USER'S MANUAL

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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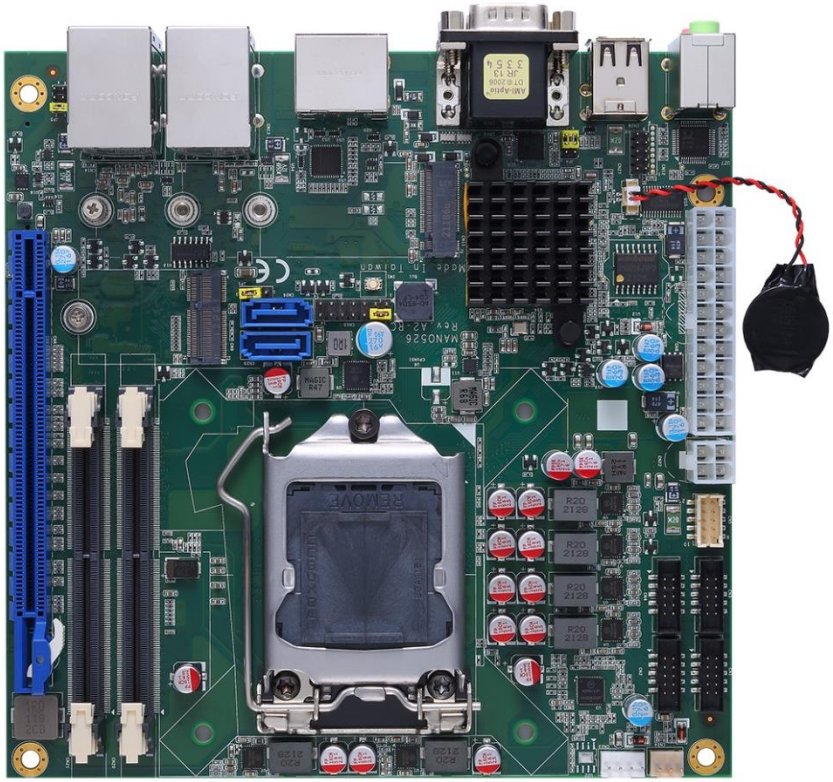
Section 1
Introduction



The MANO526 Mini-ITX motherboard supports the new 14nm 9th and 8th Generation Intel® Core™ i7/ i5/ i3 (65W CPU) and Pentium® processors in LGA1151 package. Featuring the new Intel® Q370 Express chipset with two DDR4 2400/2666MHz memory support, this motherboard is built to perform best stability and reliability for industrial applications.

It comes with two SATA 3.0, four USB 3.0, four USB 2.0 and six serial ports (one RS-232/422/485, five RS-232) providing robust storage and I/O options. Users also can increase board functionality with PCI-Express x16 and M.2 slot. The high quality MANO526 allows two display interfaces via EDP, DisplayPort++ and HDMI in triplicate views, making it an ideal solution for gaming, workstation, digital signage, medical and other IoT&M2M applications.

1.1 Features

- LGA1151 Socket for 9th and 8th Generation Intel® Core™ i7/ i5/ i3 processors (up to 65W) and Pentium® processor (Coffee Lake)
- 2 DDR4 2400/2666MHz memory with maximum capacity up to 32 GB
- 1 PCI-Express x16
- 1 M.2 Key E, size: 22x30 for WiFi (support PCIE x1, USB 2.0 signal)
- 1 M.2 Key M, size: 22x42, 22x60, 22x80 (support SATA, PCIE x4 signal)
- 2 SATA-600
- 4 USB 3.0 and 4 USB 2.0

1.2 Specifications

- **CPU**
  - LGA1151 Socket for 9th and 8th Generation Intel® Core™ i7/ i5/ i3 processors (up to 65W CPU) and Pentium® processor.

- **Chipset**
  - Intel® Q370.

- **BIOS**
  - AMI BIOS via SPI interface.

- **System Memory**
  - Two 260-pin SO-DIMM sockets.
  - Maximum up to 32GB DDR4 memory.
  - Support 2400/2666MHz.

- **Onboard Multi I/O**
  - Controller: ITE8786.
  - Six serial ports:
    - COM1, COM3~COM6 support RS-232 only; COM2 supports RS-232/422/485.
    - COM1~COM2 on the rear I/O; COM3~COM6 in wafer connector.

- **USB Interface**
  - Four USB 3.0 ports (on the rear I/O).
  - Two USB 2.0 ports in wafer connector (internal).
  - Two USB 2.0 ports in wafer connector (on the rear I/O).

- **Ethernet**
  - LAN1: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel® i219LM.
  - LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel® i211AT.

- **Serial ATA**
  - Two SATA 3.0 ports (6Gb/s).
  - One M.2 Key M slot (support SATA, PCIE x4 signal).

- **Audio**
  - Realtek ALC662 5.1 channel HDA codec.
  - Support MIC-in/line-out (on the rear I/O).
  - Support MIC-in/line-out/line-in in box header (internal).

- **Display**
  - One HDMI connector in wafer connector. Resolution max. up to 4096x2304 @30Hz.
  - One DisplayPort++ with resolution max. up to 4096x2304 @60Hz.
  - One Embedded DisplayPort (eDP) with resolution max. up to 4096x2304 @60Hz.

- **Expansion Interface**
  - One PCI-Express x16 slot.
  - One M.2 key M slot (support SATA, PCIE x4 signal).
  - One M.2 Key E slot (support PCIE x1, USB 2.0 signal).

- **Power Input**
  - One ATX power input connector.
  - One 12V ATX power input connector for CPU power.

- **Operating Temperature**
  - 0°C ~ 60°C.

- **Storage Temperature**
  - -10°C ~ 60°C.

- **Form Factor**
  - Mini ITX (6.7” x 6.7”, 17.0cm x 17.0cm).

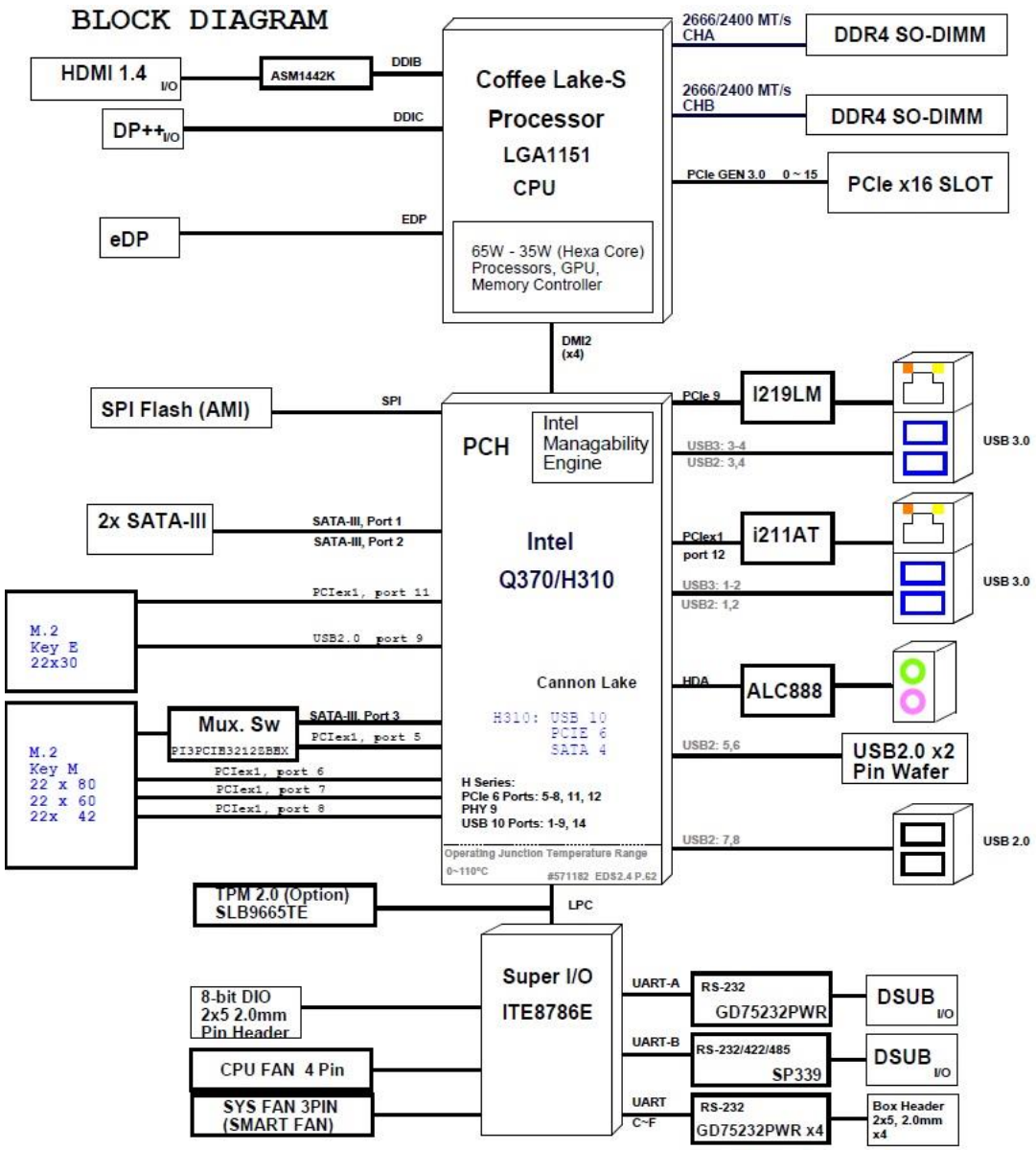
Note

All specifications and images are subject to change without notice.

1.3 Utilities Supported

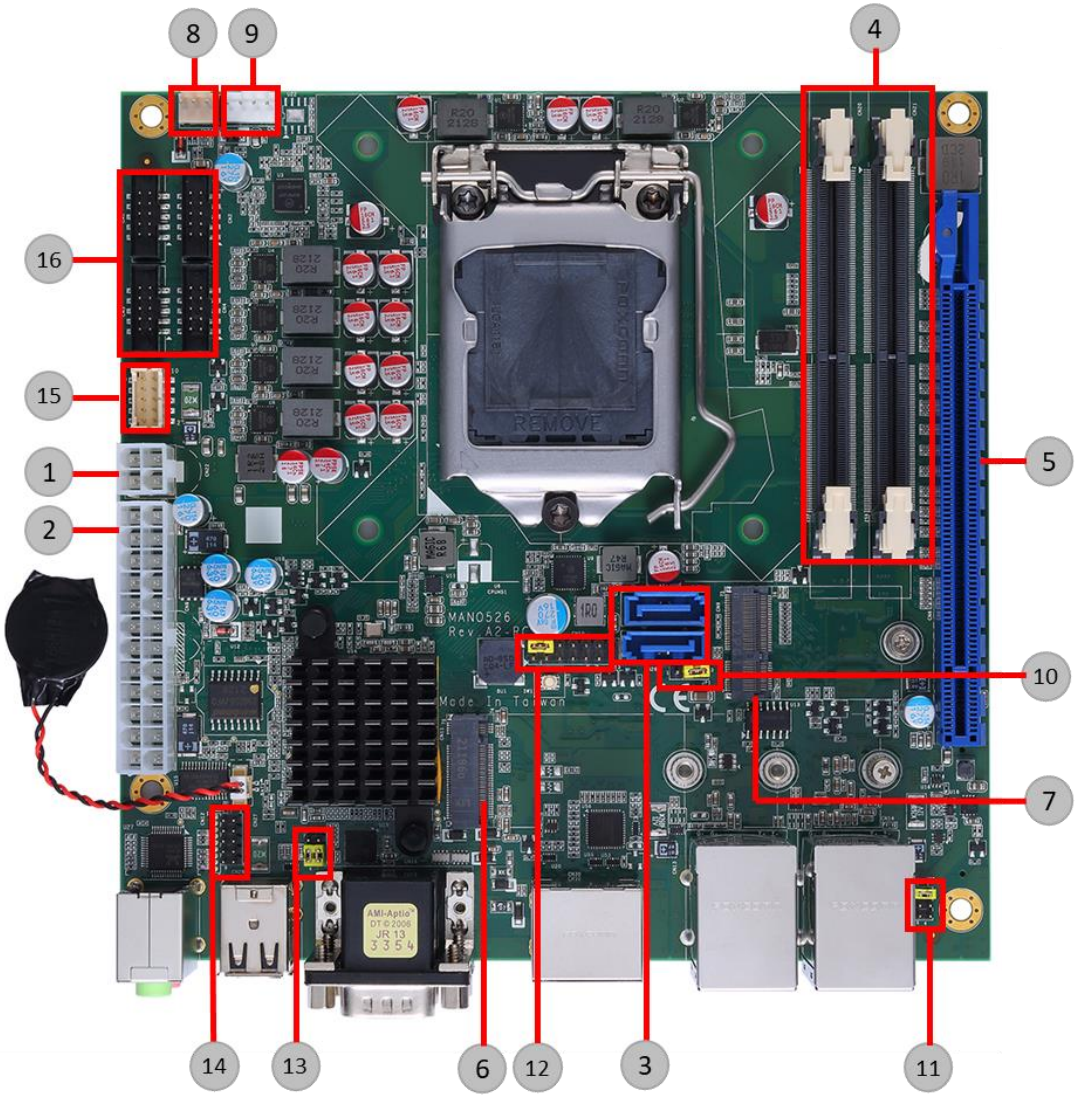
- Chipset driver
- Graphics driver
- Intel ME driver
- Ethernet driver
- Audio driver
- Intel_Rapid_Storage_Technology driver

1.4 Block Diagram

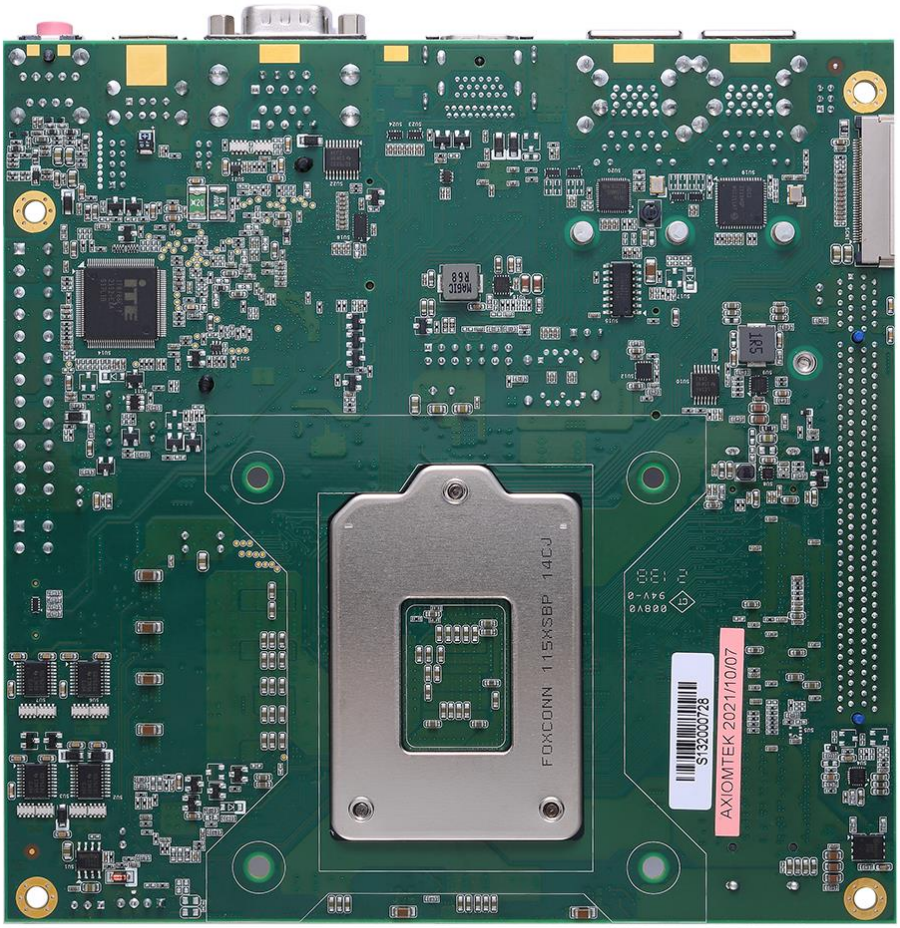


Section 2
Board and Pin Assignments

2.1 Board Layout

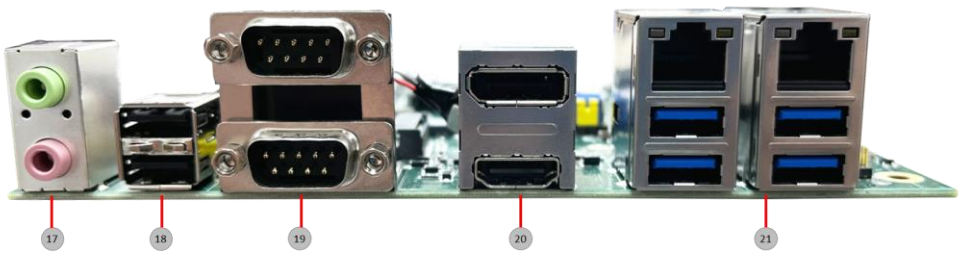


Top View



Bottom View

2.2 Rear I/O

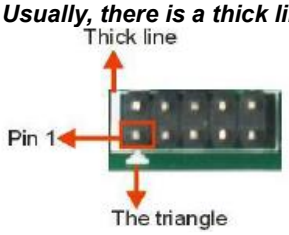


Jumpers/Connectors			
1	4-pin ATX Power Input Connector (CN22)	12	Front Panel Connector (CN10)
2	24-pin ATX Power Input Connector (CN8)	13	COM2 Data/Power Select Jumper (JP4)
3	SATA 3.0 Connectors (CN25 ~ CN26)	14	Digital I/O Connector (CN27)
4	DDR4 SO-DIMM CHA~CHB Connectors (CN20 ~ CN21)	15	USB 2.0 Wafer Connector (CN5)
5	PCI-Express x16 Slot (CN6)	16	COM3 ~ COM6 Wafer Connectors (CN1 ~ CN4)
6	M.2 Key M 2242 / 2260 / 2280 Connector (CN11)	17	Audio Jack (CN18)
7	M.2 Key E Connector (CN9)	18	USB2.0 Double Stack Type A Connector (CN28)
8	System Fan Connector (CN24)	19	COM Double-deck D-Sub Connector (CN16)
9	CPU Fan Connector (CN23)	20	DisplayPort++ and HDMI Connector (CN30)
10	Auto Power On Jumper (JP1)	21	LAN1 and USB 3.0 Port (CN13 ~ CN14)
11	EDP VDD Backlight Control Jumper (JP5)		

Note

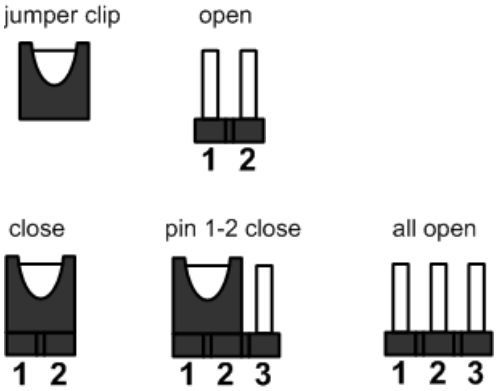
To identify the first pin of a header or jumper, please refer to the following information:

- ***Usually, there is a thick line or a triangle near the header or jumper pin 1.***



2.3 Jumper and Switch Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.



Before applying power to MANO526 Series, please make sure all of the jumper and switch are in factory default position. Below you can find a summary table of jumper, switch and onboard default settings.

Note

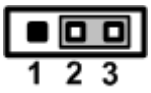
Once the default jumper and switch settings need to be changed, please do it under power-off condition.

Jumper	Description		Setting
JP1	Auto Power On Default: Disable		2-3 Close
JP4	COM2 Data/Power Select Default: RS-232 Data	COM2 Pin 1: DCD#	3-5 Close
		COM2 Pin 9: RI#	4-6 Close
JP5	EDP VDD Select Default: +3.3V		1-2 Close
SW1	Clear CMOS Default: Normal Operation		Release

2.3.1 Auto Power On (JP1)

If JP1 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP1 is disabled for power input, it is necessary to manually press soft power button to power on the system.

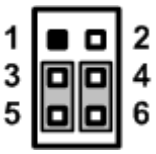
Function	Setting
Enable auto power on	1-2 close
Disable auto power on (Default)	2-3 close



2.3.2 COM2 Data/Power Select (JP4)

The COM2 port has +5V level power capability on DCD# and +12V level on RI# by setting JP4.

Function	Setting
Power: Set COM2 pin 1 to +5V level	1-3 close
Data: Set COM2 pin 1 to DCD# (Default)	3-5 close
Power: Set COM2 pin 9 to +12V level	2-4 close
Data: Set COM2 pin 9 to RI# (Default)	4-6 close



2.3.3 EDP VDD Select (JP5)

The motherboard supports voltage selection for embedded DisplayPort (eDP). Use this jumper to set up VDD power of the eDP connector. To prevent hardware damage, before connecting please make sure that the input voltage of display panel is correct.

Function	Setting
+3.3V (Default)	1-2 close
+5V	3-4 close
+12V	5-6 close

2.3.4 Clear CMOS (SW1)

This switch allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Press the tact switch for at least 1 second.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

Function	Setting
Normal (Default)	Release
Restore BIOS optimal defaults	Press

2.4 Connectors

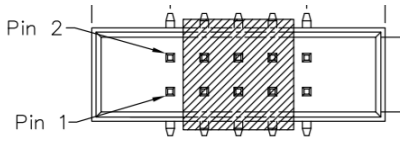
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table showing connectors on the hardware.

Connector	Description
CN1~CN4	COM3~COM6 Wafer Connectors
CN5	USB 2.0 Wafer Connector
CN6	PCI-Express x16 Slot
CN8, CN22	ATX Power Input Connectors
CN9	M.2 Key E Connector
CN10	Front Panel Connector
CN11	M.2 Key M Connector
CN13~CN14	LAN and USB 3.0 Ports
CN16	COM Double-deck D-Sub Connector
CN18	Audio Jack
CN20~CN21	DDR4 SO-DIMM CHA~CHB Connectors
CN23~CN24	Fan Connectors
CN25~CN26	SATA 3.0 Connectors
CN27	Digital I/O Connector
CN28	USB 2.0 Double-deck Connector
CN30	DisplayPort++ and HDMI Connector
SCN1	eDP Connector

2.4.1 COM Wafer Connectors (CN1~CN4)

The motherboard comes with four 2x5-pin (pitch=2.00mm) wafer connectors for COM3~COM6 serial port interfaces.

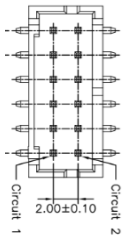
Pin	Signal	Pin	Signal
1	DCD#	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	NC



2.4.2 USB 2.0 Wafer Connector (CN5)

These are 2x5-pin (pitch=2.00mm) connectors for USB 2.0 interfaces.

Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	USB#5_D-	4	USB#6_D-
5	USB#5_D+	6	USB#6_D+
7	GND	8	GND
9	N/C	10	GND



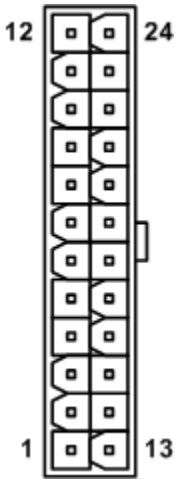
2.4.3 ATX Power Input Connectors (CN8 and CN22)

Steady and sufficient power can be supplied to all components on the board by connecting power connector. Please make sure all components and devices are properly installed before connecting the power connector.

External power supply plug fits into the connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

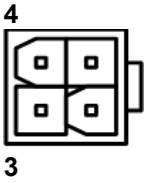
CN8 is a 24-pin connector for DC power input.

Pin	Signal	Pin	Signal
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	GND



CN22 is a 4-pin connector for +12V DC power input.

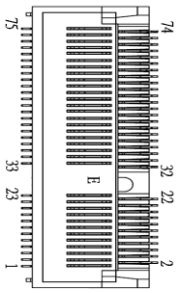
Pin	Signal
1	GND
2	GND
3	+ 12VIN
4	+ 12VIN



2.4.4 M.2 Key E Connector (CN9)

The motherboard comes with one M.2 Key E connector (Wi-Fi & Bluetooth).

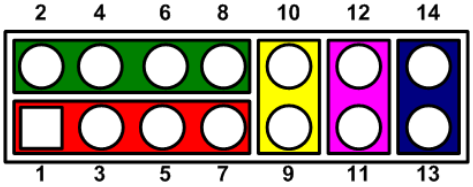
Pin	Signal	Pin	Signal	Pin	Signal
1	GND	26	N/C	51	GND
2	+3.3V	27	N/C	52	PLTRST
3	USB#9_D+	28	N/C	53	CLKREQ
4	+3.3V	29	N/C	54	BT_DISABLE
5	USB#9_D-	30	N/C	55	WAKE
6	N/C	31	N/C	56	WLAN_DISABLE
7	GND	32	N/C	57	GND
8	N/C	33	GND	58	SMBDAT
9	N/C	34	N/C	59	N/C
10	N/C	35	PCIE11_TX_DP	60	SMBCLK
11	N/C	36	N/C	61	N/C
12	N/C	37	PCIE11_TX_DN	62	N/C
13	N/C	38	CL_RST	63	GND
14	N/C	39	GND	64	N/C
15	N/C	40	CL_DATA	65	N/C
16	N/C	41	PCIE11_RX_DP	66	N/C
17	N/C	42	CL_CLK	67	N/C
18	GND	43	PCIE11_RX_DN	68	N/C
19	N/C	44	N/C	69	GND
20	N/C	45	GND	70	N/C
21	N/C	46	N/C	71	N/C
22	N/C	47	CLKOUT_PCIE_P2	72	+3.3V
23	N/C	48	N/C	73	N/C
24	N/C	49	CLKOUT_PCIE_N2	74	+3.3V
25	N/C	50	SUSCLK	75	GND



2.4.5 Front Panel Connector (CN10)

The CN10 is a 2x7-pin (pitch=2.54mm) header for front panel interface.

Pin	Signal
1	Power LED+
2	SPK-
3	GND
4	BUZZER-
5	Power LED-
6	N/C
7	N/C
8	SPK+
9	PWR-
10	PWR+
11	RESET-
12	RESET+
13	HD LED-
14	HD LED+



Power LED
Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on.

External Speaker and Internal Buzzer
Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button
Pin 9 and 10 connect the power button on front panel to the board, which allows users to turn on or off power supply.

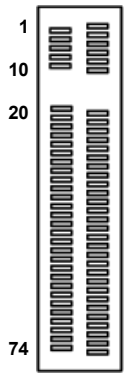
System Reset Switch
Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

HDD Activity LED
This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.4.6 M.2 Key M Connector (CN11)

The motherboard comes with one M.2 Key M connector suitable for mounting SATA/PCIE storage card.

Pin	Signal	Pin	Signal	Pin	Signal
1	GND	26	N/C	51	GND
2	+3.3V	27	GND	52	CLKREQ
3	GND	28	N/C	53	CLKOUT_PCIE_N8
4	+3.3V	29	PCIE#6_RXN	54	N/C
5	PCIE#8_RXN[*]	30	N/C	55	CLKOUT_PCIE_P8
6	N/C	31	PCIE#6_RXP	56	N/C
7	PCIE#8_RXP[*]	32	N/C	57	GND
8	N/C	33	GND	58	N/C
9	GND	34	N/C	59	N/C
10	SATA_LED	35	PCIE#6_ TXN	60	N/C
11	PCIE#8_ TXN[*]	36	N/C	61	N/C
12	+3.3V	37	PCIE#6_ TXP	62	N/C
13	PCIE#8_ TXP[*]	38	N/C	63	N/C
14	+3.3V	39	GND	64	N/C
15	GND	40	N/C	65	N/C
16	+3.3V	41	PERN0/SATA_A+	66	N/C
17	PCIE#7_RXN[*]	42	N/C	67	N/C
18	+3.3V	43	PERP0/SATA_A-	68	SUSCLK
19	PCIE#7_RXP[*]	44	N/C	69	PEDET
20	N/C	45	GND	70	+3.3V
21	GND	46	N/C	71	GND
22	N/C	47	PETN0/SATA_B-	72	+3.3V
23	PCIE#7_ TXN[*]	48	N/C	73	GND
24	N/C	49	PETP0/SATA_B+	74	+3.3V
25	PCIE#7_ TXP[*]	50	PERST	75	GND



Note

[*]: CN11 supports GEN3 x4 NVMe-based SSD.

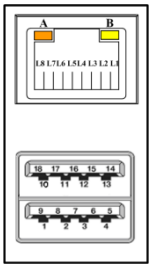
2.4.7 LAN and USB 3.0 Ports (CN13 and CN14)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10 Base-T hub.

The Universal Serial Bus (compliant with USB 3.0) connectors on the rear I/O are for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
A	Speed LED	B	Active LED

CN13



LAN1

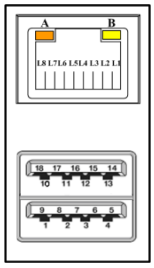
USB

Note

- ***Speed LED turns orange for 1000Mbps or green for 100Mbps.***
- ***CN13/CN14 supports Wake-on-LAN. Only CN13 supports AMT when chipset is customized into Intel® Q370***

Pin	USB Signal	Pin	USB Signal
1	+5V	10	+5V
2	USB#3_D-	11	USB#4_D-
3	USB#3_D+	12	USB#4_D+
4	GND	13	GND
5	USB#3_SSRX-	14	USB#4_SSRX-
6	USB#3_SSRX+	15	USB#4_SSRX+
7	GND	16	GND
8	USB#3_SSTX	17	USB#4_SSTX
9	USB#3_SSTX+	18	USB#4_SSTX+

CN14



LAN2

USB

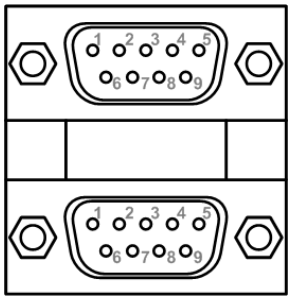
2.4.8 COM Double-deck D-Sub Connector (CN16)

The CN16 is a double-deck D-Sub connector for COM1 and COM2 serial port interfaces. Only COM2 is selectable for RS-232/422/485 mode by BIOS setting (see section 4.4). The pin assignments of RS-232/422/485 are listed in table below.

COM1:

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

COM1



COM2

COM2:

Pin	RS-232	RS-422	RS-485
1	DCD#[*]	TX-	485-
2	RXD	TX+	485+
3	TXD	RX+	N/C
4	DTR#	RX-	N/C
5	GND	GND	GND
6	DSR#	N/C	N/C
7	RTS#	N/C	N/C
8	CTS#	N/C	N/C
9	RI#[*]	N/C	N/C

Note

[*]: Pin 1 of COM2 can be DCD/+5V and pin 9 of COM2 can be RI/+12V by selecting JP4 (see section 2.3.2).

2.4.9 Audio Jack (CN18)

The motherboard provides HD audio jack on the rear I/O. Install audio driver, and then attach audio devices to CN18.

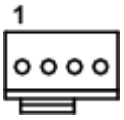
Pin Color	Signal
Green	Line-out
Pink	MIC-in

2.4.10 Fan Connectors (CN23 and CN24)

The motherboard has two fan connectors. You can find fan speed option within BIOS Setup Utility if fan is installed. For further information, see BIOS Setup Utility: Advanced\Hardware Monitor\PC Health Status in section 4.4.

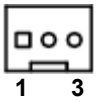
CN23 is a 4-pin (pitch=2.54mm) CPU fan connector.

Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control



CN24 is a 3-pin (pitch=2.54mm) system fan connector.

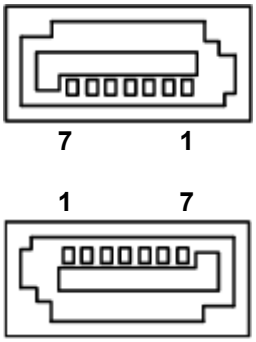
Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection



2.4.11 SATA 3.0 Connectors (CN25 and CN26)

This Serial Advanced Technology Attachment (Serial ATA or SATA) connector is for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to device such as hard disk drive.

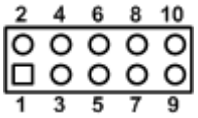
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+ **CN26**
7	GND



2.4.12 Digital I/O Connector (CN27)

The motherboard comes with a 2x5-pin (pitch=2.00mm) header for 8-bit digital I/O interface.

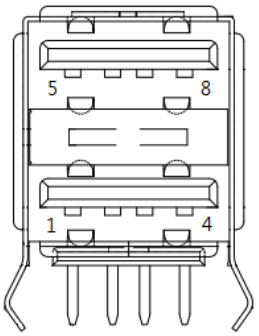
Pin	Signal	Pin	Signal
1	+5V	2	SIO_GPI70 (0xA06 Bit0, H)
3	SIO_GPO77 (0xA06 Bit5, H)	4	SIO_GPI71 (0xA06 Bit1, H)
5	SIO_GPO76 (0xA06 Bit6, H)	6	SIO_GPI72 (0xA06 Bit2, H)
7	SIO_GPO75 (0xA06 Bit7, H)	8	SIO_GPI73 (0xA06 Bit3, H)
9	SIO_GPO74 (0xA06 Bit7, H)	10	GND



2.4.13 USB 2.0 Double-deck Connector (CN28)

The CN28 is a double-deck connector for USB 2.0 interfaces. The board features Universal Serial Bus (USB) connectors, compliant with USB 2.0 (480Mbps) that can be adapted to any USB peripherals, such as monitor, keyboard and mouse. This USB 2.0 connector carries USB port 7 and 8.

Pin	Signal	Pin	Signal
1	+5V	5	+5V
2	USB#7_D-	6	USB#8_D-
3	USB#7_D+	7	USB#8_D+
4	GND	8	GND

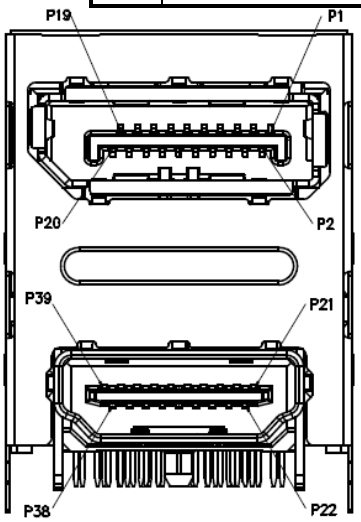


2.4.14 DisplayPort++ and HDMI Connector (CN30)

The motherboard comes with DisplayPort++ and HDMI interface on the rear I/O.

DisplayPort++:

Pin	USB Signal	Pin	USB Signal
1	DP_TX0_P	2	GND
3	DP_TX0_N	4	DP_TX1_P
5	GND	6	DP_TX1_N
7	DP_TX2_P	8	GND
9	DP_TX2_N	10	DP_TX3_P
11	GND	12	DP_TX3_N
13	GND	14	GND
15	DP_AUXP	16	GND
17	DP_AUXN	18	DP_HPD
19	GND	20	+3.3V



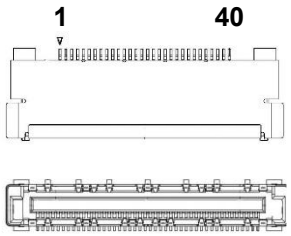
HDMI:

Pin	USB Signal	Pin	USB Signal
21	HDMI_DATA2+	22	GND
23	HDMI_DATA2-	24	HDMI_DATA1+
25	GND	26	HDMI_DATA1-
27	HDMI_DATA0+	28	GND
29	HDMI_DATA0-	30	HDMI_Clock+
31	GND	32	HDMI_Clock-
33	N.C.	34	N.C.
35	HDMI_SCL	36	HDMI_SDA
37	GND	38	+5V
39	HDMI_HPD		

2.4.15 eDP Connector (SCN1)

The embedded DisplayPort (eDP) interface is available through 40-pin connector (SCN1), which is compliant with I-PEX-CABLINE II HT1 20143.

Pin	Signal	Pin	Signal
1	VDD[*]	2	VDD[*]
3	VDD[*]	4	VDD[*]
5	N/C	6	GND
7	GND	8	GND
9	GND	10	EMB_HPD
11	GND	12	EDP_TXN3C
13	EDP_TXP3_C	14	GND
15	EDP_TXN2_C	16	EDP_TXP2_C
17	GND	18	EDP_TXN1_C
19	EDP_TXP1_C	20	GND
21	EDP_TXN0_C	22	EDP_TXP0_C
23	GND	24	EMB_AUXP
25	EMB_AUXN	26	GND
27	VSS_EDP_AMOLED	28	VSS_EDP_AMOLED
29	VSS_EDP_AMOLED	30	VSS_EDP_AMOLED
31	N/C	32	EDP_BKLTCTL
33	EDP_BKLTEN	34	N/C
35	N/C	36	VCC_EDP_BKLT
37	VCC_EDP_BKLT	38	VCC_EDP_BKLT
39	VCC_EDP_BKLT	40	N/C



Note

- ***eDP connector P/N: Aces Electronics 50203-40***

[*]: Panel power VDD is +3.3V by default, +5V or 12V is selectable by jumper JP5, see section 2.3.3.

Section 3
Hardware Description

3.1 Microprocessors

The MANO526 Series supports Intel® Core™ i7/ i5/ i3 processors (65W CPU) and Pentium® processor, which enable your system to operate under Windows® 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

3.2 BIOS

The MANO526 Series uses AMI Plug and Play BIOS with a single SPI Flash.

3.3 System Memory

The MANO526 supports two 260-pin DDR4 SO-DIMM sockets for maximum memory capacity up to 32GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB and 16GB.

Note

- ***For single memory channel configuration, install memory module in channel A (CN20) DDR4 SO-DIMM socket.***
- ***For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in both channel 0 (CN20) and channel B (CN21) DDR4 SO-DIMM sockets.***

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Section 4
AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press <Del> during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

Note

If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting SW1 (see section 2.3.4).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your 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.

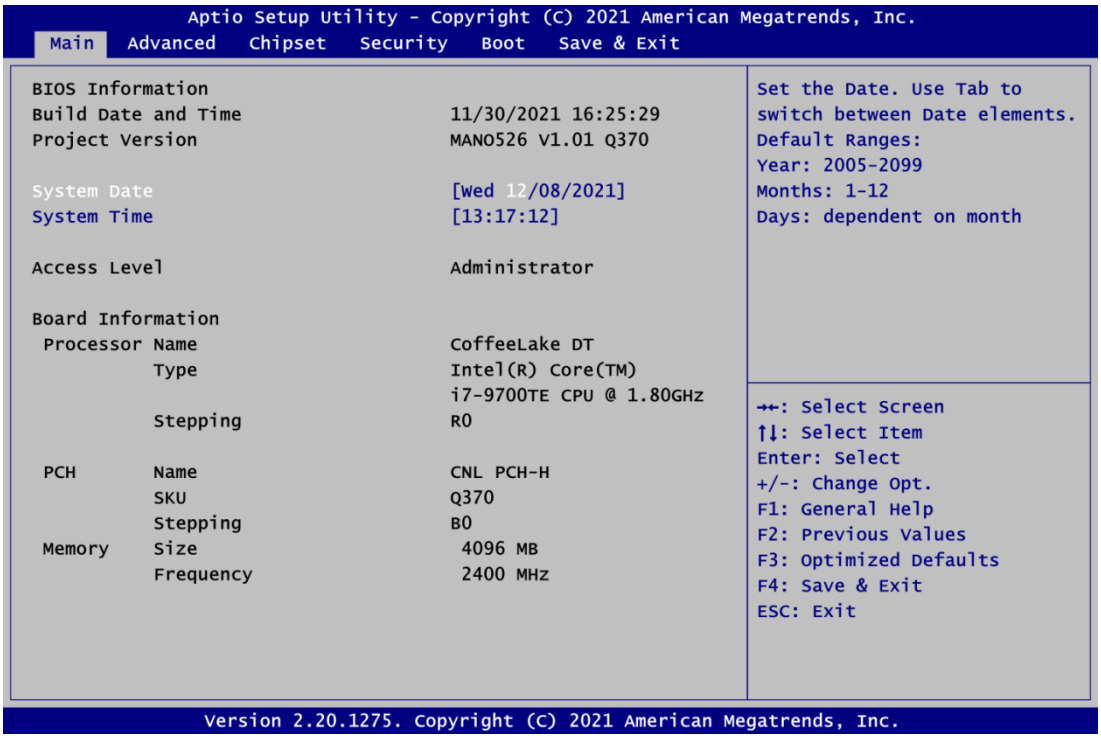
Note

Some of the navigation keys differ from one screen to another.

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

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You 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 shown below.



BIOS Information
Display the 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.

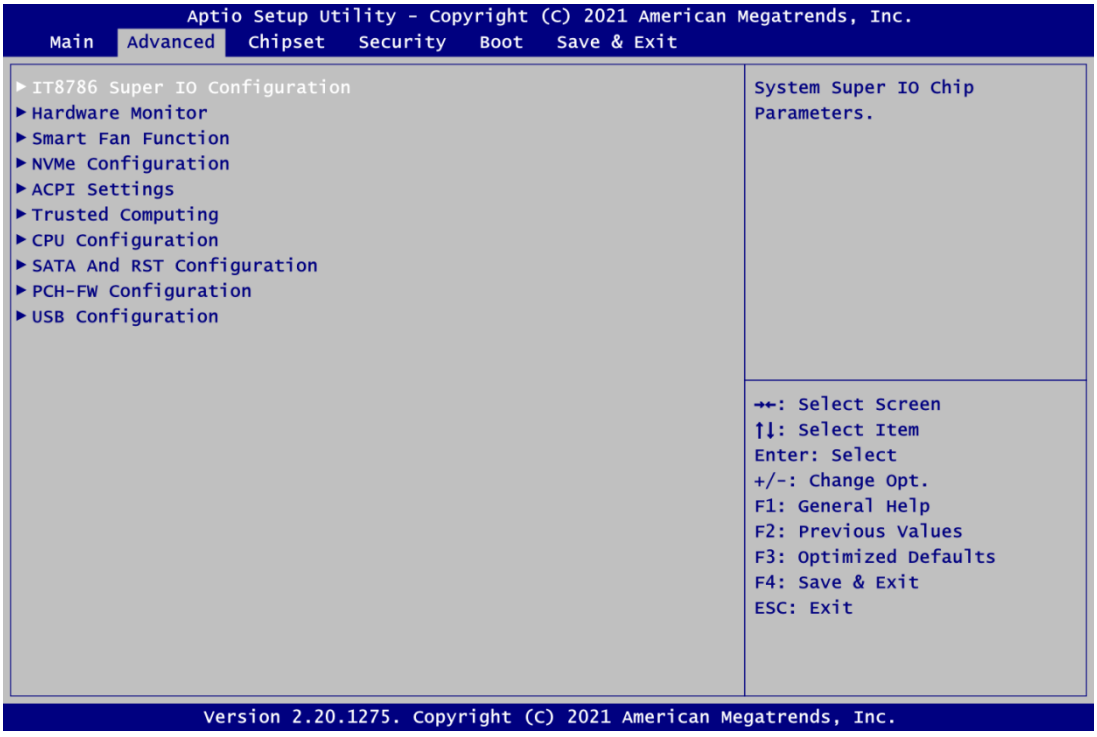
Board Information
Display the board information.

4.4 Advanced Menu

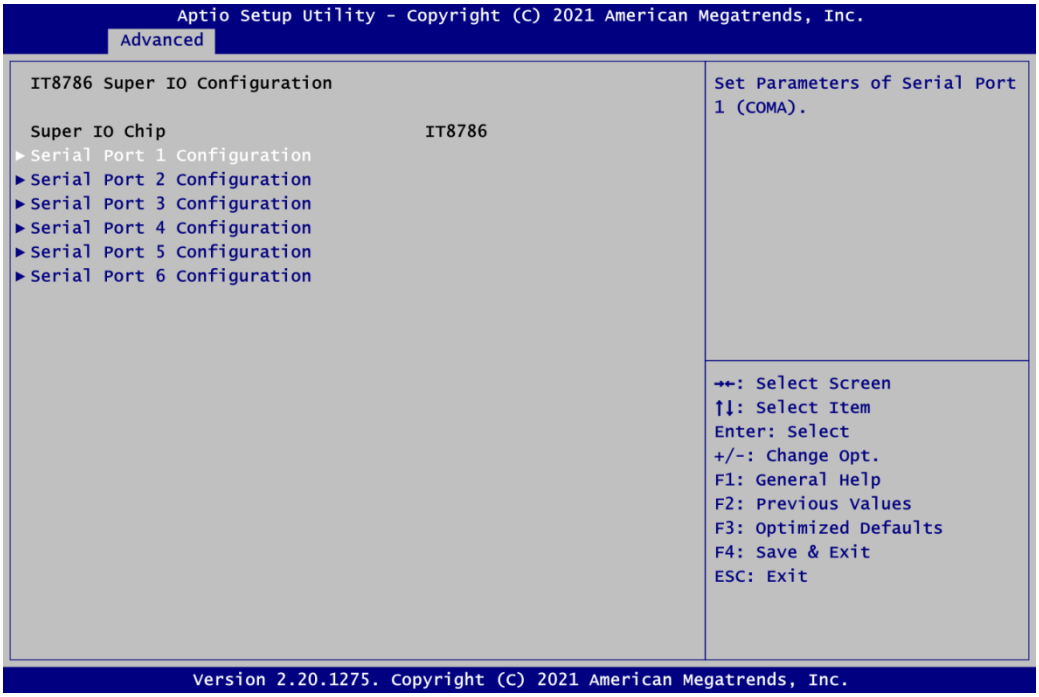
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ IT8786 Super IO Configuration
- ▶ Hardware Monitor
- ▶ Smart Fan Function
- ▶ NVMe Configuration
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ SATA And RST Configuration
- ▶ PCH-FW Configuration
- ▶ USB Configuration

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

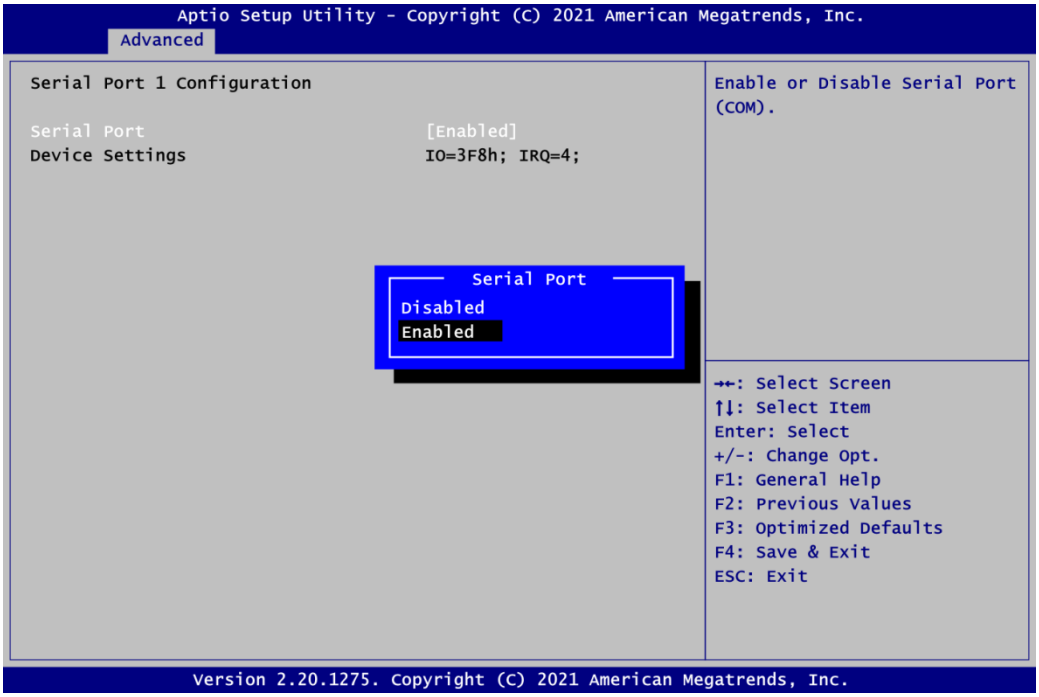


- **IT8786 Super IO Configuration**
  You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.



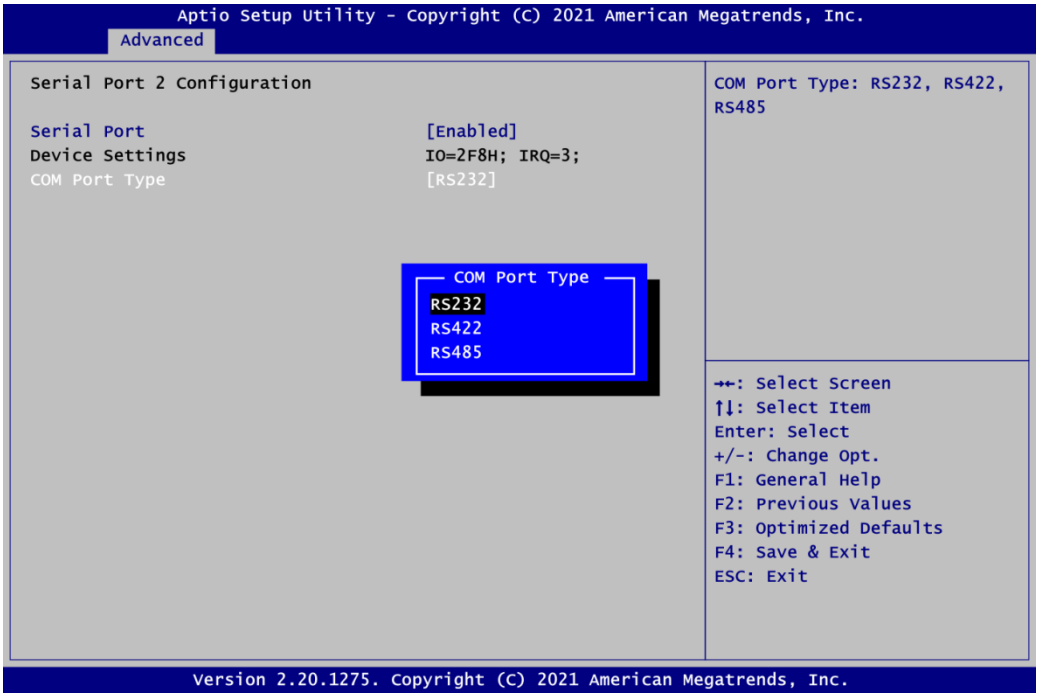
Serial Port 1~6 Configuration
Use these items to set parameters related to serial port 1~6.

- **Serial Port 1 Configuration**



Serial Port
Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

- **Serial Port 2 Configuration**



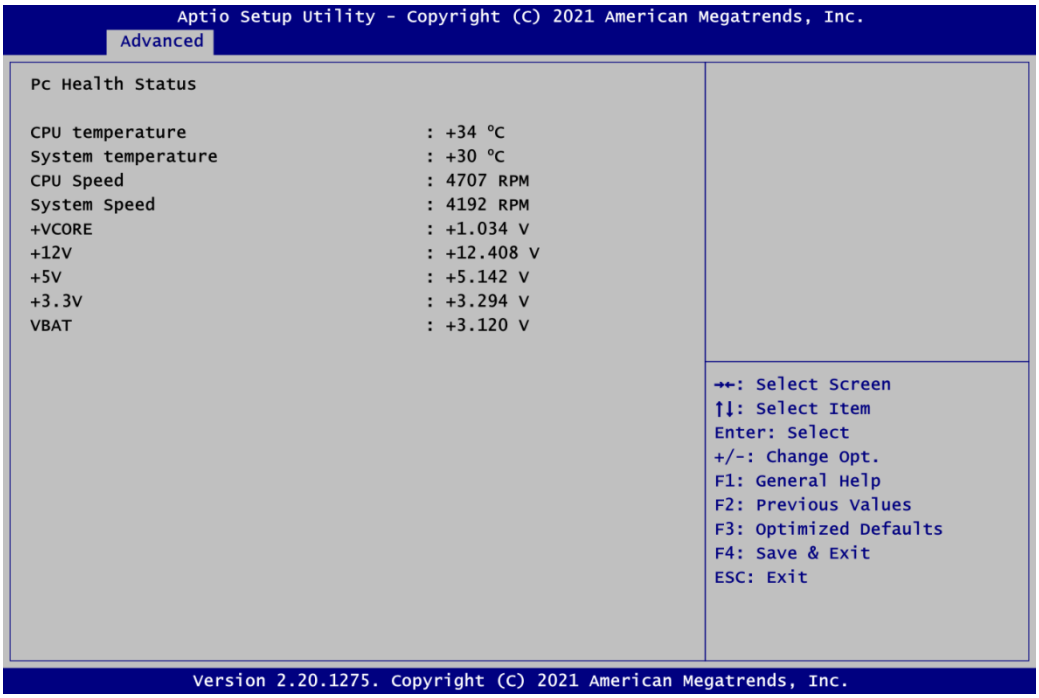
Serial Port
Enable or disable serial port 2. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

Note

Serial Port 3~6
The optimal settings for base I/O address and interrupt request address are:
- ***Serial port 3: 3E8h, IRQ6***
- ***Serial port 4: 2E8h, IRQ7***
- ***Serial port 5: 2F0h, IRQ6***
- ***Serial port 6: 2E0h, IRQ7***

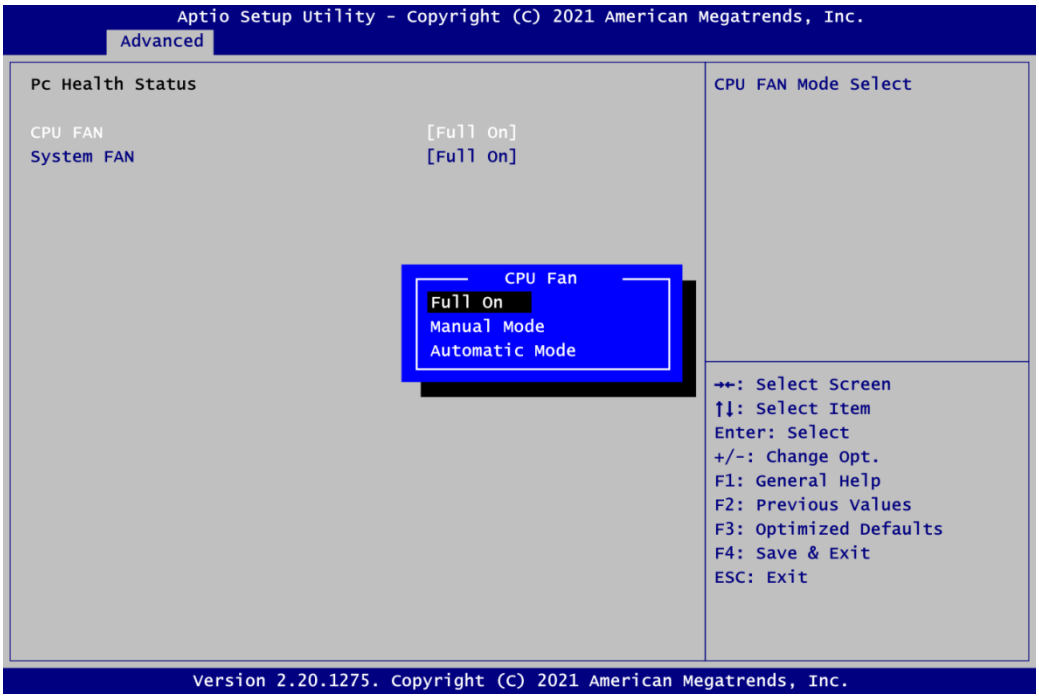
COM Port Type
Use this item to set RS-232/422/485 communication mode. Only COM2 is selectable for RS-232/422/485 mode by BIOS setting.

- **Hardware Monitor**
  This screen monitors hardware health status.

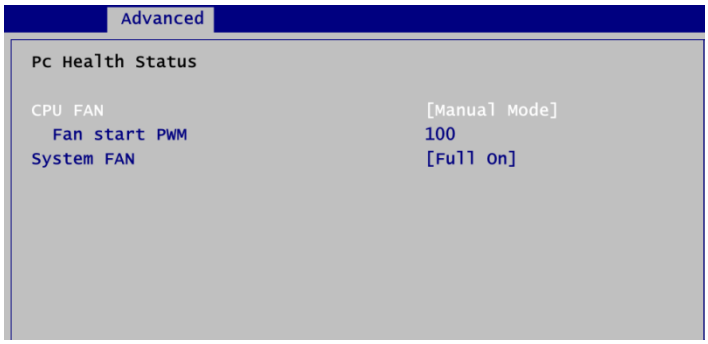


This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCORE, +12V, +5V, +3.3V and VBAT).

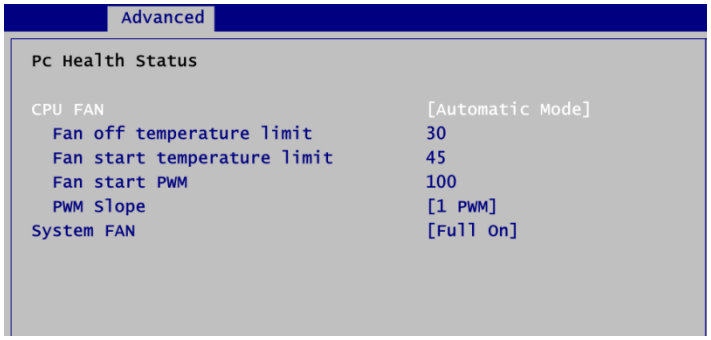
- **Smart Fan Function**
  This screen allows you to configure CPU fan and system fan mode.

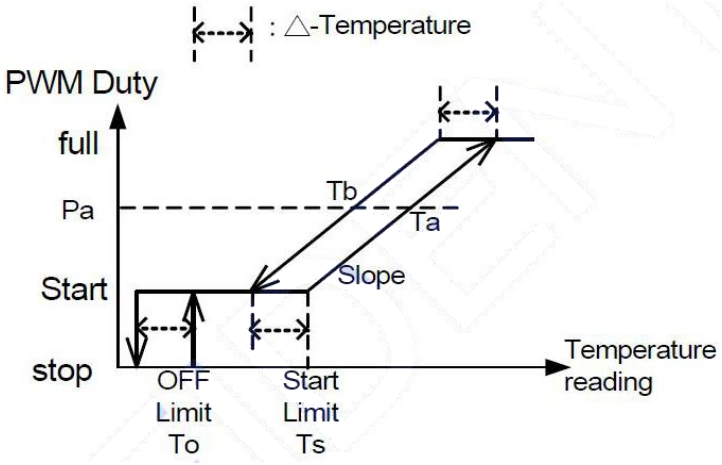


CPU FAN\System FAN
This item allows you to select Smart Fan Mode:
- Full On: The fan always runs at full speed.
- Manual Mode: Use the PWM value to determine fan speed manually. The range is from 0 (minimum speed) to 255 (maximum speed).

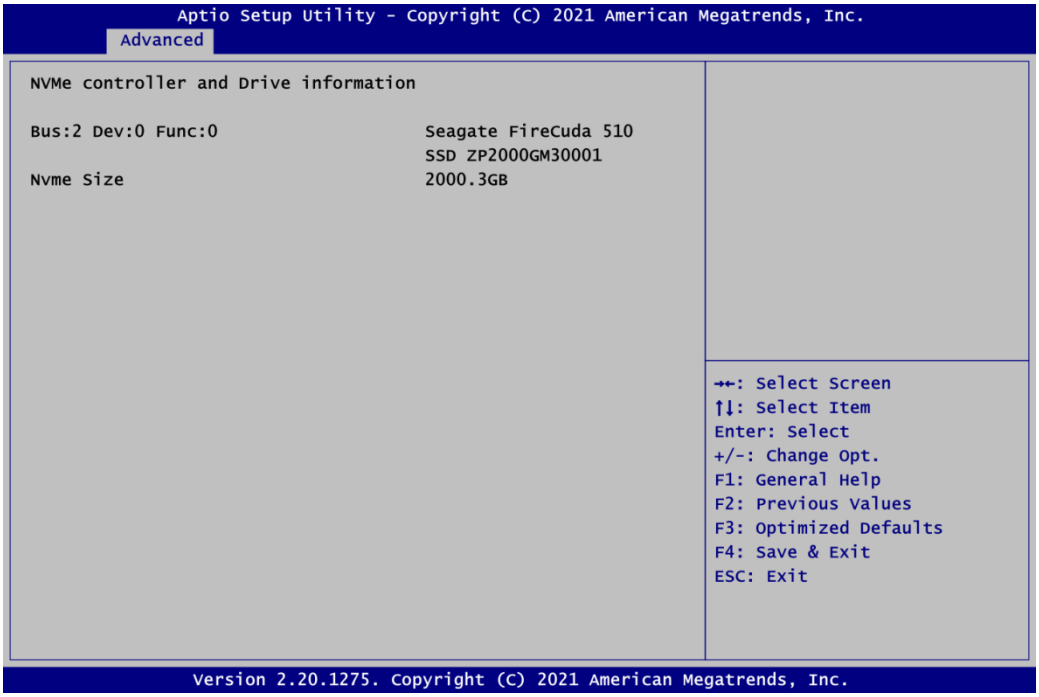


- Automatic Mode: The following option selections appear only in Automatic Mode.
  Fan off temperature limit: The fan will off when temperature is lower than this limit.
  Fan start temperature limit: The fan will work when temperature is higher than this limit.
  The initial spinning speed of fan is determined according to **start PWM value**. The **PWM Slope** is used to control how fast the fan speeds up or slows down; larger value means faster. When temperature gets higher, the fan increases its speed according to PWM Slope.

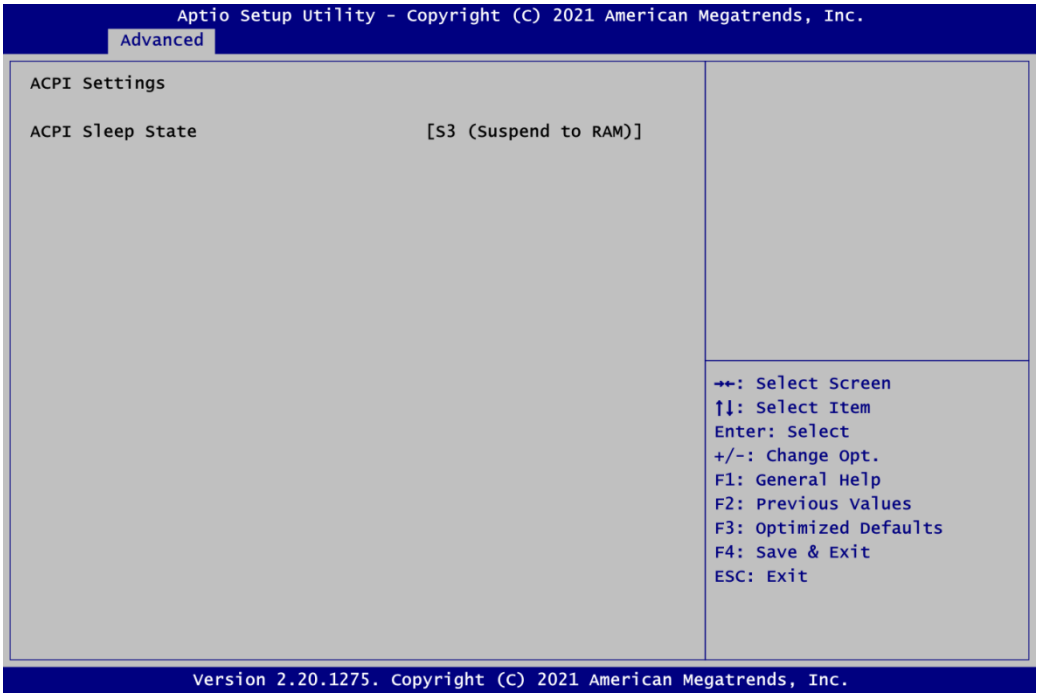




- **NVMe Configuration**
  This screen displays NVMe (Non-Volatile Memory Express) controller and drive information.

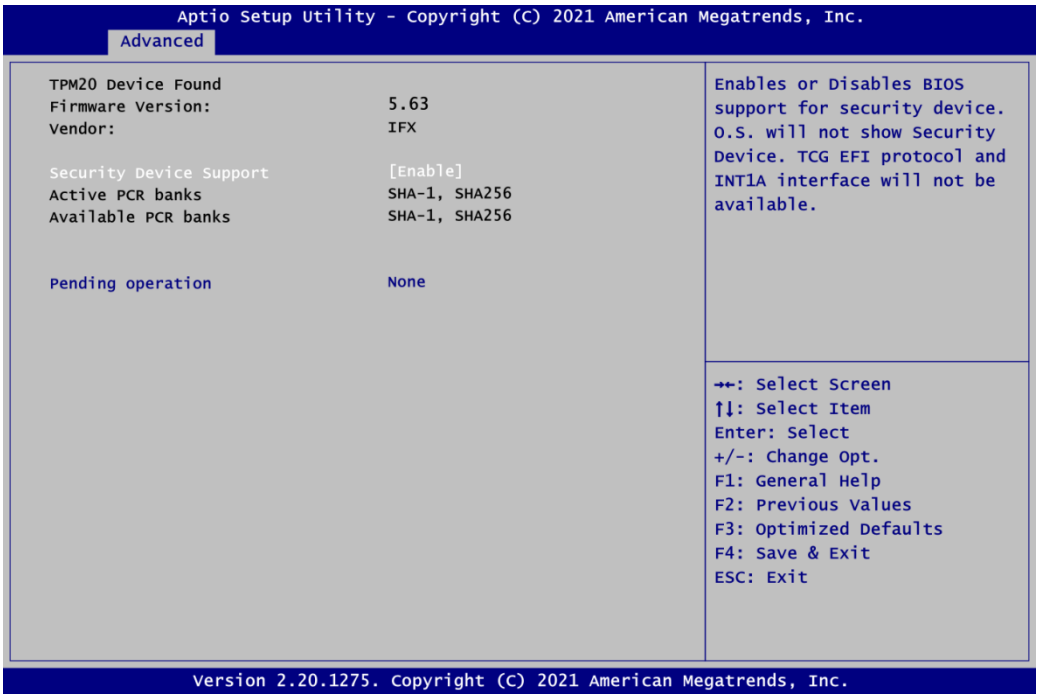


- **ACPI Settings**

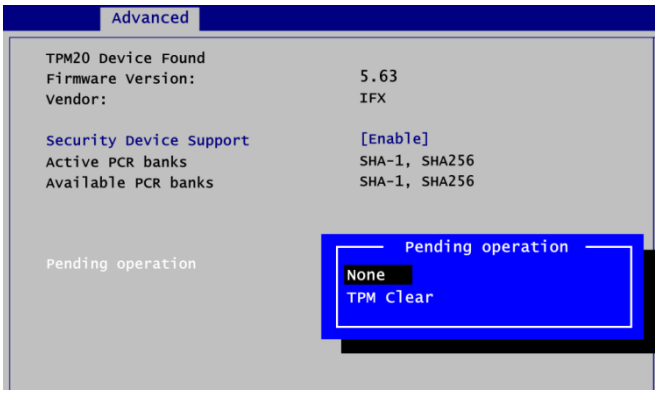


ACPI Sleep State
When the suspend button is pressed, the ACPI (Advanced Configuration and Power Interface) sleep state is S3 (Suspend to RAM).

- **Trusted Computing**
  This screen provides function for specifying the TPM settings.

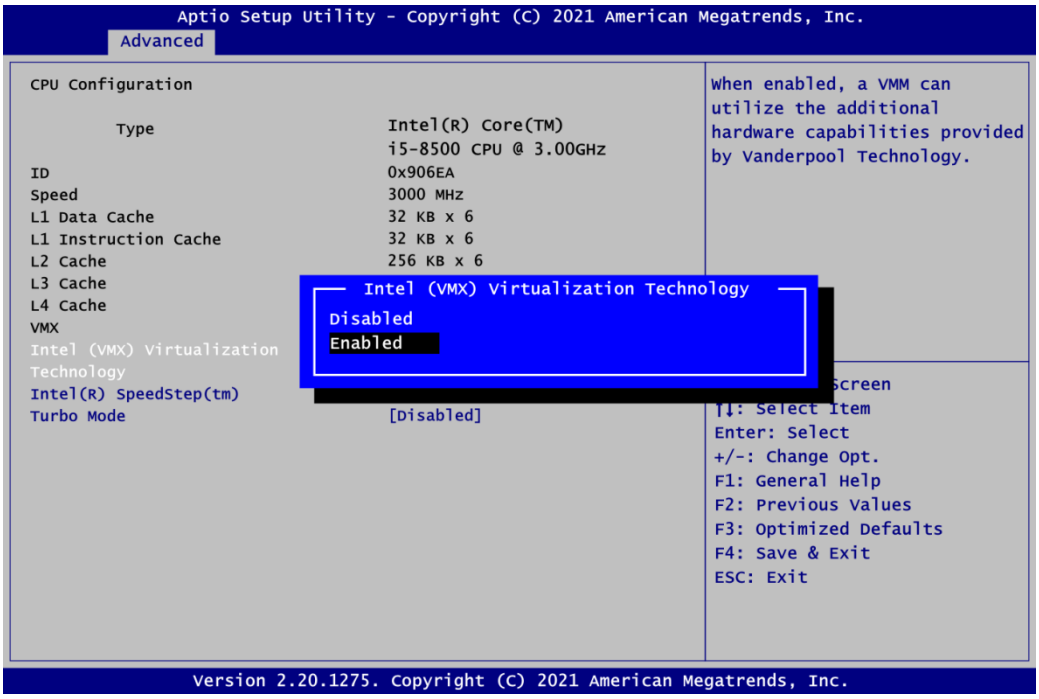


Security Device Support
Enable or disable BIOS support for security device.

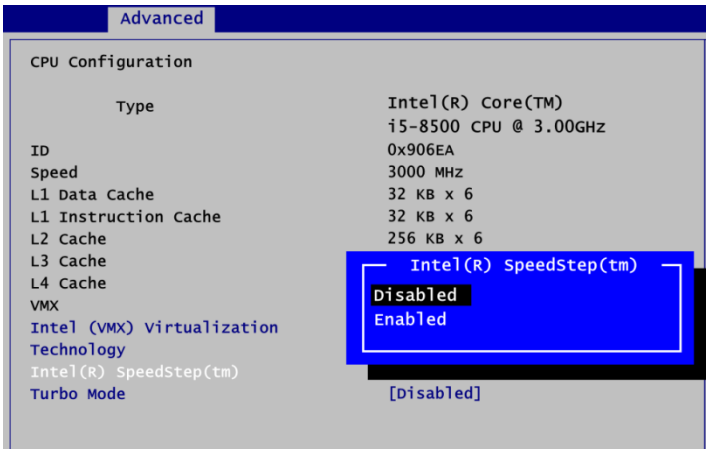


Pending operation
Schedule an operation for the security device, see image below.
- None
- TPM Clear: Clear all data secured by TPM.

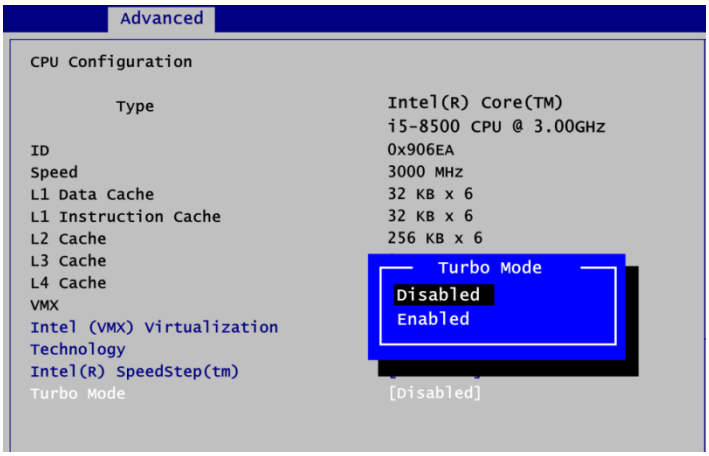
- **CPU Configuration**
  This screen shows CPU information, and you can change the value of the selected option.



Intel (VMX) Virtualization Technology
Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

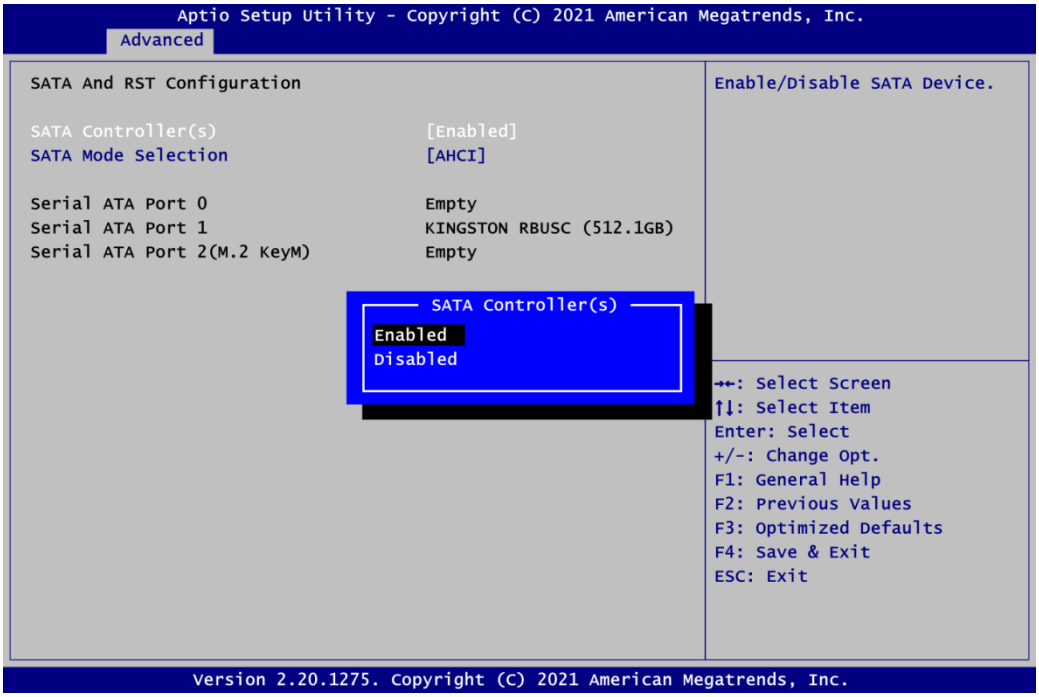


Intel(R) SpeedStep(tm)
Enable or disable Intel® SpeedStep. It allows more than two frequency ranges to be supported.

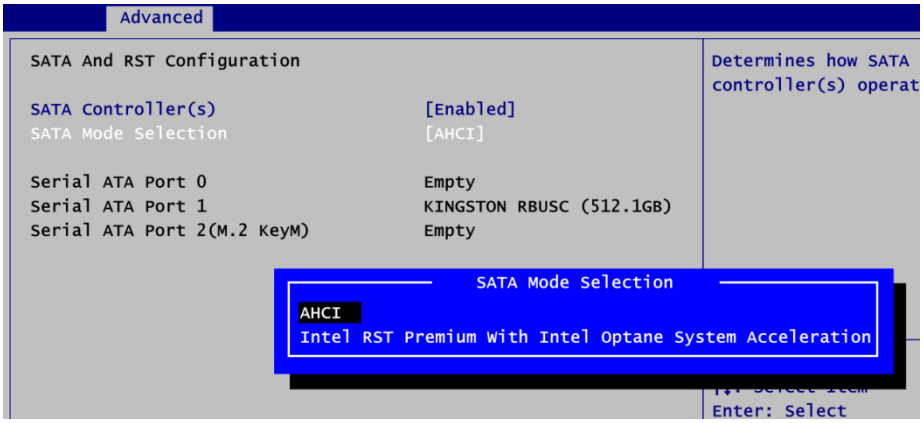


Turbo Mode
Enable or disable Intel® turbo boost mode allowing processor cores to run faster but not exceed CPU defined frequency limits.

- **SATA and RST Configuration**
  During system boot up, BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see the currently installed hardware in the SATA ports.

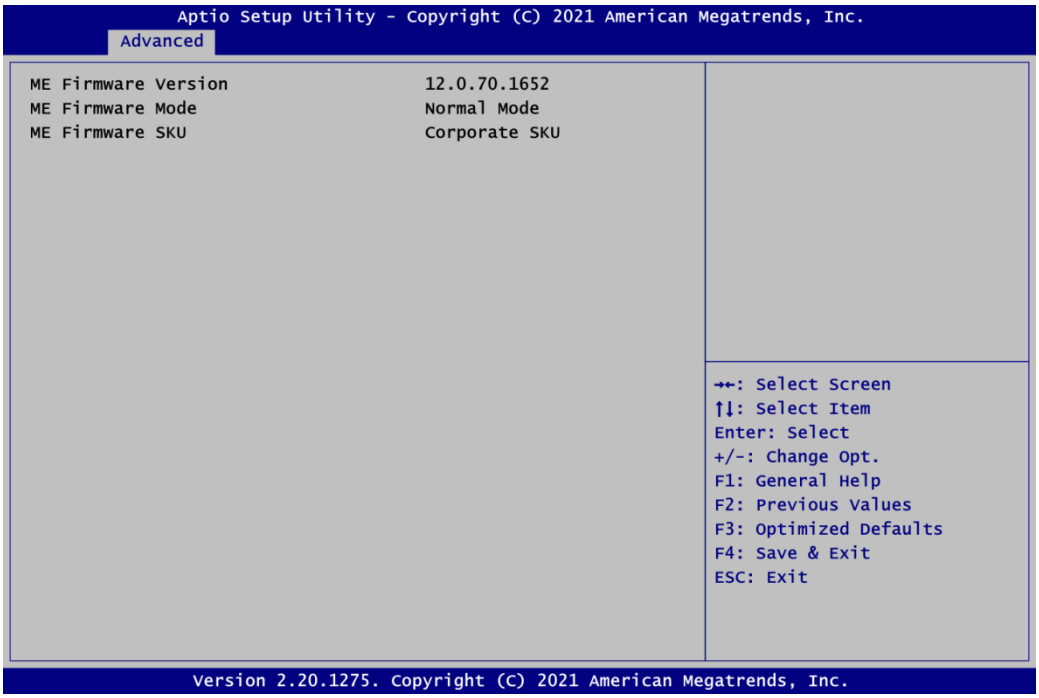


SATA Controller(s)
Enable or disable the SATA Controller feature. The default is Enabled.

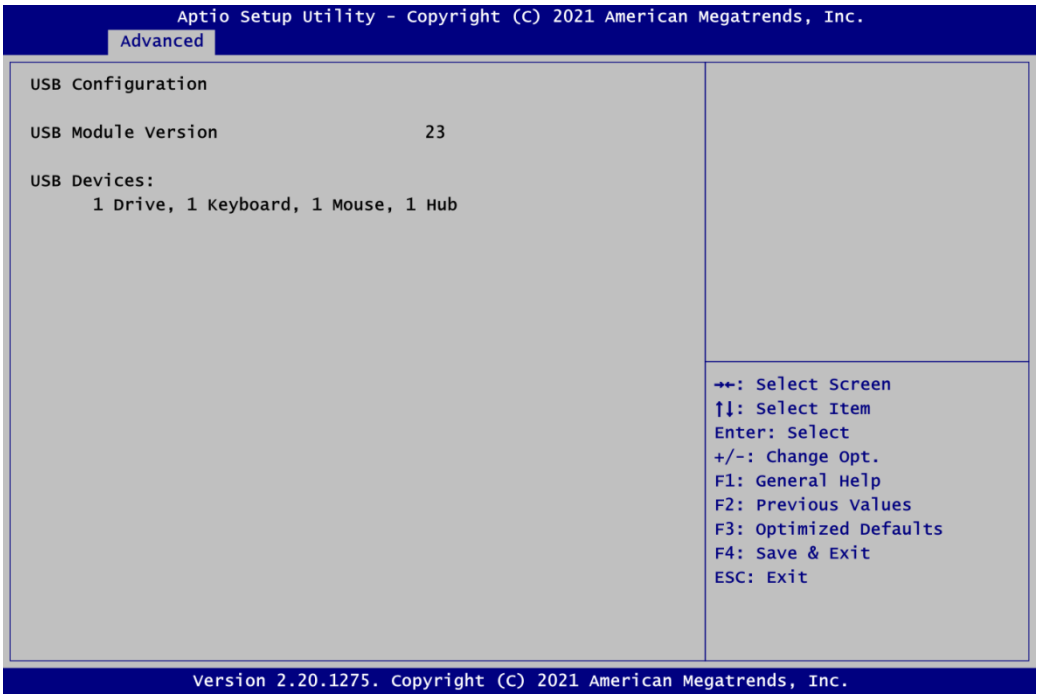


SATA Mode Selection
Determine how SATA controller(s) operate.

- **PCH-FW Configuration**
  This screen displays ME Firmware information.



- **USB Configuration**



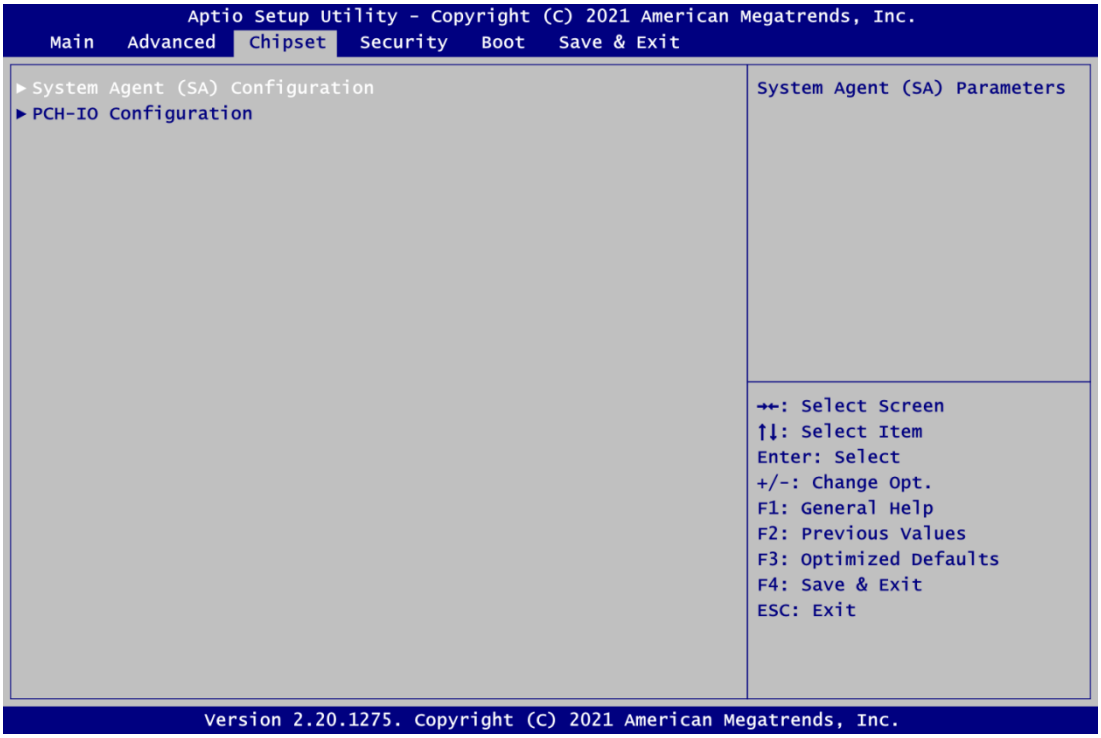
USB Devices
Display all detected USB devices.

4.5 Chipset Menu

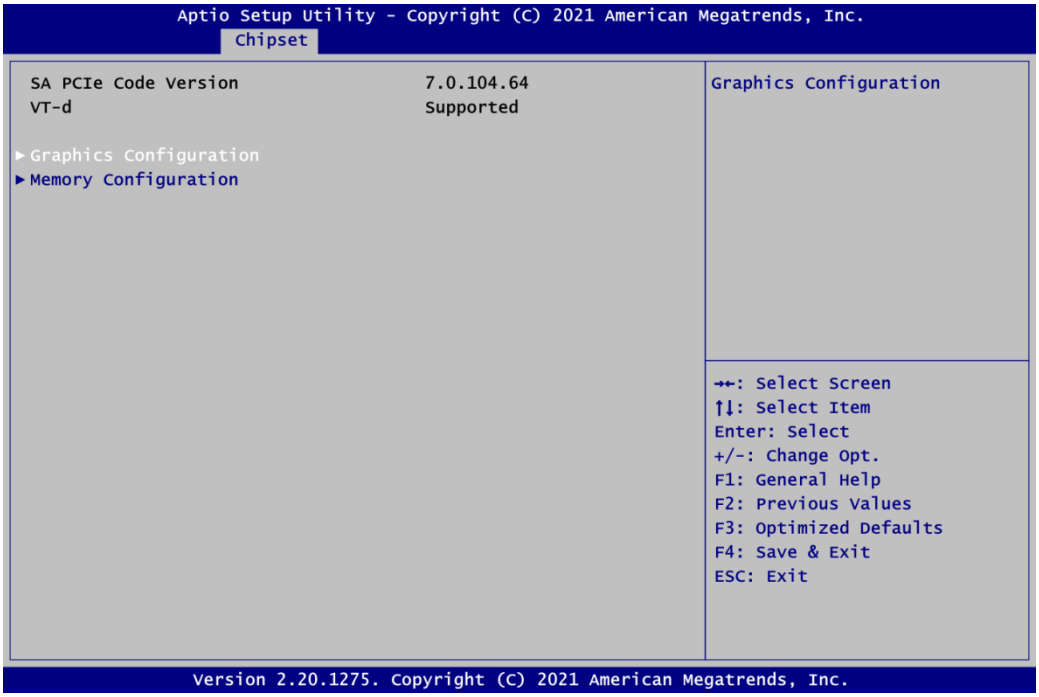
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

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

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



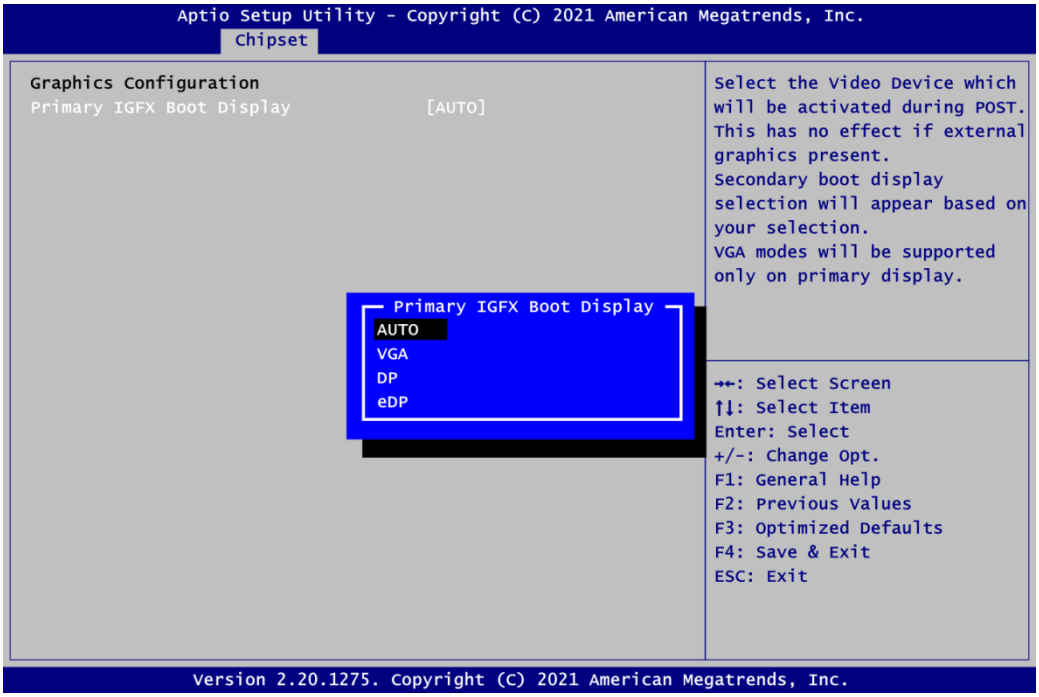
- **System Agent (SA) Configuration**
  This screen allows users to configure System Agent (SA) parameters. For items marked with "►", please press <Enter> for more options.



Graphics Configuration
Open sub menu for parameters related to graphics configuration.

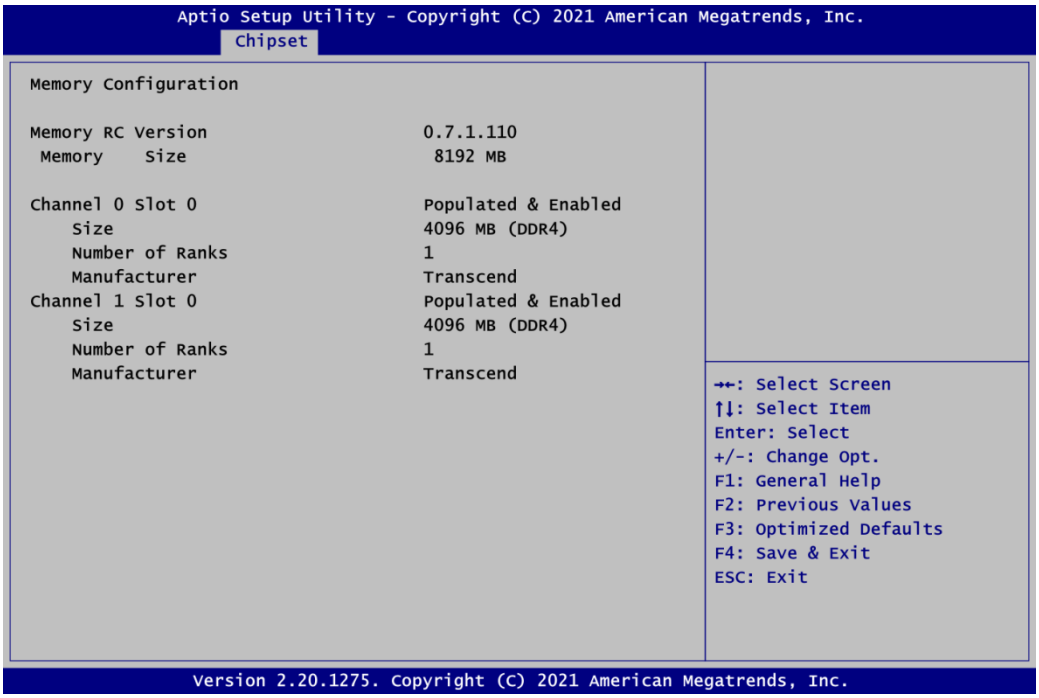
Memory Configuration
Open sub menu for information related to system memory.

- **Graphics Configuration**

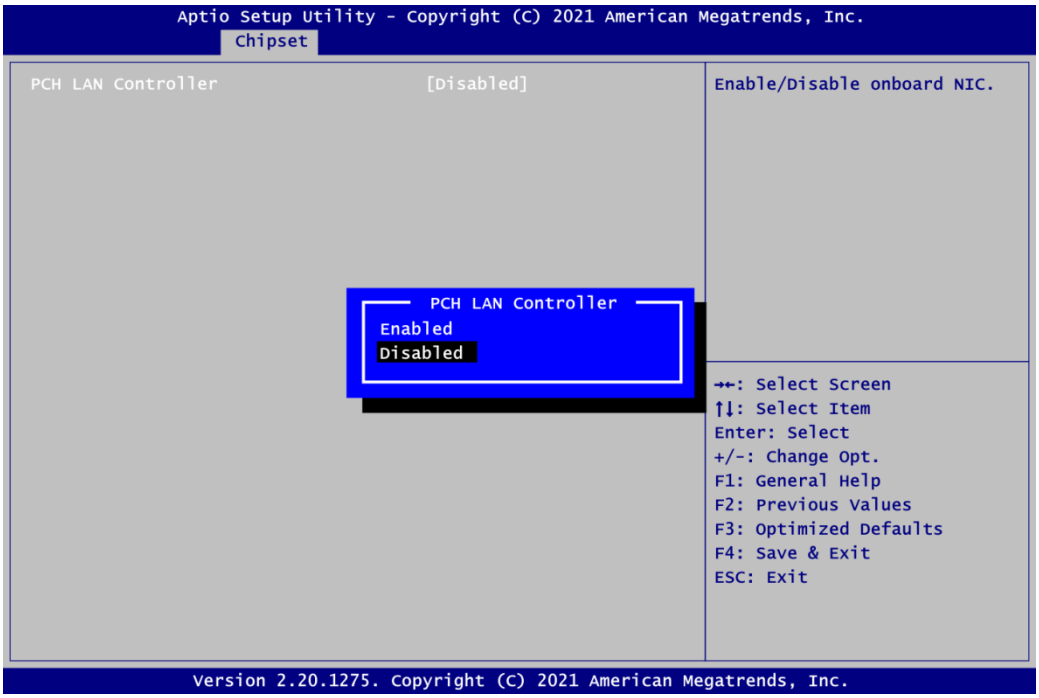


Primary IGFX Boot Display
Select the video device which will be activated during POST (Power-On Self Test). The secondary boot display selection will appear based on your selection.

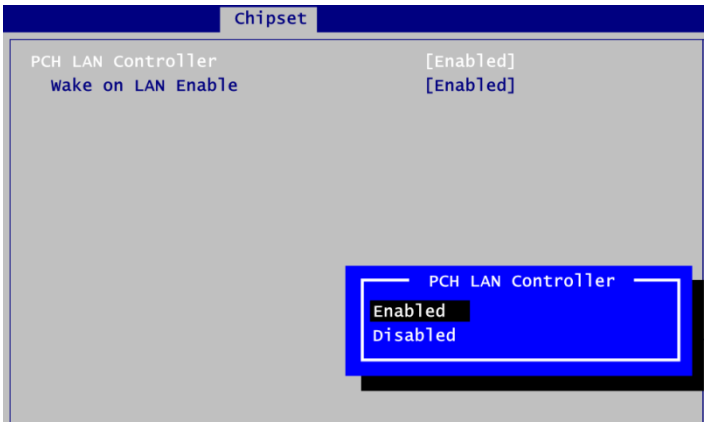
- **Memory Configuration**
  This screen shows the system memory information.



- **PCH-IO Configuration**
  This screen allows you to set PCH parameters.



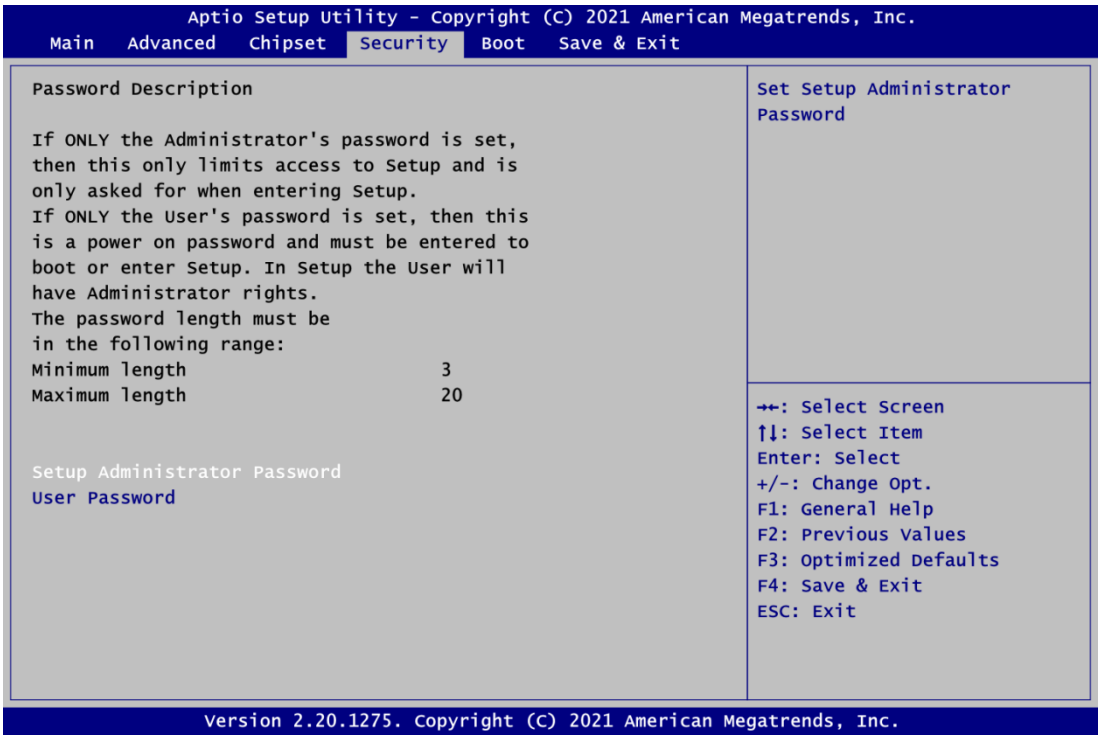
PCH LAN Controller
Enable or disable onboard PCH LAN controller.



Wake on LAN Enable
After enabling PCH LAN Controller, you can enable or disable integrated LAN to wake the system.

4.6 Security Menu

The Security menu allows users to change the security settings for the system.

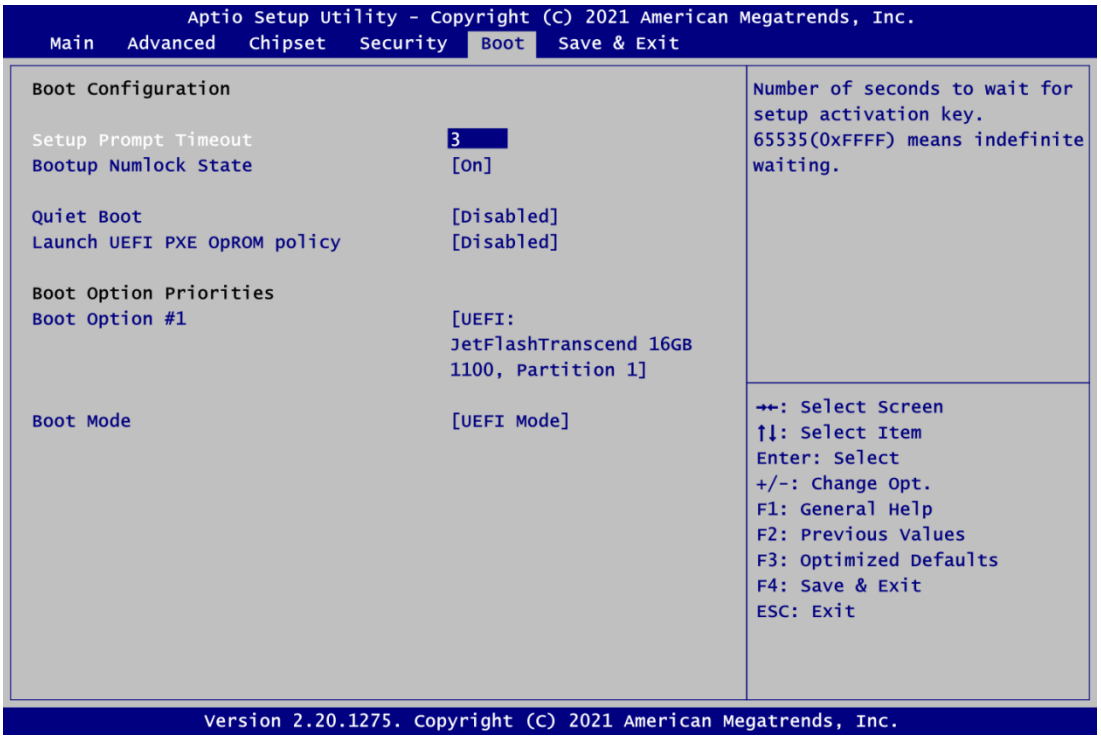


- **Setup Administrator Password**
  Set setup administrator password.

- **User Password**
  Set user password.

4.7 Boot Menu

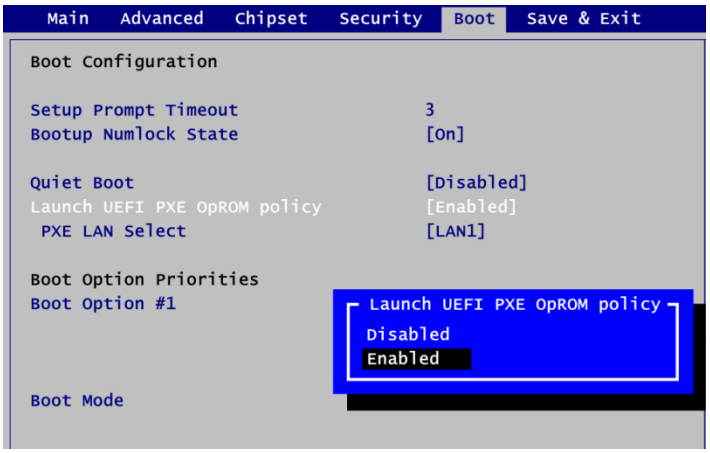
The Boot menu allows users to change boot options of the system.

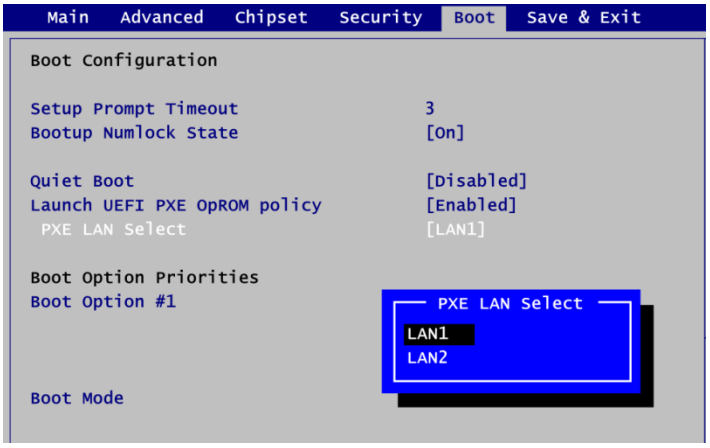


- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

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

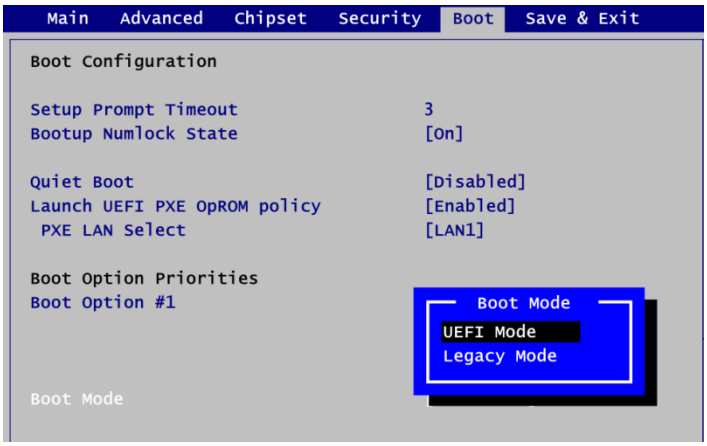
- **Quiet Boot**
  Select to display either POST output messages or a splash screen during boot-up.





- **Launch UEFI PXE OpROM policy**
  Control the execution of UEFI PXE OpROM. When enabled, you may select LAN1 or LAN2 as PXE LAN port.

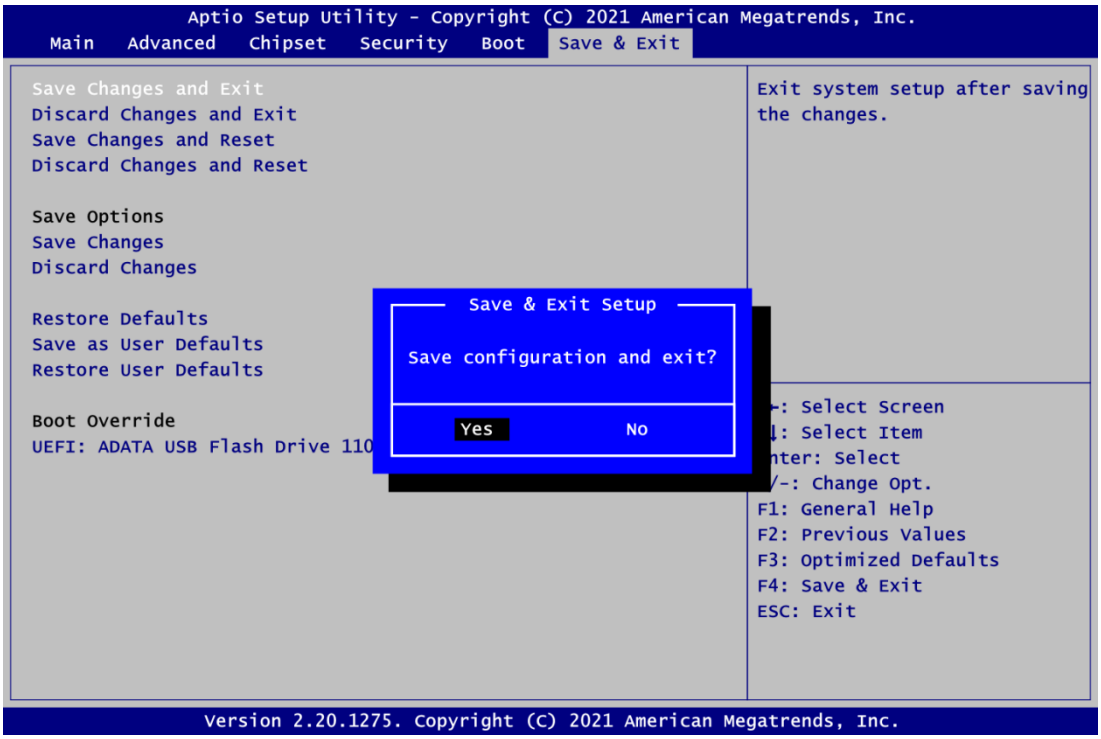
- **Boot Option Priorities**
  These are settings for boot priority. Specify the boot device priority sequence from the available devices.



- **Boot Mode**
  Use this option for boot mode settings.
  - UEFI Boot: Select support to boot any UEFI-capable OS.
  - Legacy Boot: Select support to boot non UEFI-capable OS that expects a legacy BIOS interface.

4.8 Save & Exit Menu

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



- **Save Changes and Exit**
  When you 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 configuration 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**
  When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can 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**
  When you have 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 configuration. 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 you 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 you 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

A.1 About Watchdog Timer

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

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts 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.

A.2 Sample Program

1. Enter **ADU**, and press <F4> to select the **superior ITE**
2. **PORT** setting **002E, 002F**
3. Address **07h** setting **07 GPIO**
4. Address **72h** to set the countdown, for example Sec: **C0**, Min: **40**
5. Address **73h** set the countdown time, for example 10sec: **0A**

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Appendix B
Digital I/O

B.1 Digital I/O Program SOP

1. Enter ADU, and press <F4> to select the superior ITE.
2. PORT setting 2Eh, 2Fh.
3. Address 07h setting 07 GPIO.
4. Address CEh to set the input/output (1:OUT 0:IN),
   for example address CEh is 0Fh -> GPIO0~3: output GPIO4~7: input.
5. If GPIO7x is input pin. BITx of PORT A06h show input level.
   Otherwise PORT A06h set FFh or 00h (1:High 0:Low).

B.2 Sample Code

```
outp( 0x2E, 0x87 );
outp( 0x2E, 0x01 );
outp( 0x2E, 0x55 );
outp( 0x2E, 0x55 );
outp( 0x2E, 0x07 );
outp( 0x2F, 0x07 ); // Switch to GPIO Device
outp( 0x2E, 0xCE );
outp( 0x2F, 0x0F ); // GPIO0~3 : output GPIO4~7 input
outp( 0x2E, 0x02 );
outp( 0x2F, 0x02 );
outp( 0xA06, 0xFF ); // if GP7x is output, Write output pin level
level = inp( 0xA06); // if GP7x is input, Read input pin level
```

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Appendix C
Configuring SATA for RAID

C.1 Configuring SATA Hard Drive(s) for RAID Function

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.

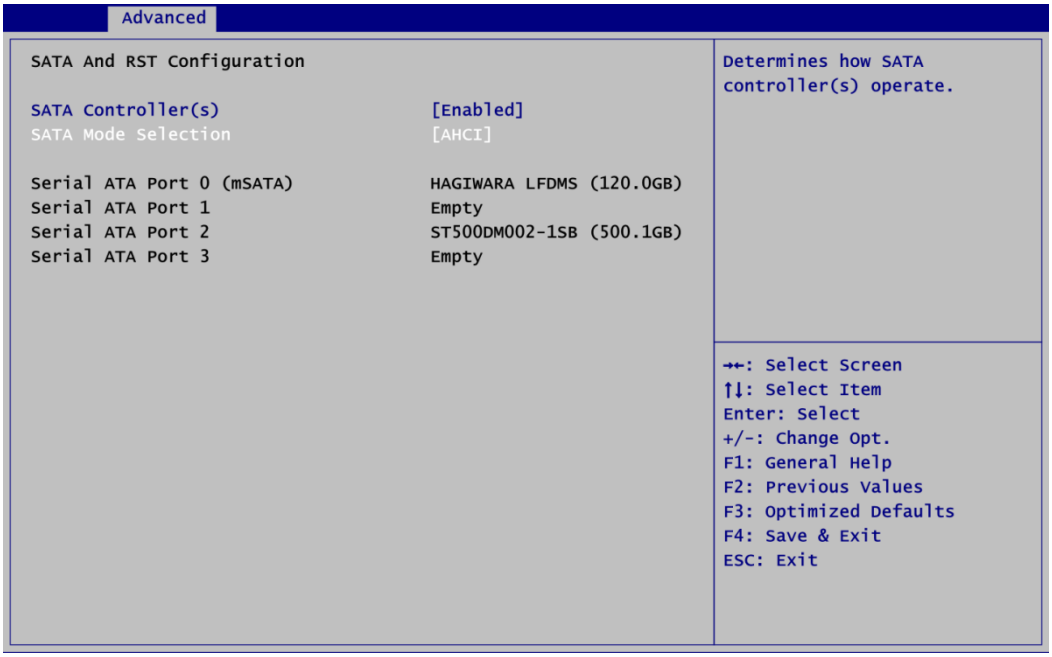
Please follow up the steps below to configure SATA hard drive(s):

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.

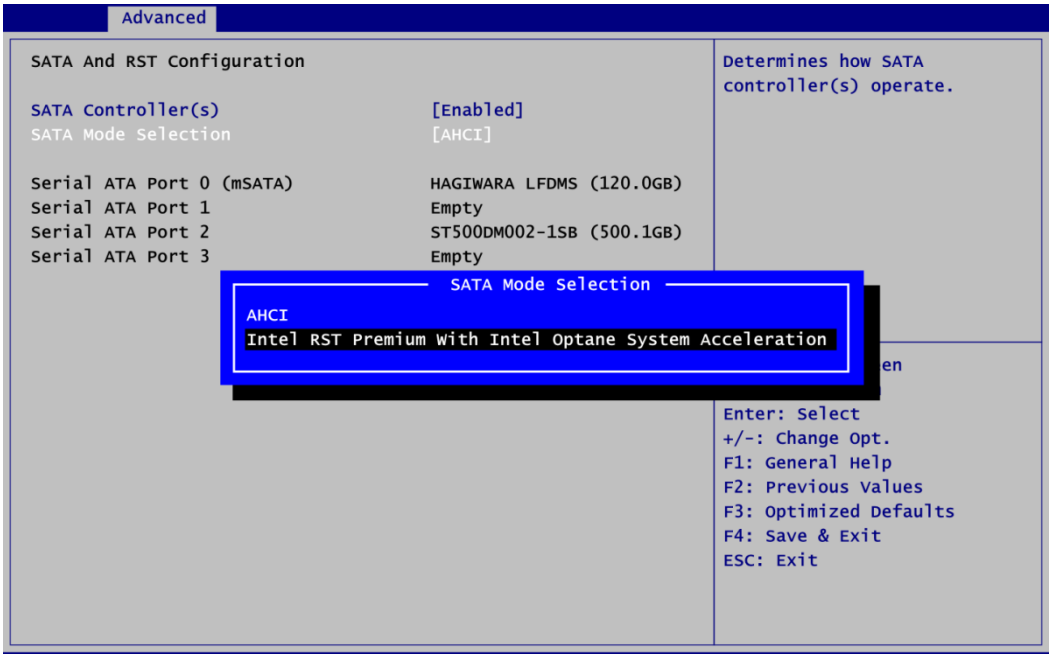
1. Installing SATA hard drive(s) in your system.
Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

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/SATA and RST Configuration, select the “SATA Mode Selection”, and press <Enter> for more options.



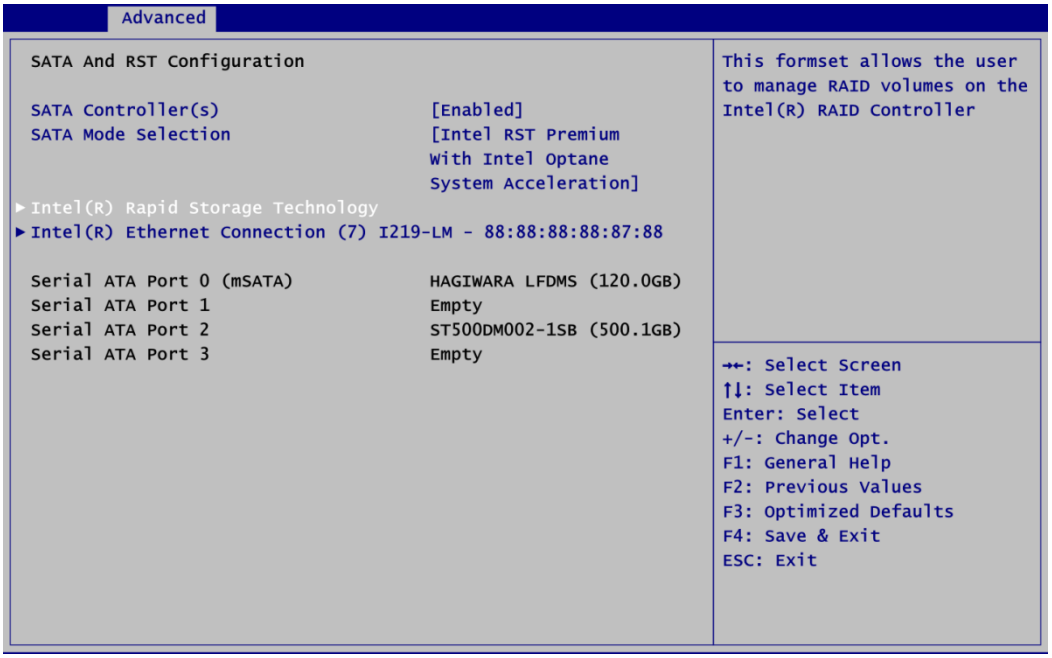
A list of options appears, please select “Intel RST Premium With Intel Optane System Acceleration”.



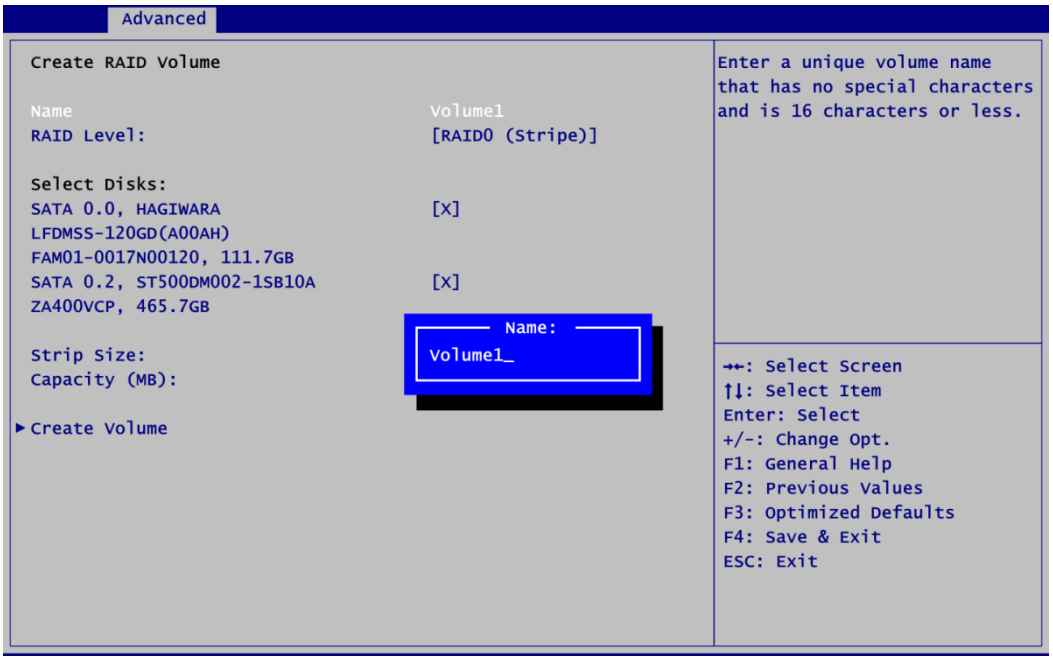
2.2. Set DVD-ROM for First Boot Option under the Boot Settings menu to boot DVD-ROM after system restarts.

3. Configuring RAID.

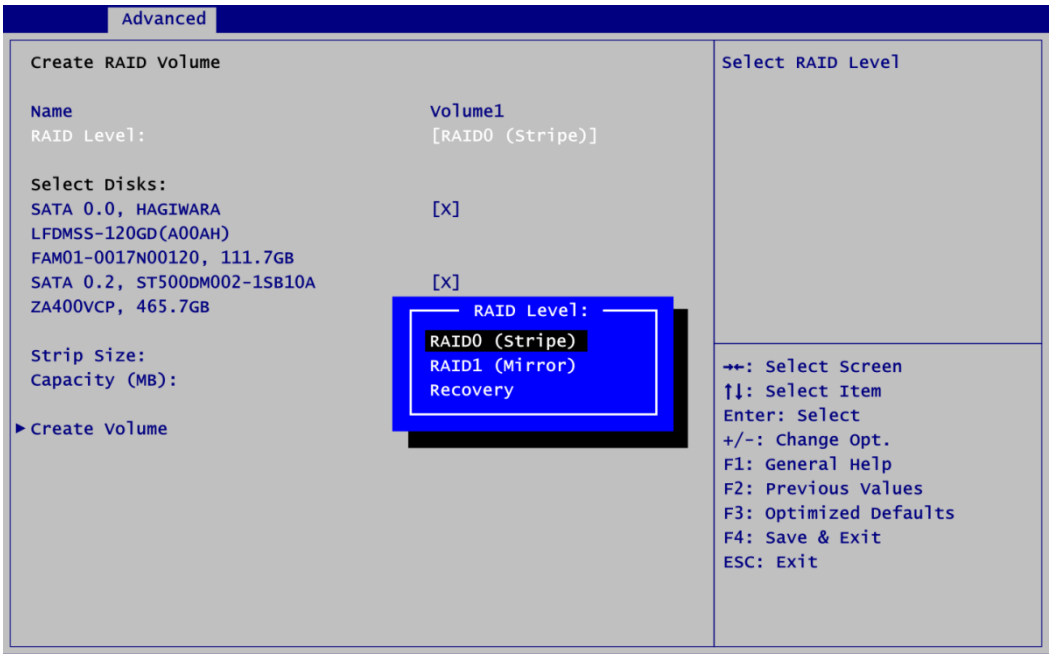
3.1. Configure a RAID array. If you want to create a RAID array, select the Intel(R) Rapid Storage Technology option and press <Enter>.



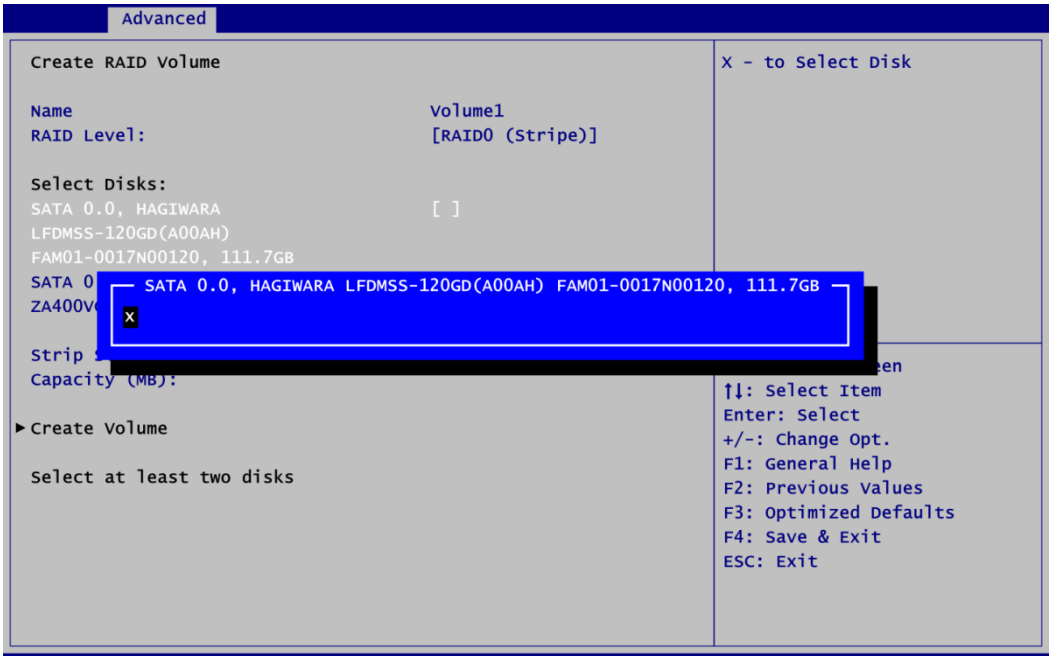
3.2. After entering the Create RAID Volume screen, you can type the disk array name with 1~16 letters or less (letters cannot be special characters) in the item “Name”.



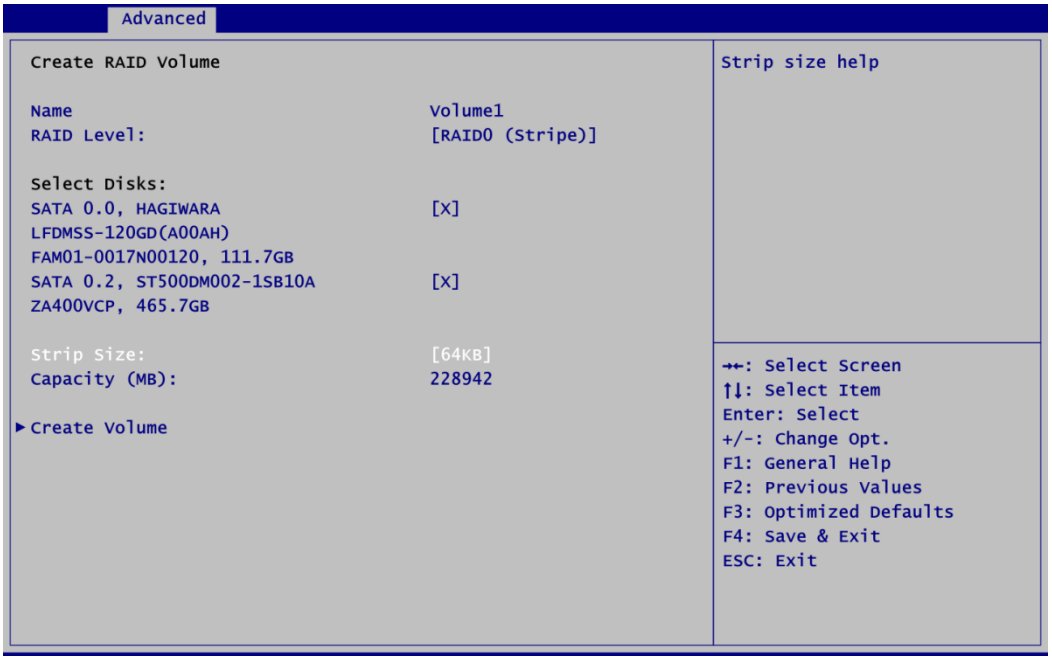
3.3. Then select a RAID level. There are three RAID levels: RAID0 (Stripe), RAID1 (Mirror) and Recovery. The RAID level option list varies according to the number of connected storage devices. For example, it can support RAID0, RAID1, RAID5 or RAID10 if 4 storages devices are connected to the system.



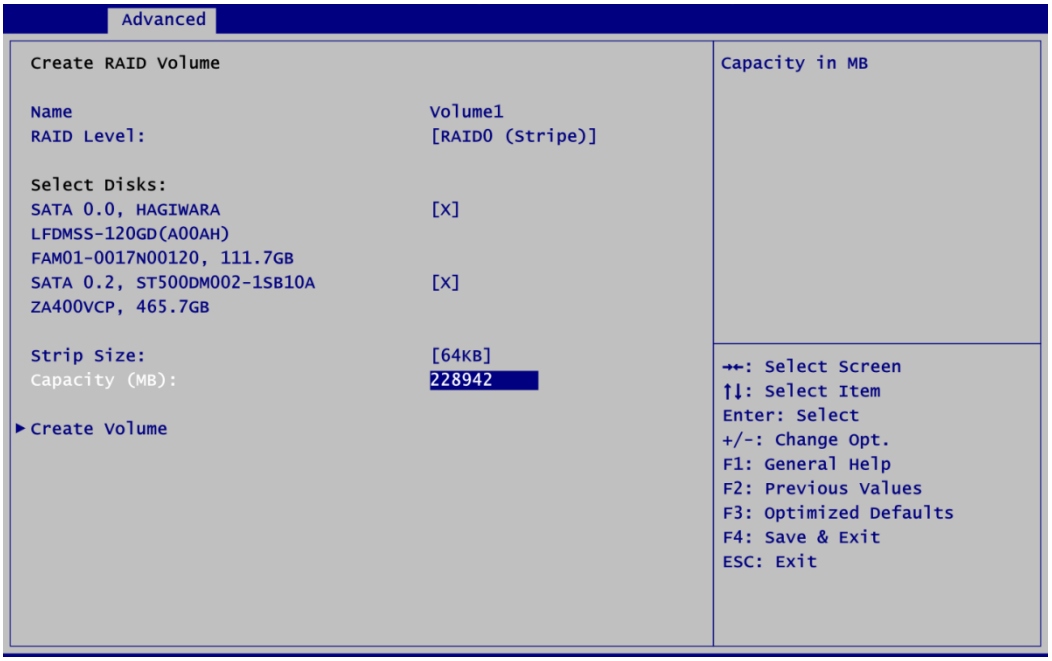
Don't forget to Select Disks by typing "X" as indicated in image below.



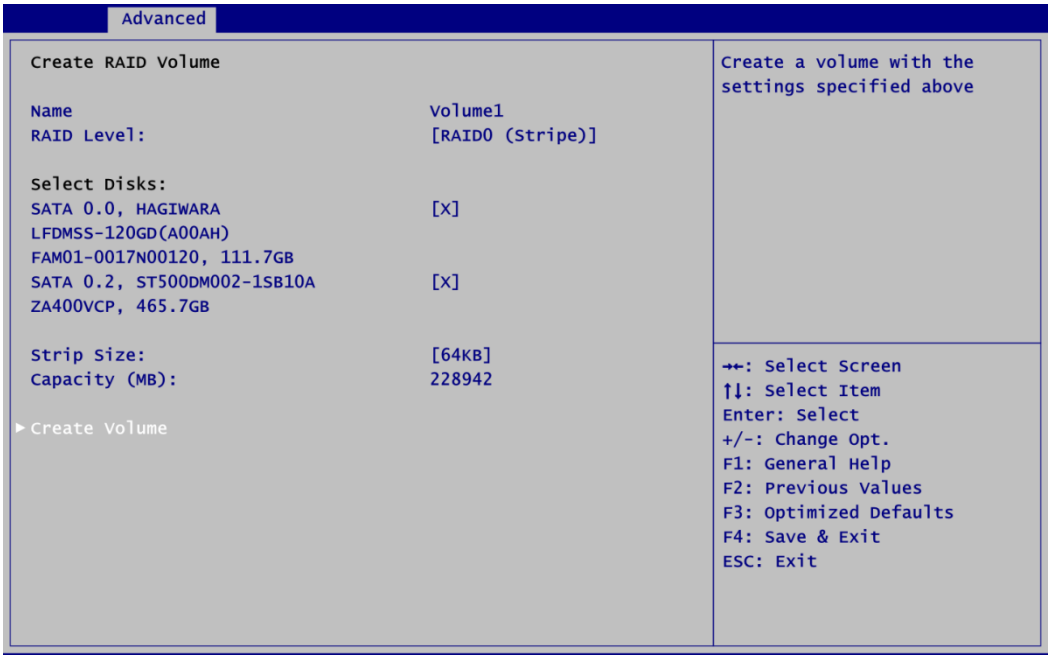
3.4. Set the stripe block size. The KB is the standard unit of stripe block size. The stripe block size can be 4KB to 128KB.



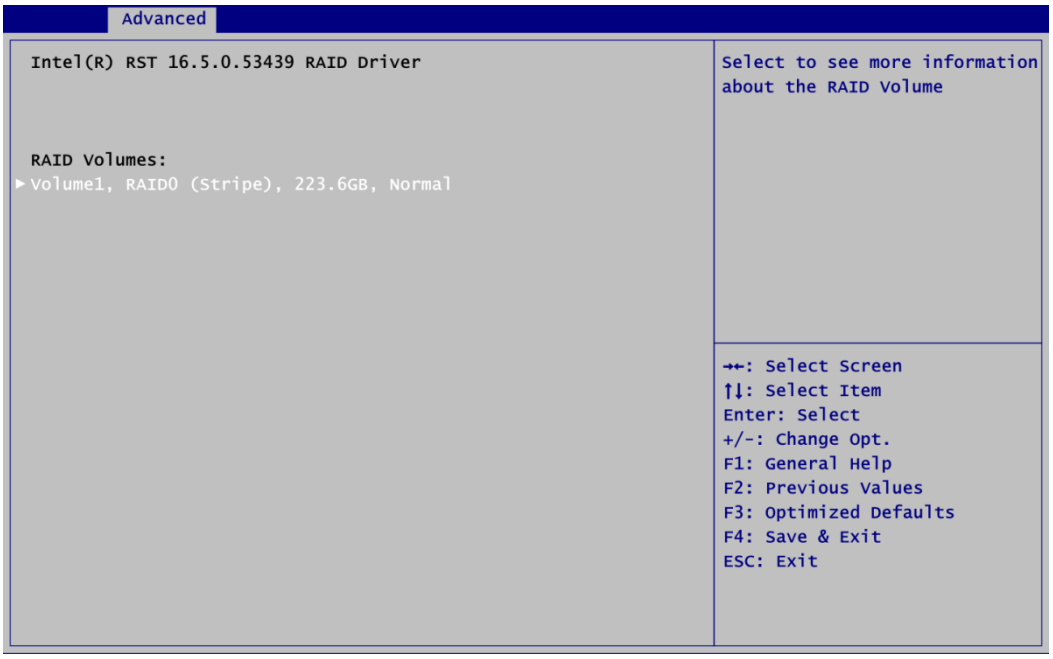
3.5. After the setting, proceed to next step for the array capacity setting.



3.6. After setting all the items on the screen, select Create Volume to start creating the RAID array.

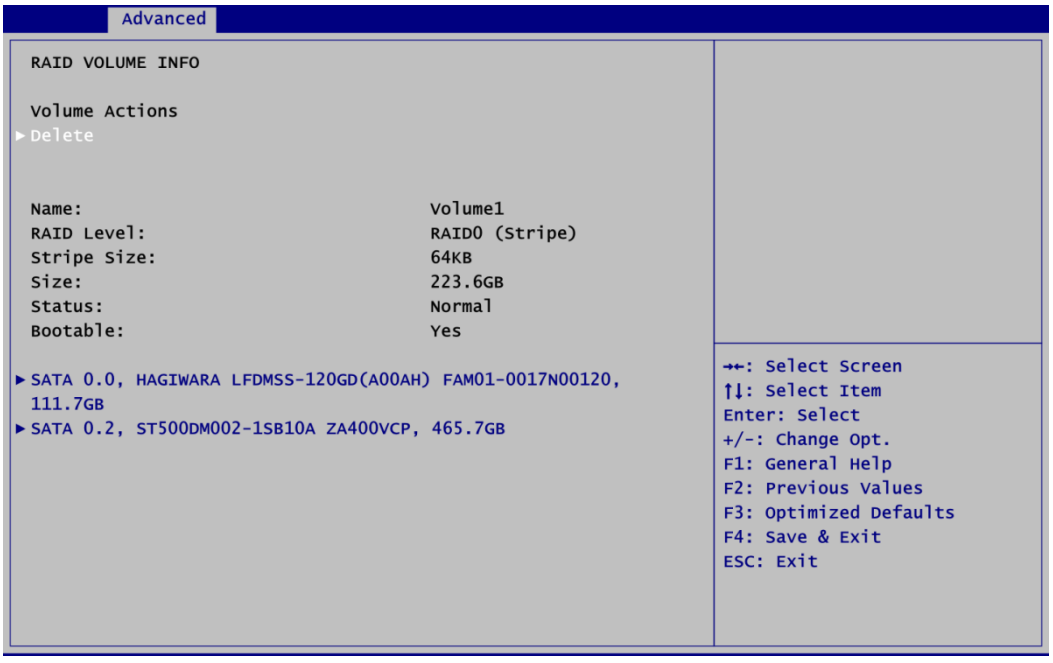


After the creation is completed, you can see detailed information about the RAID Array in the following screen, including disk name, RAID level, disk block size and disk capacity, etc.



Delete RAID volume

If you want to delete a RAID volume, select the Delete option and follow on-screen instructions.



Save and exit the BIOS Setup. Now, you can proceed to install a SATA driver controller and the operating system.

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Appendix D
iAMT Settings

Utilizing built-in platform capabilities and popular third-party management and security applications, the Intel® Active Management Technology (Intel® iAMT) has significantly lowered a major barrier to IT management efficiency, helping IT professionals discover, repair and better protect their networked computing assets.

In order to utilize Intel® iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select “Intel® iAMT” as the manageability feature.

D.1 Entering MEBx

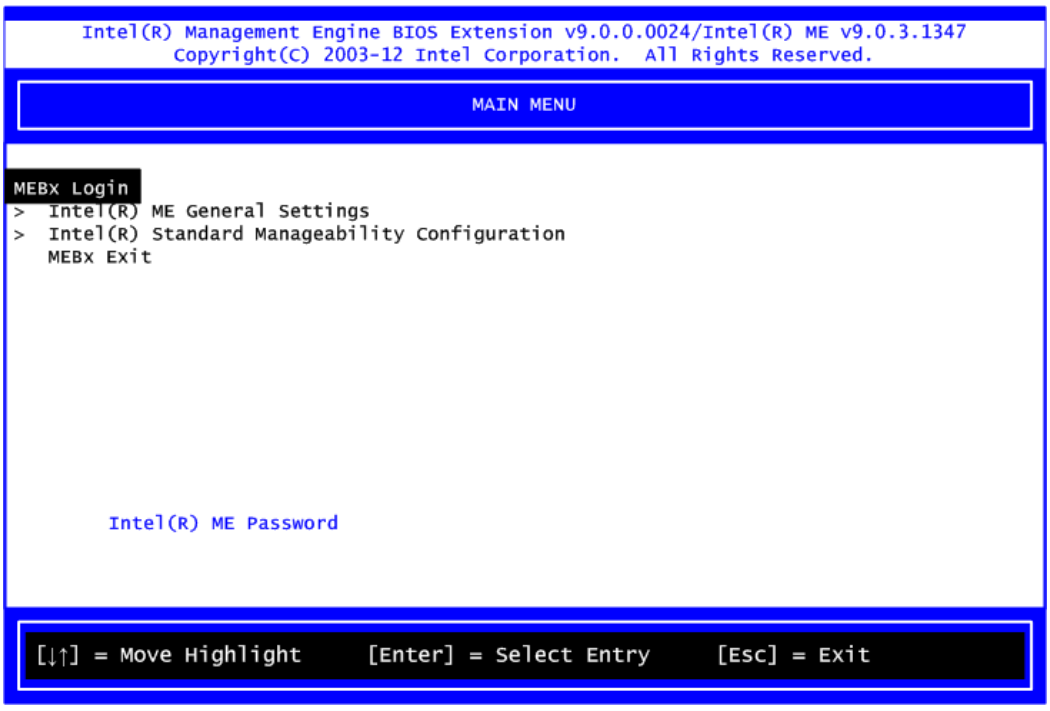
1. You must go to BIOS to enable iAMT function.
2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.

Note

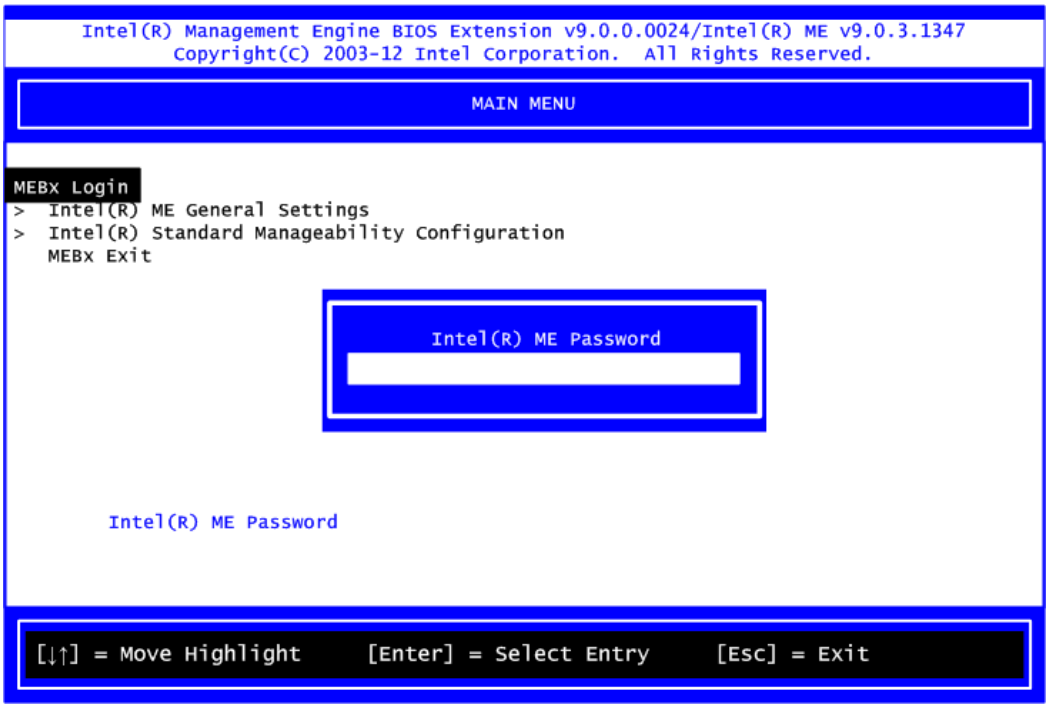
It is advised to press <Ctrl + P> before the screen pops out.

D.2 Set and Change Password

1. You will be asked to set a password when first logging in. The default password is “admin”.



2. You will be asked to change the password before setting ME.



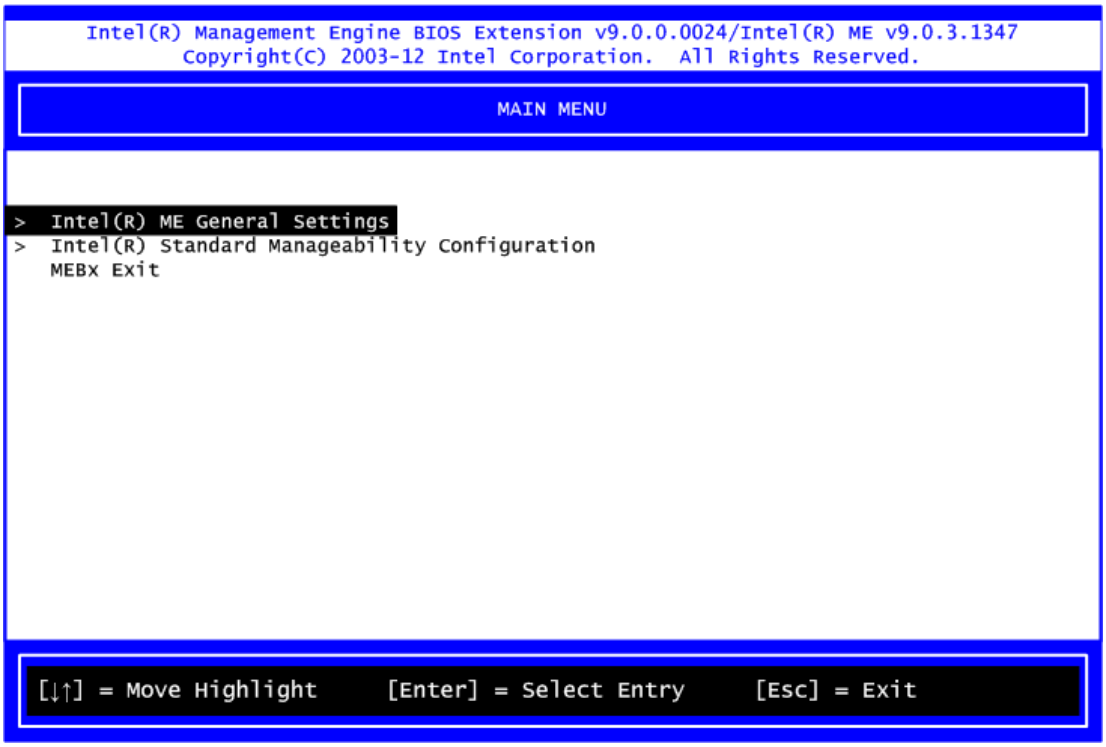
3. You must confirm your new password while revising. The new password must consist of eight characters, including at least:

   - One upper case
   - One lower case
   - One number
   - One special symbol, such as ! 、 $ or ; 、 (、 " , excepted)

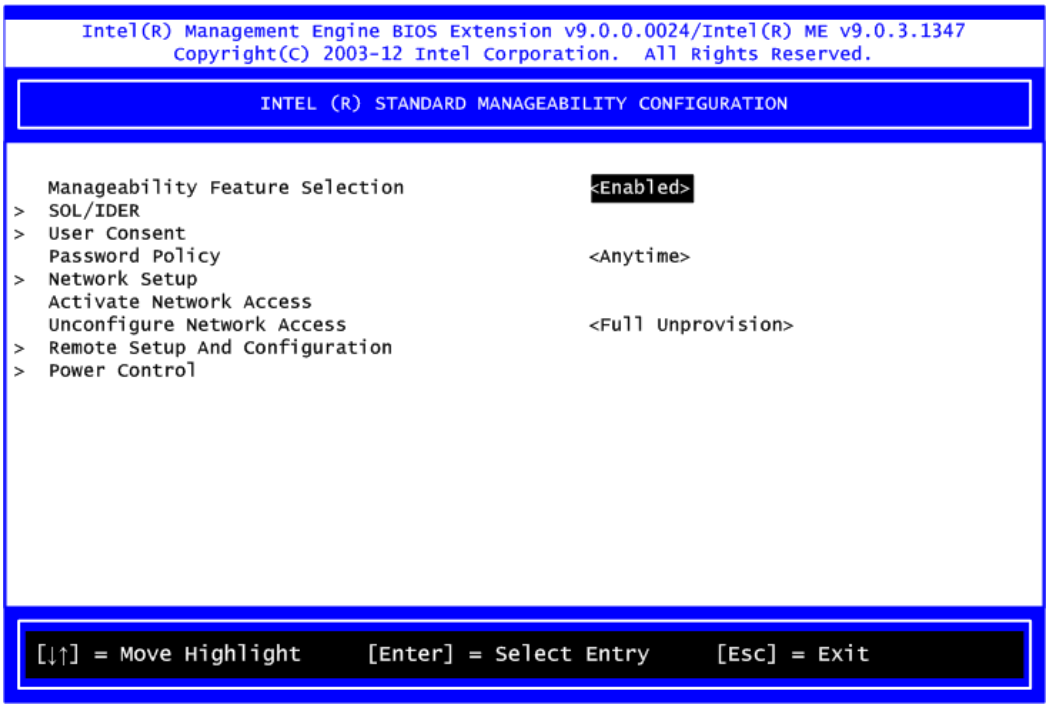
   The default value demonstrates an example of a valid password: **!!11qqQQ**
   Underline (_) and space are valid characters for password, but they won't make higher complexity.

D.3 iAMT Settings

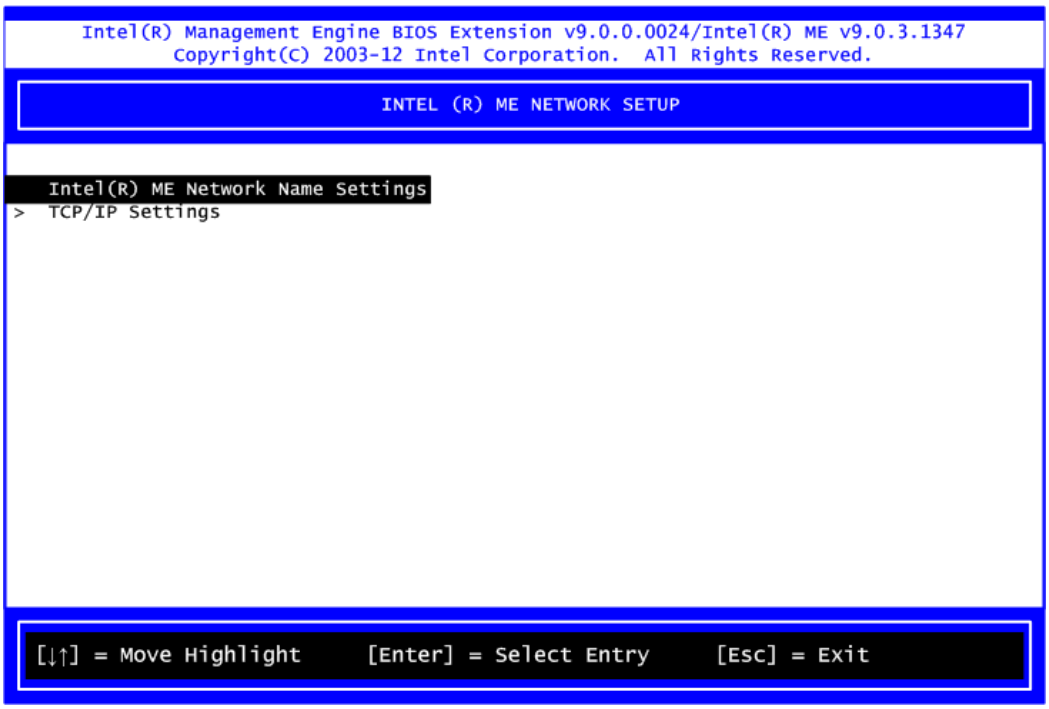
Select Intel® iAMT configuration and press <Enter>.

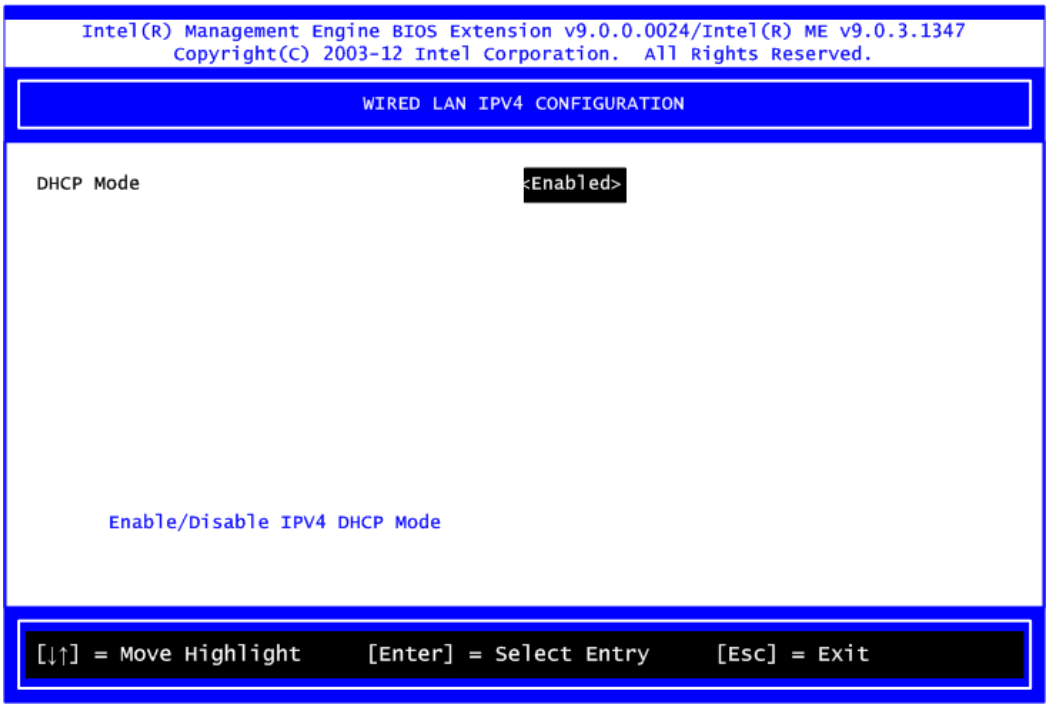


1. Select Network Setup to configure iAMT.



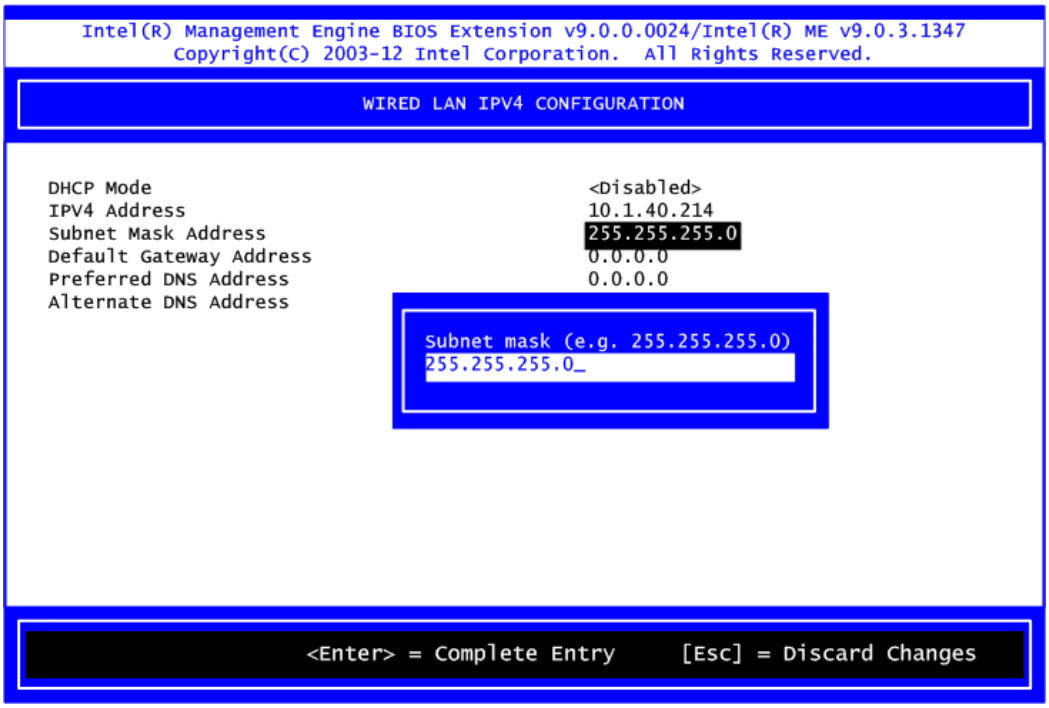
2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.



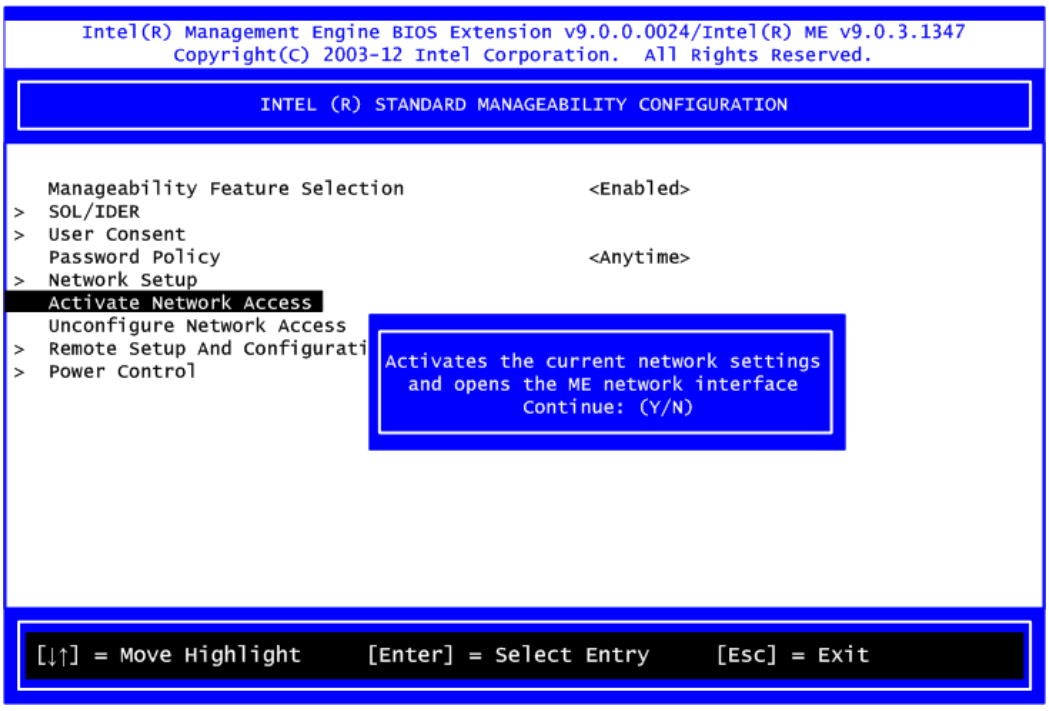


3. If DHCP Mode is disabled, set the following settings:

   - IP address
   - Subnet mask



4. Go back to Intel® iAMT Configuration, then select Activate Network Access and press <Enter>.

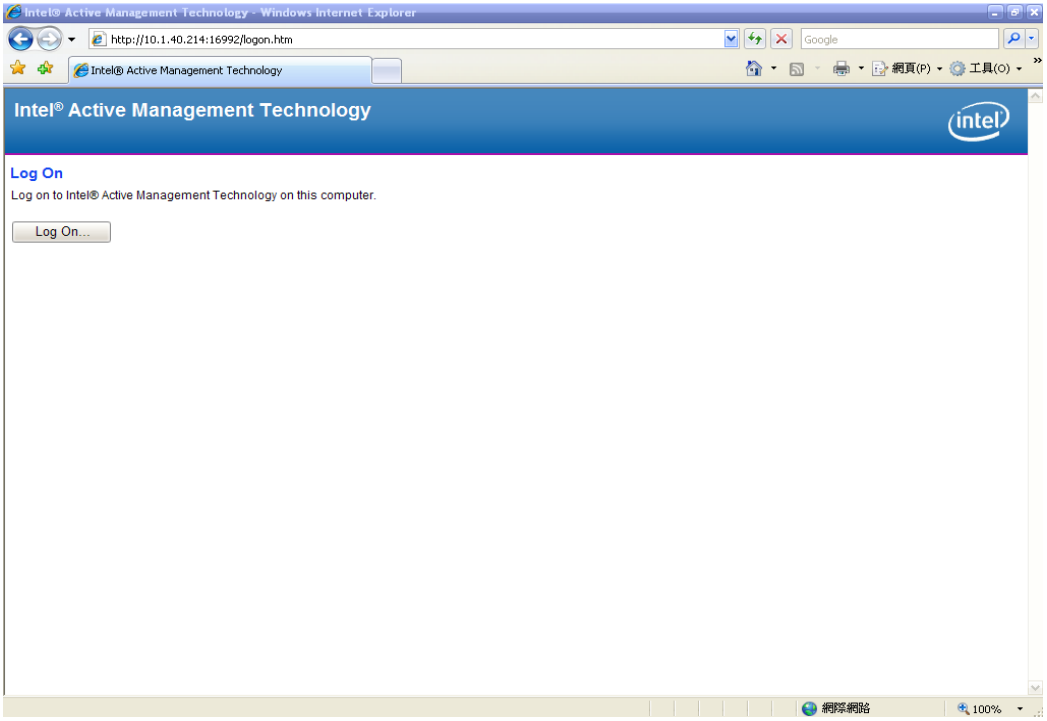


5. Exit from MEBx after completing the iAMT settings.

D.4 iAMT Web Console

1. On a web browser, type http://(IP ADDRESS):16992, which connects to iAMT Web.

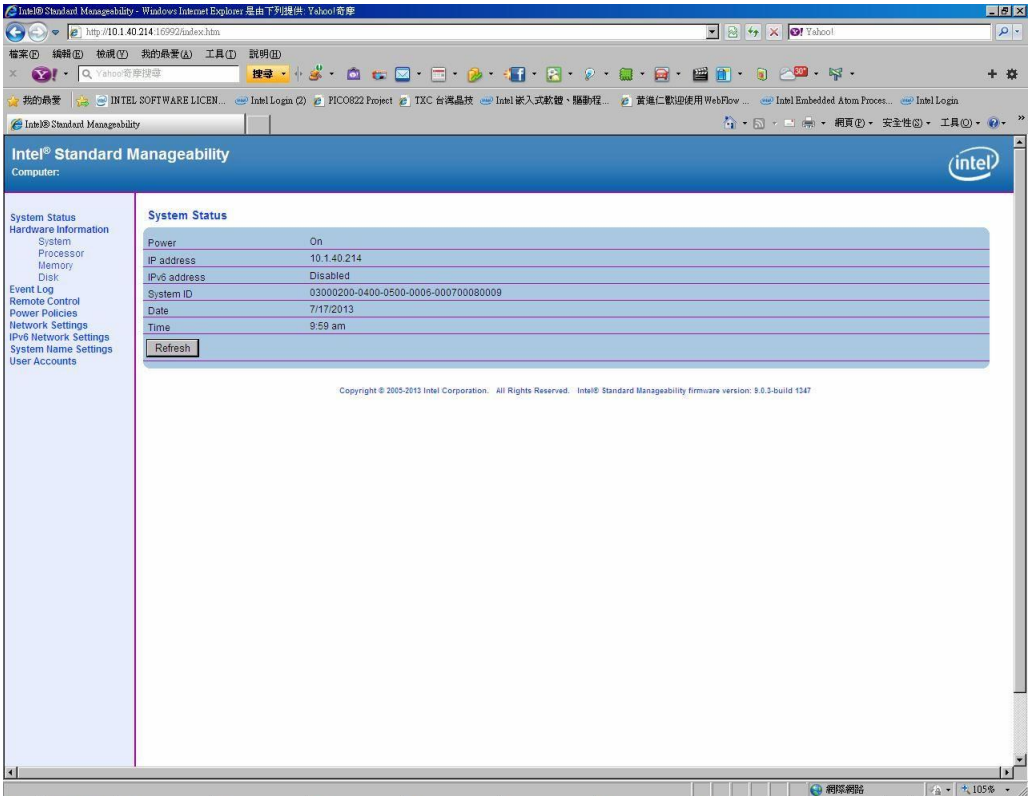
   Example: http://10.1.40.214:16992



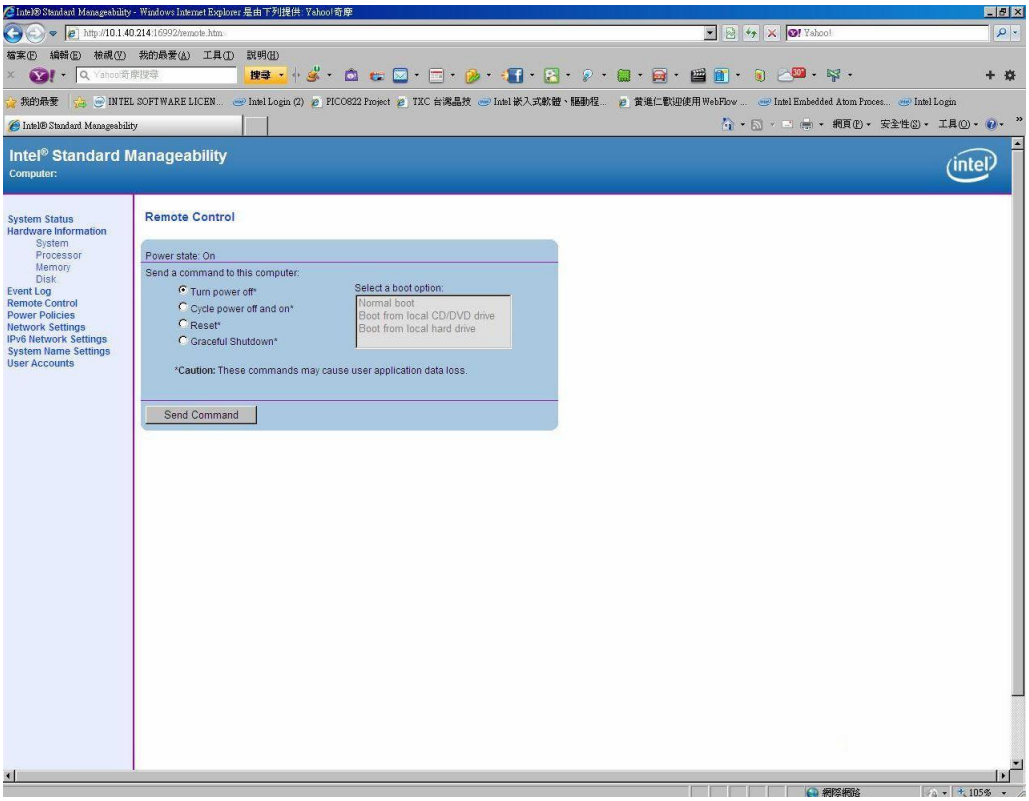
2. To log on, you will be required to type in username and password for access to the Web.

   USER: admin (default value)
   PASS: (MEBx password)

3. Enter the iAMT Web.



4. Click Remote Control, and select commands on the right side.



5. When you have finished using the iAMT Web console, close the Web browser.

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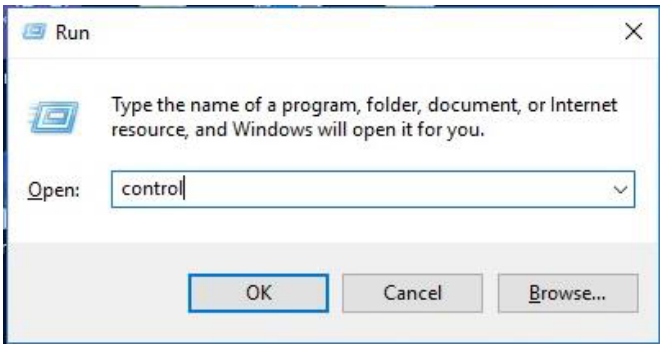
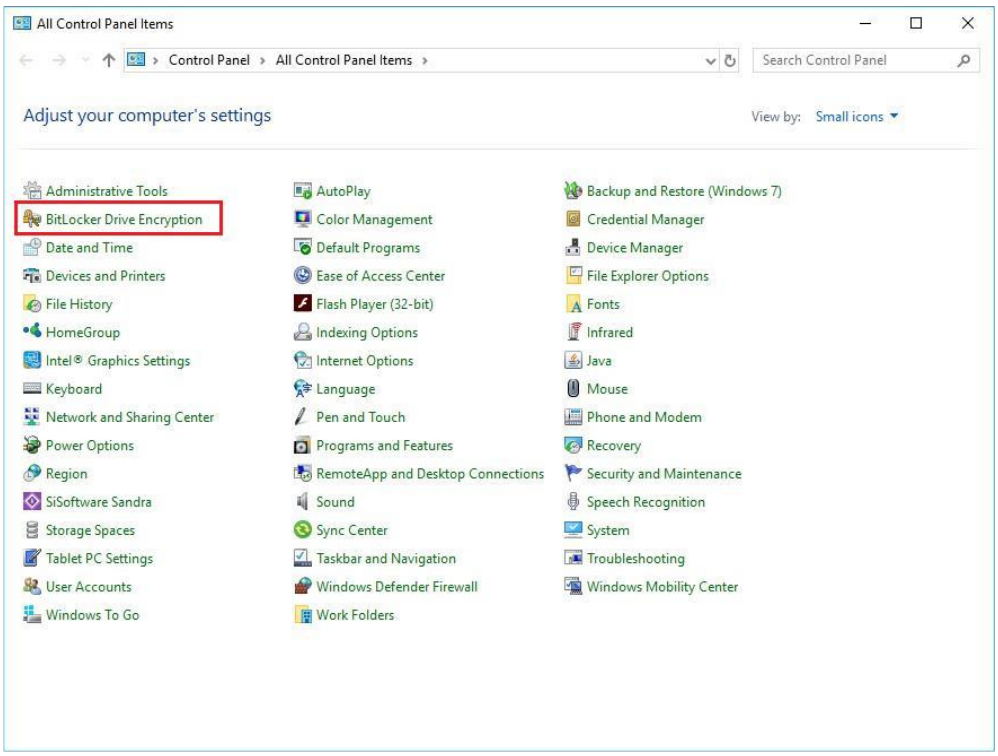
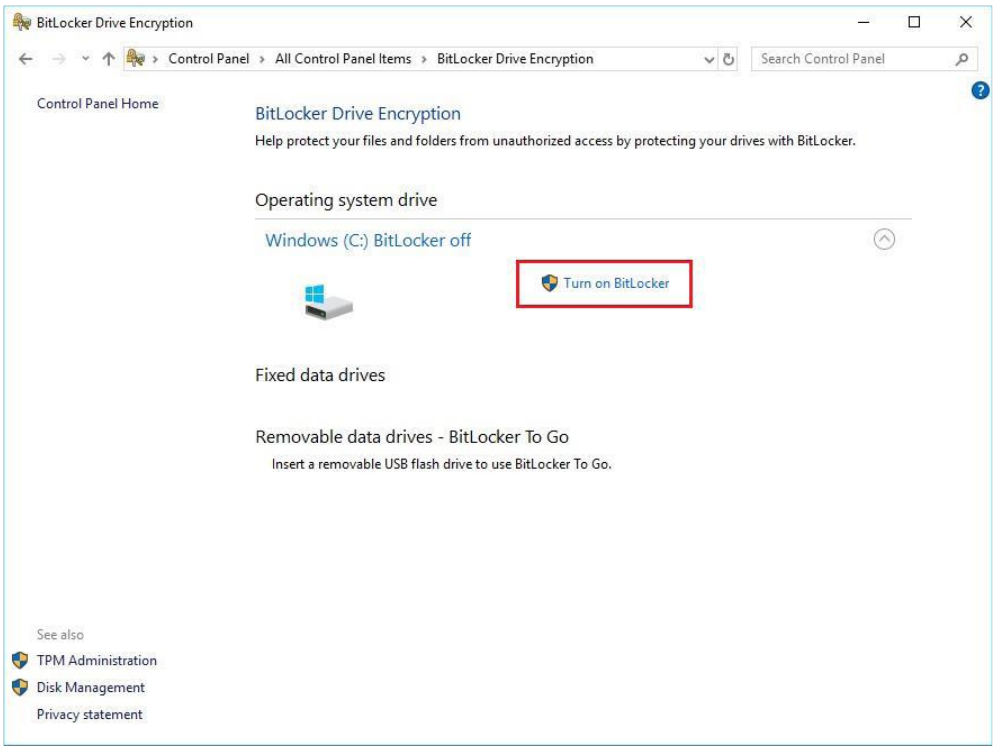
Appendix E
TPM Settings

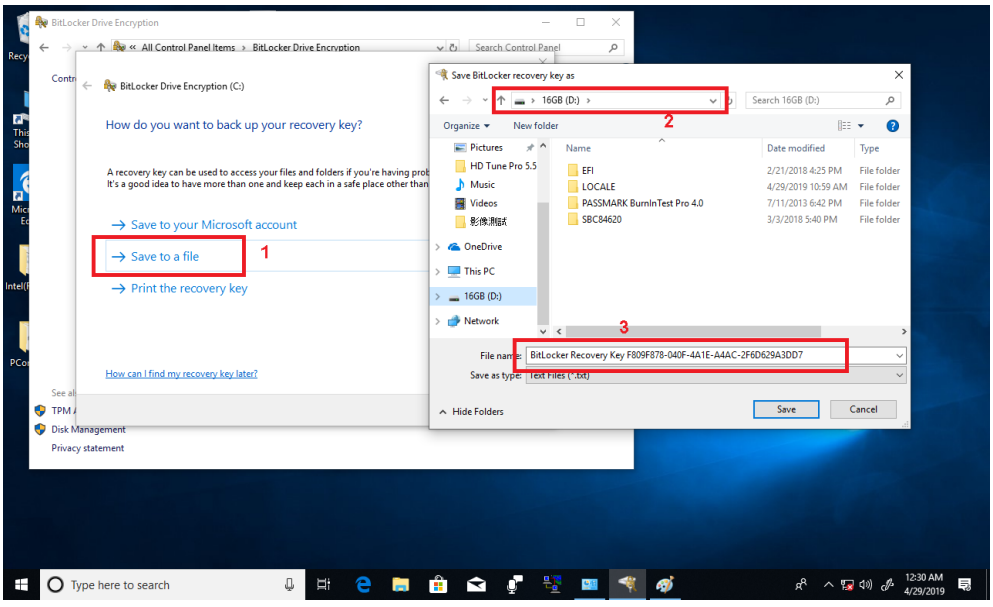
1. Setup BitLocker Drive Encryption main storage. Press <Win + R> and type “Control Panel”, then select BitLocker Drive Encryption.



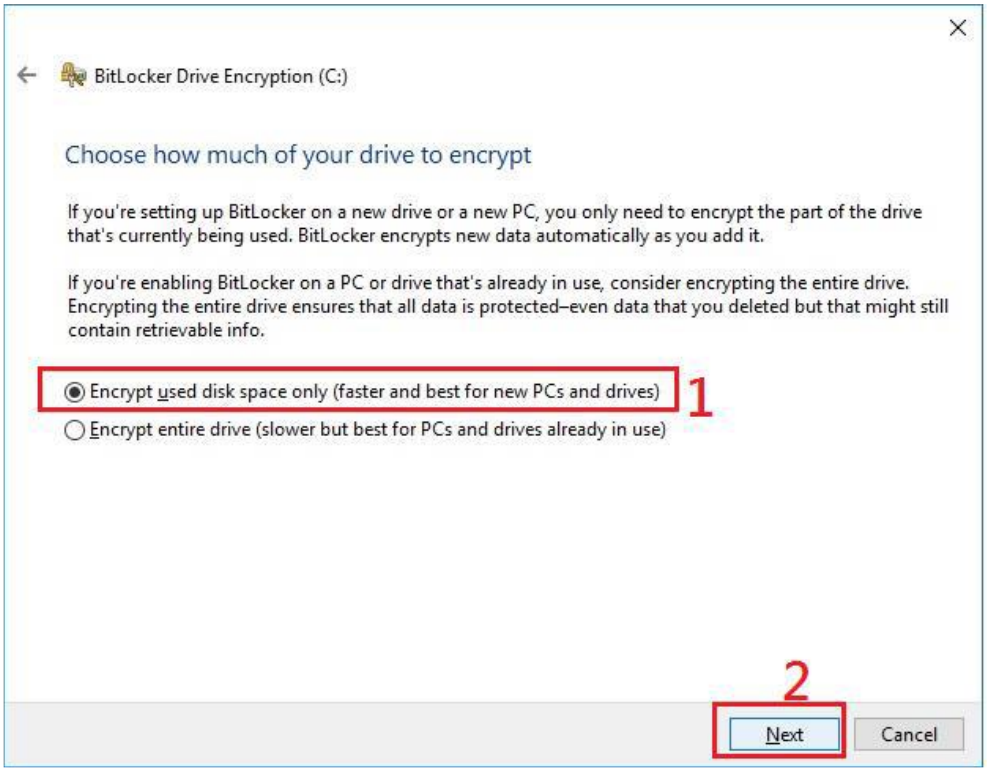


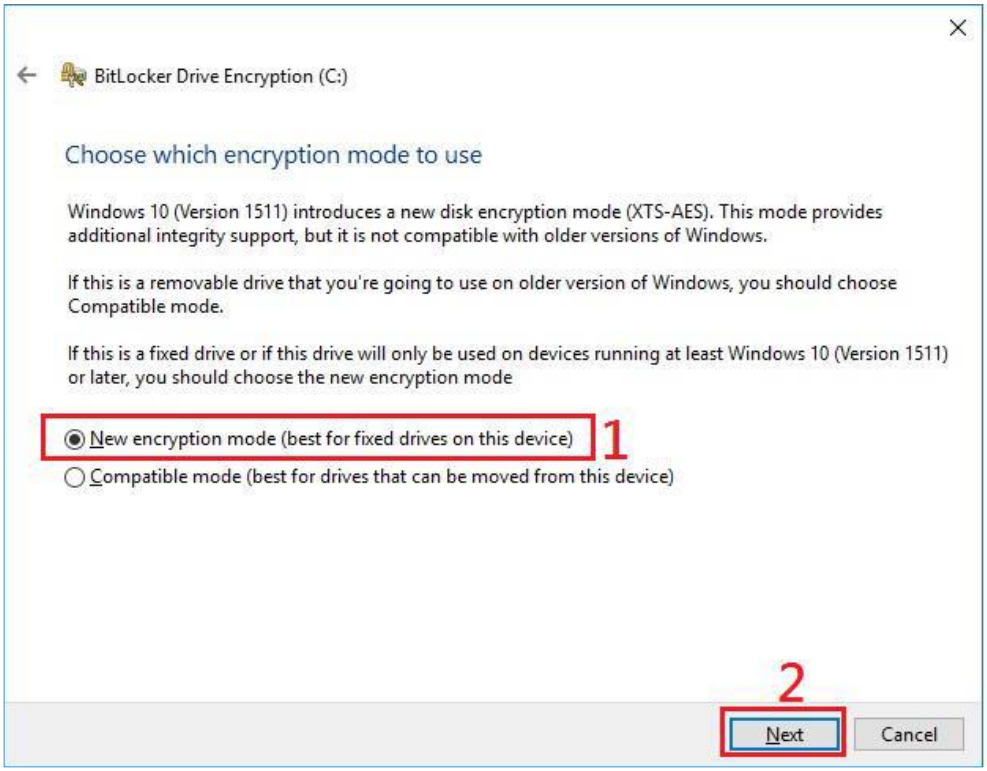


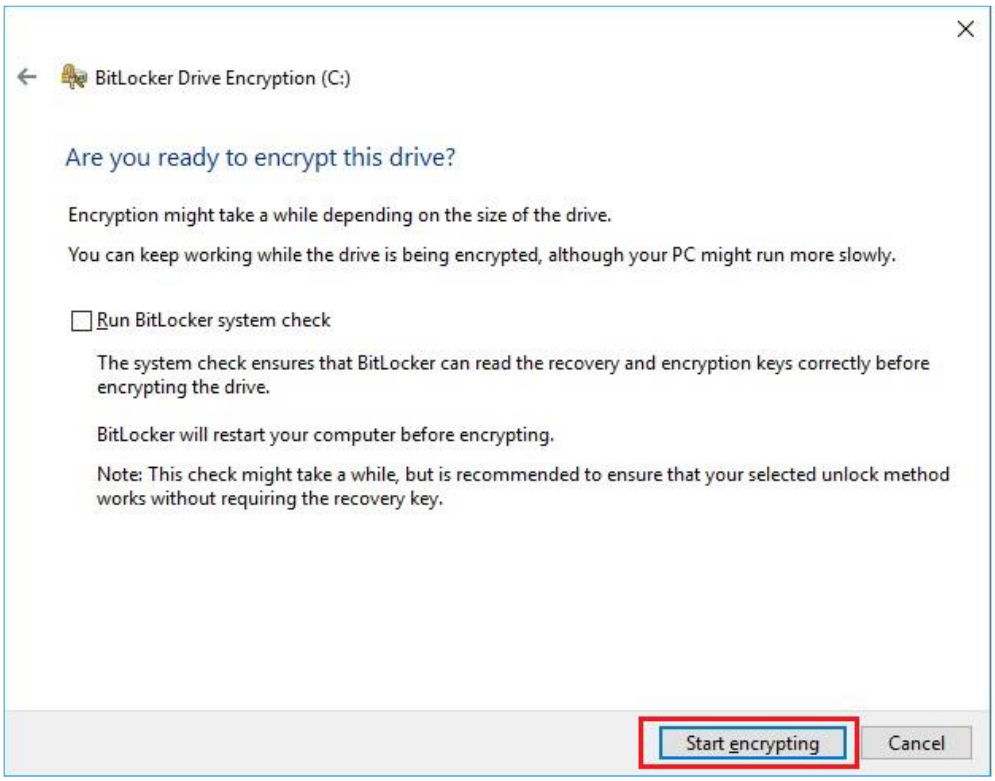
2. Insert an external storage device, for example USB Storage. Back up BitLocker recovery key in a new file and save it to the USB Storage.



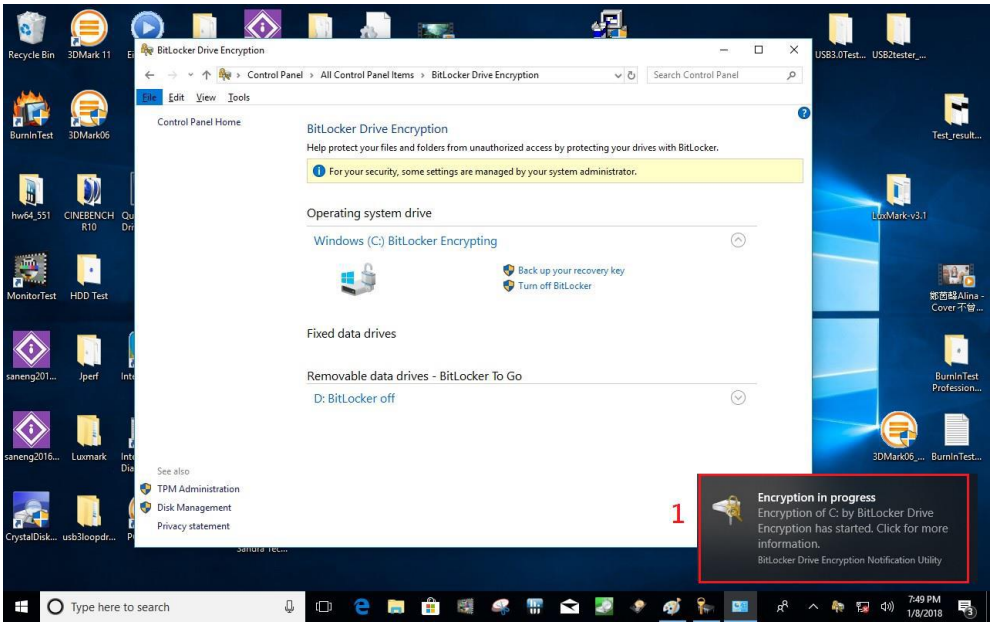
3. Please follow the steps below to encrypt your storage device:



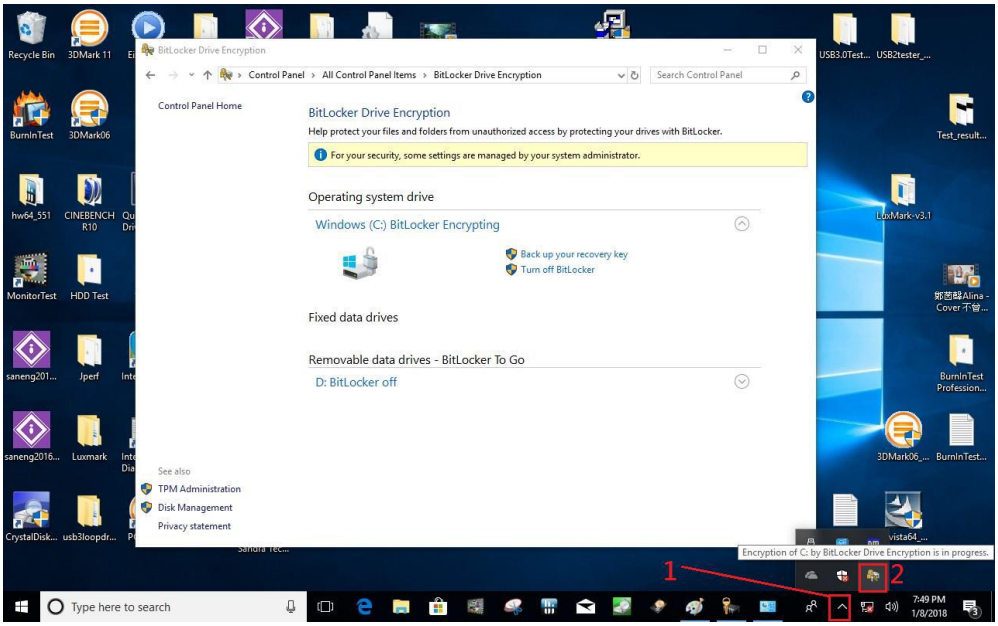


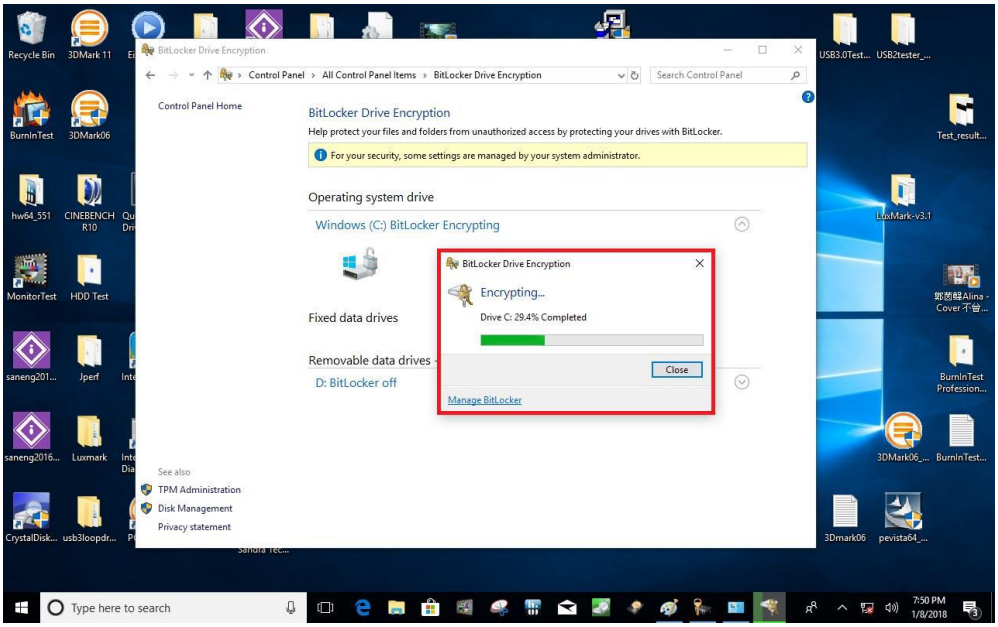


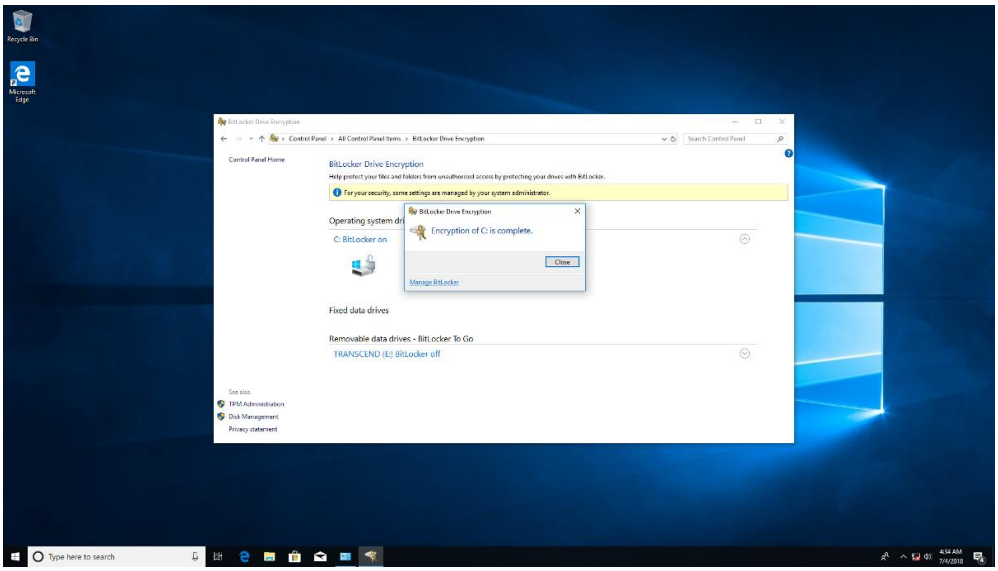
Now, the system prompts that the operating system drive encryption is in progress, and the encryption progress is checked.



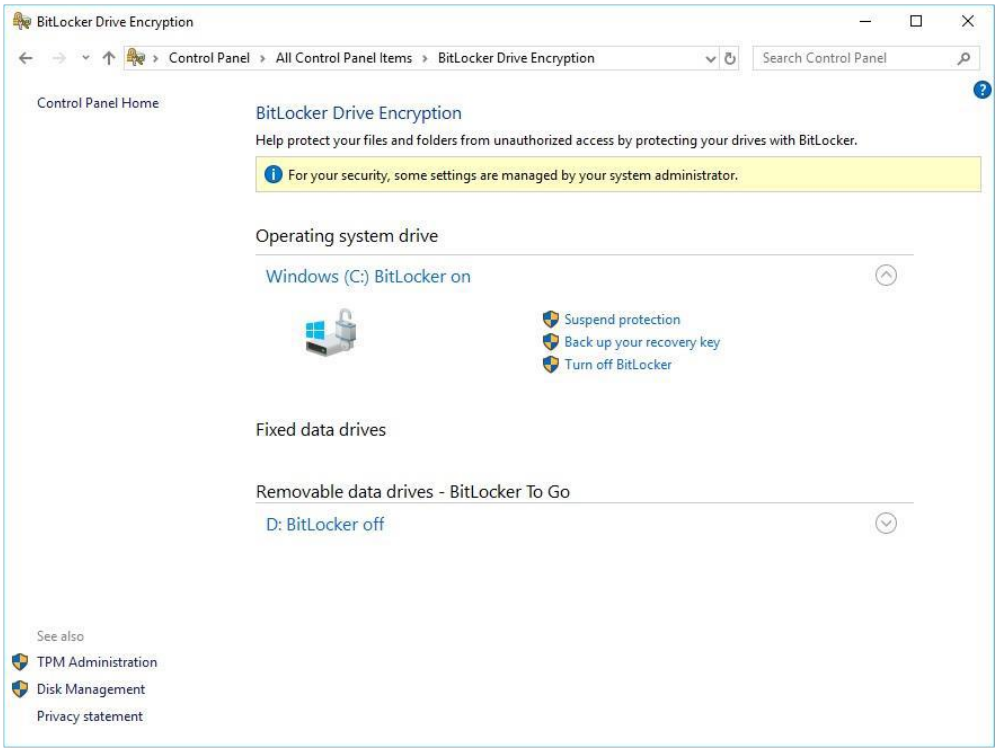
Select and click the icon in the lower right corner to complete the encryption.



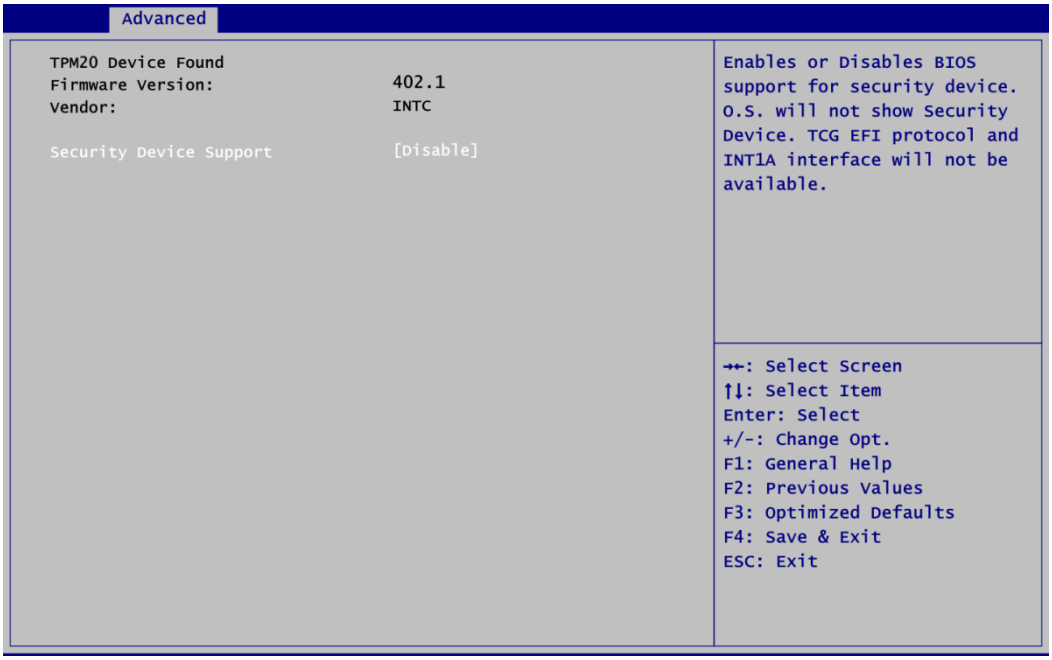




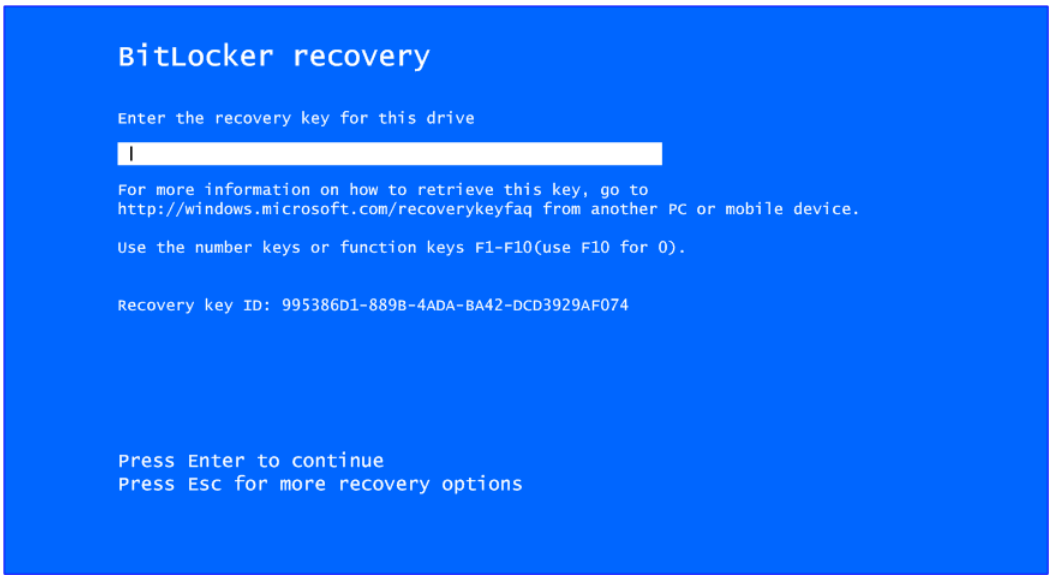
4. Confirm the completion of encryption.



5. Disable TPM function in BIOS Setup Utility.



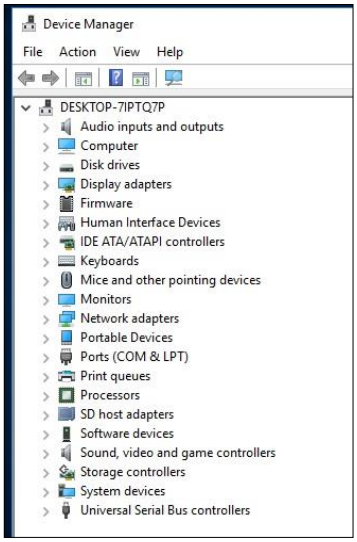
6. When the system is powered on and you see the following screen, it means the TPM module function is working fine. Note that BitLocker cannot be executed if your system does not have TPM function.



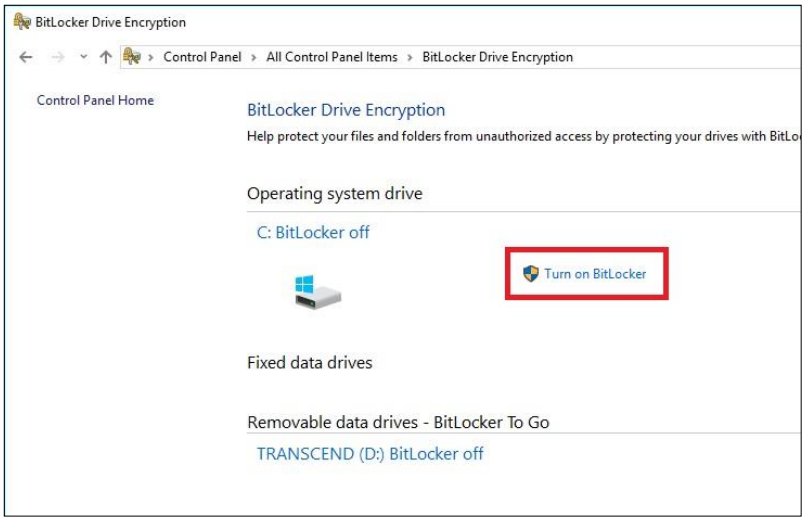
System with no TPM function support is as below:

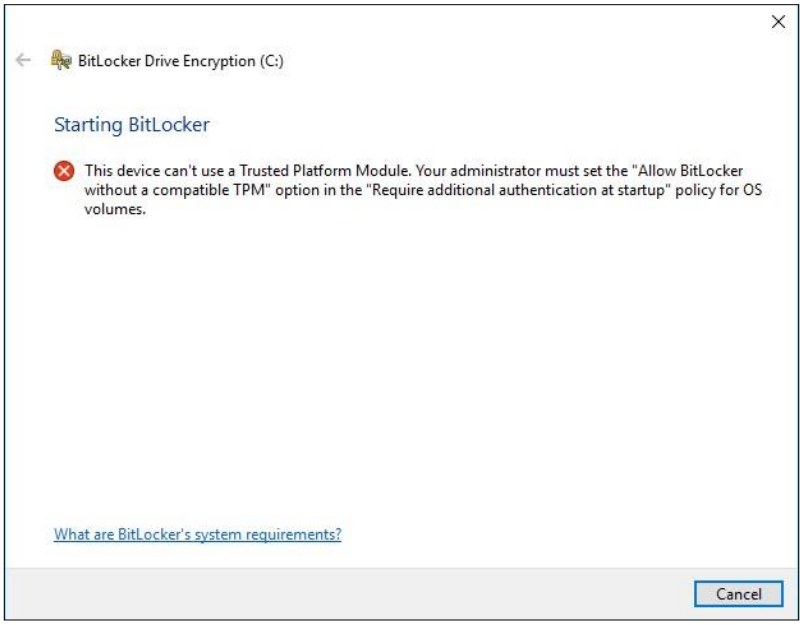
Note

1. ***TPM information is not found in Device Manager.***



2. ***When trying to turn on Bitlocker, the following error message shows up.***




BitLocker Drive Encryption (C:)
Starting BitLocker
This device can't use a Trusted Platform Module. Your administrator must set the "Allow BitLocker without a compatible TPM" option in the "Require additional authentication at startup" policy for OS volumes.
What are BitLocker's system requirements?
Cancel