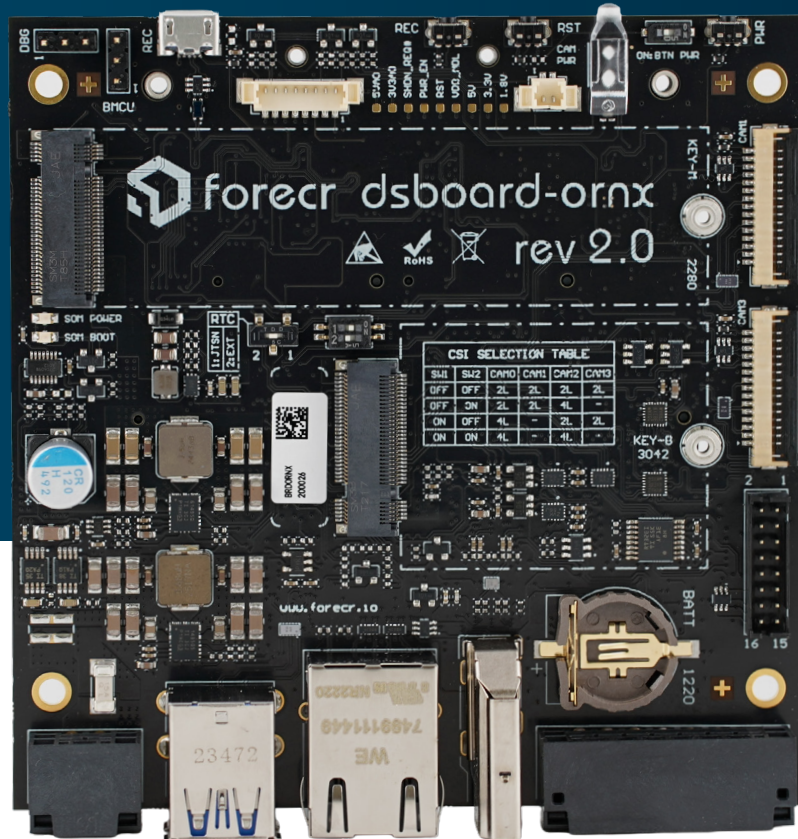




DSBOARD ORNX

USER MANUAL

UM-DSBDORNX-02
Document Revision: 1.0
23/09/2026



Elite
Partner

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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.

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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	23.09.2026	Preliminary Release

1. Introduction

The DSBOARD-ORNX is an industrial-grade carrier board engineered for harsh environments and applications demanding high processing power and high reliability. Powered by the NVIDIA® Jetson Orin™ NX / Orin™ Nano SoM, which features advanced NVIDIA Ampere GPU and ARM64 CPU architecture, it delivers exceptional performance. Its compact form factor provides a versatile and flexible solution for a wide array of industrial applications, including autonomous systems, robotics, and intelligent video analytics.

Equipped with a versatile array of connectivity options, including Gigabit Ethernet, USB 3.2, HDMI, and CAN Bus, the DSBOARD-ORNX ensures effortless integration with a wide spectrum of devices and industrial systems. The underlying NVIDIA Orin™ NX / Orin™ Nano SOM delivers the robust processing capabilities required for intensive data analytics and edge computing. Complementing its compact form factor, the board features multiple expansion slots, allowing users to seamlessly integrate peripherals and customize the system to specific project requirements. Furthermore, its extended operating temperature range guarantees reliable performance in demanding environments.

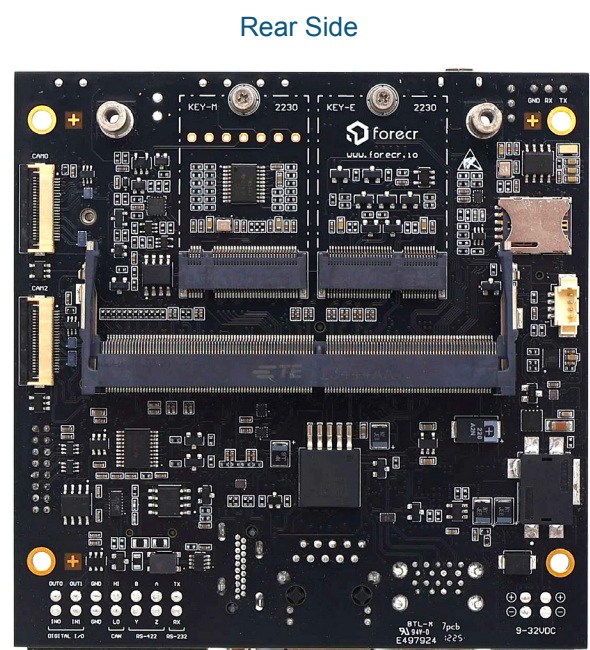
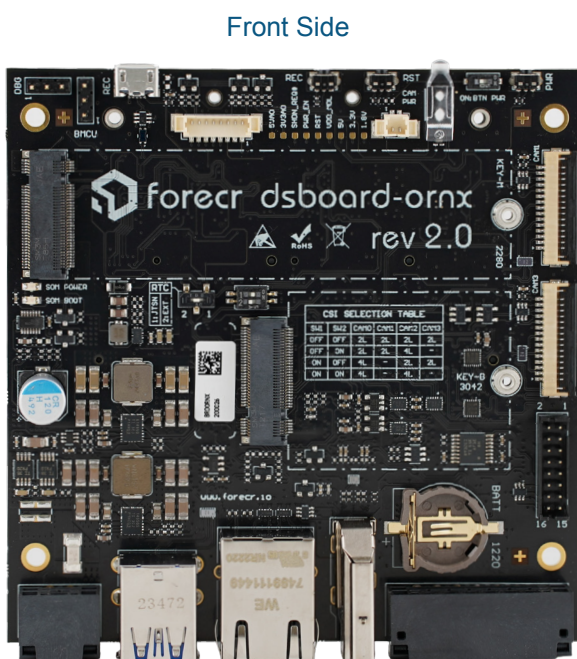
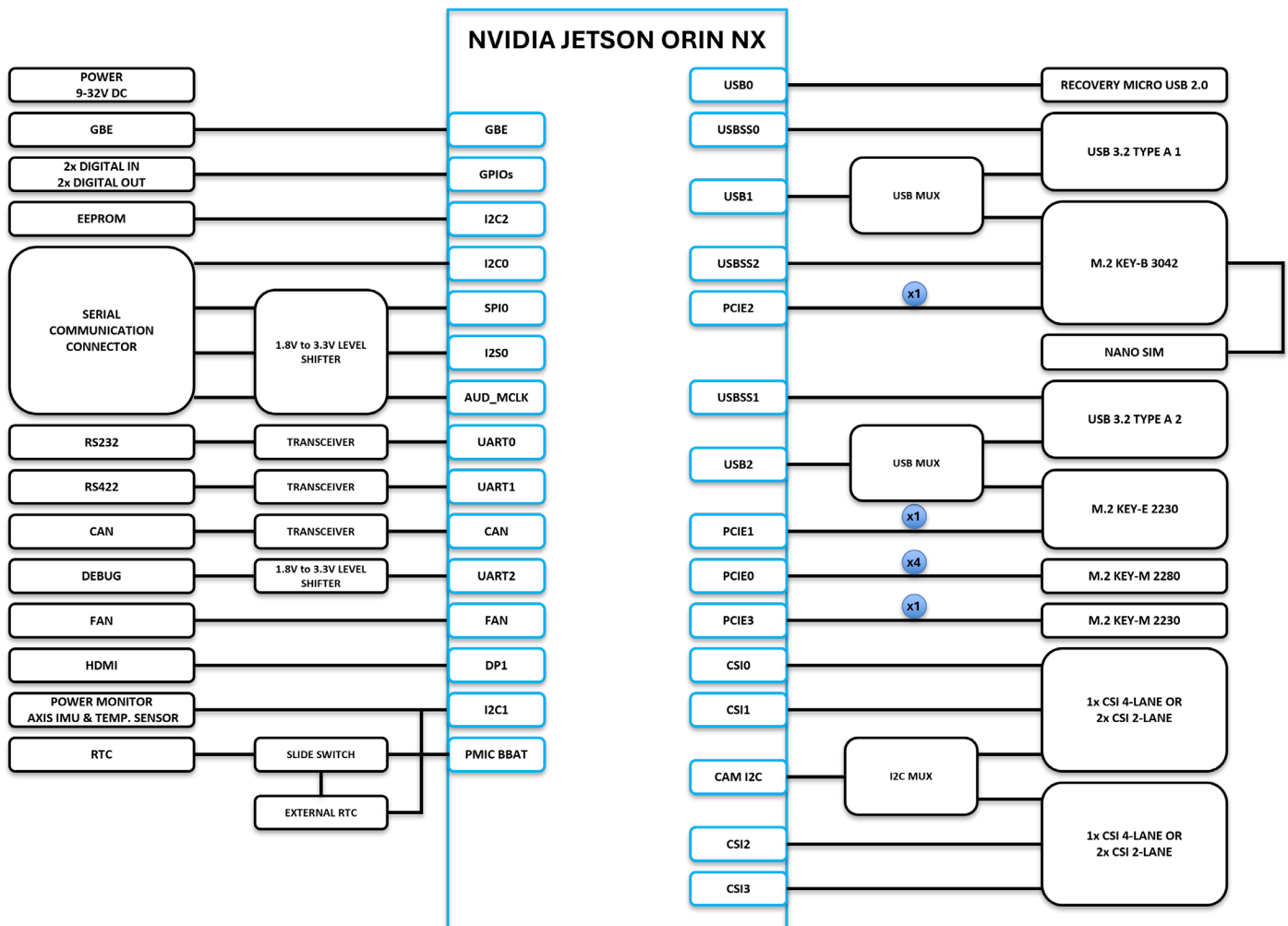
Overall, DSBOARD-ORNX is a highly dependable solution for industrial applications that demand high processing power and a reliable platform. Its advanced features and compact design make it an ideal choice for applications where space is limited, and flexibility is key.

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

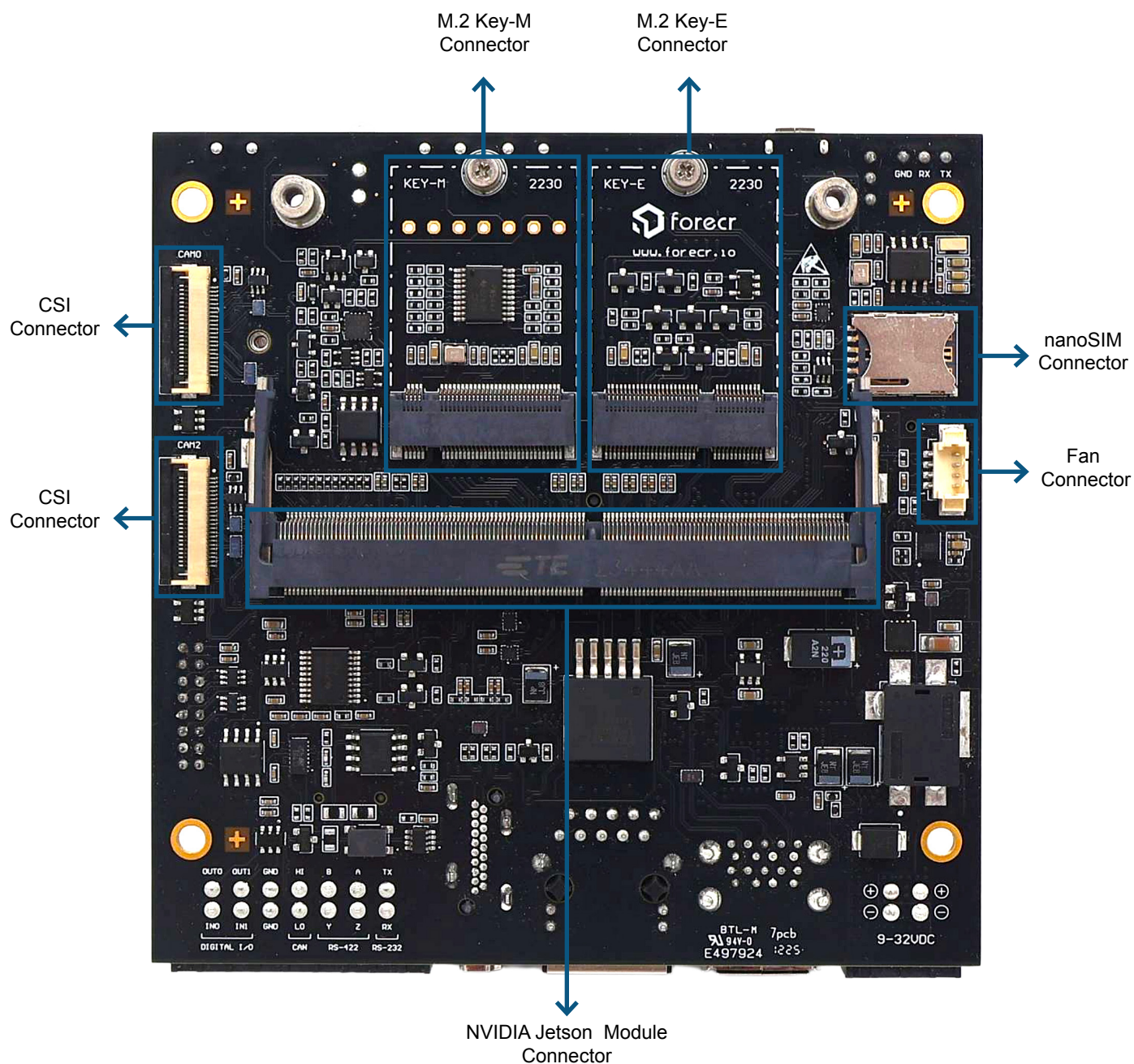
2. Product Specification

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 (max resolution 3840x2160)
Interfaces	1x Gigabit Ethernet 2x USB 3.2 Type-A 1x CAN-FD 1x RS232 1x RS422 1x microUSB 2.0 (Recovery) 2x Digital Input (12-24V) 2x Digital Output (up to 24V) 2x CSI 4-Lane or 4x CSI 2-Lane
Wireless Communication	WIFI/LTE/5G/Bluetooth Connectivity by extension sockets
Power Supply	9-32 VDC
Extension Sockets	M.2 Key-B 3042 (USB3.0, USB2.0) M.2 Key-E 2230 (PCIe x1, USB2.0) 1x nanoSIM FAN Header (5V, PWM, TACH) Serial Communication Header (1x SPI, 1x I2S, 1x I2C)
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, 82.8 gr
Operating Systems	Ubuntu Linux 20.04 / 22.04 / 24.04
JetPack Support	JetPack 5.x / 6.x / 7.2+



3.1.2 Rear Side

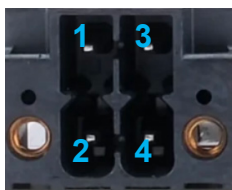


3.2 List of Connectors and Buttons, Switches, and Indicators

Connectors
DSBOARD-ORNX Power Connector
DSBOARD-ORNX I/O Terminal Connector
DSBOARD-ORNX M.2 Key-M Connectors
DSBOARD-ORNX M.2 Key-B Connector
DSBOARD-ORNX M.2 Key-E Connector
DSBOARD-ORNX CSI Connectors
DSBOARD-ORNX Panel Connector
DSBOARD-ORNX Serial Communication Connector
DSBOARD-ORNX RTC Battery Connector
DSBOARD-ORNX HDMI Connector
DSBOARD-ORNX nanoSIM Connector
DSBOARD-ORNX USB 3.2 Type-A Connector
DSBOARD-ORNX Recovery Mode Micro USB Connector
DSBOARD-ORNX Gigabit Ethernet Connector
DSBOARD-ORNX Debug Mode Header Connector
DSBOARD-ORNX Camera Power Connector
DSBOARD-ORNX Fan Connector
Buttons, Switches, and Indicators
DSBOARD-ORNX Power Pushbutton
DSBOARD-ORNX Recovery Pushbutton
DSBOARD-ORNX Reset Pushbutton
DSBOARD-ORNX CSI Configuration Switch
DSBOARD-ORNX RTC Switch
DSBOARD-ORNX Power Mode Switch
DSBOARD-ORNX 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	RS232 TX	I/O
	2	RS232 RX	I/O
	3	RS422 A	I/O
	4	RS422 Z	I/O
	5	RS422 B	I/O
	6	RS422 Y	I/O
	7	CAN_H	I/O
	8	CAN_L	I/O
	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

A photograph of an M.2 Key-M connector board, model 2230. The board is black with a central integrated circuit (IC) and various surface components. It features a multi-pin connector at the bottom and a circular mounting hole at the top. The text "KEY-M" and "2230" are visible on the board.

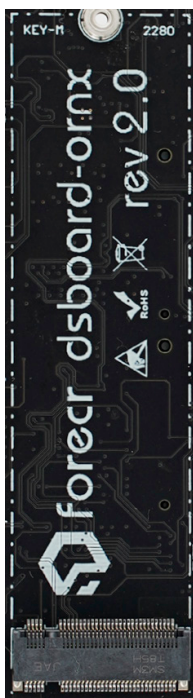
Description

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

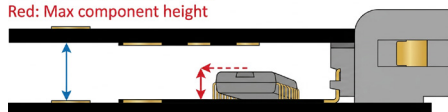
A diagram illustrating the mechanical specifications for the M.2 Key-M connector board. It shows two boards stacked vertically. A blue double-headed arrow indicates the board-to-board spacing of 1.45 mm. A red double-headed arrow indicates the maximum component height of 1.2 mm. A 3D component is shown on the bottom board, with its height measured from the board surface.

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=0 mm

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

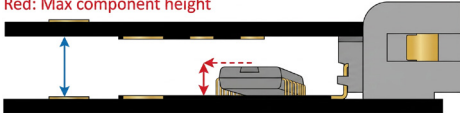


3.3.4 M.2 Key-B Connector

Pinout	Description			
	Pin	Description	Pin	Description
	1	NC	44	NC
	2	VDD_3V8	45	DGND
	3	DGND	46	NC
	4	VDD_3V8	47	PCIE2.TX0_N
	5	DGND	48	NC
	6	M2B_FULLCARD_PWOFF#	49	PCIE2.TX0_P
	7	USB2_KEYB.AP_P	50	PCIE2.RST_N
	8	M2B_W_DISABLE1#	51	DGND
	9	USB2_KEYB.AP_N	52	PCIE2.CLKREQ_N
	10	NC	53	PCIE2.CLK_N
	11	DGND	54	PCIE.WAKE_N
	20	NC	55	PCIE2.CLK_P
	21	NC	56	NC
	22	NC	57	DGND
	23	NC	58	NC
	24	NC	59	NC
	25	NC	60	NC
	26	M2B_W_DISABLE2#	61	NC
	27	DGND	62	NC
	28	NC	63	NC
	29	USBSS2_RX_N	64	NC
	30	M2_USIM_RST	65	NC
	31	USBSS2_RX_P	66	NC
	32	M2_USIM_CLK	67	M2B_RESET
	33	DGND	68	NC
	34	M2_USIM_DAT	69	NC
	35	USBSS2_TX_N	70	VDD_3V8
	36	M2_USIM_VDD	71	DGND
	37	USBSS2_TX_P	72	VDD_3V8
	38	NC	73	DGND
	39	DGND	74	VDD_3V8
	40	NC	75	NC
	41	PCIE2.RX0_N	MNT1	DGND
	42	NC	MNT2	DGND
	43	PCIE2.RX0_P		

Board to board spacing=2.45 mm
Max component height=1.3 mm

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

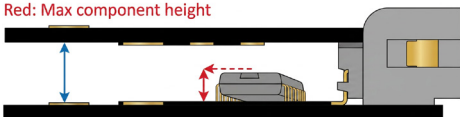


3.3.5 M.2 Key-E Connector

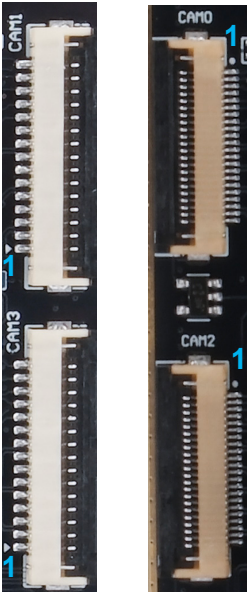
Description				
Pinout	Pin	Description	Pin	Description
	1	DGND	44	NC
	2	VDD_3V3	45	DGND
	3	USB2_KEYE.AP2_P	46	NC
	4	VDD_3V3	47	PCIE2.CLK_P
	5	USB2_KEYE.AP2_N	48	NC
	6	NC	49	PCIE2.CLK_N
	7	DGND	50	M2E_SUSCLK_32KHZ
	8	NC	51	DGND
	9	MC	52	PCIE2.RST_N
	10	NC	53	PCIE2.CLKREQ_N
	11	NC	54	M2E_WDISABLE2_N
	12	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

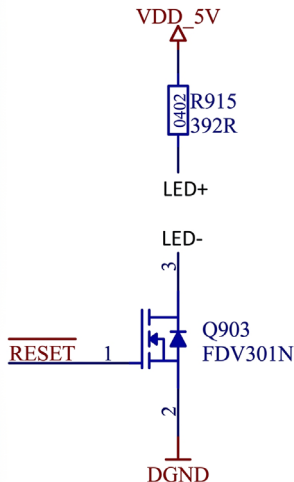
Blue: Board-to-Board spacing
Red: Max component height



3.3.6 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		

3.3.7 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 -			

3.3.8 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	I2S0_DIN
	10	I2S0_DOUT
	11	I2S0_SCLK
	12	I2S0_FS
	13	I2C0_SCL
	14	AUD_MCLK
	15	I2C0_SDA
	16	SPI0_CS1
	Note: All signal lines on this connector operate at 3.3V logic levels.	

3.3.9 RTC Battery Connector

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

3.3.10 HDMI Connector

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

3.3.11 nanoSIM Connector

	The DSBOARD-ORNX features a nanoSIM connector.
---	---

3.3.12 USB 3.2 Type-A Connectors

	The DSBOARD-ORNX features two USB 3.2 Type-A ports, each capable of delivering up to 1.5A of current.
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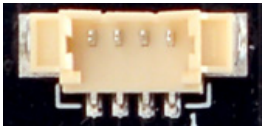
3.3.13 Recovery Mode Micro USB Connector

	The DSBOARD-ORNX features a Micro USB port used for flashing and updating the operating system (Recovery mode).
---	---

3.3.14 Gigabit Ethernet Connector

	The DSBOARD-ORNX features an RJ-45 Gigabit Ethernet port supporting 10/100/1000 Mbps operation for network communication .
---	--

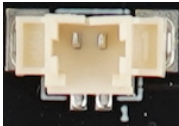
3.3.15 Fan Connector

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

3.3.16 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.	

3.3.17 Camera Power Connector

	Function	Description	
	Pinout	Pin	Description
		1	VDD_DC_MAIN
		2	GND
	Note: The DSBOARD-ORNX 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 Power Pushbutton

	The DSBOARD-ORNX provides a Power push button to energize the platform.
---	---

3.4.2 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.
---	--

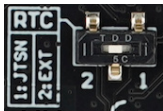
3.4.3 Reset Pushbutton

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

3.4.4 CSI 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 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.						

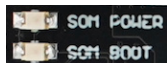
3.4.5 RTC Switch

	RTC SELECT	
	1	2
	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).	

3.4.6 Power Mode Switch

	The DSBOARD-ORNX 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).
---	--

3.4.7 LED Indicators



The DSBOARD-ORNX 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.
112	USB.MUX1	SPI1_CS1	OUTPUT	Drives USB mux #1. Drive high to connect USB2.0 interface to Key-B connector. Drive low to connect USB2.0 interface to Type-A USB connector.
226	USB.MUX2	I2S1_SCLK	OUTPUT	Drives USB mux #2. Drive high to connect USB2.0 interface to Key-E connector. Drive low to connect USB2.0 interface to Type-A USB connector.
87	USB_VBUS_EN0	GPIO00	OUTPUT	Connect to enable and overcurrent pins of load switch.
128	#USB0_VBUS_DET	GPIO05	INPUT	Connect to VBUS pin of USB connector receiving USB0_+/- interface through level shifter.
228	M2E_WDIS-ABLE1	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	32.768 kHz clock module input.
130	M2B_PWR_ON#	GPIO06	OUTPUT	LTE/5G module 3.8V power supply LDO enable control. Drive high to disable LDO. Drive low for normal operation.
206	M2B_RESET	GPIO07	OUTPUT	LTE/5G module reset control input. Drive high to trigger reset. Drive low for normal operation.
126	M2B_W_DIS-ABLE1#	GPIO03	OUTPUT	LTE/5G module airplane mode control. Drive low to enable airplane mode. Drive high for normal operation.
124	M2B_W_DIS-ABLE2#	GPIO02	OUTPUT	LTE/5G module GNSS enablement control. Drive low to disable GNSS. Drive high for normal operation.
218	M2B_FULL-CARD_PWROFF#	GPIO12	OUTPUT	LTE/5G module power on/off control. Drive low to power off the module. Drive high for normal operation.

116	CAM0_MCLK	CAM0_MCLK	OUTPUT	Camera 0 reference clock (1.8V Level)
114	CAM0_PWDN	CAM0_PWDN	OUTPUT	Camera 0 powerdown (3.3V Level)
118	CAM2_MCLK	GPIO01	OUTPUT	Camera 2 reference clock (1.8V Level)
127	CAM2_PWDN	GPIO04	OUTPUT	Camera 2 powerdown (3.3V Level)
122	CAM1_MCLK	CAM1_MCLK	OUTPUT	Camera 1 reference clock (1.8V Level)
120	CAM1_PWDN	CAM1_PWDN	OUTPUT	Camera 1 powerdown (3.3V Level)
216	CAM3_MCLK	GPIO11	OUTPUT	Camera 3 reference clock (1.8V Level)
212	CAM3_PWDN	GPIO10	OUTPUT	Camera 3 powerdown (3.3V Level)
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.
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.

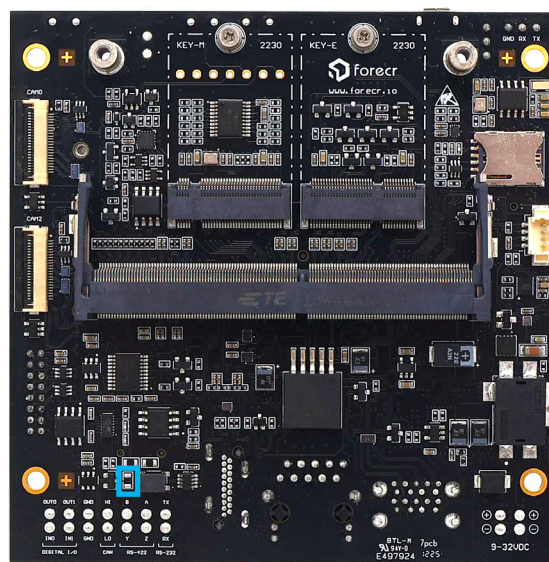
5.2 I/O Connector

On the connector, there are 6 Serial Communication, 2 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. 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 side.

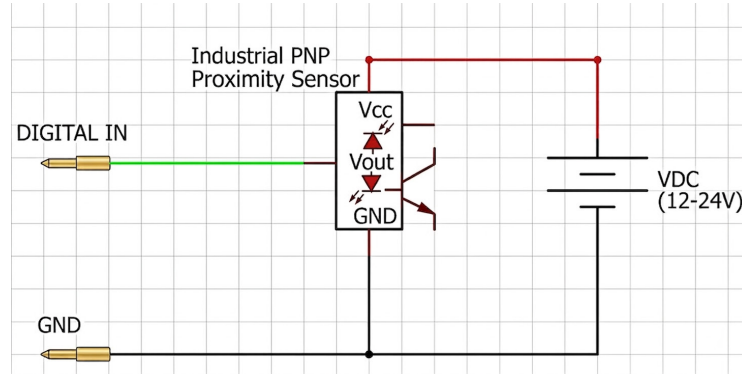
CANBus Termination Resistor



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.

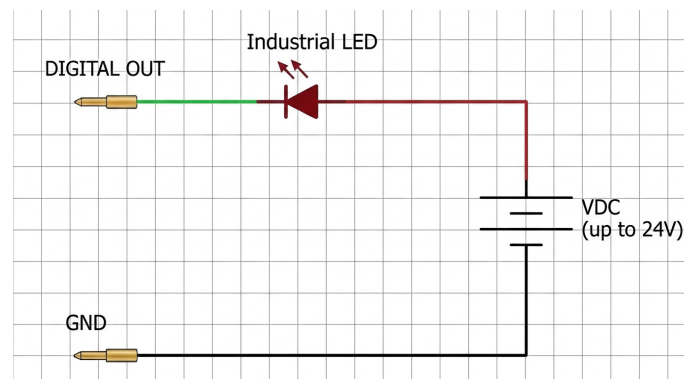
Pin Name	Sysfs Name
DIGITAL_IN0	gpio-470 (PY.00)
DIGITAL_IN1	gpio-471 (PY.01)
GROUND	GND

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"
```

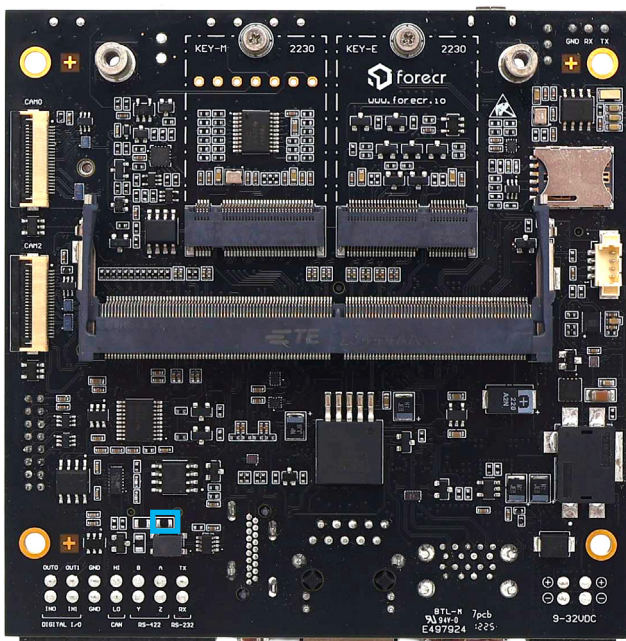
5.2.3 Serial Communication Interface

5.2.3.1 RS422

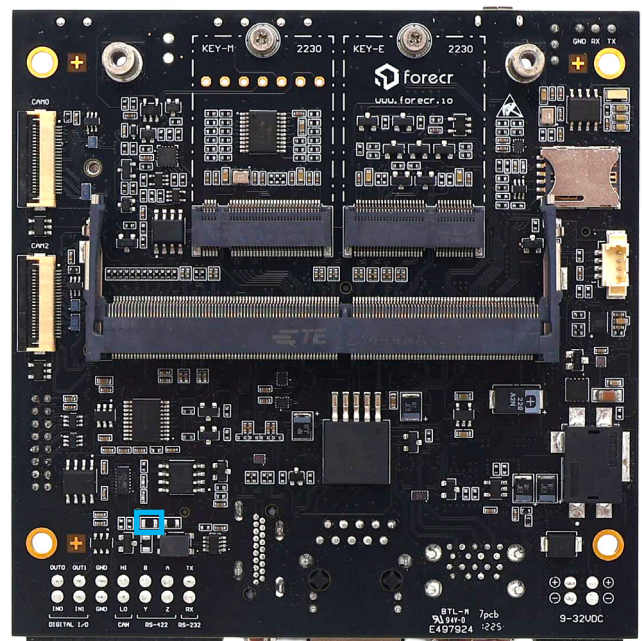
ISL83490 from Renesas is used to convert UART1 to RS-422 from Jetson.

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 side, standard resistors with above specs can be fitted.

RS422 RX (A/B) Termination Resistor



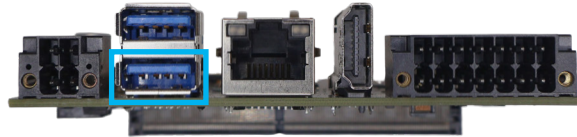
RS422 TX (Z/Y) Termination Resistor



TRSF3232E from Texas Instruments is used to convert UART0 to RS-232 from Jetson.

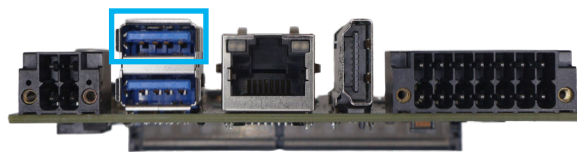
5.3 Bluetooth Functionality

The M.2 Key-E port and one of the USB Type-A connectors (marked below) share a USB 2.0 connection via an onboard multiplexer. By default, the USB 2.0 lines are routed to the USB Type-A connector. To enable Bluetooth on the M.2 Key-E slot, drive USB.MUX2 GPIO 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-A port.



5.4 Configuring USB 2.0 on the M.2 Key-B Slot

The M.2 Key-B port and one of the USB Type-A connectors (marked below) share a USB 2.0 connection via an onboard multiplexer. By default, the USB 2.0 lines are routed to the USB Type-A connector. To enable USB2.0 connection on the M.2 Key-B slot, drive USB.MUX1 GPIO HIGH to switch the mux routing to the Key-B connector. Note that routing USB 2.0 to the Key-B connector will disable USB 2.0 functionality on the mentioned USB Type-A port.



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"`

```

50-udev-default.rules
/ub/udev/rules.d

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+="<div data-bbox="65 376 477 392" data-label="Text">


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
```

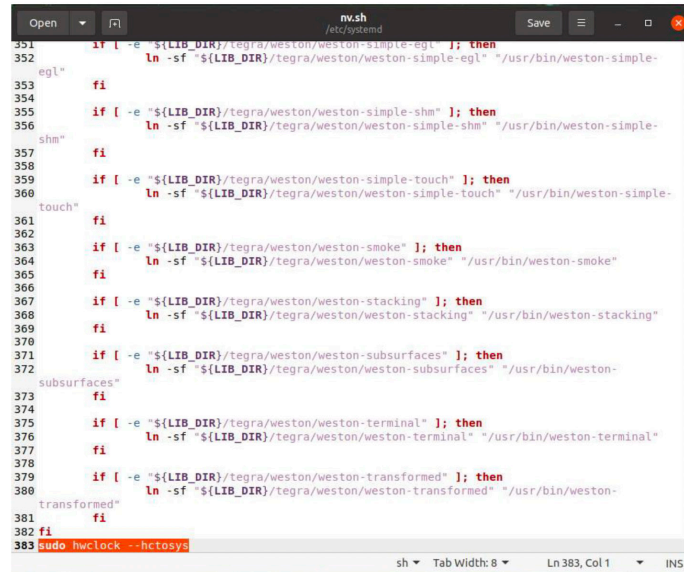
```

nvidia@tegra-ubuntu: /etc/systemd
nvidia@tegra-ubuntu:/etc/systemd$ sudo gedit nv.sh

```

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

```
sudo hwclock --hctosys
```



```

351 if [ -e "${LIB_DIR}/tegra/weston/weston-simple-egl" ]; then
352     ln -sf "${LIB_DIR}/tegra/weston/weston-simple-egl" "/usr/bin/weston-simple-
353     egl"
354 fi
355 if [ -e "${LIB_DIR}/tegra/weston/weston-simple-shm" ]; then
356     ln -sf "${LIB_DIR}/tegra/weston/weston-simple-shm" "/usr/bin/weston-simple-
357     shm"
358 fi
359 if [ -e "${LIB_DIR}/tegra/weston/weston-simple-touch" ]; then
360     ln -sf "${LIB_DIR}/tegra/weston/weston-simple-touch" "/usr/bin/weston-simple-
361     touch"
362 fi
363 if [ -e "${LIB_DIR}/tegra/weston/weston-smoke" ]; then
364     ln -sf "${LIB_DIR}/tegra/weston/weston-smoke" "/usr/bin/weston-smoke"
365 fi
366 if [ -e "${LIB_DIR}/tegra/weston/weston-stacking" ]; then
367     ln -sf "${LIB_DIR}/tegra/weston/weston-stacking" "/usr/bin/weston-stacking"
368 fi
369 if [ -e "${LIB_DIR}/tegra/weston/weston-subsurfaces" ]; then
370     ln -sf "${LIB_DIR}/tegra/weston/weston-subsurfaces" "/usr/bin/weston-
371     subsurfaces"
372 fi
373 if [ -e "${LIB_DIR}/tegra/weston/weston-terminal" ]; then
374     ln -sf "${LIB_DIR}/tegra/weston/weston-terminal" "/usr/bin/weston-terminal"
375 fi
376 if [ -e "${LIB_DIR}/tegra/weston/weston-transformed" ]; then
377     ln -sf "${LIB_DIR}/tegra/weston/weston-transformed" "/usr/bin/weston-
378     transformed"
379 fi
380 fi
381 fi
382 fi
383 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)

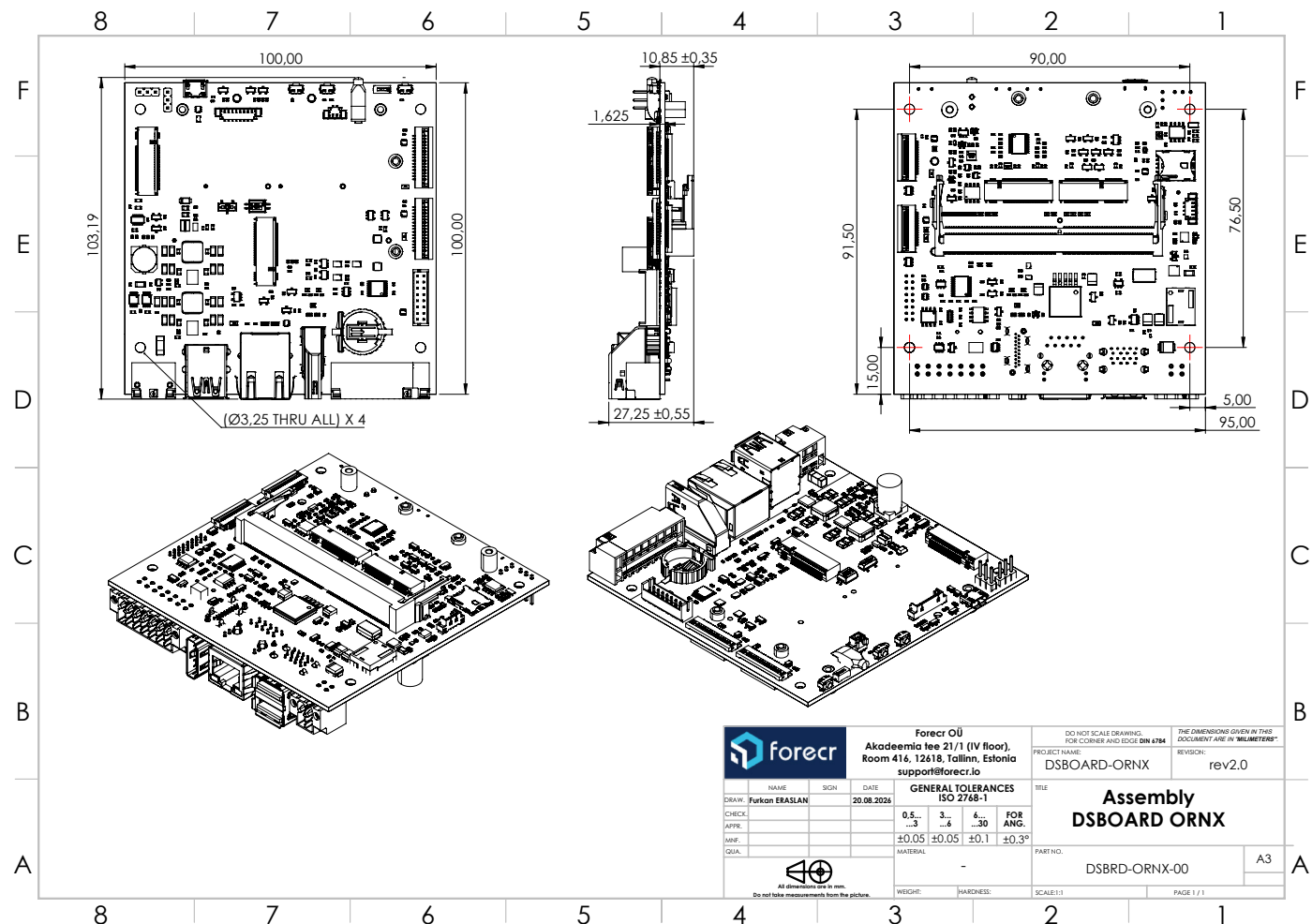
5.6.3 I2C2 Bus

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

6. 3D Model & Mechanical Information

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

DSBOARD-ORNX Stand Alone



Top View Dimensions:

- Overall width: 100,00
- Overall height: 103,19
- Mounting holes: (Ø3,25 THRU ALL) X 4

Side View Dimensions:

- Mounting flange width: 12,32 ±0,30
- Flange thickness: 1,625
- Base width: 28,72 ±0,50
- Base height: 91,50

Bottom View Dimensions:

- Overall width: 90,00
- Overall height: 76,50
- Mounting holes: (Ø3,20 THRU ALL) X 4
- Internal width: 43,20
- Internal height: 28,80
- Bottom flange width: 5,00
- Bottom flange height: 95,00

Isometric Views:

- Two isometric views showing the board from different angles, highlighting the mounting flange and base.

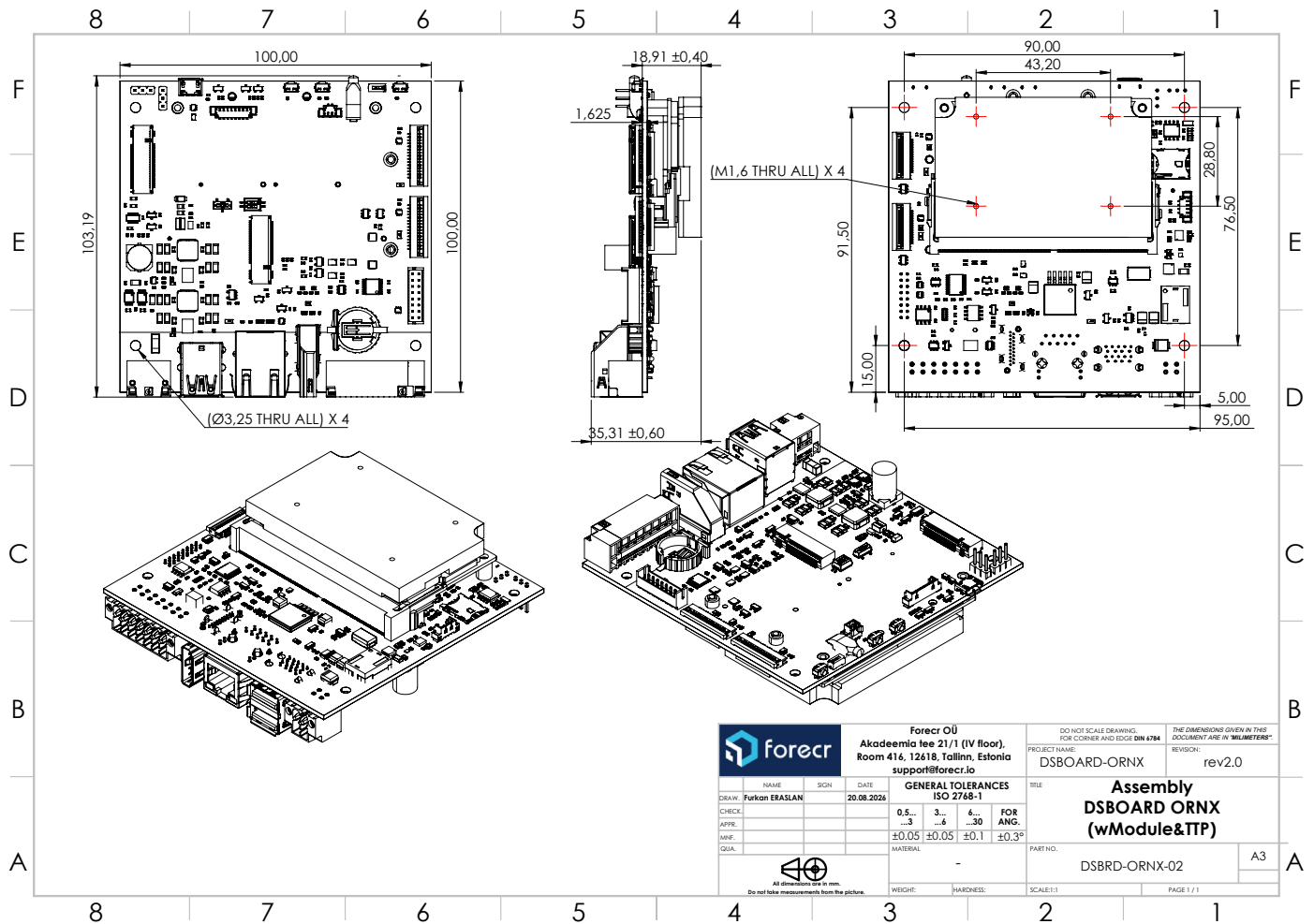
Title Block:

forecr Akadeemia tee 21/1 (IV floor), Room 416, 12618, Tallinn, Estonia support@forecr.io		DO NOT SCALE DRAWINGS. FOR CORNER AND EDGE DIN 6784 PROJECT NAME: DSBOARD-ORNX		THE DIMENSIONS GIVEN IN THIS DOCUMENT ARE IN "MILLIMETERS" REVISION: rev2.0	
DRAW: Farkas ERASLAN CHECK: APPR: MRF: QUA:		DATE: 20.08.2026 GENERAL TOLERANCES ISO 2768-1 0,5... 3... 6... ...3 ...6 ...30 FOR ANG. ±0,05 ±0,05 ±0,1 ±0,3°		TITLE: Assembly DSBOARD ORNX (wModule)	
PART NO: DSBRD-ORNX-01		SCALE: 1:1		A3	

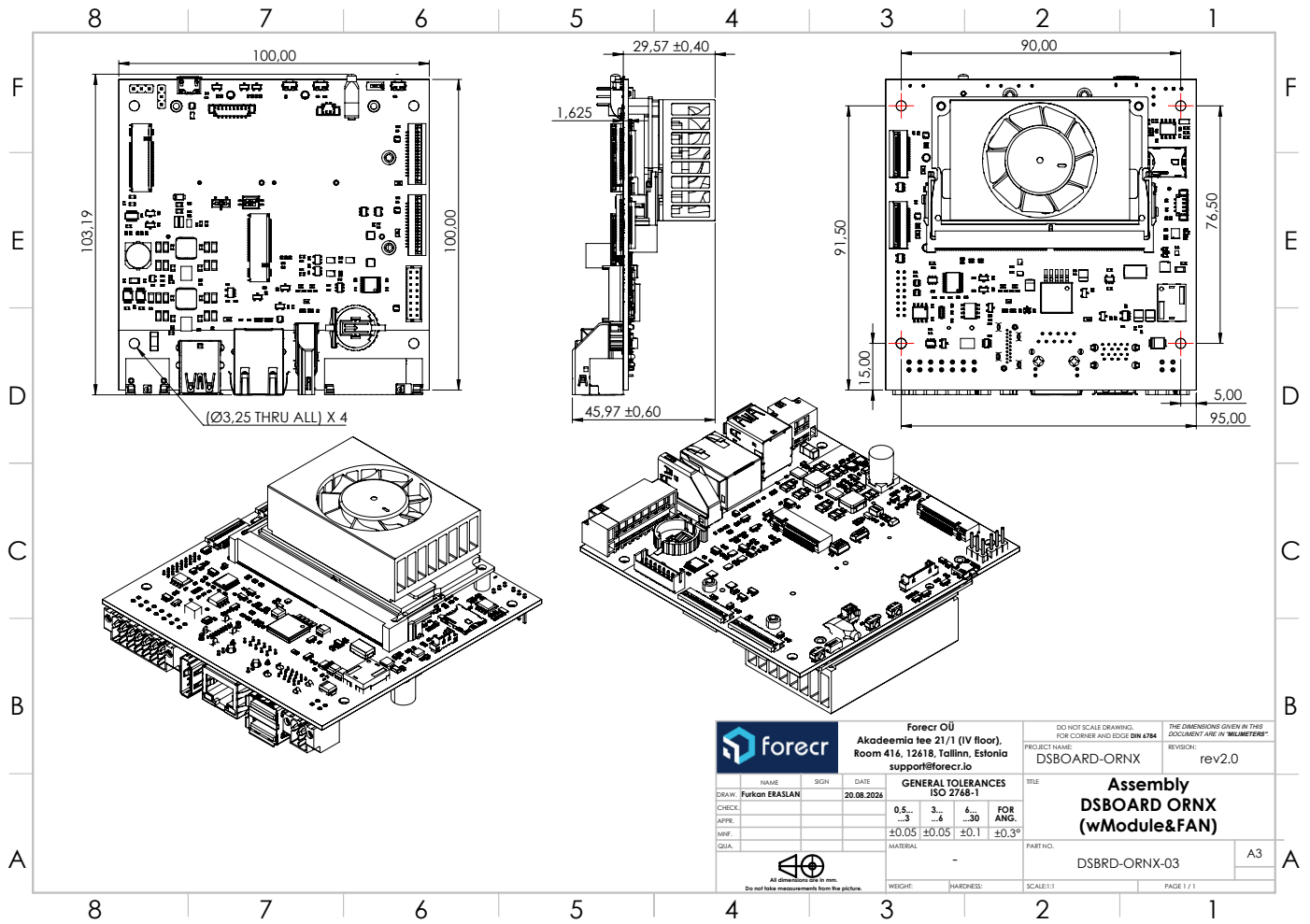
Notes:

- All dimensions are in mm.
- Do not take measurements from the picture.

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



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



7. Power Consumption

7.1 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	0.98	0.28	1.3	1.38	1.44	2.64	2.73
Power (W)	19.32	11.76	3.36	15.6	16.56	17.28	31.68	32.76

7.2 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)	1.6	1.16	0.88	1.32	1.48	1.6	2.62	2.92
Power (W)	19.2	13.92	10.56	15.84	17.76	19.2	31.44	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)	1.1	0.78	0.82	1.66	2.16	2.2
Power (W)	13.2	9.36	9.84	19.92	25.92	26.4

7.4 Orin Nano 8GB

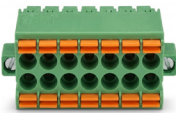
This section will be completed soon. It will be published on our website once completed. Please check our Forecr [Website](#) regularly.

8. MTBF Prediction

Methodology	Telcordia SR-332 (Parts Count) *Preliminary
Operating Environment	Ground Benign (GB), Controlled
Ambient Temperature	25 °C
Board Failure Rate	0.365 failures / 10 ⁶ hours
MTBF	2,736,308 hours, 312.36 years

Methodology	Telcordia SR-332 (Parts Count) *Preliminary
Operating Environment	Ground Fixed (GF), Uncontrolled
Ambient Temperature	40 °C
Board Failure Rate	1.406 failures / 10 ⁶ hours
MTBF	711,440 hours, 81.21 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

