DA-820E Series Hardware User Manual

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www.moxa.com/products

DA-820E Series Hardware User Manual

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Table of Contents

1. Introduction 4
Overview 4
Package Checklist 4
Model Descriptions 5
Appearance 6
Front View 6
Rear View 6
Dimensions 7
Features 7
Hardware Block Diagram 8
DA-820E Basic System 8
Hardware Specifications 8
2. Hardware Installation 9
Mounting the DA-820E on to a Rack 9
Wiring Requirements 10
Connecting the Power 11
Wiring the Power Inputs 12
Power Button 13
Reset Button 14
LED Indicators 14
Connecting Displays 15
Connecting USB Devices 16
Installing a USB Dongle Kit 16
Serial Ports 18
Gigabit LAN Ports 18
Digital Inputs/Digital Outputs 19
Relay Output 19
Installing Memory and M.2 Storage 20
Installing SATA Hard Disks 22
Installing Moxa Proprietary Expansion Modules 24
Inserting PCIe Modules 25
RTC battery 27
3. BIOS Setup 29
Entering the BIOS Setup 29
Main Page 31
Advanced Settings 31
Boot Configuration 32
SATA Configuration 33
CPU Configuration 36
Video Configuration 37
Chipset Configuration 38
PCH-FW Configuration 39
Console Redirection Configuration 40
SIO ITE8786E 41
Hardware Monitor 42
Security Settings 43
Set Supervisor Password 44
Power Settings 46
Boot Settings 47
Exit Settings 49
Enabling AMT 50
Using AMT 53
Administering Secure Boot 54
Enabling UEFI Secure Boot 55
Enroll EFI Image 56
Enroll Customer Key 57
Upgrading the BIOS 58

1. Introduction

Thank you for purchasing a Moxa DA-820E industrial computer, a multi-functional embedded computer designed especially for IEC 61850-3 substation automation systems.

This manual covers hardware installation, connector interfaces, and BIOS setup of the DA-820E. For software configuration and management, please refer to the user's manual for your operating system.

Overview

The DA-820E computer operates on an Intel® Core™ i3, i5, or i7 CPU architecture, ensuring robust performance for various applications. It features three display ports (2 x HDMI and 1 x VGA), five USB ports, four Gigabit LAN ports, two 3-in-1 RS-232/422/485 serial ports, six digital input ports, and two digital output ports, providing extensive connectivity options.

Designed for flexibility and scalability, the DA-820E is equipped with four hot-swappable 2.5" SSD slots and supports *Intel® Rapid Storage Technology (RST) with RAID 0/1 functionality. Additionally, it includes four standard PCIe slots, enabling users to install a variety of peripheral interface expansion modules. The system also offers options for redundant hot-swappable power supplies, enhancing its reliability and uptime.

The DA-820E is certified to IEC-61850-3 and IEEE 1613 standards, ensuring stable and reliable operation in power applications. Furthermore, it complies with IEC 60255 standards, which govern the protection of electrical relays in smart substations. This certification is critical, as IEC 60255 is one of the most widely recognized standards for testing relays and protection equipment. Compliance guarantees that the DA-820E will operate reliably and seamlessly with Intelligent Electronic Devices (IEDs) as part of a comprehensive substation automation system.

* Intel® RST RAID 0/1 support for SSD slot 1 and 2.

Package Checklist

Each model ships with following additional items:

- DA-820E Series rackmount computer
- Rack-mounting ear
- USB dongle kit
- A pack of thermal pads for installing optional M.2 storage and memory modules
- Quick installation guide (printed)
- Warranty card

NOTE

Notify your sales representative if any of the above items are missing or damaged.

Model Descriptions

The DA-820E Series includes the following models:

- **DA-820E-C3-H-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i3-1320PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 1 DA-PWR-150-HV
- **DA-820E-C3-HH-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i3-1320PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 2 DA-PWR-150-HV
- **DA-820E-C5-H-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i5-1340PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 1 DA-PWR-150-HV
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- **DA-820E-C7-H-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i7-1370PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 1 DA-PWR-150-HV
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- **DA-820E-C3-L-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i3-1320PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 1 DA-PWR-120-LV
- **DA-820E-C3-LL-T:** IEC 61850-3 3U rackmount computer with 13th Gen Intel® Core™ i3-1320PE processor, 4 GbE ports, 2 RS-232/422/485 serial ports, 6 DIs, 2 DOs, 3 USB 3.0 ports, 2 USB 2.0 ports, 2 HDMI ports, 1 VGA port, 1 M.2 M-key slot, 4 SATA slots, -40 to 70°C operating temp., 2 DA-PWR-120-LV
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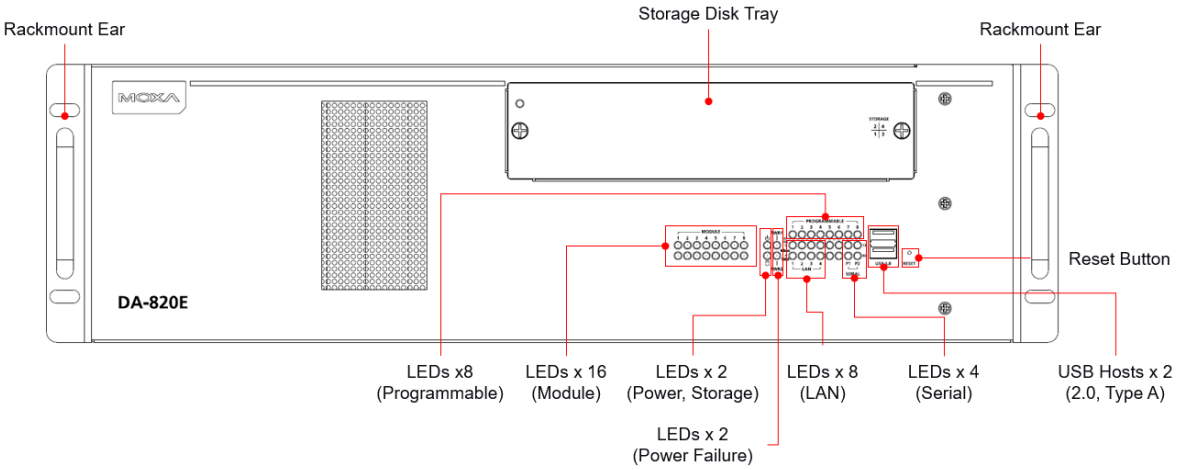
Power Modules

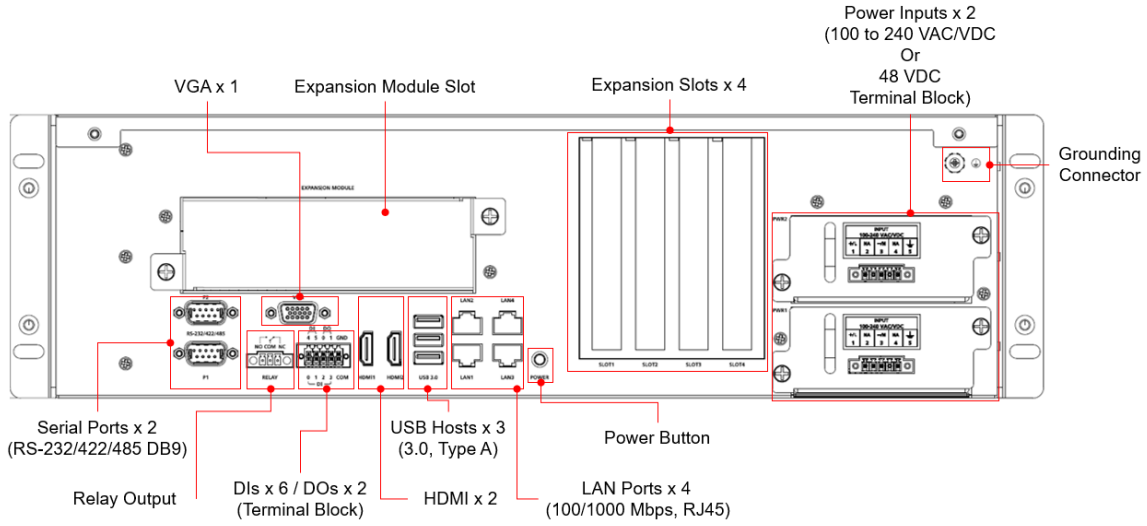
- DA-PWR-150-HV: Hot-swappable power-supply module (100 to 240 VAC/VDC) with system power input and terminal block for DA-820E computers
- DA-PWR-120-LV: Hot-swappable power-supply module (48 VDC) with system power input and terminal block for DA-820E computers

Appearance

Front View

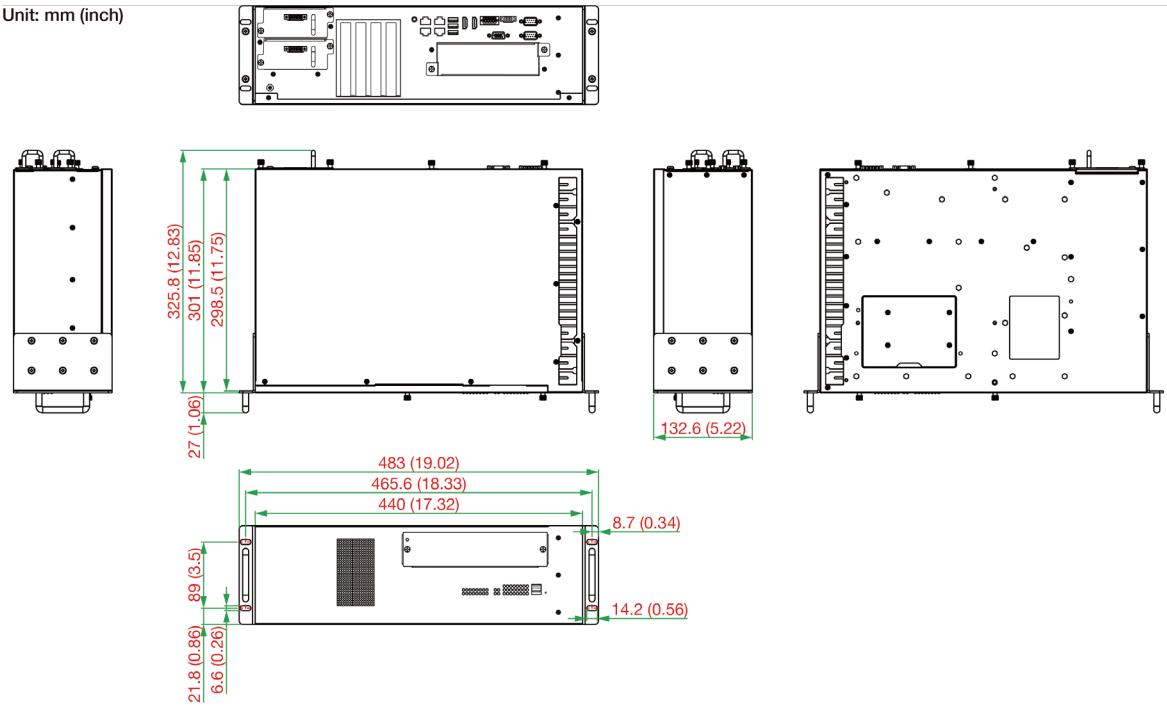


Rear View



Dimensions

Unit: mm (inch)



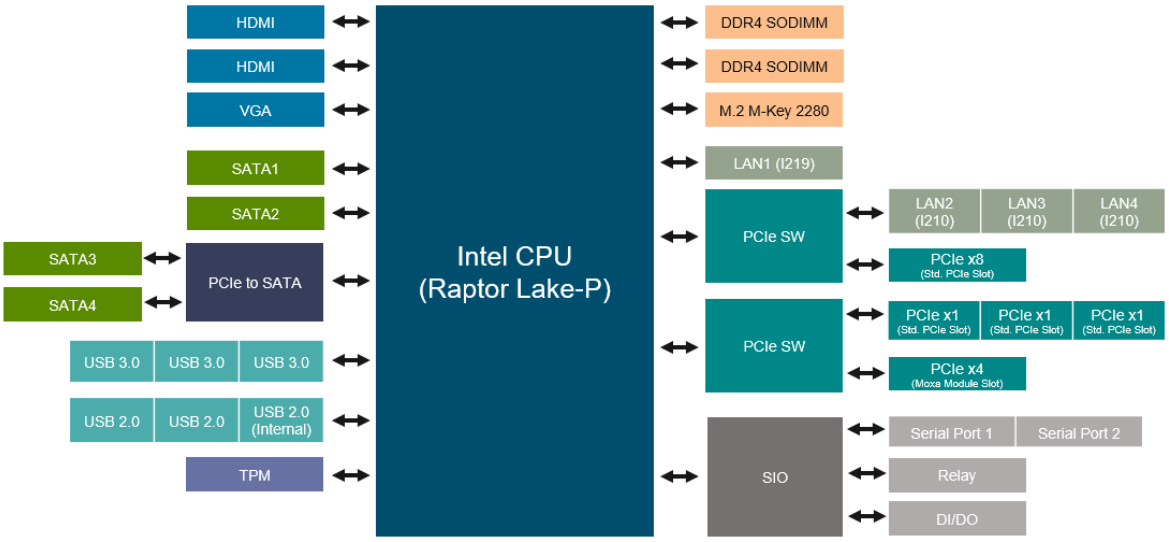
Features

The DA-820E computer has the following features:

- 13th Gen Intel® Core™ CPU (Raptor Lake-P)
- Hot-swappable redundant power supply
- 2 built-in DDR4 memory sockets for up to 64 GB capacity
- 2 x USB 2.0 and 3 x USB 3.0 type A ports for high-speed peripherals
- 1 PCIe x8 (4-lane), and 3 PCIe x1 slots for expansion modules
- 4 x hot swappable 2.5” SSD slots, supported by Intel® RST RAID 0/1 for slot 1 and 2
- IEC 61850-3, IEEE 1613, and IEC 60255 compliant for power substation automation systems
- EN 50121-4 compliant for railway wayside applications
- 2 x HDMI + 1x VGA
- 6 x DI/ 2 x DO and alarm relay

Hardware Block Diagram

DA-820E Basic System



Hardware Specifications

NOTE

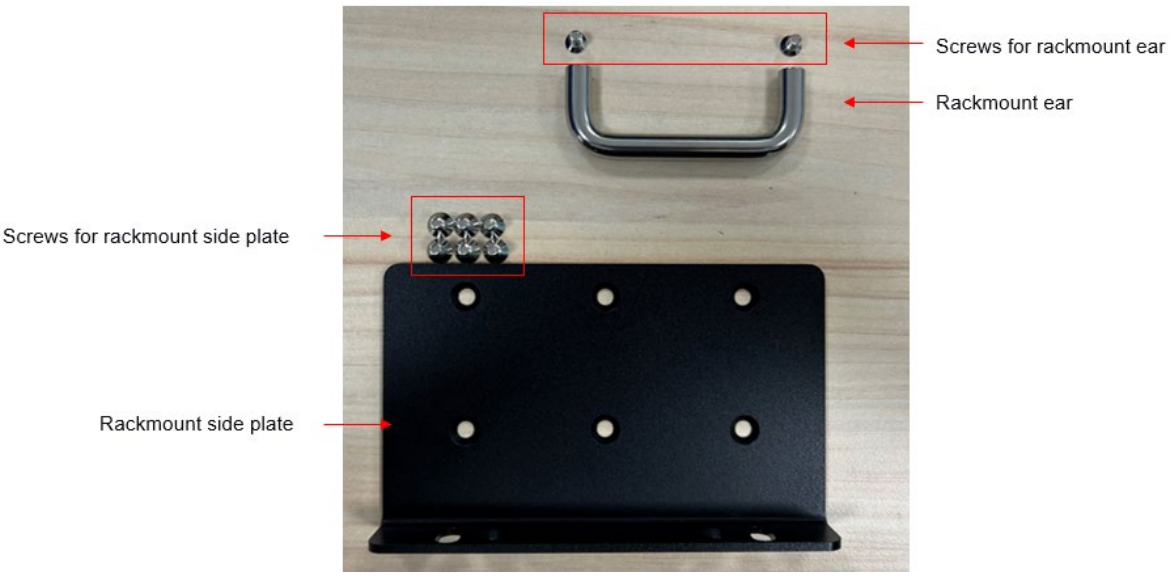
The latest specifications for Moxa's products can be found at https://moxa.com.

2. Hardware Installation

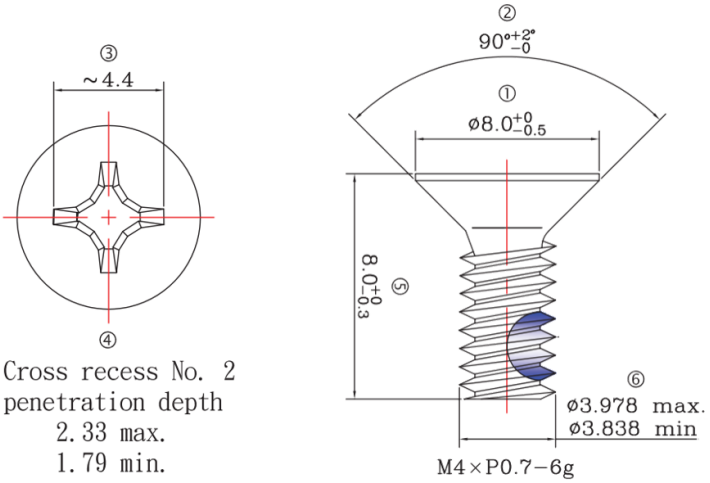
The DA-820E embedded computers are compact and rugged, making them suitable for industrial applications. The LED indicators allow users to monitor performance and identify trouble spots quickly, and multiple ports are provided for connecting a variety of different devices. The DA-820E embedded computers come with a reliable and stable hardware platform that lets you devote the bulk of your time to application development. This chapter describes the hardware installation and connector interfaces of the DA-820E embedded computers.

Mounting the DA-820E on to a Rack

The DA-820E computer comes with a rack-mounting kit that includes the following items:

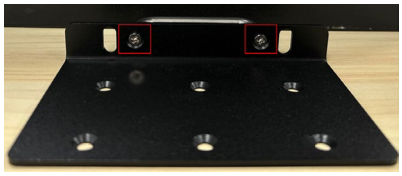


The 6 screws included in the package are of the following specifications:

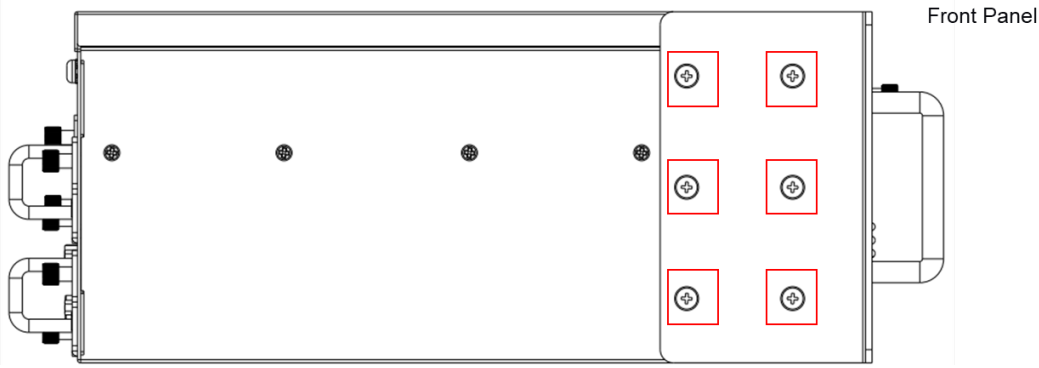


To install the rackmount ears, do the following:

1. Attach the rackmount ear to the side plate and fasten two screws tightly.
   Recommended Torque: 5.0 ±0.5 kgf-cm.



2. Attach the side plate to one side of the DA-820E computer and fasten six screws tightly.
   Recommended Torque: 23.0 ±0.5 kgf-cm.
3. Use the same method to install another Rackmount Ear Kit and attach it to the other side of the computer.



Wiring Requirements

The following common safety precautions should be observed before installing any electronic device:

- Power wires and communication/signal wires should be routed through separate paths. If power and communication/signal wires must cross paths, make sure the wires are perpendicular at the intersection point.

NOTE

Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- Use the type of signal transmitted through a wire to determine which wires should be bundled together and which should be kept separate. The rule of thumb is that wiring that carries similar electrical signals can be bundled together.
- When necessary, we strongly advise labeling the wiring for all devices in the system.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your device.

Electrical Current Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum rating, the wiring could overheat, causing serious damage to your equipment.

ATTENTION

Restricted Access Location

This equipment is intended to be used in Restricted Access Locations, such as a computer room. The access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the metal chassis of the equipment is so hot that service persons have to pay special attention or take special protection before touching it. Further, access should be through the use of a key or security identity system. Only authorized well-trained professionals can access the restricted access location.

ATTENTION

Hot Surfaces

External metal parts are hot!! Before touching it, special attention or protection is necessary.

Connecting the Power

The DA-820E features dual power inputs via a terminal block located on the rear panel. To establish a power connection, users should attach the power cord wires to the corresponding ports and securely tighten them. Upon successful power connection, the Power LED will illuminate, indicating that power is being supplied to the DA-820E. Subsequently, the BIOS will initialize the flash disk module, resulting in the Storage LED blinking. The operating system boot-up process typically takes between 30 to 60 seconds to complete.

ATTENTION

This product is intended to be supplied by a listed power supply with the output marked with and rated to deliver the following:

Listed power rating:

- 240 VAC at a maximum of 0.66 A
- 240 VDC at a maximum of 0.66 A
- 100 VAC at a maximum of 1.75 A
- 100 VDC at a maximum of 1.65 A
- 48 VDC at a maximum of 3.12 A

Maximum Tma = 70°C

ATTENTION

Before connecting the DA-820E computer to an AC/DC power source, ensure that the AC/DC power source voltage is stable.

The wiring for the input terminal block shall be installed by qualified and experienced professionals.

- Wire type: Cu, FW2
- Wire size: 18-12 AWG

Use only one conductor in a clamping point between the AC power source and the power input.

The rear panel is equipped with a Power button for power on the computer from sleep or hibernate mode.

Wiring the Power Inputs

To establish a power connection, insert the power cord wires in the correct terminals and tighten the screws to secure the wires. Refer to the following diagrams and table for a detailed description of the power input wiring terminals.

> **NOTE**
>
> The PWR1/PWR2 LEDs on the front panel will turn on if the computer loses power. For details on power LED behavior, refer to the *LED Indicators* section.

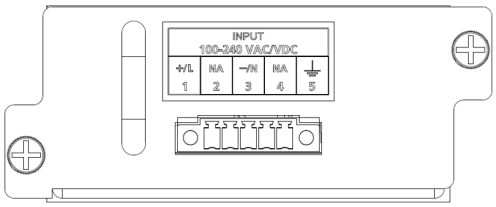
Installing/removing the Hot-swappable Power Supply

To install the hot-swappable power supply, insert it into either the PWR1 or PWR2 slot. Ensure that the power supply is inserted all the way into the slot. Secure the power supply by fastening screws on both sides.

Recommended Torque: 5.0 ±0.5 kgf-cm.

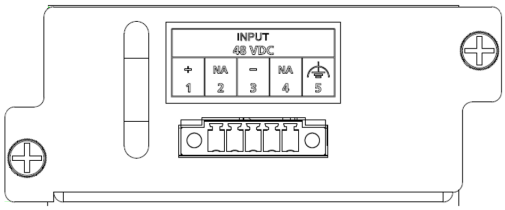
To remove the power supply, first unfasten the two screws. Then, grasp the handle of the power supply and gently pull it out of the slot.

DA-PWR-150-HV



Applicable Products: DA-820E-C3-H-T, DA-820E-C3-HH-T, DA-820E-C5-H-T, DA-820E-C5-HH-T, DA-820E-C7-H-T, and DA-820E-C7-HH-T.

DA-PWR-120-LV

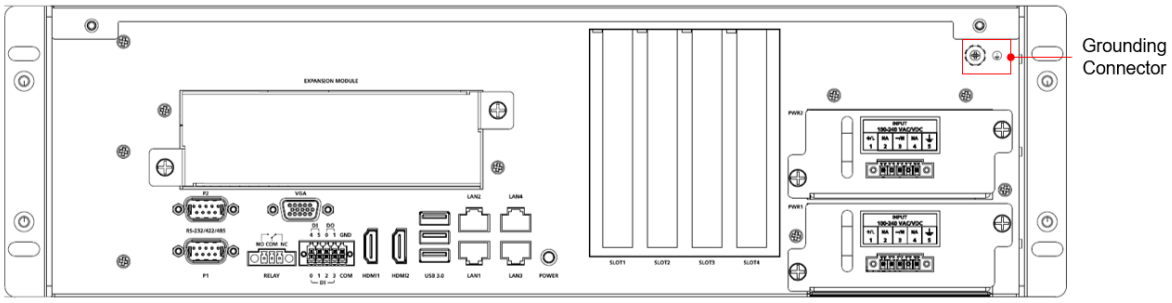


Applicable Products: DA-820E-C3-L-T, DA-820E-C3-LL-T, DA-820E-C5-L-T, DA-820E-C5-LL-T, DA-820E-C7-L-T, DA-820E-C7-LL-T.

Terminal Number	Description	Note
1	Power Line	**PWR Line** is connected to the **Line (L)** terminal for the AC power source.
	Power Positive	**PWR Positive** is connect to the + terminal for the DC power source
2	NA	No function
3	Power Neutral	**PWR Neutral** is connected to the **Neutral (N)** terminal for the AC power source.
	Power Negative	**PWR Negative** is connect to the – terminal for the DC Power
4	NA	No function
5	Bond Earth	**Bond Earth** is connected to the **Chassis Ground** via a jumper on the terminal block.

Grounding the Chassis

There is a grounding connector located on the DA-820E's rear panel.

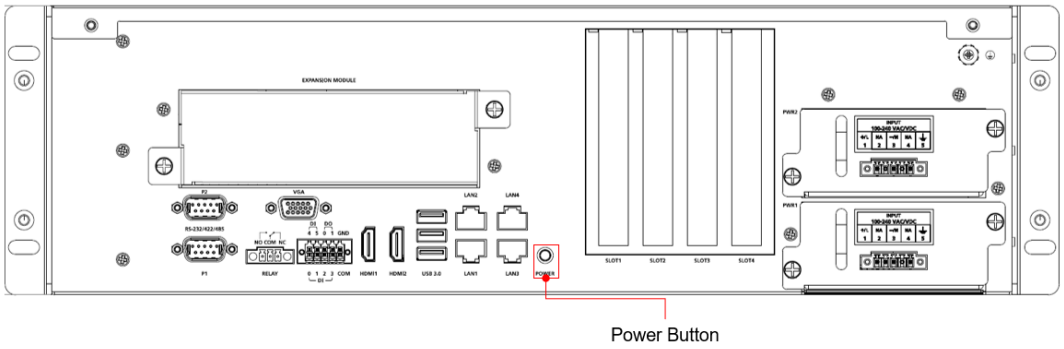


Connect the connector to the chassis ground source.

> **ATTENTION**
>
> If protective earthing is used as a safeguard, the instructions shall require connection of the equipment protective earthing conductor to the installation protective earthing conductor (for example, by means of a power cord connected to a socket-outlet with earthing connection).

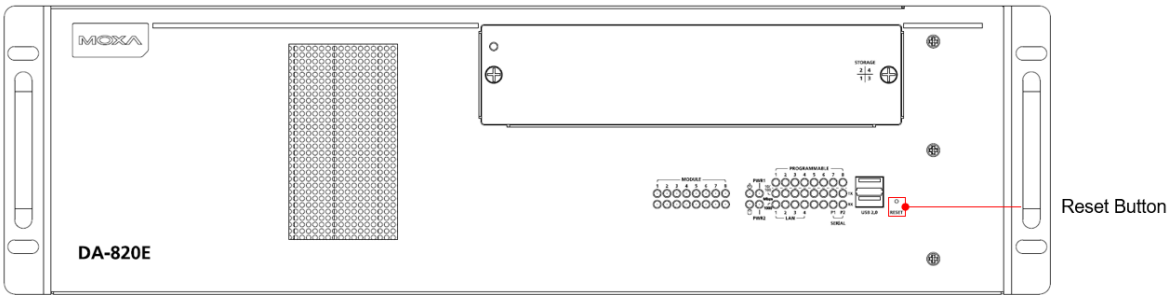
Power Button

There is a power button on the rear panel, allowing users to press the button to power on the computer again in case the computer is in sleep or hibernate mode.



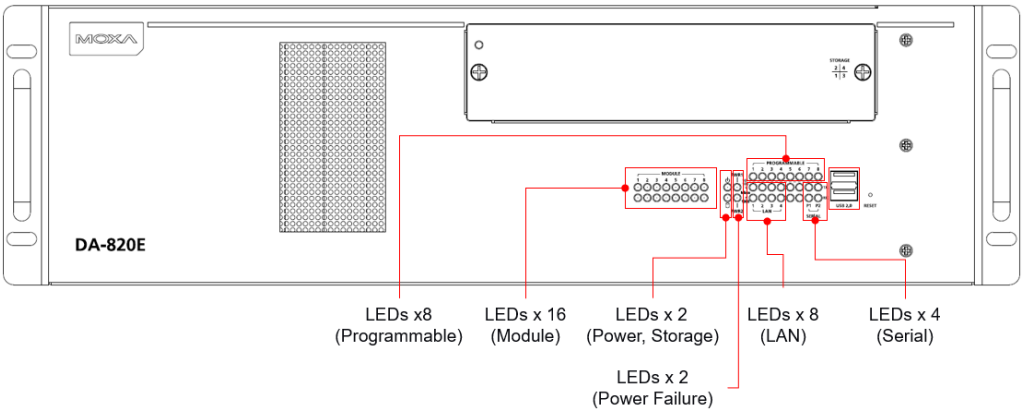
Reset Button

Pressing the Reset button initiates a hardware warm reboot. After pressing the reset button, the system will reboot automatically. During normal use, you should NOT use the Reset Button. You should only use this button if the software is not working properly. To protect the integrity of data being transmitted or processed, you should always reset the system from the operating system with the software reboot function.



LED Indicators

There are 40 LED indicators on the front panel of the computer.



Information about each LED indicator is given in the following table:

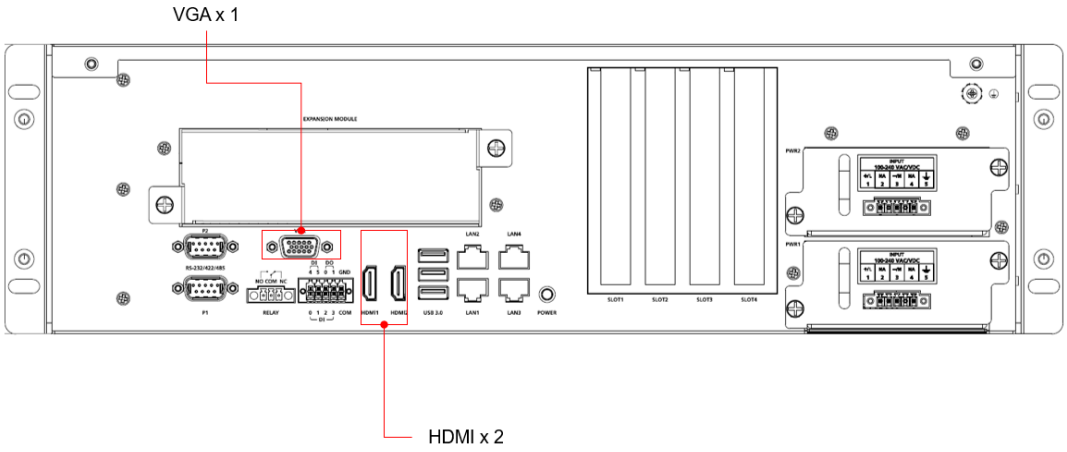
LED	Color	Status	Function
Power	Green	On	Power is on
		Off	No power
Storage	Yellow	Steady On	Slot 3 and 4 only: The SSD is connected
		Blinking	Data is being written to or read from the SSD
		Off	No activity
PWR1	Red	Off	The 1st power supply is plugged in and active
		On	Error in the 1st power supply
PWR2	Red	Off	In dual power supply mode, the 2nd power supply is plugged in and active
		On	Error in the 2nd power supply
Gigabit LAN LEDs 1 to 4	Green	Steady On	10/100 Mbps Ethernet link
		Blinking	Data is being transmitted or received
	Yellow	Steady On	1000 Mbps Ethernet link
		Blinking	Data is being transmitted or received
	Off	Off	No activity
Serial Port P1/P2	Green	On	Tx: Serial data is being transmitted
	Yellow	On	Rx: Serial data is being received
Module LEDs 1 to 8	Green/ Yellow	Steady On	Reserved for LAN-port and serial-port expansion cards
		Blinking	
Programmable LEDs 1 to 8	Green	Steady On	Indicator of statuses or for debugging, as defined by users.
		Blinking	

Connecting Displays

The DA-820E comes with one VGA interface that uses D-Sub 15-pin female connectors. In addition, two HDMI interfaces are provided on the rear panel.

Display Resolutions

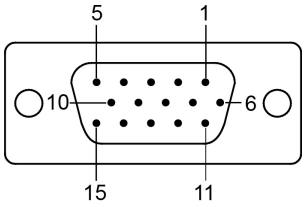
- HDMI up to 3840 x 2160 resolution at 60 Hz
- VGA up to 1920 x 1200 resolution at 60 Hz



NOTE

For optimal video streaming reliability, we recommended using premium certified HDMI cables.

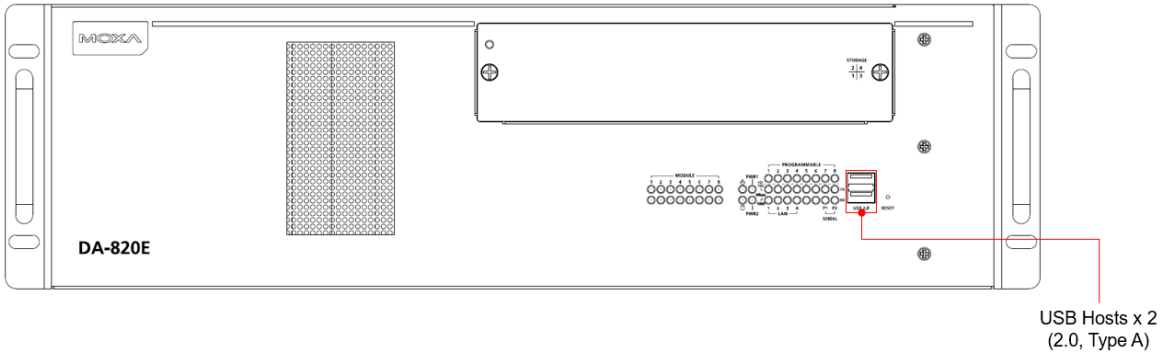
The pin definitions of the VGA connector are listed in the following table:

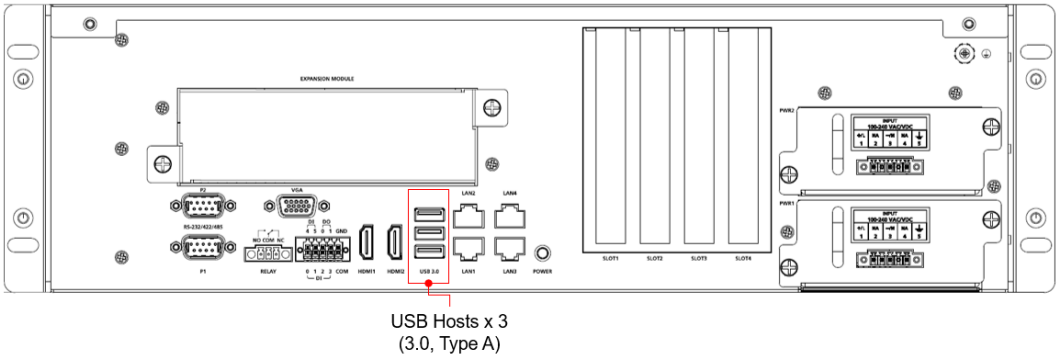


Pin No.	Signal Definition
1	RED
2	GREEN
3	BLUE
4	NC
5	GND
6	GND
7	GND
8	GND
9	VCC
10	GND
11	NC
12	DDC Data
13	HSYNC
14	VSYNC
15	DDC Clock

Connecting USB Devices

The DA-820E comes with 2 USB 2.0 ports on the front panel and 3 USB 3.0 ports on the rear panel. The USB ports can be used to connect to other peripherals, such as flash drives to expand the system's storage capacity. In addition, both USB ports support system bootup, which can be configured in the BIOS settings. See **Chapter 3: BIOS Setup** for details.



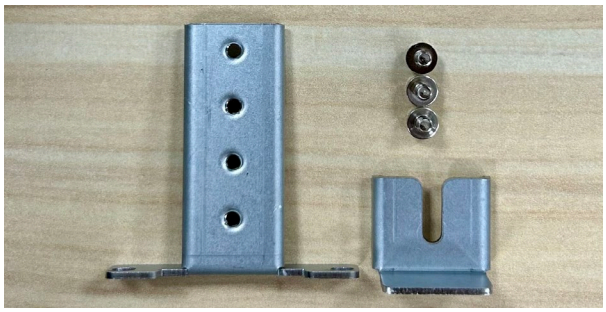


Installing a USB Dongle Kit

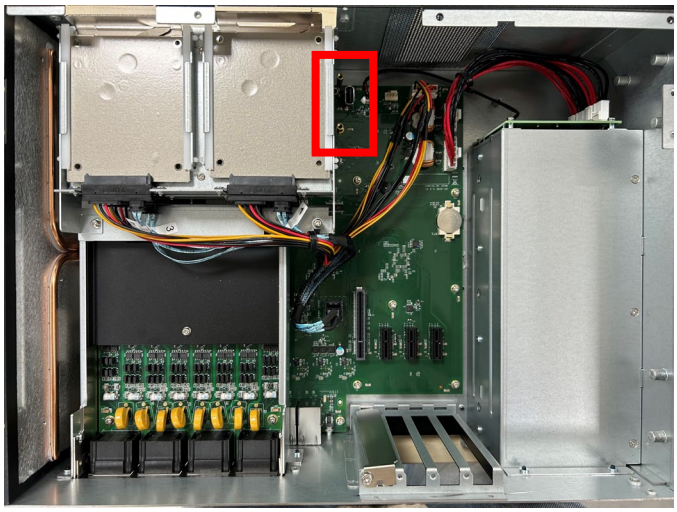
You can use a USB Dongle Kit to secure your USB dongle inside your DA-820E computer.

To install a USB Dongle Kit inside your DA-820E computer, do the following:

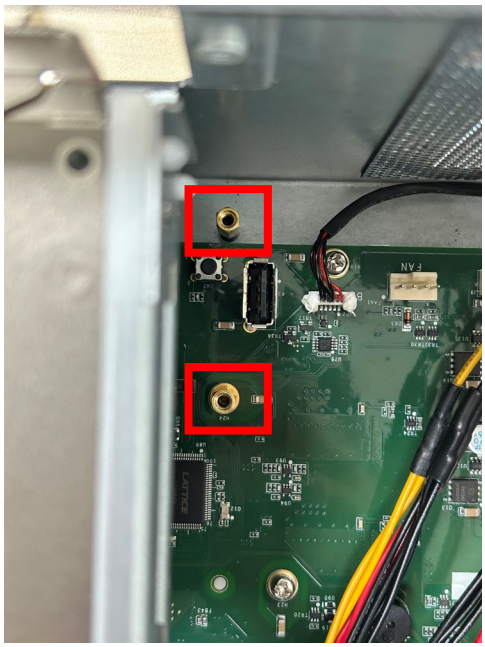
1. Power off the DA-820E computer and remove the upper cover of the computer.
2. The USB Dongle Kit includes a USB mounting bracket, a U-shaped bracket, and 3 screws.

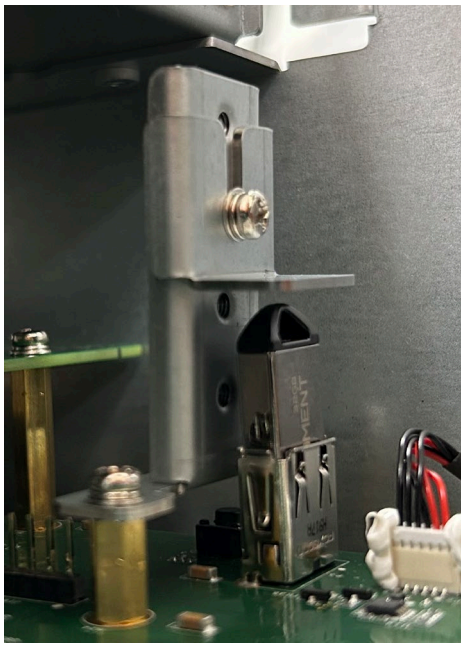


3. The internal USB slot is next to the SSD tray case.



4. Attach the USB device to the USB port inside the DA-820E computer.





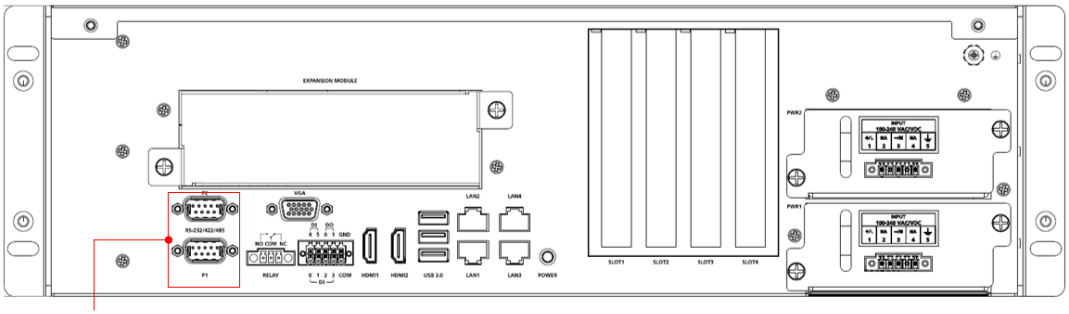
5. Replace the top cover of the computer.

NOTE

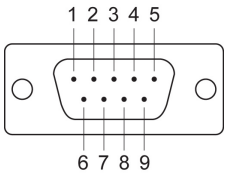
The maximum dimensions of the USB flash drives should not exceed 16 x 8 x 43 mm (L x W x H).

Serial Ports

The DA-820E comes with 2 software-selectable RS-232/422/485 serial ports on the rear panel.

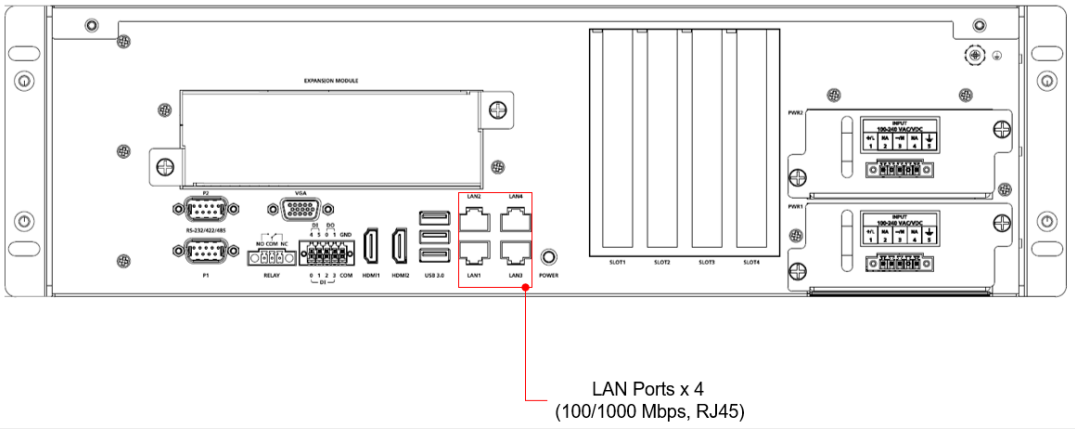


Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	–
2	RxD	TxDB(+)	TxDB(+)	–
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	–	–	–
7	RTS	–	–	–
8	CTS	–	–	–

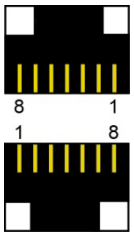


Gigabit LAN Ports

The DA-820E has 4 Gigabit LAN ports. When a LAN cable is properly connected, the LEDs on the front panel will glow to indicate a proper connection.



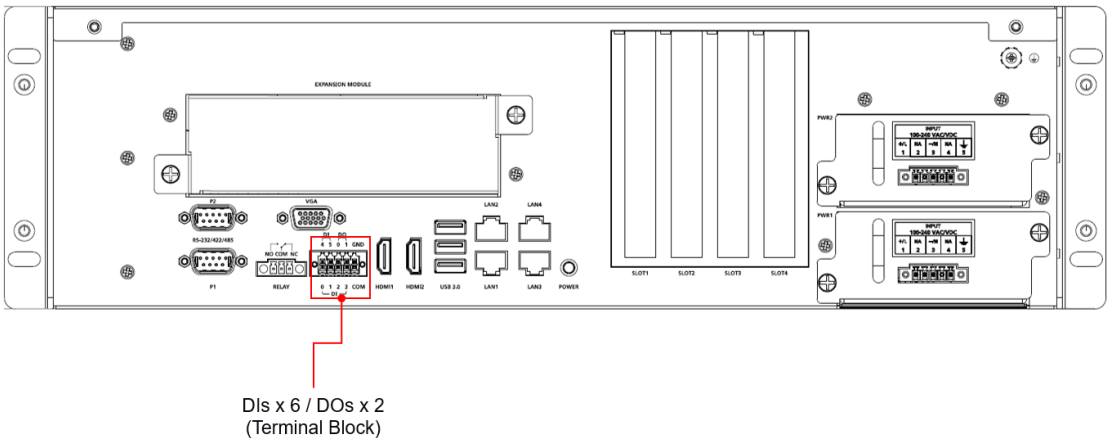
Refer to the following figure and table for the pin sequence and definitions.



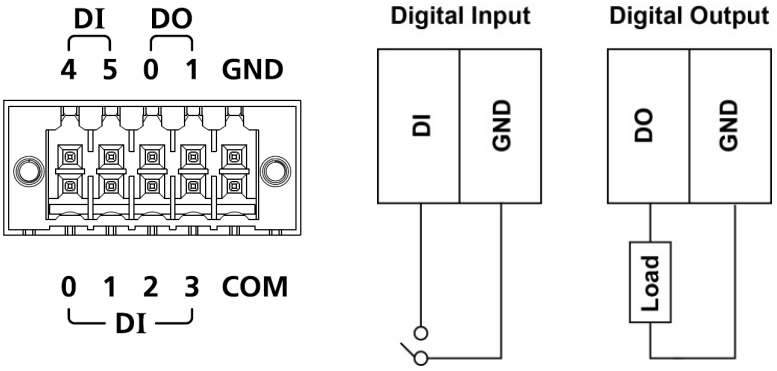
Pin	10/100 Mbps	1000 Mbps
1	Tx+	TRD(0)+
2	Tx-	TRD(0)-
3	Rx+	TRD(1)+
4	–	TRD(2)+
5	–	TRD(2)-
6	Rx-	TRD(1)-
7	–	TRD(3)+
8	–	TRD(3)-

Digital Inputs/Digital Outputs

The DA-820E comes with six digital inputs and two digital outputs in a terminal block. Refer to the following figure for the location of the DI/DO connectors.

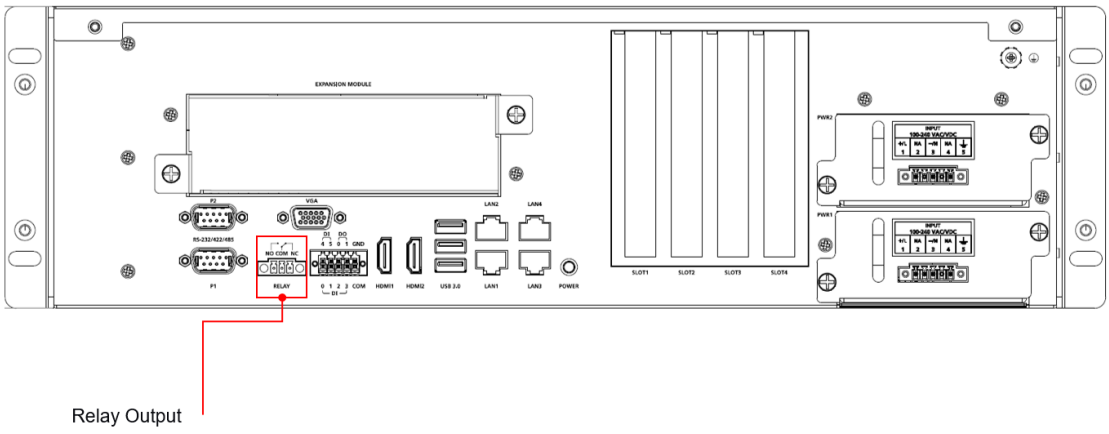


For pin definitions and wiring methods, see the figures below.

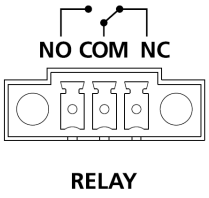


Relay Output

The DA-820E provides a relay output located on the rear panel of the computer.

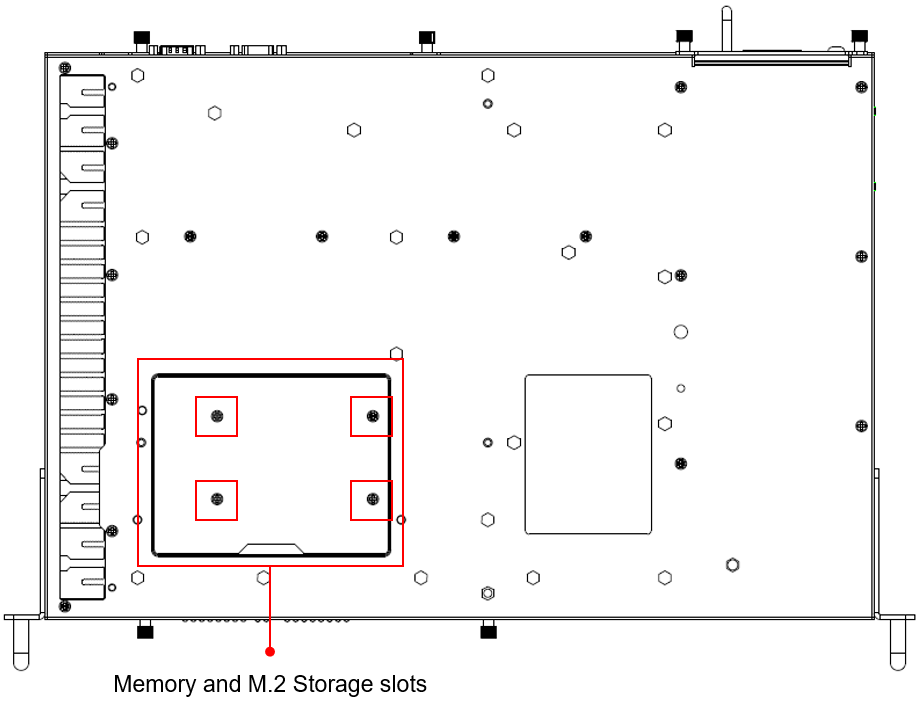


Refer to the figure on the right for detailed pin definition of the relay output connectors.



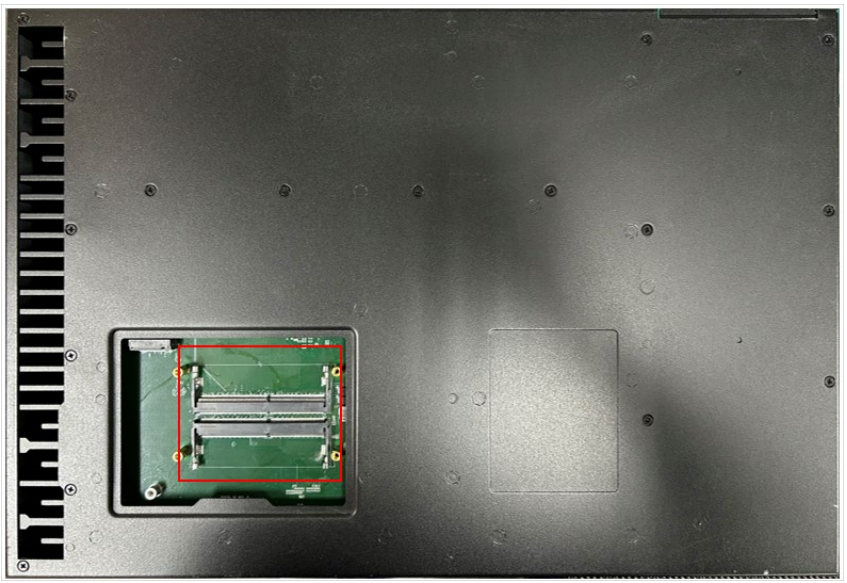
Installing Memory and M.2 Storage

The DA-820E embedded computer supports 2 DDR4 3200 SODIMM modules, for up to 64 GB of memory (2 slots, each with 32 GB, non-ECC type) and 1 M.2 M-Key 2280 slot. The slots are located on the bottom side of the DA-820E. To insert DDR4 memory and M.2 storage, please follow the following instructions:

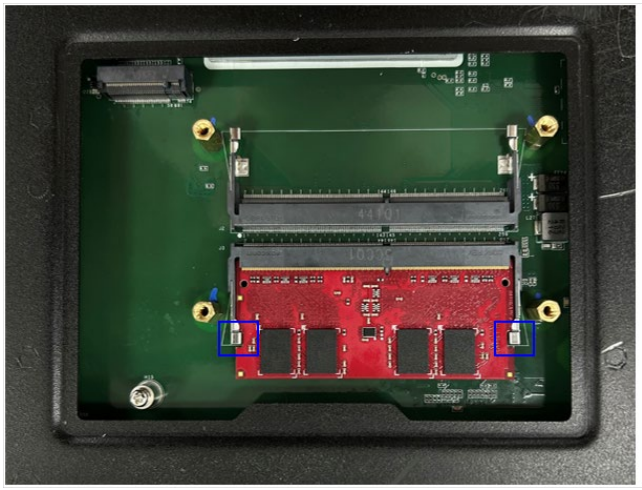


Memory and M.2 Storage slots

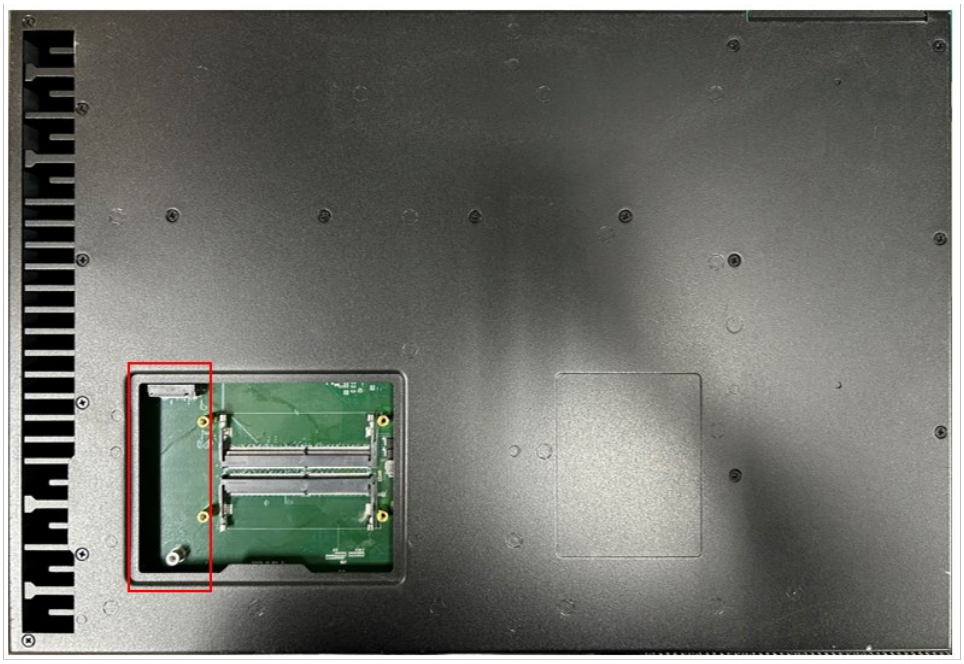
1. Disconnect the DA-820E from its power source.
2. Unfasten the screws on the bottom of the computer, and then take off the cover.
3. Find the location of the DDR4 slots to insert memory modules.



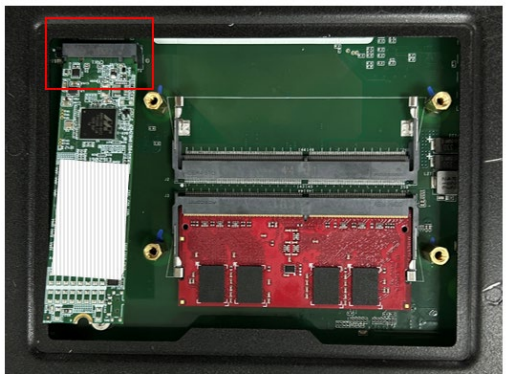
4. If a memory module is already installed in the socket, push the two fasteners to free it and then remove it. Insert the new memory module into the socket, making sure you insert the memory in the correct direction. Push down the memory module, making sure that the two fasteners snap in place and hold the module firmly.

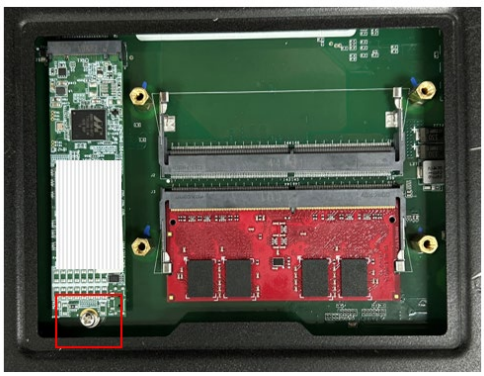


5. Find the location of the M.2 slot.



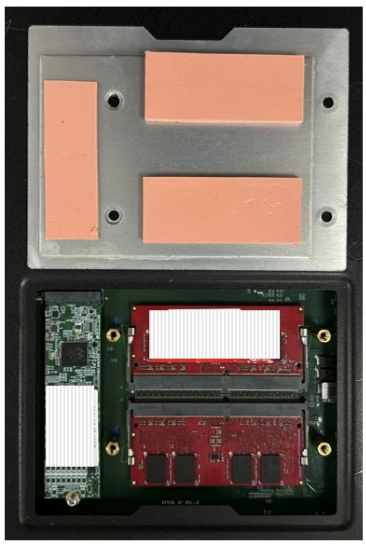
6. Insert the M.2 storage card into the slot and fasten the screw to secure the M.2 storage.

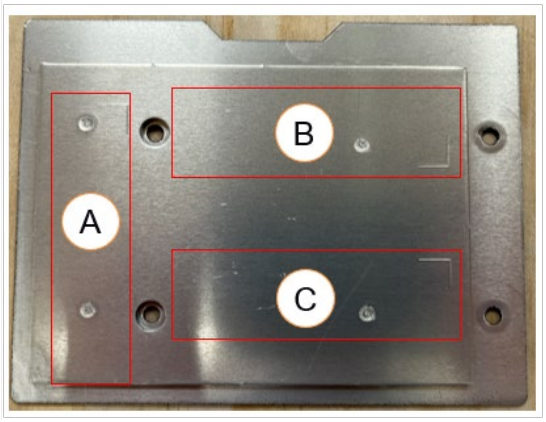




7. Stick the thermal pads on to the storage drive at the positions A, B, and C indicated in the following image.

   Remove the transparent liners on the thermal pad and stick that side on to the storage drive.





Location	Dimension (L x W x H) of the Thermal Pads
A	60 x 20 x 1.5 mm
B	60 x 25 x 5.5 mm
C	60 x 25 x 5.5 mm

8. When finished, close the cover and fasten the screws.

   Recommended Torque: 5.0 ±0.5 kgf-cm.

ATTENTION

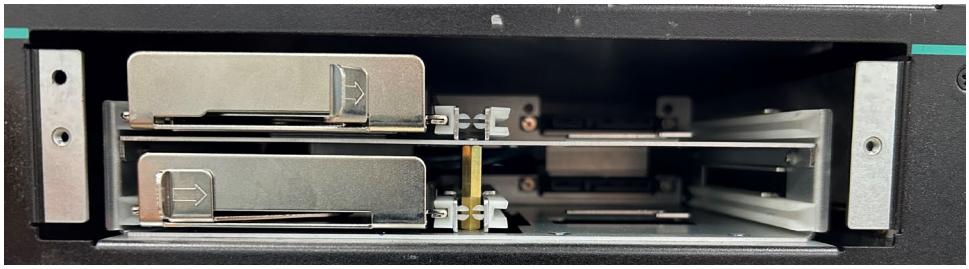
The DA-820E rackmount computer does not support the M.2 storage hot swap and PnP (Plug and Play) functions. It is necessary to remove the power source first before inserting or removing the M.2 storage card.

Installing SATA Hard Disks

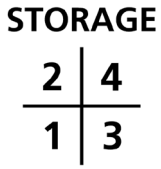
The DA-820E comes with four SATA slots that allow users to install four 2.5” SATA HDD/SSD in the computer. Follow these steps to install a SATA disk.

1. Unfasten the screw on the storage disk tray and remove the tray door.

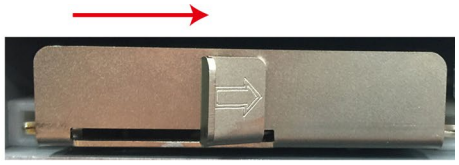
2. There are four disk trays available.



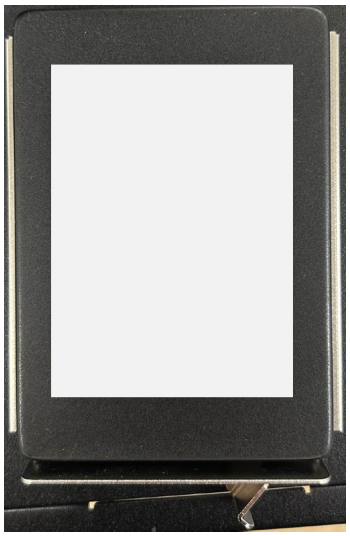
The installation sequence of the disks is indicated in the diagram below.



3. Each storage disk tray comes with a clutch. Pull the clutch to the right to take out the tray.

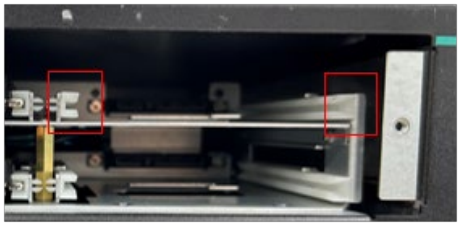


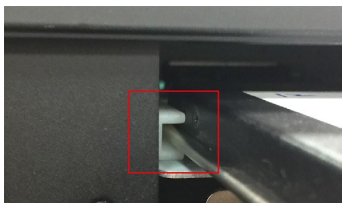
4. Place the SATA disk on the tray.



5. Turn back to the rear side of the tray and fasten four screws. See the following diagram for details.

6. There are two plastic rails inside the slot. Make sure to insert the storage tray into the rails.





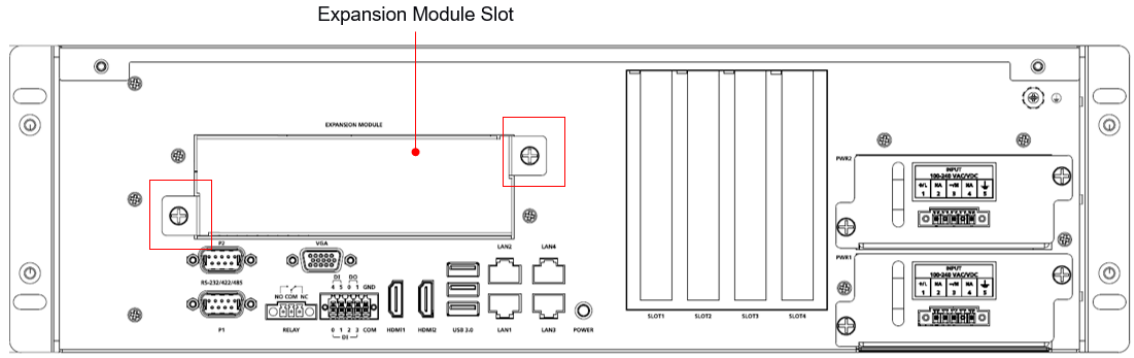
7. Push the disk tray into the computer; make sure the storage tray has been successfully inserted. Use the same method to install other three disks if necessary.

8. Restore the storage tray door to complete.
   Recommended Torque: 5.0 ±0.5 kgf-cm.

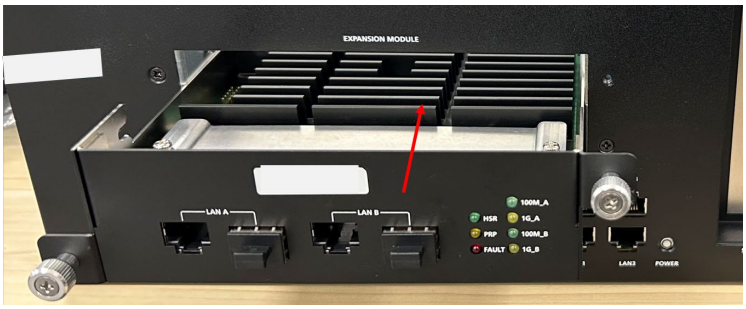
Installing Moxa Proprietary Expansion Modules

The DA-820E comes with an expansion slot, allowing users to install various expansion modules such as Gigabit Ethernet module and serial communication module. Follow these steps.

1. Unfasten the two screws on the module plate, and then remove the plate.



2. Insert the expansion module into the slot.



3. Make sure the module has been successfully inserted. Fasten the screws to complete.
   Recommended Torque: 5.0 ±0.5 kgf-cm.

ATTENTION

Please ensure to power off the computer first and then install/remove the expansion modules.

Inserting PCIe Modules

The DA-820E computer comes with four slots supporting PCIe interfaces. The following modules are supported.

Standard PCIe Interface Expansion Cards

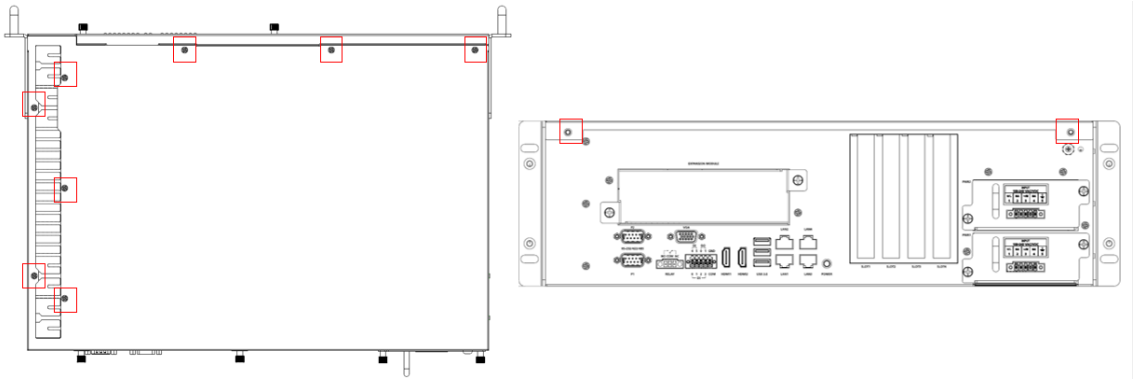
- **DA-PRP-HSR-I210:** 2-port Gigabit Ethernet expansion module compliant with IEC62439-3 protocol for Moxa DA-820 series industrial computers
- **DA-GX02-SFP-T:** 2-port 1000 Mbps fiber card, SFP slot x 2, PCIe interface (SFP module excluded)

Moxa Proprietary Expansion Modules

- **DN-PRP-HSR-I210:** 2-port Gigabit Ethernet expansion module compliant with IEC62439-3 protocol for Moxa DA-820 series industrial computers
- **DN-FX04:** 4-port 100M/1000M SFP Ethernet module
- **DN-LN04-RJ:** 4-port 10/100/1000 Mbps PCIe LAN module with RJ45 connectors
- **DN-SP08-I-TB:** 8-port software-selectable RS-232/422/485 PCIe serial module with terminal-block connector
- **DN-SP08-I-DB:** 8-port software-selectable RS-232/422/485 PCIe serial module with DB9 connector

To install the modules, do the following:

1. Unfasten the screws on the rear panel and the top cover (total 10 screws) and remove the top cover.

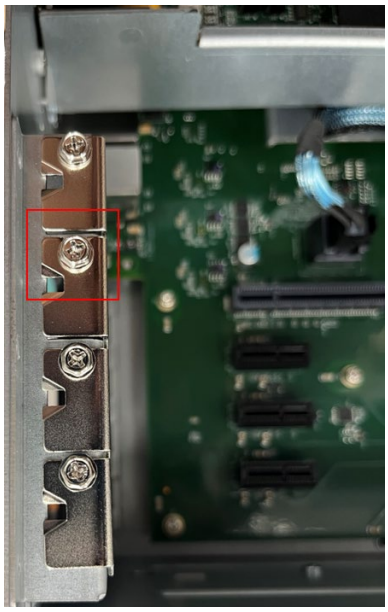


2. Find the location of these slots.

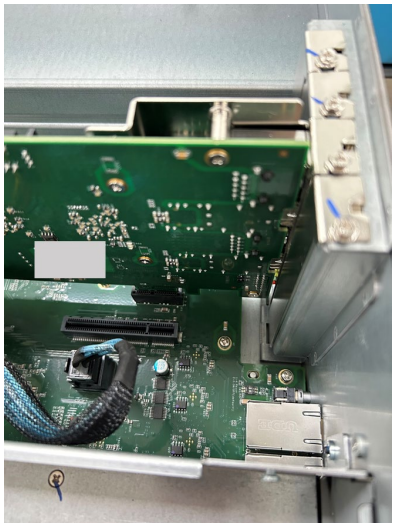
Refer to the following table for the interface details of each slot (from left to right)

Slot 1	Slot 2	Slot 3	Slot 4
PCIe x8 (4-lane) Gen. 3	PCIe x1 Gen. 3	PCIe x1 Gen. 3	PCIe x1 Gen. 3

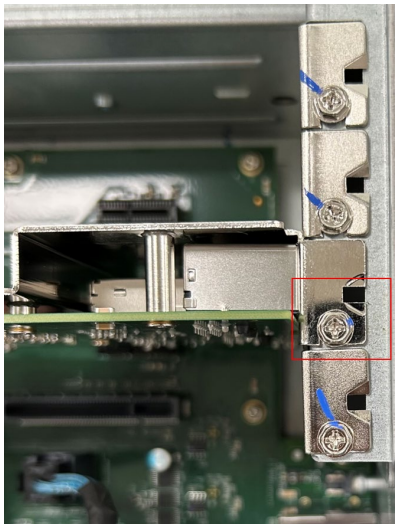
3. To insert the module, remove the screw on the protection plate first, and then remove the plate.



4. Insert the module on the slot carefully. Make sure the module has been successfully inserted.



5. Fasten the screw on the module.
   Recommended Torque: 5.0 ±0.5 kgf-cm.



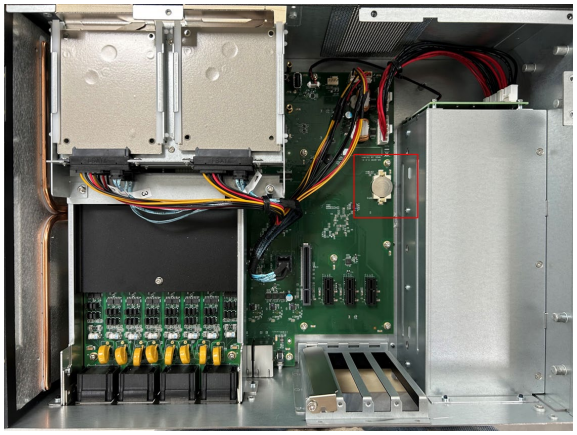
6. Restore the upper cover and fasten the screws to complete.
   Recommended Torque: 5.0 ±0.5 kgf-cm.

> **ATTENTION**
>
> Please ensure to power off the computer first and then install/remove the PCIe/PCI modules.

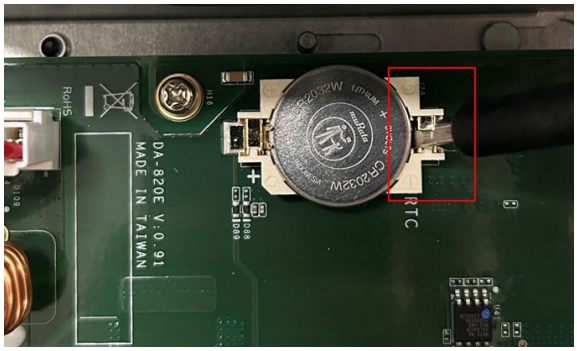
RTC battery

The DA-820E Series uses CR2032W for RTC battery. Please follow the instructions to replace the battery.

1. Remove the upper case and find the RTC battery located next to the power supply case.

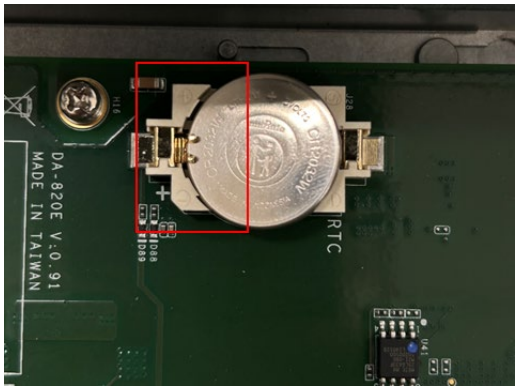


2. Use a flathead screwdriver and insert it into the circled area.



3. Push downward and release the battery from the holder.

4. Slide the battery into the holder from the left and push downward to secure the battery.



5. Restore the upper cover and fasten the screws to complete.

ATTENTION

There is a risk of explosion if the wrong type of battery is used. To avoid this potential danger, always be sure to use the correct type of battery. Contact the Moxa RMA service team if you need to replace your battery.

Caution

There is a risk of explosion if the wrong type of battery is used. Dispose of used batteries according to the instructions on the battery.

3. BIOS Setup

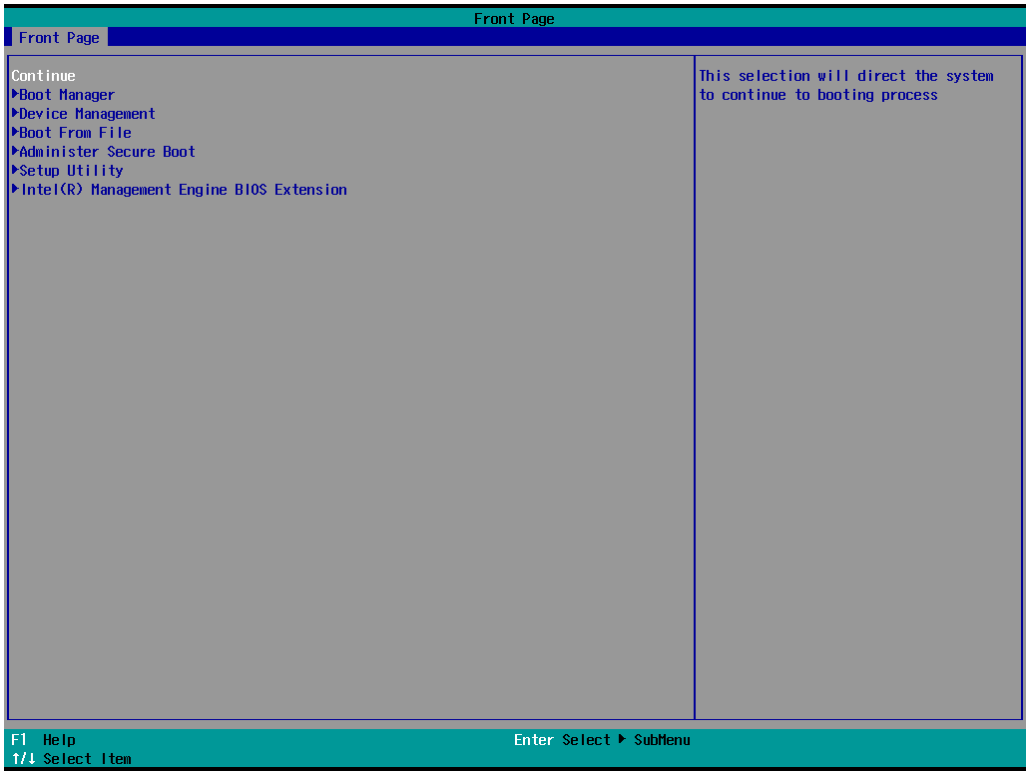
In this chapter, we describe the BIOS settings for the DA-820E computer. The BIOS is a set of input/output control routines for peripherals to initialize the basic settings. The BIOS helps boot the system before the operating system is loaded. The BIOS setup allows the user to modify the system configuration for basic input/output peripherals. All the configurations are stored in the CMOS RAM, which has backup battery in case the computer is not connected to a power source. Consequently, the data stored in the CMOS RAM is retained when the system is rebooted, or the power is disconnected.

Entering the BIOS Setup

To enter the BIOS setup utility, press the F2 key while the system is booting up. The main BIOS Setup screen will appear. You can configure the following settings on this screen.

- **Continue:** Continue to boot up
- **Boot Manager:** Select the device for boot up
- **Device Management:** Enter the device configuration menu
- **Boot From File:** Select the UEFI boot up file
- **Administer Secure Boot:** Enter the Secure Boot menu
- **Setup Utility:** Enter the BIOS configuration menu
- **Intel® Management Engine BIOS Extension:** Enter the AMT configuration menu (not supported in models with Intel® Celeron® and Core™ i3 processors)

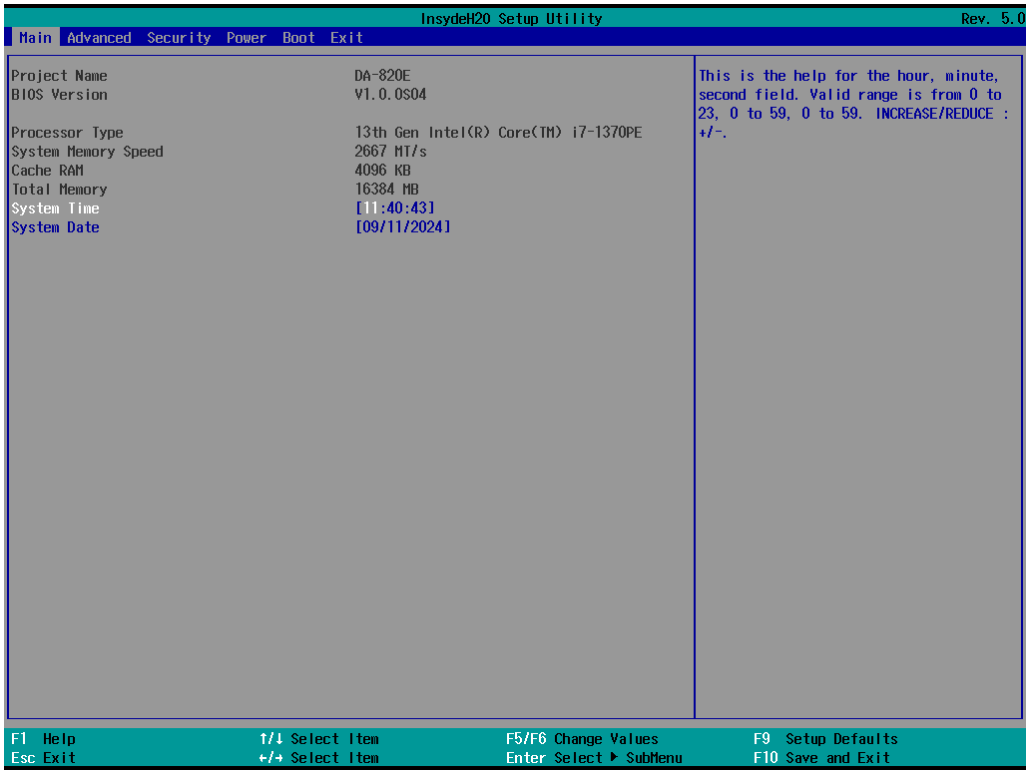
Select **F2** to enter the **BIOS configuration**.



When you enter the **Setup Utility**, a basic description of each function key is listed at the bottom of the screen. Refer to these descriptions to learn how to use them.

F1	**General Help**	**↑ ↓.**	**Select Item**
F5/ F6	**Change Values**	**←→**	**Select Menu**
F9	**Setup Defaults**	**ESC**	**Exit**
F10	**Save and Exit**	**ENTER**	**Select or go to Submenu.**

The BIOS configuration screen will be shown when you enter the **Setup Utility** option.

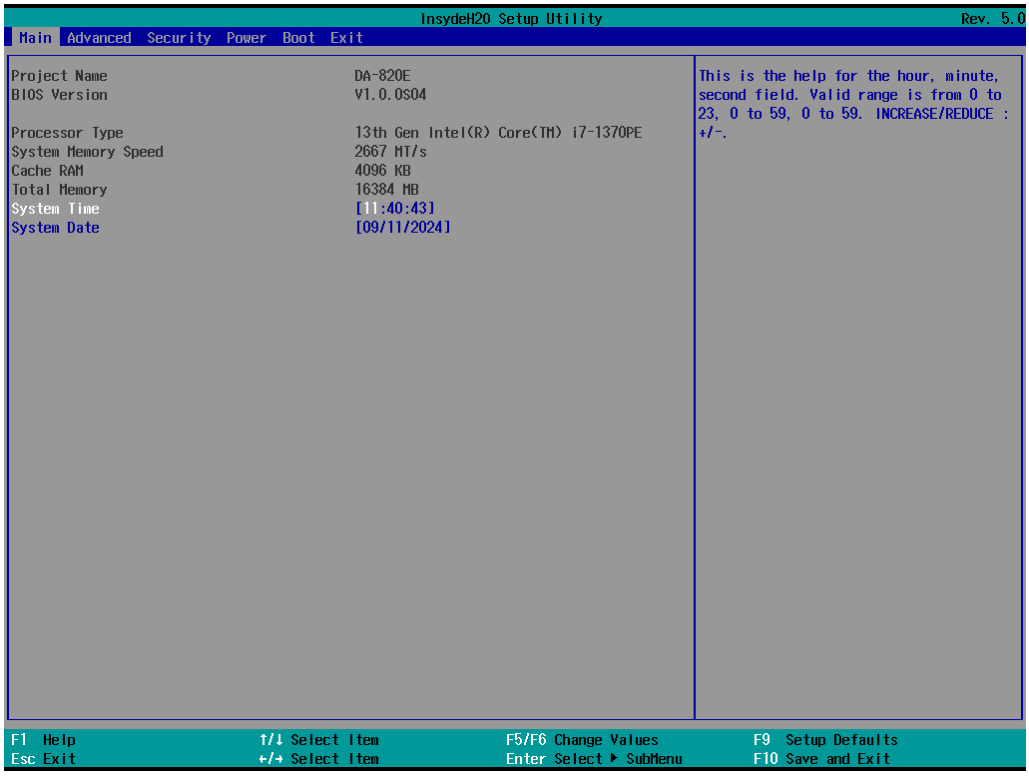


NOTE

The **Processor Type** information may vary depending on the model that you have purchased.

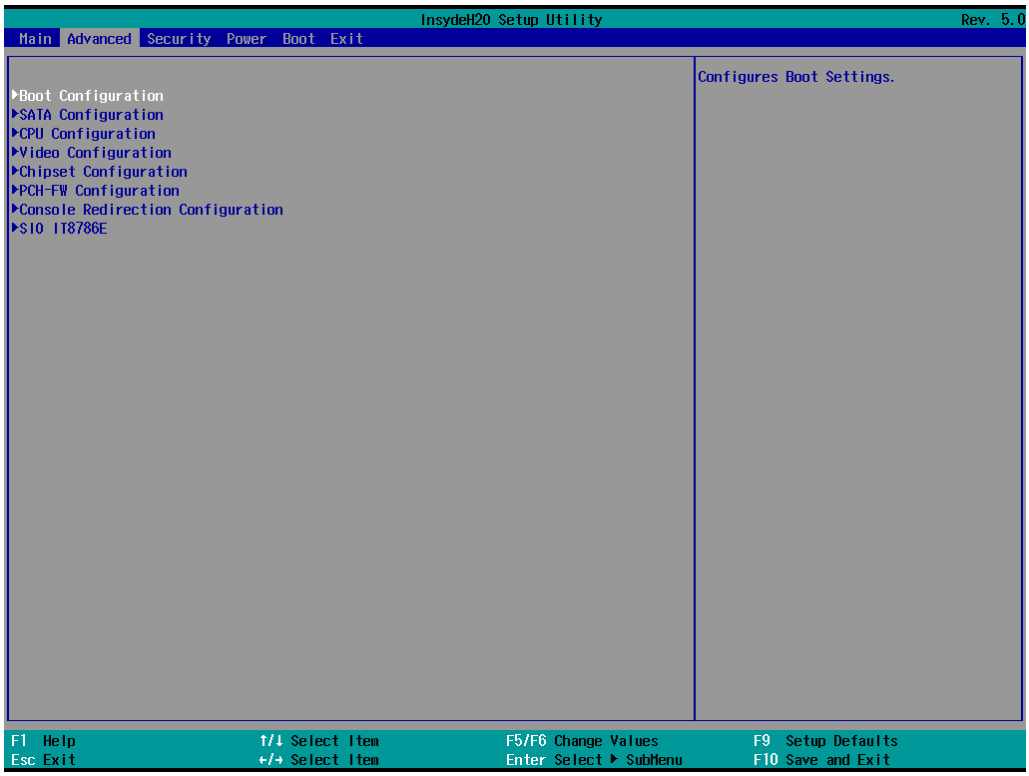
Main Page

The **Main** page displays basic hardware information, such as model name, BIOS version, and CPU type.



Advanced Settings

Select the **Advanced** tab in the main menu to open the advanced features screen.



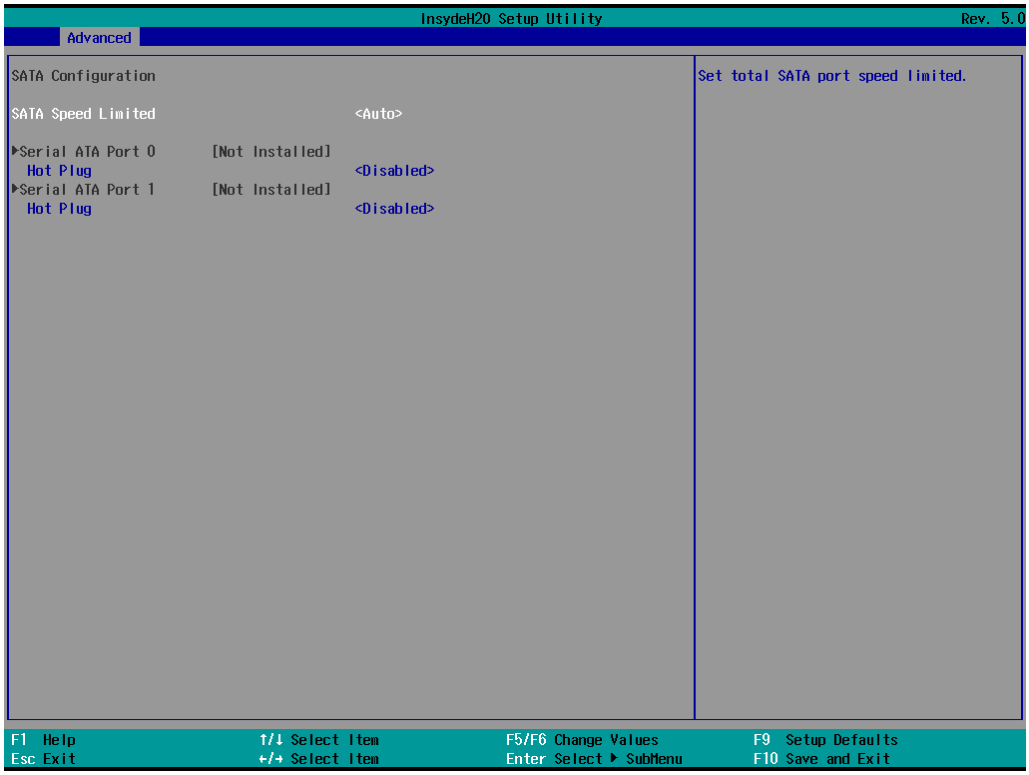
Boot Configuration

The **Numlock** option allows configuration of the Numlock value

Options: On (default), Off.

SATA Configuration

This section allows you to select the SATA speed limit and hot plug setting.



SATA Speed Limited

Options: Auto (default), Gen 1, Gen 2, Gen 3

Serial ATA Port

This setting displays information on the installed drives.

ATA Port Hot Plug

This setting allows you to enable/disable hot-plugging capabilities (the ability to remove the drive while the computer is running) that are configured by software for installed storage drives.

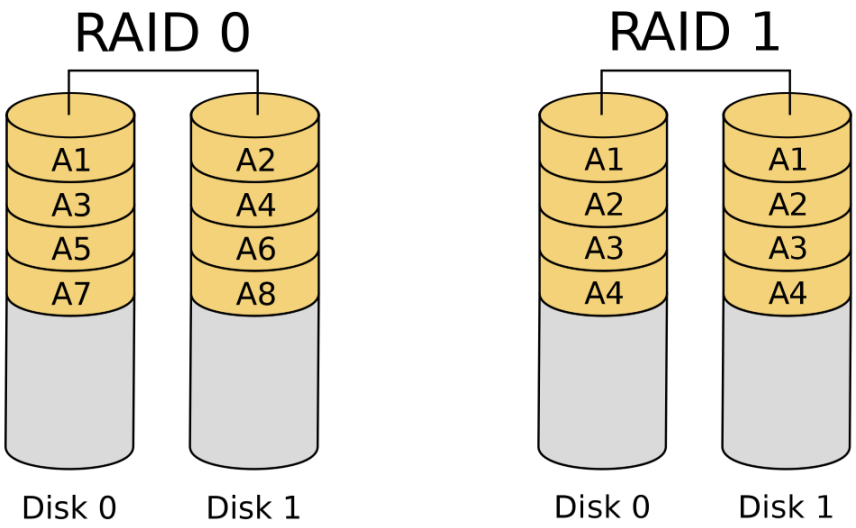
Options: Disabled (default), Enabled

RAID

You must enable the **Map SATA Root Port** under **VMD** for the redundant array of inexpensive disks technology. The device has two SATA interfaces that only support RAID level 0 and RAID level 1.

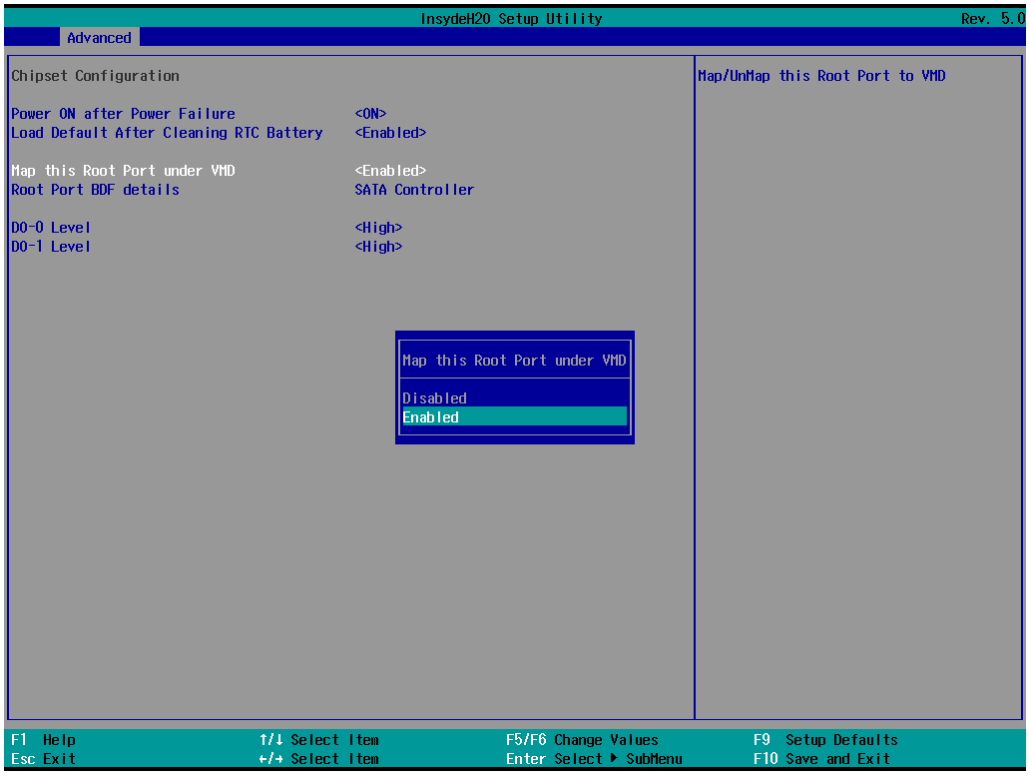
When using the continuous update policy, changes made to the data on the master drive while the system is not docked are automatically copied to the recovery drive when the system is re-docked. When using the on-request update policy, the master drive data can be restored to a previous state by copying the data on the recovery drive back to the master drive.

Source: http://en.wikipedia.org/wiki/Standard_RAID_levels for details.

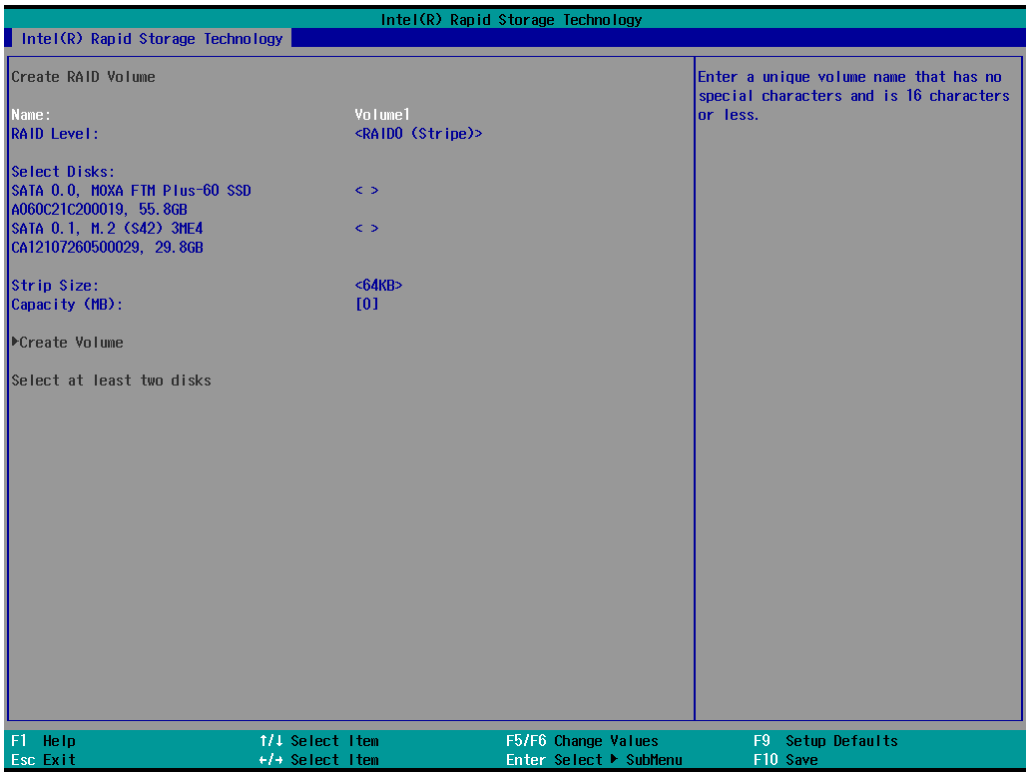


Intel Rapid Storage Technology

This section allows users to configure Intel® Rapid Storage Technology.



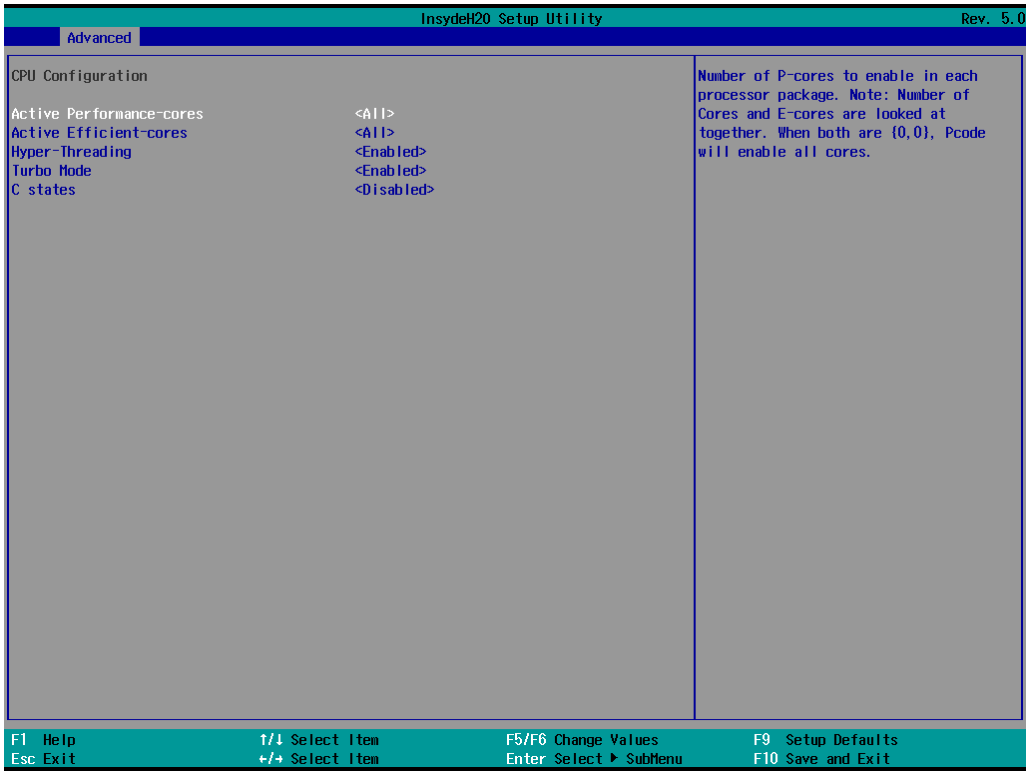
After enabling Map SATA Root Port under VMD, saving changes, and rebooting the system, you can select the Device Manager to configure the Intel Rapid Storage Technology settings.



ATTENTION

Only SATA slots 1 and 2 support BIOS SATA configuration and Intel RST RAID.

CPU Configuration



Active Performance-Cores

This item indicates the number of P-cores to enable in each processor package.

Active Efficient-Cores

This item indicates the number of E-cores to enable in each processor package.

Hyper-Threading

This feature makes the processor resources work more efficiently, enabling multiple threads to run on each core. It also increases processor throughput, improving overall performance on threaded software.

Options: Disabled, Enabled (default)

Turbo Mode

Enable/Disable processor Turbo Mode.

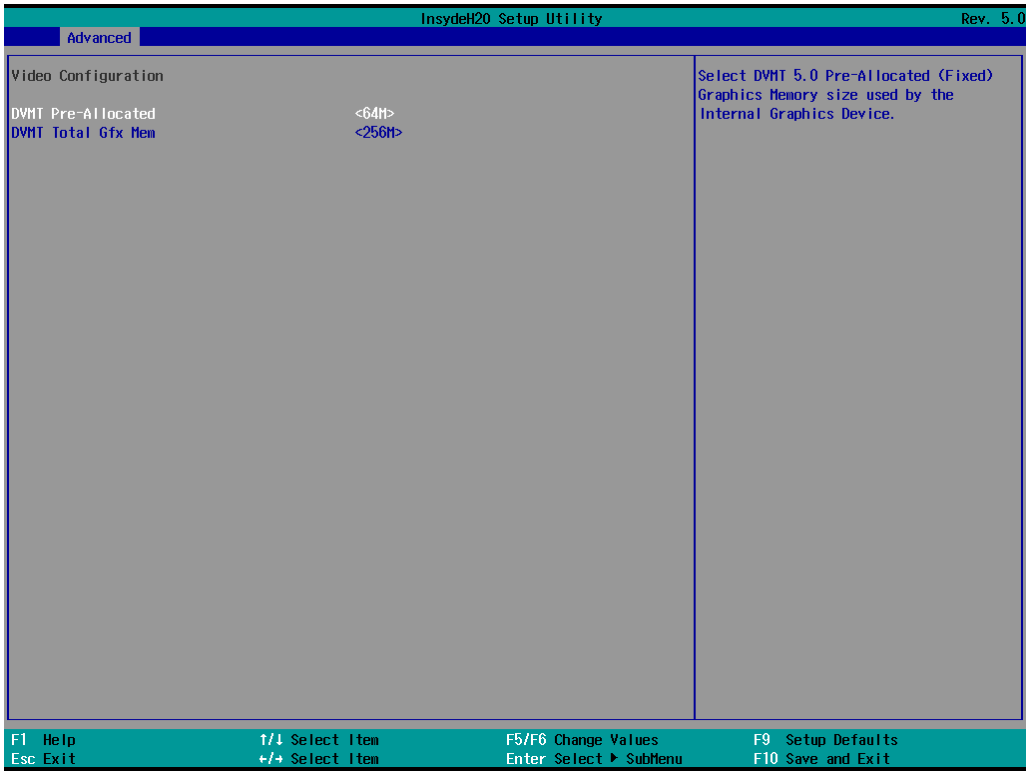
Options: Disabled, Enabled (default)

C states

Enable/Disable CPU Power Management. Allows CPU to go into C status when it's not 100% utilized.

Options: Disabled (default), Enabled

Video Configuration



DVMT Pre-Allocated

This item allows you to configure pre-allocated memory capacity for the IGD. Pre-allocated graphics memory is invisible to the operating system.

Options: 64M (default), 96M, 128M, 160M

DVMT: The amount of video memory your computer has depends on the amount of pre-allocated memory set for your system plus the Dynamic Video Memory Technology (DVMT). DVMT dynamically allocates system memory for use as video memory creating the most efficient use of available resources for maximum 2D/3D graphics performance.

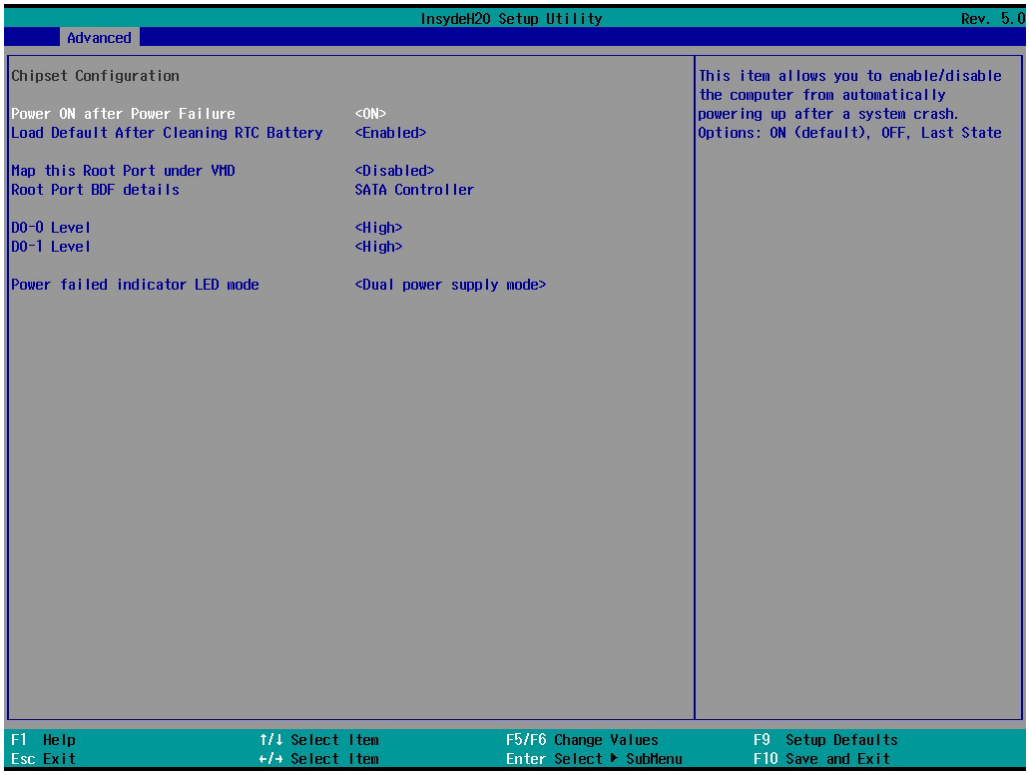
DVMT Total Gfx Mem.

This item allows you to configure the maximum amount of memory DVMT will use when allocating additional memory for the internal graphics device.

Options: 256 MB (default), 128 MB, Max.

Chipset Configuration

This section allows you to configure the chipset settings.



Power ON after Power Failure

This item allows you to enable/disable the computer from automatically powering up after system power is re-enabled.
Options: ON (default), OFF, Last State

Load Default After Cleaning RTC Battery

System will load default when detecting RTC battery loss.
Options: Disabled, Enabled (default)

Map this Root Port under VMD

Map/UnMap this Root Port to VMD.
Options: Disabled (default), Enabled

DO-X Level

This item allows users to set the DO to high or low.
Options: High (default), Low

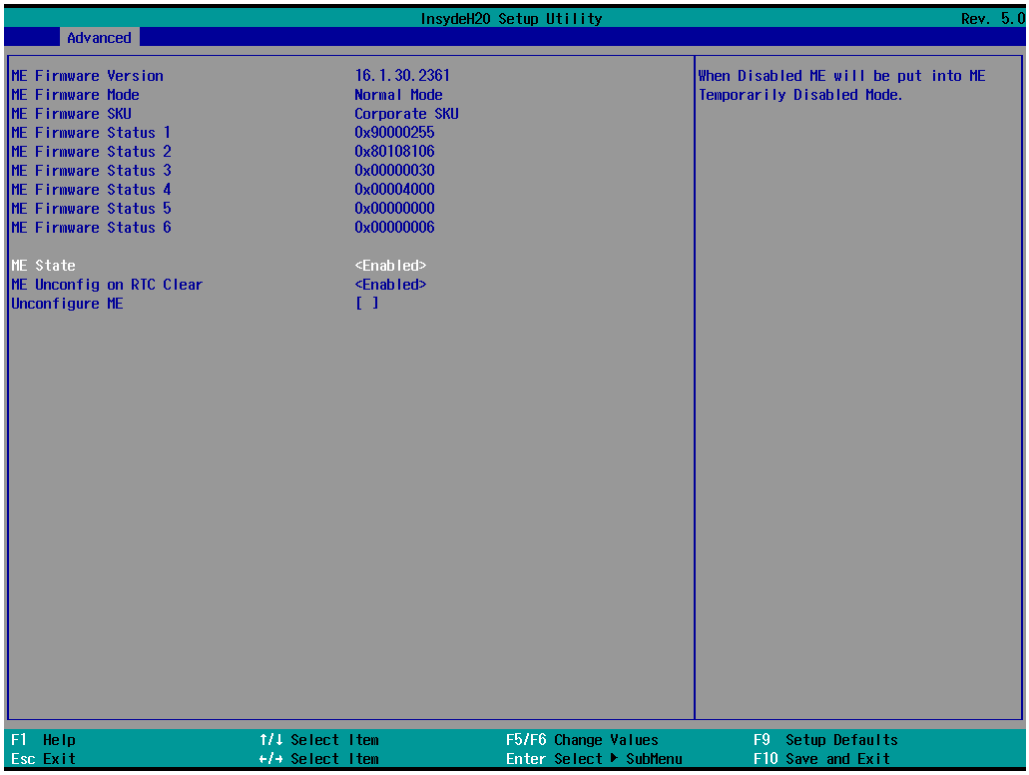
Power failed indicator LED mode

Select the single/dual power supply mode to disable/enable the front panel PWR2 power failed LED indicator.

Options:
Single power supply mode: This disables the front panel PWR2 power failed LED indicator. (default for single power supply model)
Dual power supply mode: This enables the front panel PWR2 power failed LED indicator. (default for dual power supply model)

PCH-FW Configuration

This section allows you to configure the PCH-FW settings.



ME State

When Disabled ME will be put into ME Temporarily Disabled Mode.

Options: Disabled, Enabled (default)

ME Unconfig on RTC Clear

When Disabled ME will not be unconfigured on RTC Clear.

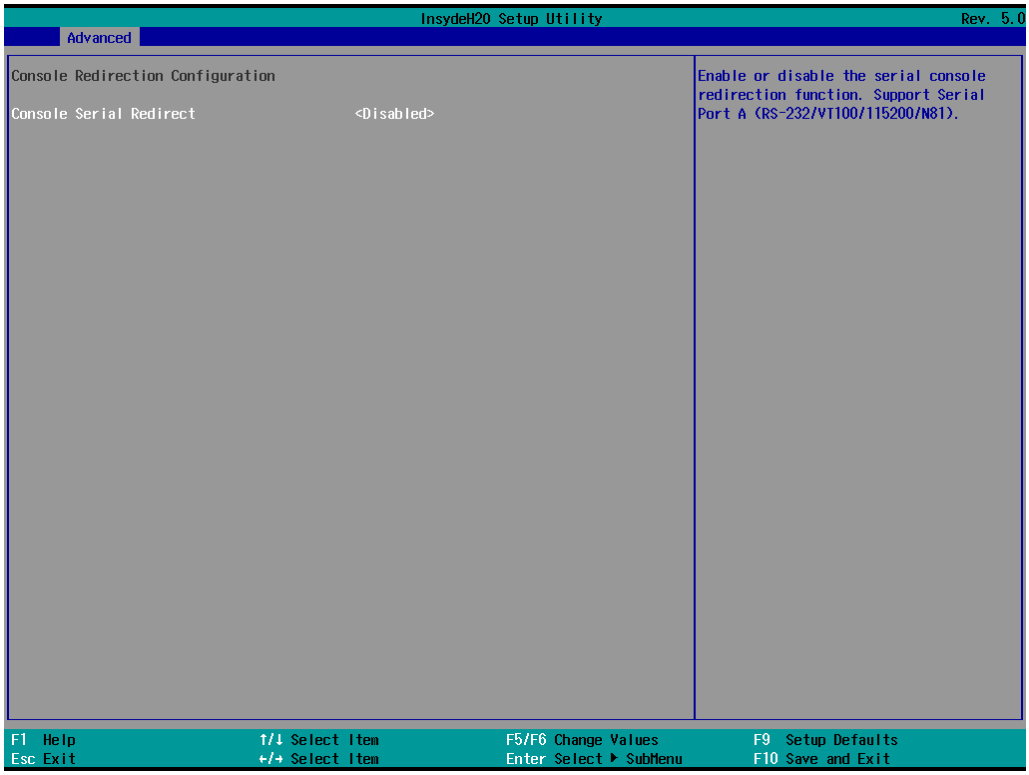
Options: Disabled, Enabled (default)

Unconfigure ME

Unconfigure ME by resetting MEBx password to default.

Console Redirection Configuration

This section allows you to configure the console redirection settings.



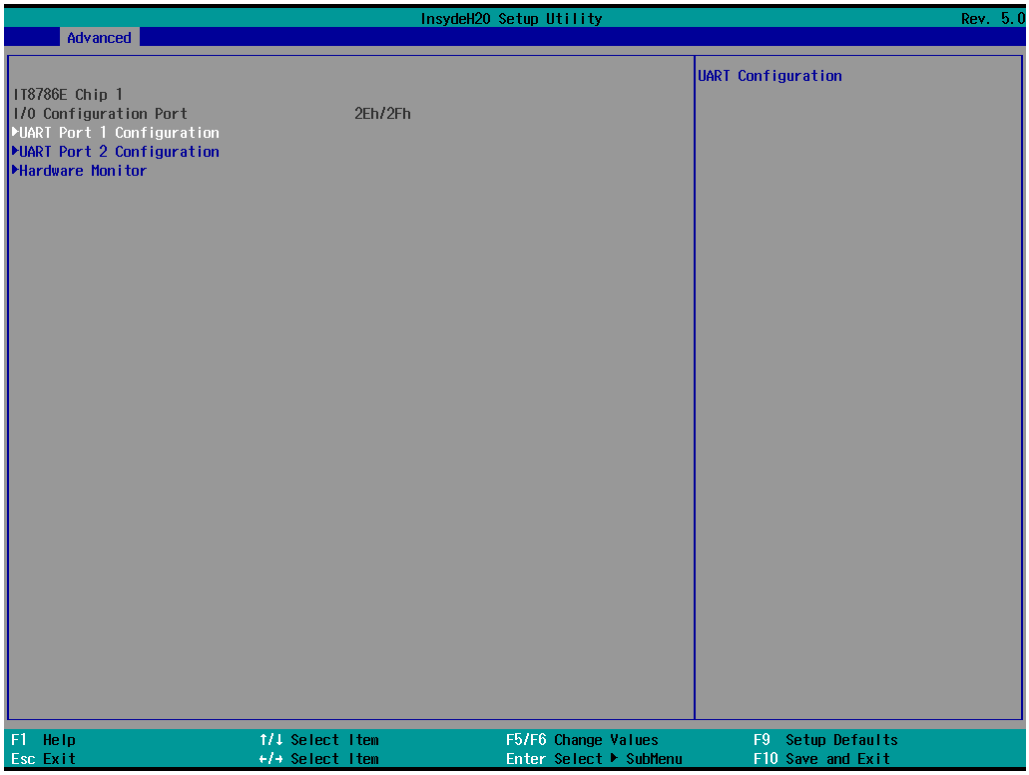
Console Serial Redirect

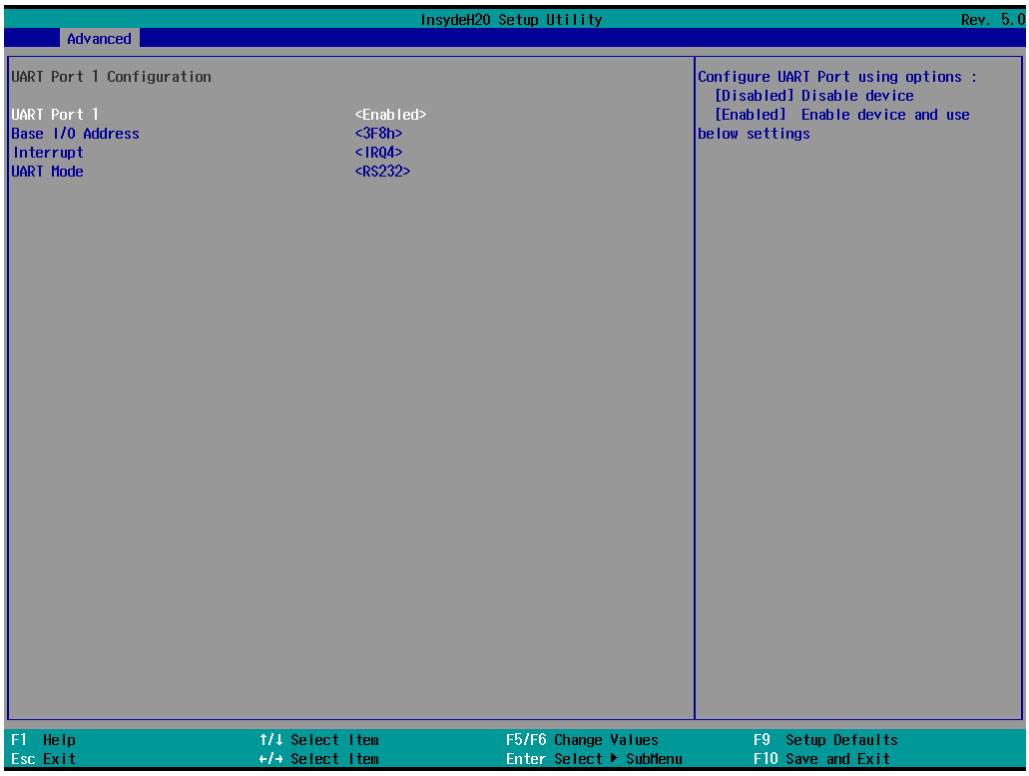
When the Console Redirection Function is enabled, the console information will be sent both to the display monitor and the serial port.

Options: Disabled (default), Enabled

SIO ITE8786E

This section allows users to configure SIO settings.





UART Port 1

This function allows users to configure the resources for the UART port 1.

Disable: Disable the UART port 1 connection

Enable: Enable the UART port 1 connection (default)

UART Port 2

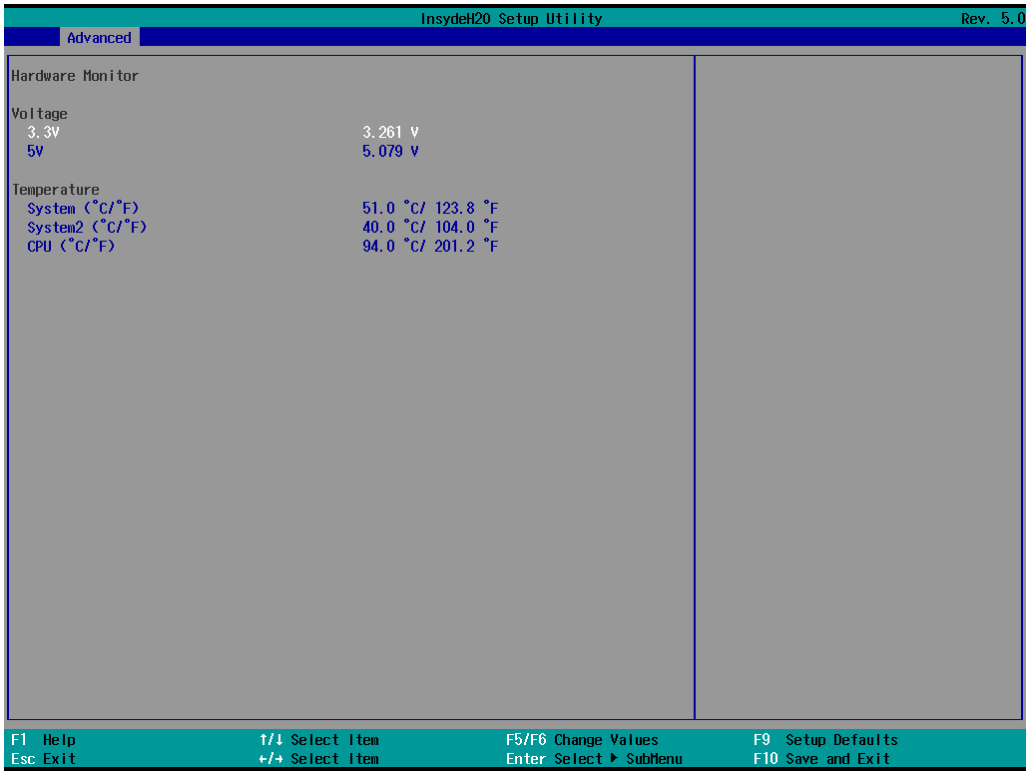
This function allows users to configure the resources for the UART port 2.

Disable: Disable the UART port 2 connection

Enable: Enable the UART port 2 connection (default)

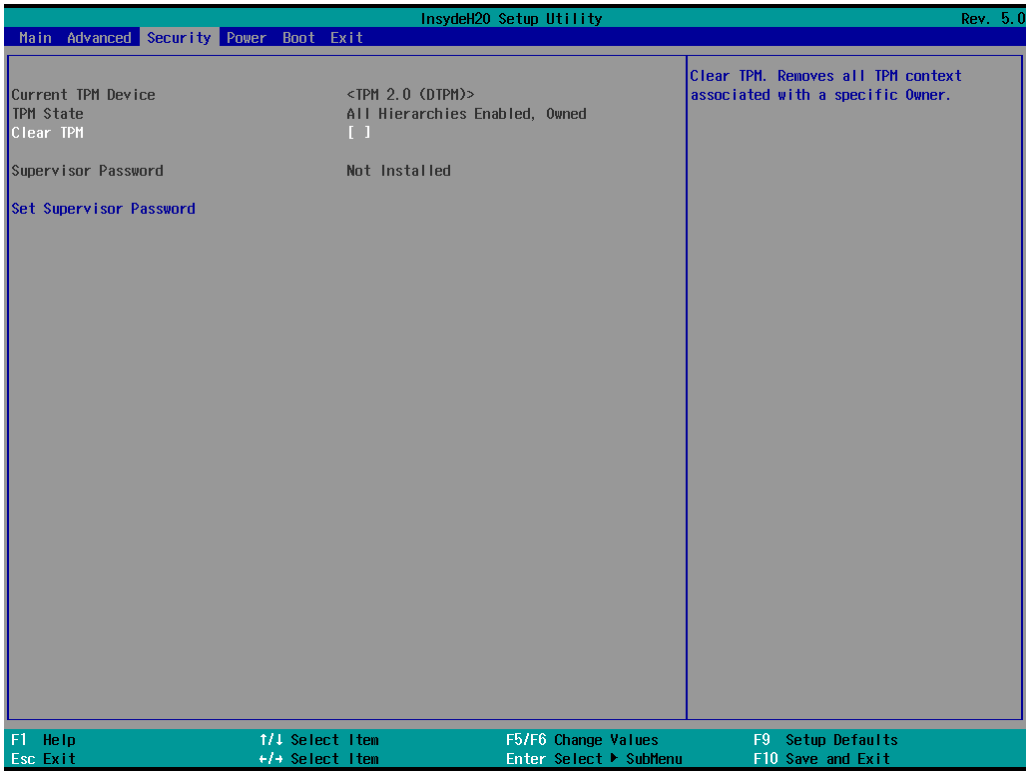
Hardware Monitor

This section allows you to view stats such as CPU and system temperature, voltage levels, and other chipset information.



Security Settings

This section allows users to configure security-related settings with a supervisor password.



Current TPM Device

This item shows if the system has TMP device and its type.

TPM State

This item allows you view the status of current TPM settings.

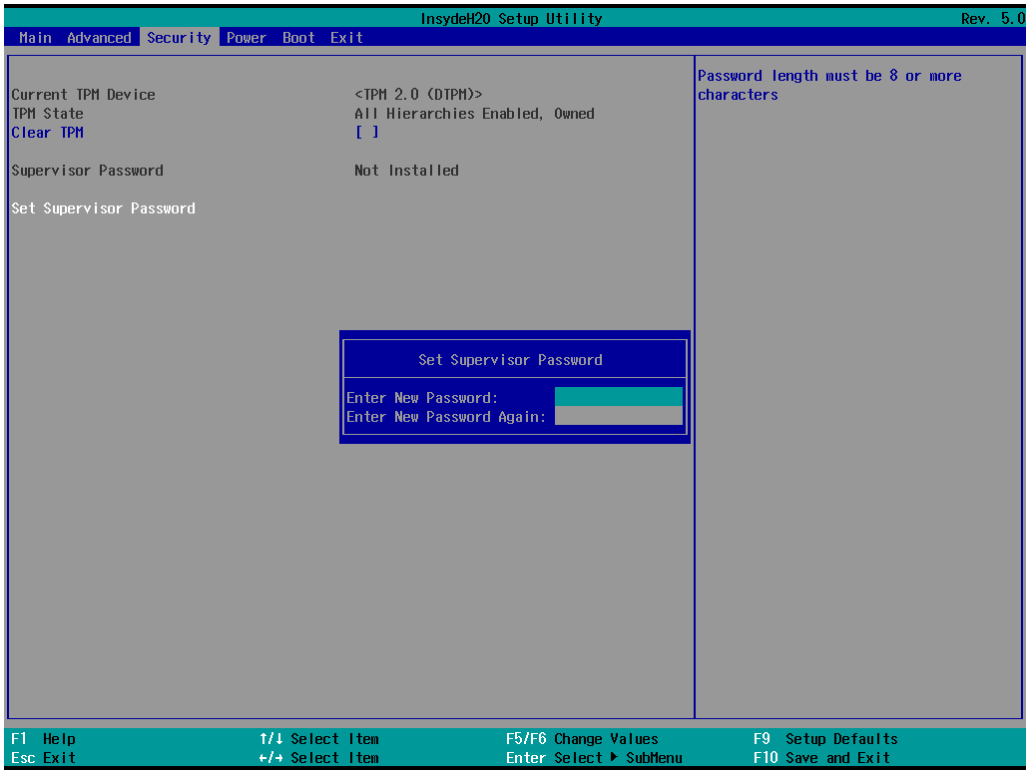
Clear TPM

This item allows users to remove all TPM context associated with a specific owner.

Set Supervisor Password

This item allows you to set the supervisor password. Select the **Set Supervisor Password** option and enter the password and confirm the password again.

To delete the password, select the **Set Supervisor Password** option and enter the old password; leave the new password fields blank, and then press enter.



After setting the supervisor password, users can choose when the input password screen should be displayed.

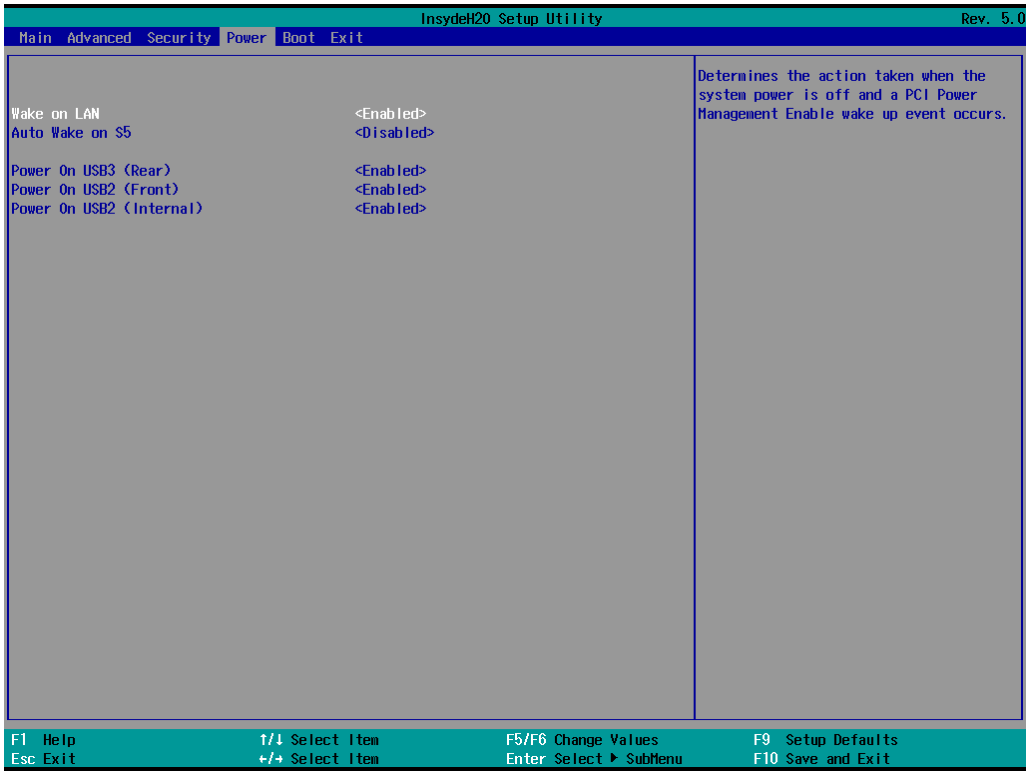
Enable: System will ask for the password on post time

Disable: System will ask for the password to go to the setup utility

Config-Only: System will only ask for the password when you select the config (F2) option

Power Settings

This section allows users to configure power settings.



Wake on LAN

This feature is used to wake the system by a LAN device from a remote host.

Options: Enabled (default), Disabled

Auto Wake on S5

This item allows you to configure the computer to wake from S5 status. S5 stands for Soft Off, where the PSU remains engaged but power to all other parts of the system is cut. Auto-wake on S5 schedules a soft-reboot at certain periodic times that may be specified in the BIOS.

Options: Disabled (default); By Every Day (user specifies a regular daily time when the computer will power up); By Day of Month (user specifies a regular day each month when the computer will power up)

Power On USB3 (Rear)

This item allows users to power on or power off the USB ports on the rear panel.

Options: Disabled, Enabled (default)

Power On USB2 (Front)

This item allows users to power on or power off the USB ports on the front panel.

Options: Disabled, Enabled (default)

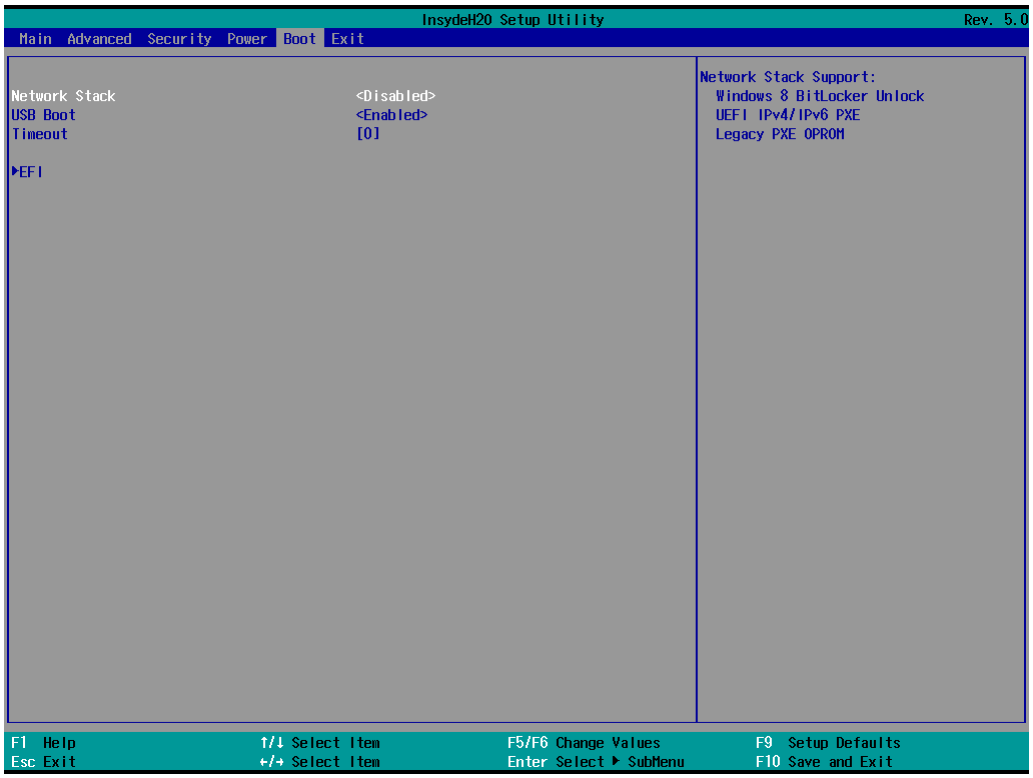
Power On USB2 (Internal)

This item allows users to power on or power off the internal USB port of the computer.

Options: Disabled, Enabled (default)

Boot Settings

This section allows users to configure boot settings.



NOTE

If you do not add any storage, you will not see the EFI option.

Network Stack

It deploys an Internet Protocol (IP) stack. The IP stack provides an application library to open/close connections to remote devices and send/receive data between the remote devices.

Options: Disabled (default), Enabled

PXE Boot capability

This item will be shown only when you have enabled the Network Stack.

PXE Booting is booting a system over a network. This item allows users to start PXE over IPv4 or IPv6

Options: Disabled (default), UEFI: IPv4, UEFI: IPv6, UEFI: IPv4/IPv6

USB Boot

Set booting to USB boot devices capability.

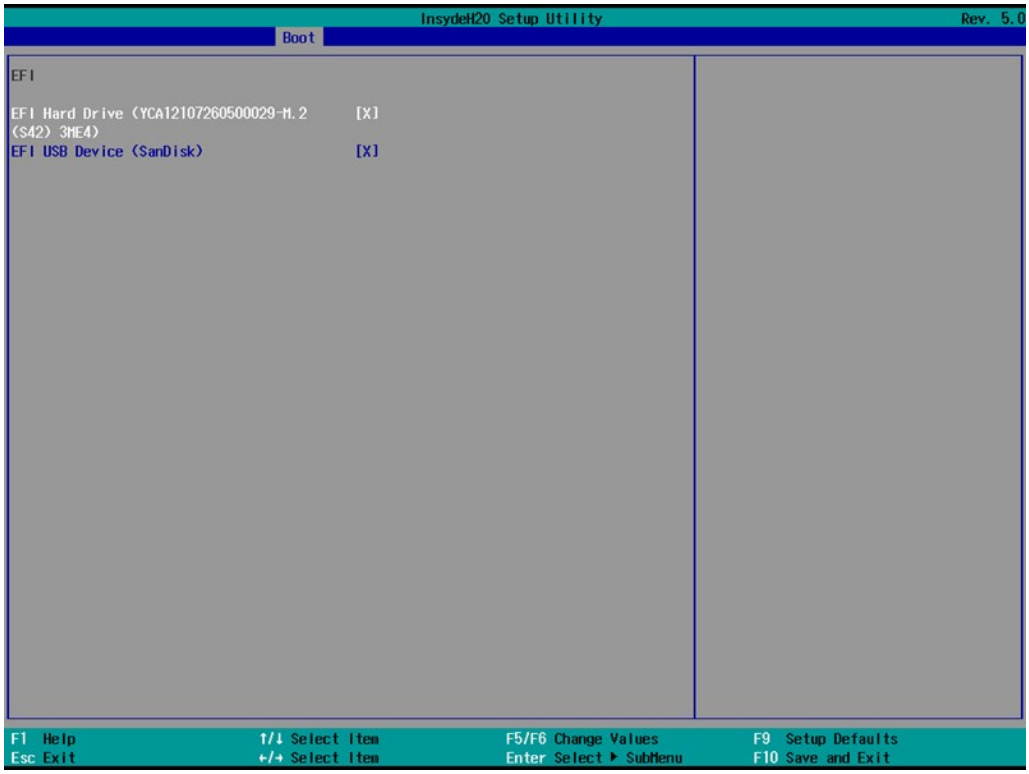
Options: Enabled (Default), Disabled

Timeout

This item allows users to set the number of seconds that the firmware will wait before booting from the default boot selection.

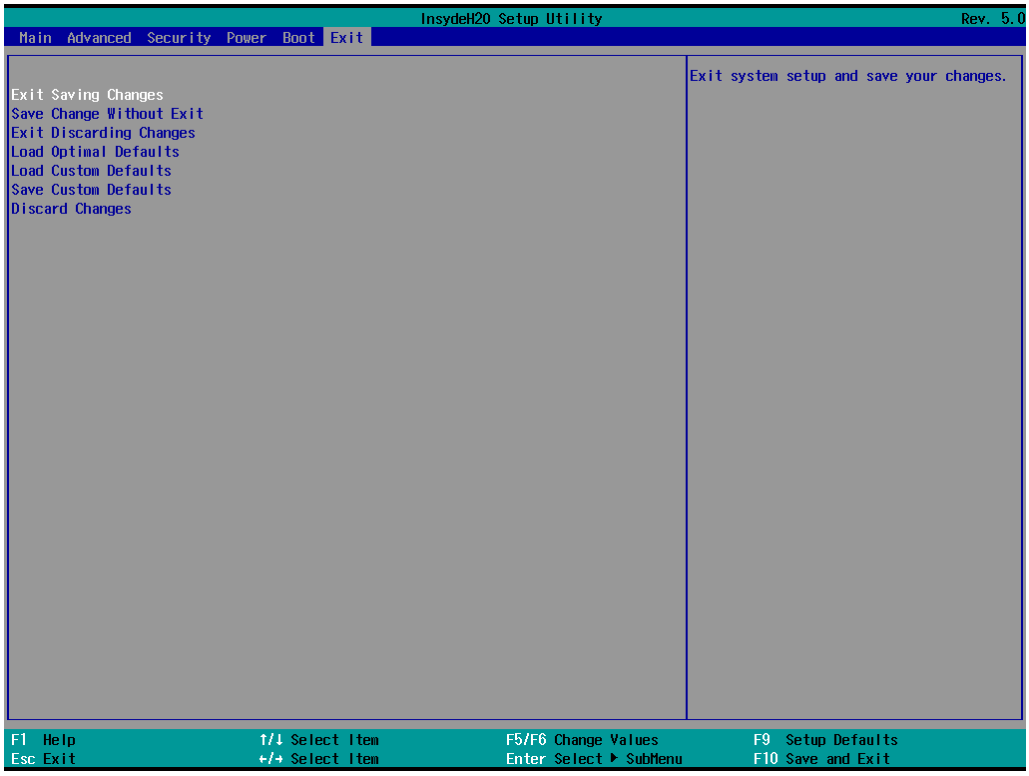
EFI

This item allows users to select the boot order. Use F5 (move down) or F6 (move up) to change the boot order.



Exit Settings

The section allows users to exit the BIOS environment.



Exit Saving Changes

This item allows you to exit the BIOS environment and save the values you have just configured.

Options: Yes (default), No

Save Change Without Exit

This item allows you to save changes without exiting the BIOS environment.

Options: Yes (default), No

Exit Discarding Changes

This item allows you to exit without saving any changes that might have been made to the BIOS.

Options: Yes (default), No

Load Optimal Defaults

This item allows you to revert to the factory default BIOS values.

Options: Yes (default), No

Load Custom Defaults

This item allows you to load custom default values for the BIOS settings.

Options: Yes (default), No

Save Custom Defaults

This item allows you to save the current BIOS values as a "custom default" that may be reverted to at any time by the load custom defaults selection.

Options: Yes (default), No

Discard Changes

This item allows you to discard all settings you have just configured.

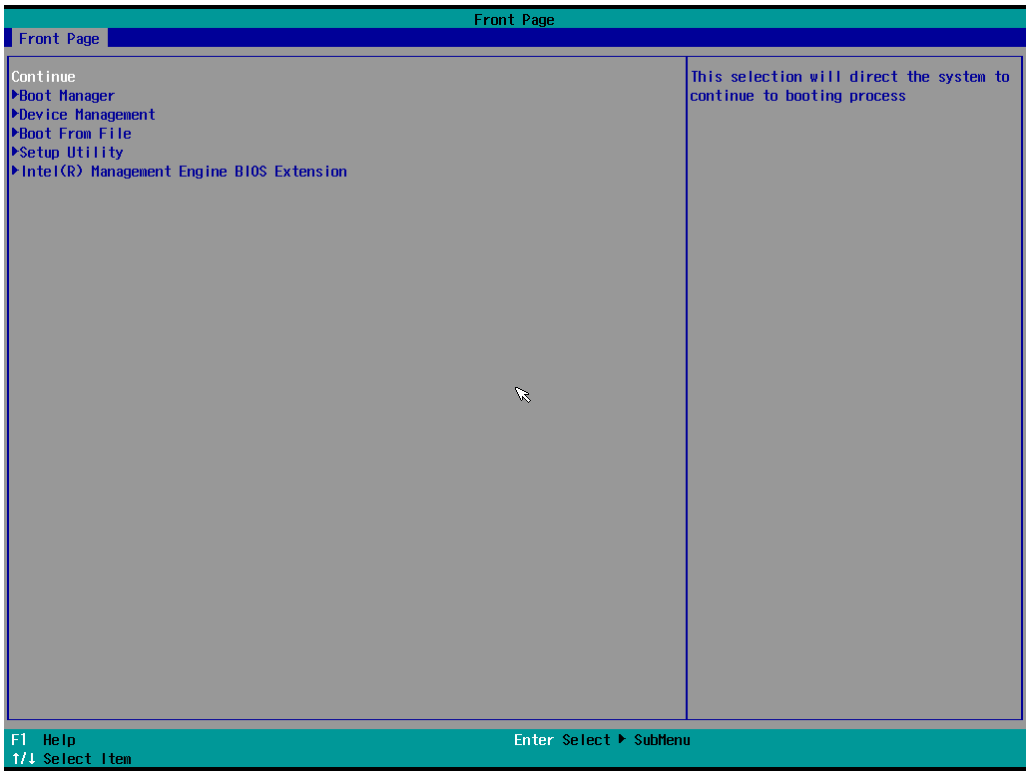
Options: Yes (default), No

Enabling AMT

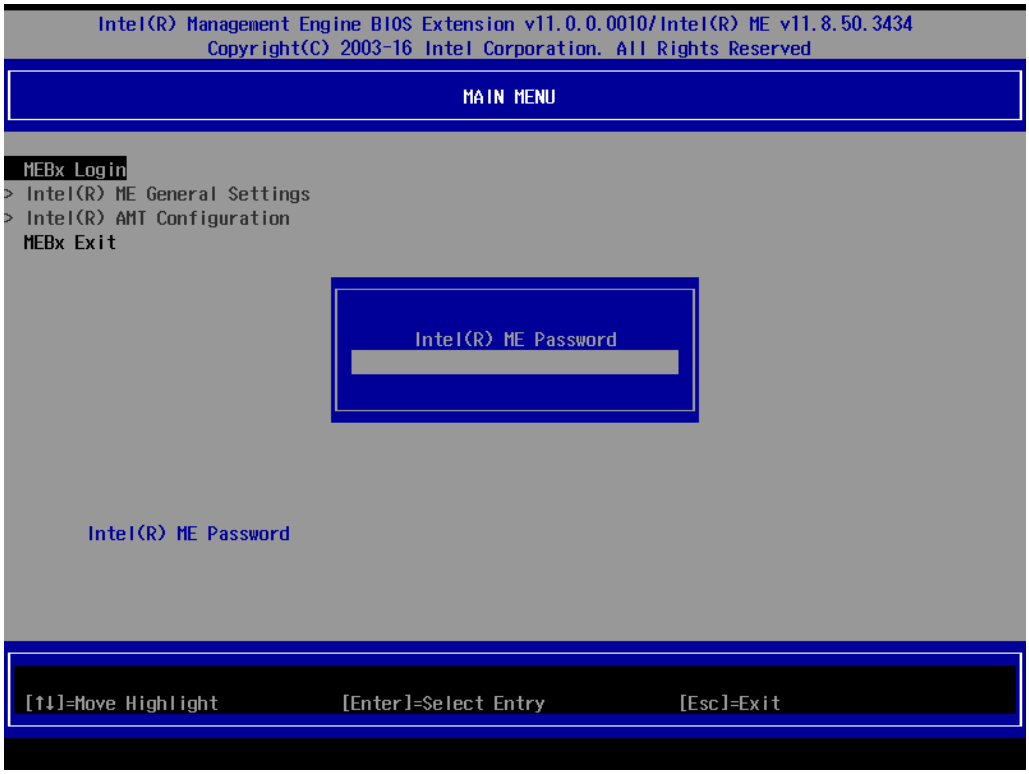
> **NOTE**
>
> The AMT function is not supported in the models with Celeron and i3 CPU.

To enter the BIOS setup utility, press the "F2" key while the system is booting up. The main BIOS Setup screen will appear. Five options will be available:

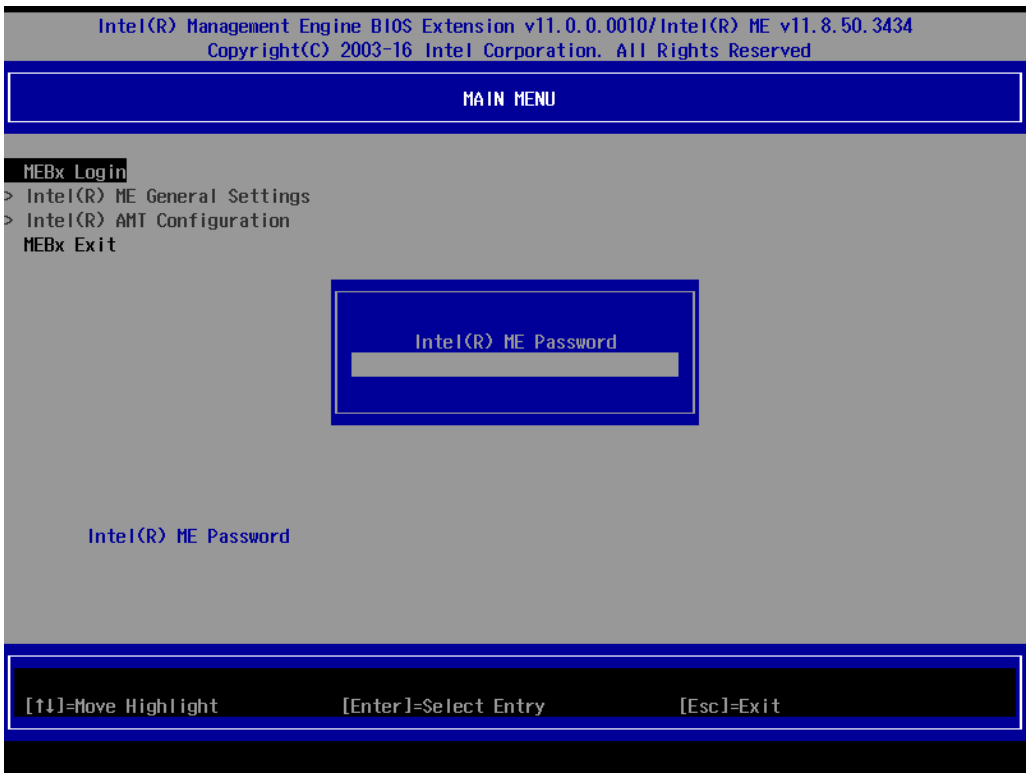
Select Intel® Management Engine BIOS Extension to enter the AMT configuration.



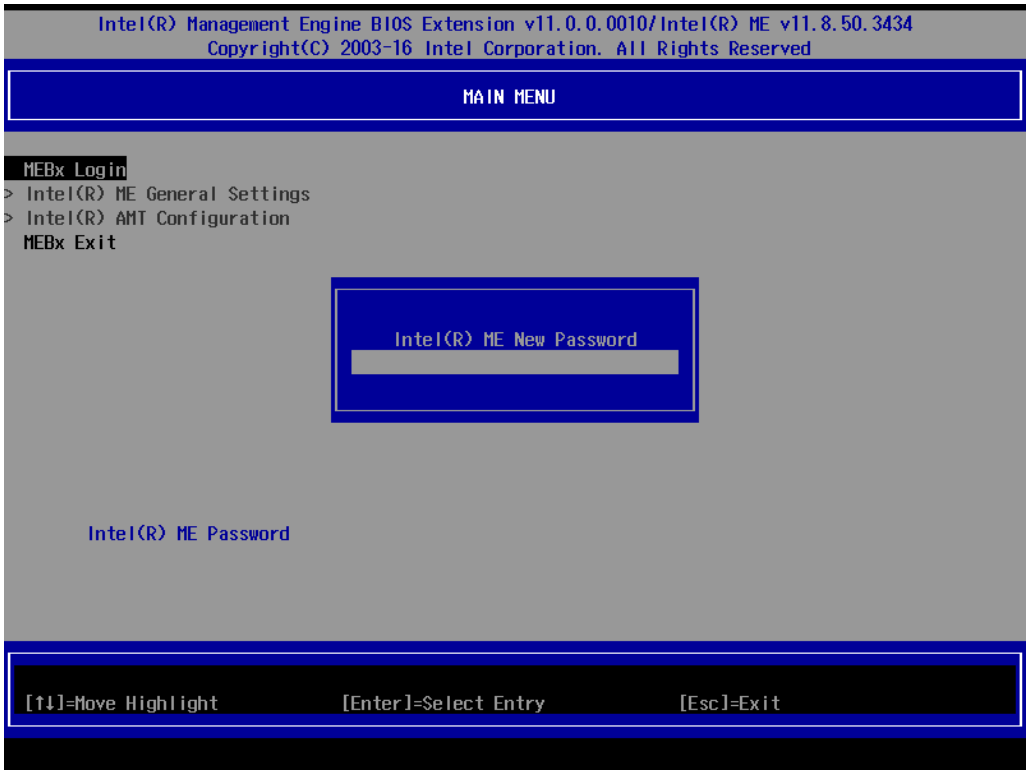
Press <Enter> to start the login procedure.



Type the default password: admin

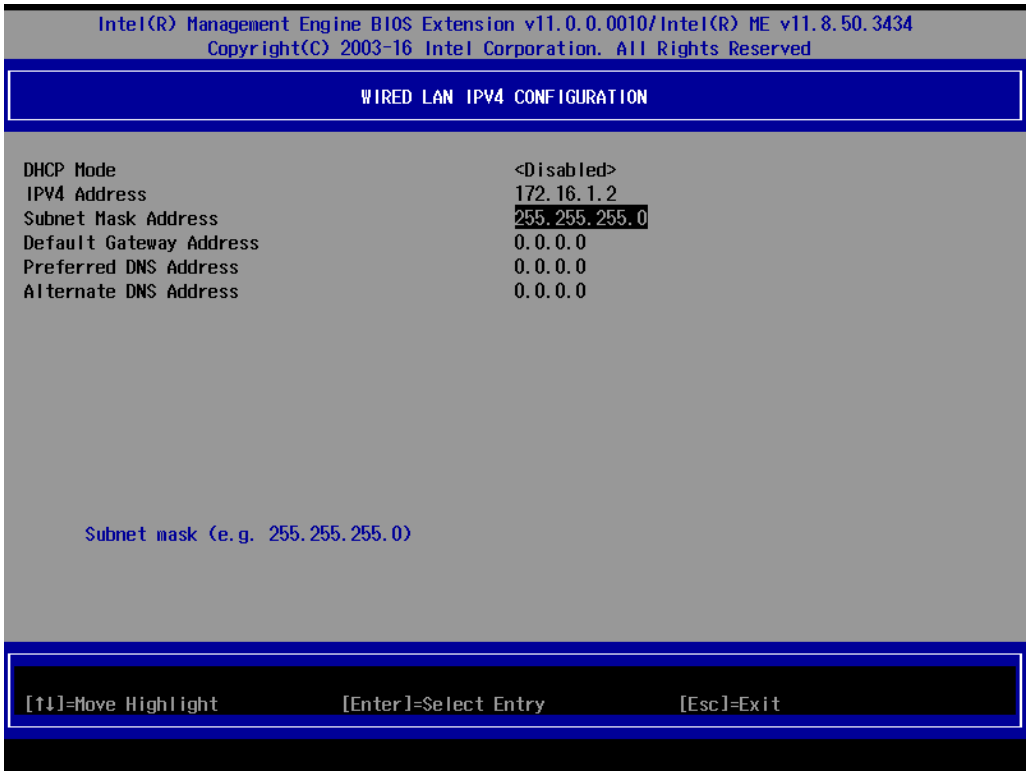


Type the new password. It must include both upper-case and lower-case characters, numbers, and special symbols. E.g., Admin'12.

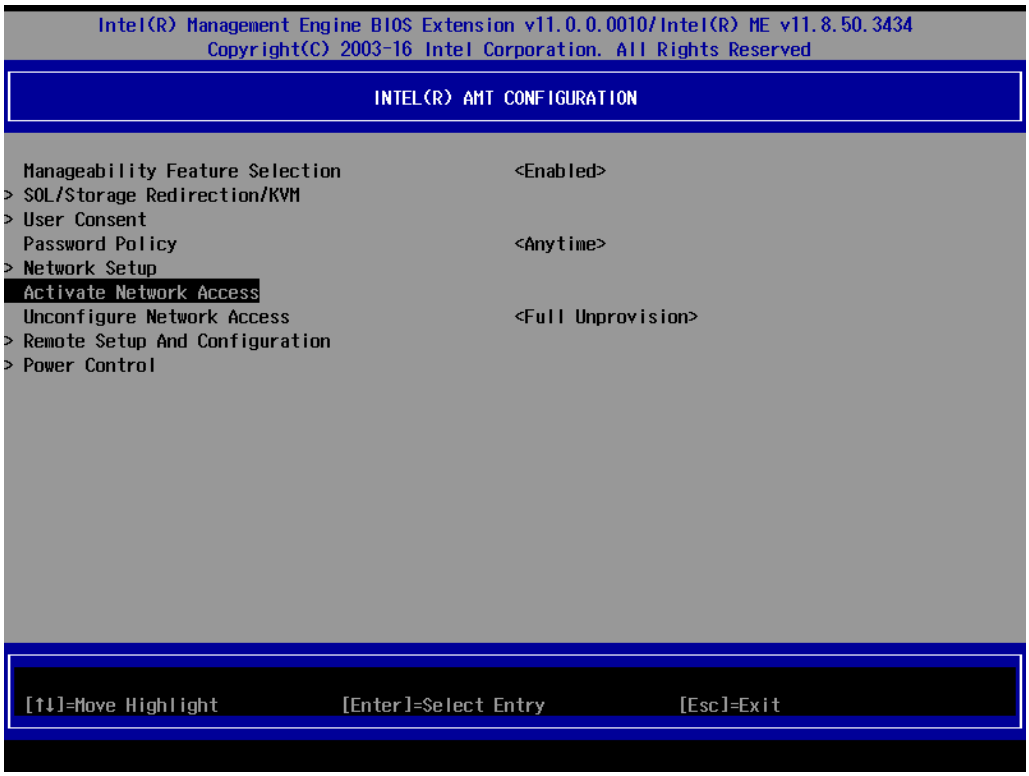


Select Intel® AMT Configuration to enable remote access without a local user present for consent, select User Consent, and then select User Opt-in and change the value to None.

Set static IP or DHCP by request.



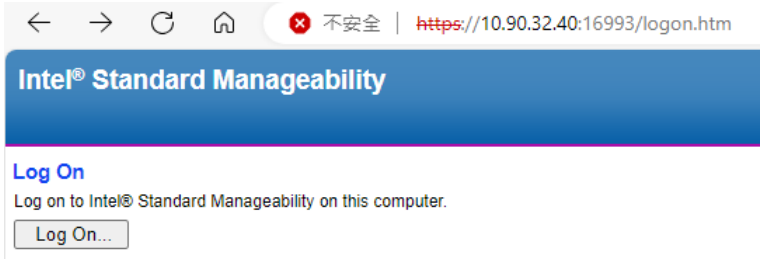
Set Activate Network Access to enable remote access capability.



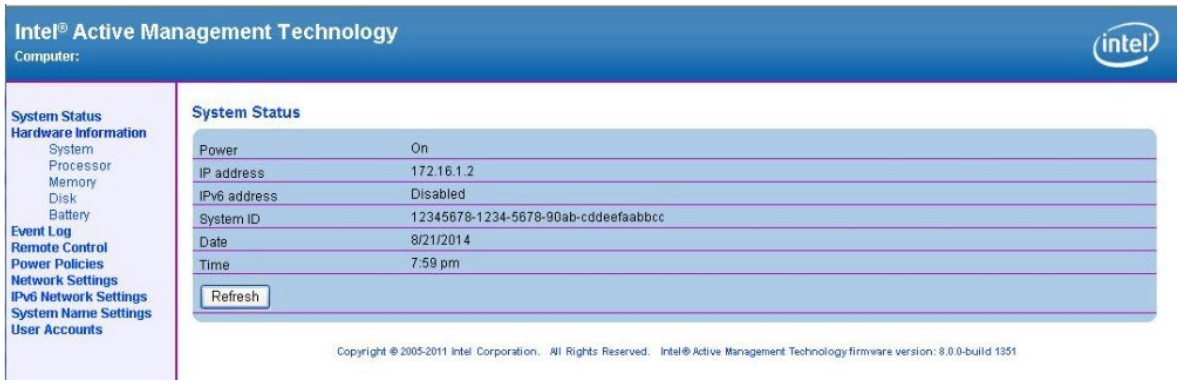
Using AMT

You can use any AMT tool available to run the remote management function using a web browser.

Type the IP address of your computer as configured in the AMT configuration settings with port 16993. The AMT logon screen will appear.



Click Log On and type the username (admin) and password.



NOTE

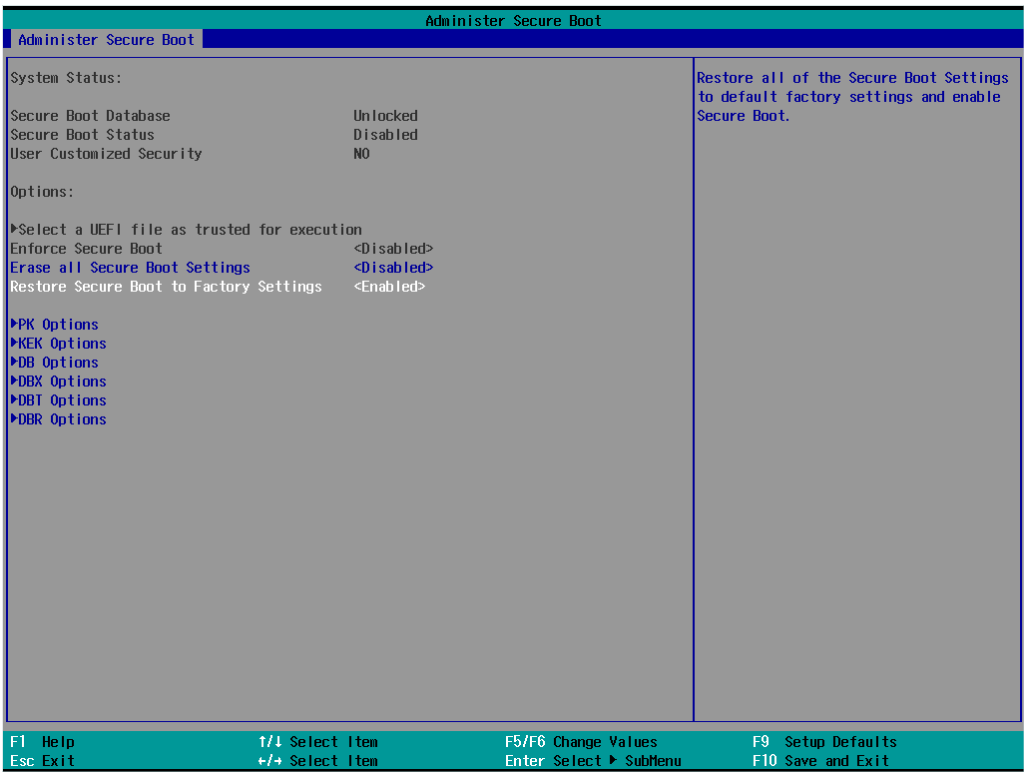
The AMT port is LAN1.

NOTE

For details, refer to the Intel AMT Implementation and Reference Guide at:
https://software.intel.com/sites/manageability/AMT_Implementation_and_Reference_Guide/default.htm?turl=WordDocuments%2Faccessingintelamtviathewebuiinterface.htm

Administering Secure Boot

Press F2 to go to the Administer Secure Boot.



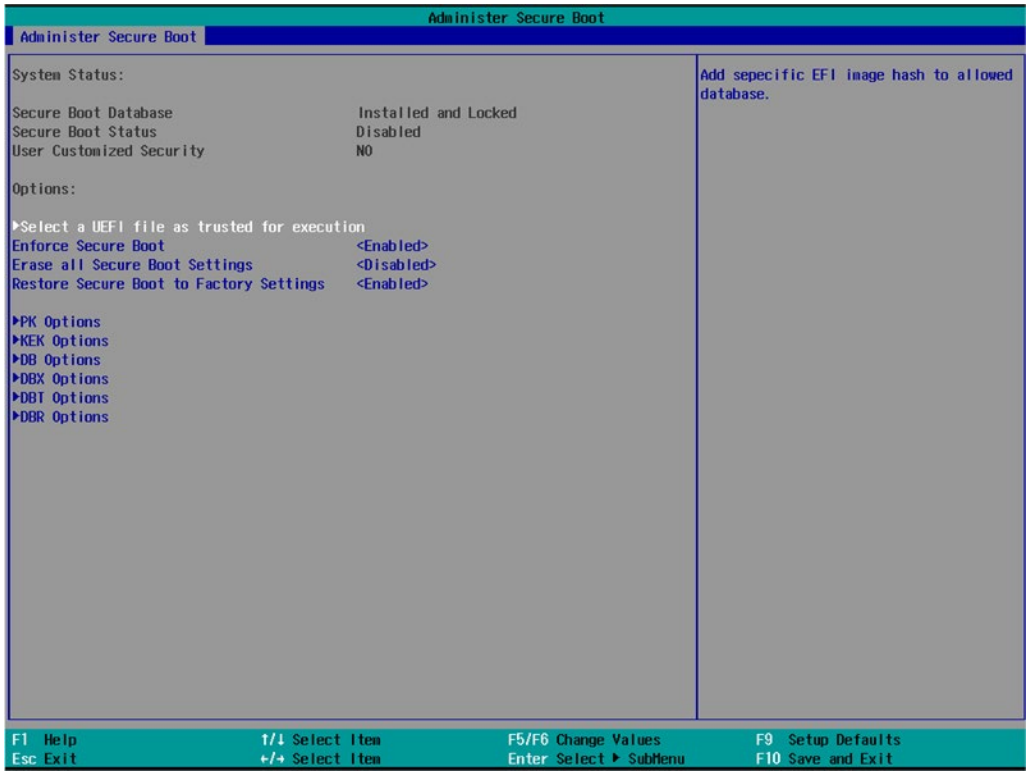
Secure Boot helps computers resist attacks and infection from malware. The feature defines an interface between the operating system and BIOS. It detects tampering with boot loaders, key operation system files, and unauthorized option ROMs by validating their digital signatures.

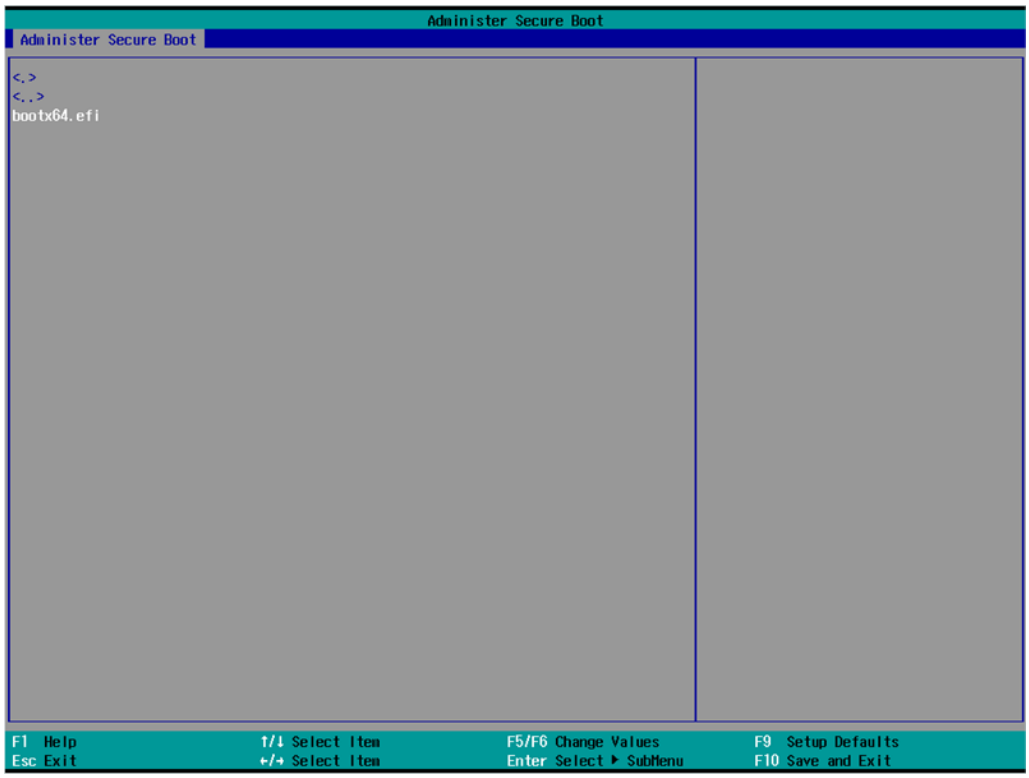
Enabling UEFI Secure Boot

Set as “enabled” in “Restore Secure Boot to Factory Settings” under Administer Secure Boot menu. Press F10 as save and exist.

Moxa has included the Microsoft key in the BIOS by default. If you cannot boot up the computer using a non-Windows OS, use the following examples.

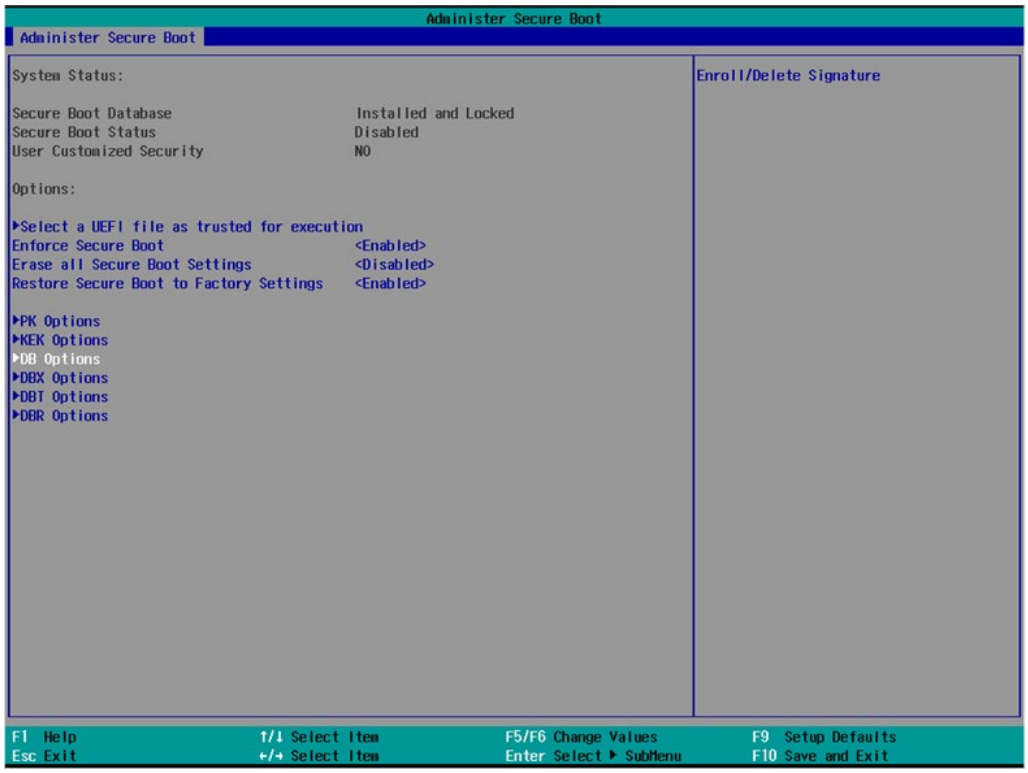
Enroll EFI Image

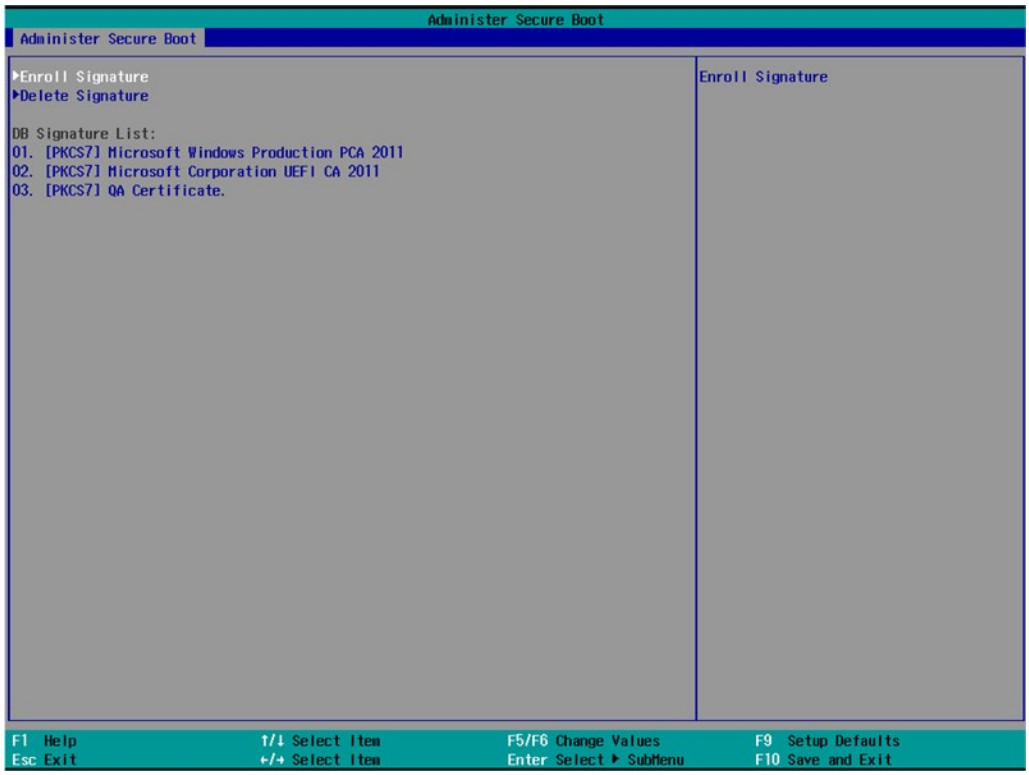




1. Enter **Administer Secure Boot** and select the option **Select a UEFI file as trusted for execution**.
2. Enter the loader name followed by the UEFI standard \EFI\BOOT\BOOT{machine type short-name}. E.g., efi\boot\BootX64.efi, Debian (EFI\debian\grubx64.efi), Suse (EFI\opensuse\grubx64.efi)

Enroll Customer Key





Enter “DB OPTION” and enroll your key. Please make sure your key is CRT format and uses RSA 2048 or better.

Upgrading the BIOS

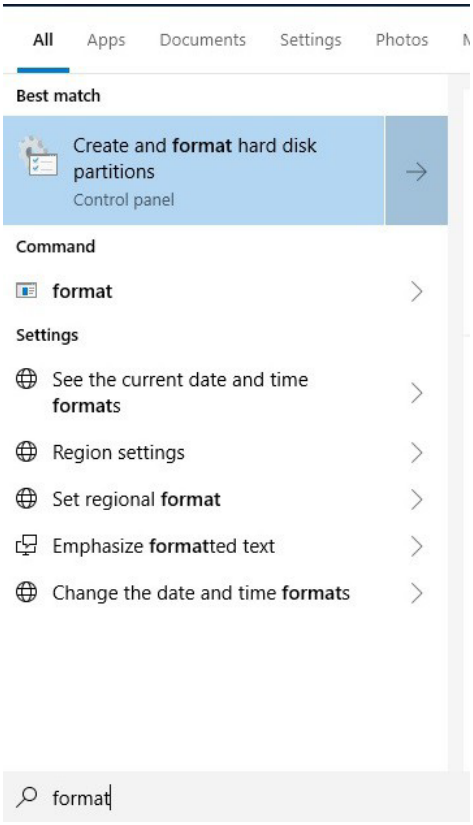
This section describes how to upgrade the BIOS on your computer.

> **NOTE**
>
> It is possible to permanently damage the computer when upgrading the BIOS. We strongly recommend that you contact Moxa's technical support staff for assistance to obtain all the necessary tools and the most current advice before attempting to upgrade the BIOS on any Moxa device.

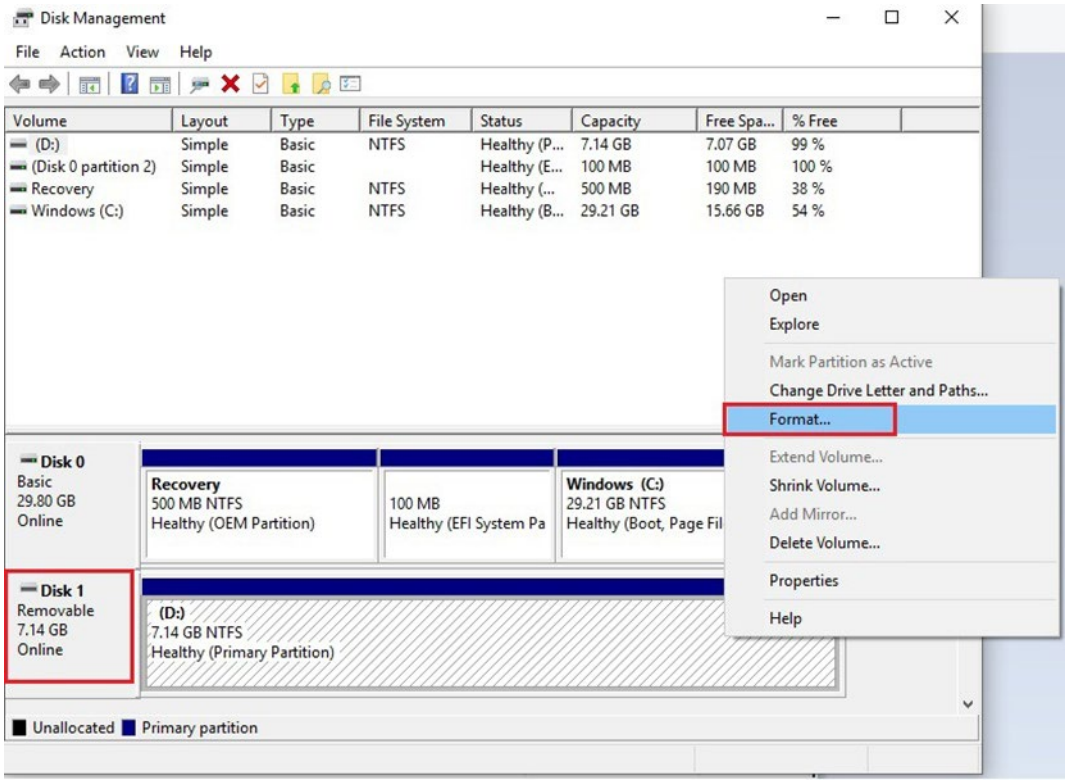
Step 1: Create a Bootable USB Disk

Before upgrading the BIOS, you must create a bootable USB drive as a system boot device for use in the future.

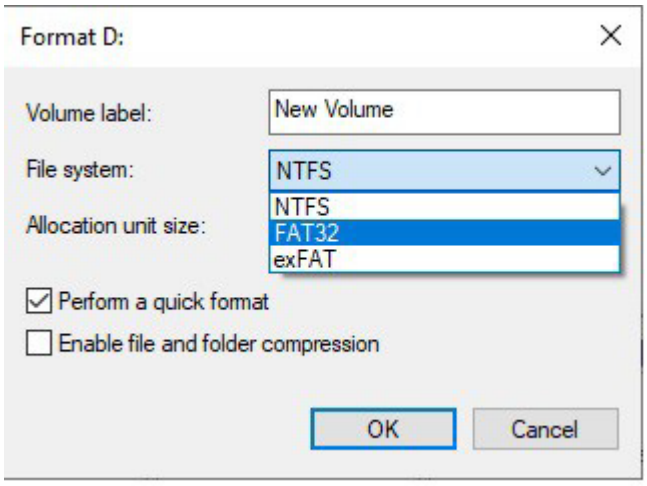
1. Insert a USB disk in the computer's USB drive.
2. Search for "format" and select **Create and format hard disk partitions**.



3. Right-click on the USB disk item and select **Format**.



4. Select **FAT32** and click **OK** to start formatting the disk.



Step 2: Prepare the Upgrade File

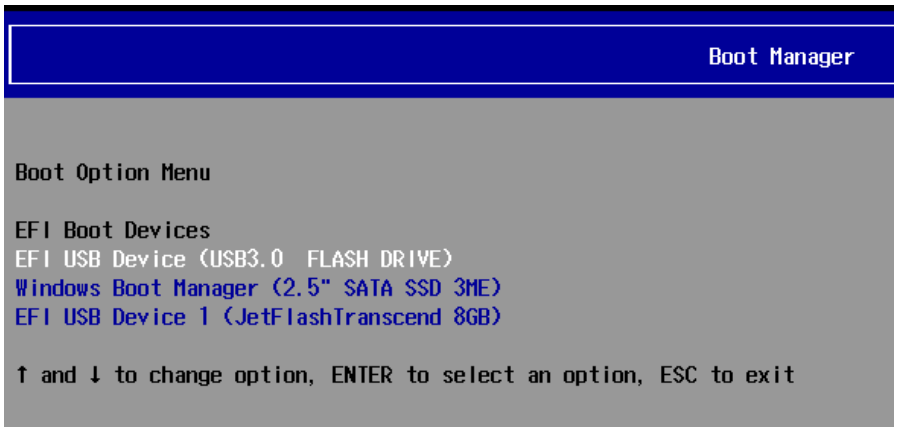
You must use the BIOS upgrade installation file to upgrade the BIOS. Contact Moxa's technical department for assistance. The BIOS upgrade file includes an **efi** folder and an **xxxx.efi** file. Copy the **efi** folder and **xxxx.efi** file to the bootable USB disk.

Step 3: Run the Upgrade Program on Your Computer

1. Reboot the computer with the boot disk and press F2 to go to the Boot Manager.

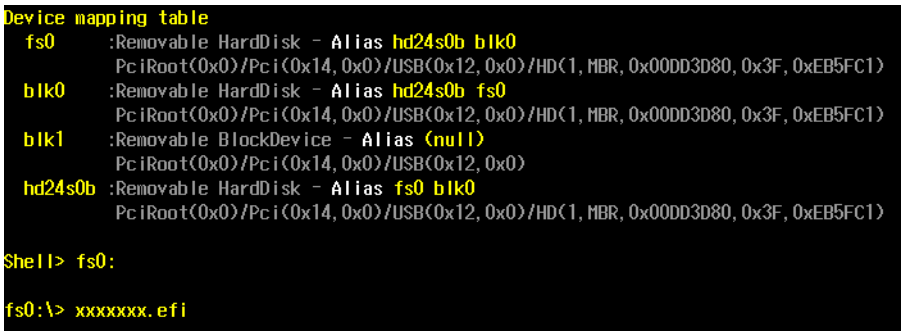
   If the BIOS cannot recognize the USB drive as a boot-up device, the USB drive might not have a partition table. Use the Windows command line tool **diskpart** to rebuild the partition table.

2. Select the USB Disk.



   The screen will switch to the SHELL environment.

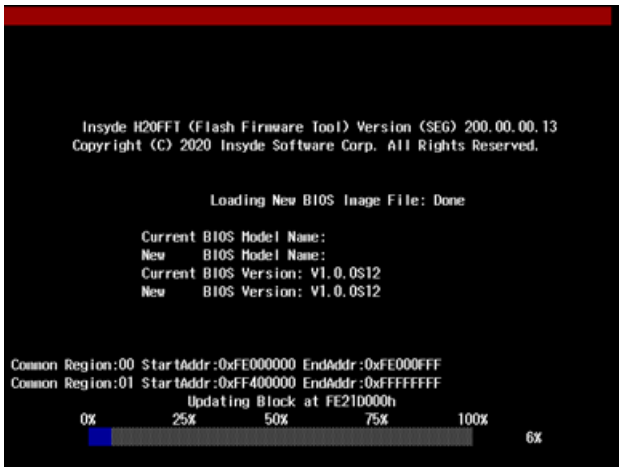
3. Type **fs0:**, go to the directory where the upgrade file is located, and type **xxxxxx.efi** (the file name is based on the upgrade file from Moxa).



4. Wait until the upgrade procedure is completed.

ATTENTION

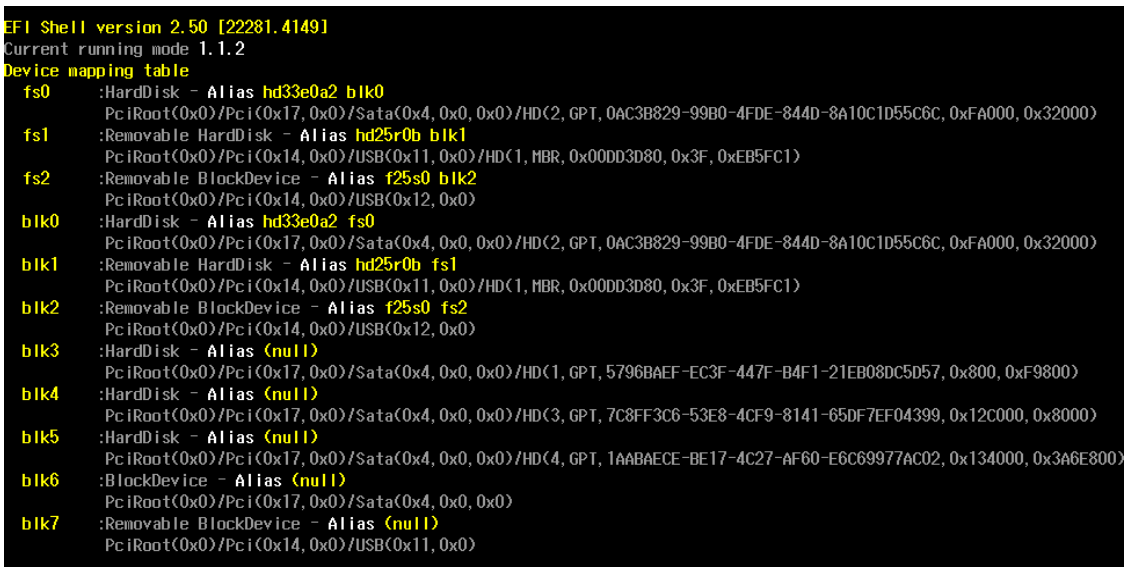
Do NOT switch off the power supply during the BIOS upgrade, since doing so may cause the system to crash.



When the upgrade is finished, the computer will automatically reboot.

You can check the BIOS version on the Main page to confirm the upgrade.

If the system has more than one boot device, you will see more than one fsx (x represents the number).



5. Go to each fsx (x stands for the number) and type ls to view the content of the boot device. If you find an upgrade file, run it.