Table of Contents

SECTION 1
INTRODUCTION

This section contains general information and detailed specifications of the . Section 1 consist of the following sub-sections:

- General Descriptions
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

1.1 General Descriptions

The Series features 11th gen Intel® Core™ i7/i5/i3 or Celeron® Quad-core ULT processor (Tiger Lake UP3), high performance yet low power consumption, fan-less slim type design, -40°C to +60°C extended operating temperature, and 9V to 48V wide range DC power input with industrial-grade reliability. Highly integrated and with rich IO configuration, the A is perfectly suitable for Edge Computing, Machine vision, Embedded controller, Robotics applications.

Features

- 11th gen Intel® Core™ i7/i5/i3 or Celeron® Quad-core ULT processor (Tiger Lake UP3)
- Dual-channel DDR4-3200 SO-DIMM for up to 64GB of memory
- Supports 3x 2.5 GbE, 6 USB, 4 COM
- -40°C to +60°C wide operating temperatures
- 9 to 48 VDC wide range DC power input
- Supports triple displays with 2 HDMI, and 1 DisplayPort++
- Intel® Iris® Xe integrated graphics (i7 & i5 SKUs)
- Trusted platform module (TPM 2.0 onboard)

Reliable and Stable Design
The embedded system supports 11th gen Intel® Core™ i7/i5/i3 or Celeron® Quad-core ULT processor, along with the features of high performance, industrial-grade operation temperature/power input and multi-functional design that make it the best solution factory automation, machine vision, Edge Computing, Robotics applications.

Rich IO Connectivity
The comes with rich I/O interfaces including two RS-232/422/485 ports, two RS-232, four USB 3.2 ports, two USB 2.0 ports, three 2.5G high speed ethernet, two HDMI 1.4b, one DisplayPort++,one 8-CH TTL DIO, and one front access SIM slot socket supported.

Embedded O.S. Supported
The with 11th generation platform supports Windows® 10 IoT, Windows®11 IoT.

High data security Supported.
The is equipped with two swappable 2.5" SATA storage drive bays that can support RAID 0/1 for data backup.

1.2 System Specifications

1.2.1 CPU

- **CPU**
  - Intel® Core™ i7-1185G7E
  - Intel® Core™ i5-1145G7E
  - Intel® Core™ i3-1115G4E
  - Intel® Core™ Celeron® 6305E

- **Chipset**
  - SoC

- **BIOS**
  - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface BIOS.

- **System Memory**
  - 2 x 260-pin DDR4-3200 SO-DIMM, up to 64GB

1.2.2 I/O System

- **Display**
  - 2 x HDMI 1.4b (3840 x 2160@30 Hz)
  - 1 x DisplayPort++ 1.2a (4096X2160@60 Hz)

- **Ethernet**
  - 3 x 2.5GbE(PoE* by option) (2 x Intel® I226-IT, 1 x Intel® I226-LM)

- **USB Ports**
  - 4 x USB 3.2 Gen 1
  - 2 x USB 2.0

- **Serial Ports**
  - 2 x RS-232/422/485 (COM1/COM2) (+5V / +12V powered)
  - 2 x RS-232 (COM3/COM4) (+5V / +12V powered)
  - Baud rate max. up to 115200

- **DIO Port**
  - 1 x 8-CH TTL DIO (DB9 female connector , 4 in & 4 out)

- **Mini PCIe Interface**
  - 1 x Full-size PCI Express Mini Card (USB + PCIe signal)
  - 1 x M.2 Key E 2230 (for Wi-Fi)
  - 1 x M.2 Key M 2280 (for NVMe storage , PCIex4 signal only)

- **Storage**
  - 2 x 2.5" swappable SATA HDD/SSD drive bays, up to 9.5mm in height (Software RAID 0,1)

- **Indicator**
  - 1 x Green LED as indicator for PWR status
  - 1 x Amber LED as indicator for HDD/SSD active

- **Switch**
  - 1 x ATX PWR switch
  - 1 x Remote PWR switch
  - 1 x AT/ATX Quick switch
  - 1 x Reset connector

- **Antenna & SIM**
  - 4 x SMA type connector openings for antenna
  - 1 x front access SIM slot + 1 internal SIM slot

- **TPM 2.0**
  - 1 x ST33HTPH2X32AHD8

1.2.3 System Specifications

- **Watchdog Timer**
  - 1-255 seconds or minutes; up to 255 levels.

- **Power Supply**
  - 9V-48V DC input

- **Operation Temperature**

  Ethernet version :
  - -40°C to +60°C (-40°F to +140°F) with 0.5 m/s air flow (with W.T. DRAM & SSD,CPU TDP 15W)

  PoE version (optional) :
  - -40°C to +50°C (-40°F to +122°F) with 0.7 m/s air flow (with W.T. DRAM & SSD,CPU TDP 15W)

- **Storage Temperature**
  - -40℃ to +80℃ (-40 ºF to +176ºF)

- **Humidity**
  - 10% to 95% (non-condensation)

- **Shock**
  - IEC 60068-2-27 (w/SSD: 50G, half sine,11 ms duration)

- **Vibration Endurance**
  - IEC 60068-2-64 (w/SSD: 3Grms STD, random, 5 - 500 Hz,1 hr/axis)

- **Weight**
  - 2.4 kg (5.29 lb) without package
  - 3.2 kg (7.0 lb) with package

- **Dimension**
  - 250mm (9.84") (W) x 170mm (6.69") (D) x 60mm (2.36") (H)

1.2.4 Driver CD Contents

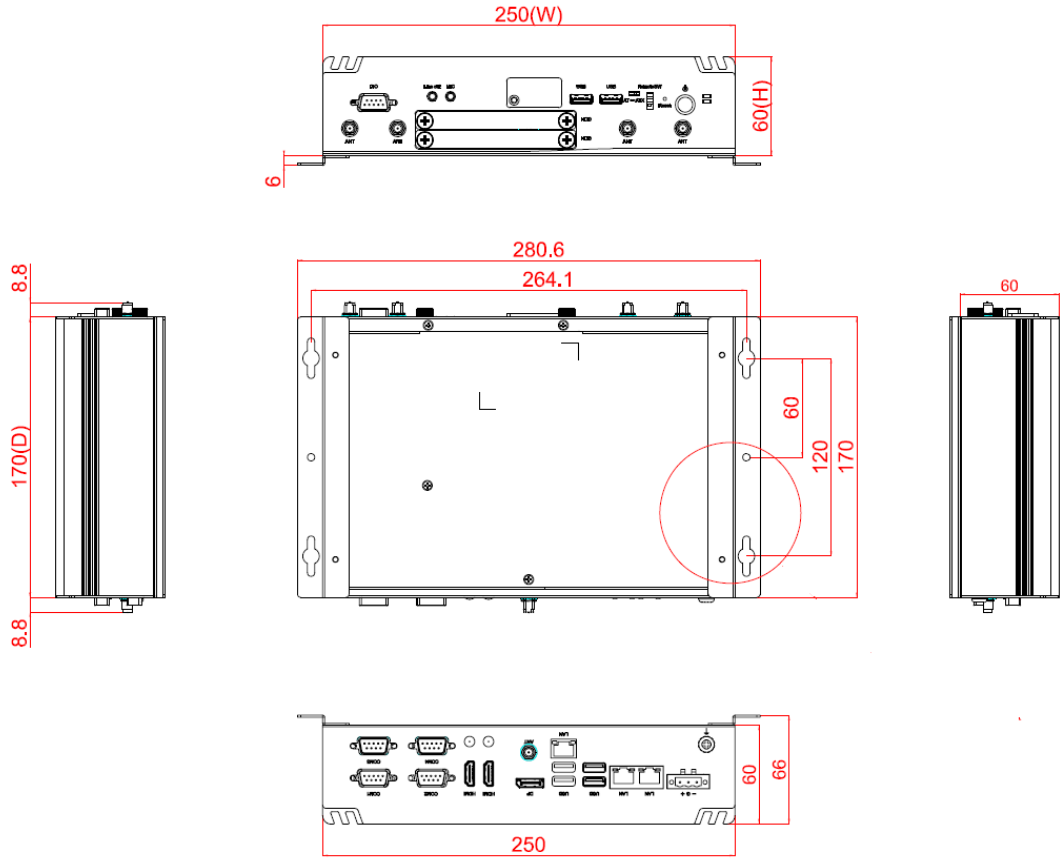
Please download the following

- **Ethernet**
- **Chipset**
- **Graphic**
- **Audio**
- **Intel® ME**
- **Intel® Rapid Storage technology**

1.3 Dimensions

The following diagrams show dimensions and outlines of the .

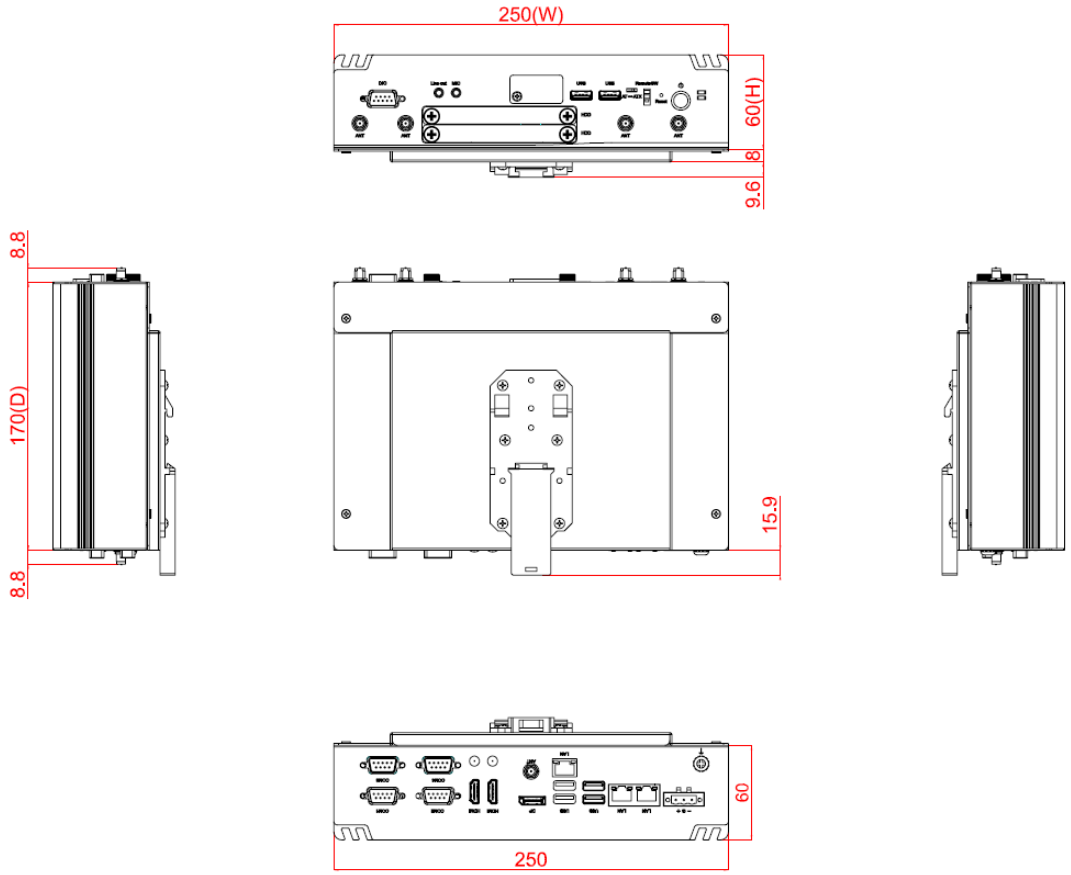
1.3.1 System Dimensions



1.3.2 Wall-mount Bracket Dimensions

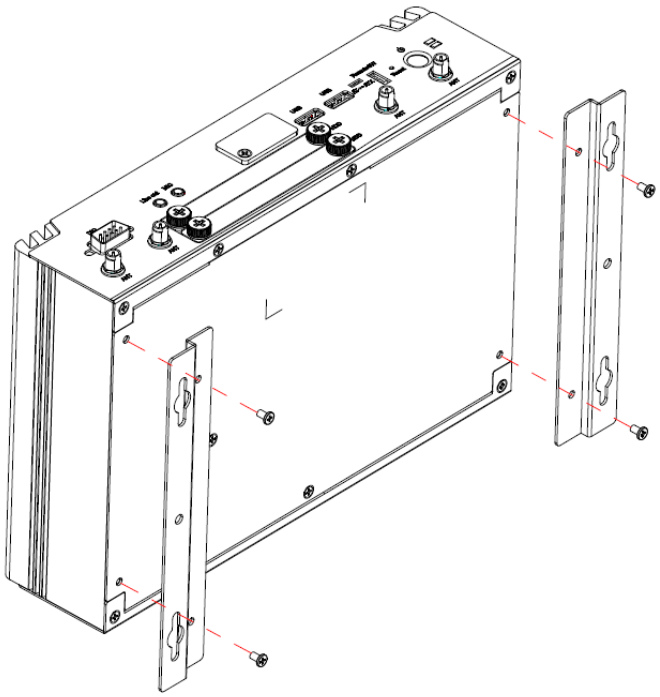
From the accessories box, users can get 4pcs of truss head M3*6L screws for fixing the wall mount kit.

Note: When users install the wall mount kit, please turn the LAN ports side outlet towards the floor.

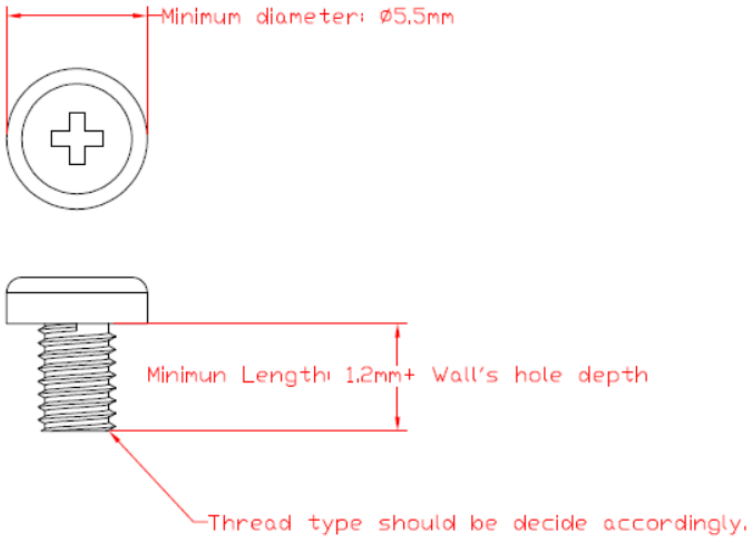


Wall-mount Bracket Assembly Drawing

From the accessories box, users can get 4pcs of truss head M3*6L screws for fixing the wall mount kit.

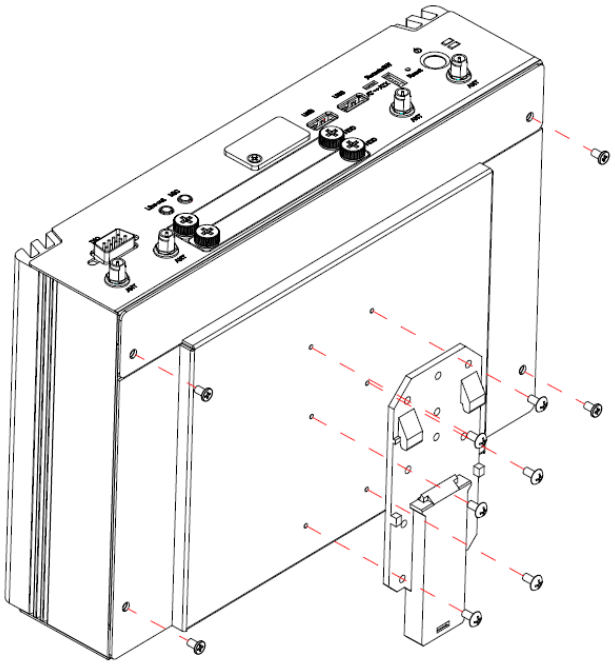


Note : If users install the screws in drywall, use the hollow wall anchors to ensure that the unit does not pull away from the wall due to prolonged strain between the cable and the power connector.



1.3.3 DIN-Rail Bracket Dimensions

From the accessories box, users can get 4pcs of truss head M3*6L and 6pcs of M3*4L countersunk flat head screws for fixing the DIN-rail mount kit.



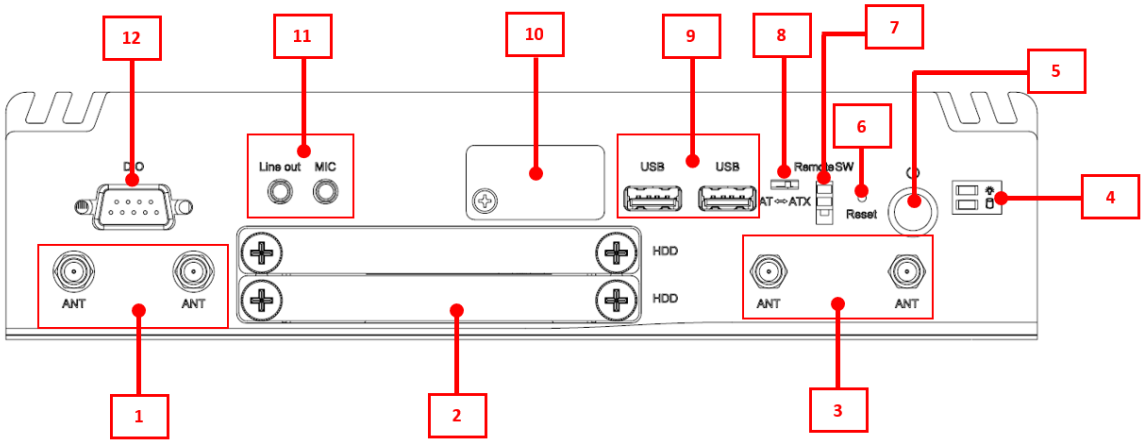
DIN-Rail Bracket Assembly Drawing

From the accessory box, users can get 6pcs of truss head M3*6L screws for fixing the wall mount kit.

1.4 I/O Outlets

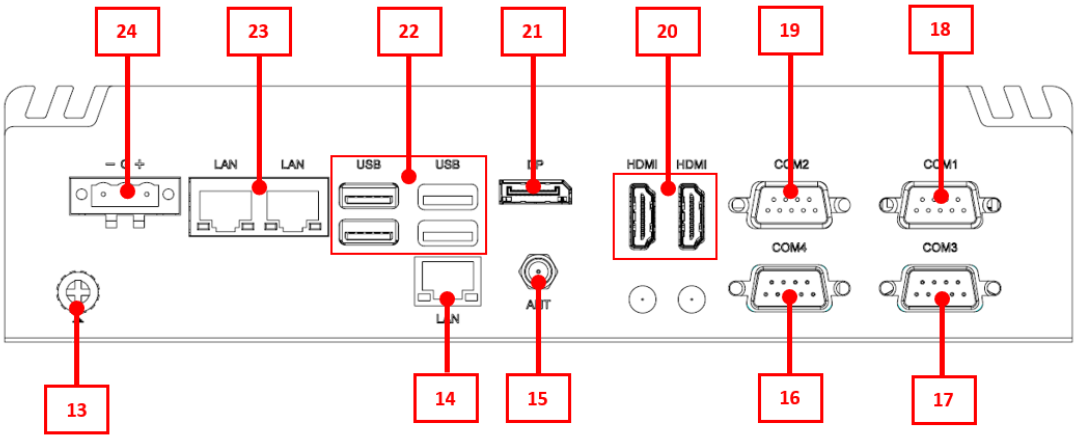
The following figures show I/O outlets on the .

Front View



1	2 x Antenna opening	7	1 x Remote power switch
2	2 x Swappable HDD drive bay	8	1 x AT/ATX quick switch
3	2 x Antenna opening	9	2 x USB 2.0
4	LEDs	10	1 x Front access SIM slot
5	1 x Power button	11	1 x Audio (Mic in/Line out)
6	1 x Reset switch	12	1 x 8-CH DIO (DB9 female,4IN & 4OUT)

Rear View



13	1 x Grounding screw	19	RS-232/422/485 (COM2)
14	1 x LAN (i226-LM)	20	2 x HDMI 1.4b
15	1 x Antenna opening	21	1 x DisplayPort++
16	RS-232 (COM4)	22	4 x USB 3.2 Gen 1
17	RS-232 (COM3)	23	2 x LAN (i226-IT)
18	RS-232/422/485 (COM1)	24	1 x Phoenix type power input

1.5 Packing List

The comes with the following bundle package:

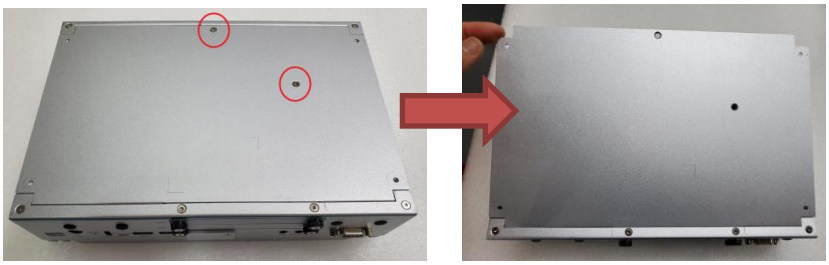
- **system unit x 1**
- **DRAM Thermal Pad x 3**
- **DRAM Bracket x 1**
- **Remote power switch Cable x 1**
- **3-pin Terminal block connector x 1**
- **Foot Pad x 4**
- **Screw pack x 1**
- **M.2 Bracket x 1**
- **M.2 Thermal pad x 3**

SECTION 2
HARDWARE INSTALLATION

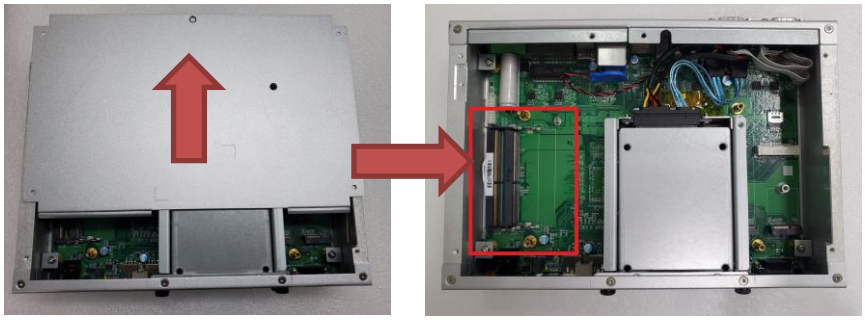
The is convenient for various hardware configurations, such as CPU, DRAM, HDD (Hard Disk Drive), SSD (Solid State Drive), PCI Express Mini card modules and optional MXM graphic module. Section 2 contains guidelines for hardware installation.

2.1 Installation of SO-DIMM

Step 1 Turn off the system and unplug the power cord.
Step 2 Turn the system unit upside down and loosen two screws on the bottom cover of the chassis and pull up the bottom cover.



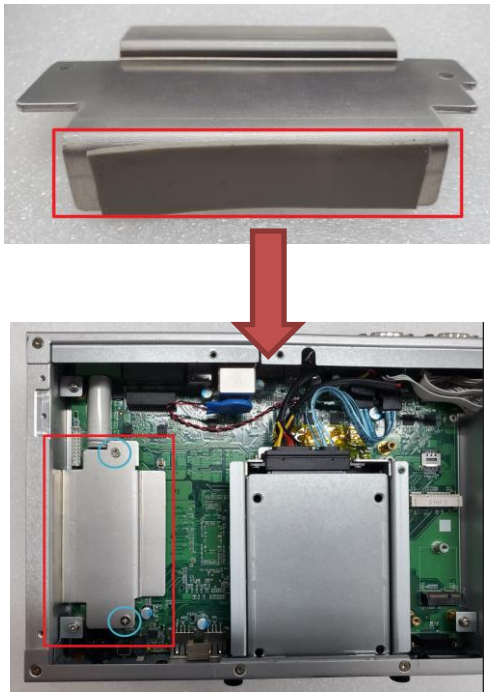
Step 3 Pull and open the bottom cover back, then located the dual DDR4 SO-DIMM sockets on main board as red marked.



Step 4 Locate the memory module, place the thermal pad on the bottom of the DRAM socket, then insert a gold colored contact into the socket and push the module down until it is locked in place by the two end latches. And then place another thermal pad on top of the DRAM module.

thermal pad for DIMM 1 **thermal pad for DIMM 2**

Step 5 Place a thermal pad on the DRAM bracket and screw it on top of the DRAM.



Step 6 Put the bottom cover back and fasten two screws back onto the system.

2.2 Installation of Mini PCIe Module (Full-Size)

Step 1 **Turn off the system and unplug the power cord.**

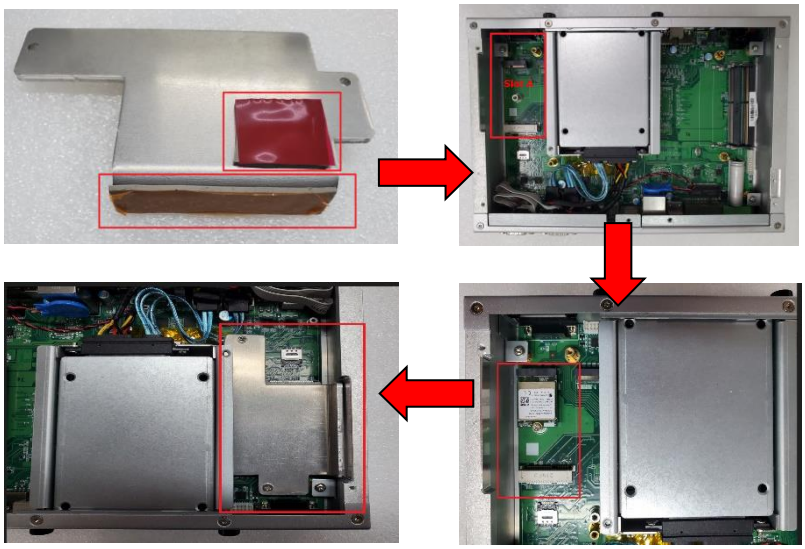
Step 2 **Turn the system upside down to locate screws at the bottom and loosen two screws as red marked.**

Step 3 **has two mini card slots:**

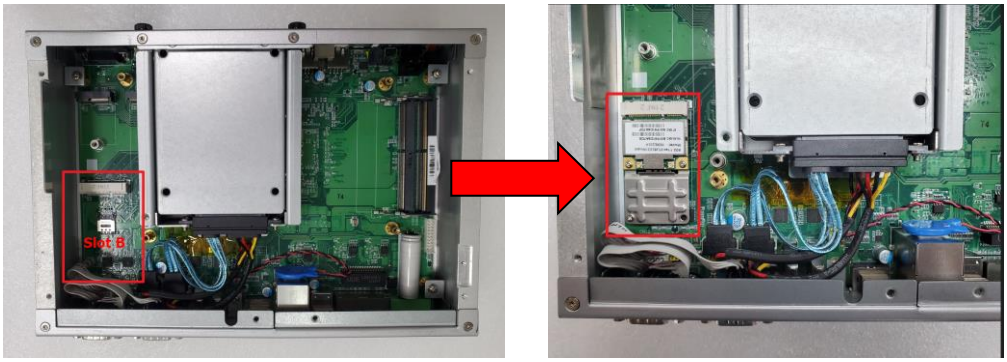
Slot A : M.2 Key E for Wi-Fi (CN7) (USB + PCIe signal)

Slot B : Mini PCIe slot for Wi-Fi or LTE (CN8) (PCIex1 signal)

Step 4 **Slot A is used as the M.2 wireless mini card slot, assembly the pad on the bracket and insert the M.2 wireless mini PCIe module into the slot and fasten the screw, then secure the thermal pad bracket on top of the mini card module.**



Step 5 Slot B is used as the wireless mini card slot, insert the Wi-Fi or LTE mini PCIe module into the slot and fasten the screw.



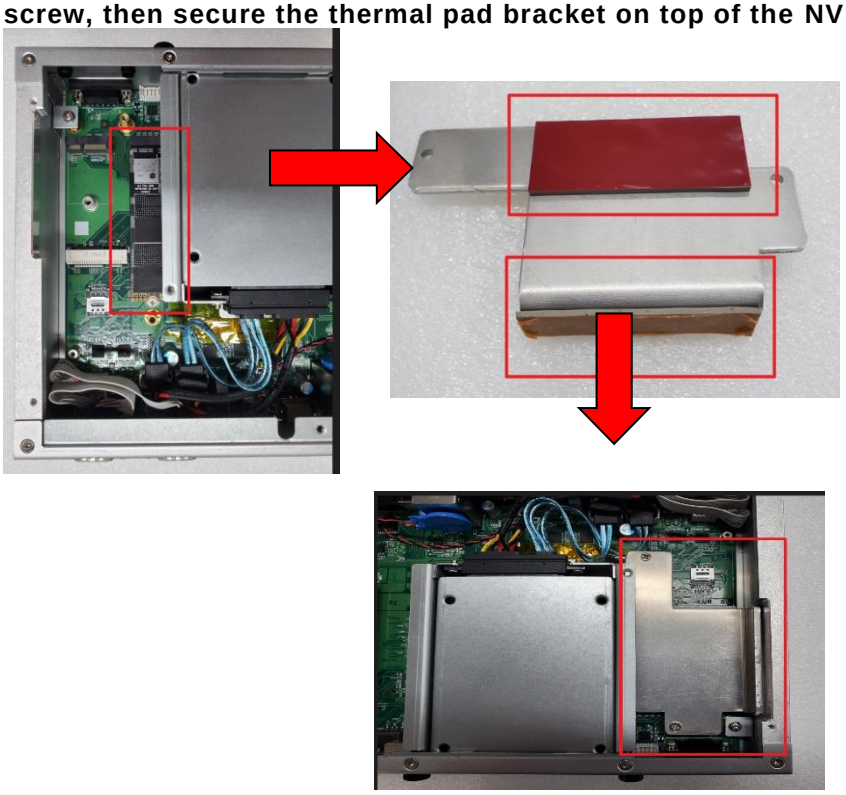
Step 6 And then connect the cable to antenna opening.

Step 7 Put the bottom cover and fasten all screws back onto the system.

2.3 Installation of NVMe storage (M.2 Key M)

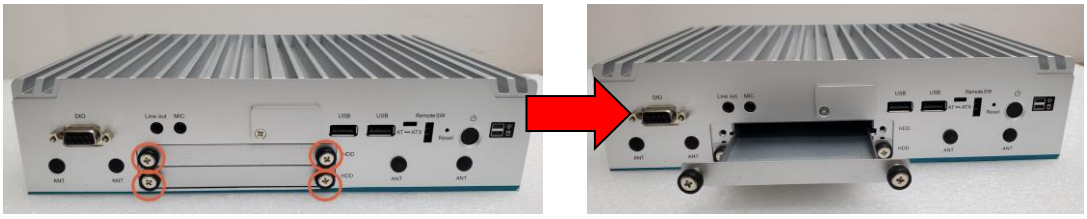
Step 1 Turn off the system and unplug the power cord.
Step 2 Turn the system upside down to locate screws at the bottom and loosen two screws as red marked.

Step 3 Located the M.2 NVMe slot as red marked, assembly the pad on the bracket and insert the M.2 NVMe module into the slot and fasten the screw, then secure the thermal pad bracket on top of the NVMe module.

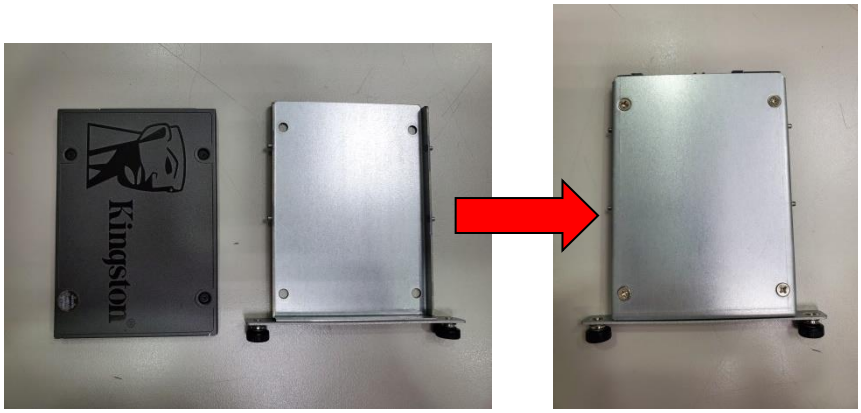


2.4 Installation of 2.5" SATA Device

Step 1 Turn off the system and unplug the power cord.
Step 2 Loosen two of the SATA drive tray's screws and pull out the SATA HDD drive tray.



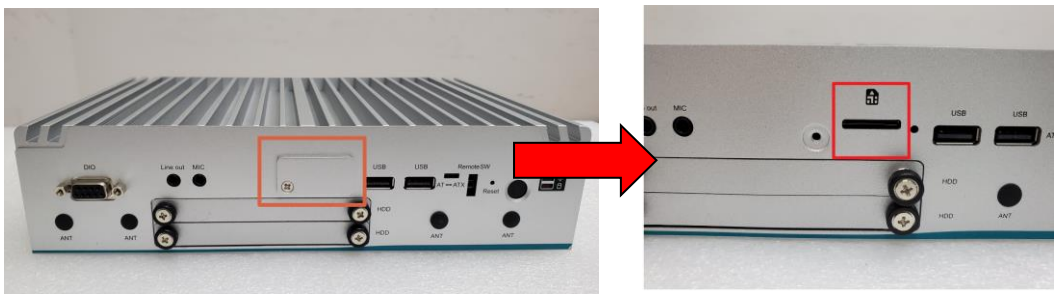
Step 3 Turn the SATA drive tray upside down to install SSD/HDD and then fasten the four HDD screws to secure the SATA drive tray.



Step 4 Slide the SATA drive tray back into the system and fasten the screws firmly to complete the installation.

2.5 Installation of SIM Card

Step 1 Turn off the system and unplug the power cord.
Step 2 Loosen the screw of the SIM slot cover on chassis.



Step 3 Make sure the SIM card direction is correct and insert the SIM card firmly.

SIM card direction (contact side facing upward)

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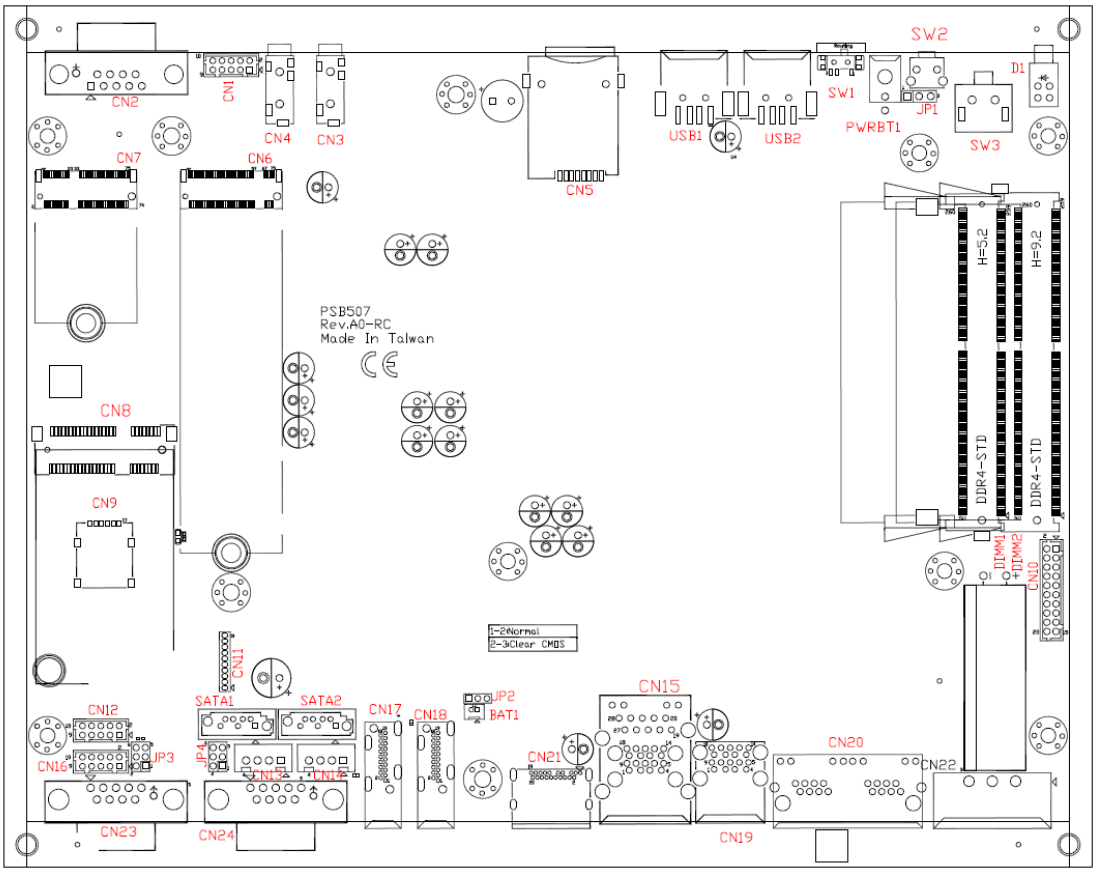
SECTION 3
JUMPER & CONNECTOR SETTINGS

Proper jumper settings configure the to meet various application needs. Hereby all jumpers settings along with their default settings are listed for devices onboard.

3.1 Locations of Jumpers & Connectors

PSB507 Top View



3.2 Summary of Jumper Settings

Proper jumper settings configure the to meet various application purposes. A table of all jumpers and their default settings is listed below.

Jumpers	Descriptions		Settings
JP2	Clear CMOS		Short 1-2
JP3	COM1 Data/Power Selection Default: RS-232 Data	CN23 Pin 1: DCD	3-5 Close
		CN23 Pin 9: RI	4-6 Close
JP4	COM2 Data/Power Selection Default: RS-232 Data	CN24 Pin 1: DCD	3-5 Close
		CN24 Pin 9: RI	4-6 Close

【Note】: How to setup jumpers

Illustrations below show that a cap on a jumper is to "close" the jumper, whereas that off a jumper is to "open" the jumper.

[Open] [Closed] [Pin1-2 Closed]

3.2.1 Restore BIOS Optimal Defaults (JP1)

Put the jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2.
This procedure is to restore BIOS optimal defaults.

Functions	Settings
Normal (Default)	1-2
Clear RTC	2-3

3.2.2 COM1 Data/Power Selection (JP3)

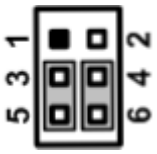
This is a 2x3-pin (pitch=2.0mm) jumper. The COM1 port has +5V level power capability on DCD and +12V level on RI by setting jumper JP3.

Functions	Settings
Power: Set CN21 pin 1 to +5V level	1-3 close
Data: Set CN21 pin 1 to DCD (Default)	3-5 close
Power: Set CN21 pin 9 to +12V level	2-4 close
Data: Set CN21 pin 9 to RI (Default)	4-6 close

3.2.3 COM2 Data/Power Selection (JP4)

This is a 2x3-pin (pitch=2.0mm) jumper. The COM2 port has +5V level power capability on DCD and +12V level on RI by setting jumper JP4.

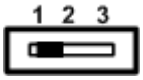
Functions	Settings
Power: Set CN22 pin 1 to +5V level	1-3 close
Data: Set CN22 pin 1 to DCD (Default)	3-5 close
Power: Set CN22 pin 9 to +12V level	2-4 close
Data: Set CN22 pin 9 to RI (Default)	4-6 close



3.2.4 Auto Power On (SW1)

If SW1 is enabled for power input, the system will be automatically powered on without pressing the soft power button. If SW1 is disabled for power input, it is necessary to manually press the soft power button to power on the system.

Functions	Settings
Disable auto power on (Default)	1-2 close
Enable auto power on	2-3 close



3.3 Connectors

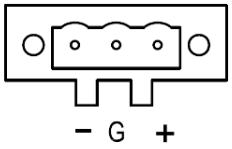
Please refer to the below connector table to get information on pin assignments for individual connectors.

External Connectors	Sections
DC-in Phoenix Power (CN22)	3.3.1
HDMI (CN17, CN18)	3.3.2
DisplayPort (CN21)	3.3.3
RS232/422/485 (CN23, CN24)	3.3.4
Ethernet (i266-LM) + USB 3.2 (CN15)	3.3.5
USB 2.0 (USB1, USB2)	3.3.6
USB 3.2 (CN19)	3.3.7
Ethernet (i266-IT) (CN20)	3.3.8
8-CH DIO (CN2)	3.3.9
ATX power button (SW3)	3.3.10
Reset Switch (SW2)	3.3.11
Remote Power Switch (PWRBT1)	3.3.12
AT/ATX Quick Switch	3.3.13
Audio (CN3, CN4)	3.3.14
RS-232 (CN16, CN12)	3.3.15
Internal Connectors	**Sections**
SATA Signal Connector (SATA 1, 2)	3.3.16
SATA Power Connector (CN13, CN14)	3.3.17
SIM slot (CN9,CN5)	3.3.18
Full-Size Express Mini Card Slot (CN8)	3.3.19
M.2 2280 Key M (CN6)	3.3.20
M.2 2230 Key E (CN7)	3.3.21

3.3.1 DC-in Phoenix Power Connector (CN22)

The system supports 24V Phoenix DC-in connector for system power input.

Pins	Signals
1	DC+
2	GND
3	DC-

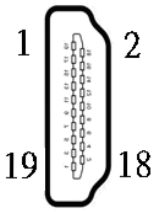


3.3.2 HDMI Connector (CN17,CN18)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pins	Signals	Pins	Signals
1	HDMI OUT_DATA2+	11	GND
2	GND	12	HDMI OUT Clock-
3	HDMI OUT_DATA2-	13	N.C.
4	HDMI OUT_DATA1+	14	N.C.
5	GND	15	HDMI OUT_SCL
6	HDMI OUT_DATA1-	16	HDMI OUT_SDA
7	HDMI OUT_DATA0+	17	GND
8	GND	18	+5V
9	HDMI OUT_DATA0-	19	HDMI_HTPLG
10	HDMI OUT Clock+		

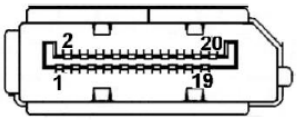
HDMI1.4b



3.3.3 DisplayPort++ (CN21)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pins	Signals	Pins	Signals
1	DPB_LANE0	11	GND
2	GND	12	DPB_LANE3#
3	DPB_LANE0#	13	Detect Pin
4	DPB_LANE1	14	GND
5	GND	15	DPB_AUX
6	DPB_LANE1#	16	GND
7	DPB_LANE2	17	DPB_AUX#
8	GND	18	DPB_HPDE
9	DPB_LANE2#	19	GND
10	DPB_LANE3	20	+3.3V

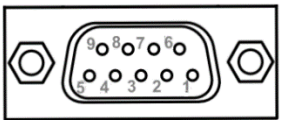


3.3.4 RS232/422/485 Serial Port Connector (CN23,CN24)

2x RS-232/422/485 ports (COM1/COM2). Please refer to Chapter 4 for the details of BIOS settings. COM1 and COM2 is equipped with +5V level power capability on DCD and +12V level on RI by setting JP3 and JP4 (see section 3.2.2 and 3.2.3).

※COM1~2 (CN23,CN24)

Pins	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use

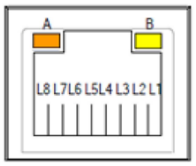


3.3.5 Ethernet + USB 3.2 Connector (CN15)

CN15 is designed for 1x Ethernet port (Intel i226-LM) & two USB 3.2 ports.

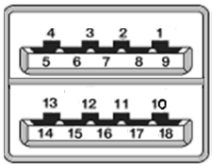
i226-LM LAN Port

Pins	LAN Signal	Pins	LAN Signal
L1	MDI0+	L5	MDI2+
L2	MDI0-	L6	MDI2-
L3	MDI1+	L7	MDI3+
L4	MDI1-	L8	MDI3-
A	Speed LED OFF: 10Mbps data rate OFF: 100Mbps data rate Amber: 1GMbps data rate Green: 2.5GMbps data rate		
B	Activity link LED(Amber) OFF: No link Blinking: Link established; data activity detected		



USB 3.2 port

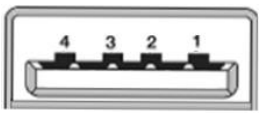
Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data-	11	USB_Data-
3	USB_Data+	12	USB_Data+
4	GND	13	GND
5	SSRX-	14	SSRX-
6	SSRX+	15	SSRX+
7	GND	16	GND
8	SSTX-	17	SSTX-
9	SSTX+	18	SSTX+



3.3.6 USB 2.0 Connector (USB1 , USB2)

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps) and ideal for installing USB peripherals such as a keyboard, mouse, scanner, etc...

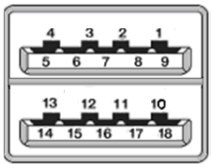
Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	3	USB_Data+
2	USB_Data-	4	GND



3.3.7 USB 3.2 Connector (CN19)

CN19 is designed for two USB 3.2 ports.

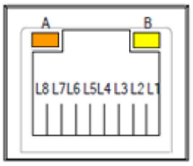
Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data-	11	USB_Data-
3	USB_Data+	12	USB_Data+
4	GND	13	GND
5	SSRX-	14	SSRX-
6	SSRX+	15	SSRX+
7	GND	16	GND
8	SSTX-	17	SSTX-
9	SSTX+	18	SSTX+



3.3.8 Ethernet Port (CN20)

One RJ-45 connector is designed by Intel i226-IT.

Pins	LAN Signal	Pins	LAN Signal
L1	MDI0+	L5	MDI2+
L2	MDI0-	L6	MDI2-
L3	MDI1+	L7	MDI3+
L4	MDI1-	L8	MDI3-
A	Speed LED OFF: 10Mbps data rate OFF: 100Mbps data rate Amber: 1GMbps data rate Green: 2.5GMbps data rate		
B	Activity link LED(Amber) OFF: No link Blinking: Link established; data activity detected		

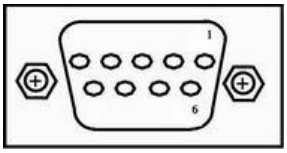


3.3.9 8-CH Digital IO (CN2)

one 8-CH output connector (DIO1~8) , default : 4IN & 4OUT. Each bit can be set to function as input or output by software programming, and users can set up via BIOS setting.

Pins	Description
1	DIO1
2	DIO2
3	DIO3
4	DIO4
5	DIO5
6	DIO6
7	DIO7
8	DIO8
9	GND

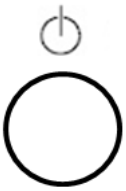
Digital I/O



3.3.10 ATX Power on/off (SW3)

The ATX power button is on the I/O side. It can allow users to control A power on/off.

Functions	Descriptions
On	Turn on/off system
Off	Keep system status



3.3.11 Reset Button (SW2)

The Reset button can allow users to reset the system.

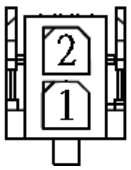
Functions	Descriptions
On	Reset system
Off	Keep system status

3.3.12 Remote Power Switch Connector (PWRBT1)

One 2-pin connector output for remote power on/off switch.

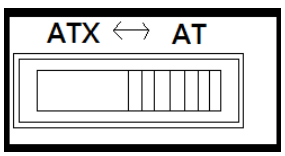
* Connector specification: Male / Female: BTX 2P 3.0mm

Functions	Descriptions
Short (1-2)	Turn on/off system
Open	Keep system status



3.3.13 AT/ATX Switch

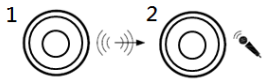
If you set AT/ATX switch to AT mode, the system will automatically power on without the need to press the soft power button during power input; users can use this switch to achieve auto power on demand.



3.3.14 Audio Connector (CN3, CN4)

The Audio jacks ideal for Audio Mic-In and Audio Line-out.

Pins	Signals
1	Line Out
2	Microphone In



3.3.15 RS-232 Serial Port Connector (CN16, CN12)

supports 2x RS-232 ports (COM3/COM4). Please refer to Chapter 4 for the details of BIOS settings.

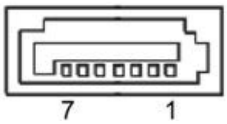
※COM3~4 (CN16,CN12)

Pins	RS-232
1	DCD, Data Carrier Detect
2	RXD, Receive Data
3	TXD, Transmit Data
4	DTR, Data Terminal Ready
5	GND, Ground
6	DSR, Data Set Ready
7	RTS, Request To Send
8	CTS, Clear To Send
9	RI, Ring Indicator

3.3.16 SATA Connector (SATA 1 & 2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are used for high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives. This board has two SATA 3.0 ports with 6Gb/s performance.

Pins	Signals
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND

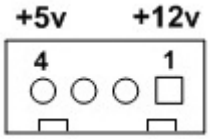


3.3.17 SATA Power Connector (CN13,CN14)

Based on CN13、CN14 to offer the SATA power for SATA 2.5" HDD/SSD.

*Connector specification: wafer 4P, P=2.5mm

Pins	Signals
1	+12V level
2	GND
3	GND
4	+5V level



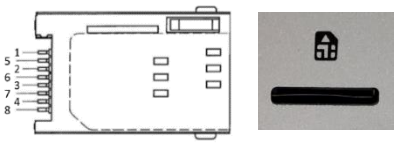
3.3.18 SIM Slot (CN9, CN5)

includes two SIM slots: CN5 is on front side and CN9 in on internal of the system that support mini PCIe slot, it is mainly used in wireless network application on CN5/CN9.

Pins	Signals
1	PRW
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	IO
8	NC

CN9

CN5

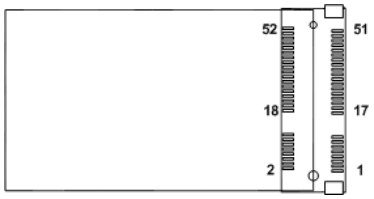


3.3.19 Full-Size PCI Express Mini Card Slot (CN8)

The supports one full-size PCI-Express Mini Card slots.CN8 is applying to either PCI-Express or USB 2.0 signal and complies with PCI-Express Mini Card Spec. V1.2.

CN8

Pins	Signals	Pins	Signals
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	SIM_PWR
9	GND	10	SIM_DATA
11	REFCLK-	12	SIM_CLK
13	REFCLK+	14	SIM_REST
15	GND	16	SIM_VPP
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/	24	+3.3VSB
25	PE_RXP3/	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/	32	SMB_DATA
33	PE_TXP3/	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB



3.3.20 M.2 2280 Key M (CN6)

The M.2 2280 Key M for NVMe storage.

Pins	Signals	Pins	Signals	Pins	Signals	Pins	Signals
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PEX3_RX-	6	NC	7	PEX3_RX+	8	NC
9	GND	10	LED_1#	11	PEX3_TX-	12	+3.3V
13	PEX3_TX+	14	+3.3V	15	GND	16	+3.3V
17	PEX2_RX-	18	+3.3V	19	PEX2_RX+	20	NC
21	GND	22	NC	23	PEX2_TX-	24	NC
25	PEX2_TX+	26	NC	27	GND	28	NC
29	PEX1_RX-	30	NC	31	PEX1_RX+	32	NC
33	GND	34	NC	35	PEX1_TX-	36	NC
37	PEX1_TX+	38	DEV SLP	39	GND	40	NC
41	PEX0_RX-	42	NC	43	PEX0_RX+	44	NC
45	GND	46	NC	47	PEX0_TX-	48	NC
49	PEX0_TX+	50	PERST#	51	GND	52	CLKREQ#
53	PEX0_REFCLkn	54	PEWAKE#	55	PEX0_REFCLkp	56	NC
57	GND	58	NC	59	CONNECTOR KEY M	60	CONNECTOR KEY M
61	CONNECTOR KEY M	62	CONNECTOR KEY M	63	CONNECTOR KEY M	64	CONNECTOR KEY M
65	CONNECTOR KEY M	66	CONNECTOR KEY M	67	NC	68	NC
69	NC	70	+3.3V	71	GND	72	+3.3V
73	GND	74	+3.3V	75	GND		

3.3.21 M.2 2230 Key E (CN7)

The M.2 2230 Key E for Wi-Fi.

1	GND	2	+3.3V	3	USB_D+	4	+3.3V
5	USB_D-	6	NC	7	GND	8	NC
9	NC	10	NC	11	NC	12	NC
13	GND	14	NC	15	NC	16	NC
17	NC	18	GND	19	GND	20	NC
21	NC	22	NC	23	NC	24	CONNECTOR Key E
25	CONNECTOR Key E	26	CONNECTOR Key E	27	CONNECTOR Key E	28	CONNECTOR Key E
29	CONNECTOR Key E	30	CONNECTOR Key E	31	CONNECTOR Key E	32	NC
33	GND	34	NC	35	PETp0	36	NC
37	PETn0	38	NC	39	GND	40	NC
41	PERp0	42	NC	43	PERn0	44	NC
45	GND	46	NC	47	REFCLKp0	48	NC
49	REFCLKn0	50	SUSCLK	51	GND	52	PERST0#
53	CLKREQ#	54	MCP_BT_DISABLE	55	PEWAKE0#	56	MCP_WIFI_DISABLE
57	GND	58	M.2_E_SMB_DATA	59	PETp1	60	M.2_E_SMB_CLK
61	PETn1	62	NC	63	GND	64	M.2_E_REFCLK
65	PERp1	66	NC	67	PERn1	68	NC
69	GND	70	NC	71	REFCLKp1	72	+3.3V
73	REFCLKn1	74	+3.3V	75	GND		

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SECTION 4
BIOS SETUP UTILITY

This section provides users with detailed descriptions in terms of how to set up basic system configurations through the BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After pressing the <Del> key, the main BIOS setup menu displays. Users can access other setup screens, such as the Advanced and Chipset menus, from the main BIOS setup menu.

It is strongly recommended that users should avoid changing the chipset's defaults. Both AMI and system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

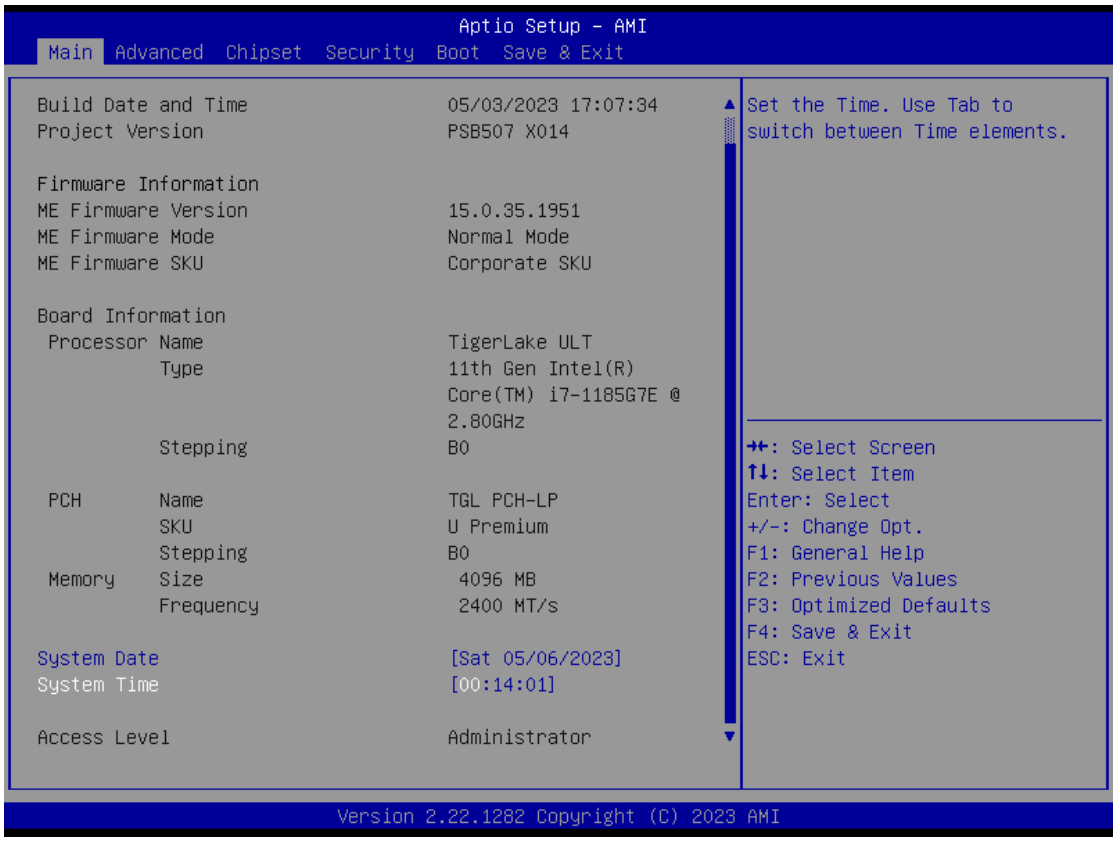
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

【Note】: ***Some of the navigation keys differ from one screen to another.***

Hot Keys	Descriptions
→← **Left/Right**	The Left and Right <Arrow> keys allow users to select a setup screen.
↑↓ **Up/Down**	The Up and Down <Arrow> keys allow users to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow users to change the field value of a particular setup item.
Tab	The <Tab> key allows users to select setup fields.
F1	The <F1> key allows users to display the General Help screen.
F2	The <F2> key allows users to Load Previous Values.
F3	The <F3> key allows users to Load Optimized Defaults.
F4	The <F4> key allows users to save any changes they made and exit the Setup. Press the <F4> key to save any changes.
Esc	The <Esc> key allows users to discard any changes they made and exit the Setup. Press the <Esc> key to exit the setup without saving any changes.
Enter	The <Enter> key allows users to display or change the setup option listed for a particular setup item. The <Enter> key can also allow users to display the setup sub- screens.

4.3 Main Menu

The Main Menu screen is the first screen users see when entering the setup utility. Users can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is also shown below.



BIOS Information
Display the auto-detected BIOS information.

System Date/Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

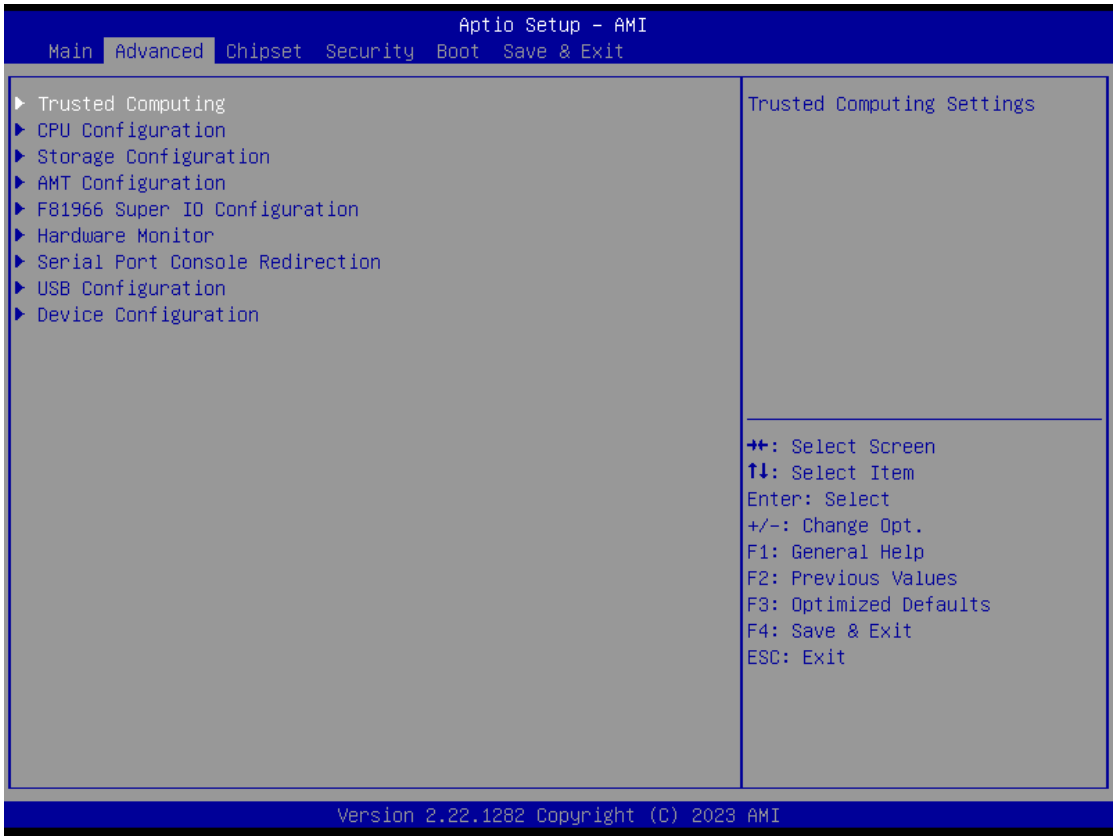
Access Level
Display the access level of current user.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. Users can select any items in the left frame of the screen to go to sub menus:

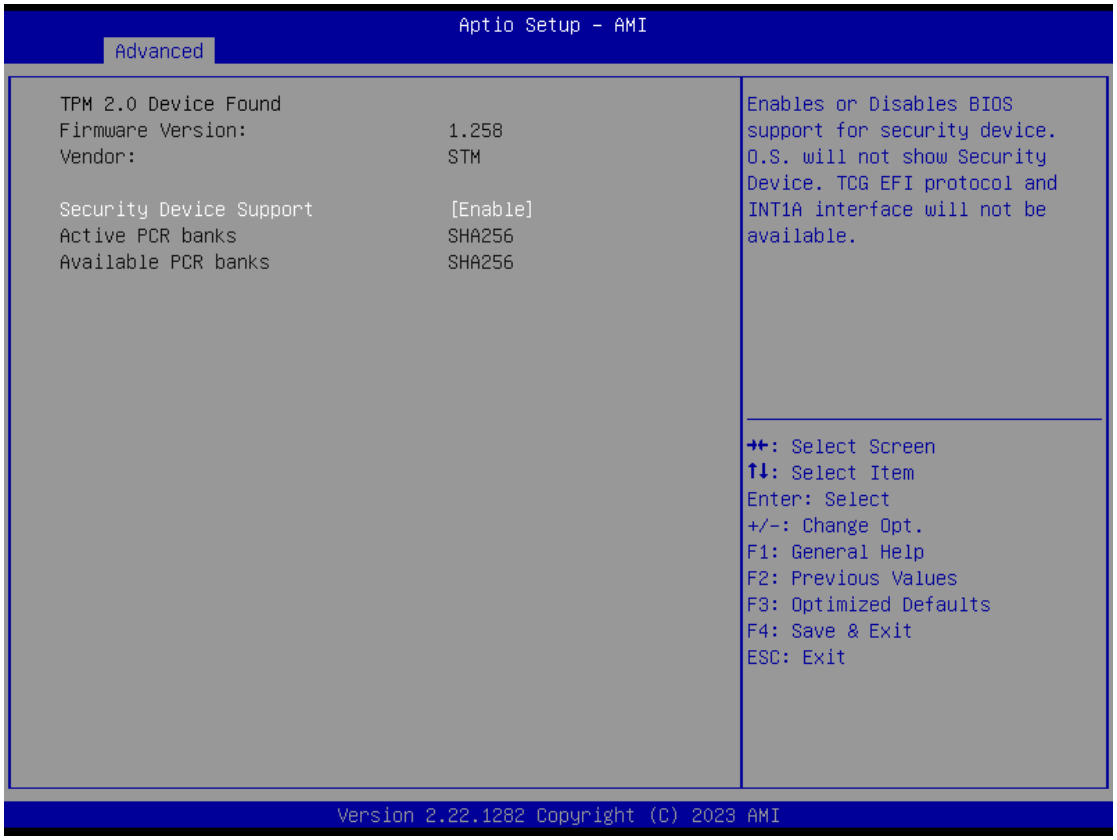
- ▶ Trusted Computing
- ▶ CPU Configurations
- ▶ Storage Configuration
- ▶ AMT Configuration
- ▶ F81966 Super IO Configuration
- ▶ Hardware Monitor
- ▶ Serial Port Console Redirection
- ▶ USB Configuration
- ▶ Device Configuration

For items marked with "▶", please press <Enter> for more options.



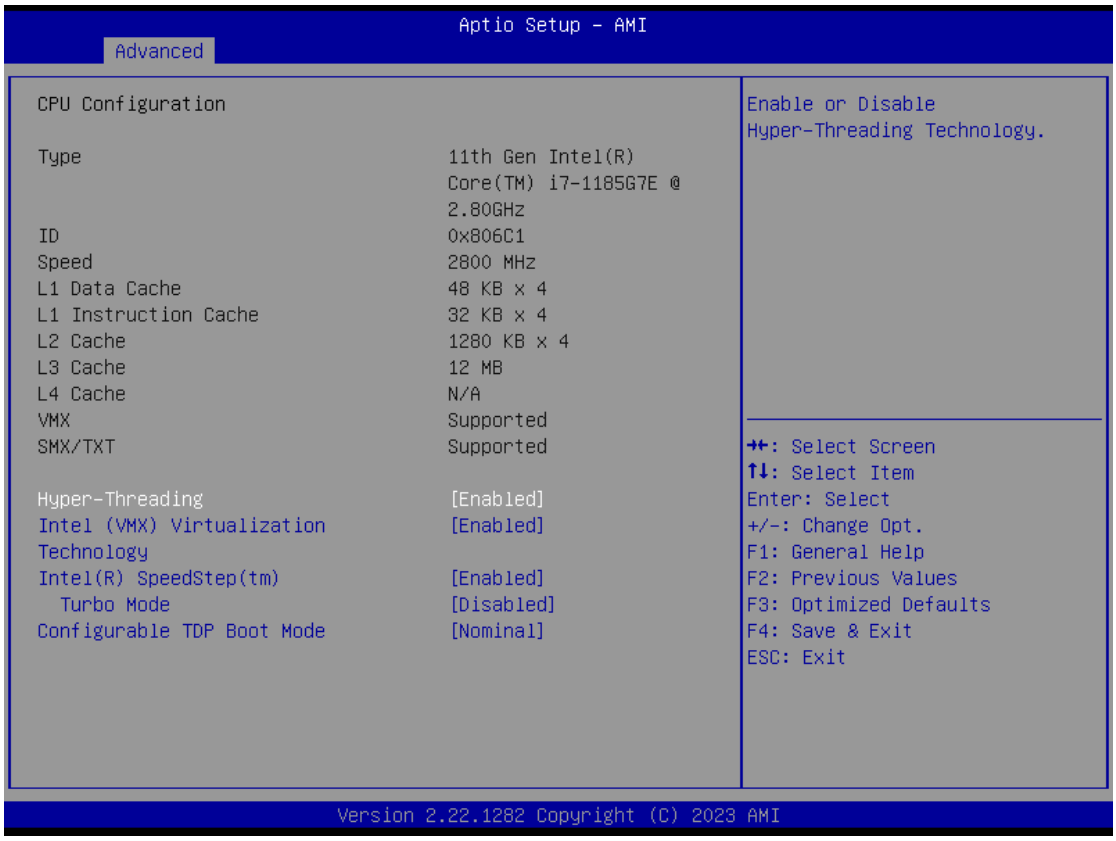
Trusted Computing

If users install a security device, such as TPM, users will see the following information for the TPM device and status.



CPU Configuration

This screen shows the CPU version and its detailed information.



Hyper-Threading
Use this item to enable or disable Hyper-Threading Technology, which makes a single physical processor perform multi-tasking functions as two logical ones.

Intel® I Virtualization Technology
It allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

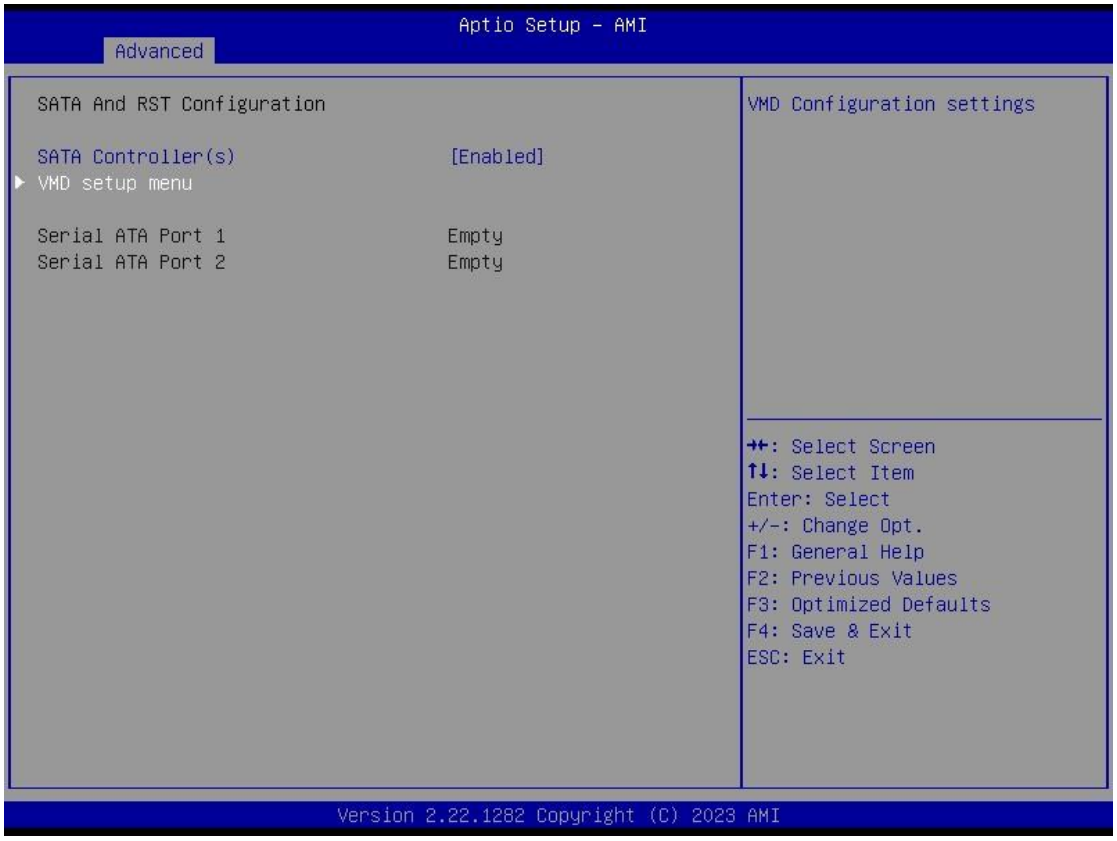
Intel® Speedstep™
Allows more than two frequency ranges to be supported.

Turbo Mode
This item is for enabling or disabling turbo mode. When enabled, it allows processor cores to run faster than marked frequency under certain conditions. The default is Disable Mode.

Configurable TDP Boot Mode
Config TDP Configurations.

Storage Configuration

Users can read the current installed hardware configurations from those SATA ports in the SATA and RST Configuration menu. During system boot up, BIOS will detect the present SATA devices automatically.

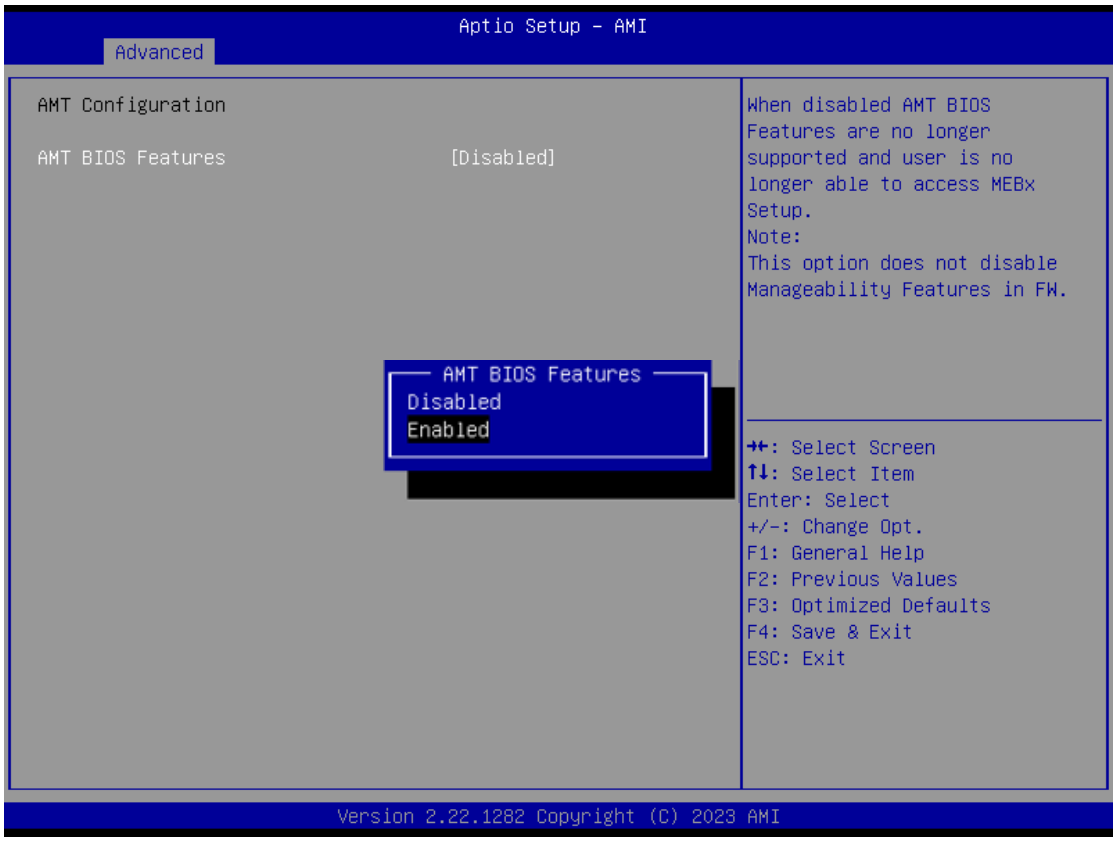


SATA Controller
Enable or disable the SATA Controller feature. The default is Enabled.

VMD Setup menu

Intel® VMD (Intel® Volume Management Device) is the new way to configure 11th Generation and greater Intel® Core™ Processor-based platforms for Intel® RST management of RAID and Intel® Optane™ memory volumes. please refer to Appendix B for how to set up and configure RAID function through VMD.

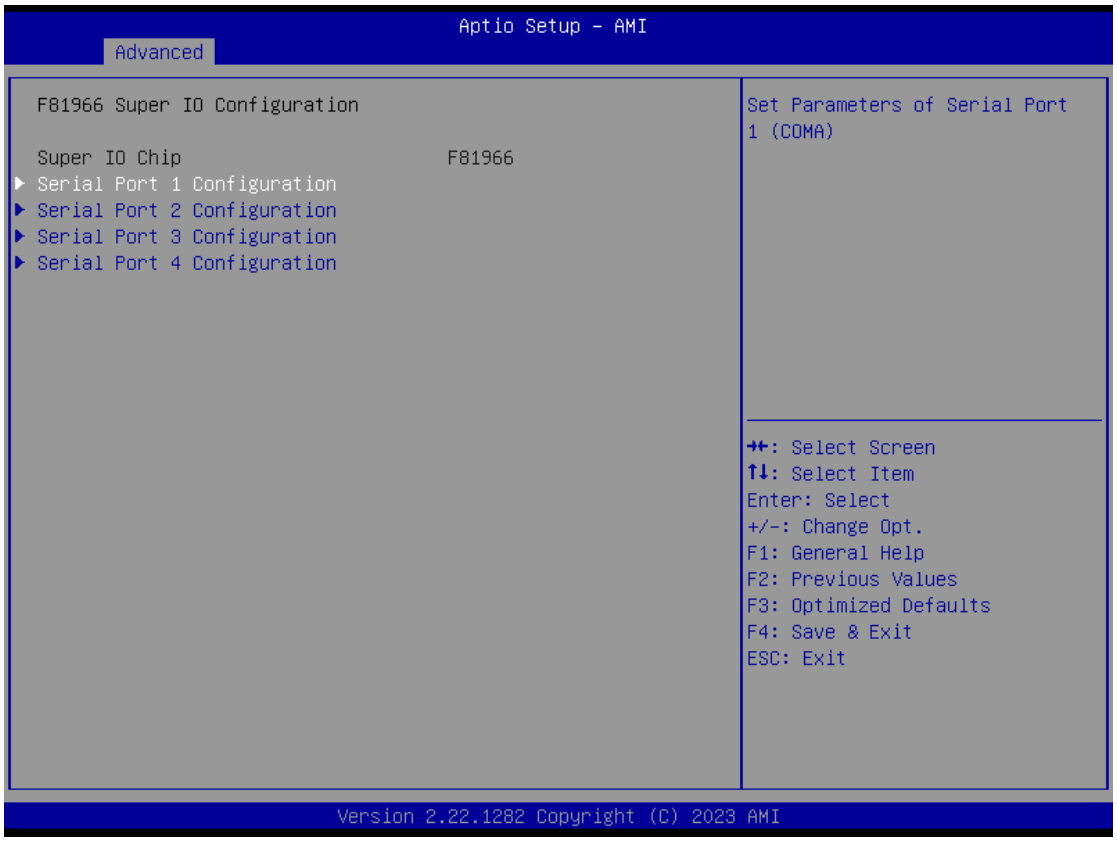
AMT Configurations
Users can use this screen to configure AMT parameters.



Intel® AMT
Enable or disable Intel® Active Management Technology BIOS Extension.

The default is enabled.

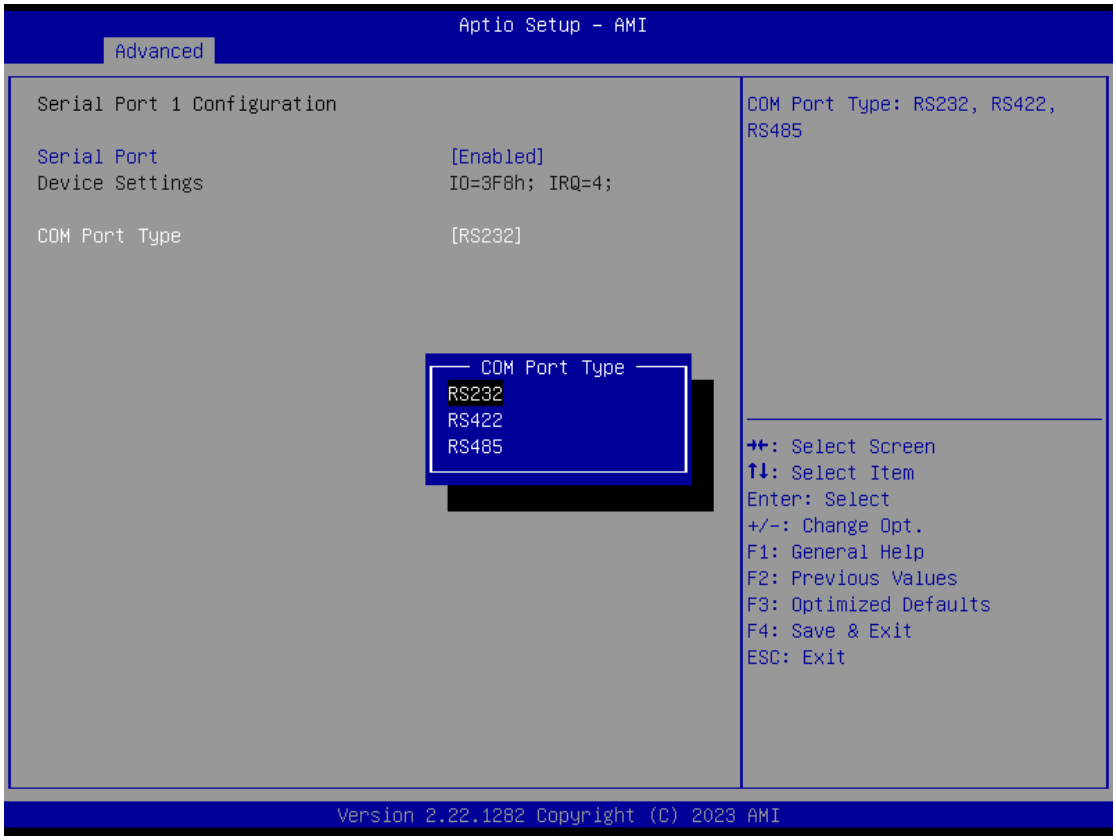
F81966 Super IO Configuration
Use this screen to select options for the F81966 Super IO Configurations and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.



Serial Port 1~4 (COM1~4) Configurations
Use these items to set parameters related to serial ports COM1/2 (RS232/422/485)
Use these items to set parameters related to serial ports COM3/4 (RS232 only)

Serial Port 1

Use this to set parameters of COM 1.

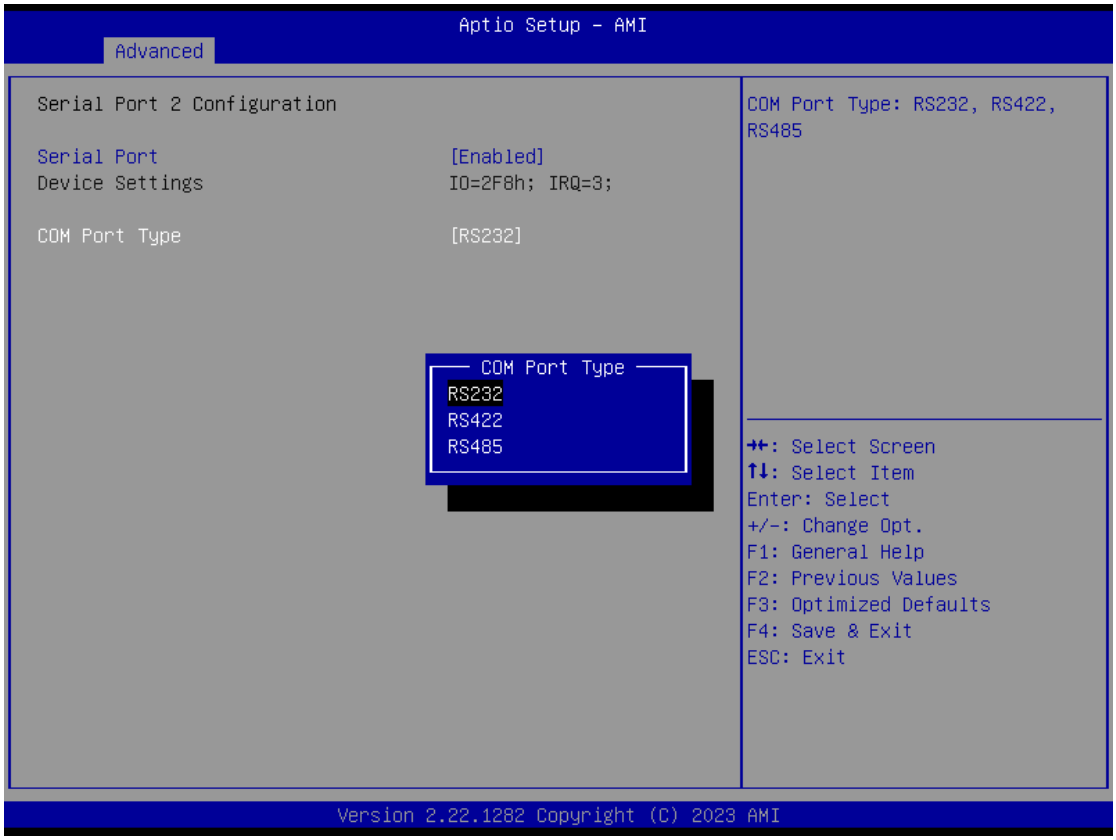


COM Port type

Use this item to set parameters related to serial ports COM 1 (RS232/422/485)

Serial Port 2

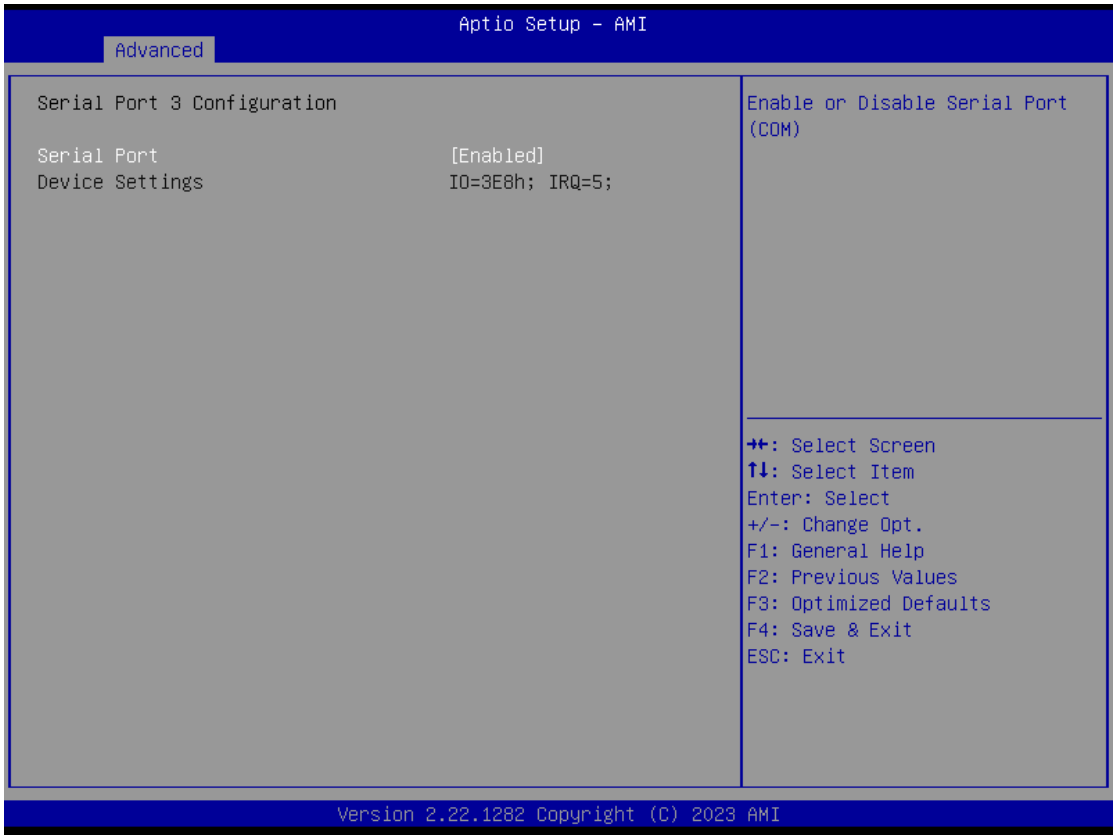
Use this to set parameters of COM 2.



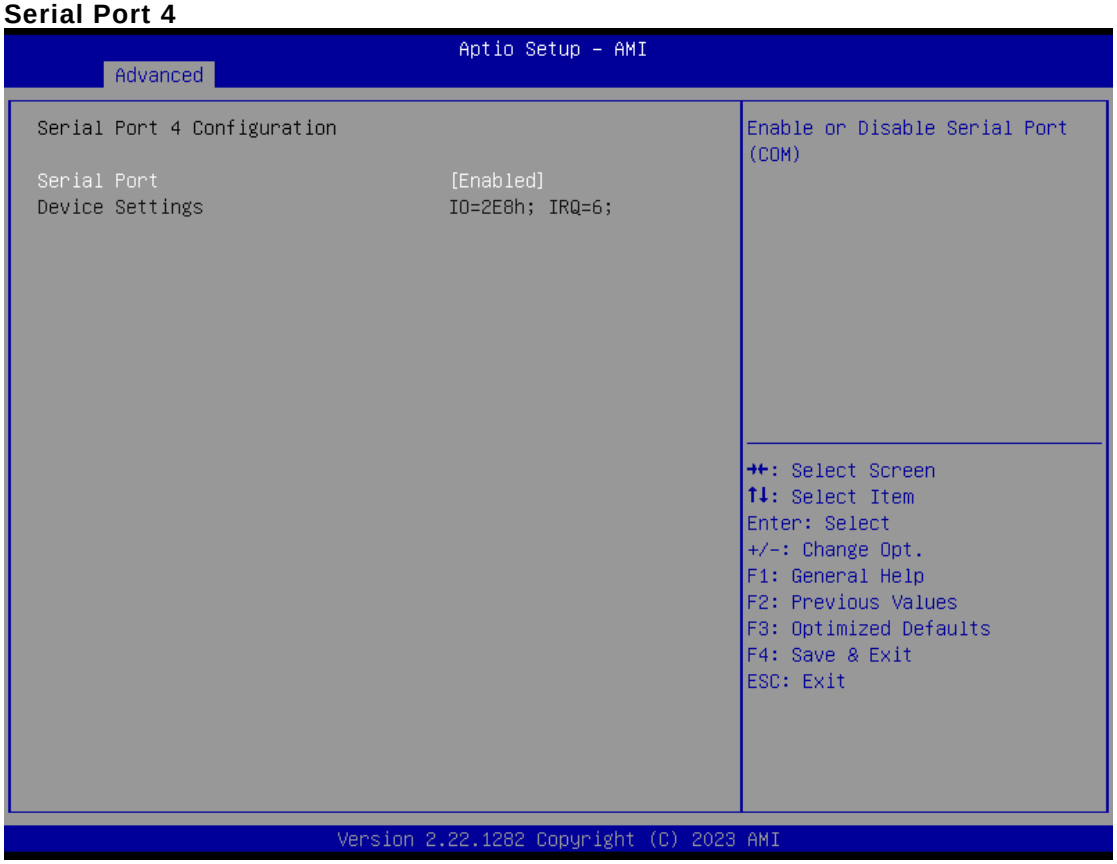
COM Port type

Use this item to set parameters related to serial ports COM 2 (RS232/422/485)

Serial Port 3

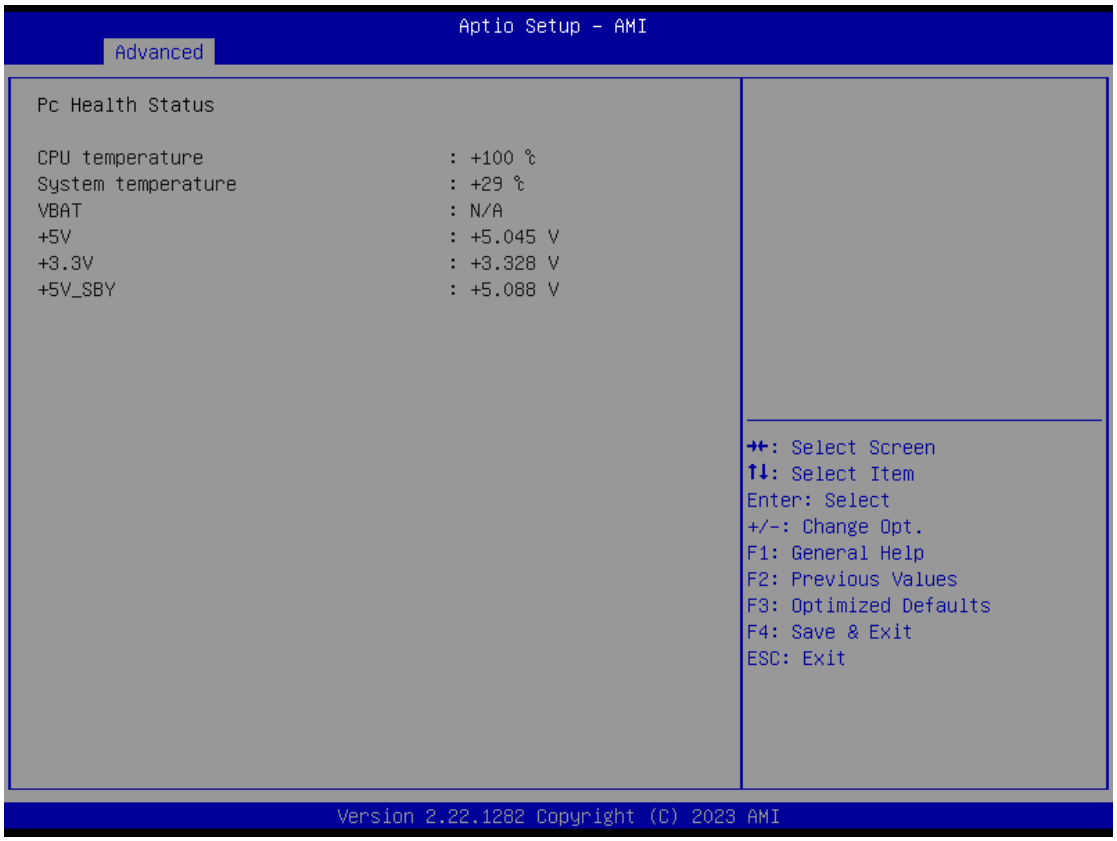


Serial Port 4



Hardware Monitor

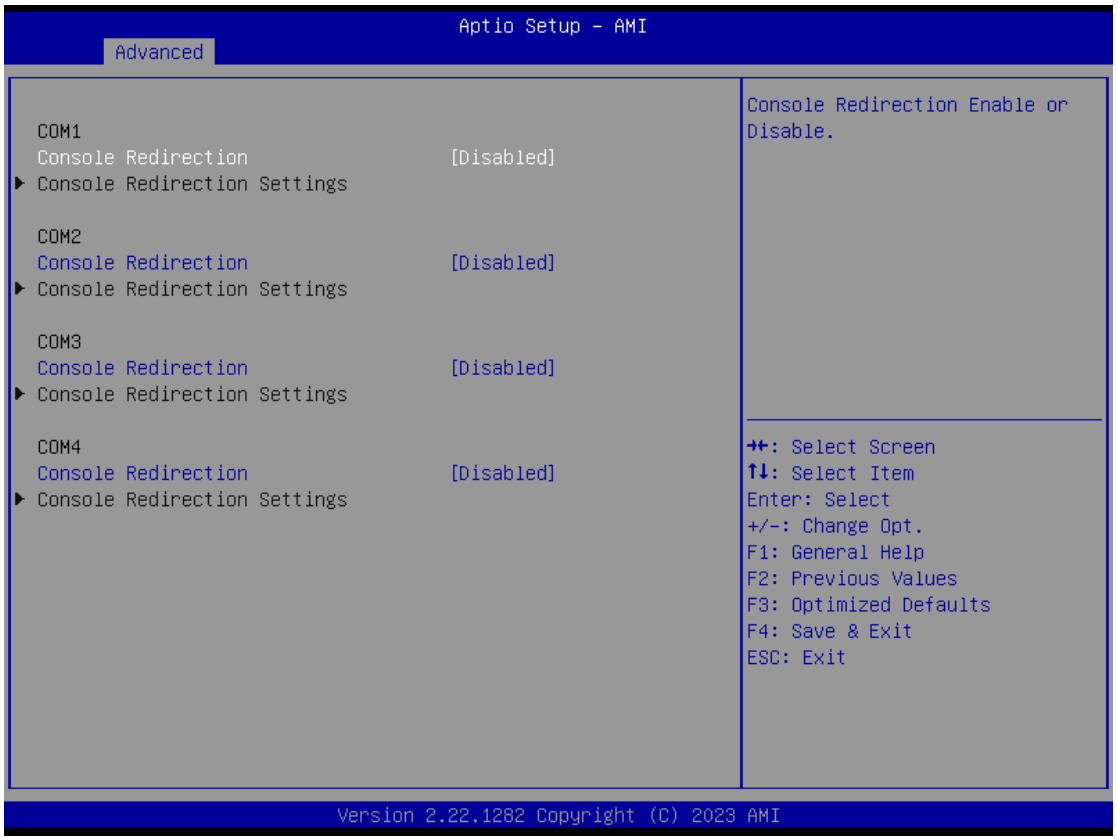
This screen monitors hardware health status.



This screen displays the temperature of system and CPU as well as system voltages (VCORE, +5V_STBY, VBAT, +5V and +3.3V).

Serial Port Console Redirection

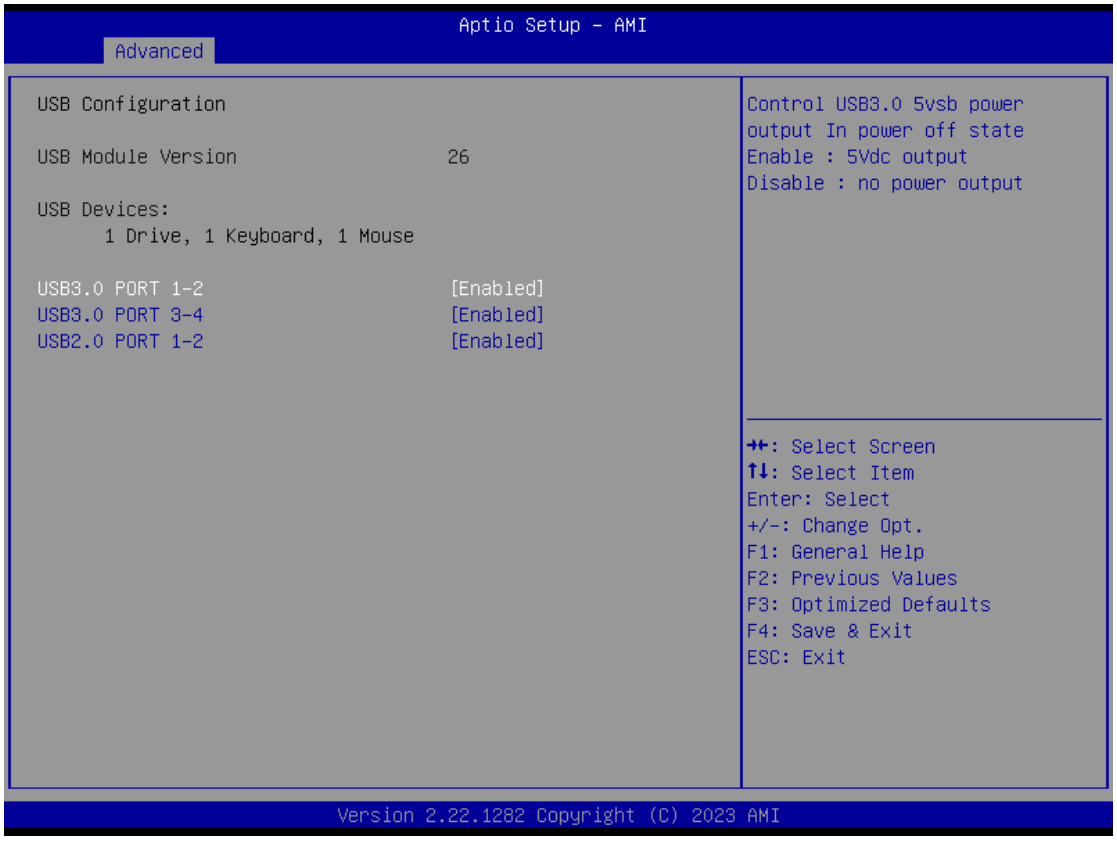
This screen allows you to set serial port console redirection.



Console Redirection
Console Redirection Enable or Disable.

Console Redirection Settings
The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

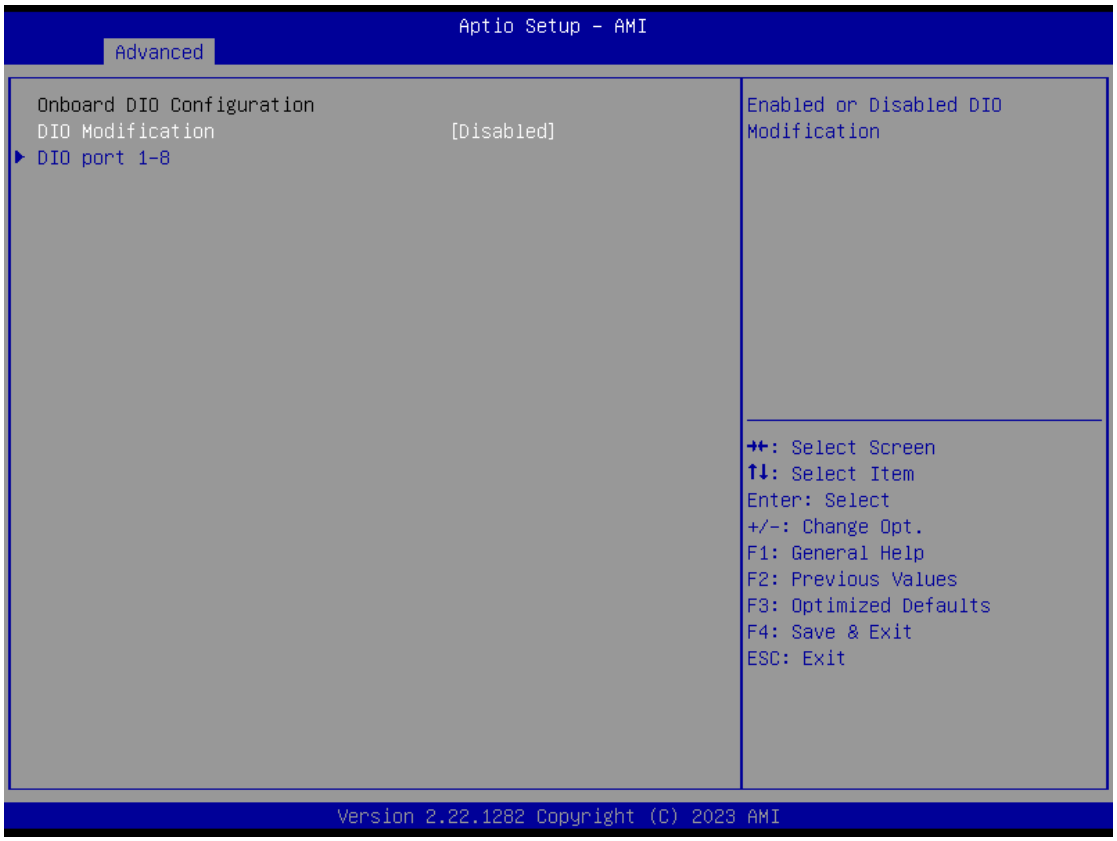
USB Configurations



Display all detected USB devices.

Device Configurations

This item allows users to set the Digital I/O to Input or Output. Default is 4 IN & 4 OUT.

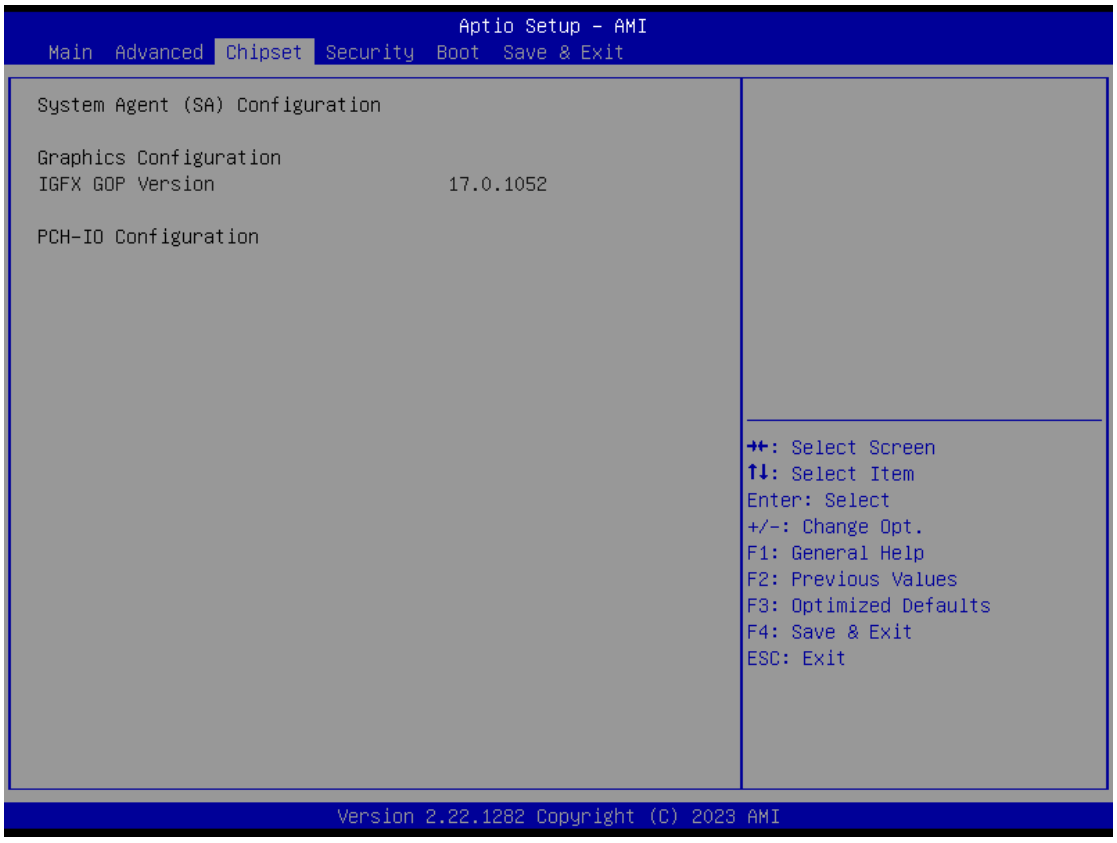


4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. Users can select any of the items in the left frame of the screen to go to the sub menus:

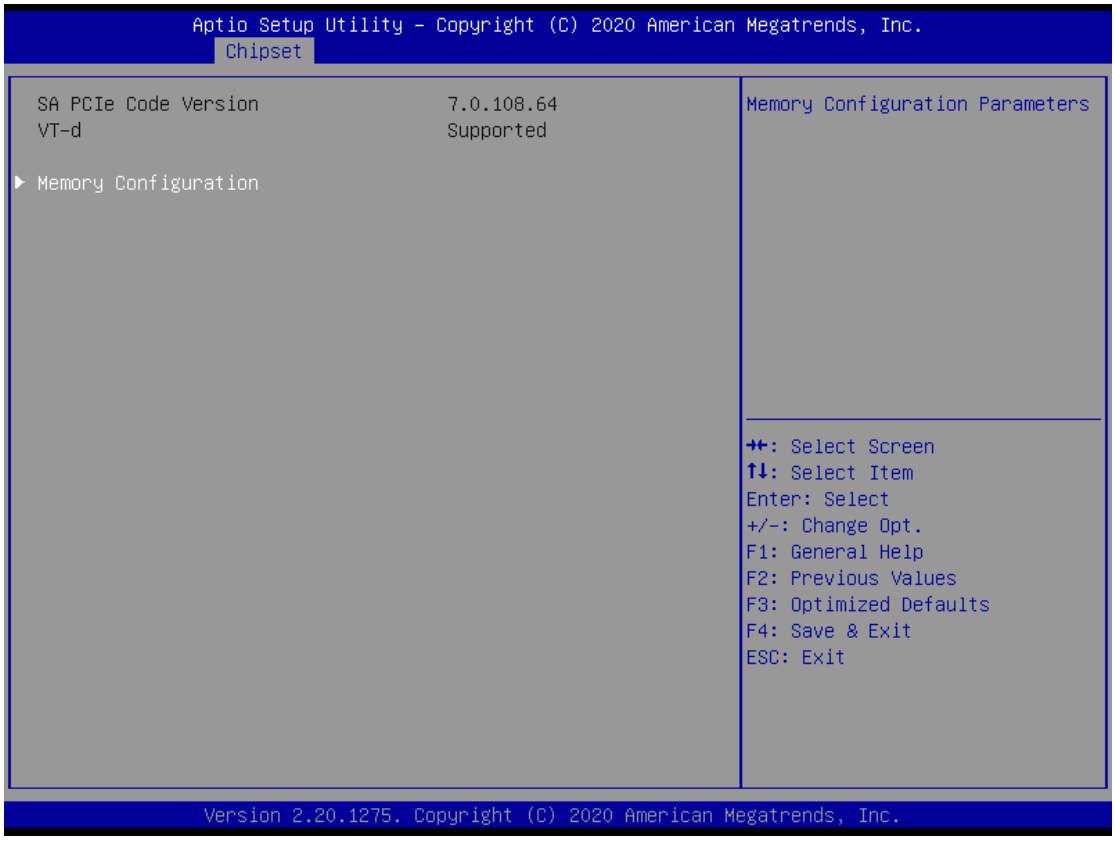
- ► System Agent (SA) Configurations
- ► PCH-IO Configurations

For items marked with "►", please press <Enter> for more options.



System Agent (SA) Configurations

This screen allows users to configure System Agent (SA) parameters. For items marked with "▶" , please press <Enter> for more options.

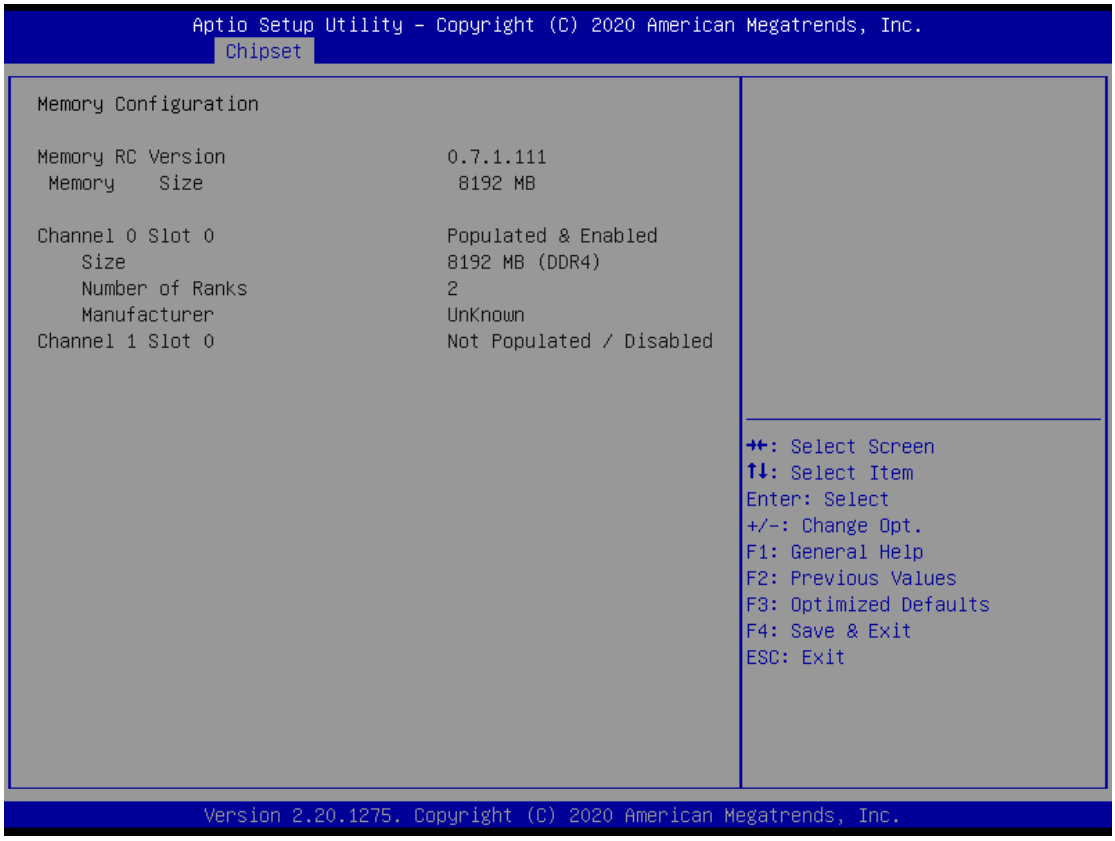


Memory Configuration

Use this item to refer to the information related to system memory.

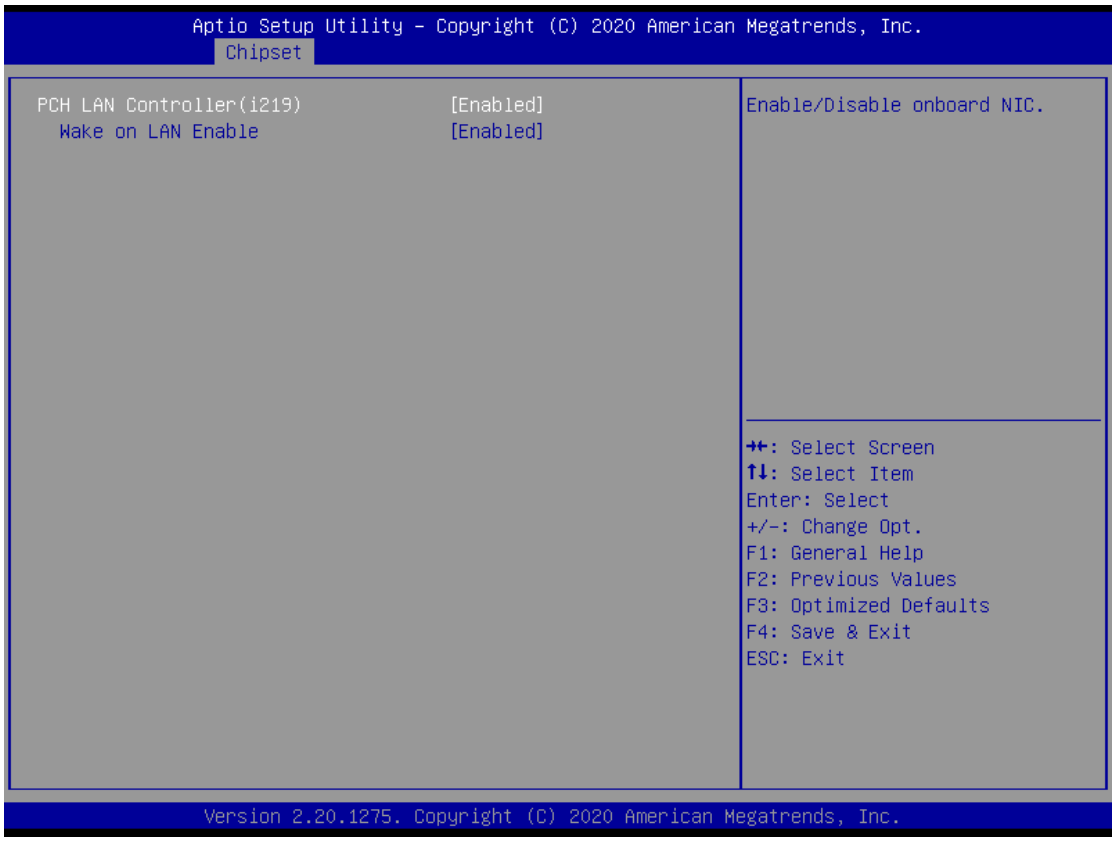
Memory Configurations

This screen shows the system memory information.

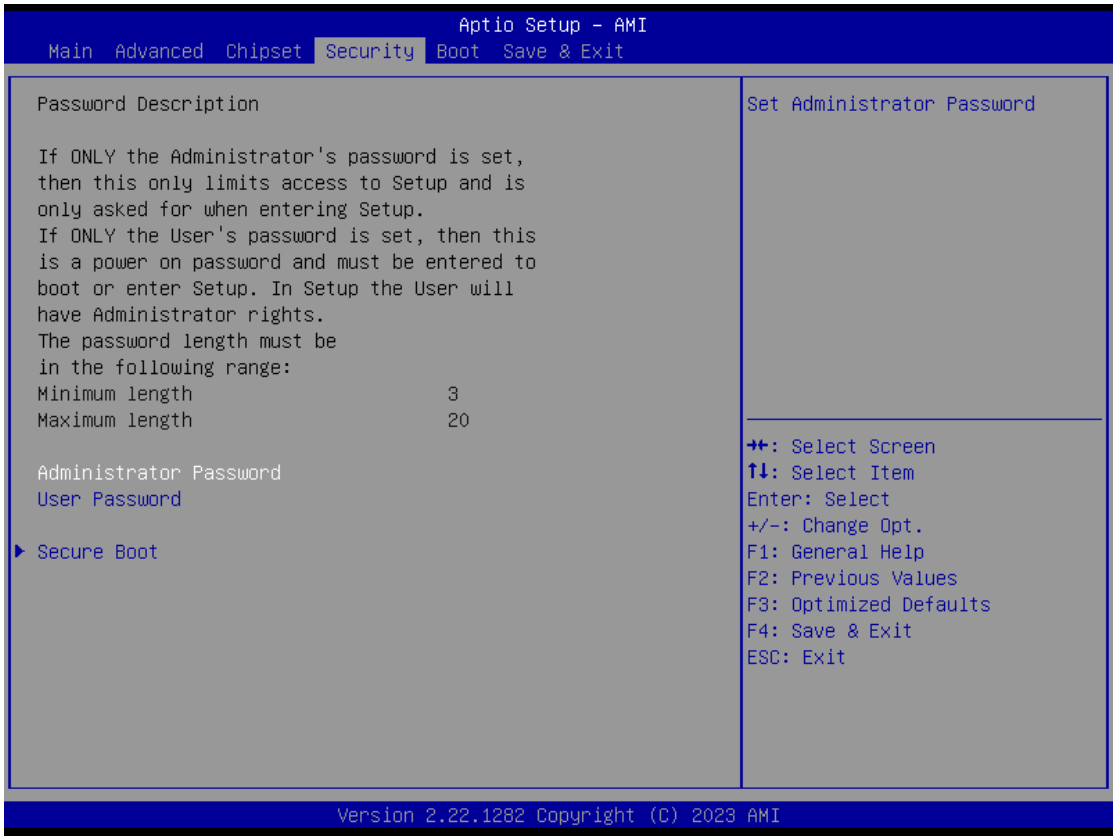


PCH-IO Configurations

This screen allows users to set PCH parameters.



Security Menu

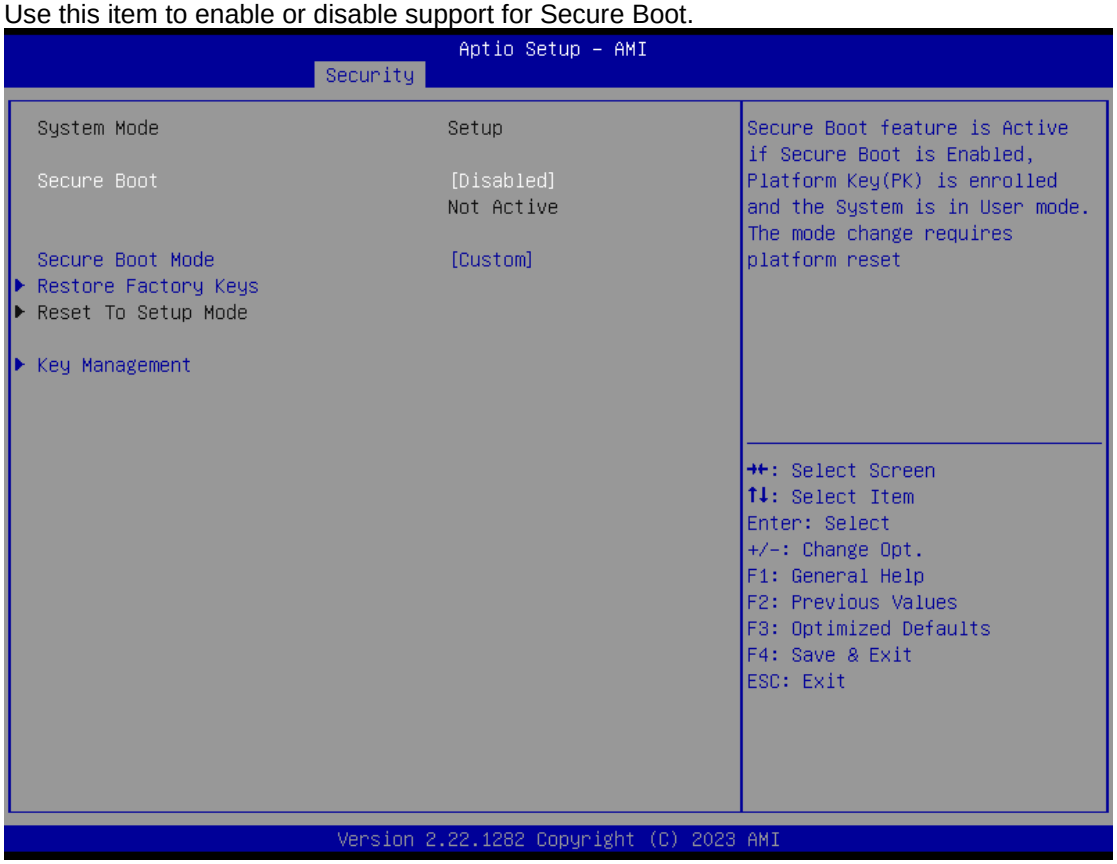


Administrator Password
This item indicates whether an administrator password has been set (installed or uninstalled).

User Password
This item indicates whether a user password has been set (installed or uninstalled).

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
Use this item to enable or disable support for Secure Boot.



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.

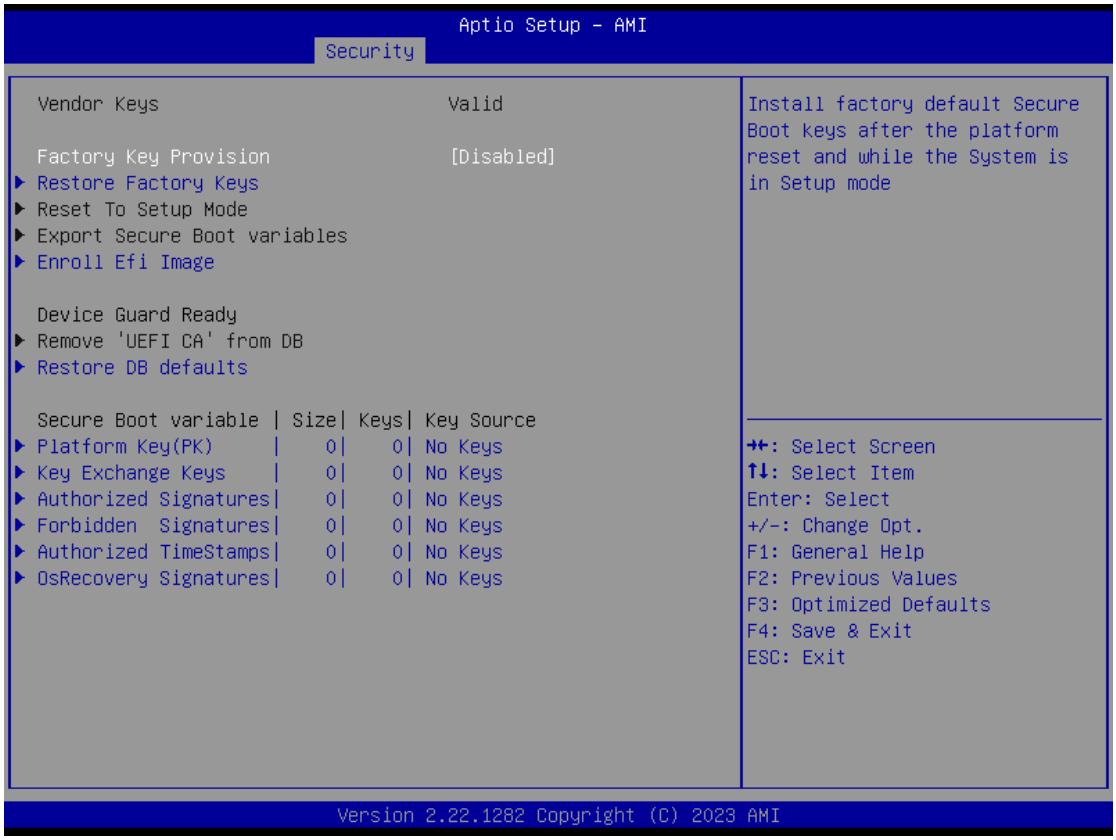
Restore Factory Keys
Use this item to force System to User Mode, to install factory default SecureBoot key databases.

Reset To Setup Mode
Select Yes and press <Enter> to restore the manufacturer default Secure Boot keys. This will also reset the system to User mode. The options are Yes and No.

Key Management
Enables expert users to modify Secure Boot Policy variables without full authentication.

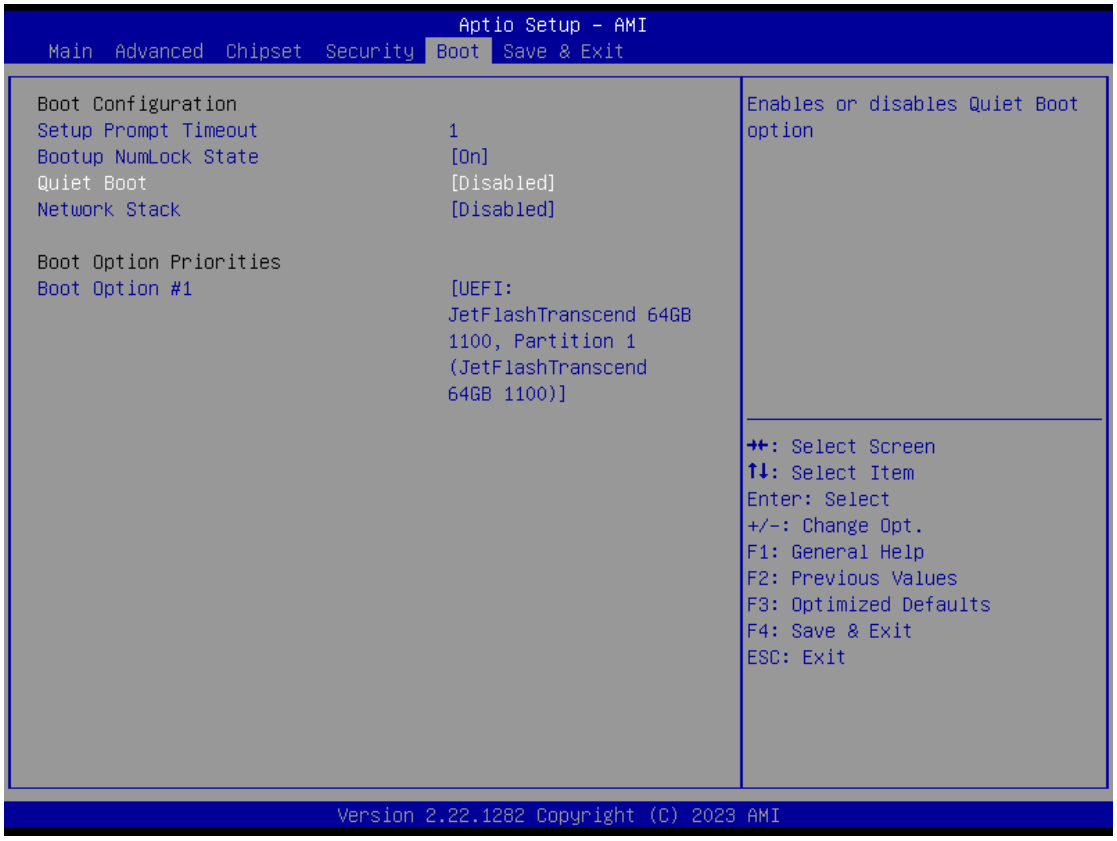
Key Management

Install factory default Secure Boot key the platform rest and while the System is in Setup mode.



4.6 Boot Menu

The Boot menu allows users to change boot options of the system.



Setup Prompt Timeout
Use this item to set up number of seconds to wait for setup activation key where 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State
Use this item to select the power-on state for the keyboard NumLock.

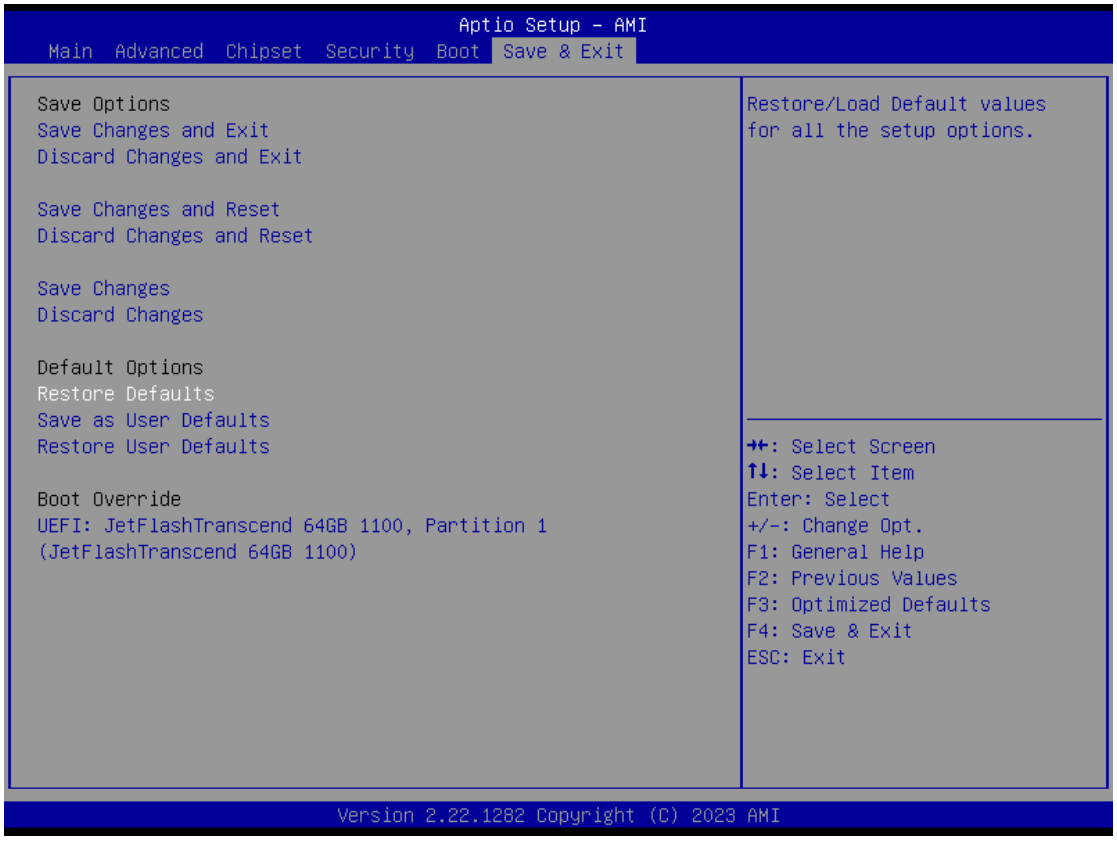
Quiet Boot
Select to display either POST output messages or a splash screen during boot-up.

Network Stack
Enable/Disable UEFI Network Stack. Default setting is Enabled.

Boot Option Priorities
These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.7 Save & Exit Menu

The Save & Exit menu allows users to load system configurations with optimal or fail-safe default values.



Save Changes and Exit
When users have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

Discard Changes and Exit
Select this option to quit Setup without making any permanent changes to the system configurations and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

Save Changes and Reset
Having completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configurations take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

Discard Changes and Reset
Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

Save Changes
Having completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

Discard Changes
Select this option to quit Setup without making any permanent changes to the system configurations. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

Restore Defaults
It automatically sets all Setup options to a complete set of default settings when users select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults
Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults
It automatically sets all Setup options to a complete set of User Defaults when users select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

Boot Override
Select a drive to immediately boot that device regardless of the current boot order.

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APPENDIX A
WATCHDOG TIMER

About Watchdog Timer

Software stability is major issue in most applications. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when a computer hangs. The system needs to be able to reset automatically when things go wrong. The watchdog timer gives us solutions in this regard.

The watchdog timer is a counter that triggers a system to reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

Sample Program

The following example enables configurations using a debug tool.

Enable WDT

↓

Enable configuration:

O 2E 87; Un-lock super I/O

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device enable:

O 2E 30

O 2F 01

↓

Set timer unit:

O 2E F0

O 2F 00 ; (00: Sec; 08:Minute)

↓

Set base timer:

O 2E F1

O 2F 0A; Set reset time (where 0A (hex) = 10sec)

Disable WDT

↓

Enable configuration:

O 2E 87; Un-lock super I/O

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device disable:

O 2E 30

O 2F 00

APPENDIX B
Configuration of RAID

B.1 Configuring SATA Hard Drive(s) for RAID

Before you begin the SATA configuration, please prepare:

- Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

Please follow up the steps below to configure SATA hard drive(s):

1. Install SATA hard drive(s) in your system.
2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
3. Configure RAID by the RAID BIOS.

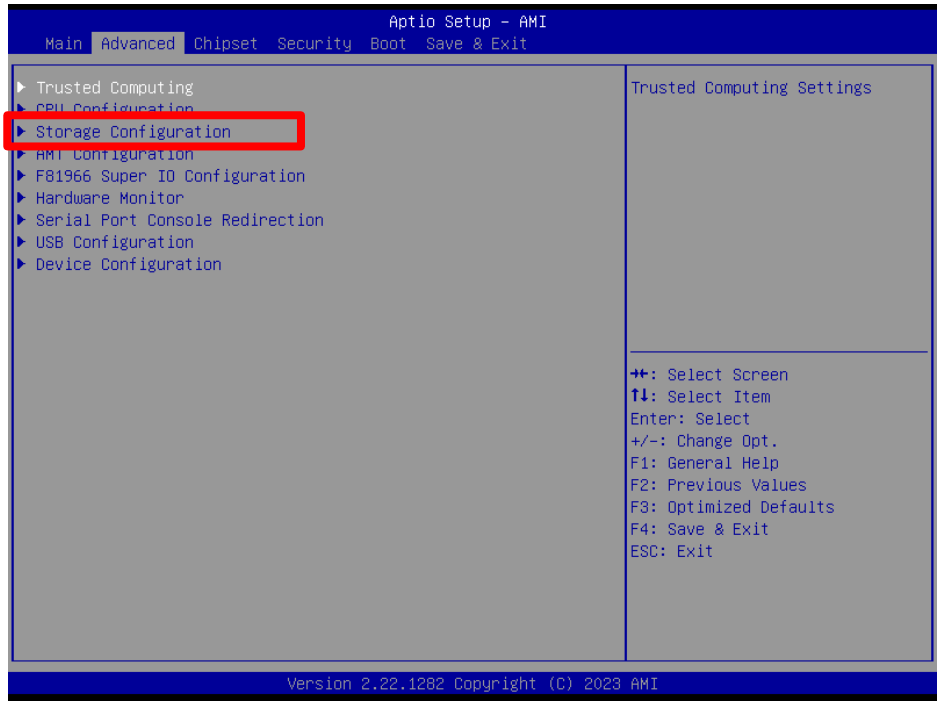
1. Installing SATA hard drive(s) in your system.

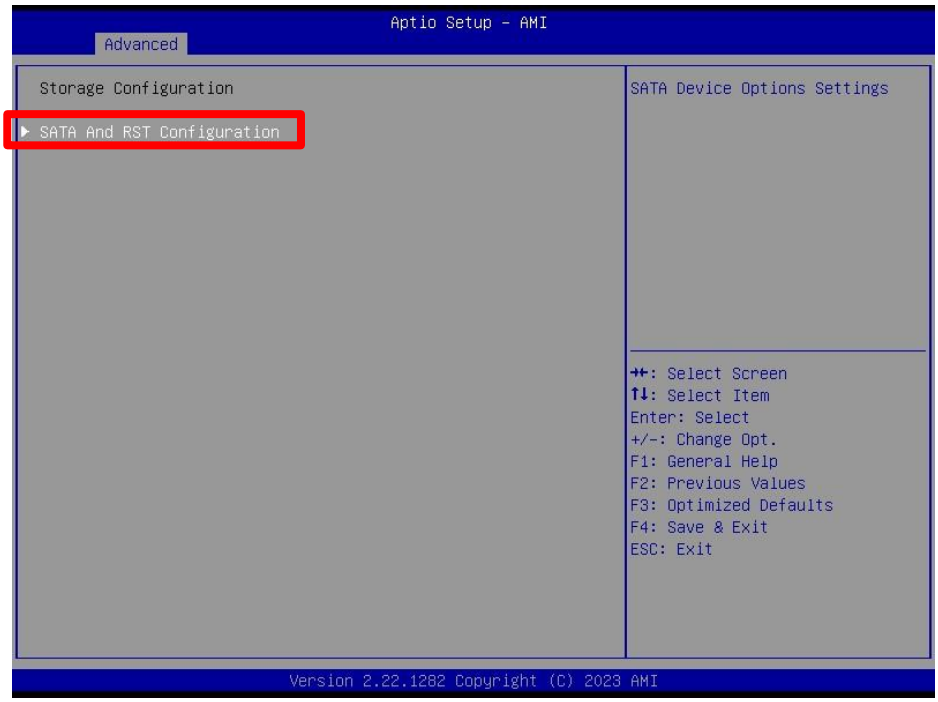
Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

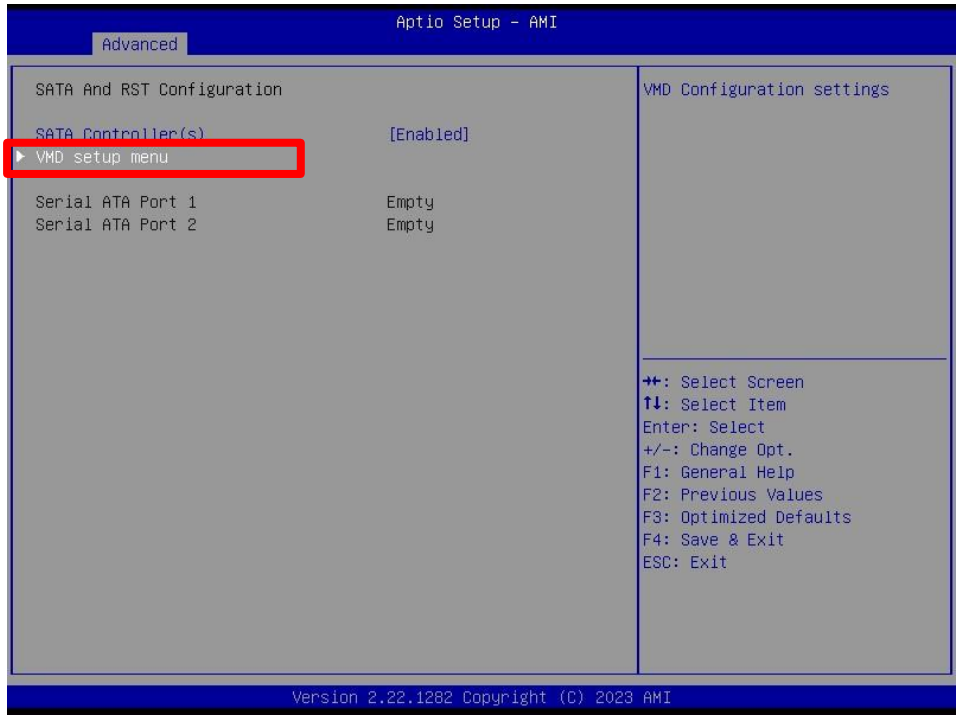
2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

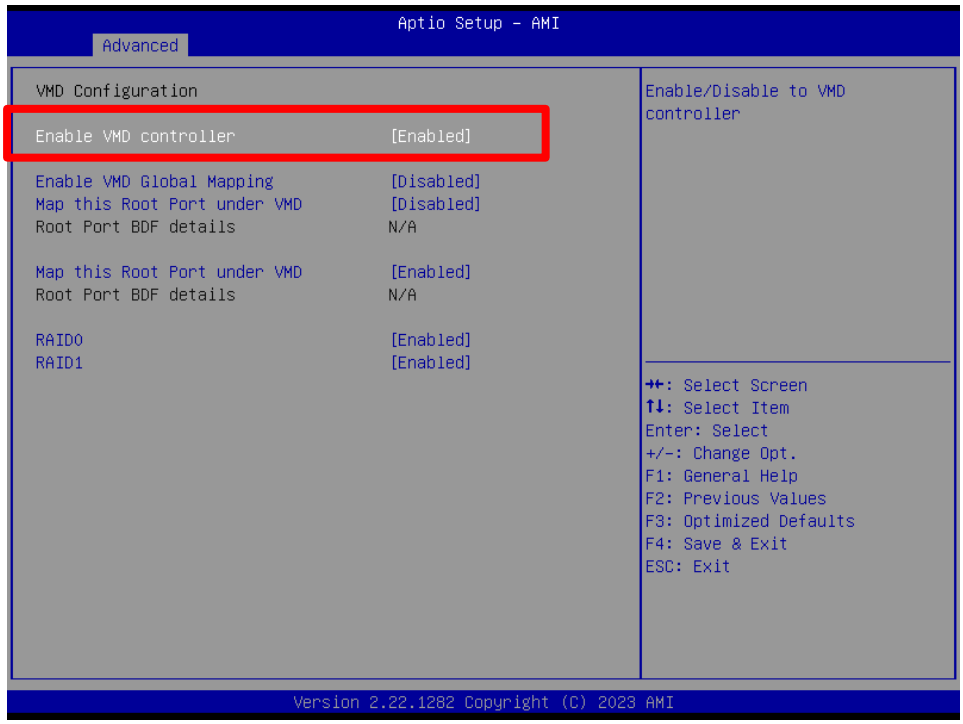
You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

2.1 Turn on your system, and then press the <Del> button to enter BIOS Setup during running POST (Power-On Self-Test). If you want to create RAID, just go to the Advanced Settings menu\Storage Configuration\SATA and RST Configuration\VMD setup menu, enabled the "Enable VMD controller", save and exit the BIOS Setup.

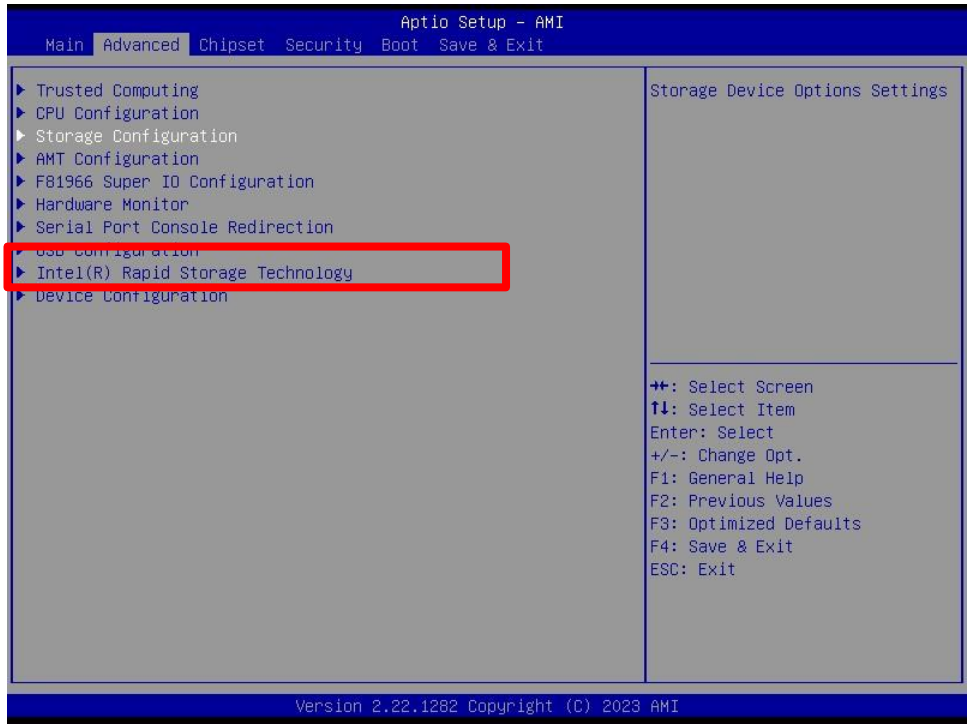




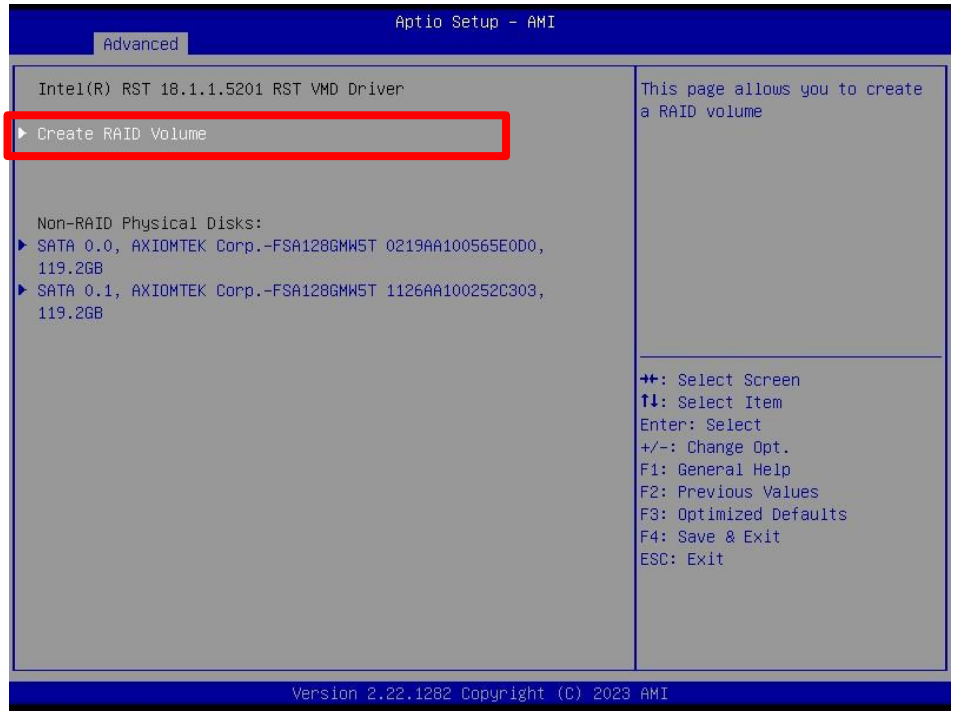

Aptio Setup – AMI
Advanced
SATA And RST Configuration
SATA Controller(s) [Enabled]
VMD setup menu
Serial ATA Port 1 Empty
Serial ATA Port 2 Empty
VMD Configuration settings
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2023 AMI


Aptio Setup – AMI
Advanced
VMD Configuration
Enable VMD controller [Enabled]
Enable VMD Global Mapping [Disabled]
Map this Root Port under VMD [Disabled]
Root Port BDF details N/A
Map this Root Port under VMD [Enabled]
Root Port BDF details N/A
RAID0 [Enabled]
RAID1 [Enabled]
Enable/Disable to VMD controller
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1282 Copyright (C) 2023 AMI

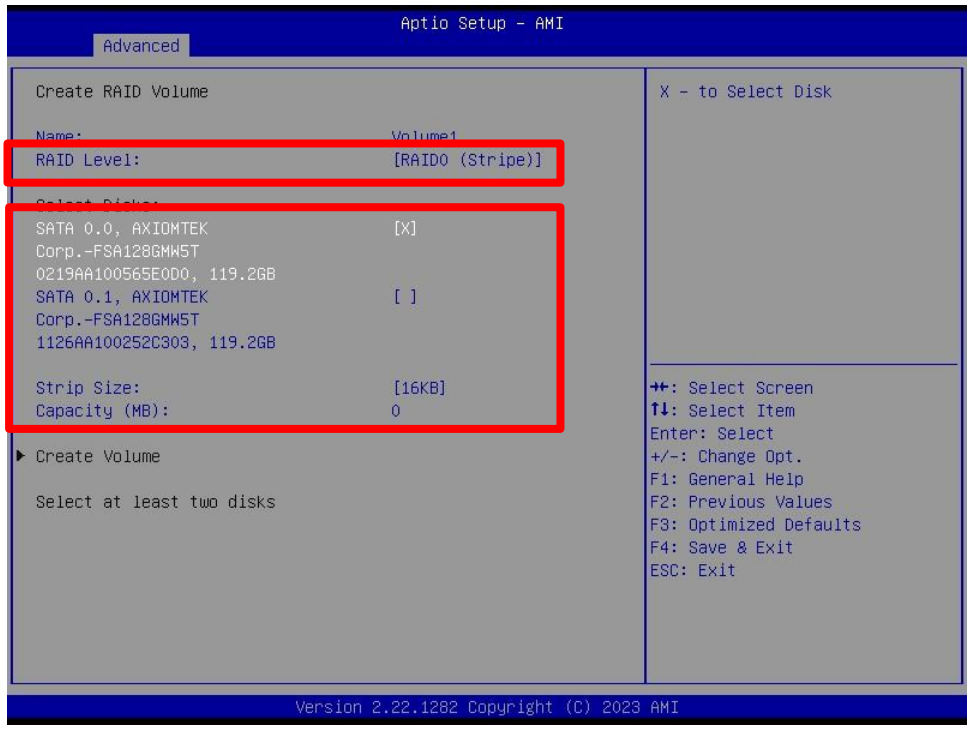
2.2 After restart, press <Del> button to enter BIOS Setup Menu. In Advanced Page, choose Intel(R) Rapid Storage Technology.



2.3 Press Create RAID volume

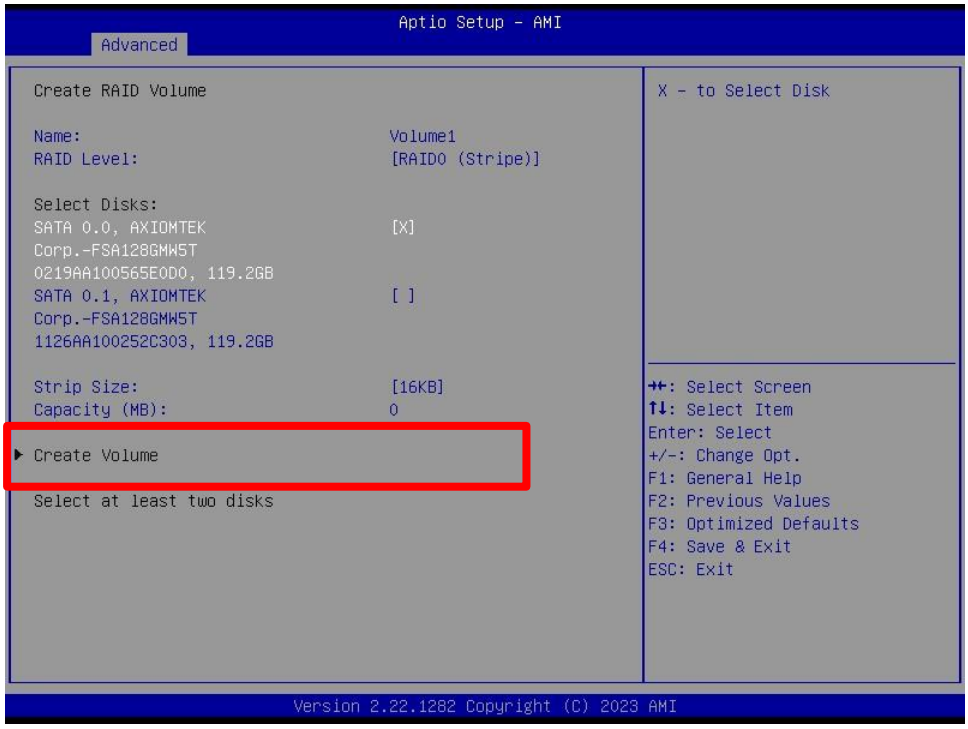


2.4 Press <RAID level> to choose RAID 0 or 1 and then select the storage device that to be used for RAID function.

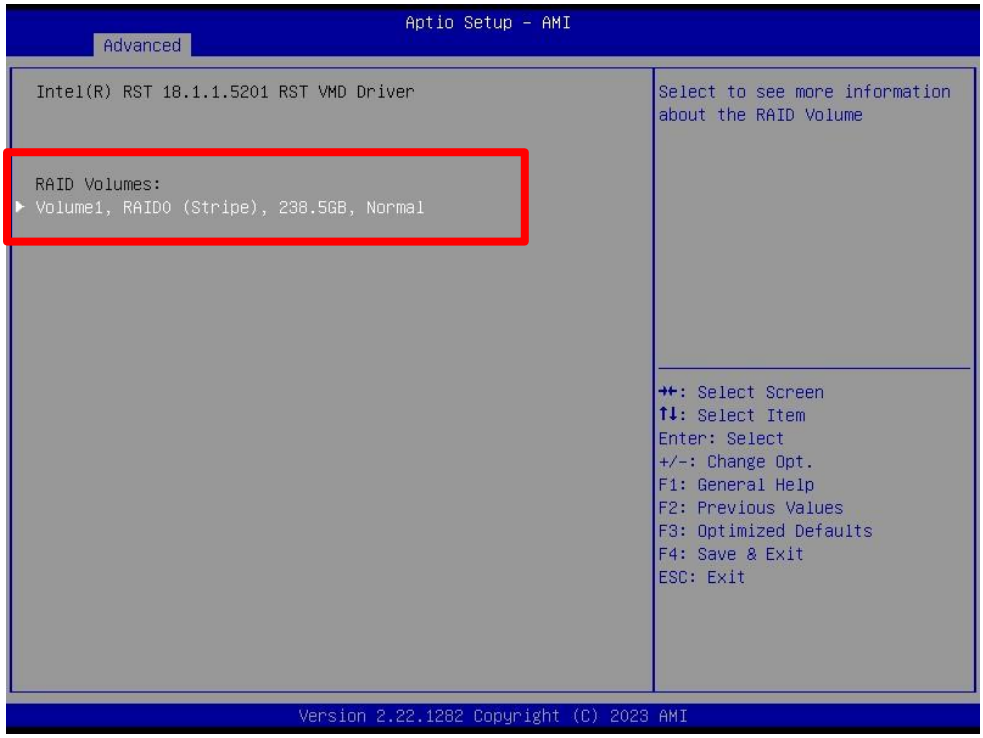


2.5 Please make sure that the storage device to be used for raid function is correct first.

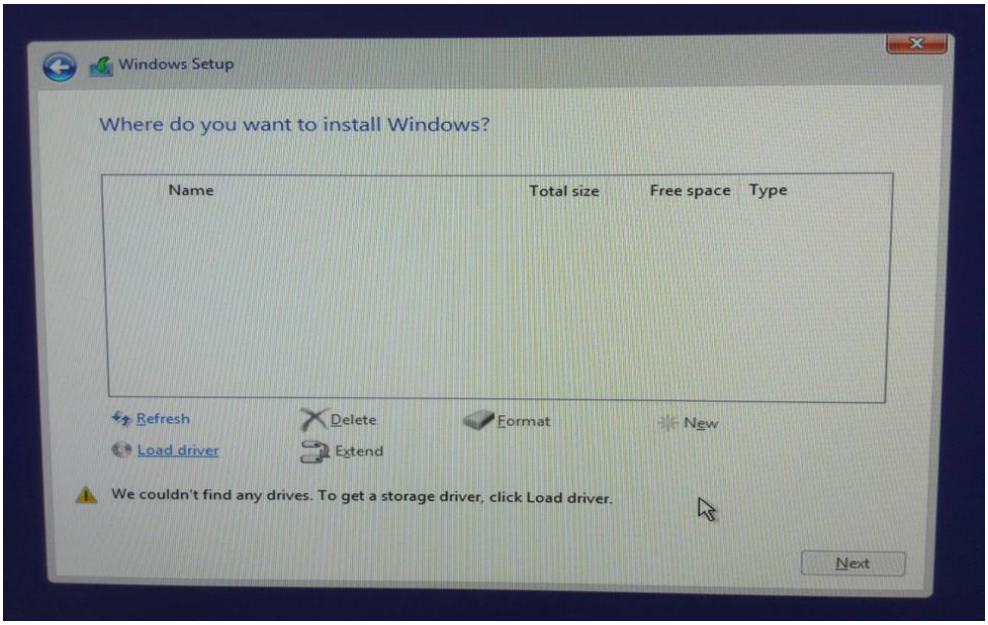
And press <Create RAID volume> to go to next step.

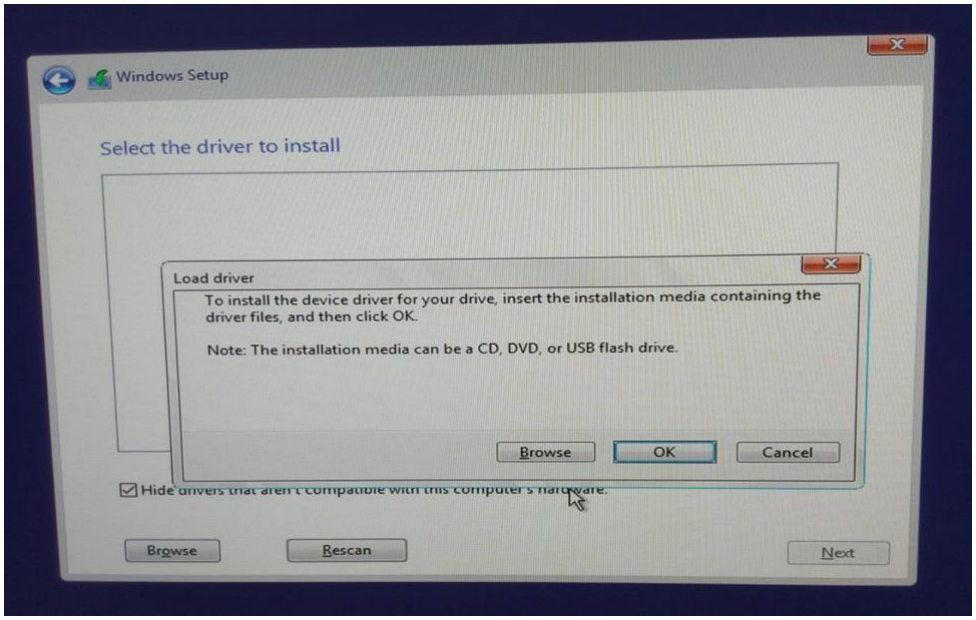


Then, users can see the final RAID volume.

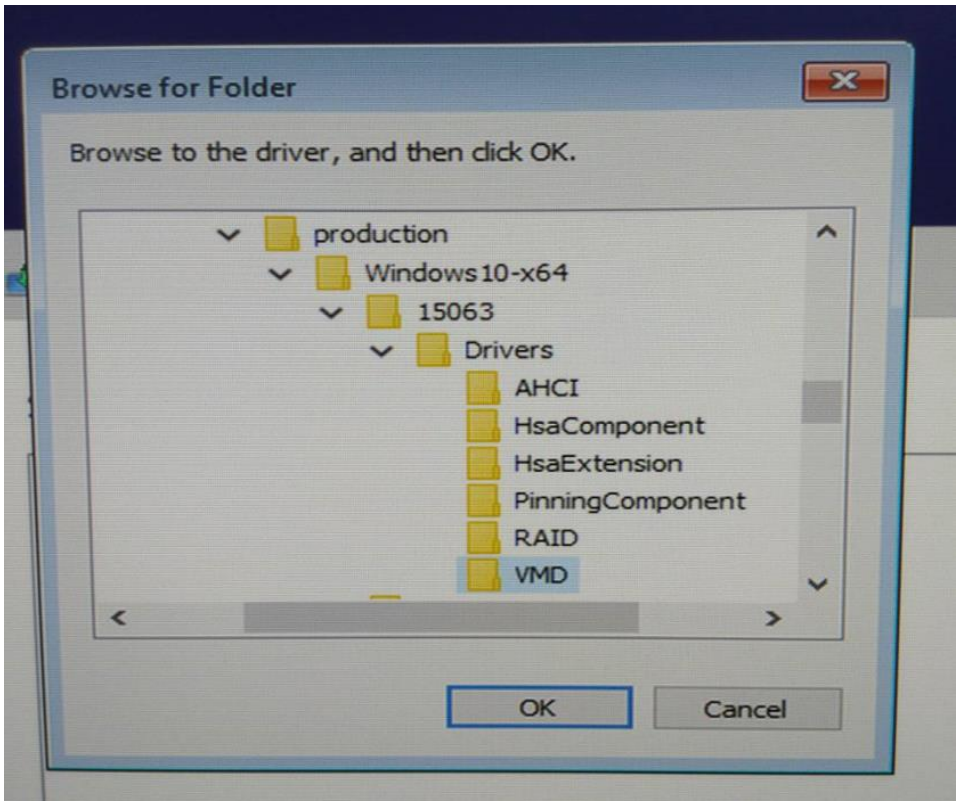


2.6 Install OS and Click Load Driver.

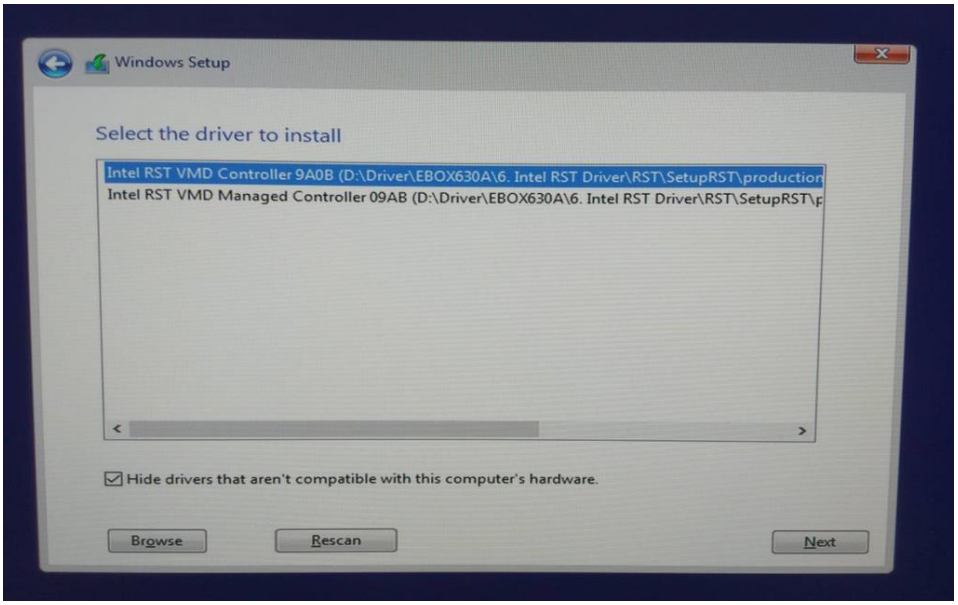




2.7 Click Browse, Find the VMD File.



2.8 Press Next



2.9 The storage will be detected after the previous steps and finished the OS install.