

USER'S MANUAL

RCO-3000-KBL Series
Advanced Fanless Embedded System



Please note, the RCO-3600 is now referred to as "RCO-3000-KBL" due to a model name change. All product features and functionality remain the same. If any questions, please contact us for more information.

Name Change Guide:

LEGACY Model Name	NEW Model Name
RCO-3600	RCO-3000-KBL

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Prefaces

Revision

Revision	Description	Date
1.0	Manual released	2019/08/13
1.1	New-added TPM 2.0 support	2020/03/17

Disclaimer

All specifications and information in this User's Manual are believed to be accurate and up to date. We do not guarantee that the contents herein are complete, true, accurate or non-misleading. The information in this document is subject to change without notice.

We disclaim all warranties, express or implied, including, without limitation, those of merchantability, fitness for a particular purpose with respect to contents of this User's Manual. Users must take full responsibility for the application of the product.

Copyright Notice

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Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. Please recycle to minimize pollution and ensure environment protection.



Safety Precautions

Before installing and using the equipment, please read the following precautions:

- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- The power outlet shall be installed near the equipment and shall be easily accessible.
- Turn off the system power and disconnect the power cord from its source before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the equipment is properly grounded.
- When the power is connected, never open the equipment. The equipment should be opened only by qualified service personnel.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Disconnect this equipment from the power before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- Avoid the dusty, humidity and temperature extremes.
- Do not place heavy objects on the equipment.
- If the equipment is not used for long time, disconnect it from the power to avoid being damaged by transient over-voltage.
- The storage temperature shall be above -40°C and below 85°C.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- If one of the following situation arises, get the equipment checked be service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well or it cannot work according the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.

Technical Support and Assistance

Contact your distributor, our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:

- Model name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Conventions Used in this Manual



WARNING

This indication alerts operators to an operation that, if not strictly observed, may result in severe injury.



CAUTION

This indication alerts operators to an operation that, if not strictly observed, may result in safety hazards to personnel or damage to equipment.



NOTE

This indication provides additional information to complete a task easily.

Package Contents

Before installation, please ensure all the items listed in the following table are included in the package.

Item	Description	Q'ty
1	RCO-3600 Series Embedded System	1
2	Utility DVD Driver	1
3	Wall Mount Kit	1
4	Accessory Kit	1
5	DVI to VGA Adapter	1

Ordering Information

Model No.	Product Description
RCO-3600	Advanced Fanless Embedded System with Intel® 6 th /7 th Gen Processor and Q170 PCH

Optional Accessories

Model No.	Product Description
1-E09A12002	Adapter AC/DC 24V 5A 120W with 3pin Terminal Block Plug 5.0mm Pitch
SFICBL022	Power Cord, 3-pin US Type, 180cm
1-TPCD00002	Power Cord, European Type, 180cm
1-TPCD00001	Power Cord, 3-pin UK Type, 180cm

Chapter 1

Product Introductions

1.1 Overview

Based on 7th Gen. Intel® Core™ i7-7700T (3.8GHz, Quad Core) / i5-7500T (3.3GHz, Quad Core) / i3-7101TE (3.4GHz, Dual Core) or 6th Gen. Intel® Core™ i7-6700TE (3.4GHz, Quad Core) / i5-6500TE (3.3GHz, Quad Core) / i3-6100TE (2.7GHz, Dual Core) or Pentium® G4400TE (2.4GHz, Dual Core) / Celeron® G3900TE (2.3GHz, Dual Core) Desktop processor, RCO-3600 series is an extreme features integration, outstanding system performance, versatile I/O connections, and rugged reliability fanless embedded systems. It offers dramatically enhanced CPU and graphics performance, wide power and feature advanced features, rich connectivity interfaces, wide range (9~50V) DC power input, and high reliability even operating in temperature extremes (-25°C ~ +60°C).

Featuring with completely cable-less designed, high functional, one-piece housing design, and anti-vibration, RCO-3600 series are ruggedized systems that can operate in harsh environments and easy to install and maintain. A build in over voltage protection (OVP), over current protection (OCP), reverse protection, and wide range DC power input makes RCO-3600 series are safety system for all industrial applications.



1.1.1 Key Features

- LGA 1151 socket for 6th/7th Gen. Intel® Core™ i7/i5/i3 or Pentium® / Celeron® Desktop Processor
- Intel® Q170 chipset
- 2x DDR4 1866/2133MHz SODIMM. Max. up to 32GB
- Intel® HD Graphics 530 / 630
- Triple independent display supported by 1x DVI-I, 1x DisplayPort, 1x HDMI (Optional)
- 2x Intel® GbE supporting Wake-on-LAN and PXE
- 2x internal 2.5" SATA HDD bay with RAID 0, 1, 5, 10 support, 2x mSATA (shared by 2x Mini PCIe), 1x CFast
- 2x full-size Mini PCIe (shared by 2x mSATA) for communication or expansion modules, 2x external SIM socket
- 4x RS-232/422/485 (w/ 2x internal), 6x USB 3.0, 2x USB 2.0 (internal), TPM 2.0
- 8x DI + 8x DO with isolation
- 9 to 50VDC wide range power input supporting AT/ATX mode
- -25°C to 60°C extended operating temperature

1.2 Hardware Specification

Processor System

- Support 6th & 7th Gen Intel® Core™ i7 / i5 / i3 / Pentium® / Celeron® Desktop Processor (LGA 1151) with AMI 128Mbit SPI BIOS
 - 7th Gen Intel® Core™ i7-7700T, Quad Core, 8MB cache, up to 3.8 GHz
 - 7th Gen Intel® Core™ i5-7500T, Quad Core, 6MB cache, up to 3.3 GHz
 - 7th Gen Intel® Core™ i3-7101TE, Dual Core, 3MB Cache, 3.4 GHz
 - 6th Gen Intel® Core™ i7-6700TE, Quad Core, 8MB cache, up to 3.4 GHz
 - 6th Gen Intel® Core™ i5-6500TE, Quad Core, 6MB Cache, up to 3.3 GHz
 - 6th Gen Intel® Core™ i3-6100TE, Dual Core, 4MB Cache, 2.7 GHz
 - Intel® Pentium® G4400TE, Dual Core, 3MB Cache, 2.4 GHz
 - Intel® Celeron® G3900TE, Dual Core, 2MB Cache, 2.3 GHz

Memory

- 1x 260-Pin DDR4 1866/2133MHz SODIMM. Max. up to 32GB

Display

Triple Display

- 1x VGA
- 1x DisplayPort, 1x HDMI (optional)

Expansion

- 2x Full-size Mini PCIe Socket (shared by 2x mSATA) for Wi-Fi / GSM / Expansion Module

Ethernet

- 1x Intel® i219LM GbE LAN port and 1x Intel® i210-AT GbE LAN port, Support Wake-on-LAN and PXE

Audio

- Codec: Realtek ALC888S
- 1x Mic-in and 1x Speaker-out

Watchdog Timer

- Software Programmable Supports 1~255 sec. System Reset

TPM

- TPM 2.0

Storage

- 2x internal 2.5" SATA HDD Bay with RAID 0, 1, 5, 10 support
- 2x mSATA socket (shared by 2x Mini-PCIe)
- 1x CFast socket
- 2x External SIM Card Socket

I/O Ports

- 6x USB 3.0 Port
- 2x USB 2.0 Port (internal)
- 8 Isolated DI and 8 Isolated DO Port
- 4x DB9 Flow Control for COM1~4 (w/ 2x internal), support RS232/422/485 with Auto Flow Control
- 4x Antenna Hole
- 1x Power Switch
- 1x AT/ATX Switch
- 1x Remote Power on/off Connector

Digital Input & Output

- 8x Digital Input (Source Type)
 - Input Voltage (Dry Contact):
 - Logic 0: Close to GND
 - Logic 1: Open
 - Input Voltage:
 - Logic 0: 3V max.
 - Logic 1: 5V min. (DI to COM-)
- 8x Digital Output
 - Supply Voltage: 5~30VDC
 - Sink Current: 200 mA Max. Per Channel

Power

- Support AT, ATX Mode
- 1x 3-pin Terminal Block Connector with Power Input 9~50VDC
- 1x Optional AC/DC 24V/5A, 120W Power Adapter

Environment

- Operating Temperature: Ambient with Air Flow: -25°C to 60°C (with Industrial Grade Peripherals)
- Storage Temperature: -40°C to 85°C
- Relative humidity: 10%~95% (non-condensing)
- Vibration:
 - With SSD: 5 Grms, 10 - 500 Hz, 0.5 hr/axis
 - With HDD: 1 Grms, 10 - 500 Hz, 0.5 hr/axis
- Shock: With SSD: 20G, half sine, 11ms

Physical

- Dimension (WxDxH, mm): 185 x 197 x 57.4 mm
- Construction: Extruded Aluminum with Heavy Duty Metal
- Mounting: Wall Mounting, DIN-Rail Mounting (Optional)

Operating System

- 6th Gen CPU: Windows 10, Windows 7, WES7
- 7th Gen CPU: Windows 10
- Linux kernel 4.X

Certifications

- CE / FCC Class A

1.3 System I/O

Front Panel

Power on/off switch

Press to power-on or power-off the system

Reset switch

Press to reset the system

AT/ATX mode select switch

Used to select AT or ATX power mode

CFast socket

Used to insert CFast card

SIM Card socket

Used to insert SIM card

HDD port

Removable 2.5" SATA HDD Area

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

Indicates the status of the watchdog active

GPIO LED

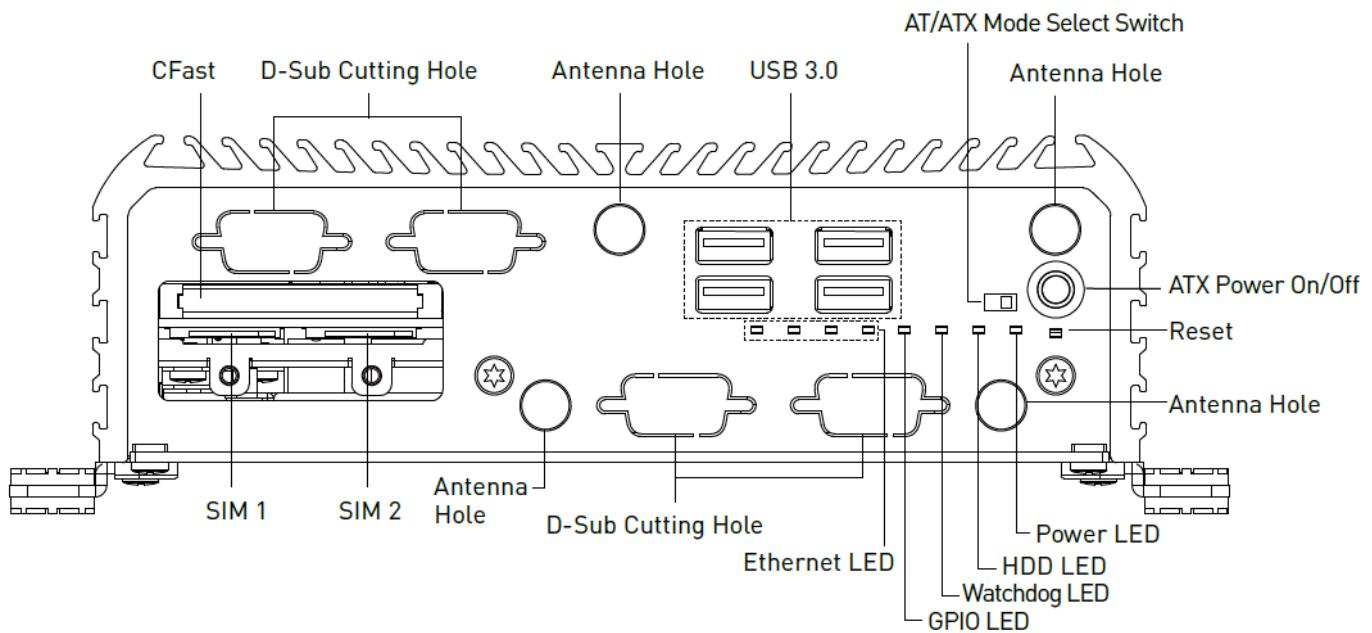
Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active

Antenna hole

Used to connect an antenna for optional Mini-Pcie WiFi module



Rear Panel

DC IN

Used to plug a DC power input with terminal block

DVI-I port

Used to connect a DVI monitor or connect optional split cable for dual display mode

DisplayPort

Used to connect a DisplayPort monitor

Speaker-out

Used to connect a speaker

Mic-in

Used to connect a microphone

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

LAN port

Used to connect the system to a local area network

Remote Power on/off Terminal Block

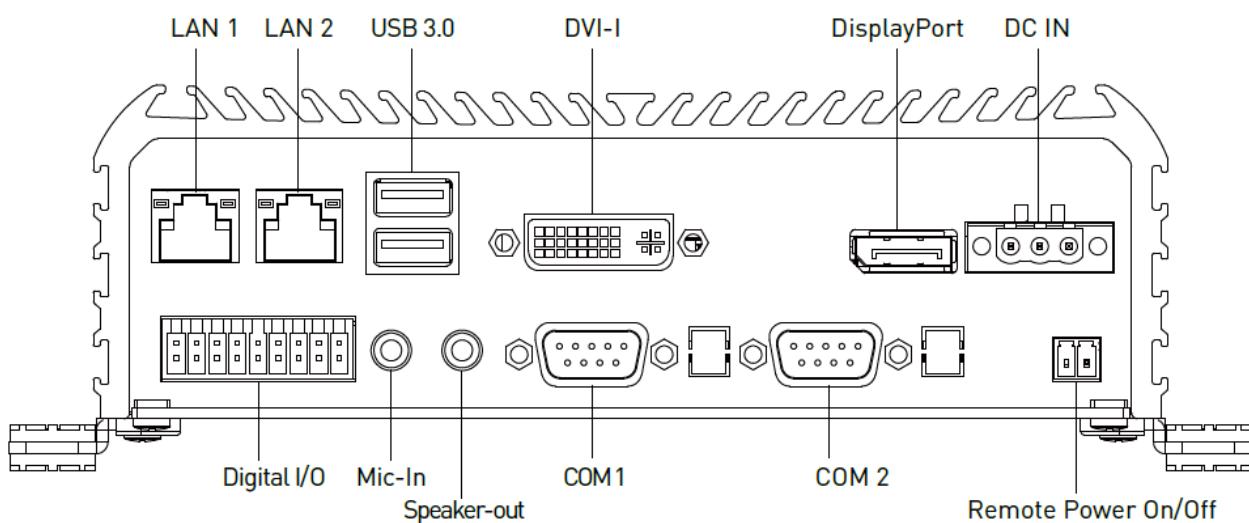
Used to plug a remote power on/off terminal block

COM port

COM1 ~ COM2 support RS232/422/485 serial device

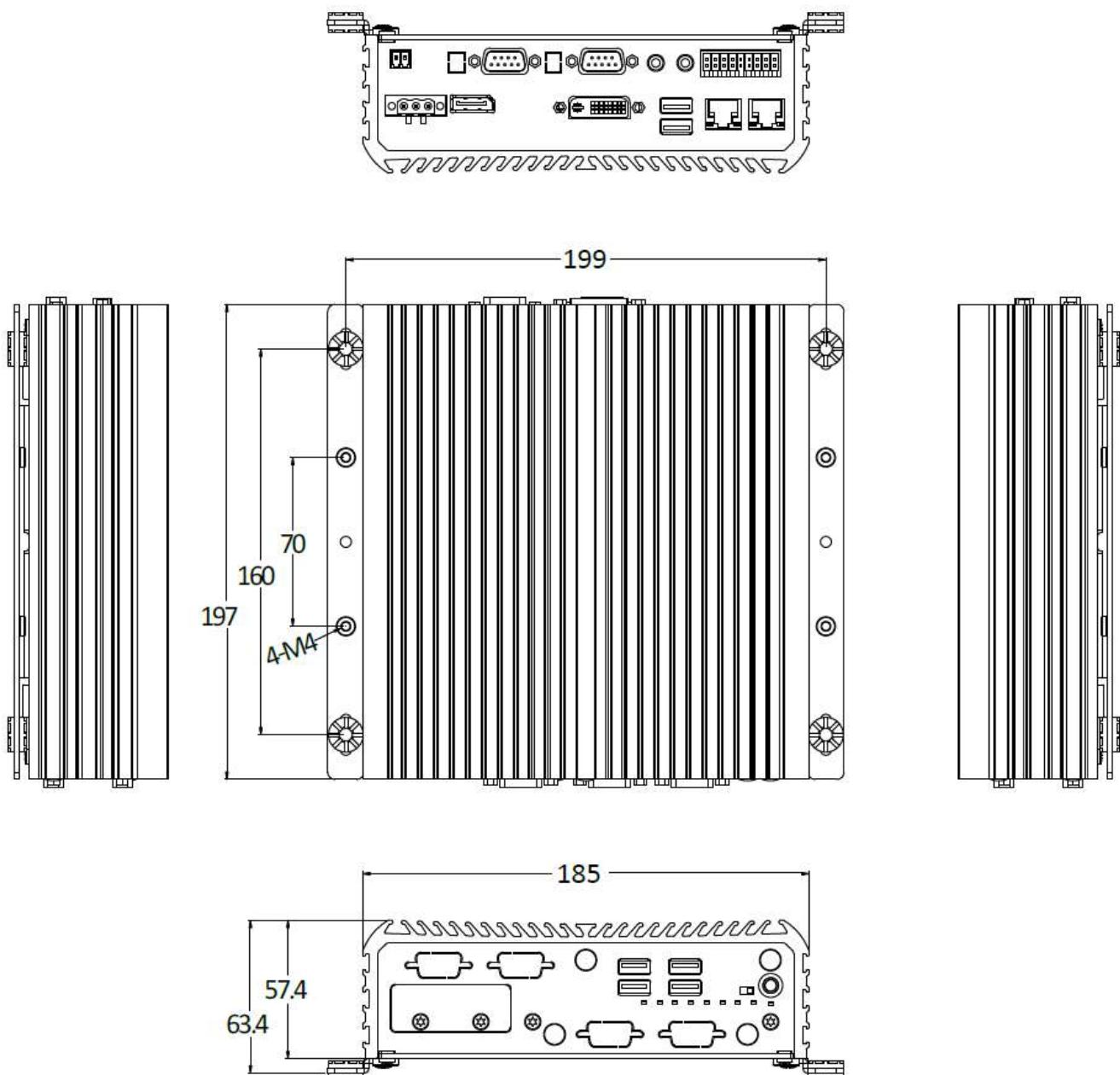
Digital I/O Terminal Block

The Digital I/O terminal block supports 8 digital input and 8 digital output



1.4 Mechanical Dimensions

Unit: mm

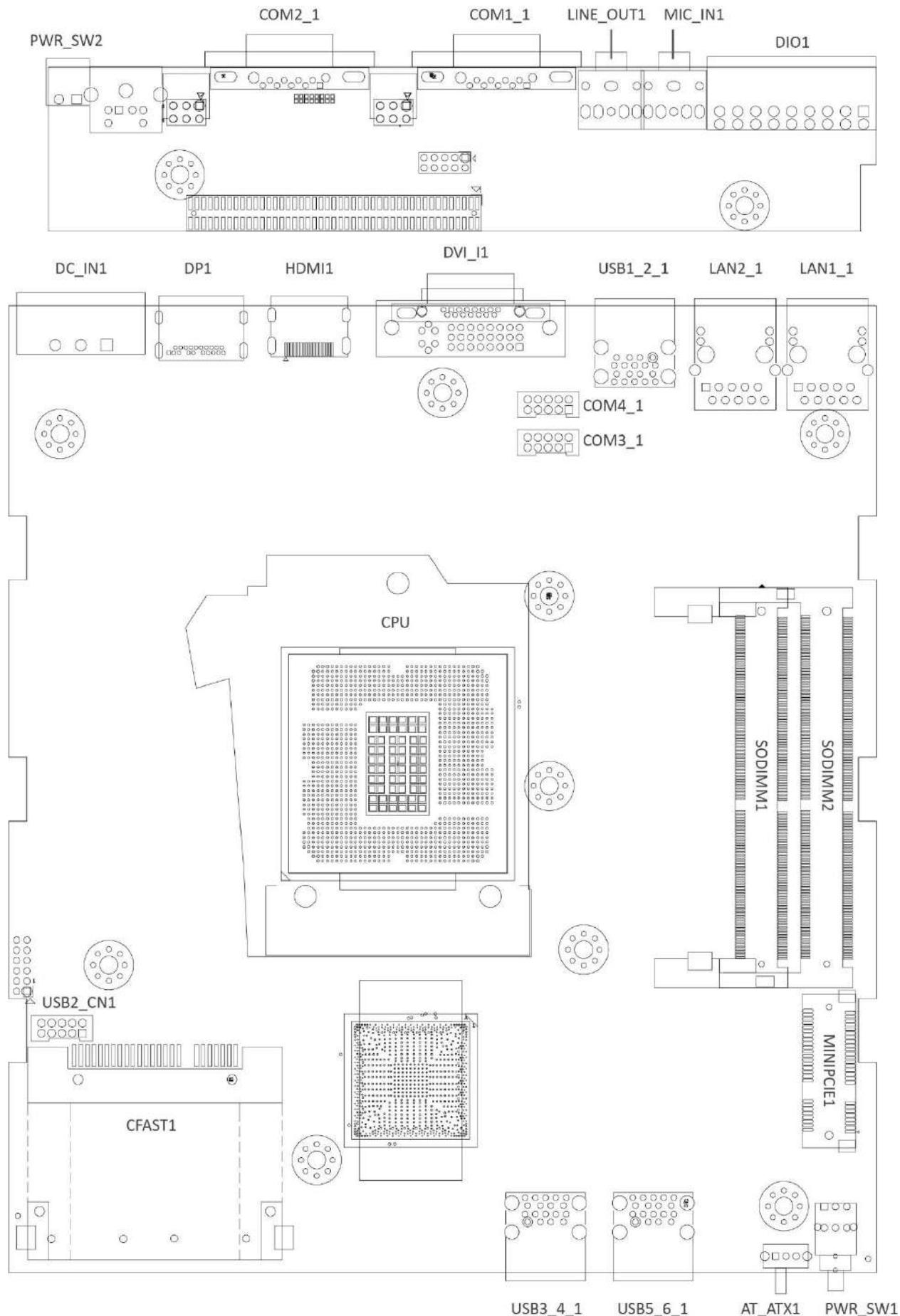


Chapter 2

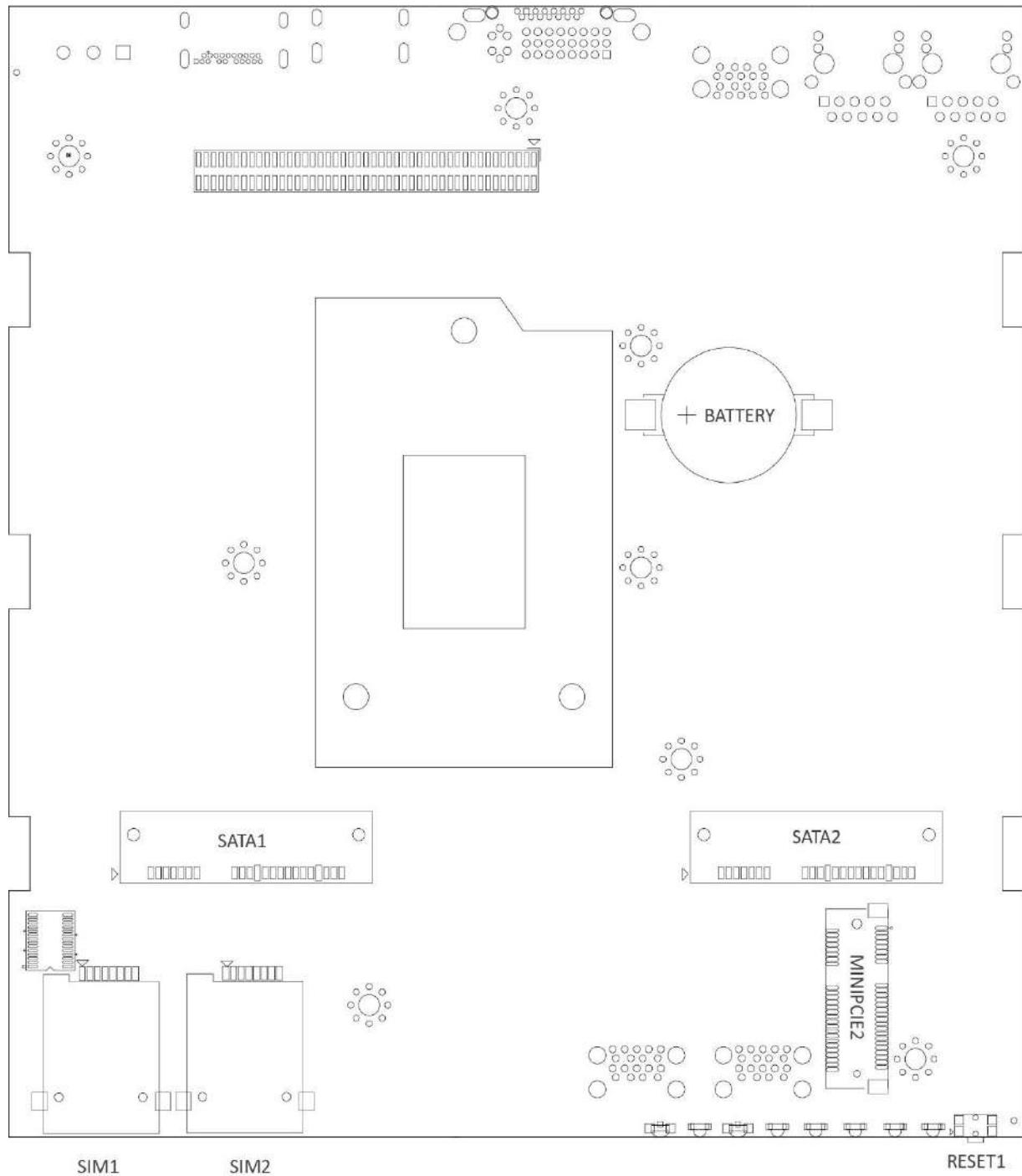
Switches and Connectors

2.1 Switch and Connector Locations

2.1.1 Top View



2.1.2 Bottom View



2.2 Connector / Switch Definition

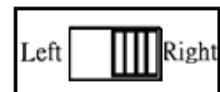
List of Connector / Switch

Connector Location	Definition
AT_ATX1	AT / ATX Power Mode Switch
CLR_CMOS1	Clear BIOS Switch
CFAST1	CFast Socket
PWR_SW1	Power Switch
RESET1	Reset Switch
USB1_2_1, USB3_4_1, USB5_6_1	USB 3.0 Port
USB2_CN1	USB 2.0 Port
SIM1, SIM2	SIM Card Socket
COM1_1, COM2_1	RS232 / RS422 / RS485 Connector
COM3_1, COM4_1	RS232 / RS422 / RS485 Connector
LAN1_1, LAN2_1	LAN Port
DC_IN1	3-pin DC 9~50V Power Input Connector
DP1	DisplayPort Connector
HDMI1	HDMI Connector
DVI_I1	DVI-I Connector
LINE_OUT1	Line-out Jack
MIC_IN1	Mic-in Jack
DIO1	8DI / 8DO Connector
PWR_SW2	Remote Power Switch
MINIPCIE1, MINIPCIE2	Mini PCI-Express / mSATA Socket
SATA1, SATA2	SATA with Power Connector
PWR_LED1	Power LED Status
HDD_LED1	HDD Access LED Status
LAN1_LINK1, LAN2_LINK1	LAN Link LED
LAN1_ACT1, LAN2_ACT1	LAN Active LED
GPIO_LED1	GPIO LED Status
WDT_LED1	Watchdog LED Status

2.3 Switches Definitions

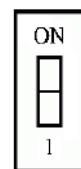
AT_ATX1: AT / ATX Power Mode Switch

Switch	Definition
1-2 (Left)	AT Power Mode
2-3 (Right)	ATX Power Mode (Default)



CLR_CMOS1: Clear BIOS Switch

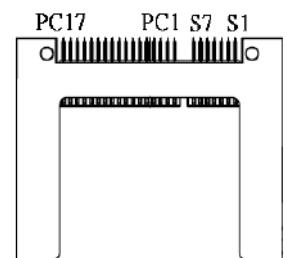
Switch	Definition
Off	Normal Status (Default)
ON	Clear BIOS



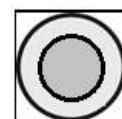
2.4 Connectors Definitions

CFAST1_2: CFast Socket

Pin	Definition	Pin	Definition	Pin	Definition
S1	GND	PC1	NC	PC10	NC
S2	SATA_TXP1	PC2	GND	PC11	NC
S3	SATA_TXN1	PC3	NC	PC12	NC
S4	GND	PC4	NC	PC13	+3.3V
S5	SATA_RXN1	PC5	NC	PC14	+3.3V
S6	SATA_RXP1	PC6	NC	PC15	GND
S7	GND	PC7	GND	PC16	GND
		PC8	NC	PC17	NC
		PC9	NC		

**PWR_SW1: Power Button**

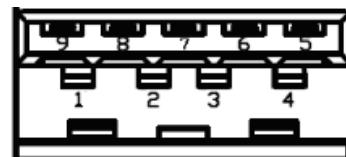
Pin	Definition	Pin	Definition
1	NC	4	GND
2	Power Button	5	NC
3	NC	6	GND

**RESET1 : Reset Button**

Pin	Definition
1	RESET
2	GND

**USB3.0 Connector, Type A**

Pin	Definition	Pin	Definition
1	+5V	6	USB3_RX+
2	USB2_D-	7	GND
3	USB2_D+	8	USB3_TX-
4	GND	9	USB3_TX+
5	USB3_RX-		

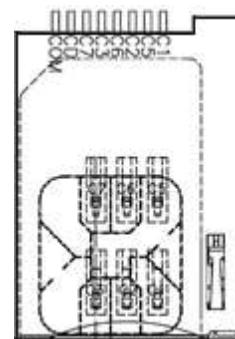


USB2.0 Connector, Type A

Pin	Definition
1	+5V
2	USB2_D-
3	USB2_D+
4	GND

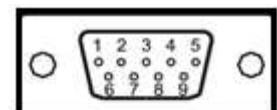
**SIM1, SIM2: SIM Card Socket**

Pin	Definition	Pin	Definition
C1	UIM_PWR	C6	UIM_VPP
C2	UIM_RESET	C7	UIM_DATA
C3	UIM_CLK	CD	NC
C5	GND	COM	GND

**COM: RS232 / RS422 / RS485 Connector**

Connector Type: 9-pin D-Sub

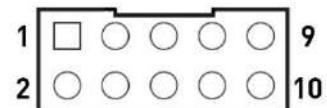
Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD	TX-	DATA-
2	RxD	TX+	DATA+
3	TxD	RX+	
4	DTR	RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		



COM: RS232 / RS422 / RS485 Connector

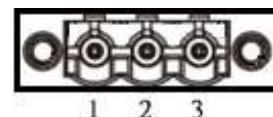
Connector Type: 2X5 10-pin box header, 2.54mm pitch

Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD	TX-	DATA-
2	DSR		
3	RxD	TX+	DATA+
4	RTS		
5	TxD	RX+	
6	CTS		
7	DTR	RX-	
8	RI		
9	GND	GND	GND
10	NC	NC	NC

**DC_IN1: DC Power Input Connector (+9~50V)**

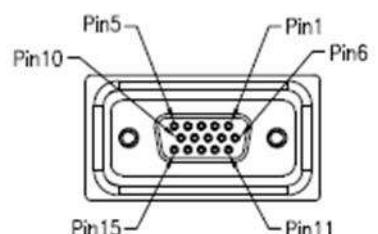
Connector Type: Terminal Block 1X3 3-pin, 5.0mm pitch

Pin	Definition
1	+9~50VIN
2	Car power detect (ACC in)
3	GND

**VGA: Standard VGA Connector**

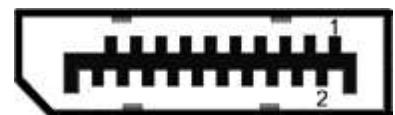
Connector Type: 15-pin D-Sub

Pin	Definition	Pin	Definition
1	RED	9	+5V
2	GREEN	10	S_GND
3	BLUE	11	NC
4	NC	12	SDA
5	GND	13	H SYNC
6	R_GND	14	V SYNC
7	G_GND	15	SCL
8	B_GND		



DP: DisplayPort Connector

Pin	Definition	Pin	Definition
1	DP_LANE0_P	11	GND
2	GND	12	DP_LANE3_N
3	DP_LANE0_N	13	GND
4	DP_LANE1_P	14	GND
5	GND	15	DP_AUX_P
6	DP_LANE1_N	16	GND
7	DP_LANE2_P	17	DP_AUX_N
8	GND	18	DP_HPD
9	DP_LANE2_N	19	GND
10	DP_LANE3_P	20	+3.3V

**LINE_OUT1 : Line-out Jack (Green)**

Connector Type: 5-pin Phone Jack

Pin	Definition
1	GND
2	OUT_R
3	NC
4	GND
5	OUT_L

**MIC_IN1: Microphone Jack (Pink)**

Connector Type: 5-pin Phone Jack

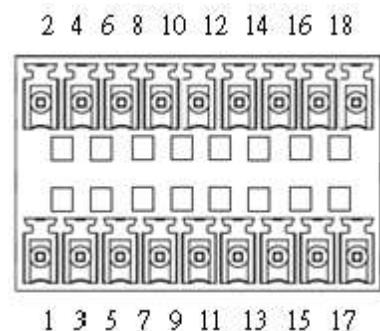
Pin	Definition
1	GND
2	MIC_R
3	NC
4	GND
5	MIC_L



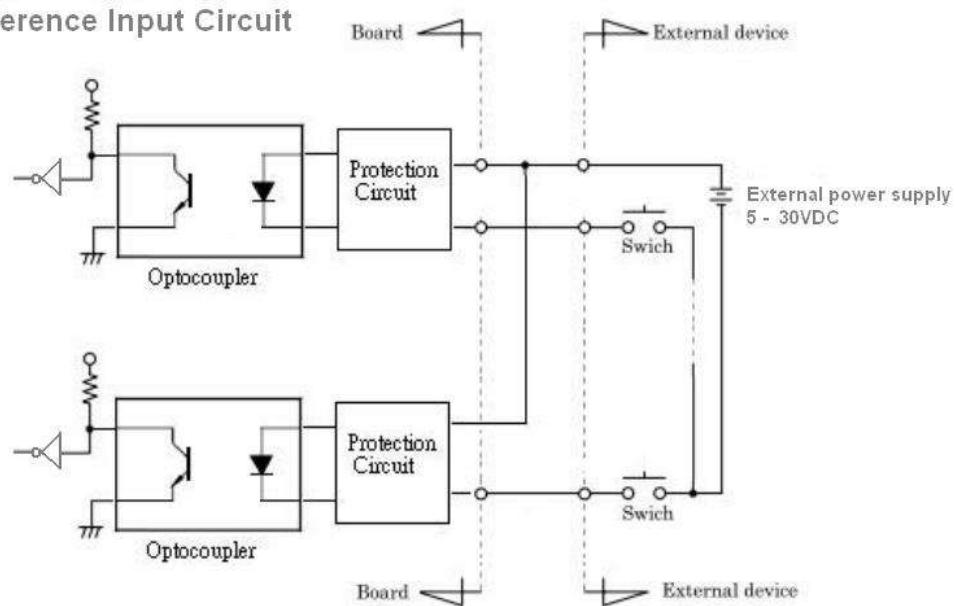
DIO1: Digital Input / Output Connector

Connector Type: Terminal Block 2X9 18-pin, 3.5mm pitch

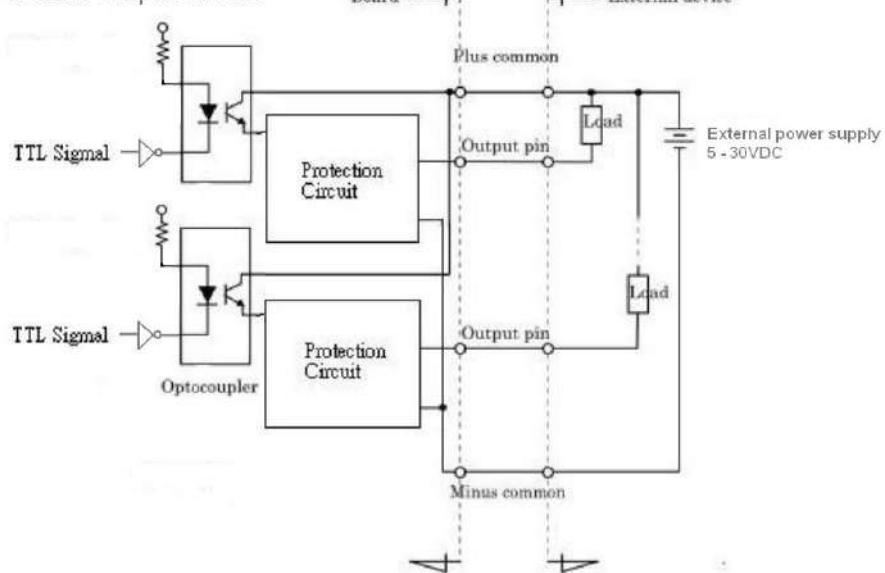
Pin	Definition	Pin	Definition
1	DIN1	2	DOUT1
3	DIN2	4	DOUT2
5	DIN3	6	DOUT3
7	DIN4	8	DOUT4
9	DIN5	10	DOUT5
11	DIN6	12	DOUT6
13	DIN7	14	DOUT7
15	DIN8	16	DOUT8
17	DC power input (+5V~+30V)	18	GND

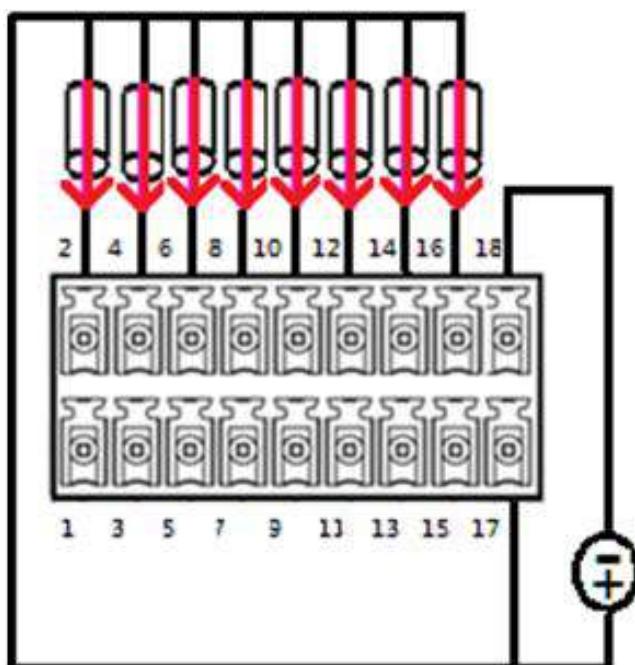
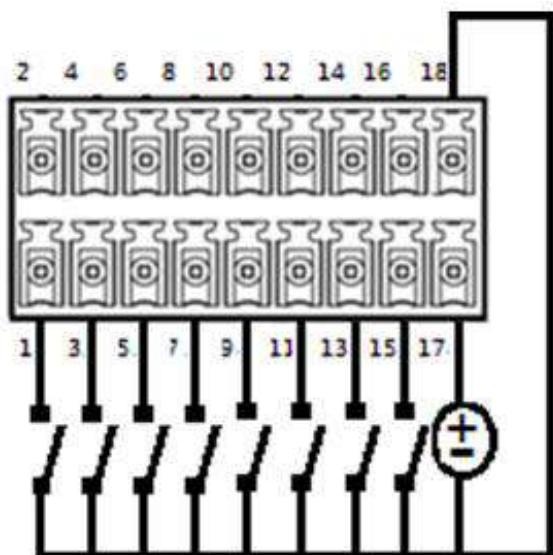


Reference Input Circuit



External Output Circuit





PWR_SW1 : Remote Power Switch

Connector Type: Terminal Block 1X2 2-pin, 3.5mm pitch

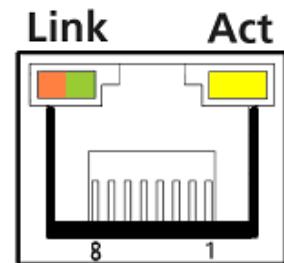
Pin	Definition
1	Power Button
2	GND



LAN1, LAN2: RJ45 with LEDs Port

Connector Type: RJ45 Connector

Pin	Definition	Pin	Definition
1	LAN_MDIOP	5	LAN_MDI2N
2	LAN_MDI0N	6	LAN_MDI1N
3	LAN_MDI1P	7	LAN_MDI3P
4	LAN_MDI2P	8	LAN_MDI3N

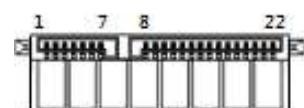


Act LED Status	Definition
Blinking Yellow	Data Activity
Off	No Activity

Link LED Status	Definition
Steady Orange	1Gbps Network Link
Steady Green	100Mbps Network Link
Off	10Mbps Network Link

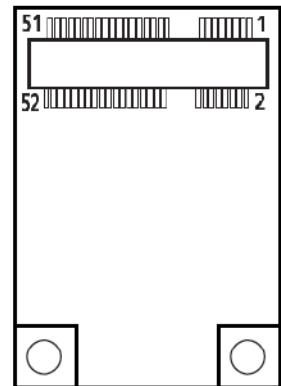
SATA with Power Connector

Pin	SATA1_1 Definition	Pin	SATA1_1 Definition
1	GND	12	GND
2	TxP	13	GND
3	TxN	14	+5V
4	GND	15	+5V
5	RxN	16	+5V
6	RxP	17	GND
7	GND	18	GND
8	NC	19	GND
9	NC	20	+12V
10	DEVSLP	21	+12V
11	GND	22	+12V

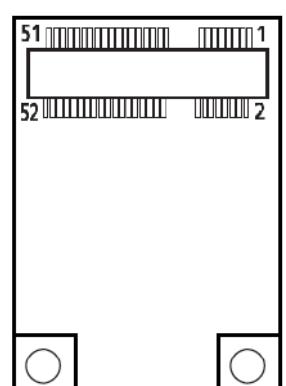


MINIPCIE1: Mini PCI-Express / mSATA Socket

Pin	Definition	Pin	Definition	Pin	Definition
1	WAKE#	19	NC	37	GND
2	+3.3V	20	NC	38	USB2_D+
3	NC	21	GND	39	+3.3V
4	GND	22	RESET#	40	GND
5	NC	23	RxN	41	+3.3V
6	+1.5V	24	+3.3VAUX	42	NC
7	CLKREQ#	25	RxP	43	GND
8	UIM_PWR	26	GND	44	DEVSLP
9	GND	27	GND	45	NC
10	USIM_DATA	28	+1.5V	46	NC
11	REFCLK-	29	GND	47	NC
12	UIM_CLK	30	SMB_CLK	48	+1.5V
13	REFCLK+	31	TxN	49	NC
14	UIM_RST	32	SMB_DATA	50	GND
15	GND	33	TxP	51	PCIE_MSATA_SEL
16	USIM_VPP	34	GND	52	+3.3V
17	NC	35	GND		
18	GND	36	USB2_D-		

**MINIPCIE2: Mini PCI-Express Socket**

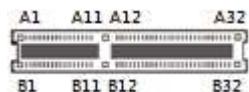
Pin	Definition	Pin	Definition	Pin	Definition
1	WAKE#	19	NC	37	GND
2	+3.3V	20	NC	38	USB2_D+
3	NC	21	GND	39	+3.3V
4	GND	22	RESET#	40	GND
5	NC	23	RxN	41	+3.3V
6	+1.5V	24	+3.3VAUX	42	NC
7	CLKREQ#	25	RxP	43	GND
8	UIM_PWR	26	GND	44	NC
9	GND	27	GND	45	NC
10	UIM_DATA	28	+1.5V	46	NC
11	REFCLK-	29	GND	47	NC
12	UIM_CLK	30	SMB_CLK	48	+1.5V
13	REFCLK+	31	TxN	49	NC
14	UIM_RST	32	SMB_DATA	50	GND
15	GND	33	TxP	51	NC
16	USIM_VPP	34	GND	52	+3.3V
17	NC	35	GND		
18	GND	36	USB2_D-		



PCIE1: PCI-Express x4 Socket

Connector Type: PCI-Express x4 Slot

Pin	Definition	Pin	Definition
A1	FAN_P4	B1	+12V
A2	+12V	B2	+12V
A3	+12V	B3	+12V
A4	GND	B4	GND
A5	NC	B5	SMB_CLK
A6	NC	B6	SMB_DATA
A7	NC	B7	GND
A8	NC	B8	+3.3V
A9	+3.3V	B9	NC
A10	+3.3V	B10	+3.3VAUX
A11	RESET#	B11	WAKE#
A12	GND	B12	FAN_P3
A13	REFCLK+	B13	GND
A14	REFCLK-	B14	TxP0
A15	GND	B15	TxN0
A16	RxP0	B16	GND
A17	RxN0	B17	FAN_P2
A18	GND	B18	GND
A19	NC	B19	TxP1
A20	GND	B20	TxN1
A21	RxP1	B21	GND
A22	RxN1	B22	GND
A23	GND	B23	TxP2
A24	GND	B24	TxN2
A25	RxP2	B25	GND
A26	RxN2	B26	GND
A27	GND	B27	TxP3
A28	GND	B28	TxN3
A29	RxP3	B29	GND
A30	RxN3	B30	NC
A31	GND	B31	NC
A32	NC	B32	GND



PWR_LED1: Power LED Status

Pin	Definition
1	POWER LED+
2	POWER LED-

**HDD_LED1: HDD Access LED Status**

Pin	Definition
1	HDD LED+
2	HDD LED-

**LAN1_LINK1, LAN2_LINK1 : LAN Link LED Status**

Pin	Definition
1	LINK LED+
2	LINK LED-100Mbps-
3	LINK LED 100Mbps-

**LAN1_ACT1, LAN2_ACT1 : LAN Active LED Status**

Pin	Definition
1	ACTIVE LED+
2	ACTIVE LED-

**GPIO_LED1: GPIO LED Status**

Pin	Definition
1	GPIO LED+
2	GPIO LED-

**WDT_LED1: Watchdog LED Status**

Pin	Definition
1	WATCHDOG LED+
2	WATCHDOG LED-



Chapter 3

System Setup

3.1 Set torque force to 3.5 kgf-cm to execute all the screwing and unscrewing.

3.2 Removing chassis bottom cover

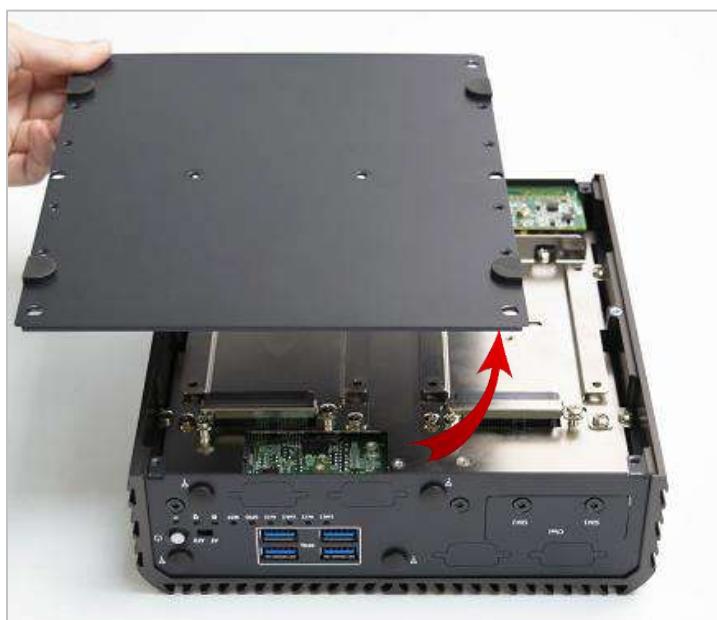
**WARNING**

In order to prevent electric shock or system damage, before removing the chassis cover, must turn off power and disconnect the unit from power source.

1. Turn the system upside down. Unscrew the 6 screws (M3x5L) on the bottom cover.

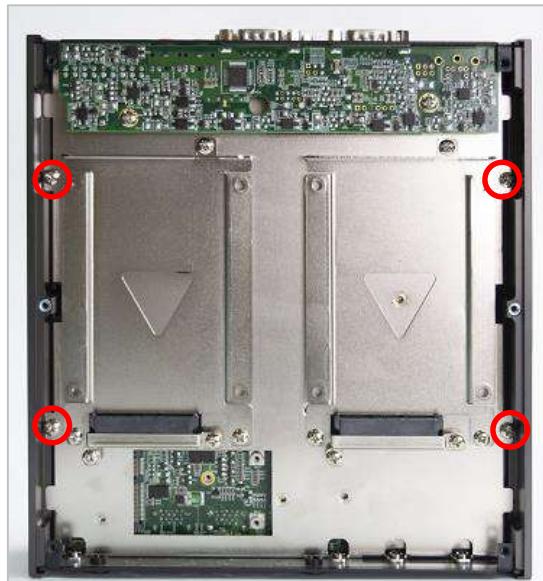


2. Now you can remove the bottom cover.



3.3 Removing chassis top cover

1. Unscrew the four screws (M3x5L) highlighted below.



2. Hold the body of the system and lift it vertically away from the top cover.

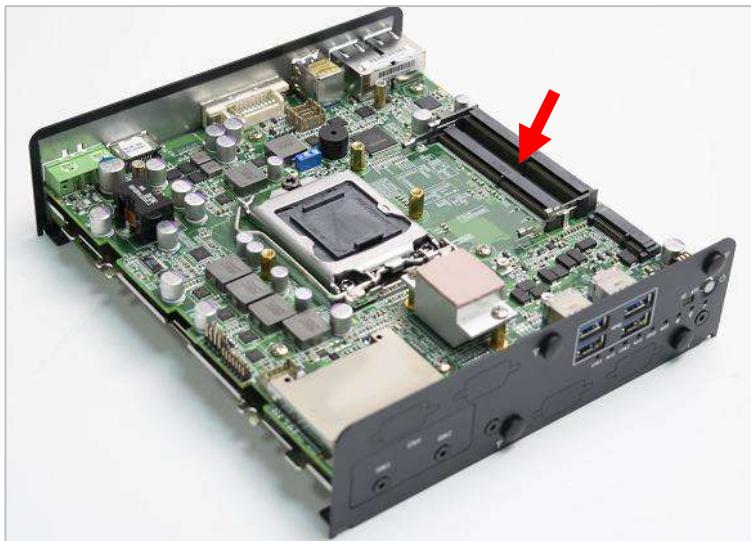


3. Top cover separated from the system body.



3.4 Installing SODIMM

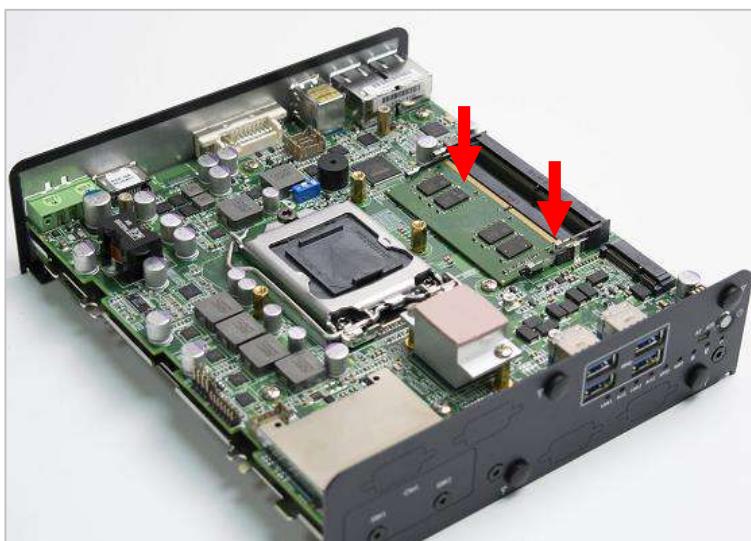
1. Place the system body with SODIMM socket facing upward. Two SODIMM sockets are available for RCO-3600 Series on the top side.



2. Insert memory module from 45 degree direction.



3. Press the memory module vertically downward until you hear the “click” sound. Make sure the memory module is firmly in place.



3.5 Installing CPU

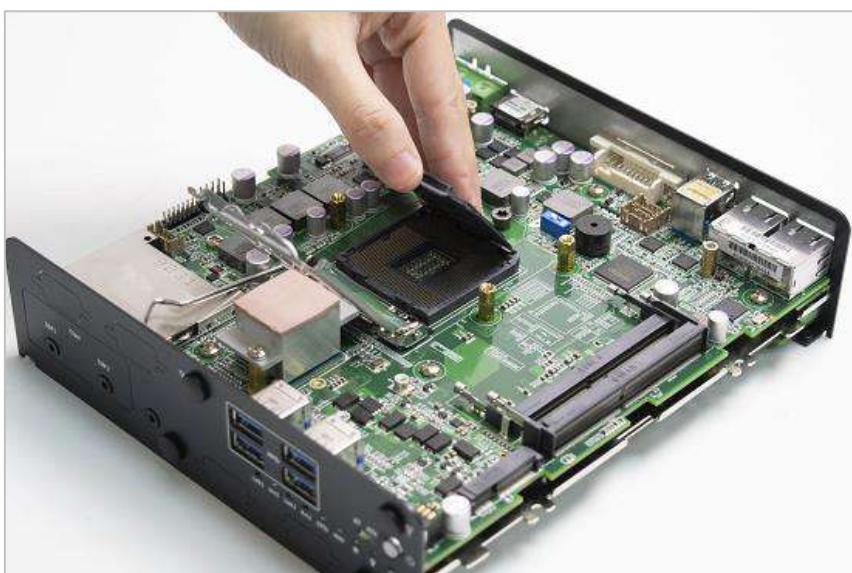
1. CPU socket is located on the top side.



2. Press down the CPU socket lever in order to open the socket cover.



3. Remove the CPU protective cover.



4. Insert CPU gently.



5. Press down the lever again to hold the socket cover.

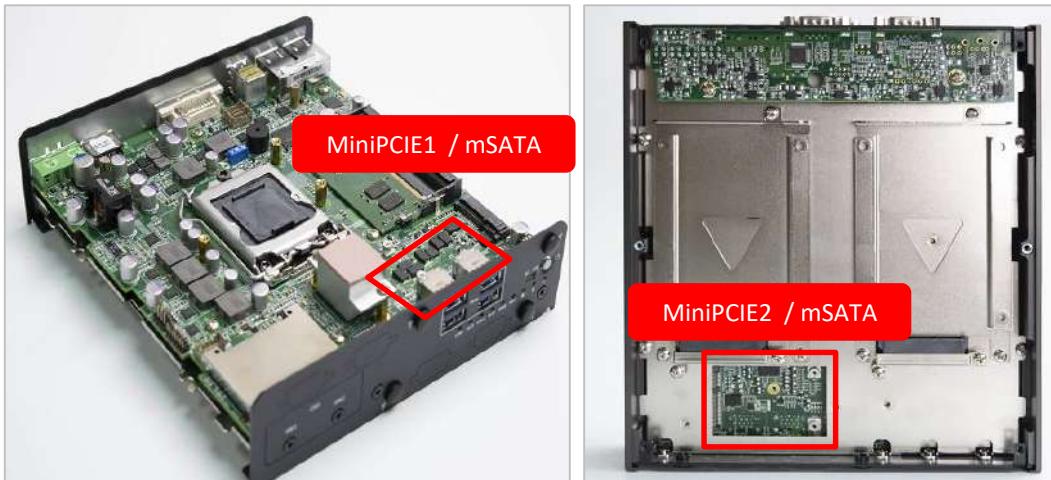


6. Paste thermal pad (1-BR0500040, 29x29x0.5mm) on the CPU.

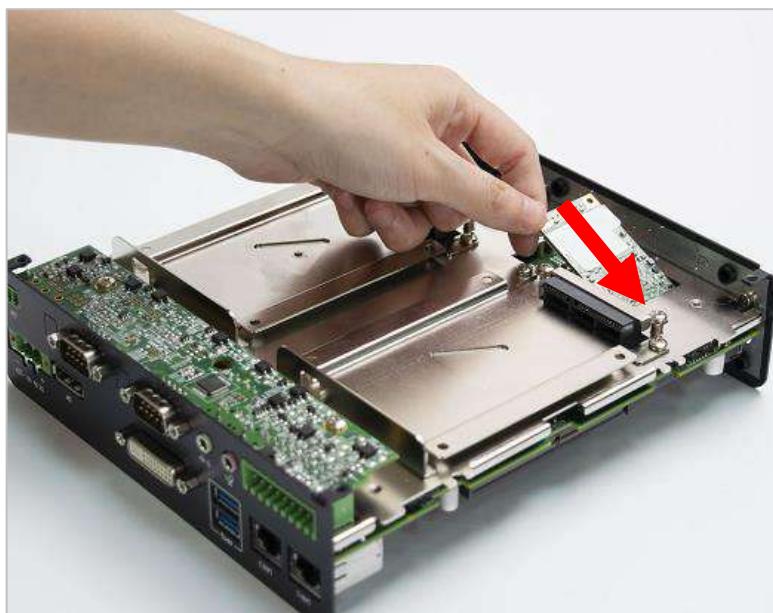


3.6 Installing mini PCIe card / mSATA

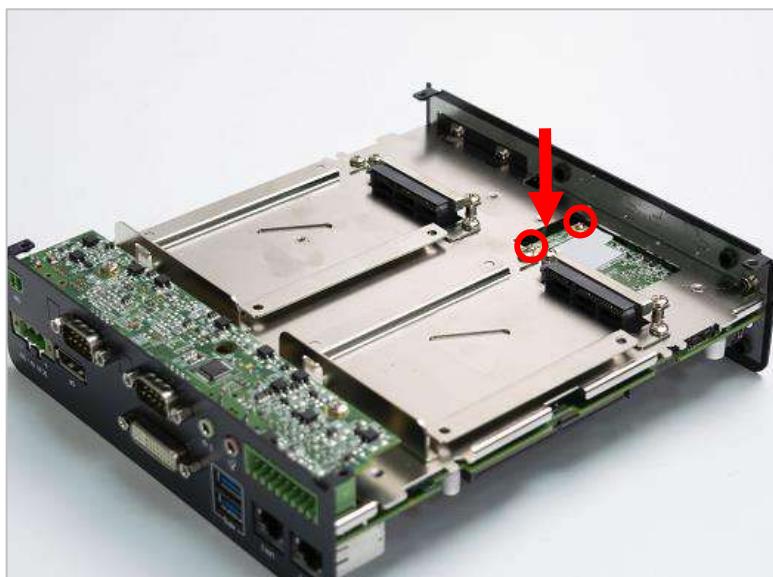
1. Two mini PCIe slots are available for RCO-3600 series. Both slots can supports mSATA.



2. Insert mini PCIe card from 45 degree direction.

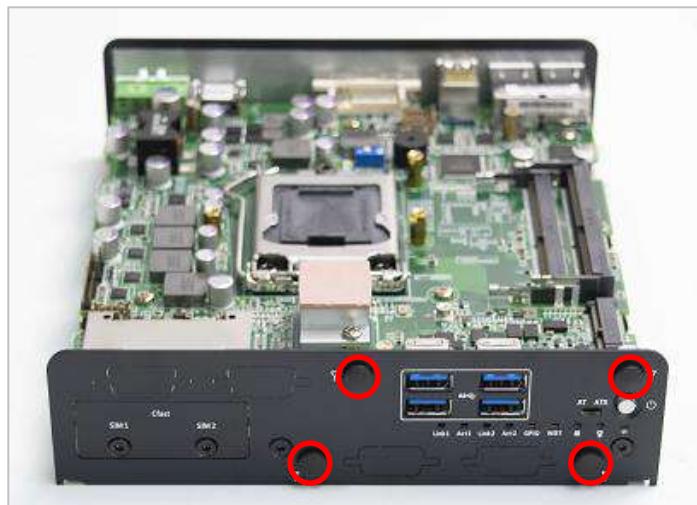


3. Press the mini PCIe card down and lock it with two screws (M2x3.7L).



3.7 Installing antenna

- Four antenna holes are available for RCO-3600 series on the rear panel.



- Remove antenna hole cover on the system panel.



- Have antenna jack penetrate through the hole.



4. Put on washer and fasten the nut with antenna jack.



5. Assemble the antenna and antenna jack together.

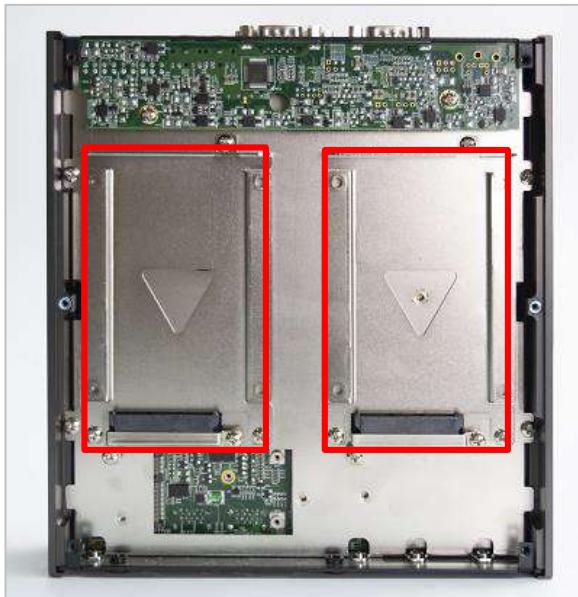


6. Attach the RF connector at the cable-end onto the communication module.

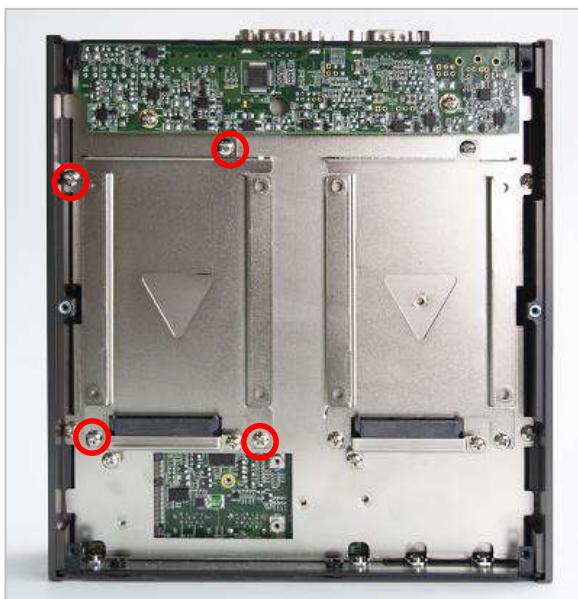


3.8 Installing HDD on internal SATA HDD bay

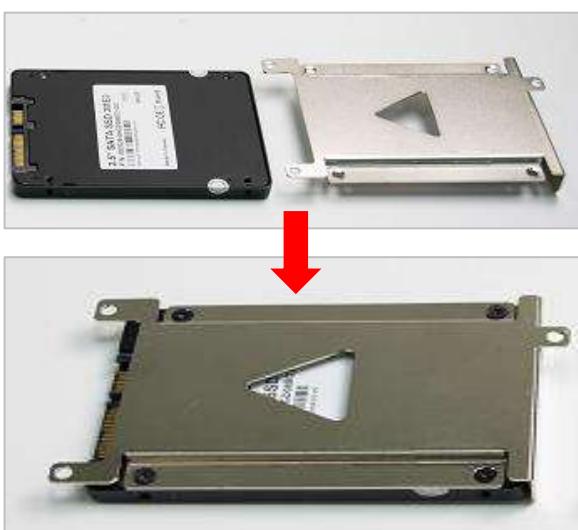
- Two internal SATA HDD bays are available for RCO-3600 series.



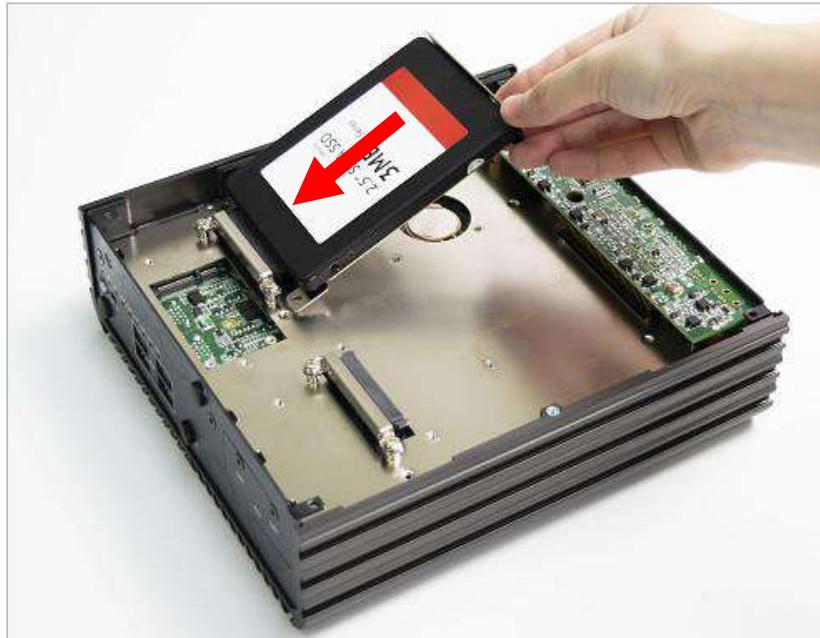
- Unscrew the four screws (M3x5L) to remove the internal SATA HDD bay.



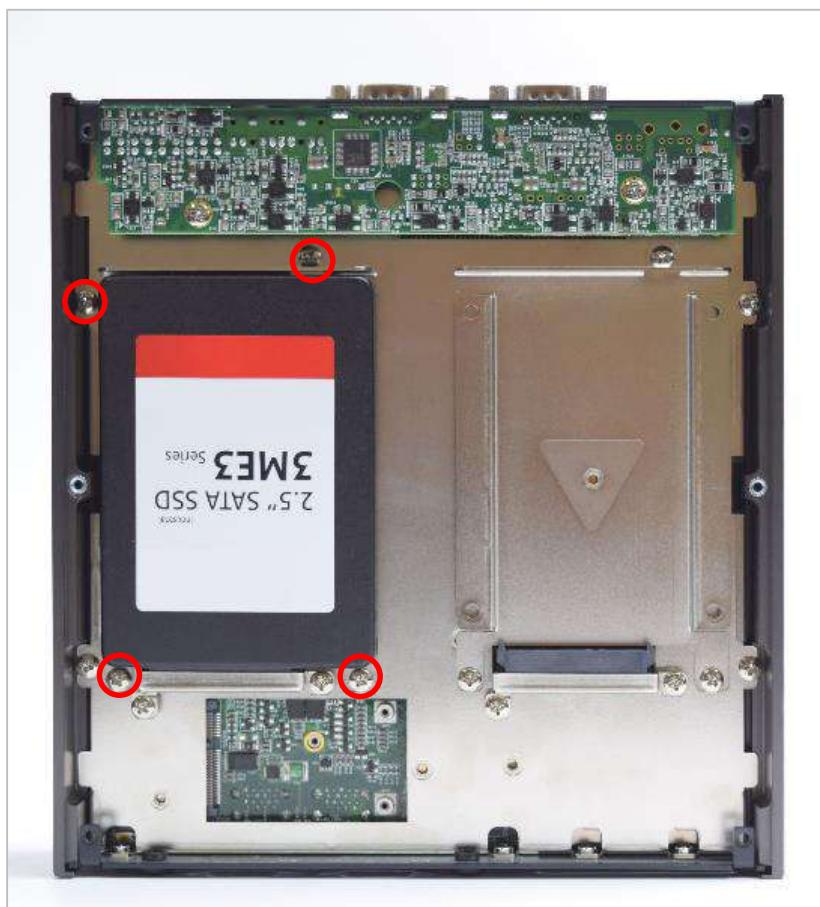
- Lock the 2.5" HDD with HDD bracket using four screws (M3x4L).



4. Install the HDD bracket following the direction below.



5. Fasten the four screws to lock the internal HDD bracket.



3.9 Assemble chassis bottom cover

1. Place the bottom cover according to the below direction and make sure the rail is facing inside the system.



2. Lock the bottom cover with the six screws (M3x5L).



3.10 Installing SIM card

1. For RCO-3600 Series, SIM card slot is located inside the control area. Unscrew the two screws below to remove the cover bracket.

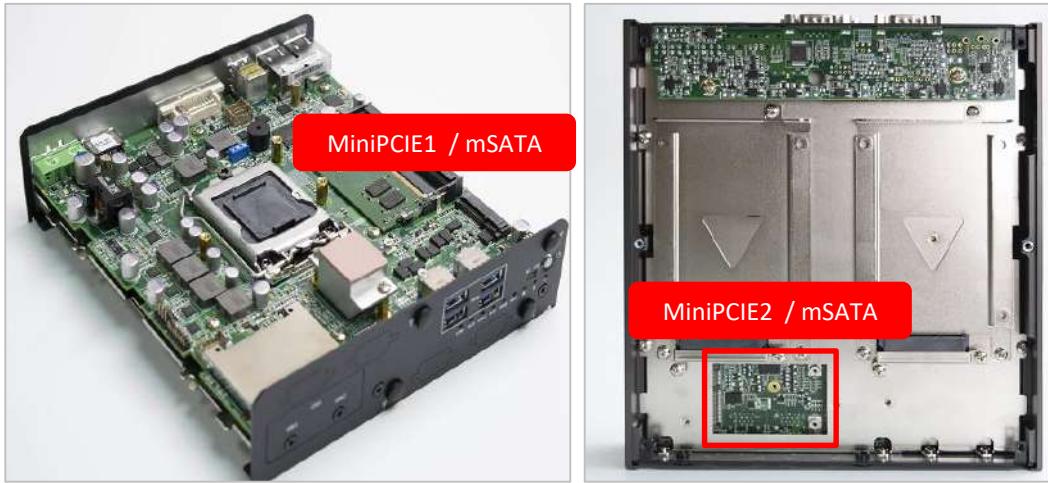


2. Now you can insert SIM card into the socket.



3. Please note that the installation of SIM 1 and SIM 2 has to match the installation of mini PCIe slots.

SIM Card Socket Number	Matching Mini PCIe Slot
SIM 1	Mini PCIe 1 / mSATA (CN1)
SIM 2	Mini PCIe 2 / mSATA (CN2)



4. To uninstall SIM card, simply press the installed SIM card and then the card will be pushed out.

3.11 Installing CFast card

- CFast socket is located on the system top side.



- Insert CFast card into the socket until you hear the “click” sound.



- The socket is push-push type. Push the installed CFast card again to remove it.

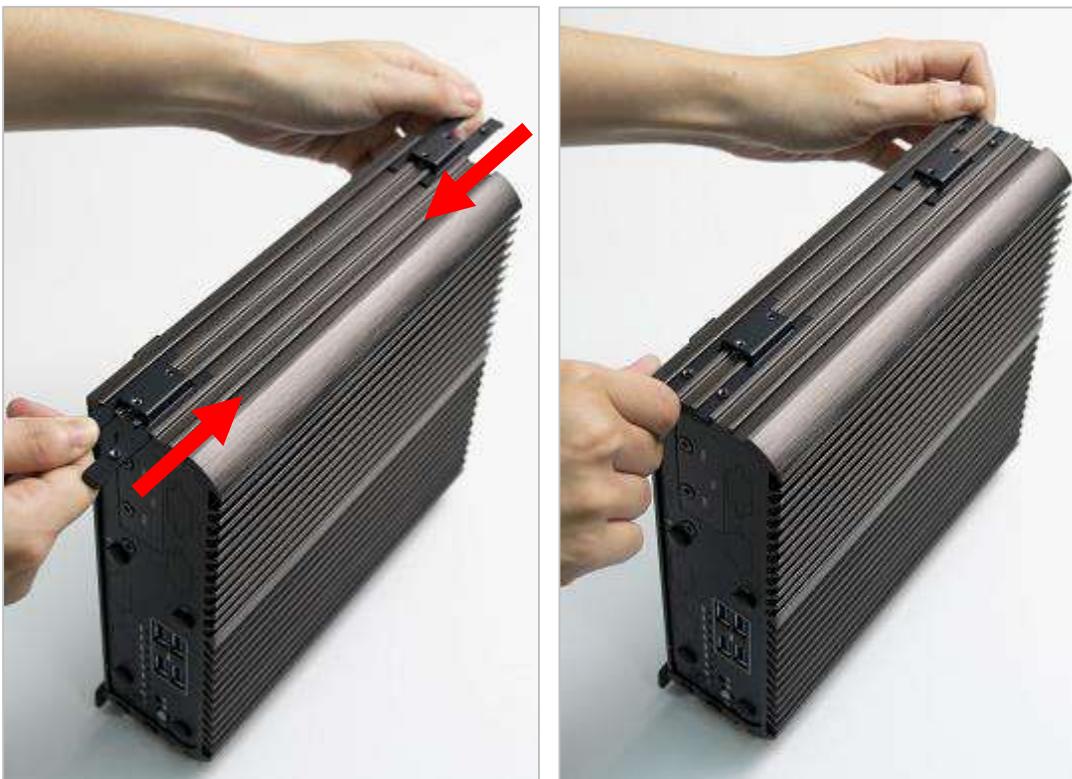


3.12 Installing wall mount kit

1. L-Shaped Wall mount kit is available for RCO-3600 series included in the standard package.



2. Turn the system to the side. Slide in the side kit through the top cover fin.



3. The highlighted eight screw holes below will be used.



4. Lock the wall mount kit with eight screws (M3x5L, Nylok).



3.13 Installing DIN rail holder

1. Din rail holder is available for RCO-3000 series as optional accessories.



2. Place the system upside down so you can see the bottom cover with two screw holes for din rail holder.



3. Place the din rail holder on top of the bottom cover and lock it with two screws (M4x5L, Nylok).



Chapter 4

BIOS Setup

4.1 BIOS Introduction

The system BIOS software is stored on EEPROM. The BIOS provides an interface to modify the configuration. When the battery is removed, all the parameters will be reset.

BIOS Setup

Power on the embedded system and by pressing immediately allows you to enter the setup screens. If the message disappears before you respond and you still wish to enter the Setup, restart the system by turning it OFF and ON or pressing the RESET button.

You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Control Keys	
<-><-->	Select Screen
<↑><↓>	Select Item
<Enter>	Select
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<F1>	General Help
<F2>	Previous Value
<F3>	Load Optimized Defaults
<F4>	Save Configuration and Exit
<Tab>	Select Setup Fields
<Esc>	Exit BIOS Setup

Main Setup

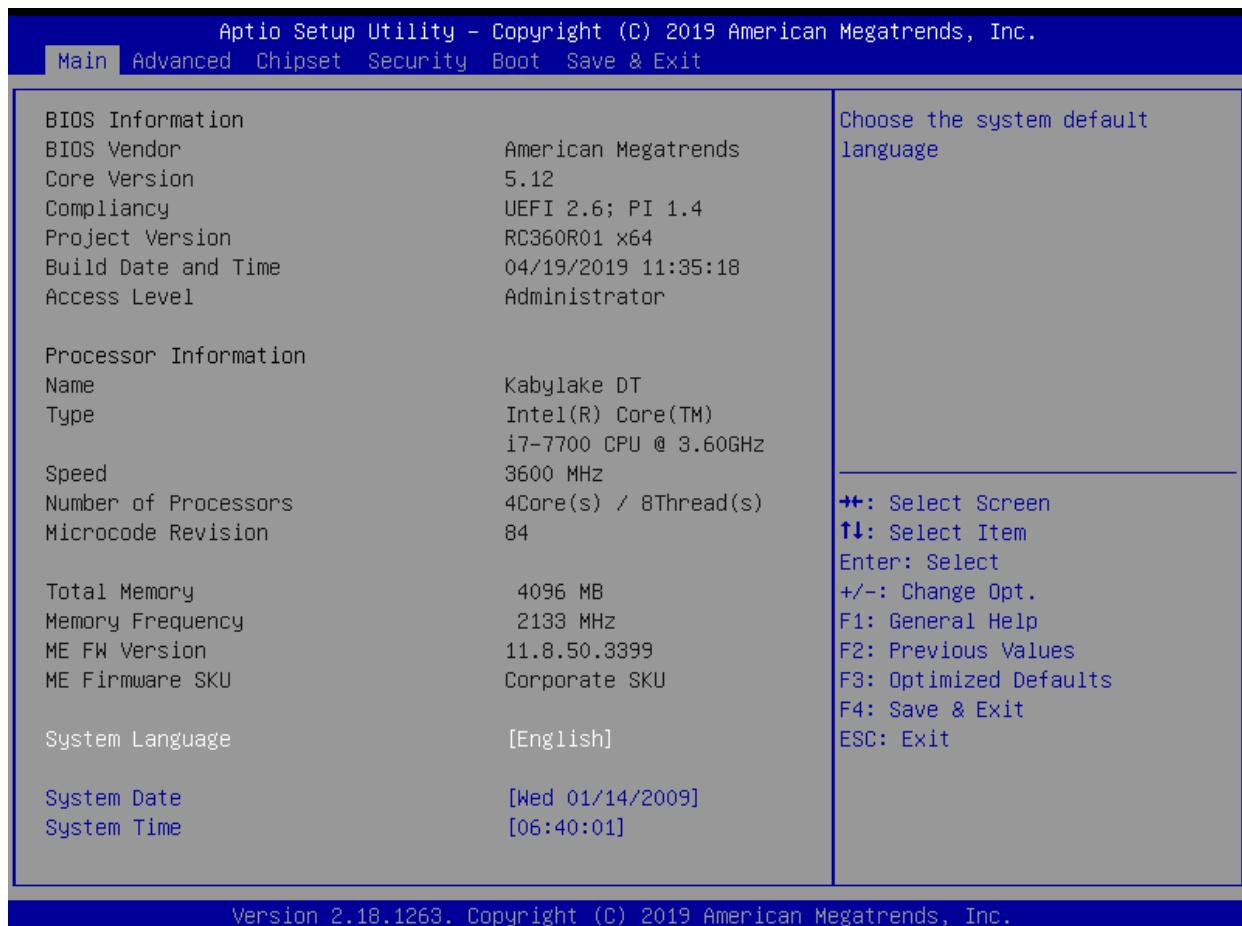
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

4.2 Main Setup

Press to enter BIOS CMOS Setup Utility, the Main Menu (as shown below) will appears on the screen. Use arrow keys to move among the items and press <Enter> to accept or enter a sub-menu.



■ System Language

Language setup allows the user to configure the language. Please use <Tab> to switch between language elements.

■ System Date

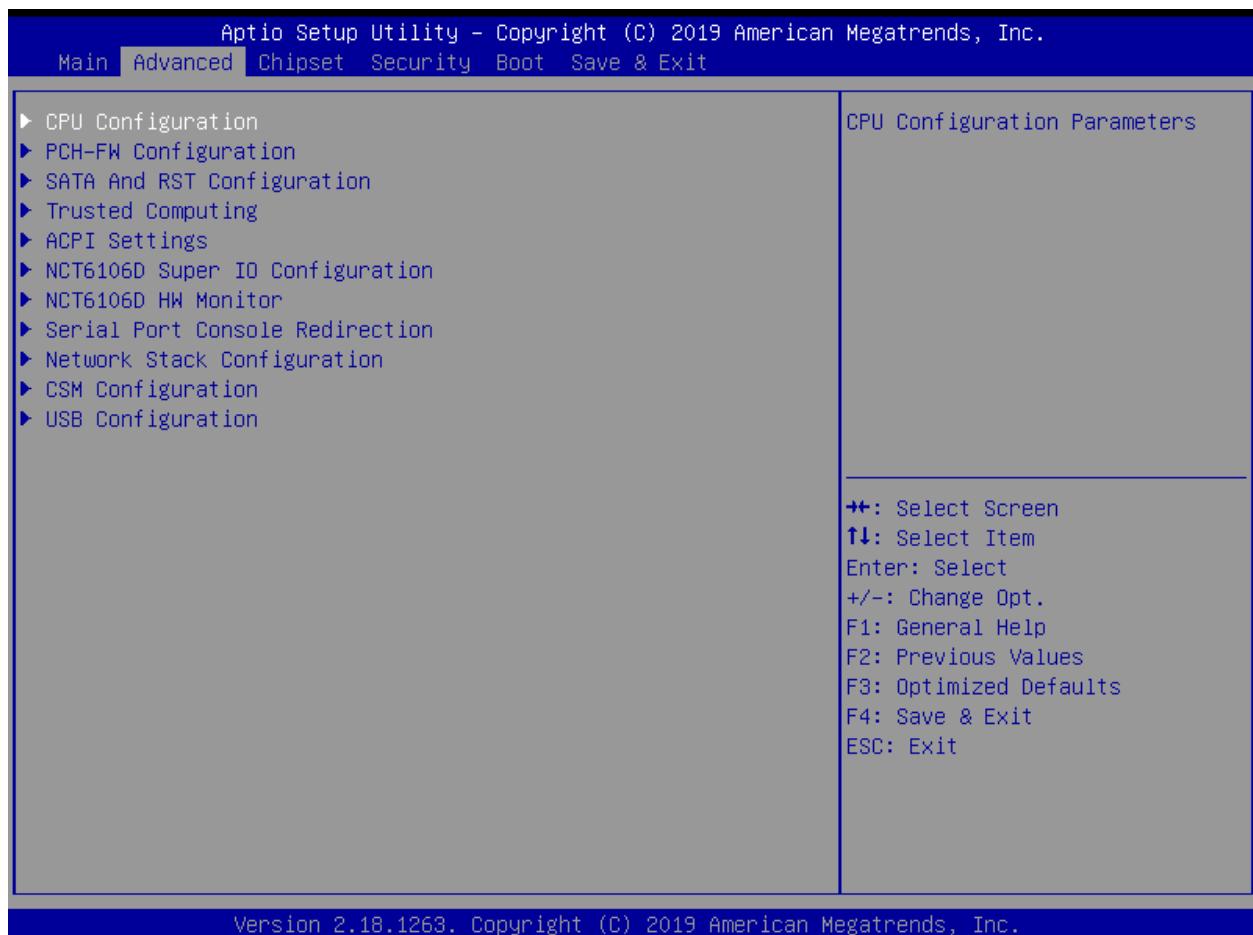
Set the date. Please use <Tab> to switch between date elements.

■ System Time

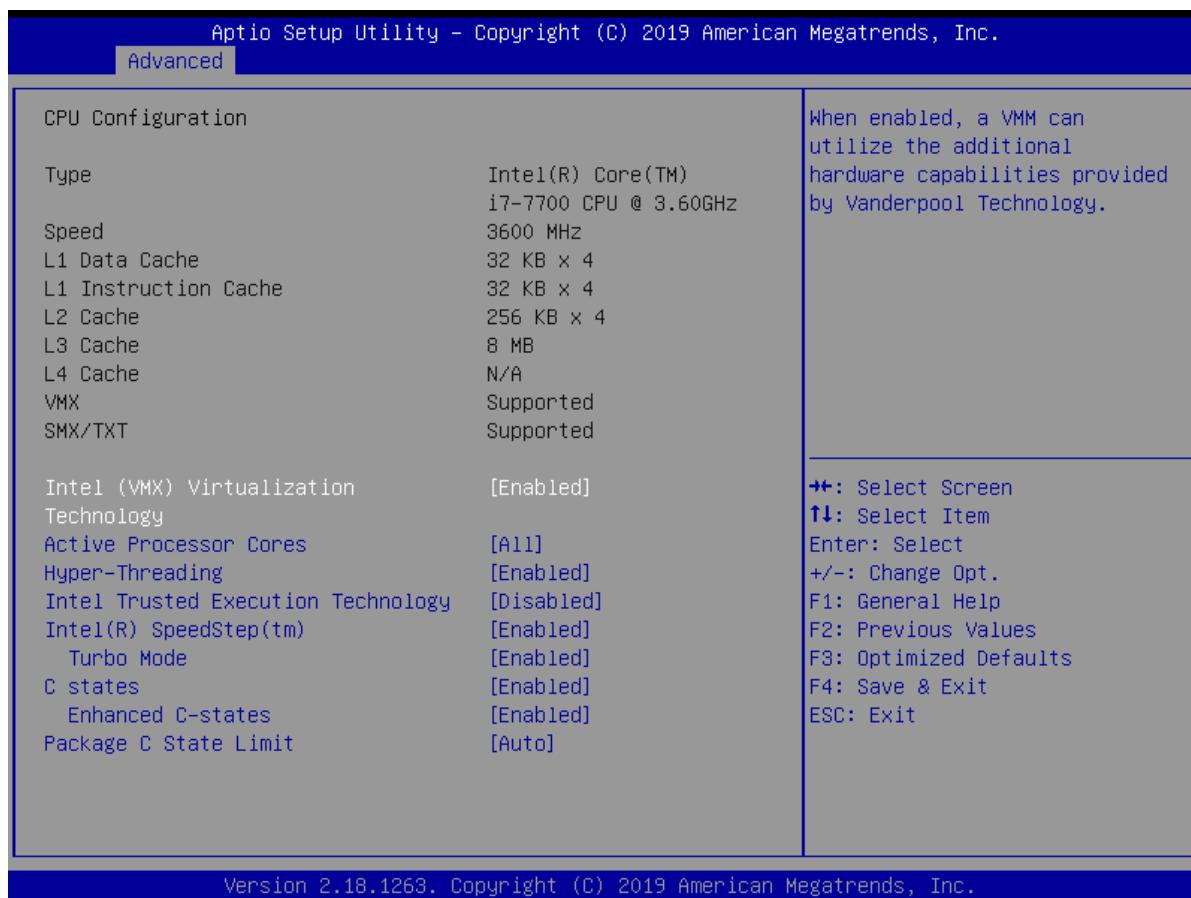
Set the time. Please use <Tab> to switch between time elements.

4.3 Advanced Setup

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



4.3.1 CPU Configuration



■ Intel Virtualization Technology

Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple Virtual systems.

■ Active Processor Cores

Set number of cores to be enabled. Select <All>, <1>, <2>, <3>, <4>, <5>, <6>, <7>, or <8> mode.

■ Hyper-Threading

This item allows you to enable or disable the Intel Hyper-Threading Technology.

■ Intel Trusted Execution Technology

This item allows you to enable or disable the Intel Trusted Execution Technology.

■ Intel SpeedStep

This item allows you to enable or disable the Intel SpeedStep.

- Turbo Mode

This item allows you to enable or disable the Turbo Mode.

■ CPU C States

This item allows you to set the power saving of the CPU states.

- Enhanced C States

This item allows your CPU reduce power consumption.

■ Package C State limit

Select Auto for the AMI BIOS to automatically set the limit on the C-State package register. The options are C0/ C1, C2, C3, C6, C7, C7s, C8 and No Limit.

4.3.2 PCH-FW Configuration

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.

Advanced

ME Firmware Version	11.8.50.3399	Configure Intel(R) Active Management Technology Parameters
ME Firmware Mode	Normal Mode	
ME Firmware SKU	Corporate SKU	
ME File System Integrity Value	2	
ME Firmware Status 1	0x90000255	
ME Firmware Status 2	0x82108306	

▶ AMT Configuration

Version 2.18.1263. Copyright (C) 2019 American Megatrends, Inc.

Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.

Advanced

Unconfigure ME	[Disabled]	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default.
----------------	------------	--

Version 2.18.1263. Copyright (C) 2019 American Megatrends, Inc.

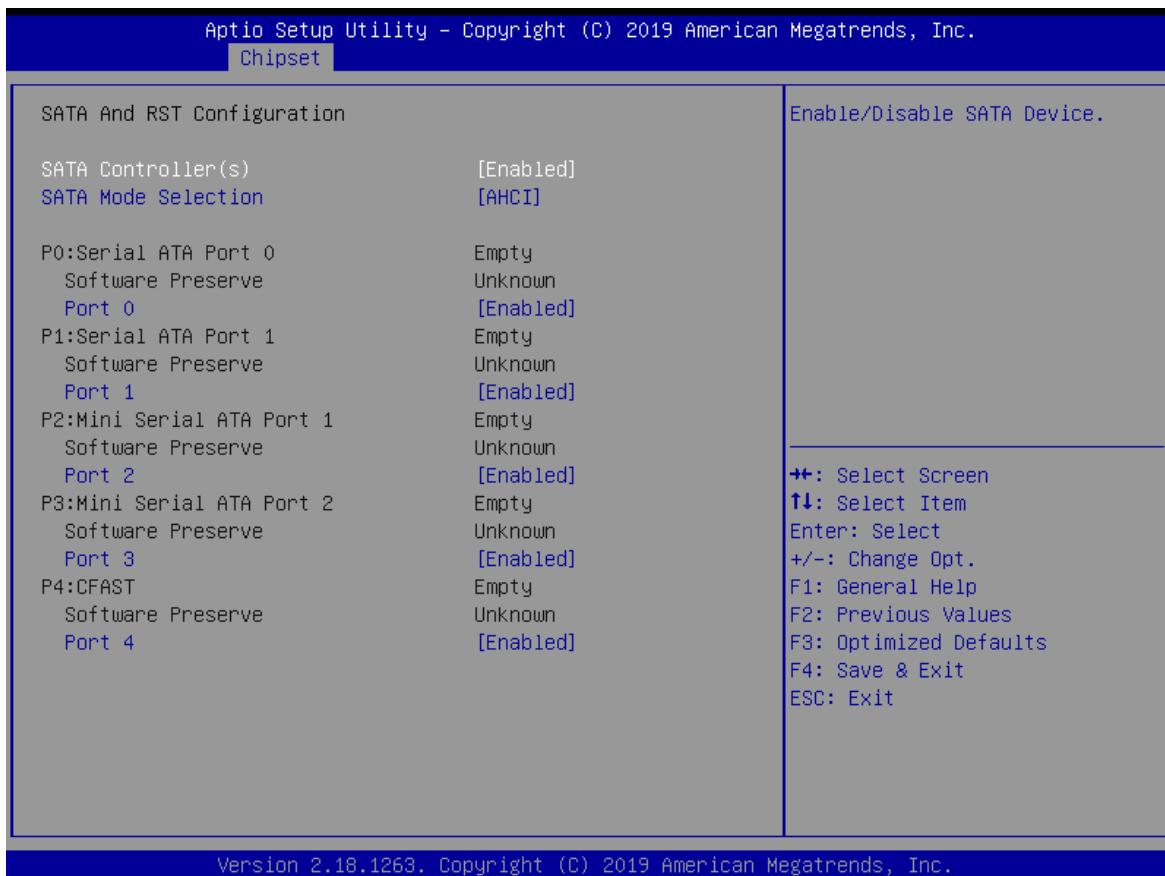
■ AMT Configuration

Intel Active Management Technology (AMT) is hardware-based technology for remotely managing and securing PCs out-of-band.

■ Un-Configure ME

Use this function to enable or disable Un-Configure ME without password function.

4.3.3 SATA And RST Configuration



■ SATA Controller(s)

Enable or disable Serial ATA controller.

■ SATA Mode Selection

This item allows users to select mode of SATA controller.

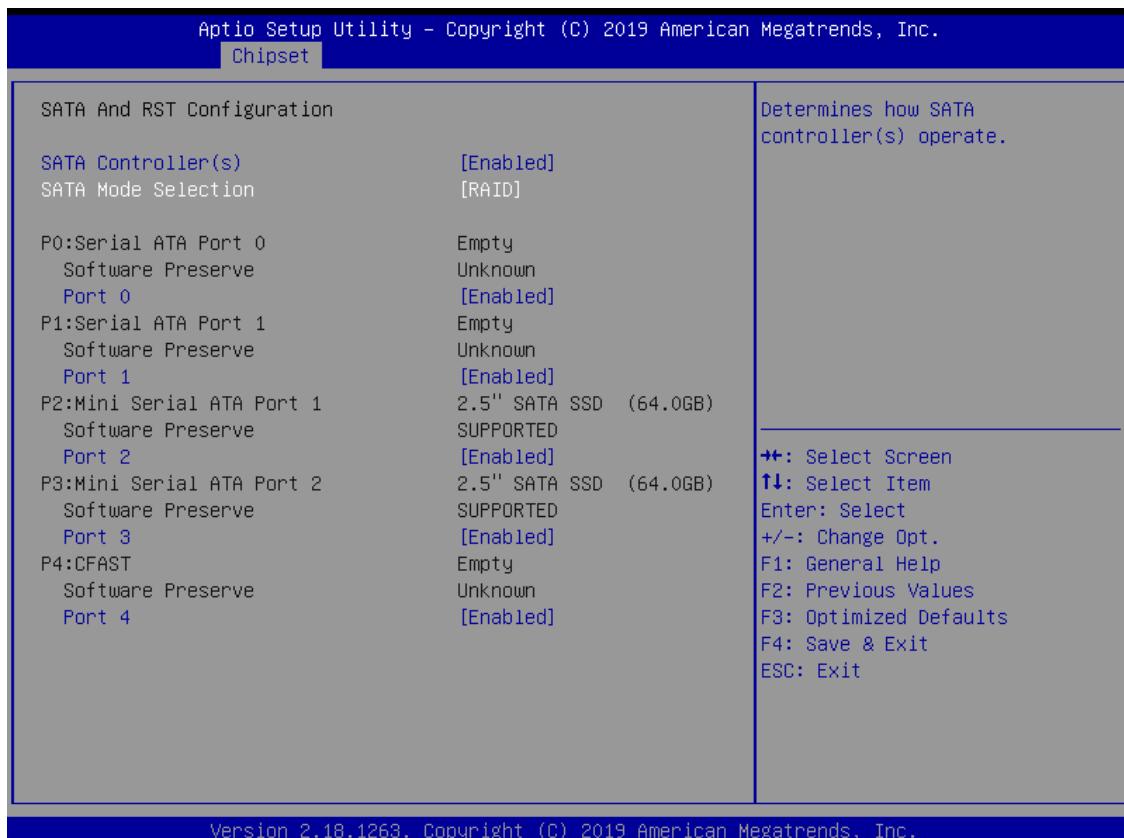
■ Serial ATA Port 0 / 1 / 2 / 3 / 4

This item allows users to enable or disable Serial ATA Port 0 / 1 / 2 / 3 / 4.

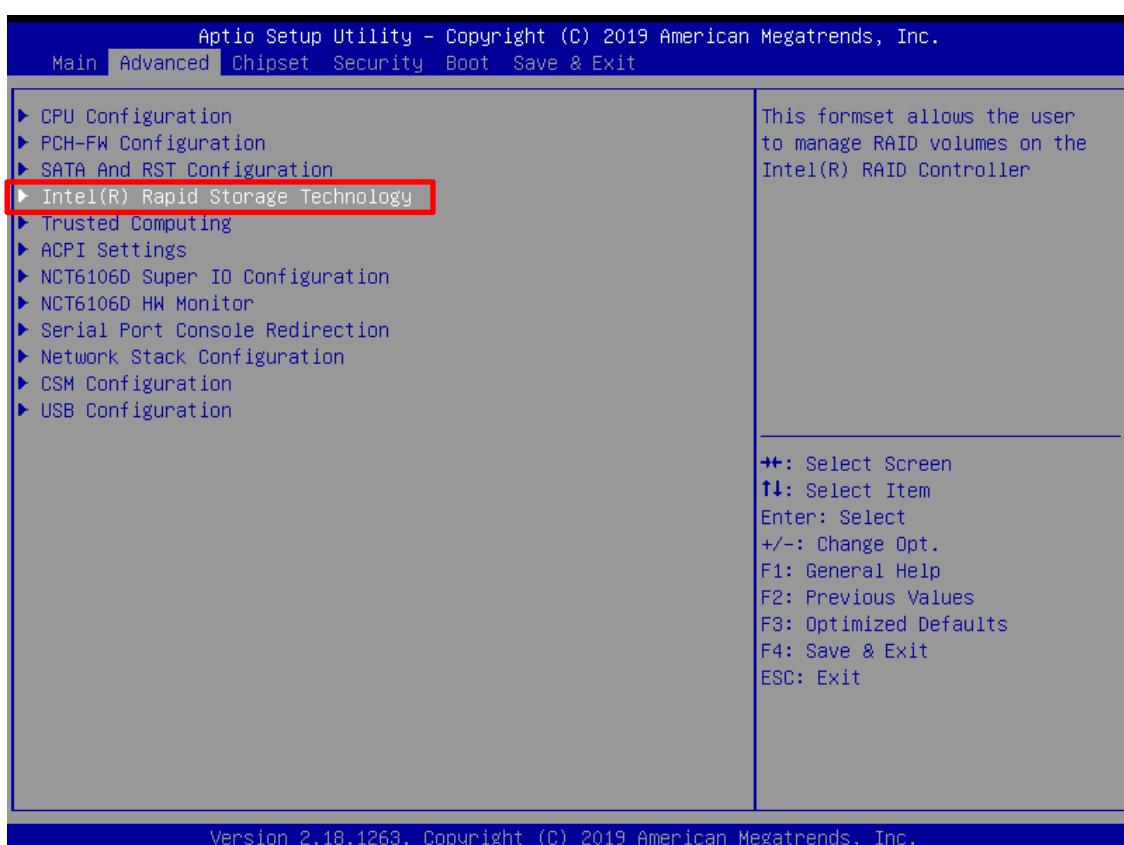
4.3.4 RST (UEFI RAID) Configuration

How to set the UEFI RAID:

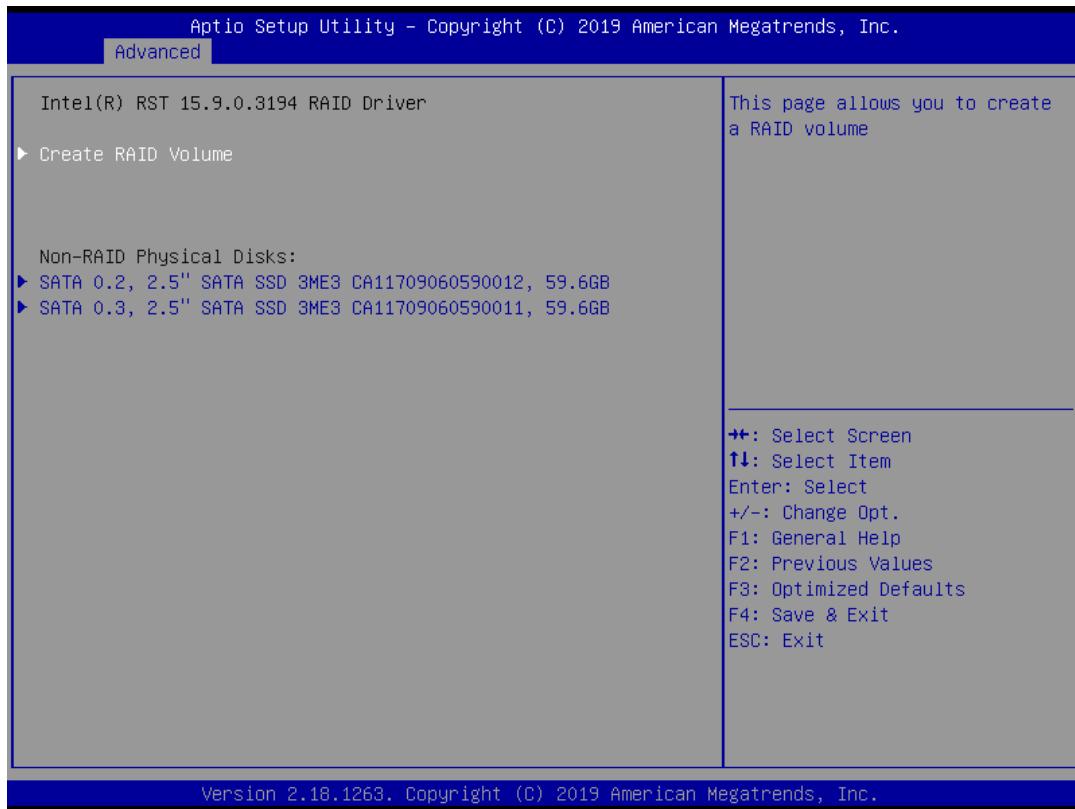
- When set to RAID, please save change reset system.



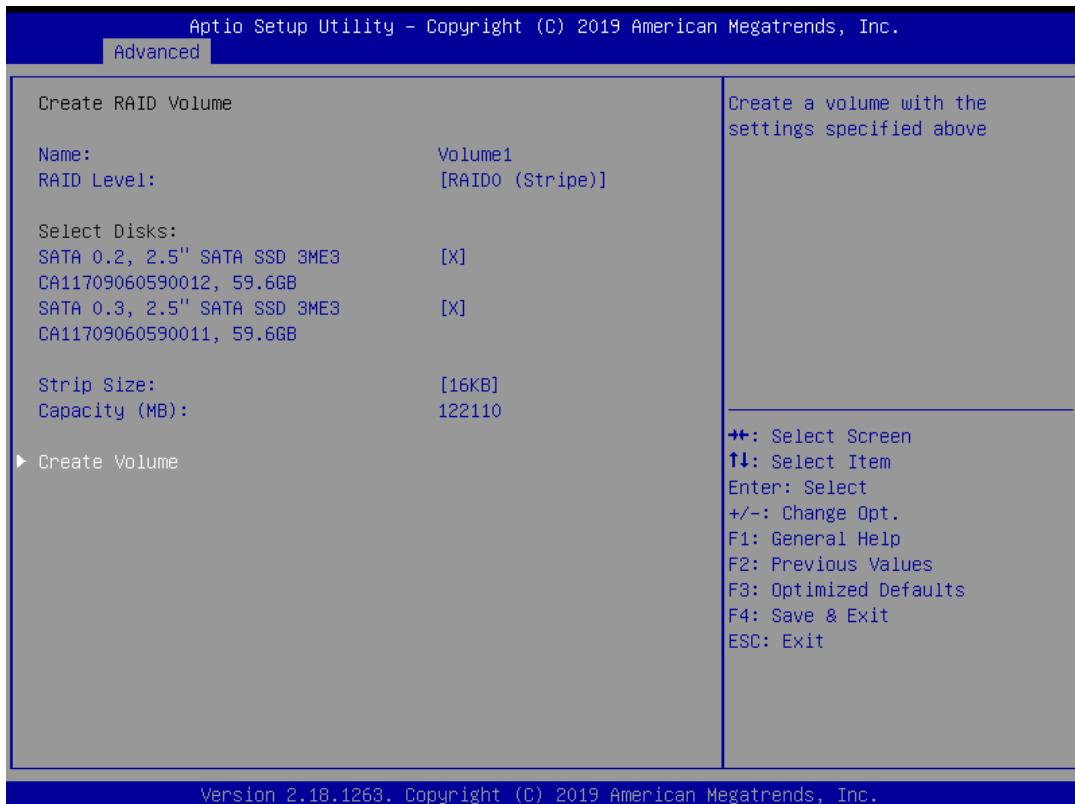
- After reboot the system, please into BIOS utility and then will see “Intel (R) Rapid Storage Technology”



3. Into Intel(R) Rapid Storage Technology, and start create RAID volume.

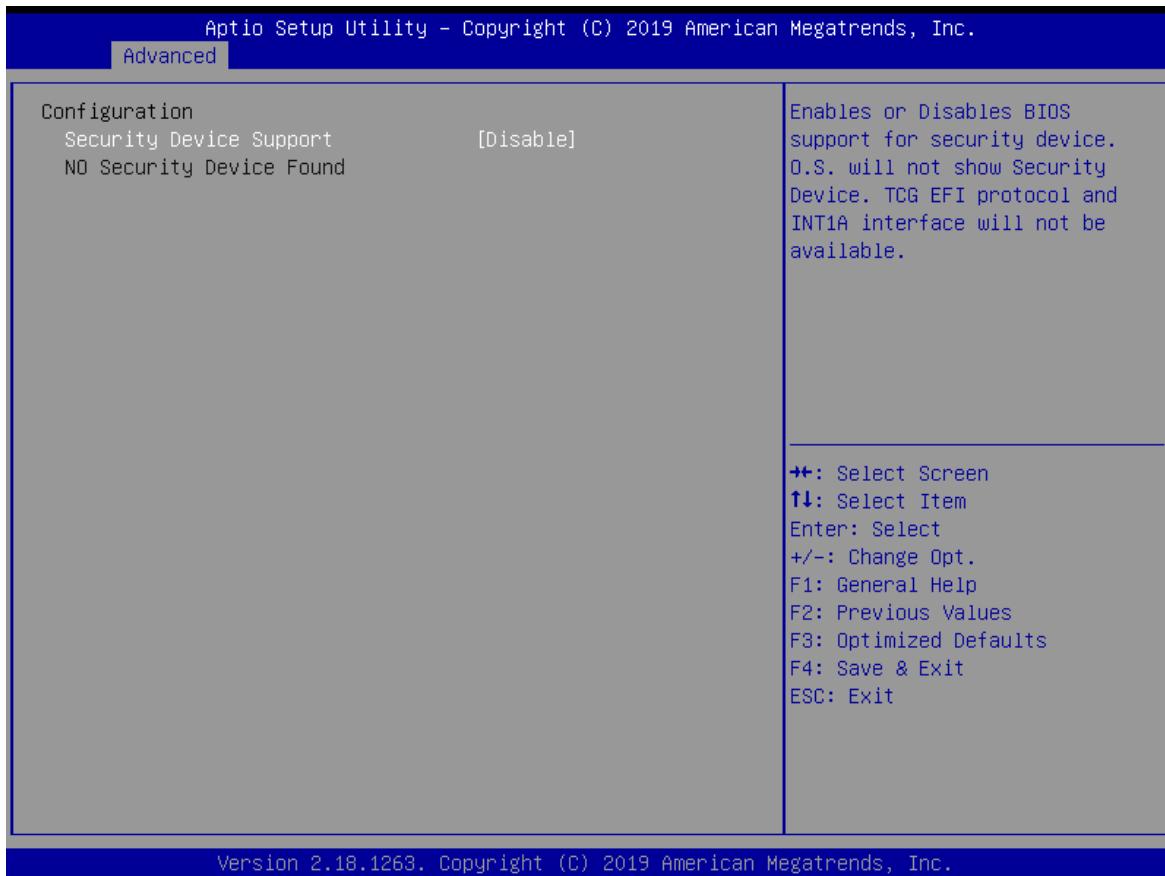


4. Start Create the RAID

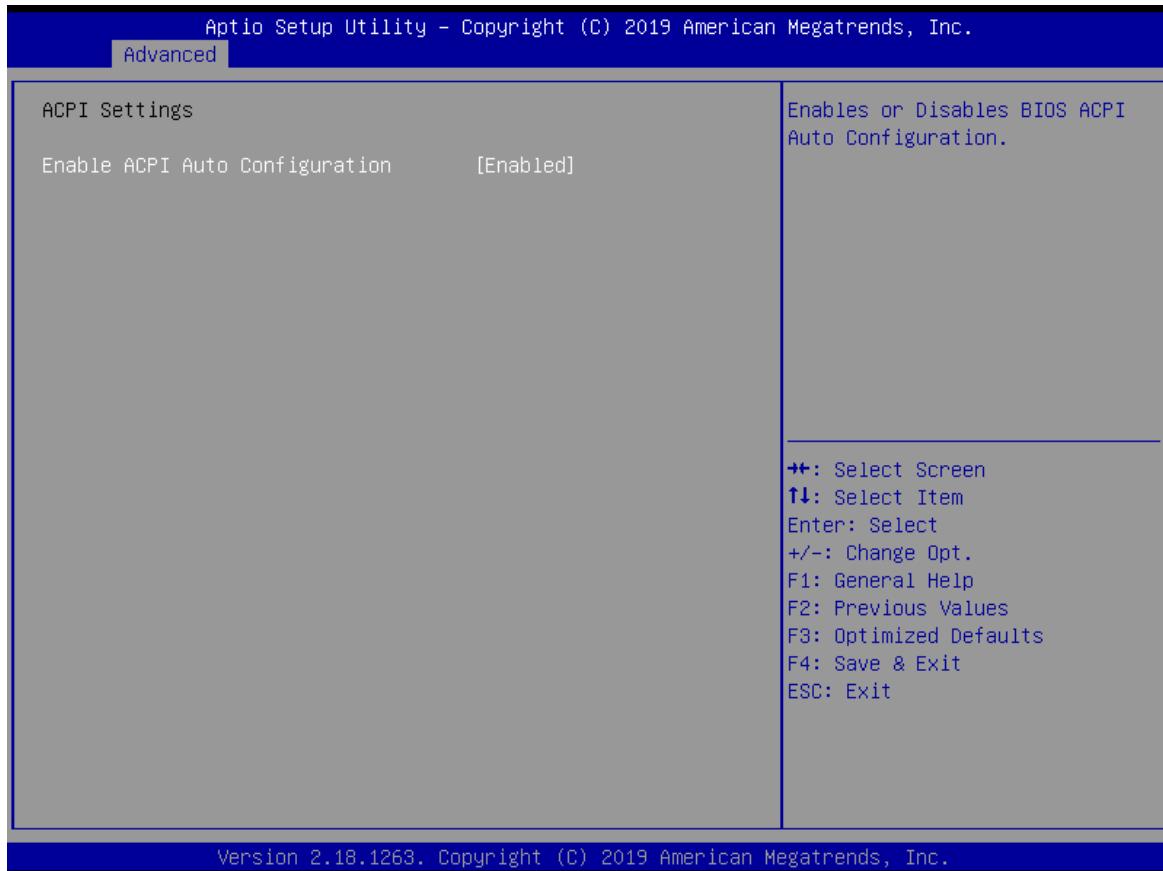


- Select Disk that you want to do the RAID
- Select [x]; No-Select []

4.3.5 Trusted Computing



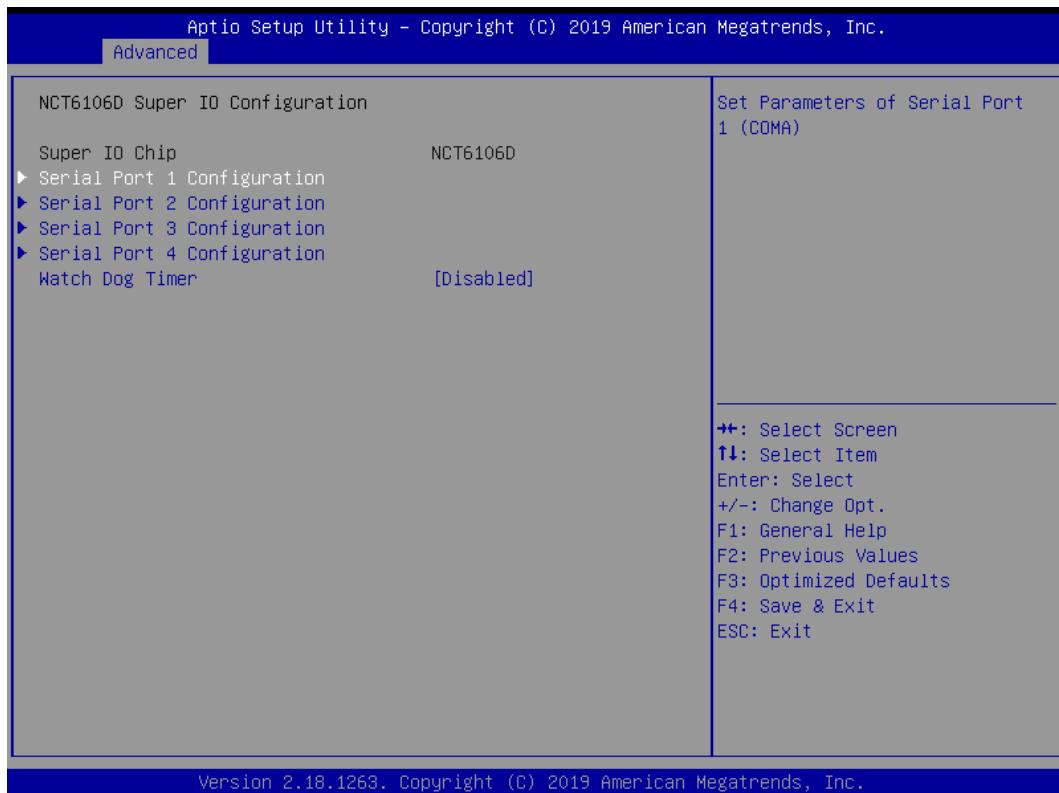
4.3.6 ACPI Settings



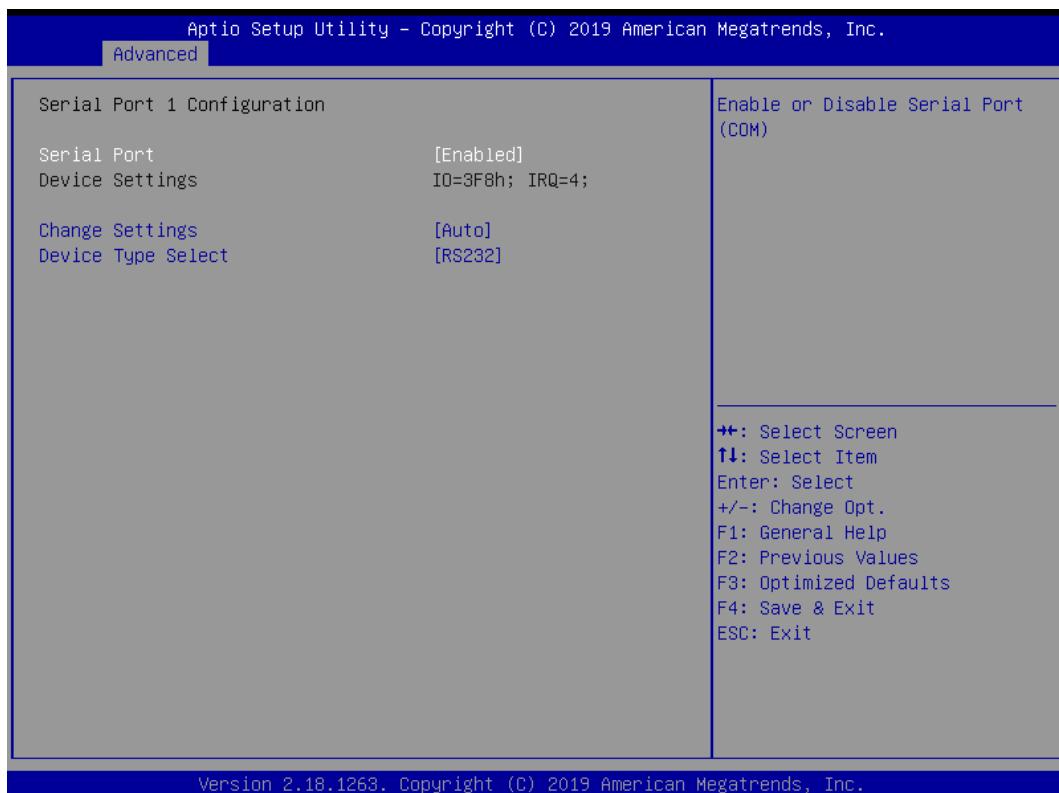
■ Enable ACPI Auto Configuration

Enable or disable BIOS ACPI auto configuration.

4.3.7 NCT6106D Super IO Configuration



■ Serial Port 1 Configuration



Serial Port

This item will allow users to enable or disable serial port.

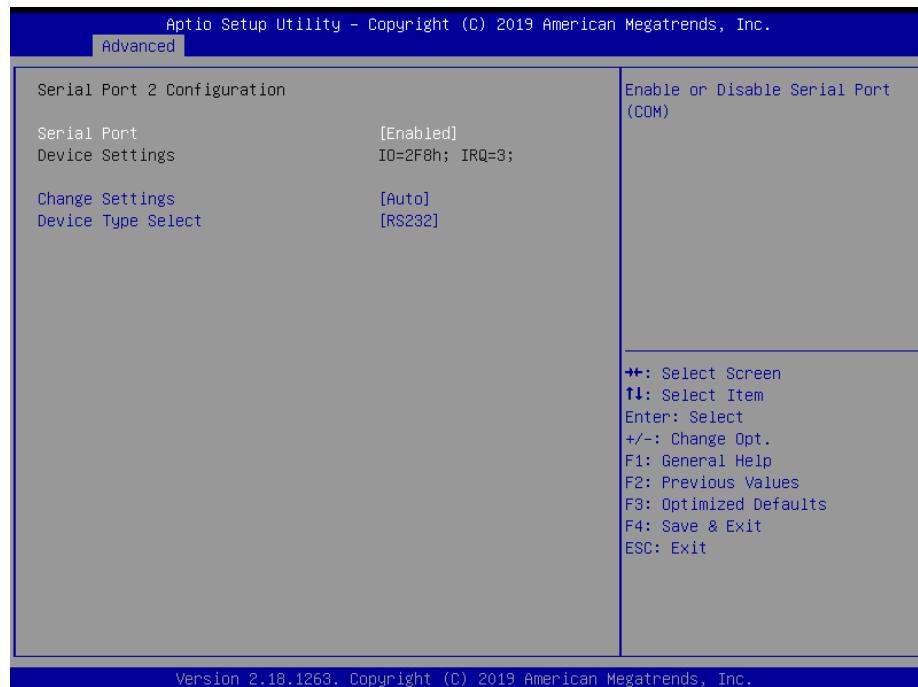
Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

Device Type Select

Change the Serial interface. Select <RS232>, <RS422> or <RS485> interface.

■ Serial Port 2 Configuration



Serial Port

This item will allow users to enable or disable serial port.

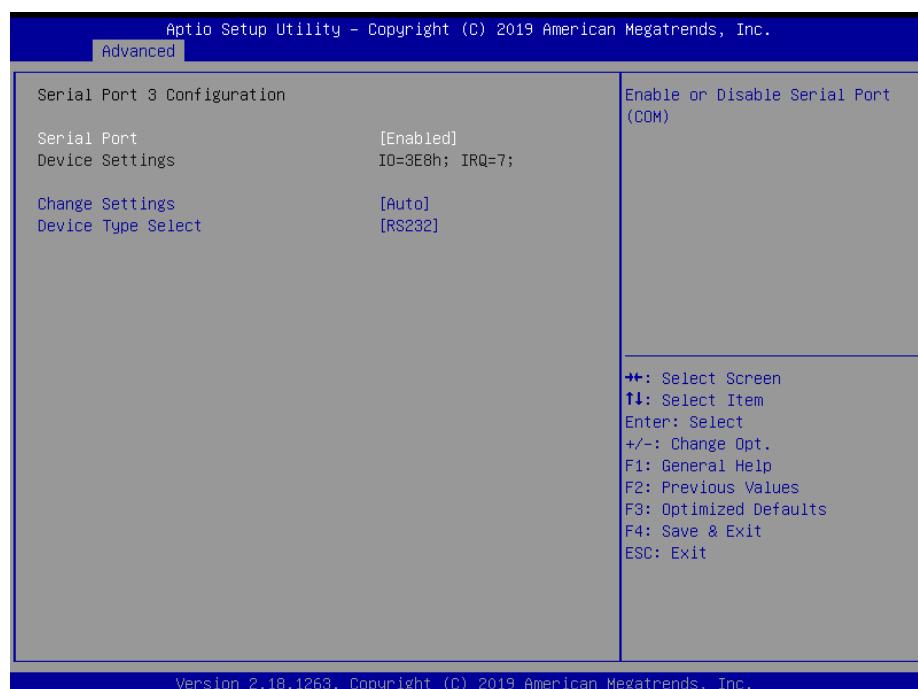
Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

Device Type Select

Change the Serial interface. Select <RS232> ,<RS422> or <RS485> interface

■ Serial Port 3 Configuration



Serial Port

This item will allow users to enable or disable serial port.

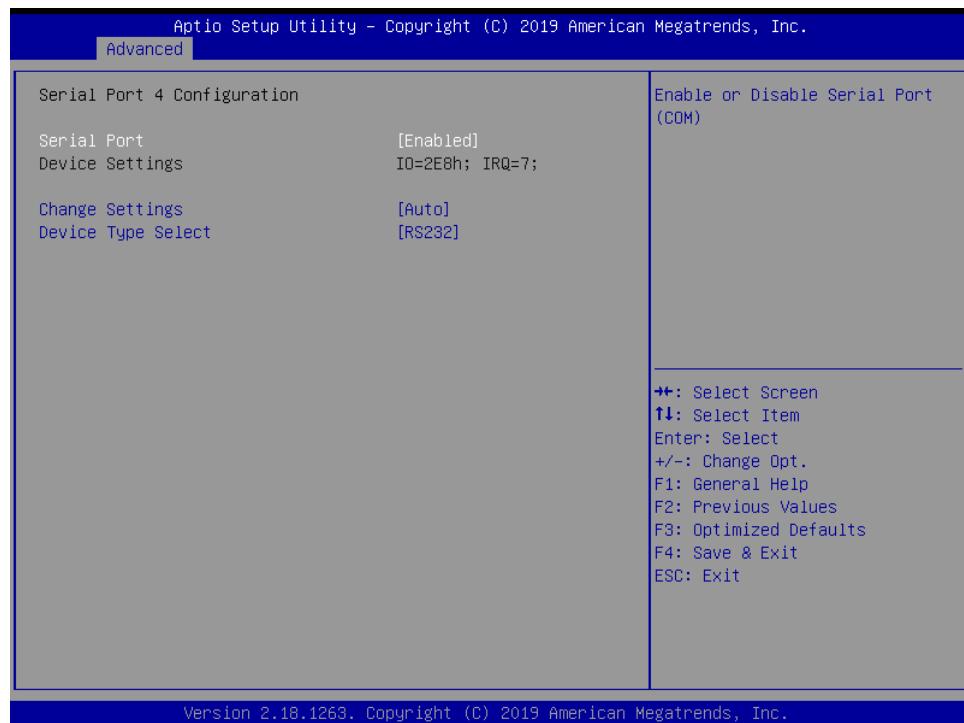
Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

Device Type Select

Change the Serial interface. Select <RS232> ,<RS422> or <RS485> interface.

■ Serial Port 4 Configuration



Serial Port

This item will allow users to enable or disable serial port.

Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

Device Type Select

Change the Serial interface. Select <RS232> ,<RS422> or <RS485> interface.

■ Watch dog Timer

Watch Dog Timer Count Mode

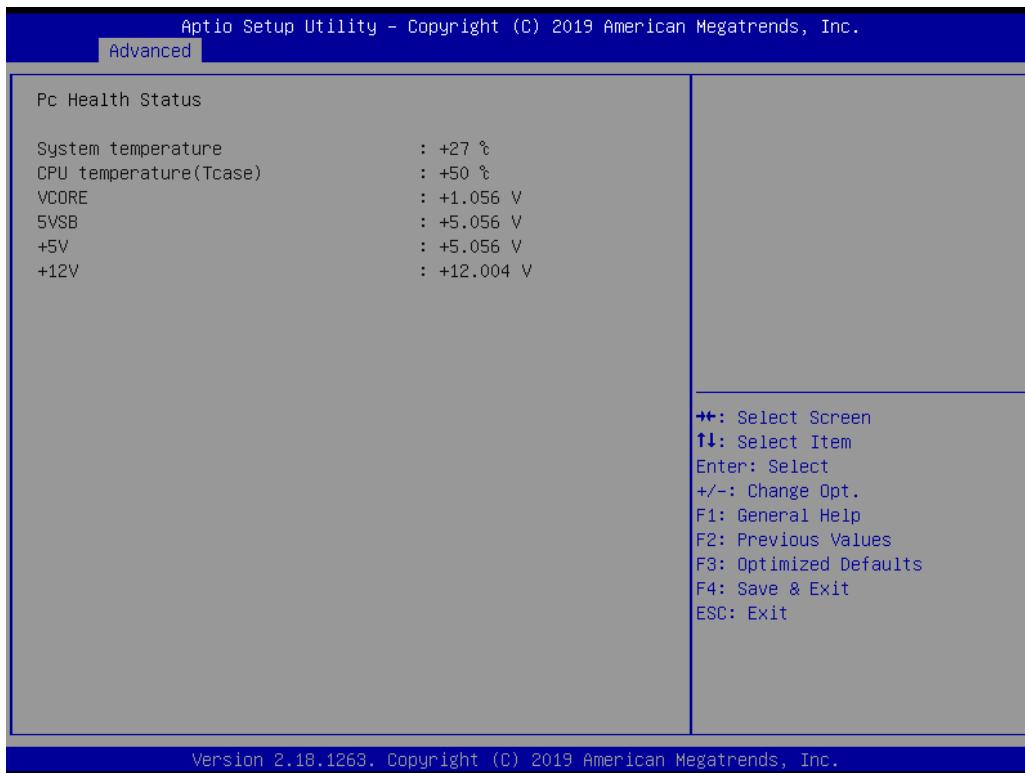
Change the Watch dog mode. Select <Second Mode> or <Minute Mode> mode.

Watch Dog Timer Time Out Value

User can set a value in the range of 0 to 255.

4.3.8 NCT6106D HW Monitor

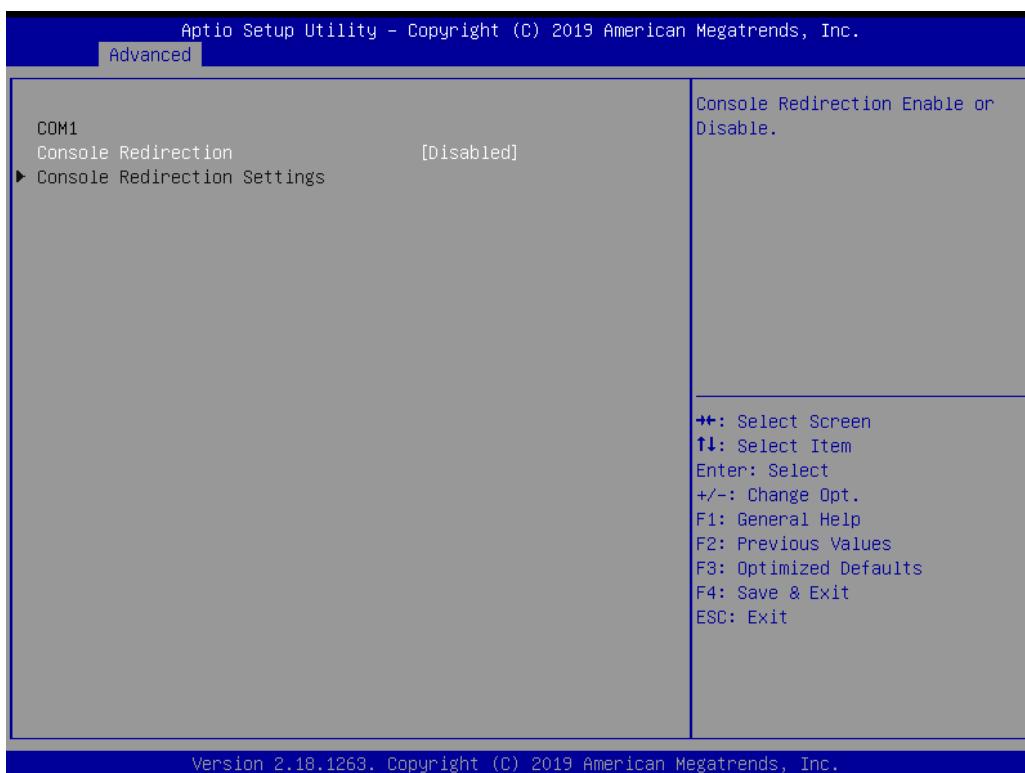
These items display the current status of all monitored hardware devices/components such as voltages, temperatures and all fans' speeds.



4.3.9 Serial Port Console Redirection

Console Redirection

This item allows users to enable or disable console redirection.



4.3.10 Network Stack Configuration



■ Network Stack

Use this item to enable or disable UEFI Network Stack.

4.3.11 CSM Configuration



■ CSM Support

This item allows you to enable or disable CSM support.

■ GateA20 Active

This item allows you to select <Upon Request> or <Always>.

Upon Request: GA20 can be disabled using BIOS services.

Always: Do not allow GA20 disabling. This option is useful when any RT code is executed above 1MB.

■ Option ROM Messages

This item allows you to select <Force BIOS> or <Keep Current>.

Force BIOS : The third-party ROM messages will be forced to display during the boot sequence.

Keep Current : The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

■ INT19 Trap Response

BIOS reaction on INT19 trapping by Option ROM: Immediate - execute the trap right away;

Postponed - execute the trap during legacy boot.

■ Boot option filter

This item allows you to select which type of operating system to boot.

UEFI and Legacy: Allows booting from operating systems that support legacy option ROM or UEFI option ROM.

Legacy only: Allows booting from operating systems that only support legacy option ROM.

UEFI only: Allows booting from operating systems that only support UEFI option ROM.

■ PXE Function

This item controls the execution of UEFI and PXE option ROM. Select <Do not launch>, <UEFI> or <Legacy>.

■ Storage

This setting allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller. Select <Do not launch>, <UEFI> or <Legacy>.

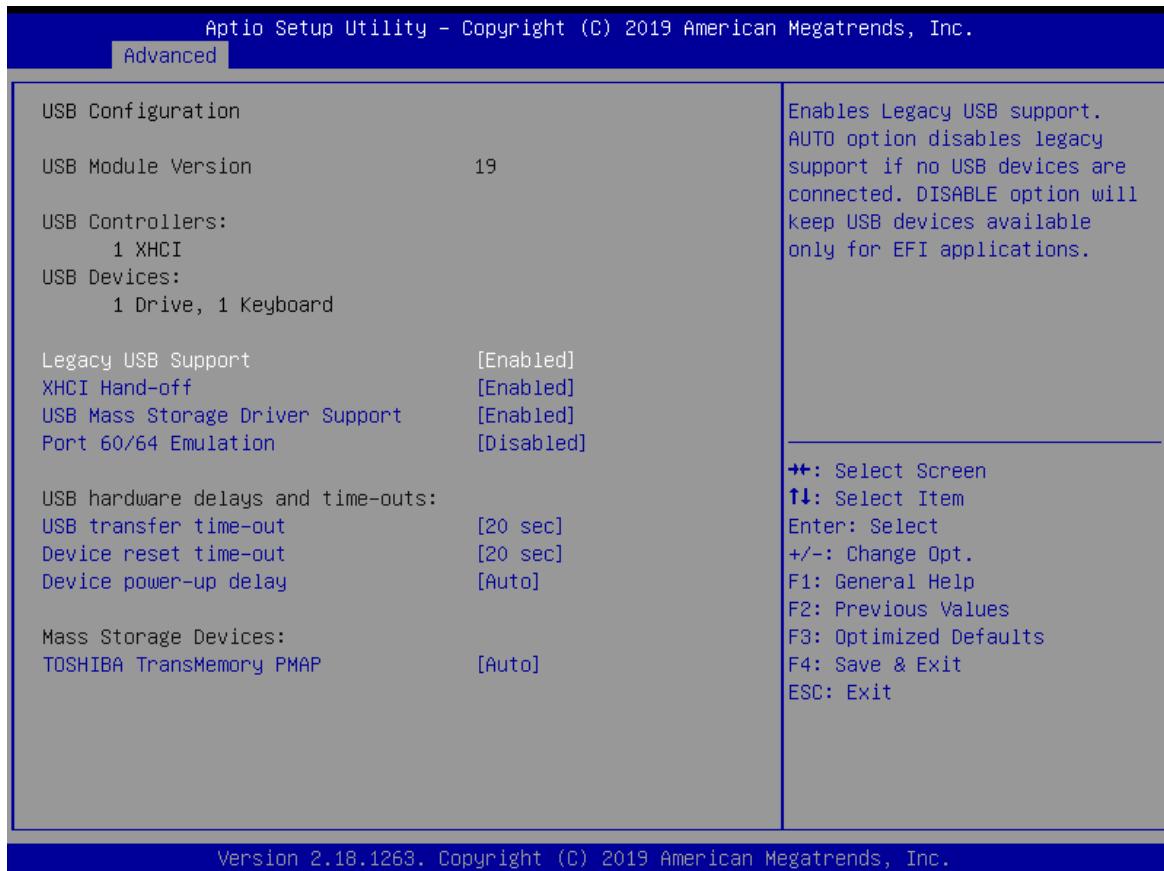
■ Video

This setting allows you to select whether to enable the UEFI or legacy video option ROM for the video device controller. Select <Do not launch>, <UEFI> or <Legacy>.

■ Other PCI devices

This item determines option ROM execution policy for devices other than Network, storage or video. Select <Do not launch>, <UEFI> or <Legacy>.

4.3.12 USB Configuration



■ Legacy USB Support

This item allows you to select <Enabled>, <Disabled> or <Auto>.

Enabled: To enable legacy USB support.

Disabled: To keep USB devices available only for EFI specification,

Auto: To disable legacy support if no USB devices are connected.

■ XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. Select <Enabled> or <Disabled>.

■ USB Mass Storage Driver Support

Enables or disables support for USB storage devices.

■ Port 60/64 Emulation

This feature enables or disables I/O port 60h/64h emulation support. This should be enabled for complete USB keyboard legacy support for non-USB-aware Operating Systems.

■ USB Transfer time-out

Use this item to set the time-out value for control, bulk, and interrupt transfers. Select <1 sec>, <5 sec>, <10 sec> or <20 sec>.

■ Device reset time-out

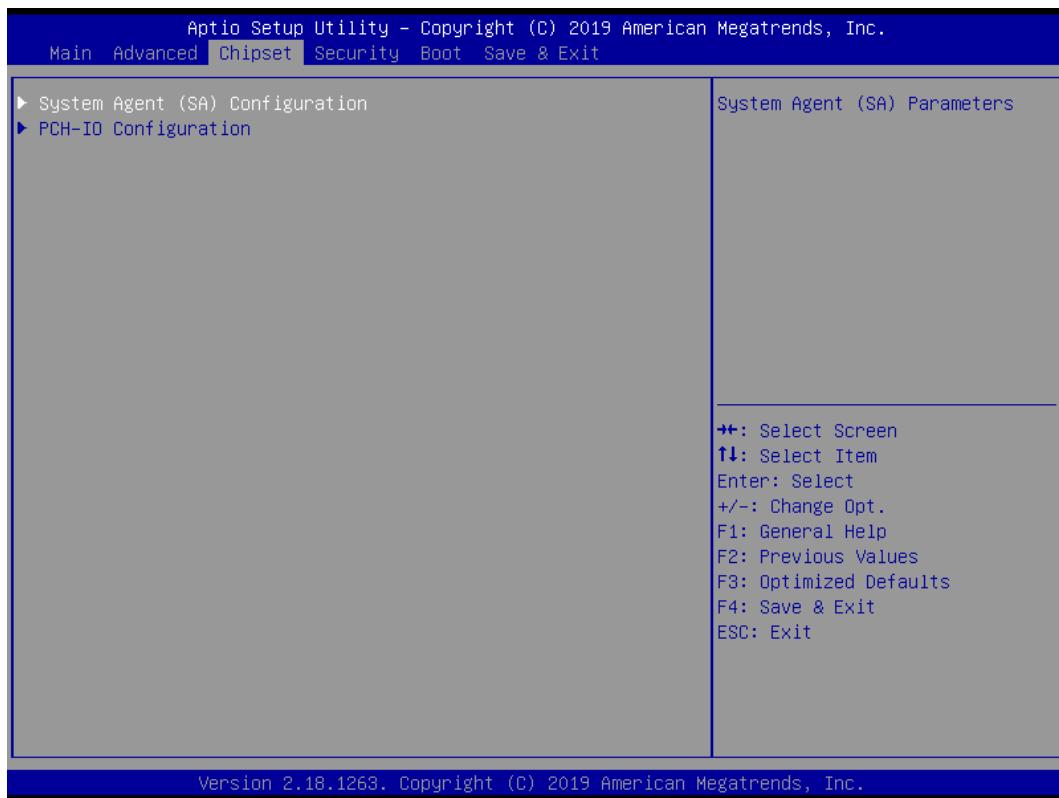
Use this item to set USB mass storage device start unit command time-out. Select <10 sec>, <20 sec>, <30 sec> or <40 sec>.

■ Device power-up delay

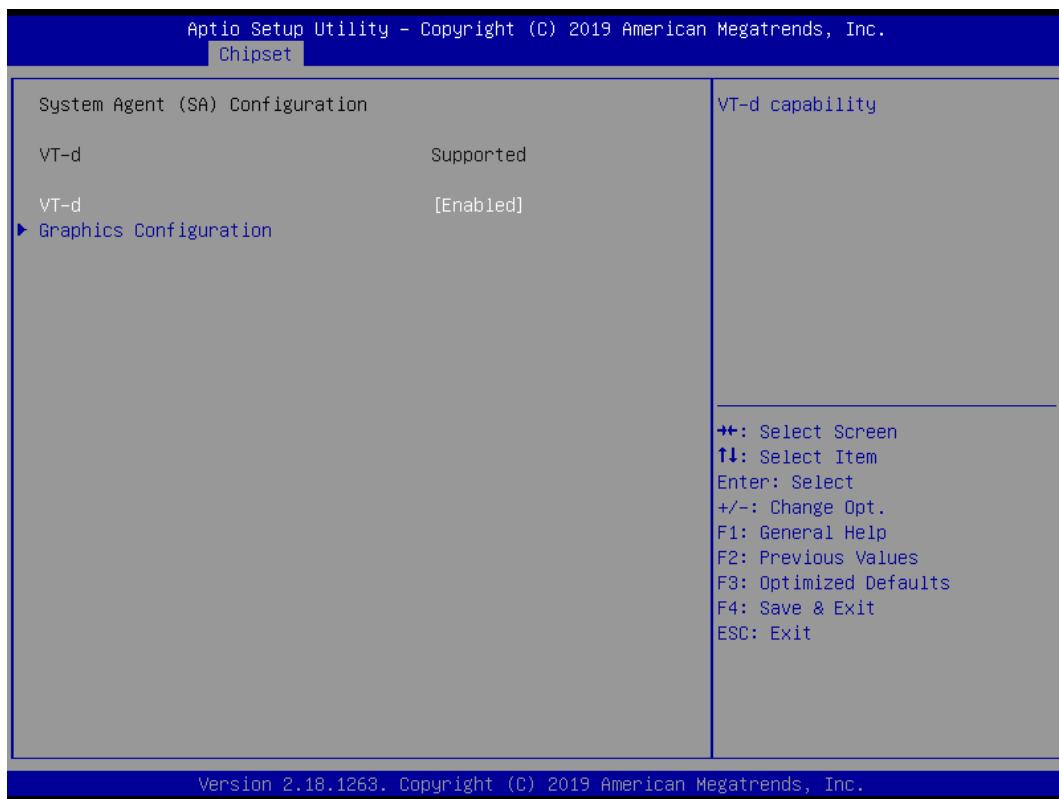
Maximum time the device will take before it properly reports itself to the Host Controller. "Auto" uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

4.4 Chipset

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



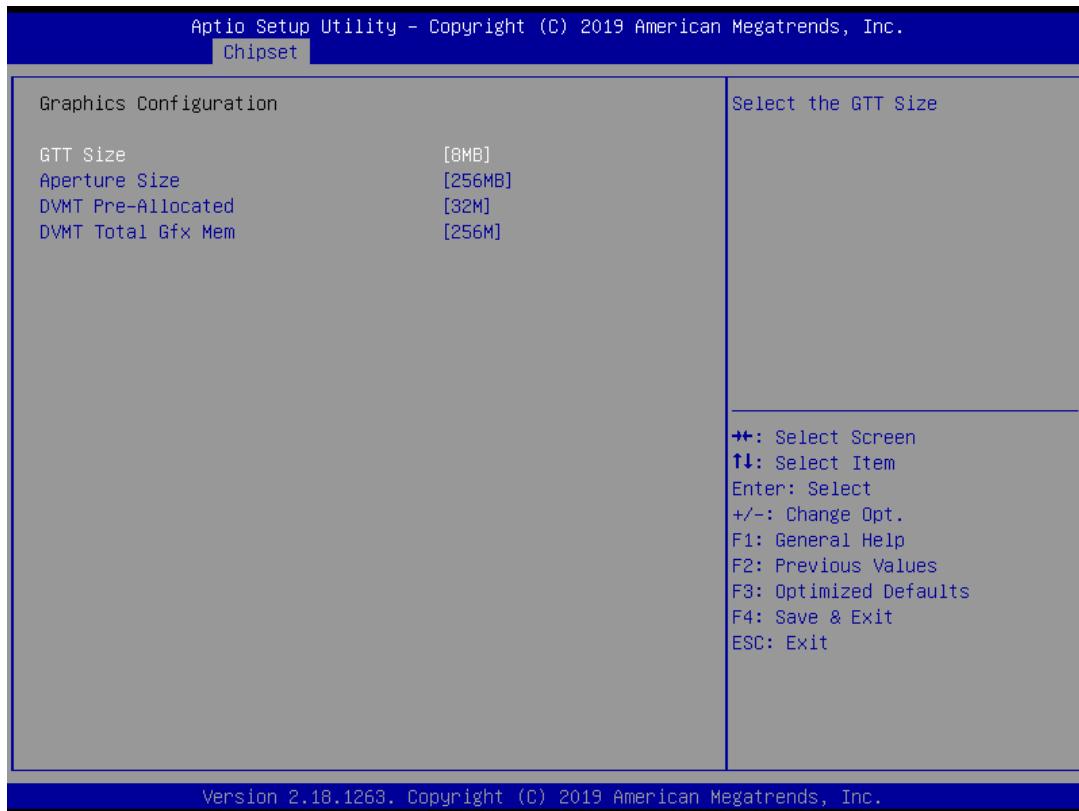
4.4.1 System Agent (SA) Configuration



■ VT-d

This item allows users to enable or disable VT-d.

■ Graphic Configuration



GTT Size

This item allows you to change the GTT size.

Aperture Size

Aperture size optimal between 128MB, 256MB, 512MB, 1024MB or 2048MB.

DVMT Pre-Allocated

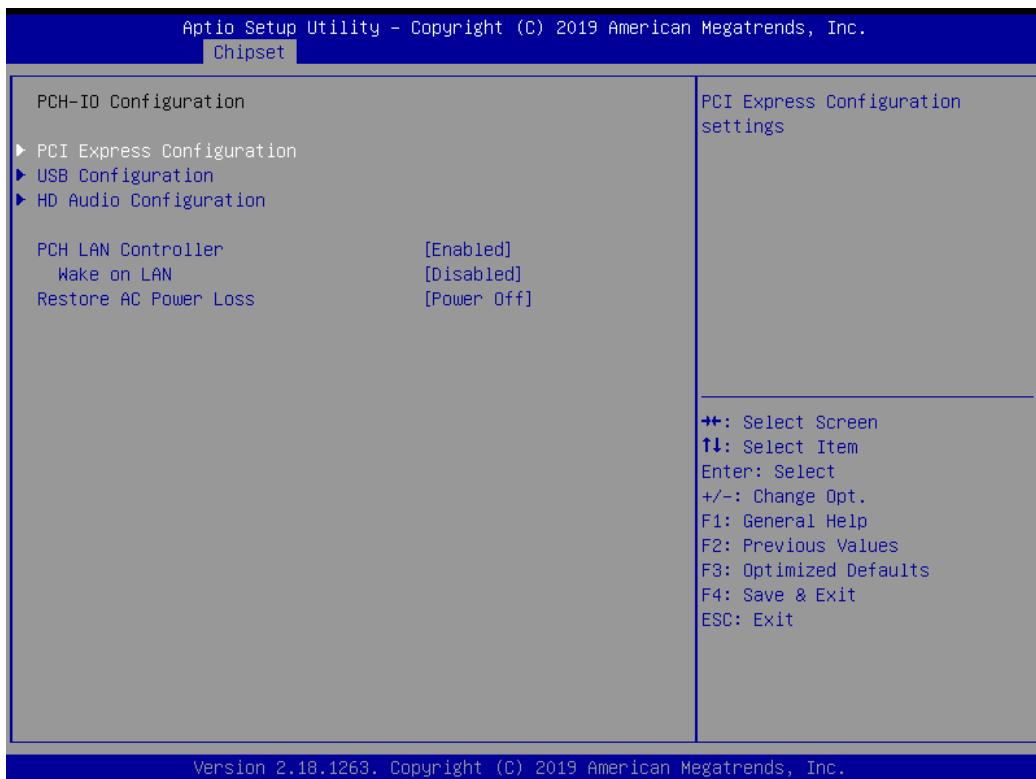
DVMT pre-allocated (fixed) Graphics memory size optimal from 0M to 60M.

DVMT Total Gfx Mem

DVMT Total Gfx Mem optimal Between 128M, 256M or MAX.

4.4.2 PCH-IO Configuration

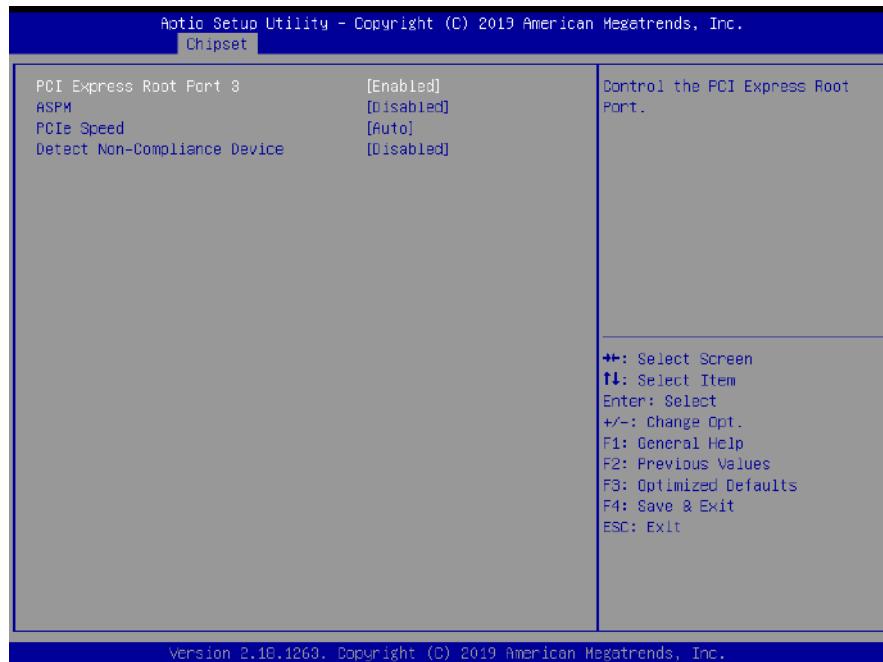
This section allows you to configure the chipset.



■ PCI Express Configuration



☐ PCI Express Root Port 3 / 15 / 16



✓ PCI Express Port 3 / 15 / 16

This item allows you to enable or disable PCI Express Port 3 / 15 / 16 in the chipset.

✓ ASPM

This item allows you to select the ASPM state for energy-saving. Select <Disabled>, <L0s>, <L1>, <L0sL1> or <Auto>

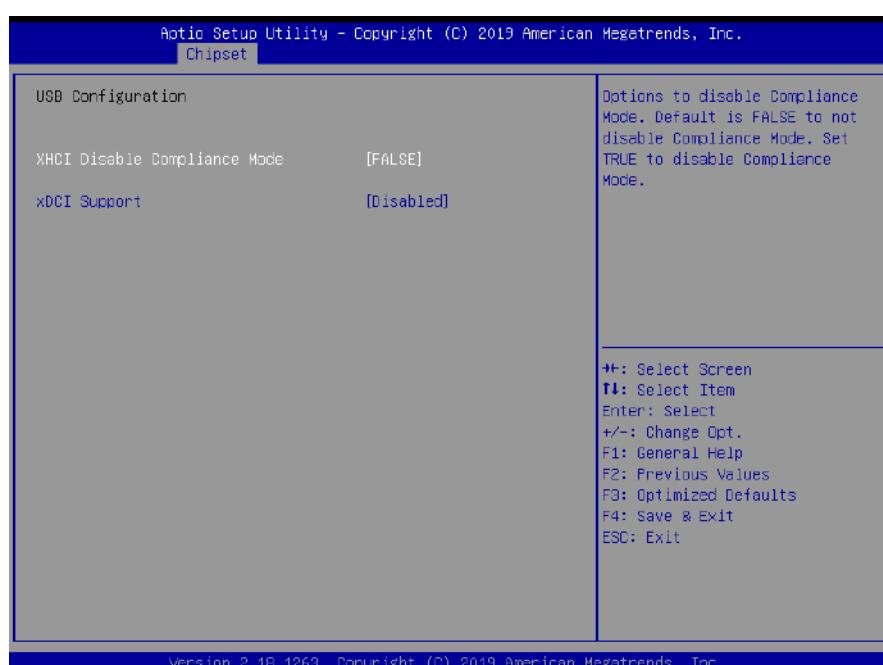
✓ PCIe Speed

Change the PCIe Port Speed. Select <AUTO>, <Gen 1> or <Gen 2>

✓ Detect Non-Compliance Device

Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

■ USB Configuration



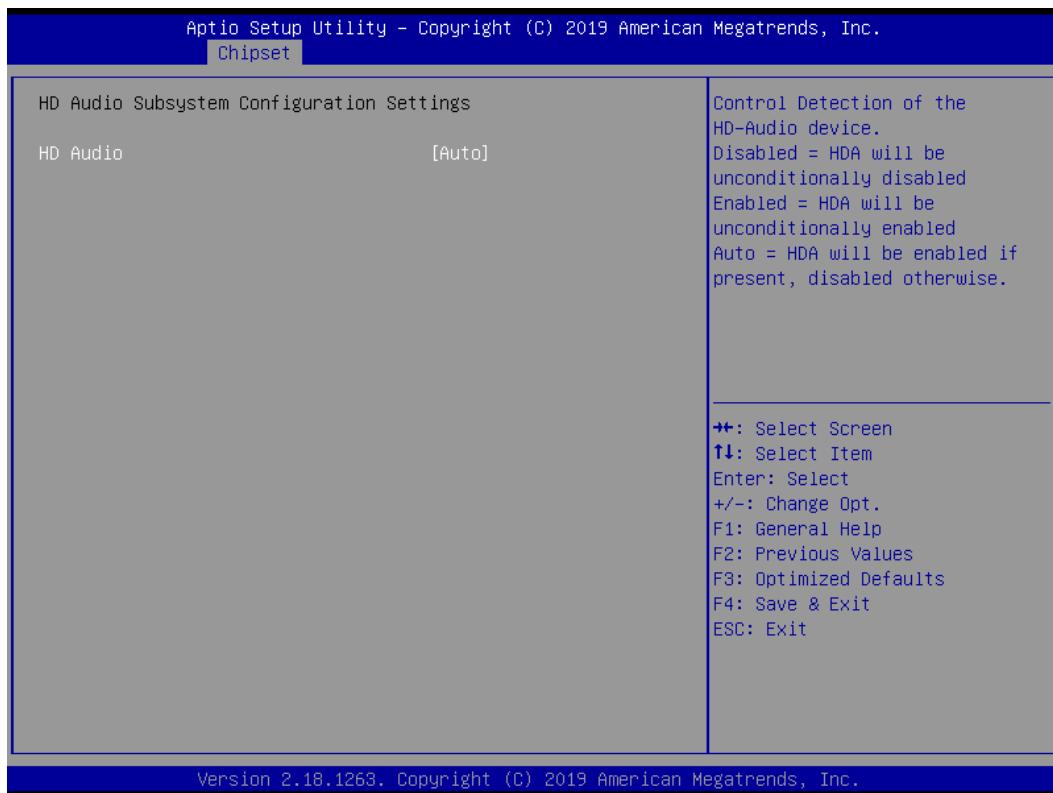
☐ XHCI Disable Compliance mode

Options to disable compliance mode. Default is FALSE enable compliance mode.
Set TRUE to disable compliance mode.

☐ xDCI Support

This item will allow users to enable or disable xDCI Support.

■ HD Audio Configuration



□ HD Audio

Control detection of the HD-Audio device. This item allows you to select <Enabled>, <Disabled> or <Auto>.

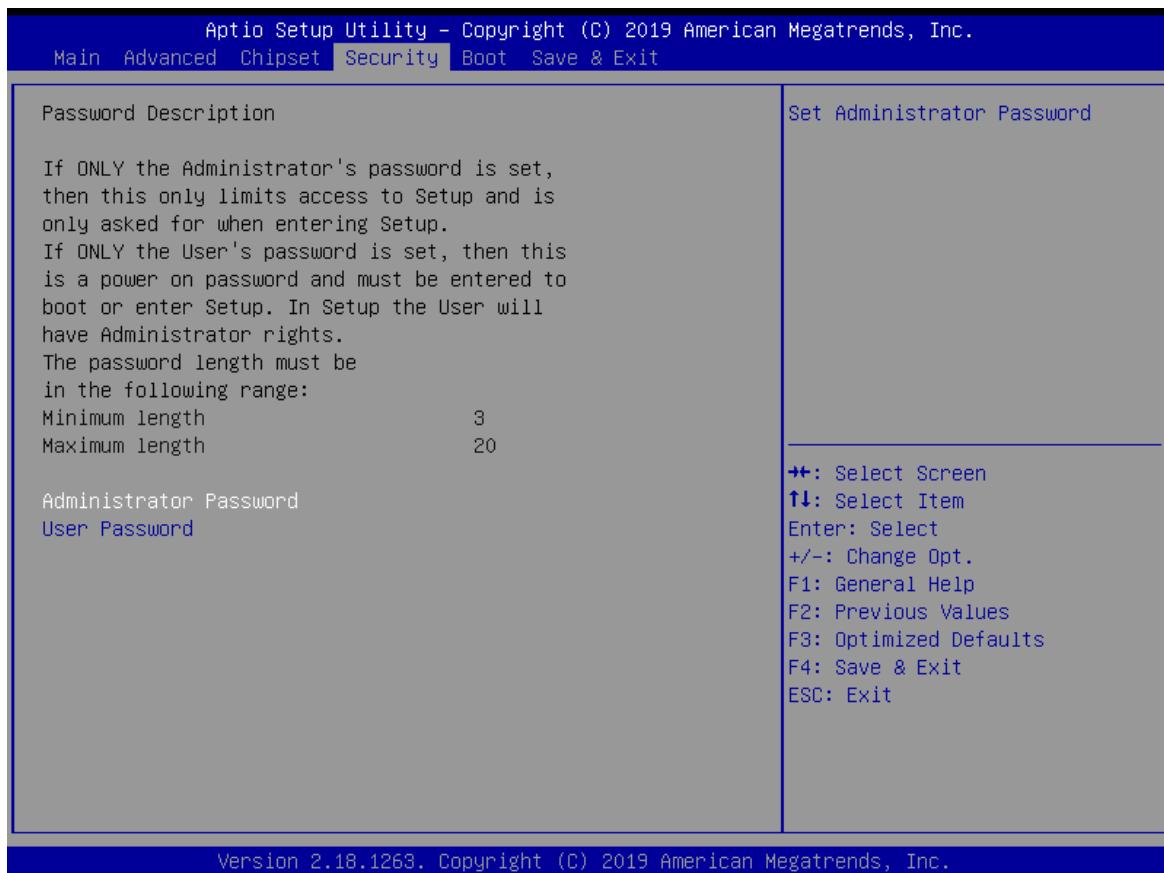
Disabled: Azalia will be unconditionally be disabled.

Enabled: Azalia will be unconditionally be enabled.

Auto: Azalia will be enabled if present, disabled otherwise.

4.5 Security

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



■ Administrator Password

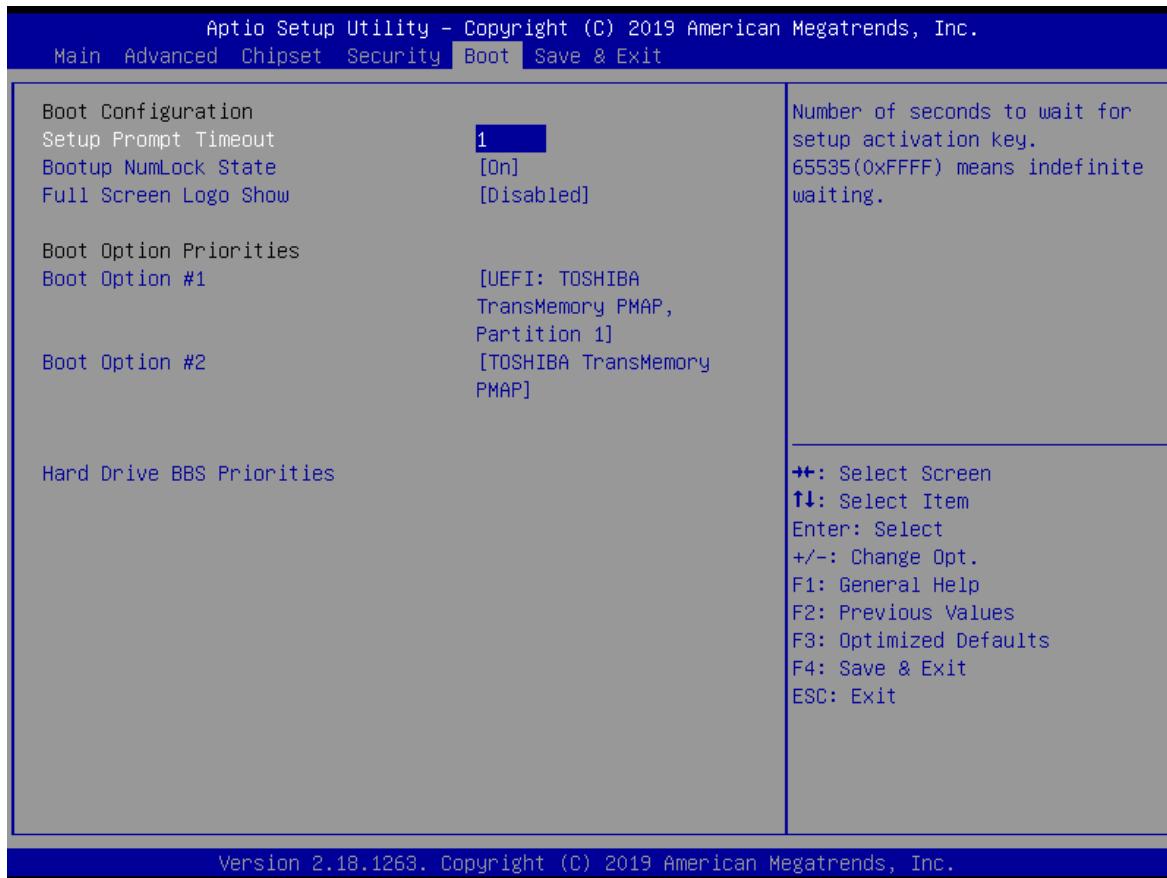
This item allows you to set Administrator Password.

■ User Password

This item allows you to set User Password.

4.6 Boot

This menu allows you to setup the system boot options.



■ Setup Prompt Timeout

This item sets number of seconds to wait for setup activation key.

■ Bootup NumLock State

This item selects the keyboard NumLock state. Select <On> or <Off>.

■ Full Screen Logo Show

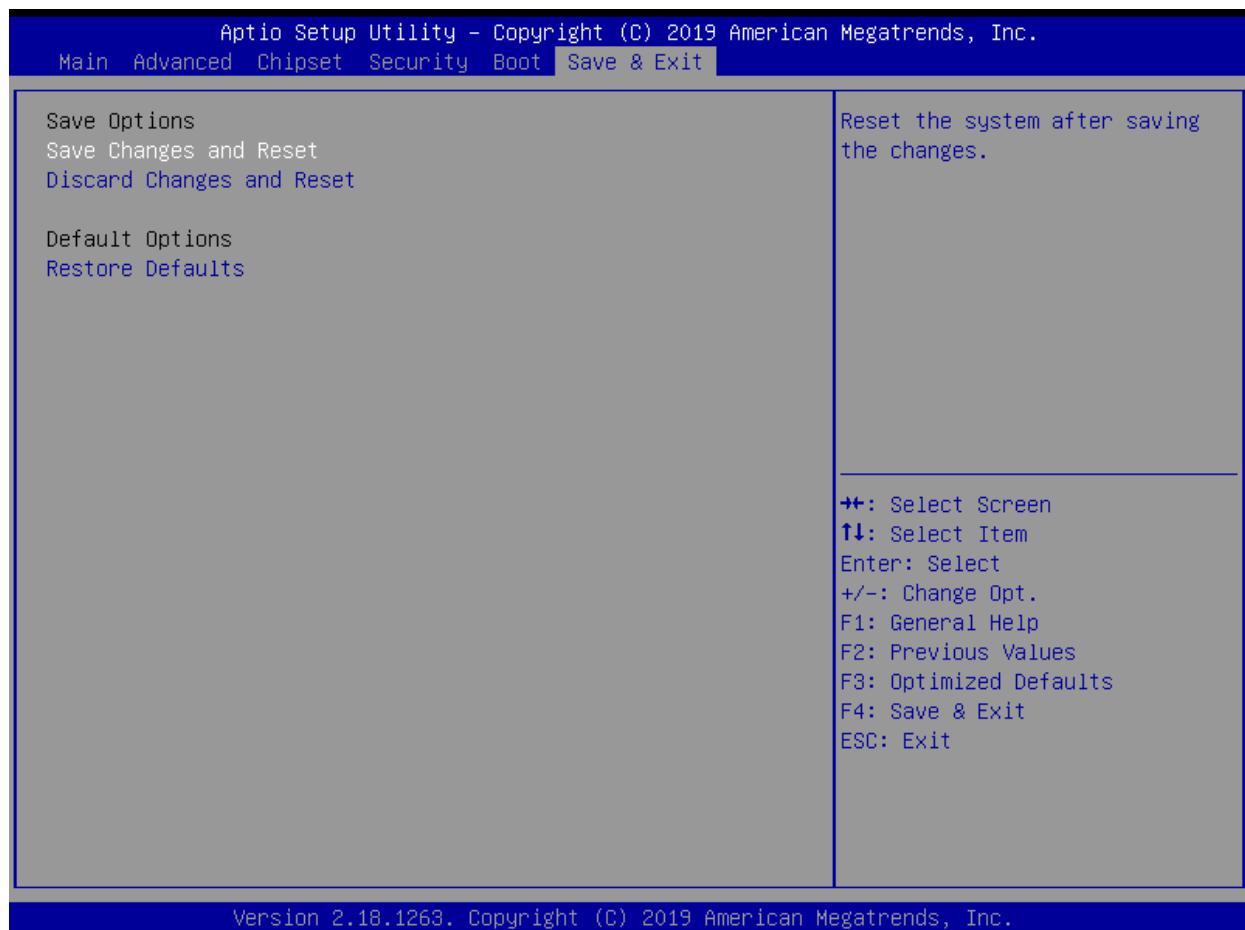
This item allows you to enable or disable Full Screen Logo Show function.

■ Hard Driver BBS Priorities

The items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.

4.7 Save & Exit

This setting allows users to configure the boot settings.



Save Changes and Reset

This item allows user to reset the system after saving the changes. This item allows user to reset the system after saving the changes.

Discard Changes and Reset

This item allows user to reset the system without saving any changes.

Restore Defaults

Use this item to restore /load default values for all the setup options.

Appendix

WDT & GPIO

This appendix provides the sample codes of WDT (Watch Dog Timer) and GPIO (General Purpose Input/ Output).

WDT Sample Code

Pseudo Code

```
#define AddrPort          0x2E
#define DataPort           0x2F
#define SIO_UnLock_Value   0x87
#define SIO_Lock_Value      0xAA
#define WATCHDOG_LDN       0x08

//Enter_Config
WriteByte (AddrPort, SIO_UnLock_Value);
WriteByte (AddrPort, SIO_UnLock_Value);

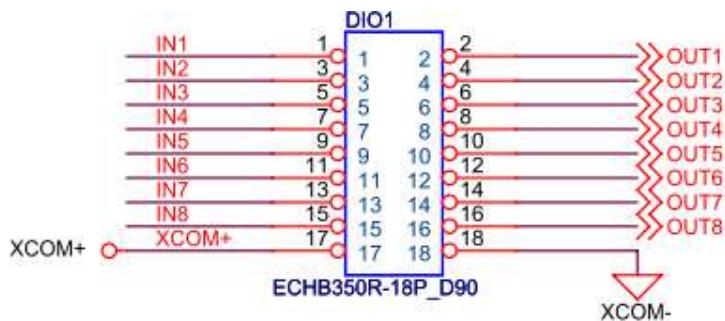
//Enter WATCHDOG LDN
WriteByte (AddrPort, 0x07);
WriteByte (DataPort, WATCHDOG_LDN);

//Set count mode
WriteByte (AddrPort, 0xF0);
buf2 = ReadByte (DataPort) & 0xF4; //clear "Select Watchdog Timer I count mode
buf2 |= 0x02;                  //Enable the Watchdog Timer I output low pulse to the KBRST# pin
// buf2 |= 0x08;                //Bit3 = (1:Minute Mode/0:Second Mode)
WriteByte (DataPort, buf2);     //Write back

//Set watch dog time value
WriteByte (AddrPort, 0xF1)
WriteByte (DataPort, Time)      //Set watch dog time value

// close config mode
WriteByte (AddrPort, SIO_Lock_Value);
```

GPIO Sample Code



PIN#	GPIO#	Default Configuration
18	XCOM-	
17	XCOM+	
16	OUT8	DIO Output8
15	IN8	DIO Input8
14	OUT7	DIO Output7
13	IN7	DIO Input7
12	OUT6	DIO Output6
11	IN6	DIO Input6
10	OUT5	DIO Output5
9	IN5	DIO Input5
8	OUT4	DIO Output4
7	IN4	DIO Input4
6	OUT3	DIO Output3
5	IN3	DIO Input3
4	OUT2	DIO Output2
3	IN2	DIO Input2
2	OUT1	DIO Output1
1	IN1	DIO Input1

The GPIO function is provided by Nuvoton NCT6106D, and it can be accessed through its GPIO index/data port. To access the GPIO register, write index to the index port, and then read/write from/to data port. The configuration is described as below.

Pseudo Code

```
#define AddrPort          0x2E
#define DataPort           0x2F
#define SIO_UnLock_Value   0x87
#define SIO_Lock_Value      0xAA
#define SIO_LDN_GPIO        0x07
#define GPIO_Port           0xF1

//Enter_Config
WriteByte (AddrPort, SIO_UnLock_Value);
WriteByte (AddrPort, SIO_UnLock_Value);

WriteByte (AddrPort, 0x07);
WriteByte (DataPort, SIO_LDN_GPIO);

//Set OUT1~OUT8Value
WriteByte (AddrPort, GPIO_Port);
WriteByte (DataPort, 0x00);      //set OUT1~OUT8 value, OUT1=Bit0, OUT2=Bit1
```

<i>Bit 7</i>	<i>Bit 6</i>	<i>Bit 5</i>	<i>Bit 4</i>	<i>Bit 3</i>	<i>Bit 2</i>	<i>Bit 1</i>	<i>Bit 0</i>
OUT8	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1

```
// Read In1~In8 value
WriteByte (AddrPort, 0xED);
Data= ReadByte (DataPort);      //Read In1~In8 value
```

<i>Bit 7</i>	<i>Bit 6</i>	<i>Bit 5</i>	<i>Bit 4</i>	<i>Bit 3</i>	<i>Bit 2</i>	<i>Bit 1</i>	<i>Bit 0</i>
IN8	IN7	IN6	IN5	IN4	IN3	IN2	IN1

```
// close config mode
WriteByte (AddrPort, SIO_Lock_Value);
```

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