DFI

EB100-KU

Fanless Embedded System
User's Manual

Copyright

This publication is provided for informational purposes only. The manufacturer makes no representations or warranties with respect to the contents or use of this manual and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. The user will assume the entire risk of the use or the results of the use of this document. Further, the manufacturer reserves the right to revise this publication and make changes to its contents at any time, without obligation to notify any person or entity of such revisions or changes.
Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.

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 B

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

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

Notice:

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

Table of Contents

About this Manual

This manual can be downloaded from the website, or acquired as an electronic file included in the optional CD/DVD. The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

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 consequencial damages to the product that has been modified or altered.

About the Package

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

- One EB100-KU System
- One Audio Cable Converter
- Four Rubber Feet
- Four 2.5" SATA SSD Screws

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

Optional Items

- Mounting Kit: wall / VESA mount
- Power Adapter
- DDR4 SO-DIMM Memory
- M.2 Storage
- Mini PCIe Wifi Kit
- SATA SSD 2.5"

The system and accessories in the package may not come similar to the information listed above. This may differ in accordance with 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.

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 Precautions

- Use the correct DC / AC 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 in the power cord.
- There is danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent specifications of batteries recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.
- Keep this system away from humid environments.
- Make sure the system is placed or mounted correctly and stably to prevent the chance of dropping or falling may cause damage.
- The openings on the system shall not be blocked and shall be kept in distance from other objects to make sure of proper air ventilation to protect the system from overheating.
- Dress the cables, especially the power cord, so they will not be stepped on, in contact with high temperature surfaces, or cause any tripping hazards.
- Do not place anything on top of the power cord. Use a power cord that has been approved for use with the system and is compliant with the voltage and current ranges required by the system's electrical specifications.
- If the system is to be unused or stored 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 is physically damaged.
- 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 electricity outlet before cleaning. Use a damp cloth for cleaning the surface. Do not use liquid or spray detergents for cleaning.

Chapter 1 - Introduction

▶ Specifications

SYSTEM	Processor	6th/7th Gen Intel® Core™ Processors, BGA 1356: i7-6600U Processor, Dual Core, 4M Cache, 2.6GHz, 15W i5-6300U Processor, Dual Core, 3M Cache, 2.4GHz, 15W i3-6100U Processor, Dual Core, 3M Cache, 2.3GHz, 15W Intel® Celeron® Processor 3965U, Dual Core, 2M Cache, 2.2GHz, 15W
	Memory	8GB
	BIOS	Insyde SPI 128Mbit
GRAPHICS	Controller	Intel® HD Graphics
	Display	2 x HDMI HDMI: resolution up to 2560x1600 @ 60Hz or 4096x2304 @ 24Hz
	Dual Displays	HDMI
STORAGE	Internal	1 x M.2 2280 M Key (PCIe x4 NVMe/SATA)
EXPANSION	Interface	1 x Half-size Mini PCIe socket (PCIe/USB 2.0)
ETHERNET	Controller	1 x Intel® I210AT (10/100/1000Mbps) 1 x Intel® I219LM (10/100/1000Mbps)
LED	Indicators	1 x Power LED 1 x Storage LED
FRONT I/O	USB	2 x USB 2.0 4 x USB 3.0
	Buttons	1 x Power Button 1 x Reset Button
	Wi-Fi Antenna	2 x Antenna Hole
REAR I/O	Ethernet	2 x GbE (RJ-45)
	Display	2 x HDMI
	Audio	1 x Line-out 1 x Mic-in
POWER	Type	DC JACK, DC 12V input

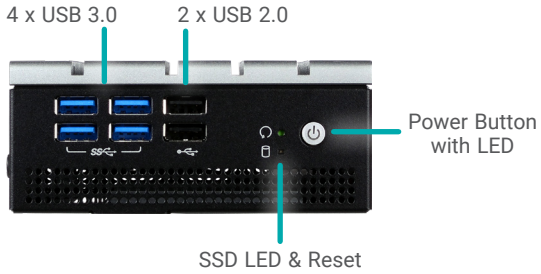
MECHANICAL	Construction	Metal + Aluminum
	Mounting	Wall/VESA Mount
	Dimensions	115mm x 48.7mm x 111mm (W x H x D)
	Weight	< 1Kg
ENVIRONMENT	Operating Temperature	-20 to 40°C
	Storage Temperature	-20 to 85°C
	Relative Humidity	5 to 95% RH (non-condensing)
COMPLIANCE	Shock	Half sine wave 3G, 11ms, 3 shock per axis
	Vibration	IEC68-2-64
	Certification	CE, FCC Class A, RoHS, UL/cUL

The specifications listed here may be based on editions that do not resemble your actual products. Please visit the download page at go.dfi.com/EB100-KU, or via the QR code to the right for the latest datasheet.

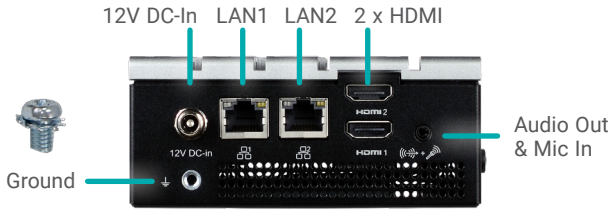
Chapter 2 - Hardware Installation

▶ Overview

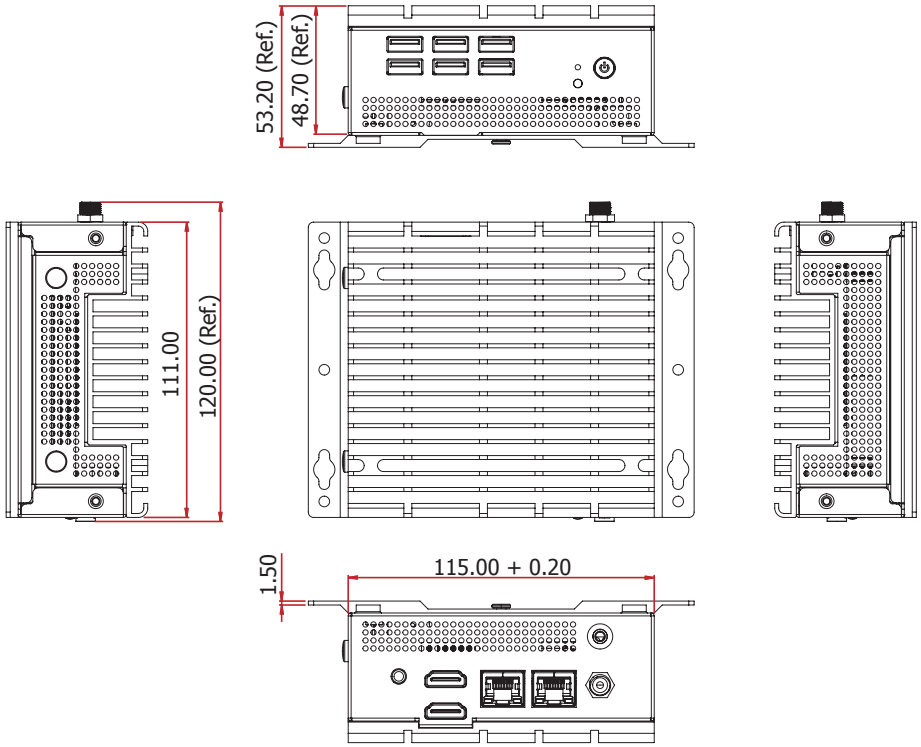
Front Panel



Rear Panel



Dimensions

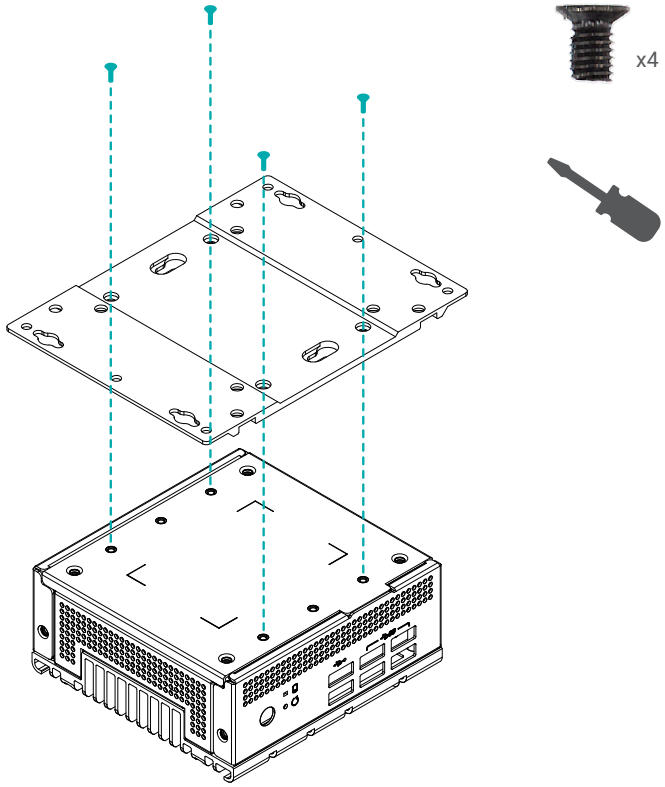


▶ Mounting Options

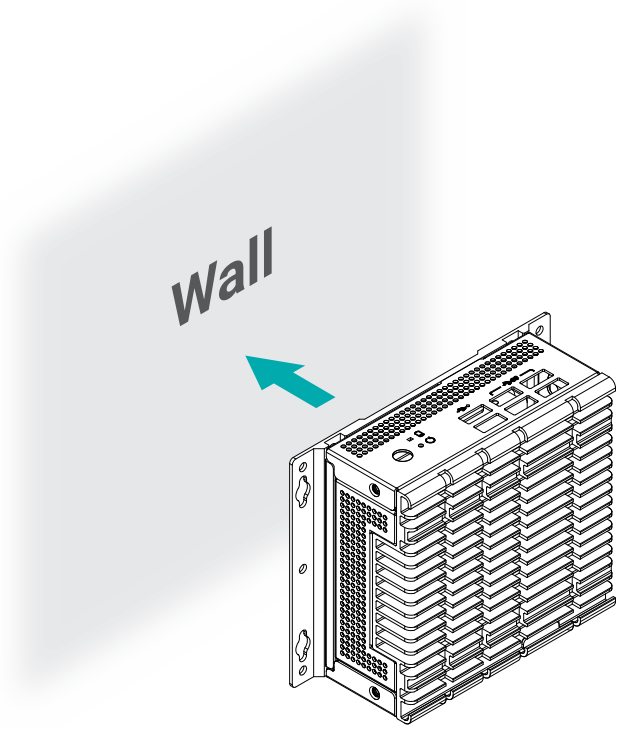
The wall/VESA mount kit contains one versitile bracket for mounting the system onto a wall or a monitor.

Wall Mount

Place the system top-side down on a stable worksurface. Locate the mounting holes on the bottom of the system and the bracket and make sure them align. Screw the brackets onto the system with four screws as illustrated below.

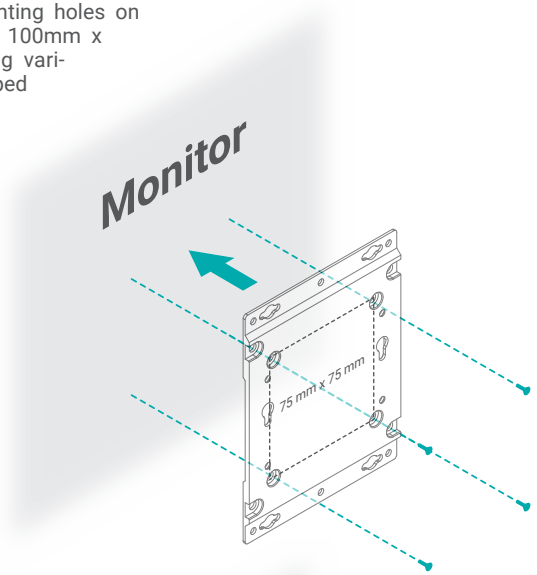


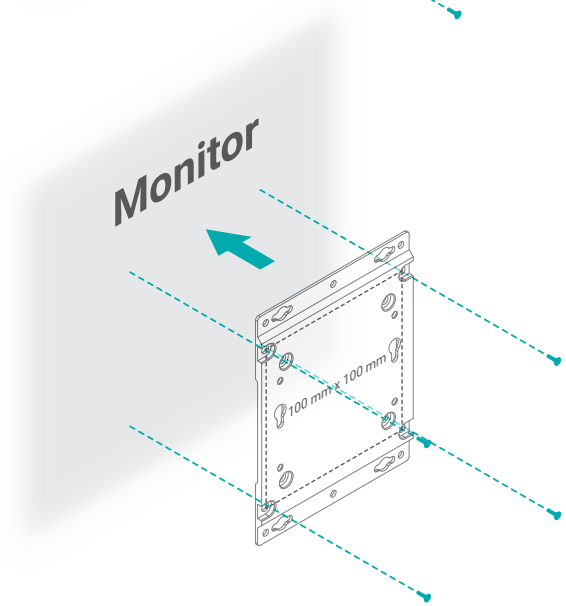
The pre-drilled mounting holes on the brackets allow for different wall mount distances. The assembly can either be screwed onto a wall or hung on steps screws.



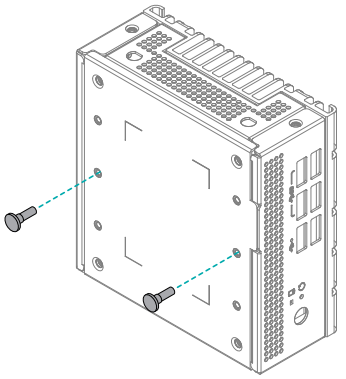
VESA Mount

There are two sets of pre-drilled mounting holes on the mount bracket — 75mm x 75mm, 100mm x 100mm — to adapt to VESA mounting variants. Mount the bracket onto the tapped holes on the back of a monitor, a stand or a wall rack that conforms to VESA mounting.

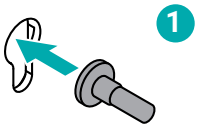


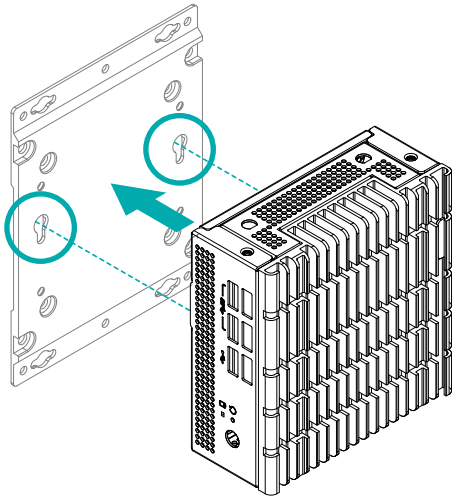


Attache the two step screws to the bottom side of the system as illustrated.



Mount the assembly onto the VESA mount bracket previously attached to the back of a monitor. Make sure the step screws sit perfectly into the step screw holes.





▶ Assembly

Overview

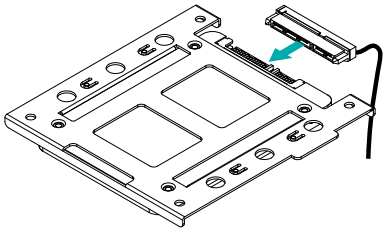
The system is assembled in the following procedure. To disassemble, please carry out the procedure in the reversed order.

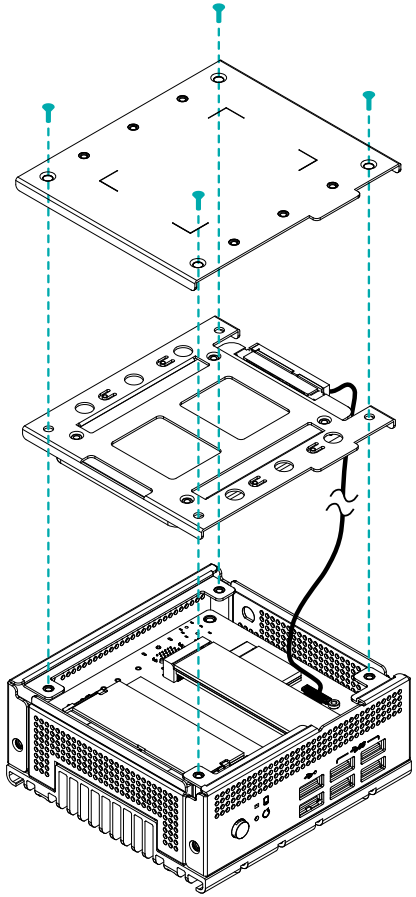
1. Mount the board onto the top cover.
2. Attach the side cover.
3. Attach the front and rear panels.
4. Mount the SATA drive onto the SATA tray.
5. Mount the SATA drive tray and bottom cover.

Bottom Cover and SATA Drive Tray

The internal I/O of the system is mainly accessed on the bottom side. The bottom metal cover and the 2.5" SATA drive tray are secured onto the chassis with 4 screws that go through the front and rear panel metals. Use a Phillips screwdriver to unscrew them.

The cable for SATA data and power shall be connected first before assembly. Route the cable in the manner that there is no contact with heat generating chips and wafers.

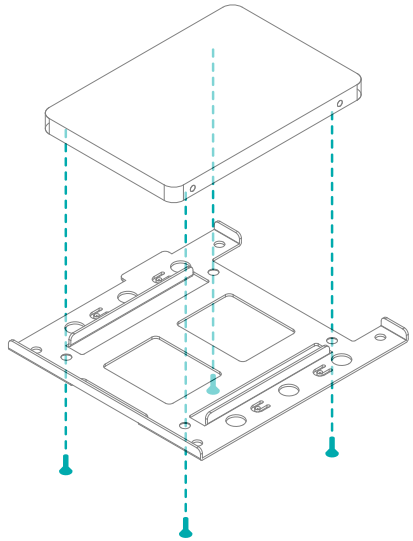




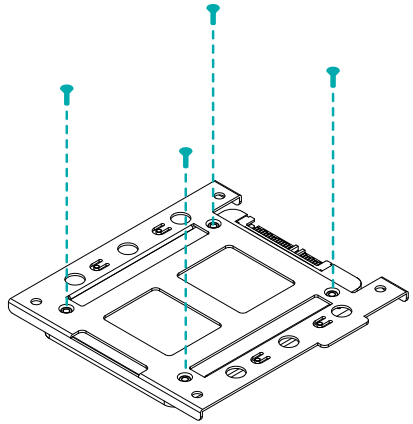
SATA Drive (optional)

The SATA Drive Tray can be mounted with a 2.5" SATA SSD and secured onto the system for storage.

Place the tray on a worksurface and place 2.5" SATA drive onto the tray as illustrated. Align the screw holes on the SATA drive to those on the tray.



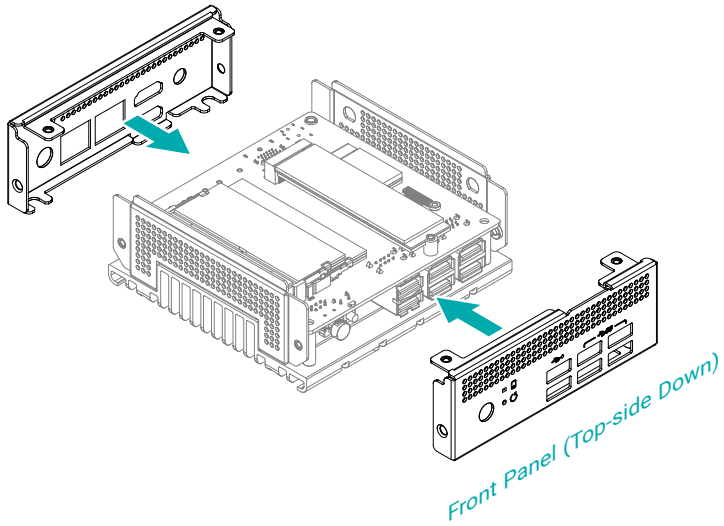
Fasten the screws and secure the drive onto the tray as illustrated with four screws.



▶ Assembly

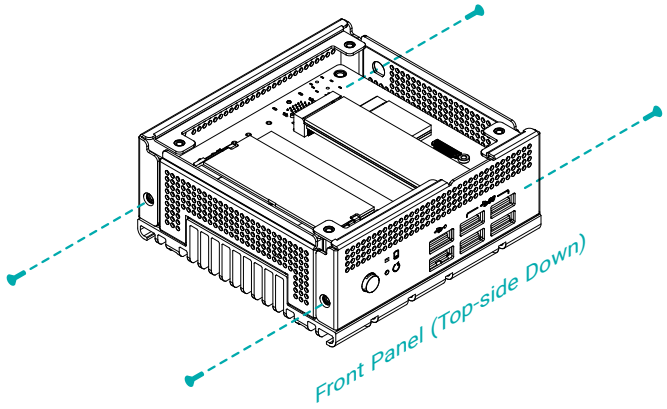
Front and Rear Panels

The front and rear panels are secured onto the assembly via screws onto the side cover. The rear panel is also secured by the DC In connector as shown below.



Place the assembly top-side down on a stable worksurface. Attache the front and rear panels to the assembly, and screw on the four screws as illustrated.


x4



Fasten the washer and nut to the DC-In coaxial connector.

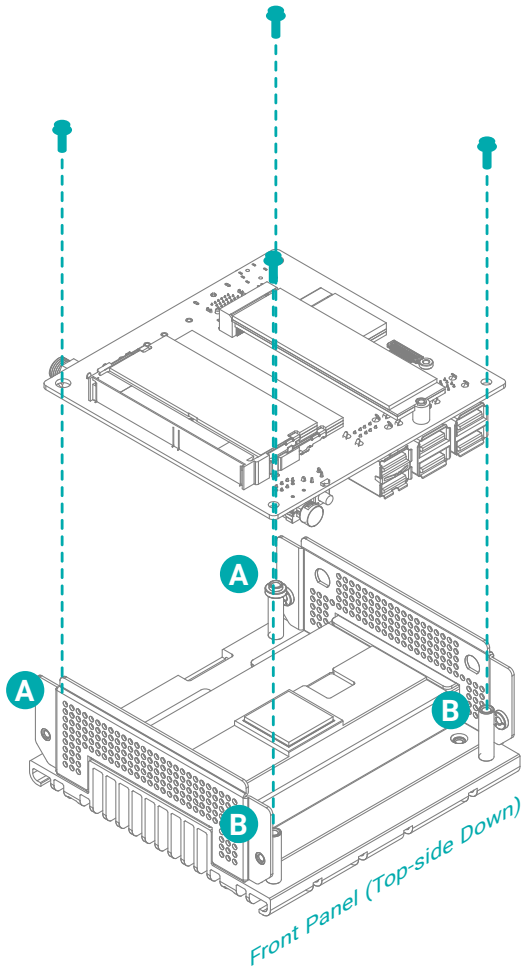
Rear Panel

System Board

The system board is secured onto the top cover via four stand-offs and spring screws. The top cover also acts as the base for the system and a heatsink for the CPU.

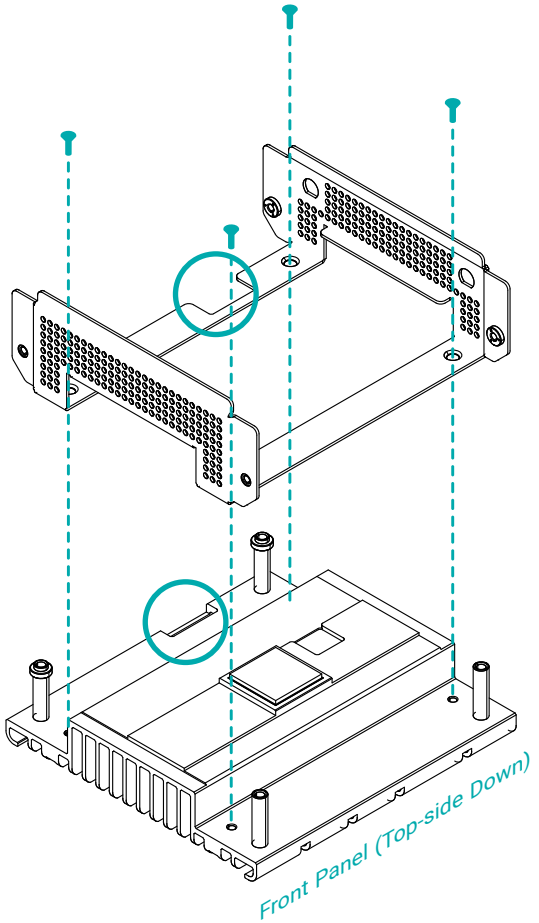
Place the assembly top-side down on a stable worksurface. Place the system board onto the top cover by aligning the mount holes to the stand-offs. The two stand-offs closer to the rear panel (A) go through the mount holes and are rimmed as opposed to thoes closer to the front panel (B).

Fasten the spring screws into the standoffs to secure the system board.



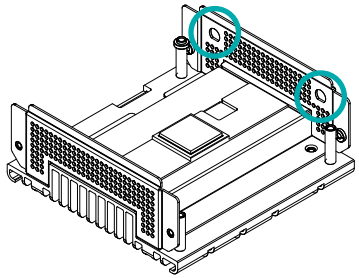
Side Cover

The cover for both sides come in one piece and is secured onto the top cover as illustrated below. Please make sure the side cover metal piece is oriented correctly by aligning the indentation to that on the top cover.



Antenna

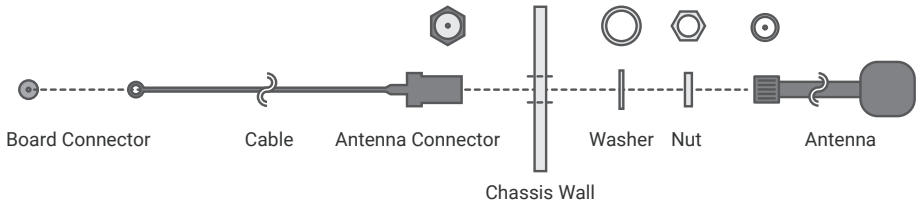
There are antenna holes reserved on the side cover and by default covered by rubber plugs. Please remove the plug prior to installing an antenna.



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

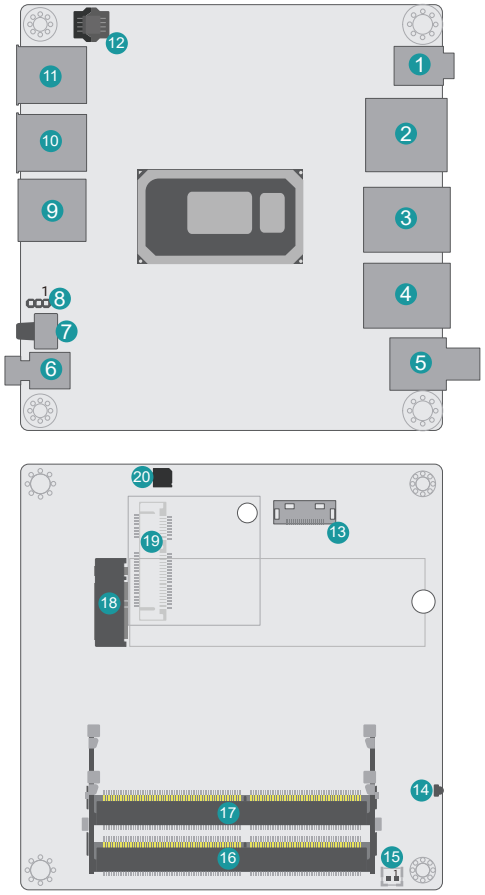
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.

Connect the internal cable to the expansion board's antenna connector, screw the antenna connector through the antenna hole on the front panel with washers and nuts, and screw on the antenna as illustrated below.



▶ Board Layout

System Board

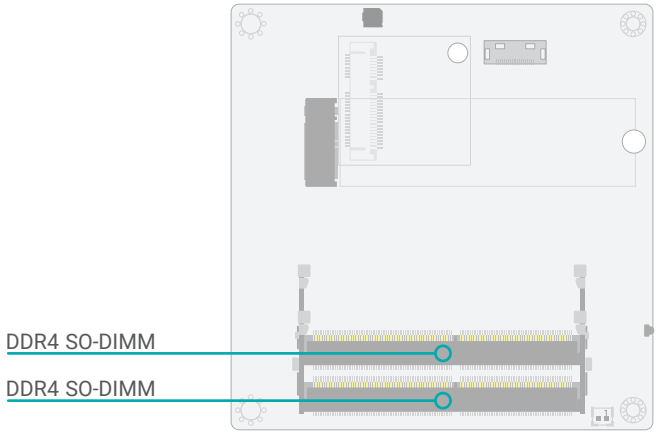


1. Audio Out and Mic In
2. HDMI1 and HDMI2
3. LAN2
4. LAN1
5. 12V DC-In
6. Power Button
7. Reset Button and SSD LED
8. Clear CMOS (JP1)
9. USB 6/7 (USB 2.0)
10. USB 3/4 (USB 3.0)
11. USB 1/2 (USB 3.0)
12. SPI Flash BIOS
13. SATA (Data and Power)
14. SSD LED
15. Battery
16. DDR4 SO-DIMM
17. DDR4 SO-DIMM
18. M.2 M Key 2280
19. Mini PCIe Half-size
20. Buzzer

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

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

▶ System Memory



The system board supports the following memory interface.

Single Channel (SC)
Data will be accessed in chunks of 64 bits from the memory channels.

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

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

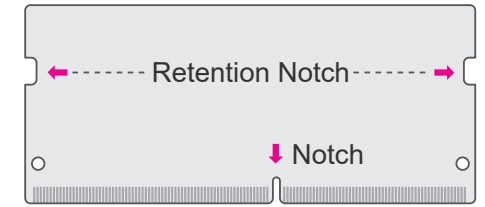
Features

- Two 260-pin SODIMM up to 32GB
- Dual Channel DDR4 1866/2133MHz

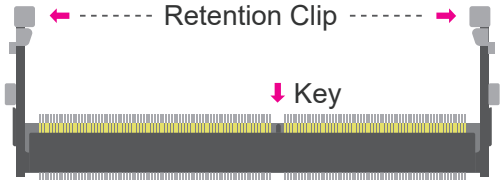
Installing the SO-DIMM Module

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

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



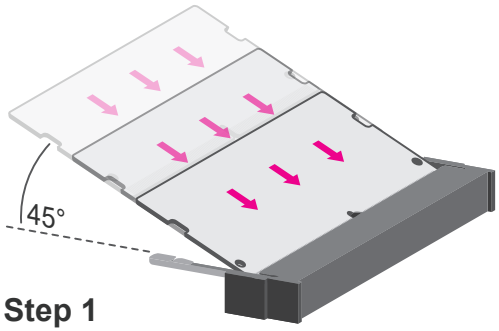
DDR4 SO-DIMM



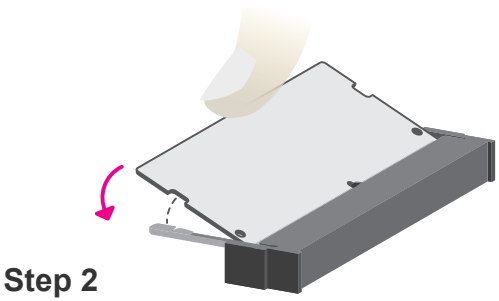
Socket Top View

System Memory

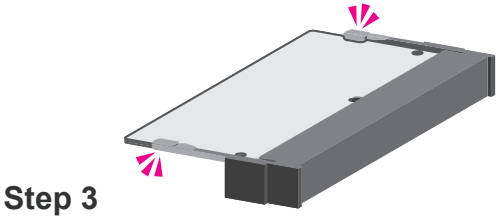
Please follow the steps below to install the memory card into the socket.



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



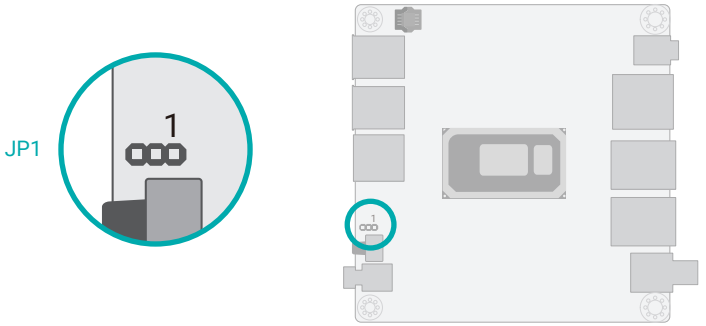
Step 2:
Press the end of the card far from the socket down while making sure the retention notch and the clip align as indicated by the dotted line in the illustration. If the retention notch and the clip do not align, please remove the card and re-insert it. Press the card all the way down.



Step 3:
The clips snap automatically and abruptly to the retention notches of the card sounding a distinctive click, and lock the card in place. Inspect that the clip sits in the notch. If not, please pull the clips outward, release and remove the card, and mount it again.

Jumper Settings

Clear CMOS (JP1)



If any anomaly of the followings is encountered —

a) CMOS data is corrupted;

b) you forgot the supervisor or user password;

c) failure to start the system due to BIOS mis-configuration

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

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

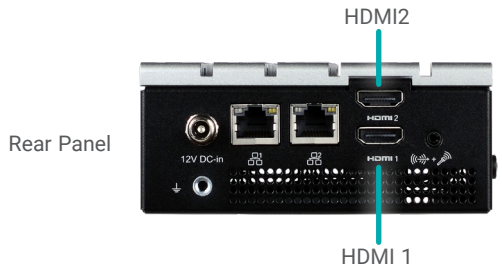
■ 1-2 On: Normal (default)

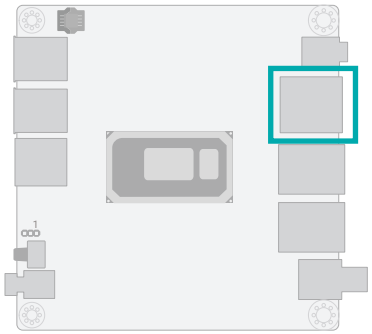
■ 2-3 On: Clear CMOS

Note:
The jumper is located on the top side of the board, and can only be accessed after removing the board from the top cover. Please refer to previous sections for instruction.

▶ I/O Ports

Graphics Display

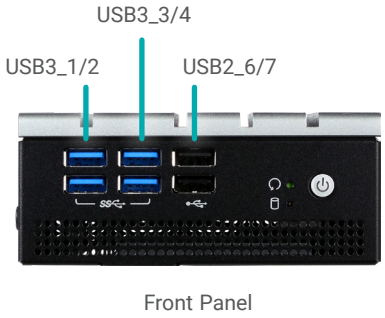


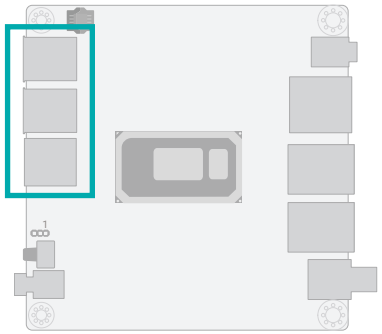


HDMI
The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port.

BIOS Setting
Configure the display devices in the "Advanced" menu (“Video Configuration” submenu) of the BIOS. Refer to Chapter 3 for more information.

USB Ports



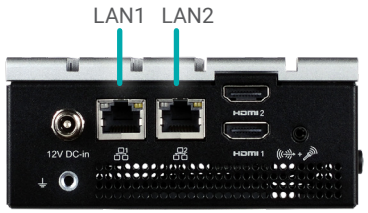


USB allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with multiple USB Type A ports at the front panel — four USB 3.0 and two USB 2.0 ports.

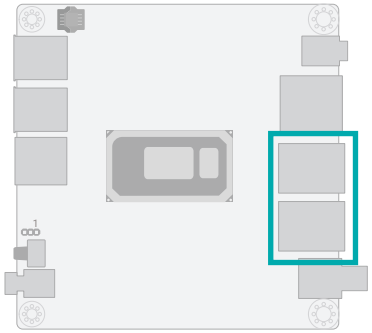
Wake-On-USB Keyboard/Mouse
The Wake-On-USB Keyboard/Mouse function allows you to use a USB keyboard or USB mouse to wake up a system from the S3 (STR - Suspend To RAM) state.

BIOS Setting
Configure USB devices in the "Advanced" menu (“USB Configuration” and "USB Power Control" submenus) of the BIOS. Refer to Chapter 3 for more information.

RJ45 LAN Ports



Rear Panel



The LAN port allows the system board to connect to a local area network by means of a network hub.

BIOS Setting
Configure Wake-on-LAN function in the "Advanced" menu (“ACPI Configuration” submenu) of the BIOS. Refer to chapter 3 for more information.

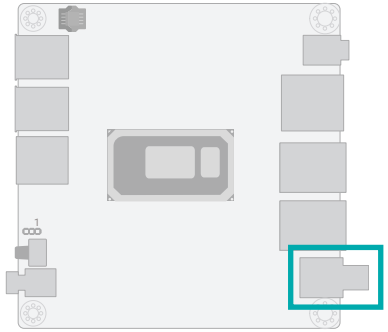
MEBX Setting
Configure IPv4/IPv6 network stacks in the MEBX. Refer to Chapter 4 for more information.

Features

- LAN1: 1 x Intel® I219LM (10/100/1000Mbps)
- LAN2: 1 x Intel® I210AT (10/100/1000Mbps)

12V DC-In

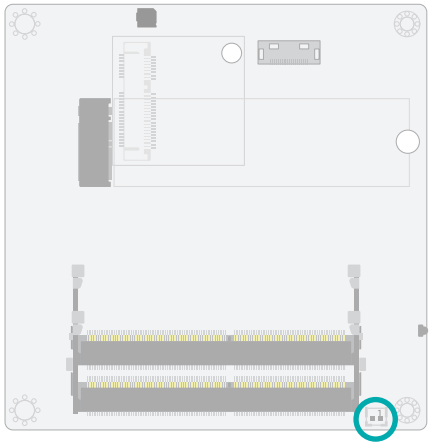
Rear Panel



Connect the power source to the 12V DC-In coaxial. An AC-to-DC converter may be included in the package as an optional item.

Important:
Insufficient power supplied to the system may result in instability or malfunction of the add-in boards and peripherals. Calculating the system’s approximate power usage is important to ensure that the power supply meets the system’s consumption requirements.

Battery



■ Battery

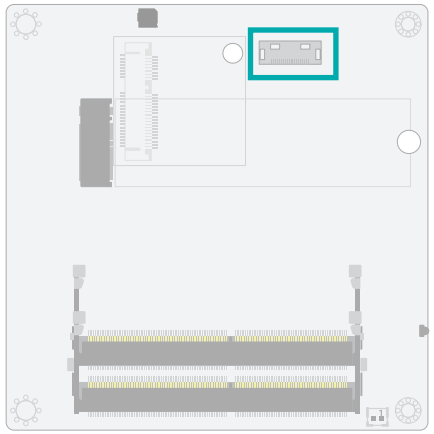
■ External Battery

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

Safety Measures

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

SATA (Serial ATA) Connector



■ SATA Pin Assignment

20-pin connector		7+15 pin connector	
1	GND	S1	GND
2	GND	S2	TP+
3	GND	S3	TP-
4	GND	S4	GND
5	GND	S5	RP-
6	N.C.	S6	RP+
7	+5V	S7	GND
8	+5V	P1	N.C.
9	+5V	P2	N.C.
10	+5V	P3	N.C.
11	+5V	P4	N.C.
12	N.C.	P5	N.C.
13	N.C.	P6	N.C.
14	GND	P7	+5V
15	RP+	P8	+5V
16	RP-	P9	+5V
17	GND	P10	GND
18	TP-	P11	GND
19	TP+	P12	GND
20	GND	P13	N.C.
		P14	N.C.
		P15	N.C.

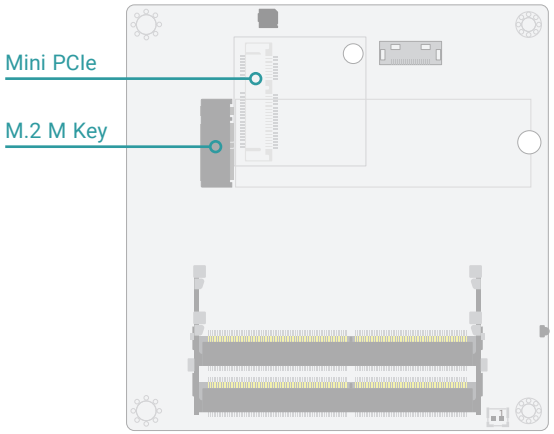
The Serial ATA (SATA) connectors are used to connect the Serial ATA device. SATA 3.0 is supported by the five SATA ports and provides data rate up to 6Gb/s. Connect one end of the Serial ATA cable to a SATA connector and the other end to your Serial ATA device.

There is a converter cable for converting the 20-pin board connector to a common 7-pin + 15-pin SATA data + power connector.

BIOS Setting

Configure the Serial ATA drives in the "Advanced" menu (“SATA Configuration” submenu) of the BIOS. Refer to chapter 3 for more information.

Expansion Slots



Mini PCIe

The Mini PCIe sockets allow for Mini PCIe modules that support multiple expansion modules. The Mini PCIe connector supports half-size Mini PCIe modules for PCIe and USB2.0 with LPC-signals.

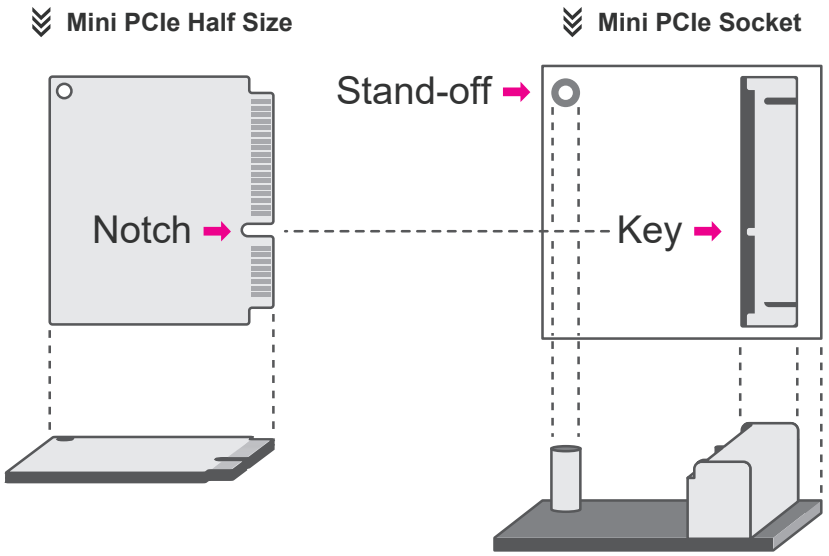
M.2 Socket

The M.2 socket is the Next Generation Form Factor (NGFF) which is designed to support multiple modules and make the M.2 more suitable in application for solid-state storage. The board preserves space and a standoff for the M.2 M key socket (22mm x 80mm). The M.2 M key supports SATA, PCIe, and reset signals.

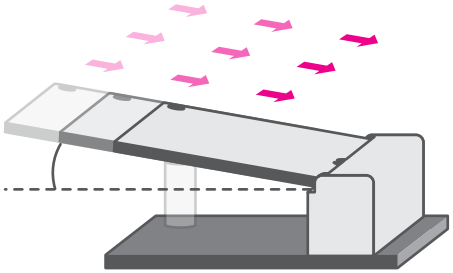
Installing the Mini PCIe Module

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

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

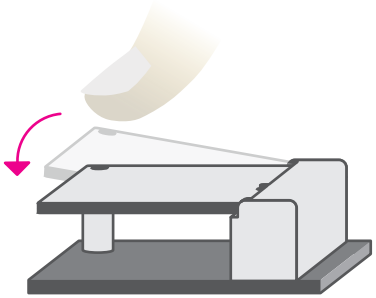


Please follow the steps below to install the card into the socket.



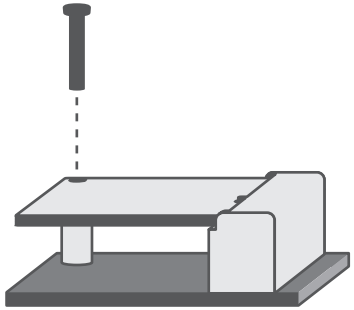
Step 1:

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



Step 2:

Press the end of the card far from the socket down until against the stand-off.



Step 3:

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

Chapter 3 - BIOS Settings

▶ 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 <Del> keys simultaneously.

Legends

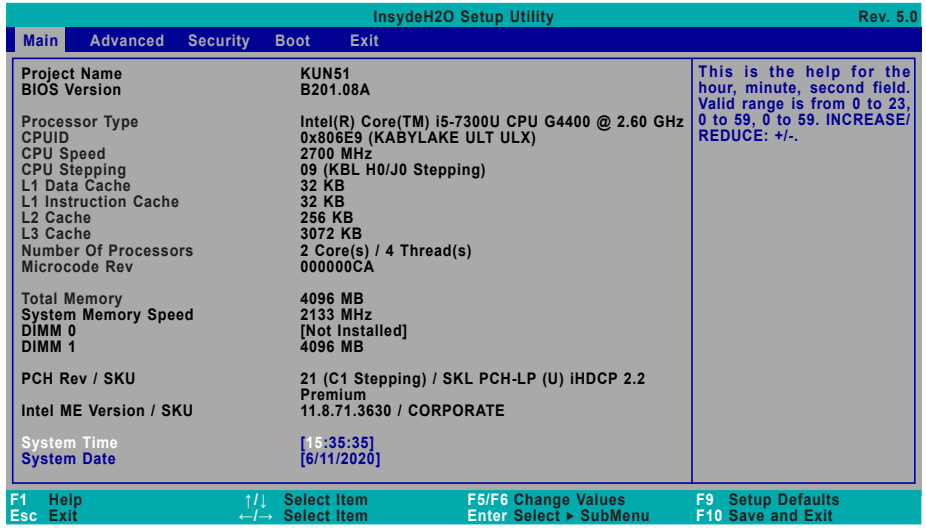
Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

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

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

▶ Main

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



System 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.

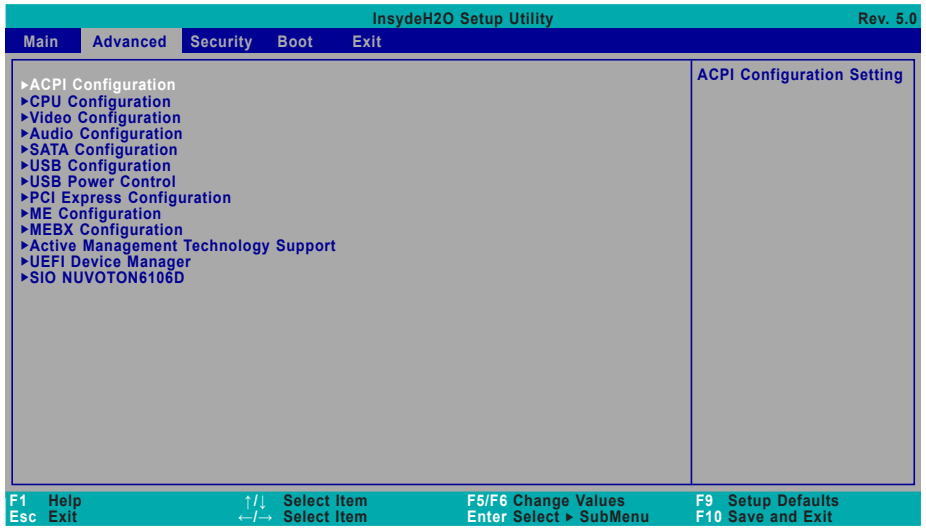
System Date

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

▶ Advanced

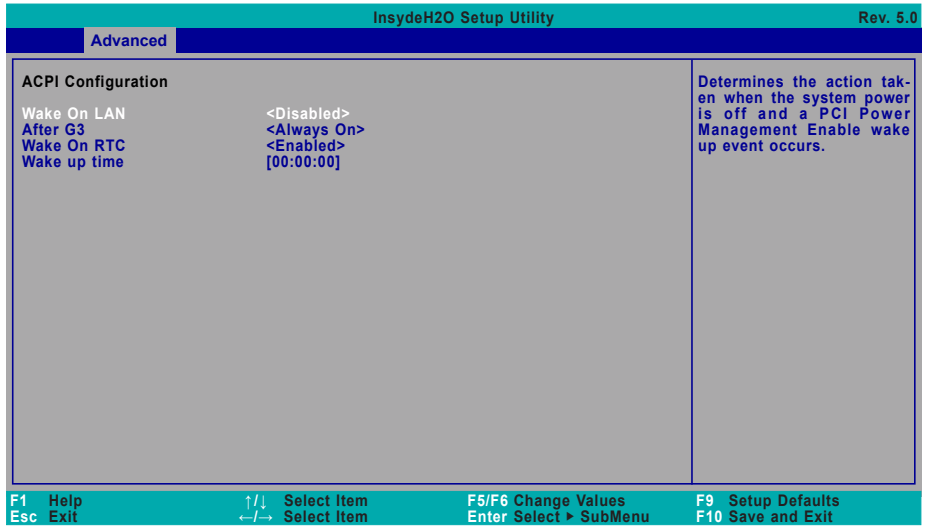
The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

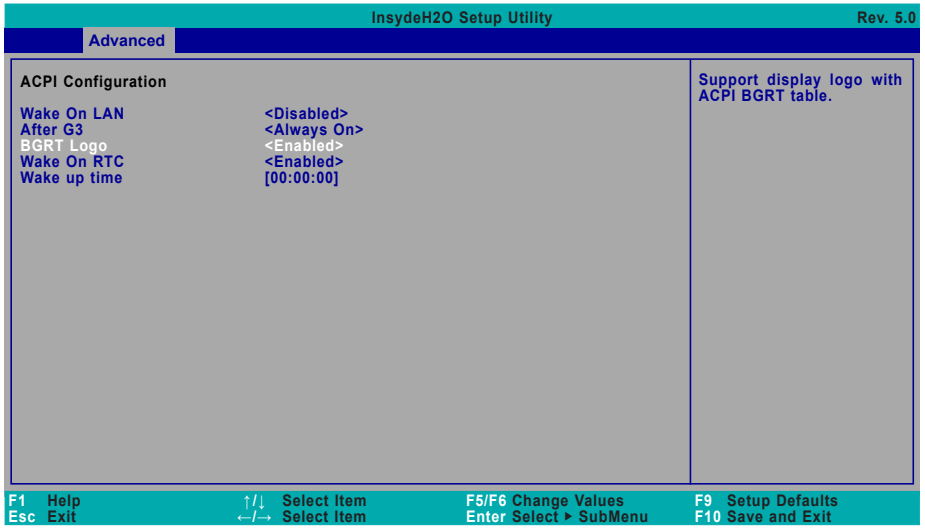
Important:
Setting incorrect field values may cause the system to malfunction.



▶ Advanced

ACPI Configuration





Wake On LAN

Enable or Disable this field to allow LAN signal to power up the system.

After G3

This field is to specify what state the system should be in when power is re-applied after a power failure.

Always On The system automatically powers on after power failure.

Always Off The system remains power off after power failure. Power-on signal input is required to power up the system.

Wake On RTC

When Enabled, the system will automatically wake up from S4/S5 state at a designated time every day via the Real-time clock (RTC) battery.

[Wake up time]

Configure the time of day the system will wake on RTC — [HH:MM:SS]. This field will only appear when “Wake On RTC” is enabled.

BGRT Logo

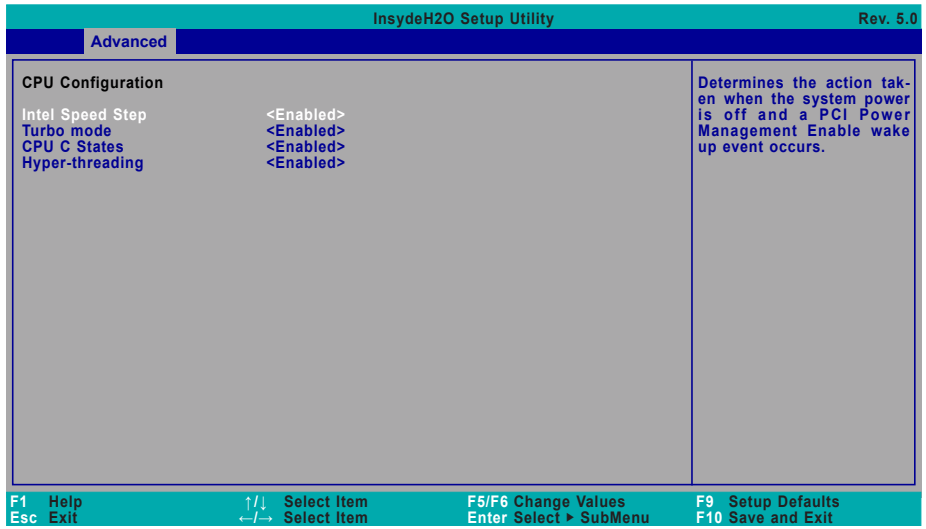
This field is used to enable or disable to support display logo with ACPI BGRT table. This field is only available when Quiet Boot is enabled.

Note:
To enable “Quiet Boot”, please refer to the Boot menu section in this chapter for more information.

▶ Advanced

CPU Configuration

Configure CPU processing related settings in this page.



Intel Speed Step

This field is used to enable or disable the Enhanced Intel SpeedStep® Technology (EIST), which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, EIST features can then be enabled via the operating system's power management.

Turbo Mode

Enable or disable turbo mode of the processor. This field will only be displayed when "Intel Speed Step" is enabled. This field is not available when the equipped CPU does not support Turbo Mode.

CPU C States

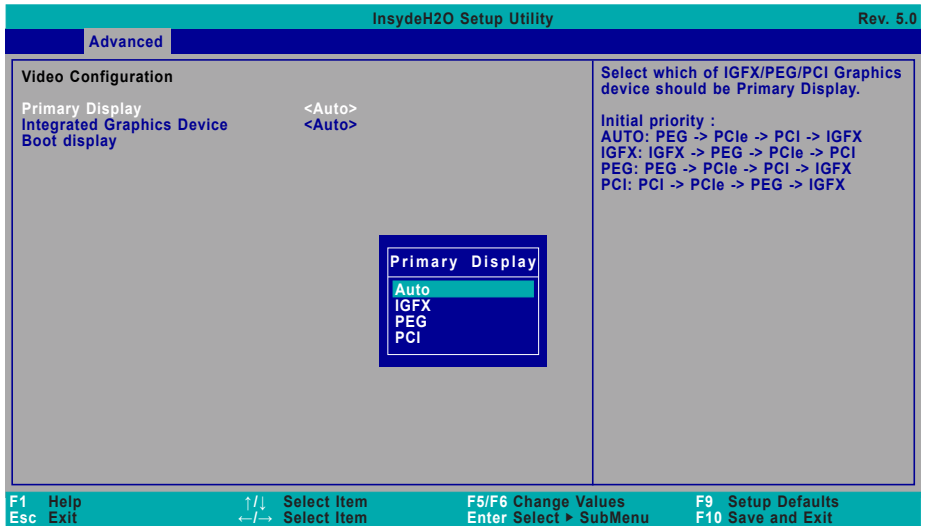
Enable or disable CPU Power Management. It allows CPU to go to C States when it's not 100% utilized.

Hyper-threading

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

▶ Advanced

Video Configuration



Primary Display

Select among Auto, IGFX, PEG, and PCI Graphics devices to be the primary display.

Integrated Graphics Device

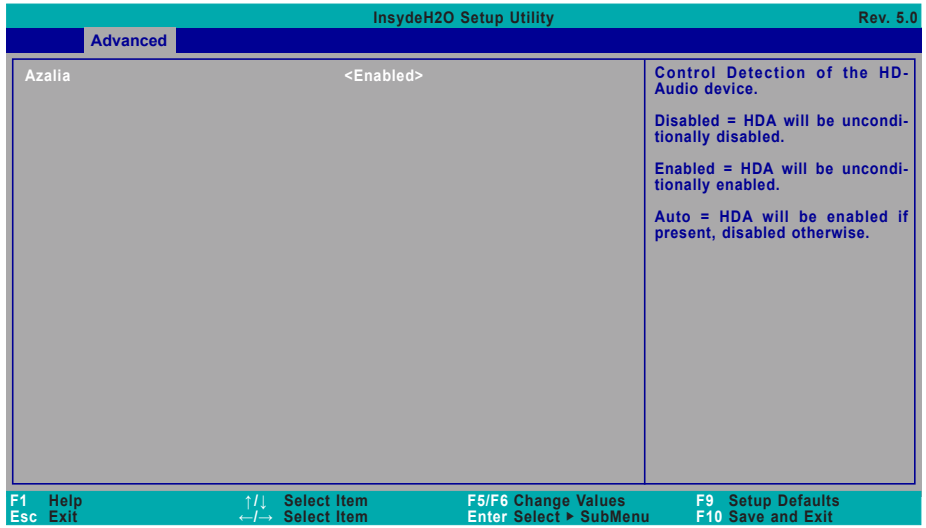
Keep IGFX enabled or disabled based on the setup options.

Boot display

Select the display device during powering up and booting up procedures — HDMI + HDMI2, or HDMI2 + HDMI.

▶ Advanced

Audio Configuration

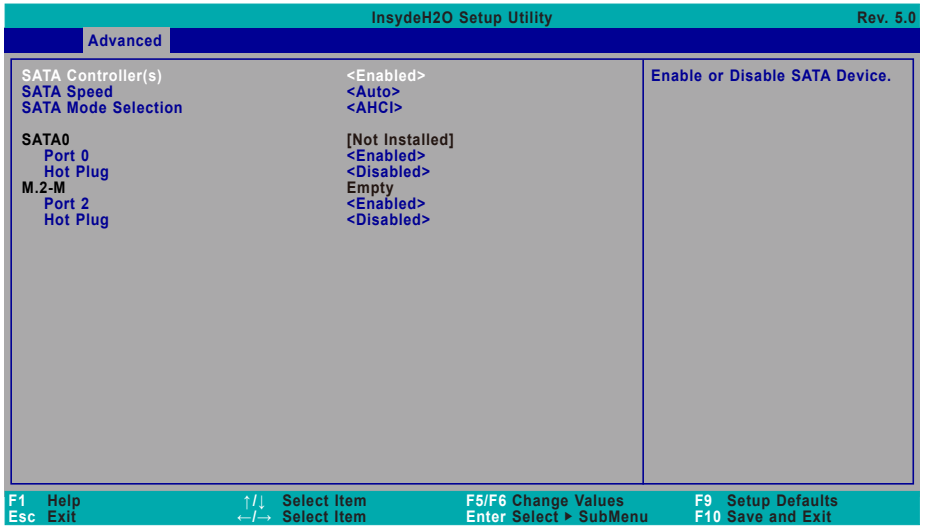


Azalia

Enable or disable Intel High Definition Audio (HDA), also known as Azalia.

▶ Advanced

SATA Configuration



SATA Controller(s)

Enable or disable the Serial ATA controller. This following fields will only be displayed when this field is enabled.

SATA Speed

Select Serial ATA controller(s) speed — Auto, Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s) or Gen 3 (6 Gbit/s).

SATA Mode Selection

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

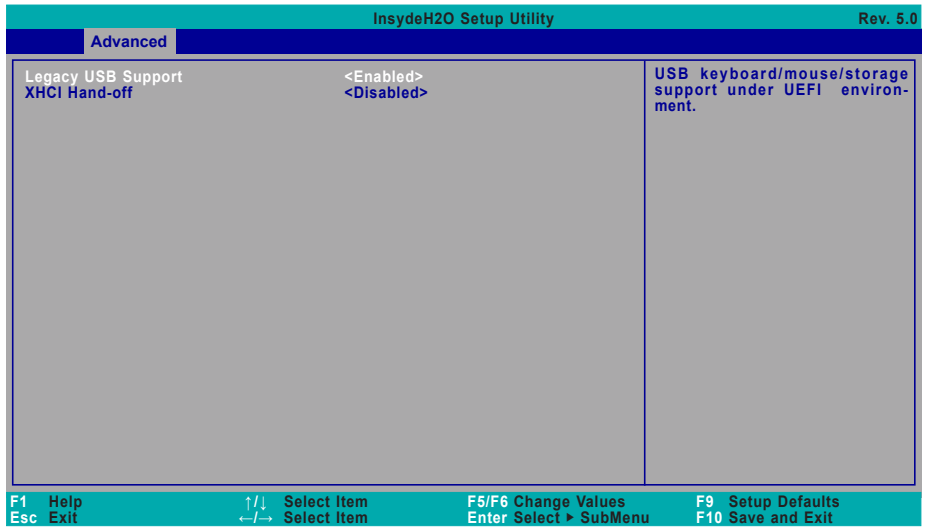
AHCI This option allows the Serial ATA controller(s) to use AHCI (Advanced Host Controller Interface).

Port 0, 2/Hot Plug

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

▶ Advanced

USB Configuration



Legacy USB Support

Enabled Enable Legacy USB support.

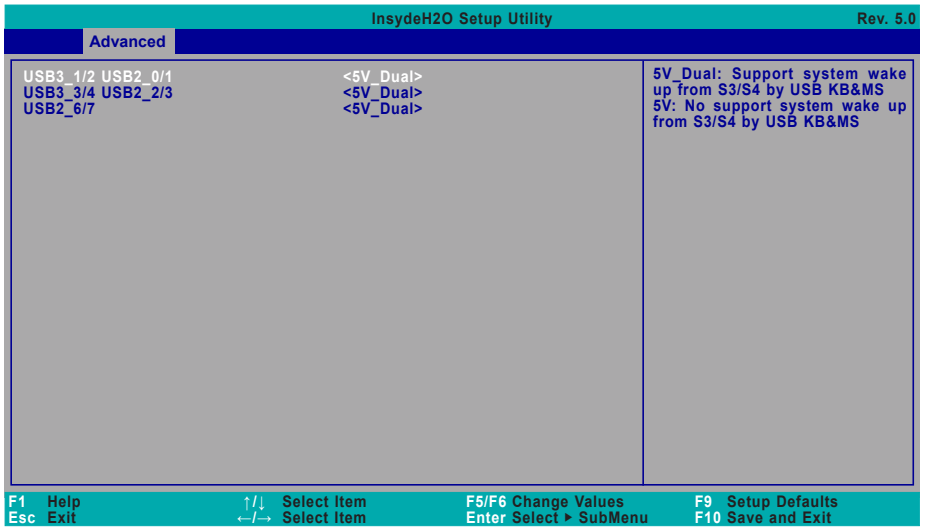
Disabled Keep USB devices available only for EFI applications.

XHCI Hand-off

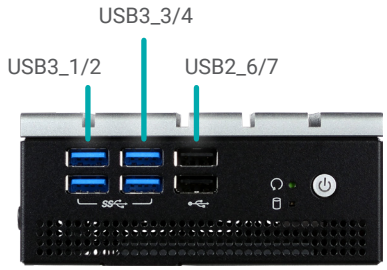
Enable or disable XHCI Hand-off.

▶ Advanced

USB Power Control



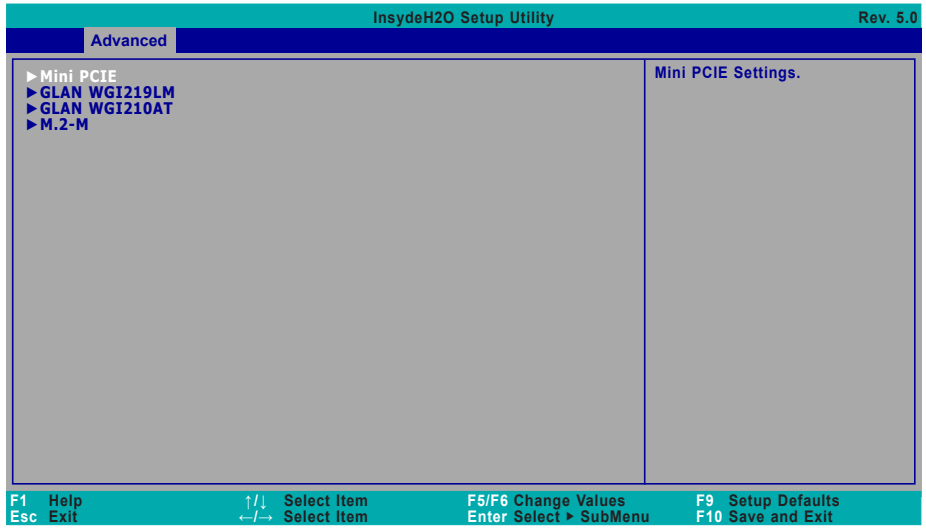
Select between 5V_Dual and 5V for each USB controller. When Wake-on-USB from S3/S4 states is required, please select 5V_Dual.



Front Panel

▶ Advanced

PCI Express Configuration



Select one of the PCI Express channels and press enter to configure the following settings.

PCI Express Root Port

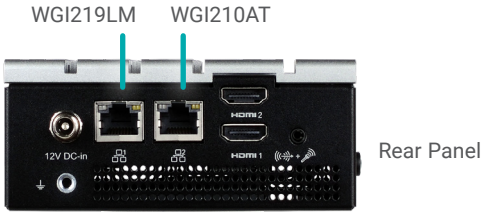
Enable or disable the PCI Express Root Port.

PCIe Speed

Select PCIe Speed of the current port — AUTO, Gen1, Gen2, or Gen3. This field may not appear when the speed of the port is not configurable.

Hot Plug

Enable or disable hot plug function of the port. This field may not appear when the port does not support hot plug.

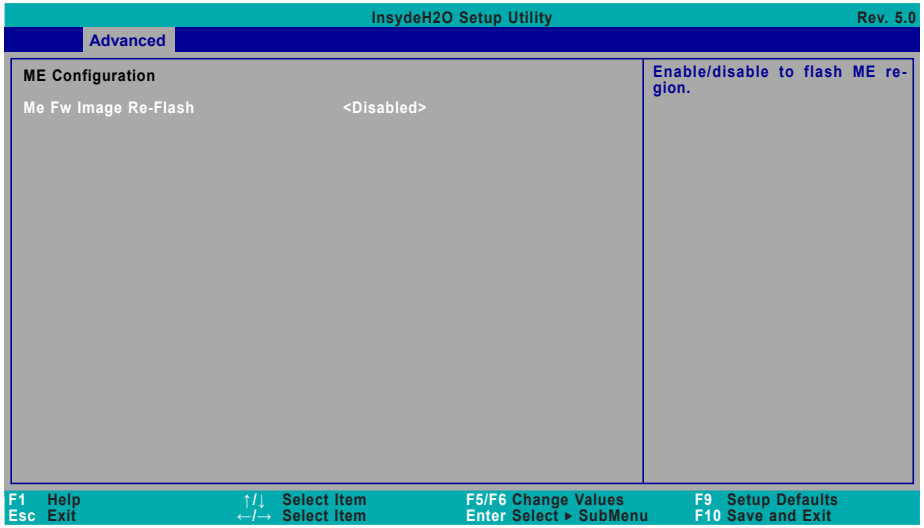


Rear Panel

▶ Advanced

ME Configuration

Configure Management Engine related settings in this page.

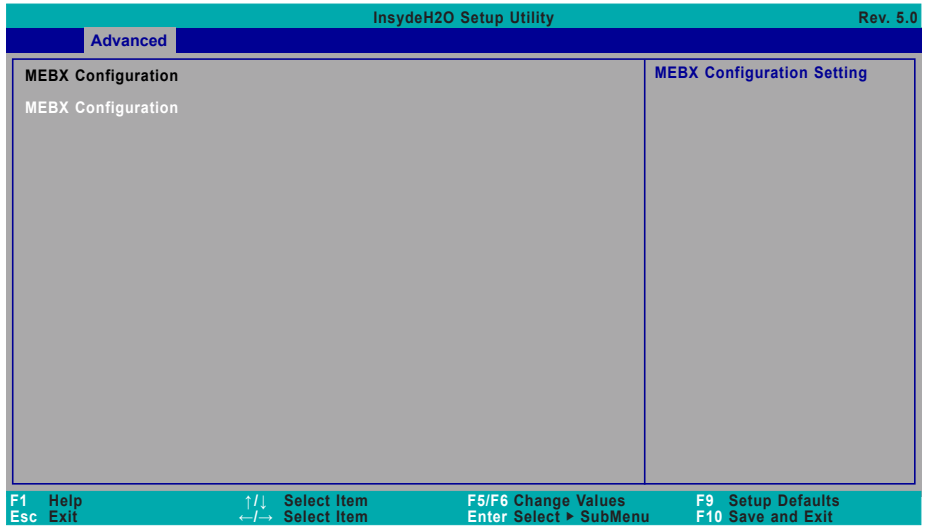


Me Fw Image Re-Flash

Enabled	Allow the user to re-write the ME firmware.
Disabled	ME firmware re-write is not allowed.

▶ Advanced

MEBX Configuration

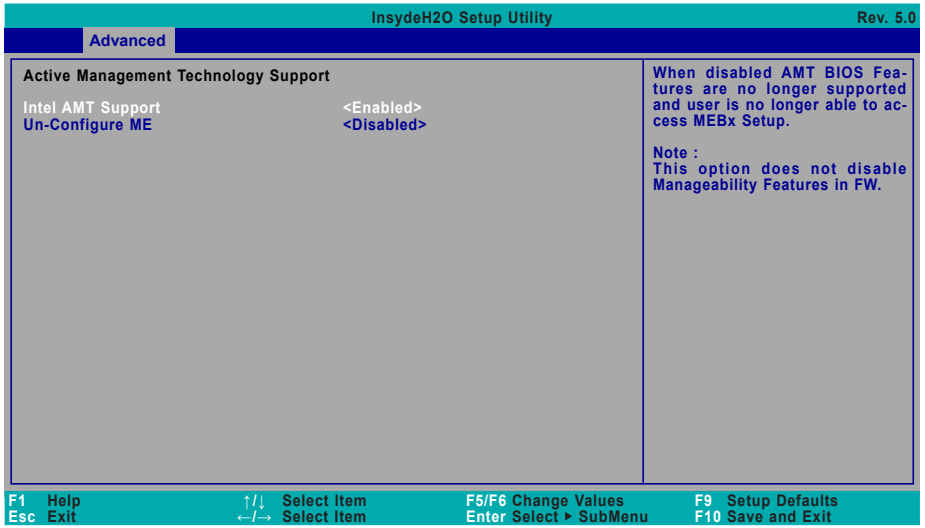


MEBX Configuration

Configure Intel® Active Management Technology (Intel® AMT) in the Intel® Management Engine BIOS Extension (MEBX) setup menu. Please refer to Chapter 4 for instructions.

▶ Advanced

Active Management Technology Support



Intel AMT Support

Enabled Enable AMT. When this field is enabled, the user is allowed to configure AMT settings via MEBX.

Disabled Disable AMT. When this field is disabled, AMT settings cannot be configured and MEBX is not allowed to enter.

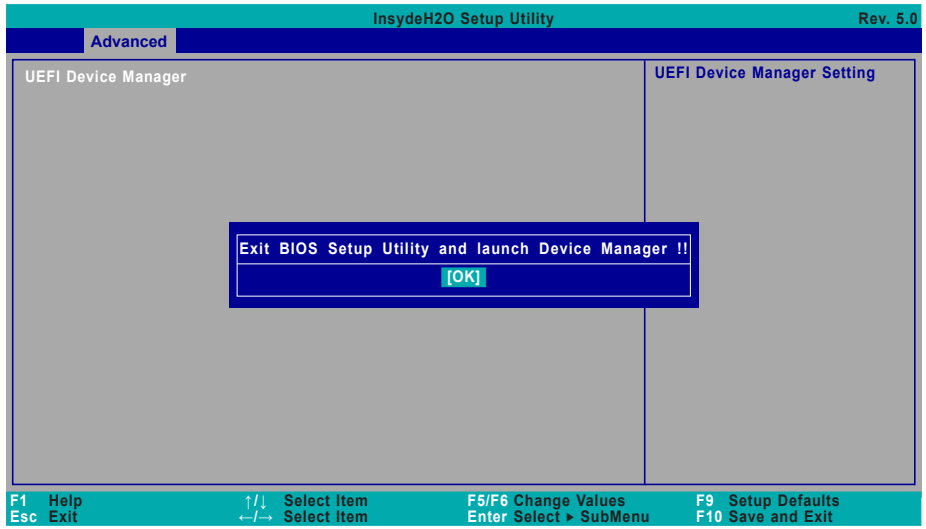
Un-configure ME

Enable or disable ME unconfiguration without password.

▶ Advanced

UEFI Device Manager

Configure UEFI device with option ROM, such as LAN card, etc.

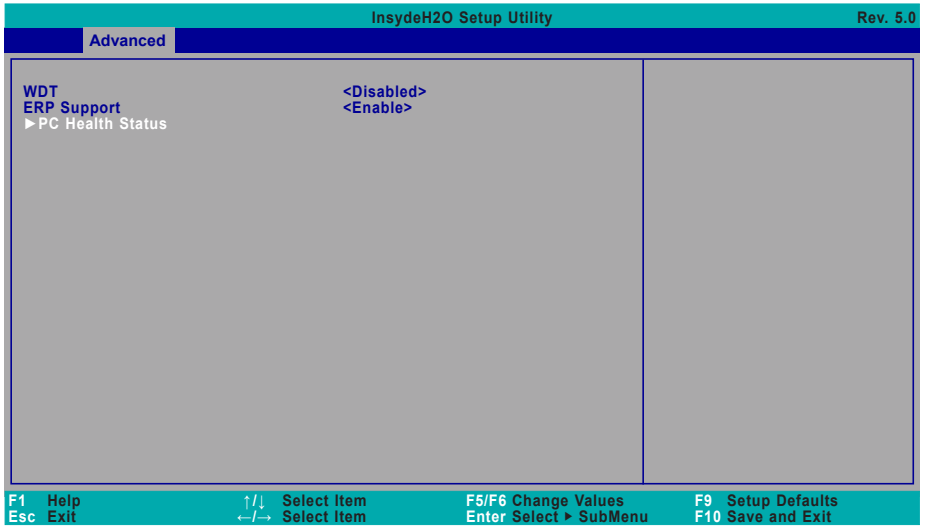


Press “Enter” and “OK” to enter UEFI Device Manager setup page. More device settings can be configured in the UEFI Device Manager, including LAN, Network Stacks, and etc.

Note:
Network Device will not be configurable in Device Manager if "Network Stack" is disabled in the "Boot" menu.

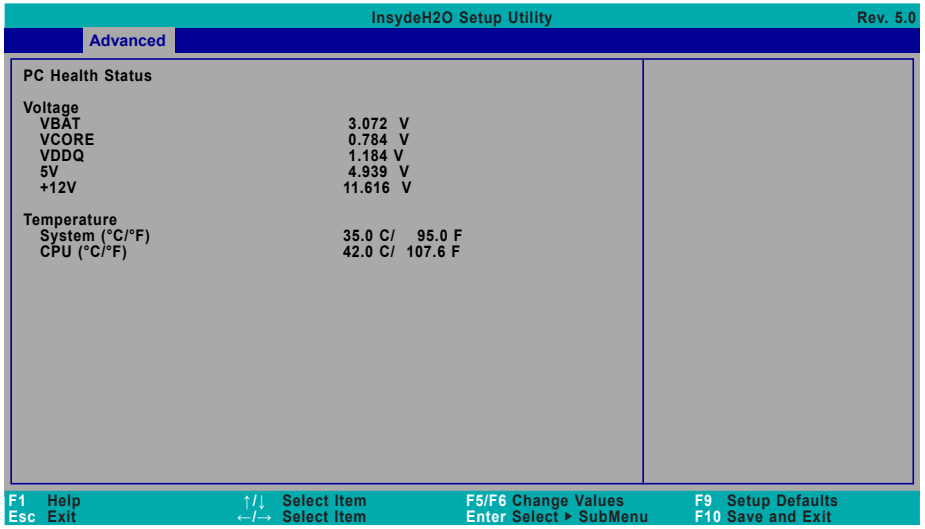
▶ Advanced

SIO NUVOTON6106D

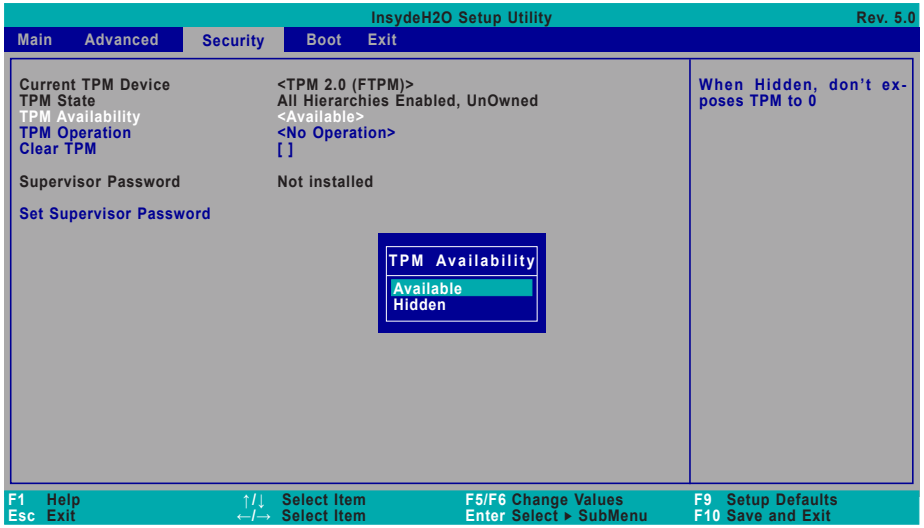


▶ PC Health Status

This section displays the PC health status.



▶ Security



TPM Availability

Set the TPM availability — Available, or Hidden.

TPM Operation

Select one of the supported operation to change TPM state.

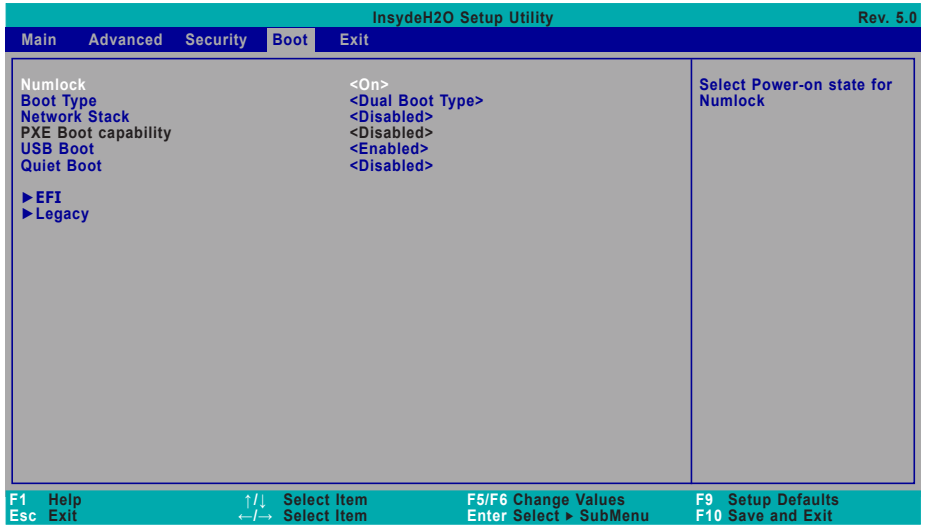
Clear TPM

Remove all TPM context associated with a specific owner.

Set Supervisor Password

Set the supervisor's password and the length of the password must be longer than one character.

▶ Boot



Numlock

Select the power-on state for numlock.

Boot Type

Select the boot type — UEFI Boot Type, Legacy Boot Type or Dual Boot Type. If you select "UEFI Boot Type" or "Dual Boot Type", the "Network Stack", "PXE Boot capability", "USB Boot" and "Quiet Boot" will show up. If you select "Legacy Boot Type", "PXE Boot to LAN", "USB Boot" and "Quiet Boot" will show up.

Note:
Please press F10 to save the settings and re-start the system board after changing "Boot Type".

Network Stack

This field is used to enable or disable network stacks, i.e. IPv4 or IPv6 network protocols.

PXE Boot capability

This field is only available when "Boot Type" is set to “UEFI Boot Type” or “Dual Boot Type”, and when "Network Stack" is enabled.

Disabled Suppoort Network Stack
UEFI IPv4/IPv6
Legacy Legacy PXE OPROM only

PXE Boot to LAN

Enable or disable Boot into the Pre-boot Execution Environment (PXE) stored in the LAN. This field is only available when "Boot Type" is set to “Legacy Boot Type” or “Dual Boot Type”, and when "Network Stack" is enabled.

USB Boot

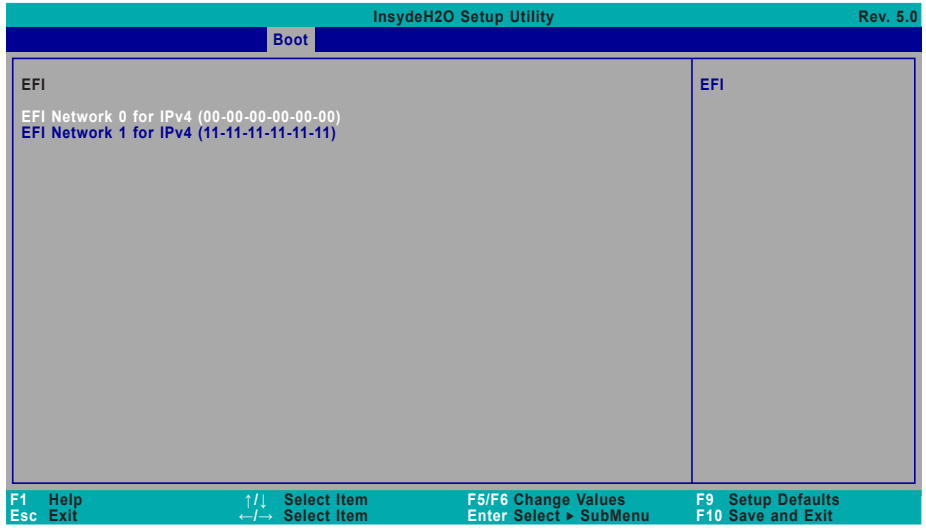
Enable or disable booting to USB boot devices.

Quiet Boot

Enable or disable booting in text mode.

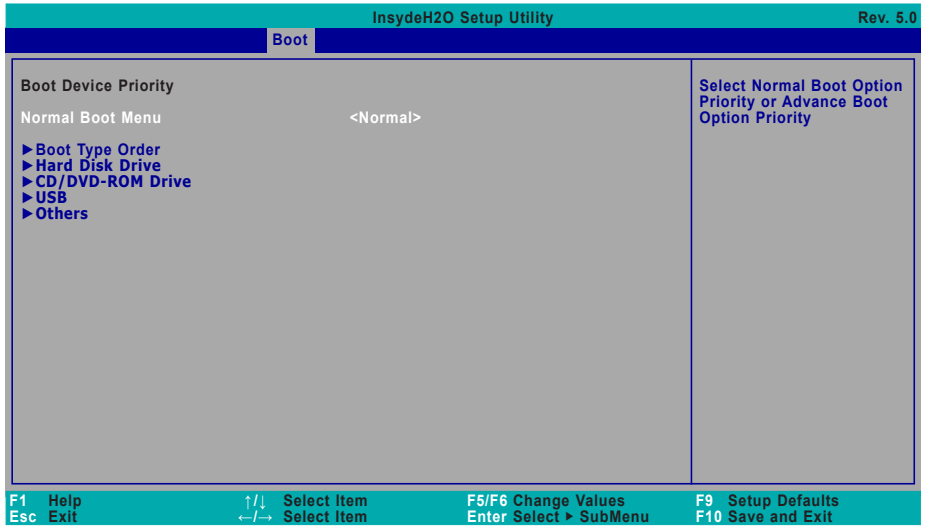
▶ EFI

Configure boot priorities in this submenu. Press -/+ or F5/F6 to move the highlighted item down/up the priority list. This field is only available when "Boot Type" is set to “UEFI Boot Type” or "Dual Boot Type".



▶ Legacy

Configure boot priorities in this submenu. Re-arrange the order by pressing -/+ or F5/F6 to move the highlighted item down/up the priority list. This field is only available when "Boot Type" is set to “Legacy Boot Type” or "Dual Boot Type".



Normal Boot Menu

Select a priority arranging method.

Normal Boot priority is arranged according to the type of the storage devices, and the configured order.
Advance Boot priority is arranged according to the configured order regardless of the type of the storage devices.

▶Boot Type Order

Arrange the priority of types of the storage devices.

▶Hard Disk Drive/ ▶CD/DVD-ROM Drive / ▶USB / ▶Others

Arrange the priority of the storage devices in each category. The submenu will not be displayed when there is no available storage device of the type.

Note:
When a desired LAN port for PXE boot is not listed as a boot device, please confirm that the "PXE Boot to LAN", "PXE boot capability", "Network Stack" and the LAN controller of the said LAN (go to "Advanced" > "PCI Express Configuration") are enabled. Please press F10 to save the settings and re-start the system board for the settings to take effect.

▶ Boot

PXE Boot capability

This field is only available when "Boot Type" is set to “UEFI Boot Type” or “Dual Boot Type”, and when "Network Stack" is enabled.

Disabled Suppoort Network Stack
UEFI IPv4/IPv6
Legacy Legacy PXE OPROM only

PXE Boot to LAN

Enable or disable Boot into the Pre-boot Execution Environment (PXE) stored in the LAN. This field is only available when "Boot Type" is set to “Legacy Boot Type” or “Dual Boot Type”, and when "Network Stack" is enabled.

USB Boot

Enable or disable booting to USB boot devices.

Quiet Boot

Enable or disable booting in text mode.

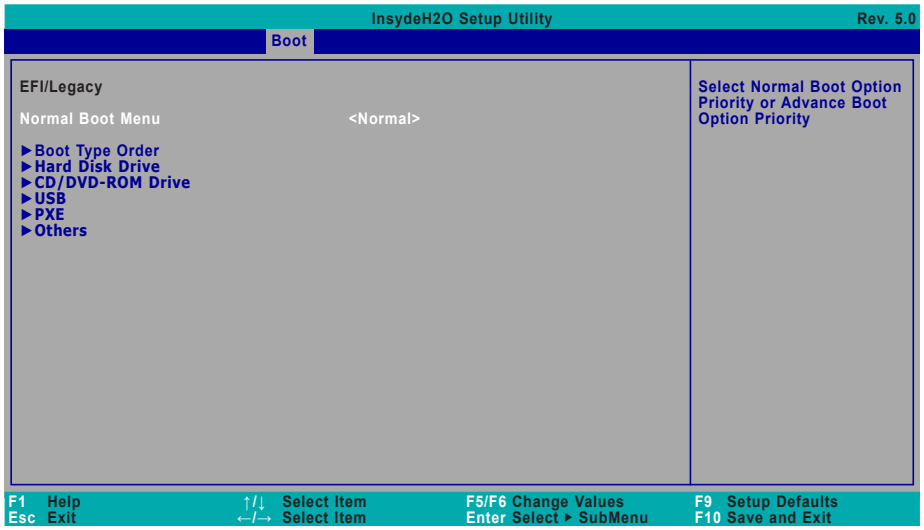
▶ EDI/Legacy

Configure boot priorities in this submenu. Re-arrange the order by pressing -/+ or F5/F6 to move the highlighted item down/up the priority list. This field is only available when "Boot Type" is set to “Legacy Boot Type” or "Dual Boot Type".

Normal Boot Menu

Select a priority arranging method.

Normal Boot priority is arranged according to the type of the storage devices, and the configured order.
Advance Boot priority is arranged according to the configured order regardless of the type of the storage devices.



▶Boot Type Order

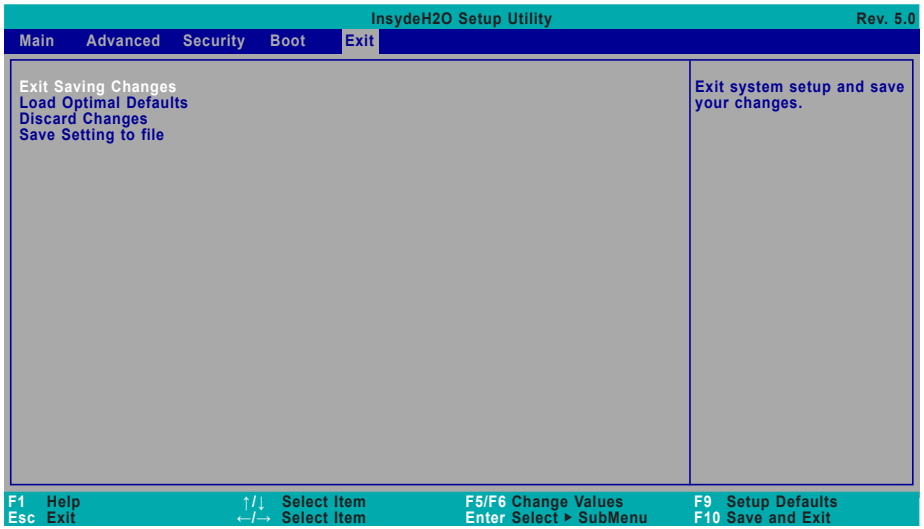
Arrange the priority of types of the storage devices.

▶Hard Disk Drive/ ▶CD/DVD-ROM Drive / ▶USB / ▶PXE / ▶Others

Arrange the priority of the storage devices in each category. The submenu will not be displayed when there is no available storage device of the type.

Note:
When a desired LAN port for PXE boot is not listed as a boot device, please confirm that the "PXE Boot to LAN", "PXE boot capability", "Network Stack" and the LAN controller of the said LAN (go to "Advanced" > "PCI Express Configuration") are enabled. Please press F10 to save the settings and re-start the system board for the settings to take effect.

▶ Exit



Exit Saving Changes

Select Yes and press <Enter> to exit the system setup and save your changes.

Load Optimal Defaults

Select YES and press <Enter> to load optimal defaults.

Discard Changes

Select YES and press <Enter> to exit the system setup without saving your changes.

Save Setting to file

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

▶ Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions about how to update BIOS with the flash utility. For updating Insyde BIOS in UEFI mode, you may refer to the how-to video at https://www.dfi.com/tw/knowledge/video/31.

▶ Notice: BIOS SPI ROM

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

Note:

a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.

b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

Chapter 4 - Intel AMT Settings

▶ Overview

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

Discover

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

Repair

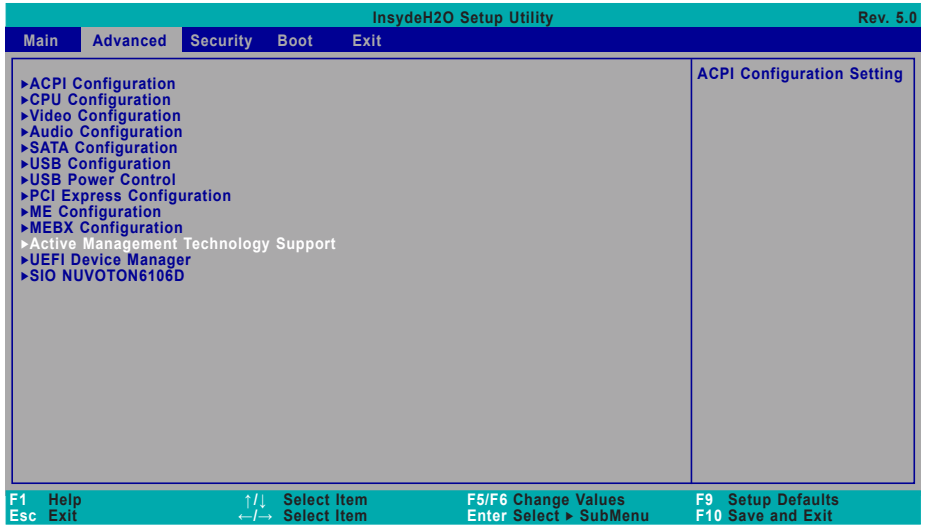
Remotely repair systems after OS failures. Alerting and event logging help detect problems quickly to reduce downtime.

Protect

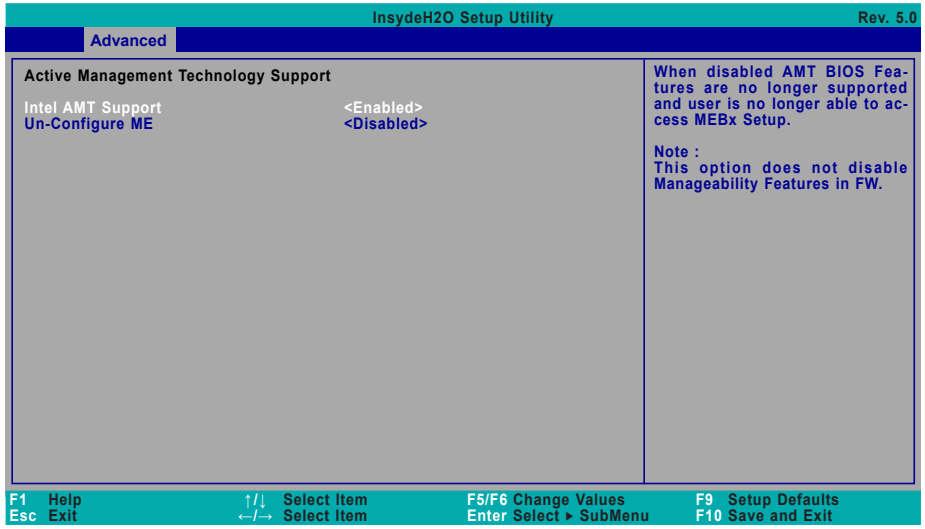
Intel AMT's System Defense capability remotely updates all systems with the latest security software. It protects the network from threats at the source by proactively blocking incoming threats, reactively containing infected clients before they impact the network, and proactively alerting when critical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

▶ Enable Intel® AMT in the Insyde BIOS

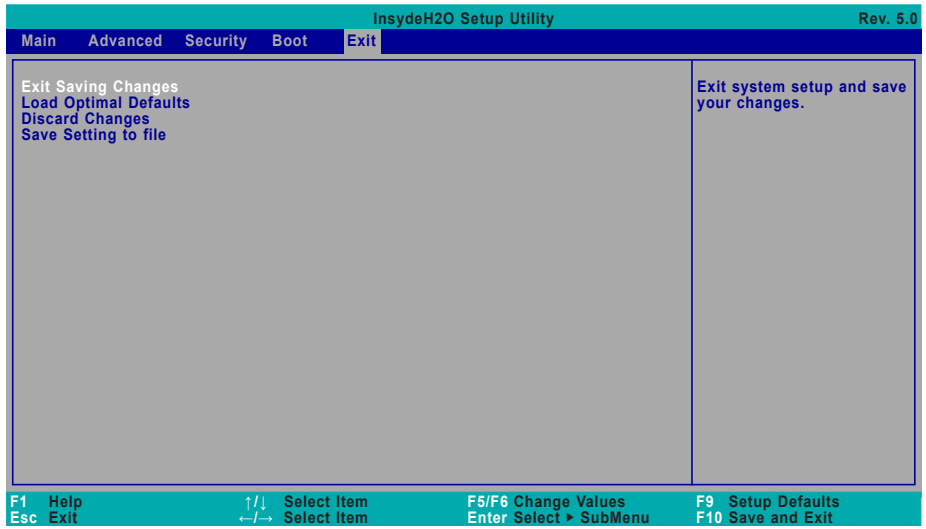
1. Power-on the system then press <Del> to enter the main menu of the Insyde BIOS.
2. In the Advanced menu, select Active Management Technology Support.



3. Set the Intel AMT Support field to Enabled.

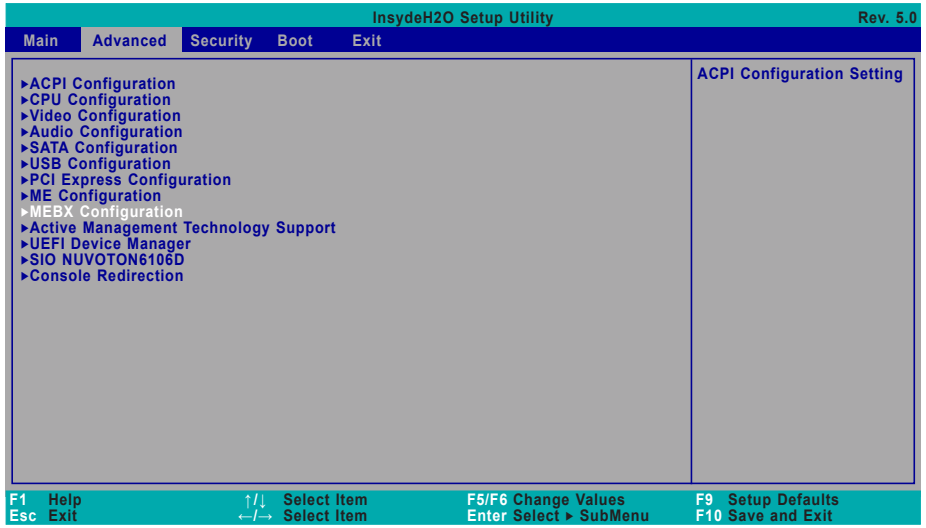


4. In the Exit menu, select Exit Saving Changes or press F10, and then select Yes and press Enter.

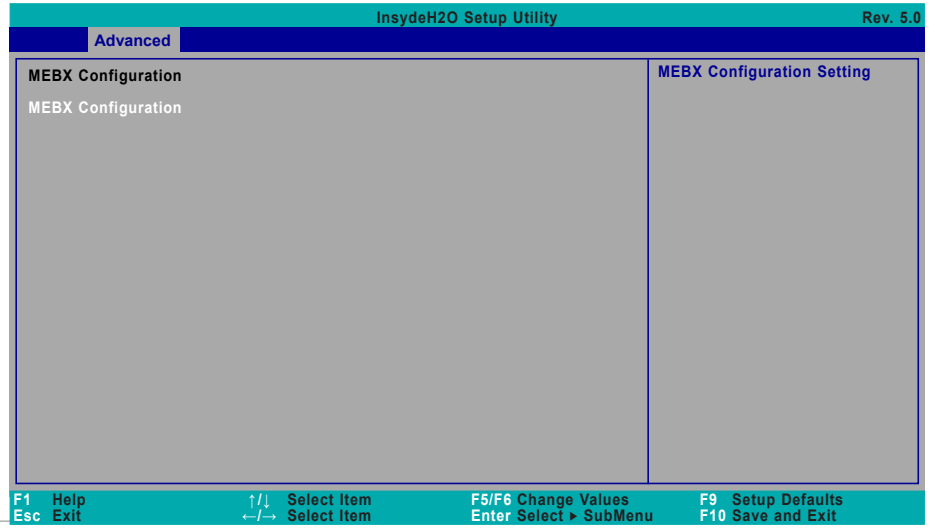


▶ Entering Management Engine BIOS Extension (MEBX)

1. After the system reboots, press <Del> to enter the main menu of the Insyde BIOS.
2. In the Advanced menu, select MEBX Configuration.



3. Select MEBX Configuration and press Enter.

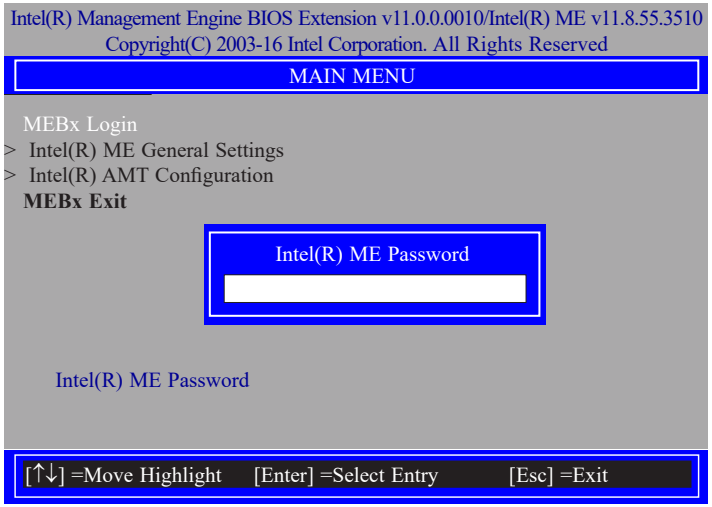


▶ MEBX

Main Menu

Select **MEBx Login** under Main Menu and press Enter. A prompt that requires password input will show up.

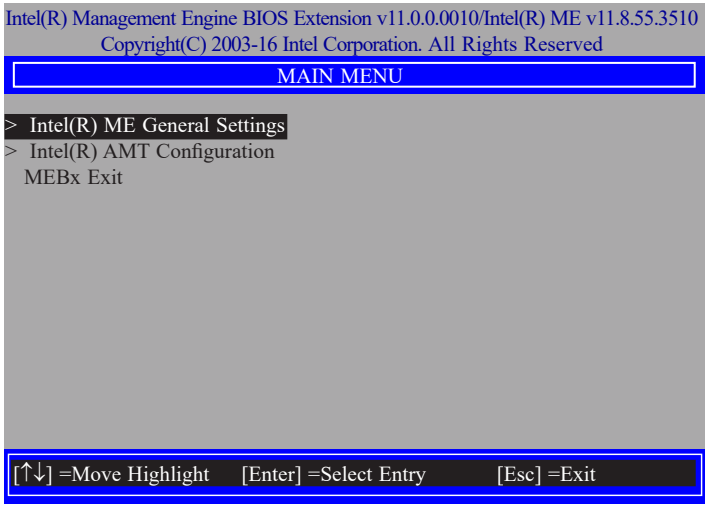
1. Enter the default password "**admin**".



2. Enter a new 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. !, $, ;);
   - At least one lower case and one upper case characters.
3. Enter the new password again to verify the new password.

Intel(R) ME General Settings

Select **Intel(R) ME General Settings** under Main Menu and then press Enter.



Change ME Password

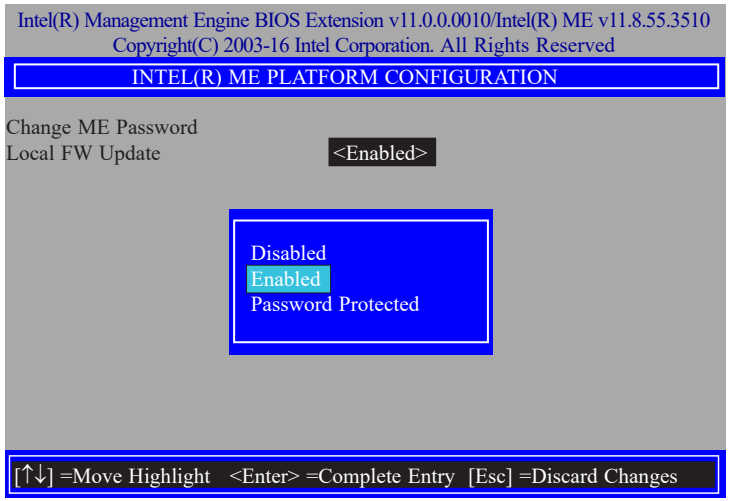
If you want to change ME password, select **Change ME Password** and then press Enter. A prompt that requires password input will show up.

1. Enter the current password and then press Enter.

2. Enter a new 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. !, $, ;);
   - At least one lower case and one upper case characters.
3. Enter the new password again to verify the new password.

Local FW Update

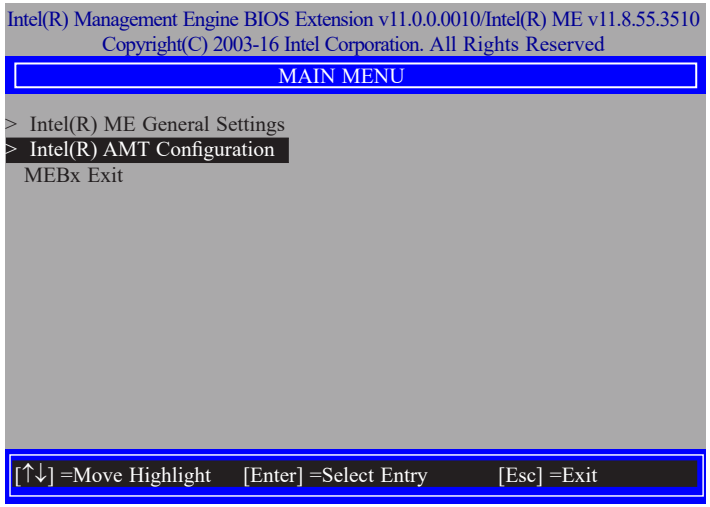
Select **Local FW Update** then press Enter. Select **Enabled** or **Disabled** or **Password Protected** then press Enter.



▶ MEBX

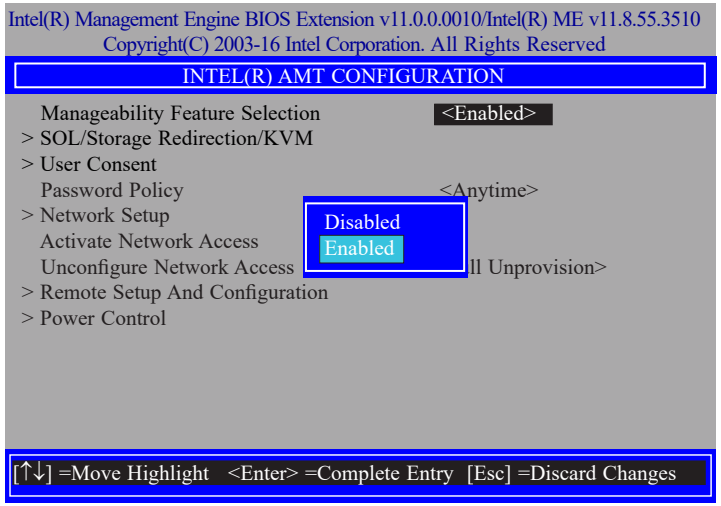
Intel(R) AMT Configuration

Select Intel(R) AMT Configuration under Main Menu and then press Enter.

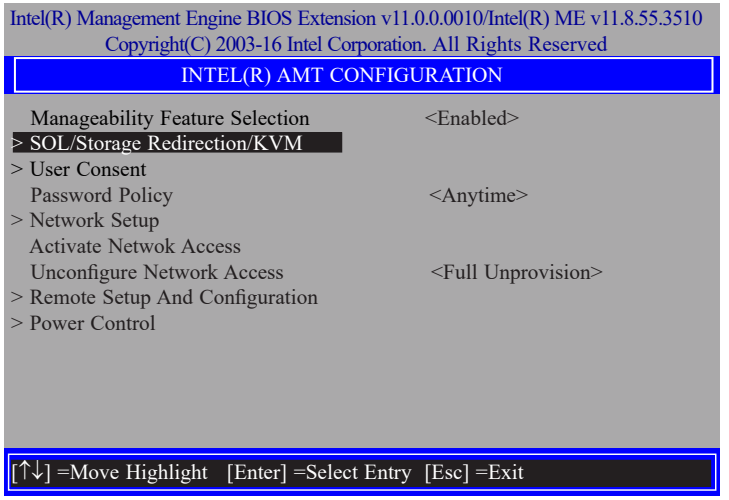


Manageability Feature Selection

Select **Enabled** or **Disabled** then press Enter. When disabled, all the following fields will be hidden. After disabling the field, system restart is required.



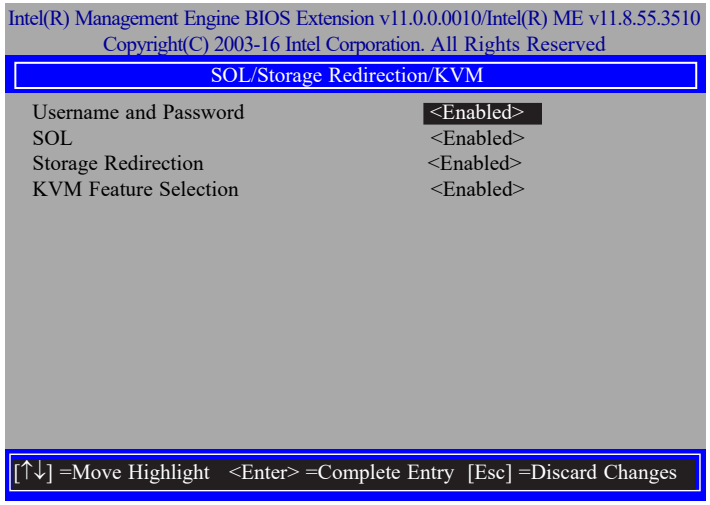
> SOL/Storage Redirection/KVM



Press Enter to enter the submenu.

▶ MEBX ▶ Intel(R) AMT Configuration

> SOL/Storage Redirection/KVM



Move the cursor to select a field and press Enter to display options.

Username and Password

Select Enabled or Disabled then press Enter.

SOL

Select Enabled or Disabled then press Enter.

Storage Redirection

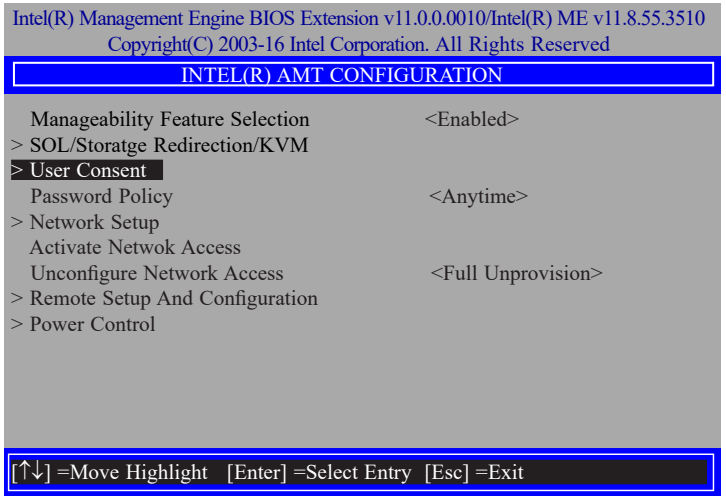
Select Enabled or Disabled then press Enter.

KVM Feature Selection

Select Enabled or Disabled then press Enter.

▶ MEBX ▶ Intel(R) AMT Configuration

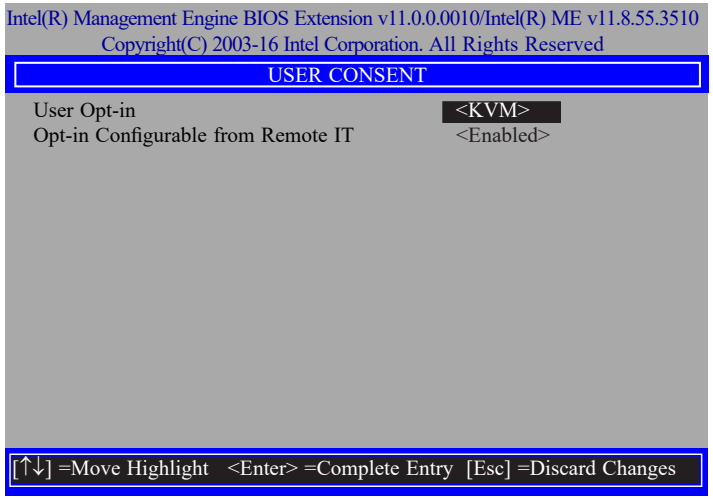
> User Consent



Press Enter to enter the submenu.

▶ MEBX ▶ Intel(R) AMT Configuration

> User Consent



Move the cursor to select a field and press Enter to display options.

User Opt-in

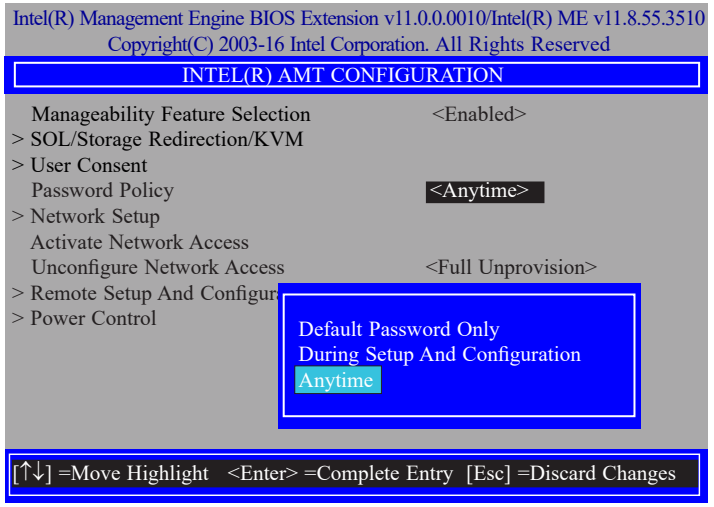
Select **NONE** or **KVM** or **ALL** then press Enter.

Opt-in Configurable from Remote IT

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

▶ MEBX ▶ Intel(R) AMT Configuration

Password Policy

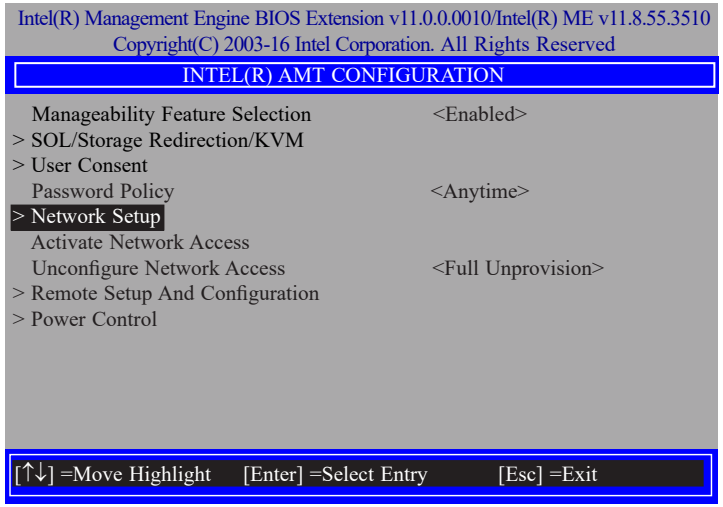


Under the **Intel(R) AMT Configuration** menu, select **Password Policy** then press Enter. You may choose to use a password only during setup and configuration or to use a password anytime the system is being accessed.

▶ MEBX ▶ Intel(R) AMT Configuration

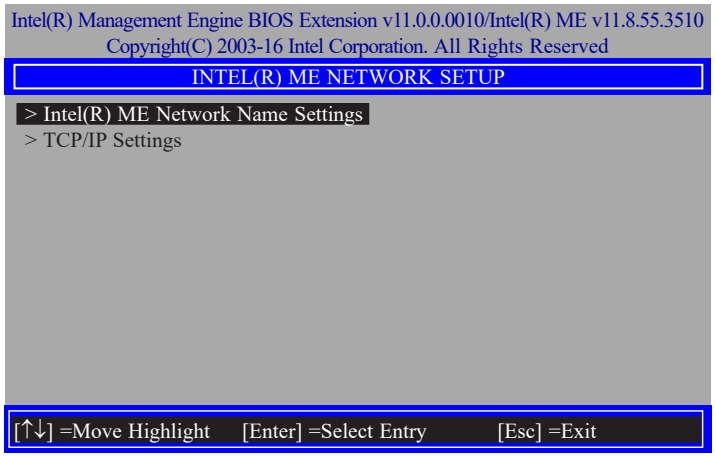
> Network Setup

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

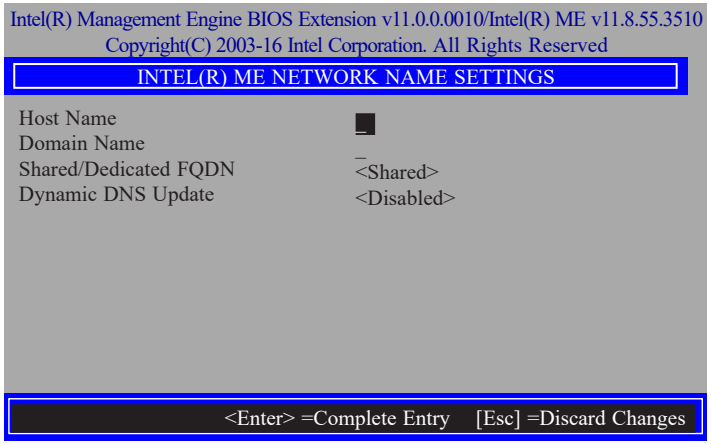


> Intel(R) ME Network Name Settings

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



Move the cursor to select a field and press Enter to display options.



Host Name

Enter the computer's host name and then press Enter.

Domain Name

Enter the computer's domain name and then press Enter.

Shared/Dedicated FQDN

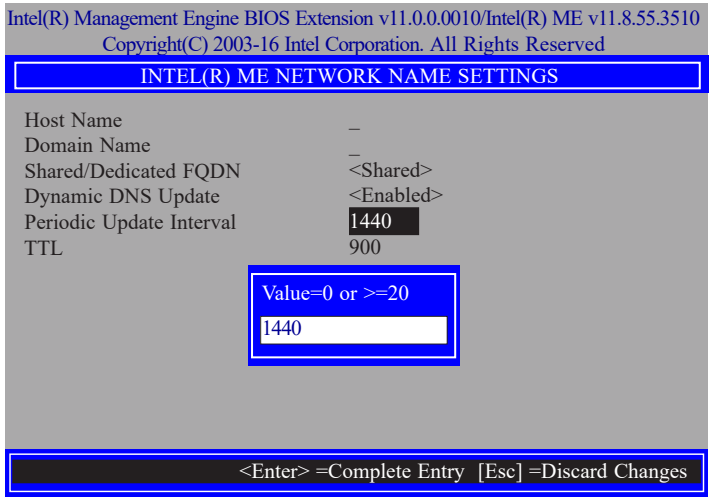
Select **Shared** or **Dedicated** and then press Enter.

Dynamic DNS Update

Select Enabled or Disabled then press Enter. When Dynamic DNS Update is Enabled, the following fields will show up.

Periodic Update Interval

Enter a value and then press Enter.

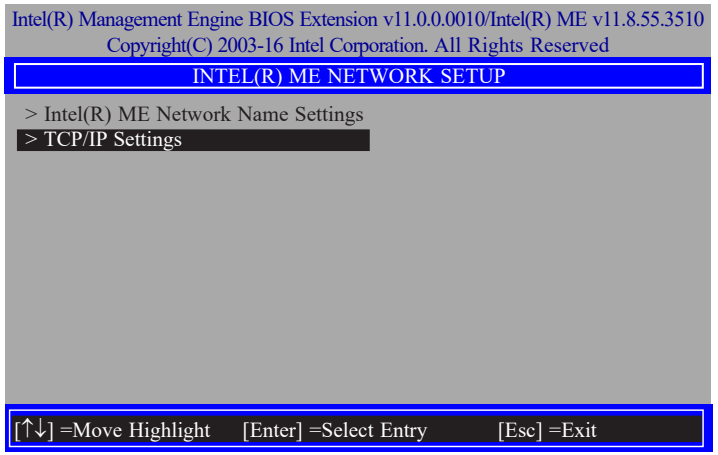


TTL

Enter a value for the Time-to-live (TTL) field and then press Enter.

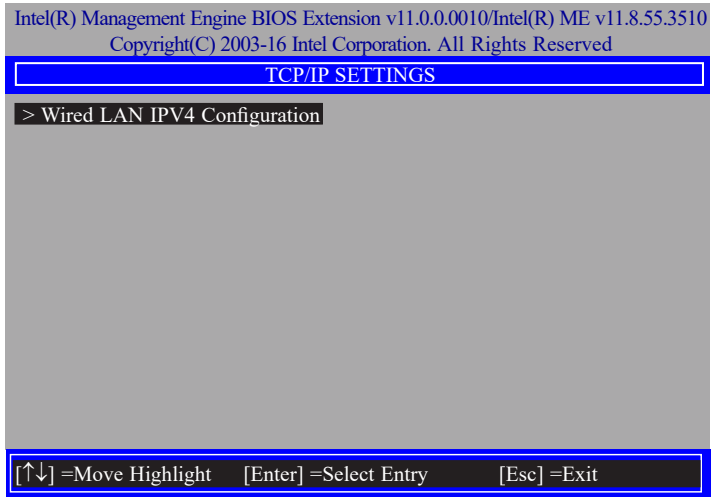
> TCP/IP Settings

Under the Intel(R) ME Network Setup menu, select TCP/IP Settings and then press Enter.



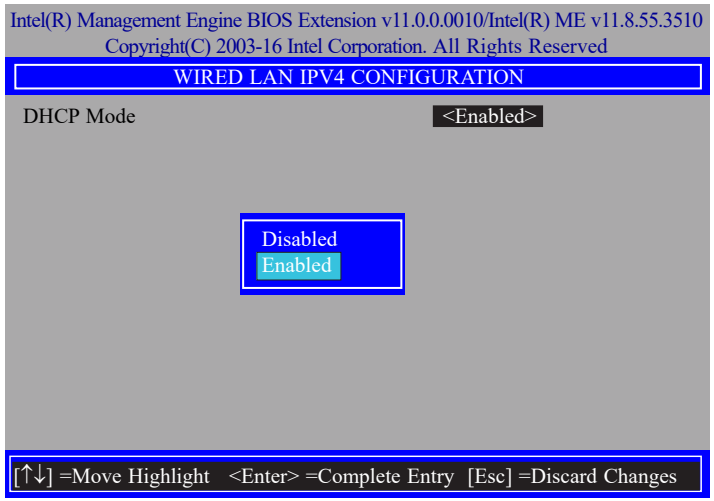
> Wired LAN IPV4 Configuration

Under **TCP/IP Settings,** select **Wired LAN IPV4 Configuration** and then press Enter.

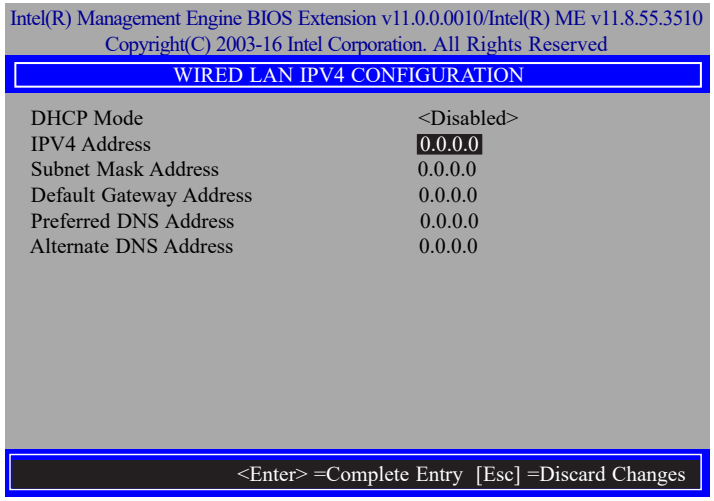


DHCP Mode

Select **Enabled** or **Disabled** then press Enter. Please make sure there is a DHCP server in the network when this field is enabled.

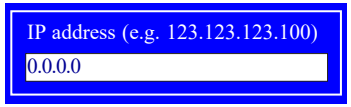


When DHCP is **Disabled**, please manually input a static route by configuring the fields as shown below.



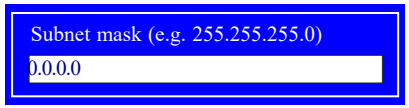
IPv4 Address

Assign a valid and available IP address to the system. Insert a value from 0.0.0.0 to 255.255.255.255 in IPv4 format.



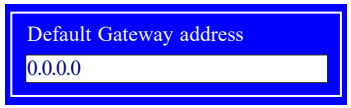
Subnet Mask Address

Insert a value from 0.0.0.0 to 255.255.255.255 in IPv4 format.



Default Gateway Address

Insert a value from 0.0.0.0 to 255.255.255.255 in IPv4 format.



Preferred DNS Address

Insert a value from 0.0.0.0 to 255.255.255.255 in IPv4 format.

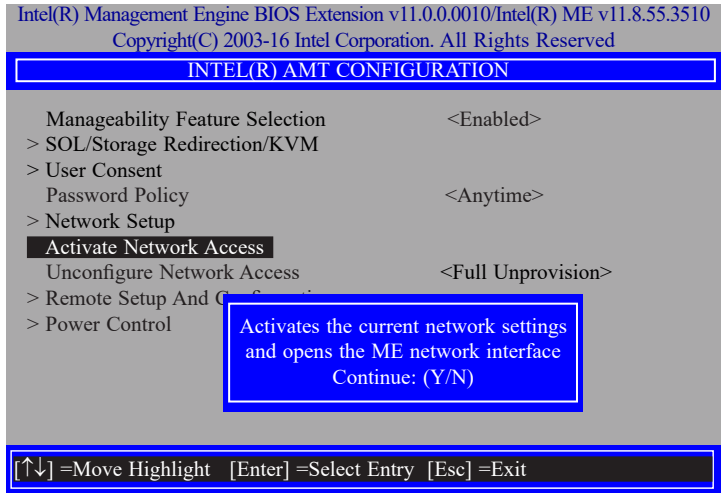
Alternate DNS Address

Insert a value from 0.0.0.0 to 255.255.255.255 in IPv4 format.

▶ MEBX ▶ Intel(R) AMT Configuration

Activate Network Access

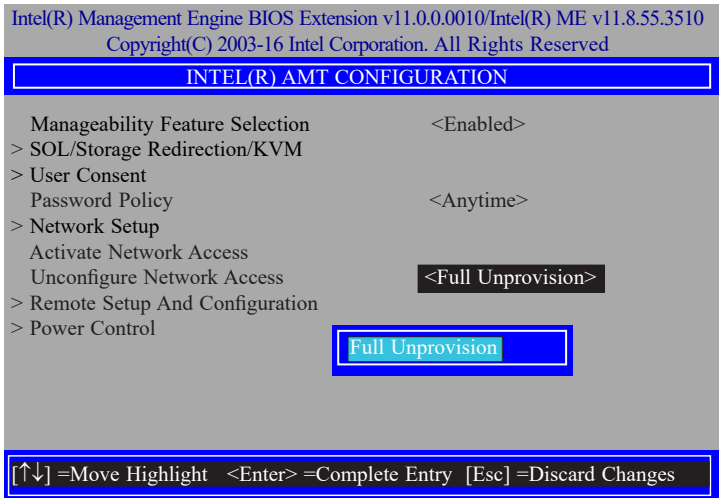
Under the **Intel(R) AMT Configuration** menu, select **Activate Network Access** and press Enter, and then press Y to activate the ME network connection with the settings configured previously, or press N to abort.



▶ MEBX ▶ Intel(R) AMT Configuration

Unconfigure Network Access

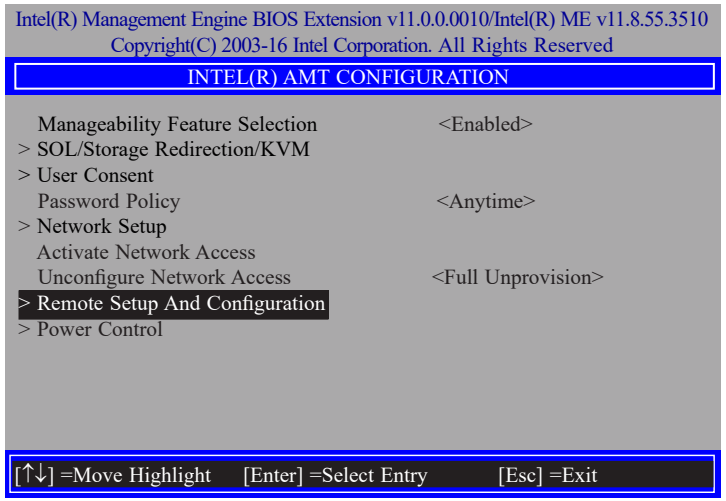
Under the **Intel(R) AMT Configuration** menu, select **Undconfigure Network Access** and press Enter, and then press Enter to fully deactivate the ME network connection and reset configuration to factory default. Press Y to confirm or N to abort.

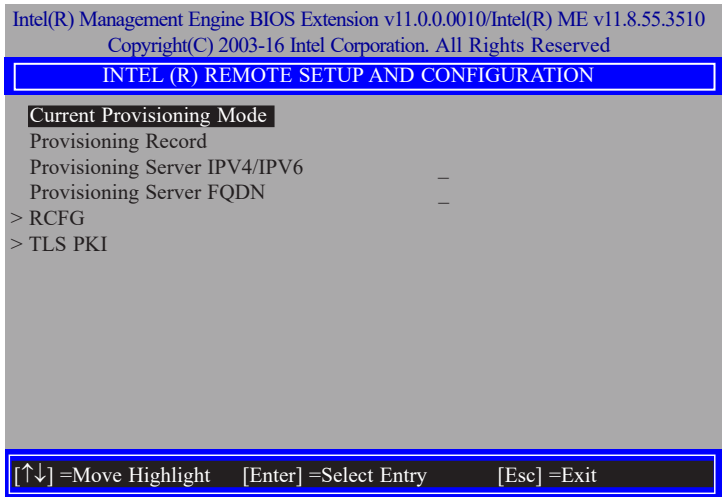


▶ MEBX ▶ Intel(R) AMT Configuration

> Remote Setup And Configuration

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





Current Provisioning Mode

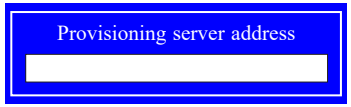
The current mode — Public Key Infrastructure (PKI) — is displayed.

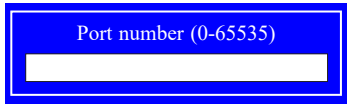
Provisioning Record

Press Enter to view the record.

Provisioning Server IPV4/IPV6

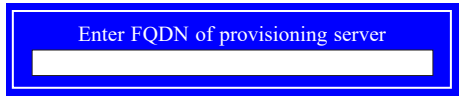
Enter the address of the server then press Enter, and then insert the TCP/UDP port number.





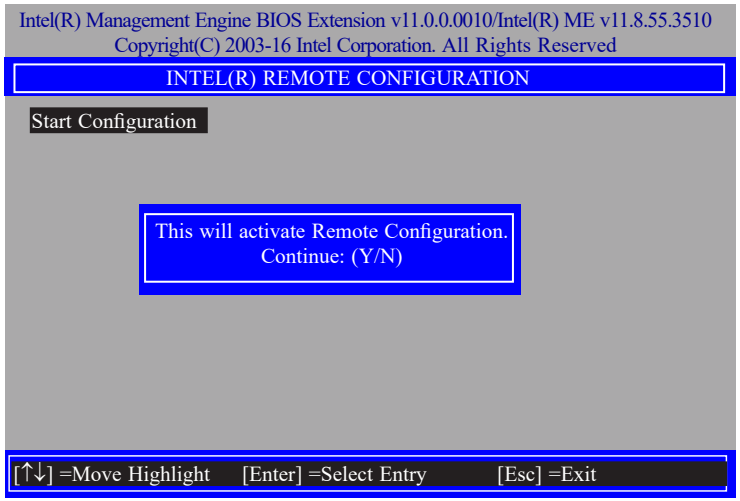
Provisioning Server FQDN

Enter the Fully Qualified Domain Name (FQDN) of the server and then press Enter.



> RCFG

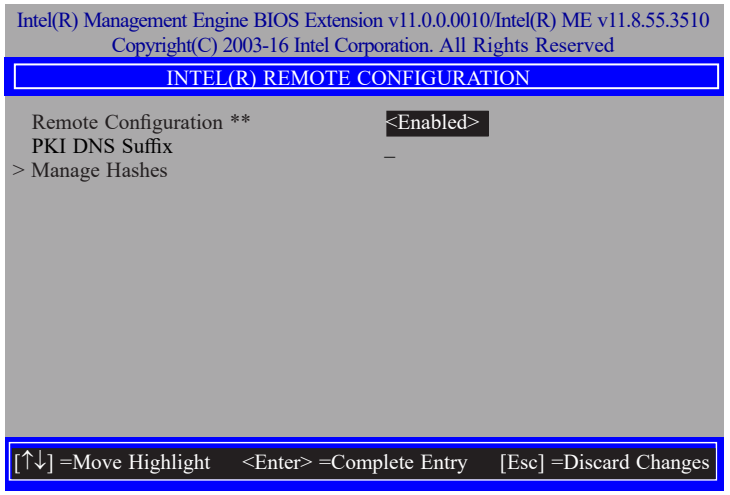
Press Enter, select **Start Configuration**, and then press Enter to activate Remote Configuration (RCFG). Press Y to confirm or N to abort.



▶ MEBX ▶ Intel(R) AMT Configuration ▶ Remote Setup And Configuration

> TLS PKI

The system adopts PKI for encryption and authentication, and the TLS protocol for communication security to ensure remote configuration safety.



Remote Configuration **

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

PKI DNS Suffix

Specify the DNS Suffix of the PKI server, and then press Enter.

> Manage Hashes

Select a hash name and then press the following keys to execute a function.

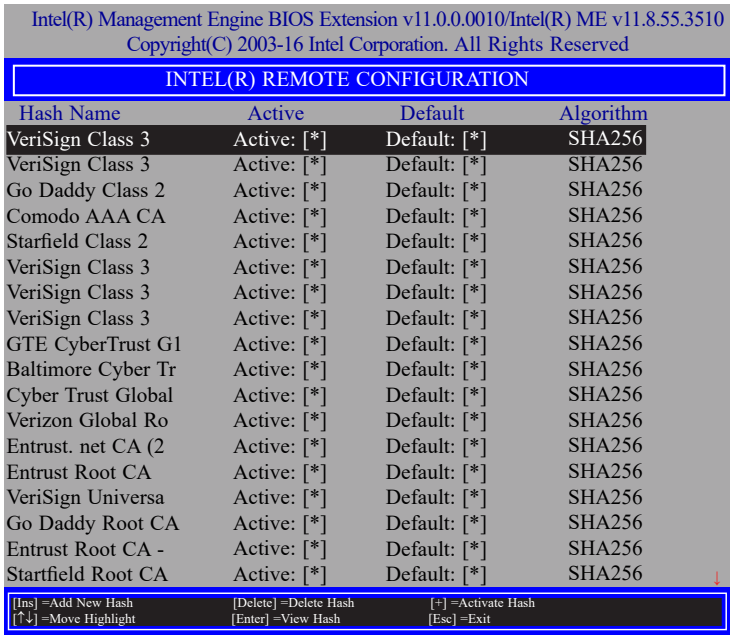
Insert — enter a custom hash certificate name,

Delete — delete a hash

Enter — view hash information

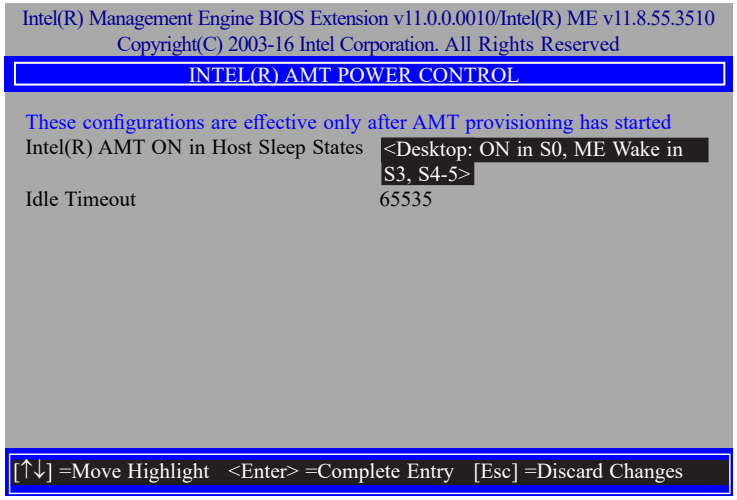
\+ — activate or deactivate a hash

Esc — exit



> Power Control

Under the **Intel(R) AMT Configuration** menu, select **Power Control** then press Enter.



Intel(R) AMT ON in Host Sleep States

Select an option and then press Enter.

Idle Timeout

Enter a timeout value and press Enter.

▶ MEBX

MEBx Exit

Under the Main Menu, select MEBx Exit and then press Enter. Press Y to confirm or N to abort.