V3400 Series User Manual

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www.moxa.com/products

V3400 Series User Manual

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Technical Support Contact Information

www.moxa.com/support

Table of Contents

1. Introduction

This chapter gives a general overview of the V3400 computer's hardware features and specifications.

Overview

The V3400 Series embedded computers are built around an Intel® Core™ i7/i3 high-performance processor and come with up to 64 GB RAM, one M.2 2280 M key slot, and two hot-swappable HDD/SSD for storage expansion. The computers are compliant with EN 50155 and EN 50121-4 standards covering operating temperature, power input voltage, surge, ESD, and vibration, making them suitable for railway onboard and wayside applications. For enhanced security, the cover of the storage slots comes with a lock, allowing only authorized personnel with keys to access the storage drives.

For connecting with onboard and wayside systems and devices, the V3400 computers are equipped with a rich set of interfaces including 4 to 8 Gigabit Ethernet ports with one-pair LAN bypass function (V3408 models only) to ensure uninterrupted data transmission, 2 RS-232/422/485 serial ports, 2 DIs, 2 DOs, and 2 USB 3.0 ports. The built-in TPM 2.0 module ensures platform integrity and provides hardware-based security as well as protection from tampering.

Vehicular applications require reliable connectivity. They also require clear indicators on the device that identify the status of the software. V3400 computers support multiple wireless configurations such as two 5G modules in M.2 slots, one LTE or Wi-Fi 5 in an mPCIe slot, and one Wi-Fi 6 in an M.2 slot. Six SIM-card slots help establish redundant 5G/LTE/Wi-Fi connections. An optimized mechanism and thermal design allow the V3400 to meet the EN 50155 OT4 (-40 to 70°C) requirement, even with two 5G modules and one Wi-Fi 6 module installed, making it well suited for practical applications in demanding onboard transportation environments.

NOTE

OT4 Test Condition:

The system was tested in fanless and airflow-free environment, two 5G & Wi-Fi connected with high transmitted power, test over 4 hours till steady state with following method:

1. System used BIT* test program to stress the CPU, external I/O interfaces, wireless modules and others system interfaces.
2. The CPU was tested with TAT** test program at full loading setting.

*BIT= BurnInTest

**TAT= Intel Thermal Analysis Test Tool

Package Checklist

The following items are included in the package.

- V3400 Series computer
- Wall-mounting kit (with 8 screws)
- 2 SSD/HDD trays
- 16 screws for securing the SSD/HDD trays
- 2 keys for the disk door lock
- HDMI cable lock
- Quick installation guide (printed)
- Warranty card

NOTE

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

Product Features

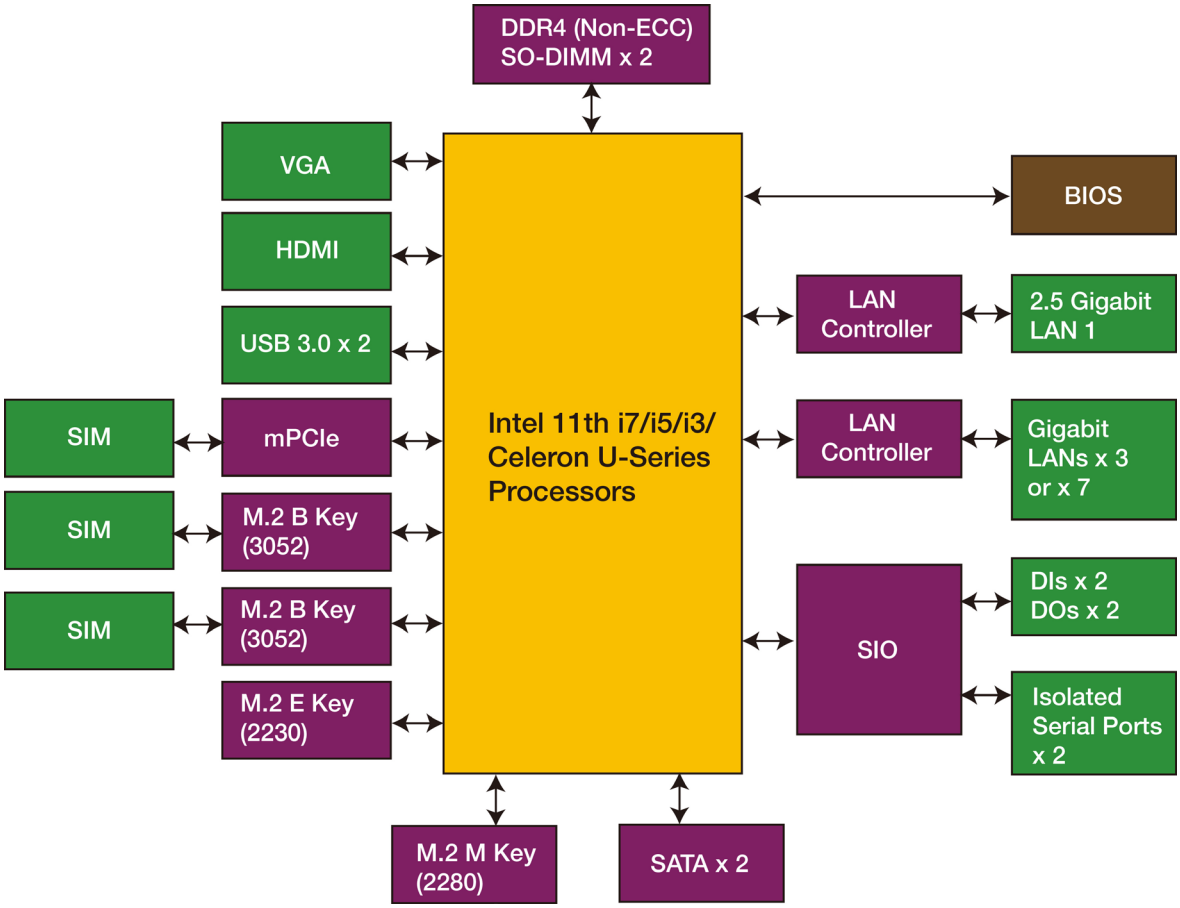
- Intel® Core™ i3/i7 embedded computer for in-vehicle applications
- Multiple wireless connectivity options: Up to two 5G, one 4G, one Wi-Fi 6,
- and one Wi-Fi 5
- Up to 8 Ethernet ports, suitable for onboard secure-gateway application
- Two hot-swappable HDD/SSD slots with locks for enhanced security
- Onboard TPM module for enhanced cybersecurity
- Low voltage monitoring support of RTC battery
- Isolated 24 to 110 VDC power input to meet versatile power requirements of
- rolling-stock applications
- Complies with all EN 50155 mandatory test items1
- Complies with EN 50121-4
- Complies with IEC 61373 requirements for shock and vibration resistance
- -40 to 70°C operating temperature with cellular and Wi-Fi modules enabled (EN 50155 OT4 range)

*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: www.moxa.com/doc/specs/EN_50155_Compliance.pdf

Hardware Specifications

For the product hardware specifications, refer to Moxa's website: https://www.moxa.com.

Hardware Block Diagram



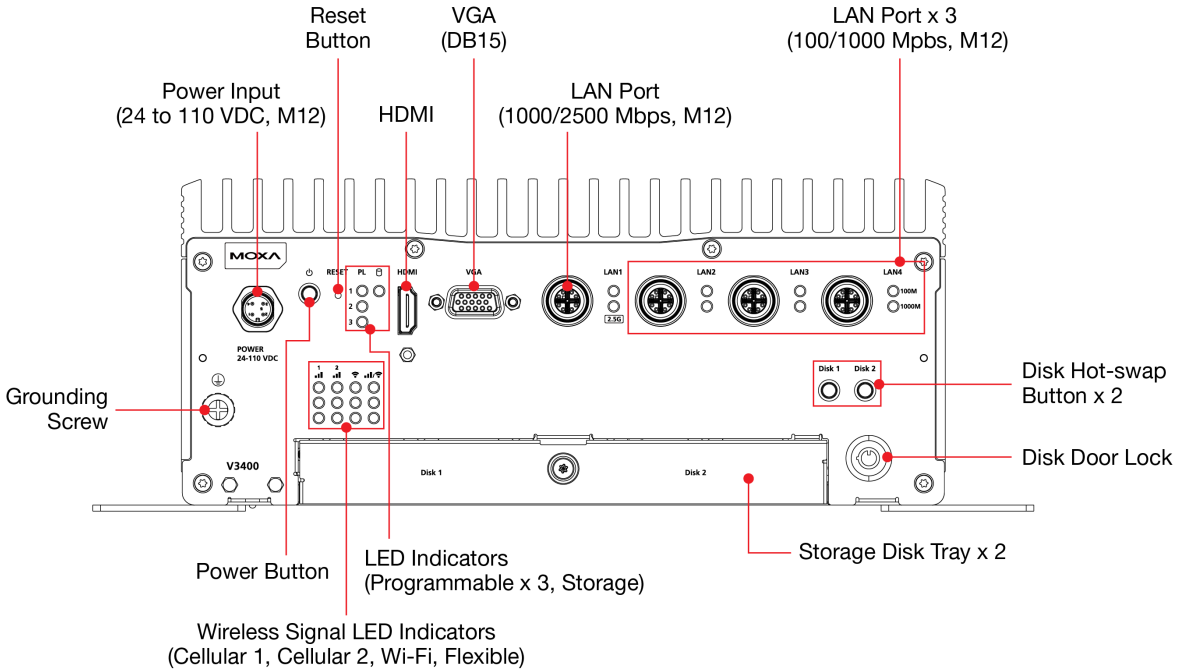
2. Hardware Overview

V3400 embedded computers are compact and rugged for use in industrial applications. LED indicators help you monitor performance and identify trouble spots, multiple serial ports allow you to connect a variety of devices for wireless operation, and the reliable and stable hardware platform lets you devote your attention to developing your applications, rather than diddling with low-level APIs and device drivers.

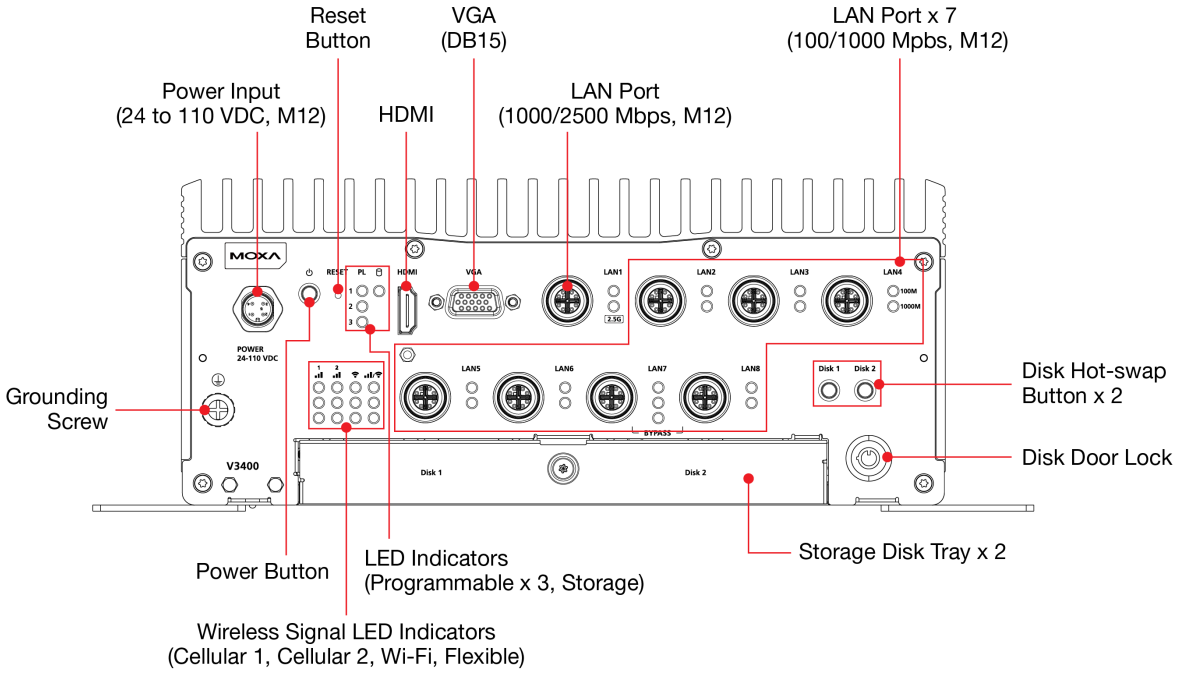
Appearance

Front View

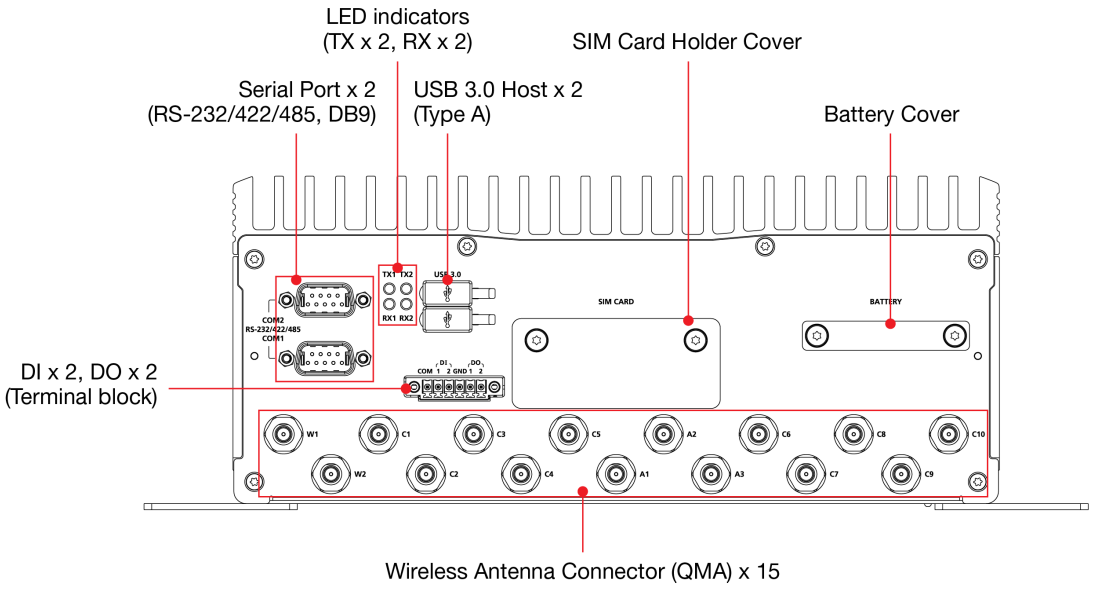
V3404 Models



V3408 Models



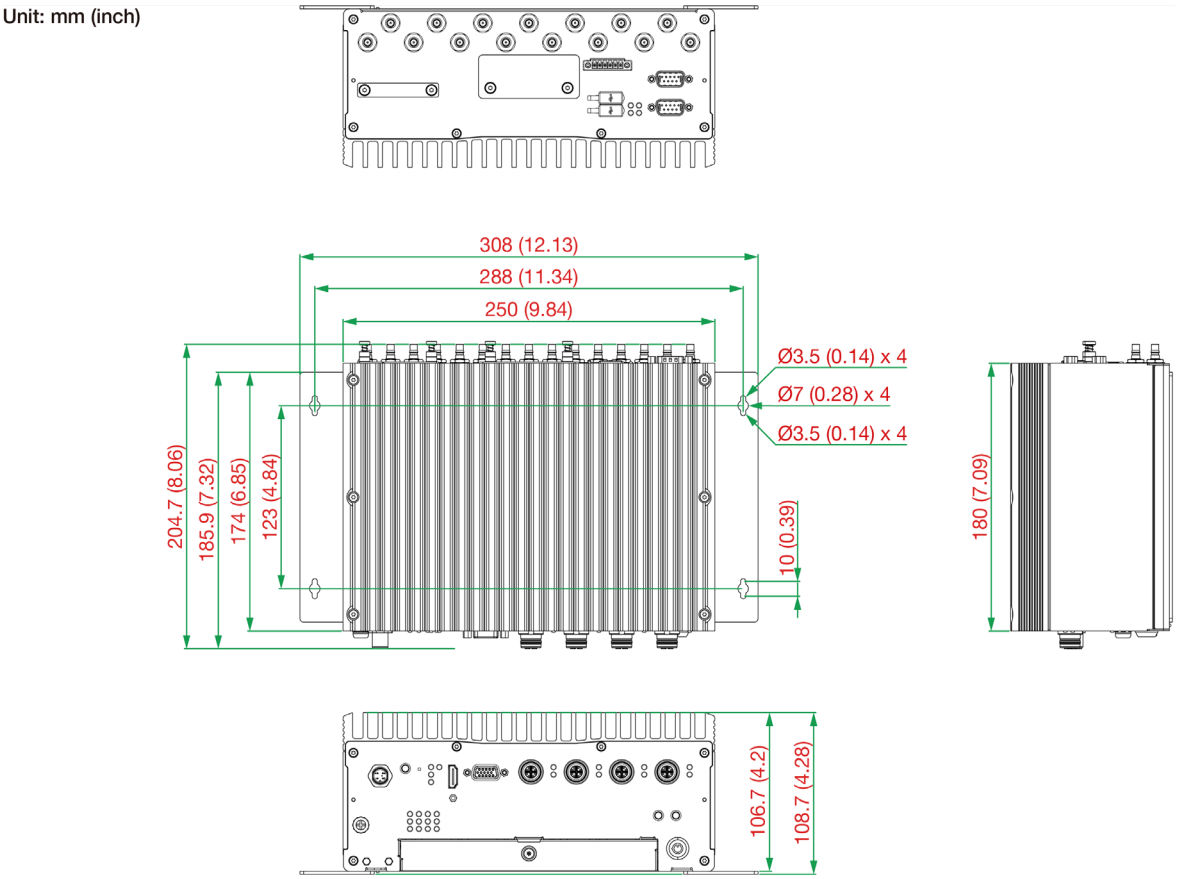
Rear View



Dimensions

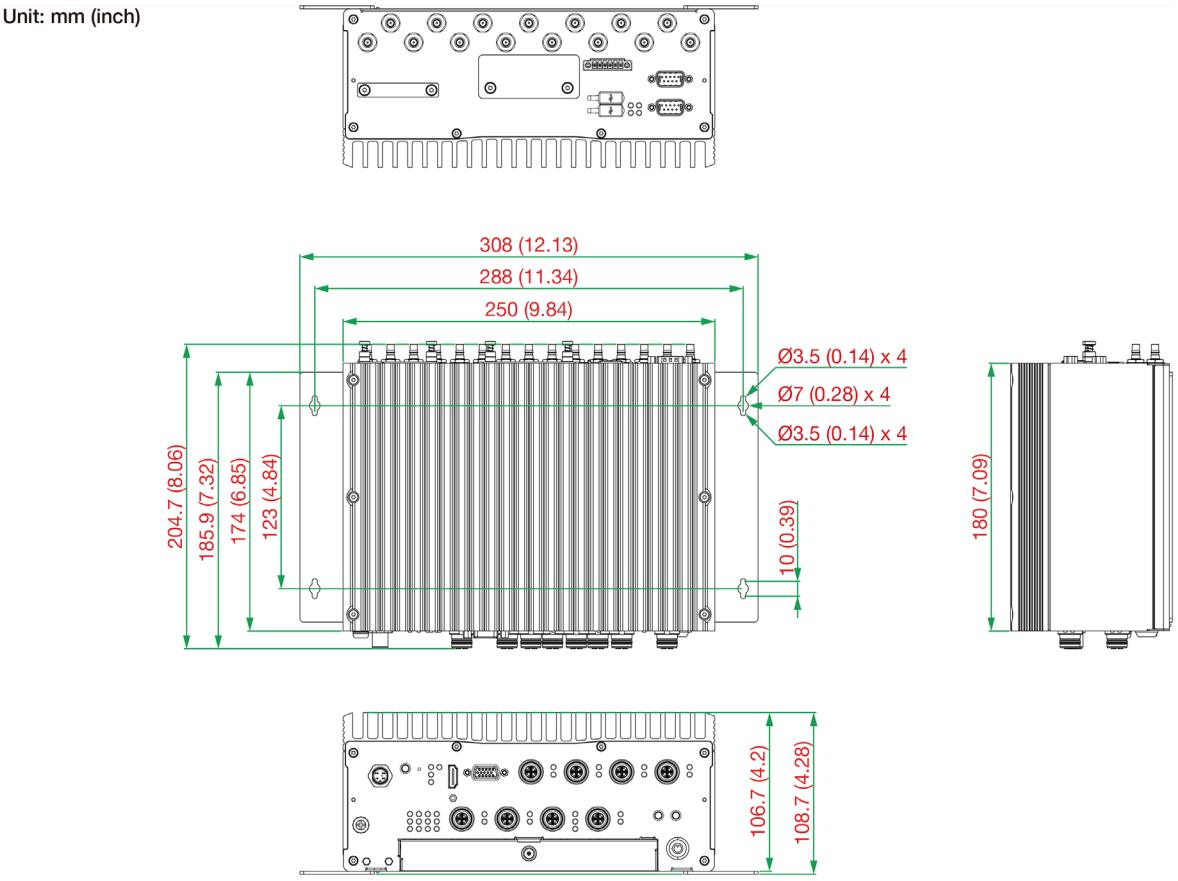
V3404 Models

Unit: mm (inch)



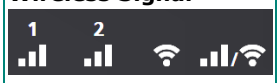
V3408 Models

Unit: mm (inch)



LED Indicators

The following table describes the LED indicators located on the front and rear panels of the V3400 Series computer.

LED Name	Color	Status	Function
Power 	Green	Steady On	Power is on
		Off	No power input or other power-input error
LAN1 (1000/2500 Mbps)	Green	Steady On	1000 Mbps Ethernet link
		Blinking	Data transmission is in progress
	Yellow	Steady On	2500 Mbps Ethernet link
		Blinking	Data transmission is in progress
	Off		Data transmission at 100/10 Mbps or cable not connected
LAN2 to LAN8 (100/1000 Mbps) *V3404-TL Models: LAN2 to LAN4 V3408-TL Models: LAN2 to LAN8*	Green	Steady On	100 Mbps Ethernet link
		Blinking	Data transmission is in progress
	Yellow	Steady On	1000 Mbps Ethernet link
		Blinking	Data transmission is in progress
	Off		Data transmission at 10 Mbps or cable not connected
Serial Port 1/2 (TX1/2, RX1/2)	Green	Steady On	Tx: Serial port is transmitting data
	Yellow	Blinking	Rx: Serial port is receiving data
	Off		No operations
Storage 	Yellow	Blinking	Data is being accessed from either the M.2 key (PCIe [x4]) or the SATA drive
	Off		Data is not being accessed from the storage drives
Disk 1/2 Hot Swap 	Yellow	Steady On	SDD/HDD is mounted
		Blinking	System is doing a hot swap of the SDD/HDD (the LEDs will blink three times before turning off)
	Off		SDD/HDD is not mounted and can be safely removed.
BYPASS V*3408-TL models: LAN7 on I/O board*	Yellow	Steady On	LAN bypass mode is activated
	Off		No operations
Programmable LED 1/2/3 (On the main board)	Green		Programmable for application active normally, LEDs blinking, or frequency adjustment
	Off		No operations
Wireless Signal  *Cellular 1/2 (5G only), Wi-Fi, and flexible slots (cellular or Wi-Fi)*	Green	3 LEDs Steady On	Signal strength at 61% to 100%
		2 LEDs Steady On	Signal strength at 41% to 60%
		1 LED Steady On	Signal strength at 21% to 40%
		1 LED Blinking	Signal strength at 0% to 20%
	Off		Wireless module not connected

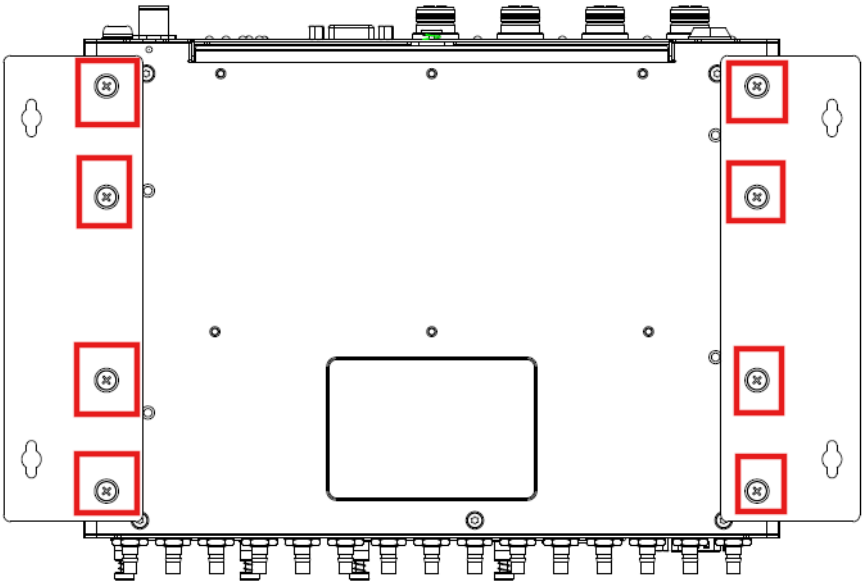
3. Hardware Setup and Connections

In this chapter, we show how to connect the embedded computers to the network and to a variety of common devices.

Installing the V3400

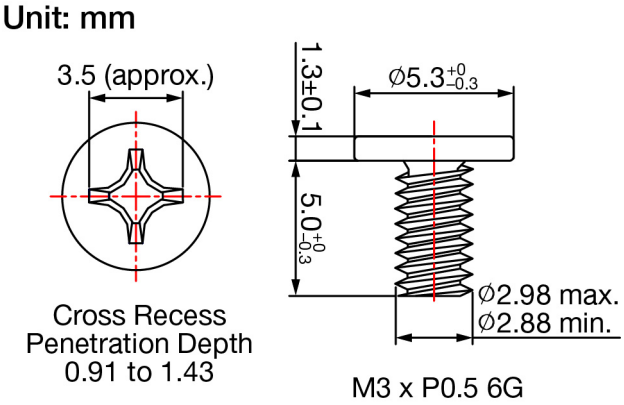
Wall or Cabinet Mounting

The V3400 computer comes with 2 wall-mounting brackets. Attach the brackets to the computer using 4 screws on each side. Ensure that the mounting brackets are attached to the V3400 computer in the direction shown in the following figure:



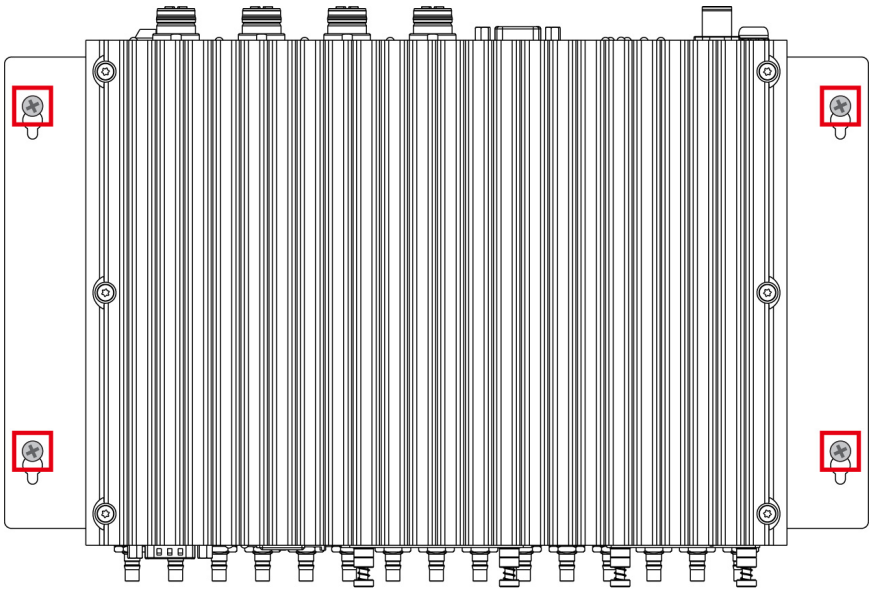
The 8 screws for the mounting brackets are included in the product package. They are standard FMS_M4x6 mm screws and require a torque of 5.5 kgf-cm.

Refer to the following illustration for details:



Use 2 screws (M3*5L standard is recommended) on each side to attach the V3400 to a wall or cabinet. These 4 screws are not included in the product package; they need to be purchased separately.

Ensure that the V3400 computer is installed in the direction shown in the following figure:



Wiring Requirements

This section describes how to connect peripheral devices to the embedded computer.

You should read and follow these common safety precautions before proceeding with the installation of any electronic device:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, ensure that the wires are perpendicular at the intersection point.

NOTE

Do not run signal or communication wiring together with 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 kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is advisable to label the wiring to all devices in the system.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your V3400.

Wiring 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.

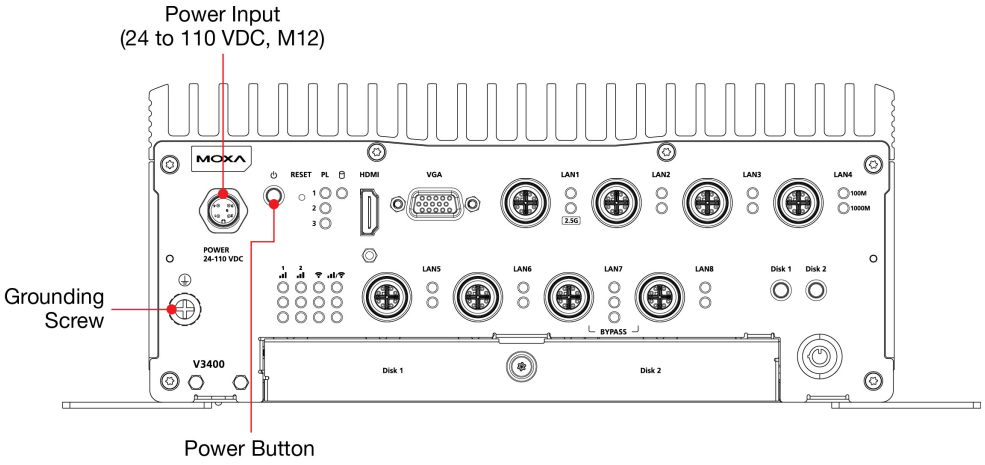
If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

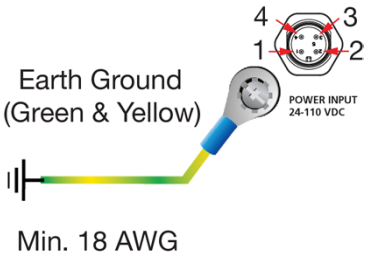
Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

The V3400 computers are provided with M12 power input connectors on the front panel. Connect the power cord wires to the connectors and then tighten the connectors. Push the power button; the Power LED (on the power button) will light up to indicate that power is being supplied to the computer. It should take about 30 to 60 seconds for the operating system to complete the boot-up process.



Pin	Definition
1	V+
2	N.C.
3	V-
4	N.C.



Min. 18 AWG

The power input specification is given below:

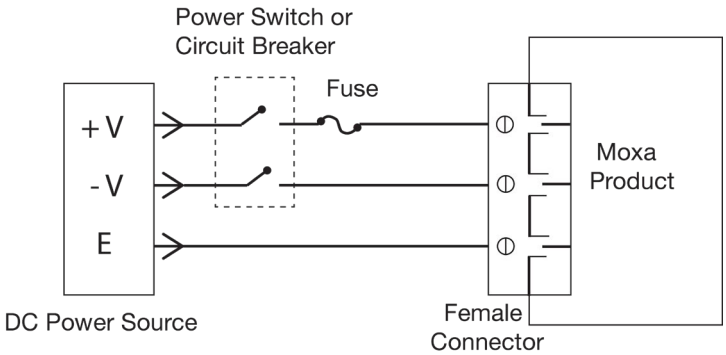
- V3404-TL (4 LAN models): DC source with a power source rating of 24 V @ 3.1 A; 110 V @ 0.63 A
- V3408-TL (8 LAN models): DC source with a power source rating of 24 V @ 3.2 A; 110 V @ 0.65 A

Use a wire with minimum 18 AWG to connect the power.

ATTENTION

For safety reasons, refer to the following instructions on power input installation.

1. The power switch or circuit breaker between Moxa's products and the power supply should easily disconnect if a power overcurrent occurs.
2. The maximum branch circuit over current protection rate should be 20 A.
3. The DC power source wire specifications should be a minimum 14 AWG and comply with VW-1 or FT-1 standards.



For surge protection, connect the grounding connector located below the power connector with the earth (ground) or a metal surface.

NOTE

This computer is designed to be supplied by listed equipment (UL listed/IEC 60950-1/IEC 62368-1) rated 24 to 110 VDC, minimum 3.1 to 0.63 A (4 LAN models) or minimum 3.2 to 0.65 A (8 LAN models), and minimum Tma=70°C. If you need assistance with purchasing a power adapter, contact the Moxa technical support team.

Grounding the Unit

For surge protection, connect the grounding connector located beside the power connector with the earth (ground) or a metal surface.

Connecting Data Transmission Cables

This section describes how to connect V3400 embedded computers to a network and serial devices.

Connecting to the Network

There are one 1000/2500 Mbps and three 100/1000 Mbps Ethernet ports for V3404 models, one 1000/2500 Mbps and seven 100/1000 Mbps Ethernet ports for V3408 models. Both use M12 X-coded connectors and are located on the front panel of the computer.

ATTENTION

There is risk of damage to the M12 X-coded cable due to improper installation or removal.

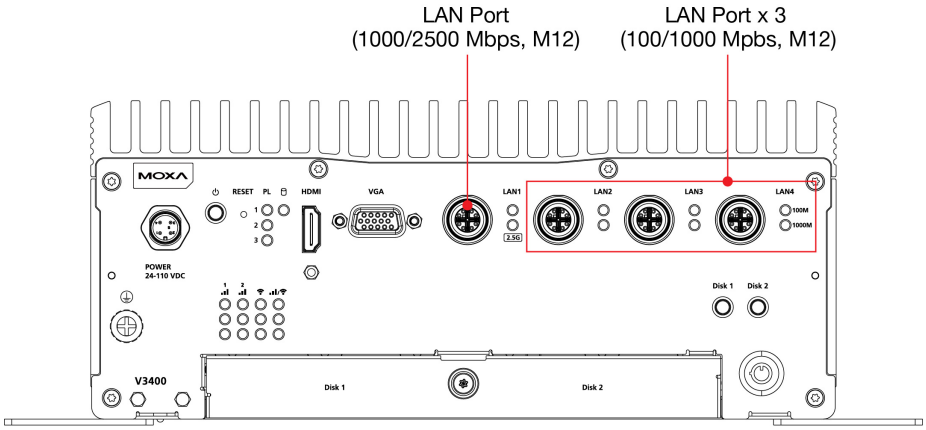
Before you attach an M12 X-coded cable to an Ethernet port on the V3400, read the instructions carefully.

The M12 X-coded cable is designed with locking mechanisms to prevent pin misalignment. Ensure that you properly align the indicator and notches when connecting the cable.

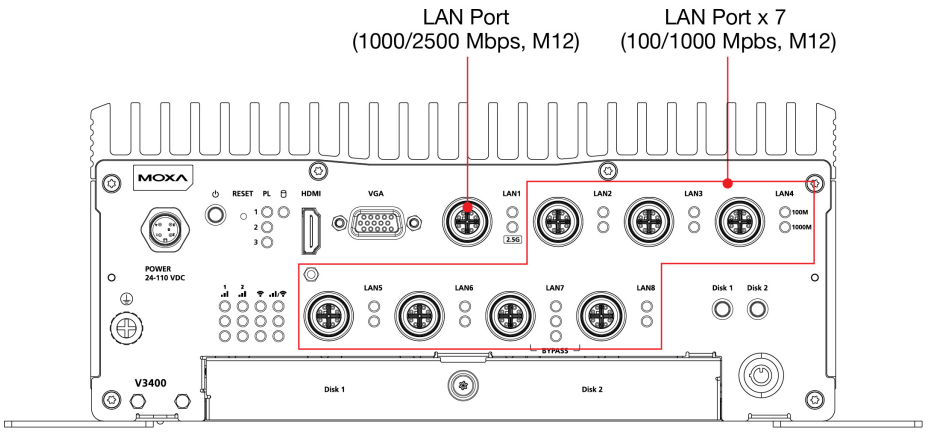
Do NOT insert the cable into a port with excessive force.

Refer to the following figure for the specific location of the Ethernet ports.

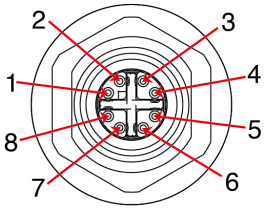
V3404 Models



V3408 Models



Refer to the following figure for the pin assignments of the Ethernet ports.



Pin	Definition
1	DA+
2	DA-
3	DB+
4	DB-
5	DD+
6	DD-
7	DC-
8	DC+

Follow the steps below to connect an M12 X-coded cable to the computer:

1. Obtain an M12 X-coded cable.

   The following table shows the Ethernet connector and cable options. For more information, contact your local Moxa sales representative.

Model Name	Type	Description
CBL-M12(FF5P)/OPEN-100 IP67	Cable and connector	1-meter X-coded M12-to-RJ45 Cat-5E UTP Gigabit Ethernet cable, 8-pin male M12 connector, IP67-rated.

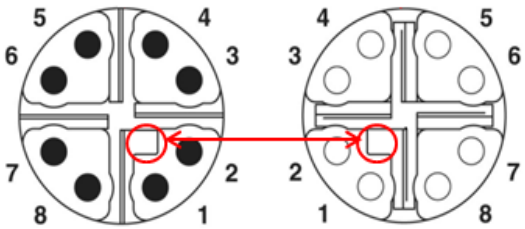
NOTE

For best performance and transmission quality, Moxa strongly recommends that you use cables and connectors from Phoenix Contact.

2. Align the notch on the M12 X-coded cable pin core with the notch on the port socket.

   Pin assignment of M12 plug. 8-pos., X-coded, pin side view

   M12 socket pin assignment 8-pos, socket side view



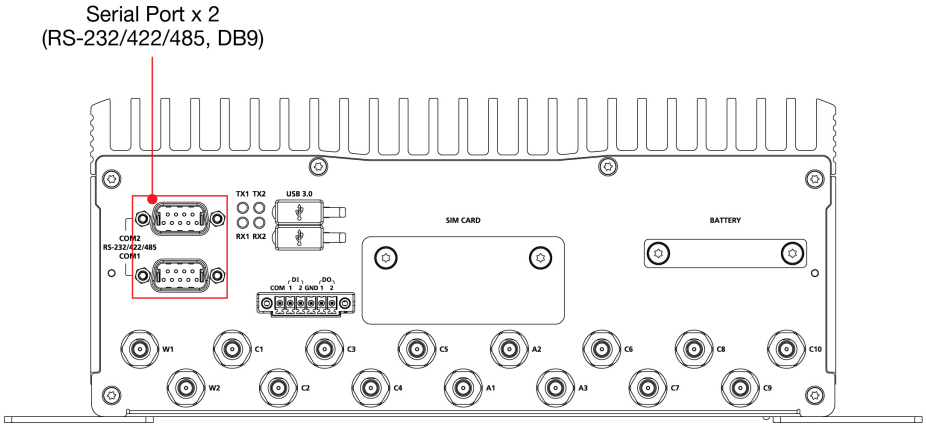
3. Connect the M12 X-coded cable to the port.

> **NOTE**
>
> Do NOT use excessive force to push the M12 X-coded cable into the port.

4. Turn the interlock screw to tighten it over the cable without using a mechanical tool (such as a screw wrench).

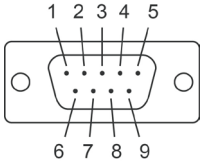
Connecting to a Serial Device

The V3400 comes with two serial ports, which can be configured for RS-232/422/485 interfaces. These ports are located on the rear panel.



Use a serial cable to connect your serial device to the embedded computer's serial port. These ports have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 using the software. The pin assignments of the ports are shown in the table below:

DB9 Male Port



RS-232/422/485 Pinouts

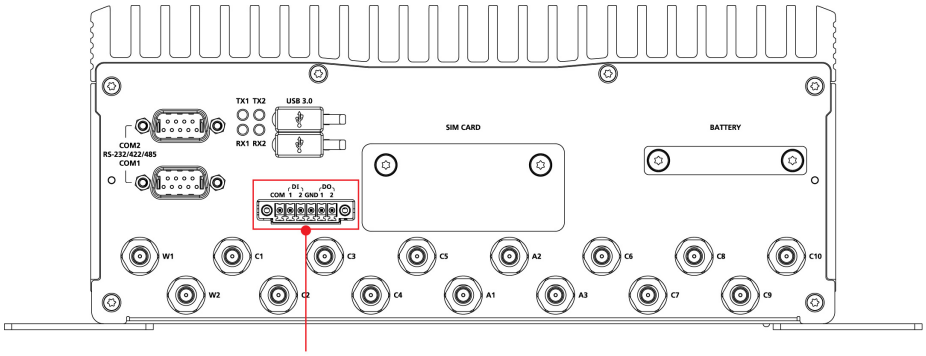
Pin	RS-232	RS-422	RS-485-4W	RS-485-2W
1	DCD	TxDA(-)	TxDA(-)	–
2	RxD	TxDB(+)	TxDB(+)	–
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	–	–	–
7	RTS	–	–	–
8	CTS	–	–	–

NOTE

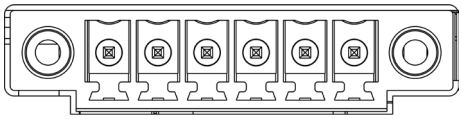
This is the pin assignment for the computer-side connectors on the V3400. If you are wiring peripheral-side connectors for a serial cable, you will need to match the pin assignment of the connectors.

Digital Inputs/Outputs

The V3400 comes with 2 digital inputs and 2 digital outputs in a terminal block.



Refer to the following figures for the pin definitions and the current ratings.



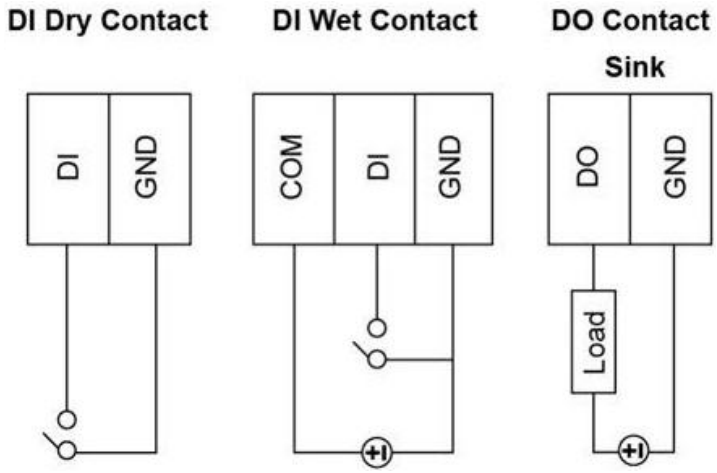
COM 1 2 GND 1 2

DI DO

Digital Inputs
Dry Contact
Logic 0: Short to Ground
Logic 1: Open
Wet Contact *(COM to DI)*
Logic 0: 10 to 30 VDC
Logic 1: 0 to 3 VDC

Digital Outputs
Current Rating: 200 mA per channel
Voltage: 24 to 30 VDC

The wiring methods are shown in the diagram below:



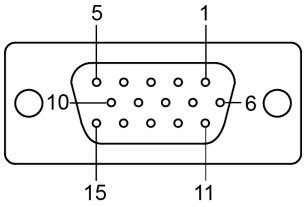
NOTE

If you are using wet contacts, you must connect the source to the power. In addition, both DI and DO can only be wired as sink types.

Connecting the Displays

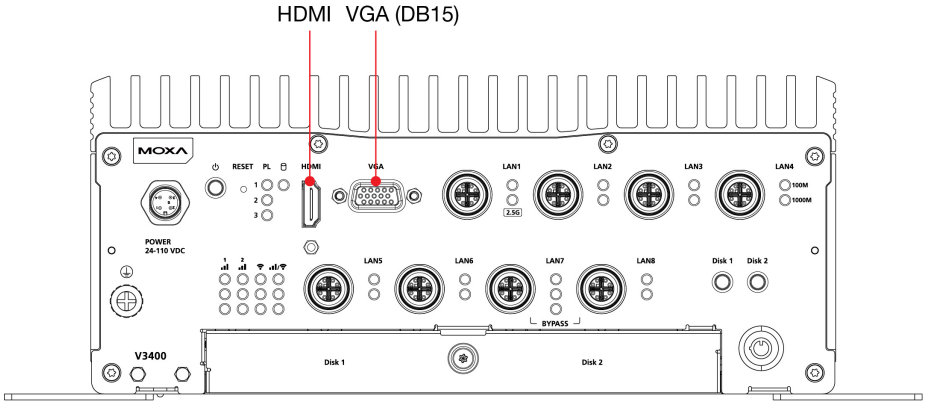
The V3400 comes with a D-Sub 15-pin female connector on the front panel to connect a VGA monitor. To ensure that the monitor image remains clear, tighten the monitor cable after connecting it to the V3400. The pin assignments of the video output connector are shown in the diagram below:

DB15 Female Connector



Pin No.	Signal Definition	Pin No.	Signal Definition
1	Red	9	VCC
2	Green	10	GND
3	Blue	11	NC
4	NC	12	DDC2B Data
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC2B Clock
8	GND		

In addition, an HDMI connector is also provided on the rear panel, allowing users to connect another display with an HDMI interface.

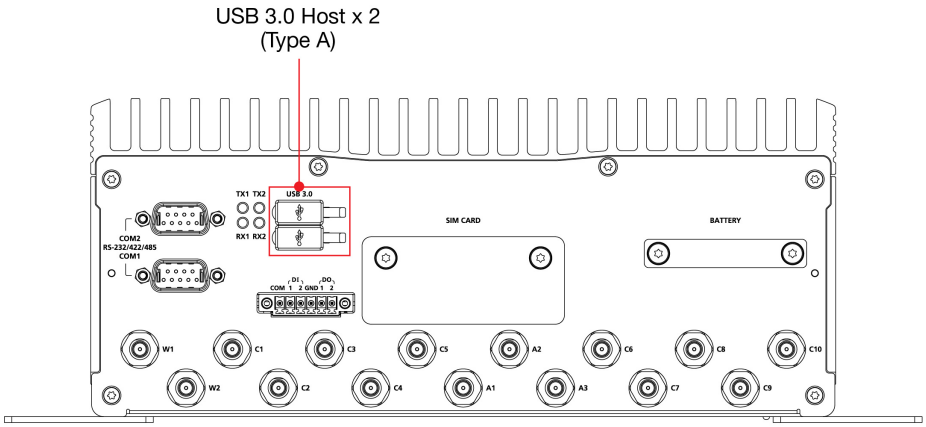


NOTE

For reliable video streaming capability, choose certified HDMI cables.

Connecting to the USB Ports

The V3400 comes with two USB ports on the rear panel. These ports come with USB 3.0 type A interfaces. Refer to the following illustrations for the location of these ports.



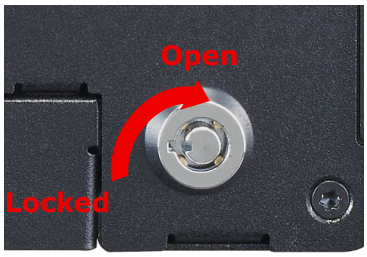
You can use these USB ports to connect various peripheral devices, such as a keyboard, a mouse, and USB storage disks, to your computer.

Installing a Hot-swappable Storage Drive

The V3400 comes with two sockets that allow users to install two disk drive for storage expansion. Follow the steps below.

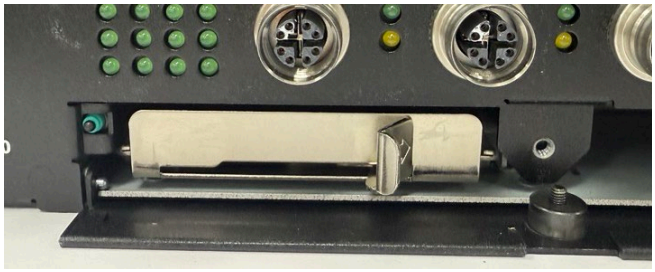
1. Place the disk drive on the storage disk tray. Turn the tray around so that the back side is facing you. Fasten the four screws to secure the disk to the tray.

2. Unfasten the screw on the storage slot cover, unlock the disk door lock using the key, and pull down the cover to access the slot.



3. Find the location of the storage tray rail inside the socket.

4. Align the tray with the rail and insert the tray into the socket.



5. Push the clutch in the tray to the left to make sure the disk drive has been connected correctly.

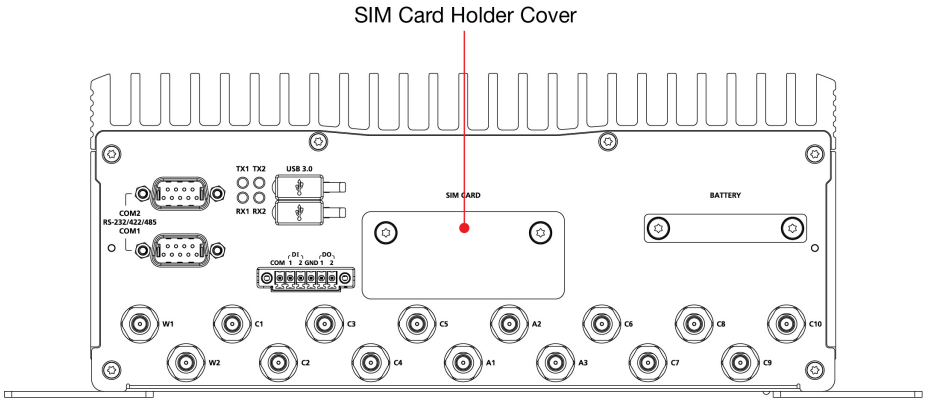
6. To remove the tray, pull the clutch in the tray to your right and pull out the tray.

Installing the SIM Cards

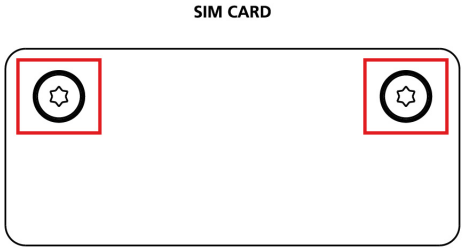
The V3400 Series comes with 6 SIM card slots on the rear panel of the computer.

To install a SIM card, do the following:

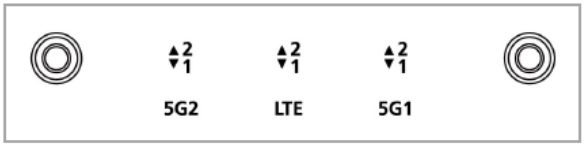
1. Find the SIM card holder cover on the real panel.



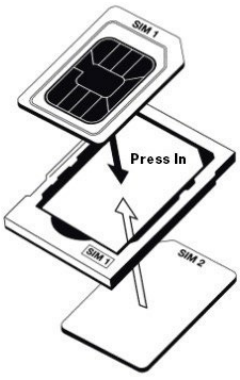
2. Unfasten the two screws on the cover and remove the cover.



2. Each cellular module supports dual SIM cards and Nano SIM card type is also supported. Check the following diagram for the location of the SIM card slots.
   Following the printed instructions on the back of the cover to push and release the SIM card tray in which you want to install the SIM card.



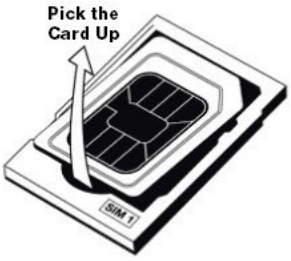
3. Place the SIM card in the correct direction on the tray and align it properly in place as indicated on the label.



4. Insert the tray back into the slot. You will hear a click indicating the tray is locked into place.

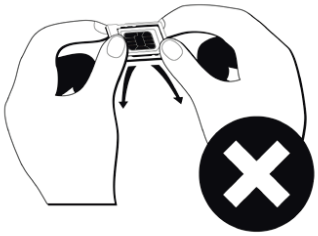
5. Replace and fasten the two screws of the cover on the SIM card slot.

   To remove the SIM card, simply push and release the SIM card tray and use the groove in the tray to carefully lift and remove the SIM card.



ATTENTION

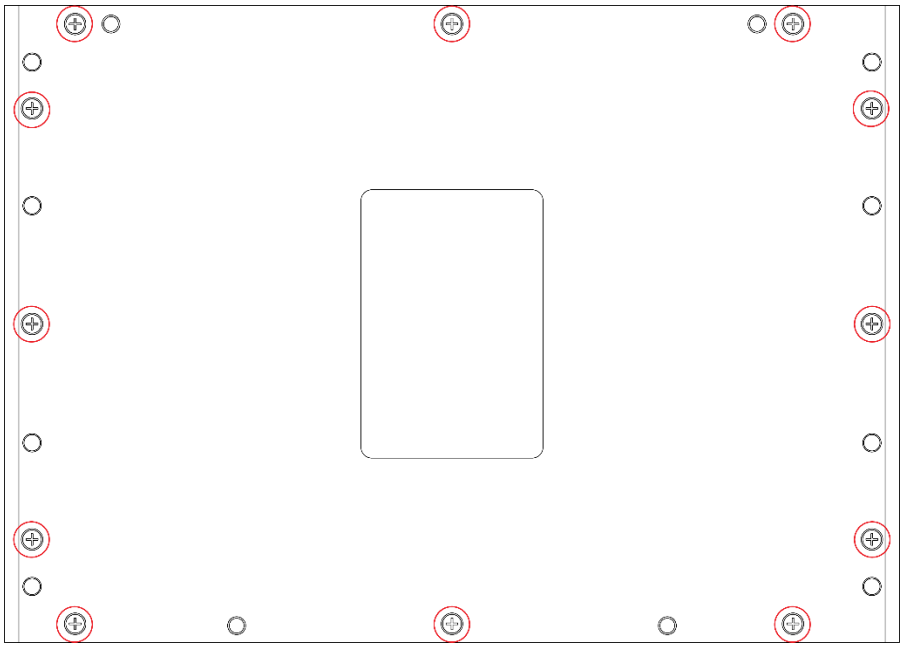
Do not bend the SIM-card tray to remove the SIM card. Improper use may cause the tray to break.



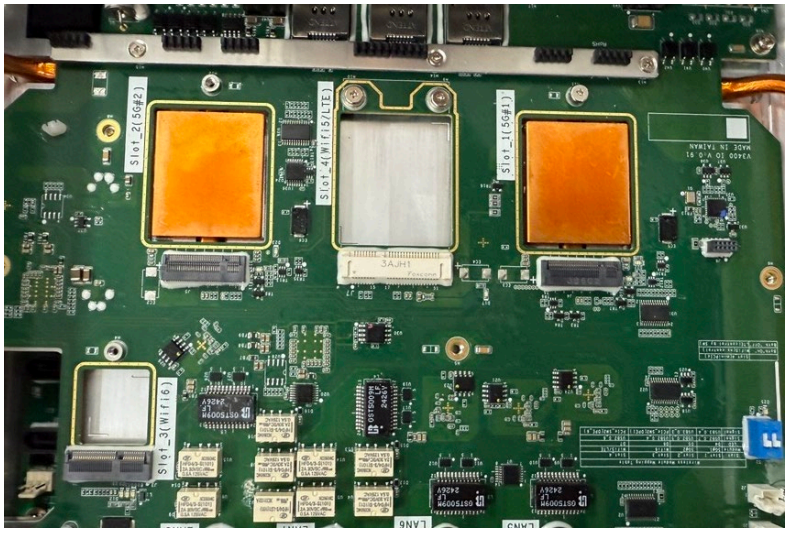
Installing the Wireless Modules

Follow these steps to install the wireless modules.

1. Remove the twelve screws on the bottom panel of the computer.



2. Find the print indicate to different of wireless module



From right to left:

Slot_1: 5G for first installation

Slot_4: LTE or Wi-Fi 5

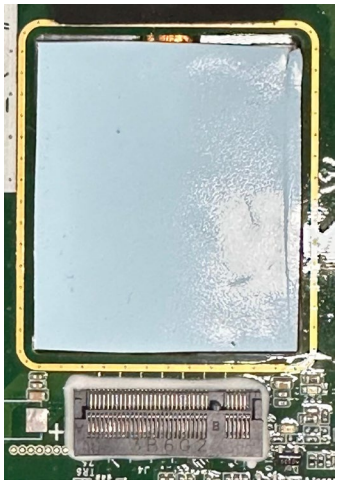
Slot_2: 5G for second installation

Slot_3: Wi-Fi 6.

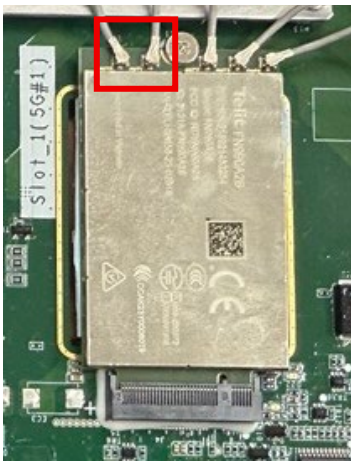
Installing the 5G Module

To install the 5G module, do the following:

1. Place the thin thermal pad on the heat sink.



2. Unfasten the screw and insert the module into the socket above the thermal pad.



3. Fasten the screws to secure the module.
4. Paste the thick thermal pads on the module.

NOTE

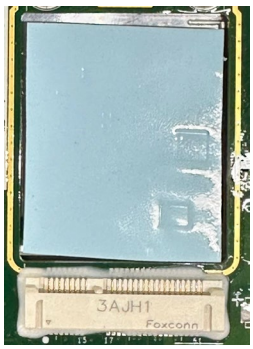
We highly recommend following the installation order. If you install only one 5G module, use Slot 1 to do the installation. If you install two 5G modules, then use Slot 1 and 2.

Installing the 4G Module

To install the 4G module, do the following:

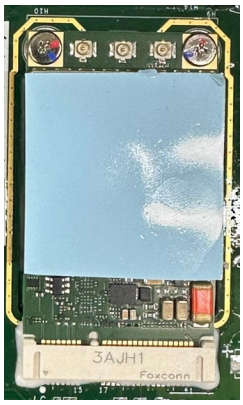
1. Find the slot 4 and place the heat sink on it.

2. Place the thick thermal pad on the heat sink.

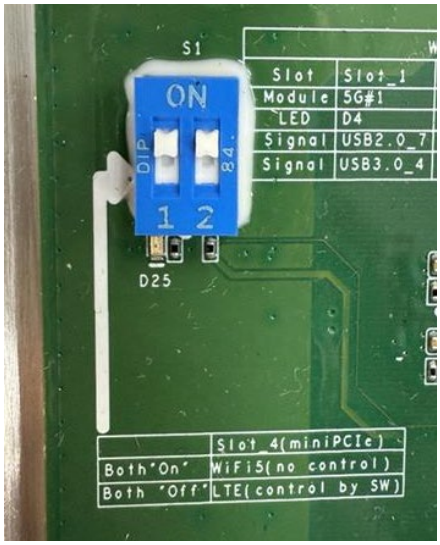


3. Unfasten the screw and insert the module into the socket above the thermal pad.

6. Fasten two screws to secure the module.
7. Paste the thin thermal pads on the module.



8. Switching the wireless nodule socket to both "off" for LTE mode.



Installing the Wi-Fi 6 Module

To install the Wi-Fi 6 module, do the following:

1. Find the slot 3 and place the thick thermal pad on it.

2. Unfasten the screw and insert the module into the socket above the thermal pad.

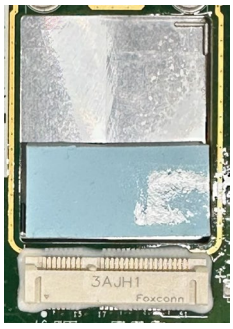
3. Fasten the screw to secure the module.
4. Paste thin thermal pad on the module.

Installing the Wi-Fi 5 Module

To install the Wi-Fi 5 module, do the following:

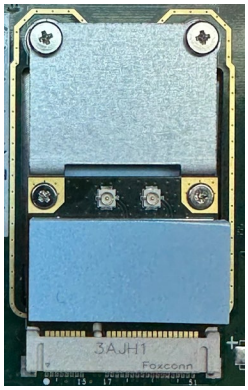
1. Connect the mPCIe adapter bracket and the Wi-Fi5 module with two screws.

2. Find the slot 4 and place the thick thermal pad close to the slot like picture below:

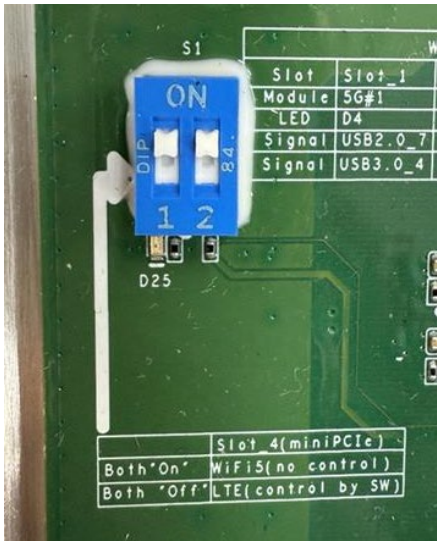


3. Unfasten the screw and insert the module into the socket above the thermal pad.

4. Fasten the screw to secure the module.
5. Paste thin thermal pad on the module.



6. Switching the wireless nodule socket to both "on" for Wi-Fi 5 mode.



Installing Wireless Antenna and Connecting Cables

To connect wireless cables and antennas, do the following:

1. Confirm the wireless module has been installed and check the number of coaxial cables corresponding to the connectors on the module. Refer to the following figures for guidance.

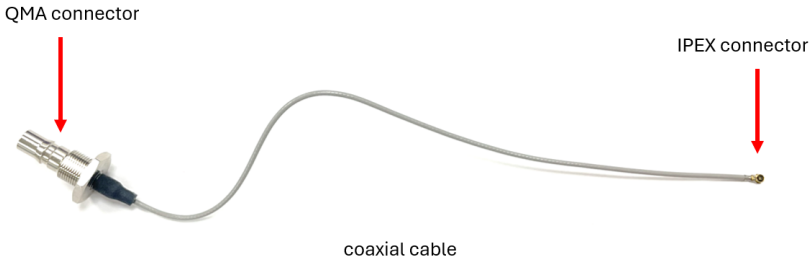
5G	4G
	

Wi-Fi 6	Wi-Fi 5
	

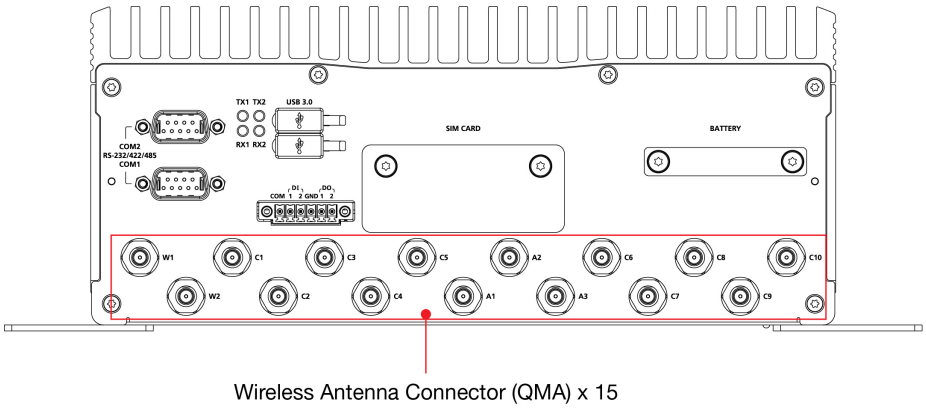
NOTE

The figures here are for illustration purposes only and may not corresponding to the product model purchased.

2. Connect the QMA connector end of the coaxial cable to the connector hole on the rear panel of the computer.



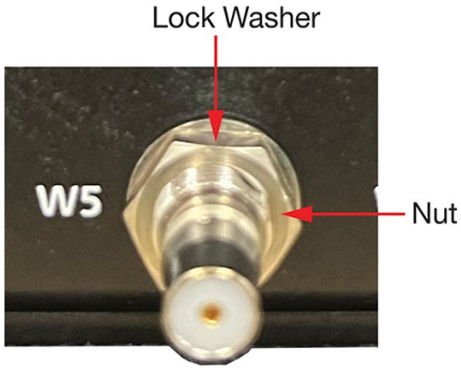
Refer to the following figure for the recommended locations for the connectors for the different types of modules.



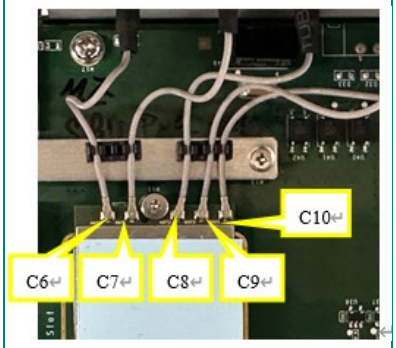
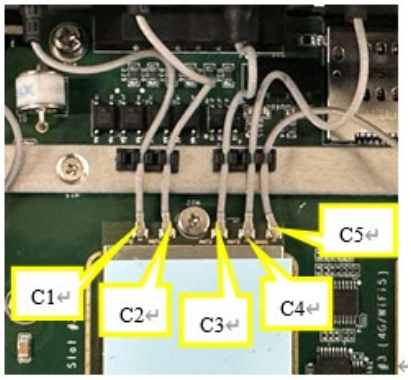
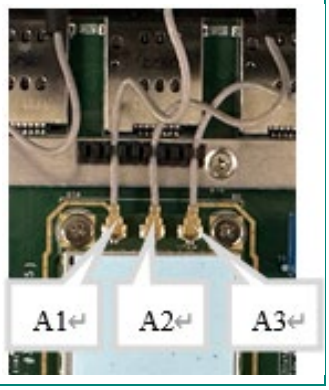
- W1 and W2 are for Wi-Fi 6 modules.
- C1 to C5 are for 5G #2 modules.
- A1 and A2 are for Wi-Fi 5 modules.
- A1, A2, and A3 are for 4G modules.
- C6 to C10 are for 5G #1 modules.

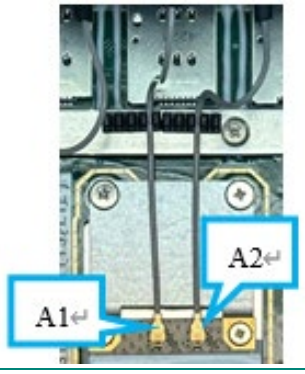
3. Hold the lock washer against the rear panel and secure the antenna connector by tightening the nut onto the thread protection ring.

   Each cable comes with its own lock washer and nut.

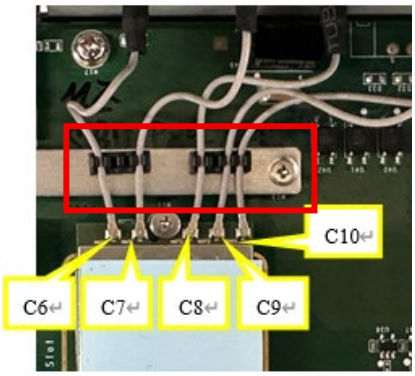


4. Plug one end of the IPEX/IPEX4 connector of coaxial cables on the module.
   Make sure to follow the order indicated on the panel for the QMA connectors.

5G #1	5G #2	4G
		

Wi-Fi 6	Wi-Fi 5
	

5. You can use black cable sockets above the modules to arrange the cables and stabilize them as shown in the following figure:



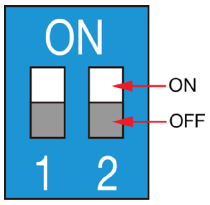
ATTENTION

Regarding the antenna, there is some reference data for your safety use:

1. Antenna isolation:
   After installing the antennas, it is strongly recommended that the isolation between the cellular and Wi-Fi antennas be greater than 60dB to avoid potential interference.
2. GNSS Antenna type: Setting default in active mode, which can be configured through MCM in Linux environment and Windows provided by Moxa.
3. GNSS Active Antenna specification:
   (1) For 5G modules validated by Moxa (third-party modules):
   Supply voltage: 3.1V, External Amplification Gain: 7.5 dB < Gain < 26 dB
   (2) For LTE modules validated by Moxa (third-party modules):
   Supply voltage: 3V, External Amplification Gain: Typical 17dB

Switching the Wireless Module Socket

The computer comes with wireless module sockets for installing a Wi-Fi 5 or 4G module. DIP switches are provided to enable installation of the module types required. The DIP switches are located below the sockets as shown in the following figure:



S1	
ON	Wi-Fi 5 module (slot 4)
OFF	4G module (slot 4)

For example, if you want to install a 4G module in slot 4, you need to turn S1 to OFF. If you want to install a Wi-Fi 5 module in slot 4, you need to turn S1 to ONN.

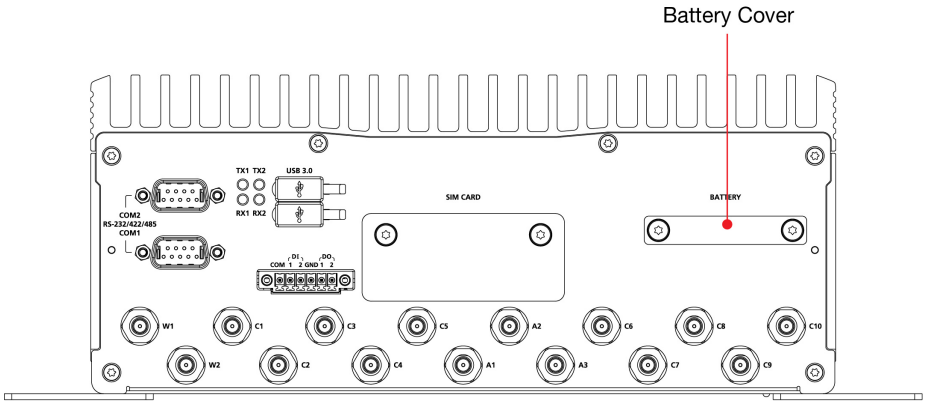
> **ATTENTION**
>
> If installing two Wi-Fi module at the same time, the frequency band(2.4 GHz, 5 GHz, 6 GHz) need to set to different band to avoid signal inference.

Replacing the Battery

The embedded computer's real-time clock is powered by a lithium battery. The V3400 comes with one slot for a battery installed with a lithium battery of type BR2032 and 3 V / 200 mAh specification.

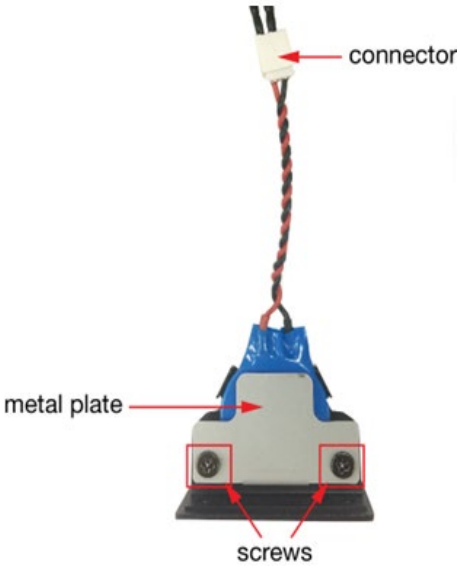
To replace the battery, do the following:

1. Locate the battery cover on the rear panel of the computer.



2. Unfasten the two screws on the battery cover.

3. Remove the cover. Remove the cover; the battery is attached to the cover as indicated.



4. Separate the connectors and remove the two screws from the metal plate.

5. Replace the new battery in the battery holder, place the metal plate on the battery, and fasten the two screws tightly.

6. Reconnect the connector, place the battery holder into the slot, and secure the cover of the slot by fastening the two screws on the cover.

NOTE

Ensure that you use the correct type of battery. Incorrect battery type may cause system damage. Contact Moxa's technical support staff for assistance, if necessary.

NOTE

This computer is intended to be installed in a restricted access area. In addition, for safety reasons, the computer should be installed and handled only by qualified and experienced professionals.

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

Dispose of used batteries in a suitable manner. Consult the battery manufacturer for details on disposing batteries.

4. BIOS Setup

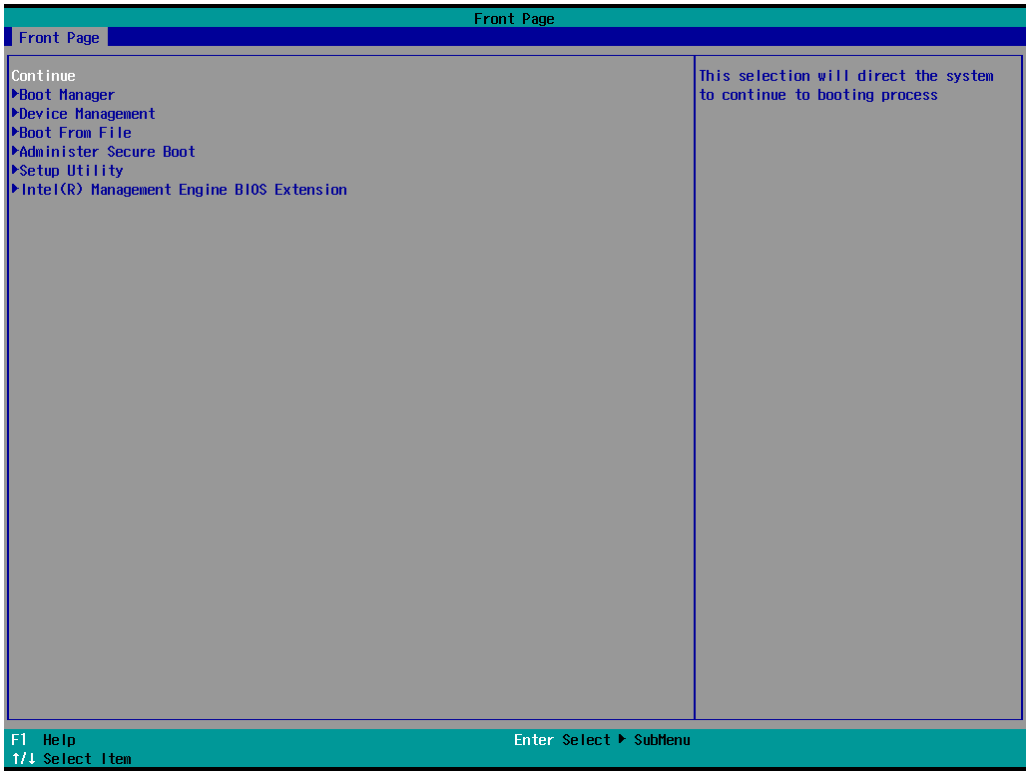
In this chapter, we describe the BIOS settings for the V3400 computer. The BIOS is a set of input/output control routines for peripherals to initialize the basic settings. The BIOS helps boot the system before the operating system is loaded. The BIOS setup allows the user to modify the system configuration for basic input/output peripherals. All the configurations are stored in the CMOS RAM, which has a 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)

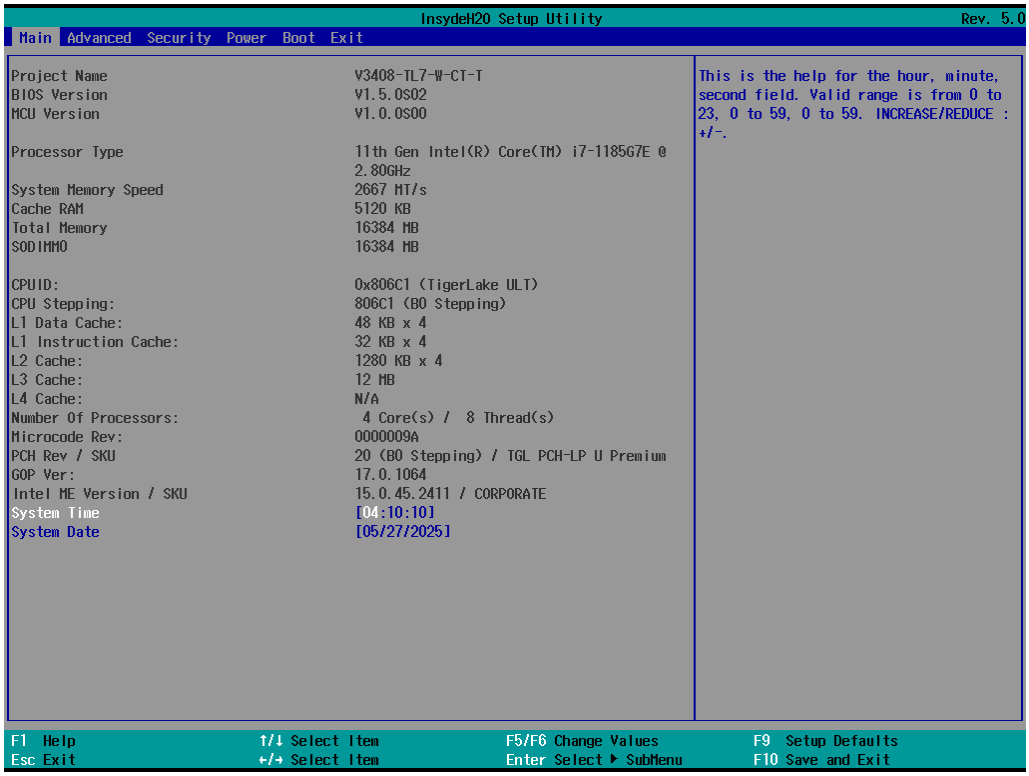
Select F2 to enter the BIOS configuration.



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 is shown when you enter the Setup Utility option.

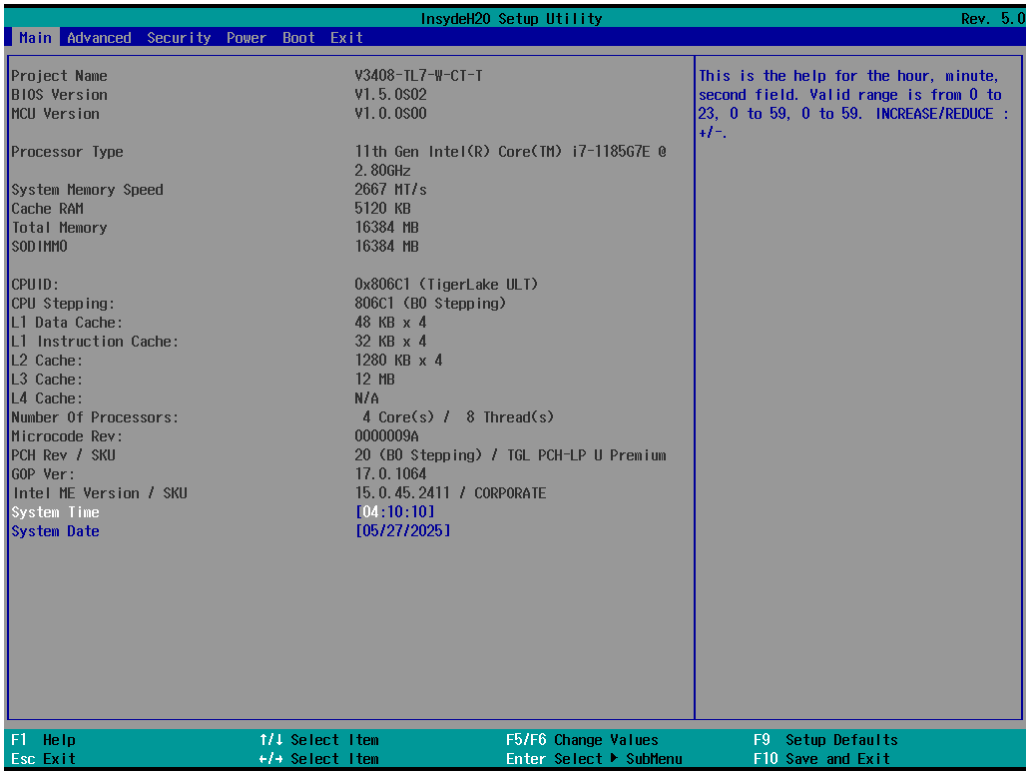


NOTE

The Project Name and Processor Type information may vary depending on the model that you have purchased.

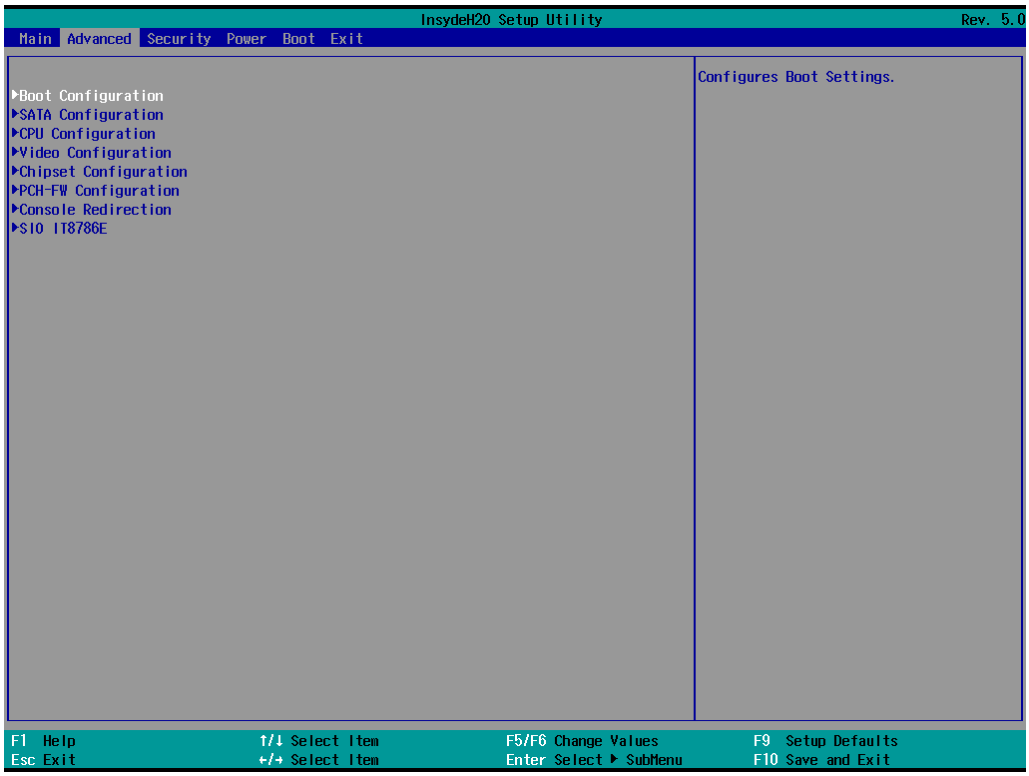
Main Page

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.



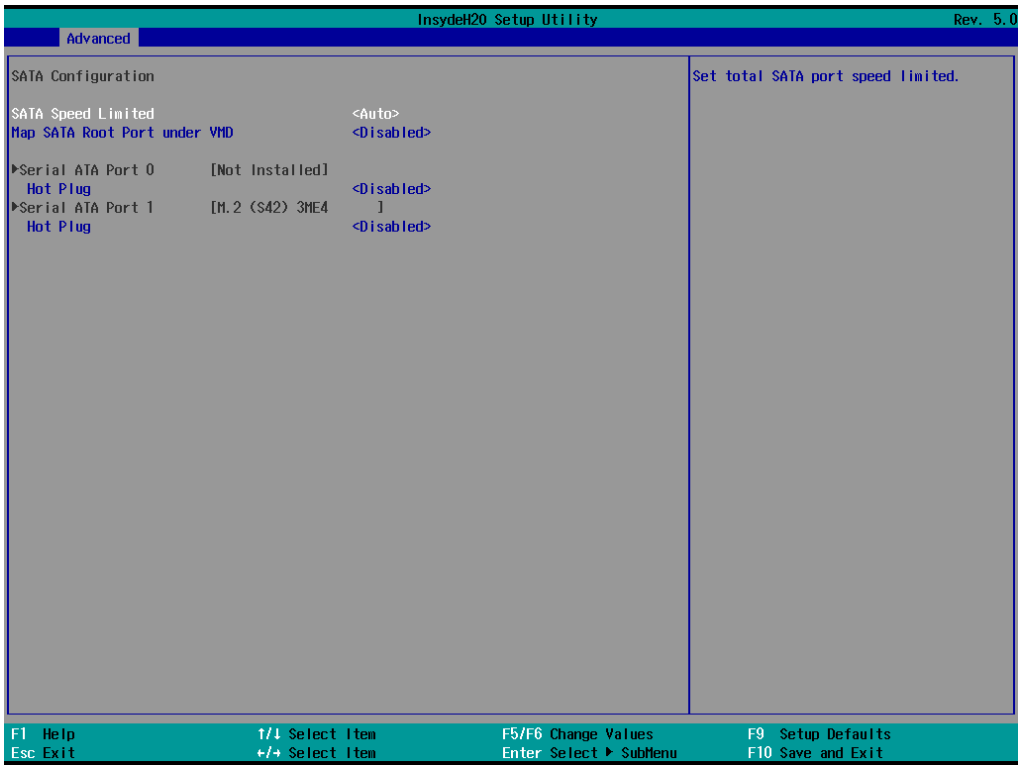
Boot Configuration

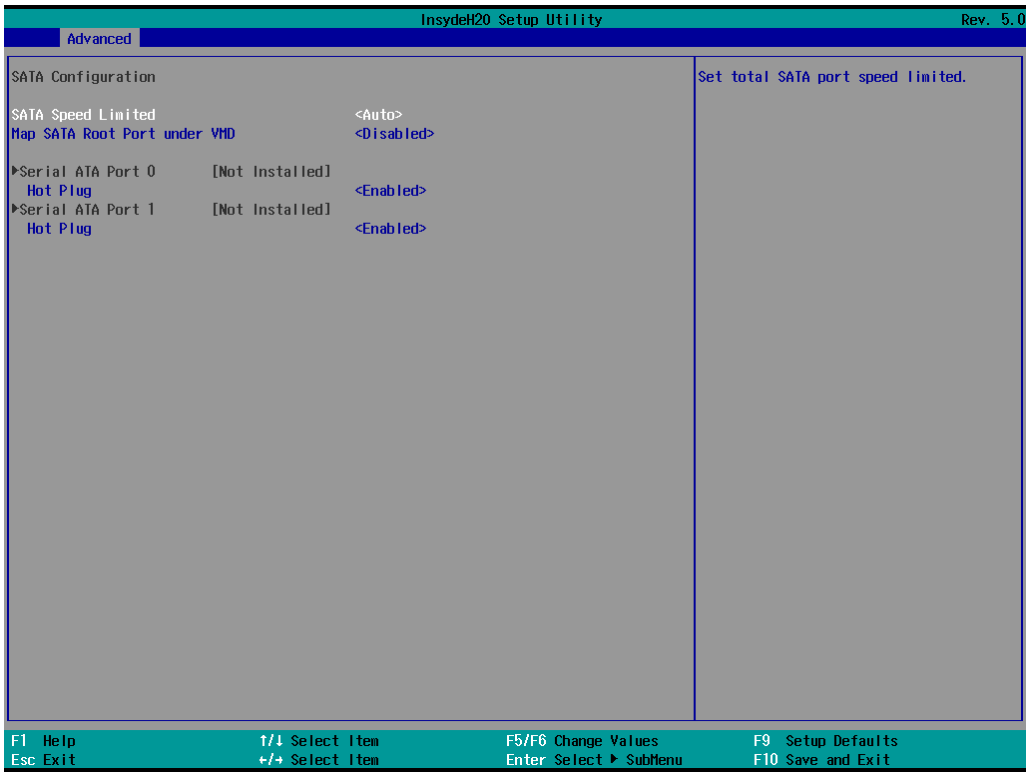
The Numlock option allows configuration of the Numlock value.

Options: On (default), Off.

SATA Configuration

These items allow you to select the SATA speed limit and enable or disable the RAID mode.





SATA Speed Limited

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

Map SATA Root Port under VMD

Options: Disabled (default), Enabled

Serial ATA Port

This setting displays information on the installed drives.

SATA Port Hot Plug

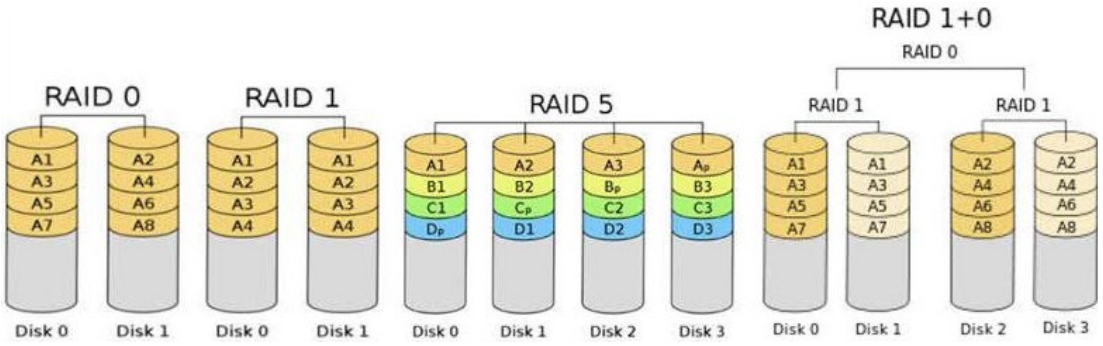
This setting allows you to enable/disable hot-plugging capabilities (the ability to remove the drive while the computer is running) that are configured by software for installed storage drives.

Options: Disabled, Enabled (default)

RAID

You must set the **Map SATA Root Port under VMD** to **Enabled** to enable redundant array of inexpensive disks (RAID) technology. The device has two SATA interfaces, which support RAID level 0 and RAID level 1.

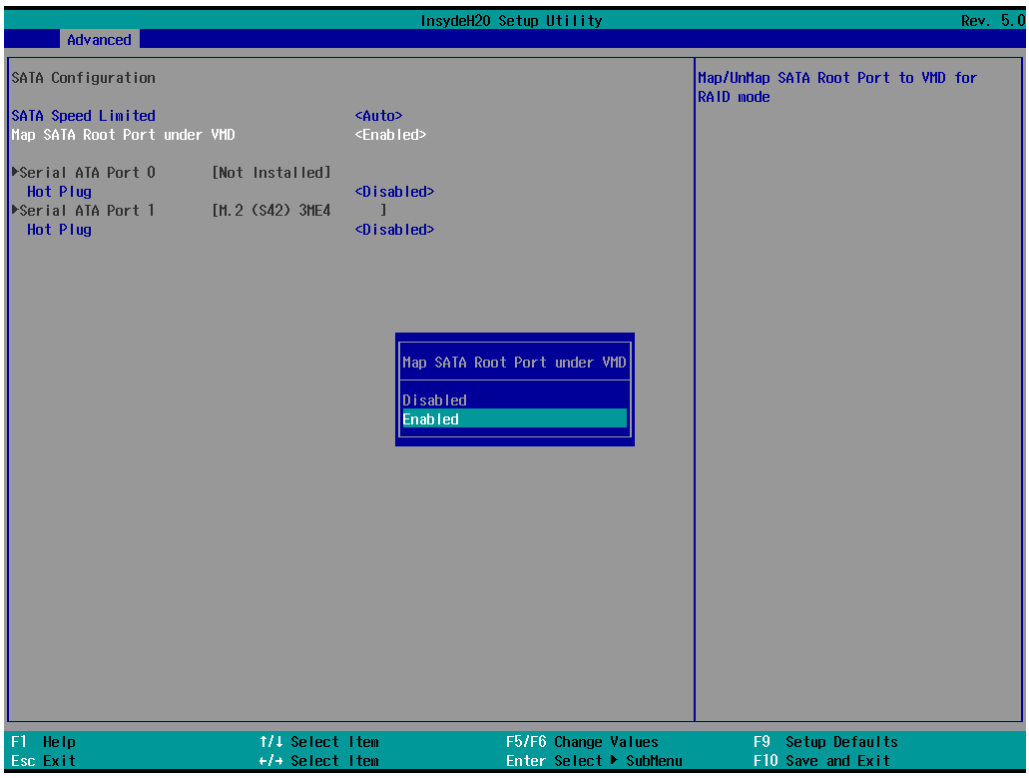
When using the continuous update policy, changes made to the data on the master drive while the system is not docked are automatically copied to the recovery drive when the system is re-docked. When using the on-request update policy, the master drive data can be restored to a previous state by copying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



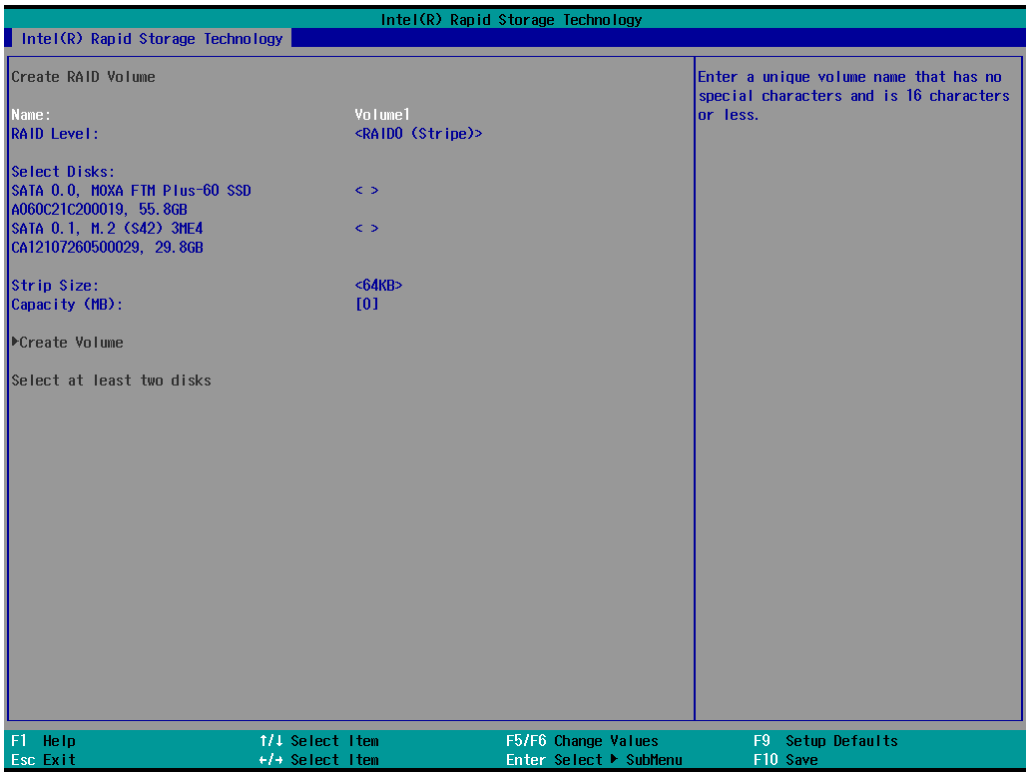
Source: http://en.wikipedia.org/wiki/Standard_RAID_levels

Intel Rapid Storage Technology

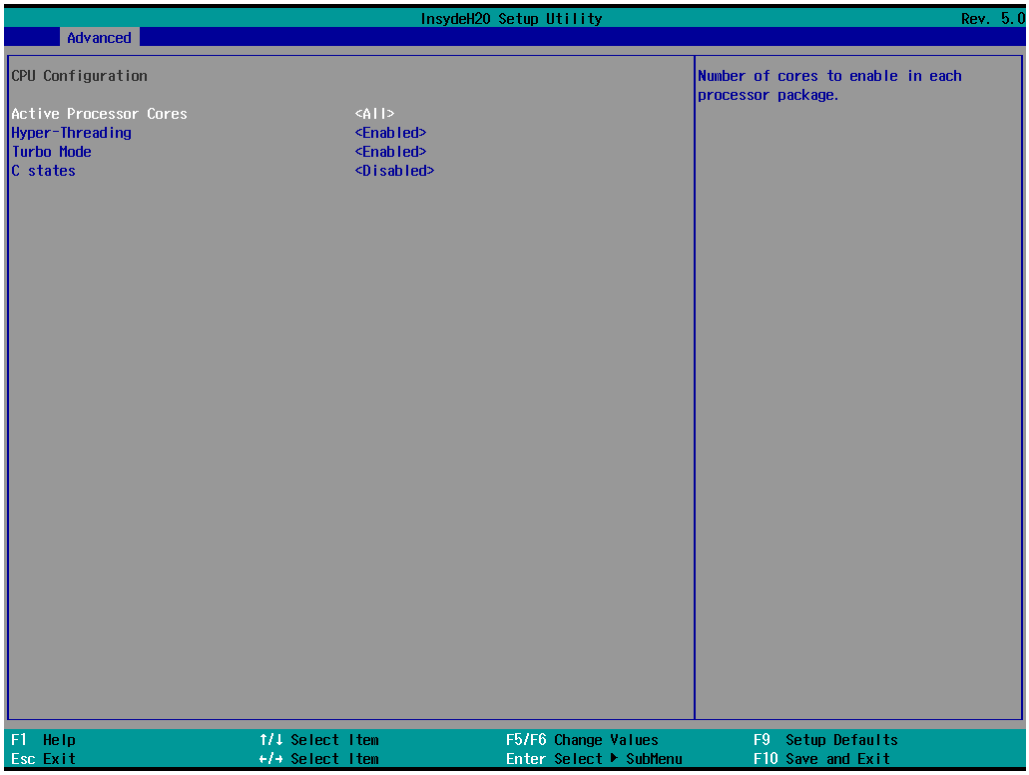
This section allows users to configure Intel® Rapid Storage Technology.



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



CPU Configuration



Active Processor Cores

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

Options: All (default),1,2,3

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

This feature allows you to enable the CPU to overclock or underclock based on system load automatically to save energy or speed up processing.

Options: Disabled, Enabled (default)

C states

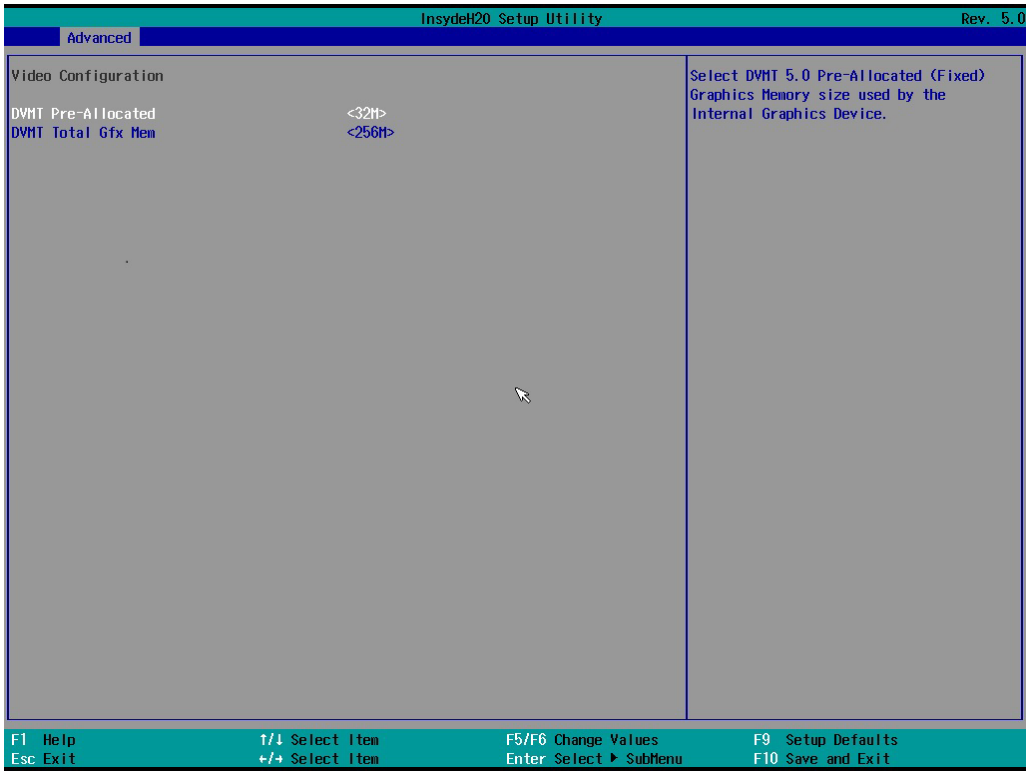
This item can Enable/Disable CPU power Management. Allow CPU to go to C states when it's not 100% utilized.

Options: Disabled (default), Enabled

NOTE

V3404-TL1 and V3408-TL1 models do not support the **Turbo Mode** function because Intel® Celeron® 6305E processor does not support it.

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: 32M (default), 64M, 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.

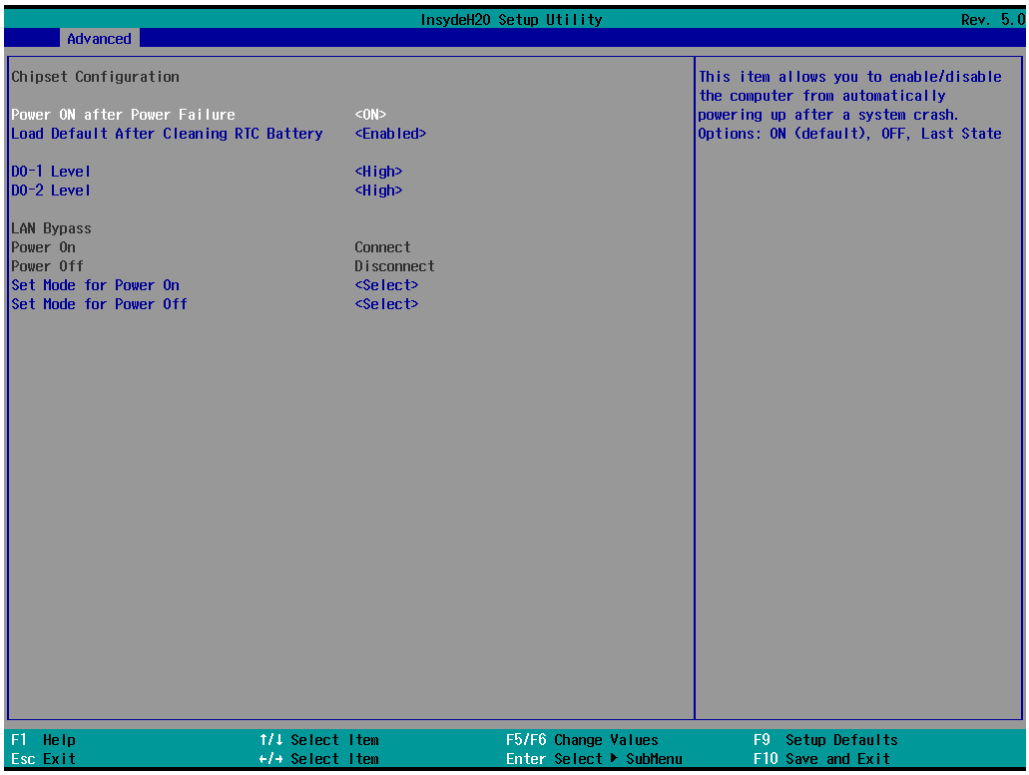
DVMT Total Gfx Mem.

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 item 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

This item allows you to enable the system to load the default setting when RTC battery loss is detected.

Options: Disabled, Enabled (default).

DO-1 Level

This item allows users to set the DO 0 as high or low.

Options: High (default), Low.

DO-2 Level

This item allows users to set the DO 1 as high or low.

Options: High (default), Low.

LAN Bypass

The following options will vary depending on the models you purchase.

Power On: LAN7 and LAN8 are in power on status.

Power Off: LAN7 and LAN8 are in power off status.

Set Mode for Power On

Configure the LAN7 and LAN8 mode when power is on.

1. Connect: LAN7 and LAN8 will independently connect to the system.
2. ByPass: LAN7 will directly connect with LAN8 without connecting to the system.

Set Mode for Power Off:

Configure the LAN7 and LAN8 mode when power is off.

1. Connect: LAN7 and LAN8 will independently connect to the system.
2. ByPass: LAN7 will directly connect with LAN8 without connecting to the system.
3. Disconnect: LAN7 will not connect with LAN8 and will not connect to the system.

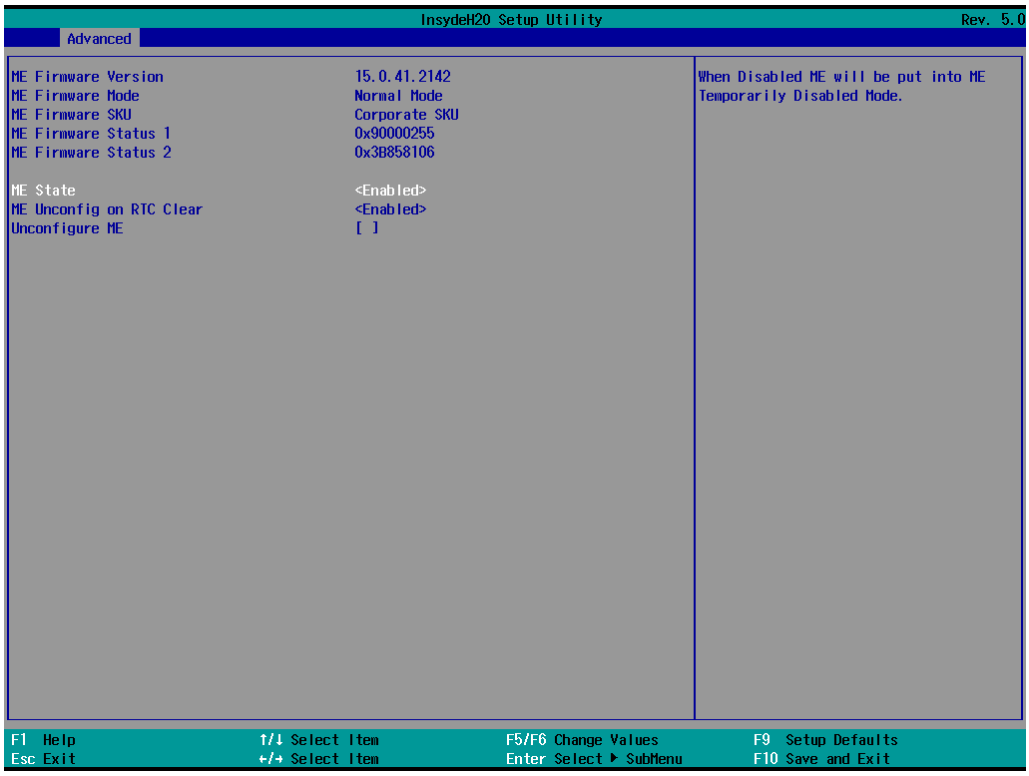
PCH-FW Configuration

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

Options:

ME State: Enabled (default), Disabled

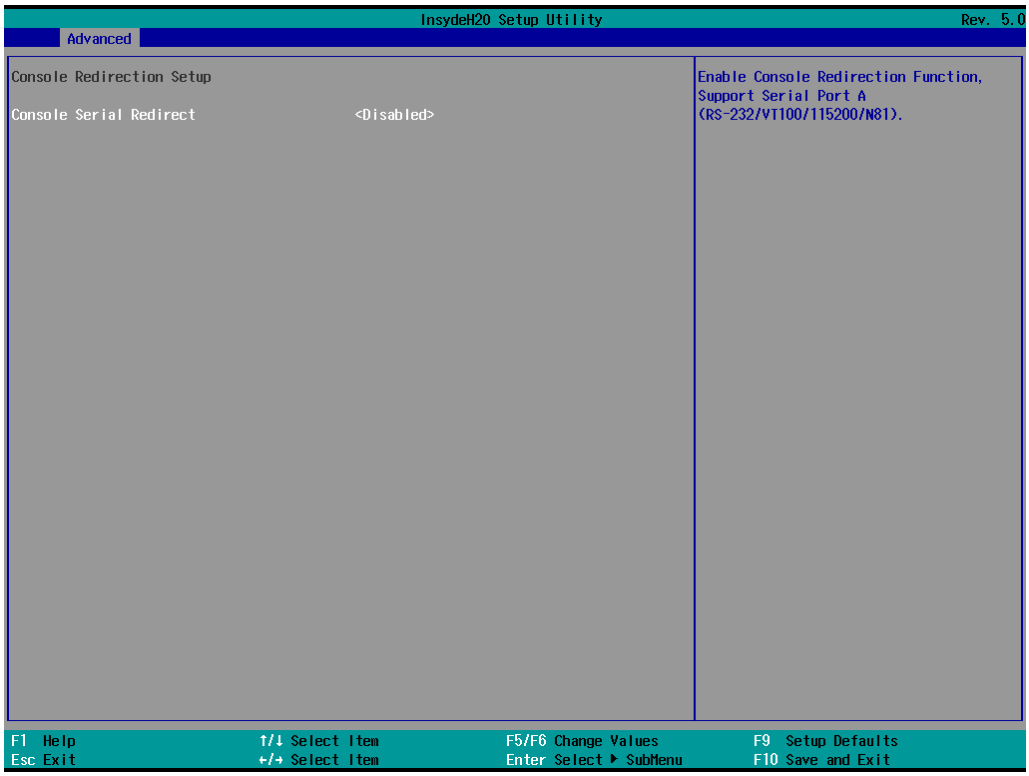
ME Unconfig on RTC Clear: Enabled (default), Disabled



Console Redirection

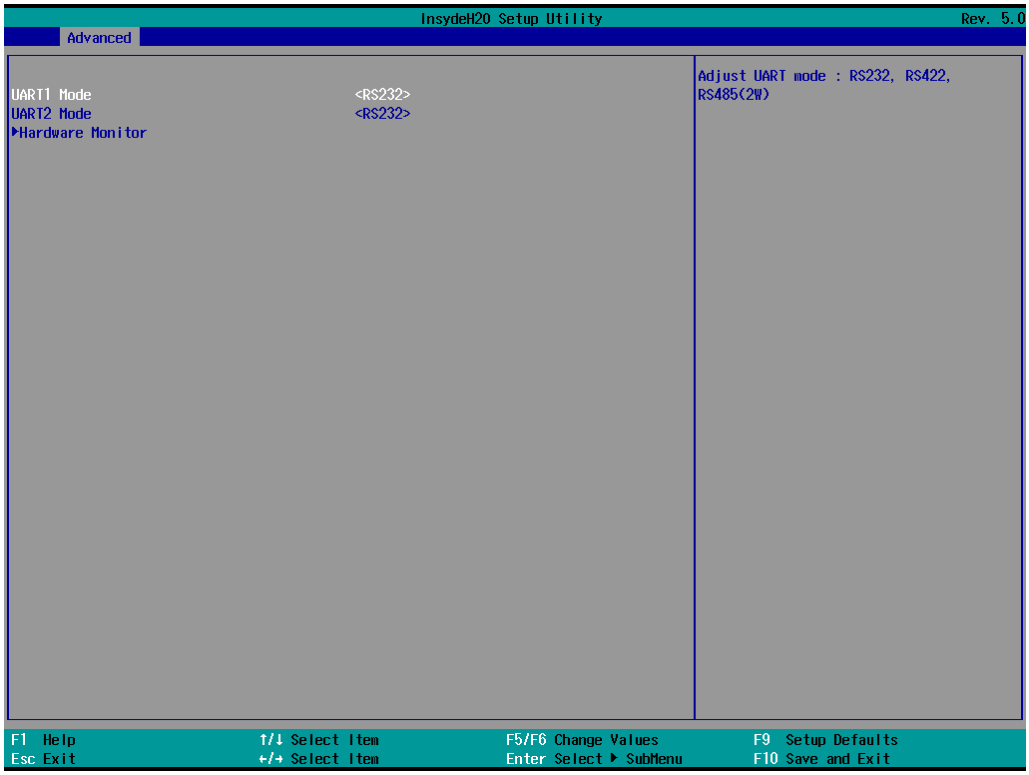
When the Console Redirection Function is enabled, the console information will be sent to both the display monitor and through the serial port.

Options: Disabled (default), Enabled



SIO ITE8786E

This section allows users to configure SIO settings.



UART1 Mode

This function allows users to configure the UART1 mode.

Option: RS232 (default), RS422, RS485

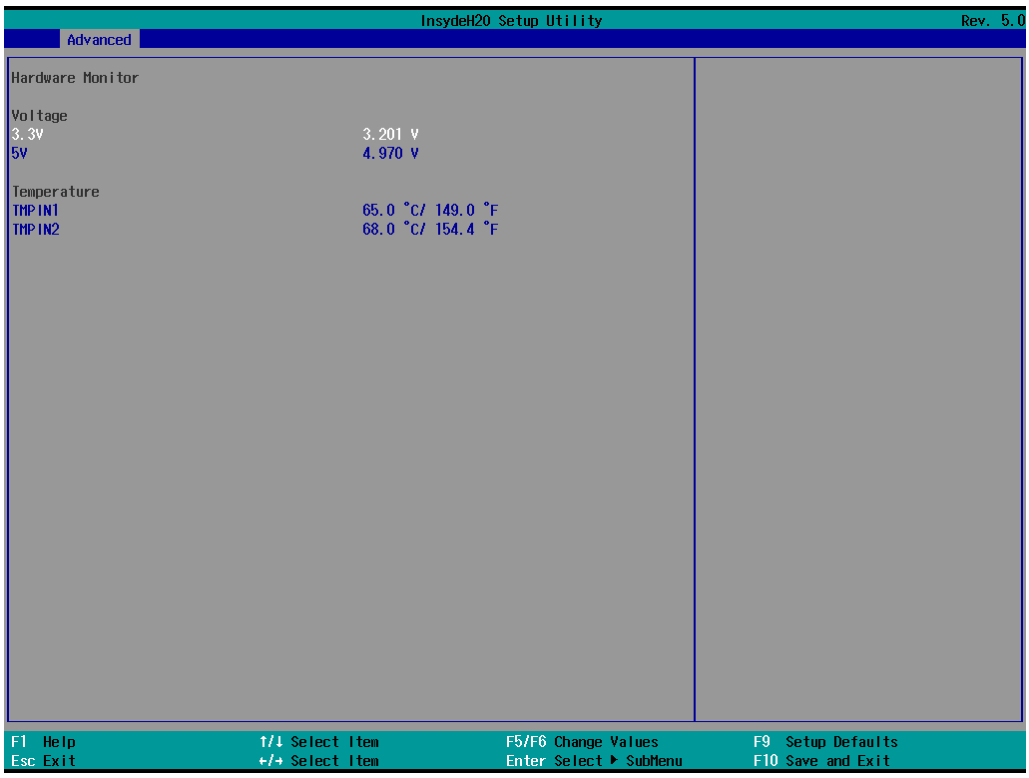
UART2 Mode

This function allows users to configure the UART2 mode.

Option: RS232 (default), RS422, RS485

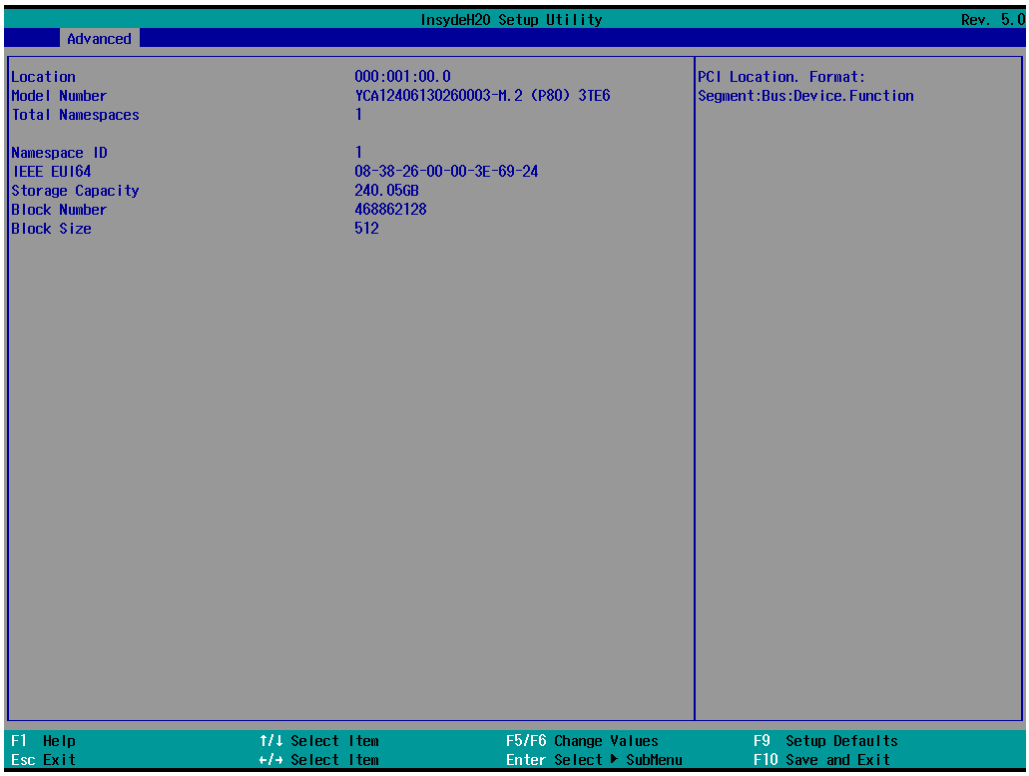
Hardware Monitor

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



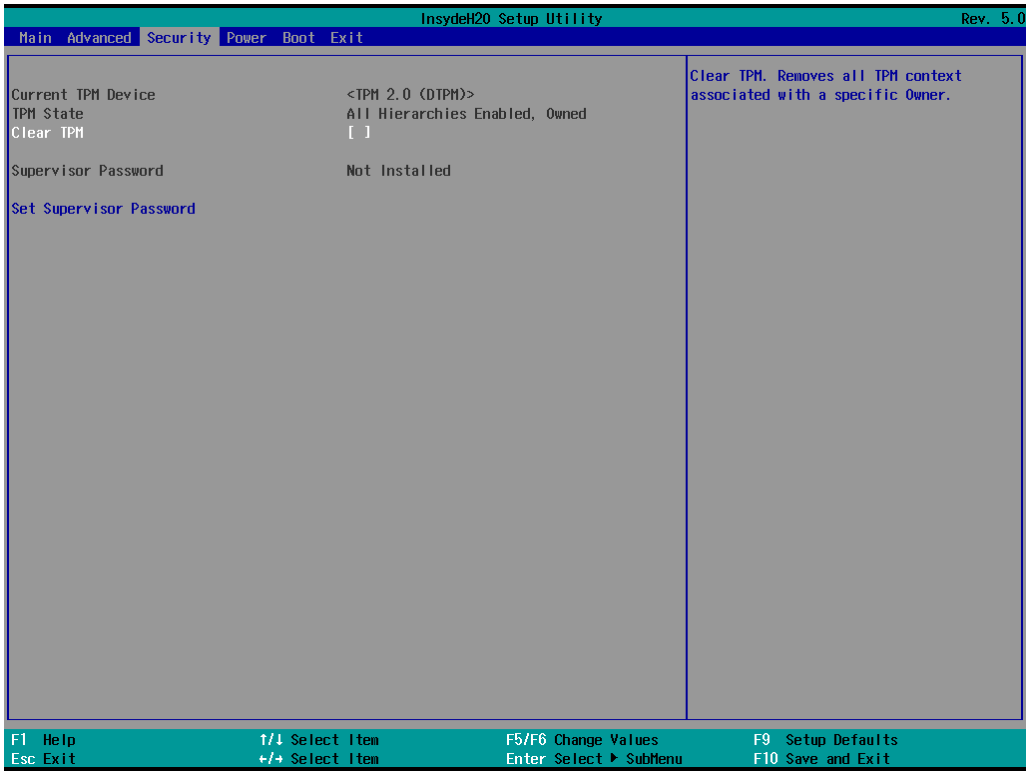
NVM Express Information

This item allows you to check the information of M.2 NVMe SSD inside the device.



Security Settings

This section allows users to configure security-related settings with a supervisor password and user 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. Select the option and press enter once to display an **x**, which indicates that the Clear TPM option is enabled. The TPM context is clear each time the system boots up.

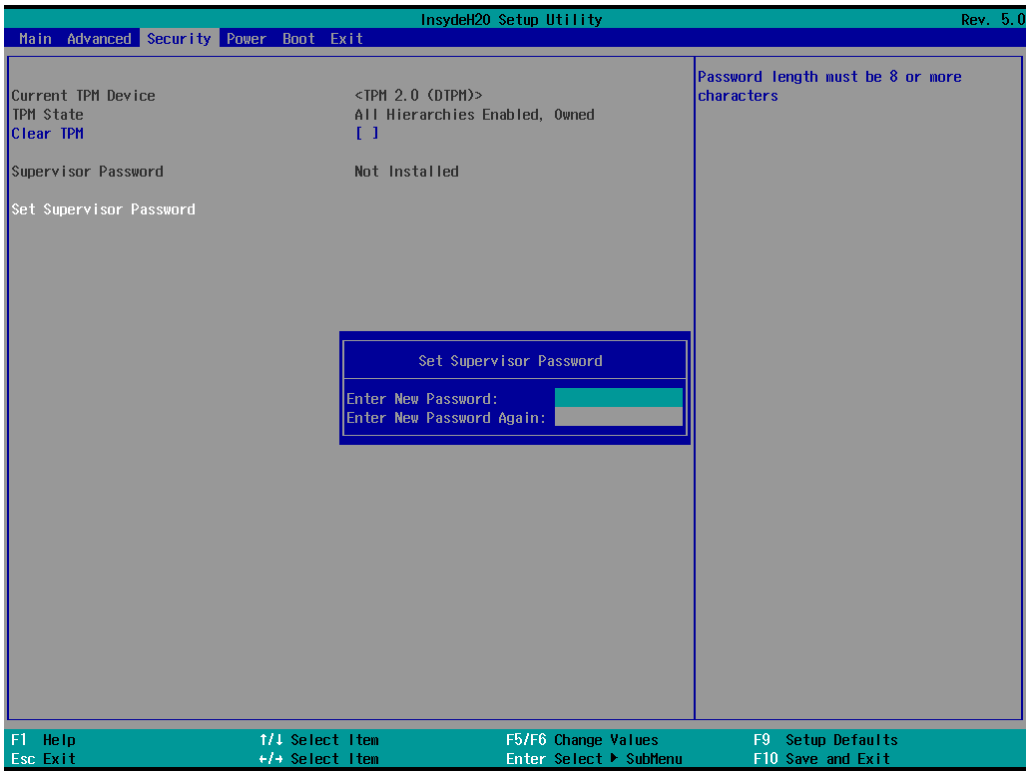
Set Supervisor Password

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

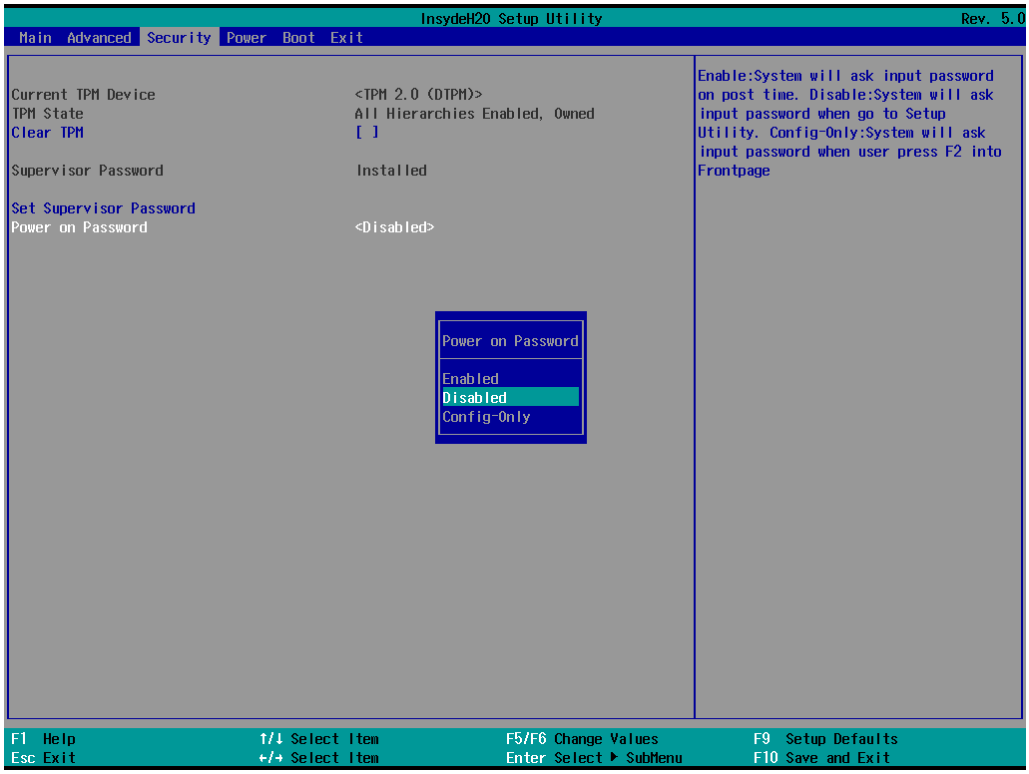
NOTE

The password must be at least 8 characters.

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.



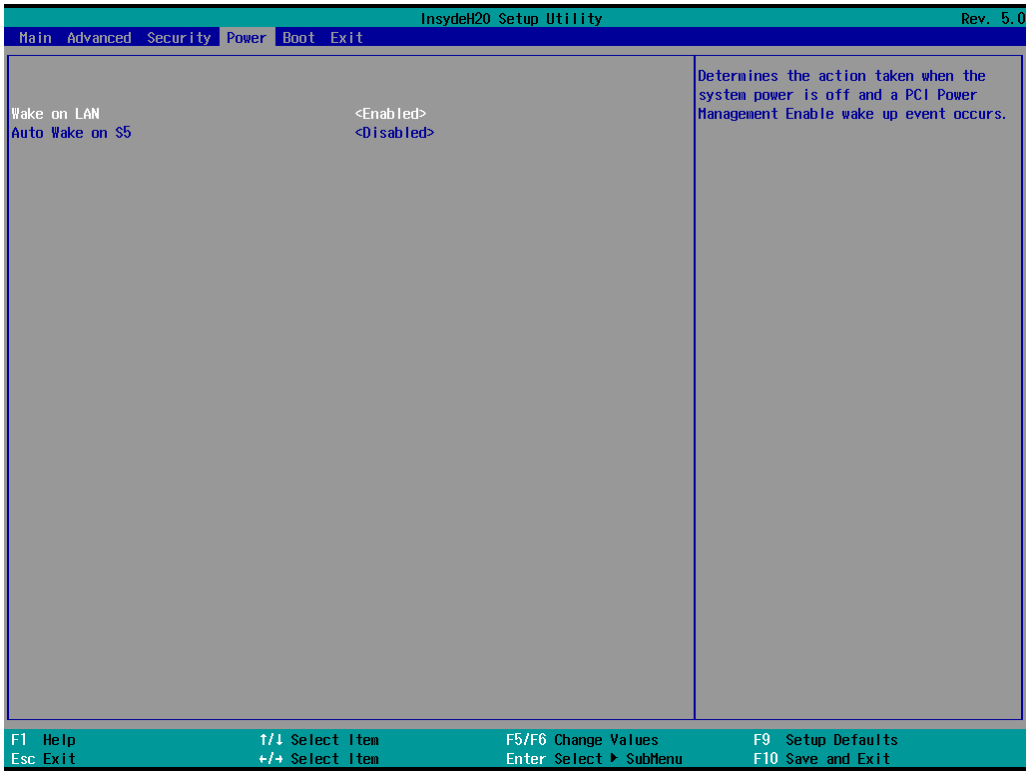
Enabled: System will ask for the password on post time

Disabled: 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

The 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

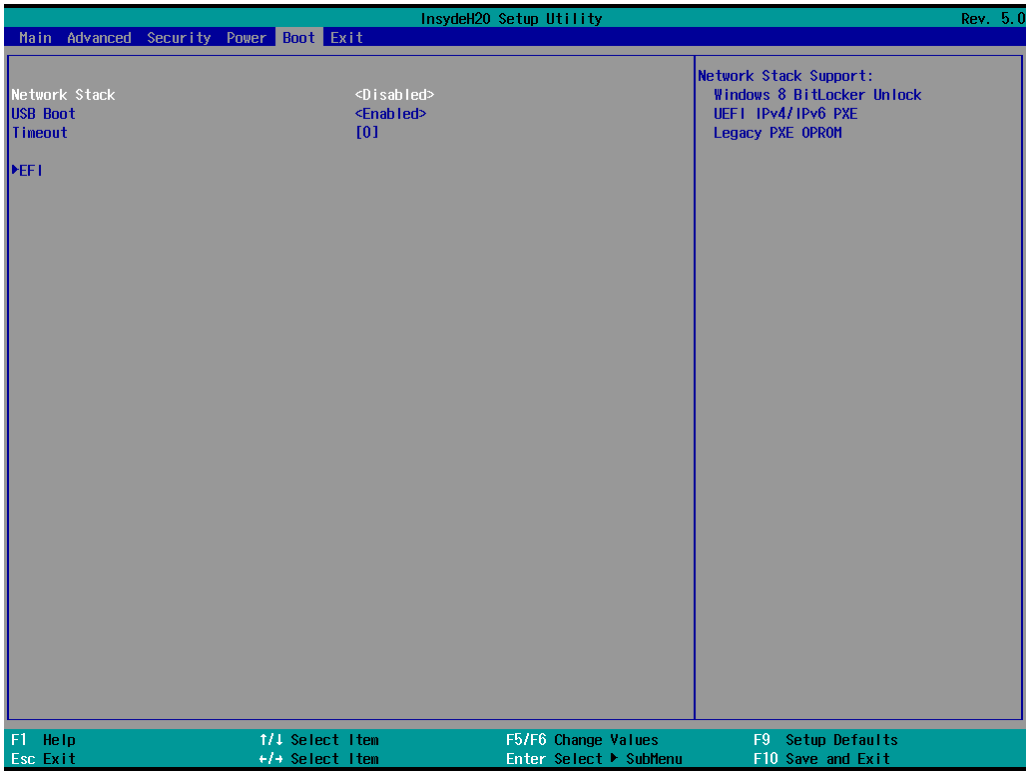
Auto Wake on S5

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)

Boot Settings

The 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

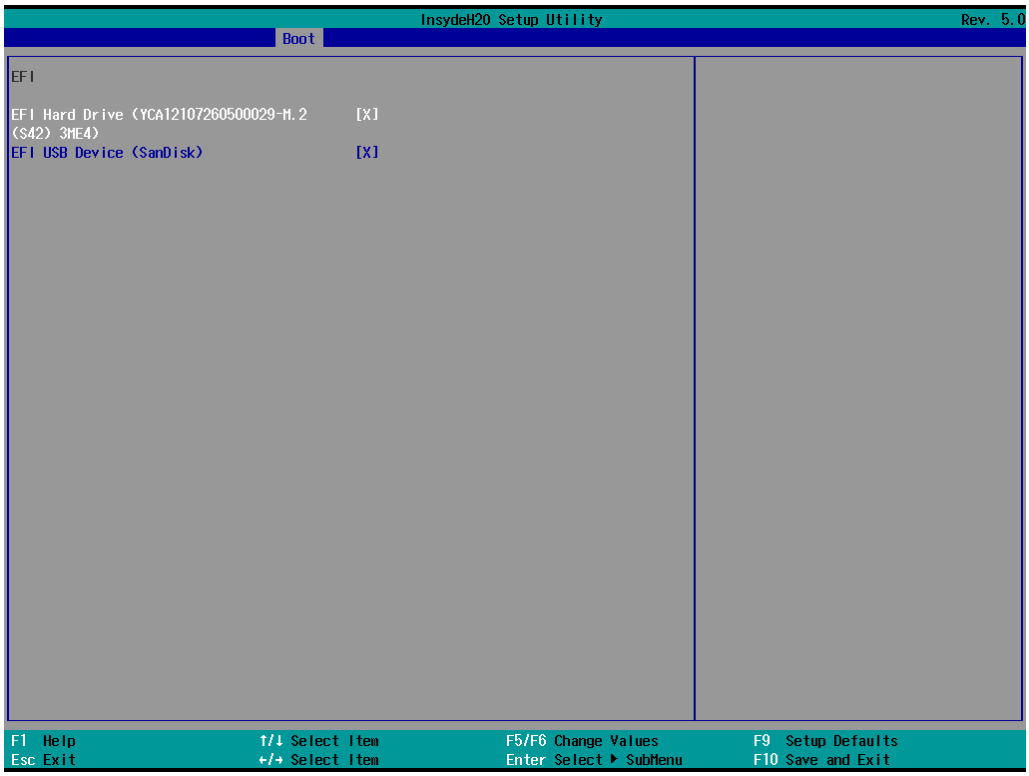
Set booting to USB boot devices capability.

Options: Enabled (default), Disabled

Timeout

This item allows users to set the number of seconds (<10 sec) that the firmware will wait before booting with the original default boot selection.

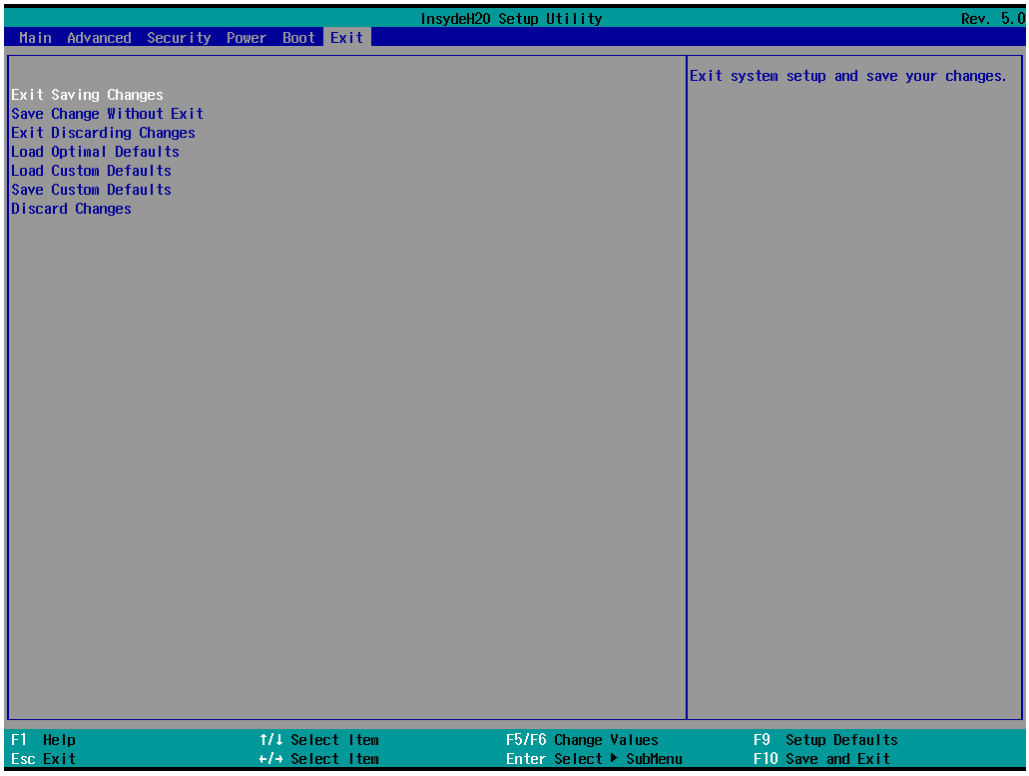
EFI



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

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 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

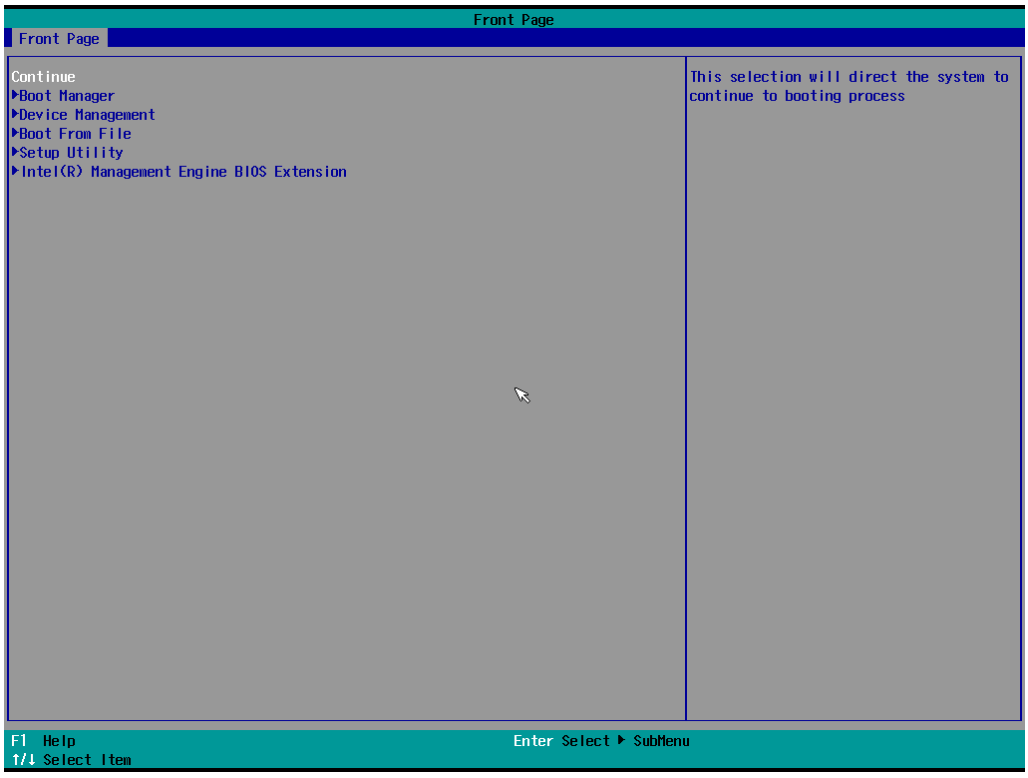
Enabling AMT

NOTE

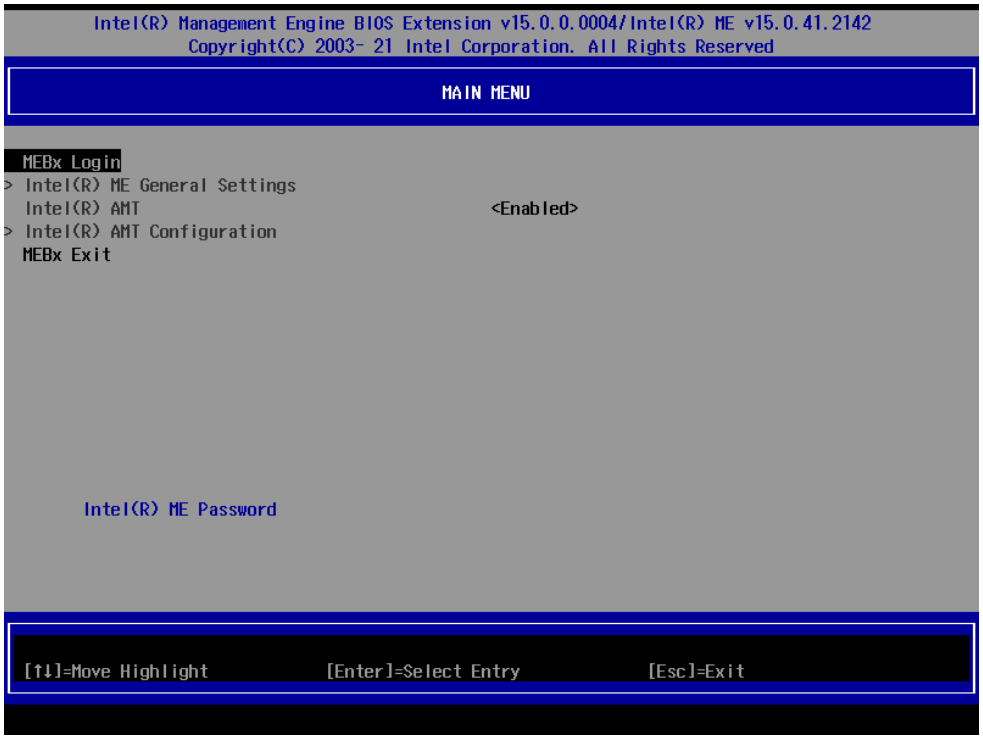
The AMT function is NOT supported in models with an Intel® Celeron® or Intel® Core™ i3 CPU.

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:

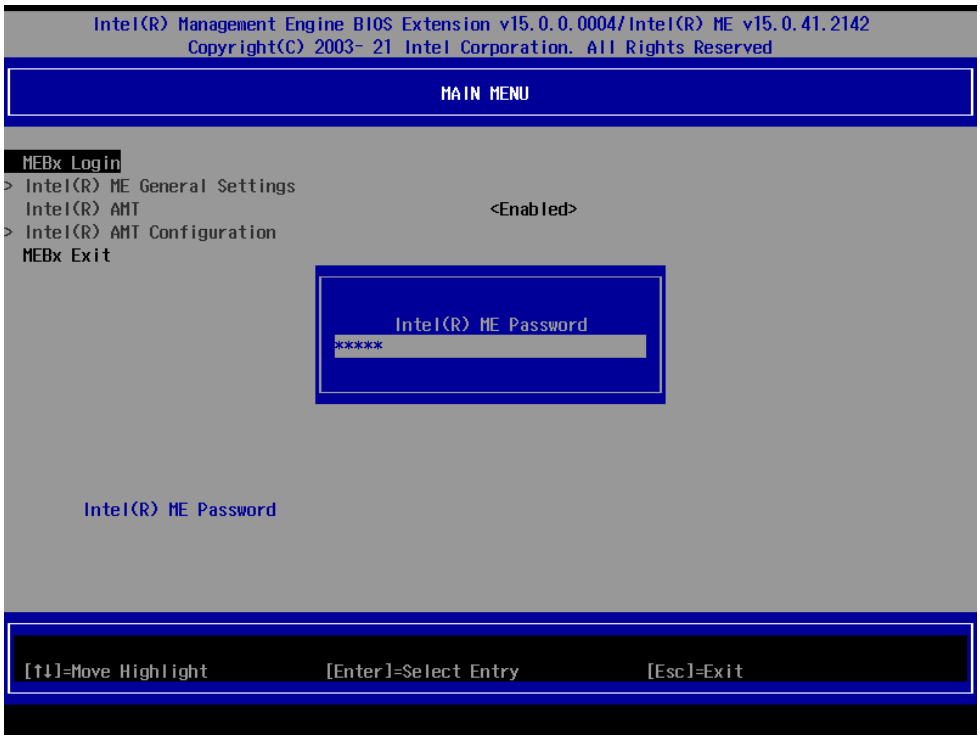
1. Select Intel® Management Engine BIOS Extension to enter the AMT configuration.



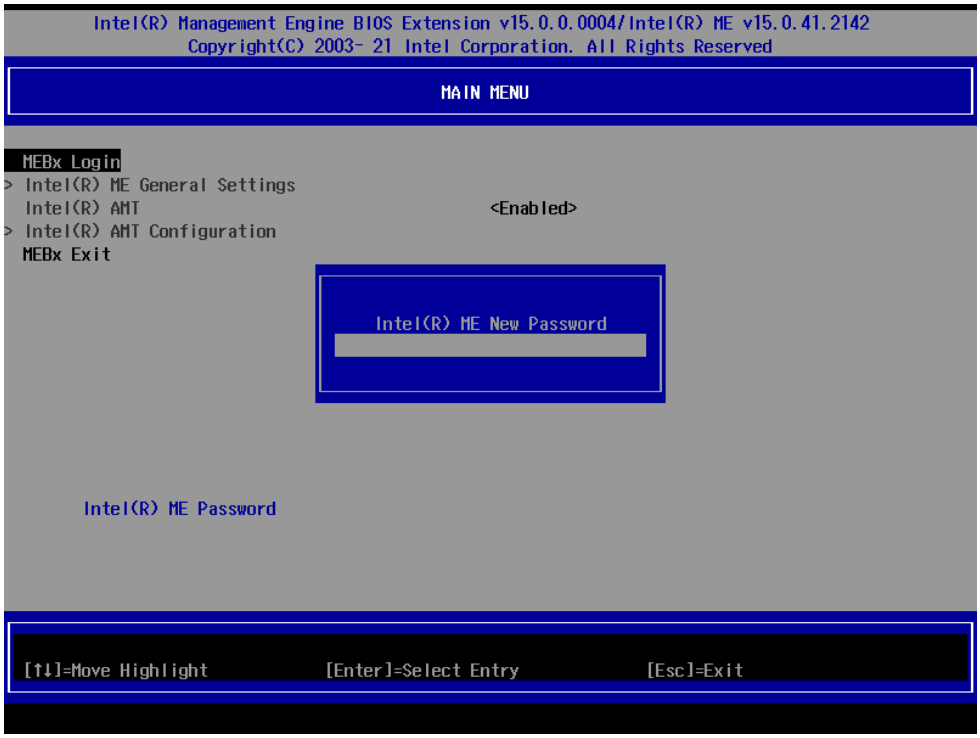
2. Press <Enter> to start the login procedure.



3. Type the default password: admin.

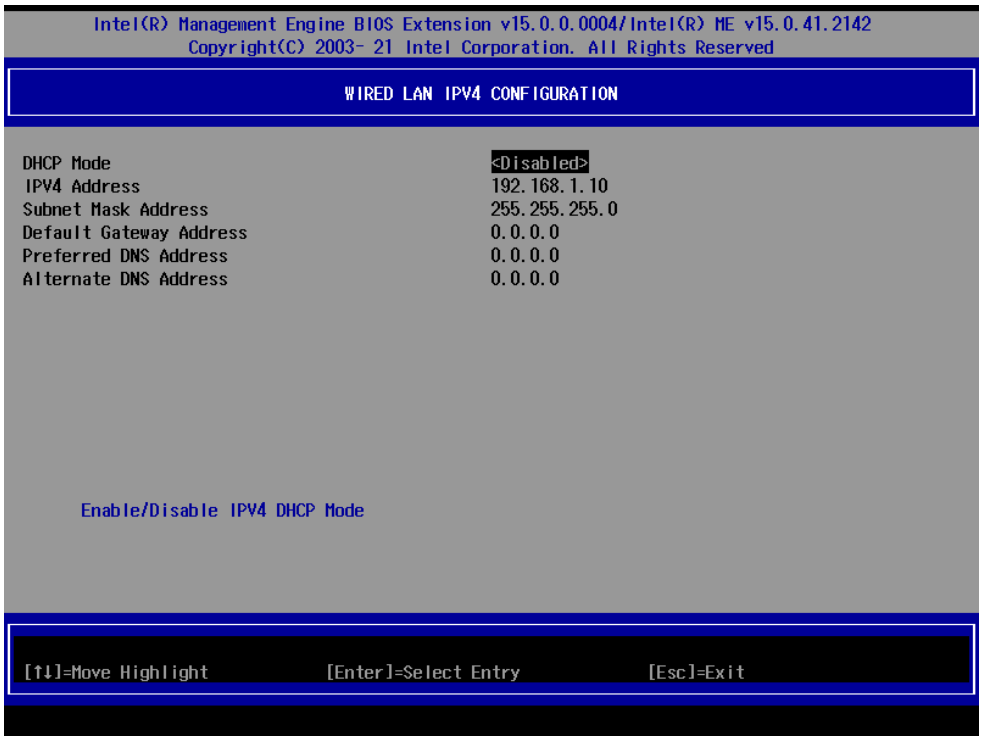


4. Type the new password. It must include both upper-case and lower-case characters, numbers, and special symbols. E.g., Admin’12.

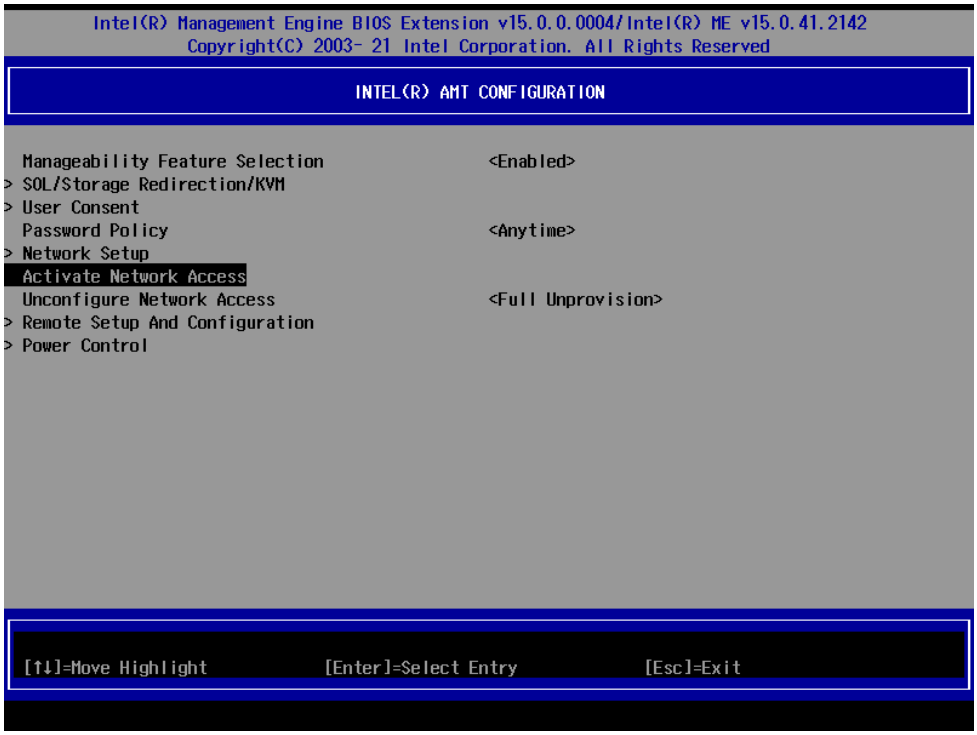


5. Select Intel® AMT Configuration to enable remote access without a local user present for consent, select User Consent, and then select User Opt-in and change the value to None.

6. Set static IP or DHCP by request.



7. Set Activate Network Access to enable remote access capability.

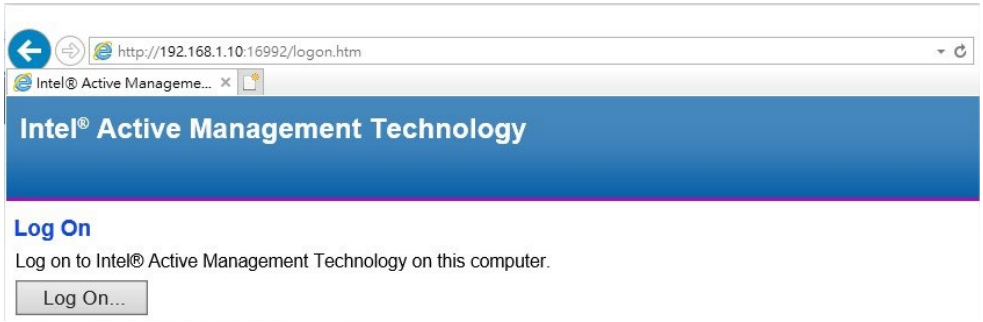


Using AMT

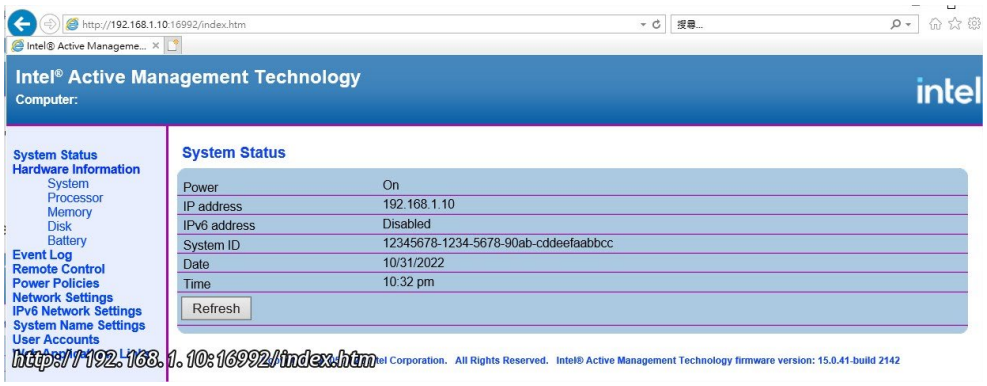
You can use any AMT tool available to run the remote management function using a web browser.

1. Type the IP address of your computer as configured in the AMT configuration settings with port 16992.

   The AMT logon screen will appear.



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



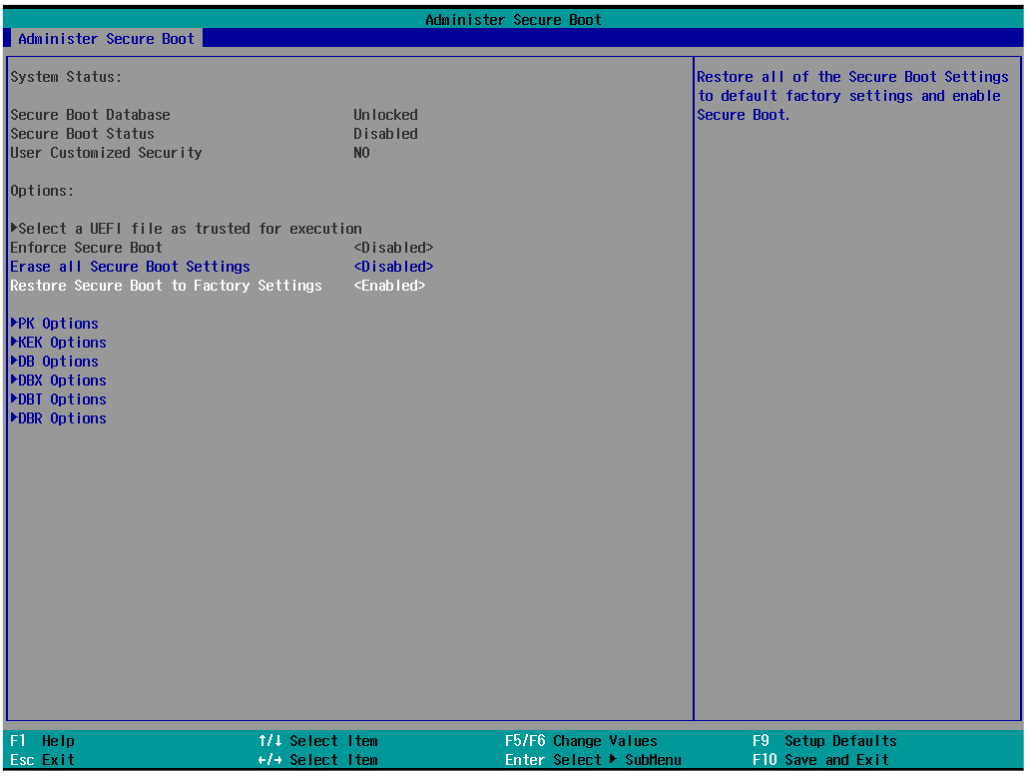
NOTE

The AMT port is LAN1.

For additional 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.



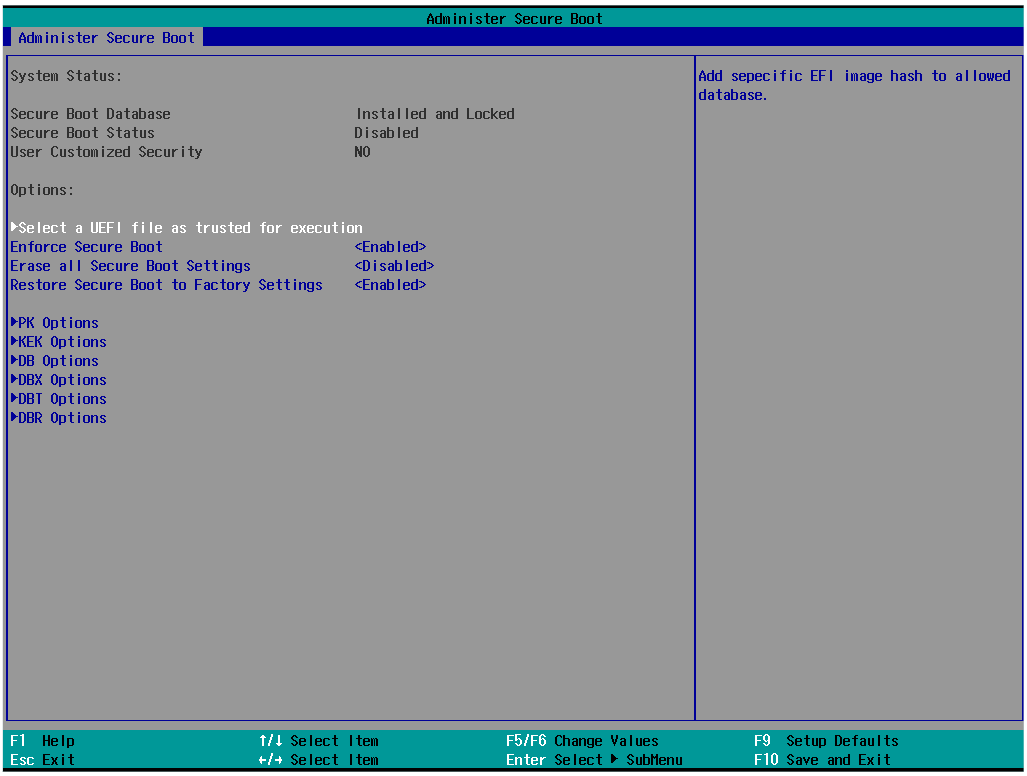
Secure Boot helps computers resist attacks and infection from malware. The feature defines an interface between the operating system and BIOS. It detects tampering with boot loaders, key operation system files, and unauthorized option ROMs by validating their digital signatures.

Enabling UEFI Secure Boot

Set **Restore Secure Boot to Factory Settings** under **Administer Secure Boot** to **Enable** and press F10 to save and exit.

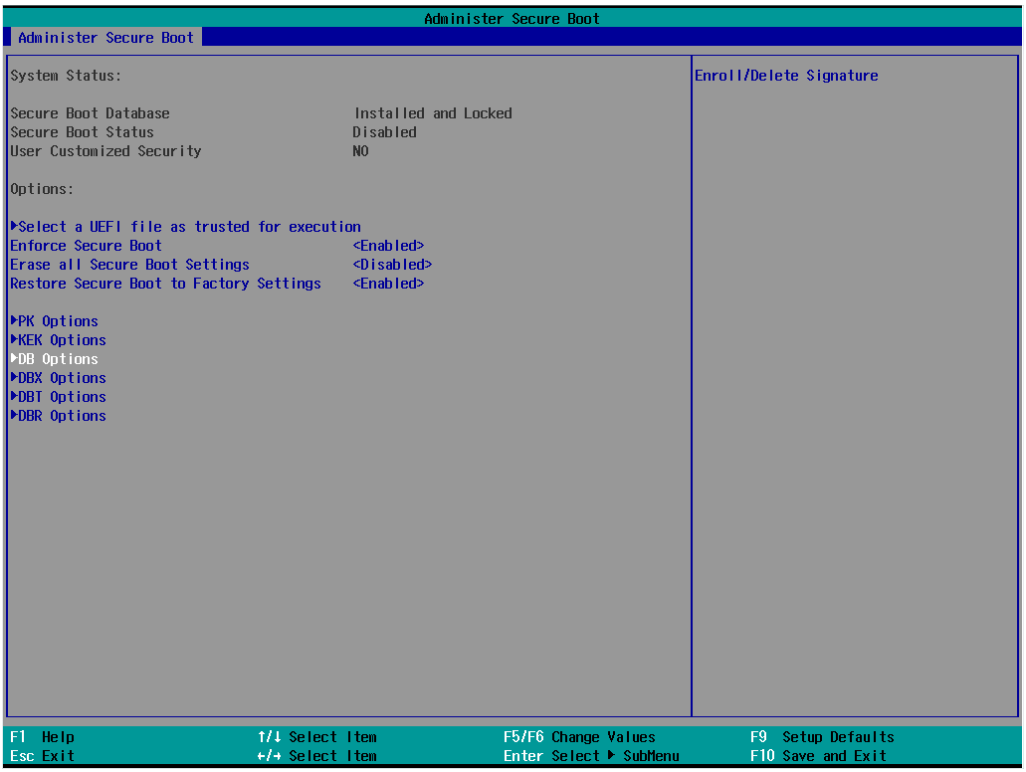
Moxa includes the Microsoft key in the BIOS by default; if the system does boot up with a non-Windows OS, use the instructions in the following sections.

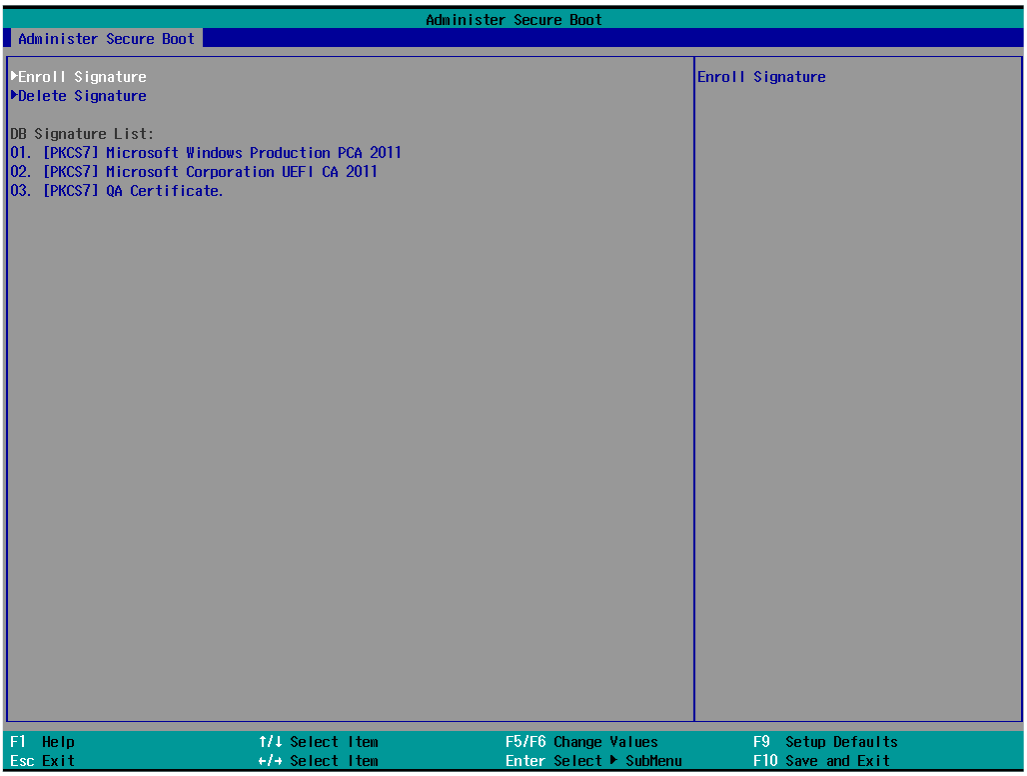
Enroll EFI Image



Enter **Administer Secure Boot** once again and choose **Select a UEFI file as trusted for execution**. Enter the name of the loader into the database followed by the UEFI standard \EFI\BOOT\BOOT{machine type short-name}. For example, efi\boot\BootX64.efi, Debian (EFI\debian\grubx64.efi), Suse (EFI\opensuse\grubx64.efi)

Enroll Customer Key





Enter “DB OPTION” and enroll your key. Ensure that 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.

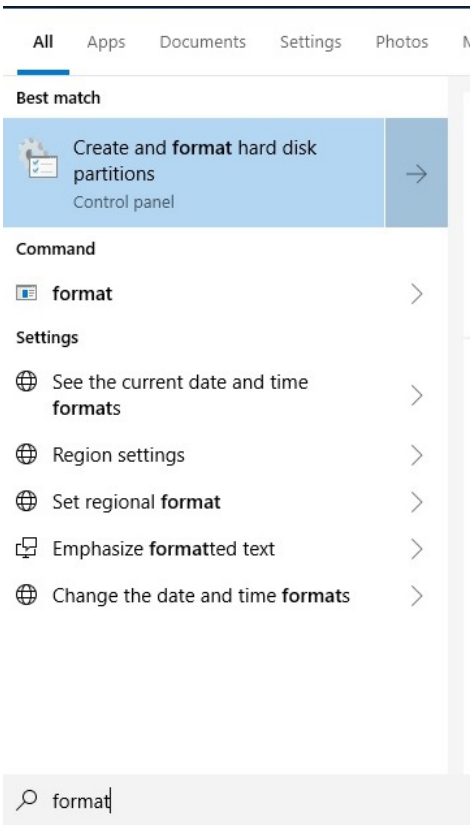
NOTE

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.

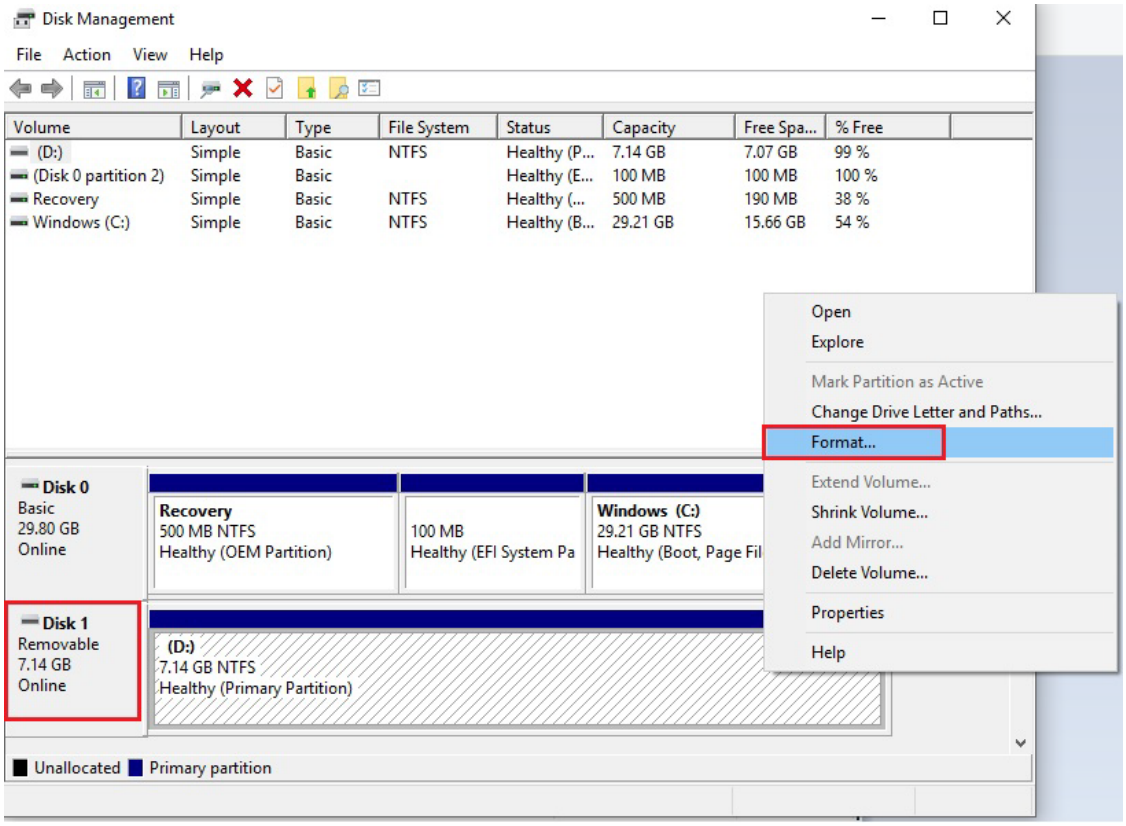
Step 1: Create a Bootable USB Disk

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

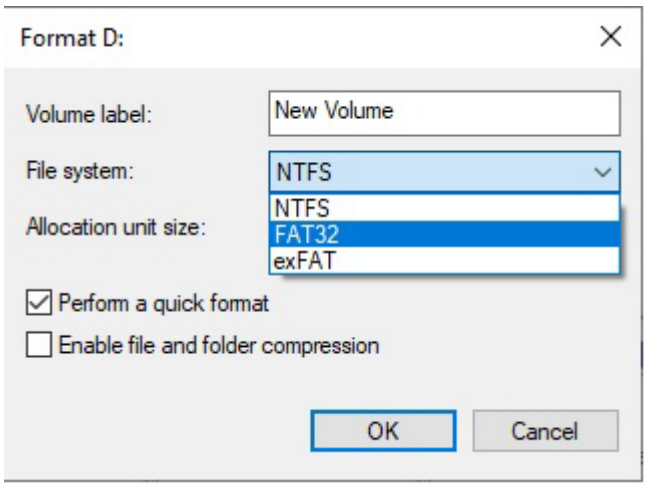
1. Insert a USB disk in the computer's USB drive.
2. Search for "format" and select Create and format hard disk partitions.



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

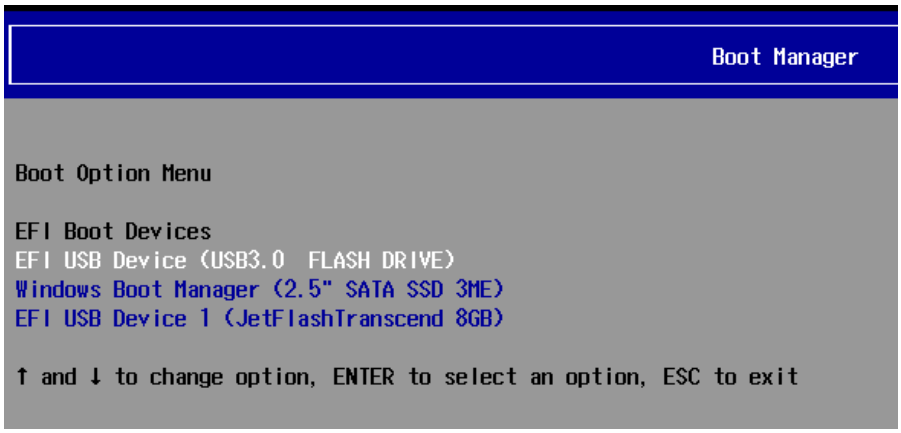
You must use the BIOS upgrade installation file to upgrade the BIOS. Contact Moxa's technical department for assistance. The BIOS upgrade file includes an efi folder and an **xxxx.efi** file. Copy the efi folder and **xxxx.efi** file to the bootable USB disk.

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.

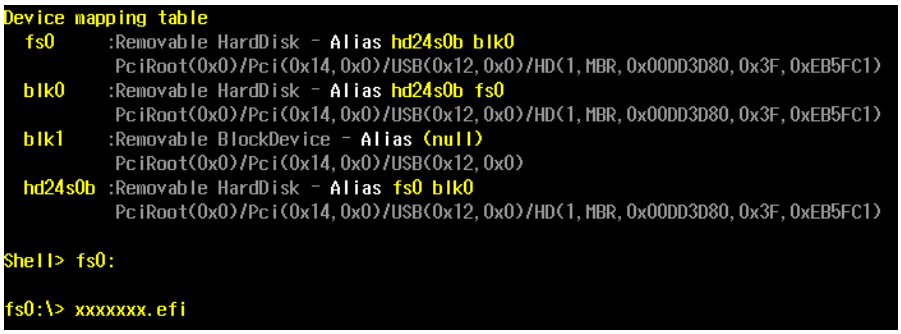
   If the BIOS cannot recognize the USB drive as a boot-up device, the USB drive might not have a partition table. Use the Windows command line tool ***diskpart*** to rebuild the partition table.

2. Select the USB Disk.



   The screen will switch to the SHELL environment.

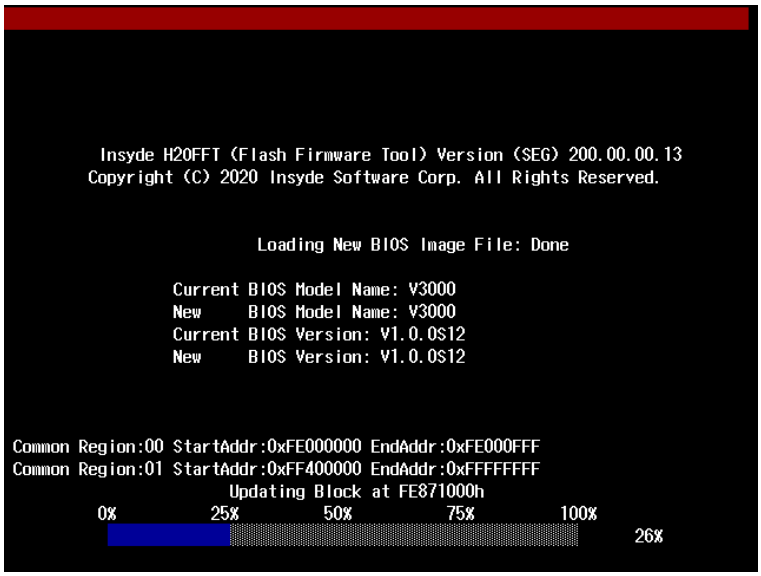
3. Type **fs0**:, go to the directory where the upgrade file is located, and type **xxxxxx.efi** (the file name is based on the upgrade file from Moxa).



4. Wait until the upgrade procedure is completed.

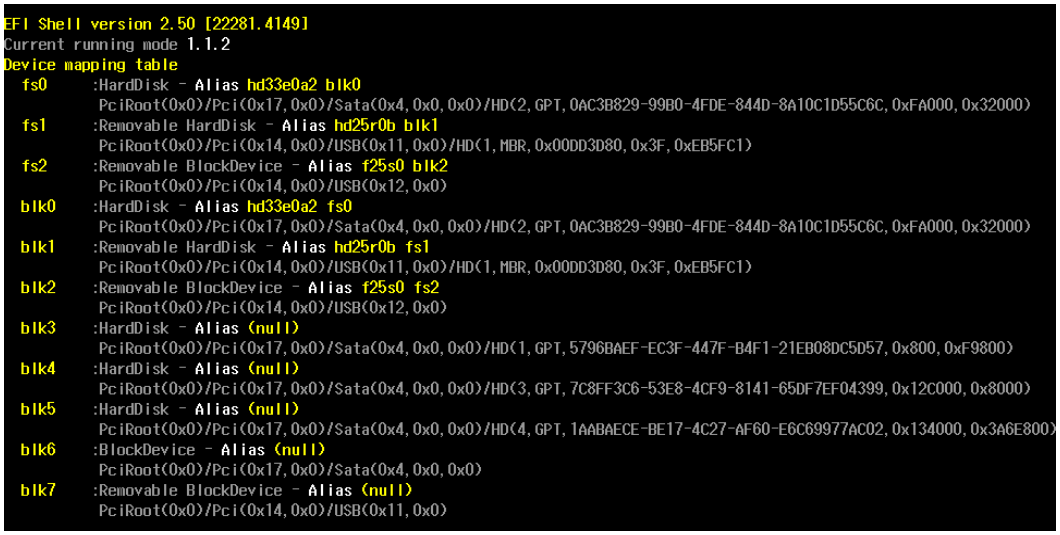
ATTENTION

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



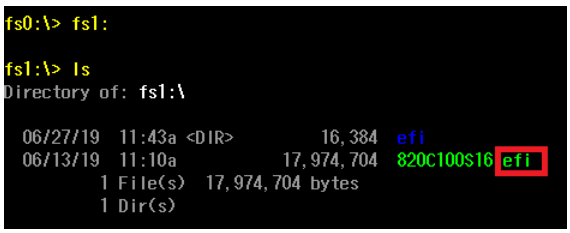
When the upgrade is finished, the computer will automatically reboot.

You can check the BIOS version on the Main page to confirm that the upgrade is completed. If the system has more than one boot device, you will see the same number of **fsx** items (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.



A. Regulatory Approval Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Class A: FCC Warning! This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

European Community

WARNING

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device and its antenna must not be co located or operating in conjunction with any other antenna or transmitter.