

MINI-AI-720

Kneron KL720 NPU
mPCIe MiniCard Module

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
● MINI-AI-720 M.2 Module	1
● M2 screw	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. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. 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.
7. Always disconnect this device from any power supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls.
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. 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.

17. If any of the following situations arises, please 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
18. Do not leave this device in an uncontrolled environment with temperatures beyond the device's permitted storage temperatures (see chapter 1) to prevent damage.
19. Do NOT disassemble the motherboard so as not to damage the system or void your warranty.
20. If the thermal pad had been damaged, please contact AAEON's salesperson to purchase a new one. Do NOT use those of other brands.
21. The Hex Cylinder Coppers on the front panel are not removable.
22. Repeatedly assemble and disassemble the system may cause damages to the exterior paint and surface and screw holes.
23. Use the right size screwdriver.
24. Use the screwdriver correctly to remove screws from the system.

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 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	○	○	○	○	○	○
<p>○: 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。</p> <p>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。</p> <p>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。</p>						

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	○	○	○	○	○	○
<p>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.</p> <p>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.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p>						

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Chapter 1

Product Specifications

1.1 Specifications

System

IC	Kneron KL720
Type	ARM CM & DSP
Support Framework	Pytorch, ONNX, TensorFlow 1.6, Tensorflow lite, Keras, Caffe
Support Model	Resnet, GoogleNet, YOLO, Tiny YOLO, MobileNet-SSD, DenseNet, RNN, LSTM
Memory Type	128MB LPDDR3
NPU Power Efficiency	1.4 TOPS
Overall Power Consumption	5W TDP

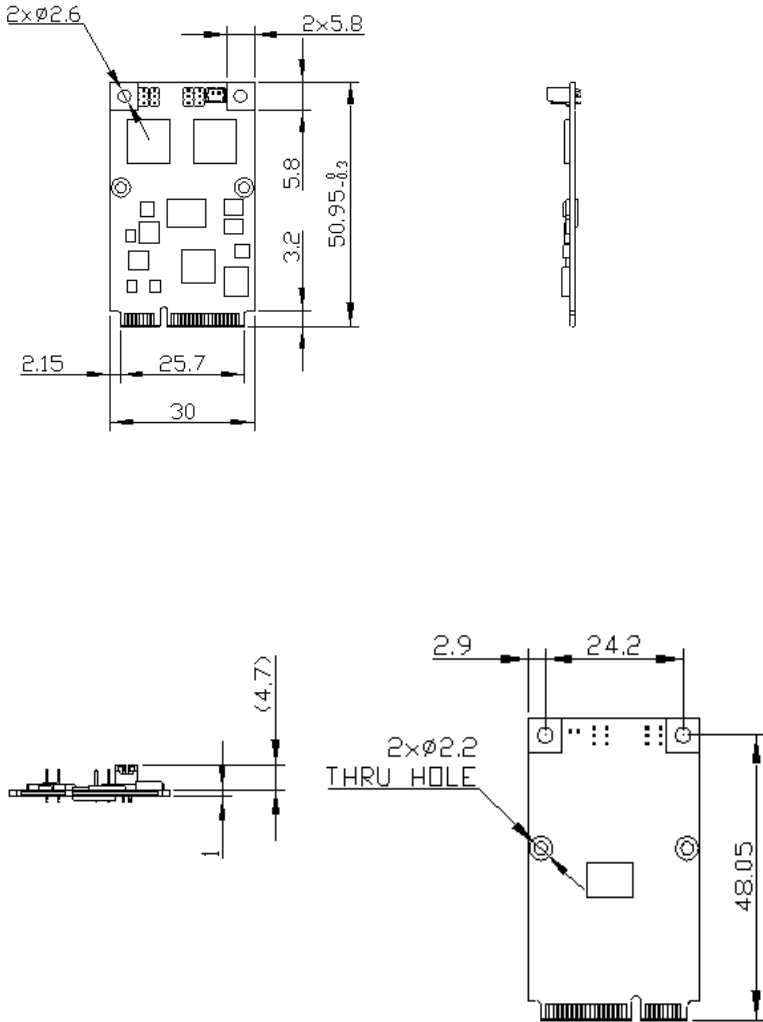
Other Specifications

Operating Temperature	32°F~122°F (0°C ~ 50°C with cooler 5m/s)
Storage Temperature	32°F~158°F (0°C~70°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE/FCC Class A

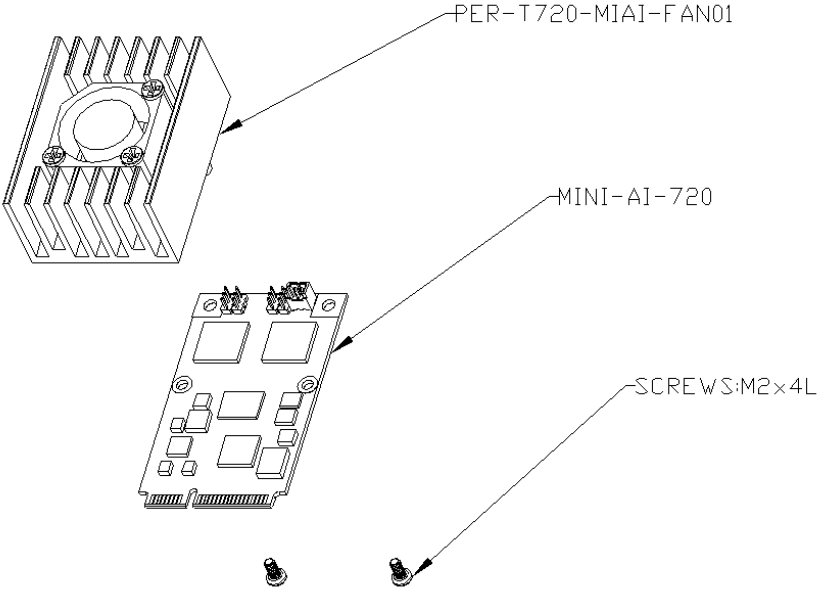
Chapter 2

Hardware Information

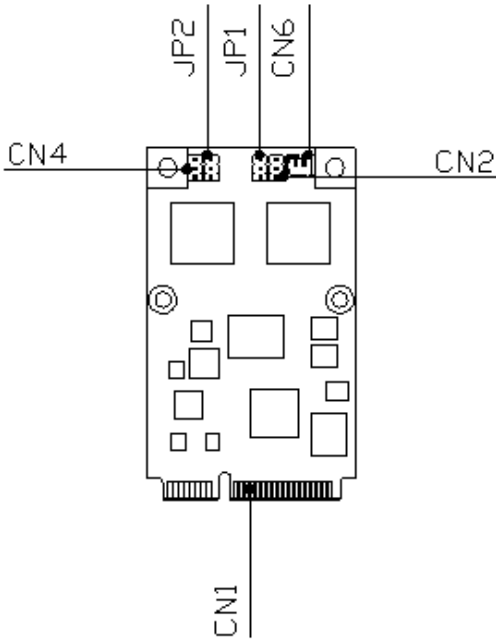
2.1 Dimensions



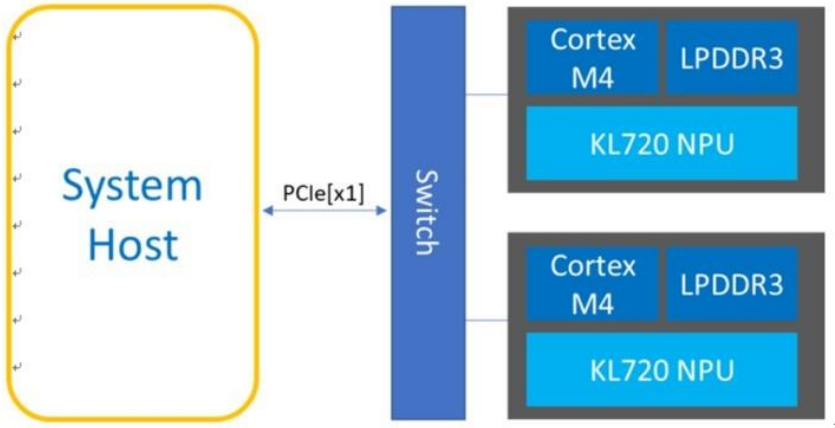
2.2 Cooler Assembly



2.3 Board Design



2.4 Block Design



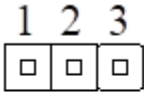
2.5 List of Jumpers

Jumpers allow users to manually customize system configurations to suit their application needs.

The following chart provides a list of each jumper function:

Label	Function
JP1	Wake function Connector (Optional)
JP2	Reset function Connector (Optional)

2.5.1 Wake function Connector (Optional) (JP1)

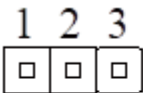


Normal Mode



Wake function

2.5.2 Reset function Connector (Optional) (JP2)



Normal Mode



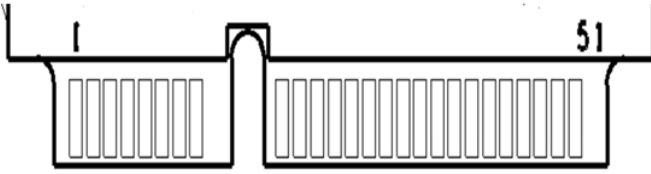
Reset function

2.6 List of Connectors

This section details the connectors featured on the module. This is a reference to help with setup and configuration for your application.

Label	Function
CN1	Mini-card connector
CN2	KL720-1 UART0 connector (Optional)
CN4	KL720-2 UART0 connector (Optional)
CN6	FAN connector

2.6.1 Mini-card connector (CN1)

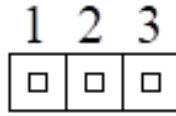


Pin	Pin Name	Signal Type	Signal level
1	PCIE_WAKE#	IN	PCIe WAKE# Open Drain with pull up on platform. Active Low.
2	+3.3VSB/+3.3V	PWR	+3.3V
3	NC	-	-
4	GND	GND	-
5	NC	-	-
6	+1.5V	PWR	+1.5V
7	PCIE_CLK_REQ#	IN	Reference clock request signal
8	UIM_PWR	PWR	-
9	GND	GND	-
10	UIM_DATA	I/O	-
11	PCIE_REF_CLK-	DIFF	PCIe Reference Clock signals (100 MHz)
12	UIM_CLK	IN	-
13	PCIE_REF_CLK+	DIFF	PCIe Reference Clock signals (100 MHz)
14	UIM_RST	IN	-
15	GND	GND	-

Pin	Pin Name	Signal Type	Signal level
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	PCIe Rx
24	+3.3VSB/+3.3V	PWR	+3.3V
25	PCIE_RX+	DIFF	PCIe Rx
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	PCIe Tx
32	SMB_DATA	I/O	+3.3V
33	PCIE_TX+	DIFF	PCIe Tx
34	GND	GND	-
35	GND	GND	-
36	USB_D-	DIFF	-

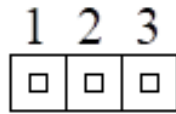
Pin	Pin Name	Signal Type	Signal level
37	GND	GND	-
38	USB_D+	DIFF	-
39	+3.3VSB/+3.3V	PWR	+3.3V
40	GND	GND	-
41	+3.3VSB/+3.3V	PWR	+3.3V
42	NC	-	-
43	GND	GND	-
44	NC	-	-
45	NC	-	-
46	NC	-	-
47	NC	-	-
48	+1.5V	PWR	+1.5V
49	NC	-	-
50	GND	GND	-
51	NC	-	-
52	+3.3VSB/+3.3V	PWR	+3.3V

2.6.2 KL720-1 UART0 Connector (Optional) (CN2)



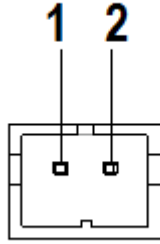
Pin	Pin Name	Signal Type	Signal level
1	X_UART0_TX_1	I/O	3.3V
2	X_UART0_RX_1	I/O	3.3V
3	GND	GND	-

2.6.3 KL720-2 UART0 Connector (Optional) (CN4)



Pin	Pin Name	Signal Type	Signal level
1	X_UART0_TX_2	I/O	3.3V
2	X_UART0_RX_2	I/O	3.3V
3	GND	GND	-

2.6.4 FAN connector (CN6)



Pin	Pin Name	Signal Type	Signal level
1	+3.3V	PWR	3.3V
2	GND	GND	-