BOXER-8224AI

AI@Edge Embedded System with
NVIDIA® Jetson Nano™

User's Manual 4th Ed

Copyright Notice

AI@Edge Embedded System

BOXER-8224AI

Acknowledgements

All other products' name or trademarks are properties of their respective owners.

- NVIDIA®, the NVIDIA logo, Jetson™, NVIDIA Jetpack™, and Jetson Nano™ are trademarks of the NVIDIA Corporation

- Arm® and Cortex® are registered trademarks of Arm Limited.

- ITE is a trademark of Integrated Technology Express, Inc.

- IBM and VGA are trademarks of International Business Machines Corporation.

- Ubuntu is a registered trademark of Canonical

- Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries

All other product names or trademarks are properties of their respective owners. No ownership is implied or assumed for products, names or trademarks not herein listed by the publisher of this document.

Packing List

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

Item	Quantity
● BOXER-8224AI (with NVIDIA® Jetson Nano™)	1
● Development Cable Kit (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 AC 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 主板/子板/背板   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	×	○	○	○	○	○

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：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。

China RoHS Requirement (EN)

Name and content of hazardous substances in product

AAEON Main Board/Daughter Board/Backplane   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	×	〇	〇	〇	〇	〇
Connector and Cable	×	〇	〇	〇	〇	〇

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

〇：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: This product defined period of use is under normal condition.

Table of Contents

Chapter 1

Product Specifications

1.1   Specifications

System	
AI Accelerator	NVIDIA® Jetson Nano™
CPU	Quad-Core ARM® Cortex®-A57 Processor
System Memory	4GB 64-Bit LPDDR4 25.6GB/s
Storage Device	16GB eMMC 5.1
	MicroSD Slot x 1
Display Interface	Mini HDMI x 1 for HDMI 2.0
Ethernet	Giga LAN x 2 (via 2x10-Pin Wafer)
I/O	USB 3.2 Gen 1 x 4 (via 2x19-Pin Wafer)
	Mini HDMI x 1 for HDMI 2.0
	RS-232/485 (via 2x9-Pin Wafer)
	UART x 1 and I2C x 2 (via 1x9-Pin Wafer)
	5V Output (via 1x2-Pin Wafer)
	GPIO x 6 (via 1x9-Pin Wafer)
	MIPI Connector x 2 for MIPI Camera
	Micro USB for Flash OS x 1
	Recovery Button x 1
	Reset Button x 1 and Power Button x 1 (via Pin Header)
Expansion	M.2 2230 E-Key x 1 (Wi-Fi/BT)
	Mini Card x 1 (LTE)
	MicroSD x 1
	SIM Card Slot x 1
OS Support	Linux (NVIDIA Jetpack™ 4.6 and above)

Power Supply

Power Requirement	12V ~ 24V DC with Wafer Connector

Mechanical

Mounting	-
Dimensions (W x D x H)	4.7" x 3.1" x 0.7" (120mm x 80mm x 19.7mm)
	SOM + Carrier Board Only
Gross Weight	0.45 lb. (0.2Kg)
Net Weight	0.23 lb. (0.1Kg)

Environmental

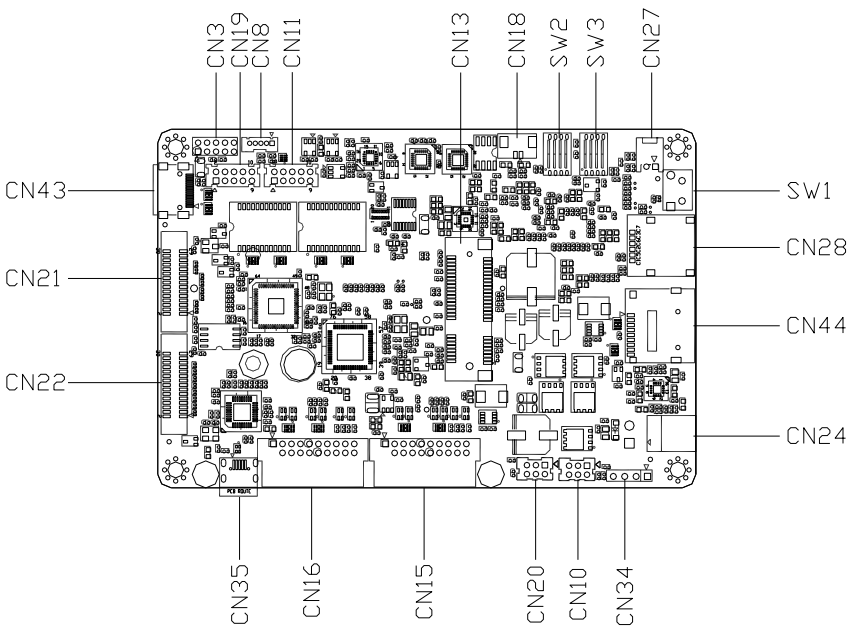|	
Operating Temperature	-4°F ~ 140°F (-20°C ~ 60°C) with 0.5 m/s airflow
Storage Temperature	-49°F ~ 176°F (-45°C ~ 80°C)
Storage Humidity	5 ~ 95% @ 40°C, non-condensing
Anti-Vibration	3.5Grm / 5~500Hz
Anti-Shock	-
Certification	CE / FCC Class A

Chapter 2

Hardware Information

2.1 Dimensions
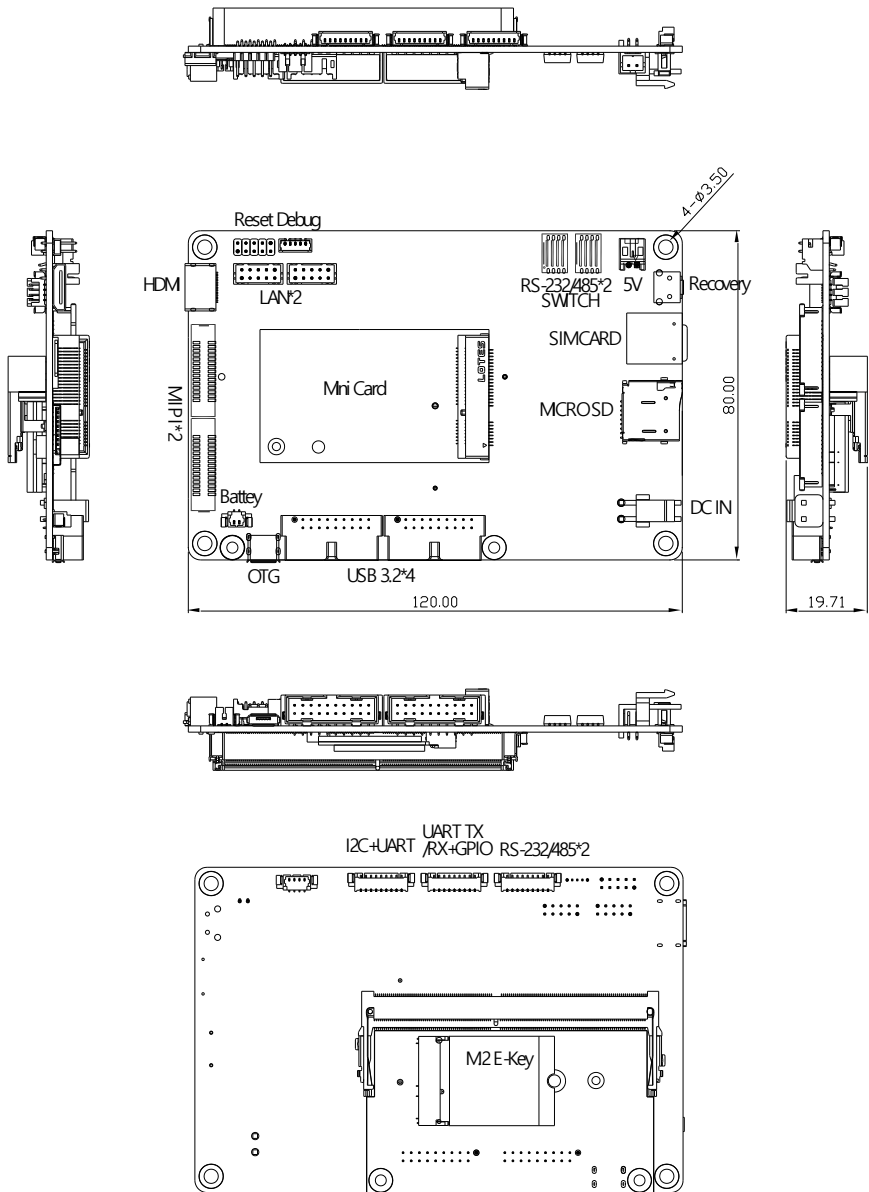
2.2   Jumpers and Connectors

Component Side

Solder Side
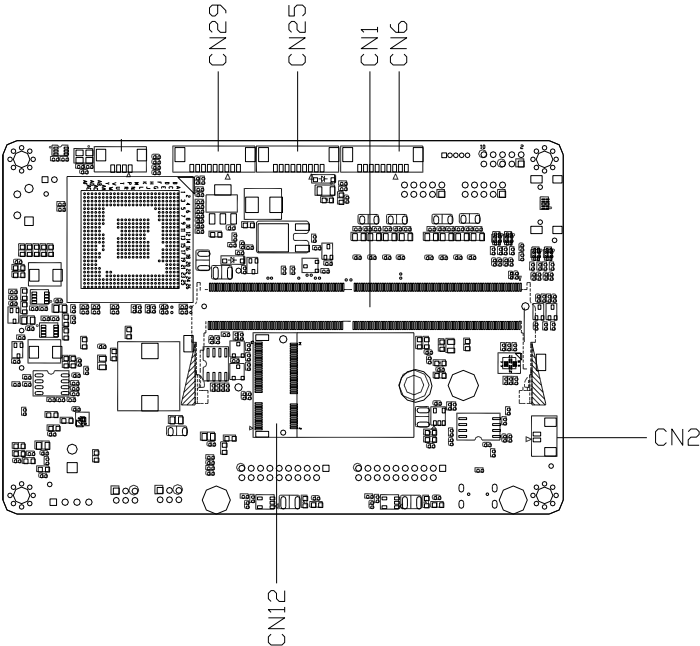
2.3   List of Jumpers

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	Front Panel Conn (AT/ATX Selection)

2.3.1   Setting Jumpers

You can configure your system 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**
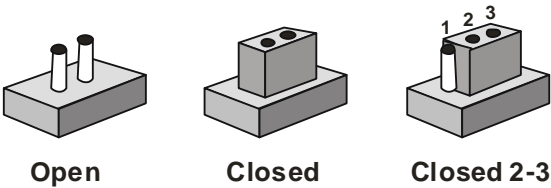
A pair of needle-nose pliers may be helpful when working with jumpers.
If you have any questions about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.
Generally, you simply need a standard cable to make most connections.

2.3.2 Front Panel Conn (AT/ATX Mode Selection) (CN3)

The AT/ATX Mode Select functions by connecting pins 7 and 8 of CN3. To prevent

damage to the system, do not connect pins 7 and 8 to any other pin.

CN3 Pins 7-8	Function
7-8 Open	AT Power Mode (Default)
7-8 Closed	ATX Power Mode

2.4 List of Connectors

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

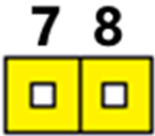The table below shows the function of each of the board's connectors.

Label	Function
CN1	NVIDIA Slot
CN2	RTC Battery Connector
CN3	Front Panel Connector (DIP.2.0mm)
CN6	RS-232/485 2x9P Wafer (SMD.1.25mm)
CN8	UART Debug Header (DIP.Pitch=1.25mm.5P.180D)
CN10	NVIDIA RTL Giga LAN LED Connector (WAFER BOX.6P.180D(M).2.0mm)
CN11	NVIDIA RTL Giga LAN Connector (BOX.5*2P.180D(M).DIP.2.0mm)
CN12	M.2 2230 E-Key Slot
CN13	Mini PCIe Slot
CN15	USB 3.2 Gen 1 (1x19P Wafer 1) (BOX HEADER.10*2P.90D.(M).DIP.2.0mm)
CN16	USB 3.2 Gen 1 (1x19P Wafer 2) (BOX HEADER.10*2P.90D.(M).DIP.2.0mm)
CN18	NVIDIA I2C Port
CN19	Intel I210-AT Giga LAN Connector (BOX.5*2P.180D(M).DIP.2.0mm)
CN20	Intel I210-AT Giga LAN LED Connector (WAFER BOX.6P.180D(M).2.0mm)
CN21	MIPI 15P/30P 15P Connector 1 (FPC Connector 1.0mm.SMD.30 Pin)
CN22	MIPI 15P/30P 15P Connector 2 (FPC Connector 1.0mm.SMD.30 Pin)
CN24	2-Pin DC-In Connector
CN25	6-Pin GPIO Connector (WAFER BOX.9P.90D(M).SMD.1.25mm)
CN27	VDD 5V Output (WAFER BOX.2P.90D(M).2.0mm)
CN28	Mini Card SIM Slot
CN29	I2C/UART 1x9-Pin Wafer (WAFER BOX.9P.90D(M).SMD.1.25mm)
CN34	MCU FW Connector
CN35	Recovery Micro USB Port
CN43	Mini HDMI Connector
CN44	Micro SD Card Slot
SW2	COM 1 RS-232/485 Select
SW3	COM 2 RS-232/485 Select
SW1	Recovery Button

2.4.1 RTC Battery Connector (CN2)
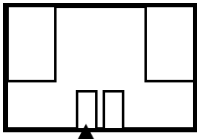
Pin	Signal	Pin	Signal
1	+3V	2	GND

2.4.2 Front Panel Connector (CN3)
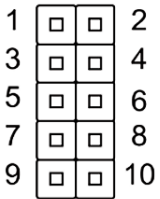
Pin	Signal	Pin	Signal
1	Button PWR ON	2	GND
3	FORCE_RECOVERY	4	GND
5	PMIC_SYS_RST	6	GND
7	BMCU_ACOK	8	GND
9	VDD 3.3V	10	GND

2.4.3 Recovery Micro USB Port (CN35)
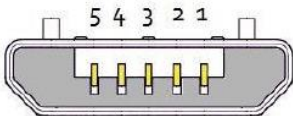
USB Micro-B

Pin	Signal	Pin	Signal
1	+5V	2	USB-
3	USB+	4	NC
5	GND		

2.4.4 Mini HDMI Connector (CN43)
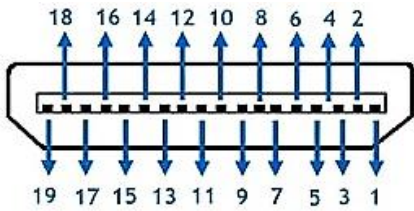
Pin	Signal	Pin	Signal
1	GND	2	DATA2+
3	DATA2-	4	GND
5	DATA1+	6	DATA1-
7	GND	8	DATA0+
9	DATA0-	10	GND
11	Diff clock+	12	Diff Clock-
13	GND	14	HDMI_CEC
15	HDMI_DDC_SCL	16	HDMI_DDC_SDA
17	NC	18	HDMI_VDD_5V
19	HDMI_HPD		

2.4.5 NVIDIA RTL Giga LAN LED Connector (CN10)
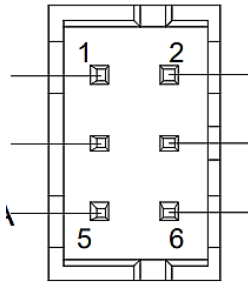
Pin	Signal	Pin	Signal
1	VDD 3V	2	GBE_LED0_ACT#
3	VDD 3V	4	GBE_LED2_1000#
5	VDD 3V	6	NC-

2.4.6   Intel I210-AT Giga LAN LED Connector (CN20)
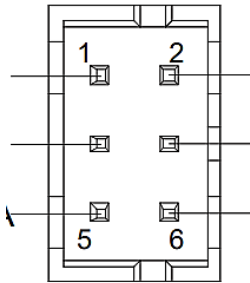
Pin	Signal	Pin	Signal
1	VDD 3V	2	LAN1_LED_LNK#_ACT
3	VDD 3V	4	LAN1_LINK1000#
5	VDD 3V	6	LAN1_LINK100#

2.4.7   USB 3.2 Gen 1 1x19P Wafer (CN15/CN16)
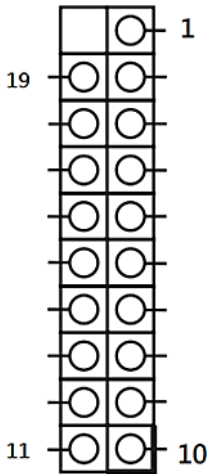
Pin	Signal	Pin	Signal
1	H1_VCC_USB2	2	USB3_RX12_N_C
3	USB3_RX12_P_C	4	GND
5	USB3_TX12_N_C	6	USB3_TX12_P_C
7	GND	8	USB12-
9	USB12+	10	NC

Pin	Signal	Pin	Signal
11	USB11+	12	USB11-
13	GND	14	USB3_TX11_P_C
15	USB3_TX11_N_C	16	GND
17	USB3_RX11_P_C	18	USB3_RX11_N_C
19	H1_VCC_USB1		

2.4.8   RS-232/485 2x9P Wafer, Dual COM Port (CN6)
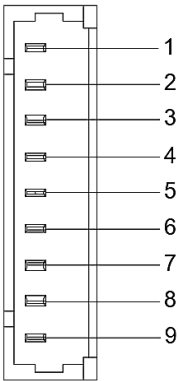
Pin	Signal	Pin	Signal
1	TB_RB_1	2	TB_RB_2
3	TA_RA_1	4	TA_RA_2
5	RA_1	6	RA_2
7	RB_1	8	RB_2
9	GND		

2.4.9   GPIO 1x9P Wafer (CN25)
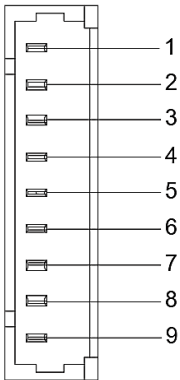
Pin	Signal	Pin	Signal
1	VDD 3V	**2**	VDD 5V
3	GPIO1	**4**	GPIO2
5	GPIO3	**6**	GPIO4
7	GPIO5	**8**	GPIO6
9	GND		

2.4.10   UART Debug Header (CN8)
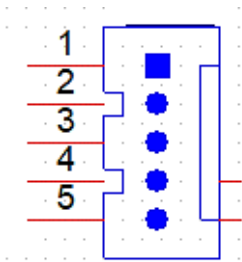
Pin	Signal	Pin	Signal
1	3.3V	**2**	UART0_TXD_HDR
3	UART0_RXD_HDR	**4**	GND
5	GND		

2.4.11   MicroSD Card Slot (CN44)
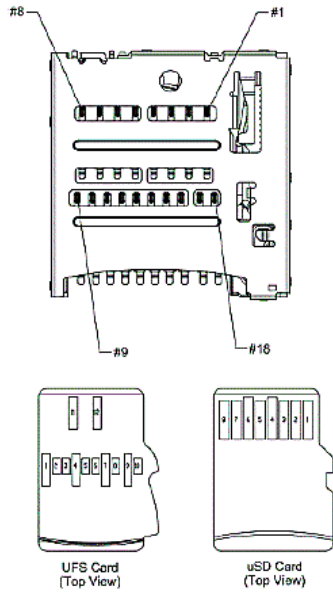
Pin	Signal	Pin	Signal
1	DATA2	2	DATA3
3	SDCARD_CMD R	4	VDD
5	SDCARD_CLK	6	VSS
7	DATA0	8	DATA1
9	SDCARD_CD_L	10	GND

2.4.12 M.2 2230 E-Key Slot (CN12)
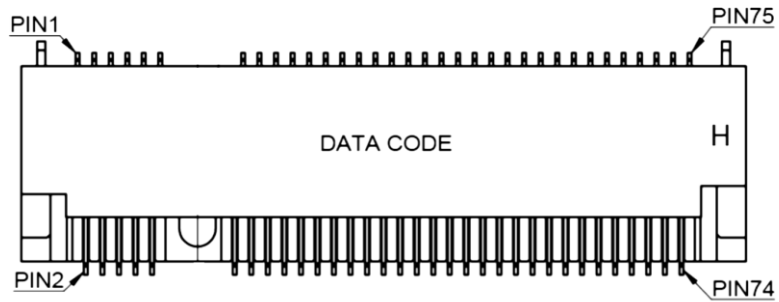
Pin	Pin Name	Signal Type	Pin	Pin Name	Signal Type	Signal Level
1	GND		**2**	+3.3V	PWR	+3.3V
3	USB+		**4**	+3.3V	PWR	+3.3V
5	USB-		**6**	NC		
7	NC		**8**	I2S3_CLK		
9	NC		**10**	I2S3_LRCLK		
11	NC		**12**	I2S3_SDIN		
13	NC		**14**	NC		
15	NC		**16**	NC		
17	NC		**18**	GND		
19	NC		**20**	BT_M2_WAKE_AP_3V3		
21	NC		**22**	NC		
23	NC					
			32	NC		
33	GND	GND	**34**	NC		
35	PEX_TX6_P		**36**	NC		
37	PEX_TX6_N		**38**	NC		
39	GND	GND	**40**	NC		
41	PEX_RX6_P		**42**	NC		
43	PEX_RX6_N		**44**	NC		
45	GND	GND	**46**	NC		
47	P2_REFCLKP		**48**	NC		
49	P2_REFCLKN		**50**	SUSCLK_32KHZ		
51	GND		**52**	RESET#		

Pin	Pin Name	Signal Type	Pin	Pin Name	Signal Type	Signal Level
53	DPE_CLKREQN2		54	W_DISABLE2		
55	PCIE_WAKE#_L		56	W_DISABLE1		
57	NC		58	GEN3_I2C_SDA		
59	NC		60	GEN3_I2C _CLK		
61	NC		62	M2_E_ALERT		
63	GND		64	NC		
65	NC		66	NC		
67	NC		68	NC		
69	GND		70	NC		
71	NC		72	+3.3V	PWR	+3.3V
73	NC		74	+3.3V	PWR	+3.3V
75	GND	GND				

2.4.13   Mini Card SIM Slot (CN28)
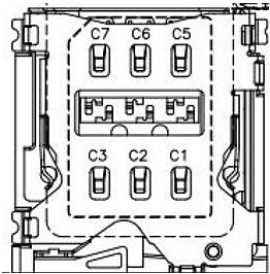
Pin	Signal	Pin	Signal
1	VCC	2	RST
3	CLK	4	GND
5	VPP	6	DATA

2.4.14   NVIDIA RTL Giga LAN Connector (CN11)
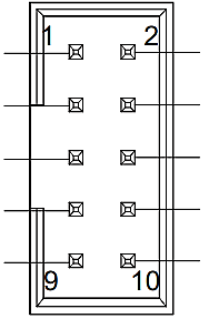
Pin	Signal	Pin	Signal
1	GBE_MX+1	2	GBE _MX-1
3	GBE _MX+2	4	GBE _MX-2
5	GND	6	GND
7	GBE _MX+3	8	GBE _MX-3
9	GBE _MX+4	10	GBE _MX-4

2.4.15   Intel I210-AT Giga LAN Connector (CN19)
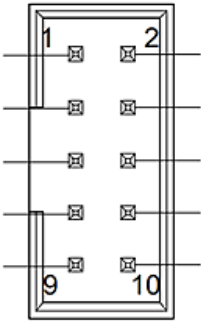
Pin	Signal	Pin	Signal
1	L1_MX+1	2	L1_MX-1
3	L1_MX+2	4	L1_MX-2
5	GND	6	GND
7	L1_MX+3	8	L1_MX-3
9	L1_MX+3	10	L1_MX-4

2.4.16   VDD 5V Output (CN27)
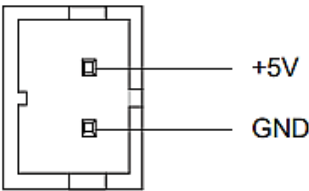
Pin	Signal	Pin	Signal
1	5V	2	GND

2.4.17   2-Pin DC-In Connector (12 ~ 24V) (CN24)
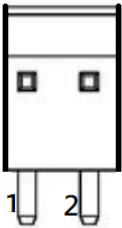
Pin	Signal	Pin	Signal
1	PWR_IN	2	GND

2.4.18   COM 1 RS-232/485 Select (SW2)
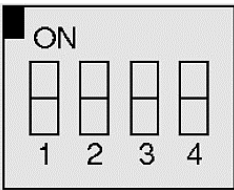
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On	-	-
1T/1R RS-485	Off	On	-	-
Enable RS-485 Bias and termination resistors	-	-	On	-
Disable RS-485 Bias and termination resistors	-	-	Off	-
250kbps for RS-232 and RS-485	-	-	-	On

Mode	S-1	S-2	S-3	S-4
RS-232 to 3Mbps and RS-485 to 20Mbps	-	-	-	Off

2.4.19   COM 2 RS-232/485 Select (SW3)

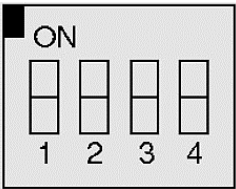| Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On	-	-
1T/1R RS-485	Off	On	-	-
Enable RS-485 Bias and termination resistors	-	-	On	-
Disable RS-485 Bias and termination resistors	-	-	Off	-
250kbps for RS-232 and RS-485	-	-	-	On
RS-232 to 3Mbps and RS-485 to 20Mbps	-	-	-	Off

2.4.20   I2C/UART 1x9-Pin Wafer (CN29)
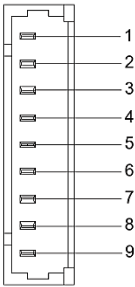
Pin	Signal	Pin	Signal
1	ID_I2C_SCL	2	ID_I2C_SDA
3	USB_UART_RXD	4	USB_UART_RTS#
5	USB_UART_TXD	6	USB_UART_CTS#
7	GEN2_I2C_SCL	8	GEN2_I2C_SDA
9	GND	-	-

2.4.21   MIPI 15P/30P 15P Connector (CN21/CN22)
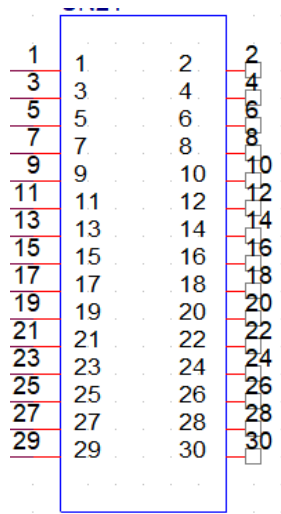
15/30 Pin #	15 Pin Name	Description
1	GND	Ground
3	CAM_D0_N	MIPI Data Lane 0 Negative
5	CAM_D0_P	MIPI Data Lane 0 Positive
7	GND	Ground
9	CAM_D1_N	MIPI Data Lane 1 Negative
11	CAM_D1_P	MIPI Data Lane 1 Positive
13	GND	Ground
15	CAM_CK_N	MIPI Clock Lane Negative
17	CAM_CK_P	MIPI Clock Lane Positive
19	GND	Ground
21	CAM_IO0	Power Enable
23	CAM_IO1	LED Indicator/Xclk
25	CAM_SCL	I2C SCL
27	CAM_SDA	I2C SDA
29	CAM_3V3	3.3V Power Output
2	NA	
4	NA	
6	NA	
8	NA	
10	NA	
12	NA	

15/30 Pin #	15 Pin Name	Description
14	NA	
16	NA	
18	NA	
20	NA	
22	NA	
24	NA	
26	NA	
28	NA	
30	NA	

Note: NVIDIA® Jetson Nano™ CSI0 for CN21.

Note: NVIDIA® Jetson Nano™ CSI2 for CN22.

2.4.22   Mini PCIe Slot (CN13)
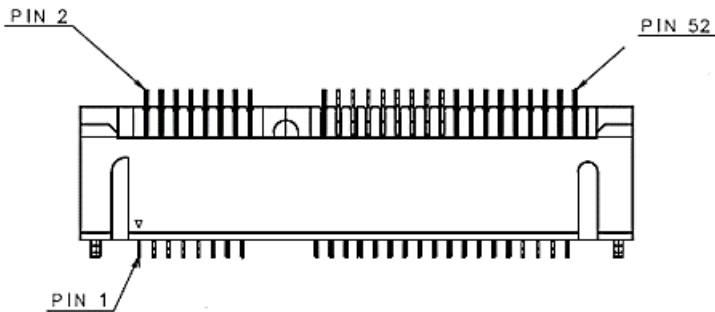
Pin	Pin Name	Signal Type	Signal Level
1	PCIE_WAKE#	IN	
2	+3.3VSB	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	N/A
8	UIM_PWR	PWR	
9	GND	GND	
10	UIM_DATA	I/O	
11	PCIE_REF_CLK-	DIFF	N/A

Pin	Pin Name	Signal Type	Signal Level
12	UIM_CLK	IN	
13	PCIE_REF_CLK+	DIFF	N/A
14	UIM_RST	IN	
15	GND	GND	
16	UIM_VPP	PWR	
17	NC		
18	GND	GND	
19	NC		
20	W_DISABLE#	OUT	+3.3V
21	GND	GND	
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RX-	DIFF	N/A
24	+3.3VSB	PWR	+3.3V
25	PCIE_RX+	DIFF	N/A
26	GND	GND	
27	GND	GND	
28	+1.5V	PWR	+1.5V
29	GND	GND	
30	SMB_CLK	I/O	+3.3V
31	PCIE_TX-	DIFF	N/A
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+	DIFF	N/A
34	GND	GND	
35	GND	GND	
36	USB_D-	DIFF	
37	GND	GND	
38	USB_D+	DIFF	
39	+3.3VSB	PWR	+3.3V
40	GND	GND	
41	+3.3VSB	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		
45	NC		
46	NC		
47	NC		
48	+1.5V	PWR	+1.5V
49	NC		
50	GND	GND	

| Pin	Pin Name	Signal Type	Signal Level
51	NC		
52	+3.3VSB	PWR	+3.3V

2.5   Hardware Assembly

This section details the hardware assembly steps for the BOXER-8224AI. Please read this section thoroughly before beginning installation and ensure you have all necessary peripheral hardware ready.

2.5.1   MIPI Camera Installation

Step 1: Locate CN21 and/or CN22, depending on your desired configuration. Please see section 2.2 for guidance on the location of these connectors.

Step 2: Unlock and pull up the actuator for CN21/CN22, as below.
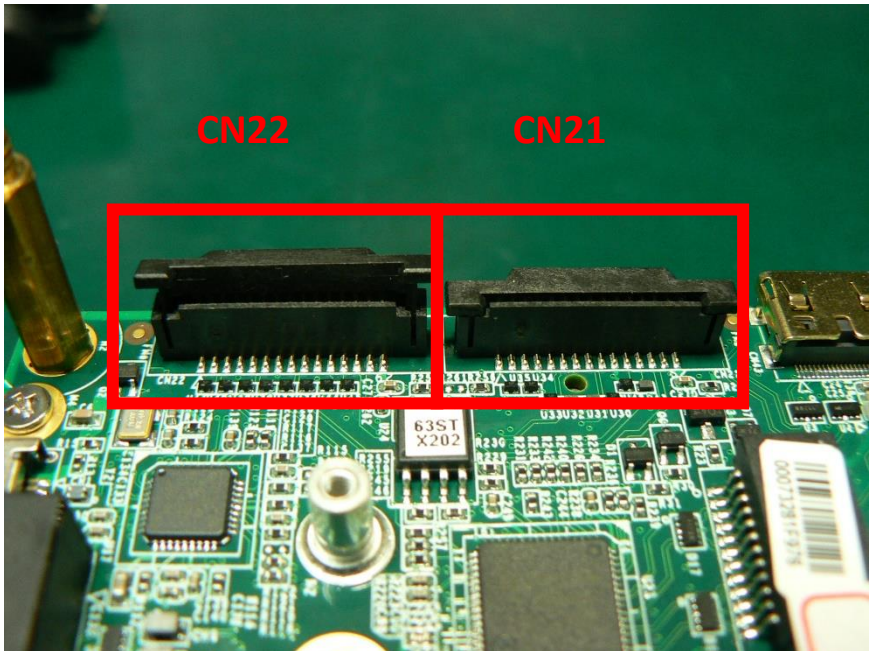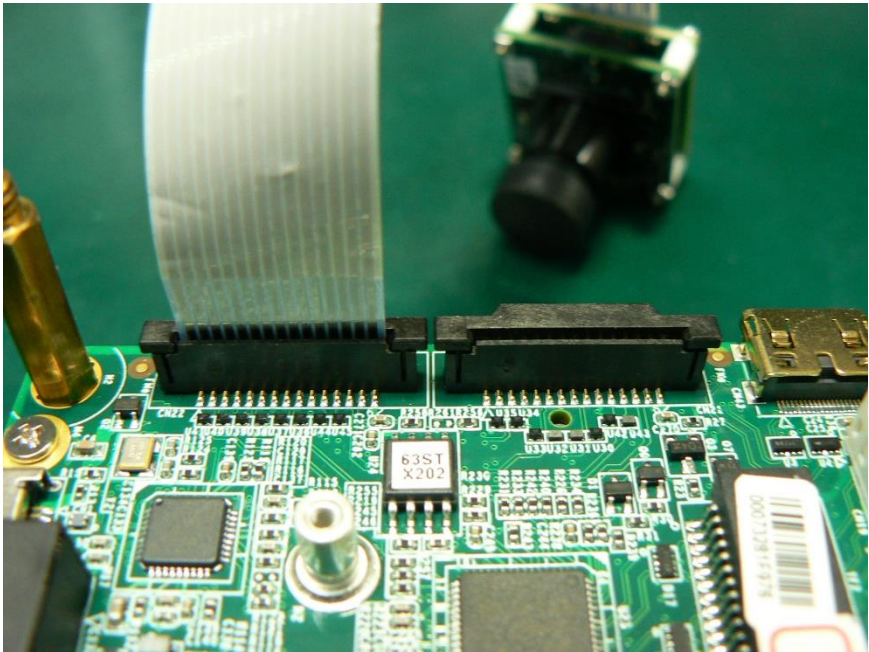

Note: Take care not to break the actuator when pulling.

Step 3: Insert the FPC Cable into the connector, ensuring the conductive side of the cable is facing the board side.
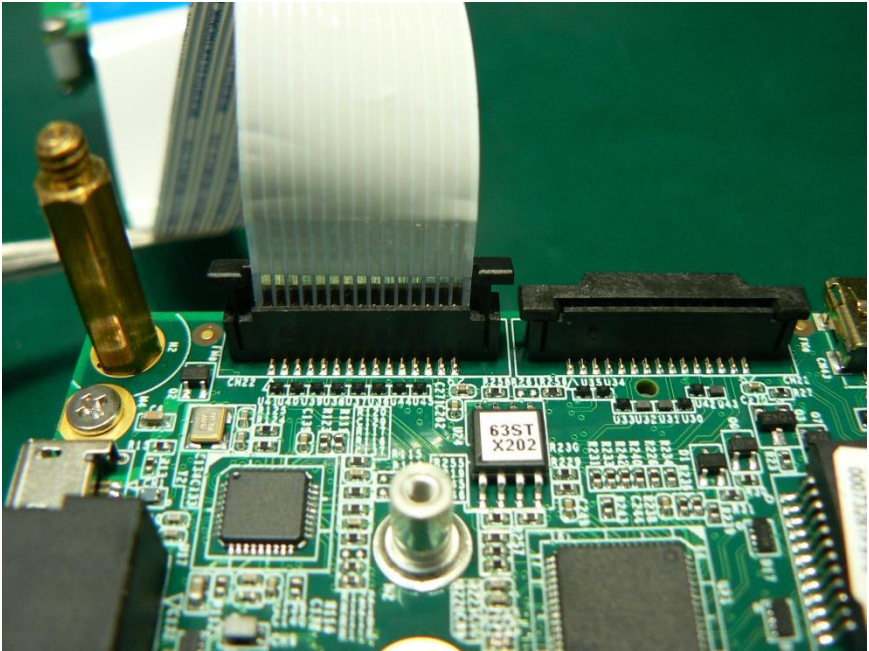
Step 4: Lock, then press the actuator.

Chapter 3

BSP Flash Guide

3.1   Flash OS Image to System

3.1.1   Before Installation

Before starting the process make sure your BOXER-8224AI system is turned off and the power is disconnected. You will need a Host PC running Ubuntu 18.04, and ensure the NVIDIA Jetson Nano module is installed onto the BOXER-8224AI 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.

```
[ 753]: l4t_flash_from_kernel: Warning: skip writing UDA partition as no image is specified
writing item=64, 1:3:secondary_gpt, 31272713728, 16896, gpt_secondary_1_3.bin, 16896, fixed-<reserved>-0, fb4ffa6d6a9160e9e03a22316c2ac656edb52ed9
[ 753]: l4t_flash_from_kernel: Successfully flash the emmc
[ 753]: l4t_flash_from_kernel: Flashing success

Reboot target
Run command: sync; nohup reboot &>/dev/null & exit on root@fe80::1%enp0s20f0u3
SSH ready
Success
Cleaning up...
```

Download the compressed BSP image file "BOXER_8224AI_JP4.6.2_A00_1.0.0.tar.gz" into the Host PC's Ubuntu 18.04 directory.

Note: No spaces, special characters, non-English characters are allowed in the name of the folder where the file is stored or in the upper folder. Please set Ubuntu 18.04 language to 'English' and format to 'United States'.

If you have any questions or need help, please contact AAEON support or your AAEON representative for assistance.

3.1.2 Connecting to PC/Force Recovery Mode

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

$ sudo tar -zxvf BOXER_8224AI_JP4.6.2_A00_1.0.0.tar.gz

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

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-8224AI, and the other end to an available USB port on the Host PC.

2.   Connect the BOXER-8224AI 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-8224AI should then enter recovery mode.

4.   To check if the device is in recovery mode, enter 'lsusb' command below in Host terminal.

$ lsusb | grep "0955:7f21"

If successful, the command will return "0955:7f21 Nvidia Corp", as below.

Bus 001 Device 035: ID 0955:7f21 NVIDIA Corp.

Recovery mode can't be initiated with the NVIDIA Jetson Nano module disassembled. Ensure the NVIDIA Jetson Nano module is installed and refer to the image below and section 2.2 to perform the steps:

3.1.3   Flash Image to Board

Use the following steps to flash the OS to the BOXER-8224AI.

1)   Open Ubuntu Host PC terminal, then access the folder you extracted in the

previous section.

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

$ ./flashboxer.sh emmc

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

```
[ 753]: l4t_flash_from_kernel: Warning: skip writing UDA partition as no image is specified
writing item=64, 1:3:secondary_gpt, 31272713728, 16896, gpt_secondary_1_3.bin, 16896, fixed-<reserved>-0, fb4ffa6d6a9160e9e03a22316c2ac656edb52ed9
[ 753]: l4t_flash_from_kernel: Successfully flash the emmc
[ 753]: l4t_flash_from_kernel: Flashing success

Reboot target
Run command: sync; nohup reboot &>/dev/null & exit on root@fe80::1%enp0s20f0u3
SSH ready
Success
Cleaning up...
```

3.1.4   Check BSP Version

After successfully flashing image to board, the system will automatically reboot, then user should check the BSP version to see if the correct version of BSP was flashed.

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

You will see the product name with version and date

BOXER-8224AI_J4.6.2_A00_1.0.0_20221118

The version name will follow the format of:

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

For example:

BOXER-8224AI_J4.6.2_A00_1.0.0_20221118

Note: File name may differ from this example.

{PJ_IF} is Project Information; e.g. BOXER-8224AI

{IMGV_IF} is Build Version; e.g. 1.0.0

{JPV_IF} is Jetpack Version; e.g. J4.6.2

{BD_IF} is Build Date; e.g. 20221118

Appendix A

Glue Removal Procedure

A.1　　Removing Glue from Your System

To protect components from damage and ensure proper operation out of the box, glue may have been applied to some cables or connectors to keep them in place during shipping. This glue must be removed before attempting to swap components or perform maintenance. This section details the steps needed to remove the glue.

Before performing any kind of system maintenance, ensure the system is shut down (not in sleep or hibernate mode) and the power cable has been removed. Follow steps in Chapter 2 to access the components inside.

You will need the following items for this step:

- Cotton or cotton swab
- Anti-static tweezers
- An alcohol solution that is at least 99.5% alcohol (ethanol solution or denatured alcohol). AAEON recommends using an eye dropper or a bottle with a nozzle as in the picture below:
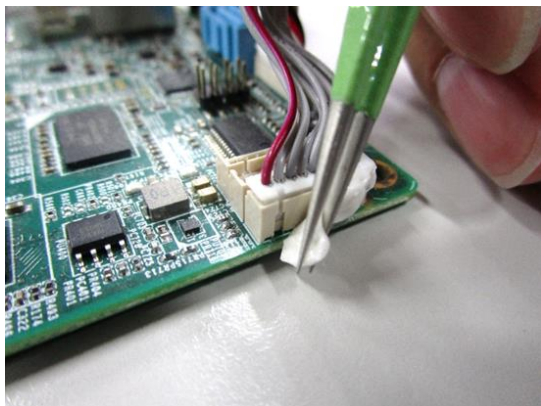
Step 1: Using an eyedropper or bottle as shown above, apply a few drops of alcohol to the glue.

Step 2: Allow the alcohol to soak for 10 seconds, then use a cotton swab or cotton with anti-static tweezers to evenly rub the alcohol over the glue.
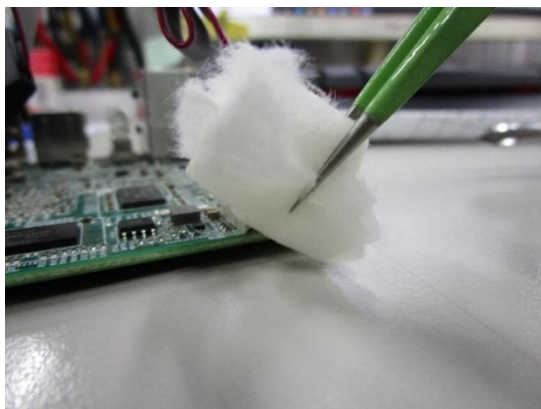
Step 3: Let soak for 10 more seconds, then use anti-static tweezers to remove the glue.

If you encounter any issues or need support, please contact your AAEON representative or visit our Support Page at AAEON.com

Appendix B

Mating Connector & Cable List

B.1 List of Mating Connectors and Cables

Conn	Function	Cable P/N	Description	9651822400, BOXER-8224AI Development Cable kit (Optional)
CN24	3P DC in	170X000563	30cm 3P DC in Cable	1pcs
CN24	DC Jack in	170X000561	25cm DC Power JACK	-
CN6	Dual COM Port	170X000569	27cm Dual D-sub 9P Male Cable	1pcs
CN25	6P GPIO	170X000570	25cm 9P GPIO Male Cable	1pcs
CN29	Dual I2C + UART	170X000571	25cm D-SUB 9P Female I2C with UART Cable	1pcs
CN43	HDMI Out	170X000575	100cm HDMI Mini HDMI to TYPE A HDMI Cable	1pcs
CN11/ CN19	LAN RJ45	170X000607	20cm RJ45 LAN Cable	2pcs
CN10/ CN20	LAN LED	170X000606	30cm LAN LED (100/1000 Mbps and Active LED)	2pcs
CN16/ CN15	Dual Port USB 3.0	1700190450	45cm Dual port USB3.0 Cable	2pcs