# tBOX400-510-FL Series

Embedded System

User's Manual

RoHS

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## Safety Precautions

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

1.  User should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instructions might damage the system.

2.  The tBOX400-510-FL does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

3.  Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

4.  Disconnect the power cord from the tBOX400-510-FL before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the tBOX400-510-FL is properly grounded.

5.  Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

6.  Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

7.  Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40°C or above 85°C. It may damage the equipment.

8.  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 to discharge any static electricity on a human body.

    ■   When handling boards and components, wear a grounding wrist strap, available from most electronic component stores.

## Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against the ingress of water: IP30
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
4. Mode of operation: Continuous

## General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.
2. Turn the system off before you start to clean up the component or computer.
3. Never drop the components inside the computer or get circuit board damp or wet.
4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.
5. Try not to put any food, drink or cigarette around the computer.

## Cleaning Tools:

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be cleaned using a product designed for cleaning the same types of components. Please read the instructions that come with a cleaning product to avoid misusage.

- 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, we still recommend using a piece of cloth to rub hardware parts.

- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.

- Vacuum cleaner: Using a vacuum cleaner to suck dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause the circuitry to corrode.

- Cotton swabs: Cotton swabs moistened with rubbing alcohol or water are excellent tools for wiping hard-to-reach areas in your keyboard, mouse, and other locations.

- Foam swabs: Whenever possible it is better to use lint-free swabs such as foam swabs.

*NOTE: We strongly recommend that you should shut down the system before you start to clean any single component.*

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 the 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 or no longer in use.

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# Table of Contents

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# CHAPTER 1
# INTRODUCTION

This chapter contains general information and detailed specifications of the tBOX400-510-FL. Chapter 1 includes the following sections:

- General Description
- System Specification
- Dimensions
- I/O Outlets
- Package List

## 1.1    General Description

The tBOX400-510-FL is an embedded system that supports the 7th Gen. Intel® Celeron - 3965U / Core™ i3-7100U / i5-7300U / i7-7600U processor (2.2 up to 2.8 GHz) onboard. It is compatible with Windows® 10 and Linux and has been optimized for the most endurable operation. The system also features fanless design with rich I/O, supports SO-DIMM up to 32GB, and delivers enhanced system reliability by including a built-in Watchdog Timer.

- **Features**
  - 7th Generation Intel® Core™ i (15W) processor onboard
  - Supports SO-DIMM DDR4-2133 up to 32GB
  - CE ,IEC 60945 , DNV 2.4, EN 50155 certified
  - Fanless with operating temperature range of -40at ~ +60~  with W.T. SSD; -25°C ~ +55°C with HDD.
  - 1 COM Port RS-232/422/485
  - Supports USB 3.0 and SATA3
  - 2x removable & lockable 2.5" SATA drive bays
  - 3x internal mini PCIe slot and 2x SIM socket
  - Supports 1 Port 10/100/1000 Base-T Ethernet LAN connectors
  - Complies with fire protection of vehicles as required  by European Standard PrCEN TS 45545-2
  - Management 8-port 10/100BASE-TX M12(8 PoE)

- **Reliable and Stable Design**
  - The tBOX400-510-FL adopts an advanced cooling system and supports mSATA, which makes it especially suitable for vibration environments and the best solution for industrial automation, digital signage, and gaming applications.

- **Embedded O/S Supported**
  - The tBOX400-510-FL supports not only Windows® 10 but also embedded O/S, such as Windows® 10 Embedded and Linux. For storage devices, the tBOX400-510-FL supports 2x 2.5" SATA drive bays and 1x mSATA slot.

## 1.2 System Specifications

### 1.2.1 CPU

● **CPU**

  ■ Onboard Intel® Core™ Celeron-3965U / Core™ i3-7100U / i5-7300U / i7-7600U processor (2.2 up to 2.8 GHz)

● **BIOS**

  ■ American Megatrends Inc. BIOS.

  ■ "Load Optimized Default": Allows the user to back up customized settings in the BIOS flash chip to prevent CMOS battery fail

● **System Memory**

  ■ Two 260-pin DDR4-2133MHz SO-DIMM sockets, maximum up to 32GB

● **Graphics**

  ■ Integrated Intel® HD Graphics 620 for DVI-I

### 1.2.2 System I/O

● **1x DVI-I Female Connector**
● **2x Screw Audio Connectors (MIC-IN/LINE-OUT)**
● **1x RJ-45 10/100/1000 Mbps Ethernet Port**
● **4x USB 3.0**
● **1x DB9 serial console for RS232/422/485**
● **1x Remote Power Switch**
● **1x Reset Button**
● **2x 2.5" SATA drive bays.**
● **1 x mSATA (Mini card)**
● **1 x M12 or terminal block DC-in (optional)**
● **5 x Antenna Opening**
● **1 x PoE Power Supply Input**
● **2 x M12 A-type 10/100/1000 Mbps Ethernet**
● **8 x M12 D-type 10/100 Mbps Ethernet with PoE**

### 1.2.3 System Specification

● **Watchdog Timer**

  ■ 1~255 seconds or minutes ; up to 255 levels

● **Power Supply**

  ■ 24-110 VDC-in power supply, Power Rate:3A@24VDC;0.65A@110VDC (Railway application)

  ■ 24 VDC-in power supply, Power Rate: 3A@24VDC (Marine application)

- **Operation Temperature**
    - -40°C ~ +60°C (- 40ºF ~ 158ºF) with W.T. SSD
    - -25°C ~ +55°C (+13°F ~ +131°F) with HDD

- **Storage Temperature**
    - -40°C ~ +85°C (- 40ºF ~ 176ºF)

- **Humidity**
    - 10% ~ 95% (non-condensation)

- **Vibration Endurance**
    - 3Grms w/ SSD (5 ~ 500Hz, X, Y, Z direction; random)
    - 1.5Grms w/ HDD (5 ~ 500Hz, X, Y, Z direction; random)

- **Weight**
    - 3.5 kg (7.72lb) without package
    - 4.5kg (11.02lb) with package

- **Dimensions**
    - 321mm (12.64") (W) x 210.2mm (8.28") (D) x 73.3mm (2.89") (H)

*NOTE: All specifications and images are subject to change without notice.*

### 1.2.4 Driver CD Content

- **Chipset Driver**
- **Graphic Driver**
- **Audio Driver**
- **Ethernet Driver**
- **ME Driver**

## 1.3 Dimensions

The following diagrams show the dimensions and outlines of the tBOX400-510-FL.
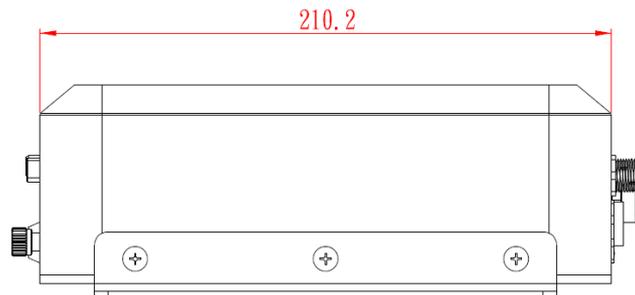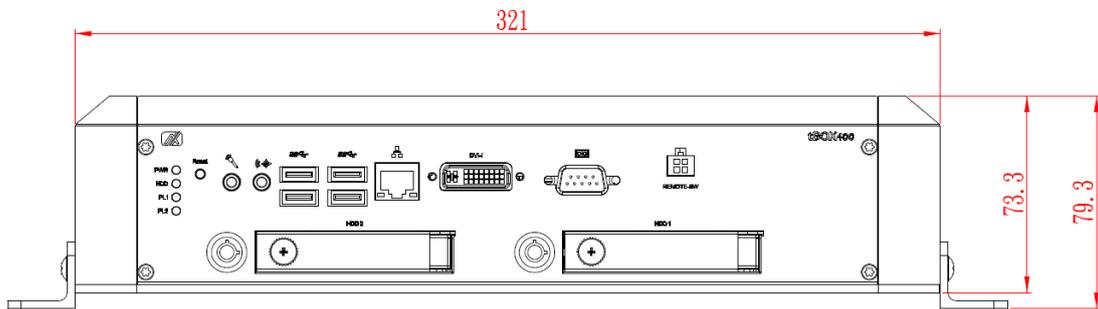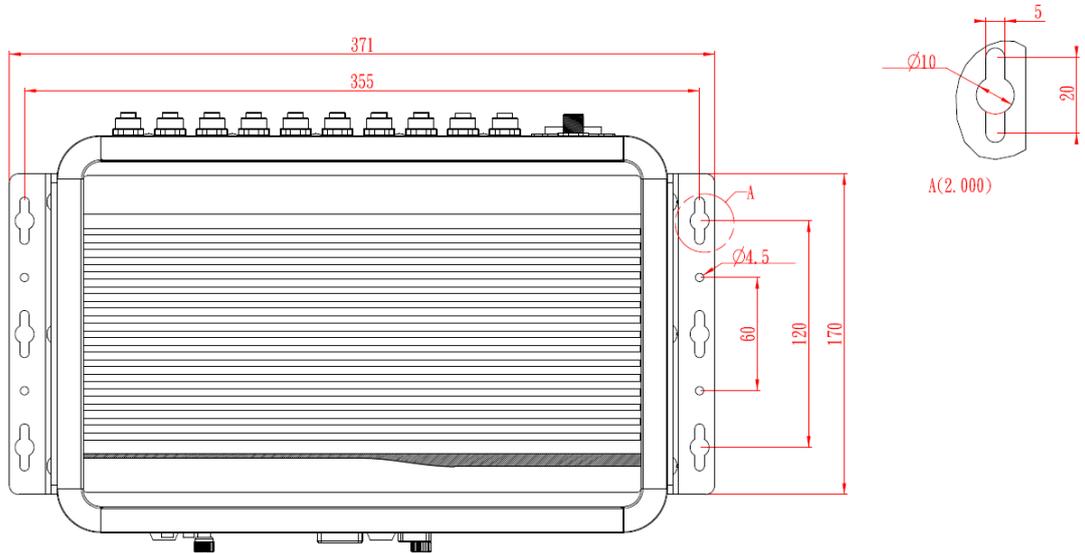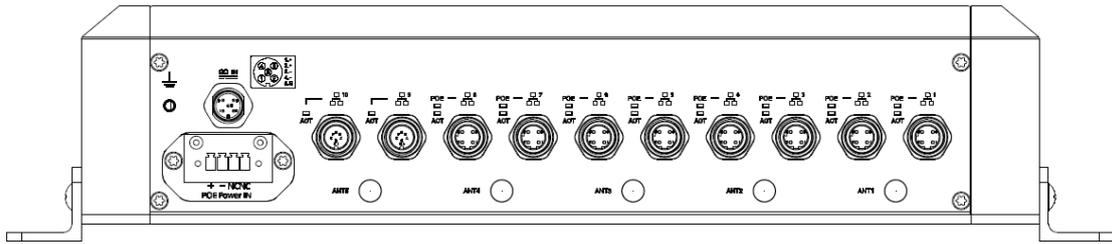
▲ 24-110VDC-in railway application
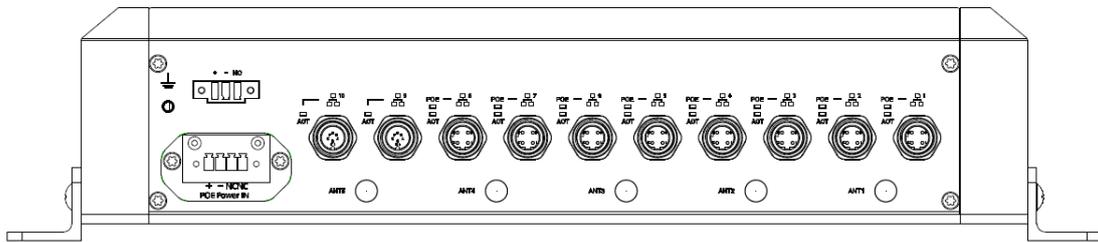


▲ 24VDC-in marine application

## 1.4 I/O Outlets

The following figures show the I/O outlets on the front and rear views of the tBOX400-510-FL.

● **Front View**
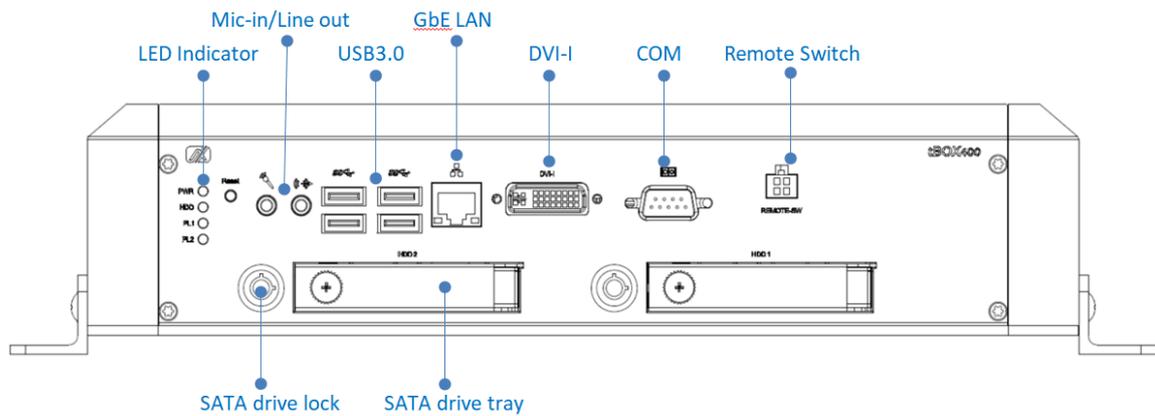
● **Rear View**
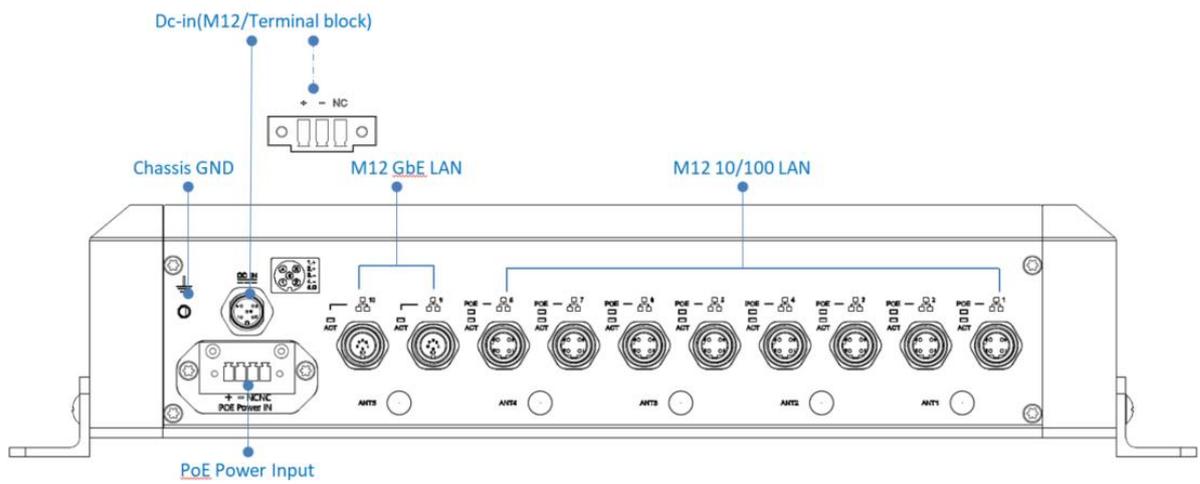
● **Board Layout**
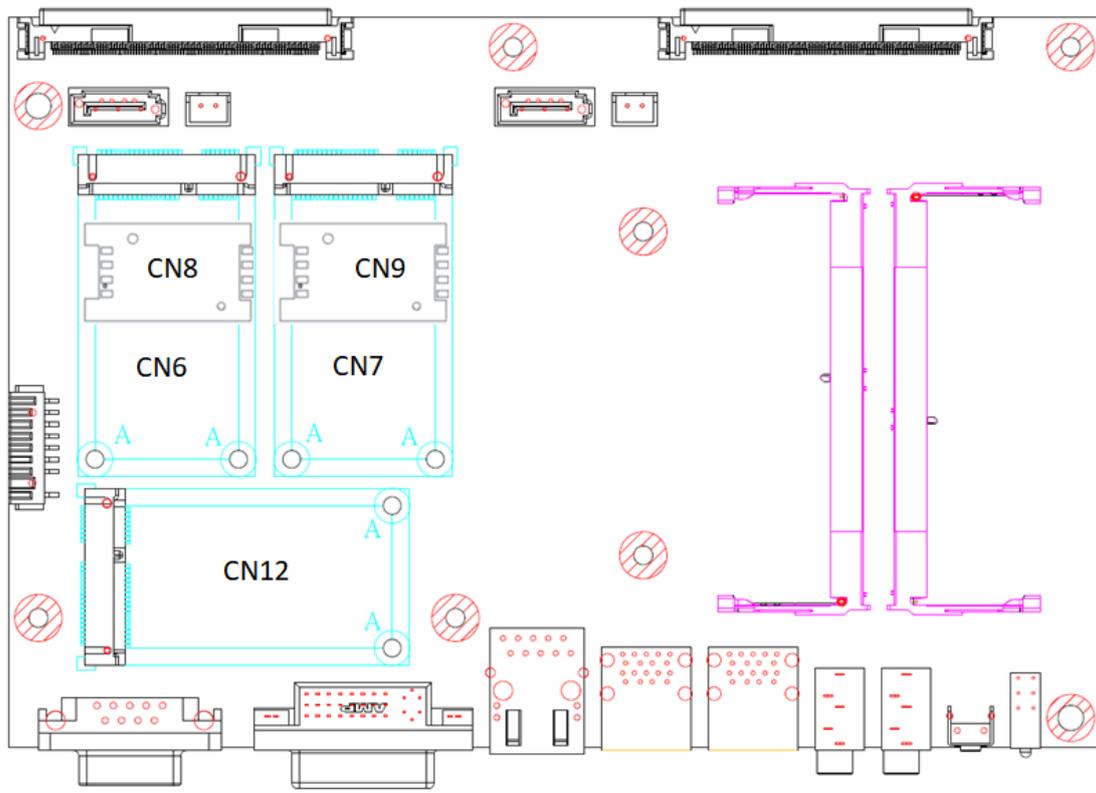
## 1.5    Packing List

The package bundled with your tBOX400-510-FL should contain the following items:

- **tBOX400-510-FL system unit x 1**
- **Quick Installation Guide x 1**
- **DVD x 1 (for drivers)**
- **Screw pack x 1**
- **Foot pad x 4**
- **Wall-mount bracket x 2**
- **DRAM thermal pad x 4**
- **SATA drive key x 2**
- **HDD Mylar x 4**
- **Power terminal block or M12 power cable x 1 (optional)**
- **Remote switch cable x1 (optional)**
- **HDD/SSD/mSATA (optional)**
- **Express Mini Card module (optional)**
- **Wireless module x 1 (optional)**

If you cannot find this package or any of the above-mentioned items is missing, please contact your local distributor immediately.

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# CHAPTER 2
# HARDWARE INSTALLATION

The tBOX400-510-FL is designed for easy hardware configurations, such as the HDD (Hard Disk Drive), DRAM and mini PCIe card. Chapter 2 will show you how to install the hardware.

## 2.1    Installing the Swappable HDD/SSD

**Step 1    Attach a piece of Mylar on the back of an HDD/SSD as shown.**



**Step 2    As shown in the picture, slide the HDD/SSD into the SATA tray. Insert screws into each side of the SATA drive through the corresponding holes.**



**Step 3    Install the SATA drive into the slot and fasten the screw to lock the SATA drive to complete the installation.**

## 2.2    Installing the DDR module and Express Mini Card

**Step 1**    **Make sure system power is off and unplug the power cord.**

**Step 2**    **Turn the tBOX400-510-FL upside down, loosen the cover screws and lift the bracket a little bit as shown.**



**Step 3**    **Disconnect the four SATA connectors and remove the bracket.**



**Step 4**    **Loosen below screws to remove the cover and put the thermal pad on the slot.**

**Step 5** **Install the DDR module with caution and put the thermal pad on the DDR module again. Then screw the DDR cover to finish the installation.**
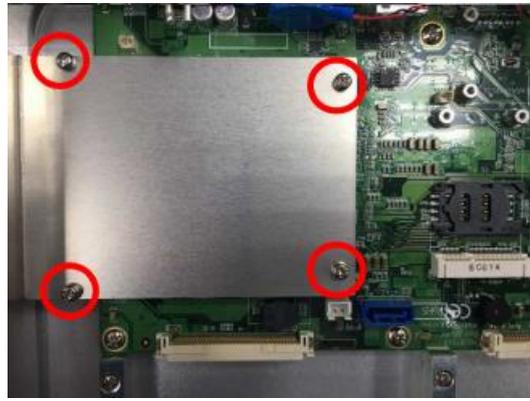
### *For the Express Mini Card:*

**Step 1      Slide a SIM or Mini Card into their respective slot with caution.**



**Step 2      Fasten the screws to complete the installation.**



### *For the External Power Supply Unit*

| Model name | Spec | Note |
|---|---|---|
| PSU120-259 | Power Supply output 53V | 24VDC input only |
| PSU120-259-48VDC | Power Supply output 53V | 48VDC input only |
| PSU120-259-96/110VDC | Power Supply output 53V | 96/110VDC input only |

# CHAPTER 3
# CONNECTOR

## 3.1    Connectors

Connectors connect the CPU board with the other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected before you turn on the system.

| Connector | Description |
|-----------|-------------|
| CN6 | Full-size PCI-Express Mini Card Connector |
| CN8 | SIM Card Socket |
| CN12 | Full-size PCI-Express Mini Card or mSATA Connector |
| CN7 | Full-size PCI-Express Mini Card Connector |
| CN9 | SIM Card Socket |

### 3.1.1   DVI Connector

**DVI-I**

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | TMDS Data 2- | 2 | TMDS Data 2+ |
| 3 | GND | 4 | CRT_SPD_Clock |
| 5 | CRT_SPD_Data | 6 | DVI_SPD_Clock |
| 7 | DVI_SPD_Data | 8 | Analog  Vsync |
| 9 | TMDS Data 1- | 10 | TMDS Data 1+ |
| 11 | GND | 12 | N.C |
| 13 | N.C. | 14 | +5V |
| 15 | GND | 16 | Hot Plug Detect |
| 17 | TMDS Data 0- | 18 | TMDS Data 0+ |
| 19 | GND | 20 | N.C |
| 21 | N.C | 22 | GND |
| 23 | TMDS Clock+ | 24 | TMDS Clock- |
| C1 | Analog RED | C2 | Analog Green |
| C3 | Analog Blue | C4 | Analog Hsync |
| C5 | GND | | |
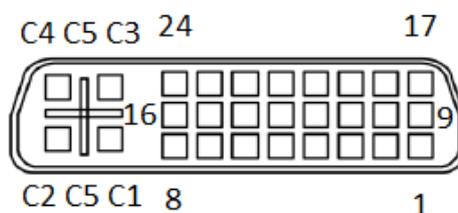
### 3.1.2   Serial Port Connector

The COM1 port connector is a DB9 connector. The pin assignment of RS-232/RS-422/RS-485 is listed in the following table. If you need a COM port to support RS-422 or RS-485, please set it up in BIOS settings.

| Pin | RS-232 | RS-422 | RS-485 |
|-----|--------|--------|--------|
| 1 | DCD, Data carrier detect | TX- | Data- |
| 2 | RXD, Receive data | TX+ | Data+ |
| 3 | TXD, Transmit data | RX+ | NC |
| 4 | DTR, Data terminal ready | RX- | NC |
| 5 | GND, ground | GND, ground | GND, ground |
| 6 | DSR, Data set ready | NC | NC |
| 7 | RTS, Request to send | NC | NC |
| 8 | CTS, Clear to send | NC | NC |
| 9 | RI, Ring indicator | NC | NC |
| 10 | NC | NC | NC |

**COM**
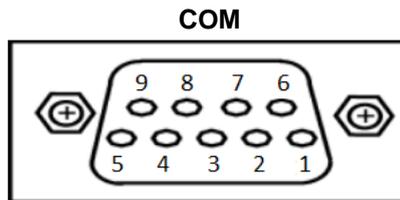


### 3.1.3   USB3.0 Stack Ports

| Pin | Signal USB Port 0 | Pin | Signal USB Port 1 |
|-----|-------------------|-----|-------------------|
| 1 | USB_VCC (+5V level standby power) | 10 | USB_VCC (+5V level standby power) |
| 2 | USB_Data2- | 11 | USB_Data3- |
| 3 | USB_Data2+ | 12 | USB_Data3+ |
| 4 | GND | 13 | GND |
| 5 | SSRX2- | 14 | SSRX3- |
| 6 | SSRX2+ | 15 | SSRX3+ |
| 7 | GND | 16 | GND |
| 8 | SSTX2- | 17 | SSTX3- |
| 9 | SSTX2+ | 18 | SSTX3+ |
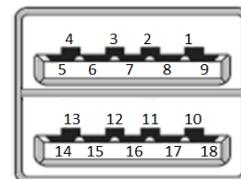
### 3.1.4  LED Indicators

| LED Indicator | Function |
|---|---|
| PWR/ Green | Power on |
| HDD/ Blue | HDD activity |
| PL1/ Green | Programmable |
| PL2/ Green | Programmable |



### 3.1.5  DC Power Input Connector

The DC-in connector has three pins as shown in the table below.

| Pin | Marine/ Railway |
|---|---|
| 1 | + |
| 2 | - |
| 3 | NC |
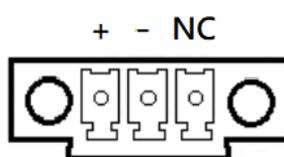


The DC-in power input connector is an M12 A-code Male 5-pin connector.

| Pin | Signal |
|---|---|
| 1 | VCC |
| 2 | VCC |
| 3 | System GND |
| 4 | System GND |
| 5 | Chassis GND |
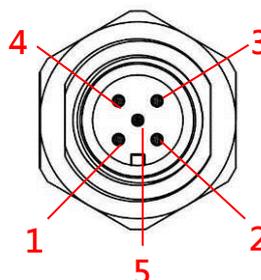


The PoE Power in connector has four pins as shown in the table below (W/ PSU-120)

| Pin | PoE Power |
|---|---|
| 1 | VCC |
| 2 | System GND |
| 3 | NC |
| 4 | NC |
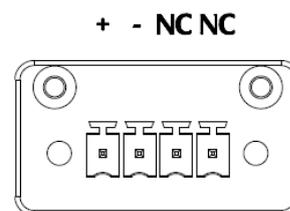
### 3.1.6   LAN Connector

The RJ-45 LAN connectors can support 10/100/1000Mbps

**Ethernet**

| Pin | Description | 10/100Base-T | 1000Base-T |
|:---:|---|:---:|:---:|
| 1 | Transmit Data+ or Bidirectional | TX+ | BI_DA+ |
| 2 | Transmit Data- or Bidirectional | TX- | BI_DA- |
| 3 | Receive Data+ or Bidirectional | RX+ | BI_DB+ |
| 4 | Not Connected or Bidirectional | N.C. | BI_DC+ |
| 5 | Not Connected or Bidirectional | N.C. | BI_DC- |
| 6 | Receive Data- or Bidirectional | RX- | BI_DB- |
| 7 | Not Connected or Bidirectional | N.C. | BI_DD+ |
| 8 | Not Connected or Bidirectional | N.C. | BI_DD- |
| B | Speed LED | OFF/Green | Orange |
| A | Activity Link LED(Orange) | OFF: No Link  Blinking: Data activity detected | |
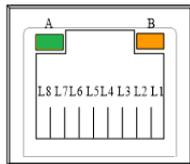
The M12 4-pin LAN connector is a D-coded type and is able to support 10/100Mbps with PoE.

| Pin | 10/100 Mbps | PoE Pin Assign |
|:---:|---|---|
| 1 | TX+ | DC- |
| 2 | RX+ | DC+ |
| 3 | TX- | DC- |
| 4 | RX- | DC+ |
| LED  Indicators | | |
| PoE Status | | Green |
| Link/Activity | | Orange |
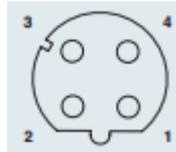
**M12-D Code 4-Pin/ Female**

The M12 4-pin LAN connector is an A-coded type and is able to support 10/100/1000Mbps.

| Pin | 10/100 Mbps | 1000 Mbps |
|-----|-------------|-----------|
| 1 | -- | MDI 2+ |
| 2 | -- | MDI 3+ |
| 3 | -- | MDI 3- |
| 4 | TX - | MDI 0- |
| 5 | RX + | MDI 1+ |
| 6 | TX + | MDI 0+ |
| 7 | -- | MDI 2 - |
| 8 | RX - | MDI 1 - |
| LED  Indicators | | |
| Link/Activity | Orange | |
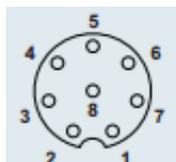


**M12-A Code 8-Pin/ Female**

### 3.1.7   SIM Card Connector (CN8,CN9)

The SIM Card slot is an ISO 7816 standard 6-pin connector for the PCI Express Mini Card.

| Pin | Signal |
|-----|-----------|
| 1 | SIM_PWR |
| 2 | SIM_RESET |
| 3 | SIM_CLK |
| 4 | NC |
| 5 | GND |
| 6 | SIM_VPP |
| 7 | SIM_DATA |
| 8 | NC |
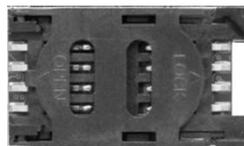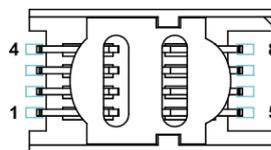
### 3.1.8 PCI-Express Mini Card Connector (CN12)

This is a full-size PCI-Express Mini Card connector on the top side complying with PCI-Express Mini Card Spec. V1.2. It supports either PCI-Express or SATA (mSATA). Since the default setting is mSATA Mini Card, if PCI-Express is needed to insert, please refer to section 4.4 to change the setting.

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 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 | +3.3VSB |
| 21 | GND | 22 | PERST# |
| 23 | PE_RXN4/SATA2_RXP | 24 | +3.3VSB |
| 25 | PE_RXP4/SATA2_RXN | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PE_TXN4/SATA2_TXN | 32 | SMB_DATA |
| 33 | PE_TXP4/SATA2_TXP | 34 | GND |
| 35 | GND | 36 | No use |
| 37 | GND | 38 | No use |
| 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 |
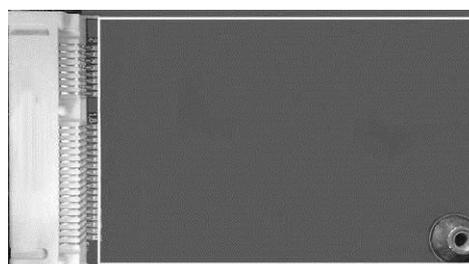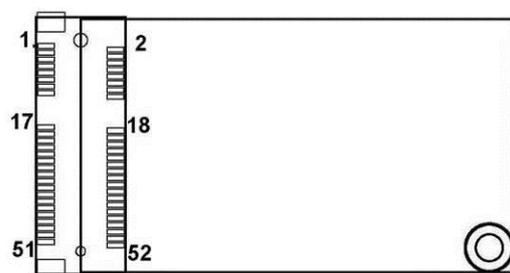
### 3.1.9 PCI-Express Mini Card Connector (CN6,CN7)

This is a PCI-Express Mini Card connector on the top side supporting PCI-Express x1  and USB 2.0. It complies with PCI-Express Mini Card Spec. V1.2.

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | WAKE# | 2 | +3.3VSB |
| 3 | No use | 4 | GND |
| 5 | No use | 6 | +1.5V |
| 7 | CLKREQ# | 8 | SIM_PWR |
| 9 | GND | 10 | SIM_DATA |
| 11 | REFCLK- | 12 | SIM_CLK |
| 13 | REFCLK+ | 14 | SIM_REST |
| 15 | GND | 16 | SIM_VPP |
| 17 | No use | 18 | GND |
| 19 | No use | 20 | +3.3VSB |
| 21 | GND | 22 | PERST# |
| 23 | PE_RXN2 | 24 | +3.3VSB |
| 25 | PE_RXP2 | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PE_TXN2 | 32 | SMB_DATA |
| 33 | PE_TXP2 | 34 | GND |
| 35 | GND | 36 | USB_D5- |
| 37 | GND | 38 | USB_D5+ |
| 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 |
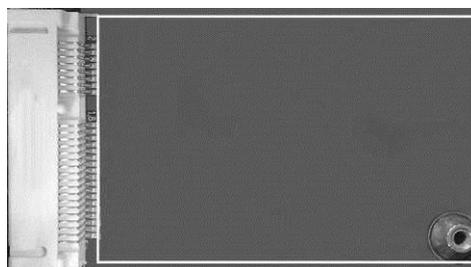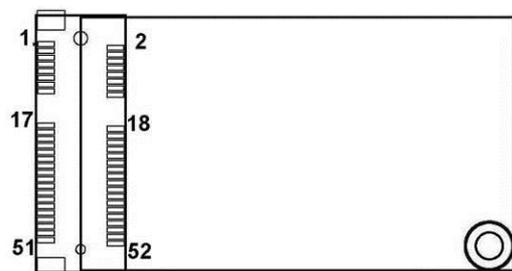
### 3.1.10  Antenna Opening

Profile opening is reserved for Wi-Fi/3G/4G antennas.



### 3.1.11   HDD Tray Locker

Locks and secures the swappable HDD/SSD bay.

| Status | Diagram |
|--------|---------|
| Unlocked |  |
| Locked |  |

### 3.1.12  Remote Switch Connector

The remote switch is ideal for a remote button which can act as an ATX power on/off button.

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | NC | N/A |
| 2 | Switch Signal | Low Active. Act as PC's ATX switch when external switch installed (Pin 3 Active)<br>**\*\*Internal pull up resister did not connect to any power source** |
| 3 | Ext. SW Sensor | Low Active. To detect whether external power switch is installed or not.<br>**\*\* Internal pull up resister did not connect to any power source** |
| 4 | GND | |
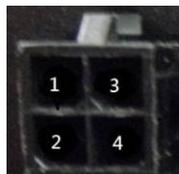
# CHAPTER 4
# AMI BIOS SETUP UTILITY

This chapter provides users with detailed descriptions of how to set up basic system configuration through the AMI BIOS setup utility.

## 4.1 Starting

To enter the setup screens, follow the steps as below:
1. Turn on the computer and press the <Del> key immediately.
2. After pressing the <Delete> key, the main BIOS setup menu displays. You can access other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

```
              Aptio Setup Utility – Copyright (C) 2019 American Megatrends, Inc.
        Main  Advanced  Chipset  Security  Boot  Save & Exit

        BIOS Information                                        Set the Date. Use Tab to
        Project Version                87510 V1.03             switch between Date elements.
        Build Date and Time            01/03/2019 09:31:52

        System Date                    [Wed 01/16/2019]
        System Time                    [05:05:22]

        Access Level                   Administrator


                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Exit
                                                               ESC: Exit


              Version 2.18.1263. Copyright (C) 2019 American Megatrends, Inc.
```

## 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>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.

*NOTE:  Some of the navigation keys may differ from one screen to another.*

| Hot Keys | Description |
|---|---|
| ← **Left/Right** | The Left and Right <Arrow> keys allow you to select a setup screen. |
| ↑↓ **Up/Down** | The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen. |
| **+− Plus/Minus** | The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item. |
| **Tab** | The <Tab> key allows you to select setup fields. |
| **F1** | The <F1> key allows you to display the General Help screen. |
| **F10** | The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes. |
| **Esc** | The <Esc> key allows you to discard any changes you have made and exit the Setup. <br> Press the <Esc> key to exit the setup without saving your changes. |
| **Enter** | The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens. |

## 4.3 Main Menu

```
        Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

  BIOS Information                                       Set the Date. Use Tab to
  Project Version              87510 V1.03               switch between Date elements.
  Build Date and Time          01/03/2019 09:31:52

  System Date                  [Wed 01/16/2019]
  System Time                  [05:05:22]

  Access Level                 Administrator



                                                         ──────────────────────────
                                                         ↔: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




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```

**System Time/Date**

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.

## 4.4 Advanced Menu

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

- ► MiniCard Switch

- ► CPU Configuration

- ► SATA And RST Configuration

- ► PCH-FW Configuration

- ► USB Configuration

- ► Serial port Console Redirection

- ► F81803 Super IO Configuration

- ► Hardware Monitor

For items marked with "►", please press <Enter> for more options.

```
          Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  MiniCard Switch                      [mSATA]            MiniCard Switch PCIE/mSATA

 ▶ CPU Configuration
 ▶ SATA And RST Configuration
 ▶ PCH-FW Configuration
 ▶ USB Configuration
 ▶ Serial Port Console Redirection
 ▶ F81803 Super IO Configuration
 ▶ Hardware Monitor




                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




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```

**Mini Card Switch**

Select the PCIe / mSATA function.

**CPU Configuration**

This screen shows the CPU configuration.

```
        Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   Advanced

 CPU Configuration                                            Enabled for Windows XP and
                                                             Linux (OS optimized for
 Type                         Intel(R) Core(TM)              Hyper-Threading Technology)
                              i7-7600U CPU @ 2.80GHz         and Disabled for other OS (OS
 ID                           0x806E9                        not optimized for
 Speed                        2900 MHz                       Hyper-Threading Technology).
 L1 Data Cache                32 KB x 2
 L1 Instruction Cache         32 KB x 2
 L2 Cache                     256 KB x 2
 L3 Cache                     4 MB
 L4 Cache                     N/A
 VMX                          Supported
 SMX/TXT                      Supported
                                                            ─────────────────────────
 Hyper-Threading              [Enabled]                     ↔: Select Screen
 Intel (VMX) Virtualization   [Enabled]                     ↑↓: Select Item
 Technology                                                 Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

**SATA Configuration**
Set SATA configuration.

```
            Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
     Advanced

  SATA Controller(s)              [Enabled]              Enable/Disable SATA Device.
  SATA Mode Selection             [AHCI]

  Serial ATA Port 0               Empty
  Serial ATA Port 1               Empty
  Serial ATA Port 2               Empty


                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



            Version 2.18.1263. Copyright (C) 2019 American Megatrends, Inc.
```

**SATA Controller (S)**

Enable or disable the integrated SATA controllers. (Default: Enabled)

**SATA Mode**

Choose the SATA operation mode. Here are the options for your selection.

**Serial-ATA Port 0-3**

Control the onboard SATA port. Here are the options for your selection: enabled and disabled.

**PCH-FW Configuration**

Configure Intel(R) Active Management Technology Parameters.

Display ME firmware version and ME firmware SKU.

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

   ME Firmware Version              11.8.50.3425
   ME Firmware Mode                 Normal Mode
   ME Firmware SKU                  Corporate SKU








                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit




                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```
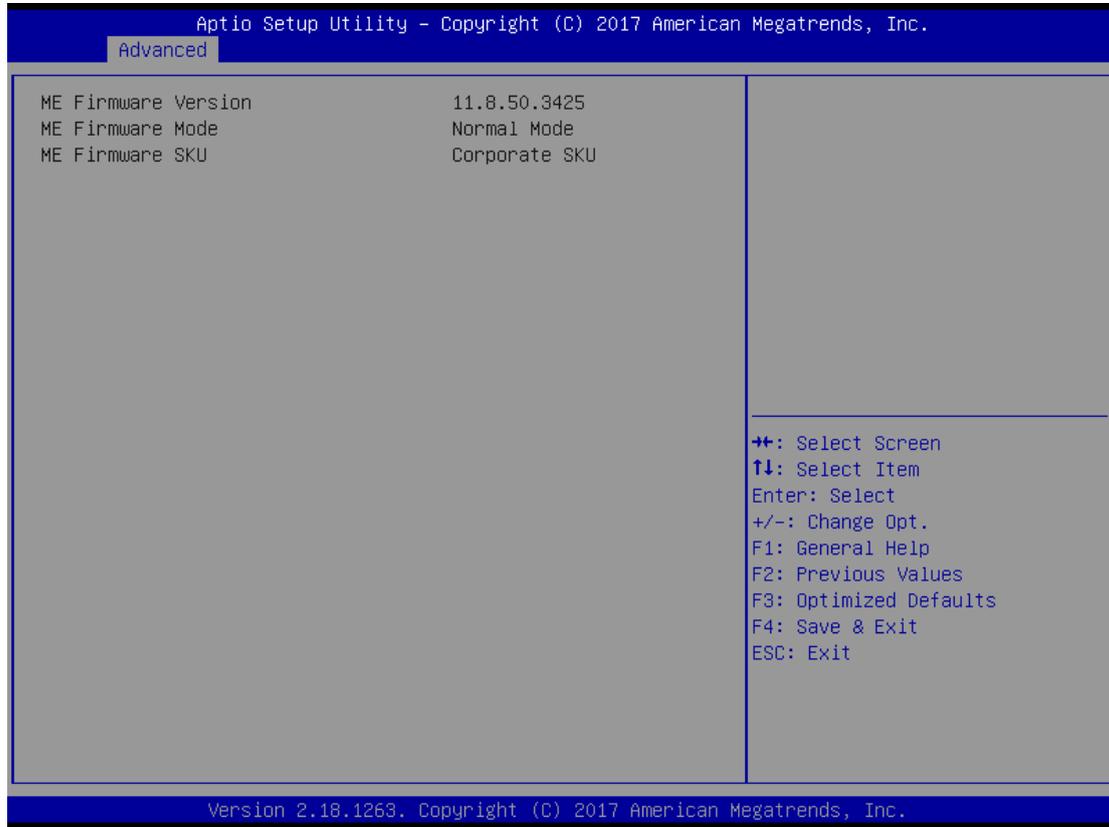
**USB Configuration**

This screen shows the USB Device.

This is for supporting USB devices on legacy OS. The system will automatically detect any USB device connected to the computer and enable the USB legacy mode.

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

   USB Configuration                                          Mass storage device emulation
                                                              type. 'AUTO' enumerates
   USB Module Version              19                         devices according to their
                                                              media format. Optical drives
   USB Controllers:                                           are emulated as 'CDROM',
        1 XHCI                                                drives with no media will be
   USB Devices:                                               emulated according to a drive
        1 Drive, 1 Keyboard                                   type.

   Mass Storage Devices:
   JetFlashTranscend 8GB 8.07          [Auto]
                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit



              Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Serial Port Console Redirection**

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
  Advanced

                                                             Console Redirection Enable or
   COM1                                                      Disable.
   Console Redirection                [Disabled]
 ▶ Console Redirection Settings




                                                             ➜←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



         Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```
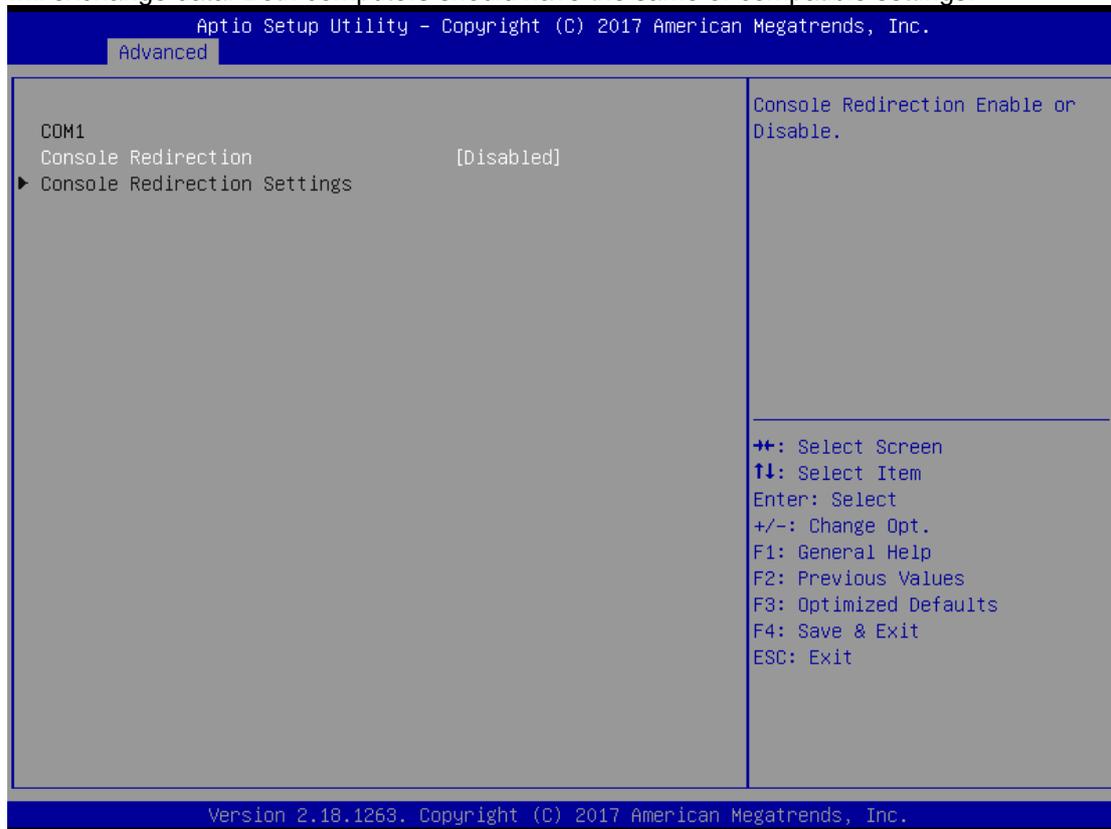
**F81803 Super IO Configuration**

Set up options for the Super IO Configuration, and change the value of the selected option

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Advanced

  F81803 Super IO Configuration                            Set Parameters of Serial Port
                                                           1 (COMA)
  Super IO Chip                      F81803
▶ Serial Port 1 Configuration




                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit




            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Serial Port 1 Configuration**

```
               Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Advanced

   Serial Port 1 Configuration                              COM Port Type: RS232, RS422,
                                                            RS485
   Serial Port                         [Enabled]
   Device Settings                     IO=3F8h; IRQ=4;

   COM Port Type                       [RS232]




                                                            ↔: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit




               Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Serial Port**
Enable/Disable serial port

**COM Port Type**
This option is used to select the RS-232/422/485 function.

**Hardware Monitor**

This screen shows the Hardware Health configuration.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Advanced

 Hardware Monitor

 CPU                            : +31 ℃
 SYSTEM                         : +33 ℃
 +3.3V                          : +3.232 V
 +5V                            : +4.960 V
 +3.3VSB                        : +3.280 V
 +5VSB                          : +5.040 V
 VBAT                           : +2.832 V



                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit




            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```
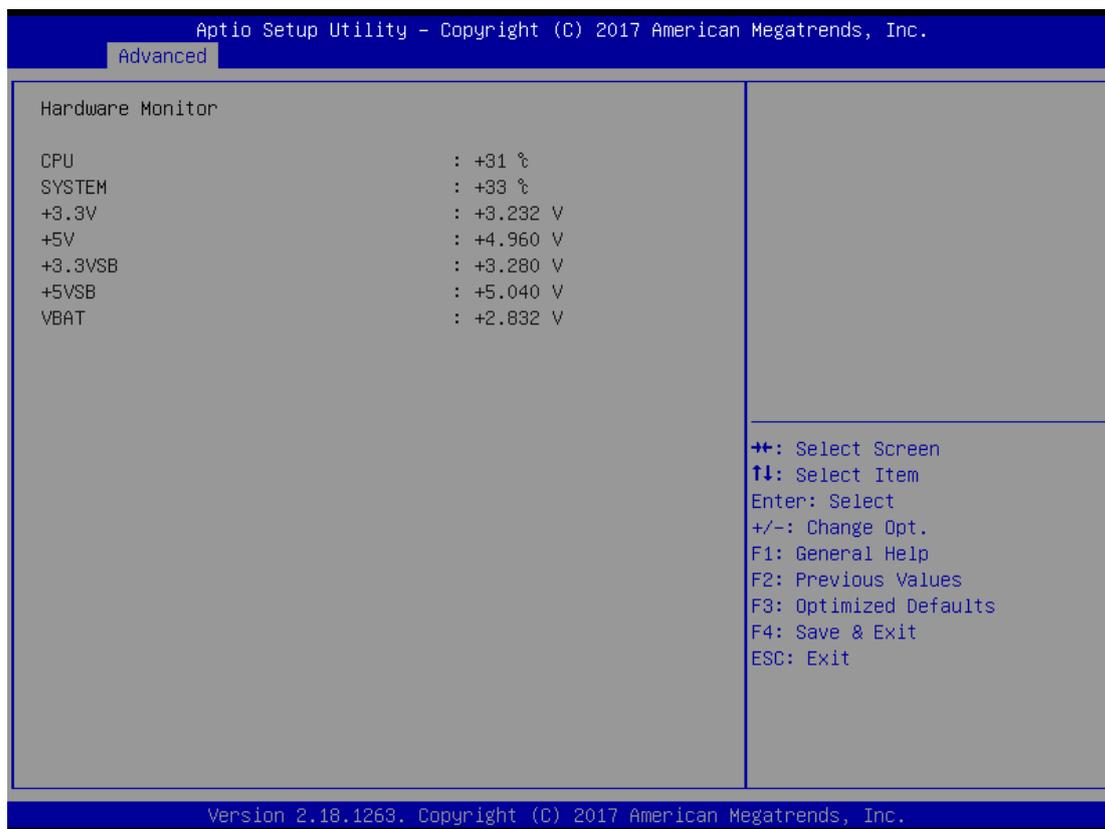
## 4.5    Chipset Menu

The Chipset menu allows users to change the advanced chipset settings.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

 ▶ System Agent (SA) Configuration                        System Agent (SA) Parameters



                                                         ─────────────────────────────
                                                         ↔: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```
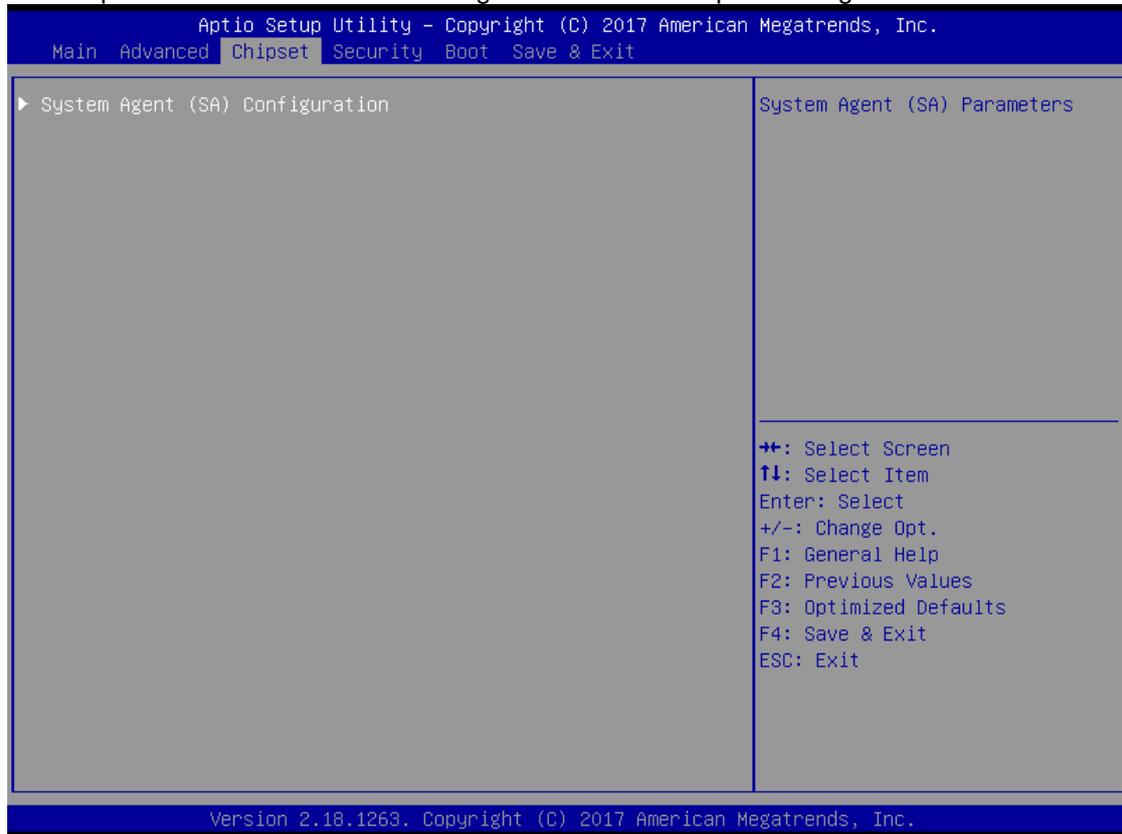
**System Agent (SA) Configuration**

Memory Configuration

This screen shows the memory information.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
            Chipset

Memory RC Version               1.9.0.0
Total Memory                     4096 MB
   Size                         4096 MB (DDR4)




                                                        ➔←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```
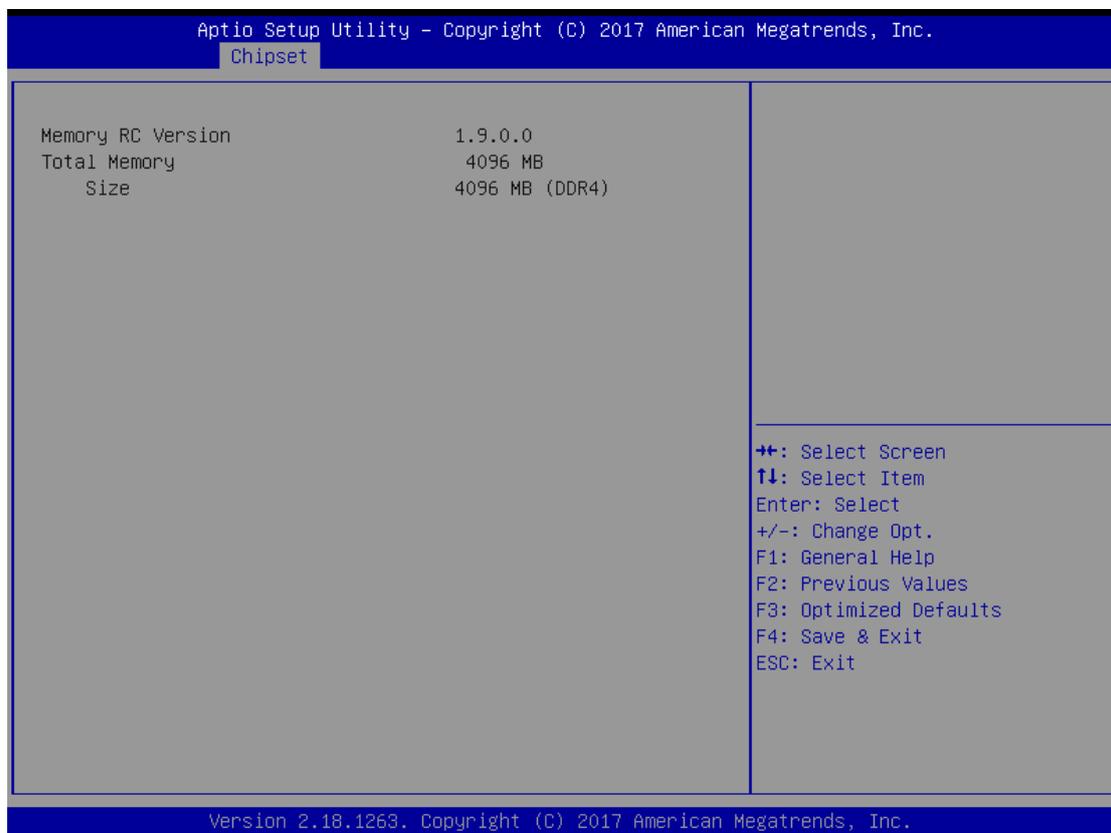
## 4.6    Security Menu

The security menu allows users to change the security settings for the system.

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

   Password Description                                 Set Administrator Password

   If ONLY the Administrator's password is set,
   then this only limits access to Setup and is
   only asked for when entering Setup.
   If ONLY the User's password is set, then this
   is a power on password and must be entered to
   boot or enter Setup. In Setup the User will
   have Administrator rights.
   The password length must be
   in the following range:
   Minimum length                    3
   Maximum length                    20                ──────────────────────────
                                                       →←: Select Screen
   Administrator Password                              ↑↓: Select Item
   User Password                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit




          Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Administrator Password**

This item indicates whether an administrator password has been set. It will show "Installed" if a password has been set or "Not Installed" if no password has been set.

**User Password**

This item indicates whether a user password has been set. It will show "Installed" if the password has been set, or show "Not Installed".

**Change Supervisor Password**

Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.

**Change User Password**

Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.

## 4.7 Boot Menu

The Boot menu allows users to change boot options of the system. You can select any of the items in the left frame of the screen to go to the sub menus:

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

   Boot Configuration                                    Number of seconds to wait for
   Setup Prompt Timeout            1                     setup activation key.
   Bootup NumLock State            [On]                  65535(0xFFFF) means indefinite
                                                         waiting.
   Quiet Boot                      [Disabled]
   Launch PXE OpROM policy         [Disabled]

   Boot Option Priorities
   Boot Option #1                  [UEFI:
                                   JetFlashTranscend 8GB
                                   8.07, Partition 1]
   Boot Option #2                  [JetFlashTranscend 8GB
                                   8.07]
                                                         ──────────────────────────────
   USB Device BBS Priorities                             →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




              Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Setup Prompt Timeout**
Set the timeout length to wait before entering the Setup menu during system power-on.

**Bootup NumLock State**
Use this item to select the power-on state for the NumLock. The default setting is on.

**Launch PXE OpROM policy**
Controls the execution of UEFI and Legacy PXE OpROM.

**Boot Option Priorities**
Use this option to specify the overall boot order from the available devices.

## 4.8    Save & Exit Menu

This option allows users to operate optimized settings, customized settings and restore default settings for system configuration.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

     Save Options                                      Exit system setup after saving
     Save Changes and Exit                             the changes.
     Discard Changes and Exit

     Save Changes and Reset
     Discard Changes and Reset

     Save Changes
     Discard Changes

     Default Options
     Restore Defaults
     Save as User Defaults
     Restore User Defaults                             ─────────────────────────────
                                                       →←: Select Screen
     Boot Override                                     ↑↓: Select Item
     UEFI: JetFlashTranscend 8GB 8.07, Partition 1     Enter: Select
     JetFlashTranscend 8GB 8.07                        +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



            Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

**Save Changes and Exit**
When you have completed the system configuration changes, select this option to leave Setup and continue start-up procedures, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Ok to save changes and exit.


**Discard Changes and Exit**
Select this option to quit Setup and continue start-up procedures without making any permanent changes to the system configuration. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Ok to discard changes and exit.


**Save Changes and Reset**
When you have completed the system configuration changes, select this option to leave Setup and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Ok to save changes and reset.


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

**Save Changes**
This option allows you to save all the values and changes you set.

**Discard Changes**
This option allows you to abandon all the values and changes you set.

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

**Save as User Defaults**
Select this option to save all current Setup options as user default settings. The User Defaults settings are designed for you to set up your own requests. 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 default settings when you select this option. After selecting Save as User Defaults to save your own settings, you can restore all your Setup options by selecting Restore User Defaults. Select Restore User Defaults from the Save & Exit menu and press <Enter>. Select Ok to restore your user default settings.

**Restore user Defaults**
It automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.
Select Load Fail-Safe Defaults from the Save & Exit menu and press <Enter>. Select Ok to load Fail-Safe Defaults.

# APPENDIX A
# WATCHDOG TIMER

## What is Watchdog Timer

The integrated Watchdog Timer can be set up by programming. There are 1~255 levels available. After initializing Watchdog Timer by setting a countdown value, the countdown of the value will start automatically when Watchdog Timer is enabled. Watchdog Timer needs to be reset periodically or disabled, otherwise the system will reboot when the value of the timer has reached zero.

## How to Use the Watchdog Timer

**(Below is an example of enabling configuration using a debug tool.)**

### Enable WDT

↓

**Enable configuration:**

O 2E 87  ; Un-lock super I/O

O 2E 87

↓

**Select logic device:**

O 2E 07

O 2F 07

↓

**WDT device enable:**

O 2E 30

O 2F 01

↓

**Activate WDT:**

O 2E F0

O 2F 80

↓

**Set base timer:**

O 2E F6

O 2F **M** ;　　**M** = time value

　　　　　00h~FFh: Time-out disable~ Time-out occurs

　　　　　after 255 seconds when **N**=71h.

**Set Second or Minute :**

O 2E F5

O 2F **N** ;　　**N**=71h or 79h

　　　　　**N**=71h, the time base is set to second.

---

**N**=79h, the time base is set to minute.

**Sample of Watchdog application**

Assume that program A must be kept running for a specified period of time:

1. Initialize Watchdog Timer with a countdown time value bigger than the running time of program A.

2. If program A has no problems when its running time has passed, Watchdog will be disabled or reset before its countdown time has reached zero.

3. If program A is running and experiencing any problem that can cause the system to shut down, Watchdog Timer will automatically reboot the system when countdown time has reached zero.

Refer to the below flowchart of editing program A