USER'S MANUAL

ICO300-83M

Robust Din-rail Fanless Embedded System

User's Manual
V 1.0.0.0

AXIOMTEK

www.axiomtek.com

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Safety Precautions

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

1. The ICO300-83M 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 ICO300-83M 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 ICO300-83M 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℃ or above 75℃. 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

   Risk of explosion if battery is replaced by an incorrect type dispose of 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 2.43~1.29A, Tma = 75 ℃, and the altitude of operation = 5000m. Tolerance of Power rating is 10% (9~36V / 3.23-0.86A).

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

Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against the ingress of water: IP40
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 rub it with a piece of dry cloth.

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

Cleaning Tools

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

Keep in mind that some components in your computer may only be 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 to 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: 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 swaps 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 components*.**

Please follow the steps below:

1. Close all application programs
2. Close operating software
3. Turn off power
4. Remove all device
5. Pull out power cable

Scrap Computer Recycling

If the computer equipments need 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 ICO300-83M. The Chapter 1 includes the following sections:

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

1.1 General Description

ICO300-83M Din-rail fanless embedded system is suitable for communications control and for protocol converter applications in critical environments. Built for rugged work environments, ICO300-83M features an extra low power consumption Intel® ATOM® E3930(1.3GHz) processors supporting industrial temperature range of -40℃ to +75℃. Its front accessible I/O cabling is very convenient for wiring and maintenance. ICO300-83M offers a 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 control cabinet. Pre-installed with Linux, Windows® 10 embedded, ICO300-83M provides programmers with a friendly environment for developing application software at a lower cost.

ICO300-83M is robust industrial-grade hardware design and adopts the advanced cooling system, besides, supporting the mSATA and SATA SSD (or HDD), which makes it especially suitable for field control & monitoring system solution for following markets:

Utility Industries (Water; Energy; Chemical Plant; Mining…)

Public Transportation Industries (Traffic/ Highway Control; Train/Bus Control…)

Homeland Security (Weather Monitoring/Alarm System…)

- **Checklist**

✓ICO300-83M System Unit x 1pcs
✓DDR thermal pad x1pcs
✓Screws for Mini Card M2*5L x2pcs
✓Screws for SSD/HDD M3*4L x4pcs
✓SATA+Power HDD cable x1pcs
✓HDMI BKT x1pcs
✓Screws for HDMI M3*5L x1pcs
✓DIO 2x6pin termninal block x2pcs
✓COM 2x5pin termninal block x4pcs
✓Din-rail Kit x1set
✓Power 3 pin terminal block x 1pcs

Note: Please contact your local vendors if any damaged or missing items.

- **Features**
  - Fanless design
  - Wide temperature operation of -40℃ - +75℃
  - Wide range 12–24V DC-in with terminal block
  - Din-rail mounting
  - Wall mounting (optional)
  - 1 isolation 2K DO terminal block connector
  - 1 isolation 2K DI terminal block connector
  - 6 isolation 2K COM Ports support RS-232/422/485
  - 3 10/100/1000 Base-T Ethernets with Magnetic Isolated Protection
  - 2 Mini Card (1 support USB/SIM; 1 support USB/mSATA)
  - Support one 2.5" SATA drive bay
  - Passed CE with FCC testing
  - Passed ATEX/C1D2 anti-explosive certificate

- **Embedded O.S. Supported**
  - ICO300-83M not only supports Windows®10, but also supports embedded OS, such as Windows® 10 embedded and Linux package support. For storage device, ICO300-83M supports one SATA SSD (or HDD) and one mSATA.

1.2 System Specifications

1.2.1 CPU

- Onboard Intel® ATOM® E3930 (1.3GHz)

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 1600/1866 MHz up to 8GB.

1.2.4 Display

- 1 x HDMI (up to 1920 x 1080 @60Hz)

1.2.5 Ethernet Ports

- LAN Chip: Intel Ethernet Controller I210-IT.
- LAN 1 ~3 support 10/100/1000 Base-T with 1.5KV magnetic isolated protection.

1.2.6 Storages

- 1 x 2.5" SATA drive bay.
- 1 x mSATA.

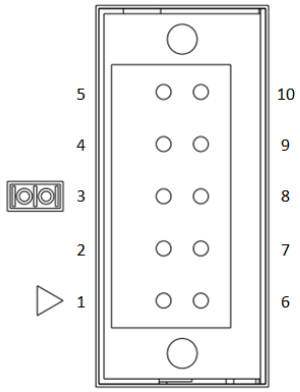
1.2.7 USB

- 2 x USB3.0

1.2.8 COM

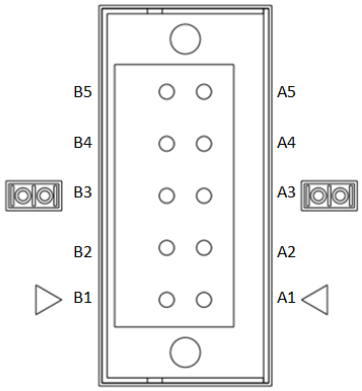
- 6 ports terminal block support RS-232/422/485 which can be selected by BIOS with isolation 2KV protection.
- Supports Auto Flow Control in RS485 mode.

COM PORT 1~2



Pin	RS232	RS422	RS485
1	GND	GND	GND
2	RTS	RX-	N.C
3	TX	RX+	N.C
4	CTS	TX-	D-
5	RX	TX+	D+
6	DTR	N.C	N.C
7	DSR	N.C	N.C
8	DCD	N.C	N.C
9	RI	N.C	N.C
10	N.C	N.C	N.C

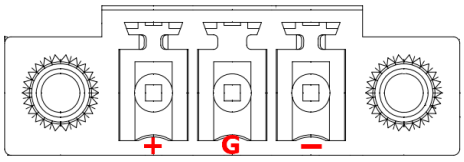
COM PORT 3~6



Pin	RS232	RS422	RS485
A1	GND	GND	GND
A2	RTS	RX-	N.C
A3	TX	RX+	N.C
A4	CTS	TX-	D-
A5	RX	TX+	D+
B1	GND	GND	GND
B2	RTS	RX-	N.C
B3	TX	RX+	N.C
B4	CTS	TX-	D-
B5	RX	TX+	D+

1.2.9 Power

- This product is intended to be supplied by a Listed Power Adapter or DC power source, rated minimum 24 Vdc, minimum 2.43 A, Tma = minimum 75 degree C, output complies with LPS/PS2.



1.2.10 WatchDog Timer (WDT)

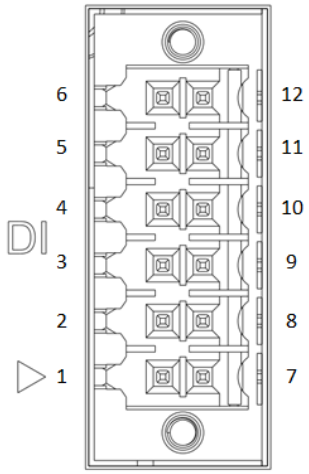
- 1~255 seconds or minutes; up to 255 levels.

1.2.11 Digital I/O Connector and Pin Definition

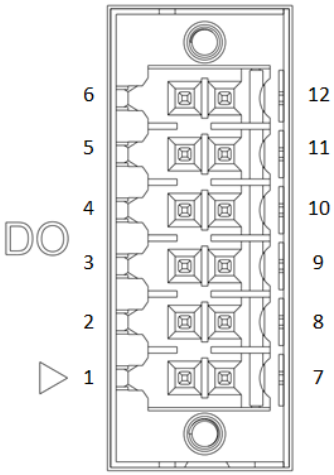
- 8bit DI and 8bit DO with 2KV optical isolation

Digital Input	
Input Channels	8 source type
Input Voltage	0 to 30VDC Input
Digital Input Levels for Dry Contacts	Logic level 0: Close to GND. Logic level 1: Open
Digital Input Levels for Wet Contacts	Logic level 0: +10V to +24V (DI To XIN_COM-). Logic level 1: +3V max.
Digital Output	
Output Channels	8 sink type
Output Current	Max. 200 mA per channel, current sink type
External voltage	10 to 30VDC, open collector to 30V

DIO



Pin	DI
1	External PWR
2	DI 8
3	DI 9
4	DI 10
5	DI 11
6	DIO_GND
7	External PWR
8	DI 12
9	DI 13
10	DI 14
11	DI 15
12	DIO_GND

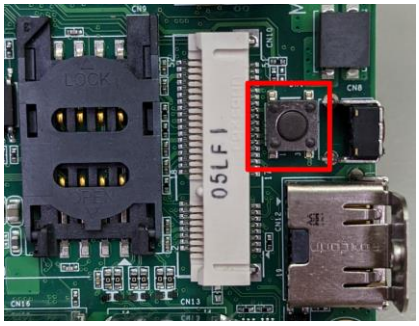


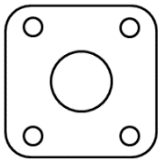
Pin	DO
1	COM+
2	DO 0
3	DO 1
4	DO 2
5	DO 3
6	COM-
7	COM+
8	DO 4
9	DO 5
10	DO 6
11	DO 7
12	COM-

1.2.12 Restore BIOS Optimal Defaults (Clear CMOS)

- Press the tact switch can restore BIOS optimal defaults.

  (The buttom is next to the HDMI connector)





1.2.13 System LED

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

LED Name	Description	Color
ACT	Indicate the storge status and it is flashing when storge access.	Orange
PWR	Indicate the Power status. When the DC input is acceptable, the LED will ON.	Green

1.2.14 Operation Temperature

- -40℃ ~ +75℃

1.2.15 Storage Temperature

- -40℃ ~ +85℃

1.2.16 Humidity

- 10% ~ 95% (non-condensation)

1.2.17 Weight

- 0.75 kg

1.2.18 Dimensions

- 66mm (2.60") (W) x110mm (4.33") (D) x155mm (6.10") (H)

1.2.19 System I/O Outlets

- One DC Power Input with terminal block.
- Five Antenna holes.
- One HDMI
- Two USB 3.0 connectors
- Three 10/100/1000 Base-T RJ-45 with 1.5KV magnetic isolated protection
- Four connectors with 2x5 pin terminal block for COM1~COM6
- Two connectors with 2x6 pin terminal block for DI and DO

1.3 Non-sparking low power equipment

The Robust Din-rail Fanless Embedded System ICO300-83M(ATEX&CID2) is designed according to **EN IEC 60079-0:2018 and EN IEC 60079-7:2015+A1:2018 will be used in Zone 2 and Class I Division 2 (CID2).**

1.3.1 General information for use

Types of protection:

- ICO300-83M(ATEX&CID2) is designed with type of protection "ec".
- UL 21 ATEX 2567X marking: II 3 G Ex ec IIC T4 Gc and Class I Div. 2 Groups ABCD T4
- Ambient temperature:-40℃~+75℃
- The devices are for use in an area of not more than pollution degree 2 in accordance with EN/IEC 60664-1.
- All of fuses shall be soldered in place and the fuses are non-interchangeable.
- The equipment shall be installed in an enclosure that provides a minimum ingress protection of IP 54 in accordance with EN 60079-0, and accessible only by the use of tool.

  (WARNING - EXPLOSION HAZARD – Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.)
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, and D or non-hazardous locations only.

  (WARNING - EXPLOSION HAZARD – Substitution of any components may impair suitability for Class I, Division 2.)
- After the Robust Din-rail Fanless Embedded System is mounted and fixed, the customer will make the whole system grounded, and the ground wire needs to meet the requirement of EN60079-0, besides, the cross-section area of the ground wire is at least 4mm².

The I/O ports of non-sparking equipment will be possible connected instruments or equipments as below examples:

- Four isolated Terminal Block connectors support RS232/RS422/RS485 (COM1~COM6)
  It will be possibled linked the temperature sensor, wet sensor, meters.

- Three Isolated 10/100/1000Mbps Ethernets
  It will be possible connected the wired network (HiNet/ NiLink/ Internet)

- Two Isolated DIO (8-IN/8-OUT) port with Magnetic Isolation Protectio
  It will be possible linked digital electronic power lemter.

- Two USB
  It is always plugged-in the USB housing cover (pls refer below picture), excepting equipment maintenance and repair situation.

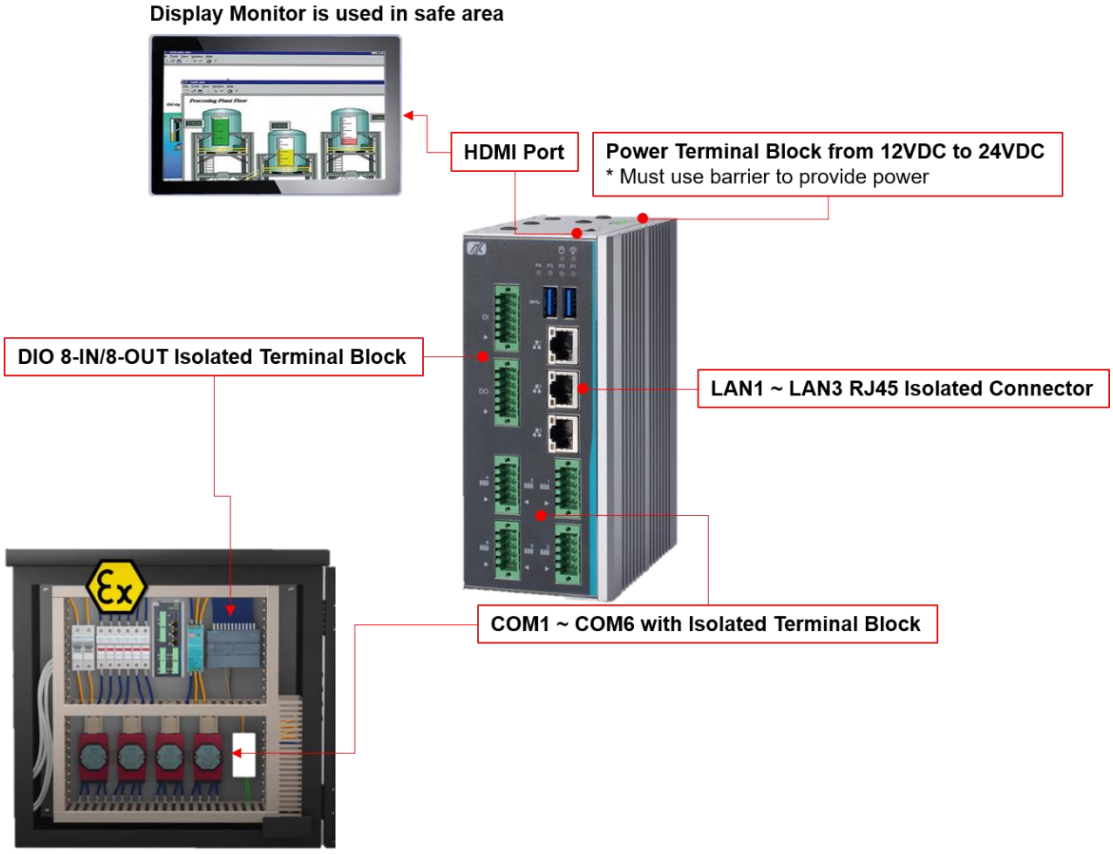
  It is used for maintenance and repair only, ex: accesse data by plugging in USB flash, or check data & remove wrong data by using USB type of keyboard/mouse.

- HDMI
  It will be possible linked the monitoring and management equipment.

WARNING – EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE FOLLOWING DEVICES: Sealed Relay Device.

1.3.2 Field Installation

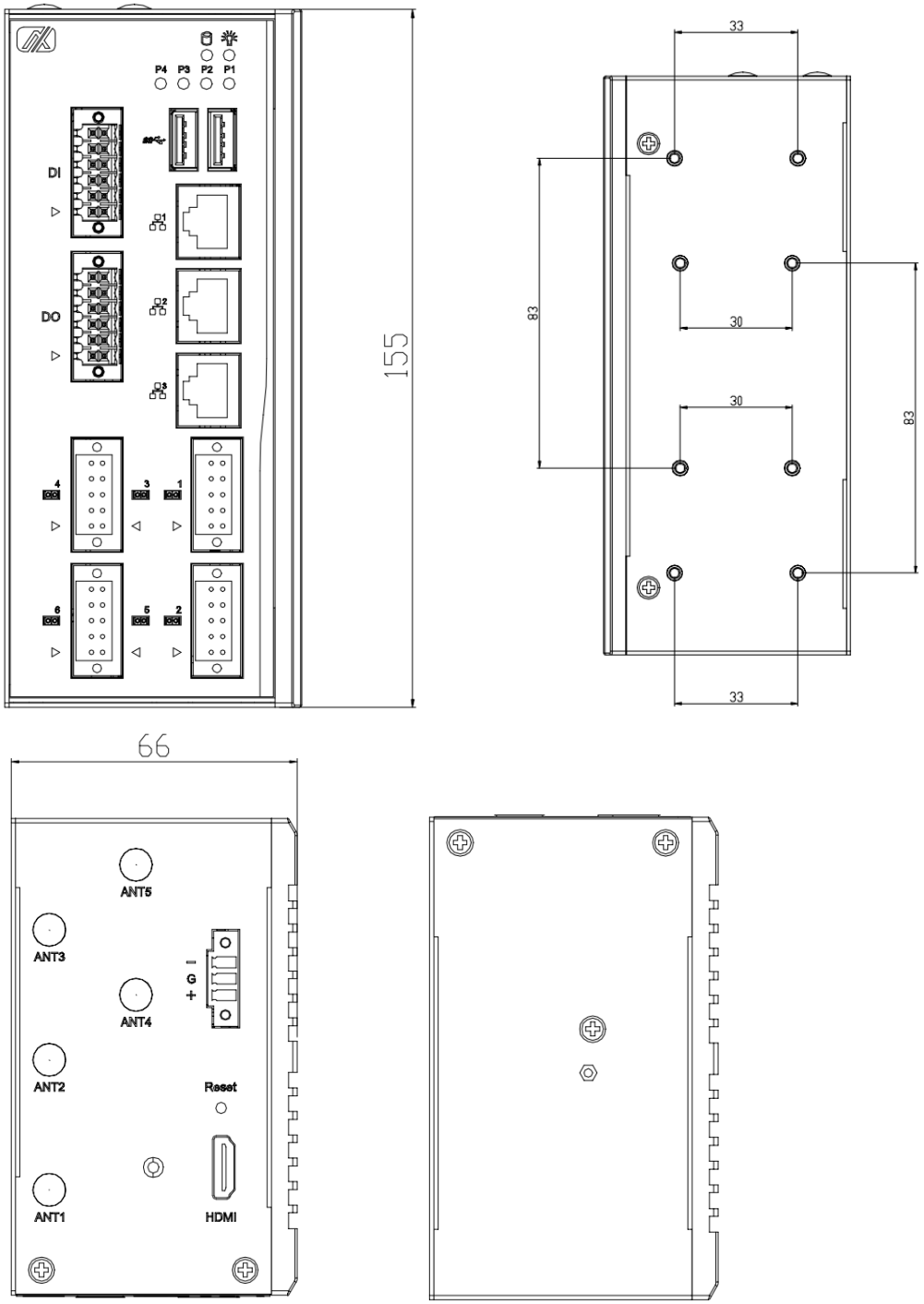
- Power Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, torque value 1.7 lb-in (0.1921 Nm).
- COM Port Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, torque value 1.7 lb-in (0.1921 Nm).
- DIO Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, torque value 1.7 lb-in (0.1921 Nm).
- The equipment shall be installed by vertical way and set in an enclosure that provides a degree of protection not less than IP 54 in accordance with EN 60079-7 and accessible only by the use of a tool.
- Terminal blocks do not accommodate more than one individual conductor in a clamping point.

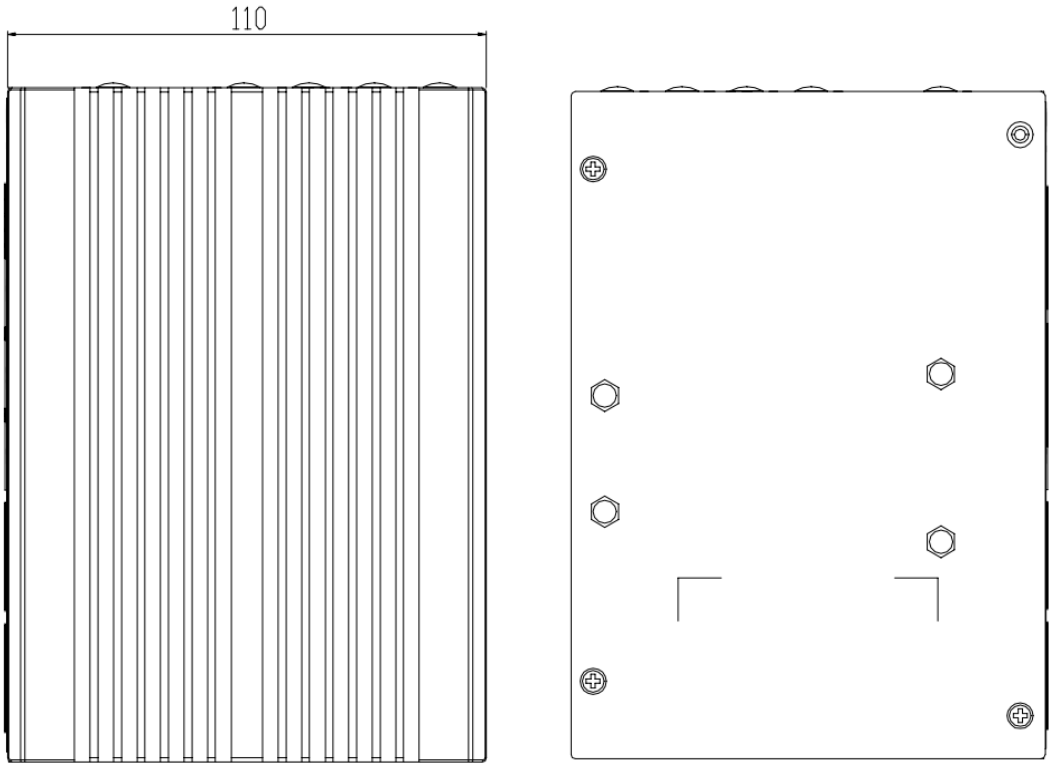


ICO300-83M (ATEX/C1D2) is installed in similar station enclosure

1.4 Dimensions

The following diagrams show you dimensions and outlines of the ICO300-83M.

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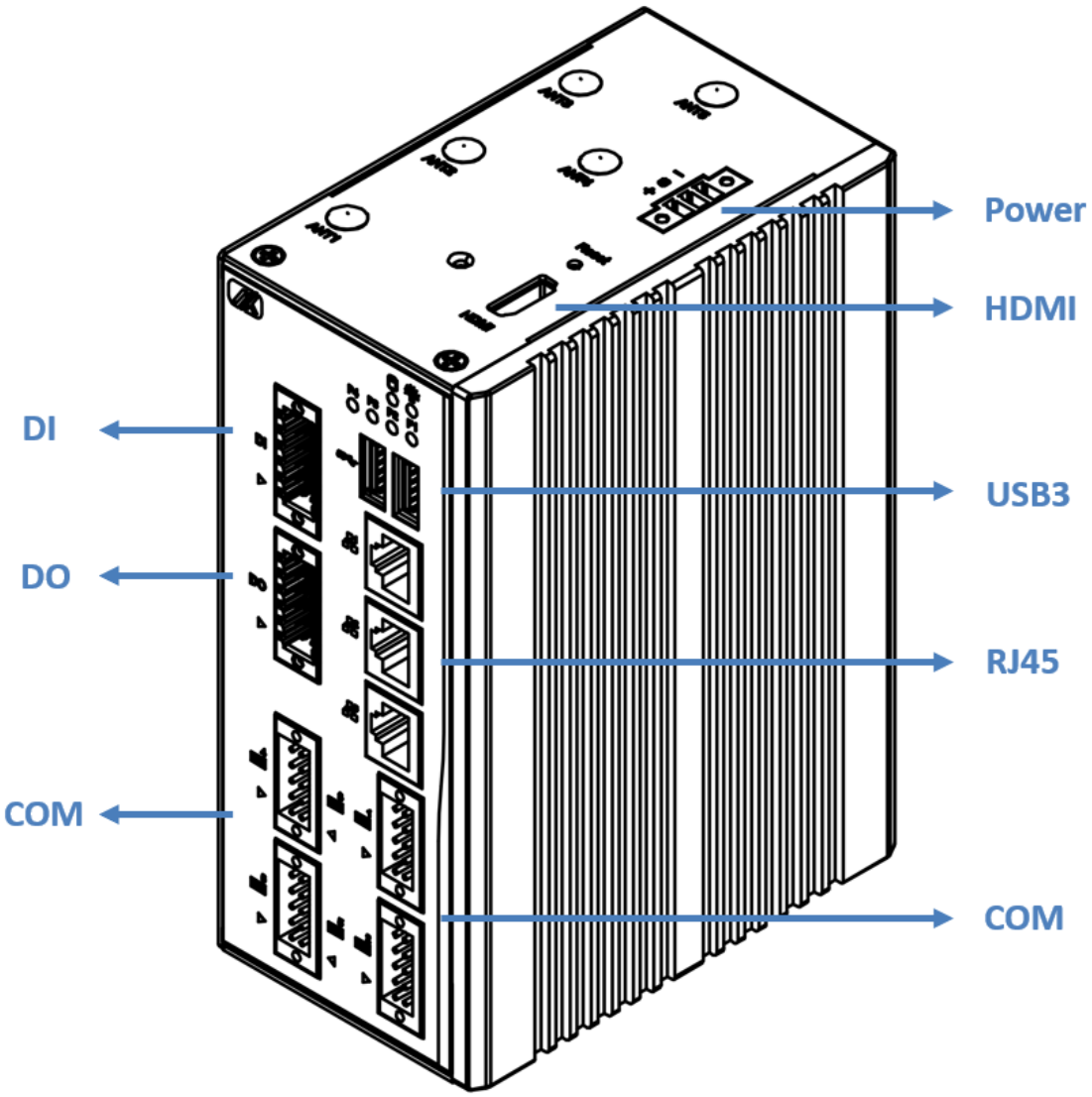
1.5 I/O Outlets

The following figures show you I/O outlets on front view and top view of the ICO300-83M.



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SECTION 2
HARDWARE INSTALLATION

The ICO300-83M is convenient for your various hardware configurations, such as Memory Module and Hard Disk Drive. The chapter 2 will show you how to install the hardware. It includes:

2.1 Installing the Memory Module

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 DDR thermal pad inside DDR socket. Install the memory module as below step(1:Insert the module to the socket; 2:Push down to lock the module)

Step 4 **The memory module is locked by two latches on the sides. We strongly recommend using "LDC737" silicone on the two sides of the memory for good ability of vibration.**

Step 5 **Put the cover back, and fasten screws tightly to lock the chassis.**

2.2 Installing the mSATA module

Step 1 Turn off the system.

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

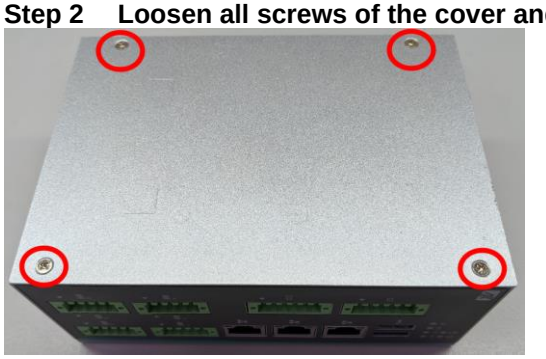
Step 3 Install the mSATA as below socket. Insert the module to the socket and fasten with the screw.

Step 4 Put the cover back to the system, and fasten screws tightly to lock the chassis.

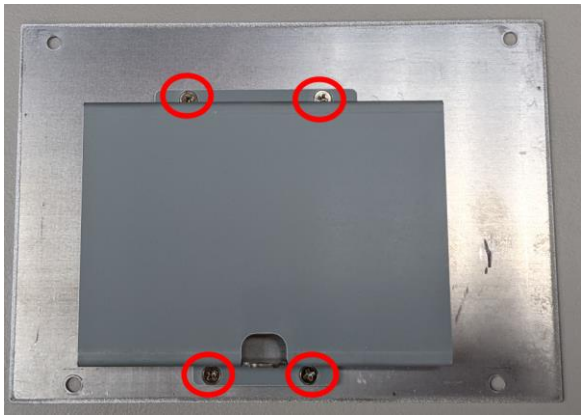
2.3 Installing the Hard Disk Drive

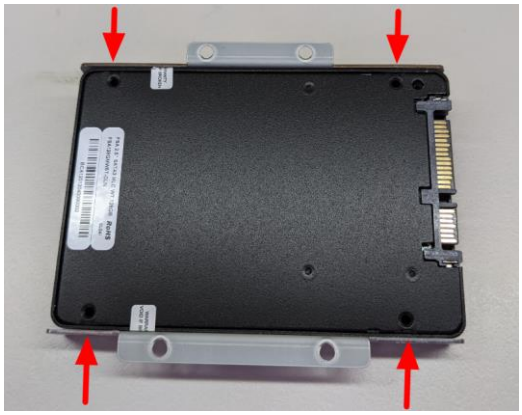
Step 1 Turn off the system.

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

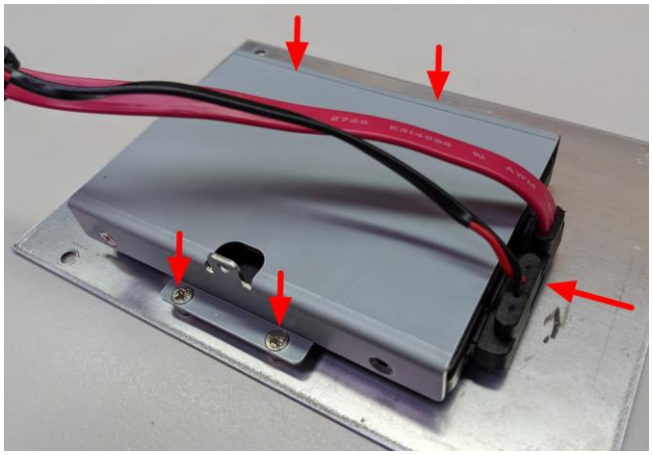


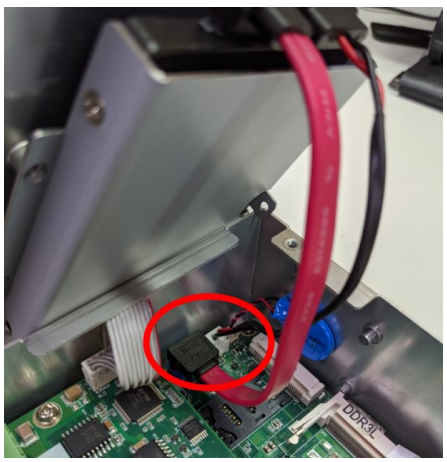
Step 3 Loosen 4pcs screws of the HDD tray, and fix the HDD into tray with screws.





Step 4 Install the HDD tray back to the system cover. Connect the SATA cable between HDD and MB.





Step 5 Put the cover back to the system and fasten screws tightly to lock the chassis.

2.4 Installing Din-rail Mounting

The ICO300-83M provides Din-rail Mount for customers can install as below:

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

Step 2 Assembly the bracket to the system and fasten screws tight.

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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.

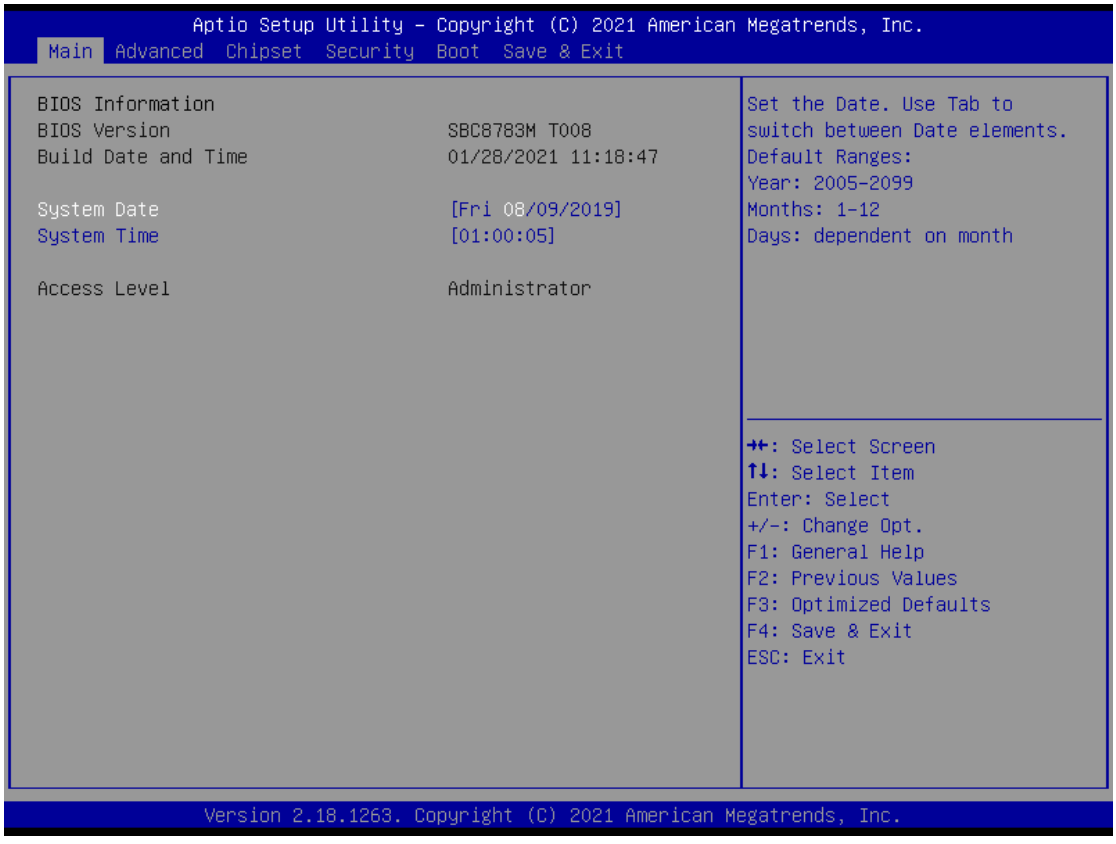
3.1 Entering Setup

To enter the setup screens, follow the steps below:

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

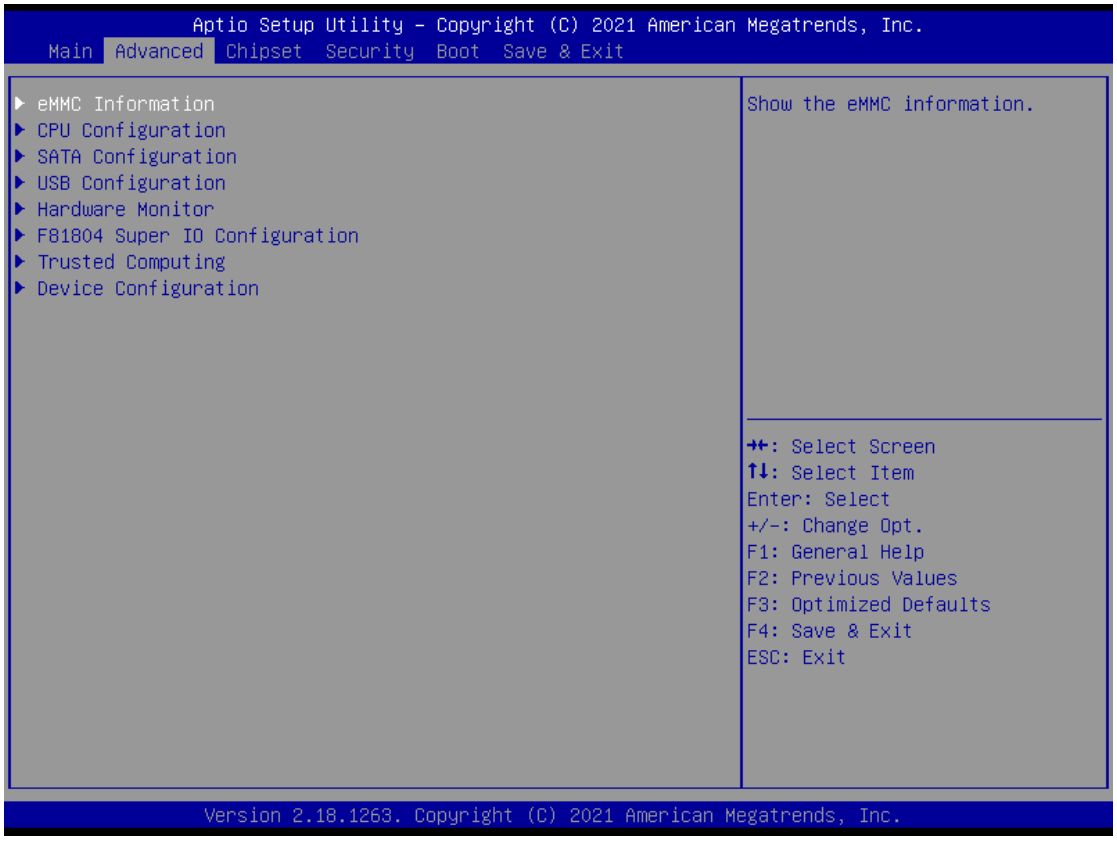


System Date
The date format is <day> <month> <date> <year>.

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

3.3 Advanced Features

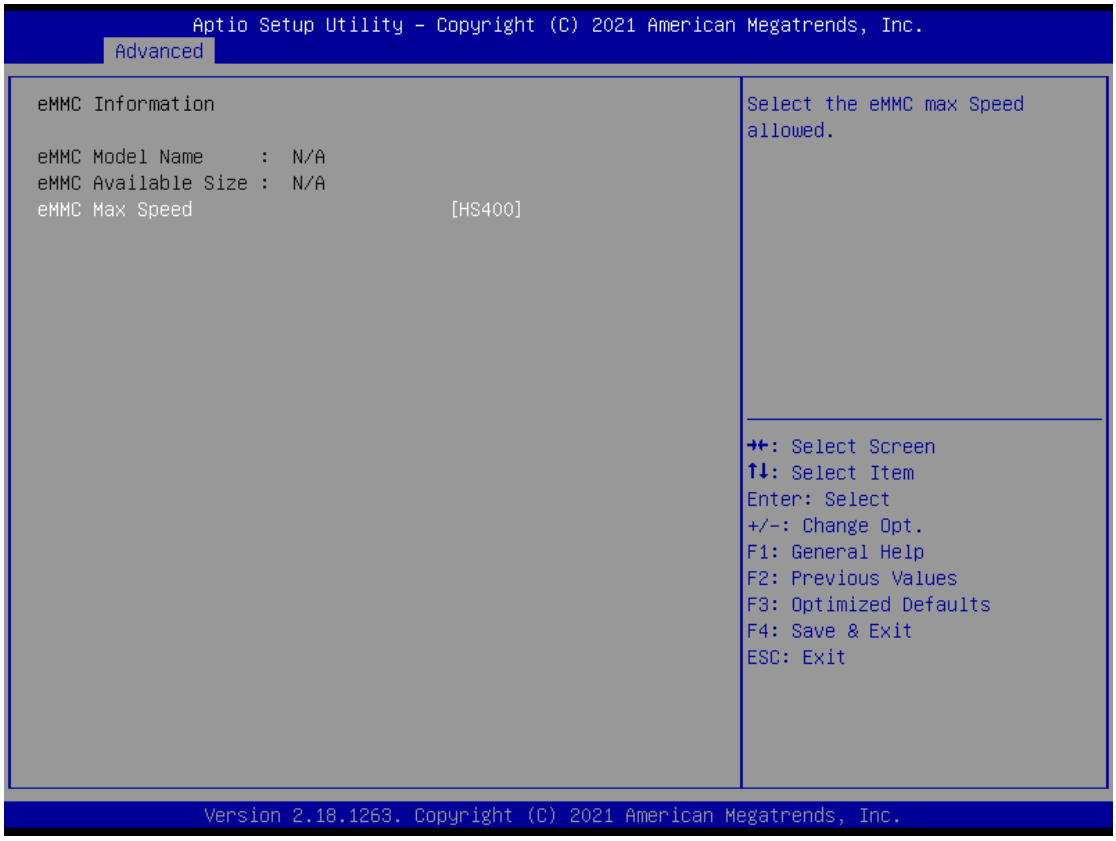
This Advanced section allows users to configure and improve your system, to set up some system features according to your preference. You can select any of the items in the left frame of the screen to go to the sub menus:



- **eMMC Configuration**

Scroll to this item and press <Enter> to view the eMMC Configuration informations.

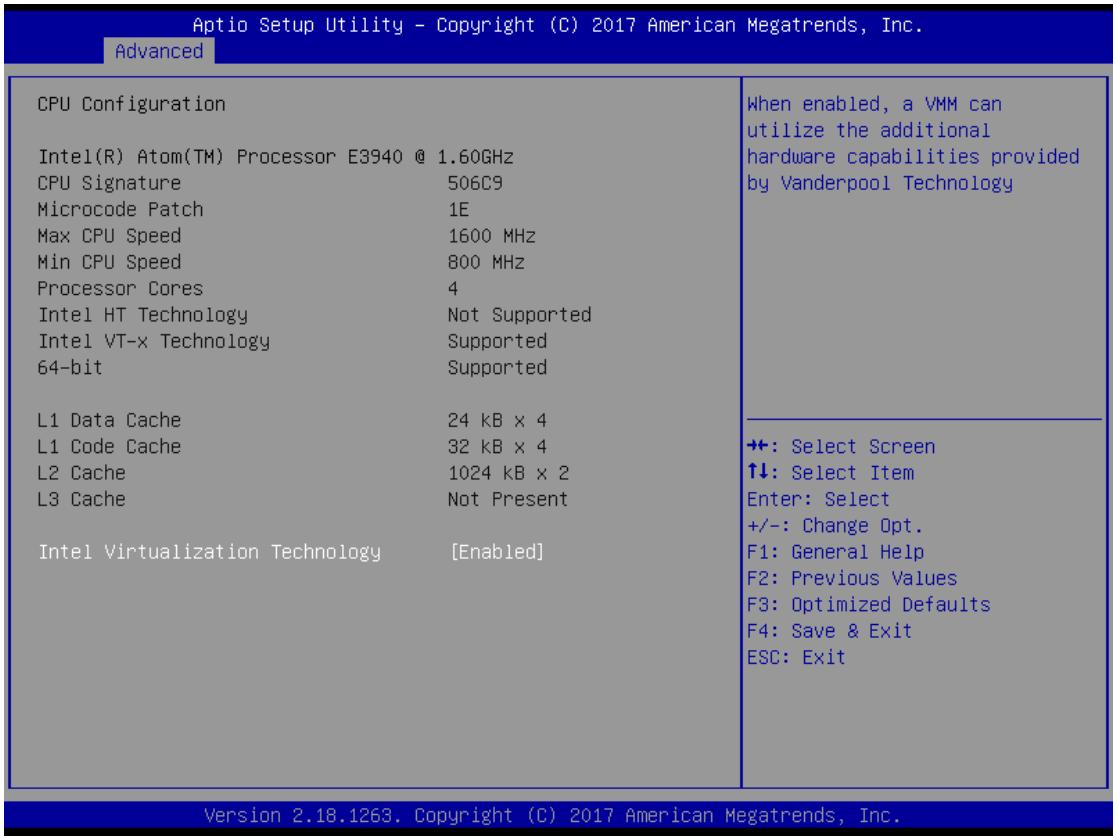
(Please refer below graphics.)



- **CPU Configuration**

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

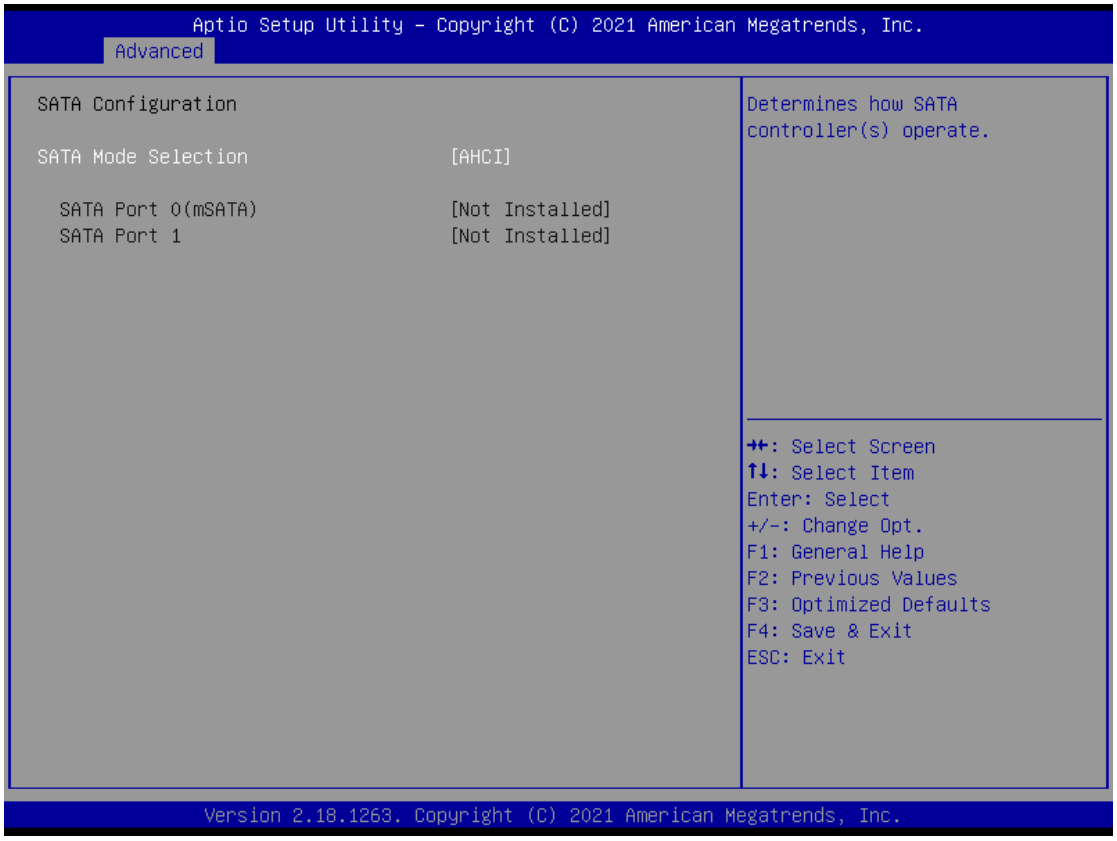
(Please refer below graphics.)



- **SATA Configuration**

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

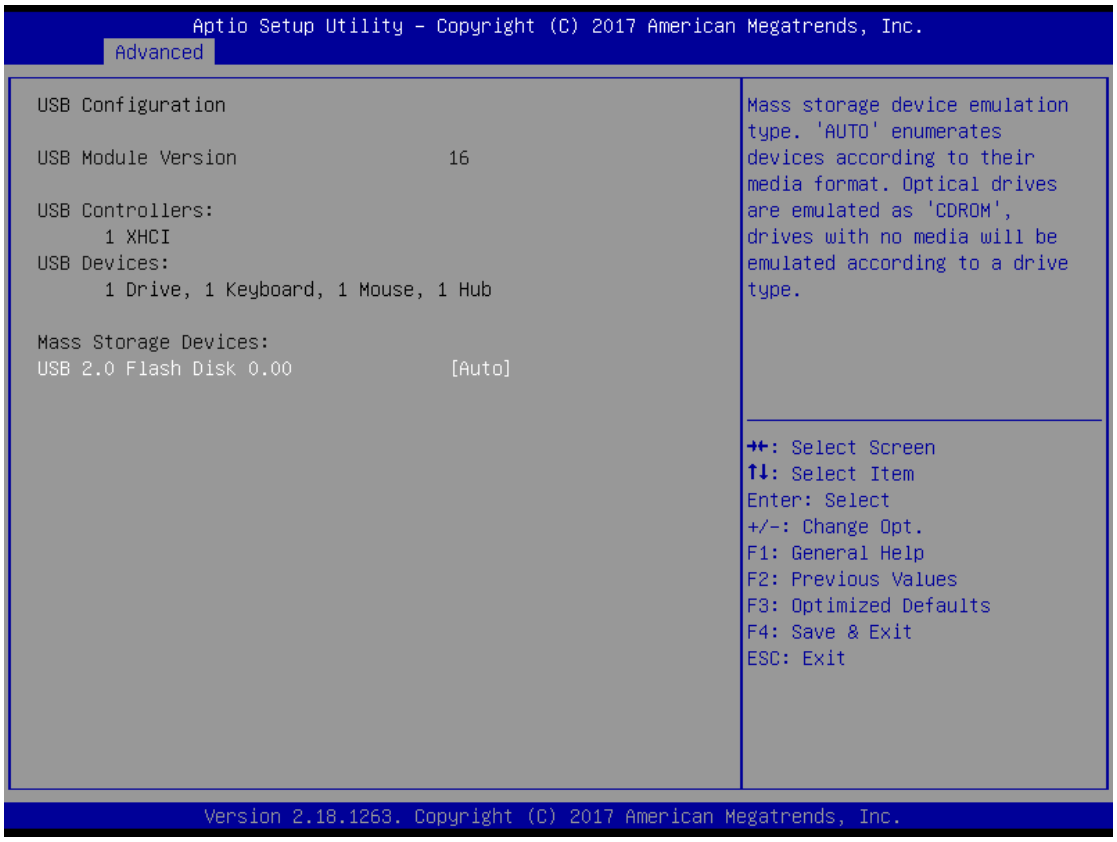
(Please refer below graphics.)



- **USB Configuration**

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

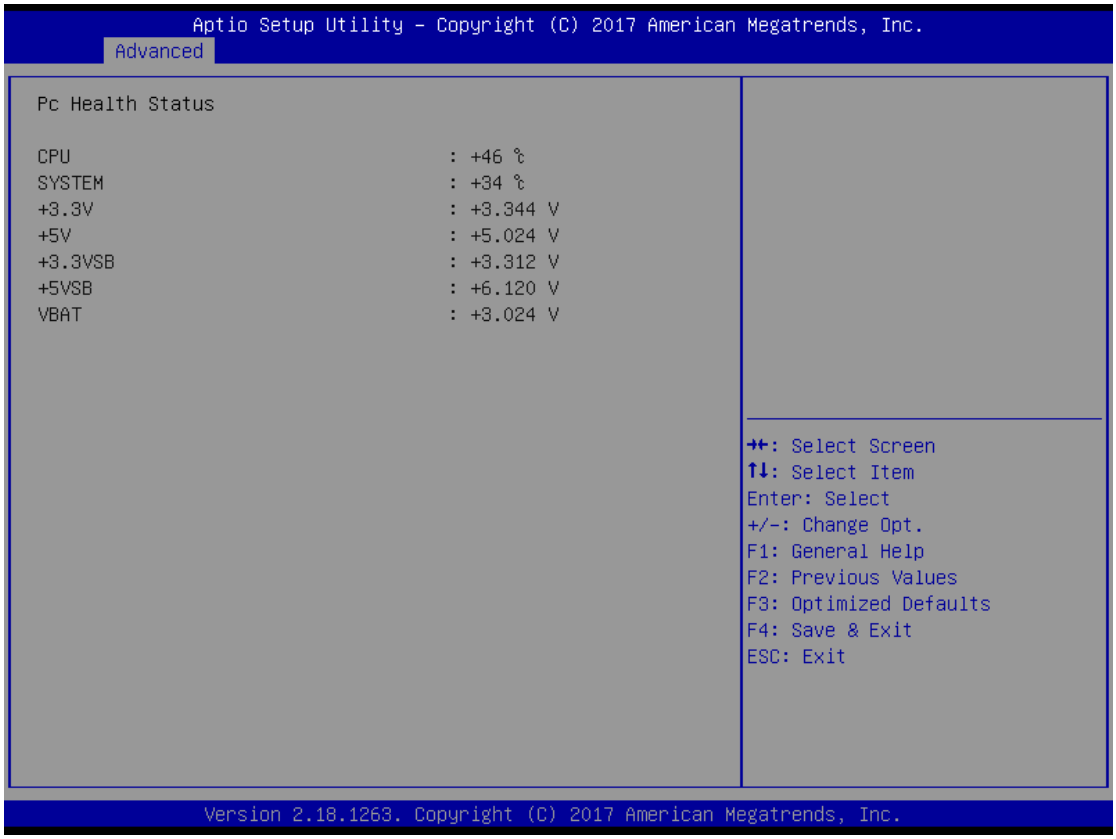
(Please refer below graphics.)



- **H/W Monitor**

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

(Please refer below graphics.)



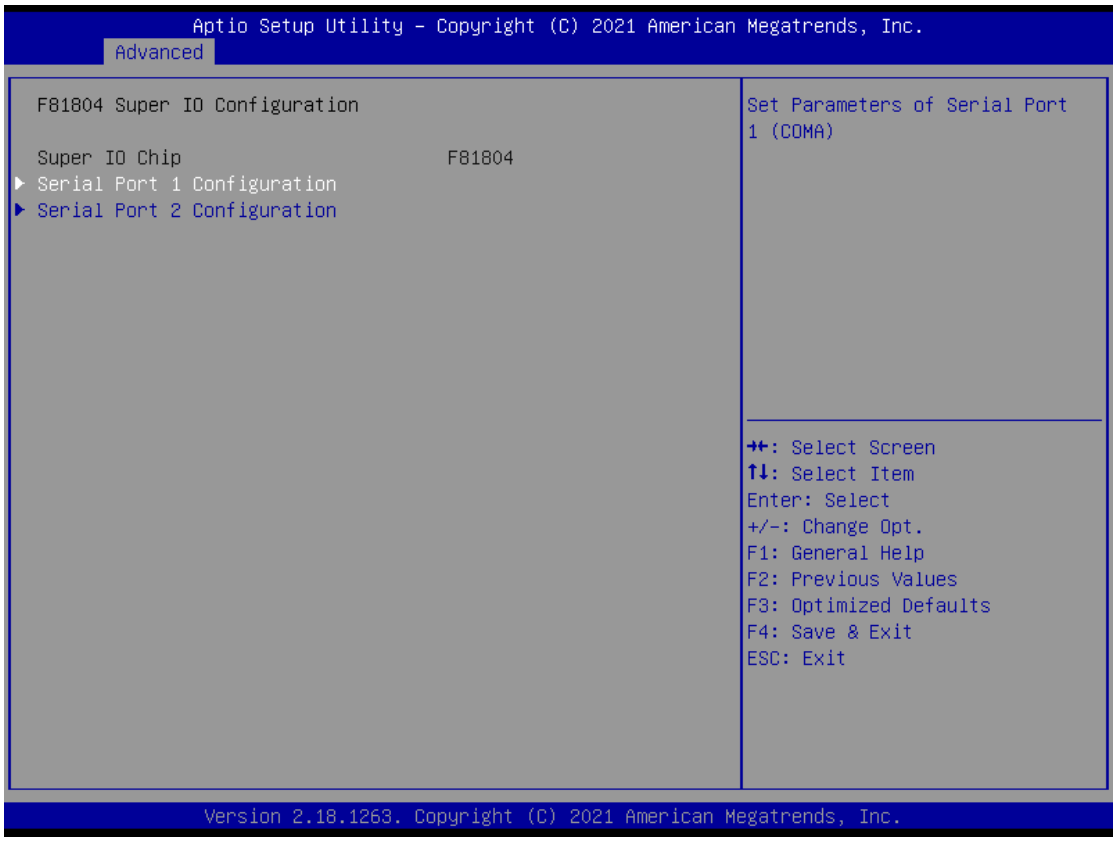
- **F81804 Super IO Configuration**

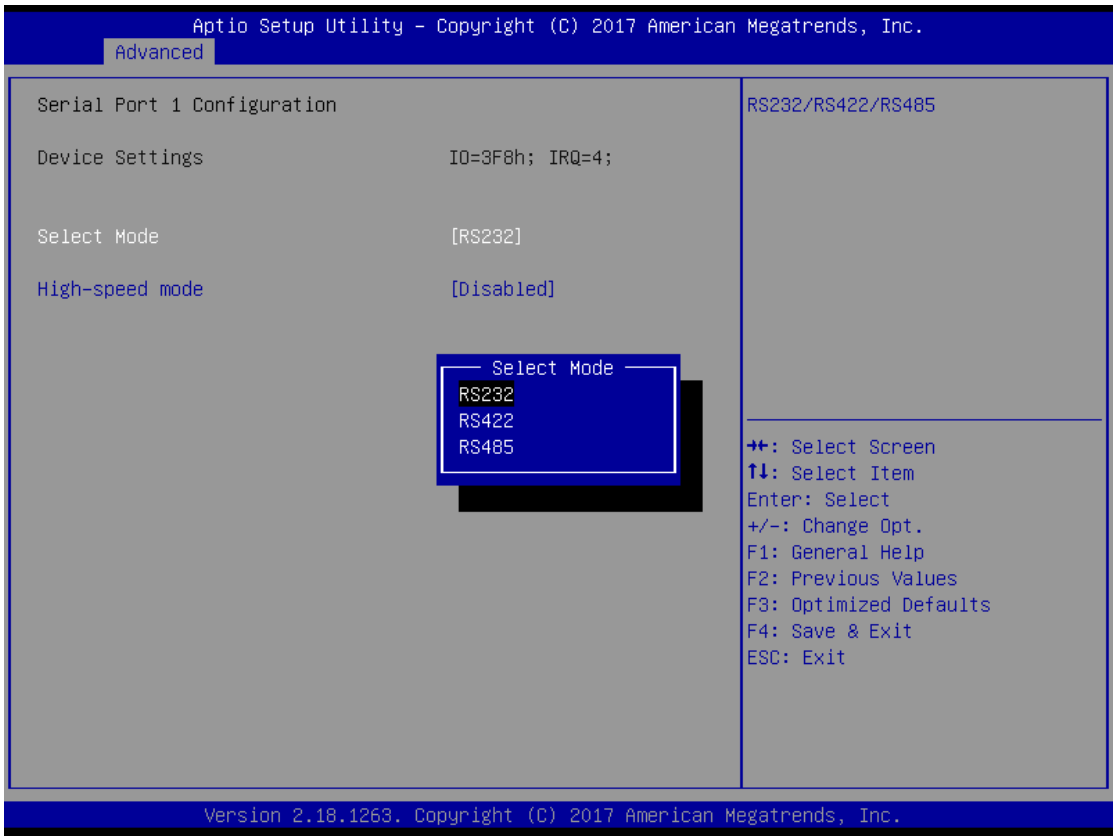
The default setting for all serial ports are RS232.

You can change the setting by selecting the value you want in each COM Port Type.

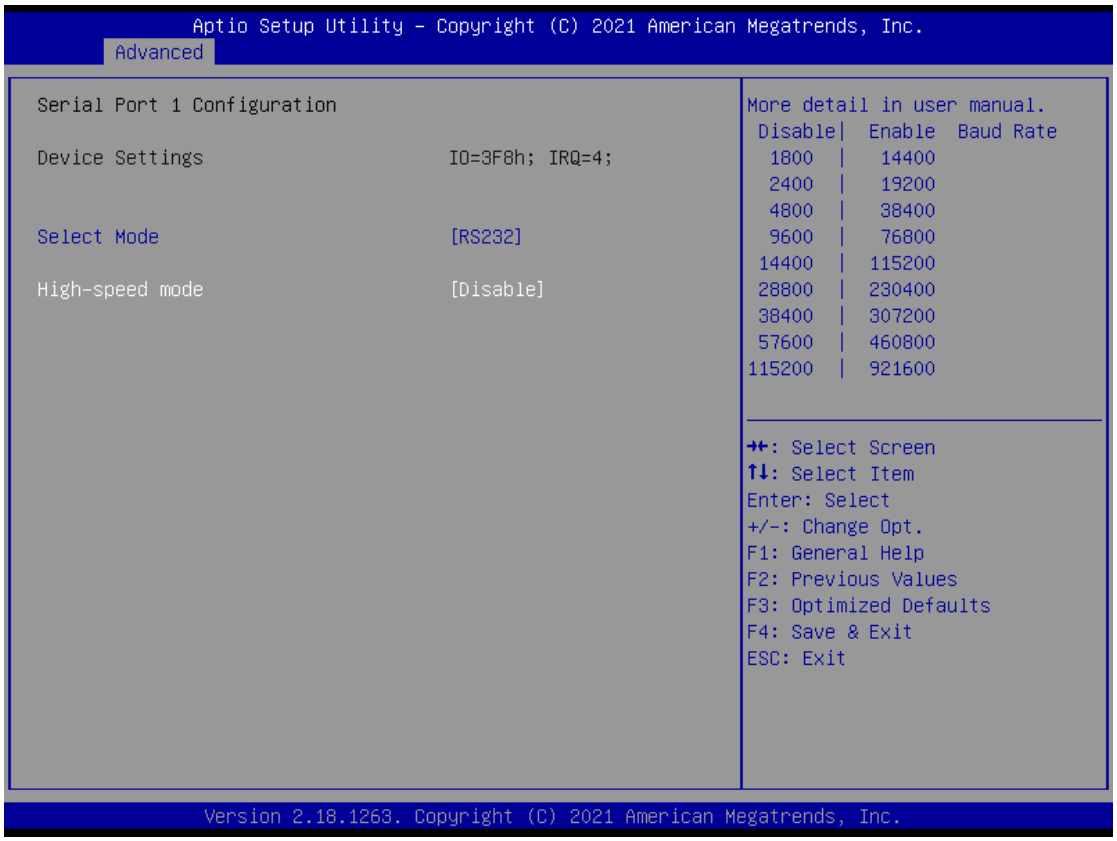
Supports RS422 & RS485 mode.

(Please refer below graphics.)



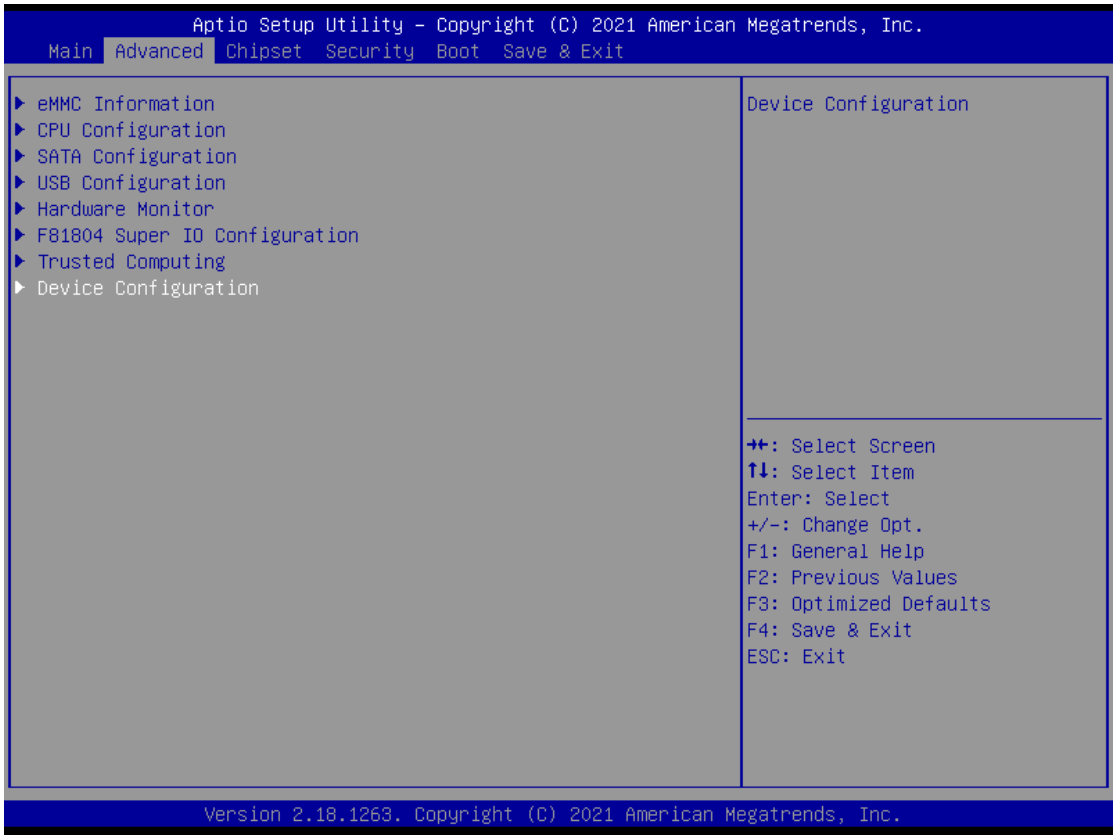


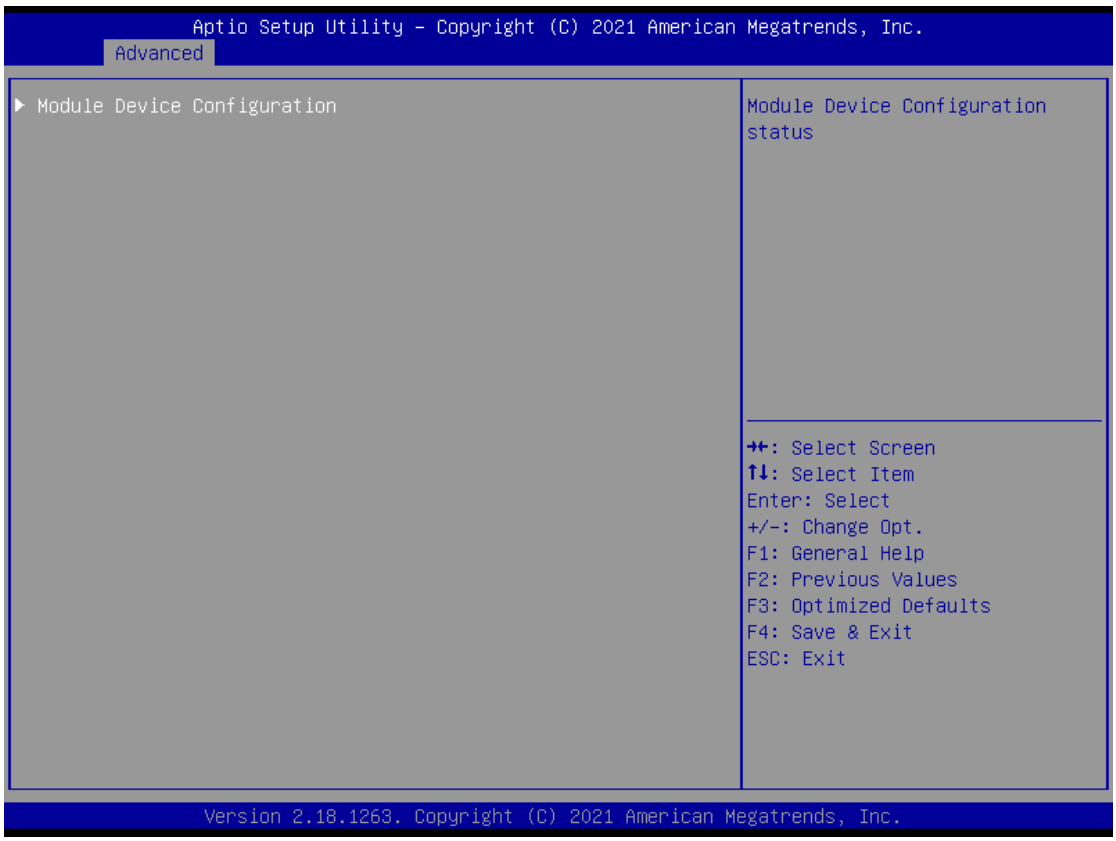
You can enable COM port High-speed mode to support higher speed com port buard rate.

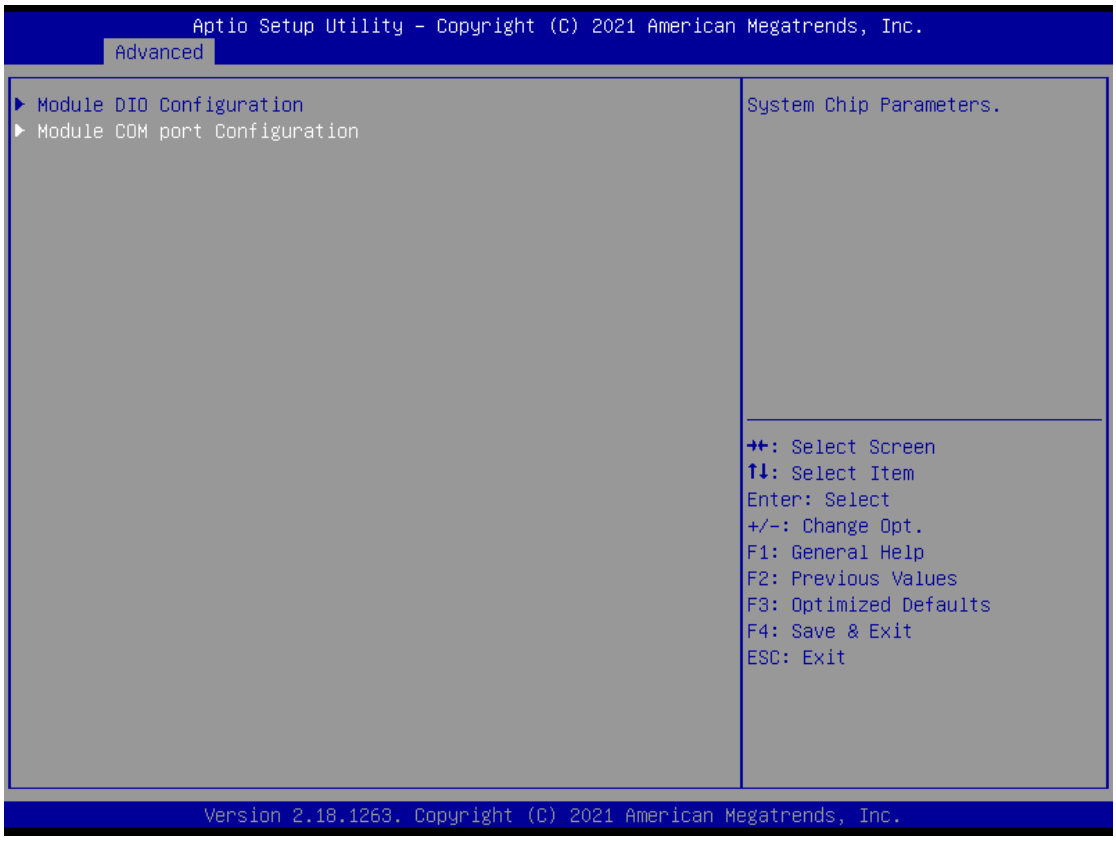

Aptio Setup Utility – Copyright (C) 2021 American Megatrends, Inc.
Advanced
Serial Port 1 Configuration
Device Settings
IO=3F8h; IRQ=4;
Select Mode
[RS232]
High-speed mode
[Disable]
More detail in user manual.
Disable | Enable Baud Rate
1800 | 14400
2400 | 19200
4800 | 38400
9600 | 76800
14400 | 115200
28800 | 230400
38400 | 307200
57600 | 460800
115200 | 921600
→←: 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) 2021 American Megatrends, Inc.

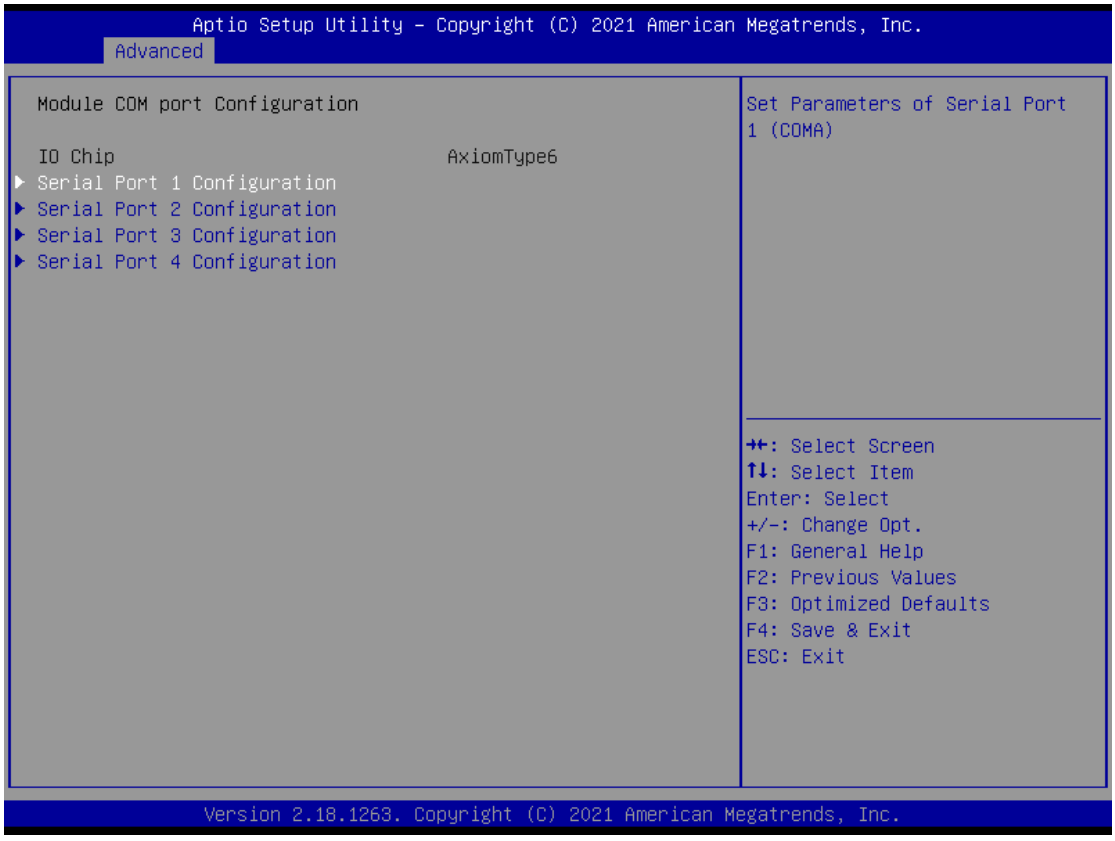
- **Device Configuration**

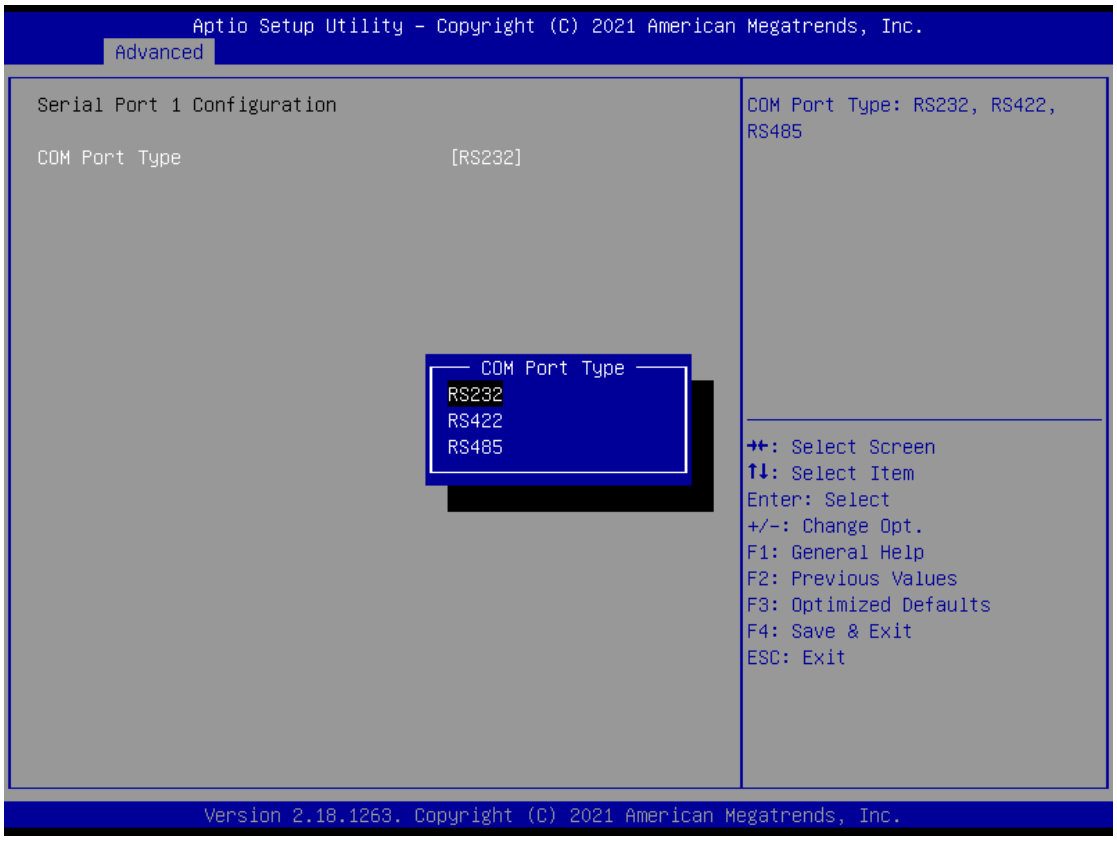
You can change the COM3~6 setting in this section.



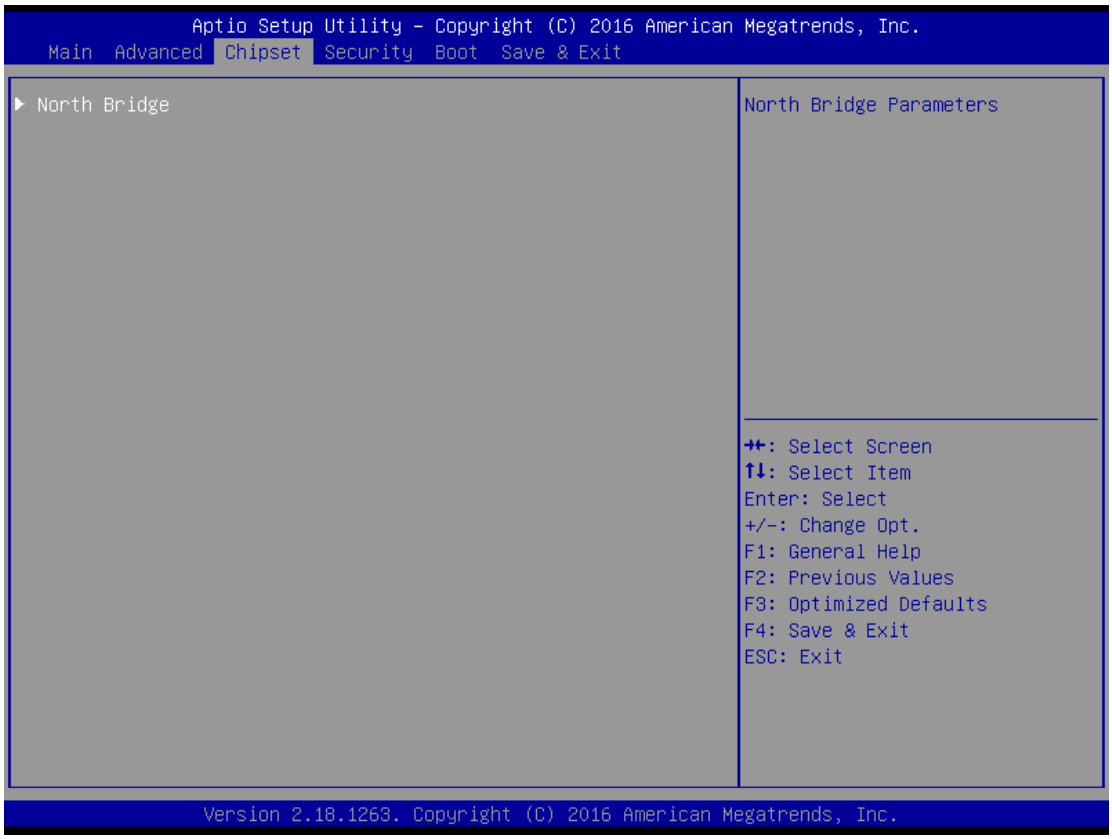


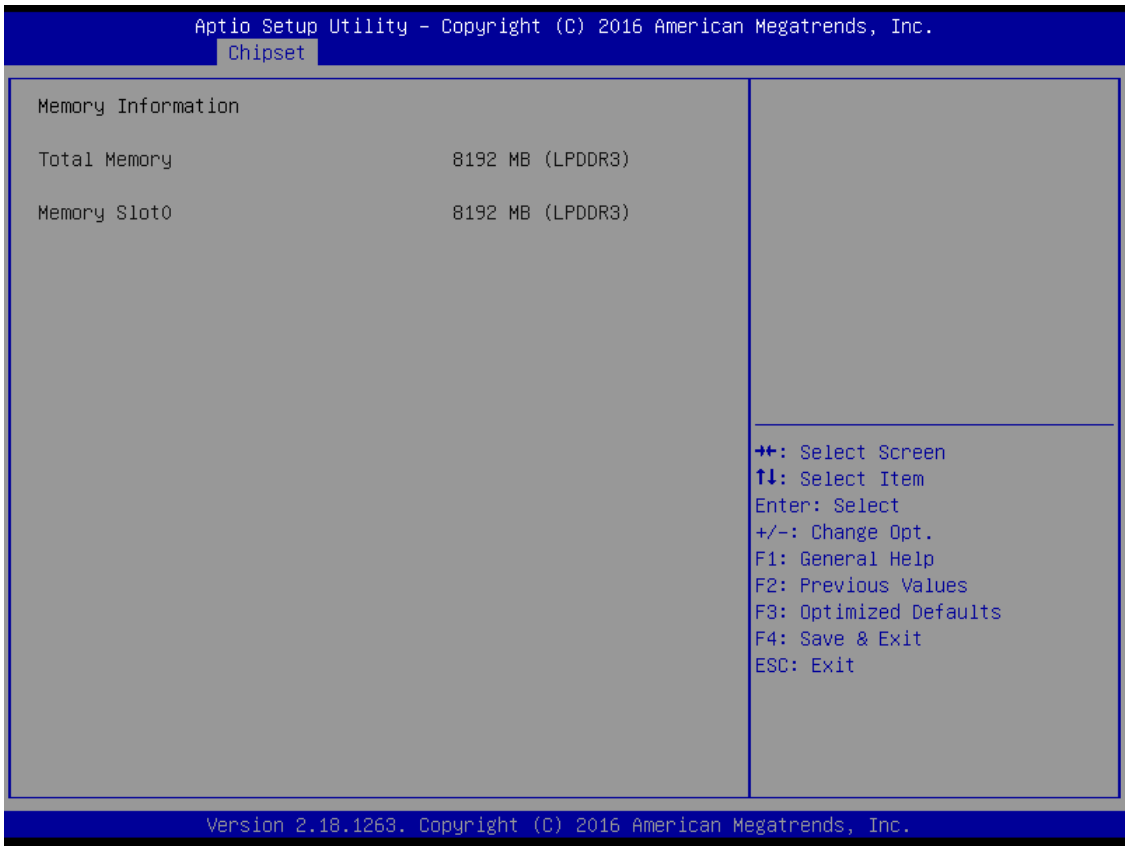

Aptio Setup Utility – Copyright (C) 2021 American Megatrends, Inc.
Advanced
Module DIO Configuration
Module COM port Configuration
System Chip Parameters.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.18.1263. Copyright (C) 2021 American Megatrends, Inc.


Aptio Setup Utility – Copyright (C) 2021 American Megatrends, Inc.
Advanced
Module COM port Configuration
IO Chip
AxiomType6
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 Configuration
Set Parameters of Serial Port 1 (COMA)
→←: 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) 2021 American Megatrends, Inc.


Aptio Setup Utility – Copyright (C) 2021 American Megatrends, Inc.
Advanced
Serial Port 1 Configuration
COM Port Type [RS232]
COM Port Type: RS232, RS422, RS485
COM Port Type
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) 2021 American Megatrends, Inc.

3.4 Chipset Feature




Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
Chipset
Memory Information
Total Memory 8192 MB (LPDDR3)
Memory Slot0 8192 MB (LPDDR3)
→←: 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.

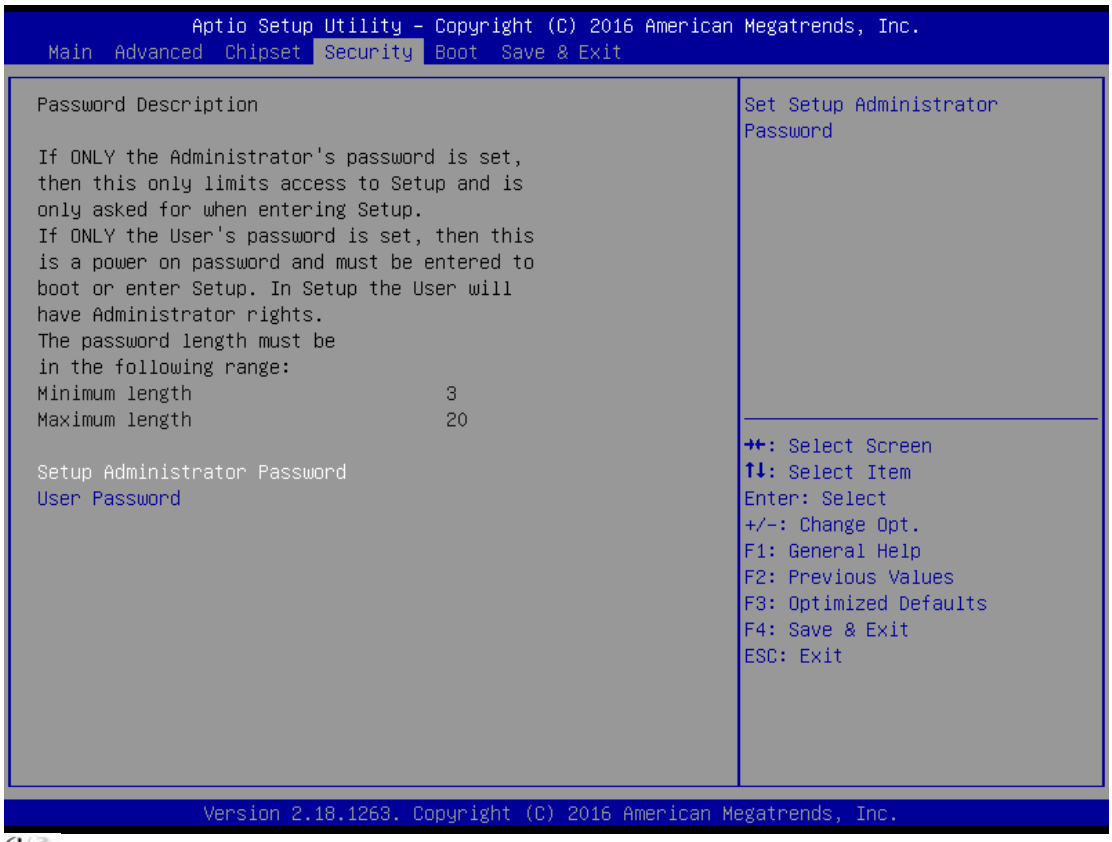
3.5 Security

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 User Password.

(Please refer below graphics.)



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.

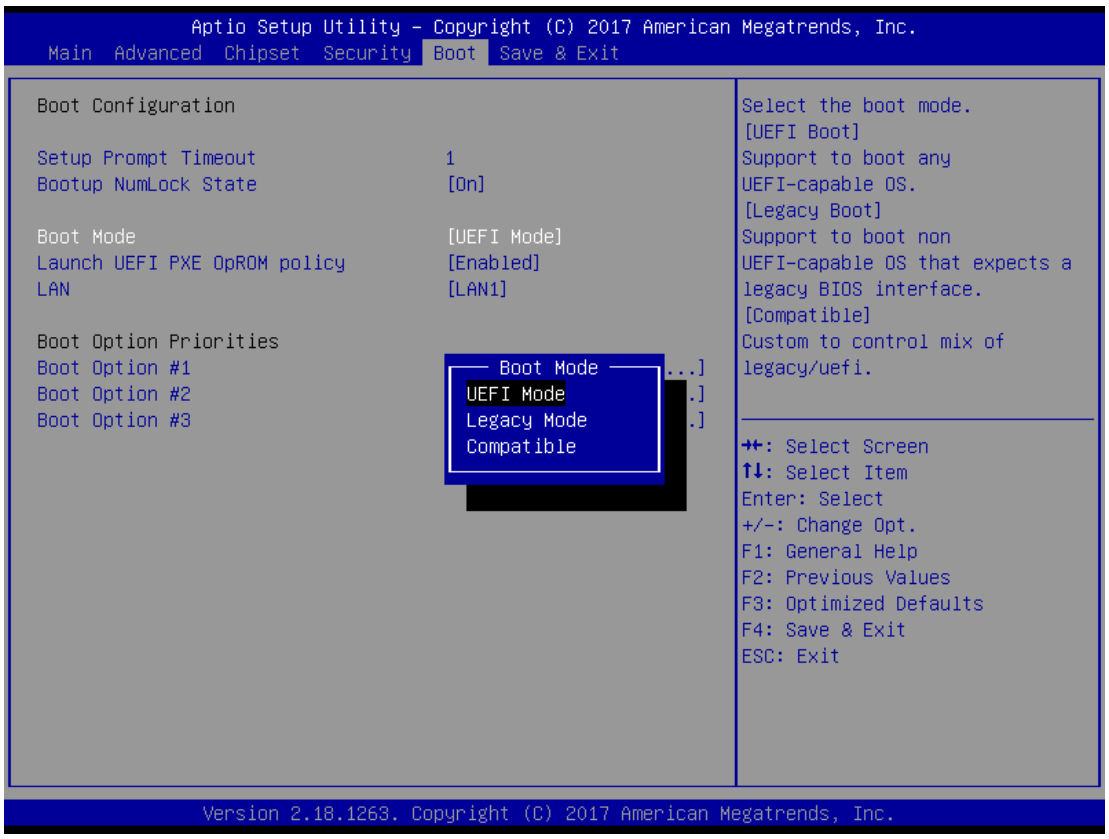
3.6 Boot Type

The default setting of boot mode is [UEFI],

UEFI – support to boot any UEFI-capable OS and option rom

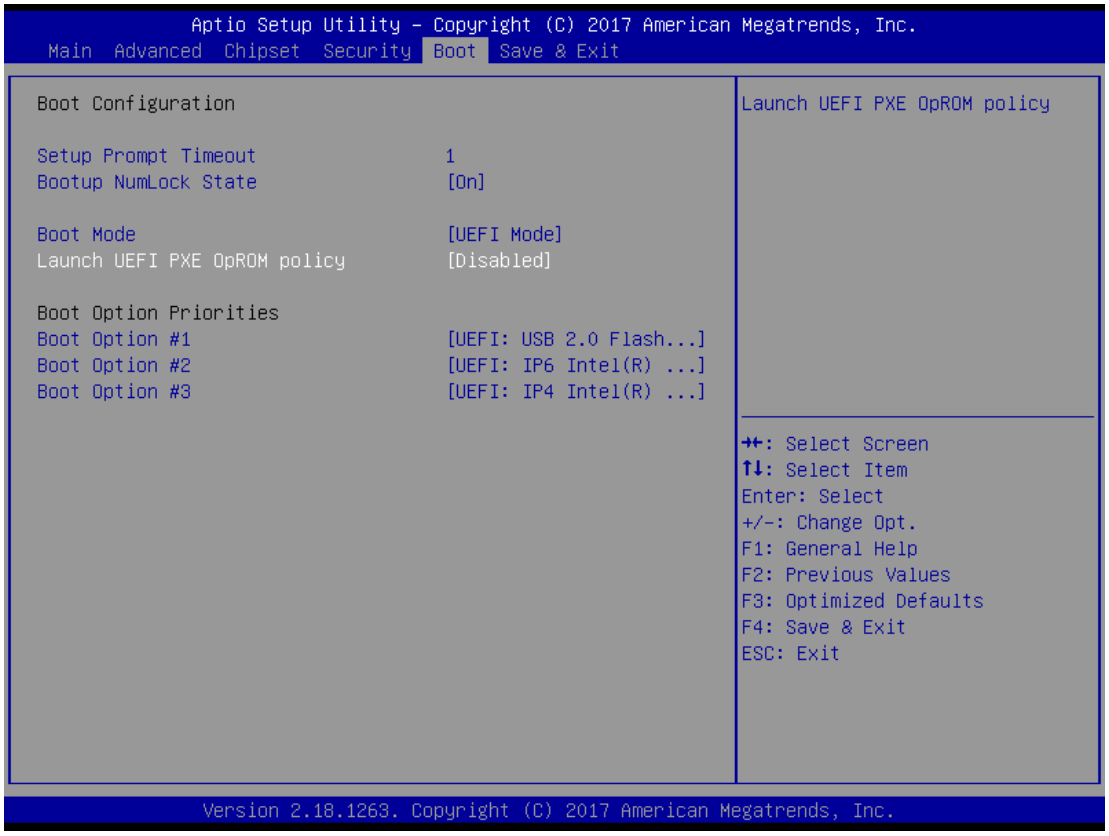
Legacy - support to boot any legacy-capable OS and option rom

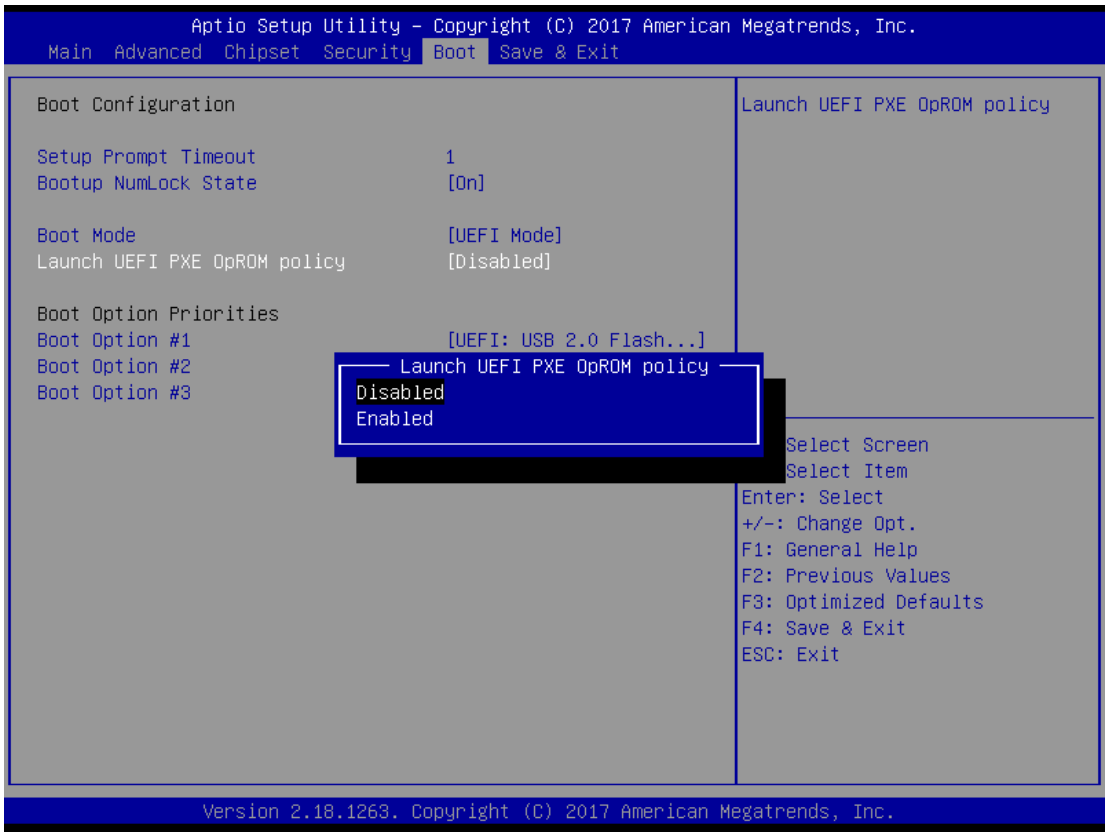
Compitable – customize boot mode of uefi/legacy of specific item



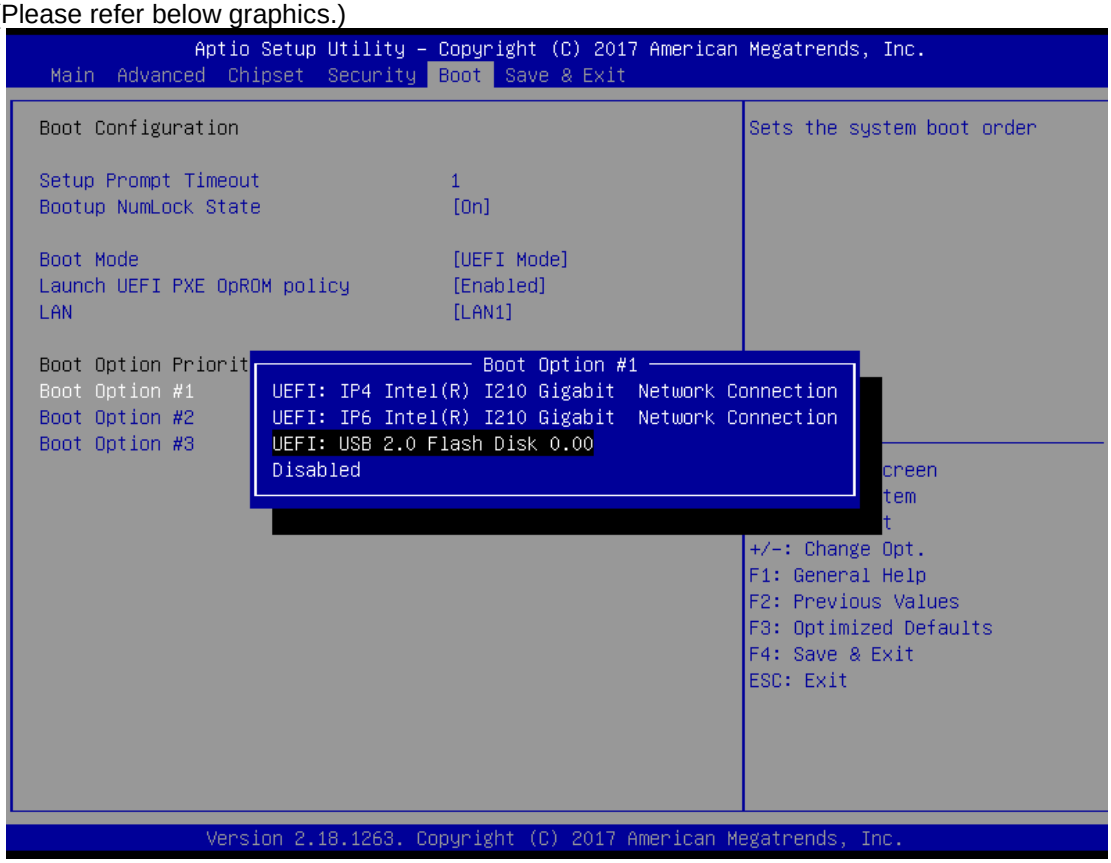
The default setting boot from onboard LAN PxE Rom is [Disabled]

(Please refer below graphics.)




Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
Main Advanced Chipset Security Boot Save & Exit
Boot Configuration
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: USB 2.0 Flash...]
Boot Option #2
Boot Option #3
Launch UEFI PXE OpROM policy
Disabled
Enabled
Launch UEFI PXE OpROM policy
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.

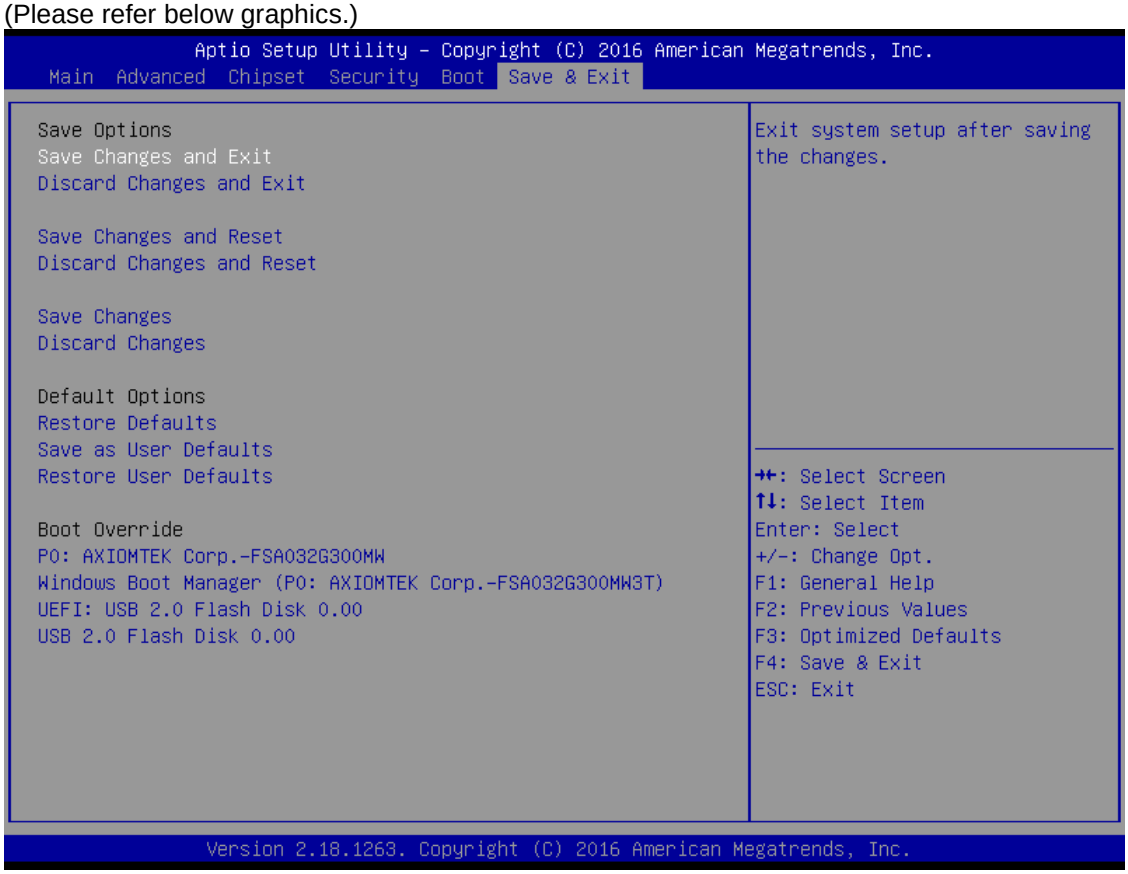
The Boot Option Priorities can select by Boot Option #1, #2…, If user is using a USB Device. (Please refer below graphics.)



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 below graphics.)



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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:

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

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device enable:

O 2E 30

O 2F 01

↓

Set timer unit:

O 2E F0

O 2F 00 ; (00: Sec; 08:Minute)

↓

Set base timer:

O 2E F1

O 2F 0A ; Set reset time (where 0A (hex) = 10sec)

Disable WDT

↓

Enable configuration:

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

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device disable:

O 2E 30

O 2F 00