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SECTION 1 INTRODUCTION

This chapter contains general information and detailed specifications of the Chapter 1 includes the following sections: The

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

1.1 General Description

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

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

- | | |
|------------------------------------|-------------------------------------|
| ✓ DDR thermal pad x1pcs | ✓ Screws for HDMI M3*5L x1pcs |
| ✓ Screws for Mini Card M2*5L x2pcs | ✓ DIO 2x6pin terminal block x2pcs |
| ✓ Screws for SSD/HDD M3*4L x4pcs | ✓ COM 2x5pin terminal block x4pcs |
| ✓ SATA+Power HDD cable x1pcs | ✓ Din-rail Kit x1set |
| ✓ HDMI BKT x1pcs | ✓ 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°C - +75°C
- 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 Ethernet 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**

- not only supports Windows[®] 10, but also supports embedded OS, such as Windows[®] 10 embedded and Linux package support. For storage device, 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.

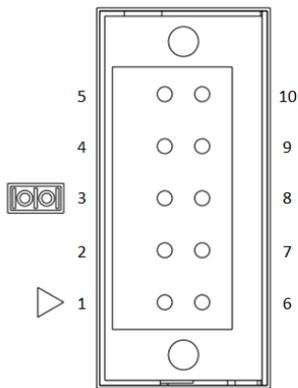
1.2.7 USB

- 2 x USB3.0

1.2.8 COM

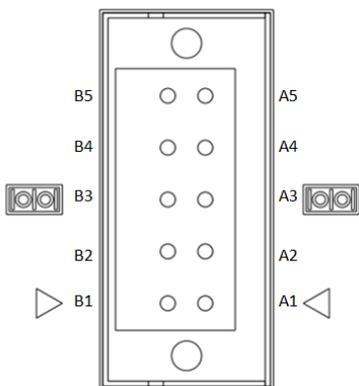
- 6 ports terminal block support RS-232/422/485 which can be selected by BIOS with isolation 2KV protection.
- Supports Auto Flow Control in RS485 mode.

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

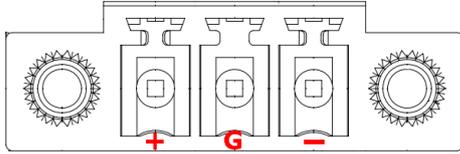
COM PORT 3~6



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)

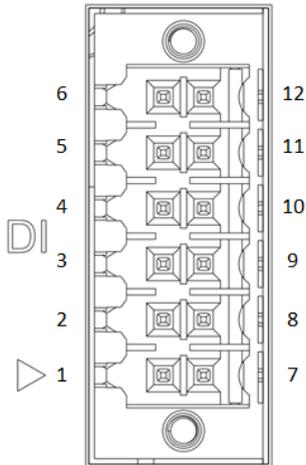
- 1~255 seconds or minutes; up to 255 levels.

1.2.11 Digital I/O Connector and Pin Definition

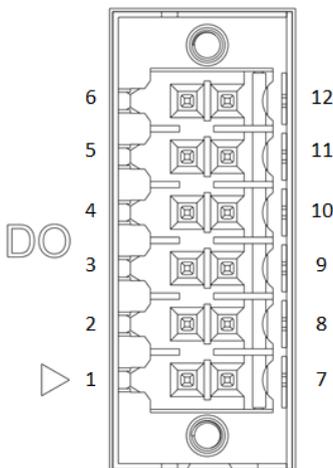
- 8bit DI and 8bit DO with 2KV optical isolation

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



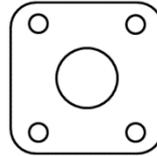
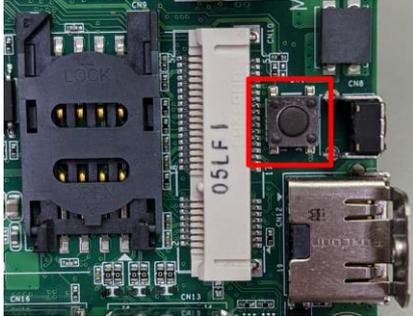
Pin	DI
1	External PWR
2	DI 8
3	DI 9
4	DI 10
5	DI 11
6	DIO_GND
7	External PWR
8	DI 12
9	DI 13
10	DI 14
11	DI 15
12	DIO_GND



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 button 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 storage status and it is flashing when storage access.	Orange
PWR	Indicate the Power status. When the DC input is acceptable, the LED will ON.	Green

1.2.14 Operation Temperature

- $-40^{\circ}\text{C} \sim +75^{\circ}\text{C}$

1.2.15 Storage Temperature

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

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 (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:

- (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°C ~+75°C
- 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 possible 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 Protection
It will be possible linked digital electronic power meter.

- Two USB

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



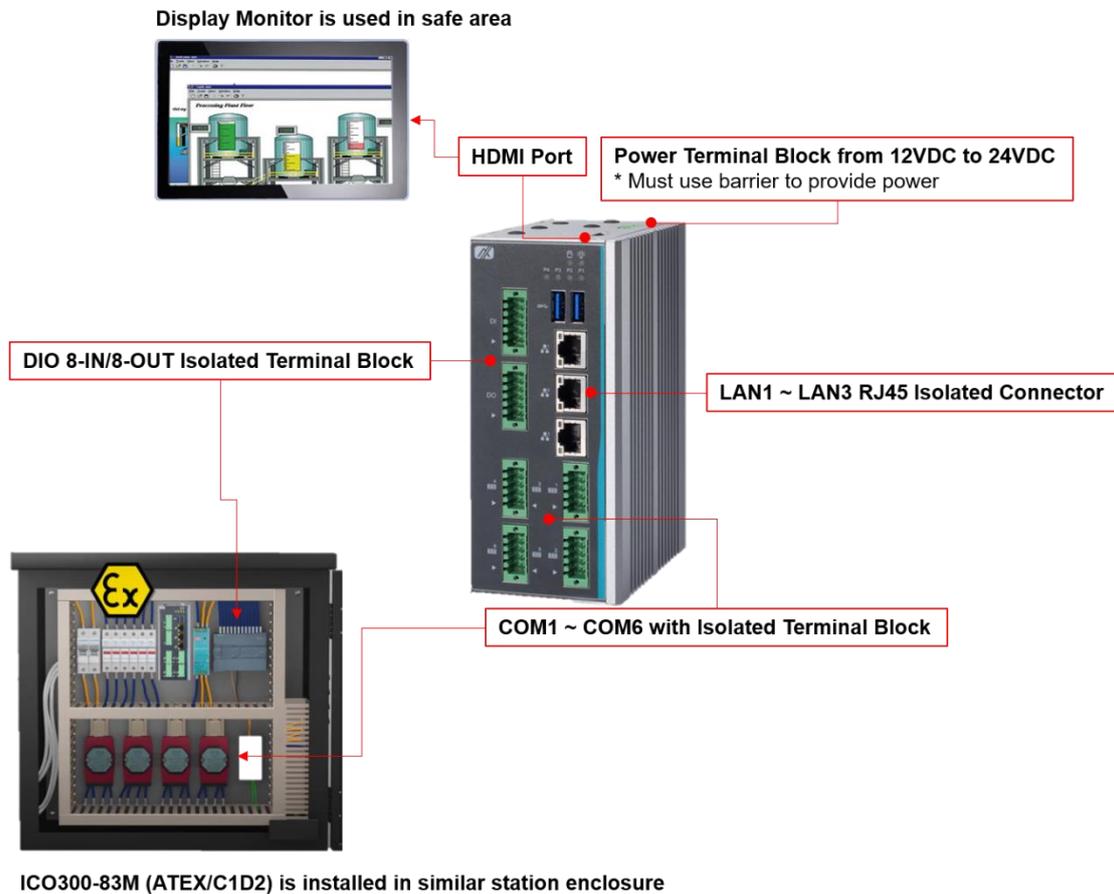
It is used for maintenance and repair only, ex: access data by plugging in USB flash, or check data & remove wrong data by using USB type of keyboard/mouse.

- 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.

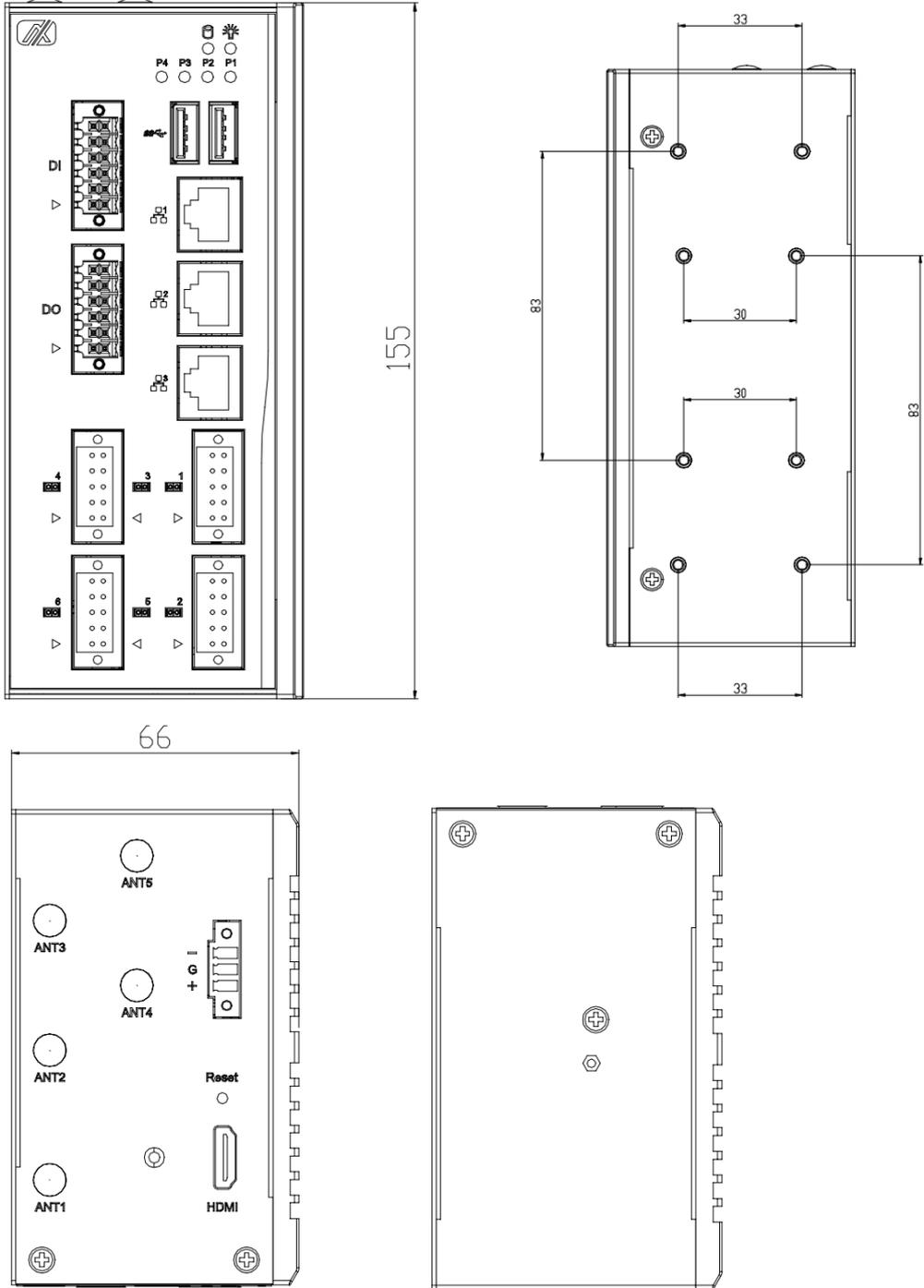
1.3.2 Field Installation

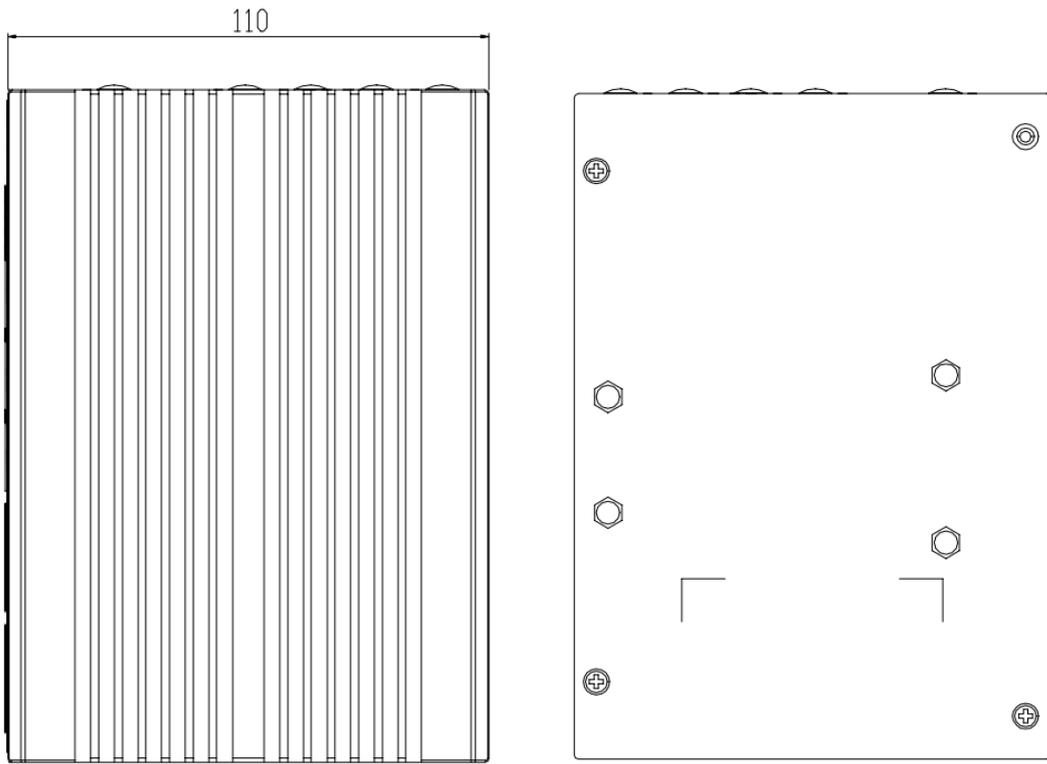
- Power Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, torque value 1.7 lb-in (0.1921 Nm).
- COM Port Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, torque value 1.7 lb-in (0.1921 Nm).
- DIO Terminal Block suitable for 28-16 AWG (0.0804-1.318 mm²) wire size, 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.



1.4 Dimensions

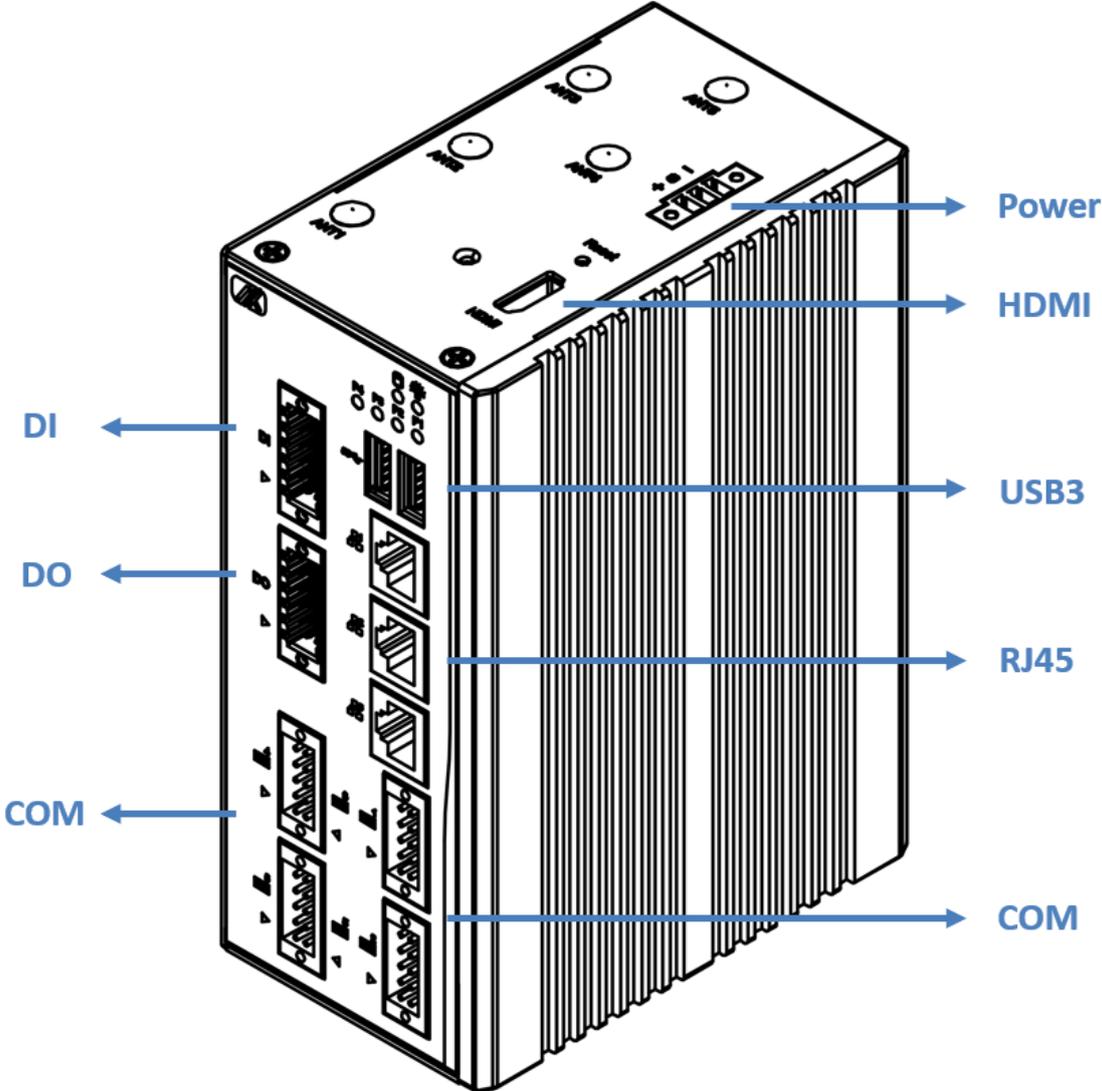
The following diagrams show you dimensions and outlines of the





1.5 I/O Outlets

The following figures show you I/O outlets on front view and top view of the



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SECTION 2 HARDWARE INSTALLATION

The 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:

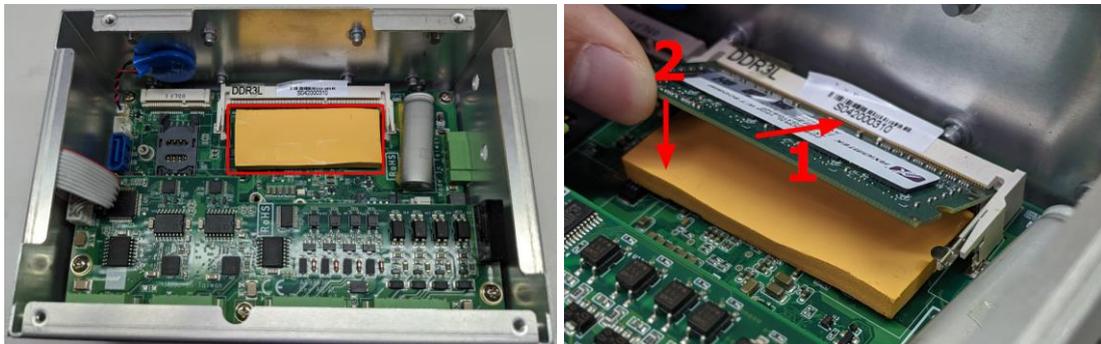
2.1 Installing the Memory Module

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.

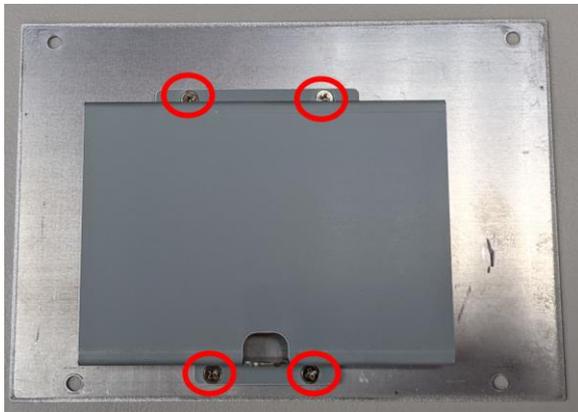
2.3 Installing the Hard Disk Drive

Step 1 Turn off the system.

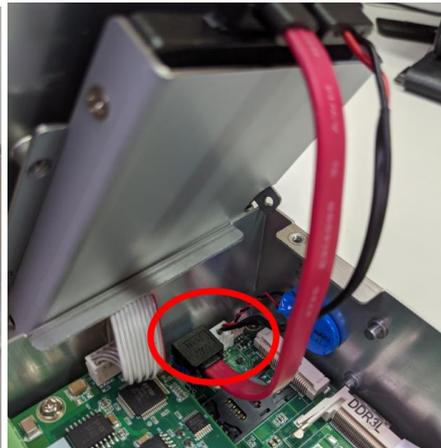
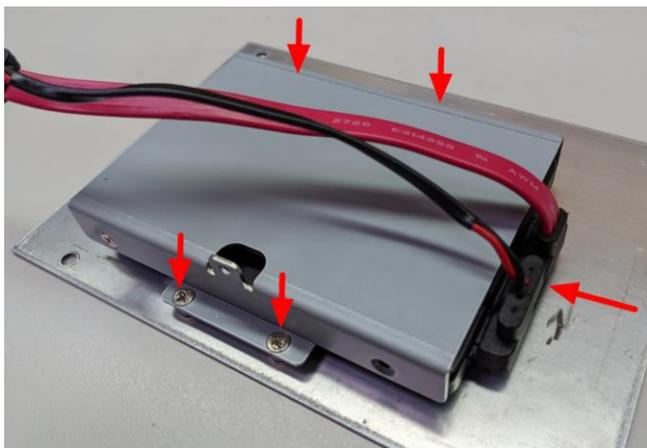
Step 2 Loosen all screws of the cover and remove the cover from the system.



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 _____ 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 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

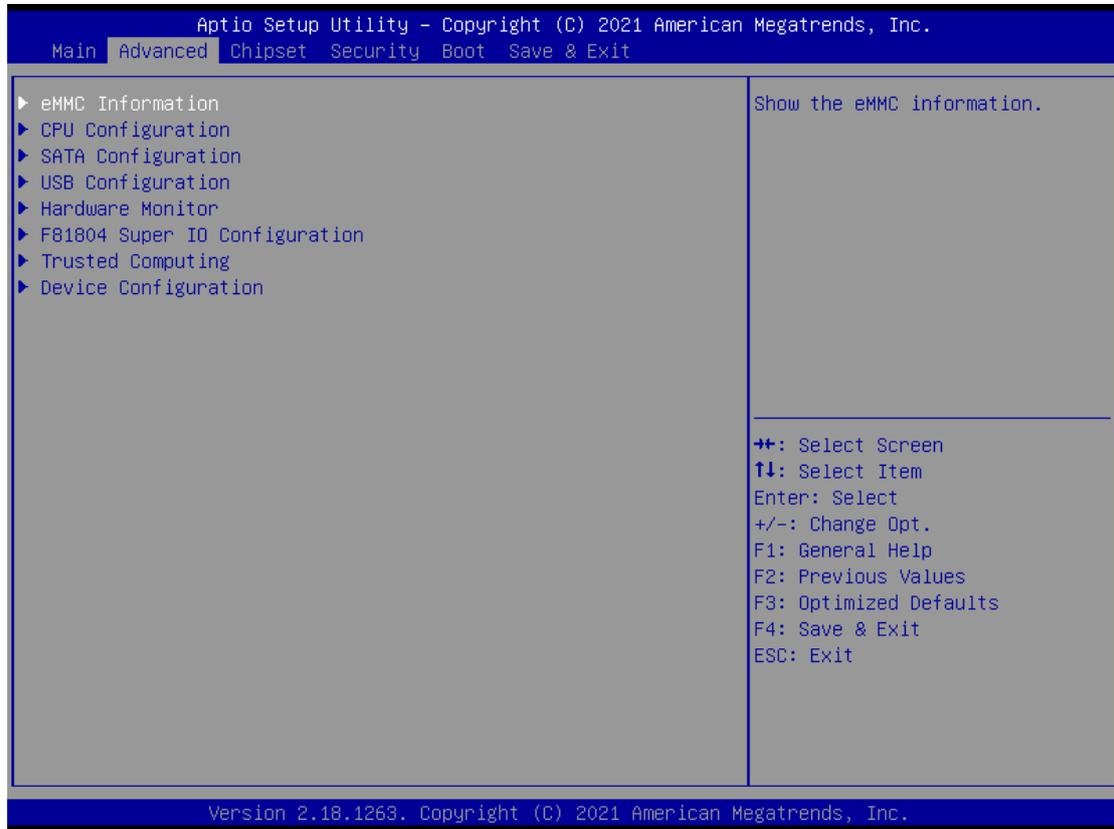
The date format is <day> <month> <date> <year>.

System Time

This item shows 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

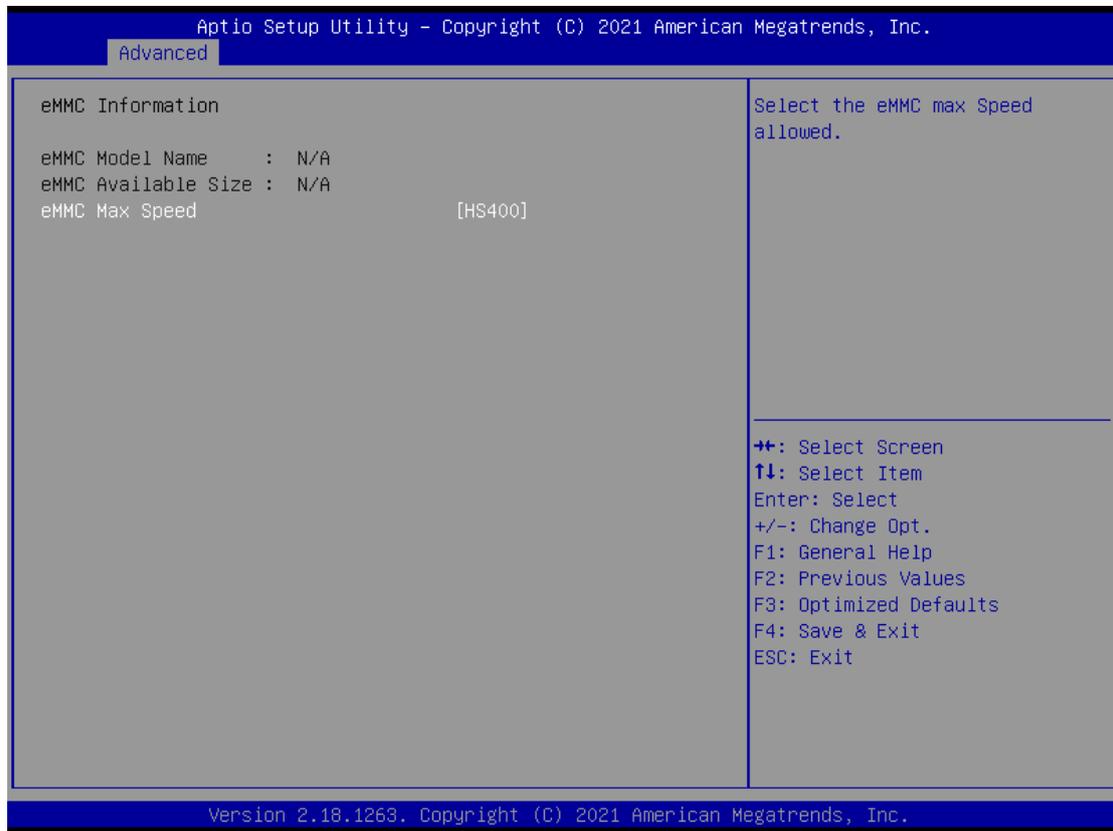
This Advanced section allows users to configure and improve your system, to set up some system features according to your preference. You can select any of the items in the left frame of the screen to go to the sub menus:



- **eMMC Configuration**

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

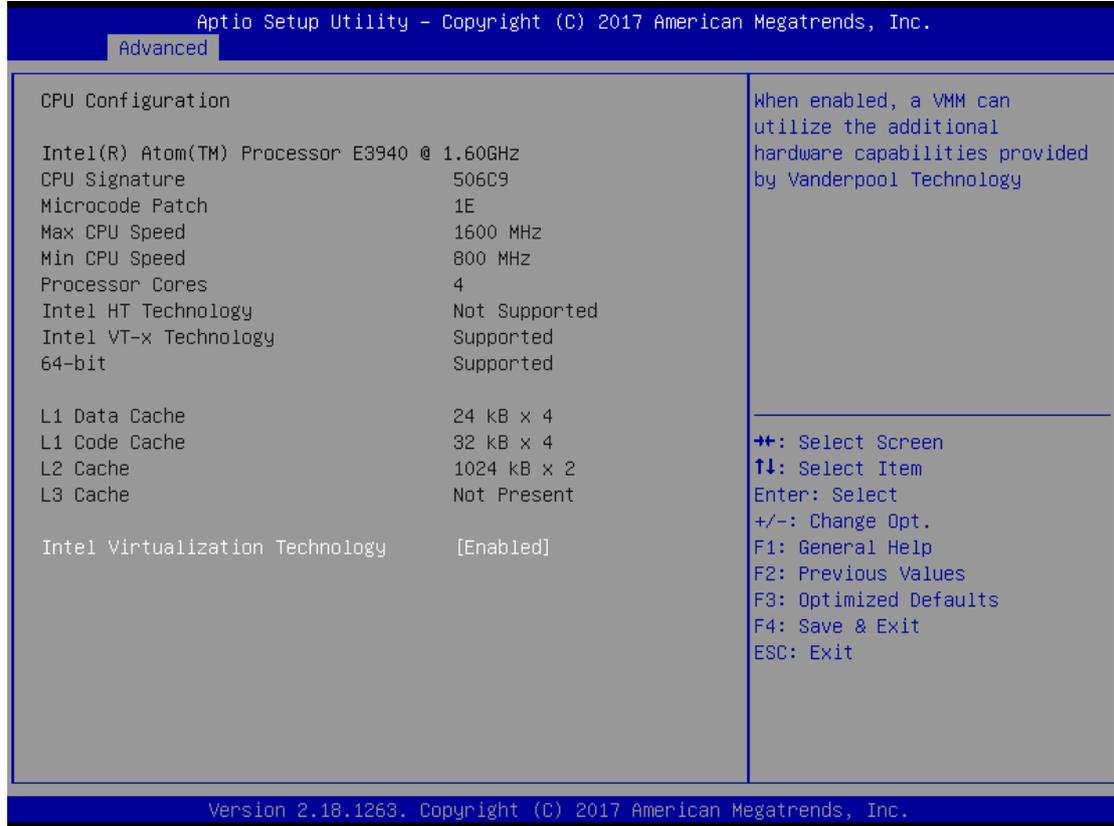
(Please refer below graphics.)



- **CPU Configuration**

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

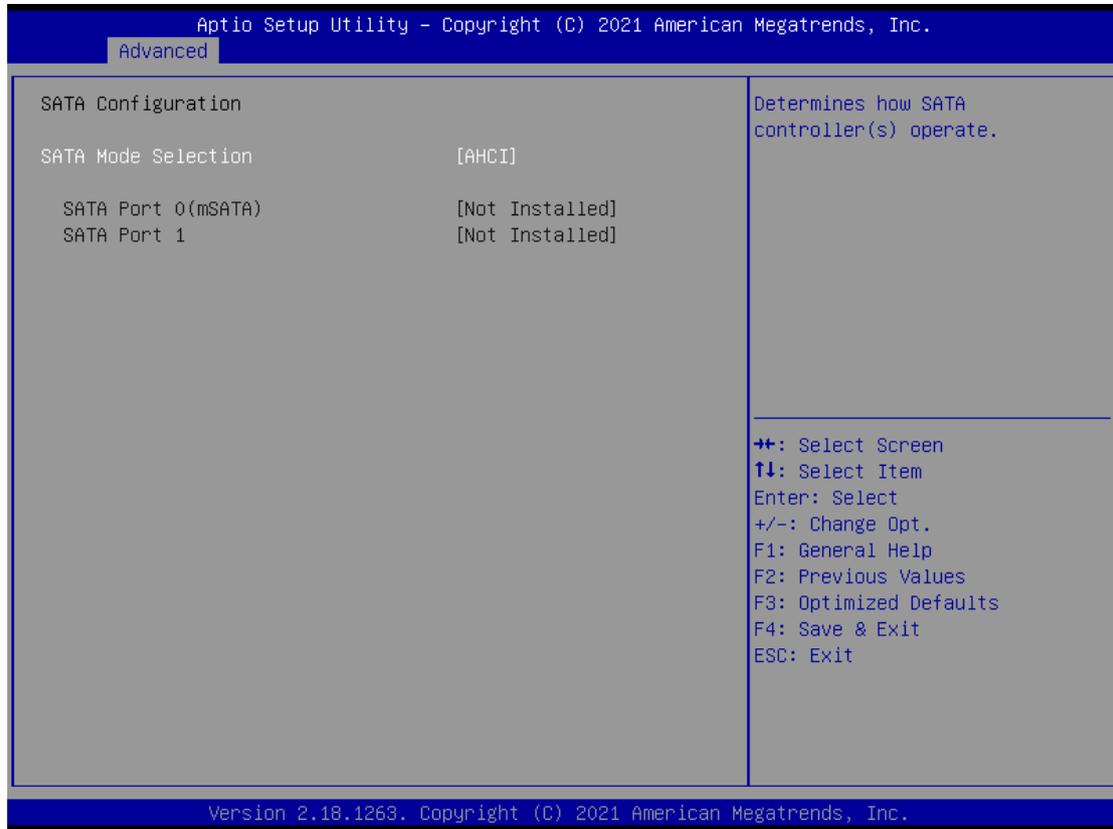
(Please refer below graphics.)



- **SATA Configuration**

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

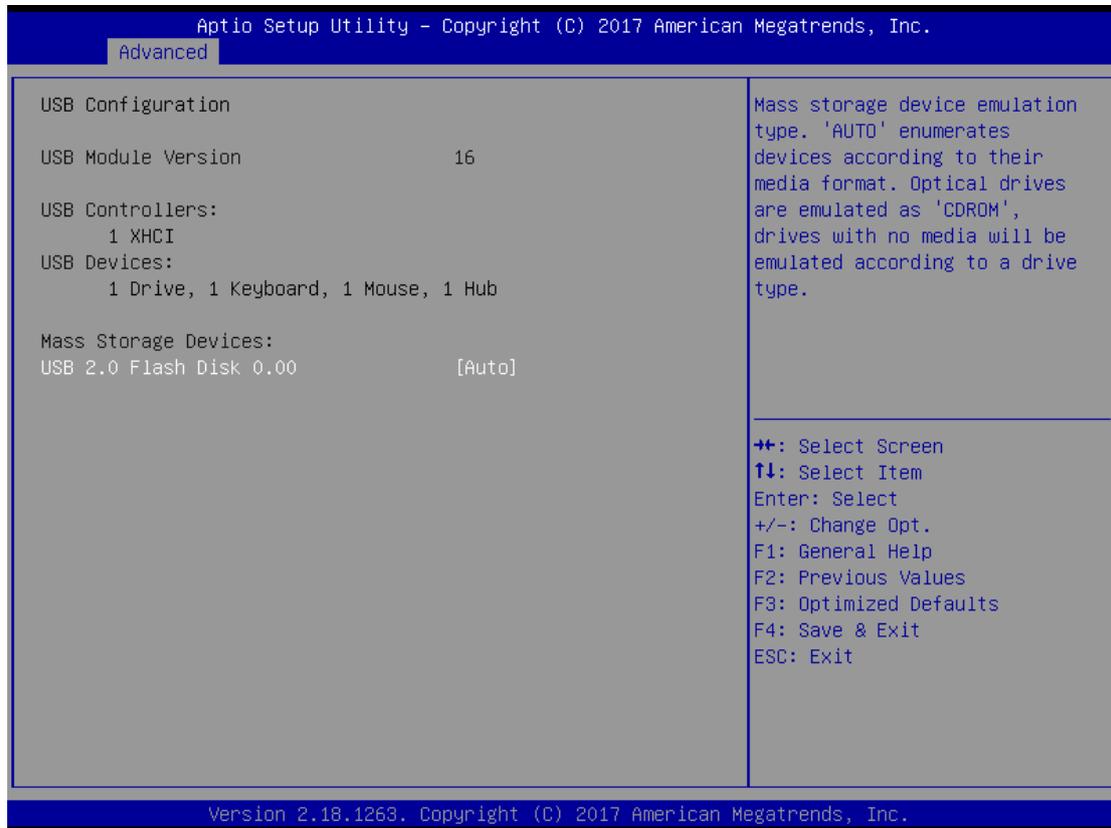
(Please refer below graphics.)



● **USB Configuration**

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

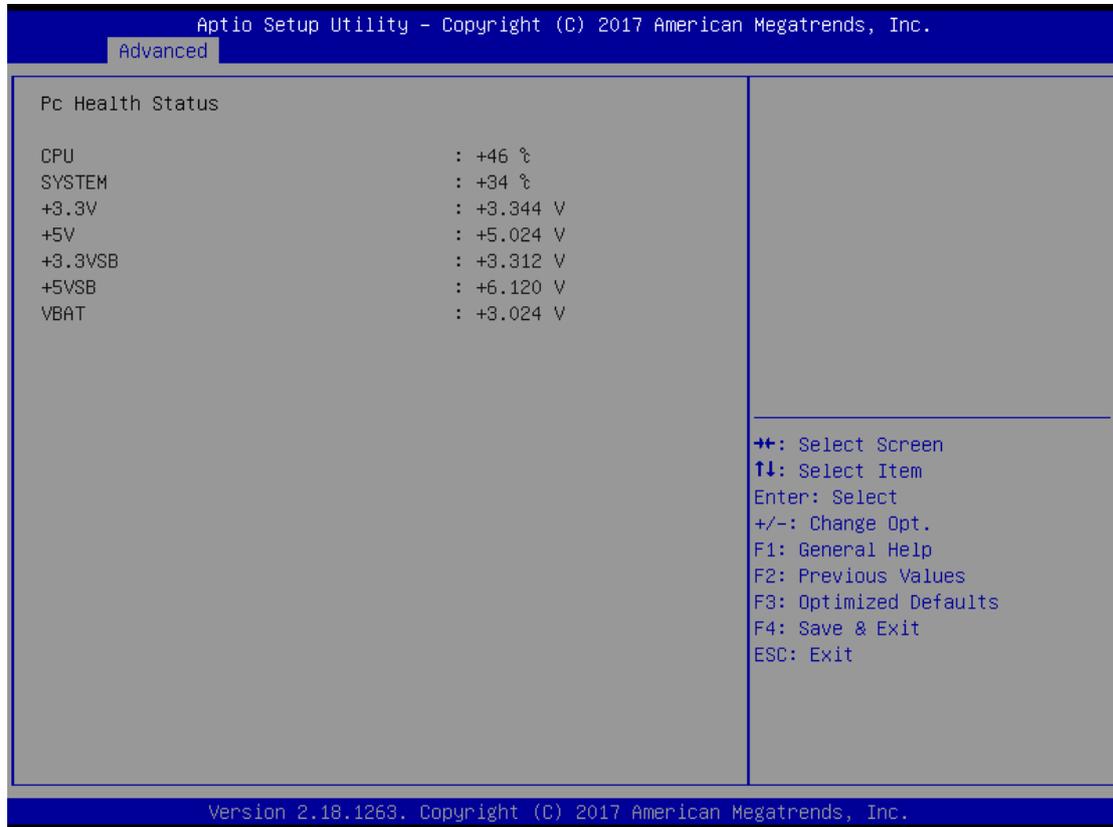
(Please refer below graphics.)



- **H/W Monitor**

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

(Please refer below graphics.)



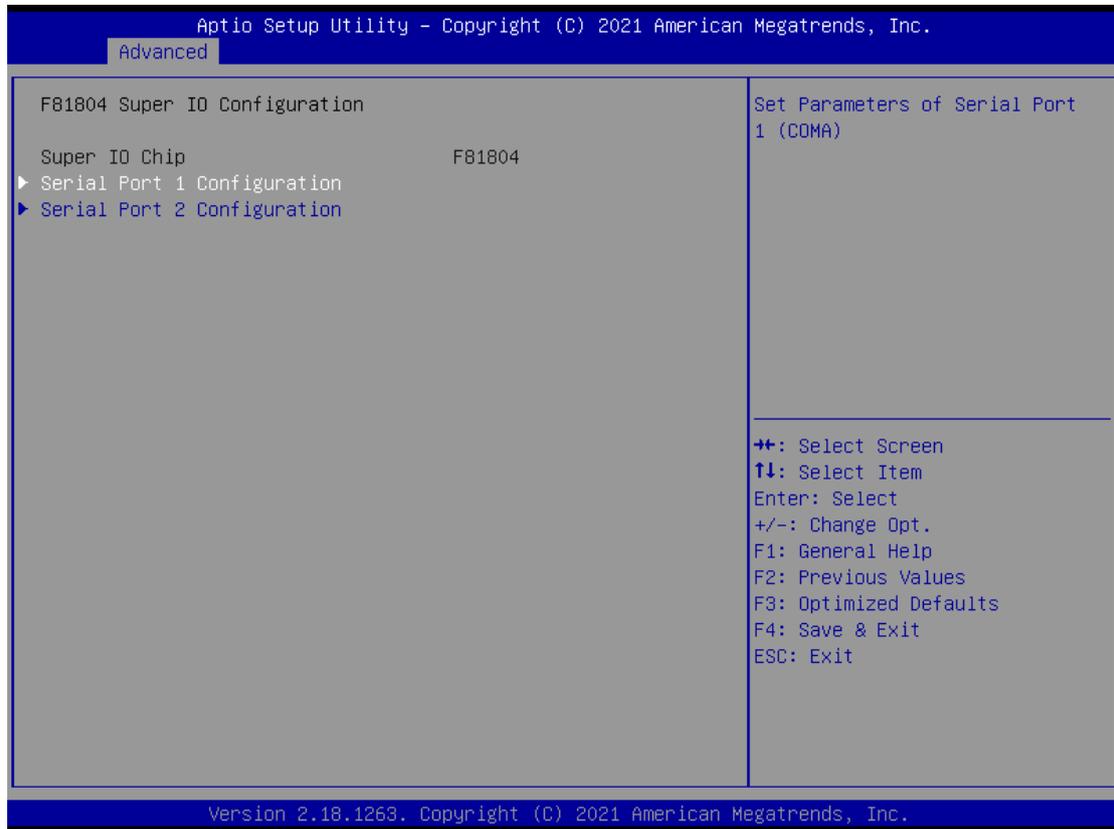
- **F81804 Super IO Configuration**

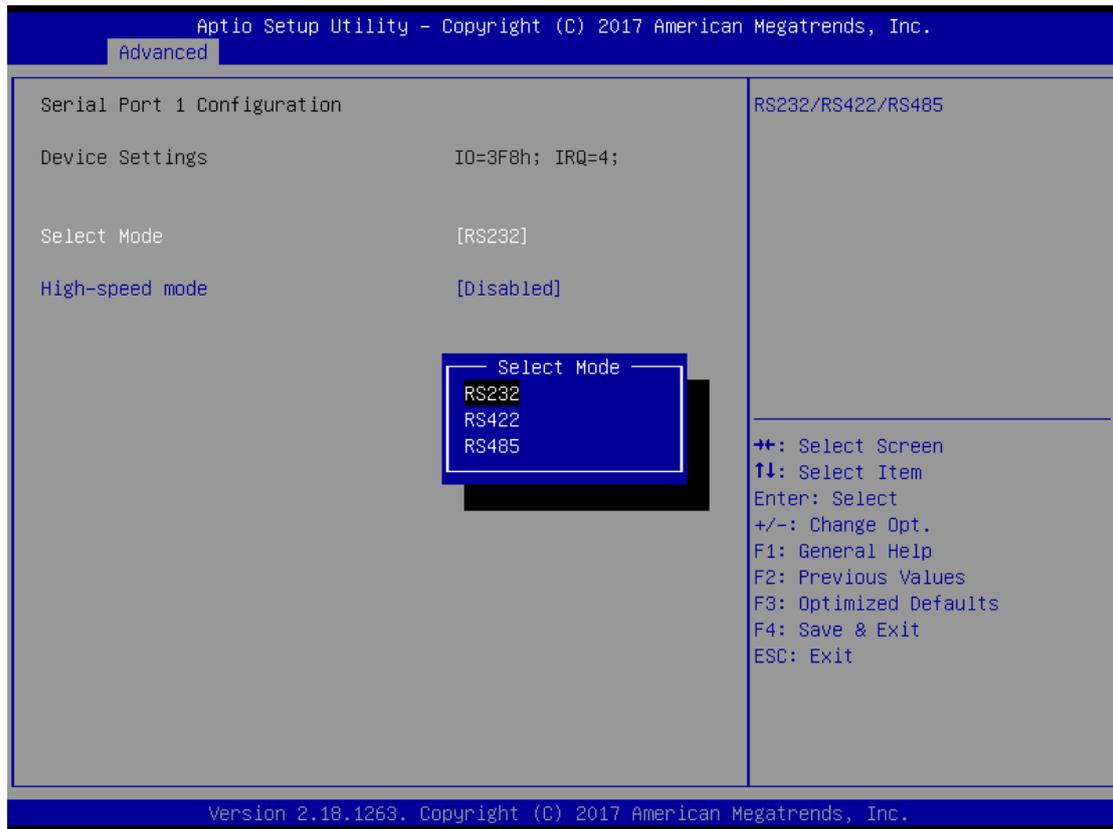
The default setting for all serial ports are RS232.

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 board rate.

Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.

Advanced

Serial Port 1 Configuration		More detail in user manual.																														
Device Settings	ID=3F8h; IRQ=4;	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-right: 1px solid black; padding: 2px;">Disable</th> <th style="text-align: left; border-right: 1px solid black; padding: 2px;">Enable</th> <th style="text-align: left; padding: 2px;">Baud Rate</th> </tr> </thead> <tbody> <tr><td style="border-right: 1px solid black; padding: 2px;">1800</td><td style="border-right: 1px solid black; padding: 2px;">14400</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">2400</td><td style="border-right: 1px solid black; padding: 2px;">19200</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">4800</td><td style="border-right: 1px solid black; padding: 2px;">38400</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">9600</td><td style="border-right: 1px solid black; padding: 2px;">76800</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">14400</td><td style="border-right: 1px solid black; padding: 2px;">115200</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">28800</td><td style="border-right: 1px solid black; padding: 2px;">230400</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">38400</td><td style="border-right: 1px solid black; padding: 2px;">307200</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">57600</td><td style="border-right: 1px solid black; padding: 2px;">460800</td><td style="padding: 2px;"></td></tr> <tr><td style="border-right: 1px solid black; padding: 2px;">115200</td><td style="border-right: 1px solid black; padding: 2px;">921600</td><td style="padding: 2px;"></td></tr> </tbody> </table>	Disable	Enable	Baud Rate	1800	14400		2400	19200		4800	38400		9600	76800		14400	115200		28800	230400		38400	307200		57600	460800		115200	921600	
Disable	Enable	Baud Rate																														
1800	14400																															
2400	19200																															
4800	38400																															
9600	76800																															
14400	115200																															
28800	230400																															
38400	307200																															
57600	460800																															
115200	921600																															
Select Mode	[RS232]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit																														
High-speed mode	[Disable]																															

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● **Device Configuration**

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



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Advanced

Serial Port 1 Configuration

COM Port Type [RS232]

COM Port Type: RS232, RS422, RS485

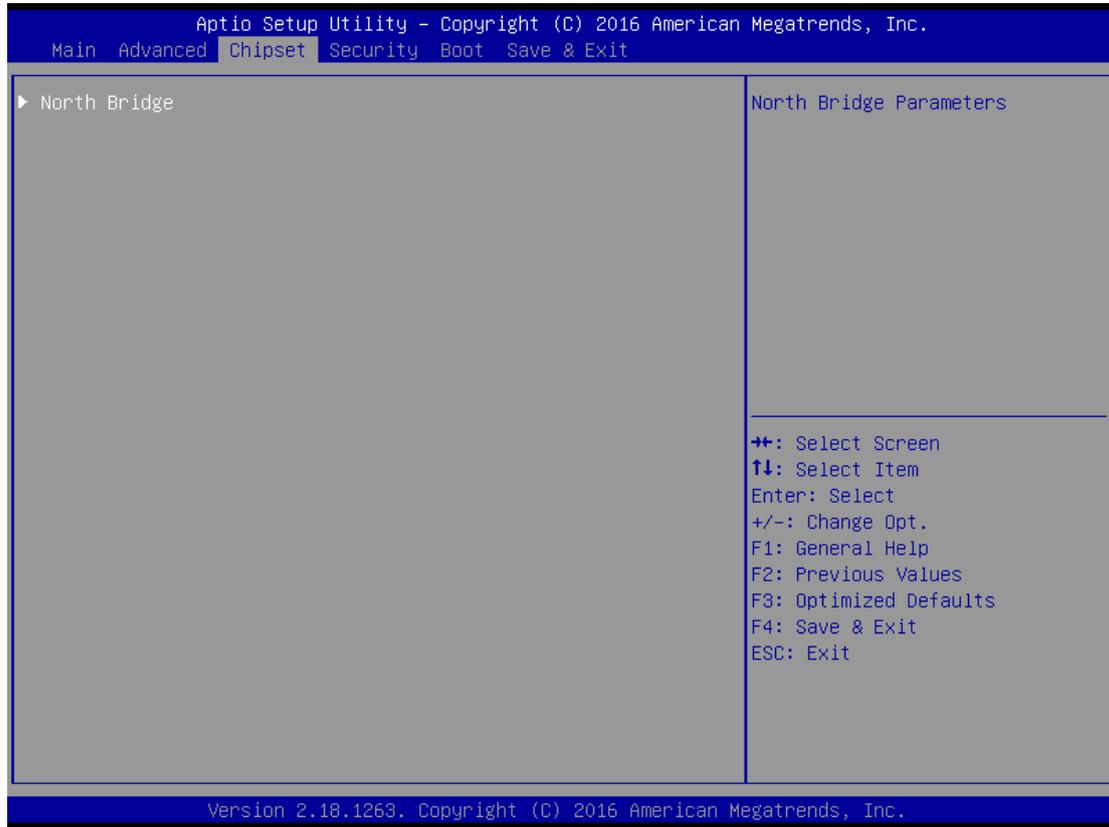
COM Port Type

- 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

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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

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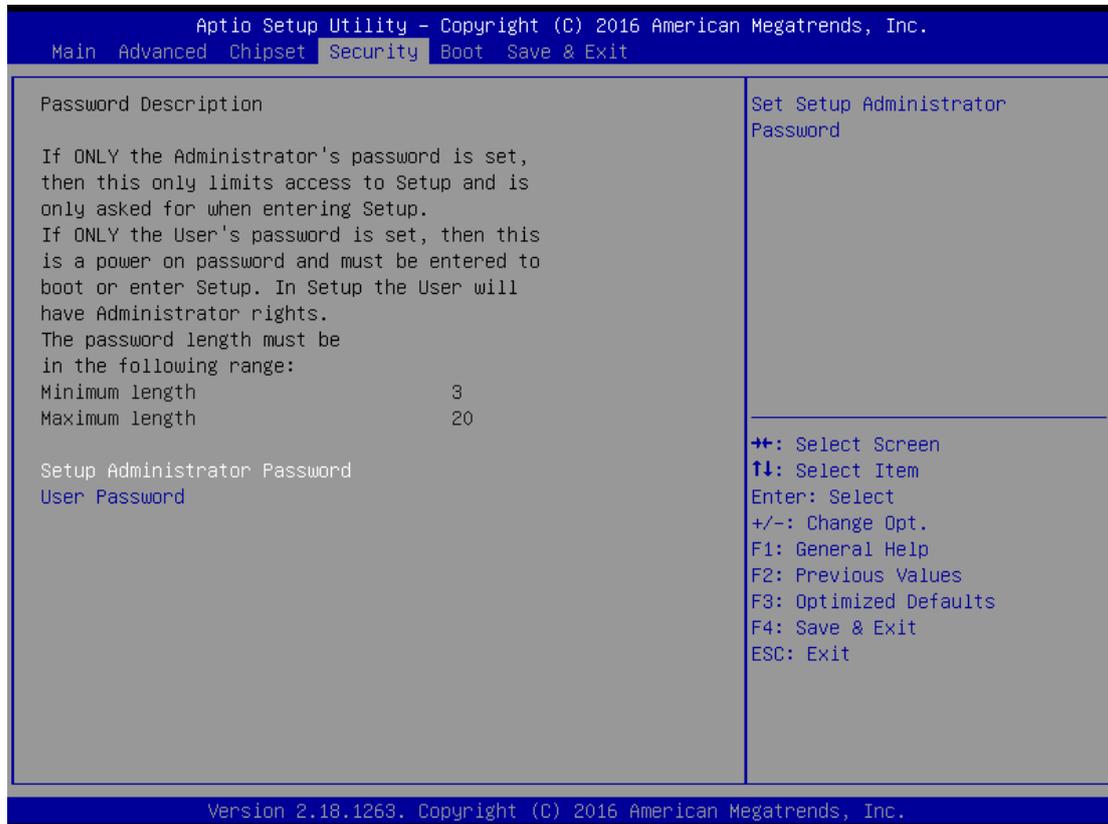
3.5 Security

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 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.

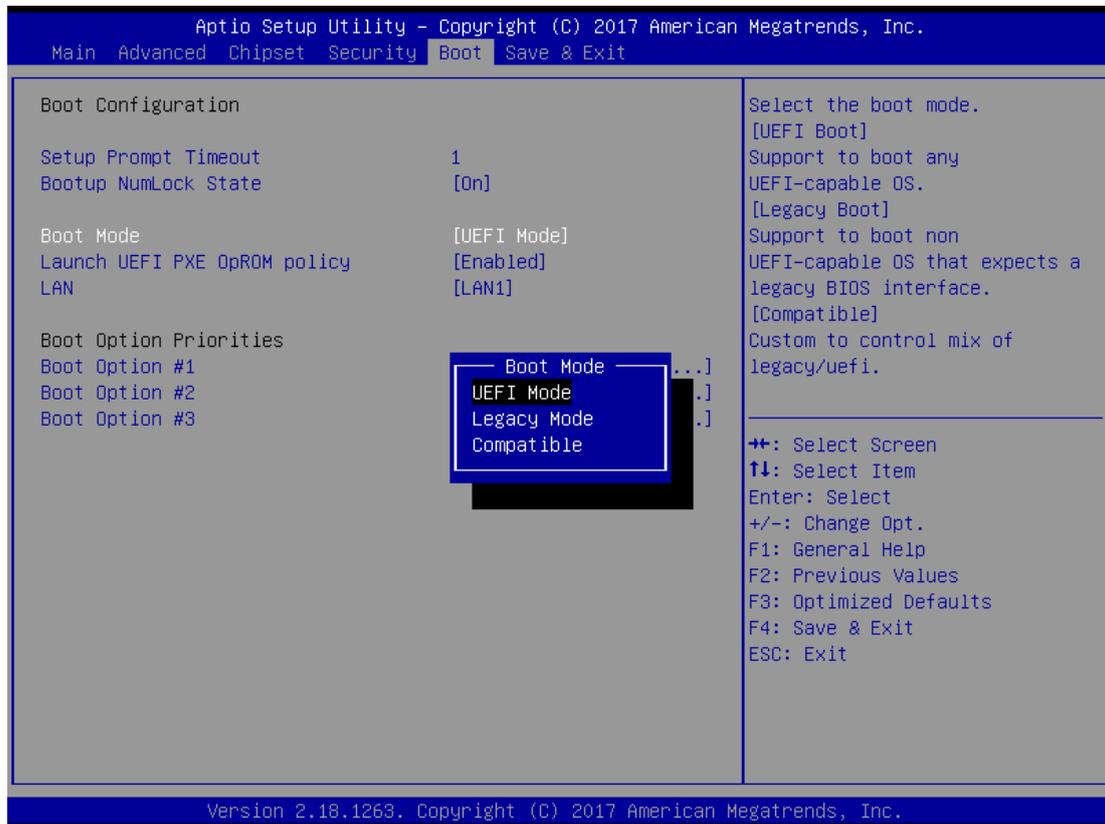
3.6 Boot Type

The default setting of boot mode is [UEFI],

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

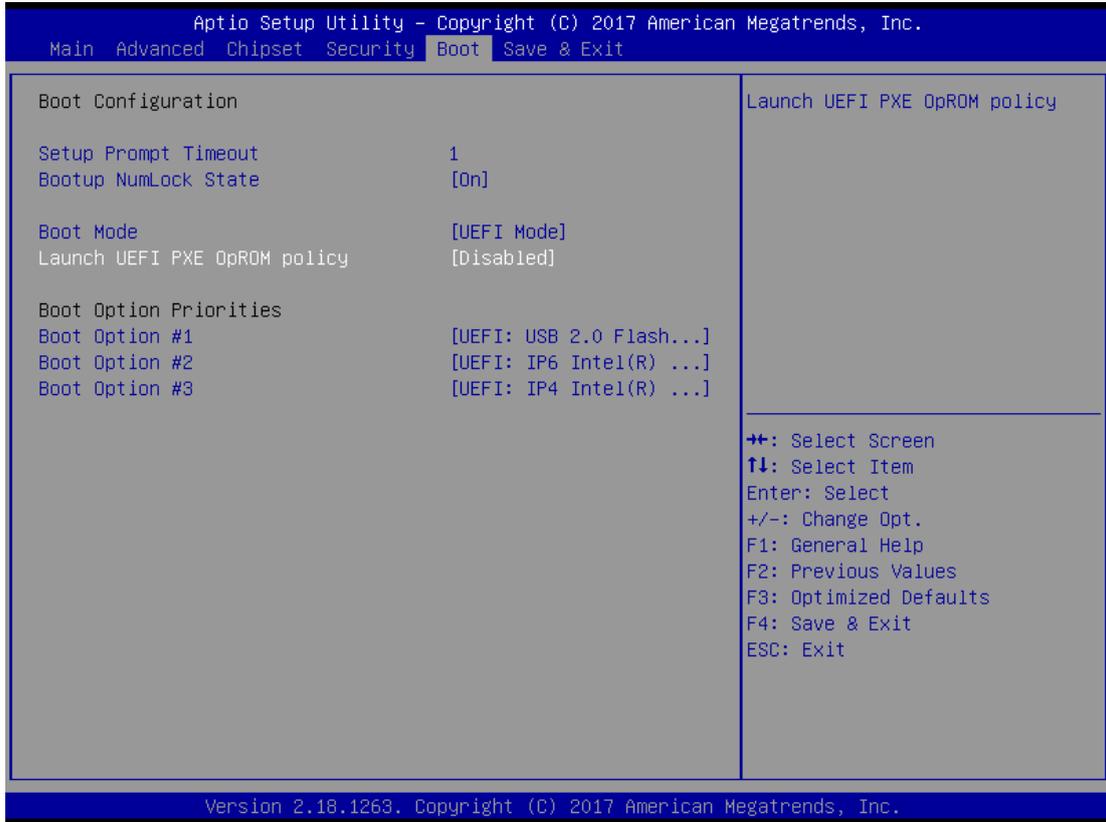
Legacy - support to boot any legacy-capable OS and option rom

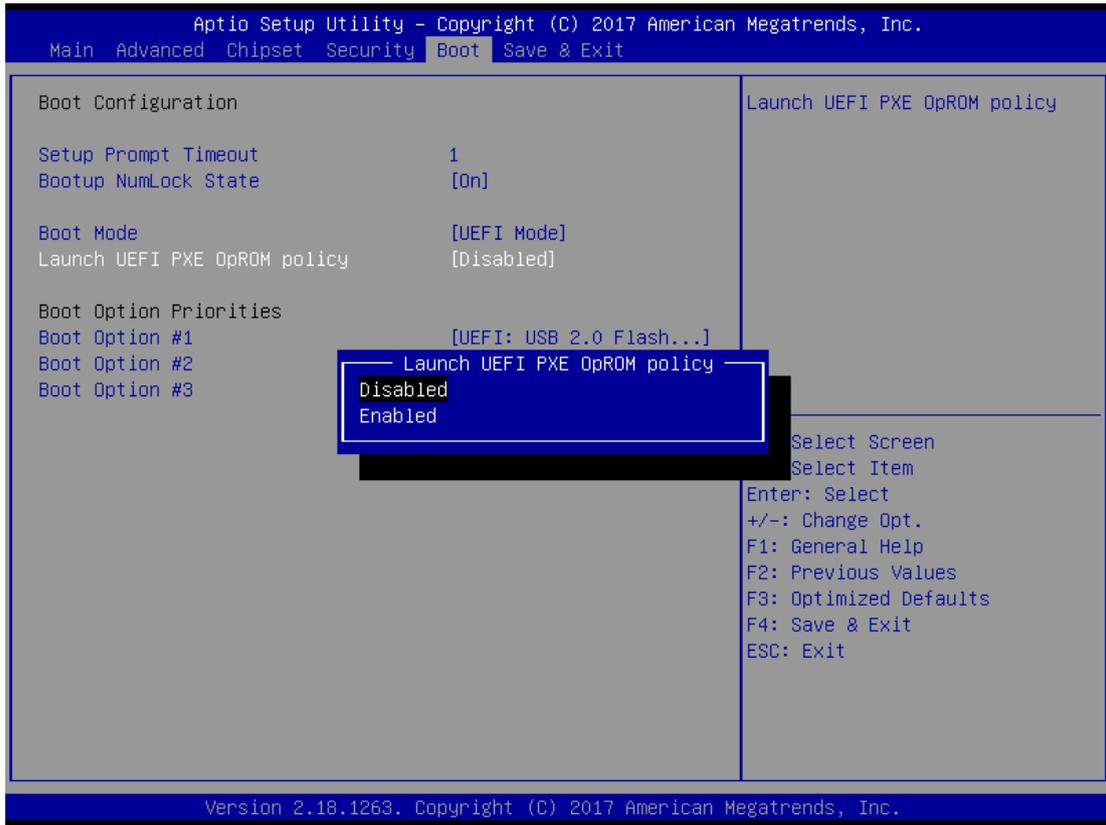
Compitable – customize boot mode of uefi/legacy of specific item



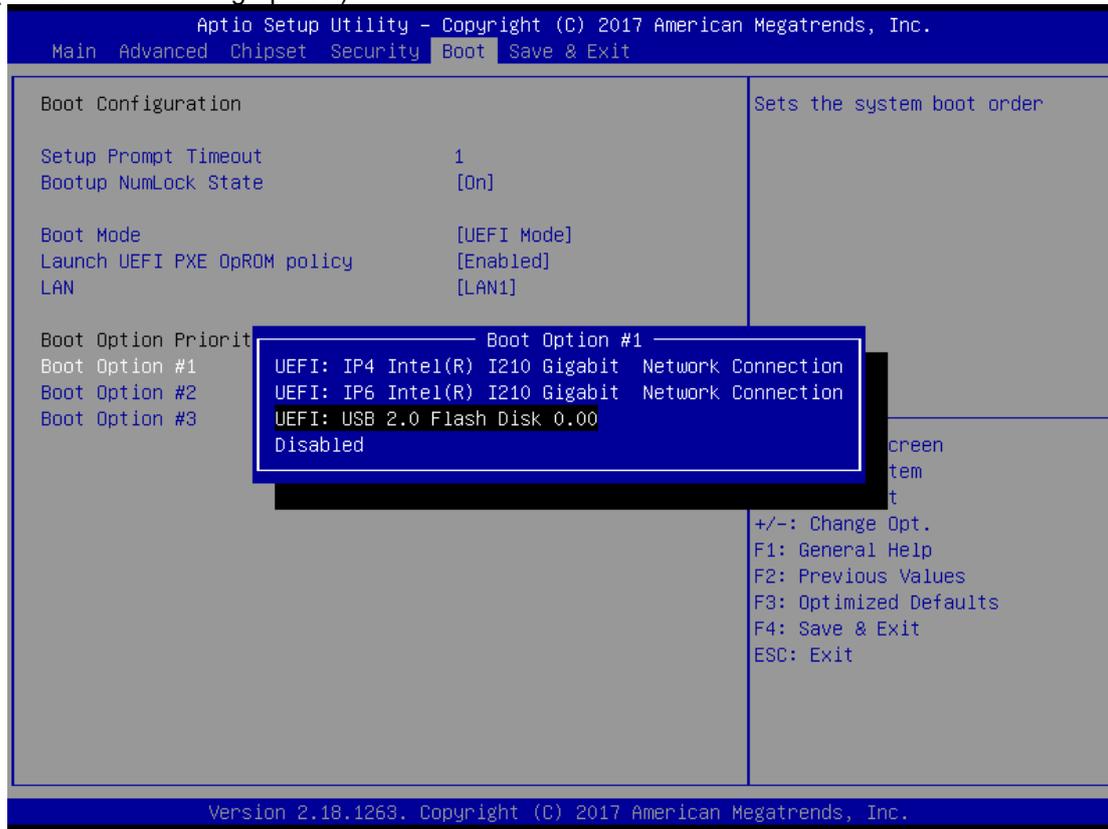
The default setting boot from onboard LAN PxE Rom is [Disabled]

(Please refer below graphics.)





The Boot Option Priorities can select by Boot Option #1, #2..., If user is using a USB Device.
(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