UP Element i12 Edge

UP Element i12 System Powered by the
Intel® NUC 12 Compute Element

User's Manual 5th Ed

Last Updated: February 13, 2025

Copyright Notice

Acknowledgement

Packing List

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

Item	Quantity
● UP Element i12 Edge	1
● Screw Bag for VESA	1
● Wi-Fi Antenna	2
● Plug & Push Terminal Block	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 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. 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 AC 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 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
18. DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4°F) OR ABOVE 60°C (140°F) 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.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	×	○	○	○	○	○
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。

环保使用期限(EFUP (Environmental Friendly Use Period)) : 10 年

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)

Name and content of hazardous substances in product

AAEON System 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	×	O	O	O	O	O
Connector and Cable	×	O	O	O	O	O
Chassis	O	O	O	O	O	O
CPU and Memory	×	O	O	O	O	O
Hard Disk	×	O	O	O	O	O
LCD Modules	×	O	O	O	O	O
CD-ROM/DVD-ROM	×	O	O	O	O	O
Touch Modules	×	O	O	O	O	O
Power	×	O	O	O	O	O
Battery	×	O	O	O	O	O

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

O：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：

1. This product defined period of use is under normal condition.
2. In above part, CPU/Memory/ Hard Disk/CD-ROM/DVD-ROM/ Power are optional.
3. In above part, LCD Modules/ Touch Modules are for all-in-one product model.

Table of Contents

Chapter 1 - Product Specifications 1

1.1 Specifications 2

1.2 Block Diagram 5

Chapter 2 – Hardware Information 6

2.1 Dimensions 7

2.2 I/O Location 8

2.3 List of Connectors 9

2.3.1 Power Button (1) 10

2.3.2 LAN 2 Ethernet Port (Intel® I225-IT) & USB 3.2 Gen 2 (2) 10

2.3.3 LAN 1 Ethernet Port (Intel® I219-LM) & USB 3.2 Gen 2 (3) 10

2.3.4 LAN 3 Ethernet Port (Realtek RTL8111H) (4) 11

2.3.5 USB 2.0 (1/2) (5) 11

2.3.6 USB Type-C 3.0 (6) 12

2.3.7 DP 1.4 & HDMI 2.0 (7) 12

2.3.8 COM 1/2 (Pin Header) (8) 13

2.3.9 GPIO (9) 14

2.3.10 Mic-In/Line-Out (10) 15

2.3.11 DC Jack (11) 15

2.3.12 Reset Button (12) 15

2.4 List of Internal Slots 16

2.4.1. M.2 2280 M-Key 17

2.4.2 M.2 3052 B-Key 17

Chapter 3 – Operating System and Certification 18

3.1. Operating System 19

3.1.1. OS Version Support 19

3.1.2. Certification Specification 19

Appendix A – Cables and Connectors 20

A.1 Cables and Connectors 21

Appendix B – M.2 2280 Installation 22

B.1 M.2 2280 Device Installation 23

Chapter 1

Product Specifications

1.1 Specifications

System	
CPU	Intel® Core™ i5-1235U Processor SoC
Memory	Onboard LPDDR5, 8GB/16GB
Graphics	Intel® Iris® Xe Graphics
Storage	Optional with M.2 2280 M-Key x 2
Ethernet	Intel® I225-IT x 1 (2.5GbE)
	Intel® I219-LM GbE x 1
	Realtek RTL8111H GbE x 1
Wi-Fi/BT	Intel® AX211 Wi-Fi 6E (802.11ax)
Expansion Slot	M.2 3052 B-Key x 1 (with Nano SIM Slot)
	M.2 2280 M-Key x 2 (PCIe 3.0 [x2])
Security	TPM 2.0/Watchdog timer
OS Support	Microsoft Windows® 10
	Linux: Ubuntu 22.04 LTS

I/O

USB	USB 3.2 Gen 2 (Type-A) x 2
	USB 2.0 (Type-A) x 2
	USB 3.2 Gen 2 (Type-C) x 1, supports DP 1.4
Display	HDMI 2.0b x 1
	DP 1.4 x 1
Ethernet	RJ-45 x 3 for GbE/2.5GbE LAN (Supports PXE function)
COM	RS-232/422/485 x 2 (Pin Header type, RS-422/485 supports 9600 baud rate)
Audio	Mic-In x 1/Line-Out x 1
GPIO	Isolation GPIO x 8 in/8 out (Pin Header Type)

Power Supply

Power Requirement	9V ~ 36V
Power Supply Type	Ø2.5 Lockable connector
Power Consumption	Intel® Core™ i5-1235U, LPDDR5 5200MHz 32GB, 4.47A @12V (Typical)
	Intel® Core™ i5-1235U, LPDDR5 5200MHz 32GB, 9.6A @12V (Maximum)

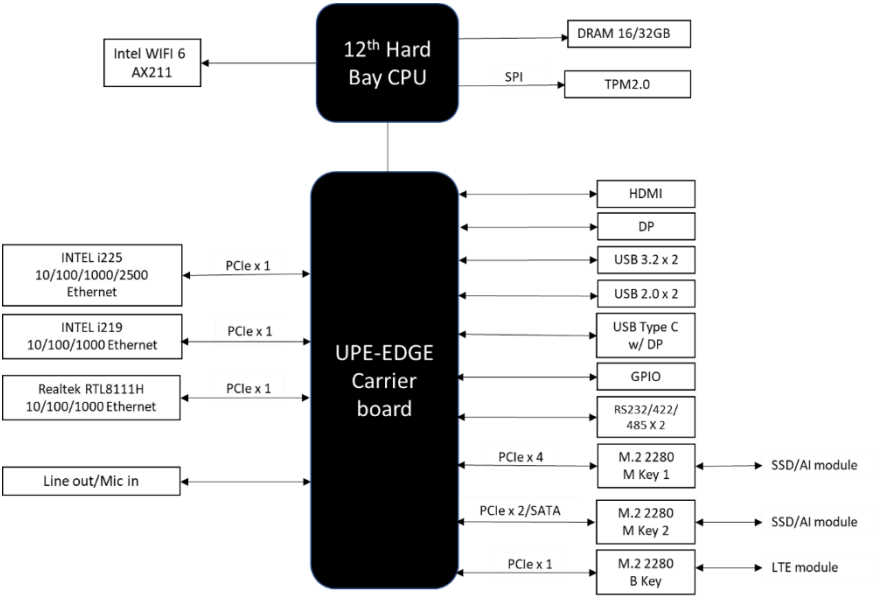
Mechanical

Mounting	75mm x 75mm VESA Mount
	Wallmount
Dimensions	5.9" x 4.9" x 1.8" (152mm x 125mm x 48mm)
Gross Weight	3.31 lb. (1.5Kg)
Net Weight	2.21 lb. (1Kg)

Environmental

Operating Temperature	With Heatsink: 32°F ~ 140°F (0°C ~ 60°) with air flow 0.5m/s
Storage Temperature	-40°F ~ 140°F (-40°C ~ 60°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE/FCC Class A, RED, RoHS Compliant, REACH
	Shock: MIL-STD-202G Method 213B, Table 213-I Condition A
	Vibration: IEC 60068-2-6: 1G, 5-500Hz, 3 axes
	IEC 60068-2-64: Operating 5Grms, 5-500 Hz, 3 axes

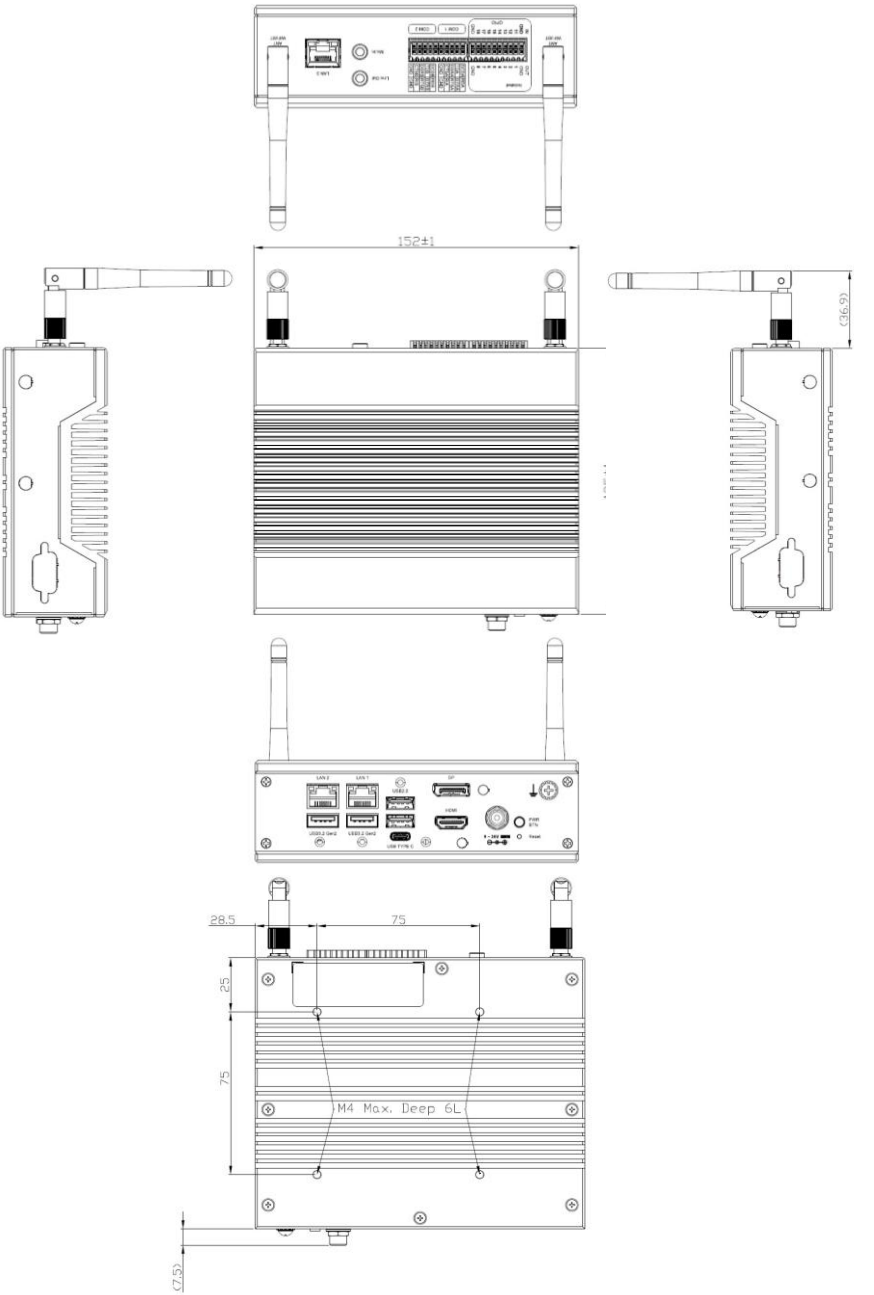
1.2 Block Diagram



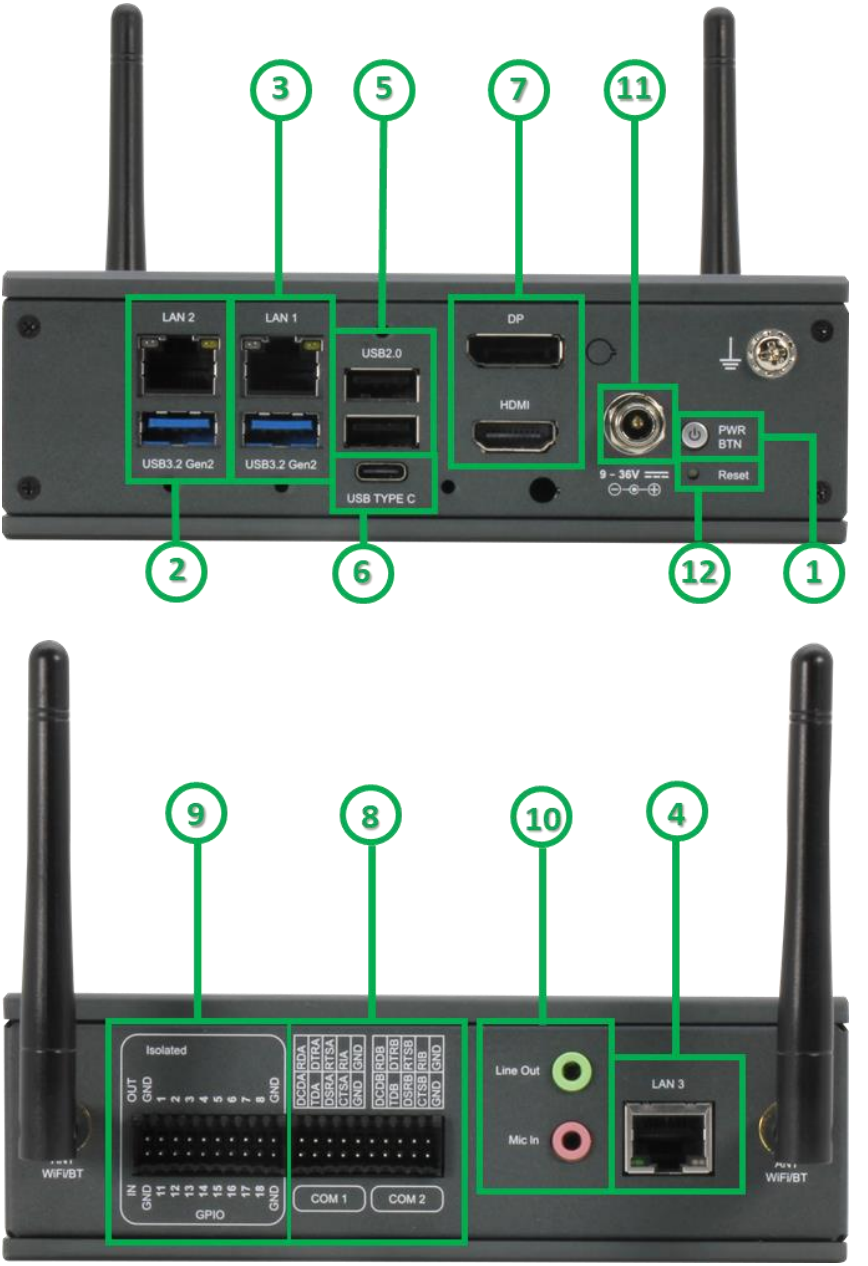
Chapter 2

Hardware Information

2.1 Dimensions



2.2 I/O Location



2.3 List of Connectors

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

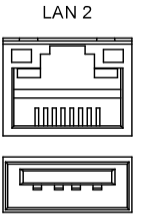
Label	Function
1	Power Button
2	USB 3.2 Gen 2 & Ethernet Port (Intel® I225-IT)
3	USB 3.2 Gen 2 & Ethernet Port (Intel® I219-LM)
4	Ethernet Port (Realtek RTL8111H)
5	USB 2.0 (1/2)
6	USB 3.2 Gen 1 (Type-C)
7	DP 1.4 & HDMI 2.0
8	RS-232/422/485 (1/2)
9	GPIO
10	Mic In/Line Out
11	DC Jack
12	Reset Button

2.3.1 Power Button (1)

The controller provides power button to switch on/off system.

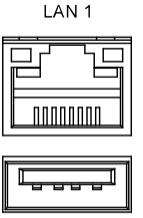
2.3.2 LAN 2 Ethernet Port (Intel® I225-IT) & USB 3.2 Gen 2 (2)

The controller provides Gigabit ethernet ports with 10/100/1000/2500 Base – Tx in combination with one USB 3.2 Gen 2.



2.3.3 LAN 1 Ethernet Port (Intel® I219-LM) & USB 3.2 Gen 2 (3)

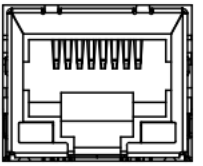
The controller provides Gigabit Ethernet ports with 10/100/1000 Base – Tx in combination with one USB 3.2 Gen 2.



2.3.4 LAN 3 Ethernet Port (Realtek RTL8111H) (4)

The controller provides one Gigabit ethernet ports and supports 10/100/1000Base-TX and LED indicator, see the details as below.

LAN 3

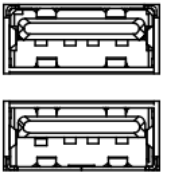


LAN Speed		Active LED	Link/Speed LED
1G	1G		
	100M		
	10M		

2.3.5 USB 2.0 (1/2) (5)

The controller provides two USB 2.0 slots, see the information as below.

USB2.0



2.3.6 USB Type-C 3.0 (6)

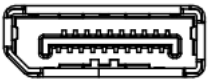
The controller provides one USB type C with support for Display port function, see the information as below.

USB TYPE C

2.3.7 DP 1.4 & HDMI 2.0 (7)

The controller provides one DP 1.4 function and HDMI 2.0, see the information as below.

DP

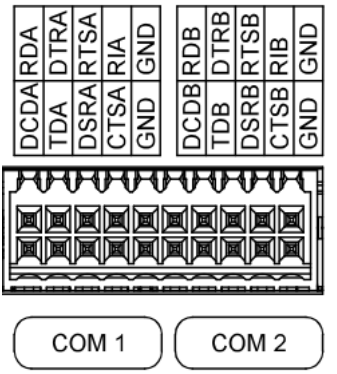


HDMI

2.3.8 COM 1/2 (Pin Header) (8)

The controller provides RS-232/422/485 via pin header interface, if you want to change the mode, please go to the BIOS setting page. Default is RS232.

See the hardware pin assignment and table as below.



COM 1	Function	Function
	DCDA/RS422TX-/RS485-	RDA/RS422TX+/RS485+
	TDA/RS422RX+	DTRA/RS422RX-
	DSRA	RTSA
	CTSA	RIA
	GND	GND

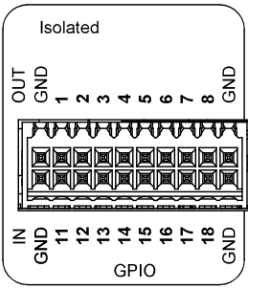
COM 2	Function	Function
	DCDB/RS422TX-/RS485-	RDB/RS422TX+/RS485+
	TDB/RS422RX+	DTRB/RS422RX-
	DSRB	RTSB
	CTSB	RIB
	GND	GND

2.3.9 GPIO (9)

The controller provides a GPIO pin header with 8 in and 8 out interfaces, see the hardware pin assignment and table as below.

Note: GPIO ports have digital isolators to protect the UP Element i12 Edge from damage as a result of high-voltage events. As such, GPIO 8 input/8 output is subject to the following three conditions:

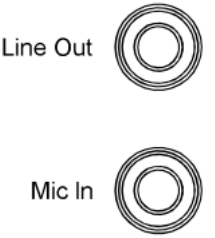
1. The maximum voltage on the GPIOs must not exceed 6V.
2. High-level input voltage (VIH): 3.5V minimum.
3. Low-level input voltage (VIL): 1.5V maximum.



Pin	Input	Pin	Output
-	GND	-	GND
11	GPIO11	1	GPIO1
12	GPIO12	2	GPIO2
13	GPIO13	3	GPIO3
14	GPIO14	4	GPIO4
15	GPIO15	5	GPIO5
16	GPIO16	6	GPIO6
17	GPIO17	7	GPIO7
18	GPIO18	8	GPIO8
-	GND	-	GND

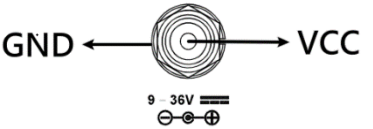
2.3.10 Mic-In/Line-Out (10)

The controller provides one Mic-in and one Line-out function, see the hardware pin assignment and table as below.



2.3.11 DC Jack (11)

The controller provides one jack interface for power range 9V ~ 36V DC in.



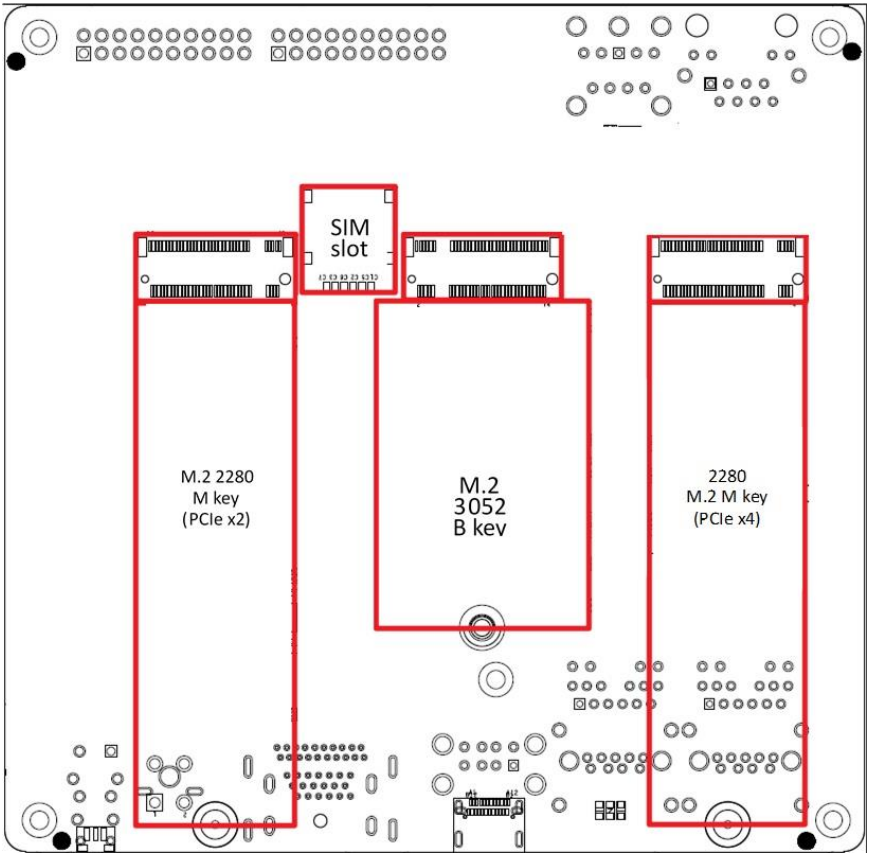
Pin	Input
VCC	9 – 36V DC_IN
GND	GND_SIGNAL

2.3.12 Reset Button (12)

The controller a provides button to reset the system.

2.4 List of Internal Slots

Slot	Function
Storage Slot	M.2 2280 M-Key 1 (PCIe [x4] interface)
Storage Slot	M.2 2280 M-Key 2 (PCIe [x2]/SATA interface)
LTE Module Slot	M.2 3052 B-Key (PCIe [x1])
SIM Slot	SIM Card



2.4.1. M.2 2280 M-Key

The controller provides one PCIe Gen 4 [x4] and one PCIe Gen 3 [x2]/SATA interface on M.2 M-Key slot for NVMe storage, SATA storage, and AI module.

2.4.2 M.2 3052 B-Key

The controller provides one M.2 3052 B-Key slot for an LTE module.

Chapter 3

Operating System and Certification

3.1. Operating System

3.1.1. OS Version Support

The Robot controller supports Windows10 Enterprise and Ubuntu 22.04.

3.1.2. Certification Specification

The controller hardware design meets CE/FCC Class A and RED certification requirements.

Note: Frame ground is required to be connected through M4 screw at front panel while operating the UP Element i12 Edge.

Appendix A

Cables and Connectors

A.1 Cables and Connectors

This table provides detailed information about the cables and connectors used by the UP Element i12 Edge. If you have any questions about the configuration of your board, please contact your AAEON sales representative.

Function Description	Mating Cable PN	Mating Cable Description
GPIO	16522X0048	Phoenix Connector.DIP.90D.10*2P.Pitch=2.54mm .H=12mm.FEMALE.PLUG IN Black.DINKLE.0156-1B20-BK
RS-232/422/485	16522X0048	Phoenix Connector.DIP.90D.10*2P.Pitch=2.54mm .H=12mm.FEMALE.PLUG IN Black.DINKLE.0156-1B20-BK

Appendix B

M.2 2280 Installation

B.1 M.2 2280 Device Installation

When installing an M.2 2280 device, please ensure the thermal pad is attached along with the device.

Note: As the below image illustrates, it is recommended that the M.2 2280 storage device is installed in the 1st Priority Location, while the 2nd Priority Location can be used if the former is occupied.

Note: For the 2nd Priority Location, there is the option to install a CANBus module (interface via PCIe [x2]).