

USER'S MANUAL

BCO-500-MTL

Semi-Rugged Fanless Mini Computer

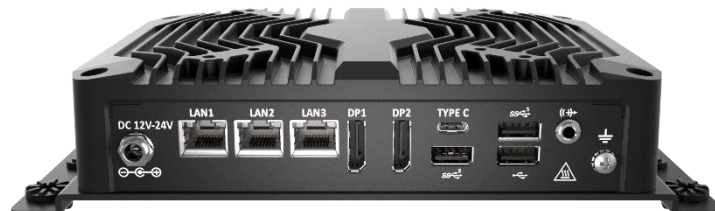


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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2025/10/7

Disclaimer

All specifications and information in this User's Manual are believed to be accurate and up to date. C&T Solution 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 C&T Solution Inc.

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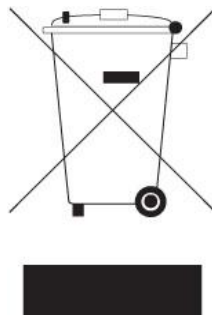
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Environmental Protection Announcement

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 75°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 by 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 to 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 C&T Solution Inc website at www.candtsolution.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-MTL Series Fanless Mini Industrial Computer	1
2	150W Power Adapter	1
3	Accessory Kit	1

Ordering Information

Model No.	Product Description
BCO-500-MTL-3L-125U	Fanless Mini Industrial Computer with Intel® Core™ Ultra 5 125U Processors, 2x DP, 3x USB, 1x Type C, 3x LAN, 1x 150W ADP
BCO-500-MTL-3L-155U	Fanless Mini Industrial Computer with Intel® Core™ Ultra 7 155U Processors, 2x DP, 3x USB, 1x Type C, 3x LAN, 1x 150W ADP

Optional Accessories

Model No.	Product Description
1-TPCD00008	AC Power Cord, 3-pin US Type, 183cm
1-TPCD00009	AC Power Cord, 3-pin EU Type, 183cm
3-BC5AD020S10-S0	M.2 B KEY Thermal Kit
3-BC5AD110S10-S0	Din-Rail Mounting Kit

Chapter 1

Product Introductions

1.1 Overview

C&T 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® Core™ Ultra Processors, Meteor Lake-U, TDP 15W
- 1x 262-pin DDR5 5600 SO-DIMM. Max. up to 32GB
- 3x Intel® 2.5 GbE
- Dual Independent Display: 2x DisplayPort
- 1x M.2 M Key for NVMe/ SATA, Auto detect
- 1x M.2 B Key for 4G/5G/NVMe support, 1x M.2 E Key for Wifi/Bluetooth
- 1x SIM Socket
- 2x COM, 1x USB Type-C Gen 1, 2x USB 3.2 Gen 1, 1x USB 2.0
- Wide Operating Temperature: -20°C to 60°C
- dTPM 2.0 Supported
- Wide Voltage DC IN 12~24V

1.2 Hardware Specification

System

Processor

- Intel® Core™ Ultra 5 Processor 125U 12M Cache, up to 4.30 GHz (2+8+2 core), 15W
- Intel® Core™ Ultra 7 Processor 155U 12M Cache, up to 4.80 GHz (2+8+2 core), 15W

System Chipset	SoC integrated
LAN Chipset	GbE1: Intel i226-LM 2.5GbE LAN PXE iAMT Support GbE2: Intel i226-V 2.5GbE LAN PXE iAMT Support GbE3: Intel i226-V 2.5GbE LAN PXE iAMT Support
Audio Codec	Realtek® ALC897 CODEC
System Memory	1x 262-Pin DDR5 5600MHz SO-DIMM. Max. up to 32GB (Non-ECC)
BIOS	AMI uEFI BIOS
Watchdog	Software Programmable Supports 1~255 sec. System Reset
TPM	fTPM 2.0, dTPM 2.0

Display

Display Port	2x DP++ 1.4 up to 3040x2160 @60Hz
Multiple Display	2x Independent Displays

Storage

M.2 M-Key	1x M.2 M Key (2280, PCIe x4 Gen 4/SATA) support for NVMe/ SATA SSD, Auto Detect
-----------	--

Expansion

M.2	1x M.2 B Key (3042/3052, PCIe x2+USB 3.0+USB 2.0) support for 4G/5G/NVMe 1x M.2 E Key (2230, PCIe+USB 2.0) for Wifi/Bluetooth
-----	---

I/O

DisplayPort	2x DisplayPort	Audio	1x Line-Out, 1x Mic-In
COM	2x DB9 COM1: RS232/422/485 COM2: RS232	SIM	1x SIM Socket
LAN	3x 2.5GbE RJ45	DC-in Jack	1x DC IN Power Jack with Lock
USB	1x USB 3.2 Type-C (5 Gbps) 2x USB 3.2 Gen 1 (5 Gbps) 1x USB 2.0	Others	6x Antenna Holes 1x Power Button

Operating System

Windows	Windows 11
Linux	Ubuntu 22.04

Power

Power Adapter	AC/DC Adapter 20V/7.5A, 150W
Power Mode	AT, ATX (Default ATX)
Power Supply Voltage	12~24VDC
Power Connector	DC in Power Jack with Lock
Power Protection	OVP (Over Voltage Protection) OCP (Over Current Protection) Reverse Protection Surge Protection

Environment

Operating Temp.	-20°C to 60°C
Storage Temp.	-20°C to 75°C
Relative Humidity	10% to 95% (non-condensing)
Certification	UL 62368 Ed. 3 CE, FCC Class A, UKCA
Vibration	With SSD: 5 Grms (5 - 500 Hz, 0.5 hr/axis)
Shock	With SSD: 50G half-sin 11ms

Physical

Construction	Extruded Aluminum with Heavy Duty Metal
Dimension	225 (W) x 130 (D) x 48 (H) mm
Weights	2 KG
Mounting	Wall Mounting Vesa Mounting Din-Rail Mounting (Optional)

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

1.3 System I/O

BCO-500-MTL

Front Panel

DC IN

Used to plug a DC power input with terminal Block

USB port

Used to connect USB device

USB Type C

Used to connect USB Type C device

DisplayPort

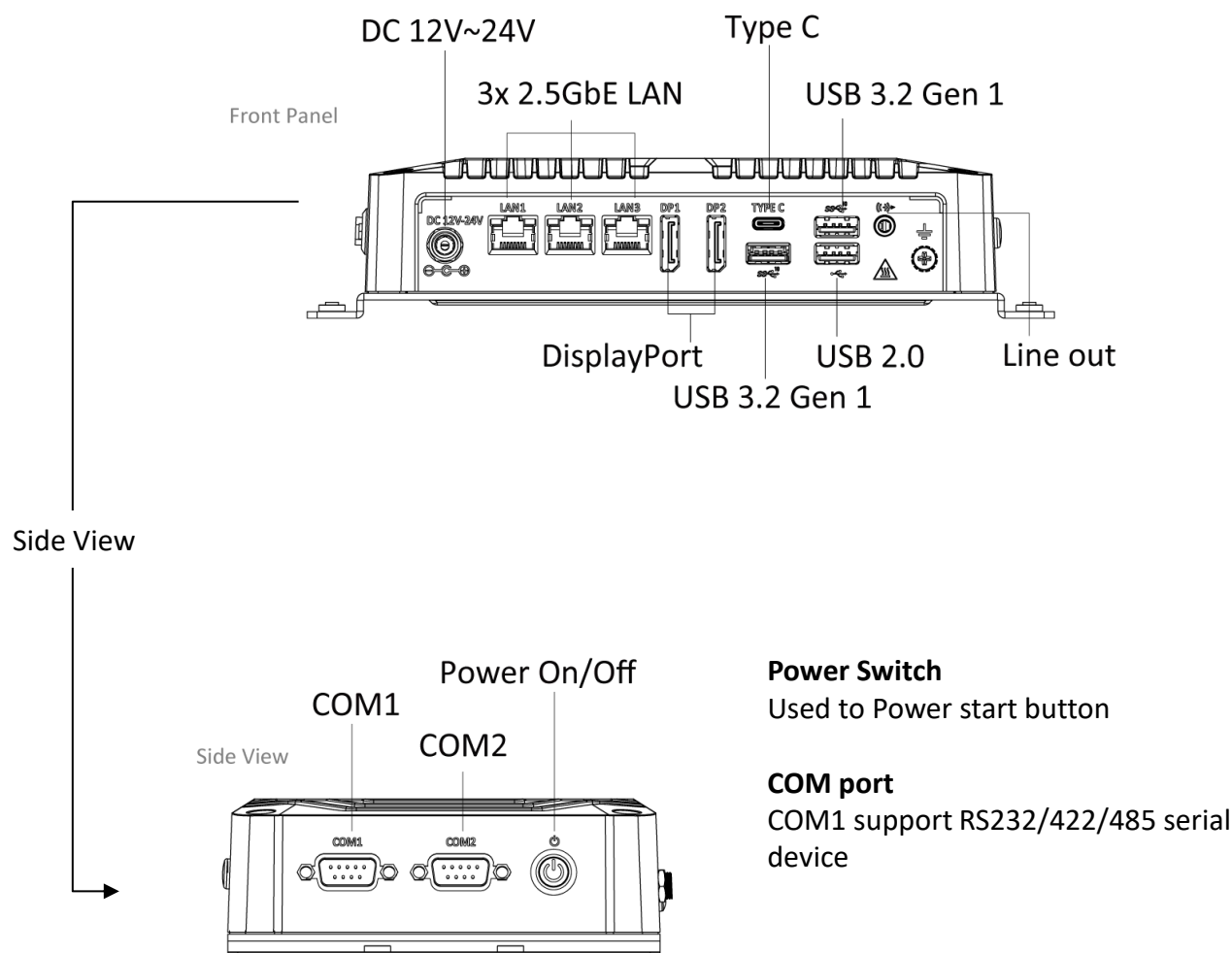
Used to connect a DisplayPort monitor

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

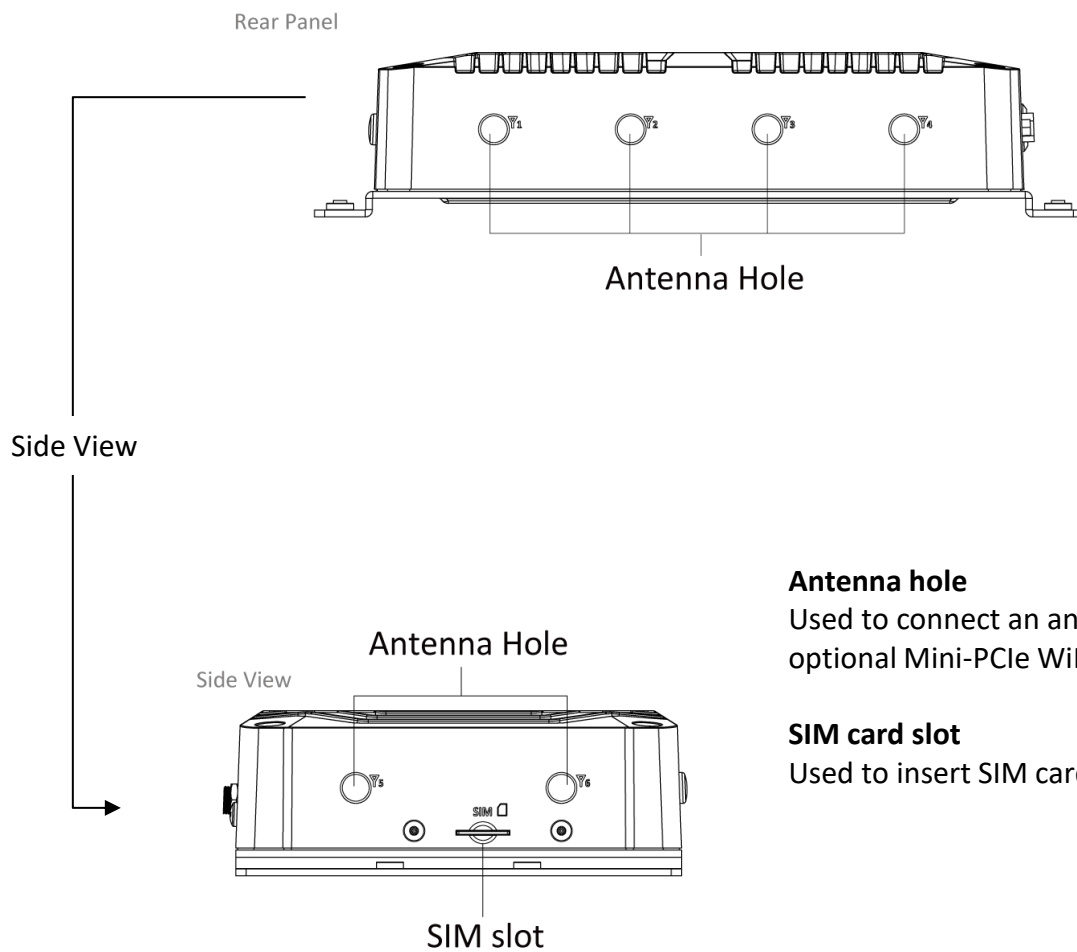
COM port

COM1 support RS232/422/485 serial device

Rear Panel

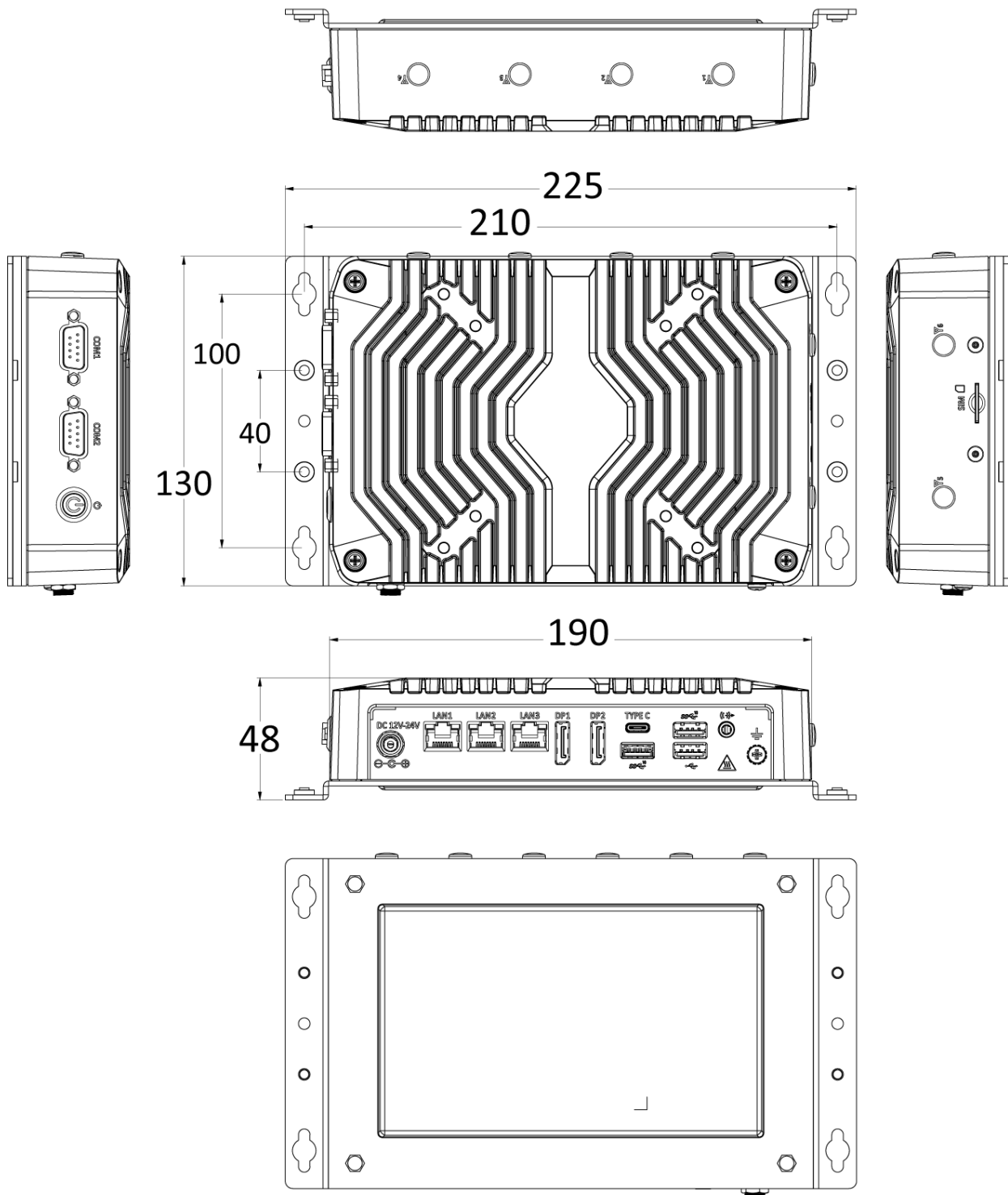
Antenna hole

Used to connect an antenna for optional Mini-PCIe WiFi module



1.4 Mechanical Dimensions

Unit: mm

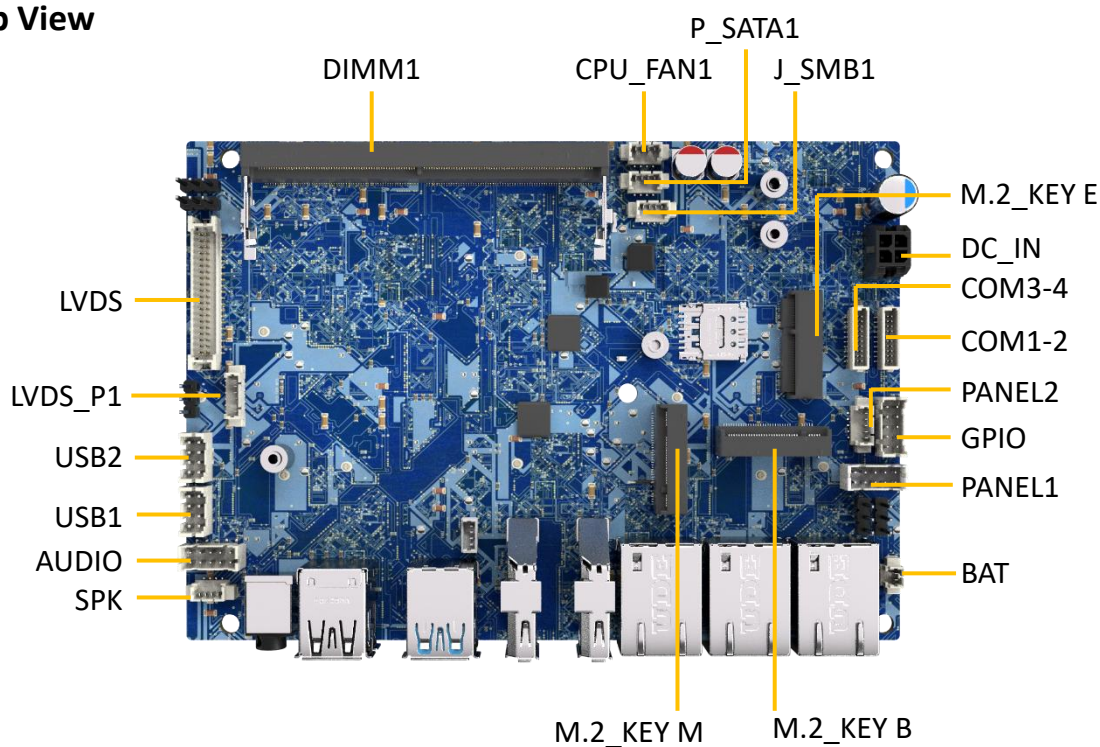


Chapter 2

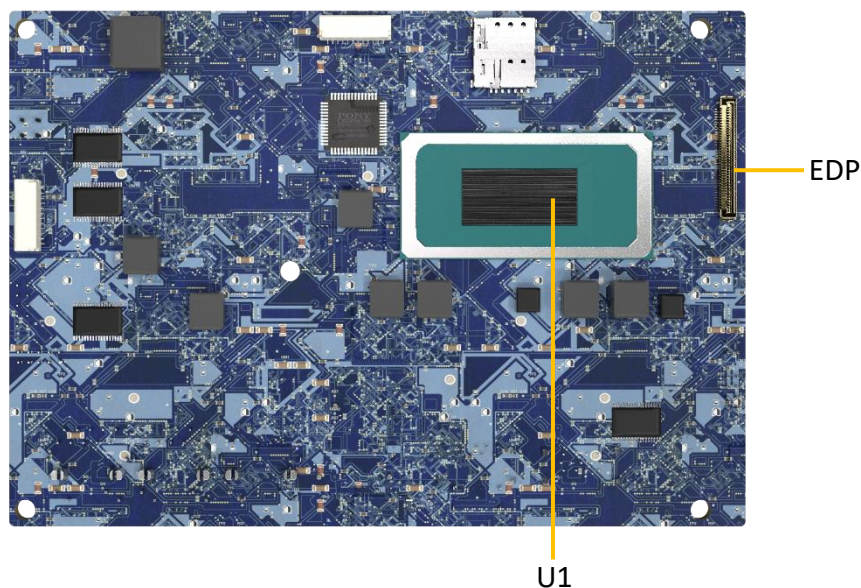
Mechanical Specifications

2.1 Switch and Connector Locations

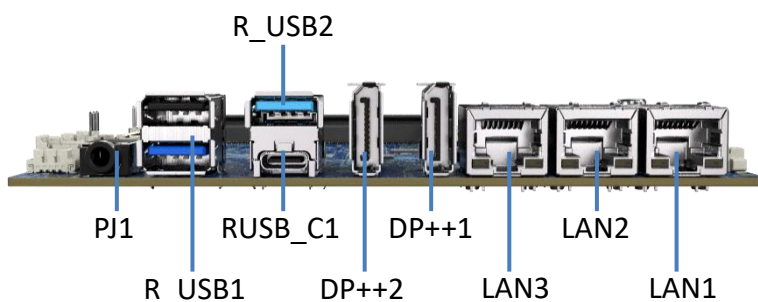
2.1.1 Top View



2.1.2 Bottom view



2.1.3 Rear I/O

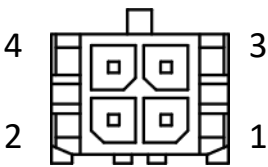
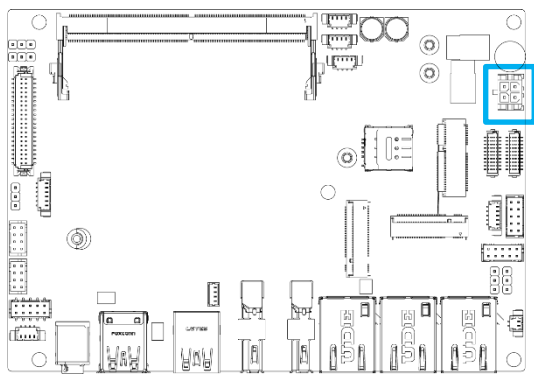


2.2 Connector / Switch Definition

Connector Location	Definition
U1	CPU
DIMM1	DDR5 SO-DIMM Slot
DC_IN	DC 12-24V Power Input 4P Micro-Fit Connector
EDP	eDP Signal I-PEX Connector
LVDS	LVDS Signal DF13 Wafer
LVDS_P1	LVDS Backlight Control Wafer
DP++1	DP++ Upright Connector
DP++2	DP++ Upright Connector
PJ1	Line-Out + MIC 2in1 3.5mm Jack
AUDIO	Front Audio Wafer (Line-Out + MIC + Line-In)
SPK	Left+ Right Amplifier Wafer
M.2_KEY M	M.2 M KEY (PCIe x4/SATA, Auto Detect, 2280)
M.2_KEY B	M.2 B KEY (PCIe x2/USB3.0+USB2.0, 3042/3052)
M.2_KEY E	M.2 E KEY (PCIe+USB2.0, 2230)
LAN1	2.5GbE LAN RJ45 Connector1
LAN2	2.5GbE LAN RJ45 Connector2
LAN3	2.5GbE LAN RJ45 Connector3
R_USB1	Dual USB3.0+USB2.0 TYPE-A Connector
R_USB2	USB3.0 TYPE-A Connector
RUSB_C1	USB3.0 TYPE-C Connector
USB1	Front Dual USB2.0 Wafer
USB2	Front Dual USB2.0 Wafer
COM1-2	COM1+COM2 Wafer
COM3-4	COM3+COM4 Wafer
GPIO	GPIO Wafer
PANEL1	Front Panel Wafer1
PANEL2	Front Panel Wafer2
CPU_FAN1	CPU FAN Wafer

2.3 Definition of Connectors

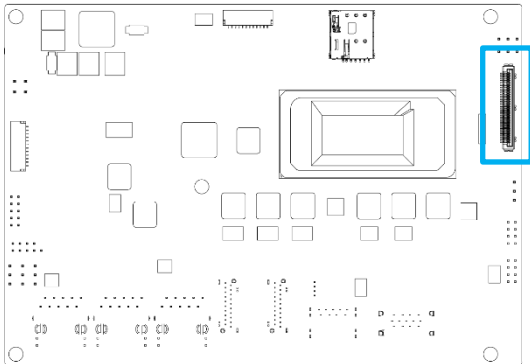
2.3.1 DC 12V/24V Power Input: Micro-Fit, 2*2P, 3.00 mm



DC_IN

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

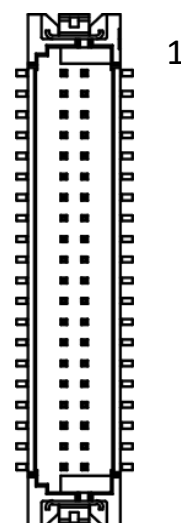
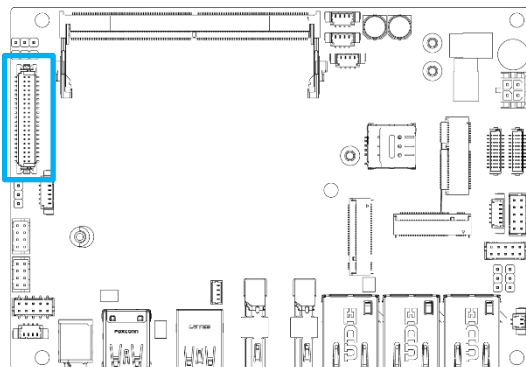
2.3.2 eDP: I-PEX, 40P, 0.5mm



EDP

Pin	Definition	Pin	Definition
1	VCC3.3/VCC5 ^[1]	21	EDP2_TX1+
2	VCC3.3/VCC5 ^[1]	22	GND
3	VCC3.3/VCC5 ^[1]	23	EDP2_TX0-
4	VCC3.3/VCC5 ^[1]	24	EDP2_TX0+
5	VCC3.3/VCC5 ^[1]	25	GND
6	VCC3.3	26	EDP2_AUX+
7	SMB_SCL	27	EDP2_AUX-
8	SMB_SDA	28	GND
9	GND	29	VCC3.3
10	EDP_HPD	30	GND
11	N/C	31	VCC12
12	N/C	32	GND
13	GND	33	GND
14	EDP2_TX3-	34	VCC5
15	EDP2_TX3+	35	GND
16	GND	36	EPD2_BKLT_CTL
17	EDP2_TX2-	37	EPD2_BKL_EN
18	EDP2_TX2+	38	VCC12
19	GND	39	VCC3.3
20	EDP2_TX1-	40	GND

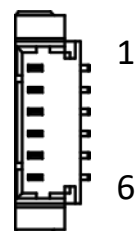
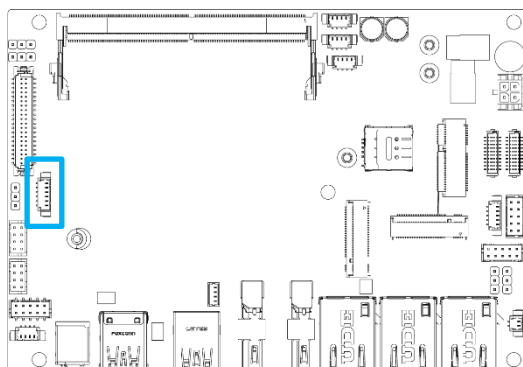
2.3.3 LVDS: DF13, 20*2P, 1.25mm



LVDS

Pin	Definition	Pin	Definition
1	VCC12	2	VCC12
3	VCC3.3/VCC5 ^[1]	4	VCC12
5	VCC3.3/VCC5 ^[1]	6	VCC3.3/VCC5 ^[1]
7	LVDS_SPC	8	LVDS_SPD
9	LVDS_BKLT_CTL	10	LVDS_BKL_EN
11	VCC3.3	12	LVDS_DET
13	LVDS_A_DATA1+	14	LVDS_A_DATA0+
15	LVDS_A_DATA1-	16	LVDS_A_DATA0-
17	GND	18	GND
19	LVDS_A_DATA3+	20	LVDS_A_DATA2+
21	LVDS_A_DATA3-	22	LVDS_A_DATA2-
23	GND	24	GND
25	LVDS_B_DATA1+	26	LVDS_B_DATA0+
27	LVDS_B_DATA1-	28	LVDS_B_DATA0-
29	GND	30	GND
31	LVDS_B_DATA3+	32	LVDS_B_DATA2+
33	LVDS_B_DATA3-	34	LVDS_B_DATA2-
35	GND	36	GND
37	LVDS_A_CLK+	38	LVDS_B_CLK+
39	LVDS_A_CLK-	40	LVDS_B_CLK-

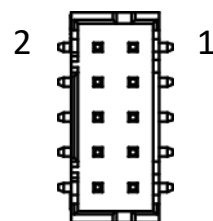
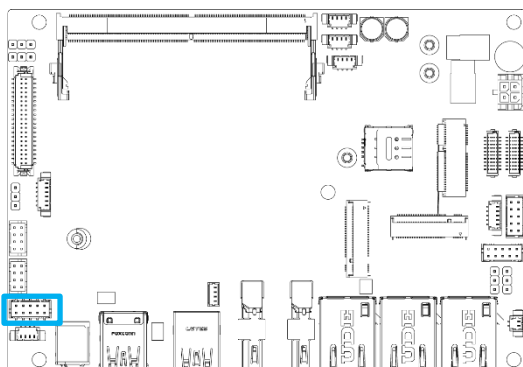
2.3.4 LVDS Backlight Control: Wafer, 6*1P, 1.25mm



LVDS_P1

Pin	Definition	Pin	Definition
1	VCC5/VCC12 ^[1]	4	LVDS_BKLT_CTL
2	VCC5/VCC12 ^[1]	5	GND
3	LVDS_BKL_EN	6	GND

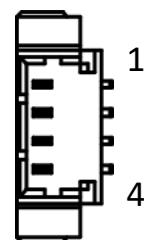
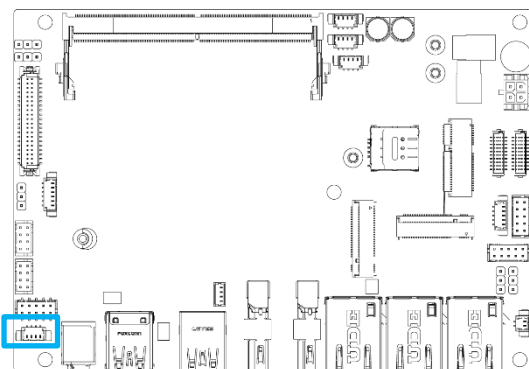
2.3.5 Front Audio: Wafer,(Line-Out + MIC + Line-In) 5*2P, 2.00mm



AUDIO

Pin	Definition	Pin	Definition
1	LINE_IN_R	2	MIC_IN2_R
3	LINE_IN_L	4	MIC_IN2_L
5	LINE_OUT_R	6	MIC2_JD
7	LINE_OUT_L	8	LINE_JD
9	LINE2_JD	10	GND_AUD

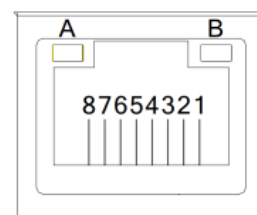
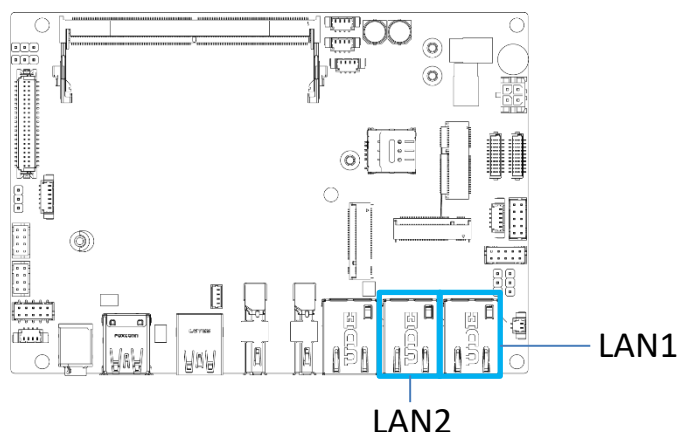
2.3.6 Left+ Right Amplifier: Wafer 4*1P, 1.25mm



SPK

Pin	Definition	Pin	Definition
1	SPK_OUT_L-	3	SPK_OUT_R-
2	SPK_OUT_L+	4	SPK_OUT_R+

2.3.7 2.5GbE LAN RJ45 Connector1



LAN1

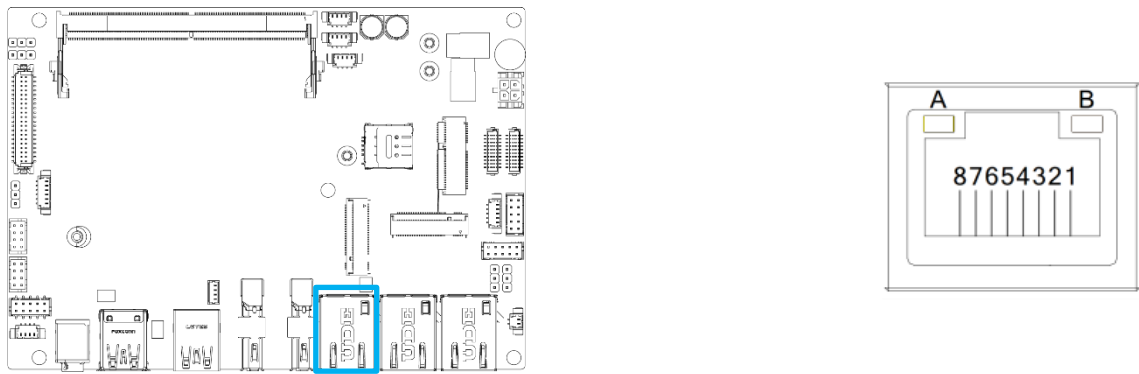
Pin	Definition		Pin	Definition	
1	MDI0+		4	MDI2-	
2	MDI0-		5	MDI1-	
3	MDI1+		7	MDI3+	
4	MDI2+		8	MDI3-	
A	Active LED	ACT: Twinkling Yellow	B	Speed LED	1000M: Turn Orange
		Only LINK: Lights On			1000M: Turn Green
		Only LINK: Lights Off			10M: Lights Off

2.3.8 2.5GbE LAN RJ45 Connector2

LAN2

Pin	Definition		Pin	Definition	
1	MDI0+		4	MDI2-	
2	MDI0-		5	MDI1-	
3	MDI1+		7	MDI3+	
4	MDI2+		8	MDI3-	
A	Active LED	ACT: Twinkling Yellow	B	Speed LED	1000M: Turn Orange
		Only LINK: Lights On			1000M: Turn Green
		Only LINK: Lights Off			10M: Lights Off

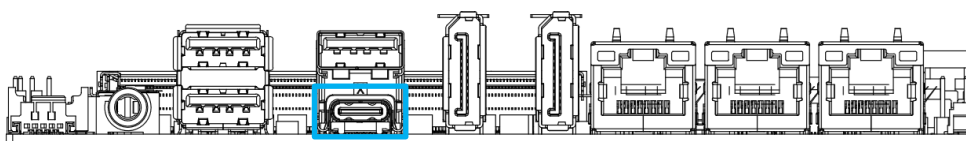
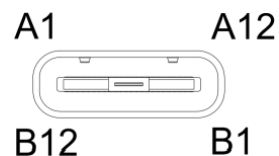
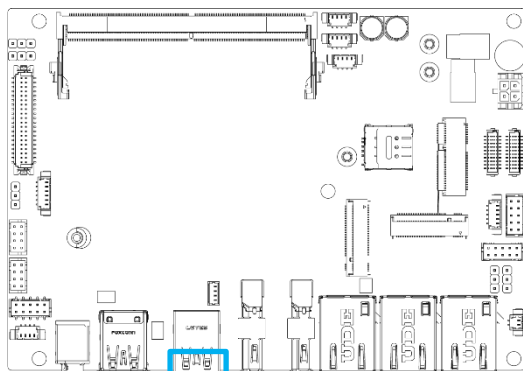
2.3.9 2.5GbE LAN RJ45 Connector3



LAN3

Pin	Definition		Pin	Definition	
1	MDI0+		4	MDI2-	
2	MDI0-		5	MDI1-	
3	MDI1+		7	MDI3+	
4	MDI2+		8	MDI3-	
A	Active LED	ACT: Twinkling Yellow	B	Speed LED	1000M: Turn Orange
		Only LINK: Lights On			1000M: Turn Green
		Only LINK: Lights Off			10M: Lights Off

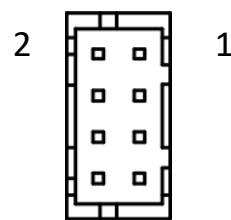
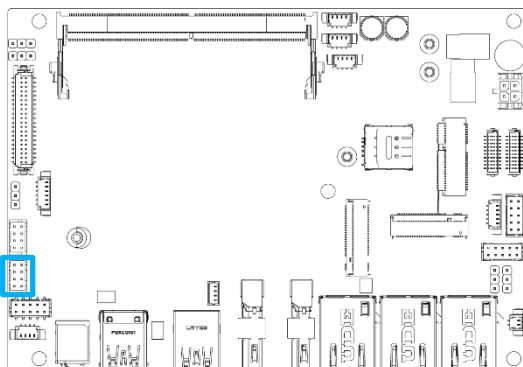
2.3.10 USB3.0 TYPE-C Connector



RUSB_C1

Pin	Definition	Pin	Definition
A1	GND	B1	GND
A2	SS_C1_TX1+	B2	SS_C1_TX2+
A3	SS_C1_TX1-	B3	SS_C1_TX2+
A4	VBUS	B4	VBUS
A5	C1_CC1	B5	C1_CC2
A6	USB2.0+	B6	USB2.0+
A7	USB2.0-	B7	USB2.0-
A8	N/C	B8	N/C
A9	VBUS	B9	VBUS
A10	SS_C1_RX2+	B10	SS_C1_RX1+
A11	SS_C1_RX2-	B11	SS_C1_RX1-
A12	GND	B12	GND

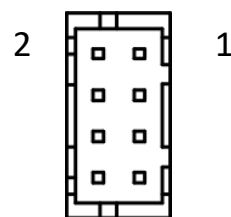
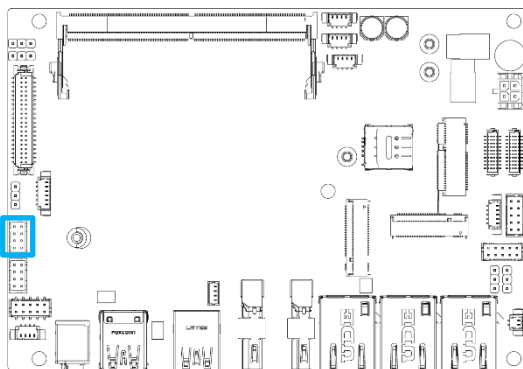
2.3.11 Front Dual USB2.0: Wafer, 4*2P, 2.00mm



USB1

Pin	Definition	Pin	Definition
1	GND	2	5V
3	USB_0+	4	USB_1-
5	USB_0-	6	USB_1+
7	5V	8	GND

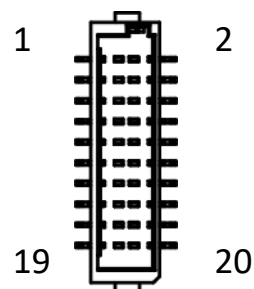
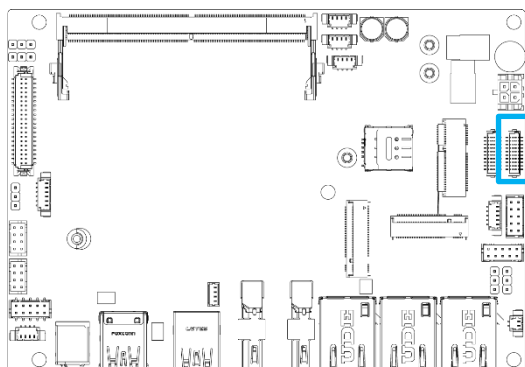
2.3.12 Front Dual USB2.0: Wafer, 4*2P, 2.00mm



USB2

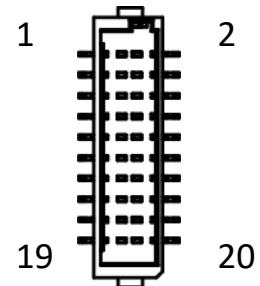
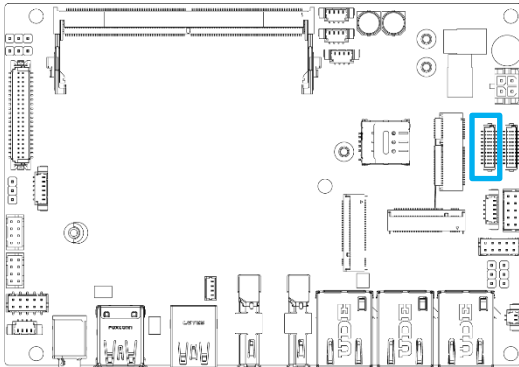
Pin	Definition	Pin	Definition
1	GND	2	5V
3	USB_0+	4	USB_1-
5	USB_0-	6	USB_1+
7	5V	8	GND

2.3.13 COM1+COM2: Wafer, 10*2P, 1.00mm



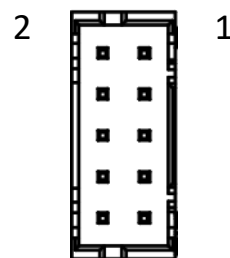
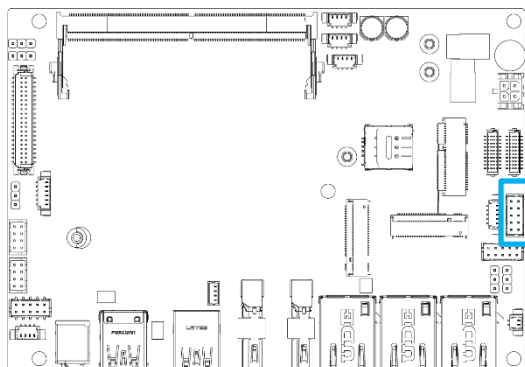
COM1-2

Pin	Definition	Pin	Definition
1	COM1_RS232_DCD/ COM1_RS422_TXD-/ COM1_RS485_TXD-	2	COM2_RS232_DCD
3	COM1_RS232_RXD/ COM1_RS422_TXD+/ COM1_RS485_TXD+	4	COM2_RS232_RXD
5	COM1_RS232_TXD/ COM1_RS422_RXD+	6	COM2_RS232_TXD
7	COM1_RS232_DTR/ COM1_RS422_RXD+	8	COM2_RS232_DTR
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

2.3.14 COM3+COM4: Wafer, 10*2P, 1.00mm**COM3-4**

Pin	Definition	Pin	Definition
1	COM3_RS232_DCD	2	COM4_RS232_DCD
3	COM3_RS232_RXD	4	COM4_RS232_RXD
5	COM3_RS232_TXD	6	COM4_RS232_TXD
7	COM3_RS232_DTR	8	COM4_RS232_DTR
9	GND	10	GND
11	COM3_RS232_DSR	12	COM4_RS232_DSR
13	COM3_RS232_RTS	14	COM4_RS232_RTS
15	COM3_RS232_CTS	16	COM4_RS232_CTS
17	COM3_RS232_RI	18	COM4_RS232_RI
19	N/C	20	N/C

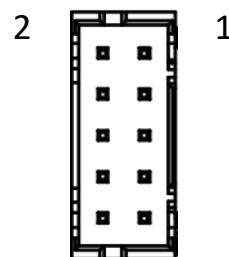
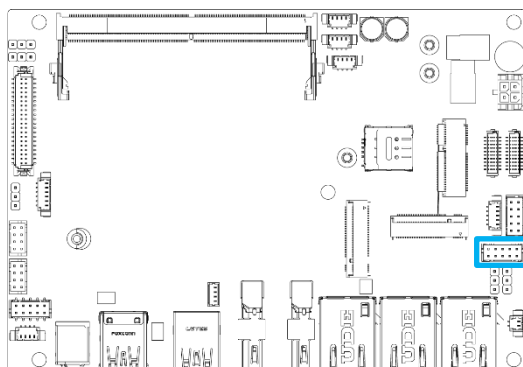
2.3.15 GPIO: Wafer, 5*2P, 2.00mm



GPIO

Pin	Definition	Pin	Definition
1	GPO7	2	GPO3
3	GPO6	4	GPO2
5	GPO5	6	GPO1
7	GPO4	8	GPO0
9	GND	10	VCC5

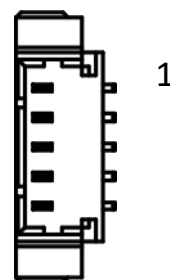
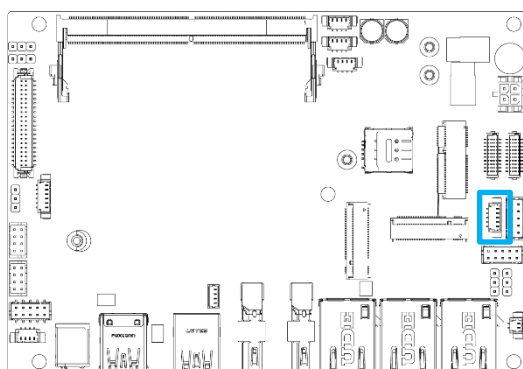
2.3.16 Front Panel: Wafer, 5*2P, 2.00mm



F_PANEL1

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

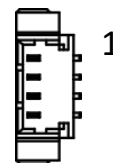
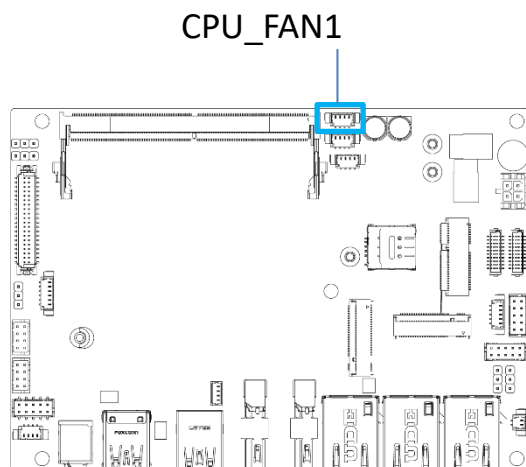
2.3.17 Front Panel: Wafer, 5*1P, 1.25mm



F_PANEL2

Pin	Definition	Pin	Definition
1	VCC5	2	Power On_N
3	GND	4	VCC3.3 STB
5	Reset_N		

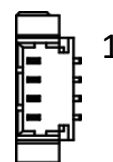
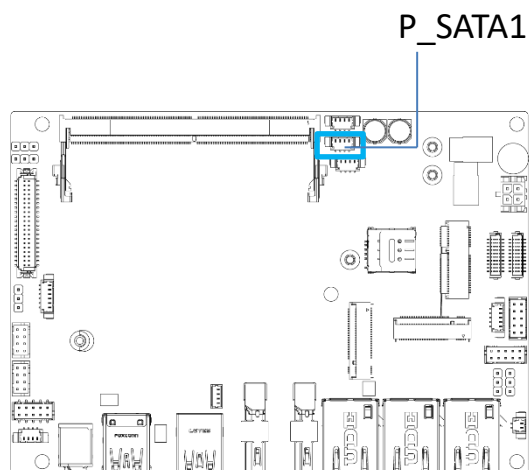
2.3.18 CPU FAN Wafer



CPU_FAN1

Pin	Definition	Pin	Definition
1	GND	3	FAN Speed Detection
2	VCC12	4	FAN Speed Control

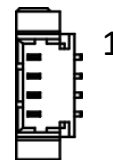
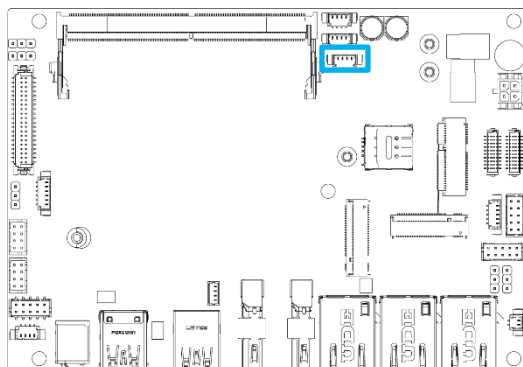
2.3.19 SATA Power Wafer



P_SATA1

Pin	Definition	Pin	Definition
1	VCC5S	3	GND
2	VCC5S	4	GND

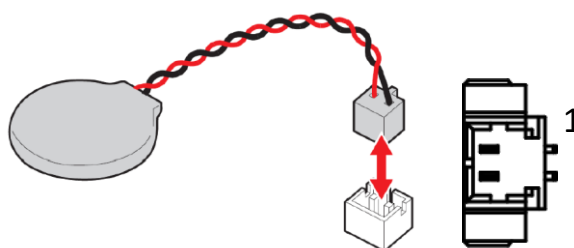
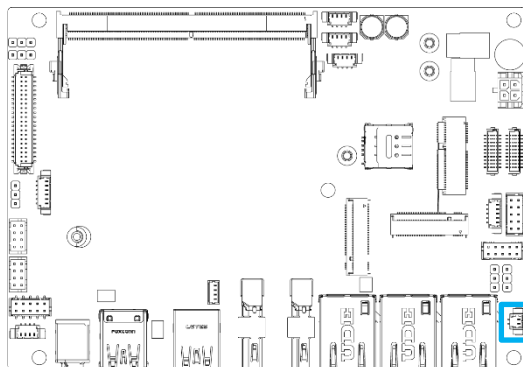
2.3.20 SMBus Wafer



J_SMB1

Pin	Definition	Pin	Definition
1	VCC5	3	SMB_SDA
2	SMB_SCL	4	GND

2.3.21 CMOS Battery Wafer



BAT1

Pin	Definition	Pin	Definition
1	VCC_BAT	2	GND

Chapter 3

System Setup

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

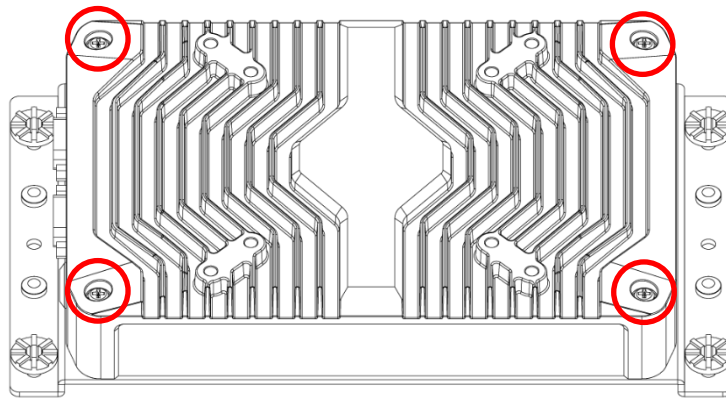
3.1 Replacement of Internal Modules



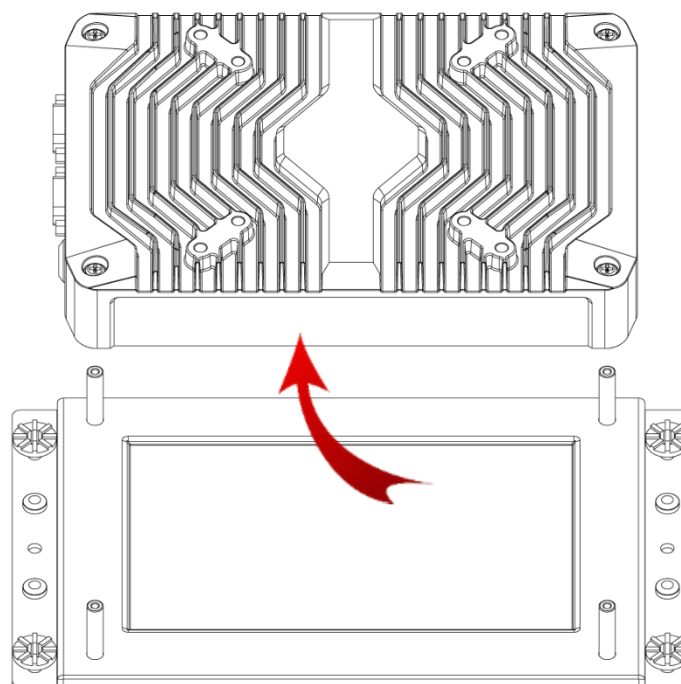
WARNING

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.

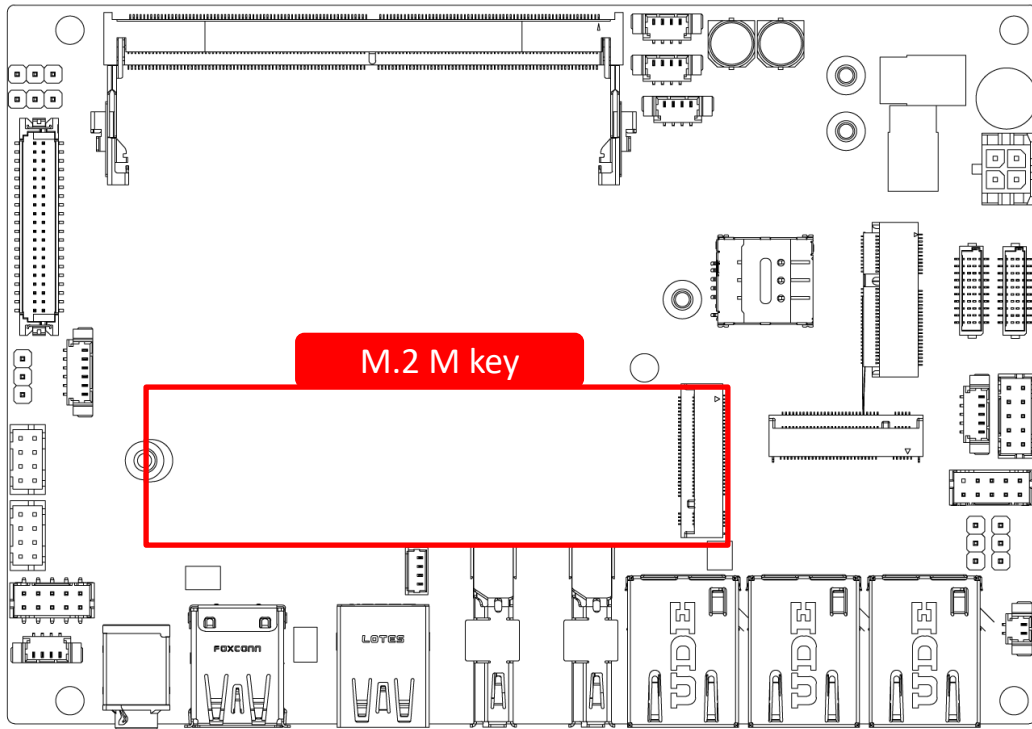


2. Remove the screws, then separate the main unit from top to bottom.



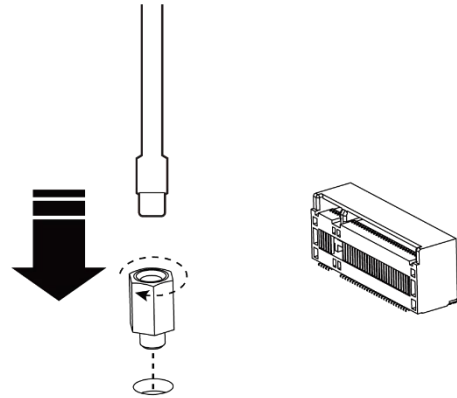
3.2 Install M.2 M Key Socket

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

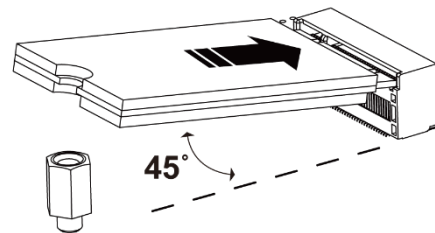


Install M.2 M Key NVMe SSD Step by Step

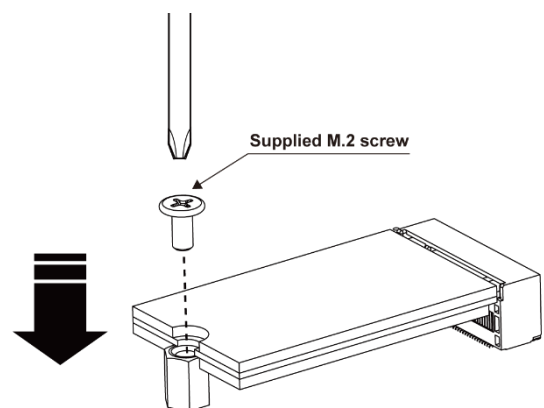
1. Assemble the copper stud



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

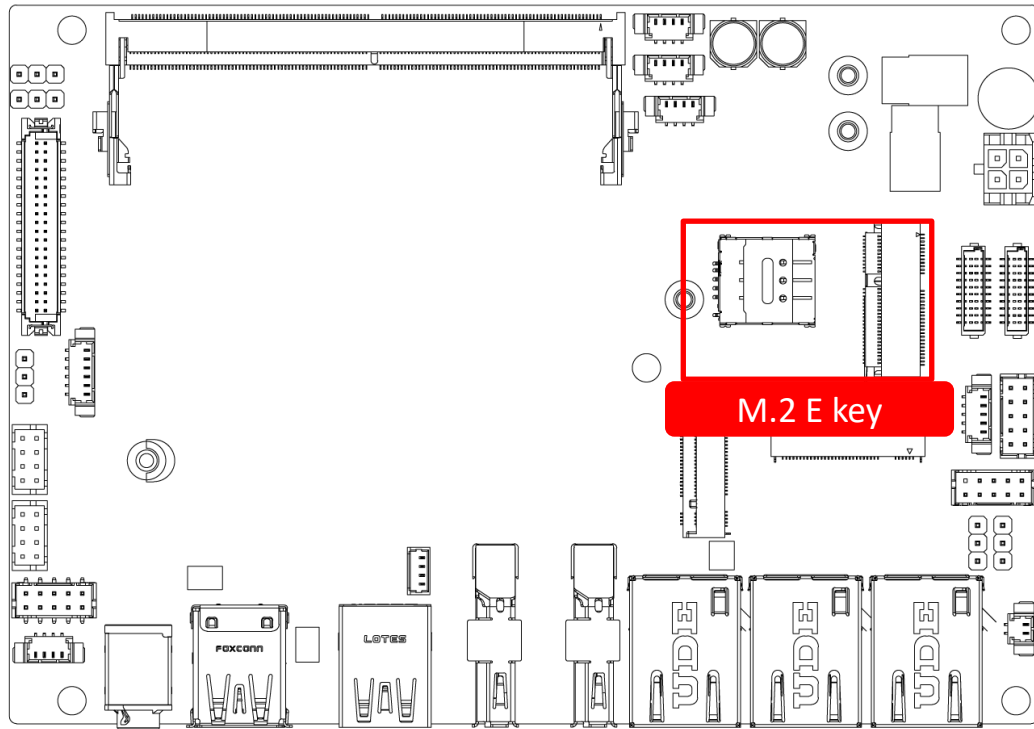


3. Press the NVMe SSD down and secure it with one screw.

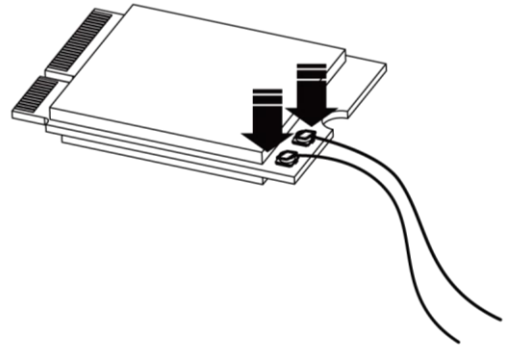


3.3 Install wireless network card and antenna

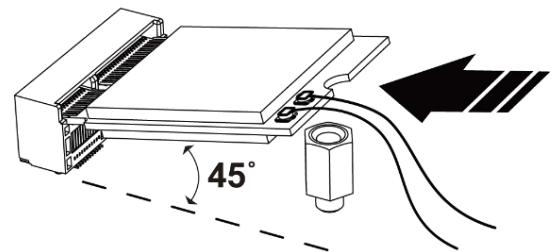
1. The M.2 E-Key supports Wi-Fi module, as highlighted in the picture below.



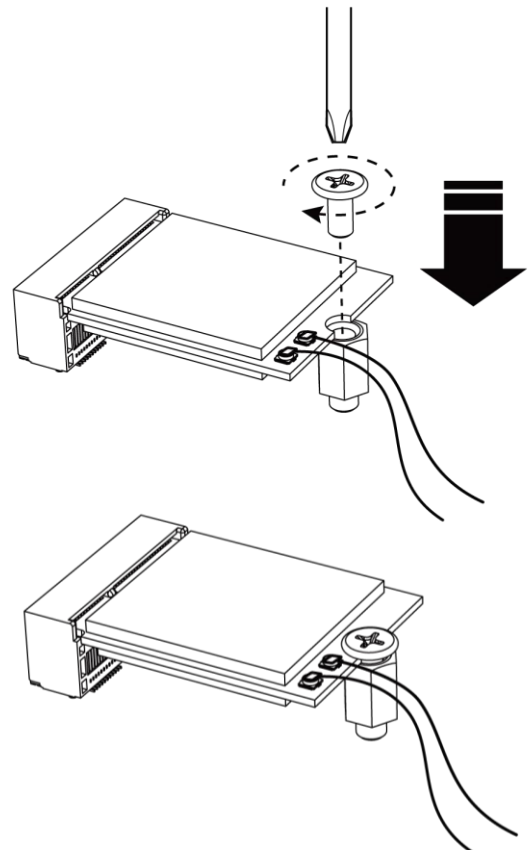
2. Connect the SMA cables to the Wi-Fi module.



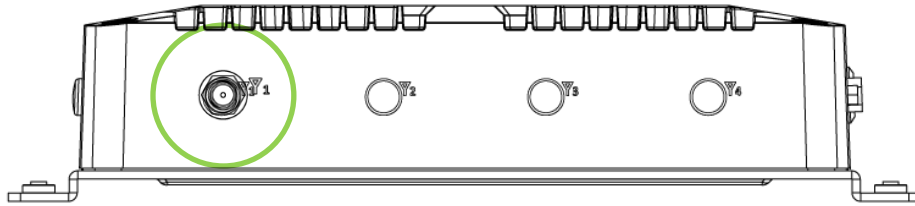
3. Insert the Wi-Fi module at a 45-degree angle.



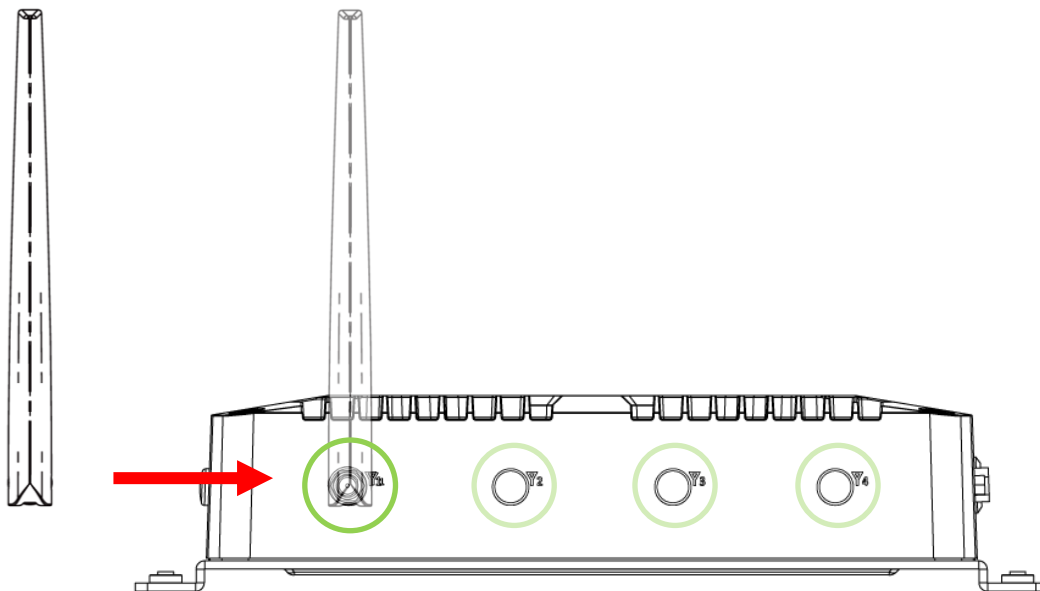
4. Press the Wi-Fi module down and secure it with one screw.



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.

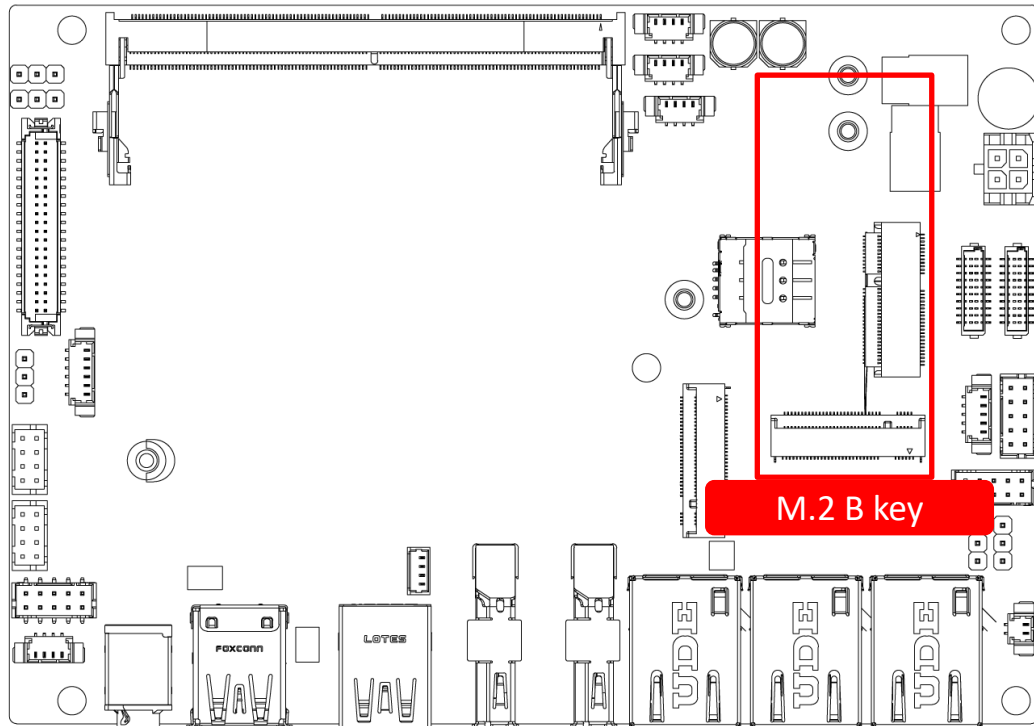


6. Attach the external antenna to the SMA jack by securely threading them together.

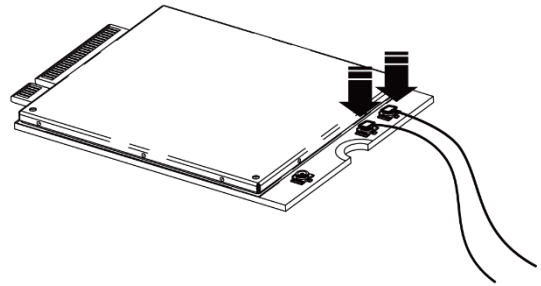


3.4 Install Communication Module and Antenna

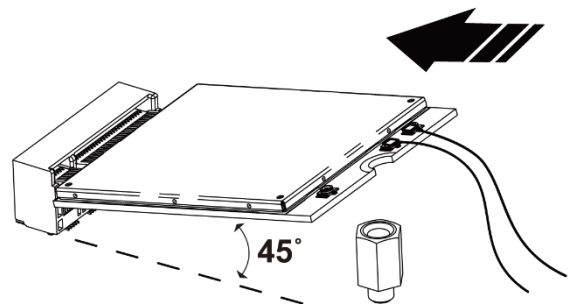
1. The M.2 B-Key supports communication (4G/5G) module, as highlighted in the picture below.



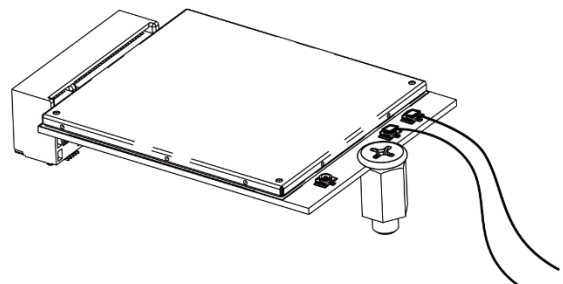
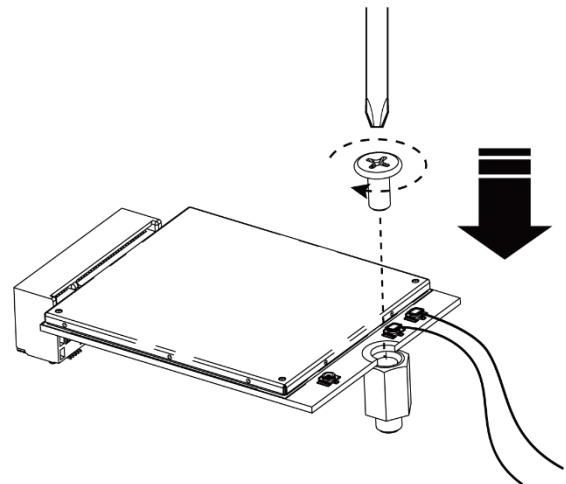
2. Connect the SMA cables to the communication (4G/LTE) module.



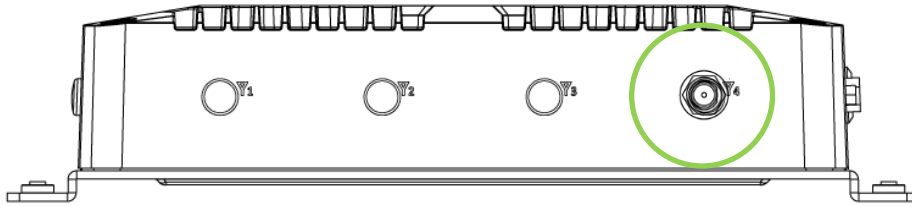
3. Insert the communication (4G/5G) module at a 45-degree angle.



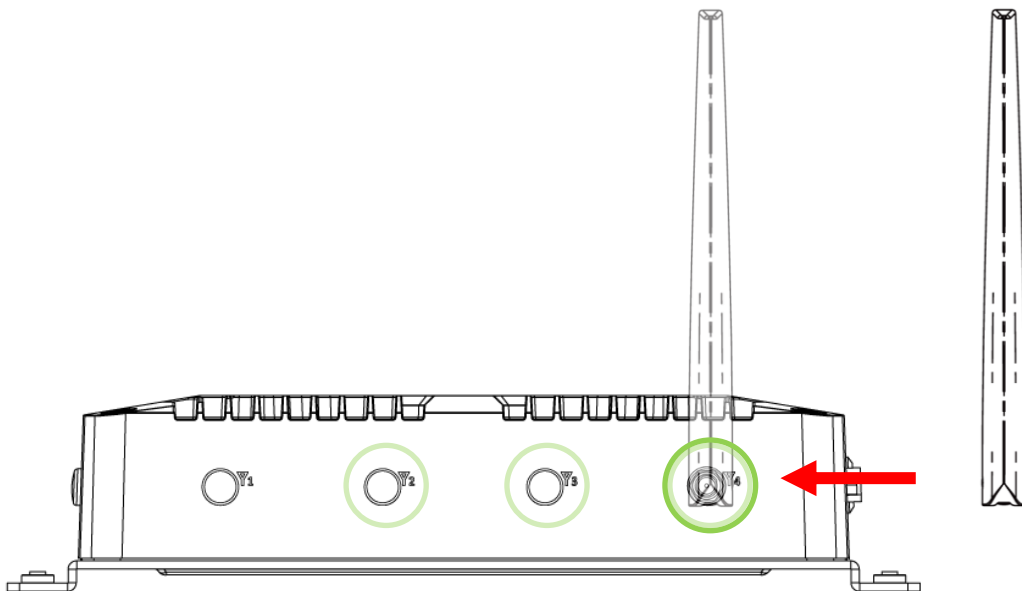
4. Press the communication module down and secure it with one screw.



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.

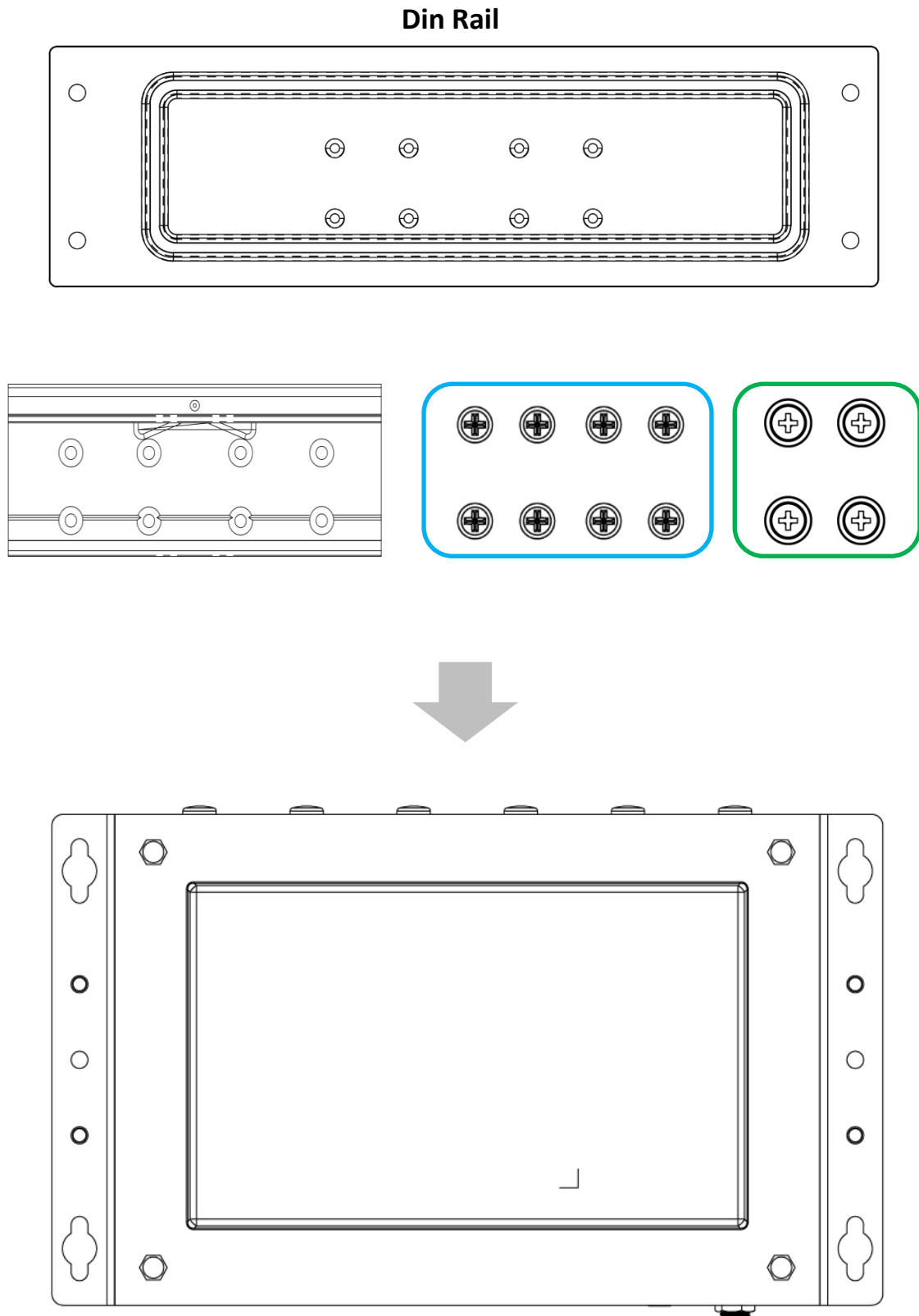


6. Attach the external antenna to the SMA jack by securely threading them together.

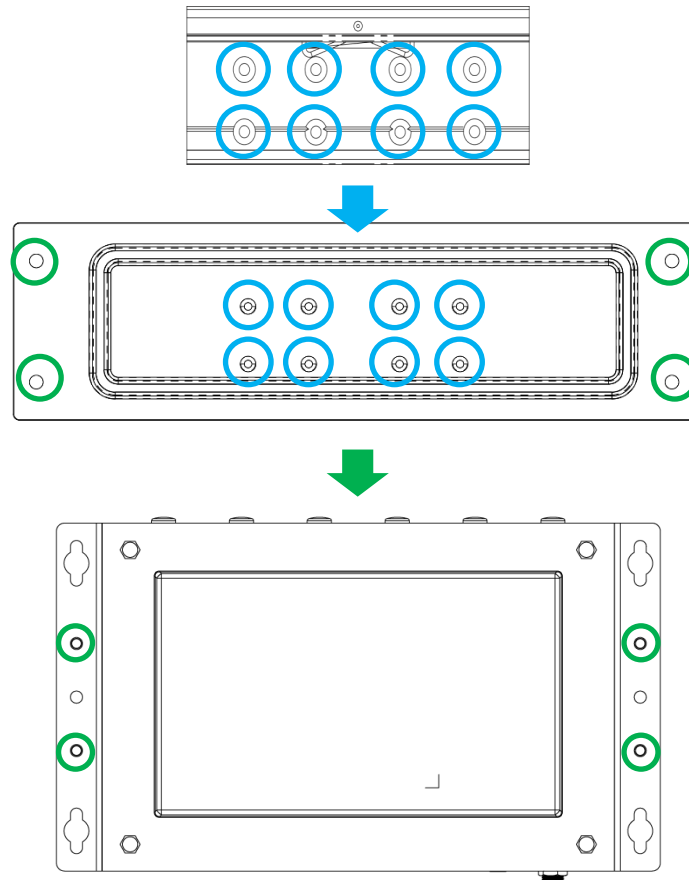


3.5 Installing DIN rail holder

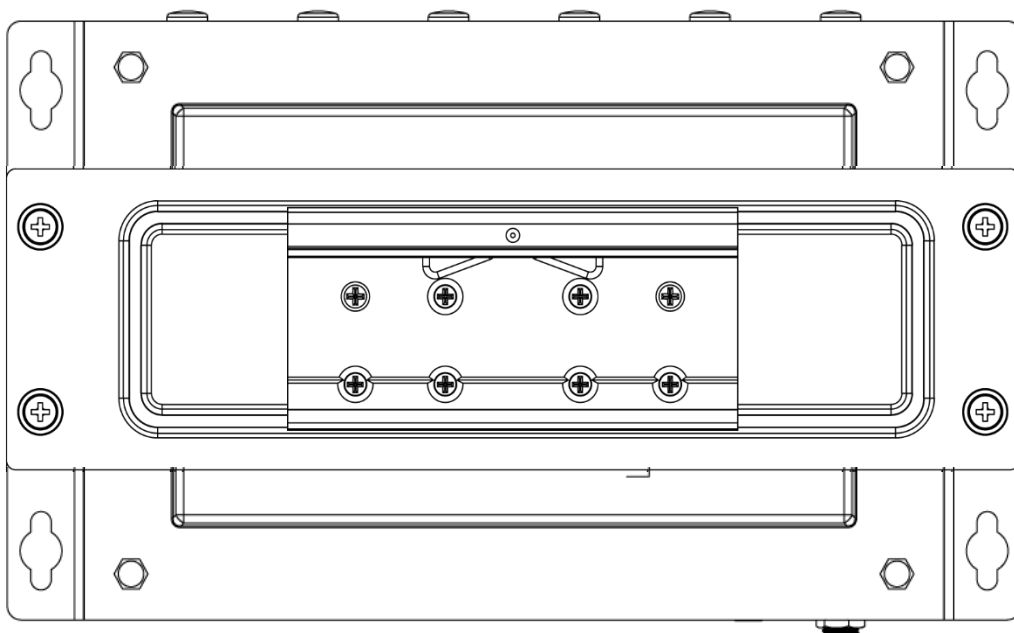
1. Din Rail holder is available for BCO-500 series.



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



Complete the schematic diagram as shown.



Chapter 4

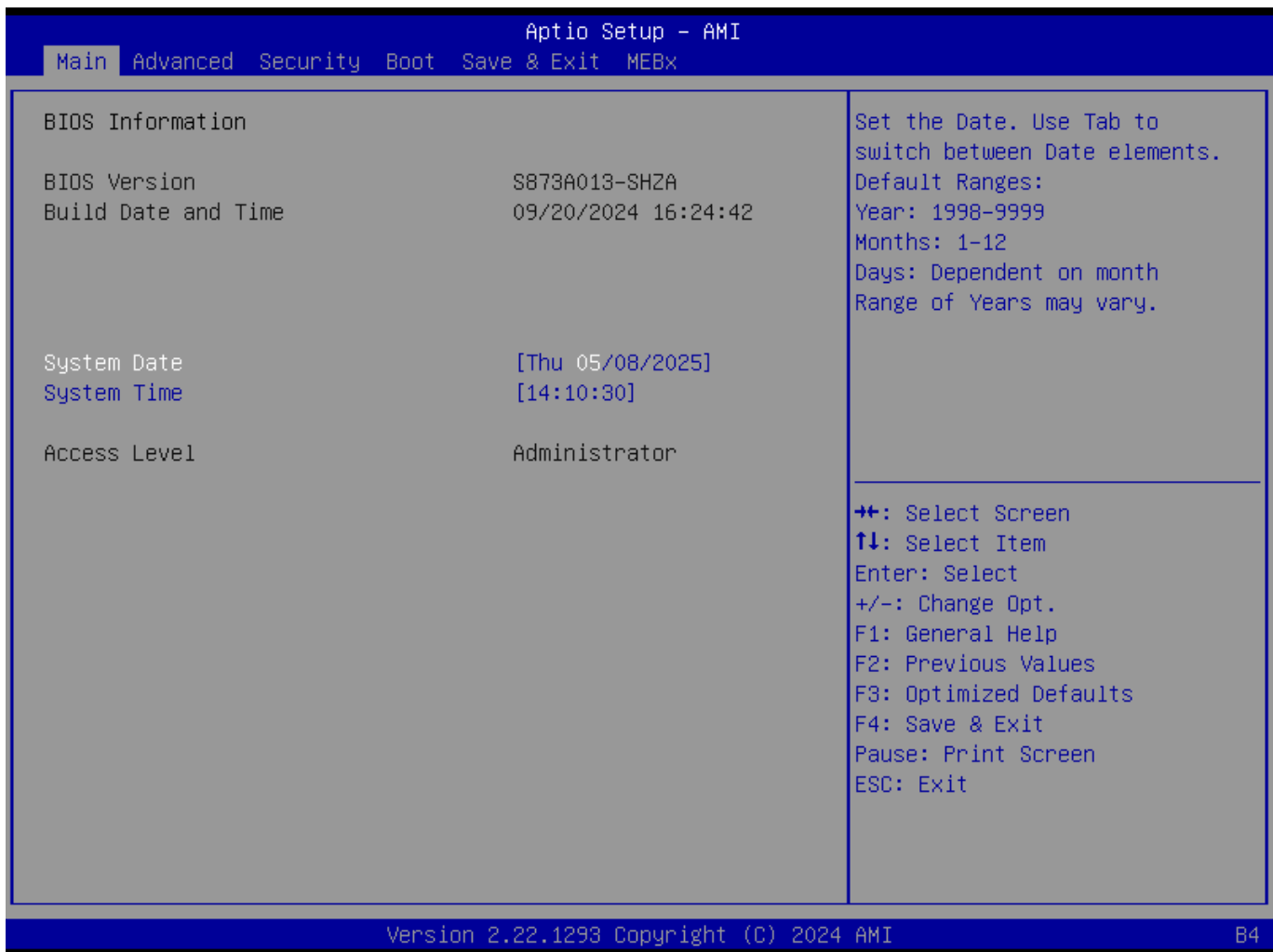
System BIOS

4.1 Description of the BIOS Options



Due to the differences in the specific model of the motherboard and the update of the BIOS version, there may be a few menus that do not match this manual, please take the actual basis.

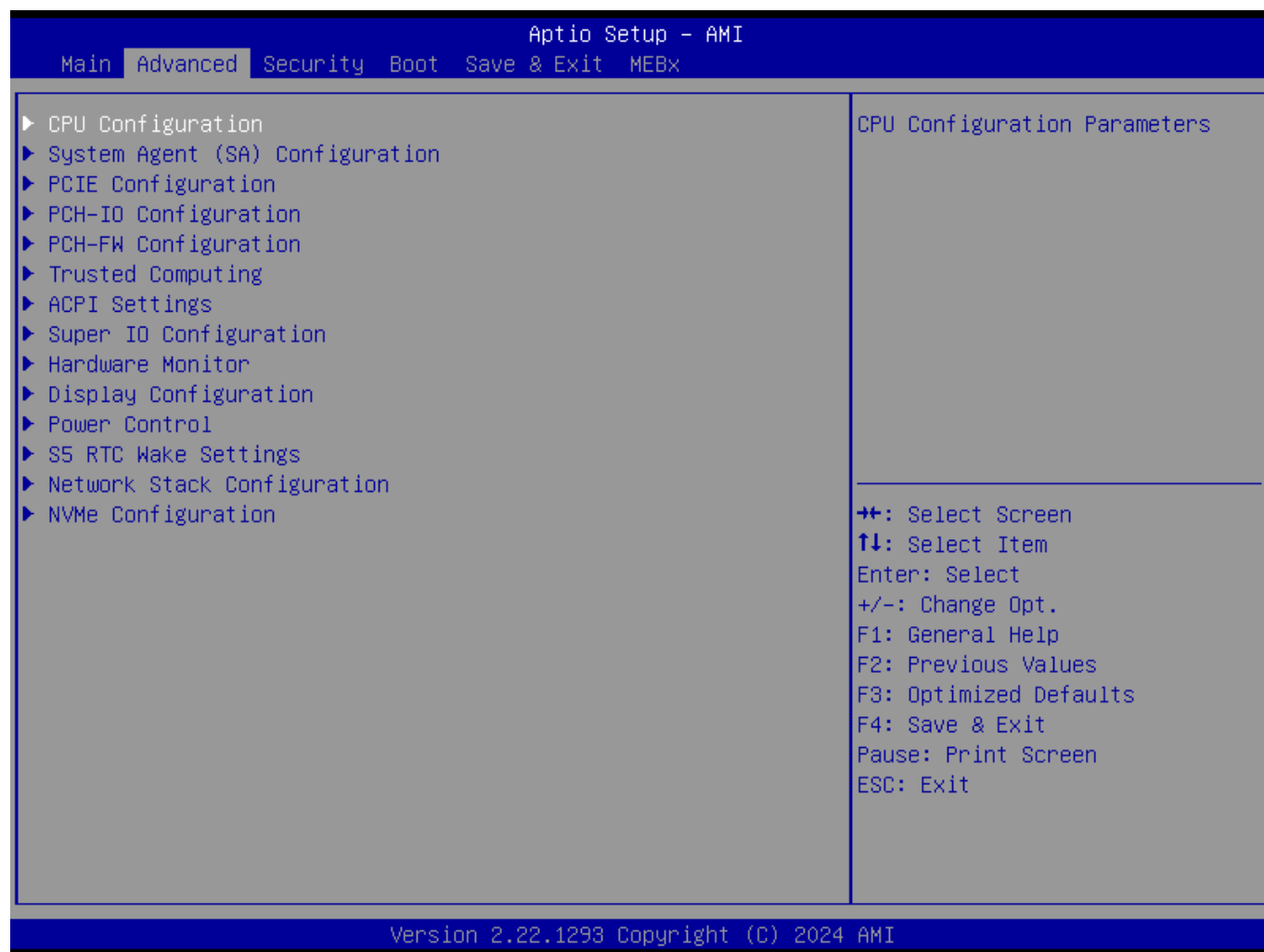
4.1.1 Main



This menu contains the following information:

- BIOS Version
Display the BIOS version information.
- Build Date and Time
Display the BIOS Build date and time.
- System Date
Set the date. Use Tab to switch between date elements. Default ranges: Year: 1998-9999
Months: 1-12
Days: Dependent on month
Range of Years may vary.
- System Time
Set the time. Use Tab to switch between time elements.
- Access Level
Display the current access level to BIOS Setup Utility.

4.2 Advanced



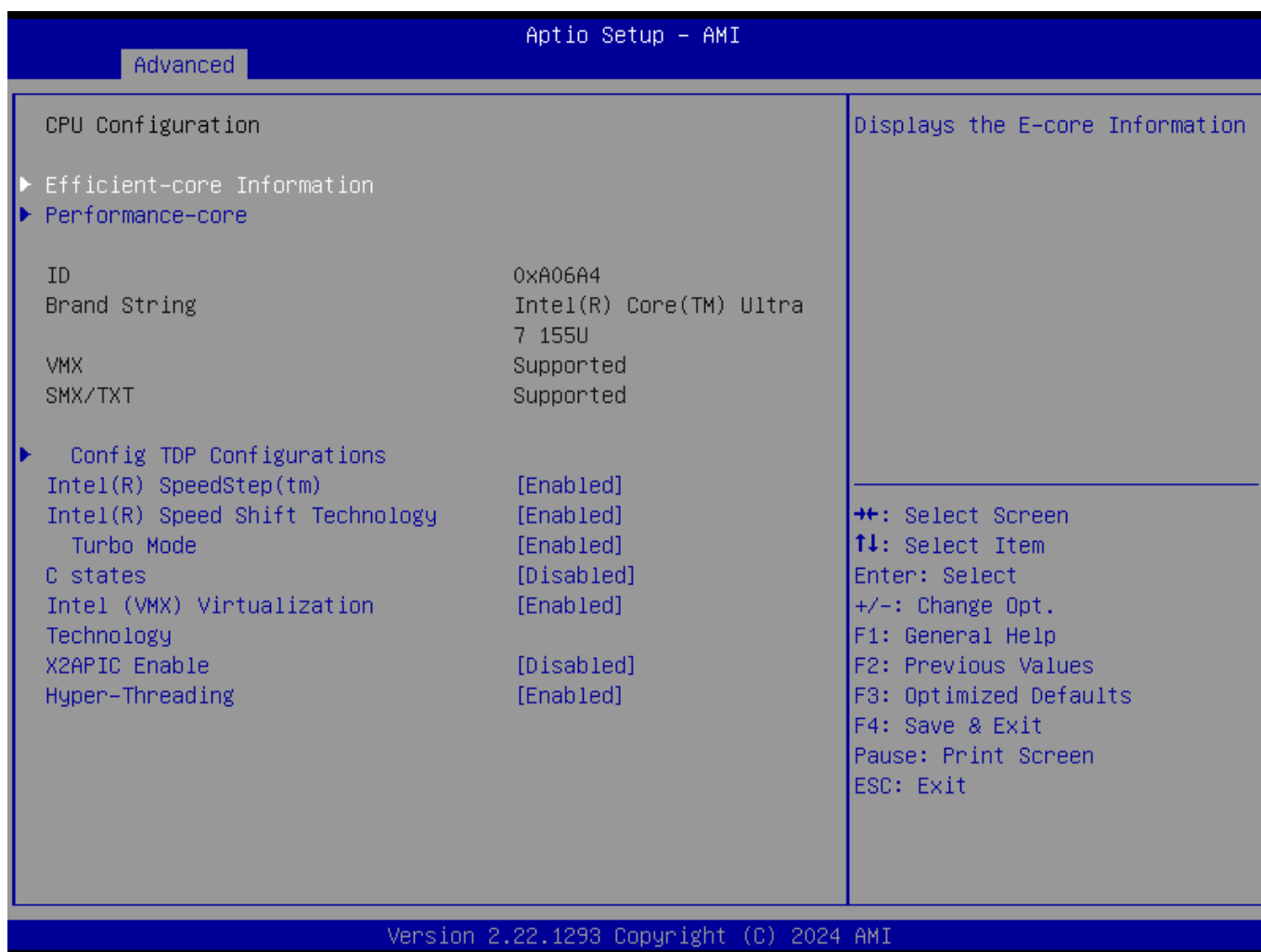
This menu contains the following information:

- CPU Configuration
CPU Configuration Parameters.
- System Agent (SA) Configuration
System Agent (SA) Parameters.
- PCIE Configuration
PCIE Parameters.
- PCH-IO Configuration
PCH Parameters.
- PCH-FW Configuration
Configure Management Engine Technology Parameters.
- Trusted Computing
Trusted Computing Settings.
- ACPI Settings
System ACPI Parameters.
- Super IO Configuration
System Super IO Chip Parameters.
- Hardware Monitor Monitor
hardware status.
- Display Configuration
Display Configuration Parameters.
- Power Control
- S5 RTC Wake Settings

Enable system to wake from S5 using RTC alarm.

- Network Stack Configuration
Network Stack Settings.
- NVMe Configuration
NVMe Device Options Settings.

4.2.1 CPU Configuration

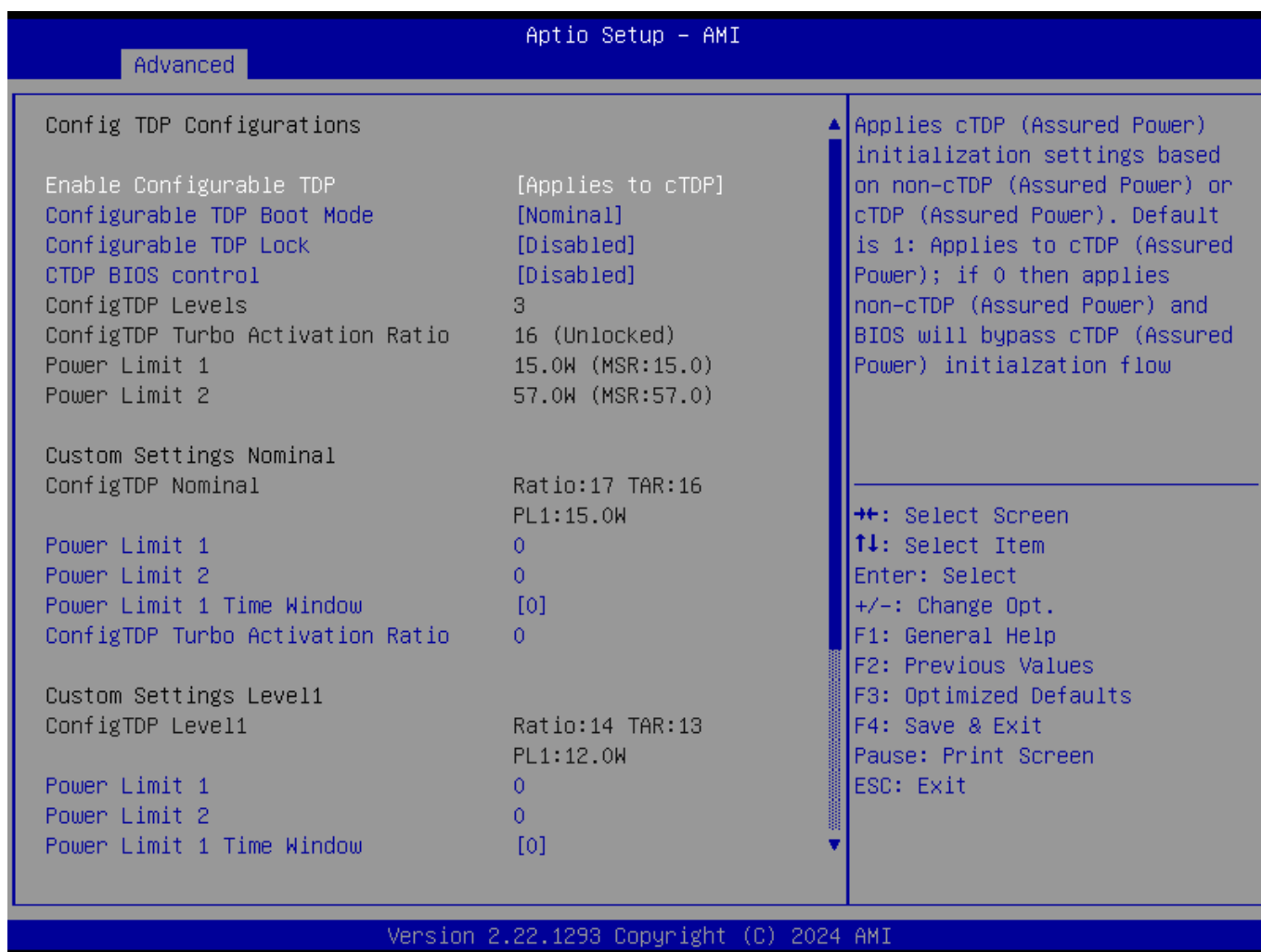


This menu contains the following information:

- Efficient-core Information Displays the E-core Information.
- Performance-core Displays the P-core Information.
- ID Display the Processor ID.
- Brand String Display the Brand String.
- VMX VMX (Virtual-Machine Extensions) supported or not.
- SMX/TXT SMX (Safer Mode Extensions) /TXT (Trusted Execution Technology) Supported or not.
- Config TDP Configurations cTDP (Assured Power) Configurations.
- Intel(R) Speed Step(tm) Allows more than two frequency ranges to be supported.
- Intel(R) Speed Shift Technology Enable or Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.

- Turbo Mode
Enable or Disable processor Turbo Mode.
- C states
Enable or Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
- Intel (VMX) Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- X2APIC Enable
Enable or Disable X2APIC Operating Mode.
When this option is configured as 'Enabled', 'VT-d' option must be 'Enabled' and 'X2APIC Opt Out' option must be 'Disabled' as well.
This option will be grayed out when 'VT-d' option is configured as 'Disabled'.
- Hyper-Threading
Enable or Disable Hyper-Threading Technology.

4.2.1.1 Config TDP Configurations



This menu contains the following information:

- **Enable Configurable TDP**
Applies cTDP (Assured Power) initialization settings based on non-cTDP (Assured Power) or cTDP (Assured Power). Default is 1: Applies to cTDP (Assured Power); if 0 then applies non-cTDP (Assured Power) and BIOS will bypass cTDP (Assured Power) initialization flow.
- **Configurable TDP Boot Mode**
cTDP (Assured Power) Mode as Nominal/Level1/Level2/Deactivate TDP (Base Power) selection. Deactivate option will set MSR to Nominal and MMIO to Zero.
- **Configurable TDP Lock**
cTDP (Assured Power) Mode Lock sets the Lock bits on TURBO_ACTIVATION_RATIO and CONFIG_TDP_CONTROL.
Note: When CTD P (Assured Power) Lock is enabled Custom ConfigTDP Count will be forced to 1 and Custom ConfigTDP Boot Index will be forced to 0.
- **CTDP BIOS control**
Enables cTDP (Assured Power) control via runtime ACPI BIOS methods. This 'BIOS only' feature does not require EC or driver support.

Custom Settings Nominal/Level1/Level2

- **ConfigTDP Nominal/Level1/Level2**

The options are as follows:

Power Limit 1: Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max

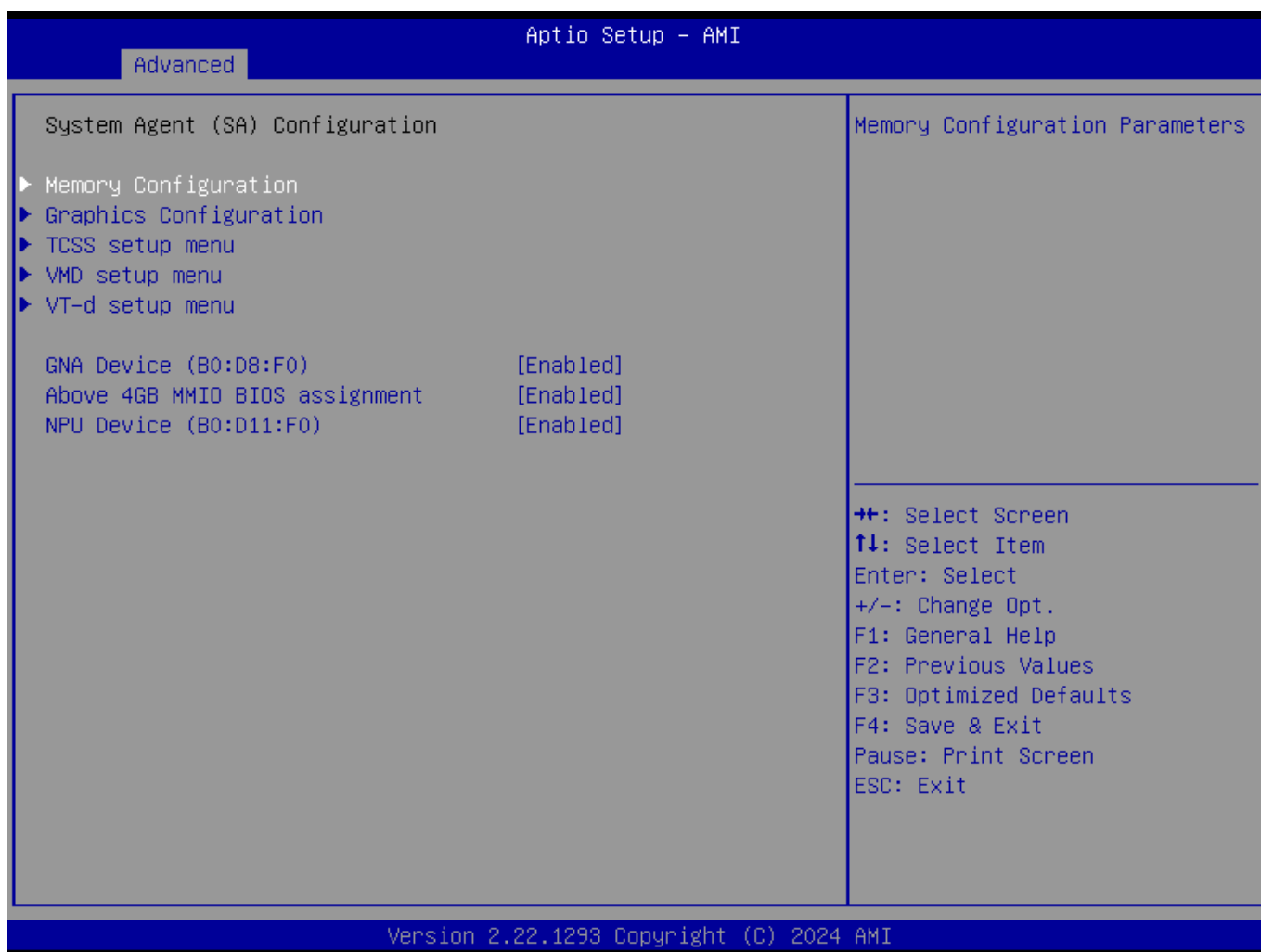
and Min Power Limit and Processor Base Power (TDP) Limit.

Power Limit 2: Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.

Power Limit 1 Time Window: Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default value (28 sec for Mobile and 8 sec for Desktop). Defines time window which Processor Base Power (TDP) value should be maintained.

ConfigTDP Turbo Activation Ratio: Custom value for Turbo Activation Ratio. Needs to be configured with valid values from LFM to Max Turbo. 0 means don't use custom value.

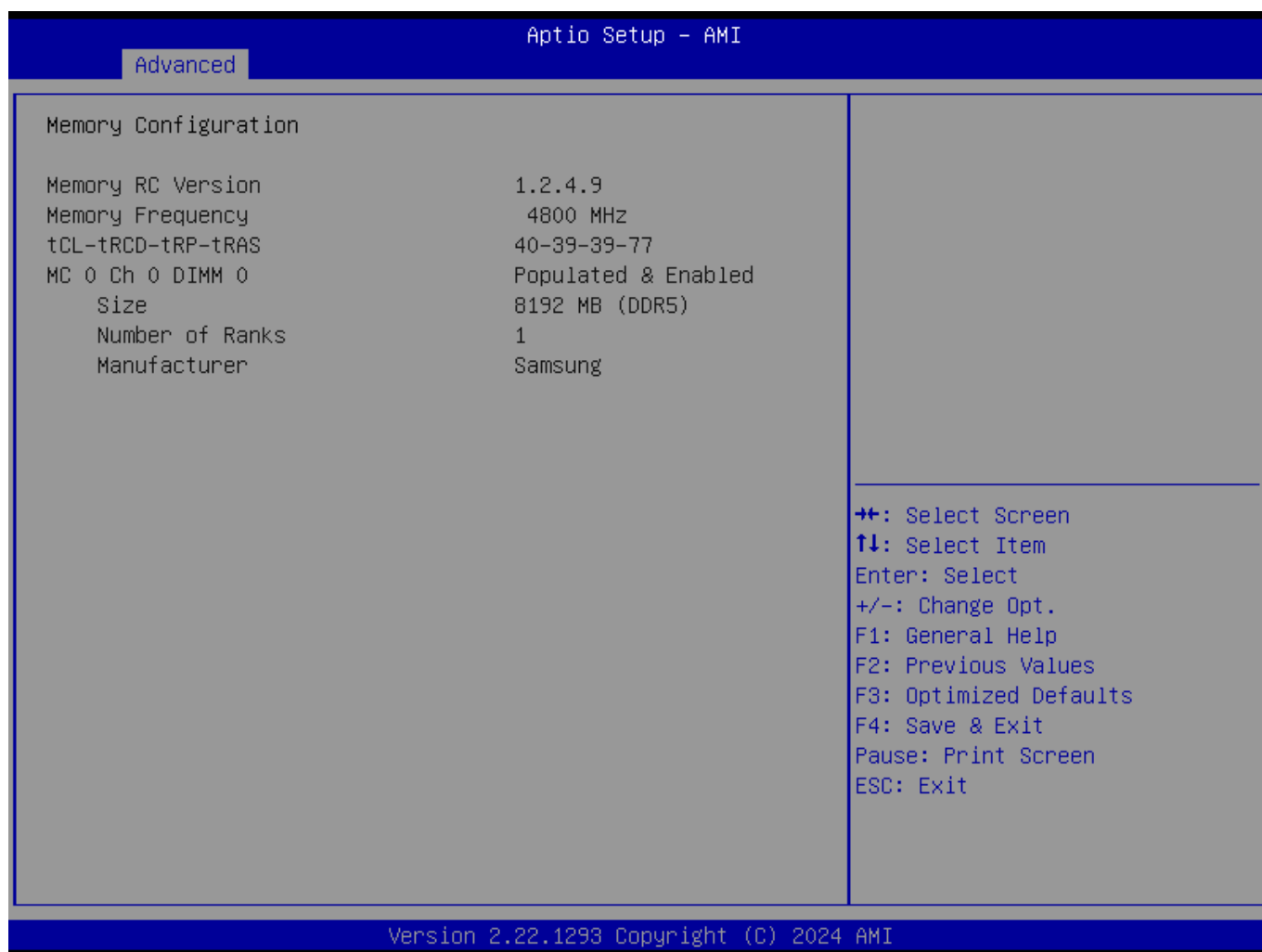
4.2.2 System Agent (SA) Configuration



This menu contains the following information:

- Memory Configuration
Memory Configuration Parameters.
- Graphics Configuration
Graphics Configuration.
- TCSS setup menu
TCSS Configuration settings.
- VMD setup menu
VMD Configuration settings.
- VT-d setup menu
VT-d Configuration settings.
- GNA Device (B0:D8:F0)
Enable or Disable SA GNA Device.
- Above 4GB MMIO BIOS assignment
Enable or Disable above 4GB Memory Mapped IO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.
- NPU Device (B0:D11:F0)
Enable or Disable NPU (Neural Processing Unit) Device.

4.2.2.1 Memory Configuration



This menu contains the following information:

- Memory Configuration
Display the Memory RC Version, Data Rate, Timings, etc.

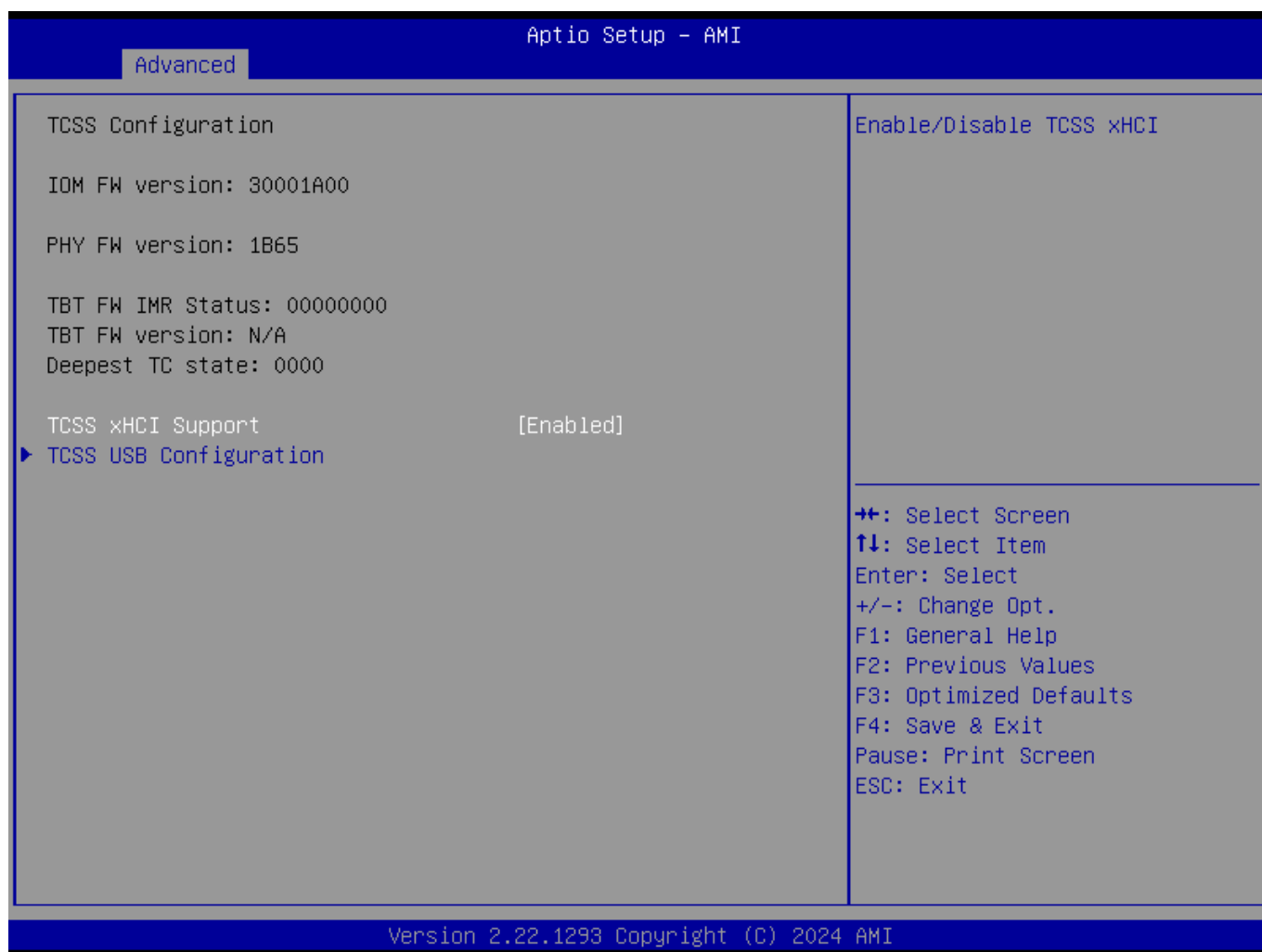
4.2.2.2 Graphics Configuration



This menu contains the following information:

- **Primary Display**
Select AUTO set IGD to be Primary Display if no external Graphics Device connected otherwise external Graphics Device detected on first PCIe port will be Primary Display or Select IGFX for IGD to be Primary Display Or select HG for Hybrid Gfx.
- **Internal Graphics**
Keep IGFX enabled based on the setup options.

4.2.2.3 TCSS setup menu



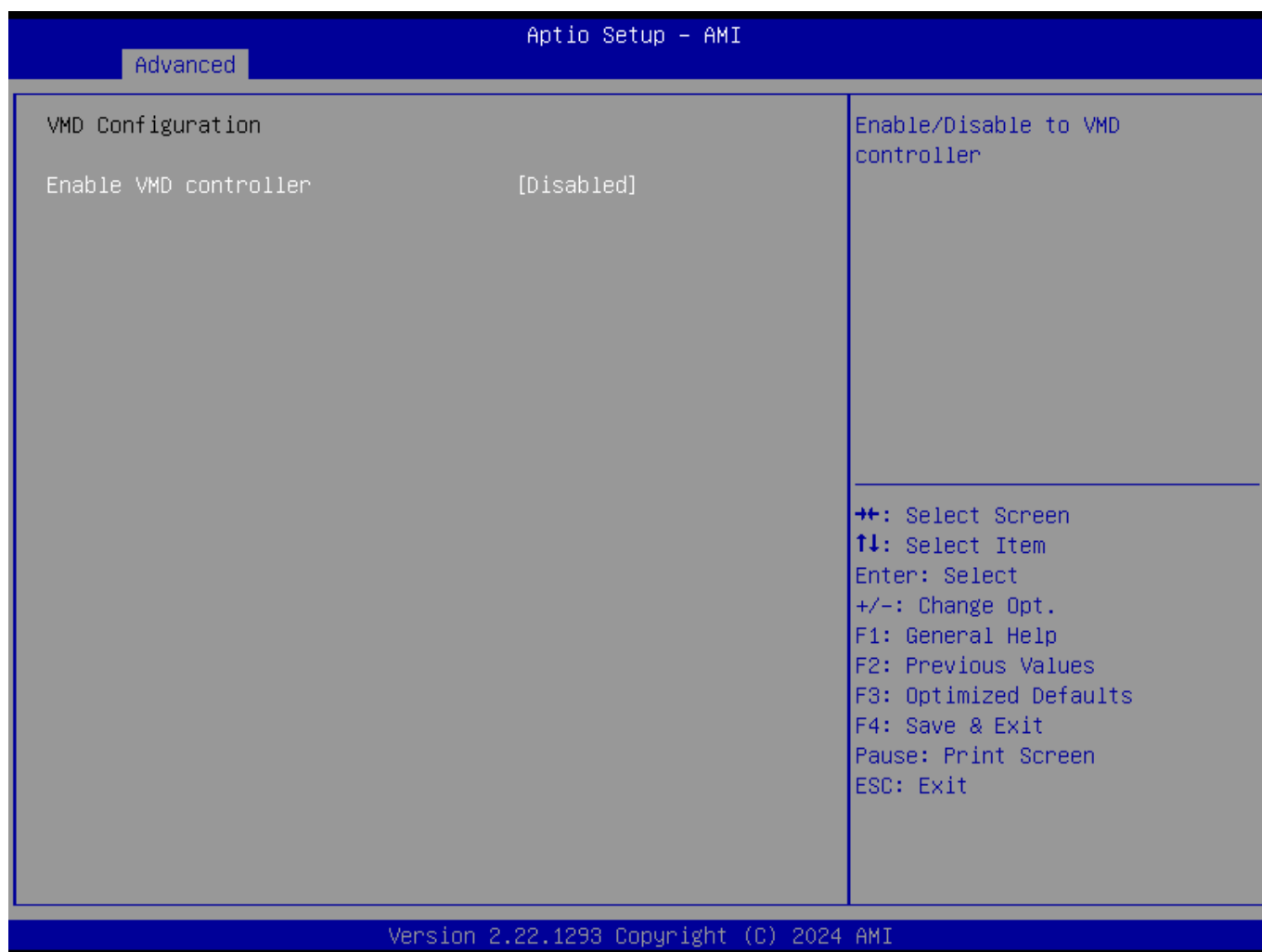
This menu contains the following information:

- TCSS xHCI Support
Enable or Disable TCSS xHCI.
- TCSS USB Configuration
SA TCSS USB Configuration settings.

The option after entering the interface settings above is as follows:

TCSS CPU USB Port Disable Override: Selectively Enable or Disable the corresponding USB port from reporting a Device Connection to the controller.

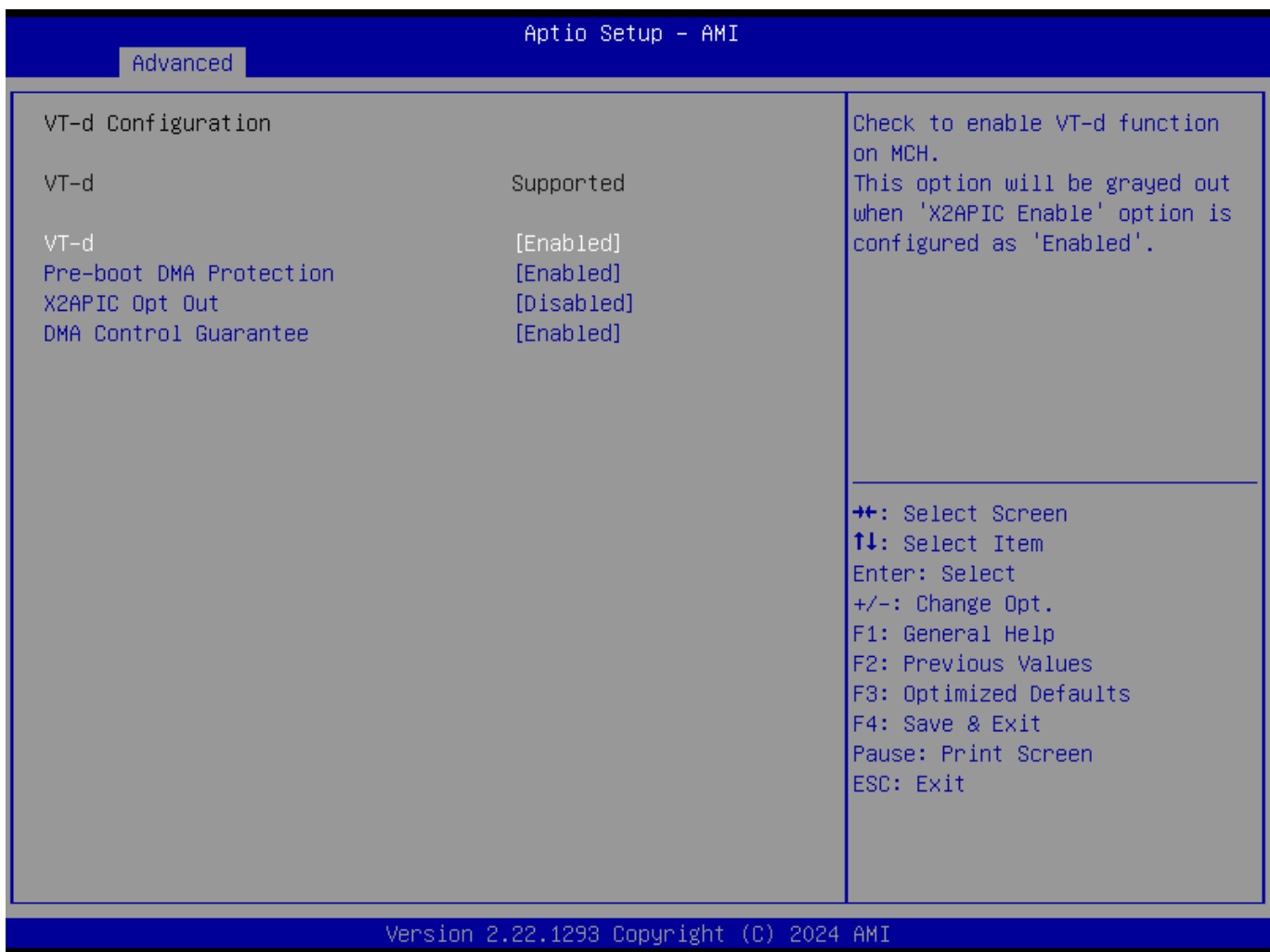
4.2.2.4 VMD setup menu



This menu contains the following information:

- Enable VMD controller
Enable or Disable to VMD controller.

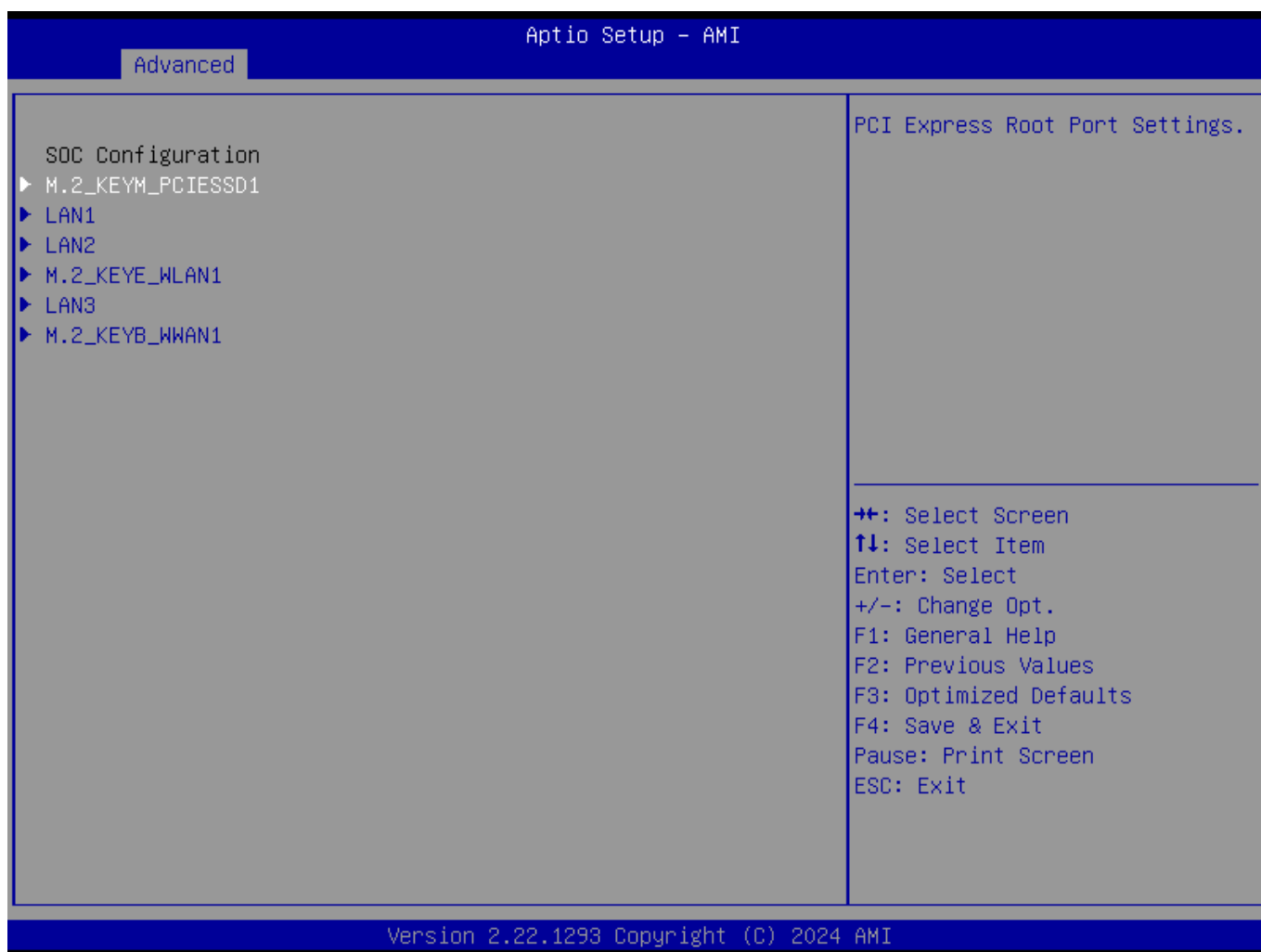
4.2.2.5 VT-d setup menu



This menu contains the following information:

- VT-d
Check to enable VT-d function on MCH.
This option will be grayed out when 'X2APIC Enable' option is configured as 'Enabled'.
- Pre-boot DMA Protection
Enable DMA Protection in Pre-boot environment (If DMAR table is installed in DXE and If VTD_INFO_PPI Is installed in PEI).
- X2APIC OPT OUT
Enable or Disable X2APIC_OPT_OUT bit.
This option will be grayed out when 'X2APIC Enable' option is configured as 'Enabled'.
- DMA Control Guarantee
Enable or Disable DMA_CONTROL_GUARANTEE bit.

4.2.3 PCIE Configuration



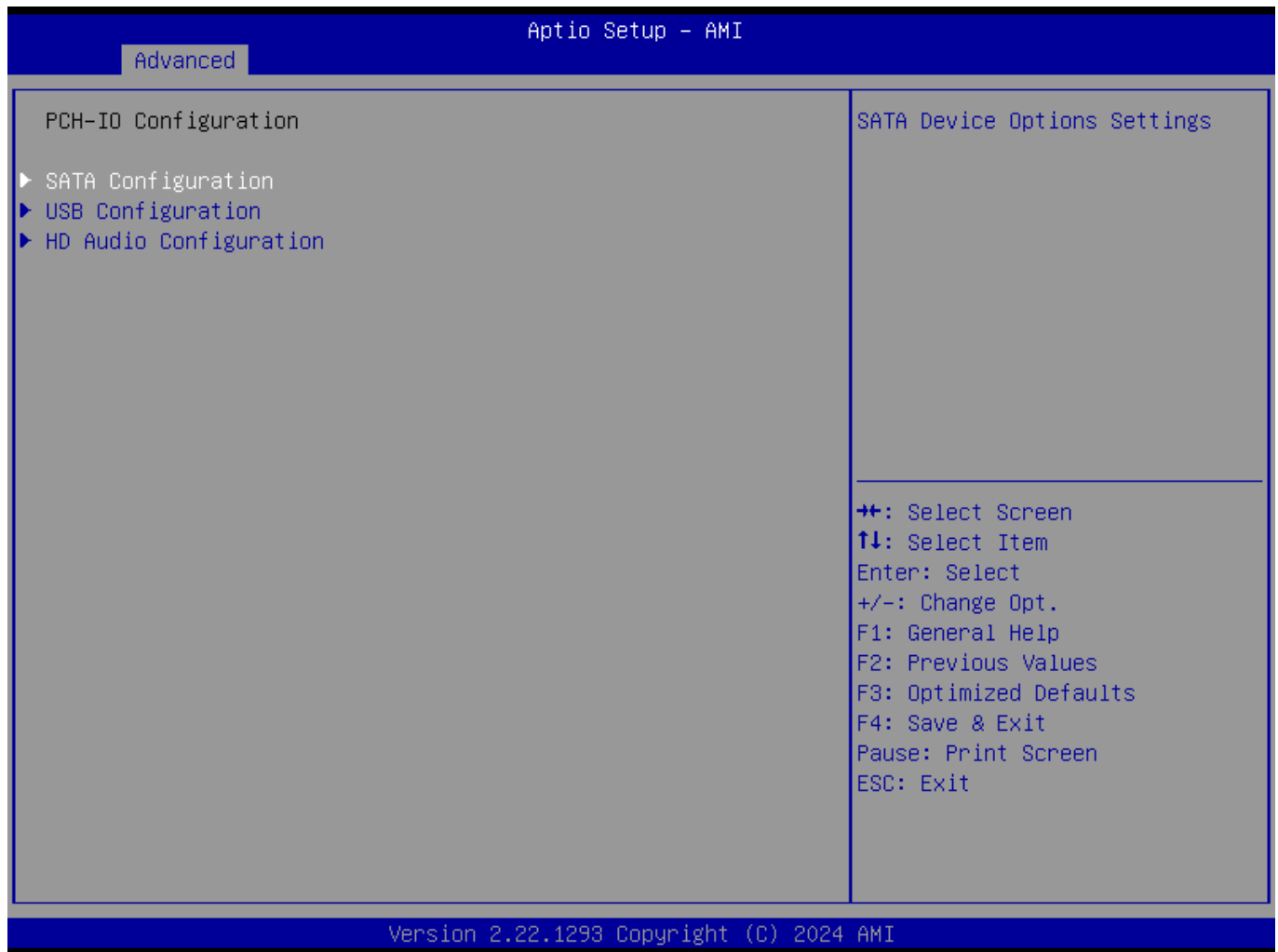
This menu contains the following information:

- M.2_KEYM_PCIESSD1/LAN1/LAN2/M.2_KEYE_WLAN1/LAN3/M.2_KEYB_WWAN1:
PCI Express Root Port Settings.

The options after entering the interface settings above are as follows.

PCI Express Root Port PXPA1/PXPB1/PXPB2/PXPB3/PXPB4/PXPC: Control the PCI Express Root Port. PCIe Speed:
Configure PCIe Speed.

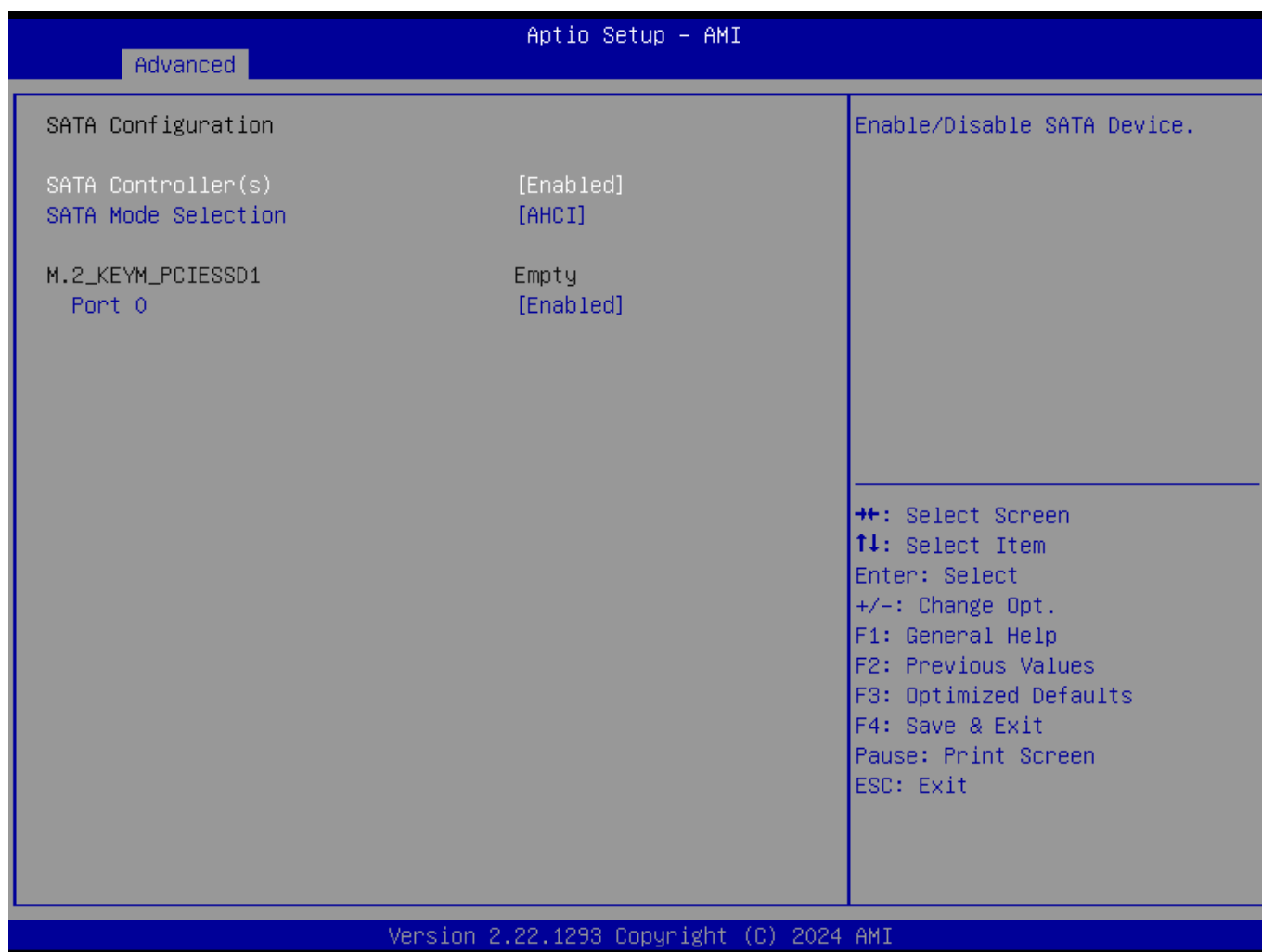
4.2.4 PCH-IO Configuration



This menu contains the following information:

- SATA Configuration
SATA Device Options Settings.
- USB Configuration
USB Configuration Settings.
- HD Audio Configuration
HD Audio Subsystem Configuration Settings.

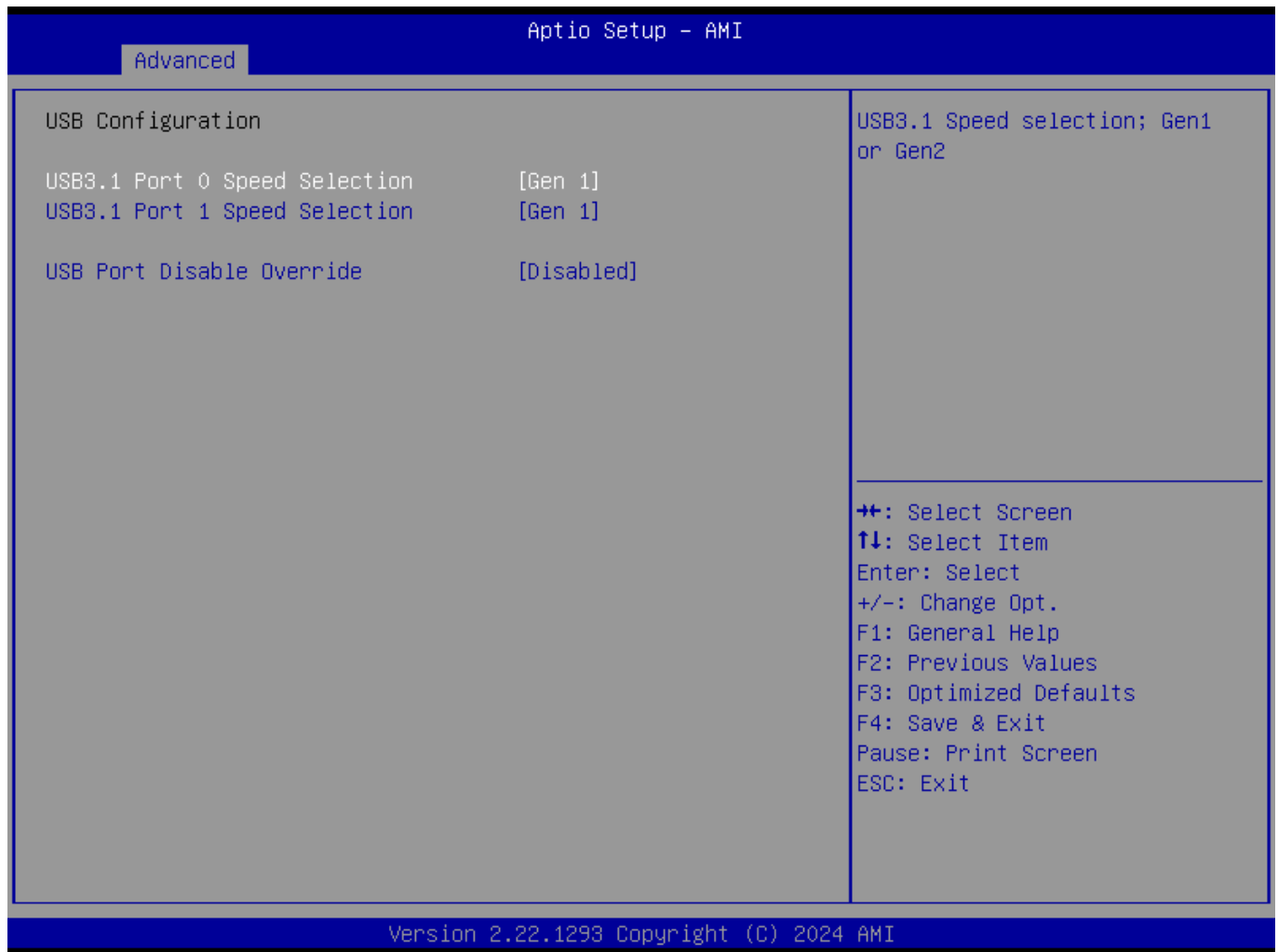
4.2.4.1 SATA Configuration



This menu contains the following information:

- SATA Controller(s)
Enable or Disable SATA Device.
- SATA Mode Selection
Determines how SATA controller(s) operate.
- M.2_KEYM_PCIESSD1
Display M.2_KEYM_PCIESSD1 Information.
- Port X
Enable or Disable SATA Port X.

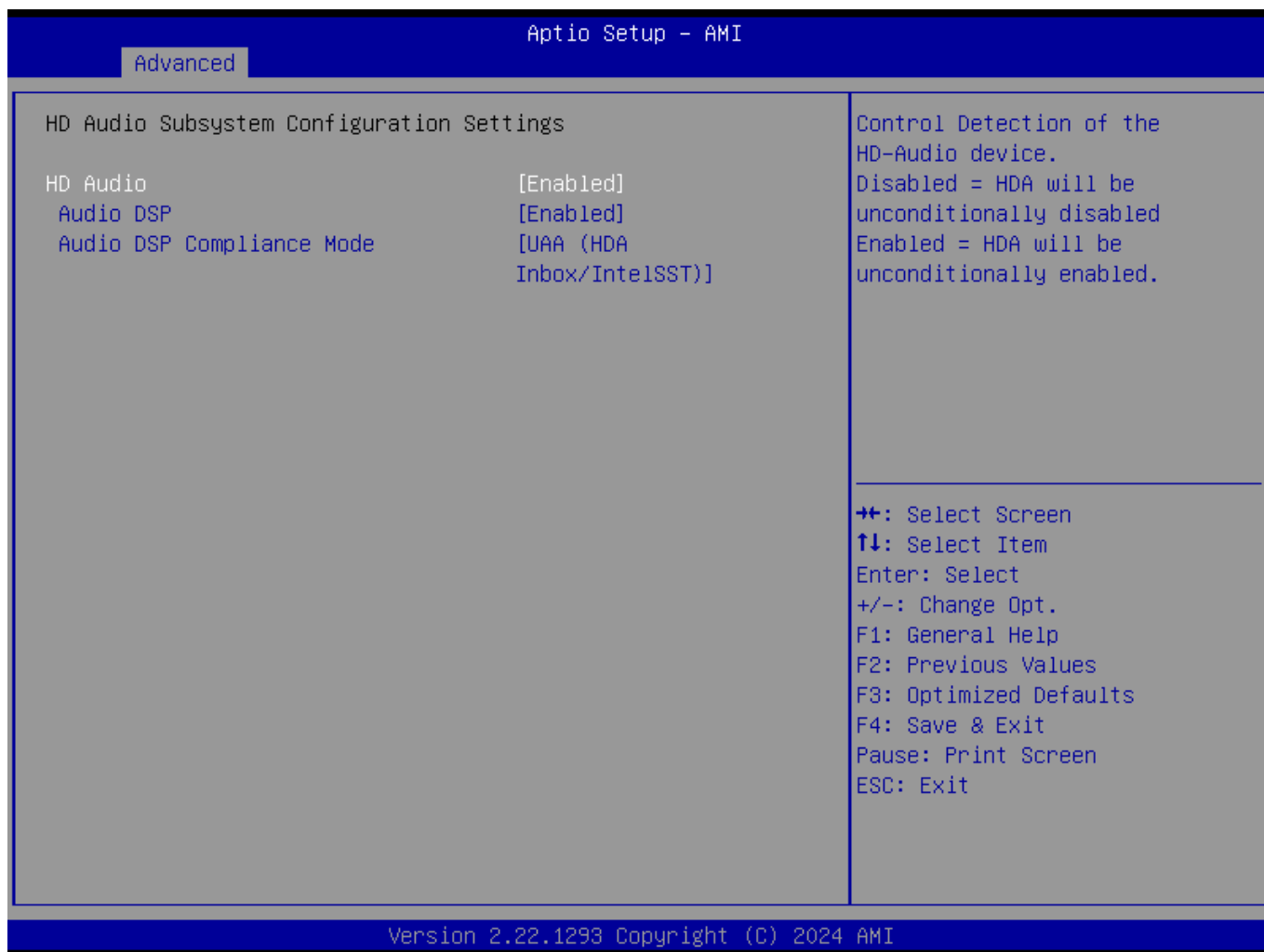
4.2.4.2 USB Configuration



This menu contains the following information:

- USB3.1 Port 0 Speed Selection
USB3.1 Speed selection; Gen1 or Gen2.
- USB3.1 Port 1 Speed Selection
USB3.1 Speed selection; Gen1 or Gen2.
- USB Port Disable Override
Selectively Enable or Disable the corresponding USB port from reporting a Device Connection to the controller.

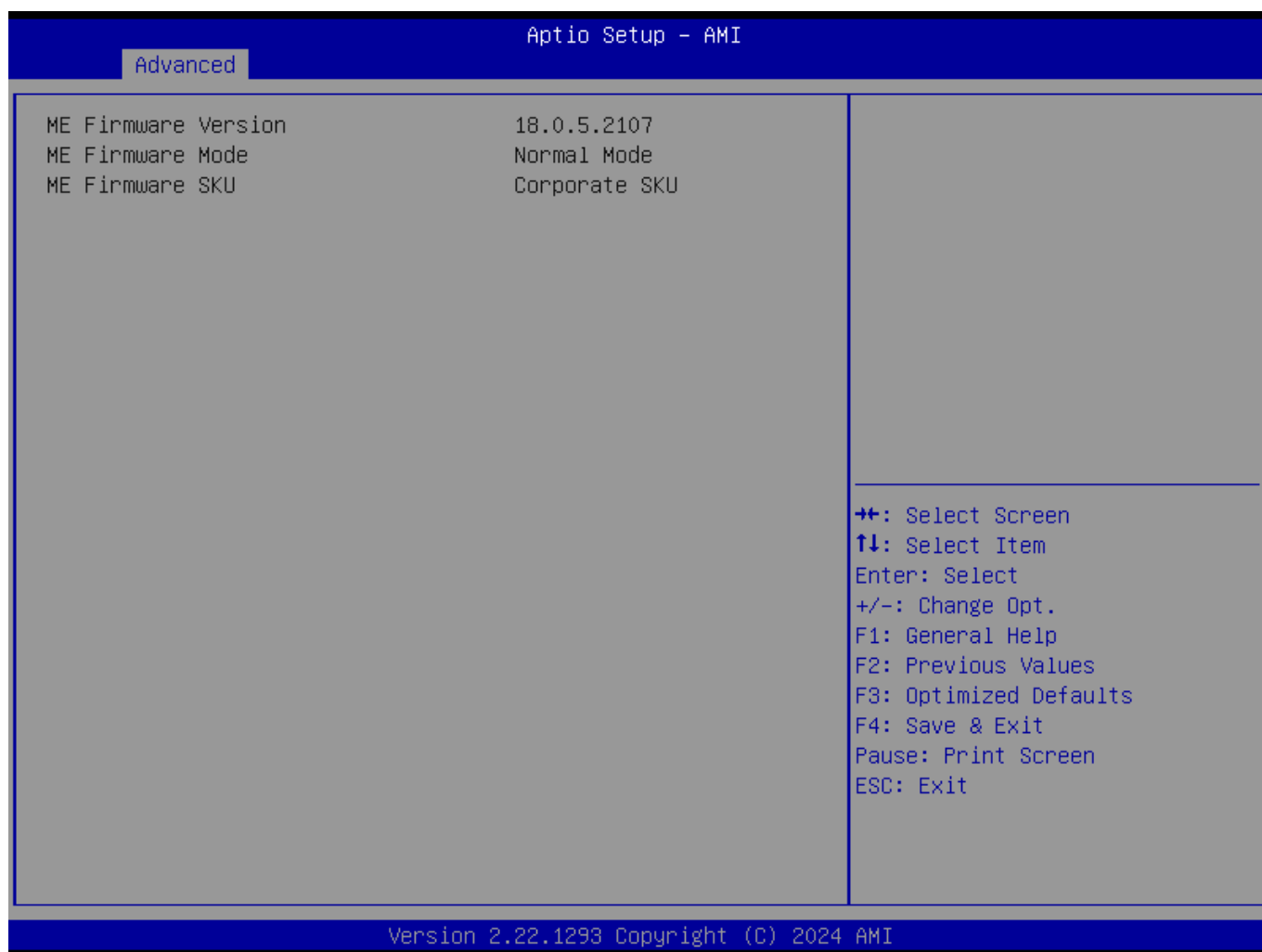
4.2.4.3 HD Audio Configuration



This menu contains the following information:

- **HD Audio**
Control Detection of the HD-Audio device. Disabled = HAD will be unconditionally disabled. Enabled = HAD will be unconditionally enabled.
- **Audio DSP**
Enable or Disable Audio DSP.
- **Audio DSP Compliance Mode**
Specifies DSP enabled system compliance:
 1. Non-UAA (Intel SST driver support only – CC_040100).
 2. UAA (HD Audio Inbox or Intel SST driver support – CC_040380). Note: NHLT (DMIC/BT/I2S configuration) is published for non-UAA only.

4.2.5 PCH-FW Configuration



This menu contains the following information:

- ME Firmware Version
Display the ME Firmware information.
- Me Firmware Mode
Display the Me Firmware Mode.
- Me Firmware SKU
Display the Me Firmware SKU.

4.2.6 Trusted Computing



This menu contains the following information:

- TPM 2.0 Device Found
Display the information of the TPM 2.0 Device: Firmware Version, Vendor.
- Security Device Support
Enable or Disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

4.2.7 ACPI Settings



This menu contains the following information:

- Enable Hibernation
Enable or Disable System ability to Hibernates (OS/S4 Sleep State). This option may not be effective with some operating systems.

4.2.8 Super IO Configuration



This menu contains the following information:

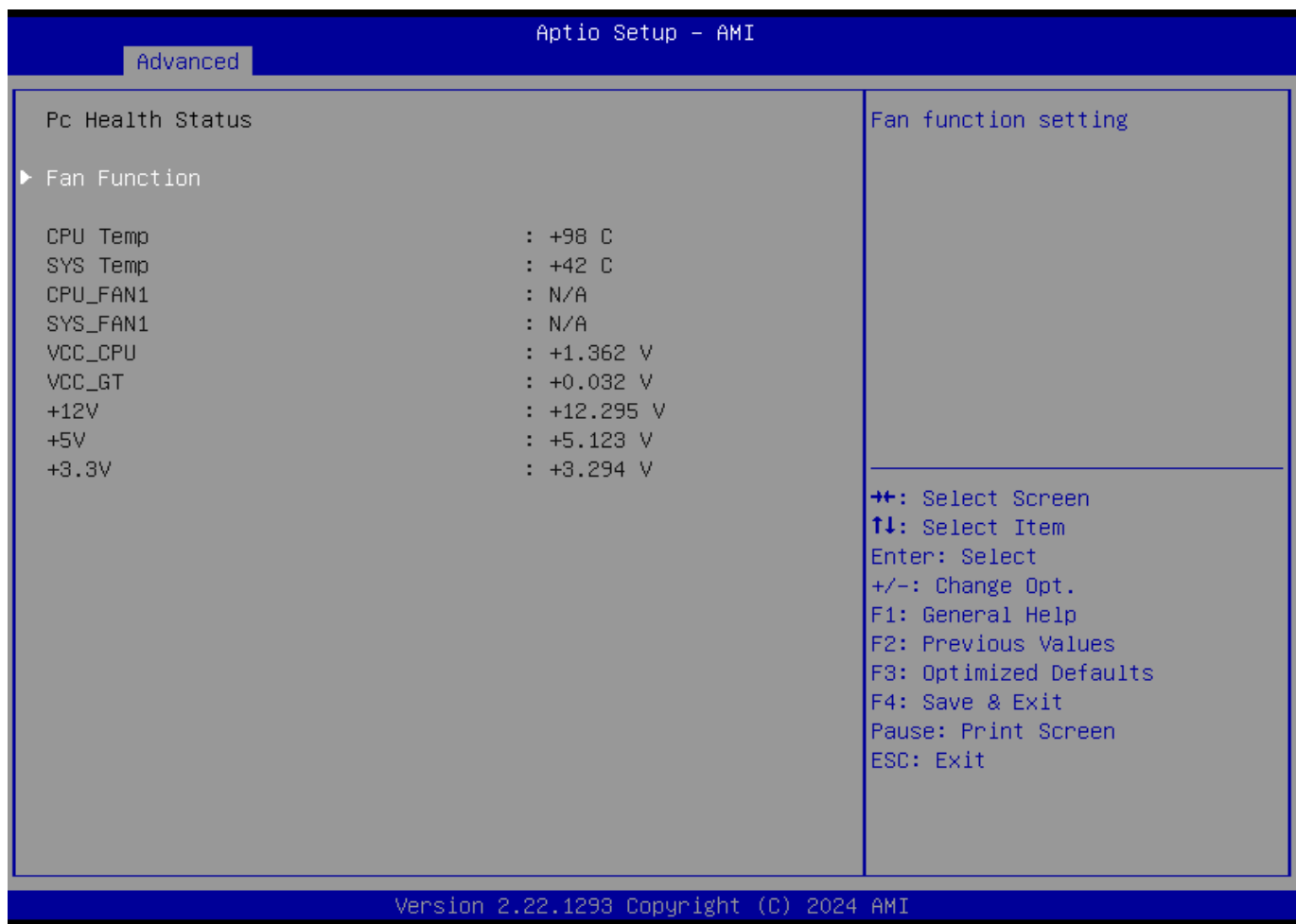
- COM X
Set Parameters of Serial Port x:

The options after entering the interface settings above are as follows. Serial Port: Enable or Disable Serial Port (COM).

Device Settings: Display the Current Device Settings.

Change Settings: If the board supported, this menu shows. Select an optimal setting for Super IO Device.

4.2.9 Hardware Monitor



This menu contains the following information:

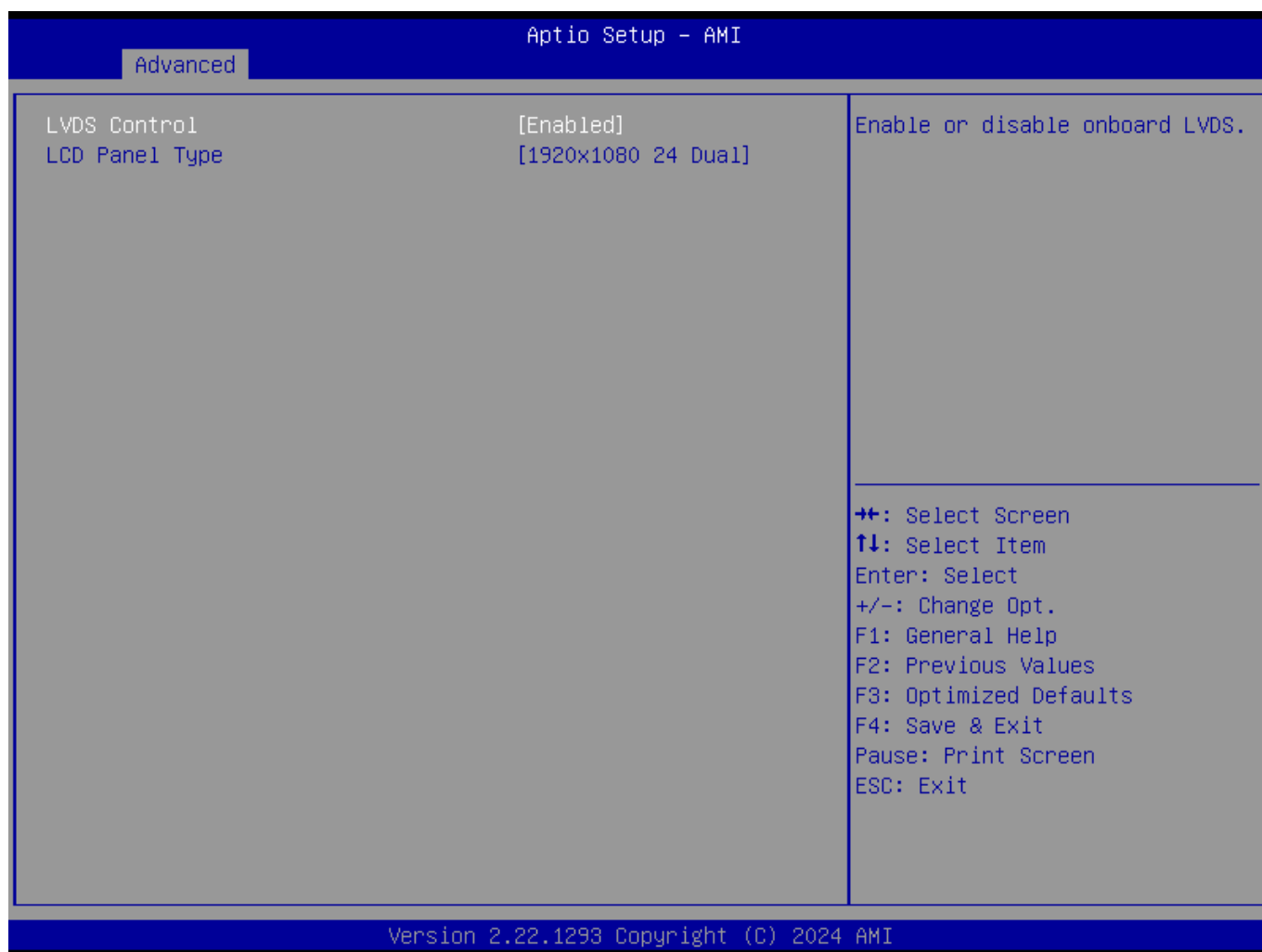
- Fan Function (If the board supported, this menu shows.) Fan Function setting.

CPU_FAN1/SYS_FAN1 Mode: FAN Mode Select.

Full on Mode; Automatic Mode; Manual Mode. Refer to section 2.7 of this manual for setting up.

- CPU Temp
Display CPU Temperature.
- SYS Temp
Display System Temperature.
- CPU_FAN1
Display CPU_FAN1 Speed.
- SYS_FAN1
Display SYS_FAN1 Speed.
- VCC_CPU
Display CPU Core Voltage Value.
- VCC_GT
Display Memory Voltage Value.
- +12V
Display +12 Voltage Value.
- +5V
Display +5 Voltage Value.
- +3.3V
Display +3.3 Voltage Value.

4.2.10 Display Configuration



This menu contains the following information:

- LVDS Control
Enable or Disable onboard LVDS.
- LCD Panel Type
Select LCD Panel Type.

4.2.11 Power Control



This menu contains the following information:

- Power On after Power Fail
Specify what state to go to when power is re-applied after a power failure (G3 state).
- M.2_KEYB_WWAN1 HSIO Select Select
M.2_KEYB_WWAN1 HSIO Type.

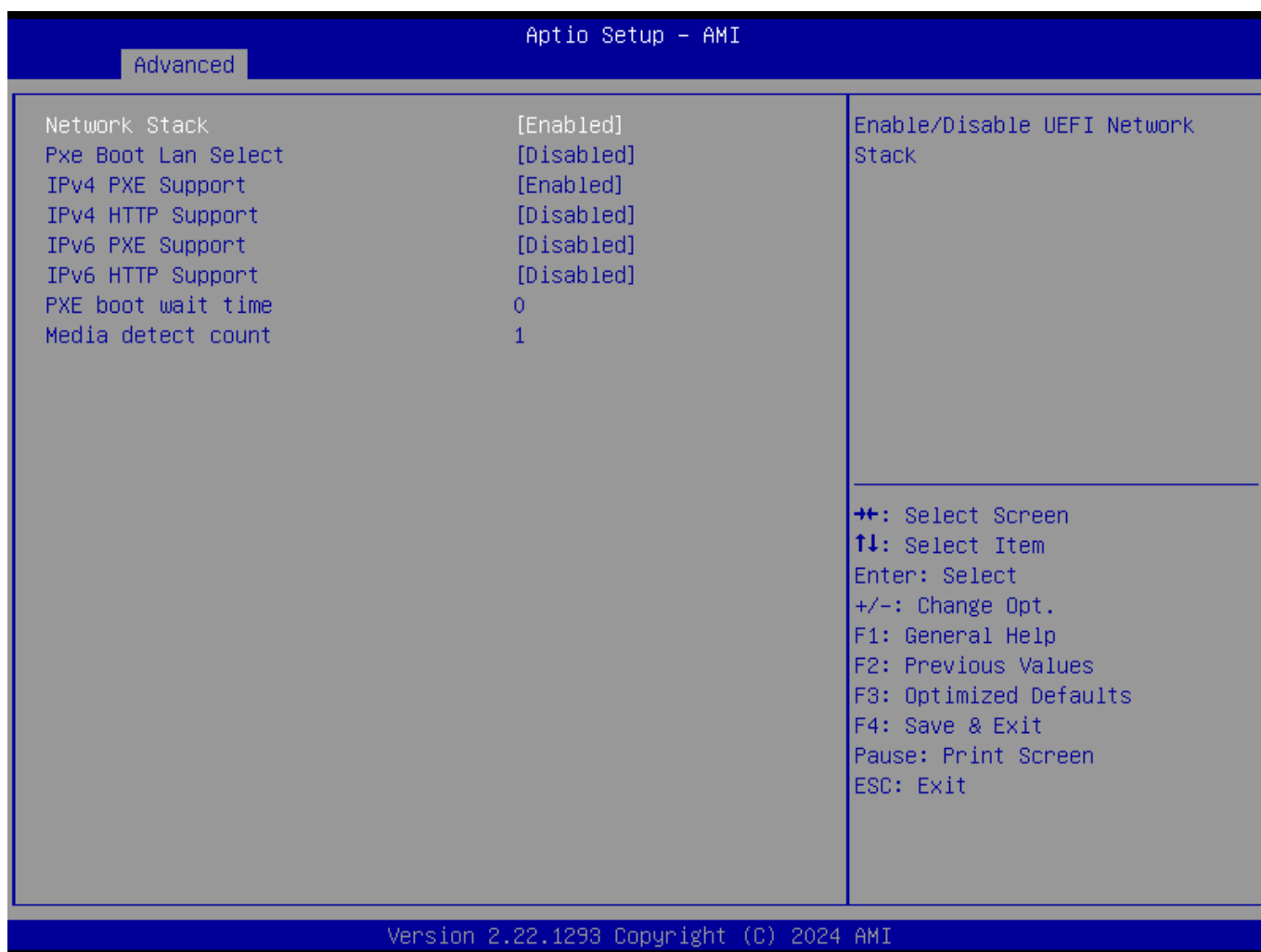
4.2.12 S5 RTC Wake Settings

Aptio Setup - AMI		
Advanced		
Wake system from S5	[Daily Time]	Enable or disable System wake on alarm event. Select FixedTime(Daily/Weekly/Monthly Time), system will wake on the hr::min::sec specified.
Wake up hour	0	
Wake up minute	0	
Wake up second	0	
		⇐: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit Pause: Print Screen ESC: Exit
Version 2.22.1293 Copyright (C) 2024 AMI		

This menu contains the following information:

- Wake system from S5
Enable or Disable System wake on alarm event. Select FixedTime (Daily/Weekly/Monthly Time), system will wake on the hr::min::sec specified.
Refer to section 2.6 of this manual for setting up.

4.2.13 Network Stack Configuration



This menu contains the following information:

- **Network Stack**
Enable or Disable UEFI Network Stack.
- **PXE Boot Lan Select**
Select the LAN port to Support PXE Boot.
- **IPv4 PXE Support**
Enable or Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
- **IPv4 HTTP Support**
Enable or Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
- **IPv6 PXE Support**
Enable or Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
- **IPv6 HTTP Support**
Enable or Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
- **PXE boot wait time**
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**
Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

4.2.14 NVMe Configuration



This menu contains the following information:

- NVMe Configuration
NVMe Device Options Settings. (When no device is connected, the Option display 'No NVMe Device Found').

4.2.14.1 NVMe Device Options Settings

Aptio Setup - AMI		
Advanced		
Seg:Bus:Dev:Func	00:01:00:00	Select either Short or Extended Self Test. Short option will take couple of minutes and extended option will take several minutes to complete.
Model Number	ZHITAI PC005 Active	
Total Size	256GB	
Vendor ID	1E49	
Device ID	0001	
Namespace: 1	Size: 256.0 GB	
Device Self Test:		
Self Test Option	[Short]	
Self Test Action	[Controller Only Test]	
Run Device Self Test		
Short Device Selftest Result	[Pass]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit Pause: Print Screen ESC: Exit
Extended Device Selftest Result	[Not Available]	
Version 2.22.1293 Copyright (C) 2024 AMI		

This menu contains the following information:

- Display the NVME device information
- Device Self Test

Self Test Option: Select either Short or Extended Self Test. Short option will take couple of minutes and extended option will take several minutes to complete.

Self Test Action: Select either to test Controller alone or Controller and Name Space. Selecting Controller and Name Space option will take lot longer to complete the test.

Run Device Self Test: Perform device self test for the corresponding Option and Action selected by user. Pressing 'Esc' key will abort the test. Result shown below is the recent result logged in the device.

4.3 Security



This menu contains the following information:

- Administrator Password
Set Setup Administrator Password.
- User Password
Set User Password.
- Secure Boot
Secure Boot configuration.

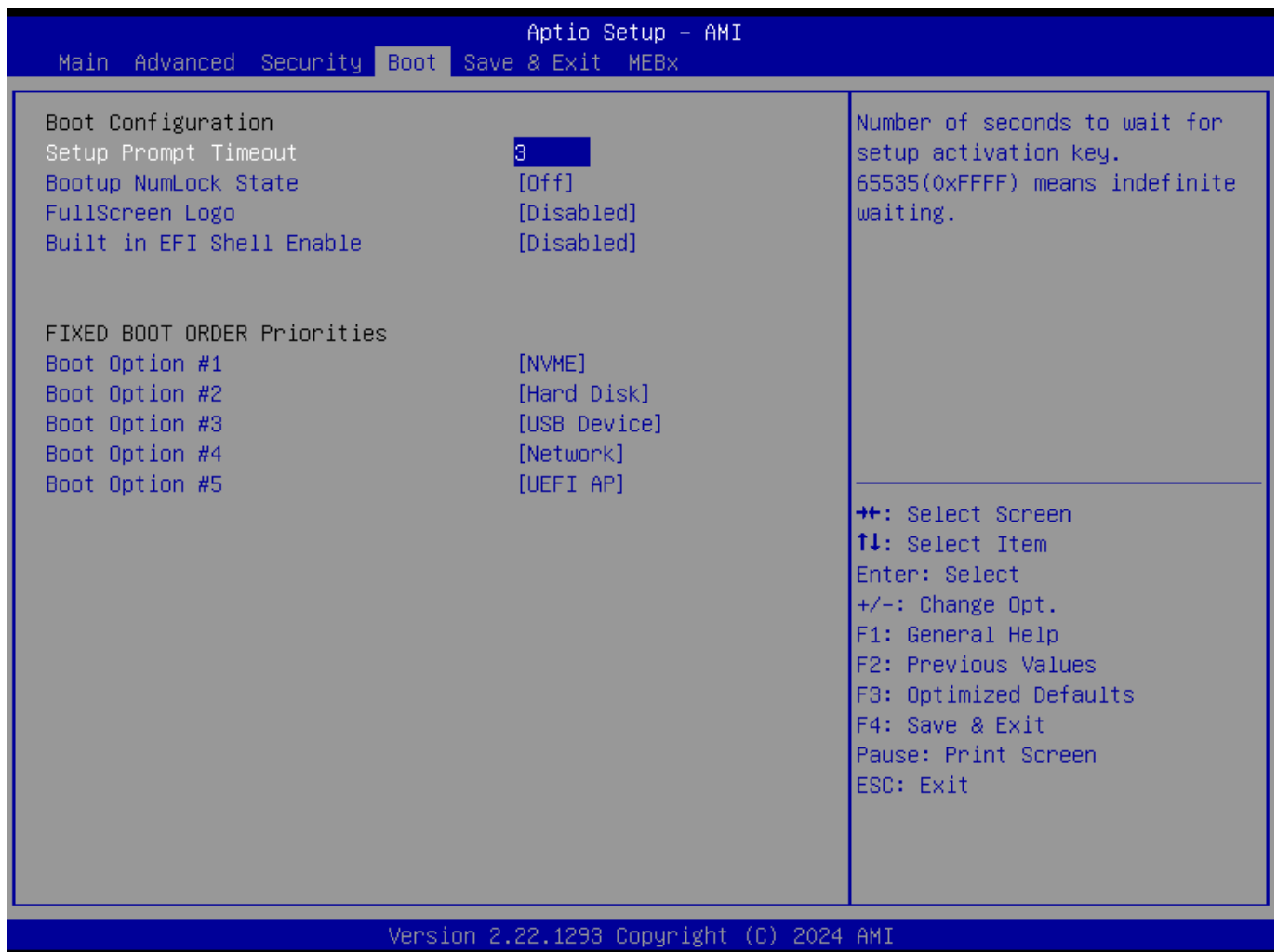
4.3.1 Secure Boot



This menu contains the following information:

- **System Mode**
Display the System Mode.
- **Secure Boot**
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**
Secure Boot mode options: Standard or Custom.
In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
- **Restore Factory Keys**
Force System to User Mode. Install factory default Secure Boot key databases.
- **Reset To Setup Mode**
Delete all Secure Boot key databases from NVRAM.
- **Expert Key Management**
Enables expert users to modify Secure Boot Policy variables without full authentication.

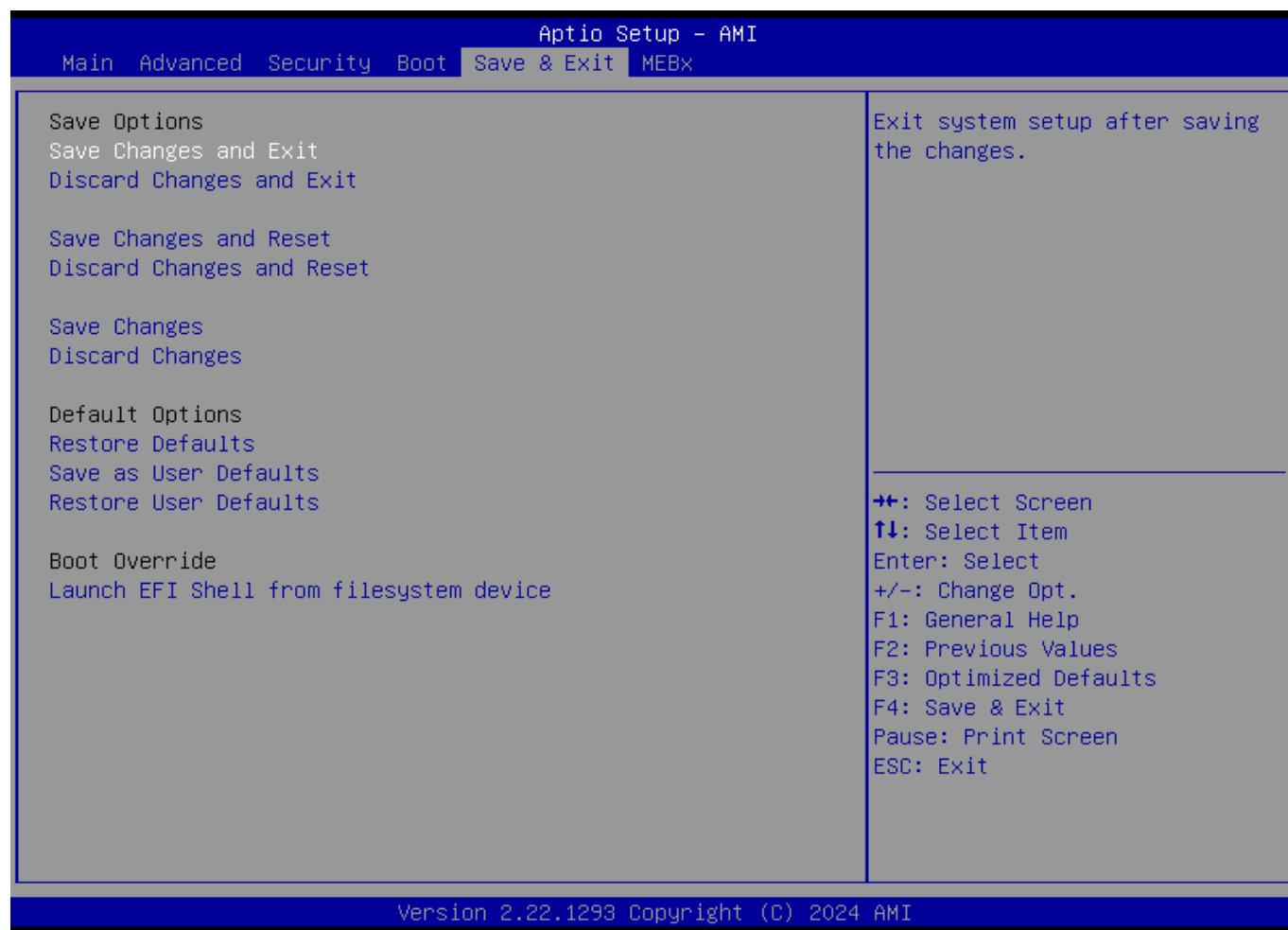
4.4 Boot



This menu contains the following information:

- Setup Prompt Timeout
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- Bootup Num Lock State
Select the keyboard Num Lock state.
- Full Screen Logo
Enable or Disable Full Screen Logo option.
- Built in EFI Shell Enable
Enable or Disable Built in EFI Shell.
- FIXED BOOT ORDER Priorities
Display Boot order, and allow to set NVME/Hard Drive/USB/XXX boot order in this group.

4.5 Save & Exit



This menu contains the following information:

Save Options:

- Save Changes and Exit
Exit the system after saving the changes.
- Discard Changes and Exit
Exit system setup without saving any changes.
- Save Changes and Reset
Reset the system after saving the changes.
- Discard Changes and Reset
Reset system setup without saving any changes.
- Save Changes
Save Changes done so far to any of the setup options.
- Discard Changes:
Discard Changes done so far to any of the setup options.

Default Options

- Restore Defaults
Restore or Load Default values for all the setup options.
- Save as User Defaults
Save the changes done so far as User Defaults.
- Restore User Defaults
Restore the User Defaults to all the setup options.

Boot Override

- Launch EFI Shell from filesystem device
Attempts to launch EFI Shell application (Shell.efi) from one of the available filesystem devices.

4.6 MEBx



This menu contains the following information:

- Intel(R) ME Password
MEBx Login.

