BOXER-8623AI

AI@Edge Compact Fanless Embedded AI System
with NVIDIA® Jetson Orin Nano™

User's Manual 1st Ed

Last Updated: February 10, 2025

Copyright Notice

Acknowledgements

Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● BOXER-8623AI	1
● Wallmount Bracket	2
● Screw Package	1
● Power Connector	1
● Power Adapter (Optional)	1
● Power Cord (Optional)	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. All cables and adapters supplied by AAEON are certified and in accordance with the material safety laws and regulations of the country of sale. Do not use any cables or adapters not supplied by AAEON to prevent system malfunction or fires.
3. Make sure the power source matches the power rating of the device.
4. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
5. Always completely disconnect the power before working on the system's hardware.
6. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
7. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
8. Always disconnect this device from any power supply before cleaning.
9. While cleaning, use a damp cloth instead of liquid or spray detergents.
10. Make sure the device is installed near a power outlet and is easily accessible.
11. Keep this device away from humidity.
12. Place the device on a solid surface during installation to prevent falls
13. Do not cover the openings on the device to ensure optimal heat dissipation.
14. Watch out for high temperatures when the system is running.
15. Do not touch the heat sink or heat spreader when the system is running
16. Never pour any liquid into the openings. This could cause fire or electric shock.

17. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

18. If any of the following situations arises, please the contact our service personnel:

    i. Damaged power cord or plug
    ii. Liquid intrusion to the device
    iii. Exposure to moisture
    iv. Device is not working as expected or in a manner as described in this manual
    v. The device is dropped or damaged
    vi. Any obvious signs of damage displayed on the device

19. DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.

FCC Statement

This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte.
Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur.
Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON System QO4-381 Rev.A2

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板及其电子组件	×	○	○	○	○	○
外部信号连接器及线材	×	○	○	○	○	○
外壳	○	○	○	○	○	○
中央处理器与内存	×	○	○	○	○	○
硬盘	×	○	○	○	○	○
液晶模块	×	○	○	○	○	○
光驱	×	○	○	○	○	○
触控模块	×	○	○	○	○	○
电源	×	○	○	○	○	○
电池	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下。

×：表示该有害物质的某一均质材料超出了 GB/T 26572 的限量要求，然而该部件仍符合欧盟指令 2011/65/EU 的规范。

环保使用期限(EFUP (Environmental Friendly Use Period)) : 10 年

备注：

一、此产品所标示之环保使用期限，系指在一般正常使用状况下。

二、上述部件物质中央处理器、内存、硬盘、光驱、电源为选购品。

三、上述部件物质液晶模块、触控模块仅一体机产品适用。

China RoHS Requirement (EN)

Name and content of hazardous substances in product

AAEON System QO4-381 Rev.A2

Part Name	Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCB Assemblies	×	O	O	O	O	O
Connector and Cable	×	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU and Memory	×	O	O	O	O	O
Hard Disk	×	O	O	O	O	O
LCD Modules	×	O	O	O	O	O
CD-ROM/DVD-ROM	×	O	O	O	O	O
Touch Modules	×	O	O	O	O	O
Power	×	O	O	O	O	O
Battery	×	O	O	O	O	O

The table is prepared in accordance with the provisions of SJ/T 11364.

O：Indicates that said hazardous substance contained in all of the homogenous materials for this product is below the limit requirement of GB/T 26572.

×：Indicates that said hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement of GB/T 26572. But this product still be compliance with 2011/65/EU Directive (allowed with 2011/65/EU Annex III of RoHS exemption with number 6(c),7(a),7(c)-1).

EFUP (Environment Friendly Use Period) value: 10 years.

Notes：

1. This product defined period of use is under normal condition.
2. In above part, CPU/Memory/ Hard Disk/CD-ROM/DVD-ROM/ Power are optional.
3. In above part, LCD Modules/ Touch Modules are for all-in-one product model.

Table of Contents

Chapter 1

Product Specifications

1.1 Specifications

System	
AI Accelerator	NVIDIA® Jetson Orin Nano™
CPU	6-core Arm® Cortex®-A78AE v8.2 64-bit CPU
System Memory	4GB LPDDR5
	8GB LPDDR5
Storage Device	M.2 2280 M-Key x 1
Display Interface	HDMI 1.4 (Type-A) x 1
Ethernet	RJ-45 x 1 for GbE LAN
	RJ-45 x 4 for GbE PoE/PSE 802.3af/at (Max. 60W)
I/O	USB 3.2 Gen 2 (Type-A) x 4
	DB-9 x 1 for RS-232 (Rx/Tx/CTS/RTS) x 1
	and CANBus FD x 1
	DB-15 x 1 for RS-232(Rx/Tx)/422/485 x 1 and DIO x 8
	Micro USB x 1 for OS Flash
	Power Button x 1
	Recovery Button x 1
	Antenna Hole x 6
Expansion	M.2 2280 M-Key x 1 (NVMe)
	M.2 3042/3052 B-Key x 1
	M.2 2230 E-Key x 1
	SIM Slot x 1
Indicator	Power LED x 1
OS Support	Linux (NVIDIA Jetpack™ 5.0 and up)

Power Supply	
Power Requirement	12V ~ 24V DC in with 2-pin Terminal Block x 1

Mechanical

Mounting	Wall Mount
Dimensions (W x D x H)	7.09" x 5.35" x 2.95" (180mm x 136mm x 75mm)
Gross Weight	7.7 lb. (3.5Kg)
Net Weight	5.5 lb. (2.5Kg)

Environmental

Operating Temperature	5°F ~ 149°F (-15°C ~ 65°C), according to IEC60068-2 with 0.5 m/s AirFlow
Storage Temperature	-40°F ~ 185°F (-40°C ~ 85°C)
Storage Humidity	5% ~ 95% @40°C, non-condensing
Anti-Vibration	3.5Grm / 5~500Hz / Operation
Anti-Shock	50G peak acceleration
Certification	CE/FCC Class A

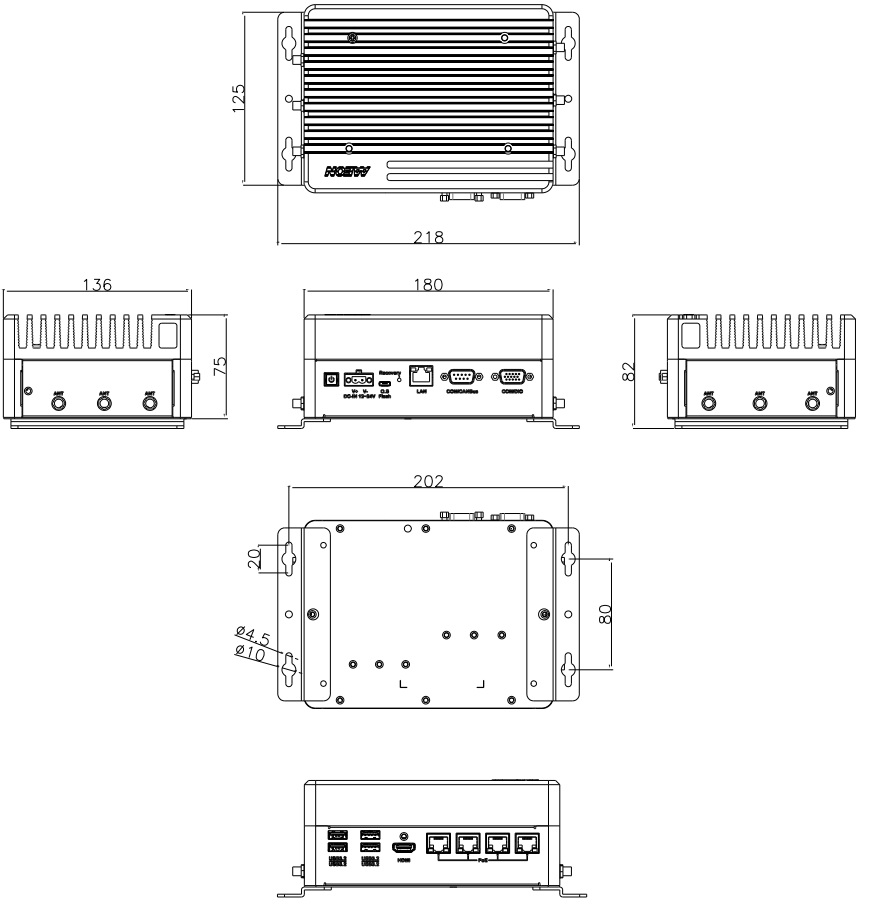
Note: The real USB, LAN and COM transmission rates depend on the user scenario and HW design.

Chapter 2

Hardware Information

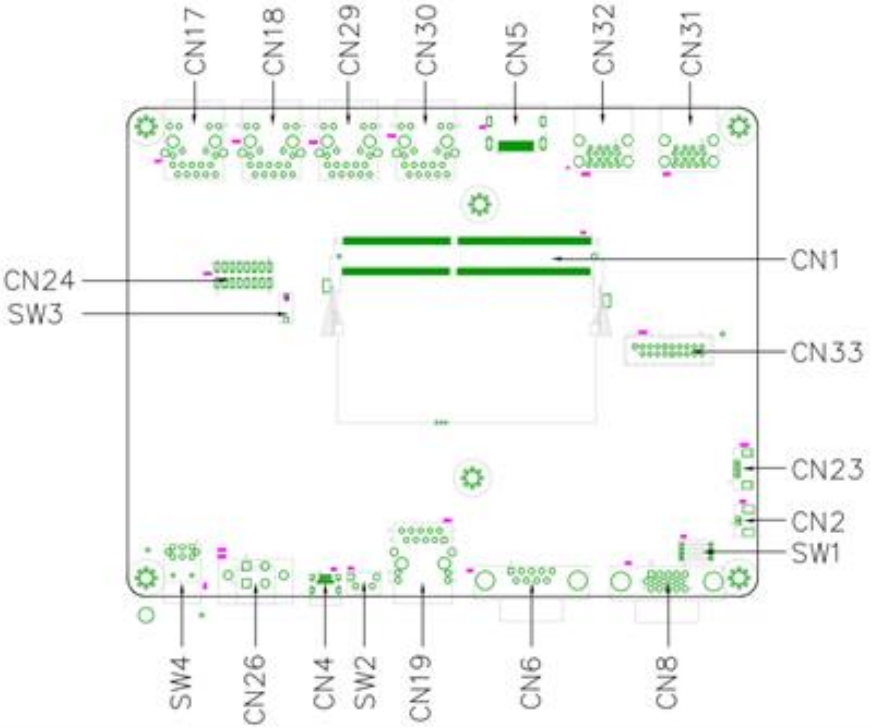
2.1 Dimensions

System



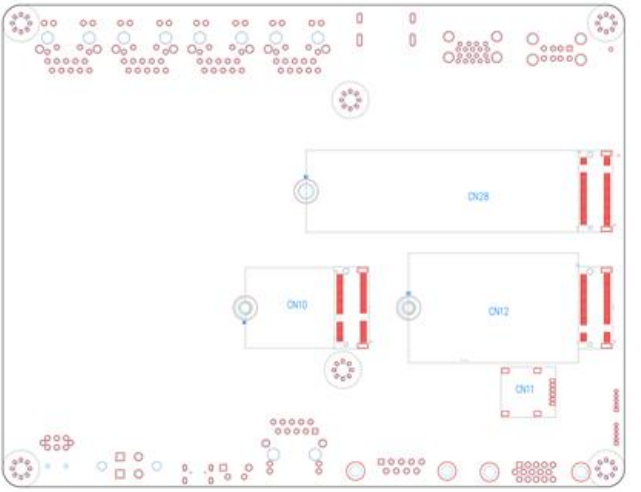
2.2 Jumpers and Connectors

Top



Note: For information regarding how to access the system's PCBA, please see section 2.4.

Bottom



2.3 List of Jumpers

The board has a number of jumpers that allow you to configure your system to suit your application.

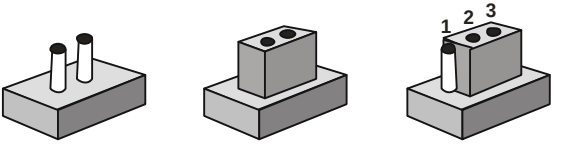
The table below shows the function of each of the board's jumpers

Label	Function
JP1	AT/ATX Select

2.3.1 Jumper Settings

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip.

To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

2.3.2 AT/ATX Mode Selection (JP1)

Pin	Function
1-2	Open AT
1-2	Close ATX (Default)

2.4 List of Connectors

The board has a number of connectors that allow you to configure your system to suit your application.

The table below shows the function of each of the board's connectors

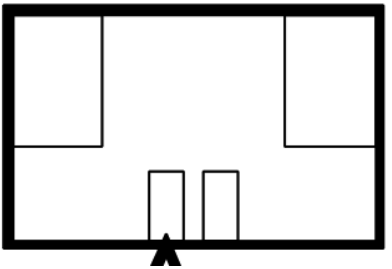
Label	Function
CN1	NVIDIA® Jetson Orin Nano™
CN2	RTC Battery Connector
CN4	Micro USB 2.0 for Flash Connector
CN5	HDMI Connector
CN6	RS-232 Connector
CN8	RS-232/422/485 + DIO Connector
CN10	M.2 2230 E-Key
CN11	Nano SIM Slot
CN12	M.2 3042/3052 B-Key
CN17	PoE GbE RJ-45 (ETH1)
CN18	PoE GbE RJ-45 (ETH0)
CN19	GbE RJ-45 (ETH4)
CN23	Fan Connector
CN24	Front Panel + NC SI
CN26	DC in Connector (5.0mm)
CN28	M.2 2280 M-Key
CN29	PoE GbE RJ-45 (ETH3)
CN30	PoE GbE RJ-45 (ETH2)
CN31	USB 3.2 Gen 2 Port
CN32	USB 3.2 Gen 2 Port
CN33	Internal USB 3.2 Gen 2 Connector
SW1	RS-232/422/485 Select

Label	Function
SW2	Recovery Button
SW3	Reset Button
SW4	Power Button
JP1	AT/ATX Select

2.4.1 Front Panel Connector (CN24)

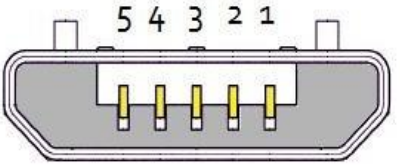
Pin	Signal	Pin	Signal
1	PWR_LED	2	5V
3	Debug UART TX	4	NC_SI_TXD0
5	Debug UART RX	6	NC_SI_TXD1
7	I2C1 SCL	8	NC_SI_RXD0
9	I2C1 SDA	10	NC_SI_RXD1
11	System Reset	12	NC_SI_CLK_IN
13	Button power	14	NC_SI_CRB
15	GND	16	NC_SI_TX_EN

2.4.2 RTC Battery Connector (CN2)



Pin	Signal	Pin	Signal
1	Positive	2	Negative

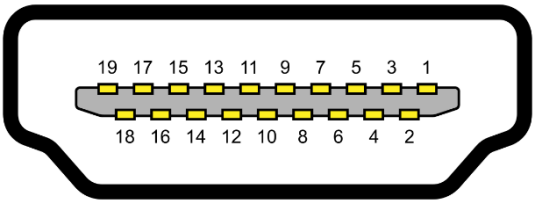
2.4.3 Micro USB 2.0 for Flash Connector (CN4)



USB Micro-B

Pin	Signal	Pin	Signal
1	+5V	2	USB1-
3	USB1+	4	
5	GND		

2.4.4 HDMI Connector (CN5)



Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N

Pin	Signal	Pin	Signal
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP		

2.4.5 M.2 2280 M-Key (CN28)

74	3.3 V	GND	75
72	3.3 V	GND	73
70	3.3 V	GND	71
68	SUSCLK (O)(0/3.3V)	PEDET	69
	Key M	NC	67
	Key M	Key M	
	Key M	Key M	
	Key M	Key M	
	Key M	Key M	
58	NC	GND	57
56	NC	REFCLKp	55
54	PEWAKE# (I/O)(0/3.3V) or NC	REFCLKn	53
52	CLKREQ# (I/O)(0/3.3V) or NC	GND	51
50	PERST# (O)(0/3.3V) or NC	PETp0/SATA-A+	49
48	NC	PETn0/SATA-A-	47
46	NC	GND	45
44	ALERT# (I) (0/1.8V)	PERp0/SATA-B-	43
42	SMB_DATA (I/O) (0/1.8V)	PERn0/SATA-B+	41
40	SMB_CLK (I/O)(0/1.8V)	GND	39
38	DEVSLP (O)	PETp1	37
36	NC	PETn1	35
34	NC	GND	33
32	NC	PERp1	31
30	NC	PERn1	29
28	NC	GND	27
26	NC	PETp2	25
24	NC	PETn2	23
22	NC	GND	21
20	NC	PERp2	19
18	3.3 V	PERn2	17
16	3.3 V	GND	15
14	3.3 V	PETp3	13
12	3.3 V	PETn3	11
10	DAS/DSS (I/O)/LED_1# (I)(0/3.3V)	GND	9
8	NC	PERp3	7
6	NC	PERn3	5
4	3.3 V	GND	3
2	3.3 V	GND	1

2.4.6 M.2 3042/3052 B-Key (CN12)

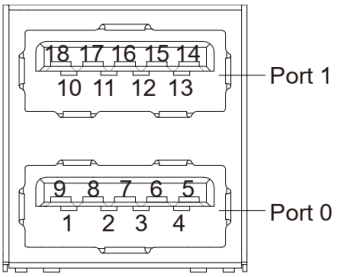
74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKN1	73
70	UIM_Power_In/GPIO1/PEWake1#	RESERVED/REFCLKP1	71
68	UIM_Power_Out/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	Reserved/PERn1	67
64	RESERVED	Reserved/PERp1	65
62	ALERT# (I)(0/3.3)	GND	63
60	I2C CLK (O)(0/3.3)	Reserved/PETn1	61
58	I2C DATA (IO)(0/3.3)	Reserved/PETp1	59
56	W_DISABLE#1 (O)(0/3.3V)	GND	57
54	Reserved/W_DISABLE#2 (O)(0/3.3V)	PEWake0# (IO)(0/3.3V)	55
52	PERST0# (O)(0/3.3V)	CLKREQ0# (IO)(0/3.3V)	53
50	SUSCLK(32kHz) (O)(0/3.3V)	GND	51
48	COEX1 (I/O)(0/1.8V)	REFCLKN0	49
46	COEX2(I/O)(0/1.8V)	REFCLKP0	47
44	COEX3(I/O)(0/1.8V)	GND	45
42	VENDOR DEFINED	PERn0	43
40	VENDOR DEFINED	PERp0	41
38	VENDOR DEFINED	GND	39
36	UART RTS (O)(0/1.8V)	PETn0	37
34	UART CTS (I)(0/1.8V)	PETp0	35
32	UART Tx (O)(0/1.8V)	GND	33
	Connector Key	Connector Key	
	Connector Key	Connector Key	
	Connector Key	Connector Key	
	Connector Key	Connector Key	
22	UART Rx (I)(0/1.8V)	SDIO Reset(O)(0/1.8V)	23
20	UART Wake (I)(0/3.3V)	SDIO Wake(I)(0/1.8V)	21
18	GND	SDIO DAT3(IO)(0/1.8V)	19
16	LED#2 (I)(OD)	SDIO DAT2(IO)(0/1.8V)	17
14	PCM_OUT/I2S SD_OUT (O)(0/1.8V)	SDIO DAT1(IO)(0/1.8V)	15
12	PCM_IN/I2S SD_IN (I)(0/1.8V)	SDIO DAT0(IO)(0/1.8V)	13
10	PCM_SYNC/I2S WS (O)(0/1.8V)	SDIO CMD(IO)(0/1.8V)	11
8	PCM_CLK/I2S SCK (O)(0/1.8V)	SDIO CLK(O)(0/1.8V)	9
6	LED#1 (I)(OD)	GND	7
4	3.3V	USB_D-	5
2	3.3V	USB_D+	3
		GND	1

Note: USB 3.2 only.

2.4.7 M.2 2230 E-Key (CN10)

74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKn1	73
70	UIM_POWER_SRC/GPIO1/PEWAKE1#	RESERVED/REFCLKp1	71
68	UIM_POWER_SNK/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	RESERVED/PETn1	67
64	RESERVED	RESERVED/PETp1	65
62	ALERT# (O)(0/3.3V)	GND	63
60	I2C_CLK (I)(0/3.3V)	RESERVED/PERn1	61
58	I2C_DATA (I/O)(0/3.3V)	RESERVED/PERp1	59
56	W_DISABLE1# (I)(0/3.3V)	GND	57
54	W_DISABLE2# (I)(0/3.3V)	PEWAKE0# (I/O)(0/3.3V)	55
52	PERST0# (I)(0/3.3V)	CLKREQ0# (I/O)(0/3.3V)	53
50	SUSCLK(32kHz) (I)(0/3.3V)	GND	51
48	COEX1 (I/O)(0/1.8V)	REFCLKn0	49
46	COEX2(I/O)(0/1.8V)	REFCLKp0	47
44	COEX3(I/O)(0/1.8V)	GND	45
42	VENDOR DEFINED	PETn0	43
40	VENDOR DEFINED	PETp0	41
38	VENDOR DEFINED	GND	39
36	UART CTS (I)(0/1.8V)	PERn0	37
34	UART RTS (O)(0/1.8V)	PERp0	35
32	UART RXD (I)(0/1.8V)	GND	33
	Module Key	Module Key	
	Module Key	Module Key	
	Module Key	Module Key	
	Module Key	Module Key	
22	UART TXD (O)(0/1.8V)	SDIO RESET# (I)(0/1.8V)	23
20	UART WAKE# (O)(0/3.3V)	SDIO WAKE# (O)(0/1.8V)	21
18	GND	SDIO DATA3(I/O)(0/1.8V)	19
16	LED2# (O)(OD)	SDIO DATA2(I/O)(0/1.8V)	17
14	PCM_IN/I2S SD_IN (I)(0/1.8V)	SDIO DATA1(I/O)(0/1.8V)	15
12	PCM_OUT/I2S SD_OUT (O)(0/1.8V)	SDIO DATA0(I/O)(0/1.8V)	13
10	PCM_SYNC/I2S WS (I/O)(0/1.8V)	SDIO CMD(I/O)(0/1.8V)	11
8	PCM_CLK/I2S SCK (I/O)(0/1.8V)	SDIO CLK(I)(0/1.8V)	9
6	LED1# (O)(OD)	GND	7
4	3.3V	USB_D-	5
2	3.3V	USB_D+	3
		GND	1

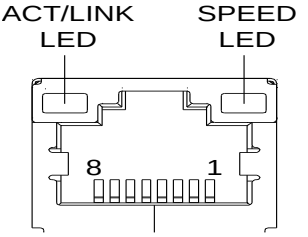
2.4.8 USB 3.2 Gen 2 Port (CN31/CN32)



Pin	Signal	Pin	Signal
U1	VBUS_1	U10	VBUS_2
U2	(A)D-	U11	(B)D-
U3	(A)D+	U12	(B)D+
U4	GND	U13	GND
U5	(A)SSRX-	U14	(B)SSRX-
U6	(A)SSRX+	U15	(B)SSRX+
U7	GND	U16	GND
U8	(A)SSTX-	U17	(B)SSTX-
U9	(A)SSTX+	U18	(B)SSTX+

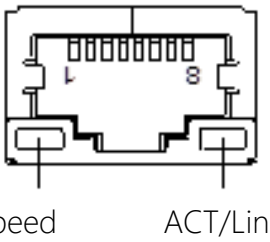
Note: Also includes USB 2.0 signal.

2.4.9 GbE RJ-45 (CN19)



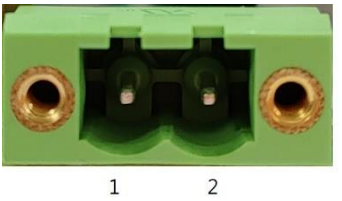
Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

2.4.10 PoE GbE RJ-45 (CN17/CN18/CN29/CN30)



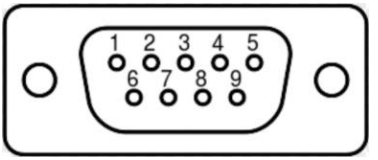
Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

2.4.11 DC in Connector (5.0mm) (CN26)



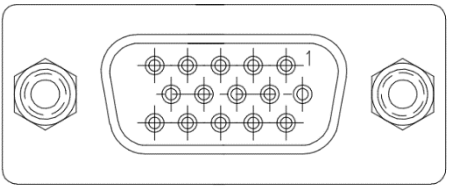
Pin	Signal	Pin	Signal
1	DC Positive	2	DC Negative

2.4.12 RS-232 Connector (CN6)



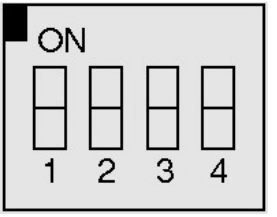
Pin	RS-232
1	CAN_L
2	RXD
3	TXD
4	
5	GND
6	CAN_H
7	RTSD
8	CTSD
9	

2.4.13 RS-232/422/485 + DIO Connector (CN8)



Pin	RS-232	RS-422	RS-485
1		TX-	D-
2	RXD	TX+	D+
3	TXD	RX+	
4		RX-	
5	GND		
6	GPIO13	PH.00	
7	GPIO11	PQ.06	
8	GPIO09	PAC.06	
9	GPIO01	PQ.05	
10	GND		
11	I2S0_LRCK	PI.02	
12	I2S0_SDIN	PI.01	
13	I2S0_SDOUT	PI.00	
14	I2S0_SCLK	PH.07	
15	NC		

2.4.14 RS-232/422/485 Select (SW1)



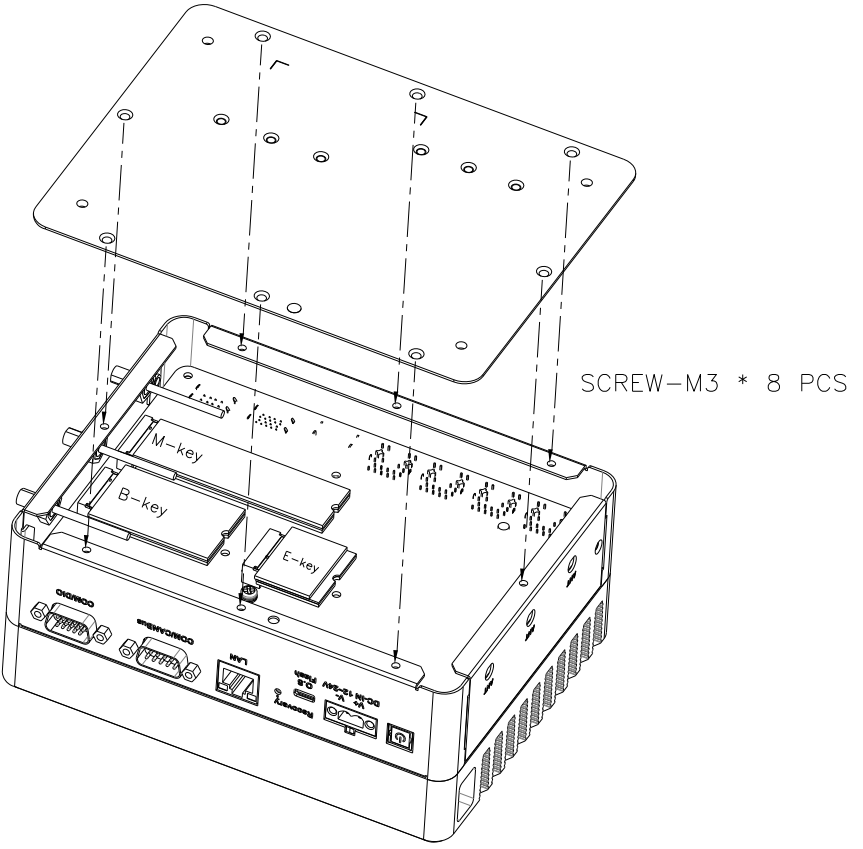
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On		
1T/1R RS-422	On	Off		
1T/1R RS-485	Off	On		
Low power shutdown	Off	Off		
250kbps for RS-232 and RS-485/RS-422				On
RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps				Off
Enable RS-422/RS-485 bias and termination resistors.			On	
Disable RS-422/RS-485 bias and termination resistors.			Off	

2.5 Hardware Installation

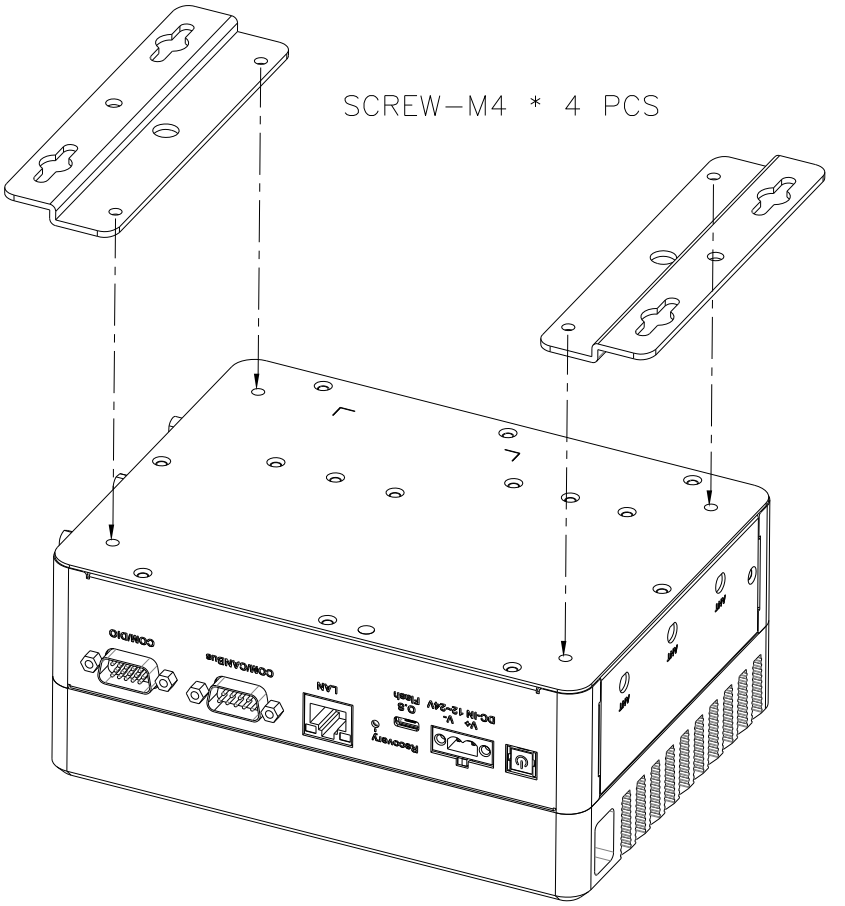
Before installing expansion modules, ensure the system is powered down and disconnect the power cord from the system.

2.5.1 Expansion Module Installation

Turn the BOXER-8623AI system over so the bottom is facing up. Install each module by first inserting at an angle (approx. 30°), then gently press down to secure. Refer to the images below for guidance on removing the bottom panel and location of each M.2 Key slot.

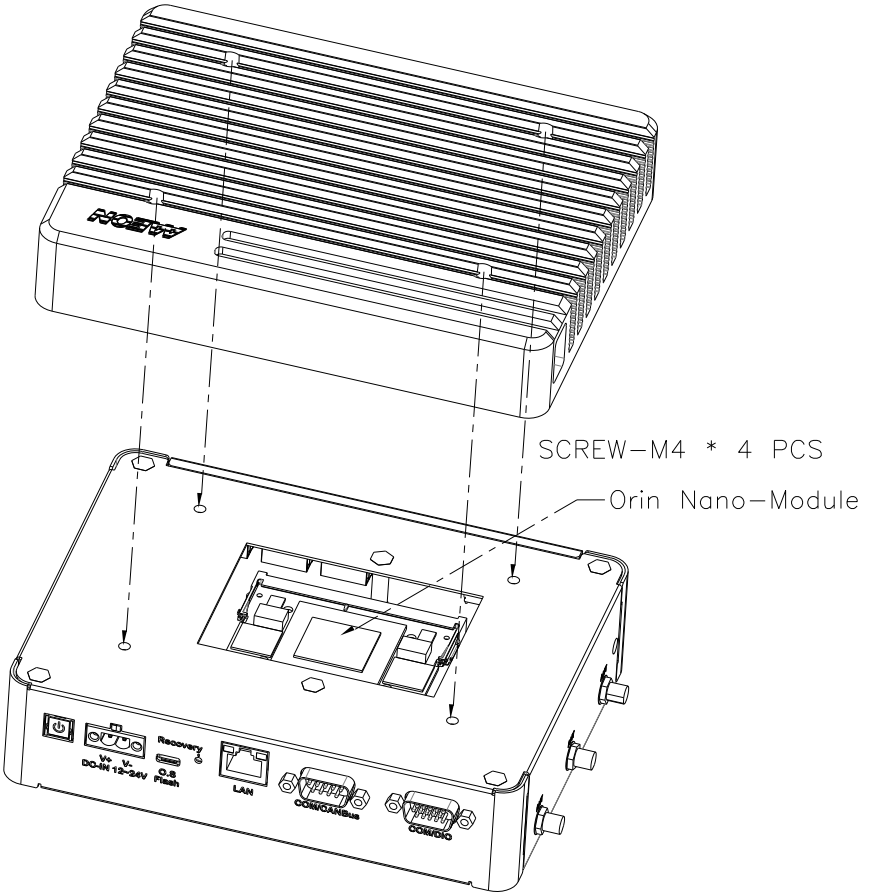


2.5.2 Wall Mount Installation



2.5.3 Jetson Orin Nano Module Installation

Turn the BOXER-8623AI system over so the top is facing up. Refer to the images below for guidance on removing the top panel and location of the Jetson Orin Nano module.



Chapter 3

BSP Flash Guide

3.1 Before Installation

Before starting the process, make sure your BOXER-8623AI system is turned off and the power is disconnected. You will need a Host PC running Ubuntu 18.04/20.04, and to make sure the NVIDIA Jetson Orin Nano module is installed on the BOXER-8623AI carrier board system.

Note: Do not use a virtual machine as a host PC, as some virtual machines may have unstable USB connections which can cause the flash procedure to fail.

Download the compressed BSP image file "BOXER-8623AI_J5.1.1_A00_1.0.0_20230908.tar.gz" into the Host Ubuntu 18.04/20.04 PC directory.

Note: No spaces, special characters, or non-English characters can be used for the name of the folder where the file is stored, or its parent folder.

Note: Ensure the language settings of Ubuntu 18.04/20.04 are set to English, and the format setting is the United States, to prevent flash failure.

3.2 Connecting to PC/Force Recovery Mode

Step 1:

On the Host computer, open the Linux terminal and enter the following command to extract the compressed BSP image files (BSP file name may vary):

```
$ sudo tar -zxvf BOXER-8623AI_J5.1.1_A00_1.0.0_20230908.tar.gz
```

Note: Do not decompress the file (Internal.tar.gz) using a Windows OS, BSP should only be decompressed in a Linux EXT3/4 file system.

Step 2:

Perform the following actions to force the system to start in USB Recovery Mode:

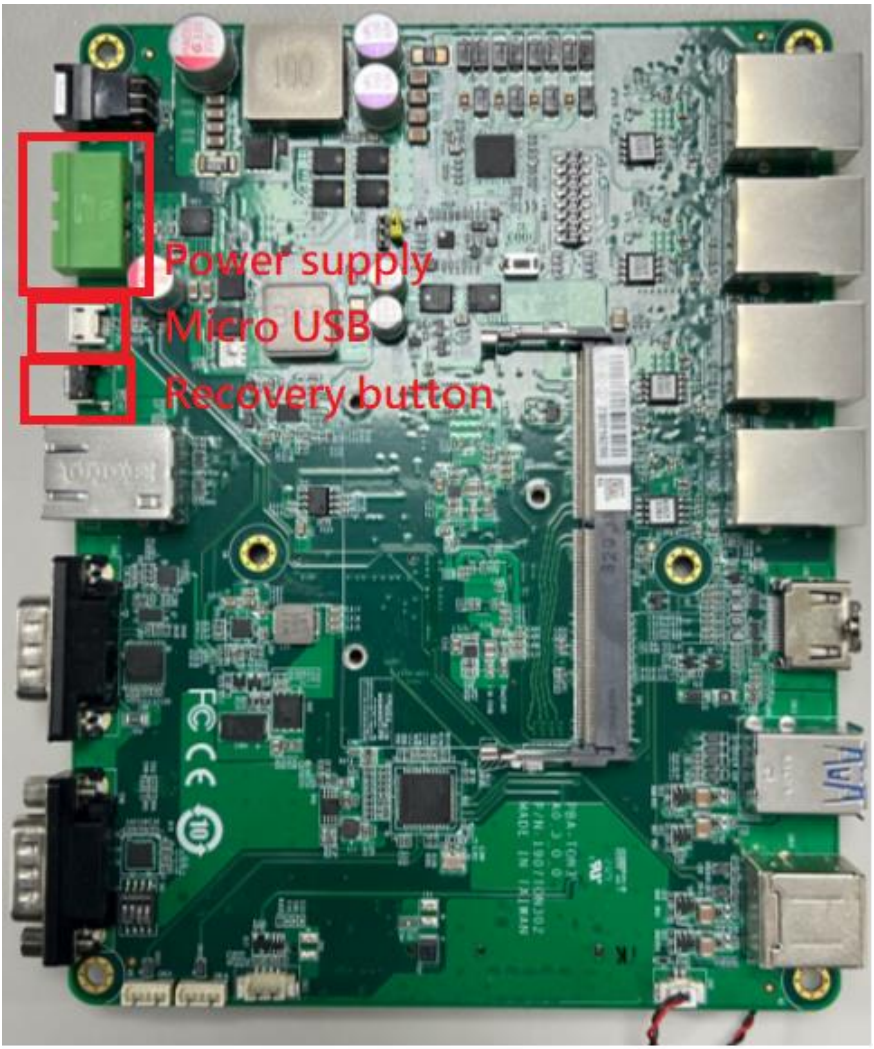
1. Connect the Micro-USB plug on the USB cable to the Recovery Port on the BOXER-8623AI, and the other end to an available USB port on the Host PC.
2. Connect the BOXER-8623AI to a power supply.
3. Press and hold the recovery key button. While holding the recovery key button, power on the system, and continue to hold the recovery key button for two seconds, then release. The BOXER-8623AI should then enter recovery mode.
4. To check if device is in recovery mode, enter the command lsusb in terminal on Host.

```
$ lsusb | grep "0955:7623"
```

If successful, the command will return "0955:7623 NVidia Corp"

```
Bus 001 Device 045: ID 0955:7623 NVidia Corp.
```

Note: Recovery mode cannot be initiated if the NVIDIA Jetson Orin Nano module is disassembled. Ensure the NVIDIA Jetson Orin Nano module is installed and refer to the image below to perform the force recovery mode steps:



3.3 Flash Image to Board

Use the following steps to flash the OS to the BOXER-8623AI.

1) Open terminal on the Ubuntu Host PC, then access the folder you extracted in the previous section.

2) Enter the following command in terminal to flash the image:

$ ./flashboxer.sh -s 62517420 nvme

3) Wait as the image is installed. Once complete you should see the following:

```
writing item=16, 9:0:secondary_gpt, 32088902144, 16896, gpt_secondary_9_0.bin, 16896, fixed-<reserved>-0, 59012273e727e6a457684ff7805a26ed6cf1c4fa
[ 309]: l4t_flash_from_kernel: Successfully flash the external device
[ 309]: l4t_flash_from_kernel: Flashing success
[ 309]: l4t_flash_from_kernel: The device size indicated in the partition layout xml is smaller than the actual size. This utility will try to fix the GPT.
Flash is successful
Reboot device
Cleaning up...
```

4) After Steps 2 and 3, mass-flash image is built up internally, so you can flash up to 10 targets at once by using the following command:

$ ./flashboxer.sh -m nvme

3.4 Check BSP Version

Once the flash image is successfully installed, the BOXER-8623AI will reboot automatically, then check the BSP version to see if the system is flashing the correct version of BSP.

Open a Terminal, and type command "cat /proc/product"

You will see the product name with version and date

BOXER-8623AI_J5.1.1_A00_1.0.0_20230908

The version name will follow the format of:

{PJ_IF}_{JPV_IF}_A00_{IMGV_IF}_{BD_IF}

For example:

BOXER-8623AI_J5.1.1_A00_1.0.0_20230908

Note: Filename may differ from this example.

{PJ_IF} is Project Information; e.g. BOXER-8623AI

{JPV_IF} is Nvidia Jetpack Version; e.g. J5.1.1

{IMGV_IF} is Aaeon BSP Version; e.g. 1.0.0

{BD_IF} is BSP Build Date; e.g. 20230908

Chapter 4

OS User Guide

4.1 Introduction

The BOXER-8623AI's OS, Ubuntu/Linux version, and preinstalled SDK components are as follows:

For Jetpack 5.1.1 (l4t 35.3.1)

1. Ubuntu/Linux version
    a. Ubuntu version: 20.04.6
    b. Kernel version: 5.10.104-tegra
    c. UEFI version: 3.1-32827747

2. Built-in all Jetson SDK Components
    a. CUDA Toolkit for L4T 11.4.19
    b. cuDNN 8.6.0
    c. TensorRT 8.5.2
    d. OpenCV 4.5.4
    e. VPI 2.2
    f. NVIDIA Container Runtime 1.11
    g. Multimedia API 35.3
    h. Nsight Systems 2023.1
    i. Nsight Graphics 2022.6
    j. Nsight Compute 2022.2
    k. Compute Sanitizer 2022.2
    l. Nsight DL Designer 2022.2
    m. Deepstream 6.2

3. Built-in Allxon DMS
    a. Pls refer https://www.allxon.com/solutions

Default login user/password is:

Account: aaeon

Password: aaeon

4.2 Update Note

Running **$ sudo apt upgrade** command in terminal will overwrite the **Aaeon kernel device tree(.dtb)/kernel image(Image)/bootloader** in the OS, which can lead to unexpected results, including the loss of I/O ports.

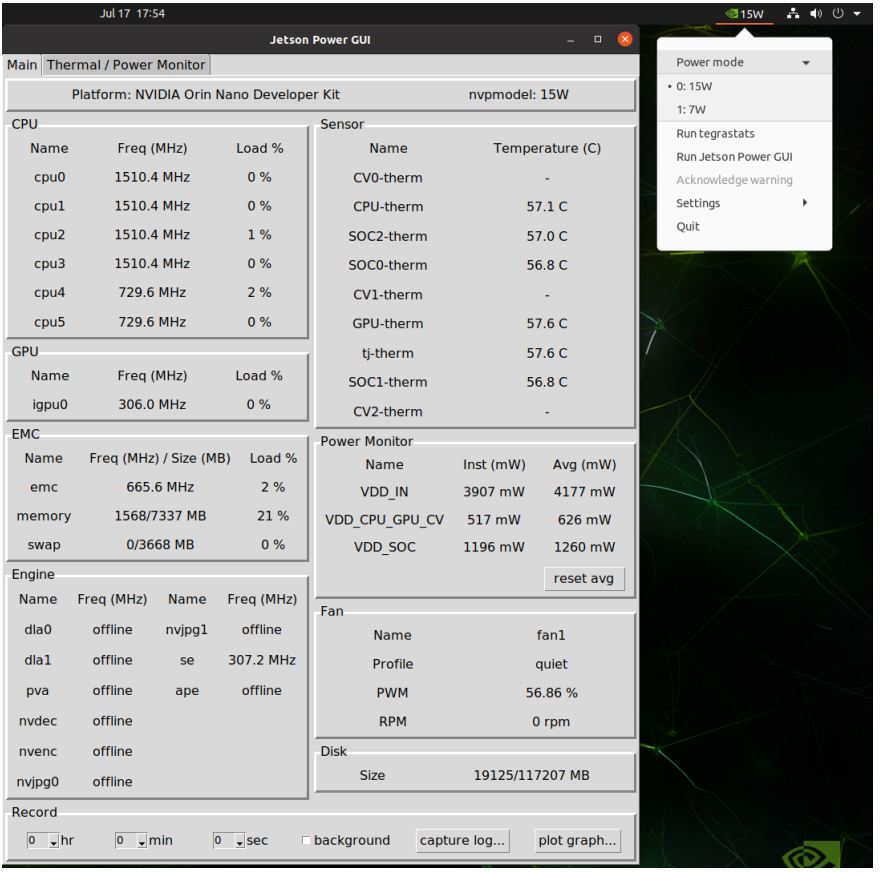
So Aaeon default disable Nvidia apt Repo for updating Nvidia apt package.

AAEON maintains updated versions of BSP on the product page, which follow updates to the NVIDIA Jetpack software. Contact your AAEON representative or visit the product page to download the latest version of Aaeon BSP for your system:

https://www.aaeon.com/en/

4.3 Power Mode for BOXER-8623AI

NVIDIA Jetson Orin Nano power mode can be selected and monitored by GUI, please refer to the following image:



Note: Power mode is dependent on DRAM size. For more detailed information please visit: https://developer.nvidia.com/embedded/jetson-modules

4.4 DIO/GPIO Setting Command for BOXER-8623AI

1. GPIO test command:

Please refer HW DIO/GPIO section for PIN Number and GPIO ID mapping. Take "PIN 2 <-> GPIO ID:PY.02" as an example on JP511:

1. Export PY.02

   $ echo PY.02 > /sys/class/gpio/export
2. Set GPIO direction to output mode

   $ echo "out" > /sys/class/gpio/PY.02/direction
3. Set the output value

   High: $ echo 1 > /sys/class/gpio/PY.02/value

   Low: $ echo 0 > /sys/class/gpio/PY.02/value
4. Set GPIO direction to input mode

   $ echo "in" > /sys/class/gpio/PY.02/direction
5. Read the input value of GPIO

   $ cat /sys/class/gpio/PY.02/value
6. Unexport PY.02

   $ echo PY.02 > /sys/class/gpio/unexport

2. FAN PWM test command:

For customer want to use FAN PWM as Normal PWM control

1. Stop NV fan control daemon

   $ sudo systemctl stop nvfancontrol
2. Set PWM value

```
$ echo [PWM_duty_cycle] >
/sys/devices/platform/pwm-fan/hwmon/hwmon<x>/pwm1
```

Where: [PWM_duty_cycle] is a value in the range [0,255]. <x> is a kernel enumerated number for fan hwmon.