USER'S MANUAL

tBOX110-APL-MR series

Embedded System

User's Manual

AXIOMTEK

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Safety Precautions

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

1. The tBOX110-APL-MR does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

2. 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.

3. Disconnect the power cord from the tBOX110-APL-MR 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 tBOX110-APL-MR is properly grounded.

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

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

6. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -45℃ or above 85℃. It may damage the equipment.

7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

   ▪ Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.

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

   If you need further assistance while purchasing the power source, please contact the manufacturer for further information.

CAUTION

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

WARNING

- Do not touch the hot surface of the system unit when it is turned on.
- Restricted access area: The equipment should only be installed in a Restricted Access Area.

Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against the ingress of water: IP20
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
5. Type of protection against electric shock: Class I equipment

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 wipe it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to remove the dirt on the floor.
2. Turn the system off before you start to clean up the computer or any components.
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 require a designated product for cleaning. 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 that you rub it with a piece of cloth.

- 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: Vacuuming the 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 recommended 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;

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

SECTION 1
INTRODUCTION

This chapter contains general information and detailed specifications of the tBOX110-APL-MR. Section 1 includes the following sections:

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

1.1   General Description

The tBOX110-APL-MR fanless embedded system is an ideal solution for communications control and protocol converter applications in harsh environments. Designed for use in strict environments, the tBOX110-APL-MR adopts an extra low power consumption Intel E3940 (1.6GHz/4-cores) processor, while also supporting an industrial operating temperature range from -40°C to +70°C. The tBOX110-APL-MR offers a wide selection of I/O functions, including 2 x USB, 2 x HDMI, 2 x LAN, 4 x COM port and 1 x DIO. Its compact size makes it suitable for DIN-rail or wall mount, allowing for easy installation into control cabinets. Supporting Windows®10, the tBOX110-APL-MR provides user-friendly interface for programmers to develop application software at a lower cost.

The tBOX110-APL-MR is a robust gateway built with an industrial-grade design. It adopts an advanced cooling system and supports mSATA and 2.5" SATA SSD (or HDD), which makes it a perfect field control & monitoring system solution for the transportation markets:

- **Features**

    - Fanless design
    - Wide temperature operation range of -40°C - +70°C
    - Supports isolated 2 x 10/100/1000 Base-T Ethernets with M12-8P Female A-coded connectors
    - Isolated 4 x COM ports supporting RS-232/422/485 (4 wires) with shield grounding
    - 2 x USB 3.0
    - 2 x HDMI1.4
    - 2 x PCIe Mini Card slots:
        a)   1 x full size (USB/mSATA/ PCIe) with external SIM slot
        b)   1 x full size (USB/ PCIe) with external SIM slot
    - Supports one 2.5" SATA drive and one mSATA (1 x half size Mini Card slot)
    - Wide range 24-110 VDC power input with M12-5P Male A-coded connector
    - 1x Terminal Block (male, 2*6 pins) for isolation DIO (4DI/4DO).
    - DIN-rail or wall-mount mounting available
    - EN50155, CE and FCC certified
    - Supports TPM 2.0

- **Embedded O.S. Supported**
    - ■ The tBOX110-APL-MR supports Windows® 10 and Linux Ubuntu 20.04

1.2   System Specifications

1.2.1   CPU
- Onboard Intel Atom® Apollo Lake-I x5-E3940 processor (1.6 GHz/4-cores).

1.2.2   BIOS
- AMI (American Megatrends Inc.) UEFI (Unified Extensible Firmware Interface) BIOS.

1.2.3   System Memory
- One DDR3L 204-pin SO-DIMM (1.35V) slot.
- Supports 1866 MHz max up to 8GB.

1.2.4   Display
- Supports HDMI standards up to 1920x1200@60Hz.

1.2.5   Ethernet Ports
- LAN chip: Intel Ethernet Controller i210-IT.
- Two M12-8P Female A-coded connectors support 10/100/1000 Base-T Ethernet with 1.5KVdc magnetic isolated protection.

1.2.6   Remote SW
- 1 x SW for remote control.

1.2.7   Storage
- 1 x mSATA (full size mini card slot).
- 1 x SATA.

1.2.8   Wireless
- 2 x Mini Card slots. (two full size)
- 2 x SIM card external sockets.
- 4 x Antenna holes.

1.2.9   USB
- 2 x USB3.0.

1.2.10   COM/CAN
- 2-port terminal block supports 4 COM (colay 2 CANBUS + 2 COM)

- COM mode supports RS-232/422/485 (which can be selected by BIOS)
- Supports High Speed Mode115.2 Kbps, up to 1.5 Mbps
- Pin define is listed as follows:

PIN	RS232	RS422	RS485	CAN
B6/A6	RX	TX+	D+	x
B5/A5	CTS	TX-	D-	x
B4/A4	TX	RX+	x	L
B3/A3	RTS	RX-	x	H
B2/A2	ISO GND	ISO GND	ISO GND	ISO GND
B1/A1	Chassis GND	Chassis GND	Chassis GND	Chassis GND
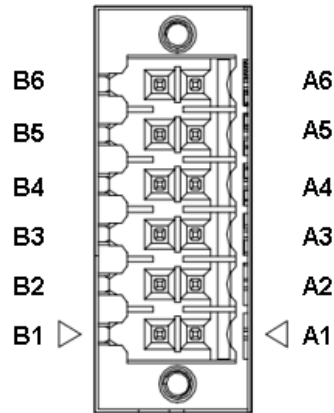
1.2.11 Power

- The DC-in power input connector is M12 A-code Male 5Pin.
- OVP (over voltage protection) and RPP (reverse polarity protection).

Pin	Signal
1	VCC
2	VCC
3	System GND
4	System GND
5	IGN
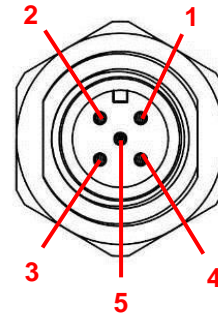
Note: Default IGN Trigger: Disabled. For more details, please refer to Smart Ignition Management

1.2.12   M12 LAN Connector (LAN1-2)

● The M12 A-code Female 8Pin LAN Connector supports 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-
ACT	Orange blinks when the corresponding LAN is active.	
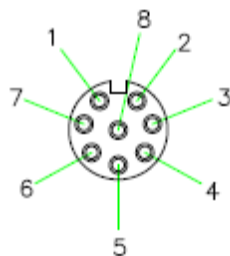
M12 A-coded 8-Pin/ Female

ACT ◯

1.2.13   Power & Reset Button

● AT auto power on.

● Power button setting for software must be set up first.

● One reset button.

> *Note: **Power button setting instructions for Windows software is offered in APPENDIX B for reference.***

1.2.14   DIO

● One TB 2x6 connector supported an isolation 4 DI / 4 DO

Pin	Signal	Pin	Signal
1	COM+	7	Ext Power
2	OUT0	8	IN 0
3	OUT1	9	IN 1
4	OUT2	10	IN 2
5	OUT3	11	IN 3
6	COM-	12	GND
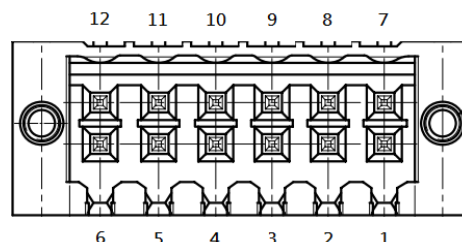
Digital I/O Specification:
A. Digital Input:

   Input channels: 4, sink/source type

   Input voltage: 0 to 30VDC at 25Hz

Introduction

<Input level for dry contacts>

Logic level 0: close to ground

Logic level 1: open

<Input level for wet contacts>

Logic level 1: +/- 3VDC max.

Logic level 0: +/- 10VDC min. to +/-30VDC max. (source to digital input)

B. Digital output:

Output channels: 4 sink type

Output current: 200mA max. per channel

On-state voltage: 12~ 24VDC nominal

Max. voltage on COM+: 30VDC

1.2.15 WatchDog Timer (WDT)

● 1~255 seconds or minutes; up to 255 levels.

1.2.16 Restore BIOS Optimal Defaults (SW1)

● Press the tact switch (SW 1) to restore optimal BIOS defaults.

1.2.17 System LED

● The table below summarizes the functional descriptions of the LED indicators and their corresponding colors.

LED Name	Description	Color
HDD	Indicates storage status. The LED flashes when storage is being accessed.	Orange
PWR	Indicates power status. When the DC input is connected, the LED will light on.	Green

1.2.18 Operation Temperature

● -40^{0}C ~ +70^{0}C

1.2.19 Storage Temperature

● -40^{0}C ~ +85^{0}C

1.2.20 Humidity

● 0% ~ 95%

1.2.21   Weight

- 0.967 kg

1.2.22   Dimensions

- 164.1 mm (6.46") (W) x 128.0 mm (5.04") (D) x 44.1mm (1.73") (H)

1.2.23   System I/O Outlets

- 2 x terminal block 2x6 pin male connector: 4 x COM
- 2 x HDMI connectors
- 2 x 10/100/1000 Base-T M12 connector with 1.5KVdc magnetic isolated protection.
- 2 x USB 3.0 ports
- 1 x DC power input with M12 connector.
- 1 x Terminal Block (male, 2*6 pins) for isolation DIO (4DI/4DO).
- 4 x Antenna holes.

1.2.24   Power Supply

- 24-110VDC-in power supply
- Power Consumption: 0.98A - 0.33A

1.2.25   Programmable LEDs

- The table below summarizes the functional descriptions of the LED indicators and their corresponding colors, setting refer to APPENDIX C

LED Name	Description	Color
PL1	The LED will be in accordance with the program.	Green
PL2	The LED will be in accordance with the program	Green

1.3 Dimensions

The following diagrams show you the dimensions and outlines of the tBOX110-APL-MR.
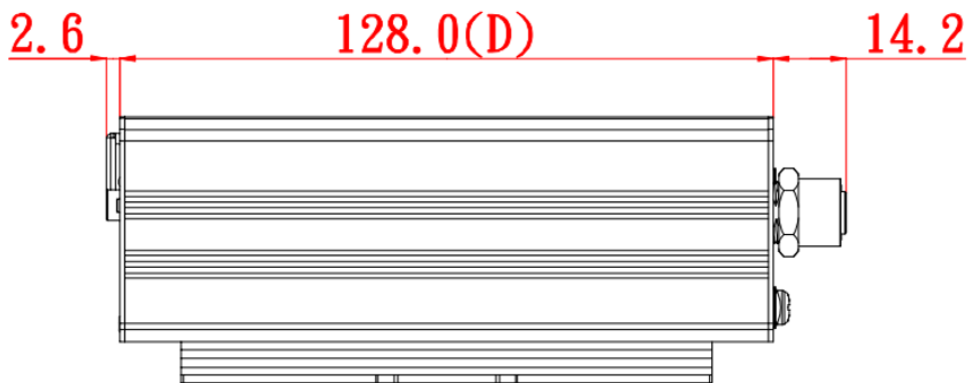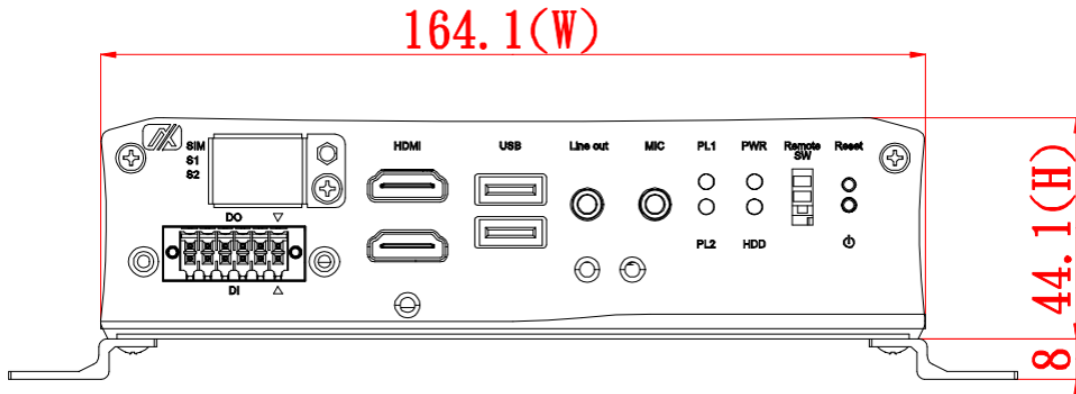
1.4 I/O Outlets

The following figures show you the I/O outlets on the front view and top view of the tBOX110-APL-MR.
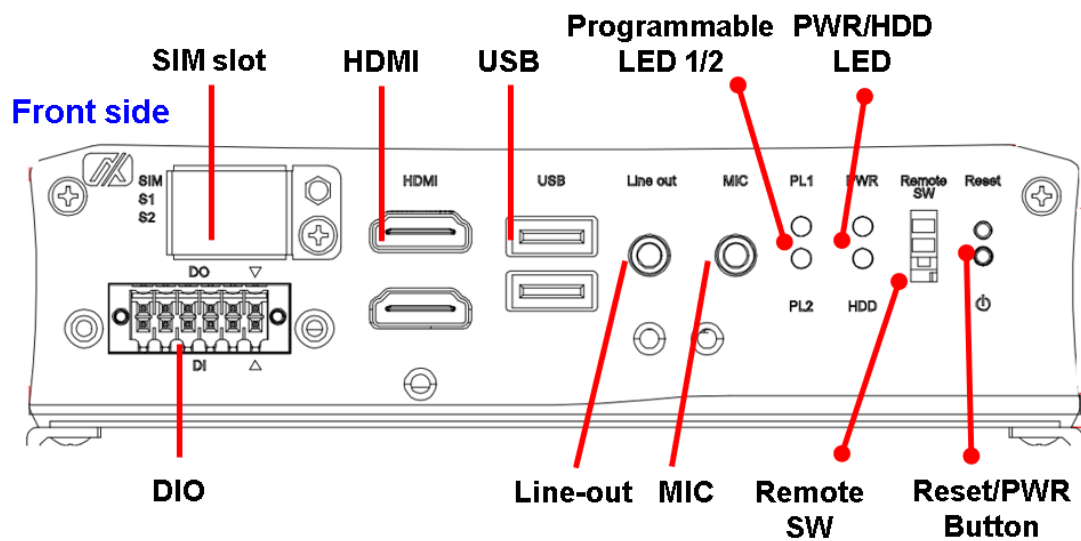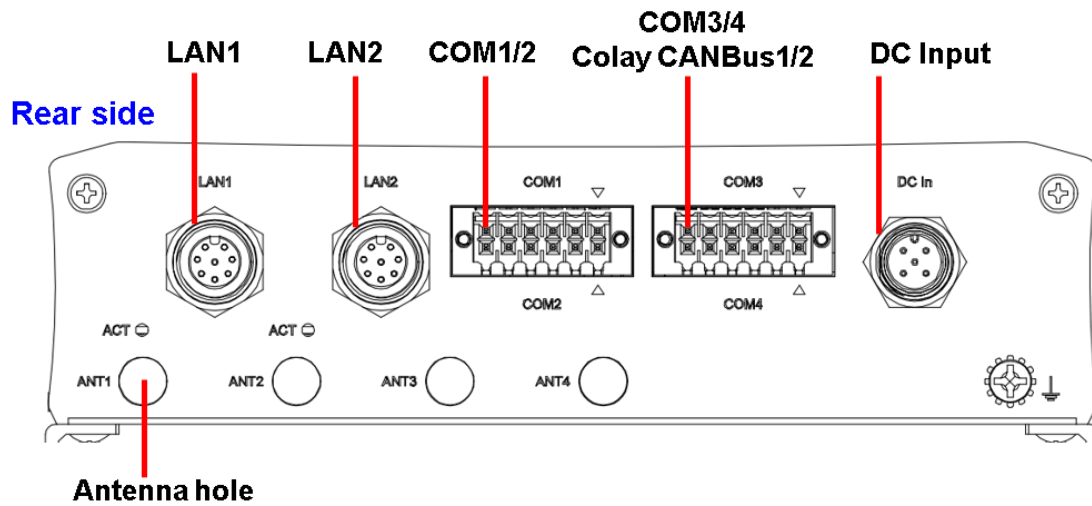
1.5 Packing List

The tBOX110-APL-MR comes with the following bundle package:

- Wall Mount kit x 1
- Thermal pad for memory x 1
- Wall Mount kit Screw x 4
- HDMI bracket x 1
- Audio bracket x 1
- DIO Terminal Block Connector x 1
- Rubber for HDD x 1
- Cable Holder kit x 1

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SECTION 2
HARDWARE INSTALLATION

The tBOX110-APL-MR is convenient for your various hardware configurations, such as memory modules and mSATA drives. Section 2 will show you how to install the hardware.

2.1 Installing the Memory Module

Step 1   Turn off the system.

Step 2   Loosen all the screws from the cover and flip the cover to the right.
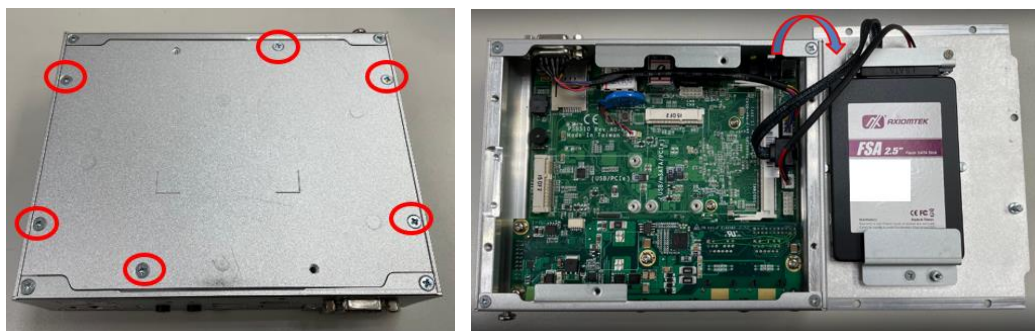
Note: 75211630600E 6pcs

*Dish head cross mechanical tooth flat tail nickel-plated M3*6L screw (120 degrees) RC*

Step 3   Put the thermal pad on the memory module.

Step 4   Insert the memory into the slot and push the memory down to lock it in place; make sure the memory is locked by the socket.
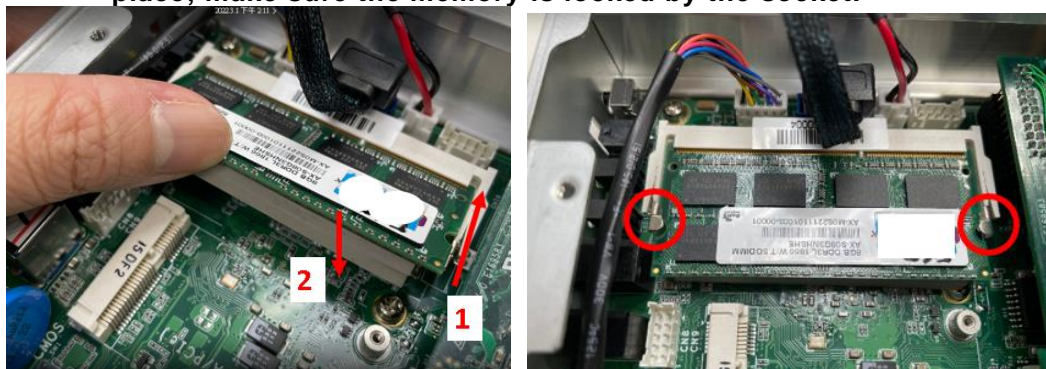
2.2   Installing the mSATA

Step 1   Insert the mSATA into the slot.
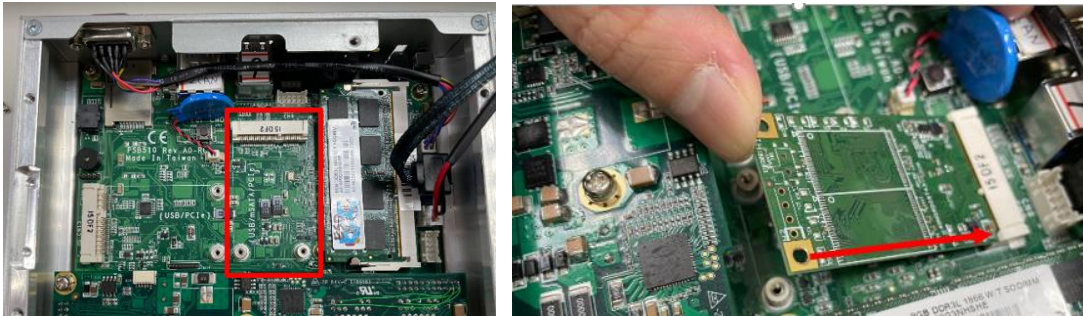
Step 2   Fasten the screws tightly.
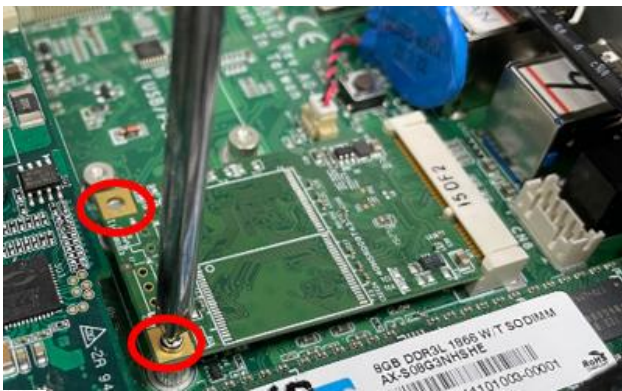
Note: 75A11610600E 2pcs
*Large flat head cross mechanical tooth flat tail nickel-plated M2*6L screw*

2.3   Installing the Wireless Module

Step 1   Loosen the screw and remove the cover.

Note: 75211630600E 1pcs
*Dish head cross mechanical tooth flat tail nickel-plated M3*6L screw (120 degrees)*

Step 2   Insert the SIM Card into the socket and push in . Then put back the cover and tighten the screw .

Step 3   Install the wireless module into the slot and tighten the screws.

Note: 75A11610600E 2pcs
*Large flat head cross mechanical tooth flat tail nickel-plated M2*6L screw*

SIM slot	Wireless module insert slot
S1	CN13
S2	CN9

Step 4 **Remove the antenna plug from one antenna hole on the system chassis, and prepare the antenna cable.**
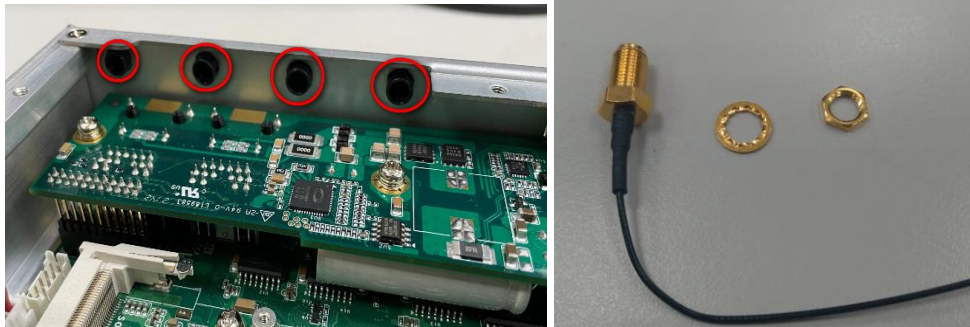
Step 5 **Make the antenna cable's gold connector through the antenna hole on the system chassis and screw it tight with the antenna nut and gasket.**

Step 6 **Screw the RF antenna to the gold connector.**
Step 7 **Connect the other end of the cable to the connector on the wireless module.**

Note: Use only standard-size SIM cards, as illustrated below:
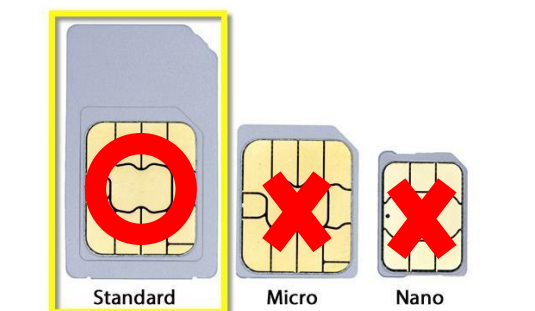
2.4   Installing the Hard Disk

Step 1   Loosen the bracket screw and take off the bracket and apply the HDD pad on the bracket.
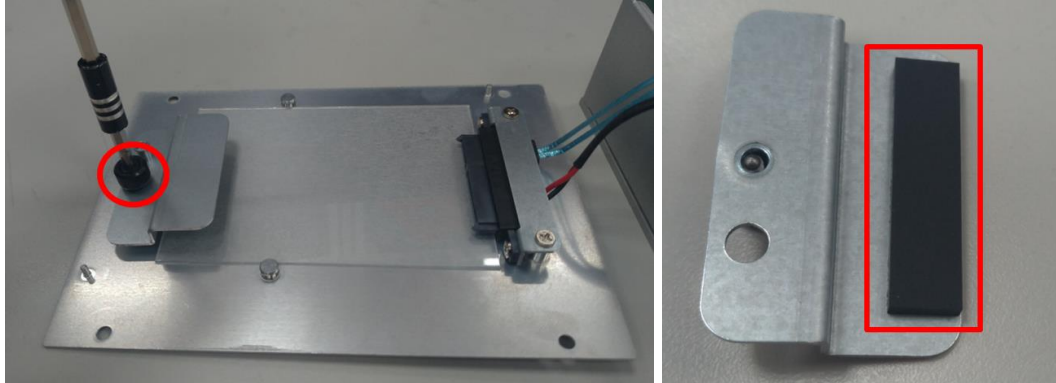
Step 2   Insert the hard disk and screw the bracket to the system chassis.
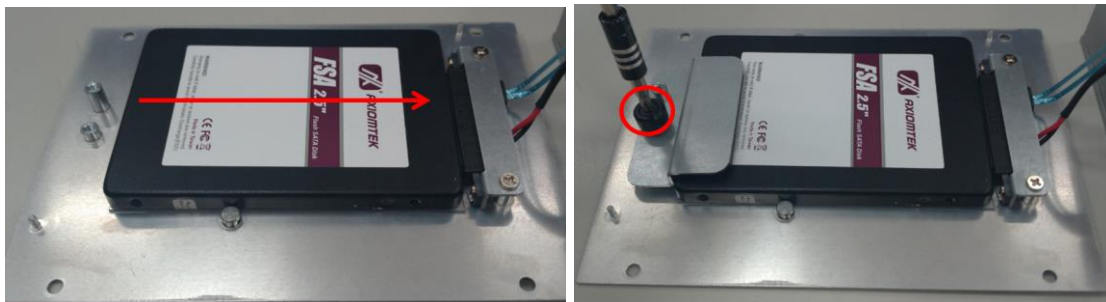
2.5   Installing the DIN-rail Mount and Wall Mount Kits

The tBOX110-APL-MR provides DIN-rail and Wall Mount kits that customers can install as below:

Method 1: DIN-rail Mount

Step 1   **Prepare the DIN-rail mount assembling components (screws and bracket).**

Step 2   **Assemble the bracket to the system unit and tighten all screws tightly.**
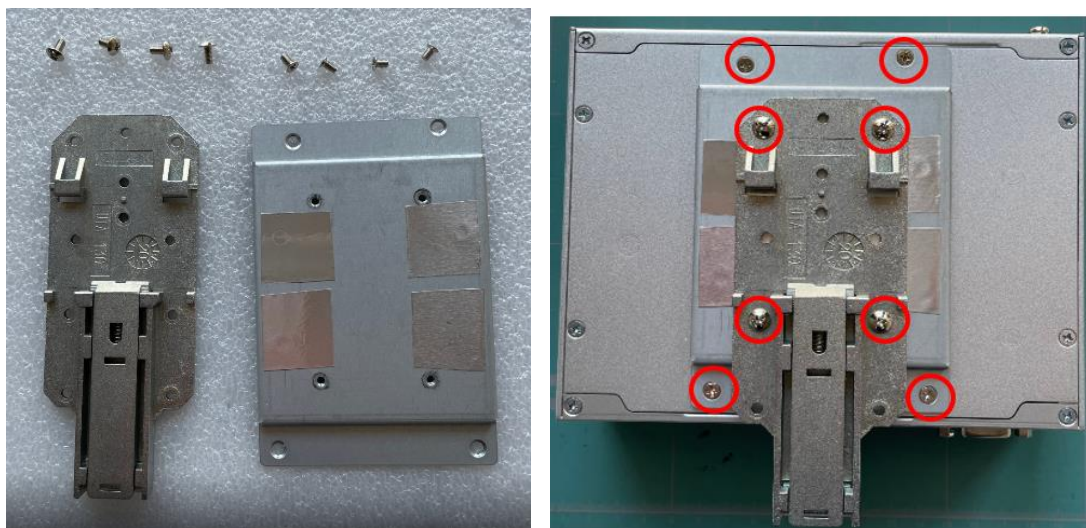
Note: 1. 75211630600E 4pcs
*Dish head cross mechanical tooth flat tail nickel-plated M3*6L screw (120 degrees) RC*
2. 75411630600E 4pcs
*Umbrella head cross type mechanical tooth flat tail nickel plated M3*6L screw*
3. The two M3 x 6mm screws need to be removed and use the four-dish head M3 screws for the DIN- rail mount .

Method 2: Wall Mount

Step 1   Prepare the wall mount assembling components (screws and bracket).

Note: 75411630600E 4pcs

   Umbrella head cross type mechanical tooth flat tail nickel plated M3*6L screw

Step 2   Align the positioning notches on the wall mount bracket to the edges of the system unit. Make sure the screw hole chamfers face upward and then fasten the bracket firmly to the system unit.
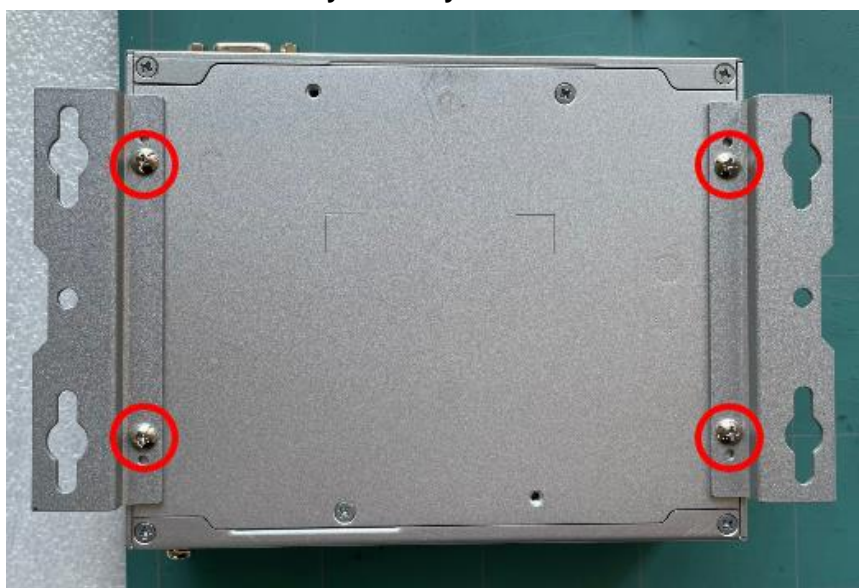
2.6 Installing the Cable Fixing Plate

For HDMI:

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

Step 2   **To fasten the HDMI cable fixing plate (Figure 1) to the system, align the hole on the plate with the hole on the system chassis, insert the screw into the holes, and tighten the screw to fasten the plate, as shown in Figure 2 below.**

Note: 75A11630600E 1pcs
     *Large flat head cross mechanical tooth flat tail nickel-plated M3*6L screw*

Step 3   **Insert the HDMI cable into the system's HDMI port. Then Insert a cable tie through the loop of the cable fixing plate to bind the HDMI cable to the plate, as shown in Figure 3 below.**

(Figure 1)   (Figure 2)   (Figure 3)

For Audio Jack:

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

Step 2   **To fasten the Audio cable fixing plate (Figure 4) to the system, align the hole on the plate with the hole on the system chassis, insert the screw into the holes, and turn the screw tightly to fasten the plate, as shown in Figure 5 below.**

Step 3   **Insert the Audio cable into the system's Audio port. Then Insert a cable tie through the loop of the cable fixing plate to bind the Audio cable to the plate, as shown in Figure 6 below.**

(Figure 4)   (Figure 5)   (Figure 6)

Note: 75A11630600E 2pcs
     *Large flat head cross mechanical tooth flat tail nickel-plated M3*6L screw*

SECTION 3
AMI UEFI BIOS UTILITY

The AMI UEFI BIOS provides users with a built-in Setup program to modify basic system configuration. All configured parameters are stored in a flash backup to save the Setup information whenever the power is turned off.

3.1   Entering Setup

To enter the setup screens, follow the steps below:

Turn on the computer and press the <Del> key immediately.

After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

3.2   The Main Menu

Once you enter the AMI BIOS Aptio Setup Utility, the Main Menu appears on the screen. In the Main Menu, there are several Setup functions and a couple of Exit options for your selection. Use Select Screen Keys (or Move Keys) to select the Setup Page you intend to configure and then press <Enter> to accept or to enter its sub-menu.

```
             Aptio Setup Utility – Copyright (C) 2022 American Megatrends, Inc.
   Main  Advanced  Chipset  Security  Boot  Save & Exit

    BIOS Information                                       Set the Time. Use Tab to
    BIOS Version                   PSB510 V1.01            switch between Time elements.
    Build Date and Time            03/31/2022 11:08:08

    System Date                    [Thu 11/17/2022]
    System Time                    [12:10:14]

    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) 2022 American Megatrends, Inc.
```

System Date
The date format is <day> <month> <date> <year>.

System Time
This item shows current time of your system with the format <hour> <minute> <second>. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

3.3   Advanced Features

This Advanced menu allows users to configure and improve your system, or to set up some system features according to your preference. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► CPU Configuration
- ► SATA Configuration
- ► USB Configuration
- ► Hardware Monitor
- ► NCT6106D Super IO Configuration
- ► Serial Port Console Redirection
- ► Trusted Computing
- ► Device Configuration
- ► Smart Ignition Management

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

```
         Aptio Setup Utility – Copyright (C) 2022 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

  ▶ CPU Configuration                              CPU Configuration Parameters
  ▶ SATA Configuration
  ▶ PCIE/mSATA Mini Card Configuration
  ▶ USB Configuration
  ▶ NCT6106D HW Monitor
  ▶ NCT6106D Super IO Configuration
  ▶ Serial Port Console Redirection
  ▶ Trusted Computing
  ▶ Device Configuration
  ▶ Smart Ignition Management


                                                 ➡⬅: 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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```

● **CPU Configuration**

Scroll to this item and press <Enter> to view the CPU Configuration information.

(Please refer to below graphics.)

```
              Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
    Advanced

 CPU Configuration                                          When enabled, a VMM can
                                                            utilize the additional
 Intel(R) Atom(TM) Processor E3940 @ 1.60GHz               hardware capabilities provided
 CPU Signature                    506CA                     by Vanderpool Technology
 Microcode Patch                  1A
 Max CPU Speed                    1600 MHz
 Min CPU Speed                    800 MHz
 Processor Cores                  4
 Intel HT Technology              Not Supported
 Intel VT-x Technology            Supported
 64-bit                           Supported

 L1 Data Cache                    24 kB x 4
 L1 Code Cache                    32 kB x 4             →←: Select Screen
 L2 Cache                         1024 kB x 2           ↑↓: Select Item
 L3 Cache                         Not Present           Enter: Select
                                                        +/-: Change Opt.
 Intel Virtualization Technology  [Enabled]             F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit

              Version 2.18.1263. Copyright (C) 2022 American Megatrends, Inc.
```

● **SATA Configuration**

Scroll to this item and press <Enter> to view the SATA Configuration information.

(Please refer to below graphics.)

AMI UEFI BIOS Utility
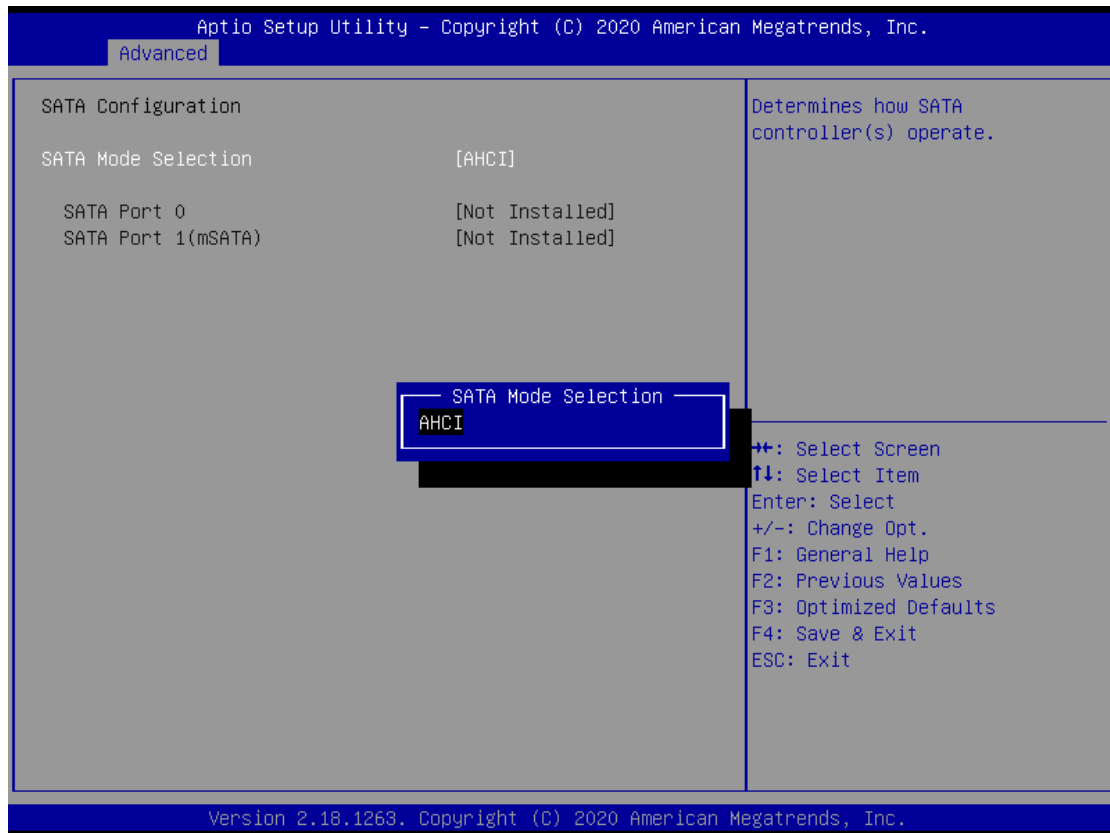
● **USB Configuration**

Scroll to this item and press <Enter> to view the USB Configuration information.

(Please refer to below graphics.)

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

   USB Configuration                                        Mass storage device emulation
                                                            type. 'AUTO' enumerates
   USB Module Version              17                       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, 1 Mouse, 1 Hub                type.

   Mass Storage Devices:
   USB 2.0 Flash Disk 0.00           [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.
```

● **H/W Monitor**

Scroll to this item and press <Enter> to view the hardware status items under monitoring.

(Please refer to below graphics.)

```
             Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
      Advanced

   Pc Health Status

   CPU                             : +43 ℃
   SYSTEM                          : +29 ℃
   +3.3V                           : +3.104 V
   +5V                             : +5.024 V
   +3.3VSB                         : +3.328 V
   +5VSB                           : +5.024 V
   VBAT                            : +2.992 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) 2022 American Megatrends, Inc.
```
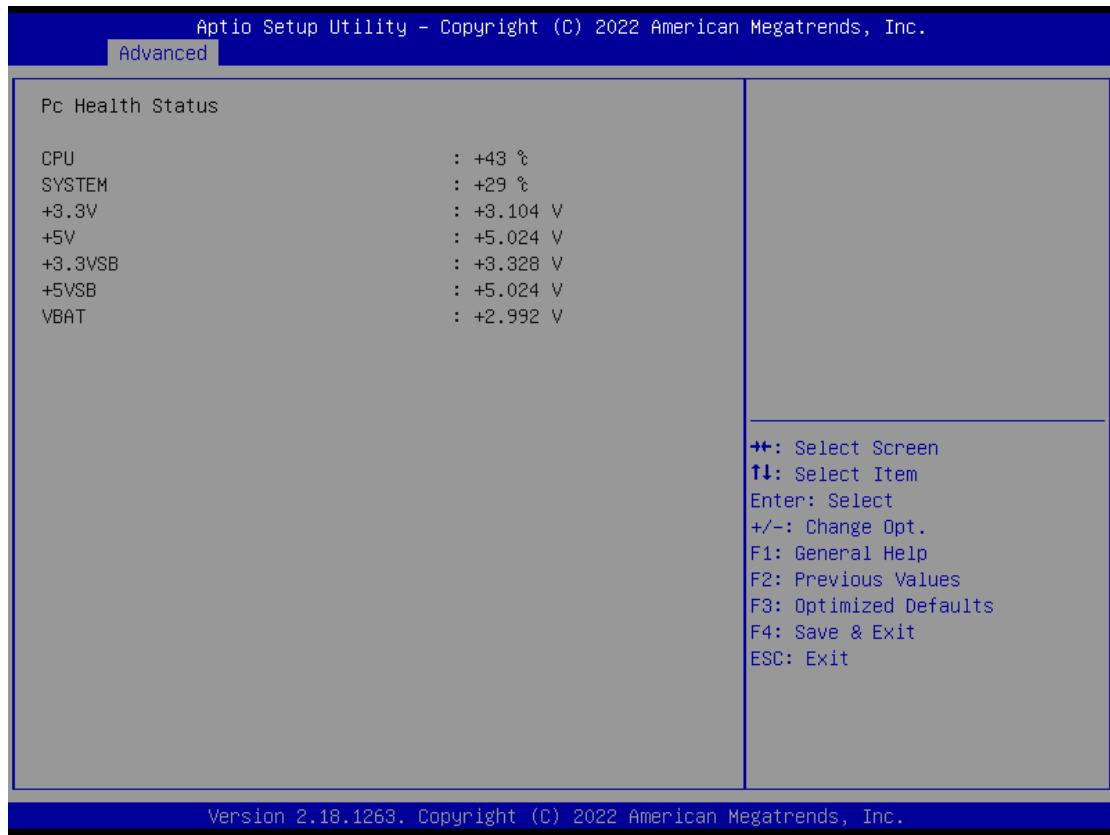
● **NCT6106D Super IO Configuration**

The default setting for all serial ports is RS232.

You can change the setting by selecting the value you want in each COM port type.

The system supports RS422 and RS485 modes as well as high-speed mode.

You can enable High-speed mode, which can be selected in the BIOS menu.

COM port speed supports up to 1.5 Mbps.

(Please refer to below graphics.)

```
         Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
    Advanced

  NCT6106D Super IO Configuration                          Set Parameters of Serial Port
                                                           1 (COMA)
  Super IO Chip                       NCT6106D
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration
▶ Serial Port 4 Configuration



                                                           ↔: 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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```

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

  Serial Port 1 Configuration                                    RS232/RS422/RS485

  Device Settings                      IO=3F8h; IRQ=4;


  Select Mode                          [RS232]

  High-speed mode                      [Disabled]

                           ┌──── Select Mode ────┐
                           │ RS232               │
                           │ RS422               │
                           │ RS485               │        →←: 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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```

● **Trust Computing**

This sub-menu will allow you to enable/disable Trusted Platform Module (TPM) support and to configure the TPM State. Select Trusted Computing and press Enter to access the sub-menu.

Select the Security Device Support item to enable the TPM device.

```
                Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.
        Advanced

    Configuration                                          Enables or Disables BIOS
      Security Device Support          [Disable]           support for security device.
       NO Security Device Found                            O.S. will not show Security
                                                           Device. TCG EFI protocol and
                                                           INT1A interface will not be
                                                           available.



                        ┌───── Security Device Support ─────┐
                        │ Disable                           │
                        │ Enable                            │
                        └───────────────────────────────────┘
                                                             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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```

```
        Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.
   Advanced

                                                       Enables or Disables BIOS
                                                       support for security device.
   TPM20 Device Found                                  O.S. will not show Security
                                                       Device. TCG EFI protocol and
   Security Device Support        [Enable]             INT1A interface will not be
   Active PCR banks               SHA-1                available.
   Available PCR banks            SHA-1,SHA256


   TPM 20 InterfaceType           [TIS]


                                                       →←: 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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```

● **DIO Configuration**

The DIO Modification default setting is "disable".

If the setting is changed to "enable", you can load manufacture default and program DIO setting.

(Please refer to below graphics.)

Note: Input/Output settings would be observe DIO pin-define settings.

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

  ▶ Onboard Device Configuration                      Onboard Device Configuration
                                                      status




                                                      _____
                                                      →←: 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.
```

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

  ▶ Onboard DIO Configuration                        Onboard DIO status




                                                     ↔: 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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```

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Advanced

    Onboard DIO Configuration                        Enabled or Disabled DIO
    DIO Modification              [Disabled]         Modification
  ▶ DIO port 1-8




                                                     ↔: 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) 2016 American Megatrends, Inc.
```

```
            Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
      Advanced

   DIO status
    1.Input/Output Status            In & High
    2.Input/Output Status            In & High
    3.Input/Output Status            In & High
    4.Input/Output Status            In & High
    5.Input/Output Status           Out & High
    6.Input/Output Status           Out & High
    7.Input/Output Status           Out & High
    8.Input/Output Status           Out & High


                                                          ++: 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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```

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

   Onboard DIO Configuration                             Enabled or Disabled DIO
   DIO Modification             [Enabled]                Modification
  ▶ Load Manufacture Default
  ▶ DIO port 1-8






                                                          ++: 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.
```
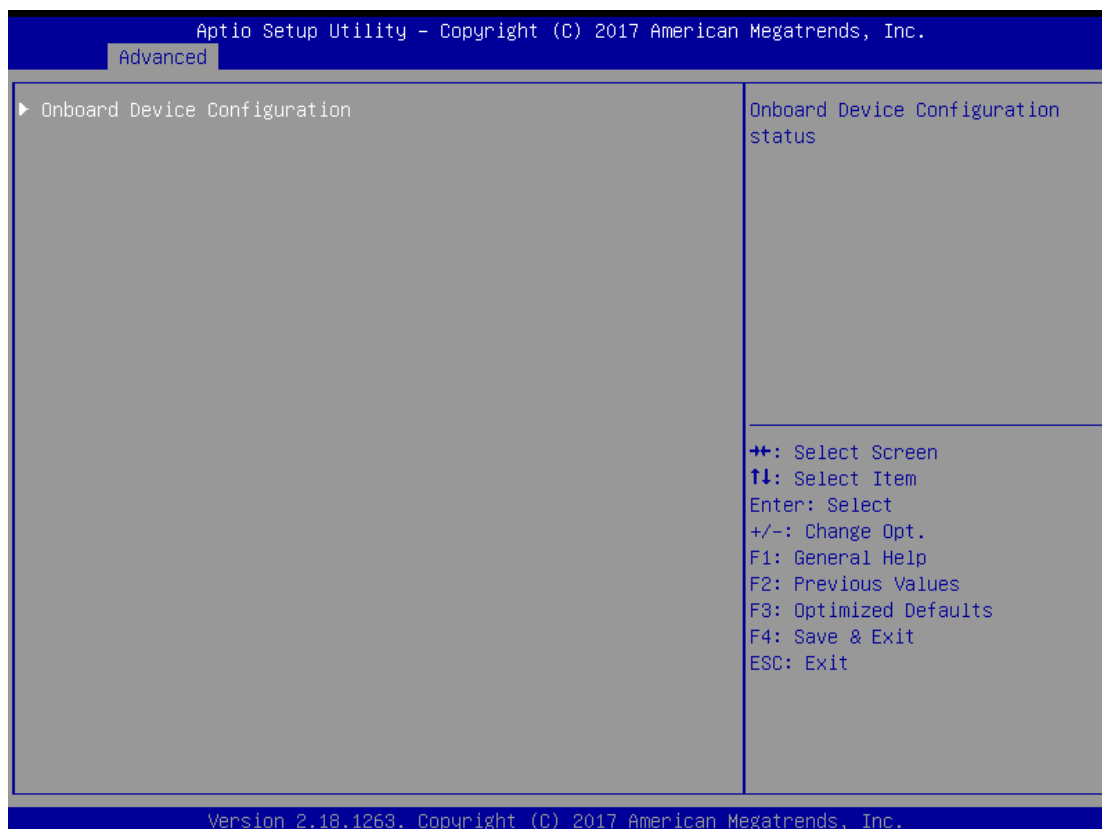
```
              Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
         Advanced

    DIO status                                                    High/Low Setting
    1.Input/Output Status            In & Low
      Input/Output Setting          [Input]
    2.Input/Output Status            In & Low
      Input/Output Setting          [Input]
    3.Input/Output Status            In & Low
      Input/Output Setting          [Input]
    4.Input/Output Status            In & Low
      Input/Output Setting          [Input]
    5.Input/Output Status           Out & High
      Input/Output Setting          [Output]
      High/Low Setting              [High]
    6.Input/Output Status           Out & High
      Input/Output Setting          [Output]             ++: Select Screen
      High/Low Setting              [High]               ↑↓: Select Item
    7.Input/Output Status           Out & High           Enter: Select
      Input/Output Setting          [Output]             +/-: Change Opt.
      High/Low Setting              [High]               F1: General Help
    8.Input/Output Status           Out & High           F2: Previous Values
      Input/Output Setting          [Output]             F3: Optimized Defaults
      High/Low Setting              [High]               F4: Save & Exit
                                                         ESC: Exit



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```

● **Smart Ignition Management**

Press Enter to access the sub-menu. Calculated based on the 24-hour military-time clock.

```
            Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
      Advanced

  Smart Ignition Management                              Change power mode
  Manufacturer                  Axiomtek                 Enabled  : In-Vehicle
  Model                         MIO311                   Disabled : AT/Raiway
  Firmware Version              V101                     *PSU and system would reset
                                                         after save setting
  PSU State                     System On
  Power Mode                    AT Mode
  Vin Voltage(V)                36.3
  IGN Signal                    Off

  Shutdown Delay Timer (IGN Off)     00:00:02
  Shutdown Delay Timer (Low Voltage) 00:03:00

  Ignition Management           [Disabled]              →←: Select Screen
                                                        ↑↓: Select Item
  Auto Power On                 [Enabled]               Enter: Select
                                                        +/-: Change Opt.
▶ Advance Setting                                       F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
▶ Save Settings                                         F4: Save & Exit
▶ Restore Factory Settings                              ESC: Exit



            Version 2.18.1263. Copyright (C) 2022 American Megatrends, Inc.
```
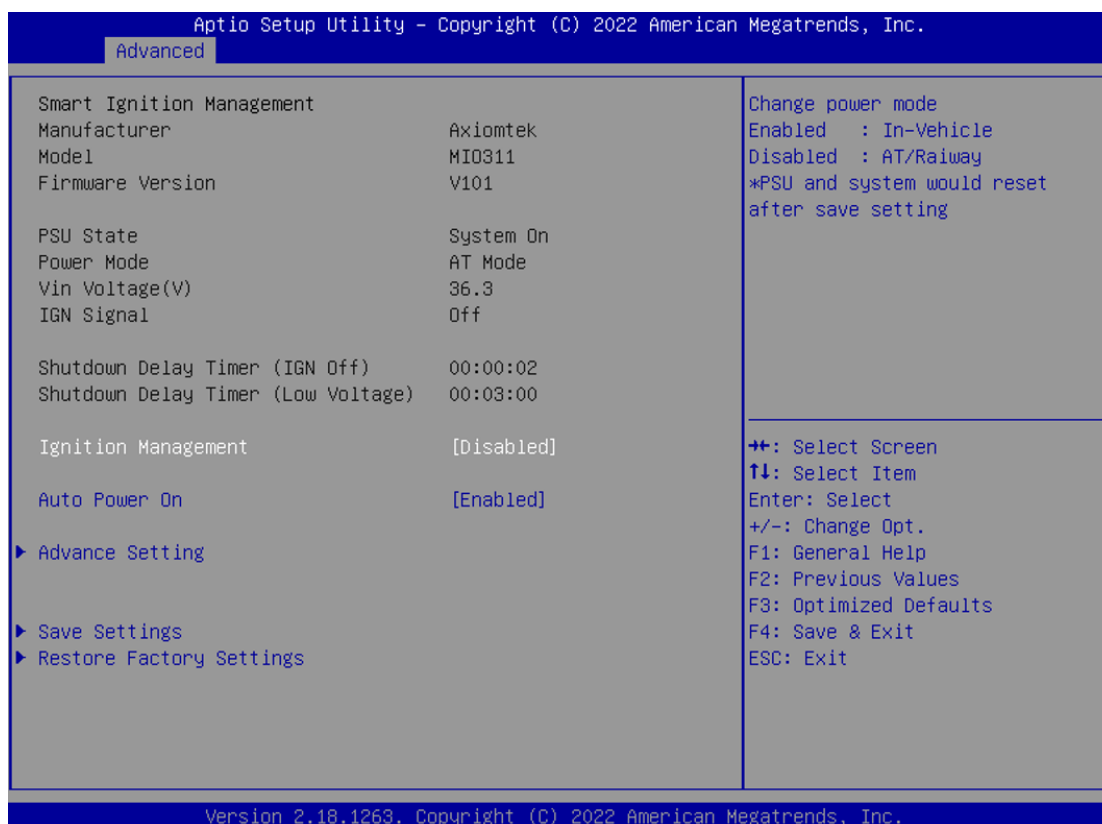
BIOS menu item	Description
Ignition Management	Enabled Switch to In-Vehicle mode *Note: IGN signal will only be triggered when DCIN M12 pin5 IGN is connected with VCC. Disabled Switch to AT/Railway mode *Note: System will be reset after Ignition Management setting has been changed and saved.
Auto Power On	Enabled System will turn on automatically under following conditions - Manually disconnects and reconnects system power - Power interruption: Resumes power after power failure Disabled System will not turn on automatically when power is connected or when power resumes from a power failure
Advance Setting	Set system on/off timing and voltage threshold levels
Save Settings	Save the current settings
Restore Factory Settings	Restores factory defaults to remove any incorrect or corrupt settings that might have prevented the system from properly powering on/off.

```
           Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
    Advanced

 ======== Voltage    ========                      The counter will be activated
 Activate Voltage Trigger(V)        9               once power source voltage is
 Low Voltage Trigger(V)             8               smaller than the value of [Low
                                                    Voltage Trigger],then, system
 Shutdown Delay Timer (Low Voltage)                 will be forced to turn off
 Minuium Timer                      00:01:00        when time's up
 Maximum Timer                      03:00:00
  Hour                              0
  Minute                            3
  Second                            0
 ======== IGN Function ========
 IGN Trigger                        [Disabled]
                                                    →←: 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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```

```
           Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
    Advanced

 ======== Voltage    ========                      The counter will be activated
 Activate Voltage Trigger(V)        9               once power source voltage is
 Low Voltage Trigger(V)             8               smaller than the value of [Low
                                                    Voltage Trigger],then, system
 Shutdown Delay Timer (Low Voltage)                 will be forced to turn off
 Minuium Timer                      00:01:00        when time's up
 Maximum Timer                      03:00:00
  Hour                              0
  Minute                            3
  Second                            0
 ======== IGN Function ========
 IGN Trigger                        [Enabled]

 System Turn On Delay Timer(IGN On)                 →←: Select Screen
 Minuium Timer                      00:00:02        ↑↓: Select Item
 Maximum Timer                      00:30:00        Enter: Select
  Hour                              0               +/-: Change Opt.
  Minute                            0               F1: General Help
  Second                            2               F2: Previous Values
 Shutdown Delay Timer (IGN Off)                     F3: Optimized Defaults
 Minuium Timer                      00:00:01        F4: Save & Exit
 Maximum Timer                      06:00:00        ESC: Exit
  Hour                              0
  Minute                            0
  Second                            2


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```
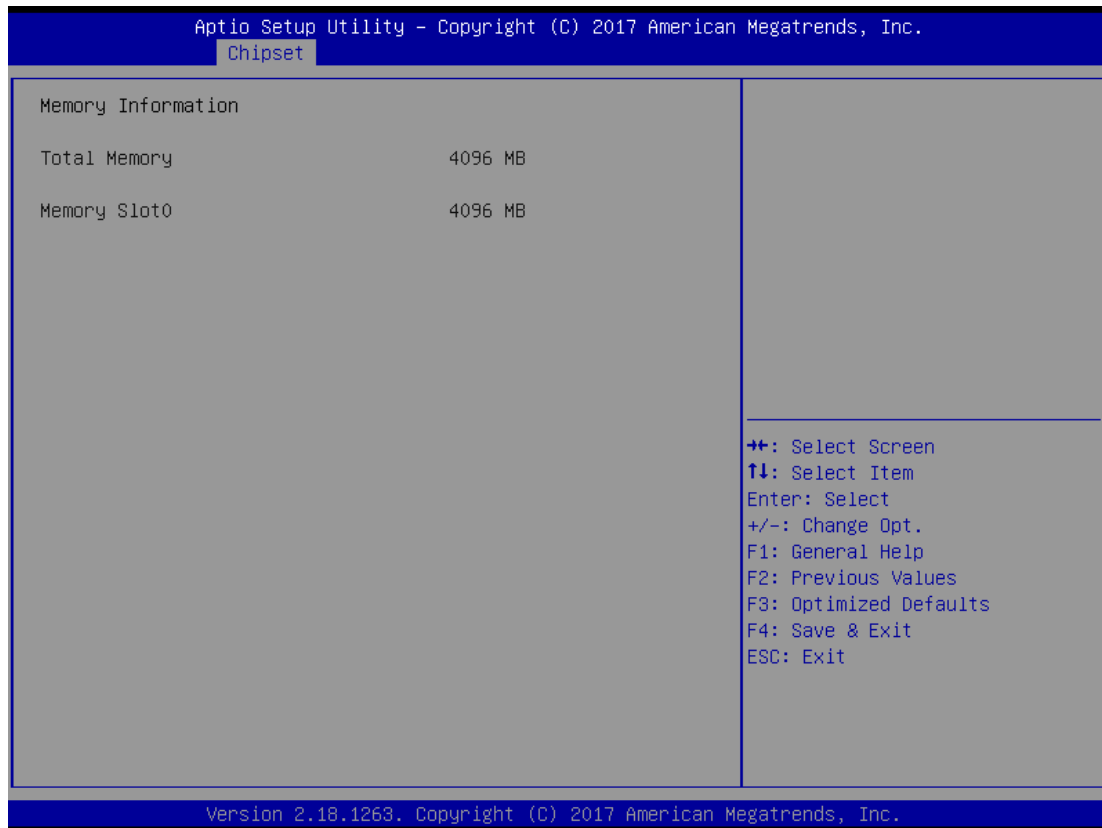
BIOS menu item	Description
Activate Voltage Trigger	The system only turns on when the voltage delivered by the power source is higher than the value you set here.
Low Voltage Trigger	The system will begin countdown stage once voltage drops below the value you set here. If the power source voltage does not come back above the value of [Activate Voltage Trigger] within the time you set for [Shutdown Delay Time (Low Voltage)], the system will shut down and remain off.
Shutdown Delay Timer (Low Voltage)	The counter will be activated once power source voltage drops below the value defined in [Low Voltage Trigger]. The system will be forced to turn off once timer completes countdown.
IGN Trigger	Enable [System Turn On Delay] and [Shutdown Delay] will be trigged by IGN. Disable IGN signal will not affect any power management.

3.4   Chipset Feature

This section contains fully optimized chipset features in the system.

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

   Memory Information

   Total Memory                      4096 MB

   Memory Slot0                      4096 MB




                                                    ➜←: 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.
```
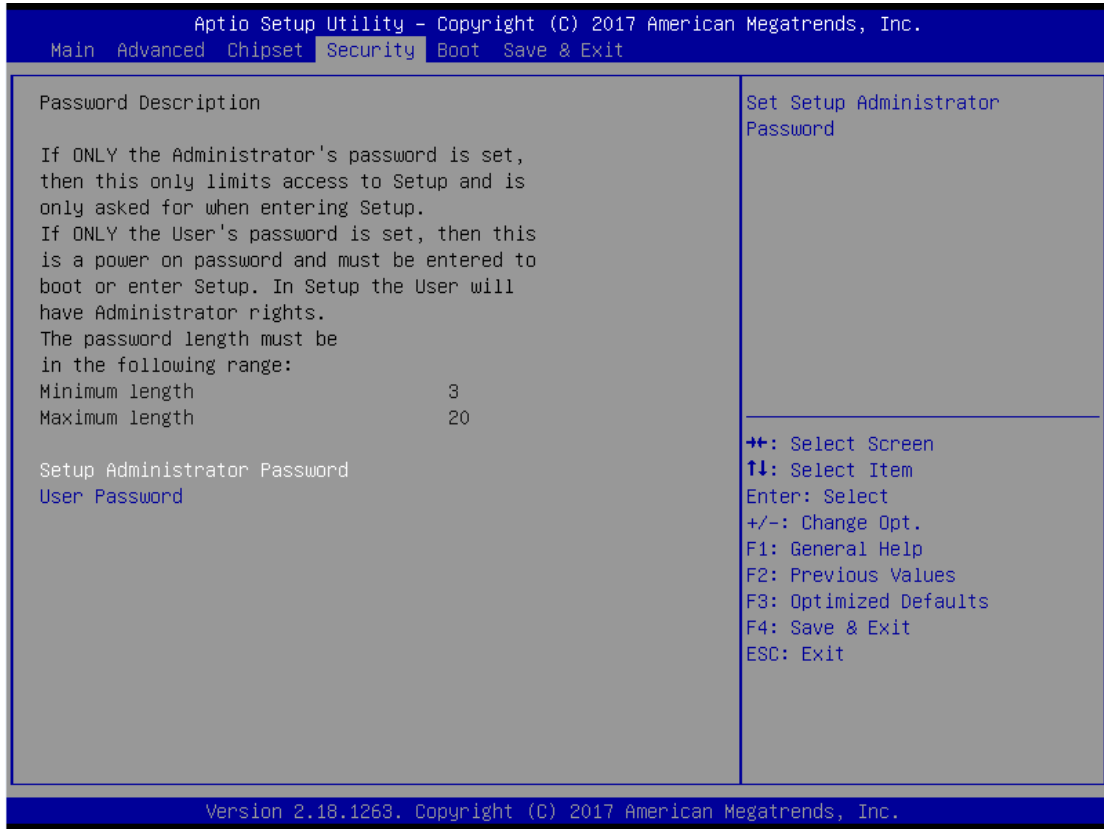
3.5   Security

The Security menu allows users to enhance system security by setting an administrator password and a user password. No password has been set in the default setting.
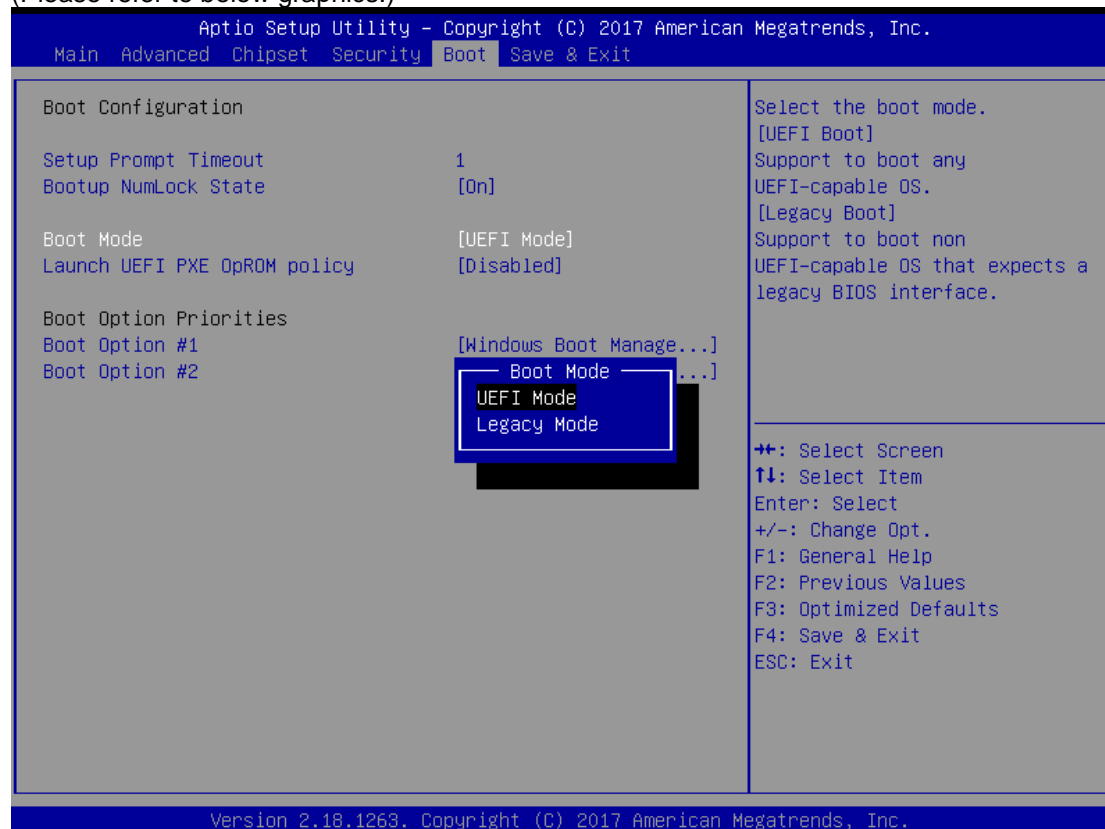
(Please refer to below graphics.)

```
              Aptio Setup Utility – Copyright (C) 2020 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

   Password Description                              Set Setup 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
                                                     ↑↓: Select Item
   Setup Administrator 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) 2020 American Megatrends, Inc.
```

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

    Password Description                              Set Setup 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
                                                    ↑↓: Select Item
    Setup Administrator Password                     Enter: Select
    User Password                                   +/-: 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.
```

Note: The BIOS default has no password. The user must remember the password after creating one. If the user forgets the password RMA is the only solution.

3.6   Boot Type

The Boot menu allows users to change boot options of the system, providing UEFI, Legacy, and Compatible modes to select from.
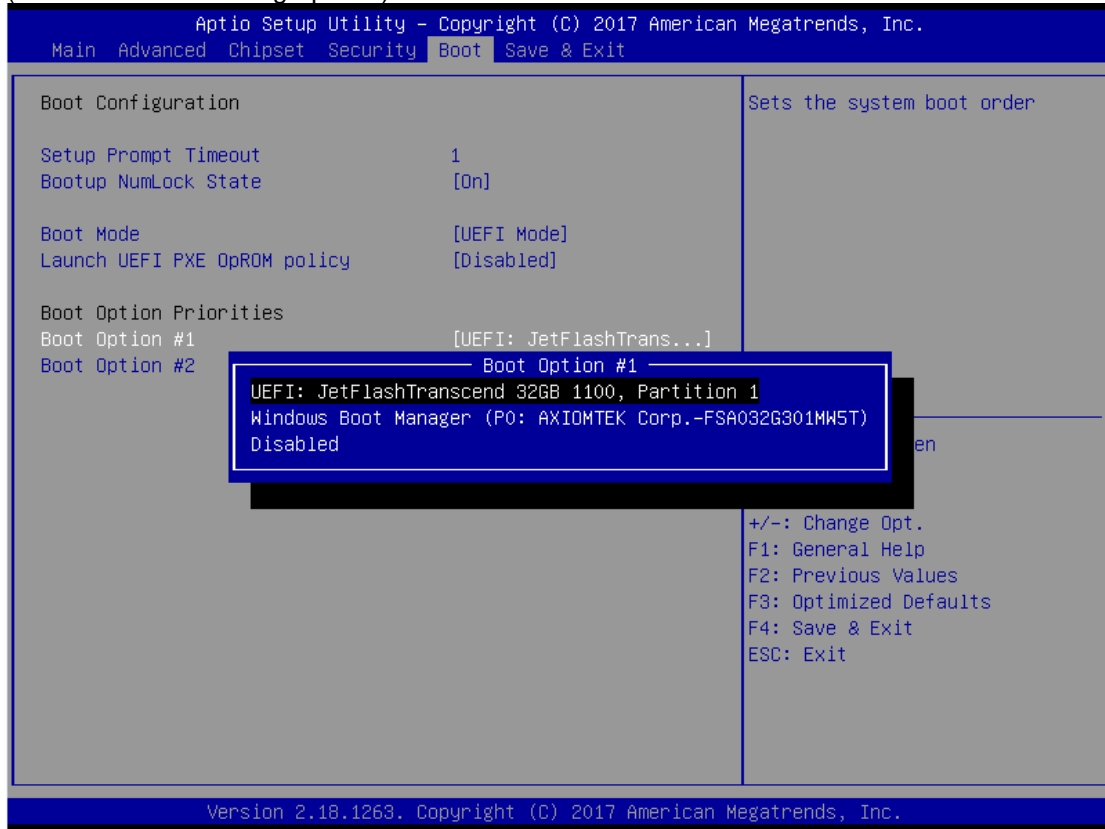
The default setting boot mode is [UEFI Mode].

(Please refer to below graphics.)

The Boot Option Priorities can be set by selecting Boot Option #1, #2…
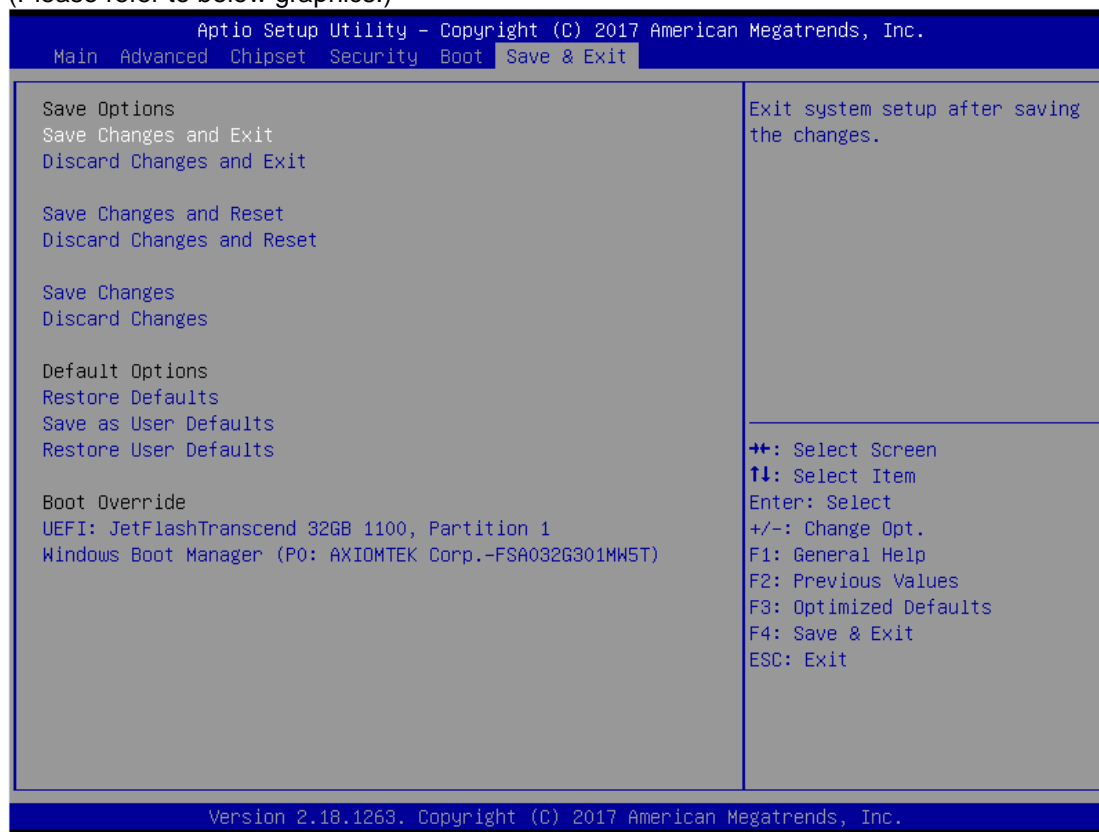
(Please refer to below graphics.)

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

  Boot Configuration                                       Sets the system boot order

  Setup Prompt Timeout                1
  Bootup NumLock State                [On]

  Boot Mode                           [UEFI Mode]
  Launch UEFI PXE OpROM policy        [Disabled]

  Boot Option Priorities
  Boot Option #1                      [UEFI: JetFlashTrans...]
  Boot Option #2          ─────────── Boot Option #1 ───────────
                          UEFI: JetFlashTranscend 32GB 1100, Partition 1
                          Windows Boot Manager (P0: AXIOMTEK Corp.-FSA032G301MW5T)
                          Disabled
                                                            en
                                                         +/-: 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.
```

.

3.7   Save & Exit

The Save & Exit menu allows users to determine whether to accept their modifications to the system configuration, or to keep default settings for optimal fail-safe performance.

(Please refer to below graphics.)

```
          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
                                                        ↑↓: Select Item
   Boot Override                                        Enter: Select
   UEFI: JetFlashTranscend 32GB 1100, Partition 1       +/-: Change Opt.
   Windows Boot Manager (P0: AXIOMTEK Corp.-FSA032G301MW5T)  F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit

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

BIOS menu item	Description
Save Changes and Exit	When users have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.
Discard Changes and Exit	Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.
Save Changes and Reset	After completing the system configuration changes, select this option to leave Setup and reboot the computer so the new system configurations will take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.
Discard Changes and Reset	Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.
Save	After completing the system configuration changes, select this option to

Changes	save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.
Discard Changes	Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.
Restore Defaults	It automatically sets all Setup options to a complete set of default settings when users select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.
Save as User Defaults	Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.
Restore User Defaults	It automatically sets all Setup options to a complete set of User Defaults when users select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.
Boot Override	Select a drive to immediately boot that device regardless of the current boot order.

APPENDIX A
WATCHDOG TIMER

About Watchdog Timer

After the system stops working for a while, it will be auto-reset by the watchdog timer. The integrated watchdog timer can be set up in the system reset mode by program.

How to Use Watchdog Timer

The following example enables 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 ; Select logic register**
>
> **O 2F 07 ; Switch to WDT device**

↓

Set timer value:

> **O 2E F6 ; Select logic register**
>
> **O 2F 05 ; Timer value 0~255 (Sec/Min) (Ex: 5)**

↓

Clear WDT status (optional):

> **O 2E F5 ;**
>
> **O 2F 40**

↓

Set base timer:

> **O 2E F5**
>
> **O 2F M ; M = 28h (Minute)**
>
> **M = 20h (Second)**

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APPENDIX B
WINDOWS POWER BUTTON SETTING

Please enter the power button setting through the PC console, and then follow below steps to complete the setting.
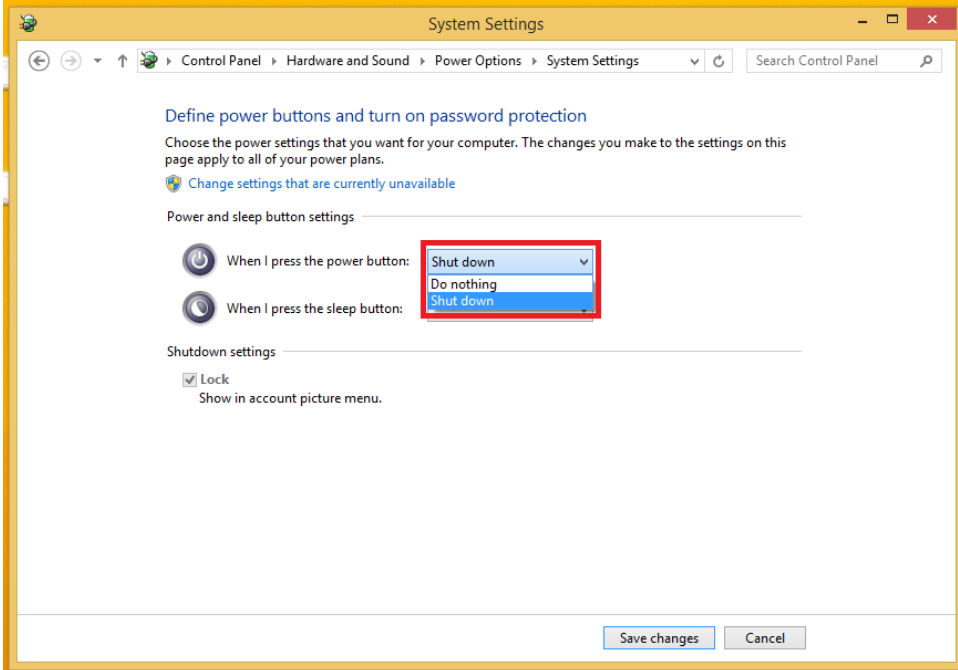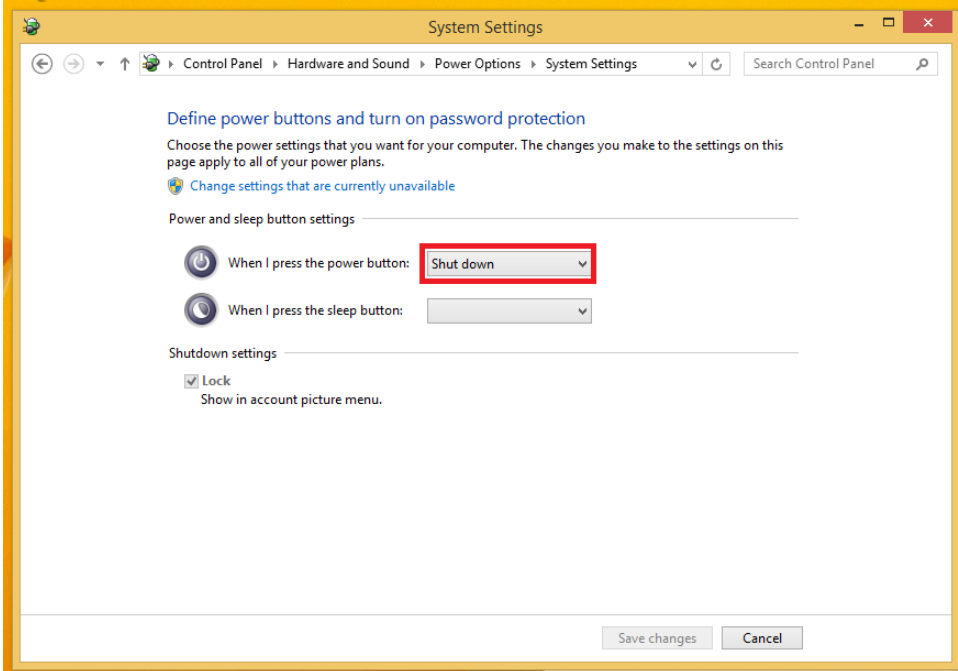
Step-3
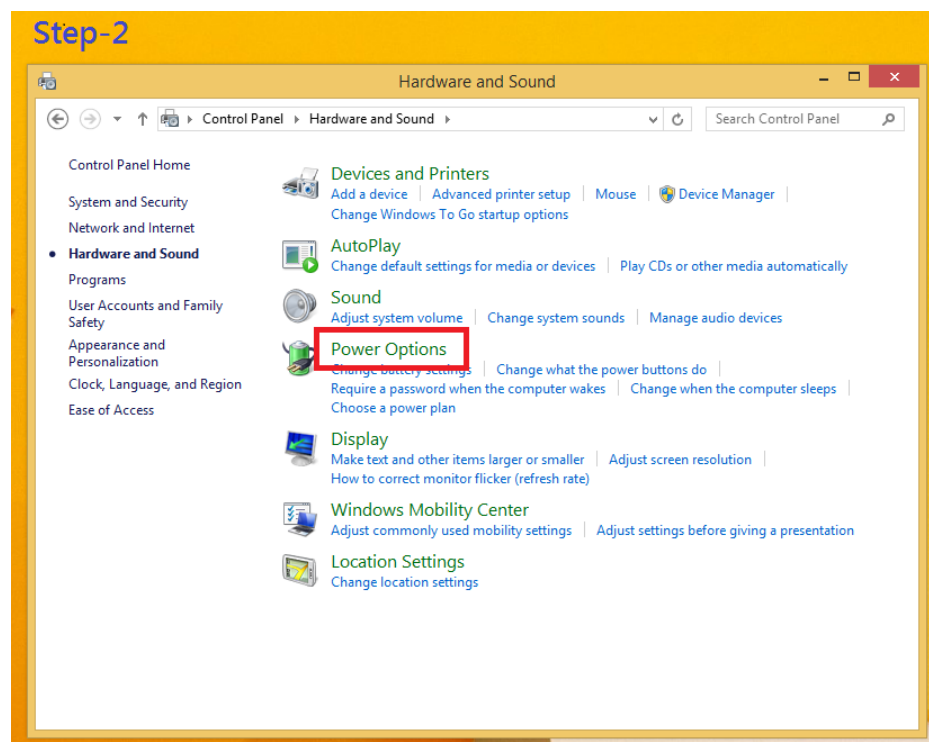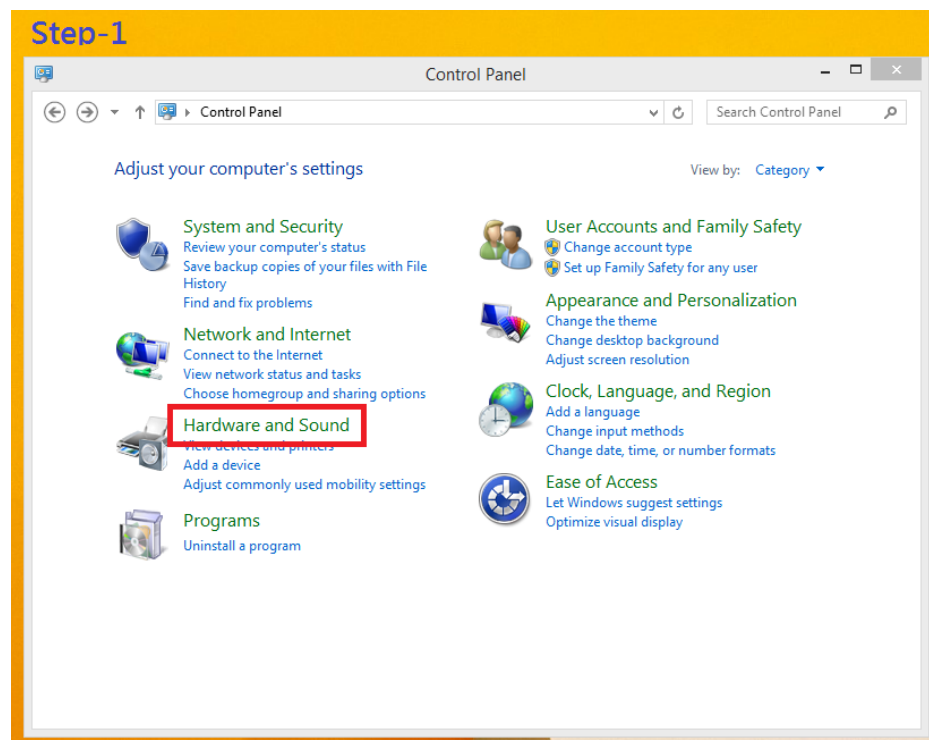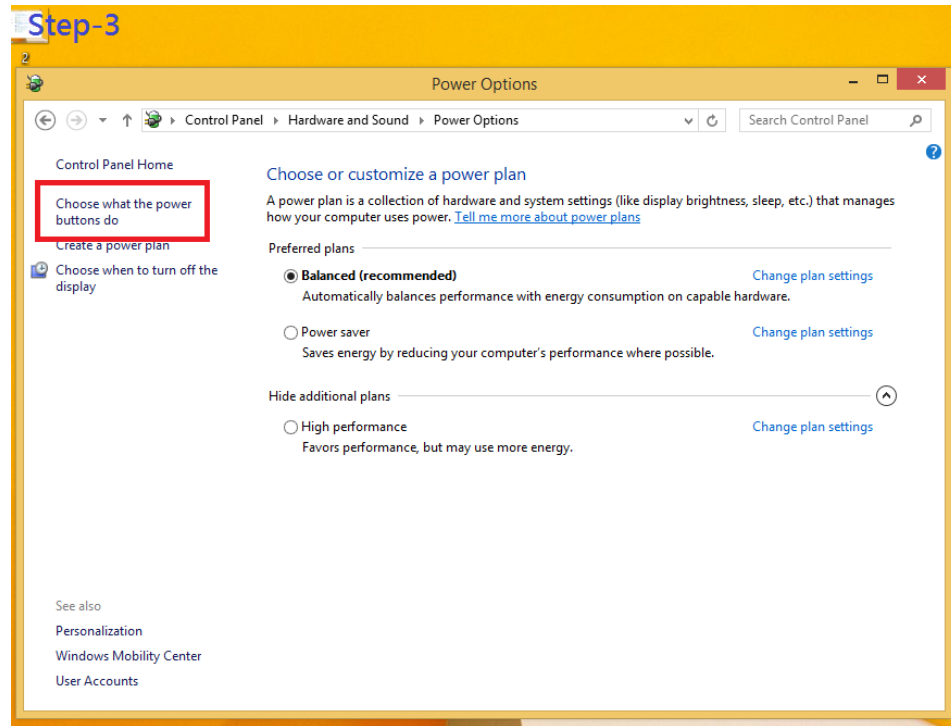
When IGN function has been used, the power button's setting must be switched to "Shut down" as below. Then the system can be shut down normally, after IGN has been turned off.

Step-4
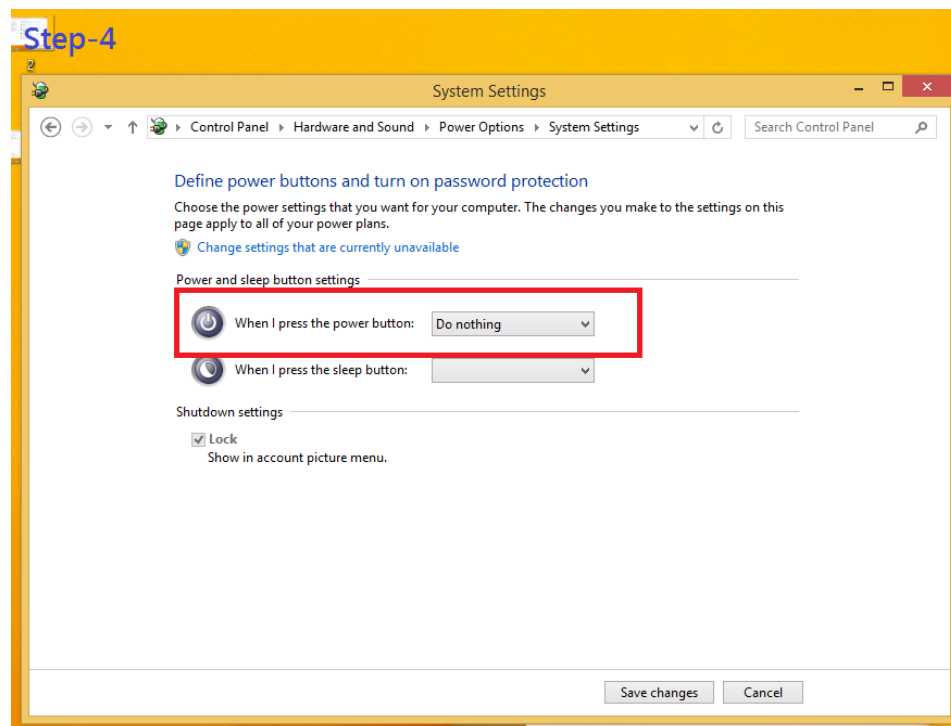
Step-5

Step-6

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APPENDIX C
PROGRAMMABLE LED SETTING

Programmable LED Setting

LEDs are controlled by General Purpose Input / Output (GPIO) in Super IO. The relevant control positions are as follows:

- Super IO GPIO3 Group(GPIO20~27), Location: Address E8h for setting Programming LED.
- GPIO26~27 is DI/DO Programming LED, setting DATA from Logic Device 7,E8~EB.

CR E8h. GPIO2 I/O Register

Location: Address E8h

Attribute: Read/Write

Power Well: VCC

Reset by: GP2X_MRST

Default : FFh

Size: 8 bits

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO2 I/O register 0: The respective GPIO2 PIN is programmed as an output port 1: The respective GPIO2 PIN is programmed as an input port.

GPIO2 Group
Enable: Logic Device 7, CR30[2]
Data: Logic Device 7, E8~EB
Multi-function: WDTO#, BEEP, SMI, PLED (Logic Device 8, CRE2[7-0])
Reset: Logic Device 9, CRE2[2]
OD/PP: Logic Device F, CRE2