Technical Manual

Of

Intel Apollo Lake Series CPU

Based SBC

NO.G03-NP691N-F

Revision: 1.0

Release date: November 11, 2021

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.

TABLE OF CONTENT

⚠ CAUTION 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
1.0	First Edition	November 11, 2021

Item Checklist

- ☑ Motherboard
- ☑ Cable(s)

Chapter 1
Introduction of the Motherboard

1-1   Feature of Motherboard

■ Onboard Intel® Apollo Lake Series Processor, with low power consumption and high performance

■ Support 1* DDR3L 1866 MHz SO-DIMM, up to 8GB

■ 1* HDMI port & 1* LVDS, supports dual independent display

■ Onboard 1* full-size Mini-PCIE slot & 1* SIM card slot

■ Onboard 1* SATAIII port &1* M.2 Socket 3 slot for M-Key type 2242 SATA SSD

■ Support RJ-45 gigabit Ethernet LAN port

■ Support USB 3.0 data transport demand

■ Compliance with ErP standard

■ Support Watchdog function

■ Solution for IoT, Machine Control & Intelligent Home

1-2   Specification

Spec	Description
Design	● 8-layer 2.5'' SBC, Pico-size form factor; PCB size: 10 cm x 7.2 cm
Embedded CPU	● Intel® Apollo Lake series CPU * *for detailed CPU support information please visit our website*
Memory Slot	● 1*DDR3L SO-DIMM slot ● Support DDR3L 1866 MHz SO-DIMM up to 8GB
Expansion Slot	● 1* full-size Mini-PCIE slot **(MPE)** ● 1* SIM card slot (**SIMCARDB1**)
Storage	● 1* SATAIII 6Gb/s port ● 1* M.2 Socket 3 slot (M2, M-key, support type-2242 SATA SSD)
LAN Chip	● Integrated with Realtek 8111H Gigabit LAN chip ● Support Fast Ethernet LAN function of providing 10/100/1000Mbps Ethernet data transfer rate
Audio Chip	● Realtek HD audio chip
BIOS	● AMI Flash ROM
Rear Panel I/O	● 1* 12V DC-in power connector ● 2* USB 3.0 port ● 1* HDMI port ● 1* RJ-45 LAN port
Internal I/O	● 1* SATA Power-out connector ● 1* Front panel header ● 1* 9-Pin USB 2.0/1.1 header for 2* USB 2.0/1.1 ports ● 1* SMBUS header ● 1* Buzzer header ● 1* RS232/422/485 serial port (**COM1**) ● 1* RS232 serial port (**COM2**) ● 1* Front panel audio header ● 1* GPIO header ● 1* LVDS header ● 1* LVDS inverter header

1-3   Layout Diagram

IO Panel Diagram:

RJ-45 LAN Port

HDMI Port

USB 3.0 Ports

12V DC-in Power Jack
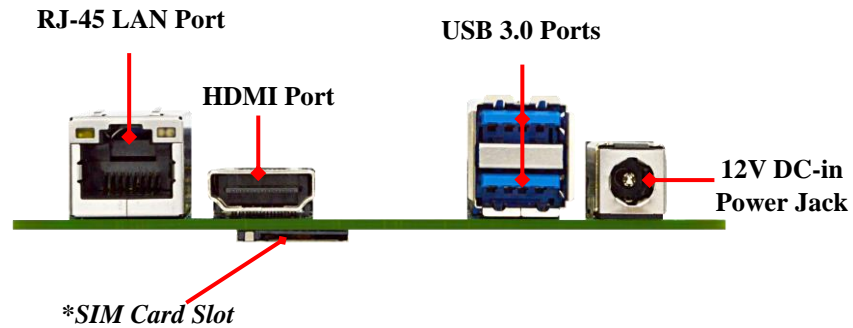
***SIM Card Slot**

*Note: **SIM card slot** is on the back side of the board and only works **when** compatible SIM card installed & 3G LAN card installed in full-size Mini-PCIE **(MPE)** slot.*

Internal Diagram-Front Side:
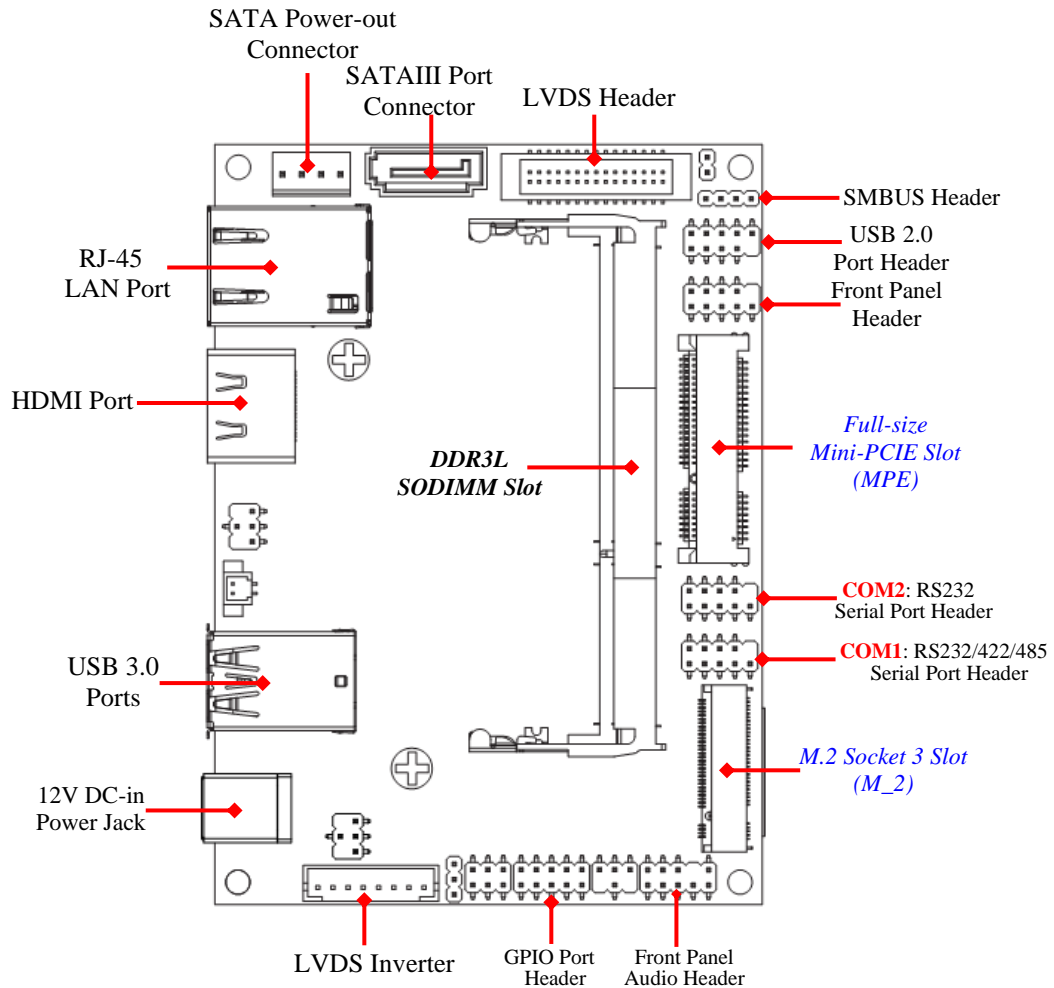
SATA Power-out Connector

SATAIII Port Connector

LVDS Header

SMBUS Header

USB 2.0 Port Header

Front Panel Header

RJ-45 LAN Port

HDMI Port

Full-size Mini-PCIE Slot (MPE)

DDR3L SODIMM Slot

COM2: RS232 Serial Port Header

COM1: RS232/422/485 Serial Port Header

M.2 Socket 3 Slot (M_2)

USB 3.0 Ports

12V DC-in Power Jack

LVDS Inverter

GPIO Port Header

Front Panel Audio Header

*Note: **1.** SODIMM module should be **1.35V DDRIII** SODIMM and **not exceeding 8GB total capacity**.*
***2**. **SIM card slot** only work **when** compatible SIM card installed & 3G LAN card installed in full-size Mini-PCIE **(MPE)** slot.*

Internal Diagram-Back Side:
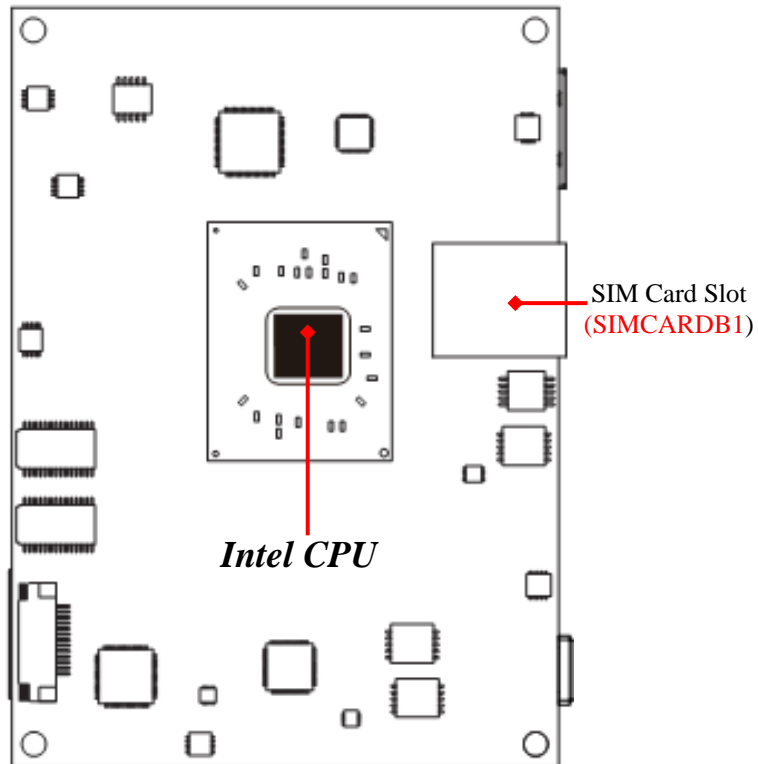
SIM Card Slot
(SIMCARDB1)

Intel CPU

Note: **1.** SODIMM module should be **1.35V DDRIII** SODIMM and **not exceeding 8GB total capacity**.
2. **SIM card slot** only work **when** compatible SIM card installed & 3G LAN card installed in full-size Mini-PCIE **(MPE)** slot.

Motherboard Jumper Positions:

JPLCD

JPCLR

JPLED

JAT_ATX

JPCOM1
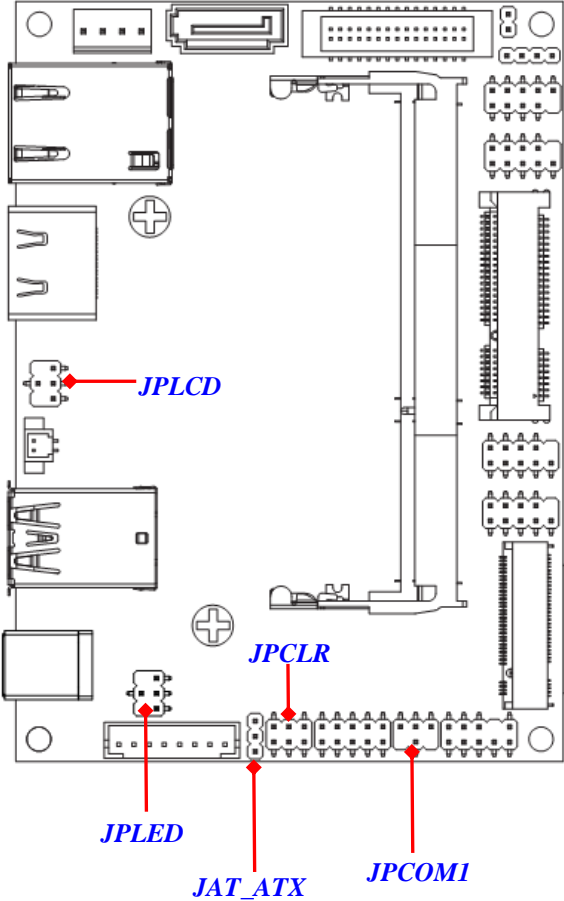
Jumper

Jumper	Name	Description
JPCLR	**Pin (1-2):** Clear CMOS RAM Settings **Pin (3-4):** RTC Reset for clear Flash **Pin (5-6):** TXE Override	6-Pin Block (2.0 pitch)
JAT_ATX	ATX/AT Mode Select	3-Pin Block (2.0 pitch)
JPCOM1	COM1 Port Pin9 Function Select	4-Pin Block (2.0 pitch)
JPLCD	LVDS Panel VCC Select	4-Pin Block (2.0 pitch)
JPLED	LVDS LED VCC Select	4-Pin Block (2.0 pitch)

Connectors

Connector	Name
DCIN1	12V DC–in System Power Jack
USB1	USB 3.0 Port Connector x2
HDMI	HDMI Port Connector
LAN1	RJ-45 LAN Port Connector
SATA	SATAIII Port Connector
PWROUT	SATA Power out Connector

Headers

Header	Name	Description
FP	Front Panel Header(PWR LED/ HD LED/Power Button /Reset)	9-pin Block (2.0 pitch)
USB3	USB2.0 Port Header	9-pin Block (2.0 pitch)
SMBUS	SMBUS Header	4-pin Block (2.0 pitch)
BUZZ	Buzzer Header	2-pin Block (2.0 pitch)
COM1	RS232/422/485 Serial Port Header	9-pin Block (2.0 pitch)
COM2	RS232 Serial Port Header	9-pin Block (2.0 pitch)
FP_AUDIO	Front Panel Audio Header	9-pin Block (2.0 pitch)
GPIO	GPIO Port Header	10-pin Block (2.0 pitch)
LVDS	LVDS Port Header	30-pin Block (1.25 pitch)
INVERTER	LVDS Inverter Header	8-pin Block (2.0 pitch)

Chapter 2
Hardware Installation

2-1 Jumper Settings

Pin 1&2 of JPCLR(6-pin): Clear CMOS RAM Settings (2.0 pitch)
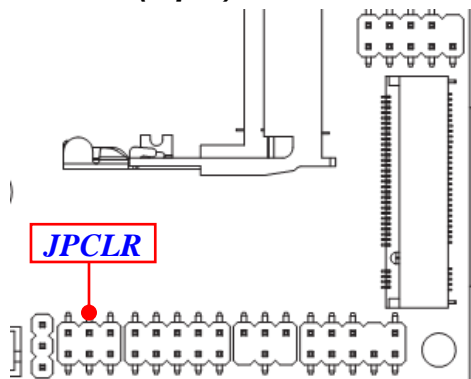
Pin (1&2) of JPCLR→ Clear CMOS
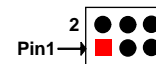
1-2 Open: Normal(Default);
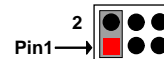
1-2 Closed: Clear CMOS(One Touch).

Pin 3&4 of JPCLR (6-pin): RTC Reset for Clear Flash (2.0 pitch)
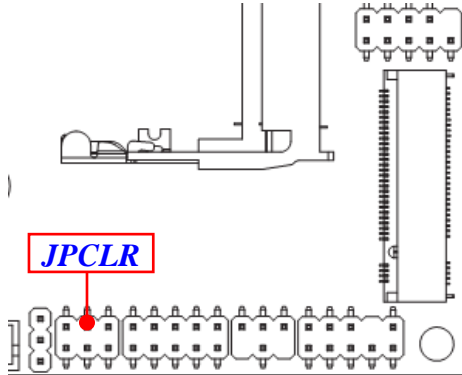
Pin (3&4) of JPCLR→
Reset RTC for Clear Flash

2
Pin1→

3-4 Open: Normal;

2
Pin1→
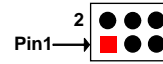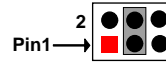
3-4 Closed: Reset RTC.

Pin 5&6 of JPCLR (6-pin): Flash Deacriptors Override Select (2.0 pitch)
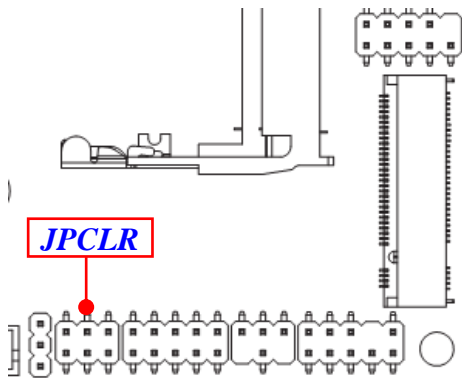
Pin (5&6) of JPCLR→ Flash Override

2
Pin1→
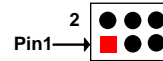
5-6 Open:Enable Security Measures
in the Flash Descriptor(Default)；

2
Pin1→
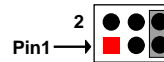
5-6 Closed: Disable Security Measures
in the Flash Descriptor(Override).

JAT_ATX (3-pin): AT Mode /ATX Mode Select (2.0 pitch)

JAT_ATX→ATX/AT Mode Select

3 ●
  ●
1 ■
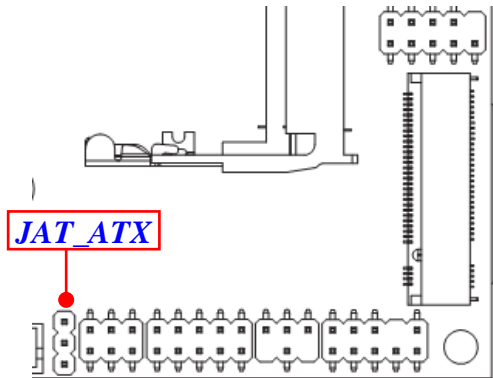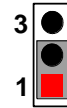
1-2 Closed: ATX Mode Selected;

3 ●
  ●
1 ■
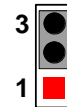
2-3 Closed: AT Mode Selected.

ATX Mode Selected: Press power button to power on after power input ready;
AT Mode Selected: Directly power on as power input ready.

JPCOM1 (4-pin): COM1 Header Pin9 Function Select (2.0 pitch)
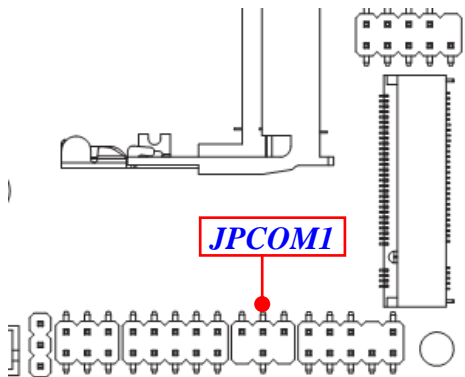
JPCOM1→COM1 Header Pin-9
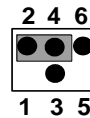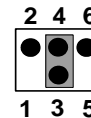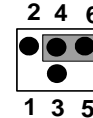
2 4 6	2 4 6	2 4 6
● ● ●	● ● ●	● ● ●
●	●	●
1 3 5	1 3 5	1 3 5
2-4 Closed:	**3-4 Closed:**	**4-6 Closed:**
Pin9=RS232;	**Pin9 = 5V;**	**Pin9 = 12V.**

JPLED (4-pin): LVDS Panel Inverter Backlight LED VCC Select (2.0 pitch)
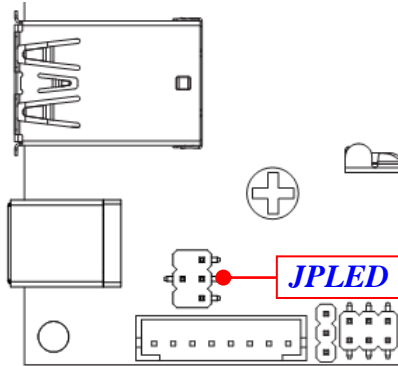
JPLED→LVDS Panel Backlight VCC
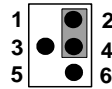
2-4 Closed: VCC=5V;
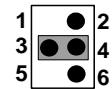
3-4 Closed: VCC= 12V;
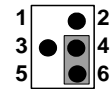
4-6 Closed: VCC=Adapter 12V.

JPLED

JPLCD (4-pin): LVDS Panel VCC 3.3V/5V/12V Select (2.0 pitch)
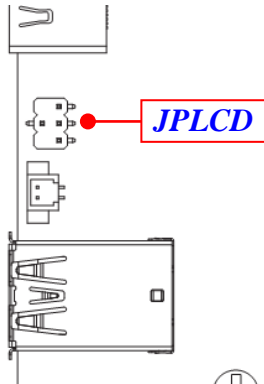
JPLCD

JPLCD→LVDS Panel VCC
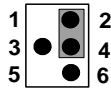
2-4 Closed: VCC=3.3V;
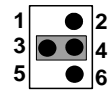
3-4 Closed: VCC= 5V;
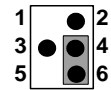
4-6 Closed: VCC= 12V.

2-2　Connectors and Headers

2-2-1 Connectors

(1) Rear Panel Connectors
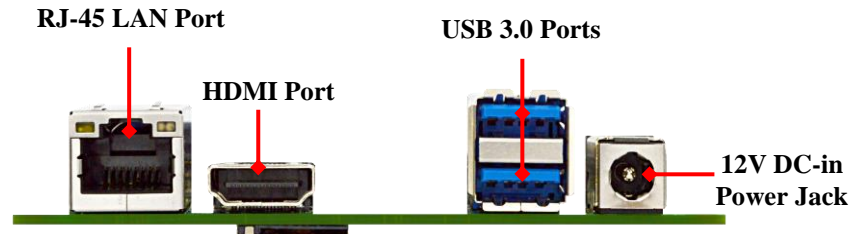
Icon	Name	Function
	RJ-45 LAN Port	This connector is standard RJ-45 LAN jack for Network connection.
	HDMI Port	To connect display device that support HDMI specification.
	USB 3.0 Port	To connect USB keyboard, mouse or other devices compatible with USB specification. USB 3.0 ports supports up to 5Gbps data transfer rate.
	Power Connector	12V DC–in system power connector For user to connect compatible power adapter to provide power supply for the system.

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

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

SATA

Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND
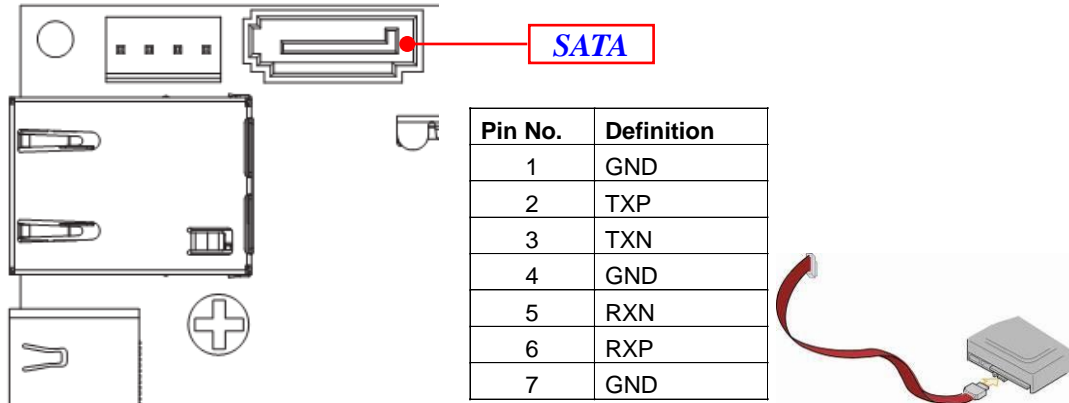
(3) PWROUT (4-pin): SATA HDD Power-Out Connector (2.54 pitch)

PWROUT

Pin 1

+12V GND GND +5V
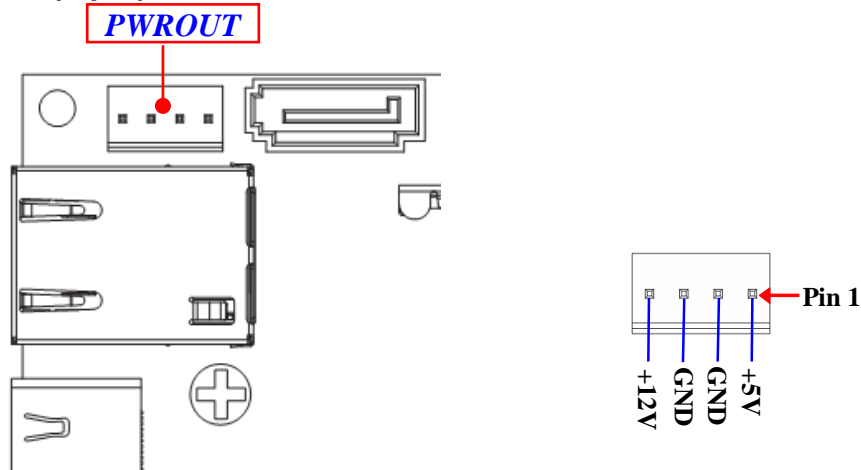
Warning: *Make sure that Pin-1 of compatible SATA Power connector is inserted into corresponding Pin-1 of* **PWROUT** *connector to avoid possible damage to the board and hard disk driver!*

2-2-2 Headers

FP (9-pin): Front Panel Header (2.0 pitch)
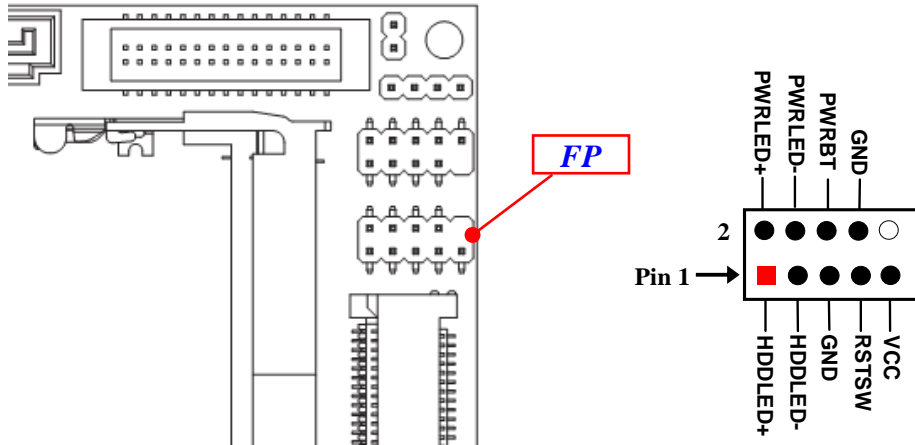
USB3 (9-pin): USB 2.0 Port Header (2.0 pitch)
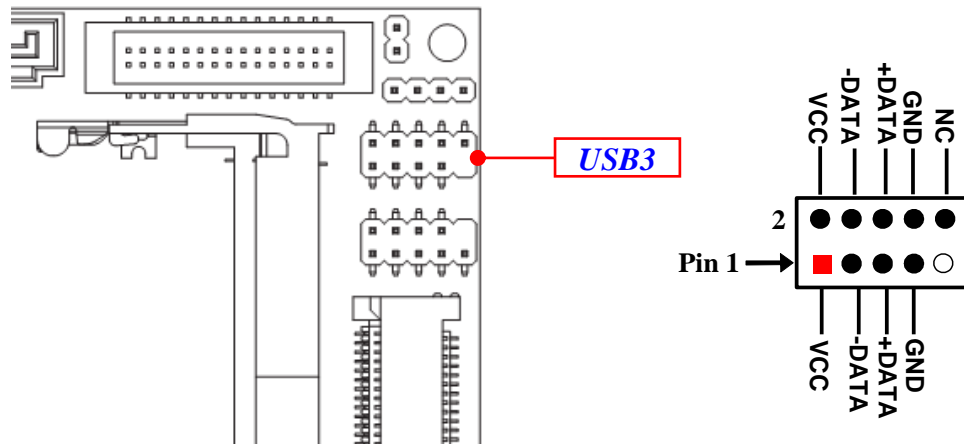
SMBUS (4-Pin): SMBUS Header (2.0 pitch)

SMBUS

SMBUS_DATA
SMBUS_CLK
VCC
GND
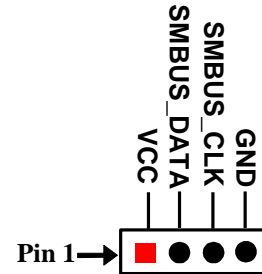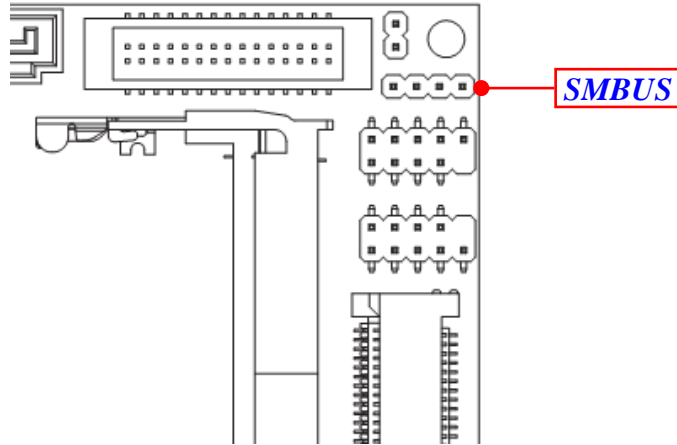
Pin 1 →

BUZZ (2-pin): Buzzer Header (2.0 pitch)

BUZZ

Buzzer-

2

Pin1 →

Buzzer+
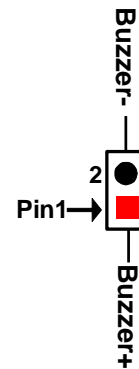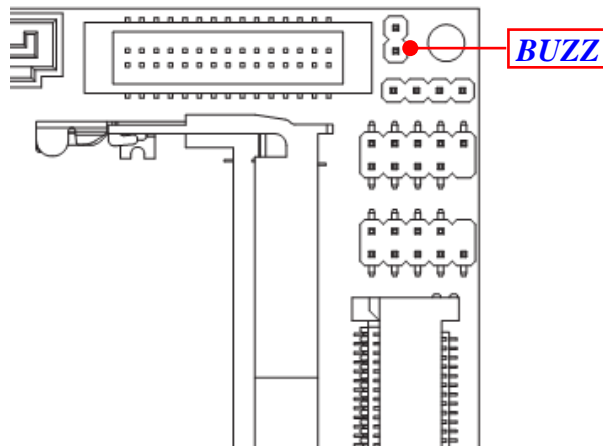
COM1/2 (9-pin): Serial Port Headers (2.0 pitch)
      COM1：RS232/422/485 Serial Port Header;
      COM2：RS232 Serial Port Header.
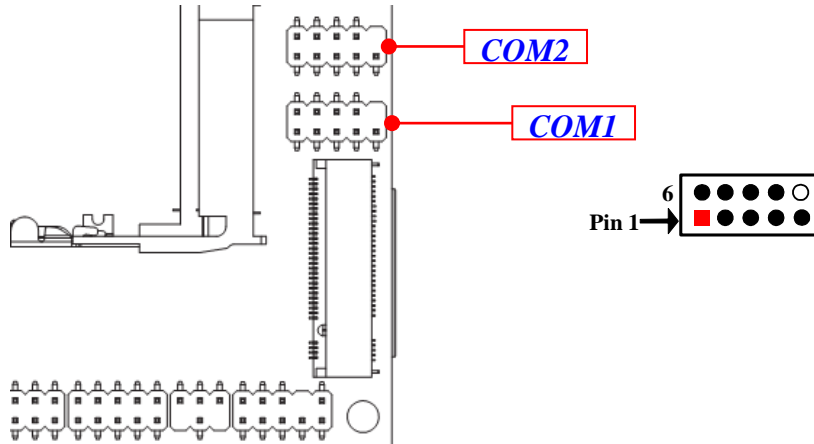
Pin NO.	RS232	*RS422	*RS485
Pin 1	DCD	TX-	DATA-
Pin 2	RXD	TX+	DATA+
Pin 3	TXD	RX+	NC
Pin 4	DTR	RX-	NC
Pin 5	GND	GND	GND
Pin 6	DSR	NC	NC
Pin 7	RTS	NC	NC
Pin 8	CTS	NC	NC
Pin 9	RI	NC	NC

***Notice:** RS422, RS485 function is supported by COM1 header only, with compatible COM cable for RS422 or RS 485 function. User also needs to go to BIOS to set 'Transmission Mode Select' for COM1 (refer to Page 27).*

FP_AUDIO (9-pin): Line-Out, MIC-In Header (2.0 pitch)

This header connects to Front Panel Line-out, MIC-In connector with cable.
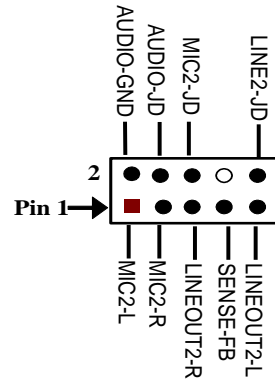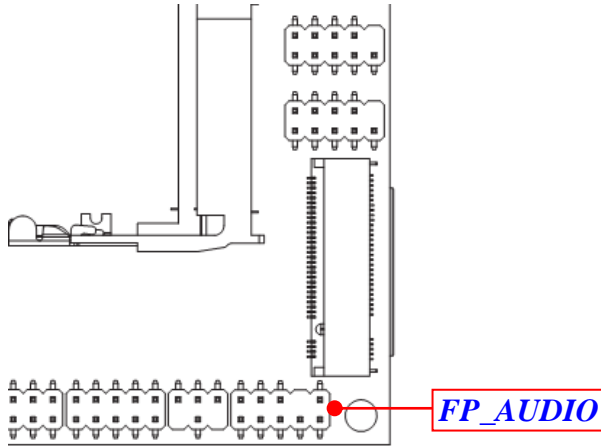
GPIO (10-pin): GPIO Port Header (2.0 pitch)
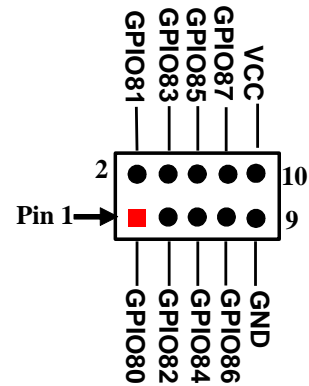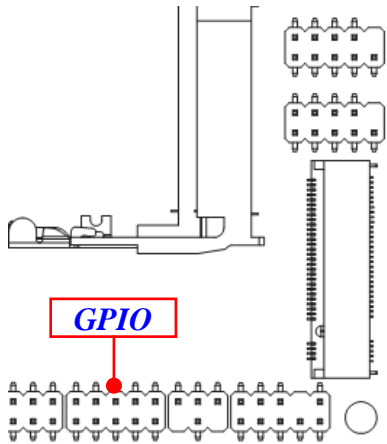
LVDS (30-pin): 24-bit Dual Channel LVDS Header (1.25 pitch)
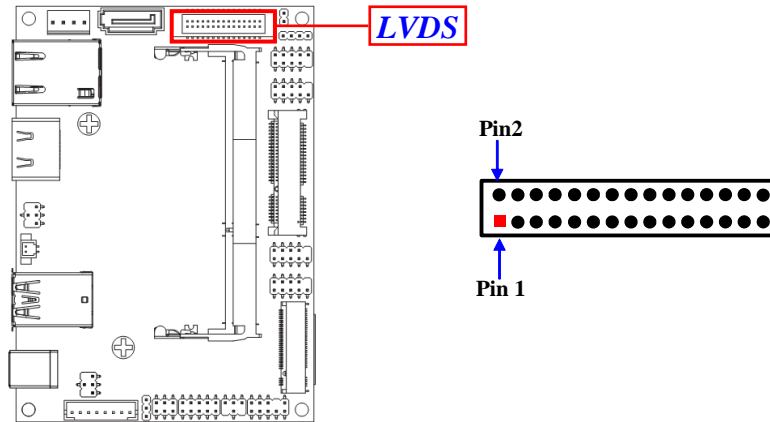
Pin NO.	Pin Define	Pin NO.	Pin Define
Pin 30	LCD VCC	Pin 29	LCD VCC
Pin 28	LCD VCC	Pin 27	LCD VCC
Pin 26	LVDSA_DATAN0	Pin 25	LVDSA_DATAP0
Pin 24	LVDSA_DATAN1	Pin 23	LVDSA_DATAP1
Pin 22	LVDSA_DATAN2	Pin 21	LVDSA_DATAP2
Pin 20	LVDS_CLKAN	Pin 19	LVDS_CLKAP
Pin 18	LVDSA_DATAN3	Pin 17	LVDSA_DATAP3
Pin 16	GND	Pin 15	GND
Pin 14	GND	Pin 13	GND
Pin 12	NC/DDC_CLK	Pin 11	NC/DDC_DATA
Pin 10	LVDSB_DATAP0	Pin 9	LVDSB_DATAN0
Pin 8	LVDSB_DATAP1	Pin 7	LVDSB_DATAN1
Pin 6	LVDSB_DATAP2	Pin 5	LVDSB_DATAN2
Pin 4	LVDS_CLKBP	Pin 3	LVDS_CLKBN
Pin 2	LVDSB_DATAP3	Pin 1	LVDSB_DATAN3

INVERTER (8-pin): LVDS Inverter Connector (2.0 pitch)

Pin 1
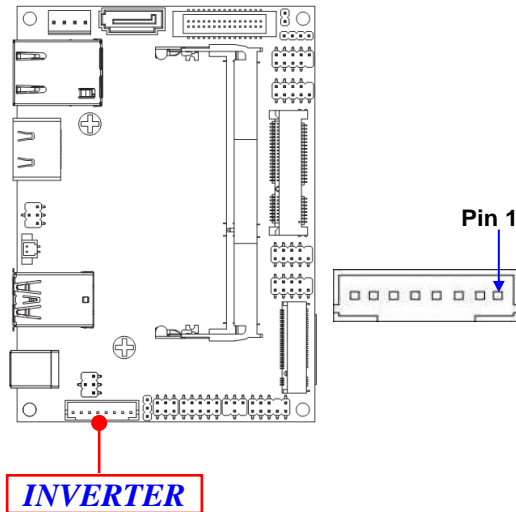
Pin No.	Definition
1	Backlight Enable
2	Backlight PWM
3	Back Light LED VCC
4	Back Light LED VCC
5	GND
6	GND
7	Backlight Up SW
8	Backlight Down SW

INVERTER

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 Popup Menu.

```
         Please select boot device:

UEFI: Built-in EFI Shell
Enter Setup

         ↑ and ↓ to move selection
      ENTER to select boot device
      ESC to boot using defaults
```
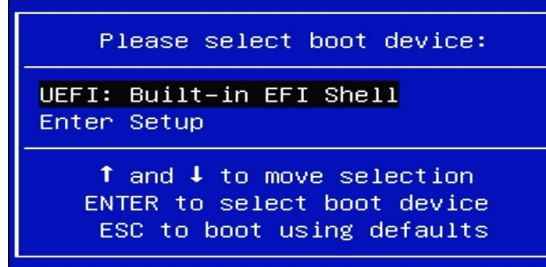
3-2   BIOS Menu Screen

The following diagram show a general BIOS menu screen:

Menu Bar

```
          Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

    BIOS Information                                        Set the Date. Use Tab to
    BIOS Vendor                  American Megatrends        switch between Date elements.
    Core Version                 5.12
    Filename                     BATNPA01
    Build Date and Time          11/04/2021 17:38:47

    TXE FW Version               3.1.90.2629

    Access Level                 Administrator

    System Date                  [Sat 01/02/2021]
    System Time                  [11:26:18]
                                                           →←: 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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```

General Help Items

Menu Items

Current Setting Value

Function Keys

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.

```
           Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

  BIOS Information                                           Set the Date. Use Tab to
  BIOS Vendor                   American Megatrends          switch between Date elements.
  Core Version                  5.12
  Filename                      BATNPA01
  Build Date and Time           11/04/2021 17:38:47

  TXE FW Version                3.1.90.2629

  Access Level                  Administrator

  System Date                   [Sat 01/02/2021]
  System Time                   [11:26:18]

                                                            →←: 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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```

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

3-7 Advanced Menu
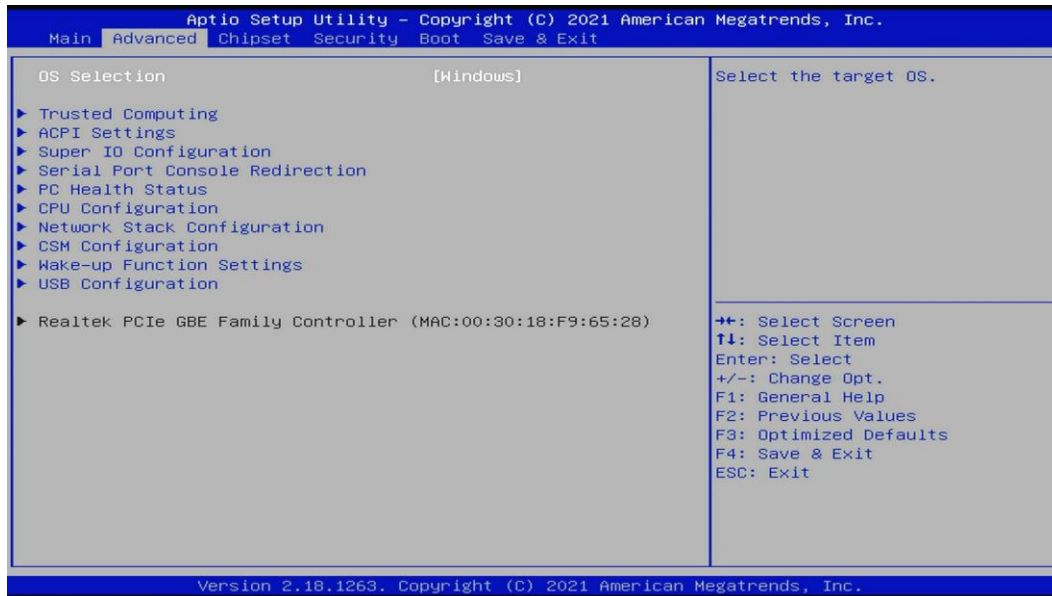
OS Selection
The optional settings are: [Windows]; [Intel Linux]; [MSDOS].

** **Note:** User needs 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.
*** Note**: *O.S. will not show security device. TCG EFI protocol and INT1A interface will not be available.*
The optional settings are: [Disabled]; [Enabled].
When set as **[Enable]**, the following sub-items shall appear:
SHA-1 PCR Bank
Use this item to enable or disable SHA-1 PCR Bank.
The optional settings are: [Disabled]; [Enabled].
SHA256 PCR Bank
Use this item to enable or disable SHA256 PCR Bank.
The optional settings are: [Disabled]; [Enabled].
Pending Operation
Use this item to schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
The optional settings are: [None]; [TPM Clear].

► **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 are: [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**
Press [Enter] to make settings for the following items:
Serial Port 1 Configuration

Serial Port

Use this item to enable or disable serial port (COM).

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

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

Change Settings

Use this item to select an optimal setting for super IO device. *Changing setting may conflict with system resources.*

The optional settings are: [Auto]; [IO=3F8h; IRQ=4]; [IO=2F8h; IRQ=3]; [IO=3E8h; IRQ=4]; [IO=2E8h; IRQ=3].

Transmission Mode Select

The optional settings are: [RS422]; [RS232]; [RS485].

Mode Speed Select

The optional settings are: [RS232/RS422/RS485=250kbps]; [RS232=1Mbps, RS422/RS485=10Mbps].

► **Serial Port 2 Configuration**

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

Serial Port 2 Configuration

Serial Port

Use this item to enable or disable serial port (COM).

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

When set as [Enabled], the following sub-item shall appears:

Change Settings

Use this item to select an optimal setting for super IO device. **Changing setting may conflict with system resources.**

The optional settings are: [Auto]; [IO=3F8h; IRQ=4]; [IO=2F8h; IRQ=3]; [IO=3E8h; IRQ=4]; [IO=2E8h; IRQ=3].

ERP Support

Use this item to enable or disable energy-related products function.

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

This item should be set as [**Disabled**] if you wish to have all active wake-up functions.

WatchDog Reset Timer
Use this item to enable or disable WDT reset function. When set as **[Enabled]**, the following sub-items shall appear:
WatchDog Reset Timer Value
User can set a value in the range of [10] to [255].
WatchDog Reset Timer Unit
The optional settings are: [Sec.]; [Min.].
WatchDog Wake-up Timer
This item support WDT wake-up.
The optional settings are: [Enabled]; [Disabled]. 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 are: [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 10, JAT_ATX block Pin 1-2 of ATX Mode & Pin 2-3 of AT Mode Select*).

▸ **Serial Port Console Redirection**
COM1
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:

Terminal Type

The optional settings are: [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 are: [9600]; [19200]; [38400]; [57600]; [115200].

Data Bits

The optional settings are: [7]; [8].

Parity

A parity bit can be sent with the data bits to detect some transmission errors.

The optional settings are: [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 are: [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 are: [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 are: [Disabled]; [Enabled].
Recorder Mode
With this mode enable only text will be sent. This is to capture Terminal data.
The optional settings are: [Disabled]; [Enabled].
Resolution 100x31
Use this item to enable or disable extended terminal resolution.
The optional settings are: [Disabled]; [Enabled].
Legacy OS Redirection Resolution
On Legacy OS, the Number of Rows and Columns supported redirection.
The optional settings are: [80x24]; [80x25].
Putty KeyPad
Use this item to select FunctionKey and KeyPad on Putty.
The optional settings are: [VT100]; [Intel Linux]; [XTERMR6]; [SCO]; [ESCN]; [VT400].
Redirection After BIOS POST
The optional settings are: [Always Enable]; [BootLoader].
Whet set as **[BootLoader]**, then Lagacy Console Redirection is disabled before booting to legacy OS. When set as **[Always Enable]**, then Legacy Console is enabled for legacy OS. Default setting for this option is set to [Always Enable].
Serial Port for Out-of-Band Management/
Windows Emergency Management Services (EMS)

Console Redirection
The optional settings are: [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 optional setting is: [COM1].

Terminal Type

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

[VT-UTF8] is the preferred terminal type for out-of-band management. The next best choice is [VT100+] and then [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 are: [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.

► **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 are: [Enabled]; [Disabled].
EIST
Use this item to enable or disable Intel SpeedStep.
The optional settings are: [Disabled]; [Enabled].
Turbo Mode
Use this item to enable or disable Turbo Mode.
The optional settings are: [Disabled]; [Enabled].
C-States
Use this item to enable or disable C States.
The optional settings are: [Disabled]; [Enabled].
When set as **[Enabled]**, users can make more settings in following:
　　Enhanced C-states
　　Use this item to enable or disable C1E. When set as **[Enabled]**, CPU will switch to minimum speed when all cores enter C-state.
　　The optional settings are: [Disabled]; [Enabled].
Max Package C State
This item controls Max Package C state that the processor will support.
The optional settings are: [PC2]; [PC1]; [C0].
Max Core C State
This item controls the max Core C State that cores will support.
The optional settings are: [Fused Value]; [Core C10]; [Core C9] [Core C8]; [Core C 7]; [Core C 6]; [Core C1]; [Unlimited].

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

Network Stack
The optional settings are: [Enabled]; [Disabled].
When set as **[Enabled]**, the following sub-items shall appear:
Ipv4 PXE Support
Use this item to enable Ipv4 PXE Boot Support. When set as **[Disabled]**, Ipv4 boot option will not be created.
The optional settings are: [Disabled]; [Enabled].
Ipv6 PXE Support
Use this item to enable Ipv6 PXE Boot Support. When set as **[Disabled]**, Ipv6 boot option will not be created.
The optional settings are: [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 item controls Legacy/UEFI ROMs priority.
The optional settings are: [UEFI and Legacy]; [Legacy only]; [UEFI only].
Network
This item controls the execution of UEFI and Legacy PXE OpROM.
The optional settings are: [Do not Launch]; [UEFI]; [Legacy].
Storage
This item controls the execution of UEFI and Legacy Storage OpROM.
The optional settings are: [Do not Launch]; [UEFI]; [Legacy].
Video
This item controls the execution of UEFI and Legacy Video OpROM.
The optional settings are: [UEFI]; [Legacy].

Other PCI devices
This item determines OpROM execution policy for devices other than Network, storage or video.
The optional settings are: [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 are: [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 on alarm event.
System will wake on the current time + Increase minutes.
The optional settings are: [Disabled]; [Enabled].
When set as **[Enabled]**, the following items shall appear:
Wake-up Time Increase
Use this item to select 1-60 minute(s).
USB Wake-up from S4
Use this item to enable or disable USB wake-up fromS4.
The optional settings are: [Disabled]; [Enabled].
***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

Legacy USB Support
The optional settings are: [Enabled]; [Disabled]; [Auto].
[Enabled]: To enable legacy USB support.
[Disabled]: To keep USB devices available only for EFI specification,
[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 are: [Enabled]; [Disabled].
USB Mass Storage Driver Support
Use this item to enable or disable USB Mass Storage Driver Support.
The optional settings are: [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 are: [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 are: [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.
The optional settings are: [Auto]; [Manual].
'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is
taken from hub descriptor.
Select [Manual] you can set value for the following sub-item: '**Device Power-up
Delay in Seconds'.**
Device Power-up Delay in Seconds
The delay range is from [1] to [40] seconds, in one second increments.

► **Realtek PCIe GBE Family Controller(MAC:XX:XX:XX:XX:XX:XX**
These items show current network brief information.

3-8 Chipset Menu

```
             Aptio Setup Utility – Copyright (C) 2021 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

 ► Uncore Configuration                                Uncore Configuration
 ► South Cluster Configuration




                                                       →←: 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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```

► **Uncore Configuration**
Press [Enter] to make settings for the following sub-items:
GTT Size
The optional settings are: [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 are: [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 graphic memory size used by the internal graphics device.
The optional settings are: [128M]; [256M]; [MAX].

Active LFP
The optional settings are: [Disabled]; [Enabled].

When set as **[Disabled], only '**Primary IGFX Boot Display**' shows up, with only one default setting [**Auto**].*

*When set as **[Enabled]**, both '**Primary IGFX Boot Display**' and '**Secondary IGFX Boot Display**' will show up for user to make further settings. User can also make further settings in '**LVDS Panel Type**' and '**LVDS FW Protect**':*

Primary IGFX Boot Display
Use this item to select the video device which will be activated during POST.
The default setting is: [Auto] when '**Active LFP**' is set as [Disabled].
The optional settings are: [Auto]; [HDMI]; [LVDS] when '**Active LFP**' is set as [Enabled].

Secondary IGFX Boot Display
Secondary boot display selection will appear based on your selection.
The optional settings are: [Disabled]; [HDMI].

LVDS Panel Type
Use this item to select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.
The optional settings are: [800 x 480 1ch18bit]; [800 x 600   1ch 18bit]; [800 x 600 1ch 24bit]; [1024 x 600   1ch 18bit]; [1024 x 768   1ch 18bit]; [1024 x 768   1ch 24bit]; [1280 x 768   1ch 24bit]; [1280 x 800   1ch 18bit]; [1280 x 800   1ch 24bit]; [1366 x 768   1ch 18bit]; [1366 x 768   1ch 24bit]; [1440 x 900   2ch 18bit]; ; [1440 x 900 2ch 24bit]; [1280 x 1024 2ch 24bit]; [1680 x 1050 2ch 24bit]; [1920 x 1080 2ch 24bit].

LVDS FW Protect
The optional settings are: [Disabled]; [Enabled].

Memory Information
The working memory information will be on display.

► **South Cluster Configuration**

▶ **PCI Express Configuration**
Press [Enter] to make settings for the following sub-items:
Peer Memory Write Enable
The optional settings are: [Disabled]; [Enabled].
Compliance Mode
The optional settings are: [Disabled]; [Enabled].
Onboard PCIE LAN
The optional settings are: [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 are: [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 are: [Disabled]; [Enabled].
M.2
M.2
Use this item to enable or disable SATA port.
The optional settings are: [Disabled]; [Enabled].
HD-Audio Support
Use this item to enable or disable HD-Audio Support.
The optional settings are: [Disabled]; [Enabled].

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

3-9 Security Menu

```
              Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

      Password Description                               Set Administrator Password

      If ONLY the Administrator's password is set,
      then this only limits access to Setup and is
      only asked for when entering Setup.
      If ONLY the User's password is set, then this
      is a power on password and must be entered to
      boot or enter Setup. In Setup the User will
      have Administrator rights.
      The password length must be
      in the following range:
      Minimum length              3
      Maximum length              20
                                                   →←: Select Screen
      Administrator Password                       ↑↓: Select Item
      User Password                                Enter: Select
                                                   +/-: Change Opt.
    ▶ Secure Boot                                  F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit


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```

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

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

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

Secure Boot Mode

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

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.

When set as [Custom], user can make further settings in 'Key Management'.

▶ **Key Management**

This item enables experienced users to modify Secure Boot variables, which includes the following items:

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 are: [Disabled]; [Enabled].

▶ **Enroll all Factory Default Keys**

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

Save all Secure Boot Variables

This item will save NRRAM content of all Secure Boot variables to the files (WFI_SIGNATURE_LIST data format) in root folder on a target file system device.

▸ **Platform Key (PK)/Key Exchange Keys/Authorized Signature/Forbidden Signature/ Authorized TimeStamps/OS Recovery 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

```
           Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

   Setup Prompt Timeout          1                     Number of seconds to wait for
   Bootup NumLock State          [On]                  setup activation key.
   Quiet Boot                    [Disabled]            65535(0xFFFF) means indefinite
                                                       waiting.
   Boot Option Priorities
   Boot Option #1                [UEFI: Built-in EFI
                                 Shell]




                                                       →←: 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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```

Setup Prompt Timeout
Use this item to set number of seconds to wait for setup activation key.

Bootup Numlock State
Use this item to select keyboard numlock state.
The optional settings are: [On]; [Off].
Quiet Boot
The optional settings are: [Disabled]; [Enabled].
Boot Option Priorities
Boot Option #1
Use this item to set the system boot order.
The optional settings are: [UEFI: Built-in EFI Shell]; [Disabled].
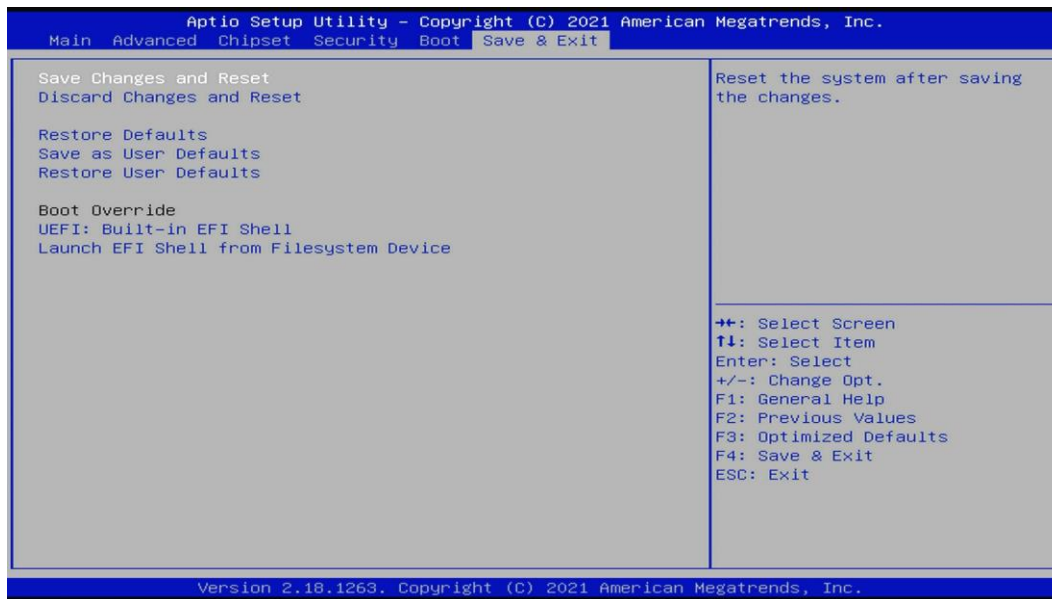
3-11 Save & Exit Menu

```
            Aptio Setup Utility - Copyright (C) 2021 American Megatrends, Inc.
   Main  Advanced  Chipset  Security  Boot  Save & Exit

  Save Changes and Reset                              Reset the system after saving
  Discard Changes and Reset                           the changes.

  Restore Defaults
  Save as User Defaults
  Restore User Defaults

  Boot Override
  UEFI: Built-in EFI Shell
  Launch EFI Shell from Filesystem Device

                                                      →←: 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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```

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.
UEFI: Built-in EFI Shell
Lauch EFI Shell from filesystem device
Use this item to launch EFI shell application (shell.efi) from one of the available filesystem device.