



EC500-KH

User's Manual



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Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.

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Trademarks

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

FCC and DOC Statement on Class A

This equipment has been tested and found to comply with the limits for a Class A 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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About this Manual

An electronic file of this manual can be obtained from the DFI website at www.dfi.com. To download the user's manual from our website, please go to "Support" > "Download Center." On the Download Center page, select your product or type the model name and click "Search" to find all technical documents including the user's manual for a specific product.

Warranty

1. Warranty does not cover damages or failures that arised 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 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.

Battery:

- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.

Safety Precautions

- Use the correct DC input voltage range.
- 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.
- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humidity.
- Place the system on a stable surface. Dropping it or letting it fall may cause damage.
- The openings on the system are for air ventilation to protect the system from overheating. **DO NOT COVER THE OPENINGS.**
- Place the power cord in such a way that it will not be stepped on. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and that it matches the voltage and current marked on the system's electrical range label.
- If the system will not be used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- If one of the following occurs, consult a service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated the system.
 - The system has been exposed to moisture.
 - The system is not working properly.
 - The system dropped or is damaged.
 - The system has obvious signs of breakage.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace the outlet.
- Disconnect the system from the DC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

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.

- 1 EC500-KH system unit
- Screw pack for Mini PCIe and M.2
- Screw pack for SATA drives
- 1 Extend power switch cable
- 1 3-pole terminal block
- 1 power cable with 2 wire stripped and tinned to DC jack

Optional Items

- Wall Mount kit
- Power Cord
- Power Adapter: 100W, 12V; 120W, 19V; 120W, 24V; 160W, 19V
- Wi-Fi/BT Kit
- CFast Card
- SO-DIMM
- M.2 SSD and SATA SSD

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.

Specifications

Processor System	7th Generation Intel® Core™ Processors, BGA 1440 Intel® Xeon® Processor E3-1535M v6, Quad Core, 8M Cache, 3.1GHz (4.2GHz), 45W Intel® Core™ i7-7820EQ Processor, Quad Core, 8M Cache, 3.0GHz (3.7GHz), 45W Intel® Core™ i5-7440EQ Processor, Quad Core, 6M Cache, 2.9GHz (3.6GHz), 45W Intel® Core™ i5-7442EQ Processor, Quad Core, 6M Cache, 2.1GHz (2.9GHz), 25W Intel® Core™ i3-7100E Processor, Dual Core, 3M Cache, 2.9GHz, 35W Intel® Core™ i3-7102E Processor, Dual Core, 3M Cache, 2.1GHz, 25W
Chipset	• Intel® CM238 / QM175 Chipset
Memory	Two 260-pin SODIMM • Supports dual-channel DDR4 2400MHz (Intel® CM238 supports ECC) • Supports up to 32GB system memory
Graphics	Intel® HD Graphics OpenGL 5.0, DirectX 11, OpenCL 2.1 • Supports these codecs: HW Decode: HEVC/H.265, H.264, M/JPEG, MPEG2, VC1/WMV9, VP8 (8-bit), VP9 (10-bit) HW Encode: HEVC/H.265, M/JPEG, MPEG2, VP8 • Output displays: VGA: resolution up to 1920x1200 @ 60Hz DVI: resolution up to 1920x1200 @ 60Hz HDMI: resolution up to 4096x2160 @ 24Hz DP: resolution up to 4096x2304 @ 60Hz
Storage	• One 2.5" SATA 3.0 Drive Bay • One CFast Socket
Ethernet	• One Intel® I210IT PCIe (10/100/1000Mbps) • One Intel® I219LM with iAMT11.0 PCIe (only Intel® Xeon® & Core™ i7/i5 support iAMT)
Expansion	One full-size/half-size Mini PCIe with Mini SIM socket (PCIe/USB) One full-size/half-size Mini PCIe with Mini SIM socket (USB) One M.2 Type 2280 (M key, PCIe x4, with Intel® QM175 only)

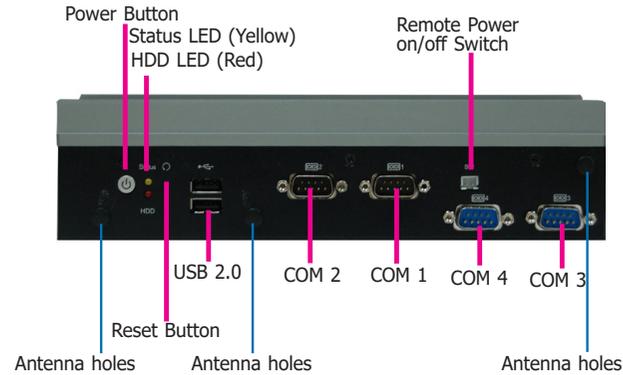

Note:

The mounting kit is optional and is not supported in standard model. Please contact your sales representative for more information.

Front Panel I/O Ports	<ul style="list-style-type: none"> • Front Panel <ul style="list-style-type: none"> - One power button with LED - 2-pin power extension switch connector - One reset button - One Status LED - One HDD LED - Two USB 2.0 Type A ports - Two RS-232/422/485 (DB-9) (RS-232 with power) - Two RS-232/422/485 (DB-9) - Four antenna Hole • Rear Panel <ul style="list-style-type: none"> - Two RJ45 LAN ports - One VGA port/one DVI-D (DVI-I connector)/one HDMI or DP++ (DP++ available upon request) - Four USB 3.0 Type A ports - One Line-out/one Mic-in Ports - One 9~36V DC-in 3-pole terminal block
Power	• Power input voltage: 9~36V DC-in (terminal block type connector)
Security	TPM 2.0 (optional)
Cooling System	• Fanless with heatsink
Environment	<ul style="list-style-type: none"> • Operating Temperature: <ul style="list-style-type: none"> 0 to 50°C (HDD) -20 to 60°C (SSD) -40 to 70°C (Industrial SSD) • Storage Temperature: <ul style="list-style-type: none"> -20 to 85°C • Relative Humidity: <ul style="list-style-type: none"> 5 to 95% RH (non-condensing) • Shock: <ul style="list-style-type: none"> Half sine wave 3G, 11ms, 3 shock per axis
Construction	• Metal + Aluminum
Mounting	<ul style="list-style-type: none"> • Wall mount - Mounting brackets and screws* (optional)
Dimensions	• 235mm x 63.2mm x 222mm (W x H x D)
Weight	• TBD
OS Support	<ul style="list-style-type: none"> • Windows 10 IoT Enterprise LTSB 64 Bit • Linux (available upon request)
Other Features	System Reset, Programmable via Software from 1 to 255 Seconds
Standards and Certifications	<ul style="list-style-type: none"> • Vibration: IEC68-2-64 • Certification: CE, FCC Class A, Microsoft Azure

Getting to Know the EC500-KH

Front View



Power button

Press to power on or power off the system.

Reset Button

Press to reset the system.

HDD LED (Red)

Indicates the status of the hard drive.

HDD LED		
HDD State	Disk access activity	HDD present or HDD not present
LED Behavior	Blink	Off

Status LED (Yellow)

Indicates system status as below.

Status LED				
Suspend Mode	S0	S1	S3	S4, S5
LED Behavior	Always ON	Quick Blink (cycle 1 sec)	Slow Blink (cycle >1 sec)	Off

Remote Power on/off switch connector

Connects to distant power on/off switch.

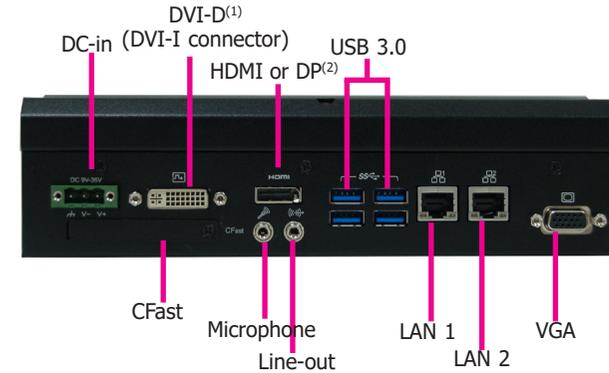
USB 2.0 Ports

Connect USB 2.0/1.1 devices.

COM Ports

Connect serial devices. COM1 and COM2 can be selected among RS232, RS422 and RS485 via jumper settings.

Rear View



DC-in

DC9~36V power input via a terminal block connector.

CFast

The CFast card slot complies with CFast 2.0 to provide transfer speeds based on the SATA 3.0 specification and can be used for convenient system capacity expansion.

DVI-D (DVI-I connector)⁽¹⁾

Connects the DVI-D connector of an LCD monitor.

HDMI or DP⁽²⁾

Connects the HDMI or DP connector of an LCD monitor.

Microphone/Line-out Ports

Connect to audio devices such as microphones and speakers.

USB 3.0 Ports

Connect USB 2.0/1.1 devices or USB 3.0 devices.

Gigabit LAN Ports

Connect the system to a local area network.

VGA Connector

Connects the VGA connector of a monitor.

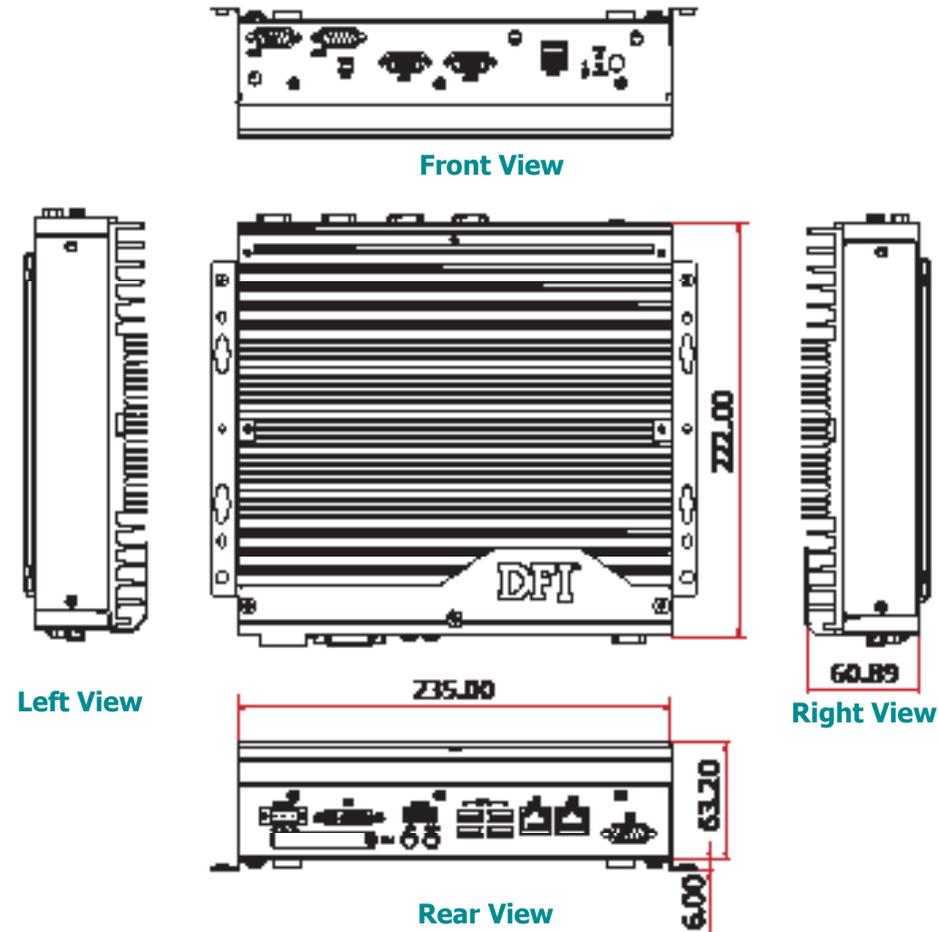


Notes:

1. This port can be in HDMI or DVI-D (DVI available upon request).
2. This port is a DP/HDMI combo port but can only transmit either HDMI or DP signals (as indicated on the panel). Please plug in a DP or an HDMI cable with the right orientation and alignment to avoid damage to the connector. You should feel resistance (due to a pin on the right) if the cable is not inserted correctly. For detailed instructions, see <https://youtu.be/SUj07rfN518>.

Mechanical Dimensions

Chassis Dimensions



Chapter 2 - Getting Started

Preparing the System

Before you start using the system, you need the following items:

- SATA hard drive
- Power adapter
- CD-ROM drive (for installing software/drivers)
- Memory module

Installing Devices

The following devices can be installed in the system.

- Memory module
- SATA hard drive
- Mini PCIe card
- M.2 card

Configuring the BIOS

To get you started, you may need to change configurations such as the date, time and the type of hard disk drive.

1. Power-on the system.
2. After the memory test, the message "Press DEL to run setup" will appear on the screen. Press the Delete key to enter the BIOS setup utility.

Installing an Operating System

Most operating system software can be installed using a DVD (and DVD burner) or bootable USB drive.

Please refer to your operating system manual for instructions on installing an operating system.

Installing the Drivers

The system requires you to install drivers for some devices to operate properly. Refer to the Supported Software chapter for instructions on installing the drivers.

Chapter 3 - Installing the Devices

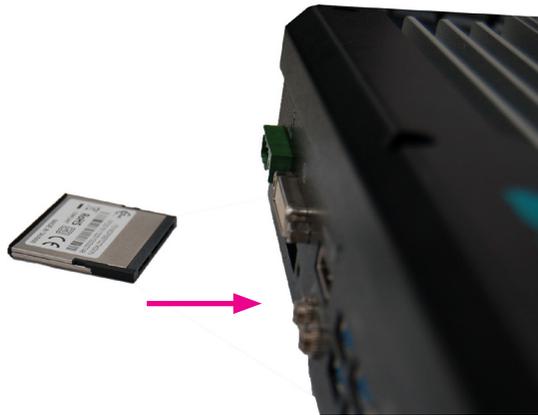
Installing a CFAST Card

The CFAST slot is located on the rear panel and can be accessed without opening the system chassis.

1. Before installing a CFAST card, take off the CFAST card slot cover.



2. Gently insert the CFAST card straight with the label on the CFAST card facing up until you feel it lock into place. Do not force the card into the slot if the card is not correctly inserted.



3. Close the CFAST card cover. To eject the card, push the card inward to release the lock and pull it out.



Removing the Chassis Cover

Please observe the following guidelines before starting any installation procedures.

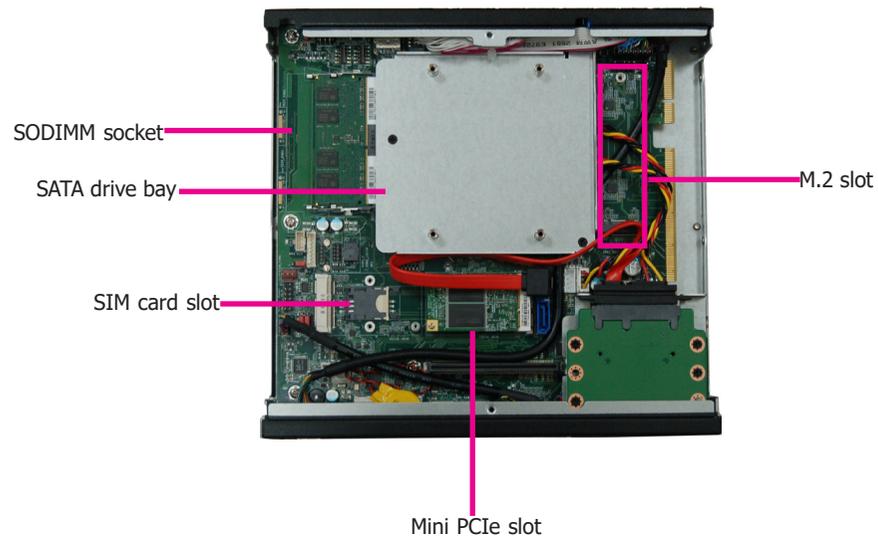
1. Make sure the system and all other peripherals connected to it have been powered off.
2. Disconnect all power cords and cables.
3. The 6 mounting screws on the left side, right side and bottom of the system are used to secure the cover to the chassis. Remove these screws and put them in a safe place for later use.



- Lift the cover upward to open the system.

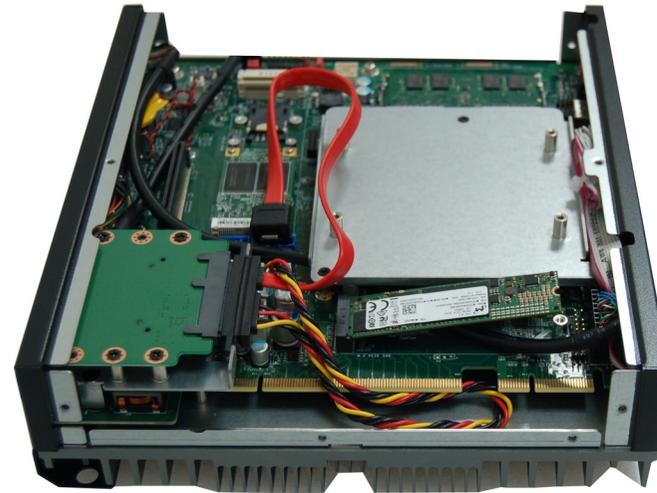


- The SODIMM sockets, Mini PCIe and M.2 slots and SATA drive bay can be easily accessed after the chassis cover is removed.



Installing an M.2 Card

The onboard M.2 Type 2280 connector (M Key) supports PCIe NVMe modules up to PCIe Gen 3.0 x4 bandwidth. Note that only SKUs with Intel® QM175 Chipset support M.2 socket.



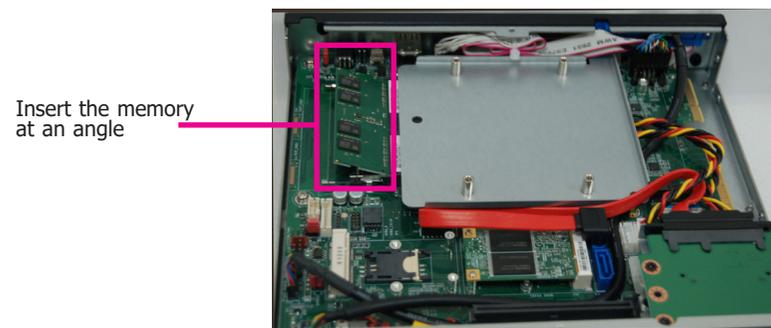
To install an M.2 card, insert the bottom edge of the M.2 card into the connector, and then secure the card to the standoff with the provided mounting screw.



Installing a SODIMM

The system can accommodate two SODIMM modules and SKUs with Intel® CM238 Chipset support Error-correcting code memory (ECC memory). Please use the following procedure to install a SODIMM module in the system.

1. The SODIMM sockets are located on the system board. Remove the SATA drive bay to access the SODIMM sockets.



2. Grasp the module by its edges and align the memory's notch with the socket's notch; then insert the memory into the socket at an angle and push it down until you feel a click.

SODIMM module installed into the socket



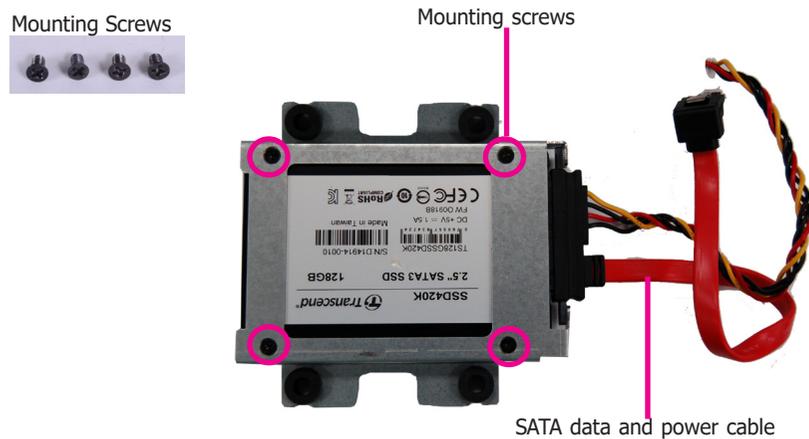
Notes:

1. The system supports dual-channel configuration. To enable dual-channel, populate both SODIMM sockets.
2. If installing only one memory module, please install it on the memory socket labeled DIMM 1 (the one closer to the center of the board).
3. The SODIMM sockets can only accept DDR4 memory modules. Please do not install other types of memory modules. The SKUs with Intel® CM238 Chipset support ECC memory.

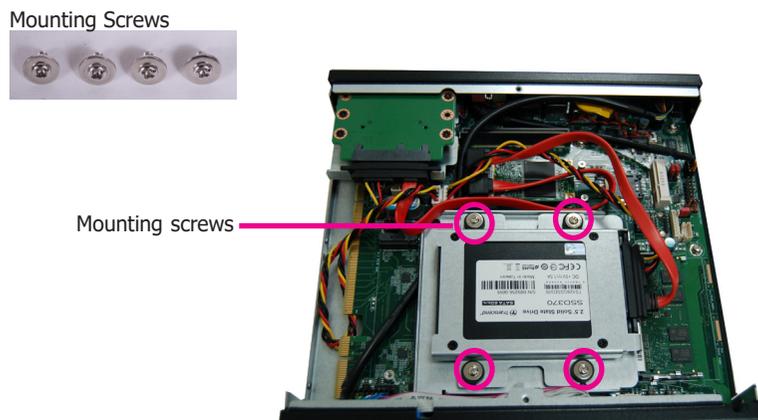
Installing a 2.5" SATA Drive

The system can accommodate one SATA drive. Please use the following procedure to install a SATA drive in the system.

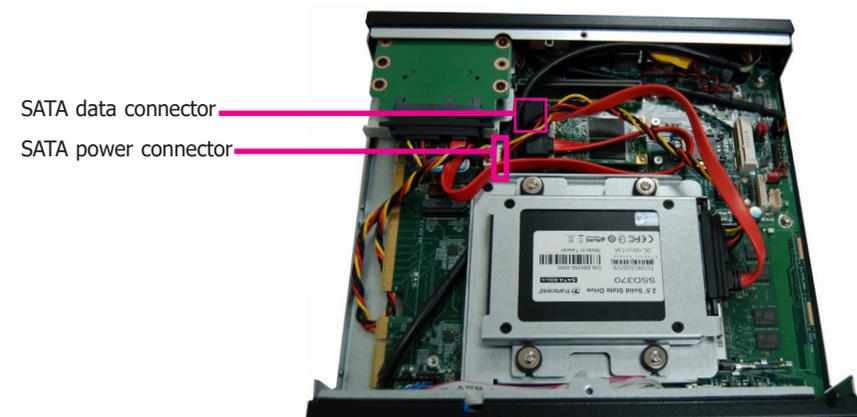
1. Before installing the SATA drive, connect the SATA data and power cable to the SATA data connector of the SATA drive. Then install the SATA drive on the HDD bracket with the provided mounting screws from the HDD bracket kit.



2. Place the SATA drive installed with the HDD bracket in the system. Align the mounting holes of the HDD bracket with the mounting holes of the drive bay and use the provided mounting screws to secure the drive in place.



3. Connect the other end of the SATA data and power cable to the SATA data and power connectors on the system board respectively.



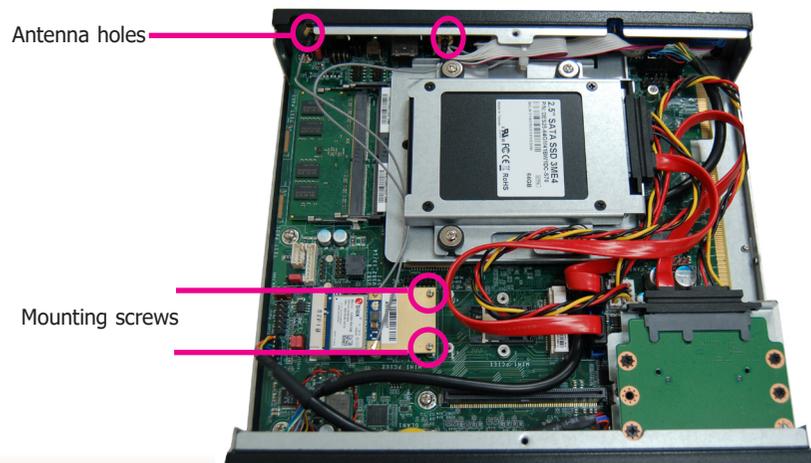
Installing a Mini PCIe Card and a SIM Card

The system board is equipped with 2 Mini PCIe slots with SIM card sockets to support a variety of wireless LAN and mobile broadband communication modules. Mini PCIe slot 1 provides both USB and PCIe interfaces whereas Mini PCIe slot 2 provides only USB interface.

1. Grasp the Mini PCIe card by its edges and align the notch in the connector of the Mini PCIe card with the notch in the connector on the system board.

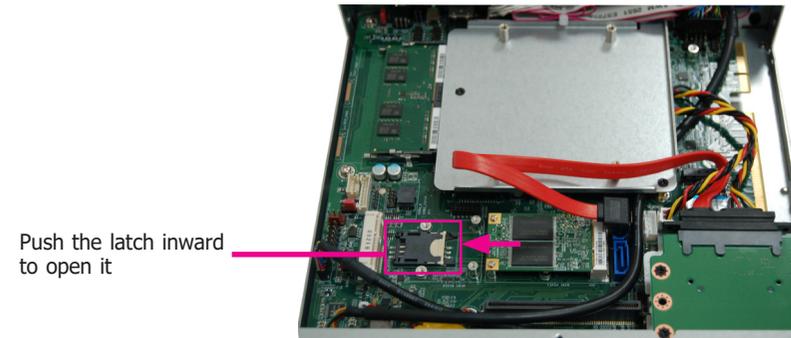


2. Push the Mini PCIe card down and use the provided mounting screws to secure the card on the system board.

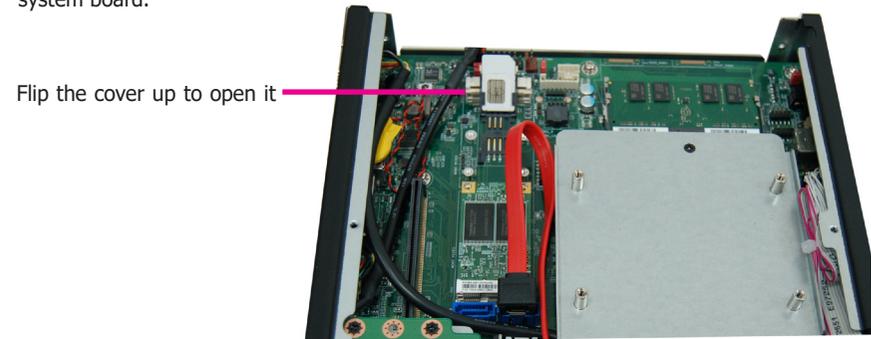


Installing a SIM Card

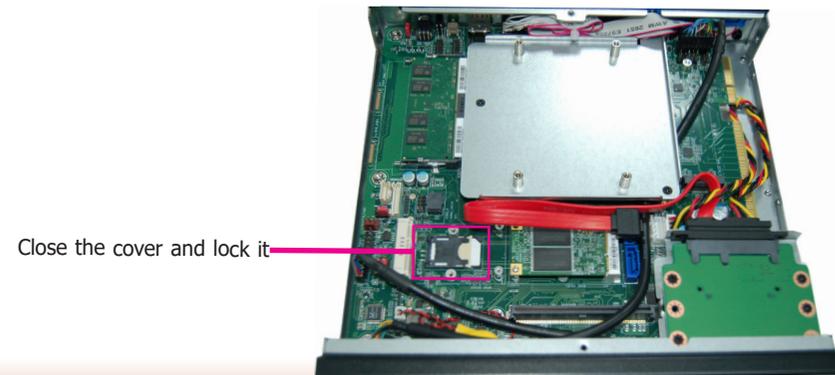
Open the SIM card socket by pushing the white latch inward.



Insert the SIM card into the slot. Please place the card with the IC facing down and the angled corner aligning with the socket's angled corner so it will be correctly in contact with the system board.

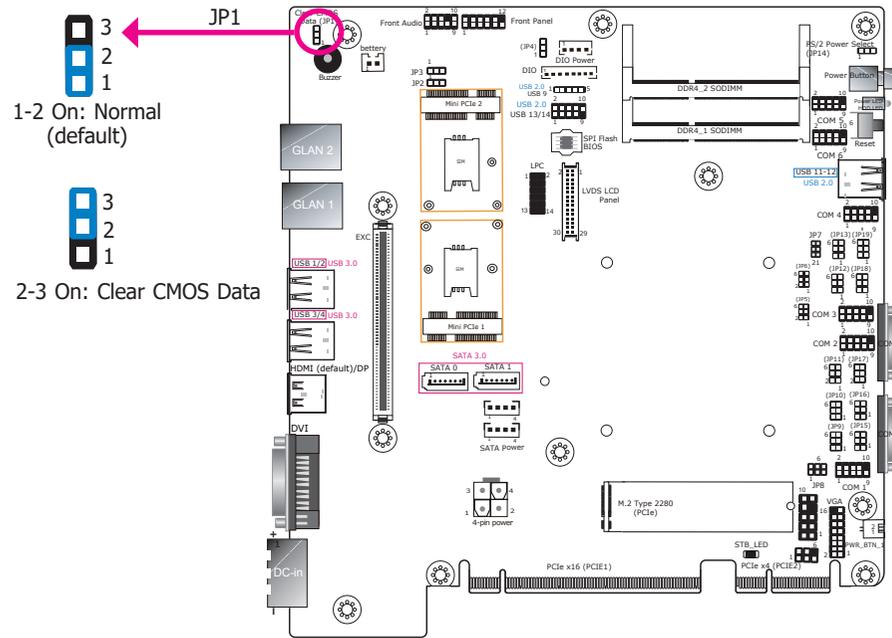


Close the slot's cover and lock the slot by pushing the white latch outward.



Chapter 4 - Jumper Settings

Clear CMOS Data



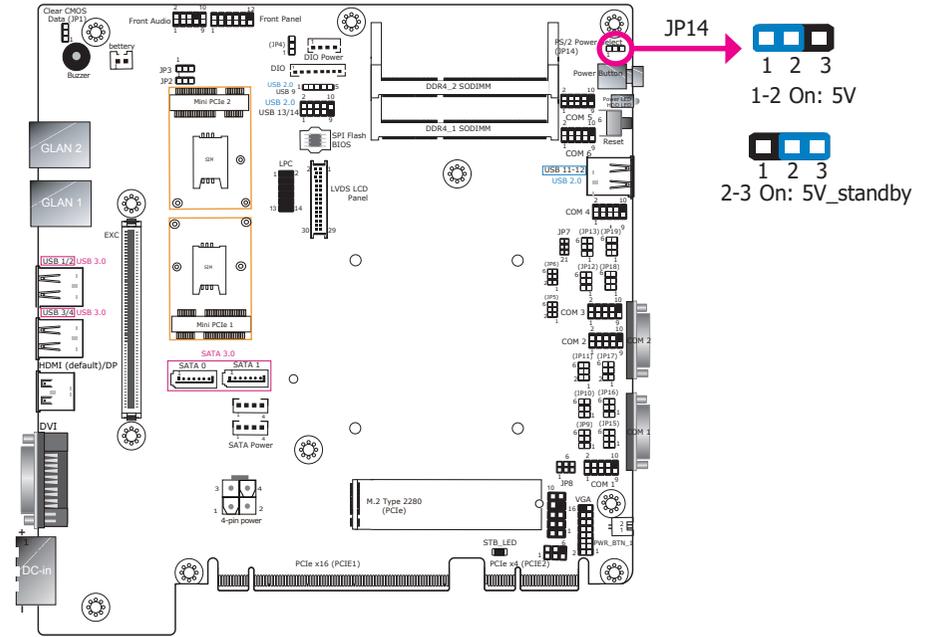
If you encounter the following conditions, you can reconfigure the system with the default values stored in the ROM BIOS.

- a) CMOS data becomes corrupted.
- b) You forgot the supervisor or user password.

To load the default values stored in the ROM BIOS, please follow these steps below:

1. Power-off the system and unplug the power cord.
2. Set the jumper pins 2 and 3 to On. Wait for a few seconds and set JP4 back to its default setting, pins 1 and 2 On.
3. Now plug the power cord and power on the system.

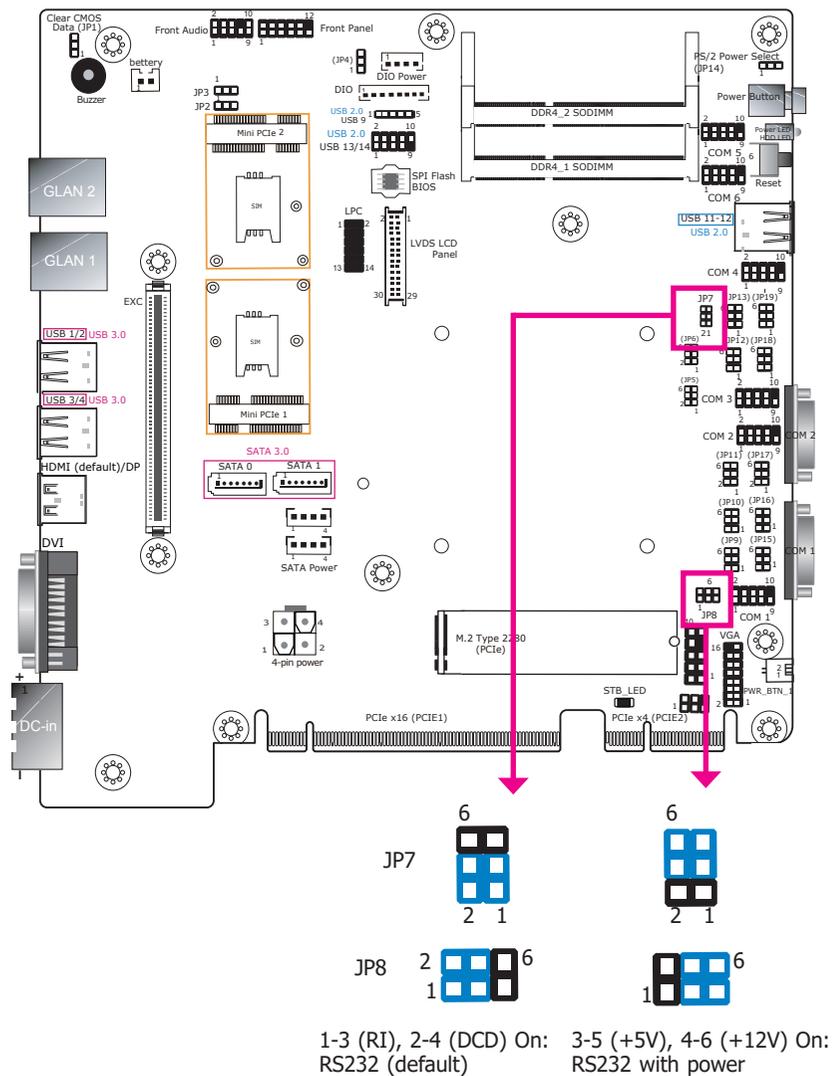
PS/2 KB/MS Power Select



JP14 is used to select power for the PS/2 KB/MS connector (J20). Please refer to Chapter 5 for detailed information on connectors.

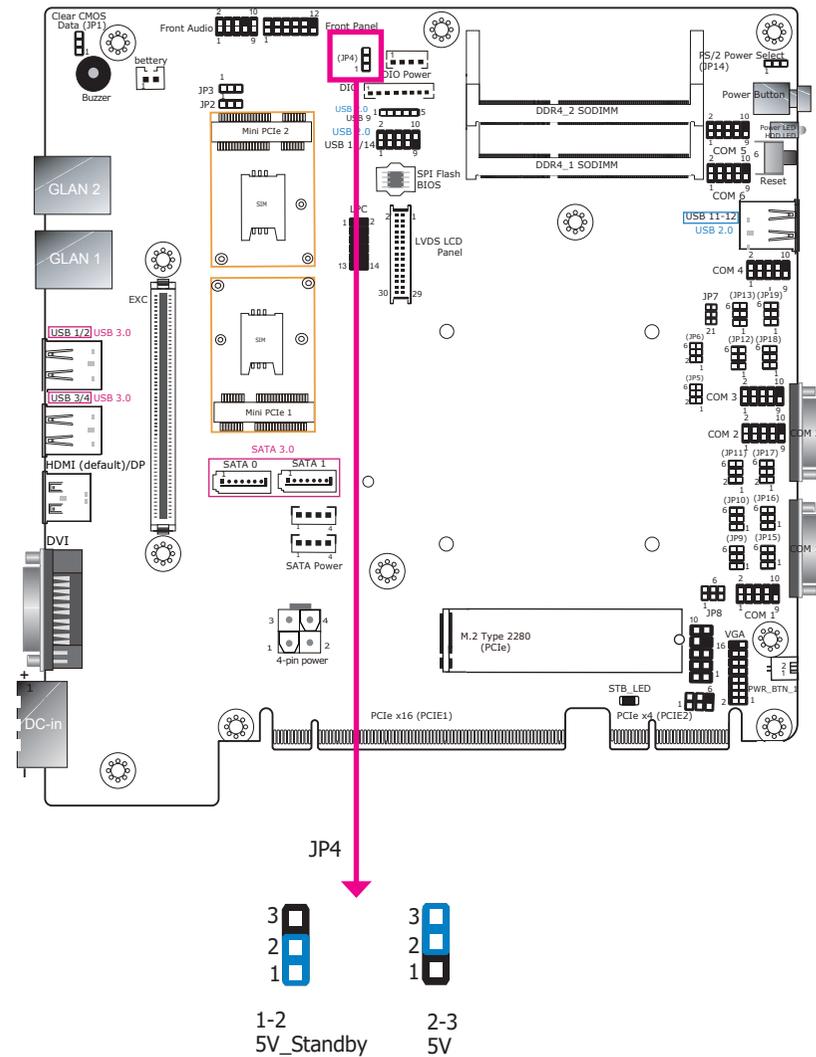
Selecting +5V_standby will allow you to use USB devices to wake up the system.

COM1/COM2 RS232 Power Select



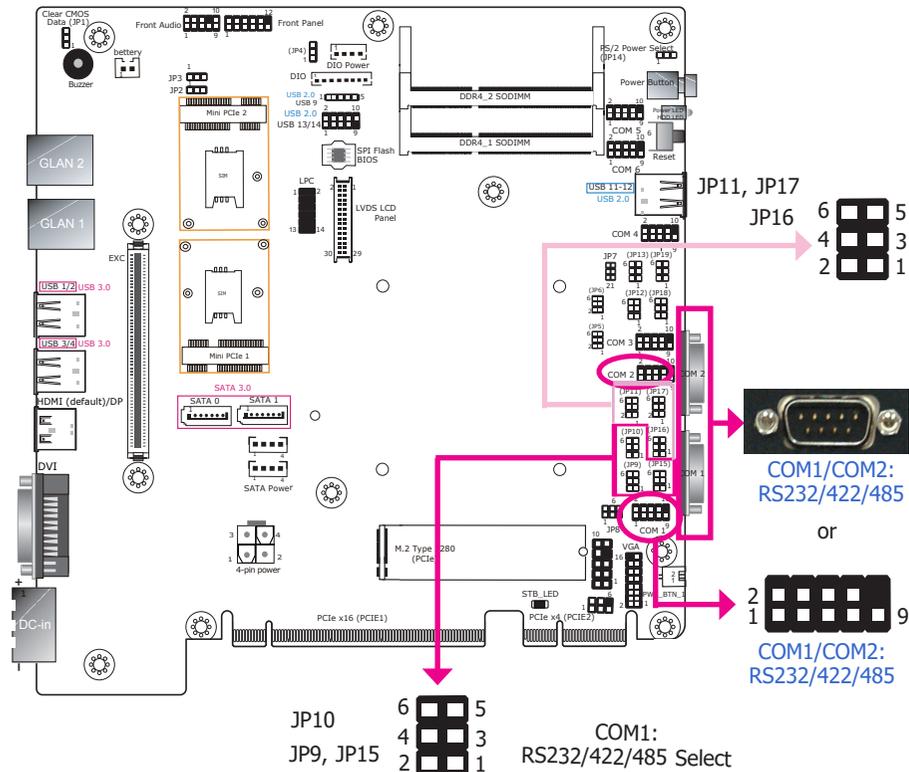
JP8 (for COM1) and JP7 (for COM2) are used to configure Serial COM ports to pure RS232 or RS232 with power. The pin functions (Pin 1 and Pin 9) of COM1 and COM2 will vary according to JP8's and JP7's setting respectively.

DIO Power Source Select (Pins 0~7)

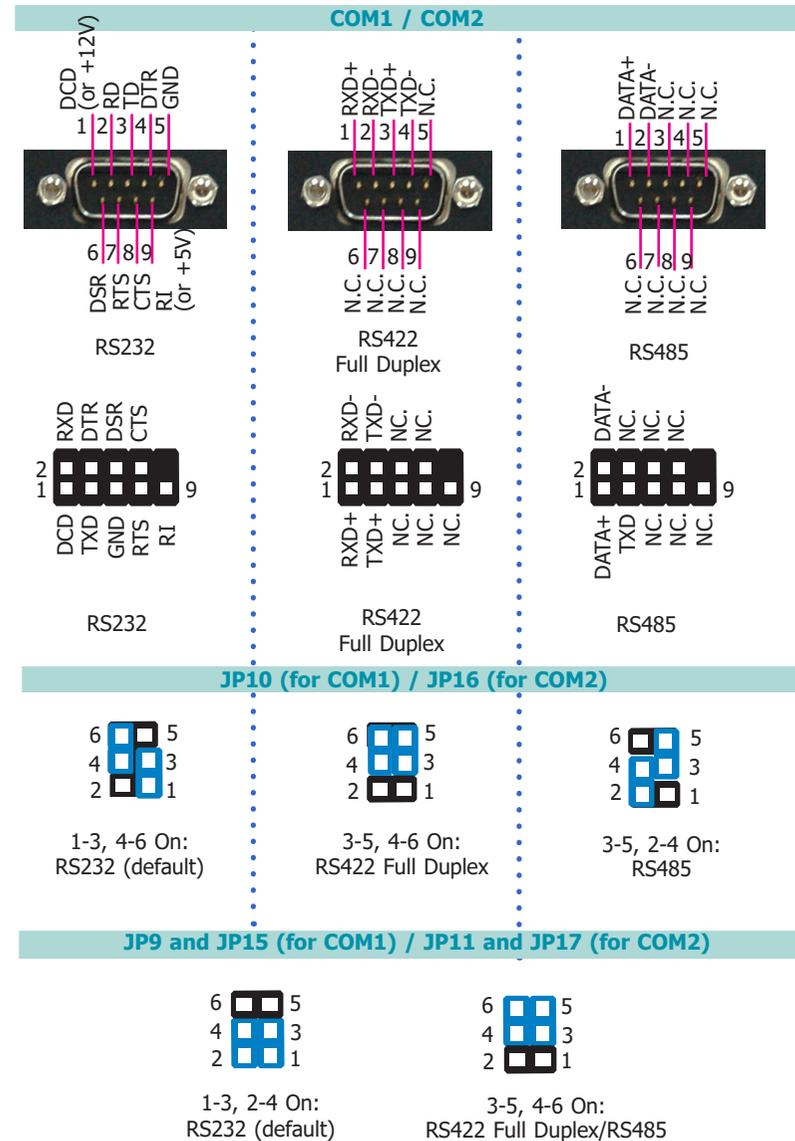


JP4 is used to configure the power of the DIO pins 0~7.

COM1/COM2 RS232/422/485 Select



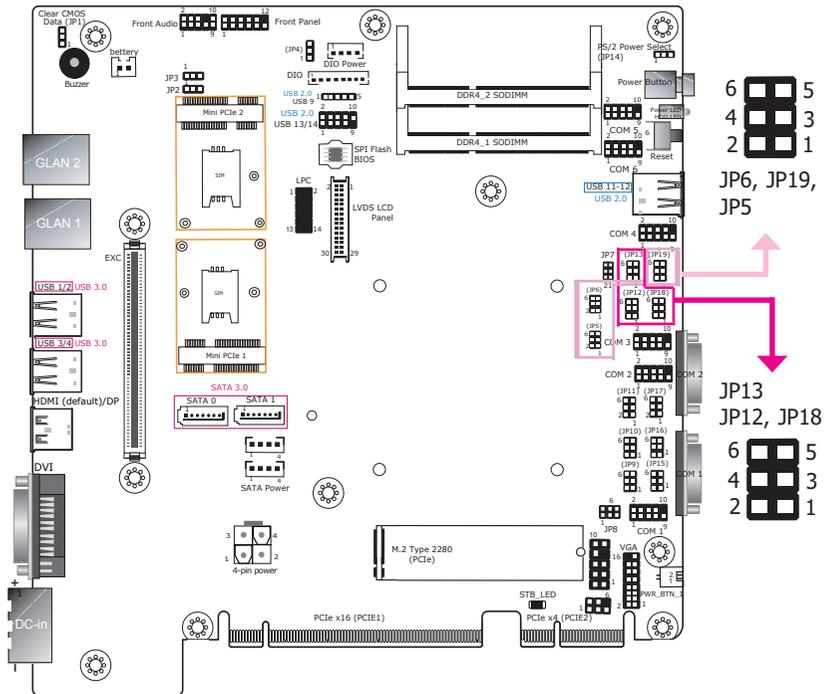
These jumpers allow you to configure the Serial COM ports to RS232, RS422 (full duplex) or RS485. JP9, JP10 and JP15 are used to configure Serial COM port 1; JP11, JP16 and JP17 are used to configure Serial COM port 2. The pin assignments of COM port 1 and COM port 2 will vary according to these jumpers' settings. You can also configure the RS485 auto flow mechanism through the BIOS setup utility. For more information, please refer to Chapter 7.



Note:

When COM1 RS232/422/485 is selected, JP9 and JP15 must be set in accordance to JP10. And when COM2 RS232/422/485 is selected, JP11 and JP17 must be set in accordance to JP16.

COM3/COM4 RS232/422/485 Select

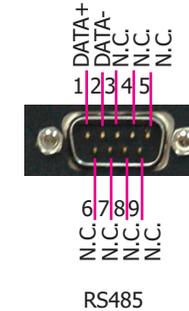
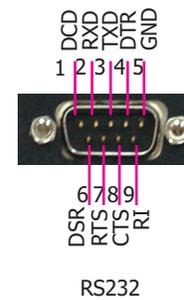


These jumpers allow you to configure the Serial COM ports to RS232, RS422 (full duplex) or RS485. JP12, JP13 and JP18 are used to configure Serial COM port 3; JP5, JP6 and JP19 are used to configure Serial COM port 4. The pin assignments of COM port 3 and COM port 4 will vary according to these jumpers' settings. You can also configure the RS485 auto flow mechanism through the BIOS setup utility. For more information, please refer to Chapter 7.

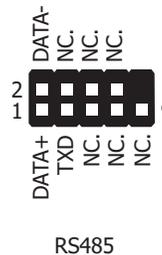
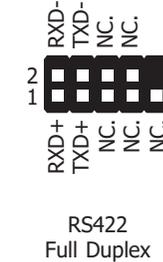
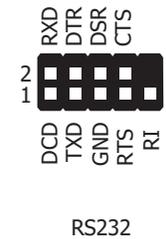


Note: When COM3 RS232/422/485 is selected, JP12 and JP18 must be set in accordance to JP13. And when COM4 RS232/422/485 is selected, JP6 and JP19 must be set in accordance to JP5.

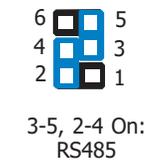
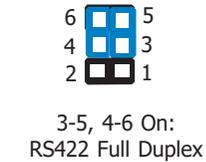
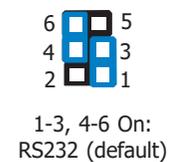
COM3 / COM4



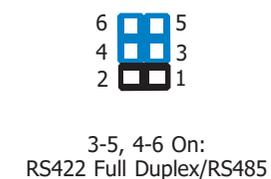
COM3 / COM4



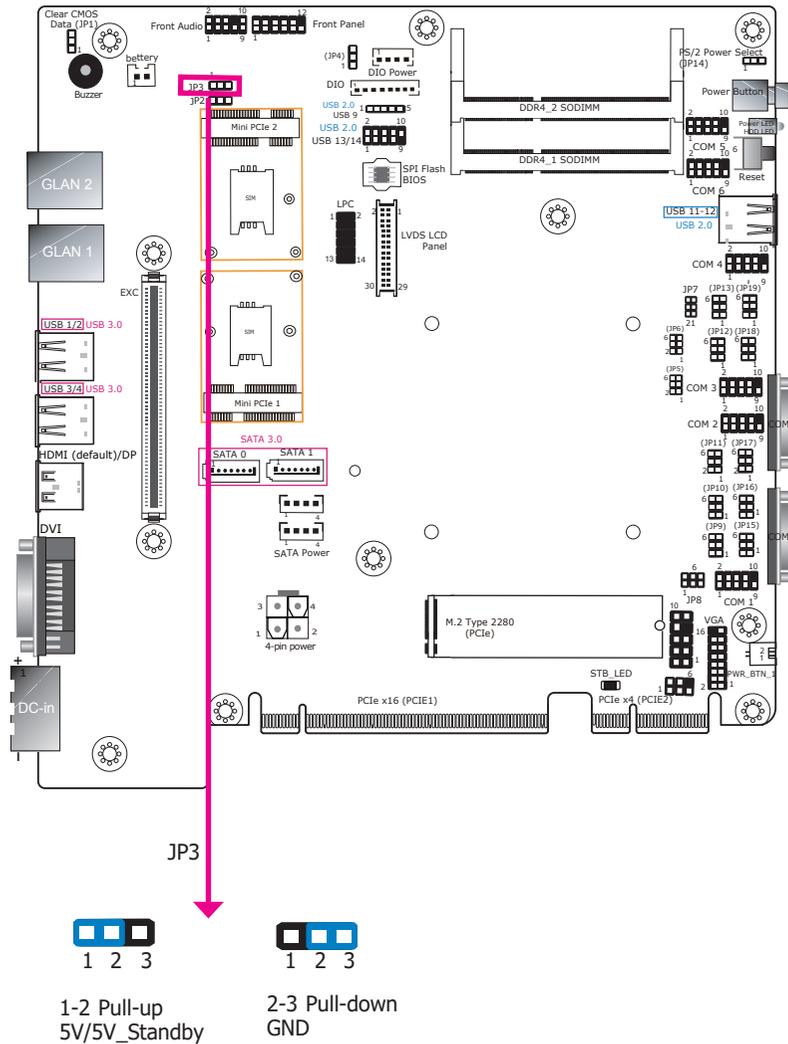
JP13 (for COM3) / JP5 (for COM4)



JP12 and JP18 (for COM3) / JP6 and JP19 (for COM4)

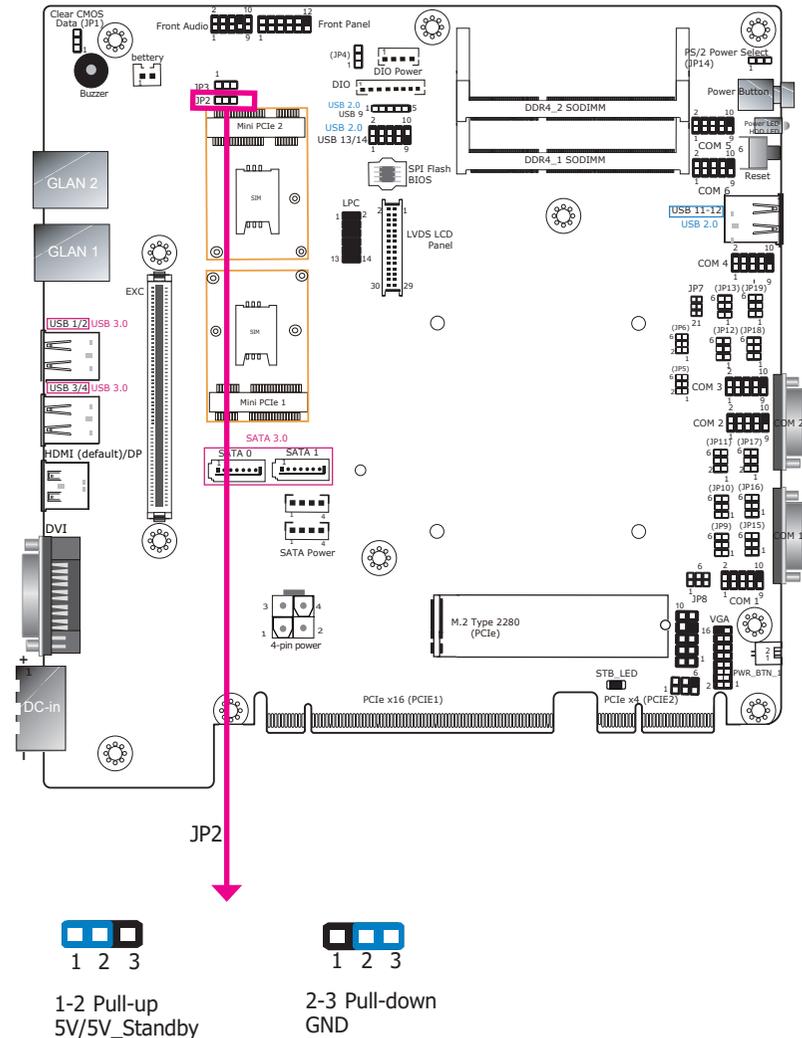


DIO High/Low Select (DIO 0~3)



JP3 is used to set the digital pins 0~3 to pull-up or pull-down.

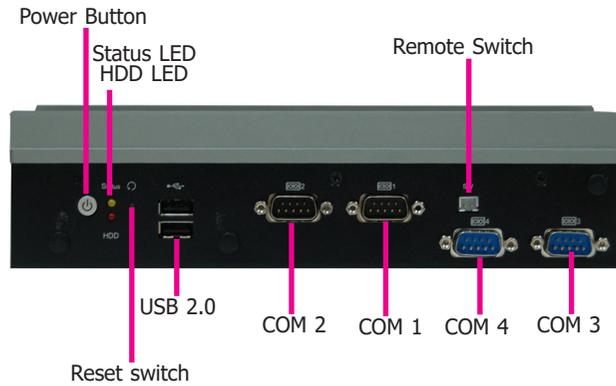
DIO High/Low Select (DIO 4~7)



JP2 is used to set the digital pins 4~7 to pull-up or pull-down.

Chapter 5 - Ports and Connectors

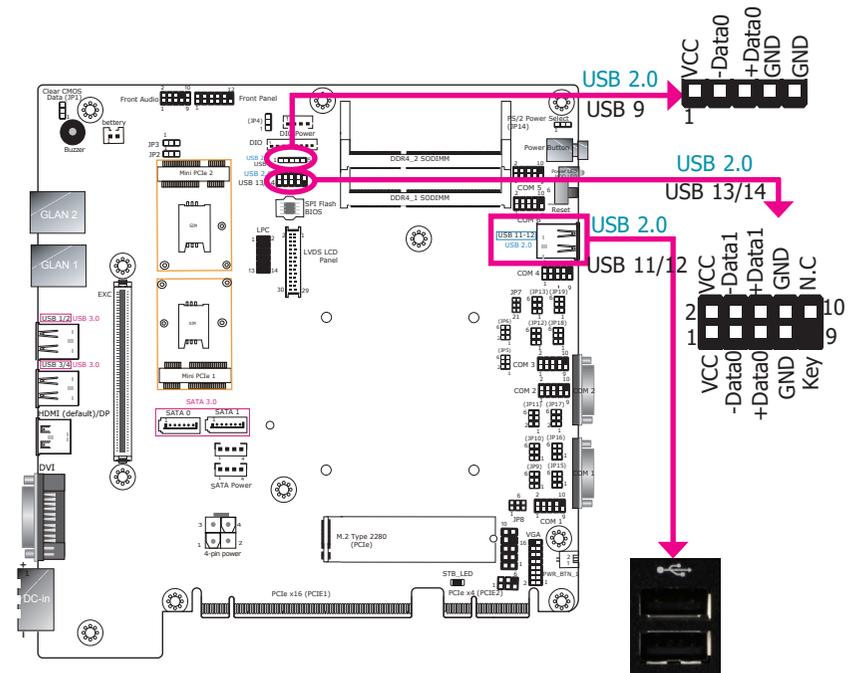
Front Panel I/O Ports



The front panel I/O consists of the following ports:

- Power button with LED
- Remote power-on/off switch
- Reset switch
- Status and HDD LEDs
- Two USB 2.0 ports
- Four RS232/422/485 serial COM ports

USB Ports

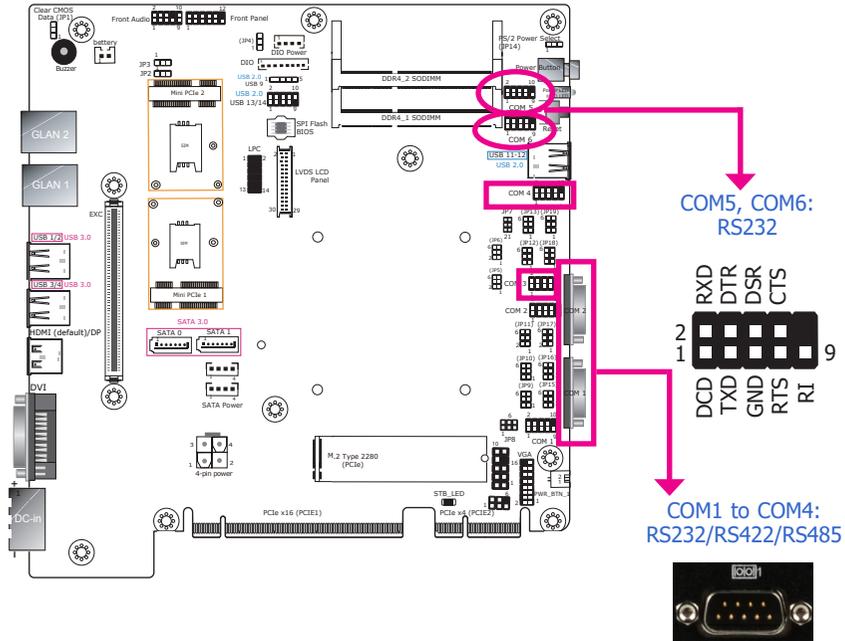


The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with 2 USB 2.0 ports at the front panel I/O ports of the system unit. In addition, the system board provides 3 USB 2.0 ports via the internal pin headers.

• BIOS Setting

Configure the onboard USB in the Advanced menu ("USB Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

COM (Serial) Ports



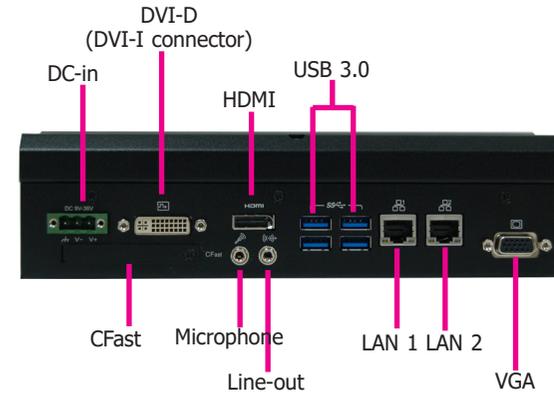
COM1 to COM4 can be selected among RS232/RS422/RS485 whereas COM5 and COM6 are fixed at RS232. For pin definitions and jumper selection of different communication modes, please refer to Chapter 4.

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.

• BIOS Setting

Configure the serial ports in the Advanced menu ("Super IO Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

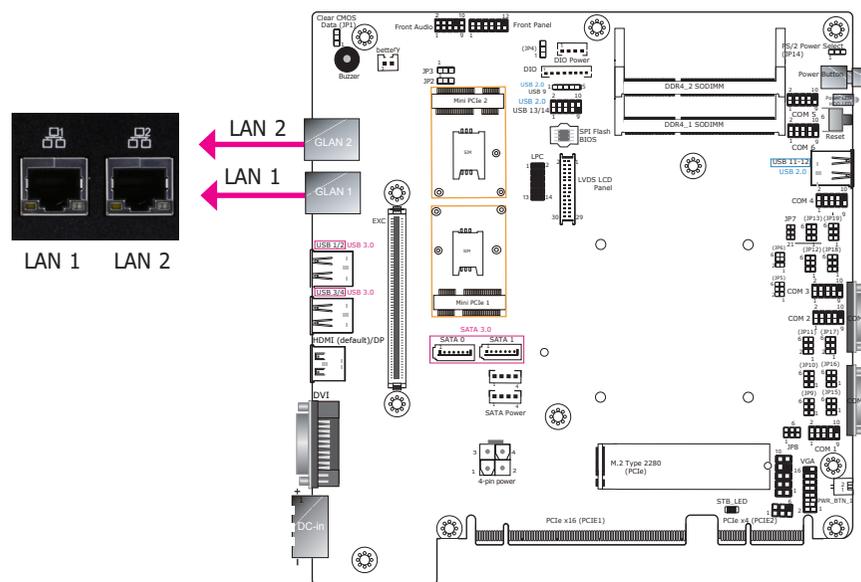
Rear Panel I/O Ports



The rear panel I/O consists of the following ports:

- 9~36V DC-in
- CFast card slot
- DVI-D (DVI-I connector)/HDMI/VGA connectors
- Line-out and microphone ports
- Four USB 3.0 ports
- Two RJ45 LAN ports

RJ45 LAN Ports



Features

- LAN 1: Intel® I219LM Ethernet controller with iAMT11.0 (Intel® Core™ i3 processors do not support iAMT)
- LAN 2: Intel® I210IT PCIe Gigabit Ethernet Controller

The LAN ports allow the system board to connect to a local area network with a network hub.

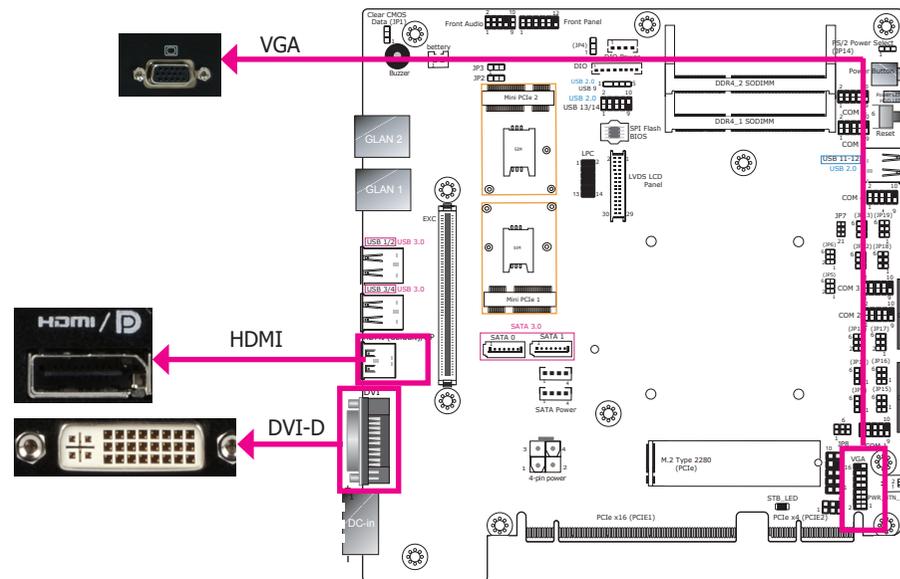
BIOS Setting

Configure the onboard LAN in the Advanced menu ("ACPI Configuration") of the BIOS. Refer to Chapter 7 for more information.

Driver Installation

Install the LAN drivers. Refer to Chapter 8 for more information.

Display Interfaces



VGA Port

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.

DVI-D (DVI-I Connector) Port or HDMI

The DVI-D port is used to connect a digital LCD monitor to transmit uncompressed digital video. This connector has a DVI-I receptacle but implements DVI-D signals (digital only).

Connect the display device's cable connector to the DVI-D port. After you plug the cable connector into the DVI-D port, gently tighten the cable screws to hold the connector in place. You can choose this port to be either DVI-D or HDMI.

HDMI Port or DisplayPort

The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port. You can choose this port to be either HDMI or DP.

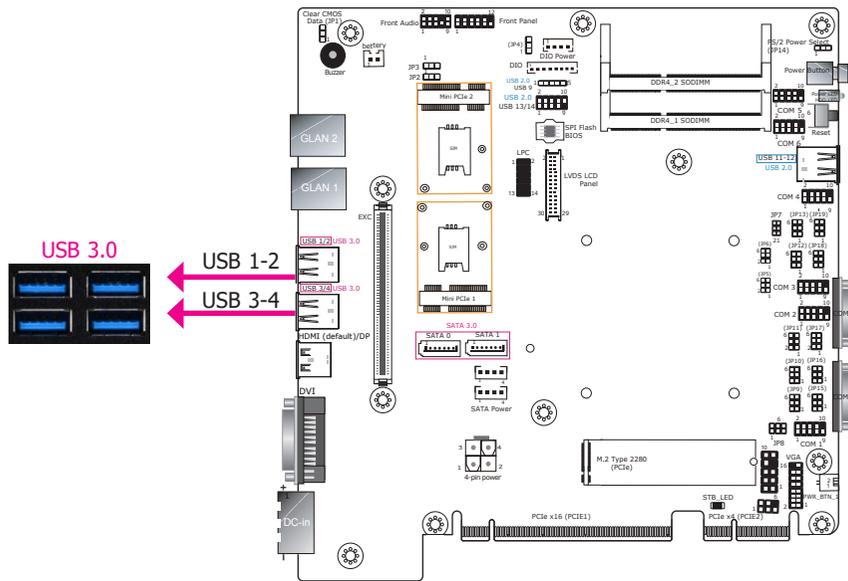
BIOS Setting

Configure the display devices in the Advanced menu ("Video Configuration" submenu) of the BIOS. Refer to the Chapter 7 for more information.

Driver Installation

Install the graphics driver. Refer to Chapter 8 for more information.

USB Ports

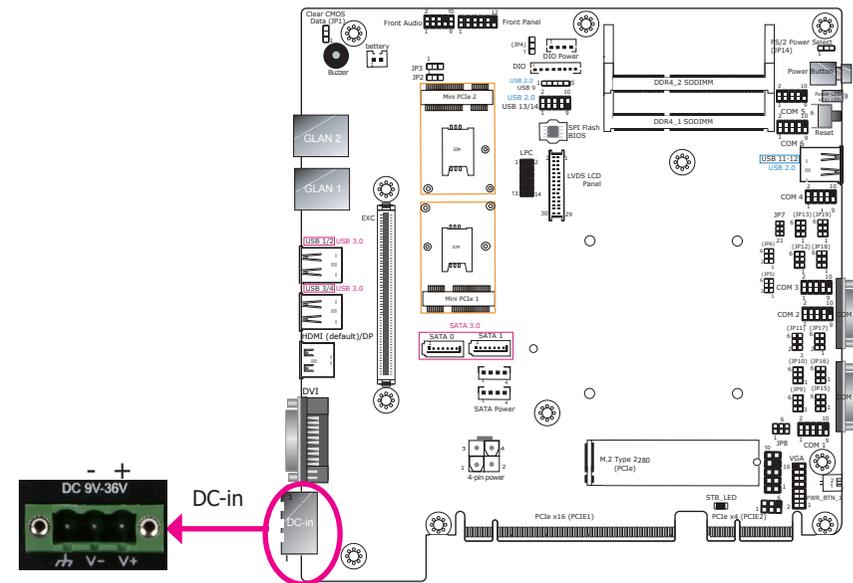


The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with 4 USB 3.0 ports at the rear panel and 2 USB 2.0 ports at the front panel of the system unit.

- **BIOS Setting**

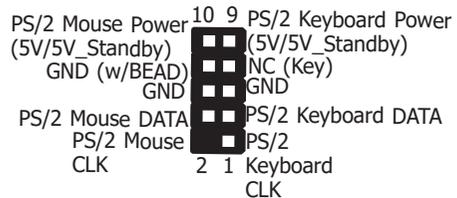
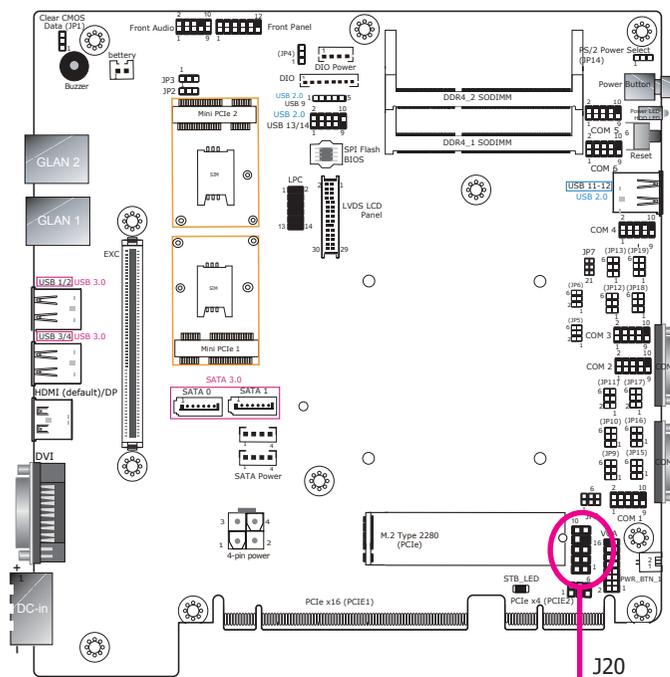
Configure the onboard USB in the Advanced menu ("USB Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

9~36V DC-in



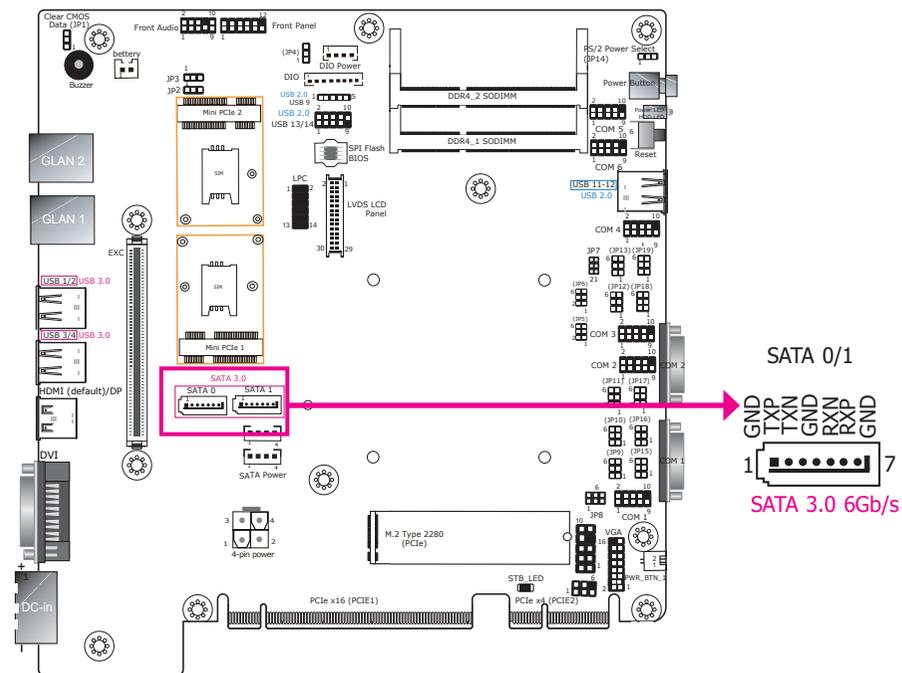
This jack provides a maximum of 160W power input solution. Connect a DC power cord to this jack. Using a voltage higher than the recommended one may fail to boot the system or cause damage to the system board.

I/O Connectors PS/2 KB/MS Connector



The 10-pin connector is used to connect PS/2 keyboard and mouse.

SATA (Serial ATA) Connectors



Features

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

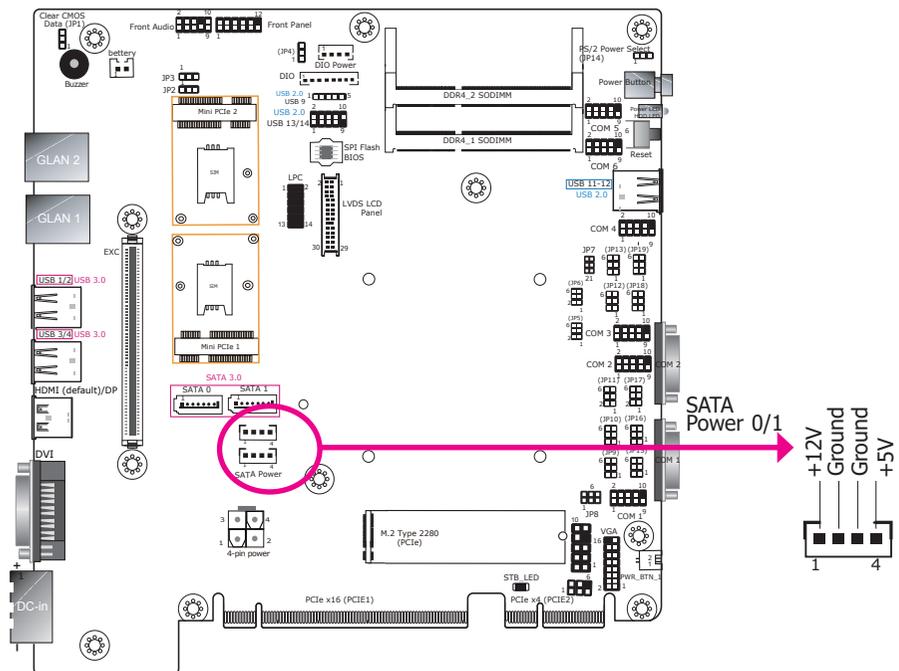
The Intel® Rapid Storage Technology supports RAID configuration of 0 and 1 as well as Intel® Optane™ Technology. Please refer to "Expansion Slots" in this chapter for more information.

The power cable must be connected from the system board's Serial ATA power connector to the SATA drive's power connector in order to provide power to the drive.

BIOS Setting

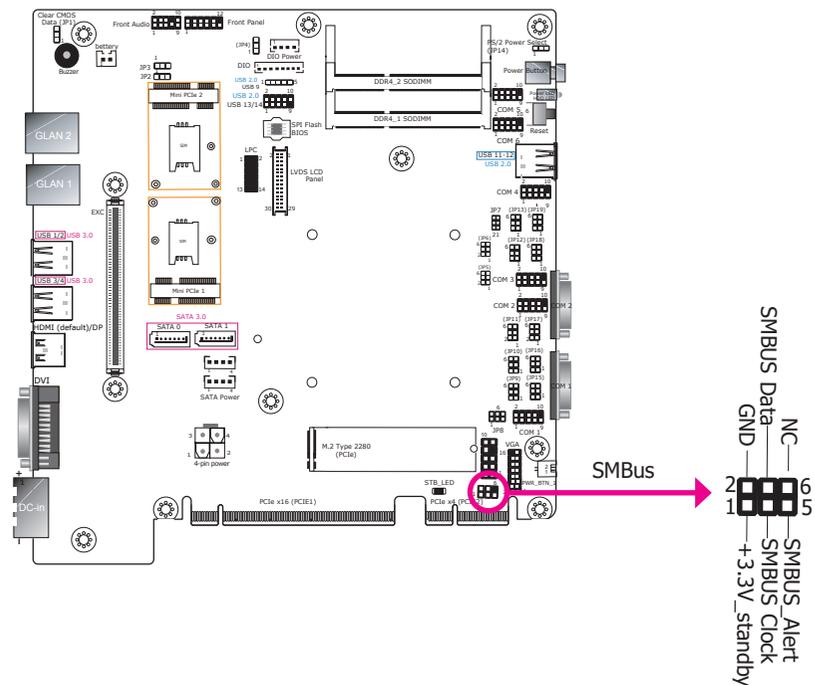
Configure the Serial ATA drives in the Advanced submenu ("SATA Configuration" section) of the BIOS. Refer to Chapter 7 for more information.

SATA (Serial ATA) Power Connectors



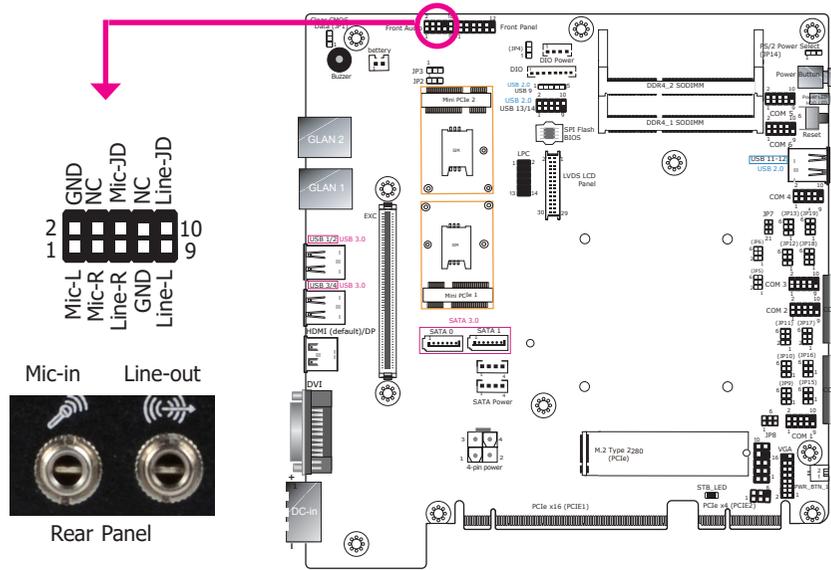
These SATA power connectors supply power to the SATA drives. Connect one end of the provided power cable to the SATA power connector and the other end to your storage device.

SMBus Connector



The SMBus (System Management Bus) connector is used to connect SMBus devices. 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.

Rear Audio Connector



Rear Audio

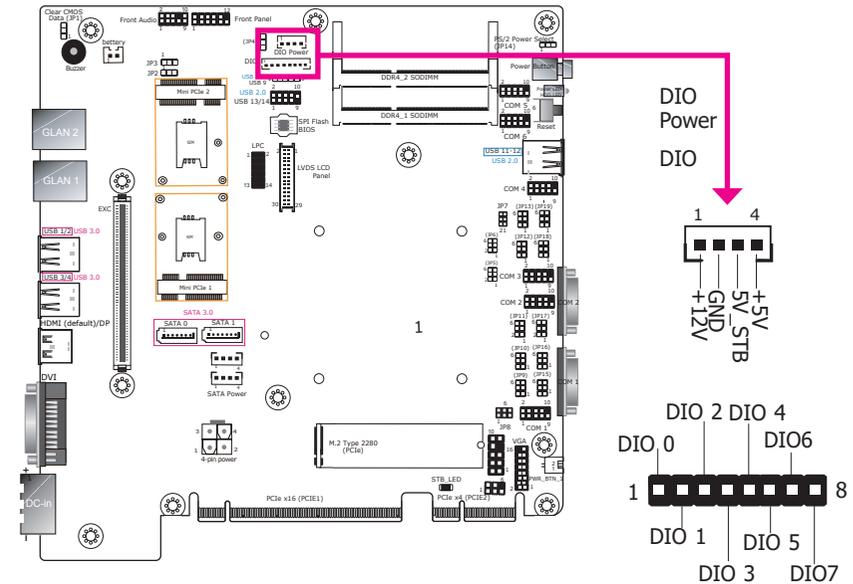
The system board is equipped with 2 audio jacks. A jack is a one-hole connecting interface for inserting a plug.

- Line-out Jack
This jack is used to connect a headphone or external speakers.
- Mic-in Jack
This jack is used to connect an external microphone.

Driver Installation

Install the audio driver. Refer to the Chapter 8 for more information.

Digital I/O Connector & DIO Power



The 8-bit Digital I/O connector provides 8-bit digital input/output signals to provide the ability to monitor and control the states of the connected external devices.

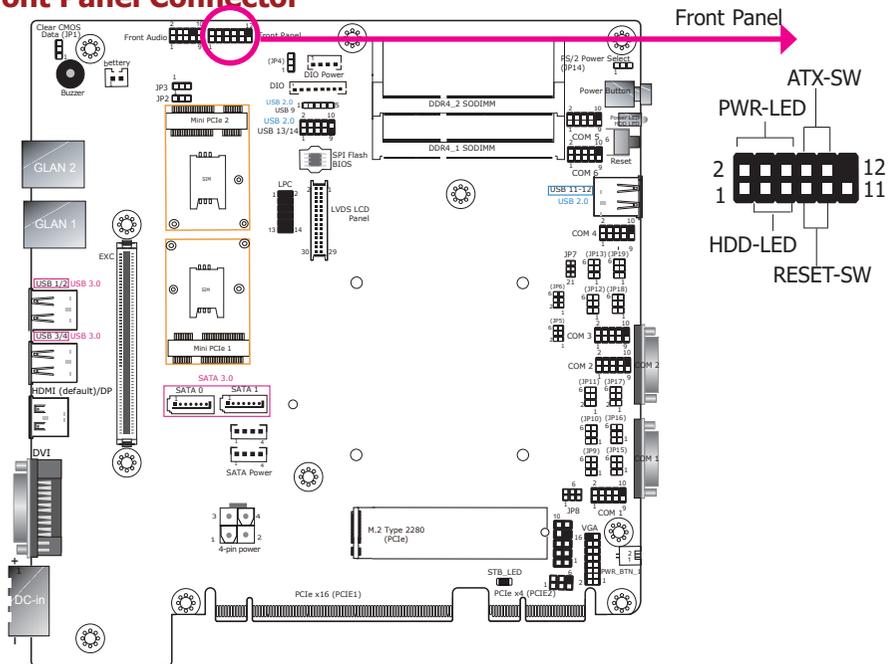
Digital I/O Connector

Pins	Function
1	DIO 0
2	DIO 1
3	DIO 2
4	DIO 3
5	DIO 4
6	DIO 5
7	DIO 6
8	DIO 7

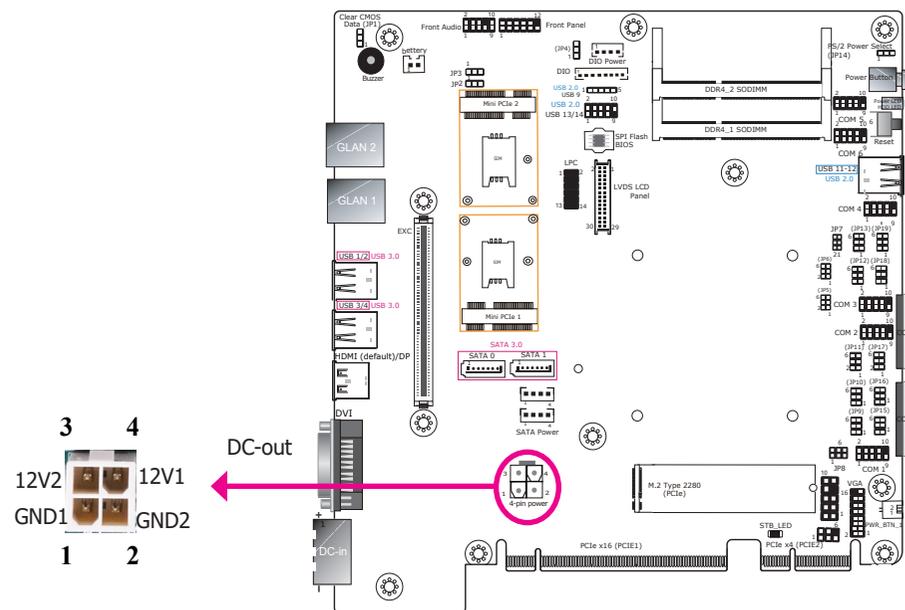
Digital I/O Power

Pins	Function
1	+12V
2	GND
3	5V_Standby
4	5V

Front Panel Connector



12V DC-out



HDD-LED - HDD LED

This LED will be lit when the hard drive is being accessed.

RESET SW - Reset Switch

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

ATX-SW - ATX Power Switch

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

PWR-LED - Power/Standby LED

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

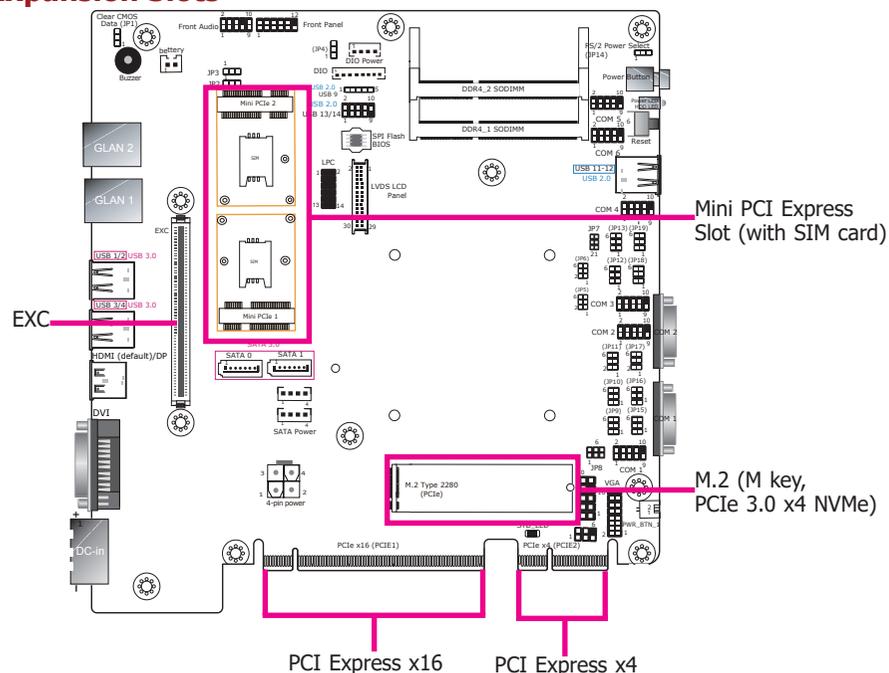
	Pin	Pin Assignment		Pin	Pin Assignment
HDD-LED	3	HDD Power	PWR-LED	2	LED Power
	5	Signal		4	LED Power
RESET SW	7	Ground	ATX-SW	6	Signal
	9	RST Signal		8	Ground
	11	N.C.		10	Signal

The 4-pin vertical type connector (optional) provides low power output:

Max: 2.0A (24W) with 35/25W CPU
 Max: 1.5A (18W) with 45W CPU

Please refer to "Specifications" in Chapter 1 for the system's processor list.

Expansion Slots



Dual Mini PCIe Slots (with Mini SIM Card Slots)

The Mini PCIe socket is used to install a Mini PCIe card. The system is equipped with two full-size (or half-size) Mini PCIe slot slots (Mini PCIe 1: PCIe & USB signals; Mini PCIe 2: USB signals only).

PCI Express x16 Slot

Install PCI Express x16 graphics card, that comply to the PCI Express specifications, into the PCI Express x16 slot such as a graphics card.

PCI Express x4 Slot

Install PCI Express cards such as network cards or other cards that comply to the PCI Express specifications into this slot.

M.2 Slot with Intel® Optane™ Memory Support

To set up Intel® Optane™ technology, please configure the SATA controller mode to "Intel RST Premium" and install the Intel® Rapid Storage Technology driver (15.5 or later depending on your Intel® Optane™ memory model). Refer to Chapter 7 and 8 for more information.

BIOS Setting

Configure these PCIe slots including their speed in the Advanced menu ("PCI Express Configuration" submenu) of the BIOS. Refer to Chapter 7 for more information.

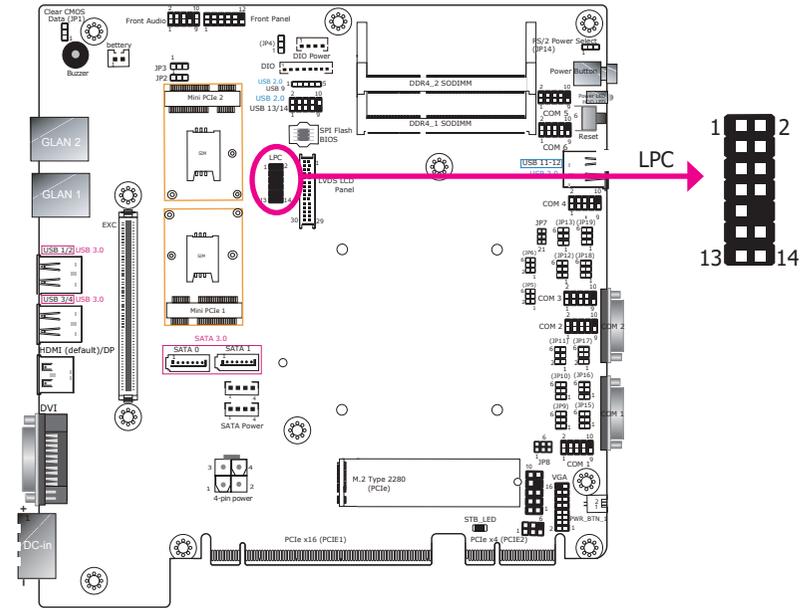
EXC Slot

The EXC interface is used to install an EXC card for I/O expansion via a daughter board.

Pin	Pin Assignment	Pin	Pin Assignment
1	GND	2	GND
3	PCIE_ECX_RX1p	4	PCIE_ECX_RX2p
5	PCIE_ECX_RX1n	6	PCIE_ECX_RX2n
7	PCIE_ECX_TX1n	8	PCIE_ECX_TX2n
9	PCIE_ECX_TX1p	10	PCIE_ECX_TX2p
11	CLK_PCIE_ECX1_p	12	CLK_PCIE_ECX2_p
13	CLK_PCIE_ECX1_n	14	CLK_PCIE_ECX2_n
15	Reserved	16	Reserved
17	Reserved	18	Reserved
19	GND	20	GND
21	CLK_PCIE_ECX3_p	22	PCIE_ECX_RX5p (N/A)
23	CLK_PCIE_ECX3_n	24	PCIE_ECX_RX5n (N/A)
25	GND	26	PCIE_ECX_TX5n (N/A)
27	SATA_LED#	28	PCIE_ECX_TX5p (N/A)
29	EDP_AUX_n (N/A)	30	CLK_PCIE_ECX5_p (N/A)
31	EDP_AUX_p (N/A)	32	CLK_PCIE_ECX5_n (N/A)
33	Intel Control Link Bus	34	Reserved
35	Intel Control Link Bus	36	Reserved
37	Intel Control Link Bus	38	HD_OUT (N/A)
39	GND	40	GND
41	EDP_LAN0_n	42	PCIE_ECX_RX4p
43	EDP_LAN0_p	44	PCIE_ECX_RX4n
45	EDP_LAN1_n	46	PCIE_ECX_TX4n
47	EDP_LAN1_p	48	PCIE_ECX_TX4p
49	EDP_LAN2_n	50	CLK_PCIE_ECX4_p
51	EDP_LAN2_p	52	CLK_PCIE_ECX4_n
53	DPC_AUX_n (N/A)	54	Reserved
55	DPC_AUX_p (N/A)	56	Reserved
57	EDP_HPD	58	Reserved
59	GND	60	GND
61	EDP_LAN3_n	62	LPC_FRAME#
63	EDP_LAN3_p	64	LPC_AD0
65	DPB_CTRL_CLK (N/A)	66	LPC_AD1
67	DPB_CTRL_DATA (N/A)	68	LPC_AD2
69	DPC_CTRL_CLK (N/A)	70	LPC_AD3
71	DPC_CTRL_DATA (N/A)	72	LPC_LDRQ1#
73	Reserved	74	DPC_HPD (N/A)

75	PLT_RST#	76	CLK_LPC
77	HD_RST# (N/A)	78	HD_SPKR (N/A)
79	GND	80	GND
81	DPC_LAN0_n (N/A)	82	USB3_RX0n
83	DPC_LAN0_p (N/A)	84	USB3_RX0p
85	DPC_LAN1_n (N/A)	86	GND
87	DPC_LAN1_p (N/A)	88	USB3_TX0n
89	DPC_LAN2_n (N/A)	90	USB3_TX0p
91	DPC_LAN2_p (N/A)	92	GND
93	DPC_LAN3_n (N/A)	94	HD_BITCLK (N/A)
95	DPC_LAN3_p (N/A)	96	HD_SYNC (N/A)
97	USB_PWR_SEL	98	HD_SIN (N/A)
99	GND	100	GND
101	USB_1P	102	USB3_RX1n
103	USB_1N	104	USB3_RX1p
105	USB_OP	106	GND
107	USB_ON	108	USB3_TX1n
109	USB_OC#	110	USB3_TX1p
111	PCIE_ECX_RX3p	112	GND
113	PCIE_ECX_RX3n	114	SATA_TXn
115	PCIE_ECX_TX3n	116	SATA_TXp
117	PCIE_ECX_TX3p	118	Reserved
119	GND	120	GND
121	BID	122	GND
123	SMB_CLK_RESUME	124	DFI Board ID_0
125	SMB_DATA_RESUME	126	DFI Board ID_1
127	INT_GPIO#	128	DFI Board ID_2
129	PCIe_Wake#	130	SATA_RXn
131	INT_SERIRQ	132	SATA_RXp
133	VIN	134	VIN
135	+3.3VDU	136	+5VDU
137	+3.3VDU	138	+5VDU
139	GND	140	GND
141	+12V	142	+3.3V
143	+12V	144	+3.3V
145	+12V	146	+3.3V
147	+12V	148	+3.3V
149	GND	150	GND
151	+5V	152	+5V
153	+5V	154	+5V
155	+5V	156	+5V
157	+5V	158	+5V
159	+5V	160	+5V

LPC Connector



The Low Pin Count Interface was defined by Intel® Corporation to facilitate the industry's transition towards legacy free systems. It allows the integration of low-bandwidth legacy I/O components within the system, which are typically provided by a Super I/O controller. Furthermore, it can be used to interface firmware hubs, Trusted Platform Module (TPM) devices and embedded controller solutions. Data transfer on the LPC bus is implemented over a 4 bit serialized data interface, which uses a 24MHz LPC bus clock. For more information about LPC bus refer to the Intel® Low Pin Count Interface Specification Revision 1.1'. The table below indicates the pin functions of the LPC connector.

Pin	Pin Assignment	Pin	Pin Assignment
1	L_CLK	2	L_AD1
3	L_RST#	4	L_AD0
5	L_FRAME#	6	3V3
7	L_AD3	8	GND
9	L_AD2	10	Kev
11	INT_SERIRQ	12	GND
13	5VSB	14	5V

Chapter 6 - Mounting Options

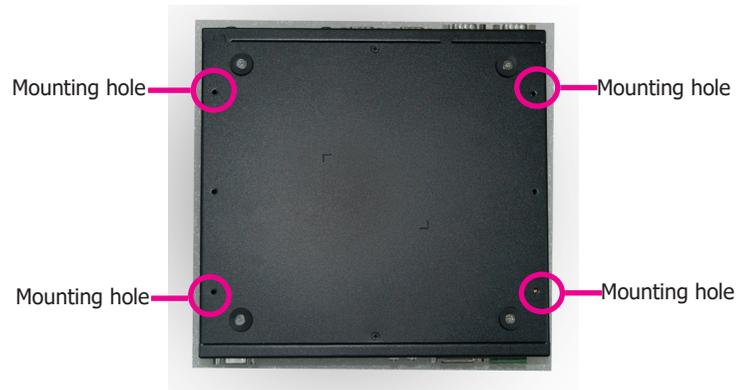
Wall Mount

The wall mount kit includes the following:

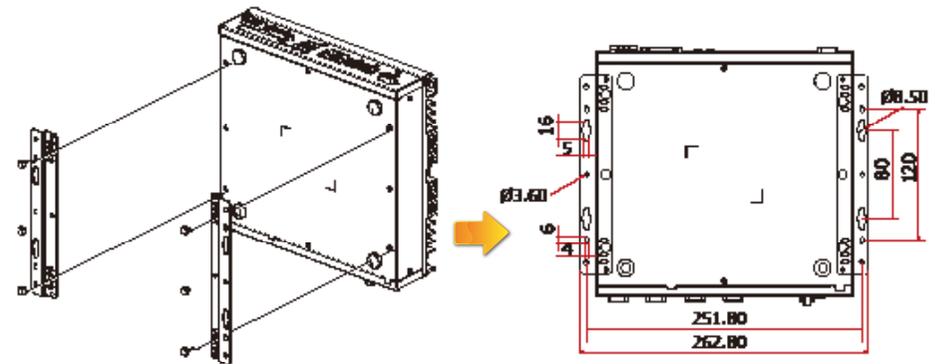
- 2 Wall mount brackets
- 4 Bracket screws



1. The wall mounting holes are located on the bottom of the system unit.



2. Use the provided mounting screws to secure the wall mount brackets on each side of the system unit.



Chapter 7 - 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 and Left arrows	Move the highlight left or right to select a menu
Up and Down arrows	Move the highlight up or down between submenu or fields
<Esc>	Exit the current menu or the BIOS Setup Utility
<F1>	Help
<F5>	Change values
<F6>	Change values
<F9>	Setup Defaults
<F10>	Save and Exit
<Enter>	Press <Enter> to enter the highlighted submenu.

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.

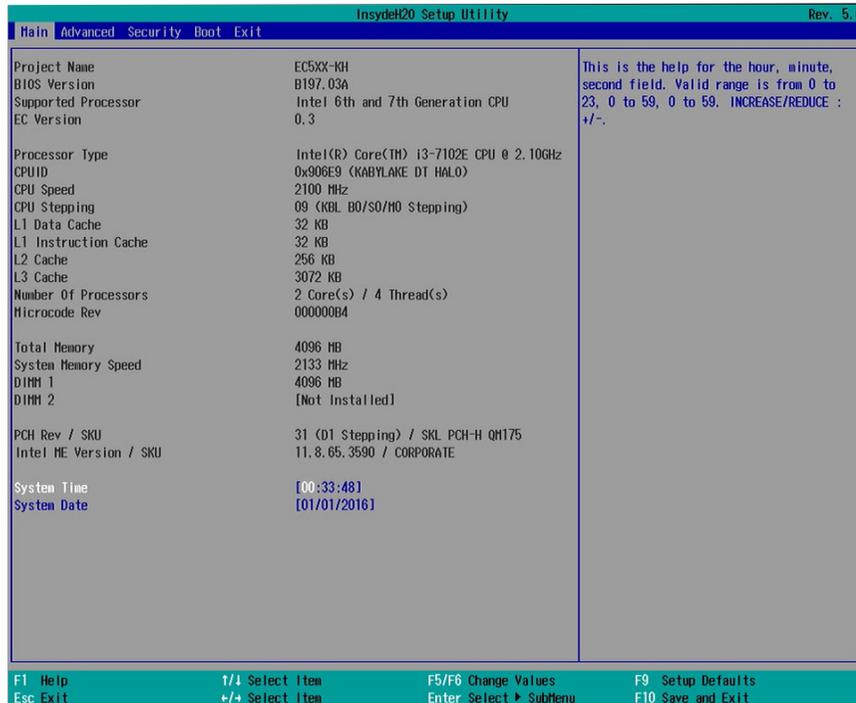
Submenu

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>.

Insyde BIOS Setup Utility

Main

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



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.

System Date

The date format is <month>, <date>, <year>. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1980 to 2099.

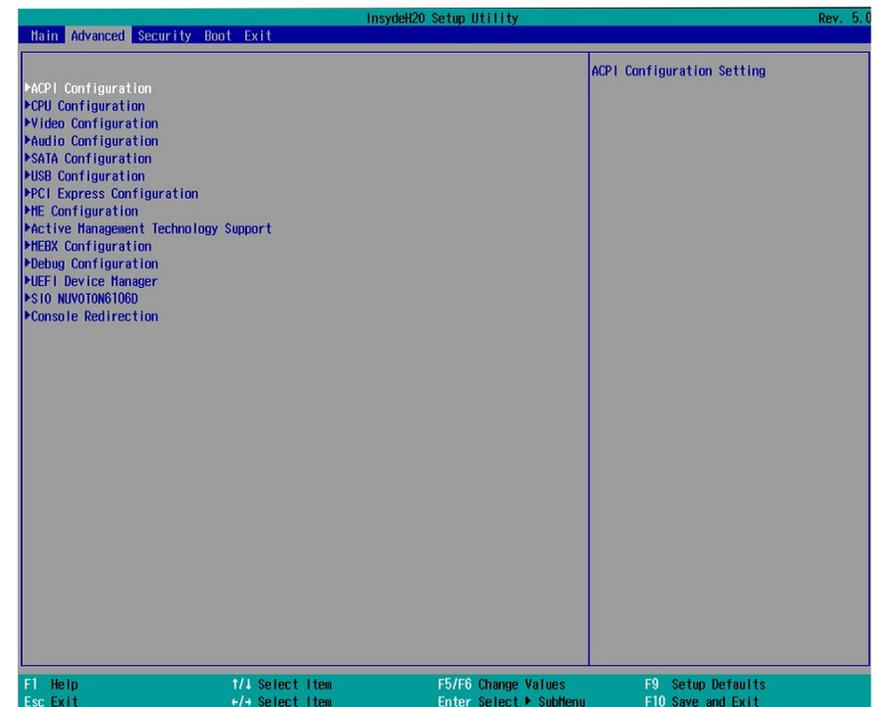
Advanced

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.



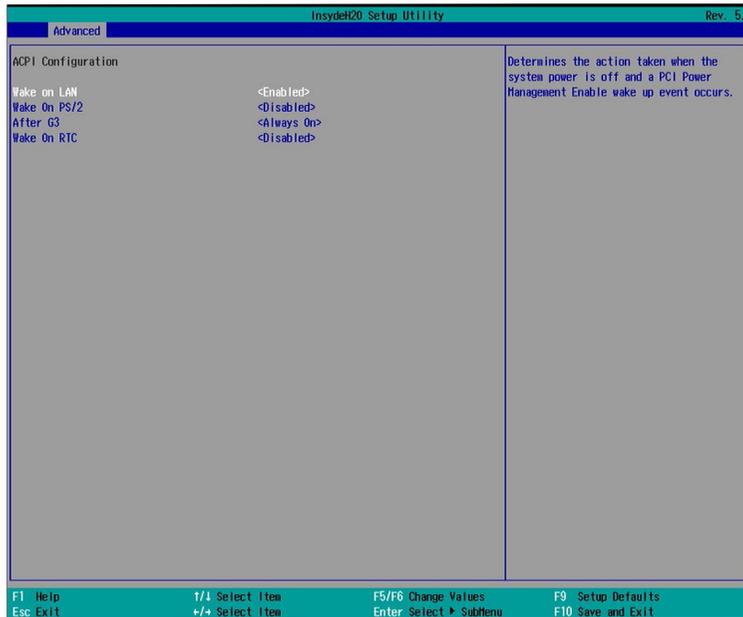
Important:

Setting incorrect field values may cause the system to malfunction.



ACPI Settings

This section configures system's ACPI parameters.



Wake on LAN

Enable or disable WOL (wake-on-LAN) to wake the system through an Ethernet adapter.

Wake on PS/2

Enable or disable the use of PS/2 devices to wake the system.

After G3

Specify which state the system should be in when power is re-applied after a power failure (G3, the mechanical-off, state).

Always On The system is powered on.

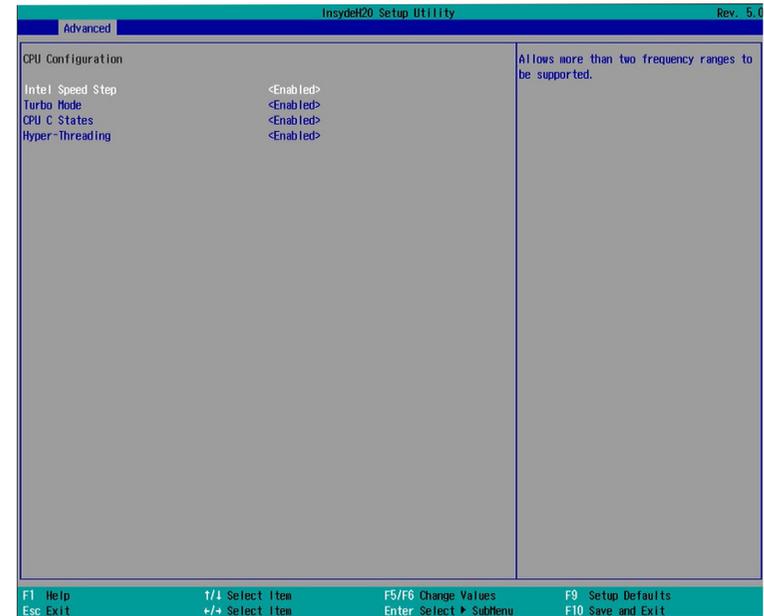
Always Off The system is powered off.

Wake on RTC

Enable this function to automatically power the system up at a particular time every day from the real-time clock battery. Specify the wake up time of the day below: <hour>, <minute>, <second>. The default is disabled.

CPU Configuration

This section configures the CPU.



Intel® SpeedStep™

Enable or disable the Enhanced Intel SpeedStep® Technology, which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, you can take advantage of its offering by setting power schemes from the operating system's power options.

Turbo Mode

Enable or disable processor turbo mode, which allows the processor core to automatically run faster than the base frequency by taking advantage of thermal and power headroom.

CPU C States

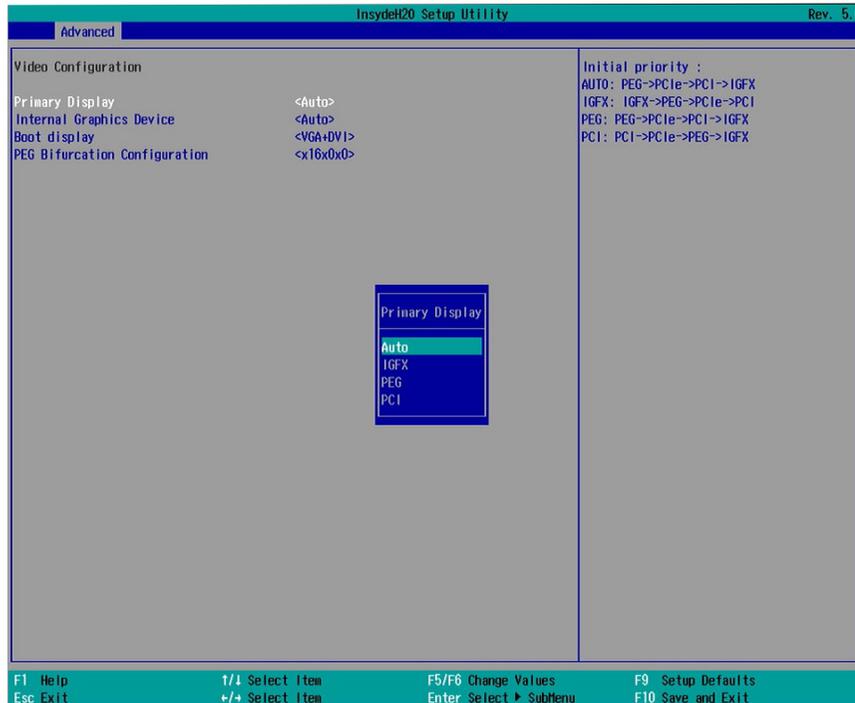
Enable or disable CPU Power Management. It allows the CPU to go to C states when it's not 100% utilized.

Hyper-Threading

Enable Intel® Hyper-Threading Technology (HT) on the processor to improve performance of operating systems and software that are optimized for hyper-threading technology. Please check the software specifications to determine if enabling HT can be advantageous to the overall system performance.

Video Configuration

This section configures the video settings. Note that the configuration options vary depending on the "Boot type" selected in the "Boot" menu.



Primary Display

Select the primary display for the system. Note that this option will be shown only if the "Boot type" is set to "Dual" or "UEFI". Depending on your selection, the order of video device initialization will be as follows:

Auto mode: PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->PCIe graphics devices->PCI graphics devices->IGFX (internal graphics)

IGFX: IGFX (internal graphics)->PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->PCIe graphics devices->PCI graphics devices

PEG: PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU) ->PCIe graphics devices->PCI graphics devices->IGFX (internal graphics)

PCI: PCI graphics devices -> PCIe graphics devices->PEG (PCIe Graphics devices connected to PEG lanes directly routed from the CPU)->IGFX (internal graphics)

Internal Graphics Device

Enable, disable or automatically detect the internal graphics.

Boot display

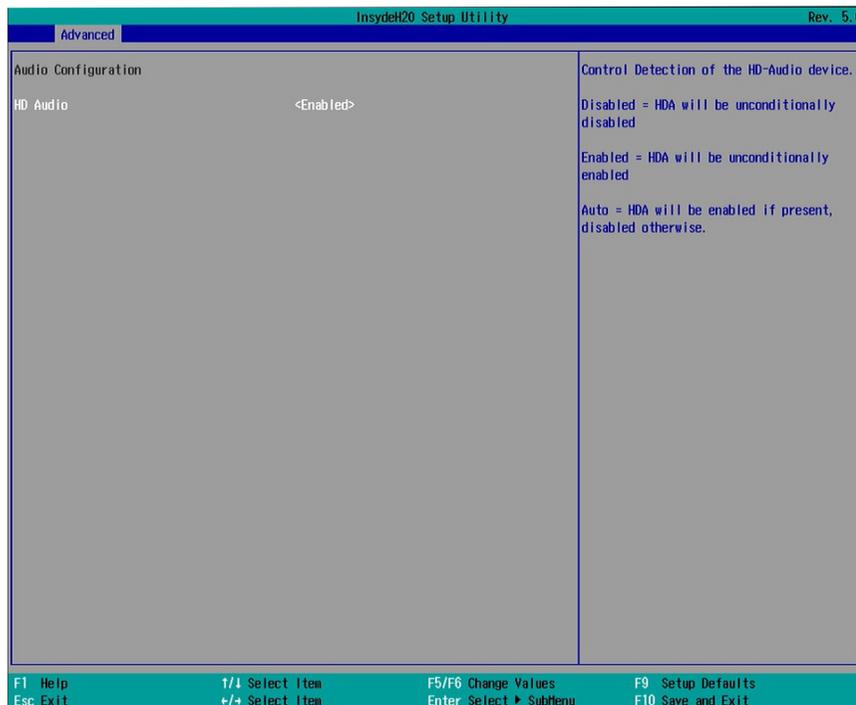
Prioritize device combination for display during system boot. Note that this option will be shown only if the "Boot type" is set to "Dual" or "Legacy".

The options are as follows:

- DVI+HDMI
- DVI+VGA
- HDMI+DVI
- HDMI+VGA
- VGA+DVI
- VGA+HDMI

Audio Configuration

This section configures the audio settings.



HD Audio

Control the detection of the high-definition audio devices.

Disabled

High-definition audio devices will be unconditionally disabled.

Enabled

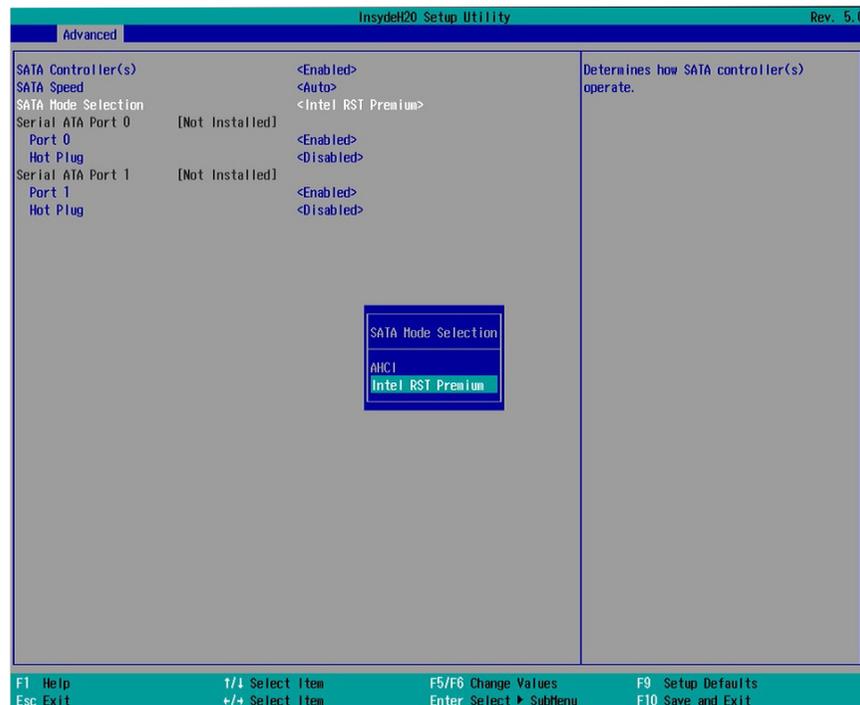
High-definition audio devices will be unconditionally enabled.

Auto

High-definition audio devices will be enabled if present and disabled otherwise.

SATA Configuration

This section configures SATA controllers.



SATA Controller(s)

Enable or disable Serial ATA controllers.

SATA Speed

Select Serial ATA device speed from Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s), Gen 3 (6 Gbit/s) or auto.

SATA Mode Selection

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

AHCI Mode

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

RAID Mode

This option allows you to create RAID using Intel® Rapid Storage Technology.

Intel RST Premium

This option allows you to create RAID using Intel® Rapid Storage Technology. It also allows for the SATA controller to use the “Intel® Optane™ technology” to accelerate system performance and responsiveness. To enable Intel® Optane™ technology, the system requires that a PCIe NVMe module and a Windows* 10 x64 bit (Version 1703/Build 15063) or later versions installed with a more recent version of the Intel® Rapid Storage Technology (Intel® RST) driver and application. For more information on Intel® Optane™ memory, please refer to [Installation Guide for Intel® Optane™ Memory](#).

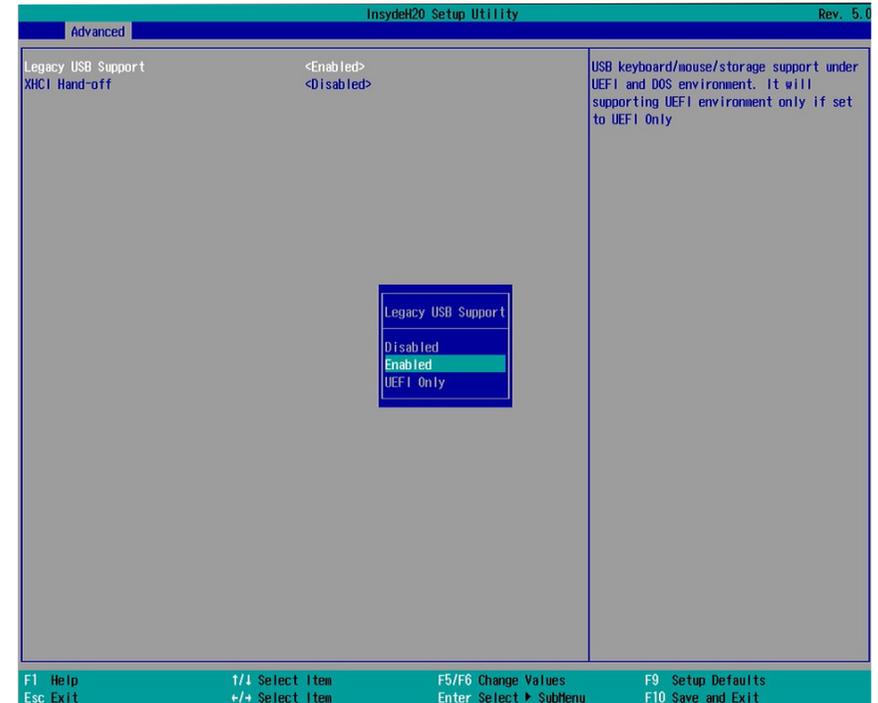
For more information on RAID Creation, please refer to Chapter 8 and 9.

Serial ATA Port 0 to 1 and Hot Plug

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

USB Configuration

This section configures the parameters of the USB devices.



Legacy USB Support

Disabled

Disable USB keyboard/mouse/storage support.

Enabled

Enable USB keyboard/mouse/storage support.

UEFI Only

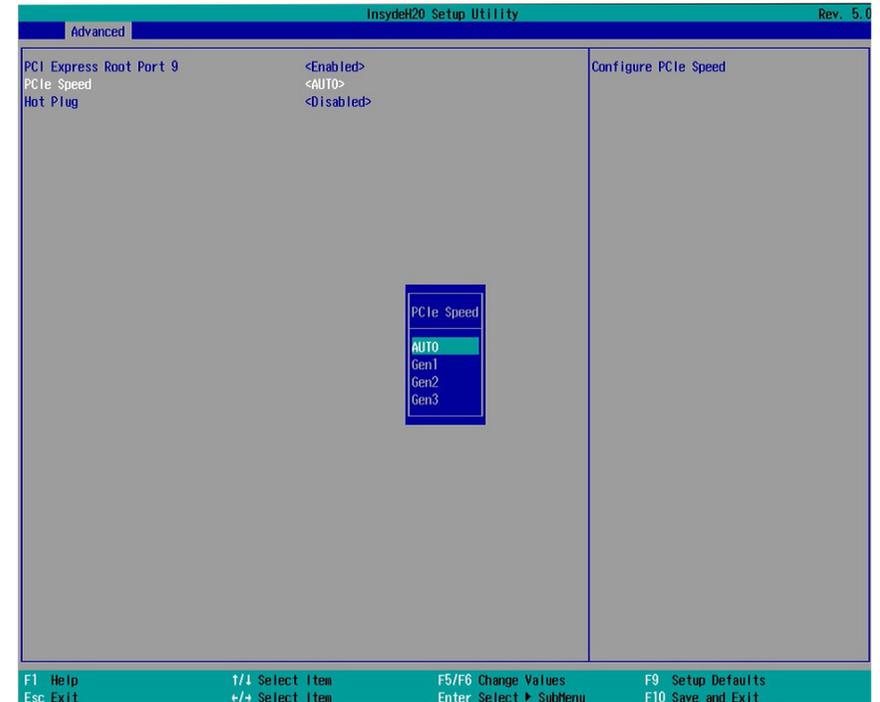
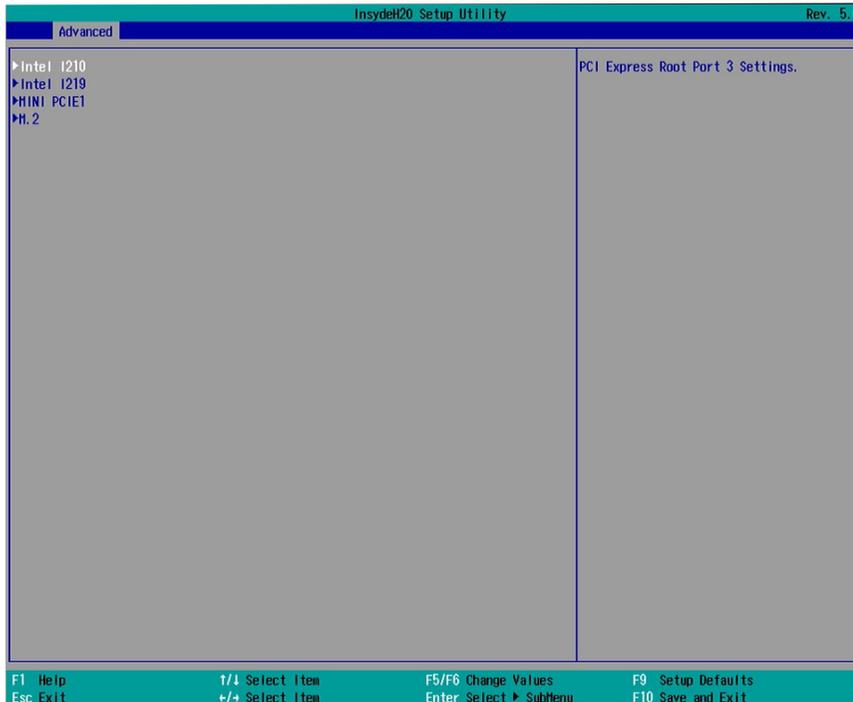
Enable USB keyboard/mouse/storage support only under the UEFI environment.

XHCI Hand-off

Enable this function for operating systems that do not support xHCI Hand-off. The XHCI ownership change will be claimed by the XHCI driver.

PCI Express Configuration

This section configures the settings of PCI Express root ports.



PCI Express Configuration

Select a device associated with a PCI Express root port and press "Enter" to configure:

- Intel I210
- Intel I219
- Mini PCIE1
- M.2

For each PCIe root port above, press "Enter" to configure its speed and hog plug.

Enable/Disable

Enable or disable this PCI Express root port.

PCIe Speed

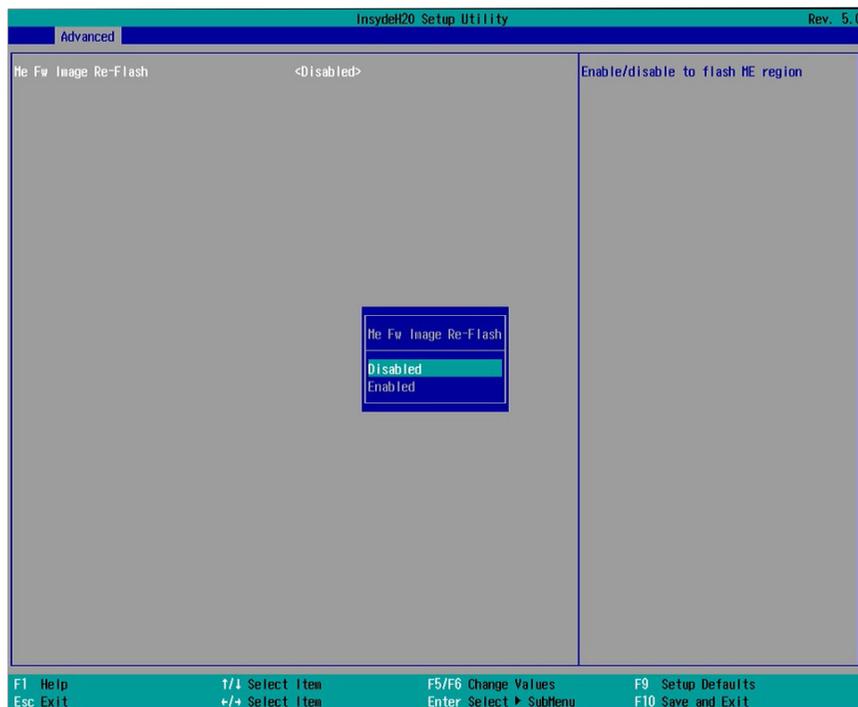
Select the speed of the PCI Express root port: Auto, Gen1 (2.5 GT/s), Gen2 (5 GT/s) or Gen3 (8 GT/s). This option is only available for Mini PCIE1 and M.2.

Hot Plug

Enable or disable the hot plug function of the PCIe root port. This option is only available for Mini PCIE1 and M.2.

ME Configuration

This section configures flashing of the Intel® Management Engine.

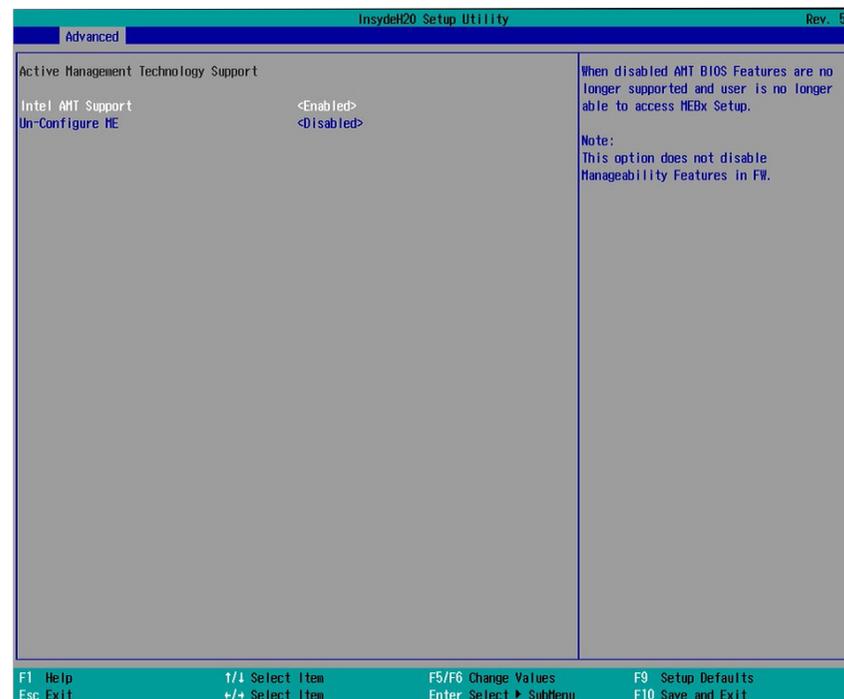


Me Fw Image Re-Flash

Enable or disable Intel® Management Engine firmware flashing when updating the BIOS.

Active Management Technology Support

The section allows you to enable or disable the Intel® Active Management Technology (Intel® AMT) BIOS extension. Refer to Chapter 10 - Intel AMT Settings for more information. Note that this function is not available for the Intel® Core™ i3, Intel® Pentium®, Intel® Celeron® processors or the Intel® H110 chipset.



Intel AMT Support

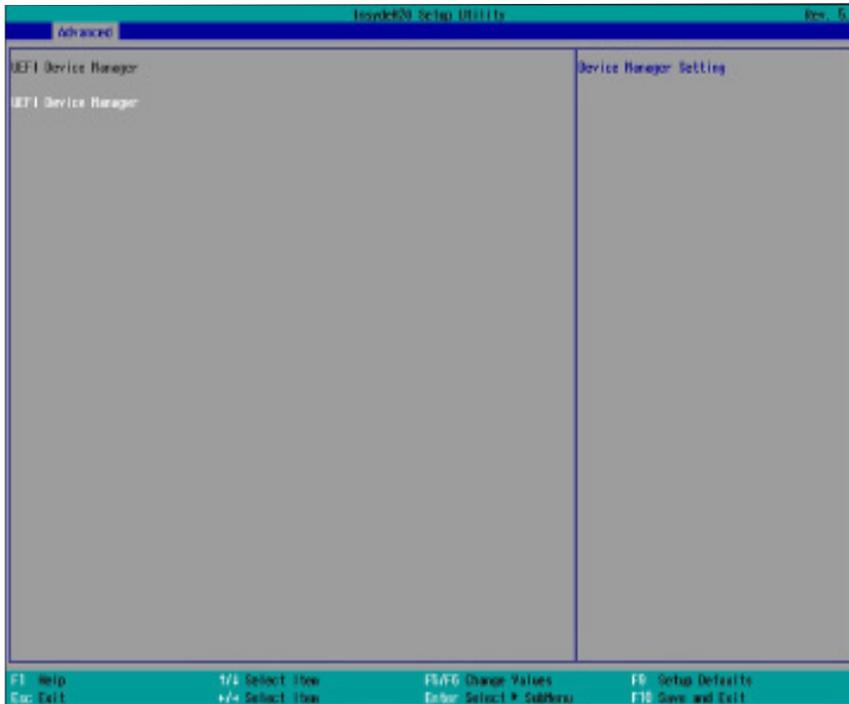
Enable or disable Intel® Active Management Technology BIOS extension.

Un-Configure ME

Clears all ME related configurations without requiring a password on the next boot.

UEFI Device Manager

This Device Manager menu is used to configure UEFI network settings when the "Network Stack" is enabled in the "Dual" or "UEFI" boot mode or when the PXE Boot to LAN is enabled in the "Legacy" boot mode. Refer to the "Boot" section in this chapter. After this function is selected, the screen will warn you that you are going to exit the BIOS setup utility.



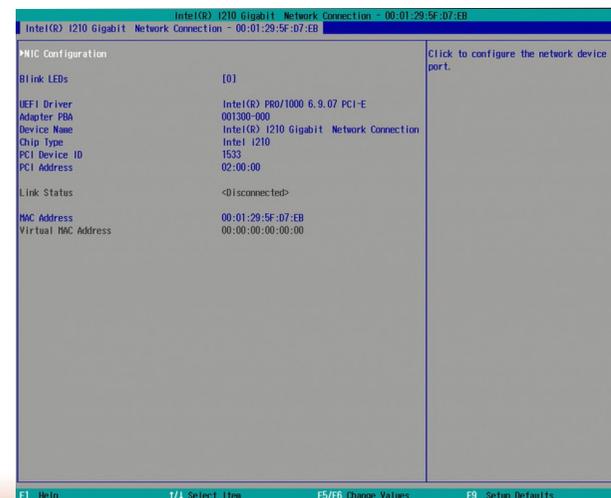
Network Device List

The "Device Manager" screen is displayed. And if the "Network Stack" or the "PXE Boot to LAN" option is enabled from the "Boot" menu, the "Network Device List" should be shown in the "Device list". Select "Network Device List" to view all of the detected network devices. For each network device, you can select to view and configure its settings. In addition, you can select either the IPv4 or IPv6 network settings for UEFI network configuration.



NIC Configuration Menu

This screen shows hardware information for the Ethernet controllers and configures their operation.



Blink LEDs

Enter the duration (seconds) for the Ethernet's LED to blink to indicate its presence.

NIC Configuration

This screen configures the Ethernet controller. Select the link speed from the following options: Auto Negotiated, 10Mbps Half, 10Mbps Full, 100Mbps Half, and 100Mbps Full.

IPv4 Network Configuration

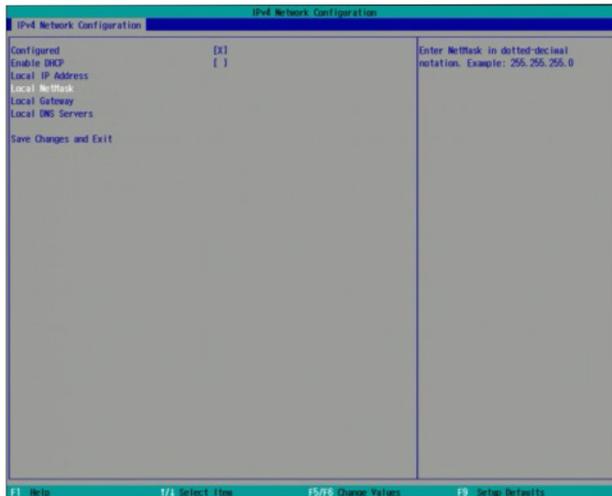
This screen configures the IP addressing method (DHCP or static IP). For static IP addressing, configure the following:

Local IP address and subnet mask: Enter the IP address for the network device in the IPv4 format:

X . X . X . X (X must be a decimal value between 0 and 255).

Local Gateway: Enter the gateway address in the IPv4 format.

Local DNS (Domain Name System) Servers: Enter DNS (Domain Name System) server IP addresses in the IPv4 format.



IPv6 Network Configuration

If you select to use IPv6 network settings, enter the Interface ID (64 bit). Policy: Select either automatic or manual. And select "Advanced Configuration" to configure IPv6 network address manually if the manual option is selected.

New IPv6 address: Enter the IP address for the network device in the IPv6 format:

x : x : x : x : x : x : x : x (x can be any hexadecimal value between 0 and FFFF). Place a space to separate each IP address to enter more than one address.

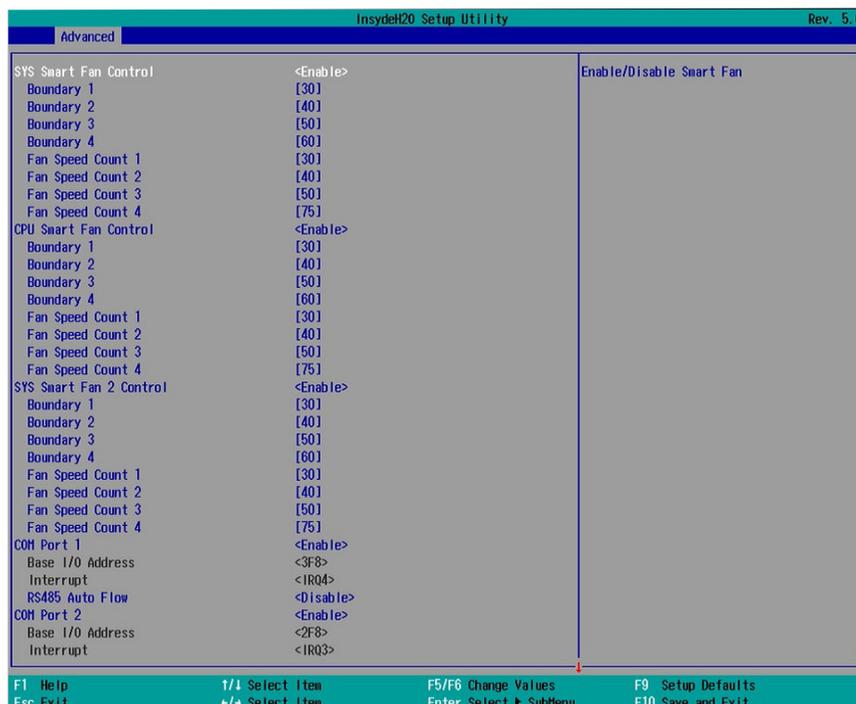
New Gateway addresses: Enter gateway addresses in the IPv6 format.

New DNS addresses: Enter DNS (Domain Name System) server IP addresses in the IPv6 format.



Super IO Configuration

This section configures the system super I/O chip parameters.



SYS Smart Fan/CPU Smart Fan/SYS Smart Fan 2 Control

Enable or disable the smart fan control.

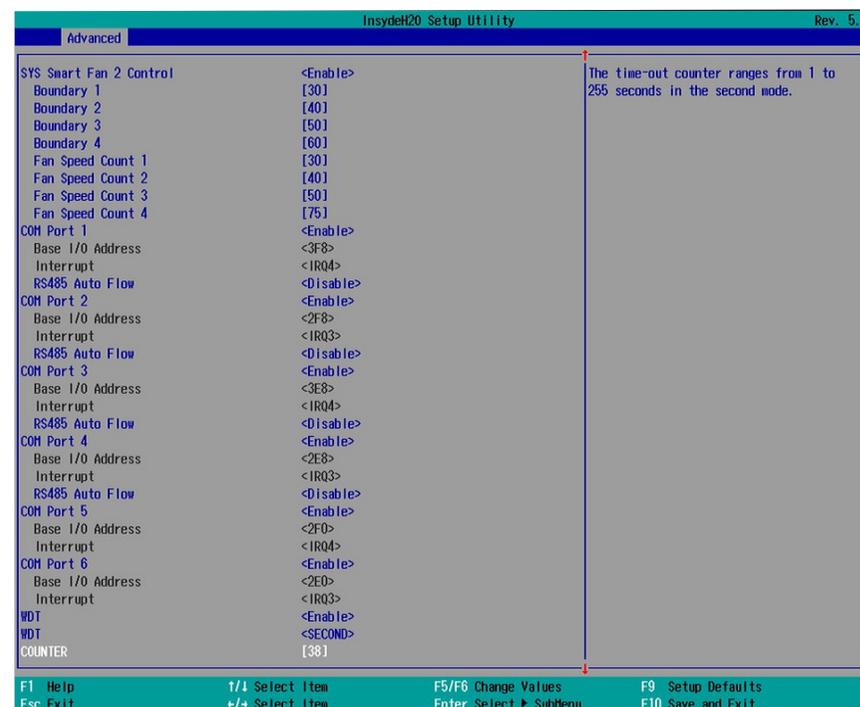
Boundary 1 to Boundary 4

Set the boundary temperatures that determine the operation of the fan with different fan speeds accordingly. For example, when the system or the CPU temperature reaches boundary temperature 1, the system or CPU fan should be turned on and operate at the designated speed.

The range of the temperature is from 0 to 127°C.

Fan Speed Count 1 to Fan Speed Count 4

Set the fan speed. The range is from 1 (lowest speed)-100% (full speed).



COM Port 1 and COM Port 6

Enable or disable each serial port.

Disable Disable this serial port.

Enable Enable this serial port.

It also shows the Base I/O address and the assigned interrupt number.

For COM Port 1 to COM Port 4, you can enable or disable the RS485 auto flow mechanism.

WDT

Enable or disable the watchdog function. A counter will appear if you select to enable WDT. Input any value between 1 and 255.

Case Open

Enable or disable the case open function.

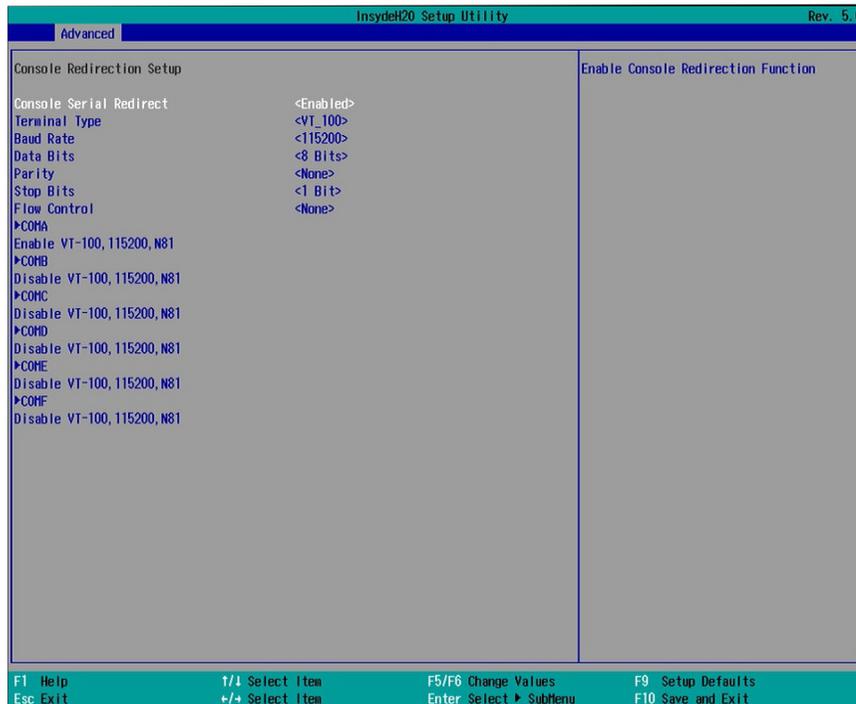
PC Health Status

This section displays PC health information such as the voltages and CPU and system temperatures.

InsydeH20 Setup Utility		Rev. 5.0
Advanced		
PC Health Status		
Voltage		
VBAT	3.152 V	
VCORE	0.736 V	
VDDQ	1.200 V	
5V	4.939 V	
+12V	12.056 V	
Temperature		
System (°C/°F)	36.0 C/ 96.8 F	
CPU (°C/°F)	100.0 C/ 212.0 F	
Fan Speed		
SYS FAN	0 RPM	
CPU FAN	0 RPM	
SYS FAN 2	0 RPM	
F1 Help	↑/↓ Select Item	F5/F6 Change Values
Esc Exit	←/→ Select Item	Enter Select ► Submenu
		F9 Setup Defaults
		F10 Save and Exit

Console Redirection

Console redirection lets you monitor and control the system from a remote station by re-directing the host screen output through a serial port.



Console Serial Redirect

Enable or disable the console redirection function. (The default is disabled.) If you select to enable it, please configure the following parameters for serial communication between the system and a remote station:

Terminal type: VT_100, VT_100+, VT_UTF8, or PC_ANSI.

Baud rate: 115200, 57600, 38400, 19200, 9600, 4800, 2400 or 1200.

Data bits: 8 bits or 7 bits.

Parity: None, Even or Odd.

Stop bits: 1 bit or 2 bits.

Flow control: None, RTS/CTS or XON/XOFF

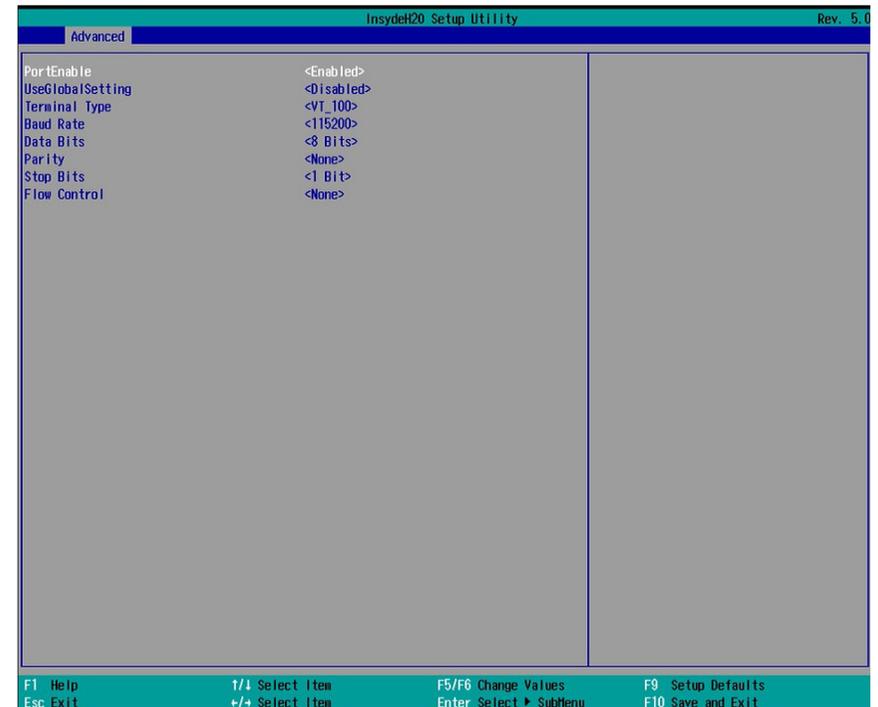
This is the global setting for all of the designated serial ports for the console redirection function.

COMA to COMF

Enable or disable the serial redirection function for each of the serial ports on the system. And configure the serial communication parameters to be used between the system and a remote station.

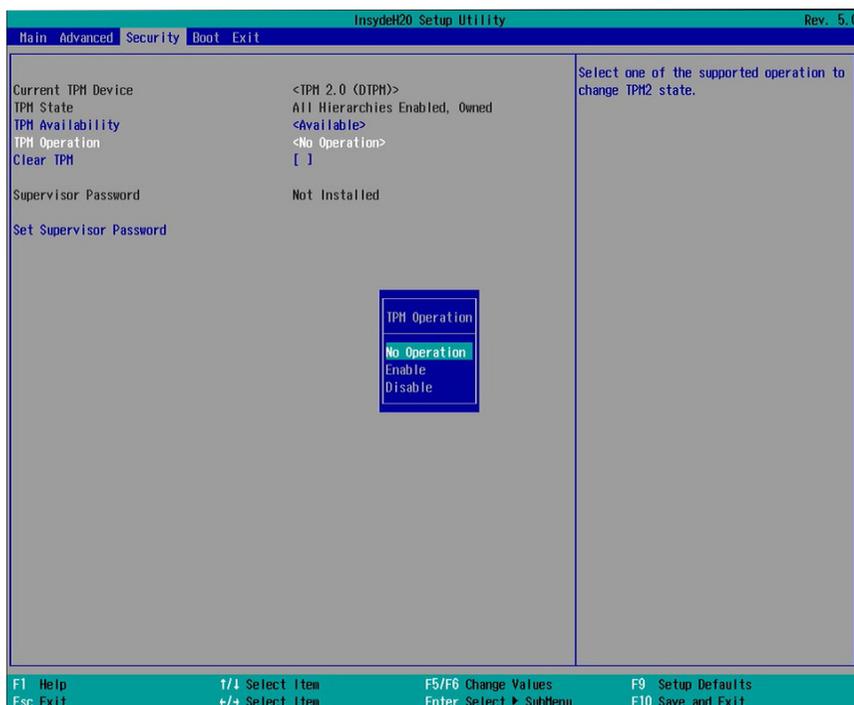
UseGlobalSetting

Choose to use the pre-configured global settings from the previous menu or configure a different setting for each serial port.



Security

This section configures the security for the BIOS Setup utility and the optional Trusted Platform Module (TPM) function.



TPM Availability

Show or hide TPM availability and its configurations.

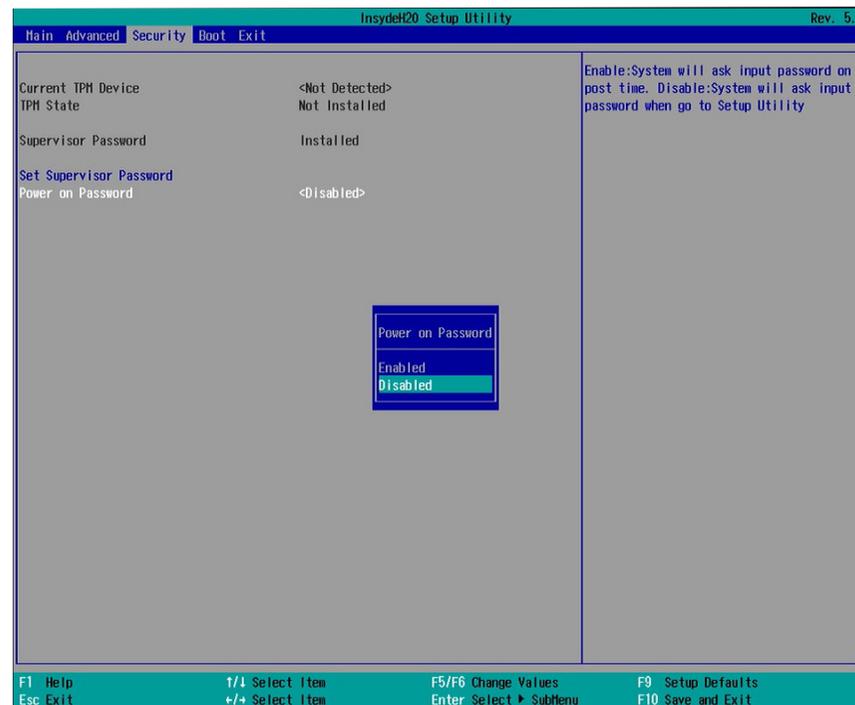
TPM Operation (optional)

Enable or disable the TPM function. It displays the following options:

- No Operation: No changes to the current state.
- Disable: Disable and deactivate TPM.
- Enable: Enable and activate TPM.

Clear TPM

Remove all TPM ownership contents.



Set Supervisor Password

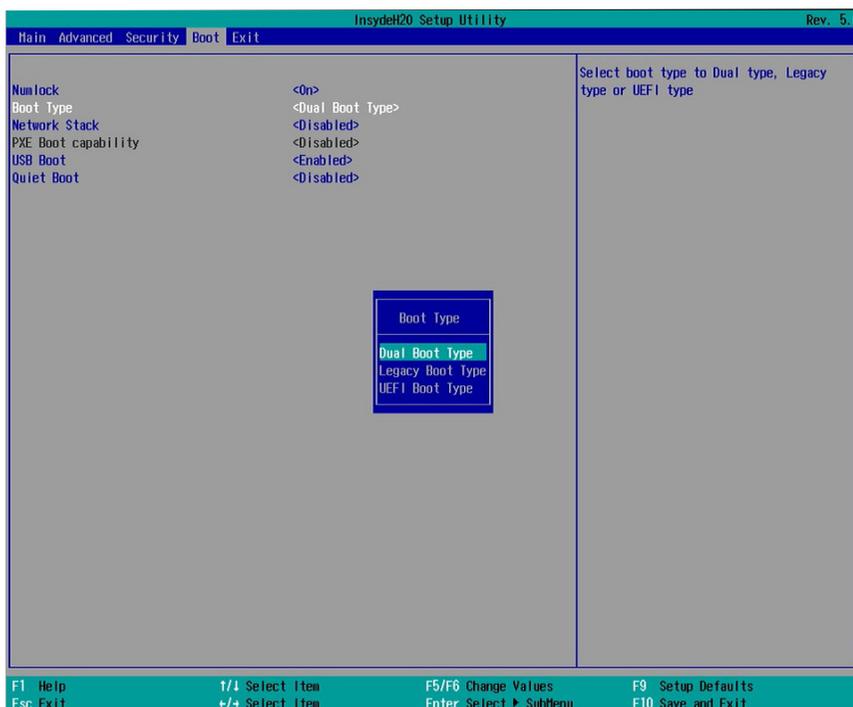
Set the administrative password for entering the BIOS utility or upon entering the power-on self-test (POST) process. The length of the password must be greater than 1 character and less than or equal to 10 characters.

Power-on Password

If you select to set the supervisor password, this option will be shown. Enable or disable prompt for password at boot.

Boot

This section configures boot options.



Numlock

Select the power-on state for the Num Lock key.

Boot Type

Select the boot type. The options are Dual Boot, Legacy Boot and UEFI Boot Type.

Network Stack

This option is shown only when the boot type is set to Dual or UEFI.

Enable or disable UEFI network stack. It supports the operation of these functions or software: Windows 8 BitLocker Network Unlock, UEFI IPv4/IPv6 PXE and legacy PXE option ROM.

If this function is enabled, you can then go to "Advanced">"Device Manager" to config-

ure network settings for network connection under the UEFI environment.

PXE Boot Capability (UEFI mode) / PXE Boot to LAN (Legacy mode)

Enable or disable Preboot eXecution Environment (PXE) boot to LAN. In the UEFI or Dual boot mode, this function can only be enabled if the Network Stack support is enabled.

USB Boot

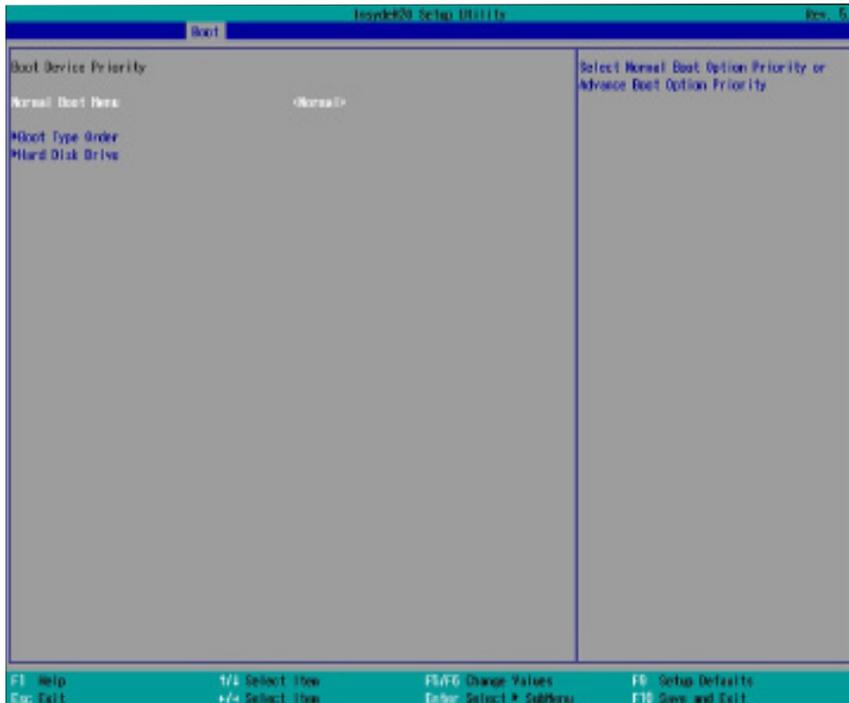
Enable or disable booting to USB boot devices.

Quiet Boot

Enable or disable the quiet boot function to configure the screen's display between POST messages or the OEM logo at bootup. Select Disabled to display the POST messages and select Enabled to display the OEM logo.

Boot Device Priority

This section configures legacy or EFI boot order or both depending on the "Boot Type" selected.



EFI Boot Menu

Use + and - keys to arrange the priority of the boot devices in the list.

Legacy Boot Menu

Normal

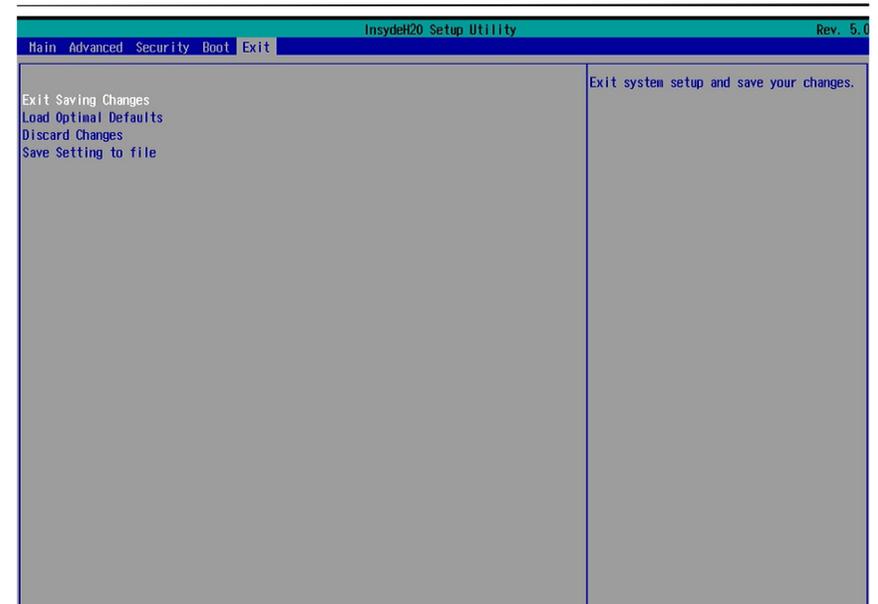
For this option, determine the boot order for the devices within each category. Use the + and - key to arrange the priority of the boot type devices in the list. The first device in the list has the highest boot priority.

Advance

For this option, determine the boot order for all bootable devices. Use + and - keys to arrange the priority of the detected boot devices in the list. The first device in the list has the highest boot priority.

Exit

This section configures the parameters for exiting the BIOS setup utility.



Exit Saving Changes

Select this field and press <Enter> to exit BIOS setup and save your changes.

Load Optimal Defaults

Select this field and press <Enter> to load the optimal defaults.

Discard Changes

Select this field and press <Enter> to exit the BIOS setup without saving your changes.

Save Setting to file

Select this option to save BIOS configuration settings to a USB drive. The operation will fail if there aren't any USB devices detected on the system. The saved configuration will have the DSF file extension and can be used for restoration.

Restore Setting from file

Select this option to restore BIOS configuration settings from a USB drive. Note that this option appears only if a USB device is detected on the system.

Updating the BIOS

To update the BIOS, you will need an updated BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions on how to update BIOS with the flash utility.

When you download the given BIOS file, you may find a BIOS flash utility attached with the BIOS file. This is the utility for performing the BIOS update procedure. For your convenience, we will also provide you with an auto-execution file in the BIOS file downloaded. This auto-execution file will bring you directly to the flash utility menu soon after system boots up and finishes running the boot files in your boot disk.

```
Read file successfully. (path= "platform.ini")

Information
Please do not remove the AC power

Insyde H20FFT (Flash Firmware Tool) Version (SEG) 100.00.08.10
Copyright(c) 2012 - 2017, Insyde Software Corp. All Rights Reserved.

Initializing
Current BIOS Model name: EC5xx-KH
New BIOS Model name: EC5xx-KH

Current BIOS version: B19A.04A
New BIOS version: B197.03A

Updating Block at FFFFFFF00h
0%      25%      50%      75%      100%
C:\EC5xx-KH> _____
```

Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to 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 8 - Supported Software

Some devices of the system require drivers from hardware manufactures to operate properly. The system may come with a CD/DVD that contains drivers, utilities and software applications. Insert the CD into a CD-ROM drive. The auto-run screen (Mainboard Utility CD) will appear. If the "Autorun" does not automatically start, please go to the root directory of the CD and double-click "Setup".

If your product package does not include a CD/DVD, you can download the latest drivers from the DFI Download Center:

<http://www.dfi.com/DownloadCenter>

Once you are on the Download Center page, select your product or type the model name and click "Search" to find product-related resources such as documentation and drivers.

Drivers are available for the following devices in Windows:

- Intel® Chipset Device Software
- Intel® Graphics Driver
- Intel® LAN Driver
- Intel® ME Driver
- Intel® Rapid Storage Technology Driver
- Audio Driver
- Intel® Serial IO Driver

Intel Chipset Device Software

The Intel® Chipset Device Software is used for updating Windows® INF files so that the Intel chipset can be recognized and configured properly in the system.

To install the utility, follow these steps:

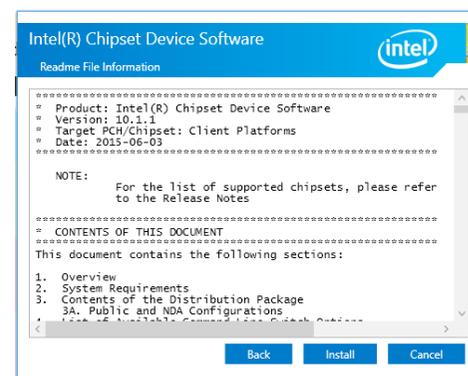
1. Setup is ready to install the utility. Click "Next".



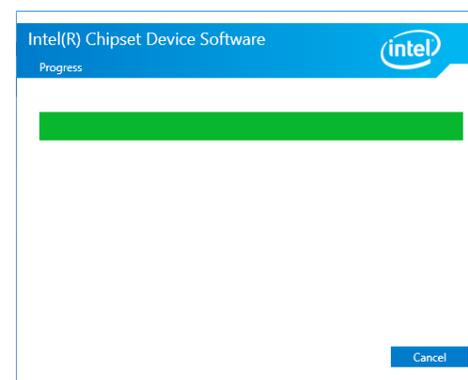
2. Read the license agreement, and then click "Yes".



3. Go through the readme document for system requirements and installation tips, and then click "Next". Please wait while the installation is in progress.



4. Please wait while the installation is in progress.



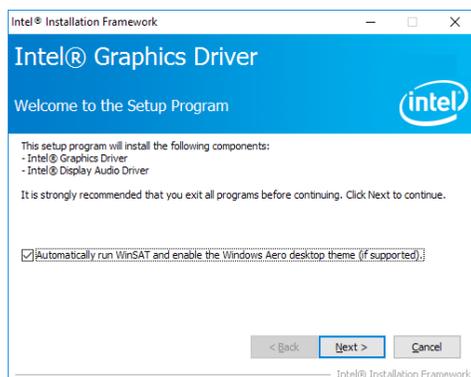
5. Click "Restart Now" to allow the new software installation to take effect.



Intel Graphics Driver

To install this driver, follow these steps:

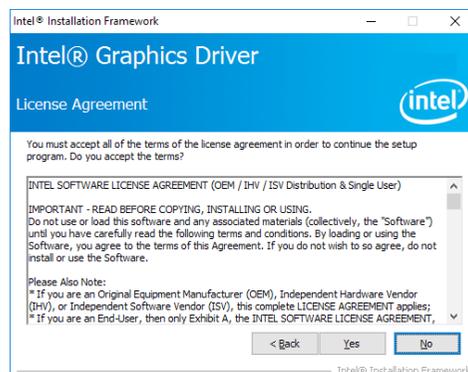
1. Setup is now ready to install the graphics driver. Click "Next".



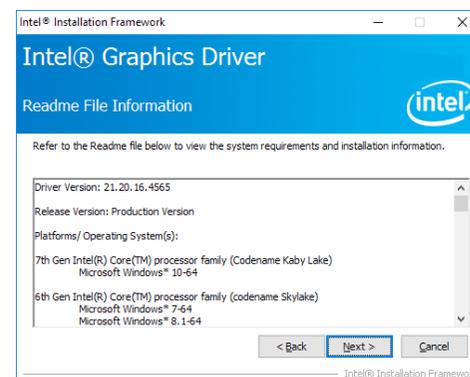
By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. When this is enabled and after the system reboots, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 7/ Windows 8.1/ Windows 10 desktop appears. The "blank screen" period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function and then click "Next".

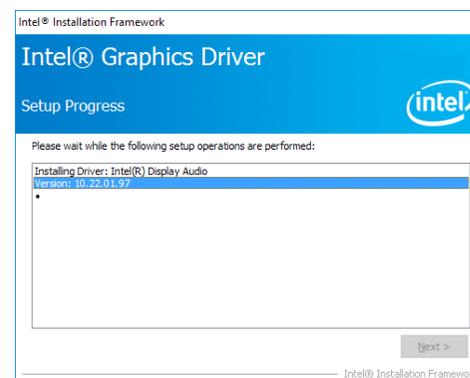
2. Read the license agreement, and then click "Yes".



3. Go through the readme document for system requirements and installation tips, and then click "Next".

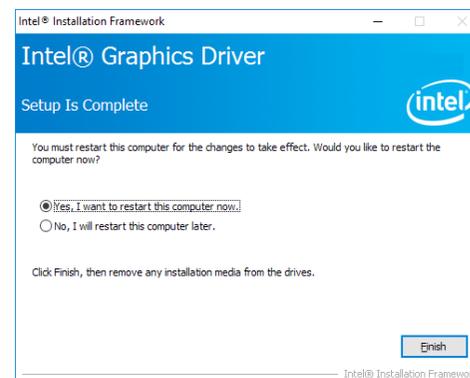


4. Setup is now installing the driver. Click "Next" to continue.



5. Click "Yes, I want to restart this computer now", and then click "Finish".

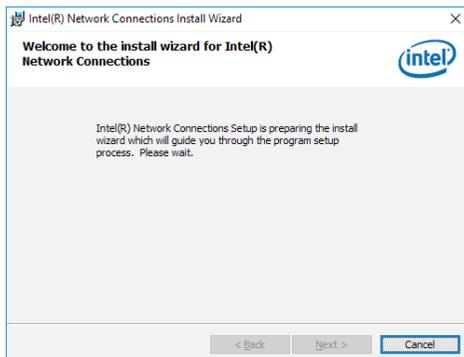
Restarting the system will allow the new software installation to take effect.



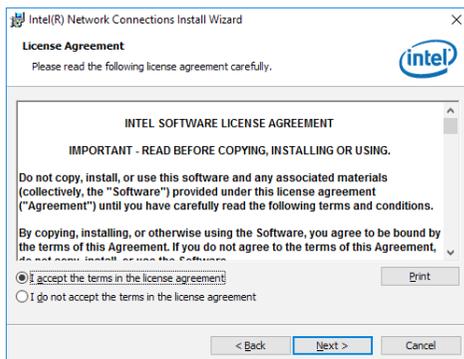
Intel LAN Driver

To install this driver, follow these steps:

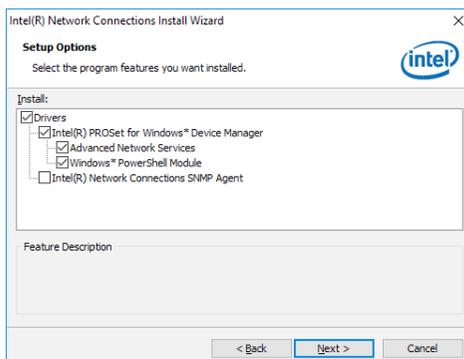
1. Setup is preparing to install the driver. Click "Next" to continue.



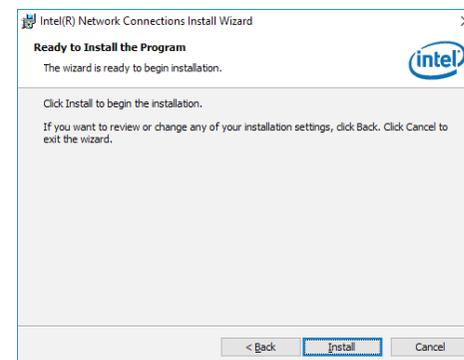
2. Click "I accept the terms in the license agreement" if you accept the agreement, and then click "Next".



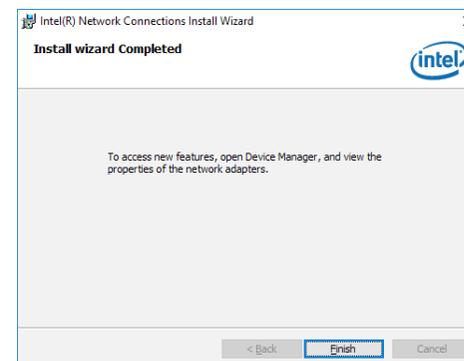
3. Select the program features you want to install, and then click "Next".



4. Click "Install" to begin the installation.



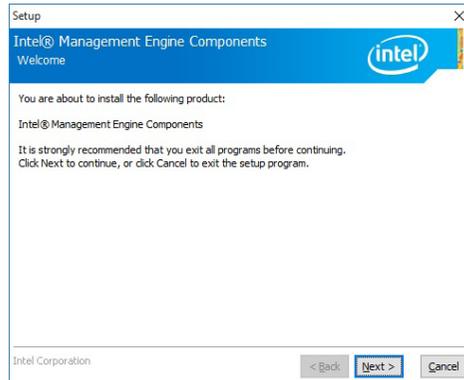
5. After the installation is complete, click "Finish".



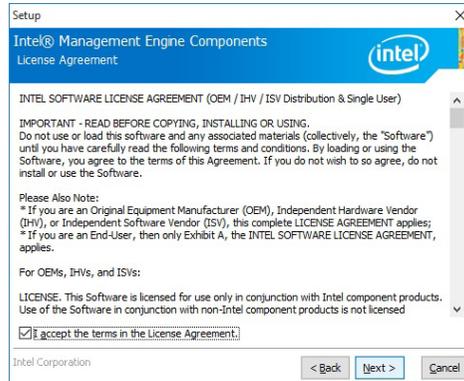
Intel ME Driver

To install the Intel® Management Engine (Intel® ME) Driver, follow these steps:

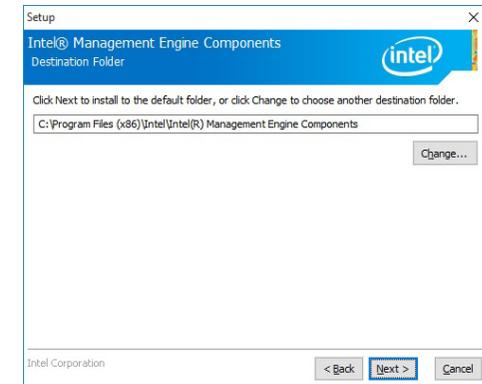
1. You are about to install the driver. Click "Next" to continue.



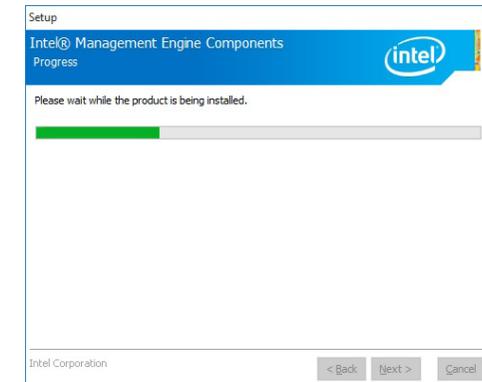
2. Read the license agreement, and then click "Next".



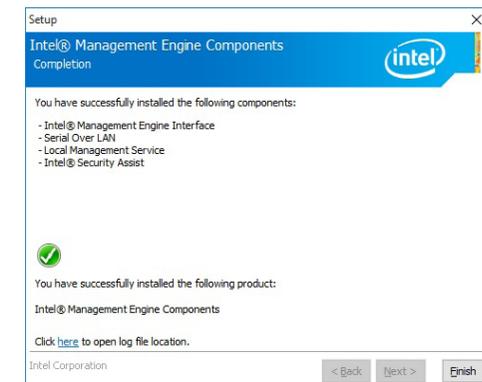
3. Setup is currently installing the driver. After the installation is complete, click "Next."



4. Please wait while the product is being installed.



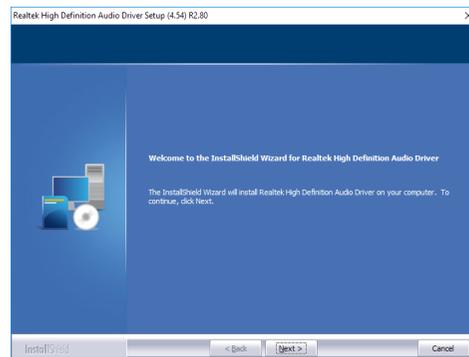
5. After the installation is complete, click "Finish".



Audio Driver

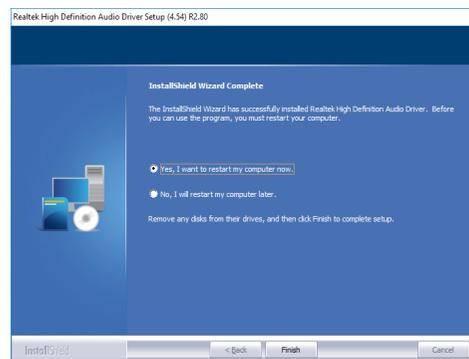
To install this driver, follow these steps:

1. Setup is now ready to install the audio driver. Click "Next".
2. Follow the steps of the on-screen instructions; click "Next" each time you finish a step.



3. Click "Yes, I want to restart my computer now", and then click "Finish".

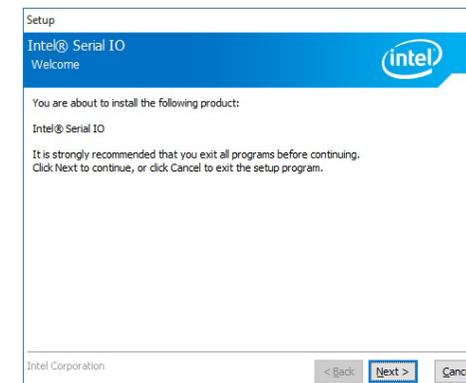
Restart the system to allow the new software installation to take effect.



Intel Serial IO Driver

To install this driver, follow these steps:

1. Setup is ready to install the driver. Click "Next" to continue.

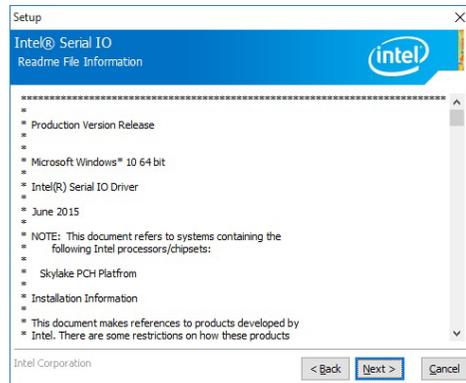


2. Read the license agreement carefully.

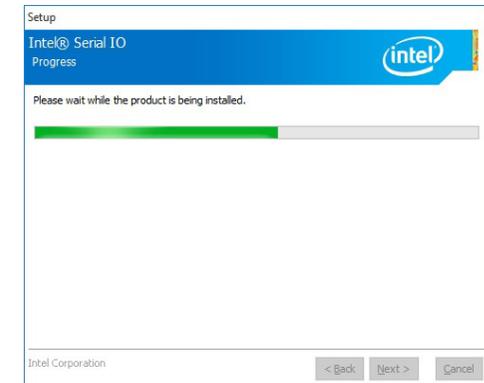
Click "I accept the terms in the License Agreement" if you agree with the terms in the agreement and then click "Next".



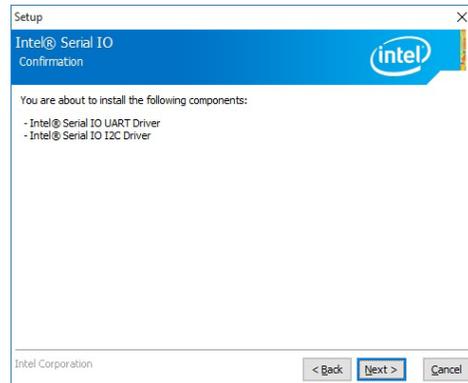
3. Read the file information and then click "Next".



5. Setup is now installing the driver.



4. Setup is ready to install the driver. Click "Next" to begin the installation.



6. Click "Finish" to exit the setup.



Intel® Rapid Storage Technology Driver

The Intel Rapid Storage Technology is a utility that allows you to monitor the current status of the SATA drives. It enables enhanced performance and power management for the storage subsystem. You can also install and set up Intel® Optane™ memory with the Intel® Rapid Storage Technology application.

Chapter 9 - RAID

The system board allows RAID configuration with levels of RAID 0 and RAID 1.

RAID Levels

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 (Mirrored 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 Level	Min. Drives	Protection	Description
RAID 0	2	None	Data striping without redundancy
RAID 1	2	Single Drive Failure	Disk mirroring

Settings

To enable the RAID function, the following settings are required.

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

Step 1: Connect the Serial ATA Drives

Refer to Chapter 3 for details on connecting 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 BIOS

1. Power on the system then press to enter the main menu of the BIOS.
2. Go to "Advanced" menu, and select the "SATA Configuration" menu.
3. Change the "SATA Mode Selection" to "Intel RST Premium" mode.
4. Save the changes in the "Exit" menu.
5. Reboot the system.

Step 3: Create a RAID Volume

1. When the Intel® RST option ROM status screen displays during POST, press <Ctrl> and <I> simultaneously to enter the option ROM user interface.
2. Select 1: Create RAID Volume and press <Enter>.
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 select the strip size and press <Enter>.
5. Press <Enter> to select the physical disks.
6. Use the up or down arrow keys to scroll through the list of hard drives and press <Space> to select the drive.
7. Press <Enter>.
8. Select the volume size and press <Enter>. You must select less than one hundred percent of the available volume space to leave space for the second volume.
9. Press <Enter> to create the volume.
10. At the prompt, press <Y> to confirm volume creation.
11. Select 4: Exit and press <Enter>.
12. Press <Y> to confirm exit.



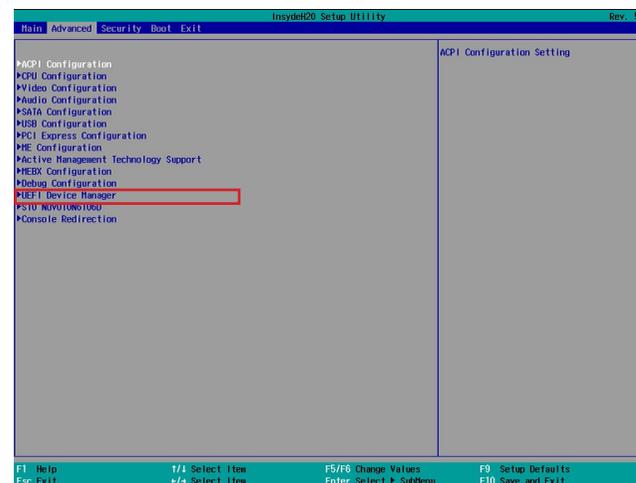
Note:

These steps are cited from the Intel® Support site, "Set Up a System with Intel® Matrix RAID Technology" (Article ID: 000005789).

Step 3-1: Create a RAID Volume if the boot type is UEFI

If the boot type is set to UEFI, RAID volume creation will be different. Please use the following steps to create RAID volumes. To set the boot type, enter the BIOS utility and go to "Boot" > "Boot type".

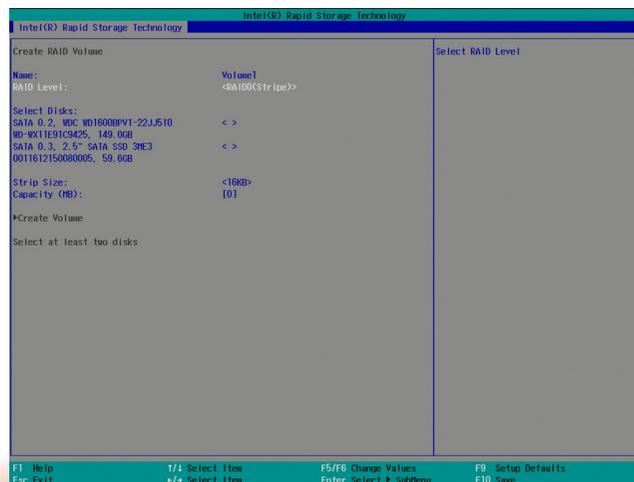
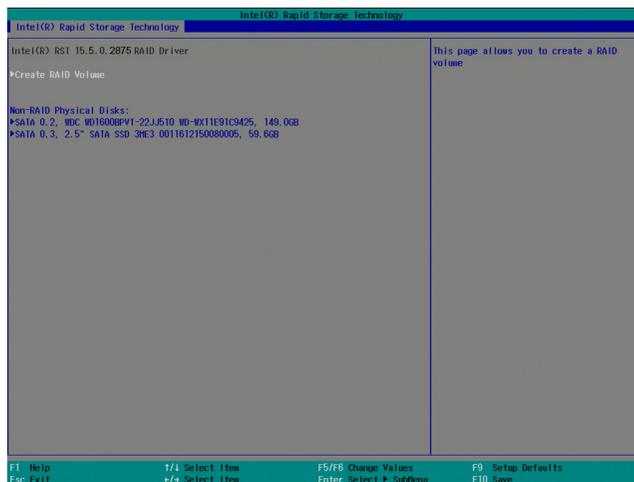
1. In the BIOS, go to the "Advanced" > "UEFI Device Manager".



2. Select UEFI Device Manager. The system will prompt you that it is going to exit the BIOS utility. Select "OK" to continue.
3. The "Intel® Rapid Storage Technology" menu appears. Enter this menu.



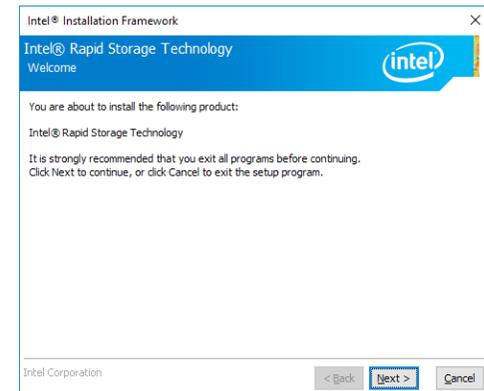
- The screen displays all available drives. Select "Create RAID volume" to create a RAID volume".
- Use the up or down arrow keys to select the RAID level and press <Enter>.
- Use the up or down arrow keys to scroll through the list of hard drives and press <Enter> and select "x" to select the drive for the RAID group.
- Use the up or down arrow keys to select the strip size and press <Enter>.
- Enter the capacity for the volume and press <Enter>.
- Select "Create Volume" to start creating the volume.



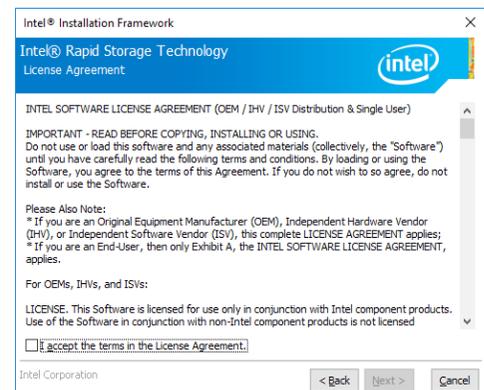
Step 4: Install the Intel Rapid Storage Technology Utility

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. Furthermore, it enables enhanced performance and power management for the storage subsystem.

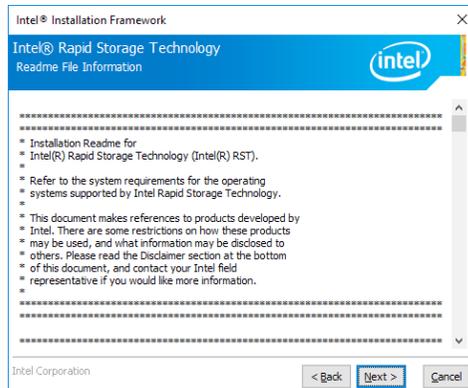
- Insert the provided DVD into an optical drive.
- Click "Intel Rapid Storage Driver" on the main menu.
- Setup is ready to install the utility. Click "Next" to continue.



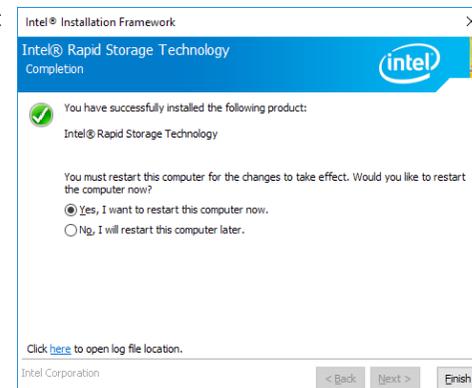
- Read the license agreement and click "I accept the terms in the License Agreement" if you accept the agreement. Then, click "Next".



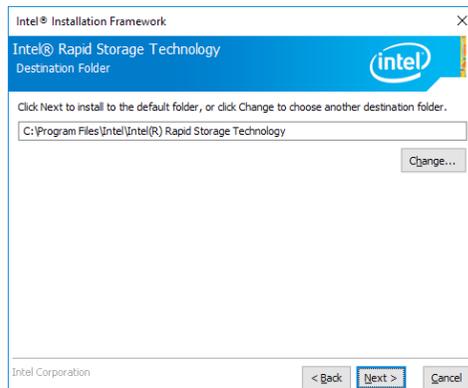
5. Go through the readme document to view system requirements and installation information, then click "Next".



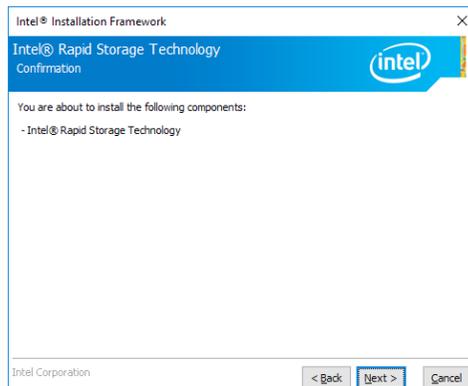
8. Click "Yes, I want to restart this computer now" to complete the installation and click "Finish".



6. Click "Next" to install to the default folder or click "change" to choose another destination folder.



7. Confirm the installation and click "Next".



Chapter 10 - Intel AMT Settings

Overview

Intel Active Management Technology (Intel® AMT) combines hardware and software solutions 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**

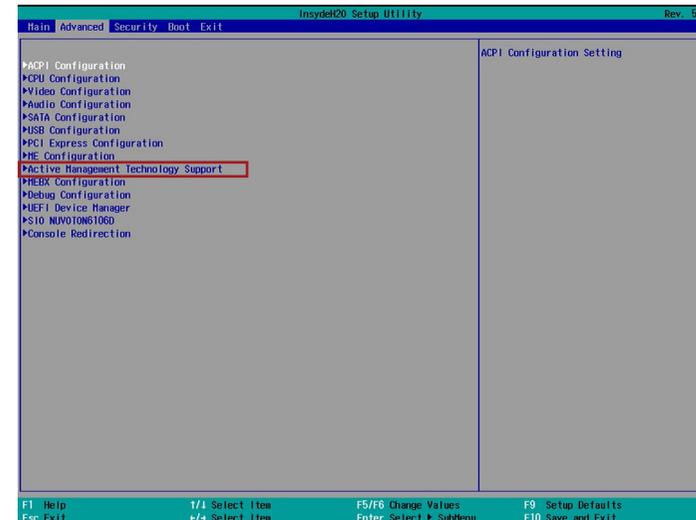
Remotely repair systems after OS failures. Alerting and event logging help detect problems quickly to reduce downtime.

- **Protect**

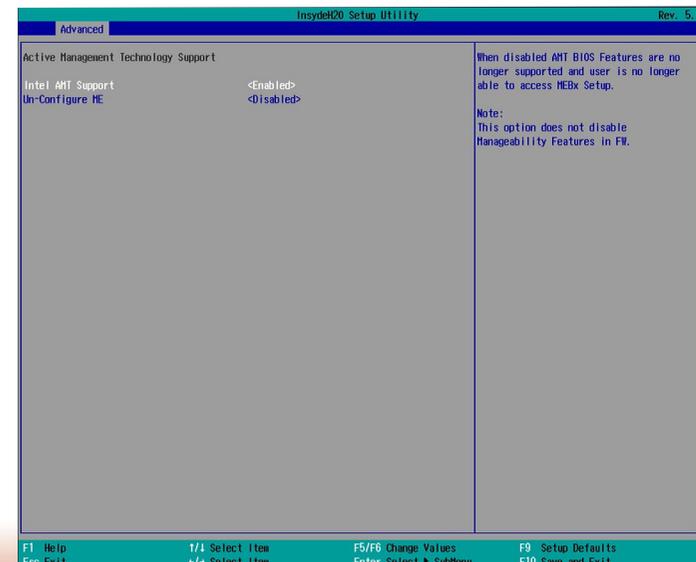
Intel AMT's System Defense capability remotely updates all systems with the latest security software. It protects the network from threats at the source by proactively blocking incoming threats, reactively containing infected clients before they impact the network, and proactively alerting when critical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

Enable Intel® AMT in the Insyde BIOS

1. Power on the system then press to enter the main menu of the BIOS setup utility.
2. In the "Advanced" menu, select "Active Management Technology Support".



3. In the "Active Management Technology Support" menu, select "Enabled" for "Intel AMT Support".

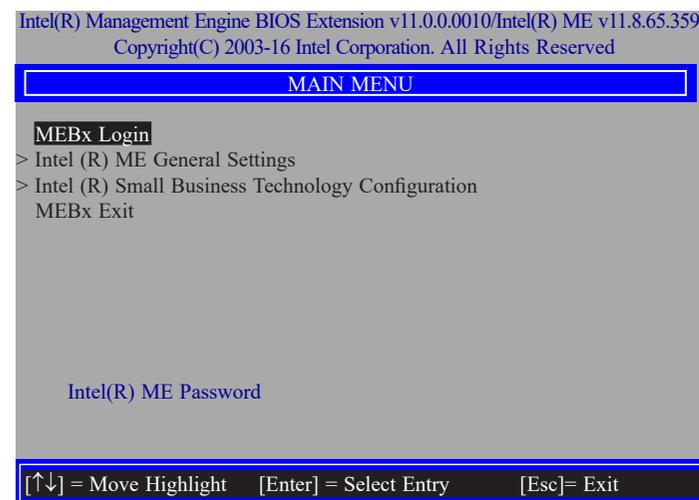


4. In the "Exit" menu, select "Exit Saving Changes" and then select "OK".



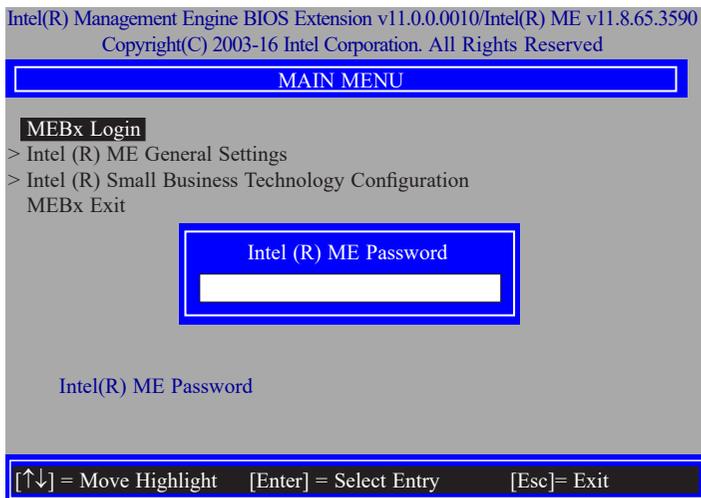
Set up Intel® AMT using the Intel® Management Engine BIOS Extension (MEBX)

1. After the system reboots, press to enter the BIOS menu again.
2. In the "Advanced" menu, select "MEBX Configuration" to enter the Manageability Engine BIOS Extension (MEBx) Setup.
3. When the system reboots, 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".

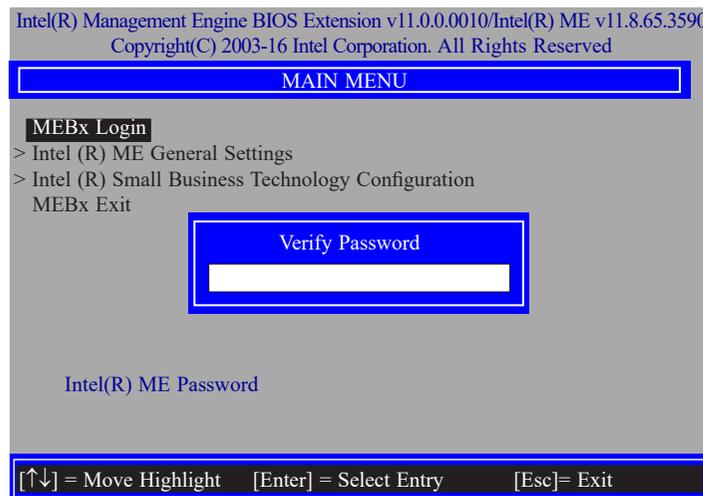


4. Enter a password in the space provided under "Intel(R) ME Password" and then press "Enter". The password must include:

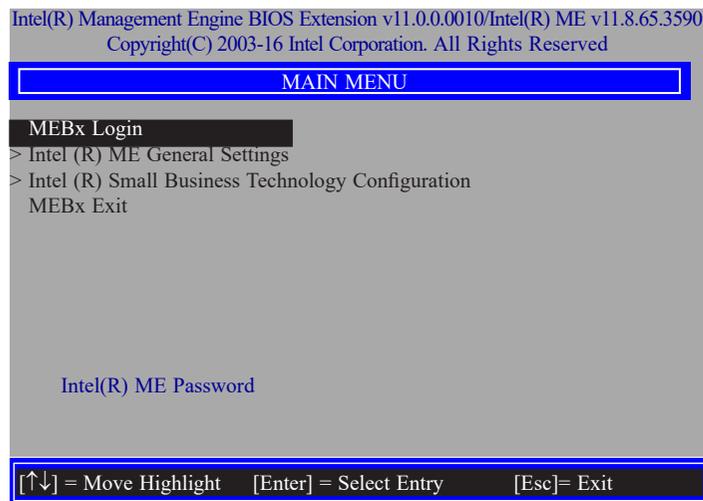
- 8-32 characters
- Strong 7-bit ASCII characters excluding : , and " characters
- At least one digit character (0, 1, ...9)
- At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
- Both lower case and upper case characters



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



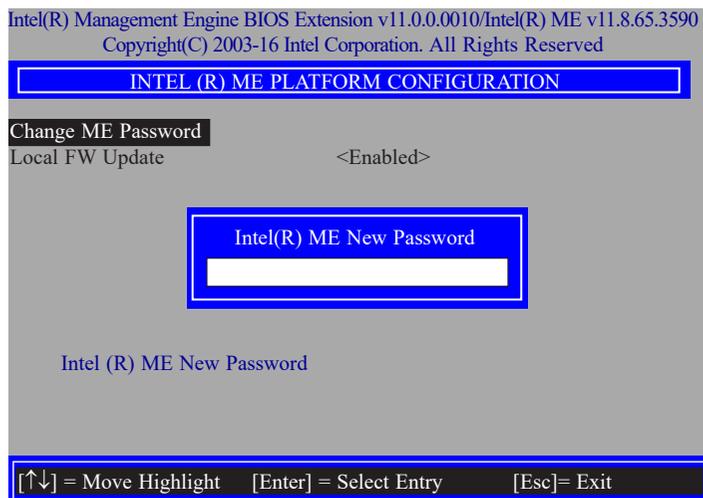
6. Select "Intel(R) ME General Settings" and then press "Enter".



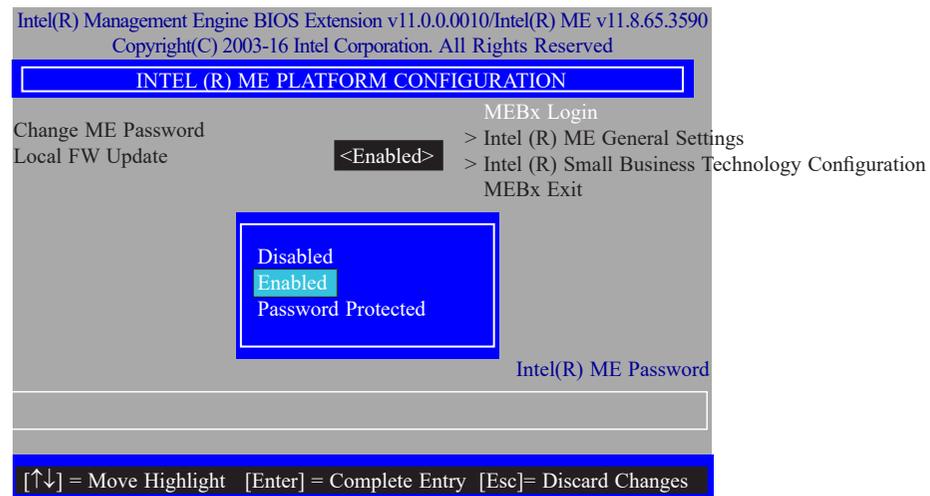
7. Select "Change Intel(R) ME Password" and then press "Enter".

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

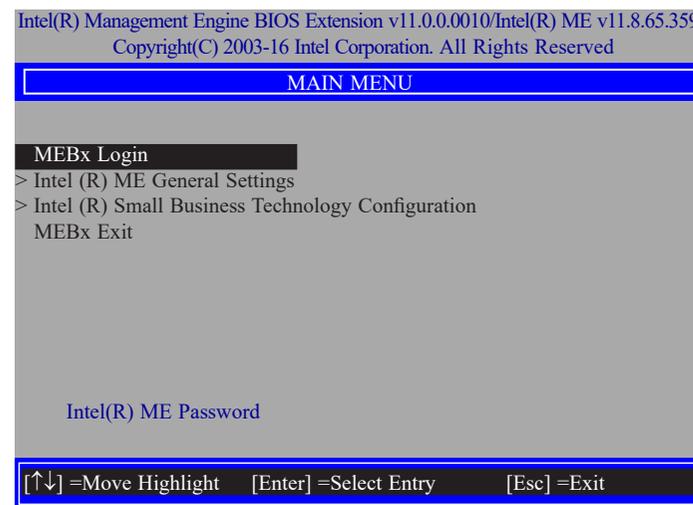
- 8-32 characters
- Strong 7-bit ASCII characters excluding : , and " characters
- At least one digit character (0, 1, ...9)
- At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
- Both lower case and upper case characters



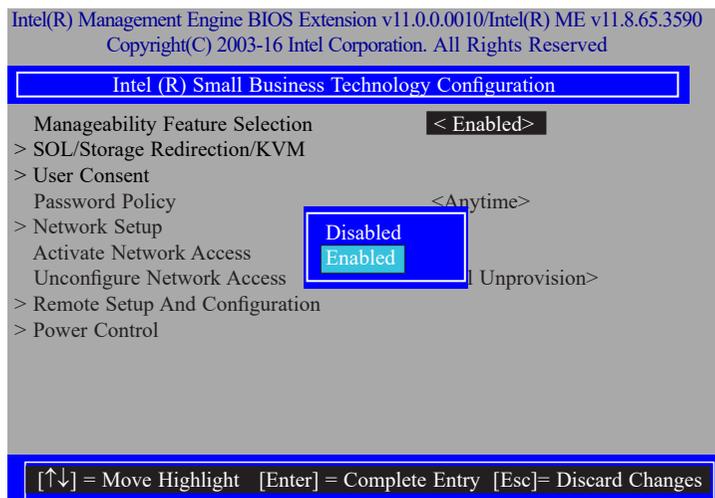
8. Select "Local FW Update" and then press "Enter". Select "Enabled" or "Disabled" or "Password Protected" and then press "Enter".



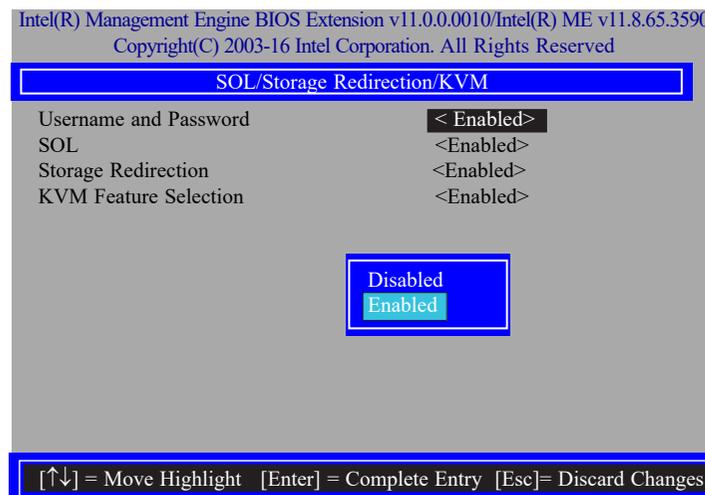
9. Select Previous Menu until you return to the "Main Menu". Select "Intel(R) Small Business Technology Configuration" and then press "Enter".



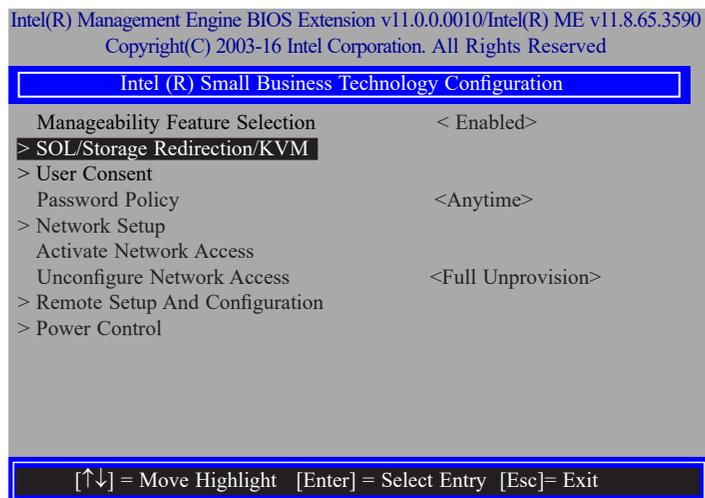
- In the "Intel(R) Small Business Technology Configuration" menu, select "Manageability Feature Selection" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



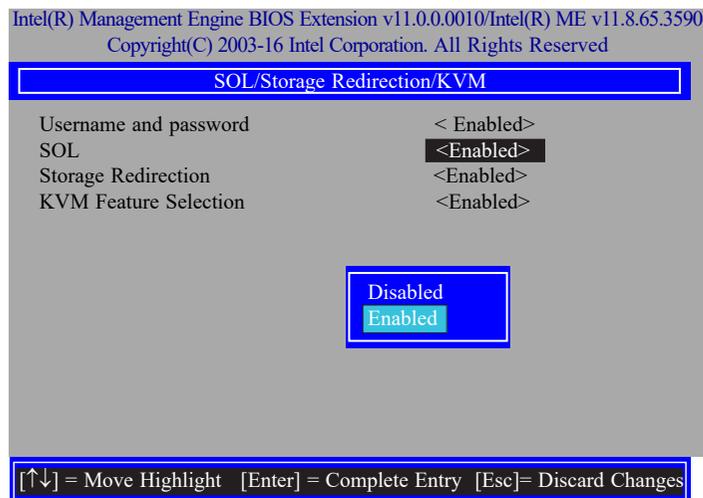
- In the "SOL/Storage Redirection/KVM" menu, select "Username and Password" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



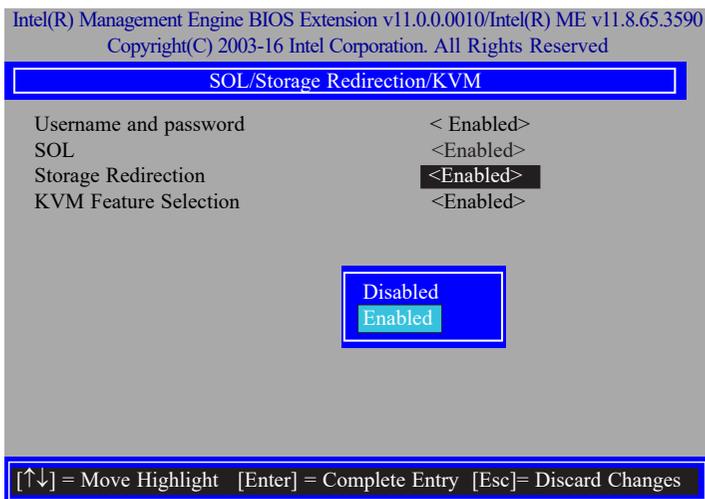
- In the "Intel(R) Small Business Technology Configuration" menu, select "SOL/Storage Redirection/KVM" and then press "Enter".



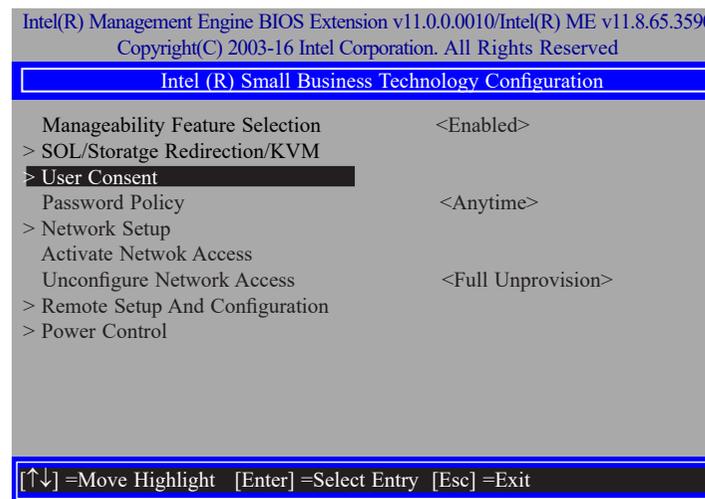
- In the "SOL/Storage Redirection/KVM" menu, select "SOL" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



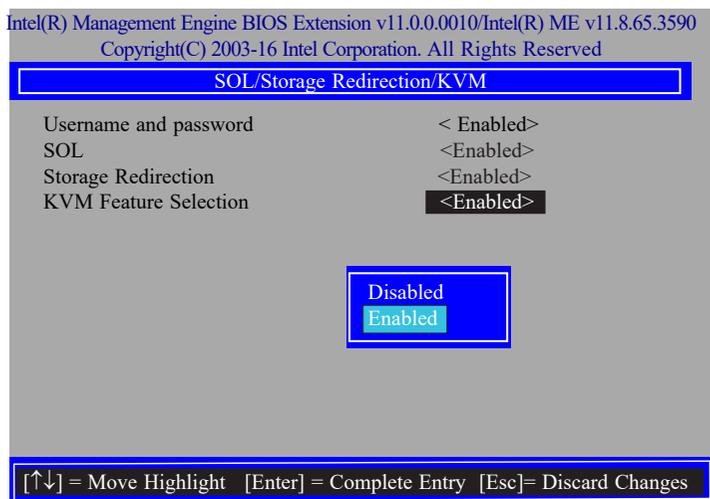
14. In the "SOL/Storage Redirection/KVM" menu, select "Storage Redirection" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



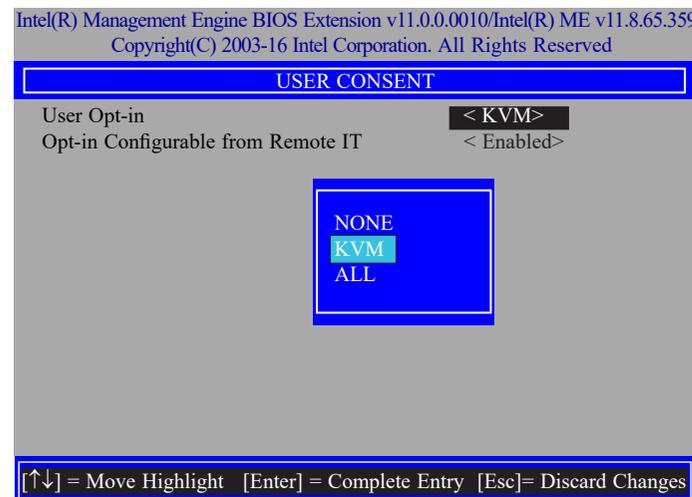
16. Select Previous Menu until you return to the "Intel(R) Small Business Technology Configuration" menu. Select "User Consent" and then press "Enter".



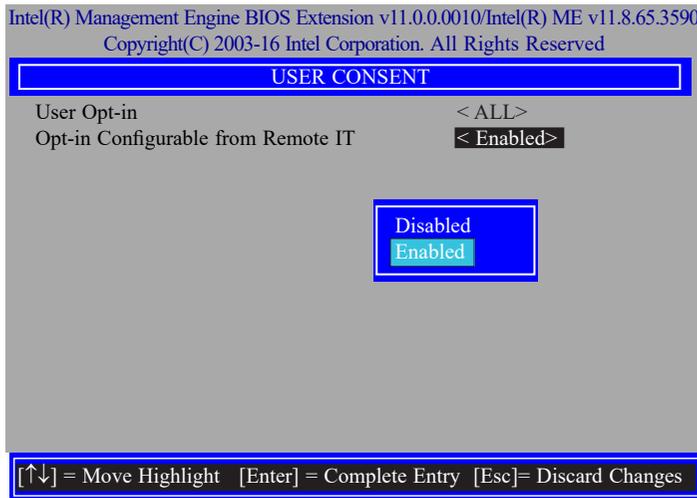
15. In the "SOL/Storage Redirection/KVM" menu, select "KVM Feature Selection" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



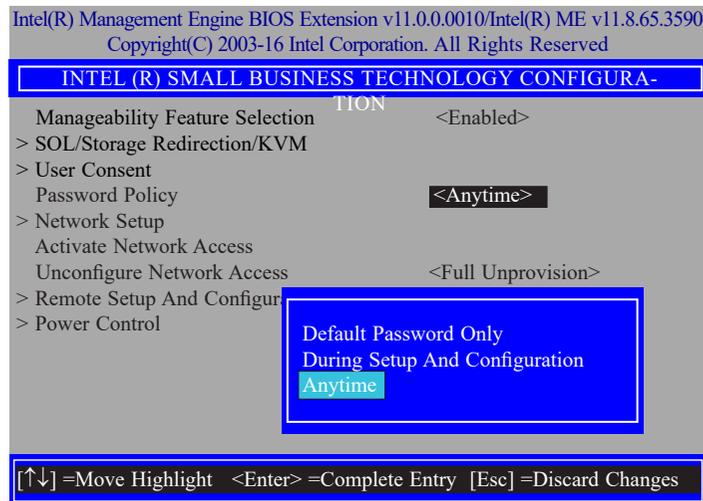
17. In the "User Consent" menu, select "User Opt-in" and then press "Enter". Select "None", "KVM" or "ALL" and then press "Enter".



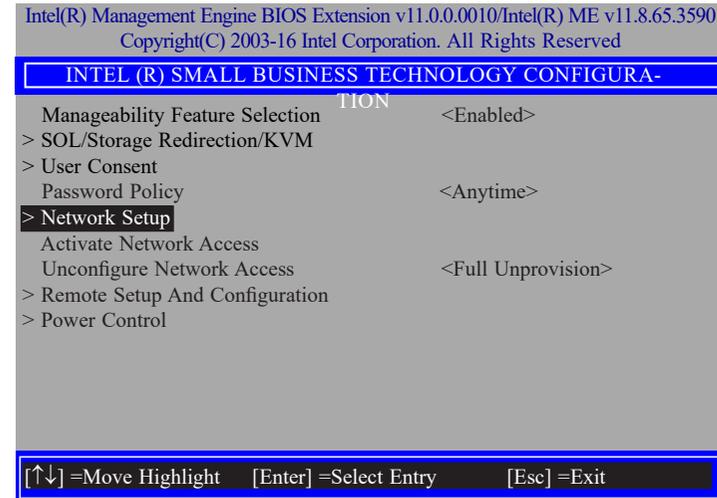
18. In the "User Consent" menu, select "Opt-in Configurable from Remote IT" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



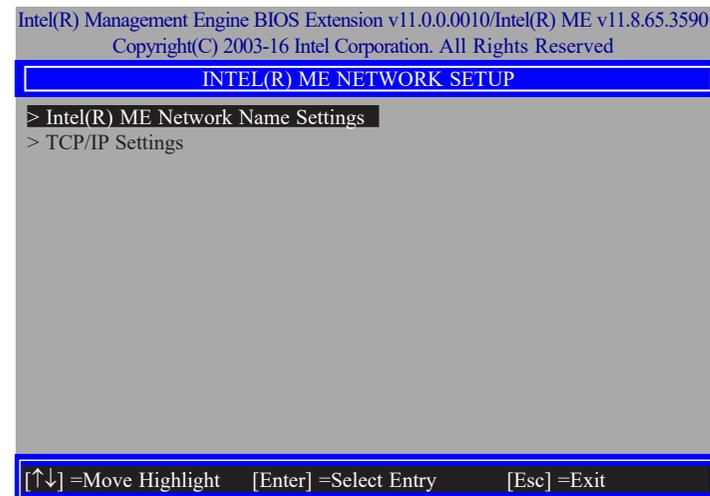
19. Select Previous Menu until you return to the "Intel(R) Small Business Technology Configuration" menu. Select "Password Policy" and then press "Enter". You may choose to use a password only during setup and configuration or to use a password anytime the system is being accessed.



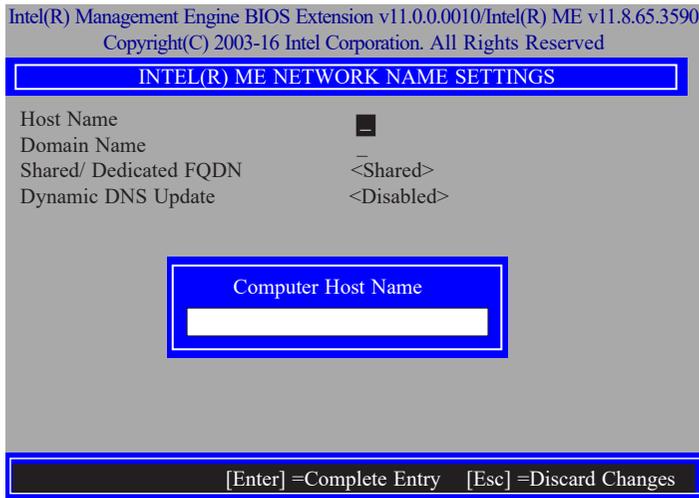
20. In the "Intel(R) Small Business Technology Configuration" menu, select "Network Setup" and then press "Enter".



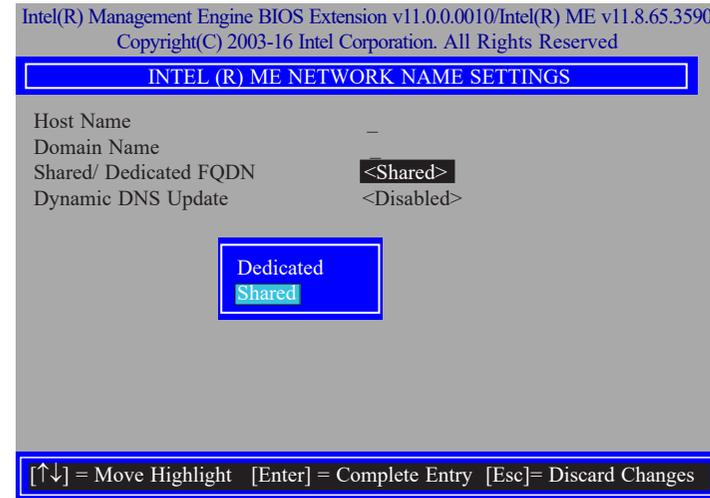
21. In the "Intel(R) ME Network Setup" menu, select "Intel(R) ME Network Name Settings" and then press "Enter".



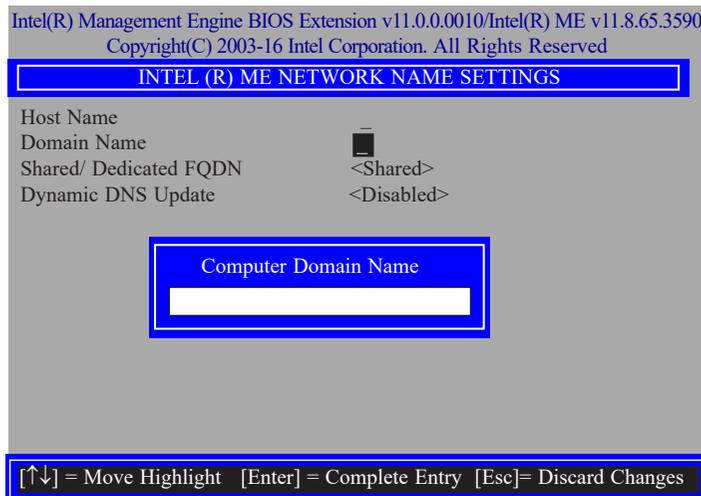
22. In the "Intel(R) ME Network Name Settings" menu, select "Host Name" and then press "Enter". Enter the computer's host name and then press "Enter".



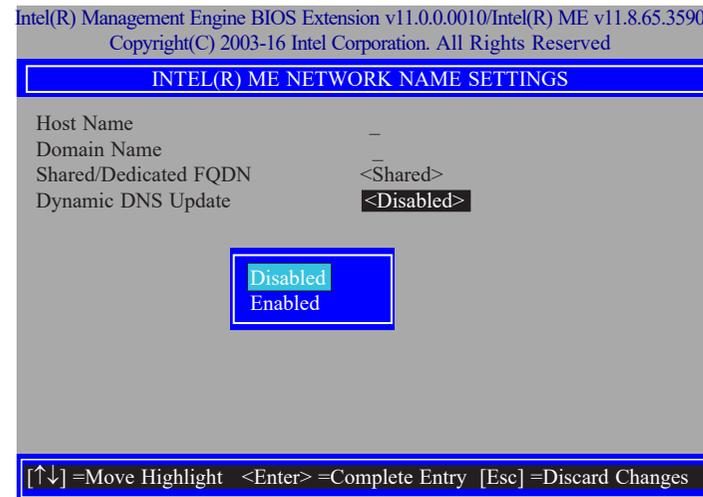
24. Select "Shared/Dedicated FQDN" and then press "Enter". Select "Shared" or "Dedicated" and then press "Enter".



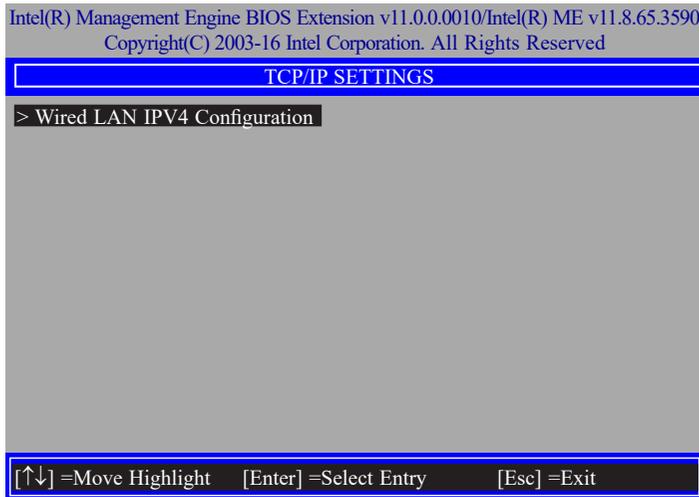
23. Select "Domain Name" and then press "Enter". Enter the computer's domain name and then press "Enter".



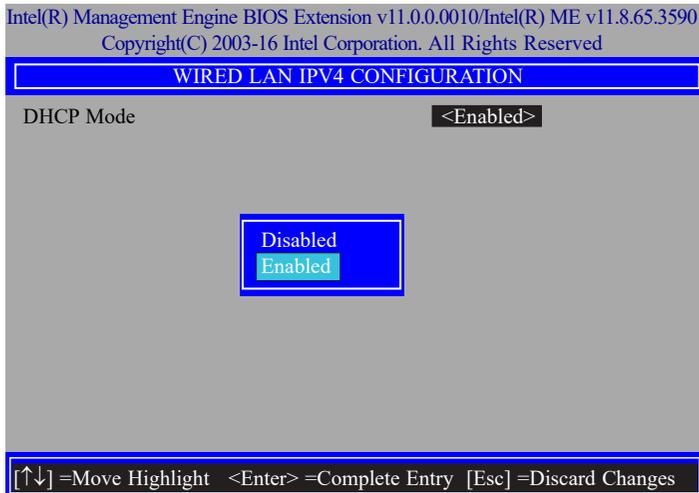
25. Select "Dynamic DNS Update" and then press "Enter". Select "Enabled" or "Disabled" and then press "Enter".



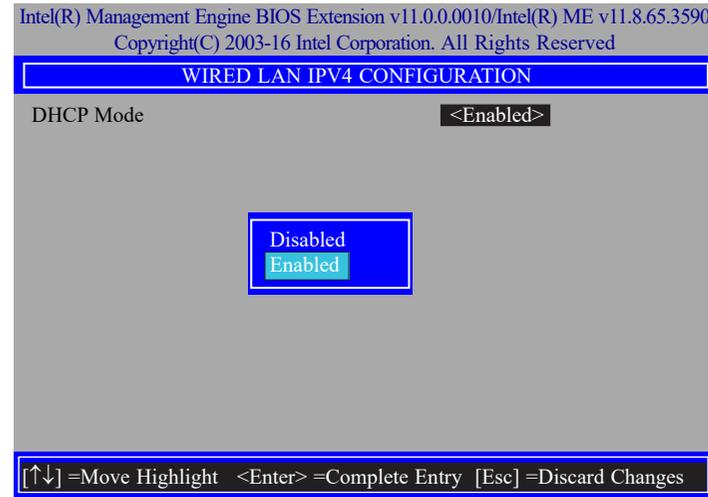
26. Select Previous Menu until you return to the "Intel(R) ME Network Setup" menu. Select "TCP/IP Settings" and then press "Enter".



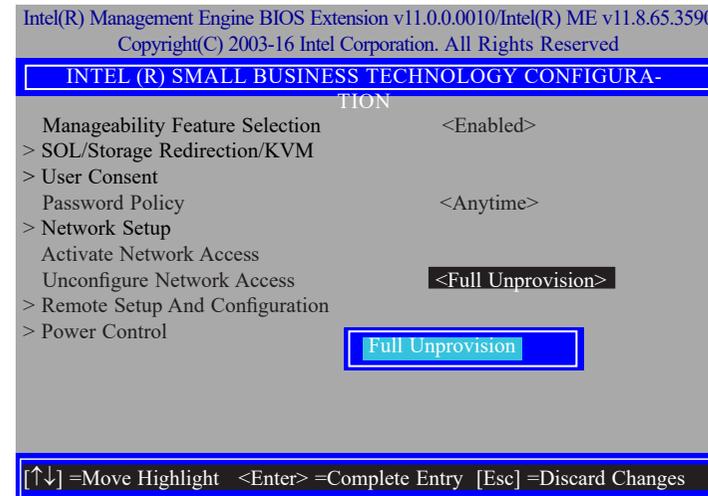
27. In the "TCP/IP Settings" menu, select "Wired LAN IPv4 Configuration" and then press "Enter".



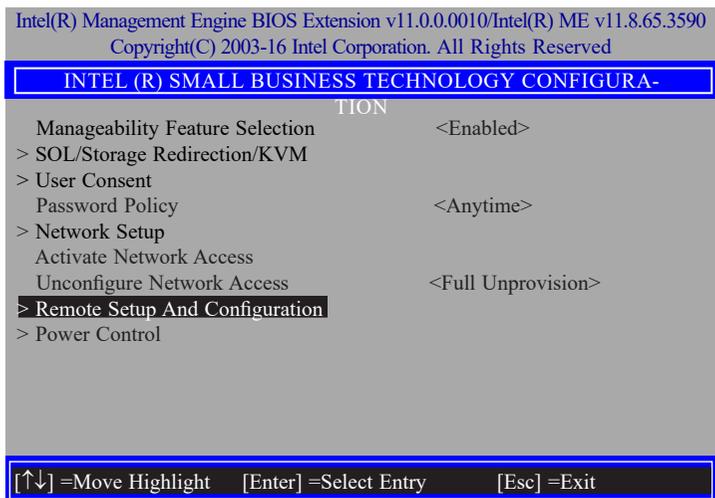
28. In the "Intel(R) Small Business Technology Configuration" menu, select "Activate Network Access" and then select "Yes/No" and press "Enter".



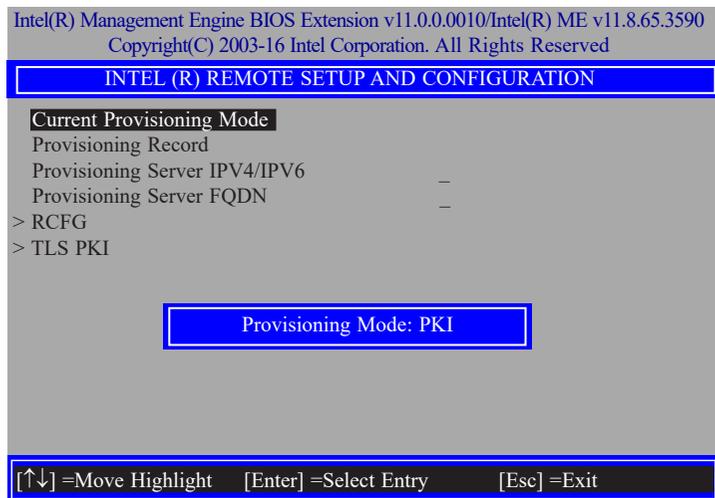
29. In the "Intel(R) Small Business Technology Configuration" menu, select "Unconfigure Network Access" and then press "Enter".



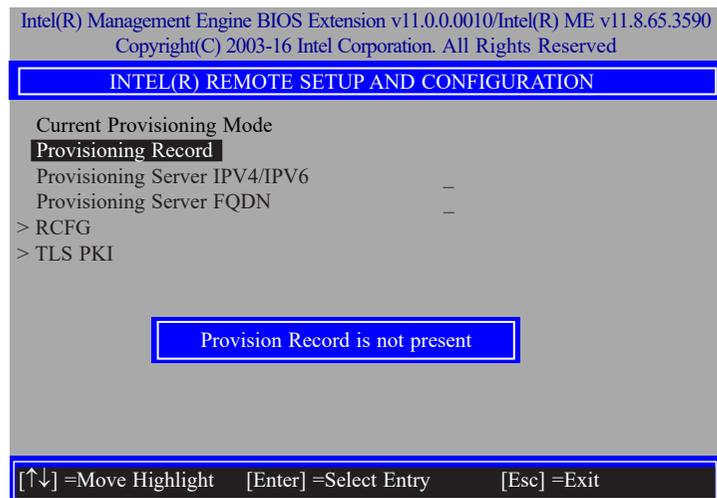
30. In the "Intel(R) Small Business Technology Configuration" menu, select "Remote Setup And Configuration" and then press "Enter".



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



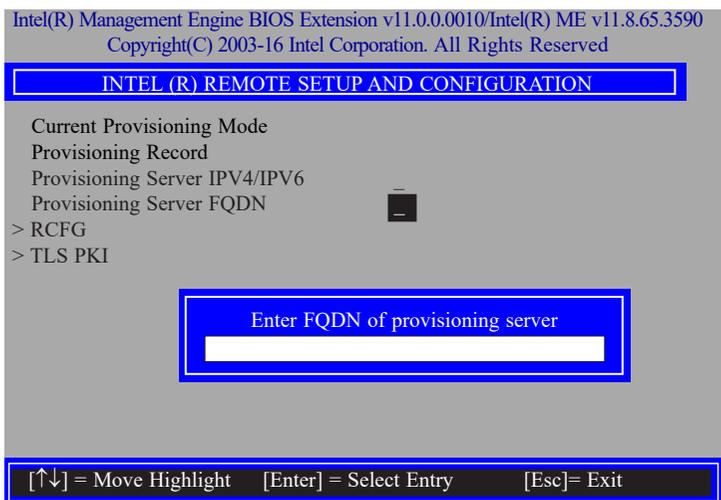
32. In the "Intel(R) Remote Setup And Configuration" menu, select "Provisioning Record" and then press "Enter".



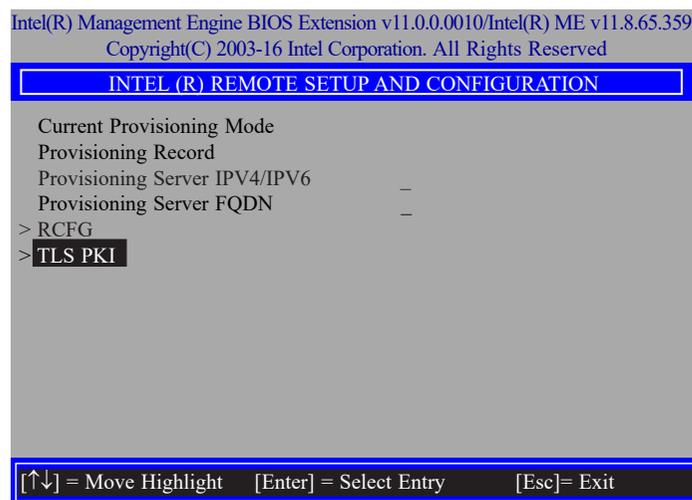
33. In the "Intel(R) Remote Setup And Configuration" menu, select "Provisioning server IPV4/ IPV6", enter "Provisioning server address" and then press "Enter".



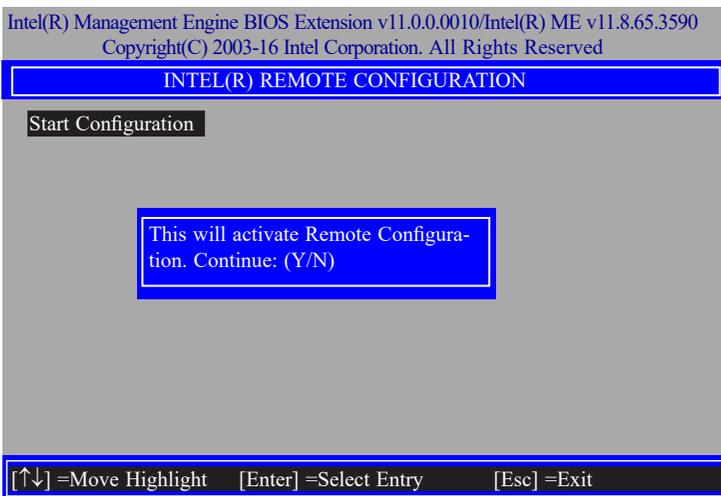
34. In the "Intel(R) Remote Setup And Configuration" menu, select "Provisioning server FQDN", enter the FQDN of Provisioning server, and then press "Enter".



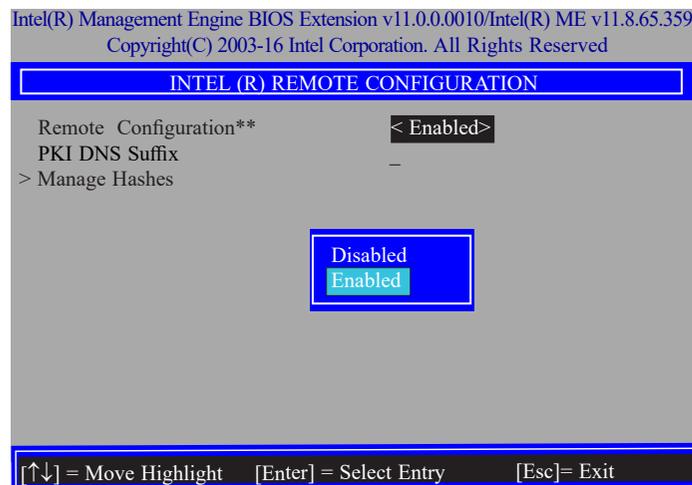
36. In the "Intel(R) Remote Setup And Configuration" menu, select "TLS PKI" and then press "Enter".



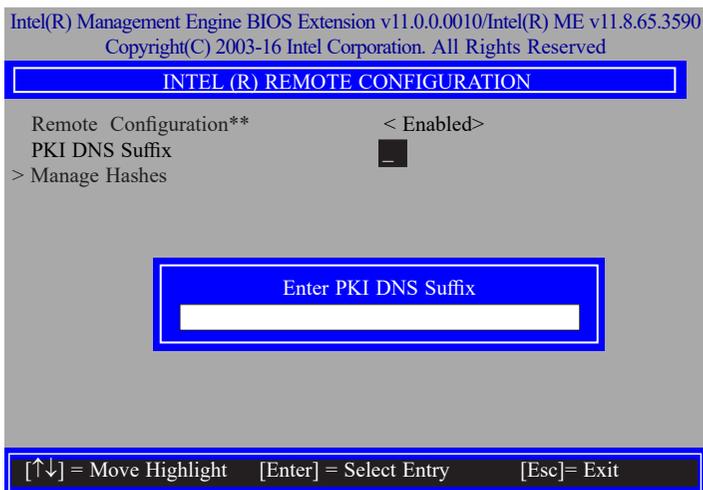
35. In the "Intel(R) Remote Setup And Configuration" menu, select "RCFG" and press "Enter", and then select "Start Configuration Y/N" and press "enter".



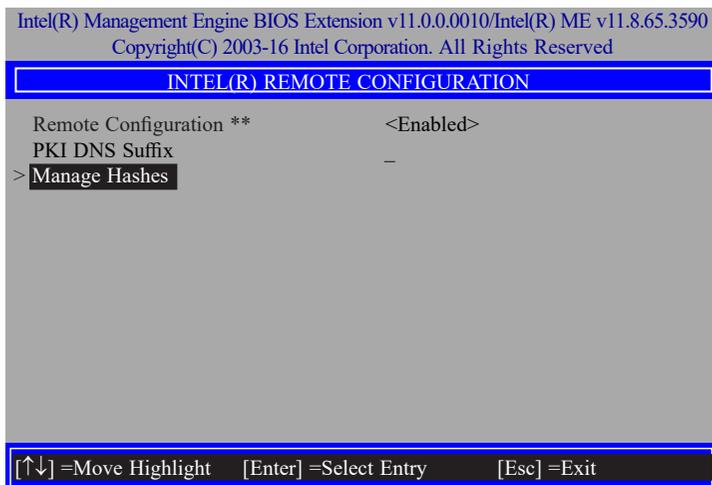
37. In the "Intel(R) Remote Configuration" menu, select "Remote Configuration**" and press "Enter", and then select "Enabled" or "Disabled" and press "Enter".



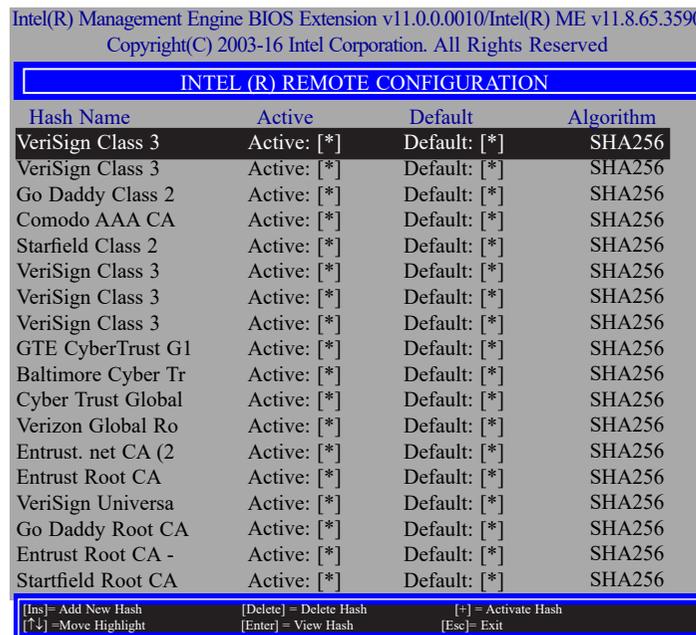
38. Select "PKI DNS Suffix", enter the "PKI DNS Suffix", and then press "Enter".



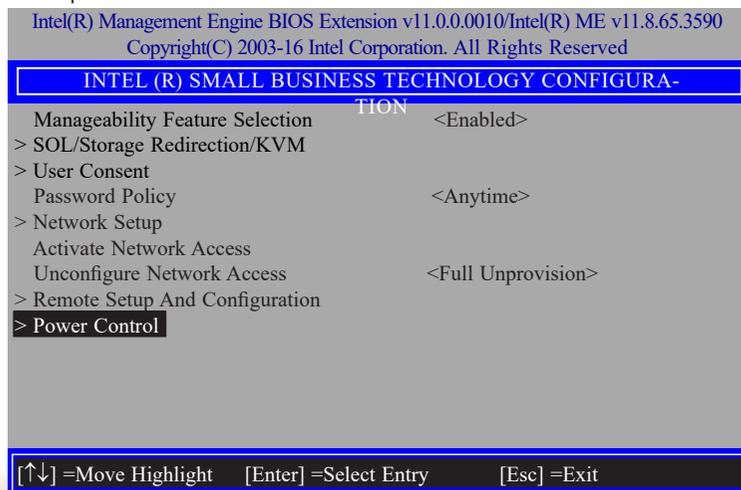
39. Select "Manage Hashes", and then press "Enter".



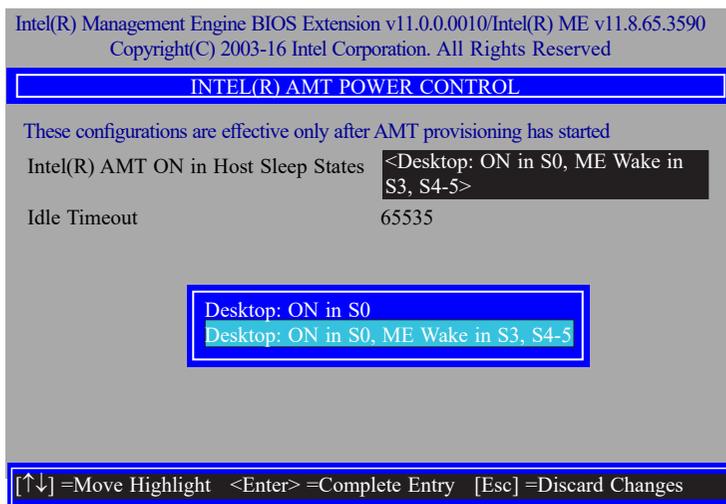
40. In the "Intel(R) Remote Configuration" menu, select the hash name then press Insert to enter custom hash certificate name, press Delete to delete a hash, press Enter to view hash information, or press + to activate or deactivate hash.



41. In the "Intel(R) Small Business Technology Configuration" menu, select "Power Control", and then press Enter.



42. 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".



44. Press "Esc" until you return to the "Main Menu". Select "MEBx Exit" then press "Enter". Press "Y" then press "Enter".



43. In the "Intel(R) AMT Power Control" menu, select "Idle Timeout" and then press "Enter". Enter the timeout value (1-65535).

