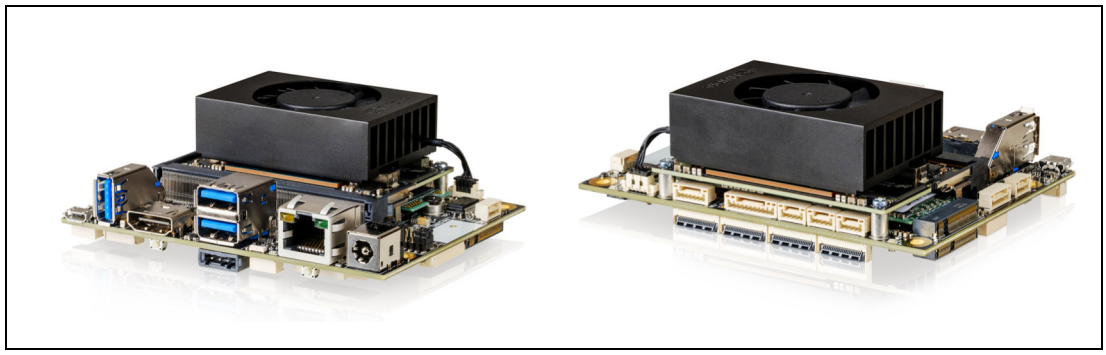


Figure 1: NVIDIA Jetson Orin Reference Design,
4-Channel MIPI CSI-2 Carrier Board with Jetson Orin NX 16 GB SoM.

2.1 JNX40S carrier board

The JNX40 carrier board has been designed for the Jetson Orin Nano and Orin NX primarily.

The JNX40 supports low level remote system management features:

- remote power cycle
- change of boot device

  Orin: primary: SSD, secondary: USB
- Limited remote debugging

The features above are implemented with the following hardware:

- UART connection between MCU and LTE module
  - This requires an LTE module with USB and UART (e.g. SIMCOM 7600)
  - It also requires firmware enhancement of the MCU
- Console UART connection (Jetson and MCU)
- 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 JNX40S features

Description	JNX40S
Compatible SoM	Jetson Orin Nano/NX
Power in	19V
HDMI 2.0	Up to 4kp60
Fan connector	Yes, 5V for original NVIDIA heatsink/fan
M.2 key B	USB 2.0 for LTE

Description	JNX40S
M.2 key E	PCIe x1 + USB 2.0 (Wi-Fi)
M.2 NVME Key M	Yes, 2280 SSD
USB 3.0	3x 3.3
micro-USB	OTG (for flashing) and host mode
Auto Flashing	Yes (plug in host cable and flash)
USB 2.0	1x USB 2.0 (JST-GH, J8, J23)
Ethernet	5GbE or 10GbE (with M.2 Key E) (J24)
PoE option	PoE++ (802.3bt Type 4 72W) (with the use of our Px modules
CSI	4x CSI-2 (2 lanes) plus camera LED (hardware sync available)
CAN RX / TX	Yes
UART	2x (1x when using LTE module) (3.3V)
I2C	3x (3.3V)
I2S	1x (3.3V)
SPI	1x (1.8V)

Host mode: peripheral devices like mouse and keyboard may be connected.

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).

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 3.3	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 (like electrolytic capacitors)

2.4 Model pictures

2.4.1 JNX40S

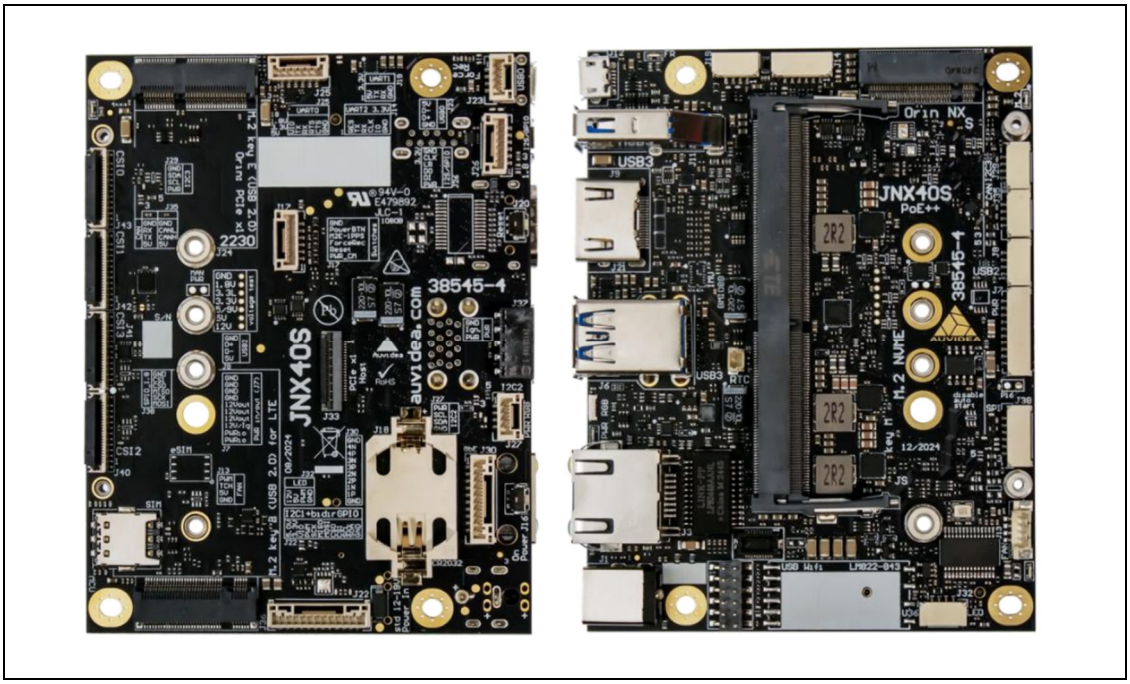


Figure 2: JNX40S Topside (left) and bottom side (right) view

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 100 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-V4-M2 (article number)

CBM-NVA-ONX-16-128-V4-M2 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)
4	JNX40S Carrier Board (4x MIPI CSI-2 ports)
M2	Default

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

This board features 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)

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 - 19V	12V nominal (absolute max. 24V)
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).

4.2 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.

4.3 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.

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

To support an extended power input range (12V – 48V) please order one of our available power modules.

4.5 J5 – RTC

4.6 J6 USB 3.3

Power cycling of the USB ports is possible.

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		

4.7 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		

4.8 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).

USB Hub Chip – GL850G.

4.9 J9 - HDMI

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

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

4.10 J11 – USB 3.1

USB 3.1 Type A standard pinout.

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

Power cycling of the USB ports is possible.

USB 3.1

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		

4.11 J12 - Micro USB

Standard pinout.

OTG support (to flash the compute module).

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

4.12 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	

4.13 J14 – UART Connector

JST-GH 1.25mm

Pin	Description	Socket pin	Note
1	MCU_NRST		MCU reset
2	UART1_TXD	203	UART connection between M.2 LTE card and MCU - do not drive this line - this is just for debugging purposes
3	UART1_RXD	205	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 as 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 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.

4.14 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)

4.15 J19 – Debug Console UART2

JST-GH 1.25mm

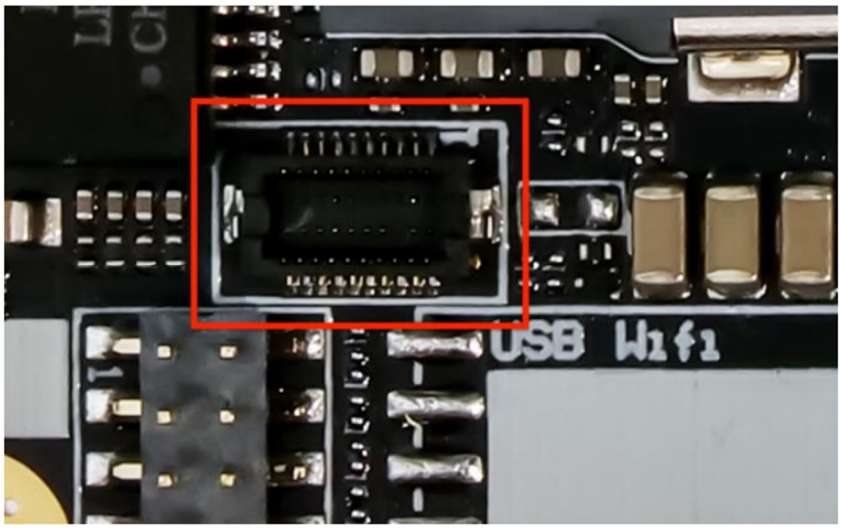
Pin	Description	Socket pin	Note
1	5V		5V 1A max (no current limiter)
2	UART2_TXD	236	
3	UART2_RXD	238	
4	GND		

CAN_RX and CAN_TX: must not be directly connected to the CAN Bus as there is the risk of damaging the Jetson compute module.

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.

4.16 J28: POE++ extension connector



❒ 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)
- P17P 4PPoE on request (40-70W PoE PD, 802.3bt, class 5-8)
- P14 PoE PSE 24V power module (38624)

- P14P PoE PSE-48V is available for projects.

Please note that the standard connector is only compatible with our P-variant power modules. (P14P, P17P, etc.)

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
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 more.

4.17 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
3	CAM_I2C_SDA	215	3.3V level
4	GND		

4.18 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 OUT: open drain (3.3V to 12V)
4	CAM_LED	218	Inverted GPIO, wired OR CSI-MCLKs 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.

4.19 J35 – CAN

JST-GH 1.25mm

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

CAN_H and CAN_L output option:
CAN_RX and CAN_TX: must not be directly connected to the CAN bus as there is the risk of damage to the Jetson compute module.

For CAN_RX and CAN_TX, an external CAN transceiver module must be used. Our carrier boards are populated with the transceiver: TJA1051 (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 must be moved. This is a hardware strapping option.

4.20 J38 – SPI

Pin	Description	Socket pin	Note
1	SPI0_MOSI	89	
2	SPI0_SCK	91	
3	SPI0_MISO	93	
4	SPI0_CS0	95	
5	SPI0_CS1	97	
6	GND		

4.21 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 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/

4.22 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.

4.23 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.

4.24 Force Recovery Button

5. Pinout description bottom side

5.1 J20 - Reset Button

Press to reset the compute module.

5.2 J22 – SPI

JST-GH 1.25mm

Pin	Description	Socket pin	Note
1	5.0 V		5.0V 1A max (no current limiter)
2	3.3 V		3.3V (current depending on version: 100 or 500mA)
3	VIO		3.3V: power to Bidirectional Level Shifter. Can be switched to power input if component L22 must be removed)
4	GPIO12	218	3.3V PWM
5	SPI1_SCK	106	3.3 V
6	SPI1_MISO	108	3.3 V
7	SPI1_MOSI	104	3.3 V
8	SPI1_CS0	110	3.3 V (may be reconfigured as GPIO)
9	SPI1_CS1	112	3.3 V (may be reconfigured as GPIO)
10	GEN1_I2CO_SCL	185	3.3V (pull up on Jetson)
11	GEN1_I2C0_SDA	187	3.3V (pull up on Jetson)
12	GND		

5.3 J25 - UART0

JST-GH 1.25mm

Pin	Description	Socket pin	Note
1	3.3 V		Can be switched to 5V or 1.8V with replacement of component L16 with eighter L24 or L20
2	UART0_TXD	99	3.3 V
3	UART0_RXD	101	3.3 V
4	UART0_RTS	103	3.3 V
5	UART0_CTS	105	3.3 V
6	GND		

5.4 J27 - I2C

JST-GH 1.25mm

Pin	Description	Socket pin	Note
1	5V		Can be switched to 3.3V if component R135 is re-placed by R136
2	I2C1_SCL	189	3.3V level
3	I2C1_SDA	191	3.3V level
4	GND		

5.5 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	
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		

5.6 J37 – Harting power connector

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

Pin	Description	Note
1	12V - 19V	input power (always on)
2	12V - 30V	ignition power (Jetson: pin 127 – inverted, MCU: PB0) – weak pullup to 3.3V – GPIO input
3	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 monitors the pin to turn on power to the Jetson
- The Jetson monitors this pin to gracefully turn off the system

The Harting connector 14110313002000 requires the corresponding counterpart 14310313101000.

5.7 J23 – USB 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		

5.8 LED Force Recovery

5.9 J26 – I2S/GPIO

Implements the TBX0104RUTR 4-Bit Bidirectional Voltage-Level Translator with Automatic Direction Sensing and ±15kV ESD Protection.

Power cycling of the USB ports is possible.

Pin	Description	Socket pin	Note
1	3.3V		Can be switched to 1.8V if component L9 is replaced by L10
2	I2S0_DIN	195	3.3V with bidirectional level translator
3	I2S0_DOUT	193	3.3V with bidirectional level translator

Pin	Description	Socket pin	Note
4	I2S0_FS	197	3.3V with bidirectional level translator
5	I2SO_SCLK	199	3.3V with bidirectional level translator
6	GND		

5.10 J30 – GbE

Pin	Description	Socket pin	Note
1	GND		
2	4N		
3	4P		
4	3N		
5	3P		
6	2N		
7	2P		
8	1N		
9	1P		
10	GND		

5.11 J17 – Switches

Pin	Description	Socket pin	Note
1	PWR_CM		Power supply for the compute module (5V or 9V depending on module, 9V while using super mode)
2	Sys Reset	239	Jetson Reset
3	FORCE_RECOVERY	214	
4	M.2 1PPS		M.2 Key E 1PPS signal*
5	BTN_PWR_ON		
6	GND		

*The M.2 cards provided by TIS support the 1PPS capability, other cards my not support this feature.

5.12 J18 – CR2032

Plus contact on the top side.

5.13 J16 – Power On button

5.14 J36 - M.2 Key B 3042 /Nano SIM card slot

This slot is supposed to be used as a LTE, E-Sim is available as an optional feature.

5.15 J24 - M.2 Key E 2230

This supports the 1PPS signal to pin17. Compatible with Wi-Fi cards for example the Intel IX200. A 2042 card can also be mounted, the spacer for 2230 cards can be removed on request. Only PCIe x1 can be used with the Orin module, other modules feature USB 2.0.

5.16 J40 – CSI2

The configuration used by our CSI is equivalent to the one used by the NVIDIA development kit.

22 pin 0.5mm pitch FPC connector (contacts down)

Pin	Description	Socket pin	Note
1	3.3V		Power: connected with bead to 3.3V (5V optional if L17 is removed)
2	CAM_I2C_SDA	215	CAM-I2C via multiplexer (3.3V)
3	CAM_I2C_SCL	213	CAM-I2C via multiplexer (3.3V)
4	GND		
5	CAM1_MCLK		IN: wired OR to control CAM_LED
6	CAM1_PWDN	120	OUT: LC (1.8V), LM/M2: 3.3V
7	GND		
8	NC	NC	
9	NC	NC	
10	GND		
11	CSI_B_D0_P	5	
12	CSI_B_D0_N	3	
13	GND		
14	CSI2_E_CLK_P	30	
15	CSI2_E_CLK_N	28	
16	GND		
17	CSI2_E_D1_P	36	
18	CSI2_E_D1_N	34	
19	GND		
20	CSI2_E_D0_P	24	

Pin	Description	Socket pin	Note
21	CSI2_E_D0_N	22	
22	GND		

5.17 J41 – CSI3

The configuration used by our CSI is equivalent to the one used by the NVIDIA development kit.

22 pin 0.5mm pitch FPC connector (contacts down)

Pin	Description	Socket pin	Note
1	3.3V		Power: connected with bead to 3.3V (5V optional if L17 is removed)
2	I2C1_SDA	191	
3	I2C1_SCL	189	
4	GND		
5	CAM0_MCLK		
6	GPIO01	118	PWDN3
7	GND		
8	NC	NC	
9	NC	NC	
10	GND		
11	NC	NC	
12	NC	NC	
13	GND		
14	CSI3_F_CLK_P	29	
15	CSI3_F_CLK_N	27	
16	GND		
17	CSI3_F_D1_P	35	
18	CSI3_F_D1_N	33	
19	GND		
20	CSI3_F_D0_P	23	
21	CSI3_F_D0_N	21	
22	GND		

5.18 J42 – CSI1

The configuration used by our CSI is equivalent to the one used by the NVIDIA development kit.

22 pin 0.5mm pitch FPC connector (contacts down)

Pin	Description	Socket pin	Note
1	3.3V		Power: connected with bead to 3.3V (5V optional if L17 is removed)
2	I2C0_SDA	187	
3	I2C0_SCL	185	
4	GND		
5	CAM1_MCLK		
6	GPIO13	228	PWDN4
7	GND		
8	NC	NC	
9	NC	NC	
10	GND		
11	NC	NC	
12	NC	NC	
13	GND		
14	CSI1_B_CLK_P	11	
15	CSI1_B_CLK_N	9	
16	GND		
17	CSI1_B_D1_P	17	
18	CSI1_B_D1_N	15	
19	GND		
20	CSI1_B_D0_P	5	
21	CSI1_B_D0_N	3	
22	GND		

5.19 J43 – CSI0

The configuration used by our CSI is equivalent to the one used by the NVIDIA development kit.

22 pin 0.5mm pitch FPC connector (contacts down)

Pin	Description	Socket pin	Note
1	3.3V		Power: connected with bead to 3.3V (5V optional if L17 is removed)
2	CAM_I2C_SDA	215	
3	CAM_I2C_SCL	213	
4	GND		
5	CAM0_MCLK		
6	CAM0_PWDN	114	
7	GND		
8	NC	NC	
9	NC	NC	
10	GND		
11	NC	NC	
12	NC	NC	
13	GND		
14	CSI0_A_CLK_P	12	
15	CSI0_A_CLK_N	10	
16	GND		
17	CSI0_A_D1_P	18	
18	CSI0_A_D1_N	16	
19	GND		
20	CSI0_A_D0_P	6	
21	CSI0_A_D0_N	4	
22	GND		

6. Appendix A: Connecting MIPI CSI-2 cameras

MIPI CSI-2 cameras can connect to the four CSI-2 connectors.

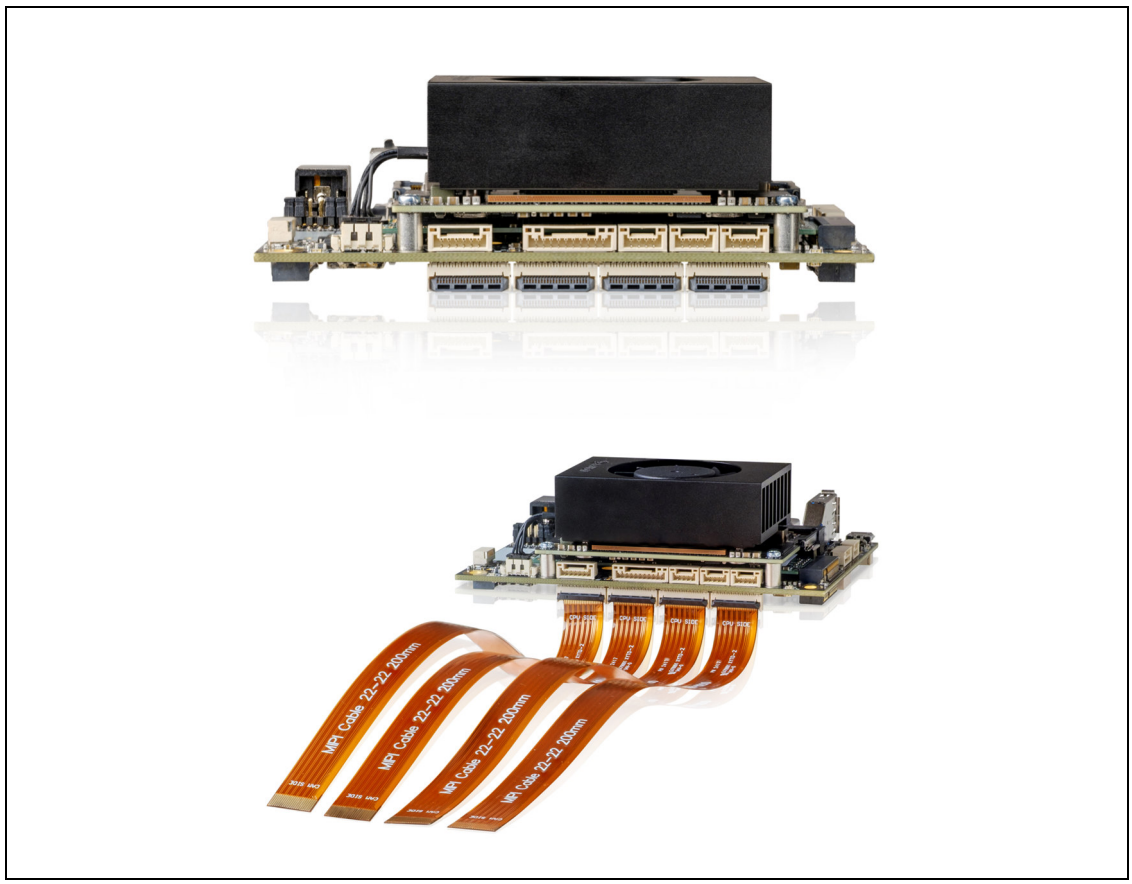


Figure 3: Connection of four MIPI CSI-2 cameras via a 22-pin 0,2 mm FFC cable

7. Appendix B: GPIO

7.1 GPIO control

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

7.1.1 Export GPIO

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

7.1.2 Change direction to in

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

7.1.3 Change direction to out

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

7.1.4 Set GPIO low

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

7.1.5 Set GPIO high

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

7.1.6 Readout GPIO value

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

8. Appendix C: I2C

8.1 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
Crypto chip		ATSHA204A		
CSI-2 camera	CSI-CD	CSI-E	CSI-F	CSI-AB
GPIO header	27 and 28	3 and 5		
EEPROM		24LC024		

8.2 I2C usage of devices and registers

8.2.1 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:~$
```

8.2.2 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:~$
```

8.2.3 Set register value:

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

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

8.2.4 Read register value:

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

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