

DSBOARD ORNXS Rev 1.11

USER MANUAL

UM-DSBDORNXS-01

Revision 1.21

01/10/2024



Forecr
<https://www.forecr.io>
support@forecr.io

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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

E-mail Address	For information requests: info@forecr.io For support requests: support@forecr.io For wholesale inquiries: sales@forecr.io
Address	Forecr OÜ Akadeemia tee 21/1 (II floor), Room 219, 12618, Tallinn, Estonia
Telephone Number	Estonia +372 5332 2632
Website	https://www.forecr.io

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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
rev 1.0	22.04.2024	Preliminary Release
rev 1.1	17.07.2024	JetPack 6.x has been added to the 2.1 Technical Specification Section and the 4.1 Installation Section.
rev 1.2	02.09.2024	Key-M, and Key-E connector pinouts have been added to section 3.3.4 and 3.3.5.

1. Introduction

DSBOARD-ORNXS is a game-changing innovation that redefines the concept of productivity and connectivity. Powered by the NVIDIA Jetson Orin Nano and Orin NX, this compact and versatile device brings unmatched processing power. With its seamless WiFi and Bluetooth connectivity, you can effortlessly collaborate and communicate with your team, breaking down barriers and unlocking new levels of efficiency.

Equipped with impressive memory options ranging from 4 GB to 16 GB of lightning-fast LPDDR5, the DSBOARD-ORNXS ensures smooth multitasking and effortless data handling. Its graphics interfaces, including a Mini DisplayPort with a maximum resolution of 3840x2160, deliver stunning visuals that elevate your work to a whole new level. Plus, with multiple extension sockets, including M.2 Key-E and 5V FAN, you have the flexibility to customize and expand your device to suit your specific needs.

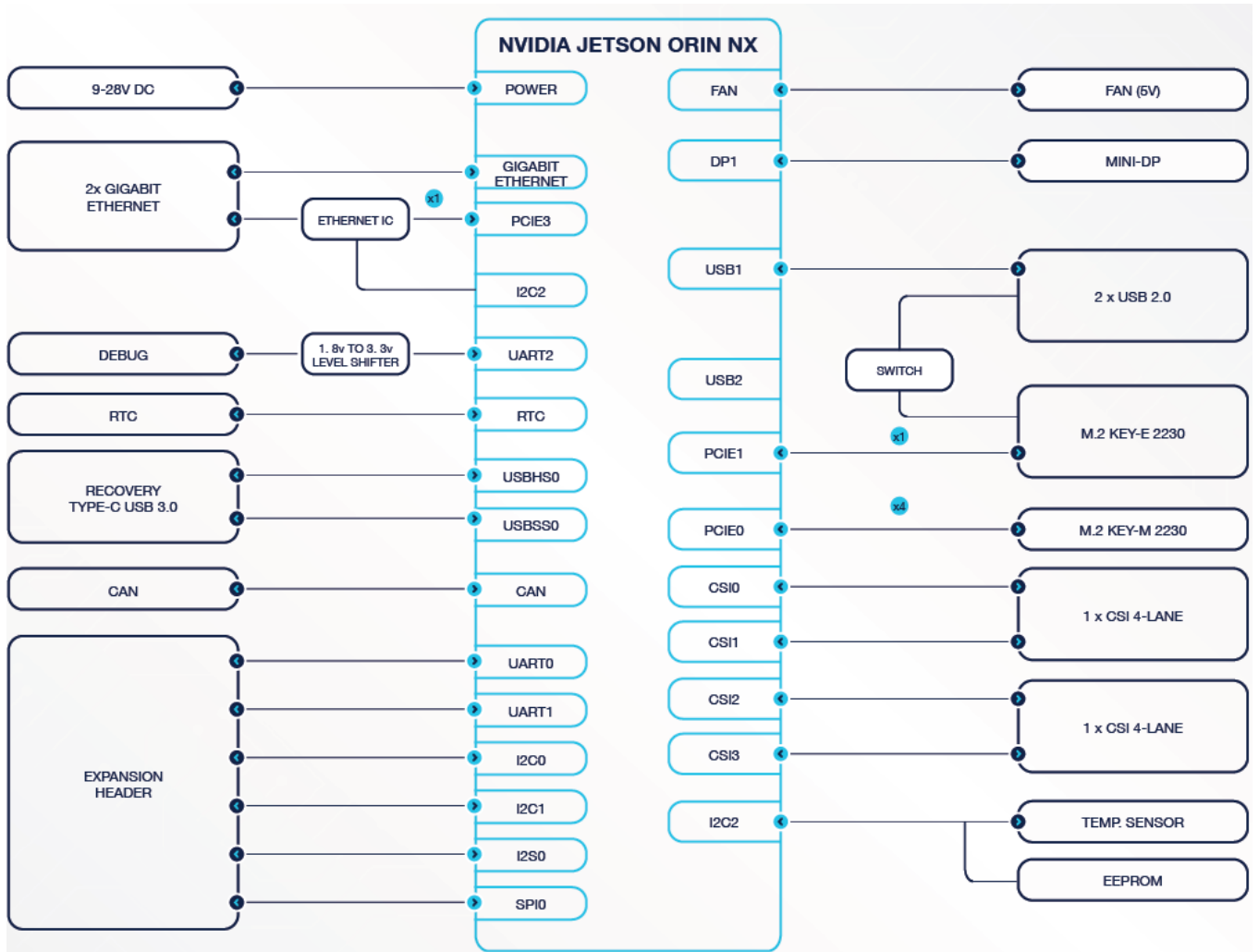
Latest revision of this user manual, datasheet, and 3D model can be downloaded from [Forecr Web Page](#).

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 Mini DisplayPort (max resolution 3840x2160)
Interfaces	2x Gigabit Ethernet 2x USB 2.0 1x CAN Bus 2X CSI 4-LANE 1x 3.0 Type-C (Recovery) 1x UART (Debug - 3.3V) 1x RTC
Wireless Communication	WiFi/Bluetooth Connectivity by extension sockets
Power Supply	9-28 VDC
Extension Sockets	1x M.2 Key-E 1x 5V FAN 1x SPI 1x I2S 2x I2C 2x UART
Mass Storage	1x M.2 Key-M 2230
Ambient Conditions	-25°C ... +85°C
Form Factor / Dimensions	60.5 mm x 91 mm, 43gr
Operating Systems	Ubuntu Linux 20.04
JetPack Support	JetPack 5.x JetPack 6.x

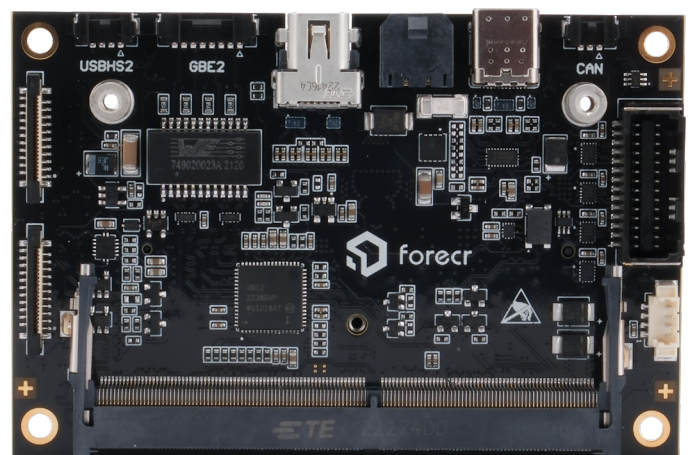
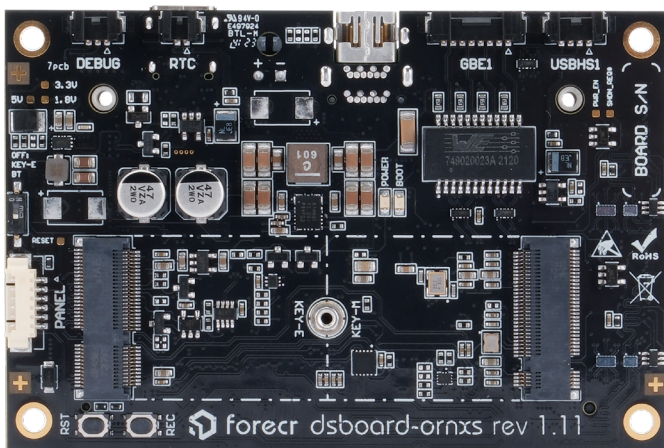
2.2 Block Diagram



2.3 Board Visuals

Top Side

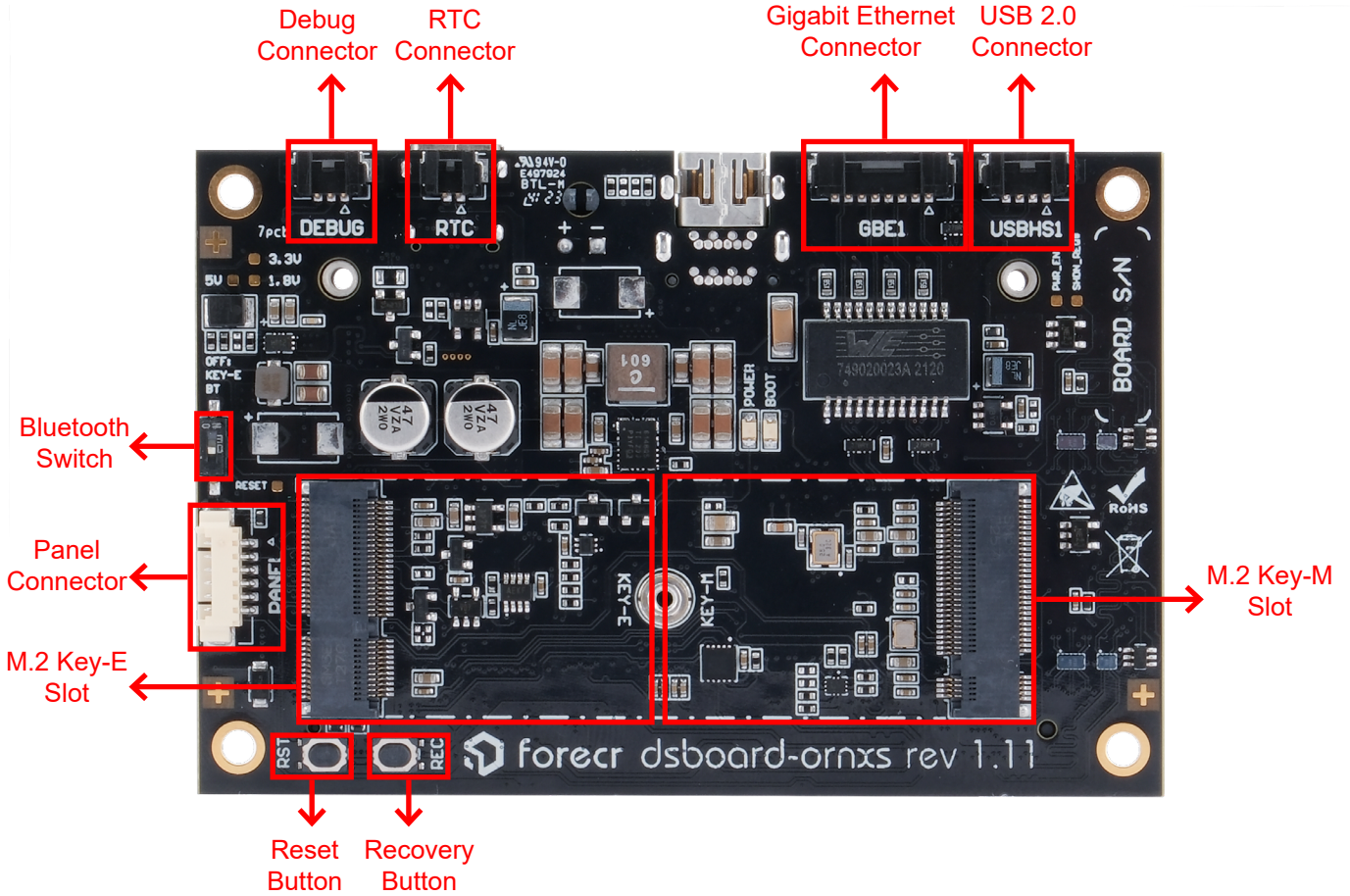
Bottom Side



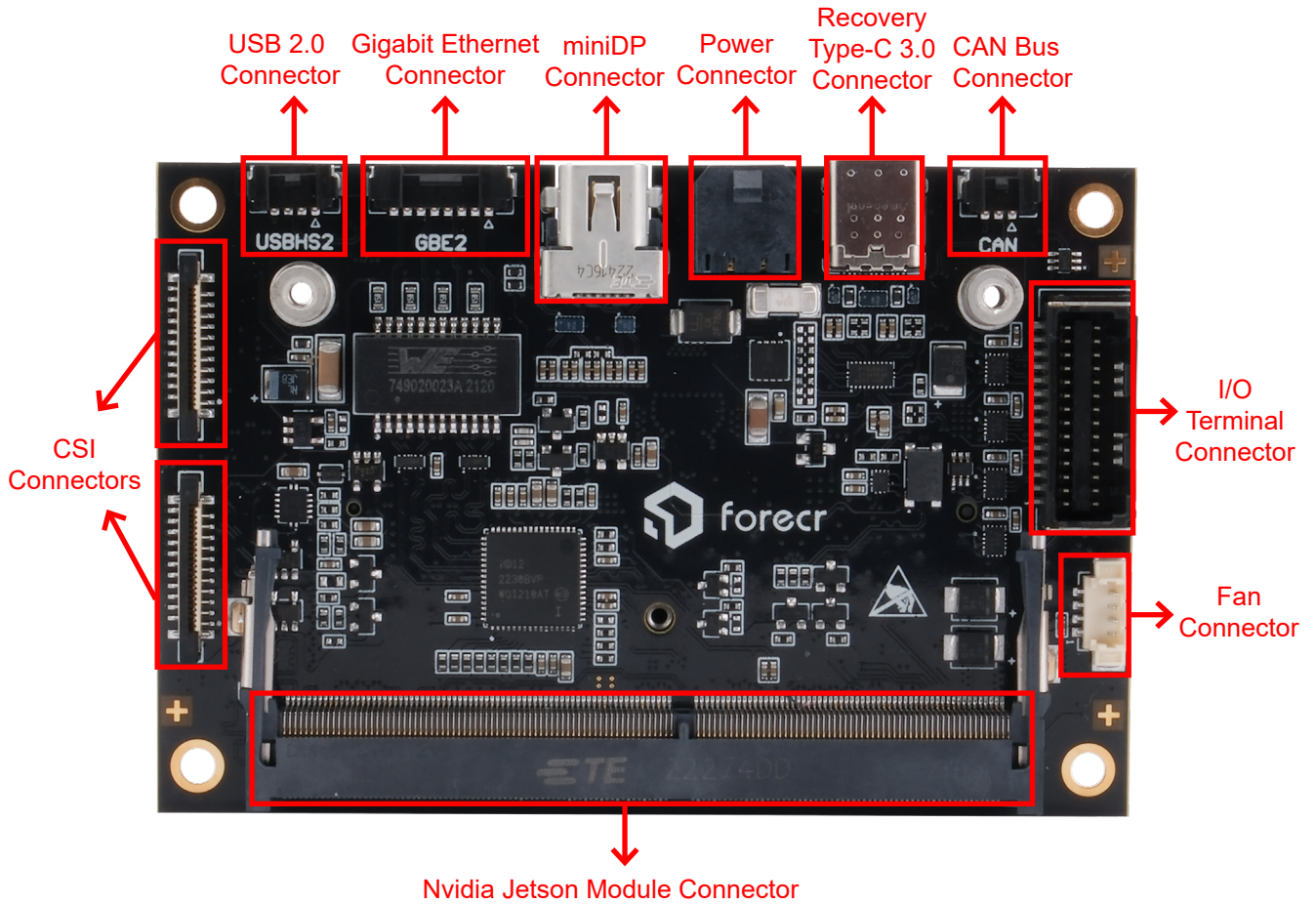
3. Hardware Information

3.1 Connector and Button Location

3.1.1 Top Side



3.1.2 Bottom Side




3.2 List of Connectors and Buttons


Connectors
DSBOARD-ORNXS Power Connector
DSBOARD-ORNXS RTC Connector
DSBOARD-ORNXS M.2 Key-M Connector
DSBOARD-ORNXS M.2 Key-E Connector
DSBOARD-ORNXS Debug Connector
DSBOARD-ORNXS Gigabit Ethernet Connector
DSBOARD-ORNXS CSI Connectors
DSBOARD-ORNXS Fan Connector
DSBOARD-ORNXS Panel Connector
DSBOARD-ORNXS I/O Terminal
DSBOARD-ORNXS USB 2.0 Connector
DSBOARD-ORNXS miniDP Connector
DSBOARD-ORNXS Recovery Type-C 3.0 Connector
DSBOARD-ORNXS CAN Bus Connector
Buttons
DSBOARD-ORNXS Reset Button
DSBOARD-ORNXS Recovery Button
DSBOARD-ORNXS Bluetooth Switch

3.3 The Definition of Each Connector



3.3.1 Power Connector

	Function		Description	
	Mating Connector		0436450200	
	Minimum Input Voltage		+9V	
	Maximum Input Voltage		+28V	
	Pinout		Pin	Description
		1	Negative	
		2	Positive	

3.3.2 RTC Connector

	Function		Description	
	Mating Connector		5055650201	
	Pinout		Pin	Description
			1	VRTC (1.85V to 5.5V)
		2	GND	

3.3.3 Gigabit Ethernet Connector

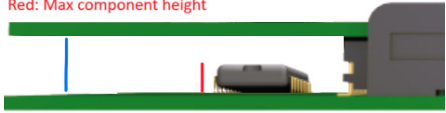
 	Function		Description	
	Mating Connector		5055650801	
	Pinout		Pin	Description
			1	DATA3-
			2	DATA3+
			3	DATA2-
			4	DATA2+
			5	DATA1-
			6	DATA1+
			7	DATA0-
		8	DATA0+	

3.3.4 M.2 Key-M Connector

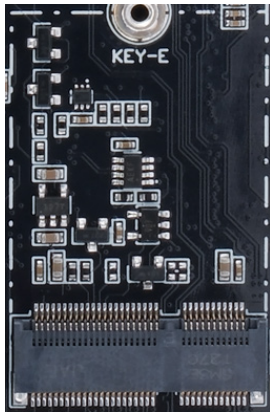
Description						
Pinout	Pin	Description	Pin	Description	Pin	Description
	1	DGND	24	NC	47	PCIE0.TX0_N
	2	VDD_3V3	25	NC	48	NC
	3	DGND	26	NC	49	PCIE0.TX0_P
	4	VDD_3V3	27	DGND	50	PCIE0.RST_N
	5	NC	28	NC	51	DGND
	6	NC	29	PCIE0.RX1_N	52	PCIE0.CLKREQ_N
	7	NC	30	NC	53	PCIE0.CLK_N
	8	NC	31	PCIE0.RX1_P	54	PCI.WAKE_N
	9	DGND	32	NC	55	PCIE0.CLK_P
	10	NC	33	DGND	56	NC
	11	NC	34	NC	57	DGND
	12	VDD_3V3	35	PCIE0.TX1_N	58	NC
	13	NC	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	NC	40	NC	71	DGND
	18	VDD_3V3	41	PCIE0.RX0_N	72	VDD_3V3
	19	NC	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	NC	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



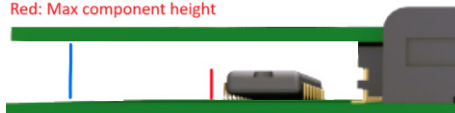
3.3.5 M.2 Key-E Connector




Description				
Pinout	Pin	Description	Pin	Description
	1	DGND	44	NC
	2	VDD_3V3	45	DGND
	3	USB2_KEYE.AP_P	46	NC
	4	VDD_3V3	47	PCIE3.CLK_P
	5	USB2_KEYE.AP_N	48	NC
	6	NC	49	PCIE3.CLK_N
	7	DGND	50	M2E_SUSCLK_32KHZ
	8	NC	51	DGND
	9	NC	52	PCIE3.RST_N
	10	NC	53	PCIE3.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	PCIE3.TX0_P	70	NC
	36	NC	71	NC
	37	PCIE3.TX0_N	72	VDD_3V3
	38	NC	73	NC
	39	DGND	74	VDD_3V3
	40	NC	75	DGND
	41	PCIE3.RX0_P	MNT1	DGND
	42	NC	MNT2	DGND
	43	PCIE3.RX0_N		

Board to board spacing=2.45 mm
 Max component height=1.45 mm

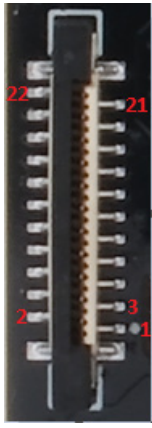
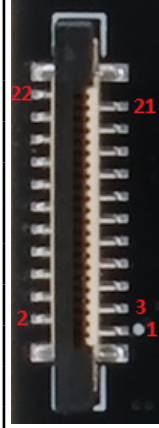
Blue: Board-to-Board spacing
 Red: Max component height




3.3.6 Debug Connector

	Function		Description	
	Mating Connector		5055650301	
	Pinout		Pin	Description
			1	GND
			2	UART2_RX (3.3V)
		3	UART2_TX (3.3V)	

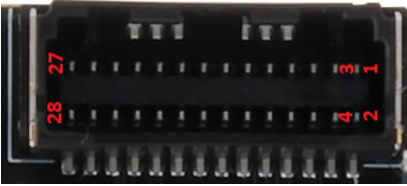
3.3.7 CSI Connectors

CSI0	CSI1	Function	Description				
		Pin/Pitch/Bottom contact	22-pin, 0.5mm pitch, bottom contact				
		Pinout	CSI0 Pinout		CSI1 Pinout		
			Pin	Description	Pin	Description	
			1	VDD_3V3	1	VDD_3V3	
			2	CAM0_I2C_SDA	2	CAM1_I2C_SDA	
			3	CAM0_I2C_SCL	3	CAM1_I2C_SCL	
			4	GND	4	GND	
			5	CAM0_MCLK_1V8	5	CAM1_MCLK_1V8	
			6	CAM0_PWDN_3V3	6	CAM1_PWDN_3V3	
			7	GND	7	GND	
			8	CSI1_D1_P	8	CSI3_D1_P	
			9	CSI1_D1_N	9	CSI3_D1_N	
			10	GND	10	GND	
			11	CSI1_D0_P	11	CSI3_D0_P	
			12	CSI1_D0_N	12	CSI3_D0_N	
			13	GND	13	GND	
			14	CSI0_CLK_P	14	CSI2_CLK_P	
			15	CSI0_CLK_N	15	CSI2_CLK_N	
			16	GND	16	GND	
			17	CSI0_D1_P	17	CSI2_D1_P	
			18	CSI0_D1_N	18	CSI2_D1_N	
			19	GND	19	GND	
	20	CSI0_D0_P	20	CSI2_D0_P			
	21	CSI0_D0_N	21	CSI2_D0_N			
	22	GND	22	GND			


3.3.8 Panel Connector

	Function		Description		
	Mating Connector		0510210600		
	Pinout	Pin	Description	Pin	Description
		1	PWR_BTN (1.8V)	4	GND
		2	GND	5	RECOVERY (1.8V)
3		RESET (1.8V)	6	GND	

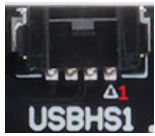
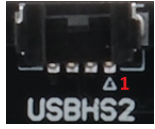
3.3.9 I/O Terminal Connector

	Function		Description	
	Mating connector		5054322801	
	Pinout	Pin	Description	I/O Type
		1	UART0_CTS (3.3V)	INPUT
		2	UART0_RTS (3.3V)	OUTPUT
		3	UART0_RX (3.3V)	INPUT
		4	UART0_TX (3.3V)	OUTPUT
		5	UART1_TX (3.3V)	OUTPUT
		6	UART1_RX (3.3V)	INPUT
		7	GND	GROUND
		8	GND	GROUND
		9	I2C0_SCL (3.3V)	BI-DIR
		10	I2C1_SCL (3.3V)	BI-DIR
		11	I2C0_SDA (3.3V)	BI-DIR
		12	I2C1_SDA (3.3V)	BI-DIR
		13	SPI0_CS1 (3.3V)	OUTPUT
		14	SPI0_MISO (3.3V)	INPUT
		15	SPI0_MOSI (3.3V)	OUTPUT
		16	SPI0_CS0 (3.3V)	OUTPUT
		17	SPI0_SCK (3.3V)	OUTPUT
		18	AUD_MCLK (3.3V)	OUTPUT
		19	I2S0_DOUT (3.3V)	OUTPUT
		20	I2S0_FS (3.3V)	OUTPUT
		21	I2S0_DIN (3.3V)	INPUT
		22	I2S0_SCLK (3.3V)	OUTPUT
		23	GND	GROUND
		24	GND	GROUND
		25	GND	GROUND
26		VDD_1V8	POWER	
27		VDD_3V3	POWER	
28	VDD_5V	POWER		


3.3.10 Fan Connector

	Function		Description	
	Mating Connector		0510210400	
	Pinout		Pin	Description
			1	GND
			2	VDD_5V
			3	TACH (1.8V)
		4	PWM (1.8V)	


3.3.11 USB 2.0 Connector

 	Description			
	Mating Connector		5055650401	
	Pinout		Pin	Description
			1	VBUS
			2	D-
			3	D+
		4	GND	


3.3.12 miniDP Connector

	Description	
	miniDP connector for display output.	

3.3.13 Recovery Type-C 3.0 Connector


	Description	
	USB 3.0 Type-C connector for software installation in recovery mode and device usage in regular use case.	

3.3.14 CAN Bus Connector


	Description			
	Mating Connector		5055650301	
	Pinout		Pin	Description
			1	CAN_N
			2	CAN_P
			3	GND

3.4 The Definition of Buttons


3.4.1 Reset Button

	<table border="1"> <tr> <th data-bbox="539 329 1329 371">Description</th> </tr> <tr> <td data-bbox="539 371 1329 463">Reset button to reset the Jetson SoM.</td> </tr> </table>	Description	Reset button to reset the Jetson SoM.
Description			
Reset button to reset the Jetson SoM.			

3.4.2 Recovery Button

	<table border="1"> <tr> <th data-bbox="539 560 1329 602">Description</th> </tr> <tr> <td data-bbox="539 602 1329 748">Recovery button should be pressed with reset button at the same time. After released reset button, recovery button should be pressed a little bit more (min. 250 ms).</td> </tr> </table>	Description	Recovery button should be pressed with reset button at the same time. After released reset button, recovery button should be pressed a little bit more (min. 250 ms).
Description			
Recovery button should be pressed with reset button at the same time. After released reset button, recovery button should be pressed a little bit more (min. 250 ms).			

3.4.3 Bluetooth Switch

	<table border="1"> <tr> <th data-bbox="539 851 1329 893">Description</th> </tr> <tr> <td data-bbox="539 893 1329 1034">Switch to select one USB2.0 channel between M.2 Key-E Bluetooth (OFF position) and USBHS2 port (ON position).</td> </tr> </table>	Description	Switch to select one USB2.0 channel between M.2 Key-E Bluetooth (OFF position) and USBHS2 port (ON position).
Description			
Switch to select one USB2.0 channel between M.2 Key-E Bluetooth (OFF position) and USBHS2 port (ON position).			

4. Software Information

4.1 Installation

JetPack-5.x Installation can be found here: <https://www.forecr.io/blogs/installation/jetpack-5-x-installation-for-ds-board-ornxs>

JetPack-6.x Installation can be found here: <https://www.forecr.io/blogs/installation/jetpack-6-x-installation-for-ds-board-ornxs>

5. Connectivity

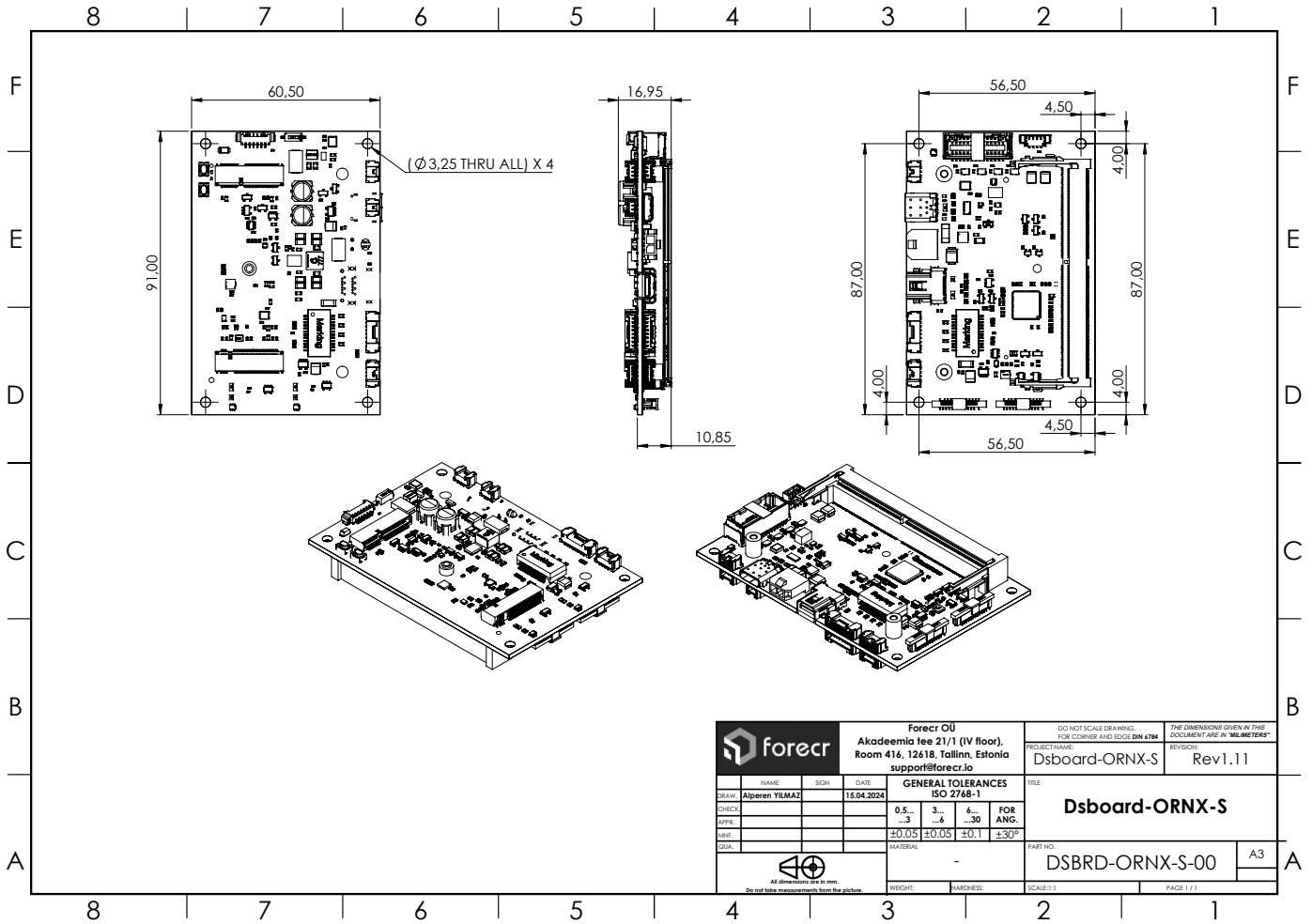
5.1 General Purpose Input/Output (GPIO)

MODULE PIN NUMBER	I/O NAME	MODULE PIN NAME	TYPE	DESCRIPTION
228	M2E_WDISABLE1	GPIO13(PWM)	OUTPUT	WiFi/BT module full powerdown control for the WiFi/BT radio. Drive low to disable WiFi/BT. Drive high for normal operation.
218	M2E_WDISABLE2	GPIO12(PWM)	OUTPUT	Reset for Bluetooth. Active low by default.

6. 3D Model & Mechanical Information

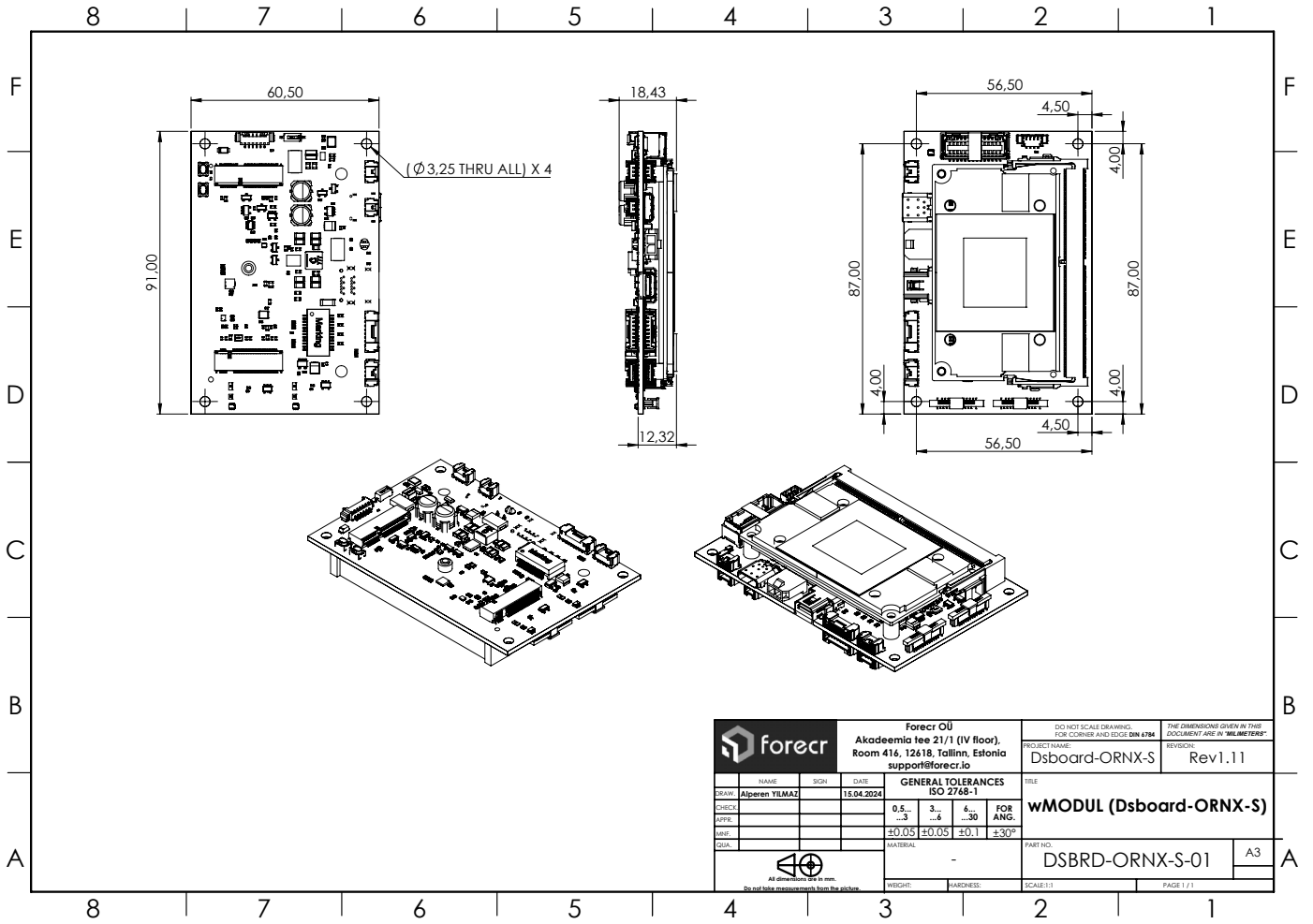
Full 3D models of all DSBOARD ORNXS Carrier Board can be found here: https://github.com/forecr/forecr_3d_models/tree/master/DSBOARD-ORNXS

DSBOARD-ORNXS Stand Alone



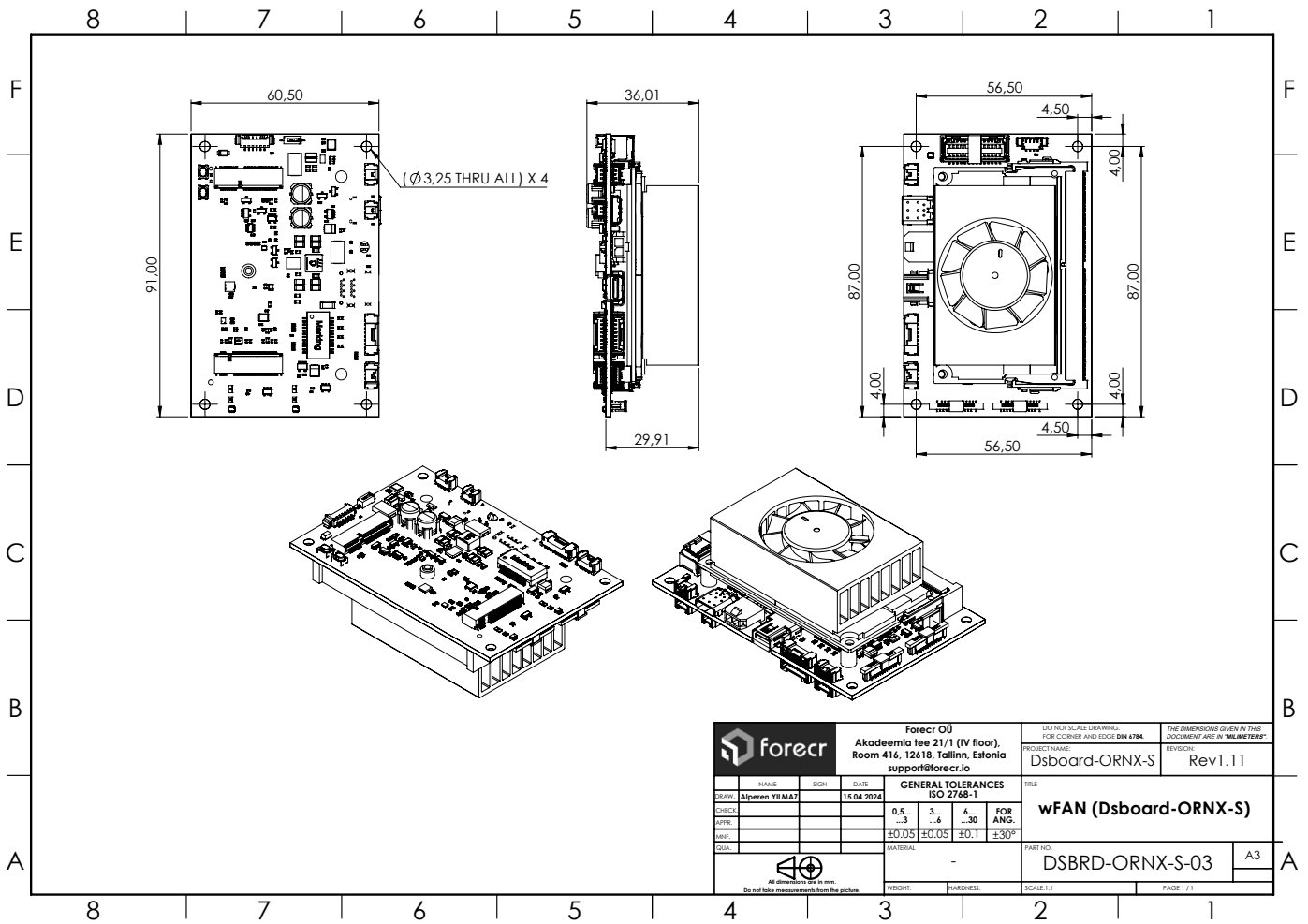
		Forecr OÜ Akadeemia tee 21/1 (IV floor), Room 416, 12618, Tallinn, Estonia support@forecr.io		DO NOT SCALE DRAWING. FOR CORNER AND EDGE DIN 4784		THE DIMENSIONS GIVEN IN THIS DOCUMENT ARE IN "MILLIMETERS"																			
		PROJECT NAME: Dsboard-ORNXS-S		REVISION: Rev1.11																					
<table border="1"> <thead> <tr> <th>NAME</th> <th>SIGN</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>DRAW: Alperen YILMAZ</td> <td></td> <td>15.04.2024</td> </tr> <tr> <td>CHECK:</td> <td></td> <td></td> </tr> <tr> <td>APPR:</td> <td></td> <td></td> </tr> <tr> <td>DES:</td> <td></td> <td></td> </tr> <tr> <td>DEL:</td> <td></td> <td></td> </tr> </tbody> </table>		NAME	SIGN	DATE	DRAW: Alperen YILMAZ		15.04.2024	CHECK:			APPR:			DES:			DEL:			GENERAL TOLERANCES ISO 2768-1		FILE Dsboard-ORNXS-S		PART NO. DSBRD-ORNXS-S-00	
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DSBOARD-ORNXS with Jetson Orin Nano/NX Module



		Forecr OÜ Akadeemia tee 21/1 (IV floor), Room 416, 12618, Tallinn, Estonia support@forecr.io		DID NOT SCALE DRAWING. FOR CORNER AND EDGE DIN 4784		THE DIMENSIONS GIVEN IN THIS DOCUMENT ARE IN MILLIMETERS	
PROJECT NAME: Dsboard-ORNX-S		REVISION: Rev1.11					
NAME: Alperen YILMAZ	SOBH: 15.04.2024	GENERAL TOLERANCES ISO 2768-1		TITLE: wMODUL (Dsboard-ORNX-S)			
CHECK: APPR: MFR: QUAL:		0.5... .3	3... .6	6... .30	FOR ANG.		
		MATERIAL: -		PART NO: DSBRD-ORNX-S-01		A3	
All dimensions are in mm. Do not take measurements from the picture		WEIGHT:	HARDNESS:	SCALE:1:1	PAGE 1 / 1		

DSBOARD-ORNXS 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)	MAXN (8 core)
Current (A)	1,44	0,7	0,1	1,5	1,7	2,02	2,8
Power (W)	17,28	8,4	1,2	18	20,4	24,24	33,6

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 (6 core)	MAXN (6 core)
Current (A)	1,4	0,7	0,08	1,4	1,6	1,81	2,24
Power (W)	16,8	8,4	0,96	16,8	19,2	21,72	26,88

7.3 Orin Nano 8GB

Power Supply: 12V-5A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	7W (4 core)	15W (6 core)
Current (A)	1,15	0,65	0,09	1,23	1,82
Power (W)	13,8	7,8	1,08	14,76	21,84

7.4 Orin Nano 4GB

Power Supply: 12V-5A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	7W_CPU (4 core)	7W_AI (4 core)	10W (6 core)
Current (A)	1,17	0,61	0,08	1,06	1,11	1,21
Power (W)	14,04	7,32	0,96	12,72	13,32	14,52

8. MTBF Prediction

Prediction method	Mil Hdbk 217F2, parts count
Environment	GF - Ground Fixed, $T_A=40^{\circ}\text{C}$, $T_J=60^{\circ}\text{C}$
Date	5-Feb-2024
Total Failure Rate	4.113321 (FPMH)
MTBF	243113 (Hours), 27.75 (Years)

9. Ordering Information

