



®

AXIOMTEK

eBOX710-521-FL Series

Embedded System

User's Manual



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JAN 2020, Version A1

Printed in Taiwan

Safety Precautions

Before getting started, please read the following important safety precautions.

1. The eBOX710-521-FL does not come with an operating system which must be loaded first before installation of any software into the computer.
2. Be sure to ground yourself to prevent static charge when installing any internal components. Use a wrist grounding strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
3. Disconnect the power cord from the eBOX710-521-FL prior to making any installation. Be sure both the system and all external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the eBOX710-521-FL is properly grounded.
4. Make sure the voltage of the power source is correct before connecting it to any power outlet.
5. Turn Off system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.
6. Do not leave equipment in an uncontrolled environment where the storage temperature is below -40°C or above 80°C as it may damage the equipment.
7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:
 - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help discharge any static electricity on human body.
 - When handling boards and components, wear a wrist grounding strap available from most electronic component stores.
8. Caution:

Risk of explosion if battery is replaced by an incorrect type Dispose of used batteries according to the instructions.

IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST
REPLACEE
PER UNE BATTERIE DE TYPE INCORRECT.
METTRE AU REBUT LES BATTERIES USAGEES
CONFORMEMENT AUX INSTRUCTIONS
9. Warning:

Hot Surface Do Not Touch.

Restricted access locations: The equipment should only be installed in a Restricted Access Area.

Classifications

1. Degree of protection against electric shock: not classified
2. Degree of protection against ingress of water: IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.
4. Mode of operation: Continuous

General Cleaning Tips

Please keep the following precautions in mind while understanding the details fully before and during any cleaning of the computer and any components within.

A piece of dry cloth is ideal to clean the device.

1. Be cautious of any tiny removable components when using a vacuum cleaner to absorb dirt on the floor.
2. Turn the system off before cleaning up the computer or any components within.
3. Avoid dropping any components inside the computer or getting circuit board damp or wet.
4. For cleaning, be cautious of all kinds of cleaning solvents or chemicals which may cause allergy to certain individuals.
5. Keep foods, drinks or cigarettes away from the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning computer and peripherals, users can also use house hold items accordingly for cleaning. Listed below are items available for cleaning computer or computer peripherals.

Pay special attention to components requiring designated products for cleaning as mentioned below.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, it is recommended to use a piece of cloth.
- Water or rubbing alcohol: A piece of cloth may be somewhat moistened with water or rubbing alcohol before being rubbed on the computer. Unknown solvents may be harmful to plastic parts.
- Absorb dust, dirt, hair, cigarette and other particles outside of a computer can be one of the best methods of cleaning a computer. Over time these items may restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are applicable to reach areas in keyboard, mouse and other areas.
- Foam swabs: If possible, it is better to use lint free swabs such as foam swabs.



【Note】 : *It is strongly recommended that customer should shut down the system before starting to clean any single components.*

Please follow the steps below:

1. Close all application programs;
2. Close operating software;
3. Turn off power switch;
4. Remove all devices;
5. Pull out power cable.

Scrap Computer Recycling

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order.

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SECTION 1 INTRODUCTION



This section contains general information and detailed specifications of the eBOX710-521-FL. Section 1 consists of the following sub-sections:

- General Descriptions
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

1.1 General Descriptions

The eBOX710-521-FL is a high performance Fanless Expandable System that features the 9th/8th generation Intel® Xeon® & Core™ i7/i5/i3 & Celeron® processors (35W). It comes with an IP40-rated heavy-duty aluminum extrusion design, offers 24V DC power input with power protection and supports -40°C to +70°C extended temperature range, thus enabling reliable operation in harsh environments.

To minimize deployment time, eBOX710-521-FL supports one flexible I/O window for customers to easily install additional I/O output. It also supports multiple I/O connections including 6 USB 3.2 ports, 2 COM ports, 6 GbE ports, plus 2 SIM sockets are provided for remarkable mobile availability. It is making perfectly suitable for intelligent factory, machine vision, and edge computing applications.

Features

- 9th/8th generation Intel® Xeon & Core™ i7/i5/i3 & Celeron® processors 35 watt with Intel® C246 PCH
- Dual swappable 2.5" SATA HDD drive bay with RAID 0/1 supported
- ECC SO-DIMM memory supported , up to 64GB
- DVI-I, HDMI, and DisplayPort with triple-view supported
- One PCIe x4 expansion slot supported
- TPM 2.0 onboard
- AXView 3.0 intelligent embedded monitoring software ready

Reliable and Stable Design

The embedded system supports 9th/8th generation Intel® Xeon® & Core™ i7/i5/i3 and Celeron® 35 watt processors, along with high flexibility and multi-functional design that make it the best solution for smart factory applications.

Flexible Connectivity

The eBOX710-521-FL-DC-6GbE comes with rich I/O interfaces including two RS-232/422/485 ports, six USB 3.2 ports, six GbE ports, triple display and flexible I/O window supported.

Embedded O.S. Supported

The eBOX710-521-FL with 9th/8th generation platform supports Windows® 10, Windows® 10 IoT and various Linux versions.

Various Storage Supported

In terms of storage, the eBOX710-521-FL supports two swappable 2.5" SATA storage drive bay and one mSATA device.

1.2 System Specifications

1.2.1 CPU

- **CPU(Xeon®)**
 - Intel® Xeon® E-2278GEL Processor (35W)
- **CPU (9th gen)**
 - LGA1151 9th gen Intel® Core™ i7/i5/i3 & Celeron® processors (35W)
 - Intel® Core™ i7-9700TE Processor
 - Intel® Core™ i5-9500TE Processor
 - Intel® Core™ i3-9100TE Processor
 - Intel® Celeron® G4930T
- **CPU (8th gen)**
 - LGA1151 8th gen Intel® Core™ i7/i5/i3 & Celeron® processors (35W)
 - Intel® Core™ i7-8700T, 35W processor
 - Intel® Core™ i5-8500T, 35W processor
 - Intel® Core™ i3-8100T, 35W processor
 - Intel® Pentium® G5400T, 35W processor
 - Intel® Celeron® G4900T, 35W processor
- **Chipset**
 - Intel® C246
- **BIOS**
 - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
- **System Memory**
 - 2 x 260-pin DDR4-2666 SO-DIMM, up to 64GB
 - ECC Memory supported

1.2.2 I/O System

- **Display**
 - 1 x HDMI 1.4 (3840 x 2160@30 Hz)
 - 1 x DisplayPort 1.2 (Resolution:4K/2K@60 Hz)
 - 1 x DVI-I (VGA: 1920 x1080@60 Hz; DVI-D: 1920 x1200@60 Hz)
- **Ethernet**
 - 6 x 10/100/1000 Ethernet ports (5 x i210IT, 1 x i219LM)
- **USB Ports**
 - 4 x USB 3.2 Gen 2
 - 2 x USB 3.2 Gen 1
- **Serial Ports**
 - 2 x RS-232/422/485 (COM1/2)
- **Expansion Interface**
 - 2 x Full-size PCI Express Mini Card Slots (USB + PCI Express signal)
 - 1 x PCIe x4 slot

- **Storage**
 - 2 x 2.5" swappable SATA HDD/SSD drive bay, up to 9.5mm height
 - RAID 0/1 supported via 2 x 2.5" SATA HDD/SSD
 - 1 x mSATA (enabled in BIOS setting)
- **Flexible I/O Window**
 - Default : 2 x DB9 half cut bracket
 - Optional I/O kits via mPCIe interface
- **Indicator**
 - 1 x Green LED as indicator for PWR status
 - 1 x Green LED as indicator for HDD active
 - 4 x Green LED as indicator for programmable
- **Switch**
 - 1 x ATX PWR switch
 - 1 x Remote PWR switch
 - 1 x AT/ATX Quick switch
 - 1 x Reset switch
- **Antenna & SIM**
 - 4 x SMA type connector openings for antenna
 - 2 x Internal SIM slot
- **TPM 2.0**
 - 1 x ST33HTPH2E32AHB4

1.2.3 System Specifications

- **Watchdog Timer**
 - 1~255 seconds or minutes; up to 255 levels.
- **Power Supply**
 - 24V DC input
- **Operation Temperature**
 - -40°C to 70°C (-40°F to +140°F) (with W.T. DRAM & SSD,CPU TDP 35W)
- **Storage Temperature**
 - -40°C ~+80°C (-40 °F ~ 158°F)
- **Humidity**
 - 10% ~ 95% (non-condensation)
- **Shock**
 - IEC 60068-2-27 (w/SSD: 50G@wall mount, half sine,11 ms duration)
- **Vibration Endurance**
 - IEC 60068-2-64 (w/SSD: 3Grms STD, random, 5 - 500 Hz,1 hr/axis)
- **Weight**
 - 4.8 kg (10.58 lb) without package
 - 5.6 kg (12.34 lb) with package
- **Dimension**
 - 280mm (11.02") (W) x 210mm (8.26") (D) x 80.5mm (3.16") (H)

1.2.4 Driver Contents

Please download the following eBOX710-521-FL drivers from Axiomtek official website.

- Ethernet
- Chipset
- Graphic
- Serial Port
- USB 3.1
- Intel® ME
- User Manual

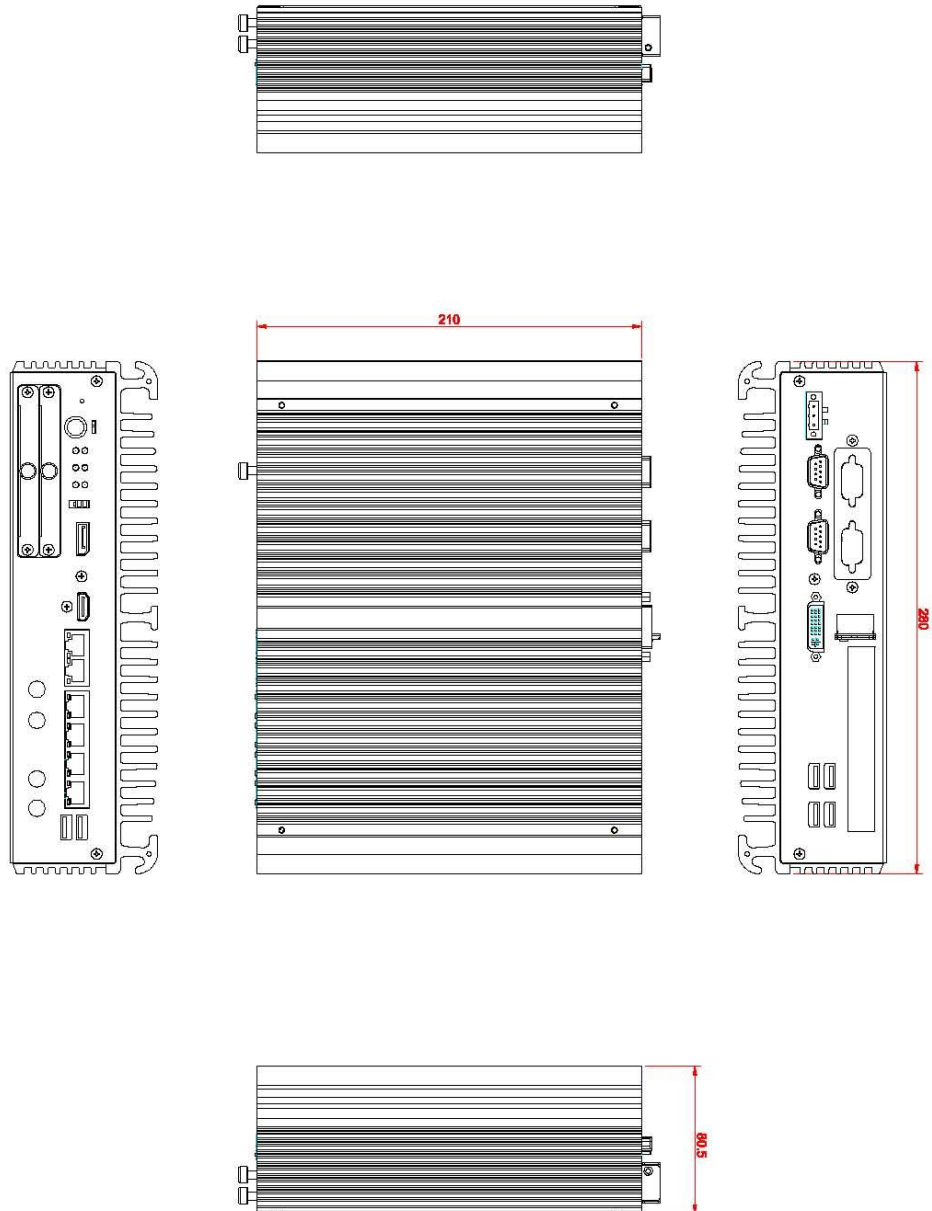


【Note】 : *All specifications and images are subject to change without notice.*

1.3 Dimensions

The following diagrams show dimensions and outlines of the eBOX710-521-FL.

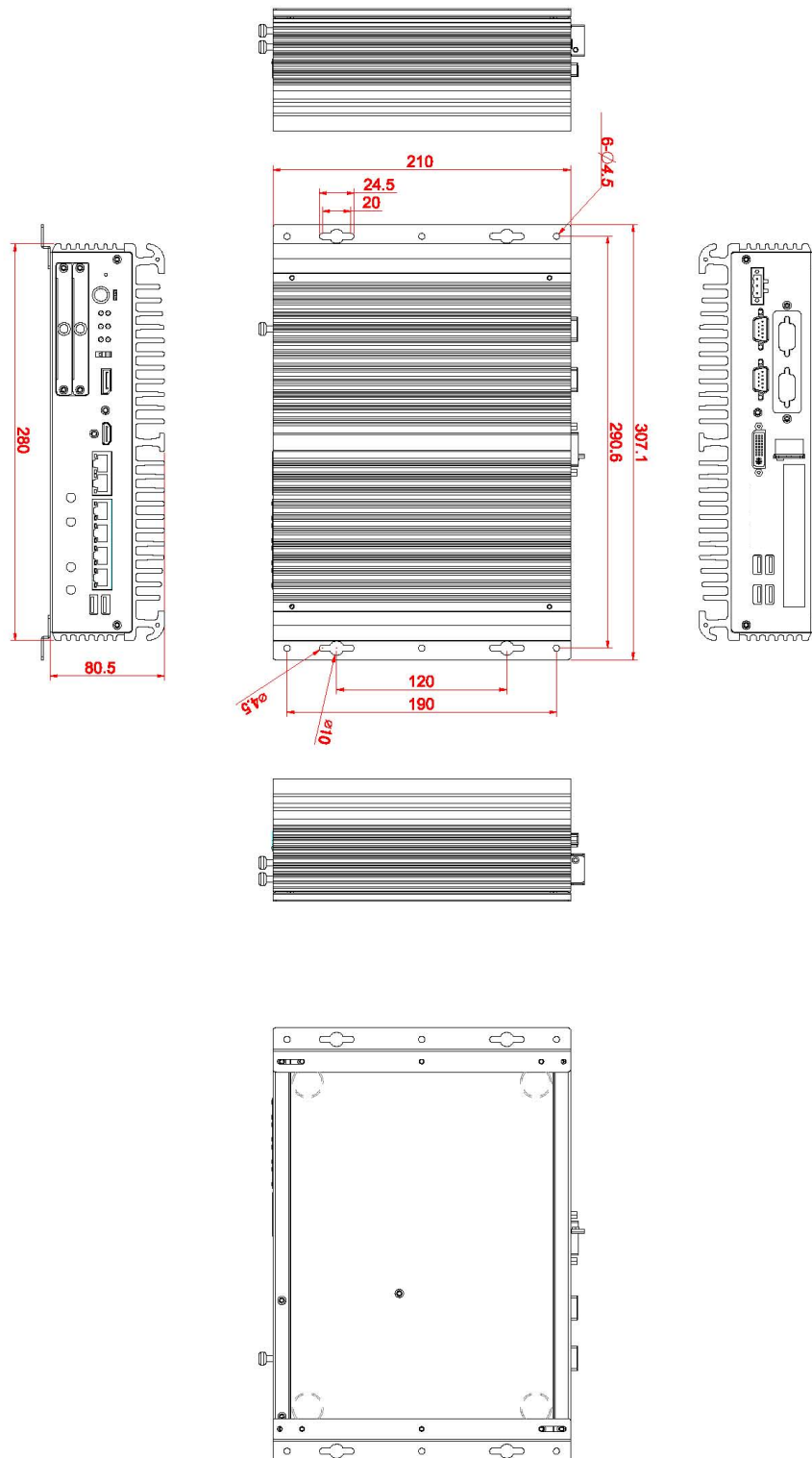
1.3.1 System Dimensions



1.3.2 Wall-mount Bracket Dimensions

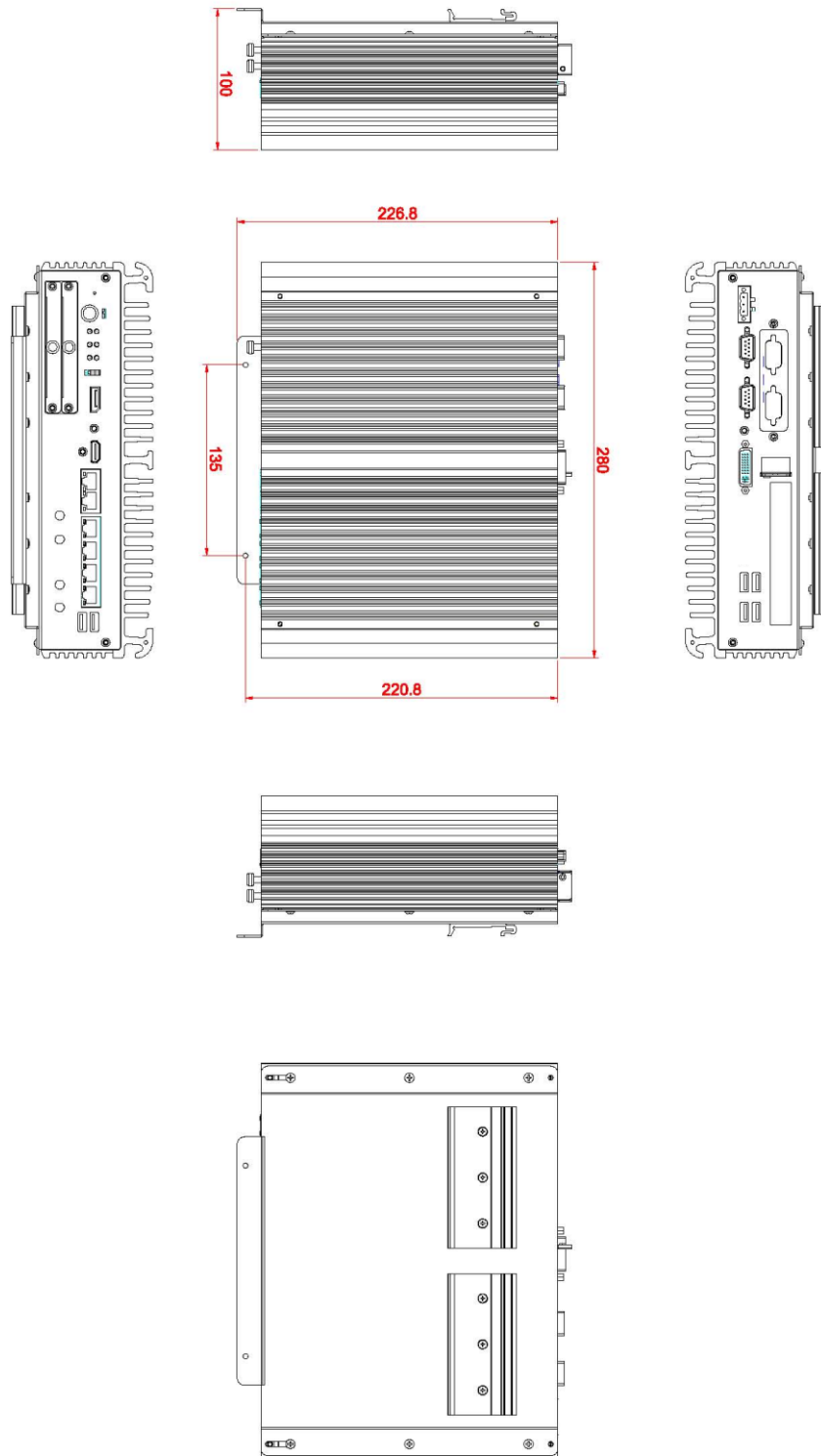
Users can get 6pcs truss head M3*6L screws for fixing the wall mount kit from the accessories box.

Note: When users install wall mount kit, please turn the LAN ports side outlet towards the floor.



1.3.3 Din-Rail Bracket Dimensions

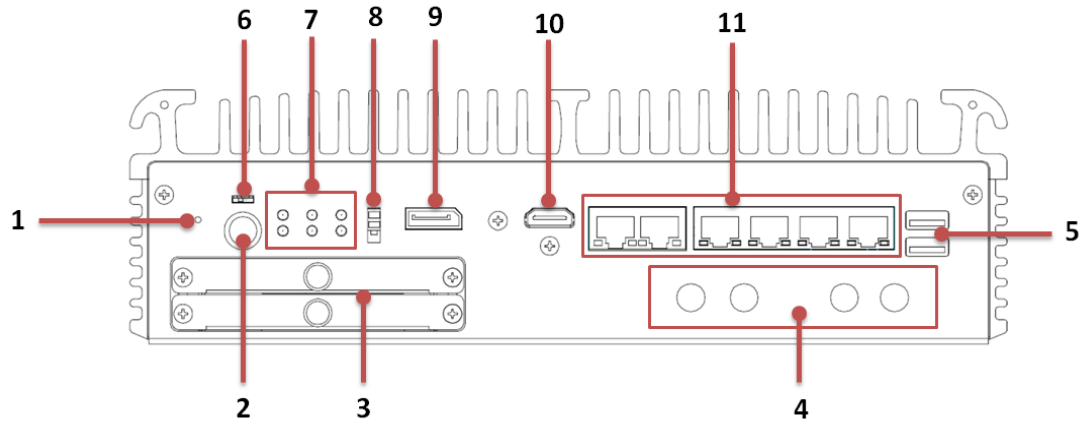
Users can get 6pcs truss head M3*6L screws for fixing the wall mount kit from the accessory box.



1.4 I/O Outlets

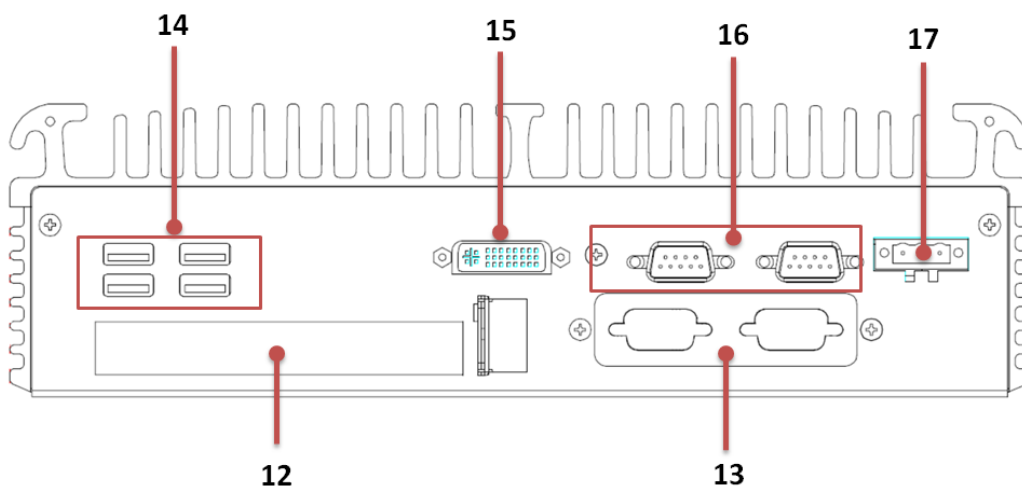
The following figures show I/O outlets on the eBOX710-521-FL.

Front View



| | | | |
|---|-------------------------|----|-------------------------|
| 1 | 1 x Reset button | 7 | System LEDs |
| 2 | 1 x Power button | 8 | 1 x Remote power switch |
| 3 | 2 x Swappable HDD tray | 9 | 1 x HDMI 1.4 |
| 4 | 4 x Antenna opening | 10 | 1 x DisplayPort 1.2 |
| 5 | 2 x USB 3.2 (Gen1) | 11 | 6 x GbE |
| 6 | 1 x AT/ATX quick switch | | |

Rear View



| | | | |
|-----------|----------------------------|-----------|----------------------------------|
| 12 | 1 x PCIe x4 slot | 15 | 1 x DVI-I |
| 13 | Flexible I/O window | 16 | 2 x RS232/422/485 (COM 1) |
| 14 | 4 x USB 3.2 (Gen2) | 17 | 24VDC power input |

1.5 Packing List

The eBOX710-521-FL comes with the following bundle package:

- eBOX710-521-FL System Unit x 1
- Thermal Grease x 1
- Terminal Block x 1
- Remote Switch Cable x 1
- Foot Pad x 4
- Screw Pack x 1

1.6 Model List

| | |
|------------------------|---|
| eBOX710-521-FL-DC-6GbE | Fanless Expandable System with LGA1151 9th/8th gen Intel® Intel® Xeon /Core™ i7/i5/i3 & Celeron® processor, Intel® C246, ECC memory and 1 PCIe x 4 expansion slot |
|------------------------|---|

Please contact Axiomtek's distributors immediately in case any abovementioned items are missing.

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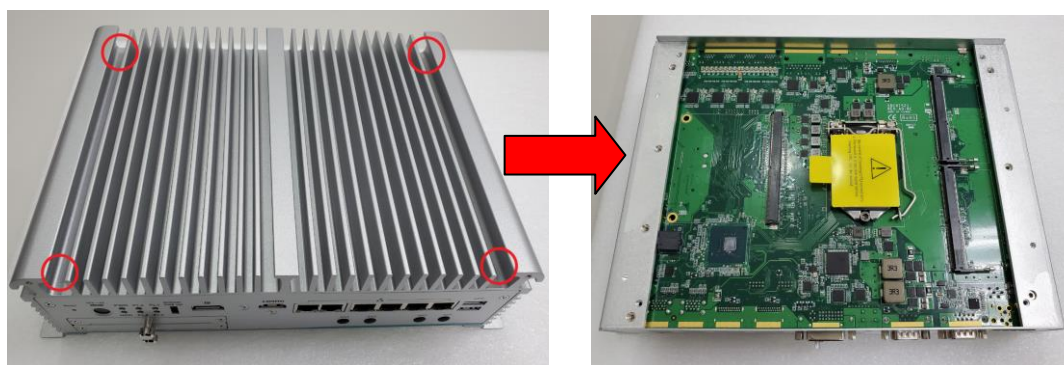
SECTION 2 HARDWARE INSTALLATION

The eBOX710-521-FL is convenient for various hardware configurations, such as CPU, DRAM, HDD (Hard Disk Drive), SSD (Solid State Drive), PCI Express Mini card modules and optional MXM graphic module. Section 2 contains guidelines for hardware installation.

2.1 Installation of CPU

Step 1 Turn off the system and unplug the power cord.

Step 2 Loosen four screws to remove top cover.



Step 3 Remove the warning label and disengage load lever.

- Disengage load lever by pushing its hook down and then pulling it slightly outward.
- Rotate load lever to open position at approximately 135°.
- Rotate load plate to open position at approximately 150°.



Note

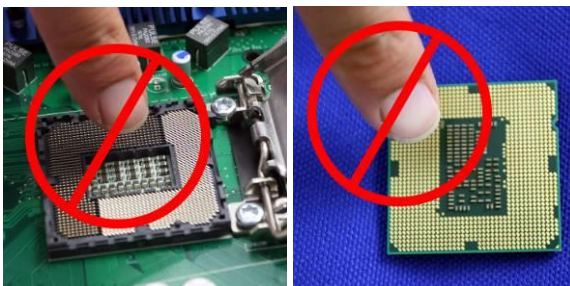
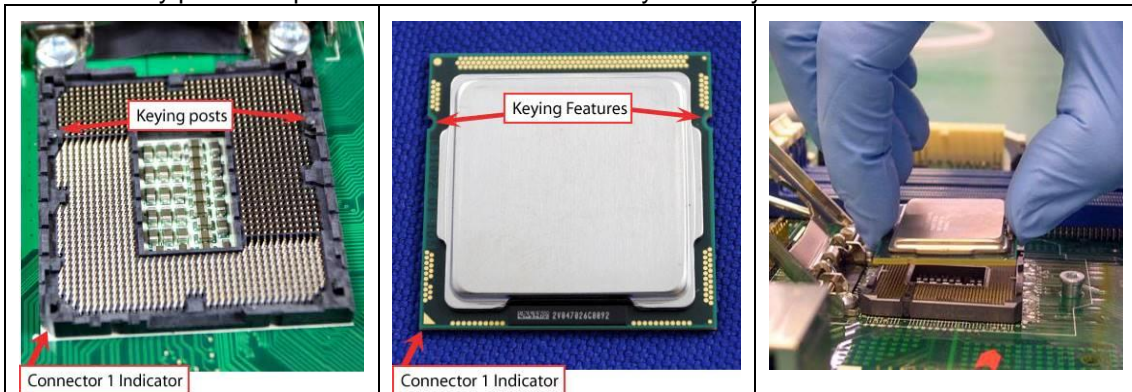
Apply pressure to corner with right-hand thumb when opening or closing load lever - otherwise lever will bounce back (as a mouse trap) causing bent contacts.

Step 4 CPU installation steps:

- Lift processor package from shipping media by grasping the substrate edges.



- Scan the processor package gold pads for any presence of foreign material.
- Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.
- Grasp the processor with thumb and index finger along the top and bottom edges. The socket will have cutouts for your fingers to fit into.
- Carefully place the processor into the socket body vertically.



Caution

Never touch fragile socket contacts to avoid damage and do not touch the processors sensitive contacts at any time during installation.

- Step 5** Align pins of the CPU with pin holes of the socket. While installing the CPU, pay attention to the CPU's orientation by aligning the arrow mark on the CPU with the arrow key on the socket.

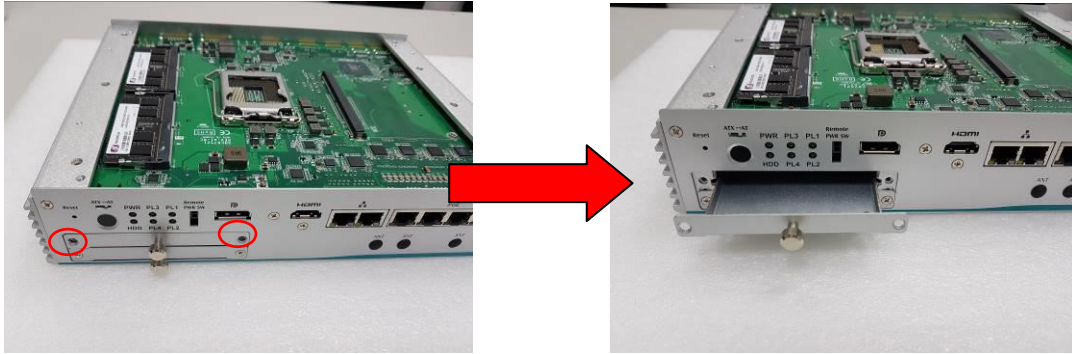


- Step 6** Put the top cover and fasten four screws back onto the system.

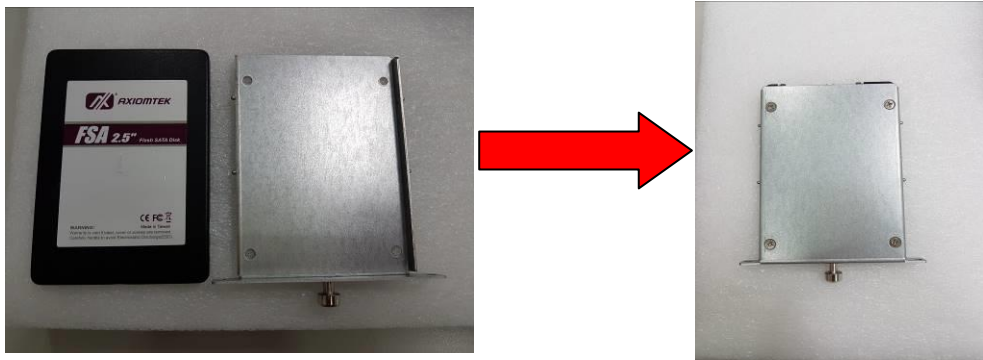
2.2 Installation of 2.5" SATA Device

Step 1 Turn off the system and unplug the power cord.

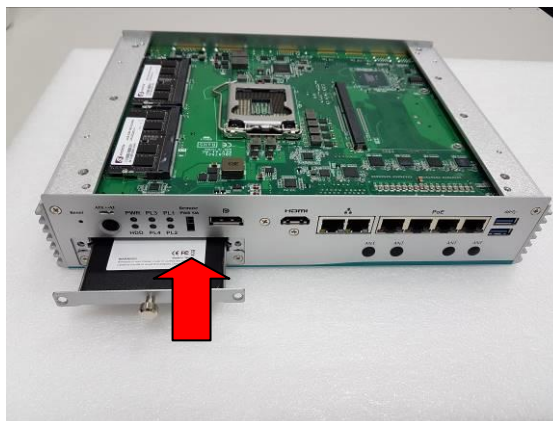
Step 2 Loosen two of the SATA drive tray's screws and extract the SATA HDD drive tray.



Step 3 Turn the SATA drive tray upside down to install SSD/HDD and then fasten the four HDD screws to secure the SATA drive tray.



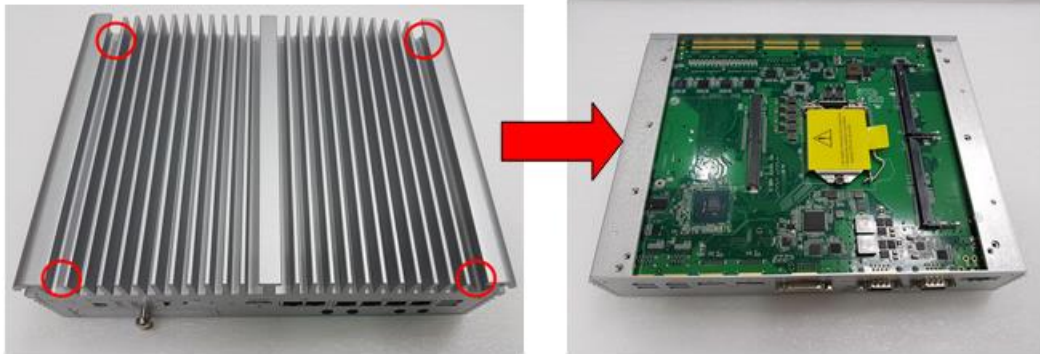
Step 4 Slide the SATA drive tray back into the system and fasten the screws firmly to complete the installation.



2.3 Installation of SO-DIMM

Step 1 Turn off the system and unplug the power cord.

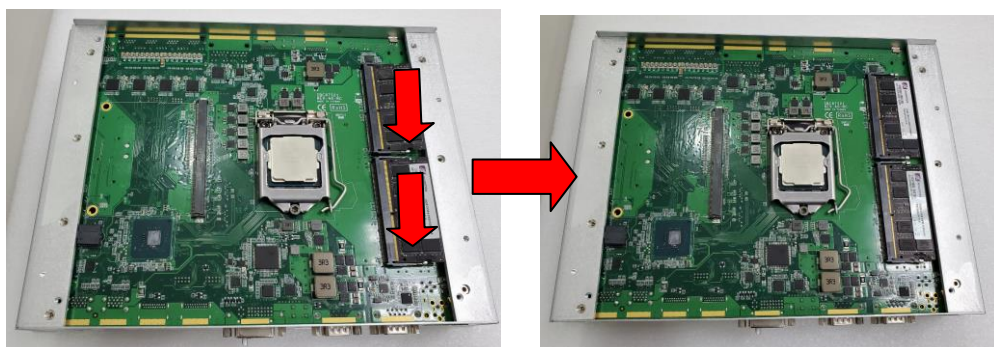
Step 2 Loosen four screws on the top heatsink which are used to fasten the heatsink to the chassis.



Step 3 Located the dual DDR4 SO-DIMM sockets on main board.



Step 4 Locate the memory module, insert a gold colored contact into the socket and push the module down until it is locked in place by the two end latches.

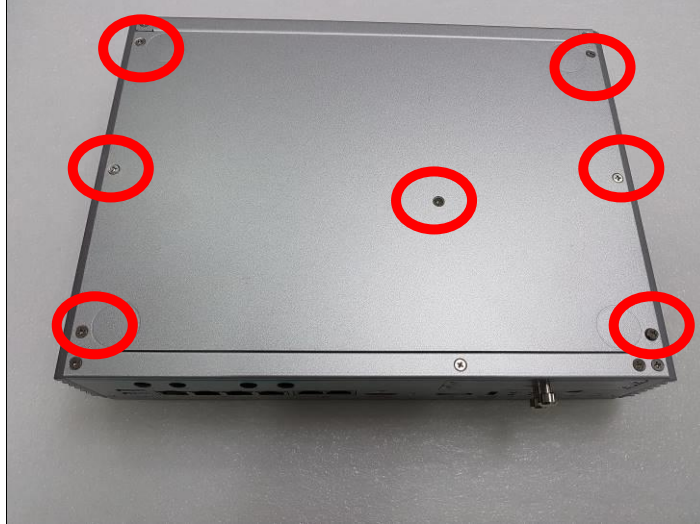


Step 5 Put the top cover back and fasten four screws back onto the system.

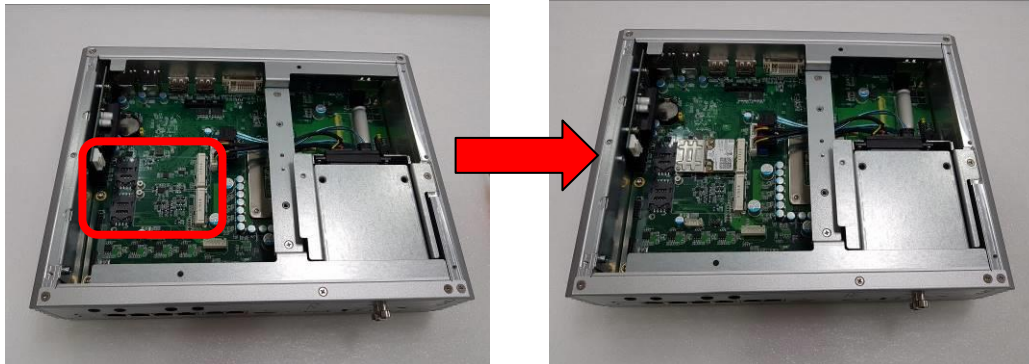
2.4 Installation of Mini PCIe Module (Full-size)

Step 1 Turn off the system and unplug the power cord.

Step 2 Turn the system upside down to locate screws at the bottom, and loosen all screws.



Step 3 Identify the two full-size mini PCIe slots, insert a mini PCIe module into one of the sockets and then fasten all screws.



Step 4 Put the bottom cover and fasten all screws back onto the system.

2.5 Installation of Flexible I/O Modules

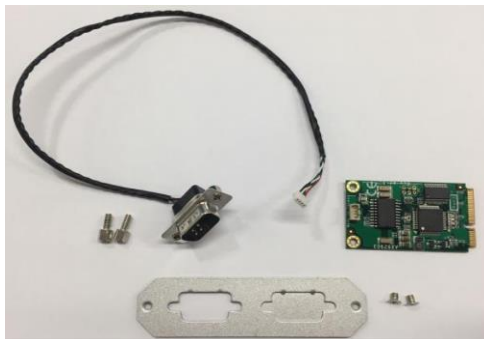
The eBOX710-521 provides an optional I/O window for customer to add flexible I/O kits via mPCIe interface. For details of the available modules listed below, please refer to their respective quick manuals.

- 1 x GbE Kit (RJ45*1)
- 32CH DIO Kit (DB32*1)
- 1 x CAN Bus/CAN Open Kit (DB9*1)
- 1 x Audio kit
- 2 x RS232 (COM3/4 via cable on flexible IO window)



Flexible IO Window for mPCIe IO kits
(Default: 2 x DB9 half cut bracket)

Steps 1 Prepare the optional flexible I/O kit as below photo shows.

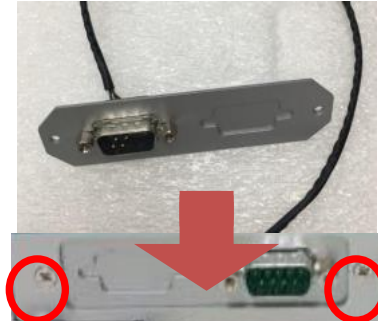


Step 2 Turn off the system and unplug the power cord.

Step 3 Loosen all screws to open the bottom cover and then insert the mPCIe module into one of the mPCIe slot.



Step 4 Assemble I/O cable to fix the I/O bracket then fasten dual screws of the Flexible I/O Window.

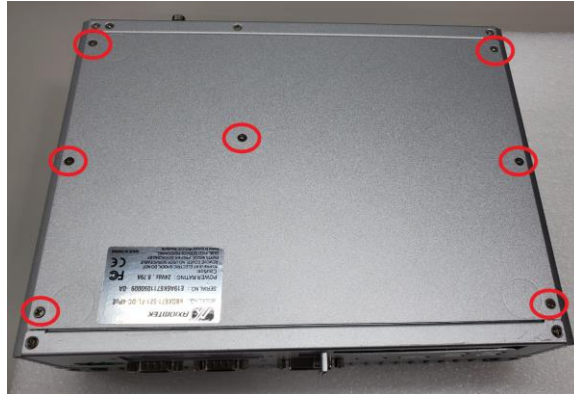


Step 5 Fasten the bottom cover with all screws onto the system.

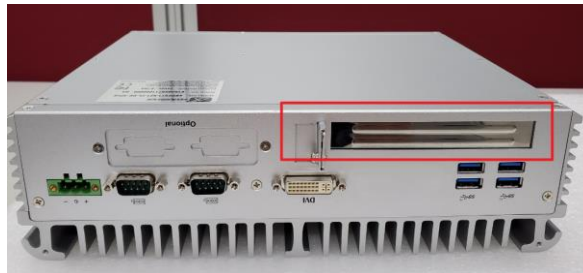
2.6 Installation of PCIe card

Step 1 Turn off the system

Step 2 Turn the system upside down to locate screws at the bottom, and then loosen all screws.



Step 3 Identify the location of the PCIe slot as below red marked.



Step 4 Loosen the screws of the slot bracket .



Step 5 Insert the PCIe card and fasten the screw of PCIe card adjustable bracket.



Step 6 Fasten the small bracket screw and put the bottom cover back onto the chassis.

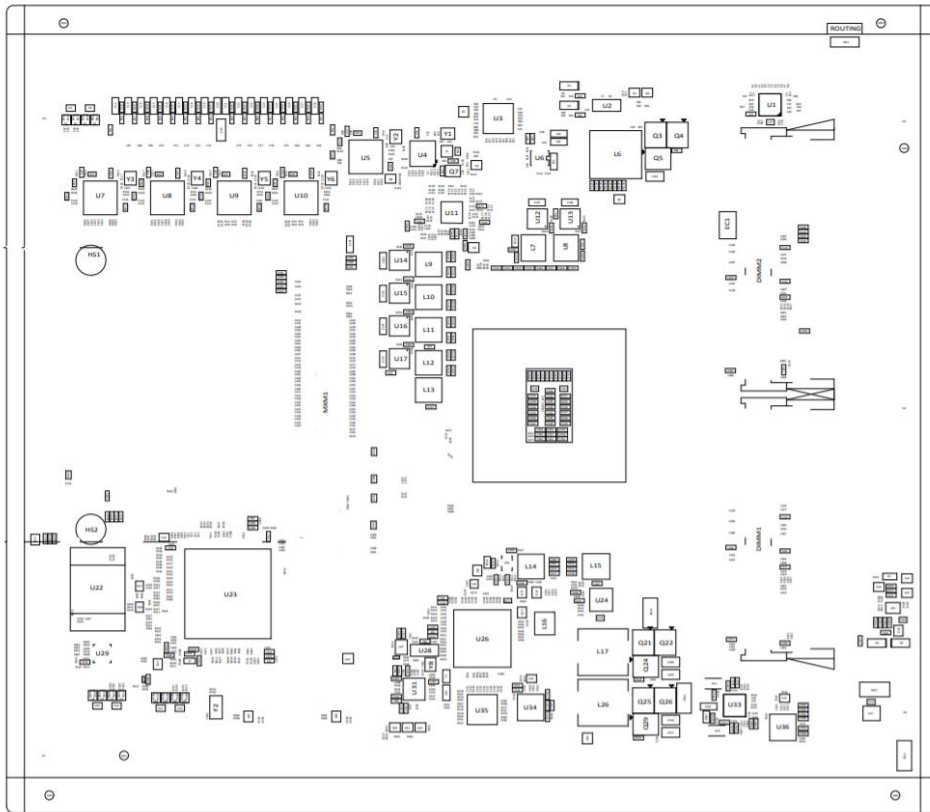


SECTION 3 JUMPER & CONNECTOR SETTINGS

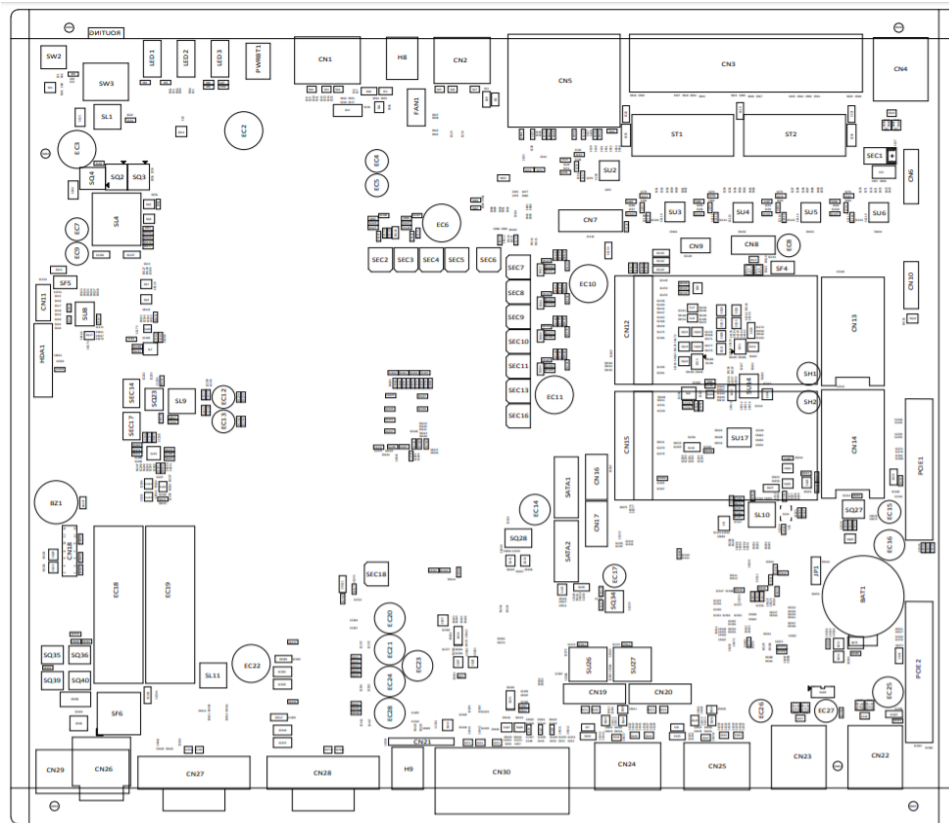
Proper jumper settings configure the eBOX710-521-FL to meet various application needs. Hereby all jumpers settings along with their default settings are listed for devices onboard.

3.1 Locations of Jumpers & Connectors

SBC87521 Top View



SBC87521 Bottom View



【Note】 : *It is strongly recommended that any unmentioned jumper settings should not be modified without instructions by Axiomtek FAEs. Any modifications without instructions might cause system failure.*

3.2 Summary of Jumper Settings

Proper jumper settings configure the eBOX710-521-FL to meet various application purposes. A table of all jumpers and their default settings is listed below.

| Jumpers | Descriptions | Settings |
|---------|--|-----------|
| JP1 | Restore BIOS Optimal Defaults Default: Normal Operation | Short 1-2 |



【Note】 : How to setup Jumpers

That a cap on a jumper is to “close” the jumper, whereas that offs a jumper is to “open” the jumper.



[Open]



[Closed]



[Pin1-2 Closed]

3.2.1 Restore BIOS Optimal Defaults (JP1)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. This procedure is to restore BIOS optimal defaults.

| Functions | Settings |
|------------------|----------|
| Normal (Default) | 1-2 |
| Clear RTC | 2-3 |

3.3 Connectors

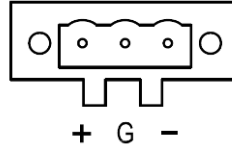
Please refer to below connector table to get their pin assignments.

| External Connectors | Sections |
|--|-----------------|
| DC-in Phoenix Power Connector | 3.3.1 |
| HDMI Connector | 3.3.2 |
| DisplayPort Connector | 3.3.3 |
| Serial Port Connector | 3.3.4 |
| USB 3.2 Connector | 3.3.5 |
| Ethernet Connector | 3.3.6 |
| DVI-I Connector | 3.3.7 |
| ATX Power On/Off Button | 3.3.8 |
| Rest Button | 3.3.9 |
| Remote Power Switch Connector | 3.3.10 |
| AT/ATX Quick Switch | 3.3.11 |
| Internal Connectors | Sections |
| SATA Signal Connector | 3.3.12 |
| SATA Power Connector | 3.3.13 |
| SIM Slot | 3.3.14 |
| Full-Size Express Mini Card slot (SCN12 & SCN15) | 3.3.15 |
| Optional Audio | 3.3.16 |
| Optional 8CH Digital IO | 3.3.17 |

3.3.1 DC-in Phoenix Power Connector (CN29)

The system supports 24V Phoenix DC-in connector for system power input.

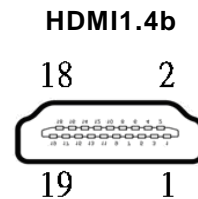
| Pins | Signals |
|------|---------|
| 1 | DC+ |
| 2 | GND |
| 3 | DC- |



3.3.2 HDMI Connector (CN2)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

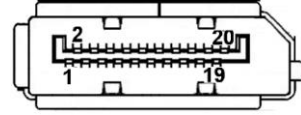
| Pins | Signals | Pins | Signals |
|------|-----------------|------|-----------------|
| 1 | HDMI OUT_DATA2+ | 11 | GND |
| 2 | GND | 12 | HDMI OUT Clock- |
| 3 | HDMI OUT_DATA2- | 13 | N.C. |
| 4 | HDMI OUT_DATA1+ | 14 | N.C. |
| 5 | GND | 15 | HDMI OUT_SCL |
| 6 | HDMI OUT_DATA1- | 16 | HDMI OUT_SDA |
| 7 | HDMI OUT_DATA0+ | 17 | GND |
| 8 | GND | 18 | +5V |
| 9 | HDMI OUT_DATA0- | 19 | HDMI_HTPLG |
| 10 | HDMI OUT Clock+ | | |



3.3.3 DisplayPort Connector (CN1)

eBOX710-521-FL supports one DisplayPort output.

| Pins | Signals | Pins | Signals |
|------|------------|------|------------|
| 1 | DPB_LANE0 | 11 | GND |
| 2 | GND | 12 | DPB_LANE3# |
| 3 | DPB_LANE0# | 13 | Detect Pin |
| 4 | DPB_LANE1 | 14 | GND |
| 5 | GND | 15 | DPB_AUX |
| 6 | DPB_LANE1# | 16 | GND |
| 7 | DPB_LANE2 | 17 | DPB_AUX# |
| 8 | GND | 18 | DPB_HPDE |
| 9 | DPB_LANE2# | 19 | GND |
| 10 | DPB_LANE3 | 20 | +3.3V |



3.3.4 Serial Port Connector (CN27,CN27)

The system has two serial ports. COM1~COM2 are RS-232/422/485 ports. Please refer to Chapter 4 for the detail of BIOS setting.

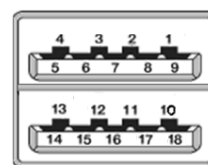
※COM1~2 (CN27,CN28)

| Pins | RS-232 | RS-422 | RS-485 |
|------|--------------------------|--------|--------|
| 1 | DCD, Data Carrier Detect | TX- | Data- |
| 2 | RXD, Receive Data | TX+ | Data+ |
| 3 | TXD, Transmit Data | RX+ | No use |
| 4 | DTR, Data Terminal Ready | RX- | No use |
| 5 | GND, Ground | No use | No use |
| 6 | DSR, Data Set Ready | No use | No use |
| 7 | RTS, Request To Send | No use | No use |
| 8 | CTS, Clear To Send | No use | No use |
| 9 | RI, Ring Indicator | No use | No use |

3.3.5 USB 3.2 Connector

The system has six USB port, four port compliant with USB 3.1 gen2 (10GB/s), two port compliant with USB 3.1 gen1 (5GB/s), and ideally for installing USB peripherals such as scanner, camera and USB devices, etc.

| Pins | Signal USB Port 0 | Pins | Signal USB Port 1 |
|------|-----------------------------------|------|-----------------------------------|
| 1 | USB_VCC (+5V level standby power) | 10 | USB_VCC (+5V level standby power) |
| 2 | USB_Data- | 11 | USB_Data- |
| 3 | USB_Data+ | 12 | USB_Data+ |
| 4 | GND | 13 | GND |
| 5 | SSRX- | 14 | SSRX- |
| 6 | SSRX+ | 15 | SSRX+ |
| 7 | GND | 16 | GND |
| 8 | SSTX- | 17 | SSTX- |
| 9 | SSTX+ | 18 | SSTX+ |



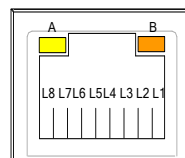
※ **CN22**、**CN23** are **USB3.2 Gen2**

※ **CN4** is **USB3.2 Gen1**

3.3.6 Ethernet Connector (LAN1~LAN6)

The board has six RJ-45 connectors: LAN1 is designed by Intel i219LM and LAN2 to LAN6 are Intel i210-IT.

| Pins | LAN Signal | Pins | LAN Signal |
|------|---|------|------------|
| L1 | MDI0+ | L5 | MDI2+ |
| L2 | MDI0- | L6 | MDI2- |
| L3 | MDI1+ | L7 | MDI3+ |
| L4 | MDI1- | L8 | MDI3- |
| A | Activity link LED(Yellow) OFF: No link Blinking: Link established; data activity detected | | |
| B | Speed LED OFF: 10Mbps data rate Green: 100Mbps data rate Orange: 1GMbps data rate | | |



3.3.7 DVI-I Connector (CN30)

DVI-I (integrated, combines digital and analog in the same connector; digital may be single or dual link) provides transmission of fast and high quality digital video between source device (graphic card) and display device.

| Pin | Signal | Pin | Signal |
|-----|---------------|-----|------------------------|
| 1 | DVI_DATA2- | 2 | DVI_DATA2+ |
| 3 | GND | 4 | N.C. |
| 5 | N.C. | 6 | DVI_SPC |
| 7 | DVI_SPD | 8 | N.C. |
| 9 | DVI_DATA1- | 10 | DVI_DATA1+ |
| 11 | GND | 12 | N.C. |
| 13 | N.C. | 14 | +5V |
| 15 | GND | 16 | DVI_HTPLG |
| 17 | DVI_DATA0- | 18 | DVI_DATA0+ |
| 19 | GND | 20 | N.C. |
| 21 | N.C. | 22 | GND |
| 23 | DVI_CLK+ | 24 | DVI_CLK- |
| C1 | Analog red | C2 | Analog green |
| C3 | Analog blue | C4 | Analog horizontal sync |
| C5 | Analog ground | | |



3.3.8 ATX Power on/off (SW3)

The ATX power button is on the I/O side. It can allow users to control eBOX710-521-FL power on/off.

| Functions | Descriptions |
|-----------|--------------------|
| On | Turn on/off system |
| Off | Keep system status |



3.3.9 Reset Button (SW2)

The Reset button can allow users to reset eBOX710-521-FL system.

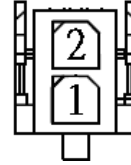
| Functions | Descriptions |
|-----------|--------------------|
| On | Reset system |
| Off | Keep system status |



3.3.10 Remote Power Switch Connector (PWRBT1)

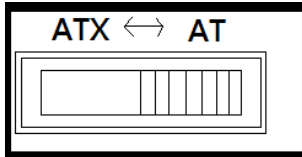
One 2-pin connector output for remote power on/off switch.

| Functions | Descriptions |
|------------|--------------------|
| Short(1-2) | Turn on/off system |
| Open | Keep system status |



3.3.11 AT/ATX Switch

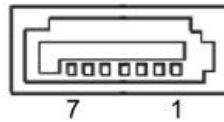
If you set AT/ATX switch to AT mode, the system will automatically power on without pressing soft power button during power input; We can use this switch to achieve auto power on demand.



3.3.12 SATA Connector (SATA 1 & 2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives. This board has two SATA 3.0 ports with 6Gb/s performance.

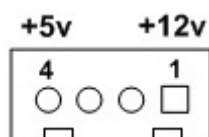
| Pins | Signals |
|------|----------|
| 1 | GND |
| 2 | SATA_TX+ |
| 3 | SATA_TX- |
| 4 | GND |
| 5 | SATA_RX- |
| 6 | SATA_RX+ |
| 7 | GND |



3.3.13 SATA Power Connector (CN16,CN17)

Based on CN19 · CN17 to offer the SATA power for SATA 2.5" HDD/SSD.

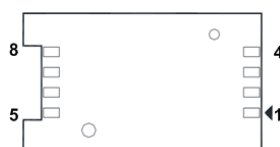
| Pins | Signals |
|------|------------|
| 1 | +12V level |
| 2 | GND |
| 3 | GND |
| 4 | +5V level |



3.3.14 SIM Card Slots (CN13,CN14)

The eBOX710-521-FL includes two SIM slots (SCN1) on the bottom side of the system for inserting the SIM card. It is mainly used in 3G/LTE wireless network application on SCN13 and SCN14.

| Pins | Signals |
|------|---------|
| 1 | PWR |
| 2 | RST |
| 3 | CLK |
| 4 | NC |
| 5 | GND |
| 6 | VPP |
| 7 | I/O |
| 8 | NC |



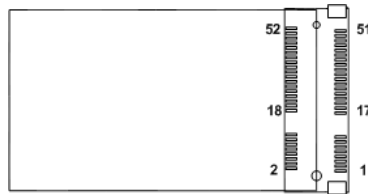
3.3.15 Full-Size PCI Express Mini Card Slot (CN12,CN15)

The eBOX710-521-FL supports dual full-size PCI-Express Mini Card slots. CN12 is applying to either PCI-Express or USB 2.0 signal, and complies with PCI-Express Mini Card Spec. V1.2.

CN15 is applies to PCI-Express or SATA (mSATA) via BIOS selection and USB signals; PCI-Express complies with PCI-Express Mini Card Spec. V1.2. Thus, users can install mSATA or WLAN/WWAN card into this slot. Please refer to the SATA of BIOS setting to enable or disable mSATA support.

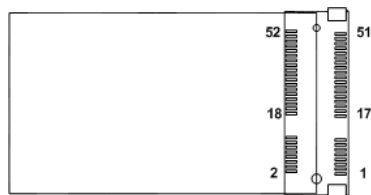
CN12

| Pins | Signals | Pins | Signals |
|------|----------|------|------------|
| 1 | WAKE# | 2 | +3.3VSB |
| 3 | No use | 4 | GND |
| 5 | No use | 6 | +1.5V |
| 7 | CLKREQ# | 8 | No use |
| 9 | GND | 10 | No use |
| 11 | REFCLK- | 12 | No use |
| 13 | REFCLK+ | 14 | No use |
| 15 | GND | 16 | No use |
| 17 | No use | 18 | GND |
| 19 | No use | 20 | W_DISABLE# |
| 21 | GND | 22 | PERST# |
| 23 | PE_RXN3/ | 24 | +3.3VSB |
| 25 | PE_RXP3/ | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PE_TXN3/ | 32 | SMB_DATA |
| 33 | PE_TXP3/ | 34 | GND |
| 35 | GND | 36 | USB_D8- |
| 37 | GND | 38 | USB_D8+ |
| 39 | +3.3VSB | 40 | GND |
| 41 | +3.3VSB | 42 | No use |
| 43 | GND | 44 | No use |
| 45 | No use | 46 | No use |
| 47 | No use | 48 | +1.5V |
| 49 | No use | 50 | GND |
| 51 | No use | 52 | +3.3VSB |



CN15

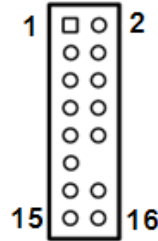
| Pins | Signals | Pin | Signals |
|------|----------------|-----|------------|
| 1 | WAKE# | 2 | +3.3VSB |
| 3 | No use | 4 | GND |
| 5 | No use | 6 | +1.5V |
| 7 | CLKREQ# | 8 | No use |
| 9 | GND | 10 | No use |
| 11 | REFCLK- | 12 | No use |
| 13 | REFCLK+ | 14 | No use |
| 15 | GND | 16 | No use |
| 17 | No use | 18 | GND |
| 19 | No use | 20 | W_DISABLE# |
| 21 | GND | 22 | PERST# |
| 23 | PE_RXN3/mSATA | 24 | +3.3VSB |
| 25 | PE_RXP3/mSATA | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PE_TXN3/ mSATA | 32 | SMB_DATA |
| 33 | PE_TXP3/ mSATA | 34 | GND |
| 35 | GND | 36 | USB_D8- |
| 37 | GND | 38 | USB_D8+ |
| 39 | +3.3VSB | 40 | GND |
| 41 | +3.3VSB | 42 | No use |
| 43 | GND | 44 | No use |
| 45 | No use | 46 | No use |
| 47 | No use | 48 | +1.5V |
| 49 | No use | 50 | GND |
| 51 | No use | 52 | +3.3VSB |



3.3.16 Intel® HD Audio Digital Header (HDA1)(Optional)

This is a 2x8-pin header for connecting external HD Audio board (AX93242).

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | BCLK | 2 | GND |
| 3 | RST# | 4 | N.C |
| 5 | SYNC | 6 | GND |
| 7 | SDO | 8 | +3.3S |
| 9 | SDIO | 10 | +12VS |
| 11 | N.C | 12 | |
| 13 | N.C | 14 | N.C |
| 15 | N.C | 16 | GND |

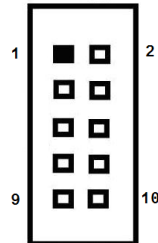


3.3.17 Digital I/O (CN11) (optional)

The system is equipped with 8bit programmable Digital I/O, Please refer to the following table to get default pin define. Default is 4in/4out.

The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

| Pins | Signals | Pins | Signals |
|------|---------|------|---------|
| 1 | Dout | 2 | Din |
| 3 | Din | 4 | Dout |
| 5 | Dout | 6 | Din |
| 7 | Din | 8 | Dout |
| 9 | +5V | 10 | GND |



SECTION 4 BIOS SETUP UTILITY

This section provides users with detailed descriptions in terms of how to set up basic system configurations through the BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the key immediately.
2. After press the key, the main BIOS setup menu displays. Users can access to other setup screens, such as the Advanced and Chipset menus, from the main BIOS setup menu.

It is strongly recommended that users should avoid changing the chipset's defaults. Both AMI and system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

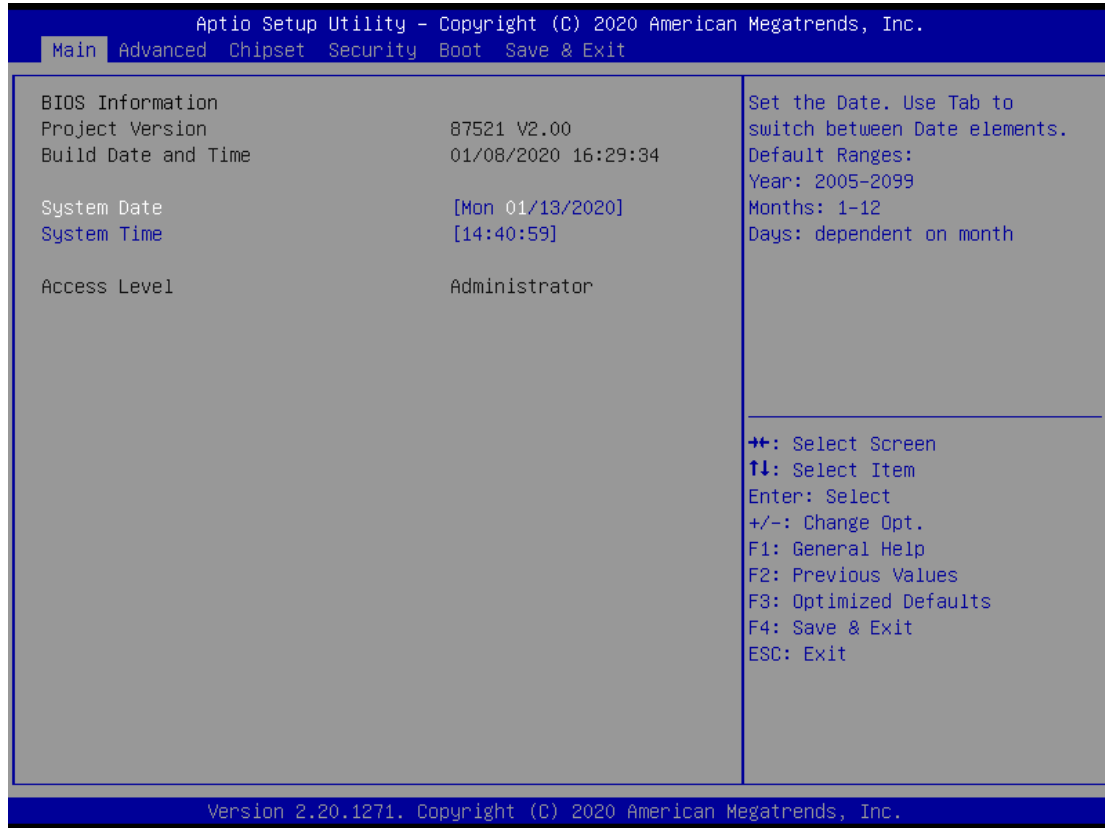


【Note】 : Some of the navigation keys differ from one screen to another.

| Hot Keys | Descriptions |
|---------------|--|
| →← Left/Right | The Left and Right <Arrow> keys allow users to select a setup screen. |
| ↑↓ Up/Down | The Up and Down <Arrow> keys allow users to select a setup screen or sub-screen. |
| +– Plus/Minus | The Plus and Minus <Arrow> keys allow users to change the field value of a particular setup item. |
| Tab | The <Tab> key allows users to select setup fields. |
| F1 | The <F1> key allows users to display the General Help screen. |
| F2 | The <F2> key allows users to Load Previous Values. |
| F3 | The <F3> key allows users to Load Optimized Defaults. |
| F4 | The <F4> key allows users to save any changes they made and exit the Setup. Press the <F4> key to save any changes. |
| Esc | The <Esc> key allows users to discard any changes they made and exit the Setup. Press the <Esc> key to exit the setup without saving any changes. |
| Enter | The <Enter> key allows users to display or change the setup option listed for a particular setup item. The <Enter> key can also allow users to display the setup sub- screens. |

4.3 Main Menu

The Main Menu screen is the first screen users see when entering the setup utility. Users can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is also shown below.



BIOS Information

Display the auto-detected BIOS information.

System Language

Choose the system default language.

System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Access Level

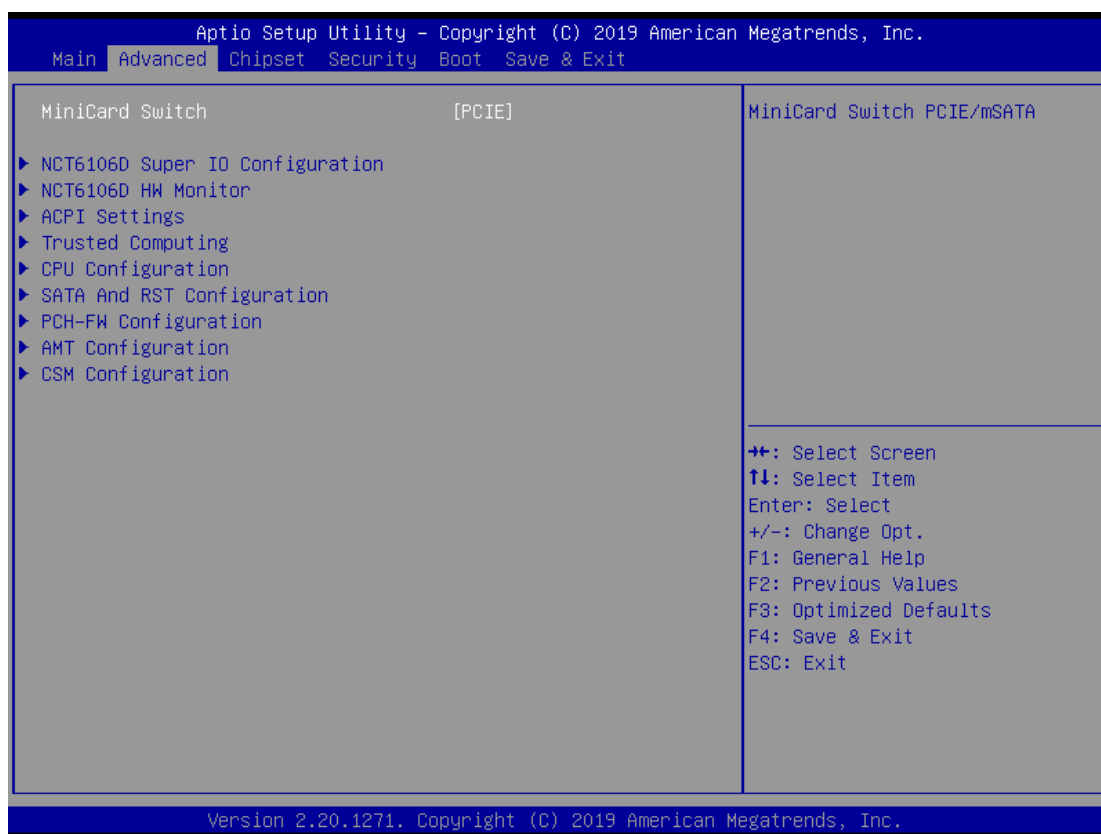
Display the access level of current user.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. Users can select any items in the left frame of the screen to go to sub menus:

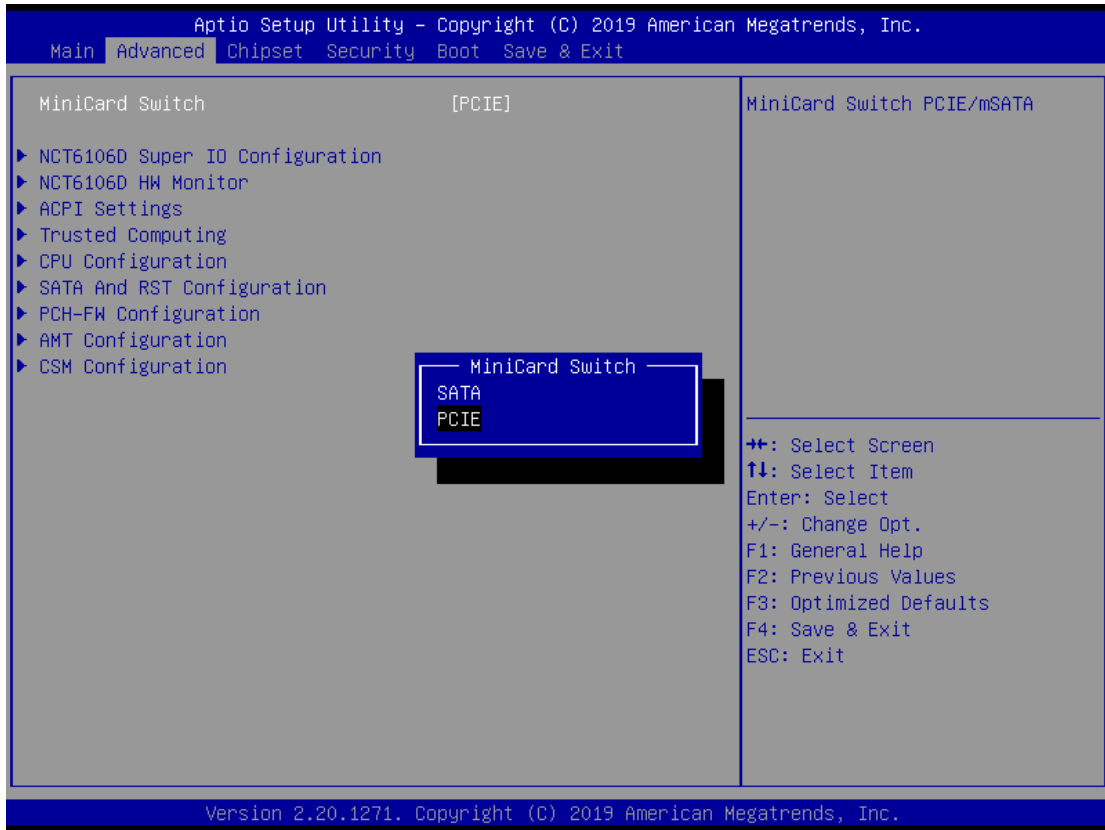
- ▶ Mini Card switch
- ▶ NCT6106D Super IO Configuration
- ▶ NCT6106D Hardware Monitor
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configurations
- ▶ SATA & RST Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration
- ▶ CSM Configuration

For items marked with “▶”, please press <Enter> for more options.



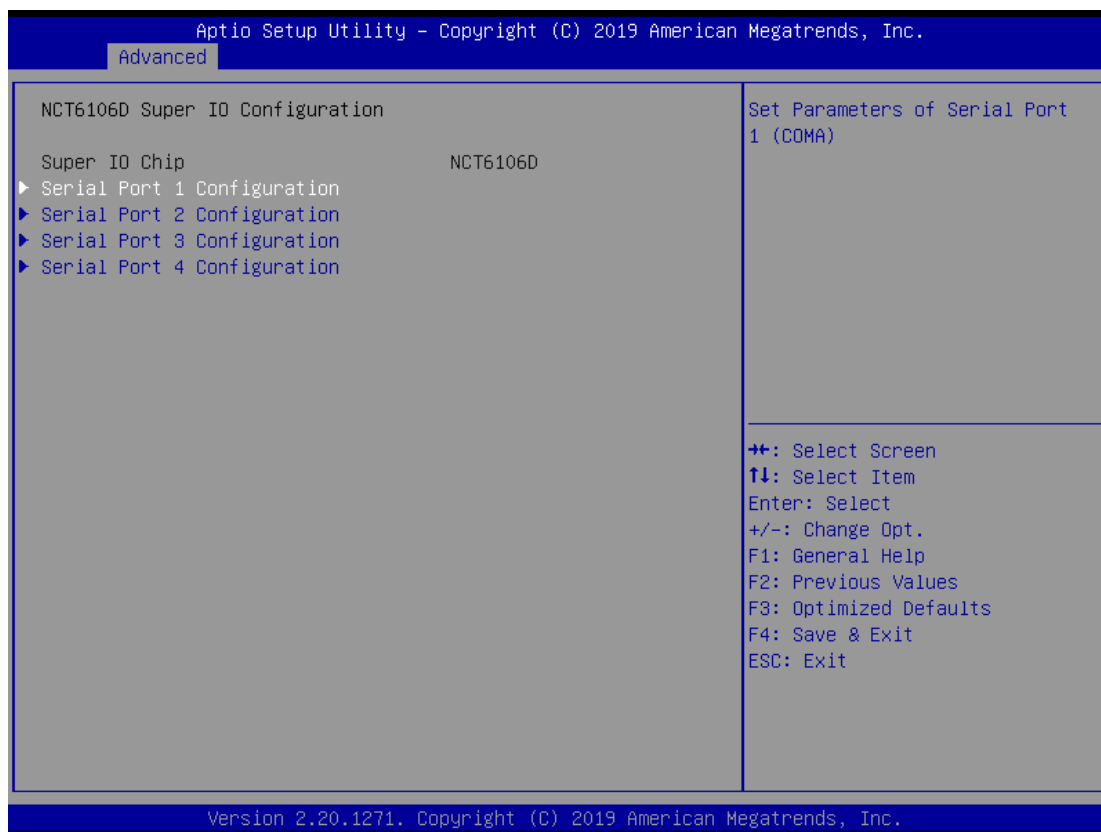
Mini Card switch

Use this to select Mini Card setting, default is "PCIE".



NCT6106D Super IO Configurations

Use this screen to select options for the NCT6106D Super IO Configurations, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with “▶”, please press <Enter> for more options

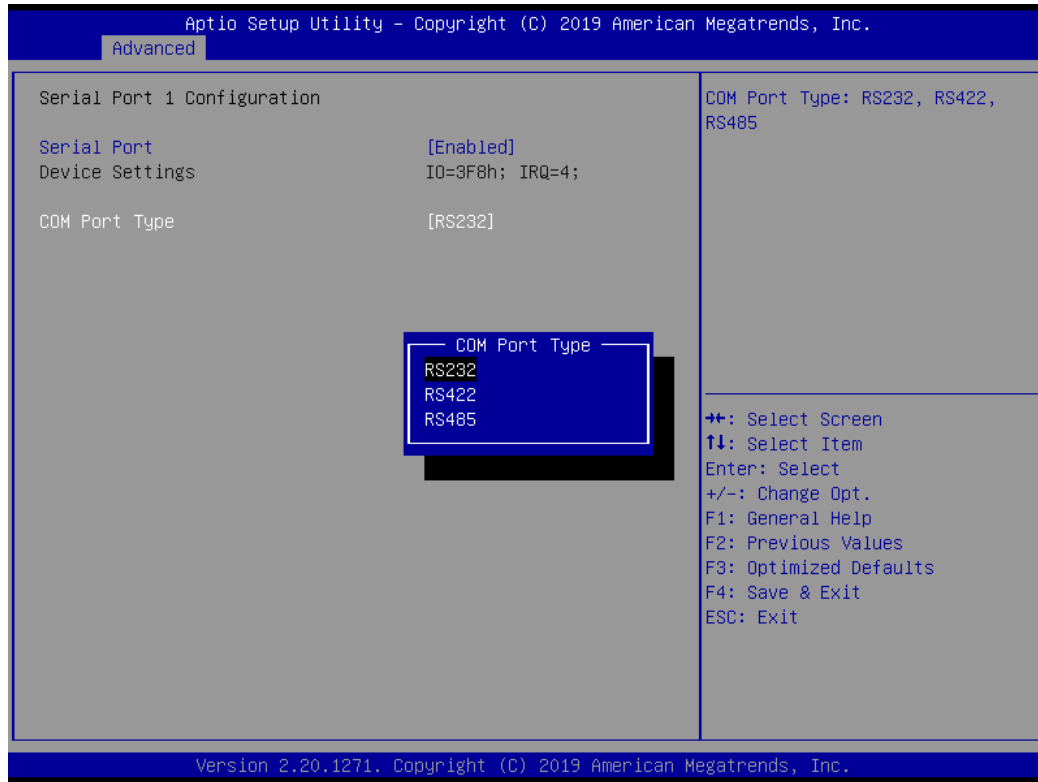


Serial Port 1~2 (COM1~2) Configurations

Use these items to set parameters related to serial ports 1~2.

Serial Port 1~2 (COM3~4) Configurations by optional (via PCIe mini card module)

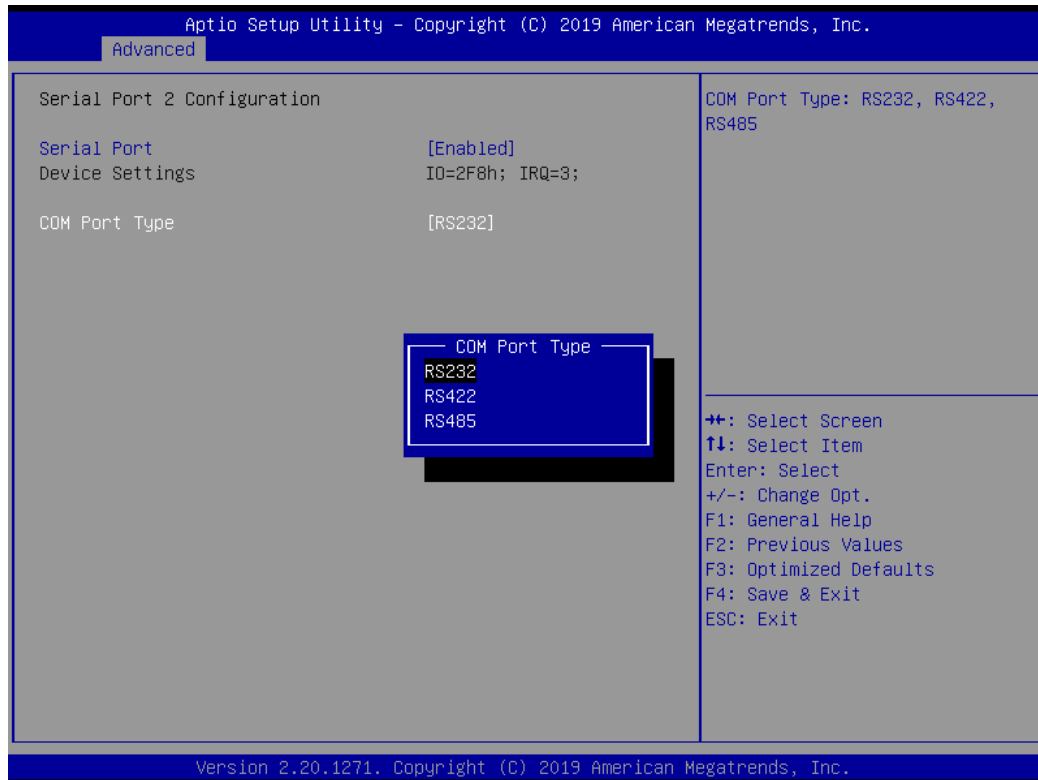
Serial Port 1



Select Mode

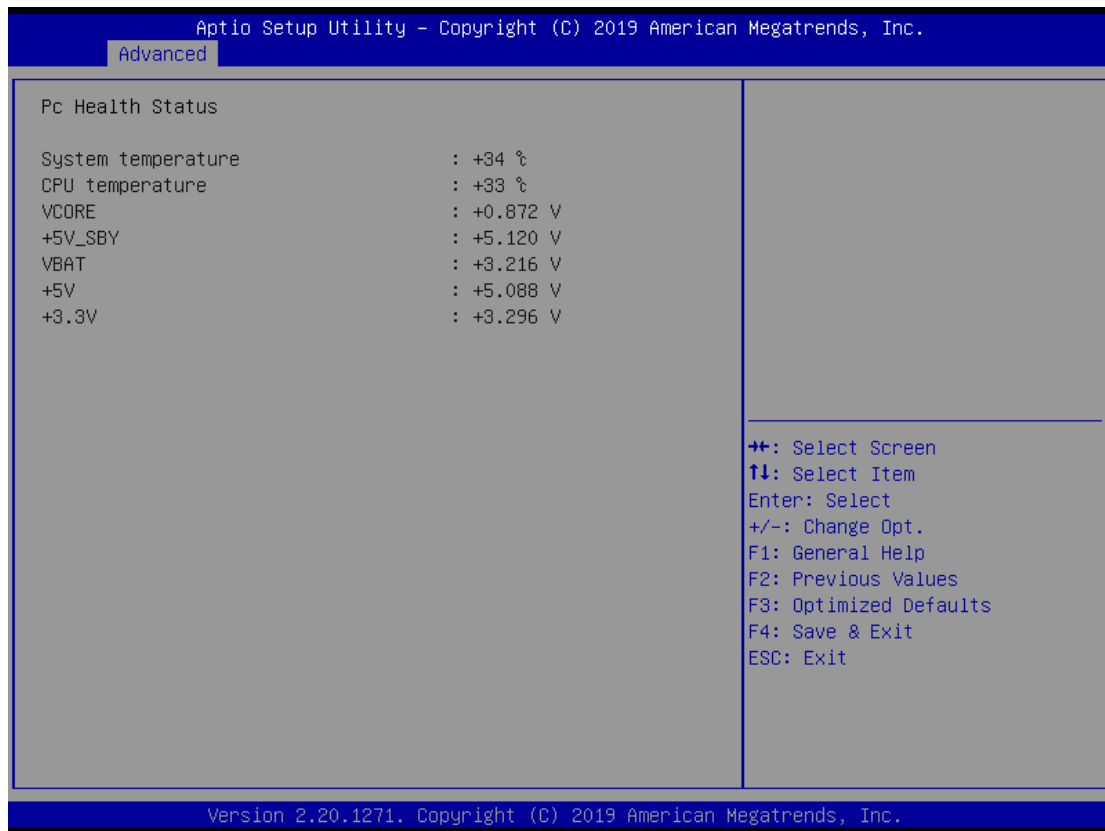
Use this option to set RS-232/RS-422/RS-485 mode.

Serial Port 2



NCT6106D Hardware Monitor

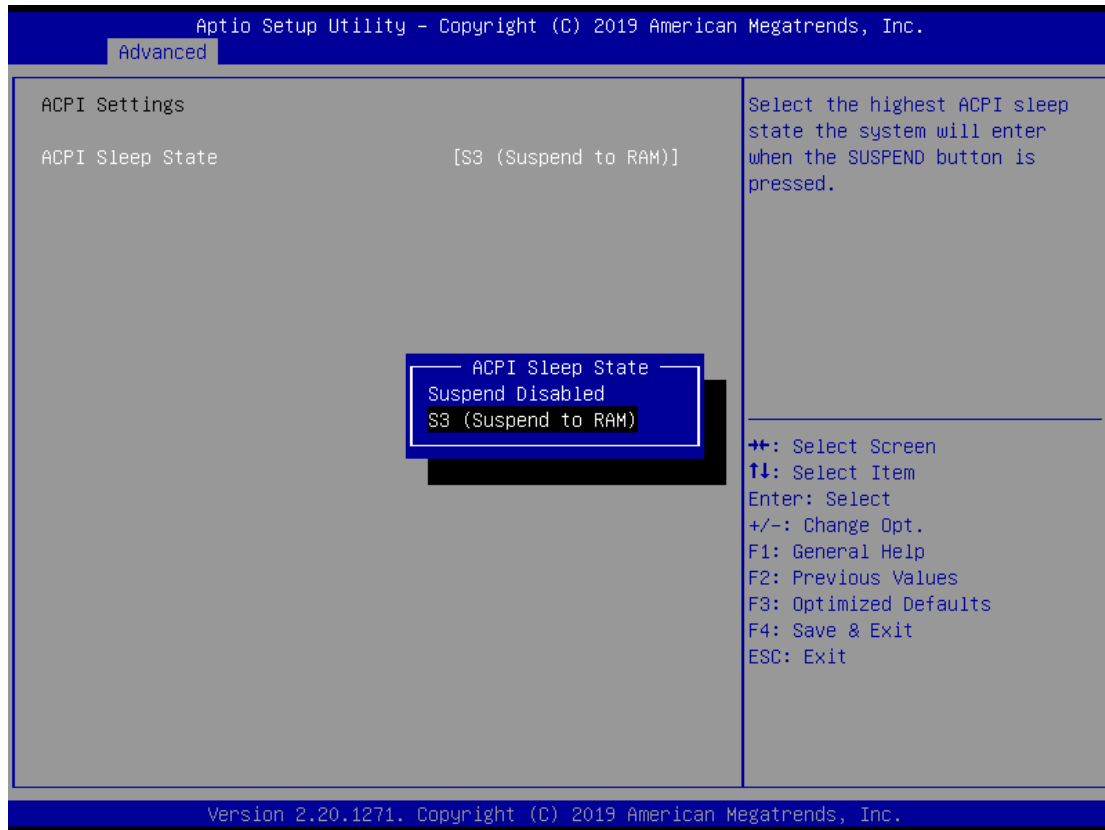
This screen monitors hardware health status.



This screen displays the temperature of system and CPU as well as system voltages (VCORE, +3.3V, +5V STBY and +5V).

ACPI Settings

Use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



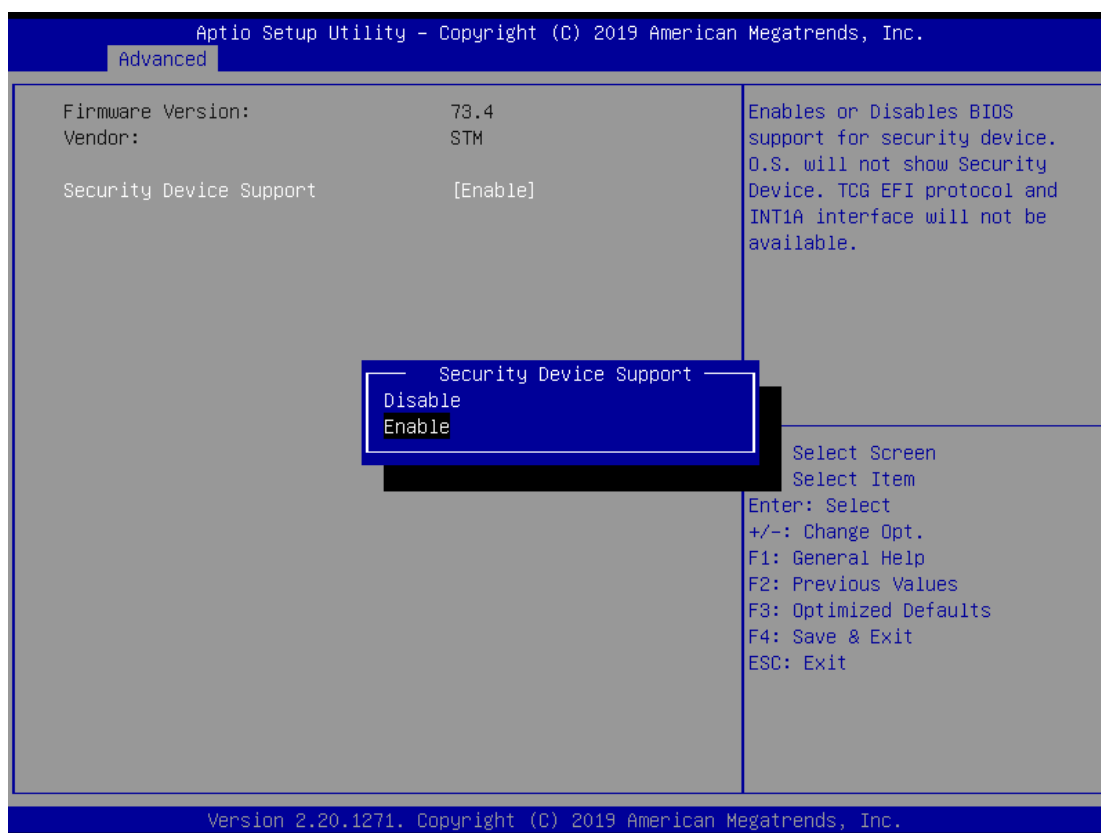
ACPI Sleep State

When the sleep button is pressed, the system will be in the ACPI sleep state.

The default is S3 (Suspend to RAM).

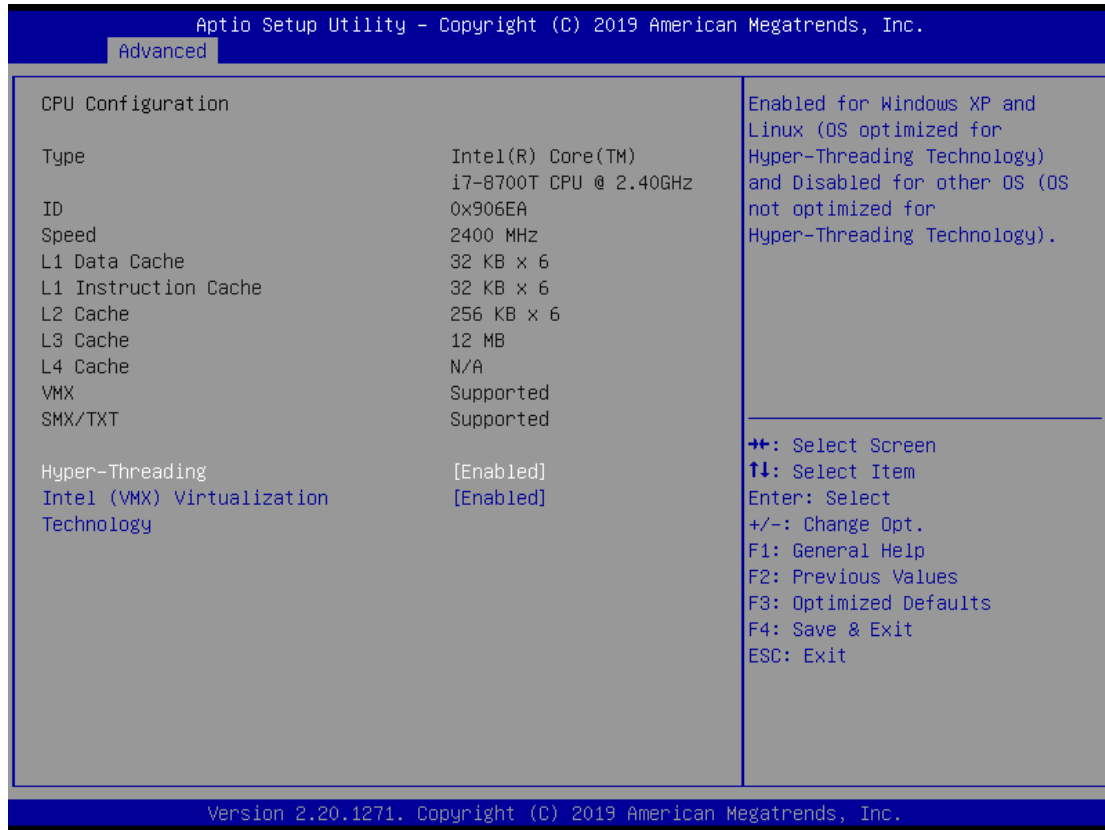
Trust Computing

If users install a security device, such as TPM, users will see the following information for the TPM device and status.



CPU Configuration

This screen shows the CPU version and its detailed information.

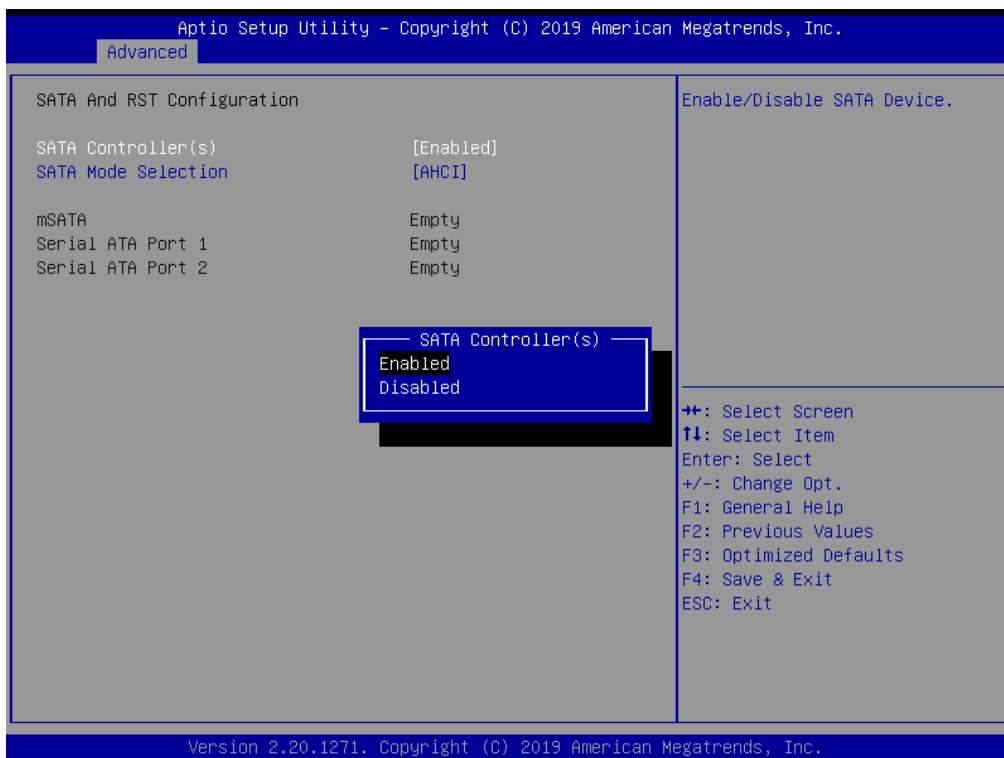
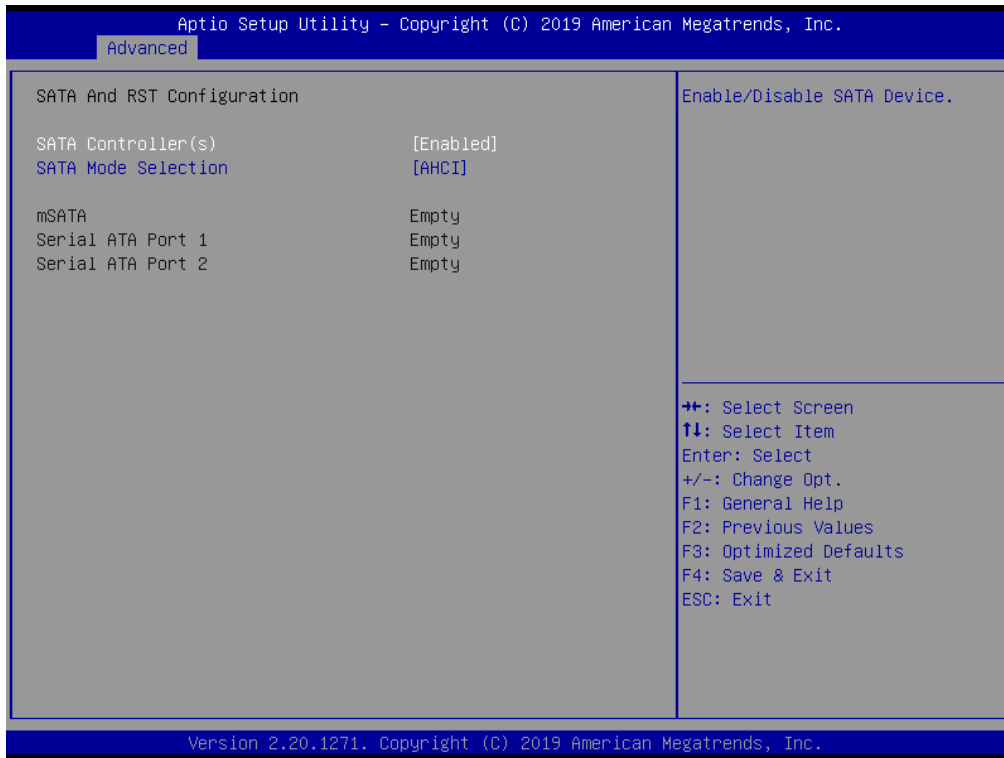


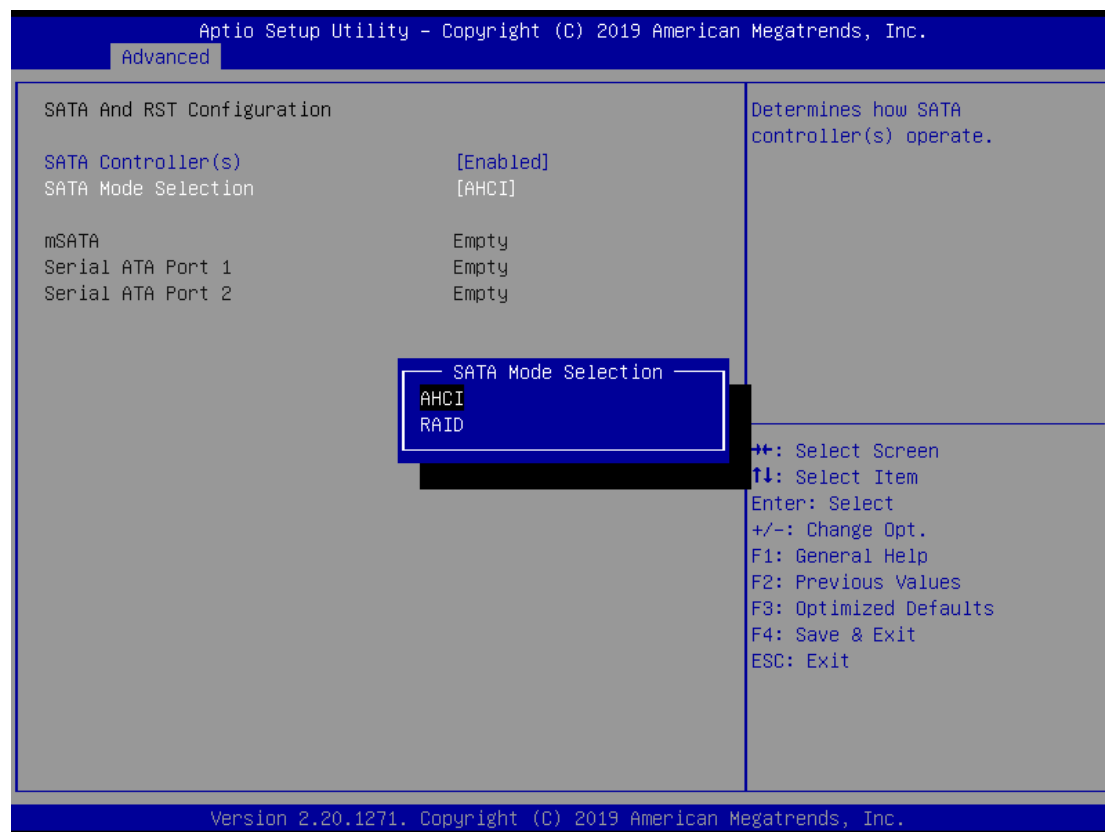
Intel Virtualization Technology

It allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

SATA & RST Configuration

In this Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.





SATA Mode Selection

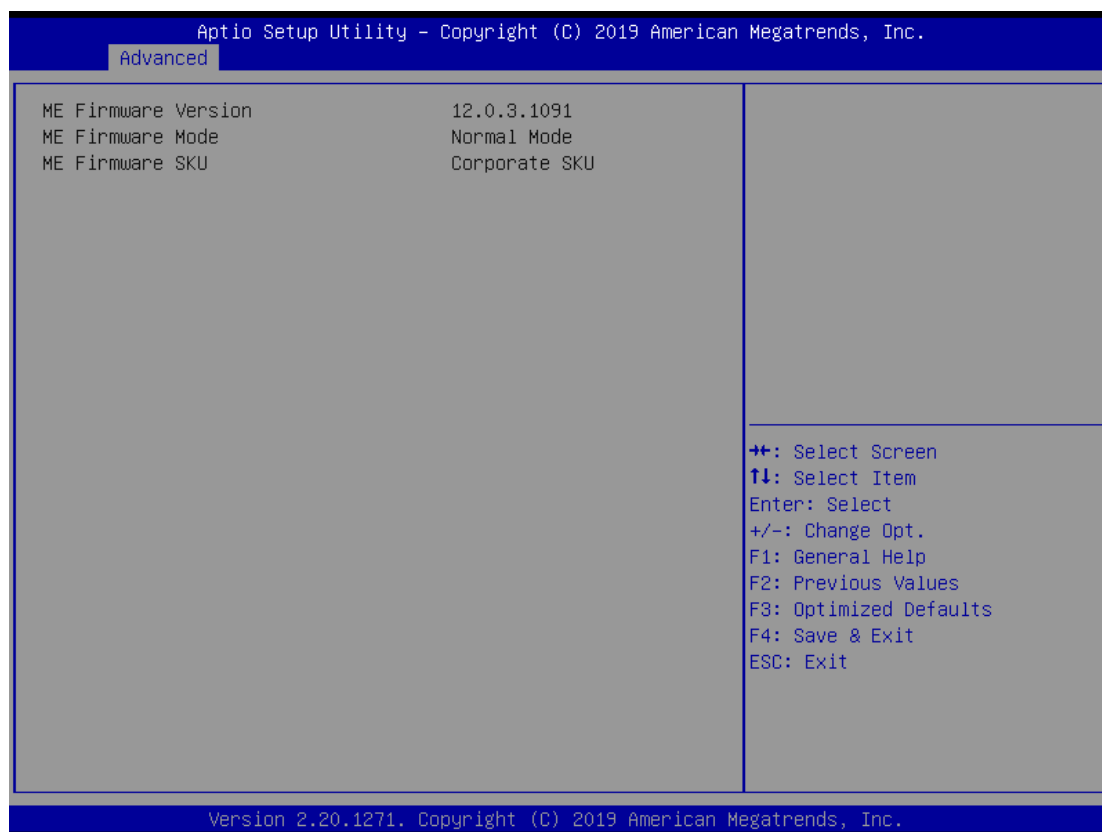
AHCI (Advanced Host Controller Interface) mode is how SATA controller(s) operate.

Serial ATA Port 1~2

It shows the device installed in connector SATA1~2.

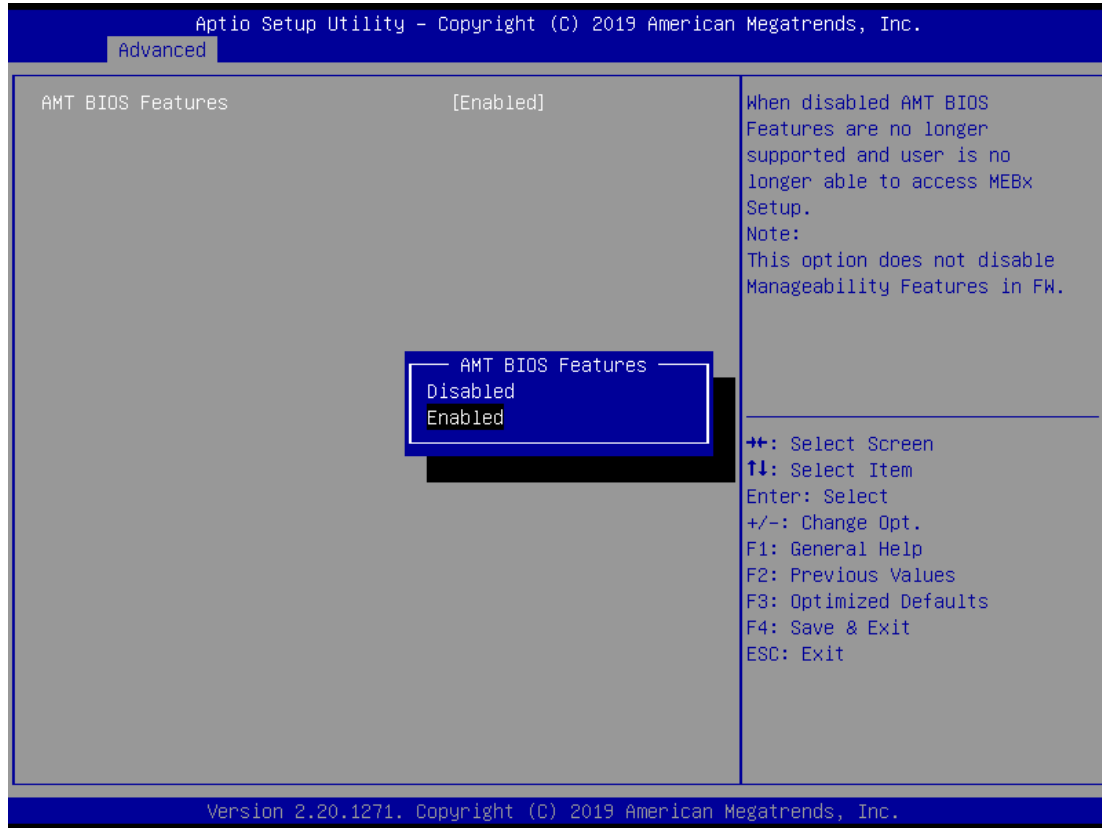
PCH-FW Configuration

This screen shows ME Firmware information.



AMT Configurations

Users can use this screen to configure AMT parameters.



Intel AMT

Enable or disable Intel® Active Management Technology BIOS Extension.

The default is enabled.

4.5 Chipset Menu

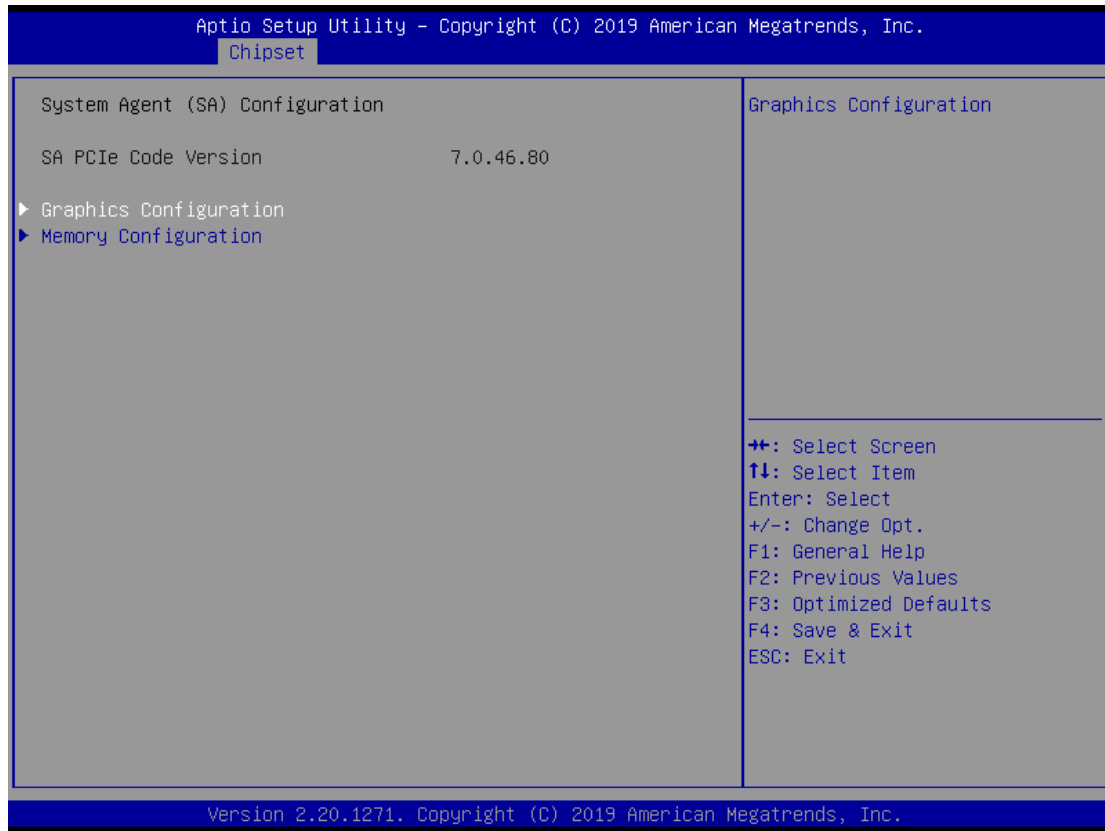
The Chipset menu allows users to change the advanced chipset settings. Users can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ System Agent (SA) Configurations
- ▶ PCH-IO Configurations

For items marked with “▶”, please press <Enter> for more options.



System Agent (SA) Configurations



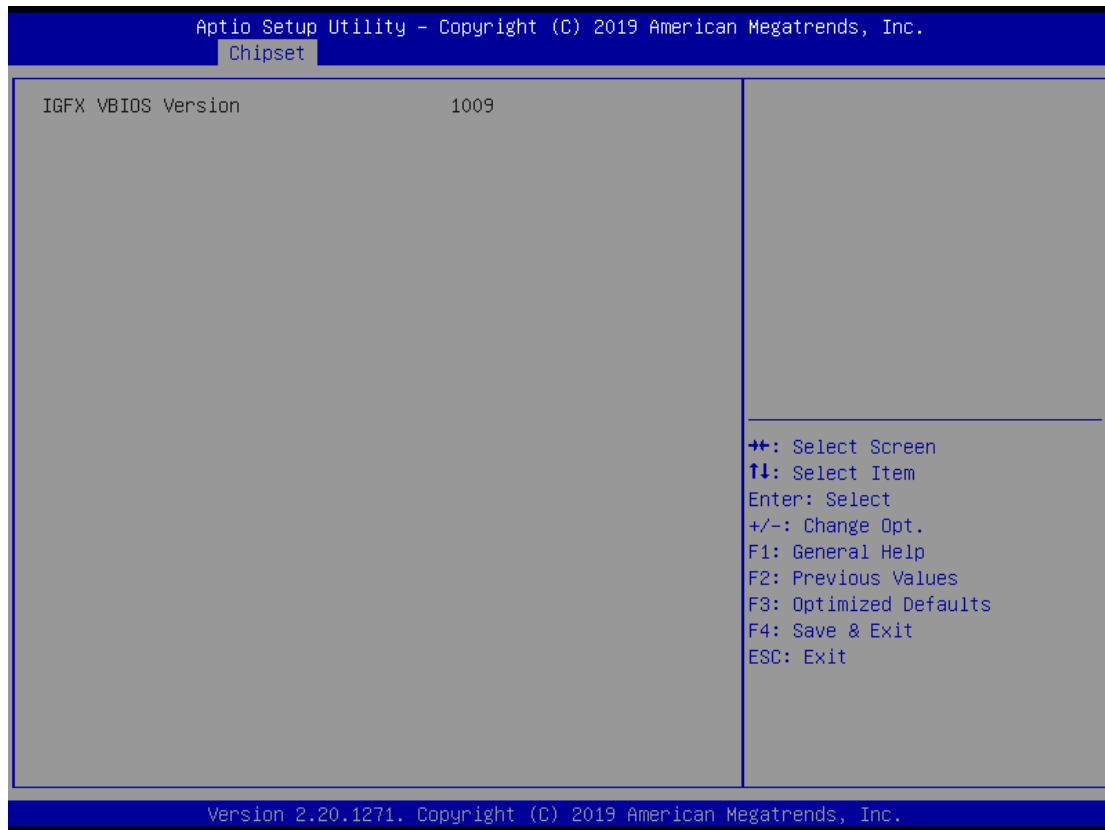
Graphics Configuration

Use this item to configure internal graphics controller.

Memory Configuration

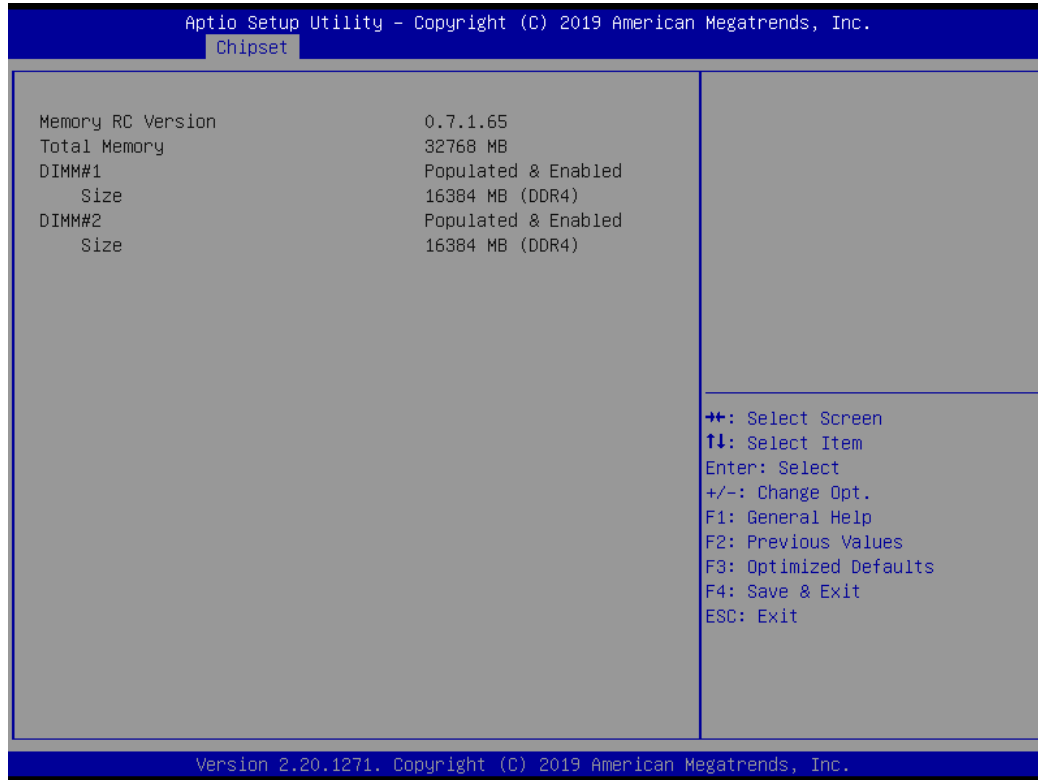
Use this item to refer to the information related to system memory.

Graphic Configurations



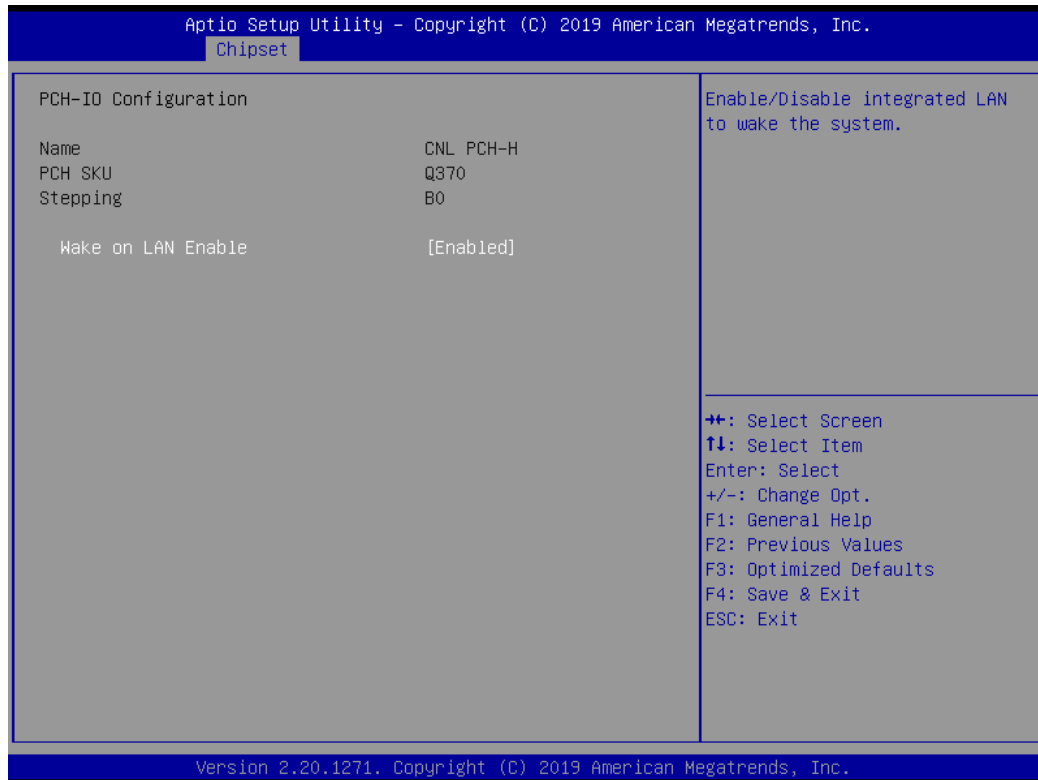
Memory Configurations

This screen shows the system memory information.

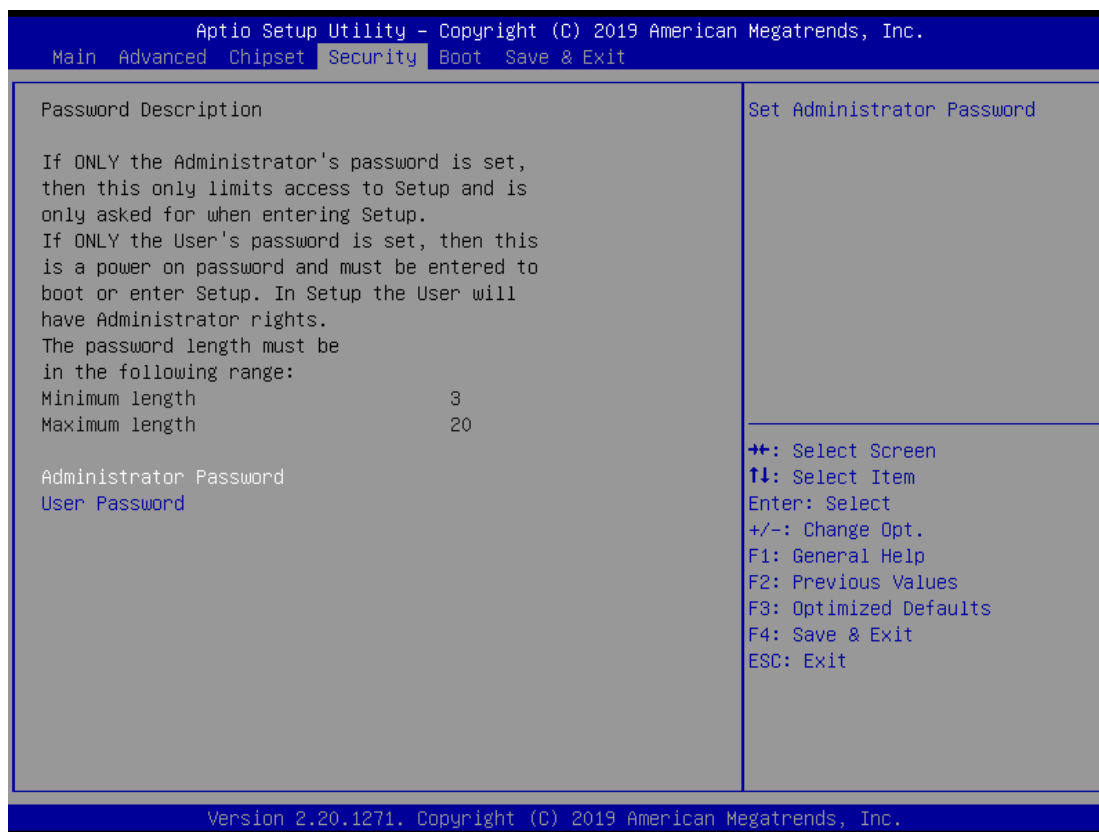


PCH-IO Configurations

This screen allows users to set PCH parameters.



Security Menu



Administrator Password

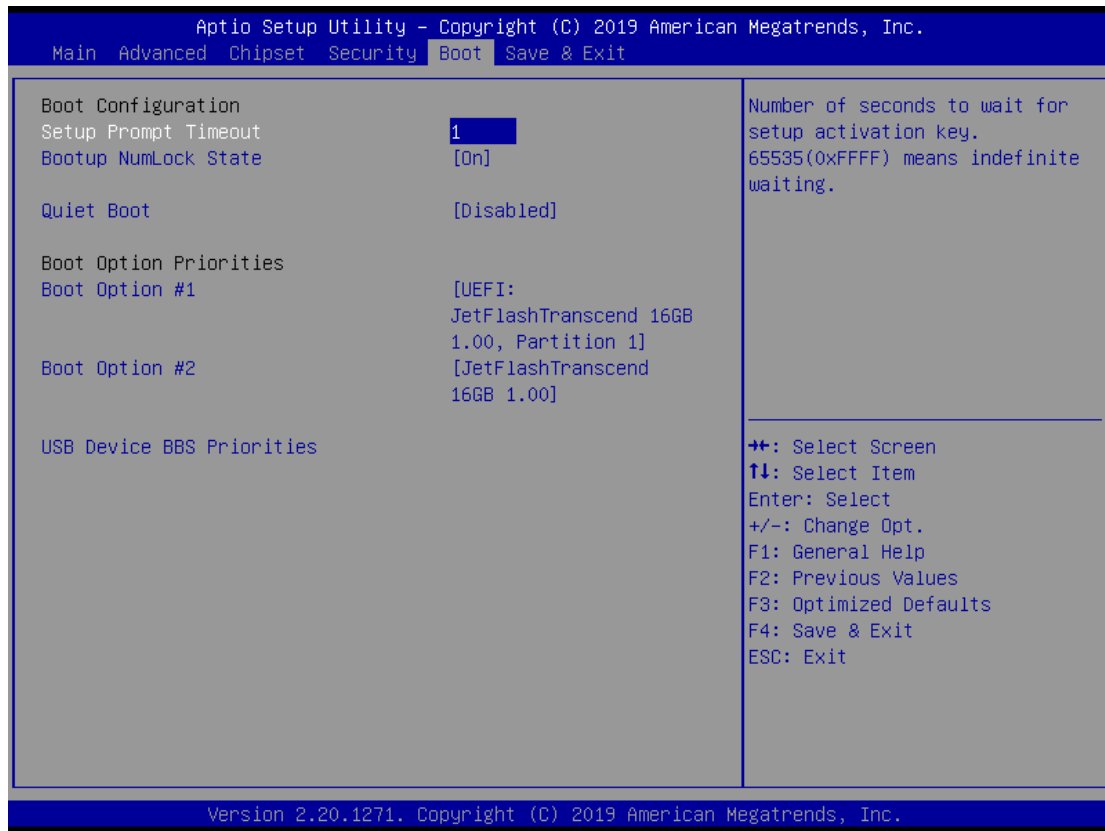
This item indicates whether an administrator password has been set (installed or uninstalled).

User Password

This item indicates whether a user password has been set (installed or uninstalled).

4.6 Boot Menu

The Boot menu allows users to change boot options of the system.



Setup Prompt Timeout

Use this item to set up number of seconds to wait for setup activation key where 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State

Use this item to select the power-on state for the keyboard NumLock.

Quiet Boot

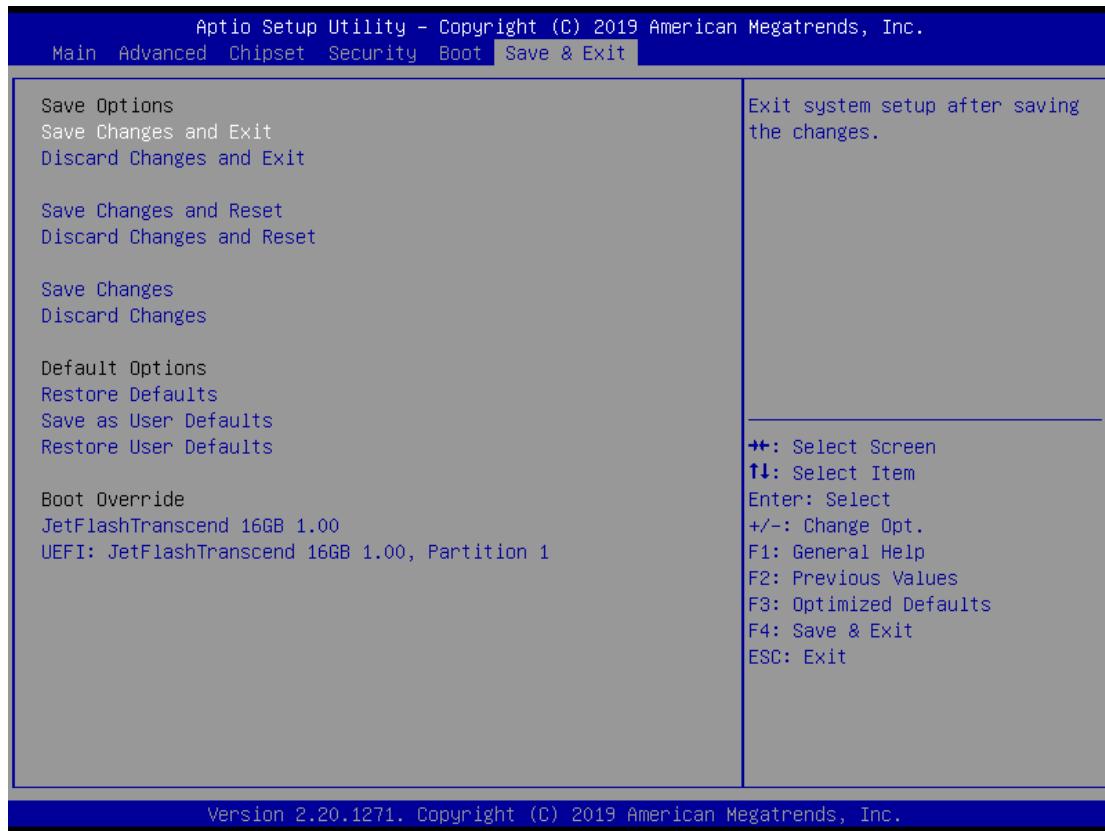
Select to display either POST output messages or a splash screen during boot-up.

Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.7 Save & Exit Menu

The Save & Exit menu allows users to load system configurations with optimal or fail-safe default values.



Save Changes and Exit

When users have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configurations and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

Save Changes and Reset

Having completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configurations take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

Save Changes

Having completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

Discard Changes

Select this option to quit Setup without making any permanent changes to the system configurations. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

Restore Defaults

It automatically sets all Setup options to a complete set of default settings when users select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when users select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

APPENDIX A WATCHDOG TIMER

About Watchdog Timer

Software stability is major issue in most applications. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solutions in this regard.

The watchdog timer is a counter that triggers a system to reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

Sample Program

The following example enables configurations using debug tool.

Enable WDT

↓

Enable configuration:

2E 87; Un-lock super I/O

2E 87

↓

Select logic device:

2E 07

2F 08

↓

WDT device enable:

2E 30

2F 01

↓

Set timer unit:

2E F0

2F 00 ; (00: Sec; 08:Minute)

↓

Set base timer:

2E F1

2F 0A; Set reset time (where 0A (hex) = 10sec)

Disable WDT

↓

Enable configuration:

2E 87; Un-lock super I/O

2E 87

↓

Select logic device:

2E 07

2F 08

↓

WDT device disable:





2E 30

2F 00

APPENDIX B PROGRAMMABLE LED

About Programmable

LED eBOX710-521-FL supports four programmable LED, which allows users to program the LED status. It can set LED as a special indicator or alarm. Please refer to Driver CD for sample code and demo tool.

-  Demo
-  LIB
-  SRC
-  Readme

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APPENDIX C

CONFIGURING SATA FOR RAID

C.1 Configuring SATA Hard Drive(s) for RAID (Controller: Intel[®] C246)

Before you begin the SATA configuration, please prepare:

- Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

Please follow up the steps below to configure SATA hard drive(s):

1. Install SATA hard drive(s) in your system.
2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
3. Configure RAID by the RAID BIOS.

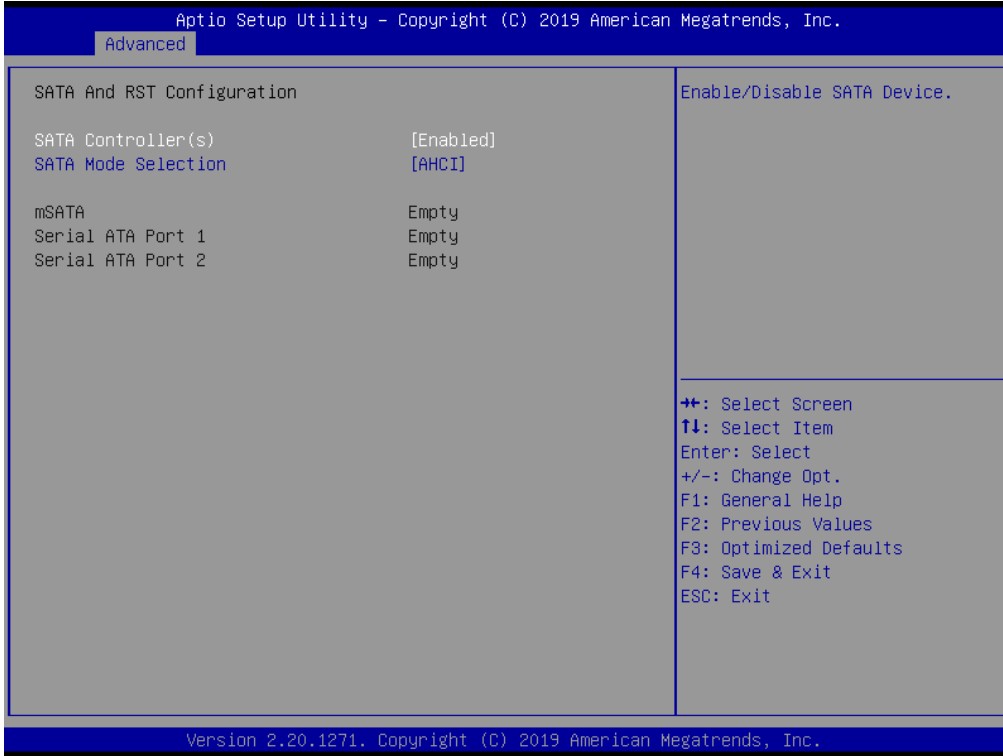
1. Installing SATA hard drive(s) in your system.

Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

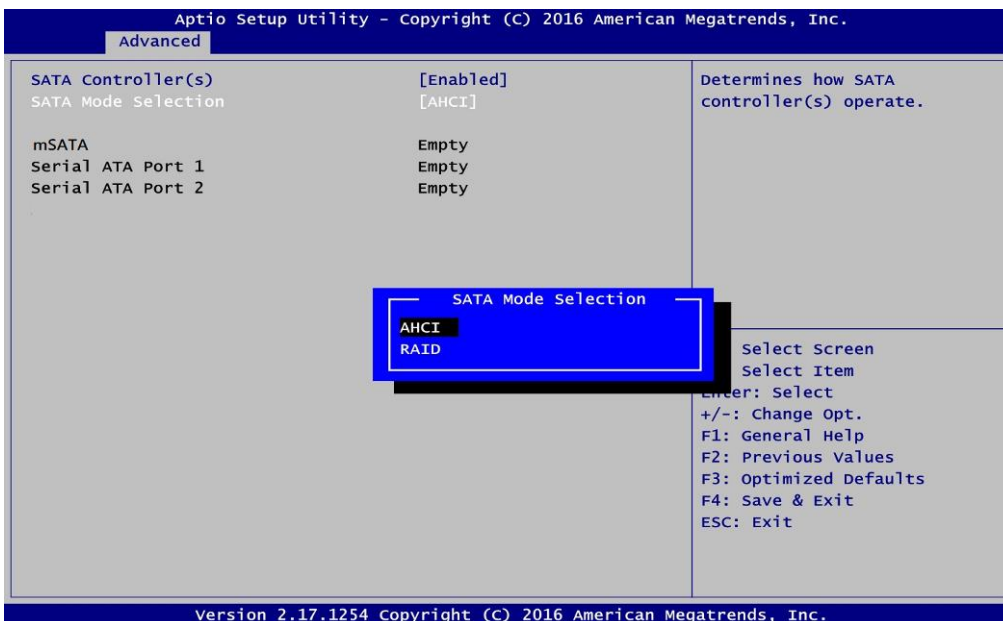
2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

- 2.1. Turn on your system, and then press the button to enter BIOS Setup during running POST (Power-On Self-Test). If you want to create RAID, just go to the Advanced Settings menu\SATA Configuration, select the "SATA Mode Selection", and press <Enter> for more options.



When a list of options appears, please select "RAID".

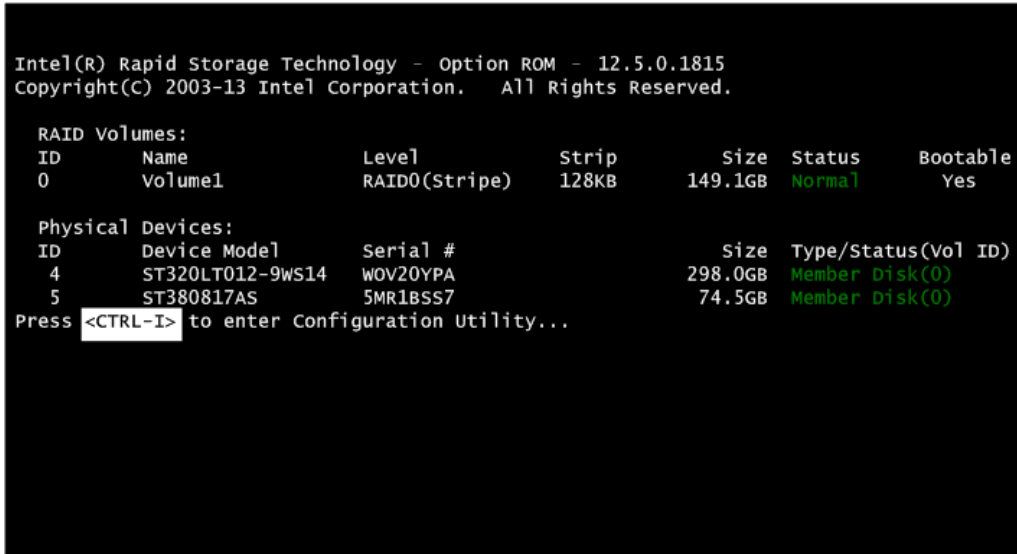


- 2.2. Save and exit the BIOS Setup.

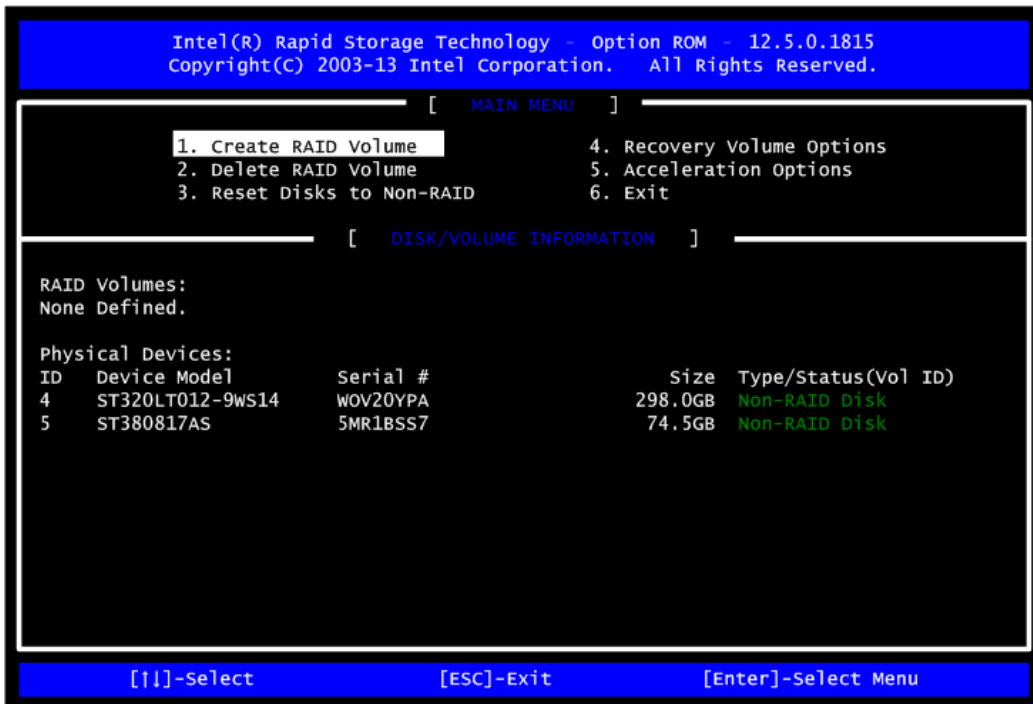
3. Configuring RAID by the RAID BIOS.

Enter the RAID BIOS setup utility to configure a RAID array. Skip this step and proceed if you do not want to create a RAID.

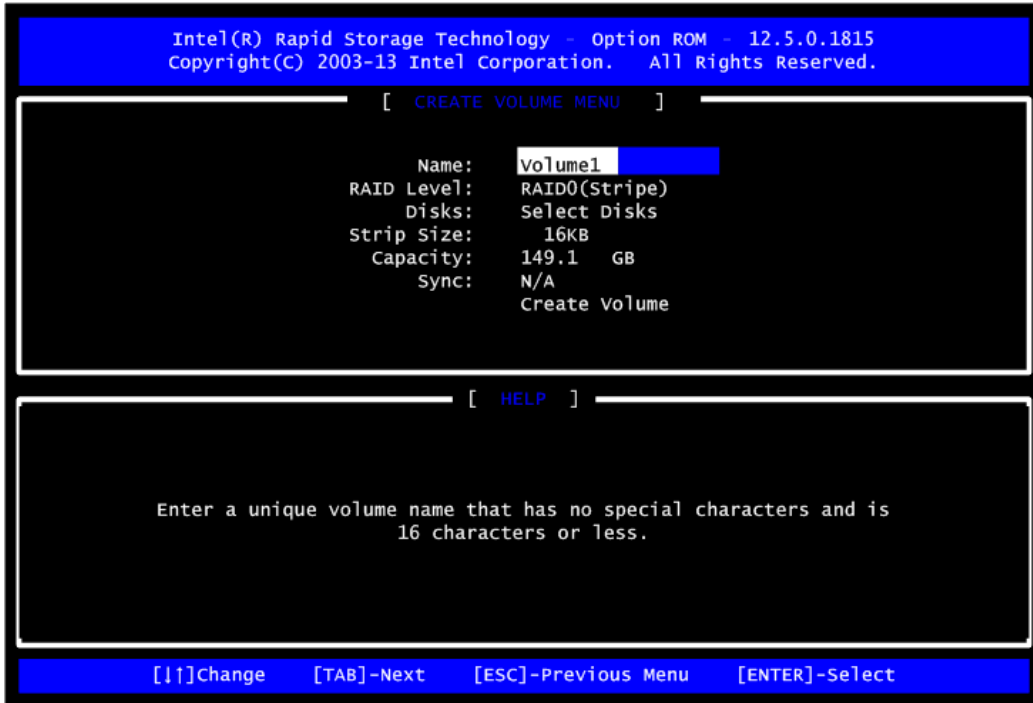
- 3.1. After the POST memory testing and before the operating system booting, a message "Press <Ctrl-I> to enter Configuration Utility" shows up accordingly, press <Ctrl + I> to enter the RAID BIOS setup utility.



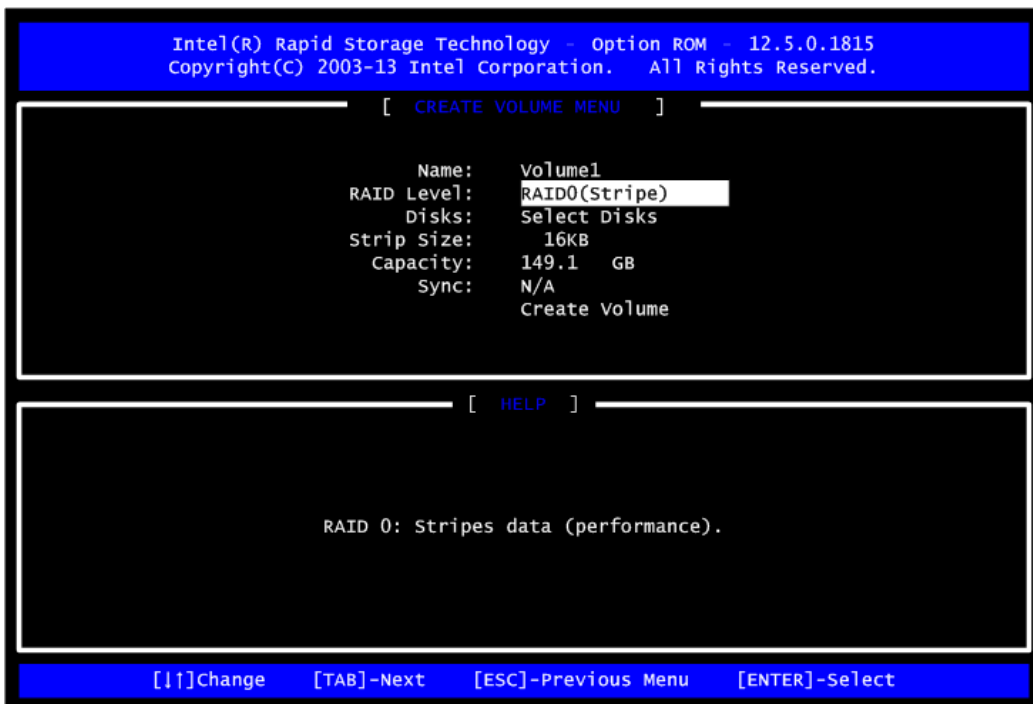
- 3.2. After you press <Ctrl + I>, the Create RAID Volume screen will appear. If you want to create a RAID array, select the Create RAID Volume option in the Main Menu and press <Enter>.



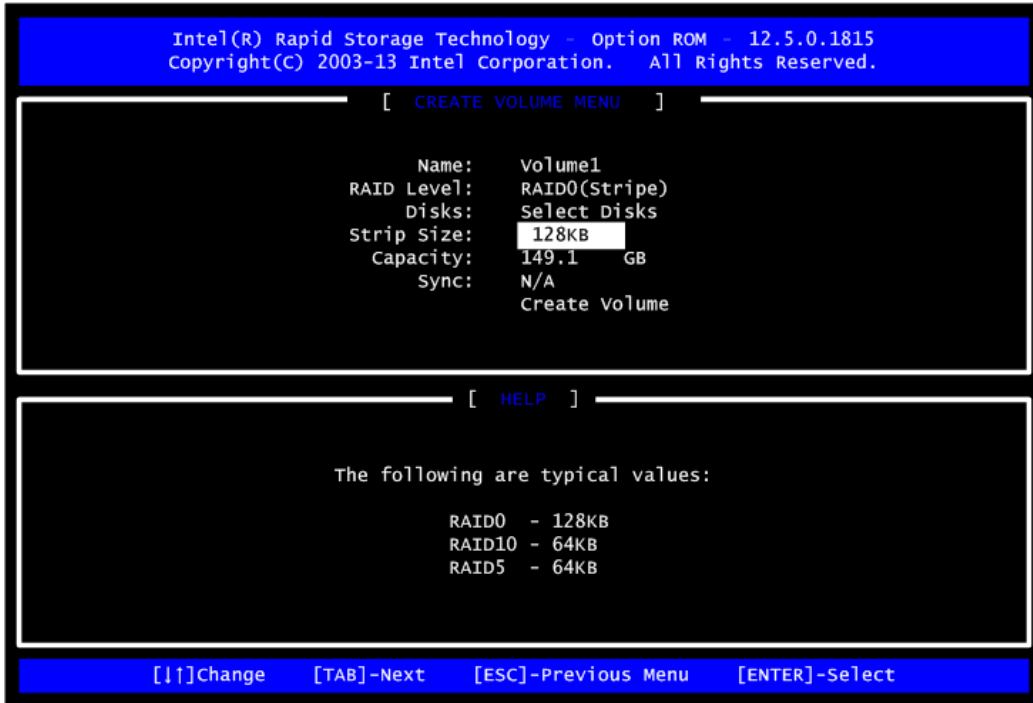
- 3.3. After entering the Create Volume Menu screen, you can type the disk array name with 1~16 letters (letters cannot be special characters) in the item "Name".



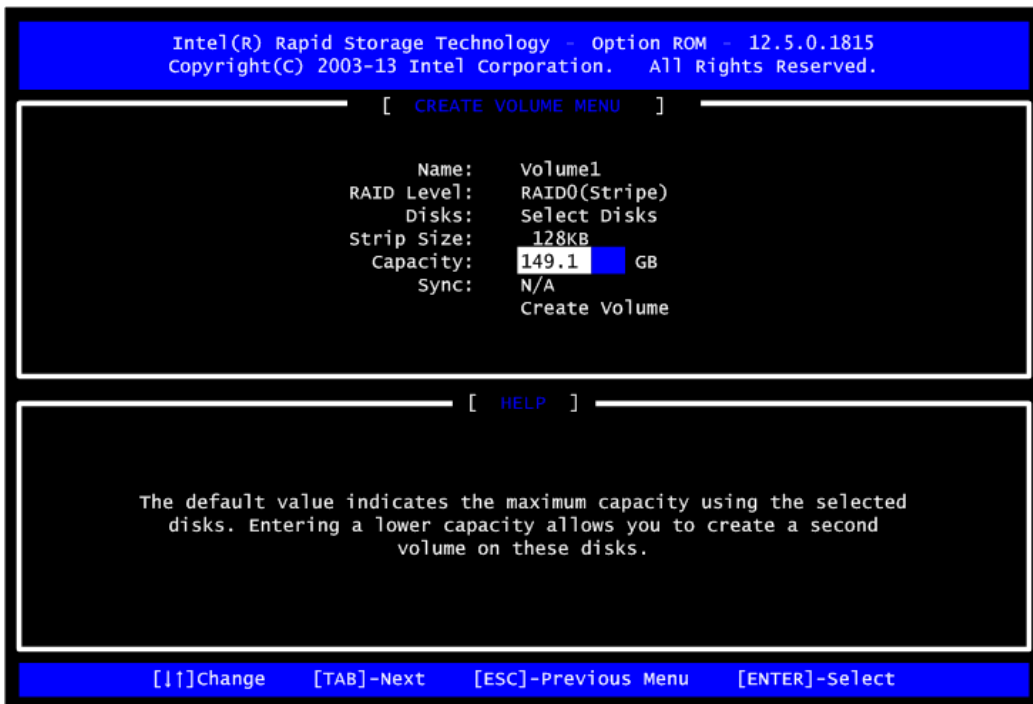
- 3.4. When finished, press <Enter> to select a RAID level. There are three RAID levels: RAID0, RAID1 and RAID5 and RAID10. Select a RAID level and press <Enter>.



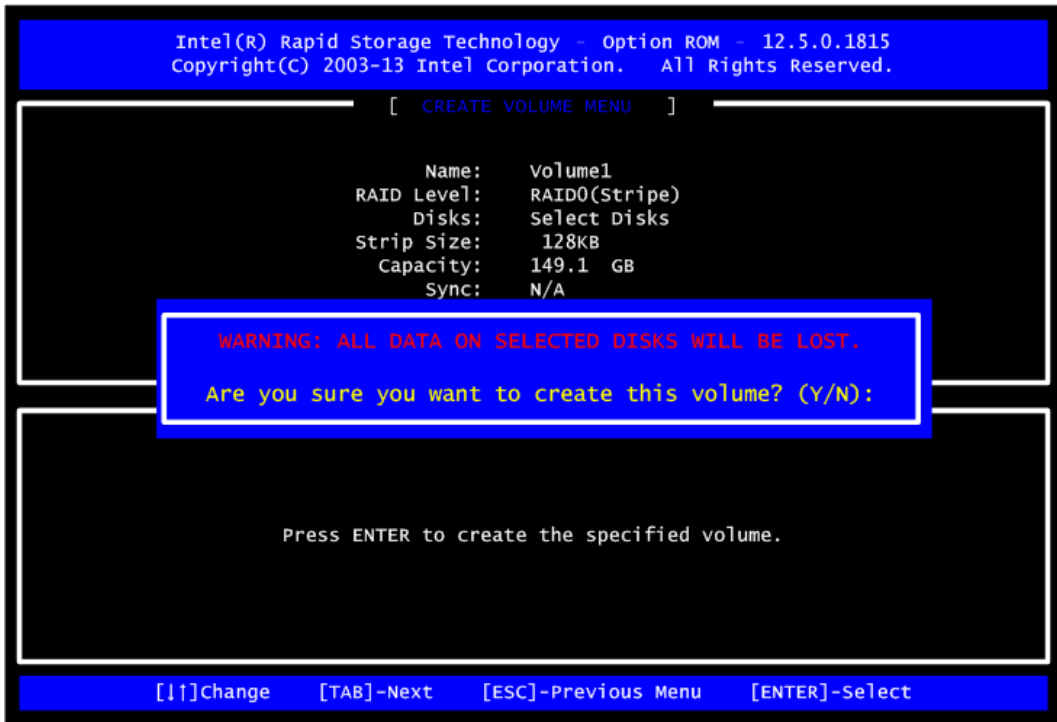
- 3.5. Set the stripe block size. The KB is the standard unit of stripe block size. The stripe block size can be 4KB to 128KB. After the setting, press <Enter> for the array capacity.



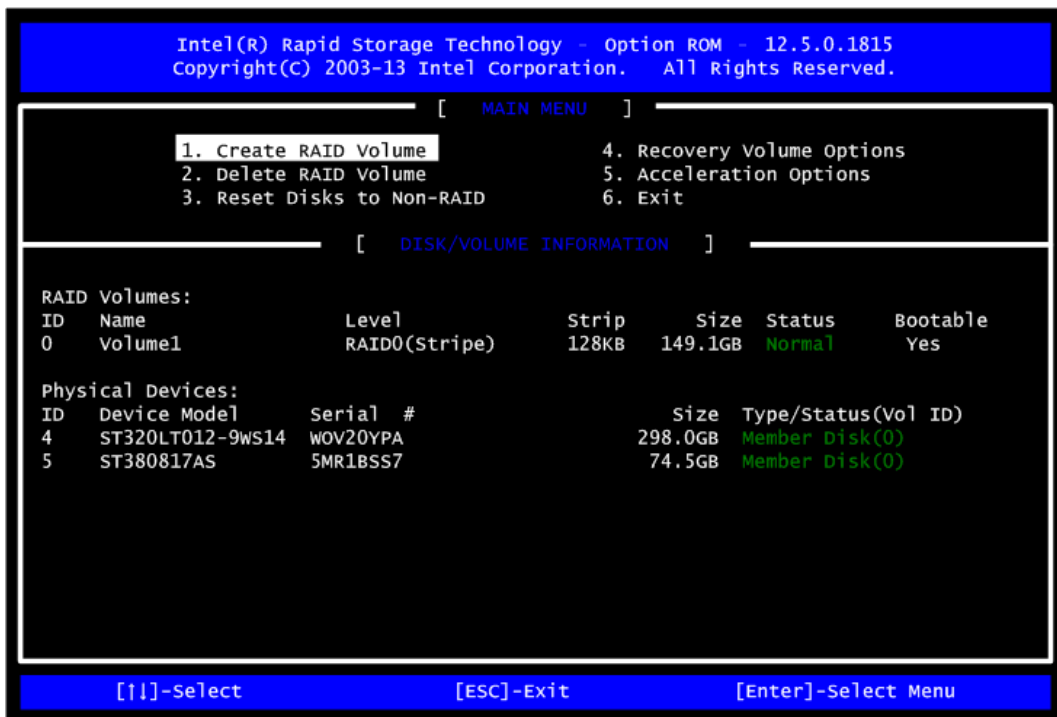
- 3.6. After setting all the items on the menu, select Create Volume and press <Enter> to start creating the RAID array.



3.7. When prompting the confirmation, press <Y> to create this volume, or <N> to cancel the creation.

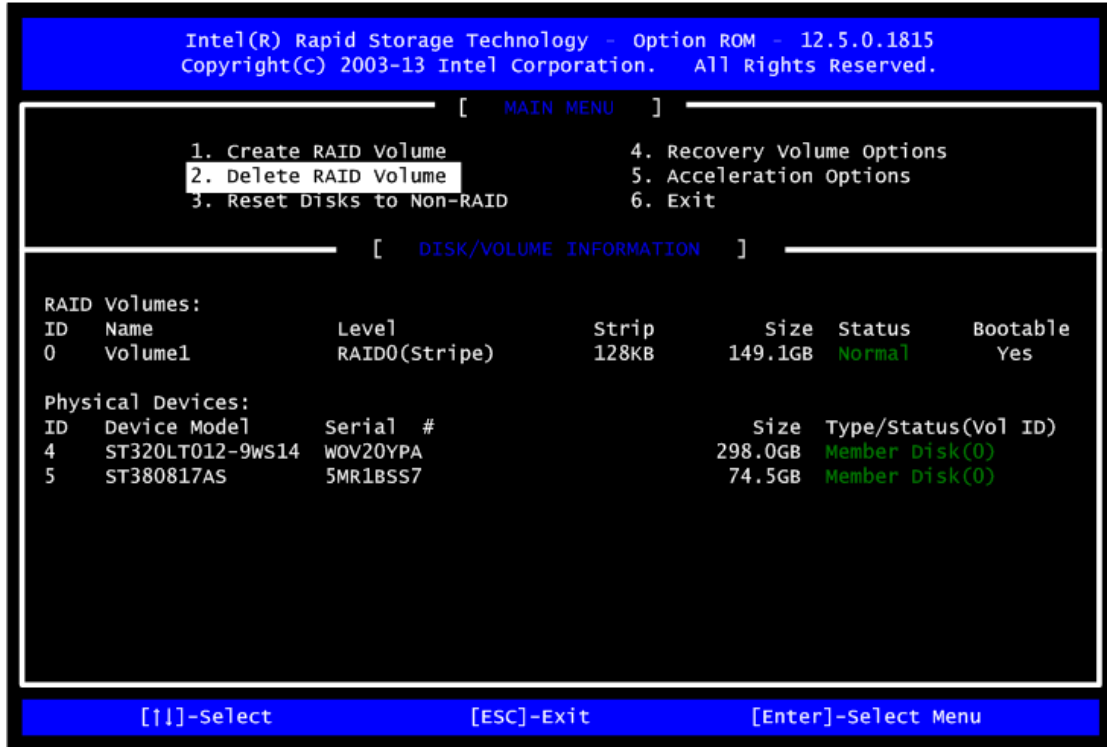


After the creation is completed, you can see detailed information about the RAID Array in the Disk/Volume Information section, including RAID mode, disk block size, disk name, and disk capacity, etc.



Delete RAID volume

If you want to delete a RAID volume, select the Delete RAID Volume option in Main Menu. Press <Enter> and follow on-screen instructions.



Please press <Esc> to exit the RAID BIOS utility. Now, you can proceed to install a SATA driver controller and the operating system.