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SECTION 1
INTRODUCTION

This section contains general information and detailed specifications of the
.Section 1 consist of the following sub-sections:

- General Descriptions
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

1.1 General Descriptions

A fanless embedded system with 7th / 6th generation Intel® Core™ i7/i5/i3 and
Celeron® processor (formally codename: Kaby Lake / Skylake) processor with flexible
I/O design. To fulfill different application needs, the flexible embedded system
supports WE8S, WES7, Windows® 10 and Linux, and it can be wall-mounted and
Din-rail mounted by optional requests.

IP40-rated heavy-duty aluminum extrusion,
enabling reliable operation in harsh environments. Moreover, a wide range 9 to 36V
DC power input with power protection, -40°C to +60°C extended temperature. To
highly reduce deployment time, this fanless embedded PC supports one optional I/O
door for customers to easily install additional I/O output. It is perfectly suitable for
any industrial grade applications.

Features

- LGA1151 socket 7th / 6th generation Intel® Core™ i7/i5/i3 & Celeron® processor (Kaby Lake / Skylake) with Intel®Q170
- Supports Jumbo Frame (9.5k), WoL, PXE Remote Boot, Teaming
- Wide range of DC power input supported from 9 to 36VDC
- One DispalyPort and two HDMI (one HDMI 2.0) with triple view supported
- Various of flexible I/O modules supported

Reliable and Stable Design

The embedded system supports 7th / 6th generation Intel® Core™ i7/i5/i3 and Celeron® processors, high flexibility and multi-functional design is the best solution for any industrial field applications.

Flexible Connectivity

It comes with rich I/O interfaces including four RS-232/422/485 ports, six USB 3.0 ports, two USB 2.0 ports, 32-CH digital I/O, four GbE LAN ports.

Embedded O.S. Supported

The   with 6th platform supports WES7, Linux; 7th platform only support Windows® 10 64 Bit.

Various Storage Supported

In terms of storage, the   supports two 2.5" SATA storage drive bay, one CFast™ and one mSATA device.

1.2 System Specifications

1.2.1 CPU

- **CPU**
    - LGA1151 socket 7th / 6th generation Intel® Core™ i7/i5/i3 & Celeron® processor, CPU TDP max. up to 35W
    - Intel® Core™ I7-6700TE/ 7700T processor
    - Intel® Core™ I5-6500TE/ 7500T processor
    - Intel® Core™ I3-6100TE/ 7101TE processor
    - Intel® Celeron® G3900TE / G4400TE processor

- **Chipset**
    - Intel® Q170

- **BIOS**
    - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.

- **System Memory**
    - Two 260-pin unbuffered DDR4-2133 MHz SO-DIMM socket, up to 32 GB at the maximum for 6th generation Intel® Core™ processor
    - Two 260-pin unbuffered DDR4-2400 MHz SO-DIMM socket, up to 32 GB at the maximum for 7th generation Intel® Core™ processor

1.2.2 I/O System

- **Display**
  - 2 x HDMI
    (1 x HDMI 2.0 Resolution:4K/2K@60Hz & 1 x HDMI 1.4b Resolution : 4K/2K@30Hz)
  - 1 x DisplayPort (Resolution:4K/2K@60Hz)

- **Ethernet**
  - 4 x 10/100/1000 Ethernet ports (3 x i210IT & 1 x i219LM)

- **USB Ports**
  - 2 x USB 2.0
  - 6 x USB 3.0

- **Serial Ports**
  - 4 x RS-232/422/485 (COM1~4)

- **DIO**
  - 1 x 32-channel programmable DI/DO

- **Audio**
  - 1 x Audio (Mic-in/Line-out)

- **Mini PCIe Interface**
  - 2 x full-size PCI Express Mini Card Slots (USB + PCI Express signal)

- **Storage**
  - 2 x 2.5" SATA HDD/SSD drive bay
  - 1 x mSATA (optional)
  - 1 x CFast^{TM}
  - 1 x SIM slot

- **Indicator**
  - 1 x Green LED as indicator for PWR status
  - 1 x Orange LED as indicator for HDD active
  - 4 x Green LED as indicator for programmable

- **Switch**
  - 1 x ATX PWR switch
  - 1 x Remote PWR switch
  - 1 x AT/ATX Quick switch
  - 1 x Reset switch

- **Antenna**
  - 4 x SMA type connector openings for antenna

1.2.3 System Specifications

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

- **Power Supply**
  - 9~36 VDC power input

- **Operation Temperature**
  - -40℃ ~+60℃ (-40 ⁰F ~ 140⁰F), with W.T. SSD & Memory : Skylake
  - -40℃ ~+55℃ (-40 ⁰F ~ 131⁰F), with W.T. SSD & Memory : Kaby Lake

- **Storage Temperature**
  - -40℃ ~+80℃ (-40 ⁰F ~ 176⁰F)

- **Humidity**
  - 10% ~ 95% (non-condensation)

- **Vibration Endurance**
  - 3Grm with CFast^{TM} (5-500Hz, X, Y, Z directions)

- **Weight**
  - 3.8 kg (8.37 lb) without package
  - 4.6 kg (10.14 lb) with package

- **Dimension**
  - 280 mm (11.02") (W) x 190 mm (7.48") (D) x 76 mm (2.99") (H)

1.2.4 Driver CD Contents

- **Ethernet**

- **Chipset**

- **Graphic**

- **Serial Port**

- **USB 3.0**

- **Intel$^{®}$ ME**

- **Audio**

- **User Manual**

- **Quick Manual**

1.3 Dimensions

The following diagrams show dimensions and outlines of the

1.3.1 System Dimensions
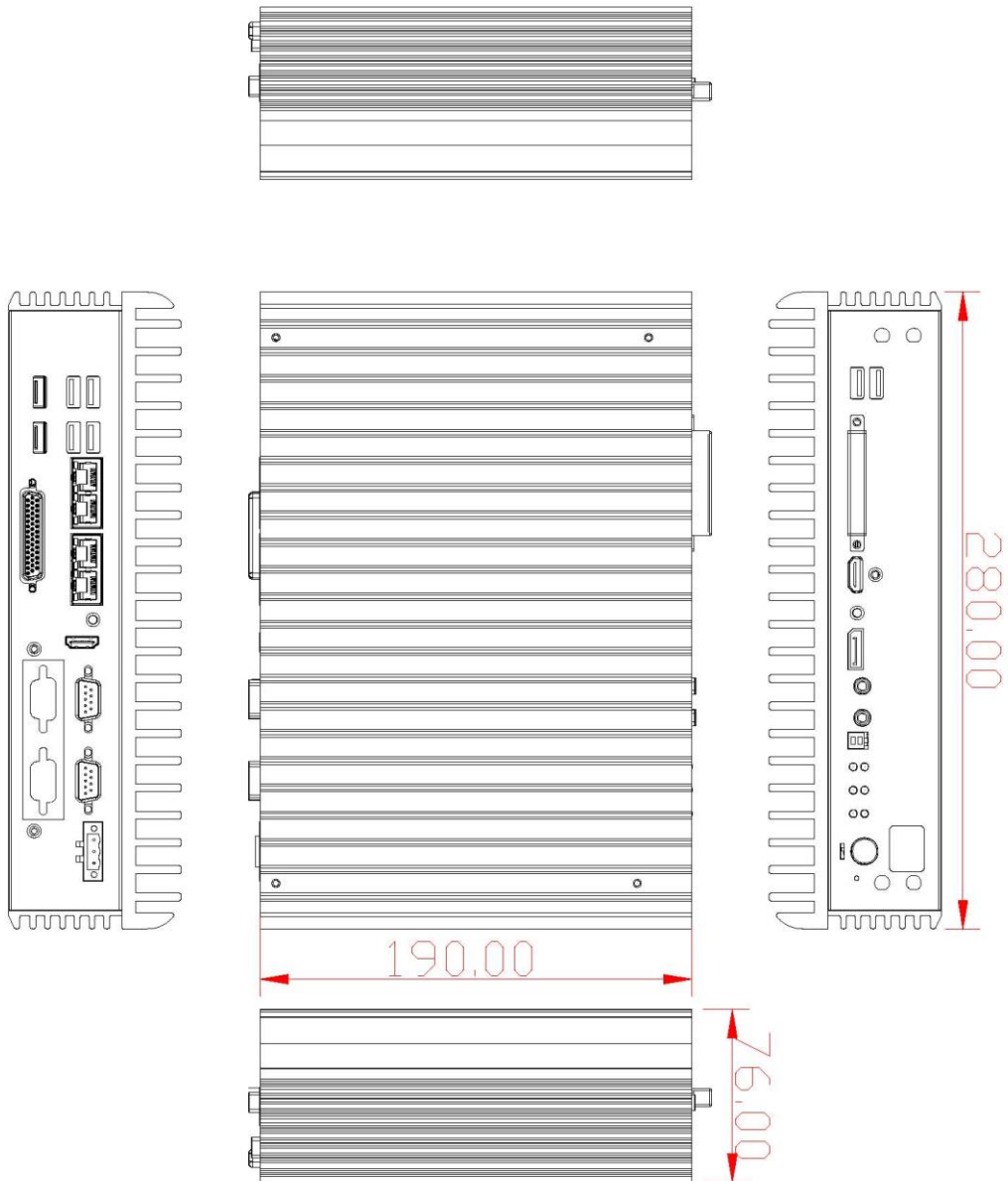
1.3.2 Wall-mount Bracket Dimensions

Users can get 4pcs truss head M3*5L screws to fix the wall-mount kit from accessory box.

Note: When you install Wall-mount kit, please turn the LAN Ports side outlet towards the floor.
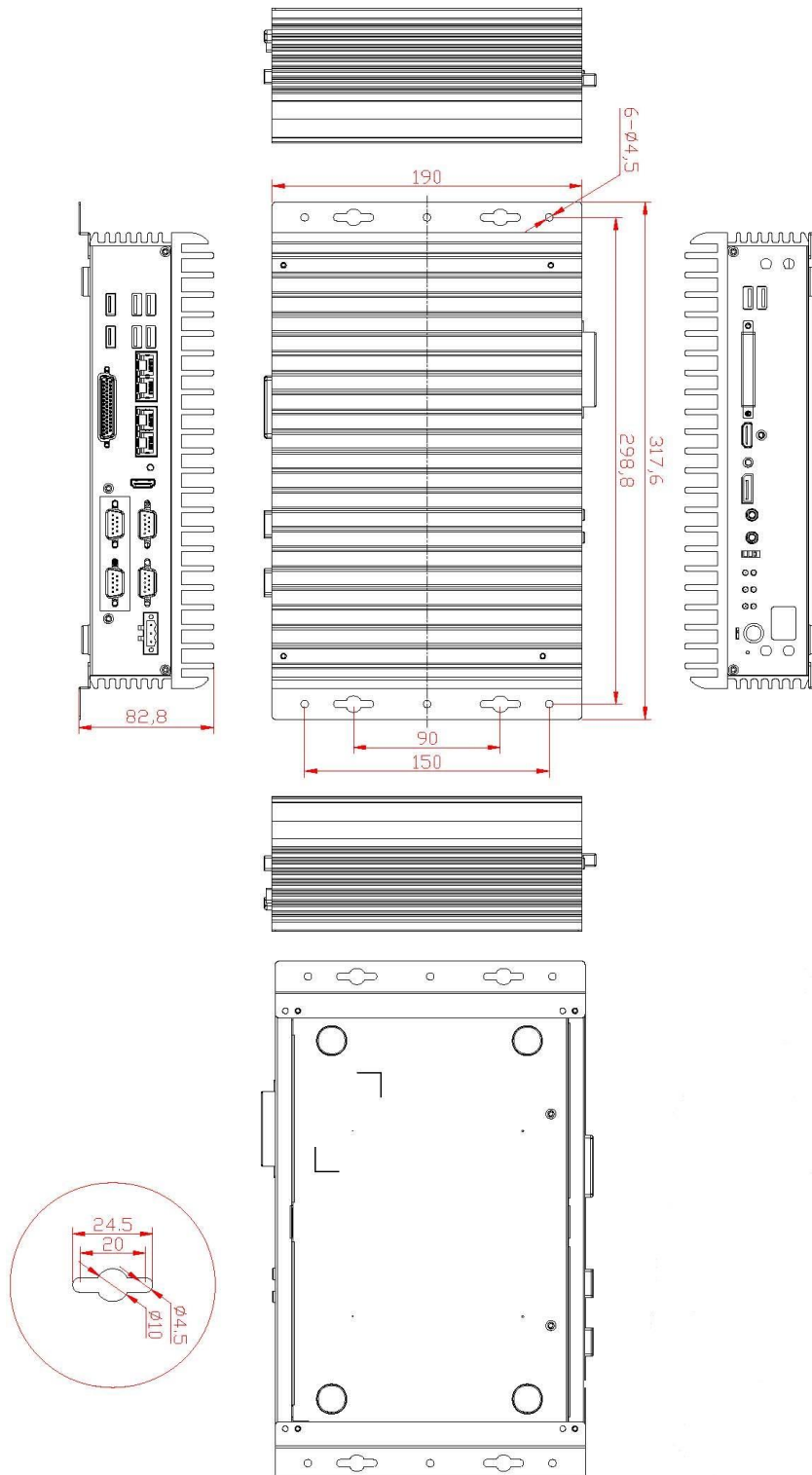
Note: If you install the screws in drywall, use the hollow wall anchors to ensure that unit does not pull away from the wall due to prolonged strain the cable and power connector.

Minimum diameter: Ø5.5mm

Minimun Length: 1.2mm+ Wall's hole depth

Thread type should be decide accordingly.
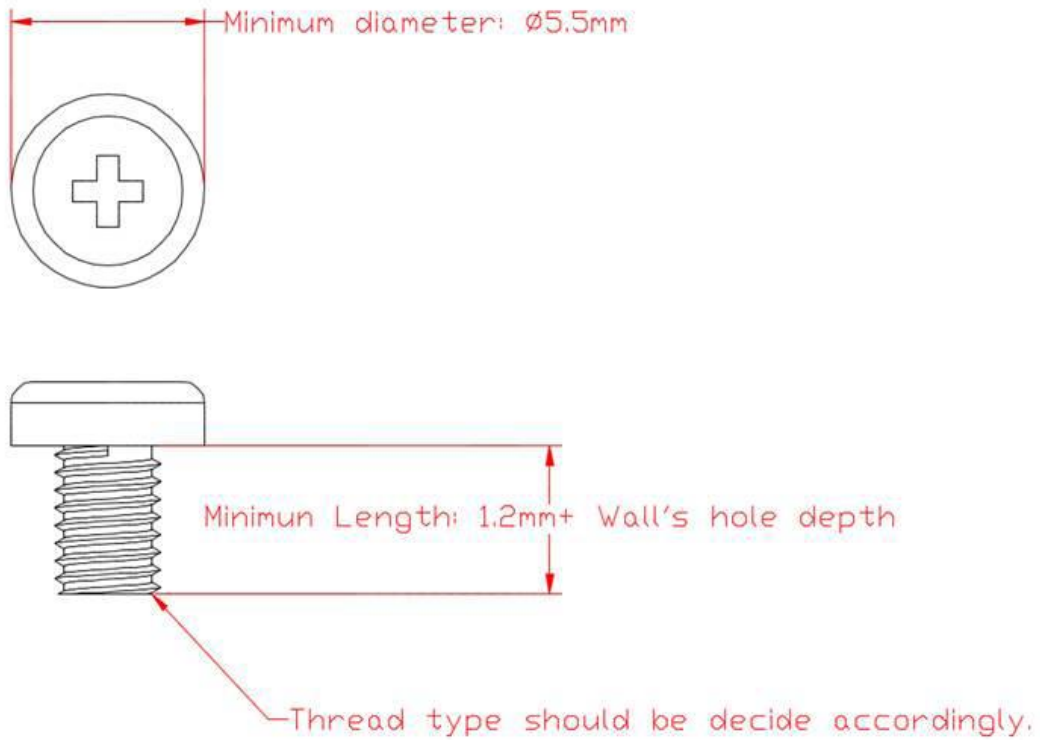
1.3.3 Din rail Bracket Dimensions

Users can get 6pcs flat head M3*4 screws from optional Din-rail kit, please refer to above photos.
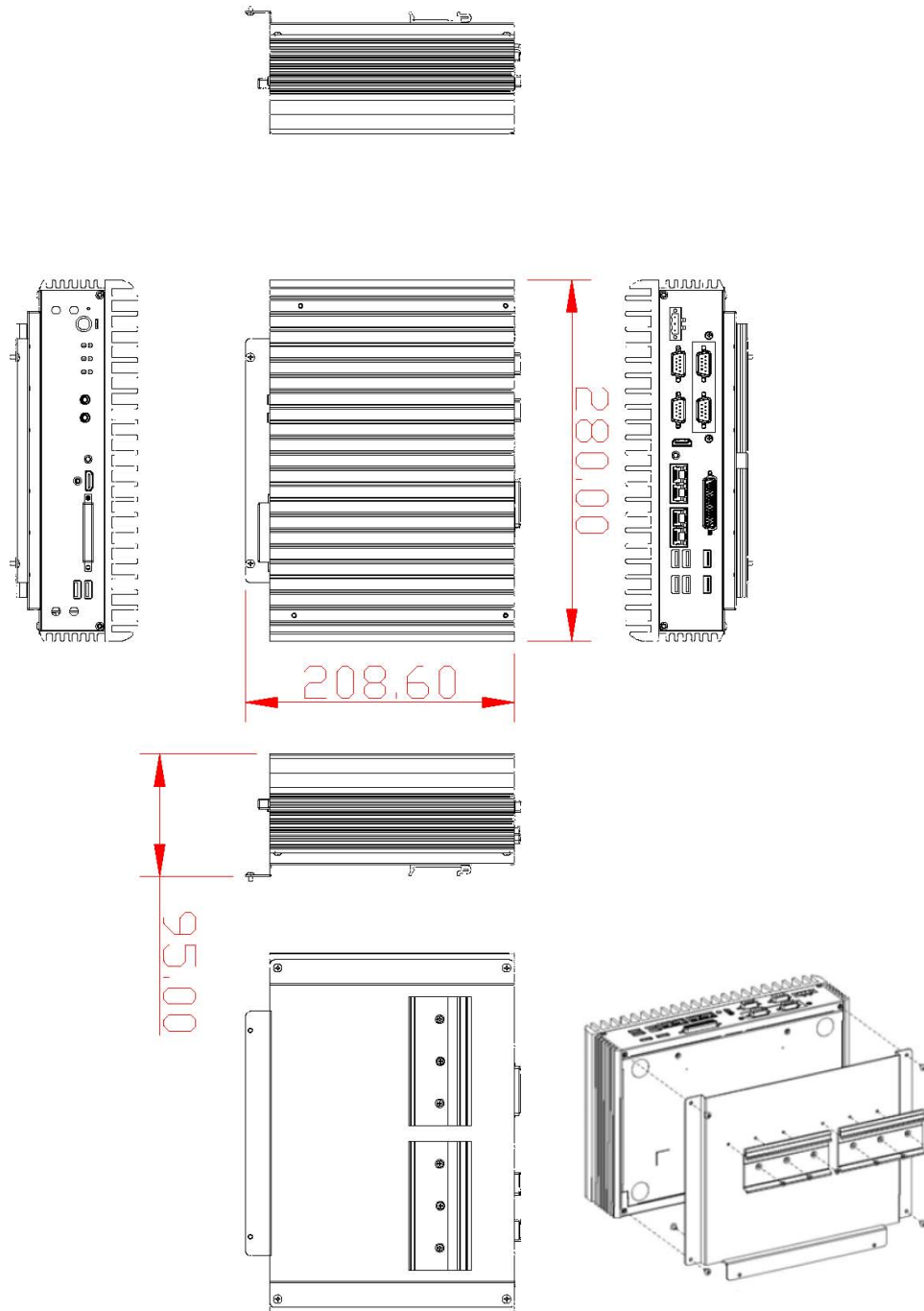
1.4 I/O Outlets

The following figures show I/O outlets on the   .

Front View
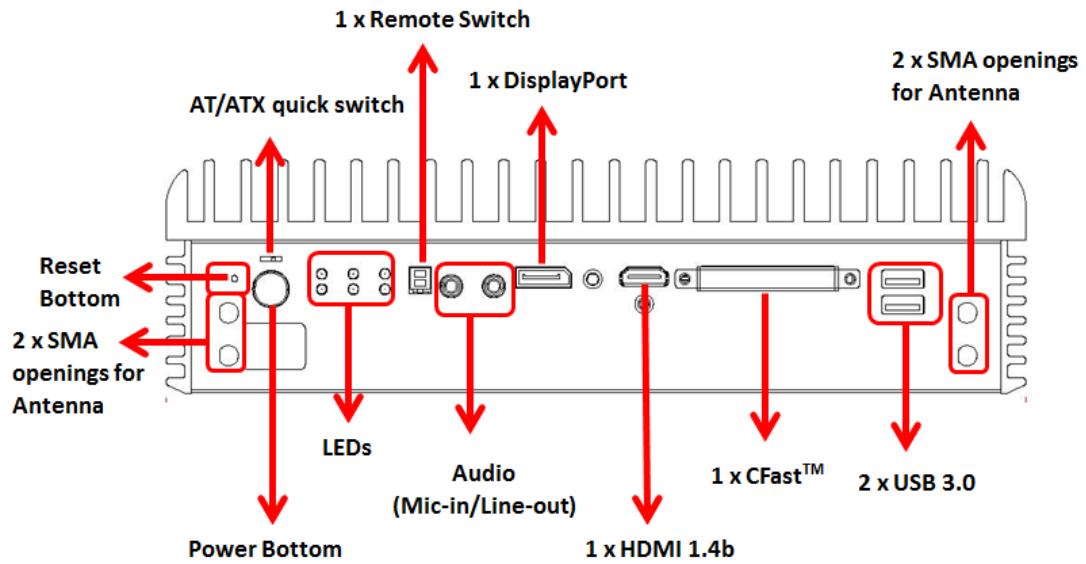
Rear View
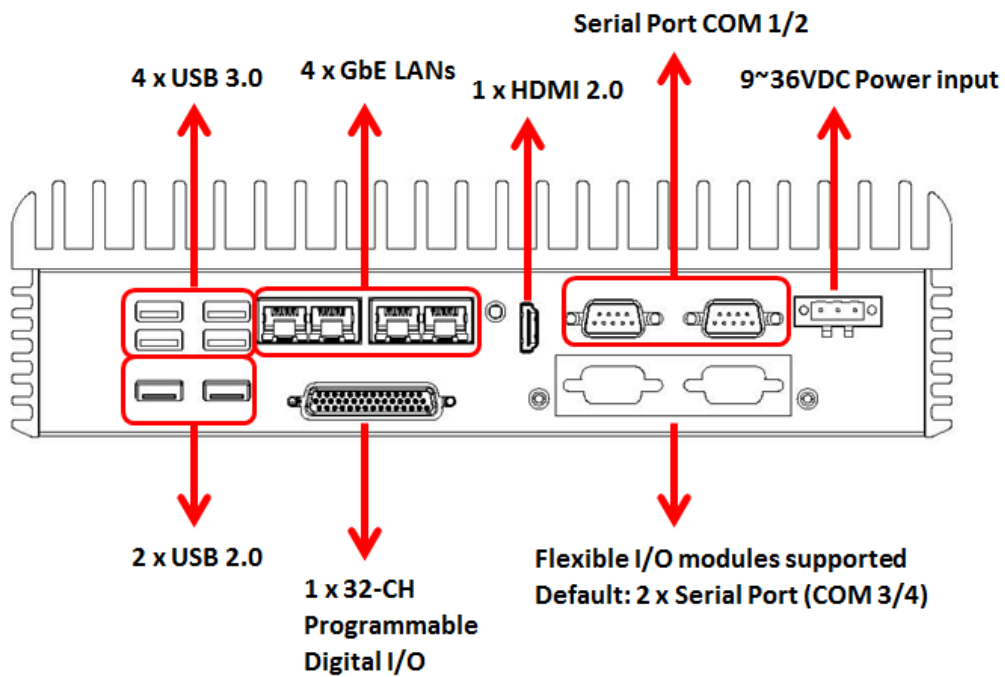
1.5 Packing List

comes with the following bundle package:

- **System Unit x 1**
- **Quick Installation Guide x 1**
- **DVD x 1 (For Driver and Manual)**
- **CPU Thermal Pad x 2**
- **PCH Thermal Pad x 1**
- **HDD screws x 4**
- **Terminal Block x 1**
- **Remote switch cable x 1**
- **HDD Bracket x 2**

1.6 Model List

	Fanless embedded system with LGA1151 socket 7th /6th generation Intel® Core™ i7/i5/i3 & Celeron® processors, Intel® Q170 chipset, 2 HDMI, 1 DisplayPort, 4 GbE LANs, 6 USB 3.0, CFast™, dual PCI Express Mini Card slots

SECTION 2
HARDWARE INSTALLATION

The   is convenient for various hardware configurations, such as CPU, DRAM, HDD (Hard Disk Drive), SSD (Solid State Drive), CFast^{TM} card and PCI Express Mini card modules. Section 2 contains guidelines for hardware installation.

2.1 Installation of CPU

Step 1   Turn off the system and unplug the power cord.
Step 2   Loosen all screws to remove top cover.
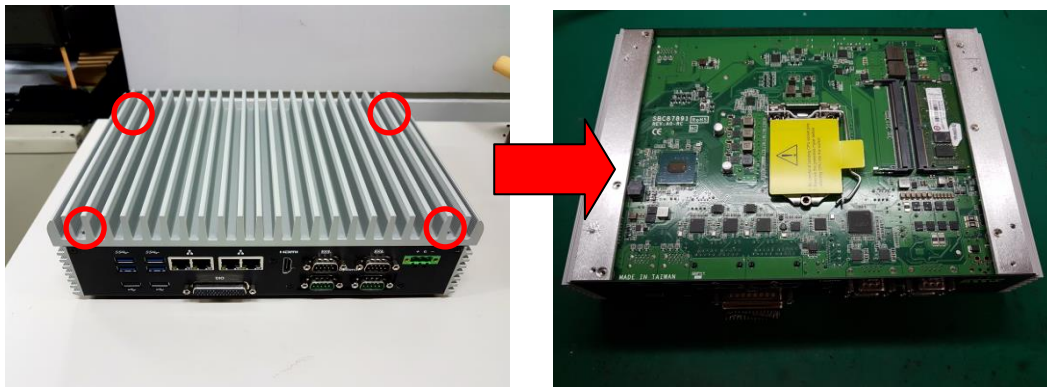
Step 3   Remove the warning label and disengage load lever.

● Disengage load lever by releasing down and out on the hook.

● Rotate load lever to open position at approximately 135°.

● Rotate load plate to open position at approximately 150°.
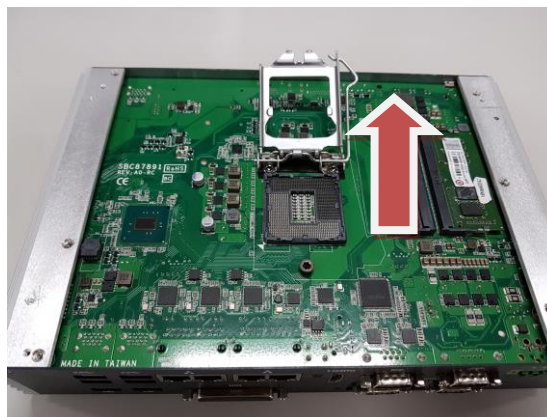
Step 4 CPU installation steps:

● Lift processor package from shipping media by grasping the substrate edges.

● Scan the processor package gold pads for any presence of foreign material.

● Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.

● Grasp the processor with thumb and index finger along the top and bottom edges.
  The socket will have cutouts for your fingers to fit into.

● Carefully place the processor into the socket body vertically.
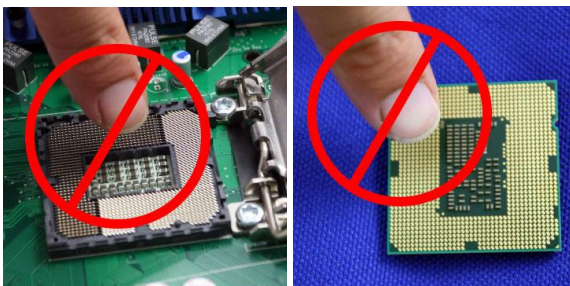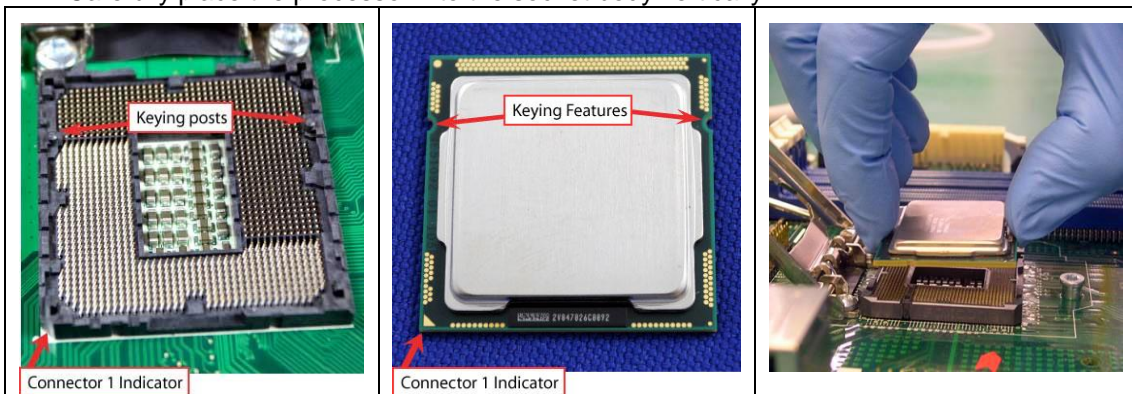
Caution	***Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during installation.***

Step 5 Align pins of the CPU with pin holes of the socket. Be careful of the CPU's orientation that user's need to align the arrow mark on the CPU with the arrow key on the socket.
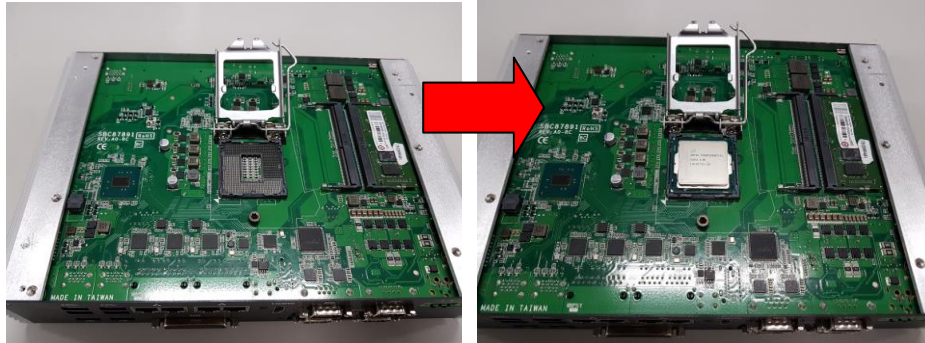
Step 6 Paste the thermal pad on top of the processor with caution, and then remove protection film.

Step 7 Put the top cover and fasten four screws back onto the system.

2.2 Installation of 2.5" SATA Device

Step 1 Turn off the system and unplug the power cord.

Step 2 Turn the system upside down to locate screws at the bottom and then loosen all screws.

Step 3 Open the bottom cover.

Step 4 Locate SSD/HDD within the red line as marked.

Please notice the direction of connector for HDD.
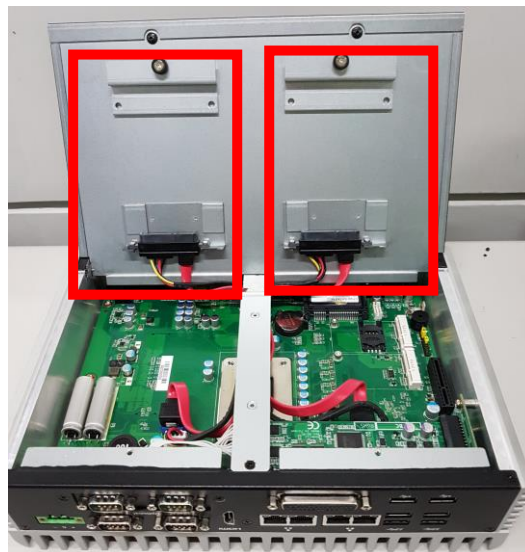
Step 5 **Before assemble the SSD/HDD, please loosen the thumb screws to remove two HDD brackets, and then assemble the SSD/HDD with the two HDD mounting screws. Make sure the PCB side of the SSD/HDD will be facing the bottom cover.**
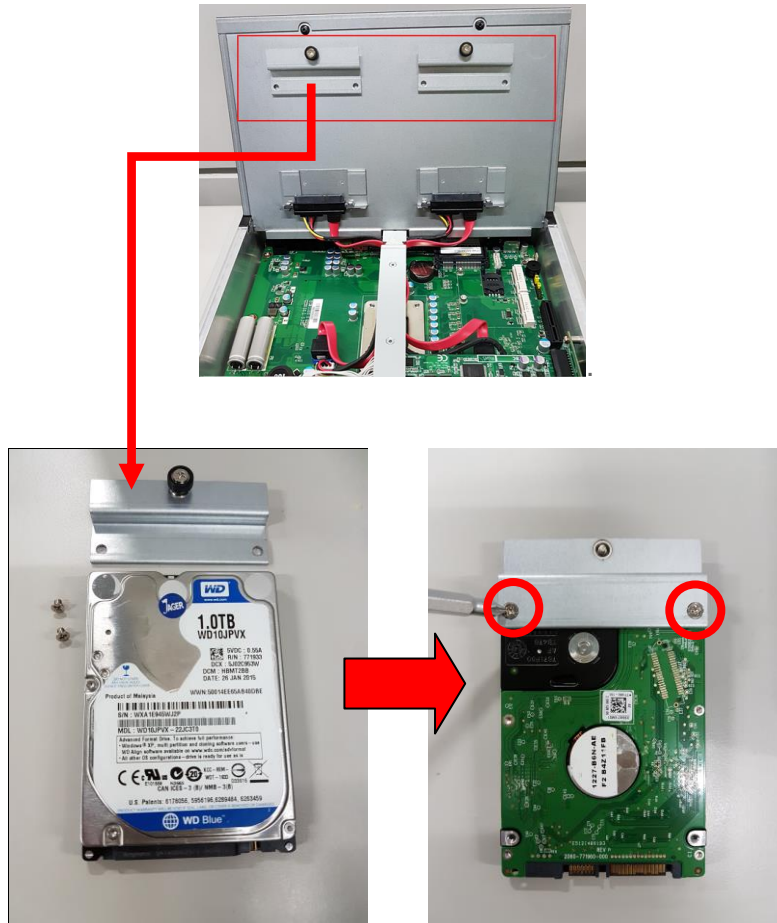
Step 6 **Connected the SSD/HDD directly and make sure the insertion is complete.**
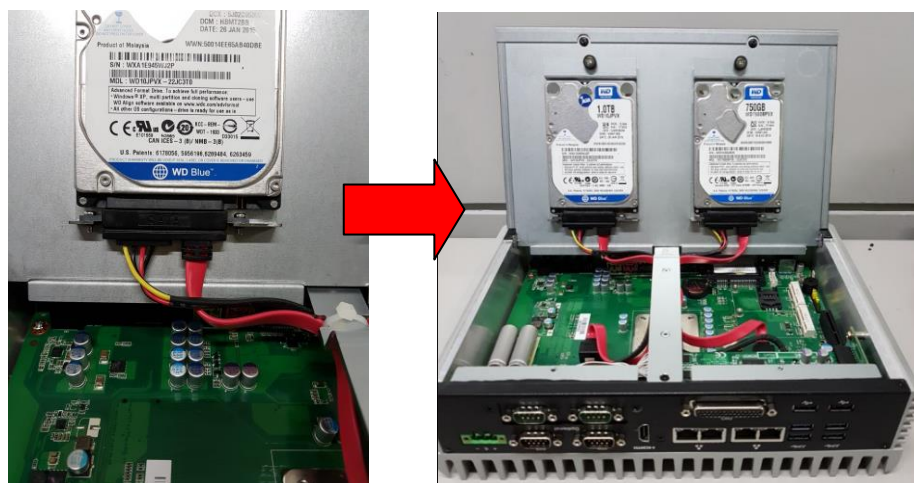
2.3 Installation of SO-DIMM

Step 1   **Turn off the system and unplug the power cord.**
Step 2   **Four screws on the top heatsink are used to fasten the heatsink to the chassis.**

Step 3   **Located the dual SO-DIMM sockets on main board.**
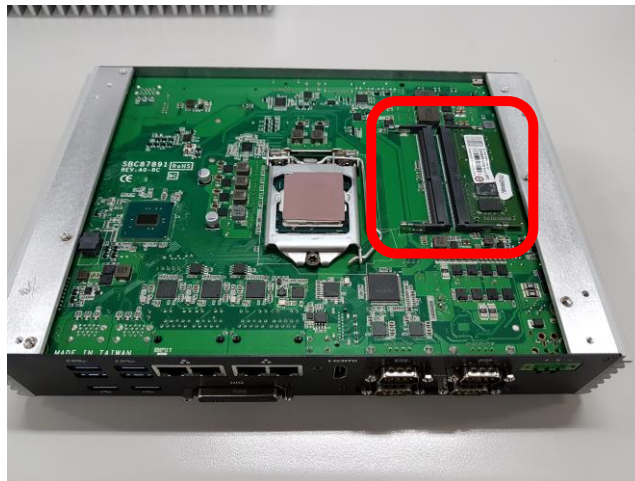
Step 4   Locate the memory module, insert a gold colored contact into the socket and push the module two end latches till locked.
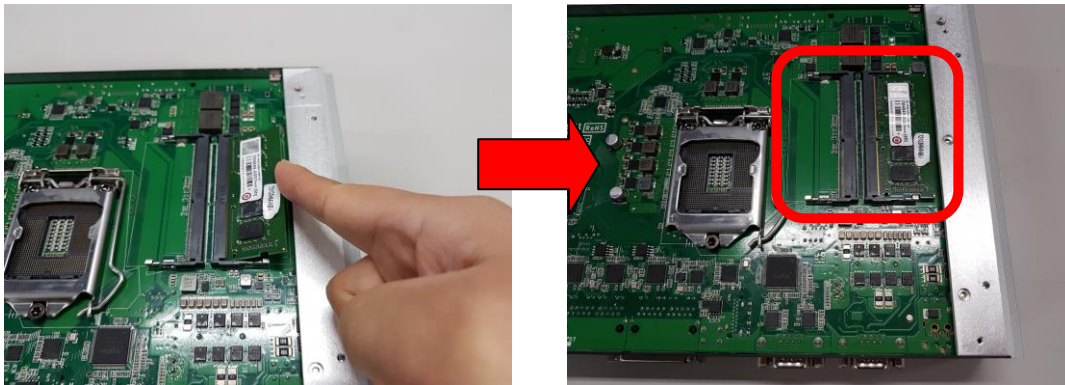
Step 5   Put the top cover and fasten four screws back onto the system.

2.4 Installation of CFast^{TM} Module

Step 1 **Turn off the system and unplug the power cord.**
Step 2 **Located the CFast^{TM} slot on front panel.**
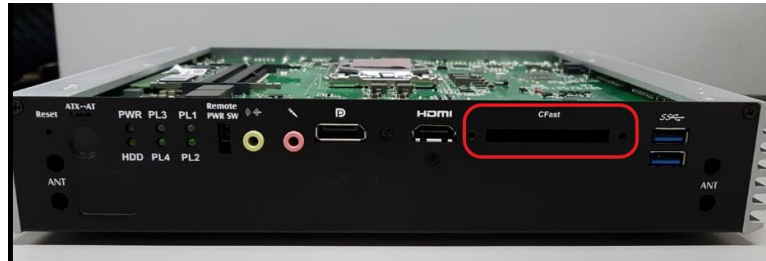
Step 3 **Insert a CFast^{TM} module into the socket.**

Step 4 **Recover and fasten all screws of the top cover.**

2.5 Installation of Mini PCIe Module (full-size)

Step 1   **Turn off the system and unplug the power cord.**
Step 2   **Turn the system upside down to locate screws at the bottom, and then loosen all screws.**

Step 3   **Identify the two full-size mini PCIe slots, insert a mini PCIe module into the sockets and then fasten all screws.**

Step 4   **Put the bottom cover and fasten two screws back onto the system.**

2.6 Installation of Flexible I/O Modules

The   an optional window for customer add flexible I/O modules, according to different modules , please refer to quick manual

-LAN Module (RJ45*1)

-DIO Module (DB9*1)

-CAN Bus/CAN Open Module (DB9*2)

-USB Module (USB*1)

Optional Window

(Default: 2 x COM)

Steps 1 Prepare the LAN module kit.

Step 2   Turn off the system and unplug the power cord.

Step 3   Open the bottom cover.

Step 4   Insert the LAN mini PCIe card.

Step 5   Assemble LAN connector with bracket.

Step 6   Connected the cable with the LAN module.
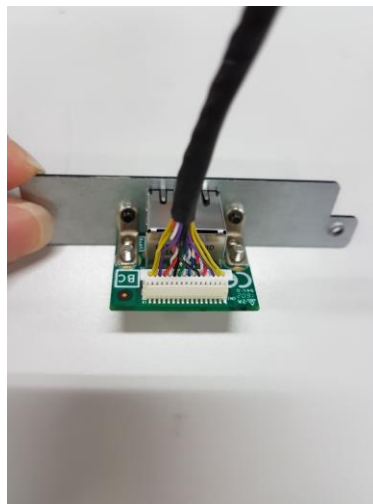
Step 7   Fasten the LAN bracket into the chassis, and then connect the LAN cable to the mini PCIe module.
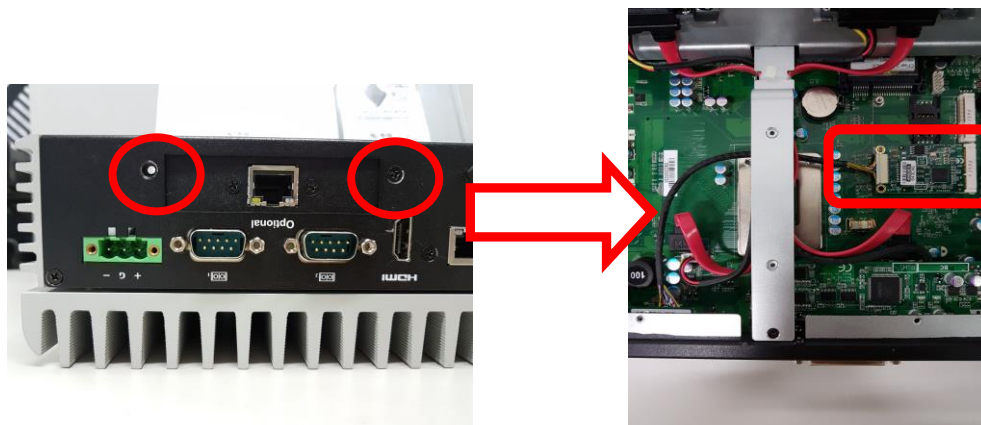
Step 8 Put the bottom cover and fasten two screws back onto the system.

SECTION 3
JUMPER & CONNECTOR SETTINGS

Proper jumper settings configure the   to meet various application needs. Hereby all jumpers settings along with their default settings are listed for devices onboard.

3.1 Locations of Jumpers & Connectors

SBC87891 Top View
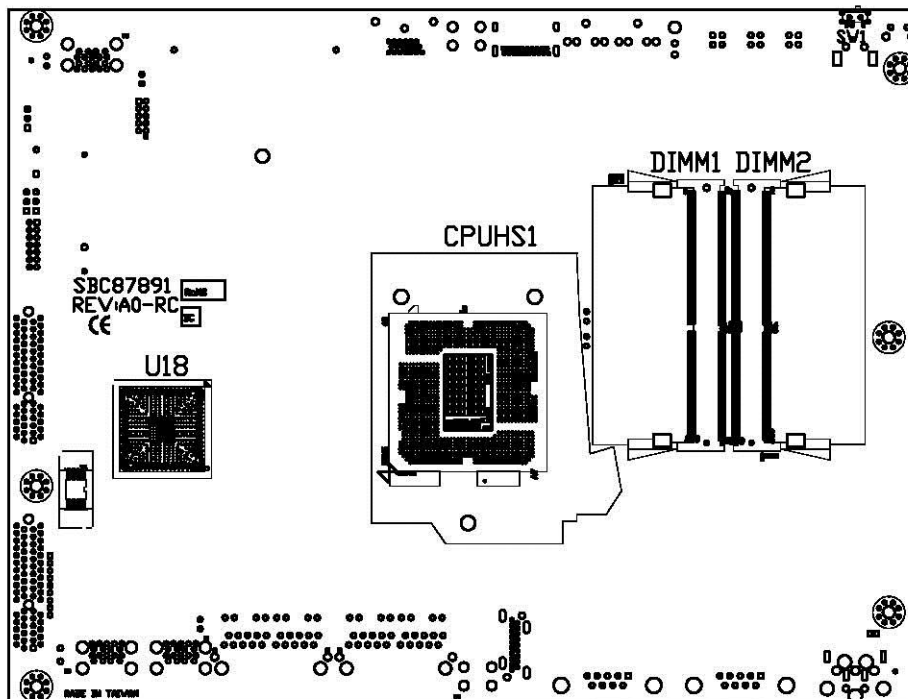
SBC87891 Bottom View
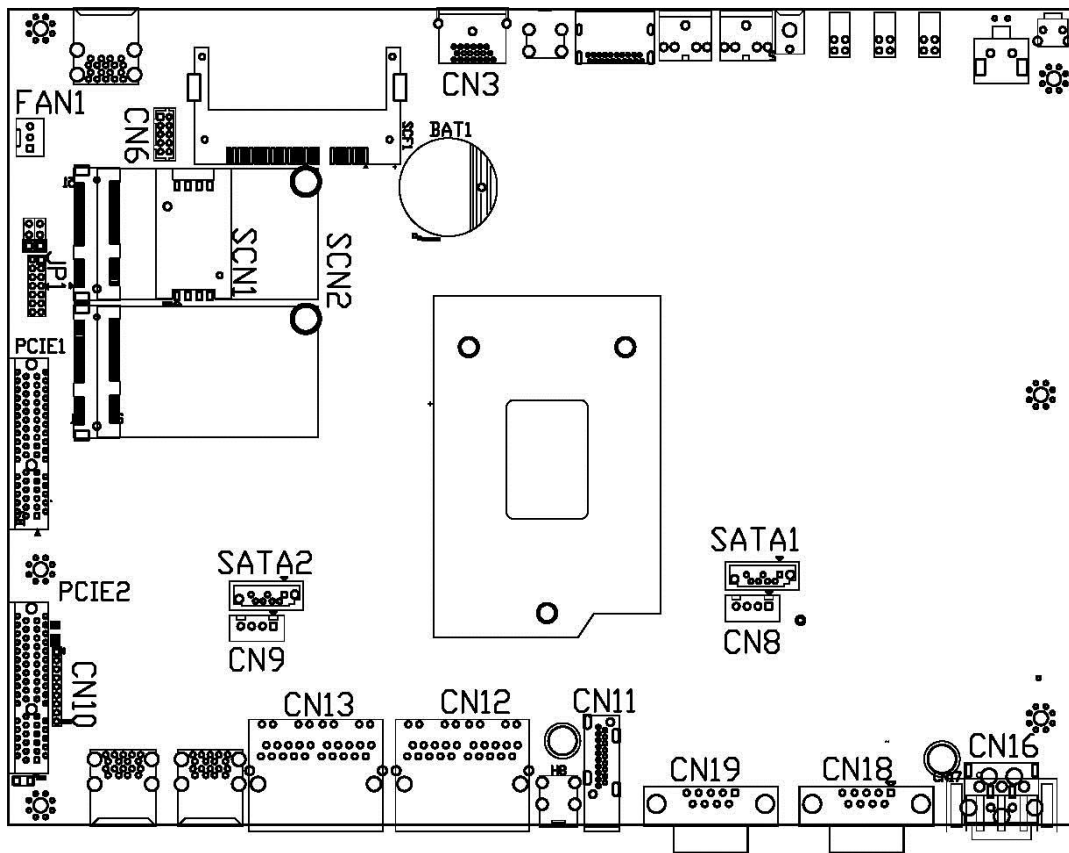
3.2 Summary of Jumper Settings

Proper jumper settings configure the   to meet various application purposes.
A table of all jumpers and their default settings is listed below.

Jumpers	Descriptions	Settings
JP1	Restore BIOS Optimal Defaults Default: Normal Operation	Short 1-2

【Note】: How to setup Jumpers

That a cap on a jumper is to "close" the jumper, whereas that offs a jumper is to "open" the jumper.

[Open]   [Closed]   [Pin1-2 Closed]

3.2.1 Restore BIOS Optimal Defaults (JP1)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2.
This procedure is to restore BIOS optimal defaults.

Functions	Settings
Normal (Default)	1-2
Clear RTC	2-3
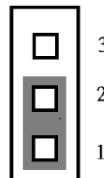
3.3 Connectors

Please refer to pin assignments below:

External Connectors	Sections
DC-in Phoenix Power Connector	3.3.1
HDMI Connector	3.3.2
DisplayPort Connector	3.3.3
Serial Port Connector	3.3.4
USB 3.0 Connector	3.3.5
Ethernet Connector	3.3.6
USB 2.0 Connector	3.3.7
Audio Connector	3.3.8
Digital I/O Connector	3.3.9
ATX Power On/Off Button	3.3.10
Rest Button	3.3.11
Remote Power Switch Connector	3.3.12
AT/ATX Switch	3.3.13
CFast™ Socket	3.3.14
Internal Connectors	**Sections**
Serial ATA (SATA) Connector	3.3.15
SATA Power Connector	3.3.16
SIM Card Slot (SCN1)	3.3.17
Full-Size Express Mini Card slot (SCN2 & SCN3)	3.3.18

3.3.1 DC-in Phoenix Power Connector

The system supports 9~36V Phoenix DC-in connector for system power input.

Pins	Signals
1	DC+
2	GND
3	DC-
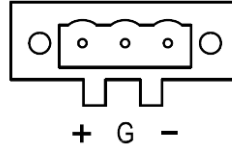
3.3.2 HDMI Connector

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pins	Signals	Pins	Signals
1	HDMI OUT_DATA2+	11	GND
2	GND	12	HDMI OUT Clock-
3	HDMI OUT_DATA2-	13	N.C.
4	HDMI OUT_DATA1+	14	N.C.
5	GND	15	HDMI OUT_SCL
6	HDMI OUT_DATA1-	16	HDMI OUT_SDA
7	HDMI OUT_DATA0+	17	GND
8	GND	18	+5V
9	HDMI OUT_DATA0-	19	HDMI_HTPLG
10	HDMI OUT Clock+		

HDMI2.0

HDMI1.4b
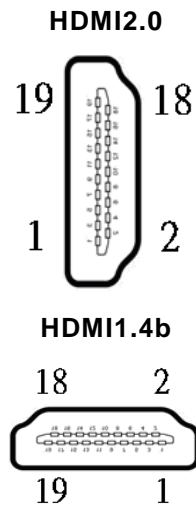
3.3.3 DisplayPort Connector

Pins	Signals	Pins	Signals
1	DPB_LANE0	11	GND
2	GND	12	DPB_LANE3#
3	DPB_LANE0#	13	Detect Pin
4	DPB_LANE1	14	GND
5	GND	15	DPB_AUX
6	DPB_LANE1#	16	GND
7	DPB_LANE2	17	DPB_AUX#
8	GND	18	DPB_HPDE
9	DPB_LANE2#	19	GND
10	DPB_LANE3	20	+3.3V
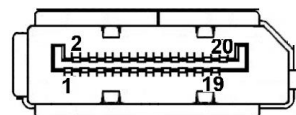
3.3.4 Serial Port Connector (COM 1~COM 4)

The system has four serial ports. COM1~COM4 are RS-232/422/485 ports. Please refer to Chapter 4 for the detail of BIOS setting.

※**COM1~4**

Pins	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use

3.3.5 USB 3.0 Connector

The Universal Serial Bus connectors are compliant with USB 3.0 (5 GB/s), and ideally for installing USB peripherals such as scanner, camera and USB devices, etc.

Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data-	11	USB_Data-
3	USB_Data+	12	USB_Data+
4	GND	13	GND
5	SSRX-	14	SSRX-
6	SSRX+	15	SSRX+
7	GND	16	GND
8	SSTX-	17	SSTX-
9	SSTX+	18	SSTX+
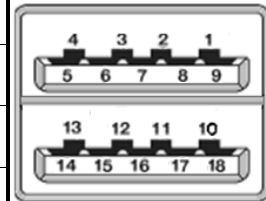
3.3.6 Ethernet Connector (LAN1~LAN4)

The board has four RJ-45 connectors are for LAN1 Ethernet-(Intel i219LM)

LAN2-4 Ethernet-(Intel i210-iT).

Pins	LAN Signal	Pins	LAN Signal
L1	MDI0+	L5	MDI2+
L2	MDI0-	L6	MDI2-
L3	MDI1+	L7	MDI3+
L4	MDI1-	L8	MDI3-
A	Activity link LED(Yellow) OFF: No link Blinking: Link established; data activity detected		
B	Speed LED OFF: 10Mbps data rate Green: 100Mbps data rate Orange: 1GMbps data rate		
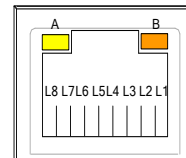
3.3.7   USB 2.0 Connector

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps), and ideally for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pins	Signal USB Port
1	USB VCC (+5V level)
2	USB #0_D-
3	USB #0_D+
4	Ground (GND)
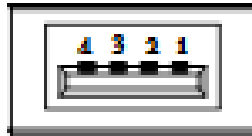
3.3.8   Audio Connector

These two audio jacks ideal are for Audio Mic-In and Audio Line-out.

Pins	Signals
1	Line Out
2	Microphone In
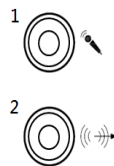
3.3.9 Digital I/O

The system is equipped with 32bit Programmable Digital I/O for 44-pin D-Sub female connectors, please refer to the following table to get default pin define. Default is 16in/16out.

The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Pins	Signals	Pins	Signals
1	N/A	2	N/A
3	Din	4	Dout
5	Din	6	Dout
7	Din	8	Dout
9	Din	10	Dout
11	Din	12	Dout
13	Din	14	Dout
15	Din	16	Dout
17	Din	18	Dout
19	Din	20	Dout
21	Din	22	Dout
23	Din	24	Dout
25	Din	26	Dout
27	Din	28	Dout
29	Din	30	Dout
31	Din	32	Dout
33	Din	34	Dout
35	GND	36	GND
37	N/A	38	N/A
39	N/A	40	N/A
41	N/A	42	N/A
43	N/A	44	N/A
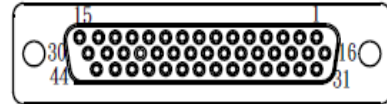
3.3.10 ATX Power On/OFF

The ATX power button is on the I/O side. It can allow users to control power on/off.

Functions	Descriptions
On	Turn on/off system
Off	Keep system status

3.3.11 Reset Button

The Reset button can allow users to reset   .

Functions	Descriptions
On	Reset system
Off	Keep system status

3.3.12 Remote Power Switch Connector

One 2-pin connector output for remote power on/off switch.

Functions	Descriptions
Short(1-2)	Turn on/off system
Open	Keep system status
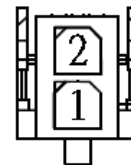
3.3.13 AT/ATX Switch

If you set AT/ATX switch to AT mode, the system will be automatically power on without pressing soft power button during power input; we can use this switch to achieve auto power on demand.
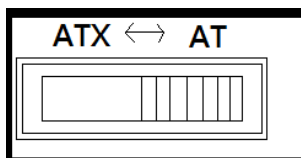
3.3.14 CFast™ Socket

The system is equipped with a CFast™ socket on the bottom side to support a CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of the CFast™ card. When installing or removing the CFast™ card, please make sure the system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

Pins	Signals	Pins	Signals
S1	GND	PC1	NC
S2	TX+	PC2	GND
S3	TX-	PC3	NC
S4	GND	PC4	NC
S5	RX-	PC5	NC
S6	RX+	PC6	NC
S7	GND	PC7	GND
		PC8	NC
		PC9	NC
		PC10	NC
		PC11	NC
		PC12	NC
		PC13	3.3V
		PC14	3.3V
		PC15	GND
		PC16	GND
		PC17	NC
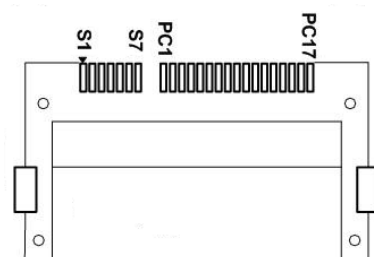
3.3.15 SATA Connector (SATA 1 & 2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives. This board has two SATA 3.0 ports with 6Gb/s performance.

Pins	Signals
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND
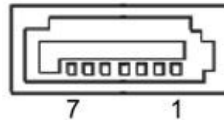
3.3.16 SATA Power Connector

Use CN8、CN9 for interfacing to SATA 2.5" HDD power supply.

Pins	Signals
1	+12V level
2	GND
3	GND
4	+5V level
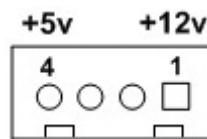
3.3.17 SIM Card Slots (SCN1)

The   lots (SCN1) on the bottom side of the system for inserting SIM Card. It is mainly used in 3G/LTE wireless network application on SCN3.

Pins	Signals
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC
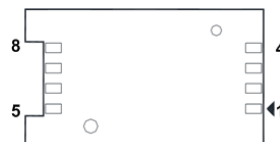
3.3.18 Full-Size PCI Express Mini Card Slot (SCN2 & SCN3)

The   -size PCI-Express Mini Card slots.SCN2 is applying to either PCI-Express or USB 2.0 signal, and complies with PCI-Express Mini Card Spec. V1.2.

SCN3 is applying for PCI-Express and SATA (mSATA) signals and complies with PCI-Express Mini Card Spec. V1.2. Thus, users can install mSATA cards into this slot. Please refer to the SATA of BIOS setting to enable or disable mSATA supported

SCN2

Pins	Signals	Pins	Signals
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/	24	+3.3VSB
25	PE_RXP3/	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/	32	SMB_DATA
33	PE_TXP3/	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
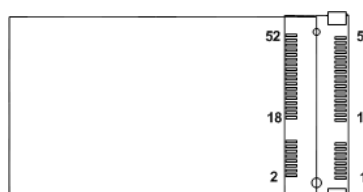
SCN3

Pins	Signals	Pin	Signals
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/mSATA	24	+3.3VSB
25	PE_RXP3/mSATA	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/ mSATA	32	SMB_DATA
33	PE_TXP3/ mSATA	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
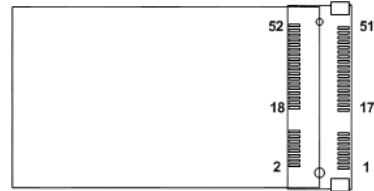
SECTION 4
BIOS SETUP UTILITY

This section provides users with detailed descriptions in terms of how to set up basic system configurations through the BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After press the <Del> key, the main BIOS setup menu displays. Users can access to other setup screens, such as the Advanced and Chipset menus, from the main BIOS setup menu.

It is strongly recommended that users should avoid changing the chipset's defaults. Both AMI and system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

【Note】: *Some of the navigation keys differ from one screen to another.*

Hot Keys	Descriptions
→← Left/Right	The Left and Right <Arrow> keys allow users to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow users to select a setup screen or sub-screen.
+− Plus/Minus	The Plus and Minus <Arrow> keys allow users to change the field value of a particular setup item.
Tab	The <Tab> key allows users to select setup fields.
F1	The <F1> key allows users to display the General Help screen.
F2	The <F2> key allows users to Load Previous Values.
F3	The <F3> key allows users to Load Optimized Defaults.
F4	The <F4> key allows users to save any changes they made and exit the Setup. Press the <F4> key to save any changes.
Esc	The <Esc> key allows users to discard any changes they made and exit the Setup. Press the <Esc> key to exit the setup without saving any changes.
Enter	The <Enter> key allows users to display or change the setup option listed for a particular setup item. The <Enter> key can also allow users to display the setup sub- screens.

4.3 Main Menu

The Main Menu screen is the first screen users see when entering the setup utility. Users can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is also shown below.

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
  Main   Advanced   Chipset   Security   Boot   Save & Exit

   BIOS Information                                      Set the Date. Use Tab to
   Project Version            SBC87891 X002_1026D        switch between Date elements.
   Build Date and Time        10/26/2016 15:36:06

   System Date                [Fri 10/28/2016]
   System Time                [11:22:24]

   Access Level               Administrator




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



         Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Information
Display the auto-detected BIOS information.

System Language
Choose the system default language.

System Date/Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Access Level
Display the access level of current user.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. Users can select any items in the left frame of the screen to go to sub menus:

- ► Mini Card Switch
- ► ACPI Settings
- ► CPU Configurations
- ► SATA Configurations
- ► PCH-FW Configurations
- ► AMT Configurations
- ► USB Computing
- ► NCT6102D Super IO Configurations
- ► NCT6106DSEC Super IO Configurations
- ► Hardware Monitor
- ► Utility Configurations

For items marked with "►", please press <Enter> for more options.

```
            Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
    Main    Advanced    Chipset    Security    Boot    Save & Exit

    MiniCard Switch                                       MiniCard Switch PCIE/mSATA
  ► ACPI Settings
  ► CPU Configuration
  ► SATA Configuration
  ► PCH-FW Configuration
  ► AMT Configuration
  ► USB Configuration
  ► NCT6102D Super IO Configuration
  ► NCT6106DSEC Super IO Configuration
  ► Hardware Monitor
  ► Utility Configuration

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


            Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

Mini Card Switch

Use this to select Mini Card setting, default is "PCIE".

BIOS Setup Utility
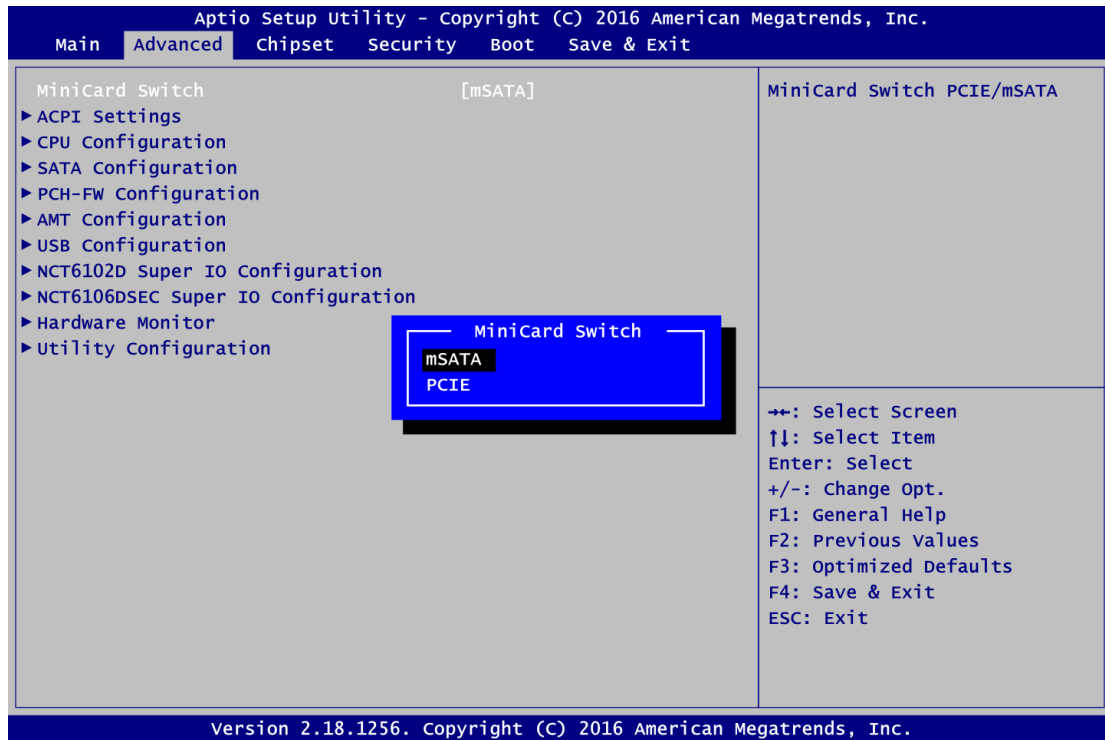
ACPI Settings

Use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

```
                  Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
            Advanced

   ACPI Settings                                              Select the highest ACPI sleep
                                                              state the system will enter
   ACPI Sleep State                  [S3 (Suspend to RAM)]    when the SUSPEND button is
                                                              pressed.




                                                              →←: 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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```

ACPI Sleep State

When the sleep button is pressed, the system will be in the ACPI sleep state.

The default is S3 (Suspend to RAM).

CPU Configurations

This screen shows the CPU version and its detailed information.

```
               Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
       Advanced

   CPU Configuration                                        When enabled, a VMM can
                                                            utilize the additional
   Intel(R) Core(TM) i5-6500TE CPU @ 2.30GHz                hardware capabilities provided
   CPU Signature                506E3                        by Vanderpool Technology
   Microcode Patch              8A
   Processor Cores              4
   Hyper Threading Technology   Not Supported
   Intel VT-x Technology        Supported
   Intel SMX Technology         Supported
   64-bit                       Supported
   EIST Technology              Supported

   L1 Data Cache                32 kB x 4
   L1 Code Cache                32 kB x 4                  →←: Select Screen
   L2 Cache                     256 kB x 2                 ↑↓: Select Item
   L3 Cache                     6 MB                        Enter: Select
                                                            +/-: Change Opt.
   Intel Virtualization Technology    [Enabled]            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

Intel Virtualization Technology
It allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

SATA Configurations

In this Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
        Advanced

  SATA Controller(s)               [Enabled]                Enable or disable SATA Device.
  SATA Mode Selection              [AHCI]

  Serial ATA Port 0                WDC WD10JPVX-2
                                   (1000.2GB)
  Serial ATA Port 1                WDC WD7500BPVX (750.1GB)
  Serial ATA Port 2                Empty
  Serial ATA Port 3                CFast 3ME     (32.0GB)


                                                            →←: 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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```

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

   SATA Controller(s)                    [Enabled]              Enable or disable SATA Device.
   SATA Mode Selection                   [AHCI]

   Serial ATA Port 0                     WDC WD10JPVX-2
                                         (1000.2GB)
   Serial ATA Port 1                     WDC WD7500BPVX (750.1GB)
   Serial ATA Port 2                     Empty
   Serial ATA Port 3                     CFast 3ME      (32.0GB)

                         ┌──── SATA Controller(s) ────┐
                         │ Enabled                    │
                         │ Disabled                   │      →←: 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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```

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

   SATA Controller(s)                    [Enabled]              Determines how SATA
   SATA Mode Selection                   [AHCI]                 controller(s) operate.

   Serial ATA Port 0                     WDC WD10JPVX-2
                                         (1000.2GB)
   Serial ATA Port 1                     WDC WD7500BPVX (750.1GB)
   Serial ATA Port 2                     Empty
   Serial ATA Port 3                     CFast 3ME      (32.0GB)

                         ┌──── SATA Mode Selection ────┐
                         │ AHCI                        │
                         │ RAID                        │
                         └─────────────────────────────┘     →←: 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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```

SATA Mode Selection

AHCI (Advanced Host Controller Interface) mode is how SATA controller(s) operate.

Serial ATA Port 0~3

It shows the device installed in connector SATA0~3

PCH-FW Configuration

This screen shows ME Firmware information.

```
              Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced

  ME FW Version                      11.0.10.1002
  ME Firmware Mode                   Normal Mode
  ME Firmware Type                   Full Sku Firmware
  ME Firmware SKU                    Corporate SKU




                                                        →←: 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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```

AMT Configurations

User can use this screen to configure AMT parameters.

```
           Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
       Advanced

  Intel AMT                       [Enabled]              Enable/Disable Intel (R)
                                                         Active Management Technology
                                                         BIOS Extension.
                                                         Note : iAMT H/W is always
                                                         enabled.
                                                         This option just controls the
                                                         BIOS extension execution.
                                                         If enabled, this requires
                                                         additional firmware in the SPI
                            ┌──── Intel AMT ────┐        device.
                            │ Disabled          │
                            │ Enabled           │
                            └───────────────────┘
                                                         →←: 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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```

Intel AMT

Enable or disable Intel® Active Management Technology BIOS Extension.

The default is enabled.

USB Configurations

```
                 Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
        Advanced

 USB Configuration                                           │
                                                             │
 USB Module Version              14                          │
                                                             │
 USB Controllers:                                            │
      1 XHCI                                                 │
 USB Devices:                                                │
      1 Keyboard, 1 Mouse                                    │
                                                             │
                                                             │
                                                             │
                                                     →←: 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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```

USB Devices

Display all detected USB devices.

NCT6102D Super IO Configurations

Use this screen to select options for the NCT6102D Super IO Configurations, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with " ", please press <Enter> for more options

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Advanced

 NCT6102D Super IO Configuration                                Set Parameters of Serial Port
                                                                1 (COMA)
  Super IO Chip                          NCT6102D
 ▶ Serial Port 1 Configuration
 ▶ Serial Port 2 Configuration




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



         Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```
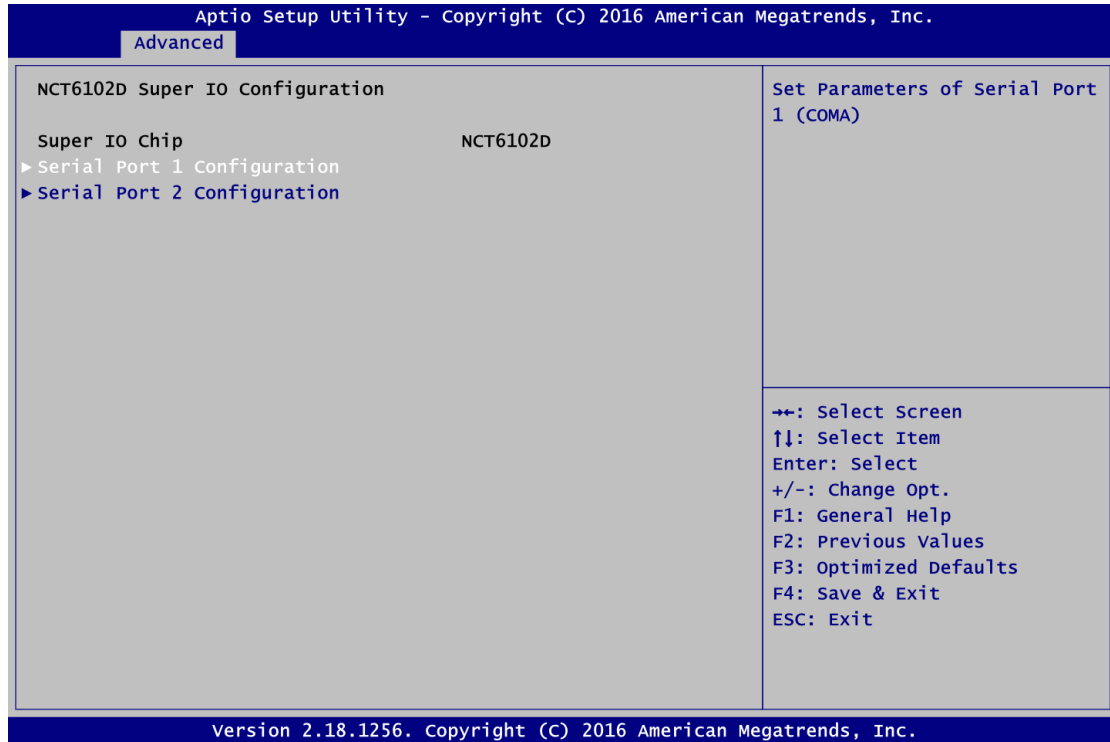
Serial Port 1~2 (COM1~2) Configurations

Use these items to set parameters related to serial ports 1~2.

Serial Port 1

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
         Advanced

  Serial Port 1 Configuration                              RS422/RS485

  Serial Port                       [Enabled]
  Device Settings                   IO=3F8h; IRQ=4;

  Select Mode                       [RS232]


                       ┌──── Select Mode ────┐
                       │ RS232               │
                       │ RS422               │
                       │ RS485               │
                       └─────────────────────┘
                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


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```

Select Mode

Use this option to set RS-232/RS-422/RS-485 mode.

Serial Port 2

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
         Advanced

  Serial Port 2 Configuration                              RS422/RS485

  Serial Port                       [Enabled]
  Device Settings                   IO=2F8h; IRQ=3;

  Select Mode                       [RS232]


                       ┌──── Select Mode ────┐
                       │ RS232               │
                       │ RS422               │
                       │ RS485               │
                       └─────────────────────┘
                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


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```

NCT6102DSEC Super IO Configurations

Use this screen to select options for the NCT6106DSEC super IO Configurations, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with " ", please press <Enter> for more options

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
         Advanced

  NCT6106DSEC Super IO Configuration                              Set Parameters of Serial Port
                                                                  1 (COMA)
  Super IO Chip                        NCT6106DSEC
 ▶Serial Port 1 Configuration
 ▶Serial Port 2 Configuration



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


                Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
         Advanced

  Serial Port 1 Configuration                                     RS422/RS485

  Serial Port                          [Enabled]
  Device Settings                      IO=3E8h; IRQ=5;

  Select Mode                          [RS232]

                              ┌──── Select Mode ────┐
                              │ RS232                │
                              │ RS422                │
                              │ RS485                │
                              └──────────────────────┘
                                                                  →←: Select Screen
                                                                  ↑↓: Select Item
                                                                  Enter: Select
                                                                  +/-: Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F3: Optimized Defaults
                                                                  F4: Save & Exit
                                                                  ESC: Exit


                Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

```
         Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
   Advanced

 Serial Port 2 Configuration                                 RS422/RS485

 Serial Port                      [Enabled]
 Device Settings                  IO=2F8h; IRQ=3;

 Select Mode                      [RS232]


                        ┌─────── Select Mode ───────┐
                        │ RS232                      │
                        │ RS422                      │
                        │ RS485                      │
                        └────────────────────────────┘
                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



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```

Hardware Monitor

This screen monitors hardware health status.

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
       Advanced

   Pc Health Status

   System temperature                  : +43 ºC
   CPU DTS temperature                 : +36 ºC
   VCORE                               : +0.960 V
   +5V_SBY                             : +5.088 V
   VBAT                                : +2.928 V
   +5V                                 : +5.088 V
   +3.3V                               : +3.312 V


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




              Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```
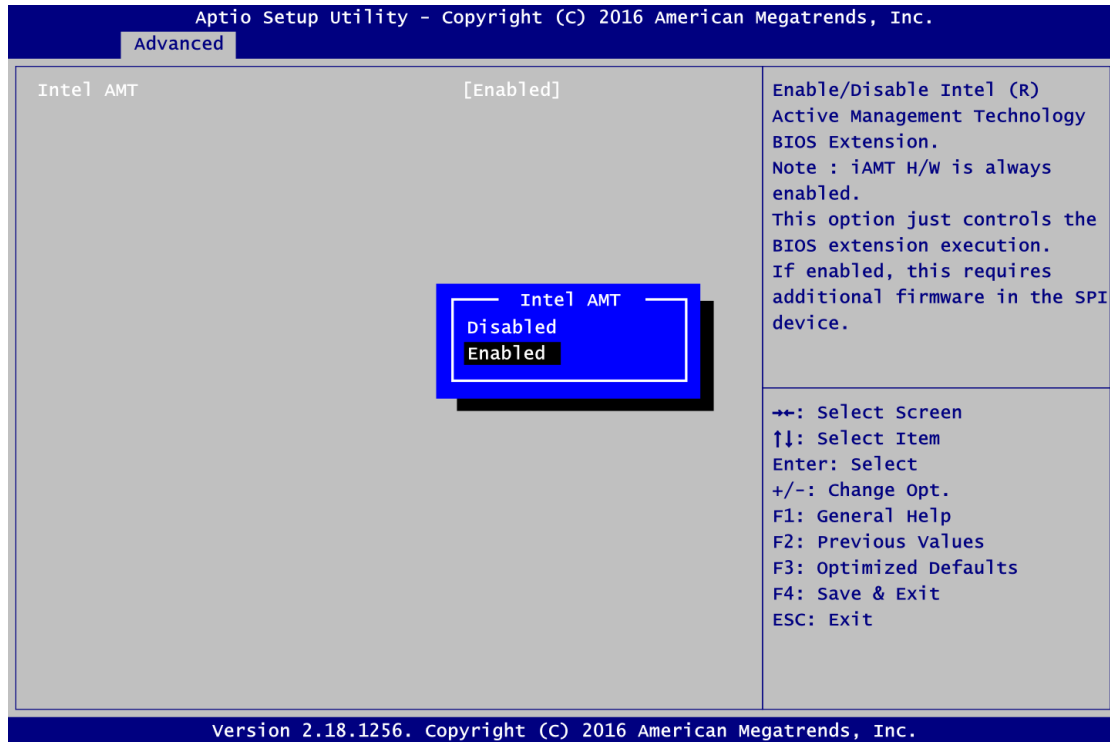
This screen displays the temperature of system and CPU, system voltages (VCORE, +3.3V, +12V and +5V).

Utility Configurations

This screen is for BIOS flash utility.

```
                 Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
       Advanced

  Utility Configuration                                      BIOS Flash Utility

 ▶ BIOS Flash Utility




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



                 Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```
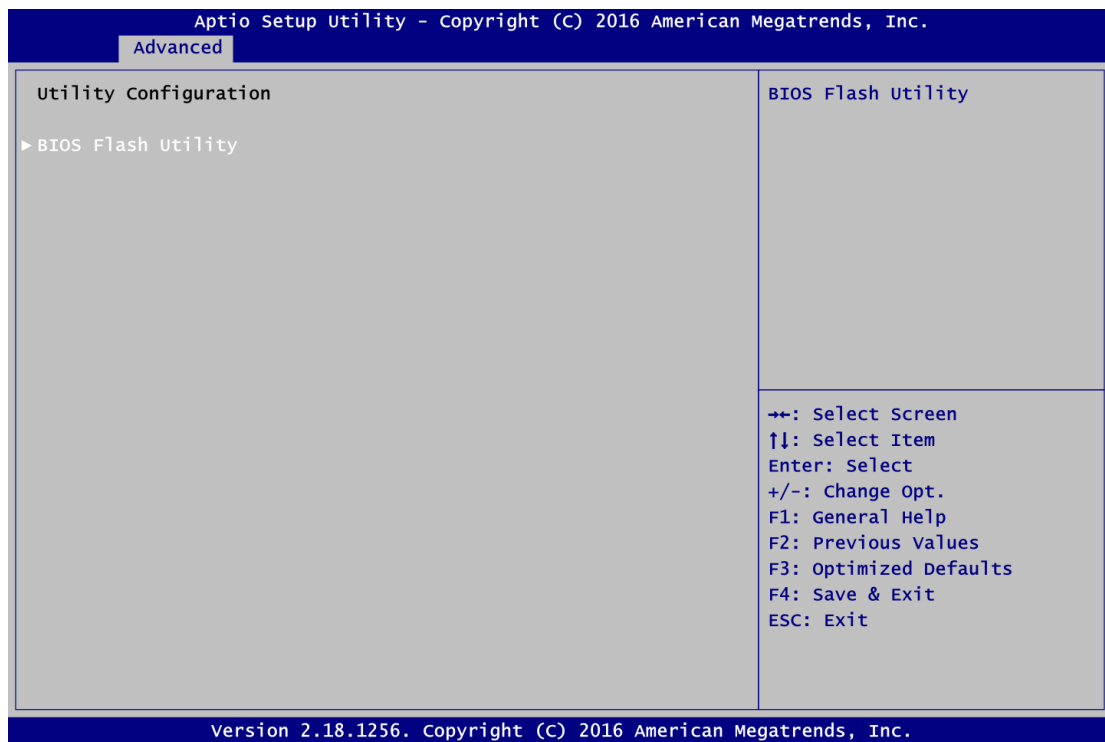
BIOS Flash Utility

BIOS flash utility configuration.

USB Configurations

This screen specifies USB settings.

```
                  Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
        Advanced

   USB Configuration                                        Enables Legacy USB support.
                                                            AUTO option disables legacy
   USB Module Version              8.10.27                  support if no USB devices are
                                                            connected. DISABLE option will
   USB Devices:                                             keep USB devices available
        1 Keyboard, 3 Hubs                                  only for EFI applications.

   Legacy USB Support             [Enabled]

                      ┌─────── Legacy USB Support ───────┐
                      │ Enabled                          │
                      │ Disabled                         │          →←: Select Screen
                      │ Auto                             │          ↑↓: Select Item
                      └──────────────────────────────────┘          Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit


                  Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```


USB Devices

Display all detected USB devices.

Legacy USB Support

Use this item to enable or disable support for USB device on legacy operating system. The default setting is Enabled. Auto option disables legacy support if no USB devices are connected, Disable option will keep USB devices available only for EFI applications.

4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. Users can select any of the items in the left frame of the screen to go to the sub menus:

- ► System Agent (SA) Configurations
- ► PCH-IO Configurations

For items marked with "►", please press <Enter> for more options.

```
        Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Main    Advanced   Chipset   Security    Boot    Save & Exit

 ► System Agent (SA) Configuration               System Agent (SA) Parameters
 ► PCH-IO Configuration




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




        Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```
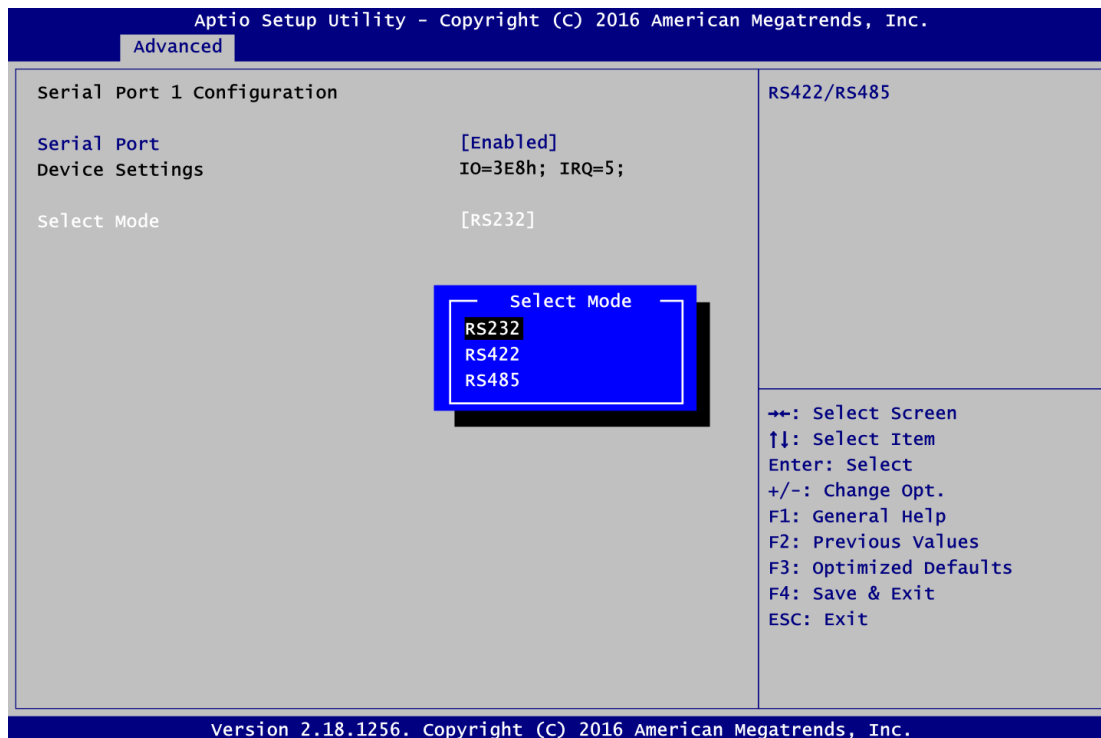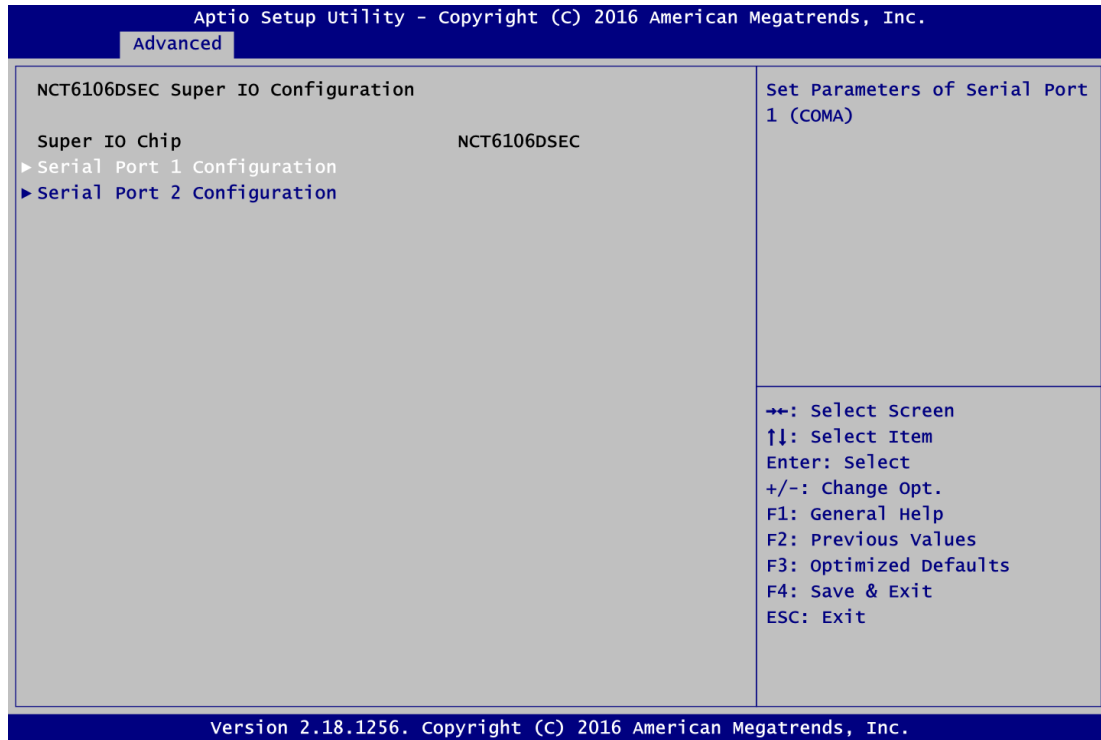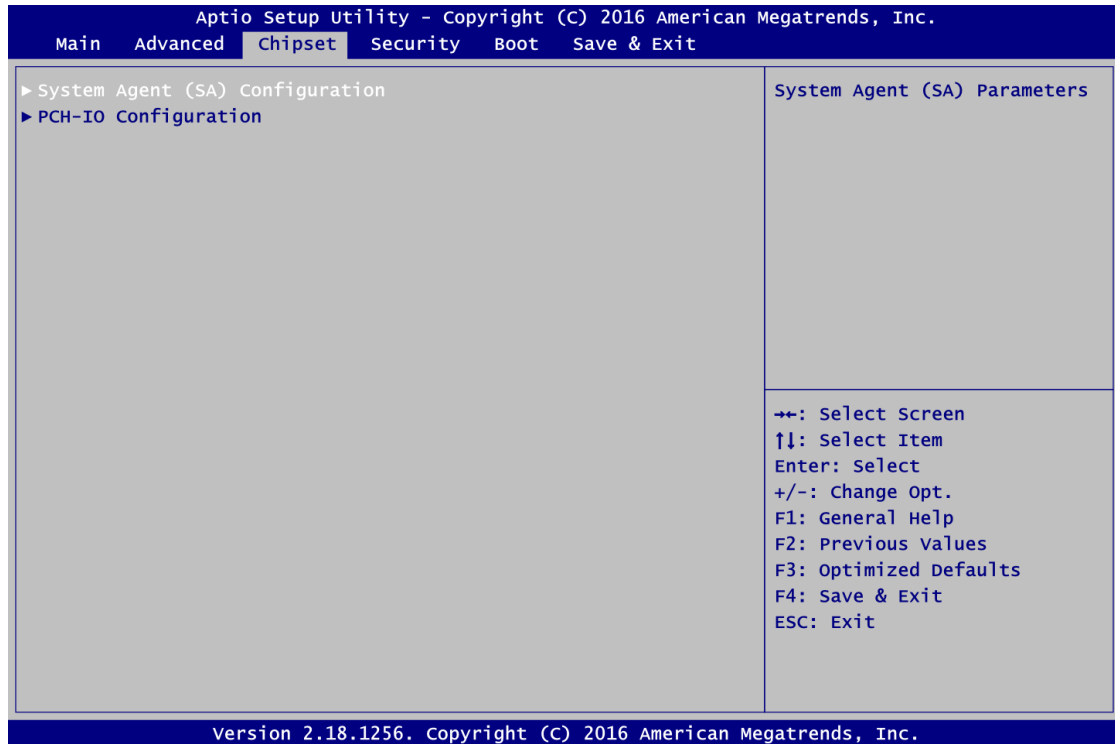
System Agent (SA) Configurations

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
            Chipset

 System Agent Bridge Name          Skylake                 Graphics Configuration
 SA PCIe Code Version              2.0.0.0
 VT-d                              Supported

▶ Graphics Configuration
▶ Memory Configuration




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




            Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

Graphics Configuration

Use this item to configure internal graphics controller.

Memory Configuration

Use this item to refer to the information related to system memory.

Graphic Configurations

```
           Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
             Chipset

 IGFX VBIOS Version                    1040                 Select the Video Device which
                                                            will be activated during POST.
 Primary IGFX Boot Display            [Auto]                This has no effect if external
                                                            graphics present.
                                                            Secondary boot display
                                                            selection will appear based on
                                                            your selection.
                                                            VGA modes will be supported
                      ┌──── Primary IGFX Boot Display ────┐ only on primary display.
                      │ Auto                              │
                      │ DP                                │
                      │ HDMI(2.0)                         │
                      │ HDMI                              │  →←: Select Screen
                      └───────────────────────────────────┘  ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



           Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self-Test). The default is HDMI (ONBOARD).The image above shows option list in Primary IGFX Boot Display when no I/O board is installed.

Memory Configurations

This screen shows the system memory information.

```
               Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
                    Chipset


    Memory RC Version                  2.0.0.1
    Total Memory                       8192 MB
    DIMM#1                             Not Present
    DIMM#2                             8192 MB




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




               Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

PCH-IO Configurations

This screen allows users to set PCH parameters.

```
               Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
                    Chipset

    Intel PCH RC Version               2.0.0.0                  Enable or disable onboard NIC.
    Intel PCH SKU Name                 PCH-H Desktop Q170 SKU
    Intel PCH Rev ID                   31/D1

    PCH LAN Controller                 [Enabled]
      Wake on LAN                      [Enabled]






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




               Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

Security Menu

```
              Aptio Setup Utility - Copyright (C) 2013 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
                                                         ↑↓: Select Item
                                                         Enter: Select
 Administrator Password                                  +/-: Change Opt.
 User Password                                           F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```
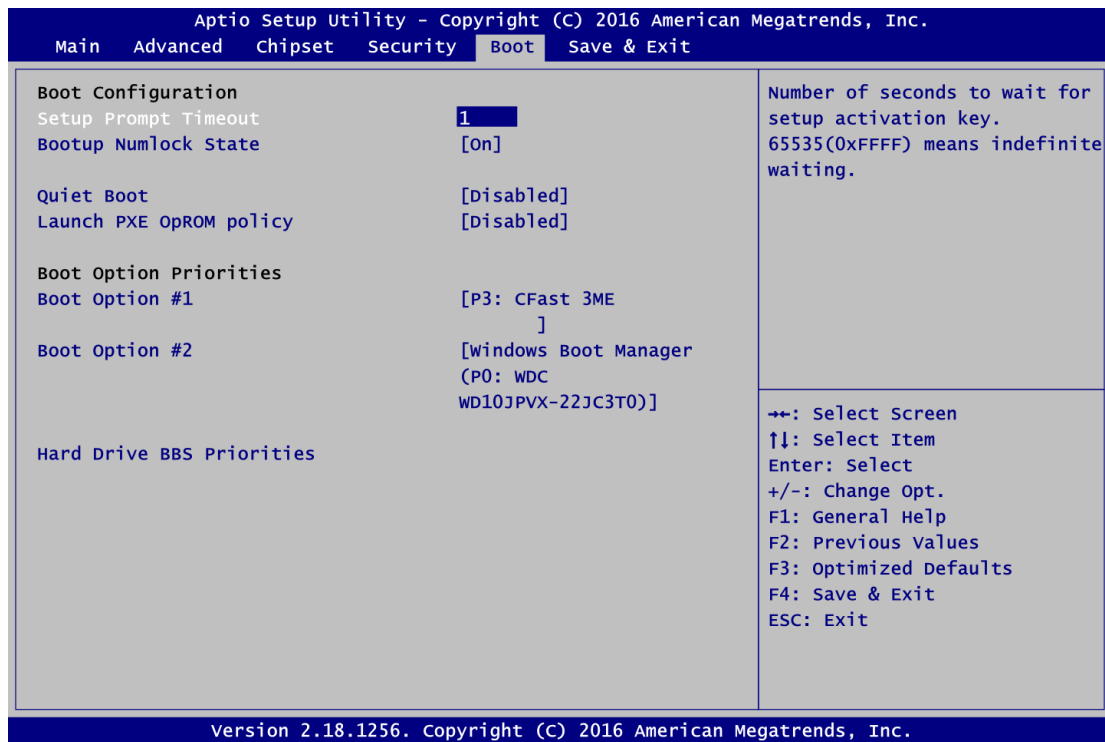
Administrator Password

This item indicates whether an administrator password has been set (installed or uninstalled).

User Password

This item indicates whether a user password has been set (installed or uninstalled).

4.6 Boot Menu

The Boot menu allows users to change boot options of the system.

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Main    Advanced    Chipset    Security    Boot    Save & Exit

    Boot Configuration                                       Number of seconds to wait for
    Setup Prompt Timeout              1                      setup activation key.
    Bootup Numlock State              [On]                   65535(0xFFFF) means indefinite
                                                             waiting.
    Quiet Boot                        [Disabled]
    Launch PXE OpROM policy           [Disabled]

    Boot Option Priorities
    Boot Option #1                    [P3: CFast 3ME
                                                 ]
    Boot Option #2                    [Windows Boot Manager
                                      (P0: WDC
                                      WD10JPVX-22JC3T0)]
                                                             →←: Select Screen
    Hard Drive BBS Priorities                                ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit


              Version 2.18.1256. Copyright (C) 2016 American Megatrends, Inc.
```

Setup Prompt Timeout

Use this item to set up number of seconds to wait for setup activation key where 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State

Use this item to select the power-on state for the keyboard NumLock.

Quiet Boot

Select to display either POST output messages or a splash screen during boot-up.

Legacy PXE OpROM

Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.
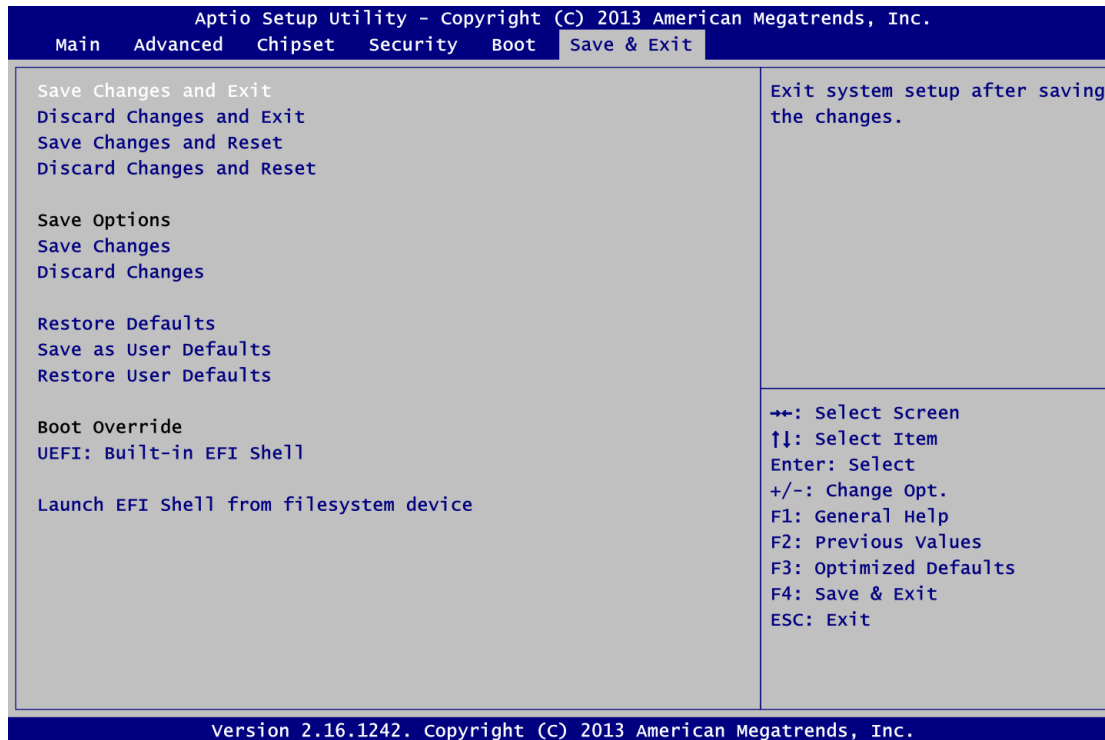
Vedio

Control the execution of UEFI and legacy video OpROM

Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.7 Save & Exit Menu

The Save & Exit menu allows users to load system configurations with optimal or fail-safe default values.

```
           Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
    Main    Advanced    Chipset    Security    Boot    Save & Exit

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

  Save Options
  Save Changes
  Discard Changes

  Restore Defaults
  Save as User Defaults
  Restore User Defaults
                                                           →←: Select Screen
  Boot Override                                            ↑↓: Select Item
  UEFI: Built-in EFI Shell                                 Enter: Select
                                                           +/-: Change Opt.
  Launch EFI Shell from filesystem device                 F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit



           Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Save Changes and Exit

When users have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configurations and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

Save Changes and Reset

When completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configurations take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

Save Changes

When completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

Discard Changes

Select this option to quit Setup without making any permanent changes to the system configurations. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

Restore Defaults

It automatically sets all Setup options to a complete set of default settings when users select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when users select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

APPENDIX A
WATCHDOG TIMER

About Watchdog Timer

Software stability is major issue in most applications. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solutions in this regard.

The watchdog timer is a counter that triggers a system to reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero, it means the software has crashed, the system will reboot.

Sample Program

The following example enables configurations using debug tool.

Enable WDT

↓

Enable configuration:

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

↓

Select logic device:

> **O 2E 07**
>
> **O 2F 08**

↓

WDT device enable:

> **O 2E 30**
>
> **O 2F 01**

↓

Set timer unit:

> **O 2E F0**
>
> **O 2F 00 ; (00: Sec; 08:Minute)**

↓

Set base timer:

> **O 2E F1**
>
> **O 2F 0A; Set reset time (where 0A (hex) = 10sec)**

Disable WDT

↓

Enable configuration:

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

↓

Select logic device:

> **O 2E 07**
>
> **O 2F 08**

↓

WDT device disable:

> **O 2E 30**
>
> **O 2F 00**

About Programmable

four programmable LED which allows user to program the LED status. It can do as special indicator or alarm. Please refer to Driver CD for sample code and demo tool.

📁 Demo
📁 LIB
📁 SRC
📄 Readme

This page is intentionally left blank.

About Programmable Digital I/O

32 channels programmable digital I/O which allows user to program the DI or DO. Please refer to Driver CD for sample code and demo tool.

Demo
LIB
SRC
Readme

This page is intentionally left blank.

APPENDIX D
CONFIGURING SATA FOR RAID

D.1 Configuring SATA Hard Drive(s) for RAID (Controller: Intel® Q170)

Before you begin the SATA configuration, please prepare:

● Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

Please follow up the steps below to configure SATA hard drive(s):

1. Install SATA hard drive(s) in your system.
2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
3. Configure RAID by the RAID BIOS.

1. Installing SATA hard drive(s) in your system.

Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

2.1. Turn on your system, and then press the <Del> button to enter BIOS Setup during running POST (Power-On Self-Test). If you want to create RAID, just go to the Advanced Settings menu\SATA Configuration, select the "SATA Mode Selection", and press <Enter> for more options.

```
             Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

 SATA Controller(s)                    [Enabled]              Determines how SATA
 SATA Mode Selection                   [AHCI]                 controller(s) operate.

 Serial ATA Port 0                     Empty
 Serial ATA Port 1                     Empty
 Serial ATA Port 2                     Empty
 Serial ATA Port 3                     Empty


                         ┌──────── SATA Mode Selection ────────┐
                         │ AHCI                                 │
                         │ RAID                                 │    Select Screen
                         └──────────────────────────────────────┘    Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit



             Version 2.17.1254 Copyright (C) 2016 American Megatrends, Inc.
```

A list of options appears, please select "RAID".

```
             Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
      Advanced

 SATA Controller(s)                    [Enabled]              Determines how SATA
 SATA Mode Selection                   [RAID]                 controller(s) operate.

 Serial ATA Port 0                     Empty
 Serial ATA Port 1                     Empty
 Serial ATA Port 2                     Empty
 Serial ATA Port 3                     Empty







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



             Version 2.17.1254 Copyright (C) 2016 American Megatrends, Inc.
```

2.2. Save and exit the BIOS Setup.

3. Configuring RAID by the RAID BIOS.

Enter the RAID BIOS setup utility to configure a RAID array. Skip this step and proceed if you do not want to create a RAID.

3.1. After the POST memory testing and before the operating system booting, a message "Press <Ctrl-I> to enter Configuration Utility" shows up, accordingly, press <Ctrl + I> to enter the RAID BIOS setup utility.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.

  RAID Volumes:
  ID       Name          Level          Strip       Size  Status      Bootable
  0        Volume1       RAID0(Stripe)  128KB     149.1GB  Normal         Yes

  Physical Devices:
  ID       Device Model     Serial #                 Size  Type/Status(Vol ID)
   4       ST320LT012-9WS14 WOV20YPA               298.0GB  Member Disk(0)
   5       ST380817AS       5MR1BSS7                74.5GB  Member Disk(0)
Press <CTRL-I> to enter Configuration Utility...
```

3.2. After you press <Ctrl + I>, the Create RAID Volume screen will appear. If you want to create a RAID array, select the Create RAID Volume option in the Main Menu and press <Enter>.

```
             Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
             Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
   ==================[ MAIN MENU ]==================
        1. Create RAID Volume          4. Recovery Volume Options
        2. Delete RAID Volume          5. Acceleration Options
        3. Reset Disks to Non-RAID     6. Exit
   ================[ DISK/VOLUME INFORMATION ]================
   RAID Volumes:
   None Defined.

   Physical Devices:
   ID   Device Model     Serial #                 Size  Type/Status(Vol ID)
   4    ST320LT012-9WS14 WOV20YPA               298.0GB  Non-RAID Disk
   5    ST380817AS       5MR1BSS7                74.5GB  Non-RAID Disk




        [↑↓]-Select            [ESC]-Exit            [Enter]-Select Menu
```
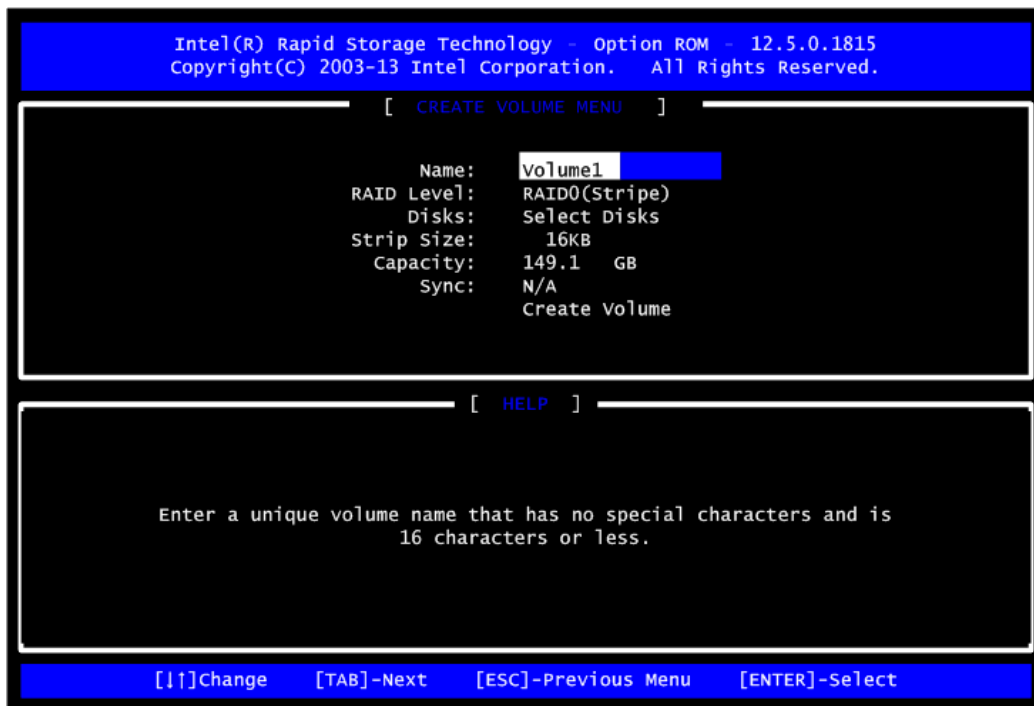
3.3. After entering the Create Volume Menu screen, you can type the disk array name with 1~16 letters (letters cannot be special characters) in the item "Name".

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
       ┌──────────────────[ CREATE VOLUME MENU   ] ───────────────────┐
       │                                                              │
       │              Name:      Volume1                              │
       │         RAID Level:     RAID0(Stripe)                        │
       │              Disks:     Select Disks                         │
       │         Strip Size:        16KB                              │
       │           Capacity:     149.1    GB                          │
       │               Sync:     N/A                                  │
       │                         Create Volume                        │
       │                                                              │
       └──────────────────────────────────────────────────────────────┘
       ┌────────────────────────[ HELP  ] ───────────────────────────┐
       │                                                              │
       │                                                              │
       │        Enter a unique volume name that has no special        │
       │        characters and is 16 characters or less.              │
       │                                                              │
       └──────────────────────────────────────────────────────────────┘
         [↓↑]Change    [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```

3.4. When finished, press <Enter> to select a RAID level. There are three RAID levels: RAID0, RAID1 and RAID5 and RAID10. Select a RAID level and press <Enter>.

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
       ┌──────────────────[ CREATE VOLUME MENU   ] ───────────────────┐
       │                                                              │
       │              Name:      Volume1                              │
       │         RAID Level:     RAID0(Stripe)                        │
       │              Disks:     Select Disks                         │
       │         Strip Size:        16KB                              │
       │           Capacity:     149.1    GB                          │
       │               Sync:     N/A                                  │
       │                         Create Volume                        │
       │                                                              │
       └──────────────────────────────────────────────────────────────┘
       ┌────────────────────────[ HELP  ] ───────────────────────────┐
       │                                                              │
       │                                                              │
       │            RAID 0: Stripes data (performance).               │
       │                                                              │
       └──────────────────────────────────────────────────────────────┘
         [↓↑]Change    [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```
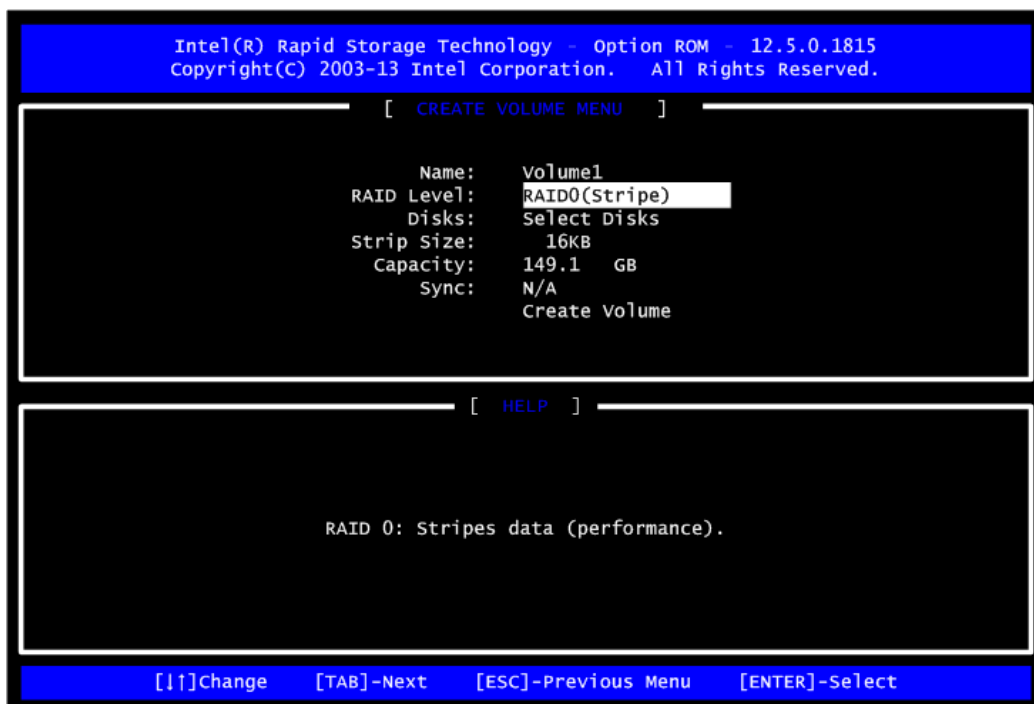
3.5. Set the stripe block size. The KB is the standard unit of stripe block size. The stripe block size can be 4KB to 128KB. After the setting, press <Enter> for the array capacity.

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
    ═══════════════[ CREATE VOLUME MENU    ]═══════════════

                      Name:     Volume1
                RAID Level:     RAID0(Stripe)
                     Disks:     Select Disks
                Strip Size:     128KB
                  Capacity:     149.1     GB
                      Sync:     N/A
                                Create Volume


    ═══════════════════[ HELP ]═══════════════════


            The following are typical values:

                        RAID0  - 128KB
                        RAID10 - 64KB
                        RAID5  - 64KB




        [↓↑]Change    [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```

3.6. After setting all the items on the menu, select Create Volume and press <Enter> to start creating the RAID array.

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
    ═══════════════[ CREATE VOLUME MENU    ]═══════════════

                      Name:     Volume1
                RAID Level:     RAID0(Stripe)
                     Disks:     Select Disks
                Strip Size:      128KB
                  Capacity:     149.1      GB
                      Sync:     N/A
                                Create Volume


    ═══════════════════[ HELP ]═══════════════════



        The default value indicates the maximum capacity using the selected
        disks. Entering a lower capacity allows you to create a second
                        volume on these disks.




        [↓↑]Change    [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```
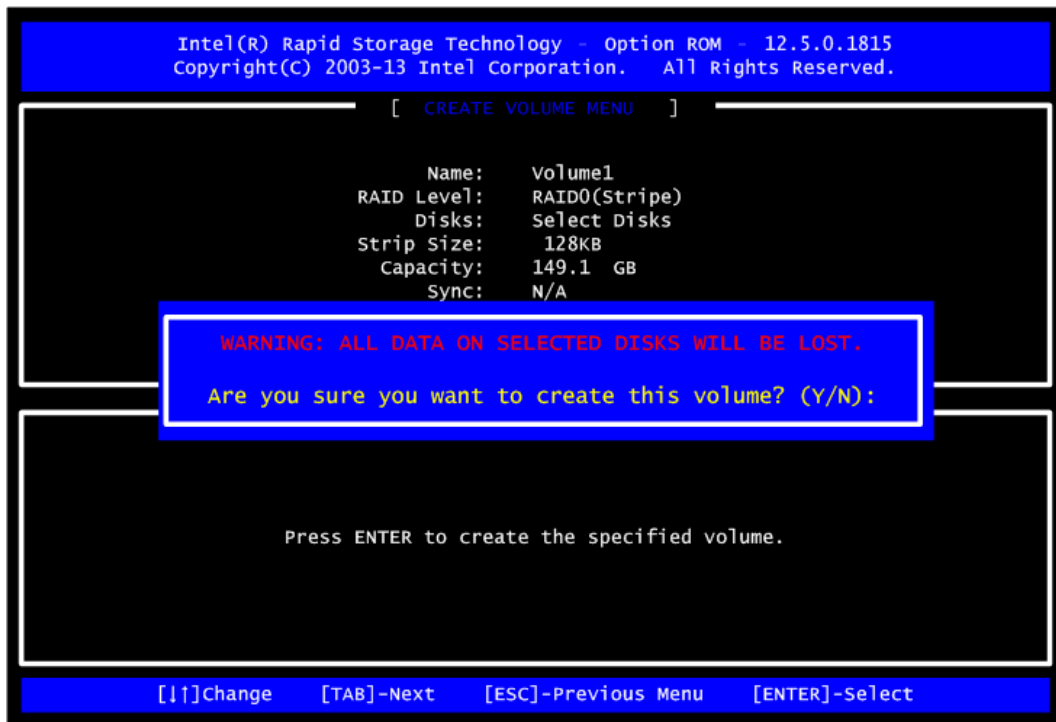
3.7. When prompting the confirmation, press <Y> to create this volume, or <N> to cancel the creation.

```
          Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
          Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
 ┌─────────────────────────[   CREATE VOLUME MENU   ]─────────────────────────┐

                            Name:     Volume1
                      RAID Level:     RAID0(Stripe)
                           Disks:     Select Disks
                      Strip Size:      128KB
                        Capacity:     149.1  GB
                            Sync:     N/A
         ┌───────────────────────────────────────────────────────────────┐
         │   WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.           │
         │                                                               │
         │   Are you sure you want to create this volume? (Y/N):         │
         └───────────────────────────────────────────────────────────────┘



                    Press ENTER to create the specified volume.




 └────────────────────────────────────────────────────────────────────────────┘
        [↓↑]Change      [TAB]-Next     [ESC]-Previous Menu     [ENTER]-Select
```
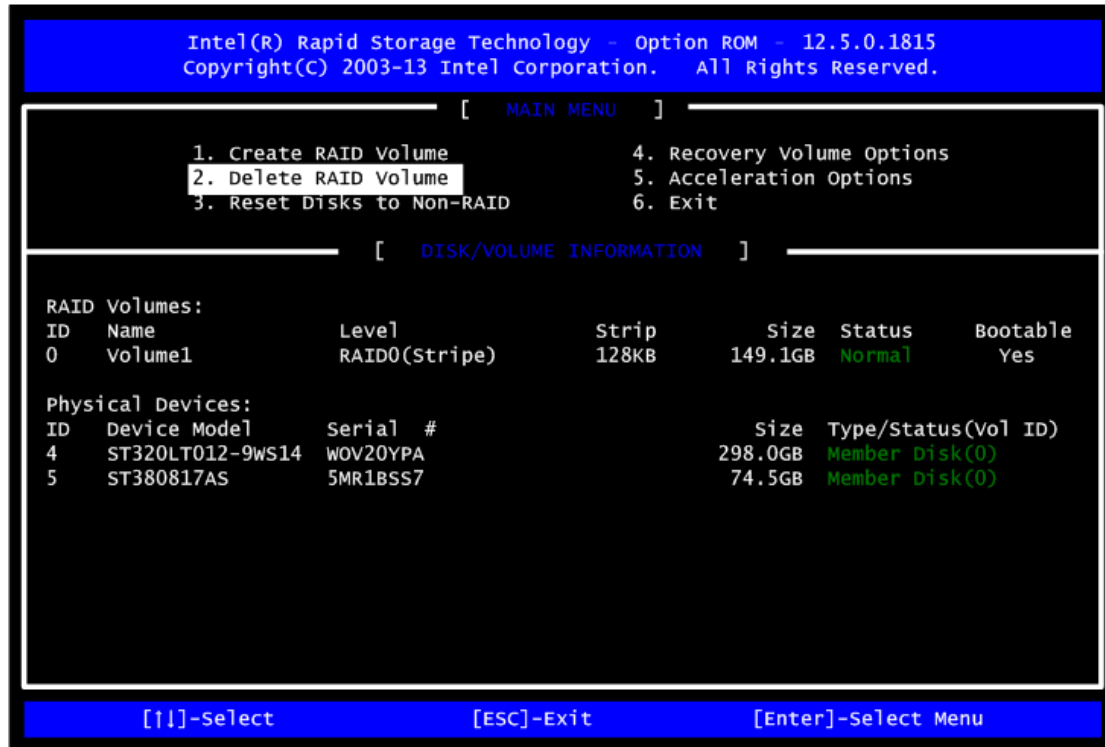
After the creation is completed, you can see detailed information about the RAID Array in the Disk/Volume Information section, including RAID mode, disk block size, disk name, and disk capacity, etc.

```
          Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
          Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
 ┌───────────────────────────────[   MAIN MENU   ]────────────────────────────┐
             1. Create RAID Volume          4. Recovery Volume Options
             2. Delete RAID Volume          5. Acceleration Options
             3. Reset Disks to Non-RAID     6. Exit
 ├────────────────────────[   DISK/VOLUME INFORMATION   ]─────────────────────┤

     RAID Volumes:
     ID   Name            Level          Strip     Size   Status      Bootable
     0    Volume1         RAID0(Stripe)  128KB   149.1GB  Normal       Yes

     Physical Devices:
     ID   Device Model    Serial  #                Size  Type/Status(Vol ID)
     4    ST320LT012-9WS14  WOV20YPA              298.0GB  Member Disk(0)
     5    ST380817AS        5MR1BSS7               74.5GB  Member Disk(0)






 └────────────────────────────────────────────────────────────────────────────┘
         [↑↓]-Select               [ESC]-Exit            [Enter]-Select Menu
```

Delete RAID volume

If you want to delete a RAID volume, select the Delete RAID Volume option in Main Menu. Press <Enter> and follow on-screen instructions.

```
┌─────────────────────────────────────────────────────────────────────┐
│     Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815      │
│        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved. │
├──────────────────────[  MAIN MENU  ]──────────────────────────────────┤
│                                                                       │
│        1. Create RAID Volume        4. Recovery Volume Options        │
│        2. Delete RAID Volume        5. Acceleration Options           │
│        3. Reset Disks to Non-RAID   6. Exit                           │
│                                                                       │
├───────────────────[  DISK/VOLUME INFORMATION  ]───────────────────────┤
│                                                                       │
│  RAID Volumes:                                                        │
│  ID   Name            Level           Strip      Size  Status   Bootable │
│  0    Volume1         RAID0(Stripe)   128KB   149.1GB  Normal      Yes  │
│                                                                       │
│  Physical Devices:                                                   │
│  ID   Device Model    Serial  #                  Size  Type/Status(Vol ID) │
│  4    ST320LT012-9WS14 WOV2OYPA                298.0GB  Member Disk(0) │
│  5    ST380817AS       5MR1BSS7                 74.5GB  Member Disk(0) │
│                                                                       │
├───────────────────────────────────────────────────────────────────────┤
│      [↑↓]-Select            [ESC]-Exit           [Enter]-Select Menu  │
└───────────────────────────────────────────────────────────────────────┘
```

Please press <Esc> to exit the RAID BIOS utility. Now, you can proceed to install a SATA driver controller and the operating system.

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iAMT SETTINGS

The Intel® Active Management Technology (Intel® iAMT) has decreased a major barrier to IT efficiency that uses built-in platform capabilities and popular third-party management and security applications to allow IT a better discovering, healing, and protection their networked computing assets.

In order to utilize Intel® iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select "Intel® iAMT" as the manageability feature.

E.1 Entering MEBx

1. You must go to BIOS to enable iAMT function.
2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.

**It is better to press <Ctrl + P> before the screen popping out.

E.2 Set and Change Password

1. User will be asked to set a password when first log in. The default password is "admin".
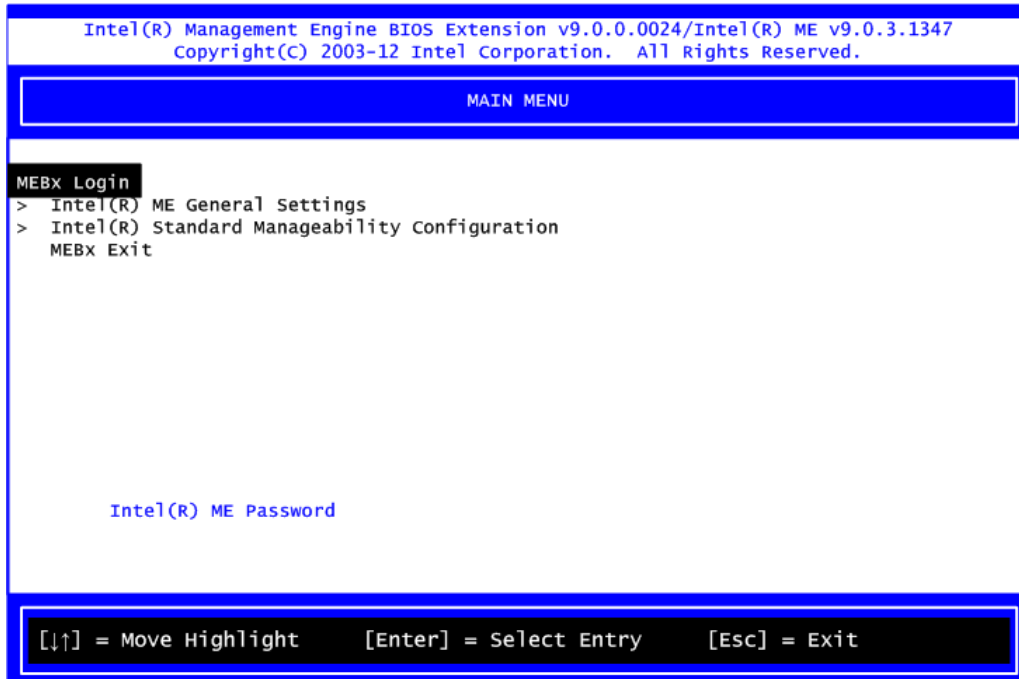
2. User will be asked to change the password before setting ME.
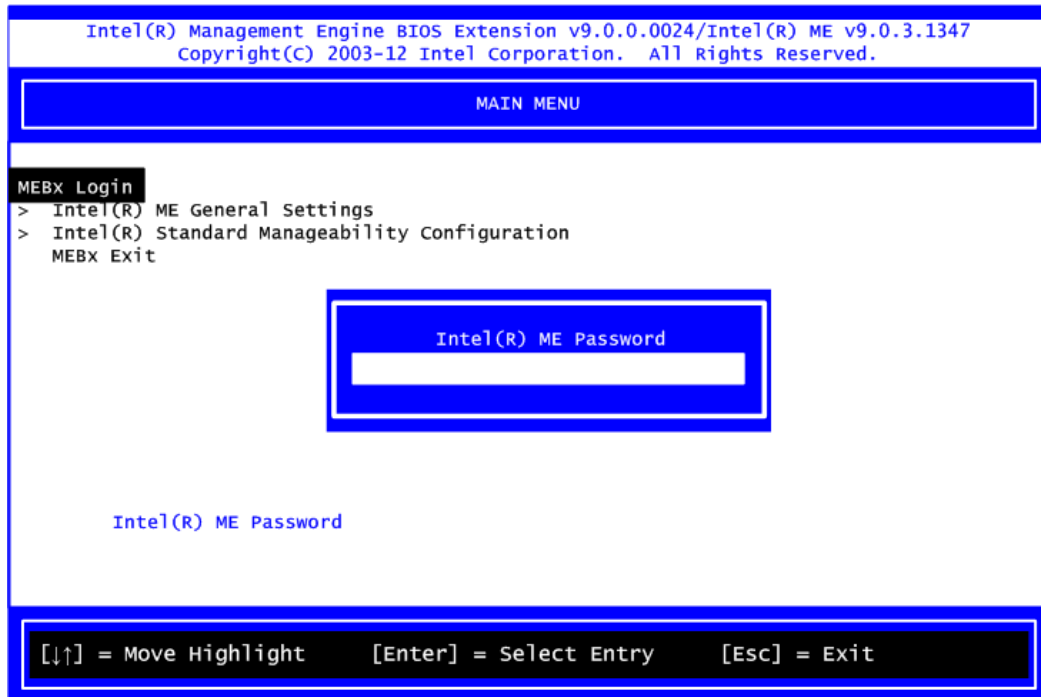
3. User must confirm the new password while revising. The new password must contain: (example: **!!11qqQQ**) (default value).

- Eight characters
- One upper case
- One lower case
- One number
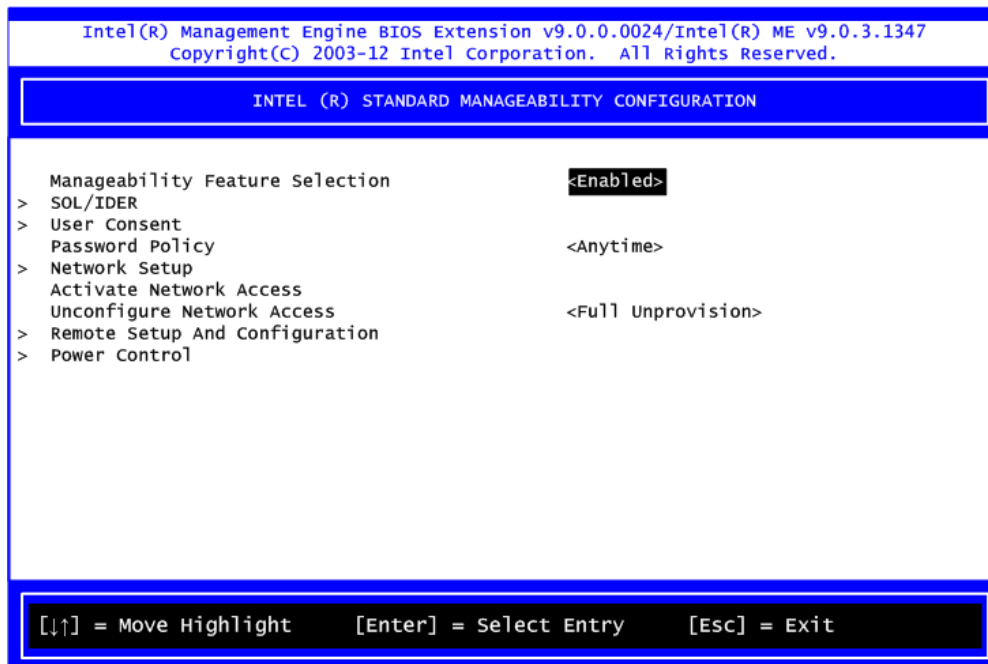- One special symbol, such as ! 、 $ or ; ，(、 " ，excepted)

Underline (_) and space are valid characters for password, but they won't make higher complexity.
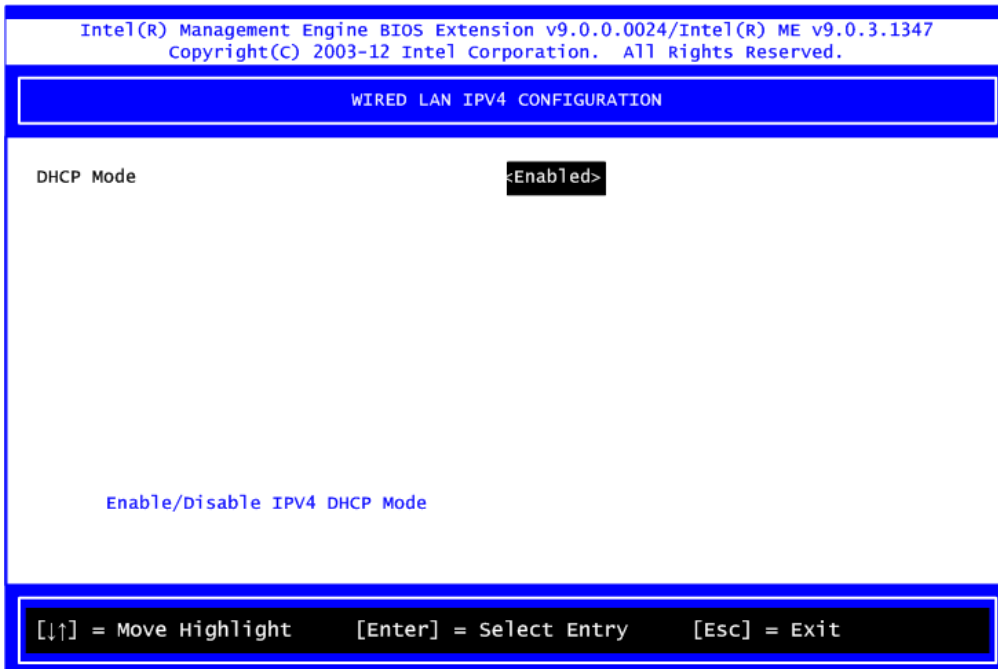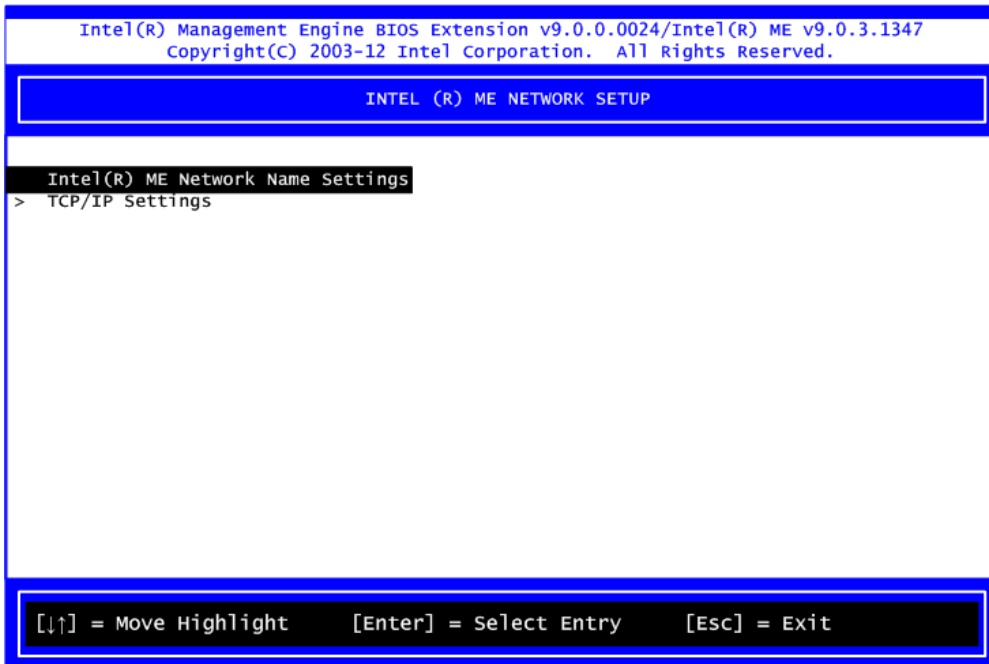
E.3 iAMT Settings

Select Intel® iAMT configuration and press <Enter>.
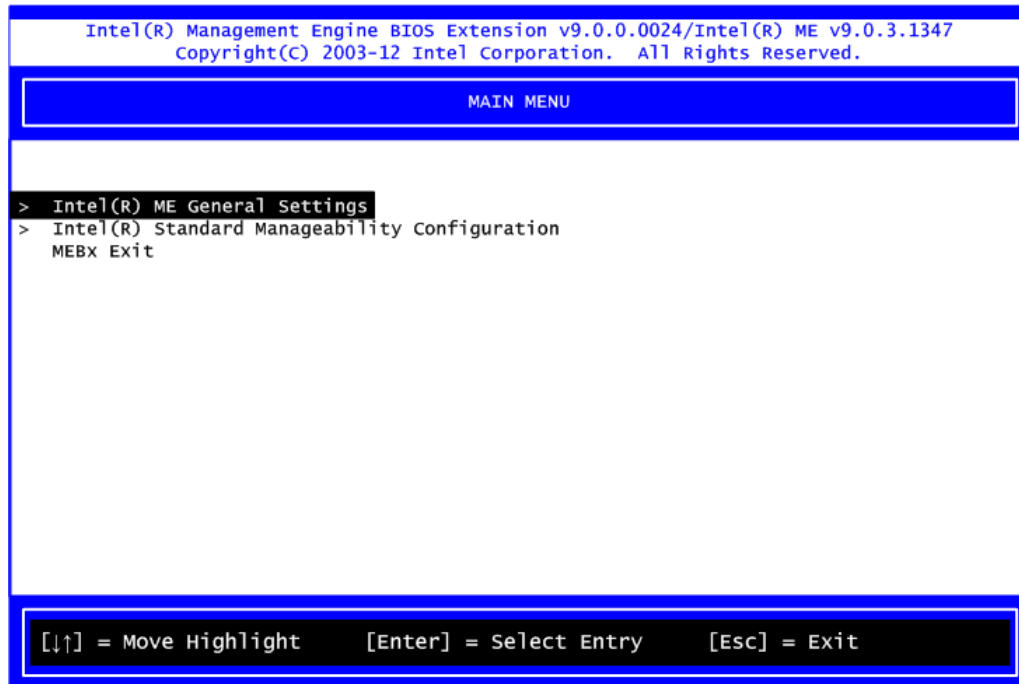
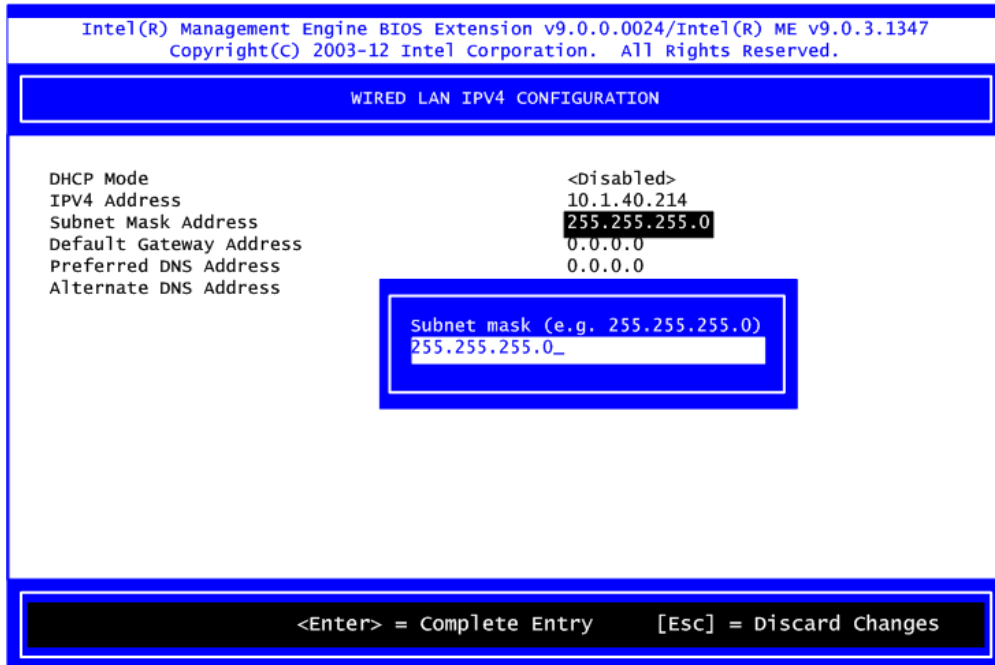1. Select Network Setup to configure iAMT.

2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.
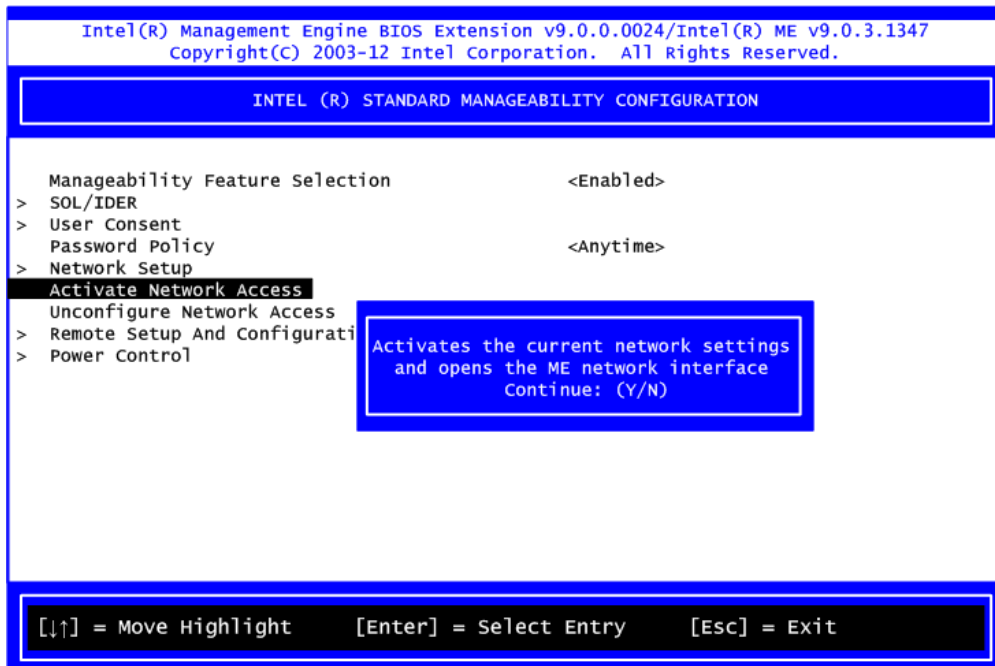
3. If DHCP Mode is disabled, set the following settings:

  - IP address
  - Subnet mask

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
              Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

                           WIRED LAN IPV4 CONFIGURATION


        DHCP Mode                                <Disabled>
        IPV4 Address                             10.1.40.214
        Subnet Mask Address                      255.255.255.0
        Default Gateway Address                  0.0.0.0
        Preferred DNS Address                    0.0.0.0
        Alternate DNS Address

                            Subnet mask (e.g. 255.255.255.0)
                            255.255.255.0_




                      <Enter> = Complete Entry     [Esc] = Discard Changes
```

4. Go back to Intel® iAMT Configuration, then select Activate Network Access and press <Enter>.

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
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                    INTEL (R) STANDARD MANAGEABILITY CONFIGURATION


        Manageability Feature Selection          <Enabled>
    >   SOL/IDER
    >   User Consent
        Password Policy                          <Anytime>
    >   Network Setup
        Activate Network Access
        Unconfigure Network Access
    >   Remote Setup And Configurati      Activates the current network settings
    >   Power Control                       and opens the ME network interface
                                                   Continue: (Y/N)




        [↓↑] = Move Highlight     [Enter] = Select Entry     [Esc] = Exit
```
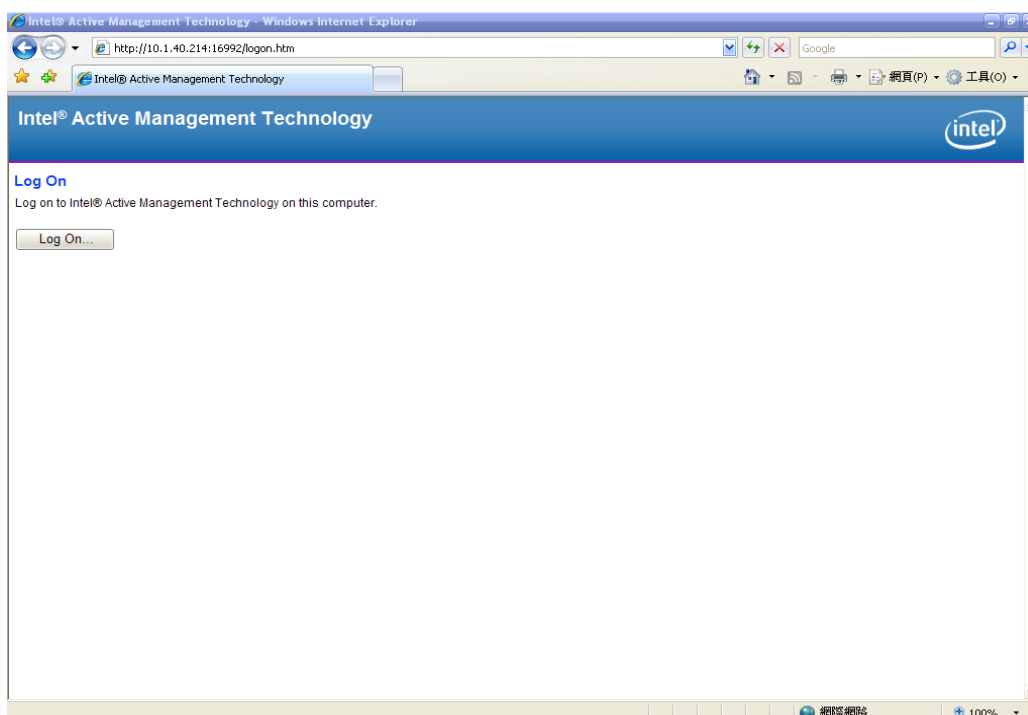
5. Exit from MEBx after completing the iAMT settings.

E.4 iAMT Web Console

1. From a web browser, please type http://(IP ADDRESS):16992, which connects to iAMT Web.

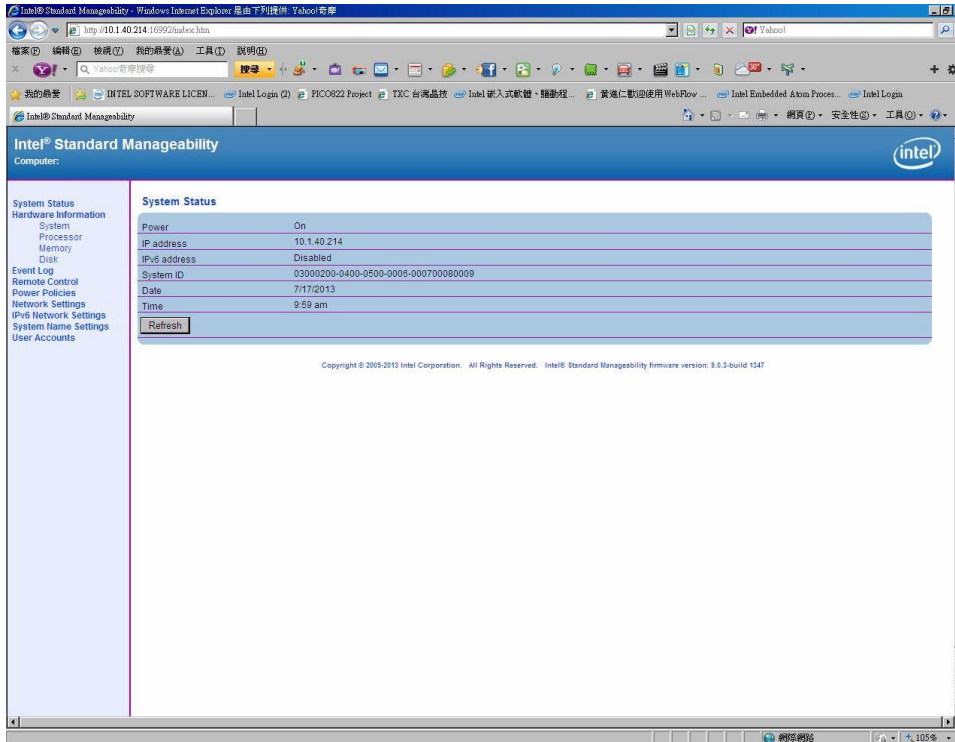   Example: http://10.1.40.214:16992

2. To log on, you will be required to type in username and password for access to the Web.
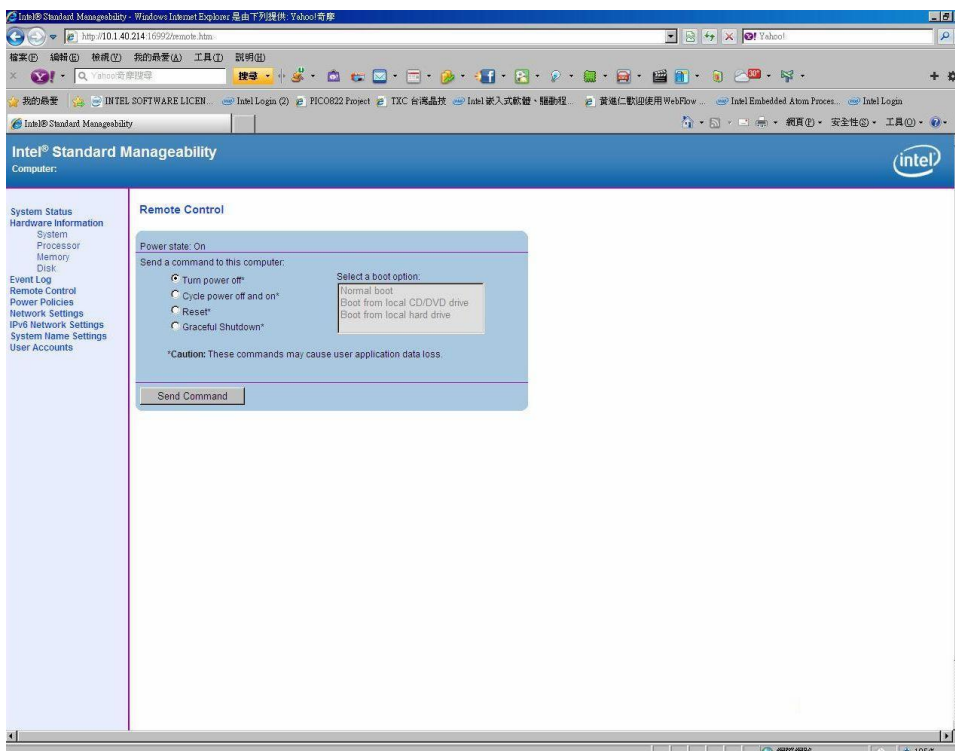
    USER: admin (default value)
    PASS: (MEBx password)

3. Enter the iAMT Web.

4. Click Remote Control, and select commands on the right side.

5. When you have finished using the iAMT Web console, close the Web browser.

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