

# BOXER-8256AI

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AI@Edge Fanless Embedded AI System  
with NVIDIA<sup>®</sup> Jetson Xavier<sup>™</sup> NX

User's Manual 1<sup>st</sup> Ed

## Copyright Notice

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## Packing List

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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

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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](http://AAEON.com) for the latest version of this document.

## Safety Precautions

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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

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### **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.*



## 产品中有毒有害物质或元素名称及含量

AAEON System

QO4-381 Rev.A0

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。

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。

**Hazardous and Toxic Materials List**

AAEON System

QO4-381 Rev.A0

Component Name	Hazardous or Toxic Materials or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBBS)	Polybrominated ethers (PBDES)
PCB and Components	X	O	O	O	O	O
Wires & Connectors for Ext.Connections	X	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU & RAM	X	O	O	O	O	O
HDD Drive	X	O	O	O	O	O
LCD Module	X	X	O	O	O	O
Optical Drive	X	O	O	O	O	O
Touch Control Module	X	O	O	O	O	O
PSU	X	O	O	O	O	O
Battery	X	O	O	O	O	O

This form is prepared in compliance with the provisions of SJ/T 11364.  
 O: The level of toxic or hazardous materials present in this component and its parts is below the limit specified by GB/T 26572.  
 X: The level of toxic of hazardous materials present in the component exceed the limits specified by GB/T 26572, but is still in compliance with EU Directive 2011/65/EU (RoHS 2).

Notes:

1. The Environment Friendly Use Period indicated by labelling on this product is applicable only to use under normal conditions.
2. Individual components including the CPU, RAM/memory, HDD, optical drive, and PSU are optional.
3. LCD Module and Touch Control Module only applies to certain products which feature these components.

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# Chapter 1

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Product Specifications

## 1.1 Specifications

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### 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 Requirement** DC 12-24V with 2-pin terminal block

## Mechanical

**Mounting** Wall-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 Weight** 4.23 lbs. (1.92 kg)

**Net Weight** 2.87 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 Humidity** 5 ~ 95% @ 40°C, non-condensing

**Anti-Vibration** 3.5Grms/ 5 ~ 500Hz/ operation – eMMC

**Anti-Shock** 50G, IEC 60068-2-27, half sine, 11 ms duration – eMMC

**Certification** CE/FCC class A

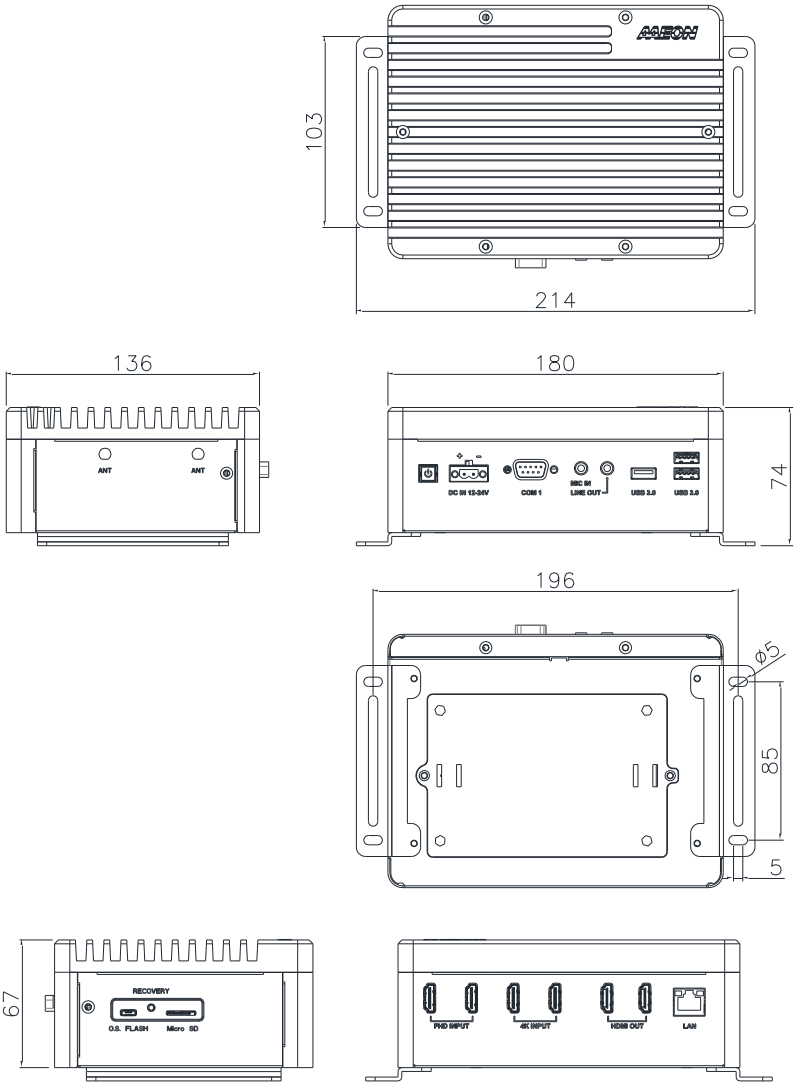
# Chapter 2

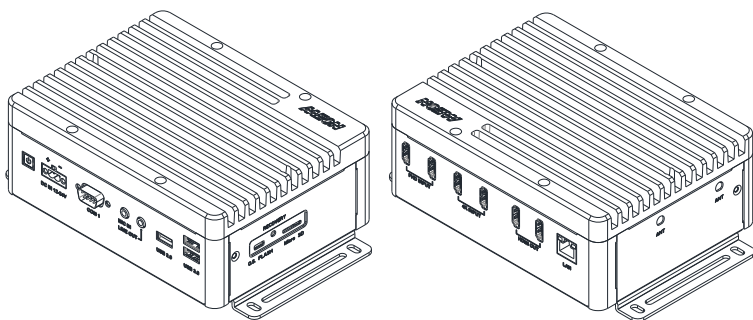
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Hardware Information



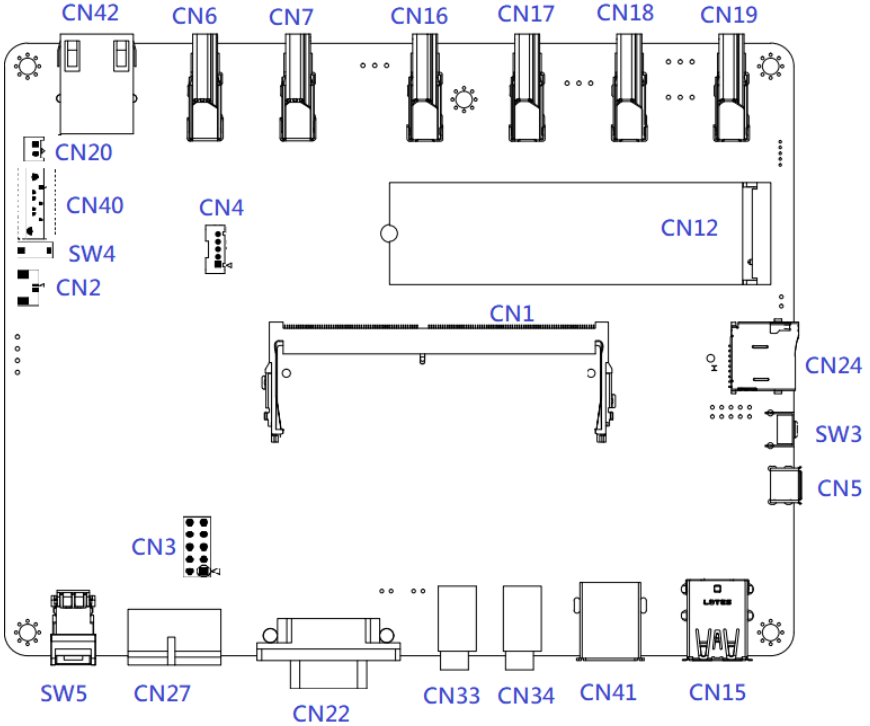
## 2.1 Dimensions



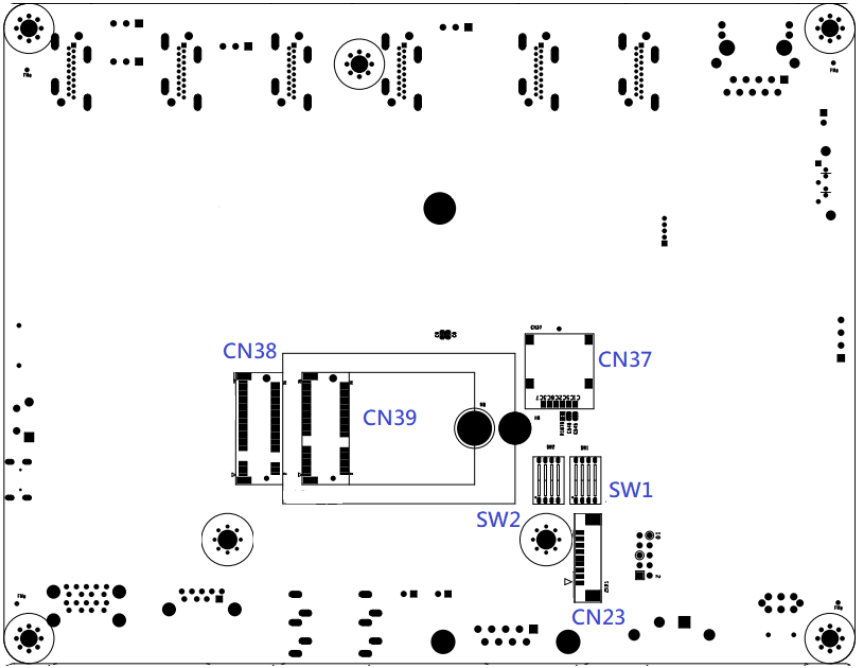


## 2.2 Jumpers and connectors

### 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.

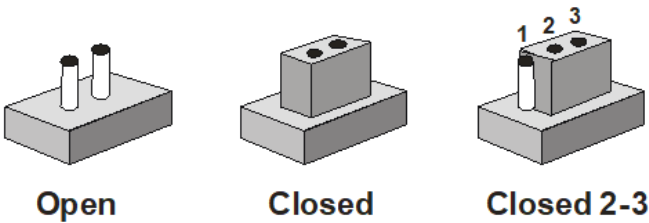
The table below shows the function of each of the board's jumpers.

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)

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CN3	Function
7-8	Open AT
7-8	Close ATX (Default)

## 2.4 List of Connectors

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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) <b>*Limitation of HDMI in</b>
CN17	HDMI In Connector (2160P@30/1080P@60) <b>*Limitation of HDMI in</b>
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)

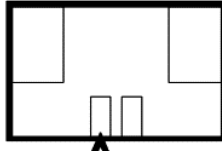
Signal Name	Pin # Top Odd	Pin # Bottom Even	Signal Name
GND	1	2	GND
CSI1 D0 N	3	4	CSI0 D0 N
CSI1 D0 P	5	6	CSI0 D0 P
GND	7	8	GND
CSI1 CLK N	9	10	CSI0 CLK N
CSI1 CLK P	11	12	CSI0 CLK P
GND	13	14	GND
CSI1 D1 N	15	16	CSI0 D1 N
CSI1 D1 P	17	18	CSI0 D1 P
GND	19	20	GND
CSI3 D0 N	21	22	CSI2 D0 N
CSI3 D0 P	23	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 HPD
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 HPD
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
PCI0 RX0 N	131	132	GND

Signal Name	Pin # Top Odd	Pin # Bottom Even	Signal Name
PCI0 RX0 P	133	134	PCI0 TX0 N
GND	135	136	PCI0 TX0 P
PCI0 RX1 N	137	138	GND
PCI0 RX1 P	139	140	PCI0 TX1 N
GND	141	142	PCI0 TX1 P
CAN RX	143	144	GND
CAN TX	145	146	GND
GND	147	148	PCI0 TX2 N
PCI0 RX2 N	149	150	PCI0 TX2 P
PCI0 RX2 P	151	152	GND
GND	153	154	PCI0 TX3 N
PCI0 RX3 N	155	156	PCI0 TX3 P
PCI0 RX3 P	157	158	GND
GND	159	160	PCI0 CLK N
USBSS RX N	161	162	PCI0 CLK P
USBSS RX P	163	164	GND
GND	165	166	USBSS TX N
PCI1 RX0 N	167	168	USBSS TX P
PCI1 RX0 P	169	170	GND
GND	171	172	PCI1 TX0 N
PCI1 CLK N	173	174	PCI1 TX0 P
PCI1 CLK P	175	176	GND
GND	177	178	MOD SLEEP*
PCI0 WAKE*	179	180	PCI0 CLKREQ*
PCI0 RST*	181	182	PCI1 CLKREQ*
PCI1 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 MDI1 N
I2C1 SDA	191	192	GBE MDI1 P
I2S0 DOUT	193	194	GBE LED ACT
I2S0 DIN	195	196	GBE MDI2 N
I2S0 FS	197	198	GBE MDI2 P
I2S0 SCLK	199	200	GND
GND	201	202	GBE MDI3 N
UART1 TXD	203	204	GBE MDI3 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)

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PIN	Signal
1	+3V
2	GND

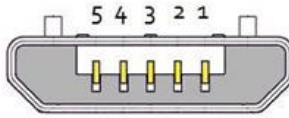
## 2.4.3 UART Debug Port Connector (CN4)

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

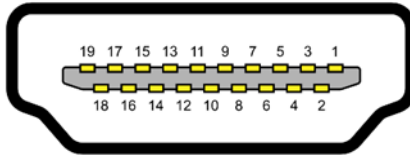
### 2.4.4 USB 2.0 Flash Connector (CN5)



USB Micro-B

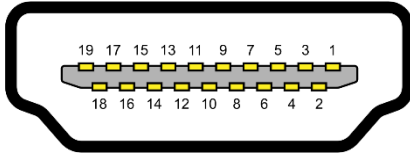
PIN	Signal	PIN	Signal
1	VBUS	2	D-
3	D+	4	-
5	GND	-	-

### 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)



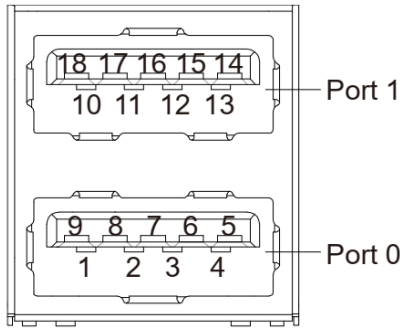
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

## 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:

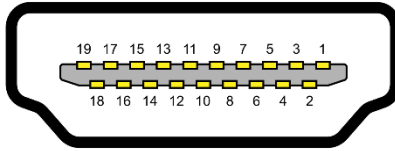
1. The HDMI source needs to have a stable output and pass the HDMI 2.0 signal integrity.
2. The HDMI cable should be certified and pass at least HDMI V2.0 standard.

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.

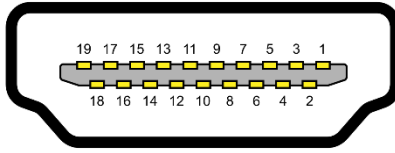
### 2.4.9.1 HDMI In Connector 1 (CN16)



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	-	-

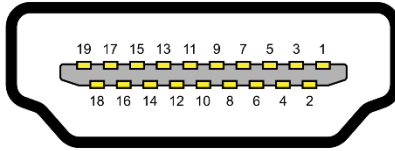


### 2.4.9.2 HDMI In Connector 2 (CN17)



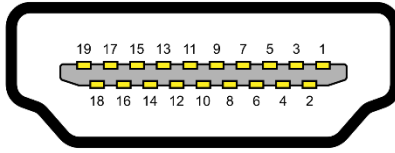
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

### 2.4.9.3 HDMI In Connector 3 (CN18)



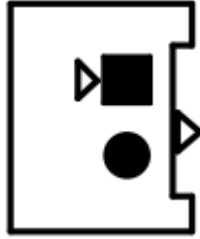
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

### 2.4.9.4 HDMI In Connector 4 (CN19)



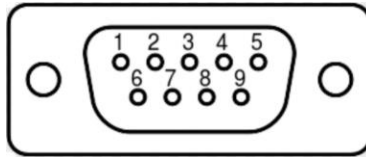
PIN	Signal	PIN	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP	-	-

## 2.4.10 SATA Power 5V (CN20)



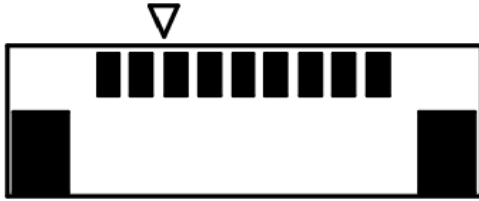
PIN	Signal	PIN	Signal
1	5V	2	GND

## 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	-	-	-

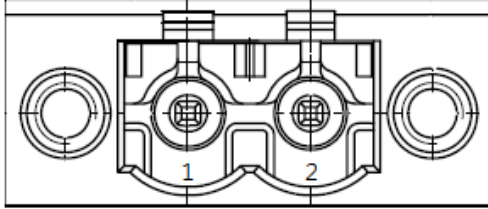
## 2.4.12 COM Port Connector 2 (Internal) (CN23)



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)

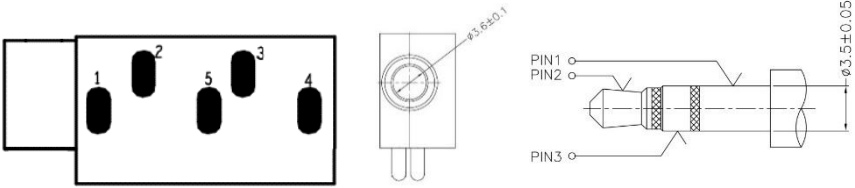
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PIN	Signal	PIN	Signal
1	PWR_IN	2	GND

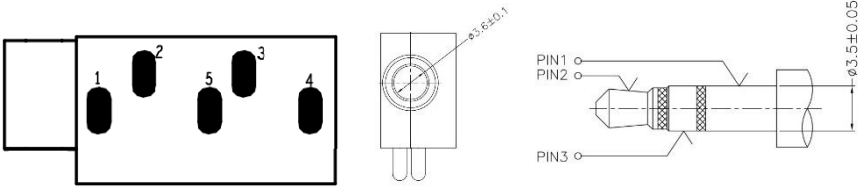
---

## 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	-	-	-



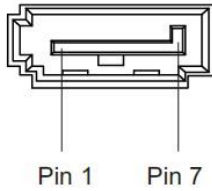
## 2.4.16 M.2 B-Key (CN38)

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)	PETp1/USB31-Tx+/SSIC-TxP	37
34	UIM-DATA (I/O)	PETn1/USB31-Tx-/SSIC-TxN	35
32	UIM-CLK (I)	GND	33
30	UIM-RESET (I)	PERp1/USB31-Rx+/SSIC-RxP	31
28	GPIO_8 (I/O) (0/1.8V)	PERn1/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)

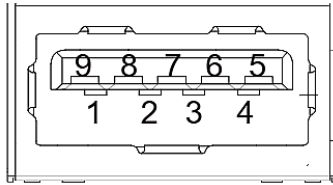
74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKn1	73
70	UIM_POWER_SRC/GPIO_1/PEWAKE1#	RESERVED/REFCLKp1	71
68	UIM_POWER_SNK/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	RESERVED/PERn1	67
64	RESERVED	RESERVED/PERp1	65
62	ALERT# (I)(0/1.8 V)	GND	63
60	I2C_CLK (O)(0/1.8 V)	RESERVED/PETm1	61
58	I2C_DATA (I/O)(0/1.8 V)	RESERVED/PETp1	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)
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)



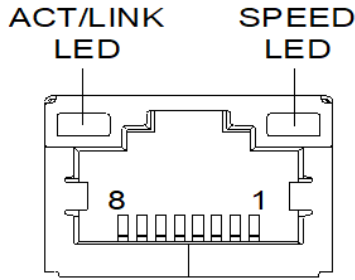
PIN	Signal	PIN	Signal
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND	-	-

## 2.4.19 USB 3.0 Connector (CN41)



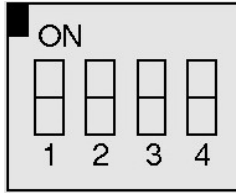
PIN	Signal	PIN	Signal
U1	VBUS	U2	(A)D-
U3	(A)D+	U4	GND
U5	(A)SSRX-	U6	(A)SSRX+
U7	GND	U8	(A)SSTX-
U9	(A)SSTX+	-	-

## 2.4.20 LAN (RJ-45) Port (CN42)



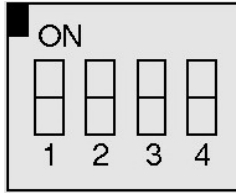
PIN	Signal	PIN	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

## 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)



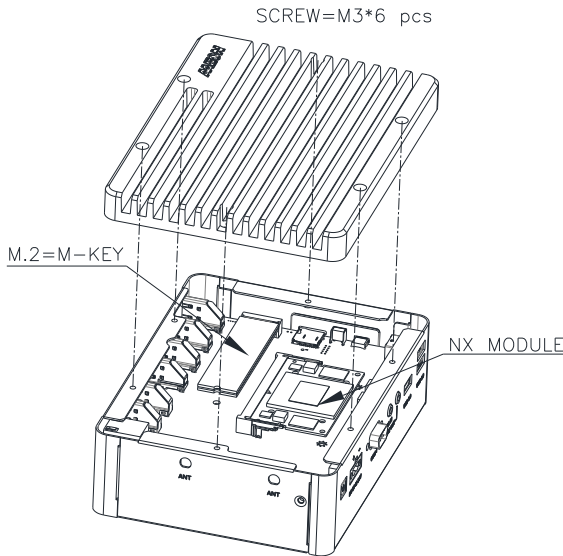
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On	-	-
1T/1R RS-422	On	Off	-	-
1T/1R RS-485	Off	On	-	-
Low power shutdown	Off	Off	-	-
250kbps for RS-232 and RS-485/RS-422	-	-	On	-
RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps	-	-	Off	-
Enable RS-422/RS-485 bias and termination resistors.	-	-	-	On
Disable RS-422/RS-485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

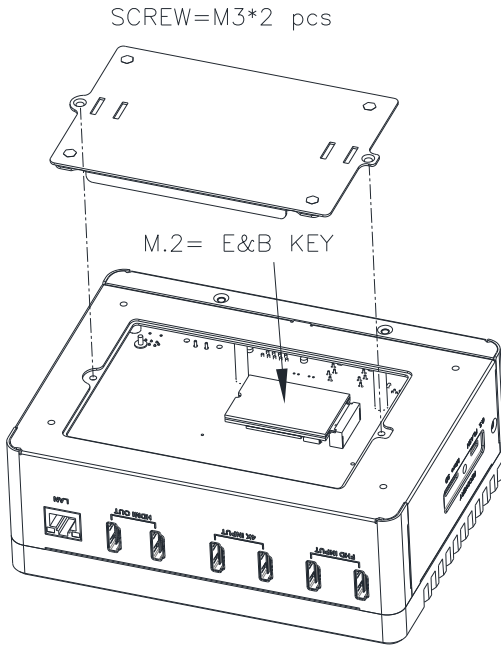


The M.2 M-Key (2280) slot is also located under the top heat sink, adjacent to the Xavier NX module. Follow standard procedures for expansion card installation, aligning the notch on the M.2 2280 SSD with the M.2 key slot. Note the location of the mounting screws.

## 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.



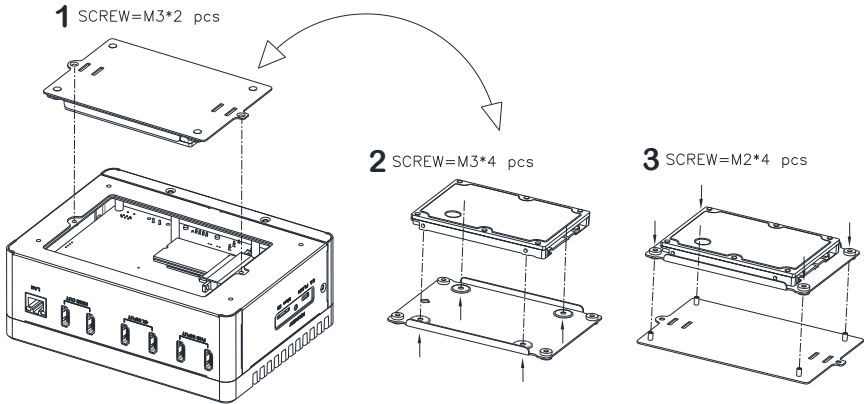
Follow standard procedures for expansion card installation, aligning the notch on each M.2 SSD with its respective key slot. For further information regarding the board location of each slot type, please refer to the module side diagram provided in section 2.2.



## 2.5.3 Hard Disk Drive (HDD) Installation

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

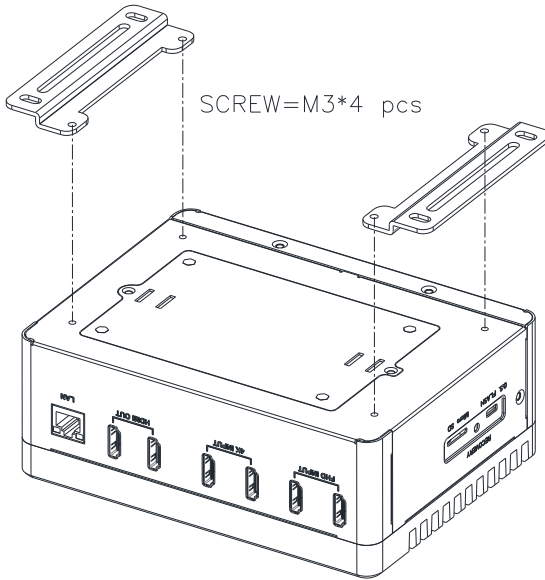
To access, remove the two (2) screws securing the bottom panel to the chassis, and then lift the panel off, as shown below.



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

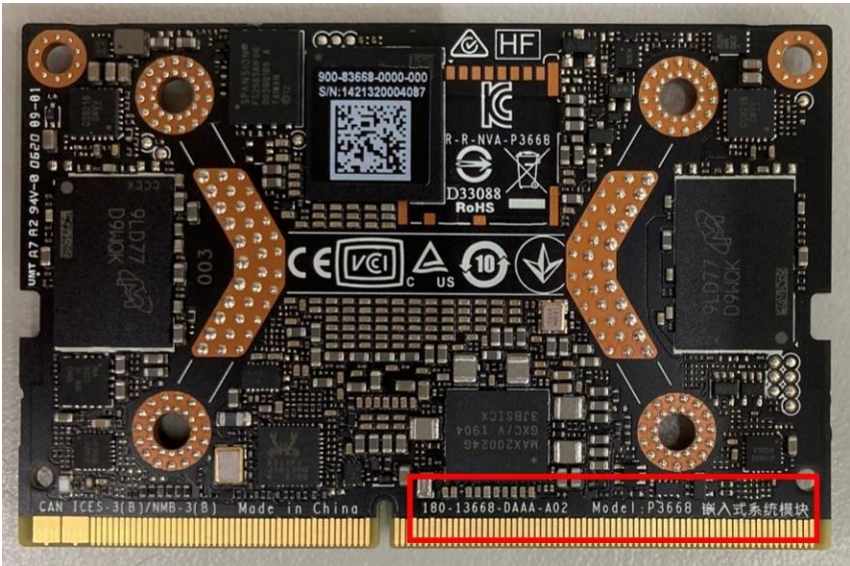
---

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.

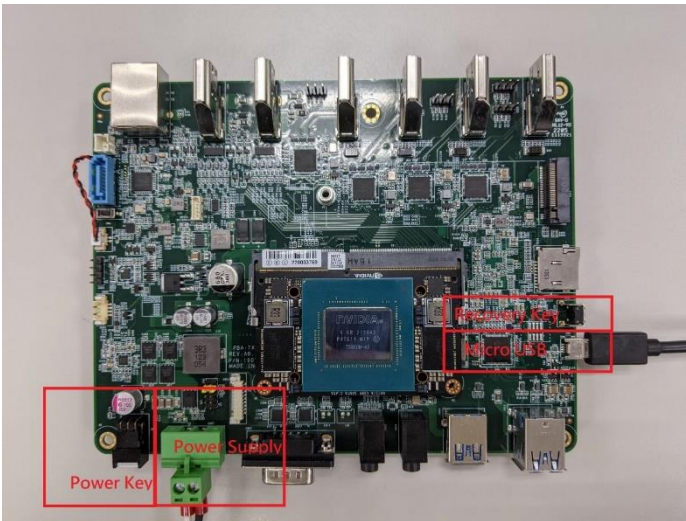
4. To check if device is in recovery mode, enter lsusb command in terminal on host.

```
$ 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 ] tegrarc_m_v2 --chip 0x23 --ismb2
[ 883.0363 ] MB2 version 01.00.0000
[ 883.1397 ]
[ 883.1399 ] Coldbooting the device
[ 883.1443 ] tegrarc_m_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.
```