BOXER-8170AI

Compact Fanless Embedded AI@Edge Box PC

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-8170AI	1
● Power Connector	1
● Screw Pack	1
● Wallmount bracket	2

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 on 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 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 diphenyl 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.

Table of Contents

Chapter 1

Product Specifications

1.1   Specifications

System	
CPU	HMP Dual Denver 2 + Quad ARM A57
Chipset	N/A
System Memory	8GB LPDDR4
AI Solution	NVidia Jetson TX2
Display Interface	HDMI 2.0 x2
Storage Device	32GB eMMC 5.1
	MicroSD
Ethernet	10/100/1000 Base-TX x 1
	IEEE 802.3 af PoE LAN x 4
I/O	RJ-45 x 4 for PoE+ (802.af) (Total 60W)
	IEEE 802.3af PoE x4 60W total power budget
	HDMI Type A x 2 for HDMI 2.0
	USB Type A x 4 for USB 3.0
	DB-9 x2 for RS-232/485 (Jump Select)
	Power On/Off Button x 1
	DC-In 2-pin terminal block x 1
	USB OTG x 1
	12~24V DC-in Power Input x 1
	SMA Antenna Holes x 2
Expansion	SATA x 1 (option)
	USB 2.0 x 1 (option)
	2 Channel CANBUS x 1 (option)
	YUR for Debug x 1

System

Indicator	Power LED
OS Support	Linux (AAEON ACLinux 4.4, Compliance with Ubuntu 16.04)

Power Supply

Power Requirement	12~24V with 2-pin terminal block

Mechanical

Mounting	Wallmount
Dimensions (W x H x D)	180 mm (W) x 48 mm (H) x 136 mm (D)
Gross Weight	6.39 lbs. (2.9 kg)
Net Weight	4.73 lbs. (2.15 kg)

Environmental

Operating Temperature	-20°C ~ 50°C (according to IEC68-2-14 with 0.5 m/s air flow ; with industrial devices)
Storage Temperature	-40°C ~ 80°C
Storage Humidity	5~95% @ 40°C, non-condensing
Anti-Vibration	3 Grms/ 5 ~ 500Hz/ operation
Certification	CE/FCC class A

1.2   Product Notice

**OTG:** OTG port is ideally for flashing image only.

COM1: Support 1.8 meter length cable when baud rate is 115200bps and 15 meter cable when baud rate is 9600bps.

USB ports: USB ports do not support USB DVD-ROM because of file system.

Storage Devices: Operating System must be installed on the eMMC drive. SATA Port can only be used for optional storage expansion drives.
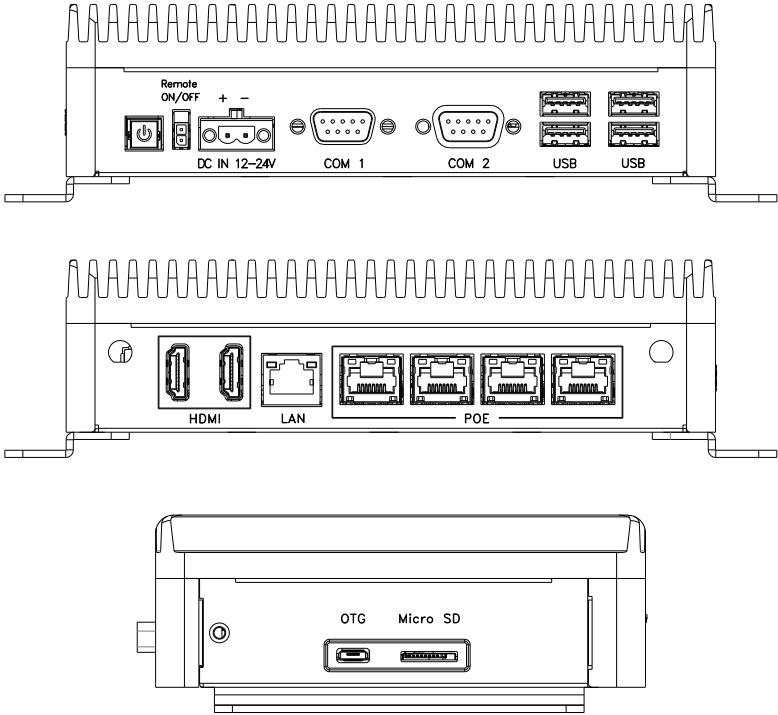
LAN LED Status: LED Status for 10/100 BASE-T is not supported.
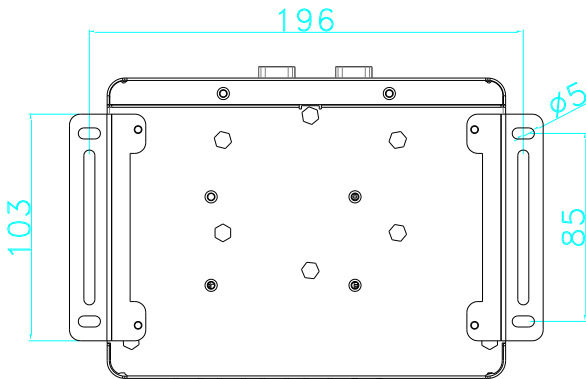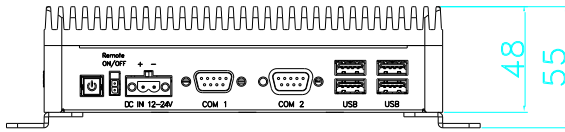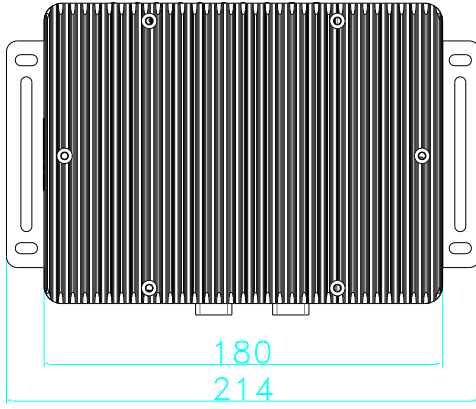
LAN LED Indicator Behavior
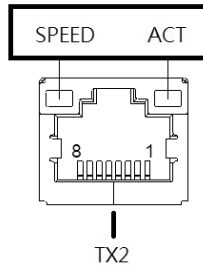
Chapter 2

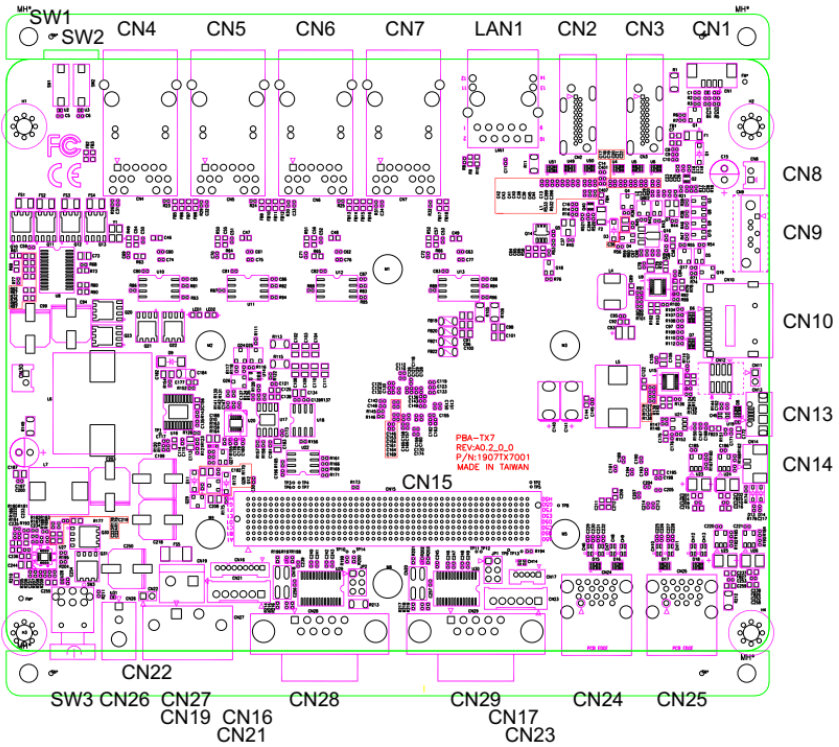Hardware Information

2.1   Dimensions

136

OTG   Micro SD
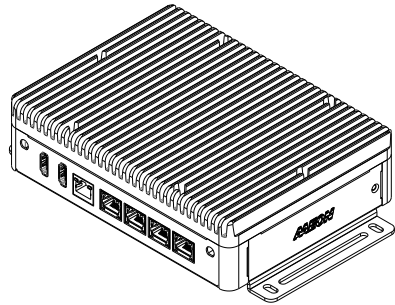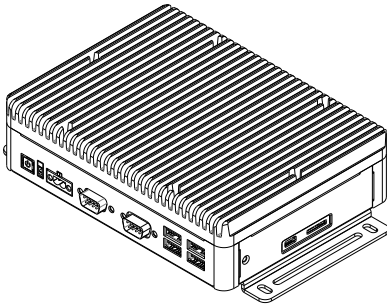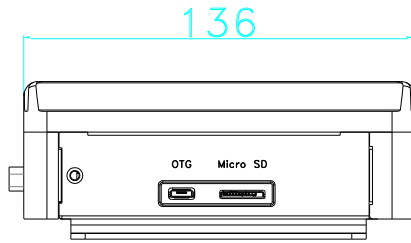
2.2 Jumpers and connectors

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
CN22	AT mode select

2.3.1   Setting Jumpers

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

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

Open   Closed   Closed 2-3
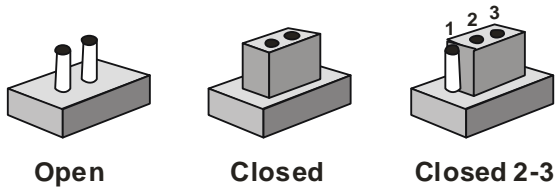
A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.3.2   Auto Power Button (CN1)

Open - ATX (Default)

Closed - AT

CN1	Function
1-2 Open	ATX (Default)
1-2 Closed	AT

2.4   List of Connectors

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

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

| Label	Function
CN1	FAN connector
CN2	HDMI 2 connector
CN3	HDMI 1 connector
CN4	POE LAN 4 (802.3af)
CN5	POE LAN 3 (802.3af)
CN6	POE LAN 2 (802.3af)
CN7	POE LAN 1 (802.3af)
CN8	SATA Power Connector
CN9	SATA connector
CN10	Micro SD Connector
CN13	OTG connector
CN14	RTC Battery Connector
CN15	TX2 CPU module connector
CN16	7 bit GPIO
CN17	USB 2.0 Connector
CN19	Internal Power In Connector
CN21	COM 1 connector
CN22	UART 0 Debug Port
CN23	CAN Bus Connector
CN24	USB 3.0 Type A Connector
CN25	USB 3.0 Type A Connector
CN26	Remote Power Connector

Label	Function
CN27	Power In Connector
CN28	COM 1 Connector
CN29	COM 2 Connector
SW1	Recovery switch
SW2	H/W Reset switch
SW3	Power switch
LAN1	TX2 GIGA LAN

2.4.1 HDMI connector (CN2/CN3)
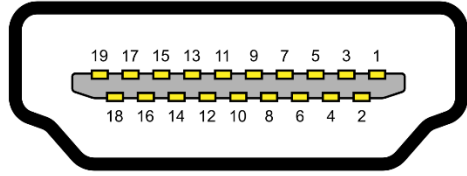
Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP		

2.4.2 SATA PWR Port (CN8)
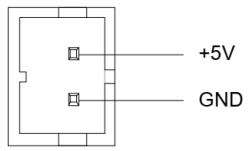
Pin	Signal	Pin	Signal
1	+5V	2	GND

2.4.3   SATA Port (CN9)

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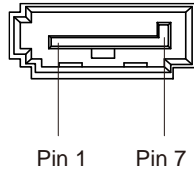
Pin	Signal	Pin	Signal
1	GND	2	SATA TX+
3	SATA TX-	4	GND
5	SATA RX-	6	SATA RX+
7	GND		

2.4.4   Micro SD (CN10)
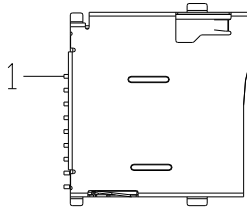
Pin	Signal	Pin	Signal
1	SDCARD D3	2	SDCARD CMD
3	GND	4	SDCARD PWR(+3.3V)
5	SDCARD CLK	6	SDCARD D0
7	SDCARD D1	8	SDCARD D2
9	SDCARD CD		

2.4.5   USB 2.0 OTG connector (CN13)
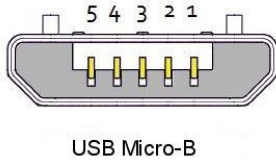
USB Micro-B

Pin	Signal	Pin	Signal
1	VBUS	2	USB1-
3	USB1+	4	ID
5	GND		

2.4.6   RTC Connector (CN14)

Pin	Signal	Pin	Signal
1	+3V	2	GND

2.4.7   TX2 Module connector (CN15)

	A	B	C	D	E	F	G	H
1	VDD IN	VDD IN	VDD IN	RSVD	FORCE RECOV#	AUDIO MCLK	I2S0 SDIN	I2S0 LRCLK
2	VDD IN	VDD IN	VDD IN	RSVD	SLEEP#	GPIO19 AUD RST	I2S0 CLK	I2S0 SDOUT
3	GND	GND	GND	RSVD	SPI0 CLK	SPI0 CS0#	GND	GPIO20 AUD INT
4	GND	GND	GND	RSVD	SPI0 MISO	SPI0 MOSI	RSVD	RSVD
5	RSVD	RSVD	RSVD	RSVD	I2S3 SDIN	I2S3 LRCLK	I2S2 CLK	I2S2 LRCLK
6	I2C PM CLK	I2C PM DAT	I2C CAM CLK	I2C CAM DAT	I2S3 CLK	I2S3 SDOUT	I2S2 SDIN	I2S2 SDOUT
7	CHARGING#	CARRIER STBY#	BATLOW#	GPIO5_CAM_FLASH_EN	RSVD	GPIO1_CAM1_PWR#	GPIO4_CAM_STROBE	GPIO3 CAM1 RST#
8	GPIO14_AP_WAKE_MDM	VIN PWR BAD#	RSVD	RSVD	RSVD	CAM1 MCLK	GPIO0_CAM0_PWR#	GPIO2 CAM0 RST#
9	GPIO15_AP2MDM_READY	GPIO17_MDM2AP_READY	RSVD	UART1 TX	UART1 RTS#	CAM0 MCLK	UART3_CTS#	UART3 RX
10	GPIO16_MDM_WAKE_AP	GPIO18_MDM_COLDBOOT	RSVD	UART1 RX	UART1 CTS#	GND	UART3 RTS#	UART3 TX
11	RSVD	JTAG TCK	RSVD	RSVD	RSVD	RSVD	UART0 RTS#	UART0 CTS#
12	JTAG TMS	JTAG TDI	RSVD	RSVD	RSVD	RSVD	UART0 RX	UART0 TX
13	JTAG TDO	JTAG GP0	RSVD	I2S1 LRCLK	SPI1 CS1#	SPI1 MOSI	SPI1 CLK	GPIO8_ALS_PROX_INT
14	JTAG RTCK	GND	I2S1 SDIN	I2S1 SDOUT	SPI1 CS0#	SPI1 MISO	GPIO9_MOTION_INT	SPI2 CLK
15	UART2 CTS#	UART2 RX	I2S1 CLK	I2C GP0 DAT	I2C GP0 CLK	GND	SPI2 MOSI	SPI2 MISO
16	UART2 RTS#	UART2 TX	FAN PWM	RSVD	RSVD	SPI2 CS1#	SPI2 CS0#	SDCARD PWR EN
17	USB0 EN OC#	FAN TACH	RSVD	RSVD	RSVD	SDCARD CD#	GND	SDCARD D1
18	USB1 EN OC#	RSVD	RSVD	RSVD	RSVD	SDCARD D3	SDCARD CLK	SDCARD D0
19	RSVD	GPIO11_AP_WAKE_BT	RSVD	RSVD	GND	SDCARD D2	SDCARD CMD	GND
20	I2C GP1 DAT	GPIO10_WIFI_WAKE_AP	RSVD	GND	CSI5 D1-	SDCARD WP	GND	CSI4 D1-
21	I2C GP1 CLK	GPIO12 BT EN	GND	CSI5 CLK-	CSI5_D1+	GND	CSI4 CLK-	CSI4 D1+
22	GPIO EXP1 INT	GPIO13_BT_WAKE_AP	CSI5 D0-	CSI5 CLK+	GND	CSI4 D0-	CSI4 CLK+	GND
23	GPIO EXP0 INT	GPIO7 TOUCH RST	CSI5 D0+	GND	CSI3 D1-	CSI4 D0+	GND	CSI2 D1-
24	RSVD	TOUCH CLK	GND	CSI3 CLK-	CSI3 D1+	GND	CSI2 CLK-	CSI2 D1+
25	LCD TE	GPIO6 TOUCH INT	CSI3 D0-	CSI3 CLK+	GND	CSI2 D0-	CSI2 CLK+	GND
26	RSVD	LCD VDD EN	CSI3 D0+	GND	CSI1 D1-	CSI2 D0+	GND	CSI0 D1-
27	RSVD	LCD0 BKLT PWM	GND	CSI1 CLK-	CSI1 D1+	GND	CSI0 CLK-	CSI0 D1+
28	GND	LCD_BKLT_EN	CSI1 D0-	CSI1_CLK+	GND	CSI0 D0-	CSI0 CLK+	GND
29	SDIO RST#	SDIO CMD	CSI1 D0+	GND	DSI3 D1+	CSI0 D0+	GND	DSI2 D1+
30	SDIO D3	SDIO CLK	GND	RSVD	DSI3 D1-	GND	DSI2 CLK+	DSI2 D1-
31	SDIO D2	GND	DSI3 D0+	RSVD	GND	DSI2 D0+	DSI2 CLK-	GND
32	SDIO D1	SDIO D0	DSI3 D0-	GND	DSI1 D1+	DSI2 D0-	GND	DSI0 D1+
33	DP1 HPD	HDMI CEC	GND	RSVD	DSI1 D1-	GND	DSI0 CLK+	DSI0 D1-
34	DP1 AUX CH-	DP0 AUX CH-	DSI1 D0+	RSVD	GND	DSI0 D0+	DSI0 CLK-	GND
35	DP1 AUX CH+	DP0 AUX CH+	DSI1 D0-	GND	DP1 TX3-	DSI0 D0-	GND	DP0 TX3-
36	USB0 OTG ID	DP0 HPD	GND	DP1 TX2-	DP1 TX3+	GND	DP0 TX2-	DP0 TX3+
37	GND	USB0 VBUS DET	DP1 TX1-	DP1 TX2+	GND	DP0 TX1-	DP0 TX2+	GND
38	USB1 D+	GND	DP1 TX1+	GND	DP1 TX0-	DP0 TX1+	GND	DP0 TX0-
39	USB1 D-	USB0 D+	GND	PEX RFU TX+	DP1 TX0+	GND	PEX RFU RX+	DP0 TX0+
40	GND	USB0 D-	PEX2 TX+	PEX RFU TX-	GND	PEX2 RX+	PEX RFU RX-	GND
41	RSVD	GND	PEX2 TX-	GND	PEX1 TX+	PEX2 RX-	GND	PEX1 RX+
42	RSVD	USB2 D+	GND	USB SS1 TX+	PEX1 TX-	GND	USB SS1 RX+	PEX1 RX-
43	RSVD	USB2 D-	USB SS0 TX+	USB SS1 TX-	GND	USB SS0 RX+	USB SS1 RX-	GND
44	PEX0 REFCLK+	GND	USB SS0 TX-	GND	PEX0 TX+	USB SS0 RX-	GND	PEX0 RX+
45	PEX0 REFCLK-	PEX1 REFCLK+	GND	SATA TX+	PEX0 TX-	GND	SATA RX+	PEX0 RX-
46	RESET OUT#	PEX1 REFCLK-	RSVD	SATA TX-	GND	GBE LINK1000#	SATA RX-	GND
47	RESET IN#	GND	PEX1 CLKREQ#	RSVD	GBE LINK ACT#	GBE MDI1+	GND	GBE MDI3+
48	CARRIER PWR ON	RSVD	PEX0 CLKREQ#	PEX WAKE#	GBE MDI0+	GBE MDI1-	GBE MDI2+	GBE MDI3-
49	CHARGER PRSNT#	RSVD	PEX0 RST#	RSVD	GBE MDI0-	GND	GBE MDI2-	GND
50	VDD RTC	POWER BTN#	RSVD	RSVD	PEX1 RST#	GBE LINK100#	GND	RSVD

2.4.8   USB3.0 connector (CN24/CN25)
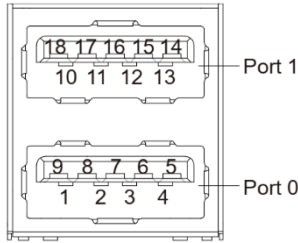
Pin	Signal	Pin	Signal
U1	VBUS_1	U10	VBUS_2
U2	(A)D-	U11	(B)D-
U3	(A)D+	U12	(B)D+
U4	GND	U13	GND
U5	(A)SSRX-	U14	(B)SSRX-
U6	(A)SSRX+	U15	(B)SSRX+
U7	GND	U16	GND
U8	(A)SSTX-	U17	(B)SSTX-
U9	(A)SSTX+	U18	(B)SSTX+

2.4.9   Power in connector (CN27)
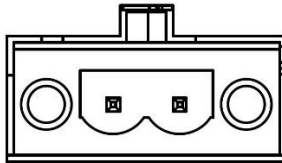
Pin	Signal	Pin	Signal
1	PWR IN	2	GND

2.4.10   COM port connector (CN28/29)
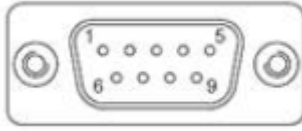
Pin	RS-232
1	
2	RXD
3	TXD
4	
5	GND
6	
7	RTS
8	CTS
9	

2.4.11   LAN (RJ-45) Port (LAN1)

ACT/LINK
LED

SPEED
LED

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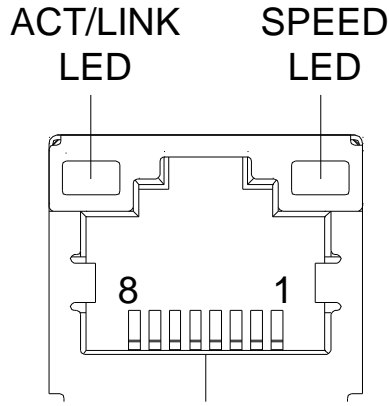
Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

2.5 Wall Mount Assembly

M3*6 Screw*4pcs
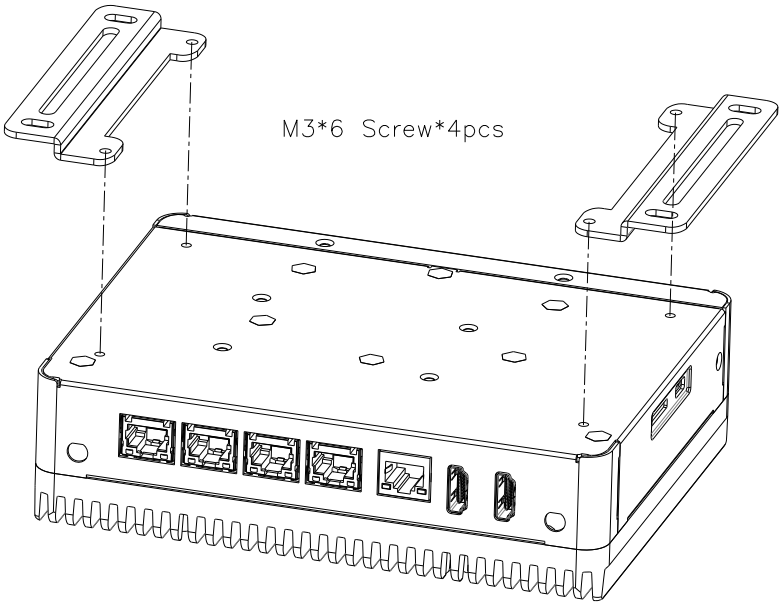
Chapter 3

OS Flash guide

3.1   Force USB Recovery Mode

To place system in Force USB Recovery Mode:

1.   Power down the device and disconnect the AC adapter. The device MUST be powered OFF, not in a suspended or sleep state.

2.   Connect the Micro-B plug on the USB cable to the Recovery (USB Micro-B) Port on the device and the other end to an available USB port on the host PC.

3.   Connect the power adapter to the device.

4.   Press and release the POWER button to power on device. Press and hold the FORCE RECOVERY button. While pressing the FORCE RECOVERY button, press and release the RESET button; wait two seconds, and then release the FORCE RECOVERY button. Refer to Chapter 2 Hardware Information for button locations.

5.   When device is in recovery mode, lsusb command on host will list a line of "NVidia Corp."

3.2   Software & BSP

Please follow the steps below to install the test image.

(1) Download **ACLinux_4.4_ACLNX44D.NV02.BOXER-8170AI.TB5.tar.gz** image. Please check with your local sales or FAE for the test image. The file name may change without notice.

(2) Unzip **ACLinux_4.4_ACLNX44D.NV02.BOXER-8170AI.TB5.tar.gz**

unzip ACLinux_4.4_ACLNX44D.NV02.BOXER-8170AI.TB5.tar.gz

(3) Enter bootloader folder

cd bootloader

(5) Enter Force USB Recovery Mode. Procedures for this step are located in the previous section **3.1 Force USB Recovery Mode.**

(6) Execute the following command to install image:

sudo ./flashall.sh