USER'S MANUAL

tBOX110-APL-MR series

Embedded System

User's Manual

AXIOMTEK

www.axiomtek.com

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Safety Precautions

Before you begin, please review these crucial safety precautions:

1. The tBOX110-APL-MR does not come with a pre-installed operating system. Please ensure you install an operating system before setting up any software.

2. Ground yourself to prevent static charge when working with internal components. Use a grounding wrist strap and place all electronic parts in static-shielded devices, as most electronic components are sensitive to static charges.

3. Disconnect the power cord from the tBOX110-APL-MR before any installation. Ensure both the system and external devices are powered OFF to avoid potential damage to sensitive components from a sudden surge of power. Also, ensure the tBOX110-APL-MR is properly grounded.

4. Verify that the voltage of the power source is correct before connecting the equipment to the power outlet.

5. Power OFF the system before cleaning. Use a cloth for cleaning, and avoid spraying any liquid cleaner directly onto the screen.

6. Do not expose this equipment to an uncontrolled environment where the storage temperature falls below -45℃ or exceeds 85℃, as it may cause damage to the equipment.

7. Refrain from opening the system's back cover. If maintenance requires cover removal, only a trained technician should do so. Integrated circuits on computer boards are sensitive to static electricity. To prevent chip damage from electrostatic discharge, follow these precautions:

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

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

   If you require further assistance when purchasing the power source, please contact the manufacturer for additional information

CAUTION

A 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 to take the following precautions before you begin cleaning the computer. When you clean any individual part or component of the computer, please read and fully understand the details below.

When cleaning the device, use a dry cloth to wipe it.

1. Be cautious of tiny removable components when using a vacuum cleaner to remove dirt from the floor.
2. Turn the system off before you start cleaning the computer or any of its components.
3. Never drop components inside the computer or allow the circuit board to become damp or wet.
4. Exercise caution when using any kind of cleaning solvent or chemical for cleaning purposes. Some individuals may be allergic to the ingredients.
5. Avoid placing any food, drink, or cigarettes near the computer.

Cleaning Tools

While various companies offer specialized products to facilitate the cleaning process for computers and peripherals, users can also utilize common household items. Below is a list of recommended items for cleaning your computer and its peripherals.

Please note that certain components may necessitate the use of specific cleaning products. Always consult the provided instructions to ensure proper usage.

1. Cloth: A piece of cloth is the ideal tool for gently cleaning components. While paper towels or tissues can suffice for most hardware, using a cloth is recommended for optimal results.

2. Water or rubbing alcohol: Lightly dampening a cloth with water or rubbing alcohol can effectively clean the computer. Avoid using unknown solvents, as they may harm plastic parts.

3. Vacuum cleaner: Utilizing a vacuum cleaner to remove dust, dirt, hair, cigarette particles, and other debris from the computer is one of the most efficient cleaning methods. Accumulated particles can impede airflow and lead to circuitry corrosion over time.

4. Cotton swabs: Moistened with rubbing alcohol or water, cotton swabs are excellent for cleaning hard-to-reach areas in your keyboard, mouse, and other locations.

Foam swabs: Whenever possible, opt for lint-free swabs like foam swabs for more precise cleaning

Note: We strongly recommend that you 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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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 for rolling stock in harsh environments. Designed for use in strict environments, the tBOX110-APL-MR adopts an extra low power consumption Intel Atom® x5-E3940 (1.6GHz/4-cores) processor, while also supporting a wide 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 a friendly environment for programmers to develop application software at a lower cost.

The tBOX110-APL-MR is a robust gateway featuring an industrial-grade design. It incorporates an advanced cooling system and supports mSATA and 2.5" SATA SSD (or HDD), making it an ideal solution for the following markets:

- Public transportation use cases (traffic/ highway control; train/bus control, etc.)

- **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 connectors

    A-coded for MR2

    X-coded for MR4
  - Isolated 4 x COM ports supporting RS-232/422/485 (4 wires) with shield ground
  - 2 x USB 3.0
  - 2 x HDMI 1.4
  - 2 x Full size PCIe Mini Card slots:

    a) 1 x (USB/mSATA/ PCIe) with external SIM slot

    b) 1 x (USB/ PCIe) with external SIM slot
  - Supports one 2.5" SATA drive and one mSATA
  - Wide range 24-110 VDC power input with M12-5P Male A-coded connector

- 1 x Terminal Block (male, 2 x 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 1600 MHz memory up to 8GB.

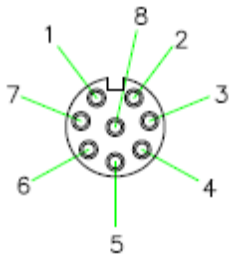
1.2.4 Display

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

1.2.5 Ethernet Ports

- Intel Ethernet Controller i210-IT installed.
- 2 x M12-8P Female A-coded connectors support 10/100/1000 with 1.5KVDC magnetic isolated protection on tBOX110-APL-MR 2.
- 2 x M12-8P Female X-coded connectors support 10/100/1000 with 1.5KVDC magnetic isolated protection on tBOX110-APL-MR 4.
- The M12 A-coded Female pins definition as below.

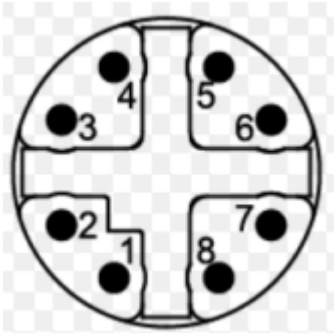
Pin	10/100 Mbps	1000 Mbps
1	--	MDI 2+
2	--	MDI 3+
3	--	MDI 3-
4	TX -	MDI 0-
5	RX +	MDI 1+
6	TX +	MDI 0+
7	--	MDI 2-
8	RX -	MDI 1-
ACT	Orange blinks when the corresponding LAN is active.	



M12 A-coded 8-Pin/ Female

- The M12 X-coded Female pins definition as below.

Pin	10/100 Mbps	1000 Mbps
1	TX+	MDI 0+
2	TX-	MDI 0-
3	RX+	MDI 1+
4	RX-	MDI 1-
5	--	MDI 2+
6	--	MDI 2-
7	--	MDI 3+
8	--	MDI 3-
ACT	Orange blinks when the corresponding LAN is active.	



M12 X-coded 8-Pin/ Female

1.2.6 Remote SW

- 1 x SW for remote control.

1.2.7 Storage

- 1 x mSATA (occupied 1 x Full size PCIe Mini Card slot).
- 1 x SATA.

1.2.8 Wireless

- 2 x Full size PCIe Mini Card slots.
- 2 x External access SIM slots (Standard size).
- 4 x Antenna holes.

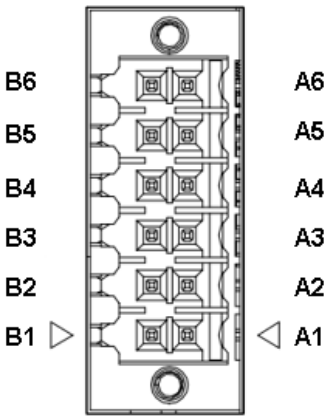
1.2.9 USB

- 2 x USB3.0.

1.2.10 COM/CAN

- 2 x Terminal Blocks, support 4 COM or 2 COM+2 CANBUS(optional).
- COM port supports RS-232/422/485 mode, which can be selected by BIOS.
- Supports High Speed Mode from 115.2 Kbps up to 1.5 Mbps.
- Pins define is listed as follows:

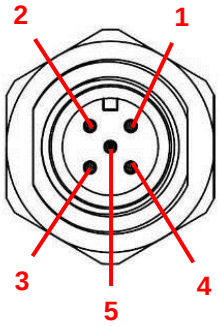
PIN	RS232	RS422	RS485	CAN
B6/A6	RX	TX+	D+	--
B5/A5	CTS	TX-	D-	--
B4/A4	TX	RX+	--	L
B3/A3	RTS	RX-	--	H
B2/A2	Signal GND	Signal GND	Signal GND	Signal GND
B1/A1	Chassis GND	Chassis GND	Chassis GND	Chassis GND



1.2.11 Power

- 1 x DC input connector with M12-5P Male A-coded.
- OVP (over voltage protection) and RPP (reverse polarity protection).

Pin	Signal
1	DC+
2	DC+
3	DC-
4	DC-
5	IGN



Note: Default IGN Trigger: Disabled, refer to Smart Ignition Management

1.2.12 Power & Reset Button

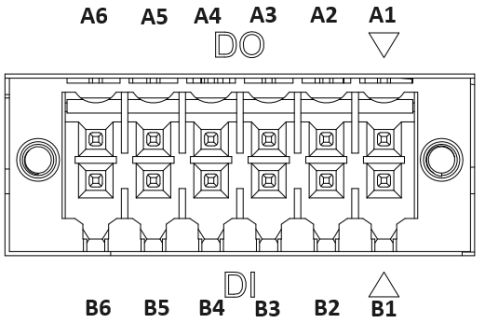
- AT mode -- auto power on.
- Power button setting for software must be set up first.
- One reset button.

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

1.2.13 DIO

- 1 x Terminal Block 2x6 pins connector supported an isolation 4 DI and 4 DO.

Pin	Signal	Pin	Signal
B1	DI_COM+	A1	DO_COM+
B2	DI0	A2	DO0
B3	DI1	A3	DO1
B4	DI2	A4	DO2
B5	DI3	A5	DO3
B6	DI_COM-	A6	DO_COM-



Digital I/O Specification:

A. Digital Input:

Input channels: 4, sink/source type

Status change frequency: 25Hz

<Input level for dry contacts>

Logic level 0: close to DI_COM-

Logic level 1: open

<Input level for wet contacts>

Logic level 1: +/- 3VDC max.

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

B. Digital output:

Output channels: 4, sink type (NPN)

Sink current: 200mA max. per channel

DO_COM+ to DO_COM- max. voltage : 30VDC

1.2.14 WatchDog Timer (WDT)

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

1.2.15 Restore BIOS Optimal Defaults (SW1)

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

1.2.16 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

1.2.17 Operation Temperature

- -40^{0}C ~ +70^{0}C

1.2.18 Storage Temperature

- -40^{0}C ~ +85^{0}C

1.2.19 Humidity

- 0% ~ 95%

1.2.20 Weight

- 0.967 kg

1.2.21 Dimensions

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

1.2.22 System I/O Outlets

- 2 x Terminal Blocks (2x6 pins) male for 4 COM
- 2 x HDMI connectors
- 2 x Ethernet:

  M12 A-coded Female for MR2

  M12 X-coded Female for MR4

- 2 x USB 3.0 ports
- 1 x DC power input with M12 A-coded Male connector
- 1 x Terminal Block (2x6 pins) male for isolation DIO (4DI/4DO)
- 4 x Antenna holes
- 2 x Audio jacks for Line out/MIC in
- 2 x SIM slots
- 4 x LED indicators

1.2.23 Power Supply

- 24-110V DC-in power supply
- Power Rate:24-110Vdc,1.47-0.33A (for tBOX110-APL-MR2)
- Power Rate: 24-110Vdc,0.98-0.33A (for tBOX110-APL-MR4)

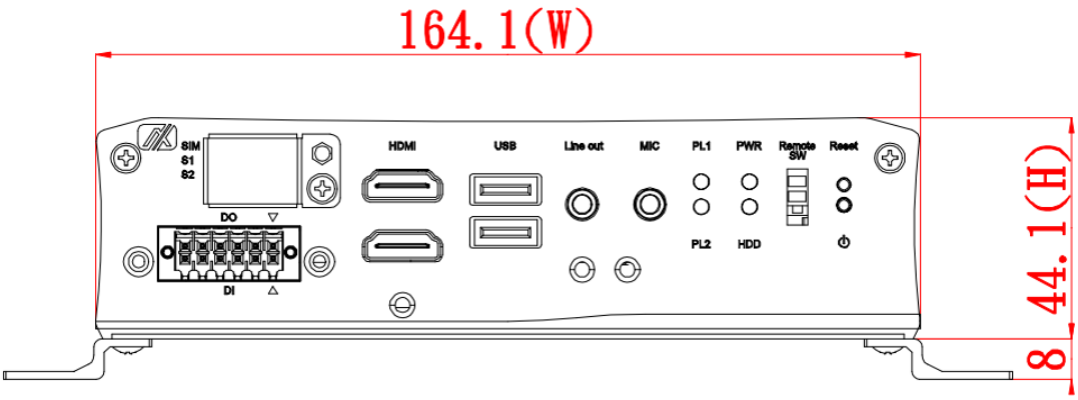
1.2.24 Programmable LEDs

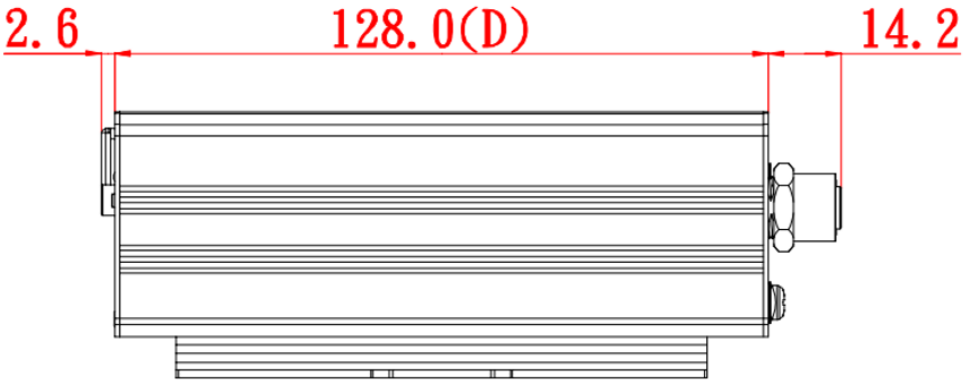
- The table below summarizes the functional descriptions of the LED indicators and their corresponding colors, setting refer to APPENDIX C.

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

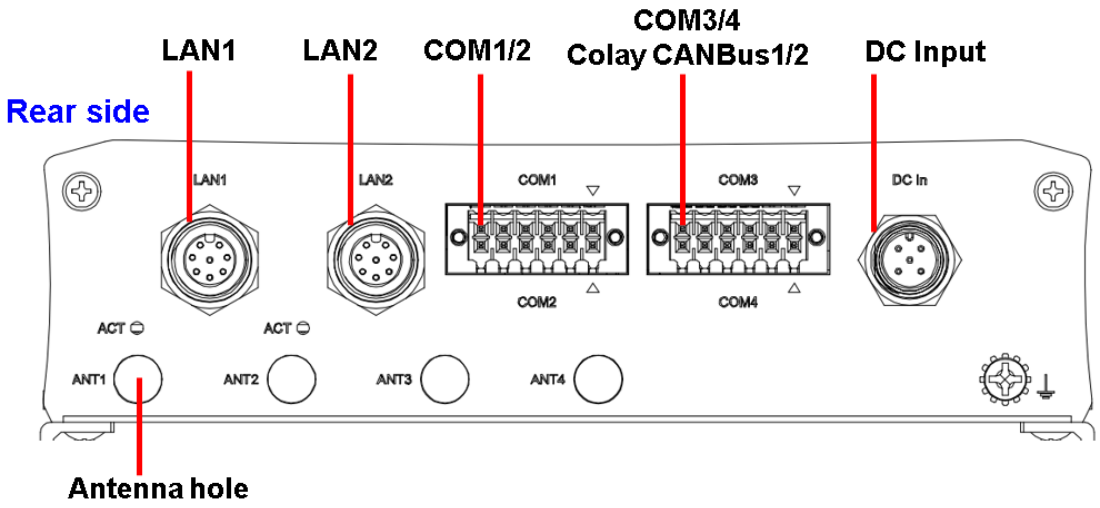
The following diagrams show you the dimensions and outlines of the tBOX110-APL-MR.

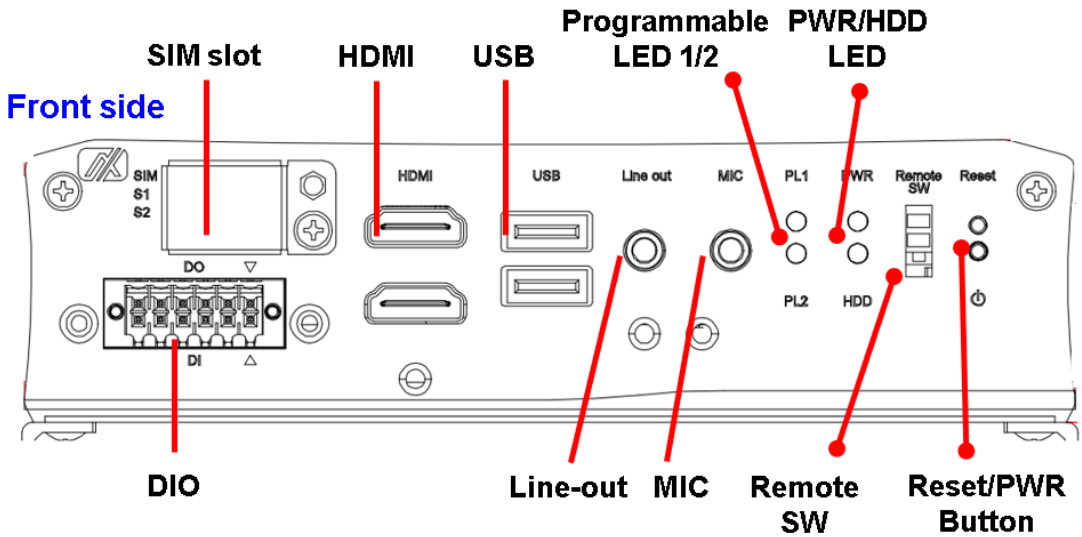




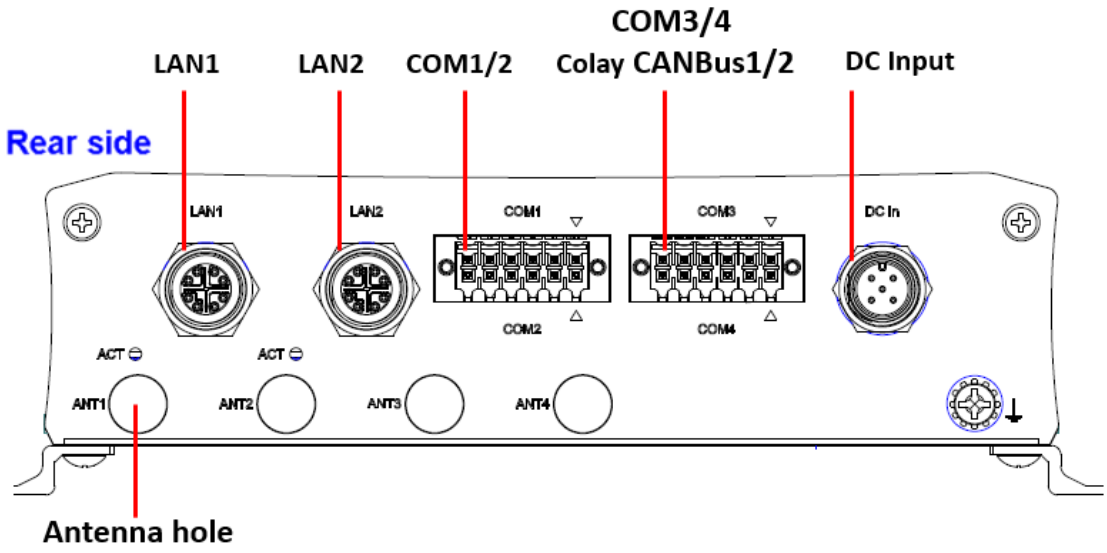
1.4 I/O Outlets

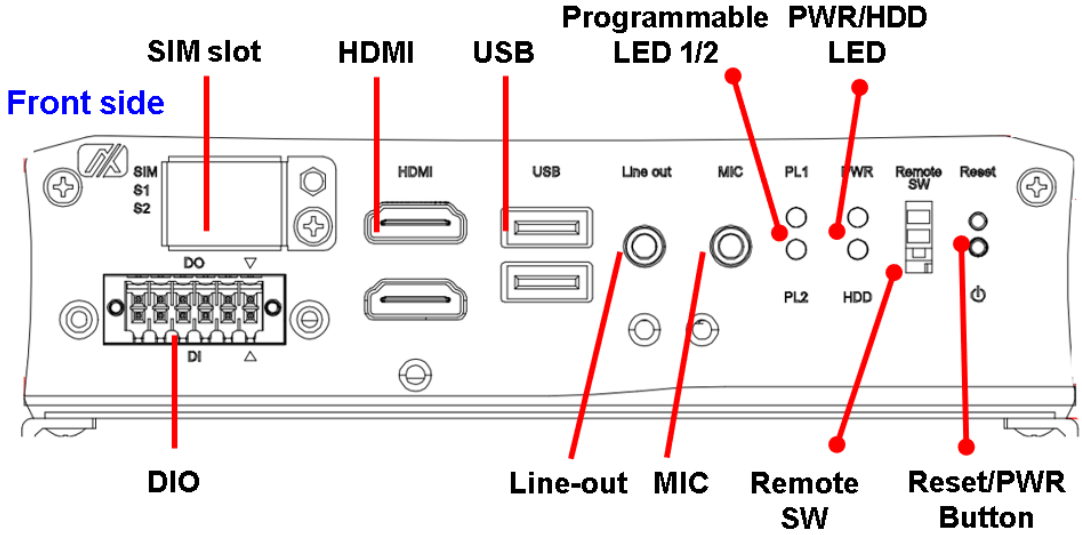
The following figures show you the I/O outlets on the front view and top view of the tBOX110-APL-MR2.





The following figures show you the I/O outlets on the front view and top view of the tBOX110-APL-MR4.





1.5 Packing List

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

- Wall Mount kit x 1
- Wall Mount kit Screw x 4
- Terminal Block Connect kit x 3
- Rubber for HDD x 1
- Cable Holder kit x 1

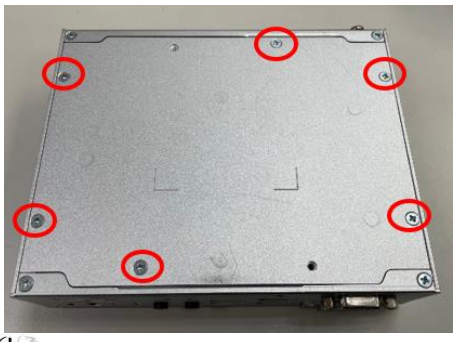
SECTION 2
HARDWARE INSTALLATION

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.

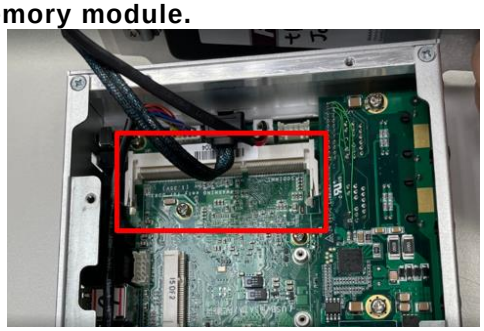
Step 2 Loosen all the screws from the cover and flip the cover to the right.



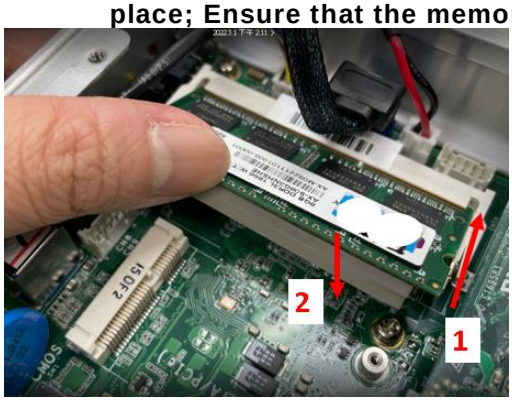
Note: 75211630600E 6pcs

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.

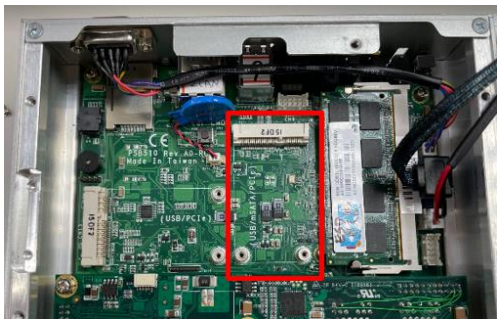


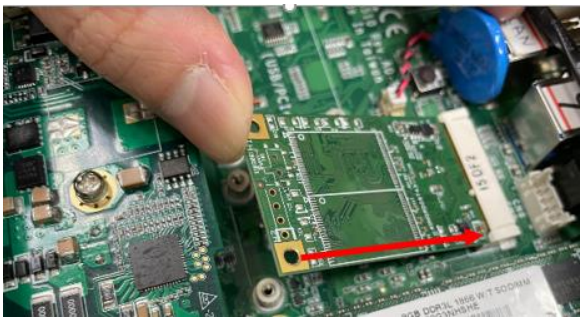
Step 4 Insert the memory module into the slot and push it down to lock it in place; Ensure that the memory is securely locked by the socket.



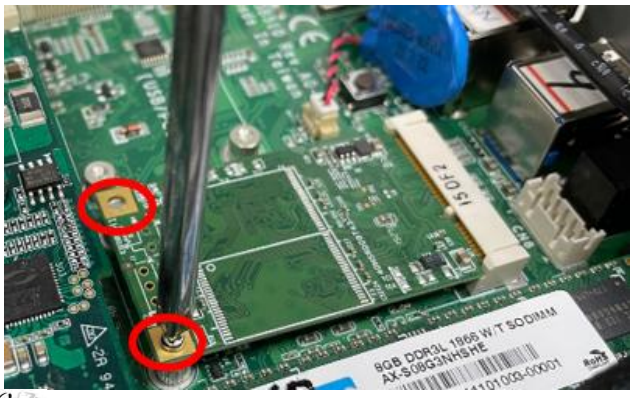
2.2 Installing the mSATA

Step 1 Insert the mSATA into the slot.





Step 2 Fasten the screws tightly.



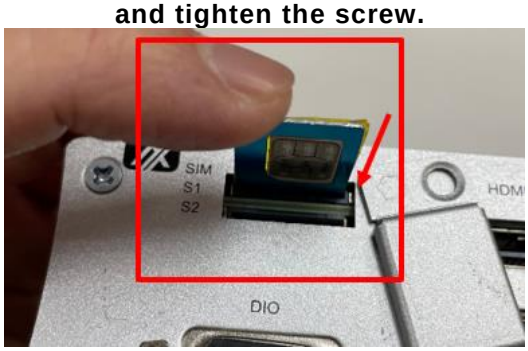
Note: 75A11610600E 2pcs
Large flat head cross mechanical tooth flat tail nickel-plated M2*6L screw

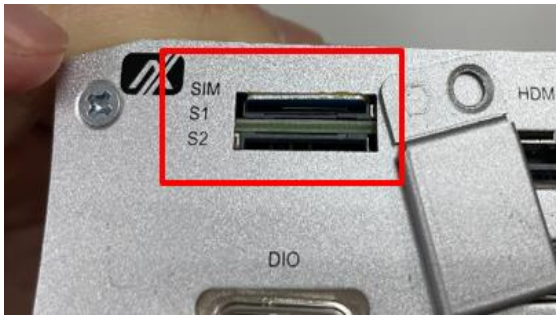
2.3 Installing the Wireless Module

Step 1 Loosen the screw and remove the cover.

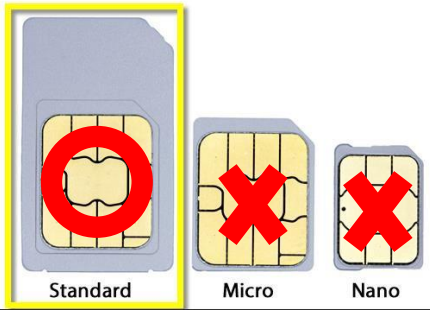
Note: 75211630600E 1pcs
Dish head cross mechanical tooth flat tail nickel-plated M3*6L screw (120 degrees)

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





Note: Use only standard-size SIM cards, as illustrated below:

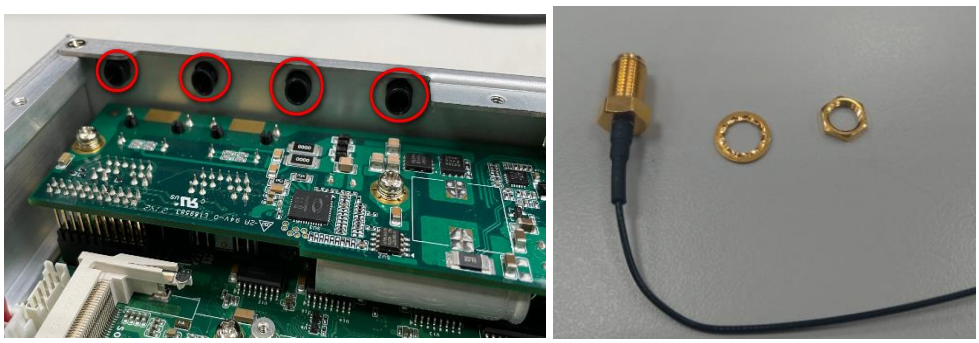


Step 3 Install the wireless module into the slot and tighten the screws.

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.

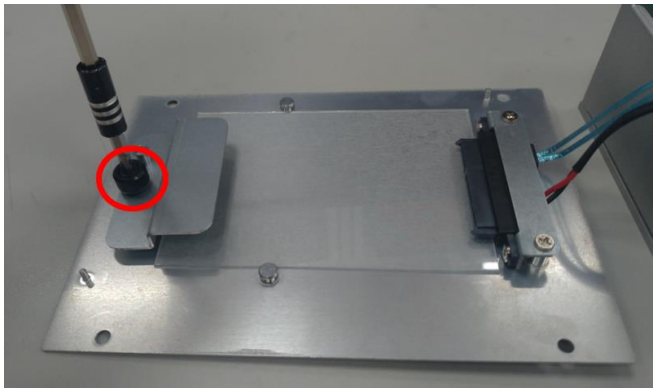


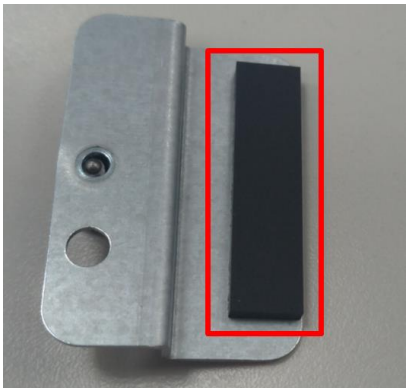
Step 5 Thread the antenna cable's gold connector through the antenna hole on the system chassis, then secure it firmly using the antenna nut and gasket.

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.

2.4 Installing the Hard Disk

Step 1 Loosen the bracket screw and remove the bracket and attach the HDD pad on the bracket.





Step 2 Insert the hard disk and screw the bracket to the chassis.

2.5 Installing the DIN-rail Mount and Wall Mount Kits

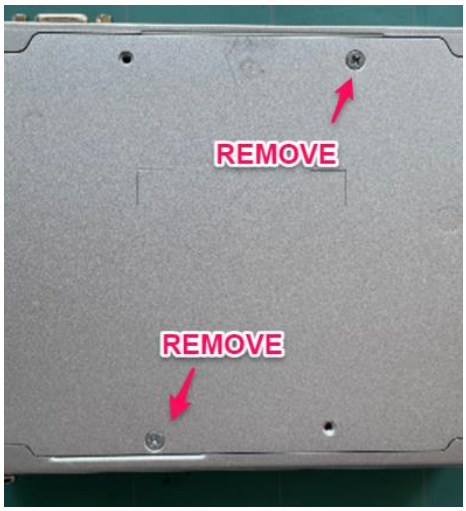
The tBOX110-APL-MR provides DIN-rail and Wall Mount kits that customers can install as below:

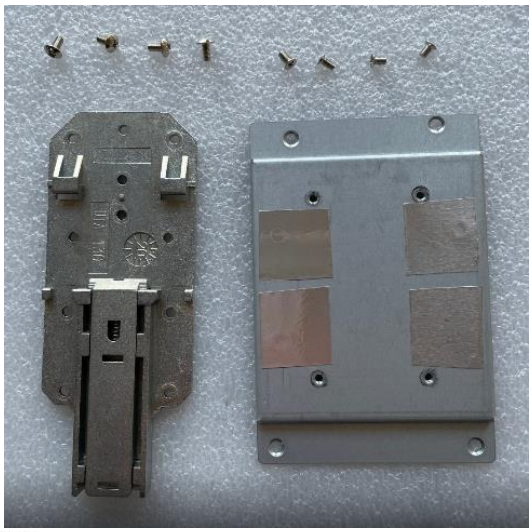
Method 1: DIN-rail Mount

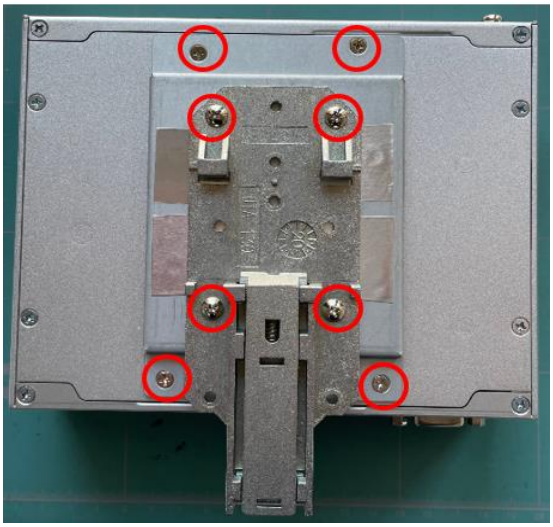
Step 0 Removed two M3 x 6mm screws.

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

Step 2 Assemble the bracket to the system 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

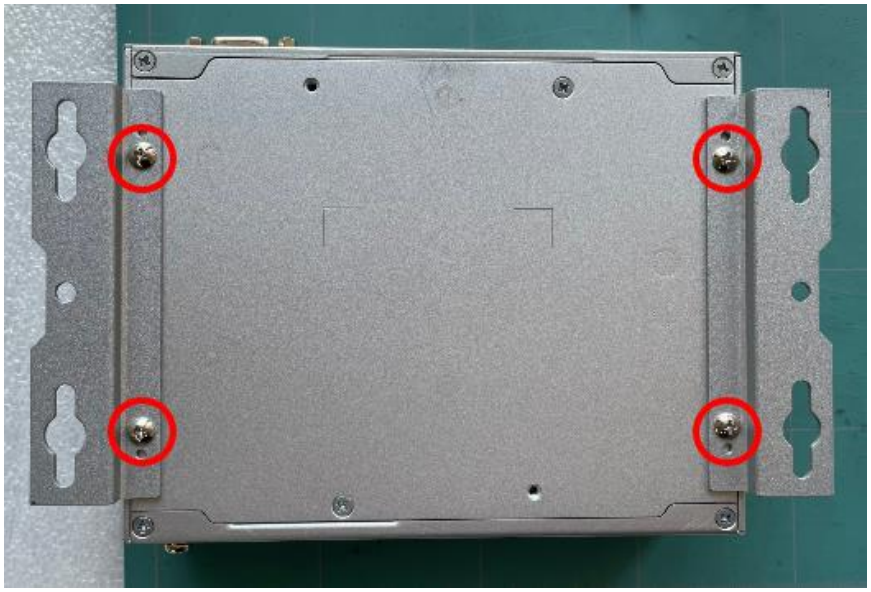
Method 2: Wall Mount

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.



2.6 Installing the Cable Fixing Plate

For HDMI:

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

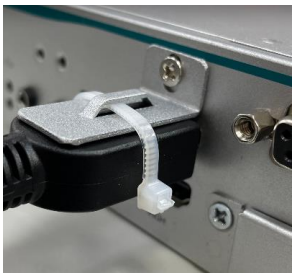
Step 2 **To fasten the HDMI cable fixing plate (Figure 1) to the system, align the hole on the plate with the hole on the system chassis, insert the screw, and tighten it to secure the plate,as shown in Figure 2 below.**

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 , and tighten it to secure 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.

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

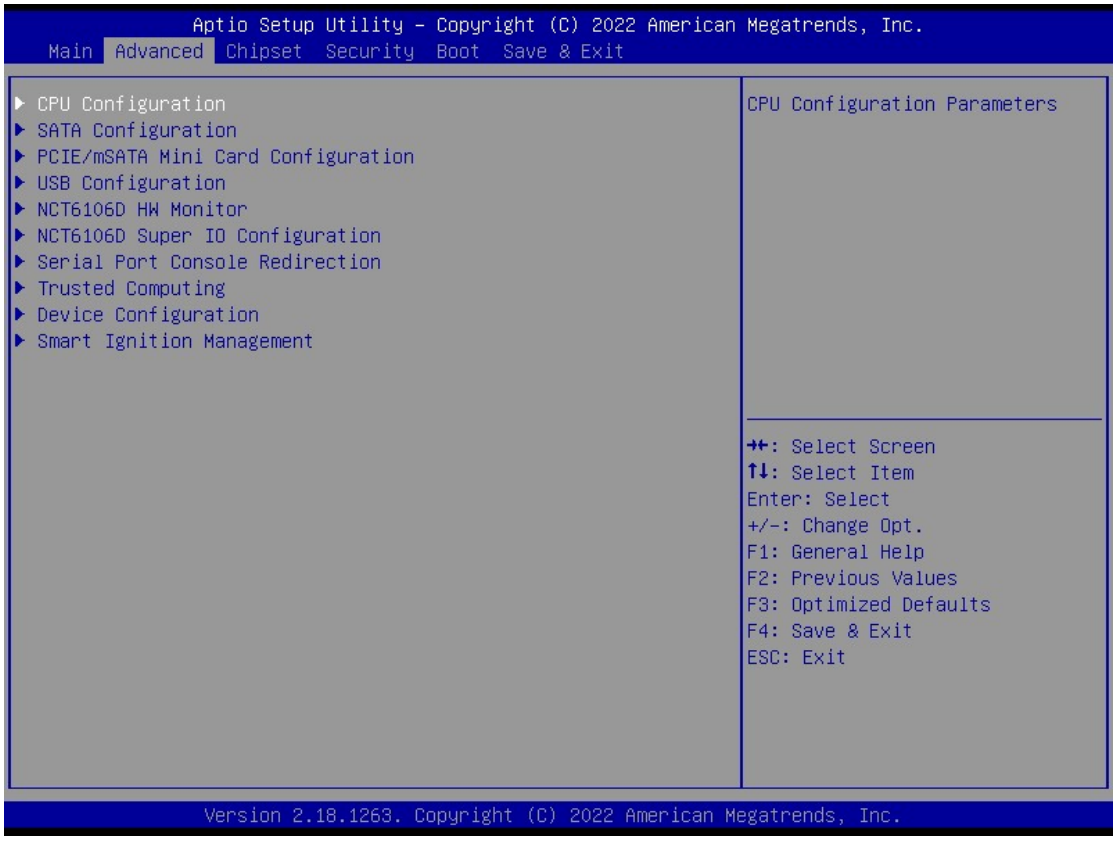
System Time
This item shows current time of your system with the format <hour> <minute> <second>. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

3.3 Advanced Features

This Advanced menu allows users to configure and optimize the system, or set up system features according to their preferences. . You can select any of the items in the left frame of the screen to access the sub menus:

- ► CPU Configuration
- ► 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

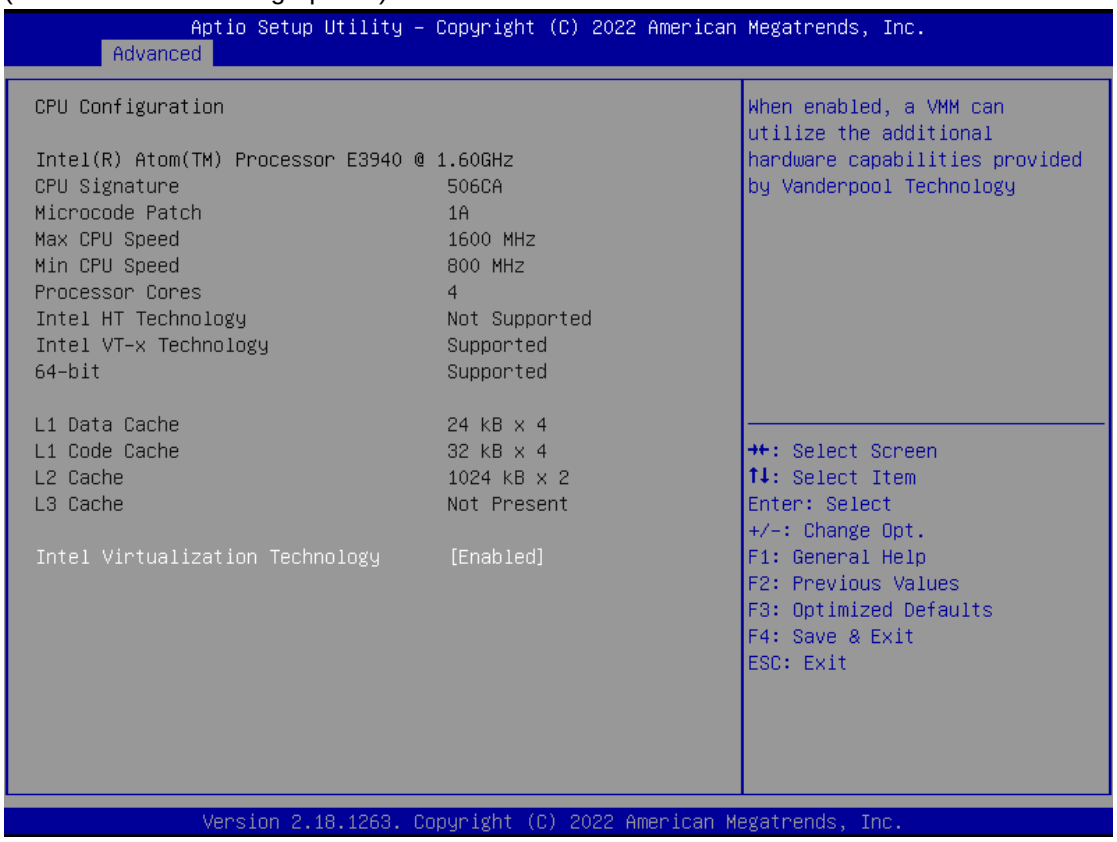
For items marked with "►", please press <Enter> for more options.



- **CPU Configuration**

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

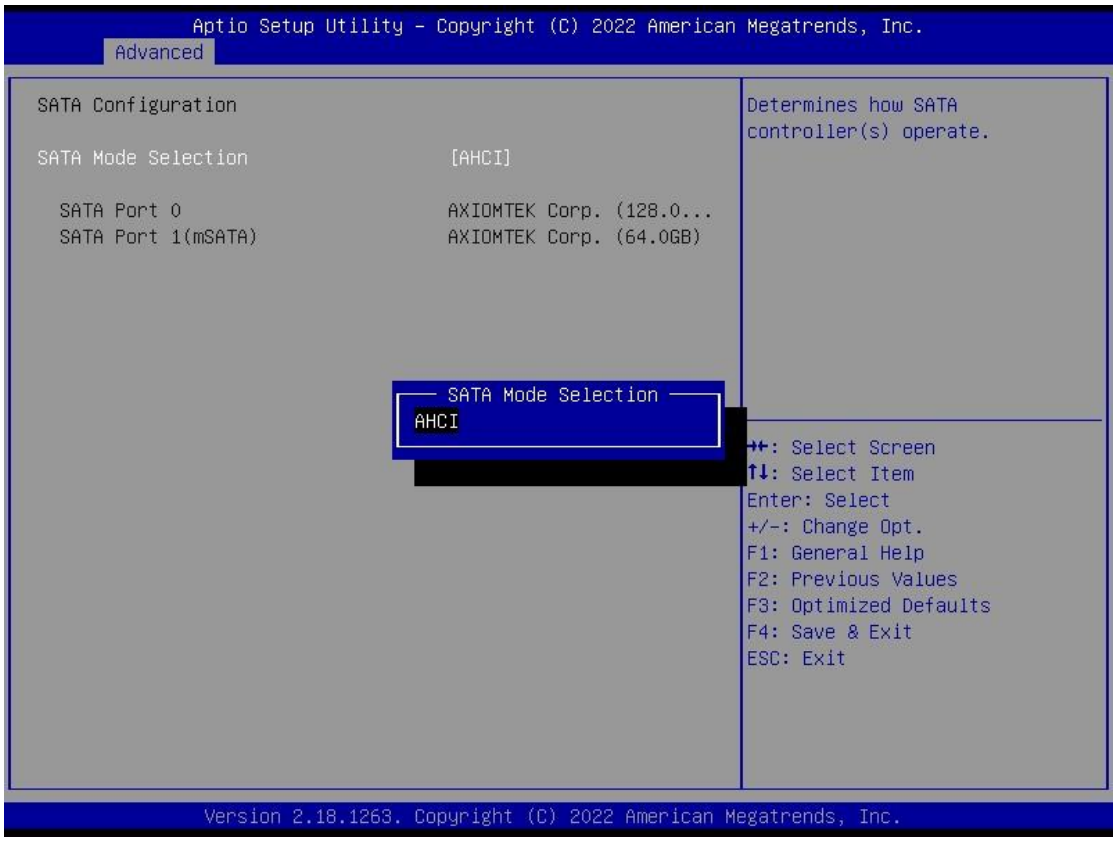
(Please refer to below graphics.)



- **SATA Configuration**

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

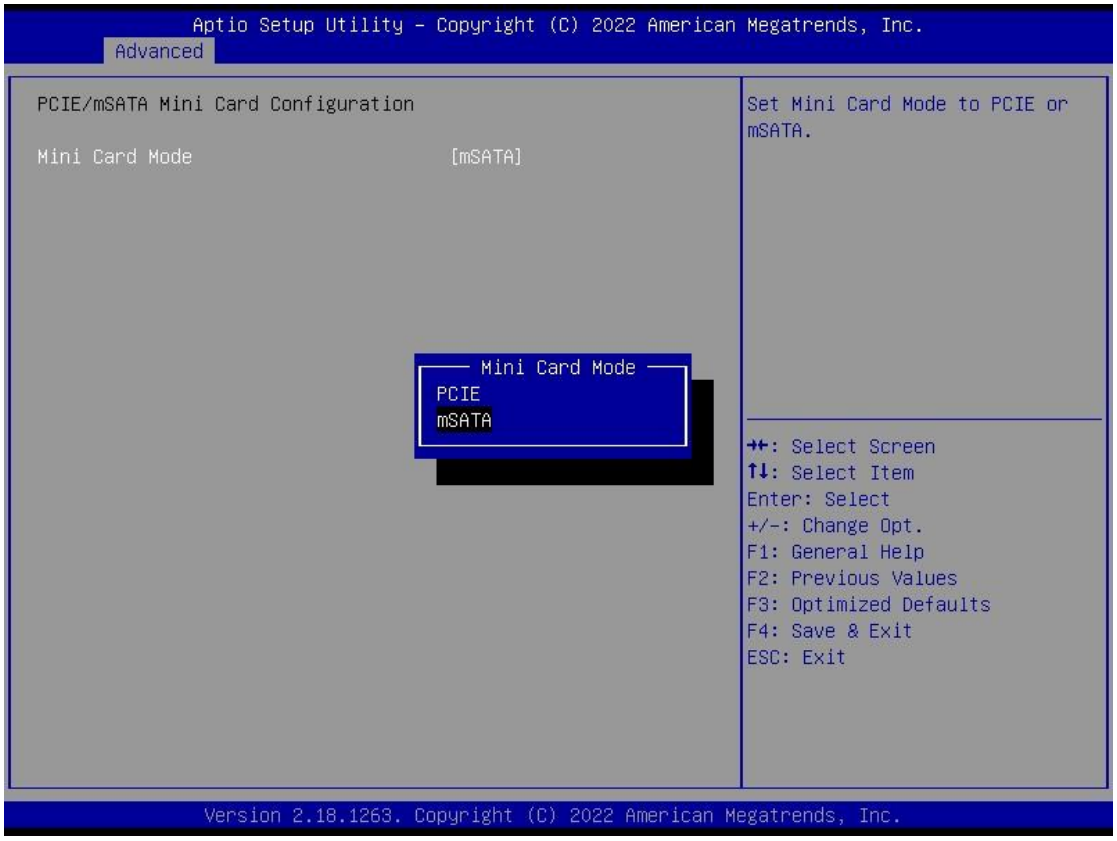
(Please refer to below graphics.)



- **PCIE/mSATA Mini Card Configuration**

Scroll to this item and press <Enter> to view the PCIE/mSATA Mini Card Configuration information.

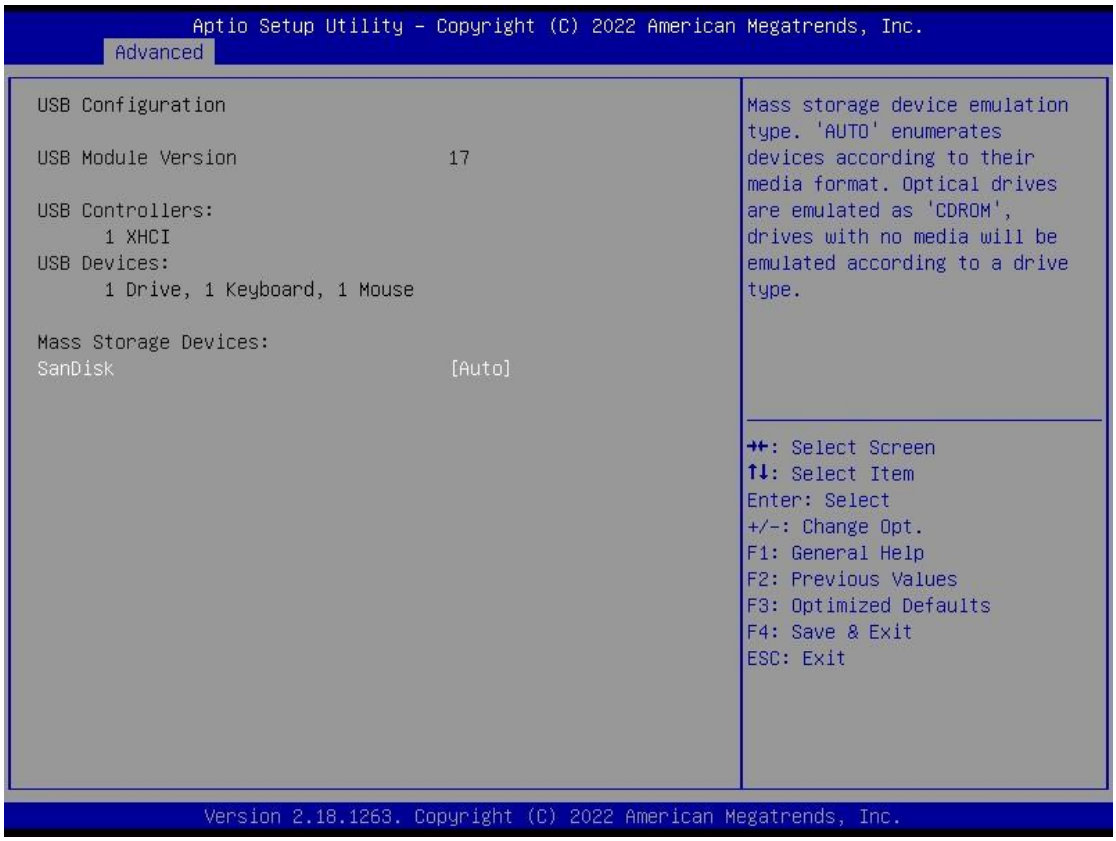
(Please refer to below graphics.)



- **USB Configuration**

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

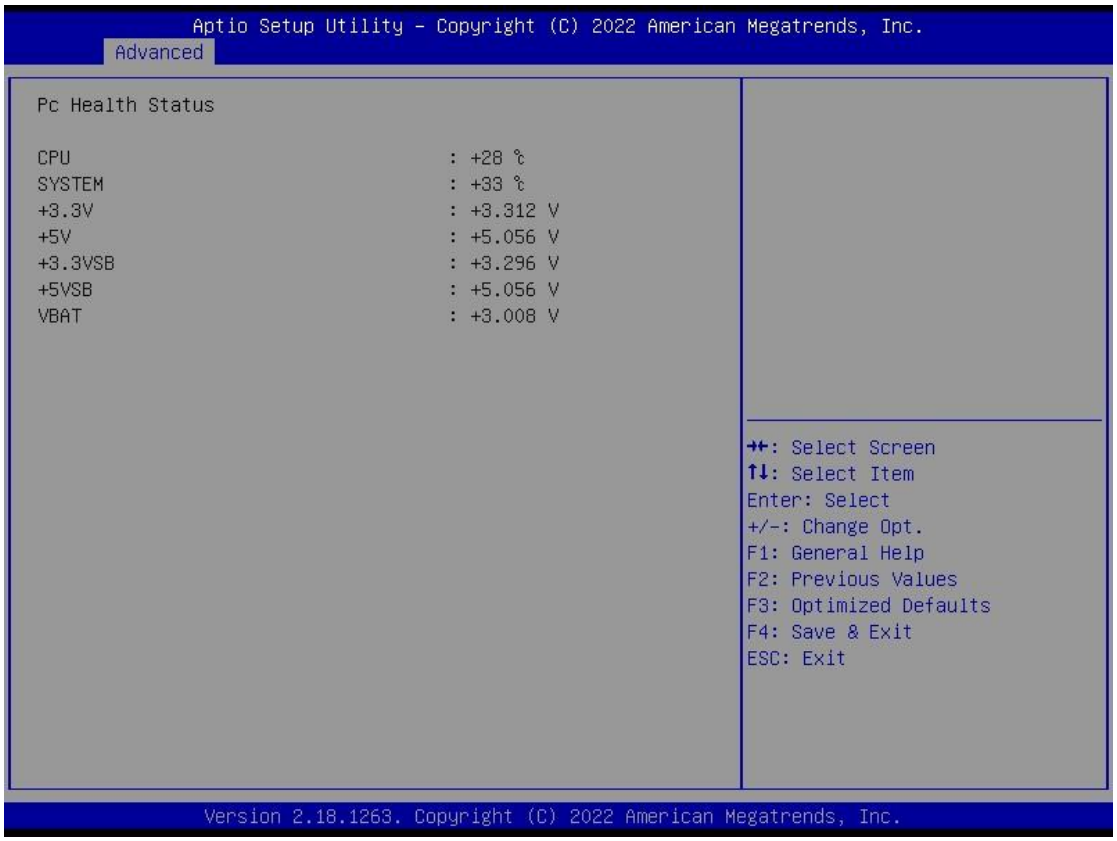
(Please refer to below graphics.)



- **NCT6106D HW Monitor**

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

(Please refer to below graphics.)



- **NCT6106D Super IO Configuration**

The default setting for all serial ports is RS232.

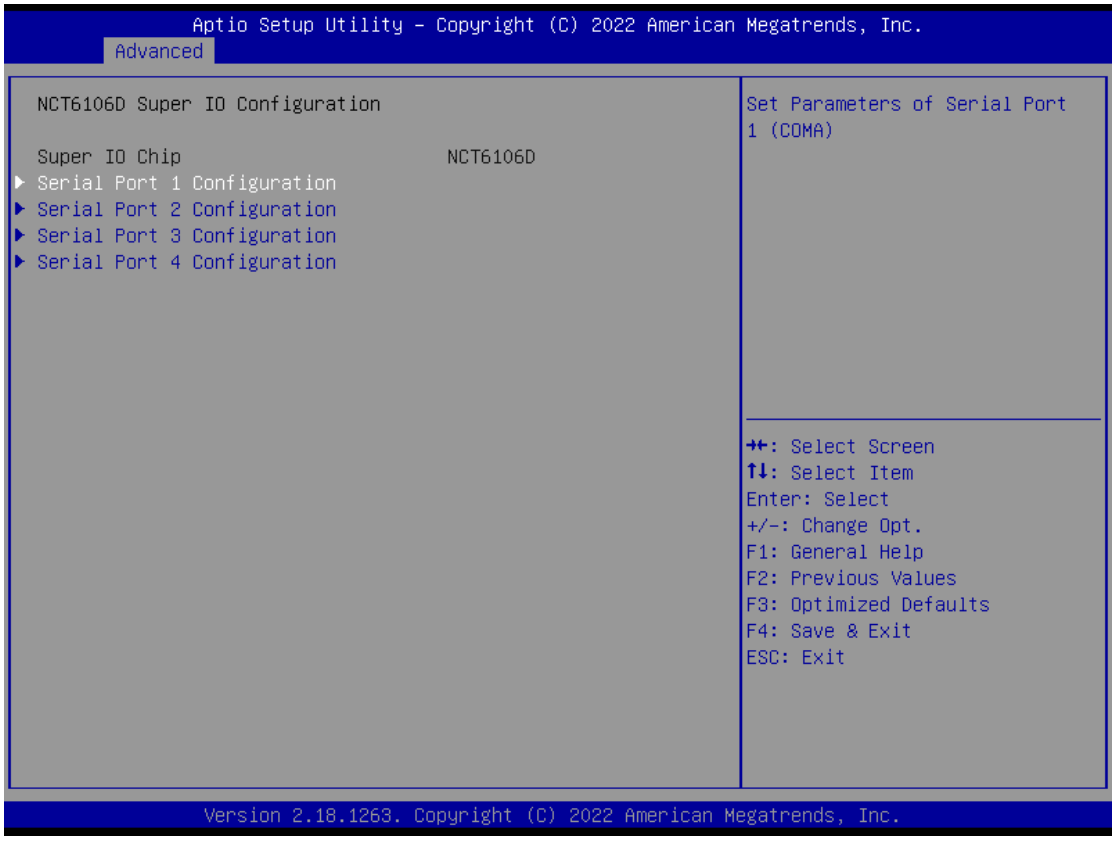
You can change the setting by selecting the value you want in each COM port type.

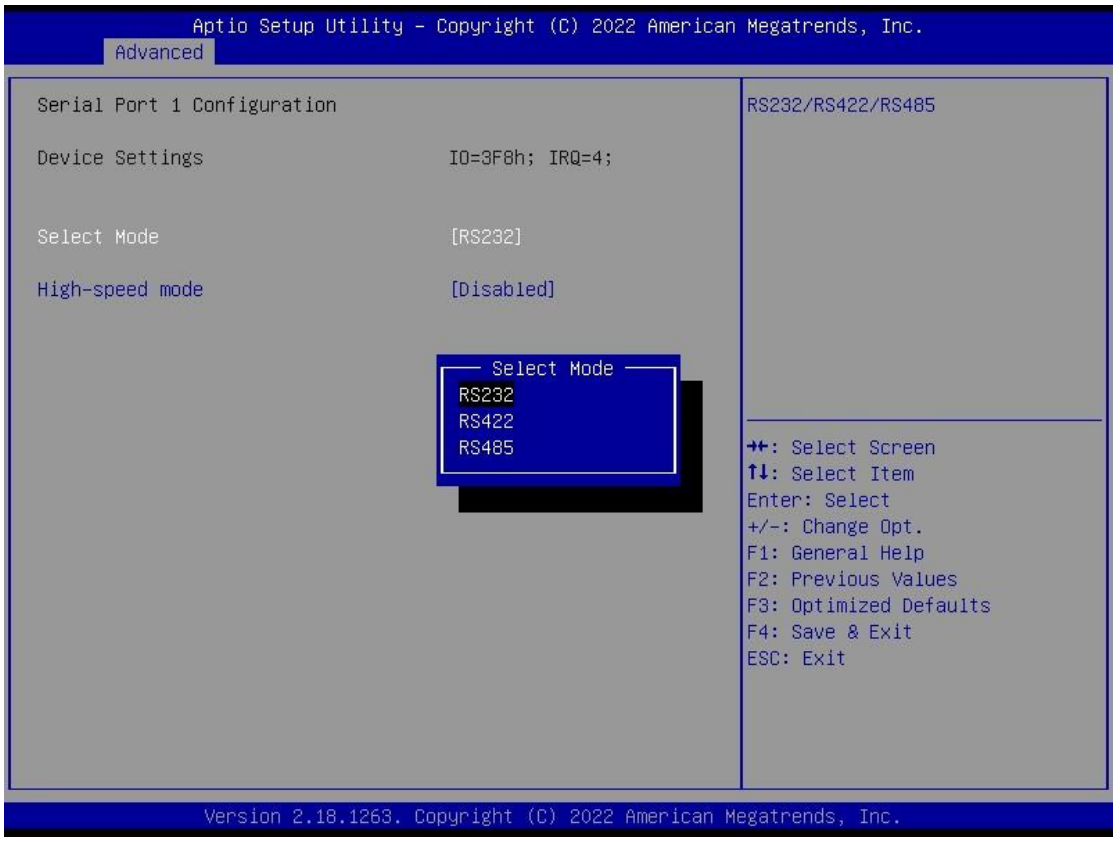
The system supports RS422 and RS485 modes as well as high-speed mode.

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.)

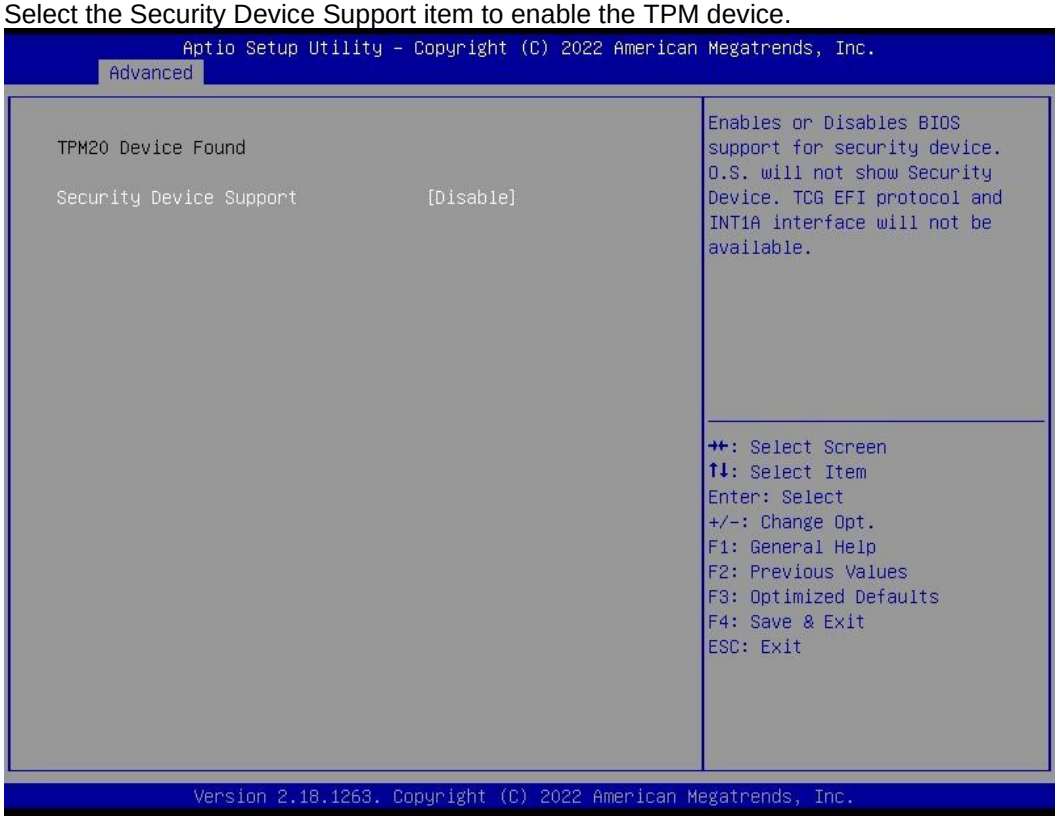



Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
Advanced
Serial Port 1 Configuration
Device Settings
IO=3F8h; IRQ=4;
Select Mode
[RS232]
High-speed mode
[Disabled]
Select Mode
RS232
RS422
RS485
RS232/RS422/RS485
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.18.1263. Copyright (C) 2022 American Megatrends, Inc.

- **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.

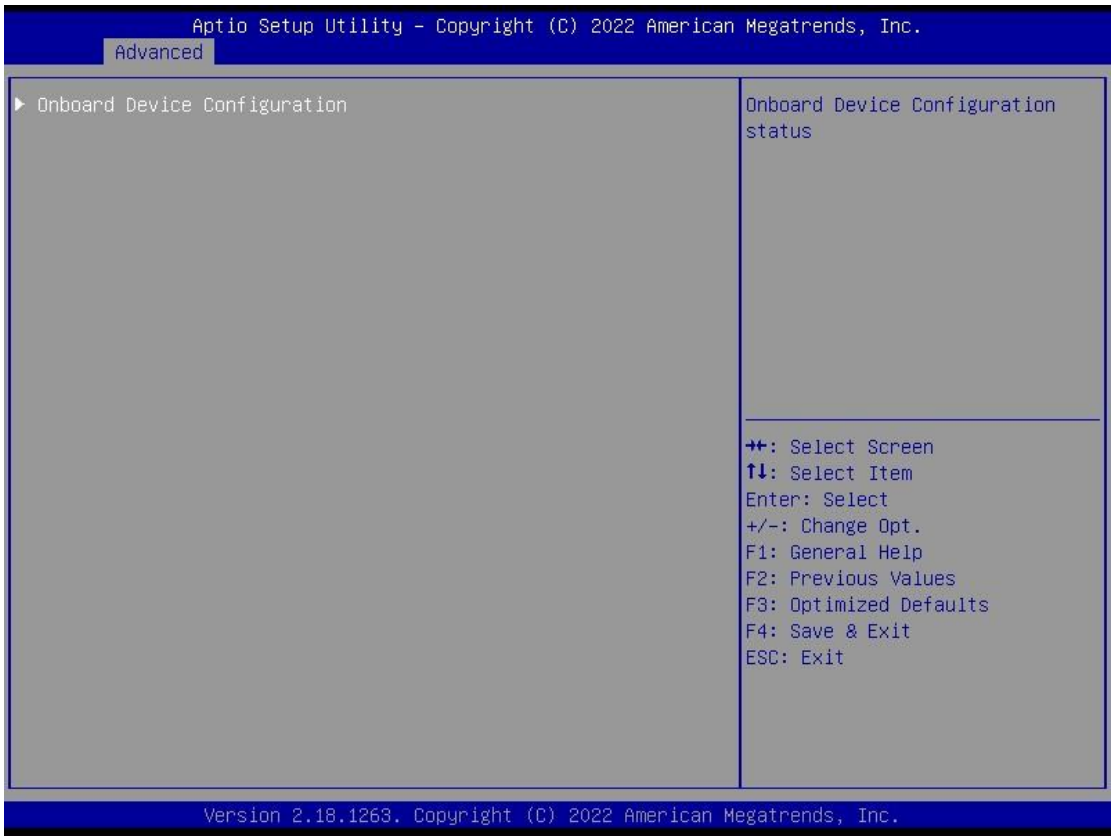


- **DIO Configuration**

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 observe DIO pin-define settings.



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

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

                                               →←: 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

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) 2022 American Megatrends, Inc.
Advanced

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

Enabled or Disabled DIO
Modification

→←: 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

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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```
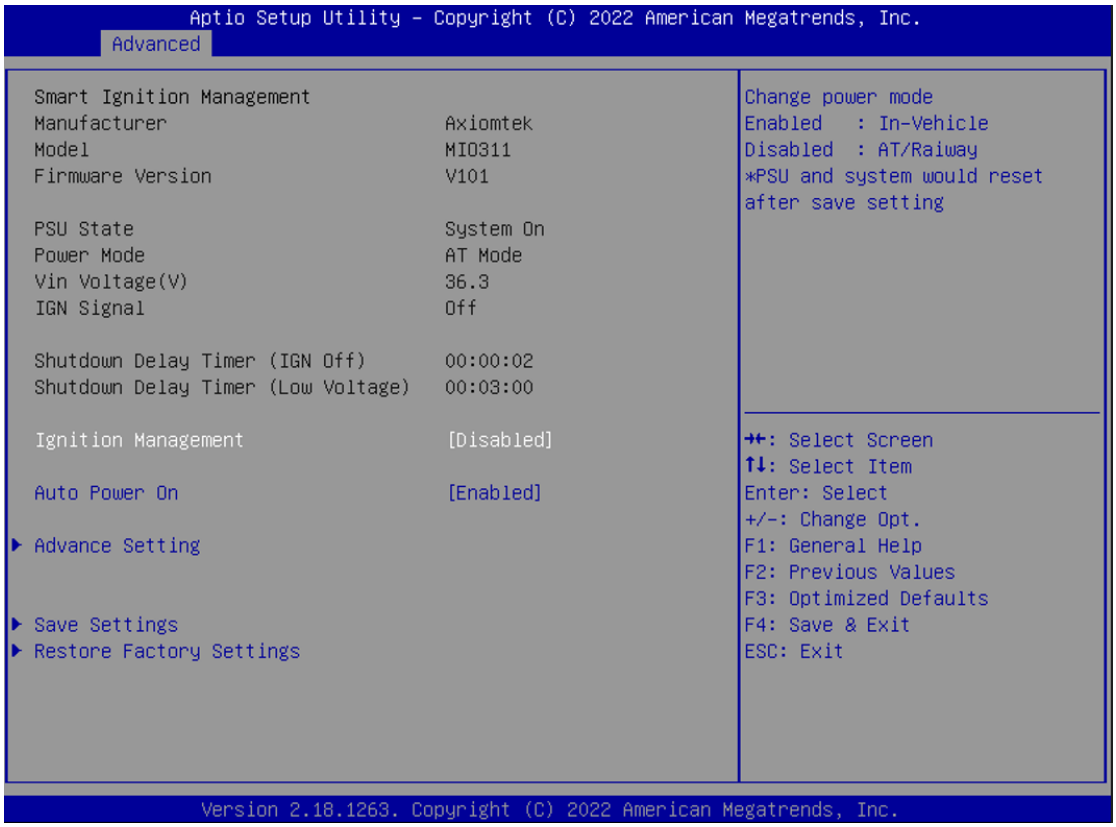
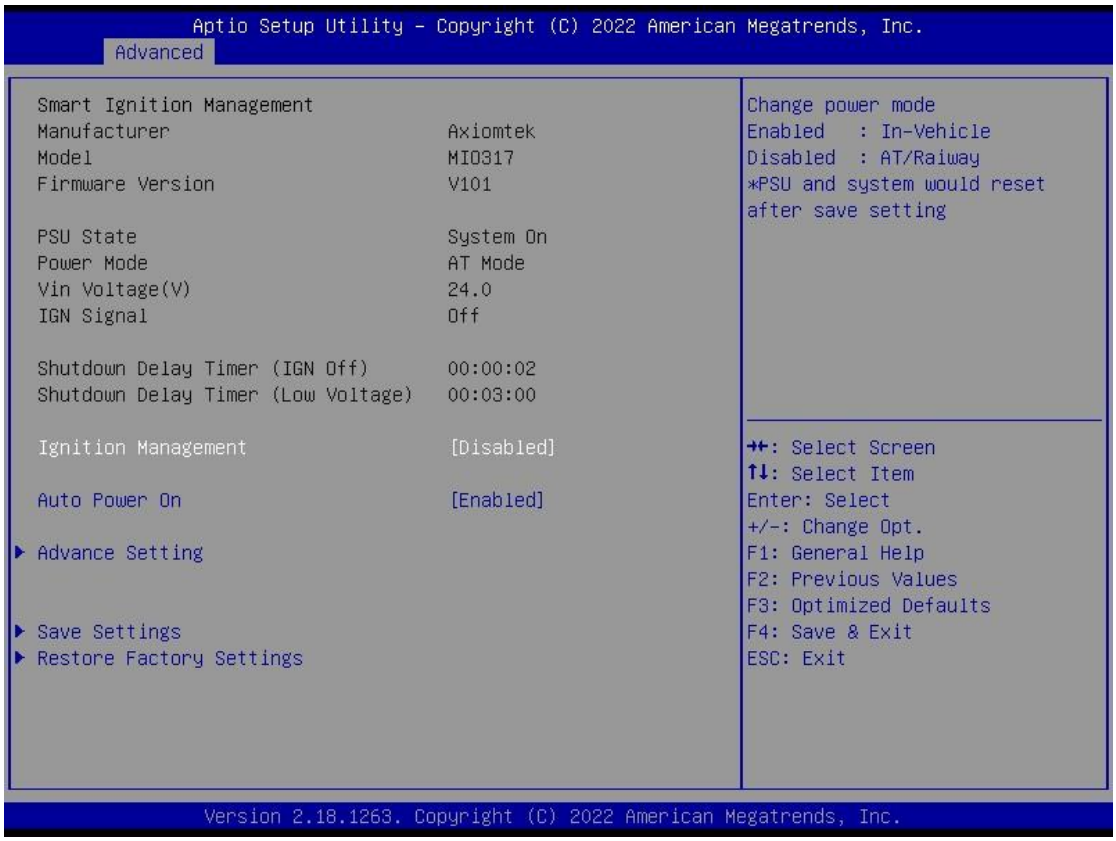

- **Smart Ignition Management**

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





BIOS menu item	Description
Ignition Management	Enabled Switch to In-Vehicle mode. In this mode, the IGN trigger will be enabled. The IGN trigger configuration is located in the Advanced Settings item. *Note: IGN signal will only be triggered when DC-in M12 pin5 IGN is connected to DC+, ignition power or ignition control signal. Disabled Switch to AT/Railway mode. *Note: System will be reset after the Ignition Management setting has been changed and saved.
Auto Power On	Enabled The system will turn on automatically under following conditions: - The system power is manually disconnected and reconnected - Power interruption: Auto power on after power loss. Disabled System will not turn on automatically when power is connected or when power resumes from a power failure.
Advanced 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 corrupted settings that may have prevented the system from powering on/off properly.

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

======== Voltage       ========
Activate Voltage Trigger(V)          16
Low Voltage Trigger(V)               14

Shutdown Delay Timer (Low Voltage)
Minuium Timer                        00:01:00
Maximum Timer                        03:00:00
 Hour                                0
 Minute                              3
 Second                              0
======== IGN Function  ========
IGN Trigger                          [Disabled]

Enable : IGN signal would
trigger [System Turn On Delay]
and [Shutdown Delay]
Disable: IGN signal would not
affect any power managment

→←: 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       ========
Activate Voltage Trigger(V)          9
Low Voltage Trigger(V)               8

Shutdown Delay Timer (Low Voltage)
Minuium Timer                        00:01:00
Maximum Timer                        03:00:00
 Hour                                0
 Minute                              3
 Second                              0
======== IGN Function  ========
IGN Trigger                          [Enabled]

System Turn On Delay Timer(IGN On)
Minuium Timer                        00:00:02
Maximum Timer                        00:30:00
 Hour                                0
 Minute                              0
 Second                              2
Shutdown Delay Timer (IGN Off)
Minuium Timer                        00:00:01
Maximum Timer                        06:00:00
 Hour                                0
 Minute                              0
 Second                              2

The counter will be activated
once power source voltage is
smaller than the value of [Low
Voltage Trigger],then, system
will be forced to turn off
when time's up

→←: 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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```
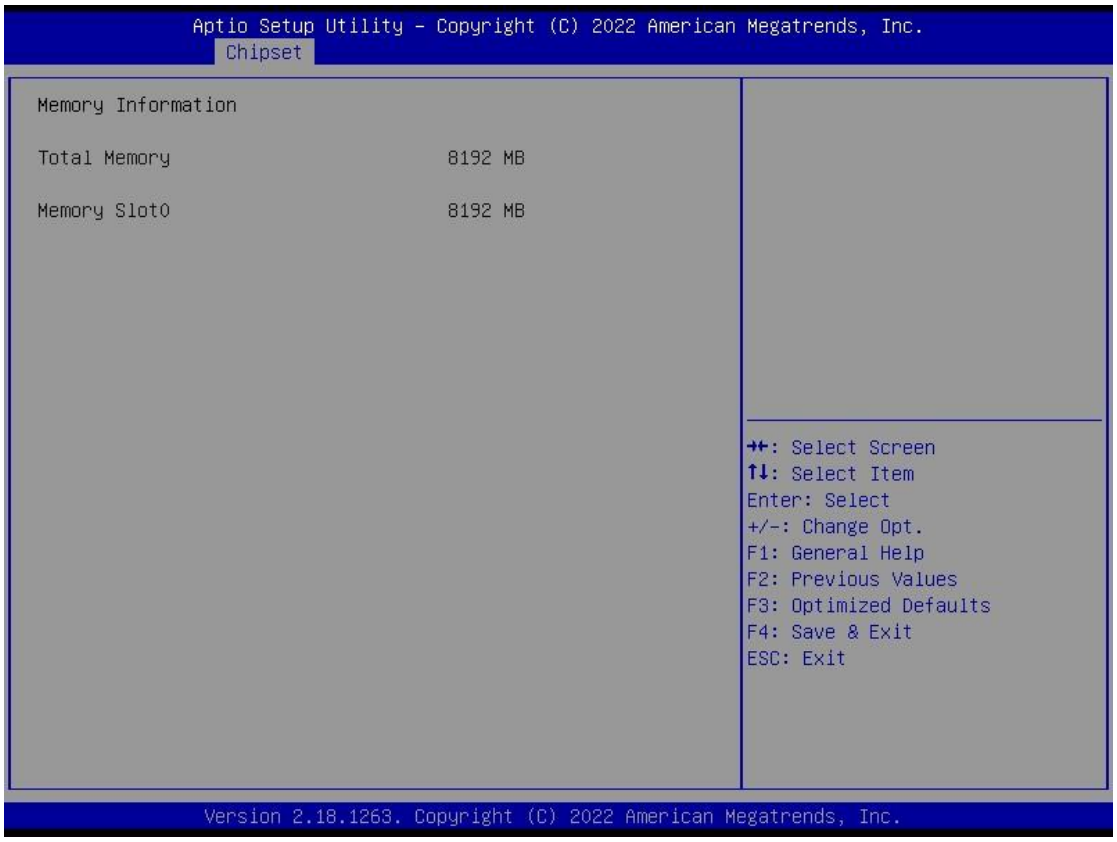

BIOS menu item	Description
Activate Voltage Trigger	The system only turns on when the voltage delivered by the power source is higher than the value you set here.
Low Voltage Trigger	The system will begin countdown stage once voltage drops below the value you set here. If the power source voltage does 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.
System Turn On Delay Timer (IGN On)	When receiving the IGN signal, the system will be turned on after setup time is counted down. The counter will be reset if IGN is off and on during the system countdown time.
Shutdown Delay Timer (IGN Off)	When IGN goes off during the system is normally operating, the system will be shut down after the shutdown timer has been counted complete which has been set by the user. Additionally, if power source voltage is lower than the setup value it will cause the system to turn off as well.

Note: Please refer to APPENDIX B for setting the motion in OS application

3.4 Chipset Feature

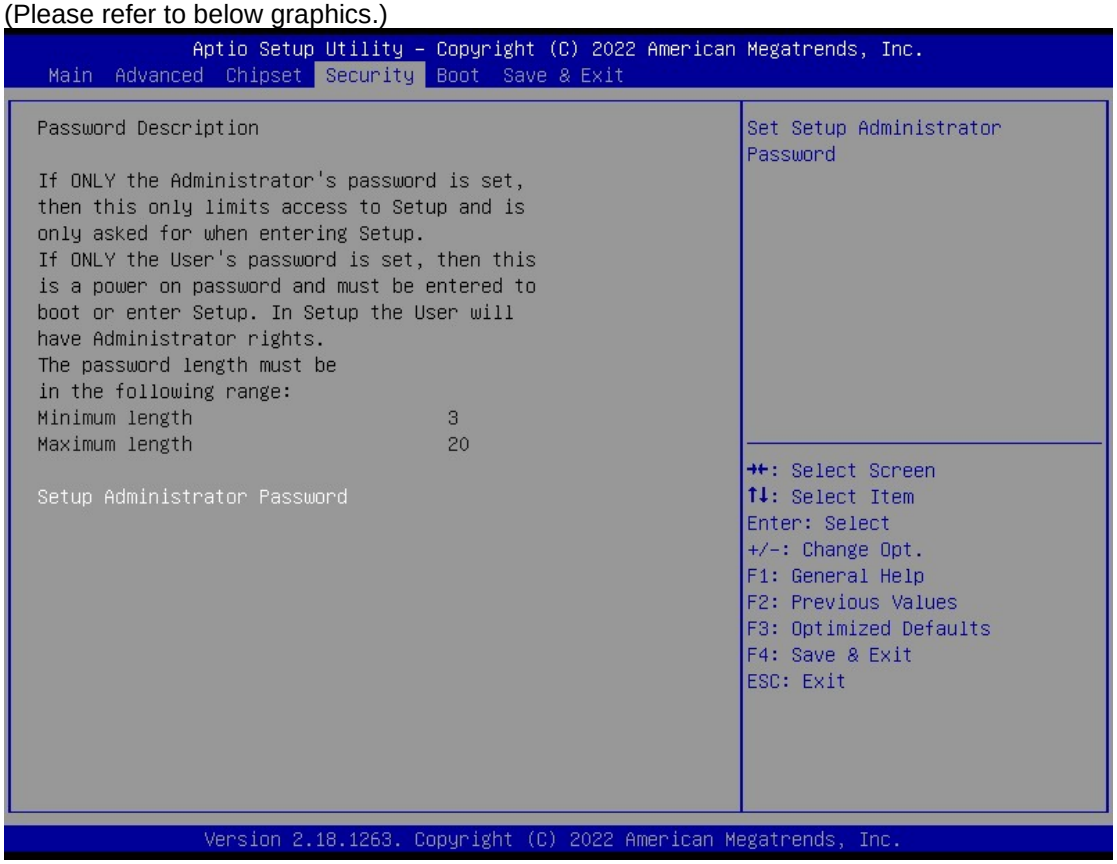
This section contains fully optimized chipset features in the system.

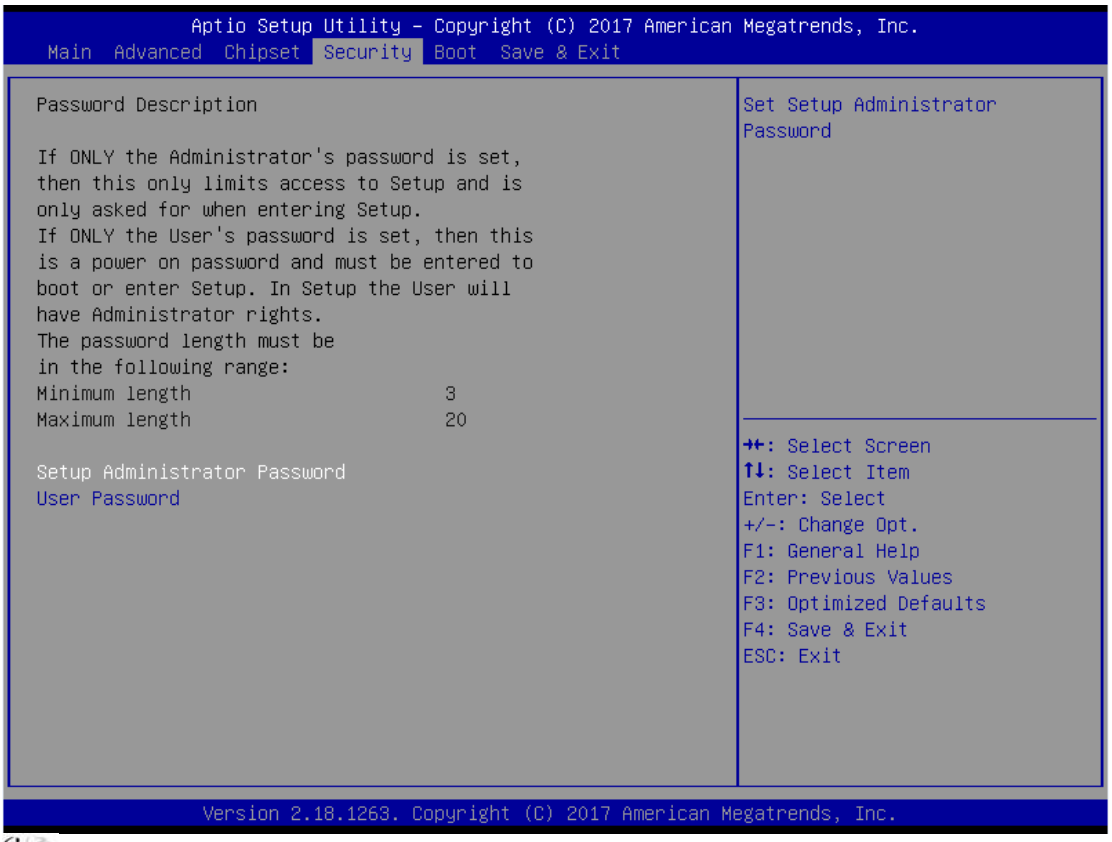


3.5 Security

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.)





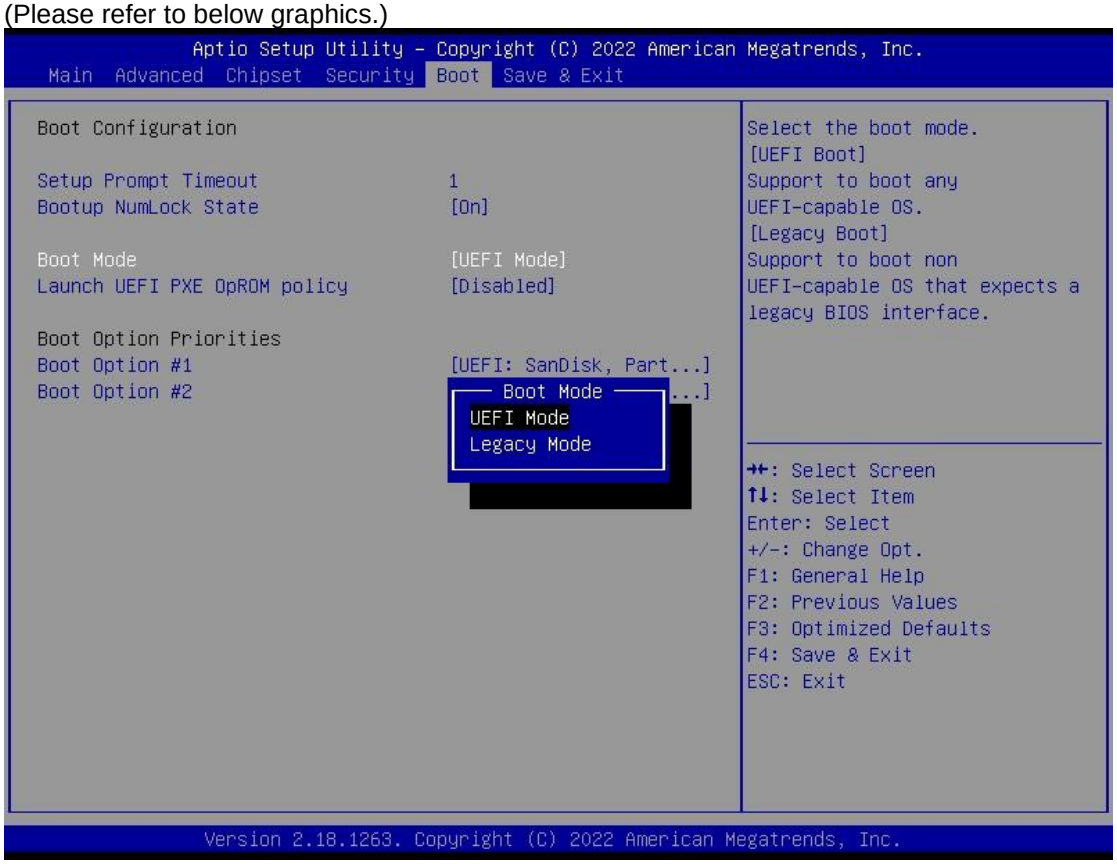
Note: The BIOS default has no password. The user must remember the password after creating one. If the user forgets the password RMA is the only solution.

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.

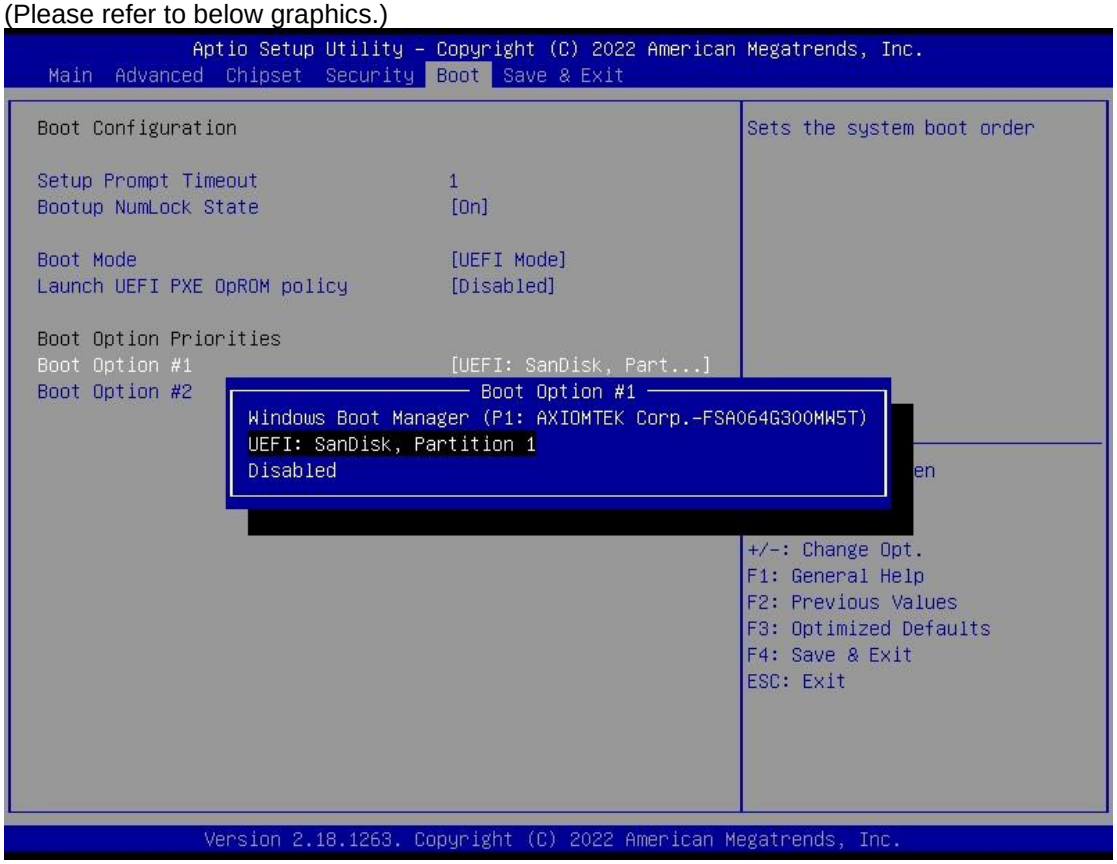
The default setting boot mode is [UEFI Mode].

(Please refer to below graphics.)



The Boot Option Priorities can be set by selecting Boot Option #1, #2…

(Please refer to below graphics.)



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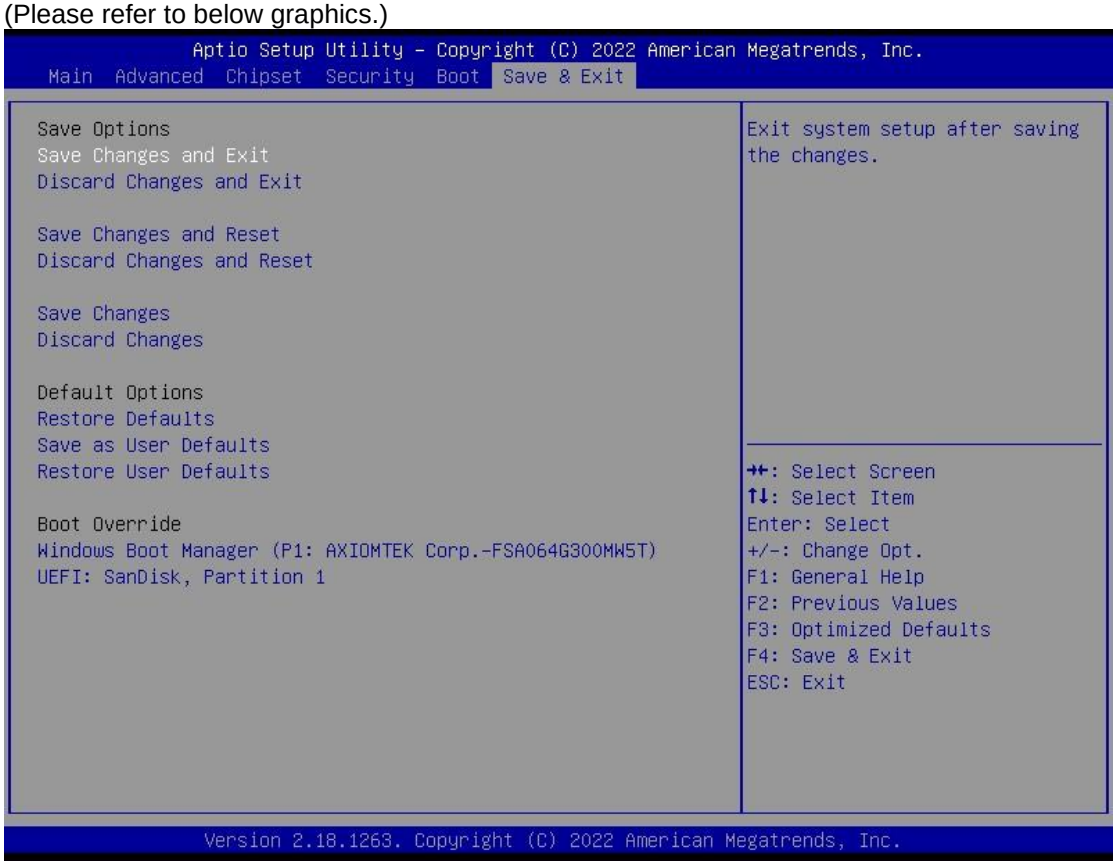
3.7 Save & Exit

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.)



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.

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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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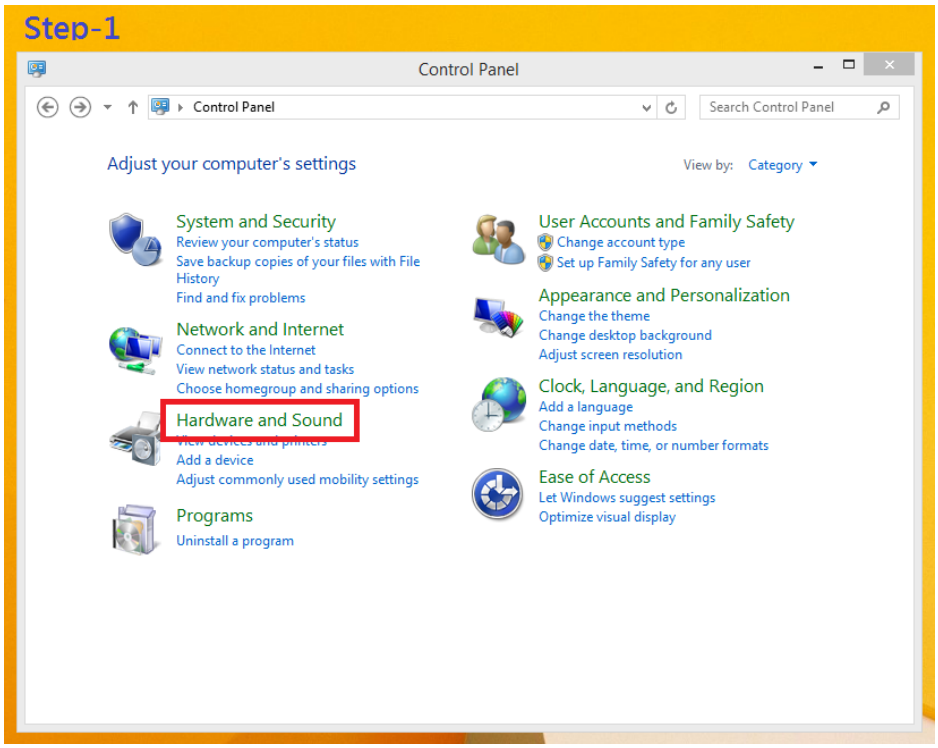
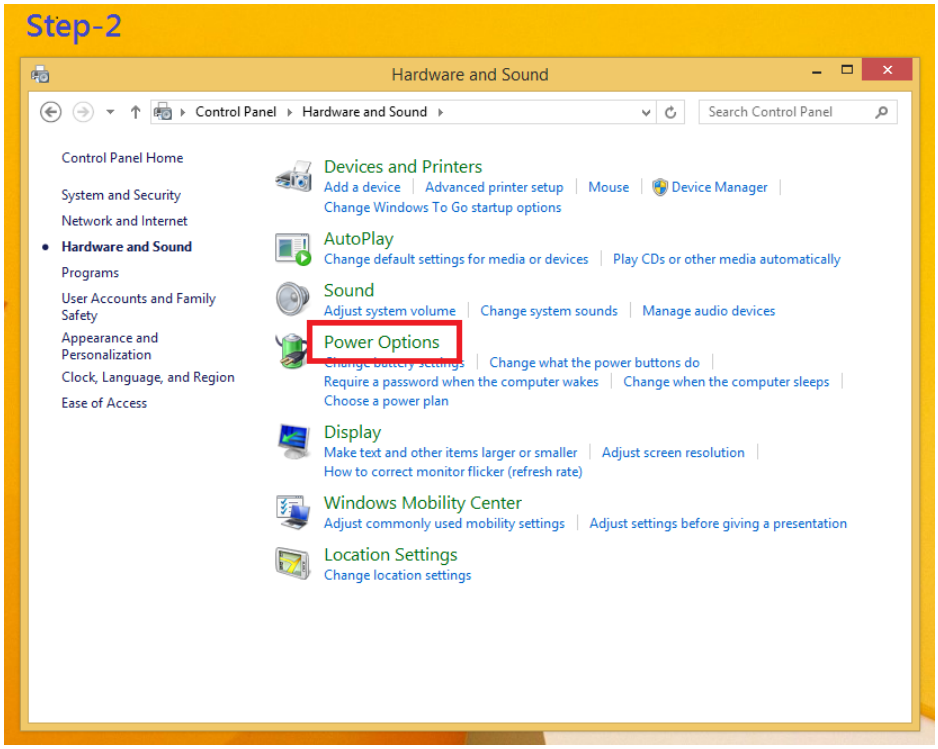
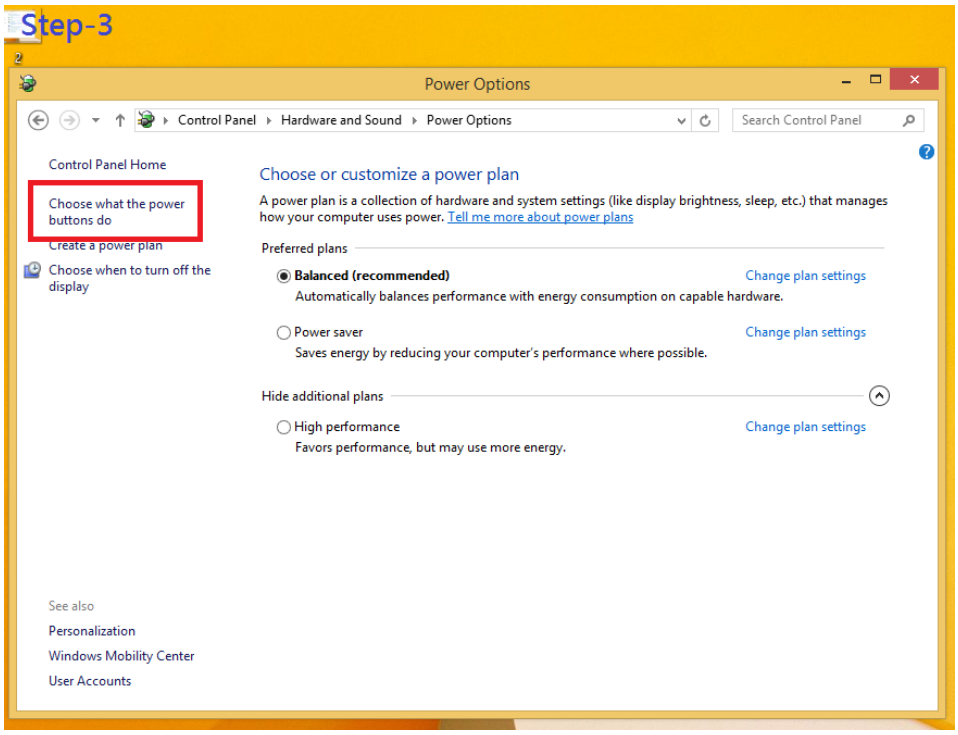
APPENDIX B
WINDOWS POWER BUTTON SETTING

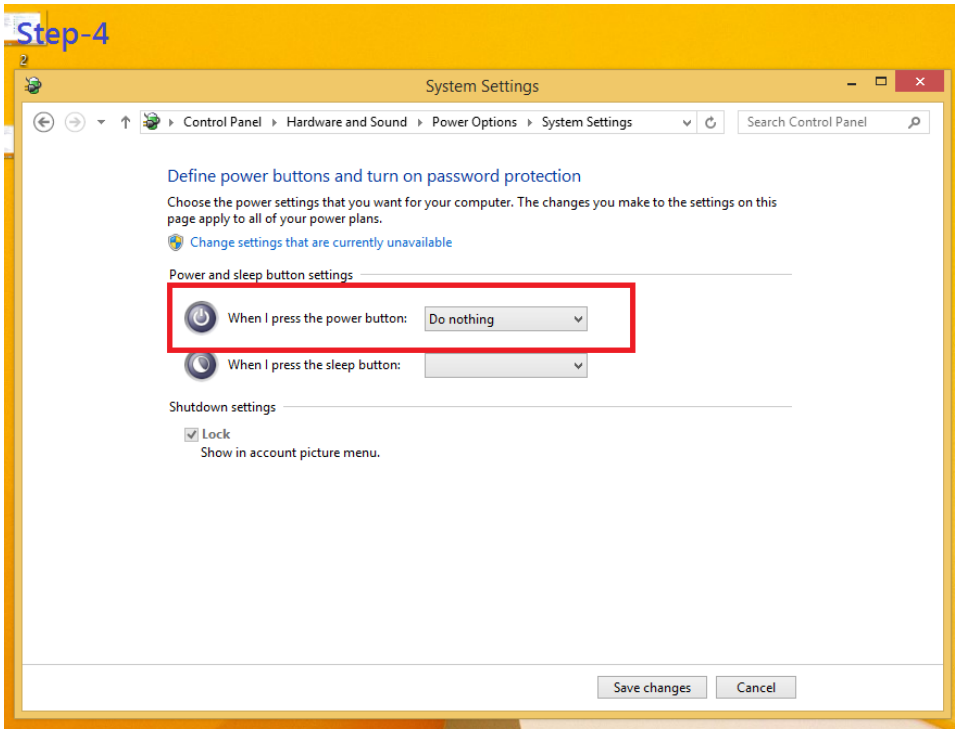
Please enter the power button setting through the PC console, and then follow below steps to complete the setting.

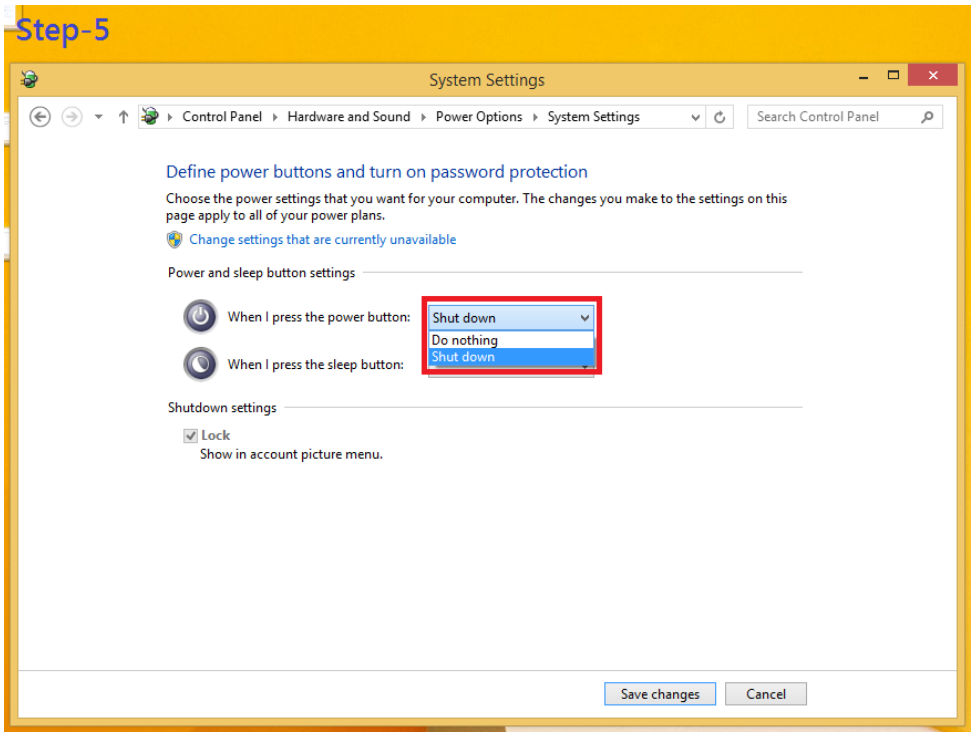


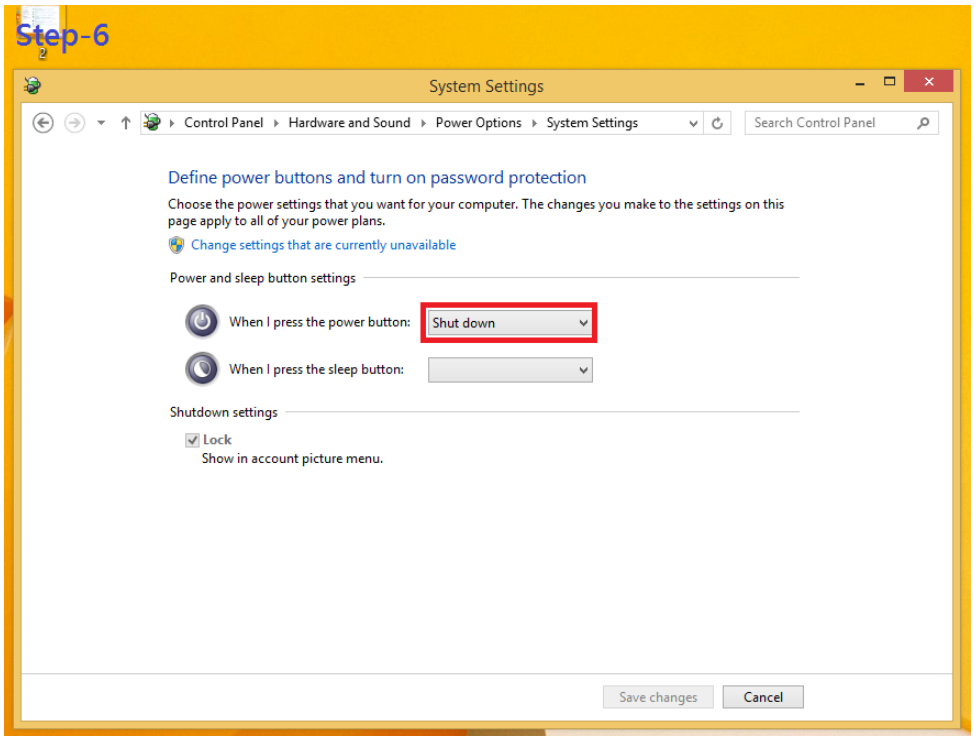




When IGN function has been used, the power button's setting must be switched to "Shut down" as below. Then the system can be shut down normally, after IGN has been turned off.




Step-5
System Settings
Control Panel ▸ Hardware and Sound ▸ Power Options ▸ System Settings
Search Control Panel
Define power buttons and turn on password protection
Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.
Change settings that are currently unavailable
Power and sleep button settings
When I press the power button:
Shut down
Do nothing
Shut down
When I press the sleep button:
Shutdown settings
Lock
Show in account picture menu.
Save changes
Cancel


Step-6
System Settings
Control Panel ▸ Hardware and Sound ▸ Power Options ▸ System Settings
Search Control Panel
Define power buttons and turn on password protection
Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.
Change settings that are currently unavailable
Power and sleep button settings
When I press the power button:
Shut down
When I press the sleep button:
Shutdown settings
Lock
Show in account picture menu.
Save changes
Cancel

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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