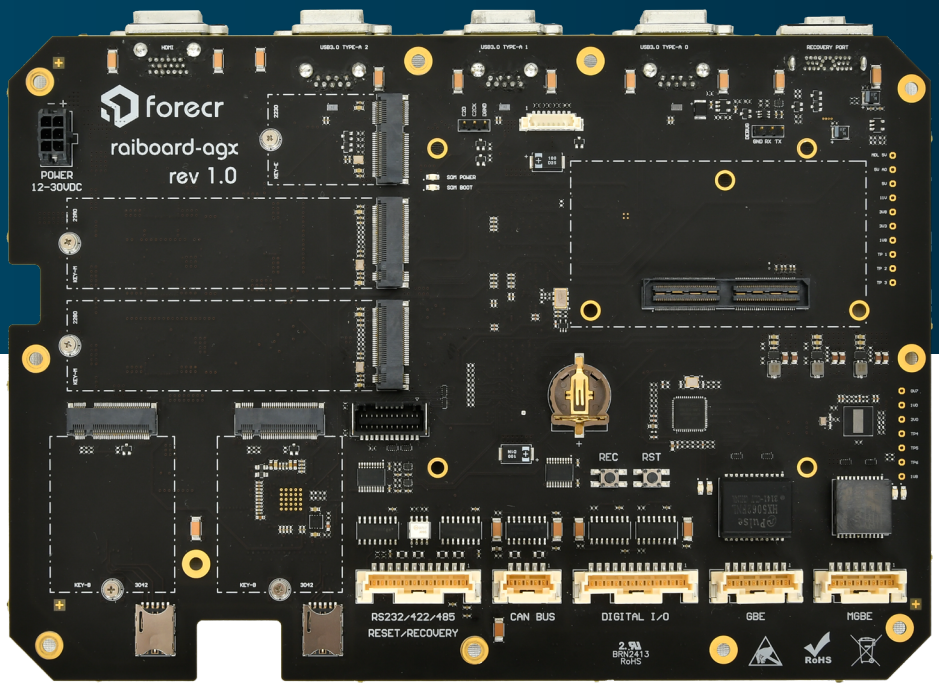
forecr



RAIBOARD-AGX Rev 1.2

USER MANUAL

UM-RAIBDAGX-01
Revision 1.2
08/04/2026

NVIDIA Elite Partner

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

Table of Contents

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

Copyright Notice

Trademark Acknowledgment

Forecr recognizes and acknowledges that all trademarks, registered trademarks, and/or copyrights mentioned in this user manual belong to their respective owners. All possible trademarks or copyright acknowledgments that are not listed herein do not mean a lack of acknowledgment to the rightful owners of mentioned trademarks and copyrights. Forecr acknowledge the rights of the trademark owners and respect their intellectual property.

Symbols

ElectroStatic Discharge (ESD) Sensitive Device!

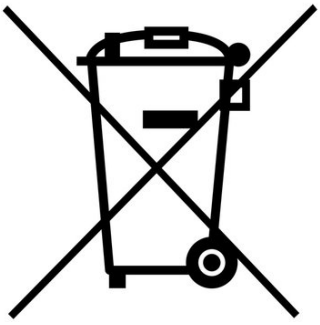
Electronic boards and their components are sensitive to static electricity. When handling any circuit board assemblies, it is recommended that ESD safety precautions be observed.

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	30.07.2025	Preliminary Release
rev 1.1	24.11.2025	Power connector part number updated.
rev 1.2	08.04.2026	Mechanical dimensions and technical drawings have been updated.

1. Introduction

The RAIBOARD-AGX Railway Grade AGX Orin Computer is a high-performance, ruggedized computing solution designed for railway, transportation, and industrial applications that demand real-time AI processing and edge computing. Powered by NVIDIA Jetson AGX Orin, it delivers exceptional AI inference capabilities for predictive maintenance, video analytics, and autonomous railway operations. Its compact yet durable design ensures reliable performance in environments with high shock, vibration, and temperature fluctuations. Operating within a wide temperature range of -40°C to +85°C, the RAIBOARD-AGX thrives in extreme conditions, making it an ideal solution for mission-critical railway applications.

Equipped with high-speed connectivity options, including Gigabit Ethernet, 10G Ethernet, USB 3.0, CANBUS, RS232/RS422/RS485, and GMSL-2, the system enables seamless data exchange between train control systems, sensors, and cloud-based analytics. Its modular expansion capabilities allow for wireless communication via WiFi, Bluetooth, LTE, and 5G, while multiple M.2 slots for SSDs, SIM cards, and communication modules enhace flexibility. With its efficient 12V-30VDC power input, the RAIBOARD-AGX ensures stable power management across various railway infrastructures.

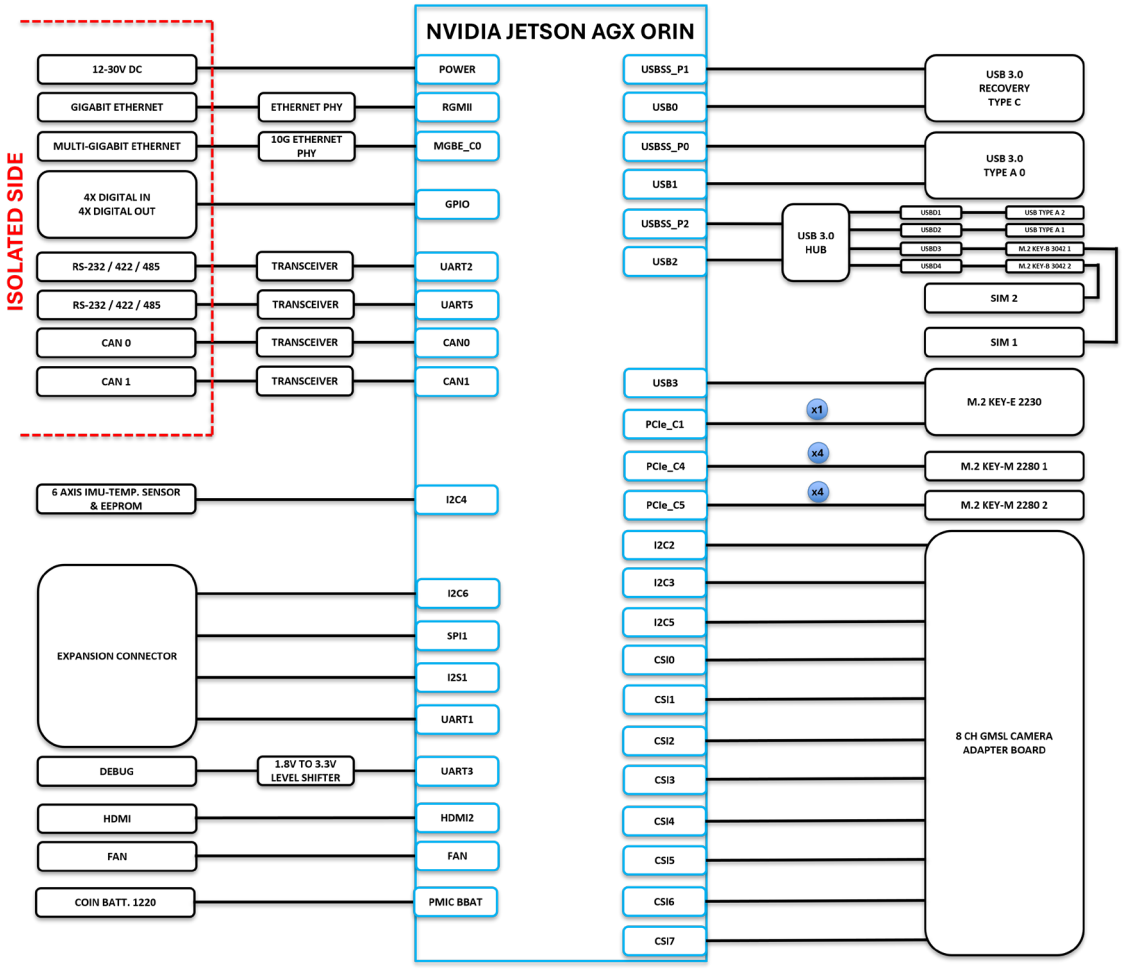
Latest revision of this user manual, datasheet, and 3D model can be downloaded from Forecr Web Page.

2. Product Specification

2.1 Technical Specification

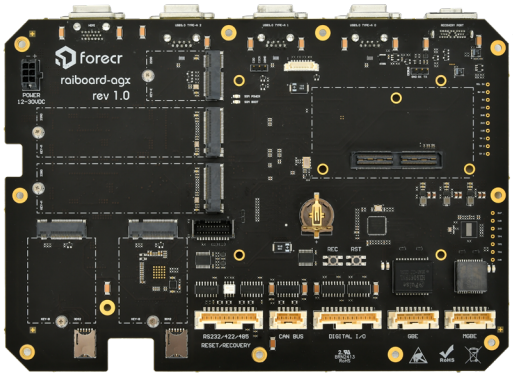
Supported Modules	NVIDIA Jetson AGX Orin Industrial NVIDIA Jetson AGX Orin 32GB/64GB
Memory	32 GB 256-bit LPDDR5x 64 GB 256-bit LPDDR5x
Graphics Interfaces	1x HDMI 2.0(max resolution 3840x2160)
Interfaces	1x Type-C USB3.0 (Recovery port) 3x Type-A USB3.0 2x CANBUS 2x RS232/RS422/RS485 (Software selectable) 1x Gigabit Ethernet 1x 10G Ethernet (1G compatible) 4x Digital INPUT 4x Digital OUTPUT
Wireless Communication	WiFi/Bluetooth/LTE/5G Connectivity by extension sockets
Power Supply	12V – 30VDC input
Extension Sockets	2x Key-M 2280 2x Key-B 3042 1x Key-E 2230 2x nanoSIM 1x 11V/5V Fan 1x Expansion Connector (UART, SPI, I2C, I2S) 1x Camera Connector (up to 6 CSI camera support)
Mass Storage	2x M.2 Key-M SSD Slot
Ambient Conditions	-40°C +85°C (with AGX Orin Industrial)
Form Factor / Dimensions	166,45mm x 230mm, 288gr
Operating Systems	Ubuntu Linux 20.04 - 22.04
JetPack Support	JetPack 5.x/JetPack 6.x

2.2 Block Diagram

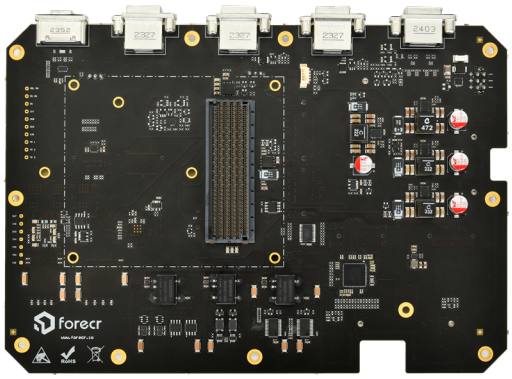


2.3 Board Visuals

Top Side



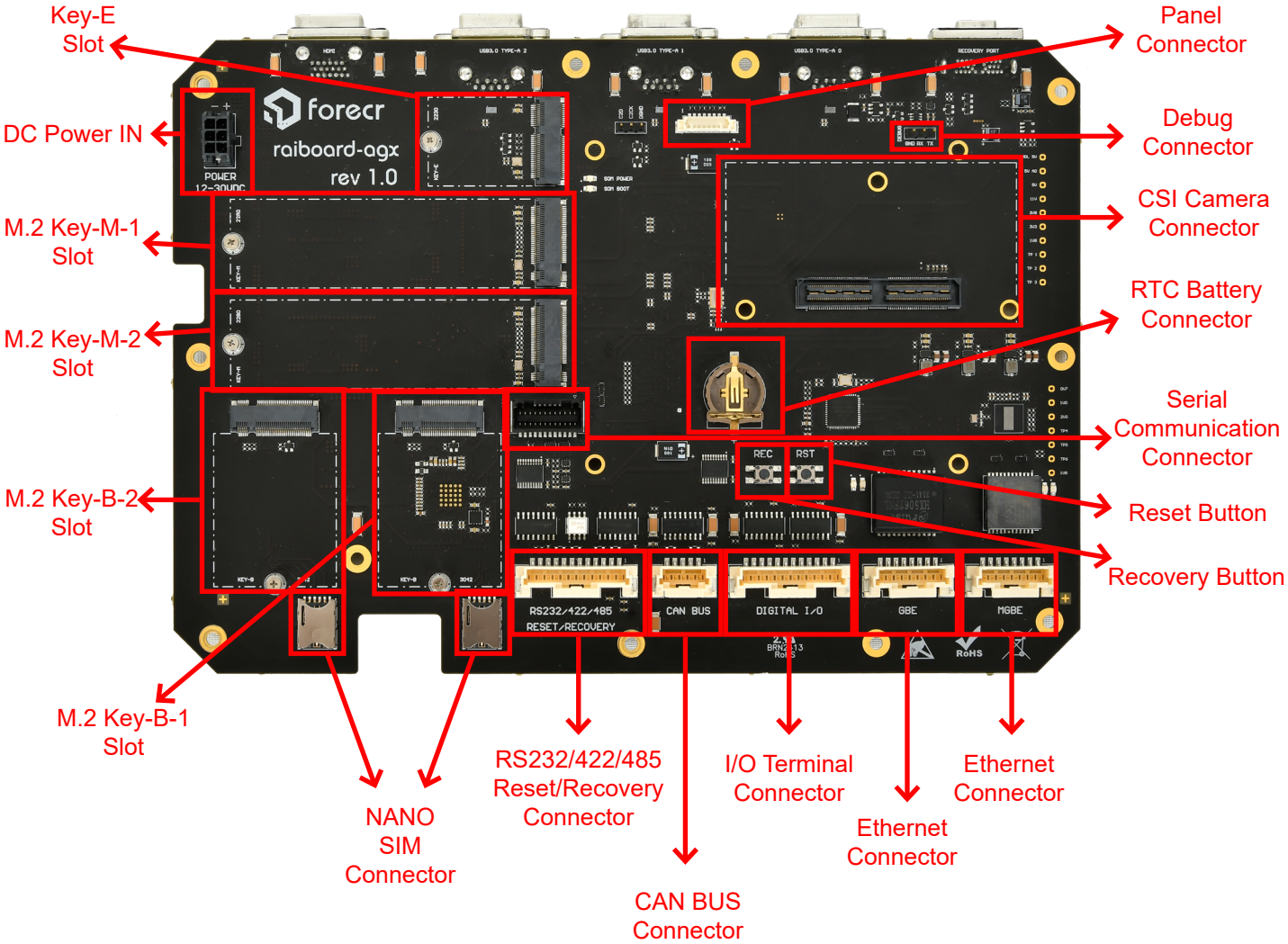
Bottom Side



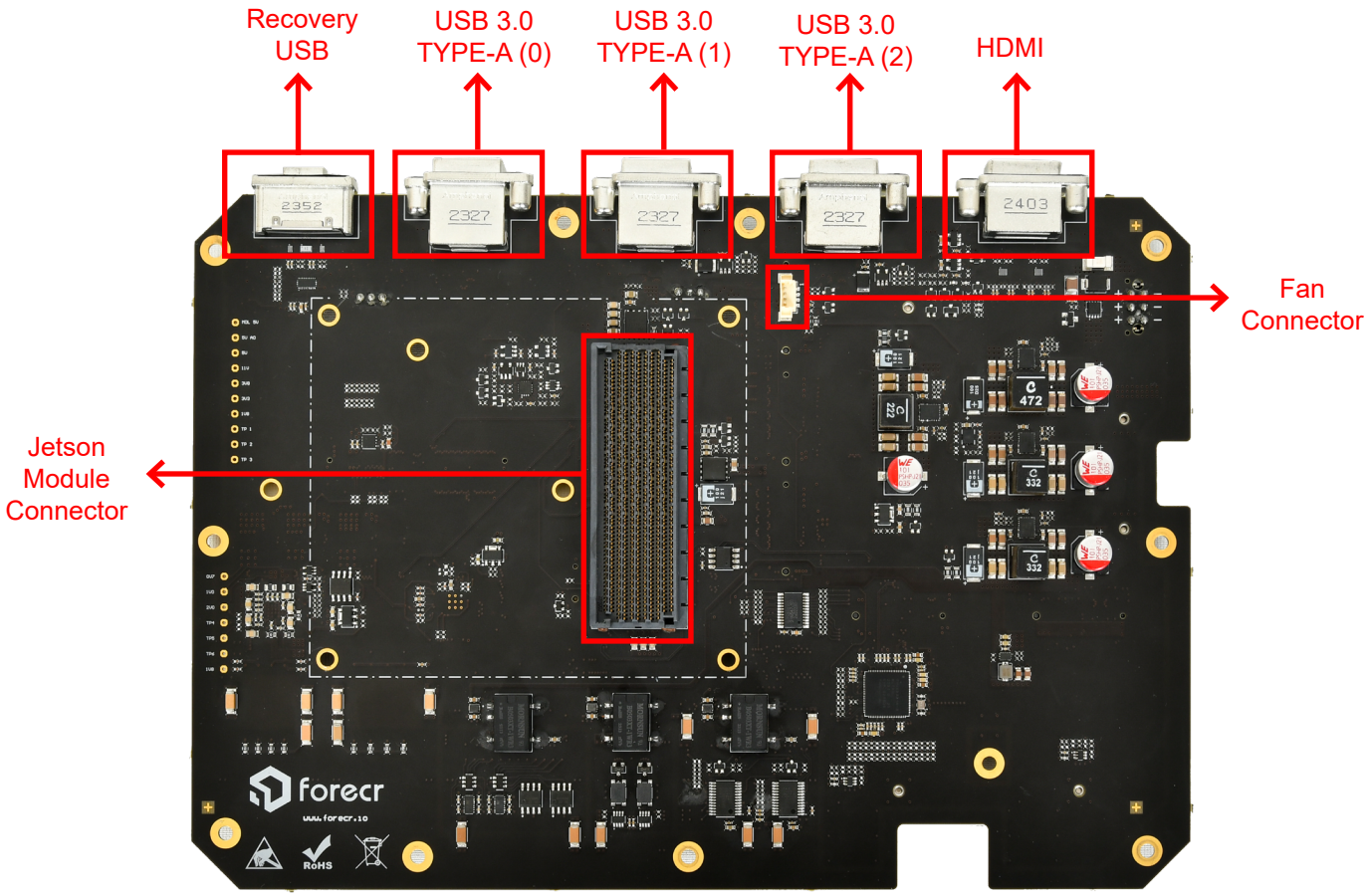
3. Hardware Information

3.1 Connector and Button Location

3.1.1 Top Side



3.1.2 Bottom Side



3.2 List of Connectors and Buttons

Connectors
RAIBOARD-AGX Power Connector
RAIBOARD-AGX M.2 Key-M1 Connectors
RAIBOARD-AGX M.2 Key-M2 Connector
RAIBOARD-AGX M.2 Key-B1 Connector
RAIBOARD-AGX M.2 Key-B2 Connector
RAIBOARD-AGX M.2 Key-E Connector
RAIBOARD-AGX CSI Camera Connector
RAIBOARD-AGX Serial Communication Connector
RAIBOARD-AGX Serial Connector
RAIBOARD-AGX Digital IO Connector
RAIBOARD-AGX CAN Bus Connector
RAIBOARD-AGX 10/100/1000 Ethernet Connectors
RAIBOARD-AGX 10G Ethernet Slot
RAIBOARD-AGX Debug Connector
RAIBOARD-AGX Panel Connector
RAIBOARD-AGX Fan Connector
RAIBOARD-AGX Nano SIM Connectors
RAIBOARD-AGX RTC Battery Connector
RAIBOARD-AGX USB Type-C Recovery Connector
RAIBOARD-AGX USB Type-A Connector x3 (3.0)
RAIBOARD-AGX HDMI Connector
Buttons
RAIBOARD-AGX Recovery Pushbutton
RAIBOARD-AGX Reset Pushbutton

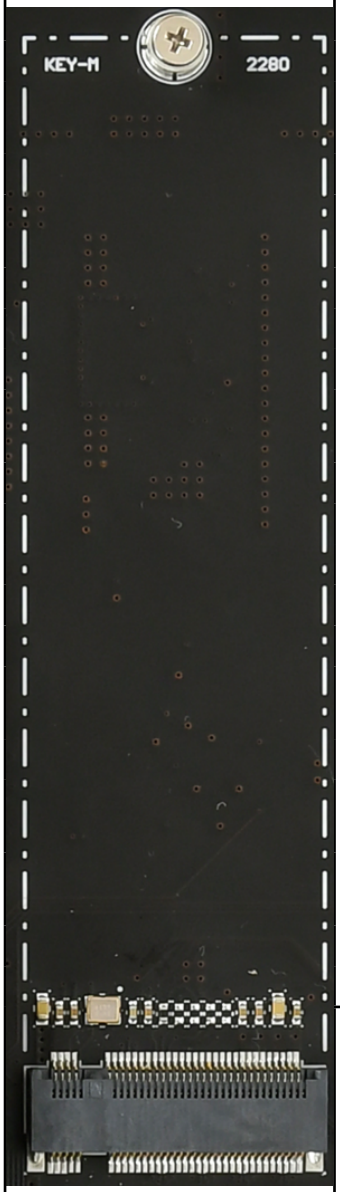
3.3 The Definition of Each Connector

3.3.1 Power Connector

Function	Description			
Connector Type	0430450624			
Mating Connector	0430250600			
Minimum Input Voltage	+12V			
Maximum Input Voltage	+30V			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	Negative	4	Positive
	2	Negative	5	Positive
	3	Negative	6	Positive

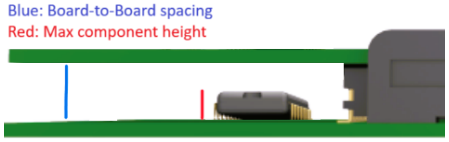
3.3.2 M.2 Key-M1 Connector

M.2 Key-M Connector



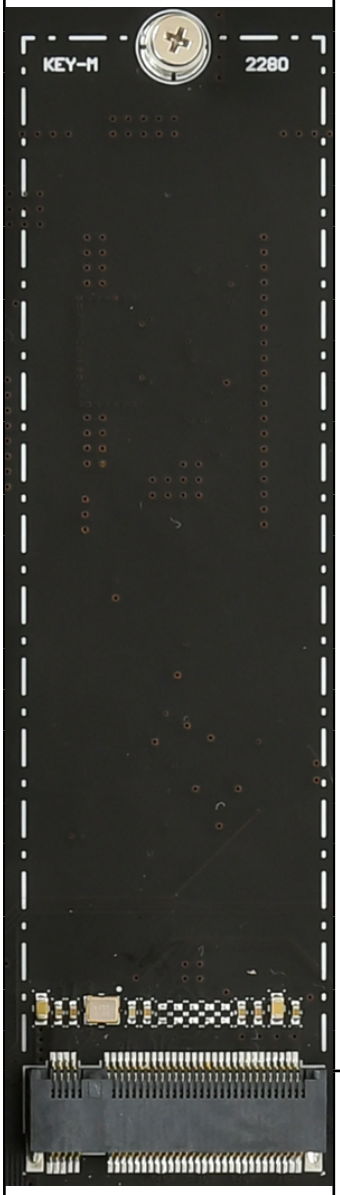
Description						
Pinout	**Pin**	**Description**	**Pin**	**Description**	**Pin**	**Description**
	1	DGND	24	NC	47	PCIE_C4.TX0_N
	2	VDD_3V3	25	PCIE_C4.TX2_P	48	NC
	3	DGND	26	NC	49	PCIE_C4.TX0_P
	4	VDD_3V3	27	DGND	50	PCIE_C4.RST_N
	5	PCIE_C4.RX3_N	28	NC	51	DGND
	6	NC	29	PCIE_C4.RX-1_N	52	PCIE_C4. CLKREQ_N
	7	PCIE_C4.RX3_P	30	NC	53	PCIE_C4.CLK_N
	8	NC	31	PCIE_C4.RX-1_P	54	PCIE.WAKE_N
	9	DGND	32	NC	55	PCIE_C4.CLK_P
	10	NC	33	DGND	56	NC
	11	PCIE_C4.TX3_N	34	NC	57	DGND
	12	VDD_3V3	35	PCIE_C4.TX-1_N	58	NC
	13	PCIE_C4.TX3_P	36	NC	67	NC
	14	VDD_3V3	37	PCIE_C4.TX1_P	68	32KHZ_CLK
	15	DGND	38	NC	69	NC
	16	VDD_3V3	39	DGND	70	VDD_3V3
	17	PCIE_C4.RX2_N	40	NC	71	DGND
	18	VDD_3V3	41	PCIE_C4.RX-0_N	72	VDD_3V3
	19	PCIE_C4.RX2_P	42	NC	73	DGND
	20	NC	43	PCIE_C4.RX-0_P	74	VDD_3V3
	21	DGND	44	M2_KEYM1_ ALERT#	75	DGND
	22	NC	45	DGND		
	23	PCIE_C4.TX2_N	46	NC		

Board to board spacing=2.45 mm / Max component height=0.95 mm



3.3.3 M.2 Key-M2 Connector

M.2 Key-M Connector

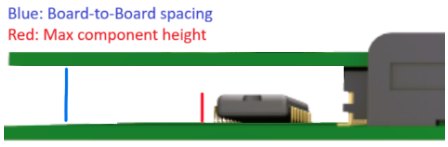


Description

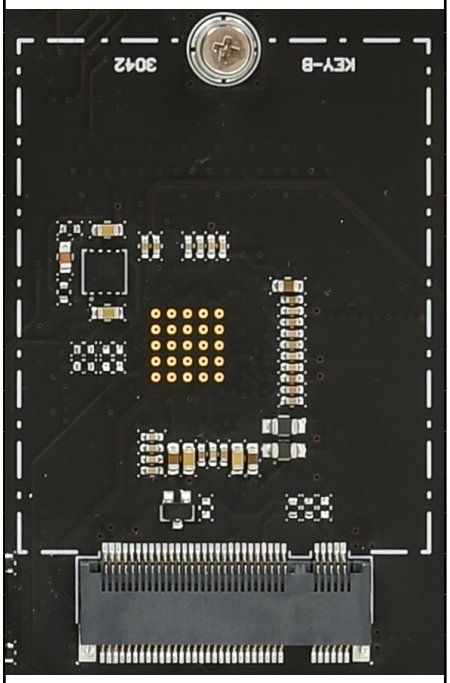
Pinout

Pin	Description	Pin	Description	Pin	Description
1	DGND	24	NC	47	PCIE_C5.TX0_N
2	VDD_3V3	25	PCIE_C5.TX-2_P	48	NC
3	DGND	26	NC	49	PCIE_C5.TX0_P
4	VDD_3V3	27	DGND	50	PCIE_C5.RST_N
5	PCIE_C5.RX3_N	28	NC	51	DGND
6	NC	29	PCIE_C5.RX-1_N	52	PCIE_C5.CLKREQ_N
7	PCIE_C5.RX3_P	30	NC	53	PCIE_C5.CLK_N
8	NC	31	PCIE_C5.RX-1_P	54	PCIE.WAKE_N
9	DGND	32	NC	55	PCIE_C5.CLK_P
10	NC	33	DGND	56	NC
11	PCIE_C5.TX3_N	34	NC	57	DGND
12	VDD_3V3	35	PCIE_C5.TX-1_N	58	NC
13	PCIE_C5.TX3_P	36	NC	67	NC
14	VDD_3V3	37	PCIE_C5.TX-1_P	68	32KHZ_CLK
15	DGND	38	NC	69	NC
16	VDD_3V3	39	DGND	70	VDD_3V3
17	PCIE_C5.RX2_N	40	NC	71	DGND
18	VDD_3V3	41	PCIE_C5.RX-0_N	72	VDD_3V3
19	PCIE_C5.RX2_P	42	NC	73	DGND
20	NC	43	PCIE_C5.RX-0_P	74	VDD_3V3
21	DGND	44	M2_KEYM2_ALERT#	75	DGND
22	NC	45	DGND		
23	PCIE_C5.TX2_N	46	NC		

Board to board spacing=2.45 mm / Max component height=0.95 mm



3.3.4 M.2 Key-B1 Connector

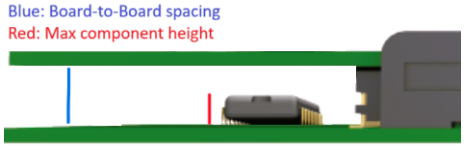


Description

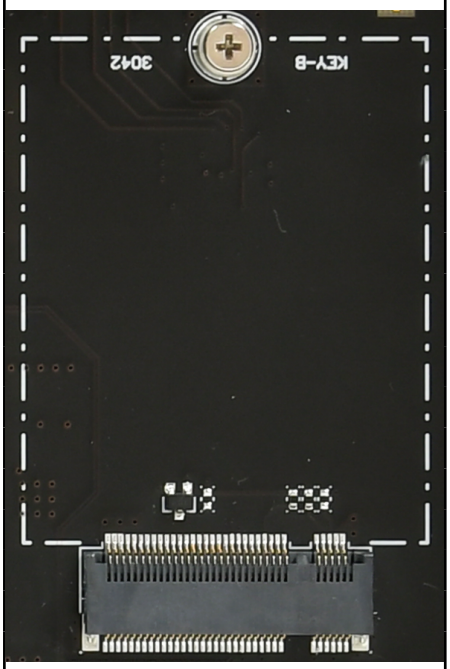
Pinout

Pin	Description	Pin	Description
1	NC	43	NC
2	VDD_3V8	44	NC
3	DGND	45	DGND
4	VDD_3V8	46	NC
5	DGND	47	NC
6	M2B_KEYB1.FULLCARD_ PWROFF#	48	NC
7	USBD3.D_P	49	NC
8	M2B_KEYB1.W_DIS-ABLE1#	50	NC
9	USBD3.D_N	51	DGND
10	NC	52	NC
11	DGND	53	NC
20	NC	54	NC
21	NC	55	NC
22	NC	56	NC
23	NC	57	DGND
24	NC	58	NC
25	NC	59	NC
26	M2B_KEYB1.W_DIS-ABLE2#	60	NC
27	DGND	61	NC
28	NC	62	NC
29	USBD3.SSRX_N	63	NC
30	M2_KEYB1_USIM_RST	64	NC
31	USBD3.SSRX_P	65	NC
32	M2_KEYB1_USIM_CLK	66	NC
33	DGND	67	M2B_KEYB1.RESET
34	M2_KEYB1_USIM_DAT	68	NC
35	USBD3_SSTX_N	69	NC
36	M2_KEYB1_USIM_VDD	70	VDD_3V8
37	USBD3_SSTX_P	71	DGND
38	NC	72	VDD_3V8
39	DGND	73	DGND
40	NC	74	VDD_3V8
41	NC	75	NC
42	NC		

Board to board spacing=2.45 mm
Max component height=1.1 mm



3.3.5 M.2 Key-B2 Connector

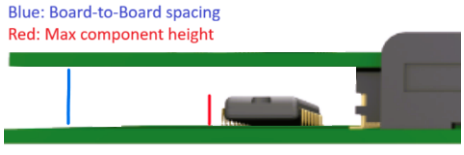


Description

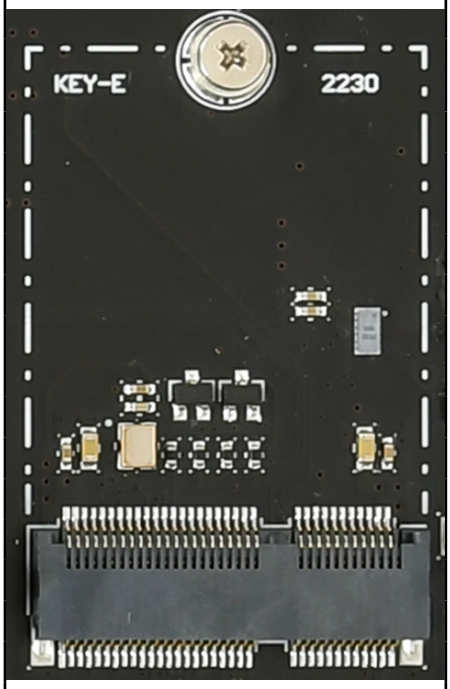
Pinout

Pin	Description	Pin	Description
1	NC	43	NC
2	VDD_3V8	44	NC
3	DGND	45	DGND
4	VDD_3V8	46	NC
5	DGND	47	NC
6	M2B_KEYB2.FULLCARD_PWROFF#	48	NC
7	USBD4.D_P	49	NC
8	M2B_KEYB2.W_DISABLE1#	50	NC
9	USBD4.D_N	51	DGND
10	NC	52	NC
11	DGND	53	NC
20	NC	54	NC
21	NC	55	NC
22	NC	56	NC
23	NC	57	DGND
24	NC	58	NC
25	NC	59	NC
26	M2B_KEYB2.W_DISABLE2#	60	NC
27	DGND	61	NC
28	NC	62	NC
29	USBD4.SSRX_N	63	NC
30	M2_KEYB2_USIM_RST	64	NC
31	USBD4.SSRX_P	65	NC
32	M2_KEYB2_USIM_CLK	66	NC
33	DGND	67	M2B_KEYB2.RESET
34	M2_KEYB2_USIM_DAT	68	NC
35	USBD4_SSTX_N	69	NC
36	M2_KEYB2_USIM_VDD	70	VDD_3V8
37	USBD4_SSTX_P	71	DGND
38	NC	72	VDD_3V8
39	DGND	73	DGND
40	NC	74	VDD_3V8
41	NC	75	NC
42	NC		

Board to board spacing=2.45 mm
Max component height=1 mm



3.3.6 M.2 Key-E Connector

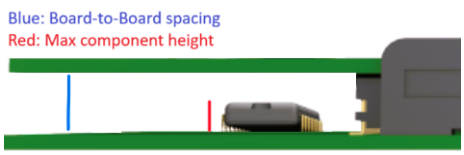


Description

Pinout

Pin	Description	Pin	Description
1	DGND	44	NC
2	VDD_3V3	45	DGND
3	USB3.D_P	46	NC
4	VDD_3V3	47	PCIE_C1.CLK_P
5	USB3.D_N	48	NC
6	NC	49	PCIE_C1.CLK_N
7	DGND	50	M2E_SUSCLK_32KHZ
8	NC	51	DGND
9	NC	52	PCIE_C1.RST_N
10	NC	53	PCIE_C1.CLKREQ_N
11	NC	54	M2E_WDIS-ABLE2_3V3_N
12	NC	55	PCIE.WAKE_N
13	NC	56	M2E_WDIS-ABLE1_3V3_N
14	NC	57	DGND
15	NC	58	NC
16	NC	59	NC
17	NC	60	NC
18	DGND	61	NC
19	NC	62	KEYE_ALERT#
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	PCIE_C1.TX_P	70	NC
36	NC	71	NC
37	PCIE_C1.TX_N	72	VDD_3V3
38	NC	73	NC
39	DGND	74	VDD_3V3
40	NC	75	DGND
41	PCIE_C1.RX_P		
42	NC		
43	PCIE_C1.RX_N		

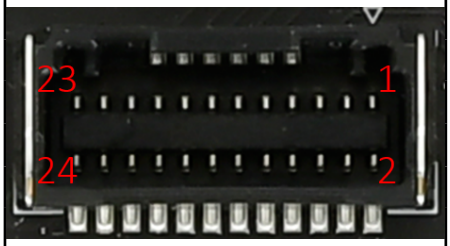
Board to board spacing=2.45 mm
Max component height=1 mm



3.3.7 CSI Camera Connector

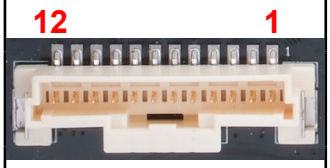
Function	Description							
Connector Type	QSH-060-01-L-D-A-K-TR							
Pinout	**Pin**	**Description**	**Pin**	**Description**	**Pin**	**Description**	**Pin**	**Description**
	1	CSI0.D0_P	37	CSI4.D0_P	73	CSI5.D1_N	109	CAM_BACK-LIGHT_PWM
	2	CSI1.D0_P	38	CSI6.D0_P	74	CSI7.D1_N	110	VDD_3V3
	3	CSI0.D0_N	39	CSI4.D0_N	75	CAM_I2C.SCL	111	NC
	4	CSI1.D0_N	40	CSI6.D0_N	76	CAM_ERROR1	112	NC
	5	GND	41	GND	77	CAM_I2C.SDA	113	NC
	6	GND	42	GND	78	CAM_ERROR2	114	NC
	7	CSI0.CLK_P	43	CSI4.CLK_P	79	GND	115	GND
	8	CSI1.CLK_P	44	CSI6.CLK_P	80	GND	116	GND
	9	CSI0.CLK_N	45	CSI4.CLK_N	81	AVDD_ CAM_2V8	117	CAM_INT1
	10	CSI1.CLK_N	46	CSI6.CLK_N	82	AVDD_ CAM_2V8	118	VDD_3V3
	11	GND	47	GND	83	AVDD_ CAM_2V8	119	CAM_VDD_ SYS_EN
	12	GND	48	GND	84	CAM_ERROR3	120	VDD_3V3
	13	CSI0.D1_P	49	CSI4.D1_P	85	CAM_FRSYNC1		
	14	CSI1.D1_P	50	CSI6.D1_P	86	CAM_ERROR4		
	15	CSI0.D1_N	51	CSI4.D1_N	87	I2C2.SCL		
	16	CSI1.D1_N	52	CSI6.D1_N	88	CAM1.MCLK		
	17	GND	53	GND	89	I2C2.SDA		
	18	GND	54	GND	90	CAM1_PWDN		
	19	CSI2.D0_P	55	NC	91	CAM0.MCLK		
	20	CSI3.D0_P	56	NC	92	CAM1_RST		
	21	CSI2.D0_N	57	NC	93	CAM0_PWDN		
	22	CSI3.D0_N	58	NC	94	CAM2.MCLK		
	23	GND	59	CSI5.D0_P	95	CAM0_RST		
	24	GND	60	CSI7.D0_P	96	CAM_FRSYNC4		
	25	CSI2.CLK_P	61	CSI5.D0_N	97	CAM_FRSYNC3		
	26	CSI3.CLK_P	62	CSI7.D0_N	98	CAM_FRSYNC2		
	27	CSI2.CLK_N	63	GND	99	GND		
	28	CSI3.CLK_N	64	GND	100	GND		
	29	GND	65	CSI5.CLK_P	101	CAM_TE_RSV		
	30	GND	66	CSI7.CLK_P	102	VDD_1V8		
	31	CSI2.D1_P	67	CSI5.CLK_N	103	CAM_INT3		
	32	CSI3.D1_P	68	CSI7.CLK_N	104	CAM_INT4		
	33	CSI2.D1_N	69	GND	105	I2C5.SCL		
	34	CSI3.D1_N	70	GND	106	CAM_INT2		
	35	GND	71	CSI5.D1_P	107	I2C5.SDA		
	36	GND	72	CSI7.D1_P	108	VDD_3V3		

3.3.8 Serial Communication Connector



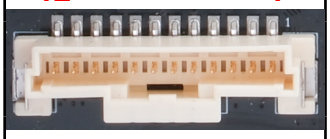
Function	Description			
Connector Type	505433-2481			
Mating connector	5054322401			
Pinout	Pin	Description	Pin	Description
	1	UART1_1V8_CTS	15	I2S1_1V8_SDIN
	2	UART1_1V8_RX	16	SPI1_1V8_CS0#
	3	UART1_1V8_RTS	17	I2S1_1V8_CLK
	4	UART1_1V8_TX	18	SPI1_1V8_CS1#
	5	I2C6_1V8_SDA	19	DGND
	6	I2C6_1V8_SCL	20	DGND
	7	DGND	21	VDD_5V
	8	DGND	22	VDD_3V3
	9	I2S1_1V8_FS	23	VDD_5V
	10	SPI1_1V8_SCK	24	VDD_1V8
	11	I2S1_1V8_SDOUT	25	
	12	SPI1_1V8_MISO	26	
	13	I2S1_1V8_MCLK01	27	
	14	SPI1_1V8_MOSI	28	

3.3.9 Serial Connector



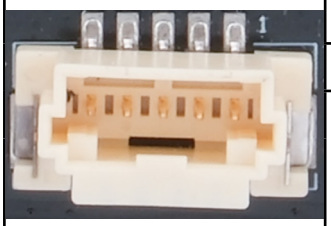
Function	Description	
Connector Type	5600201230	
Mating Connector	5023511200	
Pinout	Pin	Description
	1	SERIAL_CH0.TX_N
	2	SERIAL_CH0.TX_P
	3	SERIAL_CH0.RX_N
	4	SERIAL_CH0.RX_P
	5	GND_ISO_SERIAL
	6	SERIAL_CH1.TX_N
	7	SERIAL_CH1.TX_P
	8	SERIAL_CH1.RX_N
	9	SERIAL_CH1.RX_P
	10	GND_ISO_SERIAL
	11	RESET_ISO_N
	12	RECOVERY_ISO_N

3.3.10 Digital IO Connector



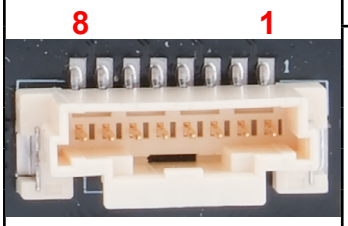
Function	Description	
Connector Type	5600201230	
Mating Connector	5023511200	
Pinout	Pin	Description
	1	DIGITAL_IN0
	2	DIGITAL_IN1
	3	DIGITAL_IN2
	4	DIGITAL_IN3
	5	GND_ISO
	6	GND_ISO
	7	GND_ISO
	8	GND_ISO
	9	DIGITAL_OUT0
	10	DIGITAL_OUT1
	11	DIGITAL_OUT2
	12	DIGITAL_OUT3

3.3.11 CAN Bus Connector

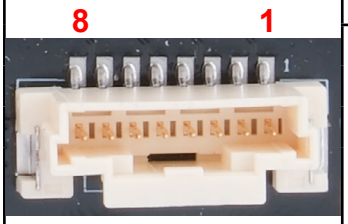


Function	Description	
Connector Type	5600200530	
Mating Connector	5023510500	
Pinout	Pin	Description
	1	CAN0_HI
	2	CAN0_LO
	3	GND_ISO_CAN
	4	CAN1_HI
	5	CAN1_LO

3.3.12 Gigabit Ethernet Connector

GBE-1	Function	Description	
	Connector Type	5600200830	
	Mating Connector	5023510800	
	Pinout	Pin	Description
		1	D0_P
		2	D0_N
		3	D1_P
		4	D1_N
		5	D2_P
		6	D2_N
		7	D3_P
		8	D3_N

3.3.13 10G Ethernet Connector

10G	Function	Description	
	Connector Type	5600200830	
	Mating Connector	5023510800	
	Pinout	Pin	Description
		1	ENET_10G.D0_N
		2	ENET_10G.D0_P
		3	ENET_10G.D1_P
		4	ENET_10G.D1_N
		5	ENET_10G.D2_N
		6	ENET_10G.D2_P
		7	ENET_10G.D3_P
		8	ENET_10G.D3_N

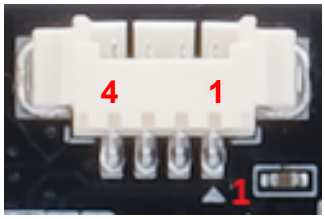
3.3.14 Debug Connector

Function	Description	
Connector Type	68001-203HLF	
Pinout	Pin	Description
	1	UART2_3V3.TX
	2	UART2_3V3.RX
	3	GND

3.3.15 Panel Connector

Function	Description	
Connector Type	53398-0871	
Mating Connector	0510210800	
Pinout	Pin	Description
	1	PWR_BTN_N
	2	GND
	3	RESET_N
	4	GND
	5	RECOVERY_N
	6	GND
	7	LED_BOOT_A
	8	LED_BOOT_C

3.3.16 Fan Connector



Function	Description	
Connector Type	53261-0471	
Mating Connector	0510210400 from Molex	
Pinout	Pin	Description
	1	DGND
	2	VDD_5V
	3	TACH
	4	PWM

3.3.17 Nano SIM Connectors

Description
RAIBOARD-AGX uses two nano SIM card connectors.

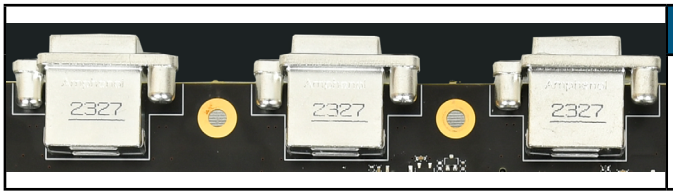
3.3.18 RTC Battery Connector

Description
The RAIBOARD-AGX implements a RTC battery holder. The connector is suitable for CR1220 batteries.

3.3.19 USB Type-C Recovery Connector

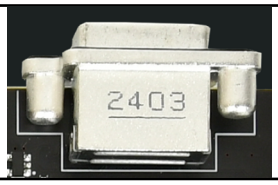
Description
RAIBOARD-AGX incorporates a USB 3.0 Type-C connector for software installation in recovery mode and device usage in regular use case.

3.3.20 USB Type-A Connector x3 (3.0)



Description
RAIBOARD-AGX includes three USB 3.0 Type-A connectors with a current limit of 15A.

3.3.21 HDMI Connector



Description
The NVIDIA® Jetson AGX module will output video via the RAIBOARD-AGX HDMI connector that is HDMI 2.0 capable.

3.4 The Definition of Buttons

3.4.1 Recovery Button

Description
RAIBOARD-AGX implements a recovery pushbutton 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)

3.4.2 Reset Button

Description
RAIBOARD-AGX implements a reset button to reset the Jetson SoM.

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-raibox-agx

JetPack-6.x Installation can be found here: https://www.forecr.io/blogs/installation/jetpack-6-x-installation-for-raibox-agx

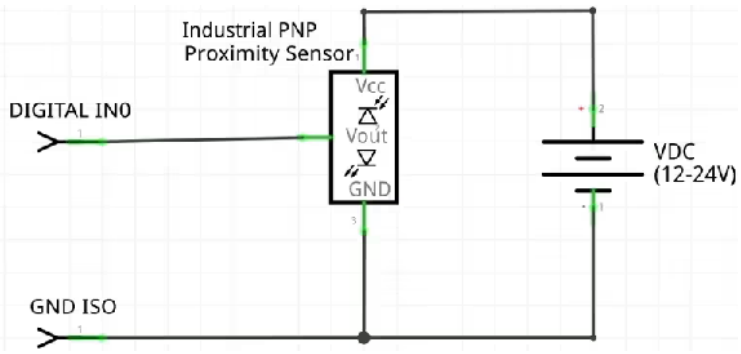
5. Connectivity

5.1 Industrial Input Output Interface

On the industrial input output connector, there are 4 ground, 4 digital input and 4 digital output pins. The pinout detail of the connector is given in section 3.3.4.

5.1.1 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, the software side can be continued.

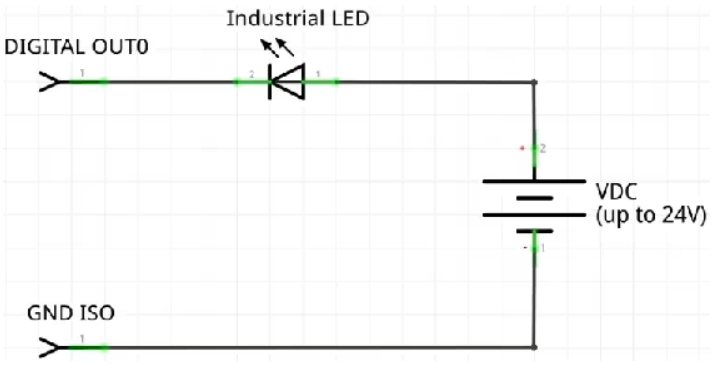
Pin Name	Sysfs Name
DIGITAL_IN0	**gpio-398 (PH.07)**
DIGITAL_IN1	**gpio-399 (PI.00)**
DIGITAL_IN2	**gpio-400 (PI.01)**
DIGITAL_IN3	**gpio-401 (PI.02)**
GROUND	**GND_ISO**

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

sudo sh -c “echo 398 > /sys/class/gpio/export” **sudo sh -c “echo in > /sys/class/gpio/PBB.01/direction”** **sudo sh -c “cat /sys/class/gpio/PH.07/value”**

5.1.2 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, the software side can be continued.

Pin Name	Sysfs Name
DIGITAL_OUT0	**gpio-444 (PP.04)**
DIGITAL_OUT1	**gpio-452 (PQ.04)**
DIGITAL_OUT2	**gpio-434 (PN.02)**
DIGITAL_OUT3	**gpio-446 (PP.06)**
GROUND	**GND_ISO**

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

```
sudo sh -c “echo 444 > /sys/class/gpio/export”
sudo sh -c “echo out > /sys/class/gpio/PP.04/direction”
```

To short output:

```
sudo sh -c “echo 1 > /sys/class/gpio/PP.04/value”
```

To open output:

```
sudo sh -c “echo 0 > /sys/class/gpio/PP.04/value”
```

5.2 Serial Communication Interface

There are two serial communication channels on RAIBOARD-AGX. On the serial communication connector, there are 8 serial communication, 2 ground pins.

5.2.1 Serial Communication Interfaces Settings

Run the GtkTerm program with arguments. On the host side, you can use TeraTerm or Putty for Windows; GtkTerm for Ubuntu OS.

Job (1/0)	Sysfs Name	
	Channel-0	Channel-1
Half/Full#	gpio-470 (PY00)	gpio-469 (PX07)
RS485/RS232#	gpio-472 (PY02)	gpio-480 (PZ02)
Driver Enable	gpio-477 (PY07)	gpio-474 (PY04)
Receievr Enable#	gpio-478 (PZ00)	gpio-468 (PX06)

5.2.1.1 RS-232 Settings

To set the serial communication interfaces in RS-232 mode:

Open new terminal then type these commands below for channel-0.

```
sudo sh -c “echo 470 > /sys/class/gpio/export”
sudo sh -c “echo 472 > /sys/class/gpio/export”
sudo sh -c “echo 477 > /sys/class/gpio/export”
sudo sh -c “echo 478 > /sys/class/gpio/export”
sudo sh -c “echo low > /sys/class/gpio/PY.00/direction”
sudo sh -c “echo low > /sys/class/gpio/PY.02/direction”
sudo sh -c “echo high > /sys/class/gpio/PY.07/direction”
sudo sh -c “echo low > /sys/class/gpio/PZ.00/direction”
```

Open new terminal then type these commands below for channel-1.

```
sudo sh -c “echo 469 > /sys/class/gpio/export”
sudo sh -c “echo 480 > /sys/class/gpio/export”
sudo sh -c “echo 474 > /sys/class/gpio/export”
sudo sh -c “echo 468 > /sys/class/gpio/export”
sudo sh -c “echo low > /sys/class/gpio/PX.07/direction”
sudo sh -c “echo low > /sys/class/gpio/PZ.02/direction”
sudo sh -c “echo high > /sys/class/gpio/PY.04/direction”
sudo sh -c “echo low > /sys/class/gpio/PX.06/direction”
```

5.2.1.2 RS-422 Settings

To set the serial communication interfaces in RS-422 mode:

Open new terminal then type these commands below for channel-0.

```
sudo sh -c “echo 470 > /sys/class/gpio/export”
sudo sh -c “echo 472 > /sys/class/gpio/export”
sudo sh -c “echo 477 > /sys/class/gpio/export”
sudo sh -c “echo 478 > /sys/class/gpio/export”
sudo sh -c “echo low > /sys/class/gpio/PY.00/direction”
sudo sh -c “echo high > /sys/class/gpio/PY.02/direction”
sudo sh -c “echo high > /sys/class/gpio/PY.07/direction”
sudo sh -c “echo low > /sys/class/gpio/PZ.00/direction”
```

```
sudo sh -c “echo 469 > /sys/class/gpio/export”
sudo sh -c “echo 480 > /sys/class/gpio/export”
sudo sh -c “echo 474 > /sys/class/gpio/export”
sudo sh -c “echo 468 > /sys/class/gpio/export”
sudo sh -c “echo low > /sys/class/gpio/PX.07/direction”
sudo sh -c “echo high > /sys/class/gpio/PZ.02/direction”
sudo sh -c “echo high > /sys/class/gpio/PY.04/direction”
sudo sh -c “echo low > /sys/class/gpio/PX.06/direction”
```

5.2.1.3 RS-485 Settings

To set the serial communication interfaces in RS-485 mode:

```
sudo echo 470 > /sys/class/gpio/export
sudo echo 472 > /sys/class/gpio/export
sudo echo 477 > /sys/class/gpio/export
sudo echo 478 > /sys/class/gpio/export
sudo echo high > /sys/class/gpio/PY00/direction
sudo echo high > /sys/class/gpio/PY02/direction
```

```
sudo echo 469 > /sys/class/gpio/export
sudo echo 480 > /sys/class/gpio/export
sudo echo 474 > /sys/class/gpio/export
sudo echo 468 > /sys/class/gpio/export
sudo echo high > /sys/class/gpio/PX07/direction
sudo echo high > /sys/class/gpio/PZ02/direction
```

```
sudo echo high > /sys/class/gpio/PY07/direction
sudo echo high > /sys/class/gpio/PZ00/direction
```

```
sudo echo low > /sys/class/gpio/PY07/direction
sudo echo low > /sys/class/gpio/PZ00/direction
```

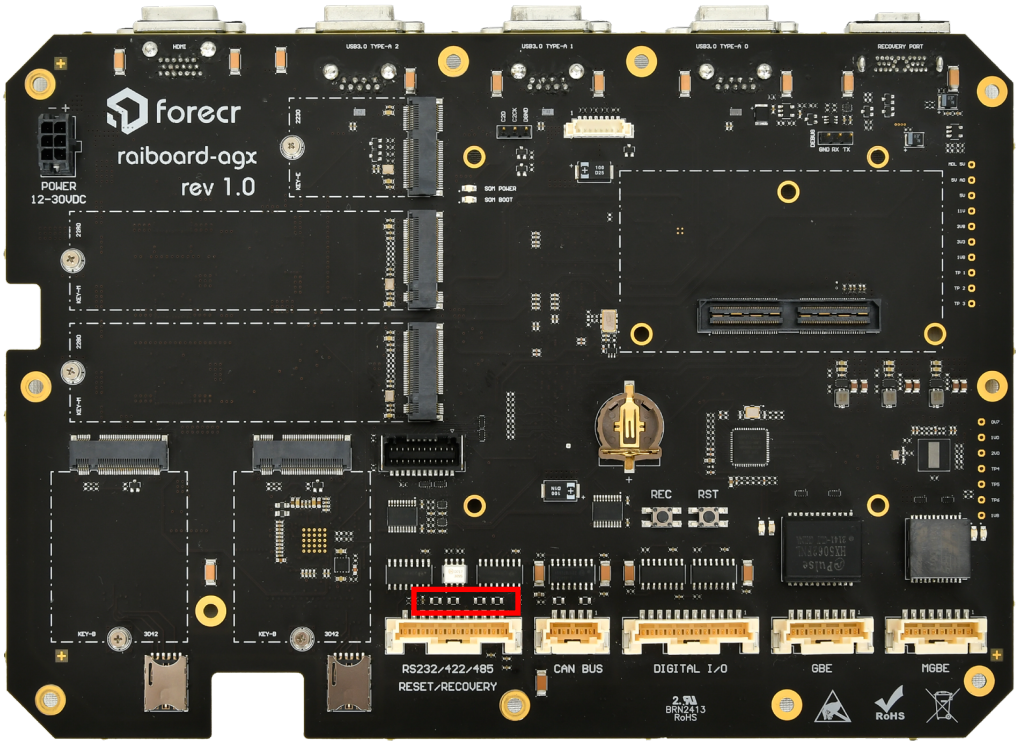
```
sudo echo high > /sys/class/gpio/PY04/direction
sudo echo high > /sys/class/gpio/PX06/direction
```

```
sudo echo low > /sys/class/gpio/PY04/direction
sudo echo low > /sys/class/gpio/PX06/direction
```

5.2.1 Serial Communication Termination Resistors

There are serial communication termination resistors on the RAIBOARD-AGX There are 0805 size 120R termination resistors between RS422 TX+/TX- and RX+/RX- pairs on the board, which are not populated by default. Standard resistors with above specs can be fitted if termination resistors are needed on the RAIBOX-AGX side.

Serial Communication Termination Resistors



5.2.2 CANBus Interface

There are two CANBus interfaces on the RAIBOARD-AGX. On the CANBus connector, there are 4 CANBus pins and one ground pin The pinout detail of the connector is given in section 333.

5.2.3 CANBus Testing

As an example CAN Bus testing application, we used a DSBOX-TX2NX as a test equipment (It has 120Ω termination resistor included). (If you use a USB-CAN adapter, connect that adapter to the USB port of the host PC and install its driver software if necessary.) To the other side of the connector, connect your device's CAN pins.

On host side, be sure that you are using same bitrate with your device.

On next step, activate CAN drivers and activate 2 CAN interfaces on RAIBOARD-AGX with the following commands below:

```
sudo modprobe can
sudo modprobe can_raw
sudo modprobe mttcan
sudo ip link set can0 type can bitrate 500000 dbitrate 2000000
berr-reporting on fd on
sudo ip link set can1 type can bitrate 500000 dbitrate 2000000
berr-reporting on fd on
sudo ip link set up can0
sudo ip link set up can1
```

Now, you can use can-utils tools to communicate.

Use cangen to write random data from both CAN Bus interface:

```
cangen can0 -v
cangen can1 -v
```

Use cansend to write data from both CAN Bus interface:

```
cansend can0 123#1122334455667788
cansend can1 123#1122334455667788
```

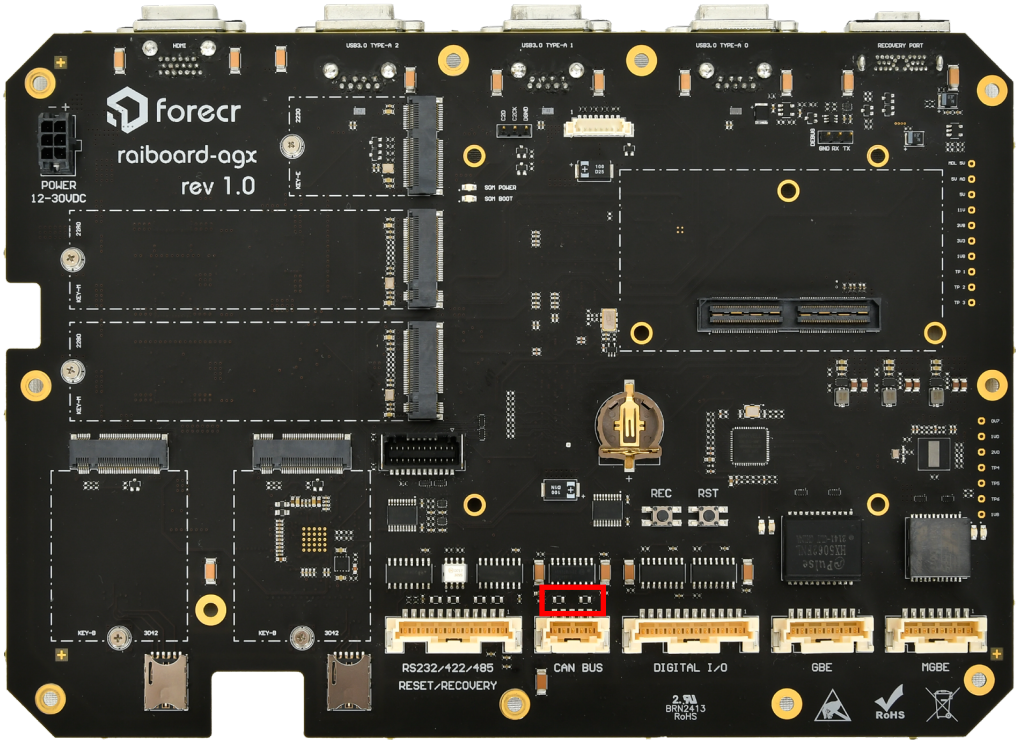
Use candump to listen bus from both CAN Bus interface:

```
candump can0
candump can1
```

5.2.4 CANBus Termination Resistors

There are 0805 size 120R termination resistors between CAN_H and CAN_L pins on the board, which are not populated by default. Standard resistors with above specs can be fitted if termination resistors are needed on the RAIBOX-AGX side.

CANBus Termination Resistors



5.3 I2C Devices

5.3.1 IMU / Temperature Sensor

RAIBOARD-AGX contains a 6-AXIS IMU-Temperature sensor from Würth Elektronik (model: 2536030320001). It is accessible from I2C4 (i2c@c250000) and its I2C slave address is 0x6b.

5.3.2 EEPROM

RAIBOARD-AGX also contains an EEPROM from onsemi (model: CAT24C04WI-GT3). It is accessible from I2C4 (i2c@ c250000) and its I2C slave address is 0x56.

5.4 General Purpose Input/Output (GPIO)

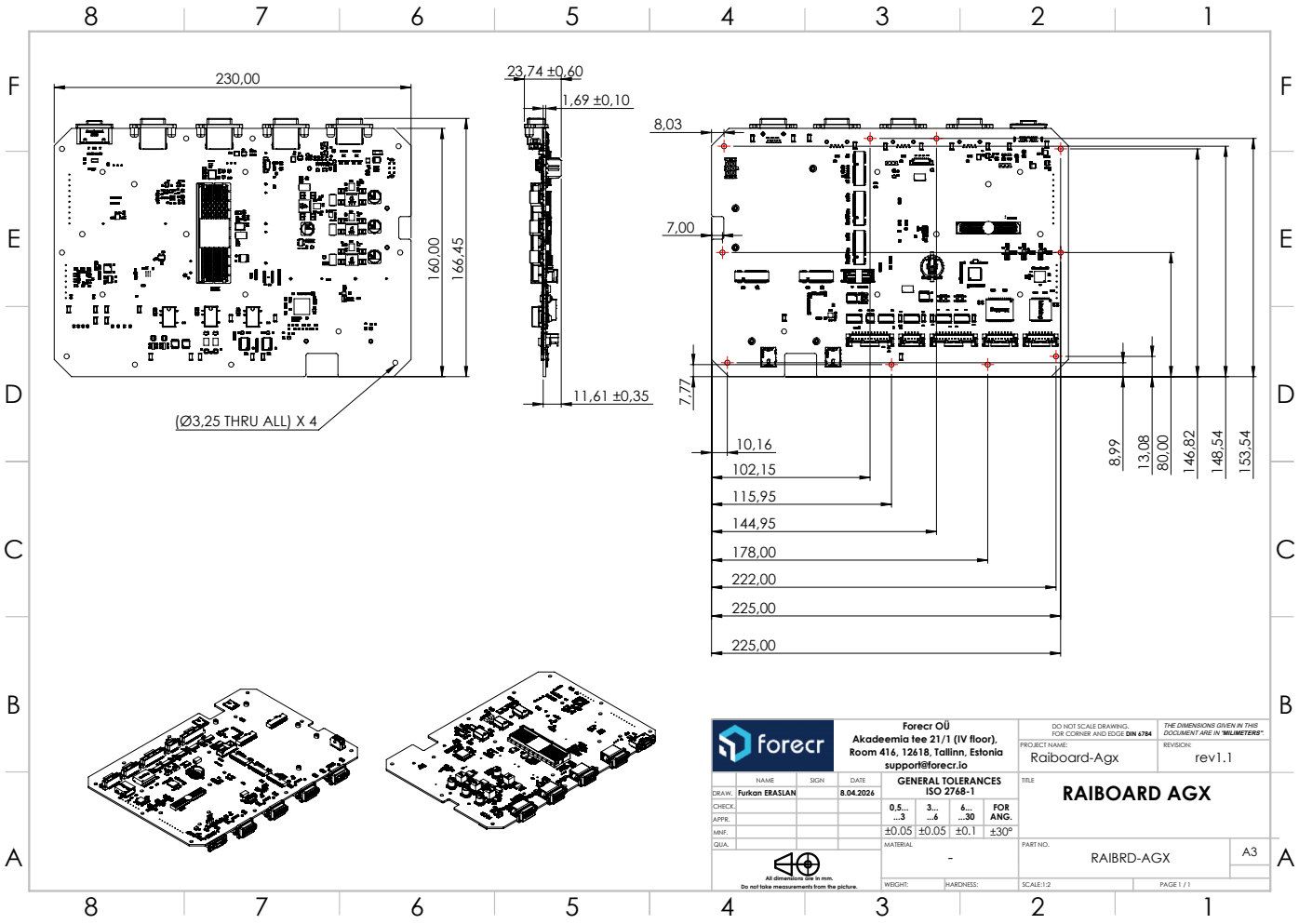
MODULE PIN NUMBER	I/O NAME	MODULE PIN NAME	TYPE	DESCRIPTION
E10	CAM_VDD_SYS_EN	GPIO12	OUTPUT	
A62	CAM_FRSYNC1	GPIO10	BIDIRECTIONAL	Camera 1 frame sync.
F59	CAM_FRSYNC2	GPIO07	BIDIRECTIONAL	Camera 2 frame sync.
E59	CAM_FRSYNC3	GPIO06	BIDIRECTIONAL	Camera 3 frame sync.
G7	CAM_FRSYNC4	GPIO13	BIDIRECTIONAL	Camera 4 frame sync.
L15	CAM_ERROR1	GPIO14	INPUT	Camera 1 error.
L9	CAM_ERROR2	GPIO28	INPUT	Camera 2 error.
A7	CAM_ERROR3	GPIO29	INPUT	Camera 3 error.
L4	CAM_ERROR4	UART4_RTS	INPUT	Camera 4 error.
L49	CAM0_PWDN	UART4_CTS	OUTPUT	Camera 0 power down (3.3V Level)
F10	CAM1_PWDN	GPIO15	OUTPUT	Camera 1 power down (3.3V Level)
L5	CAM0_RST	UART4_TX	OUTPUT	Camera 0 reset.
F9	CAM1_RST	GPIO16	OUTPUT	Camera 1 reset.
J54	CAM0.MCLK	MCLK02	OUTPUT	Camera 0 reference clock (1.8V Level)
H53	CAM1.MCLK	MCLK03	OUTPUT	Camera 1 reference clock (1.8V Level)
H55	CAM2.MCLK	MCLK04	OUTPUT	Camera 2 reference clock (1.8V Level)
E61	CAM_INT1	SPI2_CLK	INPUT	Camera 1 interrupt.
D62	CAM_INT2	SPI2_MISO	INPUT	Camera 2 interrupt.
F60	CAM_INT3	SPI2_MOSI	INPUT	Camera 3 interrupt.
D60	CAM_INT4	SPI2_CS0_N	INPUT	Camera 4 interrupt.
J51	CAM_TE_RSV	GPIO24	OUTPUT	Not connected as default
K57	CAM_BACKLIGHT_PWM	PWM01	OUTPUT	Not connected as default
G4	GPIO3_PI.00	I2S2_CLK	INPUT	DIGITAL INPUT
F5	GPIO3_PI.01	I2S2_DOUT	INPUT	DIGITAL INPUT
F6	GPIO3_PI.02	I2S2_DIN	INPUT	DIGITAL INPUT

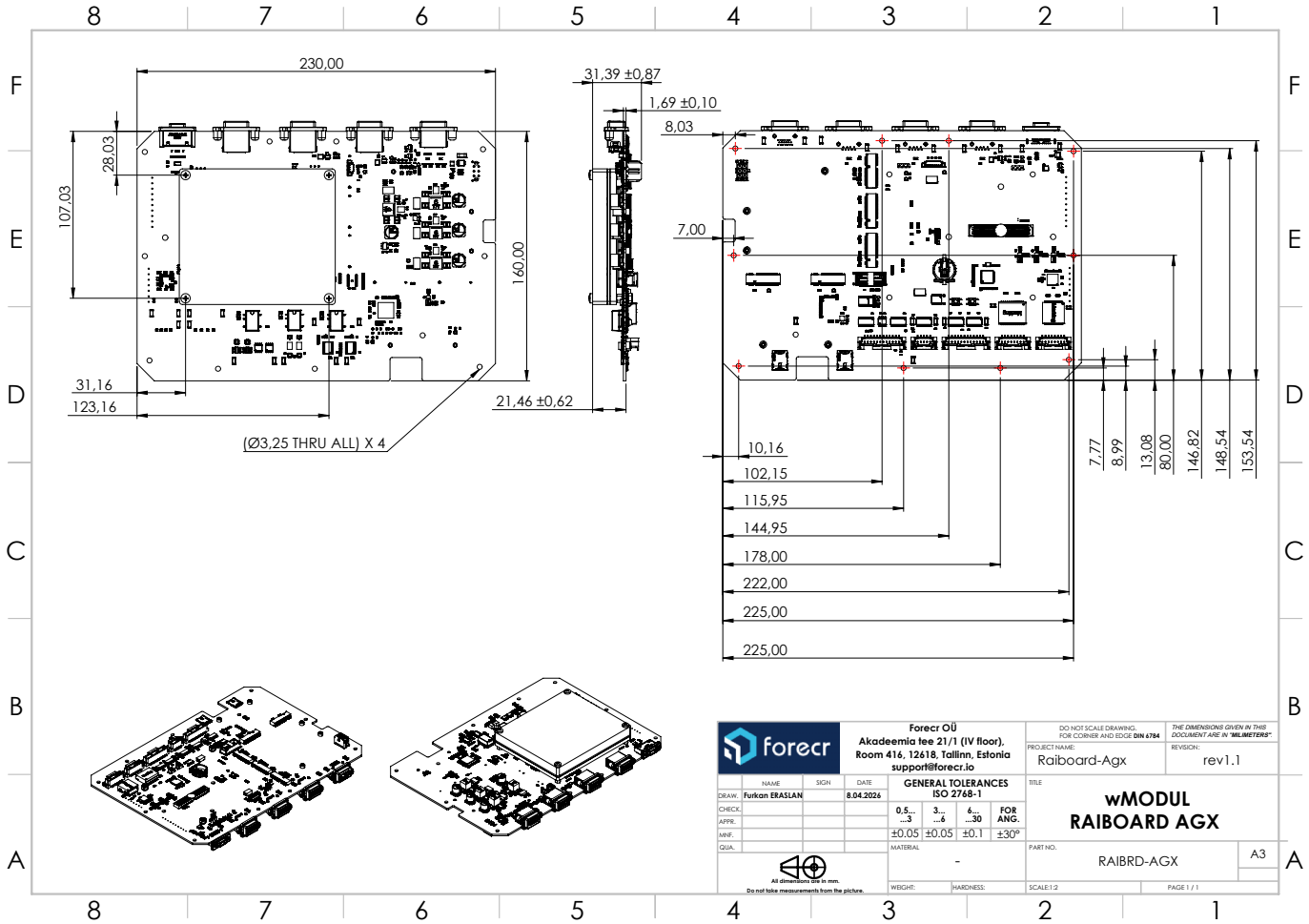
E4	GPIO3_PH.07	I2S2_FS	INPUT	DIGITAL INPUT
A54	GPIO3_PA.04	GPIO17	OUTPUT	DIGITAL OUTPUT
C55	GPIO3_PA.05	GPIO18	OUTPUT	DIGITAL OUTPUT
K56	GPIO3_PA.06	GPIO19	OUTPUT	DIGITAL OUTPUT
J55	GPIO3_PA.07	GPIO32	OUTPUT	DIGITAL OUTPUT
G58	SERIAL_CH0.DE	UART2_RTS	OUTPUT	Driver enable for serial communication control.
A57	SERIAL_CH0.R\E\	UART2_CTS	OUTPUT	Receiver enable for serial communication control.
F55	SERIAL_CH0. HALF/F\U\L\L	SPI3_CLK	OUTPUT	Half duplex or full duplex control for RS-485 communication protocol. Drive low for full duplex communication. Drive high for half duplex communication.
G56	SERIAL_CH0.MODE	SPI3_MOSI	OUTPUT	RS-485/RS-232 mode select pin. Drive high for RS-485 communication. Drive low for RS-232 communication.
E56	SERIAL_CH1.DE	SPI3_CS1_N	OUTPUT	Driver enable for serial communication control.
K58	SERIAL_CH1.R\E\	UART5_RTS	OUTPUT	Receiver enable for serial communication control.
H57	SERIAL_CH1. HALF/F\U\L\L\	UART5_CTS	OUTPUT	Half duplex or full duplex control for RS-485 communication protocol. Drive low for full duplex communication. Drive high for half duplex communication.
G55	SERIAL_CH1.MODE	GPIO23	OUTPUT	RS-485/RS-232 mode select pin. Drive high for RS-485 communication. Drive low for RS-232 communication.
D56	XFI0_RST_N	SPI3_MISO	OUPUT	10G Ethernet reset signal.
C57	XFI0_INT_N	SPI3_CS0_N	INPUT	10G Ethernet interrupt signal.
F54	GPIO22_USB_ VBUS_EN0	GPIO22	OUTPUT	Connect to enable and over-current pins of load switch.
A58	GPIO20_5V0_HDMI_ EN	GPIO20	OUTPUT	HDMI enable.
K49	XFI0_MDIO	GPIO25	BIDIRECTIONAL	MGBE C0 Management Clock
H51	XFI0_MDC	GPIO26	OUTPUT	MGBE C0 Management Data
F56	GPIO36_CAM_ AVDD_CAM_EN	GPIO36	OUTPUT	Camera AVDD supply enable.

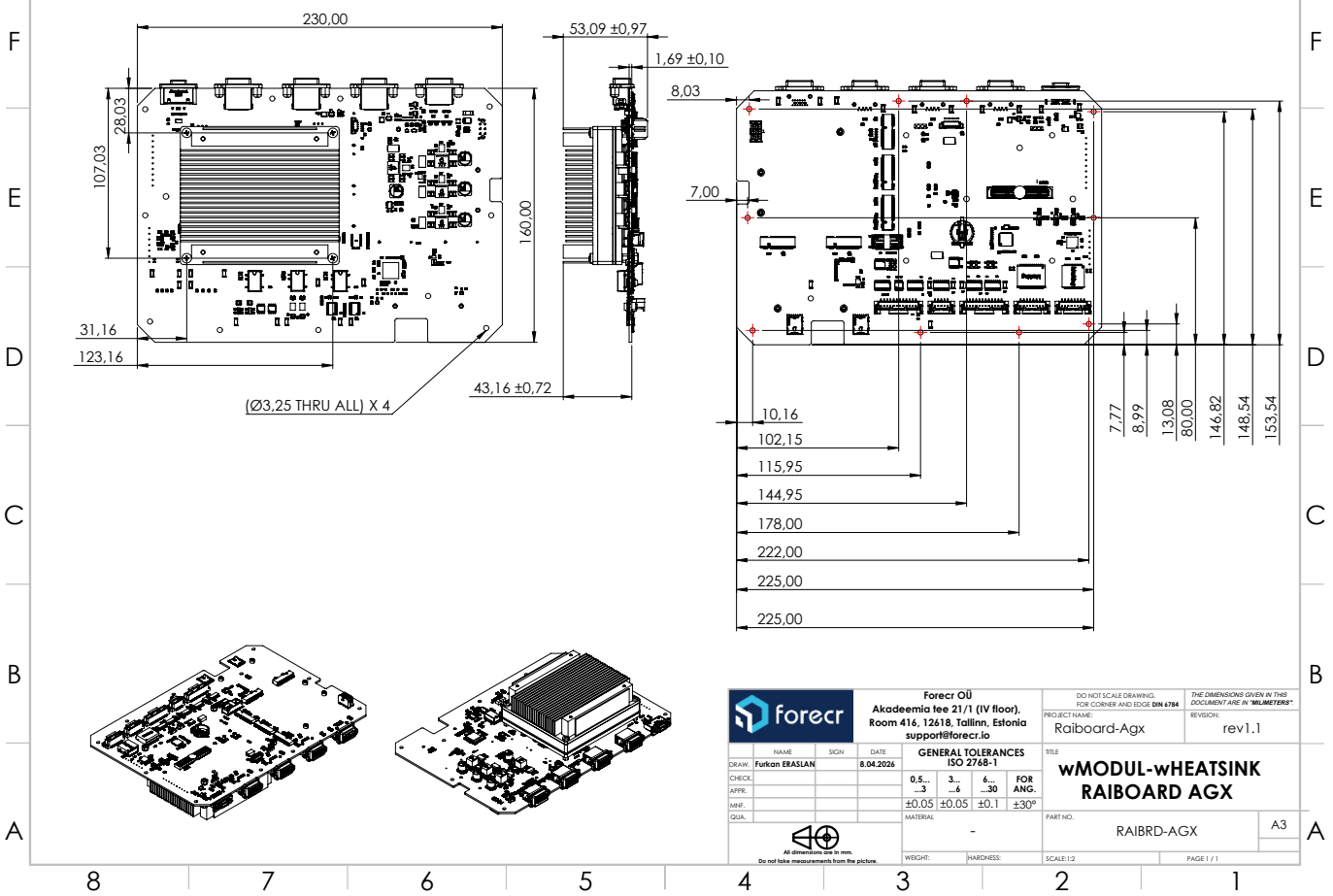
I/O Expander IC	PIN#	GPIO TYPE	TYPE	DESCRIPTION
Bus Name: I2C6 Module Pin Numbers: J53 / J52 P/N: PCA6416APW,118 Address: 0x20h	4	M2B_KEYB1.W_DISABLE1#	OUTPUT	LTE/5G module airplane mode control. Drive low to enable airplane mode. Drive high for normal operation
	5	M2B_KEYB1.W_DISABLE2#	OUTPUT	GNSS disable control. Drive low to disable GNSS. Drive high for normal operation
	6	M2B_KEYB1.FULLCARD_ PWROFF#	OUTPUT	LTE/5G module power on/off control. Drive low to power off the module. Drive high for normal operation
	7	M2B_KEYB1.RESET	OUTPUT	LTE/5G module reset control input. Drive low to put in reset state Drive high for normal operation
	8	M2B_KEYB2.W_DISABLE1#	OUTPUT	LTE/5G module airplane mode control. Drive low to enable airplane mode. Drive high for normal operation
	9	M2B_KEYB2.W_DISABLE2#	OUTPUT	GNSS disable control. Drive low to disable GNSS. Drive high for normal operation
	10	M2B_KEYB2.FULLCARD_ PWROFF#	OUTPUT	LTE/5G module power on/off control. Drive low to power off the module. Drive high for normal operation
	11	M2B_KEYB2.RESET	OUTPUT	LTE/5G module reset control input. Drive low to put in reset state Drive high for normal operation
	12	M2E_WDISABLE1	OUTPUT	WiFi/BT module full powerdown control for the WiFi/BT radio Drive low to disable WiFi/BT. Drive high for normal operation
	13	M2E_WDISABLE2	OUTPUT	Reset for Bluetooth. Active low by default

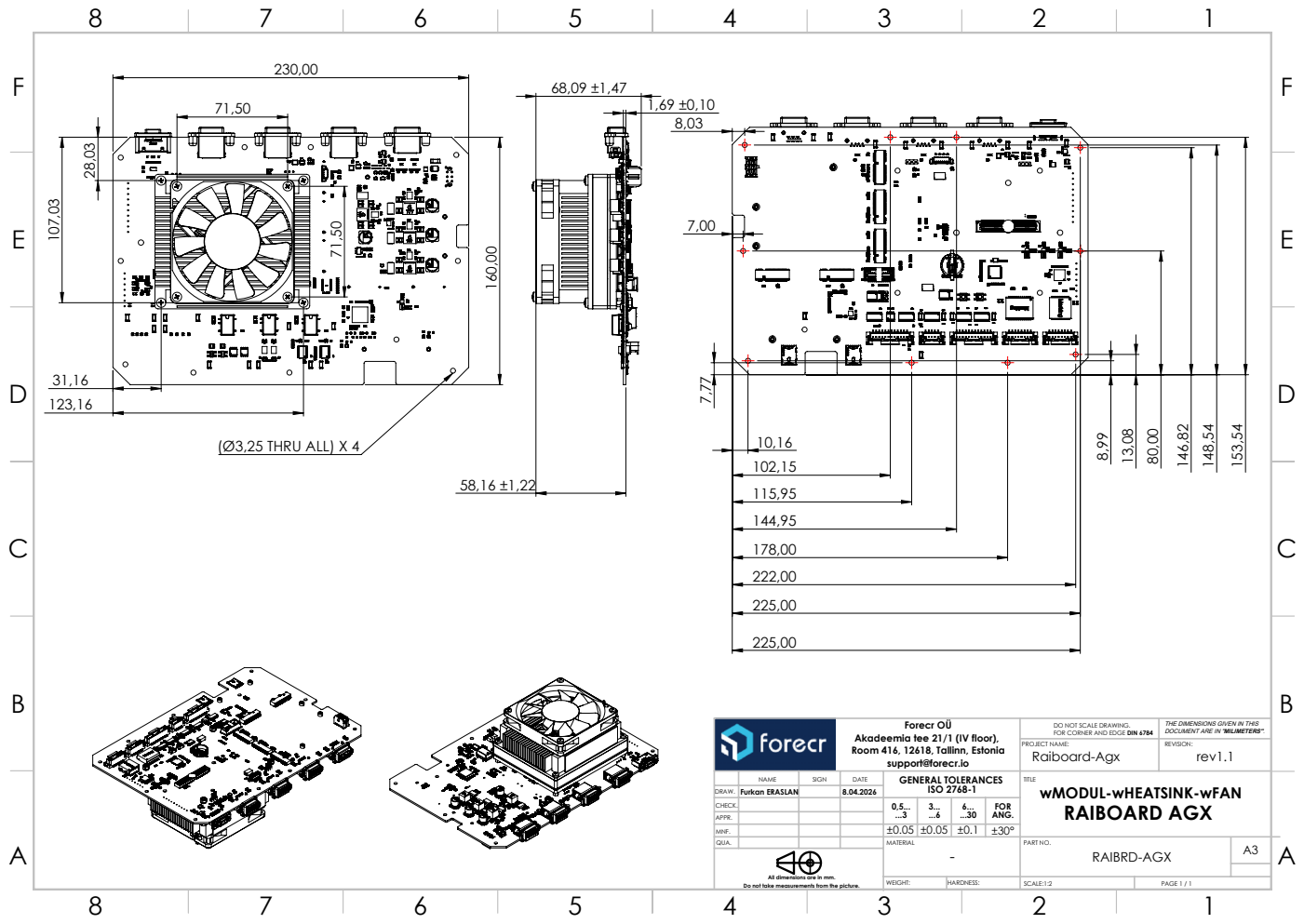
6 3D Model & Mechanical Information

Full 3D models of all RAIBOX-AGX can be found here: https://github.com/forecr/forecr_3d_models/tree/master/RAIBOARD-AGX




230,00
31,39 ±0,87
1,69 ±0,10
8,03
28,03
107,03
160,00
7,00
31,16
123,16
21,46 ±0,62
(Ø3,25 THRU ALL) X 4
10,16
102,15
115,95
144,95
178,00
222,00
225,00
225,00
7,77
8,99
13,08
80,00
146,82
148,54
153,54
Forecr OÜ
Akadeemia tee 21/1 (IV floor),
Room 416, 12618, Tallinn, Estonia
support@forecr.io
DRAW. Furkan ERASLAN 8.04.2026
GENERAL TOLERANCES ISO 2768-1
±0.05 ±0.05 ±0.1 ±30°
MATERIAL -
PROJECT NAME: Raiboard-Agx
REVISION: rev1.1
TITLE wMODUL RAIBOARD AGX
PART NO. RAIBRD-AGX
A3
SCALE:1:2
PAGE 1 / 1


230,00
53,09 ±0,97
1,69 ±0,10
8,03
28,03
107,03
160,00
7,00
31,16
123,16
43,16 ±0,72
(Ø3,25 THRU ALL) X 4
10,16
102,15
115,95
144,95
178,00
222,00
225,00
225,00
7,77
8,99
13,08
80,00
146,82
148,54
153,54
Forecr OÜ
Akadeemia tee 21/1 (IV floor),
Room 416, 12618, Tallinn, Estonia
support@forecr.io
DRAW. Furkan ERASLAN 8.04.2026
GENERAL TOLERANCES ISO 2768-1
±0.05 ±0.05 ±0.1 ±30°
MATERIAL -
PROJECT NAME: Raiboard-Agx
REVISION: rev1.1
TITLE wMODUL-wHEATSINK RAIBOARD AGX
PART NO. RAIBRD-AGX
A3
SCALE:1:2
PAGE 1 / 1


230,00
71,50
28,03
107,03
71,50
160,00
31,16
123,16
(Ø3,25 THRU ALL) X 4
68,09 ±1,47
1,69 ±0,10
8,03
58,16 ±1,22
7,00
7,77
10,16
102,15
115,95
144,95
178,00
222,00
225,00
225,00
8,99
13,08
80,00
146,82
148,54
153,54
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 6784
THE DIMENSIONS GIVEN IN THIS DOCUMENT ARE IN "MILIMETERS"
PROJECT NAME:
Raiboard-Agx
REVISION:
rev1.1
NAME
SIGN
DATE
DRAW.
Furkan ERASLAN
8.04.2026
CHECK.
APPR.
MNF.
QUA.
GENERAL TOLERANCES
ISO 2768-1
0,5... ...3
3... ...6
6... ...30
FOR ANG.
±0.05
±0.05
±0.1
±30°
MATERIAL
-
WEIGHT:
HARDNESS:
All dimensions are in mm.
Do not take measurements from the picture.
TITLE
wMODUL-wHEATSINK-wFAN
RAIBOARD AGX
PART NO.
RAIBRD-AGX
A3
SCALE:1:2
PAGE 1 / 1

7. Power Consumption

This section will be completed soon. It will be published on our website once completed. Please check our Forecr Web Page regularly.

8. MTBF Prediction

This section will be completed soon. It will be published on our website once completed. Please check our Forecr Web Page regularly.

9. Ordering Information