

BOXER-8256AI

AI@Edge Fanless Embedded AI System
with NVIDIA[®] Jetson Xavier[™] NX

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-8256AI	1
● Power Connector	1
● Wallmount Bracket	2
● Screw Package	1
● Power Adapter (optional)	-
● Power Cord (optional)	-

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.						

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Chapter 1

Product Specifications

1.1 Specifications

System

AI Accelerator	NVIDIA® Jetson Xavier™ NX
CPU	6-Core NVIDIA Carmel ARM®v8.2 64-bit CPU
System Memory	8GB LPDDR4x
Storage Device	16GB eMMC x 1
	MicroSD slot x 1
	M.2 M-Key 2280 x 1 (PCIe [x4])
Display Interface	HDMI 2.0 x 2
Ethernet	RJ-45 x 1 for GbE LAN
I/O	USB3.2 Gen 1 Type-A x 3
	DB9 for RS-232/422/485 x 1 (by switch)
	CANbus x 1
	HDMI 2.0 x 2 (for Video Display)
	HDMI 1.4 x 4 (for Video Input)
	Mic-in x 1, Line-Out x 1
	Micro USB for OS Flash x 1
	Power ON/OFF switch x 1
	Recovery button x 1
	SMA Antenna opening x 2
Expansion	M.2 B-Key 3042/3052 x 1 (PCIe [x2] + USB 3.0)
	M.2 E-Key x 1 (PCIe [x1] + USB 2.0)
	SATA Connector and 5V x 1
Indicator	Power LED x 1
OS Support	Linux (NVIDIA Jetpack 4.6.2 or above)

Power Supply

Power RequirementDC 12-24V with 2-pin terminal block

Mechanical

MountingWall-mount kit
Dimensions (W x D x H)7.09" x 5.35" x 2.64" (180 mm x 136 mm x 67 mm)
Gross Weight4.23 lbs. (1.92 kg)
Net Weight2.87 lbs. (1.3 kg)

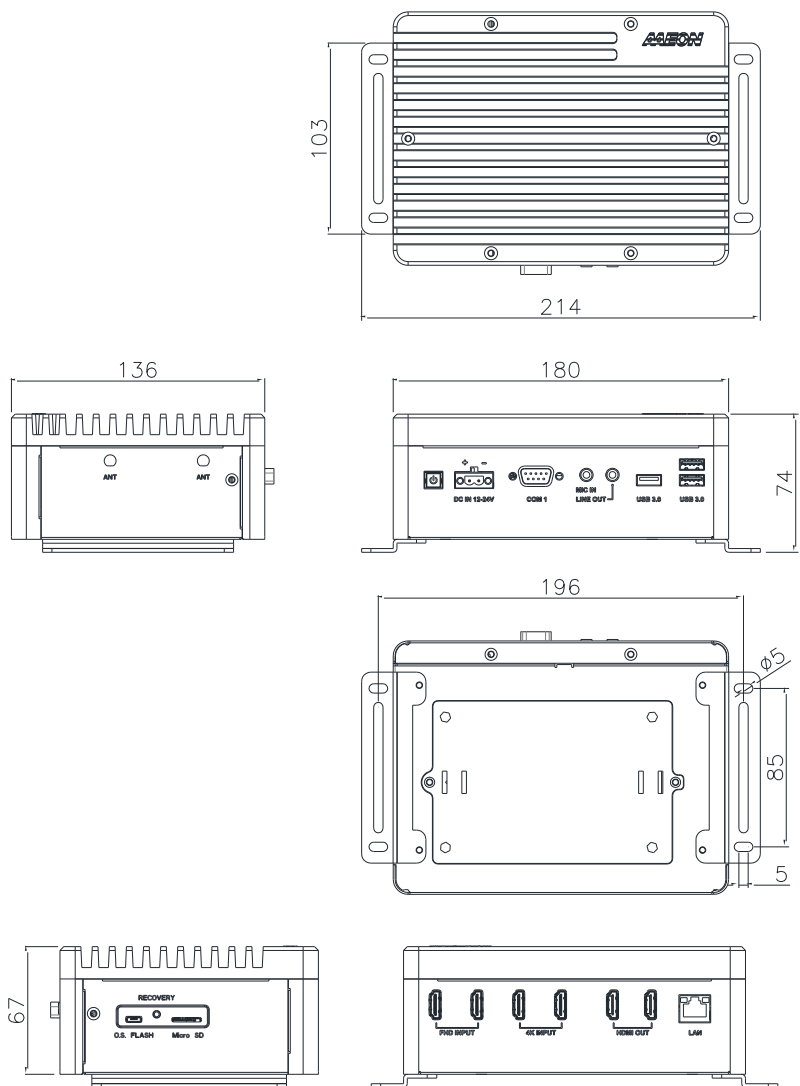
Environmental

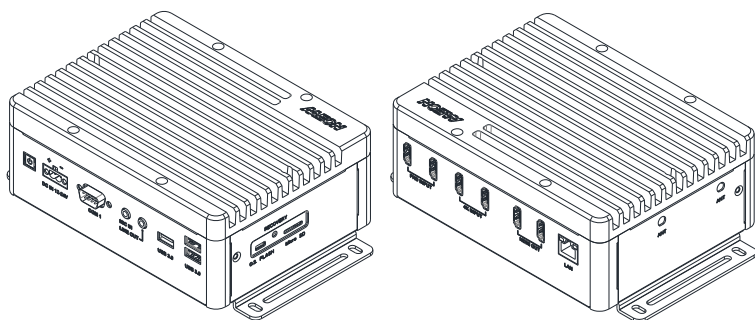
Operating Temperature-5°F ~ 140°F (-15°C ~ 60°C with 0.5 m/s airflow)
Storage Temperature-40°F ~ 176°F (-40°C ~ 80°C)
Storage Humidity5 ~ 95% @ 40°C, non-condensing
Anti-Vibration3.5Grms/ 5 ~ 500Hz/ operation – eMMC
Anti-Shock50G, IEC 60068-2-27, half sine, 11 ms duration – eMMC
CertificationCE/FCC class A

Chapter 2

Hardware Information

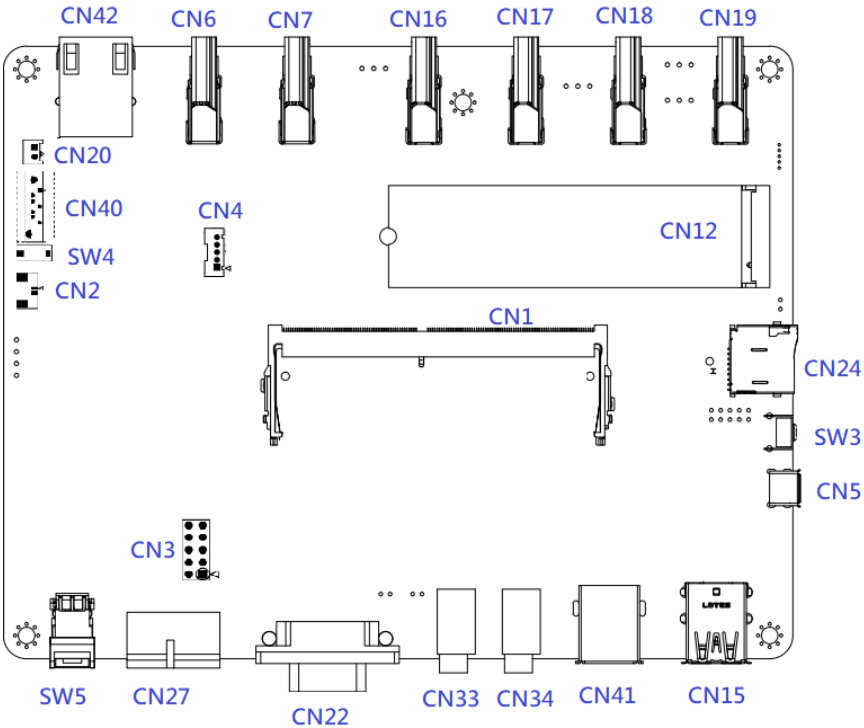
2.1 Dimensions



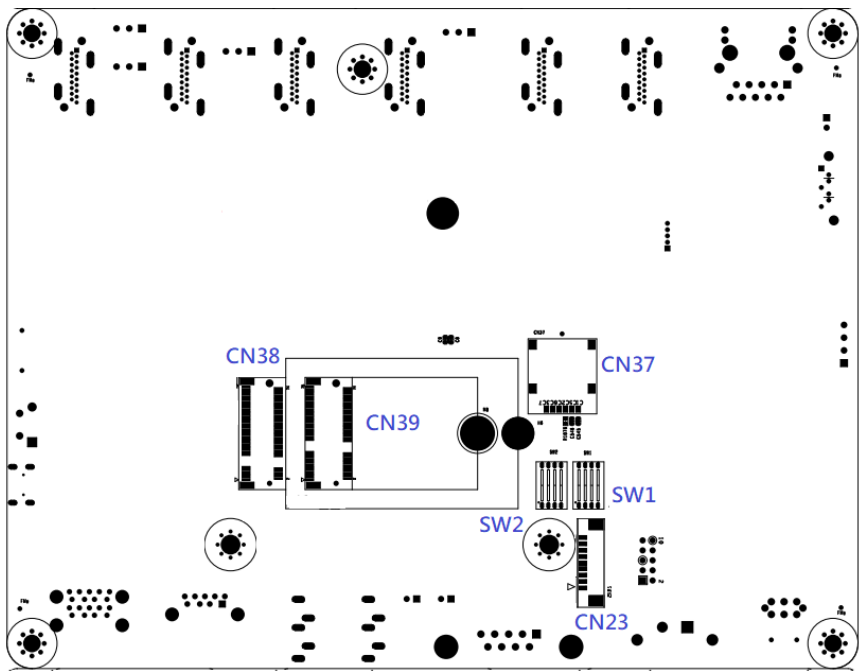


2.2 Jumpers and connectors

Component Side



Module Side



2.3 List of Jumpers

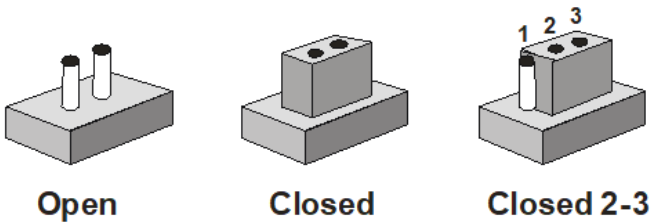
The board has a number of jumpers that allow you to configure your system to suit your application.

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

Label	Function
CN3	AT/ATX Mode Select

2.3.1 Setting Jumpers

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

2.3.2 Auto Power Setting (CN3)

CN3	Function
7-8	Open AT
7-8	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	Jetson NX CPU Module Connector
CN2	RTC Connector
CN3	Front Panel
CN4	UART for Debug/I2C
CN5	Micro USB for Flash Image
CN6	HDMI Out Connector
CN7	
CN12	M.2 M-Key
CN15	USB 3.0 Connector
CN16	HDMI In Connector (2160P@30/1080P@60) *Limitation of HDMI in
CN17	HDMI In Connector (2160P@30/1080P@60) *Limitation of HDMI in
CN18	HDMI In Connector (1080P@60)
CN19	HDMI In Connector (1080P@60)
CN20	5V SATA Power Connector
CN22	RS232/RS422/RS485/CAN BUS Connector

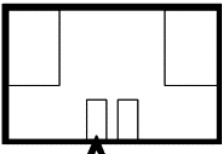
CN23	RS232/RS422/RS485 Connector
CN24	MicroSD Slot
CN27	DC Power In connector
CN33	Audio Line Out
CN34	Audio Mic In
CN37	SIM Socket
CN38	M.2 B-Key
CN39	M.2 E-Key
CN40	SATA Connector
CN41	USB 3.0 Connector
CN42	Giga LAN Connector
SW1	RS-232/RS422/RS-485 Select- COM2
SW2	RS-232/RS422/RS-485 Select- COM1
SW3	Recovery Switch
SW4	Reset Switch
SW5	Power Switch

2.4.1 Jetson NX CPU Module Connector (CN1)

Signal Name	Pin # Top Odd	Pin # Bottom Even	Signal Name
GND	1	2	GND
CSI1_D0_N	3	4	CSI0_D0_N
CSI1_D0_P	5	6	CSI0_D0_P
GND	7	8	GND
CSI1_CLK_N	9	10	CSI0_CLK_N
CSI1_CLK_P	11	12	CSI0_CLK_P
GND	13	14	GND
CSI1_D1_N	15	16	CSI0_D1_N
CSI1_D1_P	17	18	CSI0_D1_P
GND	19	20	GND
CSI3_D0_N	21	22	CSI2_D0_N
CSI3_D0_P	23	24	CSI2_D0_P
GND	25	26	GND
CSI3_CLK_N	27	28	CSI2_CLK_N
CSI3_CLK_P	29	30	CSI2_CLK_P
GND	31	32	GND
CSI3_D1_N	33	34	CSI2_D1_N
CSI3_D1_P	35	36	CSI2_D1_P
GND	37	38	GND
DP0_TXD0_N	39	40	CSI4_D2_N
DP0_TXD0_P	41	42	CSI4_D2_P
GND	43	44	GND
DP0_TXD1_N	45	46	CSI4_D0_N
DP0_TXD1_P	47	48	CSI4_D0_P
GND	49	50	GND
DP0_TXD2_N	51	52	CSI4_CLK_N
DP0_TXD2_P	53	54	CSI4_CLK_P
GND	55	56	GND
DP0_TXD3_N	57	58	CSI4_D1_N
DP0_TXD3_P	59	60	CSI4_D1_P
GND	61	62	GND
DP1_TXD0_N	63	64	CSI4_D3_N
DP1_TXD0_P	65	66	CSI4_D3_P
GND	67	68	GND
DP1_TXD1_N	69	70	DSI_D0_N
DP1_TXD1_P	71	72	DSI_D0_P
GND	73	74	GND
DP1_TXD2_N	75	76	DSI_CLK_N
DP1_TXD2_P	77	78	DSI_CLK_P
GND	79	80	GND
DP1_TXD3_N	81	82	DSI_D1_N
DP1_TXD3_P	83	84	DSI_D1_P
GND	85	86	GND
GPIO00	87	88	DP0_HPDP
SPI0_MOSI	89	90	DP0_AUX_N
SPI0_SCK	91	92	DP0_AUX_P
SPI0_MISO	93	94	HDMI_CEC
SPI0_CS0*	95	96	DP1_HPDP
SPI0_CS1*	97	98	DP1_AUX_N
UART0_TXD	99	100	DP1_AUX_P
UART0_RXD	101	102	GND
UART0_RTS*	103	104	SPI1_MOSI
UART0_CTS*	105	106	SPI1_SCK
GND	107	108	SPI1_MISO
USB0_D_N	109	110	SPI1_CS0*
USB0_D_P	111	112	SPI1_CS1*
GND	113	114	CAM0_PWDN
USB1_D_N	115	116	CAM0_MCLK
USB1_D_P	117	118	GPIO01
GND	119	120	CAM1_PWDN
USB2_D_N	121	122	CAM1_MCLK
USB2_D_P	123	124	GPIO02
GND	125	126	GPIO03
GPIO04	127	128	GPIO05
GND	129	130	GPIO06
PCIE0_RX0_N	131	132	GND

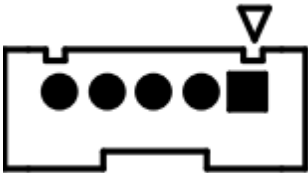
Signal Name	Pin # Top Odd	Pin # Bottom Even	Signal Name
PCIE0_RX0_P	133	134	PCIE0_TX0_N
GND	135	136	PCIE0_TX0_P
PCIE0_RX1_N	137	138	GND
PCIE0_RX1_P	139	140	PCIE0_TX1_N
GND	141	142	PCIE0_TX1_P
CAN_RX	143	144	GND
CAN_TX	145	146	GND
GND	147	148	PCIE0_TX2_N
PCIE0_RX2_N	149	150	PCIE0_TX2_P
PCIE0_RX2_P	151	152	GND
GND	153	154	PCIE0_TX3_N
PCIE0_RX3_N	155	156	PCIE0_TX3_P
PCIE0_RX3_P	157	158	GND
GND	159	160	PCIE0_CLK_N
USBSS_RX_N	161	162	PCIE0_CLK_P
USBSS_RX_P	163	164	GND
GND	165	166	USBSS_TX_N
PCIE1_RX0_N	167	168	USBSS_TX_P
PCIE1_RX0_P	169	170	GND
GND	171	172	PCIE1_TX0_N
PCIE1_CLK_N	173	174	PCIE1_TX0_P
PCIE1_CLK_P	175	176	GND
GND	177	178	MOD_SLEEP*
PCIE_WAKE*	179	180	PCIE0_CLKREQ*
PCIE0_RST*	181	182	PCIE1_CLKREQ*
PCIE1_RST*	183	184	GBE_MDIO_N
I2C0_SCL	185	186	GBE_MDIO_P
I2C0_SDA	187	188	GBE_LED_LINK
I2C1_SCL	189	190	GBE_MDIO1_N
I2C1_SDA	191	192	GBE_MDIO1_P
I2S0_DOUT	193	194	GBE_LED_ACT
I2S0_DIN	195	196	GBE_MDIO2_N
I2S0_FS	197	198	GBE_MDIO2_P
I2S0_SCLK	199	200	GND
GND	201	202	GBE_MDIO3_N
UART1_TXD	203	204	GBE_MDIO3_P
UART1_RXD	205	206	GPIO07
UART1_RTS*	207	208	GPIO08
UART1_CTS*	209	210	CLK_32K_OUT
GPIO09	211	212	GPIO10
CAM_I2C_SCL	213	214	FORCE_RECOVERY*
CAM_I2C_SDA	215	216	GPIO11
GND	217	218	GPIO12
SDMMC_DAT0	219	220	I2S1_DOUT
SDMMC_DAT1	221	222	I2S1_DIN
SDMMC_DAT2	223	224	I2S1_FS
SDMMC_DAT3	225	226	I2S1_SCLK
SDMMC_CMD	227	228	GPIO13
SDMMC_CLK	229	230	GPIO14
GND	231	232	I2C2_SCL
SHUTDOWN_REQ*	233	234	I2C2_SDA
PMIC_BBAT	235	236	UART2_TXD
POWER_EN	237	238	UART2_RXD
SYS_RESET*	239	240	SLEEP/WAKE*
GND	241	242	GND
GND	243	244	GND
GND	245	246	GND
GND	247	248	GND
GND	249	250	GND
VDD_IN	251	252	VDD_IN
VDD_IN	253	254	VDD_IN
VDD_IN	255	256	VDD_IN
VDD_IN	257	258	VDD_IN
VDD_IN	259	260	VDD_IN

2.4.2 RTC Connector (CN2)



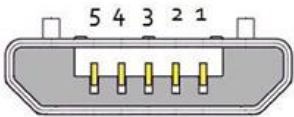
PIN	Signal
1	+3V
2	GND

2.4.3 UART Debug Port Connector (CN4)



PIN	Signal	PIN	Signal
1	-	2	-
3	UART0 RXD	4	UART0 TXD
5	GND	-	-

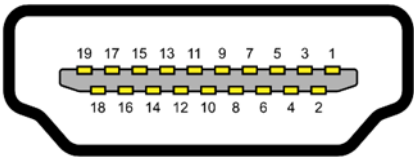
2.4.4 USB 2.0 Flash Connector (CN5)



USB Micro-B

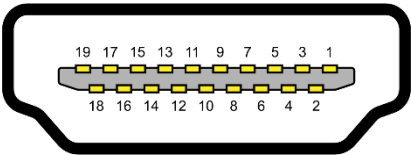
PIN	Signal	PIN	Signal
1	VBUS	2	D-
3	D+	4	-
5	GND	-	-

2.4.5 HDMI Out Connector 1 (CN6)



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
13	CEC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.6 HDMI Out Connector 2 (CN7)



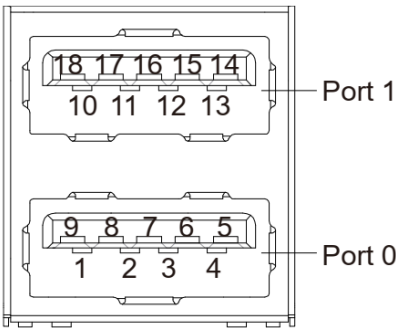
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.7 M.2 M-Key Connector (CN12)

Pin Number	Pin Name	Description	Voltage
1	CONFIG 3	Defines module type	
2	3.3 V	Supply pin	3.3 V
3	GND	Ground	
4	3.3 V	Supply pin	3.3 V
5	PERn3	PCIe Lane 3 Rx	
6	N/A		
7	PERp3	PCIe Lane 3 Rx	
8	N/A		
9	GND	Ground	
10	N/A		
11	PETn3	PCIe Lane 3 Tx	
12	3.3 V	Supply pin	3.3 V
13	PETp3	PCIe Lane 3 Tx	
14	3.3 V	Supply pin	3.3 V
15	GND	Ground	
16	3.3V	Supply pin	3.3 V
17	PERn2	PCIe Lane 2 Rx	
18	3.3 V	Supply pin	3.3 V
19	PERp2	PCIe Lane 2 Rx	
20	N/A		
21	CONFIG 0	Defines module type	
22	N/A		
23	PETn2	PCIe Lane 2 Tx	
24	N/A		
25	PETp2	PCIe Lane 2 Tx	
26	N/A		
27	GND	Ground	
28	N/A		
29	PERn1	PCIe Lane 1 Rx	
30	N/A		
31	PERp1	PCIe Lane 1 Rx	
32	N/A		
33	GND	Ground	
34	N/A		
35	PETn1	PCIe Lane 1 Tx	
36	N/A		
37	PETp1	PCIe Lane 1 Tx	
38	DEVSLP	Device Sleep, input. If driven high the host is informing the SSD to enter a low power state.	
39	GND	Ground	
40	N/A		
41	PERn0	Host receiver differential signal pair. If in PCIe mode PCIe Lane 0 Rx	
42	N/A		
43	PERp0	Host receiver differential signal pair. If in PCIe mode PCIe Lane 0 Rx	

44	N/A		
45	GND	Ground	
46	N/A		
47	PETn0	Host transmitter differential signal pair. If in PCIe mode PCIe Lane 0 Tx	
48	N/A		
49	PETp0	Host transmitter differential signal pair. If in PCIe mode PCIe Lane 0 Tx	
50	PERST#	PCIe reset	
51	GND	Ground	
52	CLKREQ#	Reference clock request signal	
53	REFCLKN	PCIe Reference Clock signals (100 MHz)	
54	PEWAKE#	PCIe WAKE# Open Drain with pull up on platform. Active Low.	
55	REFCLKP	PCIe Reference Clock signals (100 MHz)	
56	MFG1	Manufacturing pin. Use determined by vendor.	
57	GND	Ground	
58	MFG2	Manufacturing pin. Use determined by vendor.	
59-66	removed	Mechanical notch M	
67	N/A		
68	SUSCLK	32.768 kHz clock supply input provided by the Platform chipset	
69	CONFIG 1	Defines module type	
70	3.3 V	Supply pin	3.3 V
71	GND	Ground	
72	3.3 V	Supply pin	3.3 V
73	GND	Ground	
74	3.3 V	Supply pin	3.3 V
75	CONFIG 2	Defines module type	

2.4.8 USB 3.0 Connector (CN15)



PIN	Signal	PIN	Signal
U1	VBUS	U10	VBUS
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+

2.4.9 HDMI In Connector

*Please note that HDMI in application decodes via a HDMI in chipset. The application is different from the HDMI out connection to the monitor.

Here are the limitations of the current HDMI in Chipset, especially for 4K 30fps usage on HDMI in:

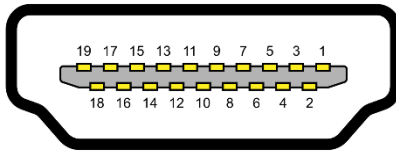
1. The HDMI source needs to have a stable output and pass the HDMI 2.0 signal integrity.
2. The HDMI cable should be certified and pass at least HDMI V2.0 standard.

Here is the Sample list of those successfully tested in our lab:

- PX - UH-3M/PTF204G
- Philips - SWV5633G/00
- Polywell - PW15-W60-T330

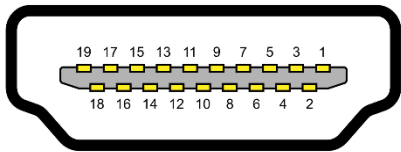
3. The Cable should be less than 3 meters to avoid signal attenuation.

2.4.9.1 HDMI In Connector 1 (CN16)



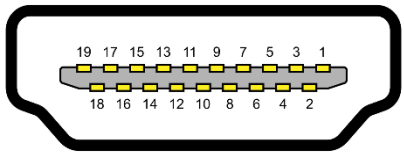
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.9.2 HDMI In Connector 2 (CN17)



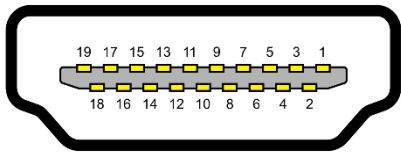
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.9.3 HDMI In Connector 3 (CN18)



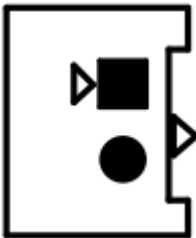
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.9.4 HDMI In Connector 4 (CN19)



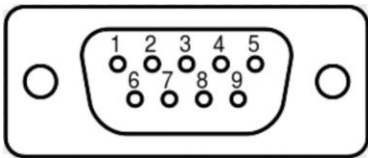
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

2.4.10 SATA Power 5V (CN20)



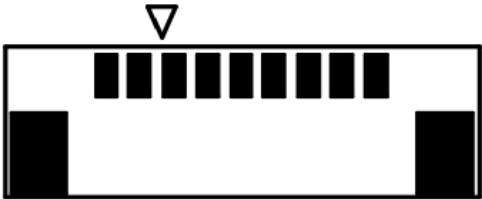
PIN	Signal	PIN	Signal
1	5V	2	GND

2.4.11 COM Port Connector 1 (CN22)



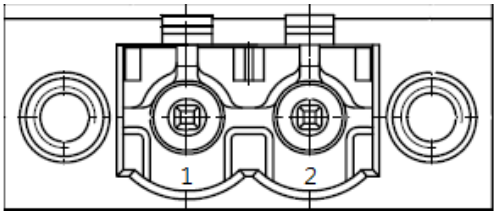
PIN	RS-232	RS-422	RS-485
1	-	TX-	RA-
2	RXD	TX+	RA+
3	TXD	RX+	-
4	-	RX-	-
5	GND	-	-
6	-	-	-
7	CAN0 L	CAN0 L	CAN0 L
8	CAN0 H	CAN0 H	CAN0 H
9	-	-	-

2.4.12 COM Port Connector 2 (Internal) (CN23)



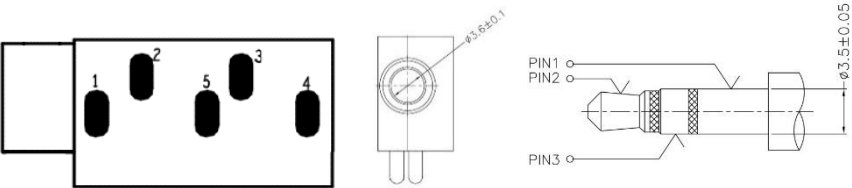
PIN	RS-232	RS-422	RS-485
1	-	TX-	RA-
2	-	-	-
3	RXD	TX+	RA+
4	-	-	-
5	TXD	RX+	-
6	-	-	-
7	-	RX-	-
8	-	-	-
9	GND	-	-

2.4.13 Power In Connector (CN27)



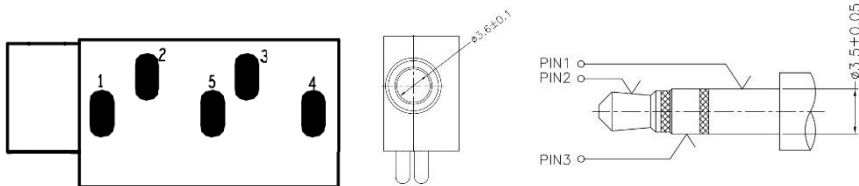
PIN	Signal	PIN	Signal
1	PWR_IN	2	GND

2.4.14 Line Out (CN33)



PIN	Signal	PIN	Signal
1	GND	2	LINE_L
3	LINE_R	4	-
5	-	-	-

2.4.15 Mic In (CN34)



PIN	Signal	PIN	Signal
1	GND	2	-
3	MIC_IN	4	-
5	-	-	-

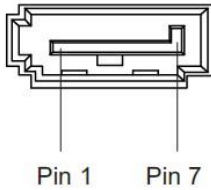
2.4.16 M.2 B-Key (CN38)

74	3.3 V/VBAT	CONFIG_2	75
72	3.3 V/VBAT	GND	73
70	3.3 V/VBAT	GND	71
68	SUSCLK(32kHz) (O)(0/3.3V)	CONFIG_1	69
66	SIM DETECT (O)	RESET# (O)(0/1.8V)	67
64	COEX_RXD (I)(0/1.8V)	ANTCTL3 (I)(0/1.8V)	65
62	COEX_TXD (O)(0/1.8V)	ANTCTL2 (I)(0/1.8V)	63
60	COEX3 (I/O)(0/1.8V)	ANTCTL1 (I)(0/1.8V)	61
58	NC	ANTCTL0 (I)(0/1.8V)	59
56	NC	GND	57
54	PEWAKE# (I/O)(0/3.3V)	REFCLKp	55
52	CLKREQ# (I/O)(0/3.3V)	REFCLKn	53
50	PERST# (O)(0/3.3V)	GND	51
48	GPIO_4 (I/O)(0/1.8V)	PETp0	49
46	GPIO_3 (I/O)(0/1.8V)	PETn0	47
44	GPIO_2 (I/O)/ALERT# (I)(0/1.8V)	GND	45
42	GPIO_1 (I/O)/SMB_DATA (I/O)(0/1.8V)	PERp0	43
40	GPIO_0 (I/O)/SMB_CLK (I/O)(0/1.8V)	PERn0	41
38	DEVSLP (O)	GND	39
36	UIM-PWR (I)	PETpI/USB31-Tx+/SSIC-TxP	37
34	UIM-DATA (I/O)	PETnI/USB31-Tx-/SSIC-TxN	35
32	UIM-CLK (I)	GND	33
30	UIM-RESET (I)	PERpI/USB31-Rx+/SSIC-RxP	31
28	GPIO_8 (I/O) (0/1.8V)	PERnI/USB31-Rx-/SSIC-RxN	29
26	GPIO_10 (I/O) (0/1.8V)	GND	27
24	GPIO_7 (I/O) (0/1.8V)	DPR (O) (0/1.8V)	25
22	GPIO_6 (I/O)(0/1.8V)	GPIO_11 (I/O) (0/1.8V)	23
20	GPIO_5 (I/O)(0/1.8V)	CONFIG_0	21
Key B		Key B	
Key B		Key B	
Key B		Key B	
Key B		Key B	
Key B		GND	11
10	GPIO_9/DAS/DSS (I/O)/LED_1# (I)(0/3.3V)	USB_D-	9
8	W_DISABLE# (O)(0/3.3V)	USB_D+	7
6	FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V)	GND	5
4	3.3 V	GND	3
2	3.3 V	CONFIG_3	1

2.4.17 M.2 E-Key (CN39)

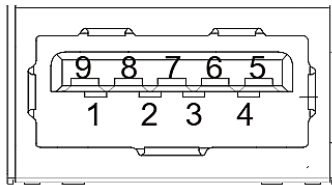
74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKn1	73
70	UIM_POWER_SRC/GPIO_1/PEWAKE1#	RESERVED/REFCLKp1	71
68	UIM_POWER_SNK/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	RESERVED/PERn1	67
64	RESERVED	RESERVED/PERp1	65
62	ALERT# (I)(0/1.8 V)	GND	63
60	I2C_CLK (O)(0/1.8 V)	RESERVED/PETm1	61
58	I2C_DATA (I/O)(0/1.8 V)	RESERVED/PETp1	59
56	W_DISABLE1# (O)(0/3.3V)	GND	57
54	W_DISABLE2# (O)(0/3.3V)	PEWAKE0# (I/O)(0/3.3V)	55
52	PERST0# (O)(0/3.3V)	CLKREQ0# (I/O)(0/3.3V)	53
50	SUSCLK(32kHz) (O)(0/3.3V)	GND	51
48	COEX_TXD (O)(0/1.8V)	REFCLKn0	49
46	COEX_RXD (I)(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 TXD (O)(0/1.8V)	GND	33
Key E		Key E	
Key E		Key E	
Key E		Key E	
Key E		Key E	
Key E		SDIO RESET#/TX_BLANKING (O)(0/1.8V)	23
22	UART RXD (I)(0/1.8V)	SDIO WAKE# (I)(0/1.8V)	21
20	UART WAKE# (I)(0/3.3V)	SDIO DATA3(I/O)(0/1.8V)	19
18	GND	SDIO DATA2(I/O)(0/1.8V)	17
16	LED_2# (I)(OD)	SDIO DATA1(I/O)(0/1.8V)	15
14	PCM_OUT/125 SD_OUT (O)(0/1.8V)	SDIO DATA0(I/O)(0/1.8V)	13
12	PCM_IN/125 SD_IN (I)(0/1.8V)	SDIO CMD(I/O)(0/1.8V)	11
10	PCM_SYNC/125 WS (I/O)(0/1.8V)	SDIO CLK/SYSCLK (O)(0/1.8V)	9
8	PCM_CLK/125 SCK (I/O)(0/1.8V)	GND	7
6	LED_1# (I)(OD)	USB_D-	5
4	3.3V	USB_D+	3
2	3.3V	GND	1

2.4.18 SATA Connector (CN40)



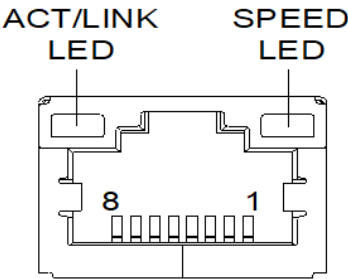
PIN	Signal	PIN	Signal
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND	-	-

2.4.19 USB 3.0 Connector (CN41)



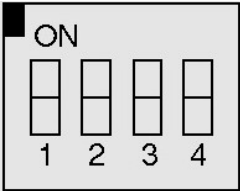
PIN	Signal	PIN	Signal
U1	VBUS	U2	(A)D-
U3	(A)D+	U4	GND
U5	(A)SSRX-	U6	(A)SSRX+
U7	GND	U8	(A)SSTX-
U9	(A)SSTX+	-	-

2.4.20 LAN (RJ-45) Port (CN42)



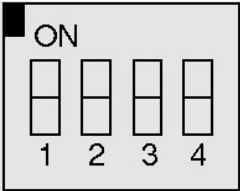
PIN	Signal	PIN	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

2.4.21 RS-232/422/485 Select-COM2 (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

2.4.22 RS-232/422/485 Select-COM1 (SW2)



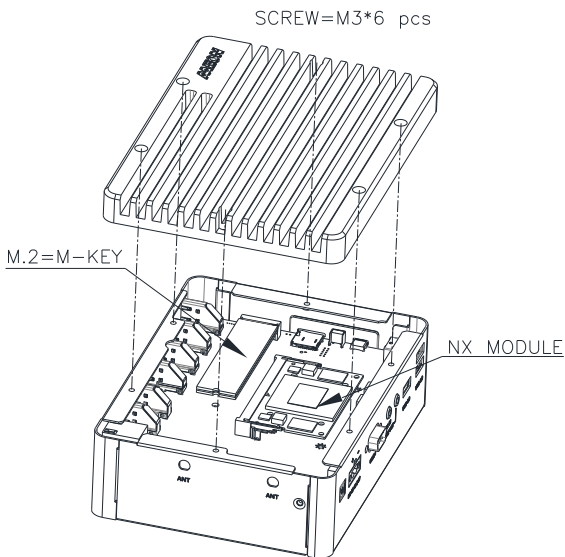
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On	-	-
1T/1R RS-422	On	Off	-	-
1T/1R RS-485	Off	On	-	-
Low power shutdown	Off	Off	-	-
250kbps for RS-232 and RS-485/RS-422	-	-	On	-
RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps	-	-	Off	-
Enable RS-422/RS-485 bias and termination resistors.	-	-	-	On
Disable RS-422/RS-485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

2.5 Hardware Assembly

This section details the hardware assembly steps for the BOXER-8256AI. Please read this section thoroughly before beginning installation and ensure you have all necessary components ready. A Phillips head screwdriver is required.

2.5.1 Module Access & M.2 M-Key Installation

The Xavier NX module is located under the top heat sink. To access, remove the six (6) screws securing the heatsink to the chassis, then lift the heatsink off. The module will be located as shown.

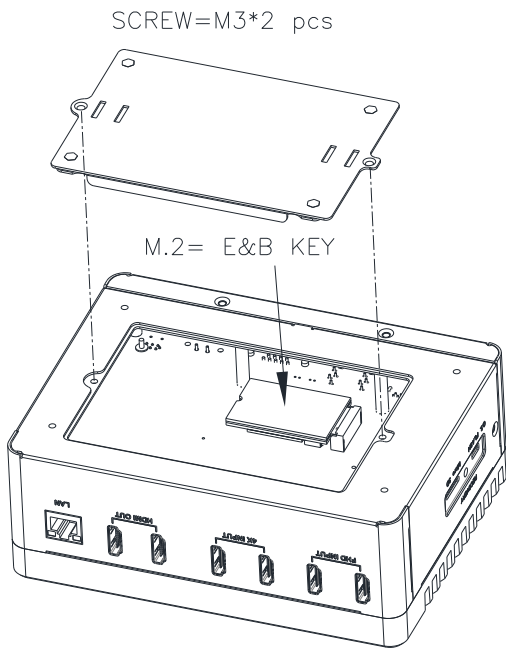


The M.2 M-Key (2280) slot is also located under the top heat sink, adjacent to the Xavier NX module. Follow standard procedures for expansion card installation, aligning the notch on the M.2 2280 SSD with the M.2 key slot. Note the location of the mounting screws.

2.5.2 M.2 E-Key and B-Key Installation

The M.2 E-Key (2230) and B-Key (3042/3052) slots are accessible by removing the bottom panel.

To access, remove the two (2) screws securing the bottom panel to the chassis, and then lift the panel off, as shown below.

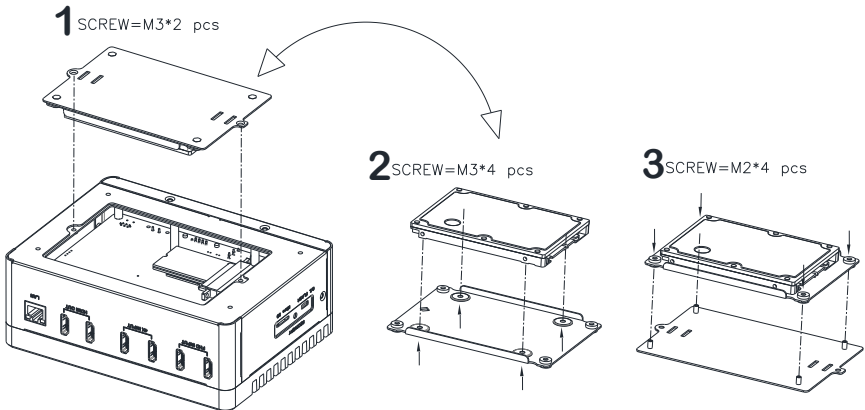


Follow standard procedures for expansion card installation, aligning the notch on each M.2 SSD with its respective key slot. For further information regarding the board location of each slot type, please refer to the module side diagram provided in section 2.2.

2.5.3 Hard Disk Drive (HDD) Installation

The hard disk drive bracket plate is accessible by removing the bottom panel.

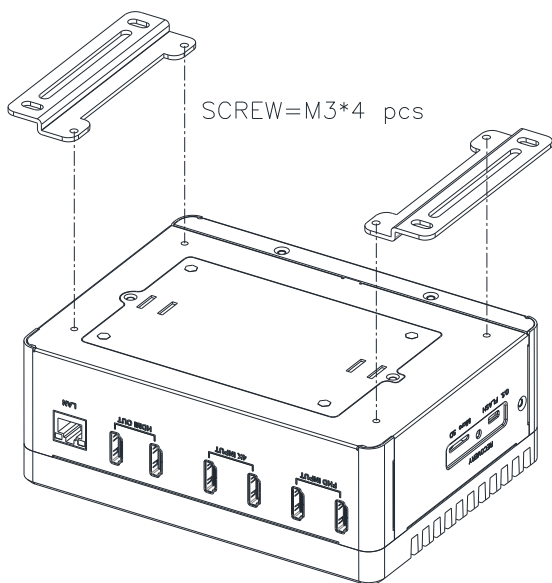
To access, remove the two (2) screws securing the bottom panel to the chassis, and then lift the panel off, as shown below.



Remove the baseplate, then place the HDD on the bracket plate, then insert and tighten the four (4) screws to secure the HDD to the bracket plate. Lastly, secure the structure to the bottom panel by inserting and tightening the outermost four (4) screws, as above.

2.5.4 Wall Mount Kit Installation

To install the wall mount kit, simply line up the brackets as shown and secure with four (4) screws (two for each bracket).



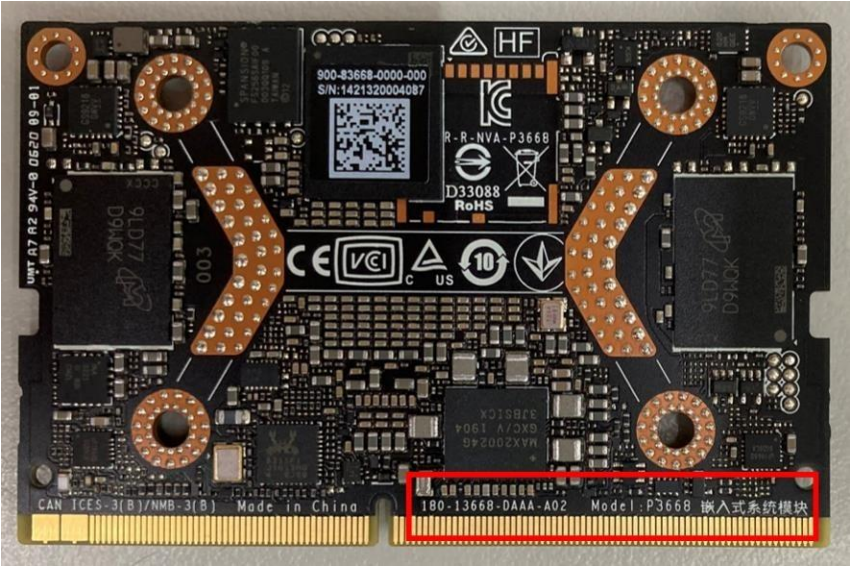
Chapter 3

OS Flash Guide

3.1 Before Installation

Before starting the process, make sure your BOXER-8256AI system is turned off and the power is disconnected. You will need a host PC running Ubuntu 18.04, and to ensure the NVIDIA Jetson Xavier NX module is installed onto the BOXER-8256AI carrier board system.

Note: Do not use a virtual machine as a host PC.



Download the compressed OS image file. The file name will follow the format of:

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

For example:

BOXER-8256AI.Ubuntu18.04_NXJP4.6.2_V1.0.0_23/06/2022

Note: Filename may differ from this example.

{OS_IF} is OS Information; e.g. Ubuntu18.04

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

{PJ_IF} is Project Information; e.g. BOXER-8256AI

{IMGV_IF} is Build Number; e.g. v1.0.0

{JPV_IF} is Jetpack Version; e.g. jp4.6.2

{BD_IF} is Build Date; e.g. 23/06/2022

Note: No spaces, special characters, Chinese or Japanese characters are allowed in the name of the folder where the file is stored, or in the upper folder.

3.2 Connecting to PC/Force Recovery Mode

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

```
$ tar -zxvf Internal.tar.gz
```

Note: Do not unzip the file (Internal.tar.gz) under Windows.

Next, perform the following steps 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-8256AI and the other end to an available USB port on the host PC.
2. Connect the BOXER-8256AI 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-8256AI should enter recovery mode.

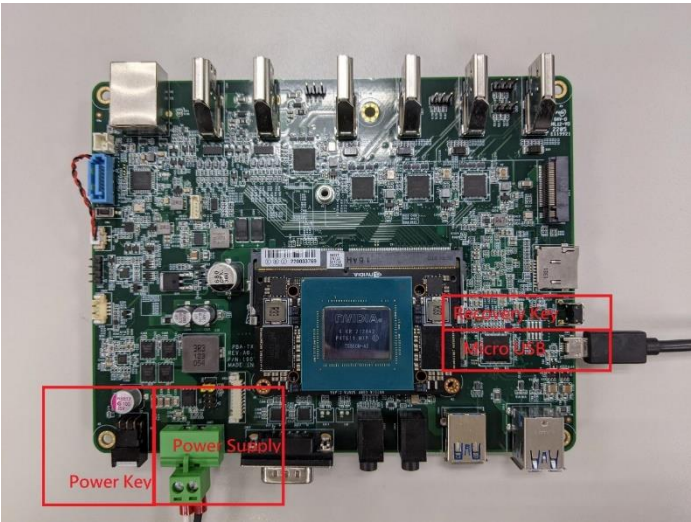
4. To check if device is in recovery mode, enter lsusb command in terminal on host.

```
$ lsusb | grep "0955:7e19"
```

If successful, the command will return "0955:7e19 Nvidia Corp"

```
Bus 001 Device 122: ID 0955:7e19 NVidia Corp.
```

Recovery mode can be initiated with the system disassembled. Ensure the NVIDIA Jetson Xavier NX 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-8256AI.

- 1) Open the terminal on Ubuntu host PC, then access the bootloader 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 finished 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.
```