ARES-1990 Series

1U Height Ultra Slim Fanless Box PC
w/ 14th Gen Raptor Lake U Series Processors

User Manual

Version 1.0

P/N: 4016199000100P

2026.08

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Revision History

Version	Release Time	Description
1.0	2026.08	Initial release

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Declaration of Conformity

CE

The CE symbol on the computer indicates that it is in compliance with the directives of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

Warning
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This device complies with Part 15 of the 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.

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into an opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User Manual for later reference.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user manual first at:

http://www.arbor-technology.com

Please do not hesitate to e-mail our customer service when you still cannot find out the answer.

E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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Chapter 1

Introduction

1.1. The Computer

- Intel® Core™ 5 Processor 120U
- Ultra Slim & Fanless Design
- Supports Wide Input Voltage Range of 9 ~ 36VDC
- Supports up to 9 x USB Ports
- Supports up to 3 x 2.5GbE LAN Ports (up to 4 x 2.5GbE via expansion)
- Supports up to 4 x Simultaneous Displays
- Dual M.2 Slots supporting SATA & NVMe Interfaces
- Supports M.2 AI Module expansion

1.2. About this Manual

This manual covers several SKUs of the ARES-1990. Product features, installation images and BIOS screens may vary from model to model.

The table below describes the ARES-1990 Series (SKUs) and the major variants based primarily on the ARES-1990-LAN model:

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

Model	Descriptions (major variants are shown in bold)
ARES-1990-LAN	ARES-1990 w/ Core i5 120U, w/ 4 x LAN, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key
ARES-1990-CAN	ARES-1990 w/ Core i5 120U, **w/ 2 x CANBus, 3 x LAN**, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key
ARES-1990-AI	ARES-1990 w/ Core i5 120U, w/ 4 x LAN, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key **Pre-installed MemryX M.2 AI Module**

1.3. Specifications

System	
CPU	Intel® Core™ 5 Processor 120U
Memory	1 x 262-pin DDR5 SO-DIMM socket, up to 48GB
Chipset	SoC
Graphics	Integrated Intel® Graphics
LAN Chipset	Intel® i226LM
Watchdog Timer	1~255 levels reset
TPM	TPM2.0 (fTPM/dTPM)
I/O	
Serial Port	2 x RS-232(Default)/422/485
	2 x RS-232 (optional)
USB Port	4 x USB-A 3.2 Gen2 ports
	4 x USB-A ports
	1 x USB-C 3.2 supports DP Alt. (4096 x 2304 @ 60 Hz) & 10W power output (5V/2A)
LAN	**ARES-1990-CAN:** 3 x 2.5GbE ports
	ARES-1990-LAN: 4 x 2.5GbE ports
	ARES-1990-AI: 3 x 2.5GbE ports + 1 x GbE port (ASIX AX88179A/B)
Video Port	1 x DisplayPort (DP++), up to 4096 x 2304 @ 60 Hz
	1 x HDMI, up to 4096 x 2304 @ 60 Hz
	1 x VGA, up to 1920 x 1200 @ 60Hz (optional)
	1 x USB-C 3.2 support DP Alt. Video port support up to 4 x simultaneous displays
Expansion Bus	1 x M.2 B-Key 2242/3042 slot (PCIe 3.0 x2 + SATA + USB2.0/3.0) w/ 1 x nano SIM card slot
	1 x M.2 E-Key 2230 slot (PCIe 3.0 x1 + USB2.0 + CNVi)
Digital I/O	8 x DI/DO via 1 x DB9 port
CANBus **(ARES-1990-CAN only)**	2 x 2kV isolated CAN FD via terminal block
Storage	
Type	1 x M.2 M-Key 2242 slot (PCIe 4.0 x4 + SATA)
Power Requirement	
Power Input	DC 9 ~36V via 3-pin terminal block (V+, GND, IGN)
Ignition Switch	1 x 3-pin terminal block (shared w/ power input)
Power Consumption	Max. 90W

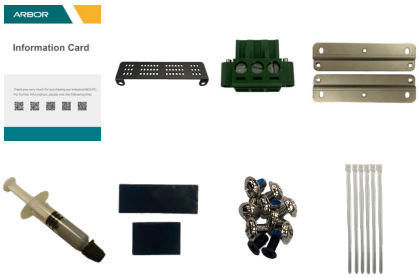
Environmental	
Operating Temp.	-20 ~ 60°C (-4 ~ 140°F), ambient w/ air flow *For ARES-1990-AI, the operating temperature is -20 ~ 55°C (-4 ~ 131°F) due to AI module thermal constraints.
Storage Temp.	-40 ~ 80°C (-40 ~ 176°F)
Operating Humidity	10 ~ 95% @ 60°C (non-condensing)
Vibration	Comply with MIL-STD-810H, Method 514.8, Category 4, operating
Shock	Comply with MIL-STD-810H, Method 516.8, Procedure I, functional shock=20g, operating
Qualification	
Certification	CE, FCC Class A
Mechanical	
Construction	Metal + Aluminum
Mounting	Wall-mount (standard) DIN-rail (optional w/ CTOS bracket) VESA (optional w/ CTOS bracket)
Weight	2 kg (4.41 lb)
Dimension (W x H x D)	234 x 44 x 140 mm (9.21” x 1.73” x 5.51”)
OS Support	
Windows 10 / Windows 11 Linux Ubuntu	
Ordering Information	
ARES-1990-LAN	ARES-1990 w/ Core 5 120U, w/ 4 x LAN, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key
ARES-1990-CAN	ARES-1990 w/ Core 5 120U, w/ 2 x CANBus, 3 x LAN, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key
ARES-1990-AI	ARES-1990 w/ Core 5 120U, w/ 4 x LAN, 9 x USB, 1 x DP, 1 x HDMI, 8 x DIO, 2 x COM, 1 x M.2 M-Key, 1 x M.2 B-Key, 1 x M.2 E-Key Pre-installed MemryX M.2 AI Module

1.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:



1 x ARES-1990 (Product outlook varies according to your model)



Accessory Box contains the following items:
- 1 x Information Card
- 1 x Cable-Lock Bracket
- 1 x 3-pin terminal block
- 2 x Wall-mount bracket
- 1 x Syringe thermal paste
- 2 x Thermal PAD
- 10 x Screws
  (M3*6 mm, black, for Cable-Lock Bracket)
  (M3*5L mm for Wall Mount)
- 6 x Cable Ties

1.4.1. Optional Accessories

The following items are normally optional, but some vendors may include them as a standard package, or some vendors may not carry all the items.

PAC-120W6B-FSP-ES	19V/6.3A, 120W AC/DC Adapter Kit
WiFi-RT1550	Realtek RTL8852CE,M.2 A+E-Key WiFi Module w/2 x 30cm Internal Wiring
ANT-T15	2.4G/5G/6G WIRELESS ANTENNA KIT
LTE-TELIT-LE910C4-EU	TELIT, LE910C4 LTE CAT.4 M.2 MODULE, RF Cable x 3, For EU
ANT-F18	4G/5G Sub-6GHz Wideband Antenna Kit
ARES-1990 VESA DIN RAIL BKT KIT	VESA DIN RAIL BKT KIT for ARES-1990 Series

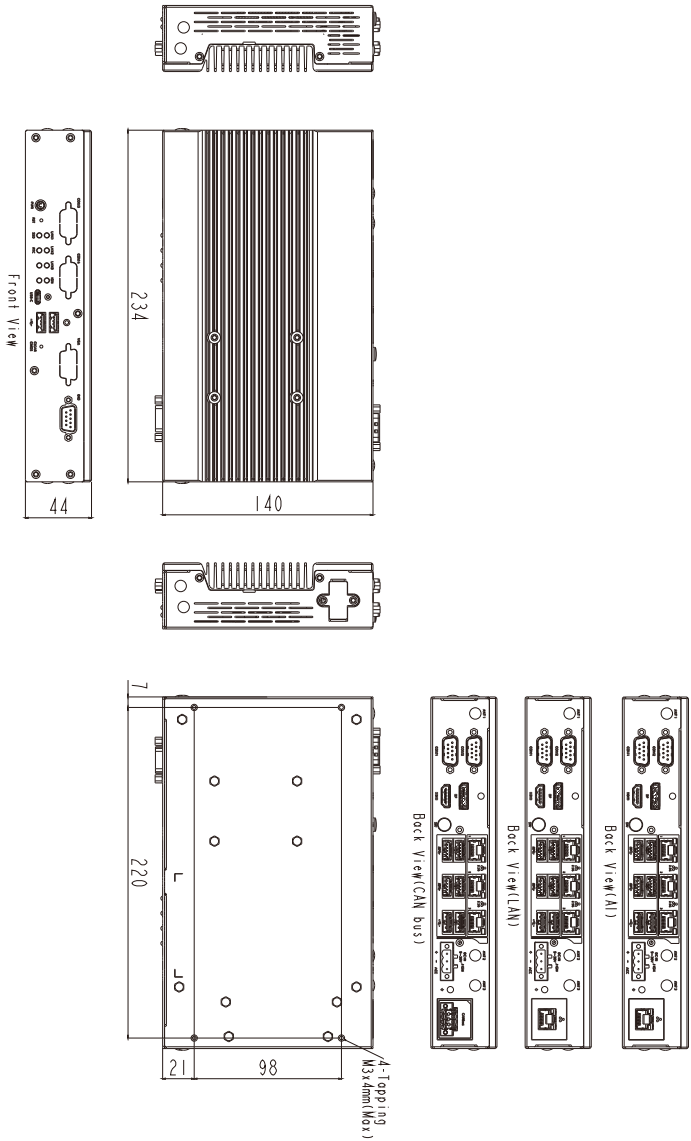
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Chapter 2

System Overview

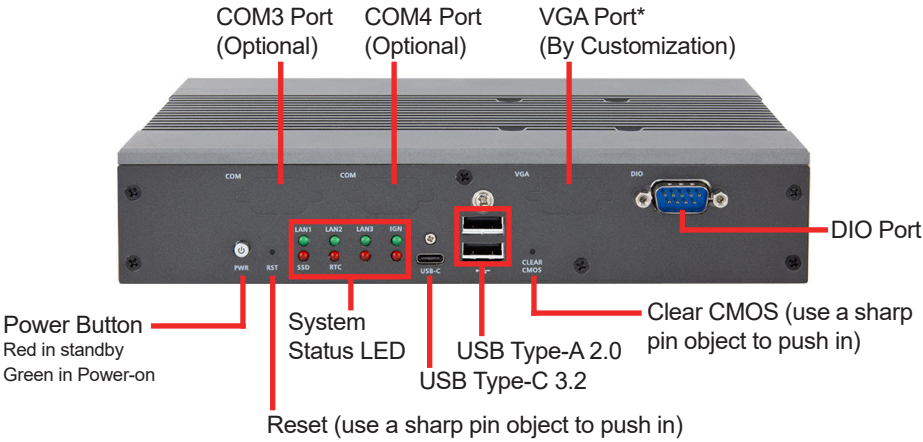
2.1. Dimensions

The following illustration shows the dimensions of the ARES-1990 series, with the measurements in width, depth, and height called out. (Unit: mm)



2.2. Product Overview

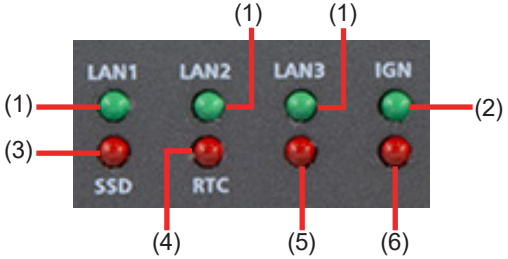
2.2.1. Front View



*Note: VGA port requires a customized motherboard version and cannot be supported via standard optional cables.

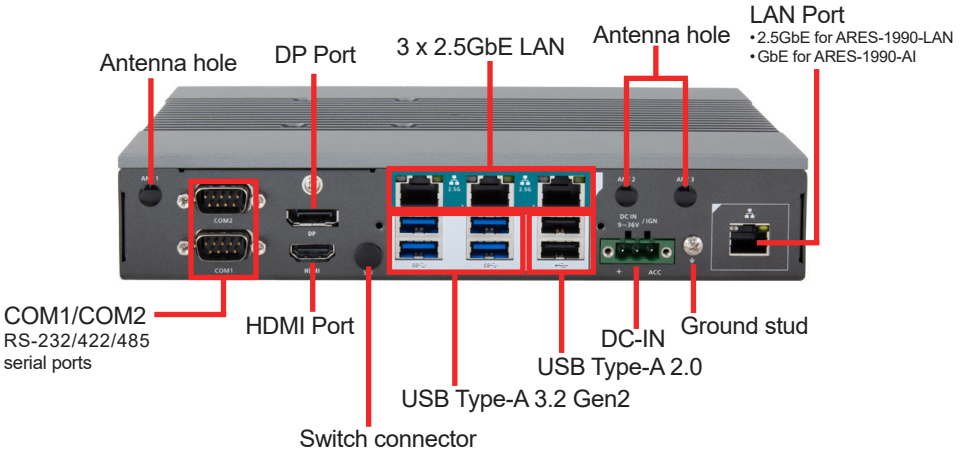
System Status LED Indicator

No	Item	Indicator	LED Color	Description
(1)	LED 1~3	LAN status	Green	Blinking: Network activity detected
(2)	LED 4	IGN status	Green	Solid: Normal operation Flashing: Settings detected
(3)	LED 5	SSD status	Red	Flashing: Data activity detected
(4)	LED 6	RTC status	Red	Solid: RTC battery low
(5)	LED 7	4th LAN status or User-defined	Red	Blinking: Network activity detected
(6)	LED 8	User-defined	Red	Users can customize the LED behavior according to their system application

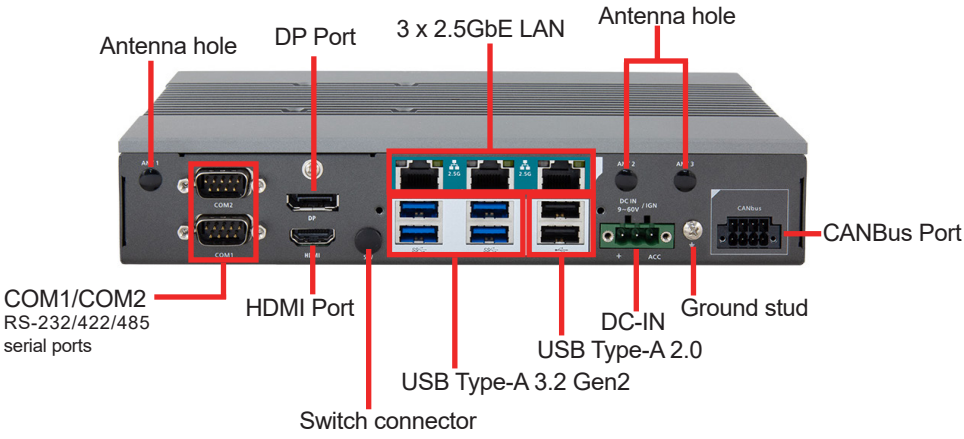


2.2.2. Rear View

ARES-1990-LAN & ARES-1990-AI



ARES-1990-CAN



2.3. Driver Installation Notes

To install the drivers, please visit our website at **www.arbor-technology.com** and download the driver pack from the **Software Download** section.

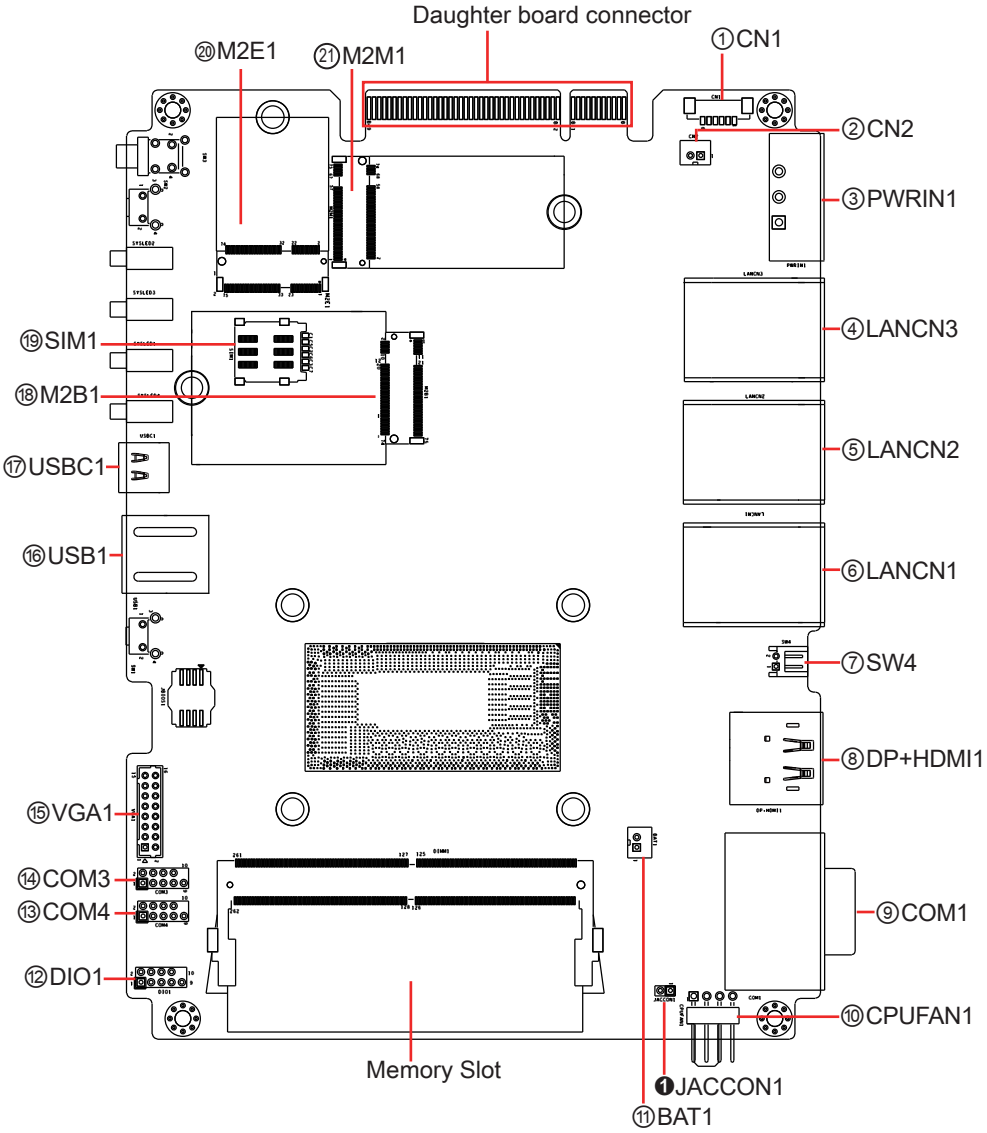
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Chapter 3

Engine of the Computer

3.1. Board Layout

Board Top



3.1.1. Jumper & Connectors

Jumper

Label	Description
❶JACCON1	IGN function selection

Connectors

Label	Description
①CN1	SMBus connector for OOB
②CN2	5V power for OOB
③PWRIN1	Power input & IGN
④LANCN3	Ethernet & USB2.0 type-A x 2
⑤LANCN2	Ethernet & USB3.2 type-A x 2
⑥LANCN1	Ethernet & USB3.2 type-A x 2
⑦SW4	Switch connector
⑧DP+HDMI1	DisplayPort and HDMI connector
⑨COM1	COM port x 2
⑩CPUFAN1	Fan connector
⑪BAT1	RTC battery connector
⑫DIO1	DIO port
⑬COM4	COM port
⑭COM3	COM port
⑮VGA1	VGA port
⑯USB1	USB2.0 type-A x 2
⑰USBC1	USB type-C
⑱M2B1	M.2 Key-B socket
⑲SIM1	SIM slot for M.2 Key-B
⑳M2E1	M.2 Key-E socket
㉑M2M1	M.2 Key-M socket

3.1.2. Jumper and Connectors Settings

❶ JACCON1

Function: IGN (Ignition) function selection
Jumper Type: Onboard type 2-pin header
Setting:

Pin	Description	
Short 1-2	Disable IGN (default)	
Open 1-2	Enable IGN	

① CN1

Function: SMBus for OOB
Connector Type: Onboard type 6-pin connector
Pin Assignment:

Pin	Description
1	PCH_PWRBTN#
2	GND
3	FR_RST#
4	GND
5	N_SOUT5
6	N_SIN5



② CN2

Function: 5V power for OOB
Connector Type: Onboard type 2-pin connector
Pin Assignment:

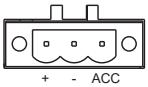
Pin	Description
1	+V5A
2	GND



③PWRIN1

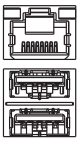
Function: DC Adapter Power Input
Connector Type: onboard 3-pin connector
Pin Assignment:

Pin	Description
1	DCIN
2	GND
3	ACC_ON



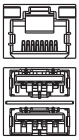
④ LANCN3

Function: Stacked GbE RJ-45 & USB 2.0 Connectors
Connector Type: RJ-45 connector that supports 10/100/1000/2500 Mbps fast Ethernet
Pin Assignment: The pin assignments conform to the industry standard



⑤ LANCN2 / ⑥LANCN1

Function: Stacked GbE RJ-45 & USB 3.2 Connectors
Connector Type: RJ-45 connector that supports 10/100/1000/2500 Mbps fast Ethernet
Pin Assignment: The pin assignments conform to the industry standard



⑦ SW4

Function: Switch connector
Connector Type: 2-pin connector
Pin Assignment:

Pin	Description
1	PWR_IN_SW#
2	GND



⑧ DP+HDMI1

Function: DisplayPort Connector
Pin Assignment: The pin assignments conform to the industry standard


DP

Function: HDMI Connector
Pin Assignment: The pin assignments conform to the industry standard


HDMI

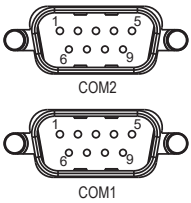
⑨ COM1 (COM1 & COM2)

Function: Double RS-232/422/485 Selectable Serial Port

Connector Type: External 9-pin D-sub male connector

Pin Assignment:

	Pin	Desc.	Pin	Desc.
RS-232	1	DCD	6	DSR
	2	RXD	7	RTS
	3	TXD	8	CTS
	4	DTR	9	RI
	5	GND		
RS-422	1	COM_422 TX-		
	2	COM_422 TX+		
	3	COM_422 RX+		
	4	COM_422 RX-		
	5	GND		
RS-485	1	COM_485 D-		
	2	COM_485 D+		
	5	GND		

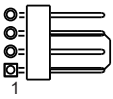


⑩ CPUFAN1

Connector Type: Onboard type 4-pin connector

Pin Assignment:

Pin	Description
1	GND
2	+12V
3	RPM
4	CTRL



⑪ BAT1

Function: RTC Battery

Connector Type: Onboard type 2-pin connector

Pin Assignment:

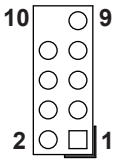
Pin	Description
1	BAT+
2	BAT-



⑫ DIO1

Function Digital I/O connector
Connector Type: Onboard type 9-pin connector
Pin Assignment:

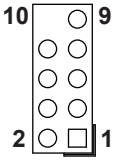
Pin	Description	Pin	Description
1	SIO_GPIO50	2	SIO_GPIO51
3	SIO_GPIO52	4	SIO_GPIO53
5	GND	6	SIO_GPIO54
7	SIO_GPIO55	8	SIO_GPIO56
9	SIO_GPIO57		



⑬ COM4

Function: RS-232 Serial Port
Connector Type: Onboard type 9-pin header
Pin Assignment:

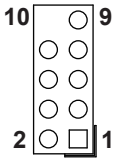
	Pin	Desc.	Pin	Desc.
RS-232	1	DCD	6	DSR
	2	RXD	7	RTS
	3	TXD	8	CTS
	4	DTR	9	RI
	5	GND		



⑭ COM3

Function: RS-232/422/485 Serial Port
Connector Type: Onboard type 9-pin header
Pin Assignment:

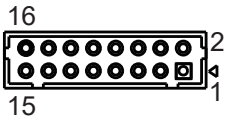
	Pin	Desc.	Pin	Desc.
RS-232	1	DCD	6	DSR
	2	RXD	7	RTS
	3	TXD	8	CTS
	4	DTR	9	RI
	5	GND		
RS-422	1	COM_422 TX-		
	2	COM_422 TX+		
	3	COM_422 RX+		
	4	COM_422 RX-		
	5	GND		
RS-485	1	COM_485 D-		
	2	COM_485 D+		
	5	GND		



⑮ VGA1

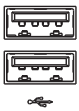
Function Analog RGB
Connector Type: Analog RGB 15-pin connector
Pin Assignment:

Pin	Description	Pin	Description
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	VDDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	VDCLK
8	GND		



⑯ USB1

Function: USB 2.0 connectors
Connector Type: USB 2.0 type-A
Pin Assignment: The pin assignments conform to the industry standard



⑰ USBC1

Function: USB 3.2 connectors
Connector Type: USB 3.2 type-C
Pin Assignment: The pin assignments conform to the industry standard



⑱ M2B1

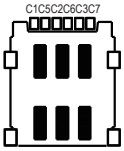
Function: M.2 B-Key socket (w/ PCIe x1+ USB3.0 or SATA + USB3.0)(either one)
Connector Type: M.2 B-Key socket
Pin Assignment: The pin assignments conform to the industry standard



⑲ SIM1

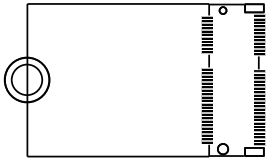
Function: Nano SIM Card Socket
Connector Type: 6-pin SIM card socket
Pin Assignment:

Pin	Desc.	Pin	Desc.
C1	VCC	C2	RST
C3	CLK	C5	GND
C6	VPP	C7	I/O



⑳ M2E1

Function: M.2 E-Key socket (w/ PCIe + USB2.0) for optional Wi-Fi/BT
Connector Type: M.2 E-Key socket
Pin Assignment: The pin assignments conform to the industry standard



㉑ M2M1

Function: M.2 M-Key socket (w/ PCIe x4 + USB3.0 for storage)
Connector Type: M.2 M-Key socket
Pin Assignment: The pin assignments conform to the industry standard

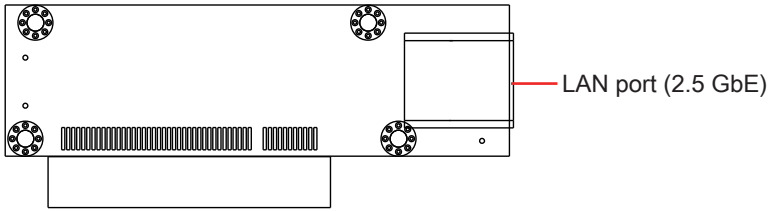


3.2. Daughter board

SCDB-3231

Function: Expansion for LAN 2.5 GbE Port daughter board
Applicable model: ARES-1990-LAN

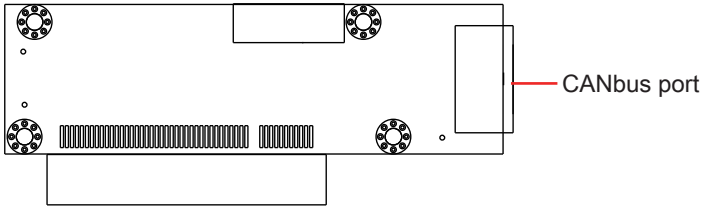
Board Top



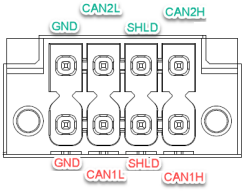
SCDB-329B

Function: Expansion for CANbus Port daughter board
Applicable model: ARES-1990-CAN

Board Top



CANbus Pin Definition:

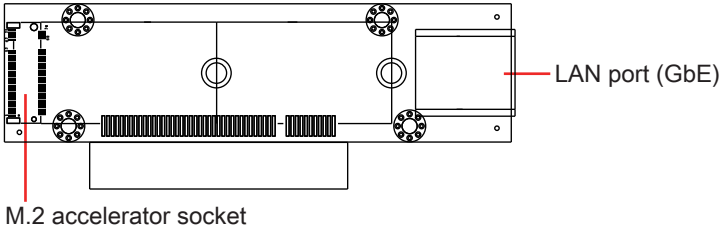


SCDB-329C

Function: Expansion for M.2 accelerator and LAN GbE Port daughter board

Applicable model: ARES-1990-AI

Board Top



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Chapter 4

Installation and Maintenance

4.1. Disassembling and Assembling the Computer

4.1.1. Disassembling the Computer

To use onboard jumper/connectors or to install/remove internal components, you will need to open the computer to access the inside of the computer. Follow through the guide below to disassemble the computer. (Product photo varies according to the SKUs. But the disassembling procedures for various SKUs are basically the same.)

1. Remove the screws on the front, top, left and right sides as shown below.



2. Lift the top cover to expose the internal components.



4.1.2. Assembling the Computer

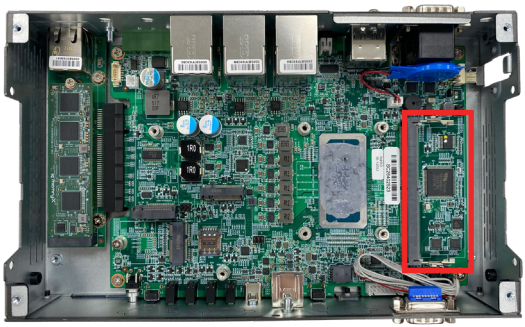
After you make required hardware installation and jumper settings, assemble the computer by performing the preceding steps in reverse order.

4.2. Install the Hardware

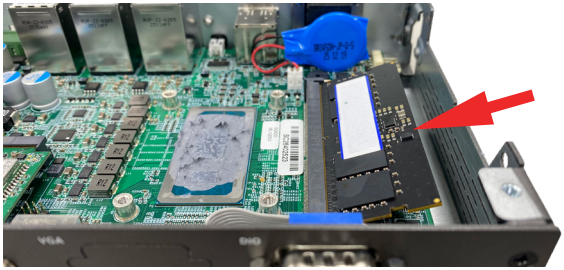
4.2.1. Installing a memory module

1. Remove the top cover from the computer as described previously.

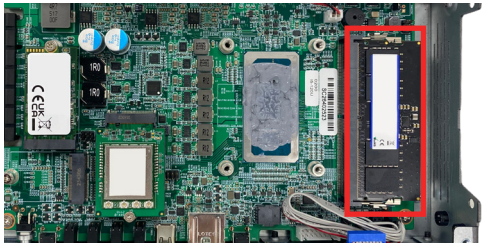
2. Locate the memory socket on the main board.



3. Insert the memory module at a angle. Moreover, lay the memory in parallel to the opening and gently insert the memory module until it is fully seated in the socket.



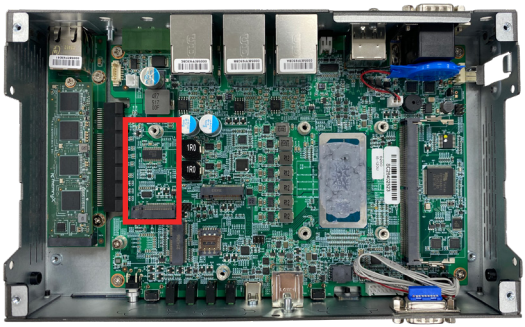
4. Once the memory is fully inserted, press down on the memory top edge to latch into place.



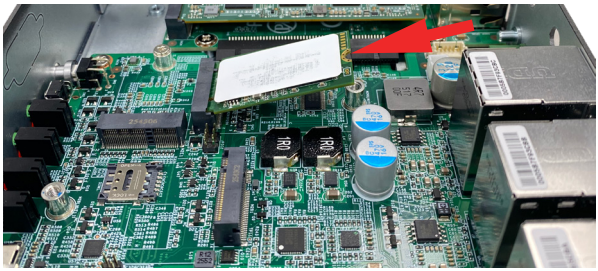
4.2.2. Installing M.2 Storage Module

1. Remove the top cover from the computer as described previously.

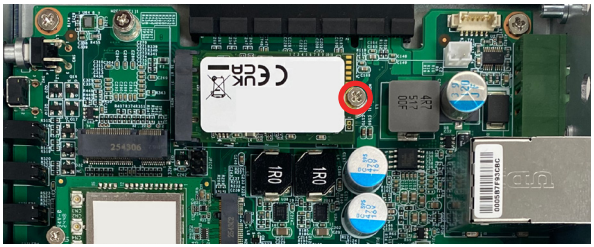
2. Locate the M.2 M-Key socket on the main board.



3. Insert the M.2 storage module into the socket by aligning the notch.

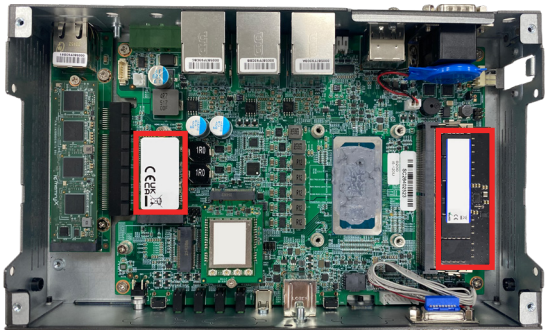


4. Once the M.2 storage module is fully inserted, press down on the module top edge and fasten the screw into the standoff.

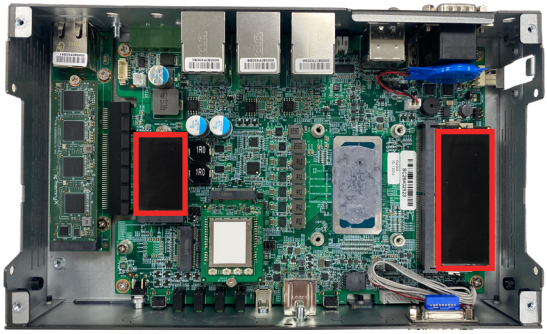


4.2.3. Installing Thermal Pad for RAM and SSD

1. Locate the installed RAM and SSD on the main board.



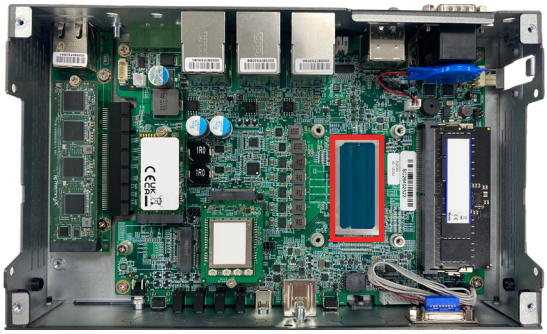
2. Use the the thermal pad provided in the accessories, attach on the RAM and SSD, then remove the thermal pad protection films.



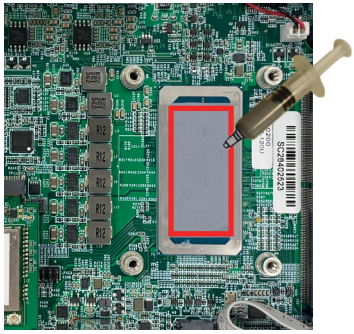
Note: When installing the RAM and SSD, make sure to attach the thermal pad on the RAM PCBA side and SSD controller IC side.

4.2.4. How to Apply Thermal Paste for CPU

1. Locate the CPU on the main board.



2. Use the Syringe thermal paste provided in the accessories, apply a small amount paste. (pattern example as below)



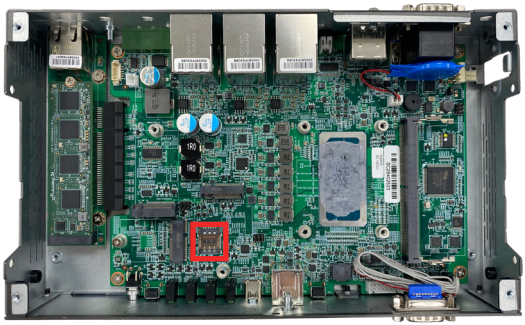
Note:

- Make sure that the CPU is clean, and that there is not any old thermal paste on it. If there is, carefully remove the old paste from the lid of he CPU with isopropyl alcohol and a microfiber cloth or paper towel that doesn't shed, and let it dry before continuing.
- Make sure to use the correct amount of thermal paste, an insufficient amount might not cover the surface area needed in order to be effective. Too much reduces the efficacy of the paste, due to the metal surfaces being too far apart, and also risks spilling out onto the motherboard during installation.

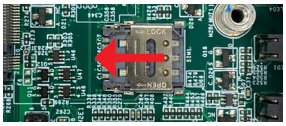
4.2.5. Installing a SIM card

1. Remove the top cover from the computer as described previously.

2. Locate the SIM card slot on the main board.



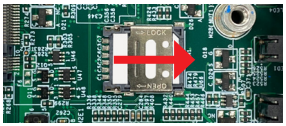
3. Slide the SIM card holder cover towards the OPEN edge and then lift the cover to open it.



4. Insert the SIM card into the card holder as shown below.



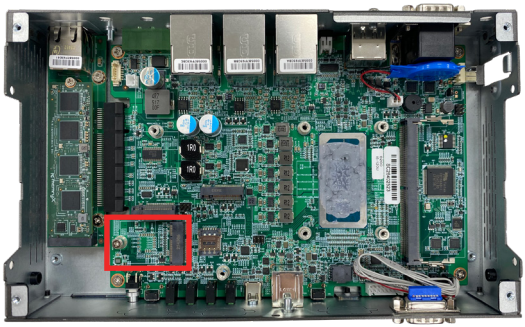
5. Close the SIM card holder door and slide the door to the LOCK edge to lock into place.



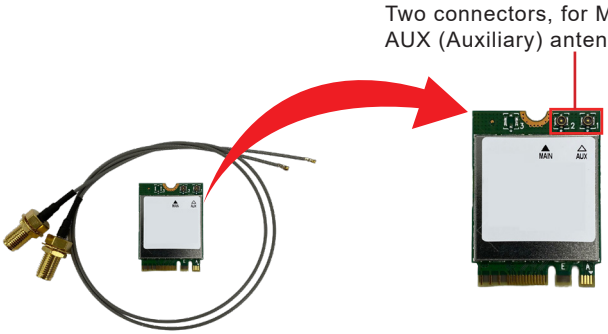
4.2.6. Installing Wi-Fi Module

1. Remove the top cover from the computer as described previously.

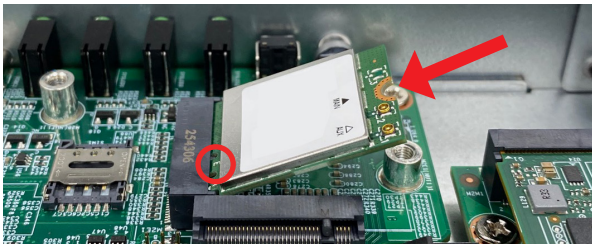
2. Locate the M.2 E-Key socket on the main board.



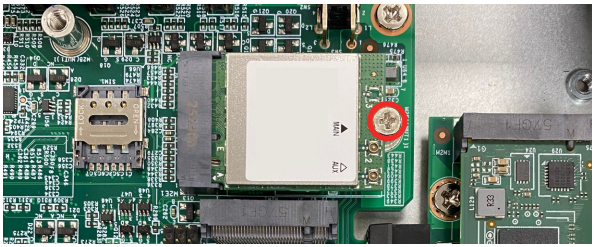
3. Prepare the optional WiFi-RT1550 module, the module is a M.2 E-Key form factor with two U.FL connectors.



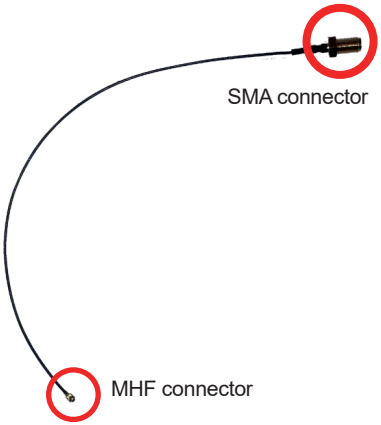
4. Plug the Wi-Fi module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.



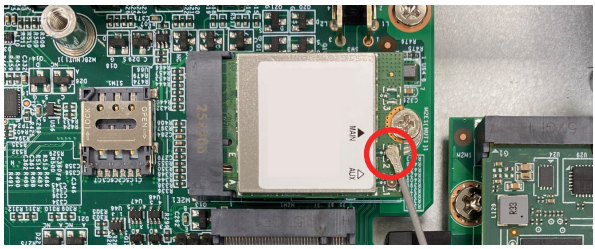
5. Press down the module and fasten the module in place using one screw.



6. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



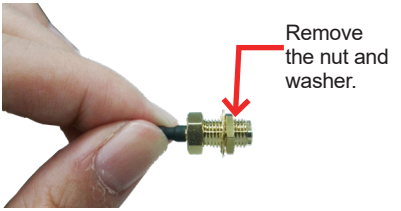
7. Connect the RF antenna's MHF connector to the Wi-Fi module's connector.

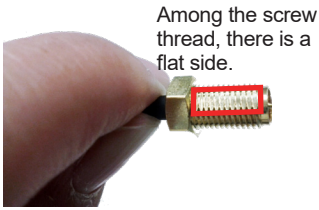


8. Remove one plastic plug from the computer's rear panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.



9. From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Note the SMA connector has the form of a threaded bolt, with one flat side.





10. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.

11. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.



Mount the washer and the nut to the SMA connector. Tighten the nut.

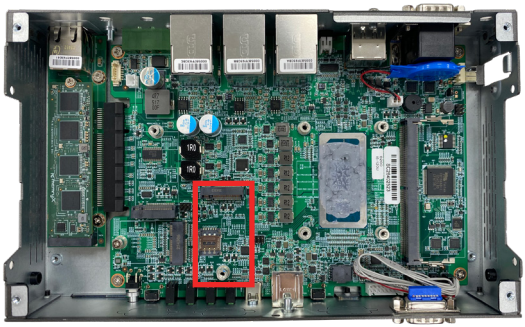
12. Have the external antenna(s). Screw and tightly fasten the antenna(s) to the SMA connector.



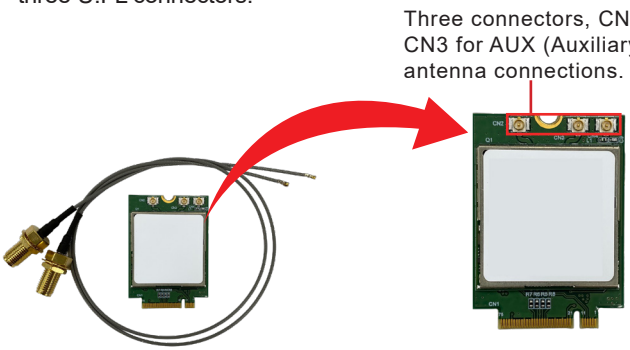
4.2.7. Installing 4G LTE Module

1. Remove the top cover from the computer as described previously.

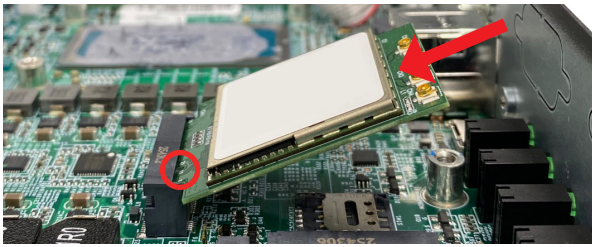
2. Locate the M.2 B-Key socket on the main board.



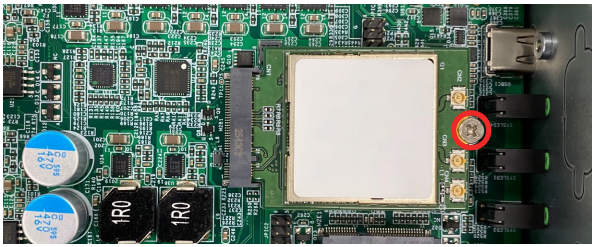
3. Prepare the optional 4G LTE module, the module is a M.2 B-Key form factor with three U.FL connectors.



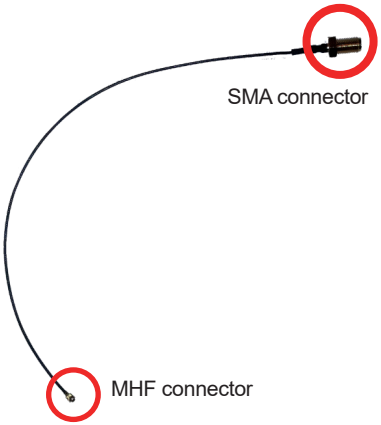
4. Plug the 4G LTE module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.



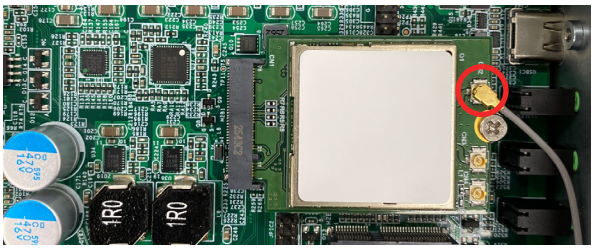
5. Press down the module and fasten the module in place use one screw.



6. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



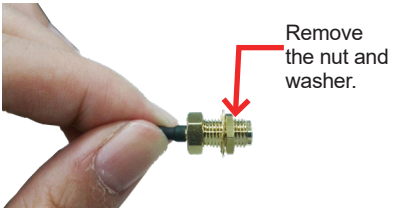
7. Connect the RF antenna's MHF connector to the 4G LTE module's connector.

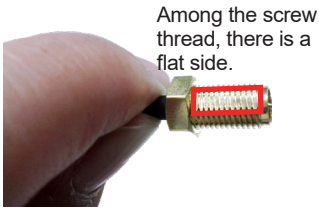


8. Remove one plastic plug from the computer's rear panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.



9. From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Note the SMA connector has the form of a threaded bolt, with one flat side.





10. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.

11. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.



Mount the washer and the nut to the SMA connector. Tighten the nut.

12. Have the external antenna(s). Screw and tightly fasten the antenna(s) to the SMA connector.

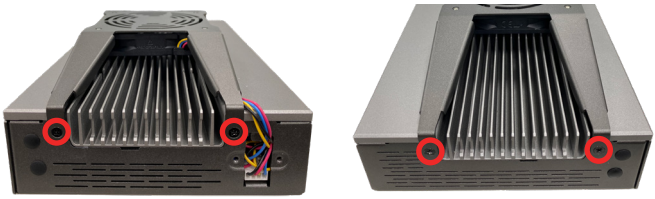


4.2.8. Installing an External Fan (optional)

1. Remove the screws on the left and right sides as shown below.



2. Prepare the optional external Fan Kit, install and fasten the screws on left and right side as shown below, and then connect the Fan cable into connector.



3. Position fan cable and cover with protection case, then fasten with two screws.



4. The external fan installation is complete.

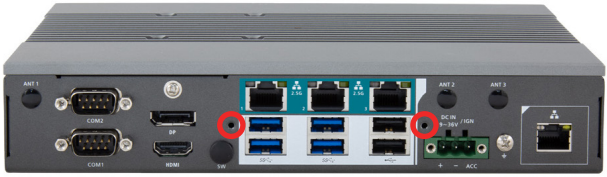


4.2.9. Installing the Cable-Lock Bracket

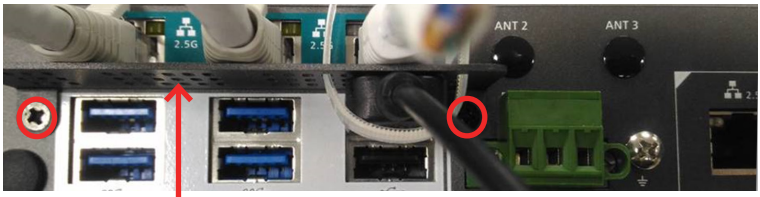
Using the cable-lock bracket prevents cables from detaching and protects connectors from accidental impacts.

Follow the instructions below to install the cable-lock bracket:

1. Locate the cable-lock bracket holes on the rear plate as shown below.



2. Use 2 x M3*6mm screws provided in the accessories to install and tighten Cable-Lock bracket, then use cable ties to secure cables when needed.



Cable-Lock Bracket

4.3. Ground the Computer

Follow the instructions below to ground the computer to earth / ground. Be sure to follow every grounding requirement in your place.

Warning Whenever the unit is installed, the ground connection must always be made first of all and disconnected lastly.

1. See the illustration below. Remove the ground screw from the rear panel.

2. Attach a ground wire to the rear plate with the screw.



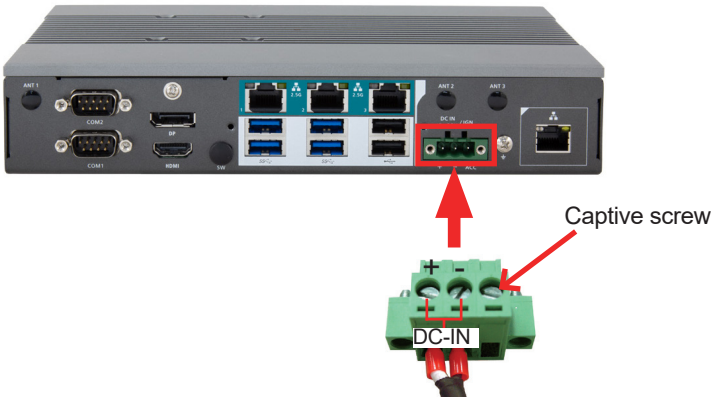
4.4. Wire DC-in Power Source

4.4.1. Automation Application

Follow the instructions below for connecting the computer to a DC-input power source.

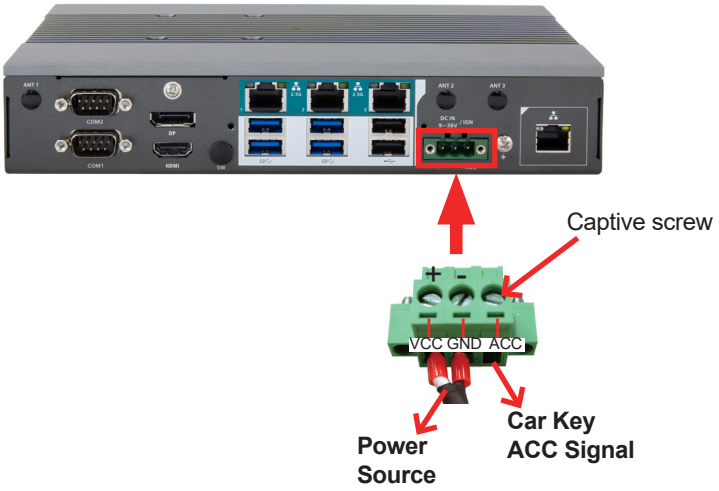
> **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

1. To turn off the Vehicle ACC for Automation application, please refer to Jumper setting of 3.1.2. Jumper and Connectors Settings on page 16.
2. Before wiring, make sure the power source is disconnected.
3. Find the terminal block in the accessory box.
4. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
5. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
6. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
7. Use a slotted screwdriver to tighten the captive screws. Plug the wired terminal block firmly into the receptacle.



4.4.2. Vehicle Application

1. To turn on the Vehicle ACC for Vehicle application, please refer to Jumper setting of 3.1.2. Jumper and Connectors Settings on page 16.
2. Before wiring, make sure the power source is disconnected.
3. Find the terminal block in the accessory box.
4. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
5. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
6. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
7. Please connect the ACC pin with your car ACC, and the device will be activated when you turn your ignition key to ACC position.
8. Use a slotted screwdriver to tighten the captive screws. Plug the wired terminal block firmly into the receptacle.



4.5. Mount the Computer

Prepare the wall mount kit and a screwdriver for wall mounting, follow through the instructions below.

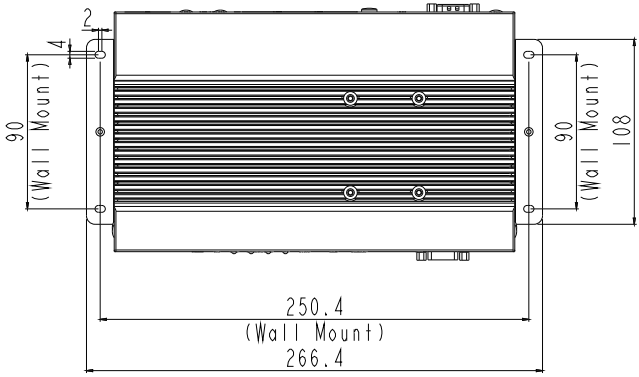
1. Using four screws (M3*5L) to tighten the wall mount kit to the bottom cover.



2. Find the cutouts as marked below, mount the computer to a wall or flat surface by the said cutouts.



With wall mount (Dimension)



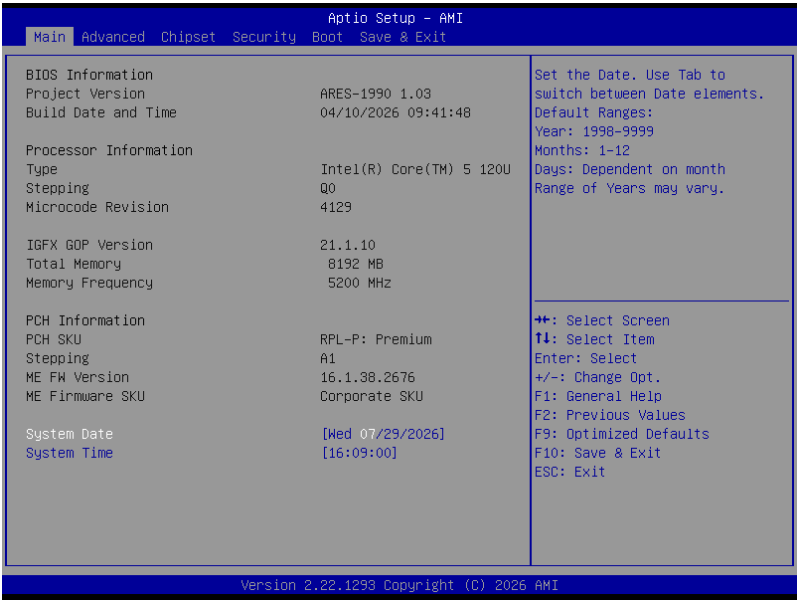
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Chapter 5

BIOS

The BIOS Setup utility is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.



The featured settings are:

Menu	Description
Main	See 5.1. Main on page 50
Advanced	See 5.2. Advanced on page 51
Chipset	See 5.3. Chipset on page 66
Security	See 5.4. Security on page 75
Boot	See 5.5. Boot on page 77
Save & Exit	See 5.6. Save & Exit on page 79

Key Commands

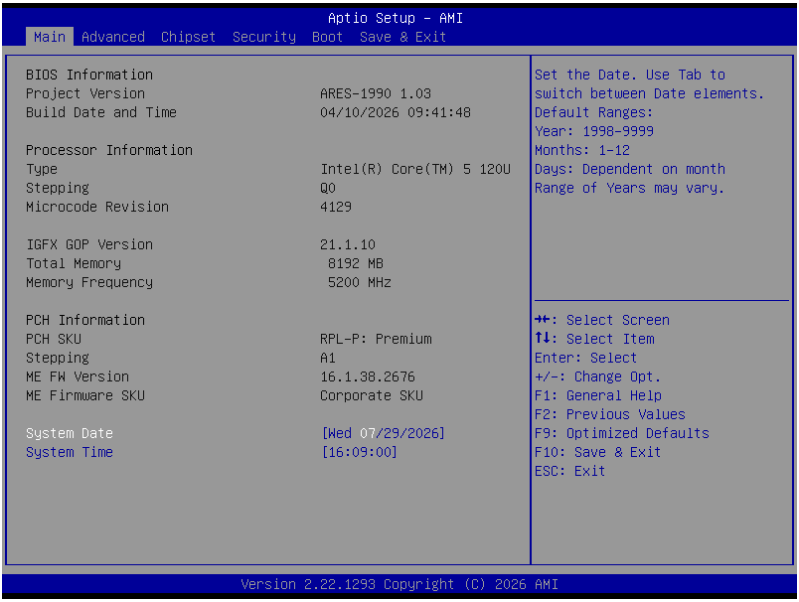
The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and use the utility.

Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	▸ On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** to exit discarding changes. ▸ On the submenus: Use **Esc** to quit current screen and return to the top menu.
Page Up / +	Increases current value to the next higher value or switches between available options.
Page Down / -	Decreases current value to the next lower value or switches between available options.
F1	Opens the **Help** of the BIOS Setup utility.
F2	Previous values
F9	Optimized defaults
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **Yes** or **No** to exit saving changes.)

Note:
This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

5.1. Main

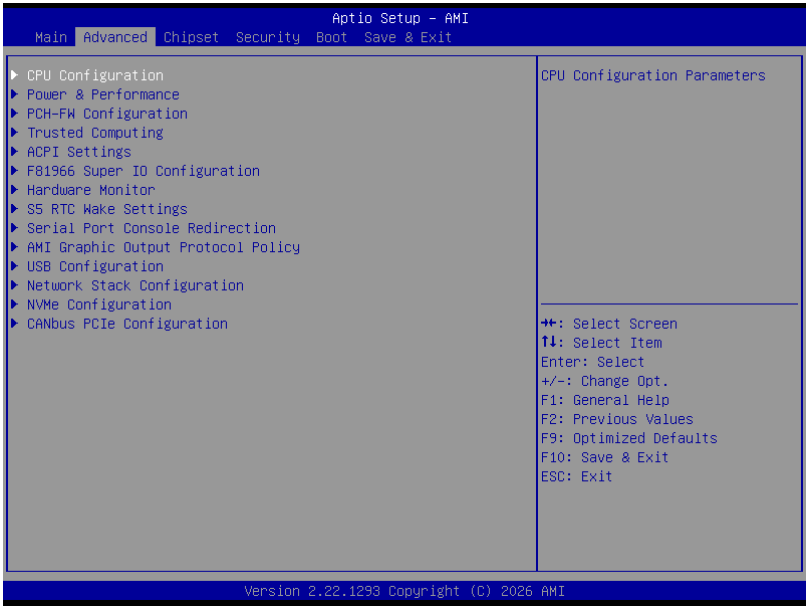
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



The featured settings are:

Setting	Description
System Date	Set the system date. Use Tab to switch between Date elements. Note that the 'Day' automatically changes when you set the date. ► The date format is: **Day:** Sun to Sat **Month:** 1 to 12 **Date:** 1 to 31 **Year:** 1998 to 9999
System Time	Set the system time. Use Tab to switch between Time elements. ► The time format is: **Hour:** 00 to 23 **Minute:** 00 to 59 **Second:** 00 to 59

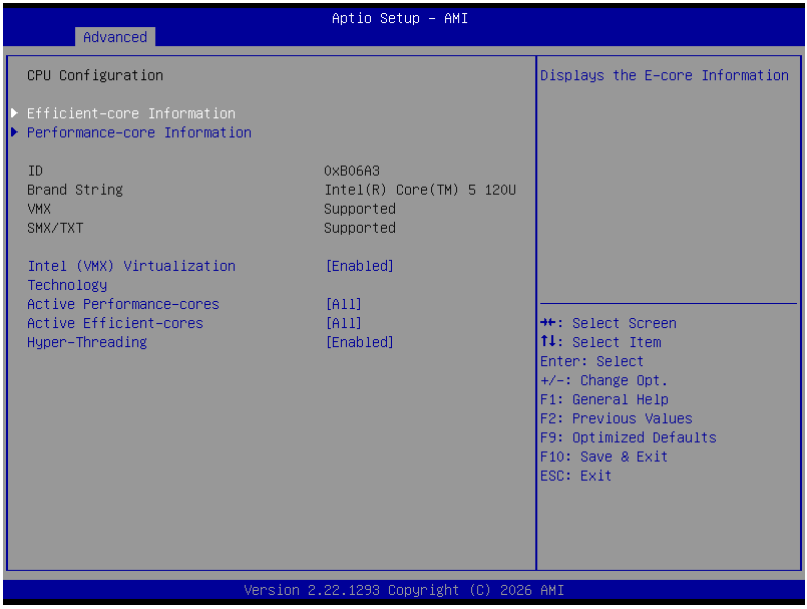
5.2. Advanced



The featured settings and submenus are:

Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 52
Power & Performance	See 5.2.2. Power & Performance on page 53
PCH-FW Configuration	See 5.2.3. PCH-FW Configuration on page 54
Trusted Computing	See 5.2.4. Trusted Computing on page 55
ACPI Settings	See 5.2.5. ACPI Settings on page 56
F81966 Super IO Configuration	See 5.2.6. F81966 Super IO Configuration on page 57
Hardware Monitor	See 5.2.7. Hardware Monitor on page 58
S5 RTC Wake Settings	See 5.2.8. S5 RTC Wake Settings on page 59
Serial Port Console Redirection	See 5.2.9. Serial Port Console Redirection on page 60
AMI Graphic Output Protocol Policy	See 5.2.10. AMI Graphic Output Protocol Policy on page 61
USB Configuration	See 5.2.11. USB Configuration on page 62
Network Stack Configuration	See 5.2.12. Network Stack Configuration on page 63
NVMe Configuration	See 5.2.13. NVMe Configuration on page 64
CANbus PCIe Configuration	See 5.2.14. CANbus PCIe Configuration on page 65

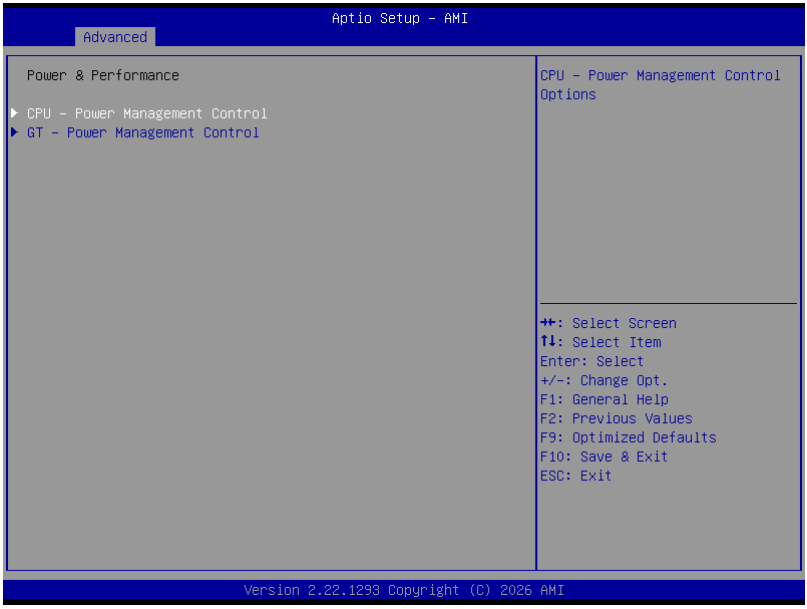
5.2.1. CPU Configuration



The featured settings are:

Setting	Description
Efficient-core Information	Displays the E-core Information.
Performance-core Information	Displays the P-core Information.
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. ► Options: **Enabled** (default) or **Disabled**
Active Performance-cores	Number of P-cores to enable in each processor package. ► Options: **1, ALL** (default)
Active Efficient-cores	Number of E-cores to enable in each processor package. ► Options: **0~7, ALL** (default)
Hyper-Threading	Enable or Disable Hyper-Threading Technology. ► Options: **Enabled** (default) or **Disabled**

5.2.2. Power & Performance

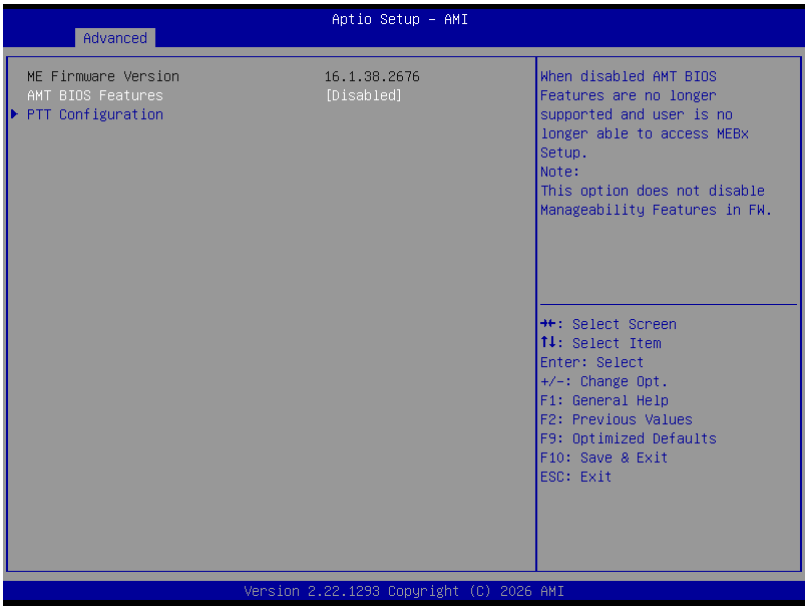


The featured settings are:

Setting	Description
CPU - Power Management Control	CPU - Power Management Control Options Boot performance mode: ► Options: Boot performance mode: **Max Battery, Max Non-Turbo Performance, Turbo Performance** Intel(R) SpeedStep(tm): ► Options: **Disabled, Enabled** Per Core P State OS control mode: Enable/Disable Per Core P states OS control mode. ► Options: **Disabled, Enabled** Turbo Mode: ► Options: **Disabled, Enabled** View/Configure Turbo Options: ► View/Configure Turbo Ratio Limit Options. Config TDP Configurations: ► Configurable Processor Base Power (cTDP) Configurations. C States: Enable/Disable CPU Power Management ► Options: **Disabled, Enabled**

GT - Power Management Control	RC6(Render Standby): Check to enable render standby support. ► Options: **Disabled / Enabled**(default) Maximum GT frequency: Maximum GT frequency limited by the user. ► Options: **Default Max Frequency**(default), **100Mhz~1200Mhz** Disable Turbo GT frequency: Enabled/Disabled GT frequency. ► Options: **Disabled**(default) **/ Enabled**

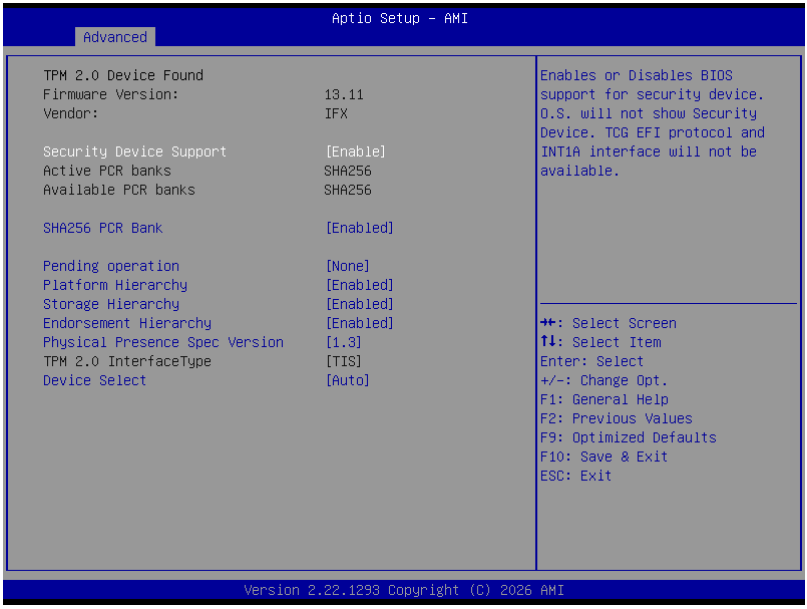
5.2.3. PCH-FW Configuration



The featured settings are:

Setting	Description
AMT BIOS Features	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. ► Options: **Enabled** or **Disabled** (default)
PTT Configuration	TPM Device Selection: PTT or dTPM. PTT: Enables PTT in SkuMgr dTPM: Disables PTT in SkuMgr ► Options: **dTPM** (default) or **PTT**

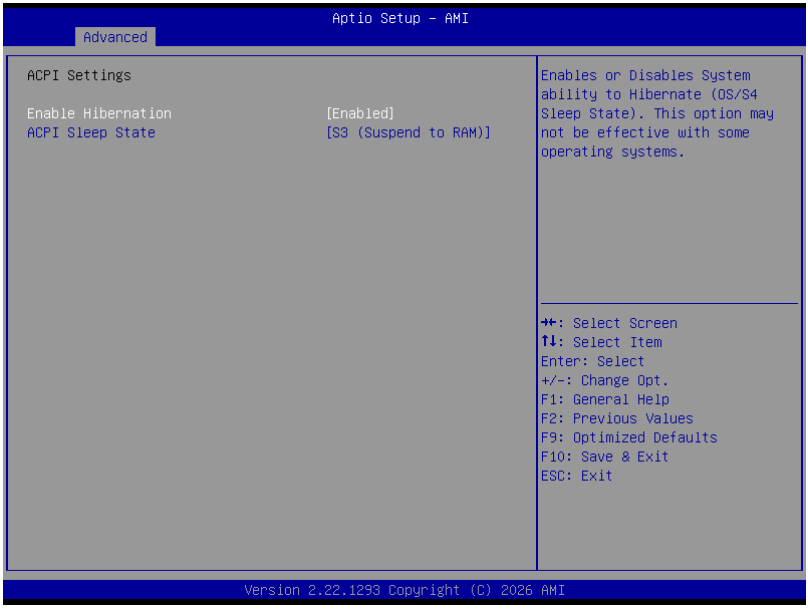
5.2.4. Trusted Computing



The featured settings are:

Setting	Description
Security Device Support	Enables or disables BIOS support for security device. OS will not show Security Device. ► Options: **Enabled** (Default) / **Disabled**
SHA256 PCR Bank	Enables or disables SHA256 PCR Bank. ► Options: **Enabled** (Default) / **Disabled**
Pending operation	Schedule an operation for the security device. ► Options: **None** (Default) / **TPM Clear**
Platform Hierarchy	Enables or disables Platform Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Storage Hierarchy	Enables or disables Storage Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Endorsement Hierarchy	Enables or disables Endorsement Hierarchy. ► Options: **Enabled** (Default) / **Disabled**
Physical Presence Spec Version	This item select to tell O.S. to support PPI Spec Version 1.2 or 1.3. ► Options: **1.3** (Default) / **1.2**
Device Select	TPM 1.2 will restruct support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both the default set to TPM 2.0 devices if not found, TPM1.2 devices will be enumerated. ► Options: **Auto** (Default) / **TPM1.2** / **TPM2.0**

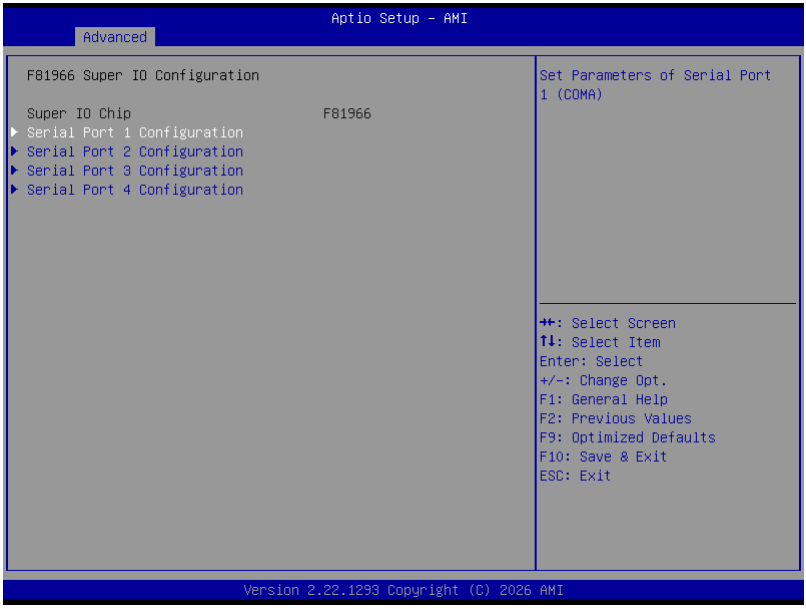
5.2.5. ACPI Settings



The featured settings are:

Setting	Description
Enable Hibernation	**Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some Operating Systems.
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: **Suspend Disabled** and **S3 (Suspend to RAM)** (default)

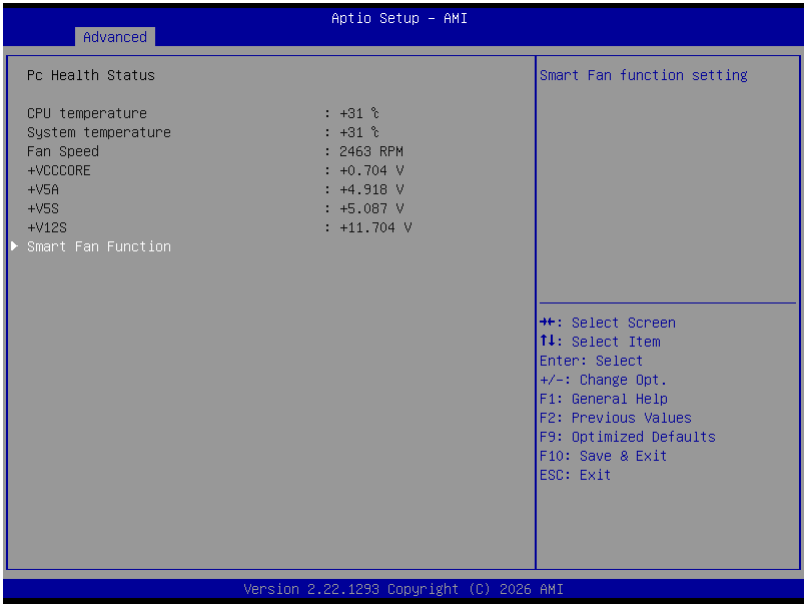
5.2.6. F81966 Super IO Configuration



The featured settings are:

Setting	Description
Serial Port 1 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled , Enabled** (Default) Mode Select: Select RS-232 or RS-422 or RS-485 ► Options: **RS-232** (Default), **RS-422**, **RS-422 Termination Resistor**, **RS-485**, **RS-485 Termination Resistor**
Serial Port 2 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled, Enabled** (Default)
Serial Port 3 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled , Enabled** (Default) Mode Select: Select RS-232 or RS-422 or RS-485 ► Options: **RS-232** (Default), **RS-422**, **RS-422 Termination Resistor**, **RS-485**, **RS-485 Termination Resistor**
Serial Port 4 Configuration	Serial Port: Enable or disable serial port (COM) ► Options: **Disabled, Enabled** (Default)

5.2.7. Hardware Monitor

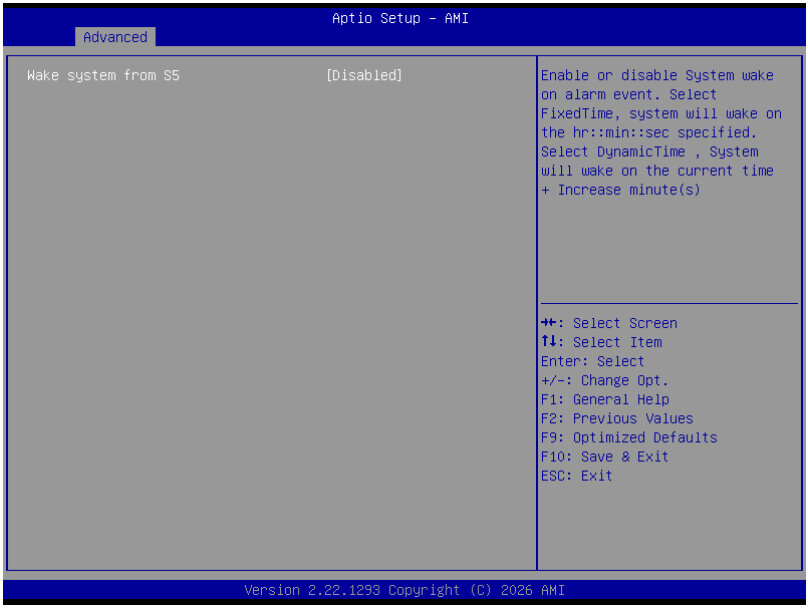


The featured settings are:

Setting	Description
Smart Fan Function	**Smart Fan1 Configuration** FAN_MODE: FAN1 output mode selection. ► Options: **Auto - Duty Cycle** (Default)**, Manual - Duty Cycle** Boundary 1~4 & Speed 1~5 settings.

Note: Smart Fan function only applies to SKUs with smart fan. If your SKU doesn't come with smart fan, ignore these settings.

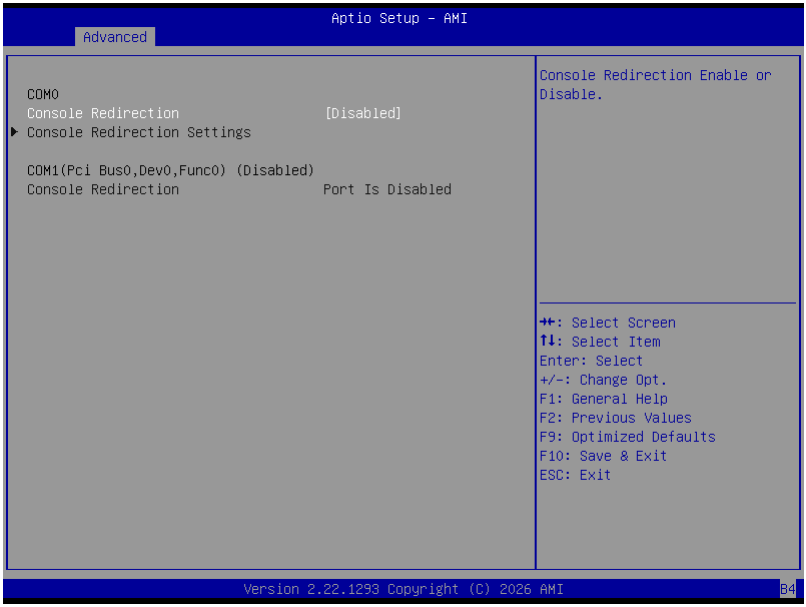
5.2.8. S5 RTC Wake Settings



The featured settings are:

Setting	Description
Wake System from S5	**Enable** or **Disable** (default) system wake on alarm event. ► Options available are: **Disabled** (default) **Fixed Time:** System will wake on the hr::min::sec specified. **DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s).

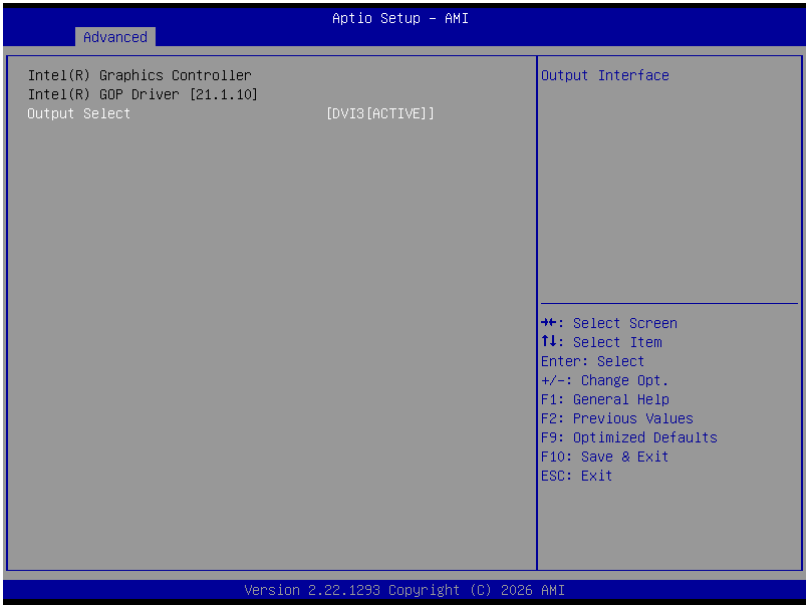
5.2.9. Serial Port Console Redirection



The featured settings are:

Setting	Description
Console Redirection	Use this item to enable or disable Console Redirection. The optional settings: **Enabled** or **Disabled.** When set as **Enabled**, user can make further settings in the following items:
Console Redirection Settings	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

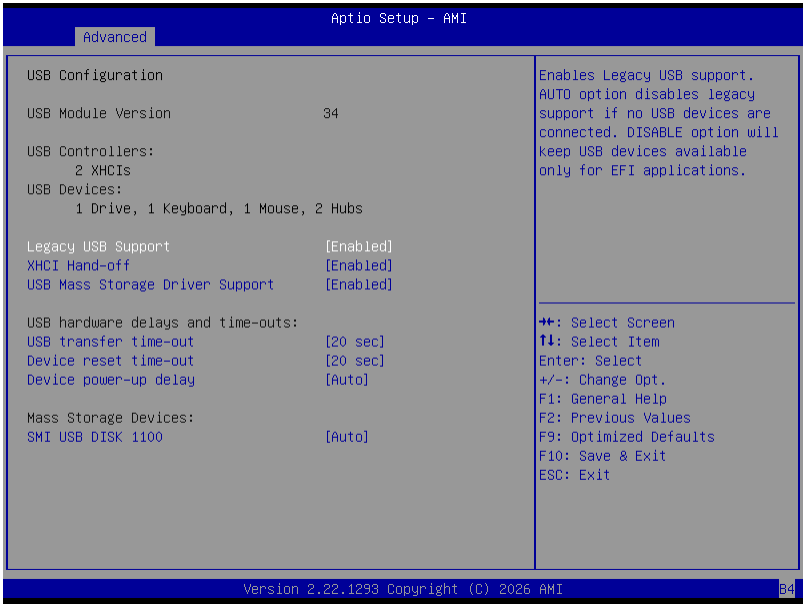
5.2.10. AMI Graphic Output Protocol Policy



The featured settings are:

Setting	Description
Output Select	Output Interface selection.

5.2.11. USB Configuration

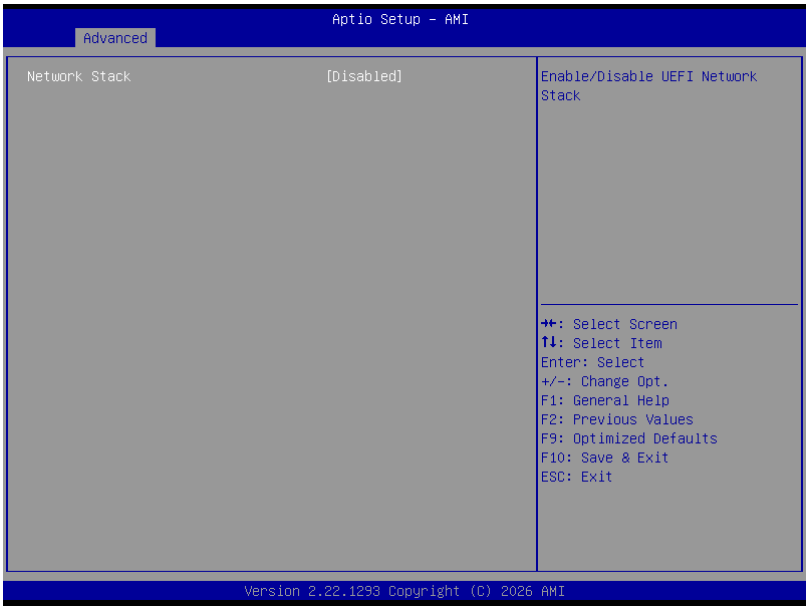


The featured settings are:

Setting	Description
Legacy USB Support	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications. ► The optional settings are: **Enabled** (default) **/ Disabled / Auto**
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. ► The optional settings are: **Enabled** (default) **/ Disabled**
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support. ► The optional settings are: **Enabled** (default) **/ Disabled**
USB transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► Options: **1 sec, 5 sec, 10 sec, 20 sec** (default)

Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ► Options: **10 sec, 20 sec** (default)**, 30 sec, 40 sec**
Device power-up delay	Use this item to set maximum time the device will take before it properly reports itself to the host controller. 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor. ► Options available are: **Auto**: Default **Manual**: Select **Manual** you can set value for the following sub-item: 'Device Power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments.

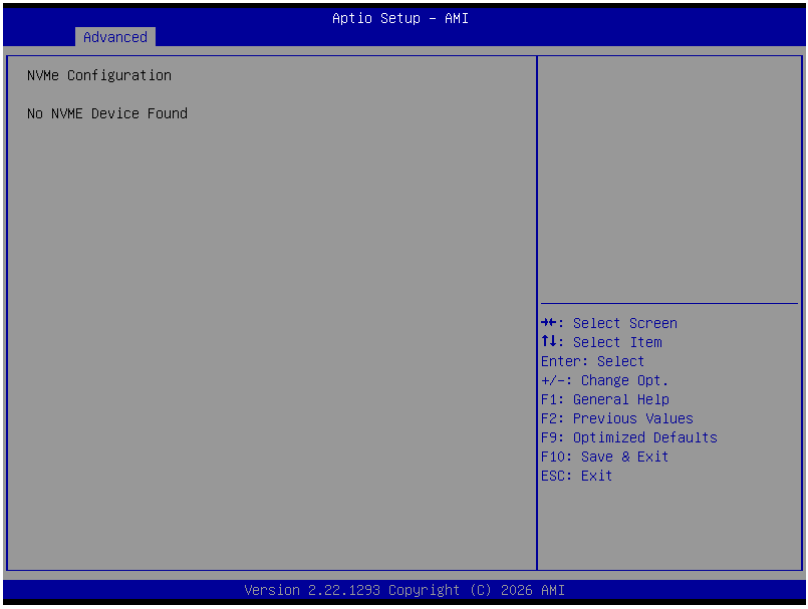
5.2.12. Network Stack Configuration



The featured settings are:

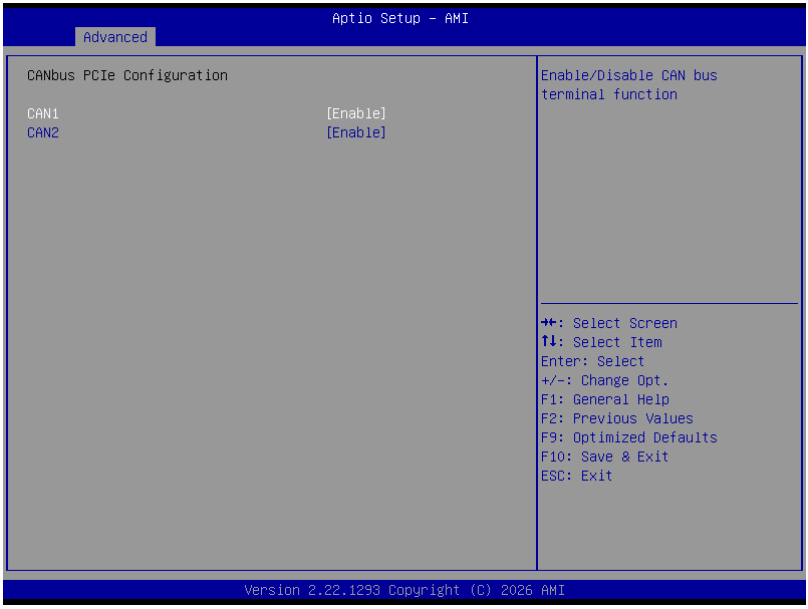
Setting	Description
Network Stack	Enable or Disable (default) UEFI network stack

5.2.13. NVMe Configuration



Access this submenu to view the NVMe controller and driver information.

5.2.14. CANbus PCIe Configuration

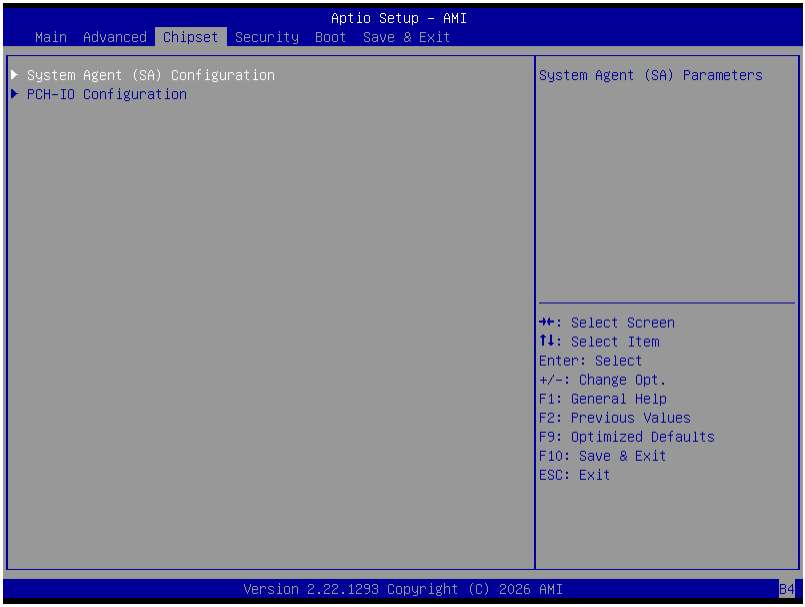


The featured settings are:

Setting	Description
CAN1	Enable/Disable CAN bus terminal function. ► Options: **Disable , Enable** (default)
CAN2	Enable/Disable CAN bus terminal function. ► Options: **Disable , Enable** (default)

Note: This setting is applicable for ARES-1990-CAN model.

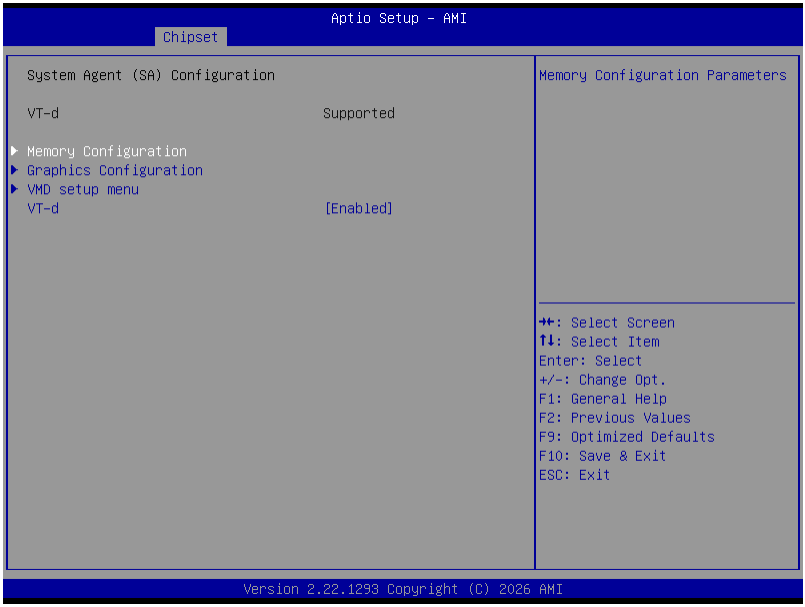
5.3. Chipset



The featured settings are:

Setting	Description
System Agent (SA) Configuration	See 5.3.1. System Agent (SA) Configuration on page 67
PCH-IO Configuration	See 5.3.2. PCH-IO Configuration on page 71

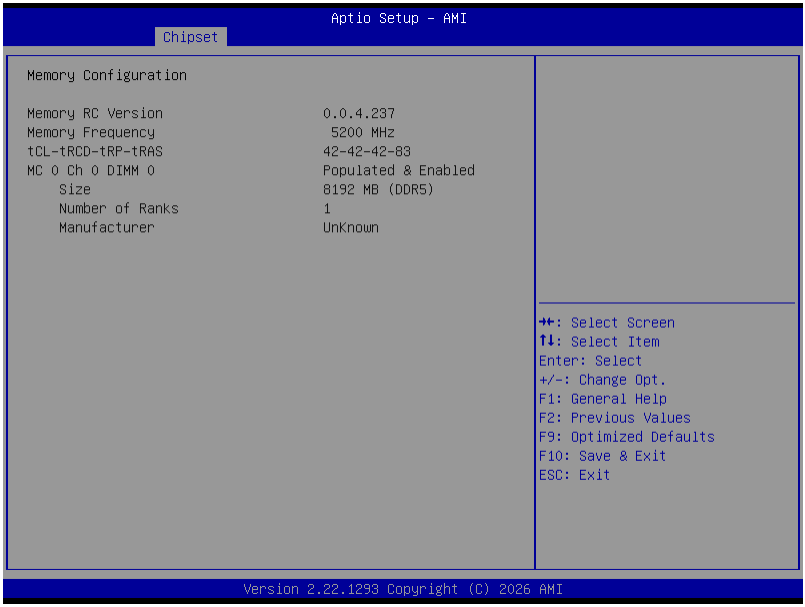
5.3.1. System Agent (SA) Configuration



The featured settings are:

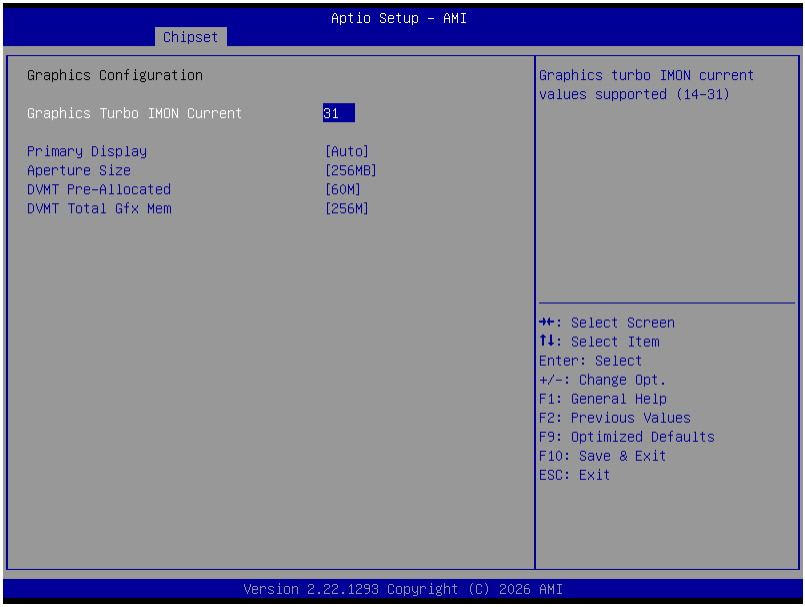
Setting	Description
Memory Configuration	See 5.3.1.1. Memory Configuration on page 68
Graphics Configuration	See 5.3.1.2. Graphics Configuration on page 69
VMD setup menu	See 5.3.1.3. VMD Configuration on page 70
VT-d	Enable/Disable VT-d capability. ► Options: **Disabled, Enabled**

5.3.1.1. Memory Configuration



Access this submenu to view the memory configuration.

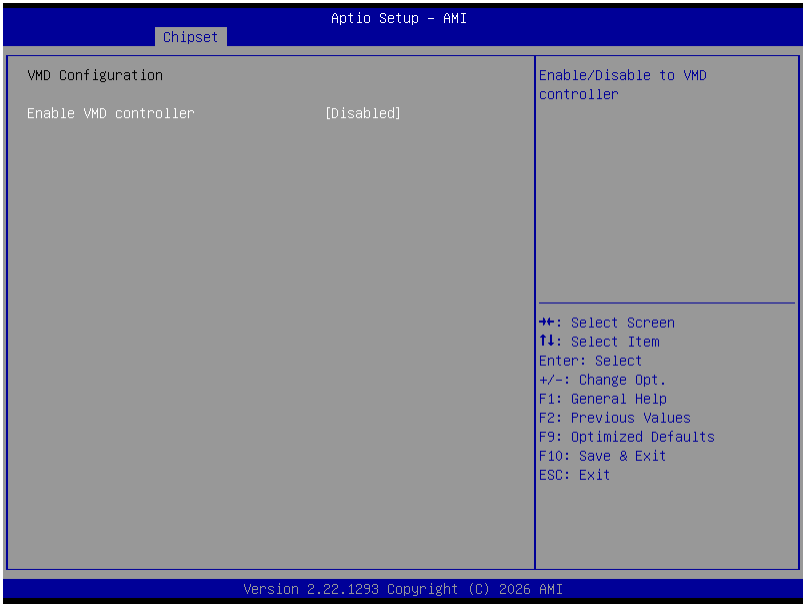
5.3.1.2. Graphics Configuration



The featured settings are:

Setting	Description
Graphics Turbo IMON Current	Graphics turbo IMON Current values supported (14-31)
Primary Display	Select which of IGFX/PEG/PCI Graphics device should be Primary Display or select HG for Hybrid Gfx. ► Options: **Auto** (default)**, IGFX, PEG Slot, PCH PCI** and **HG.**
Aperture Size	Select the Aperture Size. ► Options: **128MB, 256MB, 512MB, 1024MB** Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting > 2048MB aperture. To use this feature, please disable CSM Support.
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphics Memory size used by the Internal Graphic Device. ► Options: **0M, 32M, 64M, 96M, 128M, 160M, 4M, 8M, 12M,16M, 20M, 24M, 28M, 32M/F7, 36M, 40M, 44M, 48M, 52M, 56M, 60M**
DVMT Total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size from 128M to MAX used by the Internal Graphics Device. ► Options: **128M, 256M** (default)**, MAX**

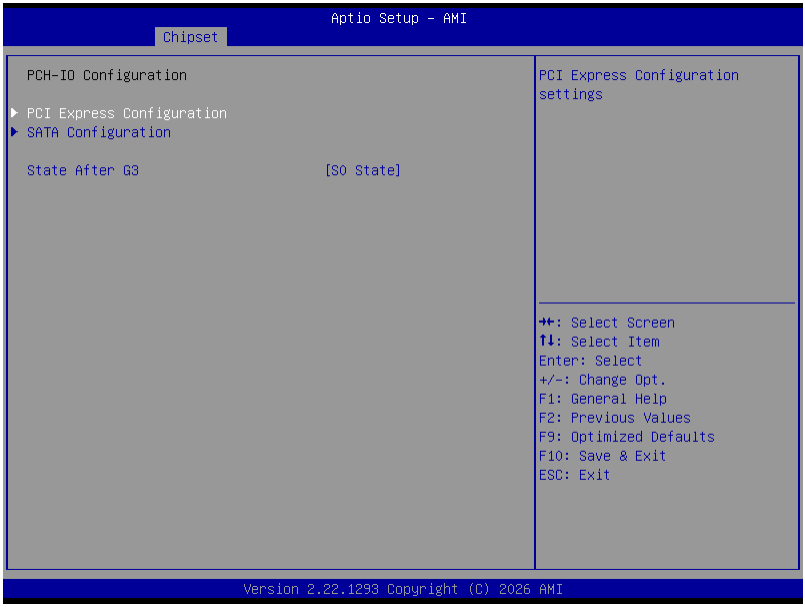
5.3.1.3. VMD Configuration



The featured settings are:

Setting	Description
Enable VMD controller	Enable/Disable to VMD controller. ► Options: **Enabled, Disabled** (default)

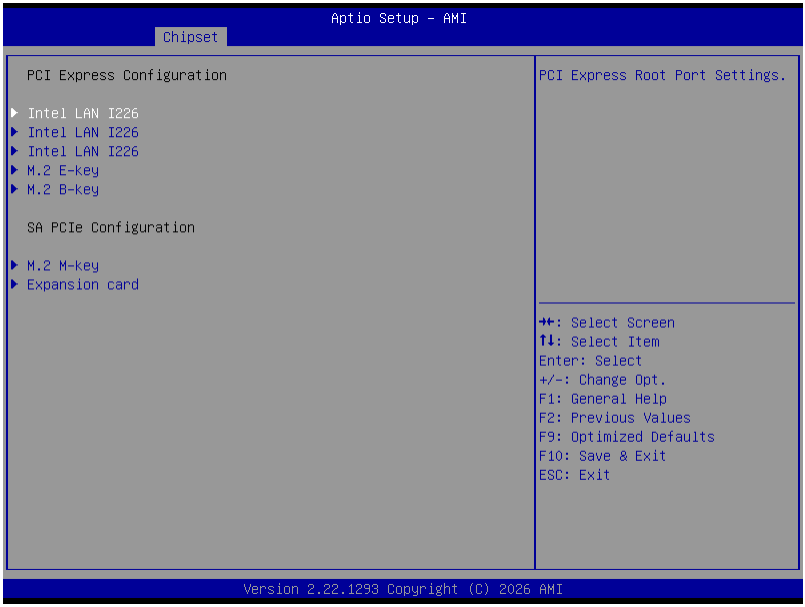
5.3.2. PCH-IO Configuration



The featured settings are:

Setting	Description
PCI Express Configuration	See 5.3.2.1 PCI Express Configuration on page 72
SATA Configuration	See 5.3.2.2. SATA Configuration on page 74
State After G3	Specify what state to go to when power is re-applied after a power failure (G3 state). ► Options: **S0 State** (default), **S5 State** and **Last State**

5.3.2.1 PCI Express Configuration

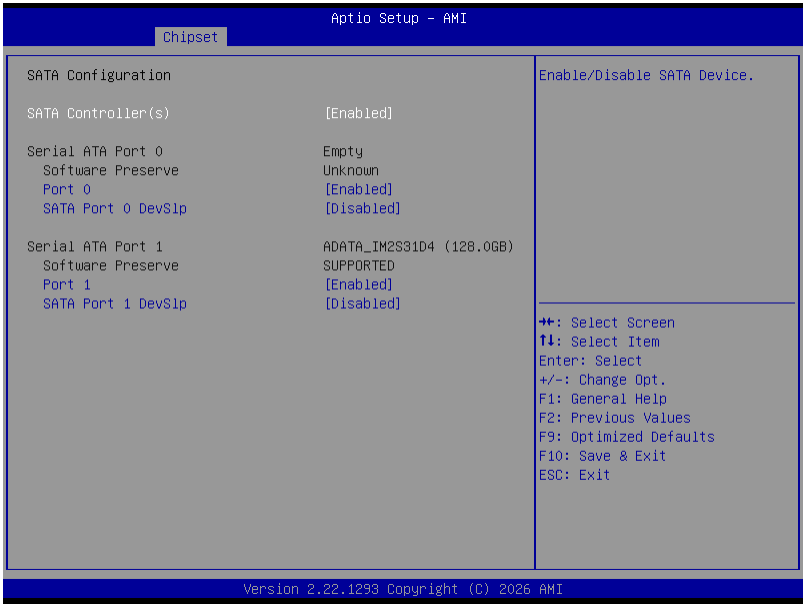


The featured settings are:

Setting	Description
Intel LAN I226	**Intel LAN I226**: Control the PCI Express Root Port. ► Options: **Enabled** (default)**, Disabled** **ASPM**: Set the ASPM level. ► Options: **Disabled** (default)**, L1** and **Auto** **L1 Substates**: PCI Express L1 Substates settings. ► Options: **Disabled** (default)**, L1.1, L1.1 & L1.2** **PCIe Speed**: Configure PCIe Speed. ► Options: **Auto** (default)**, Gen1, Gen2, Gen3**
M.2 E-key	**M.2 E-key**: Control the PCI Express Root Port. ► Options: **Enabled** (default)**, Disabled** **ASPM**: Set the ASPM level. ► Options: **Disabled** (default)**, L1** and **Auto** **L1 Substates**: PCI Express L1 Substates settings. ► Options: **Disabled** (default)**, L1.1, L1.1 & L1.2** **PCIe Speed**: Configure PCIe Speed. ► Options: **Auto** (default)**, Gen1, Gen2, Gen3**

M.2 B-key	**M.2 B-key**: Control the PCI Express Root Port. ► Options: **Enabled** (default)**, Disabled** **ASPM**: Set the ASPM level. ► Options: **Disabled** (default)**, L1** and **Auto** **L1 Substates**: PCI Express L1 Substates settings. ► Options: **Disabled** (default)**, L1.1, L1.1 & L1.2** **PCIe Speed**: Configure PCIe Speed. ► Options: **Auto** (default)**, Gen1, Gen2, Gen3**
M.2 M-key	**M.2 M-key**: Control the PCI Express Root Port. ► Options: **Enabled** (default)**, Disabled** **ASPM**: Set the ASPM level. ► Options: **Disabled** (default)**, L0s, L1** and **L0sL1** **L1 Substates**: PCI Express L1 Substates settings. ► Options: **Disabled** (default)**, L1.1, L1.1 & L1.2** **PCIe Speed**: Configure PCIe Speed. ► Options: **Auto** (default)**, Gen1, Gen2, Gen3, Gen4, Gen5**
Expansion card	**Expansion card**: Control the PCI Express Root port. ► Options: **Enabled** (default)**, Disabled** **ASPM**: Set the ASPM Level. ► Options: **Disabled** (default)**, L0s, L1** and **L0sL1** **PCIe Speed**: Configure PCIe Speed. ► Options: **Auto** (default)**, Gen1, Gen2, Gen3** and **Gen4**

5.3.2.2. SATA Configuration



The featured settings are:

Setting	Description
SATA Controller(s)	Enable or Disable SATA device. ► Options: **Enabled** (default)**, Disabled**
Port 0/1	Enable or Disable SATA Port. ► Options: **Enabled** (default)**, Disabled**
SATA Port 0/1 DevSlp	Enable or Disable SATA Port 0/1 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it. ► Options: **Enabled, Disabled** (default)

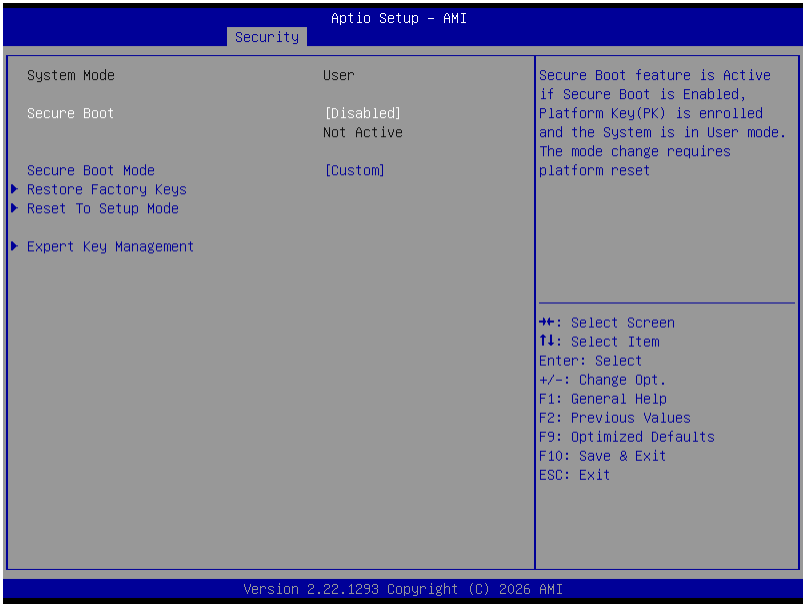
5.4. Security



The featured settings are:

Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. 2. A **Create New Password** dialog then pops up onscreen. 3. Enter your desired password that is no less than 3 characters and no more than 20 characters. 4. Hit [Enter] key to submit.
Disable Sanitize Freeze Lock	If this option is enabled, then sending Sanitize Freeze Lock command to HDDs will be skipped in next boot. ► Options: **Enabled, Disabled** (default)
Secure Boot	See 5.4.1. Secure Boot on page 76.

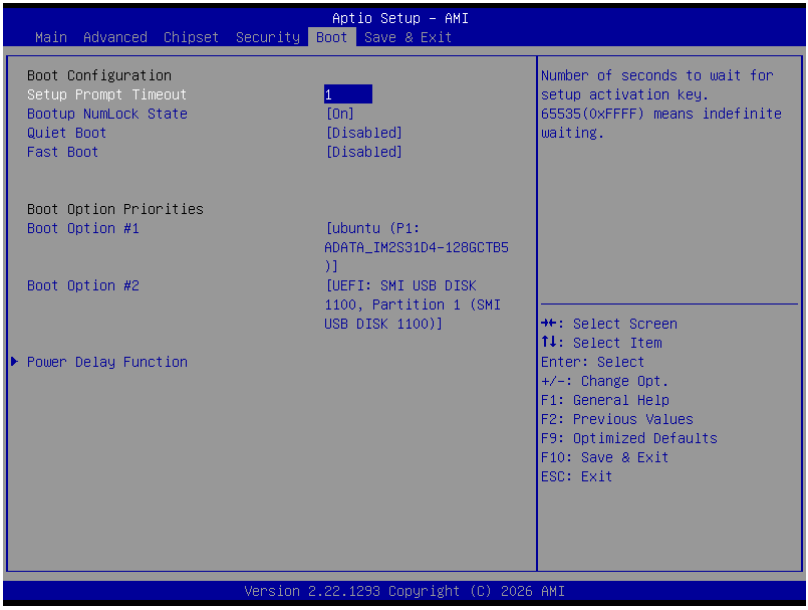
5.4.1. Secure Boot



The featured settings are:

Setting	Description
Secure Boot	**Enable**/**Disable** (default) secure boot.
Secure Boot Mode	Allow users to set the secure boot selector. ► Options: **Standard** (default) /**Custom**
Restore Factory Keys	Force system to restore default secure boot key database.
Reset To Setup Mode	Delete all secure boot key databases.
Expert Key Management	Enables expert users to modify Secure Boot Policy variables without variable authentication.

5.5. Boot

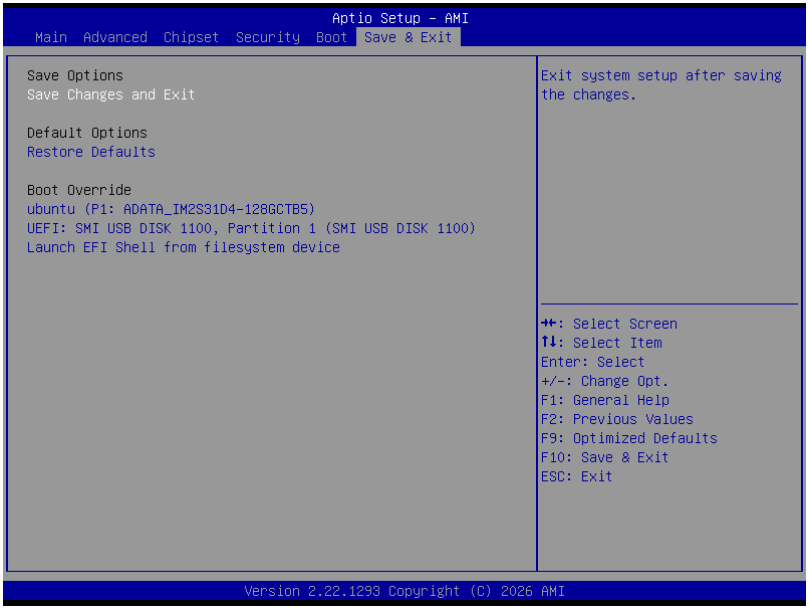


The featured settings are:

Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ► The default setting is **1** (sec). ► Set it to **65535** to wait indefinitely.
Bootup NumLock State	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ► Options available are **On** (default) and **Off**.
Quiet Boot	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ► Select **Disabled** to display the normal POST message, which is the default.
Fast Boot	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options. ► Options available are **Enabled, Disabled** (default).
Boot Option Priority	Set the system boot priorities.

Power Delay Function	**Power Delay Function** Set the system support power delay function. ► Options: **Enabled:** Support power delay function. **Disabled:** Power on/off manually operated. When **Power Delay Function** is set to **Enabled**, below settings are available: **Power on delay** Select the time which the system will power on. ► Options: **Manually Operator** (default), **04 Seconds**, **08 Seconds** and **16 Seconds**. **Power off delay** Select the time which the system will shutdown. ► Options: **Manually Operator** (default), **30 Seconds**, **60 Seconds** and **90 Seconds**.

5.6. Save & Exit



The featured settings are:

Setting	Description
Save Changes and Exit	Saves the changes and quits the BIOS Setup utility.
Restore Defaults	Restores all settings to defaults. ► This is a command to launch an action from the BIOS Setup utility.
Boot Override	**Boot Override** presents a list in context with the boot devices in the system.