DA-681C Series Embedded Computer
User Manual

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www.moxa.com/products

DA-681C Series Embedded Computer User Manual

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1. Introduction

Thank you for purchasing the Moxa DA-681C 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-681C. For software configuration and management, please refer to the user's manual for your operating system.

Overview

The DA-681C computer is built around an Intel® Celeron® or Intel® Core™ i3 CPU and comes with dual display ports (2 x HDMI), 5 USB ports, 6 Gigabit LAN ports, two 3-in-1 RS-232/422/485 serial ports, 10 RS-485 (2-wire) serial ports, 6 digital input ports, and 2 digital output ports. Additionally, one 2.5" HDD/SSD slot and one mSATA slot are included to enable storage expansion for industrial applications that require large storage space for edge data acquisition.

With IEC 61850-3, IEEE 1613, and IEC 60255 compliance, the DA-681C is sure to deliver stable and reliable system operation for power applications. EN 50121-4 compliance confirms that the DA-681C can deliver stable and reliable system operations in rail wayside applications, such as station SCADA systems, wayside disaster prevention, traction power, and signaling and safety systems, to provide an integrated view of your smart rail setup.

Model Descriptions and Package Checklist

The DA-681C Series includes the following models:

- **DA-681C-KL1-H-T:** Intel® Celeron® 3965U 2C/2T 2.2 GHz CPU with 2 HDMIs, 6 Gigabit LAN ports, 2 RS/232/422/485 3-in-1 serial ports, 2 PS/2 interfaces, 6 DIs, 2DOs, 1 mSATA, 2 SATA, 6 USB ports, without RAM, mSATA, and OS, single power, -40 to 70°C operating temperature
- **DA-681C-KL1-HH-T:** Intel® Celeron® 3965U 2C/2T 2.2 GHz CPU with 2 HDMIs, 6 Gigabit LAN ports, 2 RS/232/422/485 3-in-1 serial ports, 2 PS/2, 6 DIs, 2DOs, 1 mSATA, 2 SATA, 6 USB ports, without RAM, mSATA, and OS, dual power, -40 to 70°C operating temperature
- **DA-681C-KL3-HH-T:** Intel® Core™ i3-7100U 2C/4T 2.4 GHz CPU, with 2 HDMIs, 6 Gigabit LAN ports, 2 RS/232/422/485 3-in-1 serial ports, 2 PS/2, 6 DIs, 2DOs, 1 mSATA, 2 SATA, 6 USB ports, without RAM, mSATA, and OS, dual power, -40 to 70°C operating temperature

✏️ **NOTE**

To order a DA-681C system with preinstalled Debian 9 or Windows 10 Enterprise LTSC 64-bit OS, contact a Moxa sales representative.

Each basic system model package includes the following items:

- DA-681C rackmount computer
- Rack-mounting kit
- Quick Installation Guide (printed)
- Warranty card

Appearance

<u>Front View</u>

Rackmount Ear

LEDs x 2 (Power, Storage)

LEDs x 8 (Programmable)

Rackmount Ear

MOXA

DA-681C
Industrial Computing Platform

Storage Disk Tray

LEDs x 24 (TX/RX)

LEDs x 2 (Power Failure)

LEDs x 12 (100/1000 Mbps)

USB 2.0 Hosts x 2 (Type A)

Reset Button

<u>Rear View</u>

Keyboard/ Mouse Inputs

Serial Ports x 2 (RS-232/422/485, DB9)

Serial Ports x 12 (RS-485, Terminal Block)

Power Inputs x 2 (100 to 240 VAC/VDC Terminal Block)

Grounding Connector

LAN Ports x 6 (100/1000 Mbps , RJ45)

HDIMI Outputs x 2

USB 3.0 Hosts x 3 (type A)

DIs x 6/DOs x 2 (Terminal Block)

Relay Output

Power Button

Dimensions

Unit: mm (inch)

315.95 (12.44)

482.60 (19.0)

465.90 (18.34)

43.85 (1.73)

31.75 (1.25)

3.5 (0.53)

Features

The DA-681C computer has the following features:

- IEC 61850-3, IEEE 1613, and IEC 60255 compliance for power substation automation systems
- 7th Generation Intel® Core™ or Intel® Celeron® Processor
- Built-in DDR4 memory slot; up to 32 GB capacity
- One hot-swappable 2.5-inch HDD or SSD storage expansion trays
- Redundant power supply (100 to 240 VAC/VDC)
- EN 50121-4 compliant for railway-wayside applications

Hardware Block Diagram

DA-681C Basic System
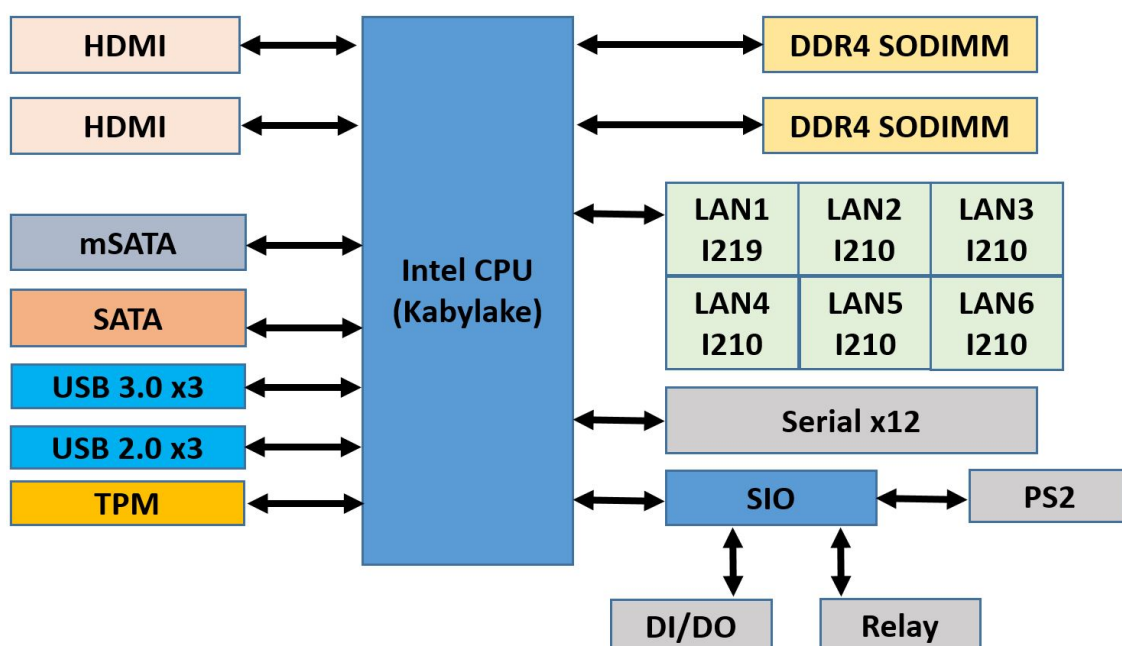
Hardware Specifications

✏ **NOTE**

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

2. Hardware Installation

The DA-681C embedded computers are compact and rugged, making them suitable for industrial applications. The LED indicators allow users to monitor performance and quickly identify trouble spots. Multiple ports are provided for connecting a variety of different devices. The DA-681C 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-681C embedded computers.

Installing Rack-mounting Ears

The DA-681C computer comes with a rack-mounting kit for installing the computer on a rack. The rack-mounting kit includes the following items: Two rack-mounting ears and four screws (size: M4x6) for each ear.
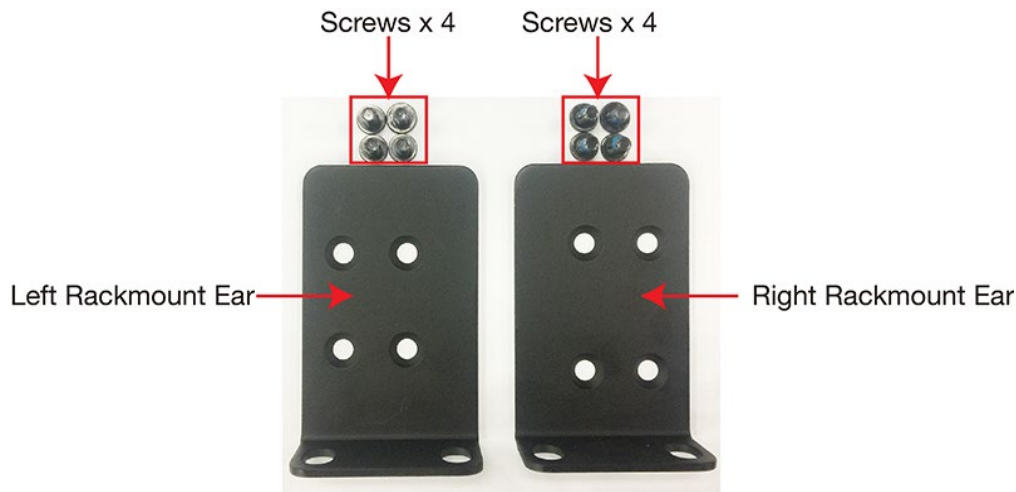
✏️ **NOTE**

The two rack-mounting ears are not identical. Refer to the diagram above to identify the left and right rack-mounting ear and ensure that you use them correctly to mount the computer.

Follow the instructions below to install the computer.

1. Attach the left rack-mounting ear to the left side of the DA-681C computer and fasten the four screws tightly.

2. Attach the other rack-mounting ear to the right side of the computer and secure it with the four screws.

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 ones 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**

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.

⚠️ **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.

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.

⚠️ **Restricted Access Location**

This equipment is intended to be used in Restricted Access Locations, such as a computer room, with access limited to SERVICE PERSONAL or USERS who have been instructed on how to handle the metal chassis of equipment that is so hot that special protection may be needed before touching it. The location should only be accessible with a key or through a security identity system.

⚠️ **WARNING**

External metal parts of this equipment are extremely hot!! Before touching the equipment, you must take special precautions to protect your hands and body from serious injury..

Connecting the Power

The DA-681C Series includes single-power and dual-power input models that use terminal block(s) located on the rear panel. Connect the power cord wires to the screws on the power input and then tighten the screws. The **Power** LED will light up to indicate that power is being supplied to the DA-681C, after which the BIOS will initialize the flash disk module, causing the **Storage** LED to blink. It should then take about 30 to 60 seconds for the operating system to complete the boot-up process.

Wiring the Power Inputs

Refer to the following illustration and table for details on wiring the power inputs to the DA-681C computer. The table uses the reference numbers in the diagram to identify the lines in the terminal blocks.

INPUT 100-240 VAC/VDC PWR 1				
+/L	NA	−/N	NA	⏚
1	2	3	4	5

INPUT 100-240 VAC/VDC PWR 2				
+/L	NA	−/N	NA	⏚
1	2	3	4	5
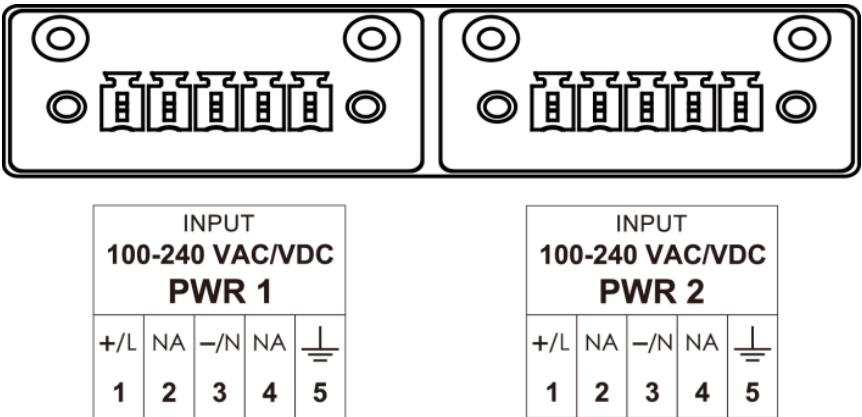
Number	Description	Note
1	Power Line	**PWR Line** is connected to the **Line (L)** terminal for the AC power source
	Power Positive	**PWR Positive** is connected to the **+** terminal for the DC power source
2	NA	Reserved
3	Power Neutral	**PWR Neutral** is connected to the **Neutral (N)** terminal for the AC power source
	Power Negative	**PWR Negative** is connect to the **−** terminal for the DC Power
4	NA	Reserved
5	Bond Earth	**Bond Earth** is connected to the **Chassis Ground** via a jumper on the terminal block

Grounding the Chassis

A grounding connector is located on the rear panel of the computer.

Grounding Connector
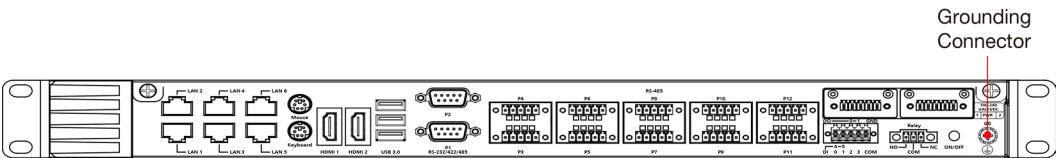
Connect this grounding connector on the chassis to the earth (ground).
The minimum wire diameter is 18 AWG.

G0
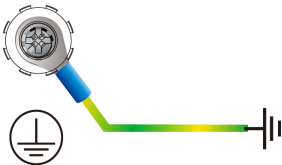
⚠ ATTENTION

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 Wiring Methods

The DA-681C comes with single or dual power inputs with both AC and DC power sources supported. Refer to the following diagrams for details of the wiring methods that can be used.

AC Terminal

INPUT 100-240 VAC/VDC PWR 1				
+/L	NA	–/N	NA	⏚
1	2	3	4	5

Line (Black)
Bond Earth (Green)
Neutral (White)

DC Terminal

INPUT 100-240 VAC/VDC PWR 1				
+/L	NA	–/N	NA	⏚
1	2	3	4	5

+ (positive) (Red)
- (negative) (Black)
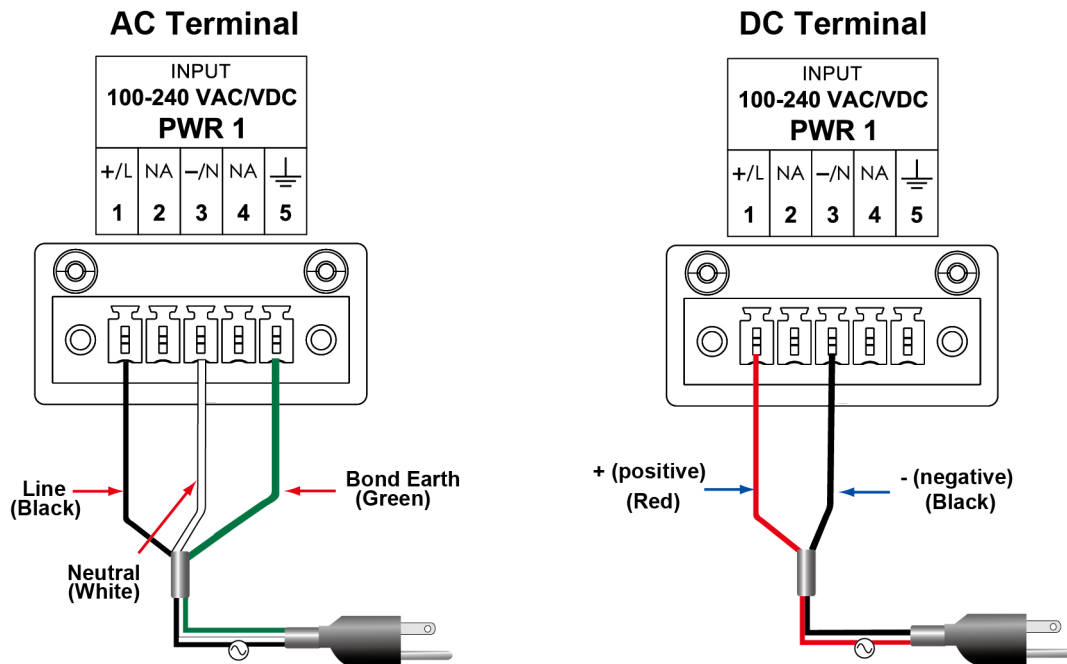
⚠ ATTENTION

This equipment must be installed according to the applicable country's wiring codes.

A power button on the rear panel allows users to power on the computer when it is in sleep or hibernate mode.

Power Button
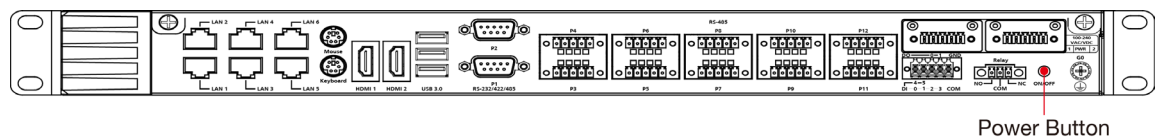
Reset Button

Pressing the **Reset** button initiates a hardware warm reboot. The button plays the same role as a desktop PC's reset button. 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 using the software reboot function.

Reset Button
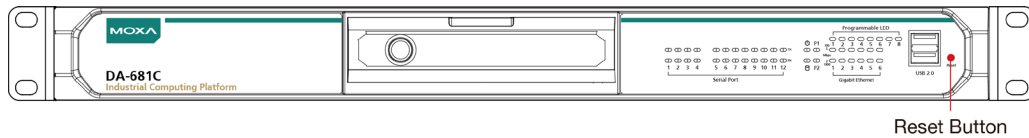
LED

There are 48 LED indicators on the front panel.

LEDs x 2
(Power, Storage)

LEDs x 8
(Programmable)

LEDs x 2 (Power Failure)

LEDs x 24
(TX/RX)

LEDs x 12
(100/1000 Mbps)
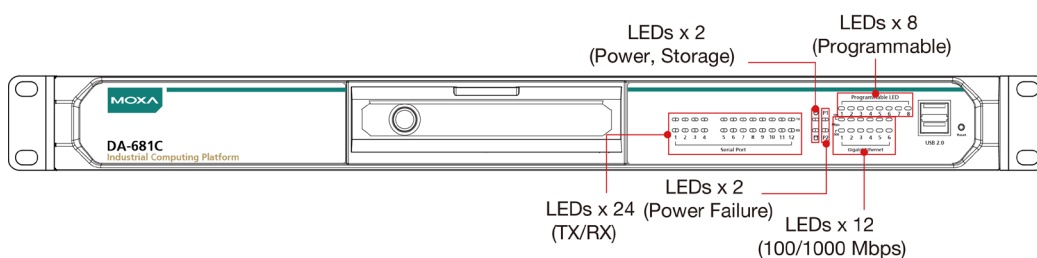
Information about each LED indicator is given in the following table:

LED	Color	Description
Power	Green	Power is on
	Off	No power input
Storage	Yellow/Blinking	Data is being written to or read from the storage unit
	Off	Storage unit is idle
Power 1 Failure	Off	The first power supply is ON
	Red	Error in the first power supply
Power 2 Failure	Off	The second power supply is ON
	Red	Error in the second power supply
Gigabit LAN LEDs 1 to 6	Green	100 Mbps Ethernet mode
	Orange	1000 Mbps (Gigabit) Ethernet mode
Serial Port P1/P12 (TX/RX)	Green	Tx: Serial data is being transmitted
	Yellow	Rx: Serial data is being received
Programmable LEDs 1 to 8	Green/Blinking	Can be used to indicate statuses or for debugging, as defined by users.

Connecting to Displays

The DA-681C comes with 2 HDMI interfaces on the rear panel, allowing users to connect two displays.
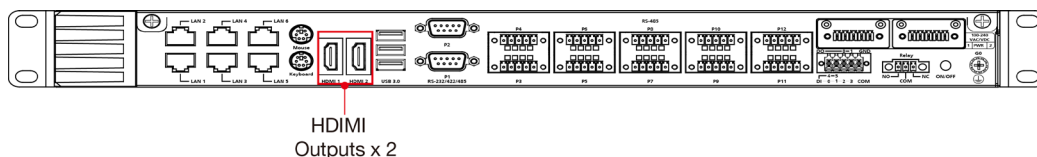
HDMI
Outputs x 2

✏ **NOTE**

For highly reliable video streaming capability, use premium, certified HDMI cables.

Connecting USB Devices

The DA-681C 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, for expanding the system's storage capacity. In addition, both USB ports support system bootup, which can be activated by modifying the BIOS settings. See "*Chapter 3* BIOS Setup" for details.

USB 2.0 Hosts x 2
(Type A)

USB 3.0 Hosts x 3 (type A)
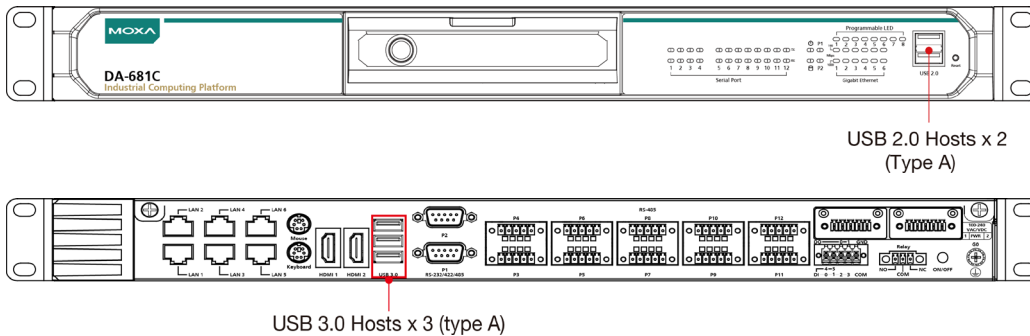
Installing a USB Dongle Kit

You can use a USB dongle kit to secure your USB dongle inside your DA-681C computer.

The USB dongle kit includes a USB plate and a screw.
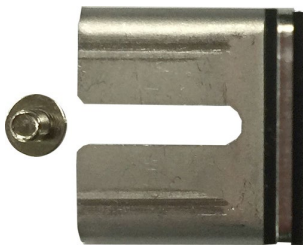
✏ **NOTE**

The USB dongle kit is an optional accessory that can be purchased separately.

To install a USB dongle kit, do the following:

1. Power off the DA-681C computer and remove the top cover of the computer.
2. Find the location of the USB slot.
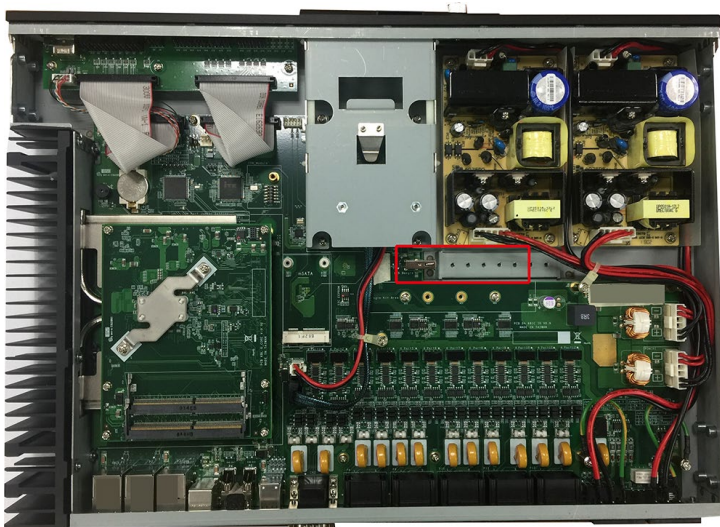
3. Insert the USB device into the USB port inside the DA-681C computer.

4. Place the USB plate on the rail and push it down as close to the USB device as possible. Finally, fasten the screw on the plate to secure the USB device.

5. Put back the top cover of the computer.

Connecting to a Keyboard and Mouse

Connectors for a keyboard and a mouse are located on the rear panel of the computer. Both connectors are PS/2 interfaces; you can directly connect a keyboard and a mouse using these connectors.
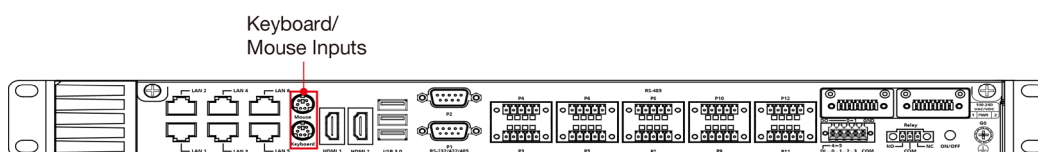
Serial Ports

The DA-681C comes with two software-selectable RS-232/422/485 serial ports (P1 and P2) with DB9 connectors, which are located on the rear panel.

Pin	RS-232	RS-422	RS-485 (2-wire)
1	DCD	TxDA(-)	–
2	RxD	TxDB(+)	–
3	TxD	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	DataA(-)
5	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
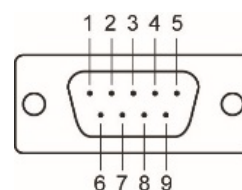
In addition, there are ten serial ports (P3 to P12) that use terminal blocks. Refer to the following table for the pin assignments.

Pin	RS-485 (2-wire)
1	–
2	–
3	Data(+)
4	Data(-)
5	GND
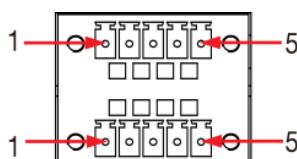
Gigabit LAN Ports

The DA-681C has 6 Gigabit LAN ports. When a LAN cable is properly connected, the LEDs on the front panel will glow to indicate the connection status.
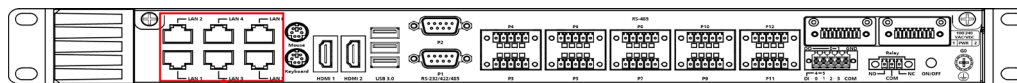
LAN Ports x 6
(100/1000 Mbps , RJ45)

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

Pin	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)-
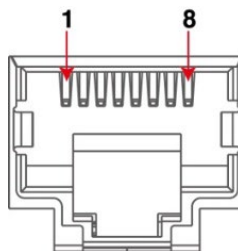
Digital Inputs/Digital Outputs

The DA-681C is provided with six digital inputs and two digital outputs in a terminal block. Refer to the following figure for the location of the DI and DO connectors.
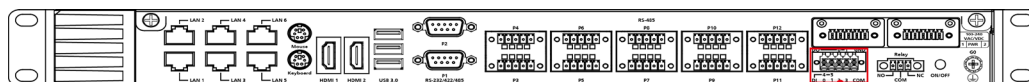
DIs x 6/DOs x 2
(terminal block)

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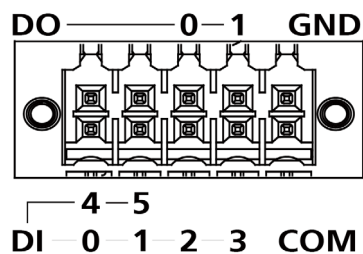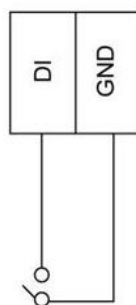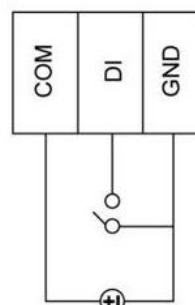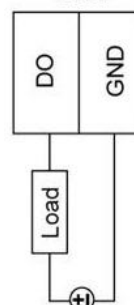
Relay Output

The DA-681C is provided with a relay output located on the rear panel of the computer.
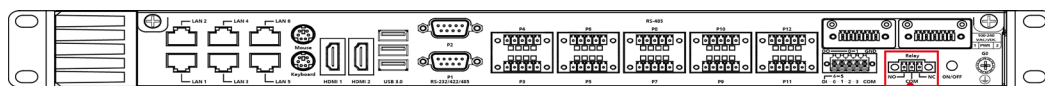
Relay Output
(terminal block)

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

Relay

NO —— —— NC

COM
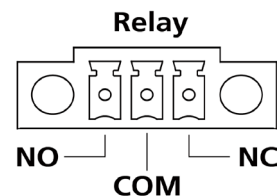
Upgrading the Memory Module

The DA-681C embedded computer supports 2 DDR4 2133 SODIMM modules for up to 32 GB of memory (2 slots, each with 16 GB capacity). To upgrade the SDRAM memory module, follow these instructions:

1. Disconnect the DA-681C from its power source.
2. Unfasten the screws on the back of the computer, and then remove the top cover.

screw   screw
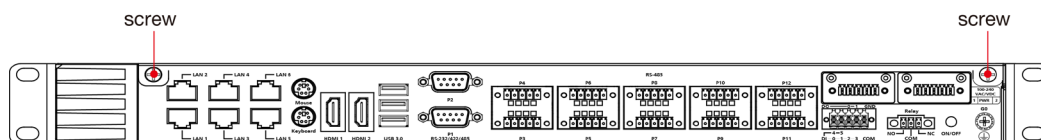
3. Find the location of the SDRAM memory slot.

---
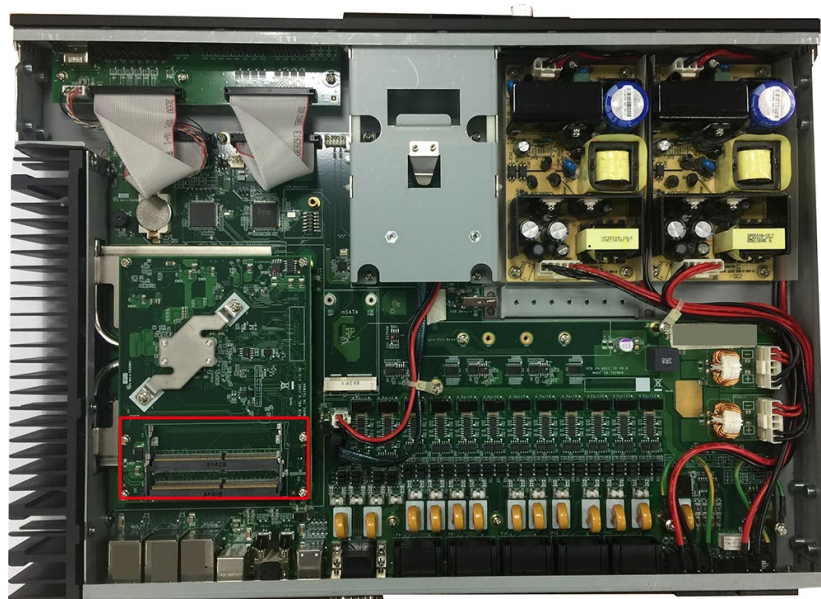
4. Install the new memory module in the slot.

   Make sure you insert the SDRAM in the correct direction. Push down the memory module, making sure that the two fasteners snap in place and are holding the module firmly.

✏️ **NOTE**

If a memory module is already installed in the slot, push the two fasteners to free the module and then remove the module.

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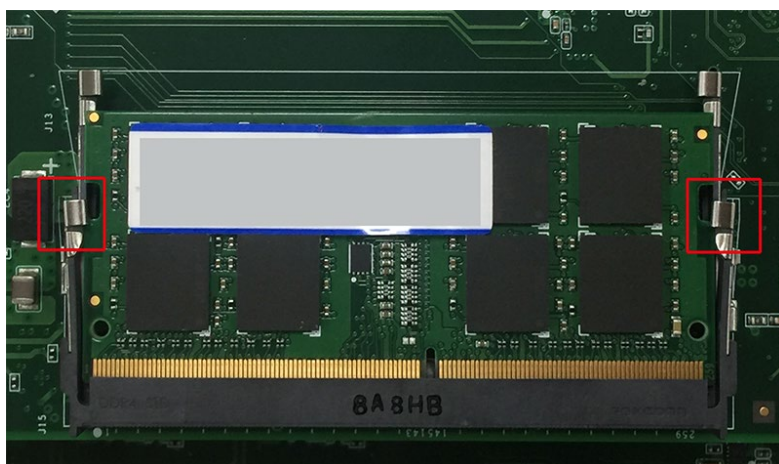
5. Replace the top cover of the computer and fasten the screws.

Installing a mSATA Storage Card

The DA-681C embedded computer comes with a mSATA slot. To insert a mSATA storage card, follow these instructions.

1. Disconnect the DA-681C from its power source.
2. Unfasten the screws on the back of the computer, and then take off the top cover.
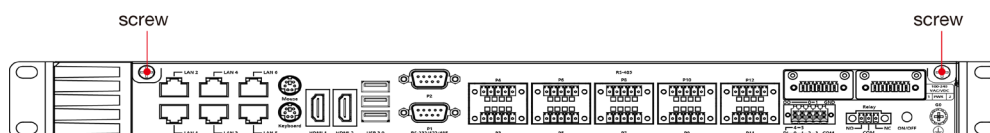
screw   screw

3. Find the location of the mSATA slot.
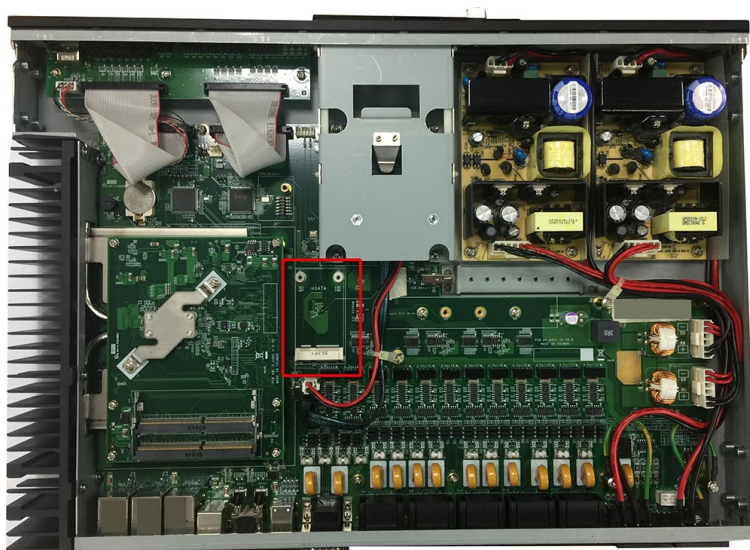
4. Insert the mSATA storage card into the slot and fasten the two screws to secure the card to the slot.
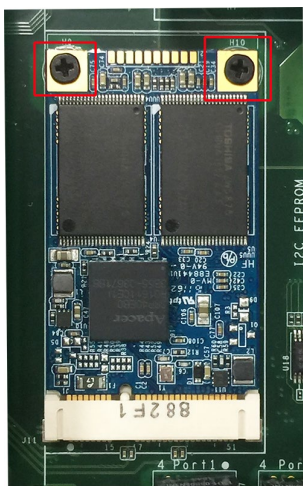
5. Replace the top cover of the computer and fasten the screws.

⚠ **ATTE NTION**

The DA-681C rackmount computer does not support hot swap and plug and play functions for the mSATA storage card. You must disconnect the power source to the computer before inserting or removing the mSATA storage card.

Installing SATA Hard Disks

The DA-681C comes with one SATA slot that allows users to install a 2.5" SATA HDD/SSD. Follow these steps to install a SATA disk.

1. Unfasten the screw on the storage slot cover and pull down the cover to access the storage tray.
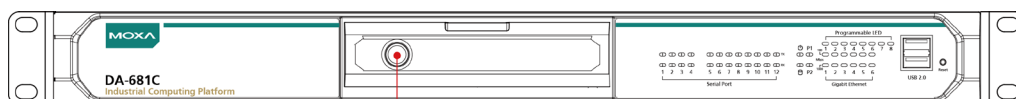
Storage Disk Tray Screw

2. Push the clutch on the storage tray to the left to release the storage tray and pull out the tray.

3. Place the SATA disk on the tray.

   Ensure that the SATA disk aligns with the screws on the storage tray.
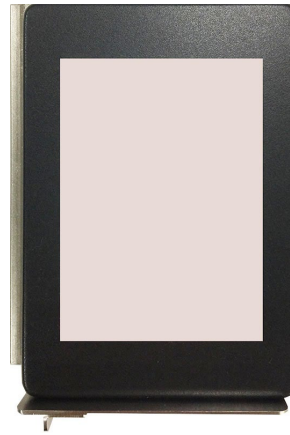
4. Turn the storage tray and the SATA disk arrangement around to access the screws on the rear side of the tray. Fasten the four screws to secure the SATA disk to the tray, as indicated in the diagram below.

5. Insert the storage tray back into the storage slot.

   Ensure that the tray is inserted correctly on to the rails of the storage slot and the tray slides smoothly inside the slot.

6. Slide the storage slot cover back and fasten the screws to secure it.

3. BIOS Setup

This chapter describes the BIOS settings of the DA-681C computer. The BIOS is a set of input/output control routines for peripherals, which are used to initialize system peripherals before the operating system is loaded. The BIOS setup allows the user to modify the system configurations of these peripherals' basic input/output interfaces.

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 opens up with the following options:

- **Continue:** Continue to boot up
- **Boot Manager:** Select the device for booting up
- **Device Management:** Enter the device configuration menu
- **Boot From File:** Select the UEFI boot up file
- **Setup Utility:** Enter the BIOS configuration menu
- **Intel® Management Engine BIOS Extension:** Enter the AMT configuration menu

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

```
                                 Front Page
 Front Page

 Continue                                      This selection will direct the system to
▶Boot Manager                                  continue to booting process
▶Device Management
▶Boot From File
▶Setup Utility
▶Intel(R) Management Engine BIOS Extension




F1  Help                        Enter Select ▶ SubMenu
↑/↓ Select Item
```
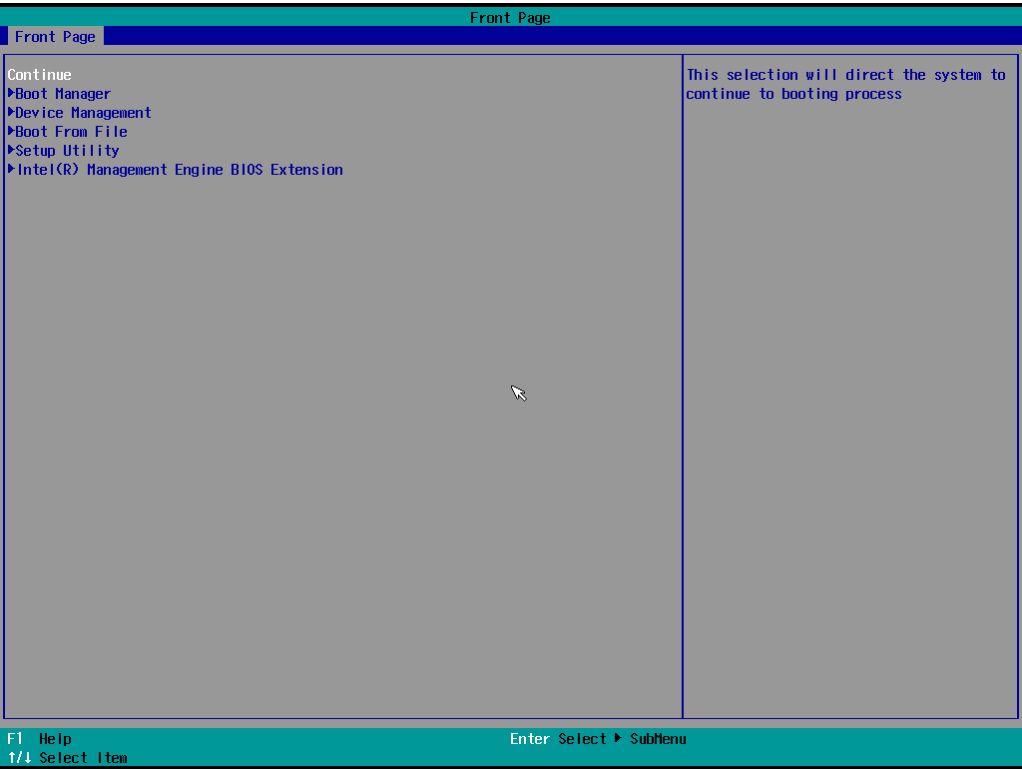
When you enter **Setup Utility**, a basic description of each function key is listed at the bottom of the screen.

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

The BIOS configuration screen will be shown when you enter the **Setup Utility** option, as shown in the following figure.
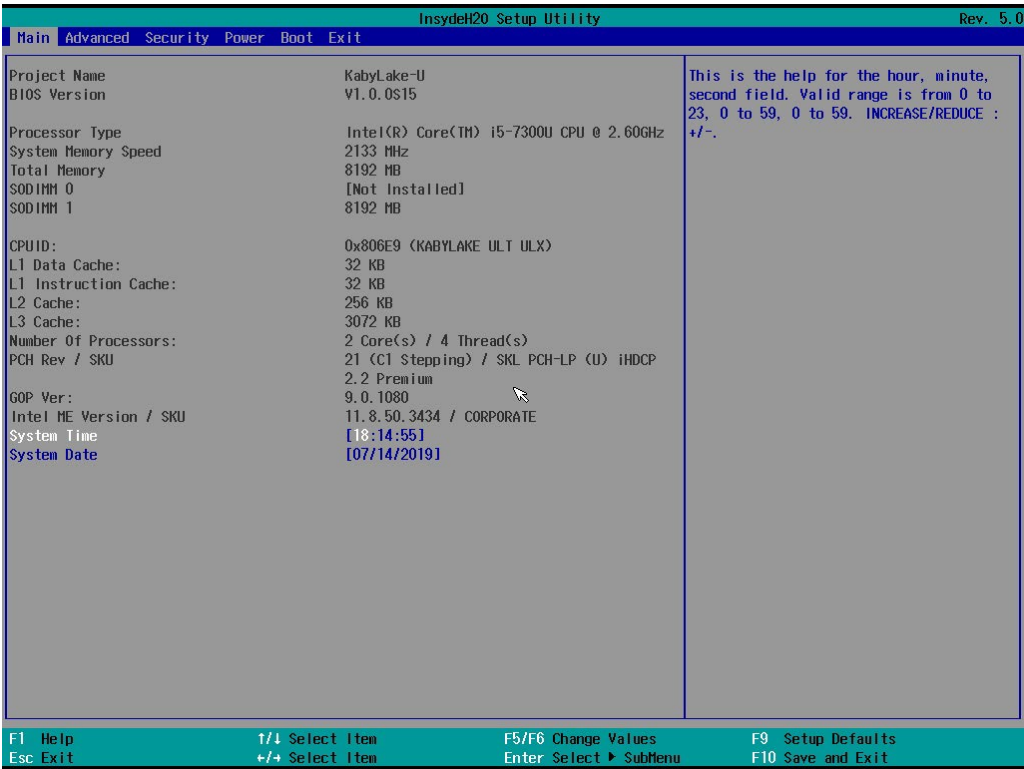
✏️ **NOTE**

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

Administer Secure Boot

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

```
                          Administer Secure Boot
 Administer Secure Boot

 System Status:                                          Restore all of the Secure Boot Settings
                                                         to default factory settings and enable
 Secure Boot Database              Unlocked              Secure Boot.
 Secure Boot Status                Disabled
 User Customized Security          NO

 Options:

 ▶Select a UEFI file as trusted for execution
 Enforce Secure Boot               <Disabled>
 Erase all Secure Boot Settings    <Disabled>
 Restore Secure Boot to Factory Settings    <Disabled>

 ▶PK Options
 ▶KEK Options
 ▶DB Options
 ▶DBX Options
 ▶DBT Options
 ▶DBR Options




 F1  Help            ↑/↓ Select Item      F5/F6 Change Values        F9  Setup Defaults
 Esc Exit            ←/→ Select Item      Enter Select ▶ SubMenu     F10 Save and Exit
```

UEFI Secure Boot Enable

Please set as "enabled" in "Restore Secure Boot to Factory Settings" under Administer Secure Boot menu. Press F10 as save and exist.

The Microsoft key is included in the BIOS by default so that the system cannot boot up using a non-Windows OS as shown in the following example.
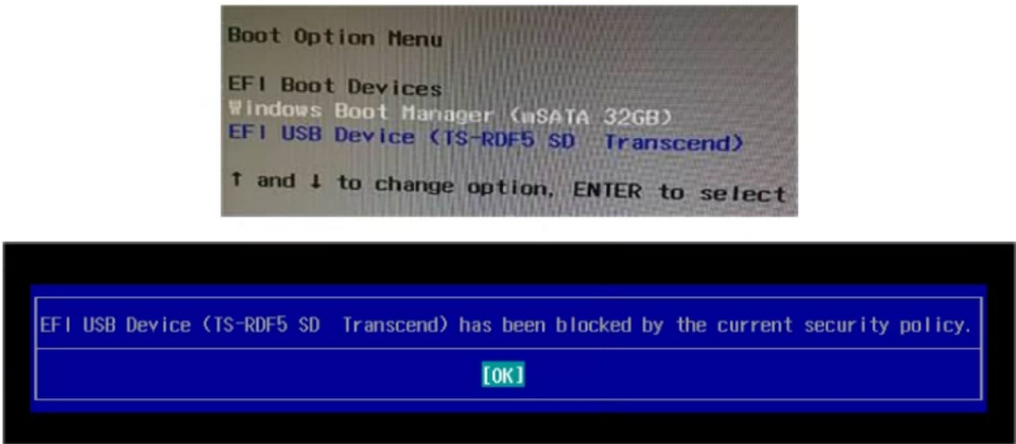
Enroll EFI Image

Enter "Administer Secure Boot" once again and see "Select a UEFI file as trusted for execution", and enter a loader into the database, named and following 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)
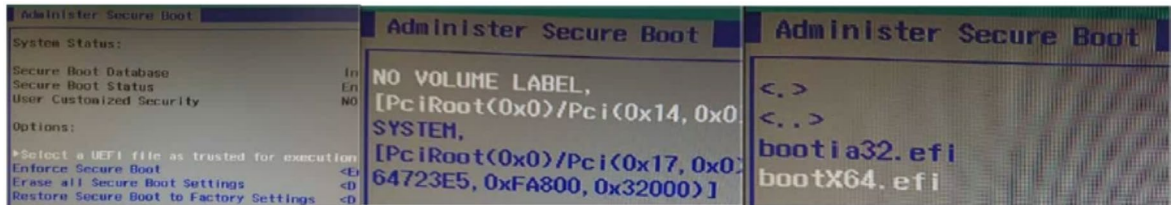
Enroll Customer Key

Enter "DB OPTION" and enroll your key. Please make sure your key is in CRT format and use RSA 2048 or better.

Main Page

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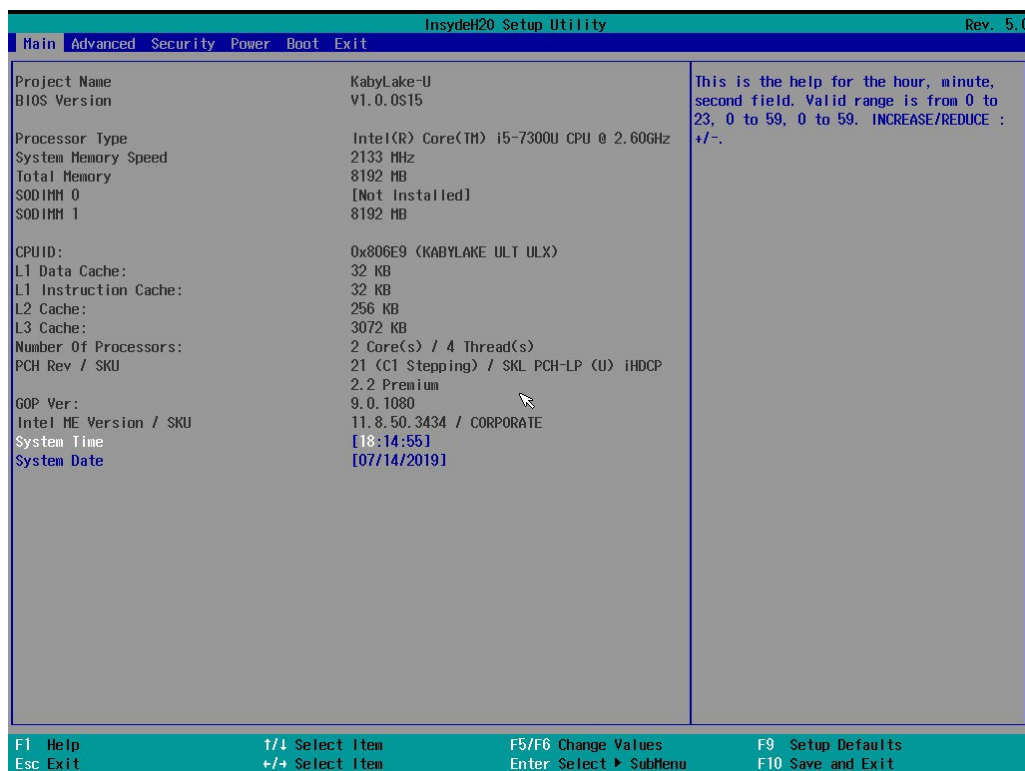
Advanced Settings

Select the **Advanced** tab in the BIOS setup utility to open the advanced features screen.

```
                              InsydeH20 Setup Utility                          Rev. 5.0
 Main  Advanced  Security  Power  Boot  Exit
                                                        Configures Boot Settings.
  ▶Boot Configuration
  ▶SATA Configuration
  ▶CPU Configuration
  ▶Active Management Technology Support
  ▶Video Configuration
  ▶Chipset Configuration
  ▶SIO ITE8786E
  ▶Console Redirection




 F1  Help            ↑/↓ Select Item       F5/F6 Change Values      F9  Setup Defaults
 Esc Exit            ←/→ Select Item       Enter Select ▶ SubMenu   F10 Save and Exit
```

✏️ **NOTE**

Active Management Technology is not supported in KL1 and KL3 models.

Boot Configuration

This item allows users to configure the default value of Numlock.

Options: On (default), Off.

```
                            InsydeH20 Setup Utility                        Rev. 5.0
    Advanced

Boot Configuration                                    Selects Power-on state for Numlock

Numlock                          <On>










F1  Help            ↑/↓ Select Item      F5/F6 Change Values     F9  Setup Defaults
Esc Exit            ←/→ Select Item      Enter Select ▶ SubMenu  F10 Save and Exit
```
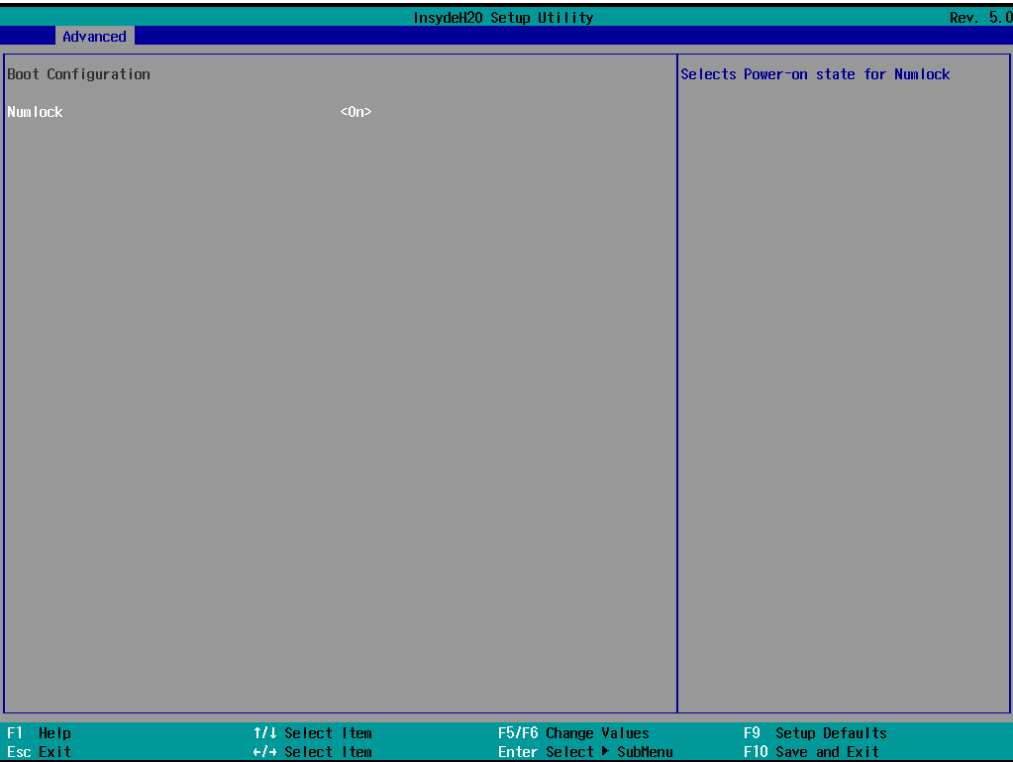
SATA Configuration

The host drive controller can be configured for AHCI (default) or Intel RST Premium mode.

```
                            InsydeH20 Setup Utility                        Rev. 5.0
    Advanced

SATA Configuration                                    Determines how SATA controller(s)
                                                      operate.
SATA Mode Selection              <AHCI>
SATA Speed Limited               <Auto>

▶Serial ATA Port 0     [32GB SATA Flash Driv]
   Hot Plug                      <Disabled>
▶Serial ATA Port 1     [Not Installed]
   Hot Plug                      <Enabled>
▶Serial ATA Port 2     [Not Installed]
   Hot Plug                      <Enabled>










F1  Help            ↑/↓ Select Item      F5/F6 Change Values     F9  Setup Defaults
Esc Exit            ←/→ Select Item      Enter Select ▶ SubMenu  F10 Save and Exit
```

SATA Speed Limited

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

Serial ATA Port

This setting displays information on the drives installed on your computer.

SATA Port—Hot Plug

This item allows you to enable/disable hot-plugging capabilities (the ability to remove the drive while the computer is running) for the storage drives installed.

Options: Disabled (default for Port 0), Enabled (default for Port 1 and Port 2)

RAID

Set the HDC configuration to **Intel RST Premium** to enable **r**edundant **a**rray of **i**nexpensive **d**isks (RAID) technology. The DA-681C has three SATA interfaces, which support RAID levels 0, 1, 5 and Recovery.

Recovery utilizes RAID 1 (mirroring) functionality to copy data from a designated master drive to a designated recovery drive. The master drive data can be copied to the recovery drive either continuously or on request.

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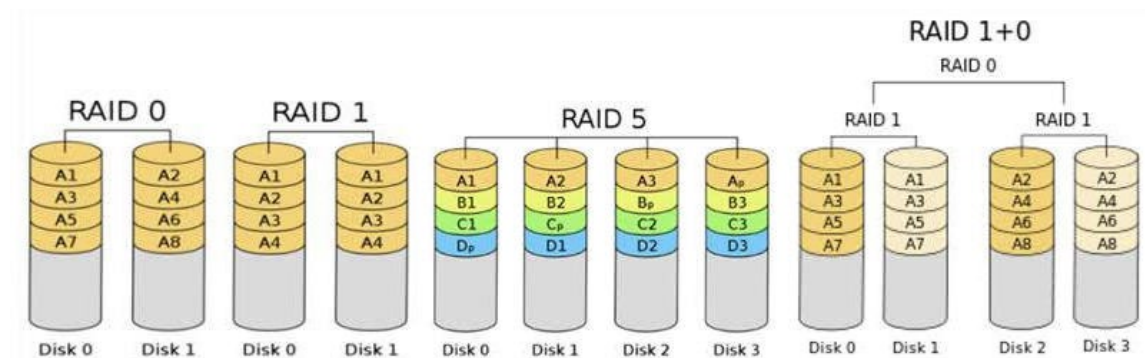
Source: http://en.wikipedia.org/wiki/Standard_RAID_levels

```
                                    InsydeH20 Setup Utility                              Rev. 5.0
        Advanced

    SATA Configuration                                              Determines how SATA controller(s)
                                                                    operate.
    SATA Mode Selection                    <Intel RST Premium With Intel Optane
                          .                System Acceleration>

    ▶Serial ATA Port 0       [Not Installed]
      Hot Plug                             <Disabled>
    ▶Serial ATA Port 1     [2.5" SATA SSD 3ME    ]
      Hot Plug                             <Enabled>


    F1  Help               ↑/↓ Select Item      F5/F6 Change Values       F9  Setup Defaults
    Esc Exit               ←/→ Select Item      Enter Select ▶ SubMenu    F10 Save and Exit
```
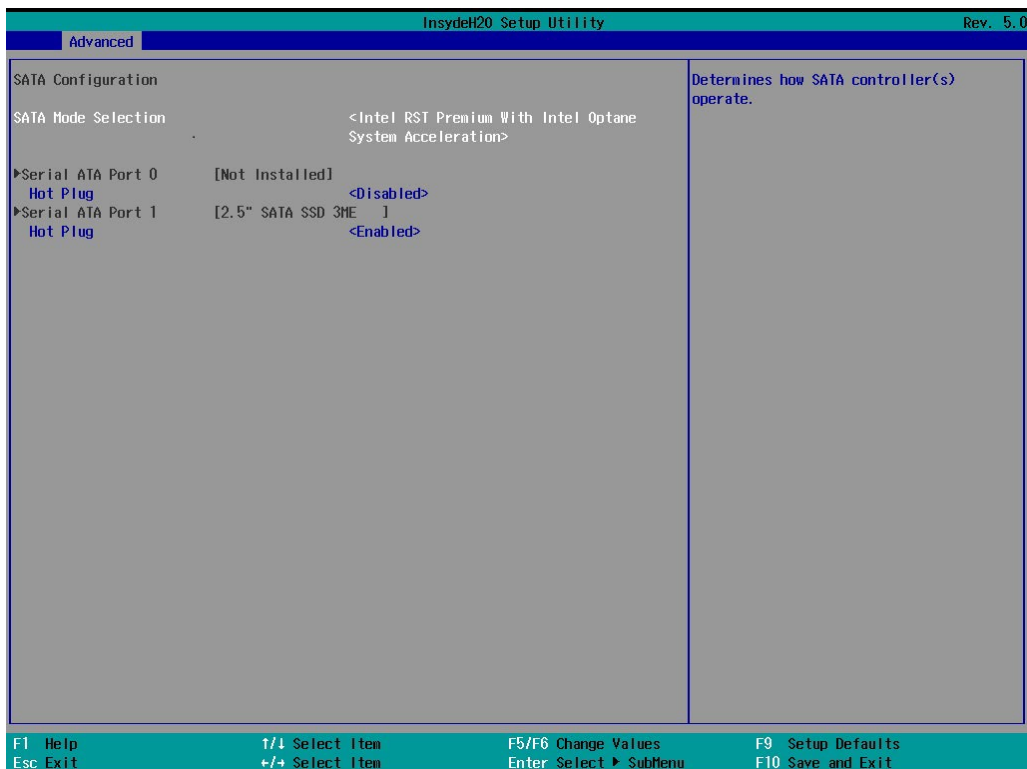
Intel Rapid Storage Technology

This option allows users to configure the Intel® Rapid Storage Technology. To configure the Intel Rapid
Storage Technology settings, select the **Device Management** option when setting the Intel RST Premium
mode, or saving changes and rebooting the computer.

```
                                       Device Manager

    Devices List                                        This formset allows the user to manage
    ▶Intel(R) Rapid Storage Technology                  RAID volumes on the Intel(R) RAID
                                                         Controller
    Press ESC to exit.






                                          ▯



    F1  Help                             ↑/↓   Select Item
    Esc Exit                             Enter Select ▶ SubMenu
```

```
                          Intel(R) Rapid Storage Technology
 Intel(R) Rapid Storage Technology

 Intel(R) RST 15.8.0.3010 RAID Driver                       This page allows you to create a RAID
                                                            volume
 ▶Create RAID Volume


 Non-RAID Physical Disks:
 ▶SATA 0.3, HGST HTS545050A7E680 TM8514GL1A6AJP, 465.7GB
 ▶SATA 0.4, Hitachi HTS545050B9A300 28PB4406Q7CJS04L, 465.7GB

















 F1  Help              ↑/↓ Select Item      F5/F6 Change Values     F9  Setup Defaults
 Esc Exit              ←/→ Select Item      Enter Select ▶ SubMenu   F10 Save
```

CPU Configuration

```
                          InsydeH20 Setup Utility                              Rev. 5.0
      Advanced

 CPU Configuration                                          Number of cores to enable in each
                                                            processor package.
 Active Processor Cores          <All>
 Hyper-Threading                 <Enabled>
 Turbo Mode                      <Enabled>
















 F1  Help              ↑/↓ Select Item      F5/F6 Change Values     F9  Setup Defaults
 Esc Exit              ←/→ Select Item      Enter Select ▶ SubMenu   F10 Save and Exit
```

Active Processor Cores

This item indicates the number of cores that can be enabled 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)

✏️ **NOTE**

Hyper-Threading is not supported in KL1 models.

Turbo Mode

Enables/disables processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled, unless max turbo ratio is greater than 16.

Options: Disabled, Enabled (default)

✏️ **NOTE**

Turbo Mode is not supported in the DA-681C-KL1 models.

Intel® Active Management Technology Support

This option allows you to configure the Intel® Active Management Technology.
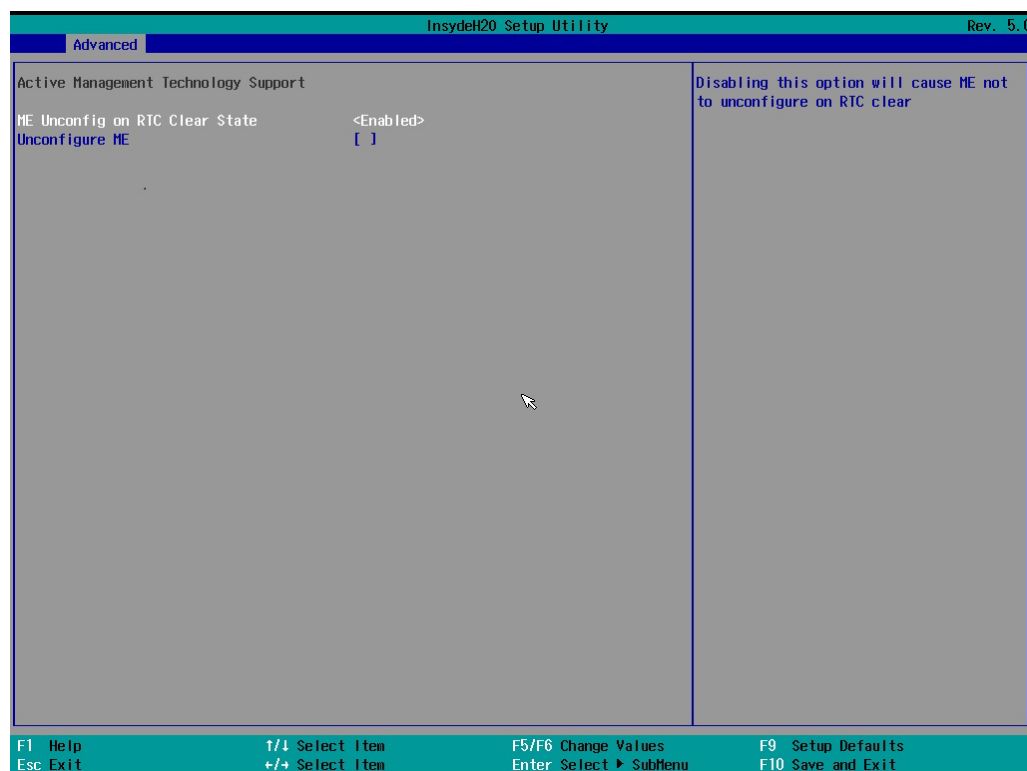
✏️ **NOTE**

Intel® Active Management Technology is not supported in KL1 and KL3 models.

ME Unconfig on RTC Clear State

Disabling this option will cause ME not to unconfigure when the RTC is cleared.

Options: Disabled, Enabled (default)

Unconfigure ME

Use this option to unconfigure ME when the MEBx password is reset to default.

Video Configuration

```
                        InsydeH20 Setup Utility                         Rev. 5.0
    Advanced

 Video Configuration                                    Select DVMT 5.0 Pre-Allocated (Fixed)
                                                        Graphics Memory size used by the
 DVMT Pre-Allocated              <32M>                  Internal Graphics Device.
 DVMT Total Gfx Mem              <256M>




                 .




 F1  Help              ↑/↓ Select Item    F5/F6 Change Values      F9  Setup Defaults
 Esc Exit              ←/→ Select Item    Enter Select ▶ SubMenu   F10 Save and Exit
```
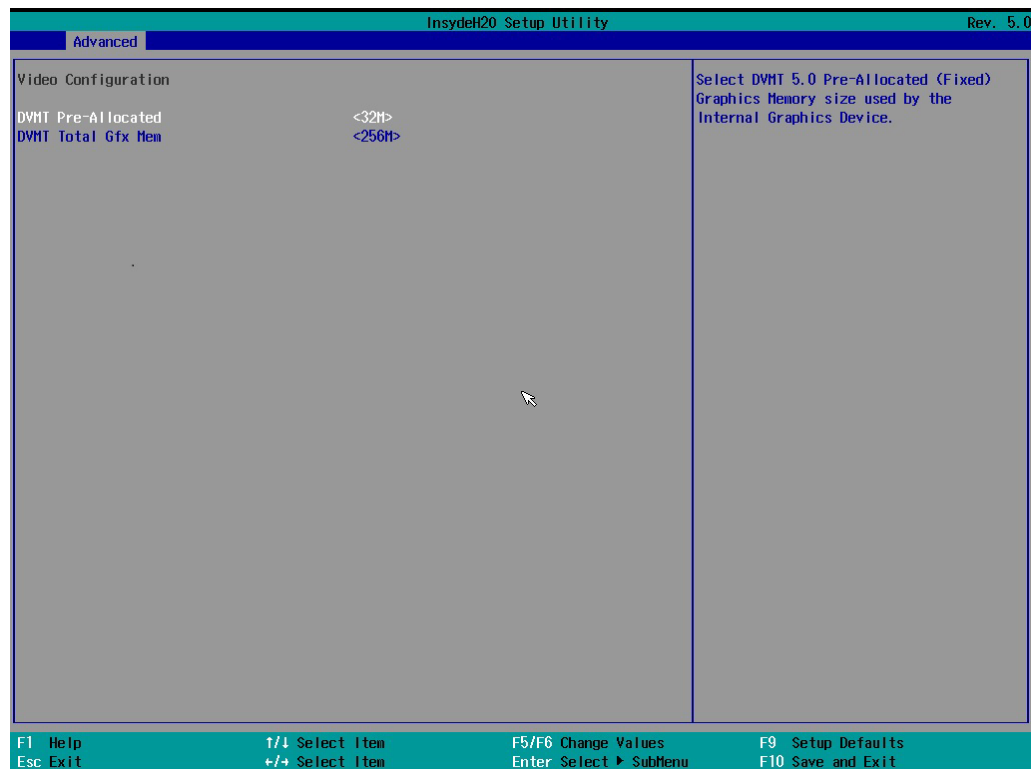
DVMT Pre-Allocated

Selecting this option allows you to configure pre-allocated memory capacity for the IGD. Pre-allocated graphics memory is invisible to the operating system.

Options: 12M, 16M, 20M, 24M, 28M, 32M (default), 36M, 40M, 44M, 48M, 52M, 56M, 60M, 64M

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 option 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 option allows you to configure the chipset settings.

```
                              InsydeH20 Setup Utility                           Rev. 5.0
   Advanced

 Chipset Configuration                                      This item allows you to enable/disable
                                                            the computer from automatically powering
 Power ON after Power Failure          <ON>                 up after a system crash. Options: ON
 Load Default After Cleaning RTC Battery <Enabled>          (default), OFF, Last State

 DO-0 Level                            <High>
 DO-1 Level                            <High>

 F1  Help              ↑/↓ Select Item     F5/F6 Change Values      F9  Setup Defaults
 Esc Exit              ←/→ Select Item     Enter Select ▶ SubMenu   F10 Save and Exit
```

Power ON after Power Failure

This option 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 it detects RTC battery loss.

Options: Disabled, Enabled (default)

DO-0 Level

This option allows users to set the DO-0 level.

Options: High (default), Low

DO-1 Level

This option allows users to set the DO-1 level.

Options: High (default), Low

SIO ITE8786E

This option allows users to configure serial port settings.

```
                          InsydeH20 Setup Utility                    Rev. 5.0
   Advanced

  ▶Hardware Monitor




          .








F1  Help            ↑/↓ Select Item      F5/F6 Change Values    F9  Setup Defaults
Esc Exit            ←/→ Select Item       Enter Select ▶ SubMenu  F10 Save and Exit
```
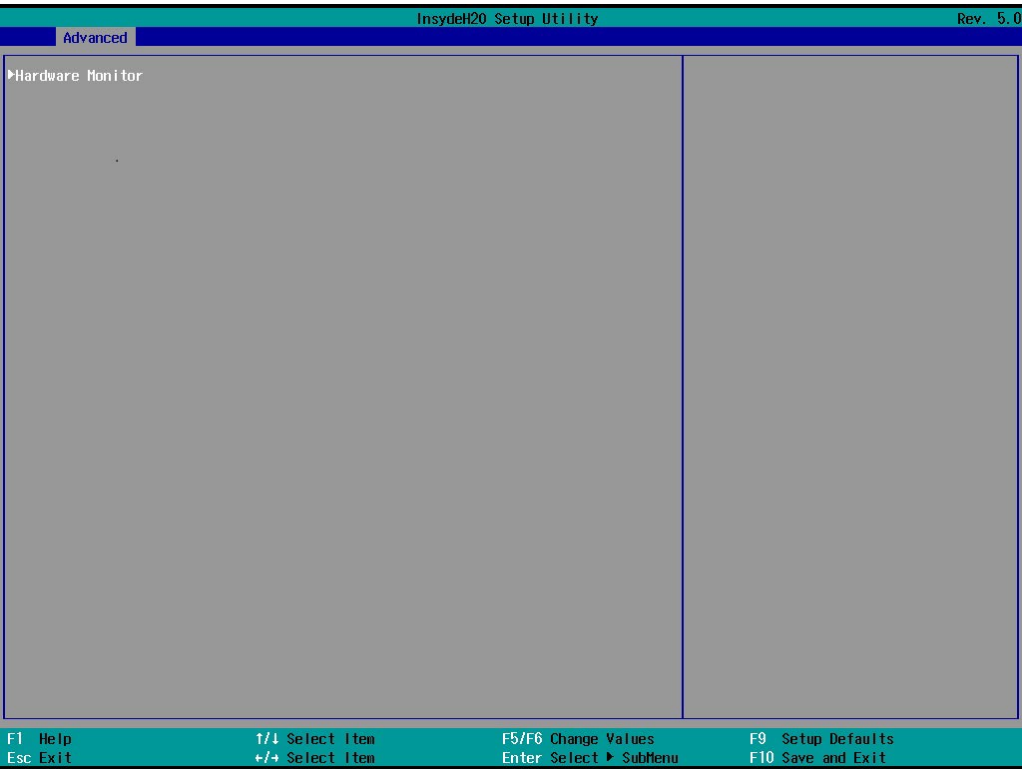
Hardware Monitor

This option allows users to view stats on the computer such as CPU and system temperature, voltage levels, and other chipset information.

```
                          InsydeH20 Setup Utility                    Rev. 5.0
   Advanced

  Hardware Monitor

  Voltage
   3.3V                           3.288 V
   5V                             4.896 V

  Temperature
   System (°C/°F)                 47°C/116°F
   System2 (°C/°F)                46°C/114°F
   CPU (°C/°F)                    69°C/156°F










F1  Help            ↑/↓ Select Item      F5/F6 Change Values    F9  Setup Defaults
Esc Exit            ←/→ Select Item       Enter Select ▶ SubMenu  F10 Save and Exit
```
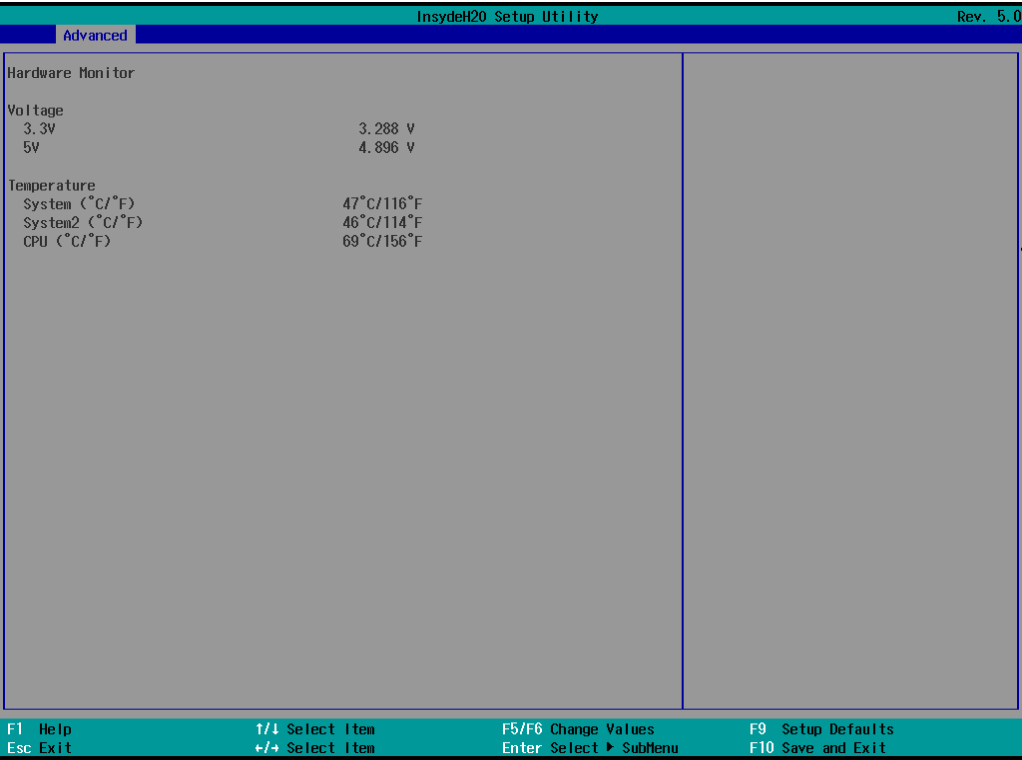
Security Settings

The **Security** page includes security-related settings. You will require the supervisor password and user password.

```
                            InsydeH20 Setup Utility                              Rev. 5.0
 Main  Advanced  Security  Power  Boot  Exit

                                                            Clear TPM. Removes all TPM context
 Current TPM Device          <TPM 2.0 (DTPM)>               associated with a specific Owner.
 TPM State                   All Hierarchies Enabled, Owned
 Clear TPM                   [ ]

 Supervisor Password         Not Installed

 Set Supervisor Password




 F1  Help               ↑/↓ Select Item          F5/F6 Change Values       F9  Setup Defaults
 Esc Exit               ←/→ Select Item          Enter Select ▶ SubMenu    F10 Save and Exit
```

Current TPM Device

This item indicates if the system has a TPM module configured and provides information on its type.

TPM State

This item allows users to view the 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. To set the password, select the **Set Supervisor Password** option**,** enter the password, and re-confirm the password.

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.

```
                                      InsydeH20 Setup Utility                            Rev. 5.0
  Main  Advanced  Security  Power  Boot  Exit

  Current TPM Device                <TPM 2.0 (DTPM)>                  Install or Change the password and the
  TPM State                         All Hierarchies Enabled, Owned   length of password  must be greater than
  Clear TPM                         [X]                              one character.

  Supervisor Password               Not Installed

  Set Supervisor Password




                                Set Supervisor Password

                           Enter New Password:
                           Enter New Password Again:




  F1  Help                  ↑/↓ Select Item        F5/F6 Change Values      F9  Setup Defaults
  Esc Exit                  ←/→ Select Item         Enter Select ▶ SubMenu  F10 Save and Exit
```
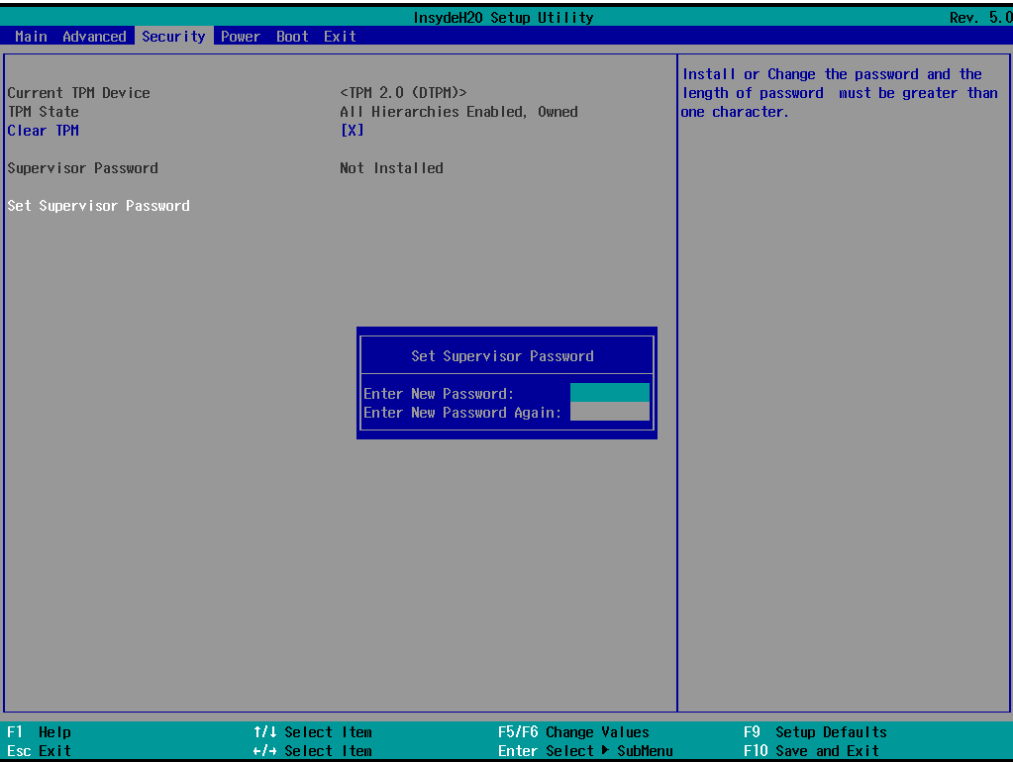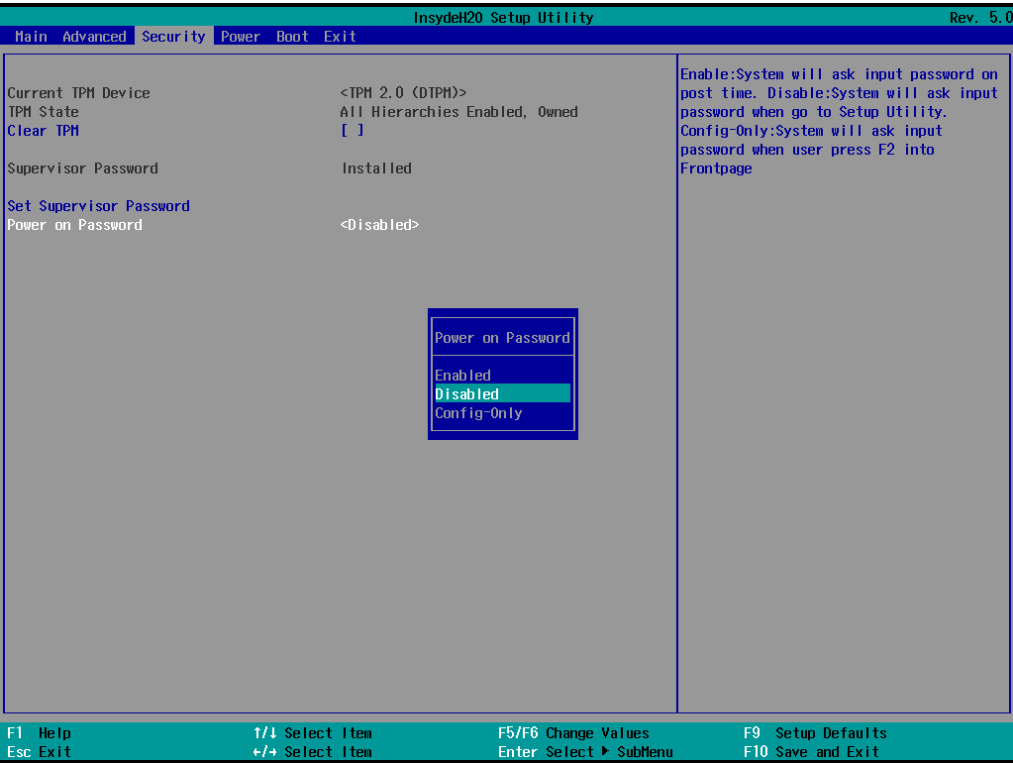
After setting the supervisor password, users can configure when the input password screen should pop up.

```
                                      InsydeH20 Setup Utility                            Rev. 5.0
  Main  Advanced  Security  Power  Boot  Exit

  Current TPM Device                <TPM 2.0 (DTPM)>                  Enable:System will ask input password on
  TPM State                         All Hierarchies Enabled, Owned   post time. Disable:System will ask input
  Clear TPM                         [ ]                              password when go to Setup Utility.
                                                                     Config-Only:System will ask input
  Supervisor Password               Installed                       password when user press F2 into
                                                                     Frontpage
  Set Supervisor Password
  Power on Password                 <Disabled>




                                      Power on Password

                                      Enabled
                                      Disabled
                                      Config-Only




  F1  Help                  ↑/↓ Select Item        F5/F6 Change Values      F9  Setup Defaults
  Esc Exit                  ←/→ Select Item         Enter Select ▶ SubMenu  F10 Save and Exit
```

Enable: System will ask input password during 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

The Power page allows users to configure the power settings of the computer.

```
                              InsydeH20 Setup Utility                              Rev. 5.0
  Main  Advanced  Security  Power  Boot  Exit

                                                         Determines the action taken when the
                                                         system power is off and a PCI Power
  Wake on LAN                      <Enabled>             Management Enable wake up event occurs.
  Auto Wake on S5                  <Disabled>

  Power On USB3(Rear)              <Enabled>
  Power On USB2(Front)             <Enabled>
  Power On USB2(Internal)          <Enabled>

  PS/2 Keyboard Power-Up           <Disabled>












  F1   Help            ↑/↓ Select Item      F5/F6 Change Values        F9  Setup Defaults
  Esc  Exit            ←/→ Select Item      Enter Select ▶ SubMenu     F10 Save and Exit
```

Wake on LAN

Enable this feature if you want to wake up the system by a LAN device from a remote host.

Options: Enabled (default), Disabled

Auto Wake on S5

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

Options: Disabled, Enabled (default)

Power On USB2(Front)

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

Options: Disabled, Enabled (default)

Power On USB2(Internal)

This option allows users to power on or power off the internal USB port inside the computer.
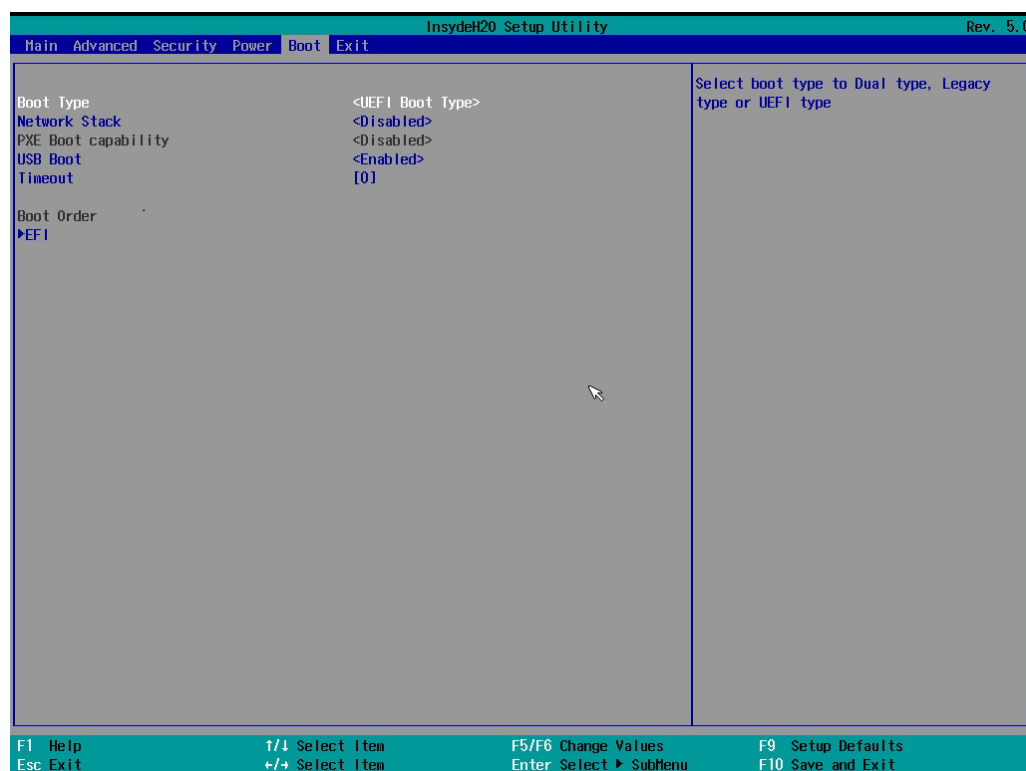
Options: Disabled, Enabled (default)

PS/2 Keyboard Power-Up

This option allows users to press **CTRL+P** to wake up the system that the PSU remains engaged with; power to all other parts of the system remains cut off.

Options: Disabled (default), Enabled

Boot Settings

The **Boot** page includes configuration settings for the boot-up process.

```
                              InsydeH20 Setup Utility                          Rev. 5.0
   Main  Advanced  Security  Power  Boot  Exit


   Boot Type                        <UEFI Boot Type>          Select boot type to Dual type, Legacy
   Network Stack                    <Disabled>                type or UEFI type
   PXE Boot capability              <Disabled>
   USB Boot                         <Enabled>
   Timeout                          [0]

   Boot Order
   ▶EFI


























   F1  Help              ↑/↓ Select Item    F5/F6 Change Values      F9  Setup Defaults
   Esc Exit              ←/→ Select Item    Enter Select ▶ SubMenu   F10 Save and Exit
```

✏️ **NOTE**

If you have not added any storage to your computer, you will not see the EFI option.

Boot Type

This option allows you to enable/disable the quick boot function.

Options: Dual Boot Type, Legacy Boot Type, UEFI Boot Type (default)

Network Stack

This option is used to deploy 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

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

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

USB Boot

Used to enable or disable boot-up from USB devices.

Options: Enabled (Default), Disabled

Timeout

This option allows users to set the number of seconds that the firmware will wait before booting the system with the default boot selection.

EFI

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

Exit Settings

The **Exit** page includes options to exit the BIOS environment.

```
                          InsydeH20 Setup Utility                              Rev. 5.0
 Main  Advanced  Security  Power  Boot  Exit

 Exit Saving Changes                                  Exit system setup and save your changes.
 Save Change Without Exit
 Exit Discarding Changes
 Load Optimal Defaults
 Load Custom Defaults
 Save Custom Defaults
 Discard Changes














 F1  Help              ↑/↓ Select Item      F5/F6 Change Values      F9  Setup Defaults
 Esc Exit              ←/→ Select Item      Enter Select ▶ SubMenu   F10 Save and Exit
```

Exit Saving Changes

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

Options: Yes (default), No

Save Change Without Exit

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

Options: Yes (default), No

Exit Discarding Changes

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

Options: Yes (default), No

Load Optimal Defaults

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

Options: Yes (default), No

Load Custom Defaults

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

Options: Yes (default), No

Save Custom Defaults

This option allows you to save the current BIOS values as a custom default that may be reverted to at any time by using the **Load Custom Defaults** option.

Options: Yes (default), No

Discard Changes

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

Options: Yes (default), No

Upgrading the BIOS

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

✏️ **NOTE**

Incorrect BIOS updates may permanently damage the computer. We strongly recommend that you contact the Moxa technical support team for assistance in obtaining all the necessary tools and the most current information before attempting to upgrade the BIOS on any Moxa device.

Step 1: Create a Bootable USB Disk

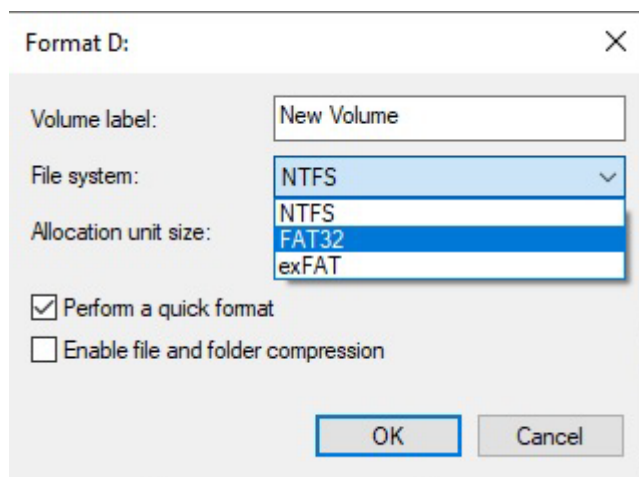Before upgrading the BIOS, you must create a bootable USB drive for the system.

1. Search for "format" and select **Create and format hard disk partitions**.
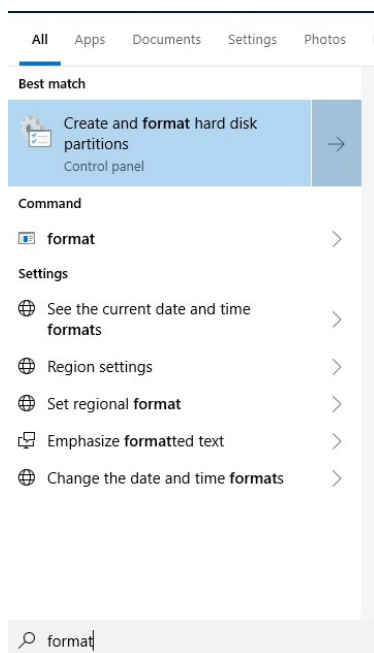
2. Right click on the USB disk and select **Format**.
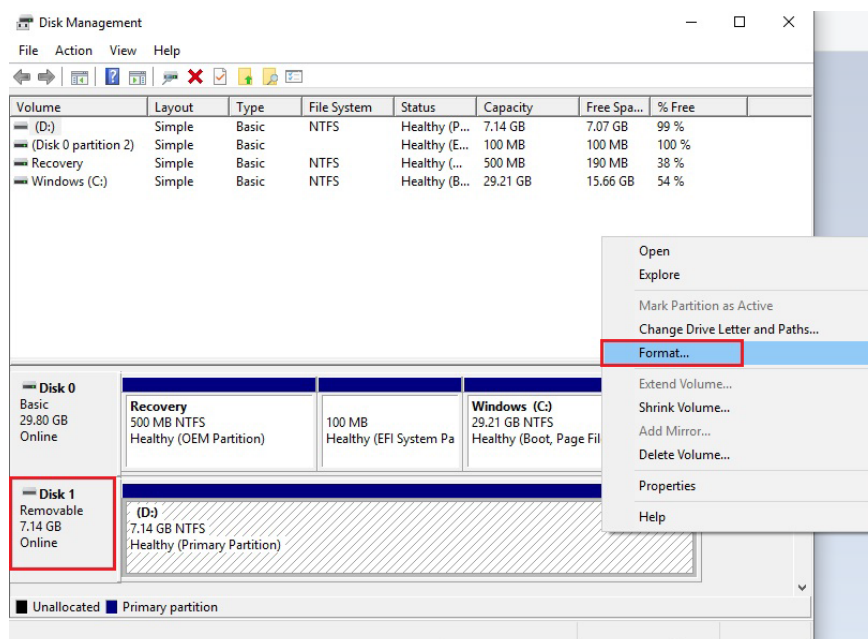
3. Select **FAT32** for the **File System** and click **OK** to start formatting the USB disk.

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.

1. Get the BIOS upgrade file (includes an **efi** folder and an xxxx**.efi** file)
2. Copy the **efi** folder and xxxx**.efi** file to the bootable USB disk.

Step 3: Run the Upgrade Program on the Computer

1. Reboot the computer from the USB device and press **F2** while it is booting up to go to the Boot Manager.

   If the BIOS does not recognize the USB device as the boot device, the USB device may not have a partition table. Use the Windows command line tool **diskpart** to rebuild the partition table.
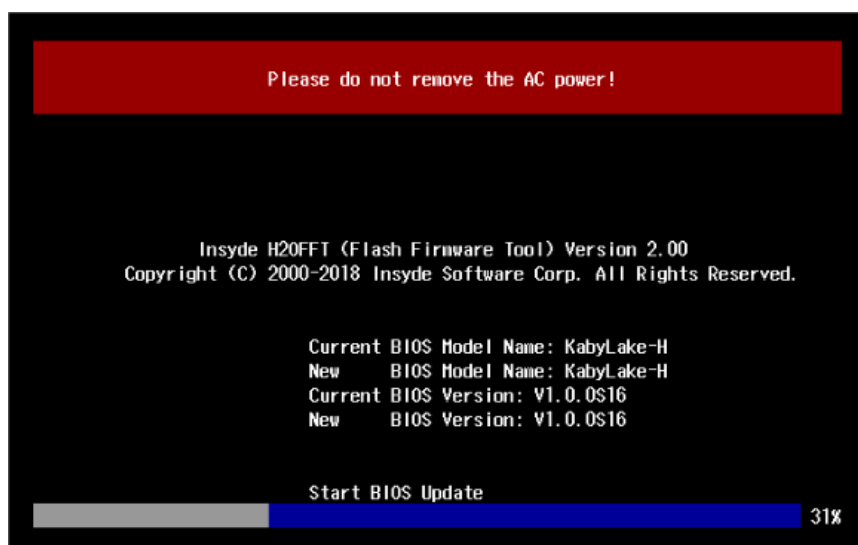
2. Select the USB disk to boot from.

3. In the SHELL environment console, type fs0:, then go to the directory where the upgrade file is located and type xxxxxx.efi (the name of the file is based on the upgrade file you get from Moxa).
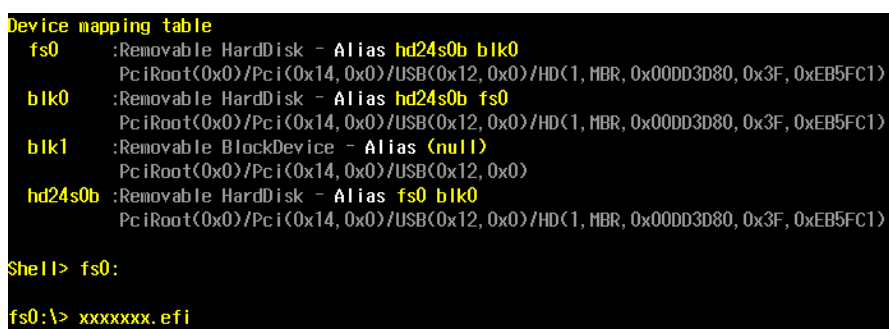
4. The upgrade program will run automatically. Wait for the process to complete.

5. When the upgrade is done, the computer will automatically reboot. You can check the BIOS version on the Main page.
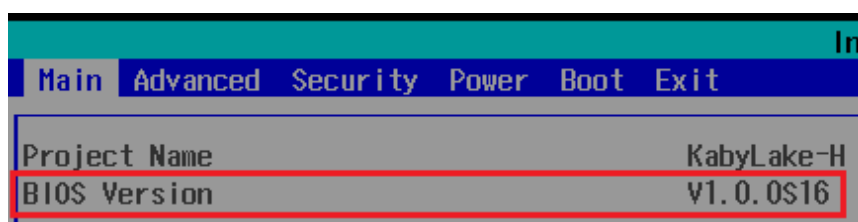
If the system has more than one boot device, you will see more than one fsx (x represents the number of devices).

```
EFI Shell version 2.50 [22281.4149]
Current running mode 1.1.2
Device mapping table
  fs0    :HardDisk - Alias hd33e0a2 blk0
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)/HD(2,GPT,0AC3B829-99B0-4FDE-844D-8A10C1D55C6C,0xFA000,0x32000)
  fs1    :Removable HardDisk - Alias hd25r0b blk1
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x11,0x0)/HD(1,MBR,0x00DD3D80,0x3F,0xEB5FC1)
  fs2    :Removable BlockDevice - Alias f25s0 blk2
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x12,0x0)
  blk0   :HardDisk - Alias hd33e0a2 fs0
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)/HD(2,GPT,0AC3B829-99B0-4FDE-844D-8A10C1D55C6C,0xFA000,0x32000)
  blk1   :Removable HardDisk - Alias hd25r0b fs1
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x11,0x0)/HD(1,MBR,0x00DD3D80,0x3F,0xEB5FC1)
  blk2   :Removable BlockDevice - Alias f25s0 fs2
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x12,0x0)
  blk3   :HardDisk - Alias (null)
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)/HD(1,GPT,5796BAEF-EC3F-447F-B4F1-21EB08DC5D57,0x800,0xF9800)
  blk4   :HardDisk - Alias (null)
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)/HD(3,GPT,7C8FF3C6-53E8-4CF9-8141-65DF7EF04399,0x12C000,0x8000)
  blk5   :HardDisk - Alias (null)
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)/HD(4,GPT,1AABAECE-BE17-4C27-AF60-E6C69977AC02,0x134000,0x3A6E800)
  blk6   :BlockDevice - Alias (null)
          PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x4,0x0,0x0)
  blk7   :Removable BlockDevice - Alias (null)
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x11,0x0)
```

6. Access each device path **fsx** (x is the device index), then type **ls** to view the content of the boot device until you locate the upgrade file and run it.

```
fs0:\> fs1:

fs1:\> ls
Directory of: fs1:\

06/27/19  11:43a <DIR>           16,384  efi
06/13/19  11:10a            17,974,704  820C100S16 efi
          1 File(s)  17,974,704 bytes
          1 Dir(s)
```

⚠️ **ATTENTION**

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

A. Safety Installation Instructions

A. RTC Battery Warning

> ⚠️ **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 battery is replaced by an incorrect type. Dispose of used batteries according to the instructions on the battery.

B. Fuse Warning

CAUTION: For continued protection against fire, replace only with fuse of the same type and rating.

C. Rack-mounting Warning

The following or similar rack-mounting instructions are included with the installation instructions:

(1) Elevated Operating Ambient: If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

(2) Reduced Air Flow: Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

(3) Mechanical Loading: Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

(4) Circuit Overloading: Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

(5) Reliable Grounding: Reliable grounding of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., by using power strips).