USER'S MANUAL

BCO-500-TWL

Semi-Rugged Fanless Mini Computer



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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2026/10/13

Disclaimer

All specifications and information in this User's Manual are believed to be accurate and up to date. Premi Inc. does not guarantee that the contents herein are complete, true, accurate or non-misleading. The information in this document is subject to change without notice and does not represent a commitment on the part of Premio Inc.
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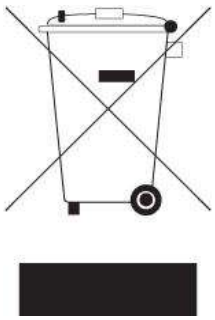
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Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. Please recycle to minimize pollution and ensure environment protection.



Safety Precautions

Before installing and using the equipment, please read the following precautions:

- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- The power outlet shall be installed near the equipment and shall be easily accessible.
- Turn off the system power and disconnect the power cord from its source before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge
- of power could ruin sensitive components. Make sure the equipment is properly grounded.
- When the power is connected, never open the equipment. The equipment should be opened only by qualified service personnel.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Disconnect this equipment from the power before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- Avoid the dusty, humidity and temperature extremes.
- Do not place heavy objects on the equipment.
- If the equipment is not used for long time, disconnect it from the power to avoid being damaged by transient over-voltage.
- The storage temperature shall be above -20°C and below 70°C.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- If one of the following situation arises, get the equipment checked be service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well or it cannot work according the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.

Technical Support and Assistance

1. Visit the Premio Inc website at www.premioinc.com where you can find the latest information about the product.
2. Contact your distributor, our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:
   - Model name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Conventions Used in this Manual



WARNING This indication alerts operators to an operation that, if not strictly observed, may result in severe injury.



CAUTION This indication alerts operators to an operation that, if not strictly observed, may result in safety hazards to personnel or damage to equipment.



NOTE This indication provides additional information to complete a task easily.

Package Contents

Before installation, please ensure all the items listed in the following table are included in the package.

Item	Description	Q'ty
1	**BCO-500-TWL** Series Fanless Mini Computer	1
2	Adapter 60W 12V 5A (selected models only)	1

Available Models

Model No.	Product Description
BCO-500-TWL-P	Semi-Rugged Fanless Mini Computer with Intel® N Series and X7000 processors, 1x DP, 1x HDMI, 3x USB, 1x TYPE C, 2x LAN, w/Power Adapter
BCO-500-TWL	Semi-Rugged Fanless Mini Computer with Intel® N Series and X7000 processors, 1x DP, 1x HDMI, 3x USB, 1x TYPE C, 2x LAN

Optional Accessories

Model No.	Product Description
1-E09A06012	AC-DC Power Adapter 12V 5A 60W/Input 100-240V
1-TPCD00001	Power Cord, 3-pin UK Type, 180cm
1-TPCD00002	Power Cord, European Type, 180cm
1-TPCD00003	Power Cord, Japan Type, 180cm
1-TPCD00005	Power Cord, 3-pin US Type, 180cm
1-TPWR00197	3P Terminal Block_Female(Molding) To DC Plug 5.5x2.5 With Lock L=100mm
3-USB20K01S10	Dual USB 2.0 Cable Module Kit
3-2COM0K02S10	COM Cable Module Kit

Chapter 1

Product Introductions

1.1 Overview

Premio Fanless Mini industrial computer are designed for entry-level applications and basic needs. The BCO series can oversee connected devices and manage the collection, storage, and transmission of sensor data, and is capable of distilling unexplored value in data. It is not only robust and can withstand dust, shock, and vibration, but also can suitable for industrial automation, industrial control, kiosk & retail, and digital signage (without high demand in graphics).



Key Features

- Supports Intel® N-Series Processors
- 1x 262-pin DDR5 4800 MT/s SO-DIMM. Max. 16GB (Non-ECC)
- Dual independent display support via 1x DisplayPort and 1x HDMI
- 2x Intel® I226-V 2.5GbE LAN
- 1x M.2 M-Key, 1x M.2 B-Key, 1x M.2 E-Key
- 2x COM or 2x USB 2.0, 1x USB Type-C, 1x Dual Nano SIM Socket
- 9 to 36VDC wide-range power input supporting AT/ATX mode
- Wide operating temperature: -10°C to 50°C
- TPM 2.0 supported
- CE, FCC Class B, UL, UKCA, ICES

1.2 Hardware Specification

System	
Processor - Standard • Intel® Processor N97, 6MB Cache, up to 3.60 GHz, 4-Core Processor - Project Based • Intel® Processor N150, 6MB Cache, up to 3.60 GHz, 4-Core Processor • Intel® Atom® x7433RE Processor 6M Cache, up to 3.40 GHz, 4 Core Processor	
System Chipset	SoC integrated
LAN Chipset	GbE1: Intel i226V 2.5GbE LAN GbE2: Intel i226V 2.5GbE LAN
Audio Codec	Realtek ALC888
System Memory	1x 262-Pin DDR5 4800 MT/s SO-DIMM. Max. up to 16GB (Non-ECC)
BIOS	AMI uEFI BIOS
Watchdog	Software Programmable Supports 1~255 sec. System Reset
TPM	TPM 2.0

Display	
Display Port	DP 1.4, up to 3840 x 2160 @ 60Hz
HDMI	HDMI 2.1, 3840 x 2160 @ 60Hz
Multiple Display	2x Independent Displays

Storage	
M.2	1x M.2 M Key 2280, 128G NVMe SSD (Default)

Expansion	
M.2	1x B-Key (2242/3042/3052 PCIe/USB3.0 Support LTE/5G, Share with SATA connector) 1x E-Key (2230 PCIe+USB2.0) support WiFi

I/O			
DisplayPort	1x DisplayPort	HDMI	1x HDMI
COM	Configurable Side I/O (Choose One): • COM: 1x RS-232/422/485 + 1x RS-232 • USB: 2x USB 2.0 Type-A	USB	2x USB 3.2 Gen 2 Type A 1x USB 3.2 Gen 1 Type A 1x USB 3.2 Gen 1 Type C
LAN	2x 2.5GbE RJ45	Audio	1x Audio out (Default) 1x Speaker out (Optional), Supports Amp 5W
SIM	1x Dual Nano SIM Slot	DC-in Jack	1x DC IN Power Jack with Lock
Others	6x Antenna Holes, 1x Power button, 1x Gounding Screw		

Operating System	
Windows	Windows 10 / Windows 11 IoT Enterprise LTSC (64-bit)
Linux	Ubuntu 22.04 / 24.04 LTS Linux 5.x / 6.x

Power	
Power Adapter	AC/DC 12V/5A, 60W
Power Mode	AT, ATX (Default ATX)
Power Supply Voltage	9~36VDC
Power Connector	DC in Power Jack with Lock
Power Protection	OVP (Over Voltage Protection) OCP (Over Current Protection) Reverse Protection DC Surge Protection

Environment	
Operating Temp.	-10°C to 50°C
Storage Temp.	-20°C to 70°C
Relative Humidity	10% to 95% (non-condensing)
Certification	CE, FCC Class B, UL61010, UKCA, ICES
Vibration	With SSD: 5 Grms (5 - 500 Hz, 0.5 hr/axis)
Shock	With SSD: 50G half-sin 11ms
ESD	4K / 8K (Option 8K/15K)

Physical	
Construction	Aluminum Alloy
Dimension	225 (W) x 130 (H) x 41 (D) mm
Mounting	Wall Mounting VESA Mount (75mm x 75mm/100mm x 100mm) DIN-Rail Mounting (Optional)

*All specifications and photos are subject to change without notice.

1.3 System I/O

BCO-500-TWL

Front Panel

DC IN
Used to connect a 9–36V DC power supply via the locking DC power jack.

USB port
Used to connect USB device

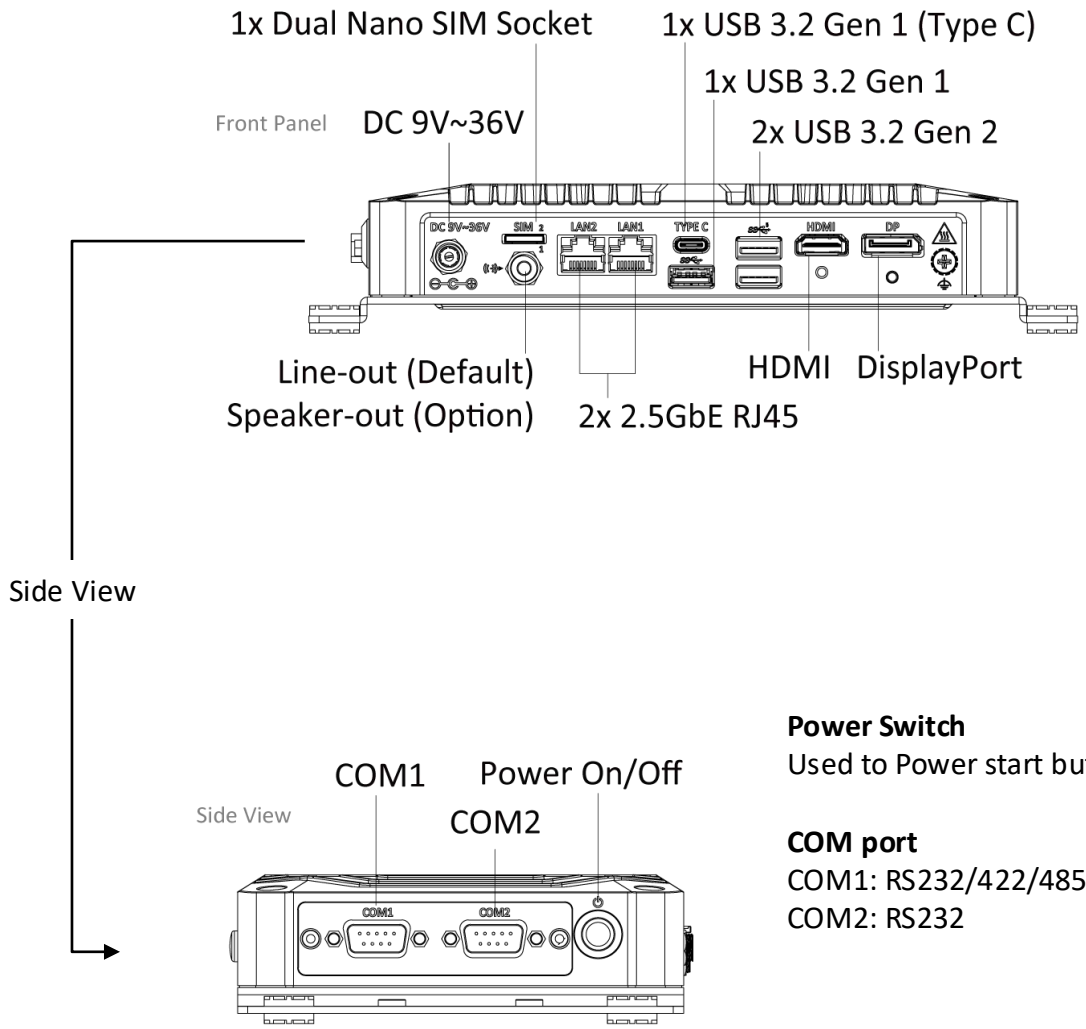
USB Type C
Used to connect USB Type C device

SIM card slot
Used to insert SIM card

DisplayPort
Used to connect a DisplayPort monitor

LAN port
Used to connect the system to a local area network

Line-out
Used to connect a speaker

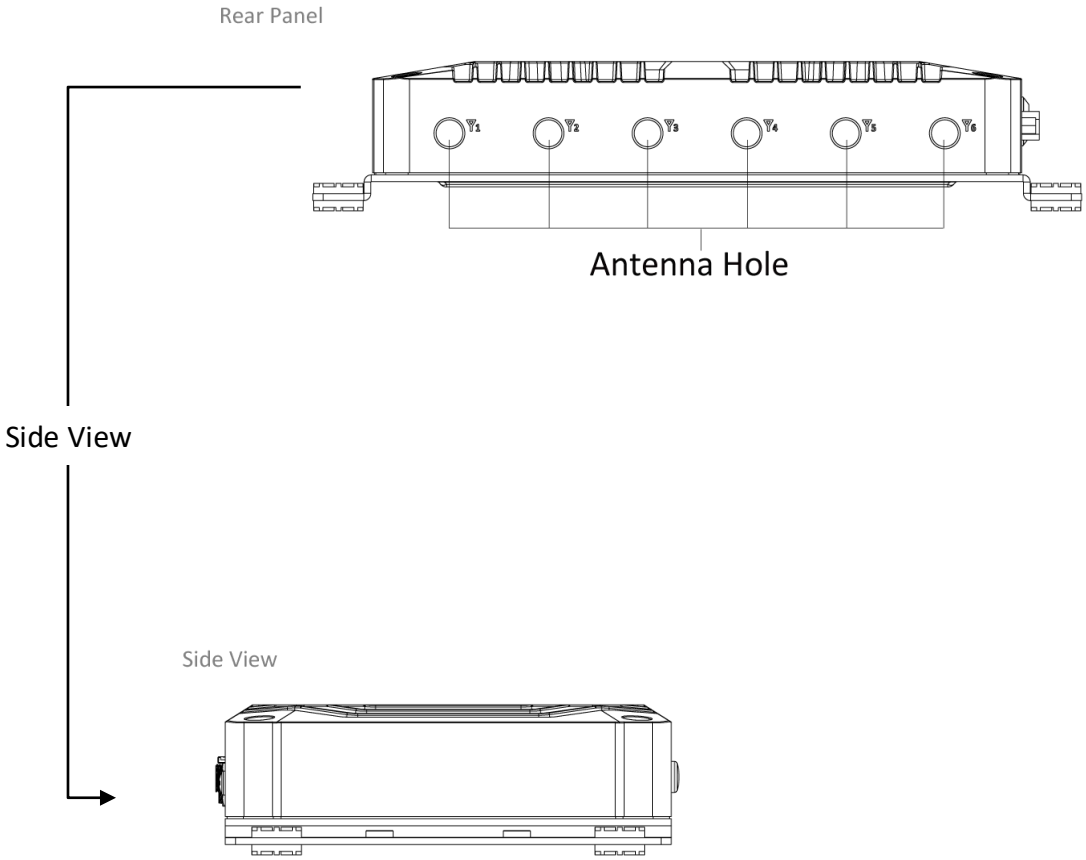


Power Switch
Used to Power start button

COM port
COM1: RS232/422/485
COM2: RS232

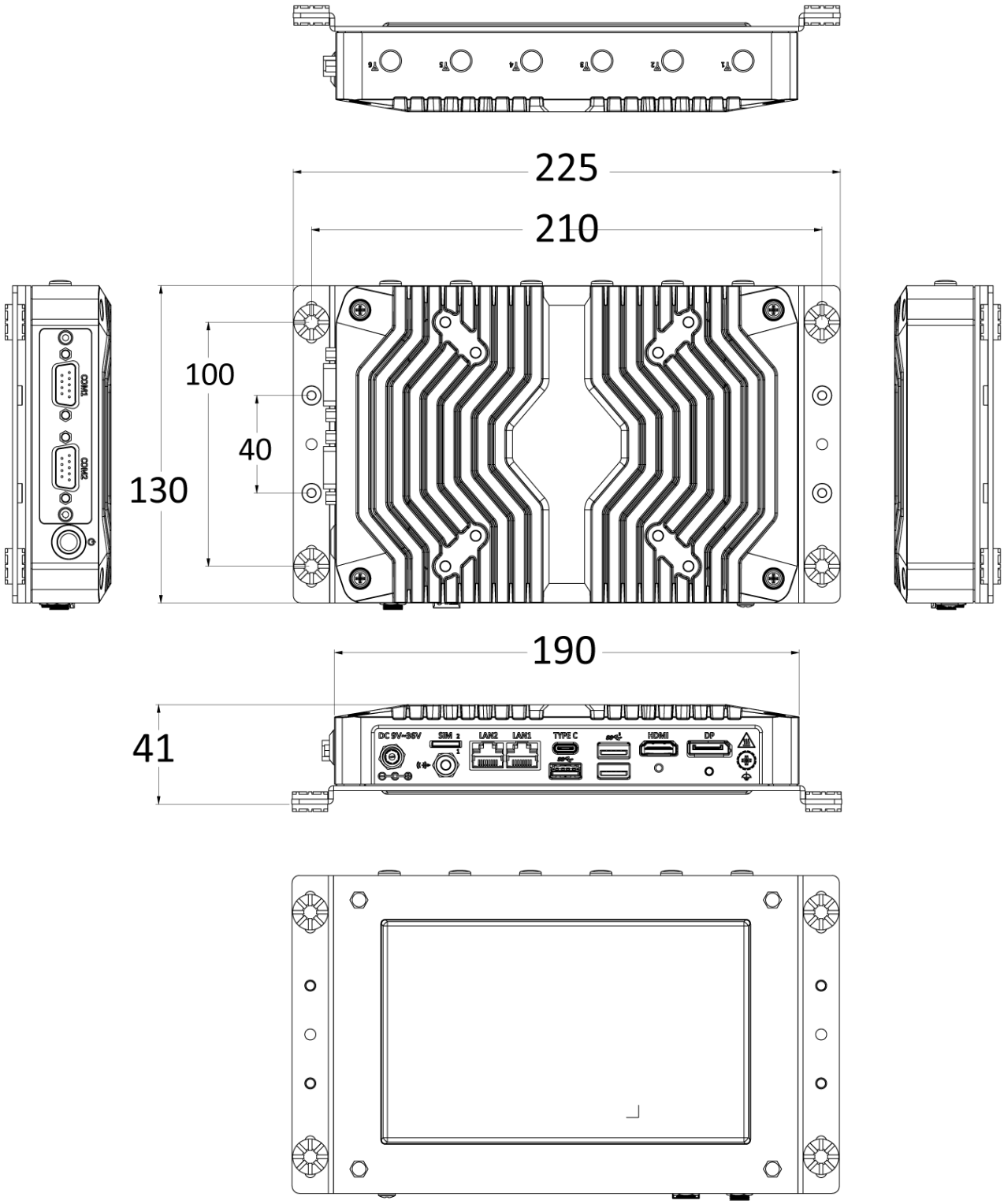
Rear Panel

Antenna hole
Used to connect an antenna for an optional M.2 E-Key Wi-Fi module.



1.4 Mechanical Dimensions

Unit: mm

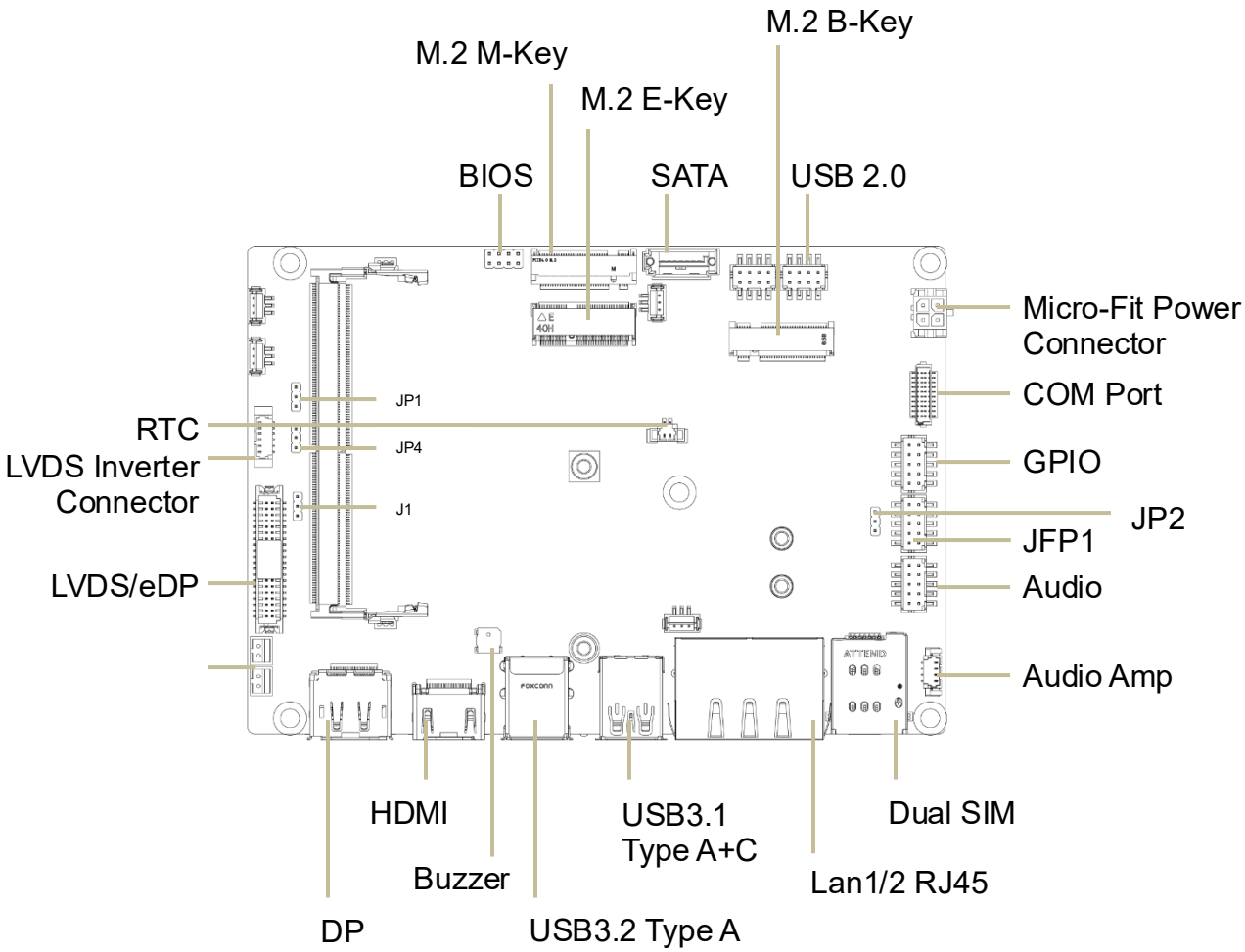


Chapter 2

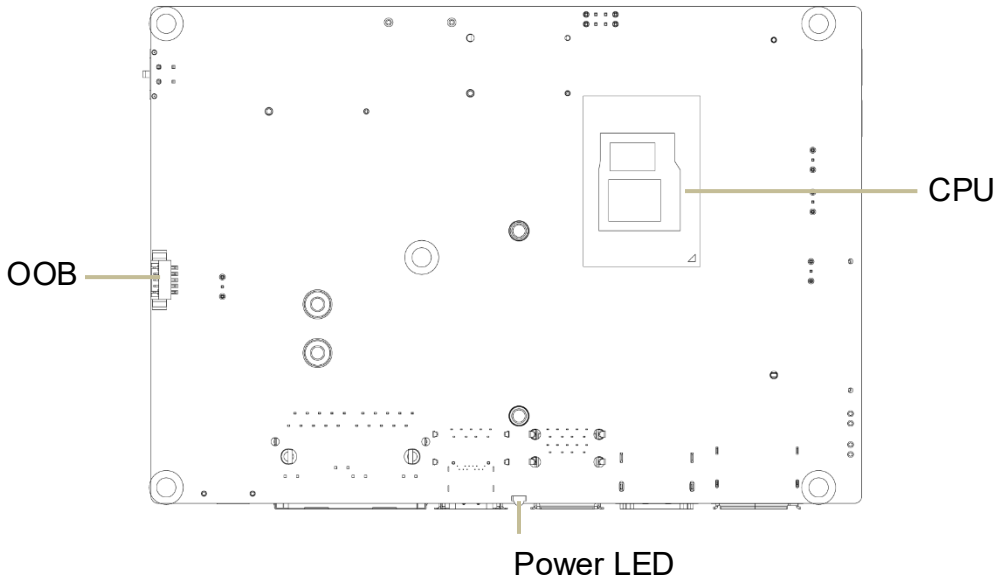
Mechanical Specifications

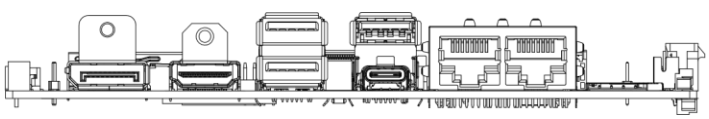
2.1 Switch and Connector Locations

Top View



Bottom view



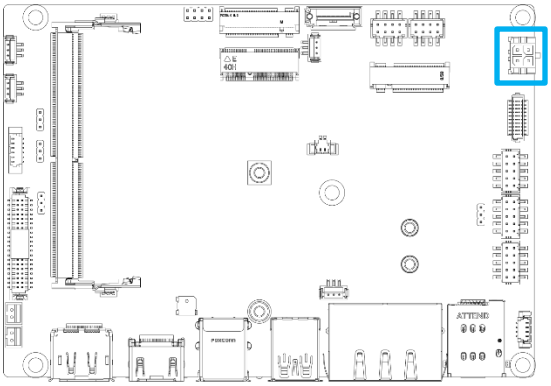


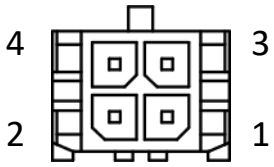
2.2 Connector / Switch Definition

Connector Location	Definition
M.2 B-Key	PCIe x1 SATA+USB3.0+USB2, Support 5G/4G
M.2 E-Key	PCIe+USB2.0, Support WIFI+BLE
LVDS / eDP	LVDS max 1920*1200@60Hz eDP max 4096*2160@60Hz
DDR5 SO-DIMM slot	DDR5 4800 MT/s Non-ECC SO-DIMM
Power LED	LED SMD 2 Color
USB3.2 Type A	USB3.2 Gen2 Type A x2
USB3.1 Type A+C	USB3.1 Gen1 (5 Gbps) Type A+C
Lan1/2 RJ45	Intel I226-V 5GT/s, x1 Lane
HDMI	HDMI 2.1, 3840 x 2160 @ 60Hz
DP	DP 1.4, up to 3840 x 2160 @ 60Hz
Dual SIM	Dual Nano SIM card
M.2 M-Key	PCIe x2 GEN3/SATA Support NVME
FPC	Front Panel Connector
M.2 B-Key Screw	M.2 B-Key Screw x2
M.2 M-Key Screw	M.2 E-Key NUT
LVDS Inverter Connector	LVDS Inverter PWR
Micro-Fit Power Connector	4 Pin Micro-Fit Power Connector
USB 2.0	USB2.0
GPIO	4xGPi+4xGPO, non-isolated 5V
Audio	Wafer, Line-in+Line-out+Mic
Buzzer	Buzzer
RTC	CR2032 Battery
Audio Amp	Wafer L/R Amplifier 5W@4Ω
COM Port	COM Port RS232/RS422/RS485
SATA	SATA Connector x1
SATA Power	Wafer SATA Power Connector
JP1 JP4 J1	JP1 Clear CMOS JP4 Inverter Power 5V/12V J1 LCD Power 3.3V/5V
BIOS	Pin Header eSPI
OOB	Wafer OOB
RT1	NTC Thermistors

2.3 Definition of Connectors

2.3.1 DC 9V/36V Power Input: Micro-Fit, 2*2P, 3.00mm

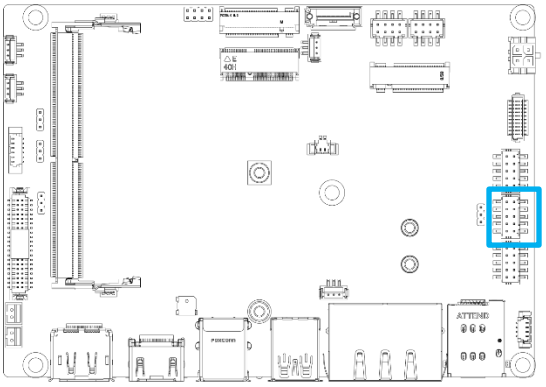




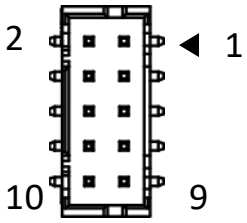
DC Power Input

Pin	Definition	Pin	Definition
1	GND	2	GND
3	DC_IN	4	DC_IN

2.3.2 I/O Front Panel: Wafer, 5x2P,2.00mm

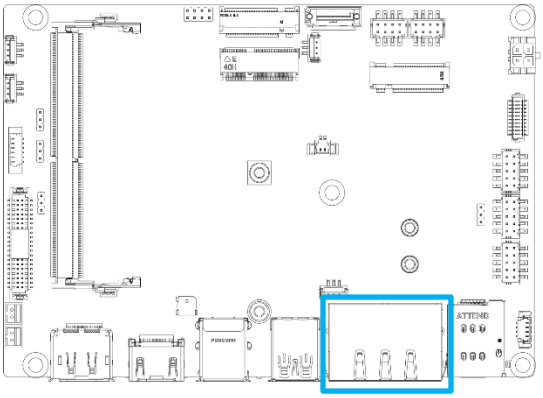


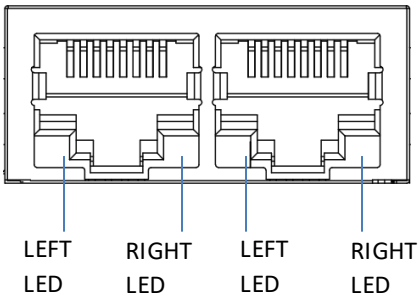
JFP1



Pin	Definition	Pin	Definition
1	N/C	2	N/C
3	RESET_BUT	4	Power On-
5	GND	6	Power On+
7	HDD LED-	8	SUS LED
9	HDD LED	10	Power LED

2.3.3 LAN 2.5GbE (Gigabit Ethernet)





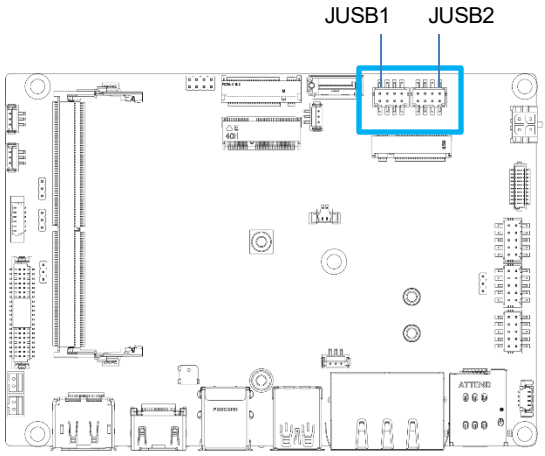
LAN1: RJ45,8P

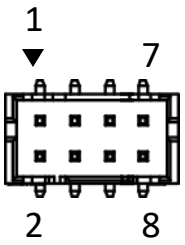
Pin	Definition	Pin	Definition
1	LAN1_MDI0_P	5	LAN1_MDI2_P
2	LAN1_MDI0_N	6	LAN1_MDI2_N
3	LAN1_MDI1_P	7	LAN1_MDI3_P
4	LAN1_MDI1_N	8	LAN1_MDI3_N
Active LED	ACT: Twinkling Yellow	Speed LED	1000M: Turn Orange
	Only LINK: Light On		2.5G: Turn Green
	No LINK: Light Off		10M: Light Off

LAN2: RJ45,8P

Pin	Definition	Pin	Definition
11	LAN1_MDI0_P	15	LAN1_MDI2_P
12	LAN1_MDI0_N	16	LAN1_MDI2_N
13	LAN1_MDI1_P	17	LAN1_MDI3_P
14	LAN1_MDI1_N	18	LAN1_MDI3_N
Active LED	ACT: Twinkling Yellow	Speed LED	1000M: Turn Orange
	Only LINK: Light On		2.5G: Turn Green
	No LINK: Light Off		10M: Light Off

2.3.4 JUSB1/JUSB2: USB2.0 Wafer, 4x2P, 2.00mm





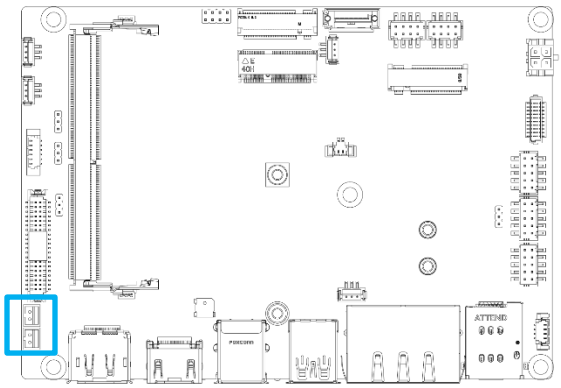
JUSB1

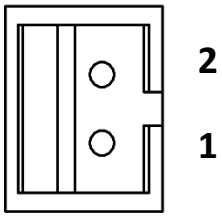
Pin	Definition	Pin	Definition
1	GND	2	N/C
3	USB2+	4	N/C
5	USB2-	6	N/C
7	+5V	8	N/C

JUSB2

Pin	Definition	Pin	Definition
1	**GND**	**2**	**+5V**
3	**USB2+**	**4**	**USB2-**
5	**USB2-**	**6**	**USB2+**
7	**+5V**	**8**	**GND**

2.3.5 CAN





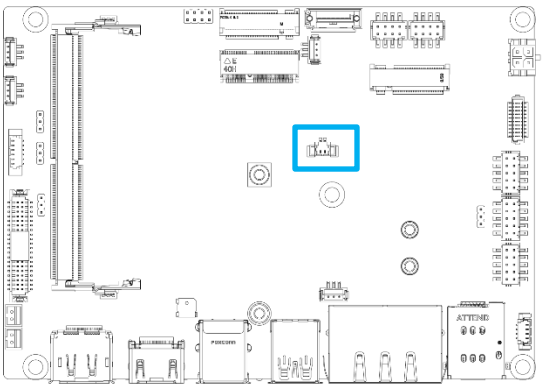
CAN Bus 1

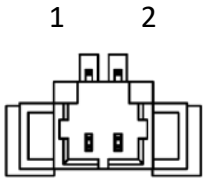
Pin	Signal
1	CAN1_L
2	CAN1_H

CAN1: CAN Bus 1

Pin	Signal
1	CAN2_L
2	CAN2_H

2.3.6 BAT1: Battery socket: Wafer, 2*1P, 1.25mm

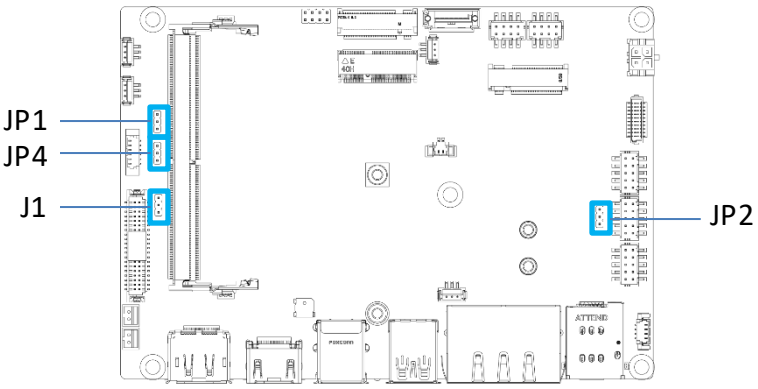




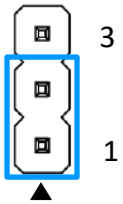
BAT1

Pin	Definition
1	Battery power
2	GND

2.3.7 Jumper

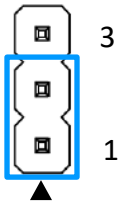


JP1:Clear CMOS, 1*3P, Pitch, 2.00mm



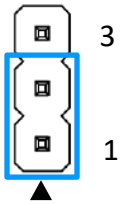
Pin	Definition
1-2	Default*
2-3	Clear CMOS

JP2:AT/ATX, 1*3P, Pitch, 2.00mm



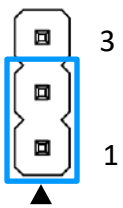
Pin	Definition
1-2	ATX Default*
2-3	AT

JP4: Inverter Power 5V/12V, 1*3P, Pitch, 2.00mm



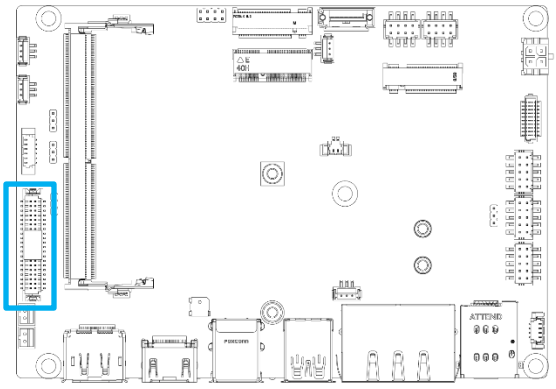
Pin	Definition
1-2	+5V Default
2-3	+12V

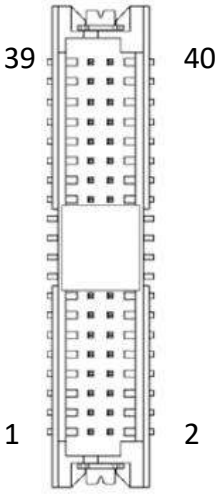
J1 LCD/eDP Power 3.3V/5V, 1*3P, Pitch, 2.00mm



Pin	Definition
1-2	+3.3V Default
2-3	+5V

2.3.8 LVDS/eDP: DF13, 20*2P, 1.25mm

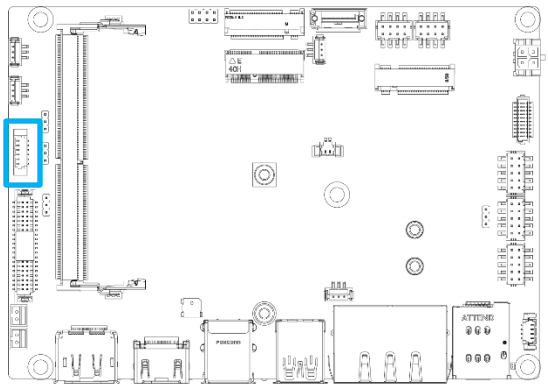


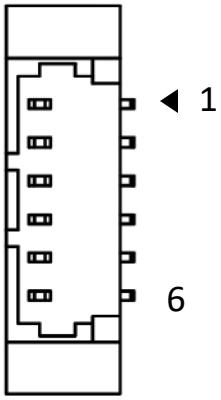


LVDS/eDP

Pin	Definition	Pin	Definition
1	12V	2	12V
3	LCD_VDD	4	12V
5	LCD_VDD	6	LCD_VDD
7	DDC_CLK	8	DDC_DATA
9	L_BKLT_CTRL#	10	LCDEN
11	INV_ON	12	LVDS_DETECT#_C
13	LVDSA_D1P/eDP_1P	14	LVDSA_D0P/eDP_HPD
15	LVDSA_D1N/eDP_1N	16	LVDSA_D0N
17	GND	18	GND
19	LVDSA_D3P	20	LVDSA_D2P/EDP_0P
21	LVDSA_D3N	22	LVDSA_D2N/EDP_0N
23	GND	24	GND
25	LVDSB_1P	26	LVDSB_D0P
27	LVDSB_1N	28	LVDSB_D0N
29	GND	30	GND
31	LVDSB_D3P	32	LVDSB_D2P
33	LVDSB_D3N	34	LVDSB_D2N
35	GND	36	GND
37	LVDSCLKAP/eDPAUXP	38	LVDSCLKBP
39	LVDSCLKAN/eDPAUXN	40	LVDSSCLKBN

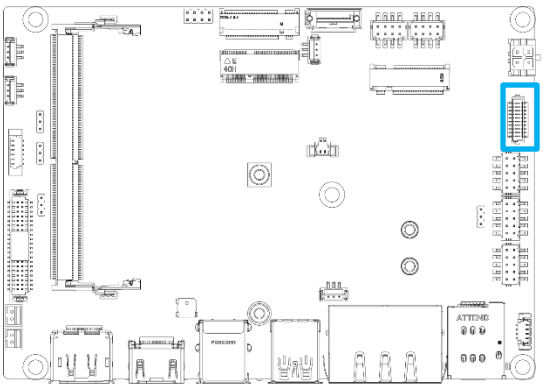
2.3.9 LED Backlight Driver Wafer, 1*6P, 1.25mm

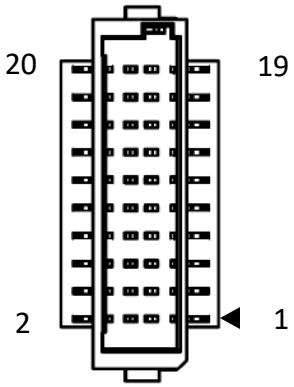




Pin	Definition
1	+5V Default/+12V
2	+5V Default/+12V
3	INV_ON
4	LCD_BKLT_CTRL#
5	GND
6	GND

2.3.10 COM1/2:2X10P Wafer 1.0mm

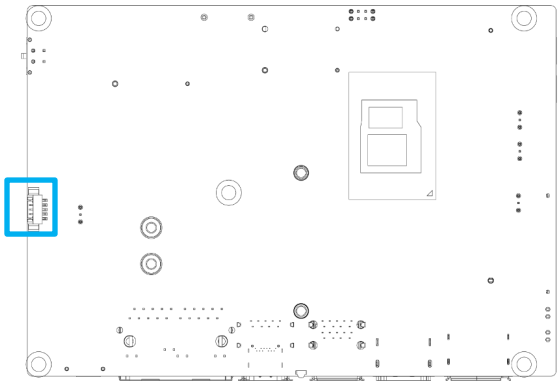


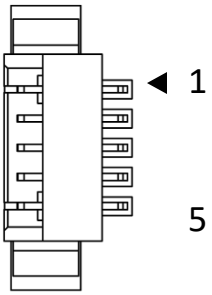


JCOM1/2

Pin	Definition	Pin	Definition
1	COM1_RS232_DCD/ COM1_RS422_TXD-/ COM1_RS485_TXD-	2	COM2_RS232_DCD/ COM2_RS422_TXD-/ COM2_RS485_TXD-
3	COM1_RS232_RXD/ COM1_RS422_TXD+-/ COM1_RS485_TXD+	4	COM2_RS232_RXD/ COM2_RS422_TXD+-/ COM2_RS485_TXD+
5	COM1_RS232_TXD/ COM1_RS422_RXD+	6	COM2_RS232_TXD/ COM2_RS422_RXD+
7	COM1_RS232_DTR/ COM1_RS422_RXD-	8	COM2_RS232_DTR/ COM2_RS422_RXD-
9	GND	10	GND
11	COM1_RS232_DSR	12	COM2_RS232_DSR
13	COM1_RS232_RTS	14	COM2_RS232_RTS
15	COM1_RS232_CTS	16	COM2_RS232_CTS
17	COM1_RS232_RI	18	COM2_RS232_RI
19	N/C	20	N/C

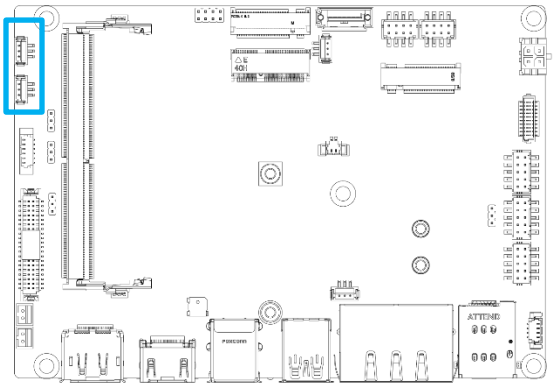
2.3.11 OOB1:1X5 WAFER, 1.25mm

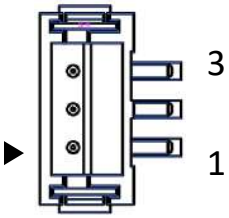




OOB1

Pin	Definition
1	+V5A
2	GND
3	Power on+
4	RESET_BUT_N
5	Power_ON_OFF





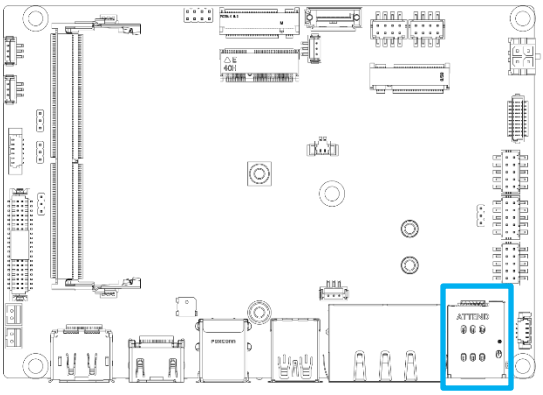
OOB2
For OOB debug, Wafer, 1*3P, 1.5mm

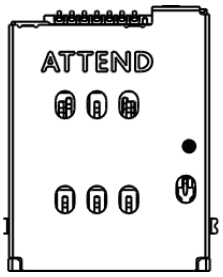
Pin	Definition
1	RX
2	TX
3	GND

OOB3
For Auto Link, Wafer, 1*3P, 1.5mm

Pin	Definition
1	RX
2	TX
3	GND

2.3.12 SIM Support Dual nano SIM card

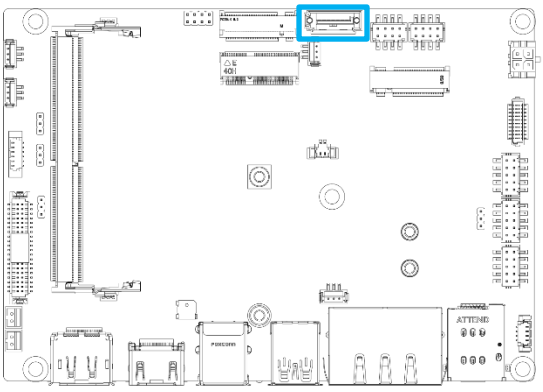


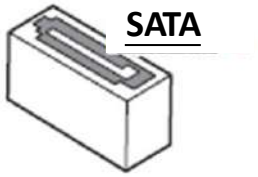


SIM1

Pin	Definition	Pin	Definition
C1	VCC1	C8	VCC2
C2	RST1	C9	RST2
C3	CLK1	C10	CLK2
CD1	CD1	CD2	CD2
C5	GND1	C12	GND2
C6	VPP1	C13	VPP2

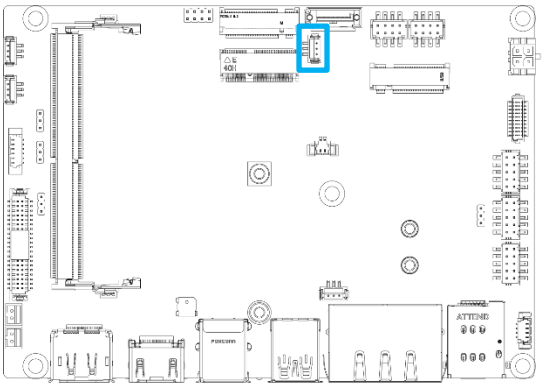
2.3.13 SATA

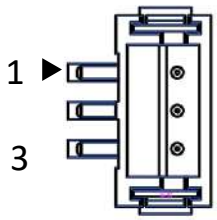




Pin	Definition
S1	GND
S2	SATA_TXP
S3	SATA_TXN
S4	SATAPCIE
S5	SATA_RXN
S6	SATA_RXP
S7	GND

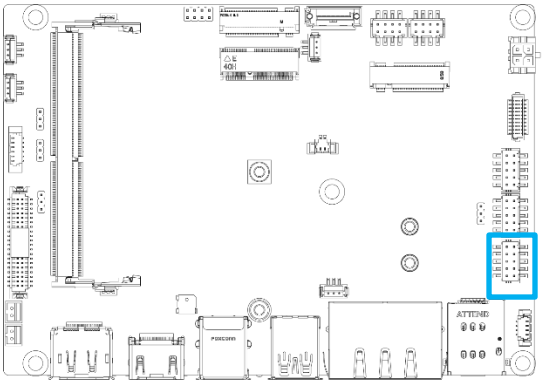
2.3.14 SATA power: Wafer, 1*3P, 1.5mm

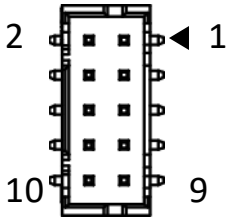




Pin	Definition
1	+5V
2	GND
3	+5V

2.3.15 JAUDIO1: Wafer, 6x2p, 2.00mm

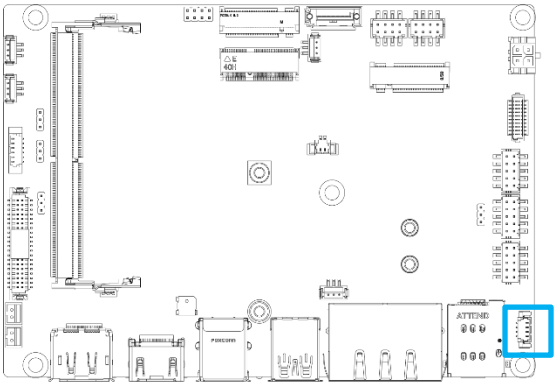


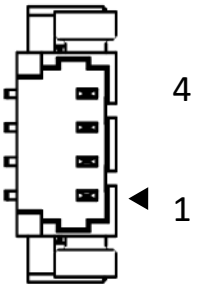


JAUDIO1

Pin	Definition	Pin	Definition
1	LINE_IN_RA	2	MIC1_RA
3	LINE_IN_LA	4	MIC1_LA
5	LOUT_RA	6	MIC1_JD
7	LOUT_LA	8	LINE1_JD
9	FRONT_JD	10	GND

2.3.16 Left+Right Amplifier :Wafer, 4*1P 1.25mm





Pin	Definition
1	L_OUT-_B
2	L_OUT+_B
3	R_OUT-_B
4	R_OUT+_B

Chapter 3

System Setup

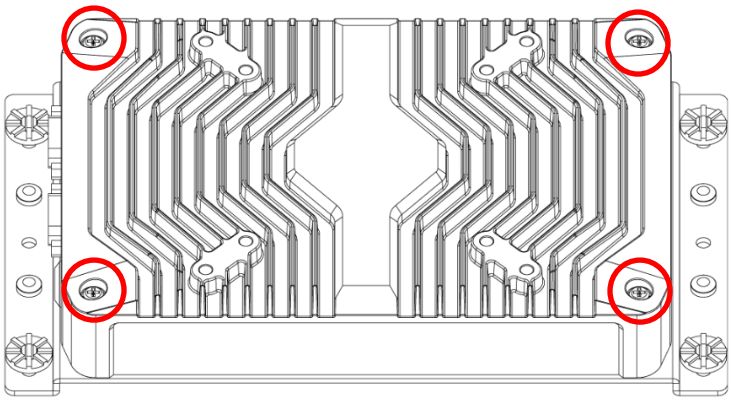
Set torque force to 3.5 kgf-cm to execute all the screwing and unscrewing.

3.1 Removing the chassis bottom cover

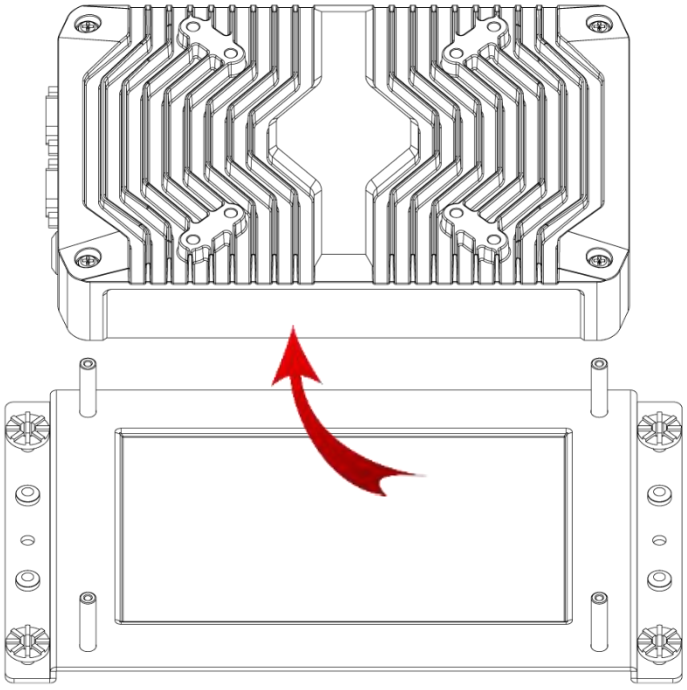
WARNING

In order to prevent electric shock or system damage, before removing the chassis cover, must turn off power and disconnect the unit from power source.

1. Use a screwdriver to remove the four screws securing the back cover.

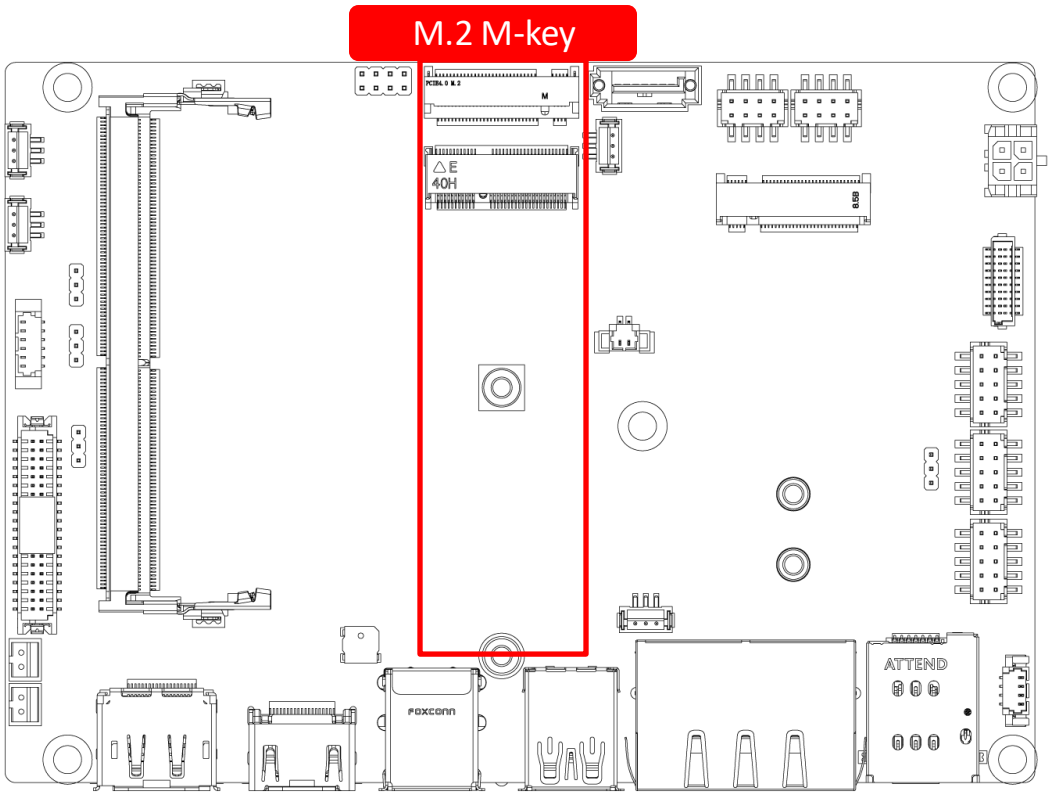


2. Remove the screws, then separate the main unit from top to bottom.



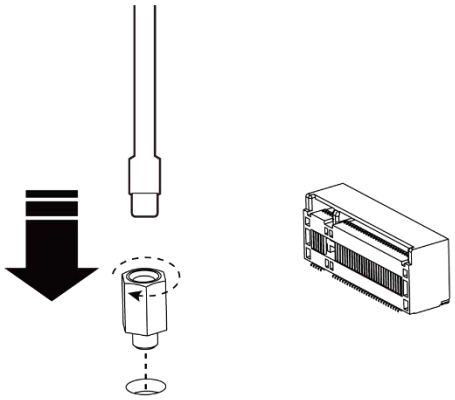
3.2 Install M.2 M-key Socket

The M.2 M-key slot supports NVMe SSD, as highlighted in the picture below.

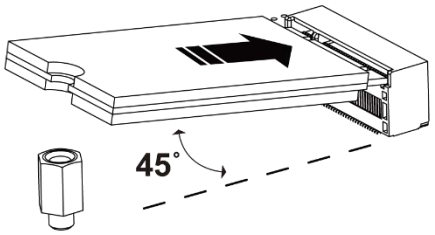


Install M.2 M-key NVMe SSD Step by Step

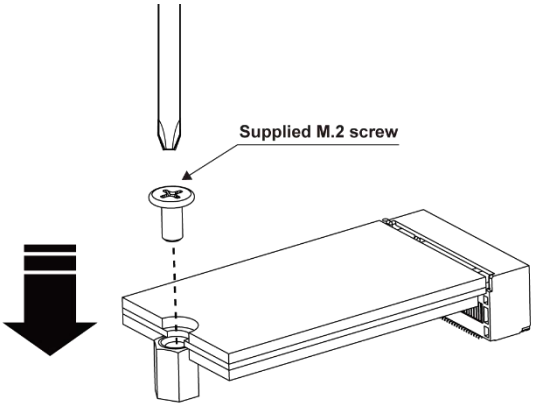
1. Assemble the copper stud



2. Insert the NVMe SSD at a 45-degree angle into the M.2 M-Key slot.

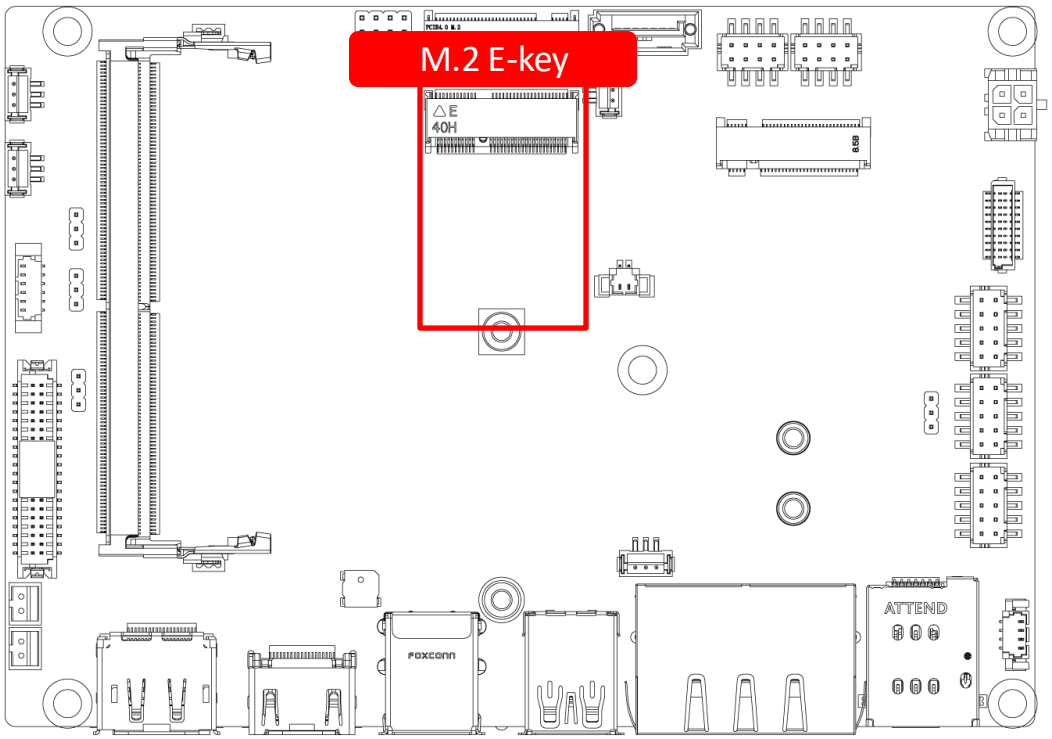


3. Press the NVMe SSD down and secure it with one screw.

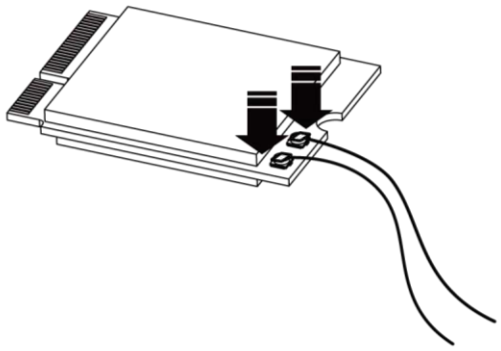


3.3 Install wireless network card and antenna

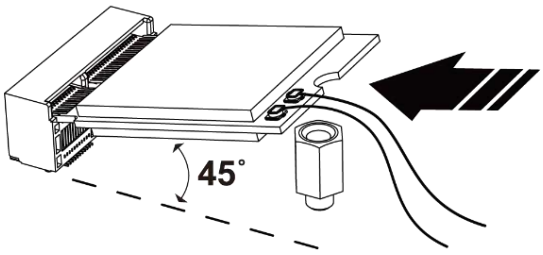
1. The M.2 E-key supports Wi-Fi module, as highlighted in the picture below.



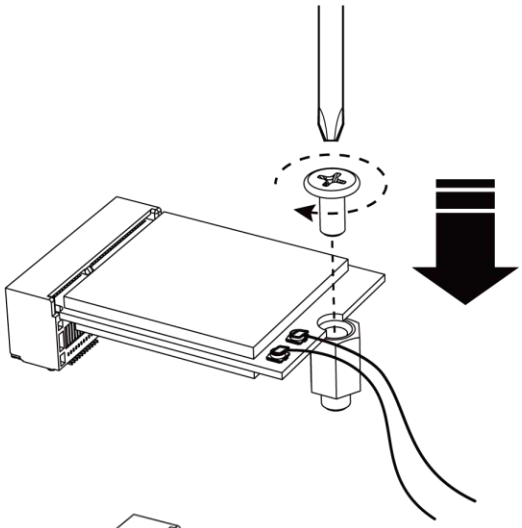
2. Connect the SMA cables to the Wi-Fi module.

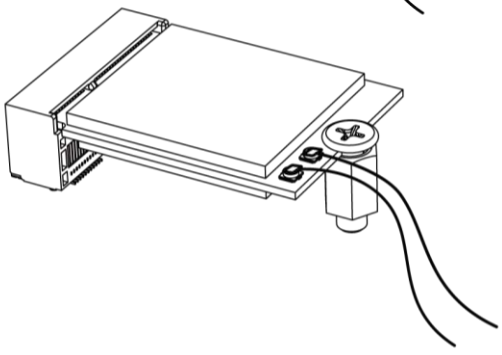


3. Insert the Wi-Fi module at a 45-degree angle.

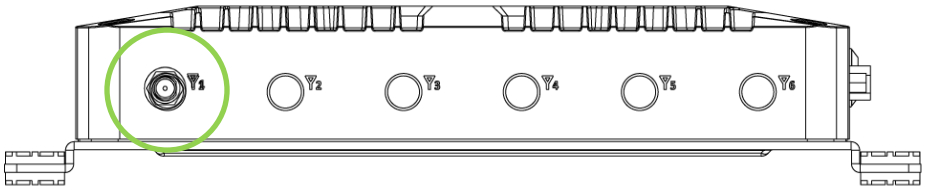


4. Press the Wi-Fi module down and secure it with one screw.

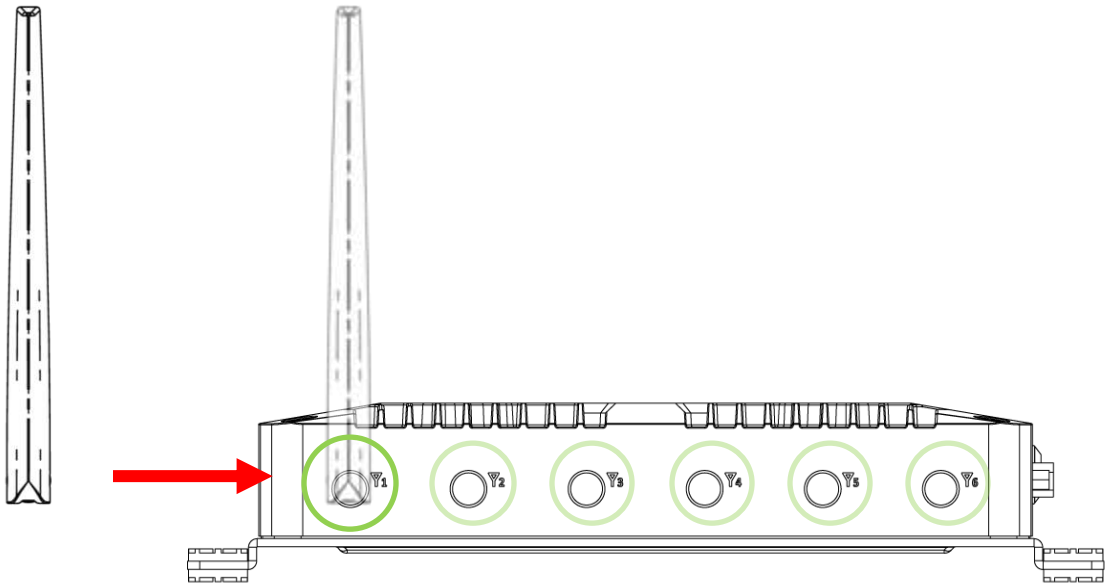




5. Ensure the internal antenna is securely connected to the network card, and the antenna interface is properly installed in the designated opening on the chassis cover.

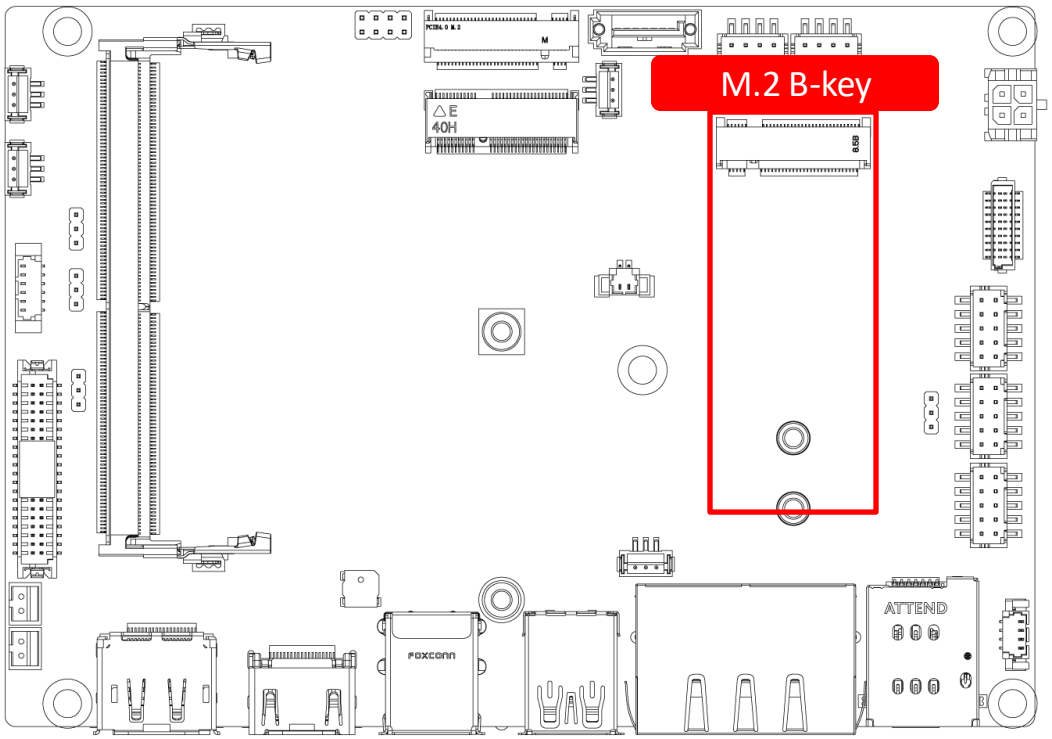


6. Attach the external antenna to the SMA jack by securely threading them together.

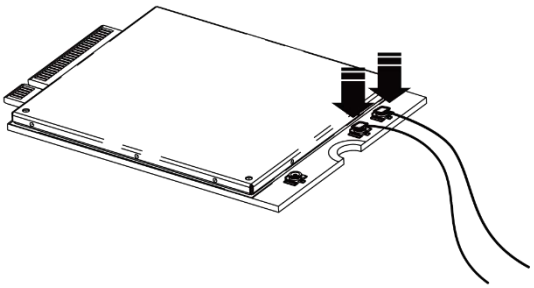


3.4 Install Communication Module and Antenna

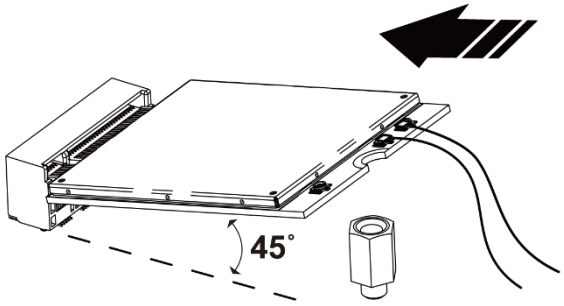
1. The M.2 B-key supports communication (4G/5G) module, as highlighted in the picture below.



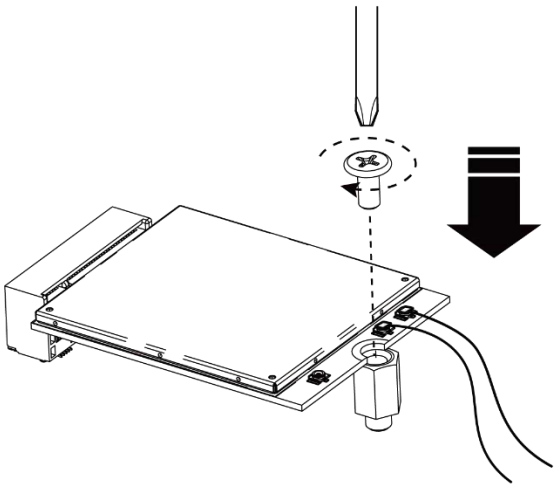
2. Connect the SMA cables to the communication (4G/LTE) module.

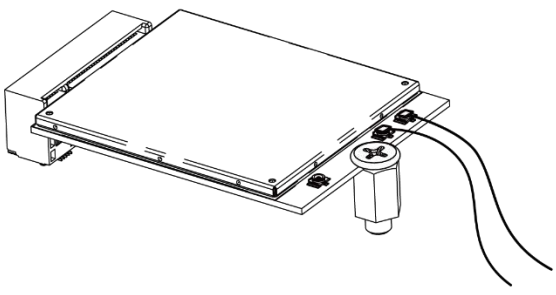


3. Insert the communication (4G/5G) module at a 45-degree angle.

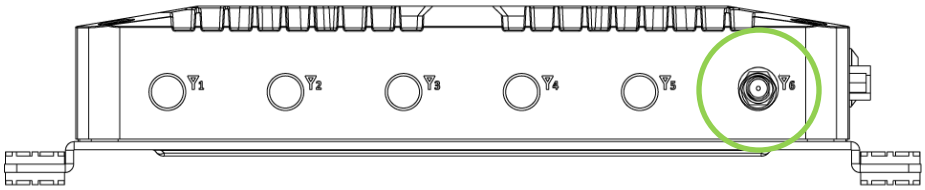


4. Press the communication module down and secure it with one screw.

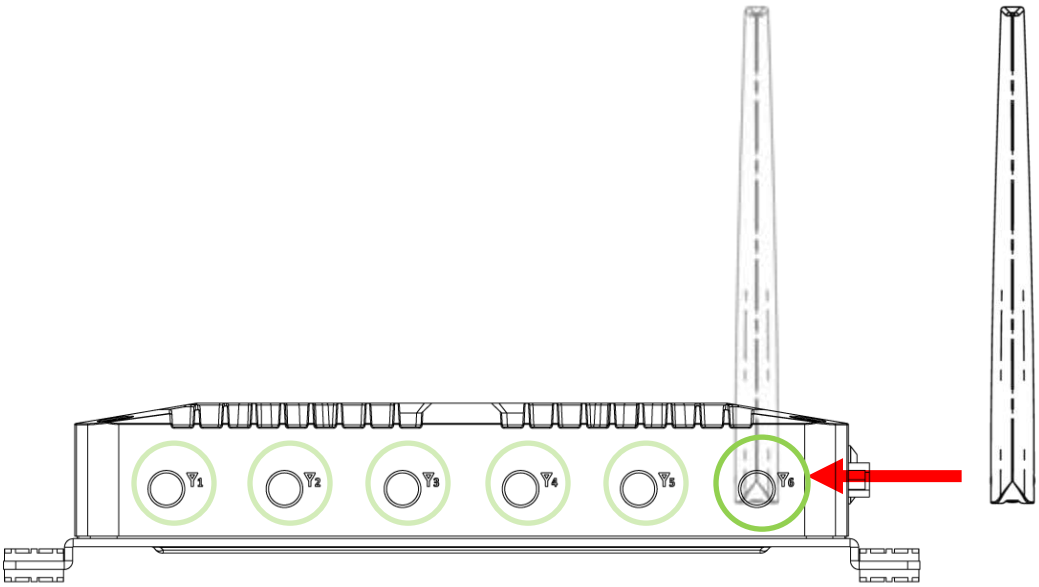




5. Ensure the internal antenna is securely connected to the network card, and the antenna interface is properly installed in the designated opening on the chassis cover.

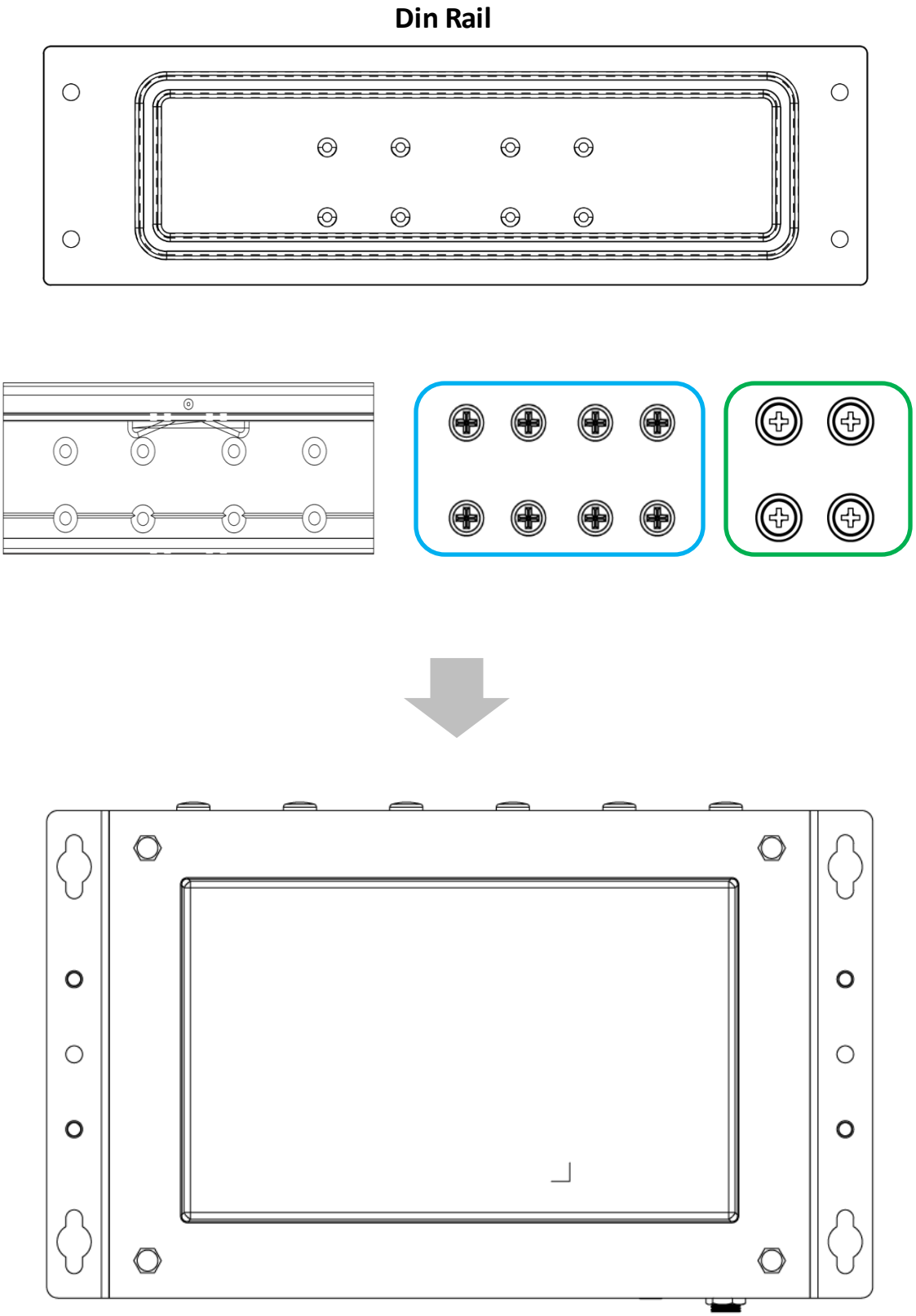


6. Attach the external antenna to the SMA jack by securely threading them together.

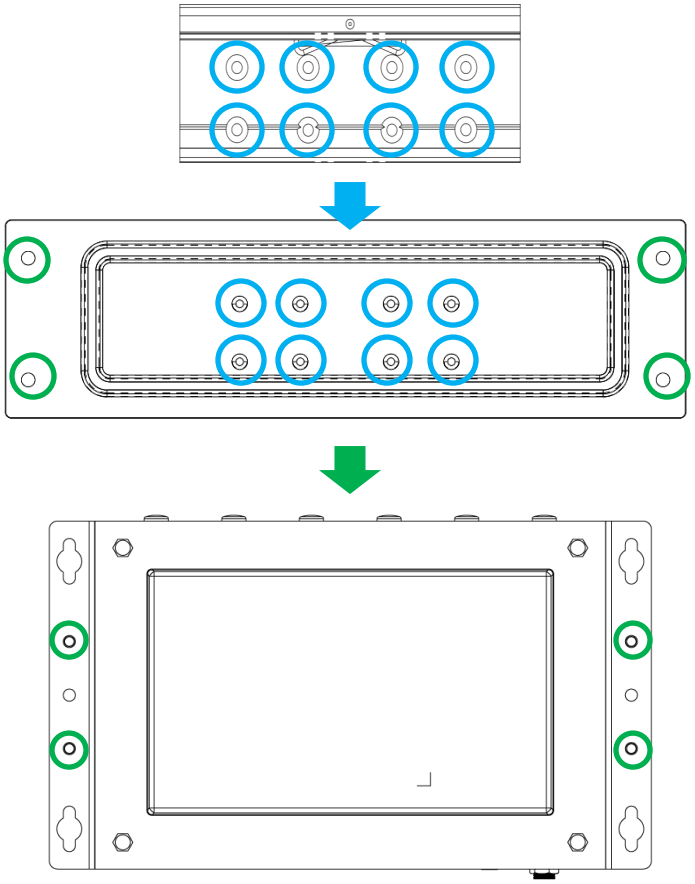


3.5 Installing DIN rail holder

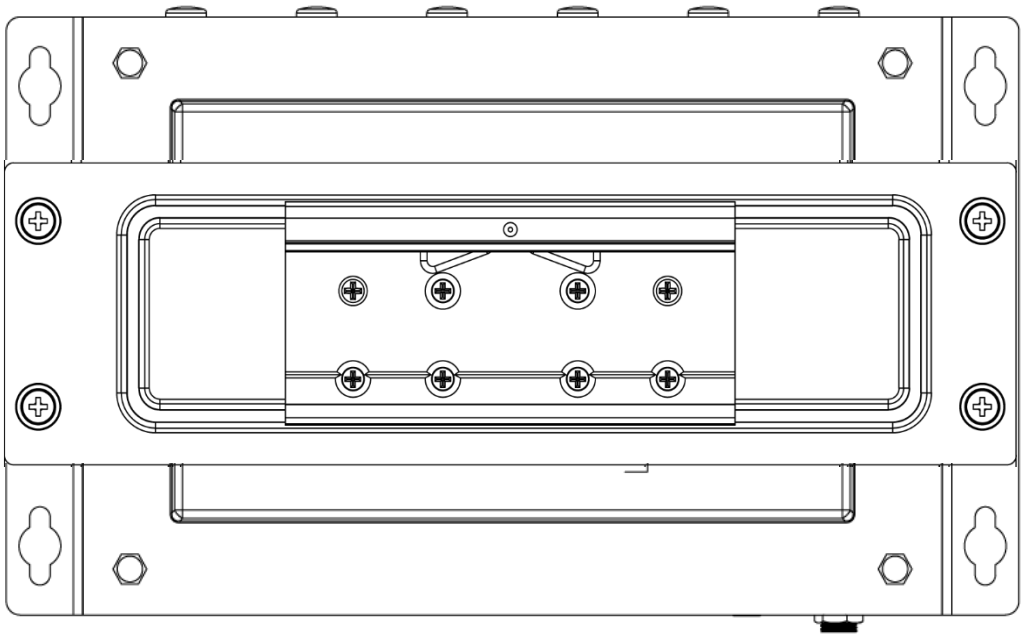
1. Din Rail holder is available for BCO-500 series.



2. Place Din rail holder on the back of computer and secure it with four screws.



Complete the schematic diagram as shown.



Chapter 4

System BIOS

4.1 BIOS Introduction

The BIOS provides an interface to modify the configuration. When the battery is removed, all the parameters will be reset.

BIOS Setup

Power on the embedded system and by pressing <Del> immediately allows you to enter the setup screens. If the message disappears before you respond and you still wish to enter the Setup, restart the system by turning it OFF and ON or pressing the RESET button.
You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Control Keys	
<→> <←>	Select Screen
<↑> <↓>	Select Item
<Enter>	Select
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<F1>	General Help
<F2>	Previous Value
<F3>	Load Optimized Defaults
<F4>	Save Configuration and Exit
<Tab>	Select Setup Fields
<Esc>	Exit BIOS Setup

Main Setup

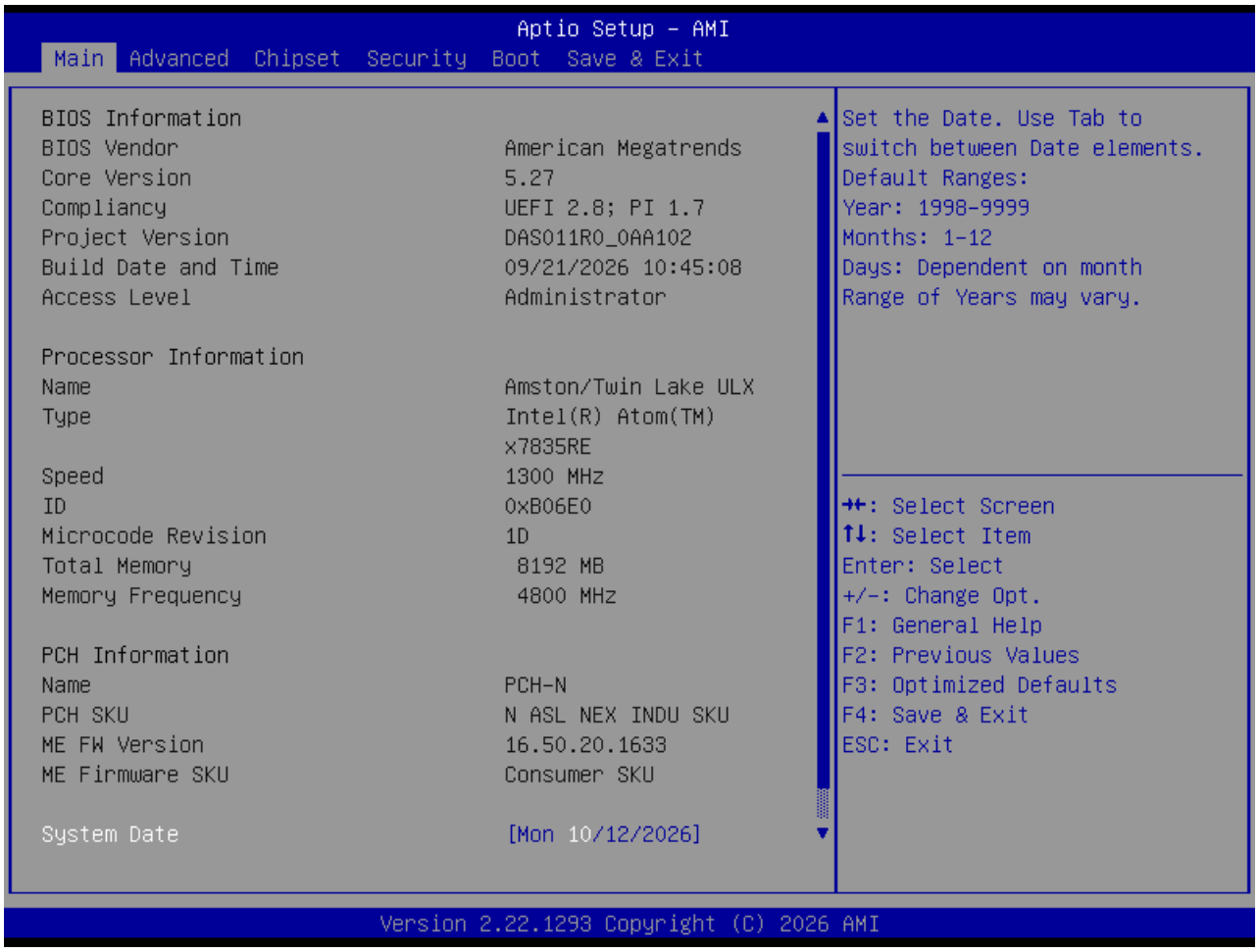
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

4.2 Main Setup

Press <Del> to enter BIOS CMOS Setup Utility. The Main setup screen is showed as following when the setup utility is entered. System Date/Time is set up in the Main Menu.



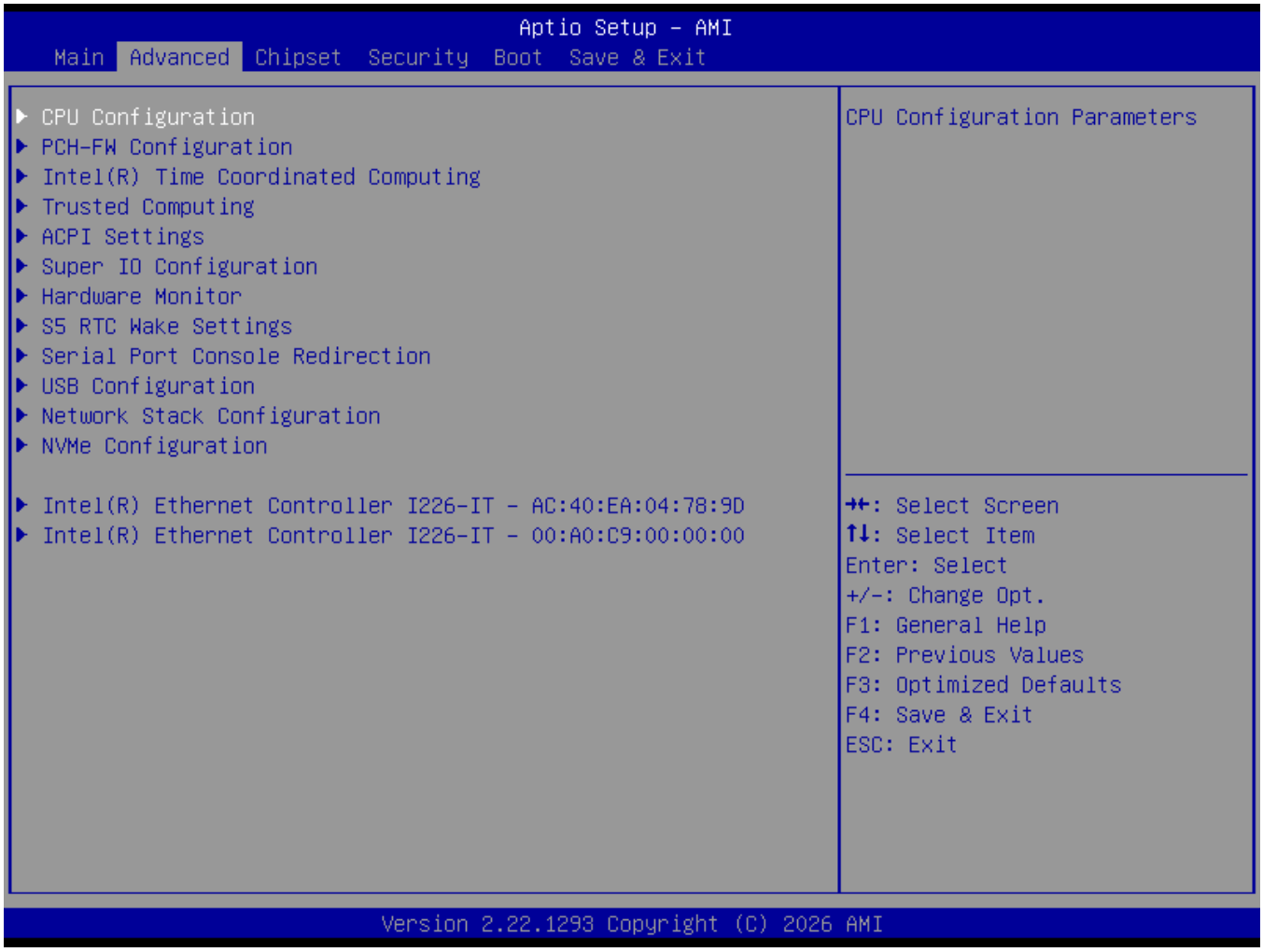
■ System Date

Set the system date. Please use <Tab> to switch between data elements.

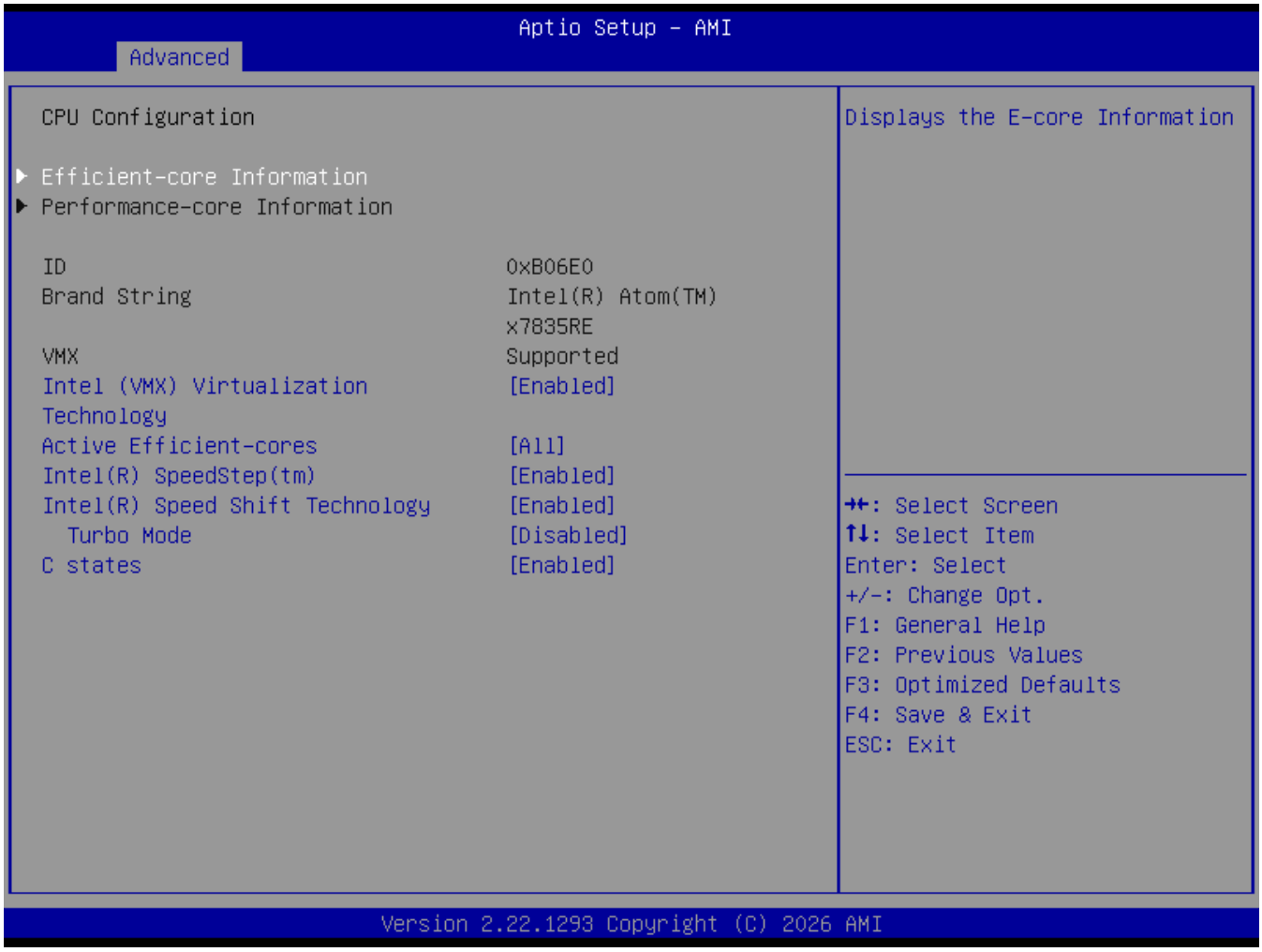
■ System Time

Set the system time. Please use <Tab> to switch between time elements.

4.3 Advanced Setup

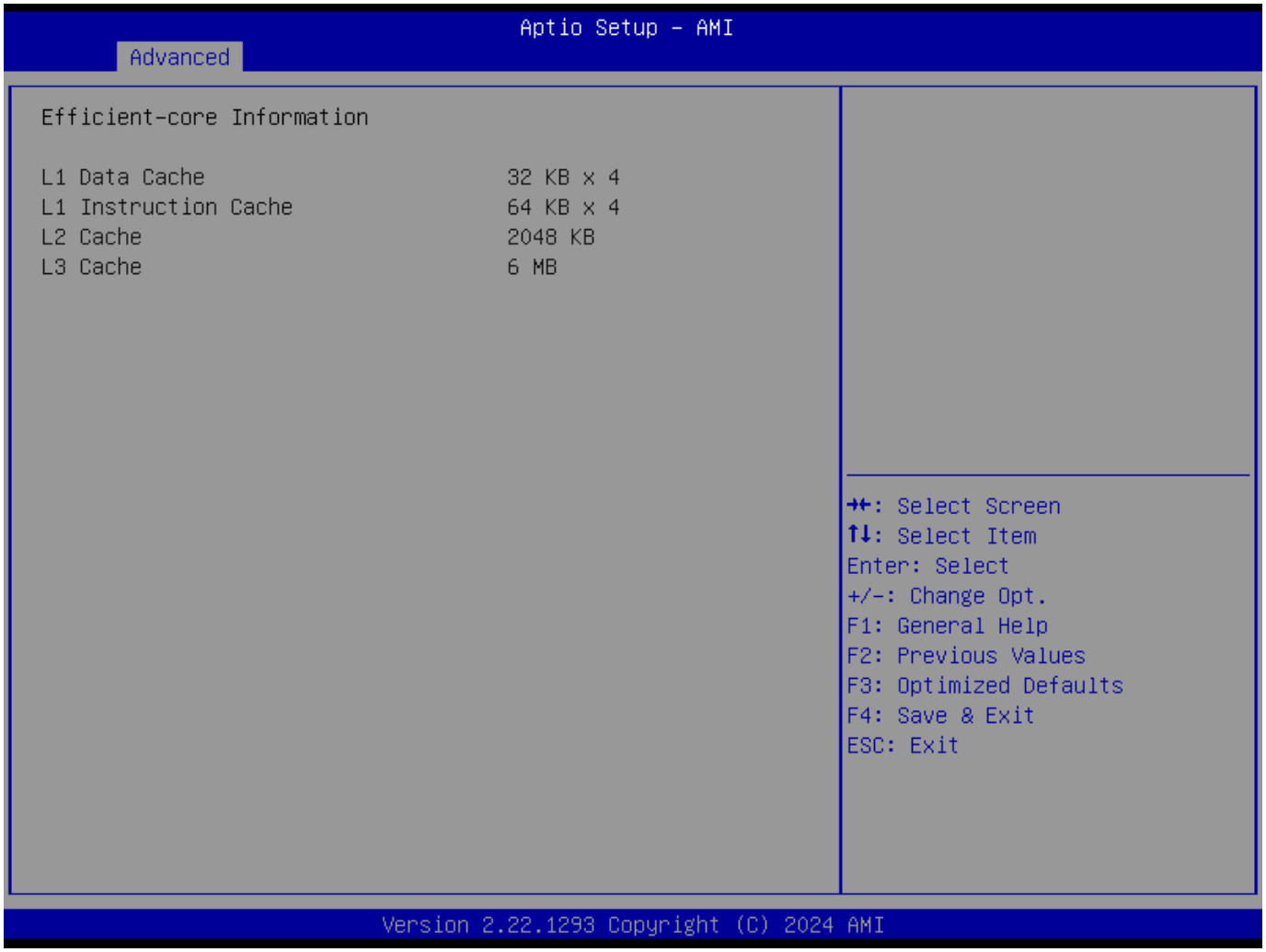


4.3.1 CPU Configuration

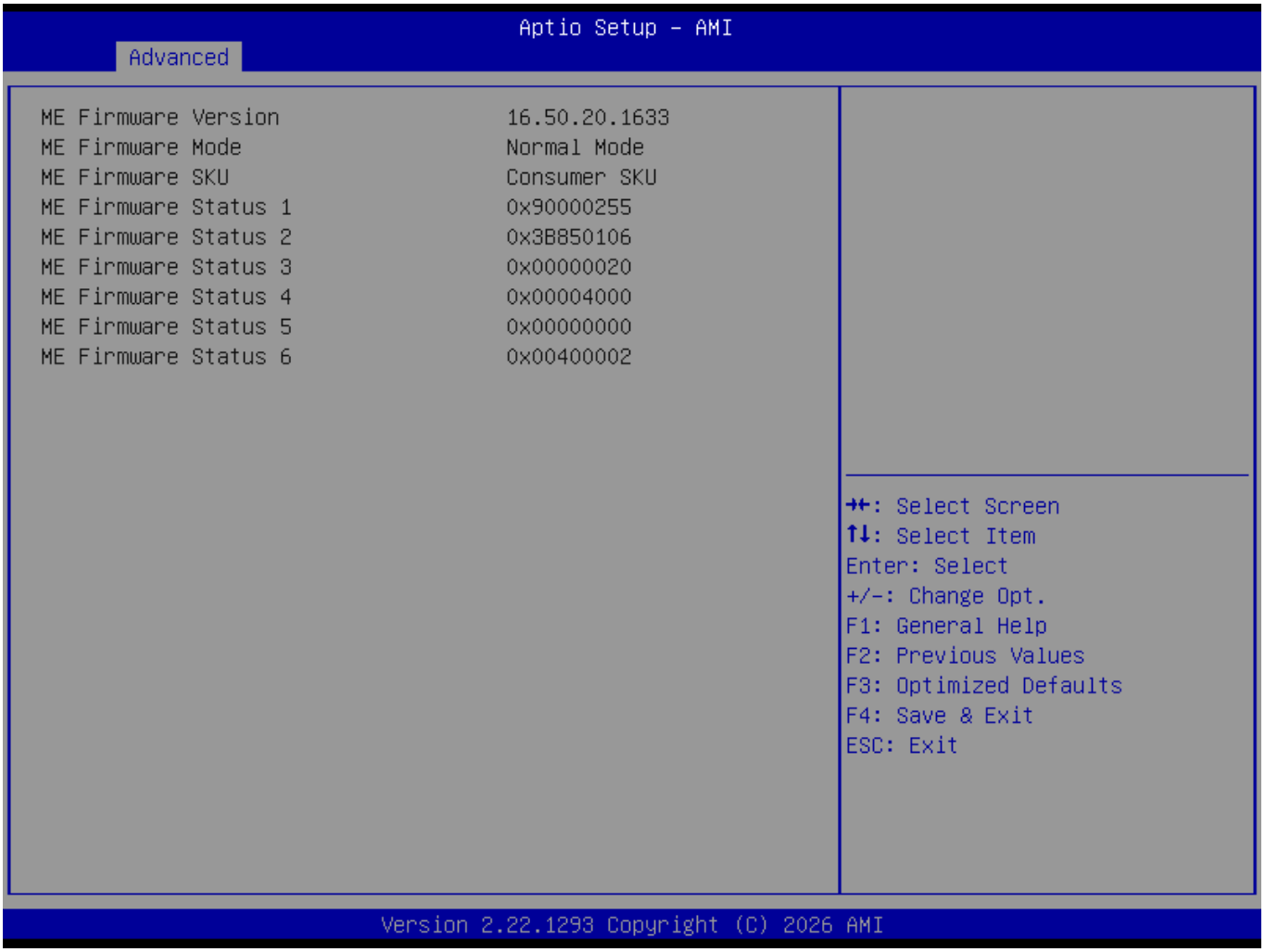


Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled, Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Virtualization Technology.
Active Processor Cores	All**[Default]** 0 1 2 3	Number of cores to enable in each processor package.
Intel® SpeedStep™	Disabled, Enabled**[Default]**	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Disabled, Enabled**[Default]**	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Disabled**[Default]**, Enabled	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.
C states	Disabled, Enabled**[Default]**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

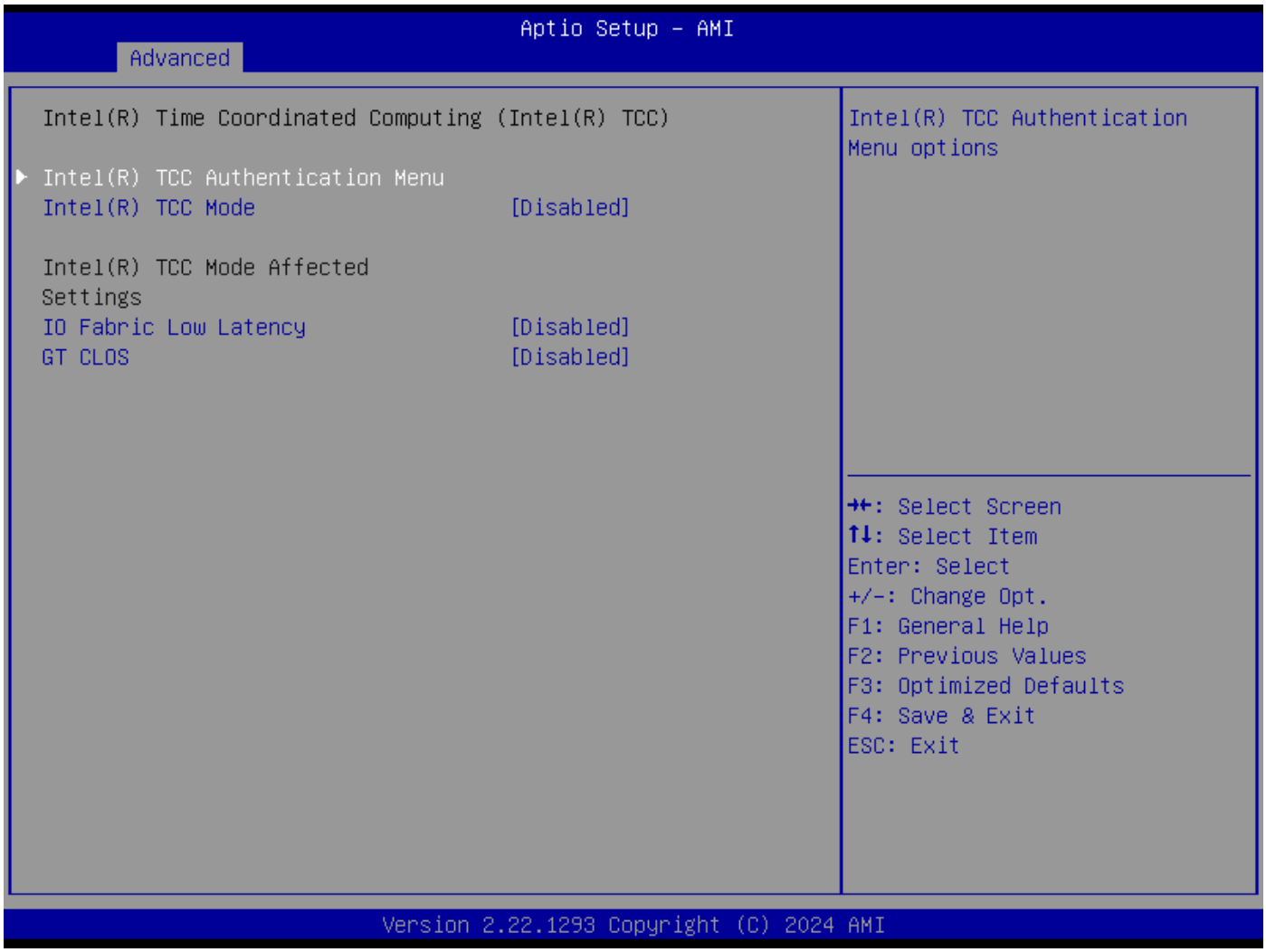
■ Efficient-core Information



4.3.2 PCH-FW Configuration



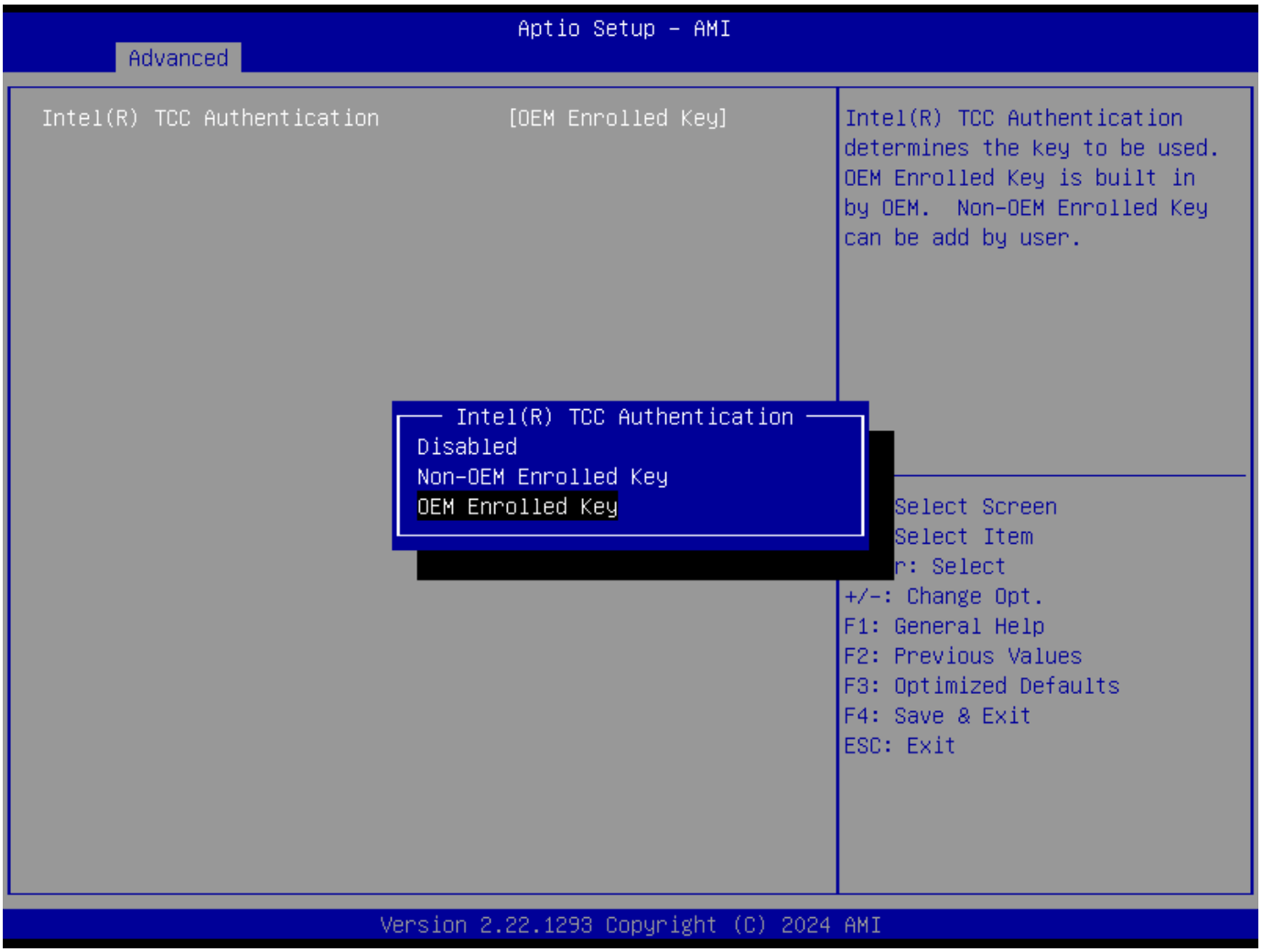
4.3.3 Intel® Time Coordinated Computing



Item	Description
Intel® TCC Authentication Menu	Intel® TCC Authentication Menu options

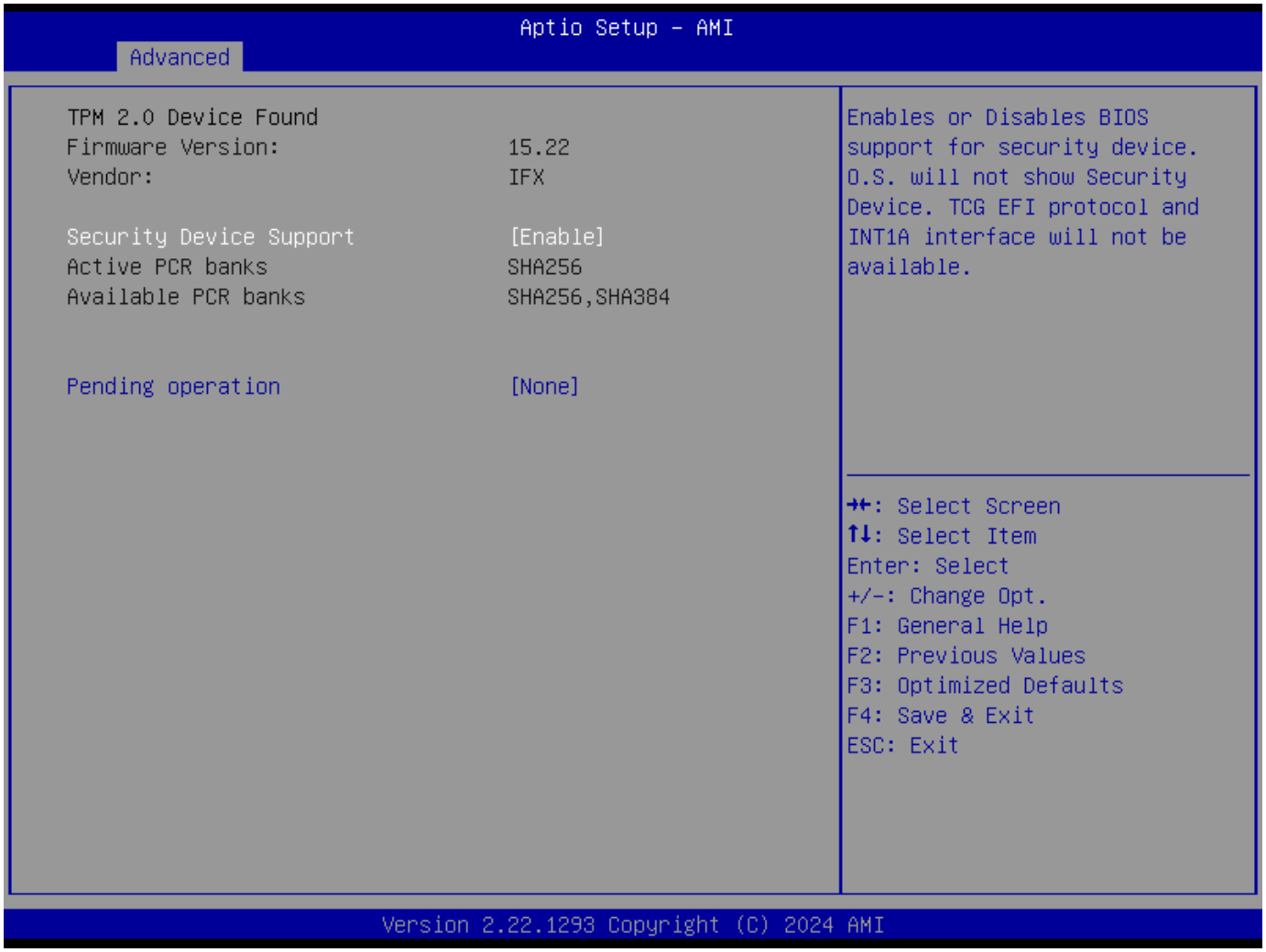
Item	Options	Description
Intel® TCC Mode	Disabled**[Default]** , Enabled	Enable or Disable Intel® TCC Mode. When enabled, this will modify system settings to improve real-time performance. The full list of settings and their current state are displayed below when Intel® TCC mode is enabled.
IO Fabric Low Latency	Disabled**[Default]** , Enabled	Enable or Disable IO Fabric Low Latency. This will turn off some power management in the PCH IO fabrics. This option provides the most aggressive IO Fabric performance setting. S3 state is NOT supported.
GT CLOS	Disabled**[Default]** , Enabled	Enable or Disable Graphics Technology(GT) Class of Service. Enable will reduce Gfx LLC allocation to minimize impact of Gfx workload on LLC

■ Intel® TCC Authentication Menu



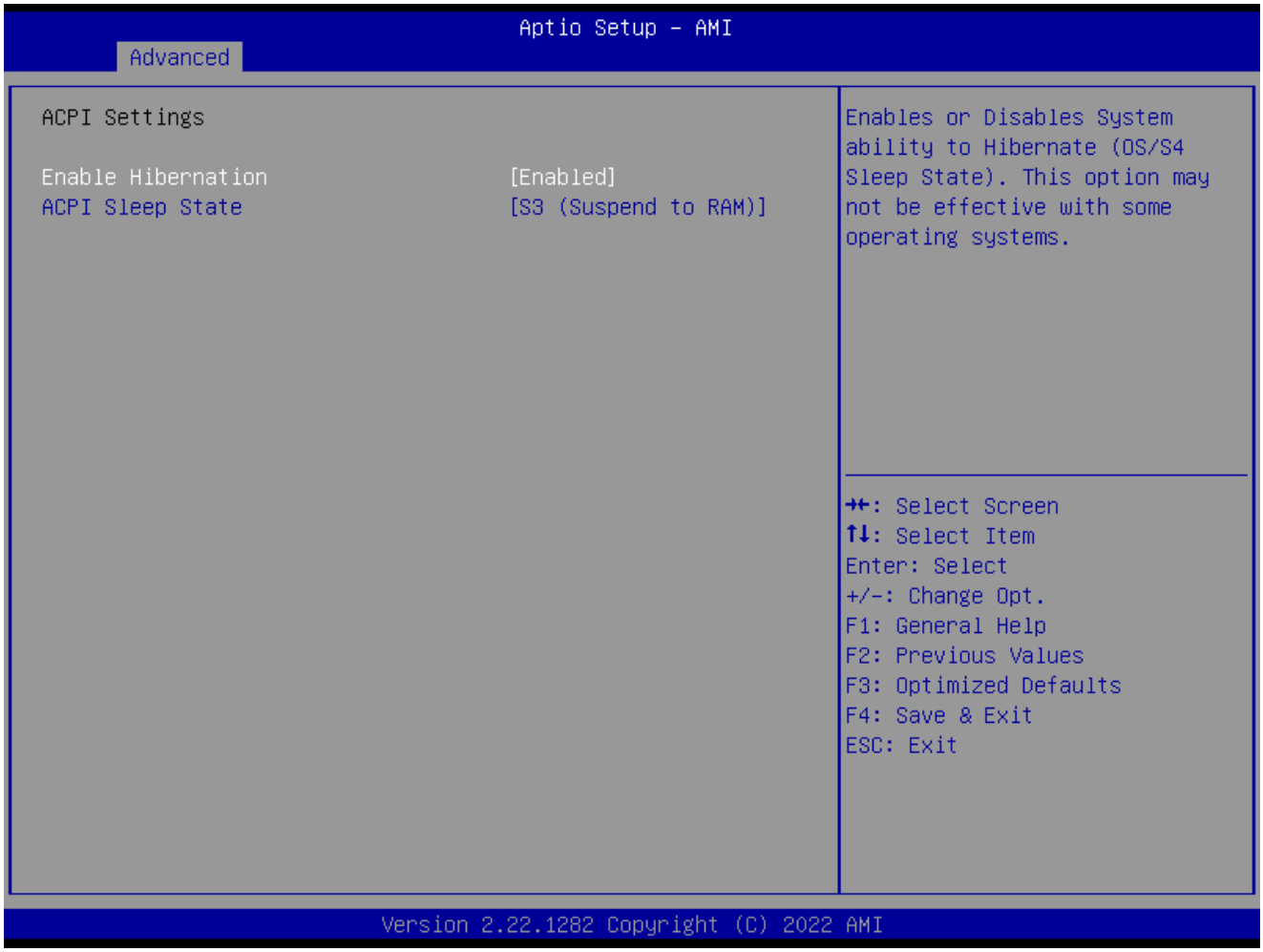
Item	Options	Description
Intel® TCC Authentication	Disabled, Non-OEM Enrolled Key, OEM Enrolled Key**[Default]**	Intel(R) TCC Authentication determines the key to be used. OEM Enrolled Key is built in by OEM. Non-OEM Enrolled Key can be add by user.

4.3.4 Trusted Computing



Item	Options	Description
Security Device Support	Enabled**[Default]** , Disabled,	Enable/Disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Pending operation	None**[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.

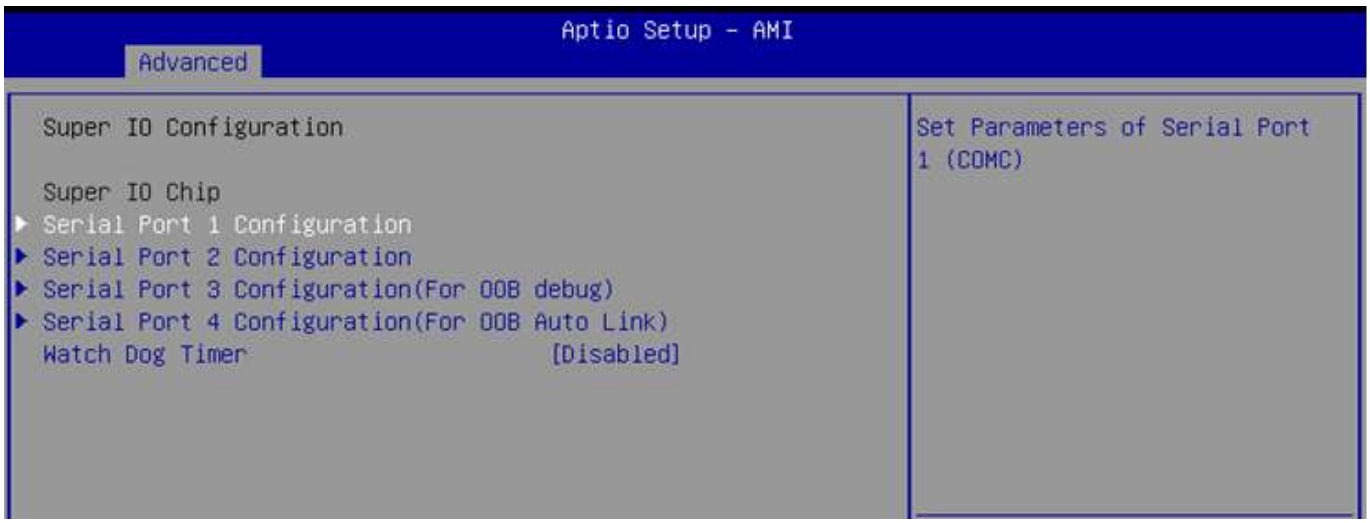
4.3.5 ACPI Settings



Item	Options	Description
Enable Hibernation	Disabled , Enabled**[Default],**	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEDN button is pressed.

4.3.6 Super IO Configuration

This setting allows you to select options for the Super IO Configuration, and change the value of the selected option.

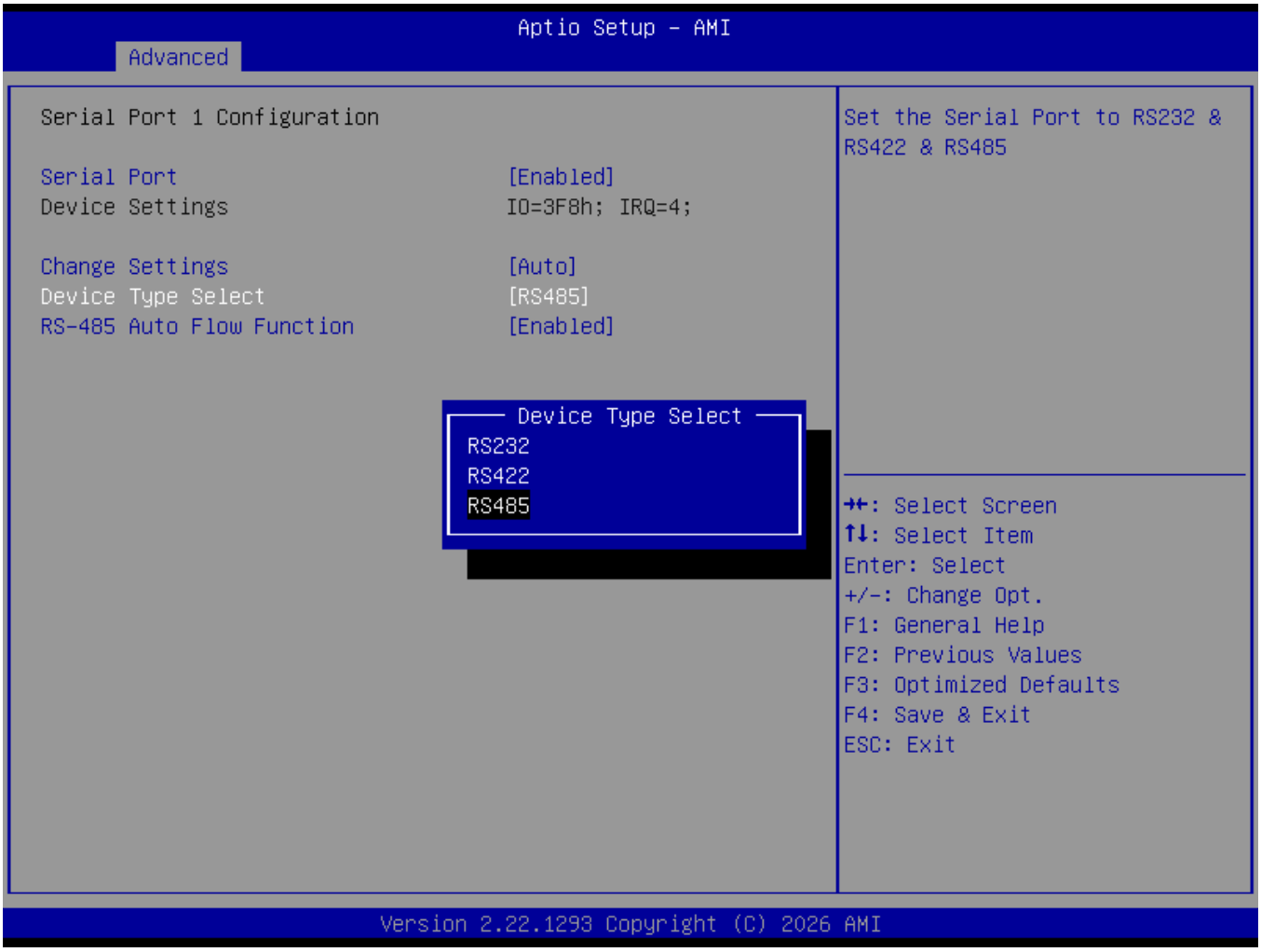


Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration(For OOB debug)	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration(For OOB Auto Link)	Set Parameters of Serial Port 4 (COMD).

Item	Options	Description
Watch Dog Timer	Disabled **[Default]**, Enabled	Enabled or Disabled Watch Dog Timer function.
Watch Dog Timer Count Mode	Second Mode**[Default]**, Minute Mode	Select Second Mode or Minute Mode.
Watch Dog Timer Time out Value	20~255(Second)**[Default]**, 1~255(Minute)	Watch Dog Timer Time out. Second 20-255 Minute 1-255

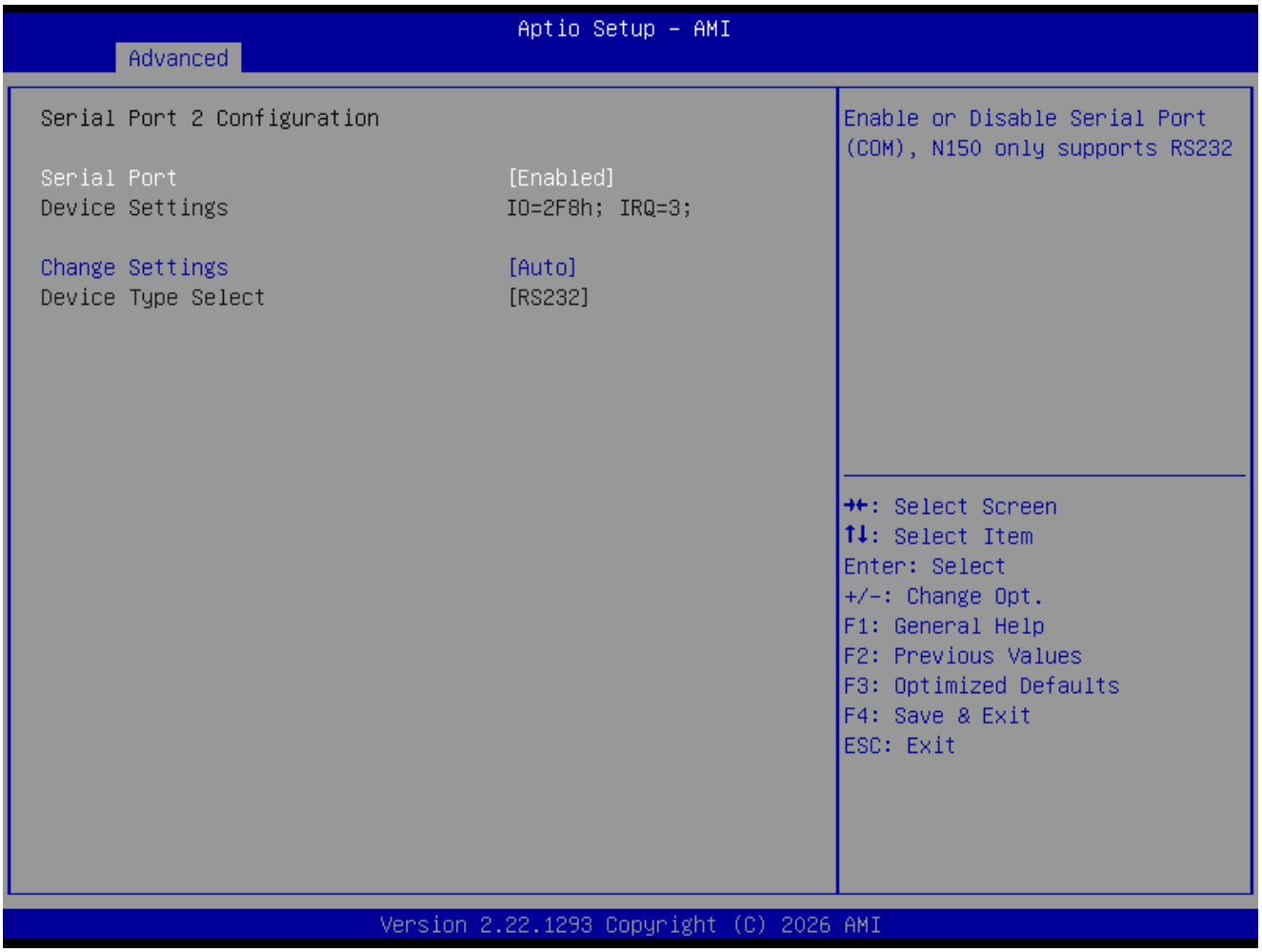
	BIOS	Super IO	Windows_11 & 10 Device Manager	Ubuntu_24.04 & 22.04 sudo dmesg | grep tty
User Manual_COM1	I/O=3F8h	com A	COM1 03F8-03FF	ttyS0 I/O=0x3f8
User Manual_COM2	I/O=2F8h	com B	COM2 02F8-02FF	ttyS1 I/O=0x2f8
User Manual_COM3	I/O=3E8h (For OOB debug)	com C	COM3 03E8-03EF	ttyS2 I/O=0x3e8
User Manual_COM4	I/O=2E8h (For OOB Auto Link)	com D	COM4 02E8-02EF	ttyS3 I/O=0x2e8

■ Serial Port 1 Configuration



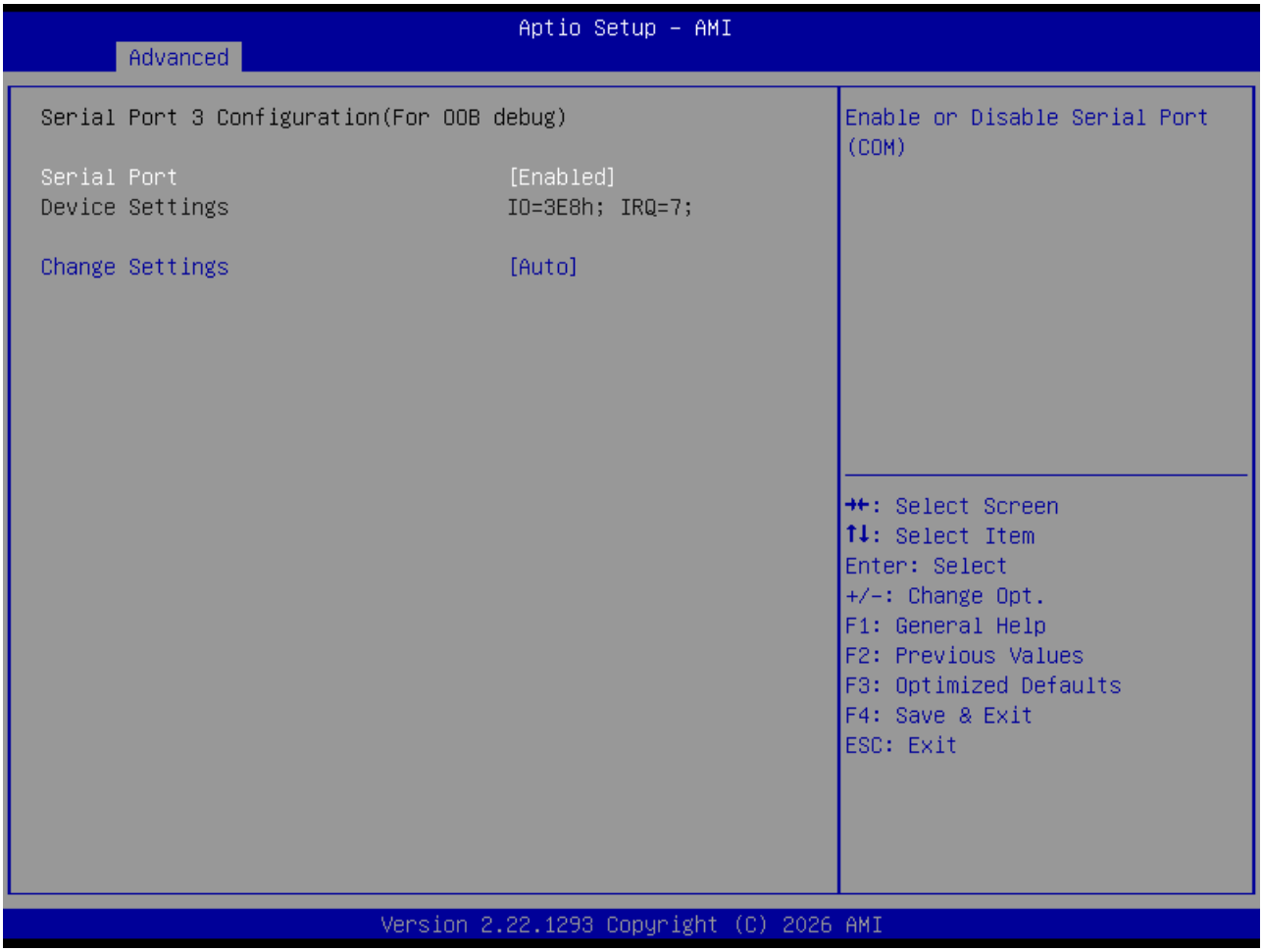
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=3Fh; IRQ=4; , IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal settings for Super IO Device.
Device Type Select	RS232**[Default]**, RS422, RS485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function

■ Serial Port 2 Configuration



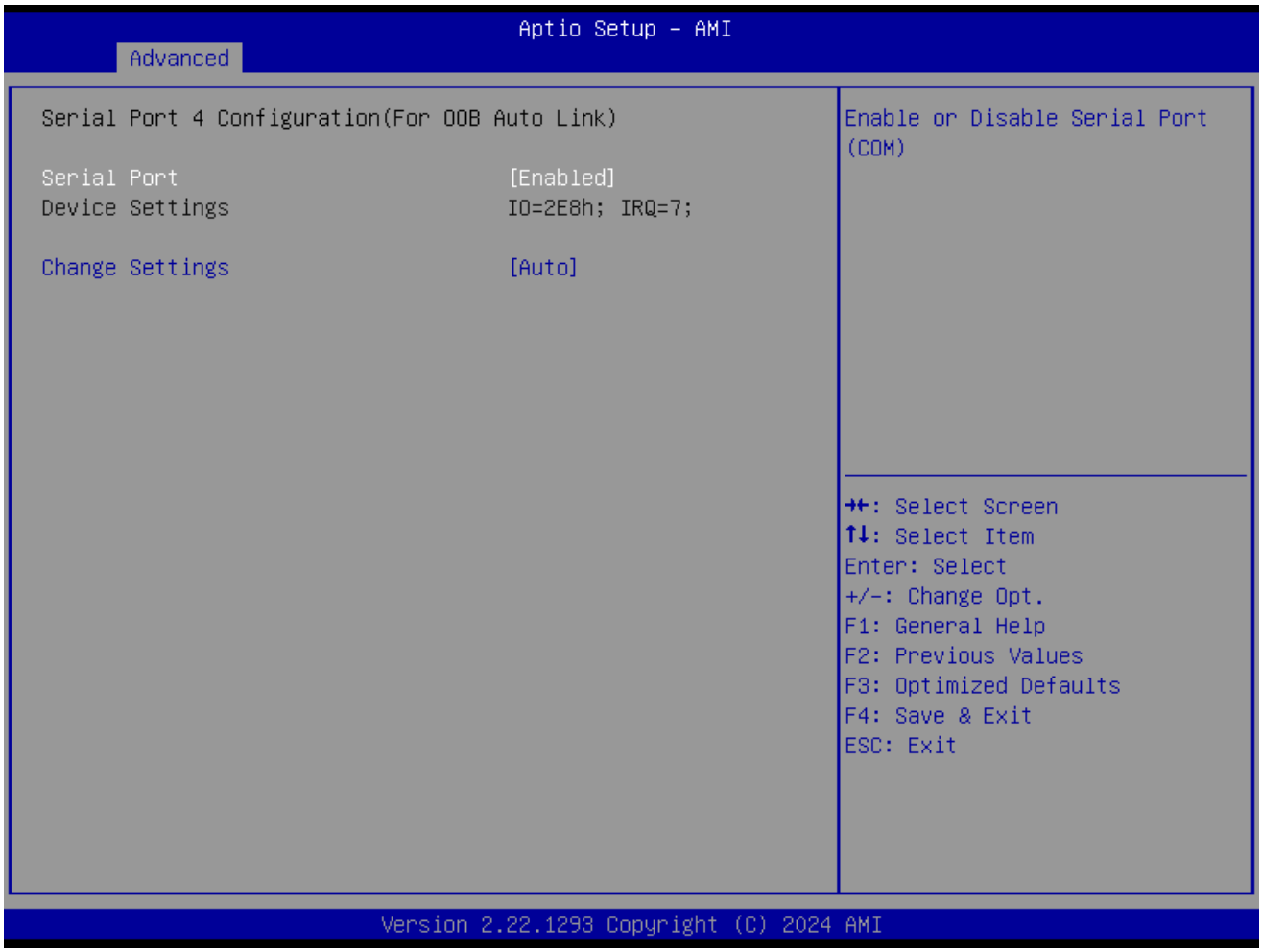
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=2F8h; IRQ=3; , IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal settings for Super IO Device.

■ Serial Port 3 Configuration(For OOB debug)



Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=3E8h; IRQ=7; , IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal settings for Super IO Device.

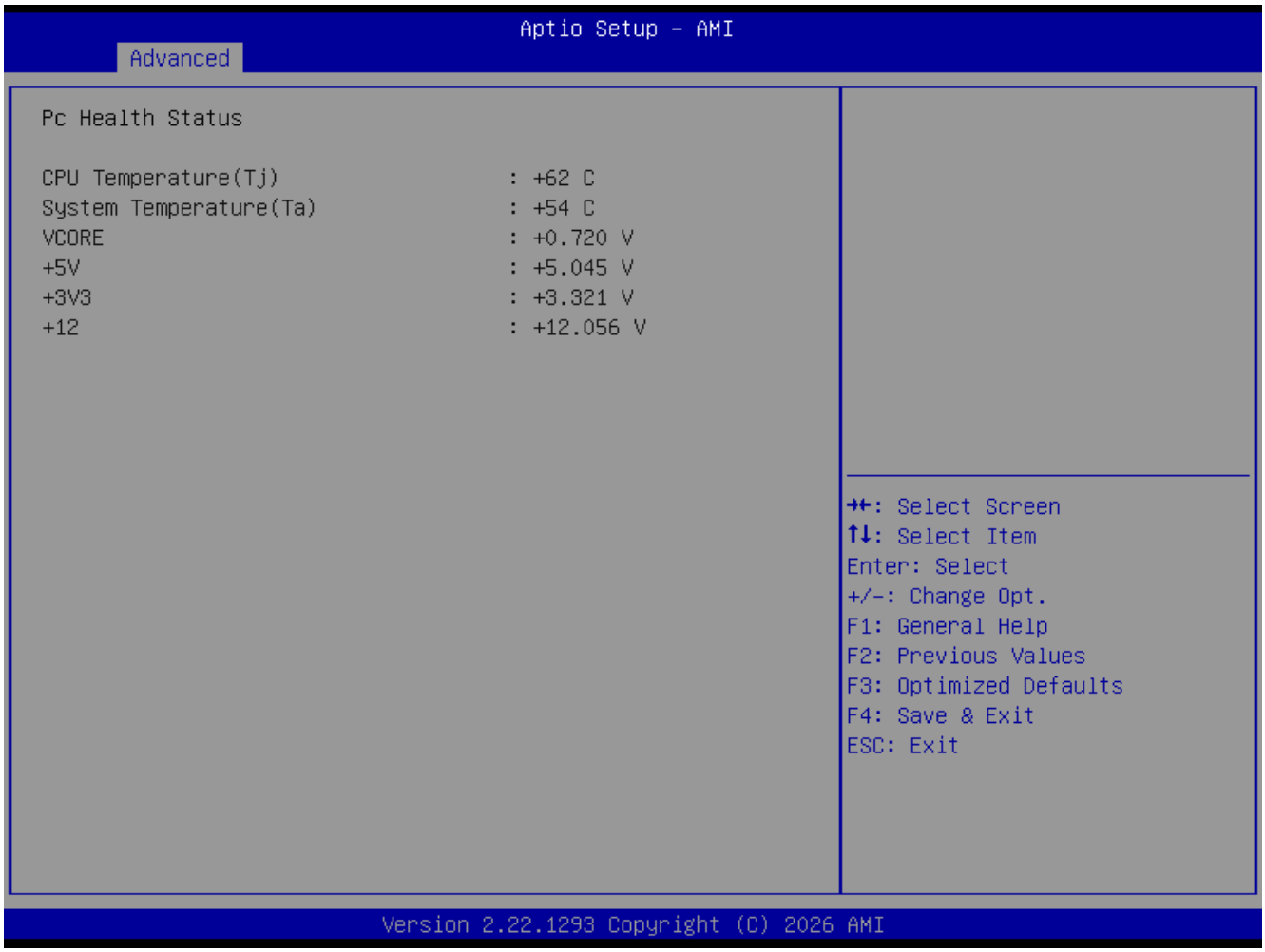
■ Serial Port 4 Configuration(For OOB Auto Link)



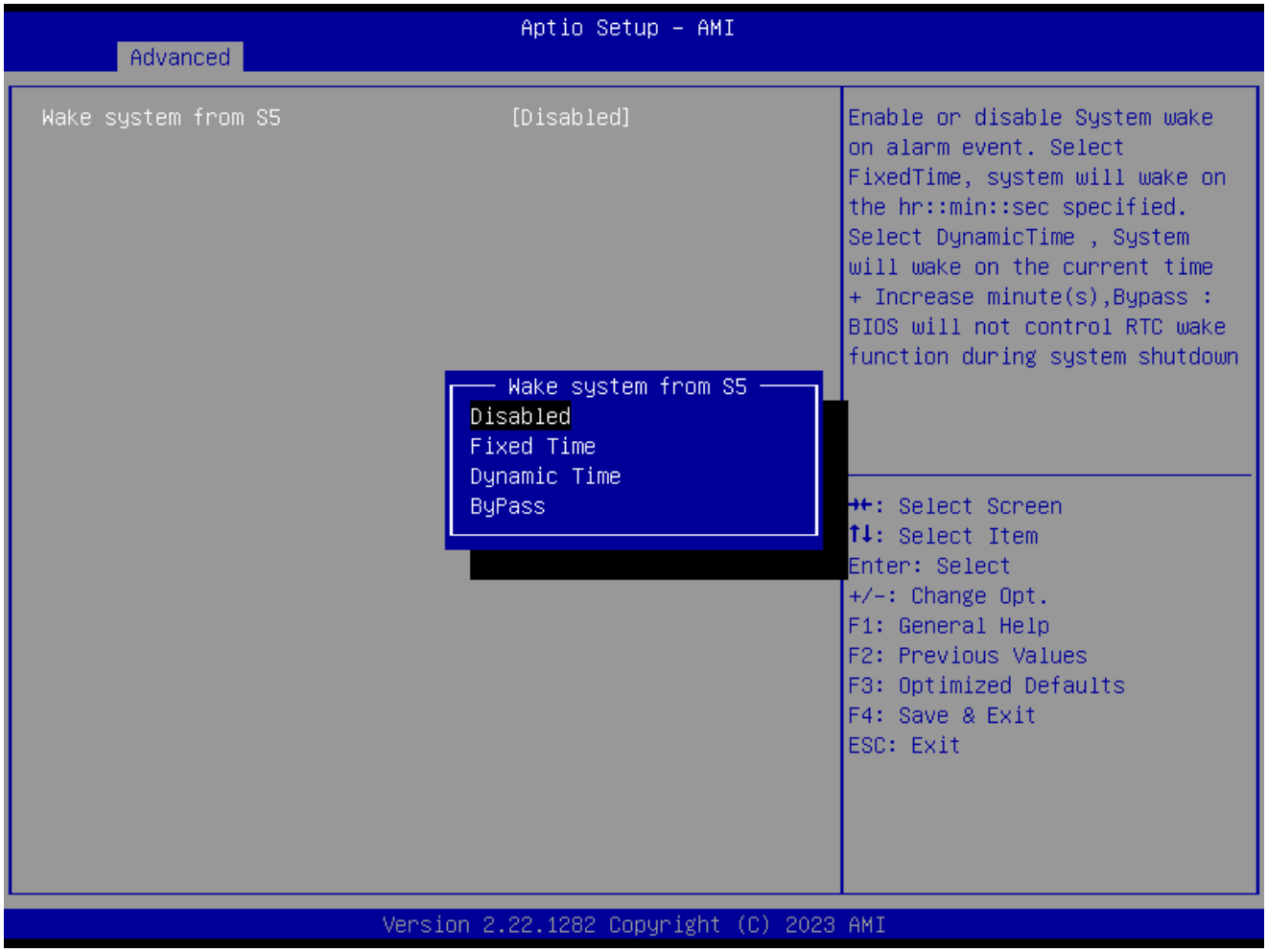
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=2E8h; IRQ=7; , IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	Select an optimal settings for Super IO Device.

4.3.7 Hardware Monitor

These items display the current status of all monitored hardware devices/ components such as voltages and temperatures.

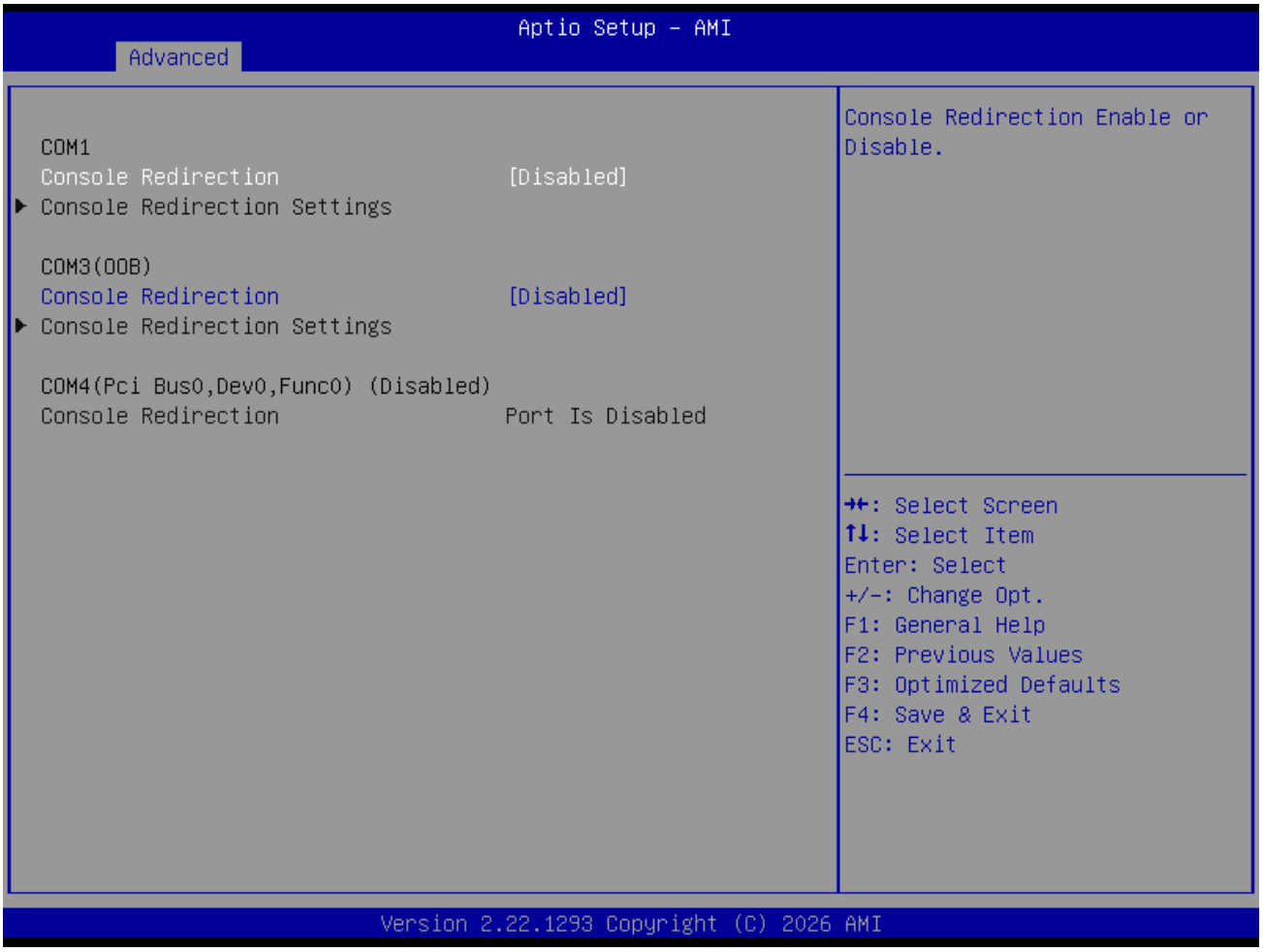


4.3.8 S5 RTC Wake Settings



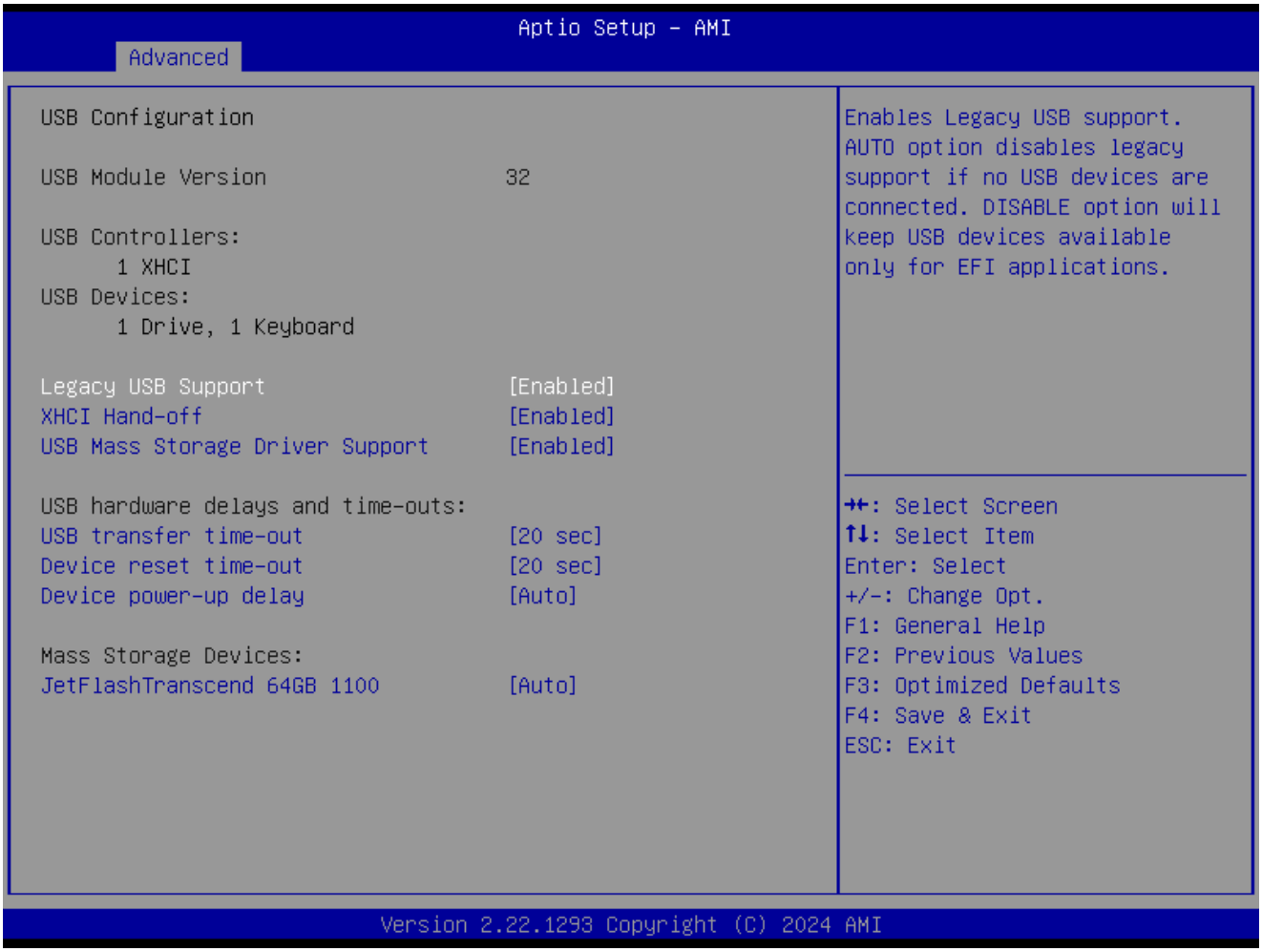
Item	Options	Description
Wake system from S5	Disabled**[Default]** Fixed Time Dynamic Time Bypass	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime , System will wake on the current time + Increase minute(s), Select Bypass : BIOS will not control RTC wake function during system shutdown

4.3.9 Serial Port Console Redirection



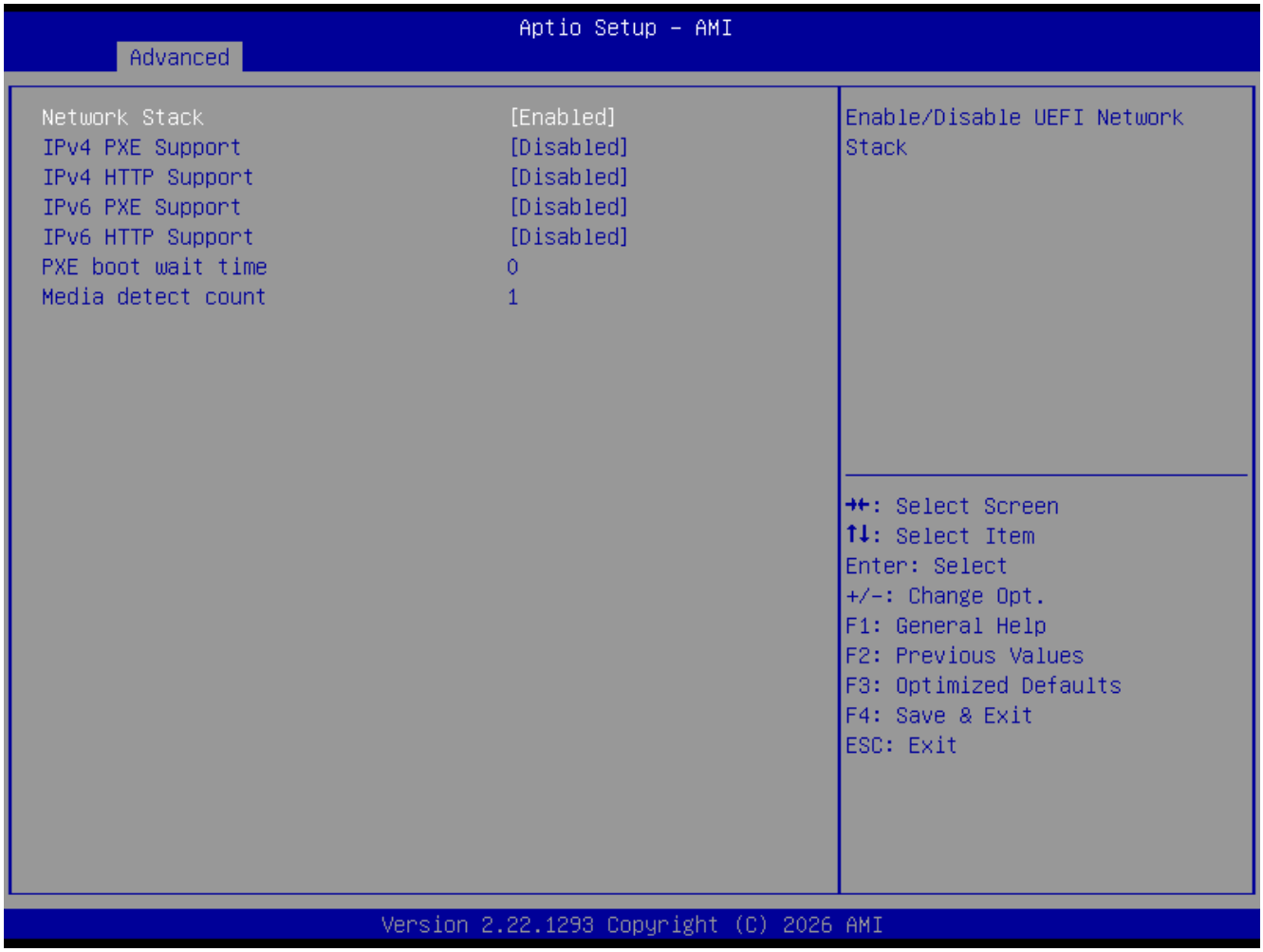
Item	Options	Description
Console Redirection	Disabled**[Default],** Enabled	Console Redirection Enable or Disable.

4.3.10 USB Configuration



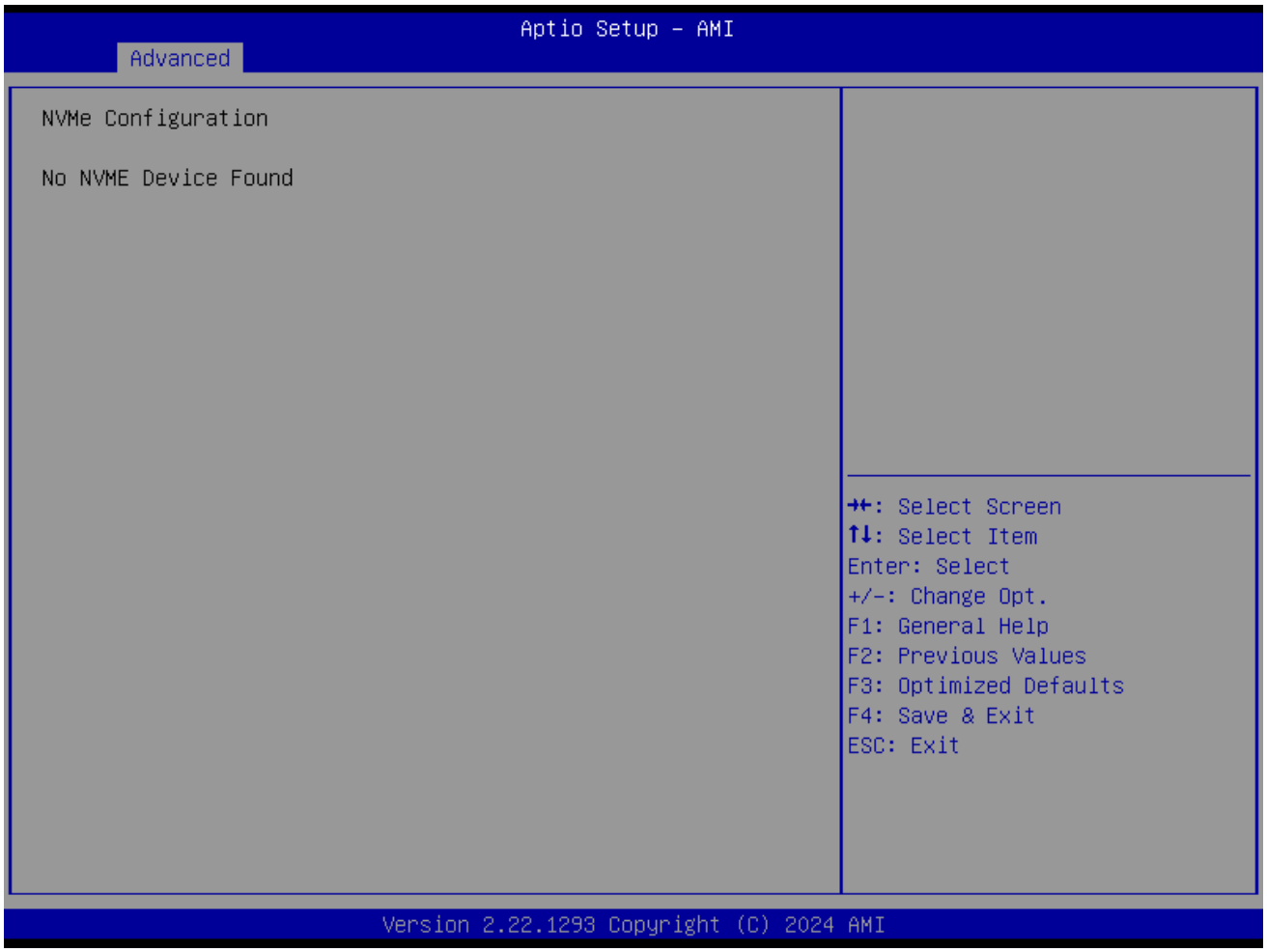
Item	Options	Description
Legacy USB Support	Enabled**[Default]**, Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled**[Default]**, Disabled	This is a workaround for OSew without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Disabled, Enabled**[Default]**	Enable/Disable USB Mass Storage Driver Support.
USB transfer time-out	1 sec, 5 sec, 10 sec, 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec , 20 sec**[Default]**, 30 sec, 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]**, Manual	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 100ms, for a Hub port the delay is taken form Hub descriptor.

4.3.11 Network Stack Configuration



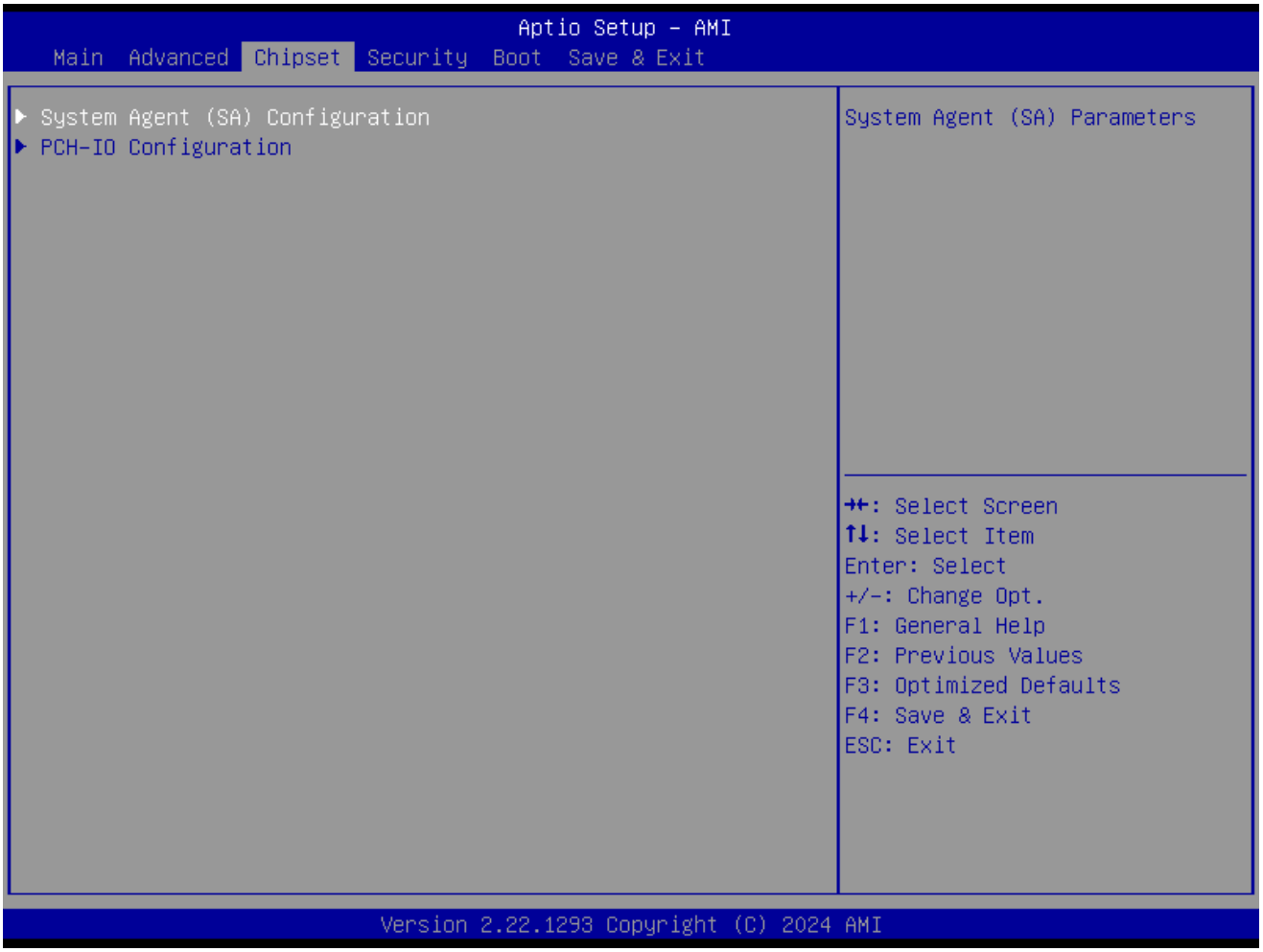
Item	Options	Description
Network Stack	Disabled**[Default]** , Enabled	Enable/Disable UEFI Network Stack.
IPv4 PXE Support	Disabled**[Default]** , Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	Disabled**[Default]** , Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	Disabled**[Default]** , Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	Disabled**[Default]** , Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	0	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	1	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

4.3.12 NVMe Configuration



4.4 Chipset

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



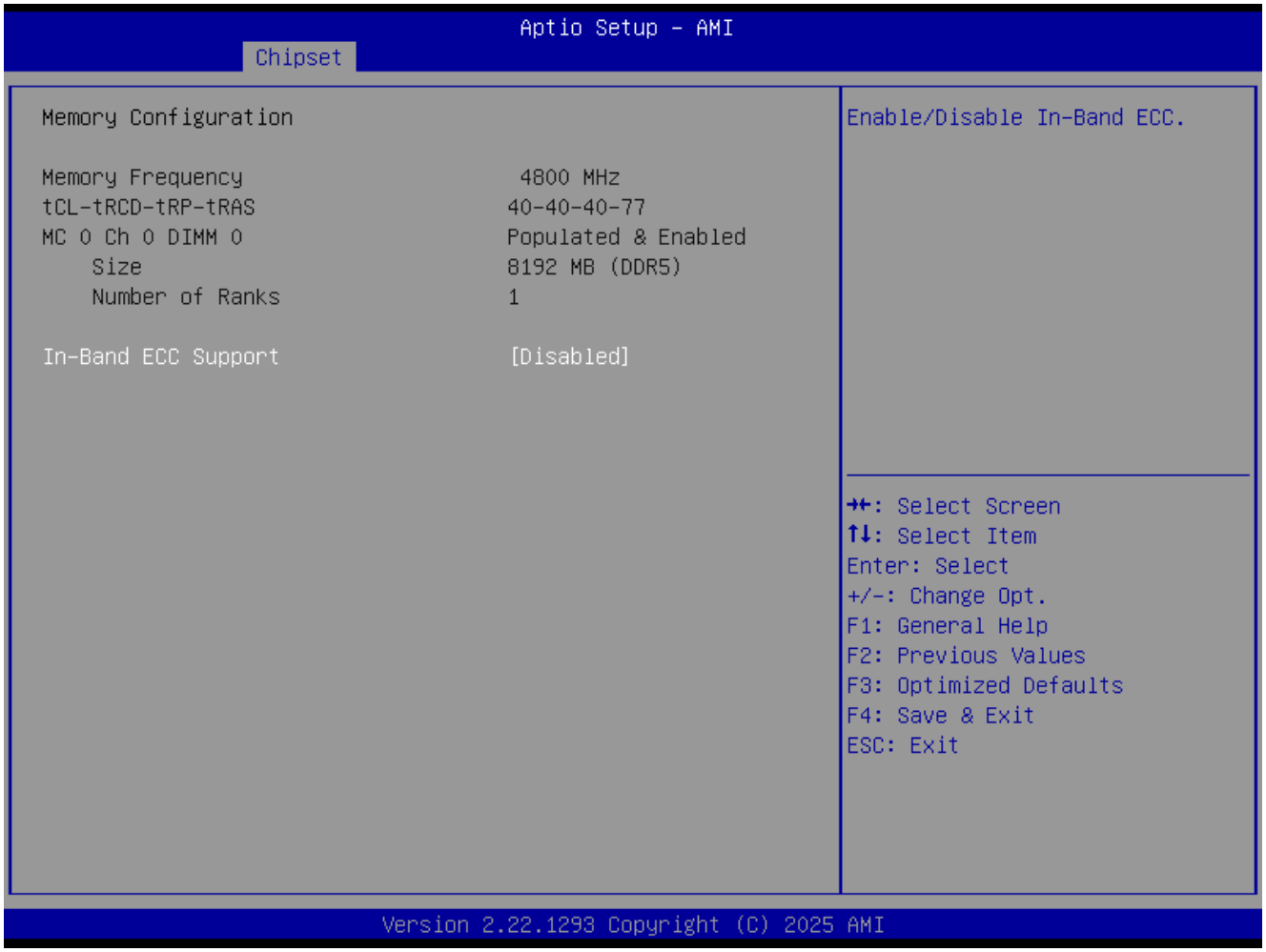
4.4.1 System Agent (SA) Configuration



Item	Description
Memory Configuration	Memory Configuration Parameters
Graphics Configuration	Graphics Configuration

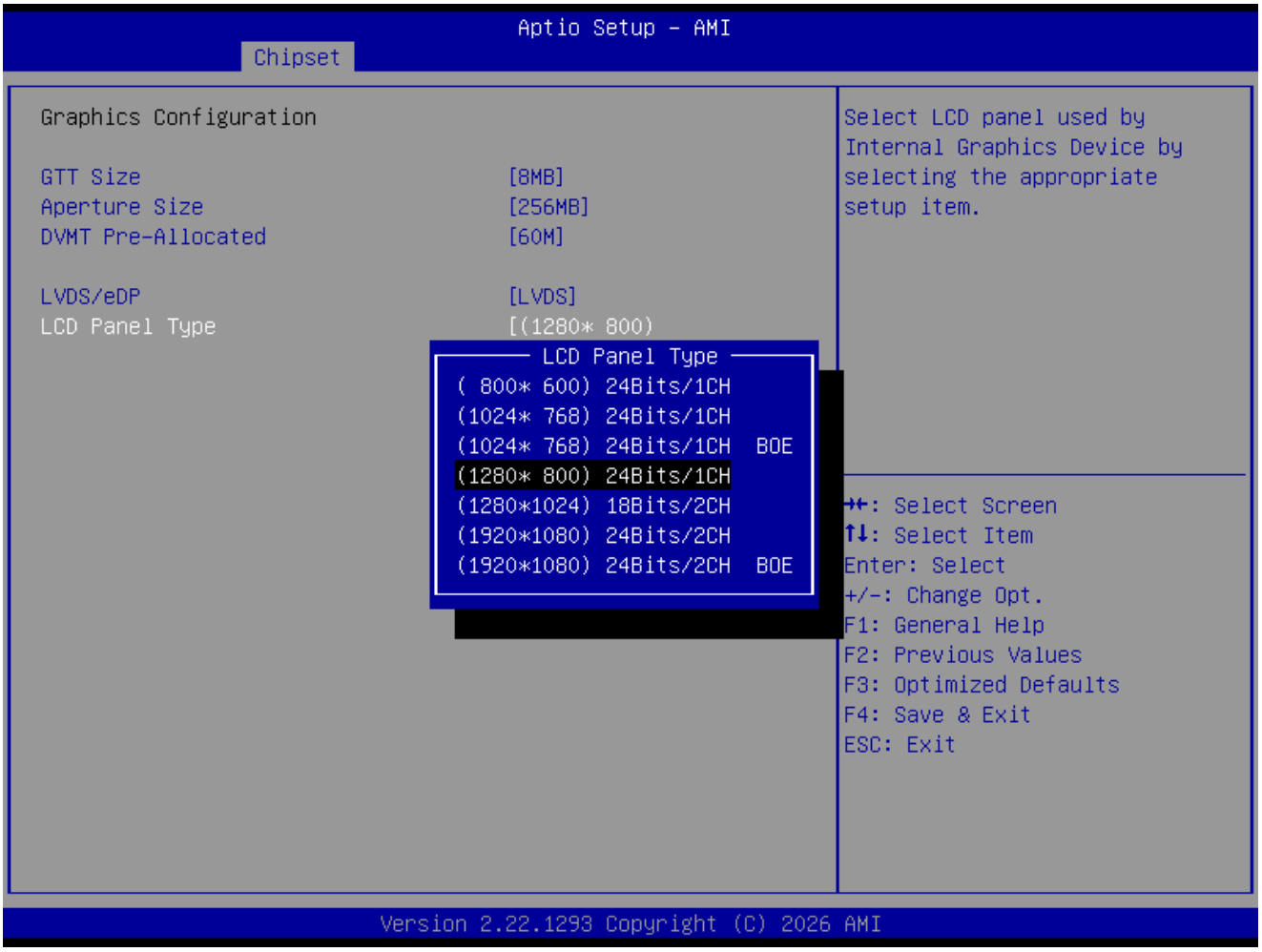
Item	Options	Description
Above 4GB MMIO BIOS assignment	Enabled**[Default]** , Disabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment\n\nThis is enabled automatically when Aperture Size is set to 2048MB.

■ Memory Configuration



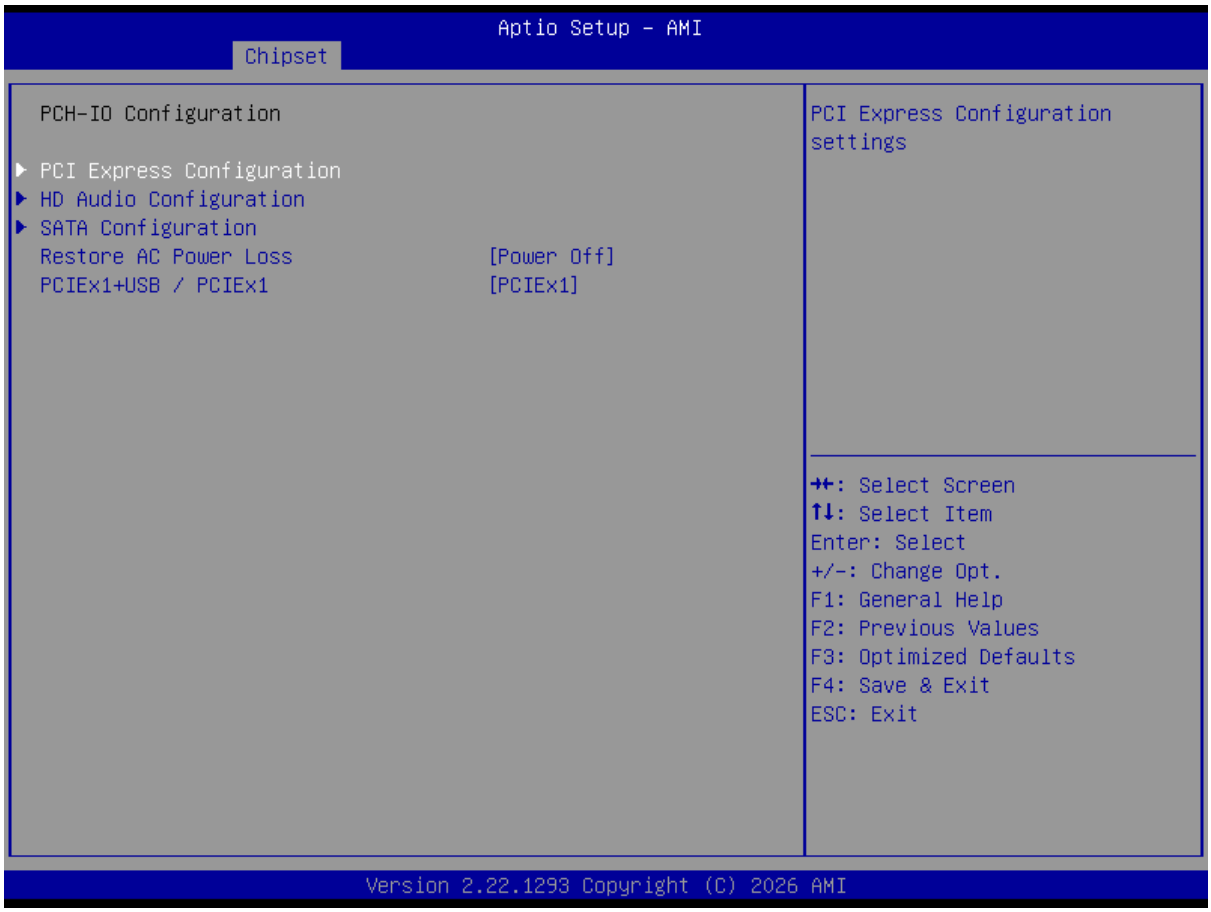
Item	Options	Description
In-Band ECC Support	Disabled**[Default]**, Enabled	Enable/Disable In-Band ECC.

■ Graphic Configuration



Item	Options	Description
GTT Size	2MB, 4MB, 8MB**[Default]**	Select the GTT Size .
Aperture Size	128MB, 256MB**[Default]** , 512MB, 1024MB	Select the Aperture Size. Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting > 2048MB aperture. To use this feature, please disable CSM Support.
DVMT Pre-Allocated	32M,64M,96M,128M, 160M, 36M, 40M,44M, 48M,52M,56M, 60M**[Default]**	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
LVDS/eDP	Disabled**[Default]**, LVDS, eDP	Please select one Panel type
LCD Panel Type	(800*600) 24Bits/1CH, (1024*768) 24Bits/1CH, (1024*768) 24Bits/1CH BOE, (1280*800) 24Bits/1CH**[Default]** , (1280*1024) 18Bits/2CH, (1920*1080) 24Bits/2CH, (1920*1080) 24Bits/2CH BOE	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.

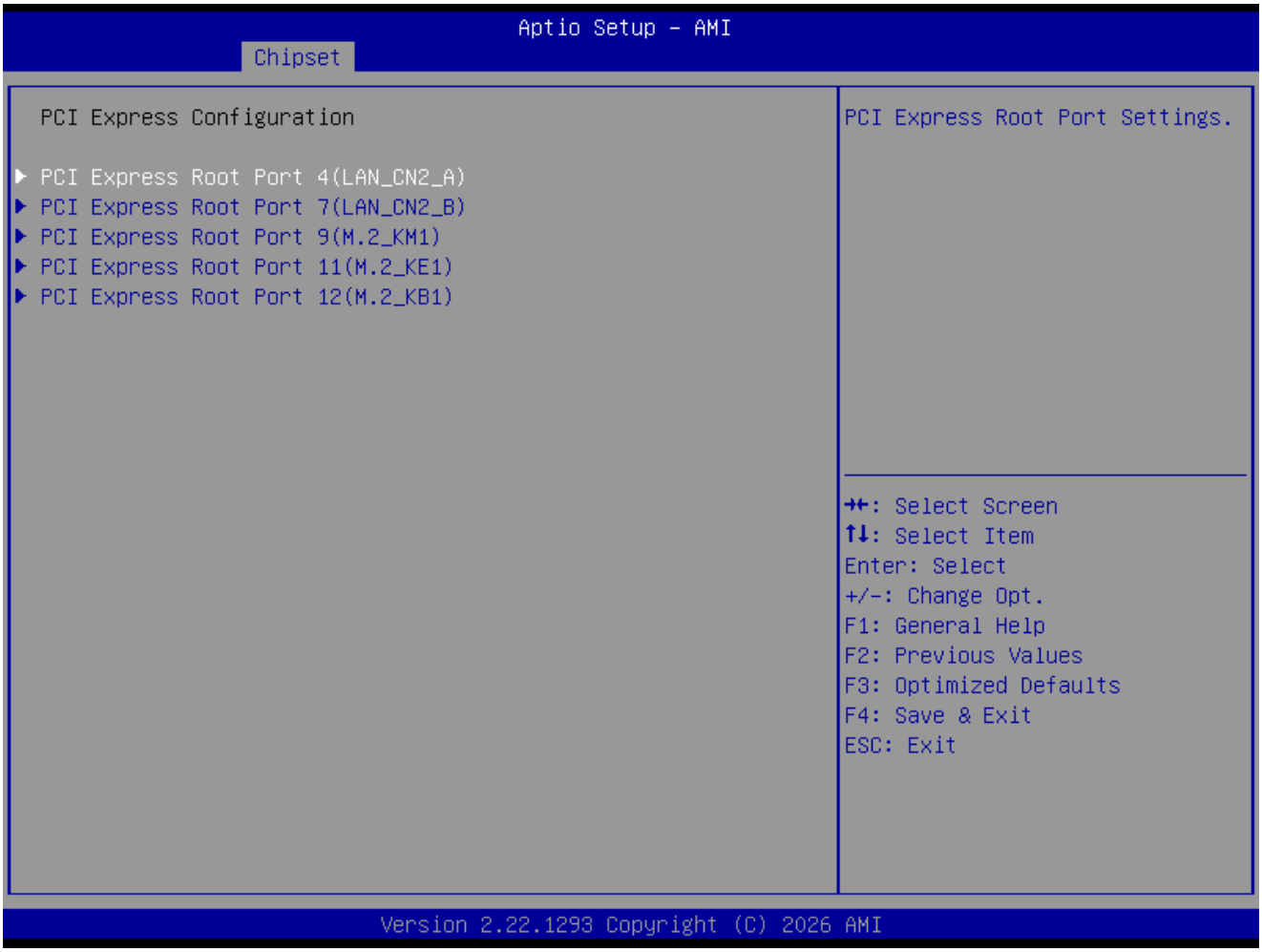
4.4.2 PCH-IO Configuration



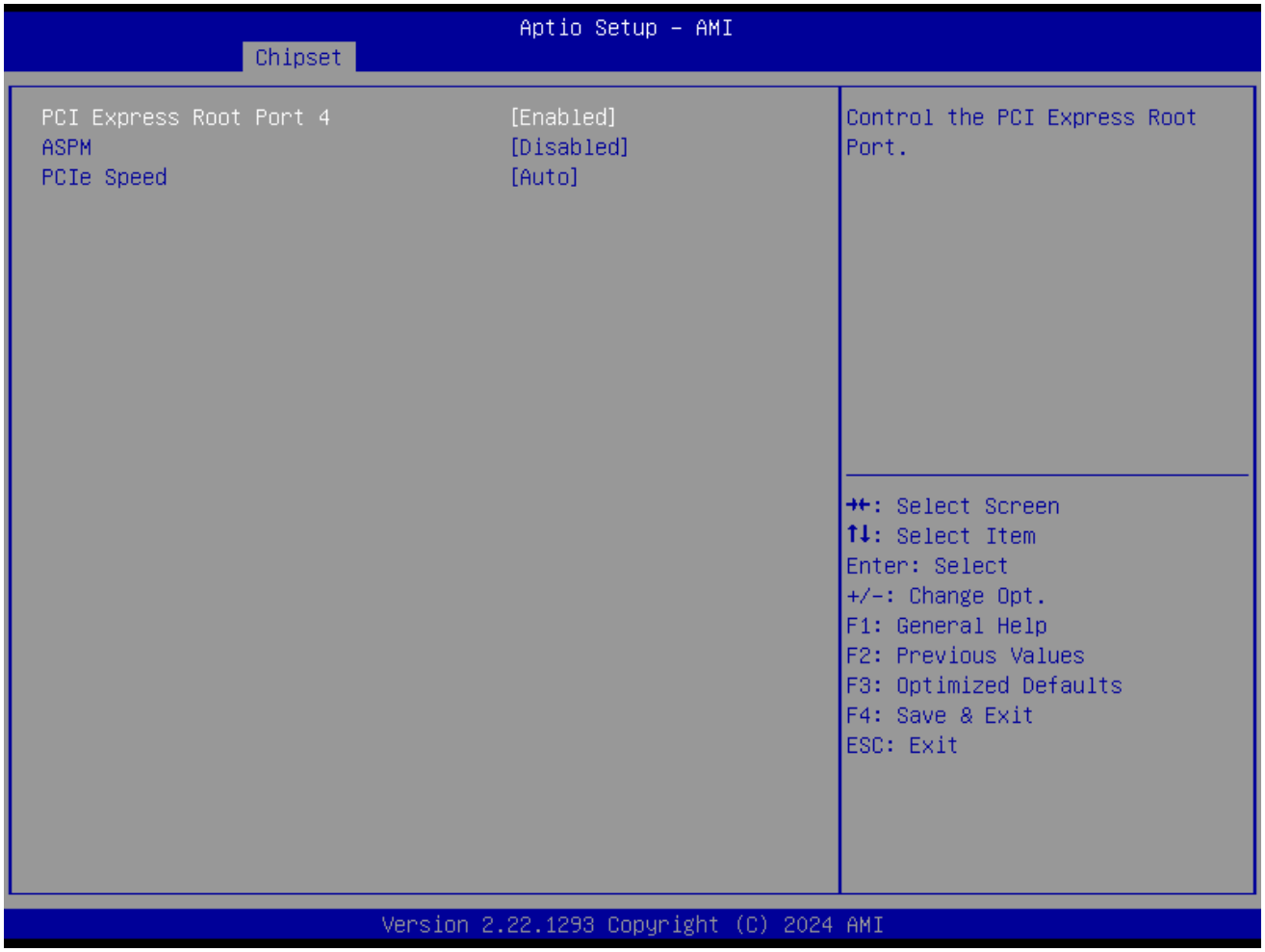
Item	Description
PCI Express Configuration	PCI Express Configuration settings.
HD Audio Configuration	HD Audio Subsystem Configuration Settings

Item	Options	Description
Restore AC Power Loss	Power On, Power Off **[Default]** , Lase State	Specify what state to go to when power is re-applied after a power failure (G3 state).
PCIEx1+USB / PCIEx1	PCIEx1+USB, PCIEx1**[Default]**	If the device is PCIEx2, please select PCIEx1, otherwise select PCIEx1+USB

■ PCI Express Configuration



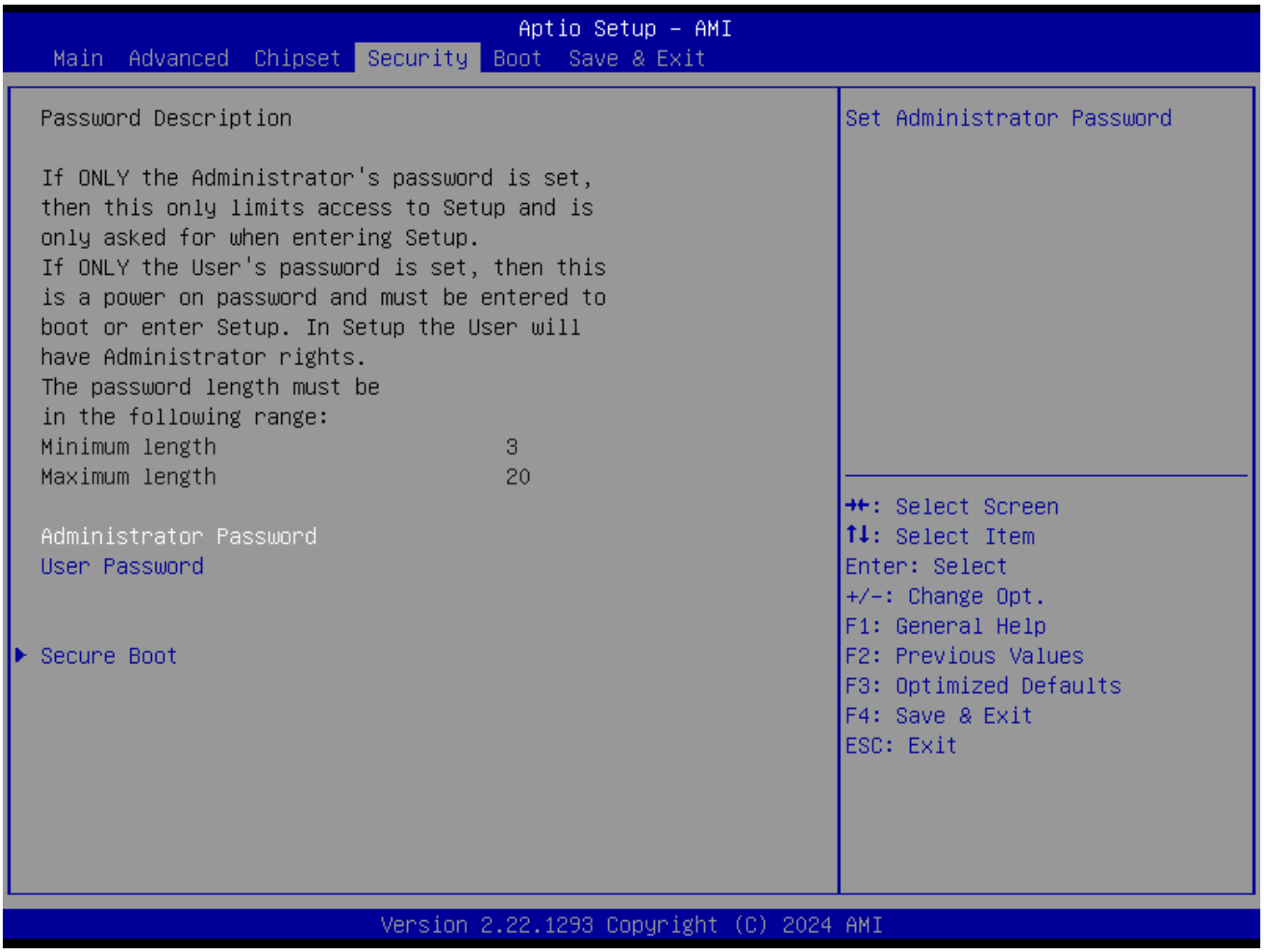
- **PCI Express Root Port 4/7/9/11/12**



Item	Options	Description
PCI Express Root Port 4/7/9/11/12	Disabled, Enabled **[Default]**	Control the PCI Express Root Port.
ASPM	Disabled **[Default]** , L1, Auto	Set the ASPM Level: Force L0s - Force all links to L0s State, AUTO - BIOS auto configure, DISABLE - Disables ASPM,
PCIe Speed	Auto**[Default]** , Gen1, Gen2, Gen3	Configure PCIe speed.

4.5 Security

Security menu allow users to change administrator password and user password settings.



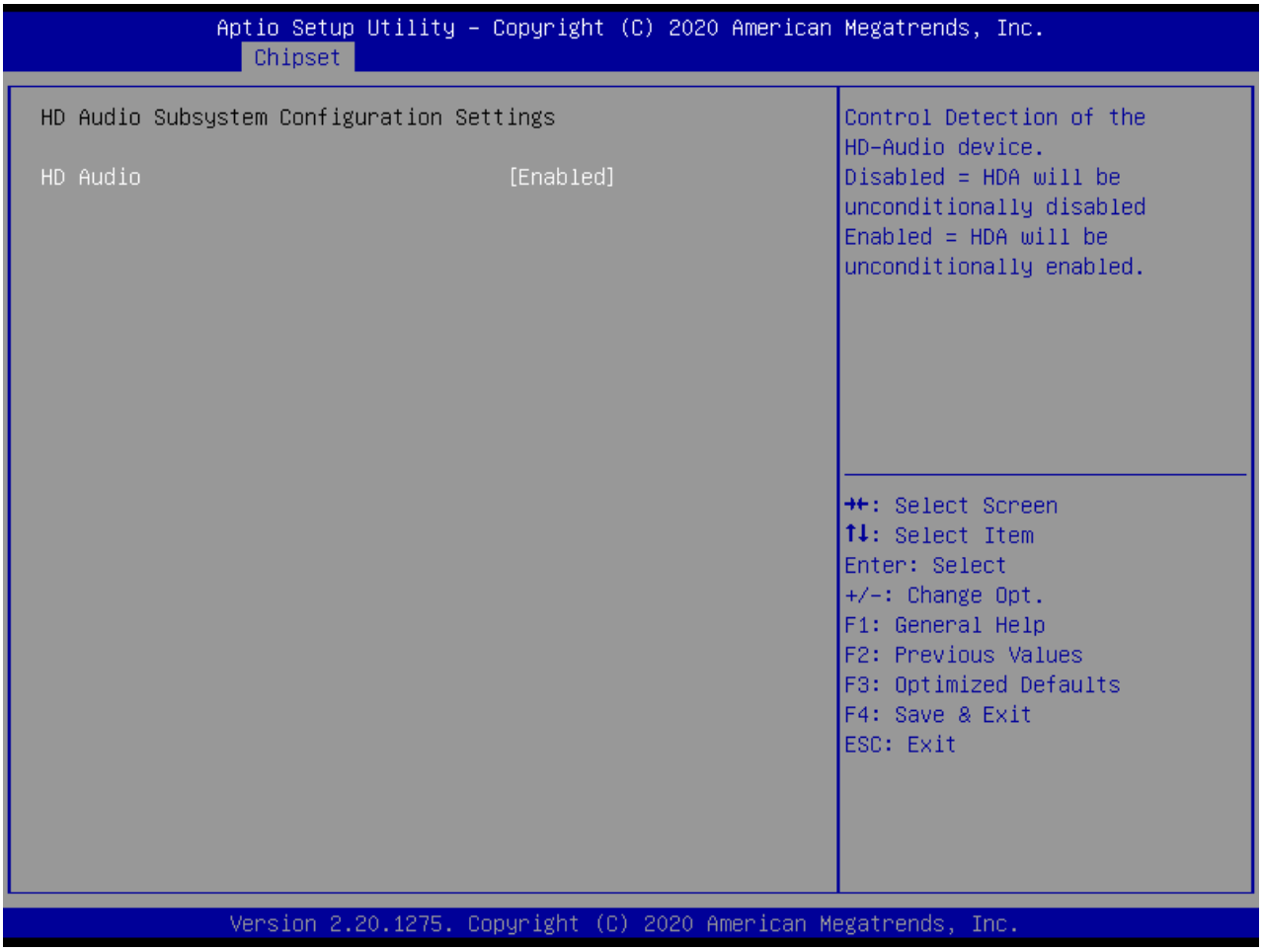
■ Administrator Password

This item allows you to set Administrator Password.

■ User Password

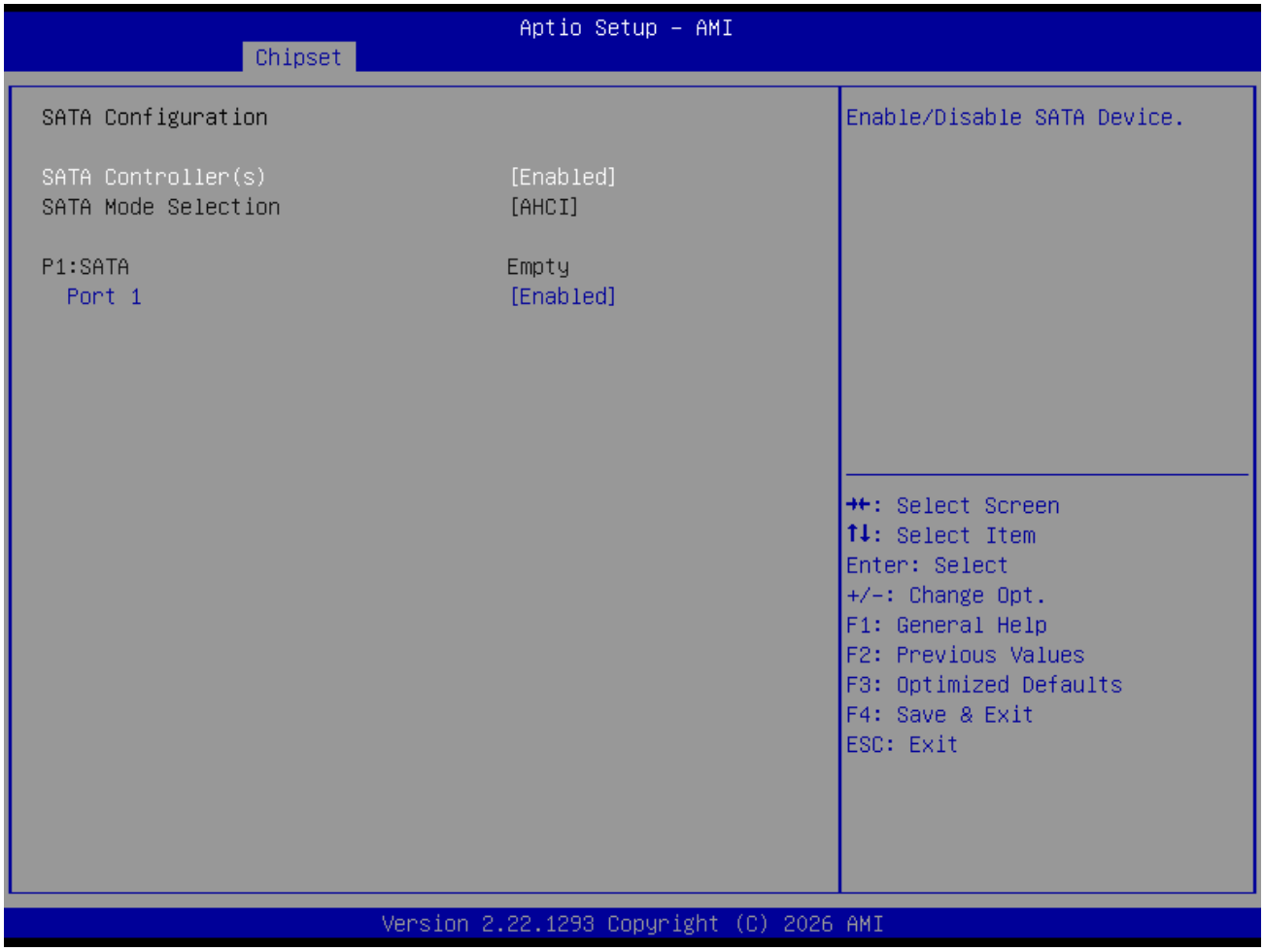
This item allows you to set User Password.

■ HD Audio Configuration



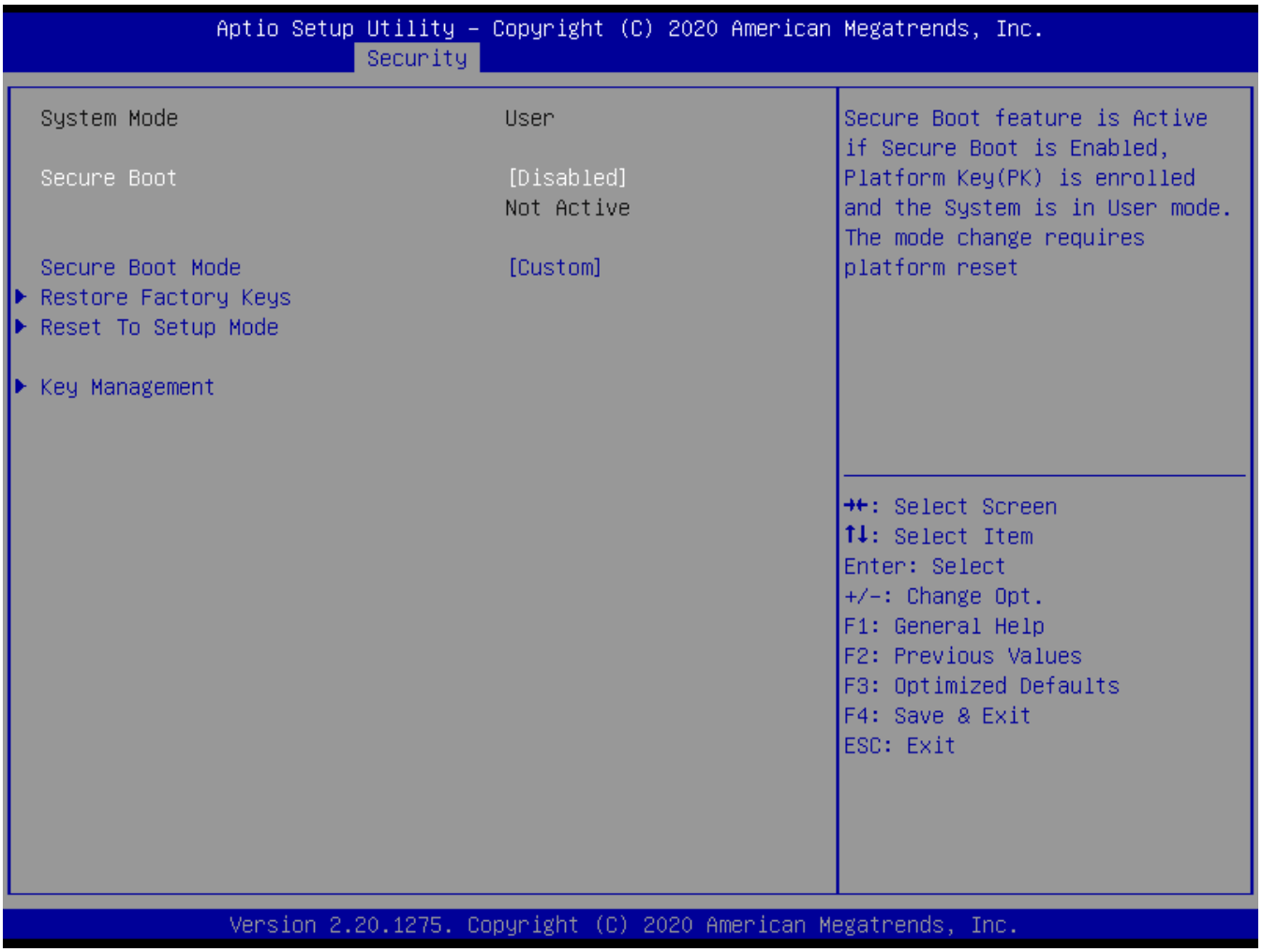
Item	Options	Description
HD Audio	Disabled, Enabled **[Default]**	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.

■ SATA Configuration



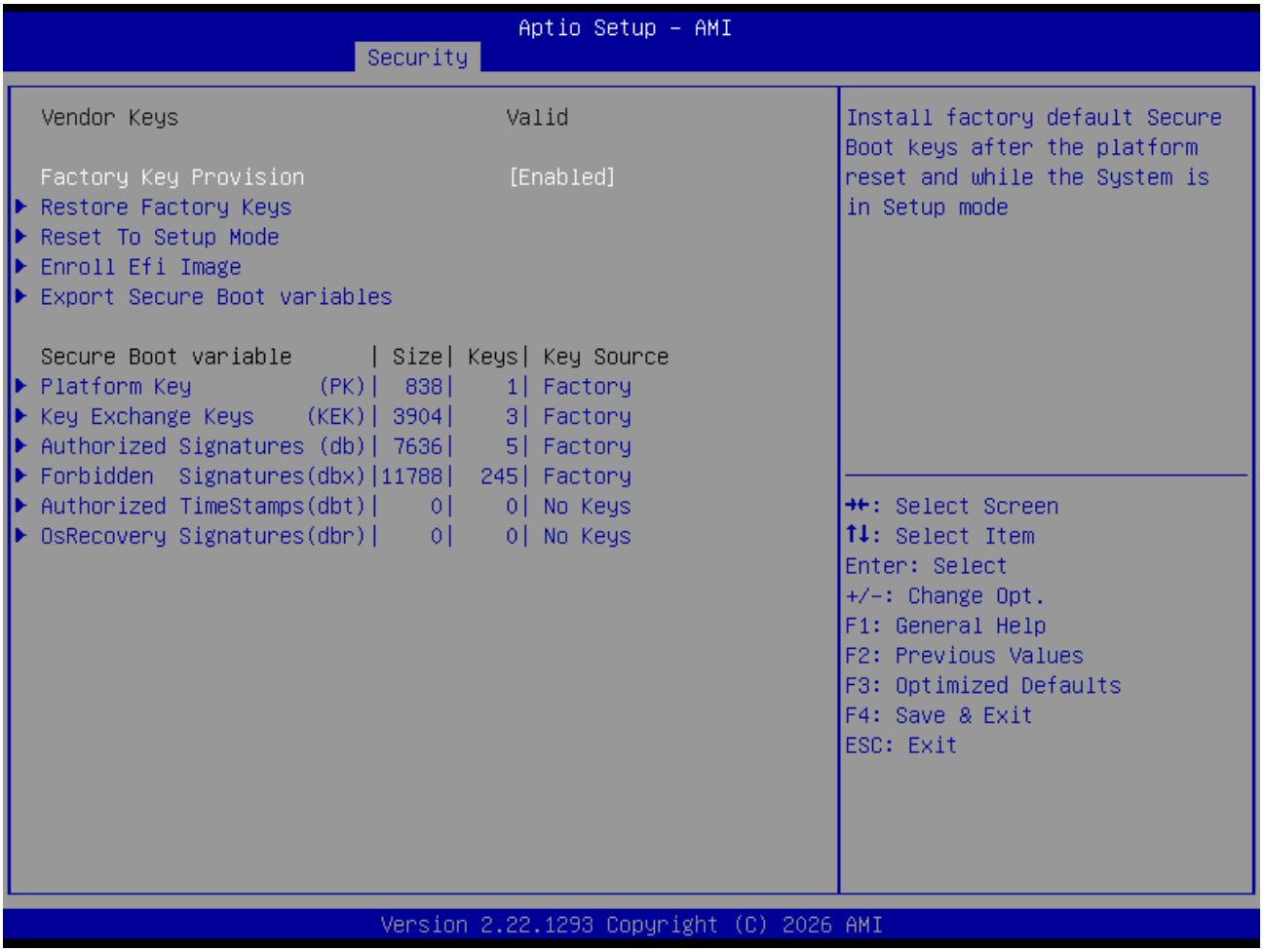
Item	Options	Description
SATA Controller(s)	Enabled**[Default]** Disabled	Enable/Disable SATA Device.
SATA Port	Disabled, Enabled**[Default]**	Enable/Disable SATA Port.

■ Security Boot



Item	Options	Description
Secure Boot	Disabled **[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**[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

Item	Description
Restore Factory Keys	Force system to User Mode. Install factory default Secure Boot key databases
Key Management	Enables expert users to modify Secure Boot Policy variables without variable authentication

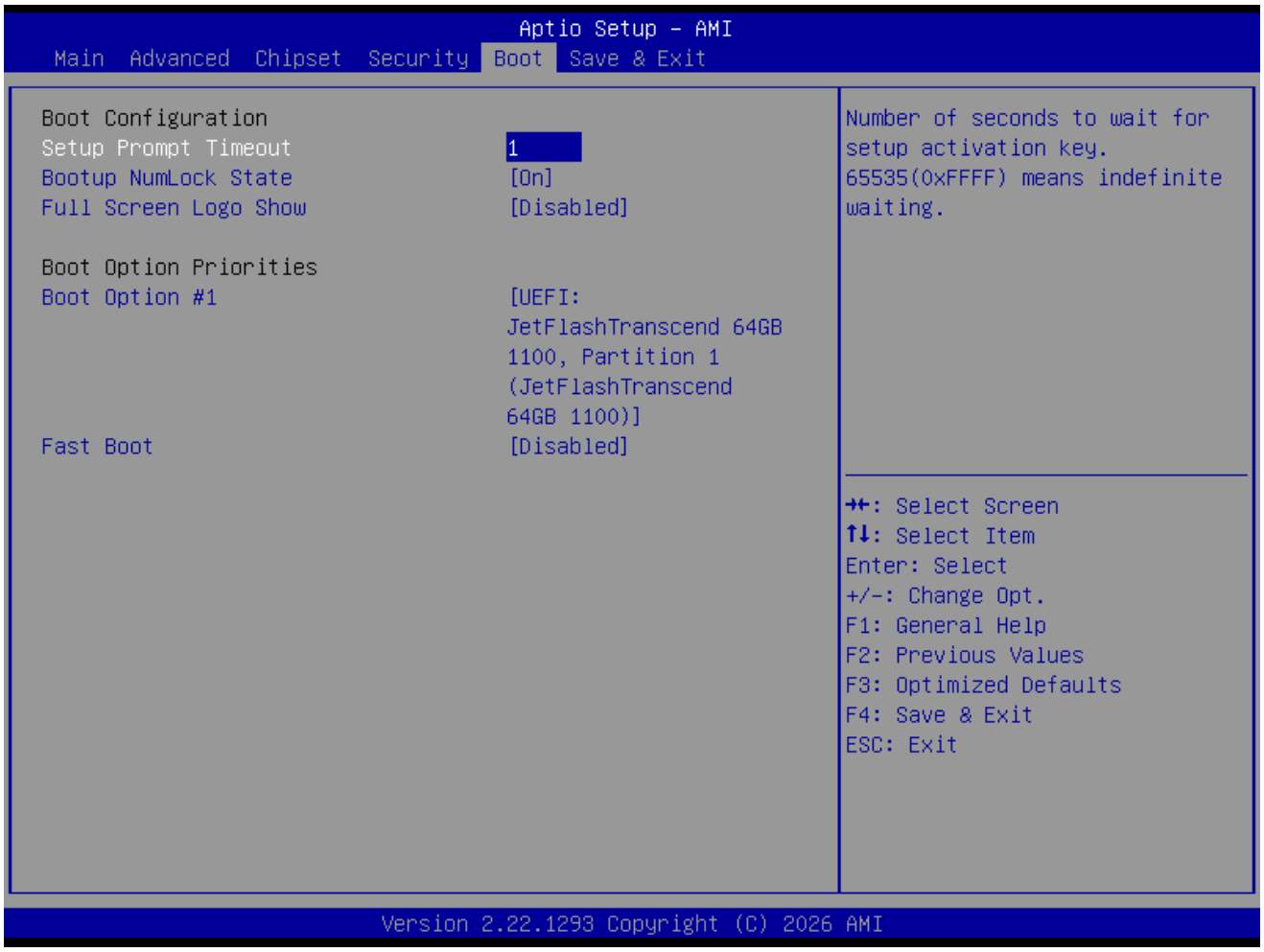


Item	Options	Description
Factory Key Provision	Disabled **[Default]** , Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode

Item	Description
Restore Factory Keys	Force System to User Mode. Install factory default Secure Boot key databases
Enroll Ffi Image	Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db)

4.6 Boot

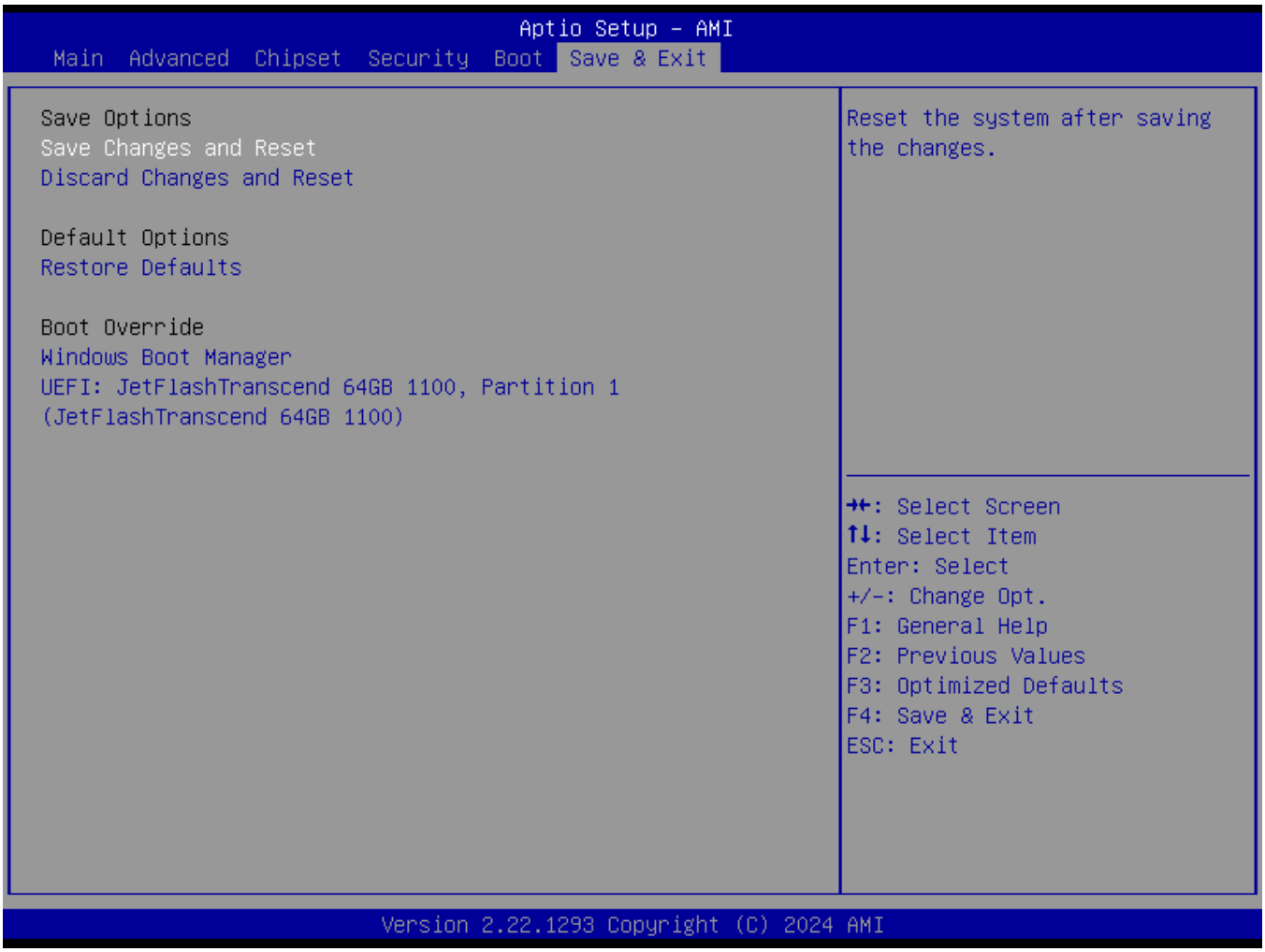
This menu allows you to setup the system boot options.



Item	Options	Description
Setup Prompt Timeout	1**[Default]**	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On**[Default]** , Off	Select the Keyboard NumLock state.
Full Screen Logo Show	Disabled**[Default]** , Enabled	Enables or disables Full Screen Logo Show option.
Fast Boot	Disabled**[Default]** , Enabled	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.
Boot Option #1		Set the system boot order.

4.7 Save & Exit

This setting allows users to configure the boot settings.



Save Changes and Reset

This item allows user to reset the system after saving the changes. This item allows user to reset the system after saving the changes.

Discard Changes and Reset

This item allows user to reset the system without saving any changes.

Restore Defaults

Use this item to restore /load default values for all the setup options.

Appendix

WDT & GPIO

This appendix provides the sample codes of WDT (Watch Dog Timer) and GPIO (General Purpose Input/ Output).

WDT Sample Code

WDT Setting

Psuedo Code

```
// IO Address 0xA16 is time value(second)
// IO Address 0xA15 is WDT enable and configuration
Example, Set 0xA16=-0x02, 0xA15=0x31, it will reset after 2 seconds

#define TimePort            0xA16
#define TimeEnablePort    0xA15

//Set WDT  Time Unit
 buf1 = ReadByte(TimeEnablePort) & 0xf7;    //Clear WDT mode.
// buf1 |= 0x08;                                    //Bit3 :(1:Minute Mode/0:Second Mode)
 WriteByte(TimeEnablePort, buf1);

//Set WDT Time Value
 WriteByte (TimePort , 0x02);                    // Set 2 seconds

//Enable WDT
 buf1 = ReadByte(TimeEnablePort);
 buf1 |= 0x31;
                  //Bit5 :WD_EN,If this bit is set to 1, the counting of watchdog time is enabled.
                 //Bit4 :WD_PULSE ,Select output mode (0: level, 1: pulse) of WDTRST# by setting this bit.
                 //Bit1~0: Select output pulse width of WDTRST#. 0: 1 ms, 1: 25 ms, 2: 125 ms, 3: 5 sec.
 WriteByte(TimeEnablePort, buf1);

// Disable WDT
buf1 = ReadByte(TimeEnablePort);       // Read current WDT setting
buf1 = buf1 & 0xDF;                        // Disable WDT by set WD_EN (bit 5) to 0.
WriteByte(TimeEnablePort, buf1);       // Write back WDT setting.
```

GPIO Sample Code

GPIO Setting

IO_DO4	I/O 0xA02h Bit3
IO_DO3	I/O 0xA02h Bit2
IO_DO2	I/O 0xA02h Bit1
IO_DO1	I/O 0xA02h Bit0
IO_DI4	I/O 0xA03h Bit3
IO_DI3	I/O 0xA03h Bit2
IO_DI2	I/O 0xA03h Bit1
IO_DI1	I/O 0xA03h Bit0

The GPIO function is provided by SIO, and it can be accessed through its GPIO port. To access the GPIO register, write value to data port. The configuration on the DCO1000-ASL is described as below.

Psuedo Code

```
#define GPI_ADDR    0xA03h
#define GPO_ADDR  0xA02h

// 0xA03h is Pin Status(default 0x5F )(at IO_DI1(Bit0) ~  IO_DI4(Bit3))
ByteData = ReadByte (GPI_ADDR)      //Read current Pin Status

//Offset 0xA02h default setting is 0x5F (output pin set to output high) (at IO_DO1(Bit0) ~  IO_DO4(Bit3))
ByteData = 0x0F                          //set IO_DO1~ IO_DO4 to high
WriteByte (GPO_ADDR, ByteData)
```

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