



CS170-Q370/C246/H310

Mini-ITX Industrial Motherboard

User's Manual

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FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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Warranty

1. Warranty does not cover damages or failures that arise from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.



Important:

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

To avoid damage to the system:

- Use the correct AC input voltage range.

To reduce the risk of electric shock:

- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One CS170-Q370/C246/H310 motherboard
- One Serial ATA data cable (Length: 500mm)
- One I/O shield

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance to the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Optional Items

- USB port cable (Length: 200mm)
- Serial ATA data cable (Length: 500mm)
- Thermal solution (For 35W, Height: 37.3mm)
- Thermal solution (For 65W, Height: 72.8mm)
- Thermal solution (For 80W, Height: 77.1mm)

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance to the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- A CPU
- Memory module
- Storage devices such as hard disk drive, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.

Chapter 1 - Introduction

► Specifications

SYSTEM	Processor	<p>9th Generation Intel® Core™ Processors, LGA 1151 Socket, TDP up to 95W</p> <ul style="list-style-type: none"> Xeon E-2278GE Processor (Core 8; Max speed 4.7 GHz; TDP 80W) (support ECC memory) i9-9900K Processor (Core 8, Max speed 5.0 GHz; TDP 95W) i7-9700E Processor (Core 8; Max speed 4.4 GHz; TDP 65W) i7-9700TE Processor (Core 8; Max speed 3.8 GHz; TDP 35W) i5-9500E Processor (Core 6; Max speed 4.2 GHz; TDP 65W) i5-9500TE Processor (Core 6; Max speed 3.6 GHz; TDP 35W) i3-9100E Processor (Core 4; Max speed 3.7 GHz; TDP 65W) (support ECC memory) i3-9100TE Processor (Core 4; Max speed 3.2 GHz; TDP 35W) (support ECC memory) <p>8th Generation Intel® Core™ Processors, LGA 1151 Socket, TDP up to 95W</p> <ul style="list-style-type: none"> Xeon E-2176G Processor (Core 6; Max speed 4.7 GHz; TDP 80W) (support ECC memory) i7-8700 Processor (Core 6; Max speed 4.6 GHz; TDP 65W) i7-8700T Processor (Core 6; Max speed 4.0 GHz; TDP 35W) i5-8500 Processor (Core 6; Max speed 4.1 GHz; TDP 65W) i5-8500T Processor (Core 6; Max speed 3.5 GHz; TDP 35W) i3-8100 Processor (Core 4; Max speed 3.6 GHz; TDP 65W) (support ECC memory) i3-8100T Processor (Core 4; Max speed 3.1 GHz; TDP 35W) (support ECC memory) Pentium G5400 Processor (Core 2; Max speed 3.7 GHz; TDP 58W) (support ECC memory) Celeron G4900 Processor (Core 2; Max speed 3.1 GHz; TDP 54W) (support ECC memory) 	Feature	OpenGL 4.5, DirectX 12, OpenCL 2.1 HW Decode: AVC/H.264, MPEG2, VC1/WMV9, JPEG/MJPEG, HEVC/H265, VP8, VP9 HW Encode: AVC/H.264, MPEG2, JPEG, HEVC/H265, VP8, VP9
	Memory	<p>Dual Channel DDR4 2400/2666MHz</p> <p>C246: Two 260-pin ECC/non-ECC SODIMM up to 32GB (Core™ i5/i7 only support non-ECC)</p> <p>Q370/H310: Two 260-pin non-ECC SODIMM up to 32GB</p>	Display	1 x LVDS up to 1920x1200 @ 60Hz 1 x VGA up to 1920x1200 @ 60Hz 2 x DP++ up to 4096x2304 @ 60Hz
	Chipset	Intel® Q370/C246/H310 Chipset	Triple-Displays	(LVDS & VGA & DP++), (LVDS & DP++ & DP++), (VGA & DP++ & DP++)
	BIOS	AMI SPI 128Mbit	EXPANSION	
GRAPHICS	Controller	Intel® UHD Graphics 630 (only Pentium G5400, Celeron G4900 support 610)	Interface	Q370/C246: 1 x PCIe x16 (Gen 3) (Max. 75W) 1 x M.2 2280 M Key (PCIe x4/SATA) (support NVMe and Intel® Optane memory) 1 x M.2 2230 E Key (USB/PCIe) (bottom side) H310: 1 x PCIe x16 (Gen 3) (Max. 75W) 1 x M.2 2280 M Key (PCIe) (support NVMe) 1 x M.2 2230 E Key (USB/PCIe)
			AUDIO	Audio Codec Realtek ALC887S-VD2-GR
			ETHERNET	Controller Q370/C246: 1 x Intel® I219LM PHY with iAMT12 and vPro (10/100/1000Mbps) (Core i7/i5 supports iAMT) 1 x Intel® I210AT PCIe (10/100/1000Mbps) H310: 1 x Intel® I219V PHY (10/100/1000Mbps) 1 x Intel® I210T PCIe (10/100/1000Mbps)
			REAR I/O	Ethernet 2 x GbE (RJ-45)
				USB Q370/C246: 2 x USB 3.1 Gen2 4 x USB 3.1 Gen1 H310: 4 x USB 3.1 Gen1 2 x USB 2.0
				Display 1 x VGA (DB-15) 2 x DP++

► Specifications

	Serial	2 x RS-232 (DB-9)
	Audio	Audio 1 x Line-out, 1 x Mic-in, 1 x Line-in (available upon request)
Internal I/O	Display	1 x LVDS
	Audio	1 x Front Audio (2.00mm pitch)
	USB	2 x USB 2.0 (2.00mm pitch)
	SATA	2 x SATA 3.0 (up to 6Gb/s) RAID 0/1/5
	DIO	1 x 8-bit DIO, 1 x DIO Power
	SMBus	1 x SMBus
	LPC	1 x LPC
WATCHDOG TIMER	Output & Interval	System Reset, Programmable via Software from 1 to 255 Seconds
SECURITY	TPM	dTPM2.0 (default)
POWER	Type	ATX
	Connector	4-pin ATX 12V power, 24-pin ATX power
	RTC Battery	CR2032 Coin Cell
OS SUPPORT	Windows / Linux	Microsoft Windows 10 IoT Enterprise 64-bit Linux
Environment	Temperature	Operating: -5 to 65°C Storage: -40 to 85°C
	Humidity	Operating: 5 to 90% RH Storage: 5 to 90% RH
MECHANICAL	Dimensions	Mini-ITX Form Factor 170mm (6.7") x 170mm (6.7")
	Height	PCB: 1.6mm Top Side: 20mm Bottom Side: 3mm

► Features

Watchdog Timer

The Watchdog Timer function allows your application to regularly “clear” the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

DDR4

DDR4 delivers increased system bandwidth and improves performance at a lower power than DDR3/DDR2.

Graphics

The integrated Intel® UHD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with outstanding graphics responsiveness. These enhancements deliver the performance and compatibility needed for today’s and tomorrow’s business applications.

PCI Express

PCI Express is a high bandwidth I/O infrastructure that possesses the ability to scale speeds by forming multiple lanes. The PCI Express architecture also supports high performance graphics infrastructure by enhancing the capability.

Serial ATA

Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s.

Gigabit LAN

Two Intel® Gigabit LAN controllers (Intel® I210AT PCIe and Intel® I219V PCIe) support up to 1Gbps data transmission. (CS170-H310)

Two Intel® Gigabit LAN controllers (Intel® I210AT PCIe and Intel® I219LM PCIe) support up to 1Gbps data transmission. (CS170-Q370/C246)

Audio

The Realtek ALC887S-VD2-GR audio codec provides High Definition audio output.

Wake-On-LAN

This feature allows the network to remotely wake up a Soft Power Down (Soft-Off) PC. It is supported via the onboard LAN port or via a PCI LAN card that uses the PCI PME (Power Management Event) signal. However, if your system is in the Suspend mode, you can power-on the system only through an IRQ or DMA interrupt.

Wake-On-USB

This function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

RTC Timer

The RTC installed on the system board allows your system to automatically power-on on the set date and time.

ACPI STR

The system board is designed to meet the ACPI (Advanced Configuration and Power Interface) specification. ACPI has energy saving features that enables PCs to implement Power Management and Plug-and-Play with operating systems that support OS Direct Power Management. ACPI when enabled in the Power Management Setup will allow you to use the Suspend to RAM function.

With the Suspend to RAM function enabled, you can power-off the system at once by pressing the power button or selecting “Standby” when you shut down Windows® without having to go through the sometimes tiresome process of closing files, applications and operating system. This is because the system is capable of storing all programs and data files during the entire operating session into RAM (Random Access Memory) when it powers-off. The operating session will resume exactly where you left off the next time you power-on the system.

Power Failure Recovery

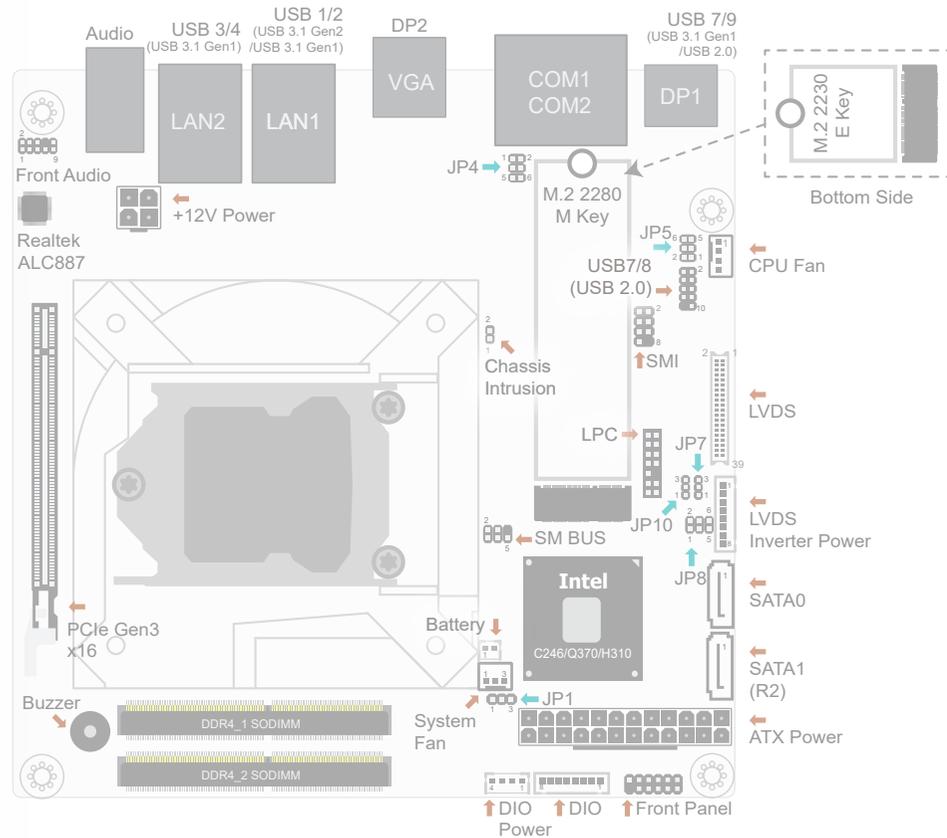
When power returns after an AC power failure, you may choose to either power-on the system manually or let the system power-on automatically.

USB

USB 3.1 Gen2 is capable of running at a maximum transmission speed of up to 10 Gbit/s (1.2 GB/s) and is faster than USB 3.1 Gen1 (5 Gbit/s, or 625 MB/s), USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.1 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

Chapter 2 - Hardware Installation

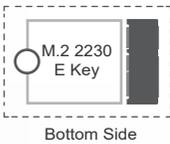
► Board Layout



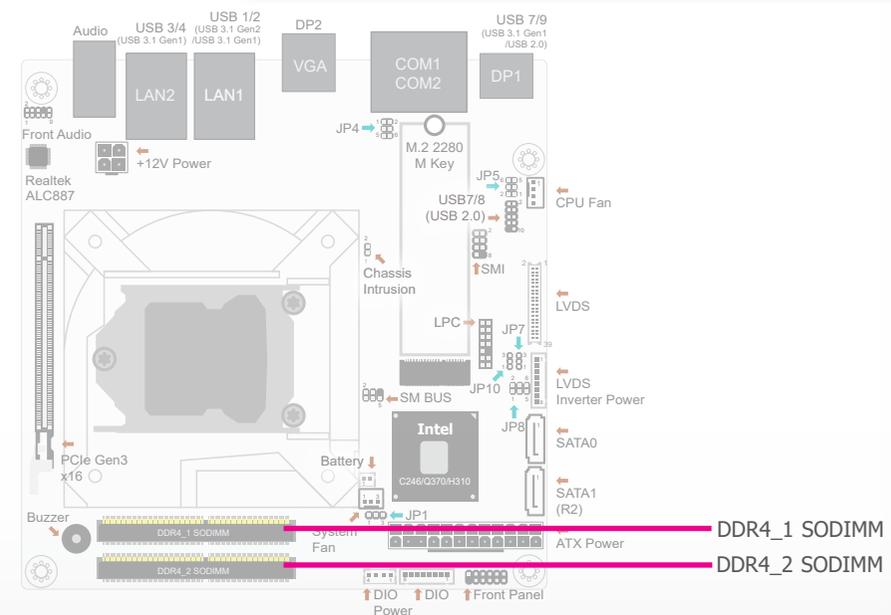
Important: Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

► System Memory

Important: When the Standby Power LED lit red, it indicates that there is power on the system board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the motherboard and components.



Note: A M.2 E Key 2230 socket with standoff is available at the bottom side of this board.



► System Memory

The system board supports the following memory interface.

Single Channel (SC)

Data will be accessed in chunks of 64 bits from the memory channels.

Dual Channel (DC)

Data will be accessed in chunks of 128 bits from the memory channels. Dual channel provides better system performance because it doubles the data transfer rate.

Single Channel DIMMs are on the same channel. DIMMs in a channel can be identical or completely different. However, we highly recommend using identical DIMMs. Not all slots need to be populated.

Dual Channel DIMMs of the same memory configuration are on different channels.

Features

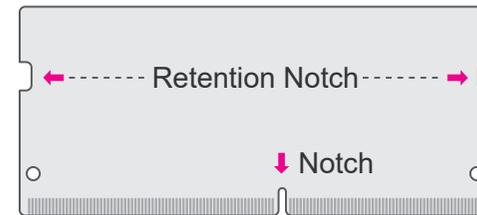
- Two 260-pin SODIMM up to 32GB
- Dual Channel DDR4 2133/2400/2666MHz
- ECC memory supported by CS170-C246

► System Memory

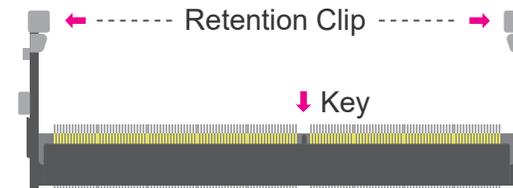
Installing the SODIMM Module

Before installing the memory module, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the SO-DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.



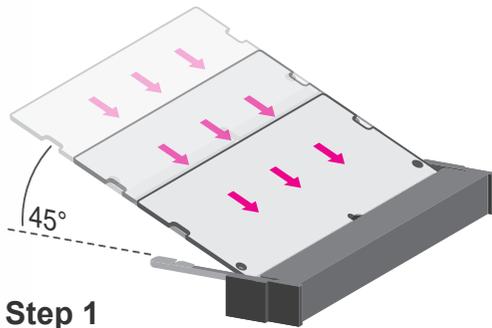
◀◀◀ **DDR4 SO-DIMM**



◀◀◀ **Socket Top View**

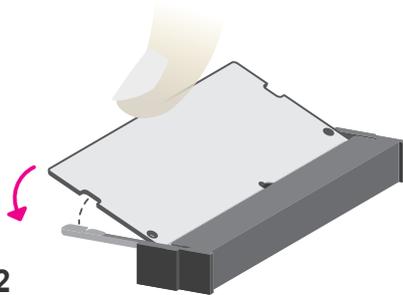
► System Memory

Please follow the steps below to install the memory card into the socket.



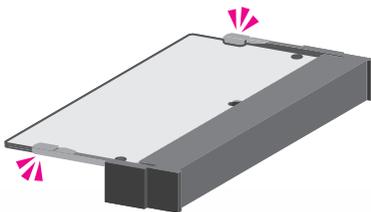
Step 1

Insert the memory card into the slot while making sure 1) the notch and the key are aligned, and 2) the non-connector end rises approximately 45 degrees horizontally. Press the card firmly into the socket while applying and maintaining even pressure on both ends.



Step 2

Press the end of the card far from the socket down while making sure the retention notch and the clip align as indicated by the dotted line in the illustration. If the retention notch and the clip do not align, please remove the card and re-insert it. Press the card all the way down.



Step 3

The clips snap automatically and abruptly to the retention notches of the card sounding a distinctive click, and lock the card in place. Inspect that the clip sits in the notch. If not, please pull the clips outward, release and remove the card, and mount it again.

► CPU

The system board is equipped with a surface mount LGA 1151 socket. This socket is exclusively designed for installing a LGA 1151 packaged Intel CPU.



Important:

1. Before you proceed, make sure (1) the LGA 1151 socket comes with a protective cap, (2) the cap is not damaged and (3) the socket's contact pins are not bent. If the cap is missing or the cap and/or contact pins are damaged, contact your dealer immediately.
2. Make sure to keep the protective cap. RMA requests will be accepted and processed only if the LGA 1151 socket comes with the protective cap.



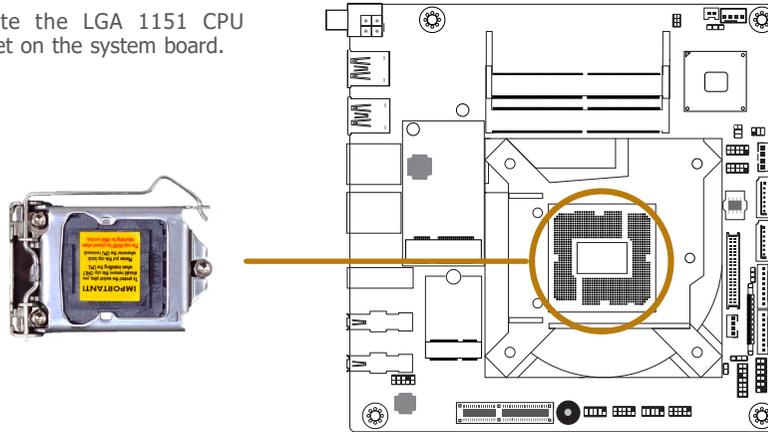
Note:

The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.

► CPU

Installing the CPU

1. Make sure the PC and all other peripheral devices connected to it have been powered down.
2. Disconnect all power cords and cables.
3. Locate the LGA 1151 CPU socket on the system board.



Important:

The CPU socket must not come in contact with anything other than the CPU. Avoid unnecessary exposure. Remove the protective cap only when you are about to install the CPU.

4. Unlock the socket by pressing the load lever down, moving it sideways until to escape the retention tab. Lift the load lever up when it's released.



5. Lift the load lever and the load plate all the way up as shown in the photo.



6. Remove the protective cap from the CPU socket. The cap is used to protect the CPU socket against dust and harmful particles. Remove the protective cap only when you are about to install the CPU.

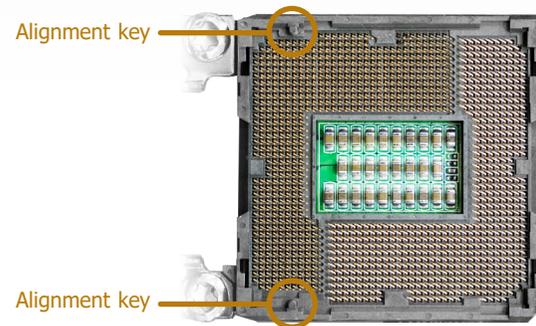


- 7-1. Insert the CPU into the socket. The gold triangular mark on the CPU must align with the chamfer corner of the CPU socket shown in the photo.



► CPU

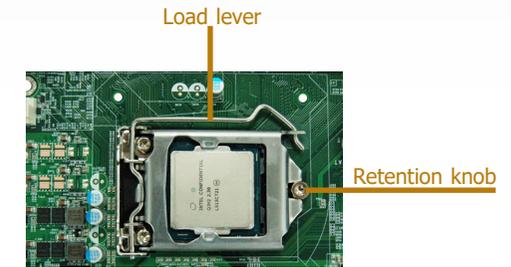
7-2. Two keys on the socket and notches on the CPU also facilitate alignment.



8. Close the load plate then push the load lever down.

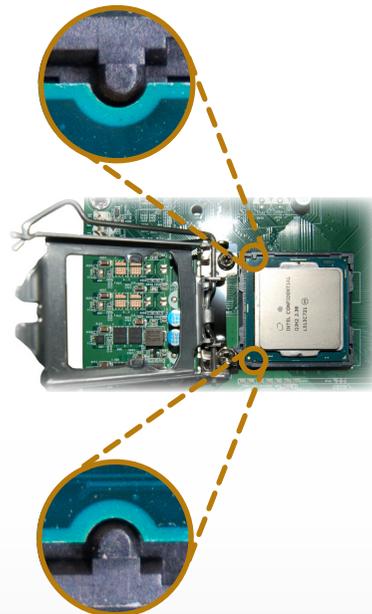
While closing the load plate, make sure the front edge of the load plate slides under the retention knob.

9. Press down the load lever and hook it under the retention tab.

**Important:**

The CPU will fit in only one orientation and can easily be seated without exerting any force.

7-3. The CPU's notch will fit into the socket's alignment key when it's seated in the correct orientation.



► CPU

Installing the Fan and Heat Sink

The CPU must be kept cool by using a CPU fan with heat sink. Without sufficient air circulation across the CPU and heat sink, the CPU will overheat damaging both the CPU and system board.



Note:

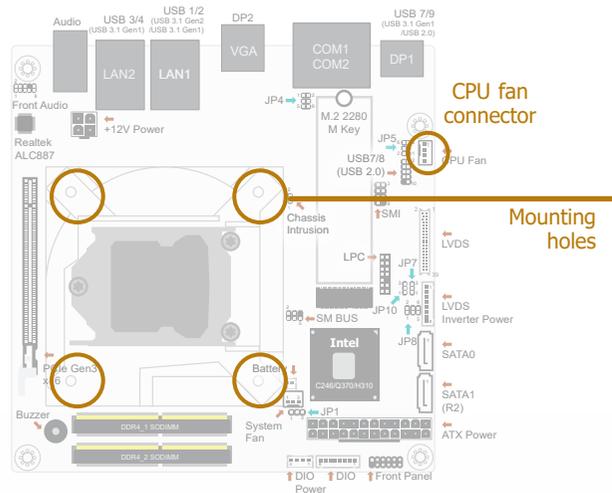
A boxed Intel® processor already includes the CPU fan and heat sink assembly. If your CPU was purchased separately, make sure to only use Intel®-certified fan and heat sink.

1. Before you install the fan / heat sink, you must apply a thermal paste onto the top of the CPU. The thermal paste is usually supplied when you purchase the fan / heat sink assembly. Do not spread the paste all over the surface. When you later place the heat sink on top of the CPU, the compound will disperse evenly.

Some heat sinks come with a patch of pre-applied thermal paste. Do not apply thermal paste if the fan / heat sink already has a patch of thermal paste on its underside. Peel the strip that covers the paste before you place the fan / heat sink on top of the CPU.

2. Place the heat sink on top of the CPU. The 4 spring screws around the heat sink, which are used to secure the heat sink onto the system board, must match the 4 mounting holes around the socket.

3. Orient the heat sink so that the CPU fan's cable is nearest the CPU fan connector.



4. Screw tight two of the spring screws at opposite corners into the mounting holes. And then proceed with the other two spring screws.



Heat sink



"Locked" position of push-pin

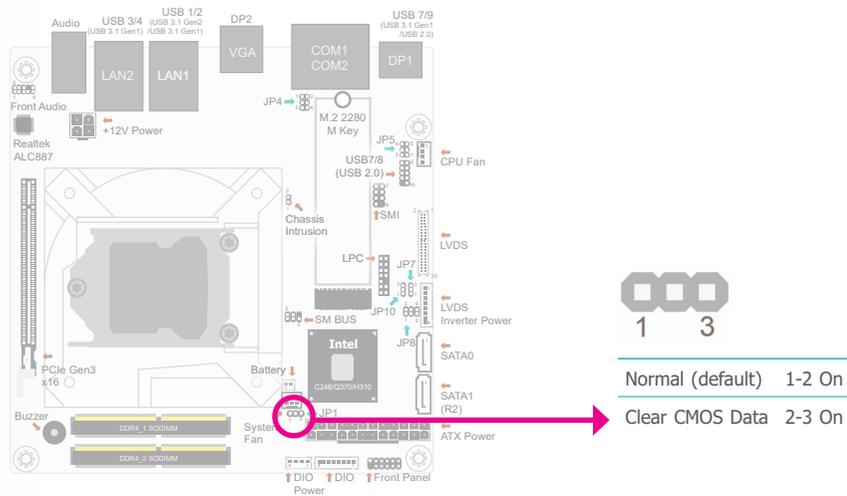


"Unlocked" position of push-pin

5. Connect the CPU fan's cable to the CPU fan connector on the system board.

► Jumper Settings

Clear CMOS Data JP1



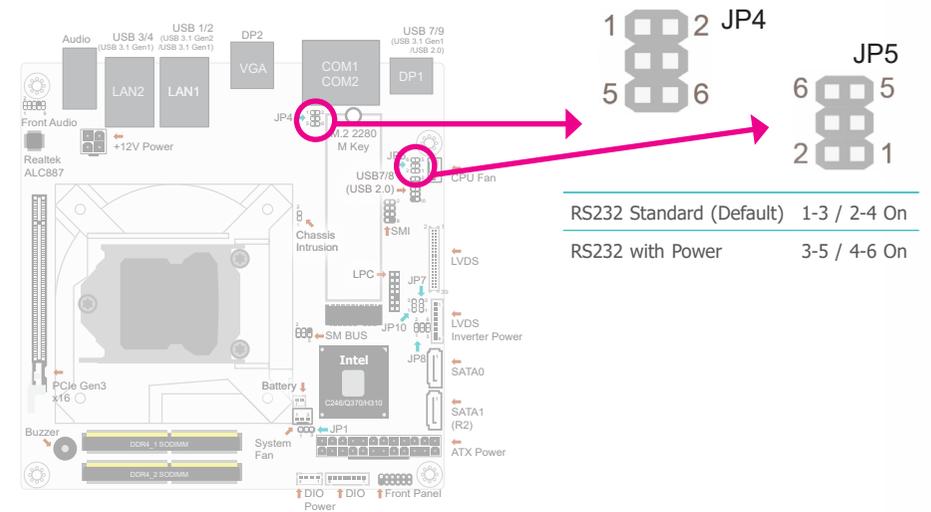
If any anomaly of the followings is encountered —

- a) CMOS data is corrupted;
- b) you forgot the supervisor or user password;
- c) failure to start the system due to BIOS mis-configuration

— it is suggested that the system be reconfigured with default values stored in the ROM BIOS. To load the default values stored in the ROM BIOS, please follow the steps below.

1. Power-off the system and unplug the power cord.
2. Put a jumper cap on JP1's pin 2 and pin 3. Wait for a few seconds and set JP1 back to its default setting, i.e. jumper cap on pin 1 and pin 2.
3. Plug the power cord and power-on the system.

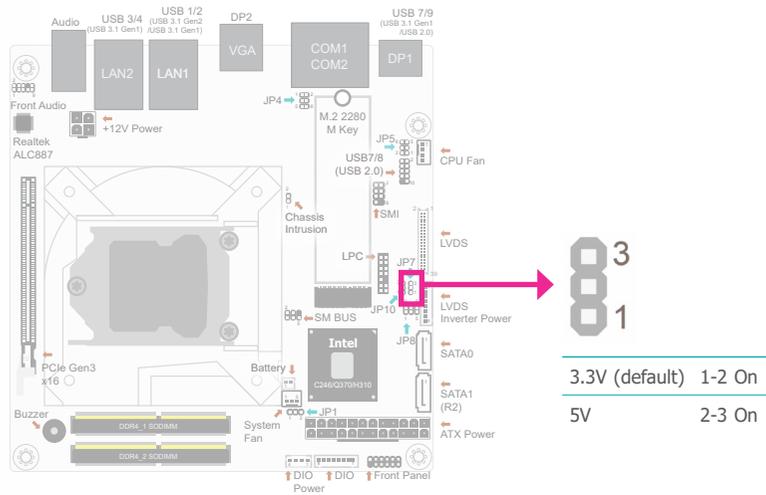
COM1/2 Power Selection JP4/5



JP4 (for COM 1) and JP5 (for COM 2) are designed to configure Serial COM ports to pure RS232 or RS232 with power.

► Jumper Settings

LVDS Backlight Power JP7



JP7 is used to select the power level of backlight control: +3.3V (default) or +5V.

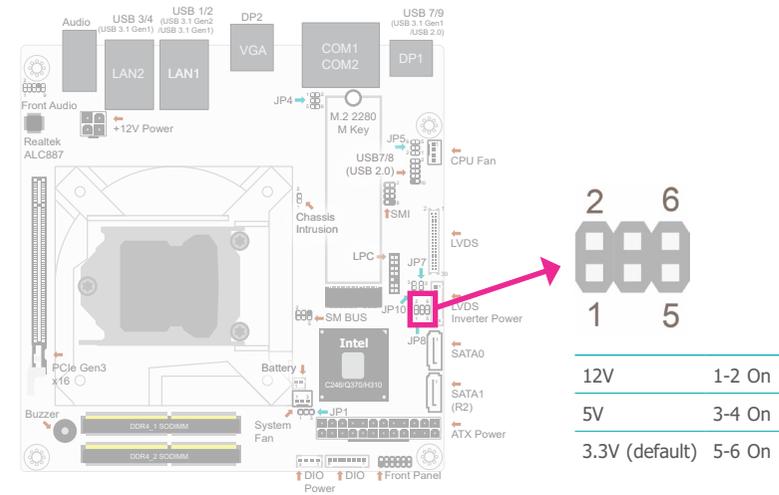


Important:

Before powering-on the system, make sure that the power settings of JP7 match the power specification of backlight control. Selecting the incorrect voltage will seriously damage the backlight.

► Jumper Settings

LVDS Panel Power JP8



JP8 is used to select the power supplied with the LVDS LCD panel.

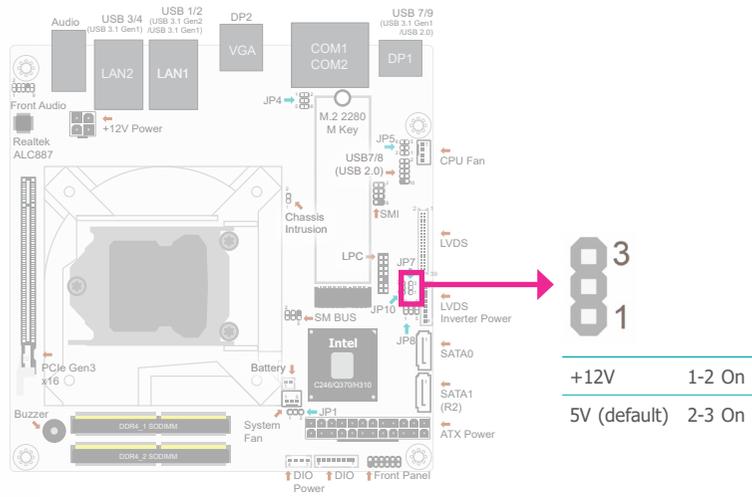


Important:

Before powering-on the system, make sure that the power settings of JP8 match the LCD panel's specification. Selecting the incorrect voltage will seriously damage the LCD panel.

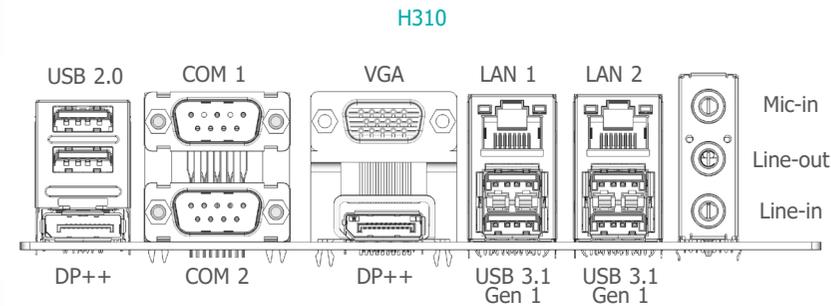
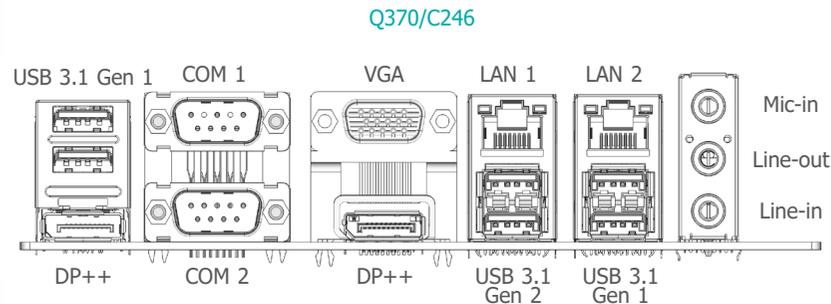
► Jumper Settings

LVDS Inverter Power JP10



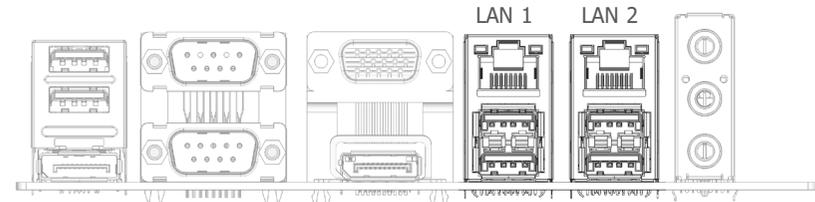
JP10 is used to select the power level of LVDS Inverter: +5V (default) or +12V.

► Rear Panel I/O Ports



► Rear Panel I/O Ports

RJ45 LAN Ports



Features

LAN1 :

- Q370/C246: Intel® i219LM PHY(10/100/1000Mbps)
- H310: Intel® i219V PHY(10/100/1000Mbps)

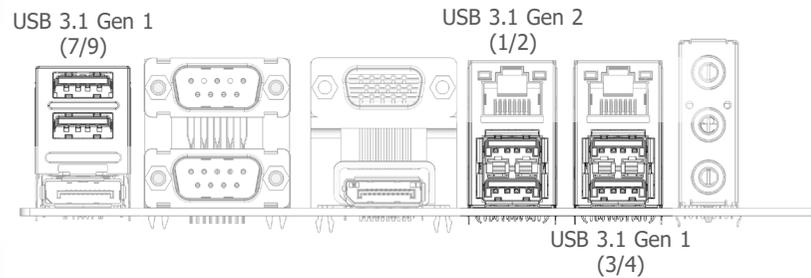
LAN2 :

- Intel® i210AT PCIe(10/100/1000Mbps)

The two LAN ports allow the system board to connect to a local area network by means of a network hub.

► Rear Panel I/O Ports

USB Ports

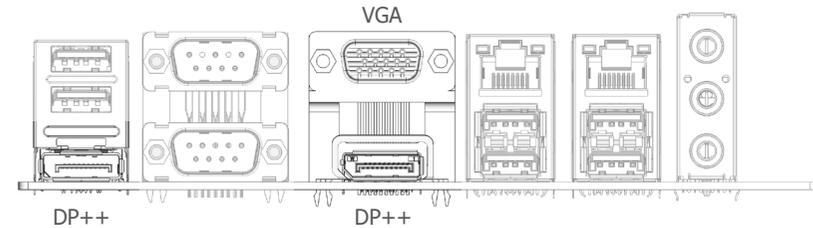


The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

The motherboard is equipped with 6 onboard USB Type A ports (USB 1/2 & 3-4 & 7/9) at the panel I/O ports with different speeds vary from the chipset.

► Rear Panel I/O Ports

Graphics Interfaces



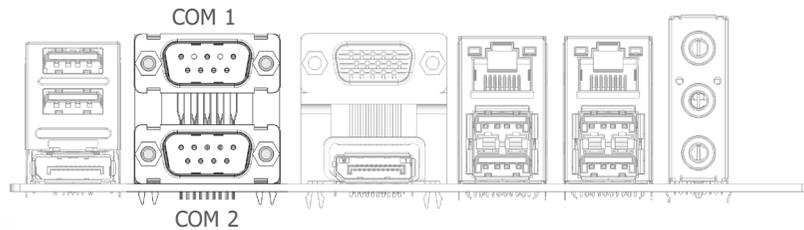
DP++ Port

The DisplayPort is a digital display interface used to connect a display device such as a computer monitor. It is used to transmit audio and video simultaneously. The interface, which is developed by VESA, delivers higher performance features than any other digital interface.

VGA

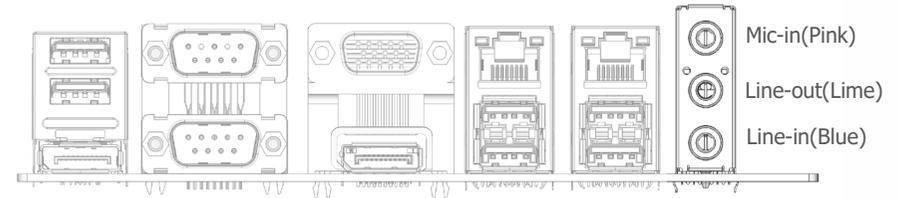
The VGA port is used for connecting a VGA monitor. Connect the monitor's 15-pin D-shell cable connector to the VGA port. After you plug the monitor's cable connector into the VGA port, gently tighten the cable screws to hold the connector in place.

► Rear Panel I/O Ports

COM (Serial) Ports

The serial mode of COM 1 and COM 2 is fixed at RS232.

The serial ports are asynchronous communication ports with 16C550A-compatible UARTs that can be used with modems, serial printers, remote display terminals, and other serial devices.

Audio**Rear Audio**

The system board is equipped with 2 audio jacks (Line-out and Mic-in). Line-in jack is available upon request. A jack is a one-hole connecting interface for inserting a plug.

- Line-in Jack (Light Blue) (optional)

This jack is used to connect any audio devices such as Hi-fi set, CD player, tape player, AM/FM radio tuner, synthesizer, etc.

- Line-out Jack (Lime)

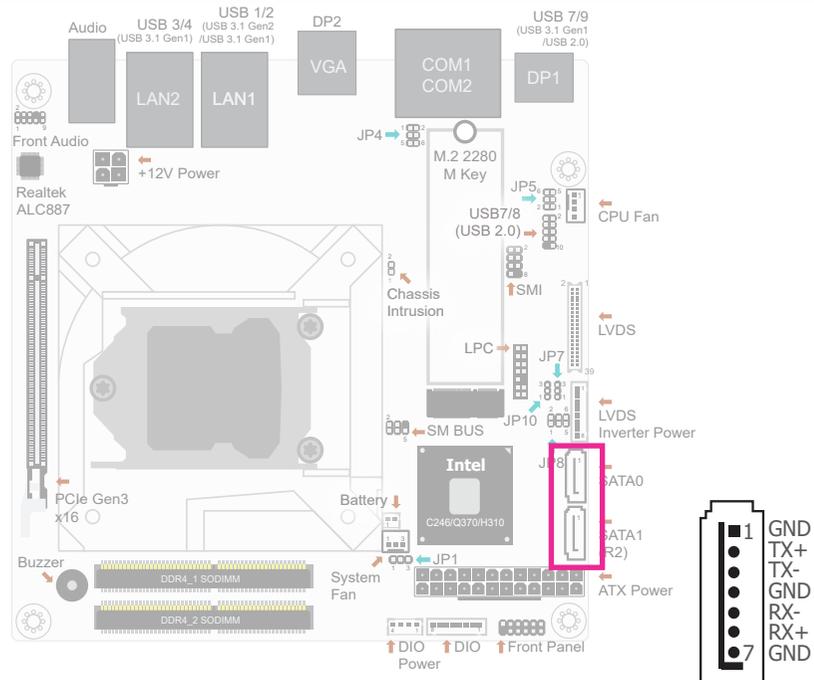
This jack is used to connect a headphone or external speakers.

- Mic-in Jack (Pink)

This jack is used to connect an external microphone

► Internal I/O Connectors

SATA (Serial ATA) Connectors

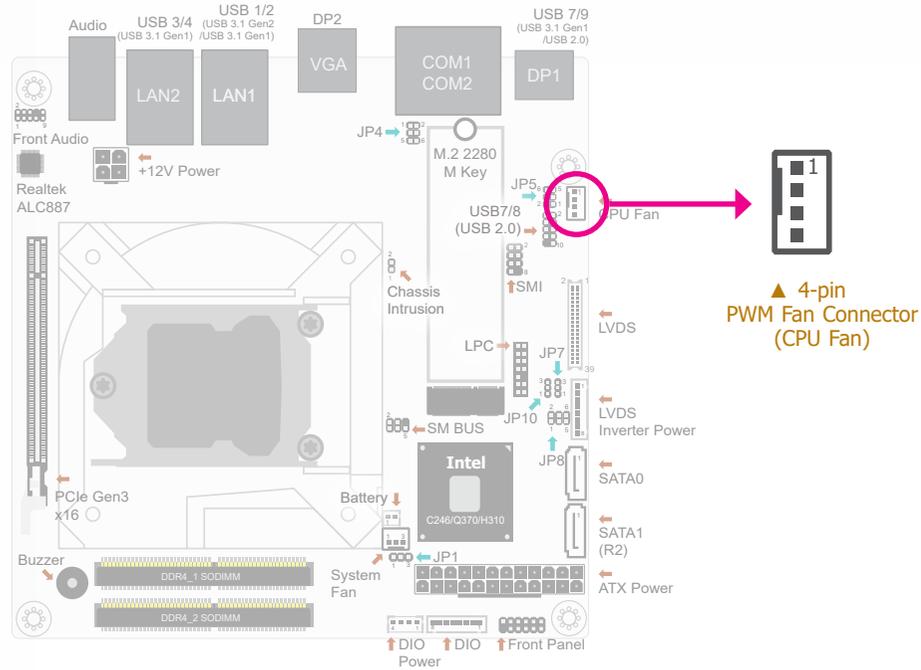


Features

- 2 Serial ATA 3.0 ports with data transfer rate up to 6Gb/s (SATA 0 and SATA 1)
- Integrated Advanced Host Controller Interface (AHCI) controller
- Supports RAID (for CS170-Q370/C246 only)

The Serial ATA connectors are used to connect Serial ATA devices. Connect one end of the Serial ATA data cable to a SATA connector and the other end to your Serial ATA device.

► Internal I/O Ports
Cooling Fan Connector



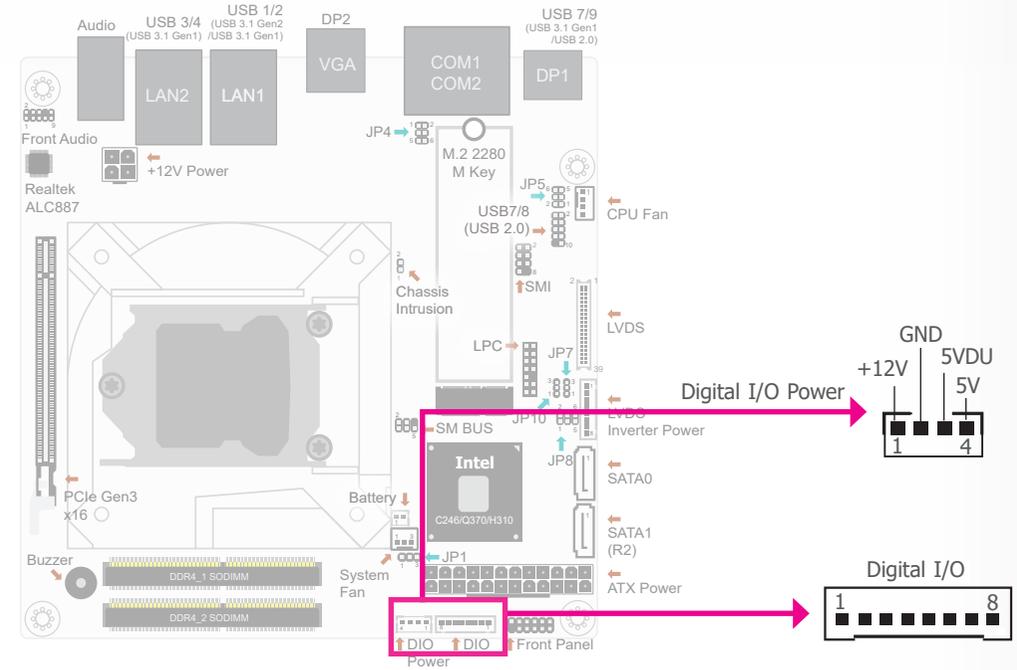
The fan connector is used to power a cooling fan. Cooling fans will provide adequate airflow throughout the chassis to prevent overheating the CPU and system board components. The 4-pin fans provide PWM to modulate fan speed.

▼ PWM Fan Pin Assignment

Pin Assignment

- 1** Ground
- 2** Power
- 3** Sense
- 4** Speed Control

► Internal I/O Ports
Digital I/O



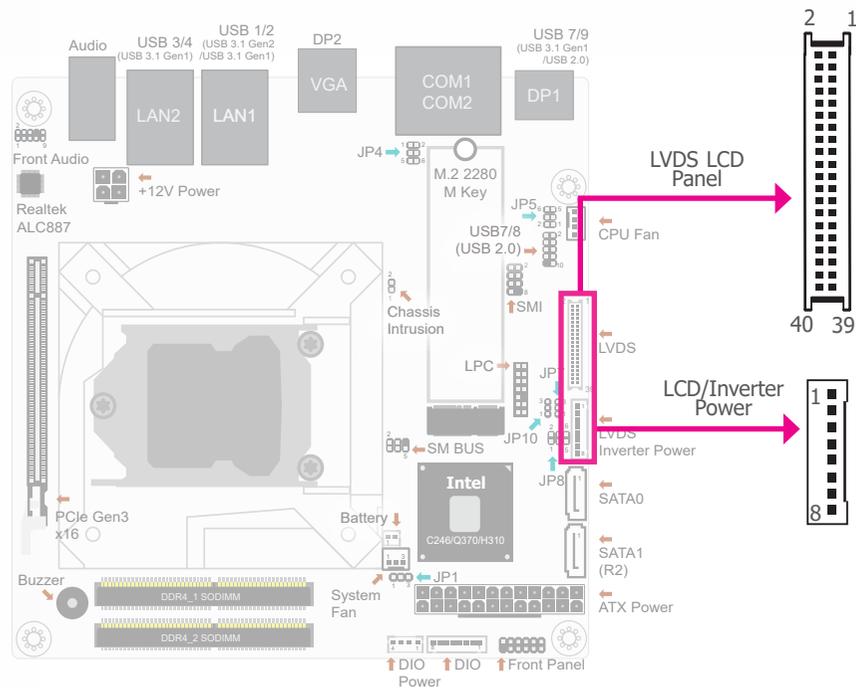
The 8-bit Digital I/O connector provides powering-on function to external devices that are connected to these connectors.

▼ Digital I/O Connector Pin Assignment

Pin	Function
1	DIO7
2	DIO6
3	DIO5
4	DIO4
5	DIO3
6	DIO2
7	DIO1
8	DIO0

► Internal I/O Ports

LVDS LCD Panel



The system board allows you to connect a LCD Display Panel by means of the LVDS LCD panel connector and the LCD/Inverter power connector. These connectors transmit video signals and power from the system board to the LCD Display Panel.

Jumper Settings

Refer to the "Jumper Settings" section in this chapter for settings relevant to the LCD panel.

▼ LVDS LCD Panel Connector

Pin	Function	Pin	Function
1	GND	2	GND
3	LVDSA_3+	4	LVDSB_3+
5	LVDSA_3-	6	LVDSB_3-
7	GND	8	GND
9	LVDSA_2+	10	LVDSB_2+
11	LVDSA_2-	12	LVDSB_2-
13	GND	14	GND
15	LVDSA_1+	16	LVDSB_1+
17	LVDSA_1-	18	LVDSB_1-
19	GND	20	GND
21	LVDSA_0+	22	LVDSB_0+
23	LVDSA_0-	24	LVDSB_0-
25	GND	26	GND
27	LVDSA_CLK+	28	LVDSB_CLK+
29	LVDSA_CLK-	30	LVDSB_CLK-
31	GND	32	GND
33	DDC_CLK	34	NC
35	DDC_DATA	36	+3.3V
37	Panel Power	38	Panel Power
39	Panel Power	40	Panel Power

▼ LCD/Inverter Power Connector

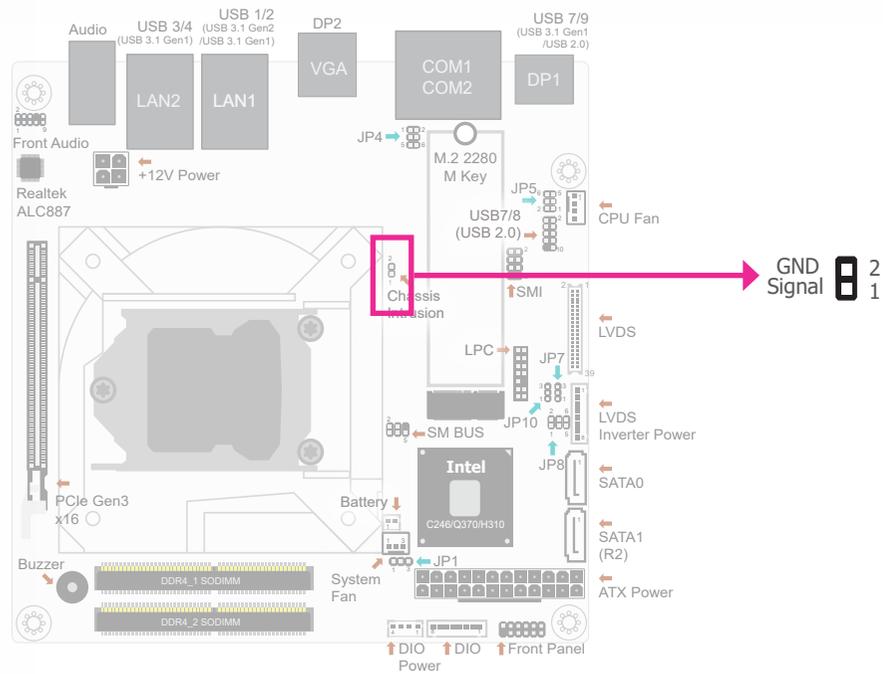
Pin	Function
1	GND
2	GND
3	Panel Inverter Brightness Voltage Control
4	Panel Power
5	+3.3V
6	Panel Backlight On/Off Control
7	LCD/Inverter Power
8	LCD/Inverter Power



Note: The signal of the LCD panel can only be displayed either via LVDS or via eDP.

► Internal I/O Ports

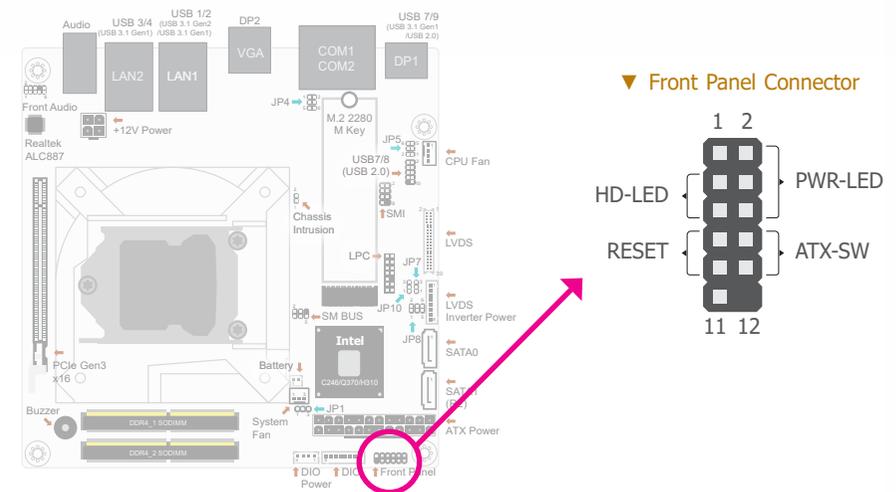
Chassis Intrusion Connector



The board supports the chassis intrusion detection function. Connect the chassis intrusion sensor cable from the chassis to this connector. When the system's power is on and a chassis intrusion occurred, an alarm will sound. When the system's power is off and a chassis intrusion occurred, the alarm will sound only when the system restarts.

► Internal I/O Ports

Front Panel Connector



▼ Front Panel Pin Assignment

Pin	Assignment	Pin	Assignment
1	N.C.	2	LED Power
HDD-LED	3 HDD Power	PWR-LED	4 LED Power
	5 Signal	6	Signal
RESET	7 Ground	ATX-SW	8 Ground
	9 Signal		10 Signal
11	N.C.	12	---

HDD-LED - Hard Disk Drive LED

Lighting of the LED indicates that the hard drive is being accessed.

RESET - Reset Switch

This switch allows you to reboot without having to power off the system.

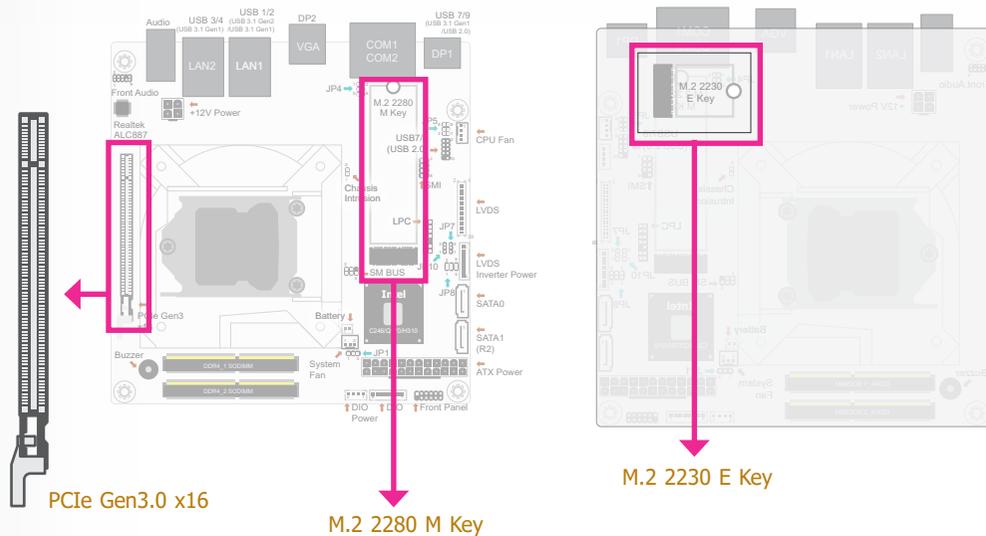
PWR-LED - Power/Standby LED

When the system's power is on, this LED will light up. When the system is in the S1 (POS - Power On Suspend) state, it will blink at 1-second intervals. When the system is in the S3 (STR - Suspend To RAM) state, it will blink at 4-seconds intervals.

ATX-SW - ATX Power Switch

This switch is used to power on or off the system.

► Internal I/O Ports
Expansion Slots



PCI Express Slot

The x16 PCIe socket supports the installation of a PCIe card signal up to Gen3.0. To switch between PCIe x16 x8 x4 , use by GPIO and BIOS control. Refer to the BIOS section for more information.

M.2 Sockets

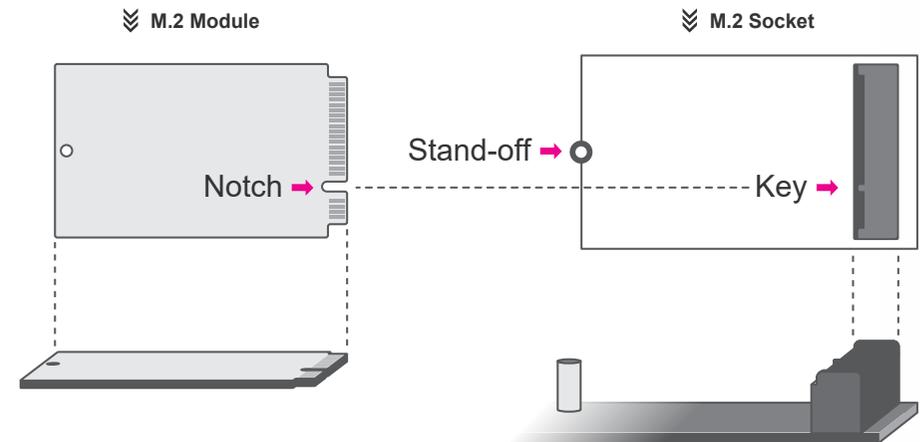
The M.2 socket is the Next Generation Form Factor (NGFF) which is designed to support multiple modules and make the M.2 more suitable in application for solid-state storage. A 22x30mm socket and standoff is reserved on the PCB for a M.2 E Key module, and a 22x80mm socket and standoff for a M.2 M Key module.

M.2 2230 supports PCIe and USB signal such as Intel® CNVi module and Intel® vPro (Partial-SKU support only), M.2 2280 supports PCIe Gen3 x4 and SATA signal (Q370 and C246), PCIe Gen2 x1 signal (H310), and Intel® Optane memory (Both of the M10 and H10) and NVMe (Q370 and C246 only).

► Internal I/O Ports
Installing the M.2 Module

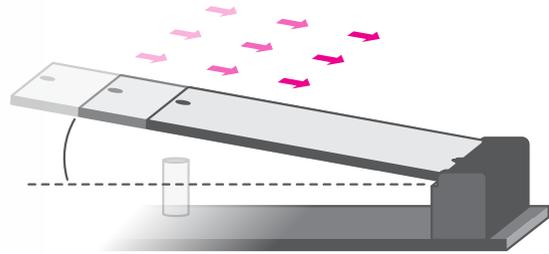
Before installing the M.2 module into the M.2 socket, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the M.2 socket on the system board
4. Make sure the notch on card is aligned to the key on the socket.
5. Make sure the standoff screw is removed from the standoff.

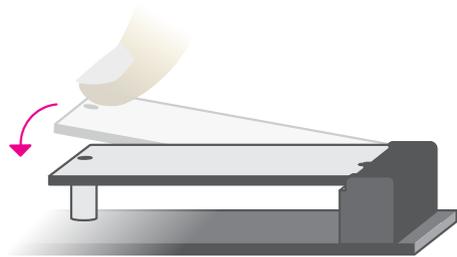


► Internal I/O Ports

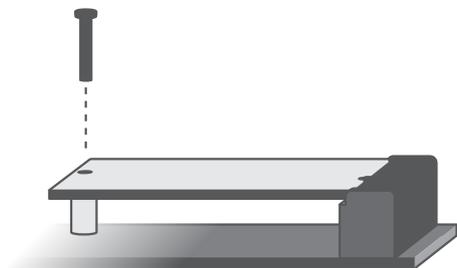
Please follow the steps below to install the card into the socket.



Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.



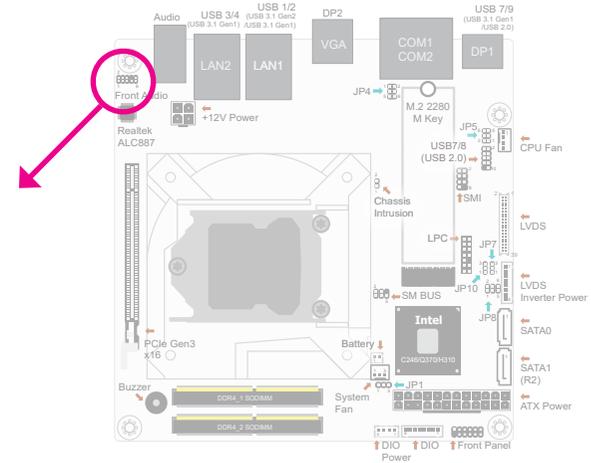
Step 2:
Press the end of the card far from the socket down until the gap between the card and the stand-off closes up.



Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.

► Internal I/O Ports

Front Audio Connector

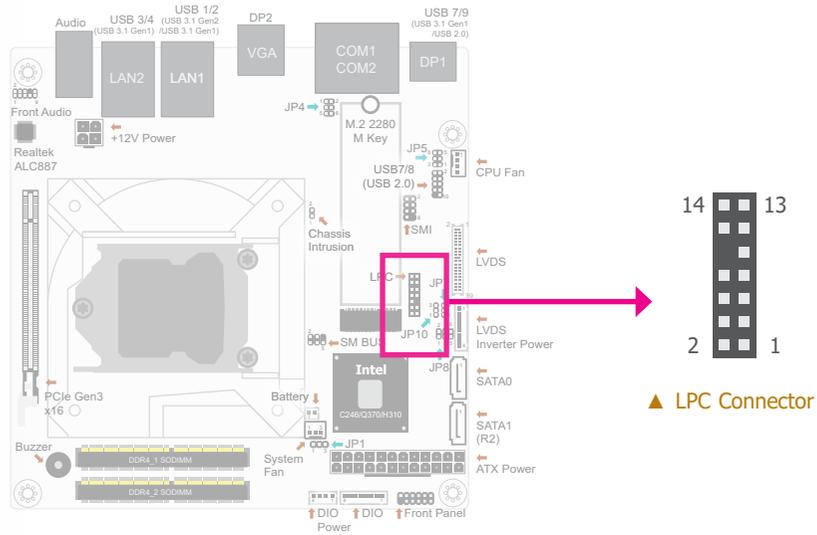


▼ Front Audio Pin Assignment

Pin	Assignment	Pin	Assignment
1	Mic2-L	2	GND
3	Mic2-R	4	N.C.
5	Line2-R	6	Mic2-JD
7	GND	8	---
9	Line2-L	10	Line2-JD

The Front Audio internal connector allows you to connect to the second line-out and mic-in jacks that are at the front panel of your system.

► Internal I/O Ports
LPC Connector



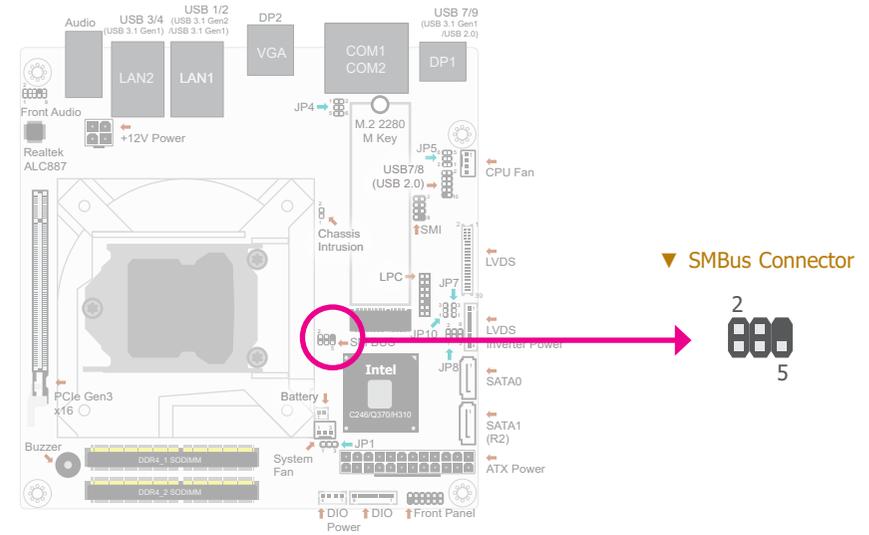
▲ LPC Connector

The LPC connector is used for debugging and its pin functions are listed below.

▼ LPC Pin Assignment

Pin	Assignment	Pin	Assignment
1	L_CLK	2	L_LAD1
3	L_RST#	4	L_LAD0
5	L_FRAME#	6	3.3V
7	L_LAD3	8	GND
9	L_LAD2	10	---
11	SERIRQ	12	GND
13	5VSB	14	5V

► Internal I/O Ports
SMBus Connector



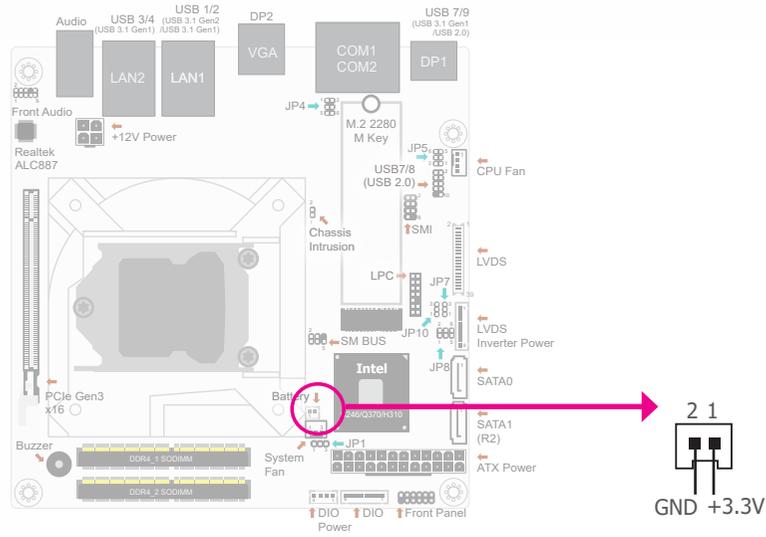
▼ SMBus Connector

The SMBus (System Management Bus) connector is used to connect the SMBus device. It is a multiple device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

▼ SMBus Pin Assignment

Pin	Assignment	Pin	Assignment
1	3V3DU	2	GND
3	SMBus_Clock	4	SMBus_DATA
5	SMBus_Alert	6	---

► Internal I/O Ports
Battery



▲ Battery Connector



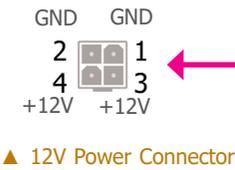
Connect to the battery connector

The lithium ion battery addendum supplies power to the real-time clock and CMOS memory as an auxiliary source of power when the main power is shut off.

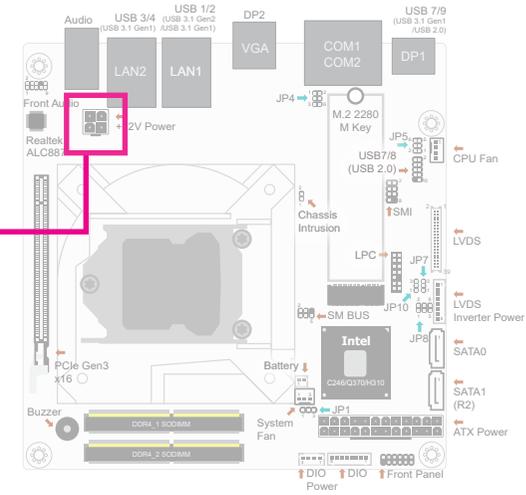
Safety Measures

- There exists explosion hazard if the battery is incorrectly installed.
- Replace only with the same or equivalent type recommended by the manufacturer.
- Dispose of used batteries according to local ordinances.

+12V Power



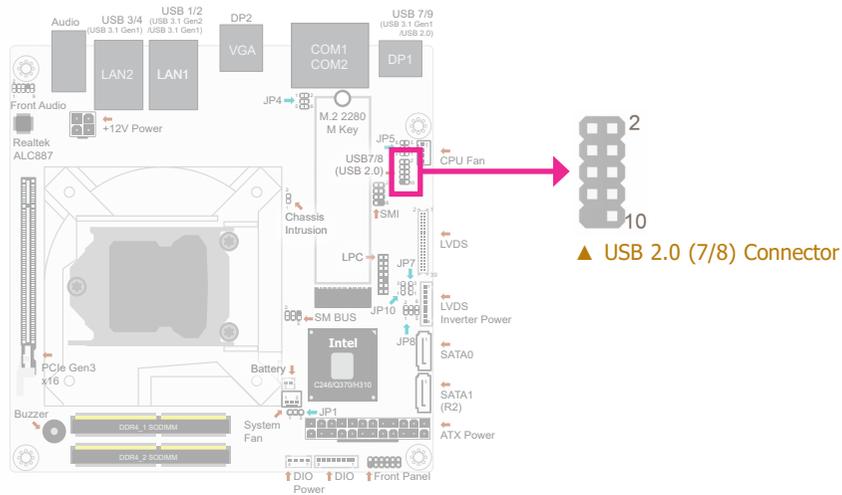
▲ 12V Power Connector



Connect a ATX 4-pin power to this jack.

► Internal I/O Ports

USB



▼ USB 2.0 (7/8) Pin Assignment

Pin	Assignment	Pin	Assignment
1	VCC	2	VCC
3	Data-	4	Data-
5	Data+	6	Data+
7	GND	8	GND
9	---	10	---

The additional USB ports(USB 7/8) may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot on the system chassis and then insert the USB port cables to a connector.

Chapter 3 - BIOS Setup

► Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board.

The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.



Note:

The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen. The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and keys simultaneously.

Legends

Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)	Scroll forward through the values or options of the highlighted field
- (minus key)	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F2>	Display previous values
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

Scroll Bar

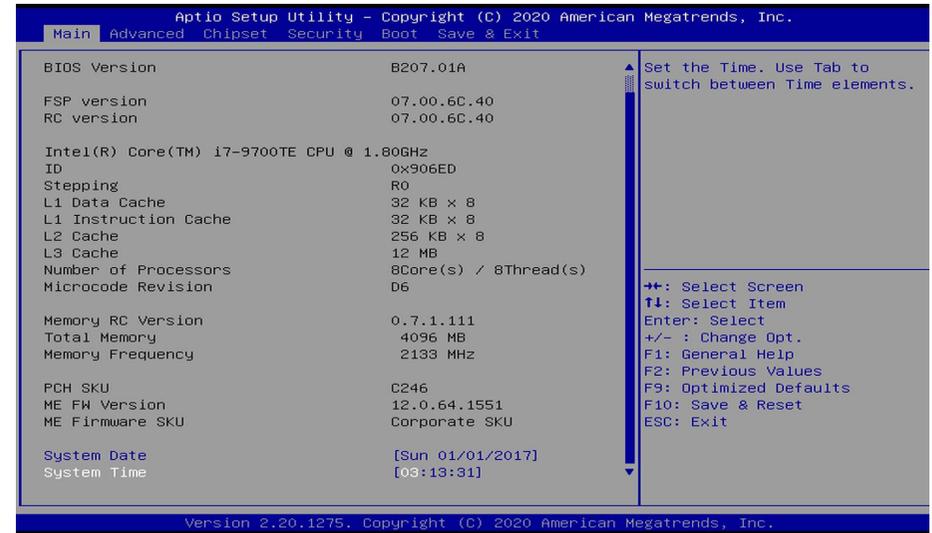
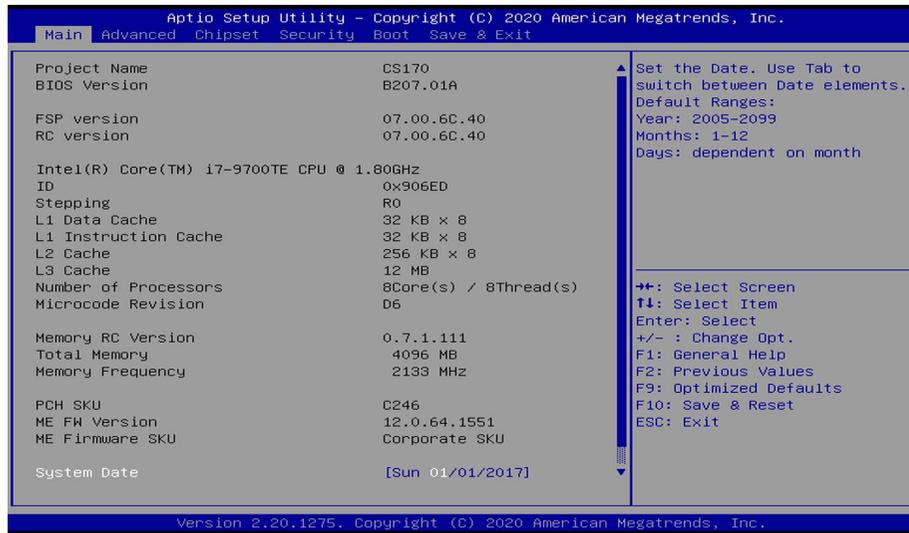
When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

Submenu

When "►" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

► **Main**

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from 01 to 12. Date displays the date, from 01 to 31. Year displays the year, from 2005 to 2099.

Scroll down the screen to reveal the rest of the fields.

System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

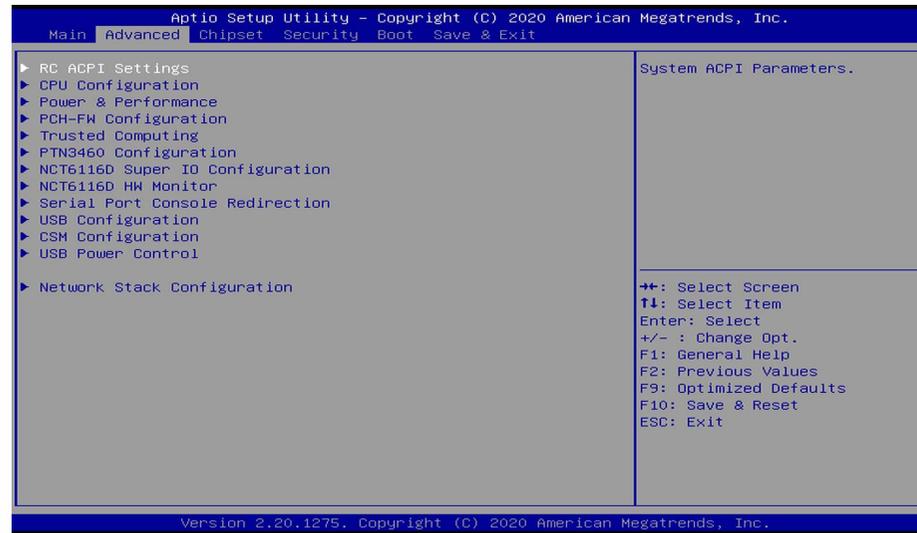
► **Advanced**

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



Important:

Setting incorrect field values may cause the system to malfunction.



RC ACPI Settings

Configure power management related settings in this page.



Wake system from S5 via RTC

When Enabled, the system will automatically power up at a designated time every day from the Real-time clock (RTC) battery. More settings will be displayed once it's switched to [Enabled] as detailed in the next page.

State After G3

Select between S0 State, Last State, and S5 State. This field is used to specify what state the system is set to return to when power is re-applied after a power failure (G3 state).

► **Advanced** ► **RC ACPI Settings**



When "Wake system from S5" is enabled, the following fields will appear.

Wake up hour

Press +/- to set the hour from 0 to 23.

Wake up minute

Press +/- to set the minute from 0 to 59.

Wake up second

Press +/- to set the second from 0 to 59.

State After G3

Specify the state to go after having resumed from a power failure.

► **Advanced**

CPU Configuration

Configure CPU processing related settings in this page.



Intel (VMX) Virtualization Technology

When this field is enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Active Processor Cores

Select number of cores to be enabled in each processor package: all, 1, 2, 3, 4 or 5.

Hyper-threading

Enable or disable Hyper-threading. When it is enabled, a physical core will perform as two logical processors, and the user may experience better computational efficiency of the system. Please make sure that the OS operating on your system is optimized for Hyper-Threading, e.g. Windows and Linux. This field is not available when the equipped CPU does not support Hyper-threading.



Note:

Some of the fields may not be available when the features are not supported by the equipped CPU.

► **Advanced****Power & Performance**

Configure the power and performance settings in this page.

**Intel(R) SpeedStep(tm)**

Enable or disable Intel Enhanced SpeedStep Technology. Voltage and frequency are switched between high and low levels in response to processor load when this field is enabled, and the Turbo Mode field will appear.

Turbo Mode

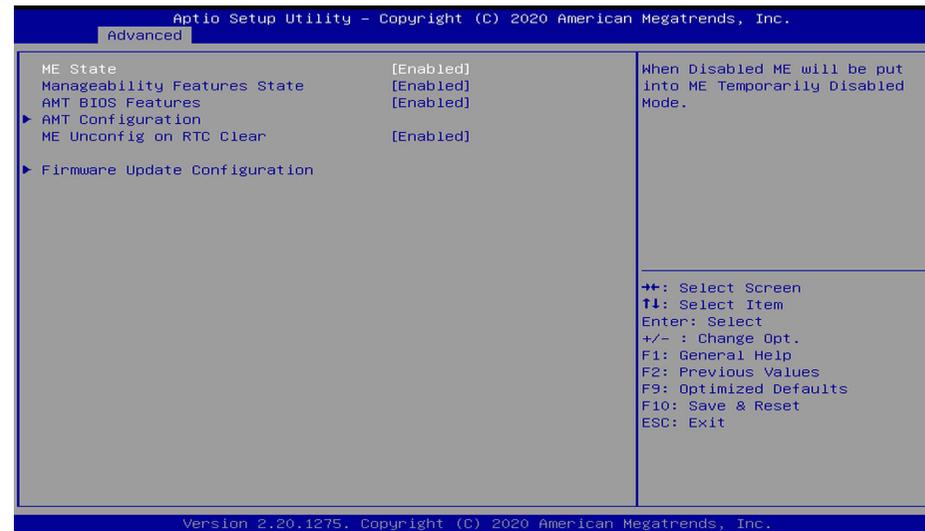
Enable or disable processor turbo mode, which allows the processor core to automatically run faster than the base frequency when the processor's power, temperature, and specification are within the limits of TDP. This field is only available when "Intel(R) SpeedStep(tm)" is enabled.

C states

Enable or disable CPU Power Management. When enabled, the CPU is allowed to go to C states when it's not 100% utilized.

► **Advanced****PCH-FW Configuration**

Configure the parameters of Management Engine Technology.

**ME State**

Enable or disable Management Engine. When this field is set to Disabled, ME will be put into ME Temporarily Disabled Mode. The following fields will only appear when ME State is enabled.

Manageability Features State

Enable or disable Intel(R) Manageability features. This option disables/enables Manageability Features support in FW. To disable, support platform must be in an unprovisioned state first.

AMT BIOS Features

When disabled, AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup. This option does not disable manageability features in FW.

► **AMT Configuration**

This section is used to configure Intel(R) Active Management Technology Parameters. Please refer to the following pages.

ME Unconfig on RTC Clear

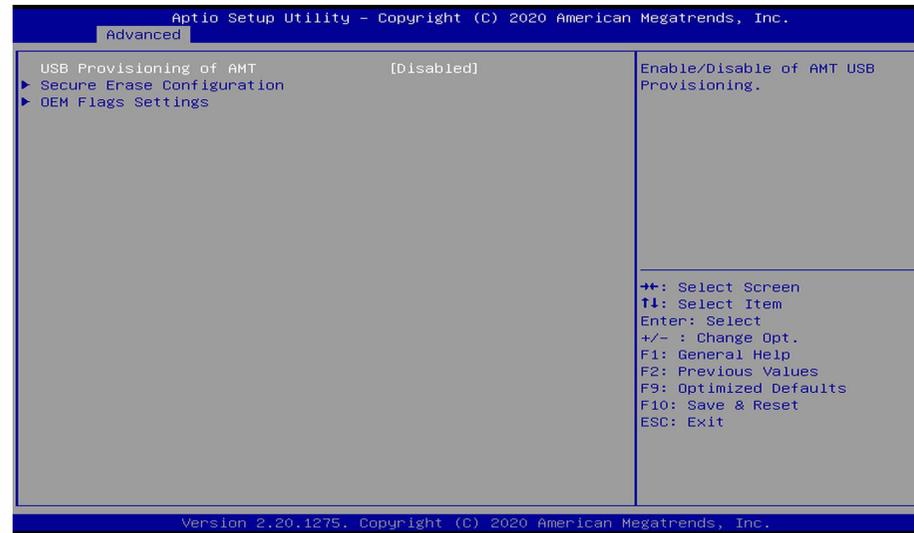
When disabled, ME will not be unconfigured on RTC Clear.

► **Firmware Update Configuration**

Please refer to the following pages.

▶ **Advanced** ▶ **PCH-FW Configuration**

▶ **AMT Configuration**



USB Provisioning of AMT

Enable or disable AMT USB Provisioning.

▶ **Secure Erase Configuration**

Please refer to the following pages.

▶ **OEM Flags Settings**

Please refer to the following pages.

▶ **Advanced** ▶ **PCH-FW Configuration**

▶ **AMT Configuration** ▶ **Secure Erase Configuration**

This section is used to configure Secure Erase.



Secure Erase Mode

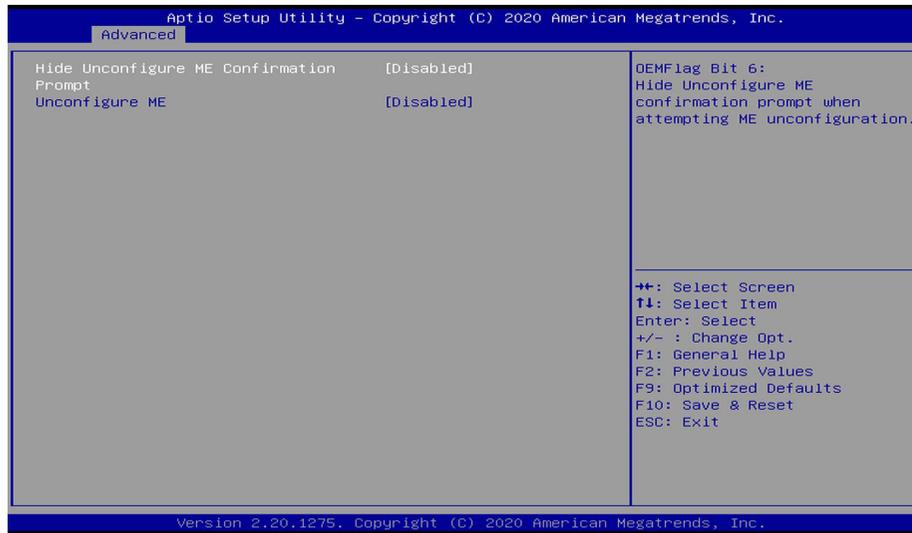
Select Secure Erase module behavior: Simulated or Real.

Force Secure Erase

Enable or disable Force Secure Erase on next boot.

► Advanced ► PCH-FW Configuration

► AMT Configuration ► OEM Flags Settings



Hide Unconfigure ME Confirmation Prompt

Enable or disable to hide unconfigure ME confirmation prompt when attempting ME unconfiguration.

Unconfigure ME

Enable or disable to unconfigure ME with resetting MEBx password to default.

► Advanced ► PCH-FW Configuration

► Firmware Update Configuration

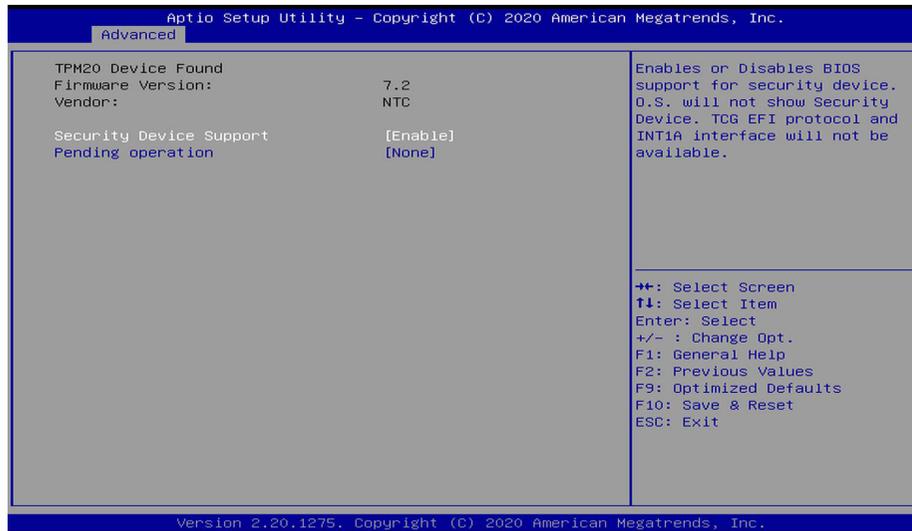


Me FW Image Re-Flash

This field is used to enable or disable the Me FW Image Re-Flash function.

► **Advanced****Trusted Computing**

Configure Trusted Computing settings.

**Security Device Support**

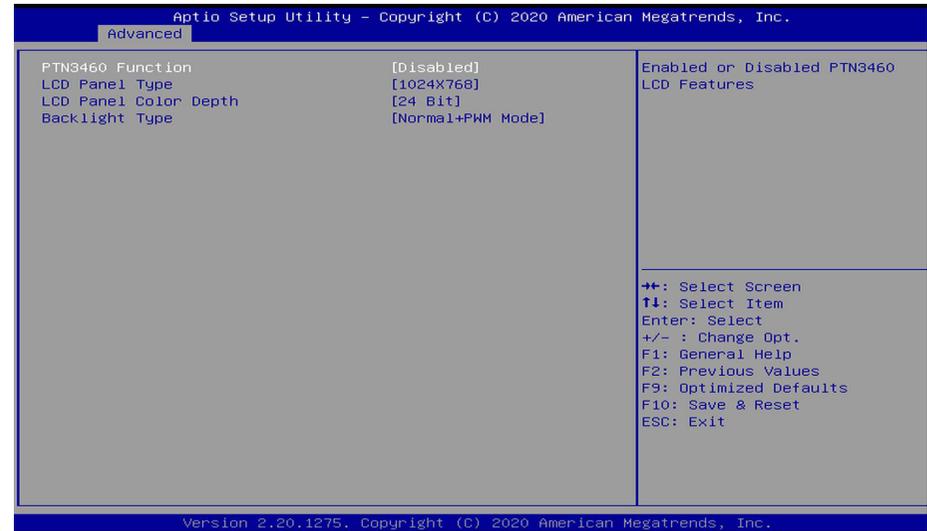
This field is used to enable or disable BIOS support for the security device. A security device will not be shown on the OS. TCG EFI protocol and INT1A interface will not be available.

Pending operation

Schedule an operation for the security device. Your computer will reboot during restart in order to change state of the security device.

► **Advanced****PTN3460 Configuration**

This section configures settings relevant to Trusted Computing innovations.

**PTN3460 Function**

Enabled or Disabled PTN3460 LCD Features.

LCD Panel Type

Select the resolution of the LCD Panel — 800X480, 800X600, 1024X768, 1366X768, 1280X1024, 1280X768, 1920X1080, or 1600X900.

LCD Panel Color Depth

Select the color depth of the LCD Panel — 18 Bit, 24 Bit, 36 Bit, 48 Bit.

Backlight Type

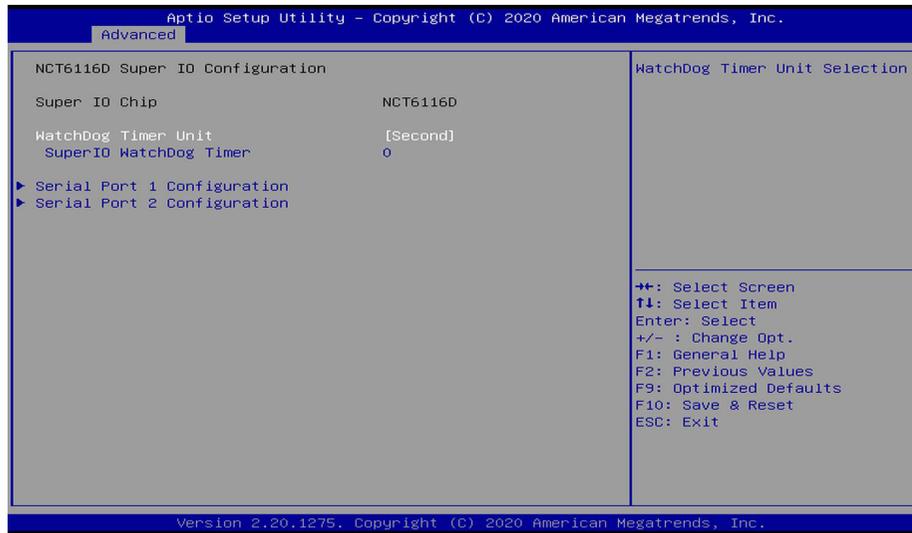
Select the inverter polarity and brightness control — Normal+PWM Mdde, Normal+DC Mdde, Invert+PWM Mdde, or Invert+DC Mdde.

**Important:**

The configuration must match the specifications of your LCD Panel in order for the LCD Panel to display properly.

► **Advanced****NCT6116D Super IO Configuration**

This section is used to configure the I/O functions supported by the onboard Super I/O chip.

**WatchDog Timer Unit**

Select WatchDog Timer Unit: Second or Minute.

SuperIO WatchDog Timer

Set SuperIO WatchDog Timer Timeout value. The range is from 0 (disabled) to 255.

► **Serial Port 1/2 Configuration**

Configure the parameters of serial port 1 (COM 1) to serial port 2 (COM 2) as detailed later.

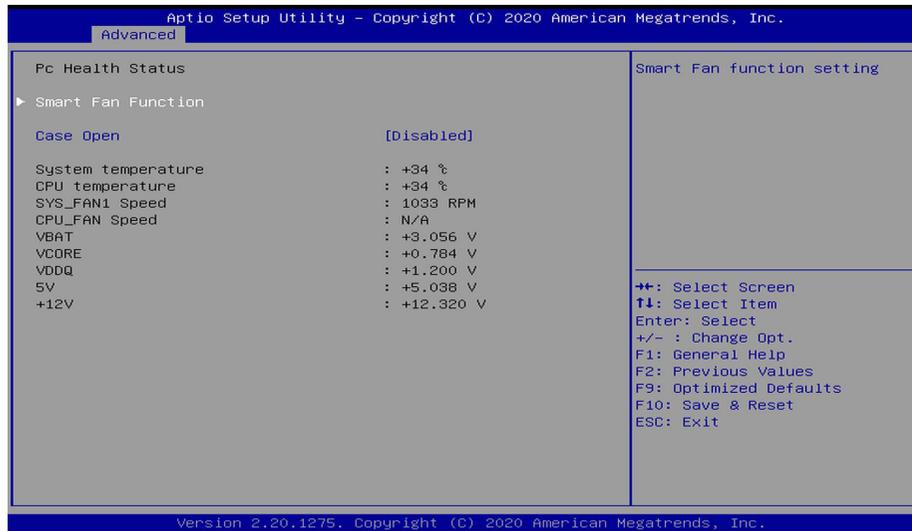
► **Advanced** ► **NCT6116D Super IO Configuration**► **Serial Port 1/2/3/4 Configuration****Serial Port**

Enable or disable the serial COM port.

► Advanced

NCT6116D HW Monitor

This section displays the hardware health monitor.



► Smart Fan Function

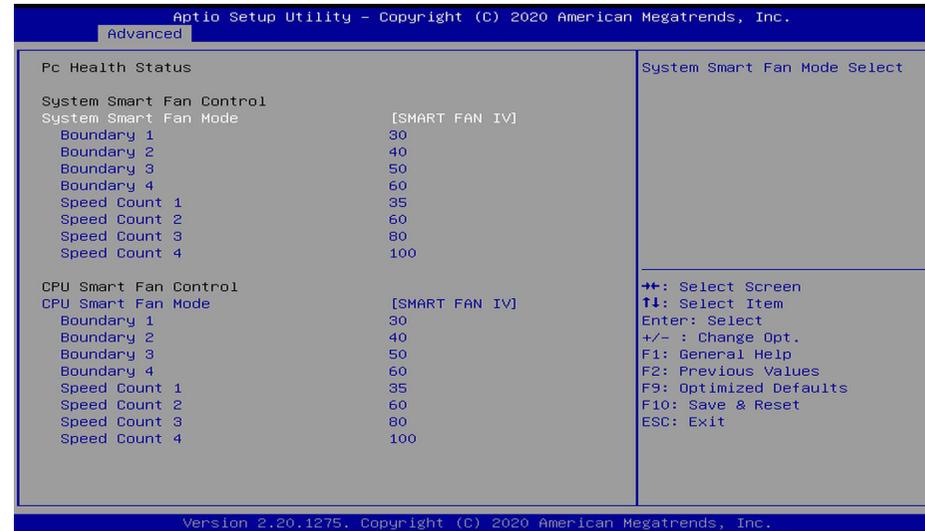
Please refer to the following pages.

Case Open

Enable or disable the case open detection function.

► Advanced ► NCT6116D HW Monitor

► Smart Fan Function

**CPU Smart Fan Mode**

Enable or disable the system smart fan. When set to "Manual mode", fan speed will not be controllable according to different system temperatures. Instead, a "Manual PWM Setting" field will be displayed to configure at which speed the fan will always be fixed regardless of system temperature.

When "CPU Smart Fan Mode" is set to "SMART FAN IV", the following fields will appear:

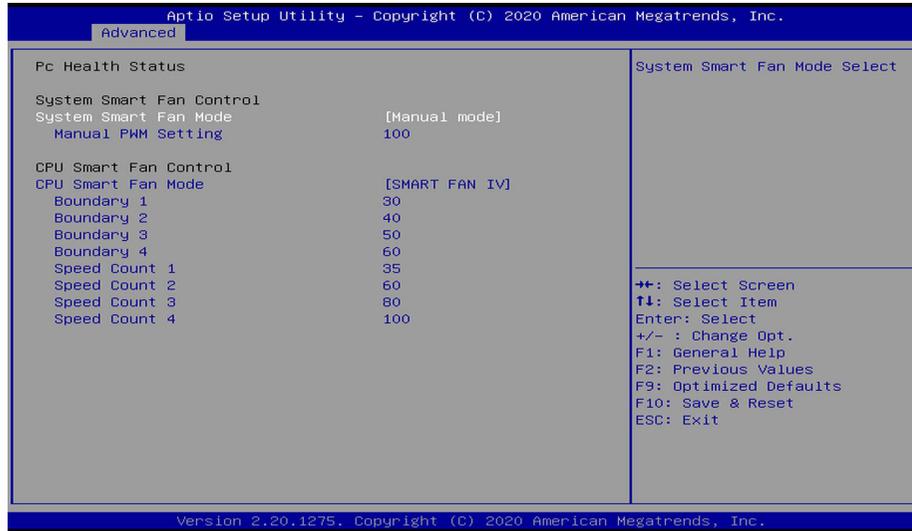
Boundary 1 to Boundary 4

Set the boundary temperatures that determine the fan speeds accordingly, the value ranging from 0-127°C. For example, when the system temperature reaches Boundary 1 setting, the fan speed will be turned up to the designated speed of the Fan Speed Count 1 field.

Speed Count 1 to Speed Count 4

Set the fan speed, the value ranging from 1-100%, 100% being full speed. The fans will operate according to the specified boundary temperatures above-mentioned.

► **Advanced** ► **NCT6116D HW Monitor**



When "CPU Smart Fan Mode" is set to "Manual mode", the following field will appear.

Manual PWM Setting

Set the fan speed to a fixed value, ranging from 1-100%, 100% being maximum speed.

► **Advanced**

Serial Port Console Redirection

This section configures settings relevant to serial port console redirection.

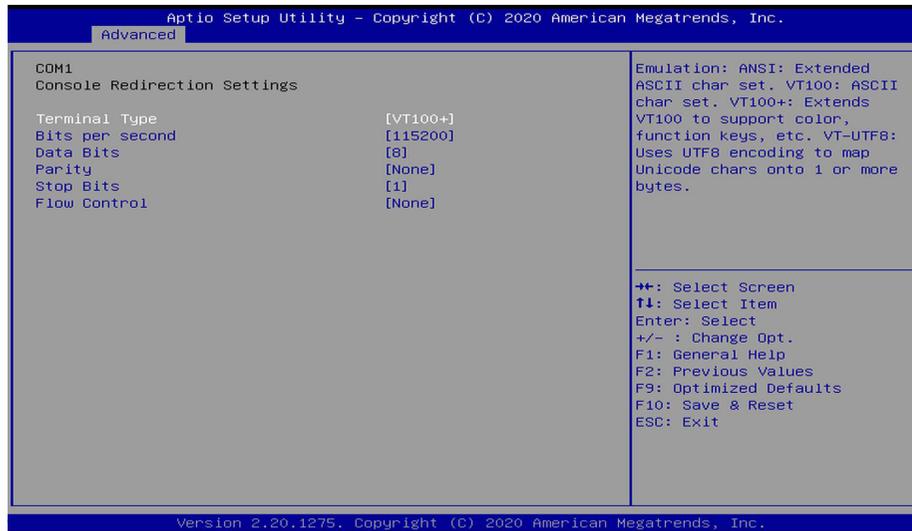


Console Redirection

This field is used to enable or disable the console redirection function. When console redirection is set to enabled, console redirection settings are available as instructed below.

► **Advanced** ► **Serial Port Console Redirection**

► **Console Redirection Settings**



Select terminal type: VT100, VT100+, VT-UTF8 or ANSI.

Bits per second

Select serial port transmission speed: 9600, 19200, 38400, 57600 or 115200.

Data Bits

Select data bits: 7 bits or 8 bits.

Parity

Select parity bits: None, Even, Odd, Mark or Space.

Stop Bits

Select stop bits: 1 bit or 2 bits.

Flow Control

Select flow control: None or Hardware RTS/CTS.

► **Advanced**

USB Configuration

This section is used to configure the USB settings.



Legacy USB Support

- Enabled** Enable Legacy USB support.
- Disabled** Keep USB devices available only for EFI applications.
- Auto** Disable Legacy support if no USB devices are connected.

XHCI Hand-off

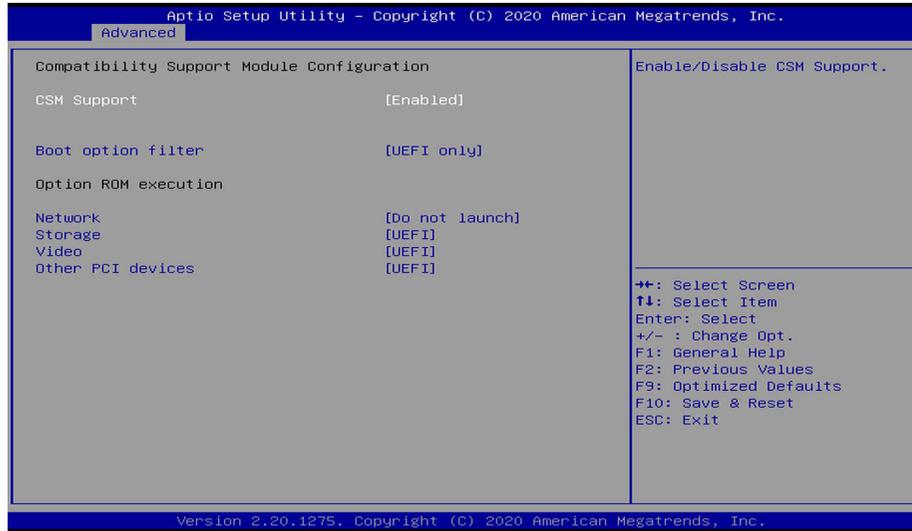
Enable or disable XHCI Hand-off.

USB Mass Storage Driver Support

Enable or disable USB Mass Storage Driver Support.

► **Advanced****CSM Configuration**

This section is used to configure the CSM settings.



This section is used to enable or disable CSM Support. When CSM Support is set to enabled, several options will appear for configuration.

Boot option filter

This field controls Legacy/UEFI ROMs priority.

Network

This field controls the execution of UEFI and Legacy Network OpROM.

Storage

This field controls the execution of UEFI and Legacy Storage OpROM.

Video

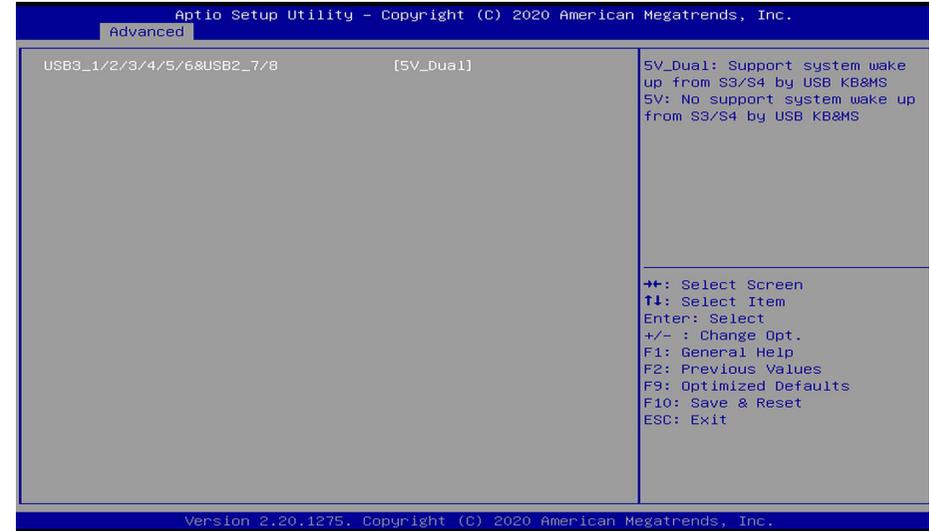
This field controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

This field determines OpROM execution policy for devices other than Network, Storage or Video.

► **Advanced****USB Power Control**

Configure USB port power voltage.

**USB Power Settings**

Select the power voltage for USB 1-8 — 5V_Dual or 5V.

► Advanced**Network Stack Configuration**

This section is used to configure the Network Stack settings.



This section is used to enable or disable UEFI network stack. When Network Stack is enabled, the following fields will appear.

Ipv4 PXE Support

Enable or disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.

Ipv6 PXE Support

Enable or disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.

PXE boot wait time

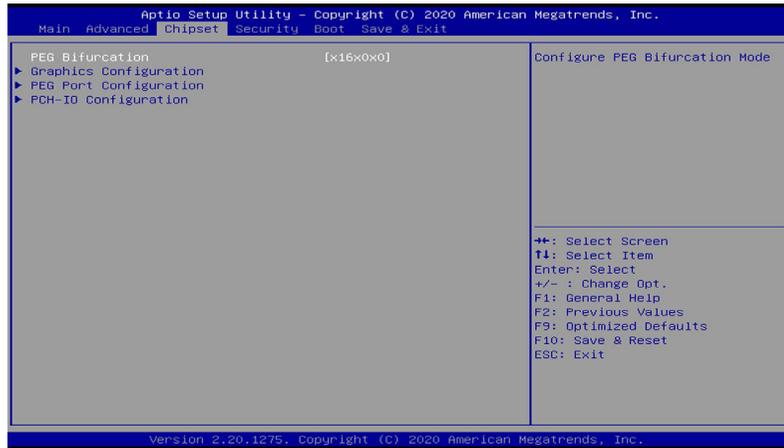
Set the wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

Media detect count

Set the number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

► Chipset

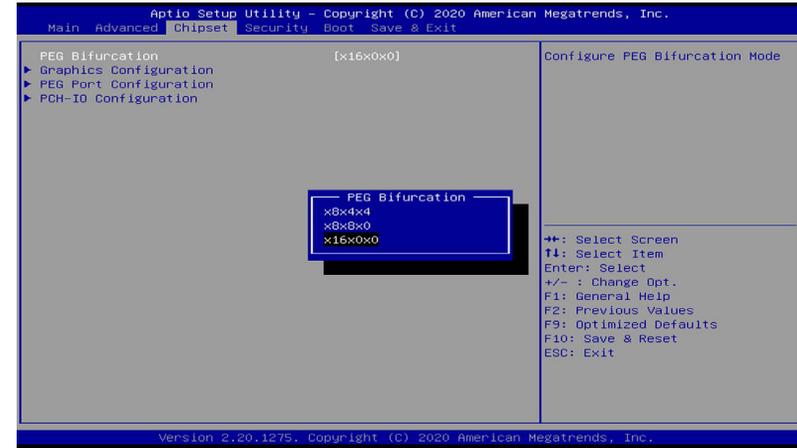
This section configures relevant chipset functions.



► Chipset

PEG Port Configuration & Bifurcation

Configure the PEG Bifurcation Mode and internal PCIe1 (PCIe x4) channel.



Graphics Configuration

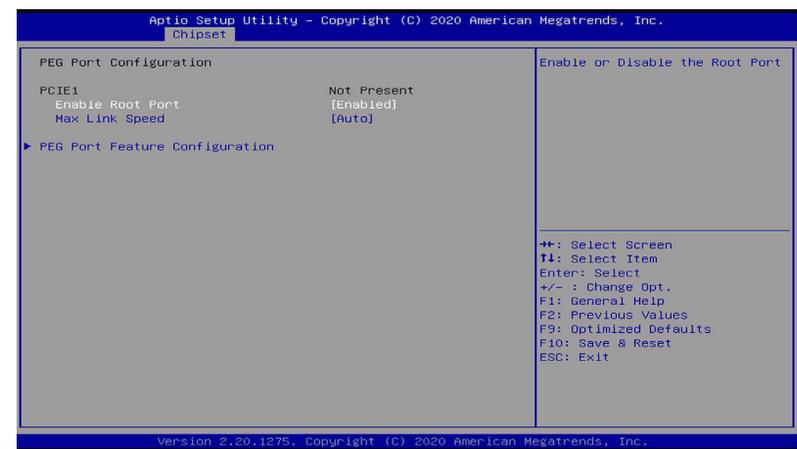


Primary Display

Select a Graphics device to be the primary display — Auto, IGFX, PEG, PCI.

Internal Graphics

Keep IGFX enabled based on the setup options.



Enable Root Port

Enable or disable the root port.

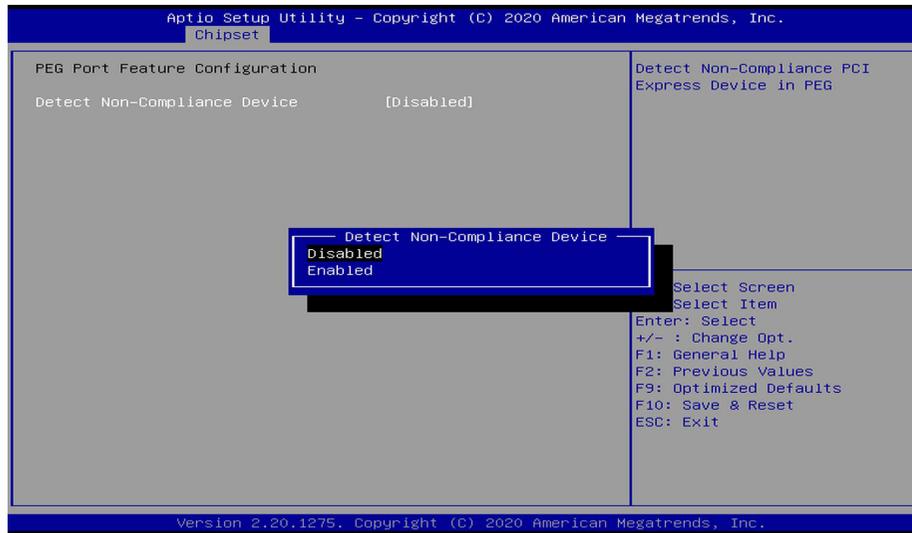
Max Link Speed

Configure Max Link Speed: Auto, Gen1, Gen2 or Gen3.

► Chipset ► PEG Port Configuration

► PEG Port Feature Configuration

This section configures the PEG port.

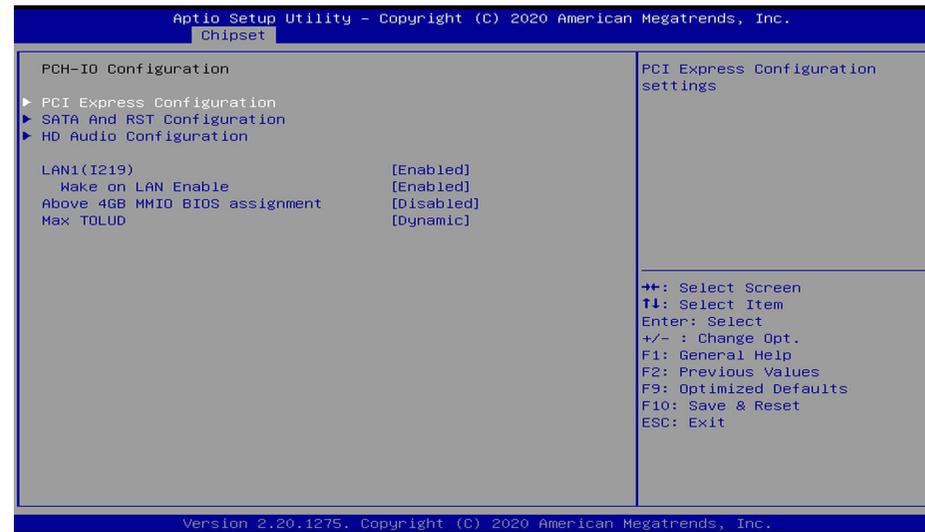


Detect Non-Compliance Device

Enable or disable this field to detect non-compliance PCIe devices in the PEG.

► Chipset

PCH-IO Configuration



► **PCI Express Configuration**

Please refer to the following pages.

► **SATA And RST Configuration**

Please refer to the following pages.

► **HD Audio Configuration**

Please refer to the following pages.

LAN1(I219)

Enable or disable onboard NIC.

Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

Above 4GB MMIO BIOS assignment

Switch MemoryMappedIO BIOS assignment above 4GB.

Max TOLUD

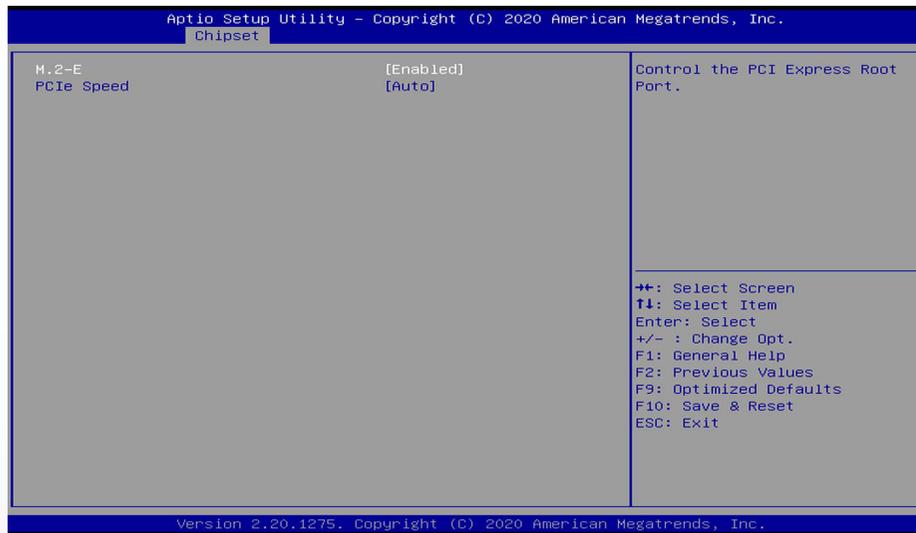
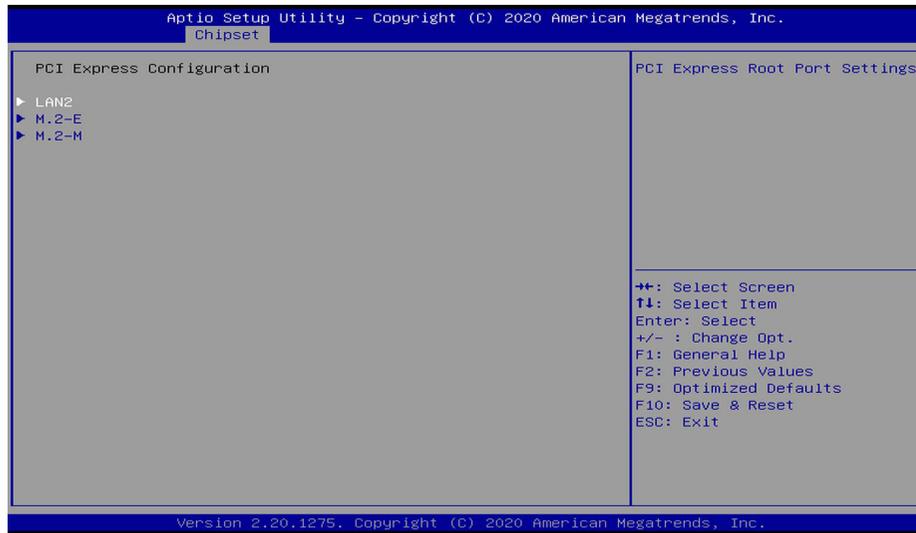
Assign a value or set "Dynamic" to automatically adjust TOLUD based on largest MMIO length.

► Chipset ► PCH-IO Configuration

► PCI Express Configuration

Select a PCIe root port.

► PCI Express Configuration ► LAN2(I210)/M.2-E/M.2-M/Mini PCIe



LAN2(I210)/M.2-E/M.2-M/Mini PCIe

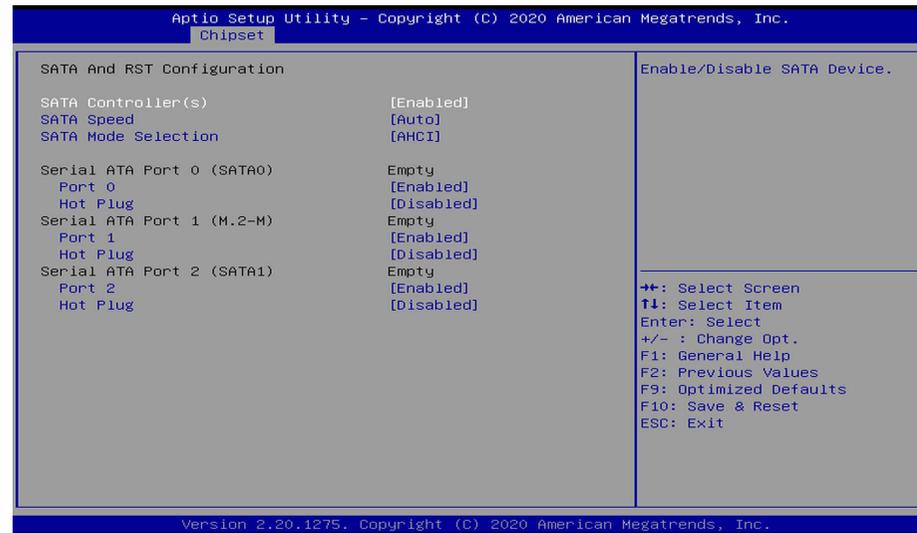
This field is used to enable or disable the PCI express root port.

PCIe Speed

Select the speed of the PCI Express root port: Auto, Gen1, Gen 2 or Gen3. This field will not appear when the root port does not support speed configuration.

► Chipset ► PCH-IO Configuration

► SATA and RST Configuration

**SATA Controller(s)**

Enable or disable the Serial ATA controller. When this field is enabled, the following fields will appear.

SATA Speed

Select the speed of the Serial ATA controller: Auto, Gen1, Gen 2 or Gen3.

SATA Mode Selection

The mode selection determines how the SATA controller(s) operates.

AHCI This option allows the Serial ATA controller(s) to use AHCI (Advanced Host Controller Interface).

Intel RST Premium With Intel Optane System Acceleration This option allows you to create RAID or Intel Rapid Storage configuration with Intel® Optane™ system acceleration on Serial ATA devices.

Use RST Legacy OROM

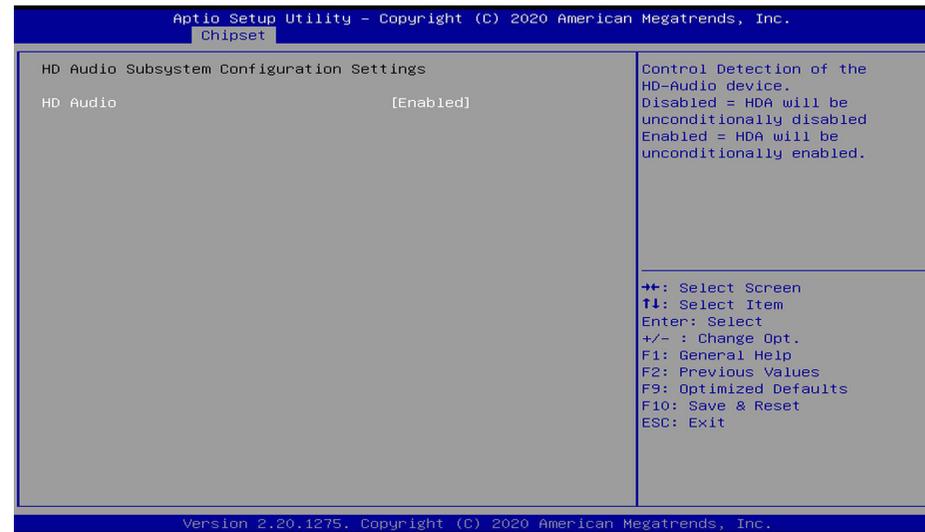
This field is only available when SATA Mode Selection is set to "Intel RST Premium With Optane System Acceleration." It is used to enable or disable to use RST Legacy OROM.

Serial ATA Port 0/1/2 and Hot Plug

Enable or disable the Serial ATA port and its hot plug function.

► Chipset ► PCH-IO Configuration

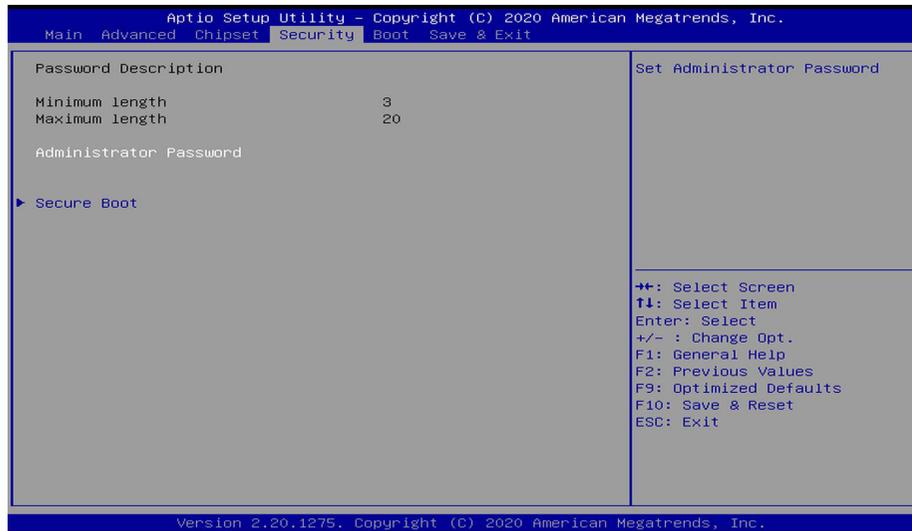
► HD Audio Configuration

**HD Audio**

Control the detection of the HD Audio device.

Disabled HDA will be unconditionally disabled.
Enabled HDA will be unconditionally enabled.

► Security



Administrator Password

Set the administrator password. Input the password, press Enter, and then input the same character string again to confirm. To remove the password, input no character.

Secure Boot

Secure Boot is used to verify that your boot loader is not tampered by malware.



System Mode

This field displays whether the system is in User or Setup mode.

Secure Boot

Enable or disable Secure Boot. Please reset the platform after changing the setting.

Secure Boot Mode

Switch between "Standard" and "Custom" to configure policy variables.

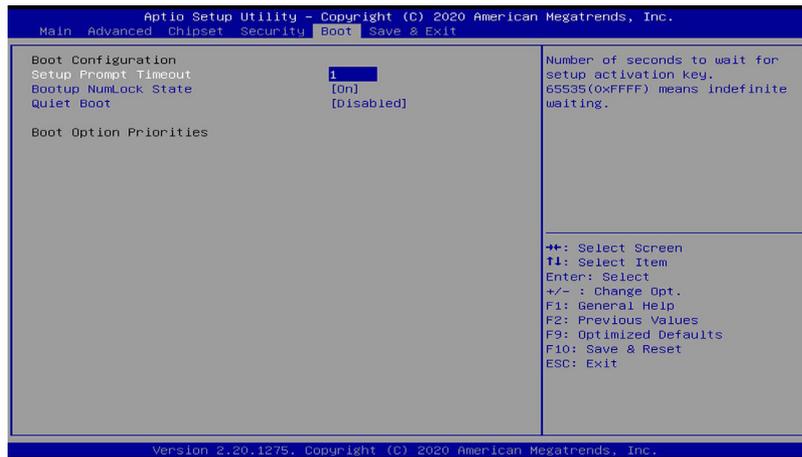
Restore Factory Keys

Force System to User Mode and install factory default Secure Boot key databases.

Reset to Setup Mode

This command is only available when the system mode is in User mode and Secure Boot Mode is set to Custom.

► Boot



Setup Prompt Timeout

Set the number of seconds to wait for the setup activation key. 65535 (0xFFFF) denotes indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state: On or Off.

Quiet Boot

This section is used to enable or disable quiet boot option.

Boot Option Priorities

Select the system boot order.

BGRT Logo

It is used to enable or disable to support display logo with ACPI BGRT table.

Boot Option Priorities

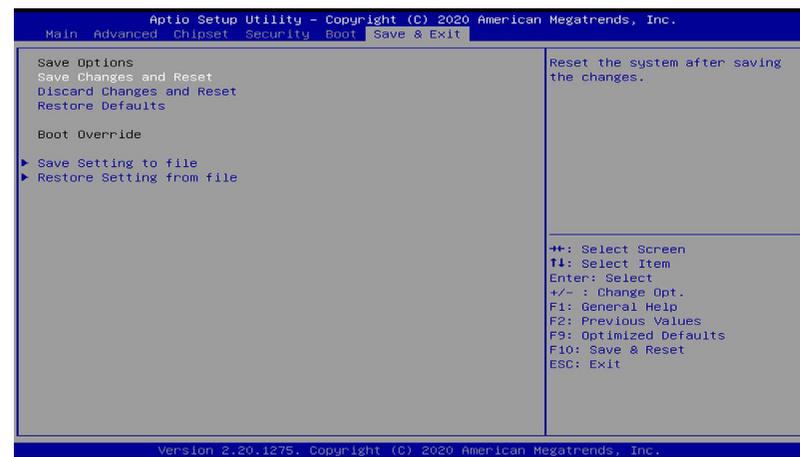
Select the driver boot order.



Note:

If "Boot option filter" of "CSM Configuration" is set to "UEFI and Legacy" or "UEFI only" and "Quiet Boot" is set to enabled, "BGRT Logo" will show up for configuration. Refer to the Advanced > CSM Configuration for more information.

► Save & Exit



Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

Discard Changes and Reset

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

Restore Defaults

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

Boot Override

Move the cursor to an available boot device and press Enter, and then the system will immediately boot from the boot device. The Boot Override function will only be effective for the current boot. The "Boot Option Priorities" configured in the Boot menu will not be changed.

Save Setting to file

Select this option to save BIOS configuration settings to a USB flash device.

Restore Setting from file

This field will appear only when a USB flash device is detected. Select this field to restore setting from the USB flash device.

► Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files. You may refer to the how-to video "How to update AMI BIOS in UEFI mode on DFI products?" at <https://www.dfi.com/Knowledge/Video/5> for updating the BIOS steps.

► Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.
2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.
3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.

**Note:**

- a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

Chapter 4 - RAID

The system board allows configuring RAID on Serial ATA drives. It supports RAID 0, RAID 1, and RAID 5.

► RAID Levels Introduction

RAID 0 (Striped Disk Array without Fault Tolerance)

RAID 0 uses two new identical hard disk drives to read and write data in parallel, interleaved stacks. Data is divided into stripes and each stripe is written alternately between two disk drives. This improves the I/O performance of the drives at different channel; however it is not fault tolerant. A failed disk will result in data loss in the disk array.

RAID 1 (Mirroring Disk Array with Fault Tolerance)

RAID 1 copies and maintains an identical image of the data from one drive to the other drive. If a drive fails to function, the disk array management software directs all applications to the other drive since it contains a complete copy of the drive's data. This enhances data protection and increases fault tolerance to the entire system. Use two new drives or an existing drive and a new drive but the size of the new drive must be the same or larger than the existing drive.

RAID 5

RAID 5 stripes data and parity information across hard drives. It is fault tolerant and provides better hard drive performance and more storage capacity.

RAID 10 (Mirroring and Striping)

RAID 10 is a combination of data striping and data mirroring providing the benefits of both RAID 0 and RAID 1. Use four new drives or an existing drive and three new drives for this configuration.

RAID Level	Min. Drives	Protection	Description
RAID 0	2	None	Data striping without redundancy
RAID 1	2	Single Drive Failure	Disk mirroring
RAID 5	3	Single Drive Failure	Block-level data striping with distributed parity
RAID 10	4	1 Disk Per Mirrored Stripe (not same mirror)	Combination of RAID 0 (data striping) and RAID 1 (mirroring)

► Settings

To enable the RAID function, the steps below are required and elaborated in following sections.

1. Connect the Serial ATA drives.
2. Enable RAID in the AMI BIOS.
3. Create a RAID volume.
4. Install the Intel Rapid Storage Technology Utility.

Step 1: Connect the Serial ATA Drives

Refer to chapter 2 for details on connecting the Serial ATA drives.



Important:

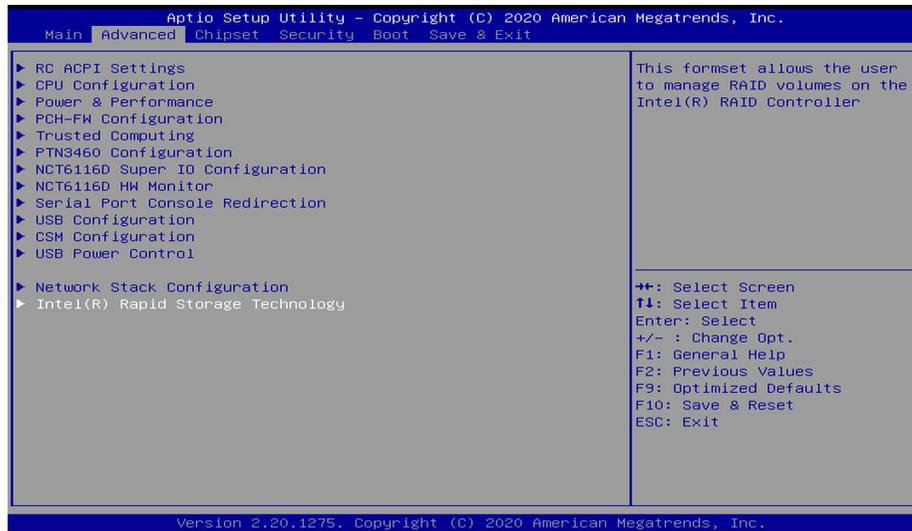
1. Make sure you have installed the Serial ATA drives and connected the data cables otherwise you won't be able to enter the RAID BIOS utility.
2. Treat the cables with extreme caution especially while creating RAID. A damaged cable will ruin the entire installation process and operating system. The system will not boot and you will lost all data in the hard drives. Please give special attention to this warning because there is no way of recovering back the data.

Step 2: Enable RAID in the AMI BIOS

1. Power-on the system then press to enter the main menu of the AMI BIOS.
2. Go to "Chipset" menu and select the "PCH-IO Configuration" menu then "SATA And RST Configuration" menu.
3. Change the "SATA Mode Selection" to "Intel RST Premium With Intel Optane System Acceleration" mode.
4. Press F10 to save the changes.
5. Reboot the system.

Step 3: Create a RAID Volume

1. Go to the "Advanced" menu of the AMI BIOS and select "Intel(R) Rapid Storage Technology".



2. The screen displays all available drives. Select "Create RAID volume" to create a RAID volume".
3. Use the up or down arrow keys to select the RAID level and press <Enter>.
4. Use the up or down arrow keys to scroll through the list of hard drives and press <Enter> to select the drive.
5. Press <Enter>.
6. Use the up or down arrow keys to select the strip size and press <Enter>.
7. Enter the volume size and press <Enter>.
8. At the prompt, press <Y> to confirm volume creation.

Step 4: Install the Intel Rapid Storage Technology Utility

The Intel Rapid Storage Technology Utility can be installed from within Windows. It allows RAID volume management (create, delete, migrate) from within the operating system. It will also display useful SATA device and RAID volume information. The user interface, tray icon service and monitor service allow you to monitor the current status of the RAID volume and/or SATA drives. It enables enhanced performance and power management for the storage sub-system.

Chapter 5 - Intel AMT Settings

► Overview

Intel Active Management Technology (Intel® AMT) combines hardware and software solution to provide maximum system defense and protection to networked systems. The hardware and software information are stored in non-volatile memory. With its built-in manageability and latest security applications, Intel® AMT provides the following functions.

Discover

Allows remote access and management of networked systems even while PCs are powered off; significantly reducing desk-side visits.

Repair

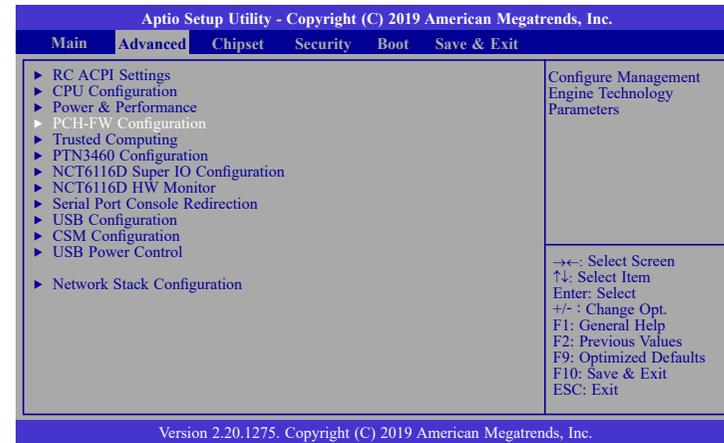
Remotely repair systems after OS failures. Alerting and event logging help detect problems quickly to reduce downtime.

Protect

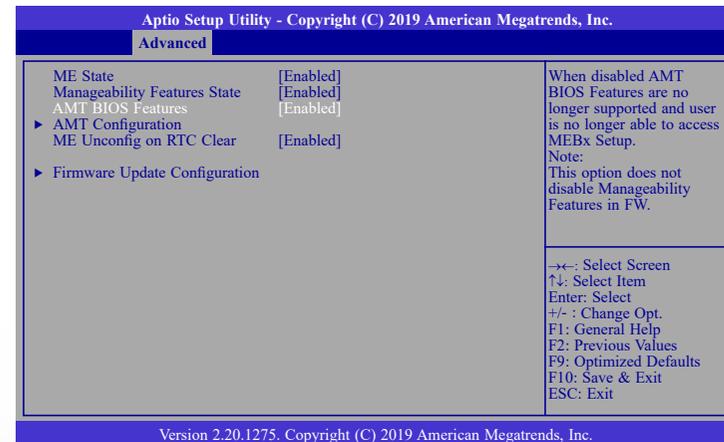
Intel AMT's System Defense capability remotely updates all systems with the latest security software. It protects the network from threats at the source by proactively blocking incoming threats, reactively containing infected clients before they impact the network, and proactively alerting when critical software agents are removed.

Enable Intel® AMT in the AMI BIOS

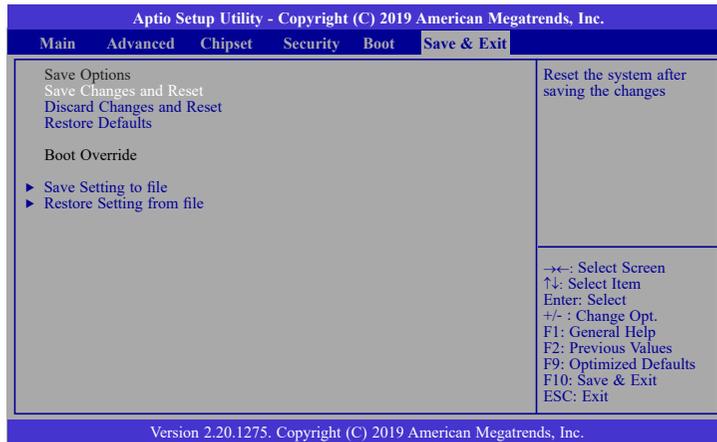
1. Power-on the system then press to enter the main menu of the AMI BIOS.
2. In the **Advanced** menu, select **PCH-FW Configuration**.



3. Select **Enabled** in the **AMT BIOS Features** field.

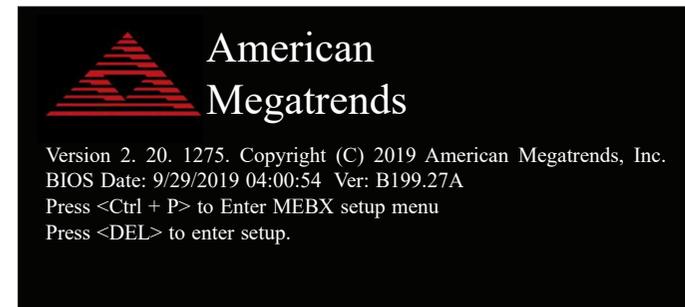


- In the **Save & Exit** menu, select **Save Changes and Reset** and then press <Enter>. A dialog box will appear. Select **Yes** and press Enter to reset the system after saving all changes made.

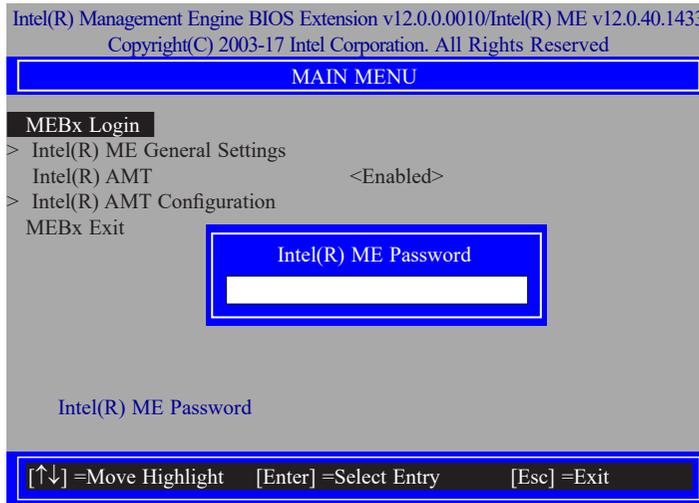


Configure Intel® AMT in the Intel® Management Engine BIOS Extension (MEBX)

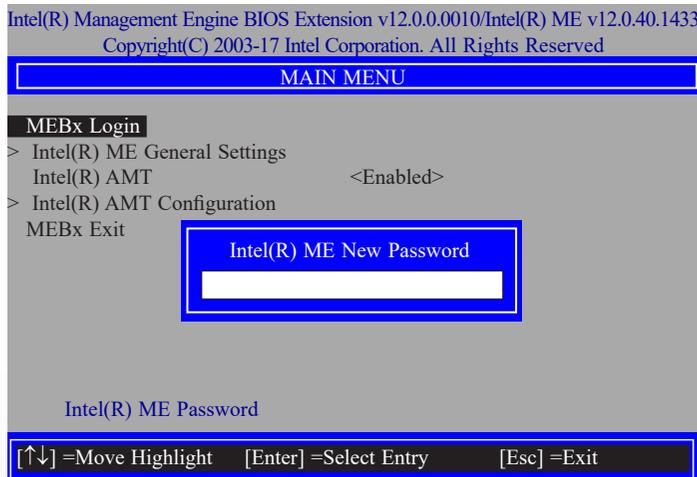
- When the system reboots, the following message will be displayed. Press <Ctrl + P> as soon as the message is displayed. This message will only be displayed very briefly.



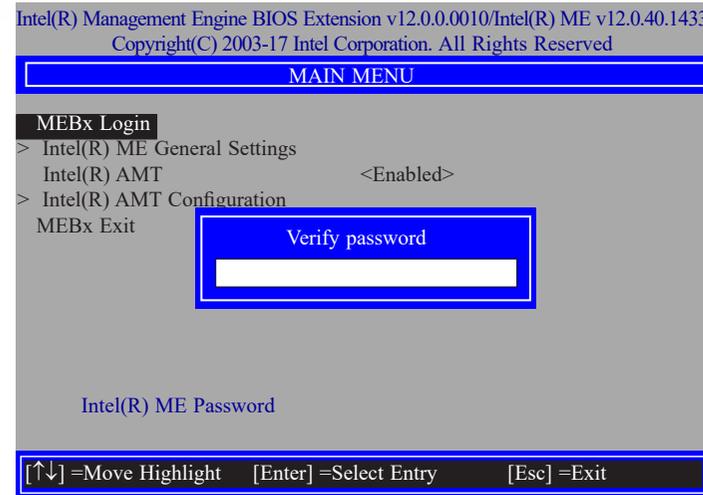
2. Select **MEBx Login** and press Enter. You will be prompted for a password. The default password is "admin". Enter the default password in the space provided under Intel(R) ME Password then press Enter.



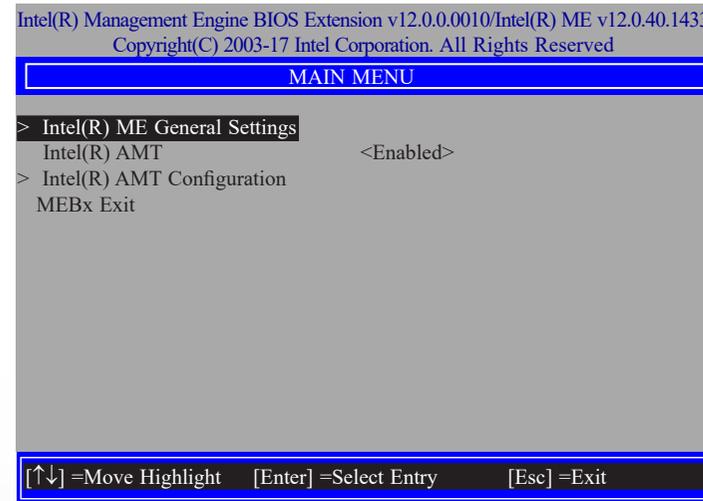
3. Enter a new password in the space provided under Intel(R) ME New Password then press Enter. The password must include:
 - 8-32 characters / Strong 7-bit ASCII characters excluding : , and " characters
 - At least one digit character (0, 1, ...9) / At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
 - Both lower case and upper case characters



4. You will be asked to verify the new password. Enter the same new password in the space provided under Verify Password then press Enter.



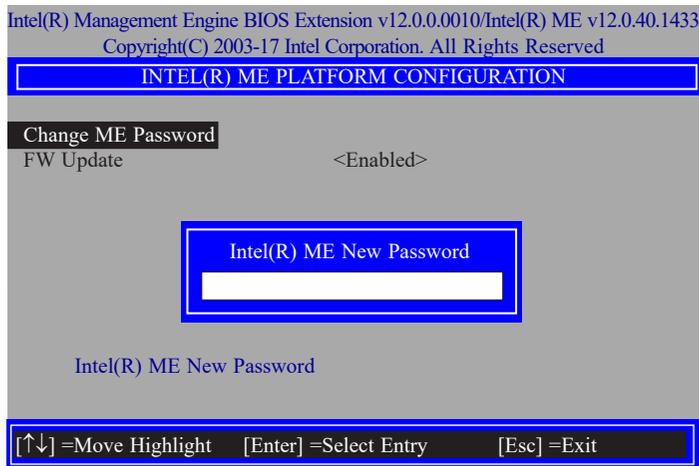
5. Select **Intel(R) ME General Settings** then press Enter.



- If you want to change ME password, select **Change ME Password** then press Enter. Enter the current password in the space provided under Intel(R) ME Password then press Enter.



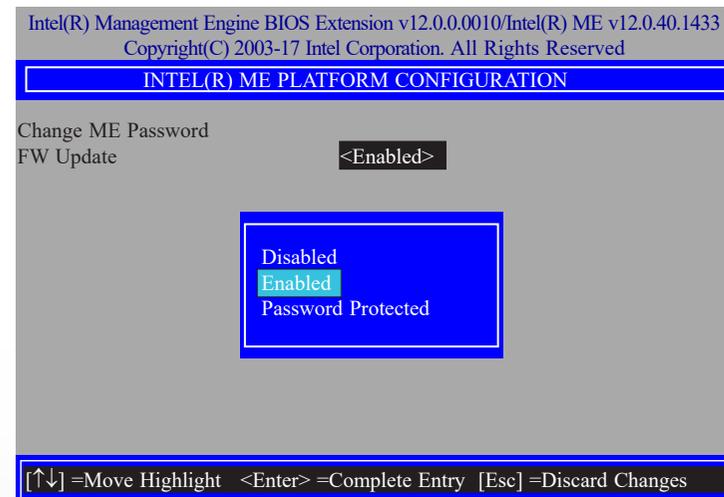
- Enter a new password in the space provided under Intel(R) ME New Password then press Enter. The password must include:
 - 8-32 characters / Strong 7-bit ASCII characters excluding : , and " characters
 - At least one digit character (0, 1, ...9) / At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
 - Both lower case and upper case characters



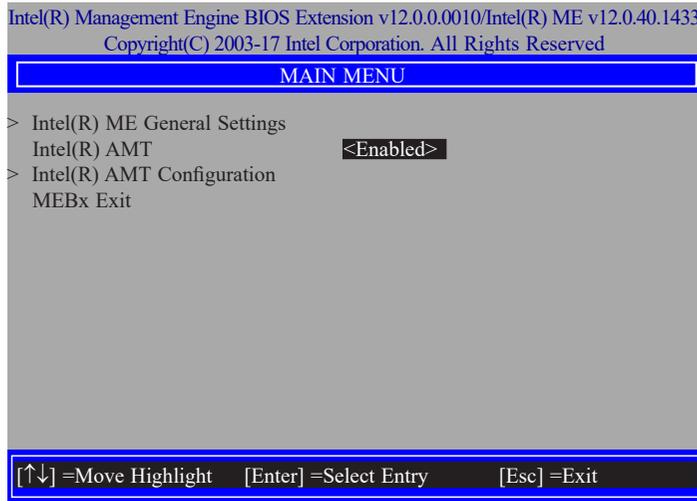
- You will be asked to verify the new password. Enter the same new password in the space provided under Verify Password then press Enter.



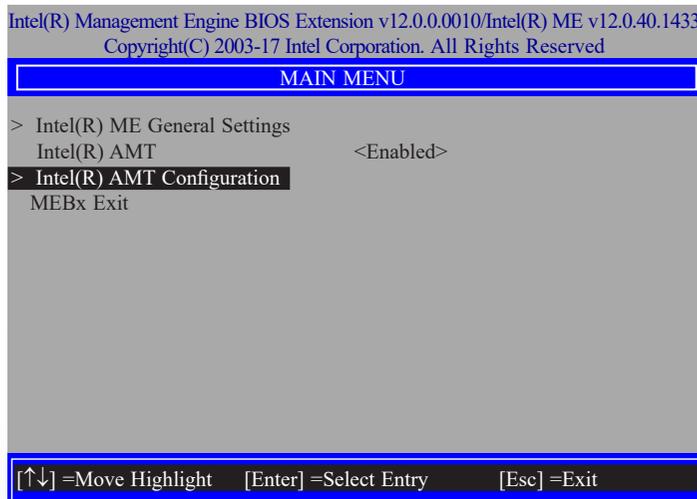
- Select **FW Update** then press Enter. Select **Enabled** or **Disabled** or **Password Protected** then press Enter.



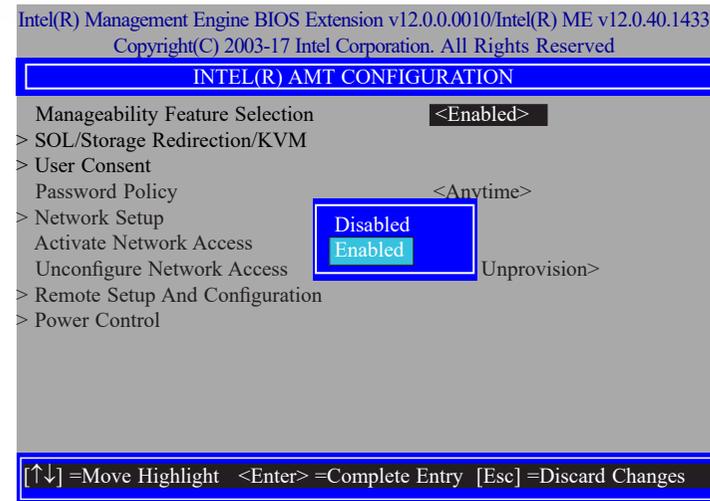
10. Press Esc until you return to the **Main Menu**. Select **Intel(R) AMT** then press Enter. Select **Enabled** or **Disabled** then press Enter.



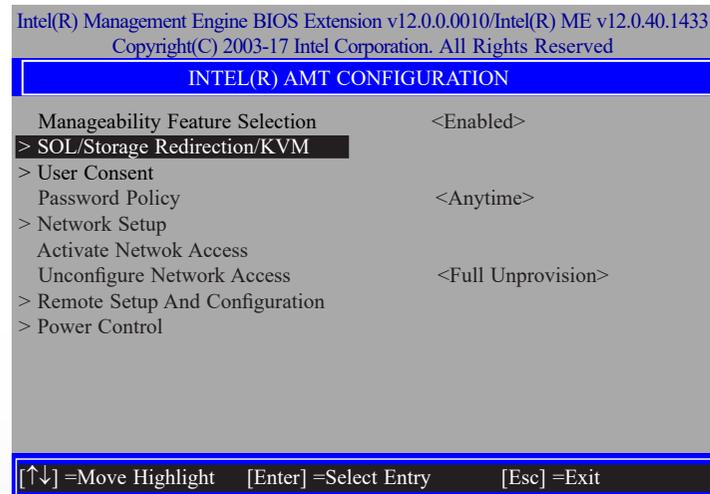
11. Select **Intel(R) AMT Configuration** then press Enter.



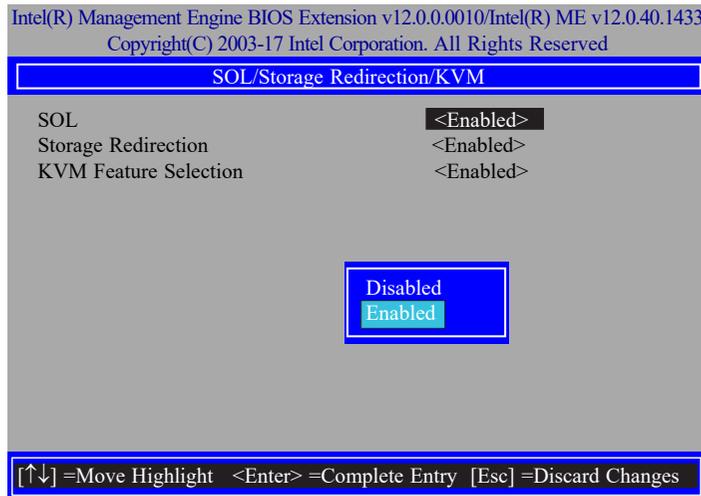
12. In the **Intel(R) AMT Configuration** menu, select **Manageability Feature Selection** then press Enter. Select **Enabled** or **Disabled** then press Enter.



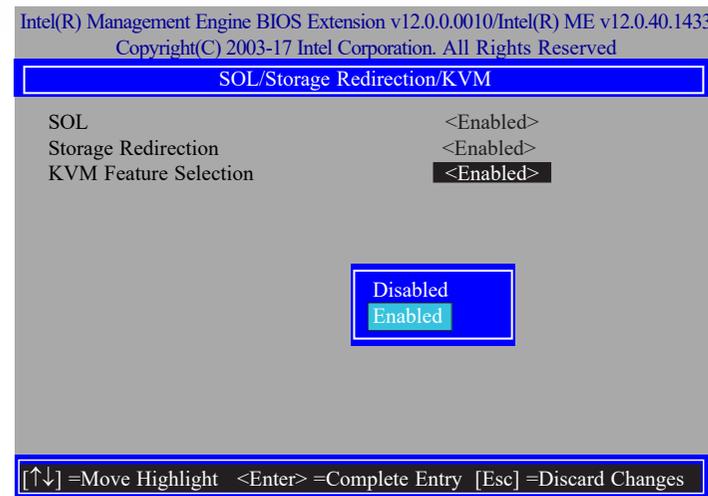
13. In the **Intel(R) AMT Configuration** menu, select **SOL/Storage Redirection/KVM** then press Enter.



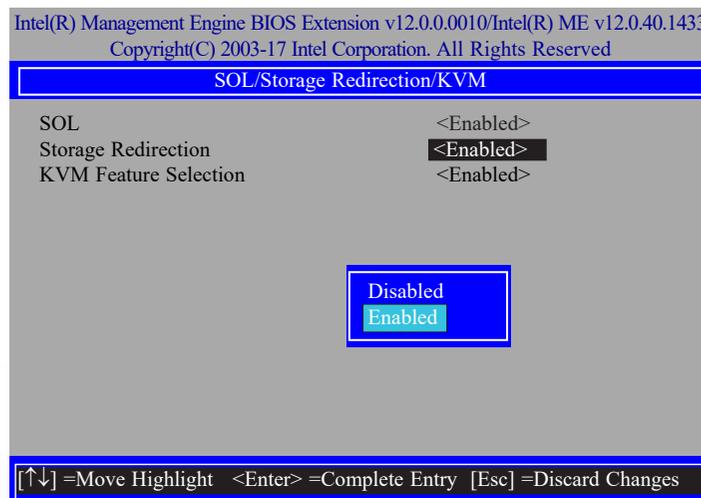
14. Select **SOL** then press Enter. Select **Enabled** or **Disabled** then press Enter.



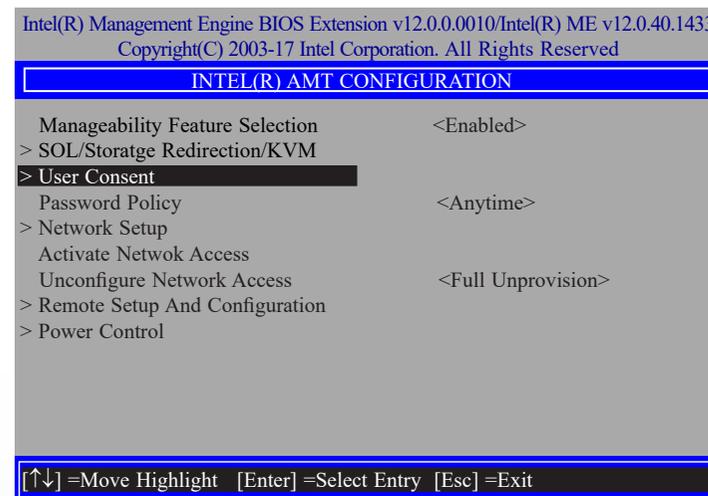
16. Select **KVM Feature Selection** then press Enter. Select **Enabled** or **Disabled** then press Enter.



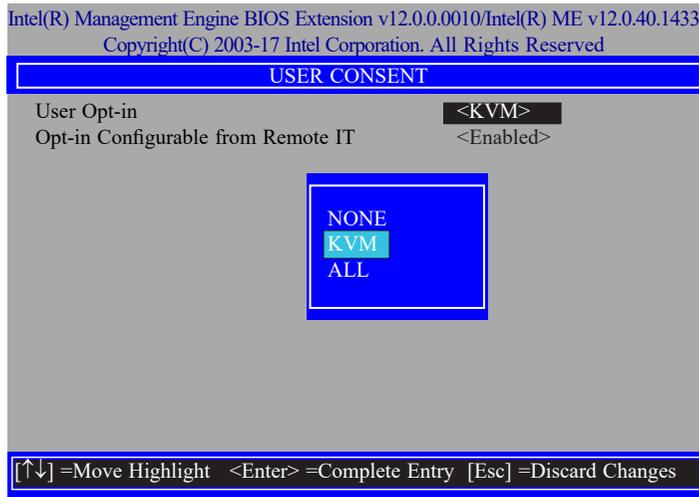
15. Select **Storage Redirection** then press Enter. Select **Enabled** or **Disabled** then press Enter.



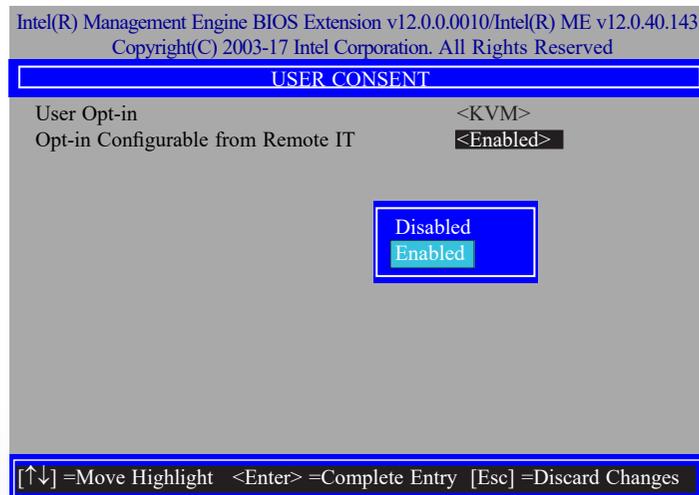
17. Press Esc until you return to the **Intel(R) AMT Configuration** menu. Select **User Consent** then press Enter.



18. In the **User Consent** menu, select **User Opt-in** then press Enter. Select **NONE** or **KVM** or **ALL** then press Enter.

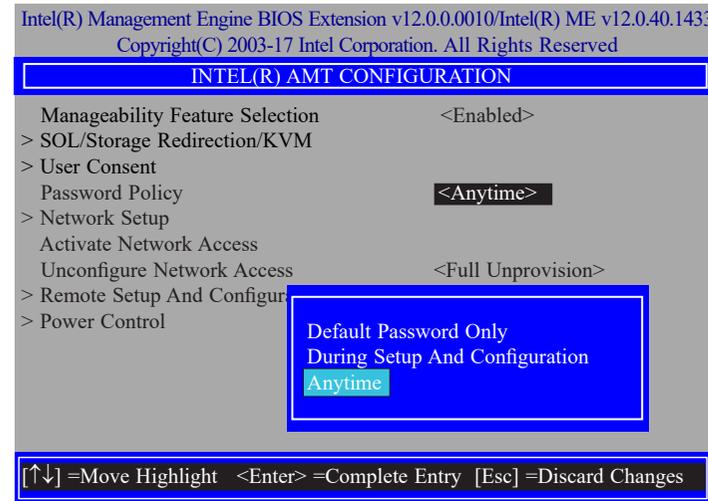


19. Select **Opt-in Configurable from Remote IT** then press Enter. Select **Enabled** or **Disabled** then press Enter.

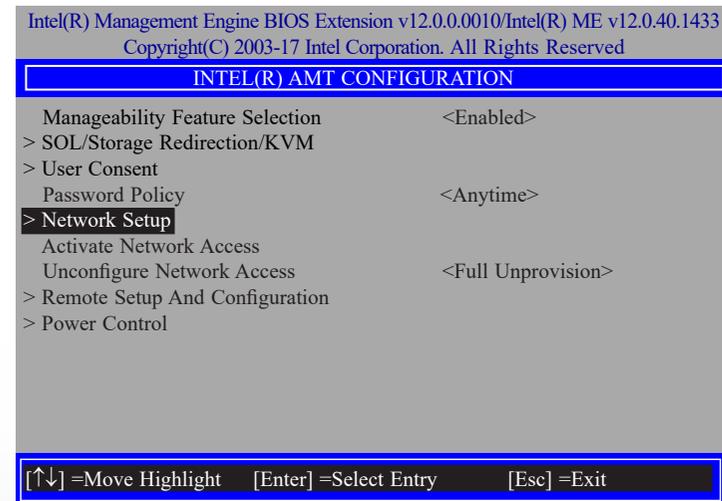


20. Press Esc until you return to the **Intel(R) AMT Configuration** menu. Select **Password Policy** then press Enter.

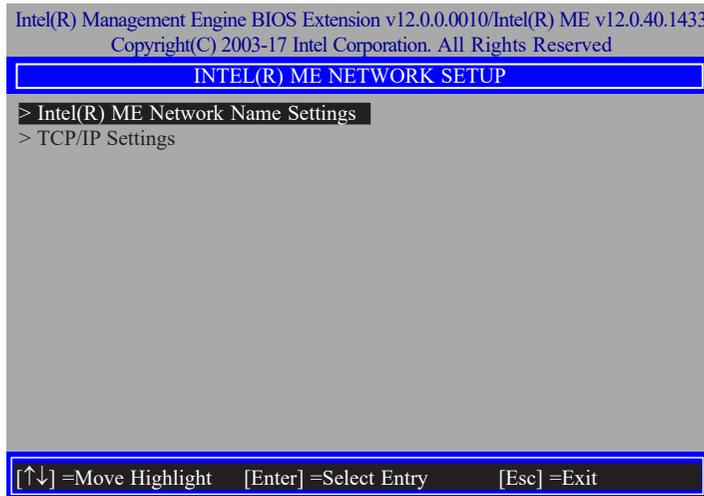
You may choose to use a password only during setup and configuration or to use a password anytime the system is being accessed.



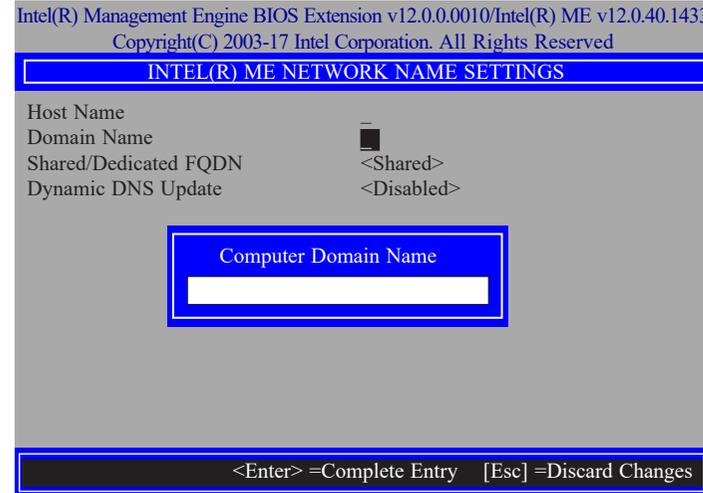
21. In the **Intel(R) AMT Configuration** menu, select **Network Setup** then press Enter.



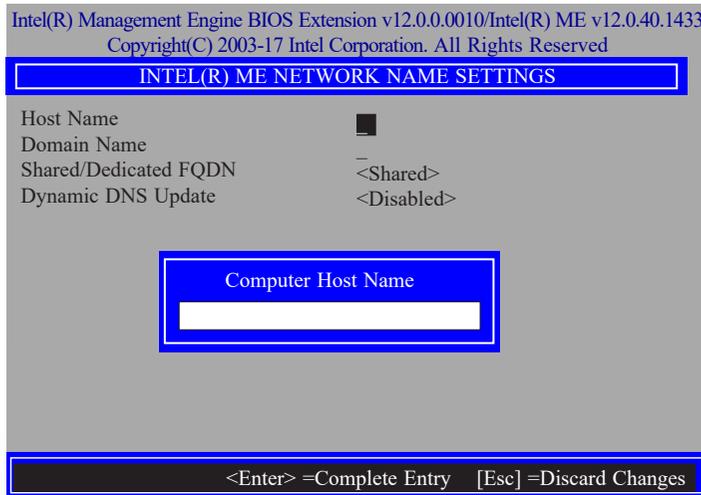
22. In the **Intel(R) ME Network Setup** menu, select **Intel(R) ME Network Name Settings** then press Enter.



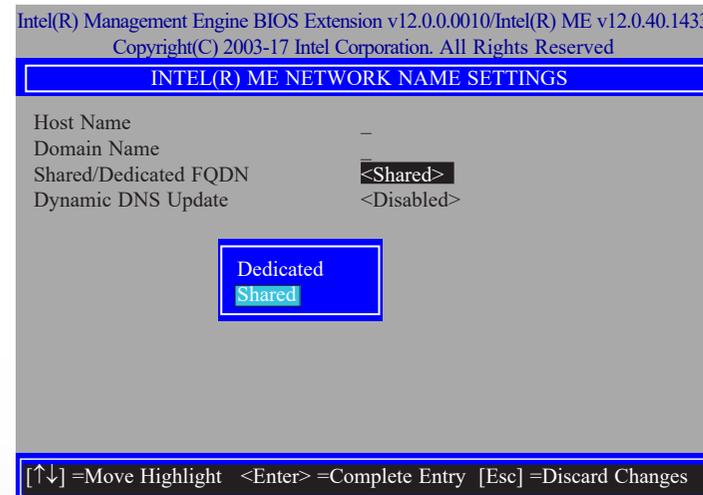
24. Select **Domain Name** then press Enter. Enter the computer's domain name then press Enter.



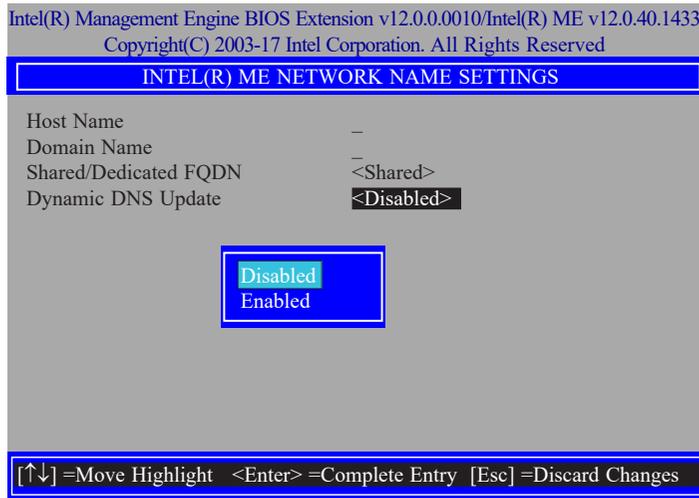
23. In the **Intel(R) ME Network Name Settings** menu, select **Host Name** then press Enter. Enter the computer's host name then press Enter.



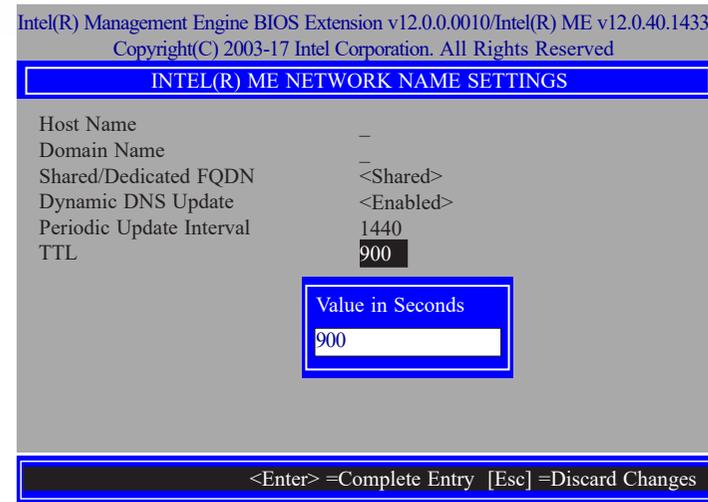
25. Select **Shared/Dedicated FQDN** then press Enter. Select **Shared** or **Dedicated** then press Enter.



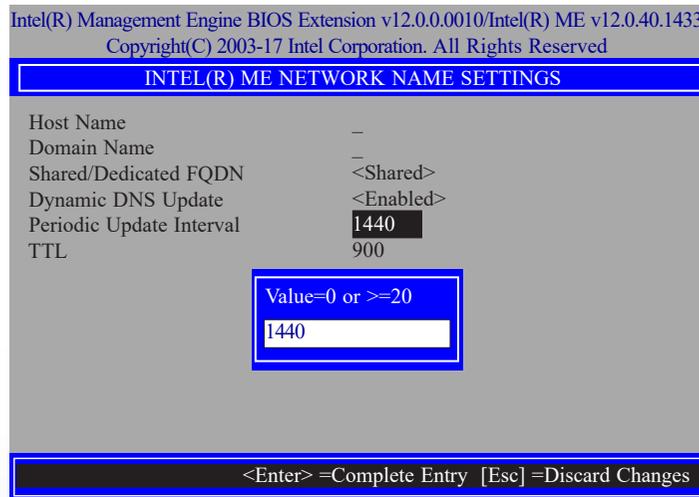
26. Select **Dynamic DNS Update** then press Enter. Select **Enabled** or **Disabled** then press Enter. If **Dynamic DNS Update** is set to **Enabled**, **Periodic Update Interval** and **TTL** fields will show up.



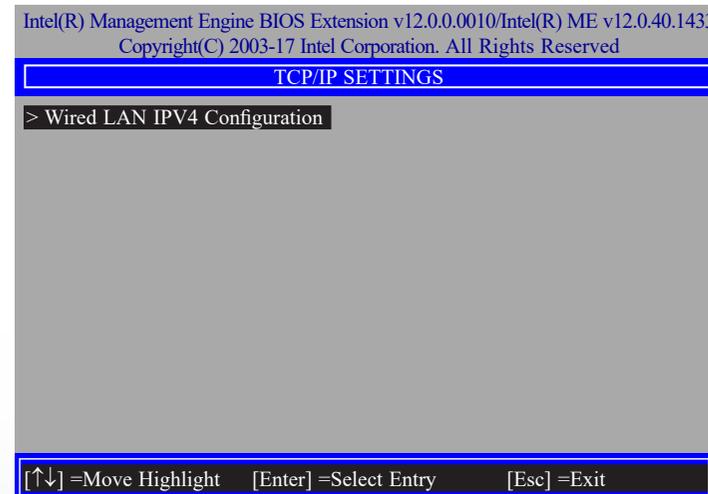
28. Select **TTL** then press Enter. Enter value then press Enter.



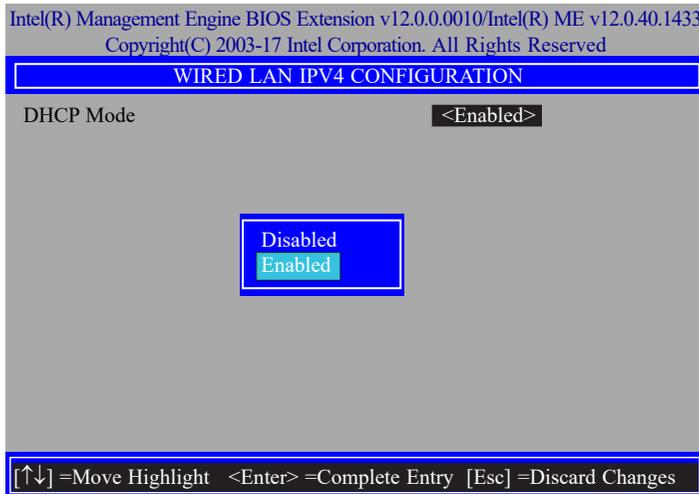
27. Select **Periodic Update Interval** then press Enter. Enter value then press Enter.



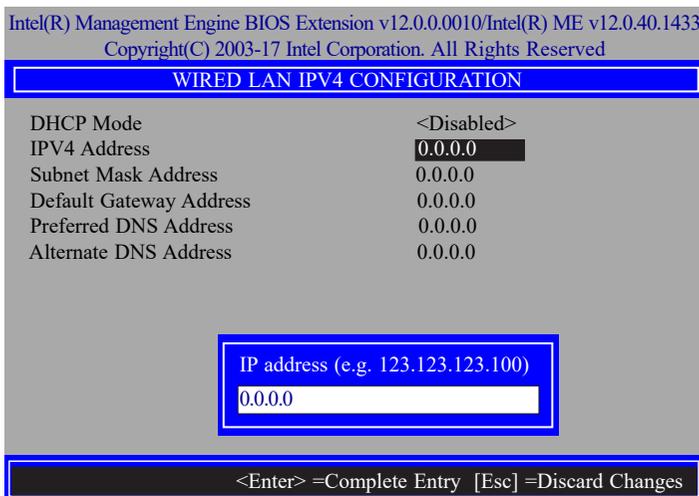
29. Press Esc until you return to the **Intel(R) ME Network Setup** menu. Select **TCP/IP Settings** then press Enter. In the **TCP/IP Settings** menu, select **Wired LAN IPv4 Configuration** then press Enter.



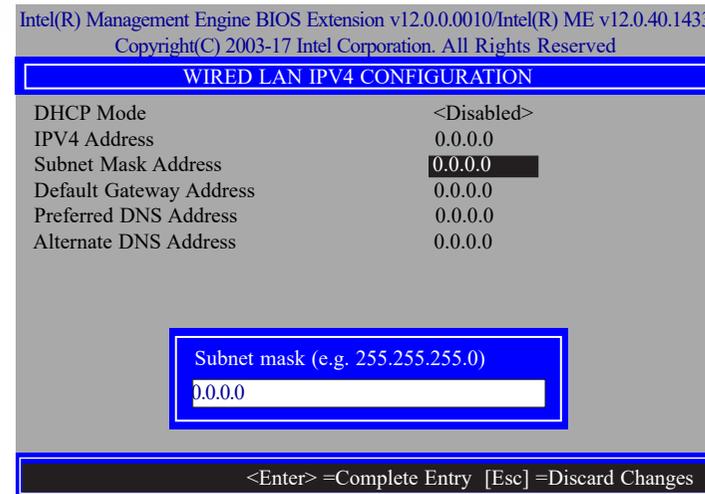
30. In the **Wired LAN IPv4 Configuration** menu, select **DHCP Mode** then press Enter. Select **Enabled** or **Disabled** then press Enter. If set to **Disabled**, **IPV4 Address**, **Subnet Mask Address**, **Default Gateway Address**, **Preferred DNS Address** and **Alternate DNS Address** will show up.



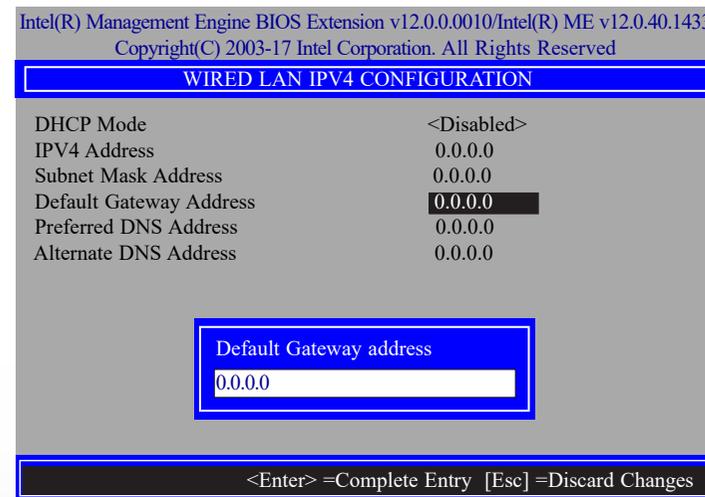
31. Select **IPV4 Address** then press Enter. Enter address then press Enter.



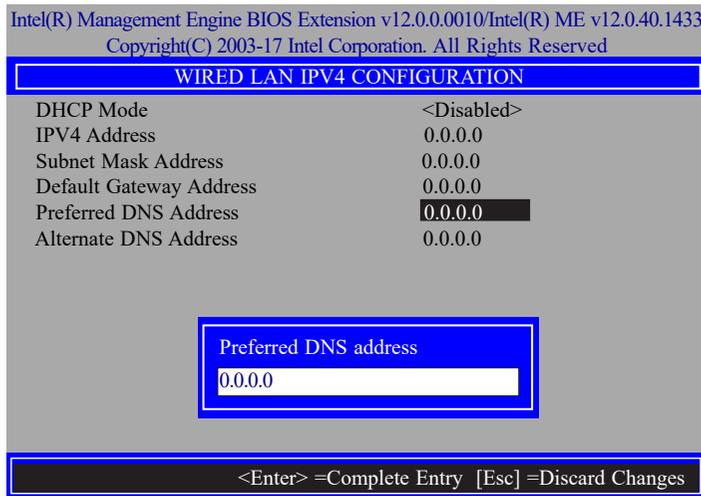
32. Select **Subnet Mask Address** then press Enter. Enter address then press Enter.



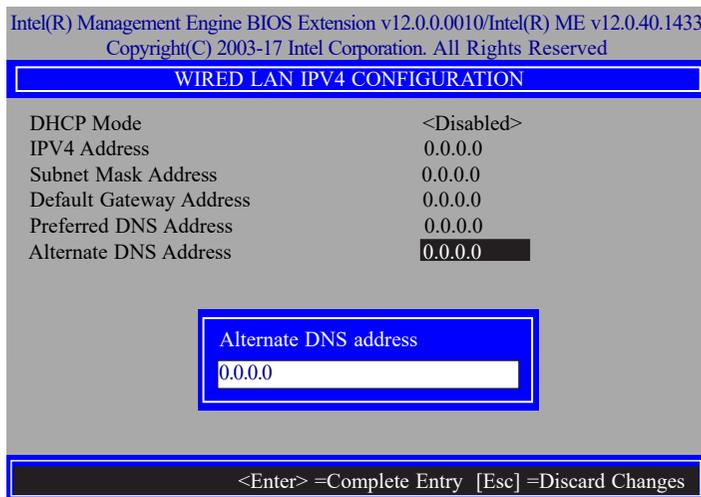
33. Select **Default Gateway Address** then press Enter. Enter address then press Enter.



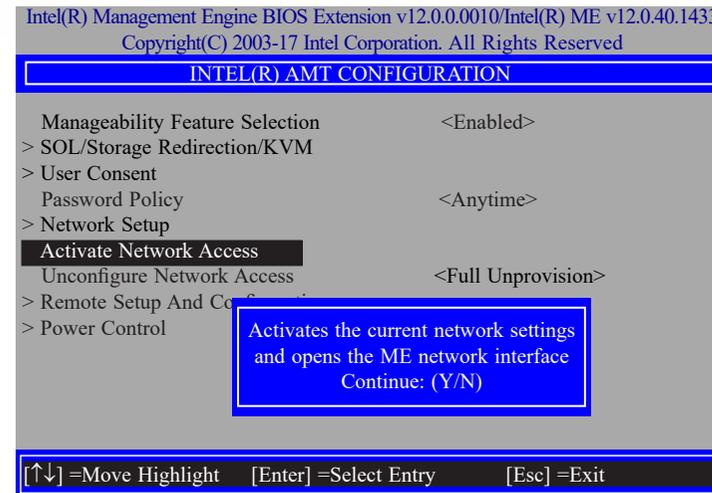
34. Select **Preferred DNS Address** then press Enter. Enter address then press Enter.



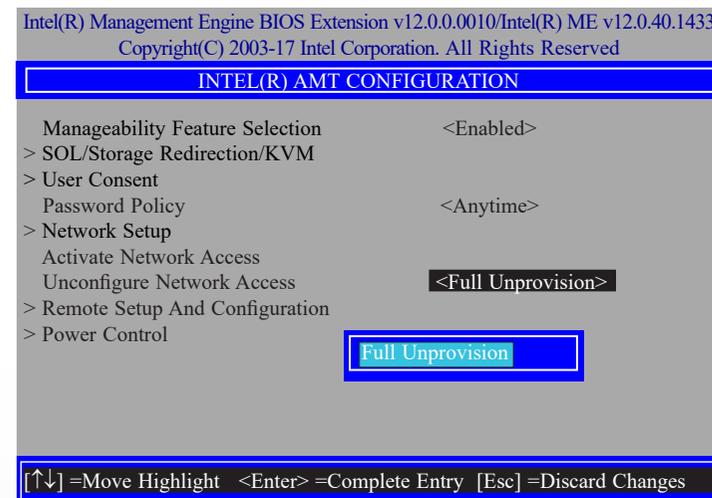
35. Select **Alternate DNS Address** then press Enter. Enter address then press Enter.



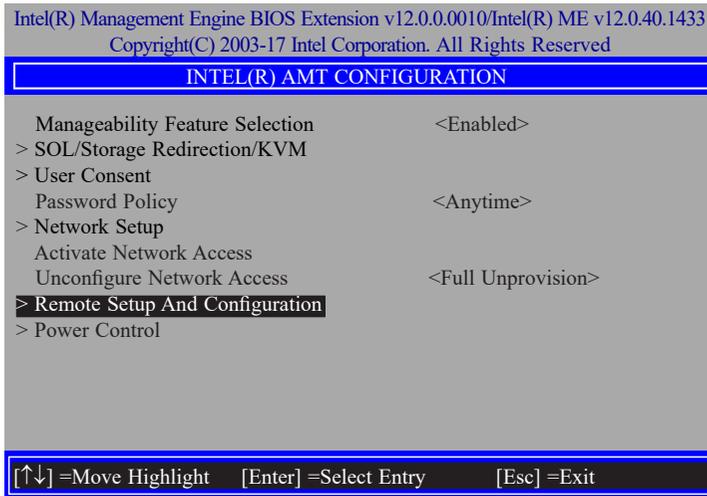
36. Press Esc until you return to the **Intel(R) AMT Configuration** menu. If you want to activate the current network settings and open the ME network interface, select **Activate Network Access**, press Enter, then press Y.



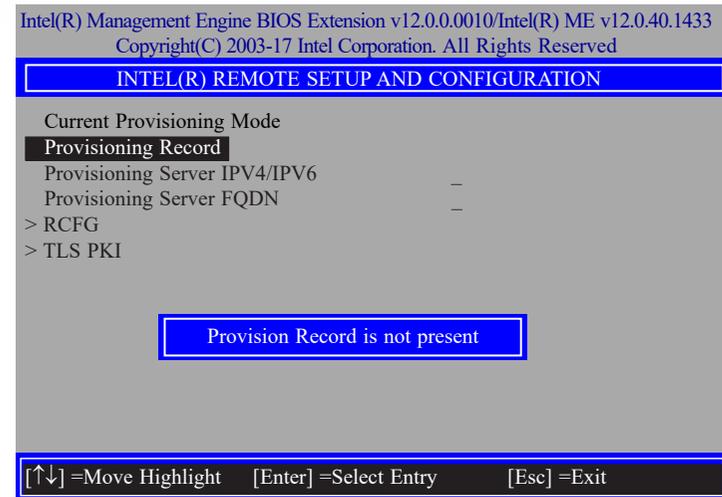
37. In the **Intel(R) AMT Configuration** menu, select **Unconfigure Network Access** then press Enter.



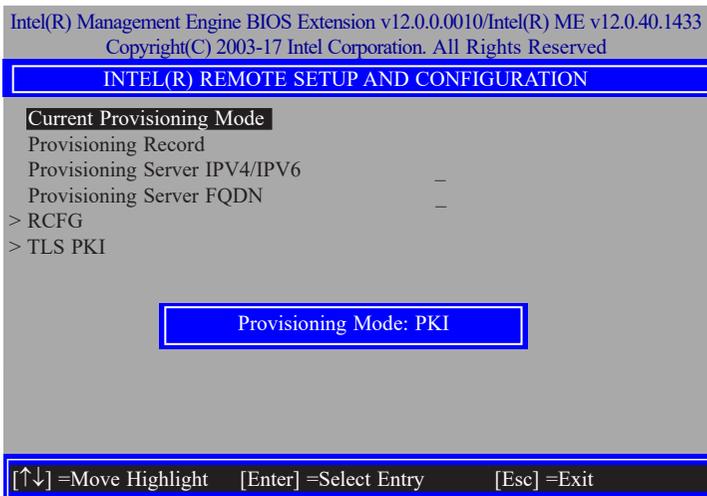
38. In the **Intel(R) AMT Configuration** menu, select **Remote Setup And Configuration** then press Enter.



40. In the **Intel(R) Remote Setup And Configuration** menu, select **Provisioning Record** then press Enter.



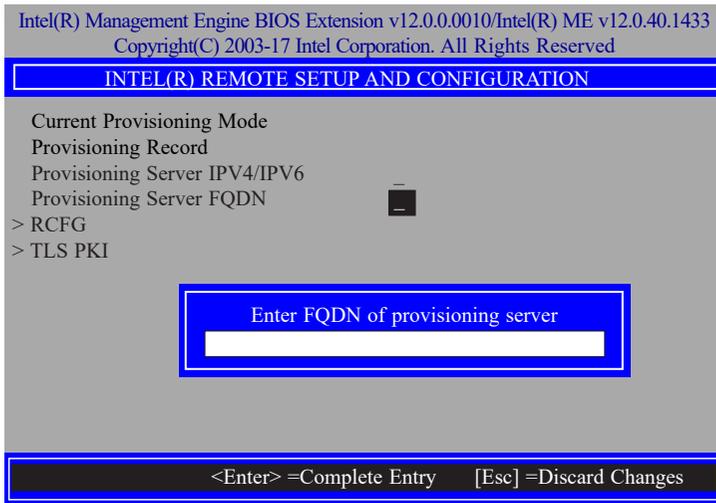
39. In the **Intel(R) Remote Setup And Configuration** menu, select **Current Provisioning Mode** then press Enter.



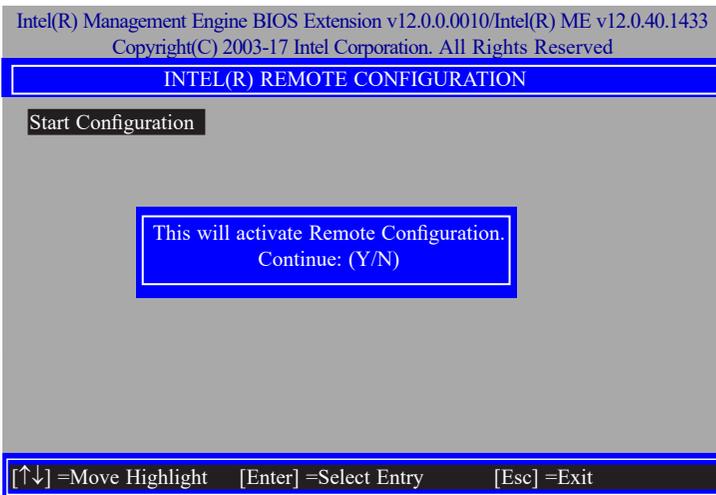
41. In the **Intel(R) Remote Setup And Configuration** menu, select **Provisioning Server IPV4/IPV6** then press Enter. Enter the address then press Enter.



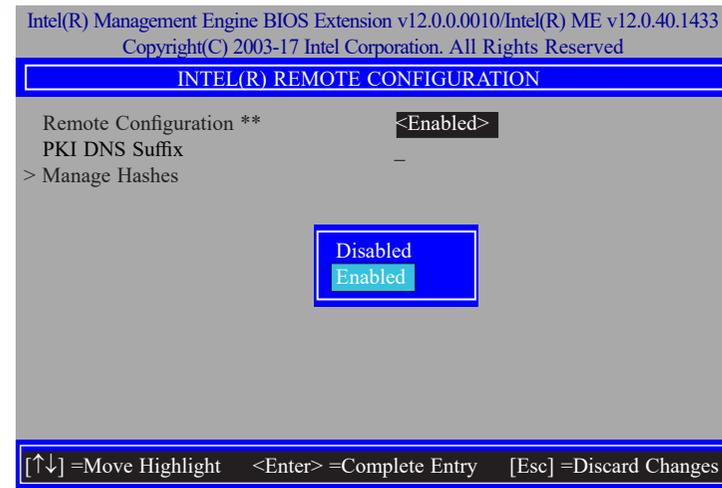
42. In the **Intel(R) Remote Setup And Configuration** menu, select **Provisioning Server FQDN** then press Enter. Enter the FQDN then press Enter.



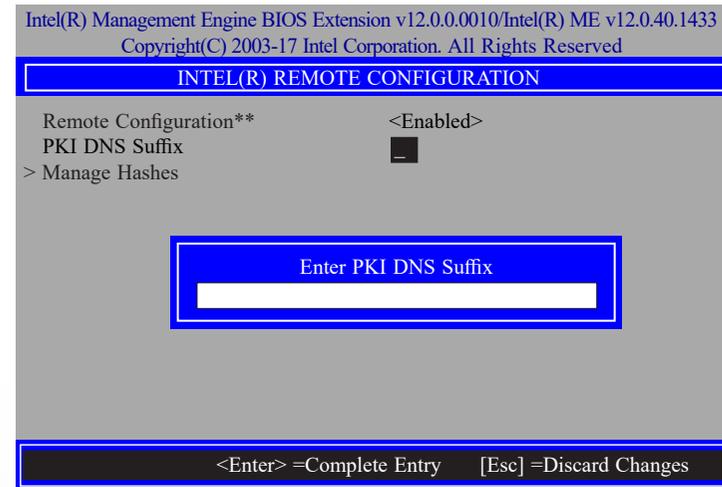
43. If you want to activate remote configuration, in the **Intel(R) Remote Setup And Configuration** menu, select **RCFG** then press Enter. Select **Start Configuration** then press Enter. Press Y to activate.



44. Press Esc until you return to the **Intel(R) Remote Setup And Configuration** menu. Select **TLS PKI** then press Enter. Select **Remote Configuration **** then press Enter. Select **Enabled** or **Disabled** then press Enter.



45. Select **PKI DNS Suffix** then press Enter. Enter the PKI DNS Suffix then press Enter.



46. In the **Intel(R) Remote Configuration** menu, select **Manage Hashes** then press Enter. Select the hash name then press Insert to enter custom hash certificate name, press Delete to delete hash, press Enter to view hash information, press + to activate or deactivate hash, and press Esc to exit.

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INTEL(R) REMOTE CONFIGURATION

Hash Name	Active	Default	Algorithm
VeriSign Class 3	Active: [*]	Default: [*]	SHA256
VeriSign Class 3	Active: [*]	Default: [*]	SHA256
Go Daddy Class 2	Active: [*]	Default: [*]	SHA256
Comodo AAA CA	Active: [*]	Default: [*]	SHA256
Starfield Class 2	Active: [*]	Default: [*]	SHA256
VeriSign Class 3	Active: [*]	Default: [*]	SHA256
VeriSign Class 3	Active: [*]	Default: [*]	SHA256
VeriSign Class 3	Active: [*]	Default: [*]	SHA256
GTE CyberTrust G1	Active: [*]	Default: [*]	SHA256
Baltimore Cyber Tr	Active: [*]	Default: [*]	SHA256
Cybertrust Global	Active: [*]	Default: [*]	SHA256
Verizon Global Ro	Active: [*]	Default: [*]	SHA256
Entrust.net CA (2	Active: [*]	Default: [*]	SHA256
Entrust Root CA	Active: [*]	Default: [*]	SHA256
VeriSign Universa	Active: [*]	Default: [*]	SHA256
Go Daddy Root CA	Active: [*]	Default: [*]	SHA256
Entrust Root CA -	Active: [*]	Default: [*]	SHA256
Startfield Root CA	Active: [*]	Default: [*]	SHA256

[Ins] =Add New Hash [Delete] =Delete Hash [+] =Activate Hash
[↑↓] =Move Highlight [Enter] =View Hash [Esc] =Exit

47. Press Esc until you return to the **Intel(R) AMT Configuration** menu, select **Power Control** then press Enter. In the **Intel(R) AMT Power Control** menu, select **Intel(R) AMT ON in Host Sleep States** then press Enter. Select an option then press Enter.

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INTEL(R) AMT POWER CONTROL

These configurations are effective only after AMT provisioning has started

Intel(R) AMT ON in Host Sleep States <Desktop: ON in S0, ME Wake in S3, S4-5>

Idle Timeout 65535

Desktop: ON in S0
Desktop: ON in S0, ME Wake in S3, S4-5

[↑↓] =Move Highlight <Enter> =Complete Entry [Esc] =Discard Changes

48. In the **Intel(R) AMT Power Control** menu, select **Idle Timeout** then press Enter. Enter the timeout value and press Enter.

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INTEL(R) AMT POWER CONTROL

This configurations are effective only after AMT provisioning has started

Intel(R) AMT ON in Host Sleep States <Desktop: ON in S0, ME Wake in S3, S4-5>

Idle Timeout 65535

Timeout Value (1-65535)
65535

<Enter> =Complete Entry [Esc] =Discard Changes

49. Press Esc until you return to the **Main Menu**. Select **MEBx Exit** then press Enter. Press Y to exit.

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MAIN MENU

> Intel(R) ME General Settings
> Intel(R) AMT Configuration
MEBx Exit

Are you sure you want to exit?(Y/N):

Exit

[↑↓] =Move Highlight [Enter] =Select Entry [Esc] =Exit