BOXER-8410AI

Compact Fanless Embedded AI@Edge Box PC

User's Manual 1st Ed

Last Updated: March 31, 2020

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Packing List

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

Item	Quantity
● BOXER-8410AI	1
● Wallmount bracket	2
● Screw Package	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

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。

China RoHS Requirement (EN)

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.

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Chapter 1

Product Specifications

1.1 Specifications

System	
Processor	HiSilicon Hi3559A: - ARM Cortex A73 x 2 cores - ARM Cortex A53 x 3 cores - ARM Cortex M7 Sensor Hub - 4 x DSP cores - 2 x NNIE multi-core heterogeneous processor
GPU	ARM Mali 2 x G71 900MHz GPU
Video	HDMI 2.0 x 1
System Memory	Onboard 4GB/8GB DDR4 (1.2V), up to 8GB
Storage	Onboard 32GB/64GB eMMC Micro-SD slot x 1 SATA III (6.0 Gbps) Port x 1
I/O	Power Button with LED indicator x 1 USB 3.2 Gen 1 Type A x 1 USB 2.0 Type A x 1 Micro USB Type B (USB 2.0) x 1 (for flash image) RJ-45 GbE LAN x 2 (Realtek RTL8211FI) DB-9 RS-232 x 2 DB-9 Console Port x 1 Audio Line In x 1 Audio Line Out x 1 2-pin terminal block +12V DC-in x 1 MicroSD x 1 Remote Power On/Off

System

Internal Header	USB 2.0 wafer x 2
	RS-232 wafer x 2
Internal Button	Reset Button
	Update Mode Button
OS Support	HiLinux

Power Supply

Power Requirement	12VDC-in with 2-pin terminal block

Mechanical

Mounting	Wall mount kit (default)
Dimensions (W x D x H)	150 mm(W) x 96 mm(D) x 56 mm(H)
Gross Weight	2.20 lbs. (1 kg)
Net Weight	1.10 lbs. (0.5 kg)

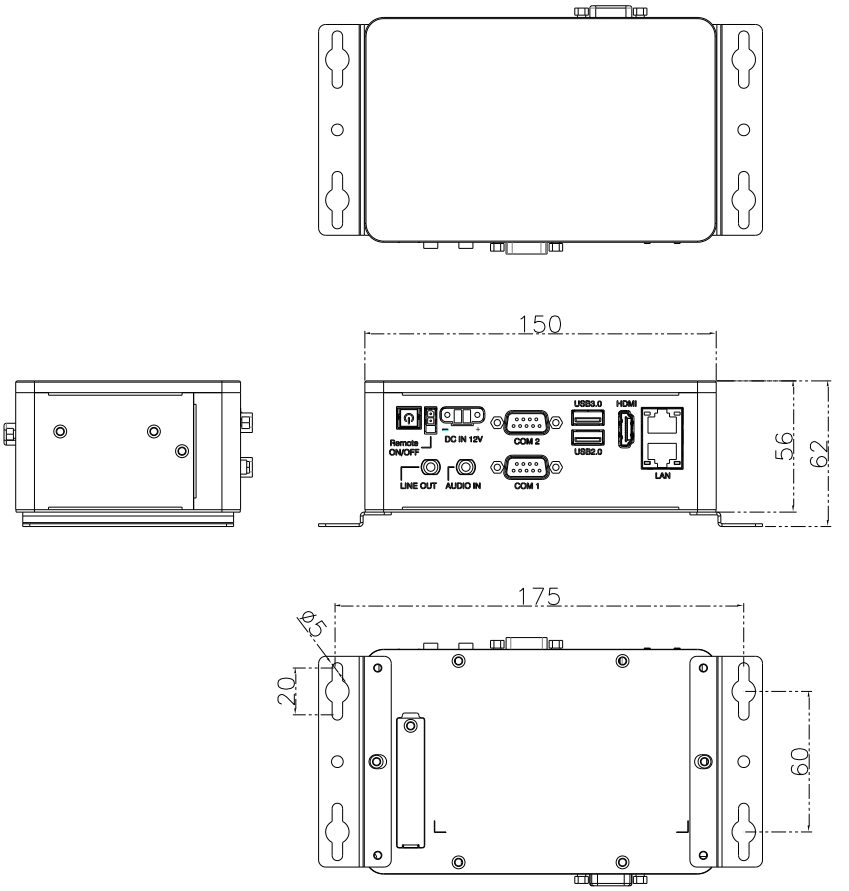
Environmental

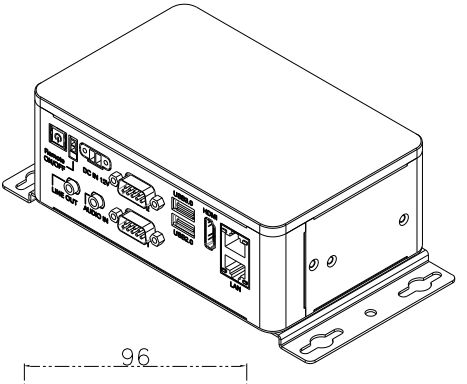
Operating Temperature	-20°C ~ 55°C with 0.5 m/s airflow
Storage Temperature	-40°C ~ 80°C
Storage Humidity	5 ~ 95% at 40°C, non-condensing
Anti-Vibration	Random, 1 Grm, 5~500Hz
Drop	76 cm (1 Corner, 3 Edge, 6 Surface)
EMC	CE/FCC class A

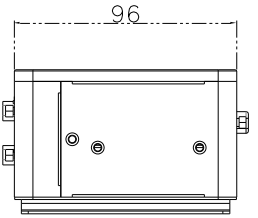
Chapter 2

Hardware Information

2.1 Dimensions



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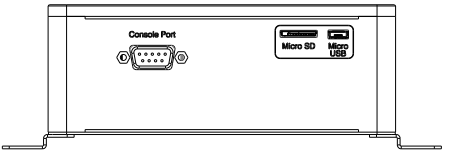
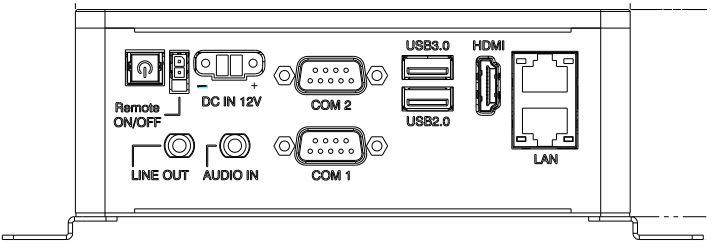
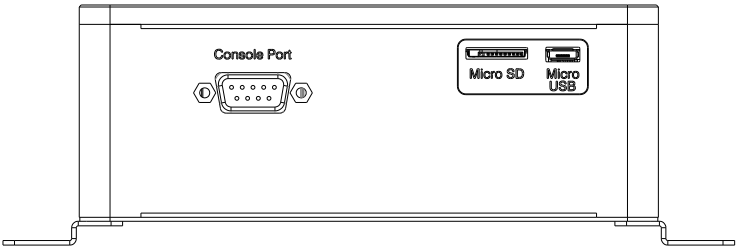
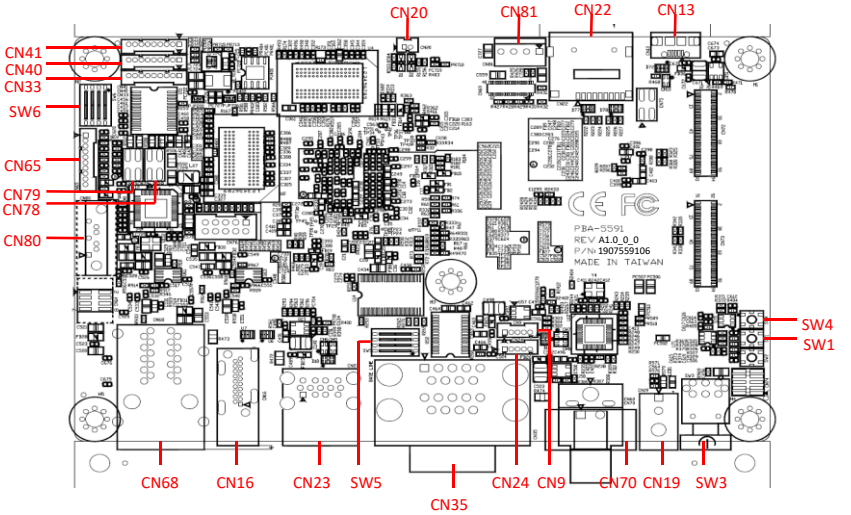

Console Port
Micro SD
Micro USB

I/O Closeup


Remote ON/OFF
DC IN 12V
COM 2
USB3.0
USB2.0
HDMI
LAN
LINE OUT
AUDIO IN
COM 1


Console Port
Micro SD
Micro USB

2.2 Jumpers and connectors

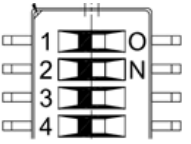


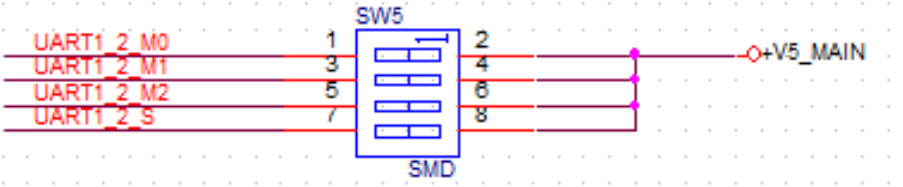
2.3 List of Switches

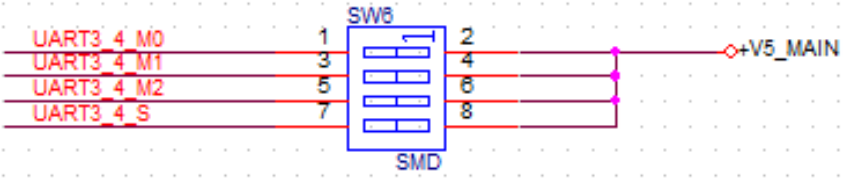
The board has a number of switches that allow you to configure your system to suit your application. The table below shows the function of each of the board's switches

Label	Function
SW5	COM1&2 RS-232 mode selection
SW6	COM3&4 RS-232 mode selection

2.3.1 COM RS-232 Mode Selection (SW5, SW6)







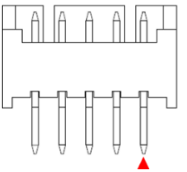
Mode Sel			
MODE_0	MODE_1	MODE_2	
0	0	1	RS232

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

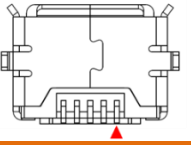
Label	Function
CN9	USB 2.0 (Header)
CN13	Micro USB Connector
CN16	HDMI Port
CN19	Remote Button
CN20	RTC Battery
CN22	Micro SD Card Slot
CN23	USB 3.0+USB 2.0 Connector
CN24	USB 2.0 (Header)
CN33	COM Console Header RS232
CN35	COM1 + COM2 Connector RS232
CN40	COM3 Header RS232
CN41	COM4 Header RS232
CN65	Audio Wafer
CN68	Dual LAN Connector
CN70	Phoenix Connector Power Input
CN78	LAN0 LED Signal (Header)
CN79	LAN1 LED Signal (Header)
CN80	SATA Port
CN81	SATA Power
SW1	System Update Mode Button
SW3	Power Button
SW4	System RESET Button

2.4.1 USB 2.0 Header (CN9/CN24)



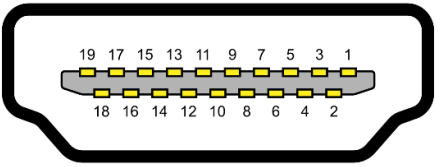
Pin	Pin Name	Signal Type	Signal Level
1	+5V	PWR	+5V
2	USB2_DM	DIFF	
3	USB2_DP	DIFF	
4	GND	GND	
5	GND	GND	

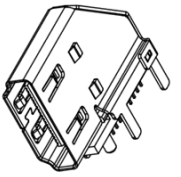
2.4.2 Micro USB Connector (CN13)



Pin	Pin Name	Signal Type	Signal Level
1	+5V	PWR	+5V
2	USB_DM0	DIFF	
3	USB_DP0	DIFF	
4	USB_ID	OUT	+1.8V
5	GND	GND	

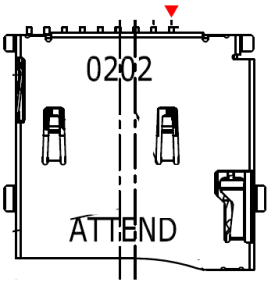
2.4.3 HDMI Port (CN16)





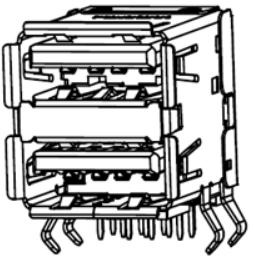
Pin	Pin Name	Signal Type	Signal Level
1	HDMI_TX2P	DIFF	
2	GND	GND	
3	HDMI_TX2N	DIFF	
4	HDMI_TX1P	DIFF	
5	GND	GND	
6	HDMI_TX1N	DIFF	
7	HDMI_TX0P	DIFF	
8	GND	GND	
9	HDMI_TX0N	DIFF	
10	HDMI_TXCP	DIFF	
11	GND	GND	
12	HDMI_TXCN	DIFF	
13	HDMI_CEC	IN	+3.3V
14			
15	HDMI_SCL	IN	+5V
16	HDMI_SDA	IN	+5V
17	GND	GND	
18	+5V	PWR	+5V
19	HDMI_HOTPLUG	OUT	

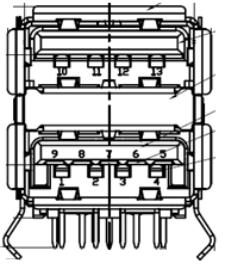
2.4.4 Micro SD Card Slot (CN22)



Pin	Pin Name	Signal Type	Signal Level
1	DATA2		+1.8V
2	DATA3		+1.8V
3	CMD	IN	+1.8V
4	+3.3V	PWR	+3.3V
5	CLK	IN	+1.8V
6	GND	GND	
7	DATA0		+1.8V
8	DATA1		+1.8V
9	DETECT	OUT	+3.3V
10	GND	GND	

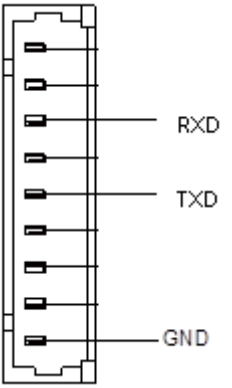
2.4.5 USB 3.0 + USB 2.0 Connector (CN23)





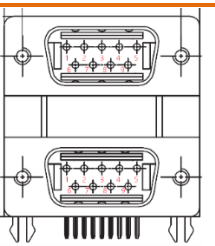
Pin	Pin Name	Signal Type	Signal Level
1	+5VSB	PWR	+5V
2	USB2_DM	DIFF	
3	USB2_DP	DIFF	
4	GND	GND	
5	USB3_RXM	DIFF	
6	USB3_RXP	DIFF	
7	GND	GND	
8	USB3_TXM	DIFF	
9	USB3_TXP	DIFF	
10	+5VSB	PWR	+5V
11	USB2_DM	DIFF	
12	USB2_DP	DIFF	
13	GND	GND	

2.4.6 COM Console Header RS-232 (Wafer Box, Optional) (CN33)



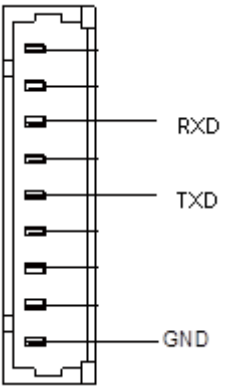
Pin	Pin Name	Signal Type	Signal Level
1			
2			
3	RXD	IN	
4			
5	TXD	OUT	
6			
7			
8			
9	GND	GND	

2.4.7 COM1 + COM2 Connector RS-232 (CN35)



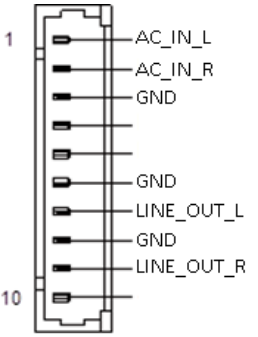
Pin	Pin Name	Signal Type	Signal Level
1			
2	RXD	IN	
3	TXD	OUT	
4			
5	GND	GND	
6			
7			
8			
9			
10			
11	RXD	IN	
12	TXD	OUT	
13			
14	GND	GND	
15			
16			
17			
18			

2.4.8 COM3, COM4 Header RS-232 (Wafer Box, Optional) (CN40/41)



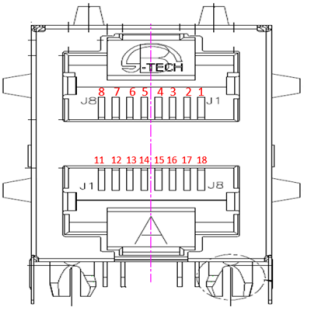
Pin	Pin Name	Signal Type	Signal Level
1			
2			
3	RXD	IN	
4			
5	TXD	OUT	
6			
7			
8			
9	GND	GND	

2.4.9 Audio Wafer (CN65)



Pin	Pin Name	Signal Type	Signal Level
1	AC_IN_L	IN	
2	AC_IN_R	IN	
3	GND	GND	
4			
5			
6	GND	GND	
7	LINE_OUT_L	OUT	
8	GND	GND	
9	LINE_OUT_R	OUT	
10			

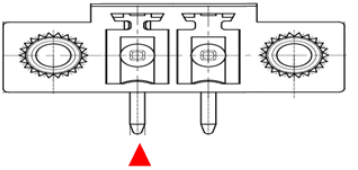
2.4.10 Dual LAN Connector (CN68)



Pin	Pin Name	Signal Type	Signal Level
1	MDIP0	DIFF	
2	MDIN0	DIFF	
3	MDIP1	DIFF	
4	MDIN1	DIFF	
5	MDIP2	DIFF	
6	MDIN2	DIFF	
7	MDIP3	DIFF	
8	MDIN3	DIFF	
9	+1.0V	PWR	+1.0V
10	GND	GND	
11	MDIP0	DIFF	
12	MDIN0	DIFF	
13	MDIP1	DIFF	
14	MDIN1	DIFF	
15	MDIP2	DIFF	
16	MDIN2	DIFF	
17	MDIP3	DIFF	

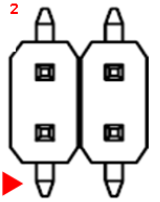
Pin	Pin Name	Signal Type	Signal Level
18	MDIN3	DIFF	
19	+1.0V	PWR	+1.0V
20	GND	GND	

2.4.11 Phoenix Connector Power Input (CN70)



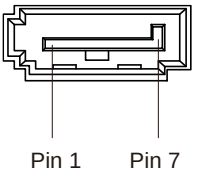
Pin	Pin Name	Signal Type	Signal Level
1	VIN	PWR	+12V
2	GND	GND	

2.4.12 LAN0/LAN1 LED Signal Header (CN78/CN79)



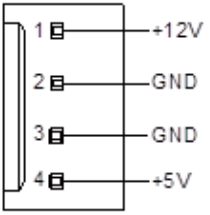
Pin	Pin Name	Signal Type	Signal Level
1	LED_1000M	IN	+3.3V
2	+3.3V	PWR	+3.3V
3	LED_100M	IN	+3.3V
4	GND	GND	

2.4.13 SATA Port (CN80)



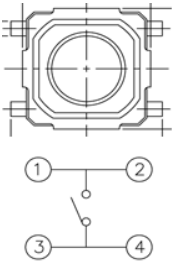
Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	
2	SATA_TX+	DIFF	
3	SATA_TX-	DIFF	
4	GND	GND	
5	SATA_RX-	DIFF	
6	SATA_RX+	DIFF	
7	GND	GND	

2.4.14 SATA Power (CN81)



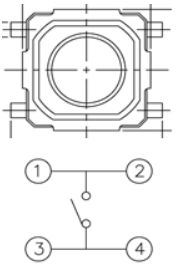
Pin	Pin Name	Signal Type	Signal Level
1	+12V	PWR	+12V
2	GND	GND	
3	GND	GND	
4	+5V	PWR	+5V

2.4.15 System Update Mode Button (SW1)



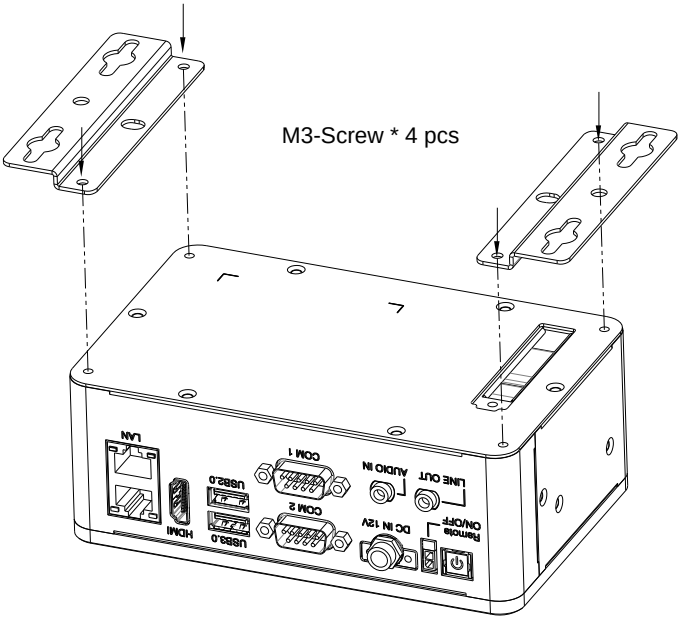
Pin	Pin Name	Signal Type	Signal Level
1	UPDATE_MODE	OUT	+1.8V
2	UPDATE_MODE	OUT	+1.8V
3	GND	GND	
4	GND	GND	

2.4.16 System Reset Button (SW4)



Pin	Pin Name	Signal Type	Signal Level
1	WDG_RSTN	OUT	+1.8V
2	WDG_RSTN	OUT	+1.8V
3	GND	GND	
4	GND	GND	

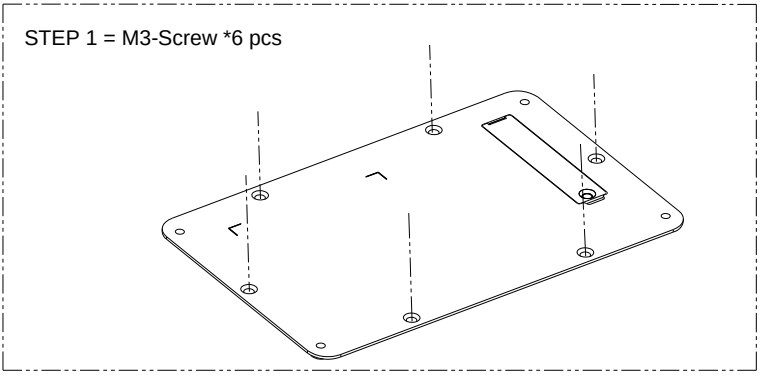
2.5 Wall Mount Assembly



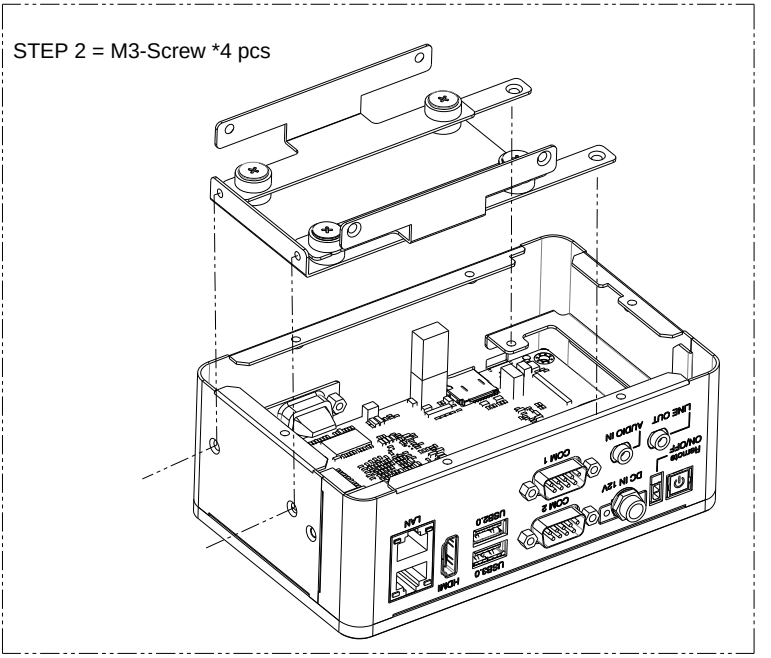
2.6 2.5″ SATA Storage Drive Assembly

Before beginning the installation procedure for the 2.5″ SATA storage device, ensure your BOXER-8410AI system is shut down (not in sleep or standby mode) and disconnected from power source.

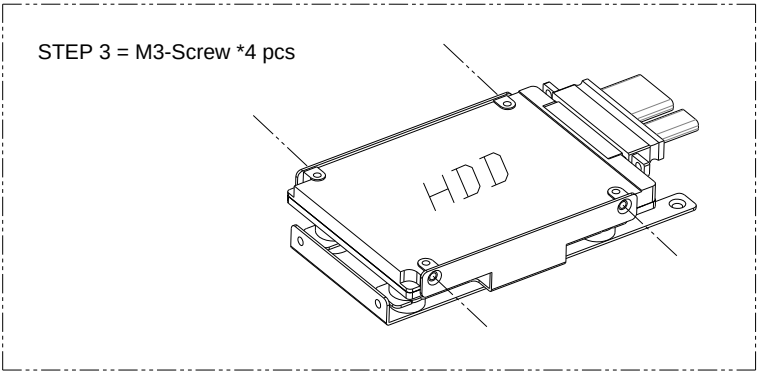
Step 1: Remove the six screws from the bottom panel as shown in the figure.



Step 2: Remove the four screws holding the 2.5" SATA drive carrier, and then remove the carrier from the system.



Step 3: Place your 2.5" SATA storage device in the carrier and secure with four screws as shown. Connect the SATA and SATA power cables to the storage device.



Step 4: Following Steps 1 and 2 in reverse order, place the 2.5" SATA storage device and carrier assembly into the BOXER-8410AI system, securing with the four screws removed in Step 2. Then replace the bottom panel and secure with the six screws removed in Step 1.

Chapter 3

OS Flash guide

3.1 Introduction

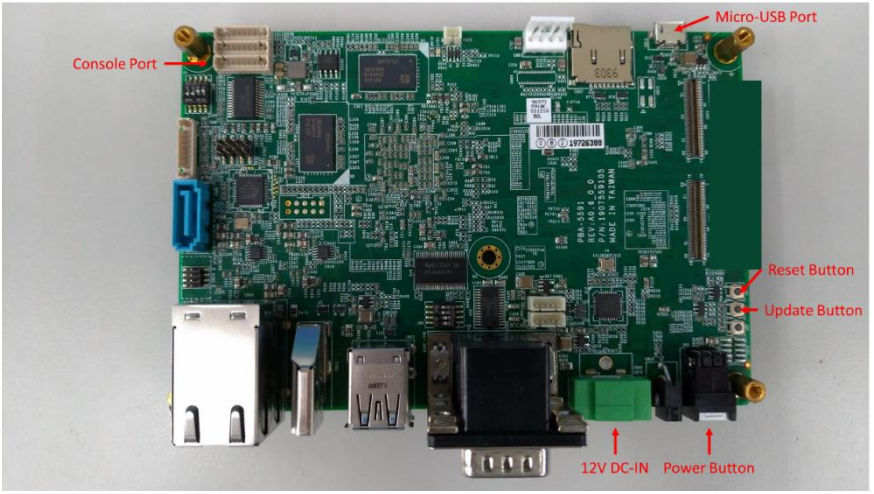
This section details the steps to flash the operating system (OS) onto the BOXER-8410AI.

Before beginning make sure you have the following prepared:

- BOXER-8410AI PCBA removed from chassis (refer to as DUT)
- Host PC with Windows 7 (Note: Process is only compatible with Windows 7)
- OS image for BOXER-8410AI. Contact your AAEON representative or supplier for image
- Get HiTool program to flash image

3.2 Hardware Pinout Definition

Refer to the image below for relevant connectors and pins during the image flashing process.



BOXER-8410AI DUT

3.3 Flash Image Steps

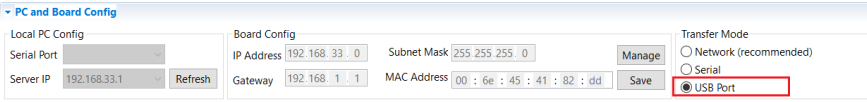
1. Connect host PC and DUT with a Micro-USB cable.
2. Connect the 12V DC-IN with a power adapter and ensure it is pugged into a 12V power source.
3. On host PC, extract/unzip the image and content files for BOXER-8410AI. You should see the following files.

Name	Date modified	Type	Size
part.xml	6/28/2019 4:49 PM	XML Document	1 KB
README.txt	2/7/2020 11:51 PM	Text Document	3 KB
rootfs_hi3559av100_58G.ext4	2/7/2020 11:49 PM	EXT4 File	444,074 KB
u-boot-hi3559av100.bin	2/7/2020 11:49 PM	BIN File	325 KB
uImage_hi3559av100_multi-core	2/7/2020 11:49 PM	File	8,665 KB

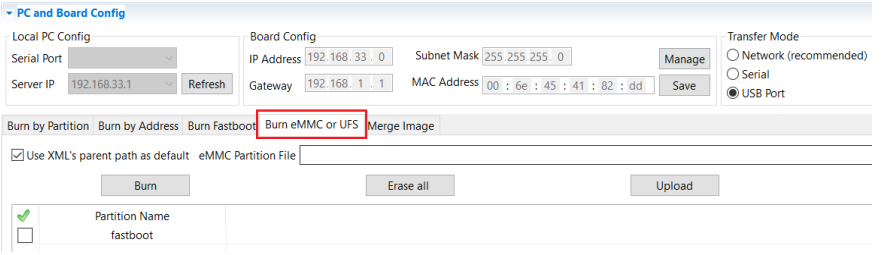
4. On host PC, run the HiTool program.

plugins	11/1/2018 2:55 PM	File folder	
Resources	11/1/2018 2:55 PM	File folder	
artifacts.xml	11/1/2018 2:54 PM	XML Document	54 KB
HiBurn.log	2/19/2020 4:26 PM	Text Document	1 KB
HiTool.exe	11/1/2018 2:55 PM	Application	40 KB
HiTool.ini	11/1/2018 2:55 PM	Configuration setti...	1 KB
hitool_release_notes_cn.xlsx	11/1/2018 2:55 PM	Microsoft Excel W...	13 KB
hitool_release_notes_en.xlsx	11/1/2018 2:55 PM	Microsoft Excel W...	14 KB

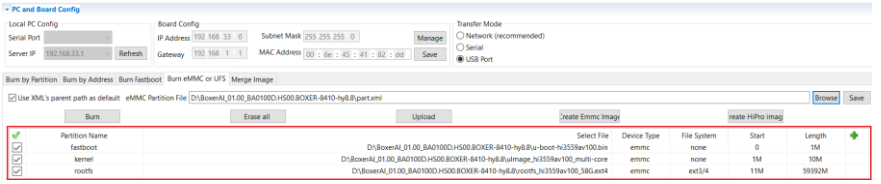
5. Select "USB Port" for Transfer Mode.



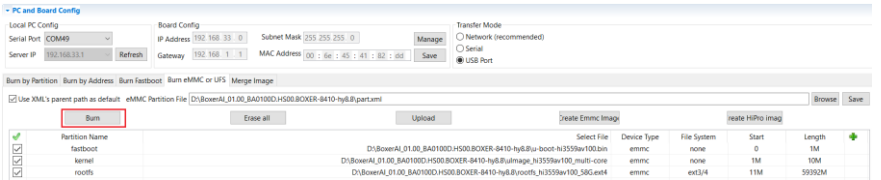
6. Open the "Burn eMMC or UFS" tab.

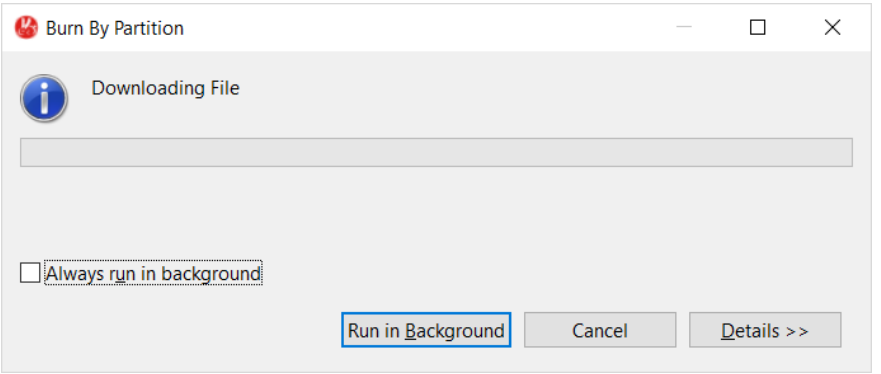


7. Fill out the partition table in HiTool. Refer to the README.txt file from the extracted BOXER-8410AI image for details.

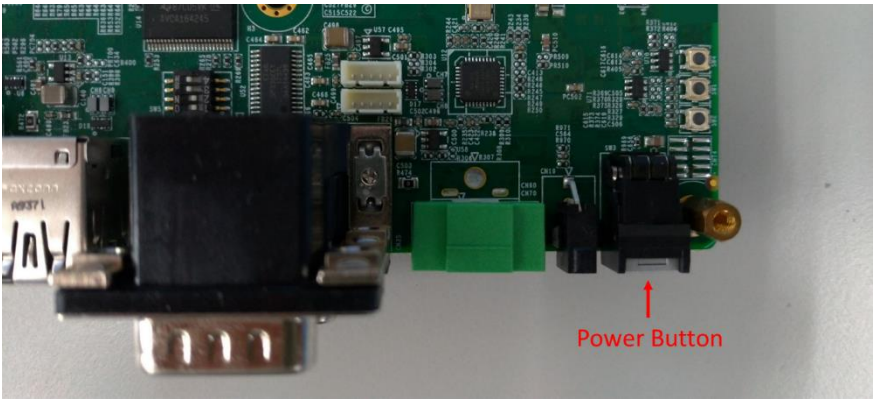


8. Click the "Burn" button in HiTool.

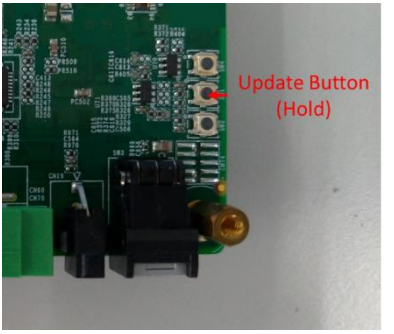




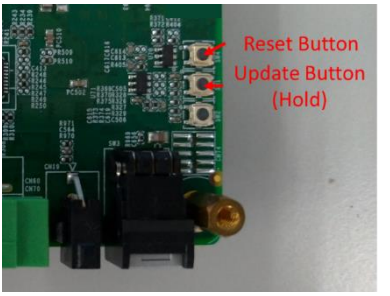
9. On the DUT, press and release the Power Button.



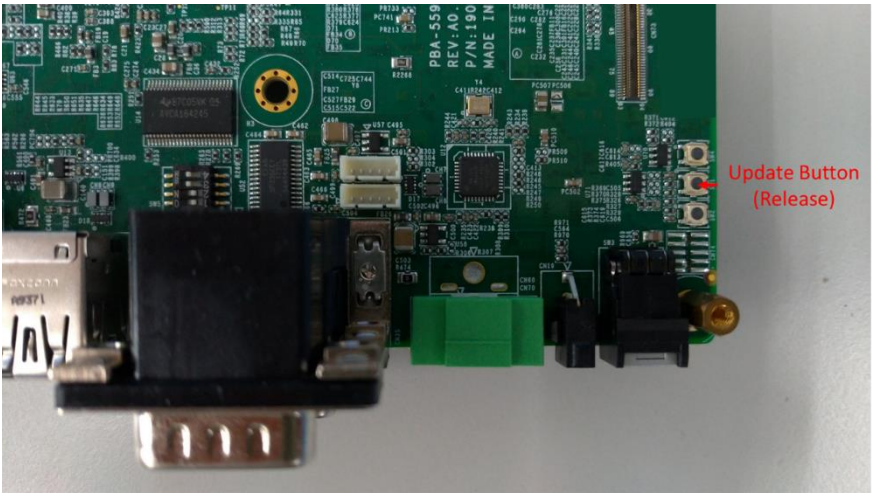
10. Next, press and hold the Update Button.



11. While holding the Update Button, press and release the Reset Button.



12. Keep holding the Update Button for 2 more seconds after pressing the Reset Button, then release.



13. HiTool should display burning process in progress.