



MILBOX-ORNX

USER MANUAL

UM-MBXORNX-01

Revision 1.0

30/06/2025

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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 MILBOX-ORNX. Therefore, this manual only represents the technical status of Forecr MILBOX-ORNX 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 MILBOX-ORNX, please reach out to the Forecr reseller from which you purchased the MILBOX-ORNX.

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

Contact Information

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Limited Product Warranty

Forecr provides a 1-year Warranty for the MILBOX-ORNX. This warranty period is valid from the original purchase date of the MILBOX-ORNX. In order to maintain warranty, the MILBOX-ORNX must not be altered or modified in any way. Changes or modifications to the MILBOX-ORNX 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 MILBOX-ORNX 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	30.06.2025	Preliminary Release

1. Introduction

The MILBOX-ORNX is a high-performance, ultracompact embedded computing solution for the most demanding AI and edge computing applications. Its lightweight and rugged design makes it perfectly suited for drone and UAV deployments where size, weight, and power efficiency are critical. Despite its small form factor, MILBOX-ORNX delivers exceptional computing power with the NVIDIA Jetson Orin NX & Orin Nano. Its 9-40V DC input ensures stable operation in dynamic power environments, making it a reliable choice for aerospace and defense applications.

It features multiple high-speed connectivity options, including Gigabit Ethernet, USB 3.0, RS- 232/422/485, CAN BUS, and a Camera Expansion Connector, allowing seamless integration with sensors, cameras, and avionics systems. Its wide operating temperature range of -25°C to 85°C guarantees reliability in operating conditions. Whether deployed in surveillance drones, autonomous UAVs, or AI-powered aerial platforms, MILBOX-ORNX provides unmatched processing power in a compact and lightweight package, making it the ultimate computing solution for next-generation airborne applications.

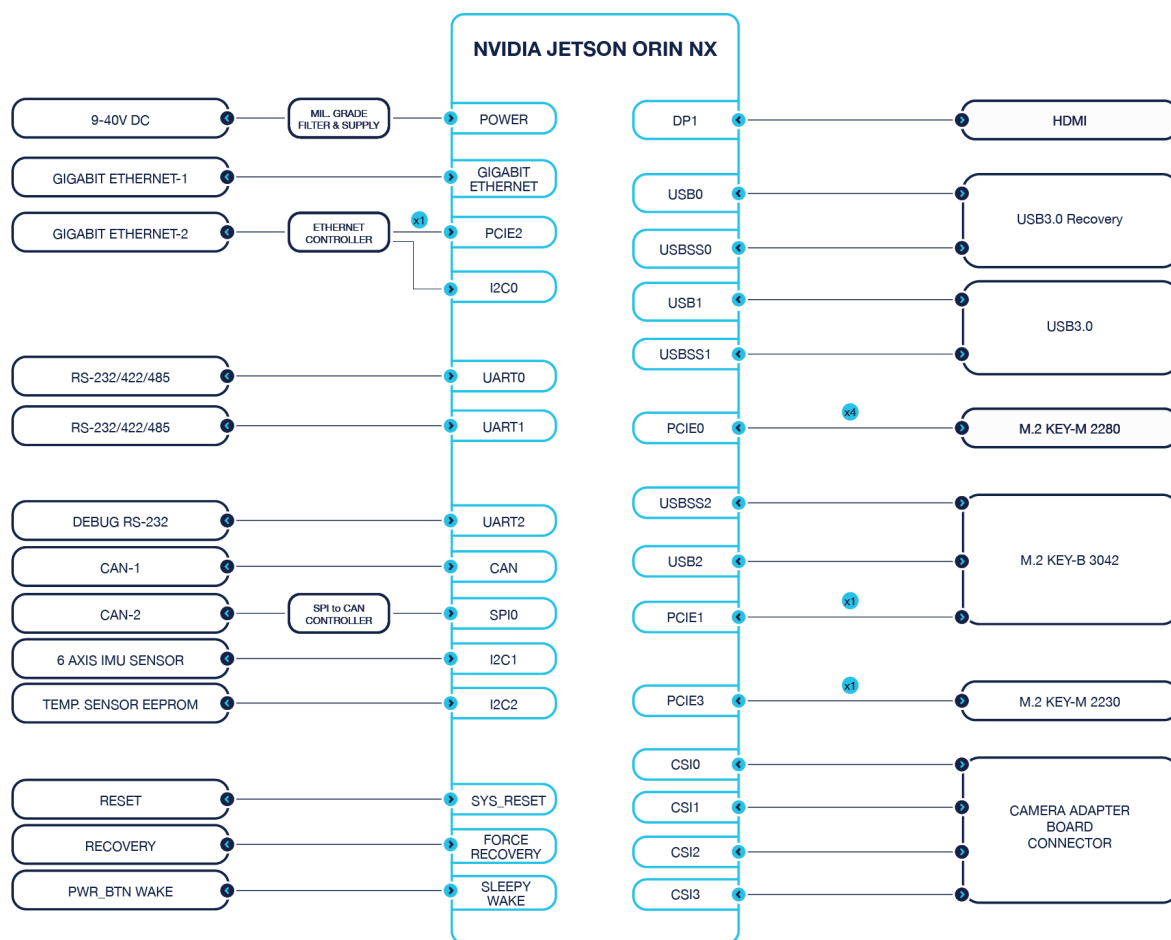
Latest revision of this user manual, datasheet, and 3D model can be downloaded from [Forecr](#) Web Page.

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 HDMI
Interfaces	2x USB3.0 2x Gigabit Ethernet 2x RS-232/422/485 1x RS-232 (Debug) 2x CAN BUS
Wireless Communication	WIFI/LTE/5G/Bluetooth
Power Supply	9-40 VDC (28 VDC Nominal)
Extension Sockets	1x M.2 Key-B (Can be converted to M.2 Key-E) 1x SIM Camera Expansion Connector
Mass Storage	1x M.2 Key-M 2280 1x M.2 Key-M 2230
Ambient Conditions	-25°C ... +85°C
Form Factor / Dimensions	LxWxH: 180.50mm x 131mm x 111mm, 1900 gr
Operating Systems	Ubuntu Linux 20.04 / 22.04
Operating Humidity	5% - 95% (Non-Condensing)
Designed to meet	MIL-STD-461G, MIL-STD-1275E, MIL-STD-704F, DO-160G, IP67
JetPack Support	JetPack 5.x / 6.x

2.2 Block Diagram



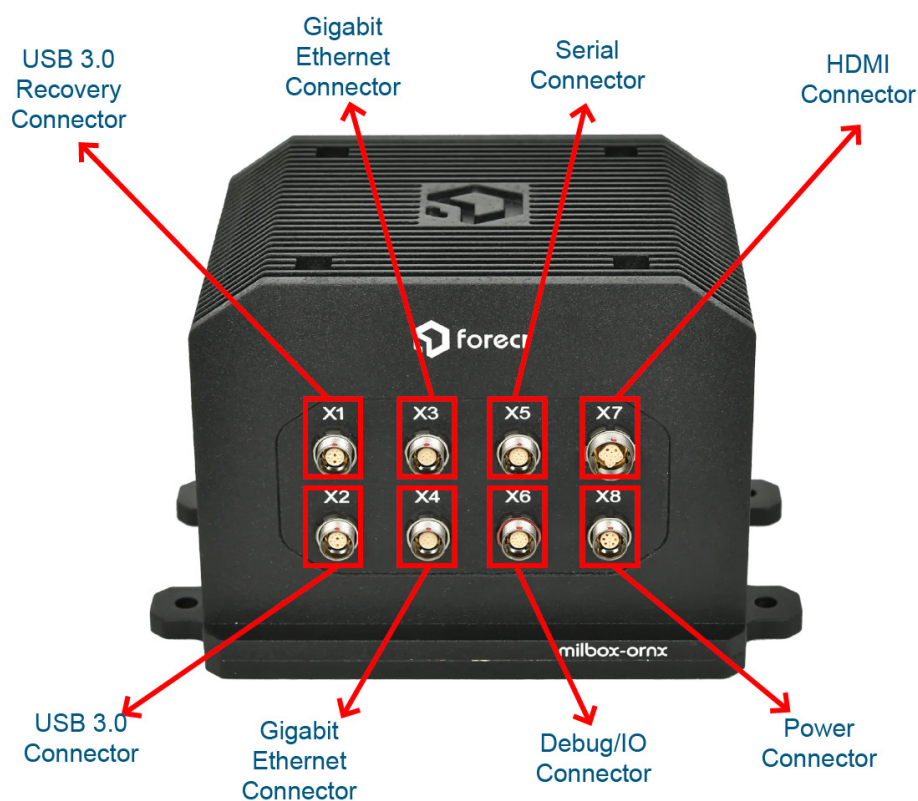
2.3 MILBOX-ORNX Visuals



3. Hardware Information

3.1 Connector Location

3.1.1 Front Connectors Layout



3.1.2 Rear Connectors Layout



3.2 List of Connector

Connectors
MILBOX-ORNX USB 3.0 Recovery Connector
MILBOX-ORNX USB 3.0 Connector
MILBOX-ORNX Gigabit Ethernet Connectors
MILBOX-ORNX Serial Connector
MILBOX-ORNX Debug/IO Connector
MILBOX-ORNX HDMI Connector
MILBOX-ORNX Power Connector
MILBOX-ORNX Coax Connectors

3.3 The Definition of Each Connector

3.3.1 USB 3.0 Recovery Connector (X1)

	Function	Description	
	Mating Connector	C10WAM-P12XMM0-0000	
	Cable P/N	CC10WAM124IYU	
	X1-Pinout	Pin	Description
		1	USB0_D+
		2	SHIELD_RX (GND)
		3	USBSS0_RX-
		4	USBSS0_RX+
		5	GND
		6	USBSS0_TX+
		7	USBSS0_TX-
		8	SHIELD_TX (GND)
		9	USB0_D-
		10	VBUS_USB0
		11	SHIELD_RX (GND)
		12	SHIELD_TX (GND)

3.3.2 USB 3.0 Connector (X2)

	Function		Description
	Mating Connector		C10WAM-P12XMM0-0000
	Cable P/N		CC10WAM124IYU
	X2-Pinout		Pin Description
		1	USB1_D+
		2	SHIELD_RX (GND)
		3	USBSS1_RX-
		4	USBSS1_RX+
		5	GND
		6	USBSS1_TX+
		7	USBSS1_TX-
		8	SHIELD_TX (GND)
		9	USB1_D-
		10	VBUS_USB1
		11	SHIELD_RX (GND)
		12	SHIELD_TX (GND)

3.3.3 Gigabit Ethernet Connectors (X3,X4)

	Function		Description
	Mating Connector		C10WAM-PD8XBE0-0000
	Cable P/N		CC10WAM084IYL
	X3,X4-Pinout		Pin Description
		1	ETH.D1_P
		2	ETH.D1_N
		3	ETH.D3_P
		4	ETH.D3_N
		5	ETH.D2_P
		6	ETH.D2_N
		7	ETH.D0_P
		8	ETH.D0_N

3.3.4 Serial Connector (X5)

	Function		Description
	Mating Connector		C10WAM-P16XBC0-0000
	Cable P/N		CC10WAM164IZW
	X5-Pinout		Pin Description
	1		SERIAL_CH0.TX+
	2		SERIAL_CH0.TX-
	3		SERIAL_CH0.RX-
	4		SERIAL_CH0.RX+
	5		GND
	6		CAN0_H
	7		CAN0_L
	8		SERIAL_CH1.TX-
	9		SERIAL_CH1.TX+
	10		SERIAL_CH1.RX-
	11		SERIAL_CH1.RX+
	12		GND
	13		GND
	14		CAN1_H
	15		CAN1_L
	16		GND

3.3.5 Debug/IO Connector (X6)



Function	Description	
Mating Connector	C10WBM-P16XBC0-0000	
Cable P/N	CC10WBM164IZW	
X6-Pinout	Pin	Description
	1	RESERVED (NC)
	2	RESERVED (NC)
	3	RESERVED (NC)
	4	RECOVERY#
	5	RESET#
	6	POWER_BTN#
	7	DBG_RS232.RX
	8	DBG_RS232.TX
	9	RESERVED (NC)
	10	RESERVED (NC)
	11	RESERVED (NC)
	12	GND
	13	RESERVED (NC)
	14	GND
	15	GND
	16	RESERVED (NC)

3.3.6 HDMI Connector (X7)



Function	Description	
Mating Connector	C11WAM-P17XMM0-0000	
Cable P/N	CC11WAM174IYN	
X7-Pinout	Pin	Description
	1	SCL
	2	TMDS D0/CLK DRAIN (GND)
	3	TMDS CLK-
	4	TMDS D0-
	5	TMDS CLK+
	6	NC
	7	CEC
	8	HPD
	9	TMDS D2-
	10	TMDS D1+
	11	TMDS D2+
	12	TMDS D1/ D2 DRAIN (GND)
	13	SDA
	14	TMDS D0+
	15	GND
	16	TMDS D1-
	17	+5V Power

3.3.7 Power Connector (X8)

	Function		Description
	Mating Connector		C10WAM-P09XMM0-0000
	Cable P/N		CC10WAM094IZO
	X8-Pinout		Pin Description
			1 DC IN -
			2 DC IN -
			3 DC IN -
			4 RESERVED (NC)
			5 DC IN +
			6 DC IN +
			7 DC IN +
			8 RESERVED (NC)
			9 RESERVED (NC)

3.3.8 Coax Connectors

Description	
	There are 4x SMA connectors and 4x HD-BNC connectors available.
	SMA connectors are reserved for antenna connections. If the configuration does not include such feature, these connectors have no internal connection. HD-BNC connectors are reserved for video input connections. If the configuration does not include such feature, these connectors have no internal connection.

4. Software Information

4.1 Installation

JetPack-6.x Installation can be found here: https://www.forecr.io/blogs/installation/jetpack-6-x-installation-for-milbox-ornx?_pos=2&_sid=6ef92d56f&_ss=r

5. Connectivity

5.1 I/O Connector

On the connector, there are 8 serial communication, 4 ground, 4 CANBus pins.

5.1.1 CANBus Interface

CAN0 channel has an IO controlled 120R termination resistor. Use the following command to enable CAN0's termination resistor:

```
sudo sh -c "echo 307 > /sys/class/gpio/export"
sudo sh -c "echo high > /sys/class/gpio/gpio307/direction"
```

CAN1 channel has an IO controlled 120R termination resistor. Use the following command to enable CAN1's termination resistor:

```
sudo sh -c "echo 315 > /sys/class/gpio/export"
sudo sh -c "echo high > /sys/class/gpio/gpio315/direction"
```

An example CAN Bus application can be found in our following blog post:

<https://www.forecr.io/blogs/connectivity/milbox-ornx-canbus-interfaces-tutorial>

5.1.2 Serial Communication Interface

List of GPIOs to configure both serial communication channels are as below:

Job(1/0)	Sysfs Name		Description
	Channel-0	Channel-1	
Half/Full#	gpio-305	gpio-313	Configures the transceiver as either half or full duplex (Default: Low)
RS485/RS232#	gpio-304	gpio-312	Selects RS-485 mode when high, and RS-232 mode when low (Default: Low)
Driver Enable	gpio-300	gpio-308	Driver enabled when high (for RS422 and RS485)
Receiver Enable#	gpio-306	gpio-314	Receiver enabled when low (for RS422 and RS485)
SHDN#	gpio-301	gpio-309	Low power shutdown mode when low (Default: High)
SLEW#	gpio-302	gpio-310	Date rate limited to 250kbps when low (Default: High)
TERM	gpio-303	gpio-311	120R termination enabled between data pairs in RS-422 and RS-485 modes (Default: Low)

An example Serial Communication application can be found in our following blog post:

<https://www.forecr.io/blogs/connectivity/milbox-ornx-serial-communication-interfaces-tutorial>

5.2 Wireless Communication

5.2.1 M.2 Key-B Interface

List of GPIOs to configure M.2 Key-B interface are as below:

Job(1/0)	Sysfs Name	Description
RESET	gpio-454 (PQ.06)	M.2 Key-B card reset control, drive low for normal operation. (Default: low)
FULLCARD_PWROFF#	gpio-433 (PN.01)	M.2 Key-B card power control, drive high for normal operation. (Default: low)
W_DISABLE1#	gpio-328 (PCC.00)	M.2 Key-B card flight mode enable control, drive high for normal operation. (Default: high)
W_DISABLE2#	gpio-446 (PP.06)	M.2 Key-B card GNSS enable control, drive high for normal operation. (Default: high)
PWR_ON#	gpio-331 (PCC.03)	M.2 Key-B card power supply enable control, drive low for normal operation. (Default: high)

To fully enable the M.2 Key-B slot, following GPIO adjustments must be made.

For JetPack-5, open a terminal and type these commands below:

```
sudo su
echo 454 > /sys/class/gpio/export
echo 433 > /sys/class/gpio/export
echo 328 > /sys/class/gpio/export
echo 331 > /sys/class/gpio/export
echo 446 > /sys/class/gpio/export

echo low > /sys/class/gpio/PQ.06/direction
echo high > /sys/class/gpio/PN.01/direction
echo high > /sys/class/gpio/PCC.00/direction
echo low > /sys/class/gpio/PCC.03/direction
echo high > /sys/class/gpio/PP.06/direction
```

For JetPack-6, install gpiod package first:

```
sudo apt install -y gpiod
```

Then, open a terminal and type these commands below:

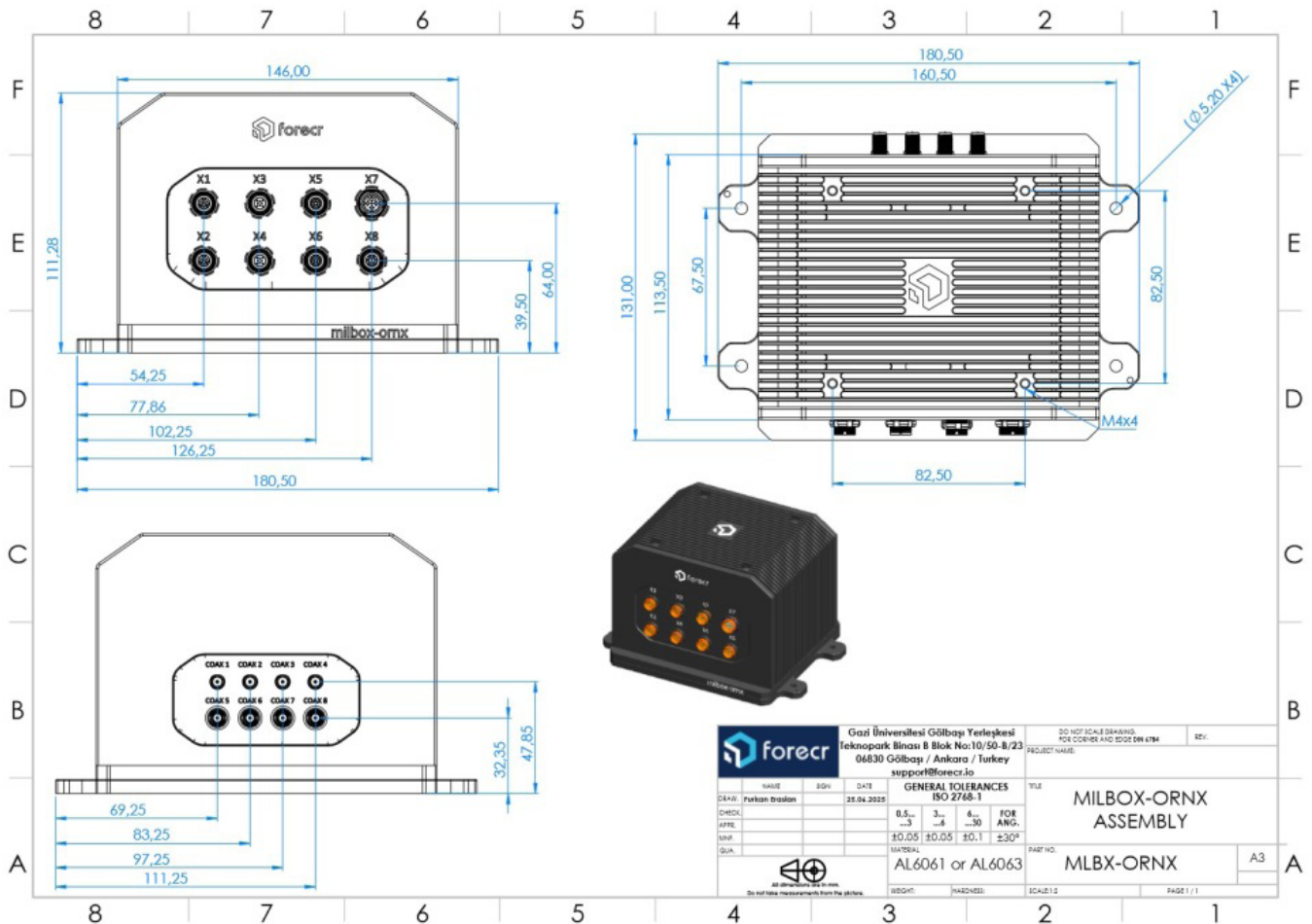
```
sudo su
gpioset --mode=signal `gpiofind "PQ.06"`=0 &
PID_M2B_RESET=$!
gpioset --mode=signal `gpiofind "PN.01"`=1 &
PID_M2B_FULLCARD_PWRON=$!
gpioset --mode=signal `gpiofind "PCC.00"`=1 &
PID_M2B_W_ENABLE1=$!
gpioset --mode=signal `gpiofind "PCC.03"`=0 &
PID_M2B_PWR_OFF=$!
gpioset --mode=signal `gpiofind "PP.06"`=1 &
PID_M2B_W_ENABLE2=$!
```

6. Mechanical Models & Drawings

6.1 3D Model

Full 3D models of all MILBOX-ORNX can be found here: https://github.com/forecr/forecr_3d_models/tree/master/MIL-BOX-ORNX

6.2 2D Mechanical Drawing



7. Power Consumption

7.1 Orin NX 16GB

Power Supply: 28V-2.85A

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)	0,84	0,52	0,26	0,72	0,82	0,92	1,38	1,48
Power (W)	23,52	14,56	7,28	20,16	22,96	25,76	38,64	41,44

7.2 Orin NX 8GB

Power Supply: 28V-2.85A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	10W (4 core)	15W (4 core)	20W (6 core)	40W (6 core)	MAXN (6 core)
Current (A)	0,9	0,55	0,25	0,73	0,83	0,87	1,4	1,45
Power (W)	25,2	15,4	7	20,44	23,24	24,36	39,2	40,6

7.3 Orin Nano 8GB

Power Supply: 28V-2.85A

All CPU and GPU cores are %100 loaded.

	Power Up Sequence	Idle	Standby (Suspend mode)	15W (6 core)	25W (6 core)	MAXN (6 core)
Current (A)	0,82	0,5	0,25	0,86	1,14	1,28
Power (W)	22,96	14	7	24,08	31,92	35,84

7.4 Orin Nano 4GB

Power Supply: 28V-2.85A

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)	0,7	0,5	0,25	0,86	1,11	1,12
Power (W)	19,6	14	7	24,08	31,08	31,36

8. Cables

USB 3.0 Recovery Cable (for X1)

End 1	C10WAM-P12XMM0-0000
End 2	USB 3.2 Gen1 Plug A
Cable Length	150cm

USB 3.0 Cable (for X2)

End 1	C10WAM-P12XMM0-0000
End 2	USB 3.2 Gen1 Plug A
Cable Length	150cm

Gigabit Ethernet Cable (for X3,X4)

End 1	C10WAM-PD8XBE0-0000
End 2	CAT 6A, RJ45 Plug
Cable Length	150cm

Serial Cable (for X5)

End 1	C10WAM-P16XBC0-0000
End 2	Straight-cut (Open-wire)
Cable Length	150cm

Debug/IO Cable (for X6)

End 1	C10WBM-P16XBC0-0000
End 2	Straight-cut (Open-wire)
Cable Length	150cm

HDMI Cable (for X7)

End 1	C11WAM-P17XMM0-0000
End 2	HDMI 2.1 Type A Plug
Cable Length	150cm

Power Cable (for X8)

End 1	C10WAM-P09XMM0-0000
End 2	Straight-cut (Open-wire)
Cable Length	150cm

9. MTBF Prediction

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

10. Ordering Information

