AXIOMTEK

SHB150 Series

Intel® Socket 1151 Core™ i7/ i5/ i3 Processors PICMG® v1.3 Full-size CPU Card

User's Manual

RoHS

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CAUTION

Wrong type of batteries may cause explosion. It is recommended that users only replace with the same or equivalent type of batteries as suggested by the manufacturer once properly disposing of any 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. Doing so can discharge static electricity from your body.
- Wear a grounding wrist strap, available from most electronic component stores, when handling boards and components.

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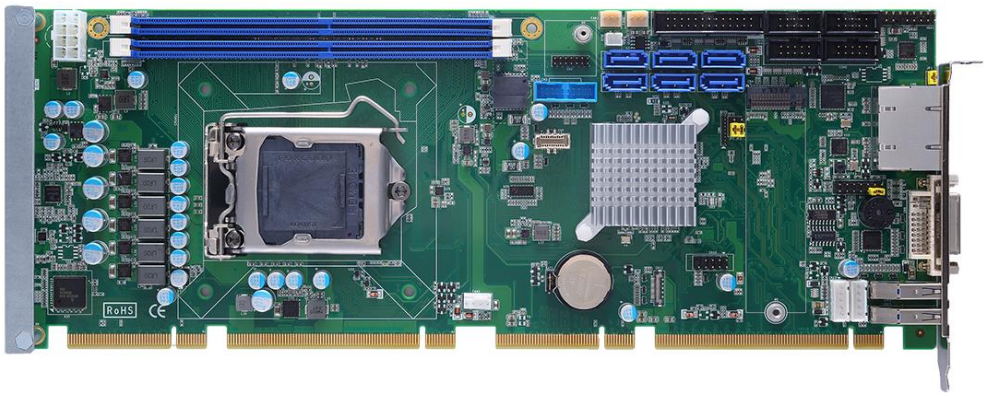
Chapter 1
Introduction



The SHB150 PICMG® v1.3 full-size Single Board Computer supports an LGA1151 socket for Intel® Core™ i7/ i5/ i3 desktop processors with 14nm technology and transfer rate 2400/ 2666 MHz. The board integrates an Intel® Q370/H310/C246 chipset that delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions. There are two 288-pin DDR4 DIMM sockets for dual channel DDR4 2400/ 2666MHz with maximum memory capacity up to 32GB. The board also features dual Gigabit Ethernet, SATA 6Gbps with SATA RAID 0/1/5/10(Q370/C246) by PCH, USB 2.0, and USB 3.1 (Gen1/Gen2) high speed compliant ports and built-in Intel® HD Audio Digital Header to achieve the best stability and reliability for industrial applications.

1.1 Features

- LGA1151 socket 8th Generation Intel® Core™ processors up to 95W
- Intel® Q370/H310/C246 PCH
- 2 DDR4 unbuffered DIMM max. up to 32GB memory capacity
- Intel® iAMT (Q370/C246 PCH) and TPM2.0 module supported (optional)
- PCIe Gen. 3 at 8GT/s supported
- USB 3.1 (Gen2) supported (Q370/C246 PCH)

1.2 Specifications

- **CPU**
  - LGA1151 socket 8th Generation Intel® Core™ i7/i5/i3, Pentium® and Celeron® processors (Coffeelake) up to 95W

- **System Chipset**
  - Intel® Q370
  - Intel® H310
  - Intel® C246

- **CPU Socket**
  - LGA1151 socket

- **DRAM Transfer Rate**
  - 2400/ 2666 MHz

- **BIOS**
  - AMI BIOS via SPI interface with socket

- **System Memory**
  - Two 288-pin DDR4 2400/ 2666MHz DIMM sockets
  - Maximum up to 32GB DDR4 memory
  - Supports the memory with ECC function (C246 PCH)

- **L1, L2, L3 Cache: Integrated in CPU**

- **Onboard Multi I/O**
  - Serial ports: two RS-232/422/485 port in 2x5-pin (pitch=2.54mm) box-header (COM 1/2) and two RS-232 ports in 2x5-pin (pitch=2.54mm) box-header (COM 3/4)
  - Parallel Port: one 26-pin 2.54-pitch box-header; SPP/EPP/ECP supported

- **USB Interface**

  Q370
  - Two USB3.1 (Gen2) ports on internal box header
  - Two USB3.1 (Gen1) ports on rear I/O
  - Two USB3.1 (Gen1) ports on internal box header
  - Two USB2.0 ports on internal pin header
  - Four USB2.0 ports on SHB connector-C golden fingers

  H310
  - Two USB3.1 (Gen1) ports on rear I/O
  - Two USB3.1 (Gen1) ports on internal box header
  - Two USB2.0 ports on internal pin header
  - Four USB2.0 ports on SHB connector-C golden fingers

  C246
  - Two USB3.1 (Gen2) ports on internal box header
  - Two USB3.1 (Gen1) ports on rear I/O
  - Two USB3.1 (Gen1) ports on internal box header
  - Two USB2.0 ports on internal pin header
  - Four USB2.0 ports on SHB connector-C golden fingers

- **Onboard Graphics**
  - Integrated Intel® HD graphics supporting DVI-I
  - DVI/VGA: Max. resolution is 1920x1200.
  - Internal DP1.4 Connector: Max resolution is 4096 x 2304. Must use with Axiomtek DP kit.

- **Ethernet**
  - LAN1/LAN2: Intel® i219LM with iAMT / Intel® i211AT Ethernet controller
  - Support 1000/100/10Mbps Gigabit/Fast Ethernet

- **Storage**
  - Serial ATA:
    Six SATA 3.0 ports (6Gbps performance) with SATA RAID 0/1/5/10 (Q370/C246)
    Four SATA 3.0 ports (6Gbps performance) (H310)
  - One M.2 2280 Key M (Only for Q370, C246 version)

- **Audio**
  - Supports HD audio interface as a 2x8 pin header
  - Supports audio kit AX93242 with MIC-in/Line-in/speaker-out (option kit)

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

- **Hardware Monitoring**
  - Monitoring temperatures, voltages and cooling fan status

- **Dimensions**
  - 338mm x 126mm

- **Expansion Interface**
  - One PCI-Express x16 (Gen.3)
  - One PCI-Express x4 (or four PCI-Express x1) (Gen.3)
  - Four PCI

Note ***All specifications and images are subject to change without notice.***

1.3 Packing list

- 1 x slot CPU card
- 1 x Driver DVD
- 1 x SATA cable
- 1 x COM cable

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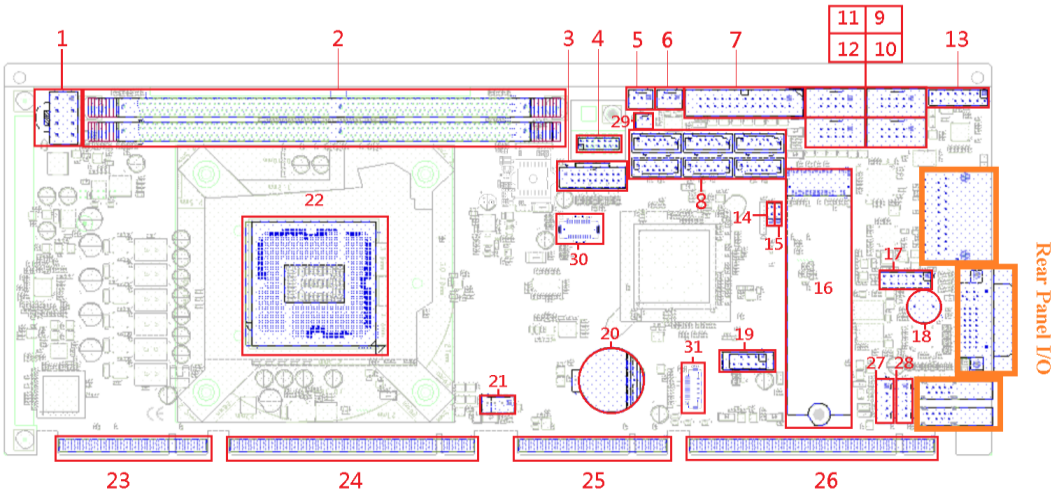
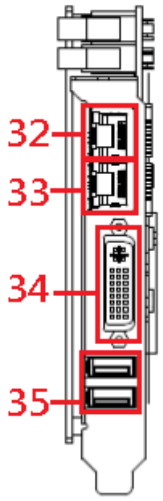
Chapter 2
Board and Pin Assignments

2.1 Board Layout

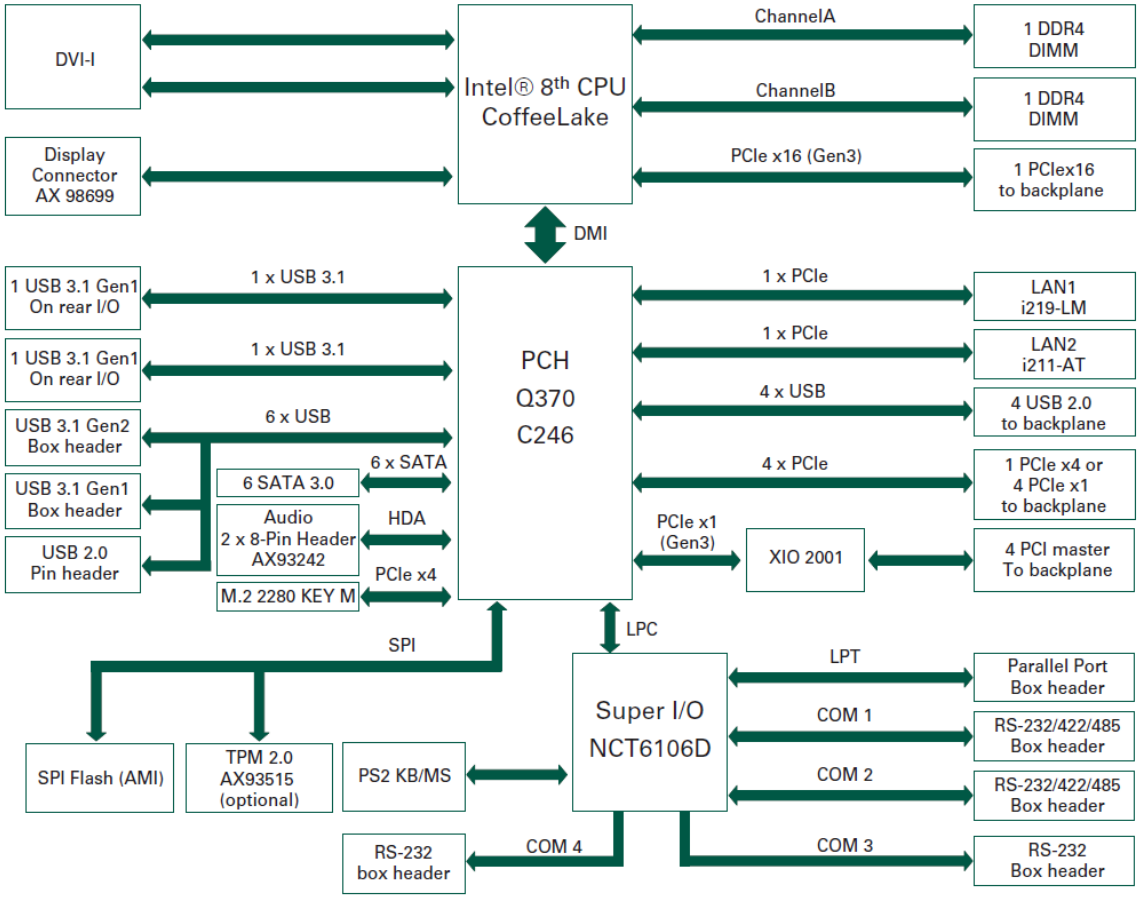


Top View

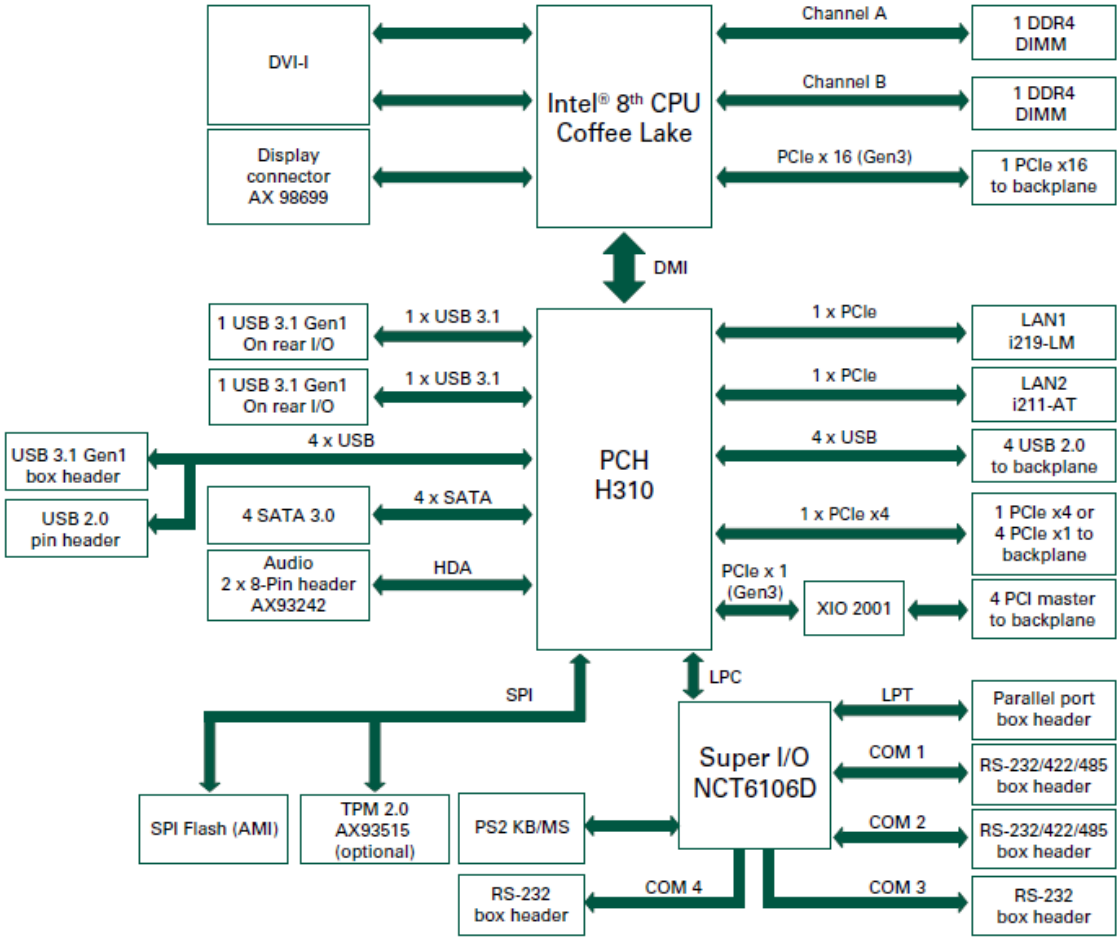


Rear Panel I/O

2.2 Block Diagram



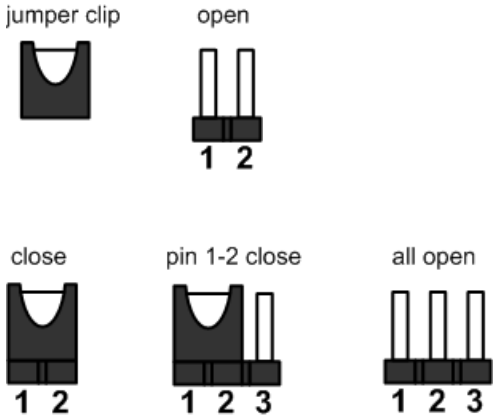
Q370/C246


DVI-I
Display connector AX 98699
Intel® 8th CPU Coffee Lake
Channel A
Channel B
PCIe x 16 (Gen3)
1 DDR4 DIMM
1 DDR4 DIMM
1 PCIe x16 to backplane
DMI
1 USB 3.1 Gen1 On rear I/O
1 USB 3.1 Gen1 On rear I/O
1 x USB 3.1
1 x USB 3.1
4 x USB
USB 3.1 Gen1 box header
USB 2.0 pin header
4 SATA 3.0
4 x SATA
Audio 2 x 8-Pin header AX93242
HDA
PCH H310
1 x PCIe
1 x PCIe
4 x USB
1 x PCIe x4
PCIe x 1 (Gen3)
XIO 2001
LAN1 i219-LM
LAN2 i211-AT
4 USB 2.0 to backplane
1 PCIe x4 or 4 PCIe x1 to backplane
4 PCI master to backplane
SPI
LPC
SPI Flash (AMI)
TPM 2.0 AX93515 (optional)
PS2 KB/MS
RS-232 box header
Super I/O NCT6106D
LPT
COM 1
COM 2
COM 3
COM 4
Parallel port box header
RS-232/422/485 box header
RS-232/422/485 box header
RS-232 box header

H310

2.3 Jumper Settings

A jumper is a small component consisting of a jumper clip and jumper pins. Install a jumper clip on two jumper pins to close a jumper. Remove the jumper clip from two jumper pins to open a jumper. The following illustration shows how to set up a jumper.



Before applying power to the SHB150 series, please make sure all of the jumpers are in factory default position. Below you can find a summary table and onboard default settings.

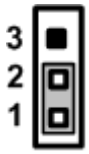
Note ***Turn off power before changing any default jumper settings.***

Jumper	Description	Setting
JP3	Auto Power On Default: Enable	1-2 Close
JP2	Restore BIOS Optimal Defaults Default: Normal Operation	1-2 Close

2.3.1 Auto Power On (JP3)

If JP3 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP3 is disabled for power input, it is necessary to manually press soft power button to power on the system.

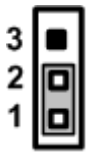
Function	Setting
Enable auto power on (Default)	1-2 close
Disable auto power on	2-3 close



2.3.2 Restore BIOS Optimal Defaults (JP2)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal operation (Default)	1-2 close
Restore BIOS optimal defaults	2-3 close



2.4 Connectors

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

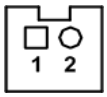
Jumpers/Headers/Connectors			
1	ATX Power Connector (ATX1)	17	Front Panel Connector (CN8)
2	DDR4 Socket (DIMM1.DIMM2)	18	Buzzer (BZ1)
3	Internal USB 3.1 Gen1 Connector (CN3)	19	Internal USB2.0 Headers (CN10)
4	TPM Pin Header (CN2)	20	RTC Battery Socket (BAT1)
5	FAN Connectors (FAN1)	21	FAN Connectors (FAN3)
6	FAN Connectors (FAN2)	22	8th Intel® Coffee Lake LGA 1151 socket
7	Parallel Port Connector (PRINT1)	23	PICMG_1.3 Gold Finger
8	SATA 3.0 Connectors (SATA1~SATA6)	24	PICMG_1.3 Gold Finger
9	COM Connectors (COM1)	25	PICMG_1.3 Gold Finger
10	COM Connectors (COM2)	26	PICMG_1.3 Gold Finger
11	COM Connectors (COM3)	27	Internal PS/2 Mouse Connectors (CN13)
12	COM Connectors (COM4)	28	Internal PS/2 Keyboard Connectors (CN14)
13	Intel® HD Audio Digital Header (HDA1)	29	Temperature Sensor Connector (CN1)
14	Restore BIOS Optimal Defaults (JP2)	30	Internal USB 3.1 Gen2 Connector (CN7)
15	Auto Power On (JP3)	31	Display Port 1.4 Connector (CN11)
16	M.2 2280 Key M NVMe SSD (CN4)		

Rear I/O Jumpers/Headers/Connectors			
32	Ethernet Ports (CN5)	34	DVI-I Connector (CN9)
32	Ethernet Ports (CN5)	35	Rear I/O l USB 3.1 Gen1 Connectors (CN12 and CN15)

2.4.1 Temperature Sensor Connector (CN1) (Optional)

This is a 2-pin connector for temperature sensor (NTC thermistor) interface. The thermistor value should be 10K and its B value is 3435K.

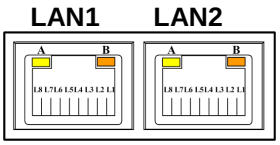
Pin	Signal
1	Sensor Input
2	GND



2.4.2 Ethernet Ports (CN5)

The board has two RJ-45 connectors: LAN1 (i219LM) and LAN2 (i211AT). Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10 Base-T hub.

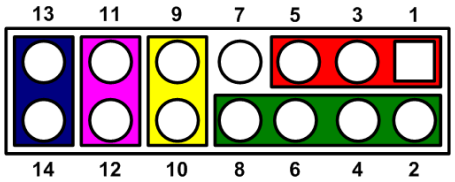
Pin	1000 Base-T	100/10 Base-T	Description
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
A	Speed LED 1000: Orange 100/10: OFF/Green		
B	Active Link LED (Yellow) Off: No link Blinking: Data activity detected		



2.4.3 Front Panel Connector (CN8)

This is a front panel header (7x2-pin p=2.54mm).

Pin	Signal
1	PWRLED+
2	EXT SPK-
3	GND
4	Buzzer
5	PWRLED-
6	N.C.
7	N.C.
8	EXT SPK+
9	PWRSW-
10	PWRSW+
11	HW RST-
12	HW RST+
13	HDDLED-
14	HDDLED+



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. Pin 3 is defined as GND.

External Speaker and Internal Buzzer

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU 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 a front panel to the CPU 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.

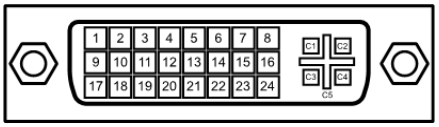
HDD Activity LED

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(+).

2.4.4 DVI-I Connector (CN8)

DVI-I (integrated, combining digital and analog in the same connector; digital may be single or dual link) provides transmission of fast and high quality digital video between a source device (graphics card) and a display device.

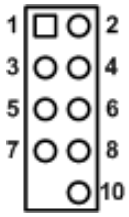
Pin	Signal	Pin	Signal
1	DVI_DATA2-	2	DVI_DATA2+
3	GND	4	N.C.
5	N.C.	6	DVI_SPC
7	DVI_SPD	8	N.C.
9	DVI_DATA1-	10	DVI_DATA1+
11	GND	12	N.C.
13	N.C.	14	+5V
15	GND	16	DVI_HTPLG
17	DVI_DATA0-	18	DVI_DATA0+
19	GND	20	N.C.
21	N.C.	22	GND
23	DVI_CLK+	24	DVI_CLK-
C1	Analog red	C2	Analog green
C3	Analog blue	C4	Analog horizontal sync
C5	Analog ground		



2.4.5 Internal USB 2.0 Connectors (CN10)

These are 5x2-pin p=2.54mm headers for USB 2.0 interface.

Pin	Signal	Pin	Signal
1	USB_PWR	2	USB_PWR
3	USB -	4	USB -
5	USB +	6	USB +
7	GND	8	GND
		10	GND

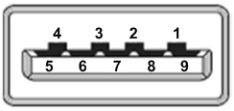


2.4.6 Rear I/O USB 3.1 (Gen1) Connectors (CN12 and CN15)

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

Pin	Signal
1	VCC
2	D-
3	D+
4	GND
5	StdA_SSRX-
6	StdA_SSRX+
7	GND_DRAIN
8	StdA_SSTX-
9	StdA_SSTX+

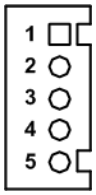
CN12: USB 3.0 port 0
CN15: USB 3.0 port 1



2.4.7 Internal PS/2 Keyboard and Mouse Connectors (CN13 and CN14)

The board has two 5-pin connectors for PS/2 keyboard (CN14) and mouse (CN13) interfaces.

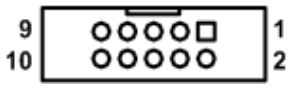
Pin	Signal
1	Clock
2	DATA
3	No connector
4	GND
5	5VSBY



2.4.8 COM Connectors (COM1~COM4)

The board supports RS-232/RS-422/RS-485 mode operation for COM1 and COM2. See the table below for the pin assignments. You can change the transmission mode from BIOS setting. COM3 and COM4 support RS-232 only.

Pin	RS-232	RS-422	RS-485
1	Data Carrier Detect (DCD)	TX-	DATA-
2	Data Set Ready (DSR)	No connector	No connector
3	Receive Data (RXD)	TX+	DATA+
4	Request to Send (RTS)	No connector	No connector
5	Transmit Data (TXD)	RX+	No connector
6	Clear to Send (CTS)	No connector	No connector
7	Data Terminal Ready (DTR)	RX-	No connector
8	Ring Indicator (RI)	No connector	No connector
9	Ground (GND)	GND	GND
10	Disconnect (NI)	NI	NI

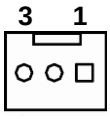


2.4.9 FAN Connectors (FAN1, FAN2 and FAN3)

Fans are needed for cooling down CPU and system temperature. The board has three fan connectors. You can find fan speed option(s) at BIOS Setup Utility if either fan is installed. For further information, see BIOS Setup Utility: Advanced\HW Monitor\PC Health Status.

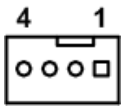
Auxiliary and system fan interfaces are available through FAN1 and FAN2. See the table below.

Pin	Signal
1	GND
2	+12V level
3	Rotation detection



CPU fan interface is available through FAN3. See the table below.

Pin	Signal
1	Ground
2	+12V
3	Rotation Detection
4	Speed Control

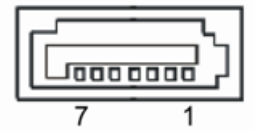


2.4.10 SATA 3.0 Connectors (SATA1~SATA6)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA 3.0 interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives.

This board has six SATA 3.0 ports with 6Gb/s performance.

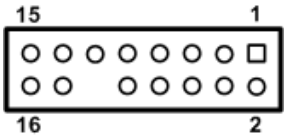
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.4.11 Intel® HD Audio Digital Header (HDA1)

This is a 2x8-pin header for connecting an external HD Audio board (AX93242).

Pin	Signal	Pin	Signal
1	BCLK	2	GND
3	RST#	4	N.C
5	SYNC	6	GND
7	SDO	8	+3.3S
9	SDIO	10	+12VS
11	N.C	12	
13	N.C	14	N.C
15	N.C	16	GND



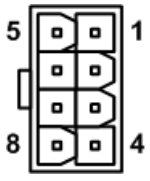
2.4.12 ATX Power Connector (ATX1)

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

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

The ATX2 is an 8-pin ATX power connector. Its pin assignments are given in table below.

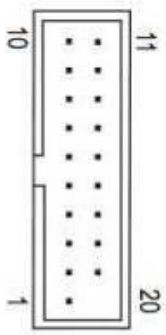
Pin	Signal	Pin	Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V



2.4.13 Internal USB 3.1 Gen1 Connector (CN3)

The CN3 is a 19-pin internal connector for installing versatile USB 3.1 compliant peripherals.

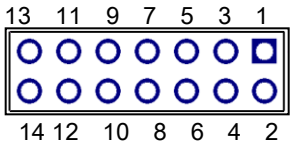
Pin	Signal	Pin	Signal
1	USB3_PWR56		
2	SSRX5-	19	VBUS1
3	SSRX5+	18	SSRX6-
4	GND	17	SSRX6+
5	SSTX5-	16	GND
6	SSTX5+	15	SSTX6-
7	GND	14	SSTX6+
8	USB10-	13	GND
9	USB10+	12	USB11-
10	ID	11	USB11+



2.4.14 TPM Pin Header (CN2)

These are 7x2-pin p=2.0mm headers for SPI interface with an AX93515 TPM module.

Pin	Signal	Pin	Signal
1	VCC3P3	2	GND
3	MOSI	4	MISO
5	CLK	6	CS2
7	RST	8	PIRQ
9	PP	10	NC
11	NC	12	NC
13	NC	14	MC



Note ***The screw type is M2*0.4.***

2.4.15 Parallel Port Connector (PRINT1)

This board has a multi-mode parallel port to support:

- **Standard Mode**:

  IBM PC/XT, PC/AT and PS/2™ are compatible with a bi-directional parallel port.

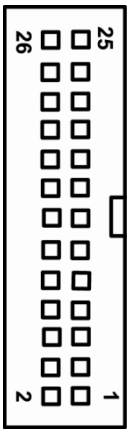
- **Enhanced Mode**:

  Enhance Parallel Port (EPP) is compatible with EPP 1.7 and EPP 1.9 (IEEE 1284 compliant).

- **High Speed Mode**:

  Microsoft and Hewlett Packard Extended Capabilities Port (ECP) is IEEE 1284 compliant.

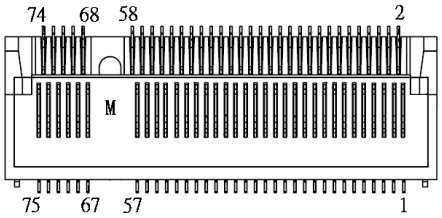
Pin	Signal	Pin	Signal
1	Strobe#	2	Auto Form Feed#
3	Data 0	4	Error#
5	Data 1	6	Initialize#
7	Data 2	8	Printer Select In#
9	Data 3	10	GND
11	Data 4	12	GND
13	Data 5	14	GND
15	Data 6	16	GND
17	Data 7	18	GND
19	Acknowledge#	20	GND
21	Busy	22	GND
23	Paper Empty#	24	GND
25	Printer Select	26	N.C



2.4.16 M.2 2280 Key M NVMe SSD (CN4)

The M.2 2280 Key M NVM Express SSD for storage.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PERn3	6	NC	7	PERp3	8	NC
9	GND	10	LED_1#	11	PETn3	12	+3.3V
13	PETp3	14	+3.3V	15	GND	16	+3.3V
17	PERn2	18	+3.3V	19	PERp2	20	NC
21	GND	22	NC	23	PETn2	24	NC
25	PETp2	26	NC	27	GND	28	NC
29	PERn1	30	NC	31	PERp1	32	NC
33	GND	34	NC	35	PETn1	36	NC
37	PETp1	38	NC	39	GND	40	NC
41	PERn0	42	NC	43	PERp0	44	NC
45	GND	46	NC	47	PETn0	48	NC
49	PETp0	50	PERST#	51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#	55	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		

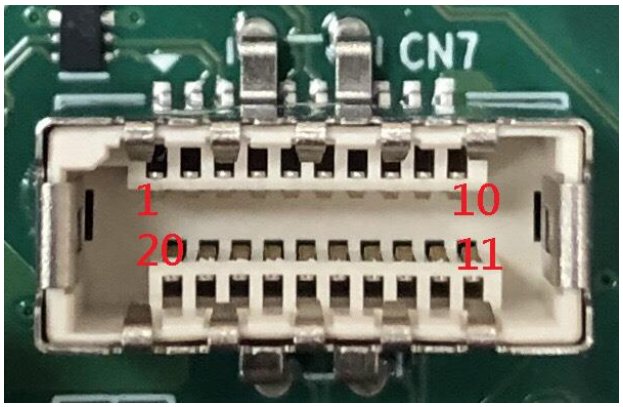


Note ***M.2 2280 Key M (Only for Q370, C246 version)***

2.4.17 Internal USB 3.1 Gen2 Connector (CN7)

The CN7 is an internal box connector for installing versatile USB 3.1 Gen2 compliant peripherals.

Pin	Signal	Pin	Signal
1	GND	11	GND
2	SSTX2+	12	SSTX3-
3	SSTX2-	13	SSTX3+
4	GND	14	GND
5	SSRX2+	15	SSRX3-
6	SSRX2-	16	SSRX3+
7	GND	17	GND
8	USBP3P_C	18	USBP4P_C
9	USBP3N_C	19	USBP4N_C
10	GND	20	+3.3VS



2.4.18 Display Port 1.4 Connector (CN11)

The CN11 is an internal box connector which is defined by Axiomtek for installing Display Port 1.4 Connector peripherals. The Display Port 1.4 Connector peripherals are available as an optional kit.

Pin	Signal	Pin	Signal
1	GND	16	DPC_AUX_D+
2	DDSP_TX_0_D+	17	DPC_AUX_D-
3	DDSP_TX_0_D-	18	+5VS
4	GND	19	DDPD_HPD_C
5	DDSP_TX_1_D+	20	+3.3VS
6	DDSP_TX_1_D-	21	+3.3VS
7	GND	22	+3.3VS
8	DDSP_TX_2_D+	23	+3.3VS
9	DDSP_TX_2_D-	24	GND
10	GND	25	GND
11	DDSP_TX_3_D+	26	GND
12	DDSP_TX_3_D-	27	GND
13	GND	28	+5VS
14	HDMI_C_DNG_DETECT	29	+5VS
15	GND	30	+5VS

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Chapter 3
Hardware Installation

3.1 Installing the Processor

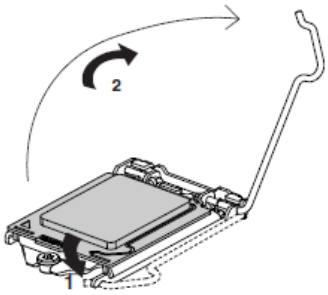
The LGA1151 processor socket comes with a cover to protect the processor. Please install the processor into the CPU socket step by step as illustrated below:

Note

Make sure that you install the correct CPU designed for the LGA1151 socket only. DO NOT install a CPU designed for LGA1156, LGA1155 or LGA1150 CPU on the LGA1151 socket.

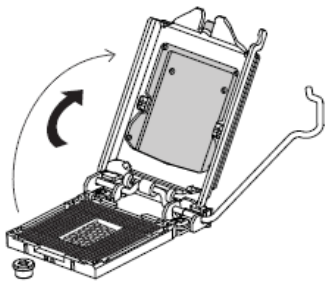
Step 1 Opening the socket:

- Disengage the load lever by pressing the lever down and pulling it slightly away by the hook. This will release the load lever from the retention tab.
- Rotate the load lever to open position at approximately 135°.
- Rotate the load plate to open position at approximately 150°.



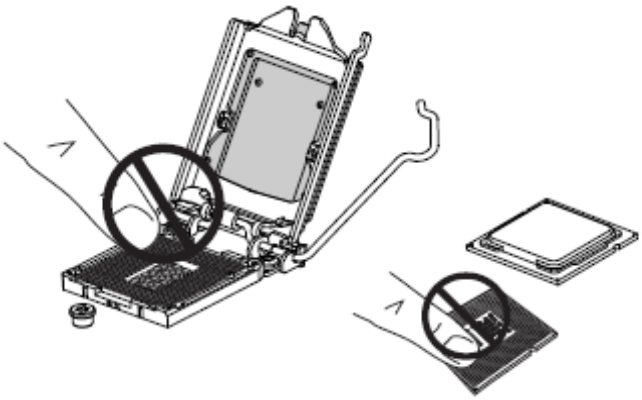
Step 2 Removing the socket protective cover:

- Place the thumb against the front edge of the protective cover and rest the index finger on the rear grip to maintain control of the cover.
- Lift the front edge of the protective cover to disengage from the socket. Keep control of the cover by holding the rear grip with the index finger.
- Lift the protective cover away from the socket, being careful not to touch the electrical contacts.



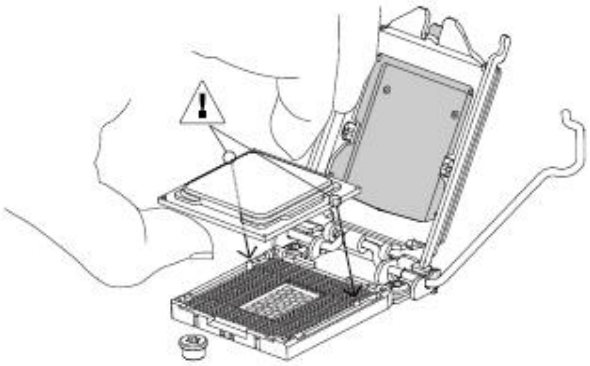
Step 3 Processor installation:

- Lift the processor package from shipping media by grasping the substrate edges.
- Scan the processor package gold pads for any presence of foreign material. If necessary, the gold pads can be wiped clean with a soft lint-free cloth and isopropyl alcohol.
- Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.



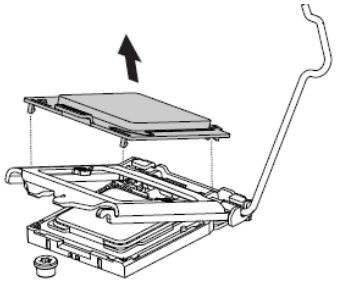
Note ***Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during Installation.***

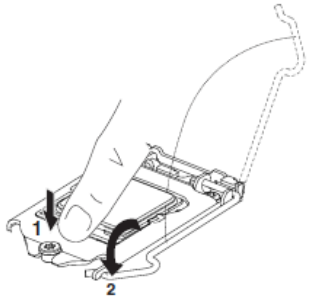
- Carefully place the processor into the socket body vertically (see image below).



Step 4 Close the socket (see image below):

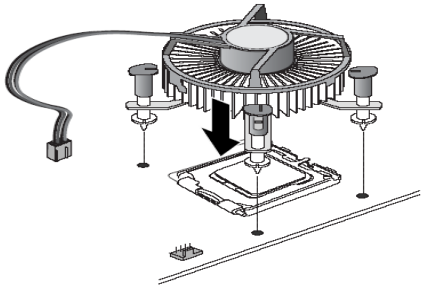
- Gently lower the load plate.
- Make sure the load plate's front edge slides under the shoulder screw cap as the lever is lowered.
- Latch the lever under the top plate's corner tab, being cautious not to damage the motherboard with the tip of the lever.



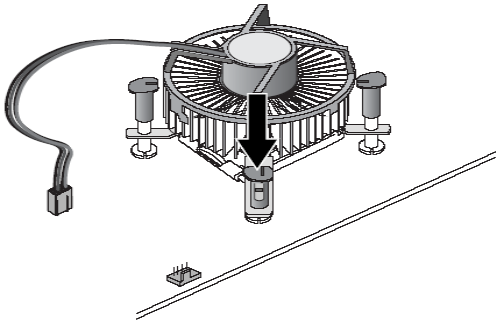


Step 5 Fan heatsink handling:

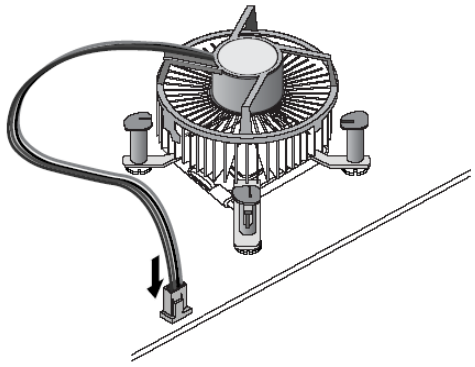
1. Orientate the CPU cooling fan to fixing holes on the board.



2. Screw the CPU cooling fan onto the board.



3. Make sure the CPU fan is plugged to the CPU fan connector.



3.2 Installing the Memory

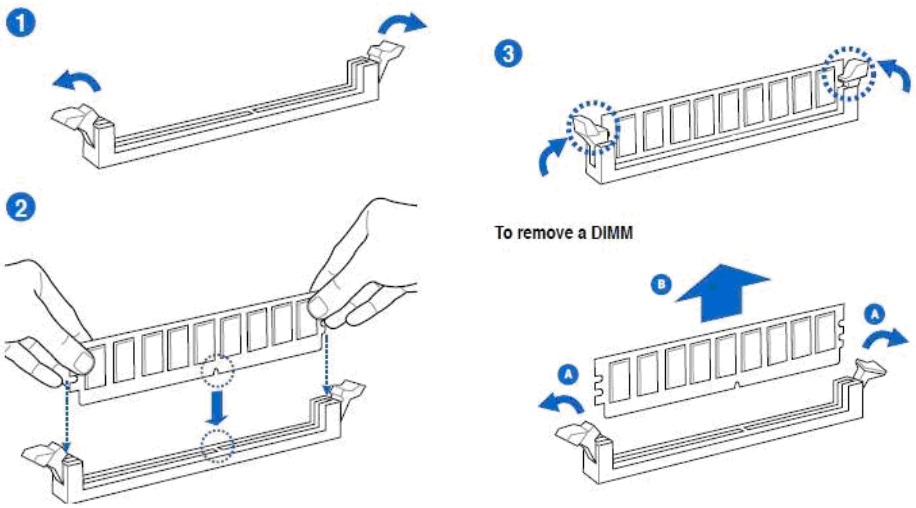
The board supports two 288-pin DDR4 DIMM memory sockets with maximum memory capacity up to 32GB.

Please follow steps below to install the memory modules:

- Push down latches on each side of the DIMM socket.
- Align the memory module with the socket to ensure that notches of the memory module match the socket keys for a correct installation.
- Install the memory module into the socket and push it firmly down until it is fully seated. The socket latches are levered upwards and clipped on to the edges of the DIMM.
- Install any remaining DIMM modules.

Note

To remove a DIMM, push down the latches on each side of the DIMM socket to loosen the DIMM, and then lift the DIMM carefully.



Chapter 4
Hardware Description

4.1 Microprocessors

The SHB150 Series supports Intel® 8th Core™ i7/ i5/ i3 processors, 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 damage.

4.2 BIOS

The SHB150 Series uses AMI Plug and Play BIOS with a single 256Mbit SPI Flash.

4.3 System Memory

The SHB150 Series supports two 288-pin DDR4 DIMM sockets for maximum memory capacity up to 32GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB, and 16GB.

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Chapter 5
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.

5.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, 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 JP2 (see section 2.3.2).

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.

5.2 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.

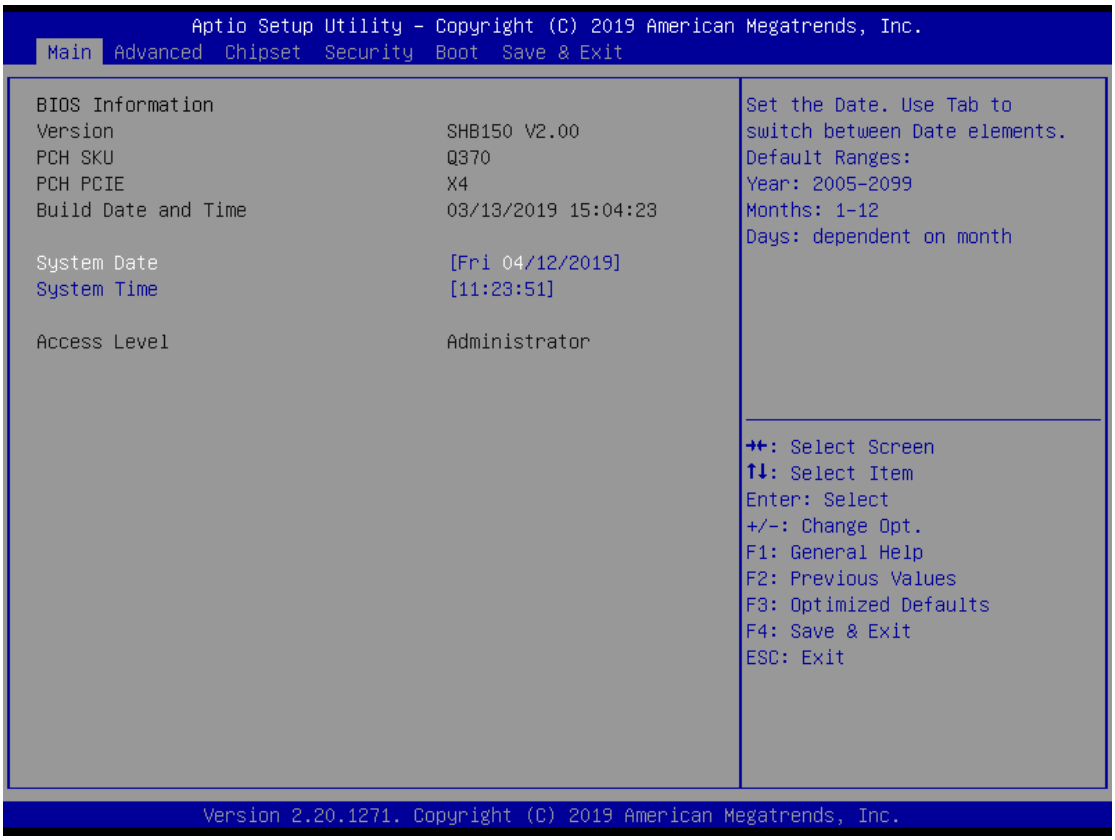
Note

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.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
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.
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.

5.3 Main Menu

The first time you 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 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.

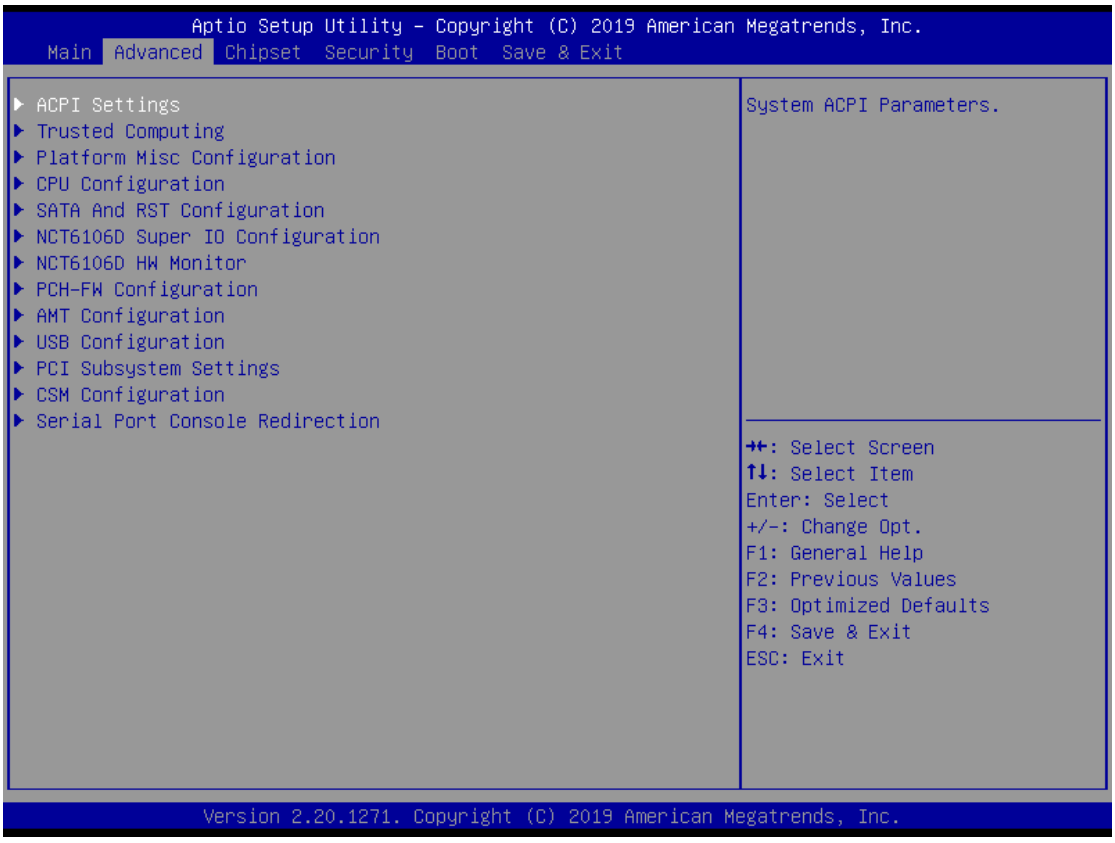
Access Level
Display the access level of the current user.

5.4 Advanced Menu

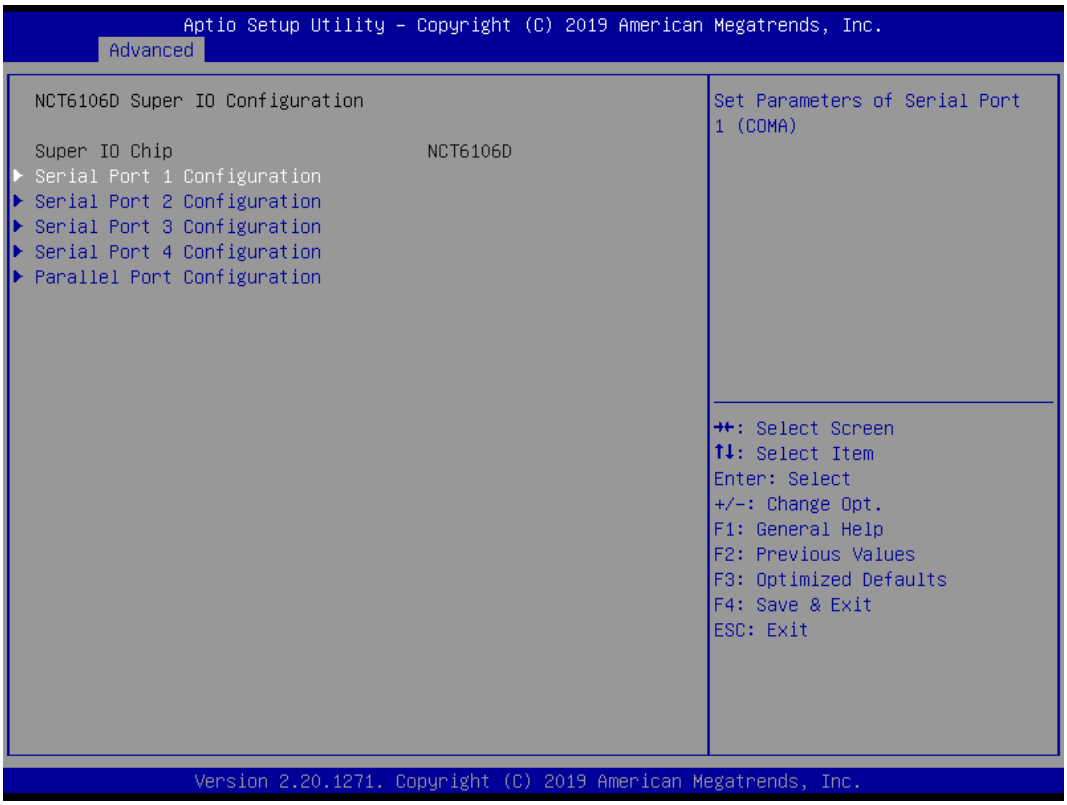
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ACPI Settings
- Trusted Computing
- Platform Misc Configuration
- CPU Configuration
- SATA and RST Configuration
- NCT6106D Super IO Configuration
- NCT6106D HW Monitor
- PCH-FW Configuration
- AMT Configuration
- USB Configuration
- PCI Subsystem Settings
- CSM Configuration
- Serial Port Console Redirection

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

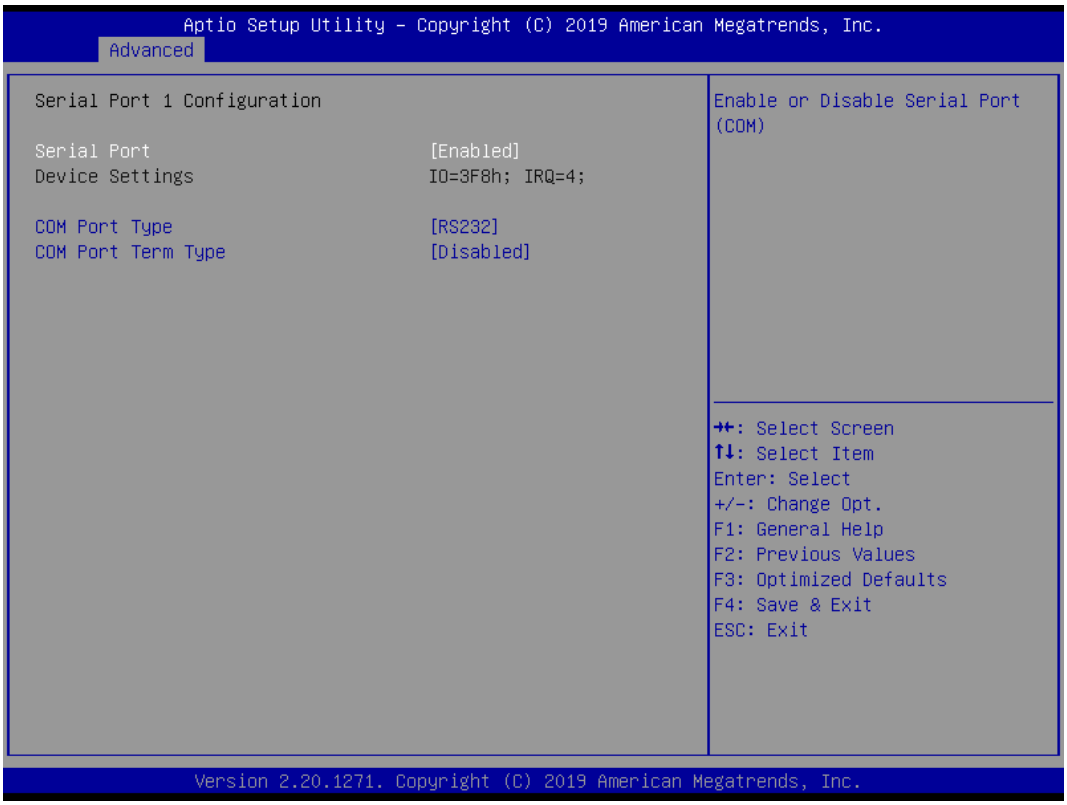


- **NCT6106D Super IO Configuration**
  You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



Serial Port 1~4 Configuration
Use this item to set parameters of serial port 1 to 4.

- **Serial Port 1 Configuration**



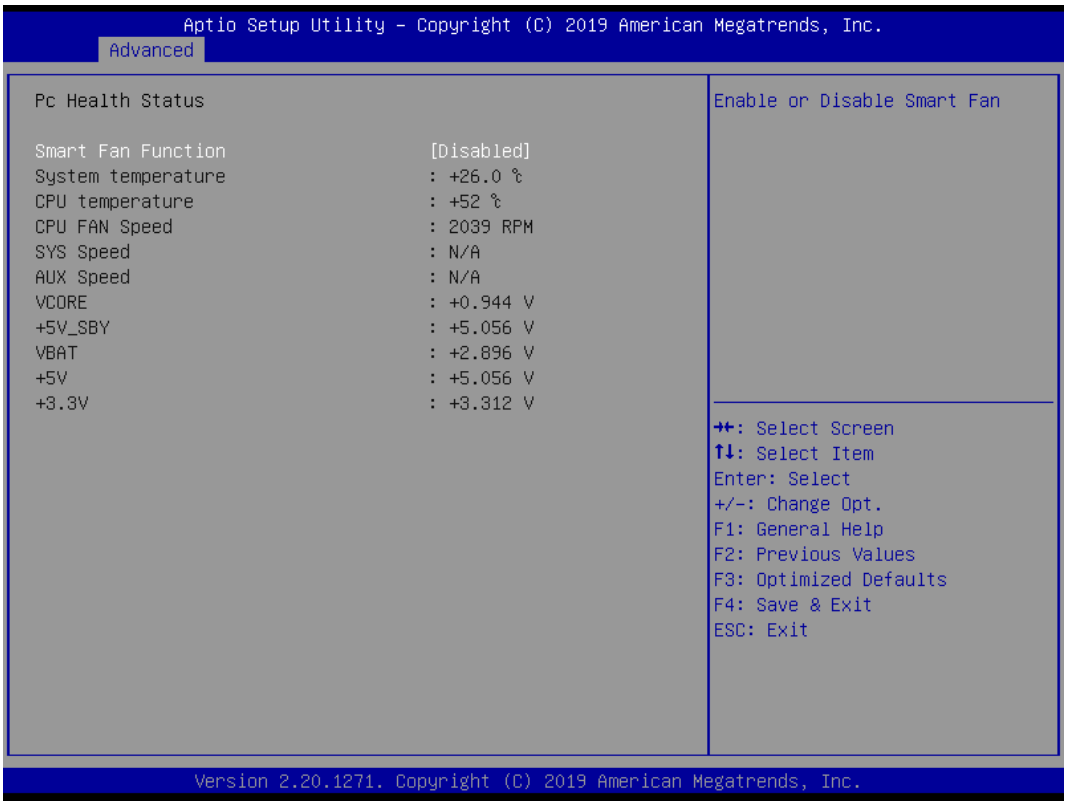
Serial Port
Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

Change Settings
Use this item to change base I/O address and IRQ settings.

COM Port Type
Select RS-232/422/485 communication mode for serial port 1.

COM Port Term Type
Enable or disable serial port termination.

- **NCT6106D HW Monitor**
  Use this screen for Smart Fan configuration and hardware health status monitoring.

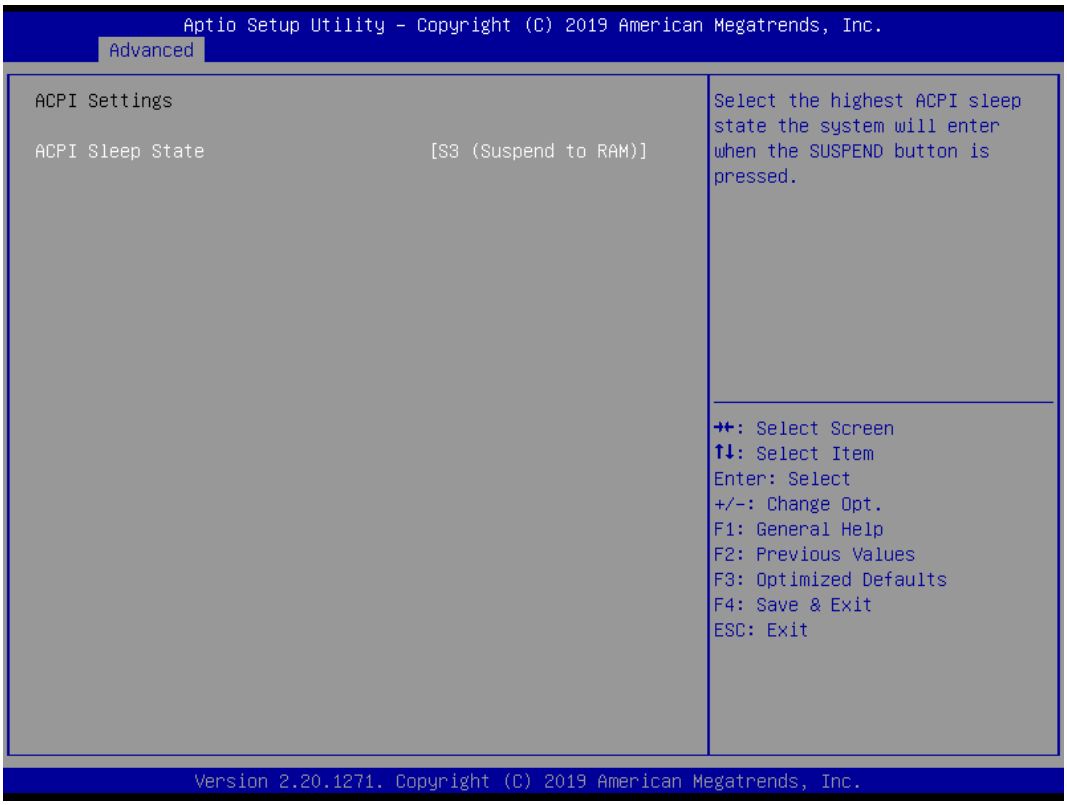


This screen displays the temperature of system, cooling fans speed in RPM and system voltages (VCORE, VIN0, VIN1, VIN2 and VBAT).

Smart Fan Function
Enable or disable Smart Fan function.

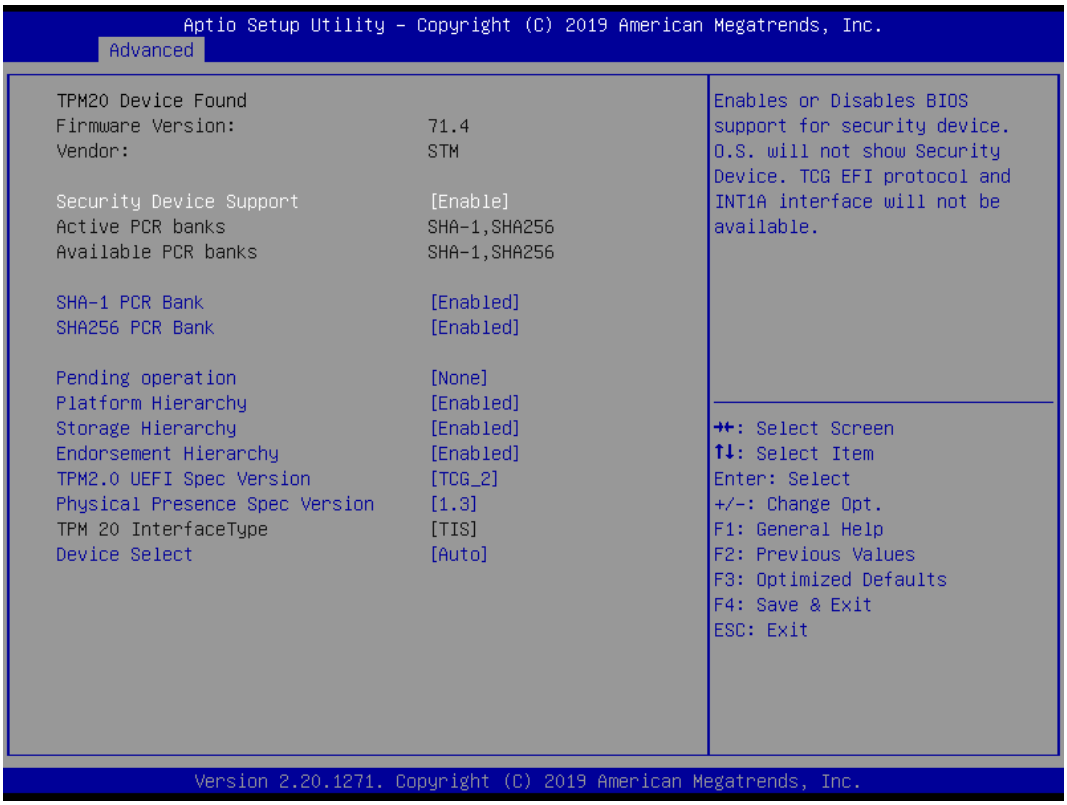
Note ***CPU FAN = FAN1; SYS FA = FAN2; AUX FAN = FAN3.***

- **ACPI Settings**
  You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



ACPI Sleep State
Select the ACPI (Advanced Configuration and Power Interface) sleep state. Configuration options are Suspend Disabled and S3 (Suspend to RAM). The default is S3 (Suspend to RAM); this option selects ACPI sleep state the system will enter when the suspend button is pressed.

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



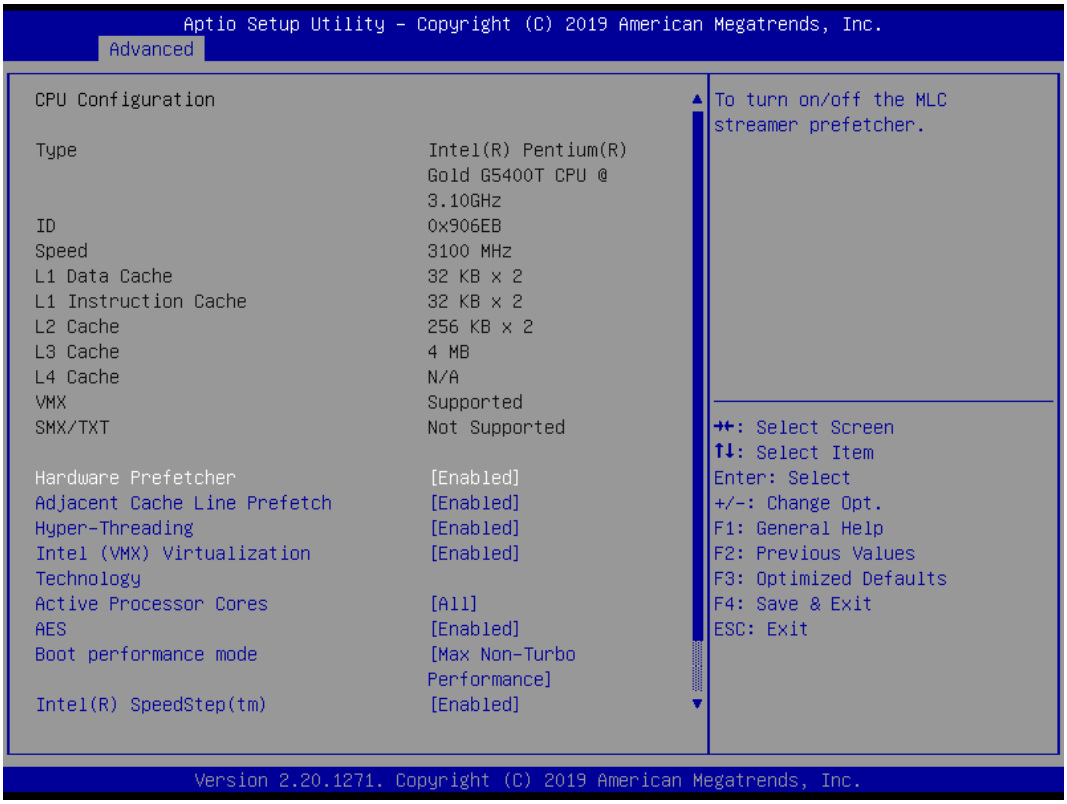
Security Device Support
Enable or disable BIOS support for the security device. The default setting is Disabled.

TPM State
Once the Security Device Support is enabled, TPM (Trusted Platform Module) can be used by the operating system.

Current Status Information
Display current TPM status information.

Pending Operation
Schedule a TPM operation which will take effect at the next bootup process.

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



Hyper-threading
Enable or disable Hyper-Threading Technology. When enabled, it allows a single physical processor to multitask as multiple logical processors. When disabled, only one thread per enabled core is enabled.

Intel 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.

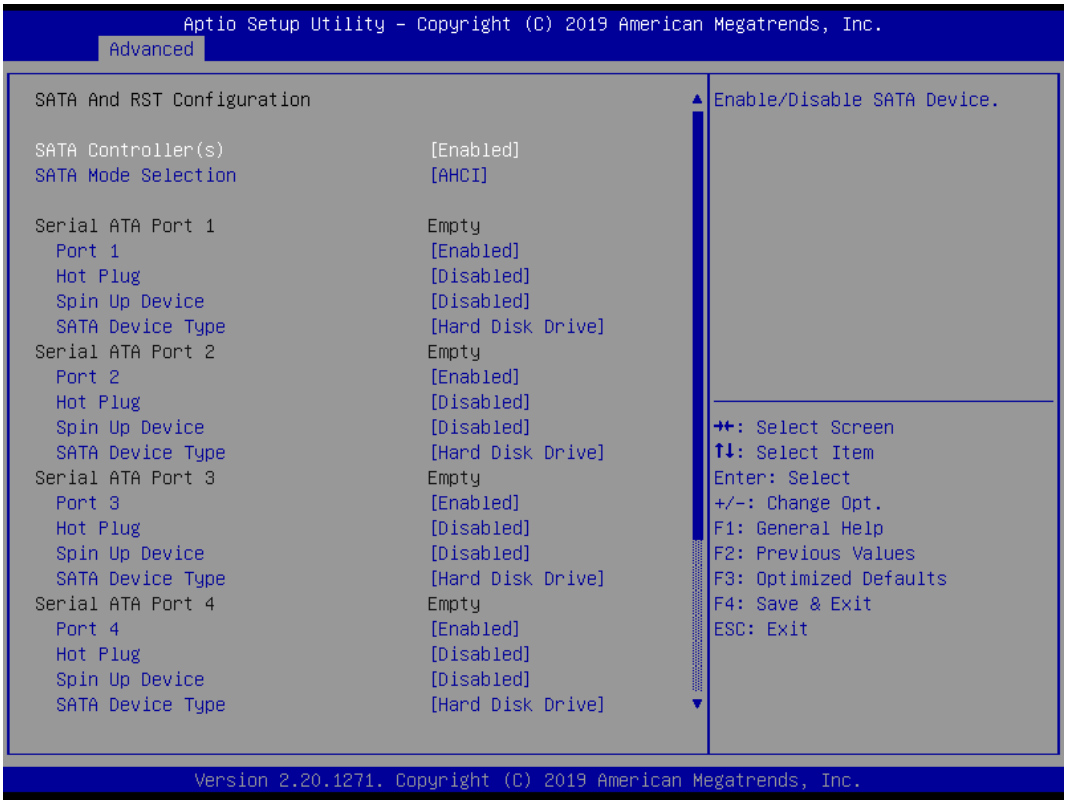
Active Processor Cores
Number of cores to enable in each processor package.

AES
Enable / Disable AES (Advanced Encryption Standard)

Boot performance mode
Select the performance state that the BIOS will set starting from reset vector.

Intel (R) SpeedStep(tm)
Allows more than two frequency ranges to be supported.

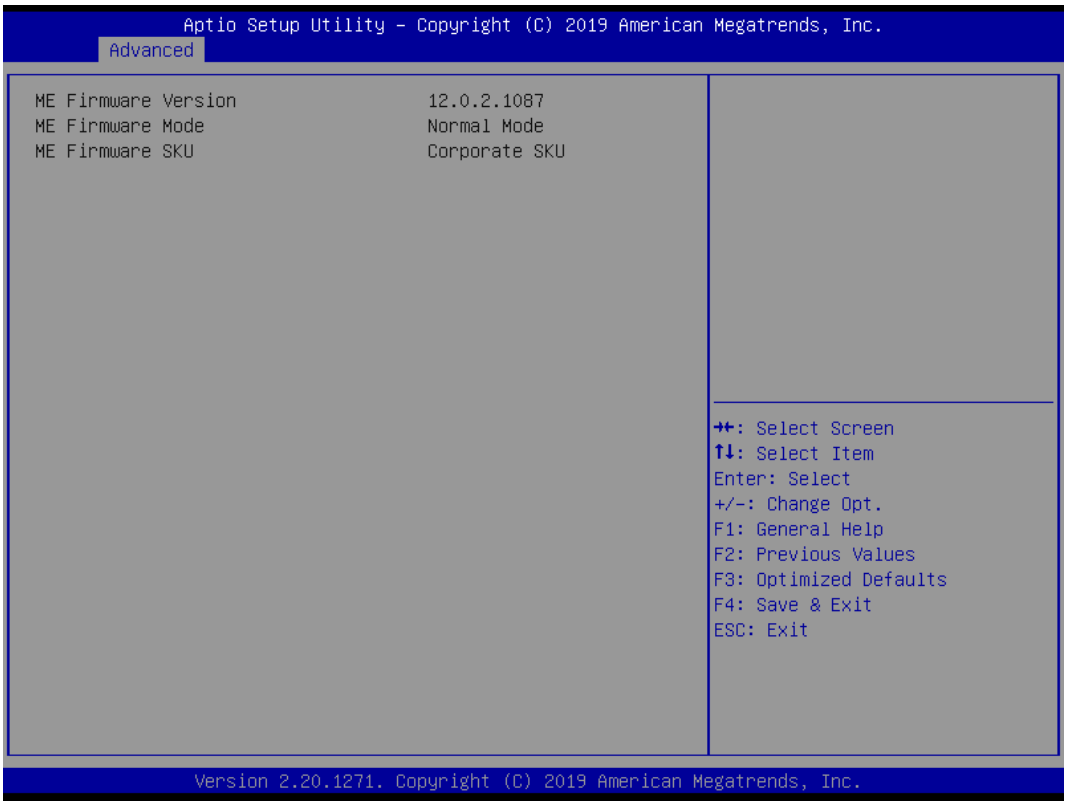
- **SATA Configuration**
  In this Configuration menu, you can see the hardware currently installed in SATA ports. During system boot up, BIOS automatically detects the presence of SATA devices.



SATA Controller(s)
Enable or disable SATA controller feature.

SATA Mode Selection
Determine how SATA controller(s) operate. Operation options are AHCI and RAID modes.

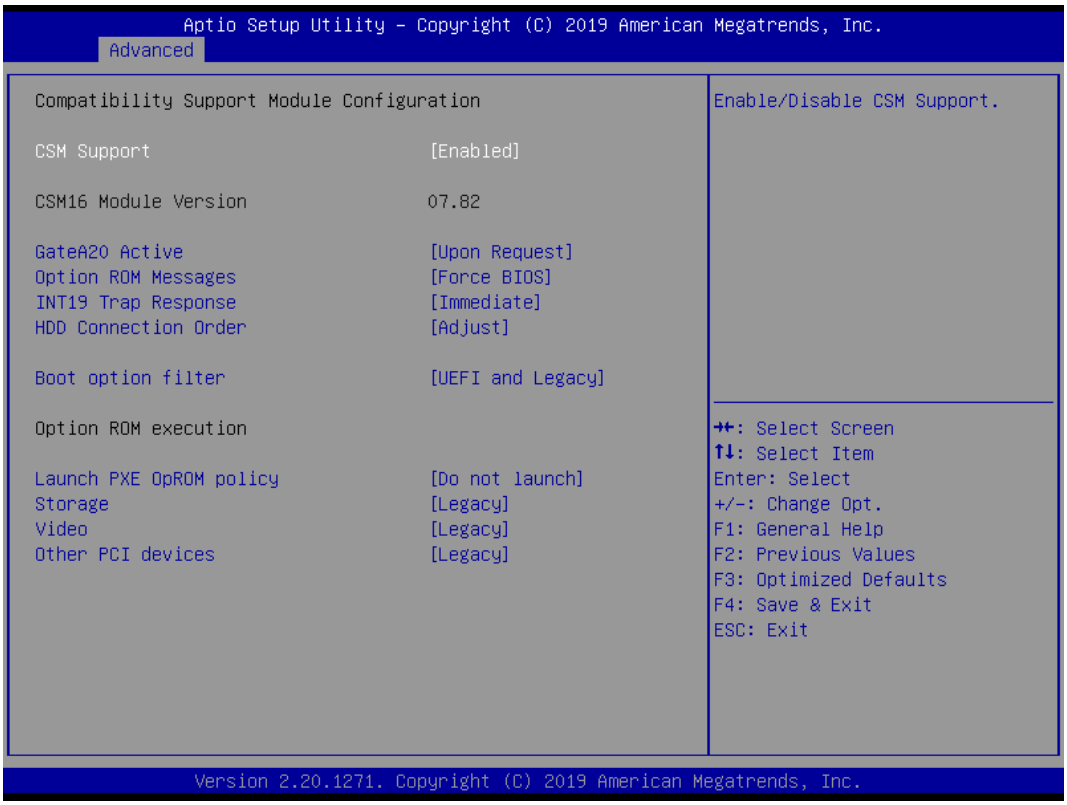
- **PCH-FW Configuration**
  This screen displays ME (Management Engine) Firmware information.



- **AMT Configuration**
  Use this screen to configure AMT parameters.

Intel AMT
Enable or disable Intel® Active Management Technology BIOS Extension. The default is Enabled. After enabling, please refer to Appendix D for iAMT settings.

- **Compatibility Support Module (CSM) Configuration**
  This screen displays CSM information.



CSM Support
Enabled / Disable CSM Support.

GateA20 Active
UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20. This option is useful when any RT code is executed above 1MB.

Option ROM Messages
Set display mode for Option ROM.

INT19 Trap Response
BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.

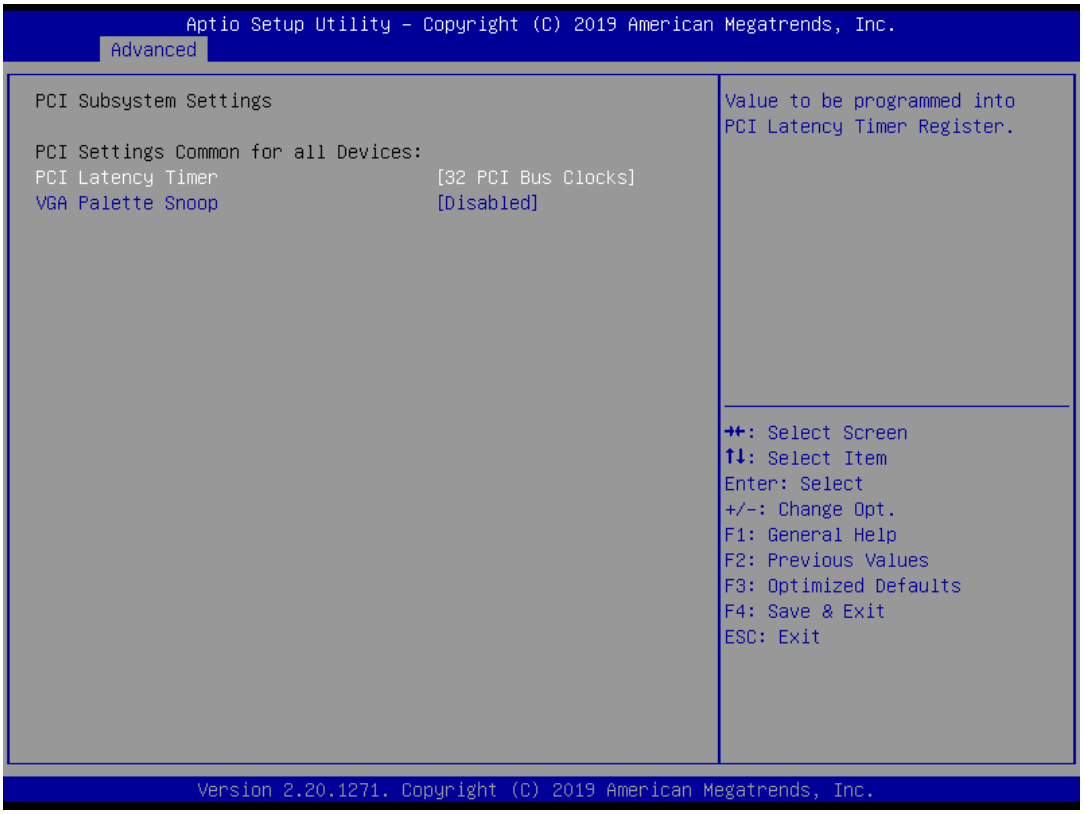
Boot option filter
This option controls Legacy/UEFI ROMs priority.

Storage
Controls the execution of UEFI and Legacy Storage OpROM.

Video
Controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices
Determines OpROM execution policy for devices other than Network, Storage, or Video.

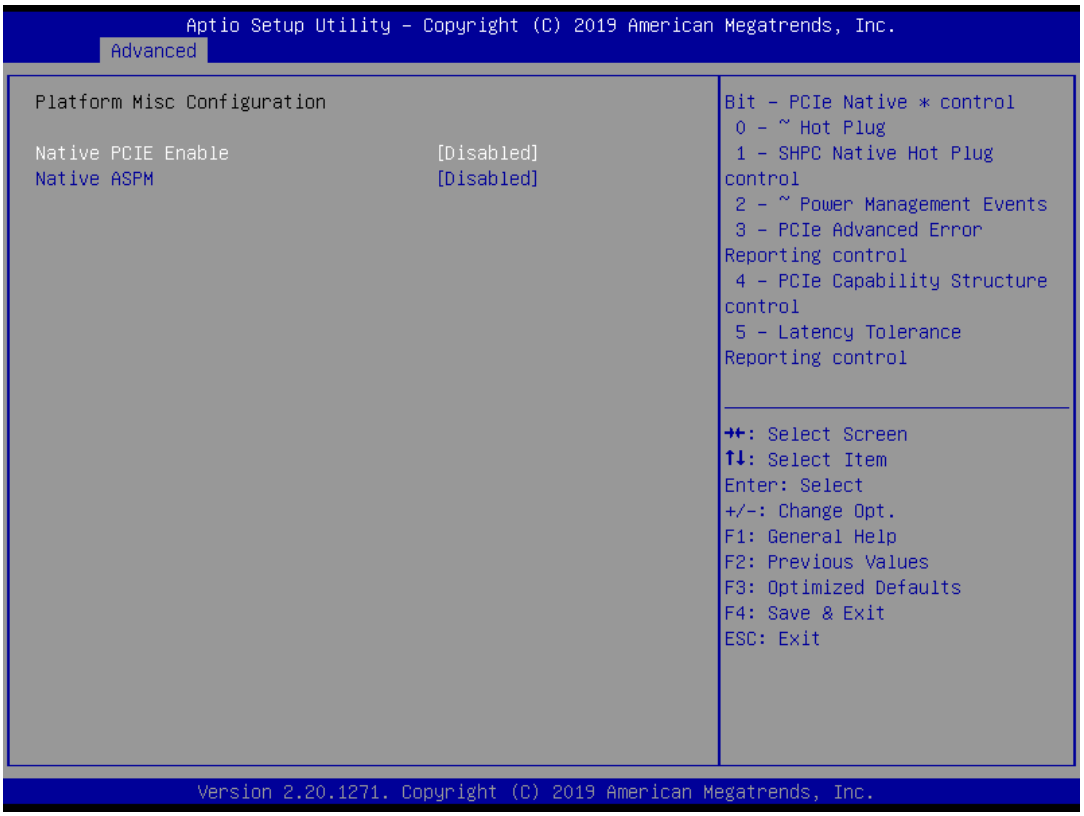
- **PCI Subsystem Settings**
  This screen allows you to set PCI Subsystem mode.



PCI Latency Timer
Set the value to be programmed into PCI Latency Timer Register.

VGA Palette Snoop
Enables or Disables VGA Palette Registers Snooping.

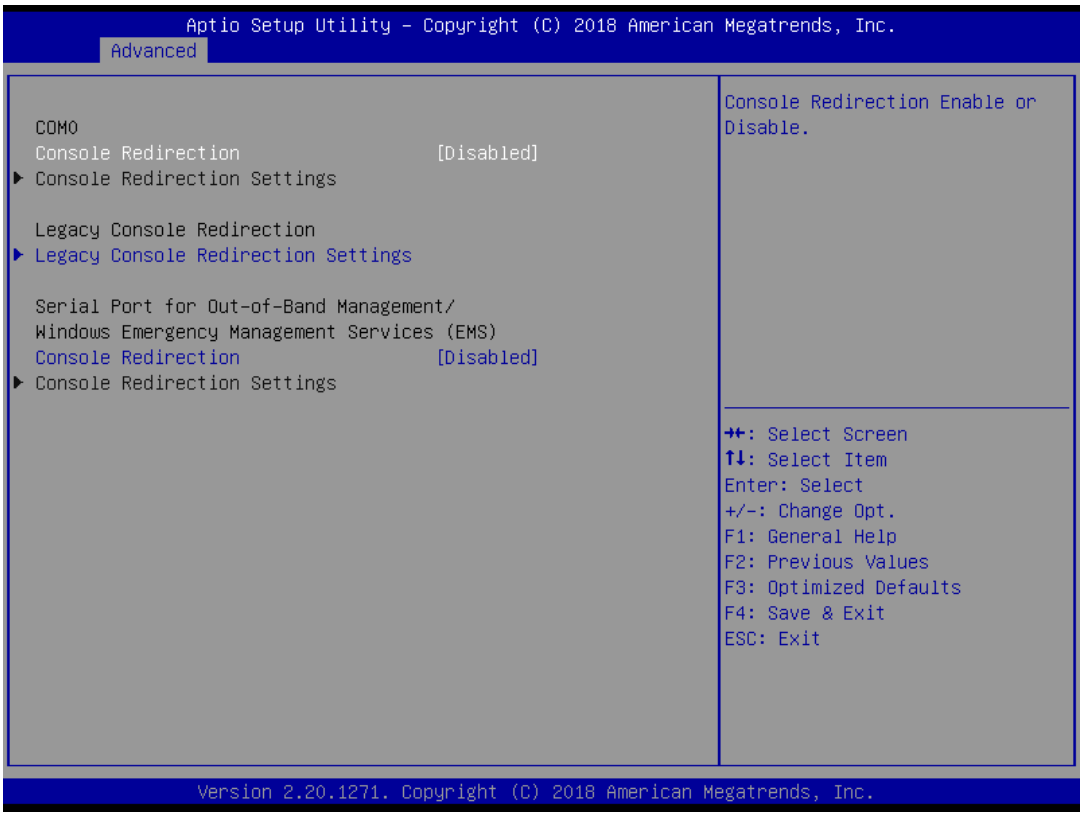
- **Platform Misc Configuration**
  This screen allows you to set Platform Misc Configuration.



Native PCIE Enable
Bit - PCIe Native * control\n 0 - ~ Hot Plug\n 1 - SHPC Native Hot Plug control\n 2 - ~ Power Management Events\n 3 - PCIe Advanced Error Reporting control\n 4 - PCIe Capability Structure control\n 5 - Latency Tolerance Reporting control.

Native ASPM
Enabled - OS Controlled ASPM, Disabled - BIOS Controlled ASPM.

- **Serial Port Console Redirection**
  This screen allows you to set serial port console redirection.



- **USB Configuration**
  This screen shows USB configuration.

USB Devices
Displays all detected USB devices.

Legacy USB Support
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected.

XHCI Hand-off
This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

USB Mass Storage Driver Support
Enable/Disable USB Mass Storage Driver Support.

USB transfer time-out
The time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out
USB mass storage device Start Unit command time-out.

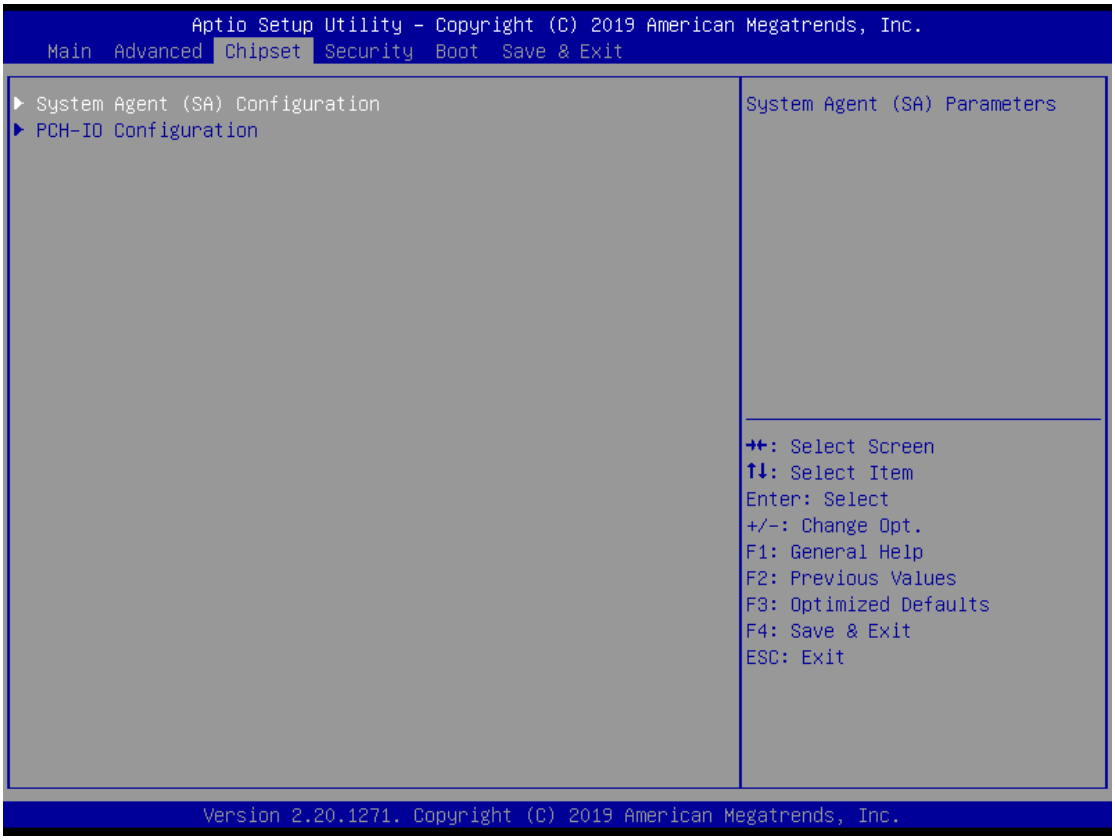
Device power-up delay
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

5.5 Chipset Menu

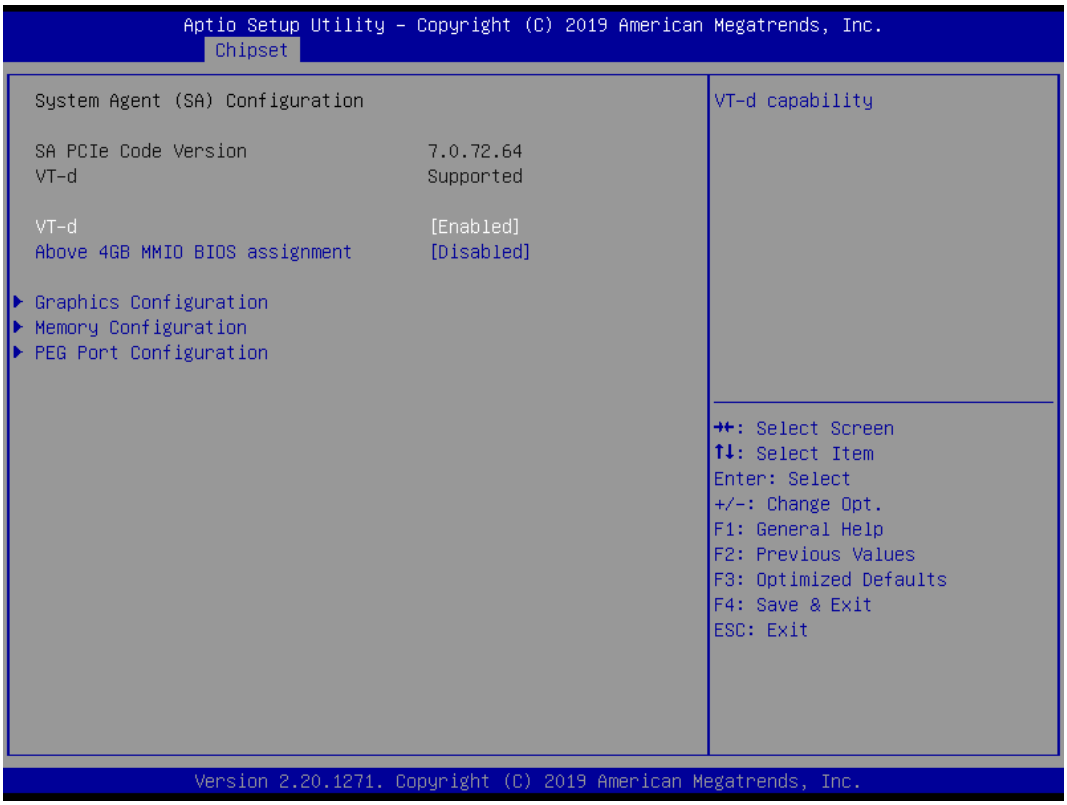
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

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

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



- **System Agent (SA) Configuration**
  This screen shows System Agent information.



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

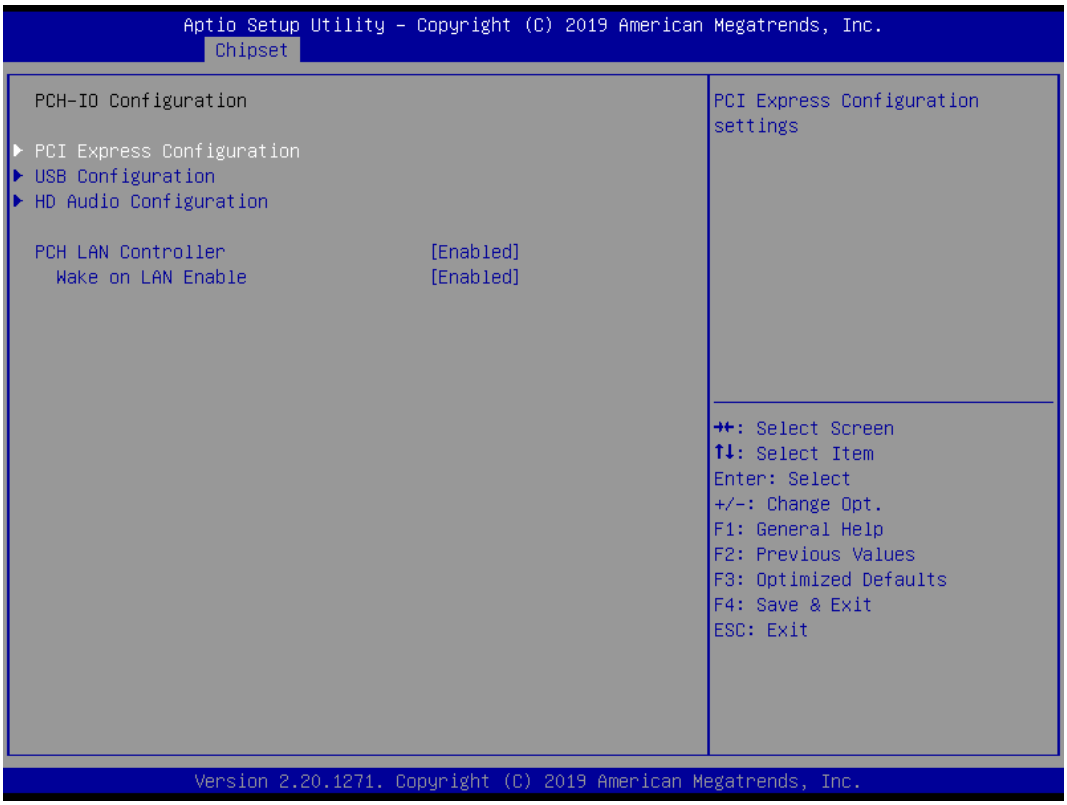
Memory Configuration
Open the sub menu for information related to system memory.

PEG Port Configuration
This screen shows PEG Port/POE Port feature information.

VT-d
VT-d capability.

Above 4GB MMIO BIOS assignment
Enable/Disable above 4GB Memory MappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

- **PCH-IO Configuration**
  This screen shows system memory information.

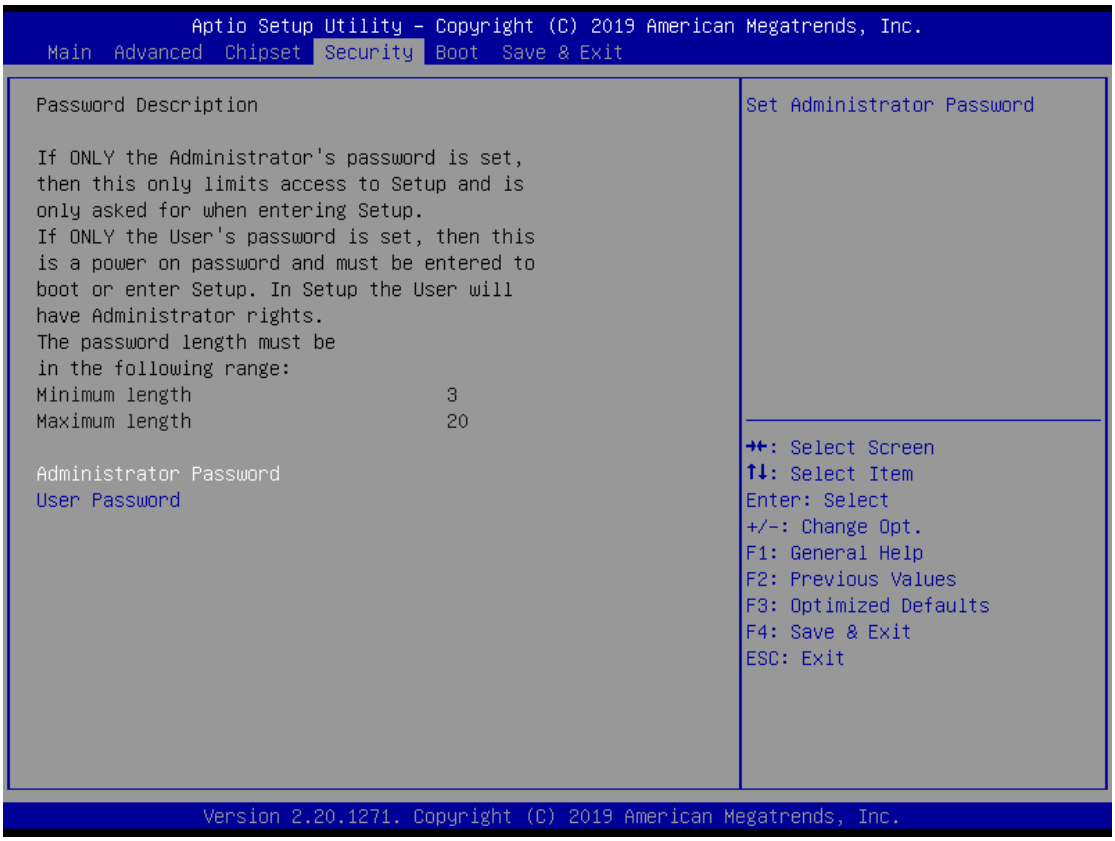


PCH LAN Controller
Enable or disable onboard PCH LAN controller.

Wake on LAN Enable
Enable or disable integrated LAN to wake the system.

5.6 Security Menu

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

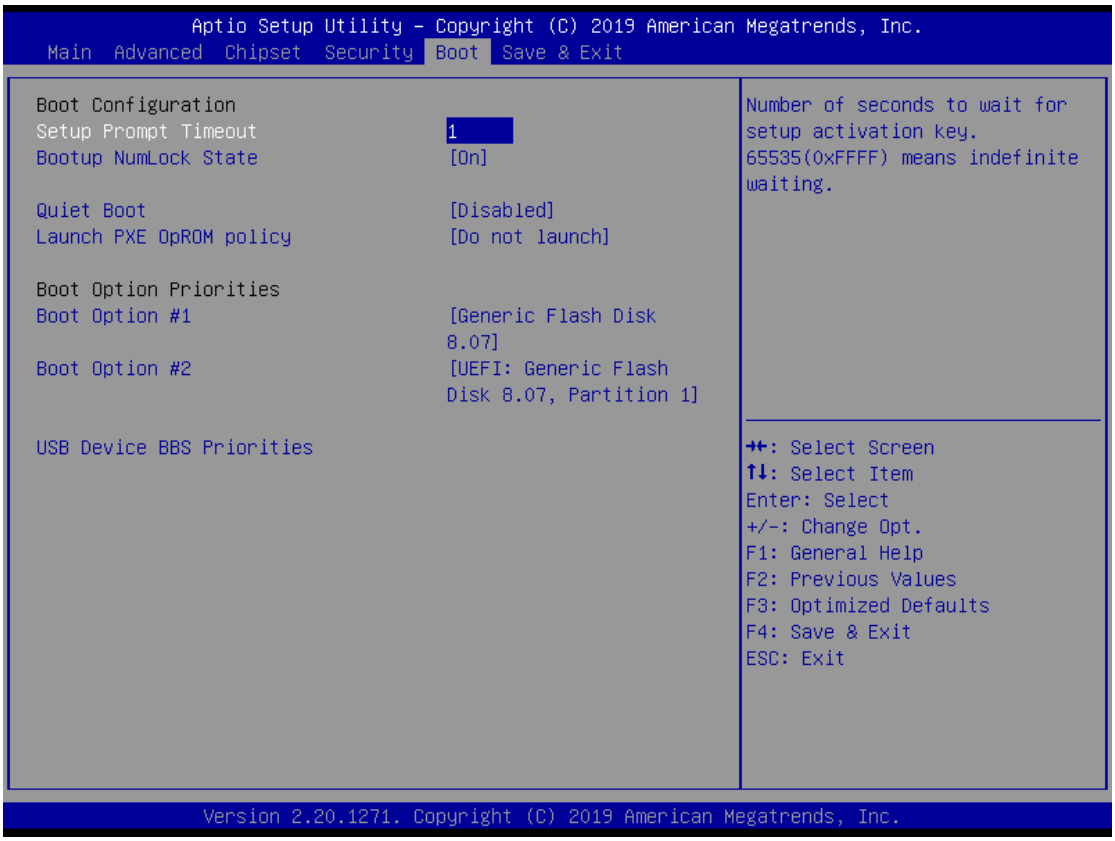


- **Administrator Password**
  This item indicates whether an administrator password has been set (installed or uninstalled).

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

5.7 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.

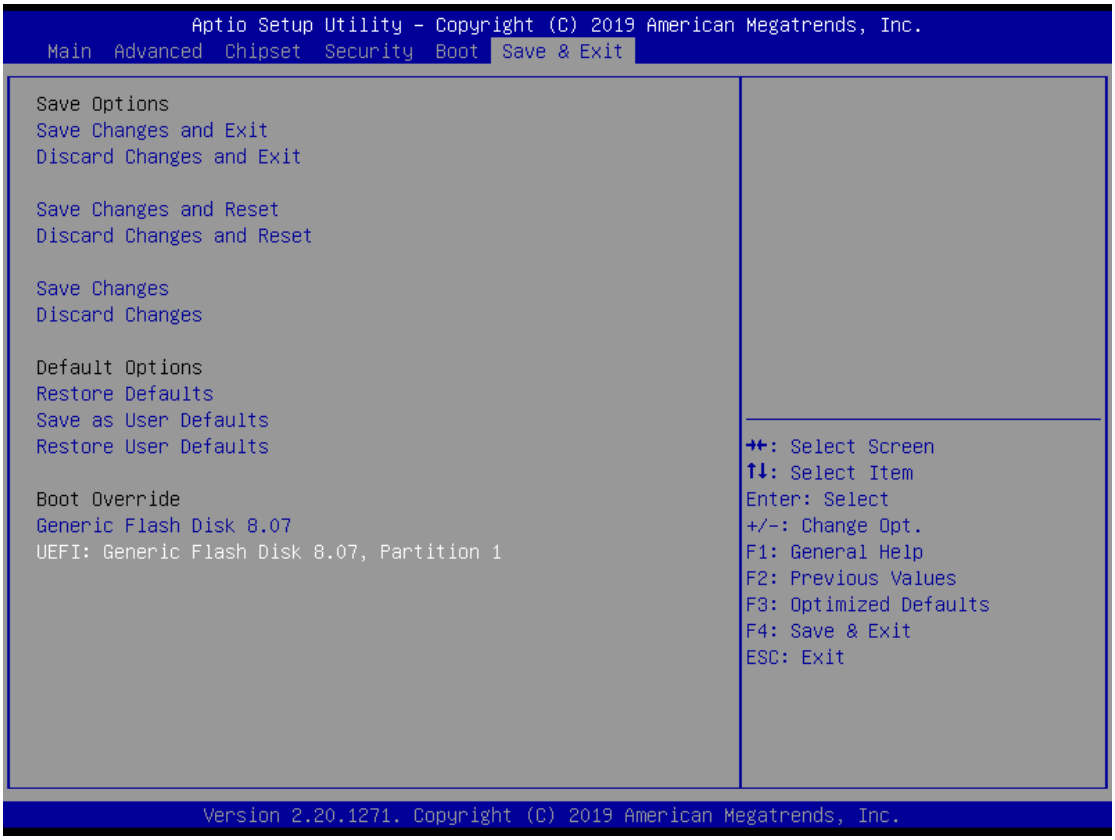
- **Quiet Boot**
  Select to display either POST output messages or a splash screen during boot-up.

- **Launch PXE OpROM policy**
  Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.

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

5.8 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 a major issue in most applications. Some embedded systems are not watched by humans 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 that 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 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.

A.2 How to Use Watchdog Timer

Start
↓
Un-Lock WDT:
O 2E 87 ; Un-lock super I/O
O 2E 87 ; Un-lock super I/O
↓
Select Logic device:
O 2E 07
O 2F 08
↓
Set Second or Minute:
O 2E F0
O 2F N ; N=00 or 08 (See *Note* below)
↓
Set base timer:
O 2E F1
O 2F M ; M=00,01,02,…FF(Hex) ,Value=0 to 255
↓
WDT counting re-set timer:
O 2E F1
O 2F M ; M=00,01,02,…FF (See *Note* below)
↓
IF No re-set timer:
; WDT time-out, generate RESET

;IF to disable WDT:
O 2E 30
O 2F 00 ; Can be disabled at any time

- Timeout Value Range
  - 1 to 255
  - Minute / Second

Note:

*If **N**=00h, the time base is set to second.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 second
02h: Time-out occurs after 2 seconds
03h: Time-out occurs after 3 seconds
.
.
FFh: Time-out occurs after 255 seconds

*If **N**=08h, the time base is set to minute.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 minute
02h: Time-out occurs after 2 minutes
03h: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

Appendix B
PCI IRQ Routing

B.1 PICMG® PCI IRQ Routing

Device	ID	Slot	Int
PCI Slot 0	31	0	BCDA
PCI Slot 1	30	1	CDAB
PCI Slot 2	29	2	DABC
PCI Slot 3	28	3	ABCD

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Appendix C
Configuring SATA for RAID

C.1 Configuring SATA Hard Drive(s) for RAID (Controller: Intel® Q370/C246)

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.

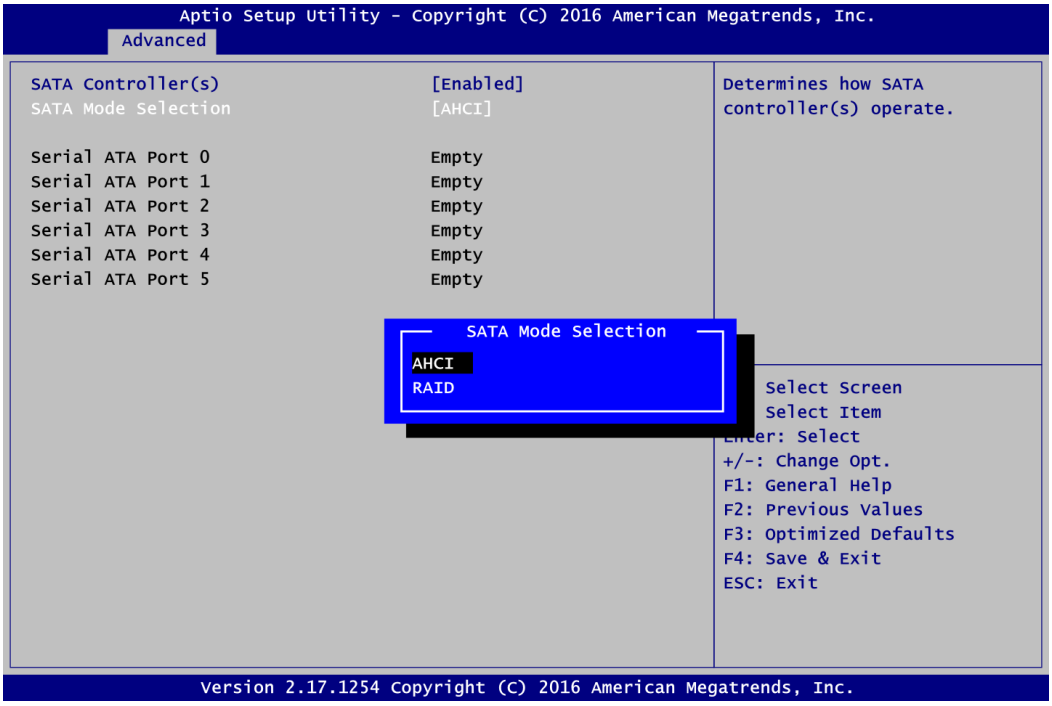
Please follow up the steps below to configure SATA hard drive(s):

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.

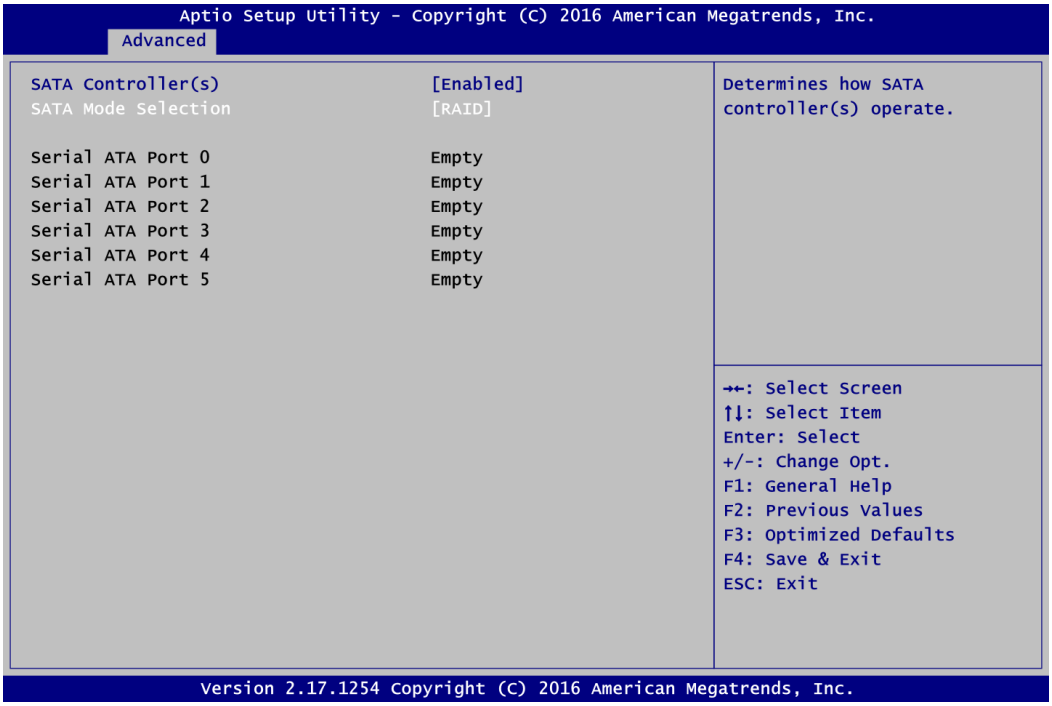
1. Installing SATA hard drive(s) in your system.
Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

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



A list of options appears, please select “RAID”.

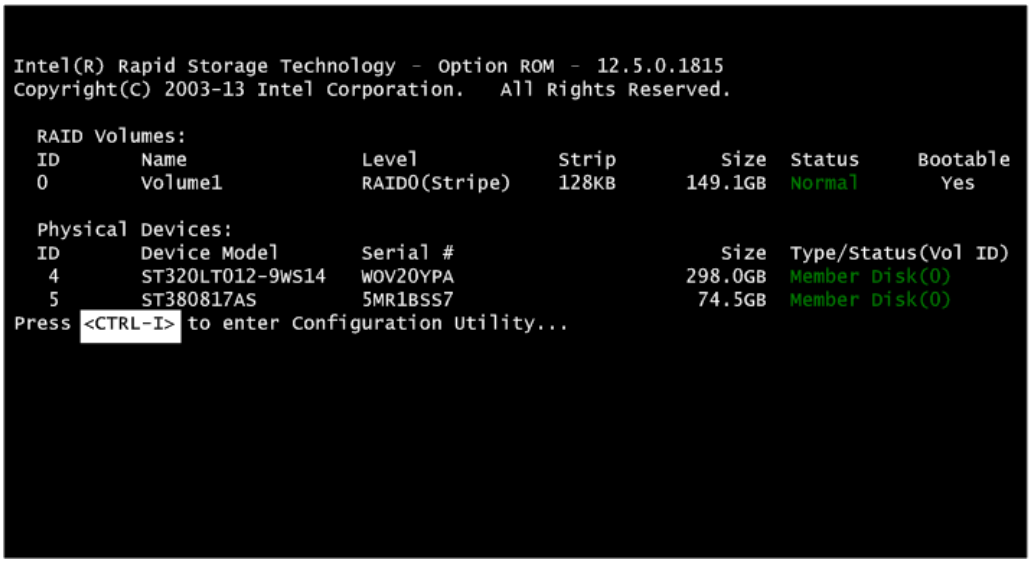


2.2. Save and exit the BIOS Setup.

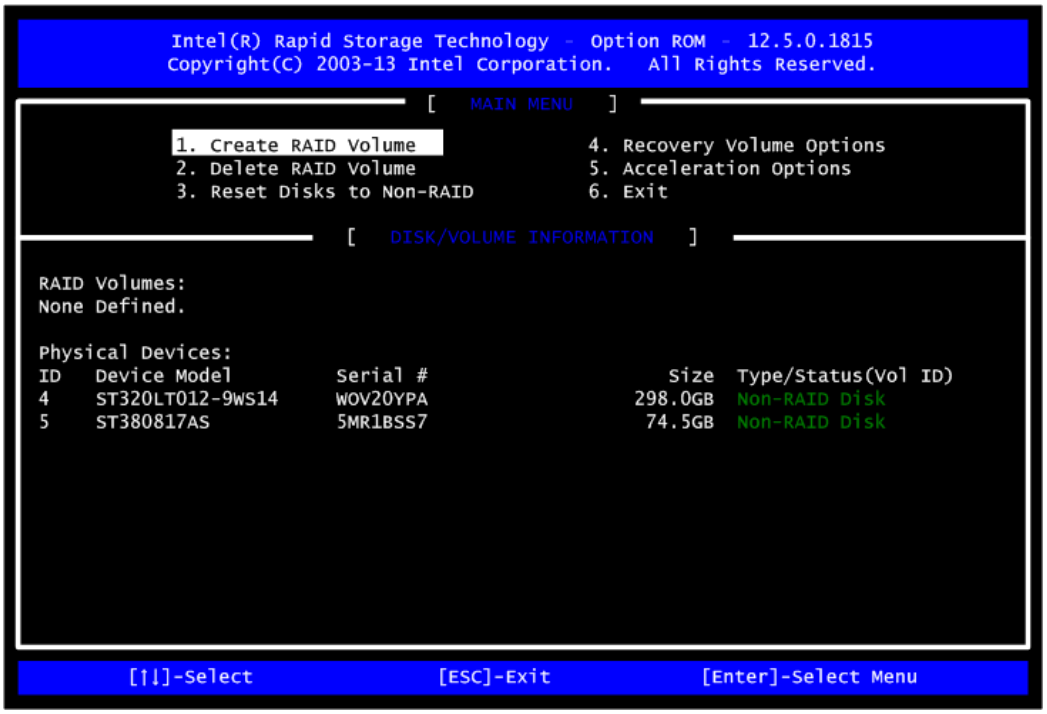
3. Configuring RAID by the RAID BIOS.

Enter the RAID BIOS setup utility to configure a RAID array. Skip this step and proceed if you do not want to create a RAID.

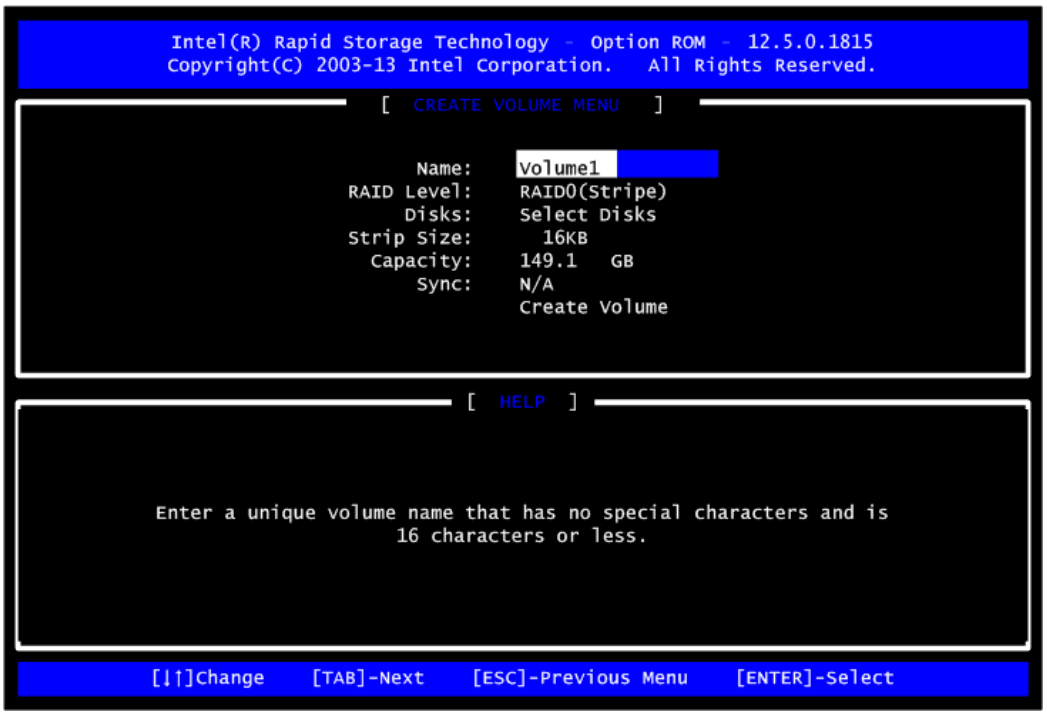
3.1. After the POST memory testing and before the operating system booting, a message "Press <Ctrl-I> to enter Configuration Utility" shows up, accordingly. Press <Ctrl + I> to enter the RAID BIOS setup utility.



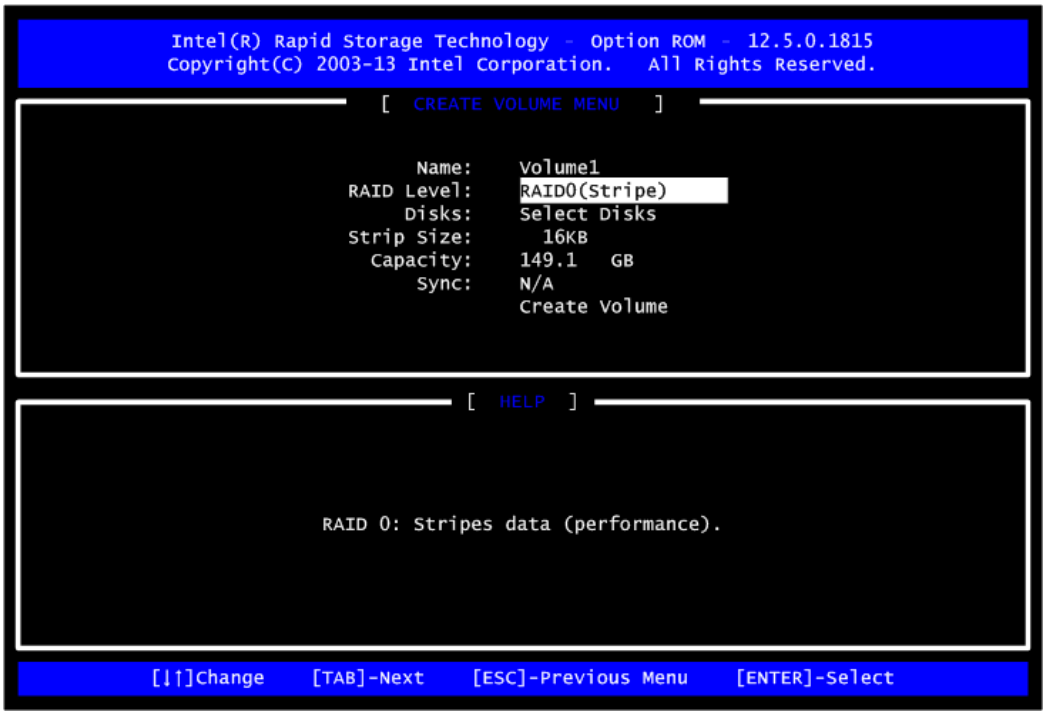
3.2. After you press <Ctrl + I>, the Create RAID Volume screen will appear. If you want to create a RAID array, select the Create RAID Volume option in the Main Menu and press <Enter>.



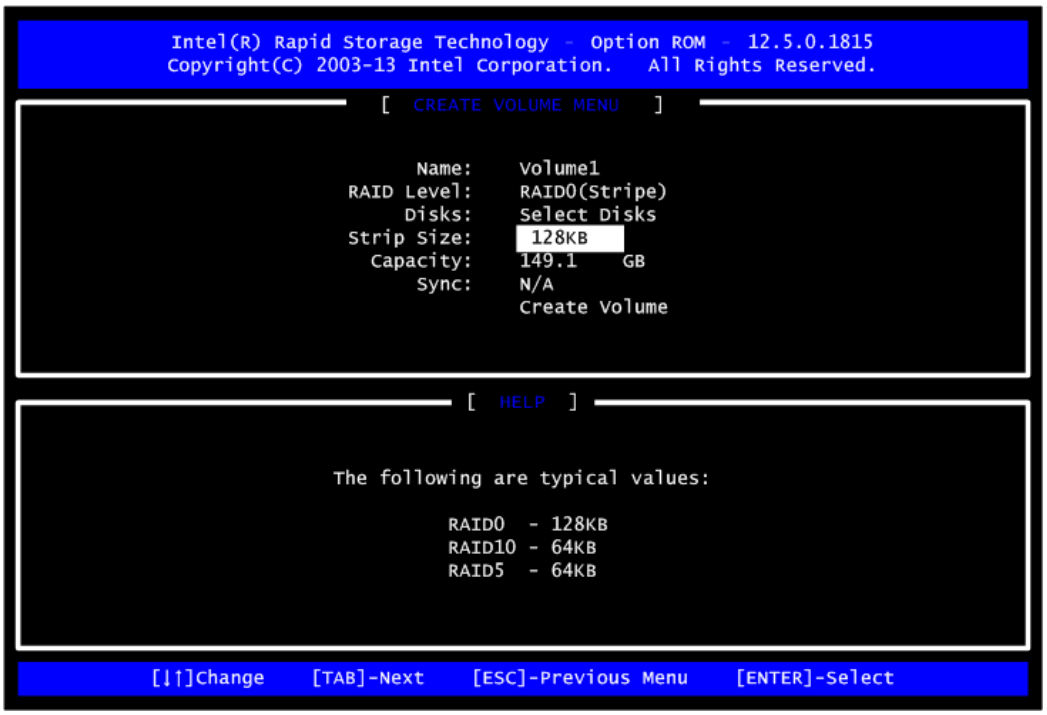
3.3. After entering the Create Volume Menu screen, you can type the disk array name with 1~16 letters (letters cannot be special characters) in the item “Name”.



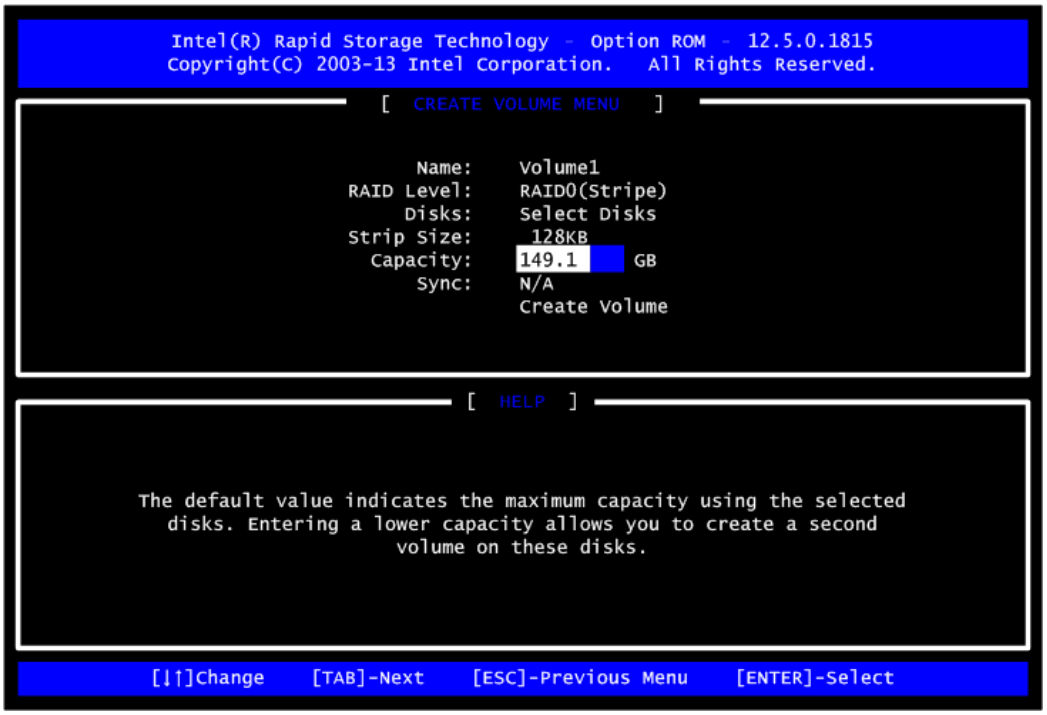
3.4. When finished, press <Enter> to select a RAID level. There are four RAID levels: RAID0, RAID1 and RAID5 and RAID10. Select a RAID level and press <Enter>.



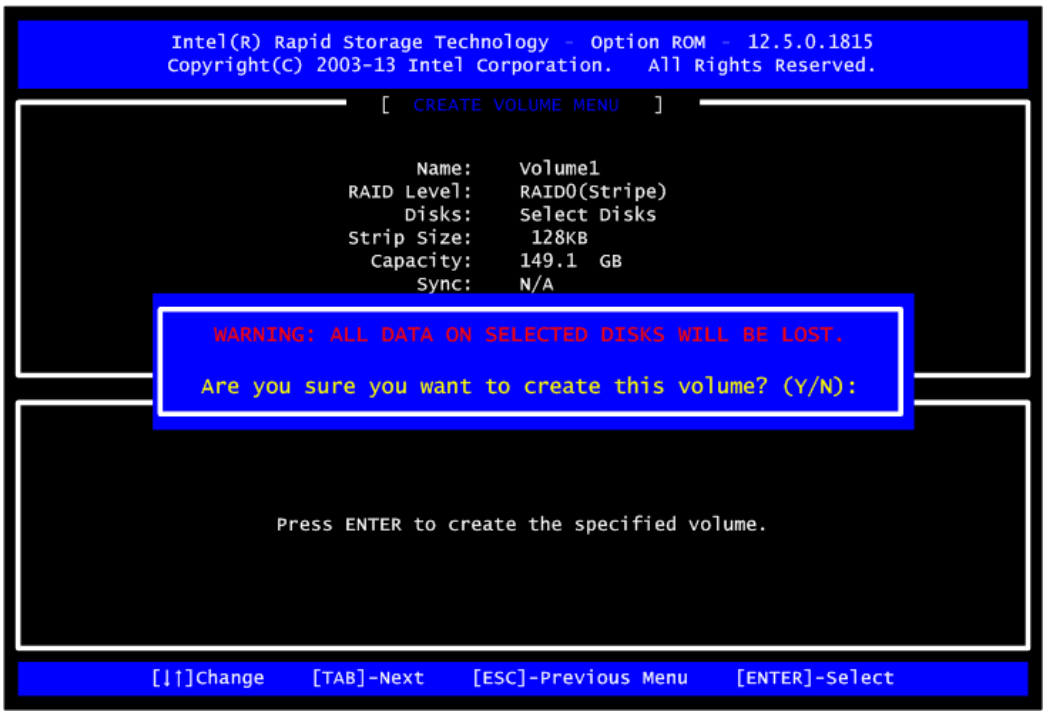
3.5. Set the strip block size. The KB is the standard unit of strip block size. The strip block size can be 4KB to 128KB. After the setting, press <Enter> for the array capacity.



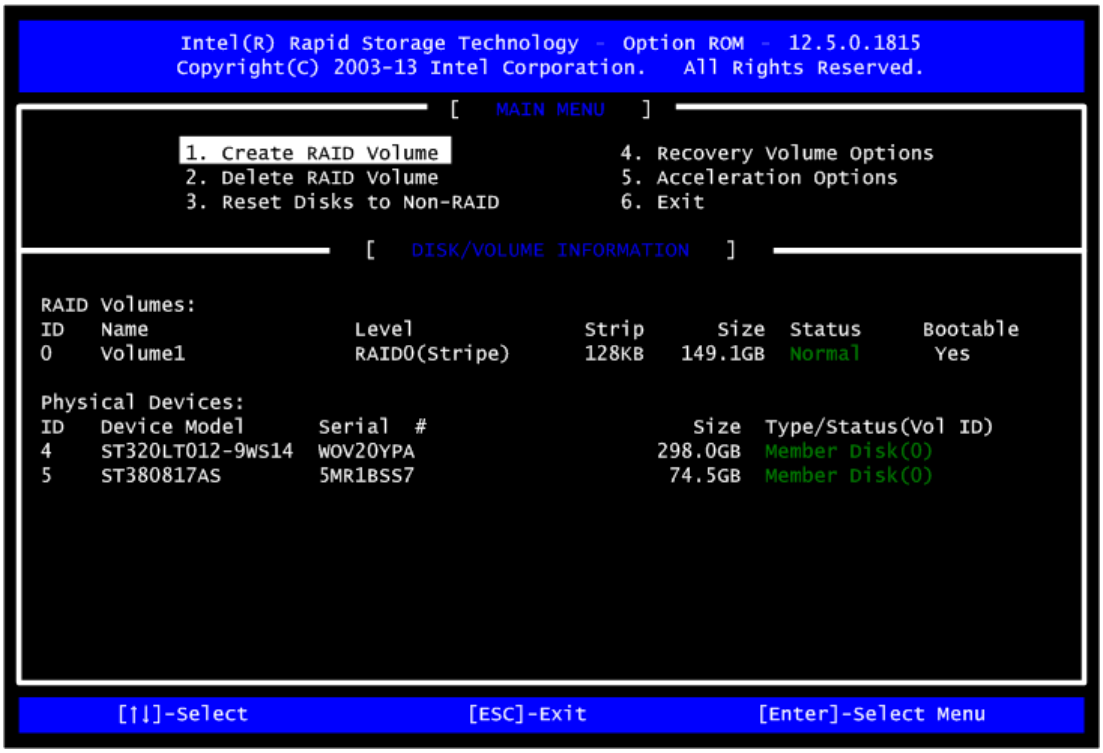
3.6. After setting all the items on the menu, select Create Volume and press <Enter> to start creating the RAID array.



3.7. When prompting the confirmation, press <Y> to create this volume, or <N> to cancel the creation.

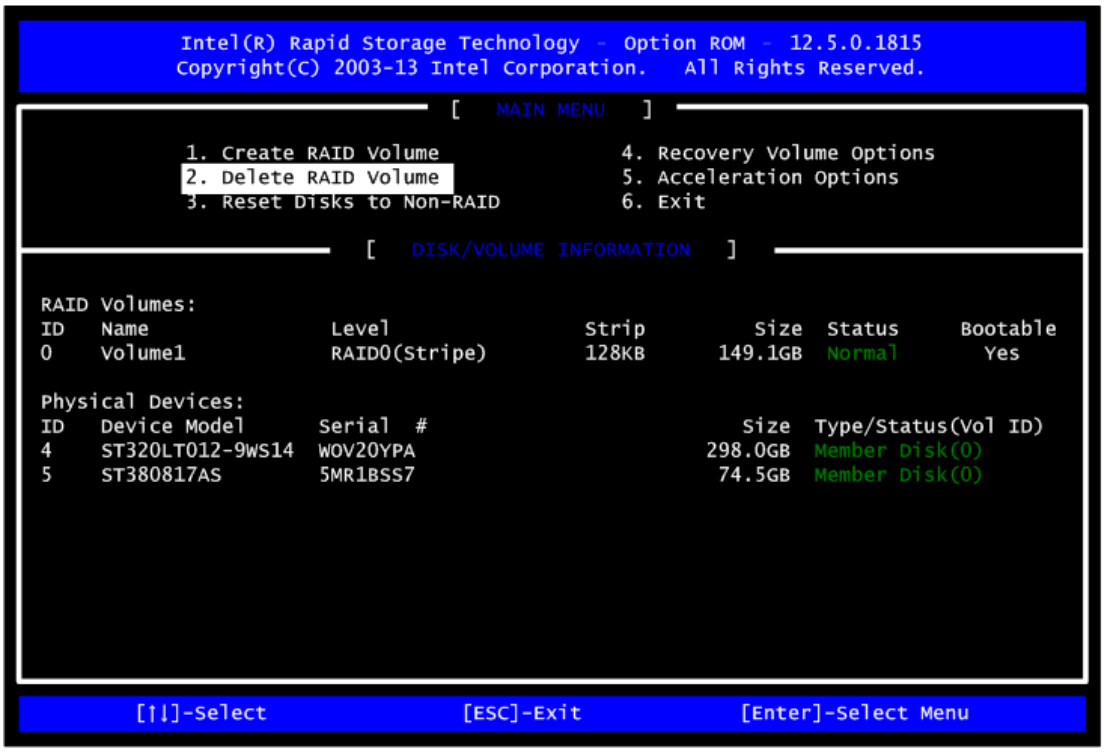


After the creation is completed, you can see detailed information about the RAID Array in the Disk/Volume Information section, including RAID mode, disk block size, disk name, and disk capacity, etc.



Delete RAID volume

If you want to delete a RAID volume, select the Delete RAID Volume option in the Main Menu. Press <Enter> and follow on-screen instructions.



Please press <Esc> to exit the RAID BIOS utility. 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

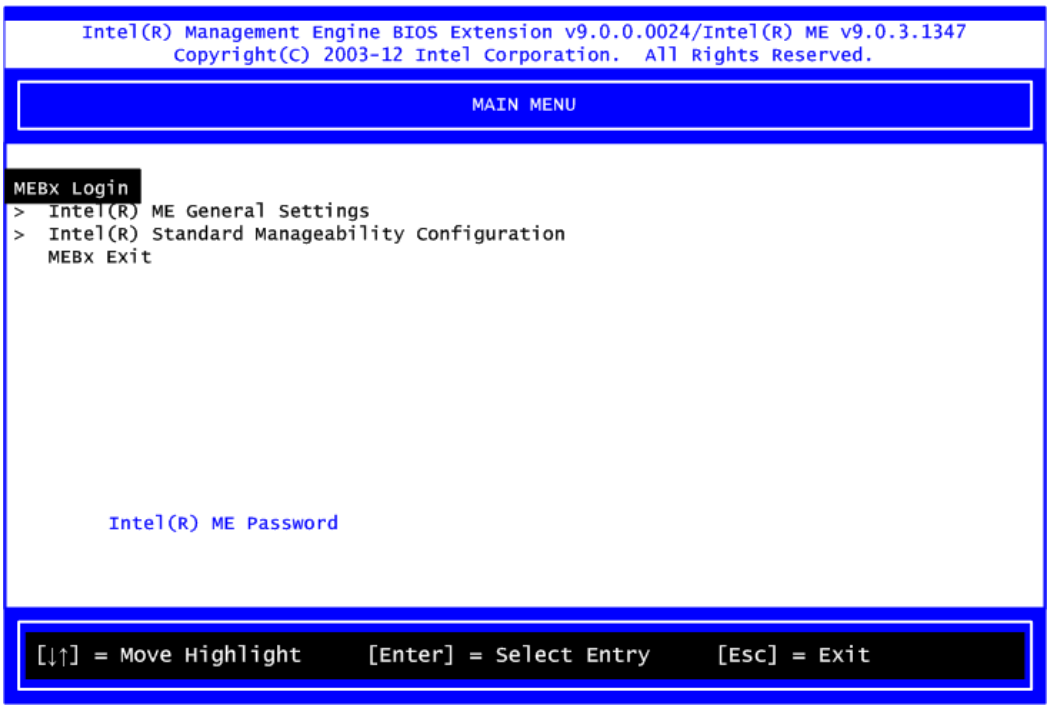
1. You must go to BIOS to enable the iAMT function.
2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.

Note

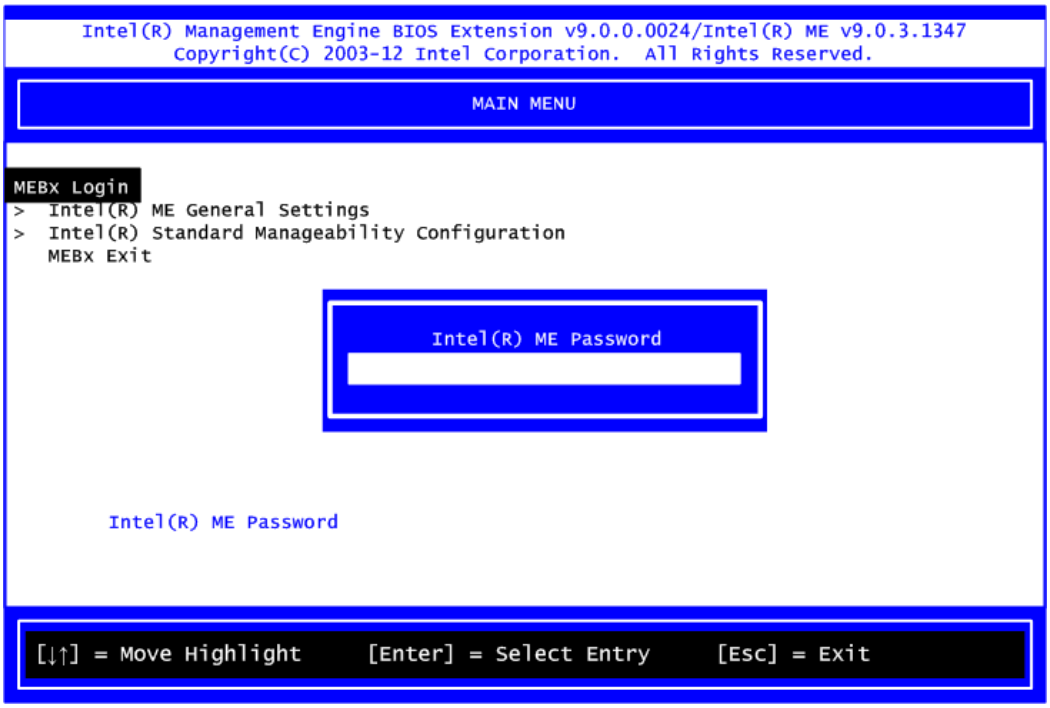
It is advised to press <Ctrl + P> before the screen pops out.

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.



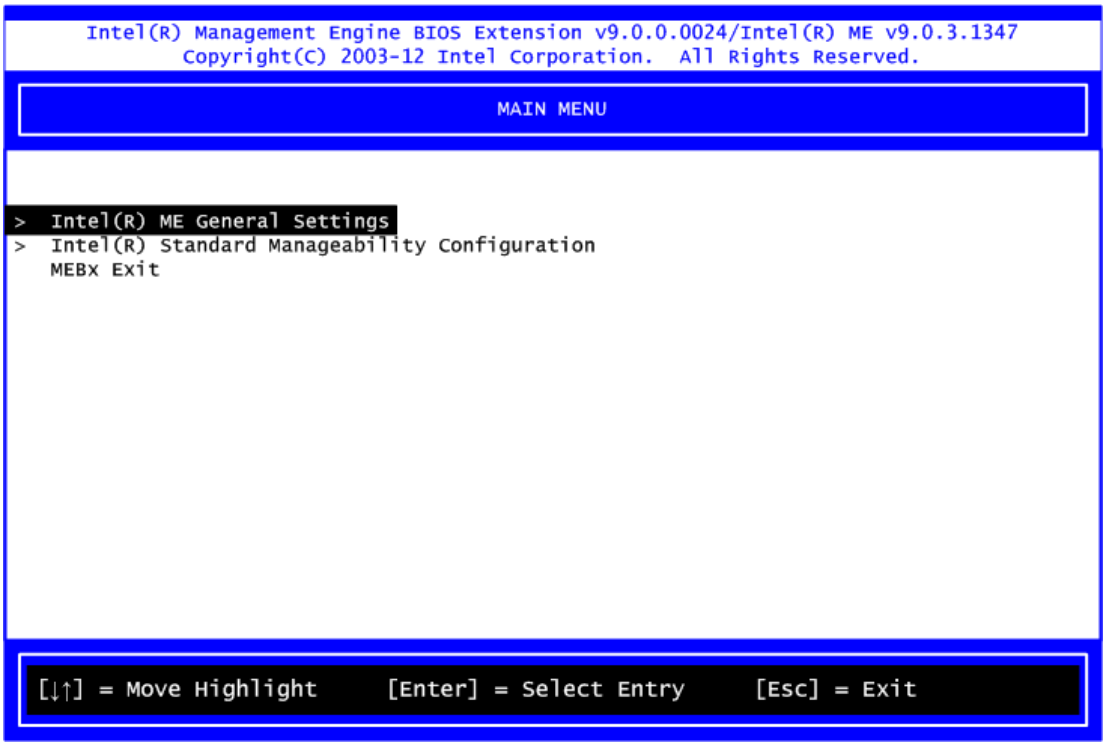
3. You must confirm your new password while revising. The new password must consist of eight characters, including at least:

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

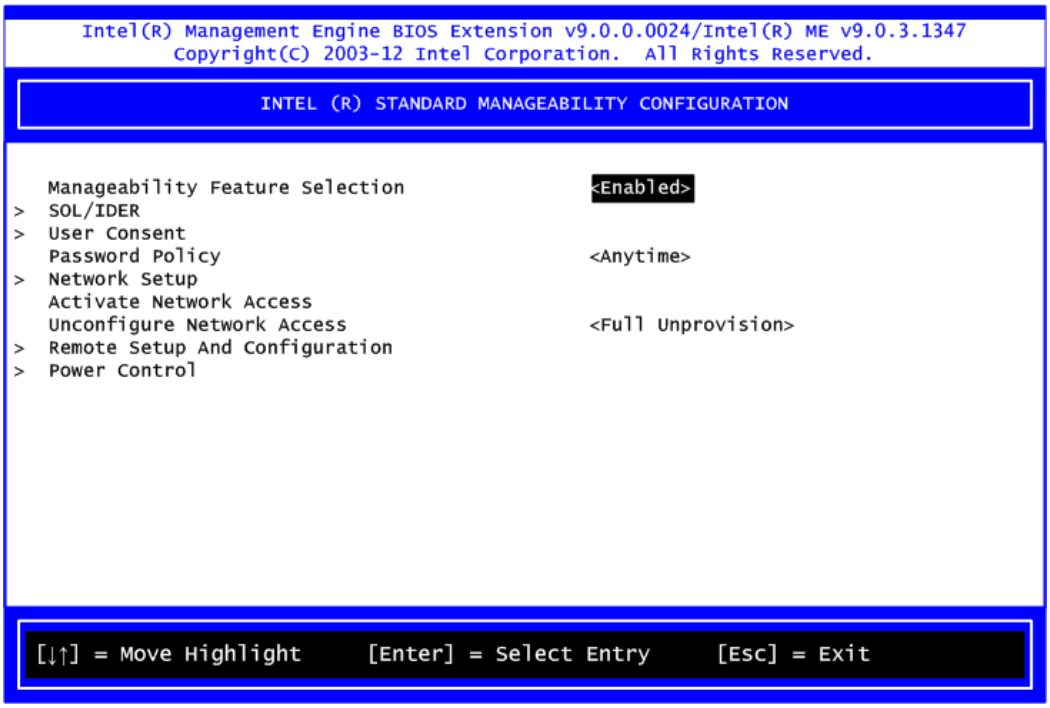
   The default value demonstrates an example of a valid password: **!!11qqQQ**
   Underline (_) and space are valid characters for making a password, but they won't make higher complexity.

D.3 iAMT Settings

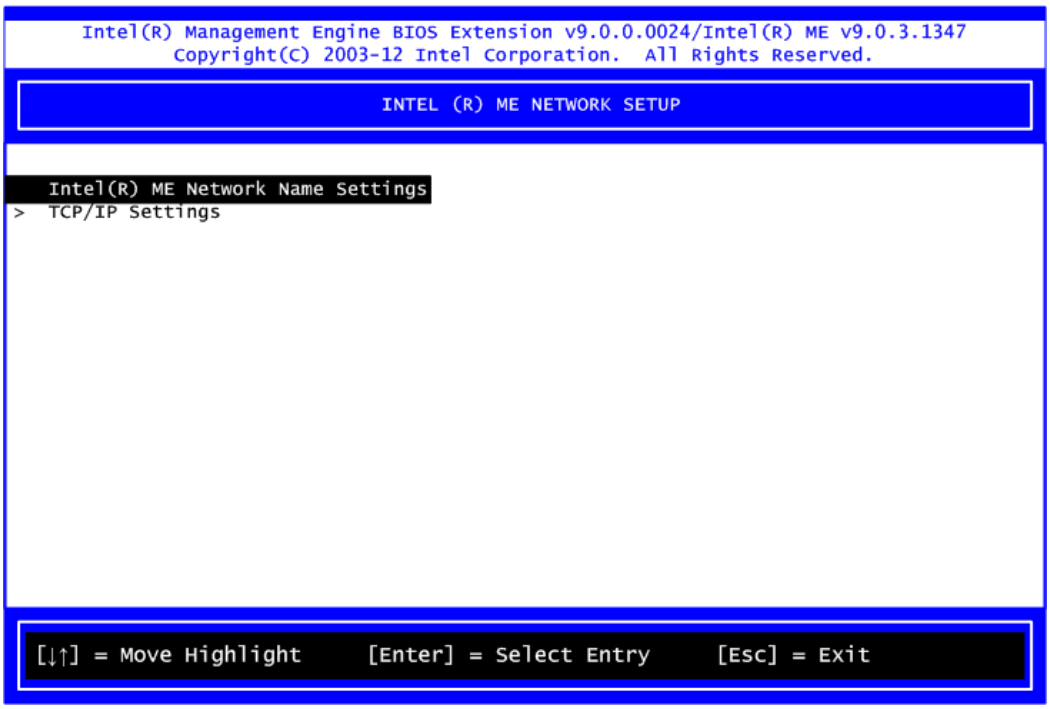
Select Intel® iAMT configuration and press <Enter>.

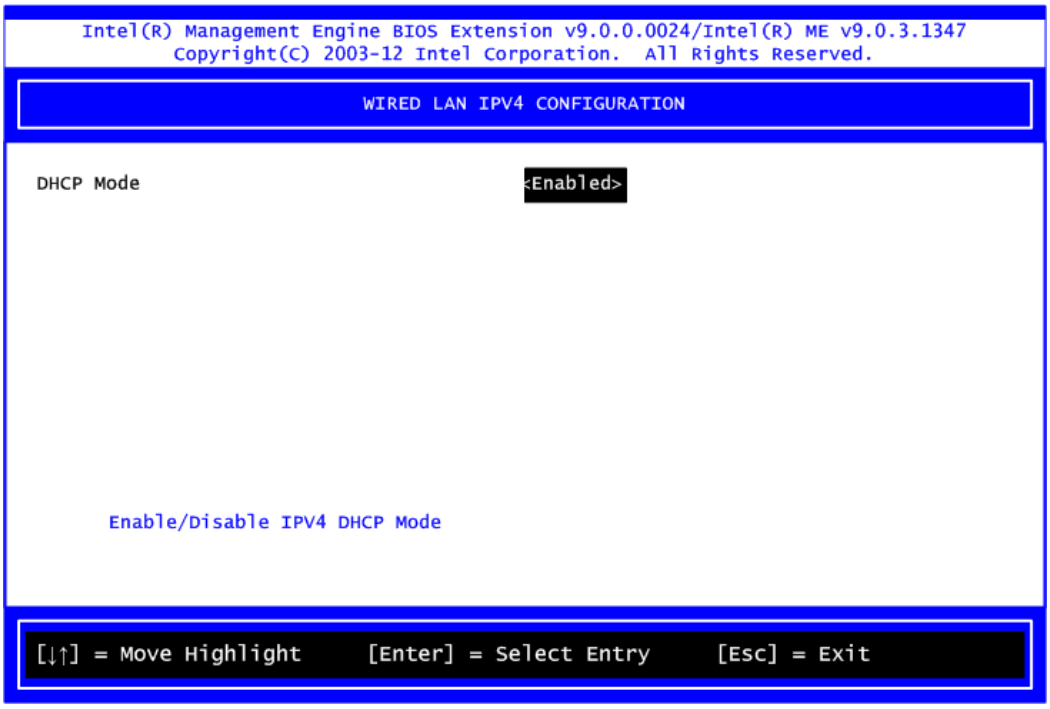


1. Select Network Setup to configure iAMT.



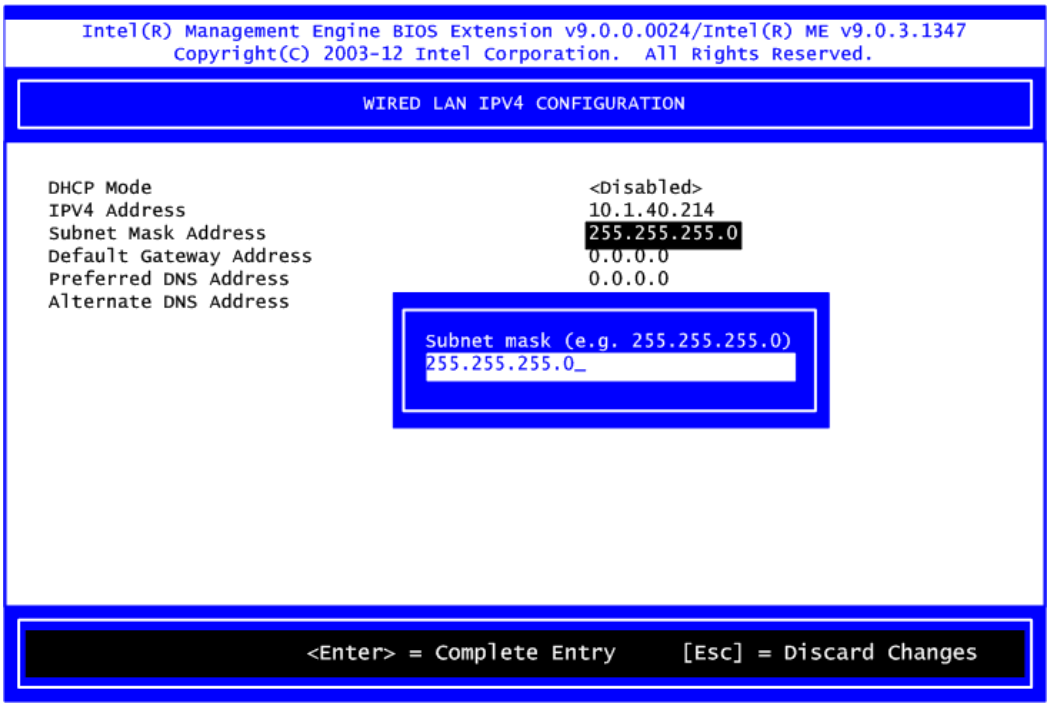
2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.



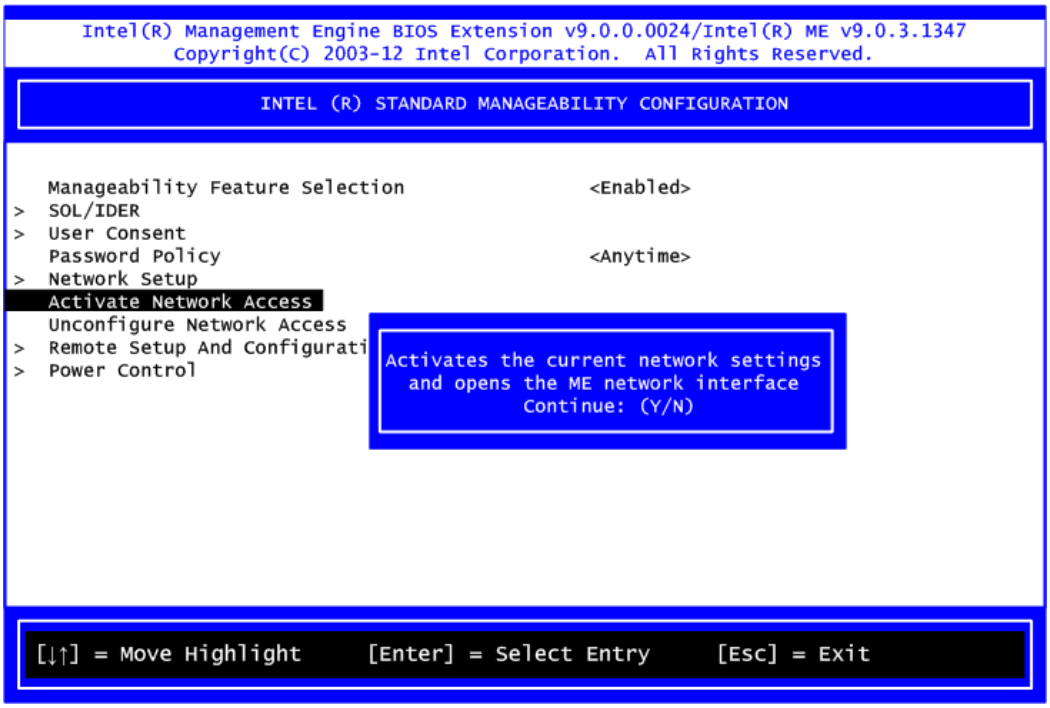


3. If DHCP Mode is disabled, complete the following settings:

   - IP address
   - Subnet mask



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

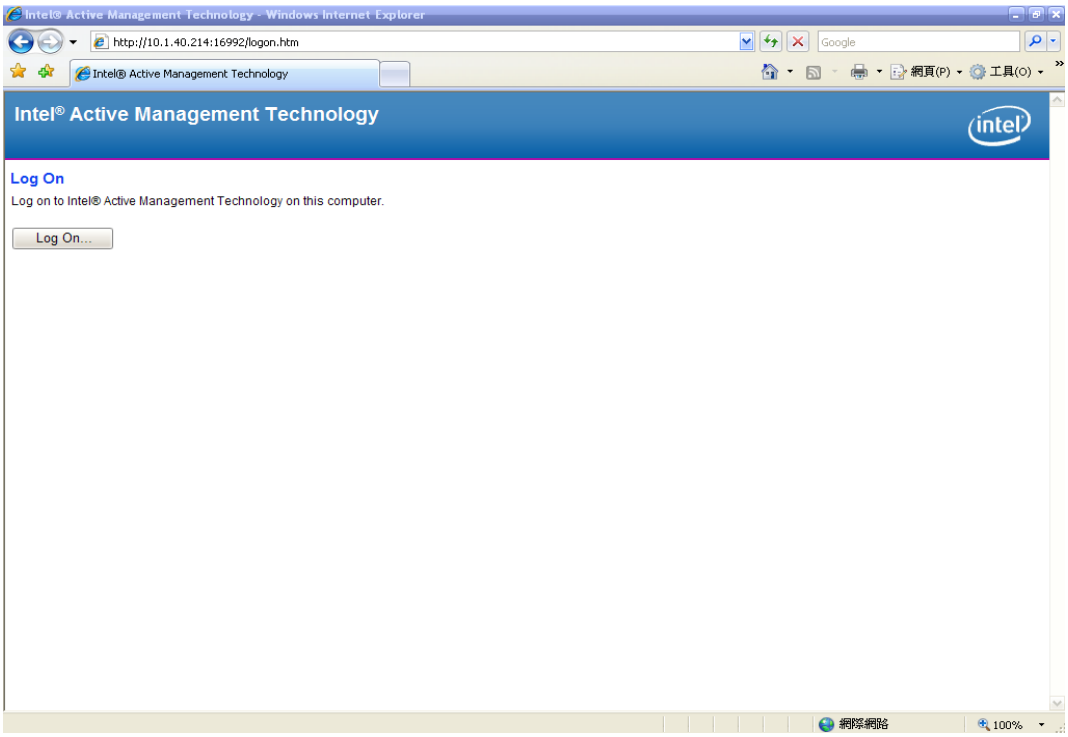


5. Exit from MEBx after completing the iAMT settings.

D.4 iAMT Web Console

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

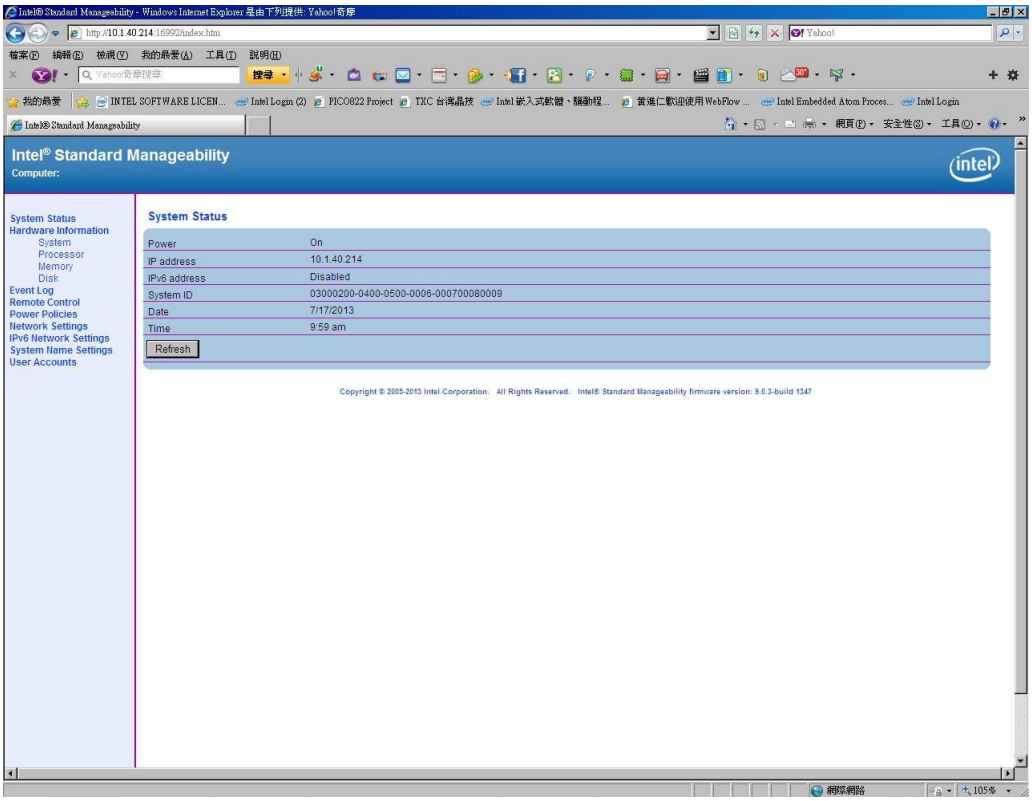
   Example: http://10.1.40.214:16992



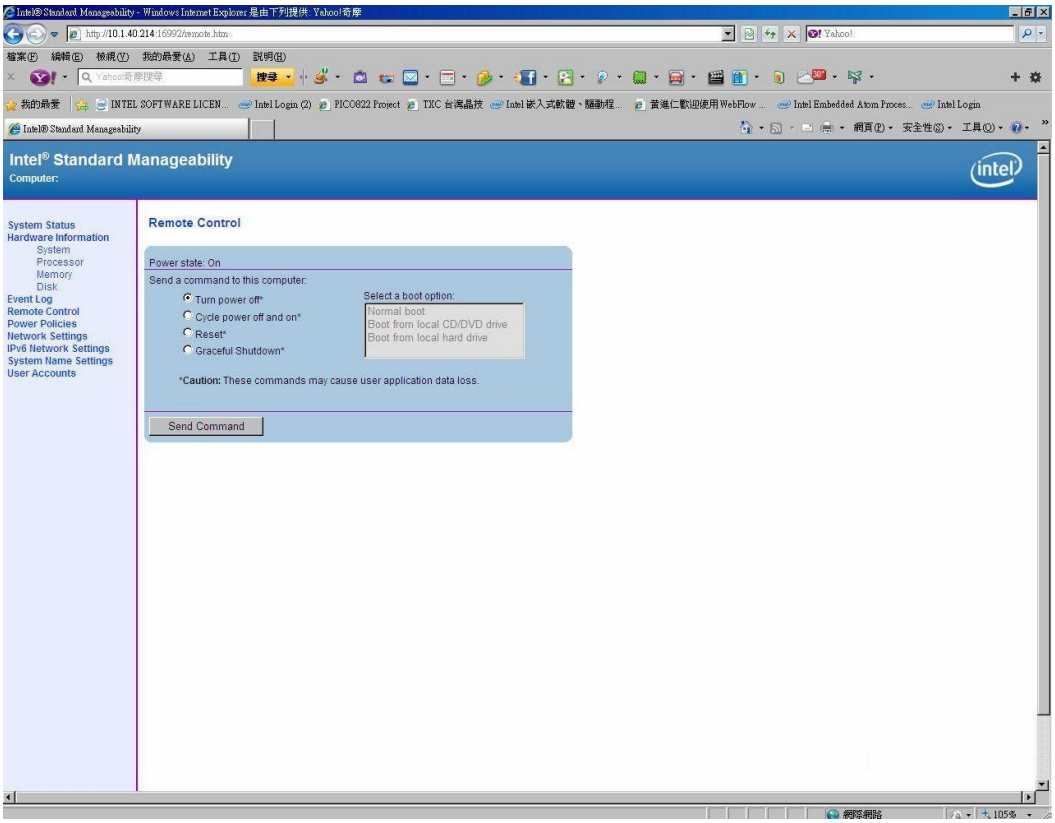
2. To log on, you will be required to type in your username and password for access to the Web.

   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.

Appendix E
PICMG® v1.3 Interface Definition

x16 PCIe Connector A			x16 PCIe Connector C		
No.	**Side B**	**Side A**	**No.**	**Side B**	**Side A**
1	N.C	N.C	1	USB0P	GND
2	GND	GND	2	USB0N	GND
3	N.C	N.C	3	GND	USB1P
4	N.C	N.C	4	GND	USB1N
5	N.C	WAKE#	5	USB2P	GND
6	PWRBT#	PME#	6	USB2N	GND
7	PWRGD	PSON#	7	GND	USB3P
8	SHB_RST#	PERST#	8	GND	USB3N
9	CFG0	CFG1	9	USBOC0#	GND
10	CFG2	CFG3	10	GND	USBOC1#
11	RSVD	GND	11	USBOC2#	GND
Mechanical Key					
12	GND	N.C	12	GND	USBOC3#
13	b_PETp0	GND	13	N.C	GND
14	b_PETn0	GND	14	N.C	GND
15	GND	b_PERp0	15	GND	N.C
16	GND	b_PERn0	16	GND	N.C
17	b_PETp1	GND	17	N.C	GND
18	b_PETn1	GND	18	N.C	GND
19	GND	b_PERp1	19	GND	N.C
20	GND	b_PERn1	20	GND	N.C
21	b_PETp2	GND	21	N.C	GND
22	b_PETn2	GND	22	N.C	GND
23	GND	b_PERp2	23	GND	N.C
24	GND	b_PERn2	24	GND	N.C
25	b_PETp3	GND	25	N.C	GND
26	b_PETn3	GND	26	N.C	GND

Mechanical Key					
27	GND	b_PERp3	27	GND	N.C
28	GND	b_PERn3	28	GND	N.C
29	REFCLK0+	GND	29	N.C	GND
30	REFCLK0-	GND	30	N.C	GND
31	GND	REFCLK1+	31	N.C	N.C
32	RSVD	REFCLK1-	32	N.C	N.C
33	REFCLK2+	GND	33	N.C	N.C
34	REFCLK2-	GND	34	N.C	GND
35	GND	REFCLK3+	35	N.C	GND
36	RSVD	REFCLK3-	36	GND	N.C
37	REFCLK4+	GND	37	GND	N.C
38	REFCLK4-	GND	38	N.C	GND
39	GND	N.C	39	N.C	GND
40	RSVD	N.C	40	GND	N.C
41	N.C	GND	41	GND	N.C
42	N.C	GND	42	+3.3V	+3.3V
43	GND	N.C	43	+3.3V	+3.3V
44	GND	N.C	44	+3.3V	+3.3V
45	a_PETp0	GND	45	+3.3V	+3.3V
46	a_PETn0	GND	46	+3.3V	+3.3V
47	GND	a_PERp0	47	+3.3V	+3.3V
48	GND	a_PERn0	48	+3.3V	+3.3V
49	a_PETp1	GND	49	+3.3V	+3.3V
50	a_PETn1	GND	50	+3.3V	+3.3V
51	GND	a_PERp1	51	GND	GND
52	GND	a_PERn1	52	GND	GND
53	a_PETp2	GND	53	GND	GND
54	a_PETn2	GND	54	GND	GND
55	GND	a_PERp2	55	GND	GND
56	GND	a_PERn2	56	GND	GND
57	a_PETp3	GND	57	GND	GND

Mechanical Key					
58	a_PETn3	GND	58	GND	GND
59	GND	a_PERp3	59	+5V	+5V
60	GND	a_PERn3	60	+5V	+5V
61	a_PETp4	GND	61	+5V	+5V
62	a_PETn4	GND	62	+5V	+5V
63	GND	a_PERp4	63	GND	GND
64	GND	a_PERn4	64	GND	GND
65	a_PETp5	GND	65	GND	GND
66	a_PETn5	GND	66	GND	GND
67	GND	a_PERp5	67	GND	GND
68	GND	a_PERn5	68	GND	GND
69	a_PETp6	GND	69	GND	GND
70	a_PETn6	GND	70	GND	GND
71	GND	a_PERp6	71	GND	GND
72	GND	a_PERn6	72	GND	GND
73	a_PETp7	GND	73	+12V	+12V
74	a_PETn7	GND	74	+12V	+12V
75	GND	a_PERp7	75	+12V	+12V
76	GND	a_PERn7	76	+12V	+12V
77	N.C	GND	77	+12V	+12V
78	+3.3V	+3.3V	78	+12V	+12V
79	+3.3V	+3.3V	79	+12V	+12V
80	+3.3V	+3.3V	80	+12V	+12V
81	+3.3V	+3.3V	81	+12V	+12V
82	RSVD	RSVD	82	+12V	+12V

x8 PCIe Connector B			x8 PCIe Connector D		
No.	**Side B**	**Side A**	**No.**	**Side B**	**Side A**
1	+5Vaux	+5Vaux	1	INTB#	INTA#
2	GND	N.C	2	INTD#	INTC#
3	a_PETp8	GND	3	GND	N.C
4	a_PETn8	GND	4	REQ3#	GNT3#
5	GND	a_PERp8	5	REQ2#	GNT2#
6	GND	a_PERn8	6	PCI_RST#	GNT1#
7	a_PETp9	GND	7	REQ1#	GNT0#
8	a_PETn9	GND	8	REQ0#	SERR#
9	GND	a_PERp9	9	N.C	+3.3V
10	GND	a_PERn9	10	GND	N.C
11	N.C	GND	11	N.C	GND
Mechanical Key					
12	GND	N.C	12	CLKC	CLKD
13	a_PETp10	GND	13	GND	+3.3V
14	a_PETn10	GND	14	CLKA	CLKB
15	GND	a_PERp10	15	+3.3V	GND
16	GND	a_PERn10	16	AD31	GND
17	a_PETp11	GND	17	AD29	+3.3V
18	a_PETn11	GND	18	N.C	AD30
19	GND	a_PERp11	19	AD27	AD28
20	GND	a_PERn11	20	AD25	GND
21	a_PETp12	GND	21	GND	AD26
22	a_PETn12	GND	22	C/BE3#	AD24
23	GND	a_PERp12	23	AD23	+3.3V
24	GND	a_PERn12	24	GND	AD22
25	a_PETp13	GND	25	AD21	AD20
26	a_PETn13	GND	26	AD19	N.C
27	GND	a_PERp13	27	+5V	AD18
28	GND	a_PERn13	28	AD17	AD16

Mechanical Key					
29	a_PETp14	GND	29	C/BE2#	GND
30	a_PETn14	GND	30	PCI_PRST#	FRAME#
31	GND	a_PERp14	31	IRDY#	TRDY#
32	GND	a_PERn14	32	DEVSEL#	+5V
33	a_PETp15	GND	33	LOCK#	STOP#
34	a_PETn15	GND	34	PERR#	GND
35	GND	a_PERp15	35	GND	C/BE1#
36	GND	a_PERn15	36	PAR	AD14
37	N.C	GND	37	N.C	GND
38	N.C	N.C	38	GND	AD12
39	GND	GND	39	AD15	AD10
40	GND	GND	40	AD13	GND
41	GND	GND	41	GND	AD09
42	GND	GND	42	AD11	C/BE0#
43	GND	GND	43	AD08	GND
44	+12V	+12V	44	GND	AD06
45	+12V	+12V	45	AD07	AD05
46	+12V	+12V	46	AD04	GND
47	+12V	+12V	47	GND	AD02
48	+12V	+12V	48	AD03	AD01
49	+12V	+12V	49	AD00	GND

Note

Please contact your vendor to get the backplane design guide if it's required. The backplane design guide is NDA required.

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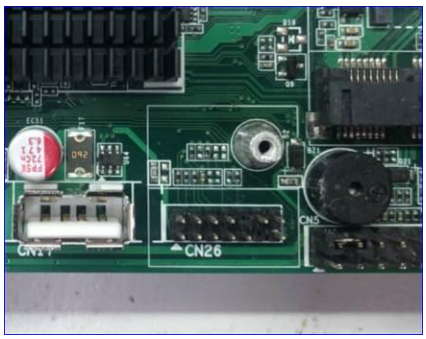
Appendix F
TPM Module Installation

The TPM 2.0 (Trusted Platform Module 2.0) module is a modularized design applying to the SHB150 and provides enhanced hardware security for the computer. In this appendix you will learn how to install the TPM 2.0 module into the SHB150. Please read and follow the instructions below carefully.

1. Insert TPM module into the SPI interface of motherboard, as illustrated below.

AX93515 TPM module

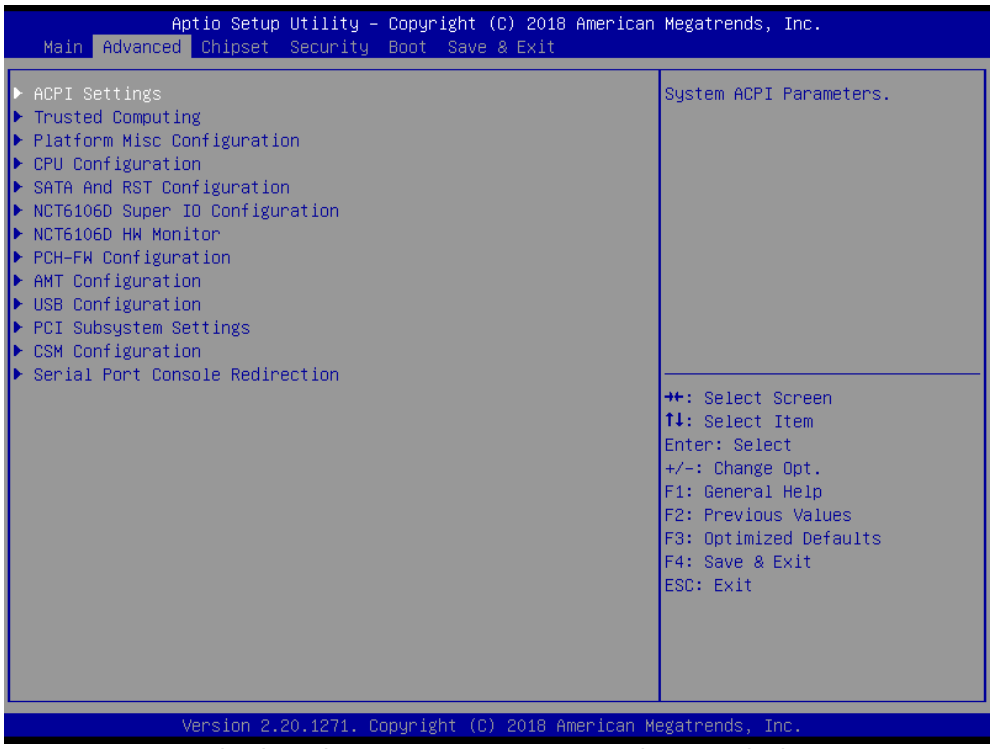


TPM SPI interface

TPM module Put On

2. There are two ways to confirm whether the TPM Module is installed successfully or not:

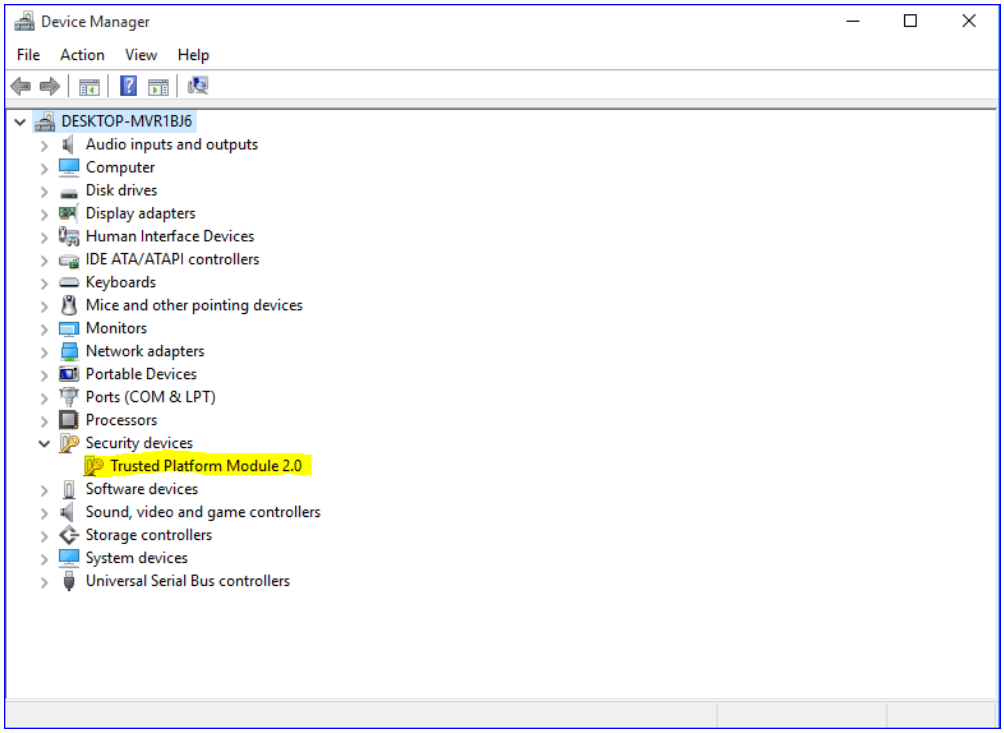
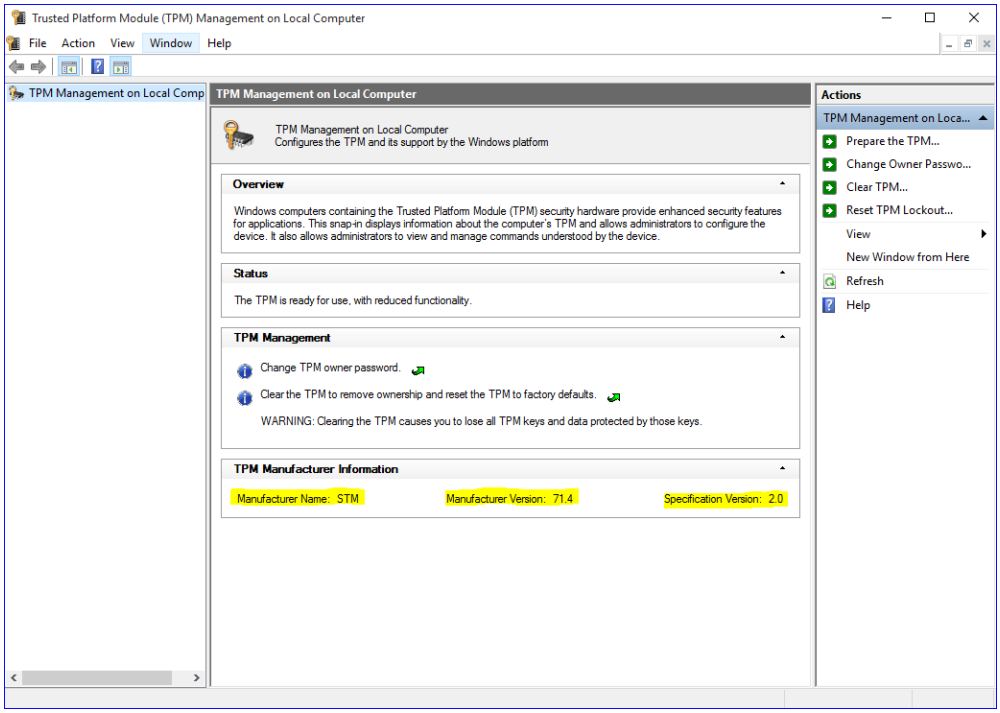
   a. Enter the BIOS setup menu and go to Trusted Computing. On the first line will show “TPM2.0 Device Found”.



(In the Advance menu, go to Trusted Computing)

(In the Trusted Computing section, on the first of line will show “TPM2.0 Device Found”, if installation is successful.)

b. In the Windows 10 OS environment, enter Device Manager, and select the item of Security devices. The screen will show “Trusted Platform Module 2.0” if installation is successful.



c. In the Windows 10 OS environment, enter Control Panel, select the item of BitLocker Drive Encryption, and enter TPM Administration. The screen will show the information below if installation is successful.