Technical Manual

of

Intel Apollo Lake Series CPU

Based SBC

NO. G03-MU02-F

Revision: 3.0

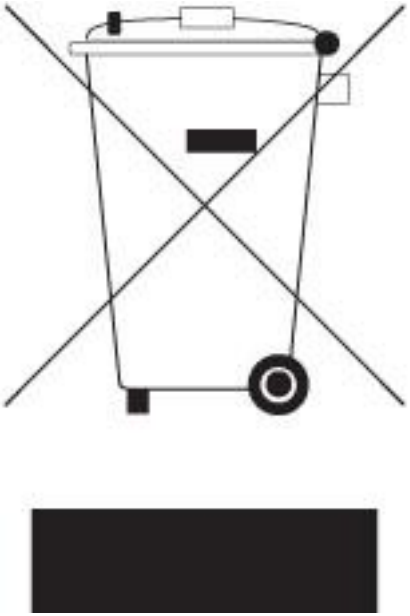
Release date: December 11, 2023

Trademark:

*** Specifications and Information contained in this documentation are furnished for information use only, and are subject to change at any time without notice, and should not be construed as a commitment by manufacturer.**

Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. To minimize pollution and ensure environment protection of mother earth, please recycle.



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Environmental Safety Instruction

- Avoid the dusty, humidity and temperature extremes. Do not place the product in any area where it may become wet.

- 0 to 60 centigrade is the suitable temperature. (The figure comes from the request of the main chipset)

- Generally speaking, dramatic changes in temperature may lead to contact malfunction and crackles due to constant thermal expansion and contraction from the welding spots' that connect components and PCB. Computer should go through an adaptive phase before it boots when it is moved from a cold environment to a warmer one to avoid condensation phenomenon. These water drops attached on PCB or the surface of the components can bring about phenomena as minor as computer instability resulted from corrosion and oxidation from components and PCB or as major as short circuit that can burn the components. Suggest starting the computer until the temperature goes up.

- The increasing temperature of the capacitor may decrease the life of computer. Using the close case may decrease the life of other device because the higher temperature in the inner of the case.

- Attention to the heat sink when you over-clocking. The higher temperature may decrease the life of the device and burned the capacitor.

USER'S NOTICE

Manual Revision Information

Reversion	Revision History	Date
3.0	Third Edition	December 11, 2023

Item Checklist

- ☑ Motherboard
- ☑ Cable(s)

Chapter 1
Introduction of the Motherboard

1-1 Feature of Motherboard

- Onboard Intel® Apollo Lake Series SoC Processor, with low power consumption never denies high performance
- Support 1* DDR3L 1866 MHz SO-DIMM, up to 8GB
- Onboard 2 * RTL8125BS 2.5GbE Ethernet RJ-45 LAN port
- 1* M.2 E-key 2230 slot supports PCIe x1/USB2.0 interface
- 1* M.2 M-key 2242 slot supports SATAIII interface
- Support 1* SATAIII device
- Onboard optional 32GB / 64GB eMMC (by order)
- 2* HDMI ports & 1* Display port, supports Triple Independent Display
- 1* EXT USB Type-C, 3* EXT USB 3.0, 1* Line-out/MIC combo
- Support Intel AES NI and TPM2.0 (**Optional**) to secure customers' data
- Support CPU Smart FAN
- Compliance with ErP standard
- Support Watchdog function
- Solution for Digital Signage, Cloud Applications, IoT & Industrial Automation

1-2 Specification

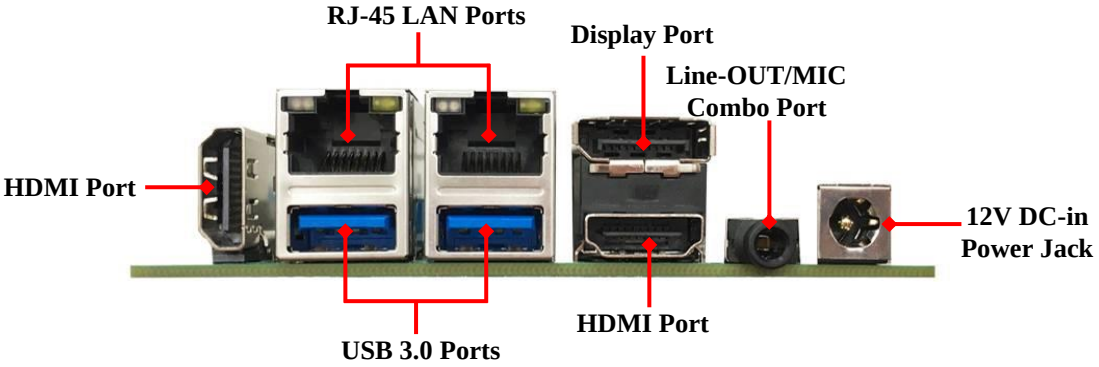
Spec	Description
Design	● NUC form factor; PCB size: 10.1 cm x 10.1 cm
Embedded CPU	● Intel® Apollo Lake series ***SoC*** CPU ** **Note** CPU model varies from different IPC options. Please consult your dealer for more information of onboard CPU.*
Memory Slot	● 1*DDR3L SO-DIMM slot ● Support DDR3L 1866 MHz SO-DIMM up to 8GB
Expansion Slot	● 1* M.2 E-key (2230) slot supports PCIe x1/USB2.0 interface**(M2E)** ***Note:M2E** slot maximum current limit is 2A while using 3.3V.*
Storage	● 1* SATAIII 6Gb/s port ● 1* M.2 M-key (2242) slot supports SATAIII interface **(M2M)** ***Note:M2M**slot maximum current limit is 2A while using 3.3V.* ● Onboard optional 32GB / 64GB eMMC **(by order)** ***Note**: Onboard eMMC capacity depends on the actual model purchased as technical specifications may update, without prior notice*
LAN Chip	● Integrated with 2* Realtek RTL8125BS 2.5GbE chip ● Support Fast Ethernet LAN function of providing 10/100/1000M/2.5G bps Ethernet data transfer rate
Audio Chip	● Realtek ALC662VD HD audio chip
BIOS	● AMI 128MB Flash ROM
Rear Panel I/O	● 2* 2.5GbE RJ-45 LAN port ● 2* USB 3.0 port ● 2* HDMI port ● 1* Display Port (***PS***. This function is converted from EDP to DP, **only display no audio** output) ● 1* Audio Line-Out & MIC combo jack ● 1* 12V DC-in system power Jack
Front Panel I/O	● 1* USB Type-C port ● 1* USB 3.0 port ● 1* Serial port (**COM** supports **RS232/422/485** function)
Internal I/O	● 1* SATA Power connector ● 1* JW_FP front panel wafer (**on the backside**)

	• 1* CPU FAN wafer (**on the backside**) • 1* LAN LED activity header • 1* GPIO header • 1* 9-Pin USB 2.0/1.1 header for 2* USB 2.0/1.1 ports • 1* SMBUS header

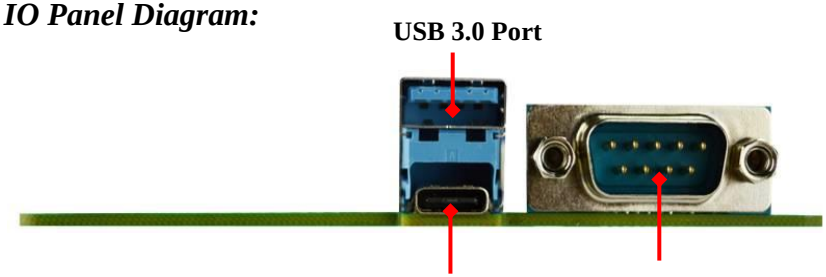
***Note:** Many PCs now include XHCI USB controllers which allow for the support of USB 3.0 and higher USB speeds. This inclusion of XHCI controllers has lessened the need for EHCI USB controllers within platforms. However, legacy operating systems (OS) may not natively recognize XHCI controllers. You might need to pre-install XHCI driver while desiring to install a non-xHCI OS (ex.Windows* 7) on Intel platforms which do not include EHCI controllers. Please contact your representative for more details.*

1-3 Layout Diagram

Rear IO Panel Diagram:

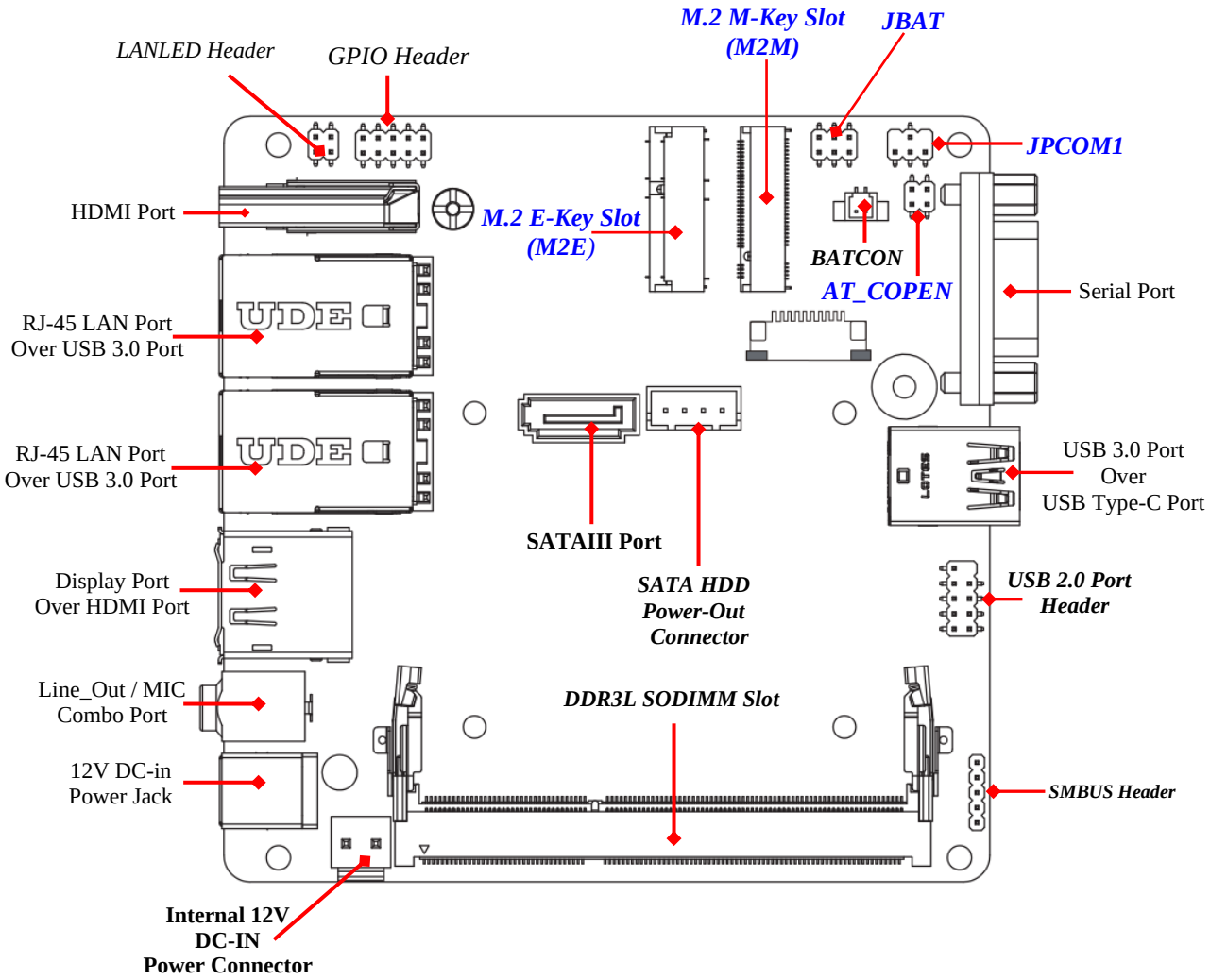


Front IO Panel Diagram:



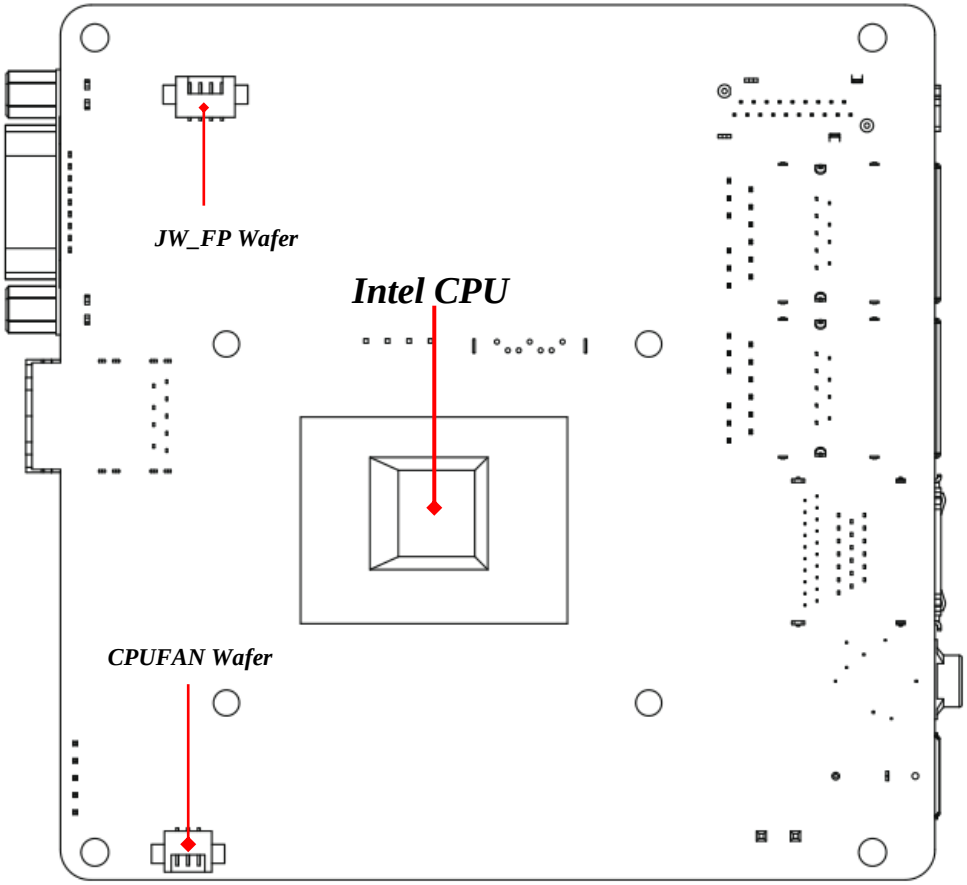
USB Type-C Port **RS232/422/485 Serial Port**

Internal Diagram-Front Side:



***Note:** SODIMM module should be **1.35V DDRIII** SODIMM and **not exceeding 8GB total capacity**.*

Internal Diagram-Back Side:



Connectors

P/N	Name
USB31	USB 3.0 Port Connector
USBC	USB 3.0 Type-C Connector
COM	RS232/422/485 Serial Port Connector
HDMI2	HDMI Connector
UL1/UL2	***Top***: RJ-45 LAN Port Connector ***Bottom:*** USB 3.0 Port Connector
DP_ HDMI1	***Top***: Display Port Connector ***Bottom:*** HDMI Connector
AUDIO	Line-Out/MIC Combo Connector
DCIN	12V DC–in System Power Jack
ATX2P	Internal 12V DC–in System Power Connector
SATA	SATAIII Port Connector
SATAPWR	SATA Power out Connector

Headers & Wafers

P/N	Name	Description	Pitch
JW_FP (backside)	Front Panel Wafer	4-pin Block	1.25mm
CPUFAN (backside)	CPUFAN Wafer	3-pin Block	1.25mm
LAN_LED	LAN Activity LED Header	4-pin Block	2.0mm
GPIO	GPIO Header	10-pin Block	2.0mm
FP_USB	USB 2.0 Port Header	9-pin Block	2.0mm
SMBUS	SMBUS Header	5-pin Block	2.0mm

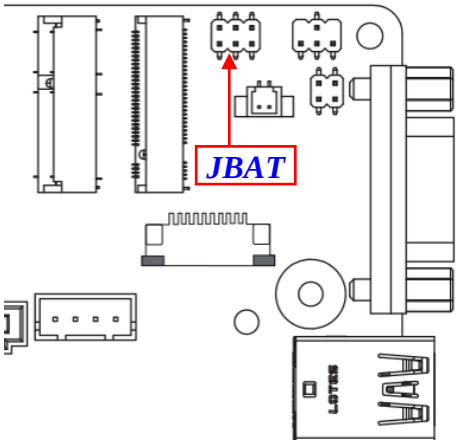
Jumper

P/N	Name	Description	Pitch
JBAT	***Pin (1-2):*** Clear Me Function Setting ***Pin (3-4):*** Clear CMOS RAM Setting ***Pin (5-6):*** Flash Descriptor Security Override	6-Pin Block	2.0mm
JPCOM1	COM Port Pin9 Function Select	4-Pin Block	2.0mm
AT_COPEN	***Pin (1-2):*** ATX Mode & AT Mode Select ***Pin (3-4):*** Case Open Detection Select	4-Pin Block	2.0mm

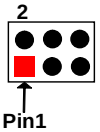
Chapter 2
Hardware Installation

2-1 Jumper Setting

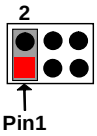
Pin (1-2) of JBAT (6-pin): Clear ME Setting



PIN(1-2) of JBAT: Clear ME

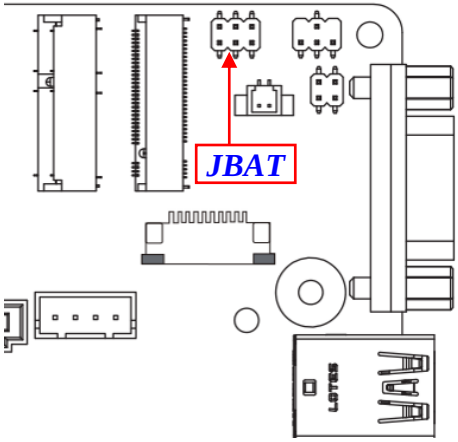


1-2 Open: Normal(Default);

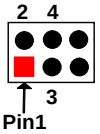


1-2 Closed: Clear ME (One Touch).

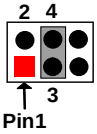
Pin (3-4) of JBAT (6-pin): Clear CMOS RAM Setting



PIN(3-4) of JBAT: Clear CMOS

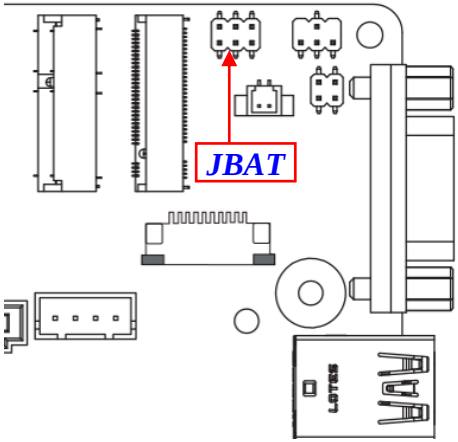


3-4 Open: Normal(Default);

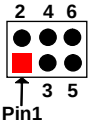


3-4 Closed: Clear CMOS (One Touch).

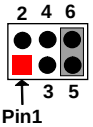
Pin (5-6) of JBAT (6-pin): Flash Descriptor Security Override



PIN(5-6) of JBAT: Flash Override

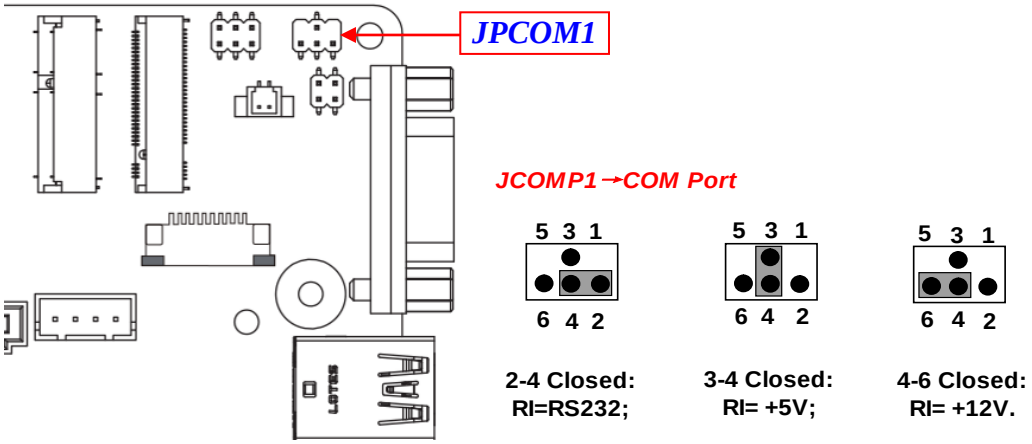


5-6 Open: Enable Security Measures in the Flash Descriptor(Default);



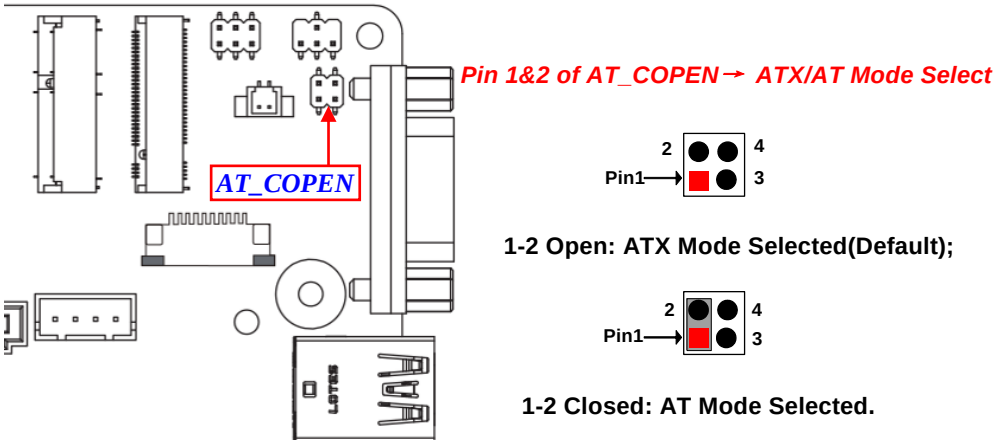
5-6 Closed: Disable Security Measures in the Flash Descriptor(Override).

JPCOM1 (4-pin): COM Port Pin9 Function Select



***Note:**Maximum current limit is 500mA while using 5V or 12V.*

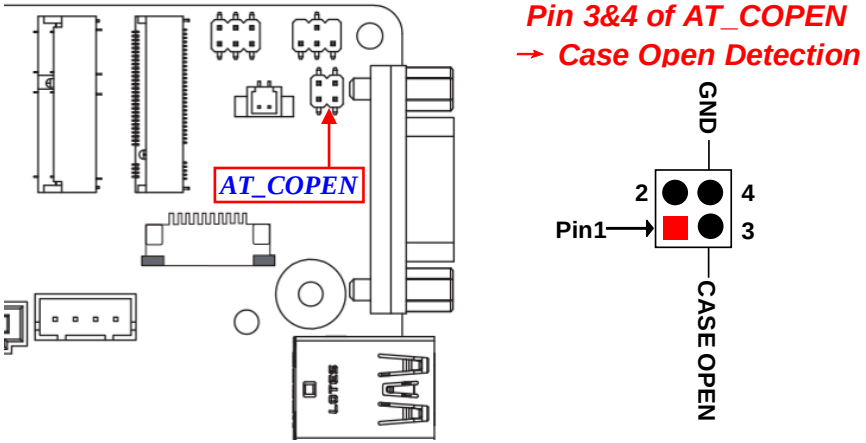
Pin 1&2 of AT_COPEN (4-pin): ATX Mode/AT Mode Select



***ATX Mode Selected**: Press power button to power on after power input ready;*

AT Mode Selected: *Directly power on as power input ready.*

Pin 3&4 of AT_COPEN (4-pin): Case Open Message Display Function Select

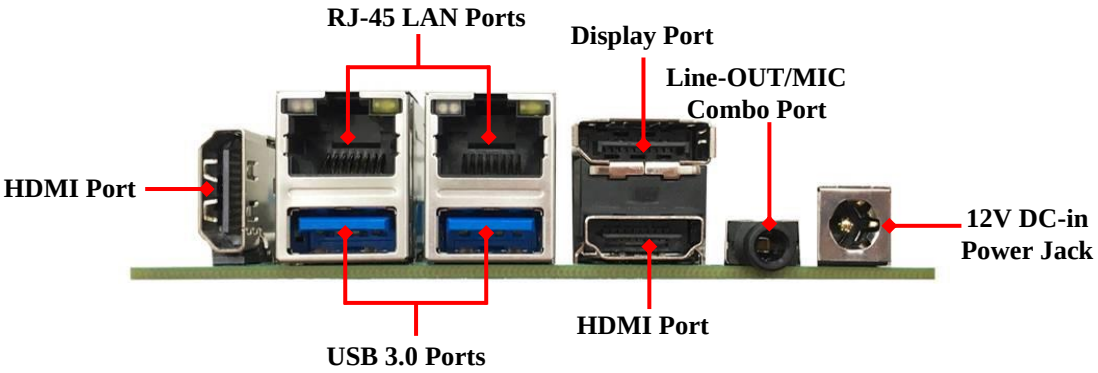


Pin (3&4) Closed: *When Case open function pin short to GND, the Case open function was detected. When used, needs to enter BIOS and enable 'Case Open Detect' function. In this case if your case is removed, next time when you restart your computer, a message will be displayed on screen to inform you of this.*

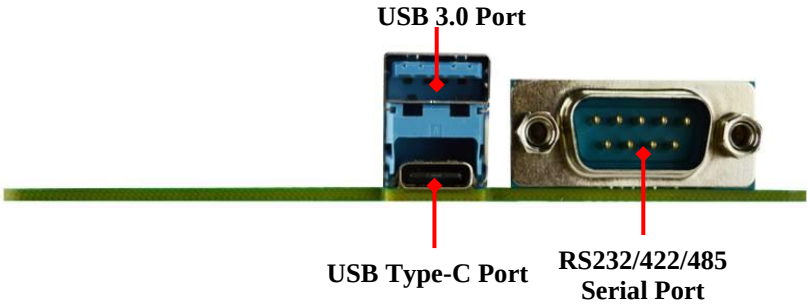
2-2 Connectors, Wafers and Headers

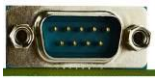
2-2-1 Connectors

Rear IO Panel Diagram:



Front IO Panel Diagram:



Icon	Name	Function
	**Power Connector**	12V DC–in system power connector For user to connect compatible power adapter to provide power supply for the system.
	**RJ-45 LAN Port**	This connector is standard RJ-45 LAN jack for Network connection.
	**USB 3.0 Port**	To connect USB keyboard, mouse or other devices compatible with USB specification. USB 3.0 ports supports up to 5Gbps data transfer rate.
	**HDMI Port**	To connect display device that support HDMI specification.
	**Display Port**	To the system to corresponding display device with compatible display port cable.
	**Line-Out/MIC Combo Connector**	This connector can functions as audio Line-Out jack and MIC jack with compatible cables & devices.
	**USB Type-C Port**	To connect USB devices compatible with USB Type-C interface.
	***RS232/422/485 Serial Port***	Mainly for user to connect external MODEM or other devices that supports Serial Communications Interface.

Note*: 1.Maximum current limit for USB ports:***

※***UL1+UL2*** *total is* ***1.5A****.*

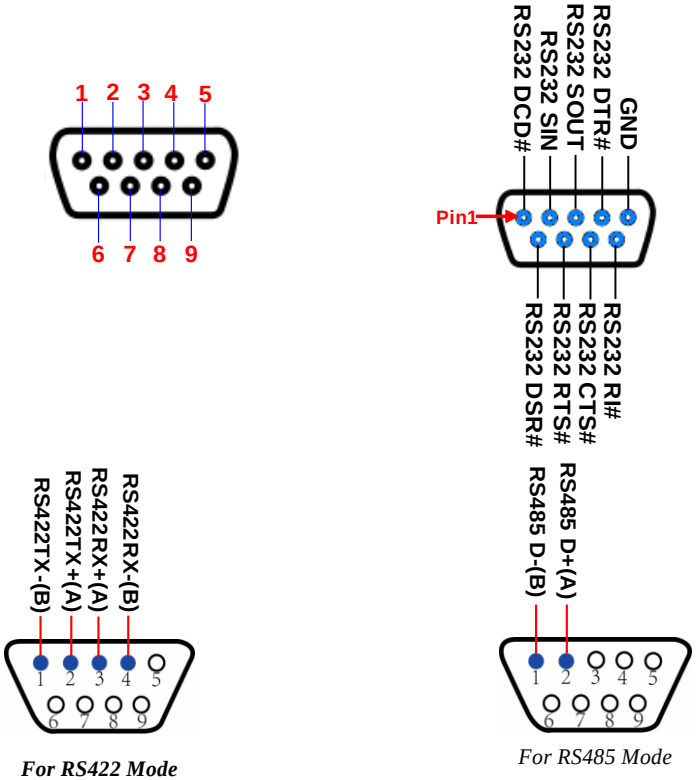
※***USB31+FP_USB*** *total is* ***1.5A****.*

※***USBC****(Type C) total is* ***3A****.*

2. DP port is converted from EDP, only display function, not support audio output.

(1) COM (9-pin Block): RS232/422/485 Serial Port

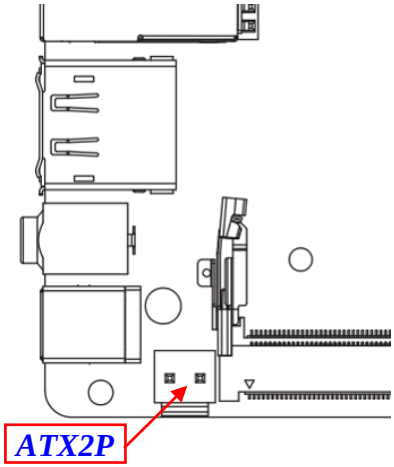
COM port can function as RS232/422/485 port. In normal settings COM functions as RS232 port. With compatible COM cable they can function as RS422 or RS 485 port. User also needs to go to BIOS to set **'*Transmission Mode Select*'** for COM (refer to Page 25) at first, before using specialized cable to connect different pins of this port.

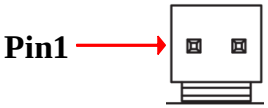


For RS422 Mode

For RS485 Mode

(2) ATX2P(2-pin) : Internal 12V DC-in Power Connector



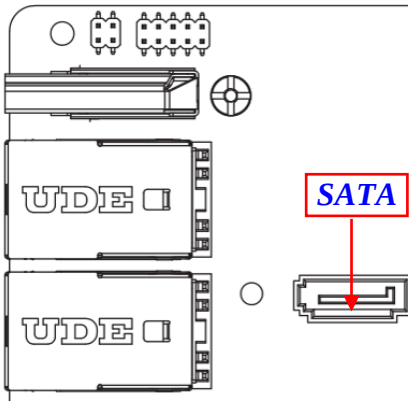


Pin No.	Definition
1	+12V
2	GND

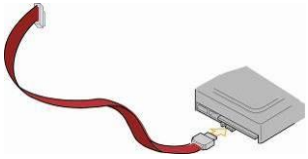
Warning: *Find Pin-1 position before connecting power cable to this 2-pin power connector.* ***WRONG INSTALLATION DIRECTION WILL DAMAGE THE BOARD!!***

(3) SATA (7-pin Block): SATAIII Port connector

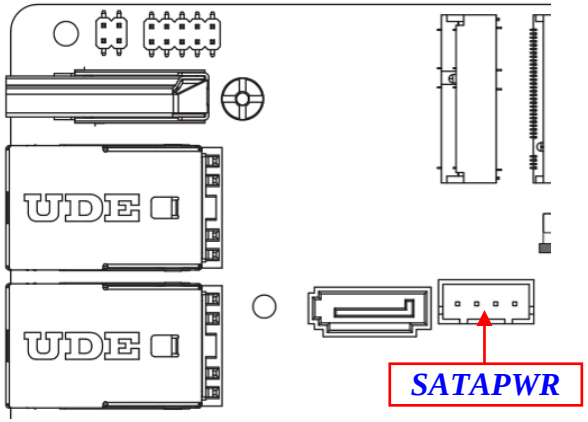
The board comes with a SATAIII port that supports 6GB/s transfer rate.

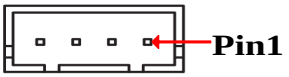


Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND



(4) SATAPWR (4-pin): SATA HDD Power-Out Connector

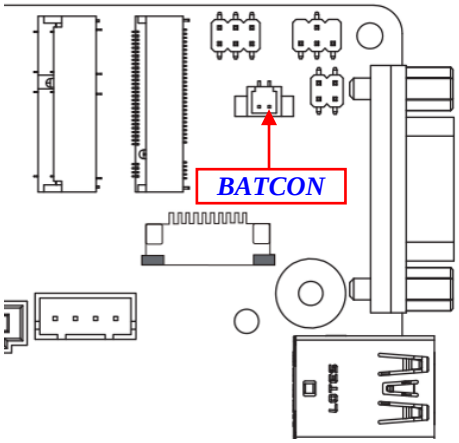


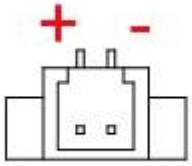


Pin No.	Definition
1	+5V
2	GND
3	GND
4	+12V

***Note:**Maximum current limit is **2A** while using 5V or 12V working voltage.*

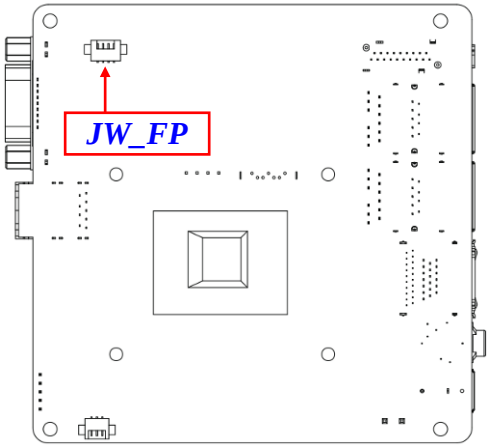
(5) BATCON (2-pin): Battery Connector

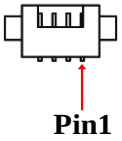




2-2-2 Wafers & Headers

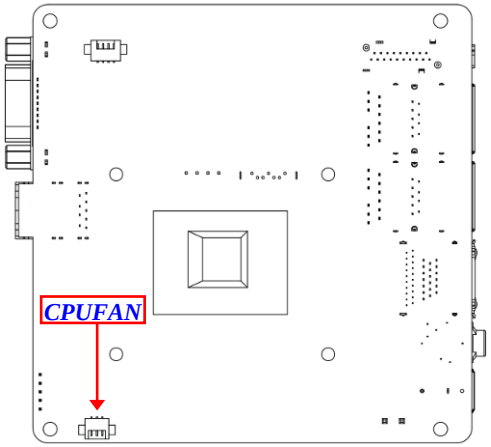
JW_FP (4-pin): Front Panel Wafer

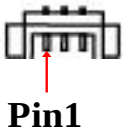




Pin No.	Definition
1	Power SW
2	GND
3	PWRLED -
4	PWRLED+

CPUFAN (3-pin): CPUFAN Wafer

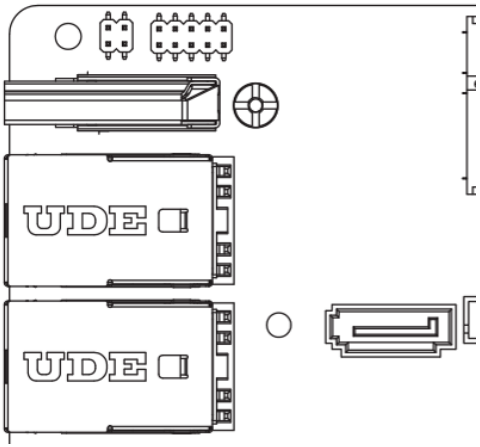


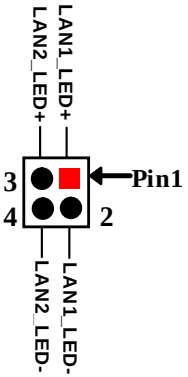


Pin No.	Definition
1	FAN_OUT
2	GND
3	Fan Detect

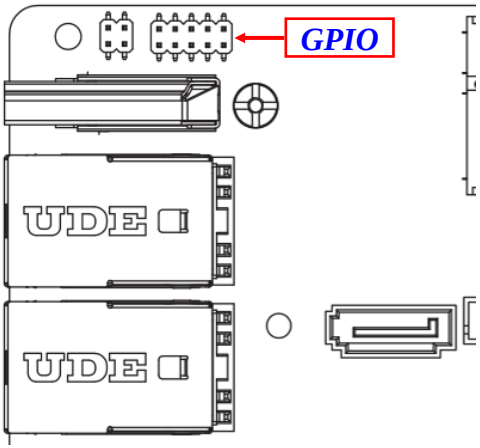
***Note:** This is a **5V** DC FAN and deliver up to **0.6A** output current.*

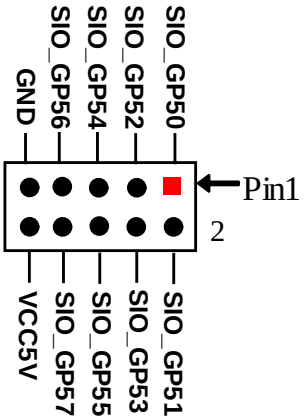
LAN_LED (4-pin): LAN Status LED Header





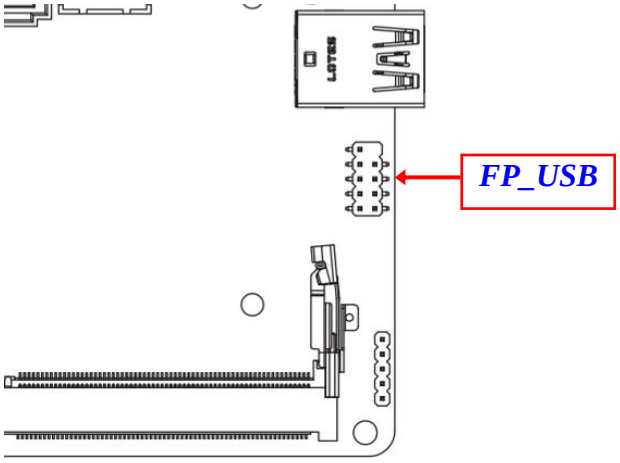
GPIO (10-pin): GPIO Header

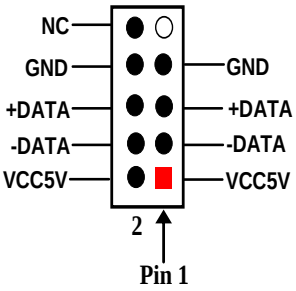




***Note:** Maximum current limit is **1A** while using 5V working voltage.*

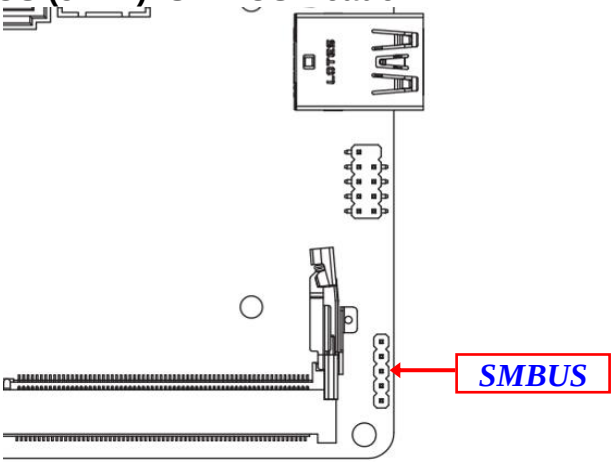
FP_USB (9-pin): USB 2.0 Port Header

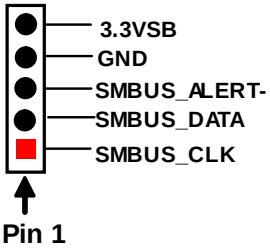




Note*:USB31 port + FP_USB port** *maximum current limit is* ***1.5A *in total while using 5V.*

SMBUS (5-Pin): SM BUS Header





Note*:** *Maximum current limit is* ***500mA *while using* ***3.3V*** *working voltage.*

Chapter 3
Introducing BIOS

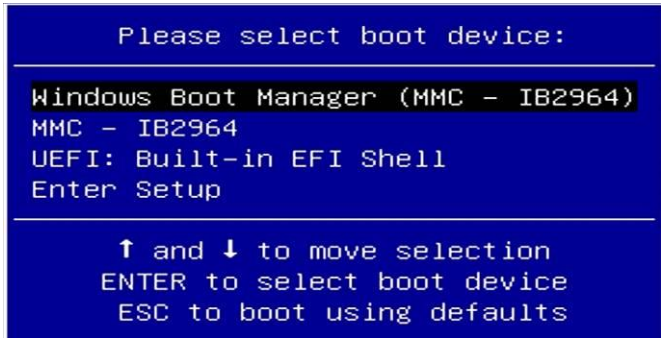
Notice!	The BIOS options in this manual are for reference only. Different configurations may lead to difference in BIOS screen and BIOS screens in manuals are usually the first BIOS version when the board is released and may be different from your purchased motherboard. Users are welcome to download the latest BIOS version form our official website.

The BIOS is a program located on a Flash Memory on the motherboard. This program is a bridge between motherboard and operating system. When you start the computer, the BIOS program will gain control. The BIOS first operates an auto-diagnostic test called POST (power on self test) for all the necessary hardware, it detects the entire hardware device and configures the parameters of the hardware synchronization. Only when these tasks are completed done it gives up control of the computer to operating system (OS). Since the BIOS is the only channel for hardware and software to communicate, it is the key factor for system stability, and in ensuring that your system performance as its best.

3-1 Entering Setup

Power on the computer and by pressing <Del> immediately allows you to enter Setup. If the message disappears before your respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "**RESET**" button on the system case. You may also restart by simultaneously pressing **<Ctrl>**, **<Alt>** and **<Delete>** keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to

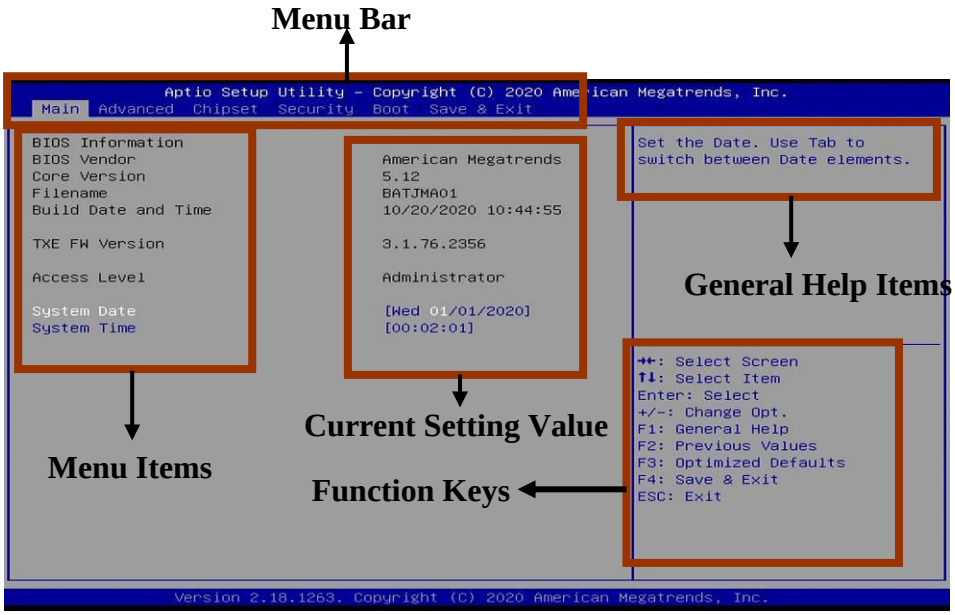
Press **<Del>** to enter Setup; press < **F7**> to enter pop-up Boot menu.



BIOS Boot Menu Screen (boot device options please refer to actual configuration)

3-2 BIOS Menu Screen

The following diagram show a general BIOS menu screen:



3-3 Function Keys

In the above BIOS Setup main menu of, you can see several options. We will explain these options step by step in the following pages of this chapter, but let us first see a short description of the function keys you may use here:

- Press←→ (left, right) to select screen;
- Press ↑↓ (up, down) to choose, in the main menu, the option you want to confirm or to modify.
- Press <Enter> to select.
- Press <+>/<–> keys when you want to modify the BIOS parameters for the active option.
- [F1]: General help.
- [F2]: Previous value.
- [F3]: Optimized defaults.
- [F4]: Save & Exit.
- Press <ESC> to quit the BIOS Setup.

3-4 Getting Help

Main Menu

The on-line description of the highlighted setup function is displayed at the top right corner the screen.

Status Page Setup Menu/Option Page Setup Menu

Press **[F1**] to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press <**Esc**>.

3-5 Menu Bars

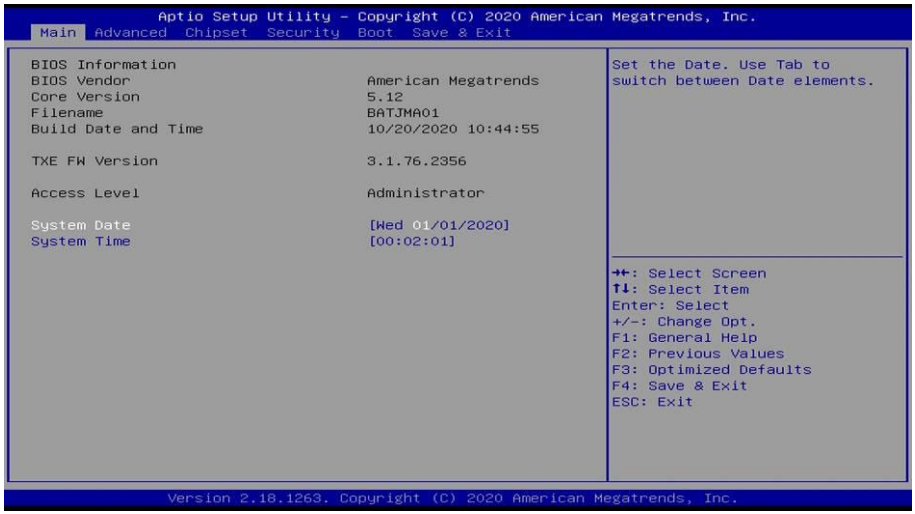
There are six menu bars on top of BIOS screen:

Main	To change system basic configuration
Advanced	To change system advanced configuration
Chipset	To change chipset configuration
Security	Password settings
Boot	To change boot settings
Save & Exit	Save setting, loading and exit options.

User can press the right or left arrow key on the keyboard to switch from menu bar. The selected one is highlighted.

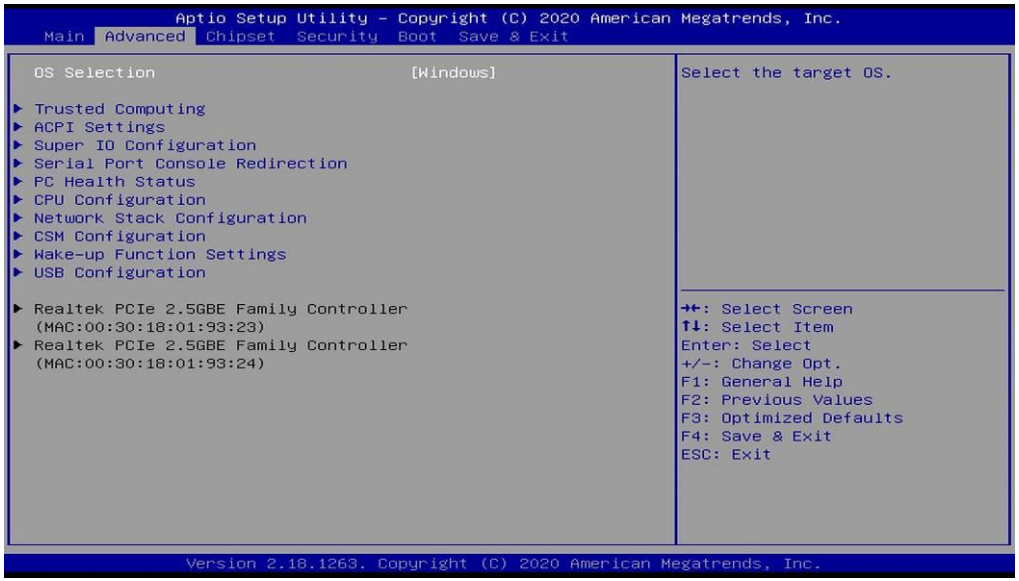
3-6 Main Menu

Main menu screen includes some basic system information. Highlight the item and then use the <+> or <-> and numerical keyboard keys to select the value you want in each item.



System Date
Set the date. Please use [Tab] to switch between date elements.
System Time
Set the time. Please use [Tab] to switch between time elements.

3-7 Advanced Menu



OS Selection
The optional settings: [Windows]; [Intel Linux]; [MSDOS].
**** Note:** User need to go to this item to select the OS mode before installing corresponding OS driver, otherwise problems will occur when installing the driver.*

► **Trusted Computing**
Press [Enter] to enable or disable '**Security Device Support**'.

TPM20 Device Found

Security Device Support
Use this item to enable or disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
The optional settings: [Disabled]; [Enabled].
When set as **[Enabled]**, user can make further settings in the following items:
SHA-1 PCR Bank
Use this item to enable or disable SHA-1 PCR Bank.
The optional settings: [Disabled]; [Enabled].
SHA256 PCR Bank
Use this item to enable or disable SHA256 PCR Bank.
The optional settings: [Disabled]; [Enabled].

► **ACPI Settings**
Press [Enter] to make settings for the following sub-items:
ACPI Settings

ACPI Sleep State
Use this item to select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
The optional settings: [Suspend Disabled]; [S3 (Suspend to RAM)].

► **Super I/O Configuration**
Press [Enter] to make settings for the following sub-items:
Super IO Configuration

► **Serial Port 1 Configuration**
Use this item to set parameters of Serial Port 1 (COMA).
Press [Enter] to make settings for the following items:
Serial Port
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], user can make further settings in the following items:
Device Settings

Change Settings
Use this item to select an optimal setting for Super IO Device.
The optional settings: [Auto]; [IO=3F8h; IRQ=4;]; [IO=2F8h; IRQ=3;]; [IO=3E8h; IRQ=4;]; [IO=2E8h; IRQ=3;].
Transmission Mode Select
The optional settings: [RS422]; [RS232]; [RS485].
Mode Speed Select
Use this item to select RS232/RS422/RS485 Speed.
The optional settings: [RS232/RS422/RS485=250kbps]; [RS232=1Mbps, RS422/RS485=10Mbps].

ERP Support
This item is Energy-Related Products function.
The optional settings: [Disabled]; [Enabled].
This item should be set as [**Disabled**] if you wish to have all active wake-up functions.

Case Open Detect
Use this item to detect if case have ever been opened. Show message in POST.
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], system will detect if COPEN has been short or not (*refer to* ***Page-10 AT_COPEN*** *jumper setting for Case Open Detection*); if Pin 3-4 is short, system will show Case Open Message during POST.

WatchDog Reset Timer
Use this item to enable or disable WDT reset function.
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following sub-items shall appear:
WatchDog Reset Timer Value
User can select a value in the range of [10] to [255] seconds when 'WatchDog Reset Timer Unit' set as [Sec]; or in the range of [1] to [255] minutes when

'WatchDog Reset Timer Unit' set as [Min].

WatchDog Reset Timer Unit

The optional settings: [Sec.]; [Min.].

WatchDog Wake-up Timer

This item support WDT wake-up.

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], the following sub-items shall appear:

WatchDog Wake-up Timer Value

User can select a value in the range of [10] to [4095] seconds when 'WatchDog Wake-up Timer Unit' set as **[Sec]**; or in the range of [1] to [4095] minutes when 'WatchDog Wake-up Timer Unit' set as **[Min]**.

WatchDog Wake-up Timer Unit

The optional settings: [Sec.]; [Min.].

ATX Power Emulate AT Power

This item support Emulate AT power function, MB power On/Off control by power supply. Use needs to select 'AT or ATX Mode' on MB jumper at first *(refer to **Page-9 AT_COPEN jumper** setting for ATX Mode & AT Mode Select).*

- **Serial Port Console Redirection**

COM1

Console Redirection

Use this item to enable or disable Console Redirection.

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], user can make further settings in the following items:

- **Console Redirection Settings**

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Press [Enter] to make settings for the following sub-items.

COM1
Console Redirection Settings

Terminal Type
The optional settings: [VT100]; [VT100+]; [VT-UTF8]; [ANSI].
Emulation: **[ANSI]:** Extended ASCII char set; **[VT100]:** ASCII char set; **[VT100+]:** Extends VT100 to support color, function keys, etc.; **[VT-UTF8]:** Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second
Use this item to select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
The optional settings: [9600]; [19200]; [38400]; [57600]; [115200].
Data Bits
The optional settings: [7]; [8].
Parity
A parity bit can be sent with the data bits to detect some transmission errors.
The optional settings: [None]; [Even]; [Odd]; [Mark]; [Space].
[Even]: parity bit is 0 if the num of 1's in the data bits is even;
[Odd]: parity bit is 0 if num of 1's in the data bits is odd;
[Mark]: parity bit is always 1;
[Space]: parity bit is always 0;
[Mark] and **[Space]**: parity do not allow for error detection.
Stop Bits
Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
The optional settings: [1]; [2].
Flow Control
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow.

Hardware flow control uses two wires to send start/stop signals.
The optional settings: [None]; [Hardware RTS/CTS].

VT-UTF8 Combo Key Support

Use this item to enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
The optional settings: [Disabled]; [Enabled].

Recorder Mode

With this mode enable only text will be sent. This is to capture Terminal data.
The optional settings: [Disabled]; [Enabled].

Resolution 100x31

Use this item to enable or disable extended terminal resolution.
The optional settings: [Disabled]; [Enabled].

Legacy OS Redirection Resolution

On Legacy OS, the Number of Rows and Columns supported redirection.
The optional settings: [80x24]; [80x25].

Putty KeyPad

Use this item to select FunctionKey and KeyPad on Putty.
The optional settings: [VT100]; [Intel Linux]; [XTERMR6]; [SCO]; [ESCN]; [VT400].

Redirect After BIOS POST

The optional settings: [Always Enable]; [BootLoader].
When [**Bootloader**] is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When [**Always Enabled**] is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to [**Always Enabled**].

Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)

Console Redirection

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], the following sub-items shall appear:

- **Console Redirection Settings**

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Press [Enter] to make settings for the following items:

Out-of-Band Mgmt Port

The default setting is: [COM1].

Terminal Type

The optional settings: [VT100]; [VT100+]; [VT-UTF8]; [ANSI].

[VT-UTF8] is the preferred terminal type for out-of-band management. The next best choice is **[VT100+]** and them **[VT100]**. See above, in Console Redirection Settings page, for more help with Terminal Type/Emulation.

Bits per second

Use this item to select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.

The optional settings: [9600]; [19200]; [57600]; [115200].

Flow Control

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a “stop” signal can be sent to stop the data flow. Once the buffers are empty, a “start” signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

The optional settings: [None]; [Hardware RTS/CTS]; [Software Xon/Xoff].

Data Bits

The default setting is: [8].

**This item may or may not show up, depending on different configuration.*

Parity

The default setting is: [None].

**This item may or may not show up, depending on different configuration.*

Stop Bits

The default setting is: [1].

**This item may or may not show up, depending on different configuration.*

► **PC Health Status**

Press [Enter] to view current hardware health status, make further settings in '**SmartFAN Configuration**'.

► **SmartFAN Configuration**

Press [Enter] to make settings for SmartFan Configuration:

SmartFAN Configuration

CPUFAN Smart Mode

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], the following sub-items shall appear:

CPUFAN Full-Speed Temperature

Use this item to set CPUFAN full speed temperature. Fan will run at full speed when above this pre-set temperature.

CPUFAN Full-Speed Duty

Use this item to set CPUFAN full-speed duty. Fan will run at full speed when above this pre-set duty.

CPUFAN Idle-Speed Temperature

Use this item to set CPUFAN idle speed temperature. Fan will run at idle speed when below this pre-set temperature.

CPUFAN Idle-Speed Duty

Use this item to set CPUFAN idle speed duty. Fan will run at idle speed when below this pre-set duty.

► **CPU Configuration**

Press [Enter] to view current CPU configuration and make settings for the following sub-items:

VT-d

Use this item to enable or disable CPU VT-d.

The optional settings: [Disabled]; [Enabled].

EIST

Use this item to enable or disable Intel SpeedStep.

The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following sub-items shall appear:

Turbo Mode

Use this item to enable or disable Turbo Mode.
The optional settings: [Disabled]; [Enabled].
**Note:* *This item might not be available depending on configuration.*

C-States

Use this item to enable or disable C-States.
The optional settings: [Disabled]; [Enabled].

Enhanced C-states

Use this item to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
The optional settings: [Disabled]; [Enabled].

Max Package C State

Use this item to control the Max Package C State that the processor will support.
The optional settings: [PC2]; [PC1]; [C0].

Max Core C States

Use this item to control the Max Core C State that cores will support.
The optional settings: [Fused Value]; [Core C10]; [Core C9]; [Core C8]; [Core C7]; [Core C6]; [Core C1]; [Unlimited].

- **Network Stack Configuration**

Press [Enter] to go to '**Network Stack**' screen to make further settings.

Network Stack

Use this item to enable or disable UEFI Network Stack.
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following sub-items shall appear:

Ipv4 PXE Support

Use this item to enable Ipv4 PXE Boot Support. If disabled, IPV4 PXE boot optional will not be created.
The optional settings: [Disabled]; [Enabled].

Ipv6 PXE Support

Use this item to enable Ipv6 PXE Boot Support. If disabled, IPV6 PXE boot optional will not be created.
The optional settings: [Disabled]; [Enabled].

PXE Boot Wait Time

Use this item to set wait time to press [ESC] key to abort the PXE boot.

Media Detect Count

Use this item to set number of times presence of media will be checked.
The optional settings range from [1] to [50].

- **CSM Configuration**

Press [Enter] to make settings for the following sub-items:
Compatibility Support Module Configuraton

Boot option Filter

This option controls Legacy/UEFI ROMs priority.
The optional settings: [UEFI and Legacy]; [Legacy Only]; [UEFI Only].

Network

This item controls the execution of UEFI and Legacy PXE OpROM.
The optional settings: [Do not Launch]; [UEFI]; [Legacy].

Storage

This item controls the execution of UEFI and Legacy Storage OpROM.
The optional settings: [Do not Launch]; [UEFI]; [Legacy].

Video

This item controls the execution of UEFI and Legacy Video OpROM.
The optional settings: [UEFI]; [Legacy].

Other PCI devices

This item determines OpROM execution policy for devices other than Network, Storage or Video.
The optional settings: [Do not Launch]; [UEFI]; [Legacy].

- **Wake-up Function Settings**

Press [Enter] to make settings for the following sub-items:

Wake-up System with Fixed Time

Use this item to enable or disable system wake-up by RTC alarm.
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following items shall appear:
Wake-up Hour
Use this item to select 0-23. For example enter 3 for 3am and 15 for 3pm.
Wake-up Minute
Use this item to select 0-59.
Wake-up Second
Use this item to select 0-59.

Wake-up System with Dynamic Time
Use this item to enable or disable system wake-up by RTC alarm.
System will wake on the current time + Increase minute(s).
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], system will wake on the current time + increased minute(s).

USB Wake-up from S4
Use this item to enable or disable USB S4 Wake-up.
The optional settings: [Enabled]; [Disabled].
Note:* *This function is supported when 'ERP Support**' is set as [Disabled].*

- **USB Configuration**

Press [Enter] to make settings for the following sub-items:
USB Configuration
USB Devices

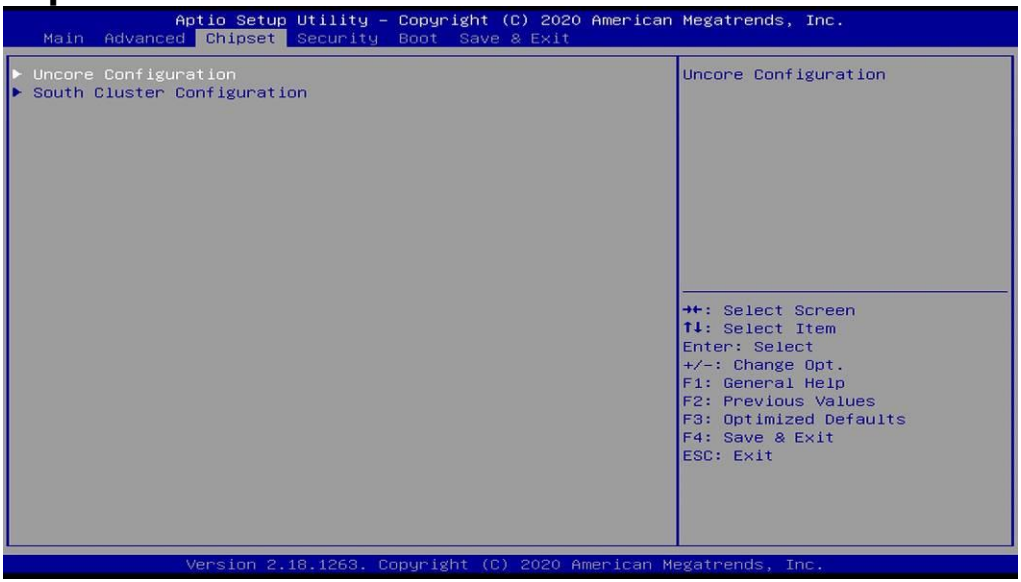
Legacy USB Support
The optional settings: [Enabled]; [Disabled]; [Auto].
[Enabled]: To enable legacy USB support.
[Disabled]: To keep USB devices available only for EFI applications.
[Auto]: To disable legacy support if no USB devices are connected.

XHCI Hand-off
This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
The optional settings: [Enabled]; [Disabled].
USB Mass Storage Driver Support
Use this item to enable or disable USB Mass Storage Driver Support.
The optional settings: [Disabled]; [Enabled].

USB Hardware Delays and Time-outs:
USB Transfer Time-out
Use this item to set the time-out value for Control, Bulk, and Interrupt transfers.
The optional settings: [1 sec]; [5 sec]; [10 sec]; [20 sec].
Device Reset Time-out
Use this item to set USB mass storage device Start Unit command time-out.
The optional settings: [10 sec]; [20 sec]; [30 sec]; [40 sec].
Device Power-up Delay
Use this item to set maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.
The optional settings: [Auto]; [Manual].
When select **[Manual]** you can set value for the following sub-item: '**Device Power-up Delay in Seconds**'**,** the delay range in from 1 to 40 seconds, in one second increments.

- ***Realtek PCIe 2.5GBE Family Controller (MAC: XX:XX:XX:XX:XX:XX)***
- ***Realtek PCIe 2.5GBE Family Controller (MAC: XX:XX:XX:XX:XX:XX)***

3-8 Chipset Menu



► **Uncore Configuration**

Press [Enter] to make settings for the following sub-items:

GTT Size

The optional settings: [2MB]; [4MB]; [8MB].

DVMT Pre-Allocated

Use this item to select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

The optional settings: [64M]; [96M]; [128M]; [160M]; [192M]; [224M]; [256M]; [288M]; [320M]; [352M]; [384M]; [416M]; [448M]; [480M]; [512M].

DVMT Total Gfx Mem

Use this item to select DVMT 5.0 Total Graphics Memory size used by the Internal Graphics Device.

The optional settings: [128M]; [256M]; [MAX].

Primary IGFX Boot Display

Use this item to select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.
The optional settings: [Auto]; [Display Port]; [HDMI1]; [HDMI2].

Secondary IGFX Boot Display

Use this item to select Secondary Display Device.
The optional settings: [Disabled]; [HDMI1]; [HDMI2].

Memory Information

The working memory information will be on display.

Total Memory

► **South Cluster Configuration**

▸ **PCI Express Configuration**

Press [Enter] to make settings for the following sub-items:

PCI Express Configuration

Peer Memory Write Enable

The optional settings: [Disabled]; [Enabled].

Compliance Mode

The optional settings: [Disabled]; [Enabled].

Onboard PCIE LAN1

The optional settings: [Disabled]; [Enabled].

Onboard PCIE LAN2

The optional settings: [Disabled]; [Enabled].

▸ **SATA Configuration**

Press [Enter] to make settings for the following sub-items:

SATA Controller

Use this item to enable or disable the Chipset SATA Controller. The Chipset SATA controller supports the 2 black internal SATA ports (up to 3Gb/s

supported per port).
The optional settings: [Enabled]; [Disabled].
When set as **[Enabled]**, the following items shall appear:
SATA Mode Selection
Use this item to determine how SATA controller(s) operate.
The default setting is: [AHCI].

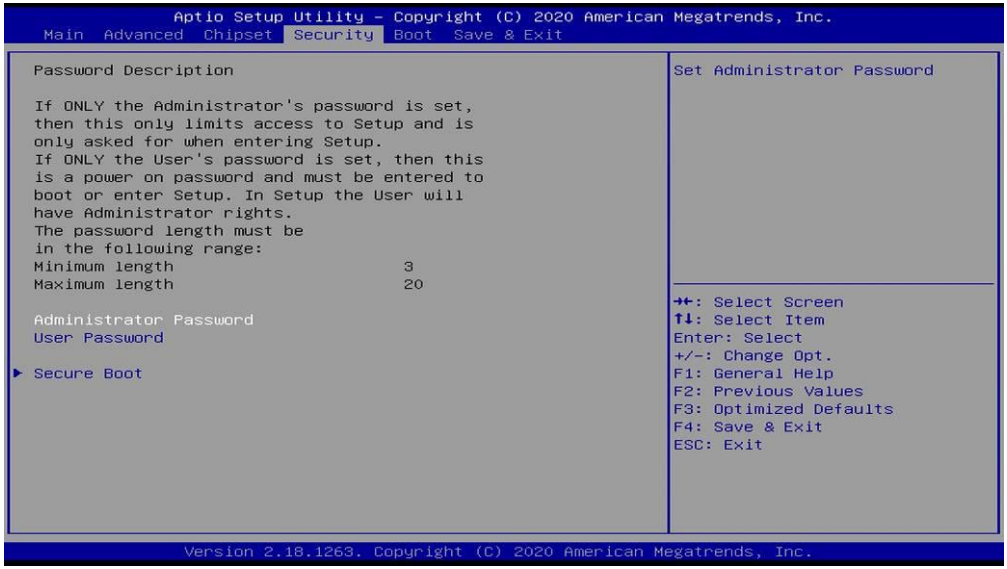
SATA Port
SATA Port
Use this item to enable or disable SATA Port.
The optional settings: [Disabled]; [Enabled].

M.2
M.2
Use this item to enable or disable SATA port.
The optional settings: [Disabled]; [Enabled].

HD-Audio Support
Use this item to enable or disable HD-Audio Support.
The optional settings: [Disabled]; [Enabled].
SCC eMMC Support
Use this item to enable or disable SCC eMMC Support.
The optional settings: [Disabled]; [Enabled].
eMMC Max Speed
Use this item to select the eMMC max Speed allowed.
The optional settings: [HS400]; [HS200]; [DDR50].

System State after Power Failure
Use this item to specify what state to go to when power re-applied after a power failure.
The optional settings: [Always On]; [Always Off]; [Former State].

3-9 Security Menu



Security menu allow users to change administrator password and user password settings.

Administrator Password

If there is no password present on system, please press [Enter] to create new administrator password. If password is present on system, please press [Enter] to verify old password then to clear/change password. Press again to confirm the new administrator password.

User Password

If there is no password present on system, please press [Enter] to create new administrator password. If password is present on system, please press [Enter] to verify old password then to clear/change password. Press again to confirm the new administrator password.

- **Secure Boot**

  Press [Enter] to make customized secure settings:

Secure Boot Control

Secure Boot can be enabled if 1. System running in User mode with enrolled Platform Key (PK); 2. CSM function is disabled.

The optional settings: [Disabled]; [Enabled].

Secure Boot Mode

Use this item to set UEFI Secure Boot Mode to Standard mode or Custom mode. This change is effective after save. After reset, this mode will return to Standard mode.

The optional settings: [Standard]; [Custom].

When set as [**Custom**], user can make further settings in the following items that show up:

- **Key Management**

This item enables experienced users to modify Secure Boot variables.

Press [Enter] to make customized secure settings:

Provision Factory Default Keys

This item is for user to install factory default secure boot keys when system is in Setup Mode.

The optional settings: [Disabled]; [Enabled].

- **Enroll All Factory Default Keys**

This item forces system to User Mode-install all Factory Default keys.

- ***Save All Secure Boot Variables***

  Secure Boot Variable/Size/Key#/Key Source

- **Platform Key (PK)/Key Exchange Keys/Authorized Signatures/Forbidden Signatures/Authorized TimeStamps/OsRecovery Signatures**

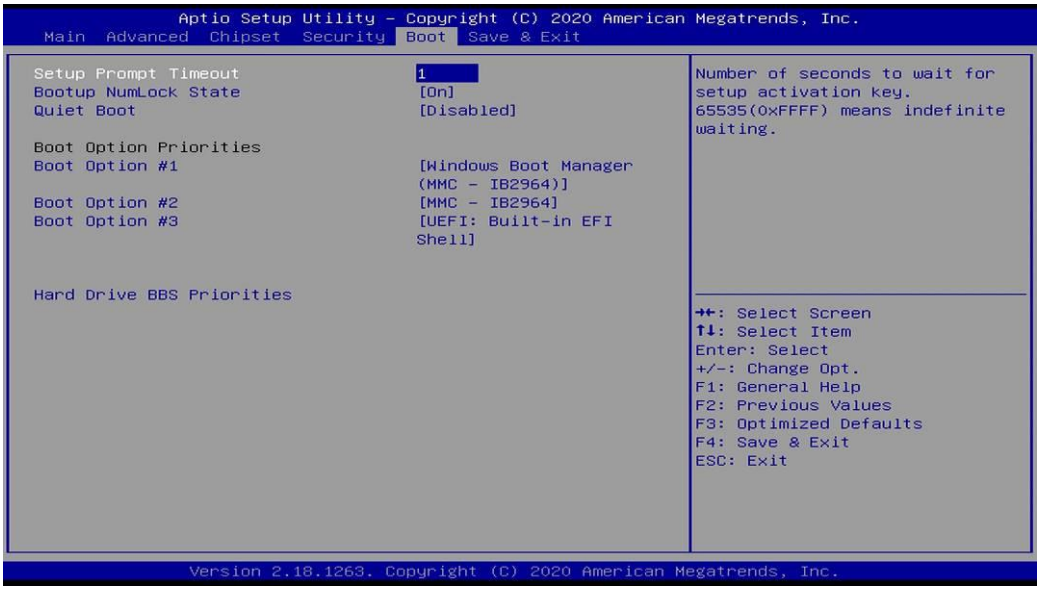
Use this item to enroll Factory Defaults or load the keys from a file with:

1. Public Key Certificate in:
   a) EFI_SIGNATURE_LIST
   b) EFI_ CERT_X509 (DER encoded)
   c) EFI_ CERT_RSA2048 (bin)
   d) EFI_ CERT_SHA256 (bin)

2. Authenticated UEFI Variable

Key: Vendor, Custom, Mixed, Test (*) modified from Setup menu

3-10 Boot Menu

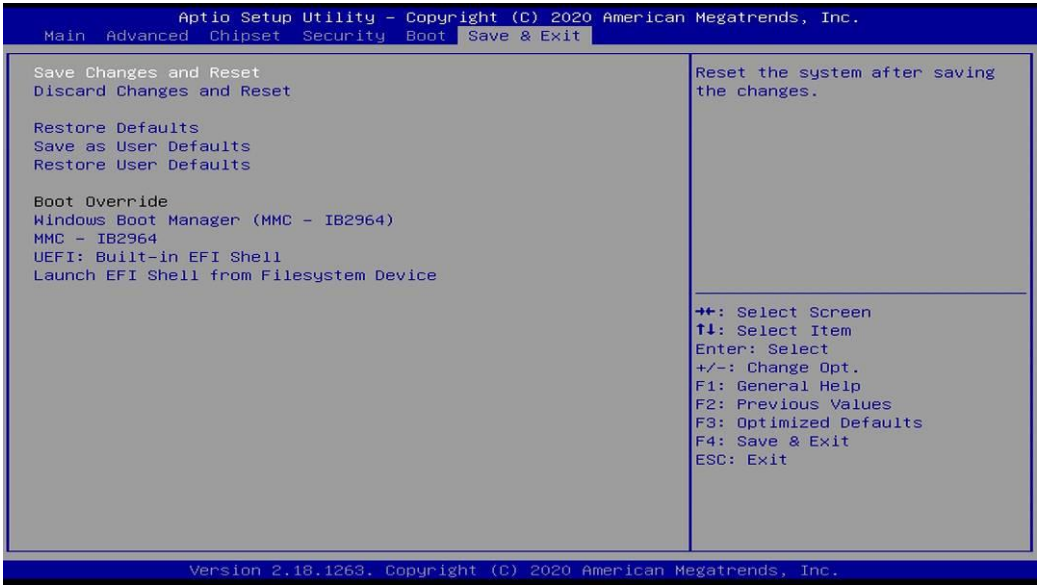


Setup Prompt Timeout
Use this item to set number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State
Use this item to select the keyboard NumLock state.
The optional settings: [On]; [Off].
Quiet Boot
The optional settings: [Disabled]; [Enabled].

Boot Option Priorities

Boot Option #1/#2/#3
Use this item to set the system boot order.
The optional settings: [Windows Boot Manager (MMC – BJTD4R)]; [MMC - BJTD4R]; [UEI: Built-in EFI Shell]; [Disabled].
Hard Drive BBS Priorities
Use this item to set the order of the legacy devices in this group.
Press [Enter] to make customized secure settings:
Boot Option#1
Use this item to set the system boot order.
The optional settings: [MMC - BJTD4R]; [Disabled].

3-11 Save & Exit Menu



Save Changes and Reset
This item allows user to reset the system after saving the changes.
Discard Changes and Reset
This item allows user to reset the system without saving any changes.

Restore Defaults
Use this item to restore /load default values for all the setup options.
Save as User Defaults
Use this item to save the changes done so far as user defaults.
Restore User Defaults
Use this item to restore defaults to all the setup options.

Boot Override

The available options here are dynamically updated and make system boot to any boot option selected.
Windows Boot Manager (MMC – BJTD4R)
Use this item to save or reset configuration of Windows Boot Manager (MMC – BJTD4R).
MMC - BJTD4R
Use this item to save or reset configuration of MMC – BJTD4R.
UEFI: Built-in EFI Shell
Use this item to save or reset configuration of UEFI.
Lauch EFI Shell from Filesystem Device
Use this item to launch EFI shell application (shell.efi) from one of the available filesystem device.