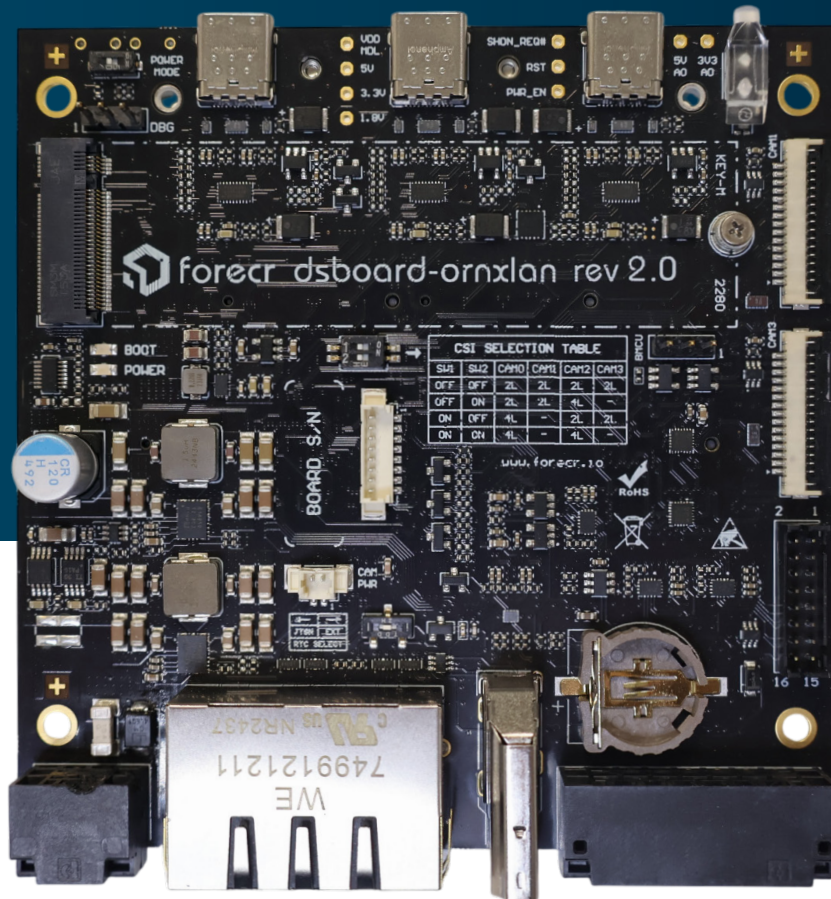




DSBOARD ORNX-LAN

USER MANUAL

UM-DSBDORNXLAN-02

Document Revision: 1.0

24/09/2026

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Preface

Disclaimer

Forecr emphasizes that the information contained in this user manual is continuously updated in line with the technical modifications and enhancements made by Forecr to its carrier board. Therefore, this manual only represents the technical status of Forecr carrier board at the time of publishing.

Forecr shall not be held responsible for any damages that may occur directly or indirectly as a result of any technical or typographical errors or omissions found in this document or for any discrepancies between the product and the user's manual.

Customer Support

In case you encounter any challenges after reading the user manual and/or using the carrier board, please reach out to the Forecr reseller from which you purchased the carrier board.

See the contact information section below for more information on how to contact us directly.

Contact Information

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Symbols

	ElectroStatic Discharge (ESD) Sensitive Device! Electronic boards and their components are sensitive to static electricity. When handling any circuit board assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to: • Do not handle the carrier board out of its antistatic packaging while it is not used for operational purposes unless it is otherwise protected. • Whenever possible, unpack or pack this product only at ESD safe work stations. • Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. • Try to handle the board by the edges, avoiding contact with components.
	HOT Surface! Do not touch. Contact may cause burns. Allow to cool before servicing.
	Waste Electrical and Electronic Equipment (WEEE)! The carrier board should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.
	Restriction of Hazardous Substances (RoHS)! The carrier board complies with the regulations and restrictions established by the ROHS Directive and does not contain hazardous substances in concentrations that may be harmful to health or the environment.

Limited Product Warranty

Forecr provides a 1-year Warranty for the carrier board. This warranty period is valid from the original purchase date of the carrier board. In order to maintain warranty, the carrier board must not be altered or modified in any way. Changes or modifications to the board, that are not explicitly approved by Forecr and described in this user manual or received from Forecr Support as a special handling instruction, will void your warranty.

To receive warranty service, the carrier board must be delivered to Forecr within the warranty period together with the original invoice or proof of purchase.

Revision History

Revision No	Revision Date	Revision Description
1.0	24.09.2026	Preliminary Release

1. Introduction

The DSBOARD-ORNX-LAN is an industrial carrier board engineered for harsh deployment environments and applications demanding high processing power and reliability. Powered by the NVIDIA® Jetson Orin™ NX / Orin™ Nano SoM, it integrates advanced NVIDIA Ampere GPU architecture and ARM64 CPU cores. The compact form factor of the carrier board delivers a versatile hardware platform for complex edge workloads, such as autonomous systems, robotics, and intelligent video analytics.

This industrial board features comprehensive connectivity options, including dual Gigabit Ethernet, USB 3.2, HDMI, and CAN Bus interfaces, enabling seamless integration with diverse peripheral devices and industrial systems. The dual Gigabit Ethernet architecture ensures high-throughput data transfer and network redundancy, while the underlying Orin™ NX / Orin™ Nano module provides the computational capacity required for intensive, real-time data processing and analytics. Beyond its space-saving design, the device offers multiple expansion slots for hardware customization to meet specific project requirements. Furthermore, its extended operating temperature range guarantees reliable, uninterrupted performance in challenging environments.

Overall, the DSBOARD-ORNX-LAN provides an effective, high-density computing platform for critical industrial applications. Its advanced feature set, coupled with dual network redundancy and a compact architecture, makes it an ideal solution where physical space is constrained and system flexibility is paramount.

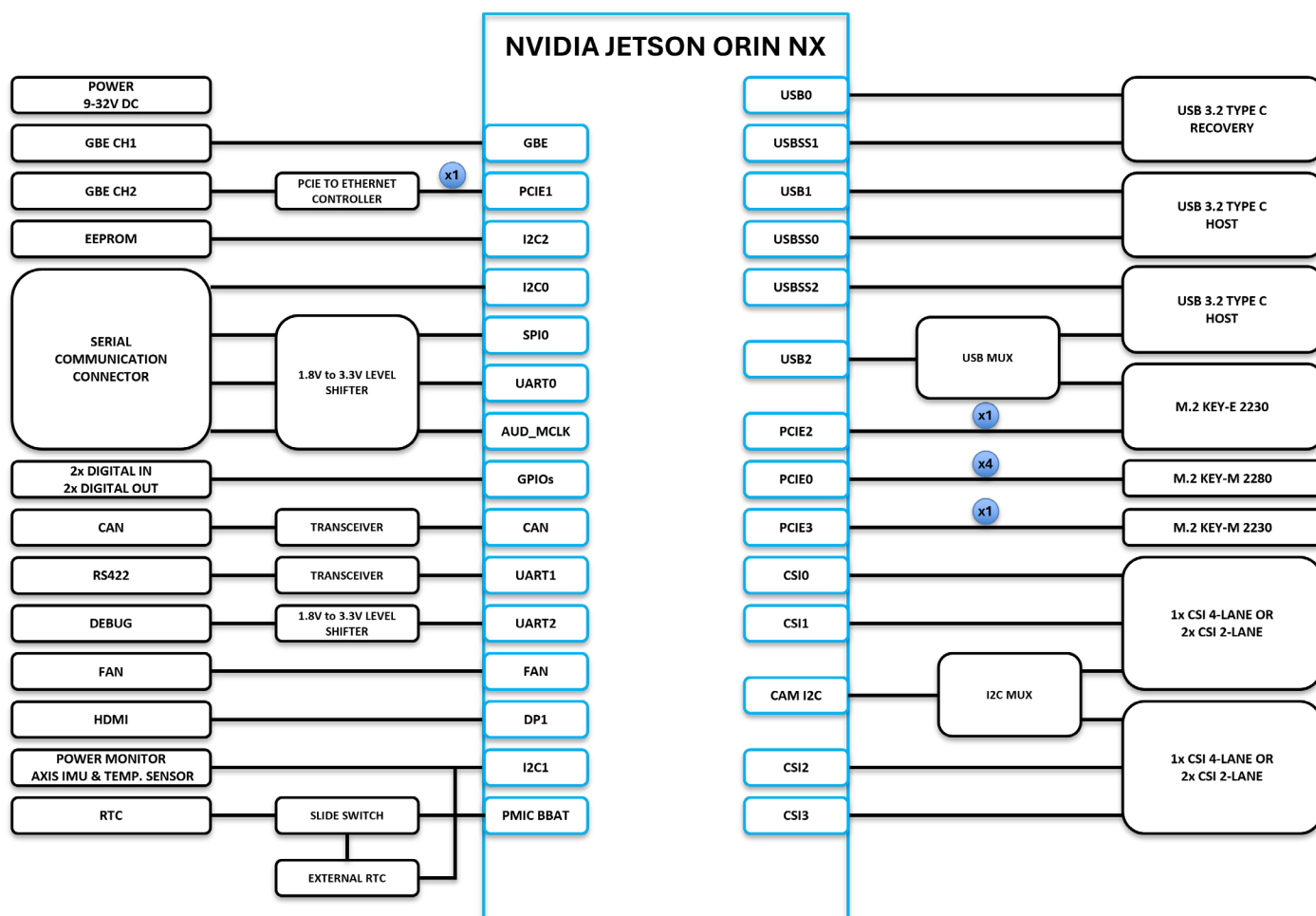
The latest revision of this user manual, datasheet, and 3D model can be downloaded from the [Forecr](#) website.

2. Product Specification

2.1 Technical Specification

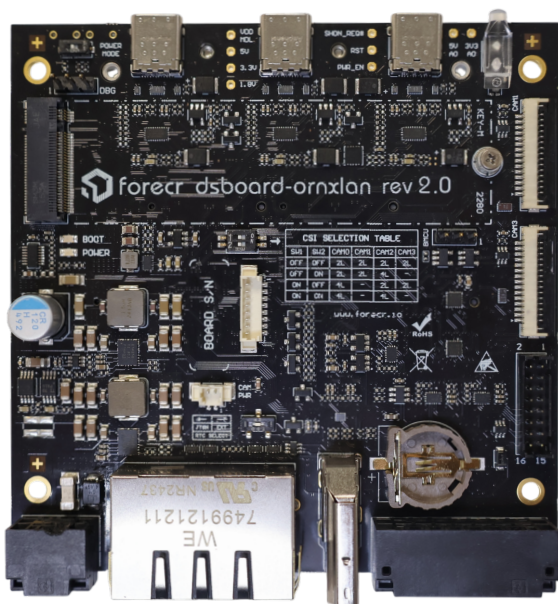
Supported Modules	NVIDIA Jetson Orin Nano 4GB / 8GB NVIDIA Jetson Orin NX 8GB / 16GB
Memory	4 GB 64-bit LPDDR5 / 8 GB 128 bit LPDDR5 8 GB 256-bit LPDDR5 / 16 GB 128 bit LPDDR5
Graphics Interfaces	1x HDMI 2.0
Interfaces	2x Gigabit Ethernet 3x USB 3.2 Type-C 1x CAN-FD 1x RS232/422/485 2x Digital Input (12-24V) 2x Digital Output (up to 24V) 2x CSI 4-Lane or 4x CSI 2-Lane
Wireless Communication	WiFi/Bluetooth Connectivity by extension sockets
Power Supply	9-32 VDC
Extension Sockets	M.2 Key-E 2230 (PCIe x1, USB2.0) FAN Header (5V, PWM, TACH) Serial Communication Header (1x SPI, 1x I2S, 1x I2C, 1x UART)
Mass Storage	1x M.2 Key-M 2280 (PCIe x4 Gen4) 1x M.2 Key-M 2230 (PCIe x1 Gen4)
Ambient Conditions	-40°C ... +85°C
Form Factor / Dimensions	100 mm x 100 mm, 83.6 gr
Operating Systems	Ubuntu Linux 20.04 / 22.04 / 24.04
JetPack Support	JetPack 5.x / 6.x / 7.2+

2.2 Block Diagram

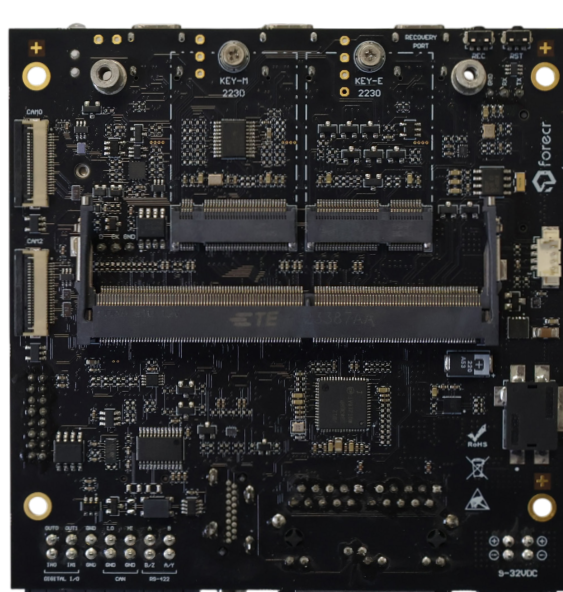


2.3 Board Visuals

Front Side



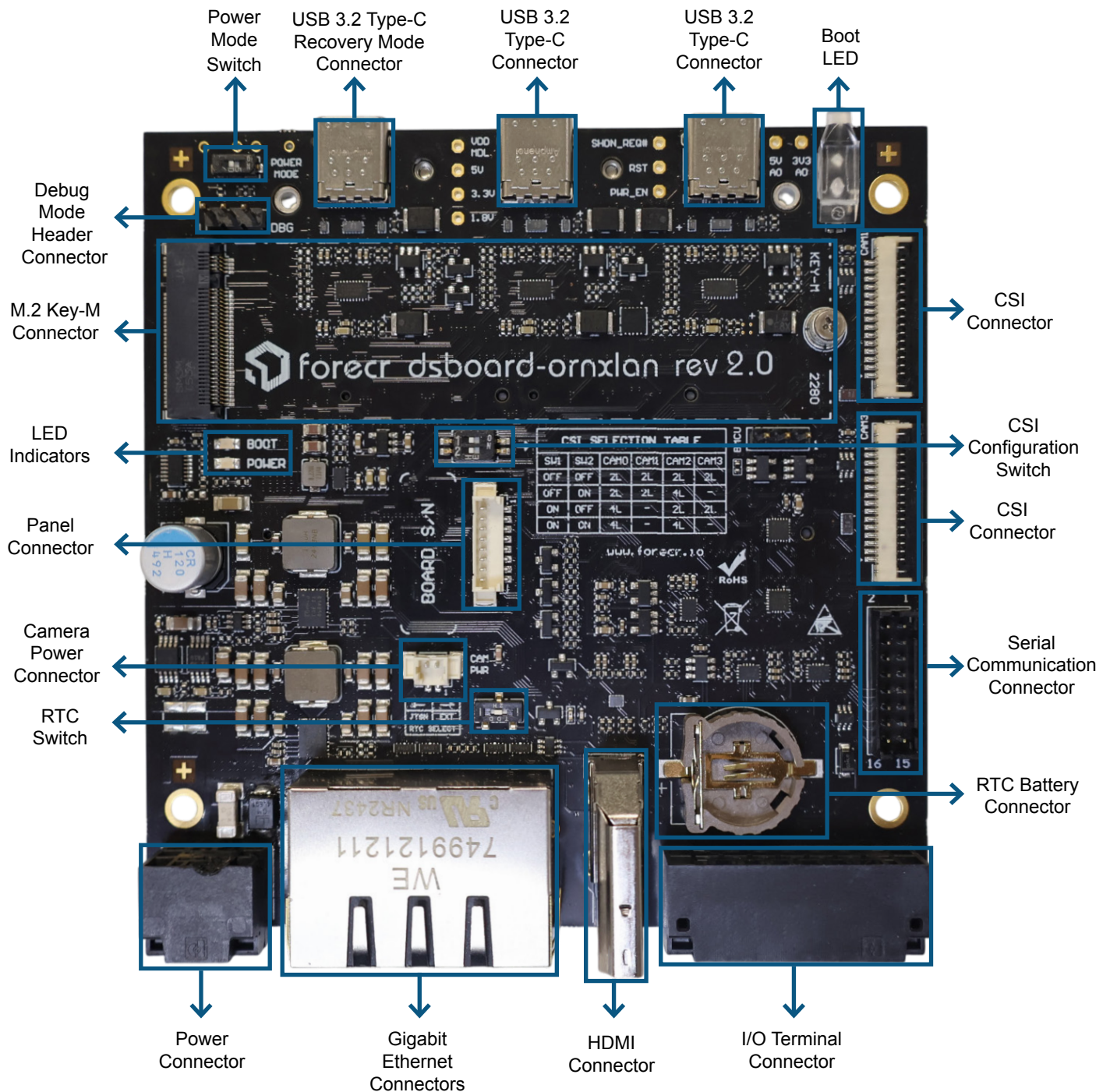
Rear Side



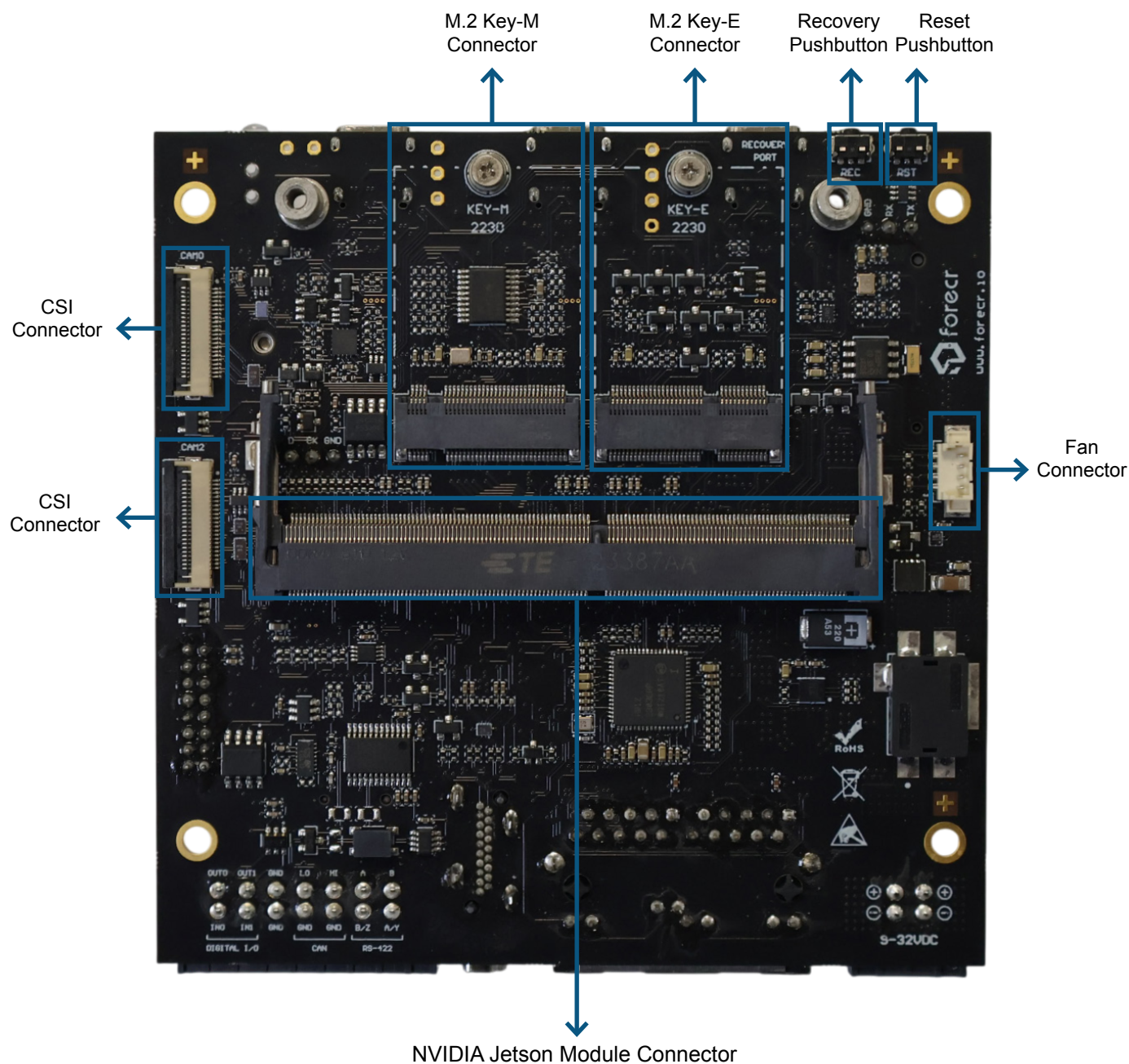
3. Hardware Information

3.1 Connector, Button, Switch, and Indicator Location

3.1.1 Front Side



3.1.2 Rear Side

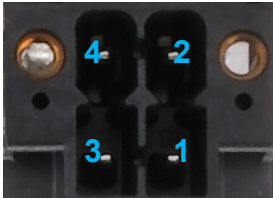


3.2 List of Connectors, Buttons, Switches, and Indicators

Connectors
DSBOARD-ORNX-LAN Power Connector
DSBOARD-ORNX-LAN I/O Terminal Connector
DSBOARD-ORNX-LAN M.2 Key-M Connectors
DSBOARD-ORNX-LAN M.2 Key-E Connector
DSBOARD-ORNX-LAN CSI Connectors
DSBOARD-ORNX-LAN Panel Connector
DSBOARD-ORNX-LAN Serial Communication Connector
DSBOARD-ORNX-LAN RTC Battery Connector
DSBOARD-ORNX-LAN HDMI Connector
DSBOARD-ORNX-LAN USB 3.2 Type-C Connectors
DSBOARD-ORNX-LAN Gigabit Ethernet Connector
DSBOARD-ORNX-LAN Fan Connector
DSBOARD-ORNX-LAN USB 3.2 Type-C Recovery Mode Connector
DSBOARD-ORNX-LAN Debug Mode Header Connector
DSBOARD-ORNX-LAN Camera Power Connector
Buttons, Switches, and Indicators
DSBOARD-ORNX-LAN Recovery Pushbutton
DSBOARD-ORNX-LAN Reset Pushbutton
DSBOARD-ORNX-LAN CSI Configuration Switch
DSBOARD-ORNX-LAN RTC Switch
DSBOARD-ORNX-LAN Power Mode Switch
DSBOARD-ORNX-LAN LED Indicators

3.3 Definition of Each Connector

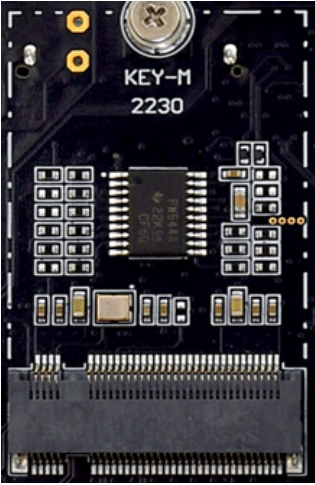
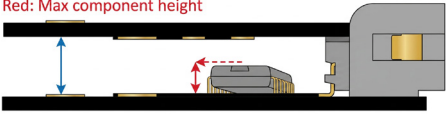
3.3.1 Power Connector

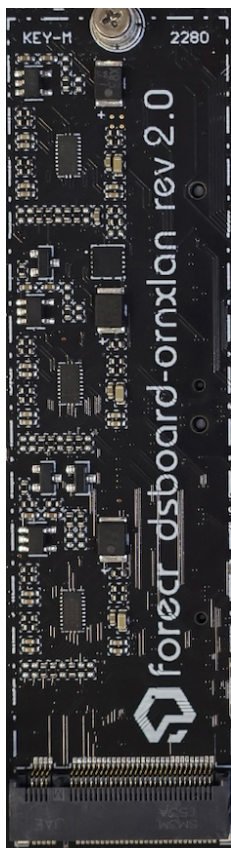
	Function		Description
	Connector Type		1787014 from Phoenix Contact.
	Mating Connector		1708595 from Phoenix Contact.
	Minimum Input Voltage		+9V
	Maximum Input Voltage		+32V
	Pinout		
	Pin	Description	
	1	Positive	
	2	Negative	
	3	Positive	
	4	Negative	

3.3.2 I/O Terminal Connector

	Function		Description
	Connector Type		1787069 from Phoenix Contact.
	Mating connector		1790344 from Phoenix Contact.
	Pinout		
	Pin	Description	I/O Type
	1	RS422 B	I/O
	2	RS422 Y / RS485 A	I/O
	3	RS232 RX / RS422 A	I/O
	4	RS232 TX / RS422 Z / RS485 B	I/O
	5	CAN_H	I/O
	6	GROUND	Power
	7	CAN_L	I/O
	8	GROUND	Power
	9	GROUND	Power
	10	GROUND	Power
	11	DIGITAL_OUT1 <i>Note:</i> Up to 24V, low-side switch	Output
	12	DIGITAL_IN1 (12-24V)	Input
	13	DIGITAL_OUT0 <i>Note:</i> Up to 24V, low-side switch	Output
	14	DIGITAL_IN0 (12-24V)	Input

3.3.3 M.2 Key-M Connectors

M.2 Key M-2230	Description						
	Pinout	Pin	Description	Pin	Description	Pin	Description
		1	DGND	24	NC	47	PCIE3.TX0_N
		2	VDD_3V3	25	NC	48	NC
		3	DGND	26	NC	49	PCIE3.TX0_P
		4	VDD_3V3	27	DGND	50	PCIE3.RST_N
		5	NC	28	NC	51	DGND
		6	NC	29	NC	52	PCIE3.CLKREQ_N
		7	NC	30	NC	53	PCIE3.CLK_N
		8	NC	31	NC	54	PCIE.WAKE_N
		9	DGND	32	NC	55	PCIE3.CLK_P
		10	NC	33	DGND	56	NC
		11	NC	34	NC	57	DGND
		12	VDD_3V3	35	NC	58	NC
		13	NC	36	NC	67	NC
		14	VDD_3V3	37	NC	68	32KHZ_CLK
		15	DGND	38	NC	69	NC
		16	VDD_3V3	39	DGND	70	VDD_3V3
		17	NC	40	NC	71	DGND
		18	VDD_3V3	41	PCIE3.RX0_N	72	VDD_3V3
		19	NC	42	NC	73	DGND
		20	NC	43	PCIE3.RX0_P	74	VDD_3V3
		21	DGND	44	NC	75	DGND
		22	NC	45	DGND	MNT1	DGND
		23	NC	46	NC	MNT2	DGND
Board to board spacing=1.45 mm Max component height=1.2 mm Blue: Board-to-Board spacing Red: Max component height 							

M.2 Key M-2280

Description

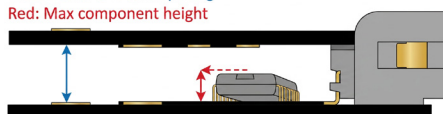
Pinout	Pin	Description	Pin	Description	Pin	Description
	1	DGND	24	NC	47	PCIE0.TX0_N
	2	VDD_3V3	25	PCIE0.TX2_P	48	NC
	3	DGND	26	NC	49	PCIE0.TX0_P
	4	VDD_3V3	27	DGND	50	PCIE0.RST_N
	5	PCIE0.RX3_N	28	NC	51	DGND
	6	NC	29	PCIE0.RX1_N	52	PCIE0.CLKREQ_N
	7	PCIE0.RX3_P	30	NC	53	PCIE0.CLK_N
	8	NC	31	PCIE0.RX1_P	54	PCIE.WAKE_N
	9	DGND	32	NC	55	PCIE0.CLK_P
	10	NC	33	DGND	56	NC
	11	PCIE0.TX3_N	34	NC	57	DGND
	12	VDD_3V3	35	PCIE0.TX1_N	58	NC
	13	PCIE0.TX3_P	36	NC	67	NC
	14	VDD_3V3	37	PCIE0.TX1_P	68	32KHZ_CLK
	15	DGND	38	NC	69	NC
	16	VDD_3V3	39	DGND	70	VDD_3V3
	17	PCIE0.RX2_N	40	NC	71	DGND
	18	VDD_3V3	41	PCIE0.RX0_N	72	VDD_3V3
	19	PCIE0.RX2_P	42	NC	73	DGND
	20	NC	43	PCIE0.RX0_P	74	VDD_3V3
	21	DGND	44	NC	75	DGND
	22	NC	45	DGND	MNT1	DGND
	23	PCIE0.TX2_N	46	NC	MNT2	DGND

Board to board spacing=2.45 mm

Max component height=1.45 mm

Blue: Board-to-Board spacing

Red: Max component height

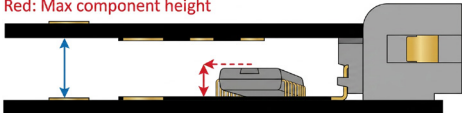


3.3.4 M.2 Key-E Connector

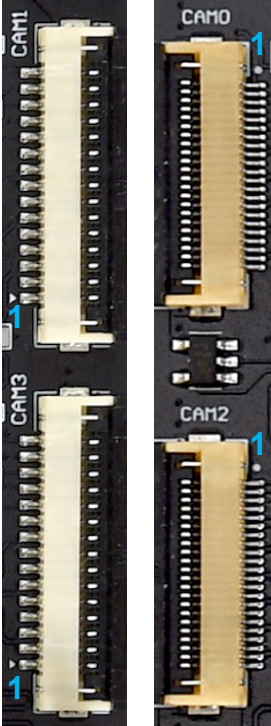
Description				
Pinout	Pin	Description	Pin	Description
	1	DGND	44	NC
	2	VDD_3V3	45	DGND
	3	USB2_KEYE.AP2_P	46	NC
	4	VDD_3V3	47	PCIE2.CLK_P
	5	USB2_KEYE.AP2_N	48	NC
	6	NC	49	PCIE2.CLK_N
	7	DGND	50	M2E_SUSCLK_32KHZ
	8	NC	51	DGND
	9	NC	52	PCIE2.RST_N
	10	NC	53	PCIE2.CLKREQ_N
	11	NC	54	M2E_WDISABLE2_N
	12	NC	55	PCIE.WAKE_N
	13	NC	56	M2E_WDISABLE1_N
	14	NC	57	DGND
	15	NC	58	NC
	16	NC	59	NC
	17	NC	60	NC
	18	DGND	61	NC
	19	NC	62	NC
	20	NC	63	DGND
	21	NC	64	NC
	22	NC	65	NC
	23	NC	66	NC
	32	NC	67	NC
	33	DGND	68	NC
	34	NC	69	DGND
	35	PCIE2.TX0_P	70	NC
	36	NC	71	NC
	37	PCIE2.TX0_N	72	VDD_3V3
	38	NC	73	NC
	39	DGND	74	VDD_3V3
	40	NC	75	DGND
	41	PCIE2.RX0_P	MNT1	DGND
	42	NC	MNT2	DGND
	43	PCIE2.RX0_N		

Board to board spacing=1.45 mm
Max component height=1.1 mm

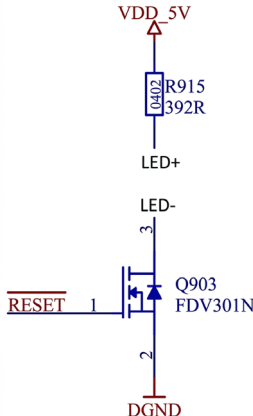
Blue: Board-to-Board spacing
Red: Max component height



3.3.5 CSI Connectors

	Function	Description							
	Pin/Pitch/ Bottom contact	CAM0, CAM2= 22-pin, 0.5mm pitch, bottom contact CAM1, CAM3= 15-pin, 1mm pitch, bottom contact							
	Pinout	CAM0		CAM1		CAM2		CAM3	
		Pin	Description	Pin	Description	Pin	Description	Pin	Description
		1	+3.3V	1	GND	1	+3.3V	1	GND
		2	SDA	2	DATA0_N	2	SDA	2	DATA0_N
		3	SCL	3	DATA0_P	3	SCL	3	DATA0_P
		4	GND	4	GND	4	GND	4	GND
		5	MCLK	5	DATA1_N	5	MCLK	5	DATA1_N
		6	PWDN	6	DATA1_P	6	PWDN	6	DATA1_P
		7	GND	7	GND	7	GND	7	GND
		8	DATA3_P	8	CLK_N	8	DATA3_P	8	CLK_N
		9	DATA3_N	9	CLK_P	9	DATA3_N	9	CLK_P
		10	GND	10	GND	10	GND	10	GND
		11	DATA2_P	11	PWDN	11	DATA2_P	11	PWDN
		12	DATA2_N	12	CLK	12	DATA2_N	12	CLK
		13	GND	13	SCL	13	GND	13	SCL
		14	CLK_P	14	SDA	14	CLK_P	14	SDA
		15	CLK_N	15	+3.3V	15	CLK_N	15	+3.3V
		16	GND			16	GND		
		17	DATA1_P			17	DATA1_P		
		18	DATA1_N			18	DATA1_N		
		19	GND			19	GND		
		20	DATA0_P			20	DATA0_P		
		21	DATA0_N			21	DATA0_N		
		22	GND			22	GND		

3.3.6 Panel Connector

	Function	Description		Led Schematic
	Connector type	53398-0871		
	Mating connector	51021-0800 from Molex		
	Pinout	Pin	Description	
		1	PWR_BTN (1.8V)	
		2	GND	
		3	RST (1.8V)	
		4	GND	
		5	RECOVERY (1.8V)	
6		GND		
7	LED +			
8	LED -			

3.3.7 Serial Communication Connector

	Function	Description	
	Connector Type	DF11-16DP-2DSA(24)	
	Mating connector	DF11-16DS-2C	
	Pinout	Pin	Description
		1	+5V (1A max, 0.5A nominal)
		2	+3.3V (1A max, 0.5A nominal)
		3	GND
		4	GND
		5	SPI0_CS0
		6	SPI0_SCK
		7	SPI0_MISO
		8	SPI0_MOSI
		9	UART0_RX
		10	UART0_TX
		11	UART0_CTS
		12	UART0_RTS
		13	I2C0_SCL
		14	AUD_MCLK
		15	I2C0_SDA
		16	SPI0_CS1
		Note 1: The UART0 interface can be reconfigured for I2S0 audio applications via hardware modification (stuffing/de-stuffing 4 onboard resistors).	
		Note 2: All signal lines on this connector operate at 3.3V logic levels.	

3.3.8 RTC Battery Connector

	The DSBOARD-ORNXLAN features a dedicated RTC battery connector designed for CR1220 coin cell batteries to maintain real-time clock functionality.
---	--

3.3.9 HDMI Connector

	The DSBOARD-ORNXLAN routes video output from the NVIDIA® Jetson Orin module through an onboard vertical HDMI 2.0 connector.
---	--

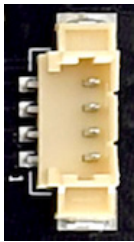
3.3.10 USB 3.2 Type-C Connectors

	The DSBOARD-ORNXLAN features two USB 3.2 Type-C ports, each capable of delivering up to 1.5A of current.
---	---

3.3.11 Gigabit Ethernet Connectors

	The DSBOARD-ORNX-LAN features two RJ-45 Gigabit Ethernet ports supporting 10/100/1000 Mbps operation for network communication. One of the ports is powered by an Intel I210 controller with hardware Precision Time Protocol (PTP / IEEE 1588) support for time-synchronized networking.
---	--

3.3.12 Fan Connector

	Function	Description	
	Connector Type	53398-0471 from Molex	
	Mating Connector	0510210400	
	Pinout	Pin	Description
		1	GND
		2	+5V
		3	FAN_TACH
		4	FAN_PWM

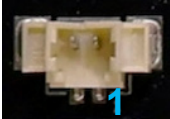
3.3.13 USB 3.2 Type-C Recovery Mode Connector

	The DSBOARD-ORNX-LAN features a USB 3.2 Type-C port used for flashing and updating the operating system (Recovery mode). When recovery functionality is not required, this port can also operate in standard host mode for connecting external USB devices.
--	--

3.3.14 Debug Mode Header Connector

	Function	Description	
	Pinout	Pin	Description
		1	TX
		2	RX
		3	GND
	Note: This connector breaks out the Jetson debug UART port using 3.3V logic levels. Signal names are assigned relative to the Jetson module; for example, TX corresponds to data transmission from the Jetson and should connect to your host adapter's RX pin.		

3.3.15 Camera Power Connector

	Function	Description	
	Pinout	Pin	Description
		1	VDD_DC_MAIN
		2	GND
	Note: The DSBOARD-ORNX-LAN includes a dedicated camera power output connector to power external peripherals and expansion boards. The output voltage matches the carrier board's main input voltage.		
	CAUTION: This connector is an output-only port. Do not supply power into the carrier board through this connector, as doing so may cause permanent, irreversible hardware damage.		

3.4 Definition of Each Button, Switch, and Indicator

3.4.1 Recovery Pushbutton

	The board includes a Recovery push button used to put the module into recovery mode. To enter recovery mode, press and hold both the Recovery and Reset buttons, release the Reset button, and keep the Recovery button pressed for a minimum of 250 ms.
---	---

3.4.2 Reset Pushbutton

	The DSBOARD-ORNX-LAN features an onboard reset push button to trigger a hardware reset of the Jetson module.
---	---

3.4.3 CSI Configuration Switch

	CSI SELECTION TABLE					
	SW1	SW2	CAM0	CAM1	CAM2	CAM3
	OFF	OFF	2L	2L	2L	2L
	OFF	ON	2L	2L	4L	-
	ON	OFF	4L	-	2L	2L
	ON	ON	4L	-	4L	-
Note: The DSBOARD-ORNX-LAN features a CSI configuration switch to select between 2-Lane and 4-Lane MIPI CSI operation. Refer to the CSI Selection Table for switch settings and lane mappings.						

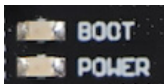
3.4.4 RTC Switch

	RTC SELECT	
	←	→
	Jetson RTC	External RTC
Note: An onboard switch allows selecting between the Jetson module's internal RTC (1–4 months typical battery backup) and a low-power external I2C RTC (10+ years estimated battery lifetime).		

3.4.5 Power Mode Switch

	The DSBOARD-ORNX-LAN features a power mode switch to select between Auto Power-On and Power Button operational modes: ON: Enables Power Button Mode (system powers on via the power button). OFF: Enables Auto Power-On Mode (system boots automatically when main power is applied).
---	--

3.4.6 LED Indicators

	The DSBOARD-ORNX-LAN features onboard LED indicators to monitor system status, confirming that the Jetson power rails are operational and the module is out of reset.
---	--

4. Software Information

4.1 Installation

The JetPack-5.x installation guide can be found [here](#).

The JetPack-6.x installation guide can be found [here](#).

The JetPack-7.2+ installation guide can be found [here](#).

5. Connectivity

5.1 General Purpose Input/Output (GPIO)

MODULE PIN NUMBER	I/O NAME	MODULE PIN NAME	TYPE	DESCRIPTION
220	PWRLED_R	I2S1_DOUT	OUTPUT	Drive high to turn on the Red LED.
222	PWRLED_G	I2S1_DIN	OUTPUT	Drive high to turn on the Green LED.
224	PWRLED_B	I2S1_FS	OUTPUT	Drive high to turn on the Blue LED.
128	HALF/FULL	GPIO05	OUTPUT	Half duplex or full duplex control for RS-485 communication protocol. Drive low for full duplex communication. Drive high for half duplex communication.
228	M2E_WDISABLE1	GPIO13	OUTPUT	WiFi/BT module full powerdown control for the WiFi/BT radio. Drive low to disable WiFi/BT. Drive high for normal operation.
210	M2E_SUS-CLK_32KHZ	CLK_32K_OUT	OUTPUT	WiFi/BT module external sleep clock output.
206	RS485/RS232	GPIO07(PWM)	OUTPUT	Serial communication control for SP330EEY-L transceiver. Drive low to enable RS-232. Drive high to enable RS-485.
126	RS485_CTRL	GPIO03	OUTPUT	Receiver or driver control for RS-485. Drive low to enable receiver. Drive high to enable driver.
110	DIGITAL_OUT1	SPI1_CS0	OUTPUT	Control signal for DIGITAL_OUT1 in I/O Connector. See Section 5.2.2 for more details.
104	DIGITAL_OUT0	SPI1_MOSI	OUTPUT	Control signal for DIGITAL_OUT0 in I/O Connector. See Section 5.2.2 for more details.
108	DIGITAL_IN1	SPI1_MISO	INPUT	Control signal for DIGITAL_IN1 in I/O Connector. See Section 5.2.2 for more details.
106	DIGITAL_IN0	SPI1_SCK	INPUT	Control signal for DIGITAL_IN0 in I/O Connector. See Section 5.2.2 for more details.
116	CAM0_MCLK	CAM0_MCLK	OUTPUT	Camera 0 reference clock (1.8V Level)
114	CAM0_PWDN	CAM0_PWDN	OUTPUT	Camera 0 power down (3.3V Level)
122	CAM1_MCLK	CAM1_MCLK	OUTPUT	Camera 1 reference clock (1.8V Level)
120	CAM1_PWDN	CAM1_PWDN	OUTPUT	Camera 1 power down (3.3V Level)
118	CAM2_MCLK	GPIO01(CLK)	OUTPUT	Camera 2 reference clock (1.8V Level)
127	CAM2_PWDN	GPIO04	OUTPUT	Camera 2 power down (3.3V Level)
216	CAM3_MCLK	GPIO11(CLK)	OUTPUT	Camera 3 reference clock (1.8V Level)
212	CAM3_PWDN	GPIO10	OUTPUT	Camera 3 power down (3.3V Level)
124	GPIO02_USB_VBUS_EN	GPIO02	OUTPUT	Connect to enable and overcurrent pins of load switch for USB Type-C ports.

130	GPIO06_USB20_MUX	GPIO06	OUTPUT	USB multiplexer control pin. Drive HIGH to route the USB 2.0 interface to the M.2 Key-E slot.
211	AUD_MCLK	GPIO09 (AUD_MCLK)	OUTPUT	Audio codec reference clock signal.
208	FAN_TACH	GPIO08 (FAN_TACH)	INPUT	Fan Tachometer signal.
230	FAN_PWM	GPIO14 (PWM)	OUTPUT	Fan Pulse Width Modulation signal.
179	PCIE.WAKE_N	PCIE_WAKE	INPUT	Wake signal shared by all PCIe interfaces.

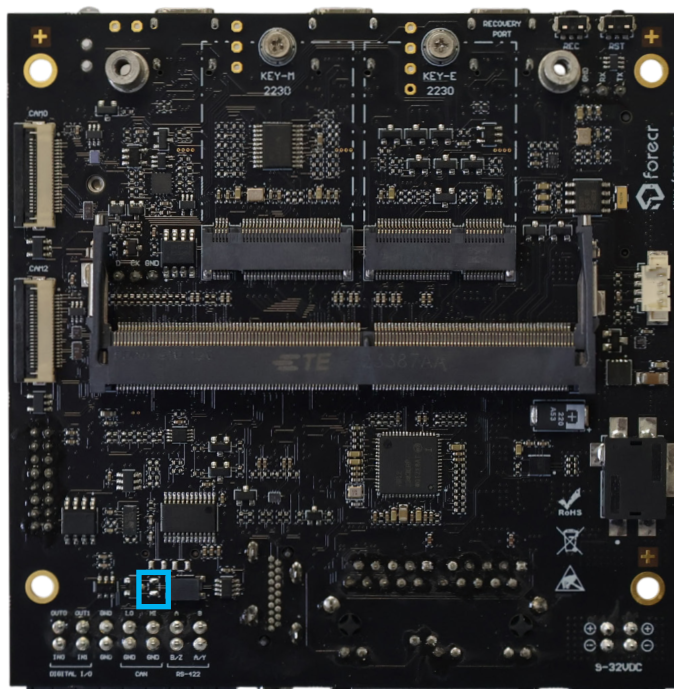
5.2 I/O Connector

On the connector, there are 4 Serial Communication, 4 Ground, 2 CANBus, 2 Digital Input and 2 Digital Output pins.

5.2.1 CANBus Interface

There is a single CAN Bus interface on the DSBOARD-ORNX-LAN. TCAN332G transceiver is used between native CAN pins of the Jetson and connector. There is a 0805 size 120R termination resistor between CAN_H and CAN_L pins on the board, which is not populated by default. A standard resistor with above specs can be fitted if termination resistor is needed on the DSBOARD-ORNX-LAN side.

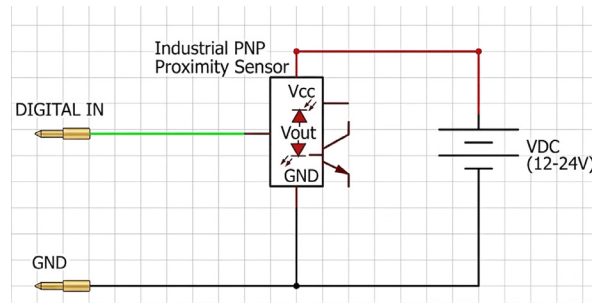
CANBus Termination Resistor



5.2.2 Industrial Input Output Interface

5.2.2.1 Setting and Reading Input Pin

Digital input side accepts signals between 12-24V (rated for 2.25mA). In our application, we used [Heschen M12 Inductive Proximity Sensor \(PNP & Normally Open\(NO\)\)](#) with 24V voltage source.



Find sysfs equivalent of the connected output pin from the table below. For this setup, it is DIGITAL_IN0. After proper hardware connection with industrial LED, we can continue with the software side.

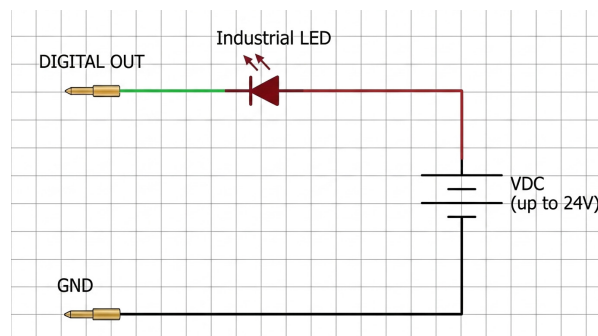
Pin Name	Sysfs Name
DIGITAL_IN0	gpio-470 (PY.00)
DIGITAL_IN1	gpio-471 (PY.01)
GROUND	GND

Set DIGITAL_IN0 as input and read sensor value. To do this, you should use the commands below.

```
sudo sh -c "echo 470 > /sys/class/gpio/export"
sudo sh -c "echo in > /sys/class/gpio/PY.00/direction"
sudo sh -c "cat /sys/class/gpio/PY.00/value"
```

5.2.2.2 Setting Digital Output as High and Low

Digital output side can drive loads up to 24V and has a current limit of 1A. They work as low side switches, open-close between them and GND. So, you should have a circuitry as in the schematic below. In our application, we used [GASH-ER 24V Indicator Light](#) with 24V voltage source.



Find sysfs equivalent of the connected output pin from the table below. For this setup, it is DIGITAL_OUT0. After proper hardware connection with industrial LED, we can continue with the software side.

Pin Name	Sysfs Name
DIGITAL_OUT0	gpio-472 (PY.02)
DIGITAL_OUT1	gpio-473 (PY.03)
GROUND	GND

Then, set DIGITAL_OUT0 as output and control light state. To do this, you should use the commands below.

```
sudo sh -c "echo 472 > /sys/class/gpio/export"
sudo sh -c "echo out > /sys/class/gpio/PY.02/direction"
```

To short output:

```
sudo sh -c "echo 1 > /sys/class/gpio/PY.02/value"
```

To open output:

```
sudo sh -c "echo 0 > /sys/class/gpio/PY.02/value"
```

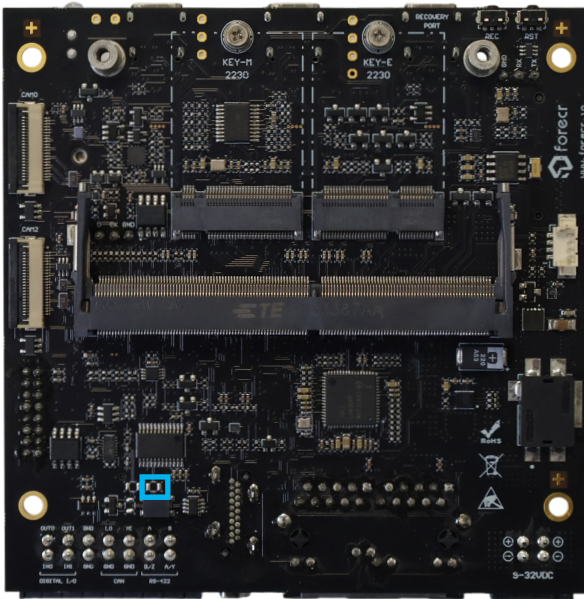
5.2.3 Serial Communication Interface

5.2.3.1 RS232/RS422/RS485

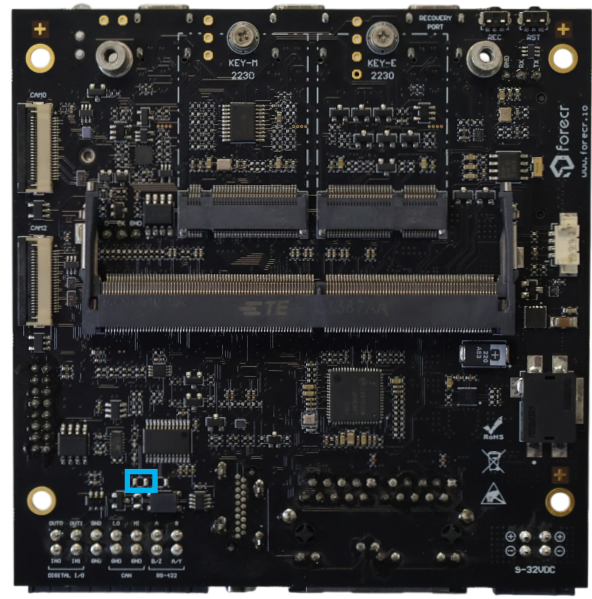
SP330EEY-L from MaxLinear is used to UART1 to RS422/RS232 from Jetson.

There are two 0805 size 120R termination resistors, one between transmit lanes and one between receive lanes. These are not populated by default. In case termination resistors are needed on the DSBOARD-ORNX-LAN side, standard resistors with above specs can be fitted.

RS422 RX (A/B) Termination Resistor



RS422 TX (Z/Y) Termination Resistor

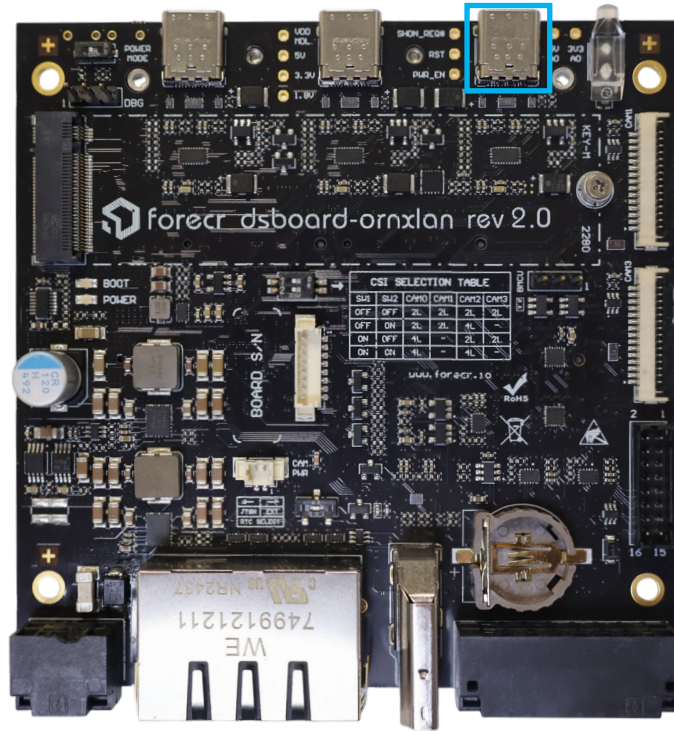


For RS422 communication protocol, RS485/RS232 GPIO from Jetson should be driven high. To use half-duplex mode, HALF/FULL GPIO should be driven high. To use full-duplex mode, HALF/FULL GPIO should be driven low. In half-duplex mode, RS485_CTRL GPIO must be used to switch between driver or receiver mode. To enable receiver mode, RS485_CTRL GPIO should be driven low. To enable driver mode, RS485_CTRL GPIO should be driven high.

For RS232 communication protocol RS485/RS232 GPIO should be driven low. HALF/FULL and RS485_CTRL GPIOs are not used in this mode.

5.3 Bluetooth Functionality

The M.2 Key-E port and one of the USB Type-C connectors (marked below) share a USB 2.0 connection via an on-board multiplexer. By default, the USB 2.0 lines are routed to the USB Type-C connector. To enable Bluetooth on the M.2 Key-E slot, drive GPIO06 HIGH to switch the mux routing to the Key-E connector. Note that routing USB 2.0 to the Key-E connector will disable USB 2.0 functionality on the mentioned USB Type-C port.

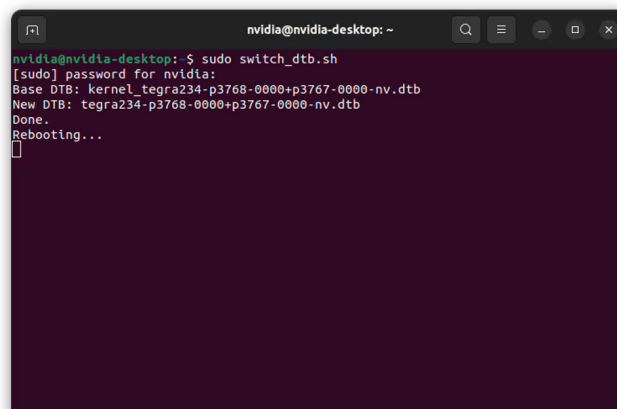


5.4 Enabling Host Mode on the Recovery USB-C Port

To use USB devices with the Recovery USB Type-C port, switch it to host mode by running:

```
sudo switch_dtb.sh
```

Note: The system will automatically reboot after executing this command to apply the new device tree configuration.



5.5 Using the External RTC

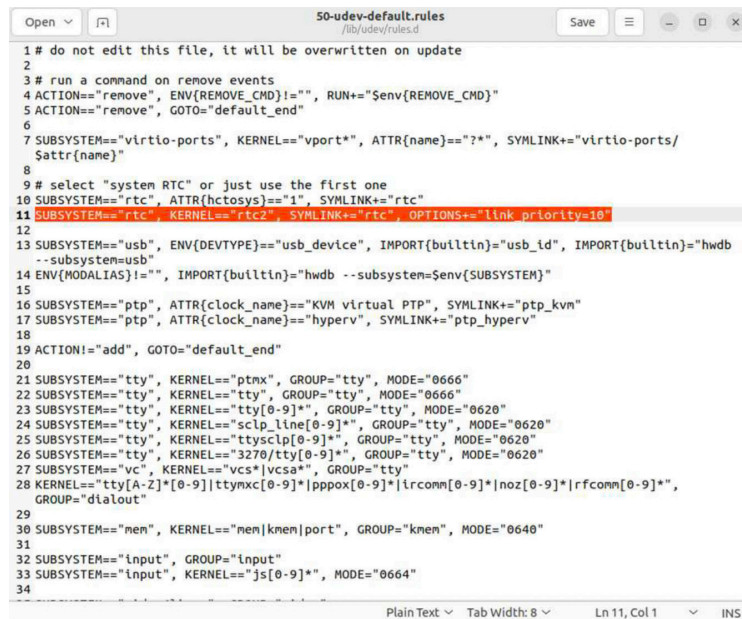
5.5.1 Hardware Configuration

Ensure the onboard RTC selection switch is set to EXT.

5.5.2 Update Udev Rules

Open `/lib/udev/rules.d/50-udev-default.rules` in a text editor with root privileges and update the RTC entry:

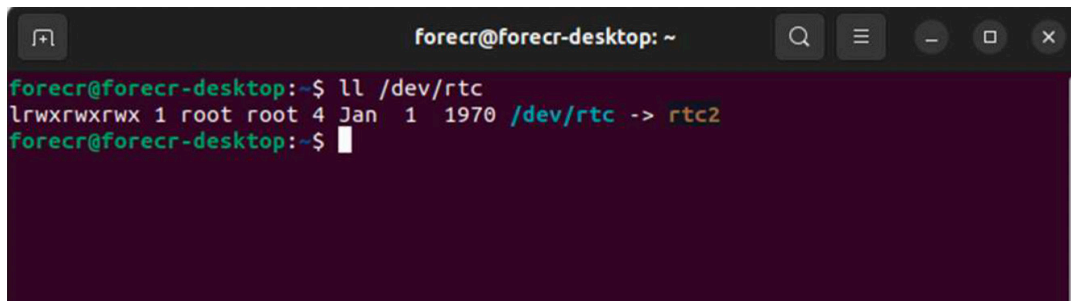
- Change `KERNEL=="rtc0"` to `KERNEL=="rtc2"`
- Change `OPTIONS="link_priority=-100"` to `OPTIONS="link_priority=10"`



```
1 # do not edit this file, it will be overwritten on update
2
3 # run a command on remove events
4 ACTION=="remove", ENV{REMOVE_CMD}!="", RUN+="$env{REMOVE_CMD}"
5 ACTION=="remove", GOTO="default_end"
6
7 SUBSYSTEM=="virtio-ports", KERNEL=="vport*", ATTR{name}=="*", SYMLINK+="virtio-ports/
  $attr{name}"
8
9 # select "system RTC" or just use the first one
10 SUBSYSTEM=="rtc", ATTR{hctosys}=="1", SYMLINK+="rtc"
11 SUBSYSTEM=="rtc", KERNEL=="rtc2", SYMLINK+="rtc", OPTIONS+="link_priority=10"
12
13 SUBSYSTEM=="usb", ENV{DEVTYPE}=="usb_device", IMPORT(builtin)="usb_id", IMPORT(builtin)="hwdb
  --subsystem=usb"
14 ENV{MODALIAS}!="", IMPORT(builtin)="hwdb --subsystem=$env{SUBSYSTEM}"
15
16 SUBSYSTEM=="ptp", ATTR{clock_name}=="KVM virtual PTP", SYMLINK+="ptp_kvm"
17 SUBSYSTEM=="ptp", ATTR{clock_name}=="hyperv", SYMLINK+="ptp_hyperv"
18
19 ACTION!="add", GOTO="default_end"
20
21 SUBSYSTEM=="tty", KERNEL=="ptmx", GROUP="tty", MODE="0666"
22 SUBSYSTEM=="tty", KERNEL=="tty", GROUP="tty", MODE="0666"
23 SUBSYSTEM=="tty", KERNEL=="tty[0-9]*", GROUP="tty", MODE="0620"
24 SUBSYSTEM=="tty", KERNEL=="scslp_line[0-9]*", GROUP="tty", MODE="0620"
25 SUBSYSTEM=="tty", KERNEL=="ttysclp[0-9]*", GROUP="tty", MODE="0620"
26 SUBSYSTEM=="tty", KERNEL=="3270/tty[0-9]*", GROUP="tty", MODE="0620"
27 SUBSYSTEM=="vc", KERNEL=="vcs*|vcsa*", GROUP="tty"
28 KERNEL=="tty[A-Z]*[0-9]*|ttynxc[0-9]*|pppox[0-9]*|ircomm[0-9]*|noz[0-9]*|rfcomm[0-9]*",
  GROUP="dialout"
29
30 SUBSYSTEM=="men", KERNEL=="men|kmen|port", GROUP="kmen", MODE="0640"
31
32 SUBSYSTEM=="input", GROUP="input"
33 SUBSYSTEM=="input", KERNEL=="js[0-9]*", MODE="0664"
34
```

Reboot the system, then verify the change in a terminal:

```
ll /dev/rtc
```

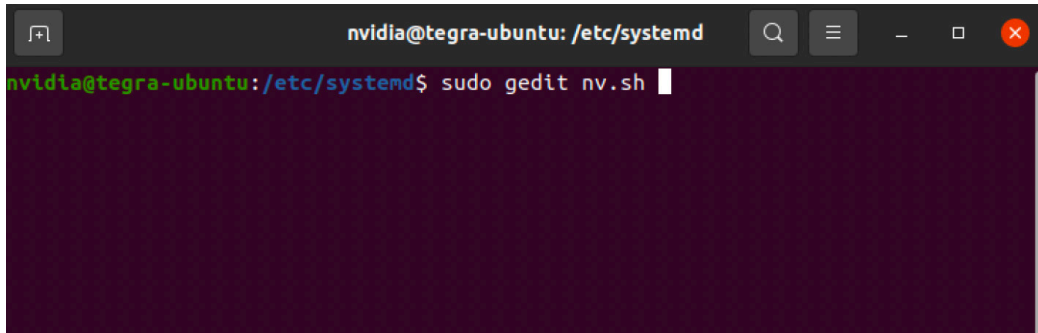


```
forecr@forecr-desktop: ~
forecr@forecr-desktop:~$ ll /dev/rtc
lrwxrwxrwx 1 root root 4 Jan 1 1970 /dev/rtc -> rtc2
forecr@forecr-desktop:~$
```

5.5.3 Configure System Time Sync on Boot

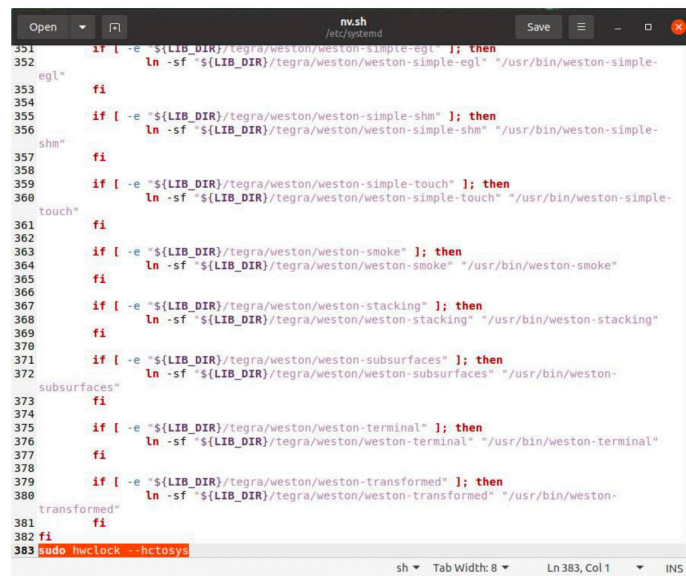
Edit `nv.sh` to sync the system clock from the hardware RTC during startup:

```
sudo gedit nv.sh
```



Add the following line to the end of the file, then save and exit:

```
sudo hwclock --hctosys
```



5.5.4 Verification

- Disconnect the power cable and wait 5 minutes.
- Reconnect power and boot the system.
- Check the system clock to verify that the correct time was maintained.

5.6 On-Board I2C Devices List

5.6.1 I2C0 Bus

- Power Monitor (on Jetson SOM) — 0x40 (40h)

5.6.2 I2C1 Bus

- Power Monitor (P/N: INA700) — 0x44 (44h)
- External RTC (P/N: PCF8523T) — 0x68 (68h)
- 6-Axis IMU / Temperature Sensor (P/N: 2536030320001) — 0x6B (6Bh)

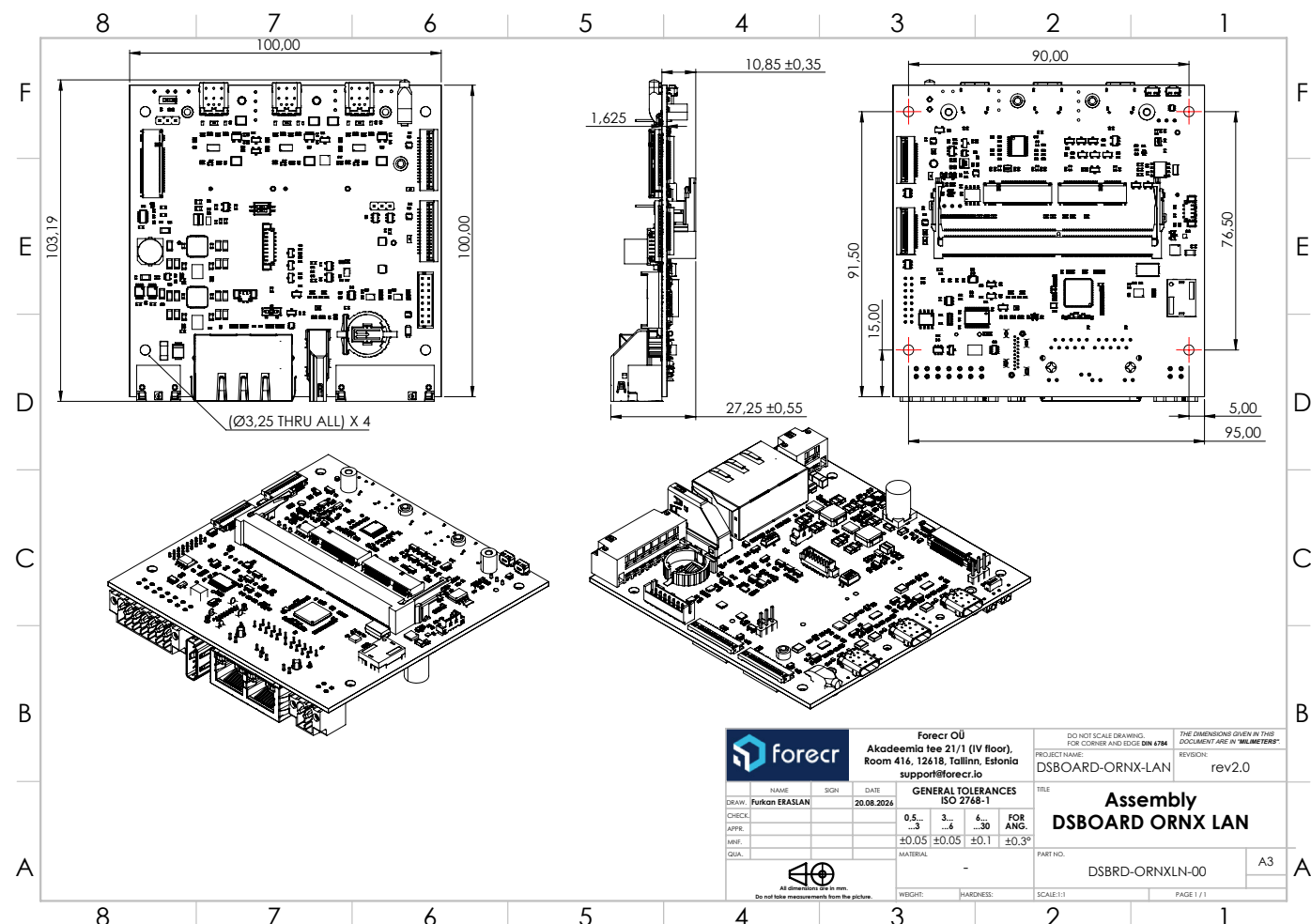
5.6.3 I2C2 Bus

- EEPROM (on Jetson SOM) — 0x50 (50h)
- EEPROM (P/N: CAT24C04WI) — 0x52 (52h)

6. 3D Model & Mechanical Information

The full 3D models of DSBOARD ORNX-LAN can be found [here](#).

DSBOARD-ORNXLAN Stand Alone



Technical drawing of the DSBOARD ORNX LAN (wModule) showing top, side, and bottom views with dimensions and a title block.

Top View Dimensions:

- Overall width: 100.00
- Overall height: 103.19
- Bottom edge width: 95.00
- Bottom edge height: 5.00
- Right edge height: 76.50
- Top edge width: 90.00
- Top edge height: 43.20

Side View Dimensions:

- Overall height: 12.32 ± 0.30
- Bottom edge height: 28.72 ± 0.50
- Top edge height: 1.625

Bottom View Dimensions:

- Overall width: 91.50
- Overall height: 15.00

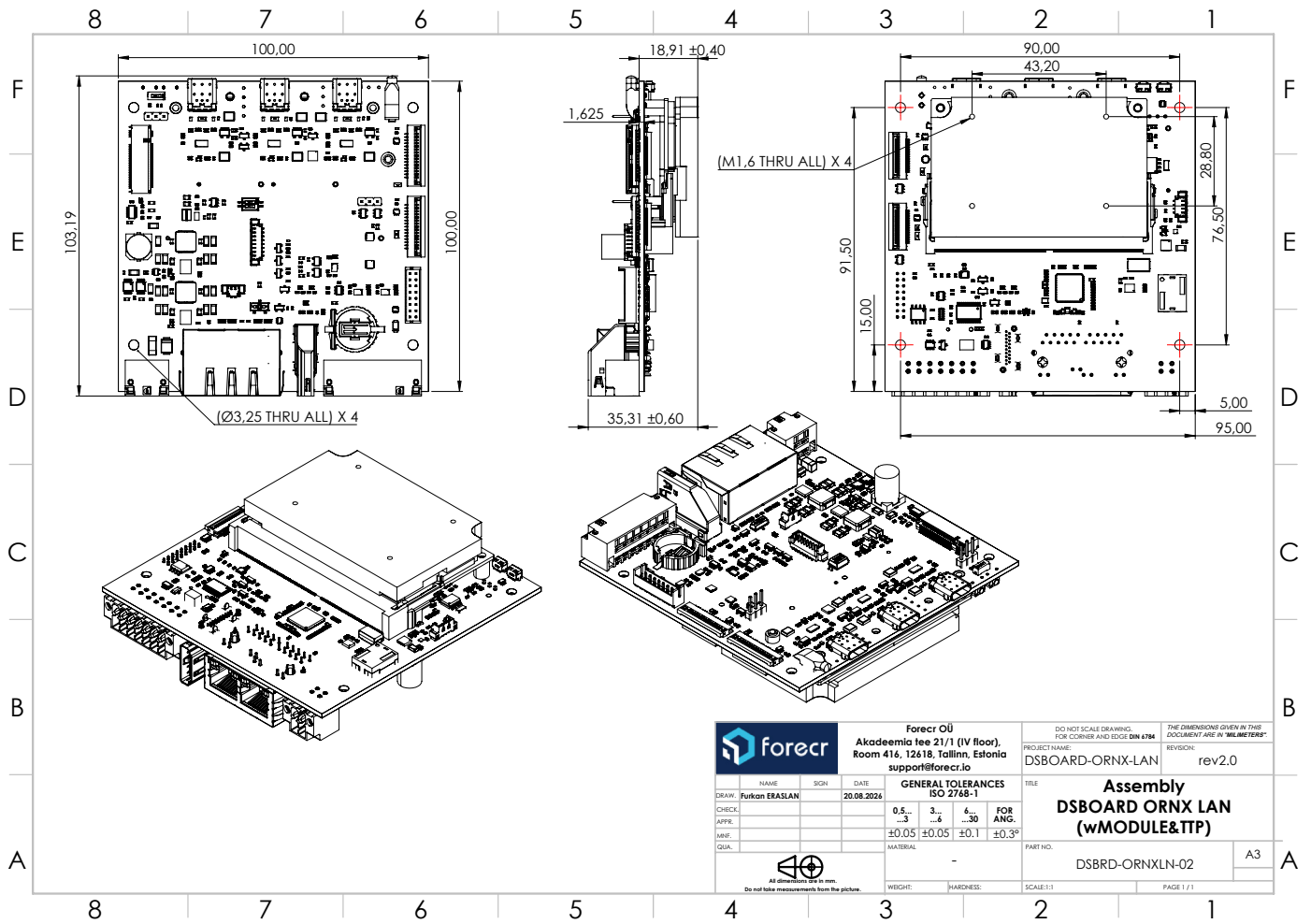
General Tolerances (ISO 2768-1):

	0.5...	3...	6...	FOR ANG.
APPR.	...	...	...	...
WARP.	±0.05	±0.05	±0.1	±0.3°
QUAL.				

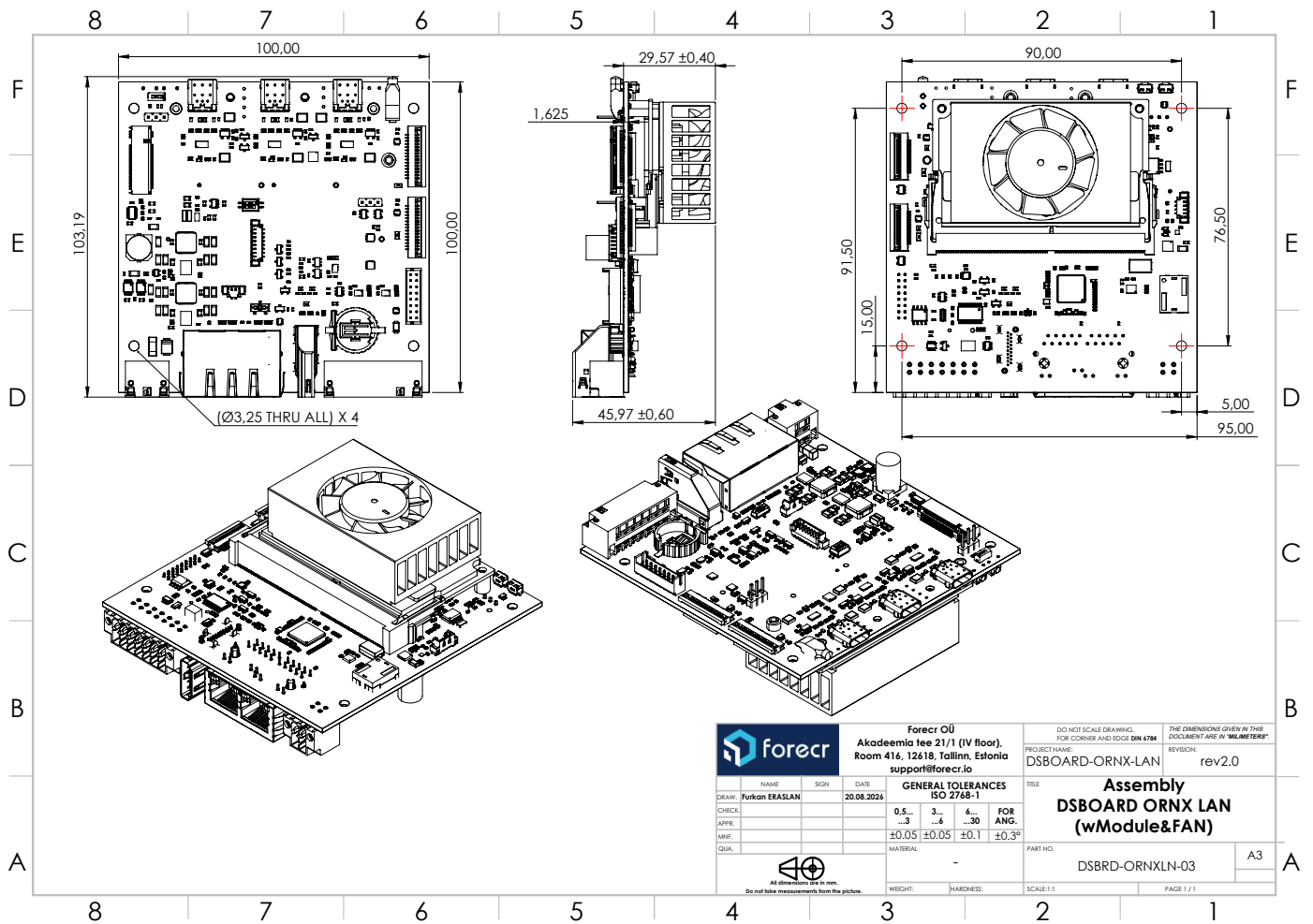
Title Block:

forecr Akadeemia tee 21/1 (IV floor), Room 416, 12618, Tallinn, Estonia support@forecr.io		DO NOT SCALE DRAWING. FOR CORNER AND EDGE DIN 4764 PROJECT NAME: DSBOARD-ORNX-LAN REVISION: rev2.0	
TITLE: Assembly DSBOARD ORNX LAN (wModule)		PART NO: DSBRD-ORNXLN-01	
SCALE: 1:1		PAGE: 1 / 1	

DSBOARD-ORNX-LAN with Jetson Orin Nano/NX Module and TTP Integration Details



DSBOARD-ORNX-LAN with Jetson Orin Nano/NX Module and Thermal Integration Details



7. Power Consumption

7.1 Orin NX 16GB

Power Supply: 12V-5A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	10W (4 core)	15W (4 core)	25W (8 core)	40W (8 core)	MAXN (8 core)
Current (A)	1.4	1.18	0.112	1.48	1.6	1.68	2.75	3.28
Power (W)	16.8	14.16	1.344	17.76	19.2	20.16	33	39.36

7.2 Orin NX 8GB

Power Supply: 12V-5A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	10W (4 core)	15W (4 core)	20W (8 core)	40W (8 core)	MAXN (8 core)
Current (A)	1.61	1.1	0.11	1.46	1.54	1.61	2.82	2.92
Power (W)	19.32	13.2	1.32	17.52	18.48	19.32	33.84	35.04

7.3 Orin Nano 4GB

Power Supply: 12V-5A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	10W (6 core)	25W (6 core)	MAXN (6 core)
Current (A)	1.15	0.56	0.12	1.71	2.22	2.28
Power (W)	13.8	6.72	1.44	20.52	26.64	27.36

7.4 Orin Nano 8GB

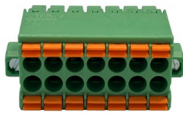
This section will be completed soon. It will be published on our website once completed. Please check our Forecr [Website](#) regularly.

8. MTBF Prediction

Methodology	Telcordia SR-332 (Parts Count) *Preliminary
Operating Environment	Ground Benign (GB), Controlled
Ambient Temperature	25 °C
Board Failure Rate	0.434 failures / 10 ⁶ hours
MTBF	2,302,259 (Hours), 262.81 (Years)

Methodology	Telcordia SR-332 (Parts Count) *Preliminary
Operating Environment	Ground Fixed (GF), Uncontrolled
Ambient Temperature	40 °C
Board Failure Rate	1.671 failures / 10 ⁶ hours
MTBF	598,587 (Hours), 68.33 (Years)

9. Accessories

	Part Number	Description	Quantity
	1790344	IO Connector	1

	Part Number	Description	Quantity
	1708595	Power Connector	1

	Description
	Fan for ORIN NX/Orin Nano

	Description
	60W / 12V Power Adapter

	Description
	Thermal Transfer Plate

10. Ordering Information

