

BOXER-6421

Fanless Embedded 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-6421	1
● Power adapter	1
● Product DVD with User's Manual (in pdf) and drivers	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 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.**

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 Embedded Box PC/ Industrial System

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	○	○	○	○	○	○
电源	○	○	○	○	○	○

○: 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 SJ/T 11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。

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、电源为选购品。

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products
AAEON Embedded Box PC/ Industrial System

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	○	○	○	○	○	○
Wires & Connectors for External Connections	○	○	○	○	○	○
Chassis	○	○	○	○	○	○
CPU & RAM	○	○	○	○	○	○
Hard Disk	○	○	○	○	○	○
PSU	○	○	○	○	○	○

O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.

X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.

Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only

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Chapter 1

Product Specifications

1.1 Specifications

- **Processor** Freescale iMX6 Dual Lite-Auto grade 1.0GHz
- **System Memory** Onboard DDR3 1GB
- **Chipset** -
- **Display Interface** DVI-D x1
- **Storage Device** SATA x 1 (Default: no HDD support)
MicroSD slot x 1
8GB eMMC onboard
- **Front I/O** USB 2.0 x 3
DVI-D x 1
- **Rear I/O** 10/100/1000 base-T Ethernet x 2 (1.5 kV isolation)
RS-232 /422 /485 x 1
RS-232 x 1
DC-in Connector
- **OS Support** Linux (Kernel 3.0.35)

Mechanical

- **Construction** Aluminum heat sink & Steel chassis
- **Mounting** VESA / Din rail (Option)
- **Dimension (W x H x D)** 155 x 25 x 85 mm (6.10 x 0.98 x 3.35")
- **Gross Weight** -

Environmental

- **Operating Temperature** -20 ~ 50°C (-4°F ~ 122°F) with 0.5 m/s airflow
- **Storage Temperature** -30 ~ 80°C (-22 ~ 176°F)
- **Operating Humidity** 5 ~ 90% @ 40°C, non-condensing
- **Anti-Vibration** 3 g rms/ 5~ 500Hz/ operation – With Micro SD
- **Anti-Shock** 1 Corner, 3 Edge, 6 Surface
- **EMC** CE/FCC Class A

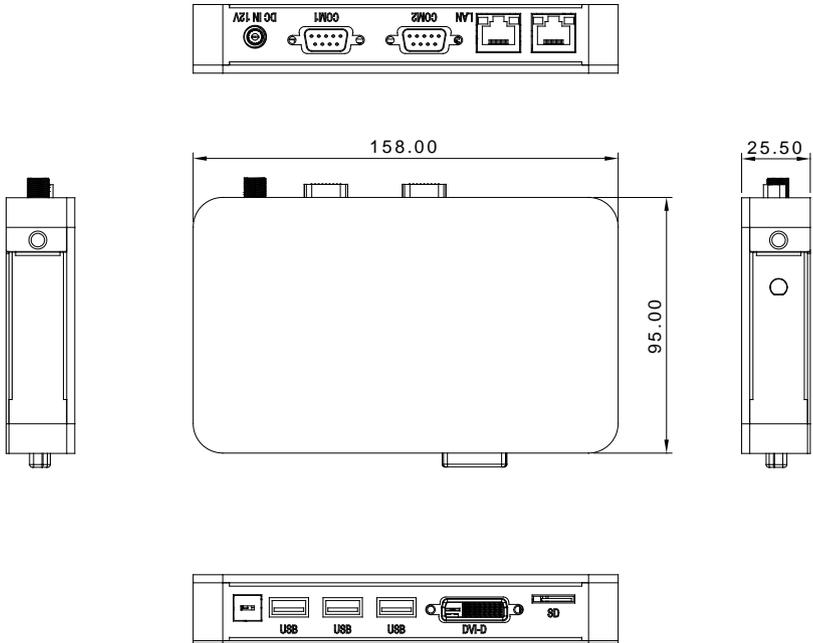
Power Supply

- **DC Input** Lockable DC-input 7~24V

Chapter 2

Hardware Information

2.1 Dimensions

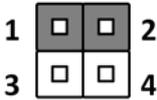


2.2 List of Jumpers

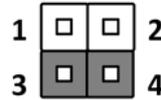
Please refer to the table below for all of the system's jumpers that you can configure for your application

Label	Function
JP1	Boot Mode Selection
JP5	Auto Power Button Selection

2.2.1 Boot Mode Selection (JP1)



Internal Boot (Default)



Serial Downloader

2.2.2 Auto Power Button Selection (JP5)



Enable



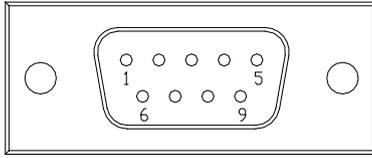
Disable (Default)

2.3 List of Connectors

Please refer to the table below for all of the system's connectors that you can configure for your application

Label	Function
CN2, CN1	RS-232/422/485
CN18, 19, 20	USB 2.0 Port
CN21	DVI-D Connector
CN22	DC-in Connector
MSD1	Micro SD Connector
RJ45_2/RJ45_3	LAN Connector

2.3.1 RS-232/422/485 (COM1/COM2)



RS-232

Pin	Pin Name	Signal Type	Signal Level
1	DCD	IN	
2	RXD	IN	
3	TXD	OUT	±5.2 V
4	DTR	OUT	
5	GND	GND	
6	DSR	IN	
7	RTS#	OUT	±5.2 V
8	CTS#	IN	
9	RI	IN	

RS-422

Pin	Pin Name	Signal Type	Signal Level
1	RS422_TX-	OUT	±5V
2	RS422_TX+	OUT	±5V
3	RS422_RX+	IN	
4	RS422_RX-	IN	
5	GND	GND	
6	NC		

7	NC
---	----

8	NC
---	----

9	NC
---	----

RS-485

Pin	Pin Name	Signal Type	Signal Level
1	RS485_D-	I/O	±5V
2	RS485_D+	I/O	±5V
3	NC		
4	NC		
5	GND	GND	
6	NC		
7	NC		
8	NC		
9	NC		

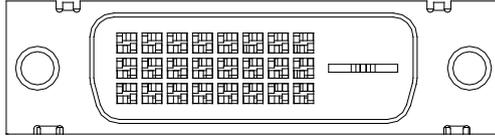
Note: COM1/2 RS-232/422/485 can be set by SW setting. Default is RS-232. can be set by CN4/CN5.

2.3.2 DC-IN Connector (CN22)



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

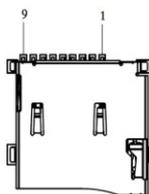
2.3.3 DVI Connector (CN21)



Pin	Pin Name	Signal Type	Signal Level
1	DVI_DATA2_N	DIFF	
2	DVI_DATA2_P	DIFF	
3	GND	GND	
4	NC		
5	NC		
6	DVI_DDC_SCL		
7	DVI_DDC_SDA		
8	NC		
9	DVI_DATA1_N	DIFF	
10	DVI_DATA1_P	DIFF	
11	GND		
12	NC		
13	NC		
14	+V5S_DVI_CON	PWR	+5V
15	GND		
16	DVI_HPD		
17	DVI_DATA0_N	DIFF	
18	DVI_DATA0_P	DIFF	
19	GND		
20	NC		

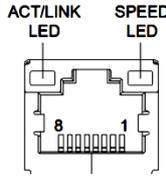
21	NC	
22	GND	
23	DVI_CLK_P	DIFF
24	DVI_CLK_N	DIFF

2.3.4 Micro SD Connector (MSD1)



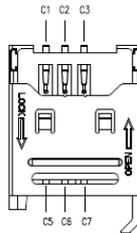
Pin	Pin Name	Signal Type	Signal Level
1	SD_DATA2	I/O	
2	SD_DATA3	I/O	
3	SD3_CMD	I/O	
4	+3.3V	PWR	+3.3V
5	SD3_CLK	I/O	
6	GND	I/O	
7	SD3_DATA0	I/O	
8	SD3_DATA1	I/O	
9	SD3_DET	I/O	

2.3.5 LAN Connector (RJ45_2/RJ45_3)



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

2.3.6 SIM Card Connector (SIM1)

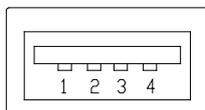


Pin	Pin Name	Signal Type	Signal Level
1 (C1)	UIM_PWR	PWR	3V/1.8V from MiniCard
2 (C2)	UIM_RESET		
3 (C3)	UIM_CLK		
4 (C5)	GND		

5 (C6) UIM_VAPP

6 (C7) UIM_DATA

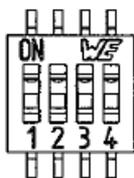
2.3.7 USB Connector (USB1~3)



Pin	Pin Name	Signal Type	Signal Level
1	USB_COR_VBUS1	PWR	+5V
2	USB_HUB_DM2	DIFF	
3	USB_HUB_DP2	DIFF	
4	GND	GND	

2.3.8 Boot Configuration Selection Switch (SW1)

This switch allows users to manually customize boot configurations for their needs.



Boot Device	Bit 1	Bit 2	Bit 3	Bit 4	
Micro SD	OFF	OFF	ON	OFF	Default
eMMC	ON	ON	ON	ON	
SATA	X	X	OFF	ON	Reserved

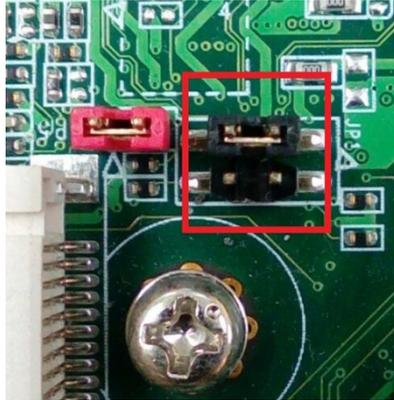
Chapter 3

Linux Operating System Installation

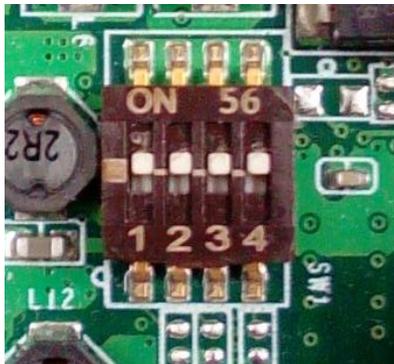
3.1 Prepare the Board

Please follow the steps to prepare the board of your BOXER-6421.

Step 1 – Set JP1 to serial downloader mode



Step 2 – Set SW1 to ON



Step 3 – Plug the USB cable to CN16 and connect to your PC

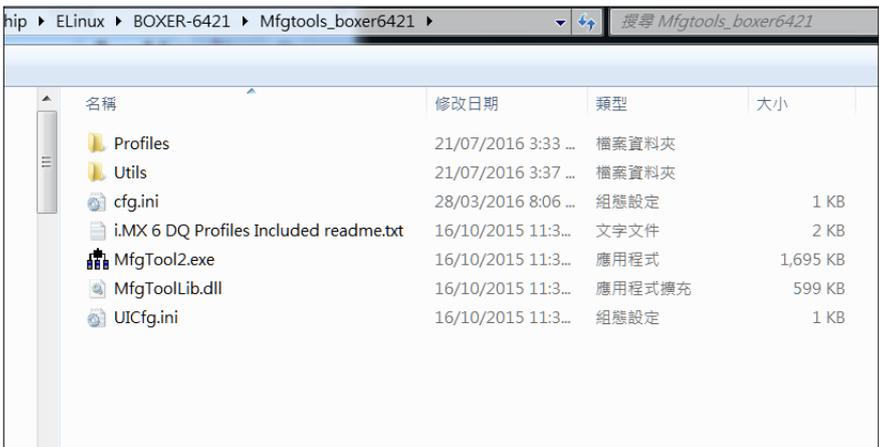


Step 4 – Turn on the power

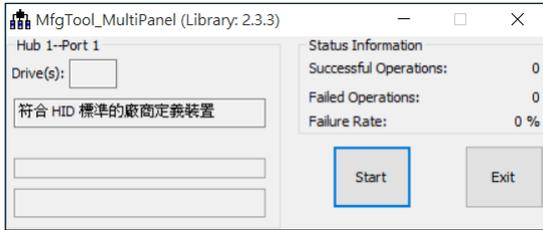
3.2 Download Image

Please follow the steps to download the image to your BOXER-6421.

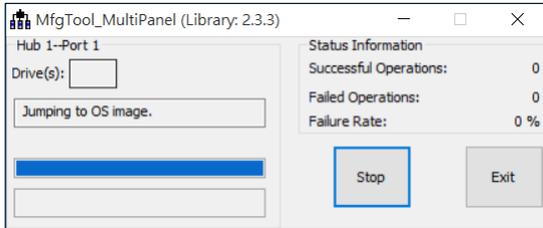
Step 1 – Open the Mfgtools_boxer6421 directory



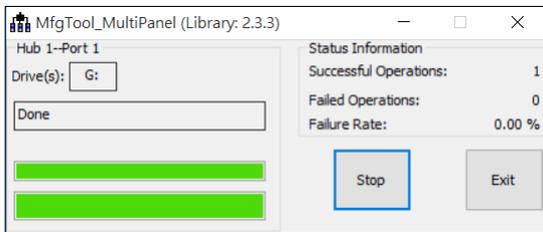
Step 2 – Open the MfgTool2.exe file



Step 3 – Click Start button to download the image



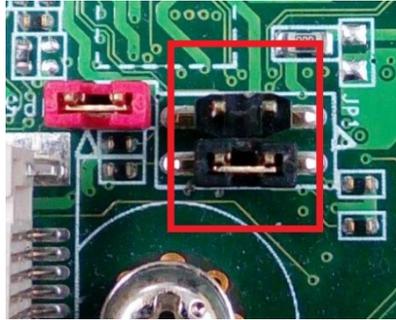
Step 4 – After the download is done, click Stop and close the MfgTool.



Step 5 – Turn off the power

3.3 Boot Image

Step 1 – Set JP1 to Internal boot mode



Step 2 – Connect the debug port to your PC and open a serial terminal (Putty or Tera Term) on your PC

Step 3 – Turn on the power

```
COM4 - Tera Term VT
File Edit Setup Control Window Help
ipg clock : 66000000Hz
ipg per clock : 66000000Hz
uart clock : 80000000Hz
cspi clock : 60000000Hz
ahb clock : 132000000Hz
axi clock : 264000000Hz
mst_low clock : 132000000Hz
ddr clock : 528000000Hz
usdhc1 clock : 198000000Hz
usdhc2 clock : 198000000Hz
usdhc3 clock : 198000000Hz
usdhc4 clock : 198000000Hz
nfc clock : 24000000Hz
Board: i.MX6Q-SABRES2: unknown-board Board: 0x63012 [POR ]
Boot Device: MMC
I2C: ready
DRAM: 1 GB
MWC: FSL_USDHC: 0,FSL_USDHC: 1,FSL_USDHC: 2,FSL_USDHC: 3
*** Warning - bad CRC or MWC, using default environment

In: serial
Out: serial
Err: serial
Found PFUZE100! deviceid=10,revid=21
Net: got MAC address from IIM: 00:00:00:00:00:00
```

Appendix A

Test Guide of Watchdog

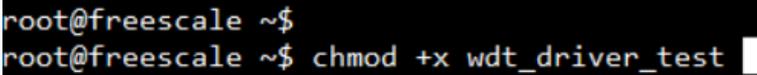
A.1 Watchdog Tool

Please follow the steps to test the watchdog on BOXER-6421

Step 1 – Copy watchdog tool to BOXER-6421

Step 2 – Change the access permissions

```
$ chmod +x wdt_driver_test
```



```
root@freescale ~$  
root@freescale ~$ chmod +x wdt_driver_test
```

Step 3 – Execute watchdog tool

```
$ ./wdt_driver_test <timeout> <sleep> <test>
```

Usage:

```
wdt_driver_test <timeout> <sleep> <test>  
    timeout: value in seconds to cause wdt timeout/reset  
    sleep: value in seconds to service the wdt  
    test: 0 - Service wdt with ioctl(), 1 - with write()
```

Example:

The timeout is 3 seconds

```
$ ./wdt_driver_test 3 5 0
```