BOXER-6845-BTL

Compact Embedded Computer

User's Manual 1st Ed

Last Updated: March 30, 2026

Copyright Notice

Acknowledgement

Packing List

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

Item	Quantity
● BOXER-6845-BTL	1
● Wall Mount Bracket	2
● 4-pin Terminal Block Connector (for DC input)	1
● Thermal Pad Package	1
● Screw Package	1
● Remote On/Off Connector	1
● 8-pin to 8-pin Graphics Card Power Cable (A1 SKU only)	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. 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 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 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

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

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

○：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 Specifications

System	
CPU	Intel® Core™ processors Series 2 (formerly Bartlett Lake), TDP Max. 65W Intel® Core™ 7 Processor 251E Intel® Core™ 7 Processor 251TE Intel® Core™ 5 Processor 221E Intel® Core™ 5 Processor 221TE Intel® Core™ 5 Processor 211E Intel® Core™ 5 Processor 211TE Intel® Core™ 3 Processor 201TE
Chipset	Intel® W680 Chipset
System Memory	DDR5 SODIMM x 2, up to 64GB, Unbuffered ECC / Non-ECC support
Display Interface	HDMI x 2 (Lockable)
Storage Device	2.5" SATA Drive Bay x 2 M.2 2280 M-Key x 2 (NVMe)
Ethernet	Lockable RJ-45 for GbE LAN: Intel® Ethernet Connection I219-LM x 1 Intel® Ethernet Controller I210-IT x 2
I/O	USB 3.2 (10Gbps) x 2 USB 2.0 x 2 DB-9 for RS-232/422/485 x 2 Mic-in x 1, Line-out x 1 DB-15 for DIO 8-bit x 1 Remote Power Switch x 1 Power Button with LED Indicator x 1

System

I/O (Cont.)	Reset Button x 1
	Antenna Opening x 10
Expansion	M.2 2230 E-Key x 1 (Wi-Fi)
	M.2 3052 B-Key x 1 w/ front-access Nano SIM Slot (LTE/5G)
	M.2 3052 B-Key x 1 w/o SIM slot (PCIe [x1] + USB3)
	M.2 2280 M-Key x 2 (NVMe)
	Front-access Nano SIM slot x 1 with cover
	OOB Function (by request)
	Riser Card Slot:
	A1 SKU: PCIe [x16] x 1 + PCIe [x4] x 1 (combined maximum power: 150W via power cable)
	Max. Power Consumption of GPU card 150W
	Max. length of GPU card: 221mm
	A2 SKU: PCIe [x4] x 1 + PCI x 1
Indicator	System Power
OS Support	Windows® 10 IoT 2021 LTSC
	Windows® 11 IoT LTSC
	Linux Ubuntu 24.04

Power Supply

Power Requirement	12 – 24V DC-in, 4-pin Terminal Block Connector with protection circuit

Mechanical

Mounting	Wall Mount
Dimensions (W x H x D)	5.9" x 10.63" x 8.86" (150mm x 270mm x 225mm) w/o Brackets
Gross Weight	18.1 lb (8.2 kg)
Net Weight	14.3 lb (6.5 kg)

Environmental

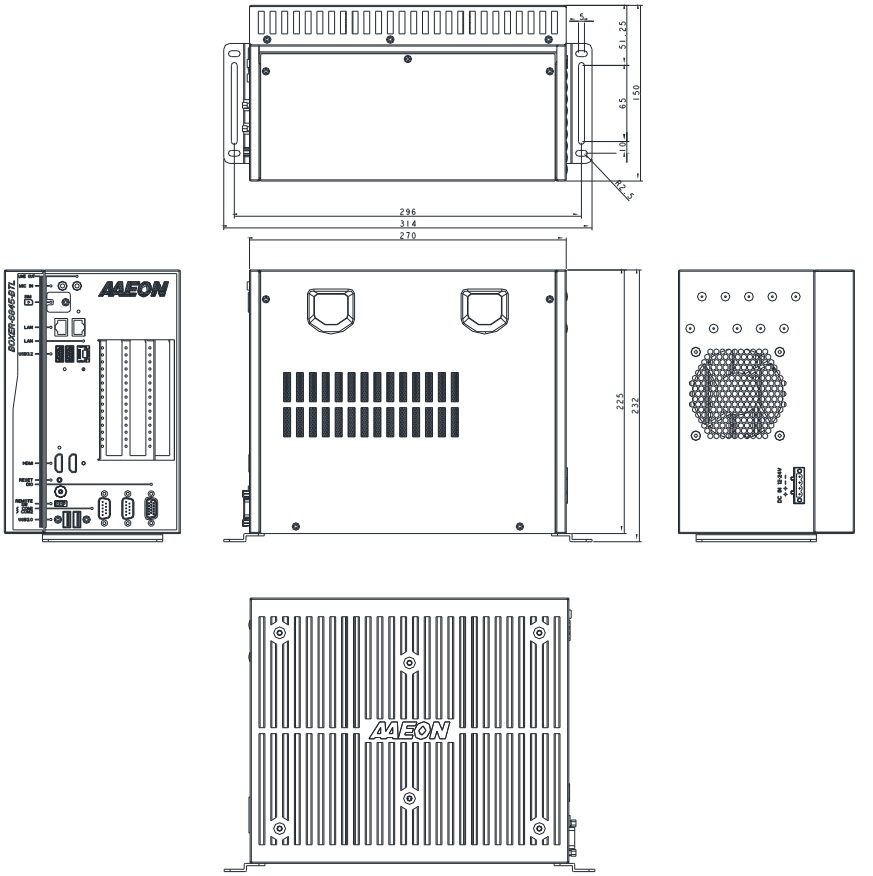
Operating Temperature	-4°F – 113°F (-20°C – 45°C) with 0.7 m/s airflow (with industrial wide temp. SSD/RAM, without add-on card)
Storage Temperature	-40˚F – 176˚F (-40˚C – 80˚C)
Storage Humidity	5 – 95% @ 40˚C, non-condensing
Anti-Vibration	3 Grms/ 5 ~ 500Hz/ operation (with SSD)
Anti-Shock	50G @ Wall Mount, half sine, 11 ms duration (with SSD)
Certification	CE/FCC Class A

Chapter 2

Hardware Information

2.1 Dimensions

A1 SKU:



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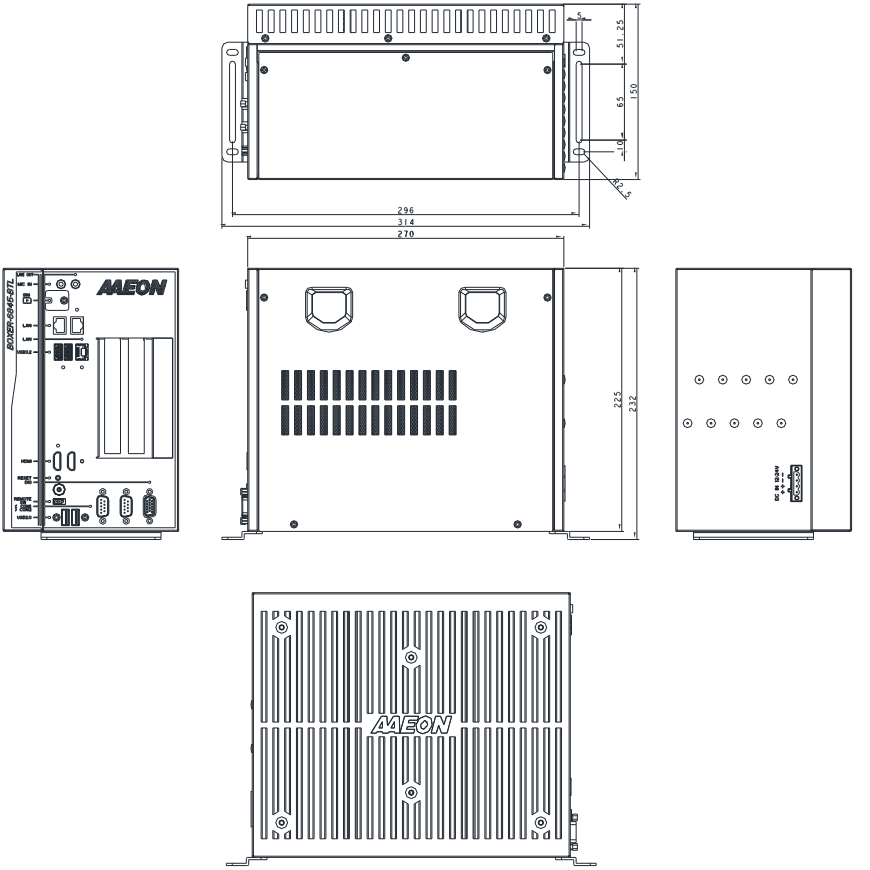
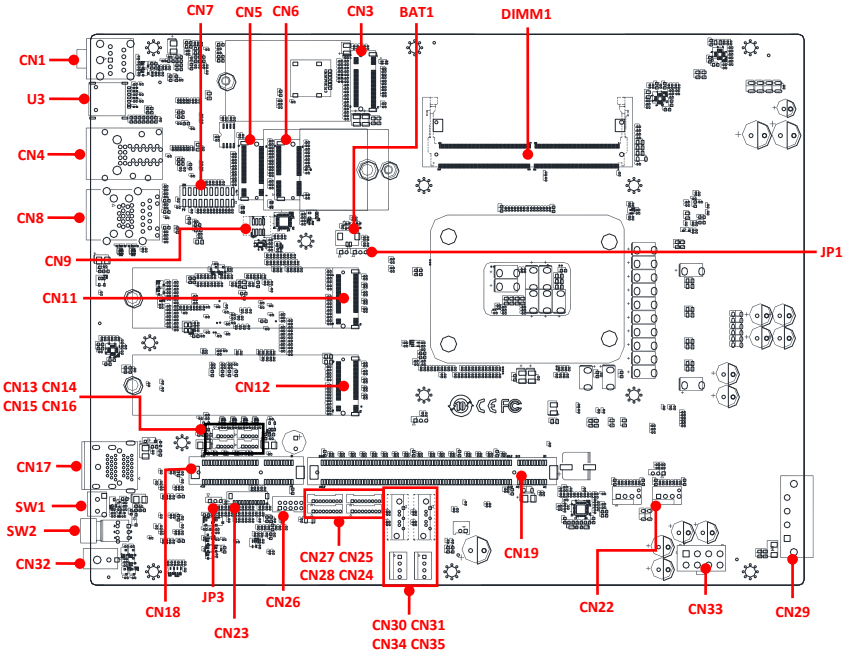


2.2 Jumpers and Connectors

Top



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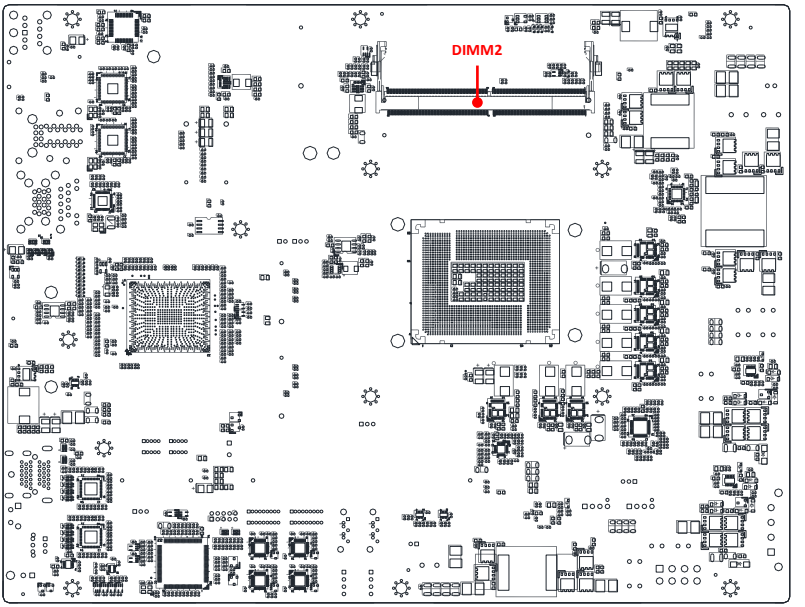
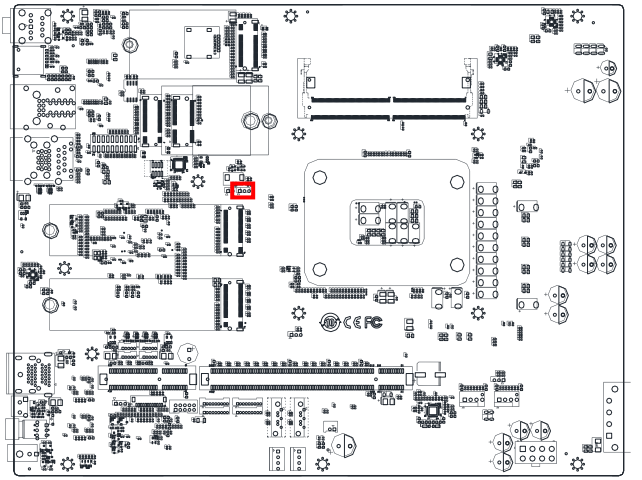


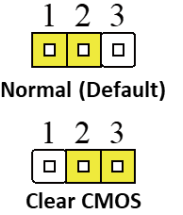
2.3 List of Jumpers

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

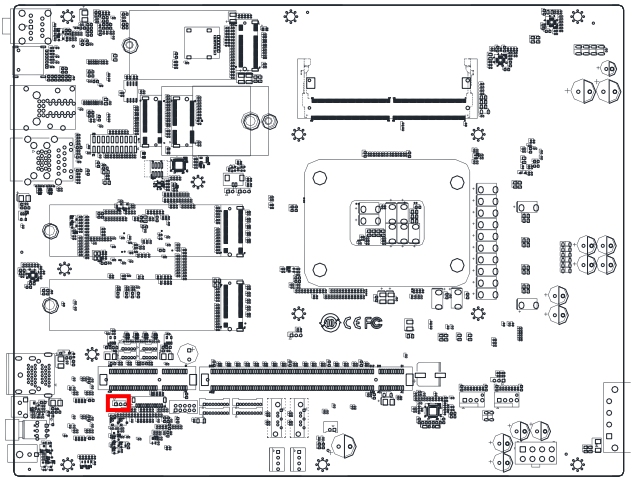
Label	Function
JP1	Clear CMOS Jumper
JP3	AT/ATX Mode Selection

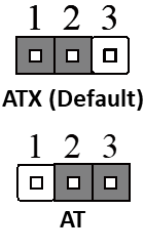
2.3.1 Clear CMOS Jumper (JP1)





2.3.2 AT/ATX Mode Selection (JP3)





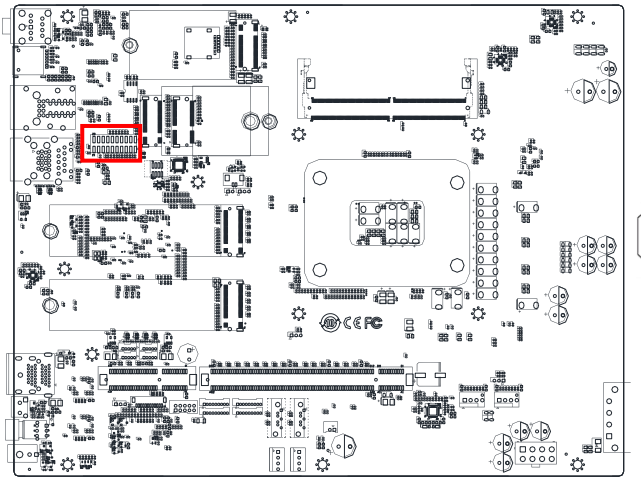
Note: AT Mode JP3(2-3): ATX power button JP3 (1-2) to power on the system.

2.4 List of Connectors

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

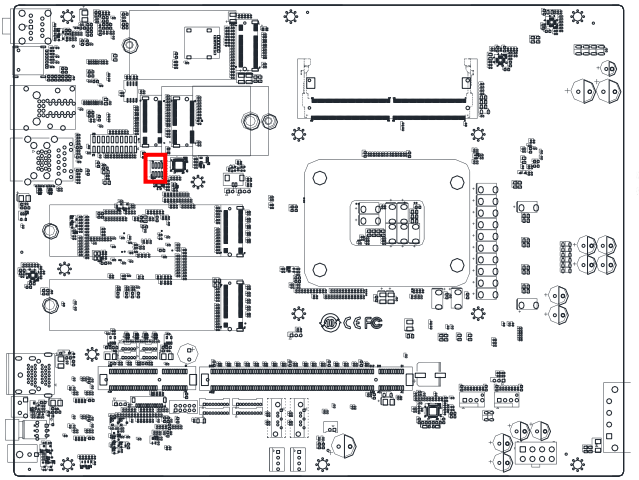
Label	Function
CN1	Audio Phone Jack (Standard)
CN3 / CN5	M.2 3052 B-Key
CN4	Dual LAN
CN6	M.2 2230 E-Key
CN7	OOB Box Header
CN8	LAN + Dual USB 3.2
CN9	SPI Flash Port
CN11 / CN12	M.2 2280 M-Key
CN13 / CN14 / CN15 / CN16	USB 2.0 Wafer Box
CN17	Dual HDMI
CN18	PCIe [x4] Slot
CN19	PCIe [x16] Slot (Standard)
CN22	Smart Fan Connector
CN23	Debug Card Connector
CN24 / CN25	COM Wafer (RS-232/422/485)
CN26	DIO
CN29	DC-In Connector
CN30	SATA 2
CN31	SATA 1
CN32	Remote Button Connector
CN33	Extended 12V Power Housing
CN34	SATA Power 2
CN35	SATA Power 1
BAT1	Battery Connector
SW1	Reset Button
SW2	Power Button
U3	Push-push Nano SIM Slot
DIMM1 / DIMM2	DDR5 SODIMM Slot

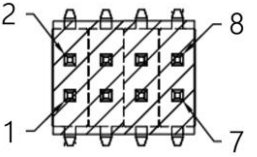
2.4.1 OOB Box Header (CN7)



Pin	Pin Name	Signal Type	Signal Level
1	+V3P3S	PWR	+3.3V
2	+V3P3S	PWR	+3.3V
3	UART1_TXD_SIO	UART	
4	NC2_SI_TXD0_OOB	NCSI	
5	UART1_RXD_SIO	UART	
6	NC2_SI_TXD1_OOB	NCSI	
7	I2C0_SCL		
8	NC2_SI_RXD0_OOB	NCSI	
9	I2C0_SDA		
10	NC2_SI_RXD1_OOB	NCSI	
11	HWRST#	Reset	
12	NC2_SI_CLK_IN_OOB	NCSI	
13	GND	GND	
14	NC2_SI_CLK_IN_OOB	NCSI	
15	PANSWH#	Switch	
16	NC2_SI_TX_EN_OOB	NCSI	
17	GND	GND	
18	UART0_TXD_OOB	UART	
19	+V5S	PWR	+5V
20	UART0_RXD_OOB	UART	

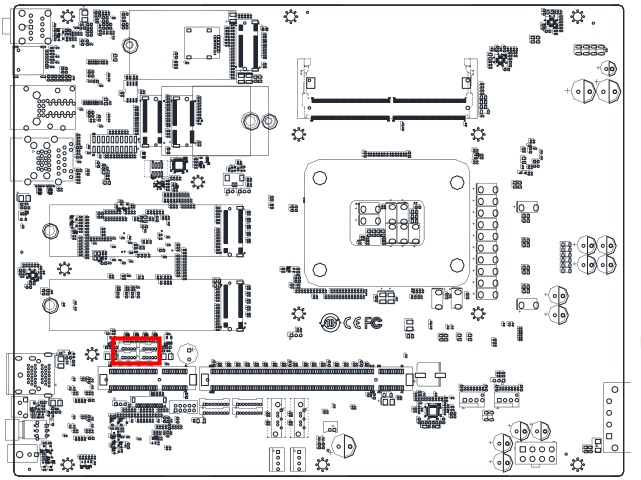
2.4.2 SPI Flash Port (CN9)

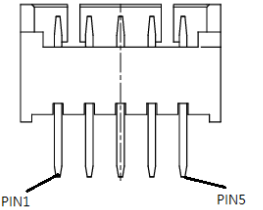




Pin	Pin Name	Signal Type	Signal Level
1	+3.3M_SPI	PWR	+3.3V
2	GND	GND	
3	SPI_CS	IN	
4	SPI_CLK		+3.3V
5	SPI_MISO	OUT	+3.3V
6	SPI_MOSI	IN	+3.3V
7	NC		
8	NC		

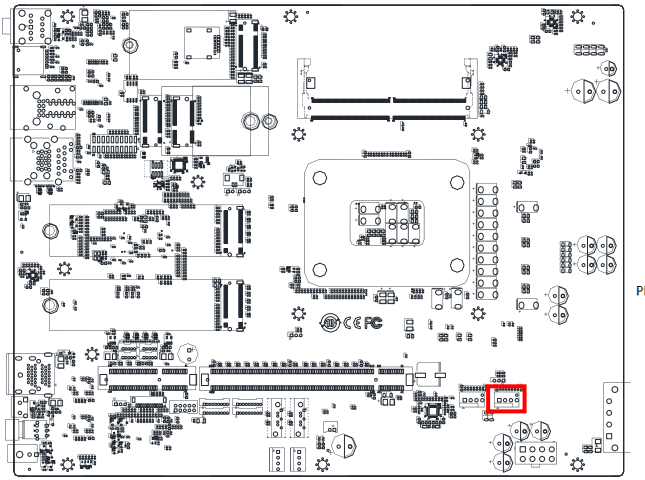
2.4.3 USB 2.0 Wafer Box (CN13/CN14/CN15/CN16)

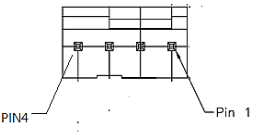




Pin	Pin Name	Signal Type	Signal Level
1	+5V	PWR	+5V
2	USBD-	DIFF	
3	USBD+	DIFF	
4	GND	GND	
5	GND	GND	

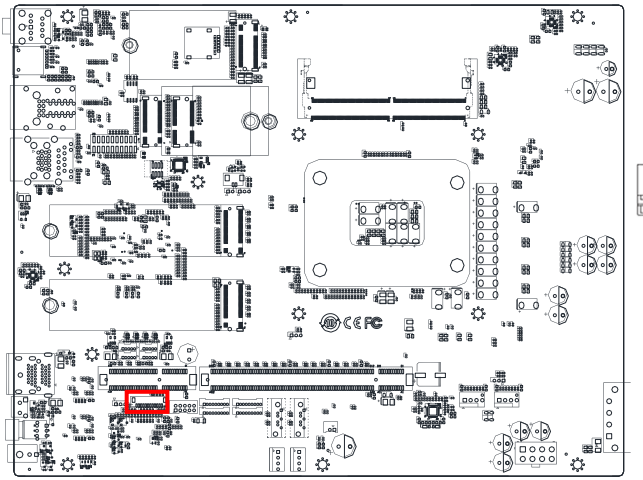
2.4.4 Smart Fan Connector (CN22)

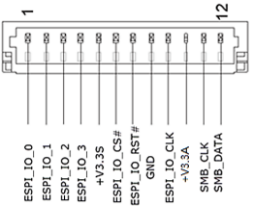




Pin	Pin Name	Signal Type	Signal Level
1	GND	GND	GND
2	+V12V	PWR	+12V
3	FAN_PWM	OUT	Signal
4	FAN_CTL	OUT	Signal

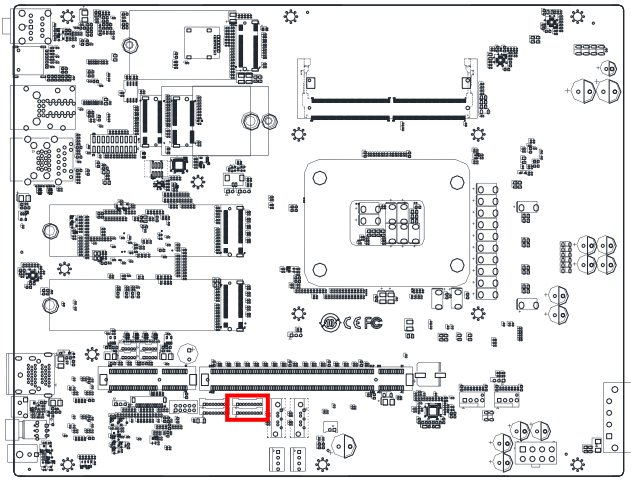
2.4.5 Debug Card Connector (CN23)

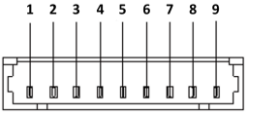




Pin	Pin Name	Signal Type	Signal Level
1	ESPI_IO_0	I/O	+1.8V
2	ESPI_IO_1	I/O	+1.8V
3	ESPI_IO_2	I/O	+1.8V
4	ESPI_IO_3	I/O	+1.8V
5	+3.3V	PWR	+3.3V
6	ESPI_IO_CS#	IN	+1.8V
7	ESPI_IO_RST#	IN	+1.8V
8	GND	GND	GND
9	EPSI_IO_LCLK	IN	+1.8V
10	+3.3V	PWR	+3.3V
11	SMDAT	I/O	NA
12	SMCLK	IN	NA

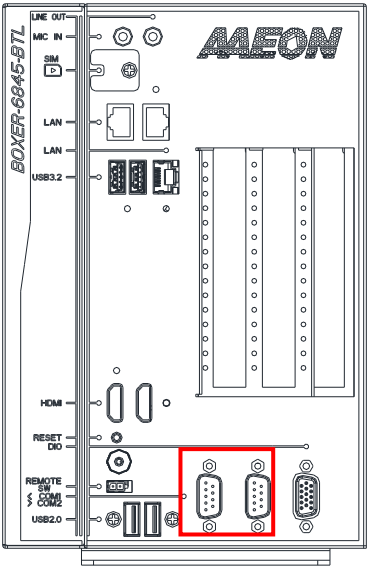
2.4.6 COM Wafer (RS-232/422/485) (CN24/CN25)

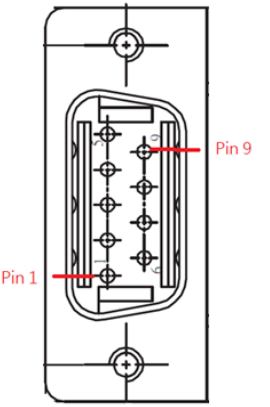




Pin	RS-232	Signal Type	RS-422	RS-485
1	DCD	IN	RS422_TX-	RS485_D-
2	DSR	IN		
3	RX	IN	RS422_TX+	RS485_D+
4	RTS	OUT		
5	TX	OUT	RS422_RX+	
6	CTS	IN		
7	DTR	OUT	RS422_RX-	
8	RI (Default: disable)	IN		
9	GND	GND		

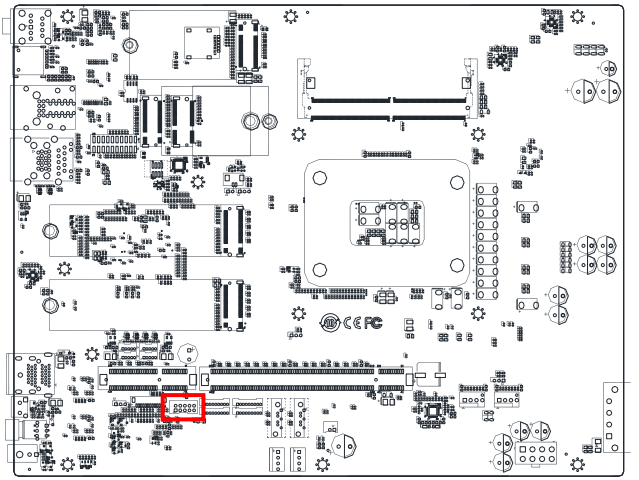
2.4.7 DB-9 Port (RS-232/422/485) (CN24/CN25)

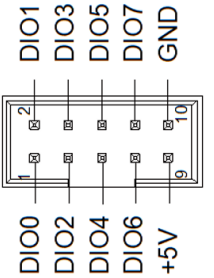




Pin	RS-232	Signal Type	RS-422	RS-485
1	DCD	IN	RS422_TX-	RS485_D-
2	RX	IN	RS422_TX+	RS485_D+
3	TX	OUT	RS422_RX+	
4	DTR	OUT	RS422_RX-	
5	GND	GND		
6	DSR	IN		
7	RTS	OUT		
8	CTS	IN		
9	RI (Default: disable)	IN		

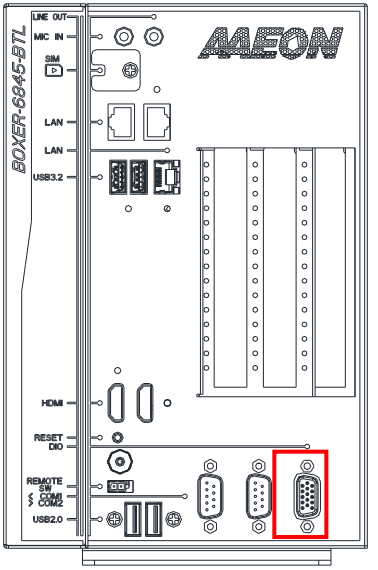
2.4.8 DIO Connector (CN26)

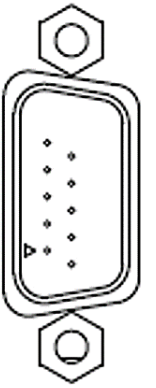




Pin	Pin Name	Signal Type	Signal Level
1	DIO0	I/O	+5V / 12mA
2	DIO1	I/O	+5V / 12mA
3	DIO2	I/O	+5V / 12mA
4	DIO3	I/O	+5V / 12mA
5	DIO4	I/O	+5V / 12mA
6	DIO5	I/O	+5V / 12mA
7	DIO6	I/O	+5V / 12mA
8	DIO7	I/O	+5V / 12mA
9	+5V	PWR	+5V / 650mA
10	GND	GND	GND

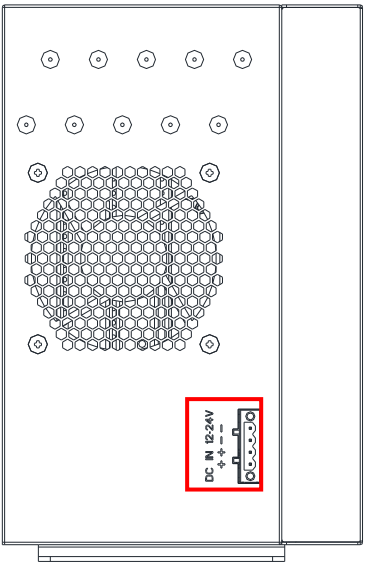
2.4.9 DB-15 for DIO 8-bit (CN26)

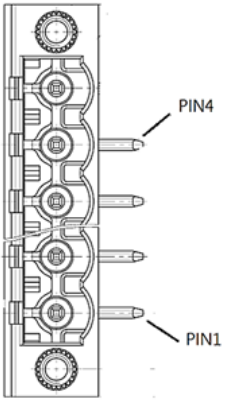




Pin	Pin Name	Signal Type	Signal Level
1	DIO0	I/O	+5V / 12mA
2	DIO1	I/O	+5V / 12mA
3	DIO2	I/O	+5V / 12mA
4	DIO3	I/O	+5V / 12mA
5	DIO4	I/O	+5V / 12mA
6	DIO5	I/O	+5V / 12mA
7	DIO6	I/O	+5V / 12mA
8	DIO7	I/O	+5V / 12mA
9	+5V	PWR	+5V / 650mA
10	GND	GND	GND

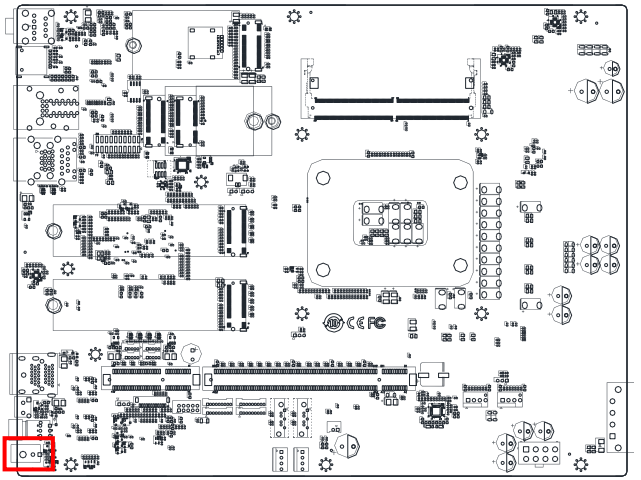
2.4.10 DC-In Connector (CN29)

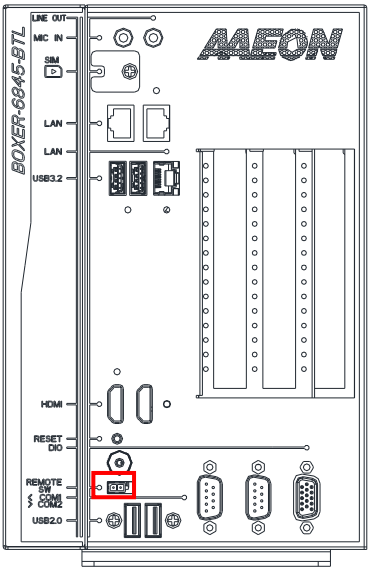


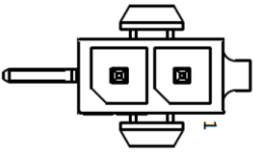


Pin	Pin Name	Signal Type	Signal Level
1	12V-24V	PWR	12V-24V
2	12V-24V	PWR	12V-24V
3	GND	GND	GND
4	GND	GND	GND

2.4.11 Remote Button Connector (CN32)

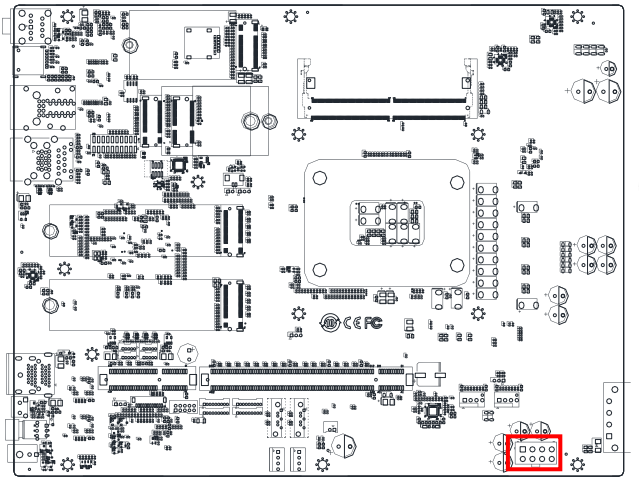


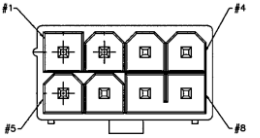




Pin	Pin Name	Signal Type	Signal Level
1	PWR_BUTTON	IN	Signal
2	GND	GND	GND

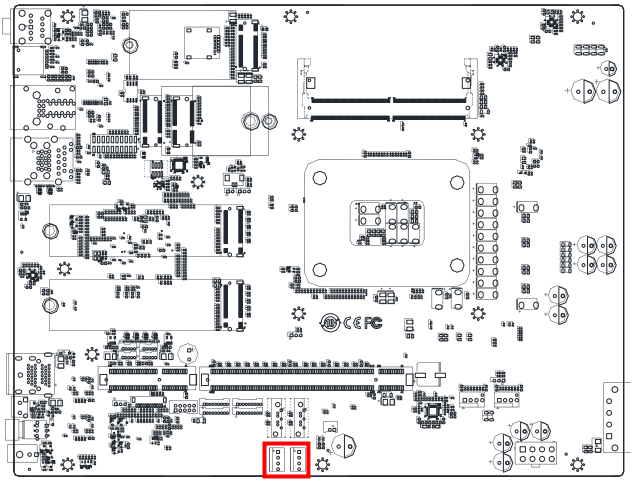
2.4.12 Extended 12V Power Housing (CN33)

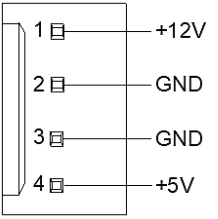




Pin	Pin Name	Signal Type	Voltage Output
1	+V12_GPU	PWR	+12V
2	+V12_GPU	PWR	+12V
3	+V12_GPU	PWR	+12V
4	GND	GND	GND
5	GND	GND	GND
6	GND	GND	GND
7	GND	GND	GND
8	GND	GND	GND

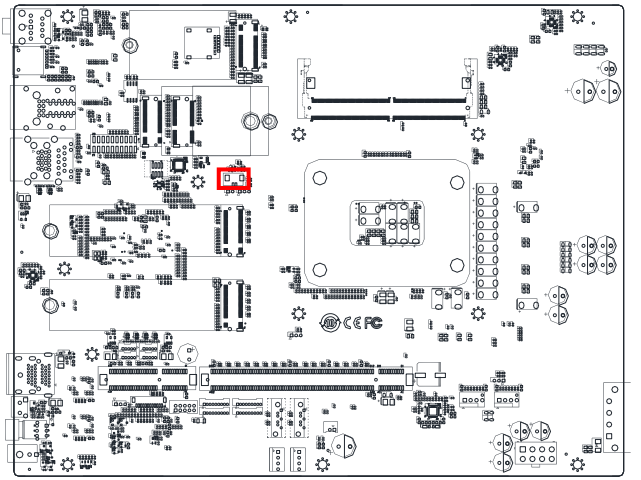
2.4.13 SATA Power (CN34/CN35)

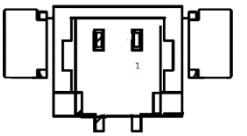




Pin	Pin Name	Signal Type	Voltage Output
1	+12V	PWR	+12V
2	GND	GND	GND
3	GND	GND	GND
4	+5V	PWR	+5V

2.4.14 Battery Connector (BAT1)

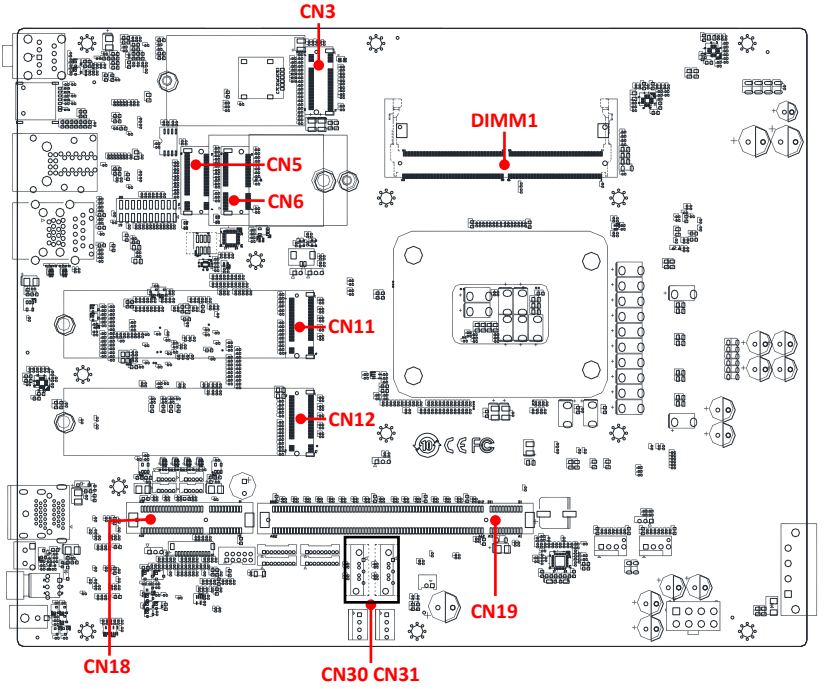




Pin	Pin Name	Signal Type	Signal Level
1	+3.3V_RTC	PWR	3.3V
2	GND	GND	

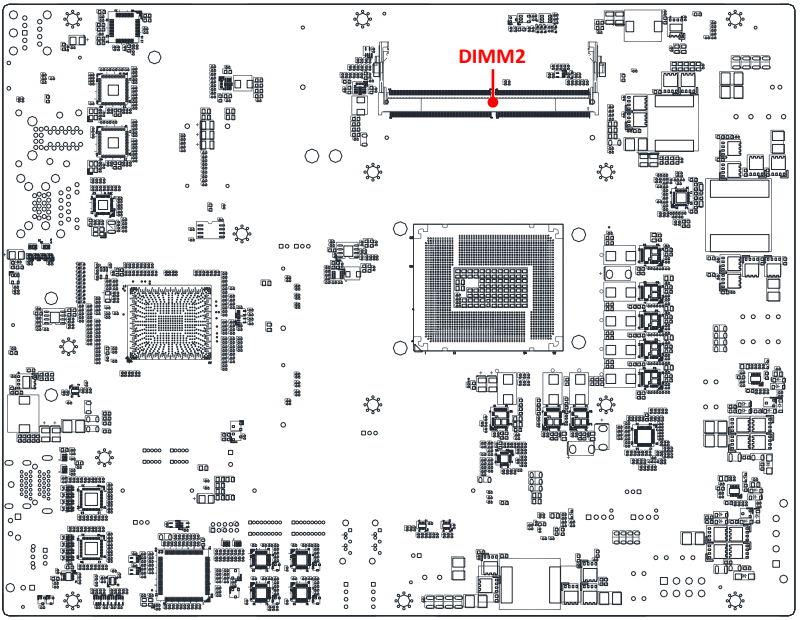
2.5 Standard Specification Connectors & System I/O

2.5.1 Board Top-Side Standard Connectors



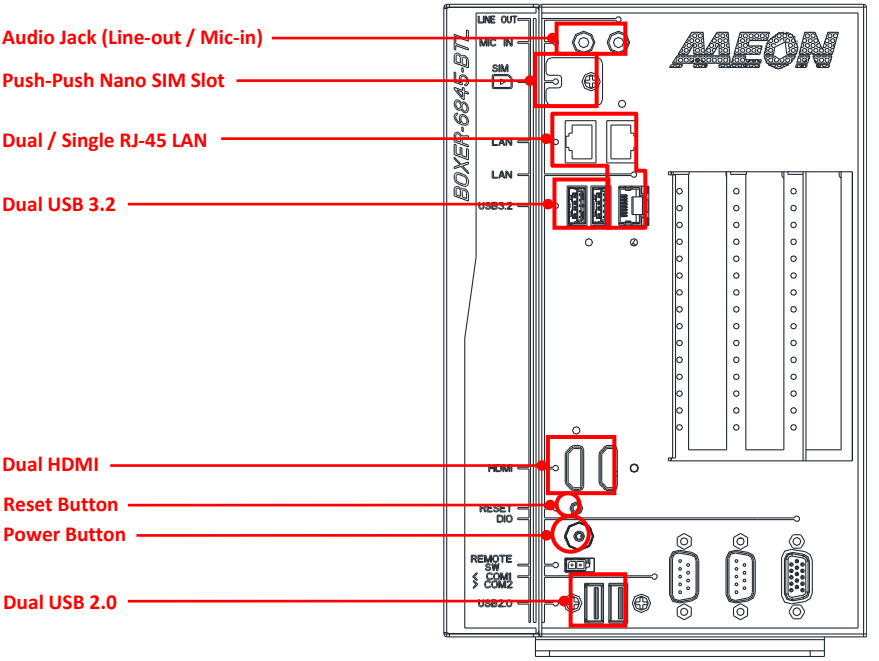
Label	Function
CN11/CN12	M.2 2280 M-Key
CN6	M.2 2230 E-Key Slot
CN3	M.2 3052 B-Key Slot (wo SIM)
CN5	M.2 3052 B-Key Slot (w/ Front Access Nano SIM Slot - Label U3)
DIMM1	DDR5 SODIMM Slot
CN18	PCIe [x4] Slot
CN19	PCIe [x16] Slot
CN30/CN31	SATA Connector

2.5.2 Board Bottom-Side Standard Connectors

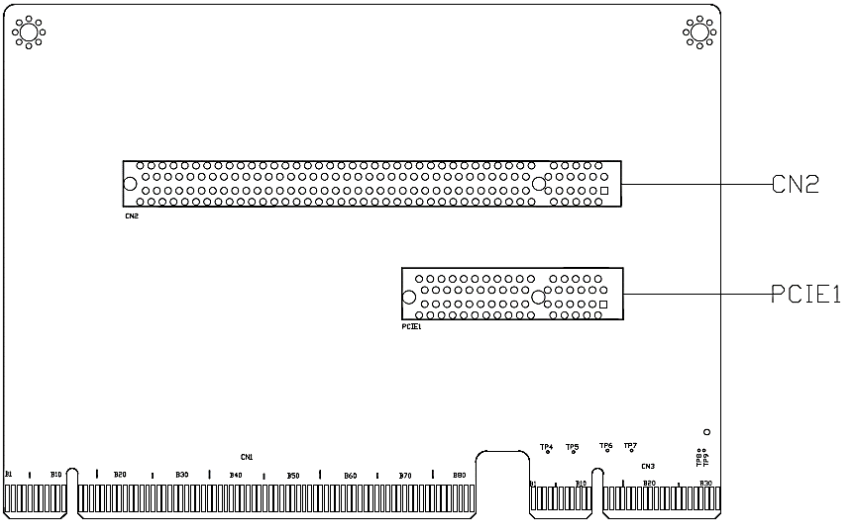


Label	Function
DIMM2	DDR5 SODIMM Slot

2.5.3 System Front-Side Standard I/O

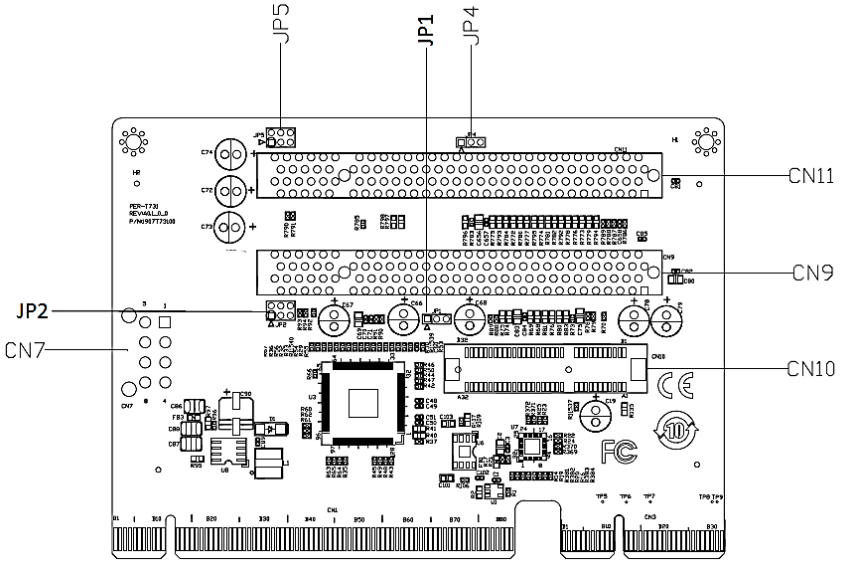


2.6 Riser Card – A1



Label	Function
CN2	Standard PCIe [x16] Slot
PCIE1	Standard PCIe [x4] Slot

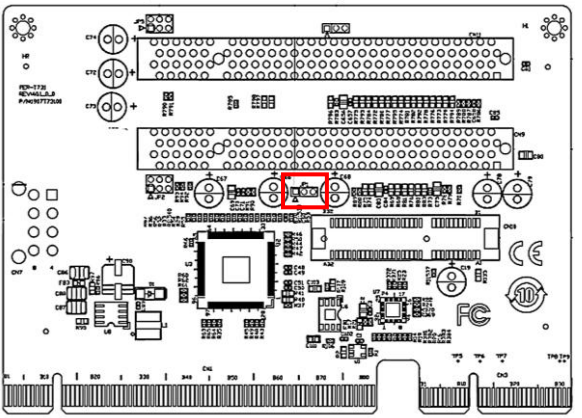
2.7 Riser Card – A2

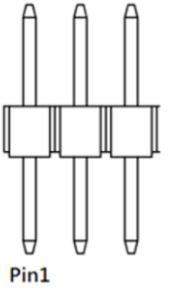


Note: CN11 is optional.

Label	Function
CN11	Standard PCI Slot (optional)
CN9	Standard PCI Slot
CN10	Standard PCIe [x4] Slot
JP1	CN9 PCI ID Select
JP4	CN11 PCI ID Select
JP5/JP2	PCI I/O Voltage Select

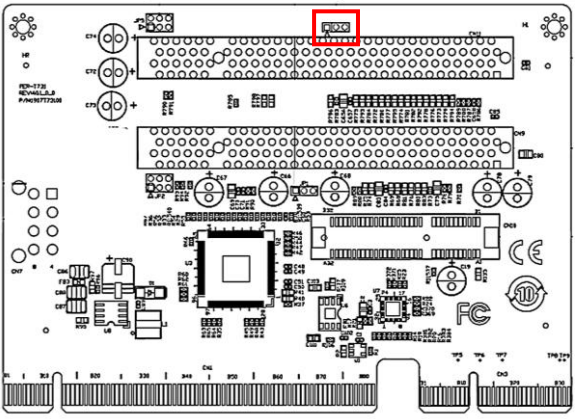
2.7.1 PCI (CN9) ID Select (JP1)

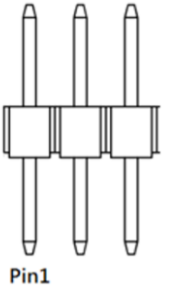




Pin	Pin Name	Signal Type	Signal Level
1	PCI_AD20 (default)		
2	PCI_IDSEL	IN	
3	PCI_AD24		

2.7.2 PCI (CN11) ID Select (JP4)

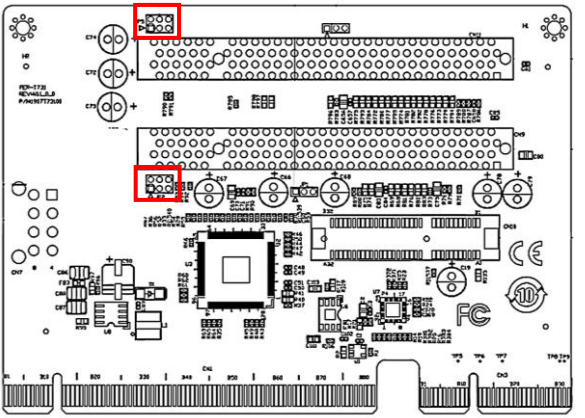


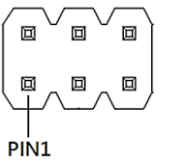


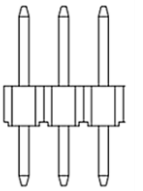
Pin	Pin Name	Signal Type	Signal Level
1	PCI_AD21 (default)		

Pin	Pin Name	Signal Type	Signal Level
2	PCI_IDSEL	IN	
3	PCI_AD25		

2.7.3 PCI I/O Voltage Select (JP5/JP2)



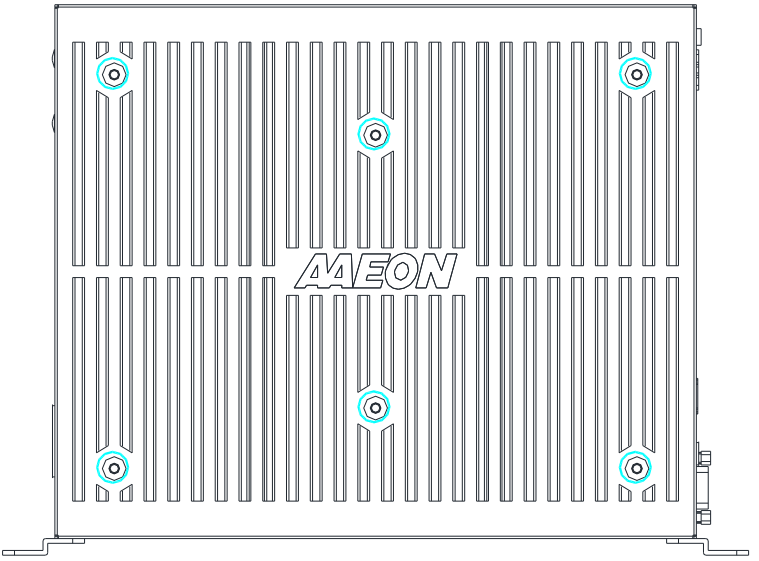




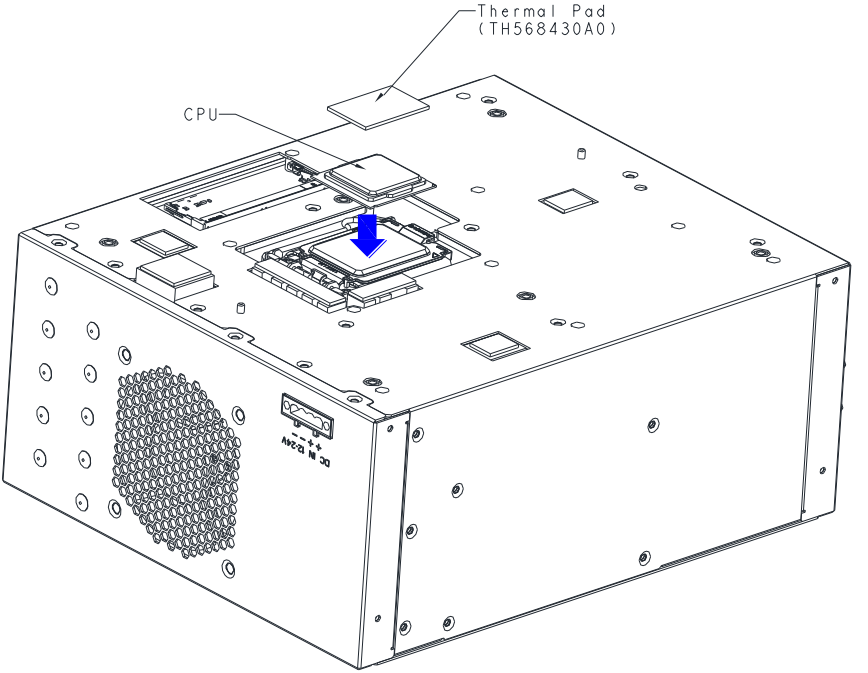
Pin	Pin Name	Signal Type	Signal Level
1	VCC5 (default)	PWR	+5V
2	VCC5 (default)	PWR	+5V
3	PCIVIO	PWR	
4	PCIVIO	PWR	
5	+V3.3S	PWR	+3.3V
6	+V3.3S	PWR	+3.3V

2.8 CPU Installation

1. Remove the six (6) screws on the chassis top panel, then lift the cover to expose the CPU socket.



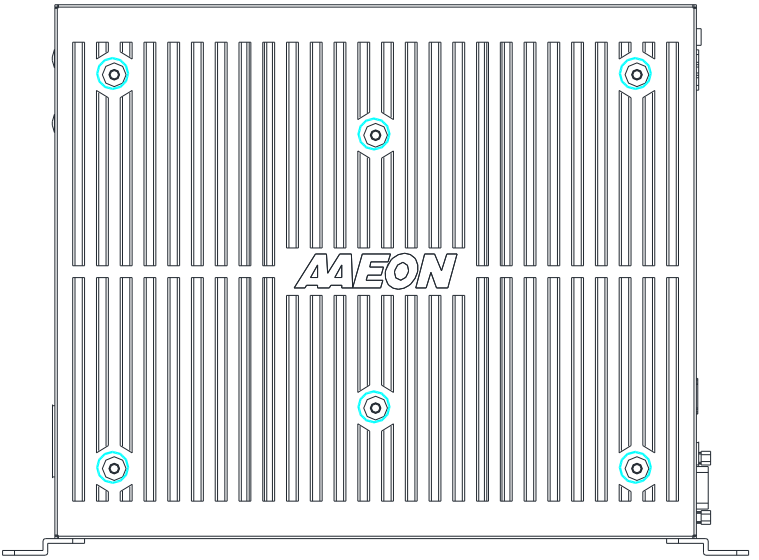
2. Insert the CPU into the socket as shown, ensuring it is covered with a thermal pad prior to reassembly.



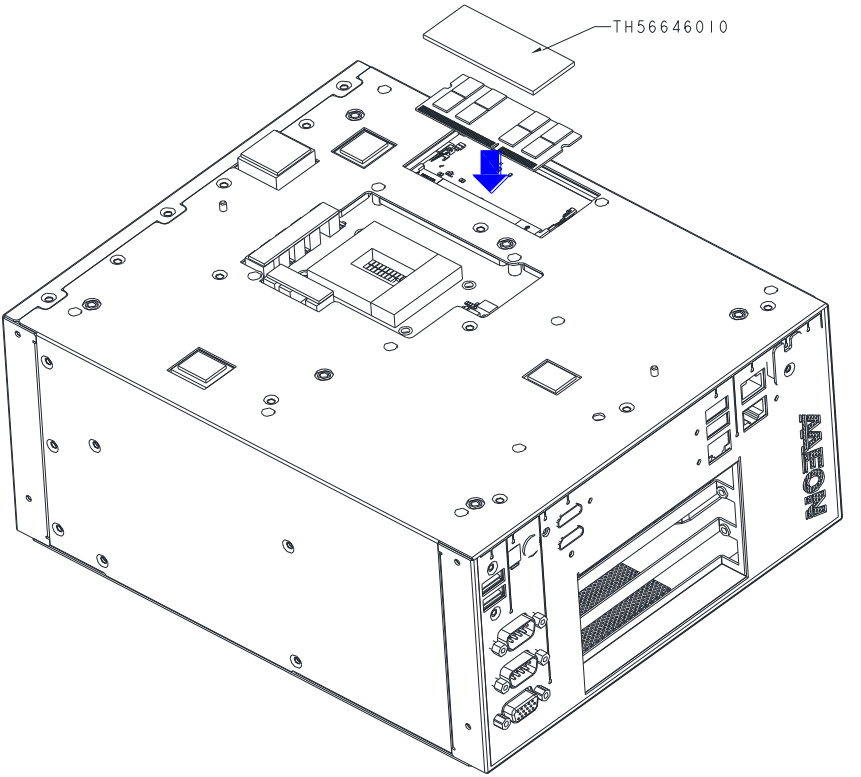
2.9 RAM Module Installation

Before you begin, make sure you have the RAM module(s) you wish to install, along with thermal pads for each. Note that if you have already opened the system to install the CPU, you may skip step 1.

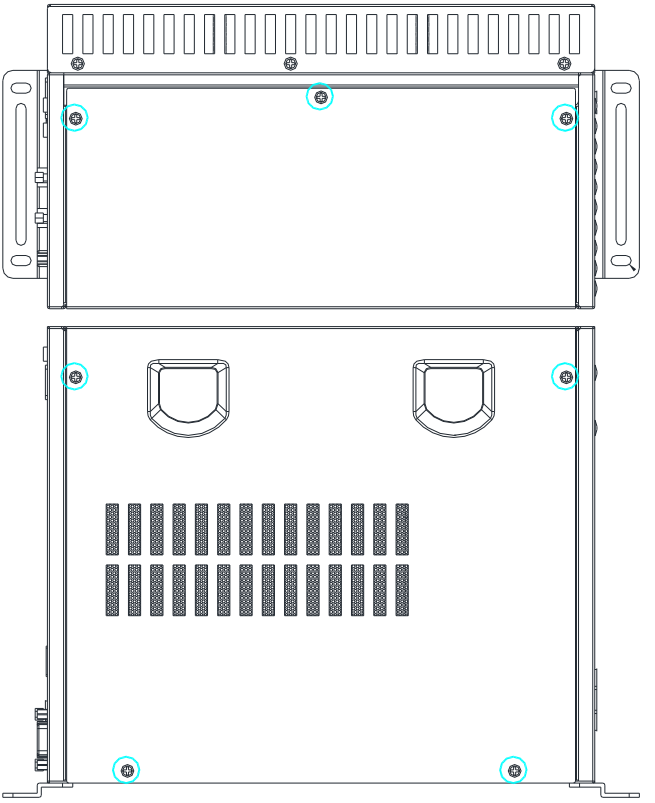
1. Remove the six (6) screws on the chassis top panel, then lift the cover to expose the SODIMM slot.



2. Insert the notched end of the RAM module into the slot at approximately a 30° angle, then gently press the module down firmly until the side tabs snap it into place, followed by a thermal pad.

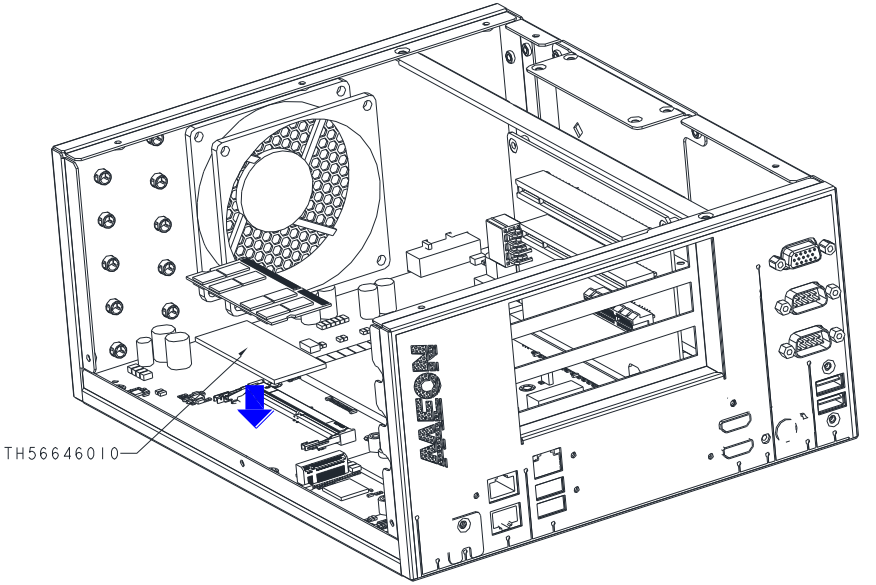


3. Next, remove the three (3) screws on the side panel and four (4) screws on the bottom panel, as shown.



A1 System SKUs

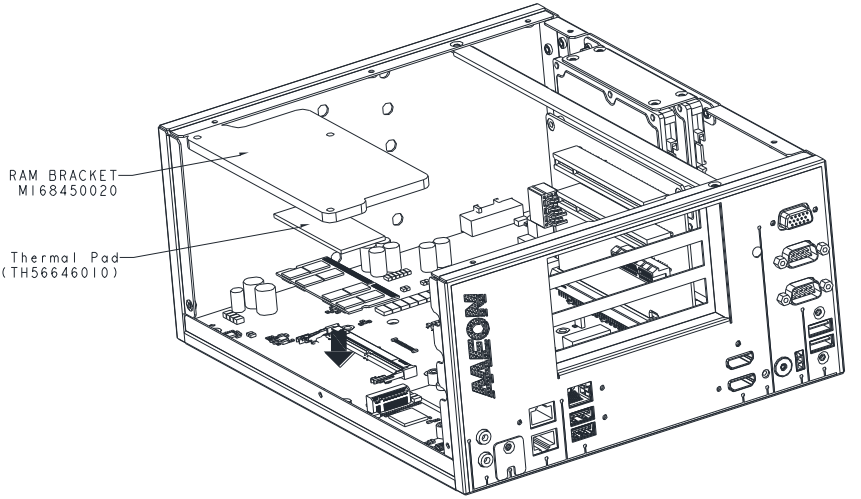
1. Insert a thermal pad followed by your RAM module, inserting the notched end of the RAM module into the slot at approximately a 30° angle.



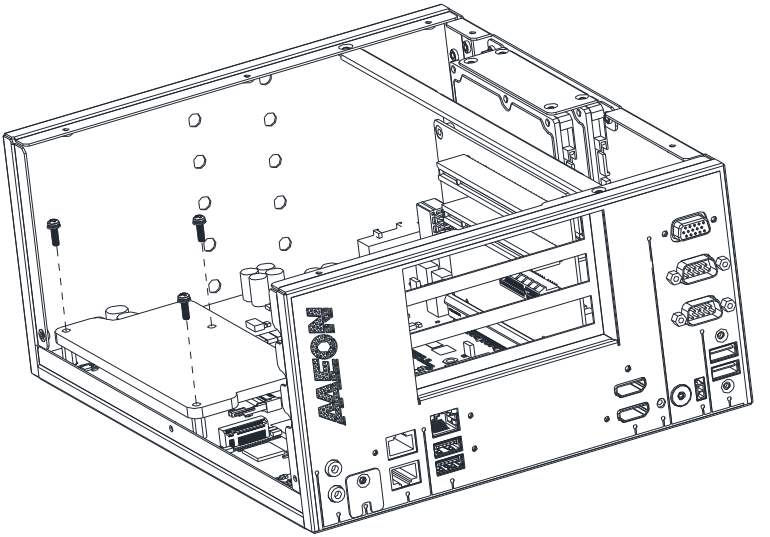
Once secured, RAM installation is complete. For A2 system SKUs, please see overleaf.

A2 System SKUs

1. For A2 system SKUs, first insert your RAM module, inserting the notched end of the RAM module into the slot at approximately a 30-degree angle, followed by a thermal pad and RAM bracket, respectively.



2. To complete RAM installation for A2 system SKUs, affix the RAM bracket to the chassis using the three (3) screws provided.



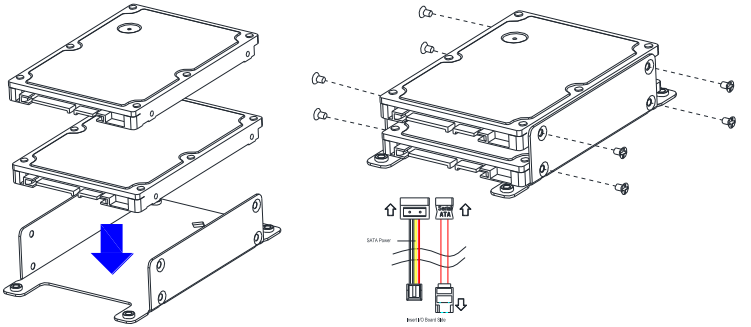
Note: According to Intel RAM specifications, memory speed may vary depending on the type of memory chips used.

Memory	CPU	DIMM1	DIMM2
1RANK/4800M	Intel® Core™ 7 Processor 251E	4800	4800
2RANK/4800M	Intel® Core™ 7 Processor 251E	4800	4800
1RANK/5600M	Intel® Core™ 7 Processor 251E	5600	5600
2RANK/5600M	Intel® Core™ 7 Processor 251E	5200	5200
1RANK/4800M	Intel® Core™ 5 Processor 221E	4800	4800
1RANK/5600M	Intel® Core™ 5 Processor 221E	5600	5600
2RANK/5600M	Intel® Core™ 5 Processor 221E	5200	5200

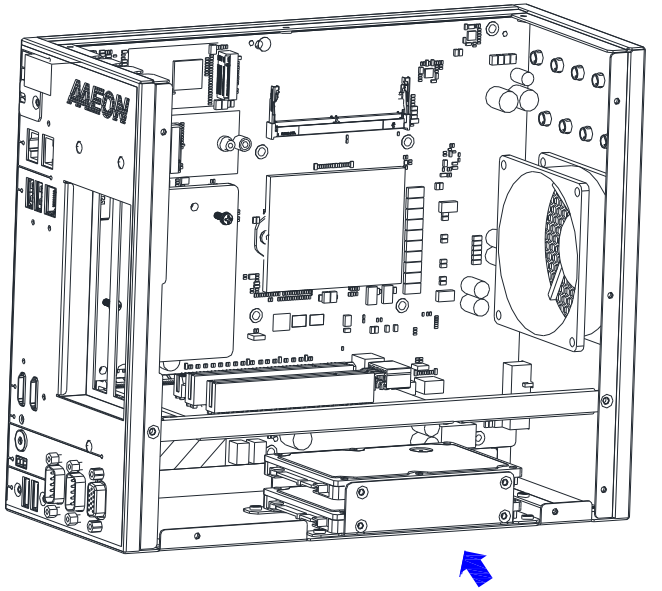
2.10 SATA Installation

Before installing the 2.5" SATA drive(s), ensure the system is powered down and disconnect the power cord from the system. Make sure you have the 2.5" SATA drive(s) ready to install. See Chapter 1 for 2.5" SATA drive requirements and specifications.

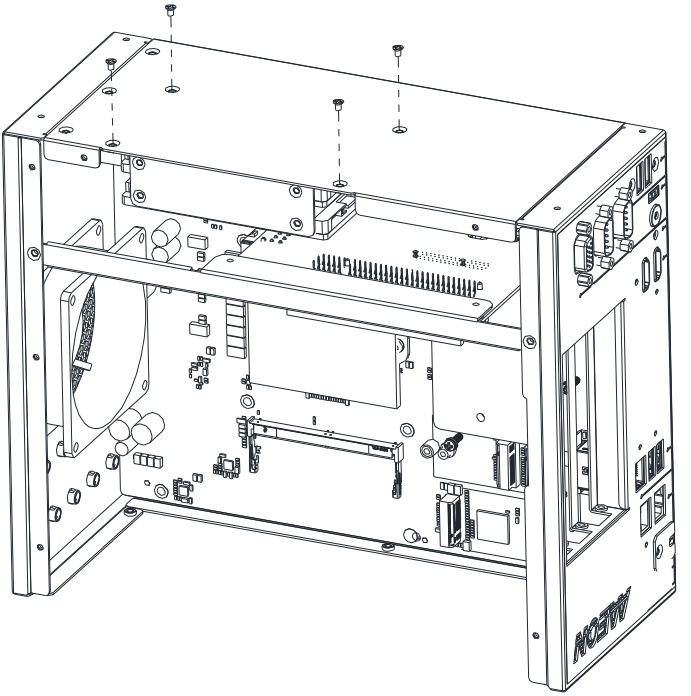
1. Install the 2.5" SATA drives into the SATA drive mount shown. Secure with four side screws.



2. Insert the SATA drive into the chassis as shown, then attach the SATA and SATA Power cables to the board and the SATA drive.



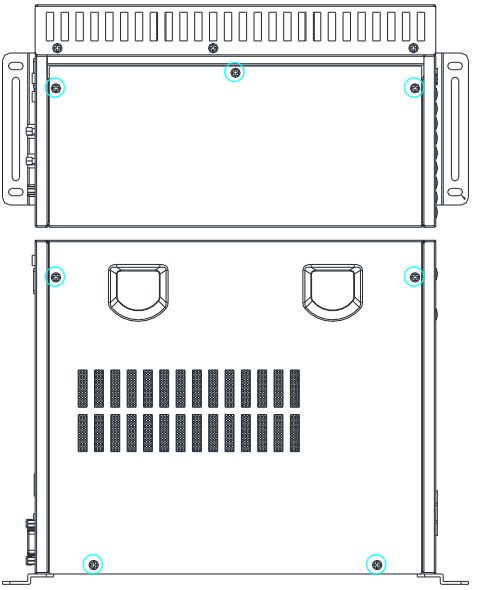
3. Affix the SATA drive to the chassis from the outside using the four (4) screws, as shown.



2.11 NVMe Installation

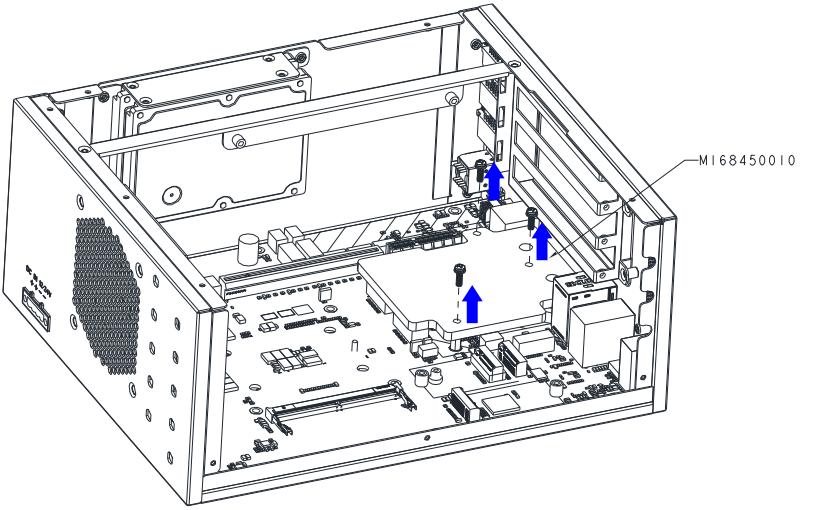
Before installing NVMe cards, ensure the system is powered down and disconnect the power cord from the system. Make sure you have the card(s) ready to install.

1. Remove the three (3) screws on the side panel and four (4) screws on the bottom panel, as shown.



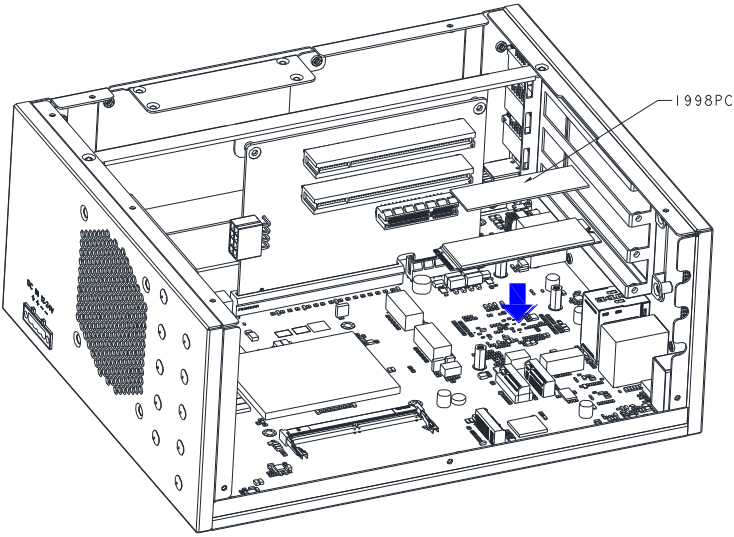
If unsure about the location of the system's two M.2 2280 M-Key slots, please consult the diagram in section 2.5.1.

2. Remove the three (3) screws on the expansion card bracket to gain access to the system's two M.2 2280 M-Key slots.

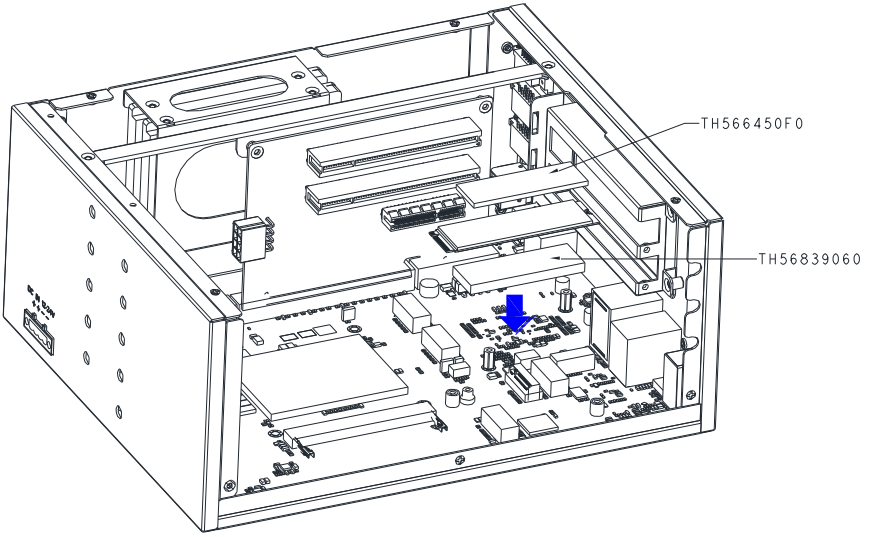


3. Insert each NVMe card into their respective slot using standard M.2 installation methods, followed by one thermal pad if installing on A1 SKUs or two thermal pads if installing on A2 SKUs.

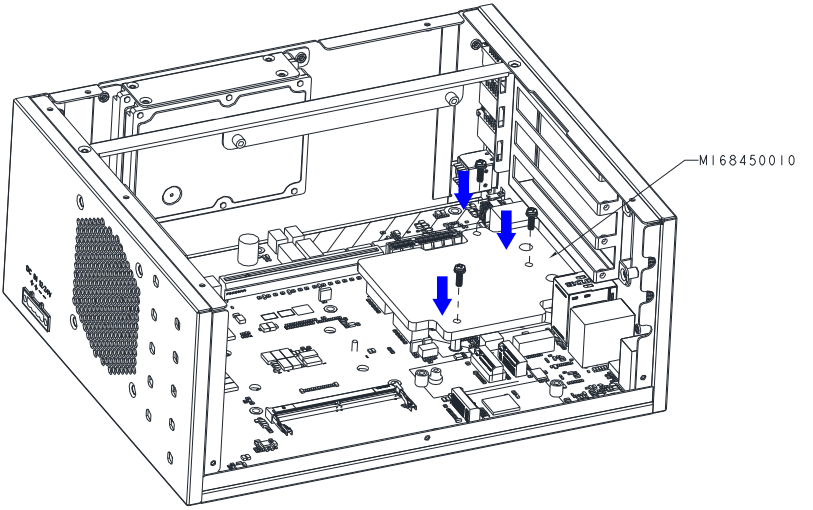
A1 SKUs:



A2 SKUs:



4. Reaffix the expansion card bracket to the motherboard using the three (3) screws removed in step 2.



Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

The system uses certain routines to perform testing and initialization. If an error, fatal or non-fatal, is encountered, a few short beeps or an error message will be outputted. The board can usually continue the boot up sequence with non-fatal errors.

The system configuration verification routines check the current system configuration against the values stored in the CMOS memory. If they do not match, an error message will be outputted, in which case you will need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

- You are starting your system for the first time
- You have changed your system's hardware
- The CMOS memory has lost power and the configuration information is erased

The system's CMOS memory uses a backup battery for data retention, which is to be replaced once emptied.

3.2 AMI BIOS Setup

The AMI BIOS ROM has a pre-installed Setup program that allows users to modify basic system configurations, which is stored in the battery-backed CMOS RAM and BIOS NVRAM so that the information is retained when the power is turned off.

To enter BIOS Setup, press <Del> or <F2> immediately while your computer is powering up.

The function for each interface can be found below.

Main – Date and time can be set here. Press <Tab> to switch between date elements

Advanced – Enable/ Disable boot option for legacy network devices

System I/O – Enable/ Disable system I/O device

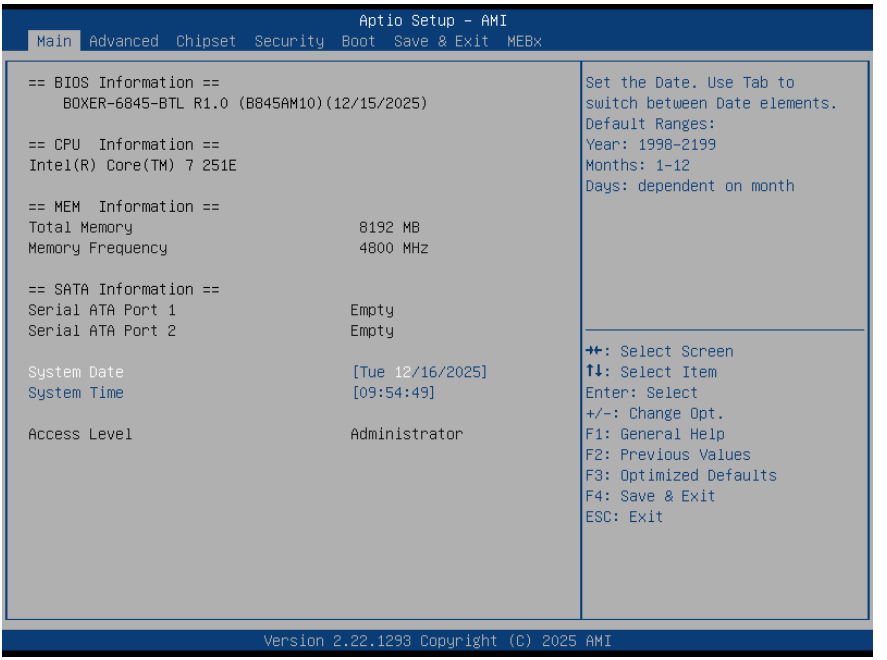
Boot – Enable/ Disable quiet Boot Option

Security – The setup administrator password can be set here

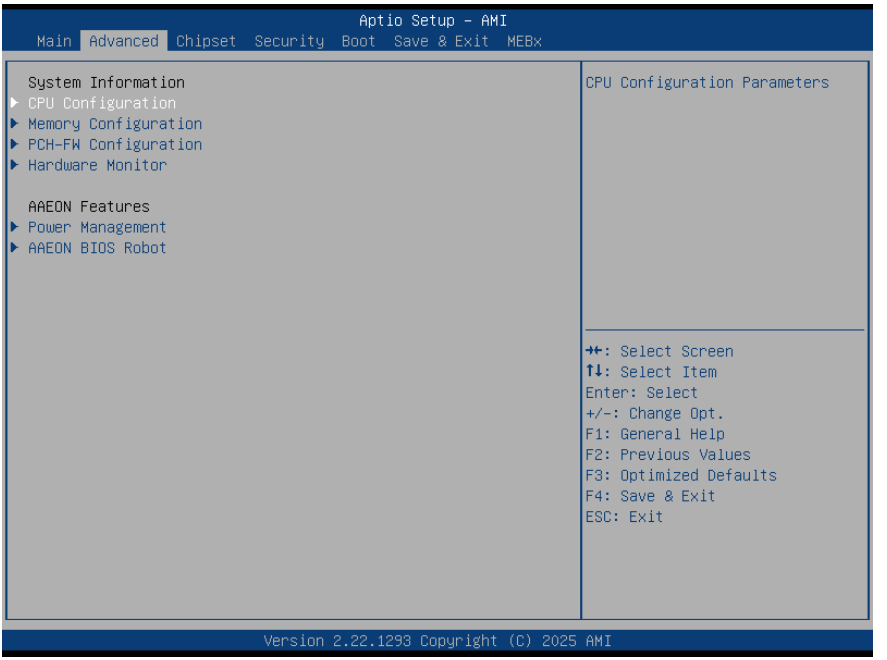
Save & Exit –Save your changes and exit the program

MEBx – Intel® Management Engine BIOS Extension.

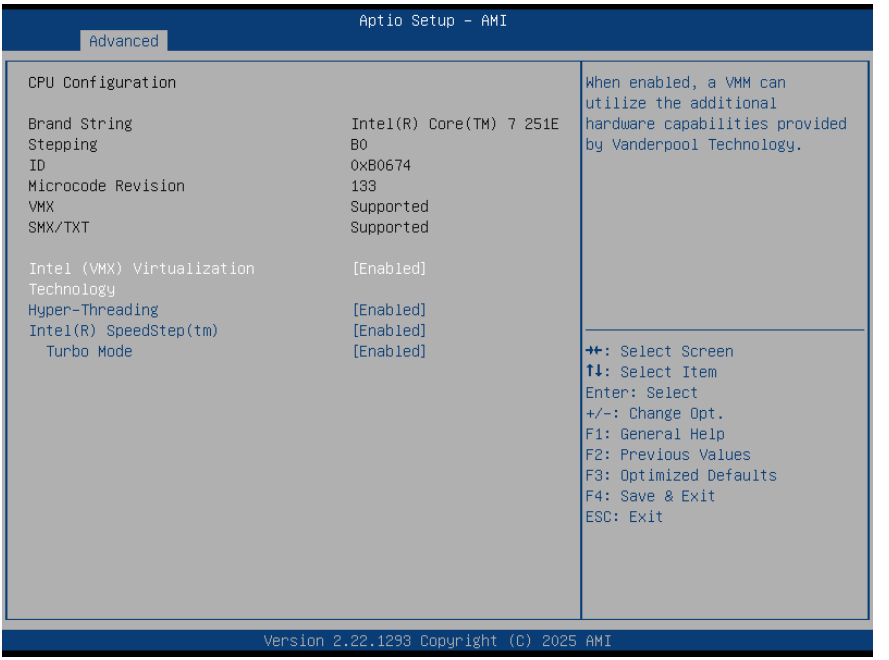
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced

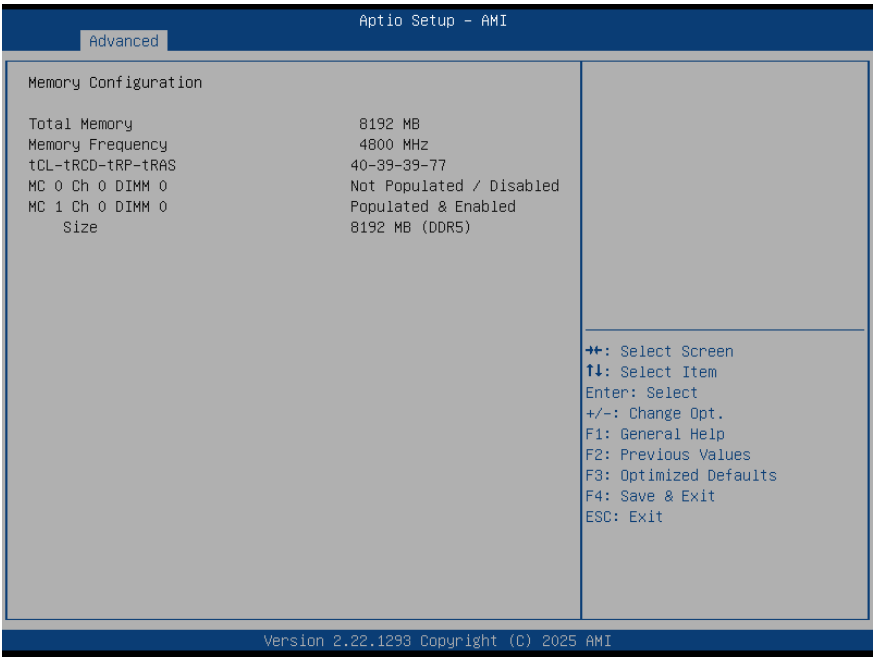


3.4.1 CPU Configuration

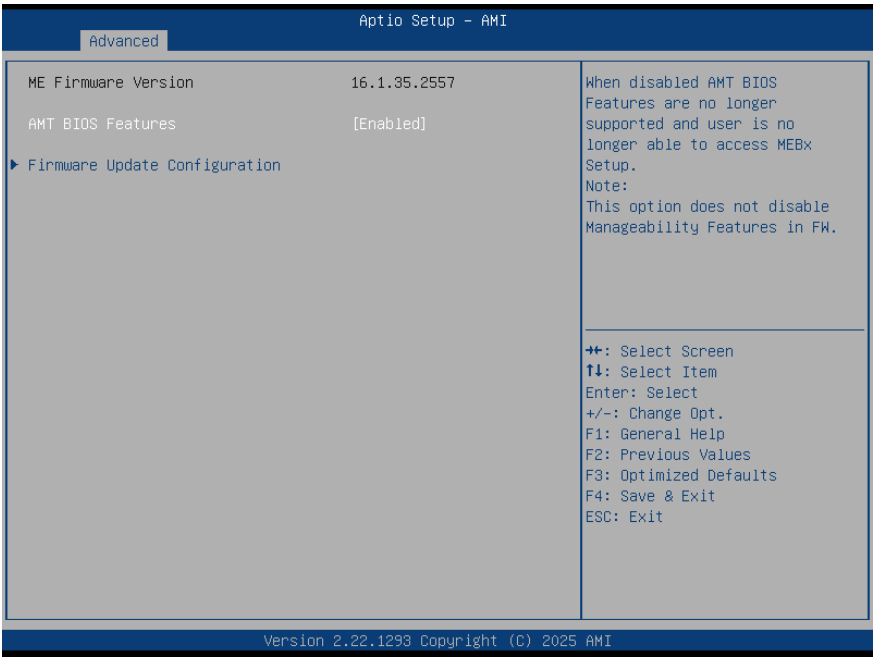


Options Summary		
Intel(VMX)Virtualization Technology	Disabled	
	Enabled	Optimal Default, Failsafe Default
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.		
Hyper-Threading	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Hyper-Threading Technology		
Intel® SpeedStep™	Disabled	
	Enabled	Optimal Default, Failsafe Default
Allows more than two frequency ranges to be supported		
Turbo Mode	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.		

3.4.2 Memory Configuration

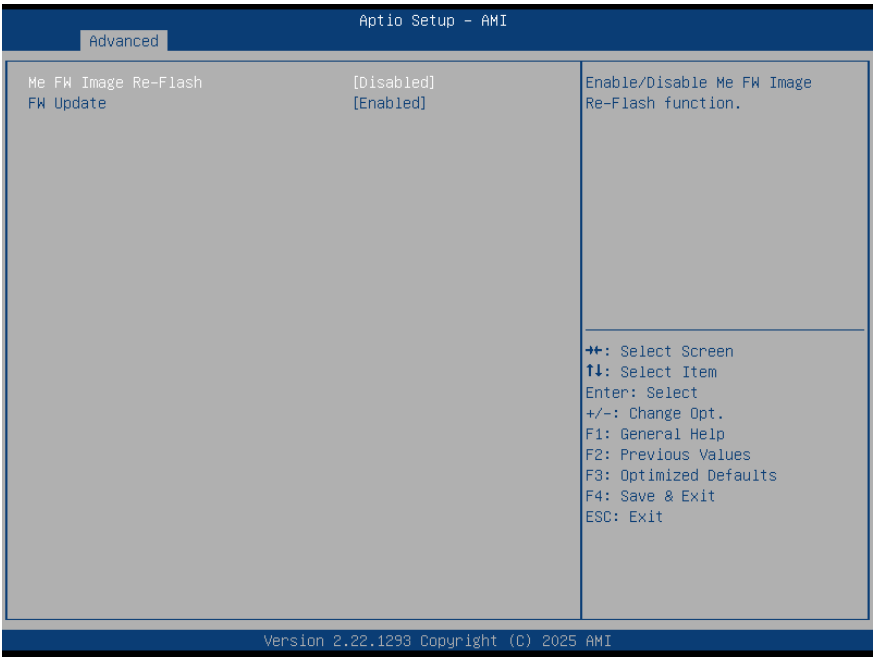


3.4.3 PCH-FW Configuration



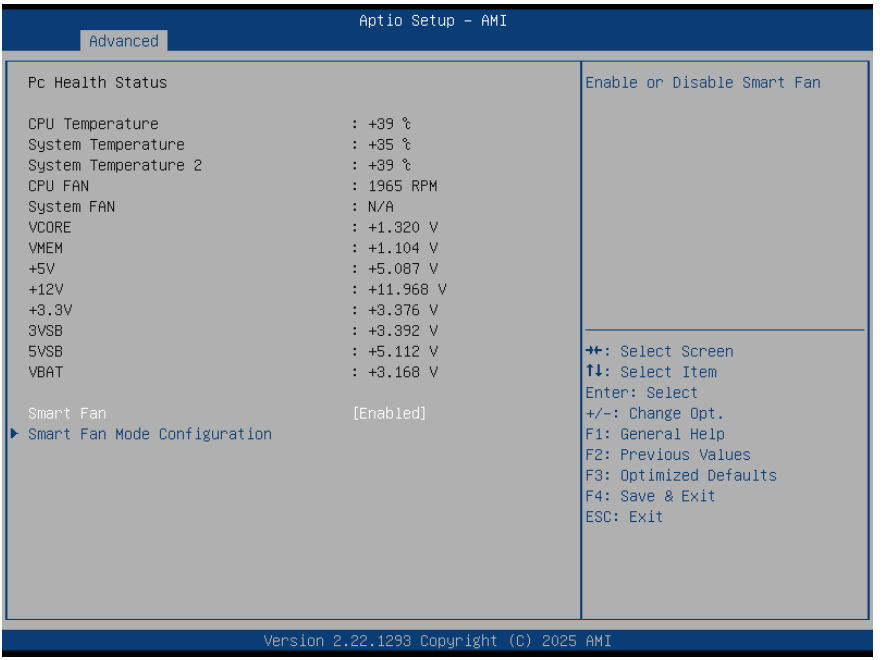
Options Summary		
AMT BIOS Features	Enabled	Optimal Default, Failsafe Default
	Disabled	
When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. **Note:** This option does not disable Manageability Features in FW.		

3.4.3.1 Firmware Update Configuration



Options Summary		
Me FW Image Re-Flash	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable/Disable Me FW Image Re-Flash function.		
FW Update	Enabled	
	Disabled	Optimal Default, Failsafe Default
Enable/Disable Me FW Update function.		

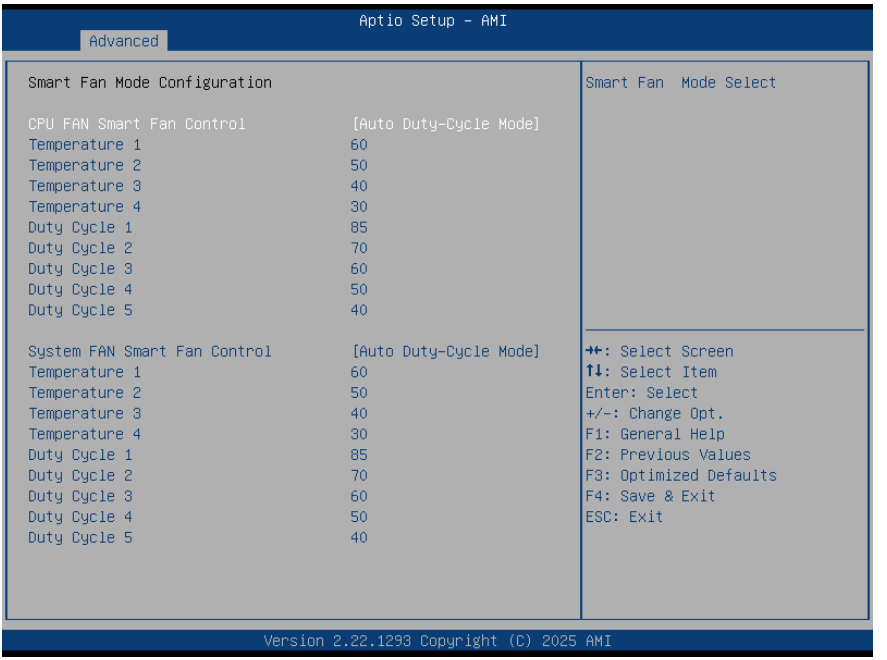
3.4.4 Hardware Monitor



Options Summary		
Smart Fan	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable Smart Fan.		

Note: Smart Fan is available on A1 SKU only.

3.4.4.1 Smart Fan Mode Configuration



Options Summary		
CPU/System Fan Smart Fan Control	Manual Duty Mode	
	Auto Duty-Cycle Mode	Optimal Default, Failsafe Default
Smart Fan Mode Select.		
CPU Fan Smart Fan Control	Manual Duty Mode	
	Auto Duty-Cycle Mode	Optimal Default, Failsafe Default
Smart Fan Mode Select.		
Temperature Source	CPU Temperature	Optimal Default, Failsafe Default
	System Temperature	
	System Temperature 2	
Select the monitored temperature source for this fan.		
Temperature 1	60	Optimal Default, Failsafe Default
Temperature 2	50	Optimal Default, Failsafe Default
Temperature 3	40	Optimal Default, Failsafe Default
Temperature 4	30	Optimal Default, Failsafe Default

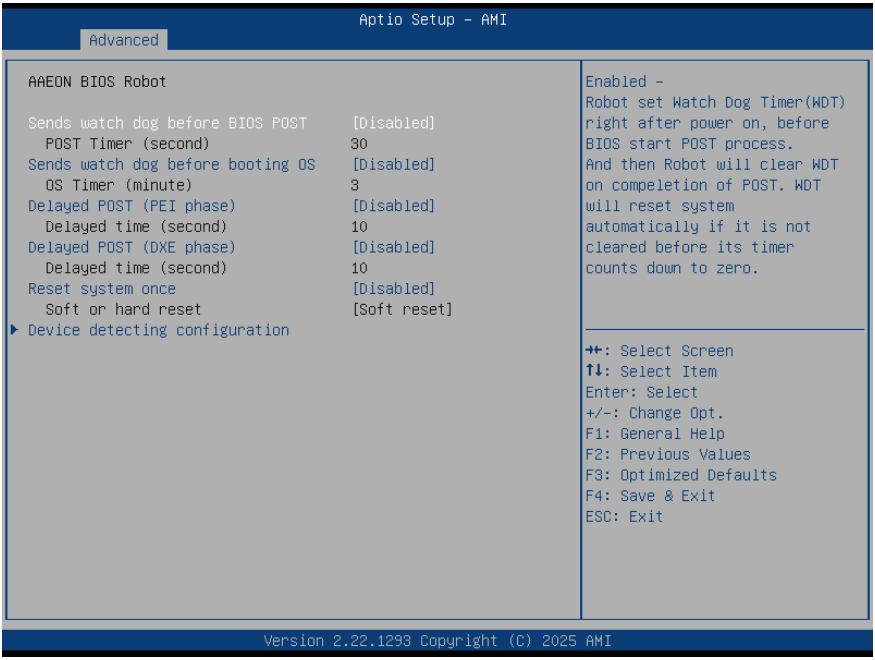
Options Summary		
Temperature 5	20	Optimal Default, Failsafe Default
Duty Cycle 1	85	Optimal Default, Failsafe Default
Duty Cycle 2	70	Optimal Default, Failsafe Default
Duty Cycle 3	60	Optimal Default, Failsafe Default
Duty Cycle 4	50	Optimal Default, Failsafe Default
Duty Cycle 5	40	Optimal Default, Failsafe Default
Auto fan speed control. Fan speed will follow different temperature by different duty cycle 1-100		

3.4.5 Power Management

Options Summary		
Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select system power mode.		
Restore AC Power Loss	Last State	Optimal Default, Failsafe Default

Options Summary		
	Always On	
	Always Off	
Set GPI[3:0] Output as Hi or Low.		
Soft-Off (S5) Wake On RTC	Disabled	Optimal Default, Failsafe Default
	By Date	
	By Weekday	
	Bypass	
By Date: System will wake on the day with hr::min::sec specified. By Weekday: System will wake on the enabled weekday with hr::min::sec specified. Bypass: BIOS will not control RTC wake function.		

3.4.6 AAEON BIOS Robot



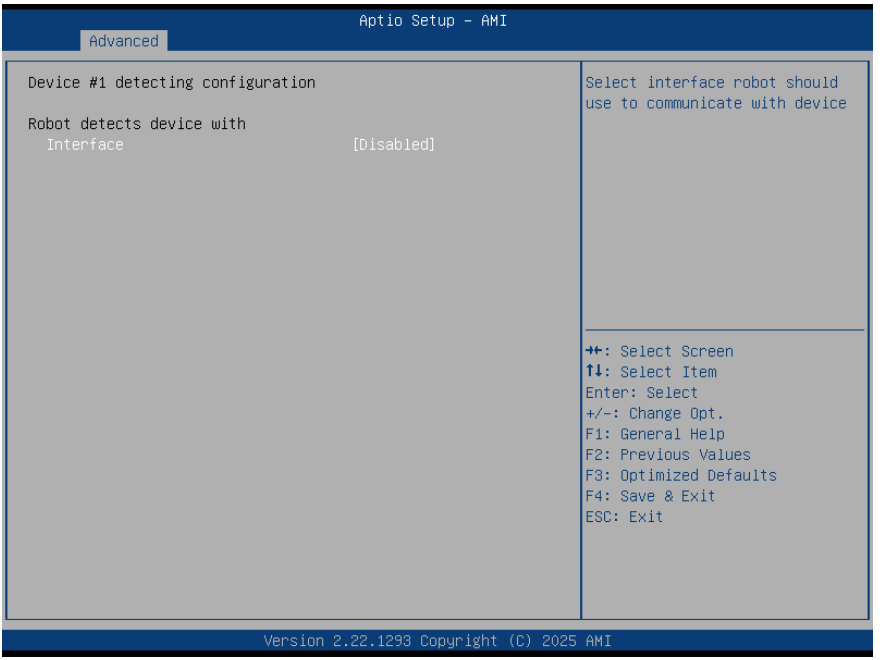
Options Summary		
Sends watch dog before BIOS POST	Disabled	Optimal Default, Failsafe Default
	Enabled	

Options Summary		
Enabled – Robot set Watch Dog Timer (WDT) right after power on, before BIOS start POST process. And then Robot will clear WDT on completion of POST. WDT on completion of POST. WDT. WDT will reset system automatically if it is not cleared before its timer counts down to zero.		
Sends watch dog before booting OS	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled – Robot set Watch Dog Timer (WDT) after POST completion, before BIOS transfer control to OS. WARNING: Before enabling this function, a program in OS must be in responsible for clearing WDT. Also, this function should be disabled if OS I going to update itself.		
Delayed POST (PEI phase)	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled -Robot holds BIOS from starting POST, right after power on. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this before 'Sends watch dog'.		
Delayed POST (DXE phase)	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enabled -Robot holds BIOS before POST completion. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this after 'Sends watch dog before BIOS POST'.		

3.4.6.1 Device Detecting Configuration

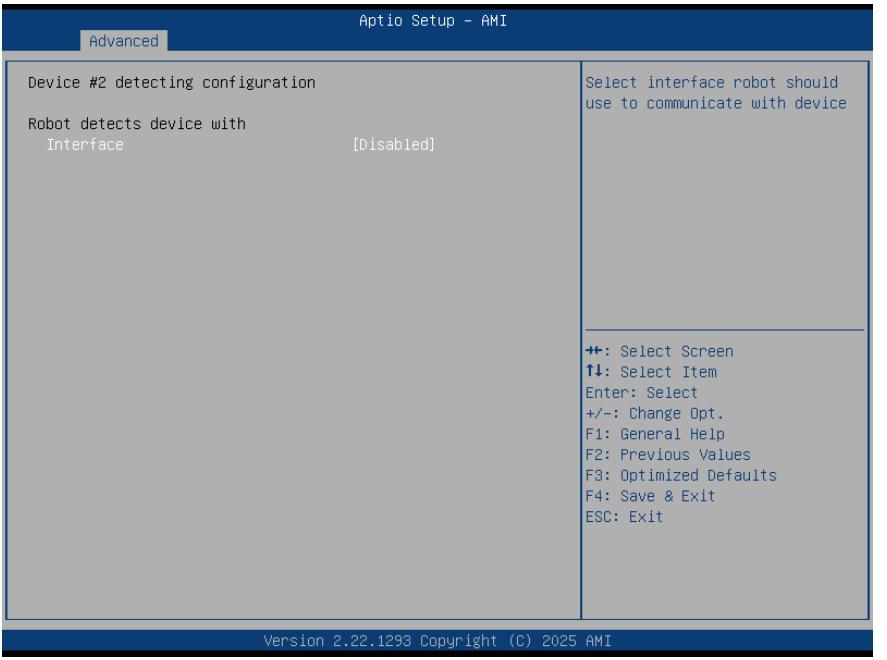
Options Summary		
Action	Reset System	Optimal Default, Failsafe Default
	Hold System	
Select action that robot should do.		
Soft or hard reset	Soft	Optimal Default, Failsafe Default
	Hard	
Select reset type robot should send on each boot.		
Retry-Count	3	Optimal Default, Failsafe Default
Fill retry counter here. Robot will reset system at most counter times, and then let system continue its POST.		
At time	After show logo	Optimal Default, Failsafe Default
	Before show logo	
Select robot action time: After show logo - Robot will do action after logo is displayed. System devices are almost ready. Before show logo - Robot will do action earlier before logo, but some devices may not be ready.		

3.4.6.1.1 Device #1 Detecting Configuration



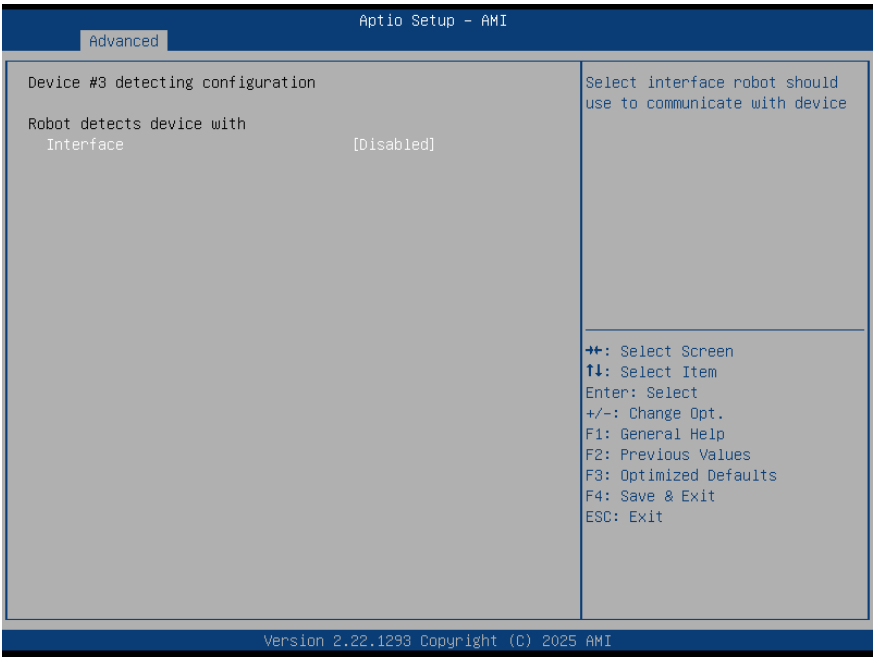
Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.4.6.1.2 Device #2 Detecting Configuration



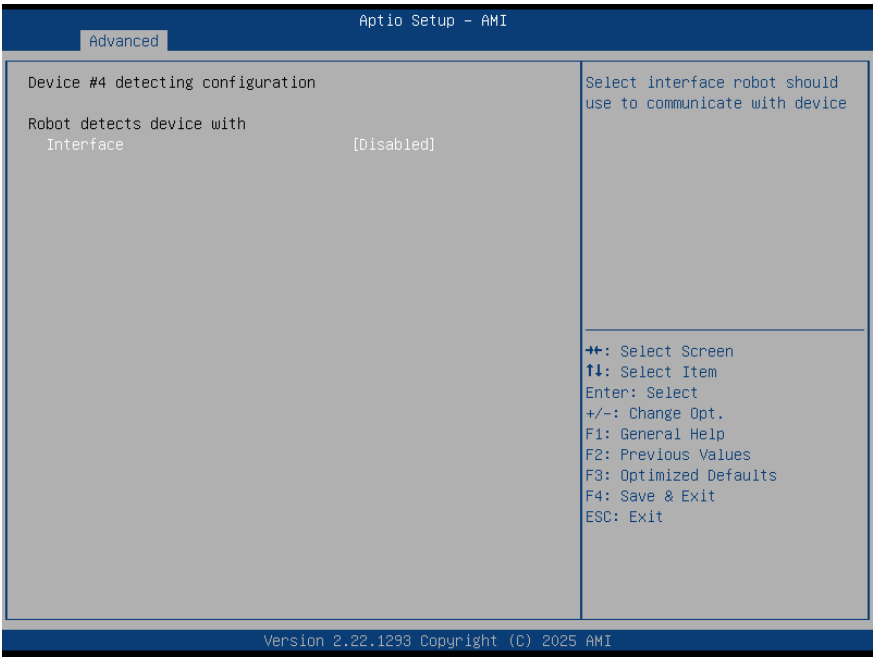
Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.4.6.1.3 Device #3 Detecting Configuration



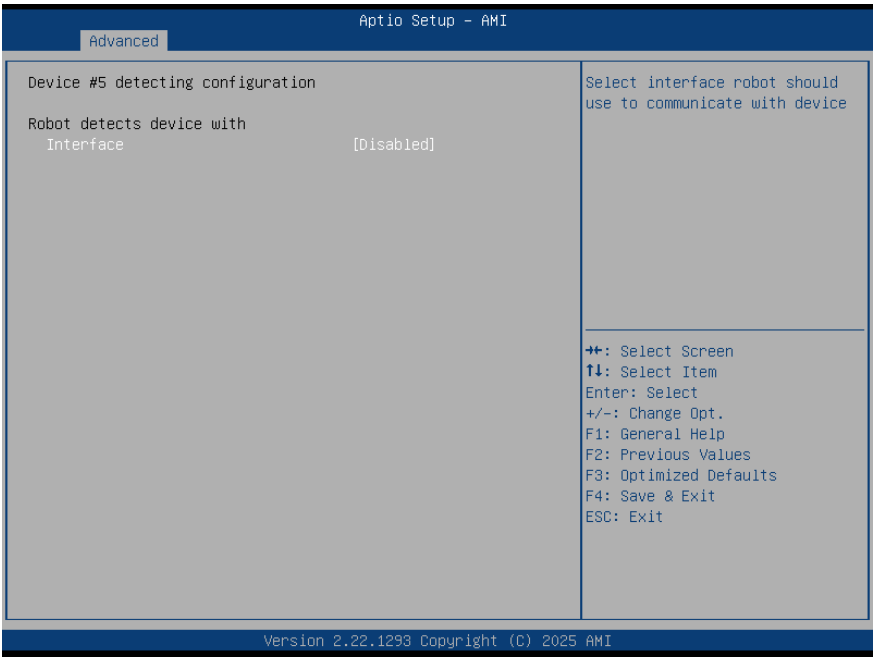
Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.4.6.1.4 Device #4 Detecting Configuration



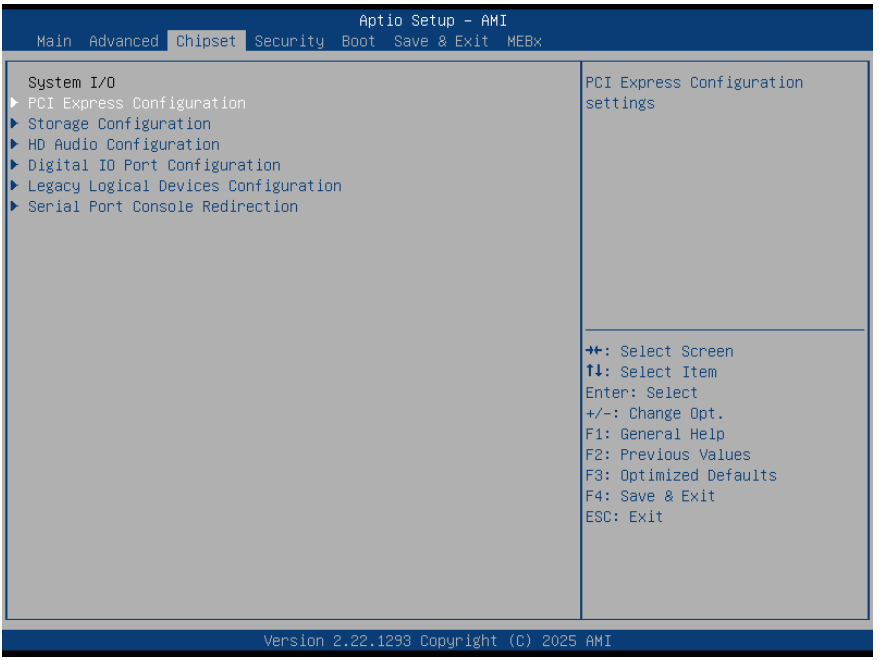
Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.4.6.1.5 Device #5 Detecting Configuration

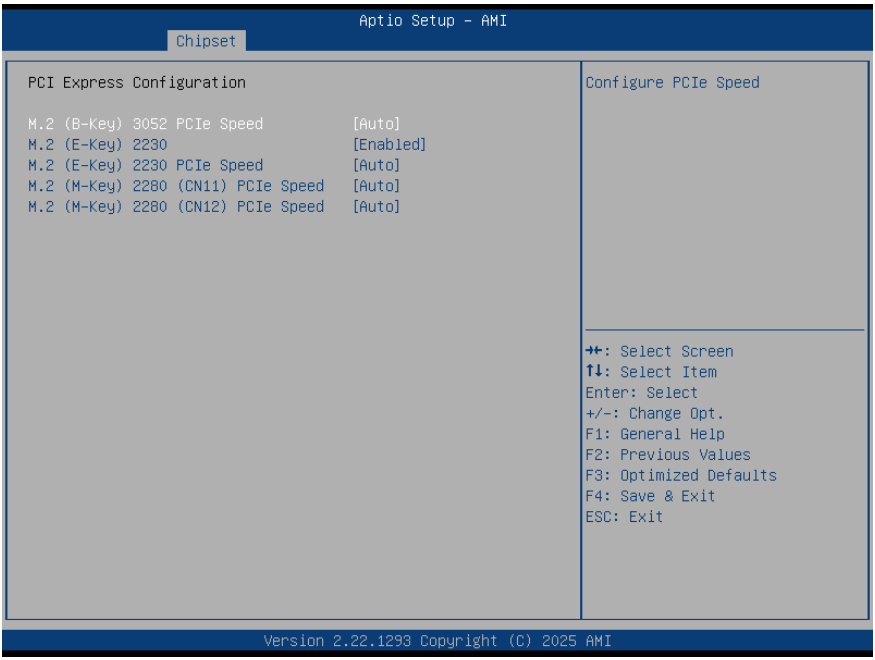


Options Summary		
Interface	Disabled	Optimal Default, Failsafe Default
	PCI	
	DIO	
	SMBUS	
	Legacy I/O	
	Super I/O	
	MMIO	
Select interface robot should use to communicate with device.		

3.5 Setup Submenu: System I/O



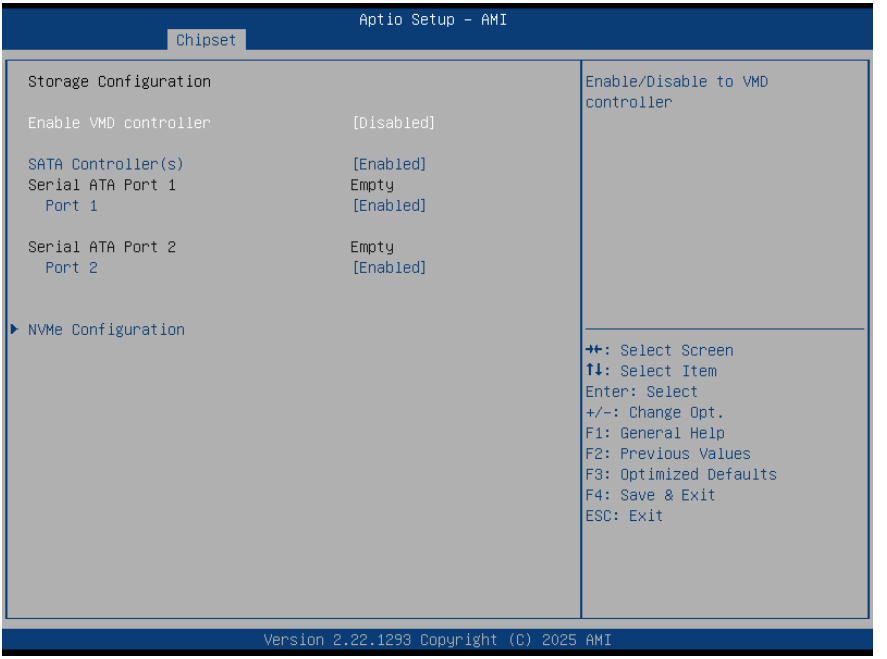
3.5.1 PCI Express Configuration



Options Summary		
M.2 (B-Key) 3052 PCIe Speed	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Configure PCIe Speed.		
M.2 (E-Key) 2230	Enabled	Optimal Default, Failsafe Default
	Disabled	
Control the PCI Express Root Port		
M.2 (E-Key) 2230 PCIe Speed	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
Configure PCIe Speed		
M.2 (M-Key) 2280 (CN11) PCIe Speed	Auto	Optimal Default, Failsafe Default
	Gen1	

Options Summary		
M.2 (M-Key) 2280 (CN11) PCIe Speed (cont.)	Gen2	
	Gen3	
	Gen4	
Configure PCIe Speed.		
M.2 (M-Key) 2280 (CN12) PCIe Speed	Auto	Optimal Default, Failsafe Default
	Gen1	
	Gen2	
	Gen3	
	Gen4	
Configure PCIe Speed.		

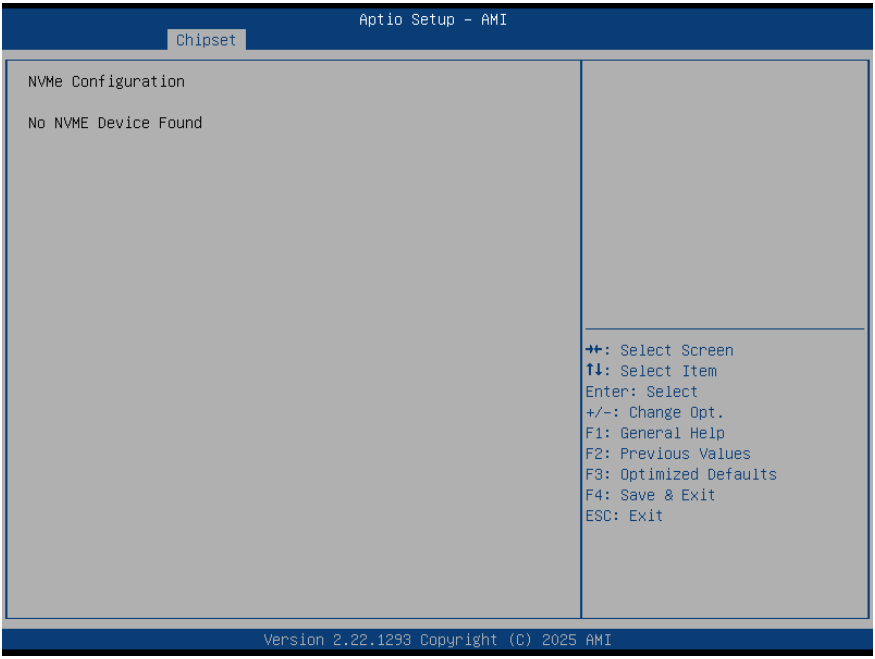
3.5.2 Storage Configuration



Options Summary		
Enable VMD controller	Disabled	Optimal Default, Failsafe Default
	Enabled	

Options Summary		
Enable/Disable to VMD controller.		
SATA Controller(s)	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable/Disable to SATA Device.		
Port 1	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		
Port 2	Enabled	Optimal Default, Failsafe Default
	Disabled	
Enable or Disable SATA Port.		

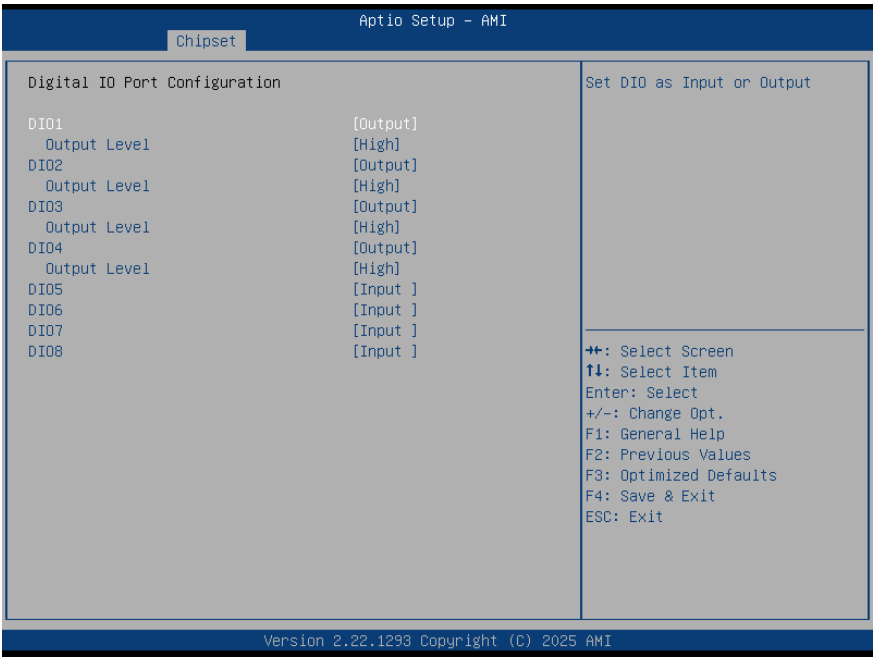
3.5.2.1 NVMe Configuration



3.5.3 HD Audio Configuration

Options Summary		
HD Audio	Disabled	
	Enabled	Optimal Default, Failsafe Default
Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally enabled.		

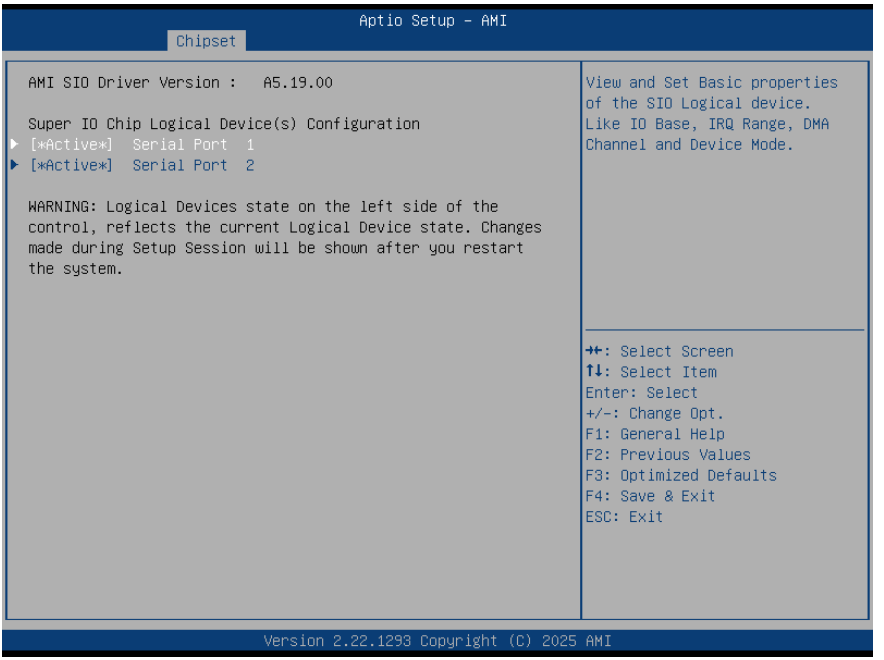
3.5.4 Digital IO Port Configuration



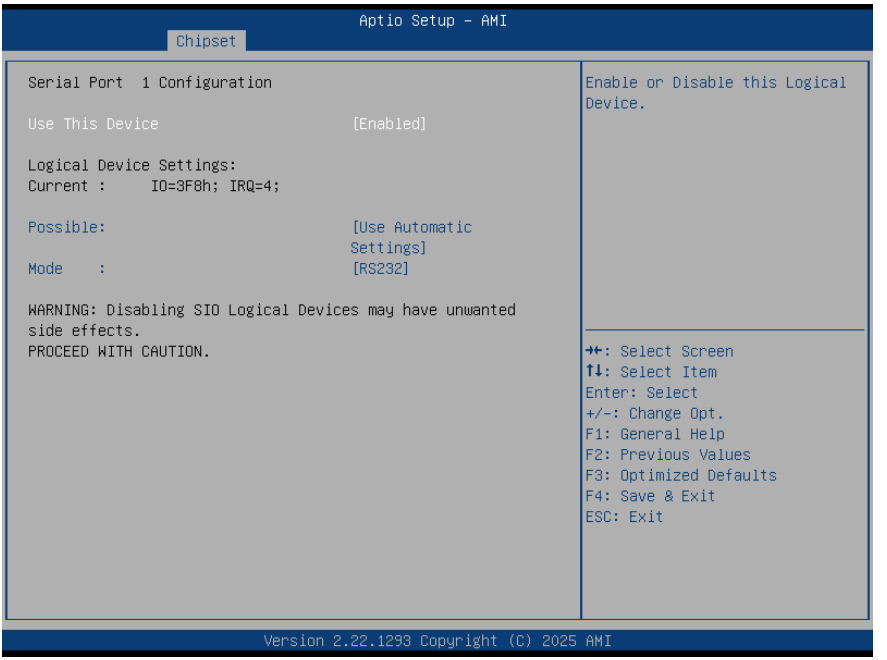
Options Summary		
DIO1	Input	
	Output	Optimal Default, Failsafe Default
Set DIO as Input or Output.		
Output Level	Low	
	High	Optimal Default, Failsafe Default
Set output level when DIO pin is output.		
DIO2	Input	
	Output	Optimal Default, Failsafe Default
Set DIO as Input or Output.		
Output Level	Low	
	High	Optimal Default, Failsafe Default
Set output level when DIO pin is output.		
DIO3	Input	
	Output	Optimal Default, Failsafe Default
Set DIO as Input or Output.		

Options Summary		
Output Level	Low	
	High	Optimal Default, Failsafe Default
Set output level when DIO pin is output.		
DIO4	Input	
	Output	Optimal Default, Failsafe Default
Set DIO as Input or Output.		
Output Level	Low	
	High	Optimal Default, Failsafe Default
Set output level when DIO pin is output.		
DIO5	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		
DIO6	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		
DIO7	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		
DIO8	Input	Optimal Default, Failsafe Default
	Output	
Set DIO as Input or Output.		

3.5.5 Legacy Logical Devices Configuration

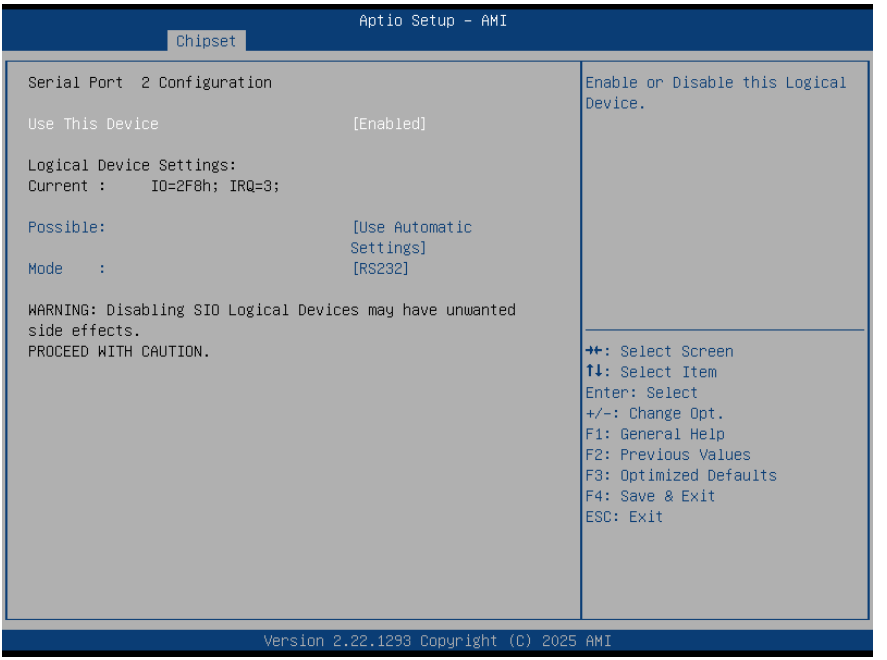


3.5.5.1 Serial Port 1



Options Summary		
Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=3F8; IRQ=4;	
	IO=2F8; IRQ=3;	
Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts.		
Mode	RS232	Optimal Default, Failsafe Default
	RS422	
	RS485	
UART RS232, 422, 485, selection.		

3.5.5.2 Serial Port 2



Options Summary		
Use This Device	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable this Logical Device.		
Possible:	Use Automatic Settings	Optimal Default, Failsafe Default
	IO=2F8; IRQ=3;	
	IO=3F8; IRQ=4;	
Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts.		
Mode	RS232	Optimal Default, Failsafe Default
	RS422	
	RS485	
UART RS232, 422, 485, selection.		

3.5.6 Serial Port Console Redirection

Options Summary		
Console Redirection	Disabled	Optimal Default, Failsafe Default
	Enabled	
Console Redirection Enable or Disable.		
Console Redirection EMS	Disabled	Optimal Default, Failsafe Default
	Enabled	
Console Redirection Enable or Disable.		

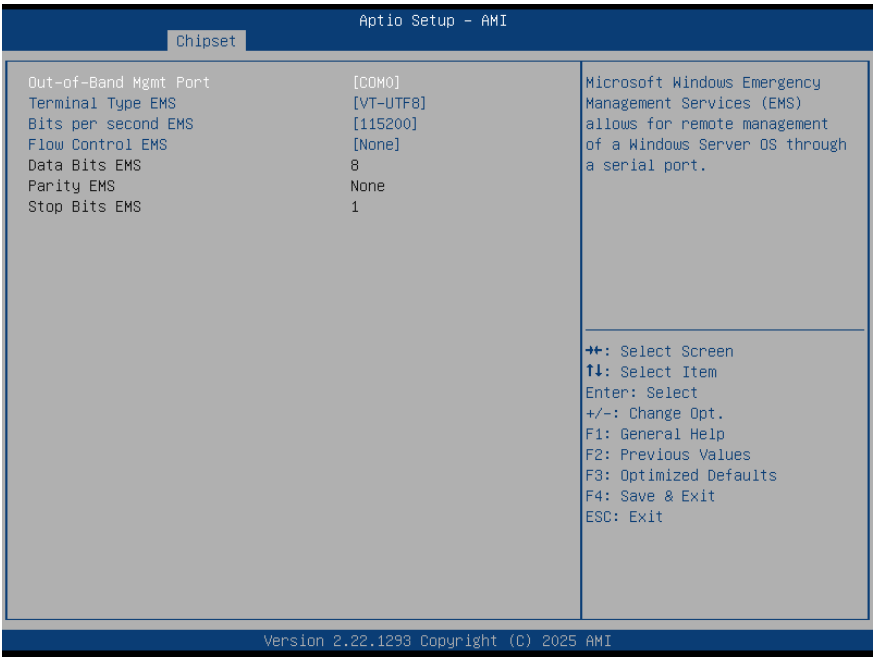
3.5.6.1 Console Redirection Settings (COM0)

Options Summary		
Terminal Type	VT100	
	VT100Plus	
	VT-UTF8	
	ANSI	Optimal Default, Failsafe Default
Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.		
Bits per second	9600	
	19200	
	38400	
	57600	
	115200	Optimal Default, Failsafe Default

Options Summary		
Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.		
Data Bits	7	
	8	Optimal Default, Failsafe Default
Data Bits.		
Parity	None	Optimal Default, Failsafe Default
	Even	
	Odd	
	Mark	
	Space	
A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.		
Stop Bits	1	Optimal Default, Failsafe Default
	2	
Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.		
Flow Control	None	Optimal Default, Failsafe Default
	Hardware RTS/CTS	
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.		
VT-UTF8 Combo Key Support	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.		
Recorder Mode	Disabled	Optimal Default, Failsafe Default
	Enabled	
With this mode enabled only text will be sent. This is to capture Terminal data.		
Resolution 100x31	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enables or disables extended terminal resolution.		

Options Summary		
Putty KeyPad	VT100	Optimal Default, Failsafe Default
	LINUX	
	XTERMR6	
	SCO	
	ESCN	
	VT400	
Select FunctionKey and KeyPad on Putty.		

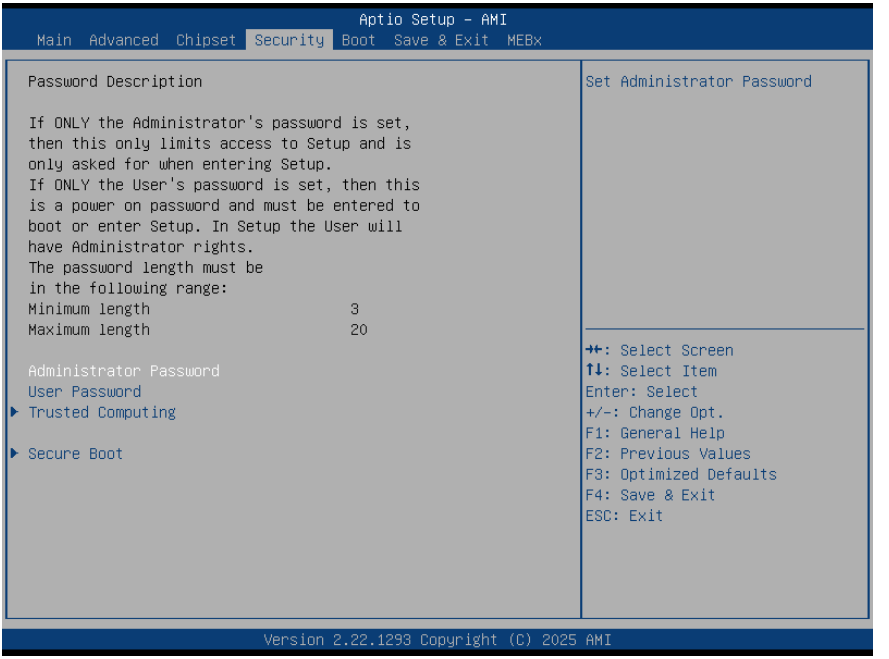
3.5.6.2 Console Redirection Settings (Out-of-Band Mgmt)



Options Summary		
Out-of-Band Mgmt Port	COM0	Optimal Default, Failsafe Default
	COM1(Pci Bus0, Dev0, Func0) (Disabled)	
Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.		

Options Summary		
Terminal Type EMS	VT100	
	VT100Plus	
	VT-UTF8	Optimal Default, Failsafe Default
	ANSI	
VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.		
Bits per second EMS	9600	
	19200	
	57600	
	115200	Optimal Default, Failsafe Default
Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.		
Flow Control EMS	None	Optimal Default, Failsafe Default
	Hardware RTS/CTS	
	Software Xon/Xoff	
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.		

3.6 Setup Submenu: Security



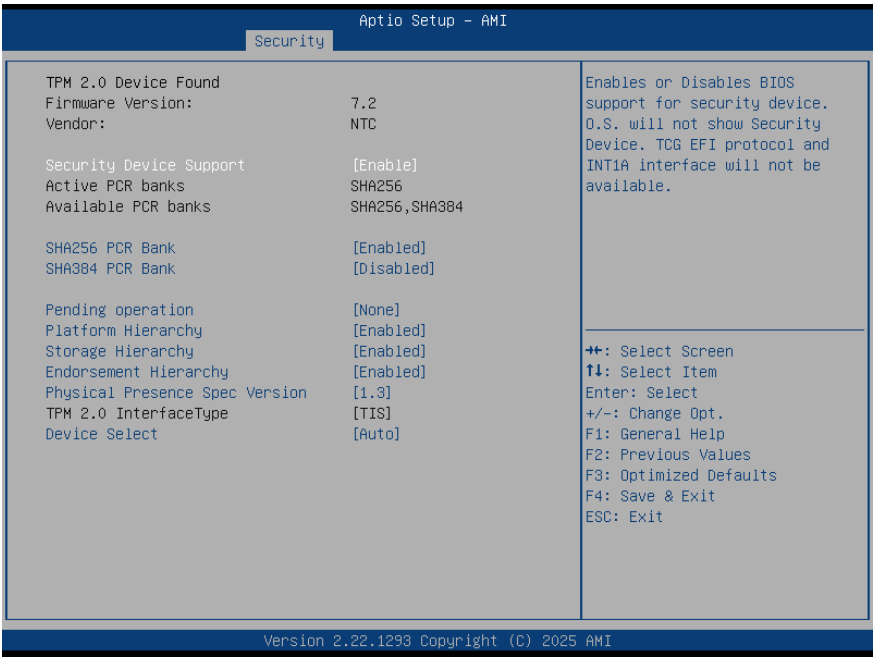
Change User/Administrator Password

You can set a User Password once an Administrator Password. The password will be required during boot up, or when the user enters the Setup utility. Please Note that a User Password does not provide access to many of the features in the Setup utility. Select the password you wish to set, press Enter to open a dialog box to enter your password (you can enter no more than six letters or numbers). Press Enter to confirm your entry, after which you will be prompted to retype your password for a final confirmation. Press Enter again after you have retyped it correctly.

Removing the Password

Highlight this item and type in the current password. At the next dialog box press Enter to disable password protection.

3.6.1 Trusted Computing



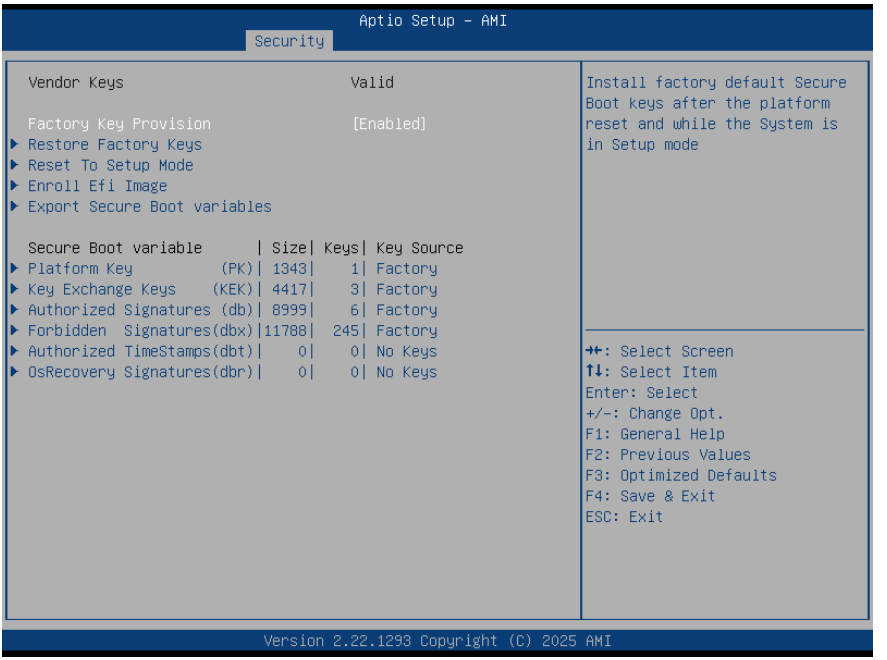
Options Summary		
Security Device Support	Enable	Optimal Default, Failsafe Default
	Disable	
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.		
SHA256 PCR Bank	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable SHA256 PCR Bank.		
SHA384 PCR Bank	Disabled	Optimal Default, Failsafe Default
	Enabled	
Enable or Disable SHA384 PCR Bank.		
Pending operation	None	Optimal Default, Failsafe Default
	TPM Clear	
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.		

Options Summary		
Platform Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Platform Hierarchy.		
Storage Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Storage Hierarchy.		
Endorsement Hierarchy	Disabled	
	Enabled	Optimal Default, Failsafe Default
Enable or Disable Endorsement Hierarchy.		
Physical Presence Spec Version	1.2	
	1.3	Optimal Default, Failsafe Default
Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.		
Device Select	TPM 1.2	
	TPM 2.0	
	Auto	Optimal Default, Failsafe Default
TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if not found. TPM 1.2 devices will be enumerated.		

3.6.2 Secure Boot

Options Summary		
Secure Boot	Disabled	Optimal Default, Failsafe Default
	Enabled	
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.		
Secure Boot Mode	Standard	
	Custom	Optimal Default, Failsafe Default
Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.		
Restore Factory Keys	Yes	
	No	
Force System to User Mode. Install factory default Secure Boot key databases.		

3.6.2.1 Key Management



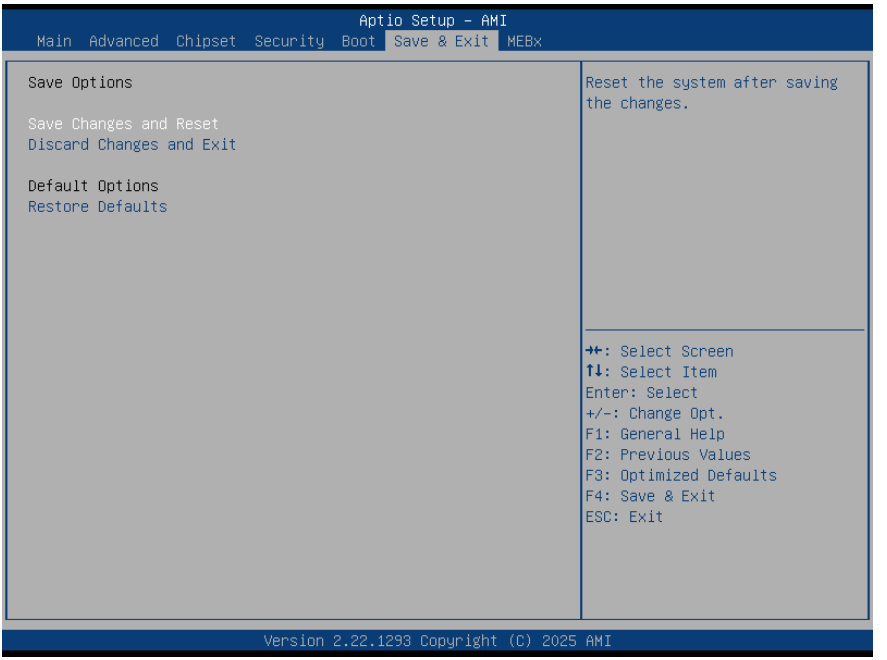
Options Summary		
Factory Key Provision	Disabled	Optimal Default, Failsafe Default
	Enabled	
Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.		
Restore Factory Keys	Yes	
	No	
Force System to User Mode. Install factory default Secure Boot key databases.		
Enroll Efi Image		
Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).		
Platform Key (PK)	Update	
Key Exchange Keys (KEK)	Update	
	Append	
Authorized Signatures (db)	Update	
	Append	

Options Summary		
Forbidden Signatures (dbx)	Update	
	Append	
Authorized TimeStamps (dbt)	Update	
	Append	
OsRecovery Signatures (dbr)	Update	
	Append	
Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3.EFI PE/COFF Image (SHA256) Key Source: Factory, External, Mixed.		

3.7 Setup Submenu: Boot

Options Summary		
Quiet Boot	Disabled	
	Enabled	Default
Enables/disables Quiet Boot option.		
Network Stack	Disabled	Default
	Enabled	
Enable/Disable UEFI Network Stack.		
Boot Option #1	Hard Disk	
Boot Option #2	NVME	
Boot Option #3	USB Device	
Boot Option #4	Network	
Sets the system boot order.		

3.8 Setup Submenu: Save & Exit



3.9 Setup Submenu: MEBx

Chapter 4

Drivers Installation

4.1 Drivers Download and Installation

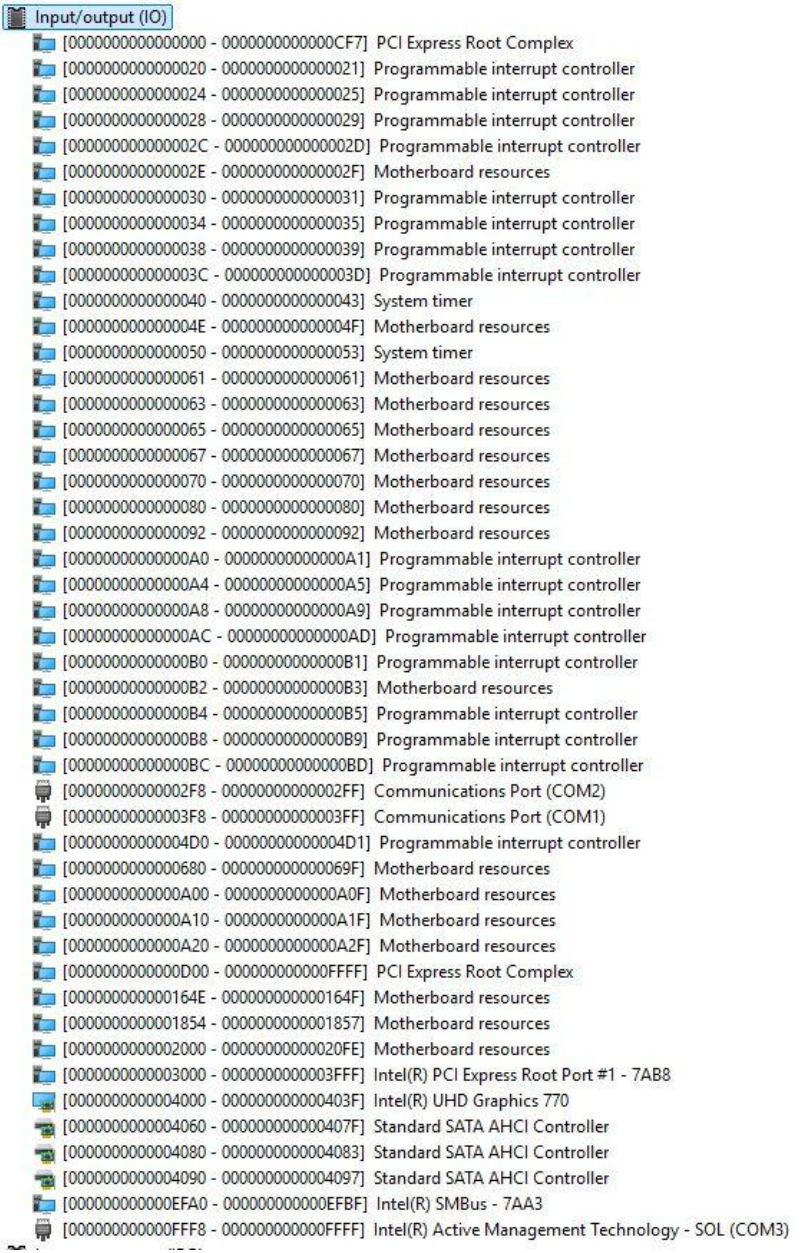
Drivers for the BOXER-6845-BTL can be downloaded from the product page on the AAEON website by following this link:

https://www.aaeon.com/en/product/detail/expandable-fanless-box-pc-solutions-boxer-6845-btl/download

Appendix A

I/O Information

A.1 I/O Address Map



A.2 IRQ Mapping Chart

A.3 Memory Address Map