BOXER-8640AI

AI@Edge Fanless Embedded
AI System with NVIDIA® AGX Orin™

User's Manual 1st Ed

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Packing List

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

Item	Quantity
● BOXER-8640AI	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

Warning!

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	×	○	○	○	○	○
Connector and Cable	×	○	○	○	○	○
Chassis	○	○	○	○	○	○
CPU and Memory	×	○	○	○	○	○
Hard Disk	×	○	○	○	○	○
LCD Modules	×	○	○	○	○	○
CD-ROM/DVD-ROM	×	○	○	○	○	○
Touch Modules	×	○	○	○	○	○
Power	×	○	○	○	○	○
Battery	×	○	○	○	○	○

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

○：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 AGX Orin™ 32GB
CPU	8-core ARM v8.2 64-bit CPU, 2MB L2 + 4MB L3
System Memory	32GB 256-Bit LPDDR5 (205GB/s)
Storage Device	64GB eMMC 5.1
	MicroSD Card Slot x 1
	2.5" SATA Drive Bay x 1
	M.2 2280 M-Key x 1
Display Interface	HDMI 2.0 x 1
Ethernet	RJ-45 x 4 for GbE PoE/PSE 802.3af (Max. 60W)
I/O	USB 3.2 Gen 2 x 2 (Type A)
	USB 3.2 Gen 2 x 2 (Type C)
	RS-232/422/485 x 1
	CANBus x 1
	Mic-In x 1
	Line-Out x 1
	MicroSD Slot x 1
	Micro USB x 1 for OS Flash
	Recovery Button x 1
	Power Button x 1
	40-pin Header compliant with NVIDIA Dev Kit
	(4 pins CANBus occupied)
Expansion	USB 2.0 Header x 1 (Optional, Circuit Reserved)
	M.2 2230 E-Key x 1 (for Wi-Fi/BT)
	M.2 2280 M-Key x 1 (for NVMe)
	2.5" SATA Drive Bay x 1

System

	RS-232/422/485 Pin Header x 1
Indicator	Power LED x 1
OS Support	Linux® (NVIDIA Jetpack™ 5.0 or above)

Power Supply

Power Requirement	DC 12V~24V 2-Pin Terminal

Mechanical

Mounting	Wallmount
Dimensions	8.26" x 6.46" x 2.32" (210mm x 164.2mm x 59mm)
Gross Weight	8.3 lb. (3.76 Kg)
Net Weight	6.4 lb. (2.9 Kg)

Environmental

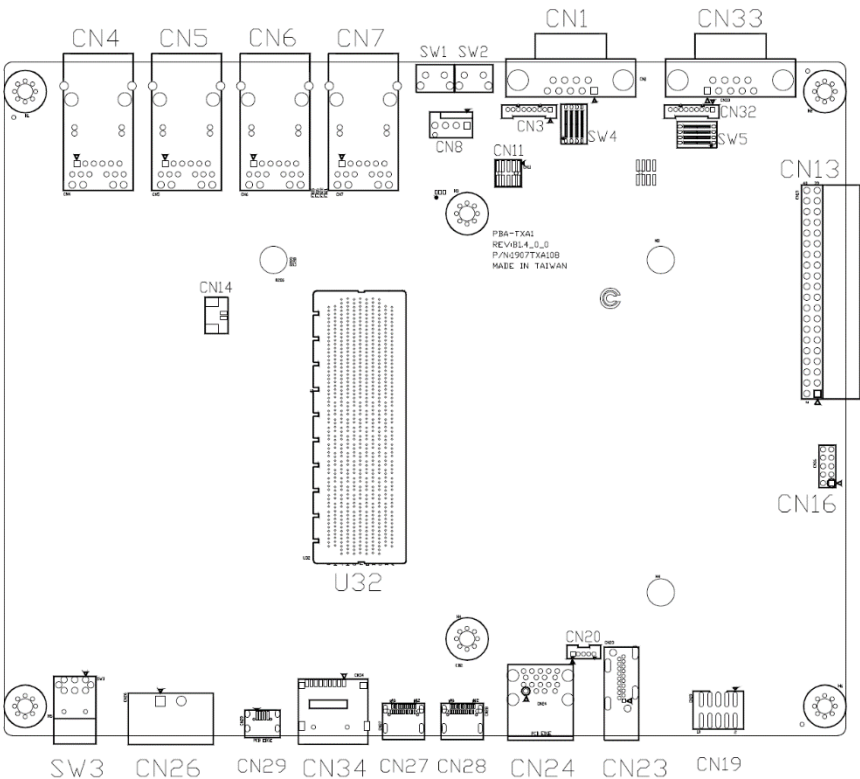| **Operating Temperature**	-4°F ~ 131°F (-20°C ~ 55°C, according to IEC60068-2 with 0.5 m/s AirFlow)
Storage Temperature	-40 °F ~ 158°F (-40°C ~ 70°C)
Storage Humidity	95% @ 40°C, non-condensing
Anti-Vibration	Random, 3.5 Grms, 5 ~ 500Hz
Anti-Shock	50G Peak Acceleration
Certification	CE/FCC Class A

Chapter 2

Hardware Information
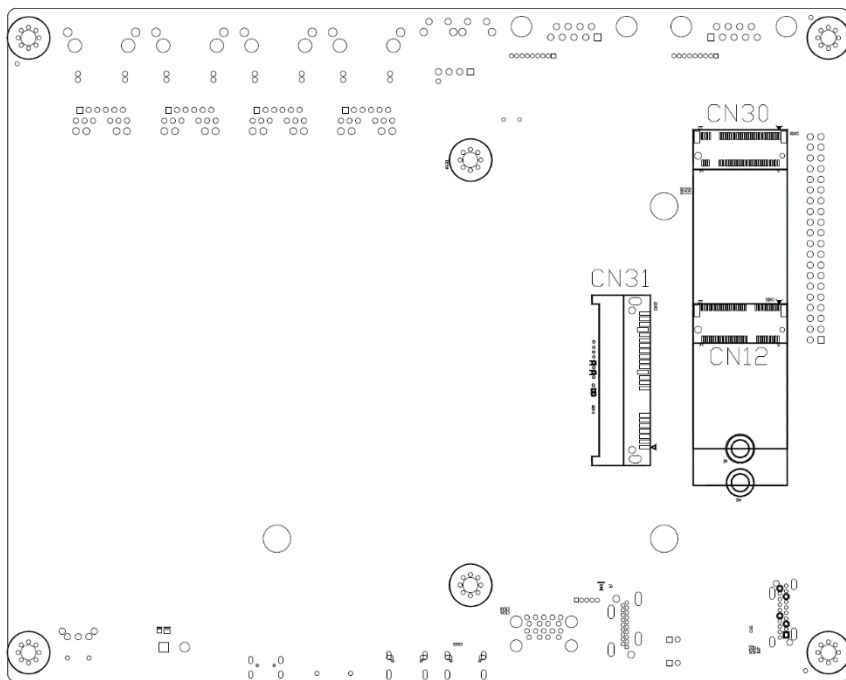
2.1   Dimensions
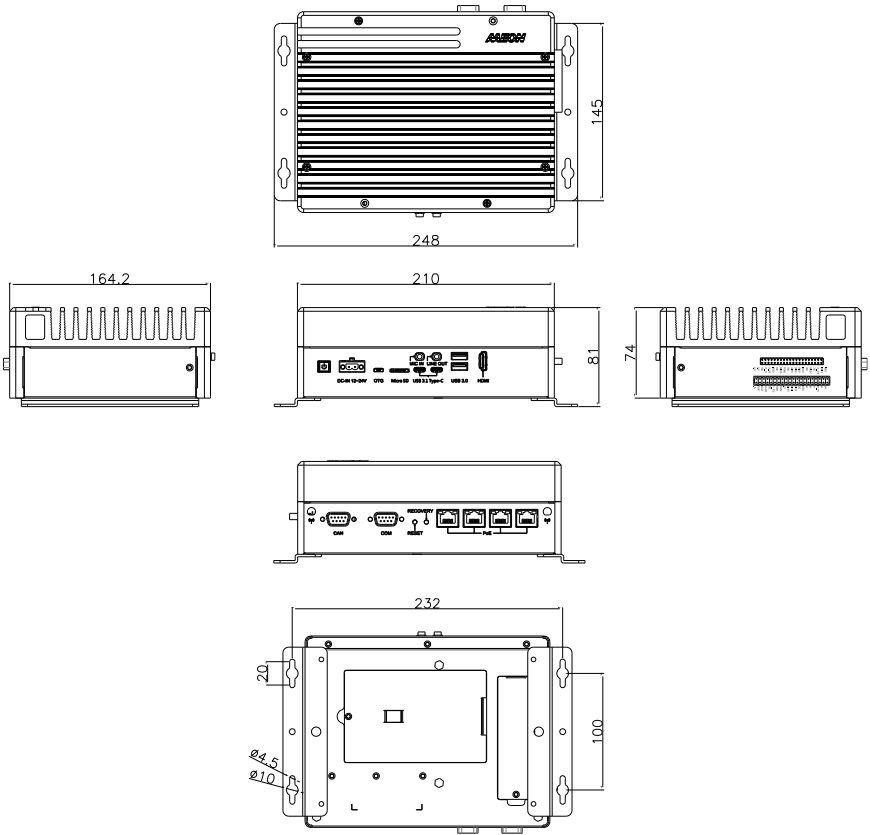
2.2   Jumpers and Connectors

Top

Bottom

2.3   List of Jumpers

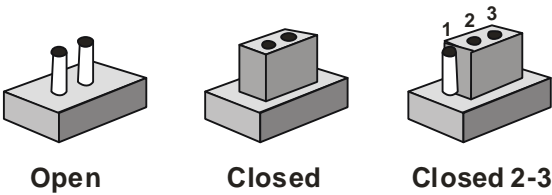The board has a number of jumpers that allow you to configure your system to suit your application.

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

Label	Function
CN16 (5-6)	AT/ATX Mode 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.

**Open   Closed   Closed 2-3**

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   Auto Power Button (CN16)

Open (Default)   Closed
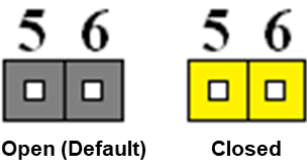
| Pin	Function
5-6 Open	ATX (Default)
5-6 Closed	AT

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	COM 1 Connector (/dev/ttyTHS1)
CN3	UART 3 for Debug
CN4	PoE Giga LAN Connector (i210)
CN5	PoE Giga LAN Connector (i210)
CN6	PoE Giga LAN Connector (i210)
CN7	PoE Giga LAN Connector (i210)
CN11	JTAG Debug Connector
CN12	M.2 2230 E-Key Slot
CN13	40-Pin Header
CN14	RTC Battery Connector
CN16	Front Panel Connector
CN19	Audio Connector
CN20	Internal USB 2.0 Connector
CN23	HDMI Connector
CN24	Dual USB 3.2 Type-A Connector
CN26	DC-In Power Connector
CN27	USB 3.2 Type-C Connector (w/o DP)
CN28	USB 3.2 Type-C Connector (w/o DP)
CN29	Micro USB (OS Flash)
CN30	M.2 2280 M-Key Slot
CN31	SATA Connector w/Power
CN32	COM 5 Connector (/dev/ttyTHS5)

| Label	Function
CN33	CANBus Connector
CN34	MicroSD Connector
SW1	Recovery Switch
SW2	Reset Switch
SW3	Power Switch
SW4	RS-232/422/485 (/dev/ttyTHS1)
SW5	RS-232/422/485 (/dev/ttyTHS5)
U32	Jetson AGX Orin Xavier CPU Connector

2.4.1   COM 1 Port Connector (CN1)
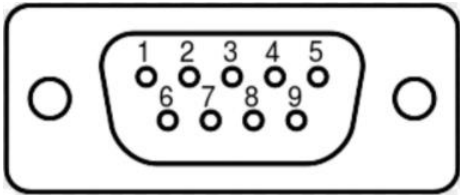
Pin	RS-232	RS-422	RS-485
1	-	TX-	D-
2	RXD	TX+	D+
3	TXD	RX+	-
4	-	RX-	-
5	GND	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-

2.4.2 UART Debug Port Connector (CN3)
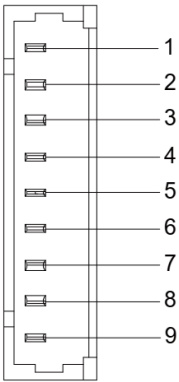
Pin	Pin Name	Signal Type
1	UART3 TXD	TTL
2	UART3 RXD	TTL
3	-	-
4	-	-
5	RXD_3	RS-232
6	TXD_3	RS-232
7	I2C SCL	3.3V
8	I2C SDA	3.3V
9	GND	-

2.4.3   PoE Giga LAN Connector (CN4/CN5/CN6/CN7)
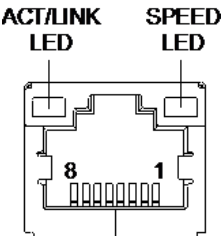
Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

2.4.4   JTAG Debug Connector (CN11)
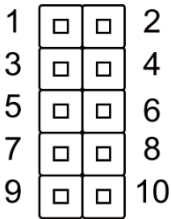
Pin	Signal	Pin	Signal
1	+1.8V	2	JTAG_TMS
3	GND	4	JTAG_TCK
5	GND	6	JTAG_TDO
7	GND	8	JTAG_TDI
9	10K PULL-UP 1.8V	10	SYS_RST#

2.4.5　M.2 2230 E-Key Connector (CN12)

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

2.4.6   40-Pin Header (CN13)

3.3V	1 ■ ●	2	5.0V
I2C5_DAT	3 ● ●	4	5.0V
I2C5_CLK	5 ● ●	6	GND
MCLK05	7 ● ●	8	UART1_TX
GND	9 ● ●	10	UART1_RX
UART1_RTS	11 ● ●	12	I2S2_CLK
GPIO32	13 ● ●	14	GND
GPIO27	15 ● ●	16	GPIO08
3.3V	17 ● ●	18	GPIO35
SPI1_MOSI	19 ● ●	20	GND
SPI1_MISO	21 ● ●	22	GPIO17
SPI1_SCK	23 ● ●	24	SPI1_CS0_N
GND	25 ● ●	26	SPI1_CS1_N
I2C2_DAT	27 ● ●	28	I2C2_CLK
CAN0_DIN	29 ● ●	30	GND
CAN0_DOUT	31 ● ●	32	GPIO09
CAN1_DOUT	33 ● ●	34	GND
I2S_FS	35 ● ●	36	UART1_CTS
CAN1_DIN	37 ● ●	38	I2S_SDIN
GND	39 ● ●	40	I2S_SDOUT

Note: Pins 29, 31, 33, and 37 are used by CANBus Connector (CN33).

2.4.7   RTC Connector (CN14)
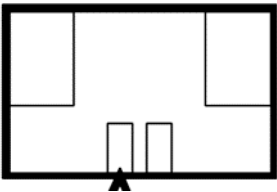
Pin	Signal	Pin	Signal
1	+3V	2	GND

2.4.8   Front Panel Connector (CN16)
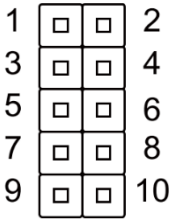
Pin	Signal	Pin	Signal
1	GND	2	Recovery
3	Reset	4	Button power
5	GND*	6	ACOK*
7	CVB_STBY	8	System_OC#
9	+3.3V_AO	10	+5V_AO

Note: Pins 5 and 6 are used for setting AT/ATX Power Mode. See Chapter 2.3.2 for information.

To prevent system damage, do not connect Pins 5 and 6 with any other pin.

2.4.9   Audio Connector (CN19)
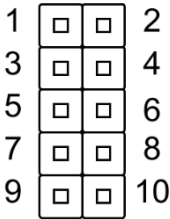
Pin	Signal	Pin	Signal
1	MIC1	2	GND
3	MIC2	4	GPIO4
5	HPO_R	6	MIC_IN_DET
7	GND	8	-
9	HPO_L	10	GPIO3

GPIO3: Headphone or Jack detection.

GPIO4: Pre-sense, detects if audio dongle is connected to header.

2.4.10   HDMI Connector (CN23)
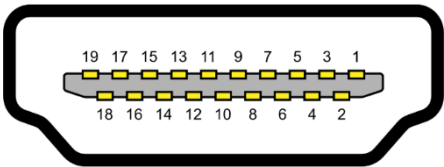
Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND

Pin	Signal	Pin	Signal
9	HDMI_DATA0_N	**10**	HDMI_CLK_P
11	GND	**12**	HDMI_CLK_N
13	NC	**14**	NC
15	HDMI_SCL	**16**	HDMI_SDA
17	GND	**18**	HDMI_PWR
19	HDMI_HDP	**-**	-

2.4.11   Dual USB 3.2 Connector (CN24)
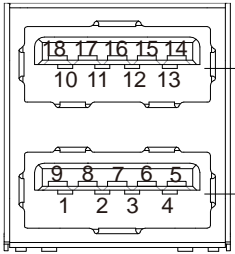
Pin	Signal	Pin	Signal
U1	VBUS_1	**U10**	VBUS_2
U2	(A)D-	**U11**	(B)D-
U3	(A)D+	**U12**	(B)D+
U4	GND	**U13**	GND
U5	(A)SSRX-	**U14**	(B)SSRX-
U6	(A)SSRX+	**U15**	(B)SSRX+
U7	GND	**U16**	GND
U8	(A)SSTX-	**U17**	(B)SSTX-
U9	(A)SSTX+	**U18**	(B)SSTX+

2.4.12   Power-In Connector (CN26)
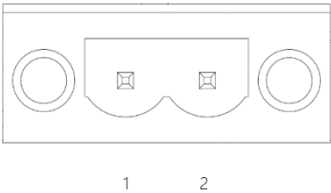
Pin	Signal	Pin	Signal
1	PWR_IN	2	GND

2.4.13   USB 3.0 Type-C Connector (CN27/CN28)
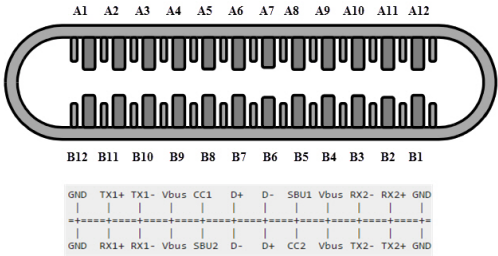
Pin	Signal	Pin	Signal
A1	GND	B12	GND
A2	(A)SSTX+	B11	(B)SSRX+
A3	(A)SSTX-	B10	(B)SSRX-
A4	VBUS_1	B9	VBUS_2
A5	CC1	B8	SBU2
A6	(A)D+	B7	(B)D-
A7	(A)D-	B6	(B)D+
A8	SBU1	B5	CC2

Pin	Signal	Pin	Signal
A9	VBUS_1	**B4**	VBUS_2
A10	(A)SSRX-	**B3**	(B)SSTX-
A11	(A)SSRX+	**B2**	(B)SSTX+
A12	GND	**B1**	GND

2.4.14   Micro USB (OS Flash) (CN29)
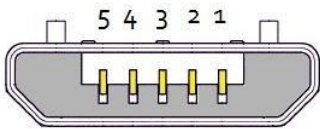
USB Micro-B

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

2.4.15   M.2 2280 M-Key Connector (CN30)

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71
68	SUSCLK(32kHz) (O)(0/3.3V)	PEDET (NC-PCIe/GND-SATA)	69
		N/C	67
Connector Key	Connector Key	Connector Key	
Connector Key	Connector Key	Connector Key	
Connector Key	Connector Key	Connector Key	
Connector Key	Connector Key	Connector Key	
58	N/C	GND	57
56	N/C	REFCLKp	55
54	PEWAKE# (I/O)(0/3.3V) or N/C	REFCLKn	53
52	CLKREQ# (I/O)(0/3.3V) or N/C	GND	51
50	PERST# (O)(0/3.3V) or N/C	PETp0/SATA-A+	49
48	N/C	PETn0/SATA-A-	47
46	N/C	GND	45
44	N/C	PERp0/SATA-B-	43
42	N/C	PERn0/SATA-B+	41
40	N/C	GND	39
38	DEVSLP (O)	PETp1	37
36	N/C	PETn1	35
34	N/C	GND	33
32	N/C	PERp1	31
30	N/C	PERn1	29
28	N/C	GND	27
26	N/C	PETp2	25
24	N/C	PETn2	23
22	N/C	GND	21
20	N/C	PERp2	19
18	3.3V	PERn2	17
16	3.3V	GND	15
14	3.3V	PETp3	13
12	3.3V	PETn3	11
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	GND	9
8	N/C	PERp3	7
6	N/C	PERn3	5
4	3.3V	GND	3
2	3.3V	GND	1

2.4.16   SATA Connector with Power (CN31)
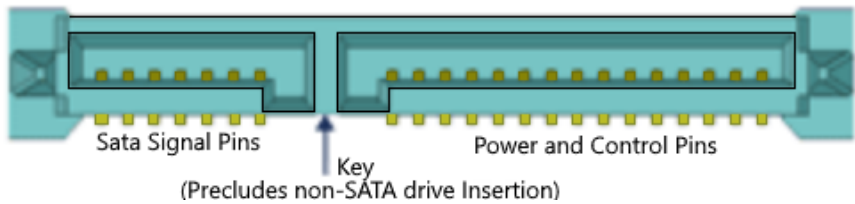
Pin	Signal	Pin	Power
1	GND	1	NC
2	TX+	2	NC
3	TX-	3	NC
4	GND	4	GND
5	RX+	5	GND
6	RX-	6	GND
7	GND	7	+5V
-	-	8	+5V
-	-	9	+5V
-	-	10	GND
-	-	11	NC
-	-	12	GND
-	-	13	NC
-	-	14	NC
-	-	15	NC

2.4.17   COM 5 Port Connector (CN32)
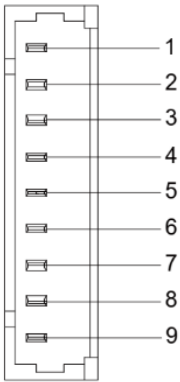
Pin	RS-232	RS-422	RS-485
1	-	TX-	D-
2	-	-	-
3	RXD	TX+	D+
4	-	-	-
5	TXD	RX+	-
6	-	-	-
7	-	RX-	-
8	-	-	-
9	GND	GND	GND

2.4.18   CANBus Connector (CN33)
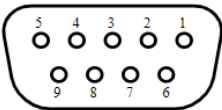
Pin	Signal
1	-
2	CAN0_L
3	GND
4	CAN1_L
5	GND
6	-
7	CAN0_H
8	CAN1_H
9	+5V

2.4.19   MicroSD Connector (CN34)
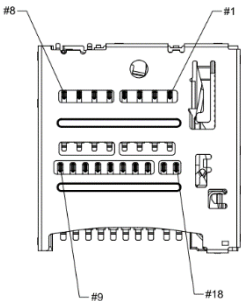
Pin	Signal	Pin	Power
1	DAT2	2	CD/DAT3
3	CMD	4	VDD

Pin	Signal	Pin	Power
5	CLK	**6**	VSS
7	DAT0	**8**	DAT1

2.4.20   RS-232/422/485 Select (SW4, SW5)
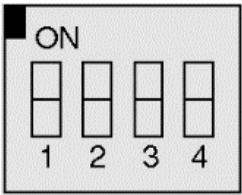
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On	-	-
1T/1R RS-422	On	Off	-	-
1T/1R RS-485	Off	On	-	-
Low power shutdown	Off	Off	-	-
250kbps for RS-232 and RS-485/RS-422	-	-	On	-
RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps	-	-	Off	-
Enable RS-422/RS-485 bias and termination resistors.	-	-	-	On
Disable RS-422/RS-485 bias and termination resistors.	-	-	-	Off

2.5   Hardware Assembly

This section details the steps needed to install various hardware components for the BOXER-8640AI.

2.5.1   M.2 Expansion Module Installation

The M.2 2280 M-Key and M.2 2230 E-Key slots can be accessed via removable covers on the bottom panel of the BOXER 8640AI system as shown in the following diagram.

2.5.2   2.5" HDD Installation

The 2.5" HDD drive bay can be accessed via a removable cover on the bottom panel of the BOXER 8640AI chassis, as shown in the following diagram.
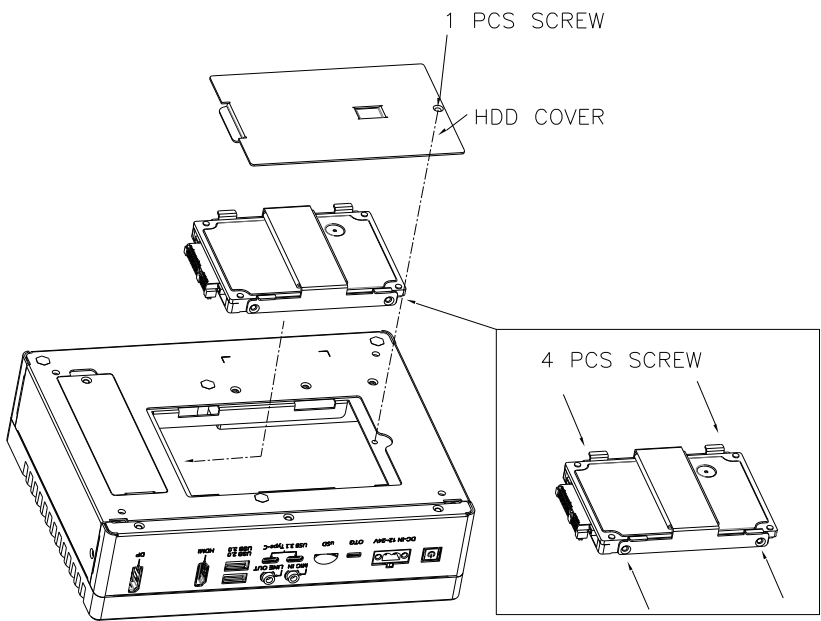
Note: When installing 2.5" HDD, ensure to apply thermal pad on top of HDD drive bay prior to affixing HDD cover.
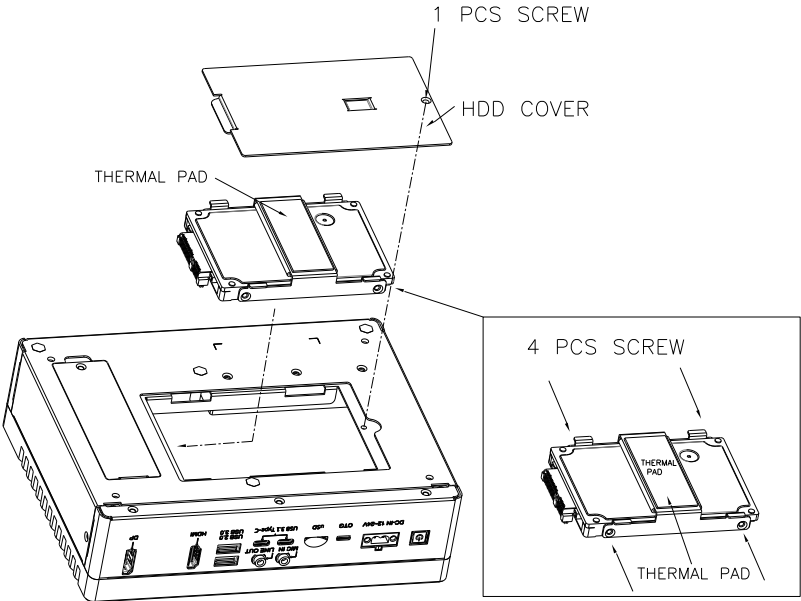
Chapter 3

BSP Flash Guide

3.1   Before Installation

Before starting the process make sure your BOXER-8640AI system is turned off and the power is disconnected. You will need a Host PC running Ubuntu 18.04, and make sure the NVIDIA Jetson Orin AGX module is installed onto the BOXER-8640AI 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 "**Internal.tar.gz**" into the Host Ubuntu 18.04 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.
Ensure the language settings of Ubuntu 18.04 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 Linux terminal and enter the following command to

extract the compressed BSP image files (BSP file name may vary):

$ sudo tar -zxvf Internal.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-8640AI, and the other end to an available USB port on the Host PC.

2.   Connect the BOXER-8640AI 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-8640AI should then enter recovery mode.

4.   To check if device is in recovery mode, enter the command **lsusb** in terminal on

Host.

$ lsusb | grep "0955:7223"

If successful, the command will return "**0955:7223 Nvidia Corp**"

`Bus 001 Device 003: ID 0955:7223 NVidia Corp.`

Note: Recovery mode cannot be initiated if the NVIDIA Jetson Orin AGX module is disassembled. Ensure the NVIDIA Jetson Orin AGX module is installed and refer to the image below to perform the steps:
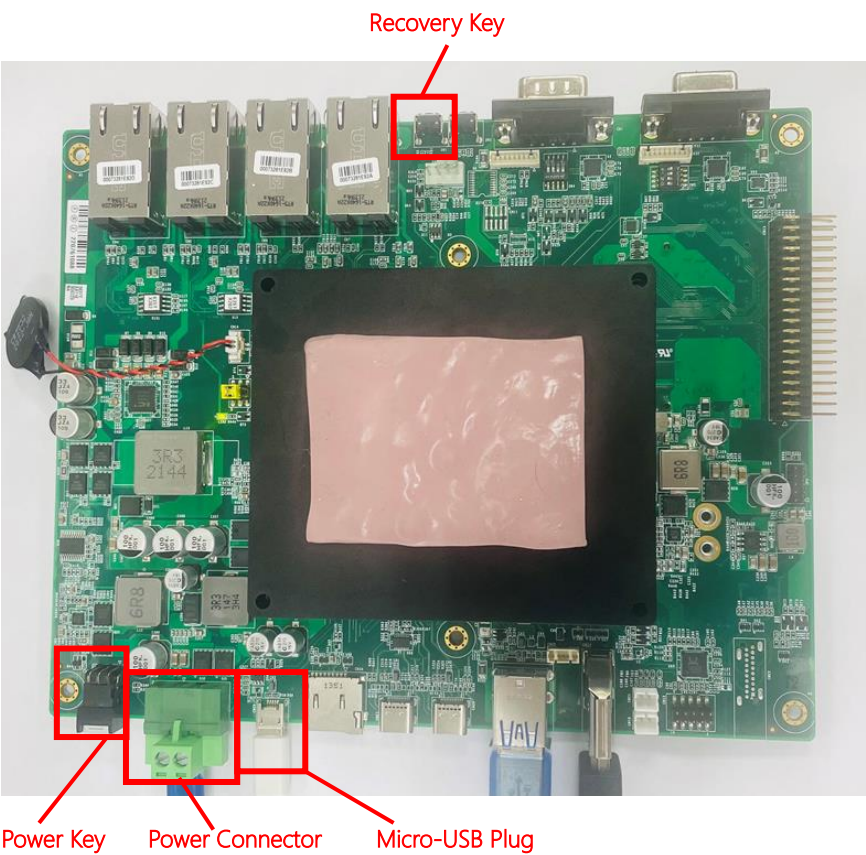
3.3 Flash Image to Board

Use the following steps to flash the OS to the BOXER-8640AI.

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:

$ sudo ./flashboxer.sh

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

```
[ 883.0285 ] Flashing completed

[ 883.0287 ] Coldbooting the device
[ 883.0328 ] tegrarcm_v2 --chip 0x23 --ismb2
[ 883.0363 ] MB2 version 01.00.0000
[ 883.1397 ]
[ 883.1399 ] Coldbooting the device
[ 883.1443 ] tegrarcm_v2 --chip 0x23 --reboot coldboot
[ 883.1479 ] MB2 version 01.00.0000
[ 883.2727 ]
*** The target t186ref has been flashed successfully. ***
Reset the board to boot from internal eMMC.
```

3.4   Check BSP Version

Once the flash image is successfully installed, the BOXER-8640AI 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**"

```
aaeon@localhost:~$ cat /proc/product
BOXER-8641AI_J5.0.2_E00_1.0.0_20220817
BOXER-8641AI.Ubuntu20.04_AGXORINJP5.0.2_V1.0.0_17/08/2022
```

The version name will follow the format of:

{PJ_IF}. **{OS_IF}**_**{PLF_IF}{JPV_IF}**_**{IMGV_IF}**_**{BD_IF}**

For example:

BOXER-8640AI. Ubuntu20.04_AGXORINJP5.0.2_V1.0.1_13/09/2022

Note: Filename may differ from this example.

{OS_IF} is OS Information; e.g. Ubuntu20.04

{PLF_IF} is Platform Information; e.g. AGXORIN

{PJ_IF} is Project Information; e.g. BOXER-8640AI

{IMGV_IF} is Build Number; e.g. v1.0.1

{JPV_IF} is Jetpack Version; e.g. jp5.0.2

{BD_IF} is Build Date; e.g. 13/09/2022

Chapter 4

OS User Guide

4.1   Introduction

The BOXER-8640AI's OS, Ubuntu/Linux version, and preinstalled SDK components are

as follows:

For **Jetpack 5.0.2** (l4t 35.1)

1.   Ubuntu/Linux version

a.   Ubuntu version: 20.04.4
b.   Kernel version: 5.10.104-tegra
c.   UEFI version: EFI v2.70 by EDK II

2.   Built-in all Jetson SDK Components

a.   CUDA Toolkit for L4T 11.4
b.   cuDNN 8.4
c.   TensorRT 8.4
d.   OpenCV 4.5
e.   VPI 2.1
f.   NVIDIA Container Runtime 1.10
g.   Multimedia API 35.1
h.   Nsight Systems 2022.3
i.   Nsight Graphics 2022.3
j.   Nsight Compute 2022.2
k.   Compute Sanitizer 2022.2
l.   Nsight DL Designer 2022.1
m.   Deepstream 6.1.1

3.   Built-in Allxon DMS

a.   Please refer to vendor website at 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/p/ai-edge-solutions-boxer-8640ai

4.3 BOXER-8640AI Power Mode

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