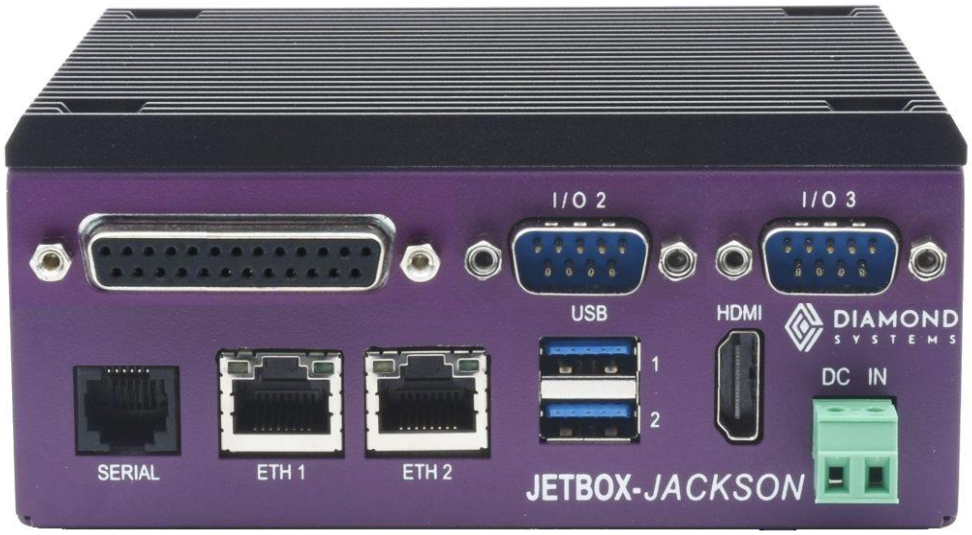
JetBox-Jackson™

NVIDIA® Jetson Orin Nano / NX System

User Manual

Revision 2.0



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Technical Support Request Form
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Revision 2.0

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Notices
Technical Support Please use the Technical Support Request form to request assistance with a product you have already purchased.
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Important Safe Handling Information

WARNING!

ESD-Sensitive Electronic Equipment

- Observe ESD-safe handling procedures when working with this product.
- Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.
- Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The Osbourne carrier board contains a high number of I/O connectors with connections to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation, and connection to other equipment.

This section provides critical, best practice suggestions to avoid damage to your products. It includes descriptions of many common causes of damage – all of which can void your warranty.

Please follow these guidelines to be aware of common causes of damage and take the necessary precautions to prevent damage to your Diamond Systems' (or any vendor's) embedded computer boards.

Damage from incorrect handling or storage

- Physical and electronic damage can occur from mishandling. The following are frequent scenarios.
- An electrostatic discharge (ESD) causes a board to malfunction or stop working entirely. If ESD occurs, typically there is no visual sign of damage. While it is often difficult to identify faulty component(s), if the fault is identified there is a good chance that the board can be repaired.
- A screwdriver slips during installation, causing a gouge in the PCB surface and cutting signal traces or damaging components.
- A board is dropped, causing damage to the circuitry near the point of impact. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge. These design rules can minimize but cannot always prevent damage from impact.
- A short occurs when a metal screwdriver tip slips, or a screw drops onto a board while it is powered on. This can cause overvoltage or power supply problems described below.
- A storage rack with slots to hold boards can damage components near the board edge. Many boards have components that are close to the board edge, which are subject to damage in racks.
- Connector pins are bent by improperly dis-assembling attached boards or ribbon cables from a pin header, or from physical impact or improper storage. Typically, bent pins can be repaired one at a time with needle-nose pliers. Severely bent or frequently repaired pins may require the replacement of the connector.

Best Practices to avoid damage during handling or storage

- To prevent ESD damage, always follow proper ESD-prevention practices when handling any electronic components.
- To prevent physical damage from impact, handle all boards with care and work in a safe, spacious environment.
- To prevent short circuit damage from a metallic tool or dropped screw, perform assembly operations ONLY when the system is powered off.

- To prevent damage to fragile components and connector pins in storage, always store boards in individual ESD-safe sleeves in sturdy bins with dividers between boards. Do NOT use racks with slots, or stack boards in a pile or in close proximity.
- To prevent damage to connector pins during assembly or dis-assembly, use caution to align connectors and especially when force is needed to disassemble components and wires. Do not 'rock' connectors back and forth or pull any component at the wrong angle.

Damage due to incorrect voltage or connections

Power supply wired backwards

Diamond Systems power supplies and boards are not designed to withstand a reverse power supply connection. Reverse power will destroy nearly every IC that is connected to the power supply. Reverse power damage is rarely repairable. Check twice before applying power!

Board not installed properly in PC/104 stack

If a PC/104 board is accidentally shifted by 1 row or 1 column (of pins) it is possible for power and ground signals on the bus to contact the wrong pins. For example, this can damage components attached to the data bus because it puts the ±12V power supply lines directly on data bus lines.

Overvoltage on analog input

If a voltage applied to an analog input exceeds the design specification of the board, the input multiplexor and/or parts behind it can be damaged. Most of our boards will withstand an erroneous connection of up to ±35V on the analog inputs, even when the board is powered off, but not all boards, and not in all conditions.

Overvoltage on analog output

If an analog output is accidentally connected to another output signal or a power supply voltage, the output can be damaged. On most of our boards, a short circuit to ground on an analog output will not cause trouble.

Overvoltage on digital I/O line

If a digital I/O signal is connected to a voltage above the maximum specified voltage, the digital circuitry can be damaged. On most of our boards the acceptable range of voltages connected to digital I/O signals is 0-5V, and they can withstand about 0.5V beyond that (-0.5 to 5.5V) before being damaged. However, logic signals at 12V and even 24V are common, and if one of these is connected to a 5V logic chip, the chip will be damaged, and damage may extend past that chip to others in the circuit.

Best Practices to avoid damage due to incorrect voltage or connections

- Ensure all power supply connections are correct and not reversed!
- Ensure all pins are aligned properly before and after assembling boards and components!
- Ensure proper voltage is supplied to all analog inputs!
- Ensure all analog voltage outputs do not connect to another signal output or power supply output!
- Ensure all voltages for digital I/O lines are proper and with range, and that higher voltage signals (24V or 12V) are not supplied to lower voltage circuits (12V or 5V)!

IMPORTANT! Always check twice before Powering Up!

1. Introduction and System Configurations

1.1. JetBox-Jackson Overview

JetBox-Jackson is a rugged deployable solution for AI at the edge utilizing the Nvidia Jetson Orin NX and Jetson Orin Nano compact GPU modules. JetBox-Jackson includes the Jackson carrier board and the selected Jetson module with Linux OS loaded, integrated into a compact steel + aluminum enclosure. The integrated heat sink cover provides cooling without additional fan. An internal M.2 socket supports up to 2TB additional storage beyond the flash included on the Jetson module.

The system is compatible with both 12V and 24V DC power supplies. A 12VDC universal AC adapter is included with the system.

JetBox-Jackson provides access to 16 digital I/O ports via a 16-position screw terminal on the front panel. The enclosure is mountable on a DIN rail or placed on a tabletop.

JetBox-Jackson with the Orin NX module additionally supports one CAN port with an internal cable that replaces one of the serial ports on the front panel.

1.2. Jetson System-on-Module (SoM) Overview

JetBox-Jackson equips the Jetson Orin Nano and Jetson Orin NX Nvidia modules. These modules are powerful AI computing platform. The architecture of the modules compatible with Jackson carrier board to build a complete embedded system through interface circuitry and I/O connectors for all the major features of the module. The system also provides a CAN port and a 2nd Ethernet port with the Orin NX module.

1.2.1. Jetson Orin Nano Features Description

The Jetson Orin Nano series modules deliver up to 67 TOPS of AI performance in the smallest NVIDIA Jetson™ form factor, with power options between 7W and 25W. This gives you up-to 142X the performance of NVIDIA Jetson Nano. Jetson Orin Nano is available in 8GB and 4GB versions.

Features	Jetson Orin Nano 4GB	Jetson Orin Nano 8GB
AI Performance	34 TOPs	67 TOPs
GPU	512 core NVIDIA Ampere GPU with 16 Tensor Cores	1024 core NVIDIA Ampere GPU with 32 Tensor Cores
CPU	6-core NVIDIA Arm® Cortex A78AE v8.2 64-bit CPU, 1.5 GHz 1.5MB L2 + 4MB L3	6-core NVIDIA Arm® Cortex A78AE v8.2 64-bit CPU, 1.5 GHz 1.5MB L2 + 4MB L3
VIDEO ENCODE	1080p30 supported by 1-2 CPU cores	1080p30 supported by 1-2 CPU cores
VIDEO DECODE	1x 4K60 (H.265), 2x 4K30 (H.265), 5x 1080p60 (H.265), 11x 1080p30 (H.265)	1x 4K60 (H.265), 2x 4K30 (H.265), 5x 1080p60 (H.265), 11x 1080p30 (H.265)
MEMORY	4GB 64-bit LPDDR5@2133 MHZ, 51 GB/s	8GB 128-bit LPDDR5@2133 MHZ, 102 GB/s
CONNECTIVITY	1 Gigabit Ethernet, 3 x1 + 1 x4 PCIe lanes	1 Gigabit Ethernet, 3 x1 + 1 x4 PCIe lanes
DISPLAY	1x 4K30 multi-mode DP 1.2 (+MST)/eDP 1.4/HDMI 1.4**	1x 4K30 multi-mode DP 1.2 (+MST)/eDP 1.4/HDMI 1.4**
USB	3x USB 3.2 Gen2 (10 Gbps) 3x USB 2.0	3x USB 3.2 Gen2 (10 Gbps) 3x USB 2.0

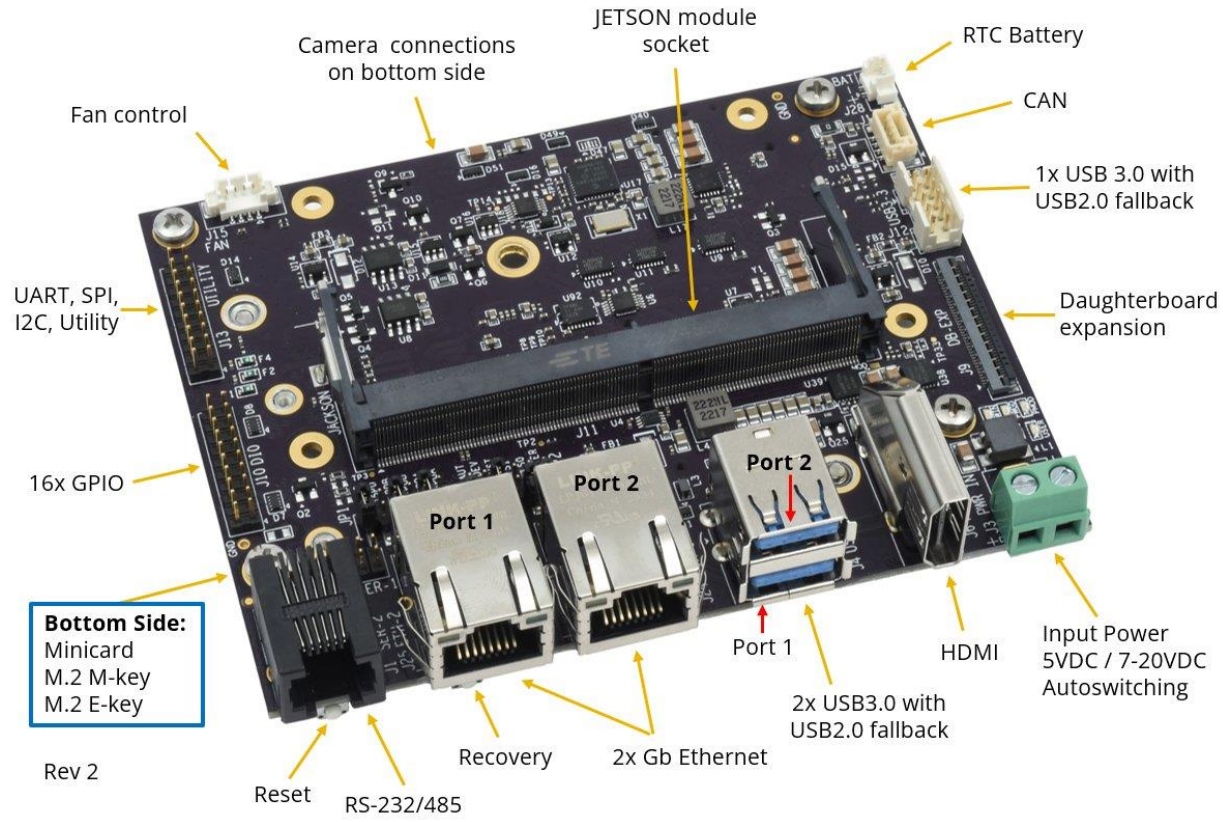
1.2.2. Jetson Orin NX Features Description

The Jetson Orin NX is built around a low-power version of the NVIDIA Orin SoC, delivering up to 157 TOPs of AI performance, combining the NVIDIA Ampere™ GPU architecture with 64-bit operating capability with power options between 10W and 40W. Jetson Orin NX is available in 8GB and 16GB versions.

Features	Jetson Orin NX 8GB	Jetson Orin NX 16GB
AI Performance	117 TOPs	157 TOPS
GPU	1024 core NVIDIA Ampere GPU with 32 Tensor Cores	1024 core NVIDIA Ampere GPU with 32 Tensor Cores
CPU	6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3	8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3
VIDEO ENCODE	1x 4K60 (H.265) 3x 4K30 (H.265) 6x 1080p60 (H.265) 12x 1080p30 (H.265)	1x 4K60 (H.265) 3x 4K30 (H.265) 6x 1080p60 (H.265) 12x 1080p30 (H.265)
VIDEO DECODE	1x 8K30 (H.265), 2x 4K60 (H.265), 4x 4K30 (H.265), 9x 1080p60 (H.265), 18x 1080p30 (H.265)	1x 8K30 (H.265), 2x 4K60 (H.265), 4x 4K30 (H.265), 9x 1080p60 (H.265), 18x 1080p30 (H.265)
MEMORY	8GB 128-bit LPDDR5 102.4GB/s	16GB 128-bit LPDDR5 102.4GB/s
CONNECTIVITY	1 Gigabit Ethernet, 3 x1 + 1 x4 PCIe lanes	1 Gigabit Ethernet, 3 x1 + 1 x4 PCIe lanes
DISPLAY	1x 8K30 multi-mode DP 1.4a (+MST)/eDP 1.4a/HDMI 2.1	1x 8K30 multi-mode DP 1.4a (+MST)/eDP 1.4a/HDMI 2.1
USB	3x USB 3.2 Gen2 (10 Gbps) 3x USB 2.0	3x USB 3.2 Gen2 (10 Gbps) 3x USB 2.0

1.3. Jackson Carrier Board

The heart of JetBox-Jackson is the Diamond Systems Jackson carrier board. The system assembly consists of the Jackson carrier board, the Jetson module installed on it with a custom-tailored Linux operating system installed, an RTC battery, and an internal thermal transfer block to carry the Jetson heat to the top cover, all housed inside a 2-part enclosure with steel body and aluminum heat sink top cover.



1.4. System Configurations

JetBox-Jackson is available with two models of Jetson modules. The architecture of these modules allows a CAN port and a 2nd Ethernet port with the NX module.

Feature	JB-JAX-ONA8-1T-01	JB-JAX-ONX8-1T-01	JB-JAX-ONX16-1T-01
Module supported	Nano	NX	NX
Gigabit Ethernet	1	2	2
USB 3.0	2	2	2
USB3.0/USB 2.0	1	1	1
Serial ports	1 RS-232 + 1 RS-232/485	1 RS-232 + 1 RS-232/485	1 RS-232 + 1 RS-232/485
Display	1 HDMI + 1 DP	1 HDMI + 1 DP	1 HDMI + 1 DP
Storage / Expansion socket	M.2 M-Key 2242 / 2280 dual footprint	M.2 M-Key 2242 / 2280 dual footprint	M.2 M-Key 2242 / 2280 dual footprint
GPIO	16x GPIOs with 3.3V/5V Compatibility	16x GPIOs with 3.3V/5V Compatibility	16x GPIOs with 3.3V/5V Compatibility
CAN	N/A	1 port* (* replaces 1 serial port on the front panel)	1 port* (* replaces 1 serial port on the front panel)

2. Functional Overview

2.1. Power Supply

The JetBox-Jackson system with either Orin NX or Orin Nano module can be powered from a wide input voltage range of 8V to 20V. If the Nano module is installed, the system can also be powered with +5VDC +/-5%. The Jackson carrier board in the system has an auto-switching power circuit that will route 5V from the internal power supply to the module in the case that a higher input voltage is detected.

Module	Module ID	Module Input Voltage	JetBox Input Voltage
Orin Nano	0	5VDC	5VDC +/-5% or 8-20VDC
Orin NX	1	8-20VDC	8-20VDC

2.2. USB

The system provides access to 2x USB3.2 ports (with fallback support of USB2.0). The lower positioned USB port is used for programming the system in Recovery mode. No separate connector is provided for recovery mode.

2.3. Ethernet

The system provides 1 or 2 10/100/1000 Ethernet ports on RJ-45 jacks. The left jack is operational on all models and is provided by the Jetson module. On systems with the Nano module, only this one Ethernet port is available. On systems with the NX module, the right jack is also operational and is derived from an Intel WGI210IT PCIe Ethernet controller on the Jackson carrier board.

The Ethernet jacks use **TIA568B** pinout. The jacks are equipped with LINK and ACT LEDs.

2.4. Digital I/O

The system provides 16 digital I/O lines, that can be individually configurable as an input or output. Digital I/O lines are realized using an I2C GPIO expander and made available on a DB25 female connector on the front panel. The I/O is jumper-configurable for 3.3V or 5V logic levels and for 10K ohm pull-up / pull-down resistors. The default setting is 3.3V and pull-down resistors.

2.5. Serial Ports

The system supports two serial ports. Port #1 is on the DB9 connector labeled I/O 2 and has fixed RS-232 protocol. Port 2 is on an RJ-12 connector and is jumper-configurable for RS-232 or RS-485.On systems with the Nano module installed, port 2 is also available on DB9 connector labeled I/O 3. In this configuration, either the RJ-12 or the DB9 connector may be used, but not both simultaneously.

2.6. Controller Area Network (CAN)

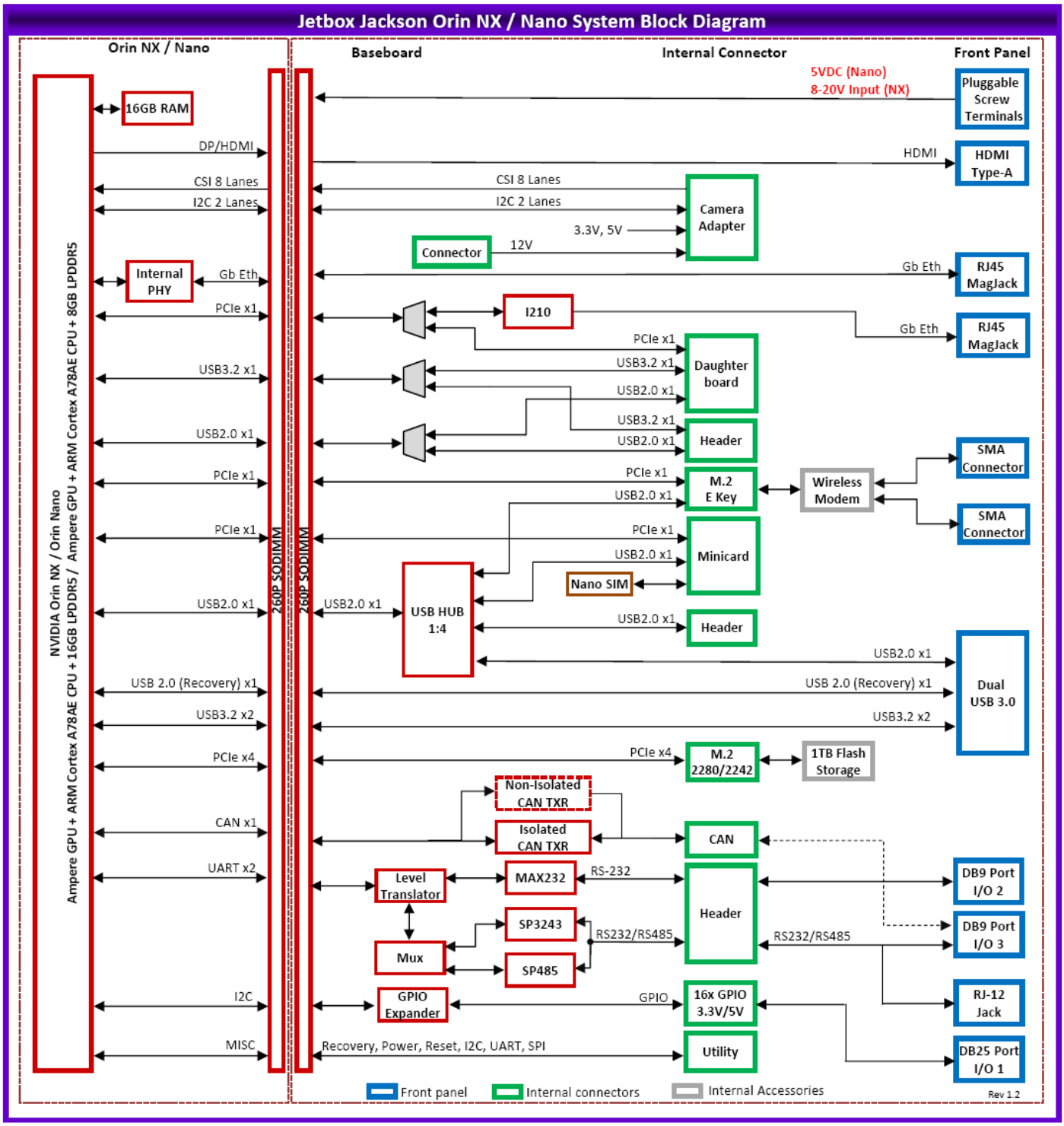
Systems with the NX Jetson module include one CAN port. The interface is realized with a non-isolated transceiver TJA1042T. As an option an isolated transceiver ADM3053BRWZ can be installed; please contact the factory for more information.

2.7. Display

The system offers one HDMI2.1 a/b video output option with audio. The HDMI video output is available on a single port vertical RA type HDMI connector.

3. Block Diagram

For completeness, the diagram below shows the underlying Jackson carrier board with the installed Jetson module inside the JetBox enclosure. All features on the Jackson board are shown including expansion sockets. Interfaces available externally are shown on the right. If access to the expansion sockets (M.2 E key and minicard) are desired, the system must be disassembled since these are located on the bottom of the Jackson carrier board.



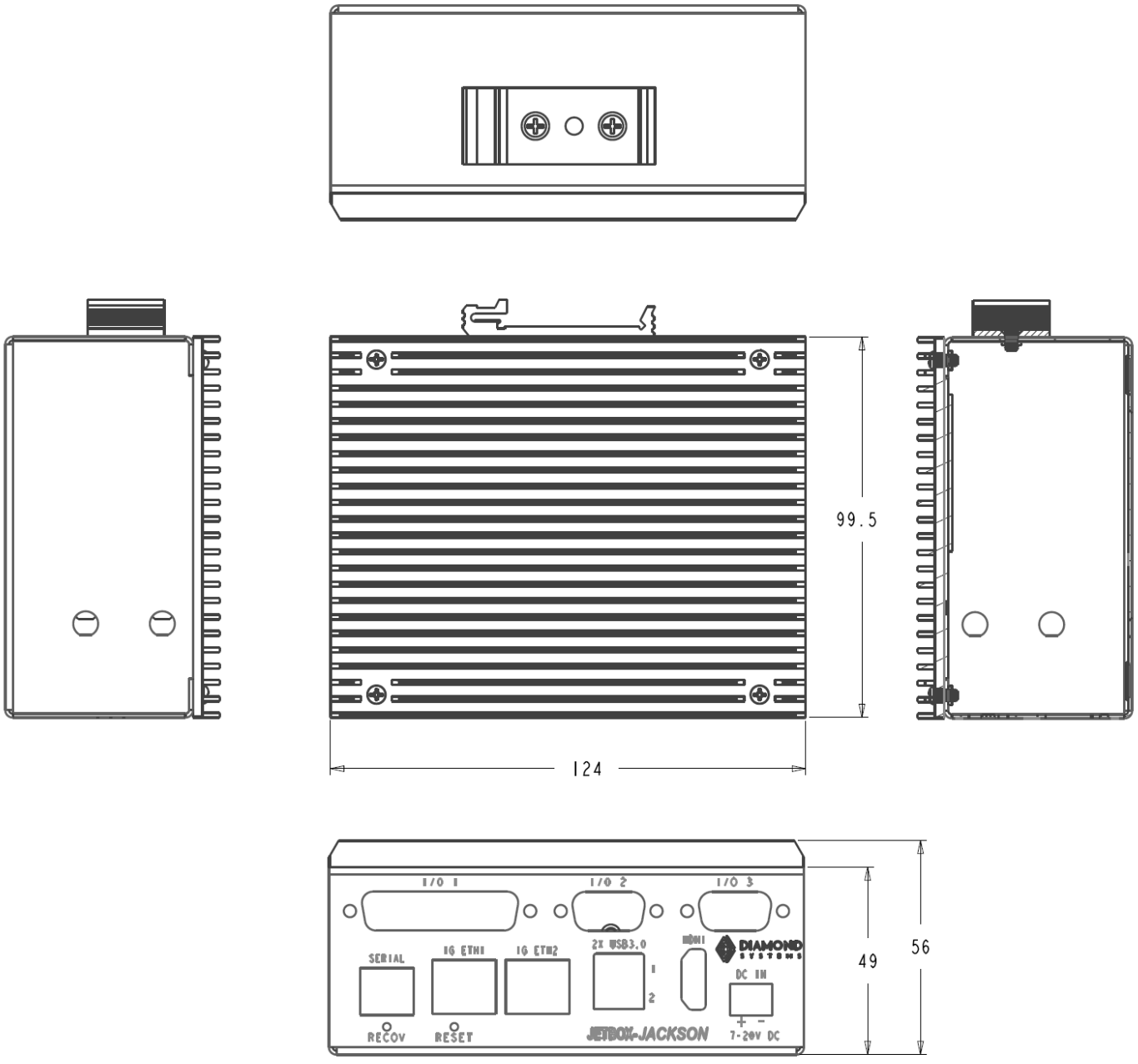
Link to higher resolution drawing

4. Mechanical Drawing

Drawing dimensions are in mm.

124 x 56 x 99.5mm W x H x D

4.88 x 2.20 x 3.92 in. W x H x D



5. Connector Specifications

5.1. Power In

Power input is via a pluggable screw terminal block. The enclosure provides + and – labels to identify the correct wiring polarity. The screw terminals have 0.2” pitch and elevator style contacts for improved reliability.

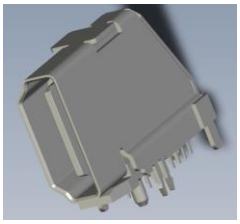
Important note: There is no connection between the power supply – input and the chassis.

Pin	Description
+	8-20VDC (5VDC optional for Nano only)
-	Ground or power supply - output

Connector manufacturer	Phoenix Contact
Socket on main board	 1836189
Standard pluggable screw terminal block Screw terminals in high position revealing +/- markings on front panel	 1900772
Optional pluggable screw terminal block Screw terminals in low position hiding +/- markings on front panel	 1836079

5.2. HDMI

The HDMI port is provided on a standard vertical stacked standard connector as shown below. The connector follows the industry-standard pinout.

Connector PN: QJ3119C-WFB1-4F Mating cable PN: Standard HDM cable	

5.3. Serial Ports RS232

Two serial ports are provided on this connector, one supporting fixed RS-232 and the second supporting RS232/RS485 (selected basis the Jumper settings). The RS232/RS485 or UART is also available in RJ12 connector on the front edge but at a time only one of the connectors must be used.

TX1	**1**	**2**	RTS1
RX1	**3**	**4**	CTS1
GND	**5**	**6**	GND
TX2/TX2_P/RX2_P	**7**	**8**	RTS2/TX2_N/RX2_N
RX2	**9**	**10**	CTS2

Connector type: 2x5 2mm Header Connector PN: 0877581016 Mating Cable PN: 6981075	

5.4. Serial Port/ RS232 /RS485

1	NC
2	TX2/TX2_P/RX2_P
3	RX2
4	RTS2/TX2_N/RX2_N
5	GND
6	CTS2

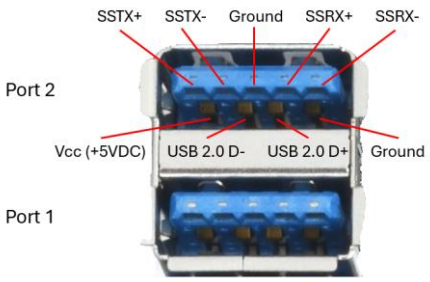
Serial port 2 is available on an RJ-12 connector along the front edge of the board.

Connector type: RJ12 (6P6C) right angle Connector manufacturer / PN: Link-PP LPJE174-0NNL Mating Cable PN: 6980104 or any RJ-12 cable with user-specified termination at the other end	

5.5. USB 3.2

Two USB3.2/USB2.0 ports are accessed with a right-angle stacked standard connector as shown below. Both ports follow the standard pinout. Port 1 is the lower connector, and port 2 is the upper connector.

1	USB_PWR
2	USB2_D-
3	USB2_D+
4	GND
5	USB3_RX-
6	USB3_RX+
7	GND
8	USB3_TX-
9	USB3_TX+

Connector PN: 484060003 Mating Cable PN: Industry-standard USB 3.0 compliant type A male		

5.6. Ethernet (J24, J25)

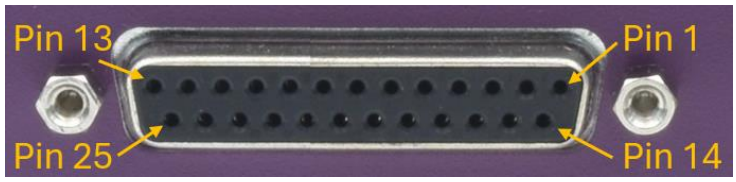
The Ethernet ports are terminated on two right-angle RJ-45 jacks with integrated transformers and LEDs (MagJacks). They follow the standard pinouts for RJ-45 TIA-568B. The wiring colors indicate the common wiring found in CAT5/CAT6 cables. Looking into the front of the board, port one is on the left, and port 2 is on the right.

1	Data A+	Orange / White
2	Data A-	Orange
3	Data B+	Green / white
4	Data C+	Blue
5	Data C-	Blue / White
6	Data B-	Green
7	Data D+	Brown / White
8	Data D-	Brown

5.7. Digital I/O

The board provides 16x GPIO lines, which can be individually programmed for input or output. The GPIOs are accessible on a DB25 female connector on the front panel. Internal jumpers are used to select the voltage level (3.3V/5V) and 10K ohm pull-up/pull-down configuration. By default, the DIO is configured for 3.3 V and pulldown. The assigned voltage level appears on pins 18 and 23. These pins are limited to 100mA via an internal auto-resettable polyswitch fuse. N/C = Not Connected.

DIO_PA0	1	14	DIO_PA1
DIO_PA2	2	15	DIO_PA3
DIO_PA4	3	16	DIO_PA5
DIO_PA6	4	17	DIO_PA7
GND	5	18	3.3V / 5V
DIO_PB0	6	19	DIO_PB1
DIO_PB2	7	20	DIO_PB3
DIO_PB4	8	21	DIO_PB5
DIO_PB6	9	22	DIO_PB7
GND	10	23	3.3V / 5V
N/C	11	24	N/C
N/C	12	25	N/C
N/C	13		

Connector Type: DB25 Female connector with #4-40 screwlocks	

5.8. RTC Battery (Internal J28)

This connector is internal and is not normally accessed by the user. A CR2032 battery is connected to this connector and mounted to an internal wall of the enclosure with an adhesive pad.

Pin	Detail
1	RTC_BATT (3.3V)
2	GND

RTC BATT may range between 1.85V to 5.5V .

Connector manufacturer / PN: Molex 0533980271 Mating Cable PN: 4713001 (backup battery with soldered wire leads)	

5.9. CAN

On models with the NX module installed, one CAN port is available on a DB9 male connector in position I/O 3. The pinouts for the CAN connector are as shown below.

1	N.C.
2	CAN Data -
3	Ground
4	N.C.
5	N.C.
6	Ground
7	CAN Data +
8	N.C.
9	N.C.

5.10. Reset Switch

The Reset switch is used to initiate a factory reset of the JetBox-Jackson system. When pressed, the system enters the Reset mode and remains in that state until the switch is released. Once the reset switch is released, the system boots into the operating system.

5.11. Recovery Switch

The Recovery switch is used to put the system into Recovery mode. The recovery mode is used by the system to update its operating system. The switch is recessed behind the front panel and is accessible using the tip of a paper clip or similar thin object. To put the system into recovery mode, push the switch in and hold it in while applying power to the system. Then release the switch a few seconds later.

6. Jumper Configuration

6.1. Jumper Blocks

Jumpers JP1 and JP2 must be positioned in 1 of the 2 configurations shown in the diagram below.

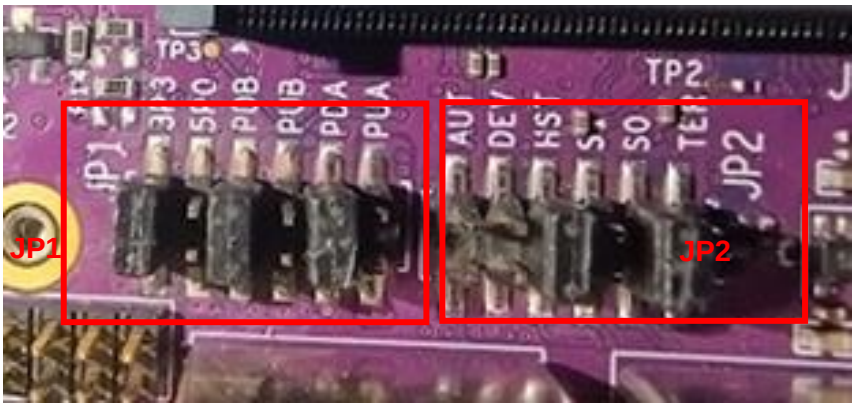


Figure 6-1: Jumper Configuration

The Jumper blocks on the Jackson carrier board are configured to enable/disable or to alter the default signal routing settings on the circuit, using Jumper shunts.

The following table describes the Jumper Blocks.

Name	Function
JP1	DIO voltage selection/DIO push pull/up down selection
JP2	USB/Serial Mode and Termination Enable/Disable

6.2. Enable/Disable DIO Pull/UP Down (JP1)

JP1 Jumpers are provided to select the voltage level and Pullup/pull down configuration of the DIO. By default, the DIOs are 3.3 Voltage pulled down. The configuration is as shown below:

Position	Function	Shorted	Open
3P3	DIO Voltage Level	***3.3V**	
5P0	DIO Voltage Level	5V	
PDB	DIO PORT B Pull Down Enable	***Enabled**	Disabled
PUB	DIO PORT B Pull up Enable	Enabled	Disabled
PDA	DIO PORT A Pull Down Enable	***Enabled**	Disabled
PUA	DIO PORT A Pull up Enable	Enabled	Disabled

***Default Mode**

6.3. Select USB/Serial Mode & Termination Enable/Disable (JP2)

The USB1 port of the carrier board is used as a device in the recovery mode to flash the module and is used as a Host in normal operation. This selection is achieved by changing the jumper positions on JP2 as shown below:

Position	Function	Shorted	Open
AUT	Auto Power ON	Disabled	***Enabled**
DEV	USB2 J4 Bottom Port Device Mode	Enabled	Disabled
HST	USB2 J4 Bottom Port Host Mode	***Enabled**	Disabled
S1	Serial Port Protocol Select1	See table below	
S0	Serial Port Protocol Select0		
TER	RS485 Termination	Enabled	***Disabled**

***Default Mode**

The Serial port two Protocol selection Jumper for Standard Board is as shown below:

S1	S0	Protocol
OUT	OUT	***Not Valid**
OUT	IN	RS232
IN	OUT	RS485
IN	IN	Not Valid

7. Getting Started

JetBox-Jackson is a compact, ready-to-deploy Nvidia Jetson AI computing platform. Below steps help you to create practical AI applications, impressive AI robots, and more.

7.1. Powering Up System

Refer to the below section to power on the JetBox-Jackson system. The system is pre-programmed and ready to run. Attach KB / MS / display / power to start the system.

Required Accessories

- Any carrier board which has M.2 M-Key NVMe slot and able to boot without M.2 M-Key NVMe.
- Host PC installed with Ubuntu 20.4 x86_64, Kernel version: 5.15.0-52 or above.
- USB A to USB A cable.
- M.2 Key M 2280 NVMe PCIe SSD.
- Jackson board assembled with Orin NX/Nano module.
- Jackson BSP released files.

7.1.1. Bringing up JetBox-Jackson

JetBox-Jackson is shipped to our customers ready to work out of the box. A 12V DC adapter is included with the JetBox-Jackson. The JetBox module, included with the JetBox Jackson, is flashed with the latest BSP. However, it is highly recommended to check the Diamond System Corp website for any updated BSPs at https://www.diamondsystems.com/products/jackson.

To get started with JetBox-Jackson, a minimum of USB keyboard, USB mouse and an HDMI monitor are required. Refer to the reference set up image provided below:

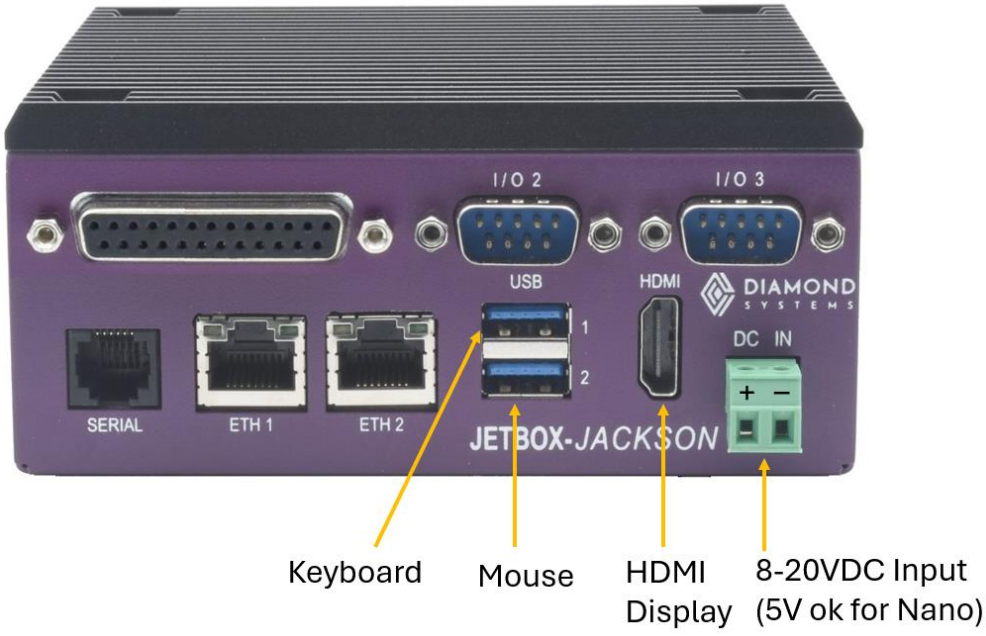


Figure 7-1: JetBox-Jackson Typical Set Up

Follow the steps provided below for JetBox-Jackson connections and boot to OS:

1. Connect the included 12V DC IN on front panel.
2. Connect the USB keyboard and mouse to USB ports 1 & 2 on the front panel.
3. Connect the HDMI monitor to HDMI port on the front panel.
4. Ensure that all the connections are intact.
5. Power ON the adapter and the module should now boot to OS.
6. On the Linux Welcome screen, fill in the basic details like Username, password, date & time.
7. The system boots into Ubuntu Desktop. Now, the system is set up and ready.

7.2. Flashing BSP Image

7.2.1. Format NVMe

1. Connect the NVMe drive to any host computer which has M.2 M-Key NVMe support.
2. Execute the command below to check the NVMe drive's device name:

```
lsblk -d -p | grep nvme
```

3. Execute the command below to create a new GPT:

```
sudo parted /dev/ mklabel gpt ex:
sudo parted /dev/nvme0n1 mklabel gpt
```

4. Execute the command below to add the APP partition:

```
sudo parted /dev/nvme0n1 mkpart APP 0GB 45GB
```

5. Execute the command below to format APP as an ext4 partition and mount it.

```
sudo mkfs.ext4 /dev/nvme0n1p1
```

7.2.2. Flash a Device

1. Connect M2M key device at J20 with proper format.

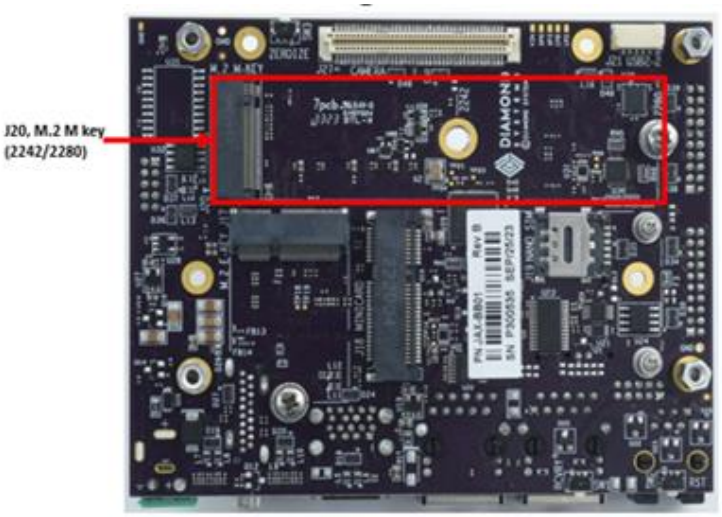


Figure 7-2: M2M Key Device at J20

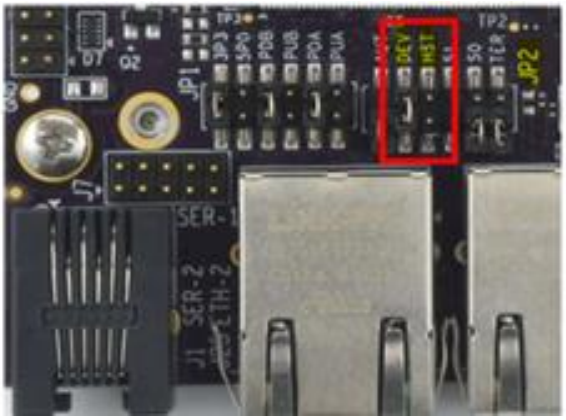


Figure 7-3: Insert into DEV

2. Remove the jumper from HST and insert it into DEV.
3. Power cycle the board by pressing and holding recovery SW button and release after 4 seconds. Connect USB A to USB A cable between J4 bottom port of Jackson board and Host PC installed with Ubuntu 20.4 x86_64, Kernel version: 5.15.0-52 or above.

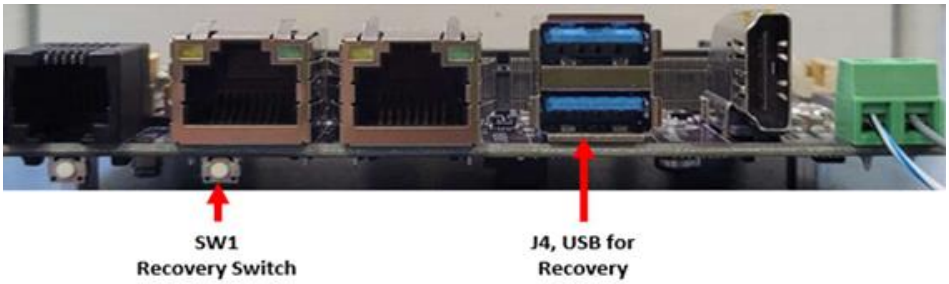


Figure 7-4: Connect USB cable

4. Open the Linux terminal in the Host PC and run 'lsusb' command to verify whether the board is in recovery mode or not. If board is booted in recovery mode, the Jetson Orin NX ™ will be detected as shown below.

```
hmecd001409@DSC:~$ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 035: ID 0955:7323 NVIDIA Corp. APX
Bus 001 Device 123: ID 413c:2107 Dell Computer Corp. Dell USB Entry Keyboard
Bus 001 Device 124: ID 413c:301a Dell Computer Corp. Dell MS116 USB Optical Mous
e
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Figure 7-5: Verify board in recovery mode

Note: Similarly, the Jetson Orin Nano will be detected, but with different device ID. Refer below table for Orin NX and Orin Nano module's Device ID for different memory configuration.

7323	for Jetson Orin NX (P3767-0000 with 16 GB)
7423	for Jetson Orin NX (P3767-0001 with 8 GB)
7523	for Jetson Orin Nano (P3767-0003 and P3767-0005 with 8 GB)
7623	for Jetson Orin Nano (P3767-0004 with 4GB)

5. Run the following command to flash the Jackson package from your host machine to the carrier board.

```
sudo ./apply_binaries.sh

sudo ./tools/l4t_flash_prerequisites.sh

sudo ./tools/kernel_flash/l4t_initrd_flash.sh --external-device nvme0n1p1 -c
tools/kernel_flash/flash_l4t_external.xml -p "-c
bootloader/generic/cfg/flash_t234_qspi.xml" --showlogs --network usb0 jetson-
orin-nano-devkit internal
```

Figure 7-6: Module Reboots

6. The flashing process takes around 30 minutes to complete and below logs pop up upon completion.
7. When the flashing is complete, the module automatically reboots.
8. After rebooting, remove the USB cable at J4 bottom port and connect HDMI cable.

7.3. USB0 Host & Gadget Mode Configuration

To convert USB0 as host device, execute the commands below and reboot to apply changes.

1. Open the terminal and run the command '**sudo otg_host'**.

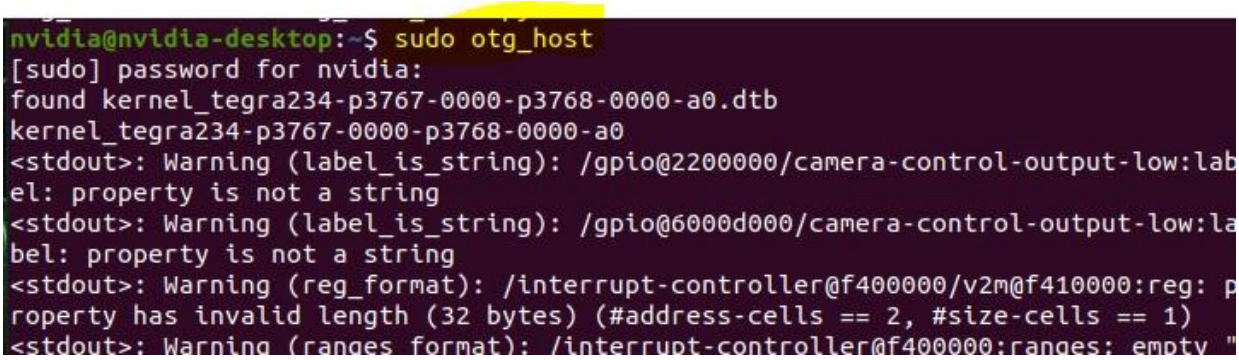


Figure 7-7: Run Command

2. Power off the board.
3. Remove DEV jumper and insert HST jumper on JP2.

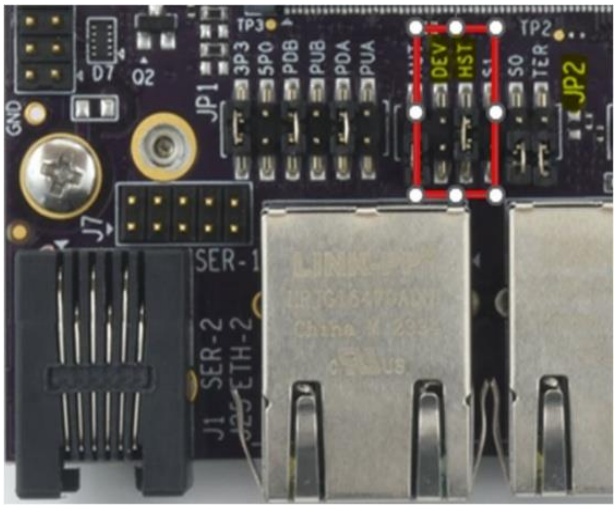


Figure 7-8: Insert HST Jumper

4. Connect the USB mouse to J4 bottom port and power on the board. Check whether the USB mouse is working.

8. Specifications

Features	
Jetson Module	Orin Nano or Orin NX
Cooling Accessory	Integrated heat spreader solution
Display	1x HDMI 2.0a/b
CAN Interface	1x CAN 2.0 Non-isolated transceiver standard, isolation optional consult factory (systems with Orin NX only)
Digital I/O	16x Digital IO obtained through I2C GPIO expander; see detailed specifications below
Ethernet	2x 10/100/1000 Mbps RJ45 with built-in magnetics and LEDs
Serial ports	1x RS-232 1x RS-232/485 (Configurable) (systems with Orin NX only)
USB Ports	2x USB 3.2
Utility	Force recovery and Reset buttons available on front panel
Digital I/O Specifications	
Device	PCA9535PW
Number of Lines	16
Direction	Programmable bit by bit
Logic Levels	3.3V/5V jumper configurable
Pull resistors	10K ohms +/-1%; Jumper-selectable pull-up/down
Input Voltage Thresholds	
Logic 0	-0.5V min, 0.99V(3.3V VIO), 1.5V(5V VIO) max
Logic 1	2.64V(3.3V VIO)/ 3.5V(5V VIO) min, 5.5V max
Output Voltage Thresholds	
Logic 0	0.0V min; 0.7V max @ 10mA output current
Logic 1	2.5V(3.3V VIO)/4V(5V VIO) min @ -10mA output current; 3.3V/5V max
Mechanical and Environmental Properties	
System Input Voltage	With Orin NX: 7-20VDC With Orin Nano: 5VDC +/-5%
Dimensions	124 W x 56 H x 99 D (mm) / 4.9 W x 2.2 H x 3.9 D (in)
Weight	0.698 kg. / 1.54 lbs.
Operating Temperature	-25°C to +80°C ambient (Est. 70C with Super Mode in full performance condition)
RoHS	Compliant

9. Limited Warranty Policy

For details on the product warranty refer to the link https://www.diamondsystems.com/sales/Warranty.pdf.