# CMI221-991

## Mini-ITX Systems

# User's Manual

Version 1.0
(November 2019)

iBASE

## Disclaimer

IBASE reserves the right to make changes and improvements to the products described in this document without prior notice. Every effort has been made to ensure the information in the document is correct; however, IBASE does not guarantee this document is error-free. IBASE assumes no liability for incidental or consequential damages arising from misapplication or inability to use the product or the information contained herein, nor for any infringements of rights of third parties, which may result from its use.

## Trademarks

All the trademarks, registrations and brands mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

# Compliance

CE

This product has passed CE tests (pre-scan) for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

FC

This product has been tested and found to comply with the limits for a Class B (pre-scan) device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

## WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

## Green IBASE


This product is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

# Important Safety Information

Carefully read the precautions before using the device.

### Environmental conditions:

- Lay the device horizontally on a stable and solid surface in case the device may fall, causing serious damage.
- Leave plenty of space around the device and do not block the openings for ventilation.
- Slots and openings on the chassis are for ventilation. Do not block or cover them. Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures between 0˚C and 45˚C.
- Do not leave this device in an environment where the storage temperature may go below -20˚C or above 80˚C. This could damage the device. The device must be used in a controlled environment.

### Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power in case a small amount of electrical current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.

**WARNING**

### Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

### Avoid Disassembly

You are not suggested to disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.

## CAUTION

Danger of explosion if internal lithium-ion battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

# Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, memory, HDD, power adapter, panel and touchscreen.

* PRODUCTS, HOWEVER, THAT FAILS DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

# Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.

   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)

3. If repair service is required, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

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# Table of Contents

# Chapter 1
# General Information

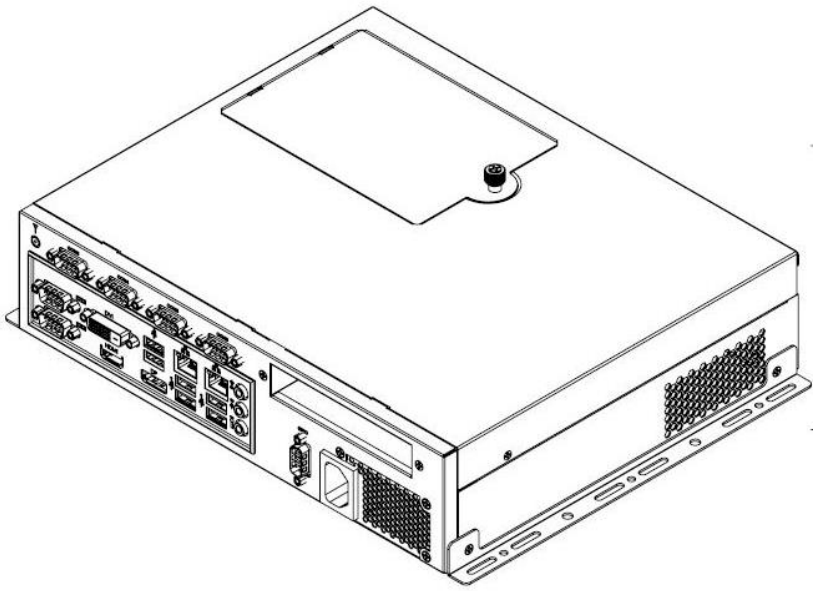
The information provided in this chapter includes:

- Features
- Specifications
- Overview
- Dimensions

## 1.1 Introduction

The CMI221 Mini-ITX System uses the MI991AF motherboard to support Intel® 6th Gen. i7/i5/i3 CPUs and up to 32GB of DDR4 2400 SO-DIMM system memory. The *CMI221-991-6COM* series supports ***six COM*** ports, and the CMI221-991M has ***four COM*** ports. The models available are:

- CMI221-991-6COM-i7 (with IBD182V) with Intel® Core™ i7-6700TE
- CMI221-991-6COM-i5 (with IBD182V) with Intel® Core™ i5-6500TE
- CMI221-991M [Barebone]

Rear view of CMI221-991-6COM (with 6 COM ports)

## 1.2 Features

- Mini-ITX system with MI991AF Mini-ITX motherboard
- Supports Intel® 6th Gen. Core™ i7/i5/i3/Pentium DT processor
- 2 x DDR4-2400 SO-DIMM, upgradable to 32 GB
- DVI-D, HDMI, DisplayPort graphics interface
- 2x USB 2.0 & 6x USB 3.0 ports
- Dual GbE LAN,
- 2.5” HDD and/or mSATA storage
- 1x PCIe (x16) expansion slot
- 100V~240V AC power input

## 1.3 Specifications – CMI221-991

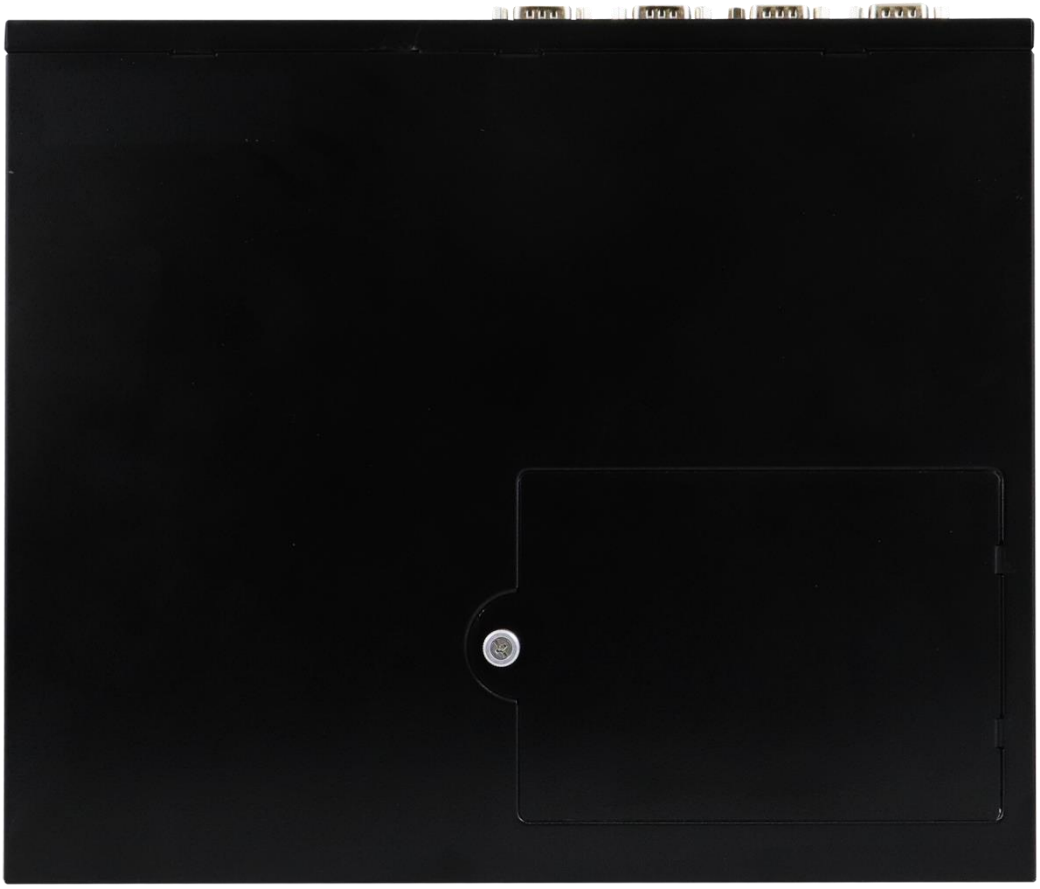
| Product Name | CMI221-991-6COM Series | CMI221-991M |
|---|---|---|
| **System** | | |
| **Motherboard** | MI991AF | |
| **CPU** | Intel® 6th Gen. Core™ i7/i5/i3/Pentium DT processor<br>• Intel® Core™ i7-6700TE (2.4GHz ~ 3.4GHz) @35W<br>• Intel® Core™ i5-6500TE (2.3GHz ~ 3.3GHz) @35W | |
| **Chipset** | Intel® Q170 | |
| **Memory** | 2 x DDR4-2400 SO-DIMM, upgradable to 32 GB | |
| **Graphics** | Core™ DT processor integrated HD Graphics, | |
| **Storage** | • 1x 2.5" SATA 1TB 5400RPM<br>• 2.5” SATA SSD (Reserved), reserved cable kit for 2nd storage | |
| **Power Supply** | Industrial ATX power 250W<br>AC-In 100V ~ 240V<br>Input frequency 47Hz ~ 63Hz | |
| **BIOS** | AMI BIOS | |
| **Watchdog** | Watchdog Timer 256 segments, 0, 1, 2…255 sec/min | |
| **Chassis** | Black, Matte black paint over galvanized sheet steel | |
| **Mounting** | Desktop or wall mount | |
| **Dimensions** | 300mm(W) x 250mm(D) x 72mm(H) | |
| **Net Weight** | TBD | |
| **Certification** | CE **following EN55032**; FCC Class A / LVD | |
| **Operating System** | • Windows 10 (64-bit) / 8.1 (64-bit) / 7 Pro (32-bit / 64-bit)<br>• Windows Embedded 8.1 (64-bit)<br>• Linux Fedora (64-bit) / Ubuntu (64-bit) | |

| Product Name | CMI221-991-6COM Series | CMI221-991M |
|---|---|---|
| **I/O Ports** | | |
| **Rear Panel** | • 6x DB9 for COM#1~6 (COM1 RS232/422/485, COM2~6 RS232) | • 4 x DB9 for COM#1~4 (COM1 RS232/422/485, COM2~4 RS232) |
| | • 6x USB 3.0 ports<br>• 2x RJ-45 GbE Connector<br>• AC power socket<br>• 1x Antenna hole reserved<br>• 1x DVI-D, 1x HDMI, 1 x DisplayPort<br>• 1x Audio port for [Line-in / Line-out / Mic]<br>• 1 x GPIO Port (4-In & 4-Out) | |
| **Front Panel** | • 2 x USB2.0 ports | |
| **Expansion** | 1 x PCIe (x16) slot<br>Option: IP119 riser card | |
| **Environment** | | |
| **Temperature** | • **Operating:** 0 ~ 45 °C (32 ~ 113 °F)<br>• **Storage:** -20~ 80 °C (-4 ~ 176 °F) | |
| **Relative Humidity** | 5 ~ 90% at 45 °C (non-condensing) | |
| **Vibration Protection** | • **Operating:** 0.25 Grms / 5 ~ 500 Hz<br>• **Non-operating:** 1 Grms / 5 ~ 500Hz | |

All specifications are subject to change without prior notice.
For detailed MB specifications, refer to the respective user manuals on our website.

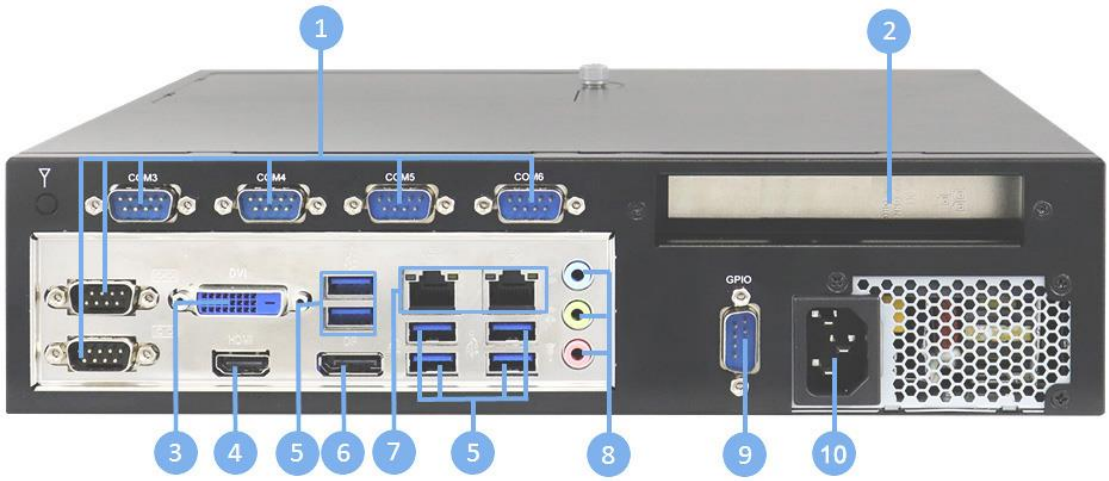
## 1.4 System View

### Top View



### Front View

**Rear View**



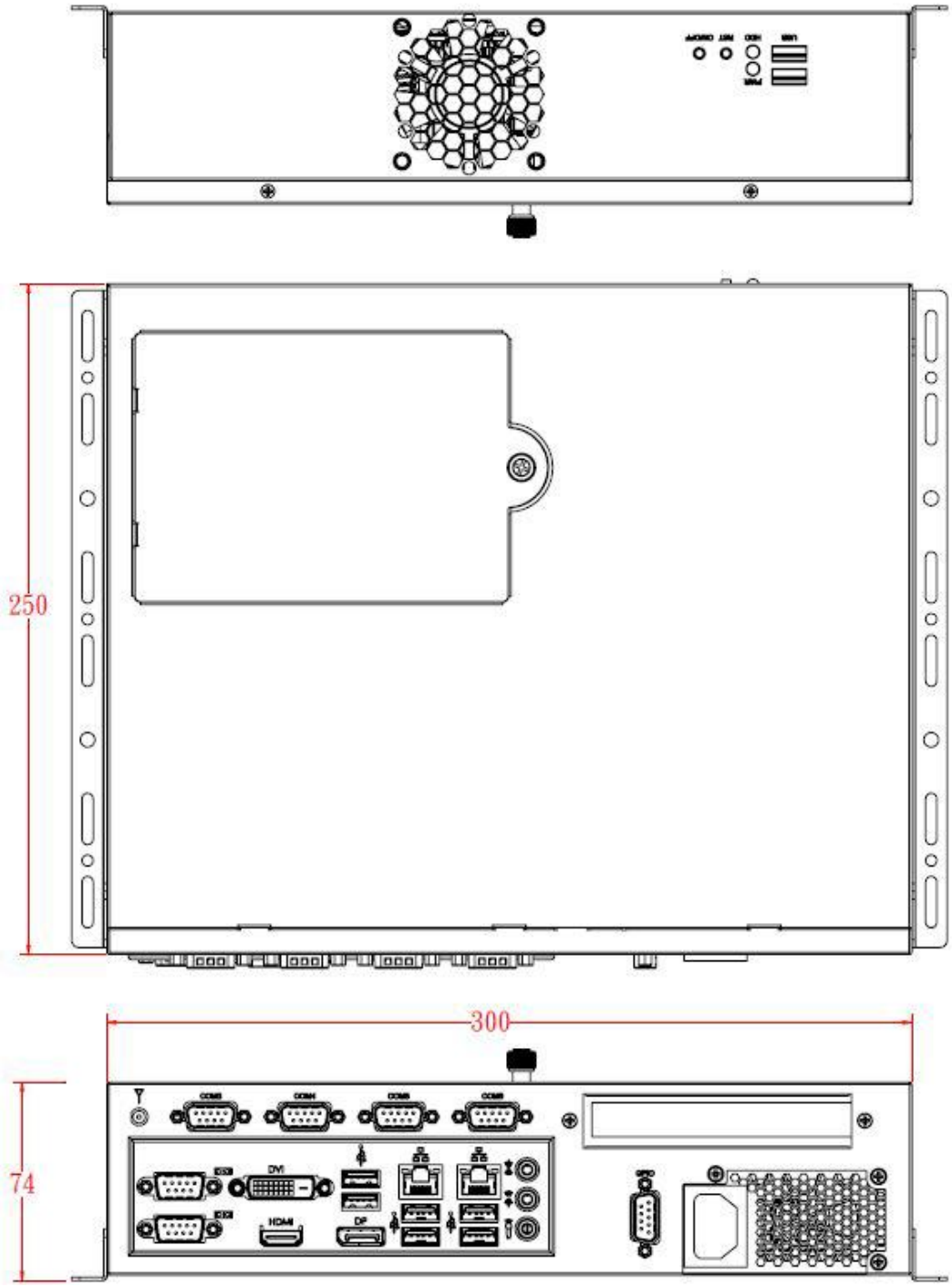

| No. | Name | No. | Name |
|---|---|---|---|
| 1 | COM Ports (COM1 ~ COM6) | 6 | DisplayPort |
| 2 | Expansion Slot | 7 | GbE LAN Ports |
| 3 | DVI-D Port | 8 | Audio Jacks (From top to bottom: Line-In, Line-Out, Mic) |
| 4 | HDMI Port | 9 | GPIO Connector |
| 5 | USB 3.0 Ports | 10 | Power In (110V~220V) |

**Remarks:**

1. CMI221-991-6COM supports **COM#1~6** (COM1 RS232/422/485, COM2~6 RS232)
2. CMI221-991M supports **COM#1~4** (COM1 RS232/422/485, COM2~4 RS232)

## 1.5 Dimensions

Unit: mm




Rear view of CMI221-991-6COM (with 6 COM ports)

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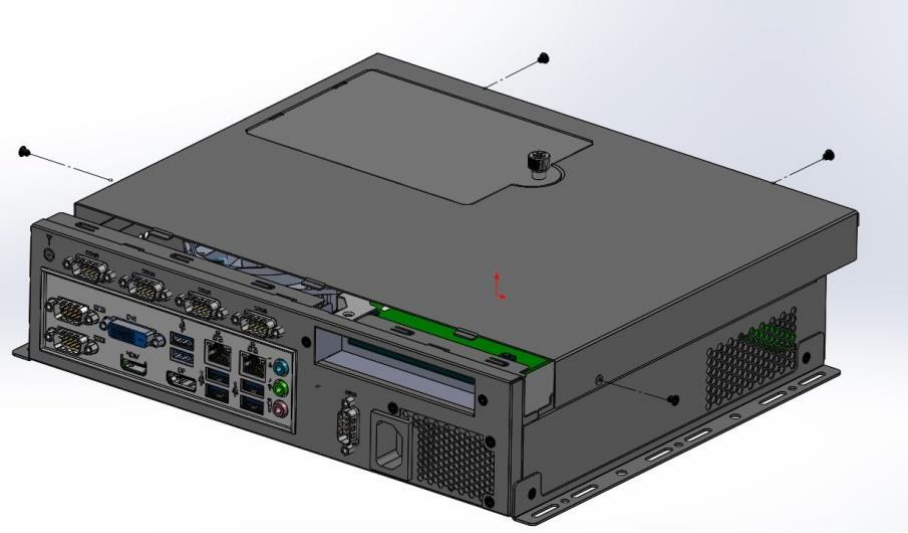
# Chapter 2
# Hardware Installation

The information provided in this chapter includes:

- Essential installations
  - HDD Installation
  - Memory Installation
  - WiFi / 3G / 4G Antenna Installation
  - PCIe (x16) Expansion Card Installation
  - Fan Replacement
  - Mounting Brackets Installation

## 2.1 Essential Installations

Release the four screws shown below to remove the cover for all installations except for that of the HDD. After installation, secure the device cover.

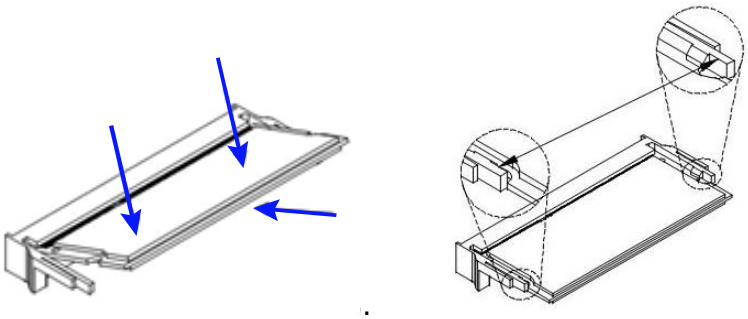


### 2.1.1 HDD Installation

1. Loosen the single screw to release the HDD tray. Loosen the 4 screws holding the HDD. Install the HDD by fixing it with the screws that have been removed and connect the related cables. Close and secure the tray.

### 2.1.2 Memory Installation

1. Remove the system cover, locate the memory slot and align the key of the memory module with that on the memory slot.
2. Insert the module slantwise and gently push the module straight down until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.

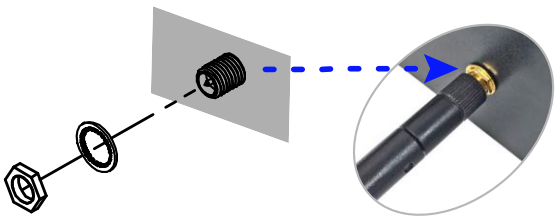


To remove the module, press the clips outwards with both hands.

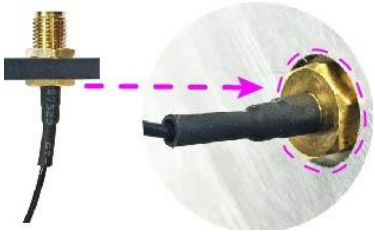
## 2.2 WiFi / 3G / 4G Antenna Installation

Thread the WiFi / 3G / 4G antenna extension cable through an antenna hole of the front I/O cover and fasten the antenna as shown below. Then apply adhesive to the edge of the hex nut behind the front I/O cover to prevent the extension cable from falling if the cable becomes loose. After installation, secure the device cover.

1. Thread and fasten the hex nut and the washer. Then install the antenna.



2. Apply adhesive around here.



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**Info:** The diameter of the nut is around 6.35 mm (0.25”-36UNC).

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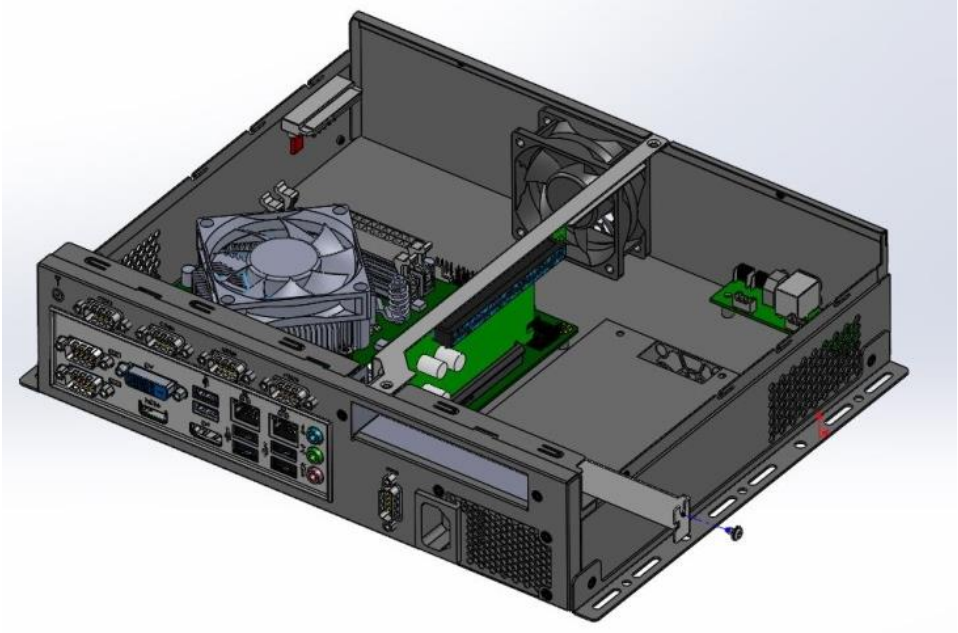
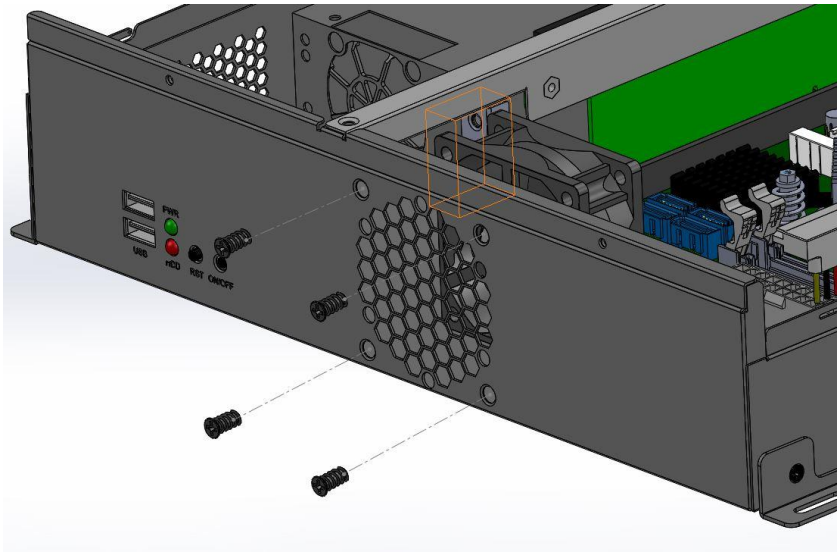
## 2.3 PCIe (x16) Expansion Card Installation

Release the screw holding the expansion slot bracket after removing the system chassis cover. Then install the expansion card and fix it with the screw that we removed earlier. Secure the system cover.



## 2.4 Fan Replacement

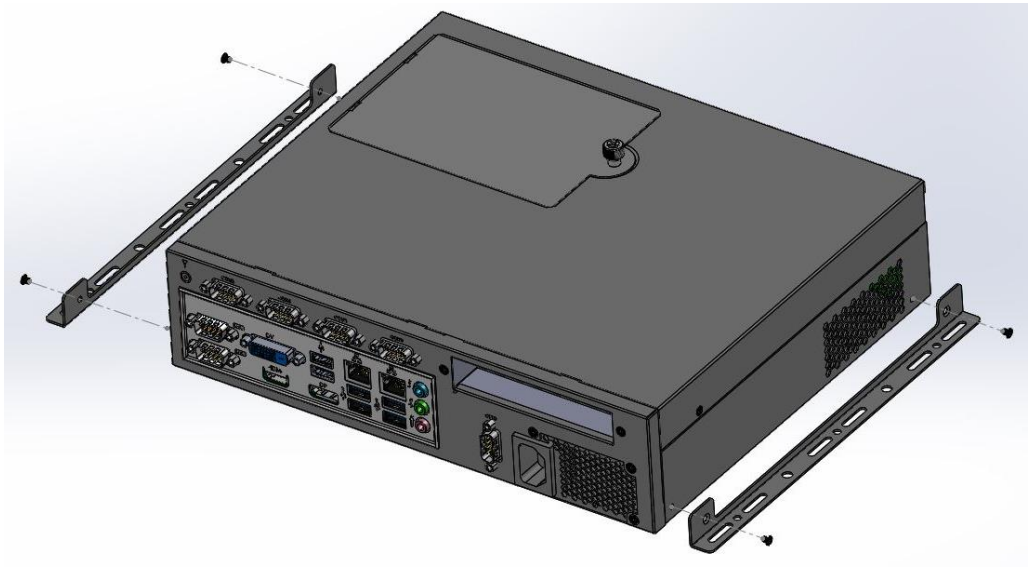
Remove the system cover and release the 4 fan screws. Replace the fan and tighten it with the screws that were removed. Replace the system cover.



## 2.5 Mounting Brackets Installation

### Wall Mount Installation:

Attach the wall mounting brackets to your CMI221 System, and secure them with the supplied screws as shown below.



Prepare at least four screws (M3, 6 mm) to mount the device on wall .

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# Chapter 3
# Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- HD Graphics Driver Installation
- HD Audio Driver Installation
- LAN Driver Installation
- Intel® Management Engine Drivers Installation
- Intel® USB 3.0 Drivers Installation

## 3.1 Introduction

This section describes the installation procedures for software and drivers.

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**Note:** After installing your operating system, you must install the Intel® Chipset Software Installation Utility first before proceeding with the drivers installation.

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## 3.2 Intel® Chipset Software Installation Utility

The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for Intel chipset components. Follow the instructions below to complete the installation.

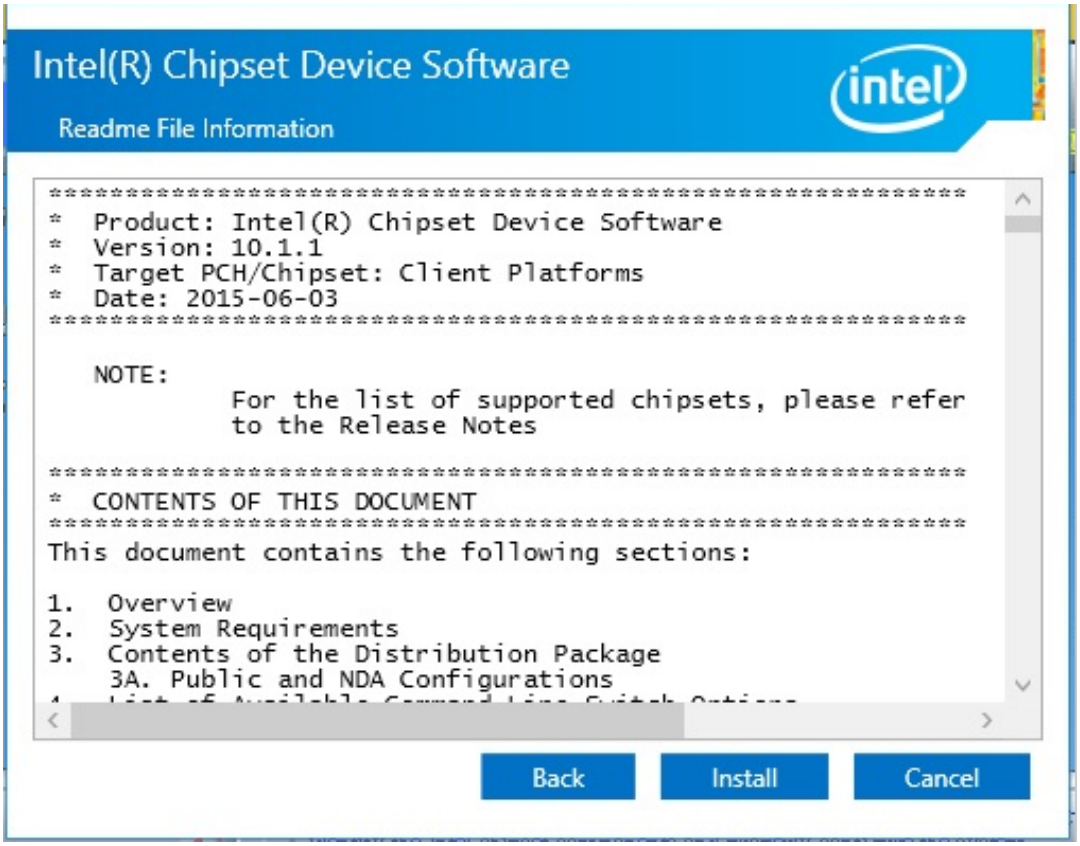
1. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page as shown. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. Click ***Intel(R) Chipset Software Installation Utility.***

3. When the ***Welcome*** screen to the ***Intel® Chipset Device Software*** appears, click ***Next*** to continue.

4. On the next screen, click ***Yes*** to accept the software license agreement.

5. On the ***Readme File Information*** screen, click ***Install*** to continue.



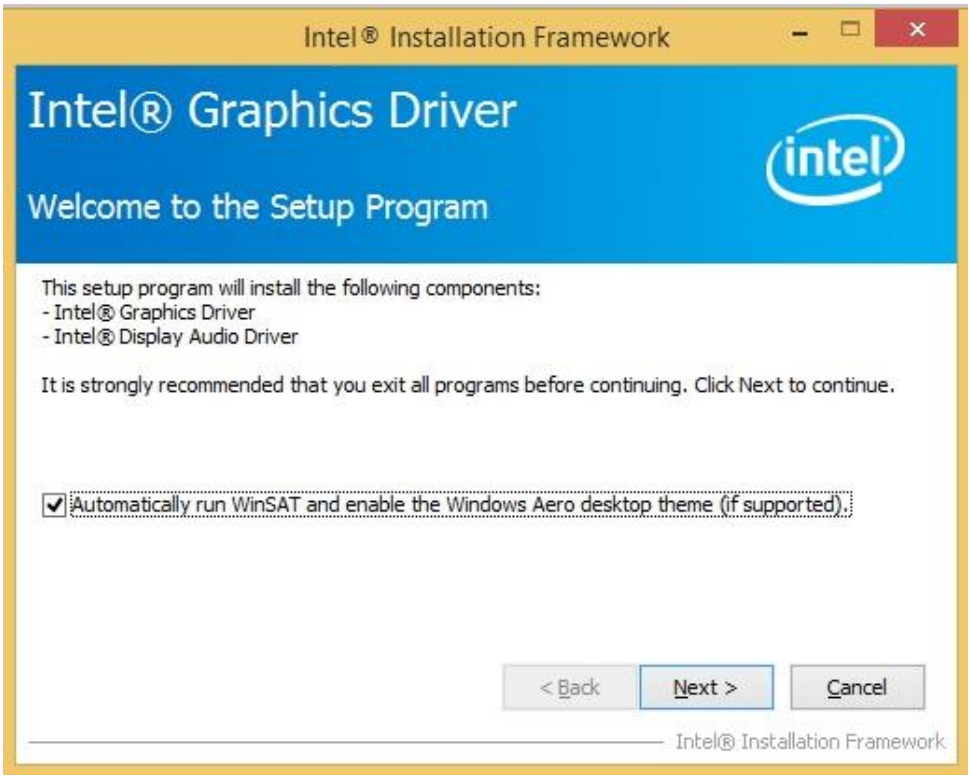

6. After the utility has been installed, click ***Finish*** to restart the computer and for changes to take effect.+

## 3.3 HD Graphics Driver Installation

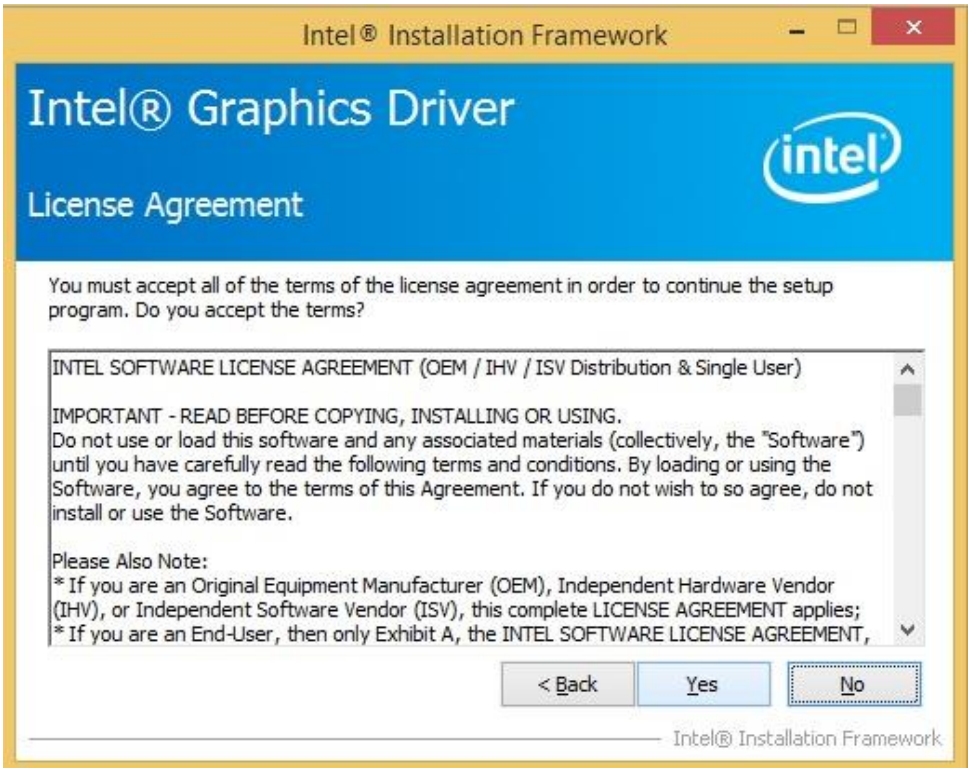
1. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. Click ***Intel(R) HD Graphics Driver***.

3. When the ***Welcome*** screen appears, click ***Next*** to continue.

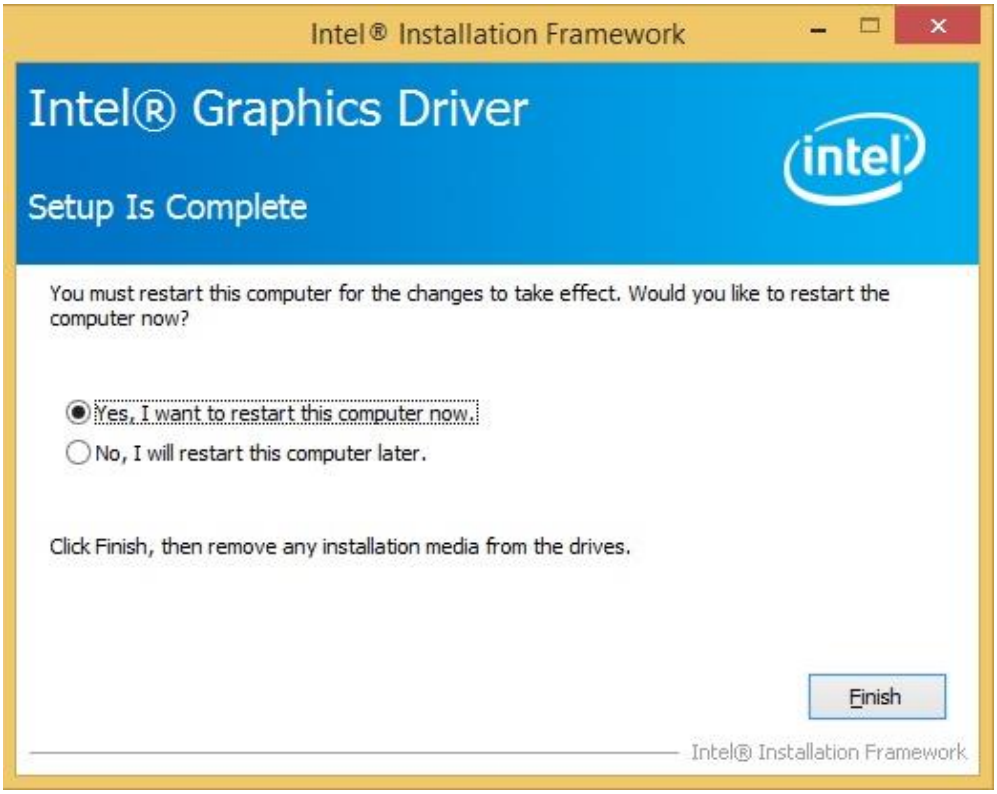



4. Click ***Yes*** to to agree with the license agreement and continue the installation.



5. On the screen shown below, click ***Install*** to continue.


6. When installation has been completed, click ***Finish*** to restart the computer and for changes to take effect.

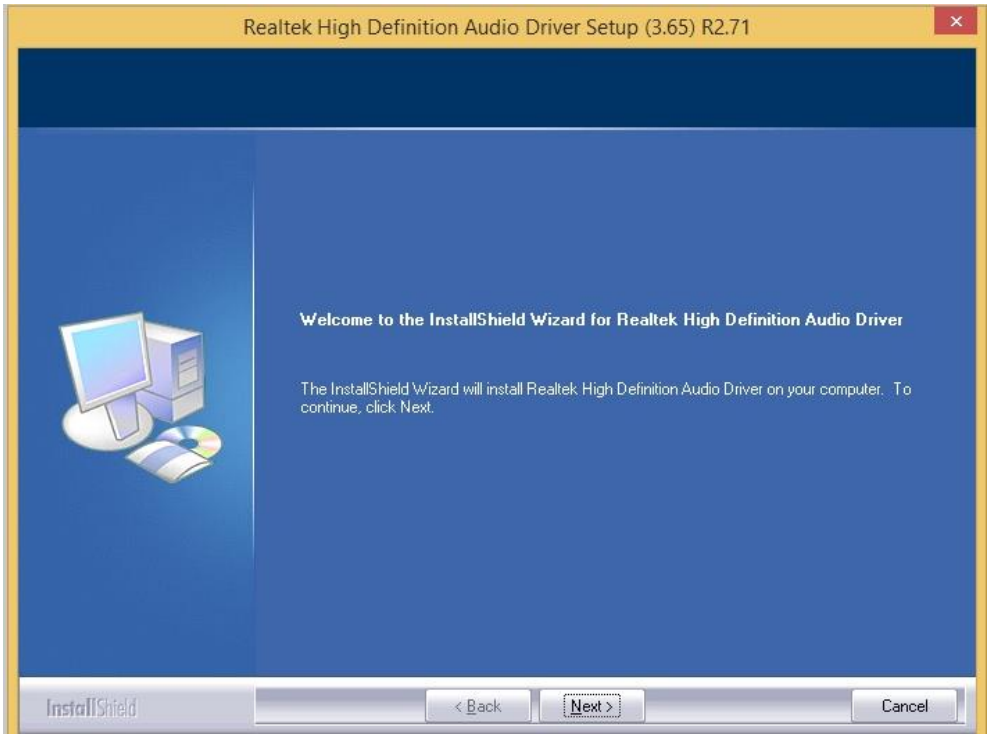


## 3.4 HD Audio Driver Installation

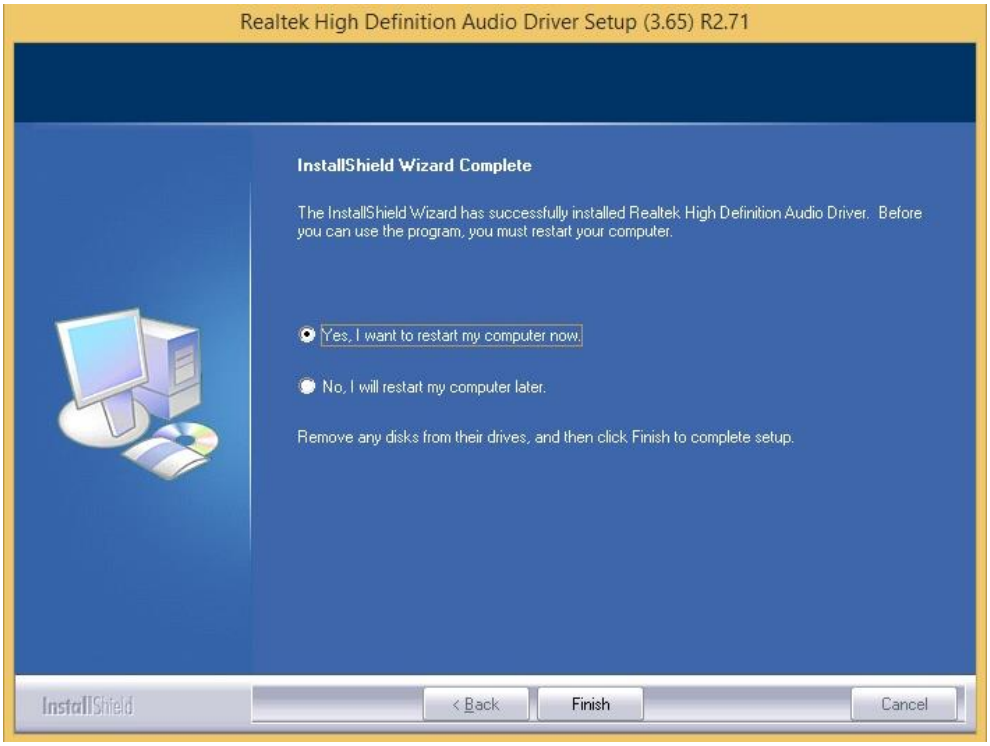
1. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. Click ***Realtek High Definition Audio Driver***.

3. On the ***Welcome to the InstallShield Wizard*** screen, click ***Next*** to proceed and complete the installation process.




4. After the ***InstallShield Wizard*** has completed the driver installation, restart the computer for changes to take effect.

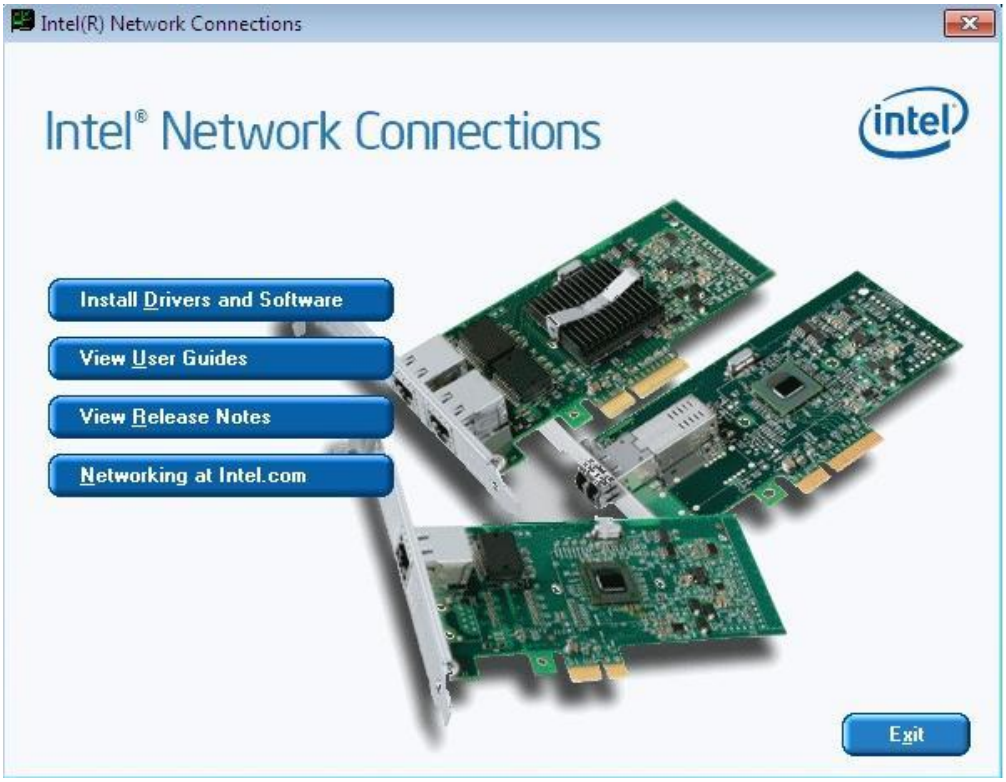


## 3.5 LAN Driver Installation

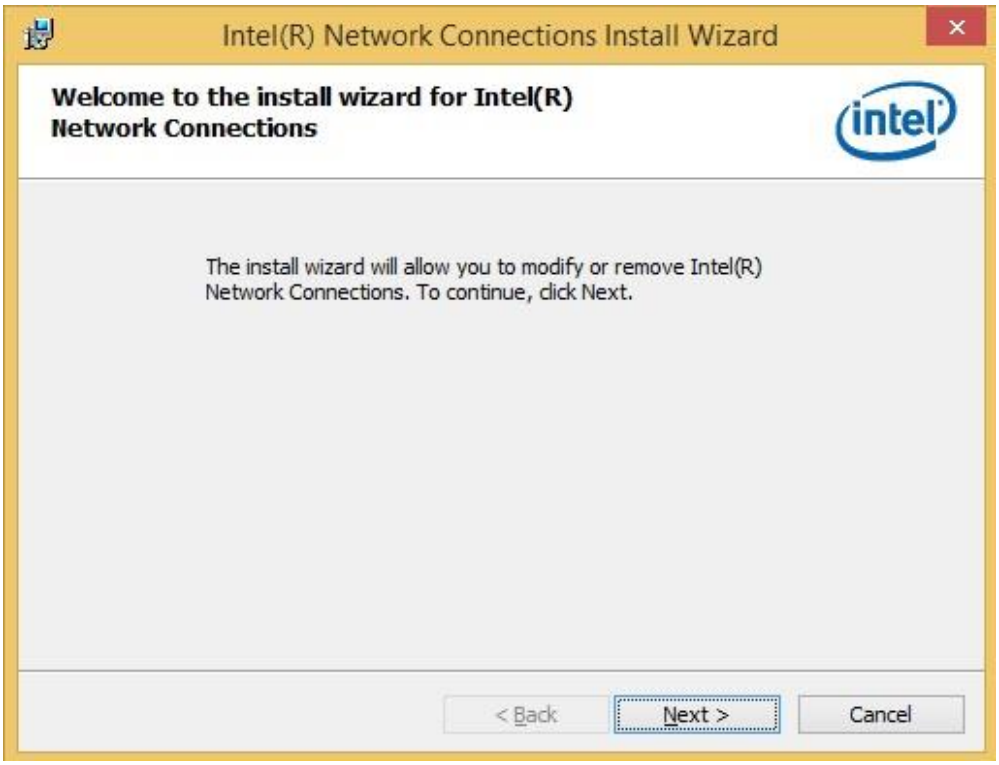
1. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. Click ***Intel(R) PRO LAN Network Driver***.

3. Click ***Install Drivers and Software***.

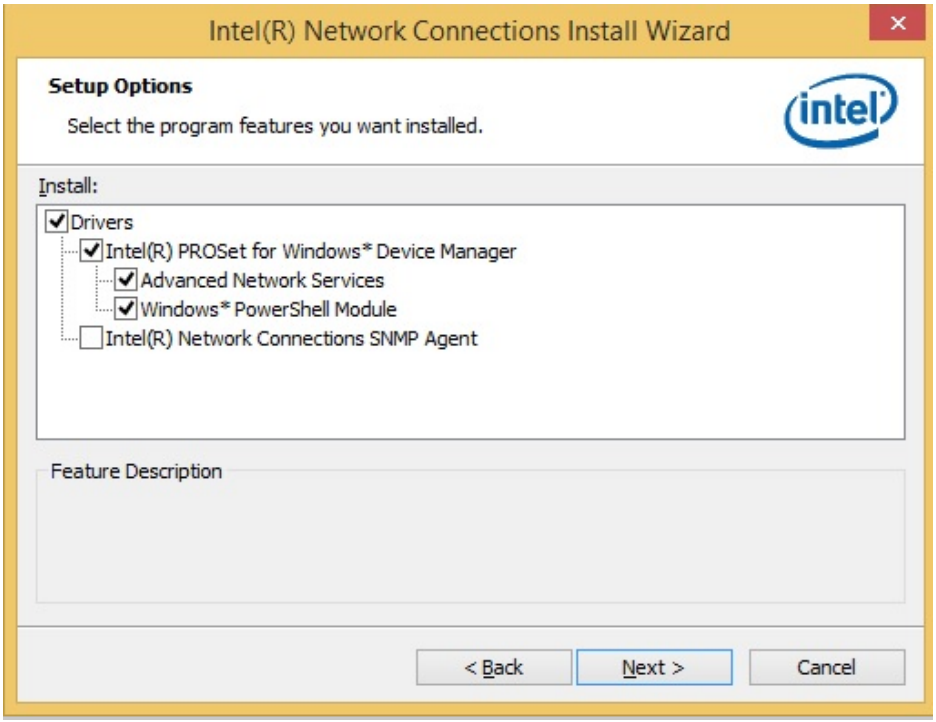



4. When the ***Welcome*** screen appears, click ***Next***.

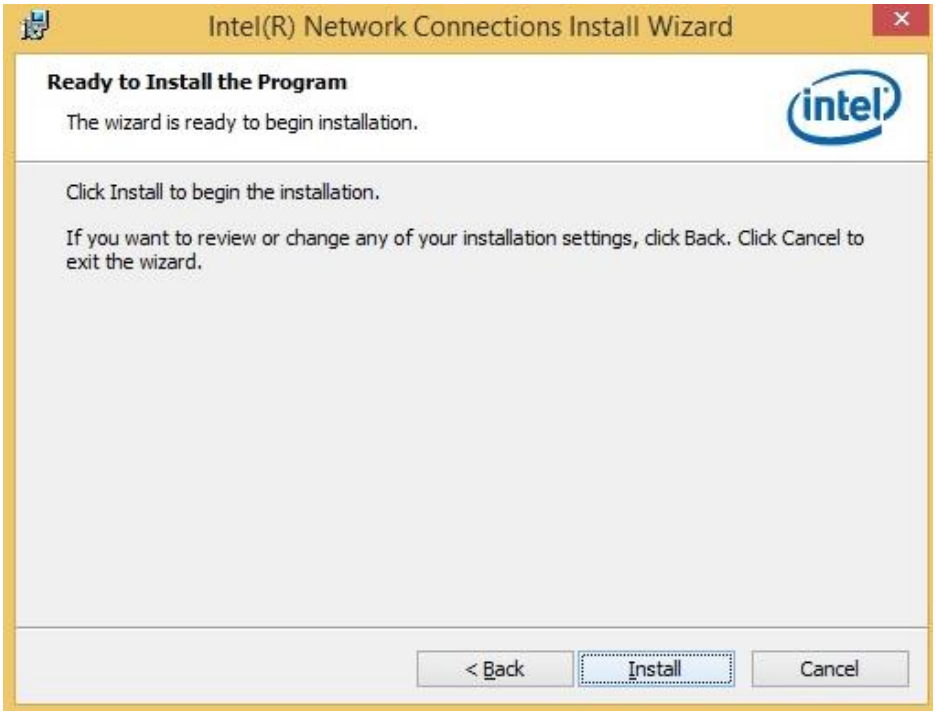


5. On the next screen, click ***Next*** to to agree with the license agreement.

6. Click the checkbox for Drivers in the Setup Options screen and click ***Next*** to continue.




7. Click ***Install*** to begin the installation.

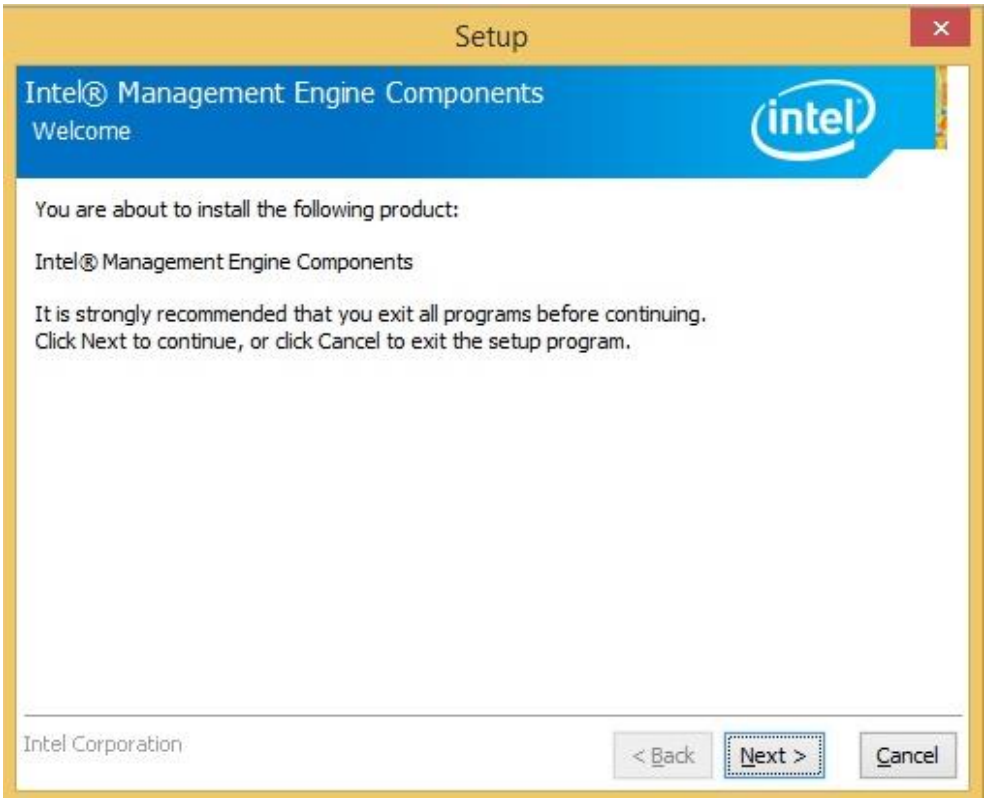



8. When InstallShield Wizard has completed the installation, click ***Finish***.

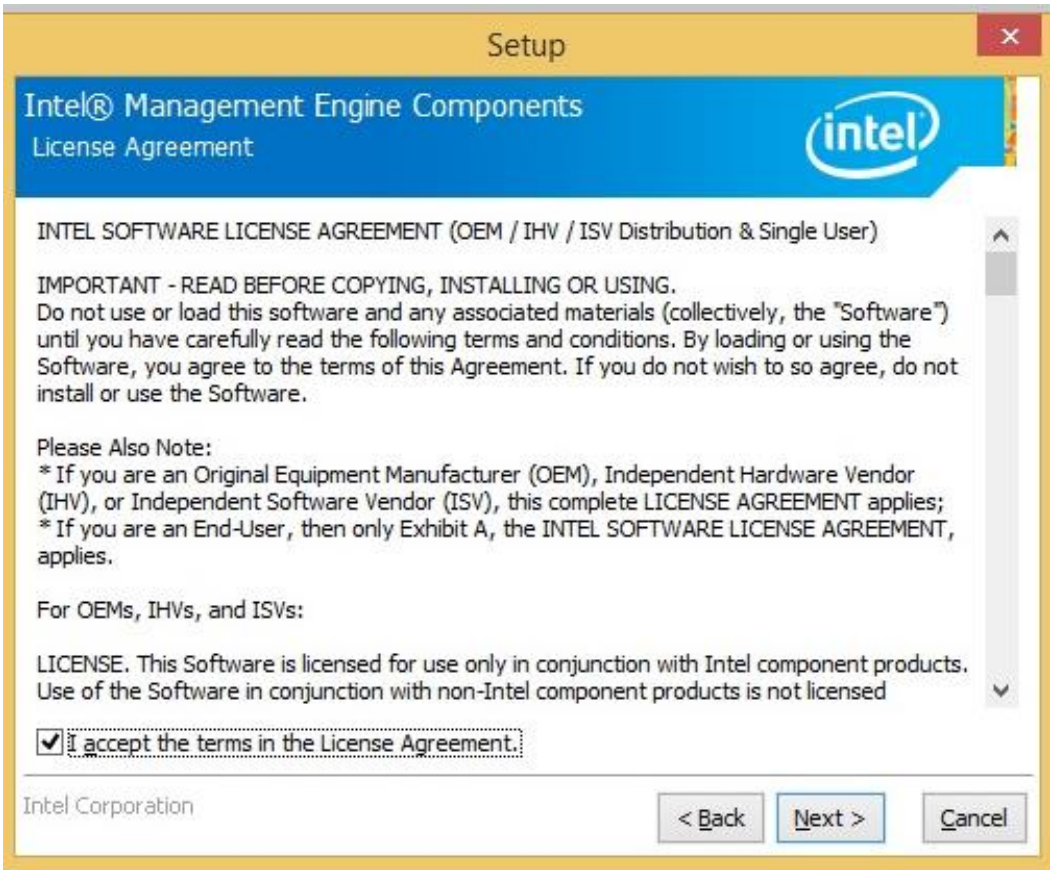
## 3.6 Intel® Management Engine Drivers Installation

1. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. When the ***Welcome*** screen to the ***Intel® Management Engine Components*** setup appears, click ***Next*** to continue.



3. Click ***Next*** to to agree with the license agreement.



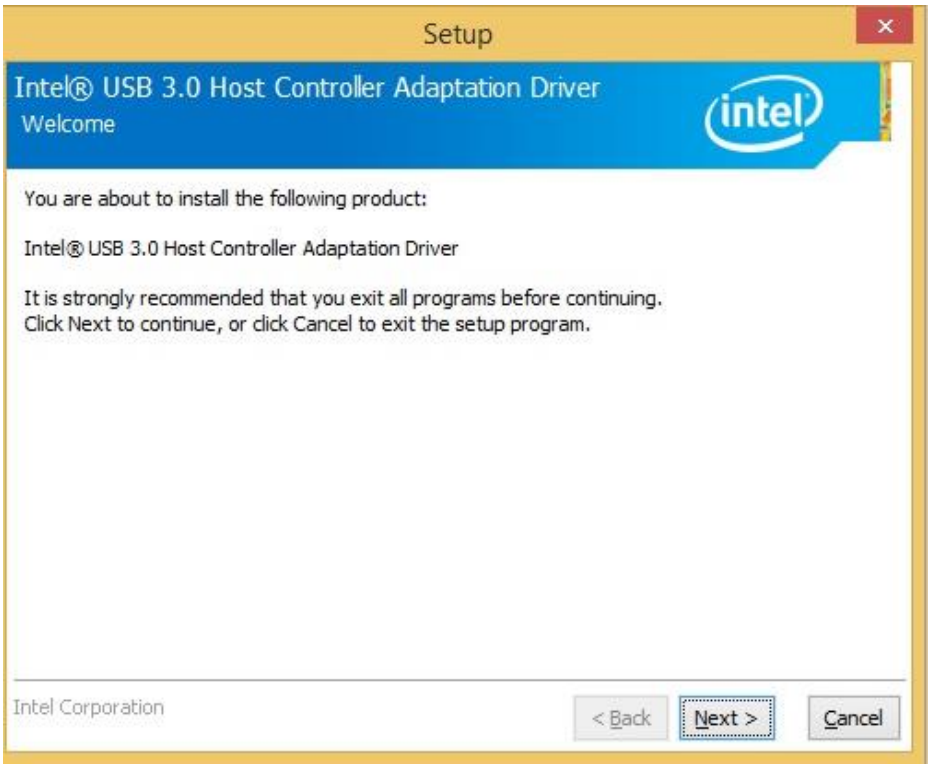

4. Follow the instructions accordingly. When the Setup Progress screen appears, click ***Next***. Click ***Finish*** when the components have been successfully installed.

## 3.7 Intel® USB 3.0 Drivers Installation

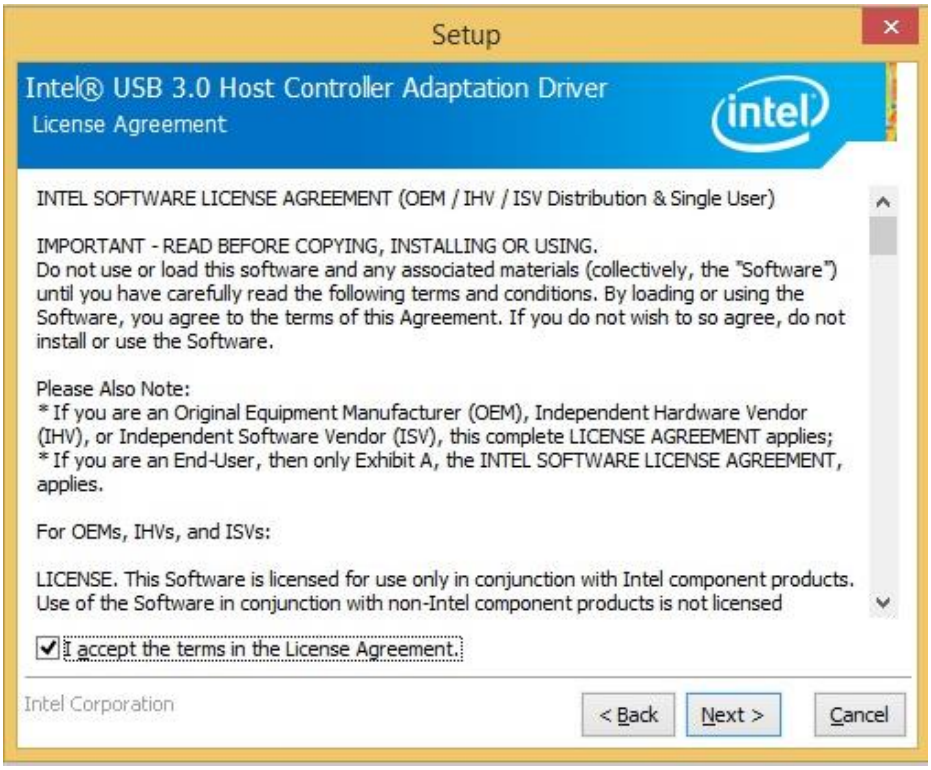
1. Click ***Intel*** and then ***Intel(R) Skylake Chipset Drivers***.


2. Click ***Intel(R) USB 3.0 Drivers***.

3. When the ***Welcome*** screen to the ***Intel® USB 3.0 Host Controller Adaptation Driver*** setup appears, click ***Next***.

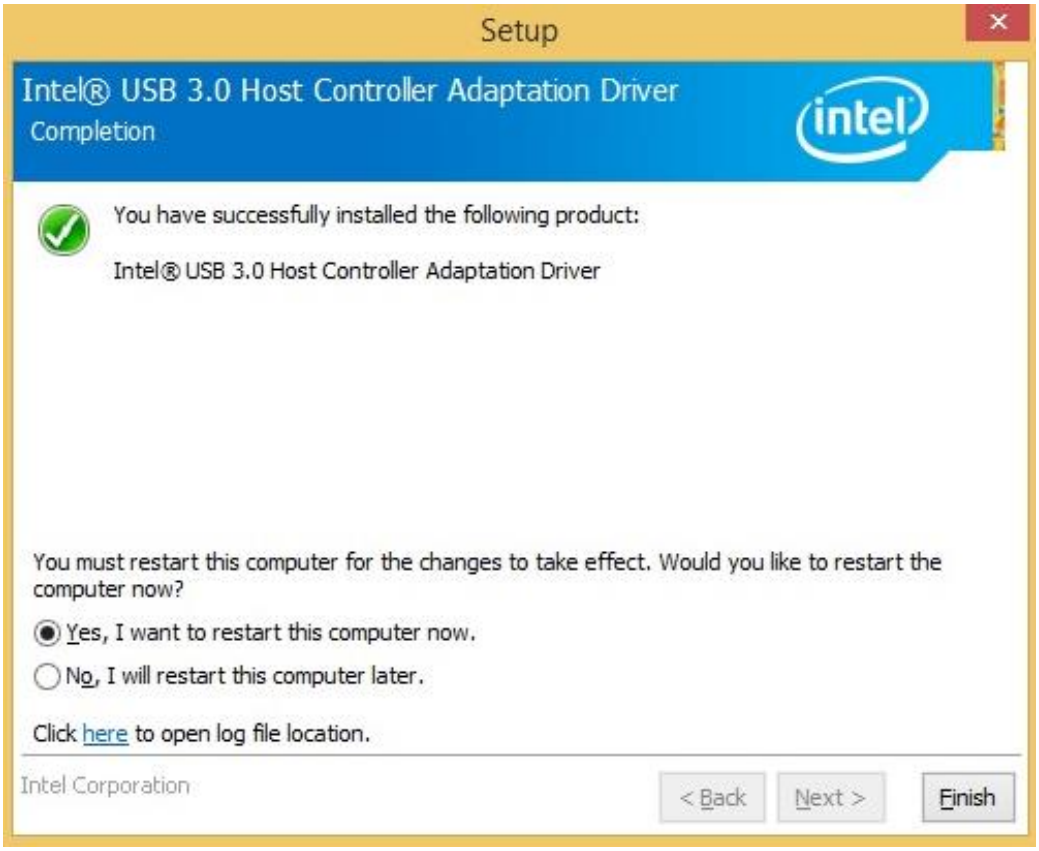



4. Click Next to to agree with the license agreement.



5. On the ***Readme File Information*** screen, click ***Next*** to continue and follow the instructions accordingly.

6. When the driver has been successfully installed, click ***Finish*** to restart the computer and for changes to take effect.



# Chapter 4
# BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Boot Settings
- Save & Exit

## 4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

### 4.1 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup.

If you still need to enter Setup, restart the system by pressing the ”Reset” button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

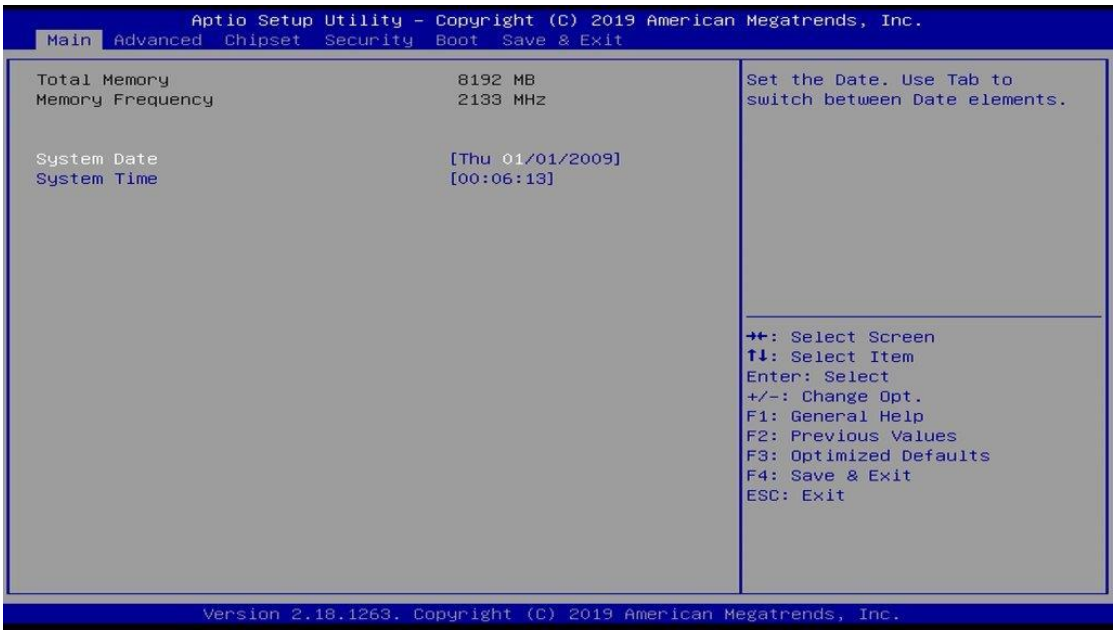
---

**Warning:** It is strongly recommended that you avoid making any changes to the chipset defaults.

These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

---

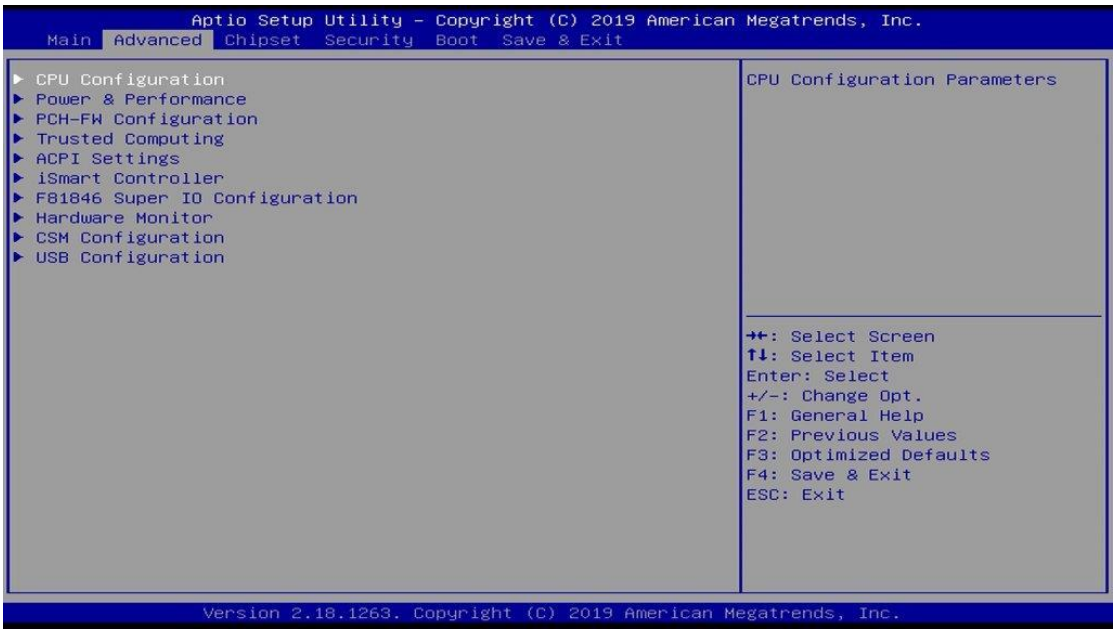
## 4.2 Main Settings




| BIOS Setting | Description |
|---|---|
| System Date | Sets the date. Use the <Tab> key to switch between the date elements. |
| System Time | Set the time. Use the <Tab> key to switch between the time elements. |

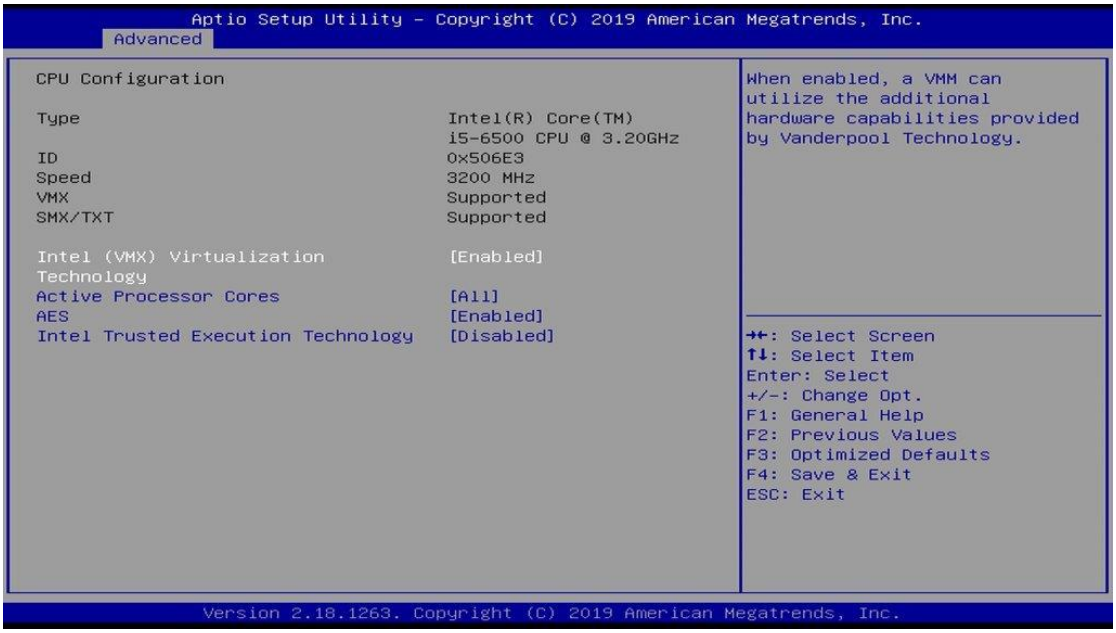
## 4.3 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



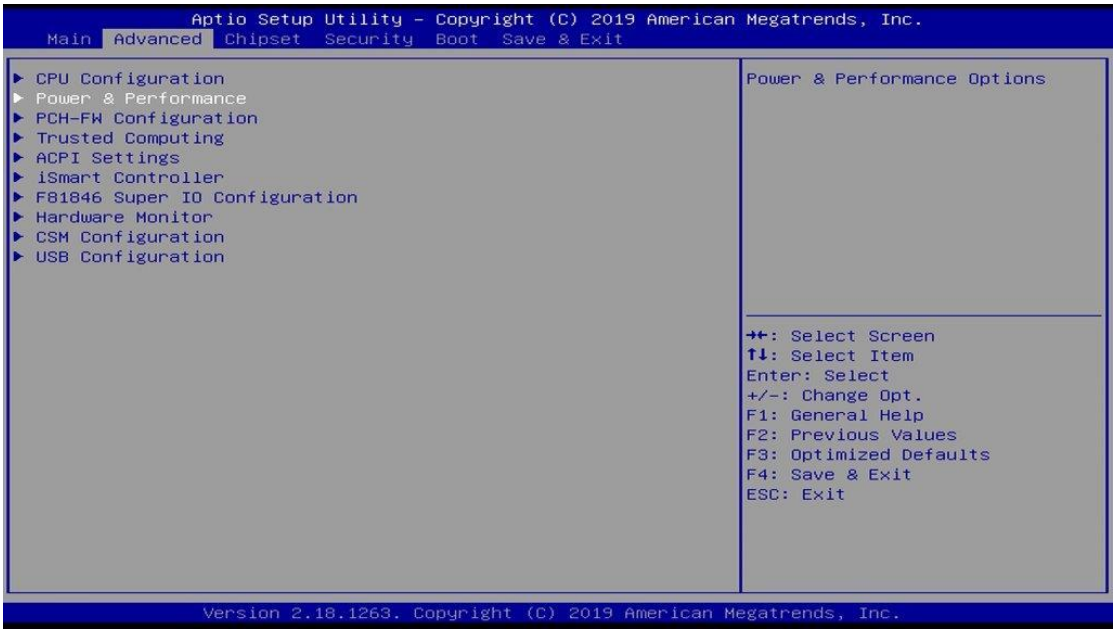

| BIOS Setting | Description |
|---|---|
| CPU Configuration | Displays CPU configuration parameters. |
| Power & Performance | Shows power and performance options. |
| PCH-FW Configuration | Configures management engine technology parameters. |
| Trusted Computing | Trusted computing settings. |
| ACPI Settings | Displays system ACPI parameters. |
| iSmart Controller | Sets up system power on settomgs. |
| Fintek Super IO Configuration | Displays super IO chip parameters. |
| Hardware Monitor | Shows hardware monitoring status. |
| CSM Configuration | Enables / Disables option ROM execution settings, etc. |
| USB Configuration | Displays USB configuration parameters. |

### 4.3.1 CPU Configuration



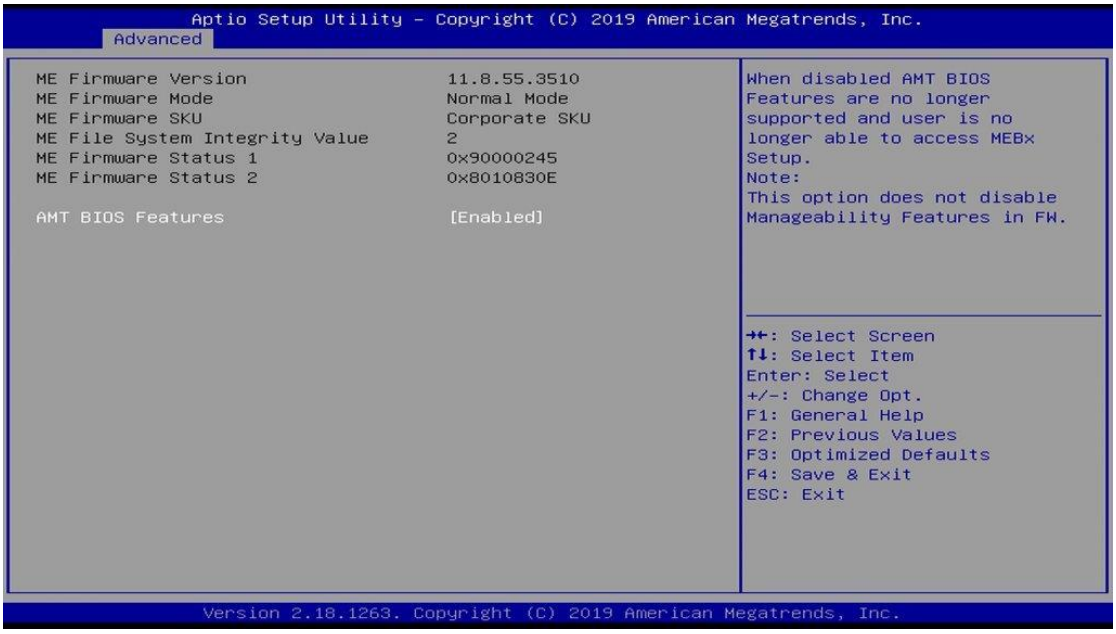

| BIOS Setting | Description |
|---|---|
| Intel(VMX) Virtualization Technology | Enables / Disables a VMM to utilize the additional hardware capabilities provided by Vanderpool Technology. |
| Active Processor Cores | Number of cores to enable in each processor package. Options: All, 1, 2, 3 |
| AES | Enables / Disables AES (Advanced Encription Standard). |
| Intel Trusted Execution Technology | Enables / Disables utilization of additional hardware capabilities provided by Intel(R) Trusted Execution Technology. Changes require a full power cycle to take effect. |

### 4.3.2 Power & Performance



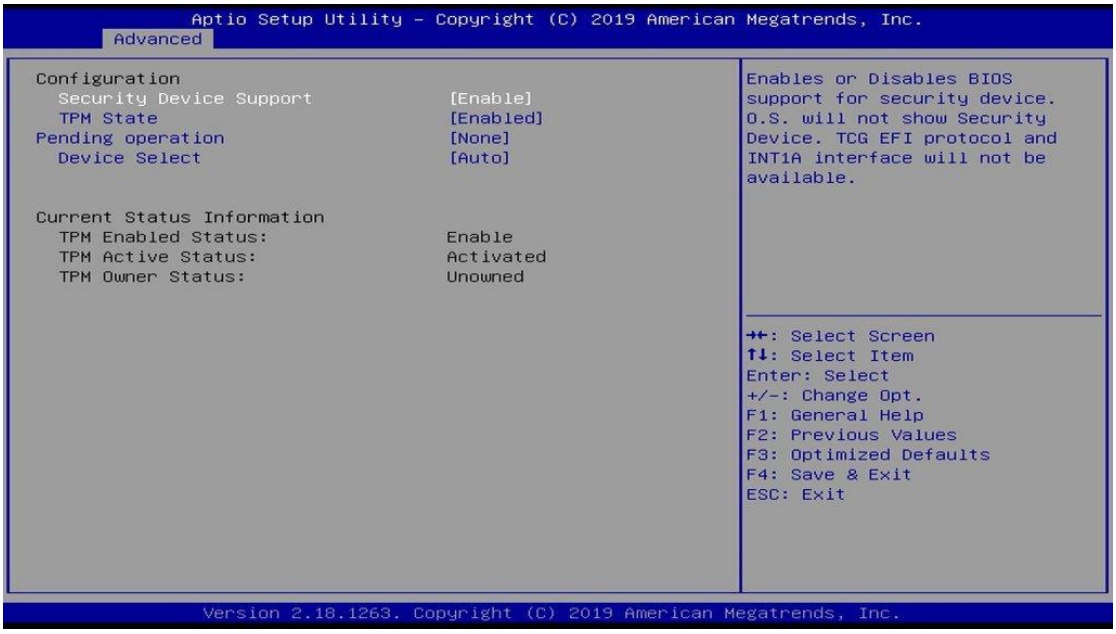

| BIOS Setting | Description |
|---|---|
| CPU – Power Management Control | CPU – Power Management Control Options |
| Intel® SpeedStep(tm) | Allows more than two frequency ranges to be supported |
| Intel® Speed Shift Technology | Enables / Disables Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states. |
| Turbo Mode | Enables / Disables processor Turbo Mode (requires EMMTTM enabled too). **Auto** means enabled, unless max. turbo ration is bigger than 16-SKL AO W/A. |

### 4.3.3 PCH-FW Configuration



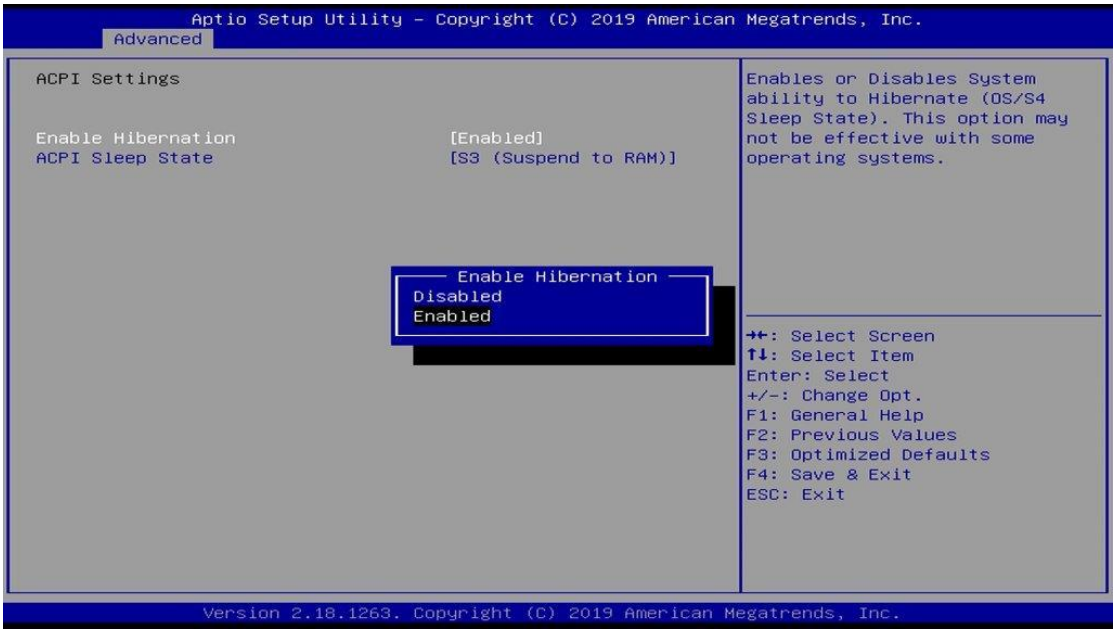

| BIOS Setting | Description |
|---|---|
| AMT BIOS Features | When disabled AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup.<br>Note: This option does not disable Manageability features in FM. |

### 4.3.4 Trusted Computing



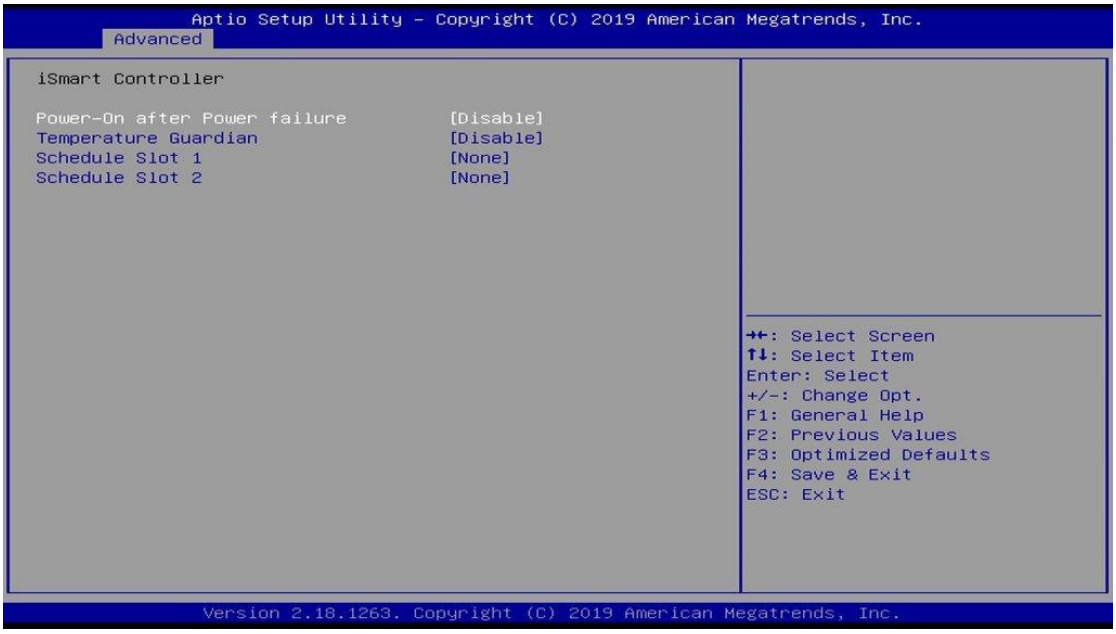

| BIOS Setting | Description |
|---|---|
| Security Device Support | Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTIA interface will not be available. |
| TPM State | Enables/Disables Security Device. NOTE: Your computer will reboot during restart in order to change State of the Device. |
| Pending operation | Schedule an operation for the security device.<br>NOTE: Your computer will reboot during restart in order to change state of security device. |
| Device Select | **TPM 1.2** will restrict support to TPM 1.2 devices.<br>**TPM 2.0** will restrict support ot TPM 2.0 devices.<br>**Auto** will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated. |

### 4.3.5 ACPI Settings



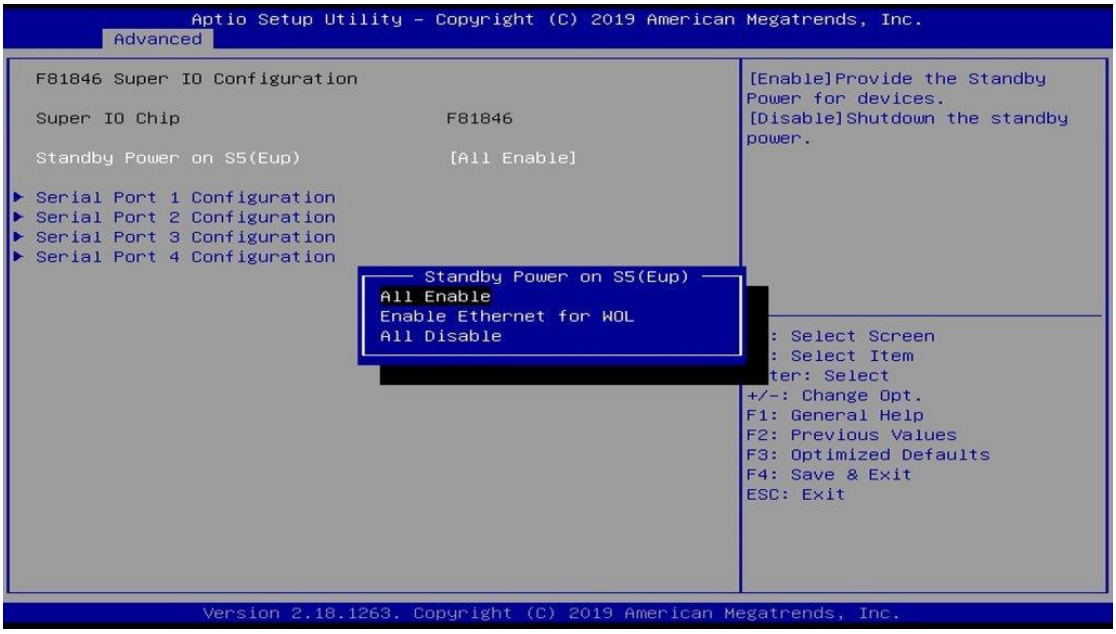

| BIOS Setting | Description |
|---|---|
| Enable Hibernation | Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS. |
| ACPI Sleep State | Selects an ACPI sleep state where the system will enter when the Suspend button is pressed.<br>Options: Suspend Disabled, S3 (Suspend to RAM) |

### 4.3.6 iSmart Controller



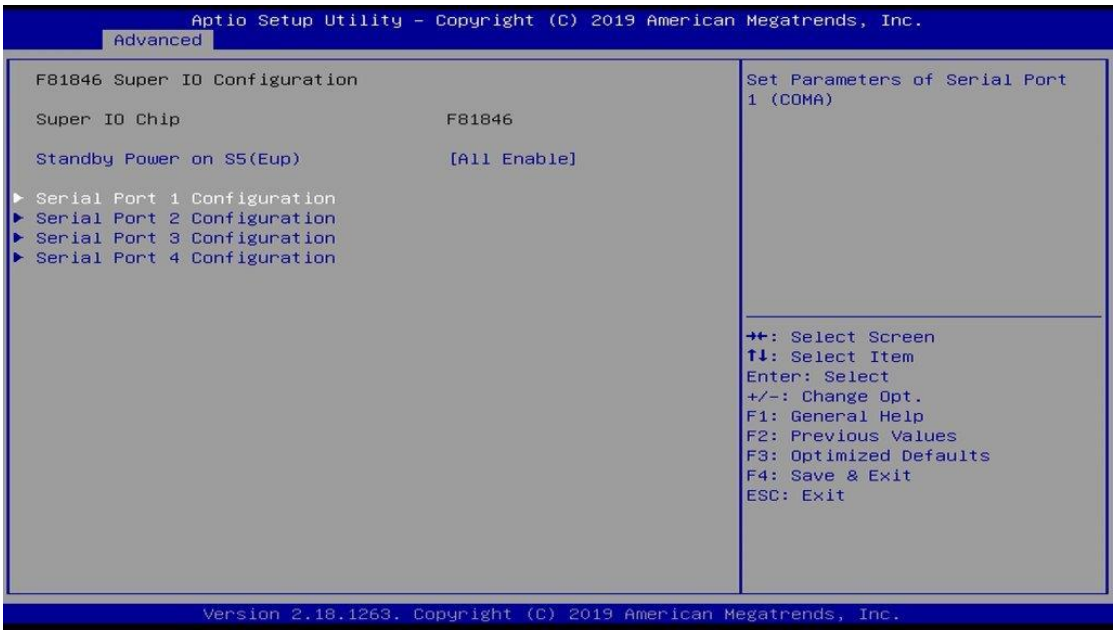

| BIOS Setting | Description |
|---|---|
| Power-On after Power failure | Options: Disable, Enable |
| Temperature Guardian | Options: Disable, Enable |
| Schedule Slots | Sets up the hour / minute system power on.<br>Options:<br>• None<br>• Power On<br>• Power On / Off |

### 4.3.7 F81846 Super IO Configuration



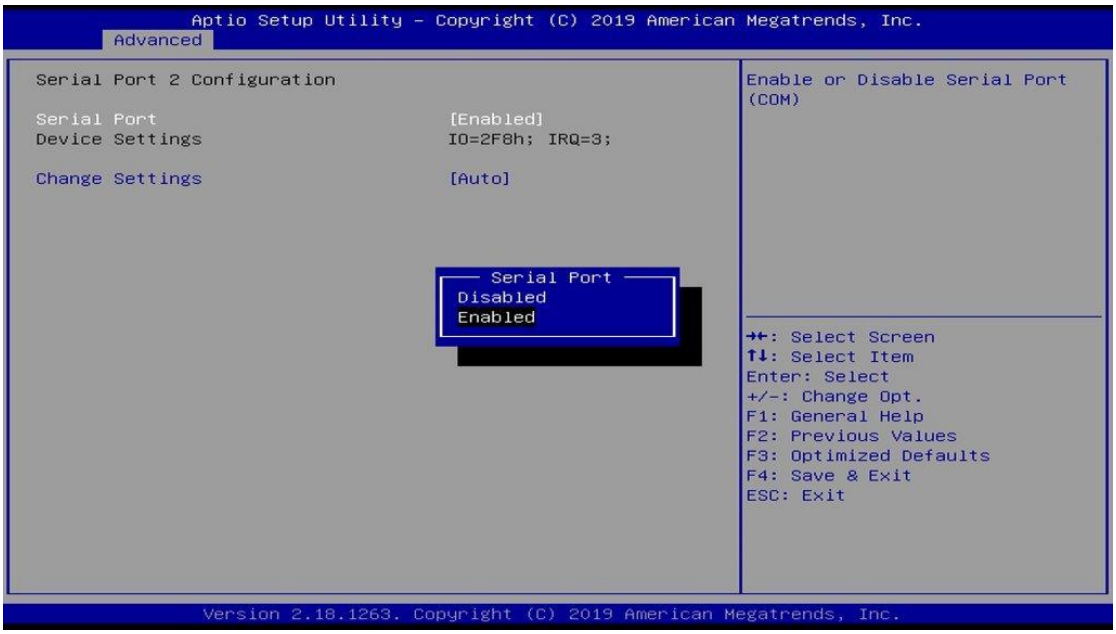

| BIOS Setting | Description |
|---|---|
| Standby Power on S5 (ErP) | Enable - provide the standby power for device.<br>Disable - shutdown the standby power.<br>Options: All Enable, Enable Ethernet for WOL, All Disable. |
| Serial Port Configuration | Sets parameters of Serial Ports.<br>Enables / Disables the serial port and select an optimal setting for the Super IO device. |

### 4.3.7.1 Serial Port 1 Configuration



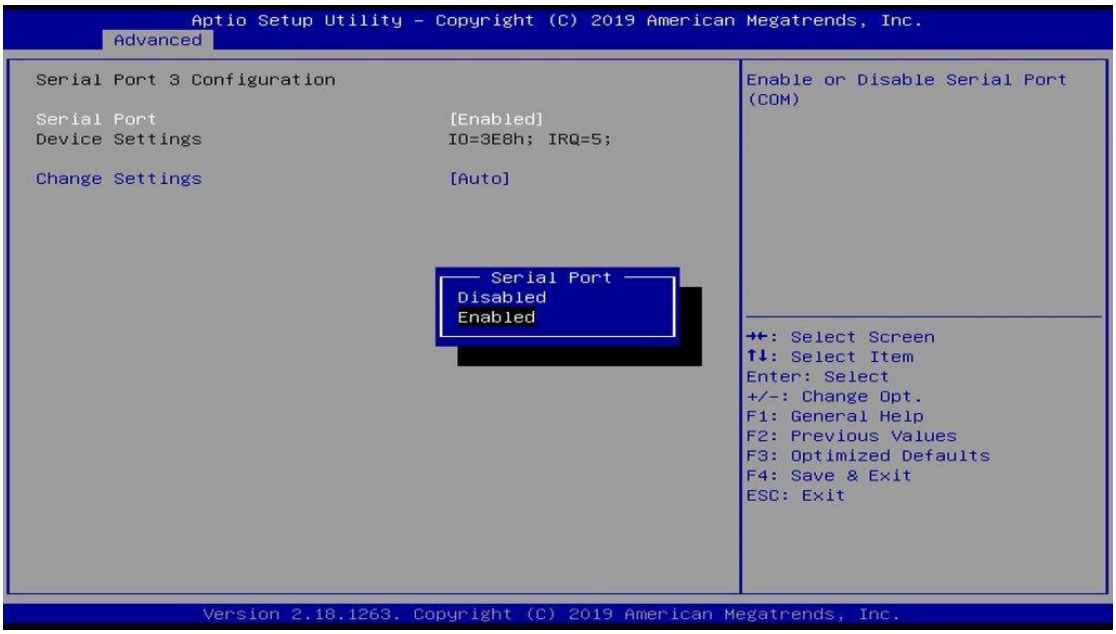

| BIOS Setting | Description |
|---|---|
| Serial Port | Enables / Disables the serial port. |
| Change Settings | Selects an optimal settings for Super I/O device.<br>Options:<br>• Auto<br>• IO = 3F8h; IRQ = 4<br>• IO = 3F8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2F8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 3E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12 |
| F81846 Serial Port1 Mode Select | F81846 serial port1 loop back//RS-232 / 422 / 485.<br>Options:<br>• RS232<br>• RS485<br>• RS422 |

### 4.3.7.2 Serial Port 2 Configuration



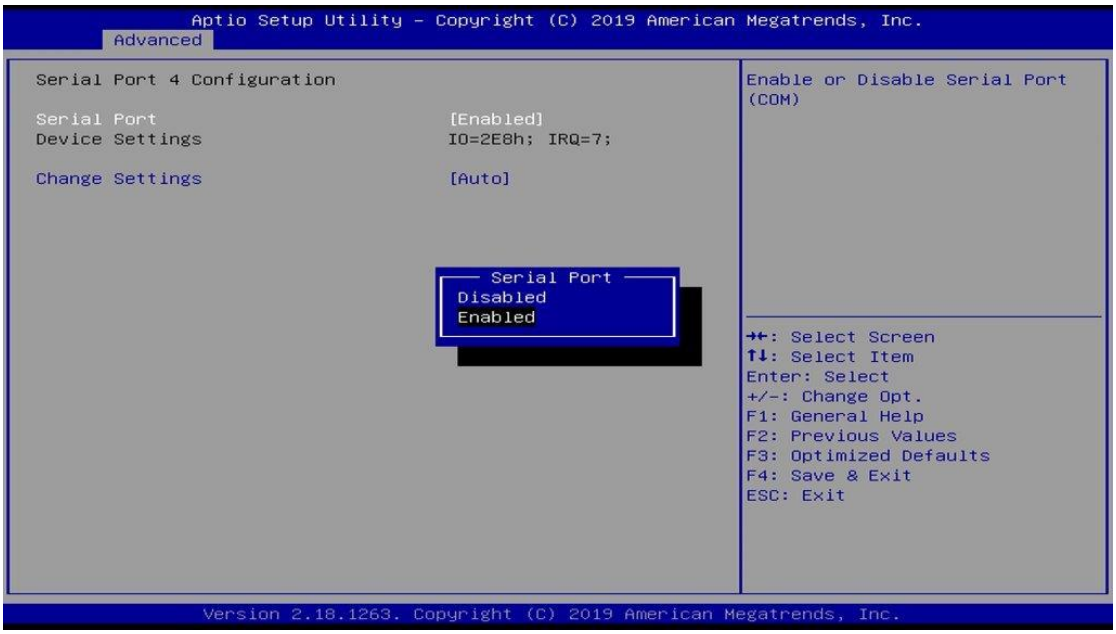

| BIOS Setting | Description |
|---|---|
| Serial Port | Enables / Disables the serial port. |
| Change Settings | Selects an optimal settings for Super I/O device.<br>Options:<br>• Auto<br>• IO = 2F8h; IRQ = 3<br>• IO = 3F8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2F8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 3E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12 |

### 4.3.7.3 Serial Port 3 Configuration



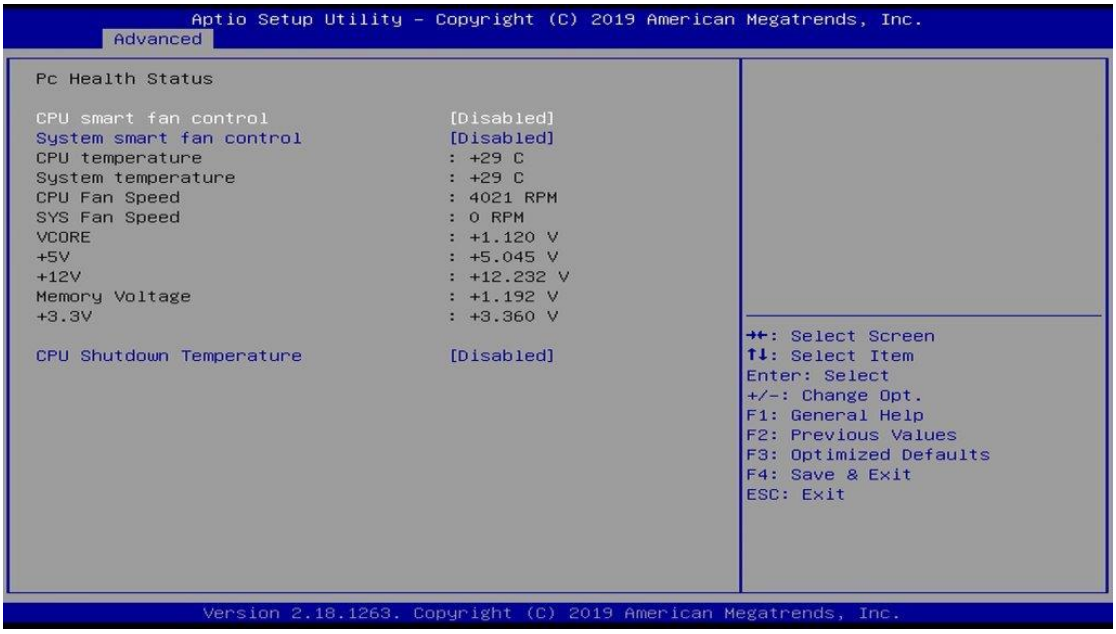

| BIOS Setting | Description |
|---|---|
| Serial Port | Enables / Disables the serial port. |
| Change Settings | Selects an optimal settings for Super I/O device.<br>Options:<br>• Auto<br>• IO = 3E8h; IRQ = 7<br>• IO = 3E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2F0h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E0h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12 |

### 4.3.7.4 Serial Port 4 Configuration



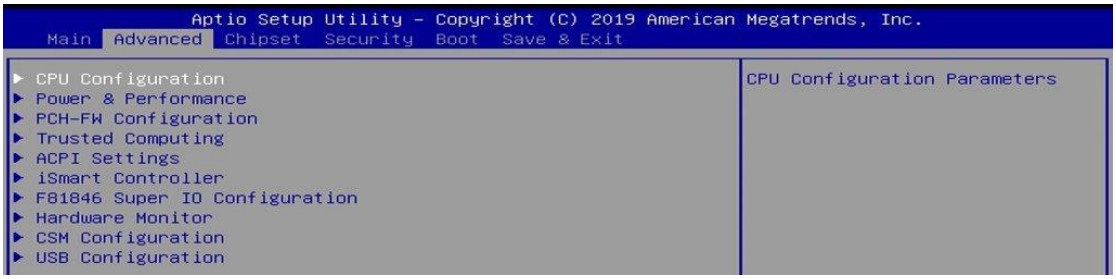

| BIOS Setting | Description |
|---|---|
| Serial Port | Enables / Disables the serial port. |
| Change Settings | Selects an optimal settings for Super I/O device.<br>Options:<br>• Auto<br>• IO = 2E8h; IRQ = 7<br>• IO = 3E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E8h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2F0h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12<br>• IO = 2E0h; IRQ = 3, 4, 5, 6, 7, 9, 10, 11, 12 |

### 4.3.8 Hardware Monitor




| BIOS Setting | Description |
|---|---|
| CPU Smart Fan Control | Enables / Disables the CPU smart fan feature.<br>Options: Disabled / 50°C / 60°C / 70°C / 80°C |
| System Smart Fan Control | Enables / Disables the system smart fan feature.<br>Options: Disabled / 50°C / 60°C / 70°C / 80°C |
| Temperatures / Voltages | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status. |
| CPU Shutdown Temperature | Options: Disabled / 70°C / 75°C / 80°C / 85°C / 90°C / 95°C |

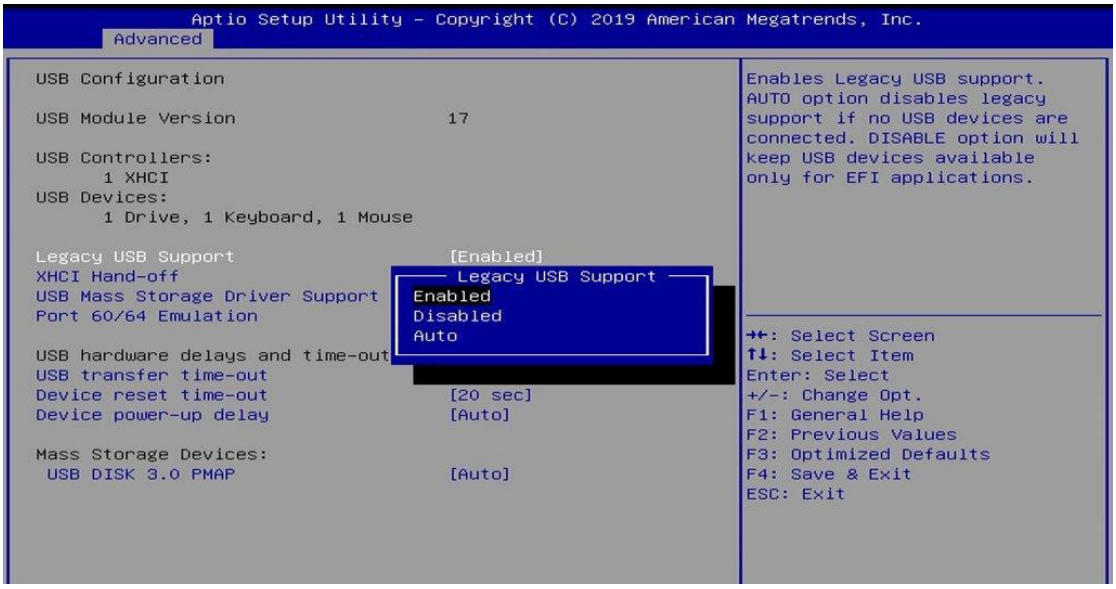
### 4.3.9 CSM Configuration





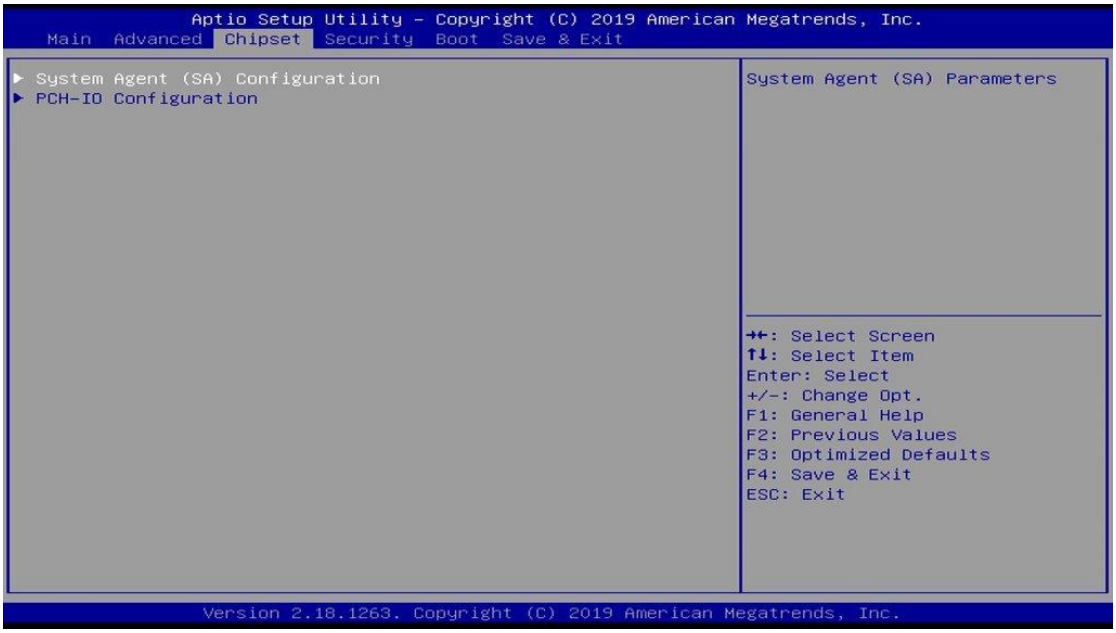
| BIOS Setting | Description |
|---|---|
| Network | Controls the execution of UEFI and Legacy PXE OpROM.<br>Options: Do not launch / Legacy |

### 4.3.10 USB Configuration



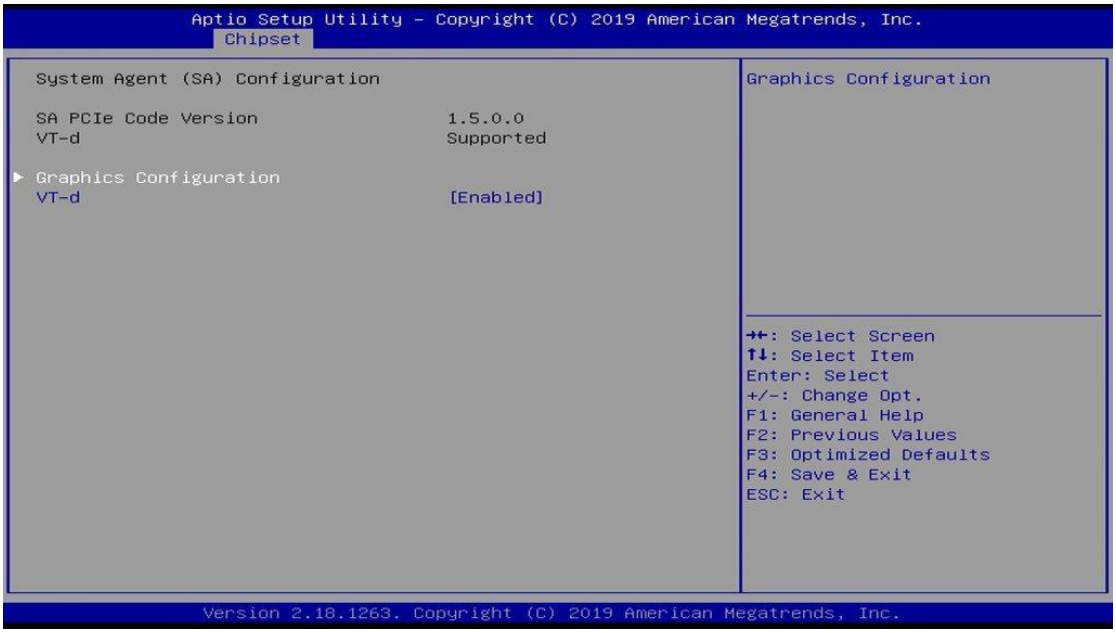

| BIOS Setting | Description |
|---|---|
| Legacy USB Support | **Auto** disables legacy support if there is no USB device connected. **Disable** keeps USB devices available only for EFI applications. |
| XHCI Hand-off | This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. |
| USB Mass Storage Driver Support | Enables / Disables the support for USB mass storage driver. |
| Port 60/64 Emulation | Enables / Disables I/O port 60h/64h emulation. This should be enabled for the complete USB KB legacy support for non-USB aware OSes. |
| USB Transfer time-out | The time-out value for control, bulk, and Interrupt transfers. Options: 1 sec / 5 sec / 10 sec / 20 sec |
| Device reset time-out | Seconds of delaying execution of start unit command to USB mass storage device.<br>Options: 10 sec / 20 sec / 30 sec / 40 sec |
| Device power-up delay | Maximum time the device will take before it roperly reports itself to the Host Controllwer. ‘Auto’ uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor. |
| Mass Storage Devices | Mass storage device emulation type. **Auto** enumerates devices according to their media format. Optical drives are emulated as **CROM**, deives with no medial will be emulated according to a drive type |

## 4.4 Chipset Settings

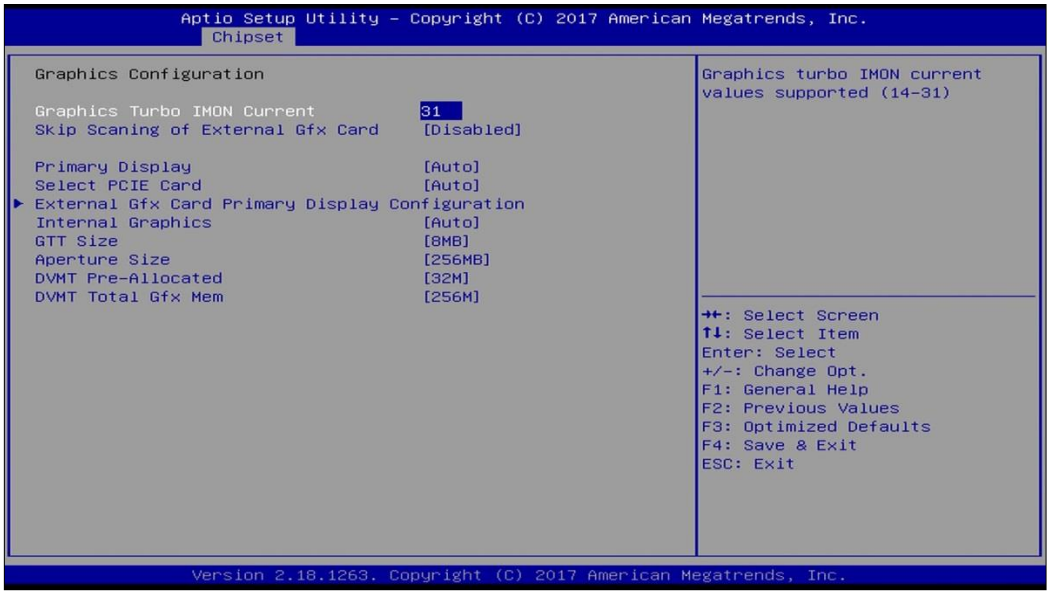



| BIOS Setting | Description |
|---|---|
| System Agent (SA) Configuration | System Agent (SA) parameters |
| PCH-IO Configuration | PCH parameters |

### 4.4.1 System Agent (SA) Configuration



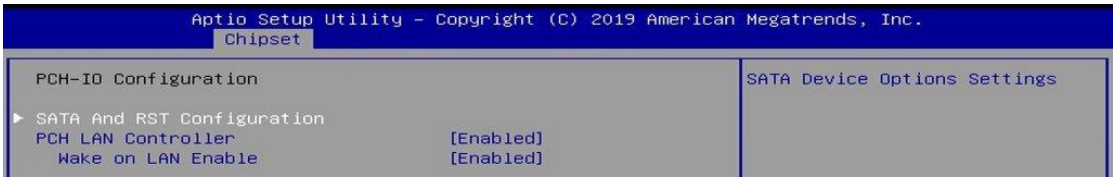
### 4.4.1.1 Graphics Configuration




| BIOS Setting | Description |
|---|---|
| Skip Scanning of External Gfx Card | If enabled, it will not scan for external Gfx Card on PEG and PCH PCIE ports. |
| Primary Display | Selects which of IGFX/PEG/PCI graphics device should be primary display, or selects SG for switchable Gfx. Options: Auto /IGFX /PEG /PCI /SG |
| External Gfx Card Primary Display Configuration | Configures the external Gfx card primary display.<br>• Primary PEG: Selects the primary PEG (options: Auto / PEG11 / PEG12).<br>• Primary PCIE: Selects the primary PCIe (options: Auto / PCIE1 ~ PCIE18) |
| Internal Graphics | Keep IGFX enabled based on the setup options.<br>Options: Auto / Disabled / Enabled |
| GTT Size | Sets the GTT size as 2MB, 4MB, or 8MB. |
| Aperture Size | Sets the aperture size as 128 MB / 256 MB / 512 MB / 1024 MB / 2048 MB.<br>Note: Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support. |
| DVMT Pre-Allocated | Sets DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics devce.<br>Options: 0M /32M /64M /4M /8M /12M /16M /20M /24M /28M /32M/F7 /36M /40M /44M /48M /52M /56M /60M |

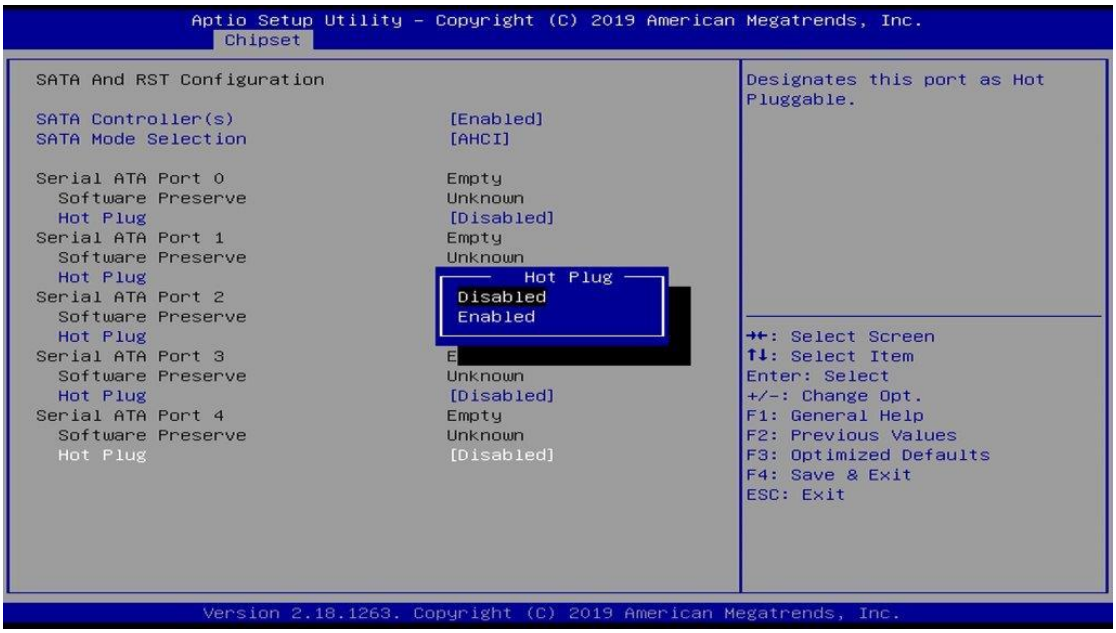
| | |
|---|---|
| DVMT Total Gfx Mem | Selects DVMT 5.0 total graphic memory size used by the internal graphcis device. Options: 256M/128M/MAX |

### 4.4.2 PCH-IO Configuration



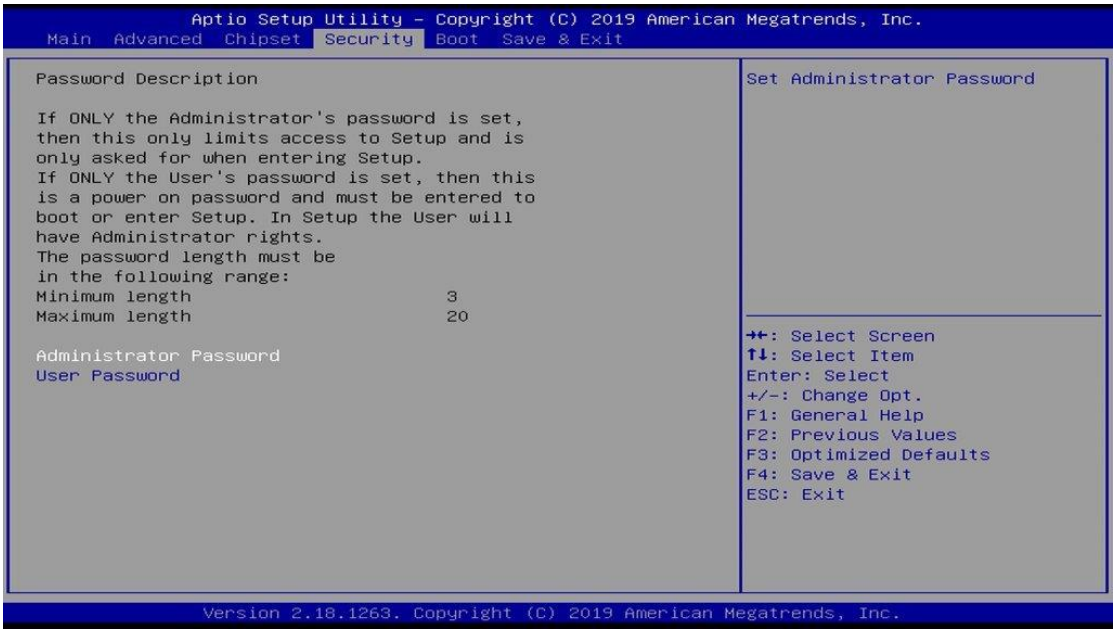

| BIOS Setting | Description |
|---|---|
| SATA and RST Configuration | Configures SATA devices. |
| PCH LAN Controller | Enables / Disables the onboard NIC. |
| Wake on LAN Enable | Enables / Disables the integrated LAN to wake up the system. |

#### 4.4.2.1 SATA and RST Configuration:



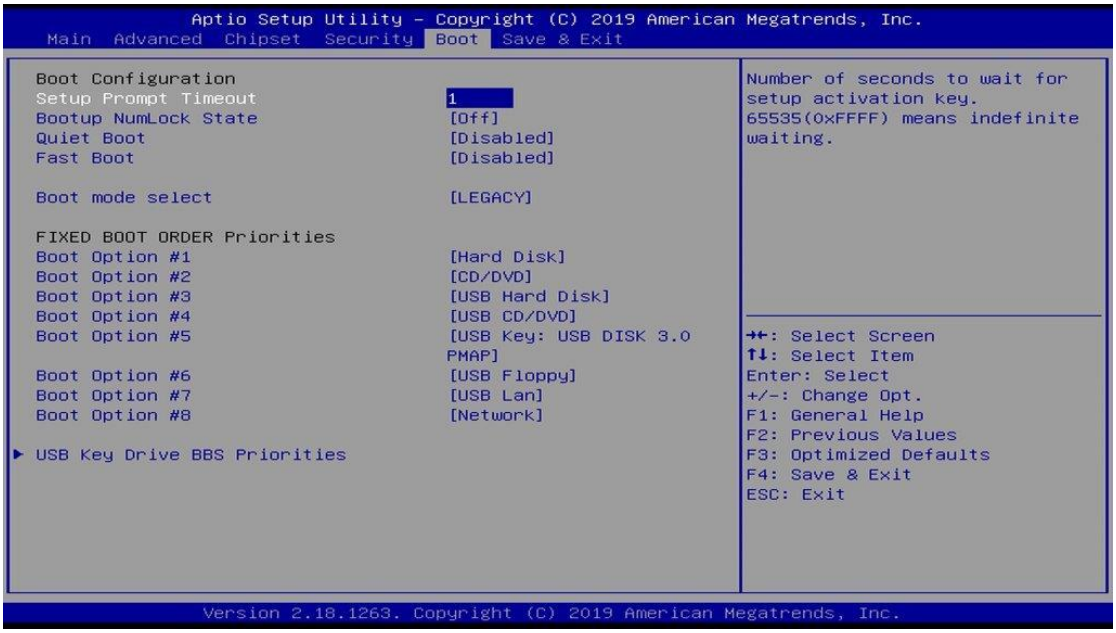

| BIOS Setting | Description |
|---|---|
| SATA Controller(s) | Enables / Disables the SATA device. |
| SATA Mode Selection | Determines how SATA controller(s) operate. Options: AHCI / Intel RST Premium |
| Serial ATA Port 0~2 | Enables / Disables Serial Port 0 ~ 2. |
| SATA Ports Hot Plug | Enables / Disables SATA Ports HotPlug. |

## 4.5 Security Settings



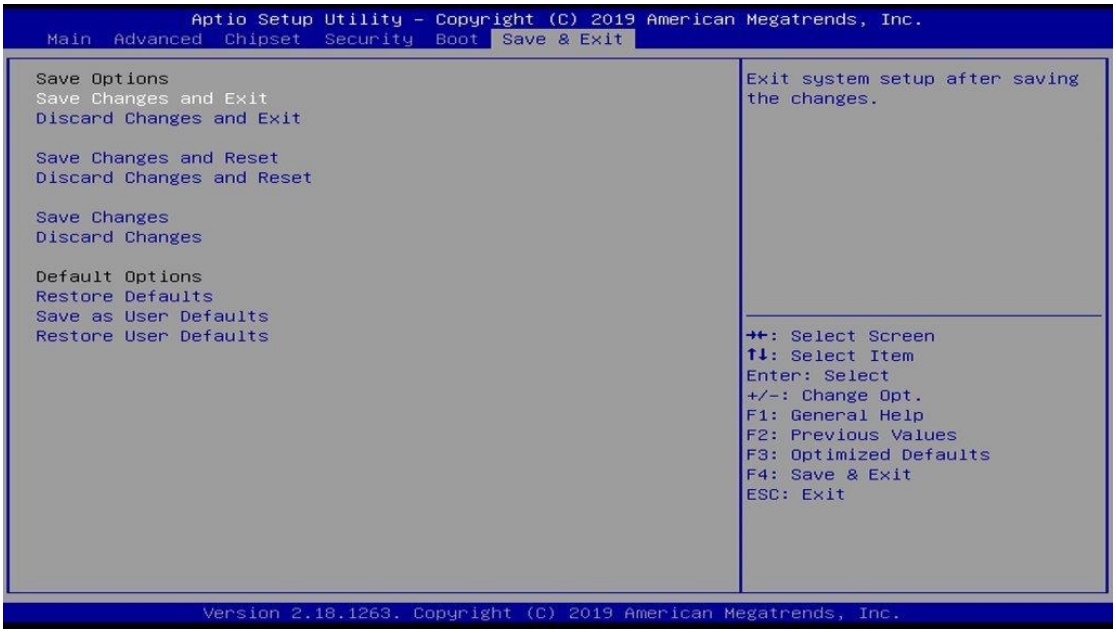

| BIOS Setting | Description |
|---|---|
| Administrator Password | Sets an administrator password for the setup utility. |
| User Password | Sets a user password. |

## 4.6 Boot Settings




| BIOS Setting | Description |
|---|---|
| Setup Prompt Timeout | Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting. |
| Bootup NumLock State | Selects the keyboard NumLock state. |
| Quiet Boot | Enables / Disables Quiet Boot option. |
| Fast Boot | Enables / Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options. |
| Boot mode select | Options: LEGACY, UEFI |
| FIXED BOOT ORDER Priorities | Sets the system boot order. |
| USB Key Drive BBS Priorities | Specifies the Boot Device Priority sequence from available USB Key Drives |

## 4.7 Save & Exit Settings




| BIOS Setting | Description |
|---|---|
| Save Changes and Exit | Exits system setup after saving the changes. |
| Discard Changes and Exit | Exits system setup without saving any changes. |
| Save Changes and Reset | Resets the system after saving the changes. |
| Discard Changes and Reset | Resets system setup without saving any changes. |
| Save Changes | Saves changes done so far to any of the setup options. |
| Discard Changes | Discards changes done so far to any of the setup options. |
| Restore Defaults | Restores / Loads defaults values for all the setup options. |
| Save as User Defaults | Saves the changes done so far as User Defaults. |
| Restore User Defaults | Restores the user defaults to all the setup options. |

# Appendix

This section provides the mapping addresses of peripheral devices and the sample code of watchdog timer configuration.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer Configuration

# A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

| Address | Device Description |
|---|---|
| 0x00000A00-0x00000A0F | Motherboard resources |
| 0x00000A10-0x00000A1F | Motherboard resources |
| 0x00000A10-0x00000A1F | Motherboard resources |
| 0x0000002E-0x0000002F | Motherboard resources |
| 0x0000004E-0x0000004F | Motherboard resources |
| 0x00000061-0x00000061 | Motherboard resources |
| 0x00000063-0x00000063 | Motherboard resources |
| 0x00000065-0x00000065 | Motherboard resources |
| 0x00000067-0x00000067 | Motherboard resources |
| 0x00000070-0x00000070 | Motherboard resources |
| 0x00000070-0x00000070 | System CMOS/real time clock |
| 0x00000080-0x00000080 | Motherboard resources |
| 0x00000092-0x00000092 | Motherboard resources |
| 0x000000B2-0x000000B3 | Motherboard resources |
| 0x00000680-0x0000069F | Motherboard resources |
| 0x0000FFFF-0x0000FFFF | Motherboard resources |
| 0x0000FFFF-0x0000FFFF | Motherboard resources |
| 0x0000FFFF-0x0000FFFF | Motherboard resources |
| 0x00001800-0x000018FE | Motherboard resources |
| 0x0000164E-0x0000164F | Motherboard resources |
| 0x00000020-0x00000021 | Programmable interrupt controller |
| 0x00000024-0x00000025 | Programmable interrupt controller |
| 0x00000028-0x00000029 | Programmable interrupt controller |
| 0x0000002C-0x0000002D | Programmable interrupt controller |
| 0x00000030-0x00000031 | Programmable interrupt controller |
| 0x00000034-0x00000035 | Programmable interrupt controller |
| 0x00000038-0x00000039 | Programmable interrupt controller |
| 0x0000003C-0x0000003D | Programmable interrupt controller |
| 0x000000A0-0x000000A1 | Programmable interrupt controller |
| 0x000000A4-0x000000A5 | Programmable interrupt controller |

| Address | Device Description |
|---|---|
| 0x000000A8-0x000000A9 | Programmable interrupt controller |
| 0x000000AC-0x000000AD | Programmable interrupt controller |
| 0x000000B0-0x000000B1 | Programmable interrupt controller |
| 0x000000B4-0x000000B5 | Programmable interrupt controller |
| 0x000000B8-0x000000B9 | Programmable interrupt controller |
| 0x000000BC-0x000000BD | Programmable interrupt controller |
| 0x000004D0-0x000004D1 | Programmable interrupt controller |
| 0x00000800-0x0000087F | Motherboard resources |
| 0x0000E000-0x0000EFFF | Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115 |
| 0x000000F0-0x000000F0 | Numeric data processor |
| 0x0000F090-0x0000F097 | Standard SATA AHCI Controller |
| 0x0000F080-0x0000F083 | Standard SATA AHCI Controller |
| 0x0000F060-0x0000F07F | Standard SATA AHCI Controller |
| 0x000003F8-0x000003FF | Communications Port (COM1) |
| 0x000002F8-0x000002FF | Communications Port (COM2) |
| 0x000003E8-0x000003EF | Communications Port (COM3) |
| 0x000002E8-0x000002EF | Communications Port (COM4) |
| 0x00000040-0x00000043 | System timer |
| 0x00000050-0x00000053 | System timer |
| 0x00001854-0x00001857 | Motherboard resources |
| 0x00000000-0x00000CF7 | PCI Express Root Complex |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex |
| 0x0000F0A0-0x0000F0A7 | Intel(R) Active Management Technology - SOL (COM5) |
| 0x0000F000-0x0000F03F | Intel(R) HD Graphics 630 |
| 0x000003B0-0x000003BB | Intel(R) HD Graphics 630 |
| 0x000003C0-0x000003DF | Intel(R) HD Graphics 630 |
| 0x0000FF00-0x0000FFFE | Motherboard resources |
| 0x0000F040-0x0000F05F | Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123 |
| 0x00000060-0x00000060 | Standard PS/2 Keyboard |
| 0x00000064-0x00000064 | Standard PS/2 Keyboard |

**4.8**

## B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

| Level | Function |
|---|---|
| IRQ 0 | System timer |
| IRQ 1 | Standard PS/2 Keyboard |
| IRQ 3 | Communications Port (COM2) |
| IRQ 4 | Communications Port (COM1) |
| IRQ 5 | Communications Port (COM3) |
| IRQ 7 | Communications Port (COM4) |
| IRQ 8 | System CMOS/real time clock |
| IRQ 11 | Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123 |
| IRQ 11 | Intel(R) 100 Series/C230 Series Chipset Family Thermal subsystem - A131 |
| IRQ 12 | Microsoft PS/2 Mouse |
| IRQ 13 | Numeric data processor |
| IRQ 14 | Motherboard resources |
| IRQ 16 | High Definition Audio Controller |
| IRQ 19 | Intel(R) Active Management Technology - SOL (COM5) |
| IRQ 54 ~ IRQ 204 | Microsoft ACPI-Compliant System |
| IRQ 256 ~ IRQ 511 | Microsoft ACPI-Compliant System |
| IRQ 4294967283 | Intel(R) Management Engine Interface |
| IRQ 4294967284 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967285 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967286 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967287 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967288 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967289 | Intel(R) I211 Gigabit Network Connection |
| IRQ 4294967290 | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| IRQ 4294967291 | Intel(R) HD Graphics 630 |
| IRQ 4294967292 | Intel(R) Ethernet Connection (2) I219-LM |
| IRQ 4294967293 | Standard SATA AHCI Controller |
| IRQ 4294967294 | Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115 |

## C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for the use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

### Sample Code

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81866.H"
//---------------------------------------------------------------------------
int main (int argc, char *argv[]); void EnableWDT(int);
void DisableWDT(void);
//---------------------------------------------------------------------------
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        char SIO;
        printf("Fintek 81866 watch dog program\n");
        SIO = Init_F81866();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81866, program abort.\n");
                return(1);
        }//if (SIO == 0)

        if (argc != 2)
        {
                printf(" Parameter incorrect!!\n");
                return (1);
```

```
        }

        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        if (bTime)
        {       EnableWDT(bTime); }
        else
        {       DisableWDT();  }
        return 0;
}
//-------------------------------------------------------------------------
void EnableWDT(int interval)
{
        unsigned char bBuf;

        bBuf = Get_F81866_Reg(0x2B);
        bBuf &= (~0x20);
        Set_F81866_Reg(0x2B, bBuf);             //Enable WDTO

        Set_F81866_LD(0x07);                    //switch to logic device 7
        Set_F81866_Reg(0x30, 0x01);             //enable timer

        bBuf = Get_F81866_Reg(0xF5);
        bBuf &= (~0x0F);
        bBuf |= 0x52;
        Set_F81866_Reg(0xF5, bBuf);             //count mode is second
        Set_F81866_Reg(0xF6, interval);         //set timer
        bBuf = Get_F81866_Reg(0xFA);
        bBuf |= 0x01;
        Set_F81866_Reg(0xFA, bBuf);             //enable WDTO output

        bBuf = Get_F81866_Reg(0xF5);
        bBuf |= 0x20;
        Set_F81866_Reg(0xF5, bBuf);             //start counting
}
//-------------------------------------------------------------------------
void DisableWDT(void)
{
        unsigned char bBuf;
        Set_F81866_LD(0x07);                    //switch to logic device 7
        bBuf = Get_F81866_Reg(0xFA);
        bBuf &= ~0x01;
        Set_F81866_Reg(0xFA, bBuf);             //disable WDTO output

        bBuf = Get_F81866_Reg(0xF5);
        bBuf &= ~0x20;
        bBuf |= 0x40;
        Set_F81866_Reg(0xF5, bBuf);             //disable WDT
}
//-------------------------------------------------------------------------
```

```
//---------------------------------------------------------------------------
//
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include "F81866.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int F81866_BASE; void Unlock_F81866 (void); void Lock_F81866 (void);
//---------------------------------------------------------------------------
unsigned int Init_F81866(void)
{
	unsigned int result;
	unsigned char ucDid;

	F81866_BASE = 0x4E;
	result = F81866_BASE;

	ucDid = Get_F81866_Reg(0x20);
	if (ucDid == 0x07)			//Fintek 81866
	{	goto Init_Finish;}

	F81866_BASE = 0x2E;
	result = F81866_BASE;

	ucDid = Get_F81866_Reg(0x20);
	if (ucDid == 0x07)			//Fintek 81866
	{	goto Init_Finish;}

	F81866_BASE = 0x00;
	result = F81866_BASE;

Init_Finish:
	return (result);
}
//---------------------------------------------------------------------------
void Unlock_F81866 (void)
{
	outportb(F81866_INDEX_PORT, F81866_UNLOCK);
	outportb(F81866_INDEX_PORT, F81866_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_F81866 (void)
{
	outportb(F81866_INDEX_PORT, F81866_LOCK);
}
//---------------------------------------------------------------------------
void Set_F81866_LD( unsigned char LD)
{
	Unlock_F81866();
```

```
        outportb(F81866_INDEX_PORT, F81866_REG_LD);
        outportb(F81866_DATA_PORT, LD); Lock_F81866();
}
//----------------------------------------------------------------------------
void Set_F81866_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_F81866();
        outportb(F81866_INDEX_PORT, REG);
        outportb(F81866_DATA_PORT, DATA);
        Lock_F81866();
}
//----------------------------------------------------------------------------
unsigned char Get_F81866_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_F81866();
        outportb(F81866_INDEX_PORT, REG);
        Result = inportb(F81866_DATA_PORT);
        Lock_F81866();
        return Result;
}
//----------------------------------------------------------------------------
```

```
//----------------------------------------------------------------------------
//
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//----------------------------------------------------------------------------
#ifndef        F81866_H
#define        F81866_H     1
//----------------------------------------------------------------------------
#define     F81866_INDEX_PORT      (F81866_BASE)
#define     F81866_DATA_PORT       (F81866_BASE+1)
//----------------------------------------------------------------------------
#define     F81866_REG_LD      0x07
//----------------------------------------------------------------------------
#define F81866_UNLOCK 0x87
#define     F81866_LOCK  0xAA
//----------------------------------------------------------------------------
unsigned int Init_F81866(void);
void Set_F81866_LD( unsigned char);
void Set_F81866_Reg( unsigned char, unsigned char); unsigned char
Get_F81866_Reg( unsigned char);
//----------------------------------------------------------------------------
#endif //     F81866_H
```