

USER'S MANUAL

ICO120-E3350-A

ICO120-E3350-B

ICO120-E3350-C

ICO120-E3350-E

ICO120-E3350-F

Robust Din-rail Fanless

Embedded System

User's Manual



www.axiomtek.com

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Safety Precautions

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

1. The ICO120-E3350 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 ICO120-E3350 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 ICO120-E3350 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 -40°C or above 85°C . 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 wrist-grounding strap, available from most electronic component stores.
8. Caution

There is risk of explosion if incorrect type battery is installed; please dispose of the used batteries according to the instructions.
9. Warning

Hot Surface Do Not Touch.

Restricted access area: The equipment should only be installed in a Restricted Access Area.
10. This product is intended to be supplied by a Listed Power Adapter or DC power source, output meets SELV, rated 12-24Vdc, minimum 1.30-0.74A, Tma = 60 degrees C, and the altitude of operation = 2000m.

If need further assistance with purchasing the power source, please contact the manufacturer for further information.
11. This product is intended to be supplied by DC power source, output meets SELV, rated 12-24Vdc, minimum 1.30-0.74A, Tma = 70 degrees C, and the altitude of operation = 2000m.

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

12. When use with desk top Class I power adapter, the Power Cord only shall only connect to a socket-outlet with earthing connection.

Classification

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

General Cleaning Tips

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

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

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

Cleaning Tools

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

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning.

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 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 plastic parts.

Vacuum cleaner: Absorb 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 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 the power
4. Remove all device
5. Pull out the power cable

Scrap Computer Recycling

If the computer equipment needs the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

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SECTION 1

INTRODUCTION

This chapter contains general information and detailed specifications of the ICO120-E3350. The main different between these models are I/O of 2 DB9 connectors:

ICO120-E3350-A: with 2 serial ports

- ICO120-E3350-B: with 1 serial port and 1 DIO port
- ICO120-E3350-C: with 1 serial port and 1 CAN port
- ICO120-E3350-E: with 1 CAN port and 1 DIO port
- ICO120-E3350-F: with 2 serial port and 1 DIO port

The Chapter 1 includes the following sections:

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

1.1 General Description

The ICO120-E3350 Din-rail fanless embedded system is suitable for communications control and protocol converter applications in critical environments. Built for harsh working environments, ICO120-E3350 features an extra-low power consumption Intel® Celeron® N3350(1.5GHz/4-cores) processor supporting an industrial temperature range of -40°C to +70 °C. Its front accessible I/O cabling is very convenient for wiring and maintenance. ICO120-E3350 offers an HDMI output, making it particularly well-suited for communication control, SCADA and industrial automation. Its compact size with Din-rail mounting allows for easy installation into the control cabinet. Pre-installed with Linux®, Windows 10 and Windows® 11, ICO120-E3350 provides programmers with a friendly environment for developing application software at a lower cost.

ICO120-E3350 has a robust industrial-grade design and adopts the advanced cooling system. Besides, it supports the mSATA and makes it especially suitable for field control & monitoring system solution for the following markets:

Utility Industries (Water, Energy, Chemical Plant, Mining, etc.)

Public Transportation Industries (Traffic/ Highway Control, Train/Bus Control, etc.)

Homeland Security (Weather Monitoring/Alarm System, etc.)

Features

- Fanless design
- Wide temperature operation of -40°C – +70°C
- Supports 2 10/100/1000 Base-T Ethernets with Magnetic Isolated Protection
- COM Port supports RS-232/422/485 or console mode
- CAN Port supports SocketCAN and J1939
- 8-bit programmable DIO
- 2 USB 2.0 Ports

- Wide range 12–24V DC-in with terminal block
- Din-rail mounting
- Wall mounting (optional)
- Passed CE, FCC, UL, UKCA certification
- O.S. Supported

ICO120-E3350 supports Windows 10[®], Windows[®] 11 and Linux package. For storage device, ICO120-E3350 supports one mSATA.

1.2 System Specifications

1.2.1 CPU

- Onboard Intel[®] Celeron[®] N3350 (2-core, 1.1 GHz) processor.

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 1600MHz max. up to 8GB.

1.2.4 Display

- An HDMI connector supports up to 1920x1200@60Hz

1.2.5 Ethernet Ports

- LAN Chip: Intel Ethernet
- Controller Intel I210-IT (wide temperature)
- Two RJ-45 connectors that support 10/100/1000 Base-T Ethernet with 1.5KV magnetic isolated protection

1.2.6 Storages

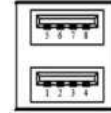
- 1 x mSATA.
- 1 x eMMC (optional)

1.2.7 USB

- 2 USB 2.0 Ports
- USB Pin Assignment:

USB 2.0

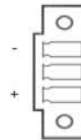
Pin	Signal USB2.0 Port 1	Pin	Signal USB2.0 Port 2
1	VCC	1	VCC
2	D0-	2	D1-
3	D0+	3	D1+
4	GND	4	GND



1.2.8 Power

- Power Input
 - DC Terminal block: Wide-range 12 - 24V. OVP and Reverse protection.

Pin	Signal
1	-
2	NC
3	+

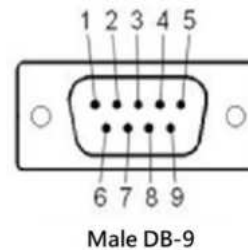


1.2.9 COM: ICO120-E3350-A & ICO120-E3350-C & ICO120-E3350-F

- Front side DB9 supports RS-232/422/485 which can be selected by BIOS.
- Supports Auto Flow Control in RS485 mode.
- Serial Port Pin Assignment: (DB9 Male) as below
- Supports High-Speed Mode 115.2 Kbps, up to 1.5

COM1

Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	--
4	DTR	RX-	--
5	GND	GND	GND
6	DSR	--	--
7	RTS	--	--
8	CTS	--	--
9	RI	--	--

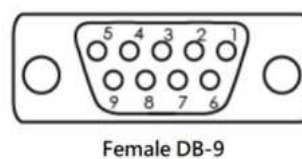


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1.2.10 DIO: ICO120-E3350-B & ICO120-E3350-E & ICO120-E3350-C

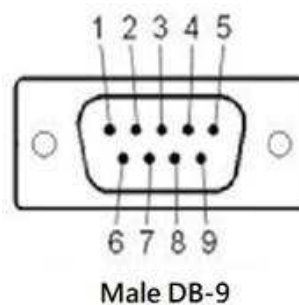
- Bottom side DB9 female connector supports 8 bits TTL level programmable digital input/output
- The voltage of TTL is 5V
- The programming is as follow:
 - I/O sink current is 8~10mA
 - Input/Output can be programmed

Pin	Signal
1	DIO0
2	DIO1
3	DIO2
4	DIO3
5	DIO4
6	DIO5
7	DIO6
8	DIO7
9	GND



1.2.11 CANbus: ICO120-E3350-C & ICO120-E3350-E

Pin	Definition
1	NC
2	CAN-L
3	NC
4	CN
5	GND
6	NC
7	CAN-H
8	NC
9	NC

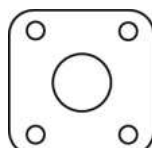


1.2.12 Watchdog Timer (WDT)

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

1.2.13 Restore BIOS Optimal Defaults (SW1)

- Pressing the tact switch (SW 1) can restore BIOS optimal defaults.



1.2.14 System LED

- There are showed the LED's indicators and functional descriptions.

LED Name	Description	Color
ACT	Indicates the storage status and it will be flashing when storages active.	Orange
PWR	Indicates the Power status. When the DC input is acceptable, the LED will be ON.	Green

1.2.15 Operation Temperature

- Wide temperature $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

1.2.16 Storage Temperature

- $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

1.2.17 Humidity

- 10% ~ 95% (non-condensation)

1.2.18 Weight

- ICO120-E3350-A、B、C、E = 0.3 kg
- ICO120-E3350-F = 0.4 kg -

1.2.19 Dimensions

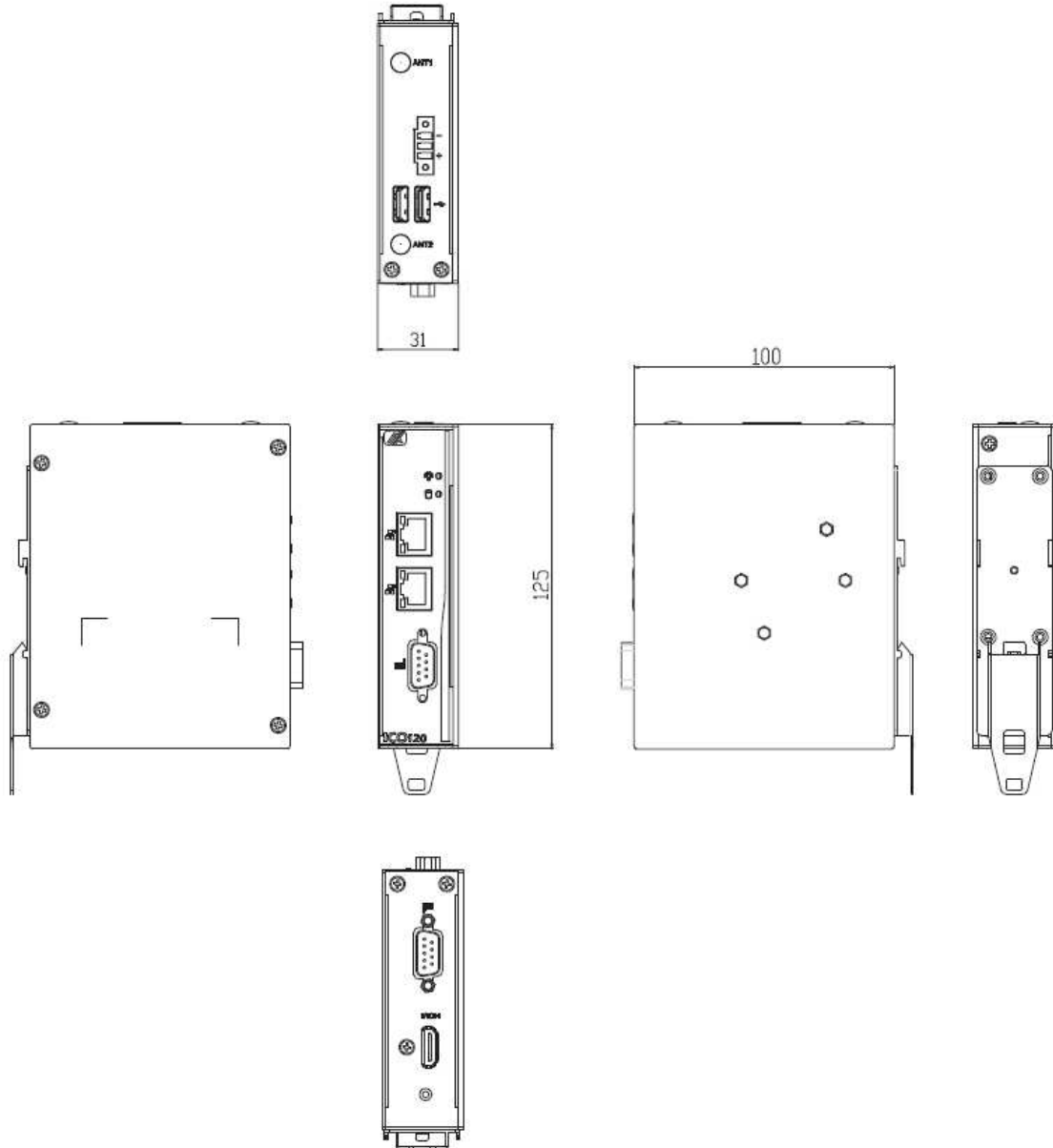
- ICO120-E3350-A、B、C、E = 31mm (1.22") (W) x100mm (3.93") (D) x125mm (4.92") (H)
- ICO120-E3350-F = 48mm (1.22") (W) x100mm (3.93") (D) x125mm (4.92") (H)

1.2.20 System I/O Outlets

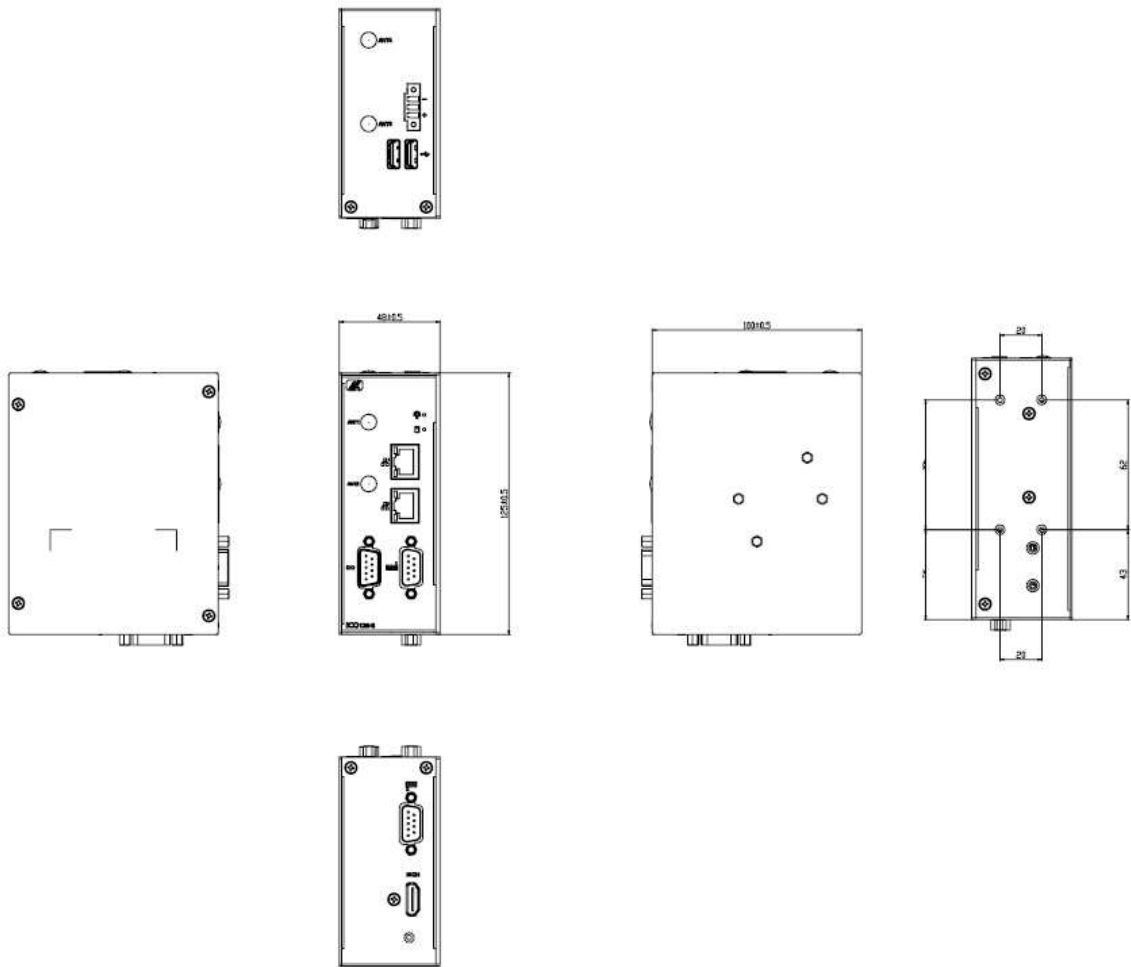
- Two 9-pin D-Sub connectors:
 - ICO120-E3350-A: COM1 (male connector), COM2 (male connector)
 - ICO120-E3350-B: COM1 (male connector), DIO (female connector)
 - ICO120-E3350-C: COM1 (male connector), CANbus1 (male connector)
 - ICO120-E3350-E: CANbus1 (male connector), DIO (female connector)
 - ICO120-E3350-F: COM1 (male connector), COM2 (male connector), DIO (female connector)
- One female connector for HDMI.
- Two 10/100/1000 Base-T RJ-45 with 1.5KV magnetic isolated protection.
- Two USB 2.0 Ports
- One DC Power Input with terminal block.

1.3 Dimensions

The following diagrams show you the dimensions and outlines of the ICO120-E3350-A/B/C/E.

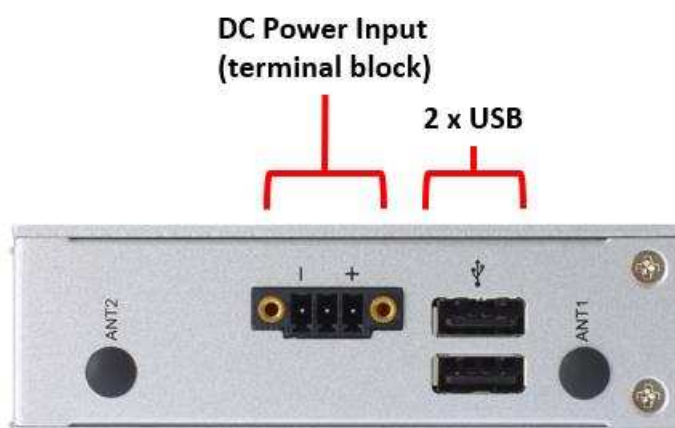
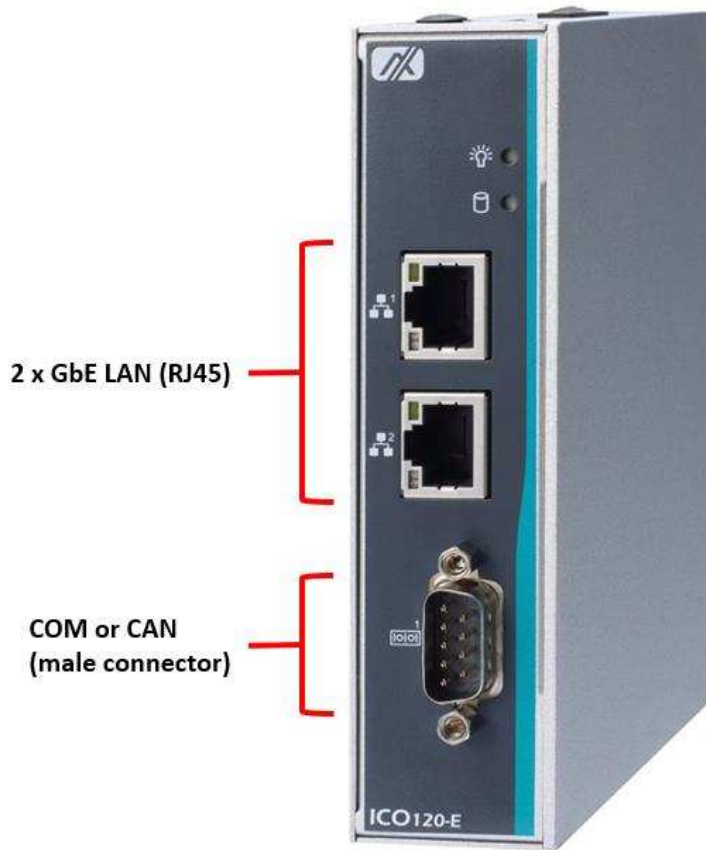


The following diagrams show you the dimensions and outlines of the ICO120-E3350-F.

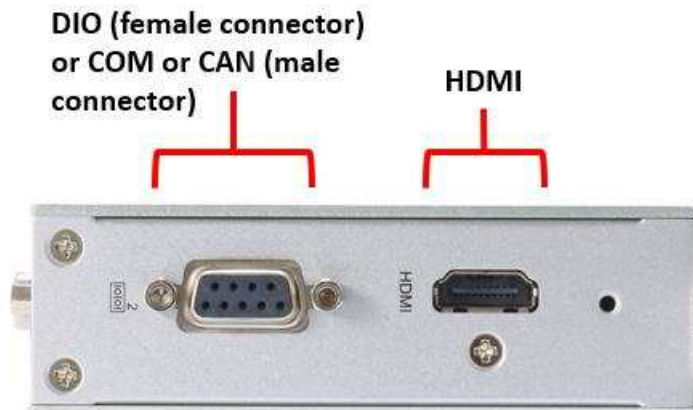


1.4 I/O Outlets

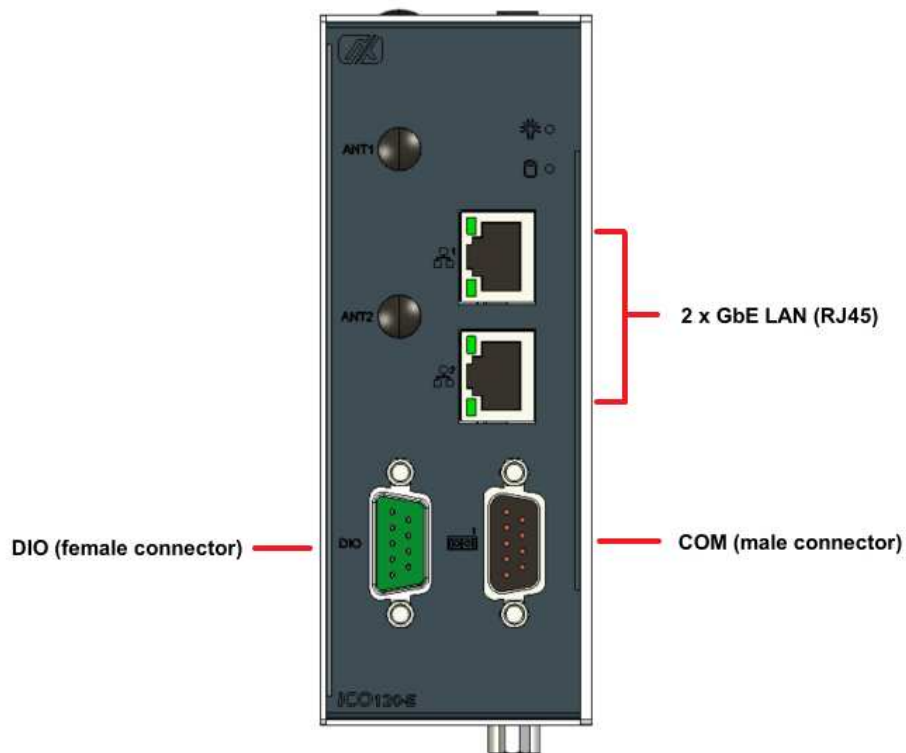
The following figures show you I/O outlets from the front view and top view of the ICO120-E3350-A/B/C/E.

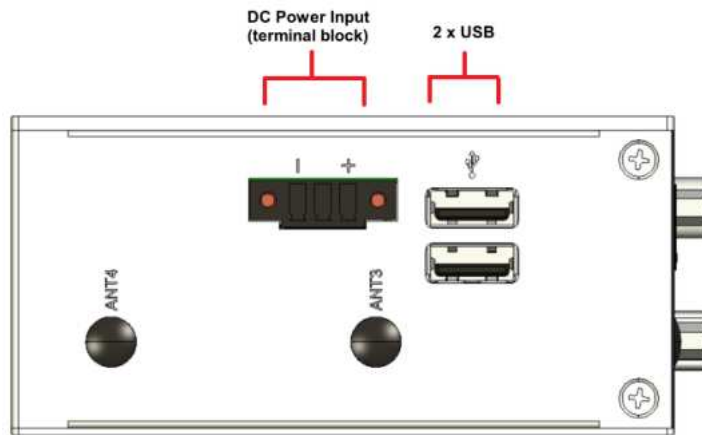


The following figures show you I/O outlets from the bottom view of the ICO120-E3350-A/B/C/E.

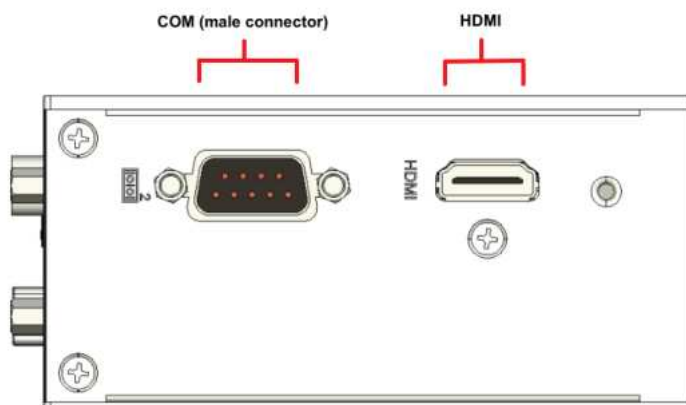


The following figures show you I/O outlets from the front view and top view of the ICO120-E3350-F.





The following figures show you I/O outlets from the bottom view of the ICO120-E3350-F.



SECTION 2 HARDWARE INSTALLATION

The ICO120-E3350 is convenient for your various hardware configurations, such as Memory Module and mSATA. Chapter 2 will show you how to install the hardware. It includes:

2.1 Installing the Memory Module

ICO120-E3350-A 、 B 、 C 、 E

Step 1 Turn off the system.

Step 2 Loosen all screws of the cover and remove the cover from the system.



Step 3 Put the thermal pad on the memory module to improve the cooling effect.



Step 4 Use two fingers to hold the memory module and insert the gold figure into the slot and push the module down.



Step 5 The memory module is locked by two latches on the sides. We strongly recommend using “LDC737” silicone on both sides of the memory for better anti-vibration.



Step 6 Put the cover back to the system and tighten the screws then close the chassis.

ICO120-E3350-F

Step 1 Turn off the system.

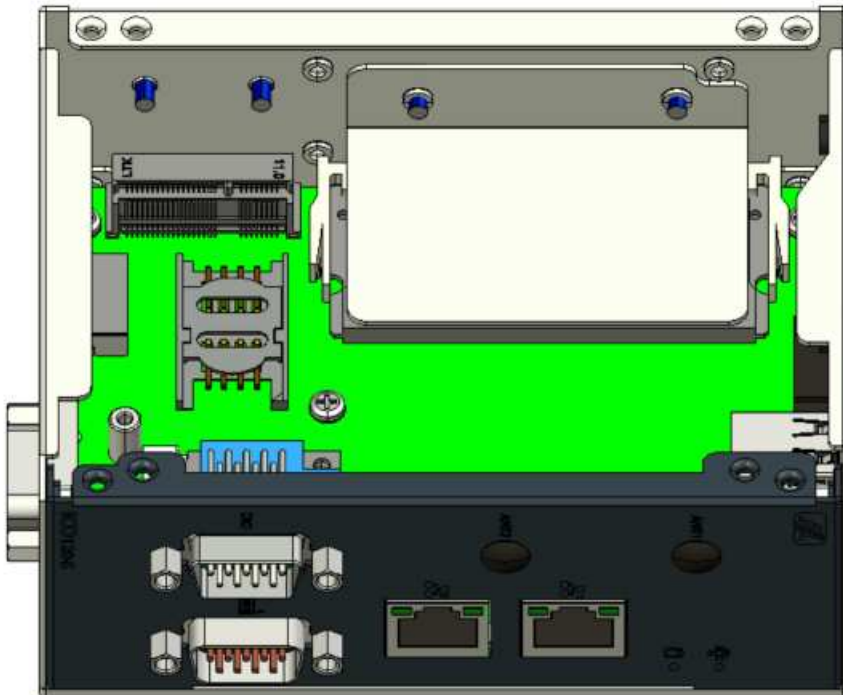
Step 2 Loosen all screws of the cover and remove the cover from the system.



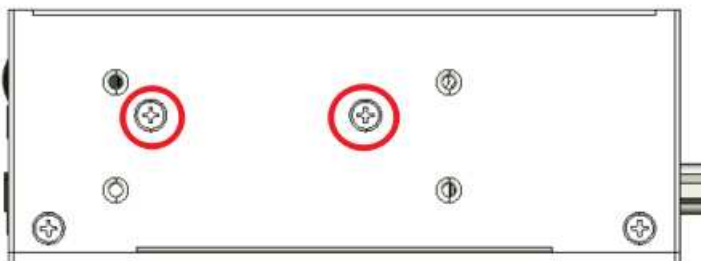
Step 3 Use two fingers to hold the memory module and insert the gold figure into the slot and push the module down.



Step 4 Install DDR bracket



Step 5 The bracket screws it tight



Step 6 Put the cover back to the system and tighten the screws then close the chassis.

2.2 Installing the mSATA

Step 1 Turn off the system.

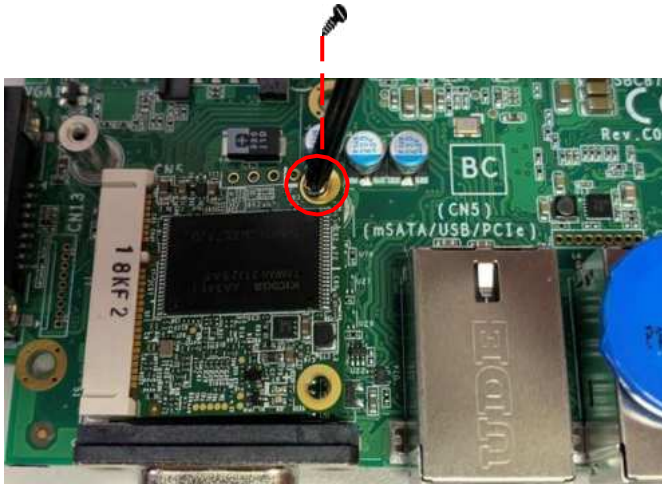
Step 2 Loosen all the screws of the cover and remove the cover from the system.



Step 3 Insert the mSATA into the slot which marking with “mSATA / USB / PCIe”.



Step 4 Tighten the screw tightly.

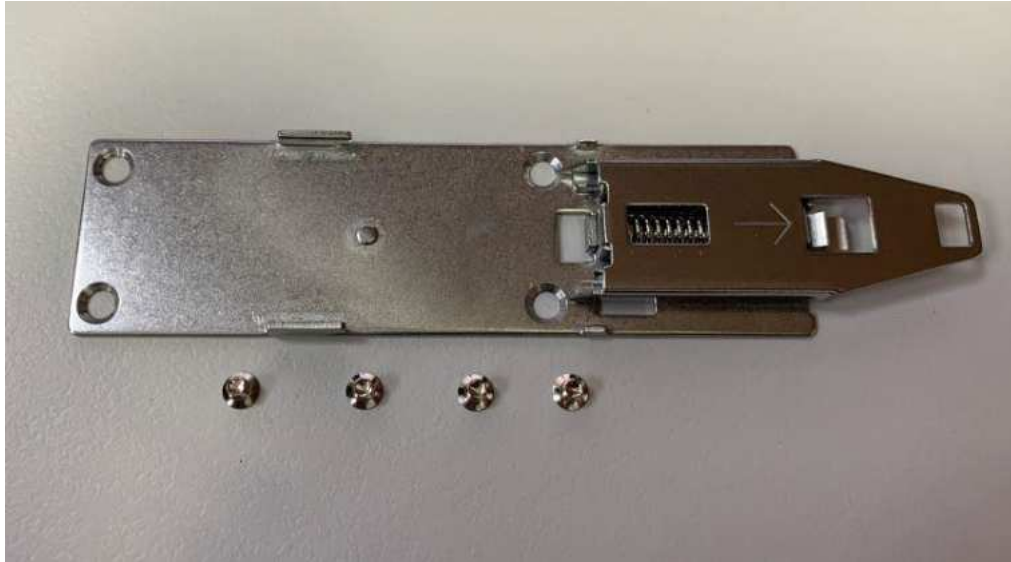


Step 5 Put the cover back to the system and tighten the screws then close the chassis.

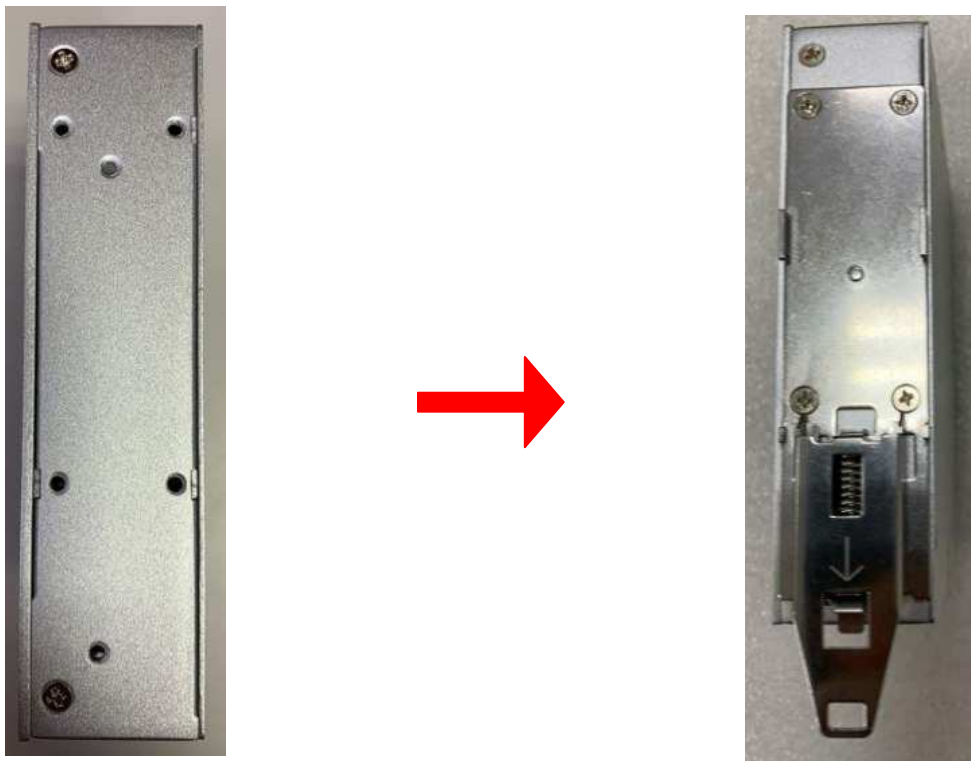
2.3 Installing Din-rail Mounting

The ICO120-E3350 provides Din-rail Mount as below:

Step 1 Prepare Din-rail Mount assembling components (screws and bracket).

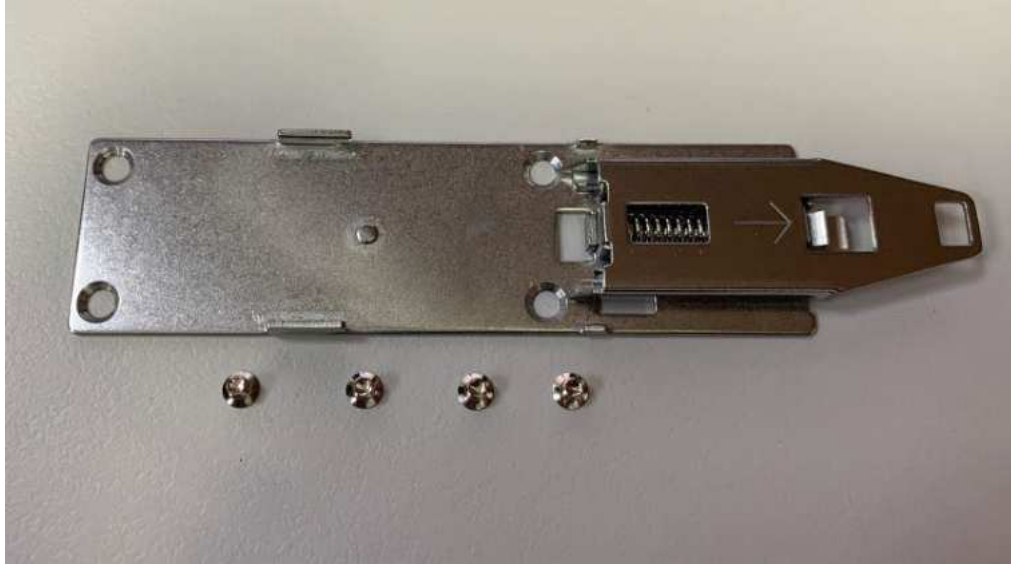


Step 2 Assemble the bracket to the system and tighten the screws.

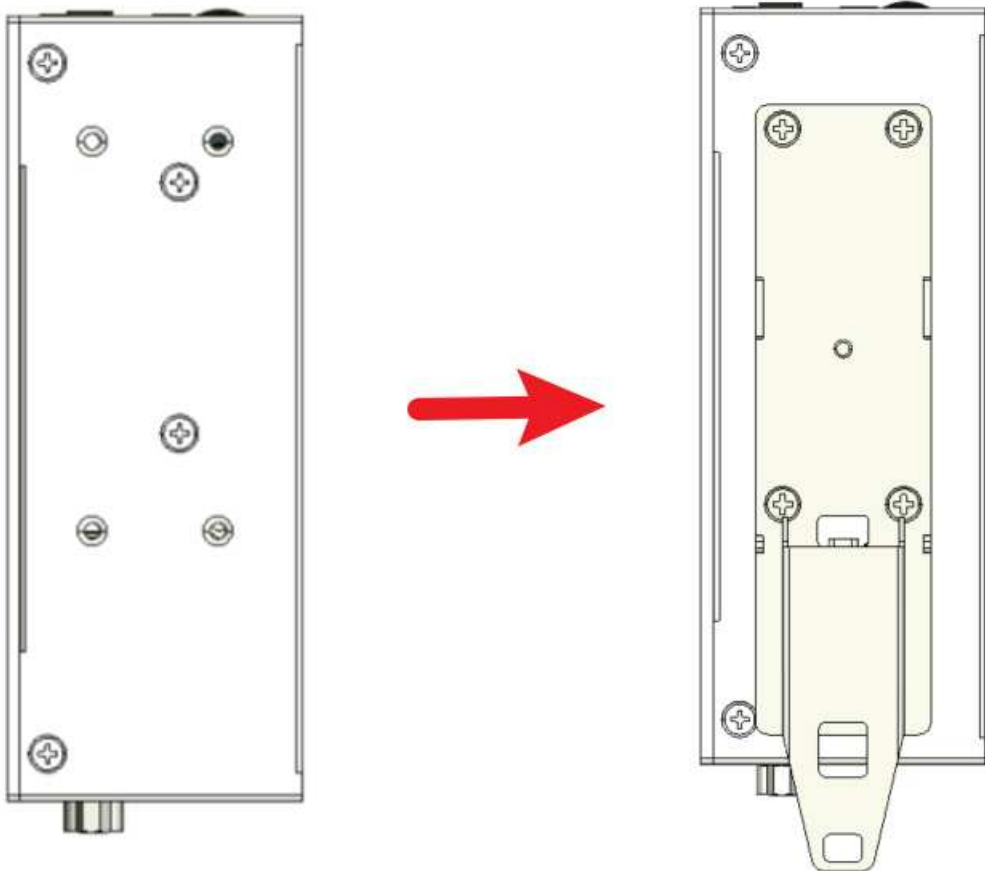


The ICO120-E3350-F provides Din-rail Mount as below:

Step 1 Prepare Din-rail Mount assembling components (screws and bracket).



Step 2 Assemble the bracket to the system and tighten the screws..



2.4 Installing Wall Mounting (optional)

The ICO120-E3350 provides Wall Mounting that customers can install as below:

Step 1 Prepare Wall Mount assembling components (screws and bracket).



Step 2 Assemble the bracket to the system and tighten the screws.



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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-backed-up to save the Setup information whenever the power is turned off.

3.1 Entering Setup

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the key immediately.
2. After you press the 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 then press <Enter> to accept or enter its sub-menu.

System Date

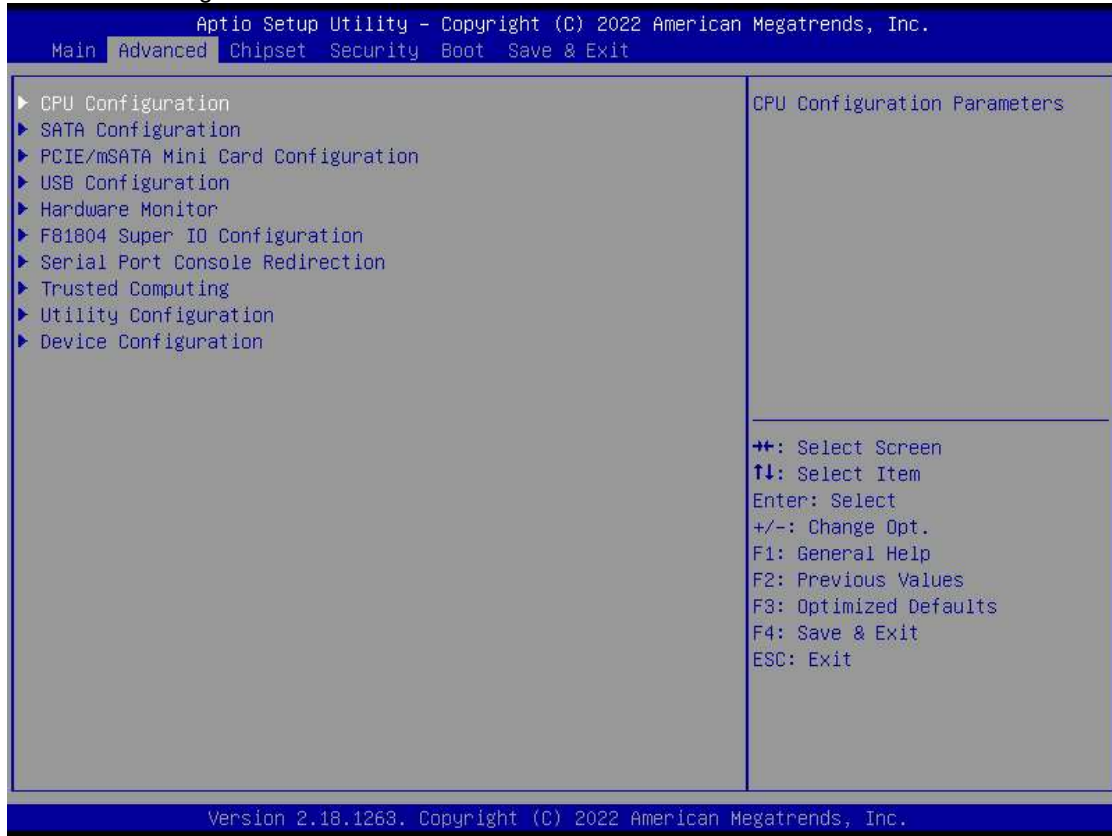
The date format is <day> <month> <date> <year>.

System Time

This item shows the 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.

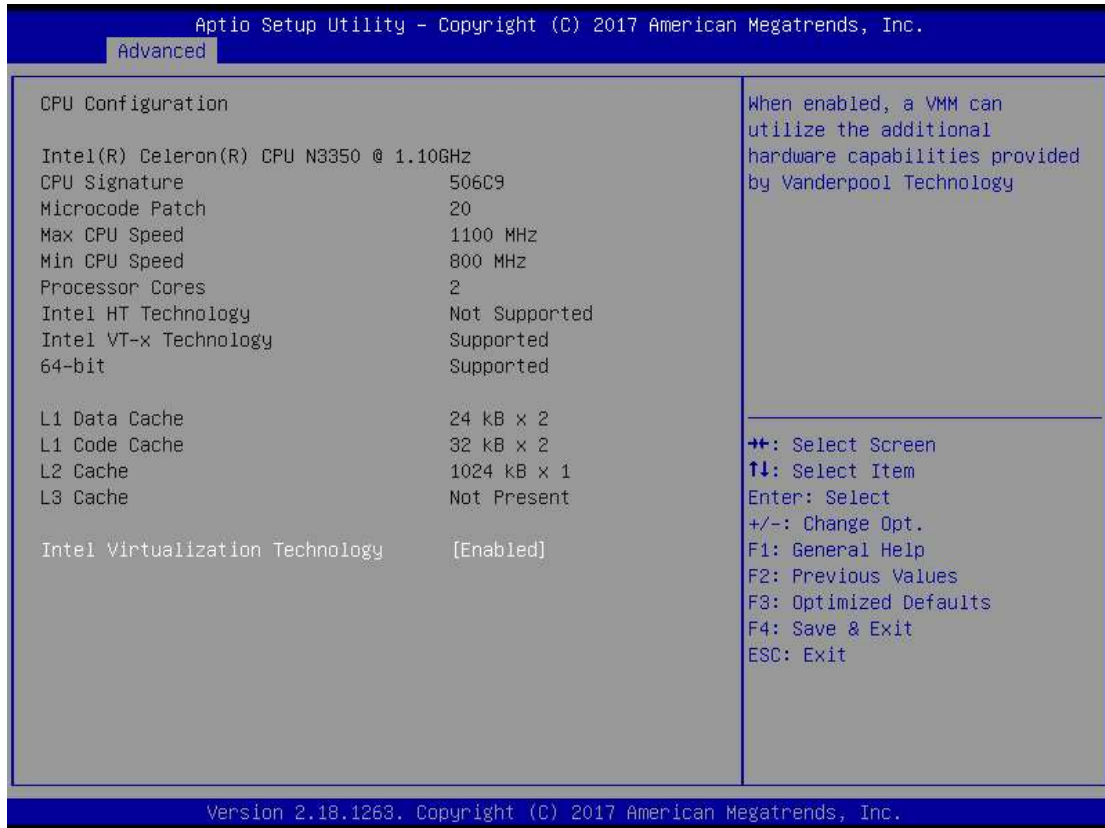
3.3 Advanced Features

This Advanced section 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

Scroll to this item and press <Enter> to view the CPU Configuration information. (Please refer to the graphics below.)



SATA Configuration

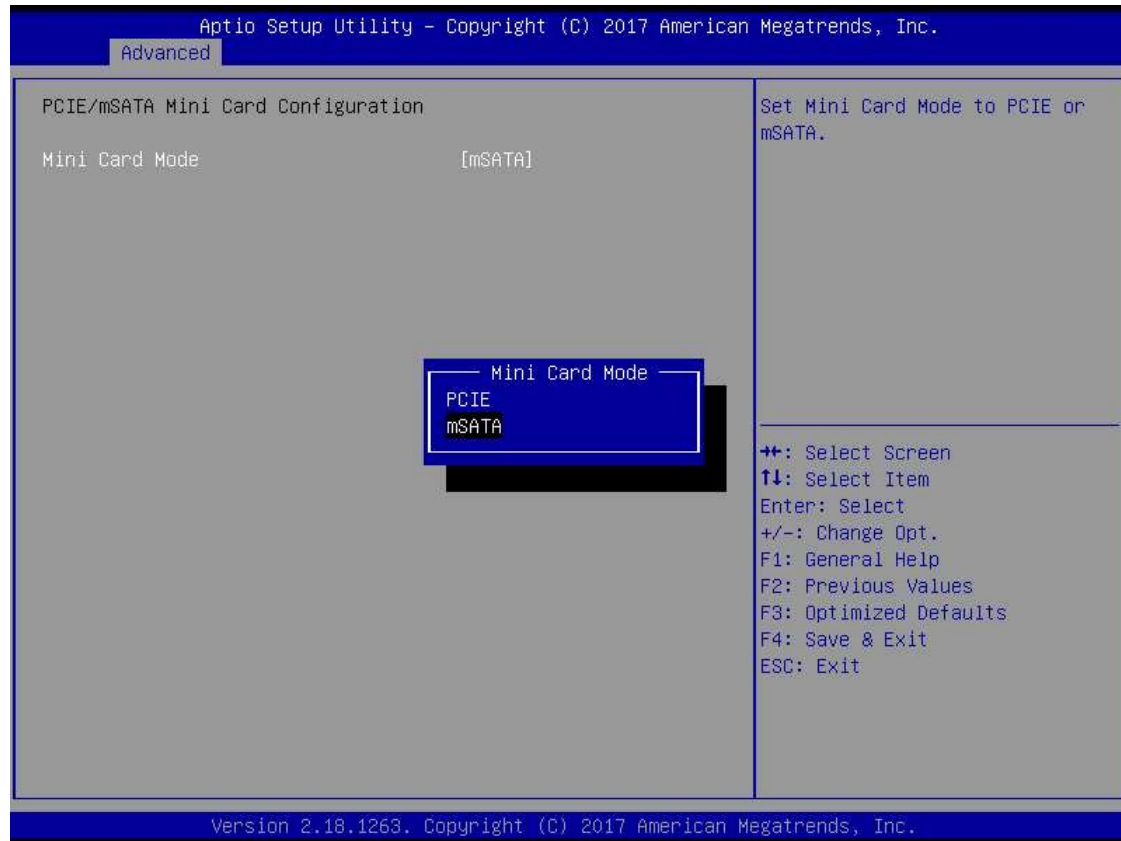
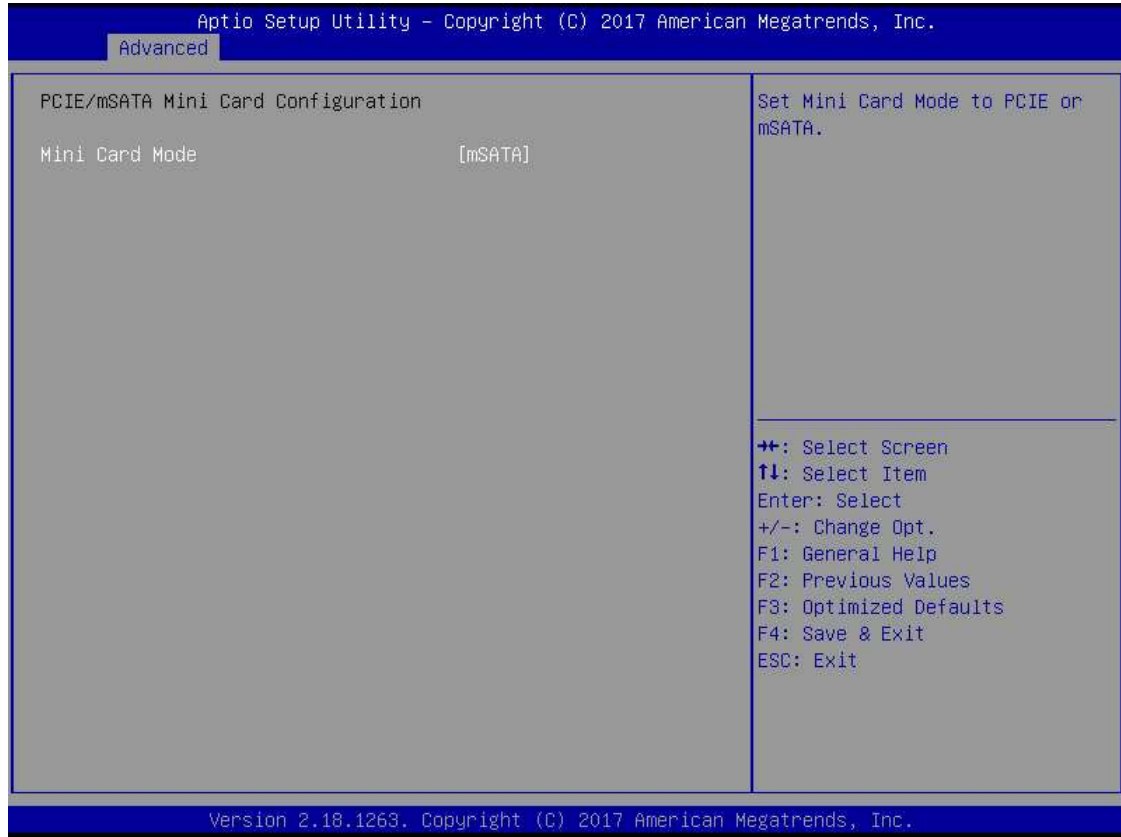
Scroll to this item and press <Enter> to view the SATA Configuration information.

(Please refer to the graphics below.)



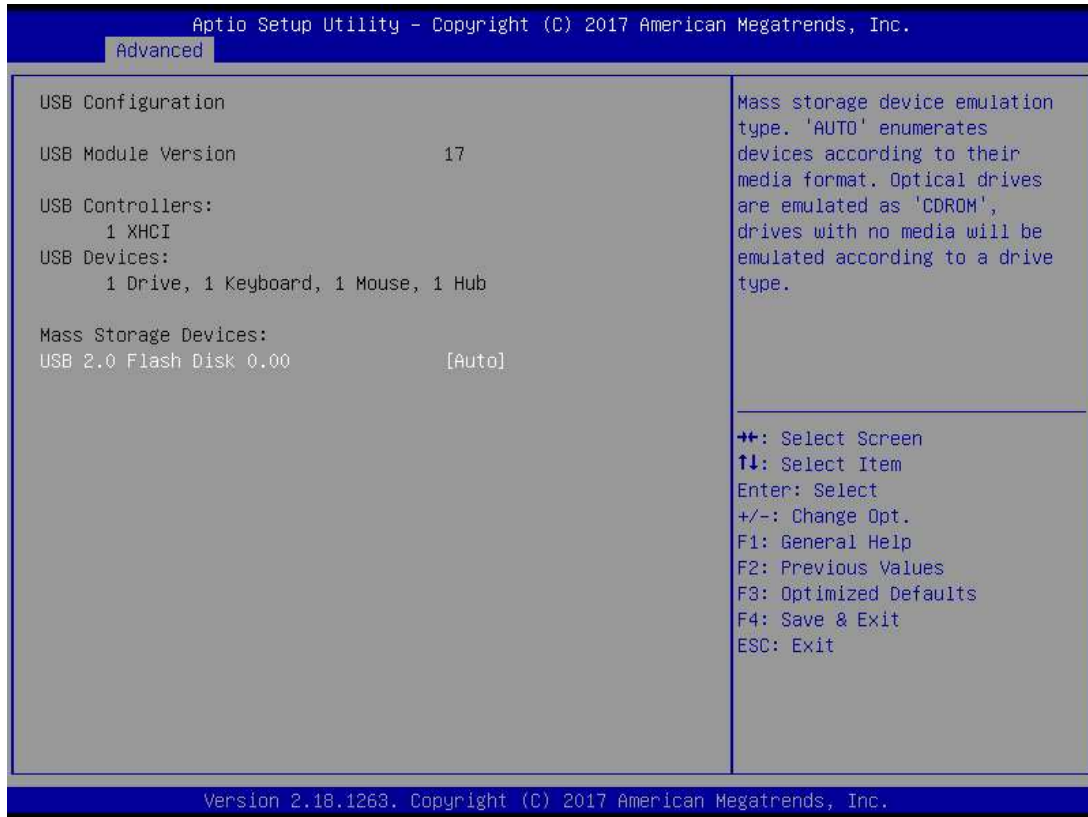
PCIe/mSATA Mini Card Configuration

You can choose the PCIe or mSATA mode in their BIOS menu.



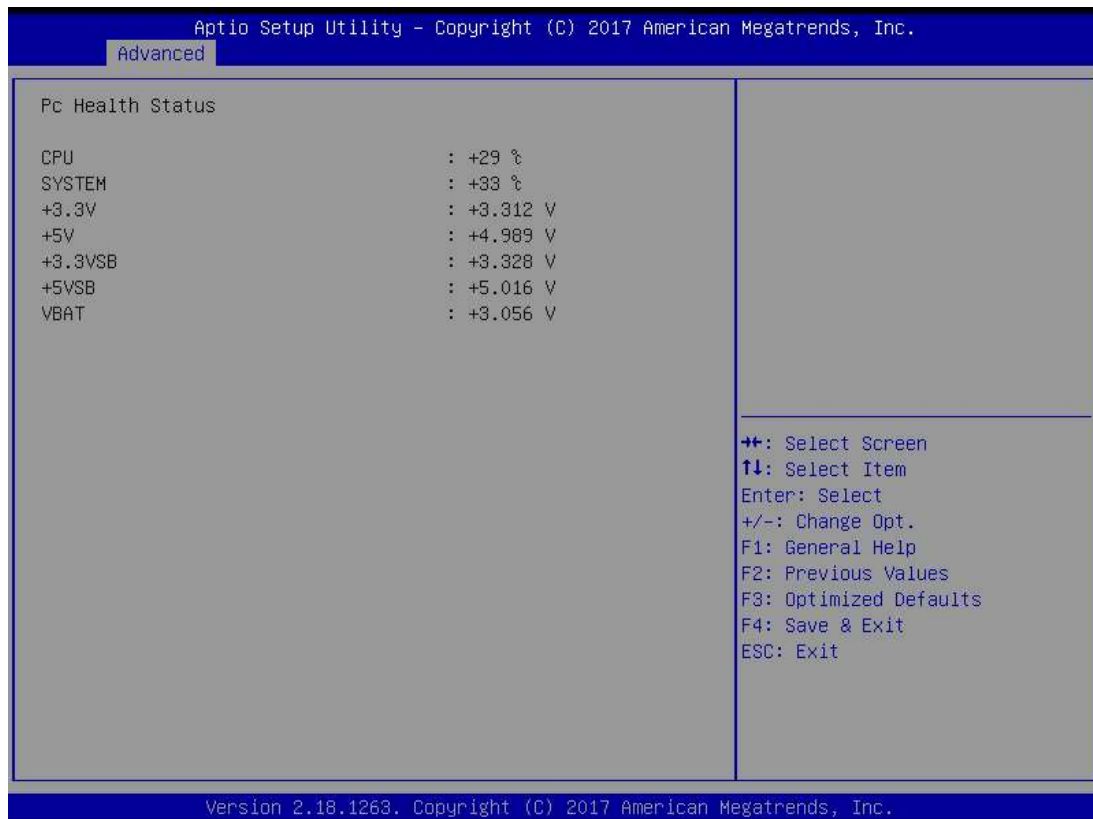
USB Configuration

Scroll to this item and press <Enter> to view the USB Configuration information. (Please refer to the graphics below.)



H/W Monitor

Scroll to this item and press <Enter> to view the monitor hardware status. (Please refer to the graphics below.)



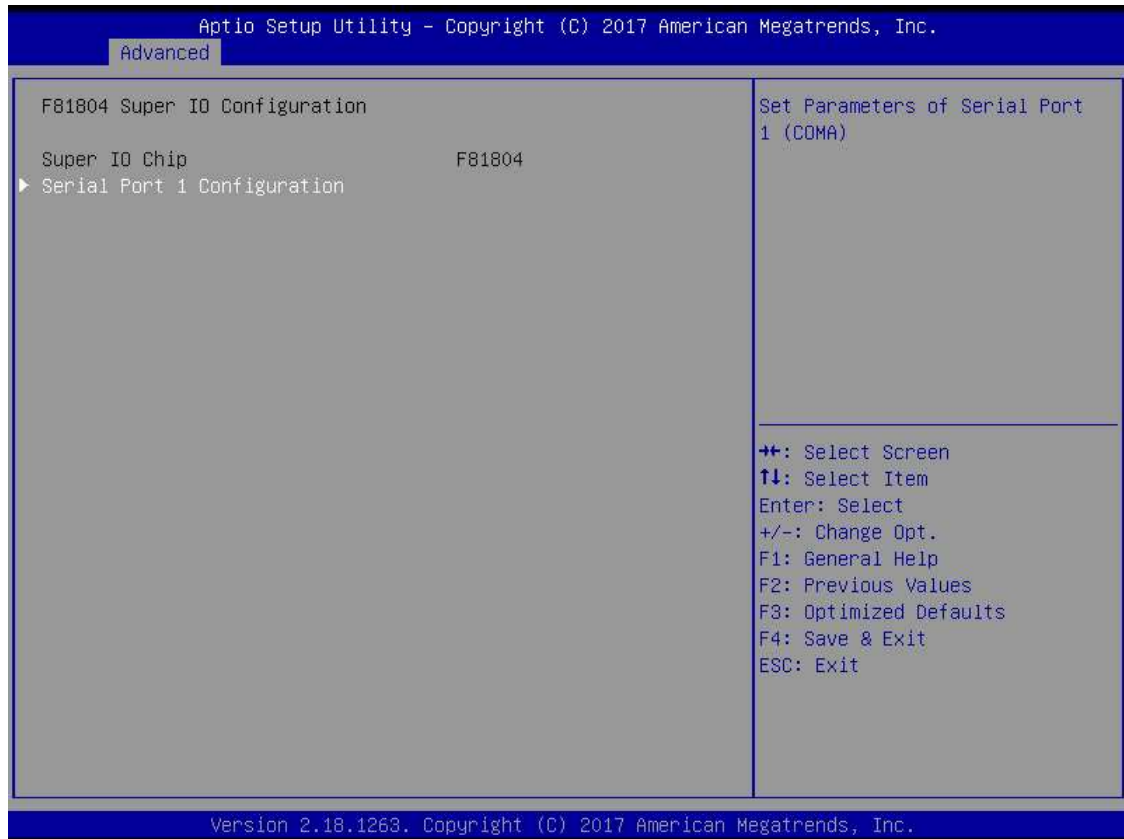
F81804 Super IO Configuration

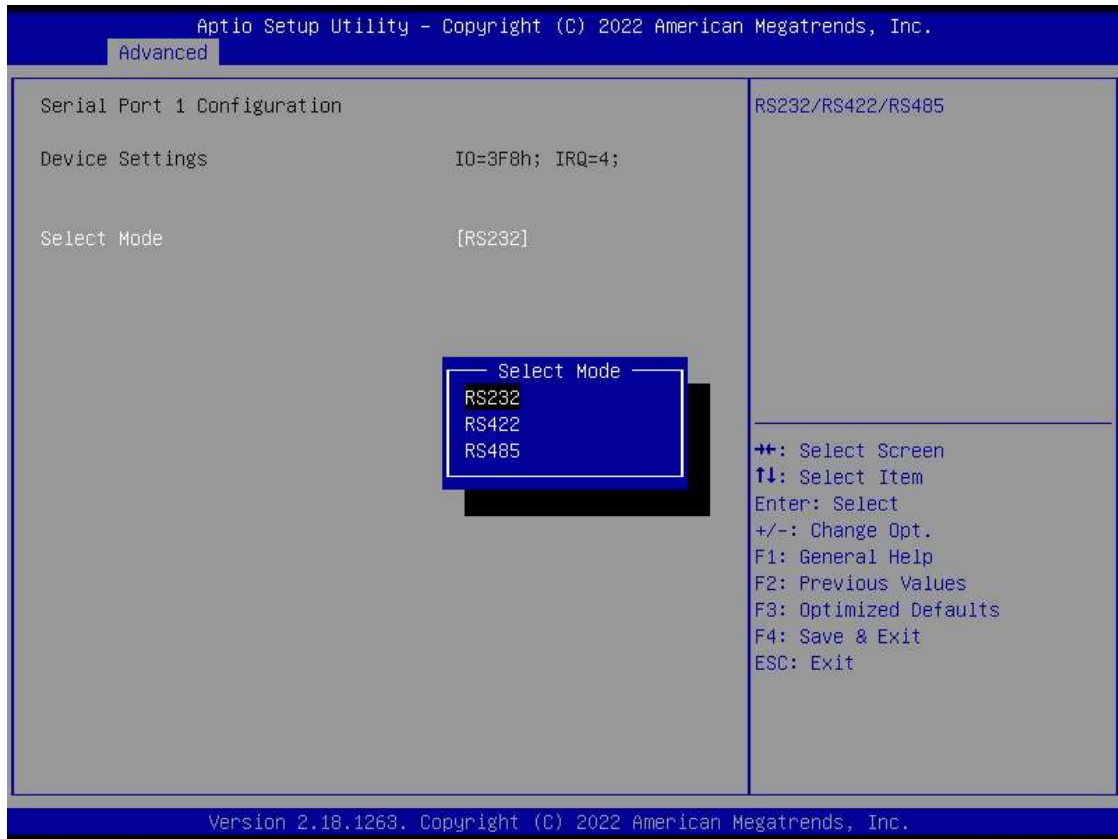
The default setting for the Serial Port is RS232.

You can change the setting by selecting the value you want in each COM Port Type. The COM supports RS422 & RS485 mode and high-speed mode.

You can enable High-speed mode in the BIOS menu. Com Port speed supports up to 1.5 Mbps.

(Please refer to the graphics below.)





Serial Port Console Redirection

The default setting for the console redirection function is [Disabled] (Please refer to the graphics below.)



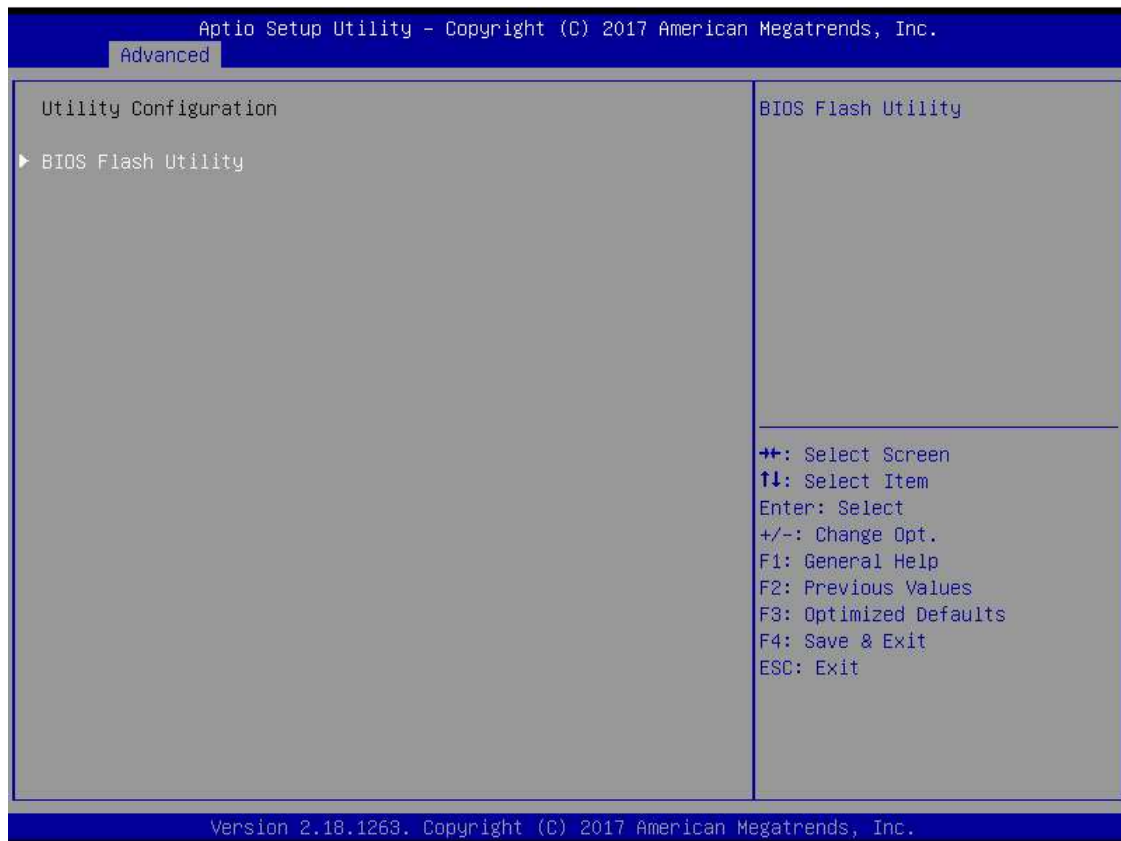
And you can further change the setting by selecting or setting the value you want in each function as the following pictures.

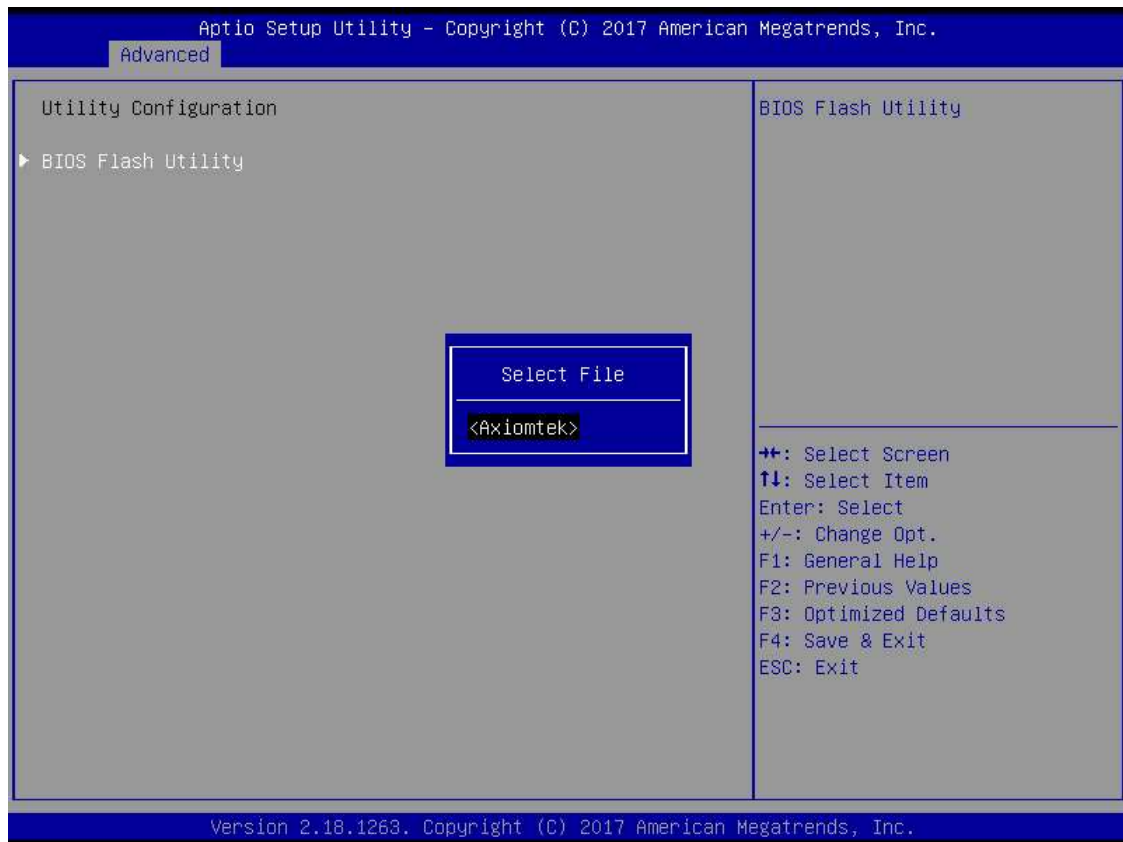
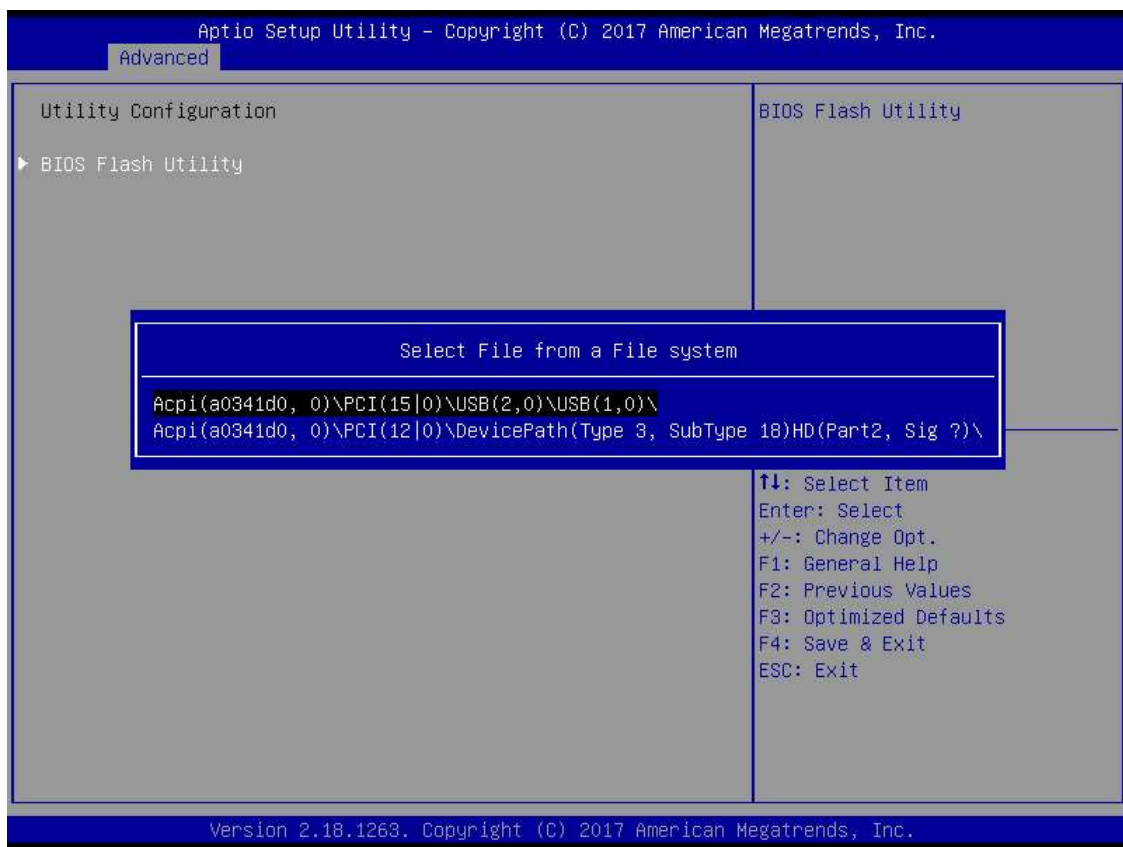


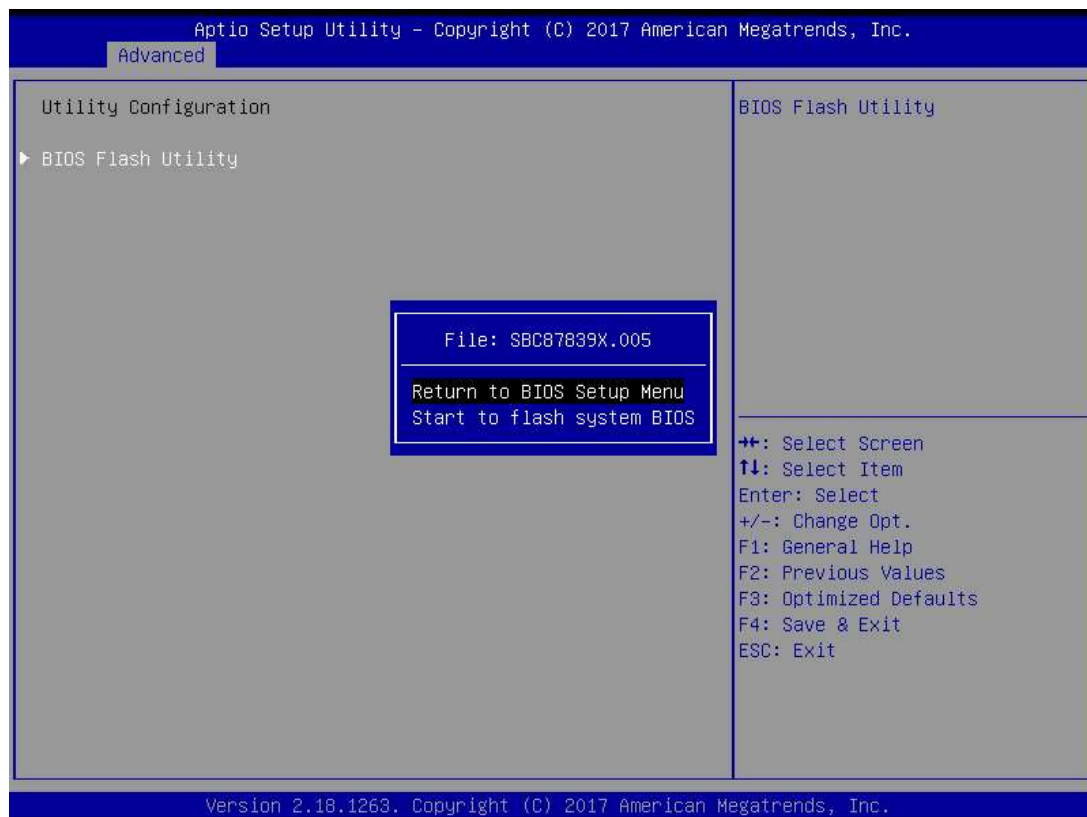
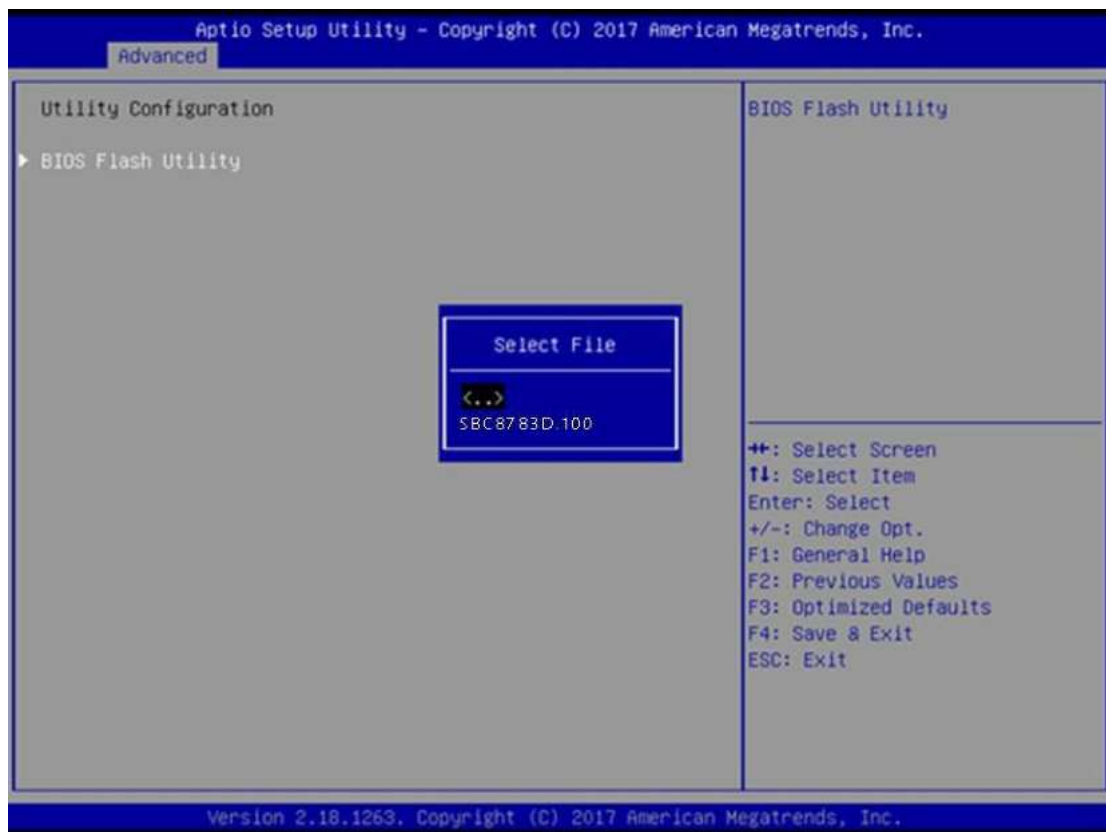
Utility Configuration

BIOS flash utility is a tool for flash BIOS on setup menu, follow the step to flash BIOS.

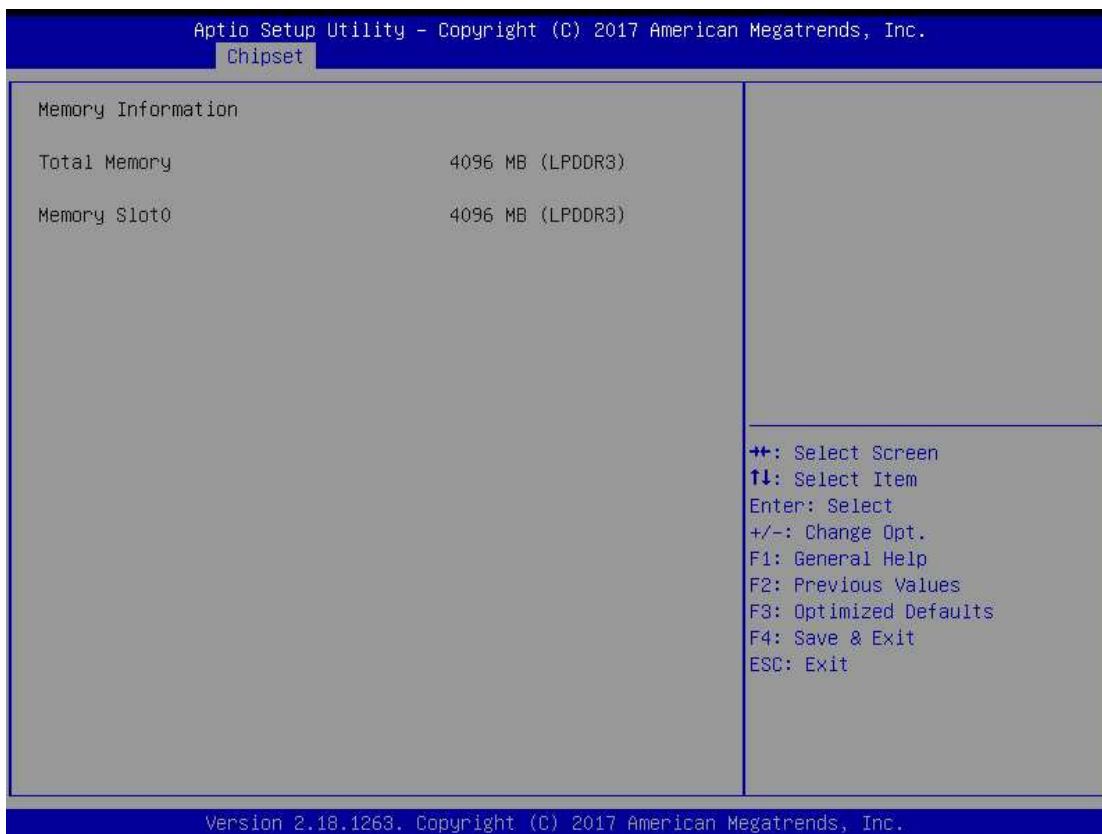
1. Create a folder and rename it to Axiomtek on the root of USB storage (Ex: X:\Axiomtek)
2. Copy the BIOS file to the Axiomtek folder (Ex: X:\Axiomtek\SBC8783D.100) (Note: BIOS file name must contain the word SBC8783D)
3. Enter the BIOS flash utility and locate the BIOS file
4. Select "Start flash system BIOS"







3.4 Chipset Feature



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

Chipset

TXE Information	
MRC Version	0.56
PMC FW	03.31
TXE FW	3.1.76.2356

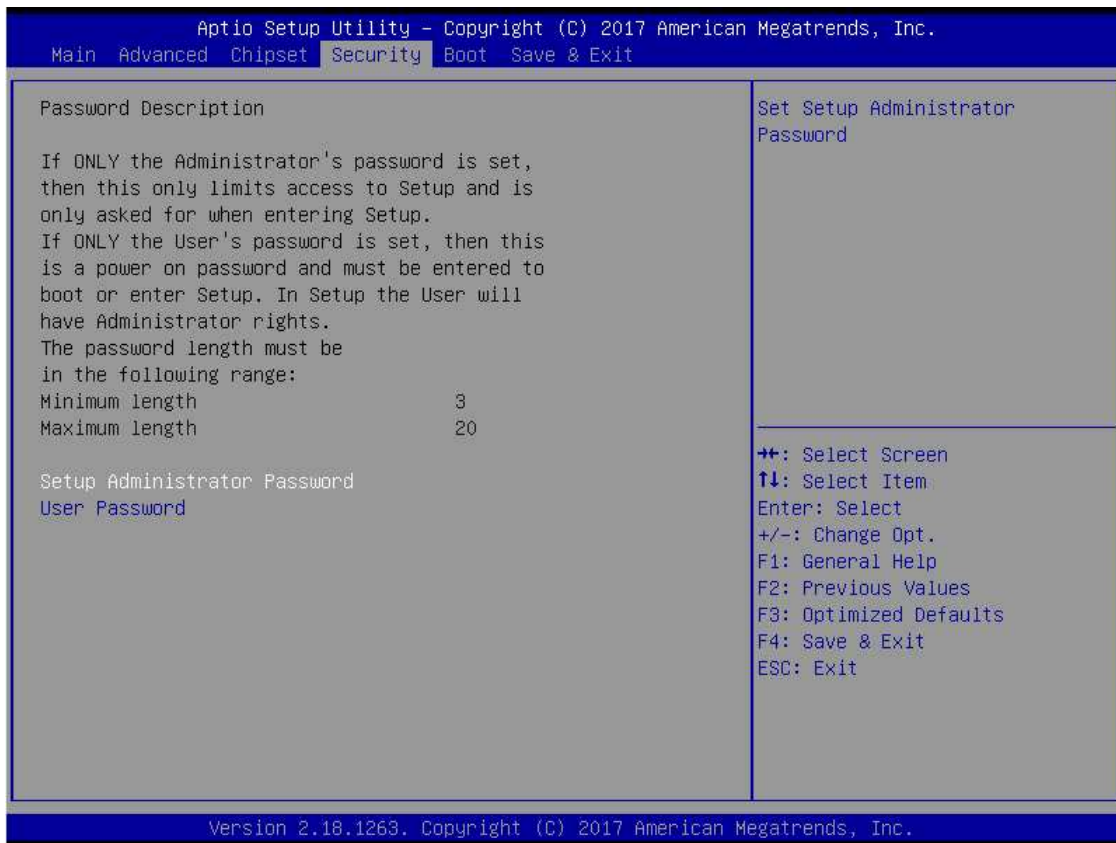
++: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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3.5 Security

The default setting for Administrator Password is “Not setting passwords”.

The Security menu allows users to change the security settings for the system. You can set the password for both Administrator Password and the User Password. (Please refer to the graphics below.)

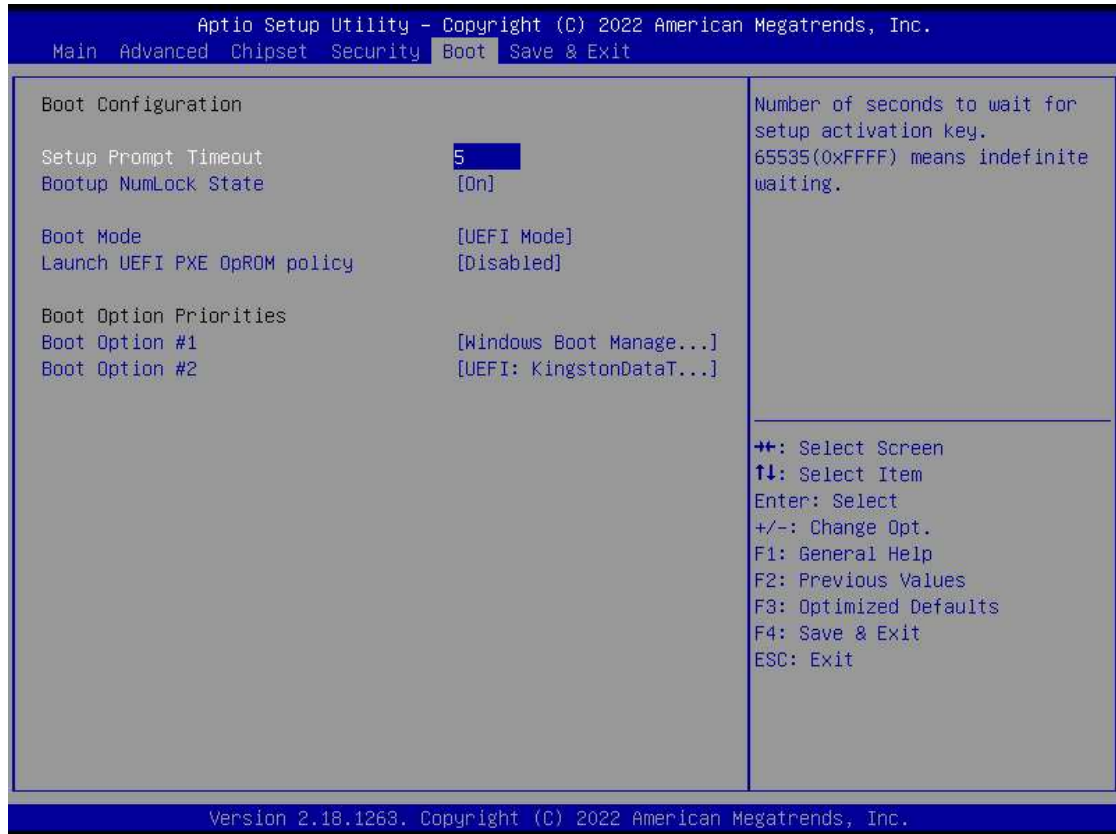


Note: The BIOS default has no password, when user created the password, please remember the password number, if users forget password the RMA is the only solution.

3.6 Boot Mode

Boot has UEFI, Legacy, Compatible mode for selection. The default setting boot mode is [UEFI Mode]

The default setting Launch UEFI PXE OpROM policy is [Disable] (Please refer to the graphics below.)



When select Compatible Mode

Compatible Mode: When use PCIe to SATA device, option ROM can use this Mode setting.

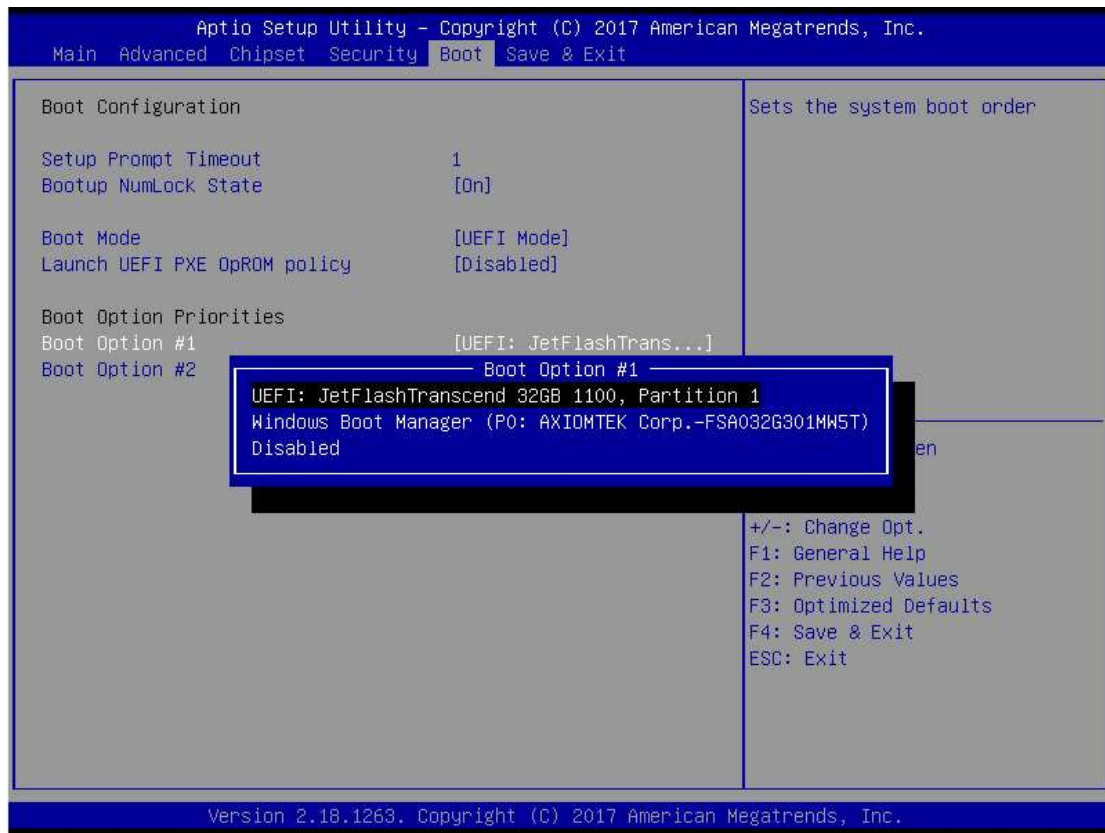
The default setting PXE OpROM is

[Disable] The default setting Video

OpROM is [UEFI] The default setting

Video OpROM is [UEFI]

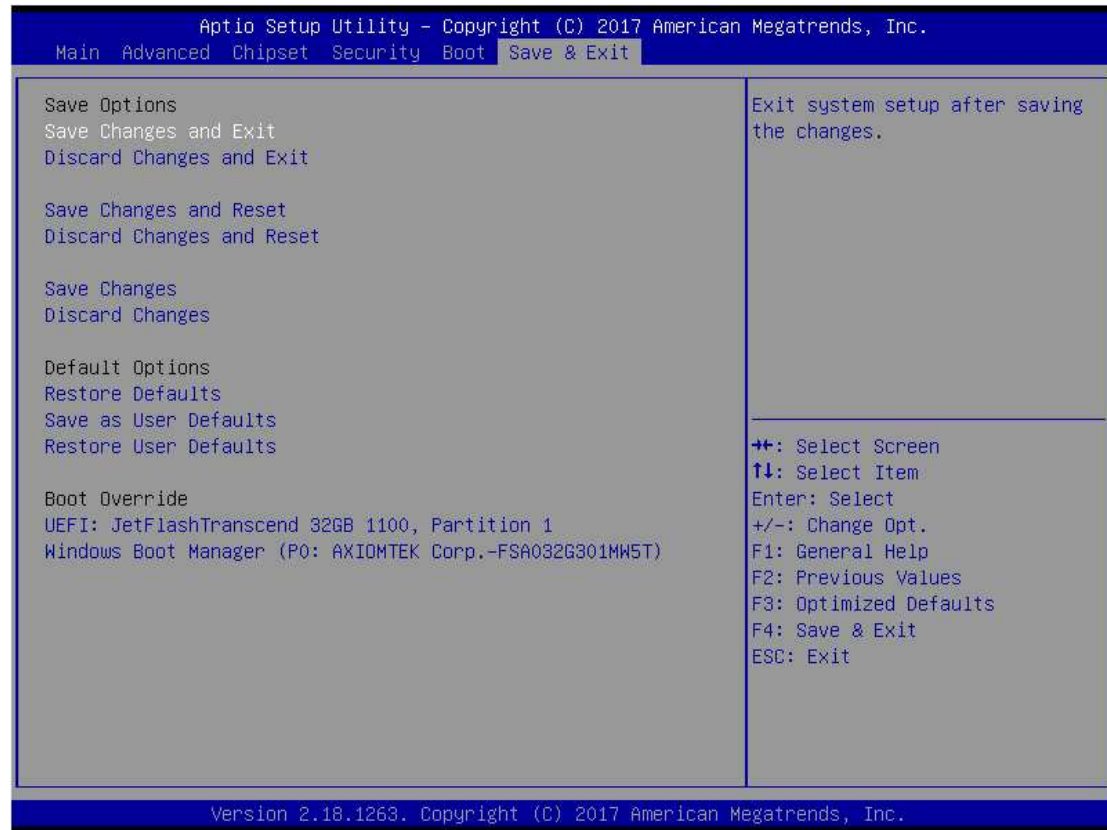
The Boot Option Priorities can select by Boot Option #1, #2..., If the user is using a USB Device. (Please refer to the graphics below.)



3.7 Save & Exit

This section allows you to determine whether or not to accept your modifications. Type "Y" to quit the setup utility and save all changes. Type "N" to bring you back to the Previous Setup utility.

(Please refer to the graphics below.)



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APPENDIX A WATCHDOG TIMER

About Watchdog Timer

After the system stops working for a while, it can 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 debug tool.

Enable WDT



Enable configuration:

○ 2E 87 ; Un-lock
super I/O ○ 2E 87



Select logic device:

○ 2E 07 ; Select logic
register ○ 2F 07 ;
Switch to WDT device



Set timer value:

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



Clear WDT status

(optional): ○ 2E F5 ;
○ 2F 40



Set base timer:

○ 2E F5
○ 2F M ; M = 28h (Minute)
M = 20h (Second)

40
Timer

Watchdog