C&T SOLUTION INC.

USER'S MANUAL

VCO-3400 Series

Advanced Machine Vision System

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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2019/08/13

Disclaimer

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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

1. Visit the C&T Solution Inc website at www.candtsolution.com where you can find the latest information about the product.
2. 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	VCO-3400 Series Embedded System	1
2	Utility DVD Driver	1
3	Wall Mount Kit	1
4	Accessory Kit	1

Ordering Information

Model No.	Product Description
VCO-3400-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U
VCO-3400-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U
VCO-3411E-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 1x PCIe x4 Slot (1 Lane)
VCO-3411E-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 1x PCIe x4 Slot (1 Lane)
VCO-3411P-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 1x PCI
VCO-3411P-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 1x PCI
VCO-3422E-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 2x PCIe x4 Slot (1 Lane)
VCO-3422E-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 2x PCIe x4 Slot (1 Lane)
VCO-3422P-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 2x PCI
VCO-3422P-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 2x PCI
VCO-3433P-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 3x PCI
VCO-3433P-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 3x PCI
VCO-3444P-7300U	Advanced Machine Vision System with Intel® Core™ i5-7300U, 4x PCI
VCO-3444P-7100U	Advanced Machine Vision System with Intel® Core™ i3-7100U, 4x PCI

Optional Accessories

Model No.	Product Description
1-E09A12002	Adapter AC/DC 24V 5A 120W with 3pin Terminal Block Plug 5.0mm Pitch, GST120A24-CT1
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 the 7th Gen. Intel® Core™ i5-7300U (up to 3.8GHz, Dual Core) / i3-7100U (2.4GHz, Dual Core) processor, VCO-3400 series advanced machine vision system is an extreme features integration, outstanding system performance, versatile I/O connections, and rugged reliability fanless embedded systems. It offers modularize expansion I/O, rich connectivity interfaces, wide range (9~50V) DC power input, and high reliability even operating in temperature extremes (-40°C ~ +70°C). Featuring with completely cable-less designed, high functional, one-piece housing design, and anti-vibration, VCO-3400 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), reserve voltage protection, and wide range DC power input makes VCO-3400 series are safety system for all industrial applications.

VCO-3400 VCO-3411E(P) VCO-3422E(P) VCO-3433P VCO-3444P

1.1.1 Key Features

- Intel® 7th Gen (Kaby Lake-U) Processor Core™ i5-7300U, Core™ i3-7100U
- 1x DDR4 SODIMM. max up to 16GB
- Triple independent display supported by 1x VGA and 2x DisplayPort
- 2x Intel® GbE supporting Wake-on-LAN and PXE
- 2x Internal 2.5" SATA HDD Bay with RAID 0, 1, 5 support, 1x mSATA (shared by 1x Mini PCIe & 1x SATA), and 1x CFast (shared by 1x mSATA & 1x SATA)
- 2x full-size mini PCIe for communication or expansion modules
- 4x RS-232/422/485, 4x USB 3.0
- 1x PCIe x4 expansion (VCO-3411E only)
- 1x PCI expansion (VCO-3411P only)
- 2x PCIe x4 expansion (VCO-3422E only)
- 2x PCI expansion (VCO-3422P only)
- 3x PCI expansion (VCO-3422P only)
- 4x PCI expansion (VCO-3444P only)
- 8x DI + 8x DO with isolation
- 9 to 50VDC wide range power input supporting AT/ATX mode
- -40°C to 70°C extended operating temperature
- TPM 2.0 Supported

1.2 Hardware Specification

Processor System
- 7th Gen Intel® Core™ i5-7300U Processor, Dual Core, 3MB Cache, up to 3.5 GHz
- 7th Gen Intel® Core™ i3-7100U Processor, Dual Core, 3MB Cache, 2.4 GHz
- TPM 2.0 Supported

Chipset
- SoC integrated

Memory
- 1x 260-Pin DDR4 1866/2133MHz SODIMM. Max. up to 16GB

Display
Triple Display
- 1x VGA
- 2x DisplayPort

Expansion
- **VCO-3411E Series:** 1x PCIe x4 slot with 1-lane Gen2 PCIe Signal
- **VCO-3411P Series:** 1x PCI
- **VCO-3422E Series** : 2x PCIe x4 slot with 1-lane Gen2 PCIe Signal
- **VCO-3422P Series**: 2x PCI
- **VCO-3433P Series:** 3x PCI
- **VCO-3444P Series:** 4x PCI
- 2x Full-size Mini PCIe Socket for Wi-Fi / GSM / Expansion Module
- Card Dimension: 175 (L) x 112 (H) mm

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

Audio
- Codec: Realtek ALC888S
- 1x Mic-in and 1x Line-out

Watchdog Timer
- Software Programmable Supports 1~255 sec. System Reset

Storage
- 2x internal 2.5" SATA HDD with RAID 0, 1, 5 support
- 1x mSATA (shared by 1x Mini PCIe & 1x SATA)
- 1x CFast (shared by 1x mSATA & 1x SATA)

I/O Ports
- 4x USB 3.0 Port
- 8 Isolated DI and 8 Isolated DO Port
- 4x DB9 Flow Control for COM1~4, Support RS232/422/485 with Auto Flow Control
- 3x 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 12V/5A, 60W Power Adapter

Environment
- Operating Temperature: Ambient with Air Flow: -40°C to 70°C (with Industrial Grade Peripherals)
- Storage Temperature: -40°C to 85°C
- Relative humidity: 10%~95% (non-condensing)
- Vibration:
  - ✓ With SSD: 1 Grms, 5 - 500 Hz, 0.5 hr/axis
  - ✓ With HDD: 1 Grms, 5 - 500 Hz, 0.5 hr/axis
- Shock: With SSD: 50G, half sine, 11ms

Physical
- **VCO-3400 Series**
  - ✓ Dimension (WxDxH, mm): 59 x 197 x 185 mm
  - ✓ Weight: 3.28 kg
- **VCO-3411E(P)**
  - ✓ Dimension (WxDxH, mm): 99 x 197 x 185 mm
  - ✓ Weight: 3.31 ~ 3.37 kg
- **VCO-3422E(P)**
  - ✓ Dimension (WxDxH, mm): 119 x 197 x 185 mm
  - ✓ Weight: 3.42 ~ 3.45 kg
- **VCO-3433P**
  - ✓ Dimension (WxDxH, mm): 139 x 197 x 185 mm
  - ✓ Weight: 4.22 kg
- **VCO-3444P**
  - ✓ Dimension (WxDxH, mm): 159 x 197 x 185 mm
  - ✓ Weight: 4.45 kg
- Construction: Extruded Aluminum with Heavy Duty Metal
- Mounting: Wall/ DIN-Rail Mounting

Operating System
- Windows® 10
- Linux kernel 4.X

Certifications
- CE
- FCC Class A

1.3 System I/O

1.3.1 VCO-3400

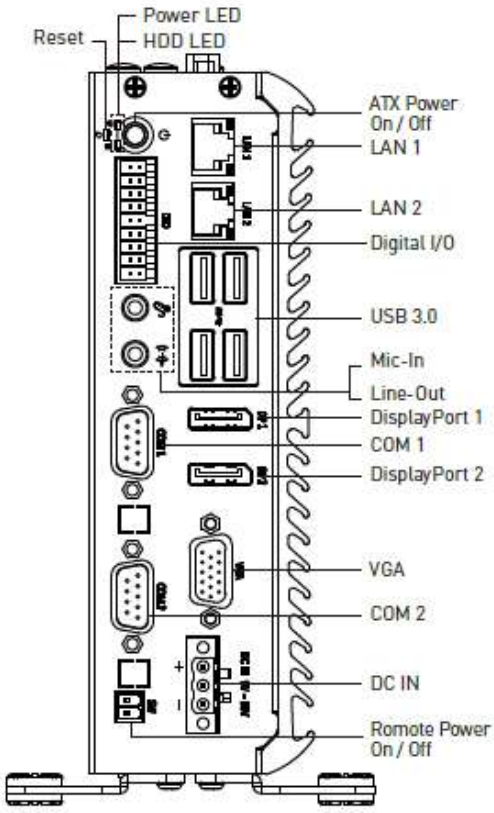
Front Panel

ATX 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
COM port
COM1 ~ COM2 support RS232/422/485 serial device
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
DC IN
Used to plug a DC power input with terminal block
VGA
Used to connect a VGA monitor
DisplayPort
Used to connect a DisplayPort monitor
LAN port
Used to connect the system to a local area network
Mic-in
Used to connect a microphone
Line-out
Used to connect a speaker
Digital I/O Terminal Block
The Digital I/O terminal block supports 8 digital input and 8 digital output
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block

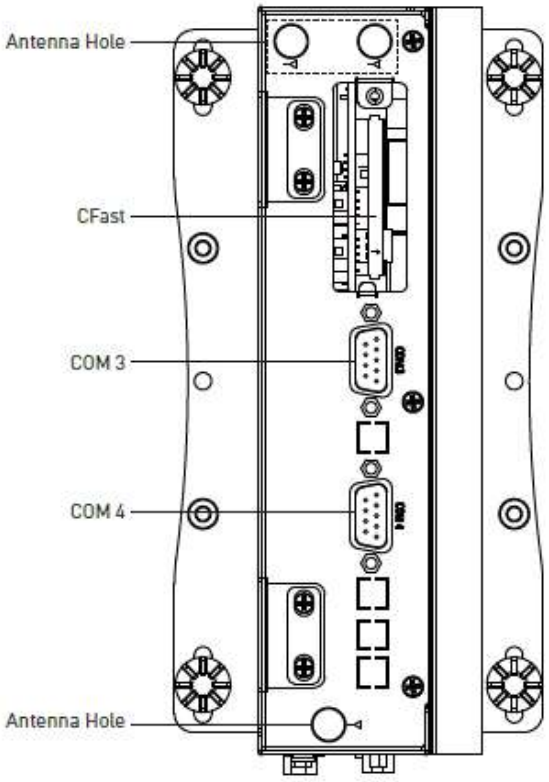
Top View

CFast Socket
Used to insert CFast card
Antenna hole
Used to connect an antenna for optional Mini-PCIe WiFi module

Front View



Top View



1.3.2 VCO-3411E(P)

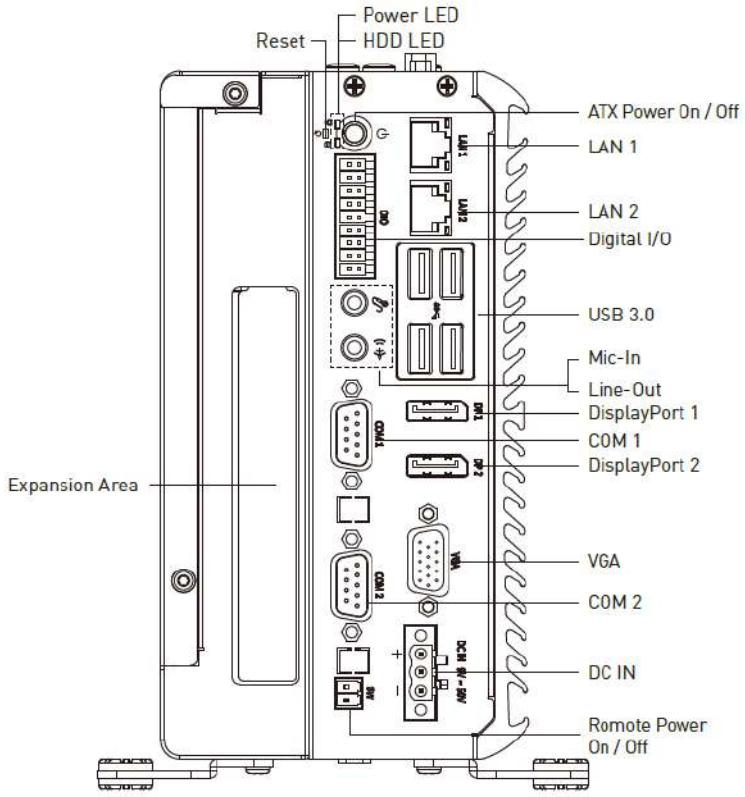
Front Panel

ATX 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
COM port
COM1 ~ COM2 support RS232/422/485 serial device
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
DC IN
Used to plug a DC power input with terminal block
VGA
Used to connect a VGA monitor
DisplayPort
Used to connect a DisplayPort monitor
LAN port
Used to connect the system to a local area network
Mic-in
Used to connect a microphone
Line-out
Used to connect a speaker
Digital I/O Terminal Block
The Digital I/O terminal block supports 8 digital input and 8 digital output
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block
Expansion Area
Used to plug PCIe Card (VCO-3411E only)
Used to plug PCI Card (VCO-3411P only)

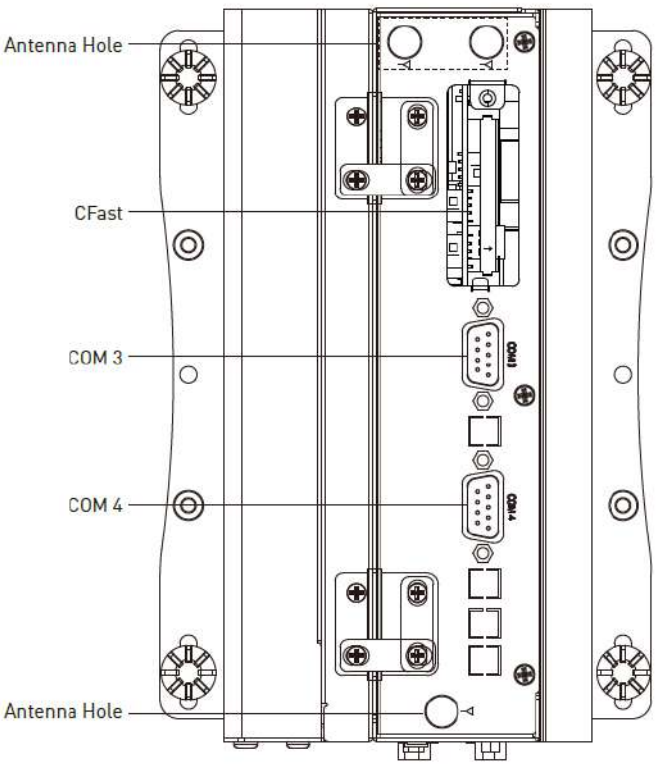
Top View

CFast Socket
Used to insert CFast card
Antenna hole
Used to connect an antenna for optional Mini-PCIe WiFi module

Front View



Top View



1.3.3 VCO-3422E(P)

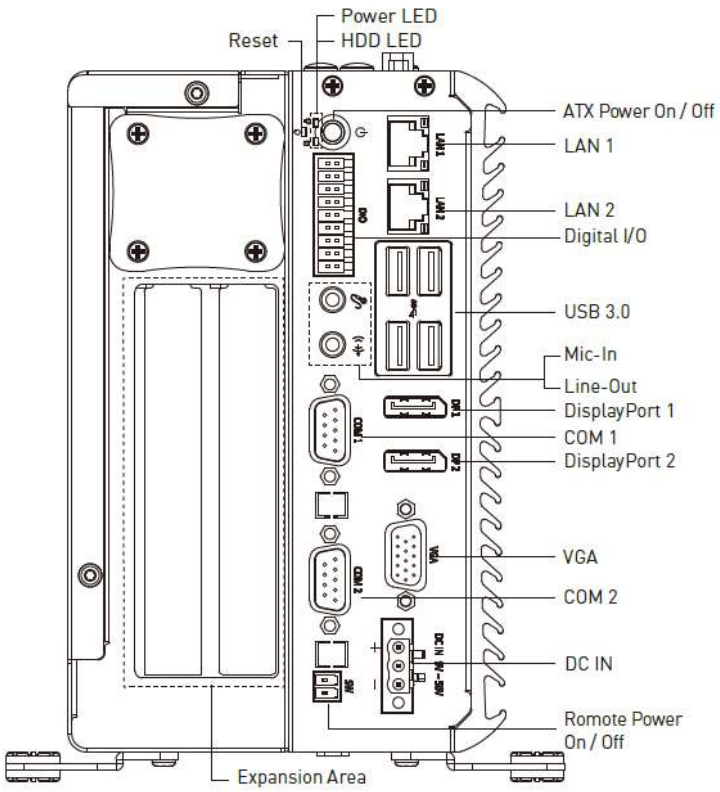
Front Panel

ATX 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
COM port
COM1 ~ COM2 support RS232/422/485 serial device
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
DC IN
Used to plug a DC power input with terminal block
VGA
Used to connect a VGA monitor
DisplayPort
Used to connect a DisplayPort monitor
LAN port
Used to connect the system to a local area network
Mic-in
Used to connect a microphone
Line-out
Used to connect a speaker
Digital I/O Terminal Block
The Digital I/O terminal block supports 8 digital input and 8 digital output
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block
Expansion Area
Used to plug PCIe Card (VCO-3422E only)
Used to plug PCI Card (VCO-3422P only)

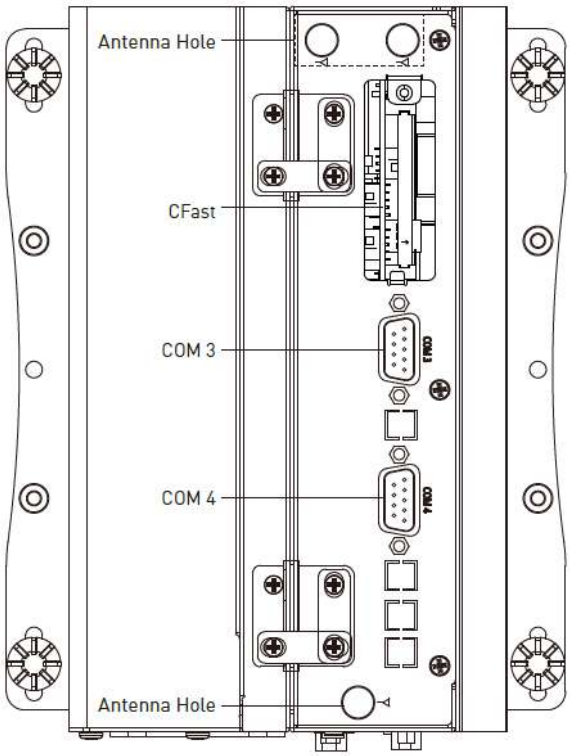
Top View

CFast Socket
Used to insert CFast card
Antenna hole
Used to connect an antenna for optional Mini-PCIe WiFi module

Front View



Top View



1.3.4 VCO-3433P

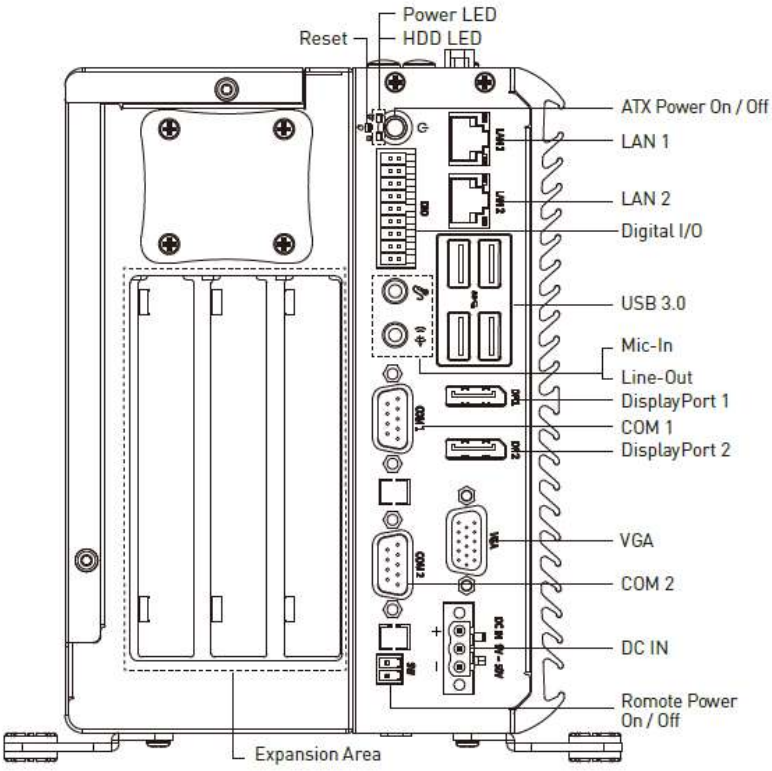
Front Panel

ATX 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
COM port
COM1 ~ COM2 support RS232/422/485 serial device
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
DC IN
Used to plug a DC power input with terminal block
VGA
Used to connect a VGA monitor
DisplayPort
Used to connect a DisplayPort monitor
LAN port
Used to connect the system to a local area network
Mic-in
Used to connect a microphone
Line-out
Used to connect a speaker
Digital I/O Terminal Block
The Digital I/O terminal block supports 8 digital input and 8 digital output
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block
Expansion Area
Used to plug PCI Card

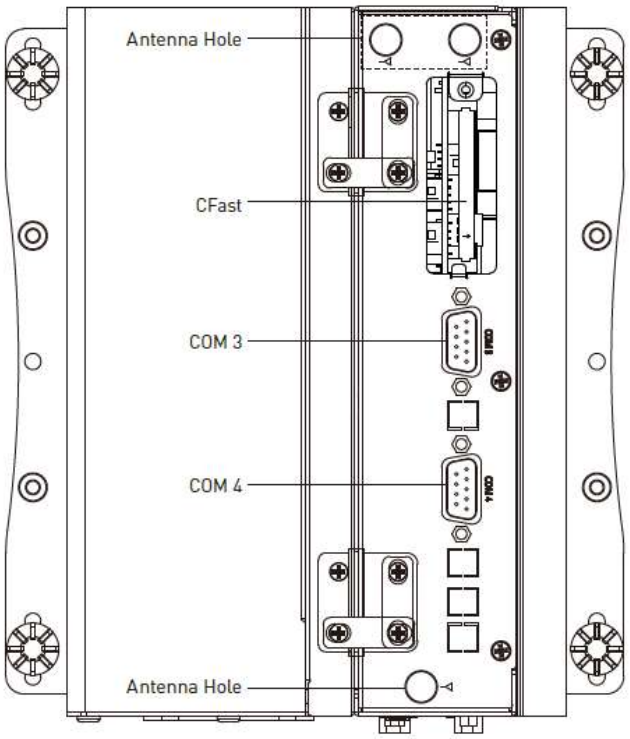
Top View

CFast Socket
Used to insert CFast card
Antenna hole
Used to connect an antenna for optional Mini-PCIe WiFi module

Front View



Top View



1.3.5 VCO-3444P

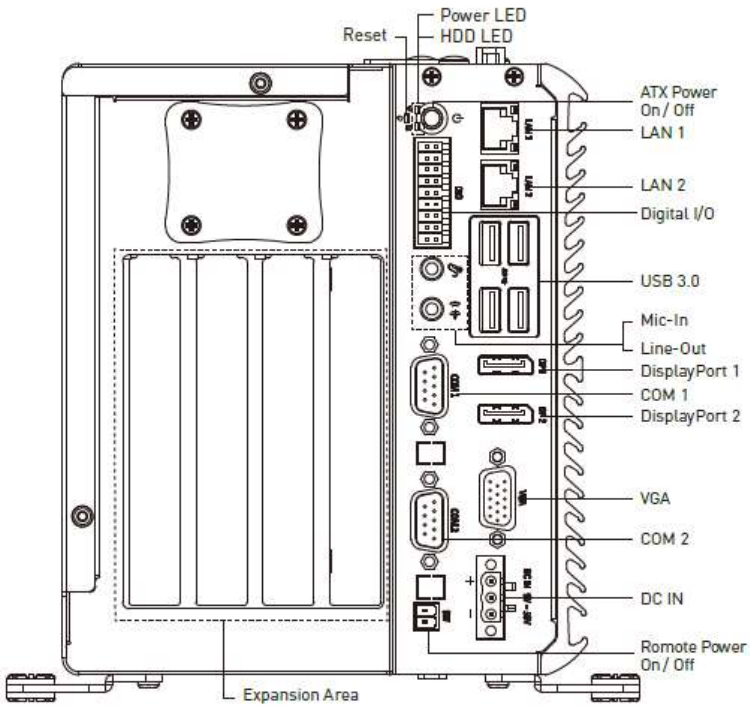
Front Panel

ATX 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
COM port
COM1 ~ COM2 support RS232/422/485 serial device
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
DC IN
Used to plug a DC power input with terminal block
VGA
Used to connect a VGA monitor
DisplayPort
Used to connect a DisplayPort monitor
LAN port
Used to connect the system to a local area network
Mic-in
Used to connect a microphone
Line-out
Used to connect a speaker
Digital I/O Terminal Block
The Digital I/O terminal block supports 8 digital input and 8 digital output
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block
Expansion Area
Used to plug PCI Card

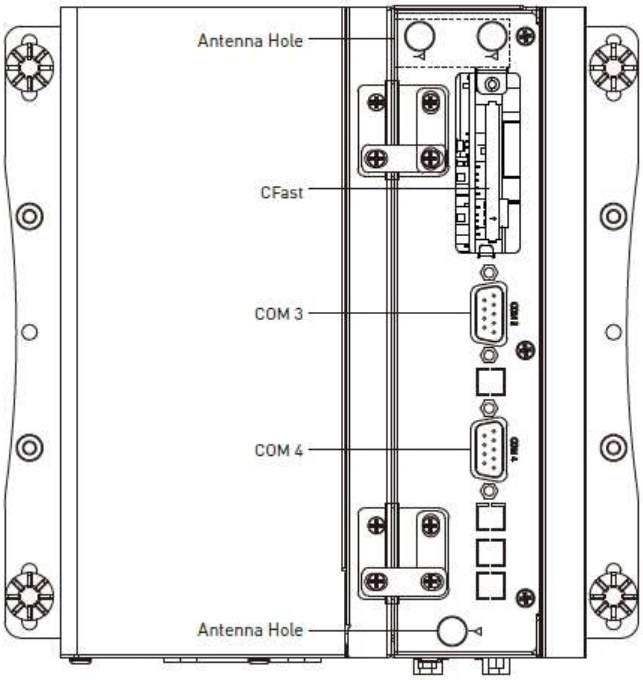
Top View

CFast Socket
Used to insert CFast card
Antenna hole
Used to connect an antenna for optional Mini-PCIe WiFi module

Front View



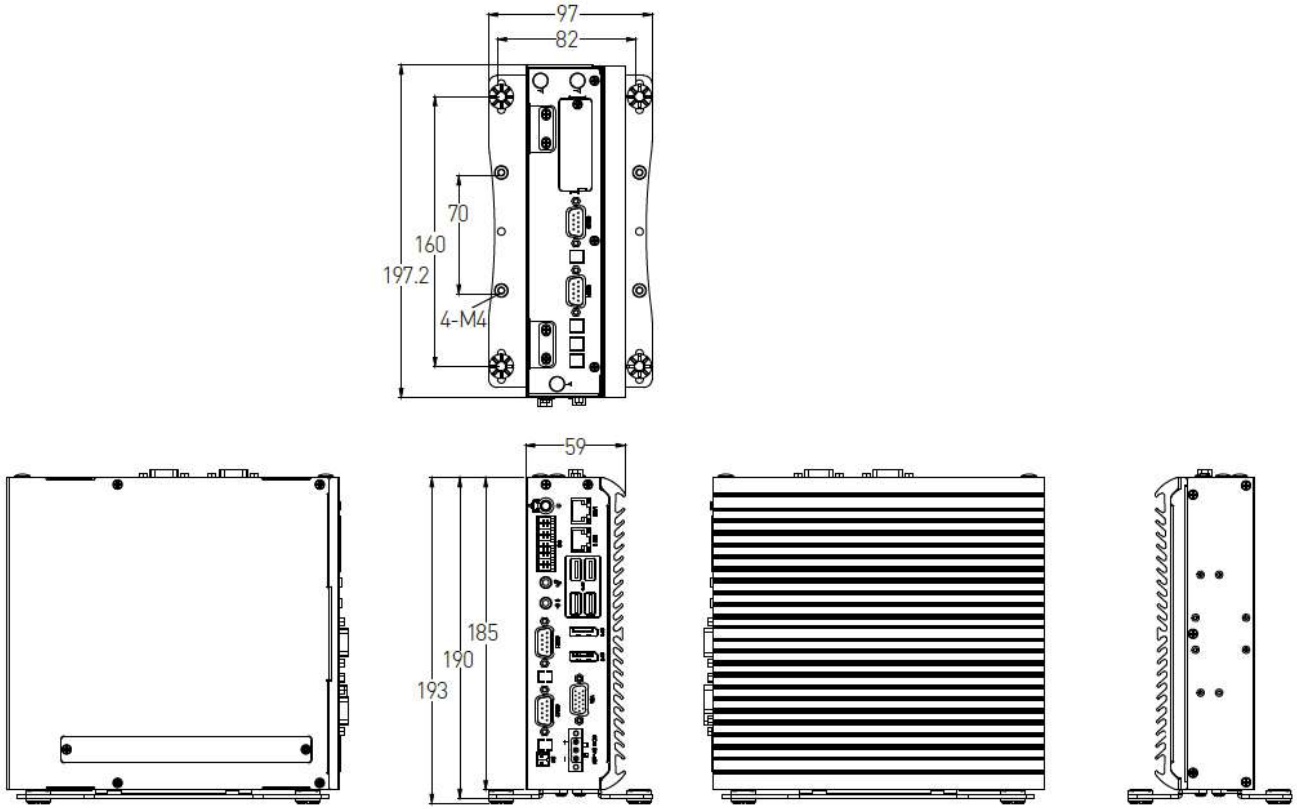
Top View



1.4 Mechanical Dimensions

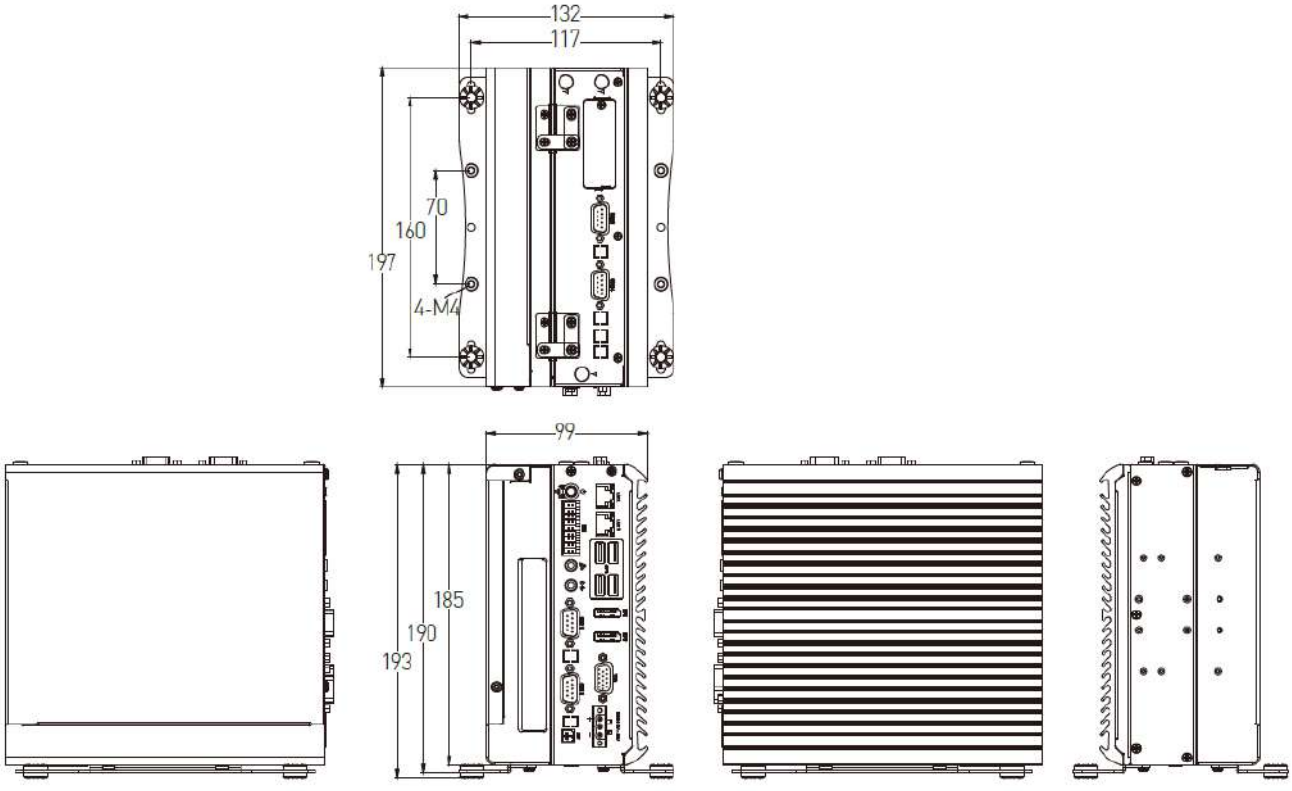
1.4.1 VCO-3400

Unit: mm



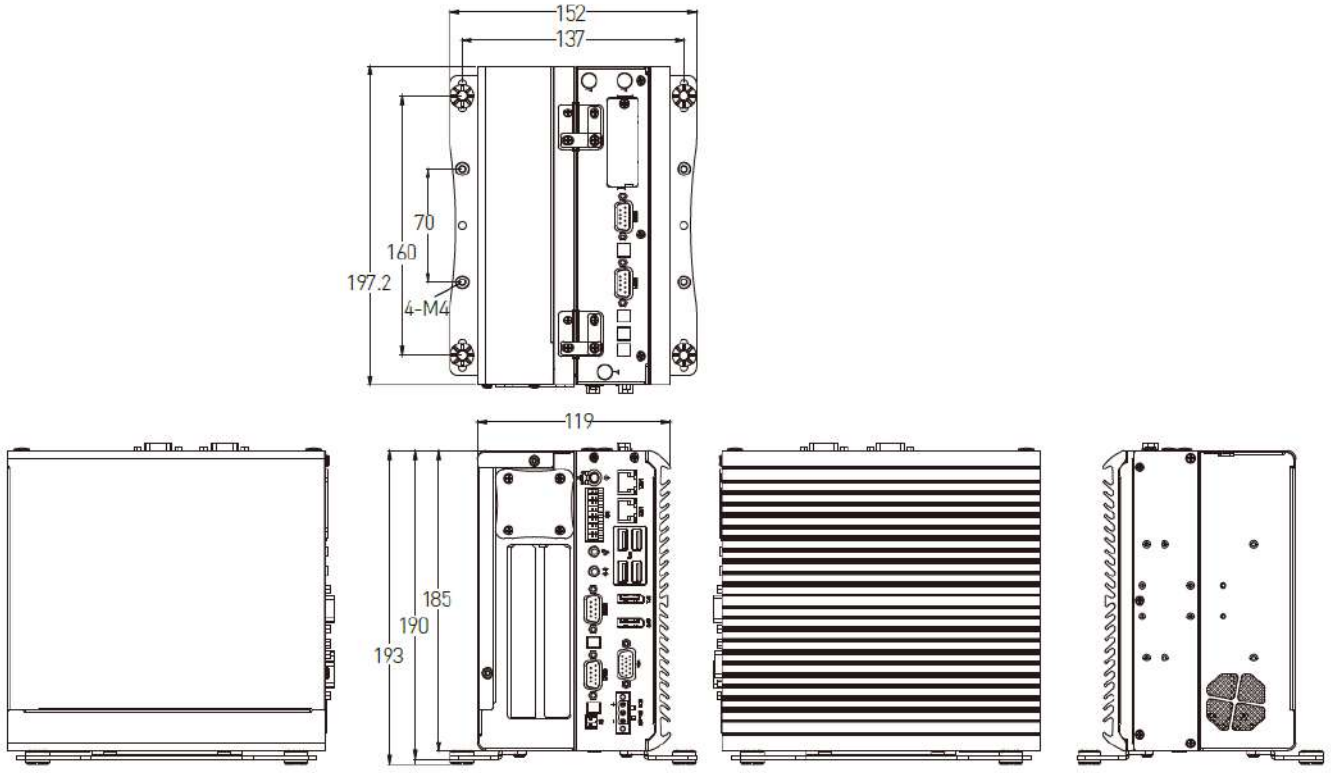
1.4.2 VCO-3411E(P)

Unit: mm



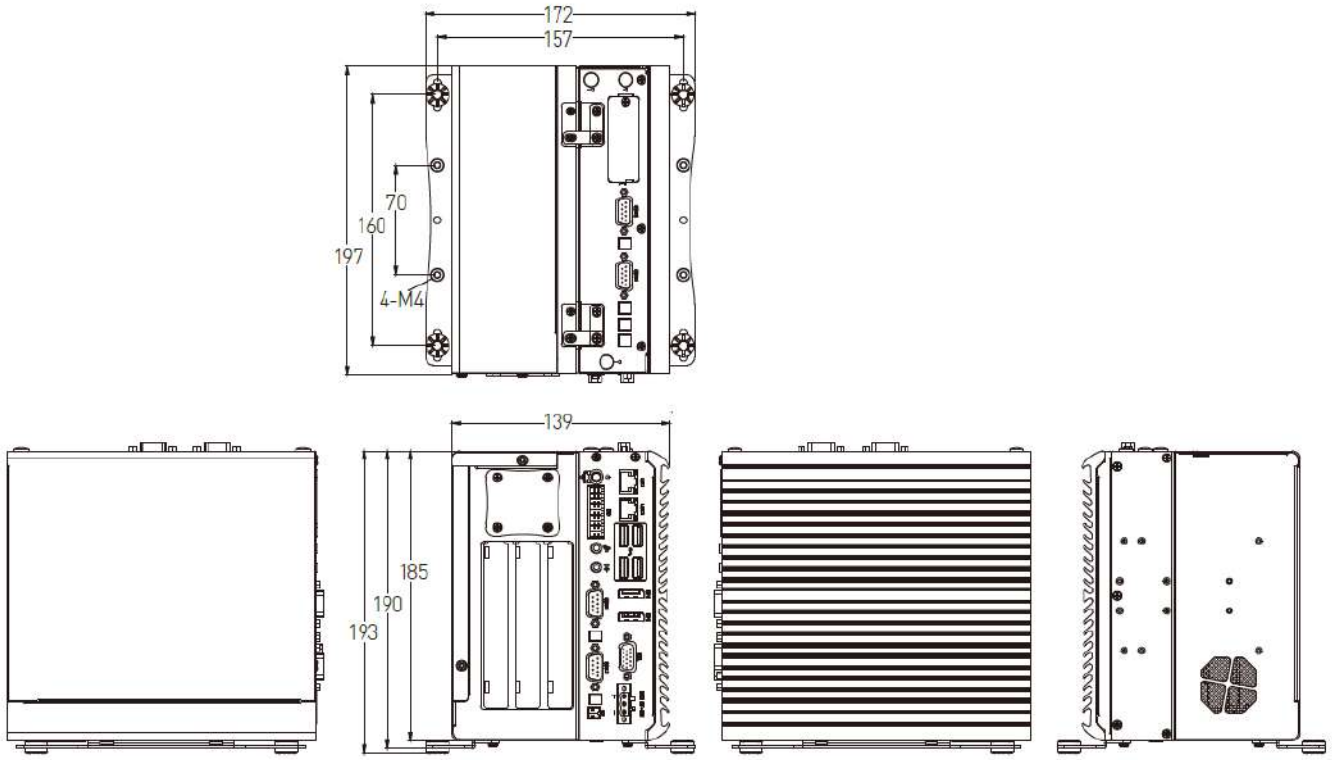
1.4.3 VCO-3422E(P)

Unit: mm



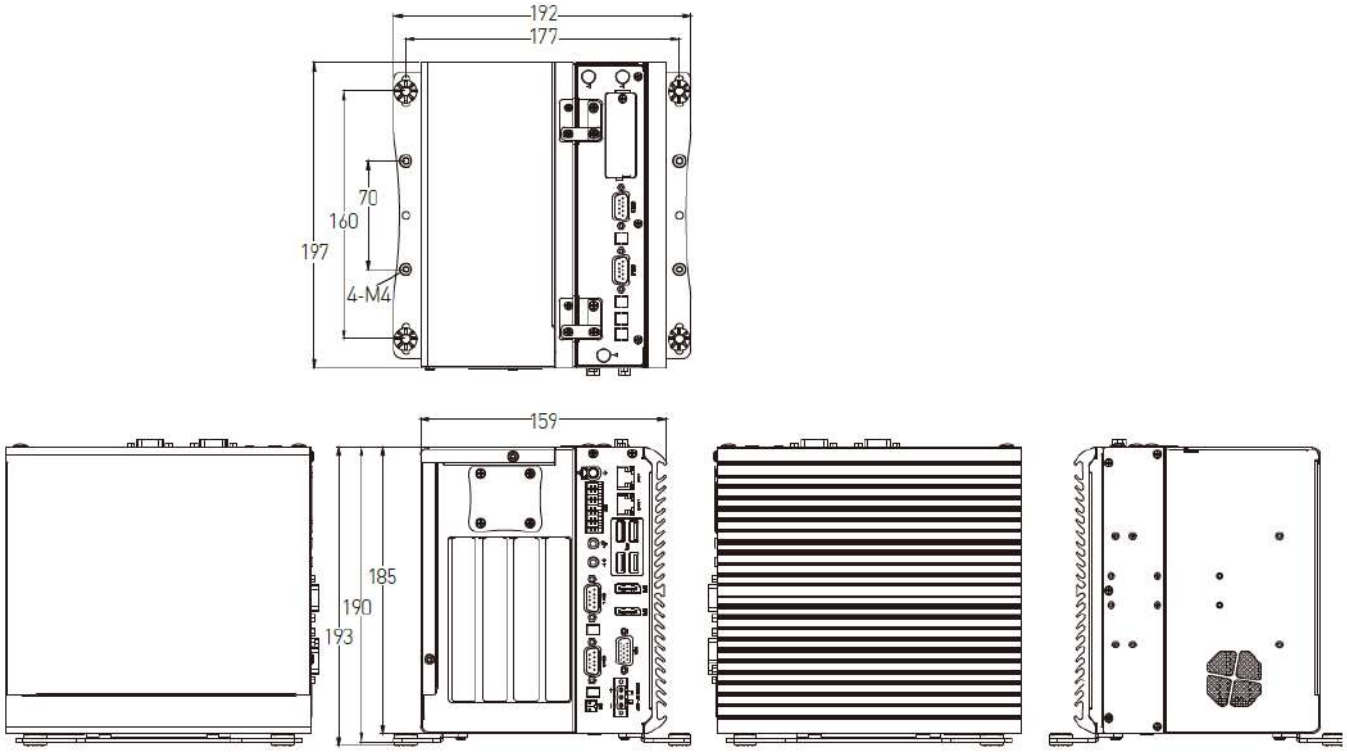
1.4.4 VCO-3433P

Unit: mm



1.4.5 VCO-3444P

Unit: mm

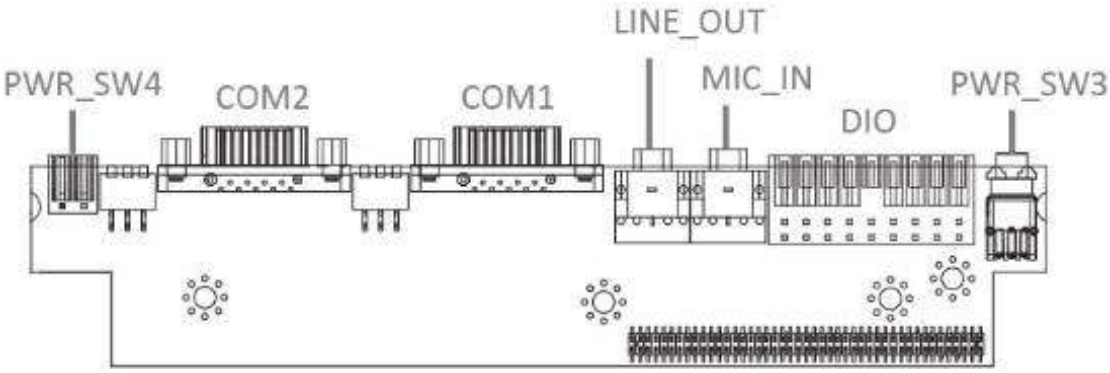


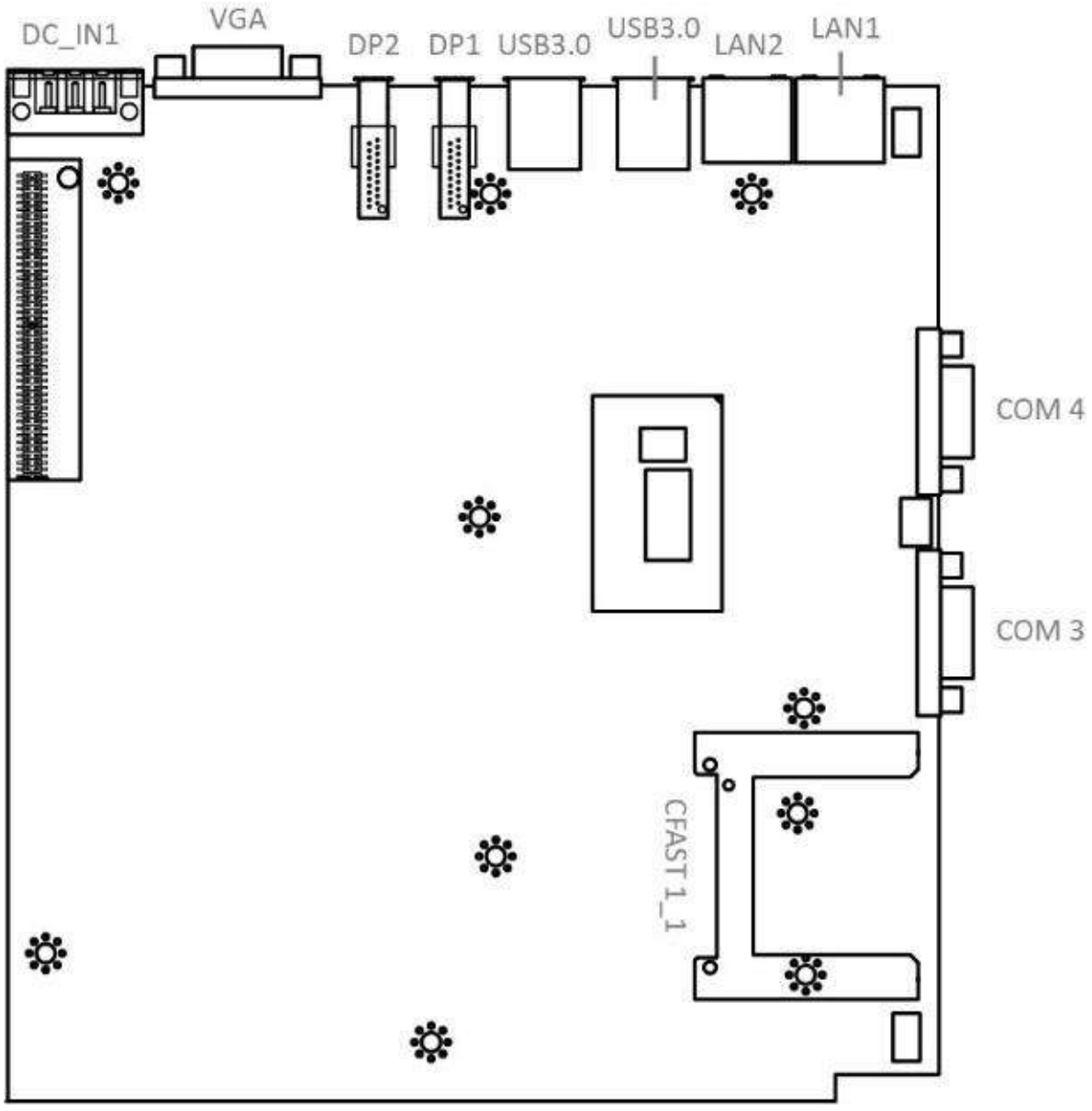
Chapter 2

Switches and Connectors

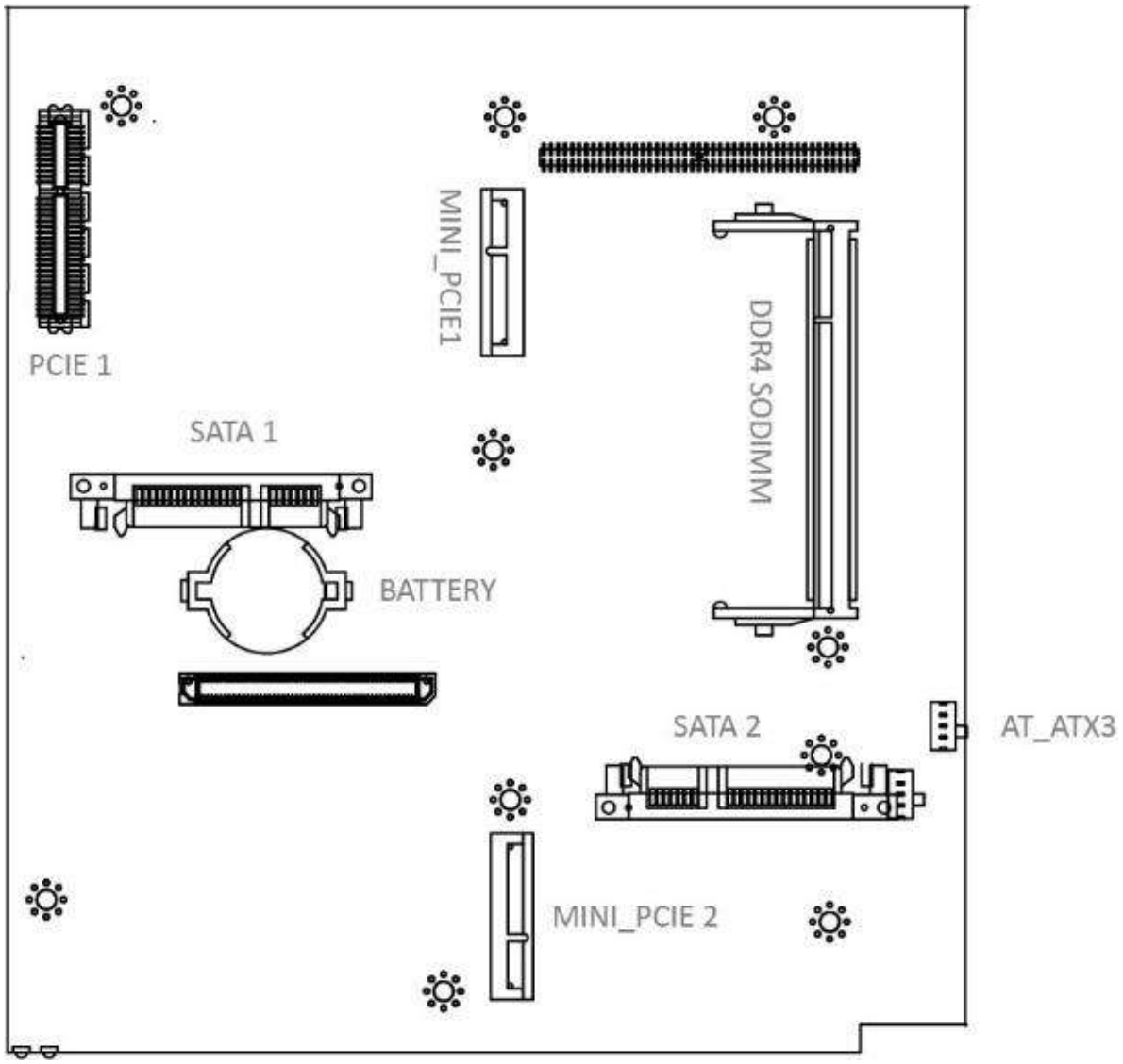
2.1 Switch and Connector Locations

2.1.1 Top View





2.1.2 Bottom View



2.2 Connector / Switch Definition

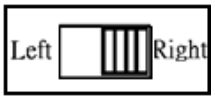
List of Connector / Switch

Connector Location	Definition
AT_ATX3	AT / ATX Power Mode Switch
CLR_CMOS1	Clear BIOS Switch
CFAST1_1	CFast Socket
PWR_SW3	Power Switch
RESET2	Reset Switch
USB1_2_1, USB1_2_2	USB 3.0 Port
COM1_1, COM2_1	RS232 / RS422 / RS485 Connector
COM3_2, COM4_2	RS232 / RS422 / RS485 Connector
LAN1, LAN2	LAN Port
DC_IN1	3-pin DC 9~50V Power Input Connector
DP1, DP2	DisplayPort Connector
LINE_OUT1	Line-out Jack
MIC_IN1	Mic-in Jack
DIO1	8DI / 8DO Connector
PWR_SW4	Remote Power Switch
MINI-PCIE1	Mini PCI-Express / mSATA Socket
MINI-PCIE2	Mini PCI-Express Socket
SATA1, SATA2	SATA with Power Connector
PCIE1	PCI-Express x4 Slot
PWR_LED1	Power LED Status
HDD_LED1	HDD Access LED Status

2.3 Switches Definitions

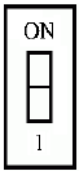
AT_ATX3: AT / ATX Power Mode Switch

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



CLR_CMOS1: Clear BIOS Switch

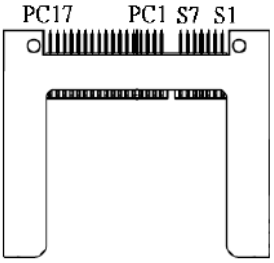
Switch	Definition
Off	Normal Status (Default)
ON	Clear BIOS



2.4 Connectors Definitions

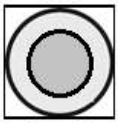
CFAST1_1: CFast Socket

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_SW3: Power Button

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

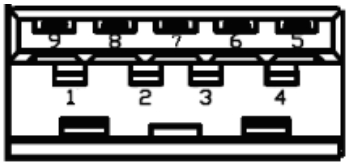


RESET2 : Reset Button

Pin	Definition
1	RESET
2	GND

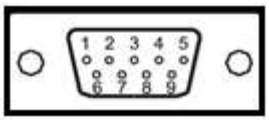
USB3.0 Connector, Type A

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-		



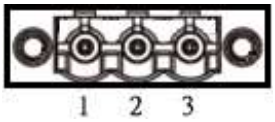
COM: RS232 / RS422 / RS485 Connector
Connector Type: 9-pin D-Sub

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		



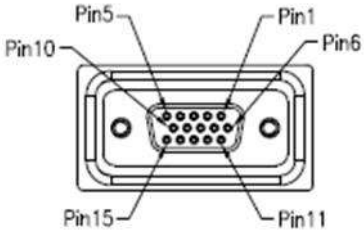
DC_IN1: DC Power Input Connector (+9~50V)
Connector Type: Terminal Block 1X3 3-pin, 5.0mm pitch

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



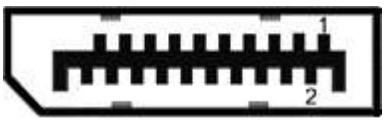
VGA: Standard VGA Connector
Connector Type: 15-pin D-Sub

Pin	Definition	Pin	Definition
1	RED	9	+5V
2	GREEN	10	S_GND
3	BLUE	11	NC
4	NC	12	SDA
5	GND	13	HSYNC
6	R_GND	14	VSYNC
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

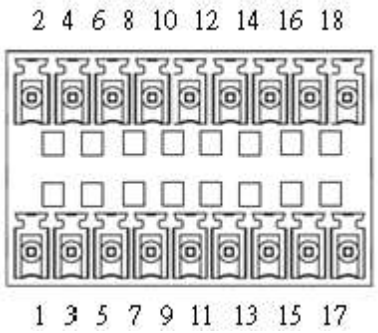
Pin	Definition
1	GND
2	OUT_R
3	NC
4	GND
5	OUT_L

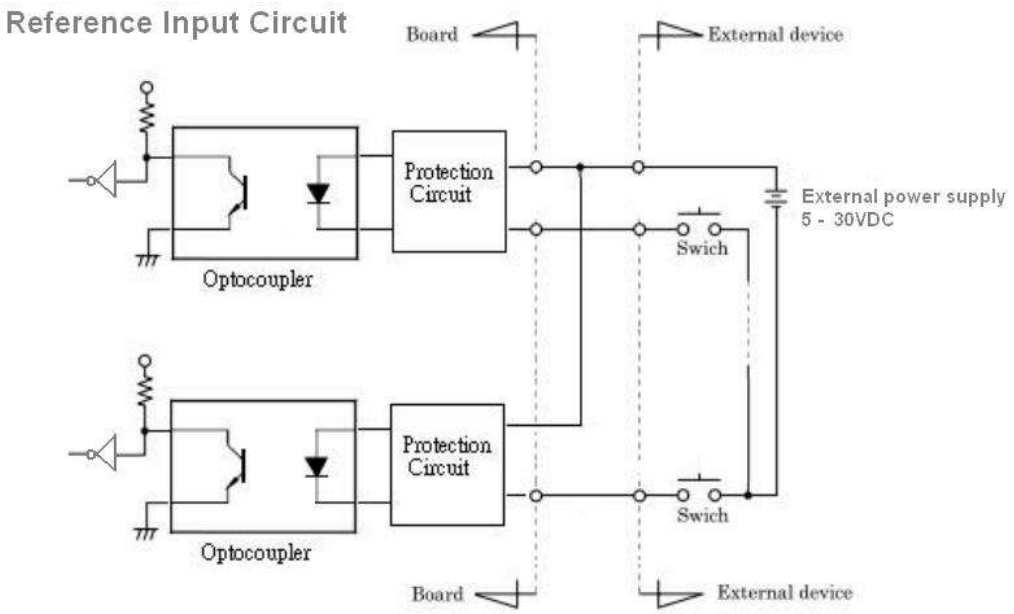
MIC_IN1: Microphone Jack (Pink)
Connector Type: 5-pin Phone Jack

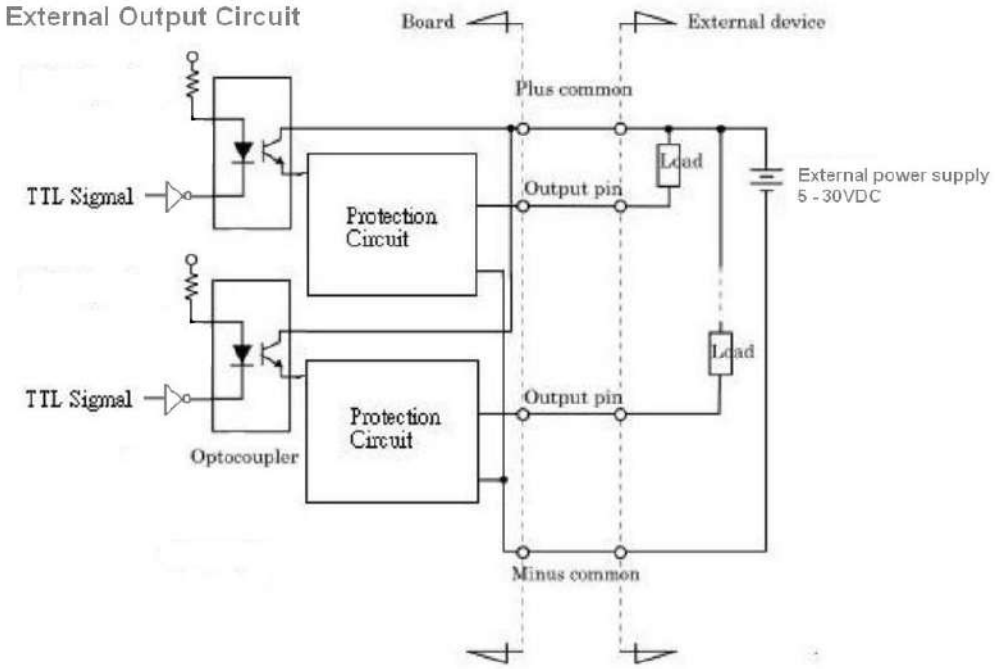
Pin	Definition
1	GND
2	MIC_R
3	NC
4	GND
5	MIC_L

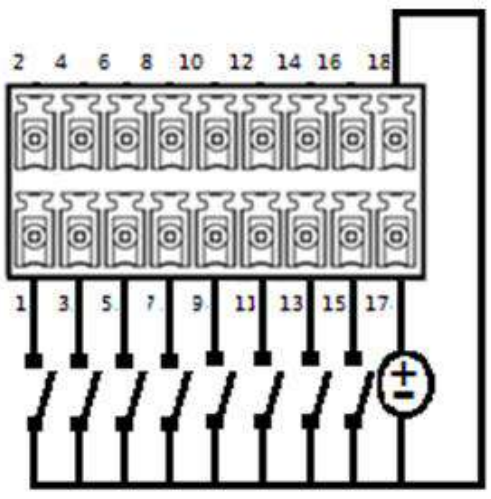
DIO1: Digital Input / Output Connector
Connector Type: Terminal Block 2X9 18-pin, 3.5mm pitch

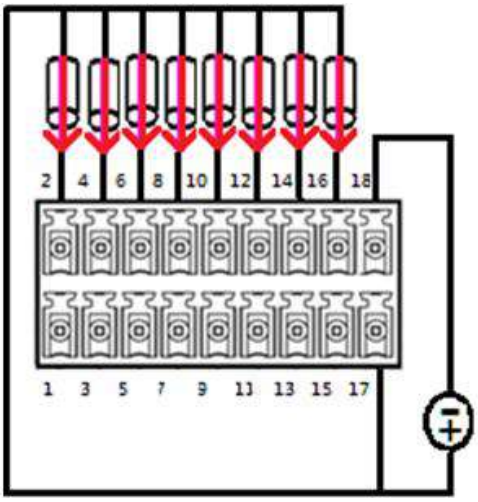
Pin	Definition	Pin	Definition
1	DIN1	2	DOUT1
3	DIN2	4	DOUT2
5	DIN3	6	DOUT3
7	DIN4	8	DOUT4
9	DIN5	10	DOUT5
11	DIN6	12	DOUT6
13	DIN7	14	DOUT7
15	DIN8	16	DOUT8
17	DC power input (+5V~+30V)	18	GND




Reference Input Circuit
Board
External device
Protection Circuit
Optocoupler
Swich
External power supply
5 - 30VDC
Protection Circuit
Optocoupler
Swich
Board
External device

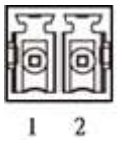

External Output Circuit
Board
External device
Plus common
TTL Signal
Protection Circuit
Output pin
Load
External power supply
5 - 30VDC
TTL Signal
Protection Circuit
Output pin
Load
Optocoupler
Minus common


2 4 6 8 10 12 14 16 18
1 3 5 7 9 11 13 15 17


2 4 6 8 10 12 14 16 18
1 3 5 7 9 11 13 15 17

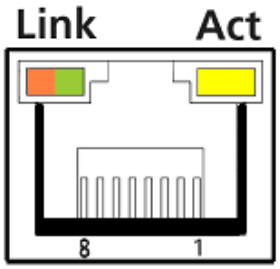
PWR_SW4 : Remote Power Switch
Connector Type: Terminal Block 1X2 2-pin, 3.5mm pitch

Pin	Definition
1	Power Button
2	GND



LAN1, LAN2: RJ45 with LEDs Port
Connector Type: RJ45 Connector

Pin	Definition	Pin	Definition
1	LAN_MDI0P	5	LAN_MDI2N
2	LAN_MDI0N	6	LAN_MDI1N
3	LAN_MDI1P	7	LAN_MDI3P
4	LAN_MDI2P	8	LAN_MDI3N

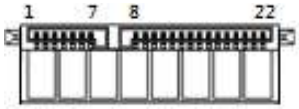


Act LED Status	Definition
Blinking Yellow	Data Activity
Off	No Activity

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

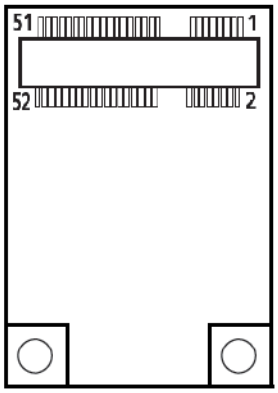
SATA with Power Connector

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



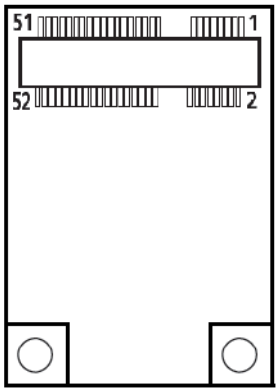
MINIPCIE1: Mini PCI-Express / mSATA Socket

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

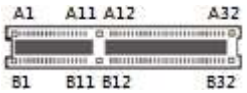
Pin	Definition	Pin	Definition	Pin	Definition
1	WAKE#	19	NC	37	GND
2	+3.3V	20	NC	38	USB2_D+
3	NC	21	GND	39	+3.3V
4	GND	22	RESET#	40	GND
5	NC	23	RxN	41	+3.3V
6	+1.5V	24	+3.3VAUX	42	NC
7	CLKREQ#	25	RxP	43	GND
8	UIM_PWR	26	GND	44	NC
9	GND	27	GND	45	NC
10	UIM_DATA	28	+1.5V	46	NC
11	REFCLK-	29	GND	47	NC
12	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	UIM_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_LED2: Power LED Status

Pin	Definition
1	POWER LED+
2	POWER LED-

HDD_LED2: HDD Access LED Status

Pin	Definition
1	HDD LED+
2	HDD LED-

Chapter 3

System Setup

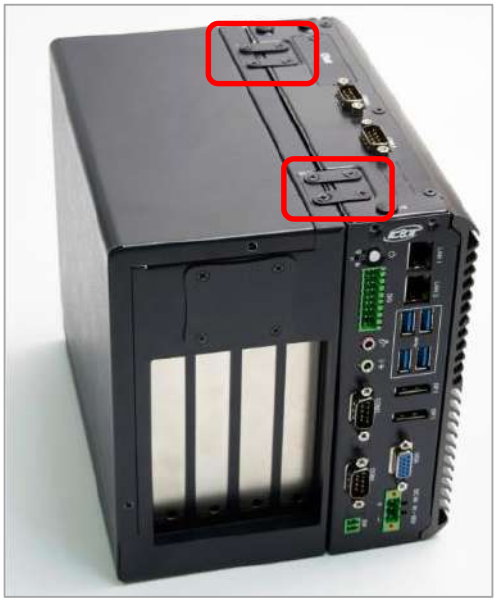
3.1 Set torque force to 3.5 kgf-cm to execute all the screwing and unscrewing

WARNING

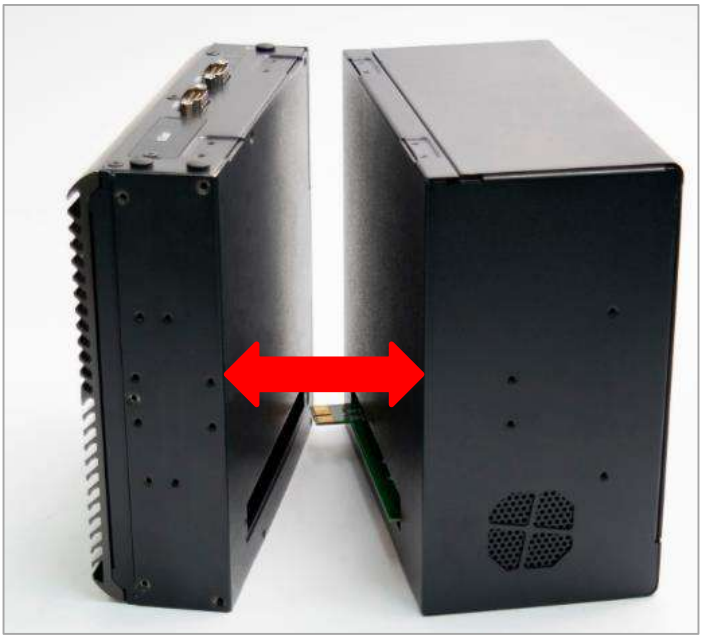
In order to prevent electric shock or system damage, before removing the chassis cover, must turn off power and disconnect the unit from power source.

3.2 Disconnecting expansion module from computing module

1. Remove the 4 connecting brackets on the top side of the system and the 4 brackets on the bottom side.



2. Now you can separate the expansion module from the computing module.



3.3 Removing bottom cover

1. Unscrew the 4 screws on the connecting side of computing module.

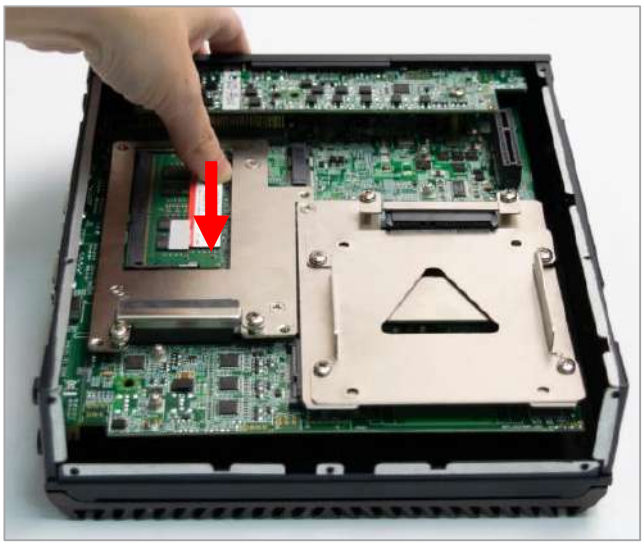
2. Now you can remove the bottom cover following the below direction.

3.4 Installing SODIMM

1. Place the system body with SODIMM socket facing upward.

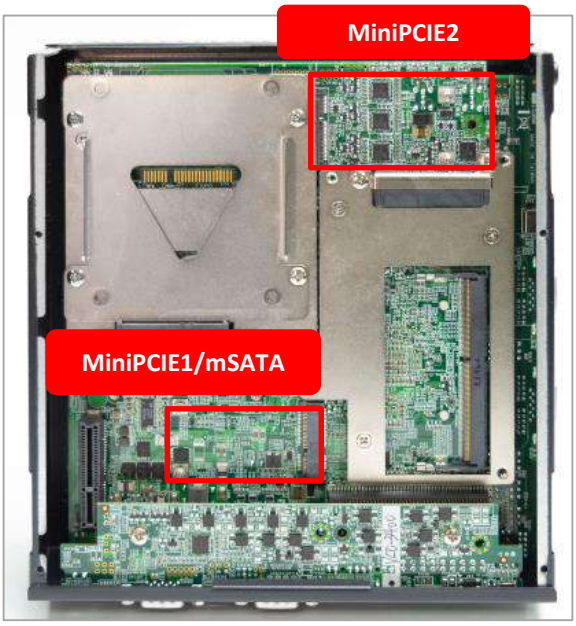
2. Insert memory module from 45 degree direction.

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

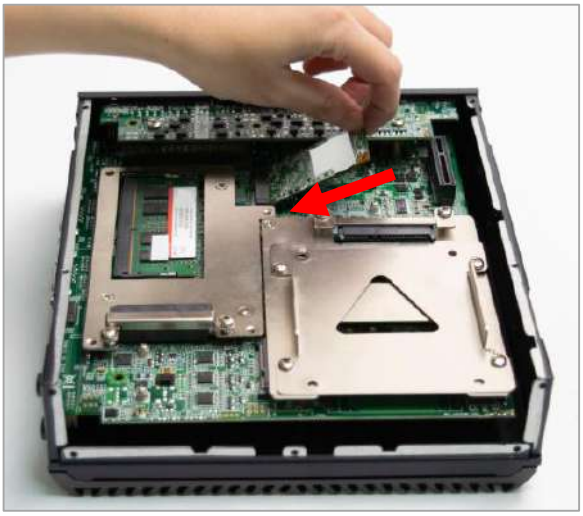


3.5 Installing mini PCIe card / mSATA

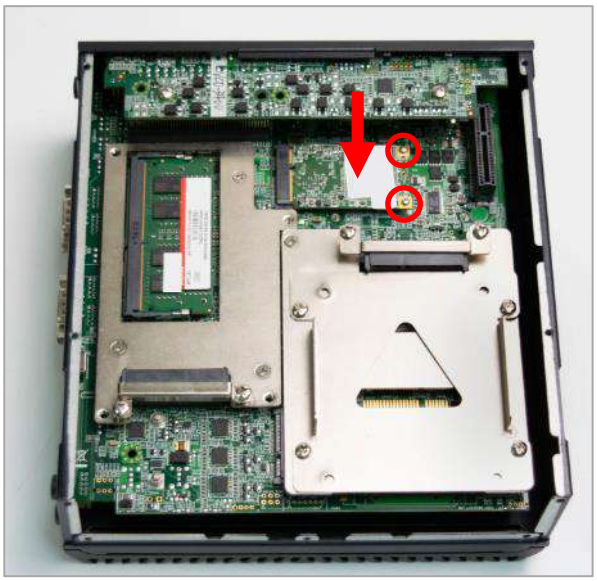
1. Two mini PCIe slots are available for VCO-3400 series. MiniPCIE1 supports mSATA.



2. Insert mini PCIe card or mSATA module from 45 degree direction.

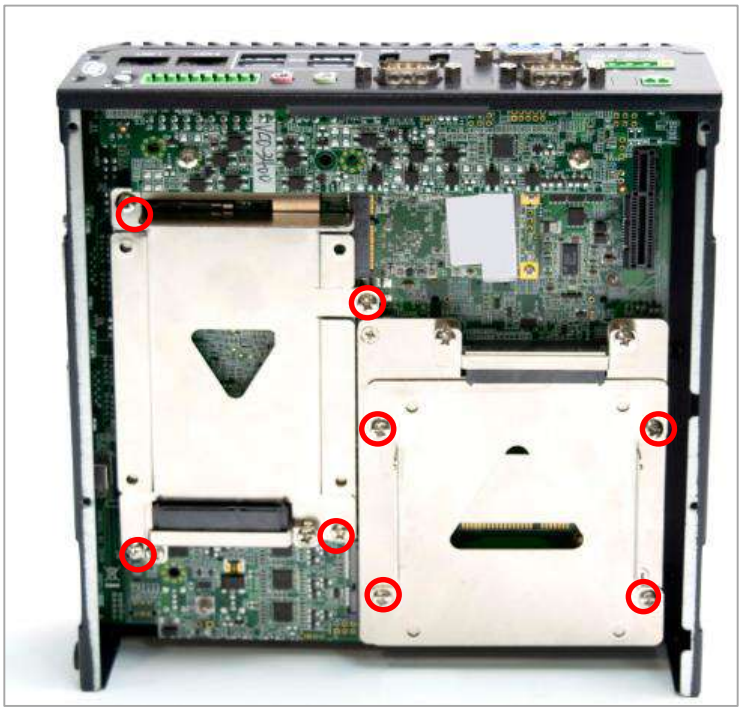


3. Press the mini PCIe card or mSATA module down and lock it with two screws (M2x3.7L).

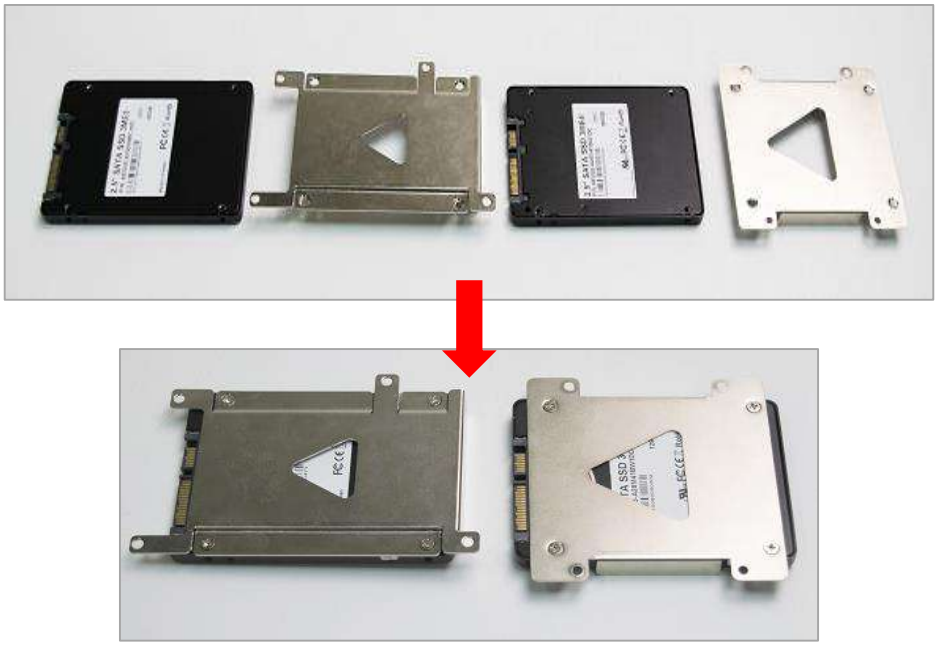


3.6 Installing HDD on internal SATA HDD bay

1. Two internal SATA HDD bays are available for VCO-3400 Series.
2. The screws circled below (M3x5L) need to be removed in order to take out the internal SATA HDD bay.



3. Lock the 2.5" HDD with HDD bracket using four screws.



4. Install the HDD bracket following the direction below.

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

3.7 Installing antenna

1. Three antenna holes are available for VCO-3400 series on the front panel.

2. Remove antenna hole cover on the front panel.

3. Have antenna jack penetrate through the hole.

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

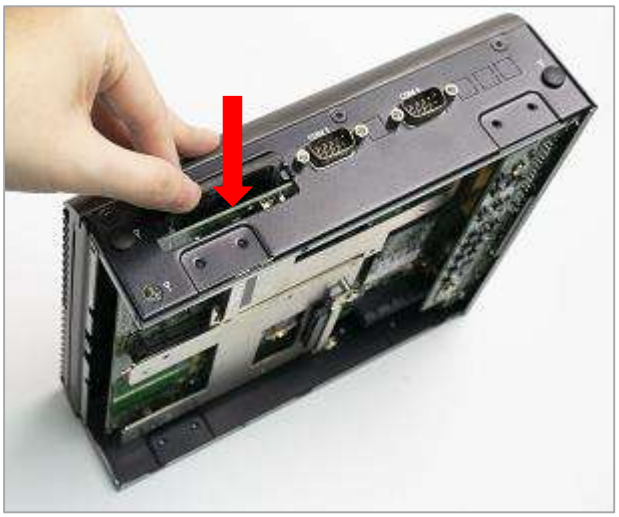
5. Assemble the antenna and antenna jack together.

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

3.8 Installing CFast card

1. CFast socket is located on the system top side. Unscrew one screw to remove the bracket.


2. Insert CFast card into the socket until you hear the "click" sound.

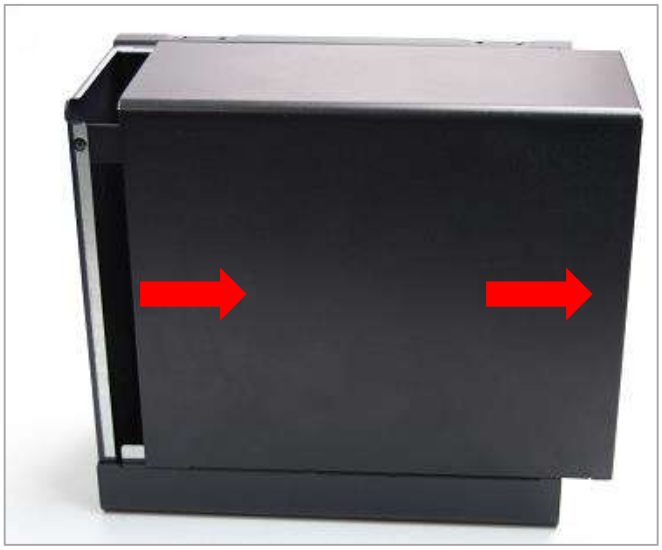


3. The socket is push-push type. Push the installed CFast card again to remove it.

3.9 Installing PCIe/PCI expansion card

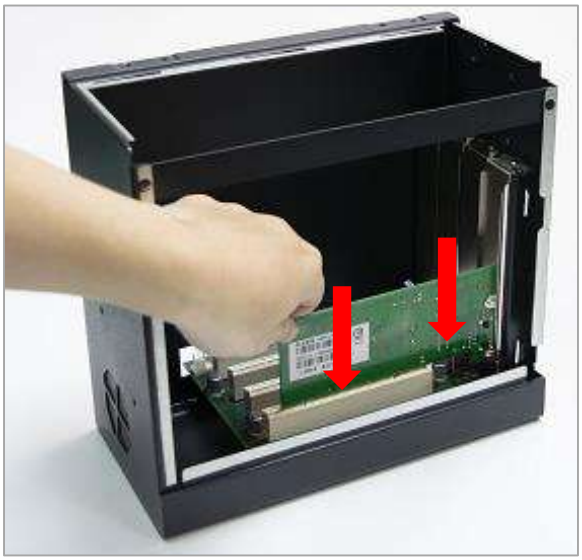
1. Unscrew two screws on the front side of expansion module.

2. Push the chassis cover following the below direction to open the expansion module.



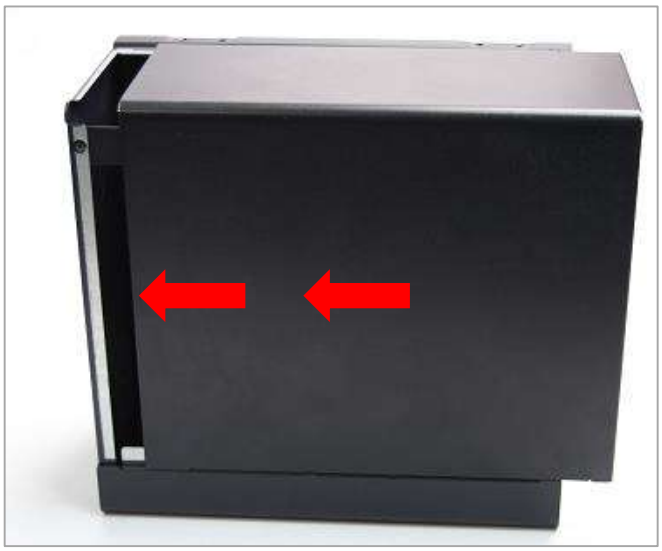
3. Now you will be able see the expansion slots. Unscrew the screw securing the card bracket to remove the bracket.

4. Insert your PCIe/PCI card into the expansion slot.



5. Install the screw back to secure the PCIe/PCI card.

6. Close the chassis cover.



3.10 Assemble chassis bottom cover

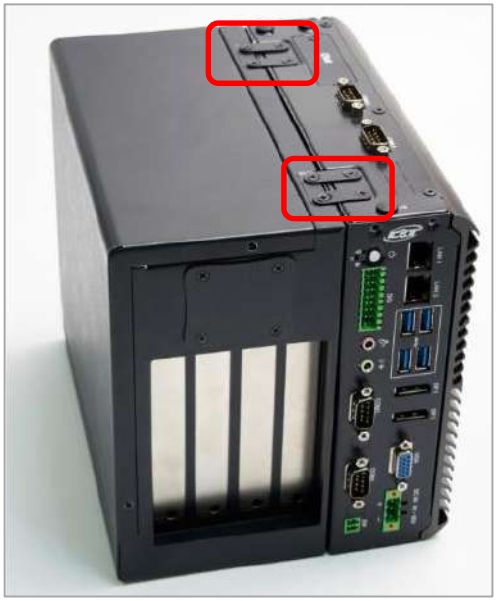
1. Place the bottom cover according to the below direction and make sure the rail is facing inside the System.

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

3.11 Connecting expansion module with computing module

1. Connect expansion module with computing module by inserting the gold fingers on the expansion module into the slot on the computing module.

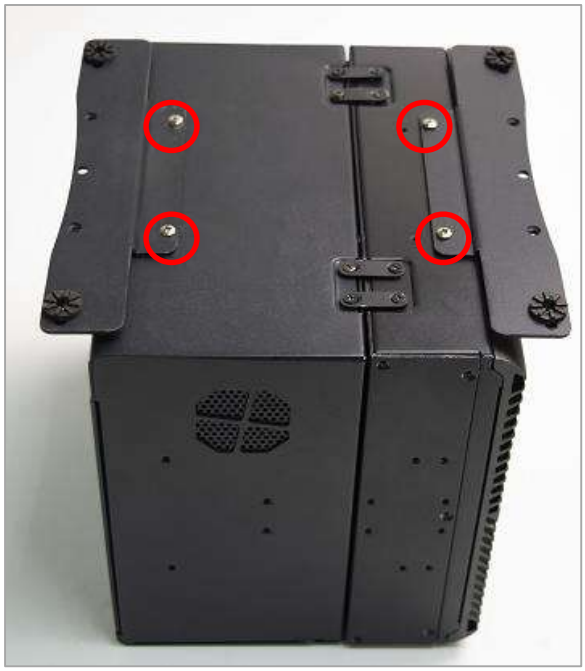
2. Fasten all the screws with the connecting brackets on the top side and bottom of the system.



3.12 Installing wall mount kit

1. Wall mount kit is available for VCO-3400 series included in the standard package.

2. Lock the wall mount kit with 4 screws on the system bottom side.



1. Installation complete.

3.13 Installing book mount

1. For book mounting, use the same wall mount kit in the standard package.

2. Lock the wall mount kit with 4 screws on the system rear side.

3. Installation complete.

3.14 Installing din rail mount

1. Din rail mount kit is available for VCO-3400 series as an optional accessory.

2. Lock the din rail mount with two screws on the system rear panel.

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 <Del> 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

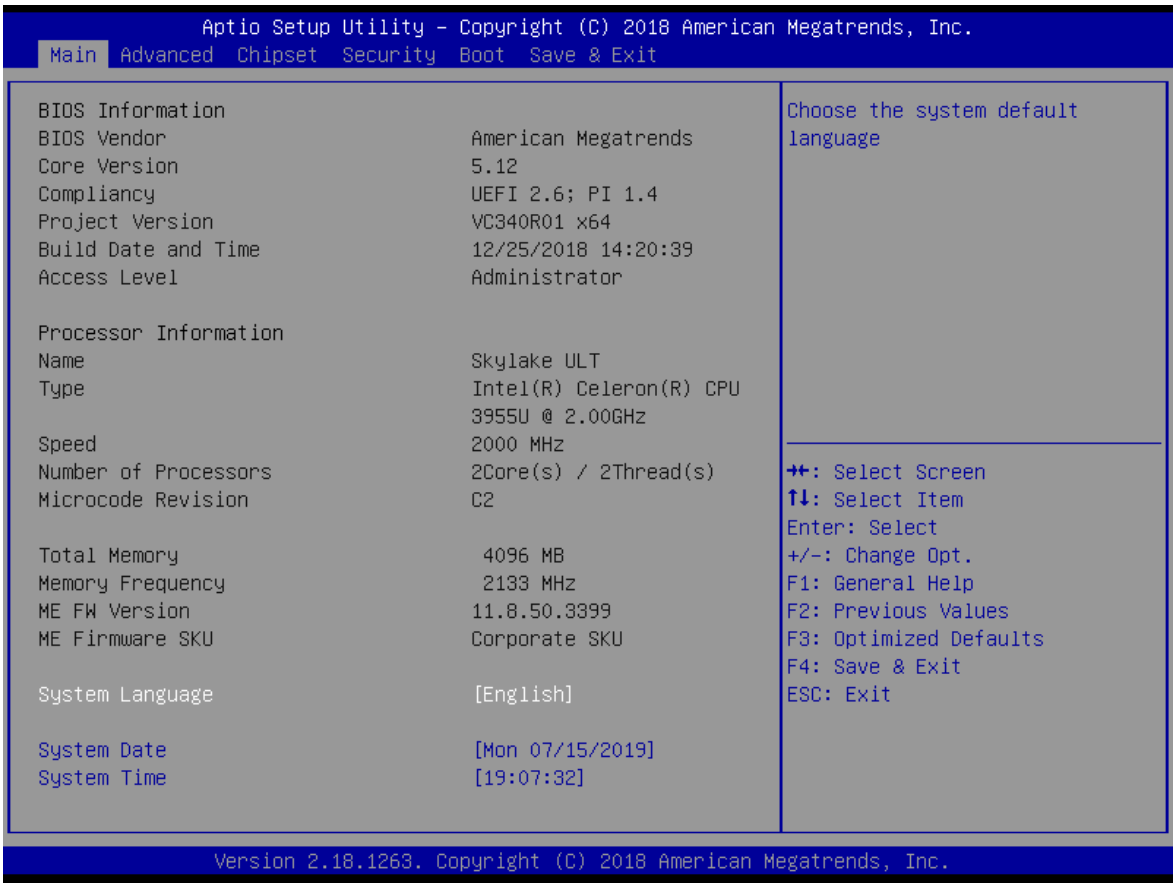
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

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 <Del> to enter BIOS CMOS Setup Utility. The Main setup screen is showed as following when the setup utility is entered. System Date/Time is set up in the Main Menu.



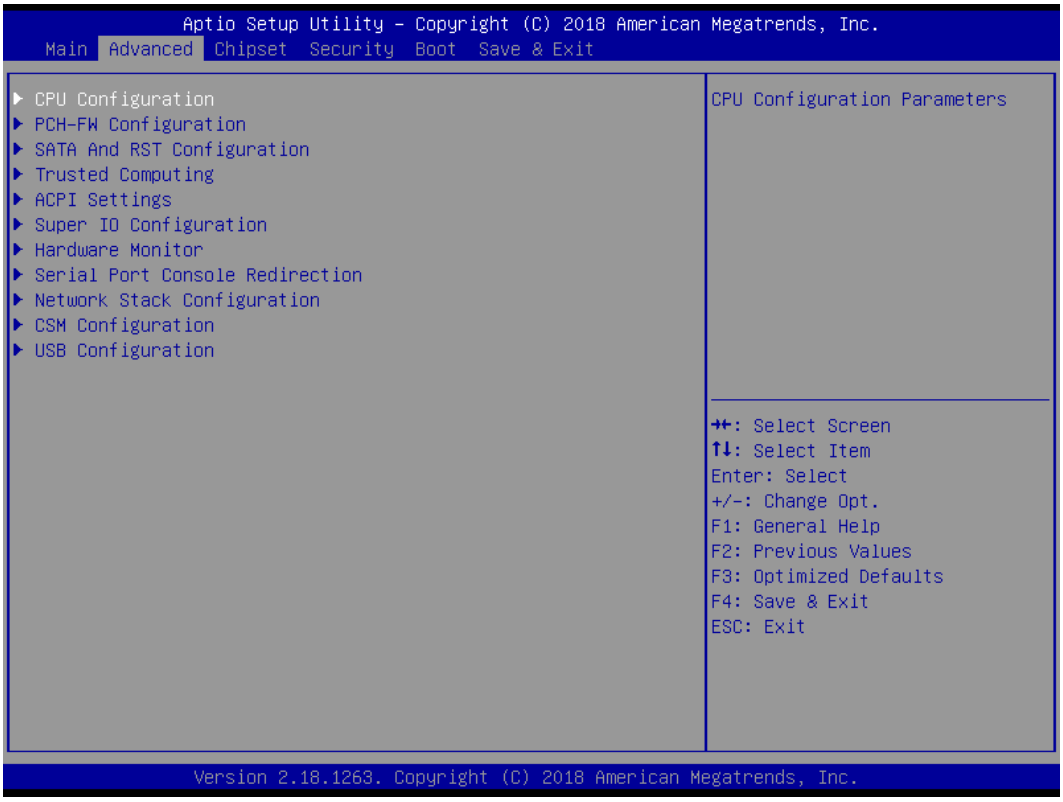
■ System Date

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

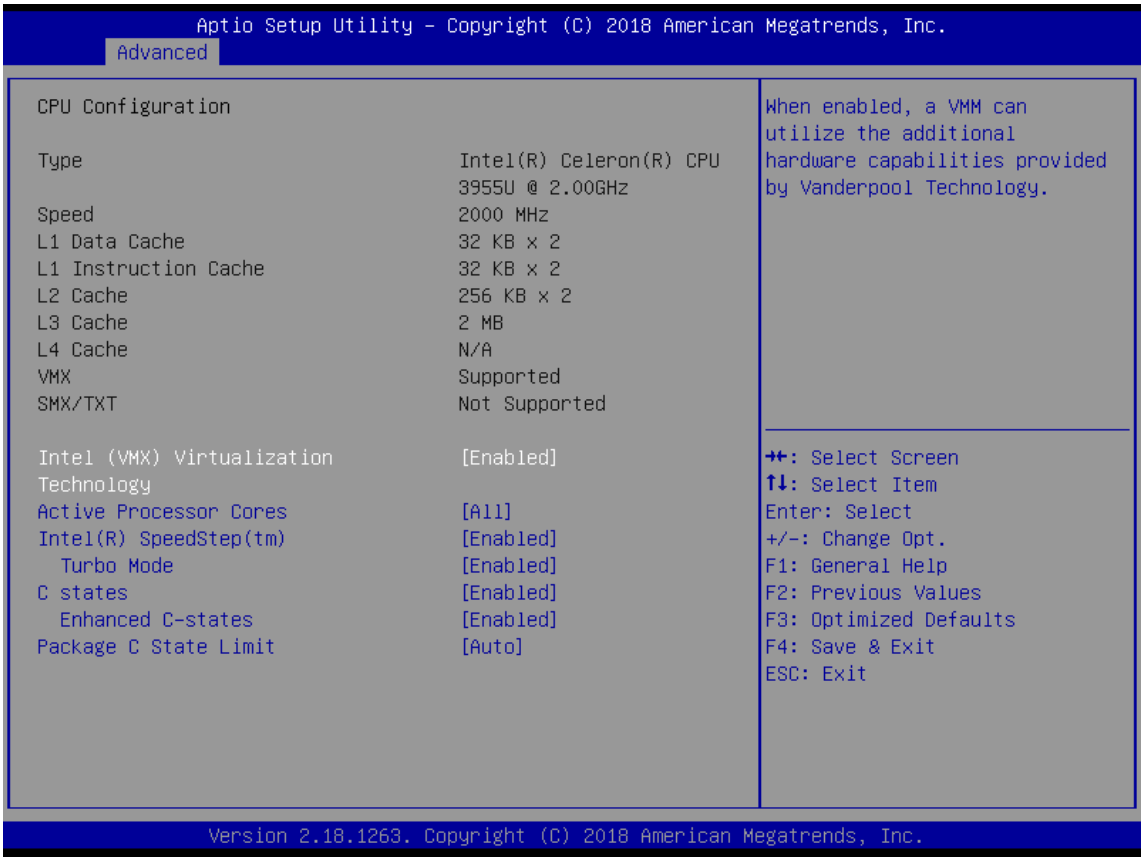
■ System Time

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

4.3 Advanced Setup



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.

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

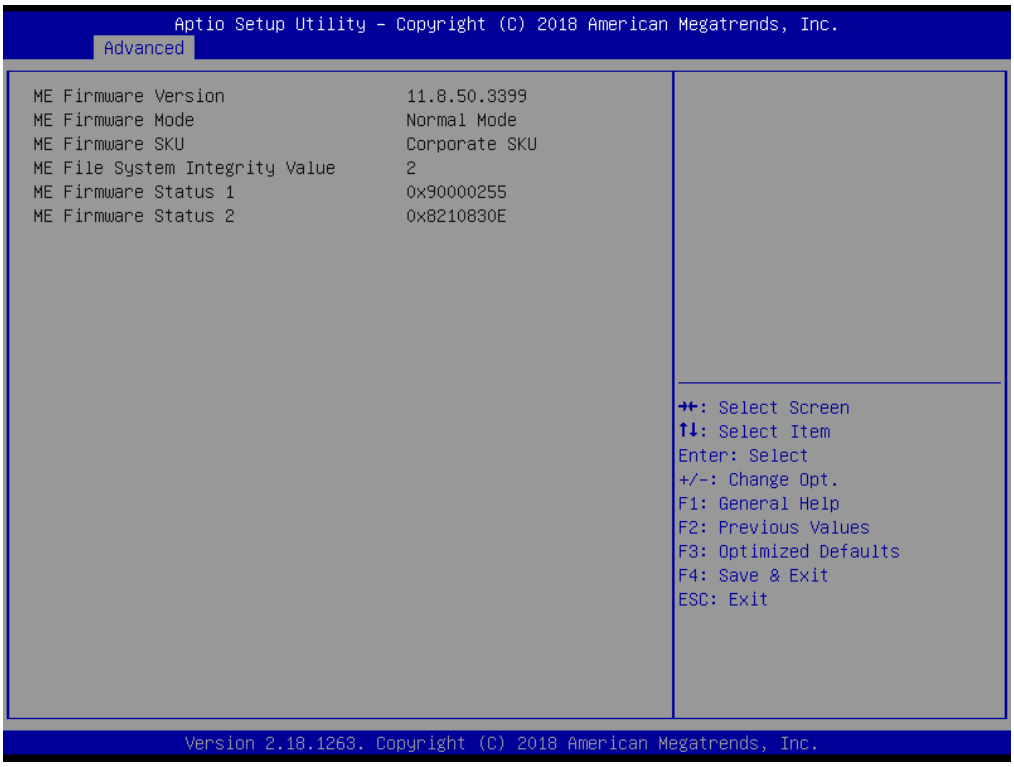
This item allows you to set the power saving of the CPU states.

- **Enhanced C States**
  This item allows your CPU reduce power consumption.

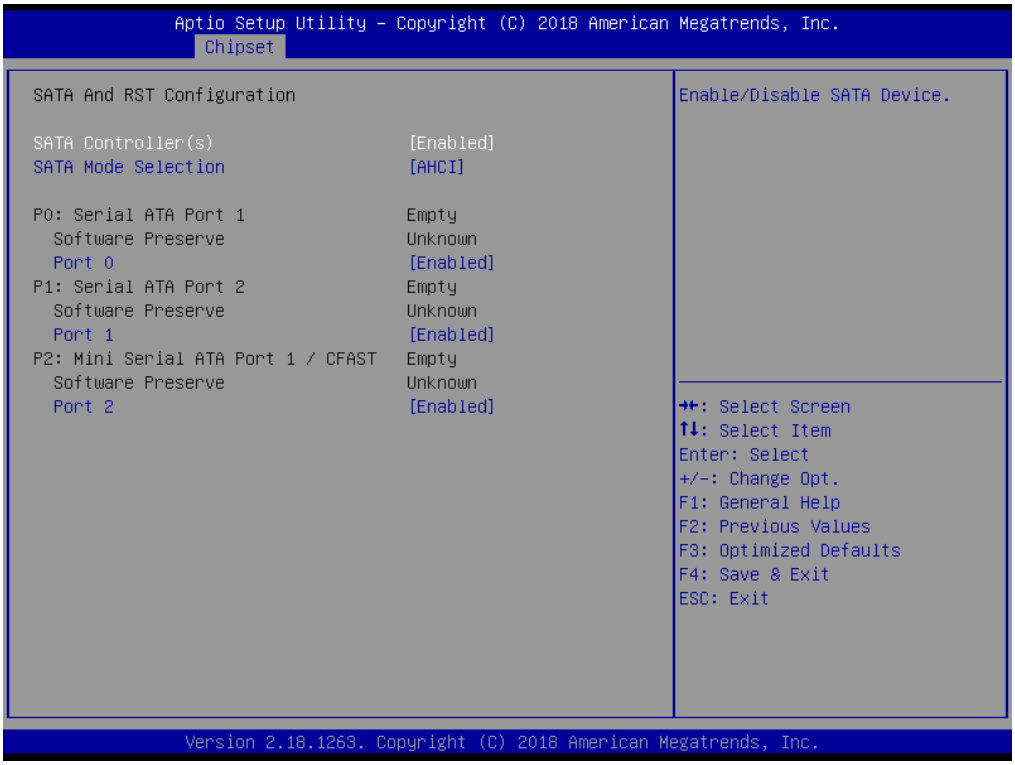
Package C State limit

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



4.3.3 SATA and RST Configuration



■ SATA Controller(s)
Enable or disable Serial ATA controller.

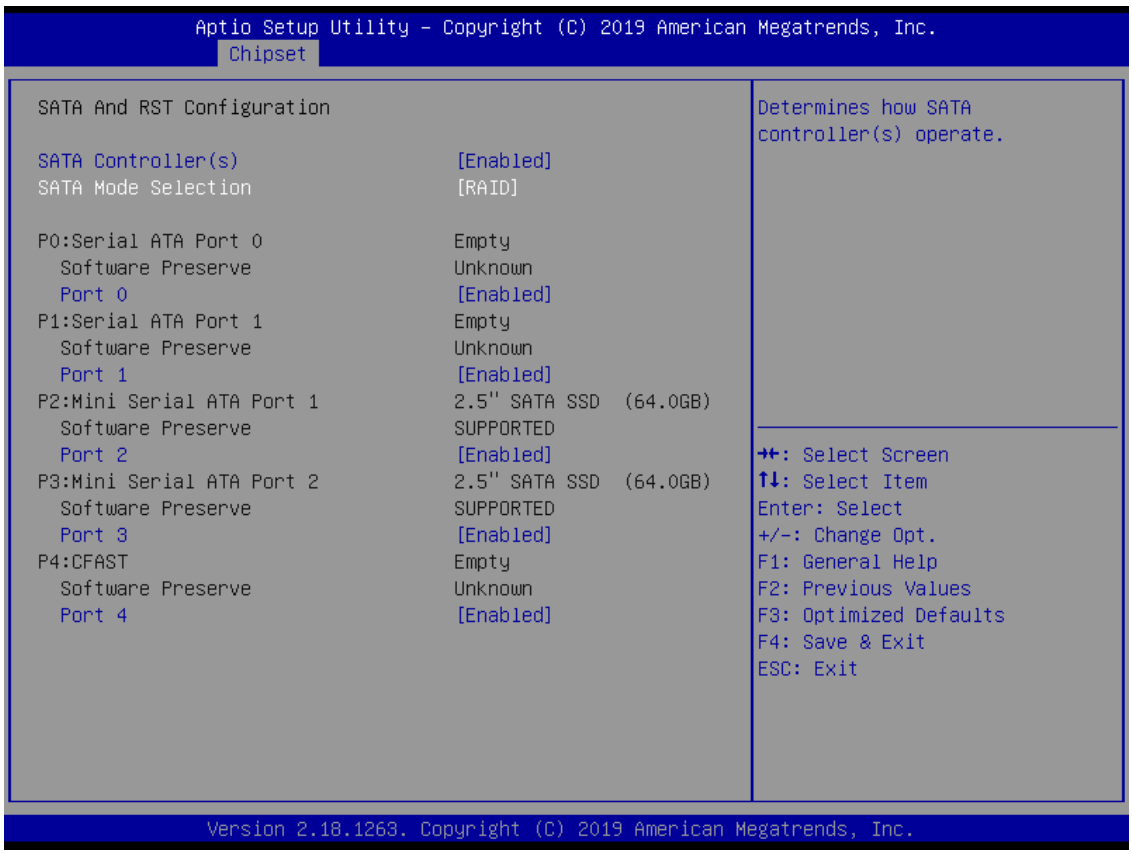
■ SATA Mode Selection
This item allows users to select mode of SATA controller.

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

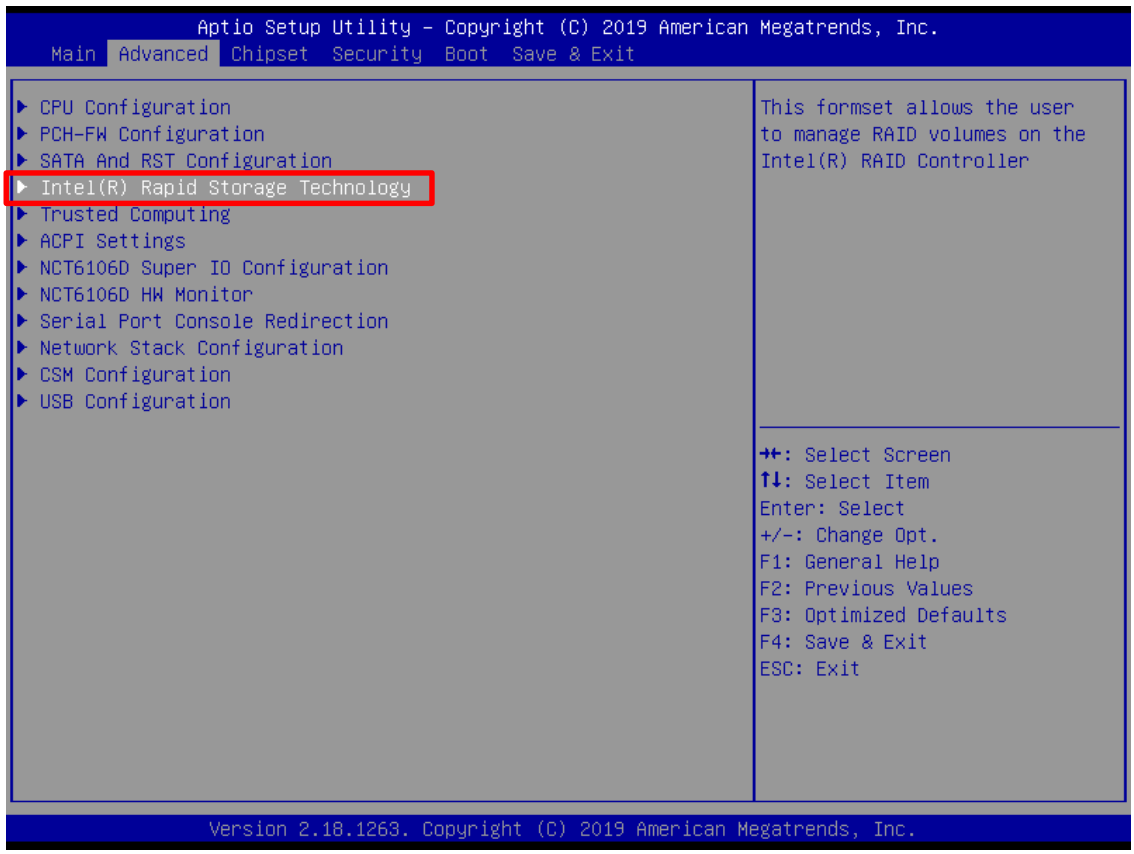
4.3.4 RST (UEFI RAID) Configuration

How to set the UEFI RAID:

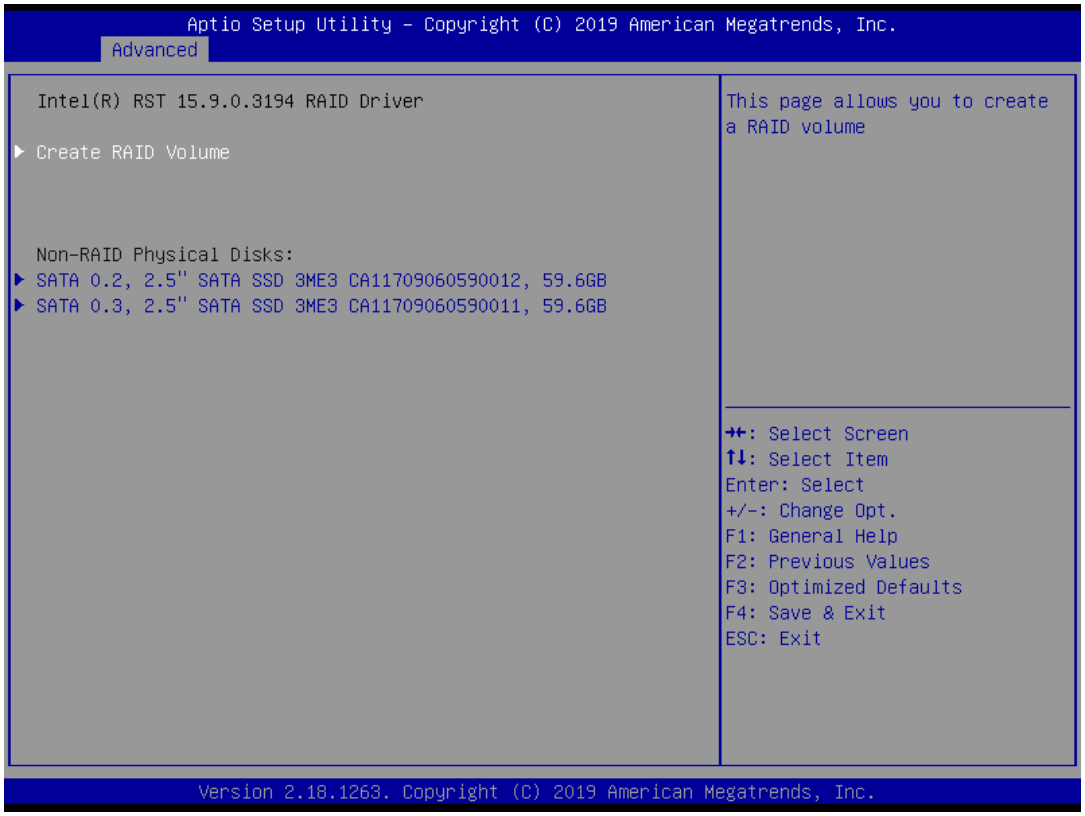
1. When set to RAID, please save change reset system.



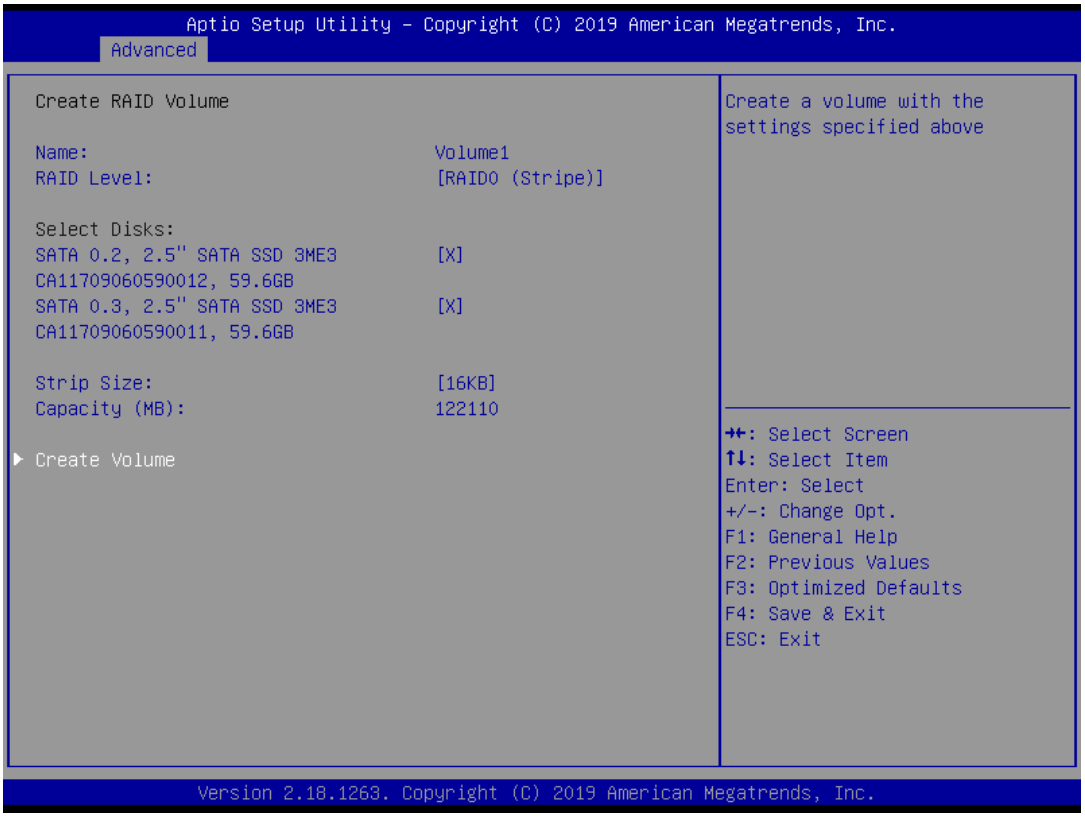
2. After reboot the system, please into BIOS utility and then will see "Intel (R) Rapid Storage Technology"



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

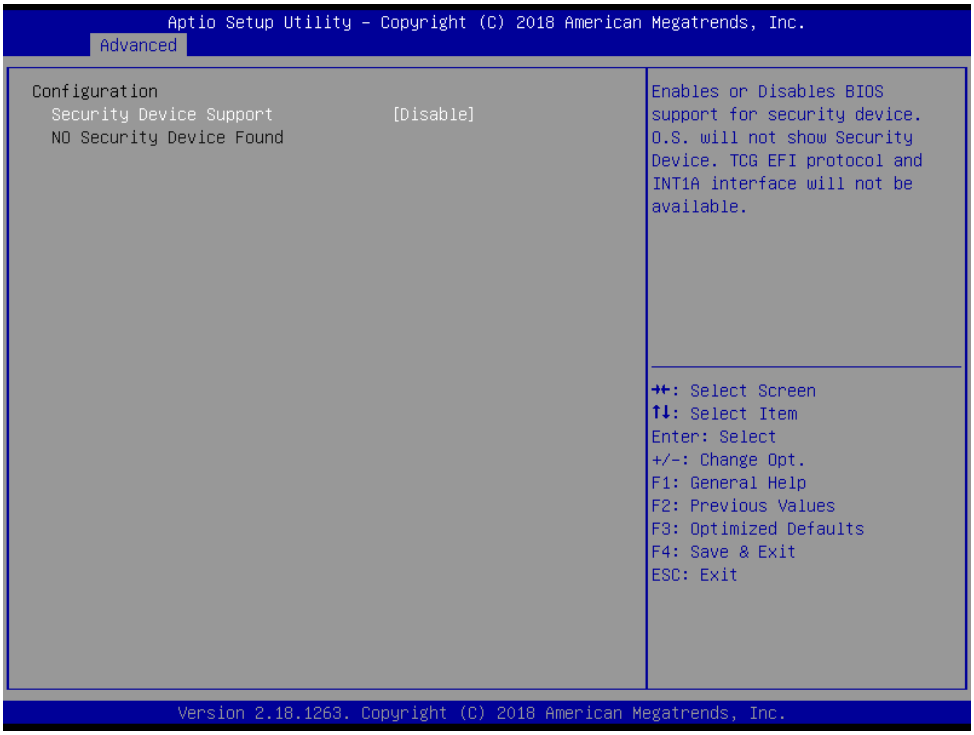


4. Start Create the RAID



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

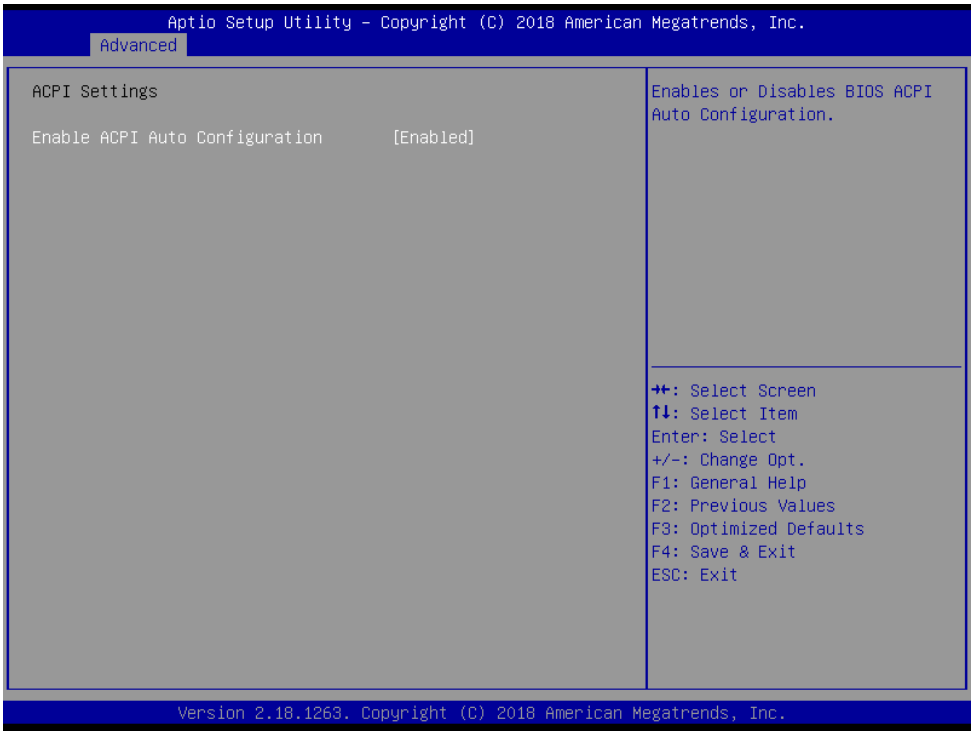
4.3.5 Trusted Computing



■ Security Device Support

Enable or disable Security Device Support.

4.3.6 ACPI Settings

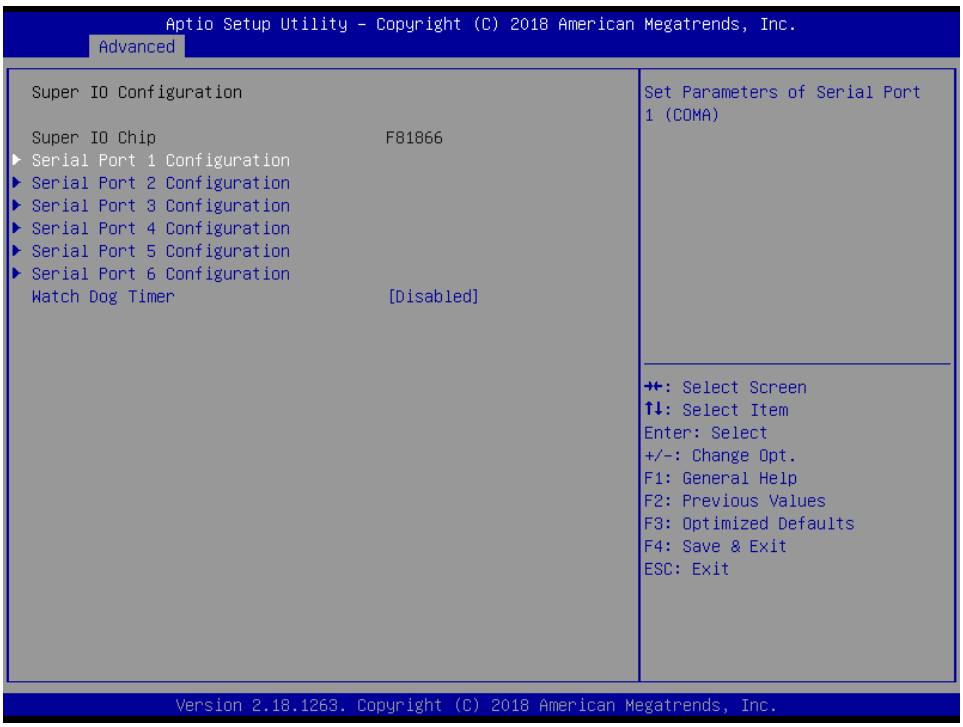


■ Enable ACPI Auto Configuration

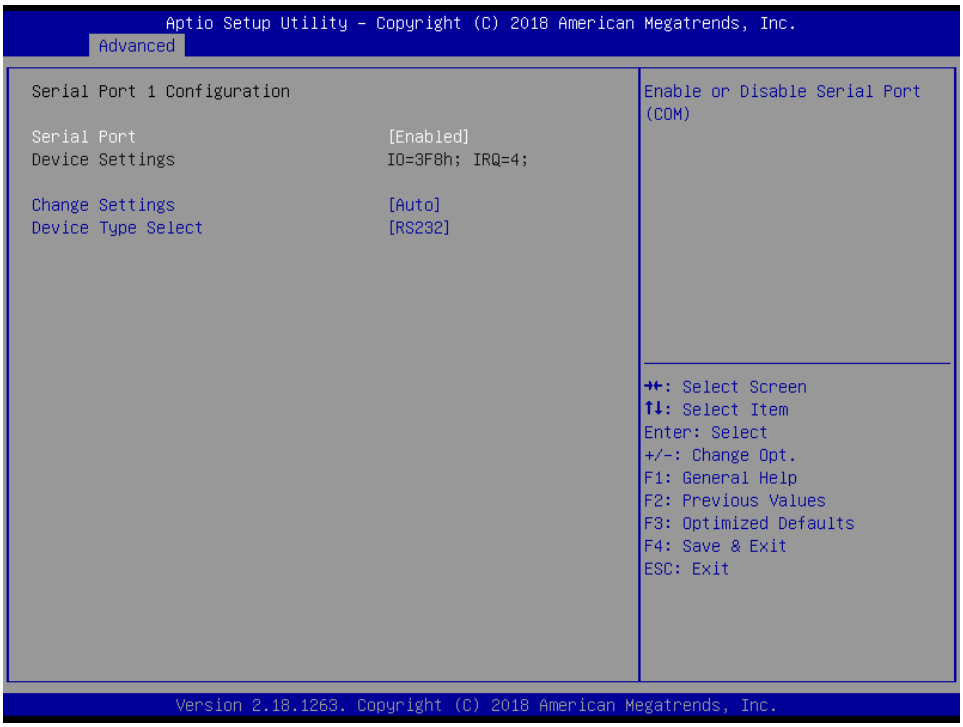
Enable or disable ACPI Auto Configuration.

4.3.7 Super IO Configuration

This setting allows you to select options for the Super IO Configuration, and change the value of the selected option.

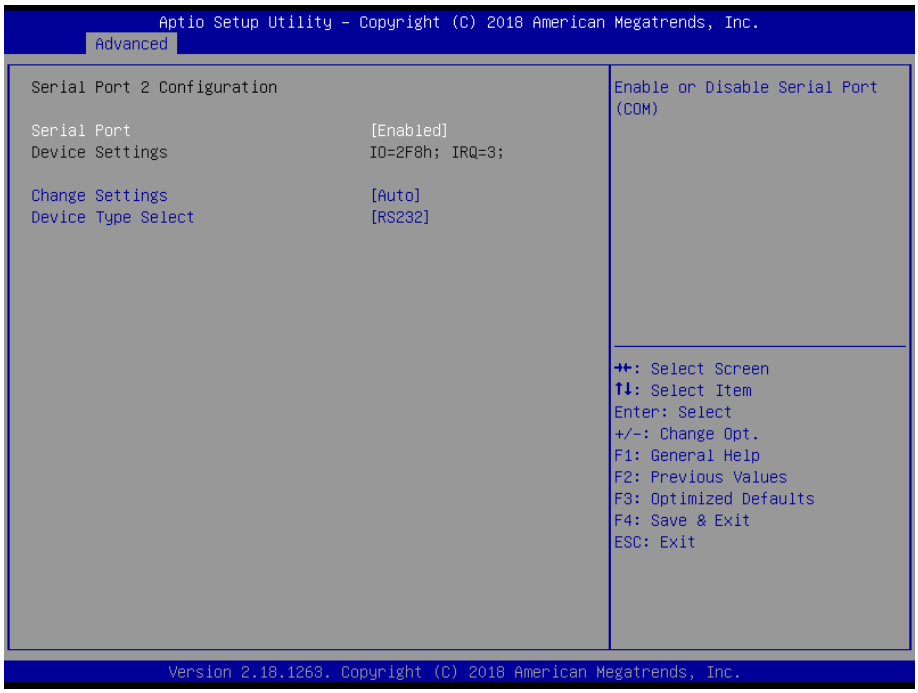


■ Serial Port 1 Configuration



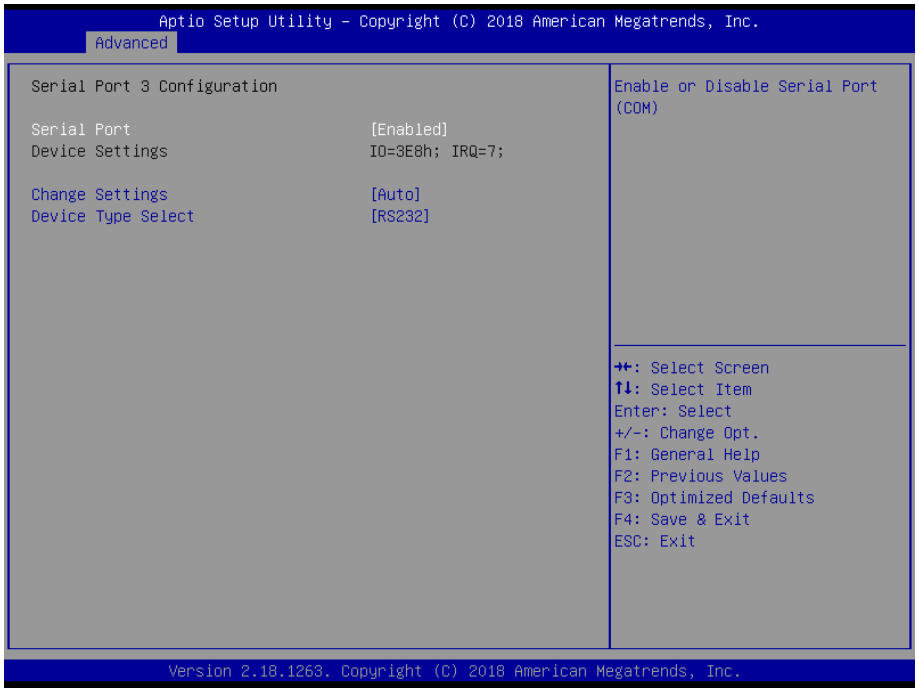
- **Serial Port**
  This item allows you to enable or disable serial port.
- **Change Settings**
  This item allows you to change the address & IRQ settings of the specified serial port.
- **Device Type Select**
  Change the Serial interface. Select <RS232>, <RS422> or <RS485> interface.

Serial Port 2 Configuration



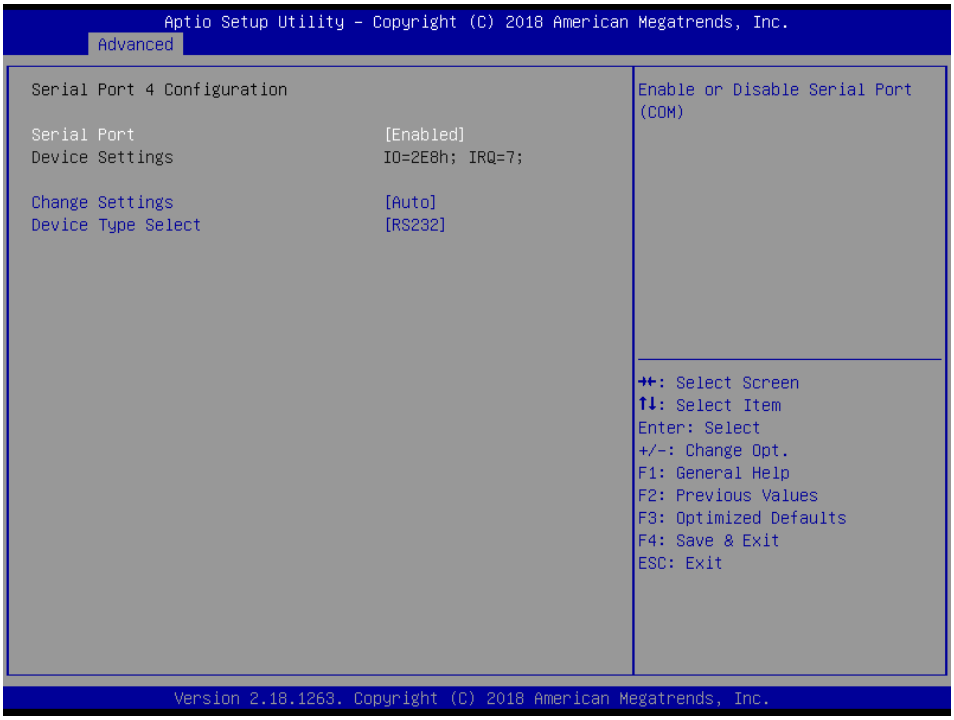
- **Serial Port**
  This item allows you to enable or disable serial port.
- **Change Settings**
  This item allows you to change the address & IRQ settings of the specified serial port.
- **Device Type Select**
  Change the Serial interface. Select <RS232>, <RS422> or <RS485> interface.

Serial Port 3 Configuration



- **Serial Port**
  This item allows you to enable or disable serial port.
- **Change Settings**
  This item allows you to change the address & IRQ settings of the specified serial port.
- **Device Type Select**
  Change the Serial interface. Select <RS232>, <RS422> or <RS485> interface.

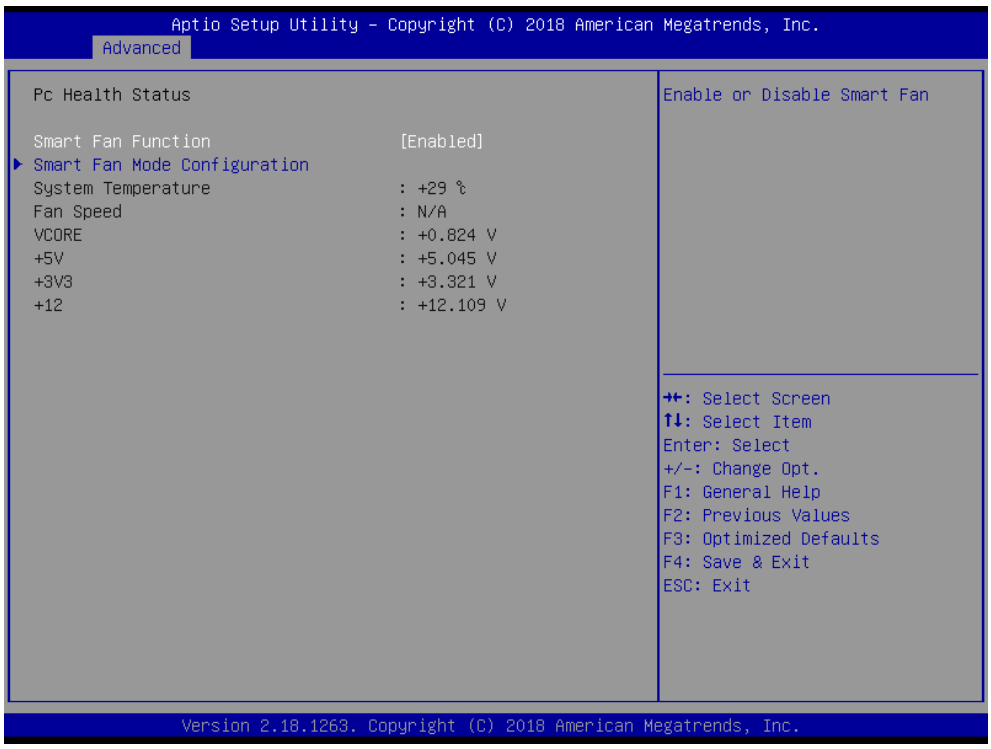
Serial Port 4 Configuration

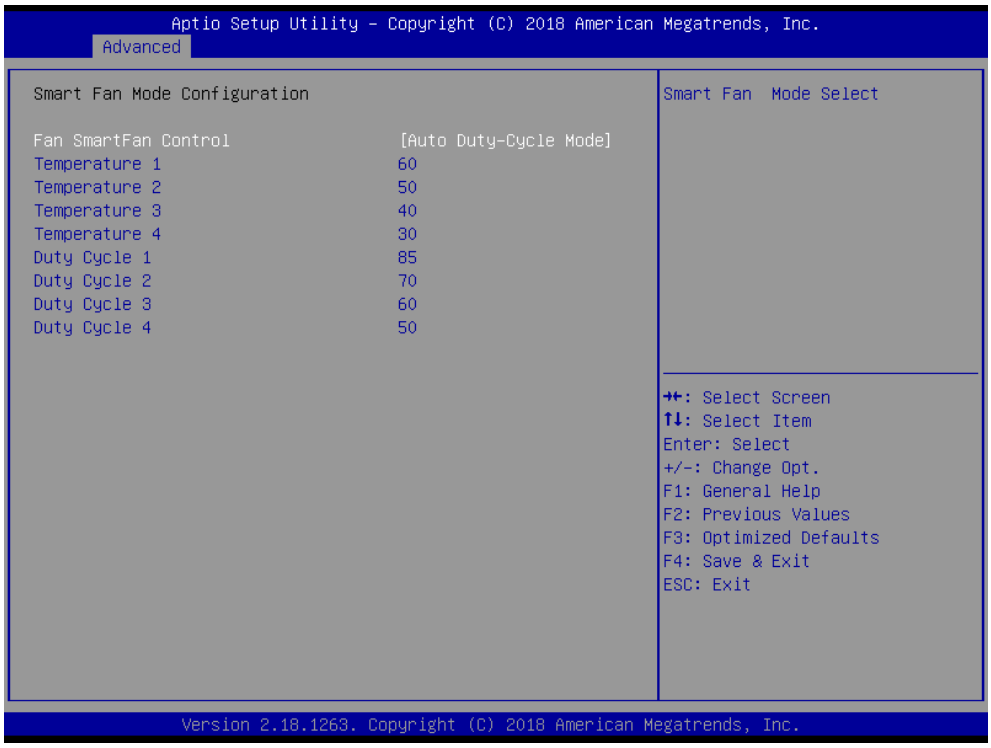


- **Serial Port**
  This item allows you to enable or disable serial port.
- **Change Settings**
  This item allows you to change the address & IRQ settings of the specified serial port.
- **Device Type Select**
  Change the Serial interface. Select <RS232>, <RS422> or <RS485> interface.

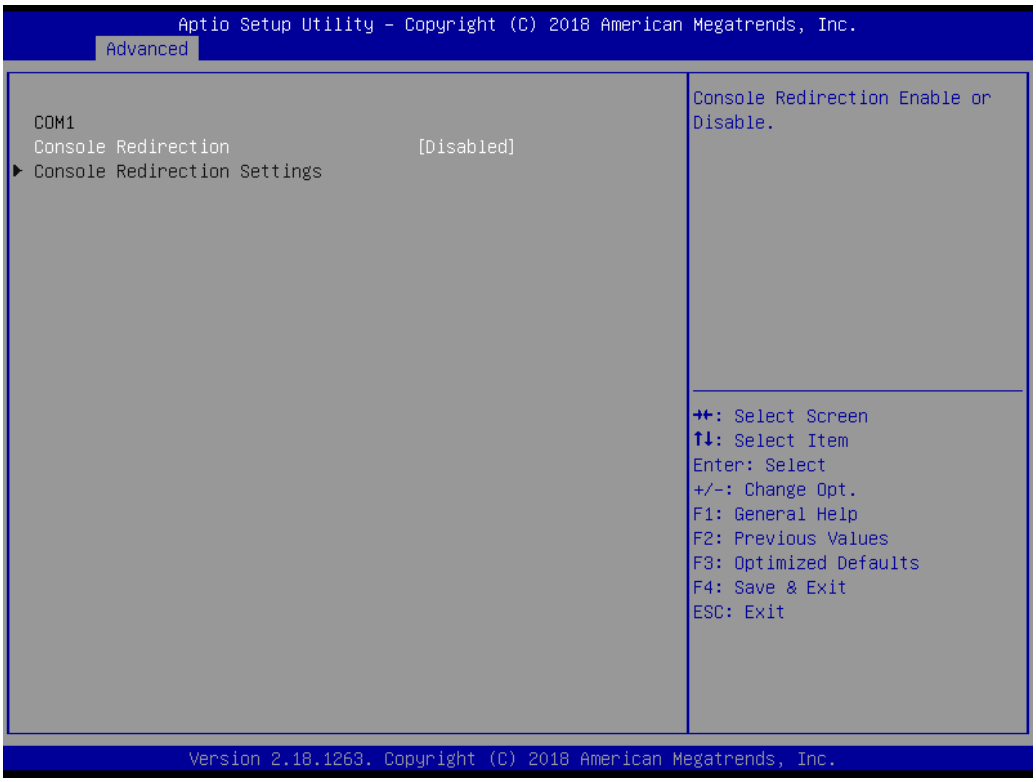
4.3.8 Hardware Monitor

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





4.3.9 Serial Port Console Redirection

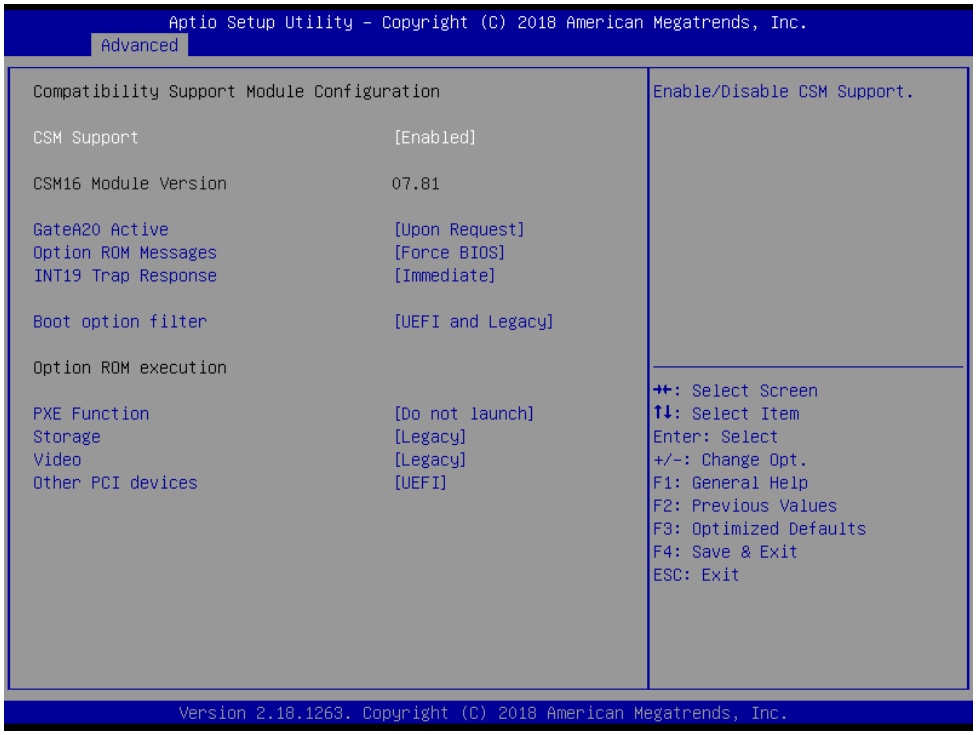


■ Console Redirection

These items allows you to enable or disable COM1 console redirection.

4.3.10 Stack Configuration

4.3.11 CSM Configuration



CSM Support
This item allows users to enable or disable for "CSM Support".

GateA20 Active
This item allows users to set Upon Request or Always for "GateA20 Active".

Option ROM Messages
This item allows users to set Force BIOS or Keep Current for "Option ROM Messages".

INT19 Trap Response
This item allows users to set the BIOS reaction to INT19 trapping by Option ROM:
"Immediate" - execute the trap right away;
"postponed" - execute the trap during legacy boot.

Boot option filter
This item allows users to select which type of operating system to boot by option:
"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.
This item is configurable only when CSM Support is set to Enabled.

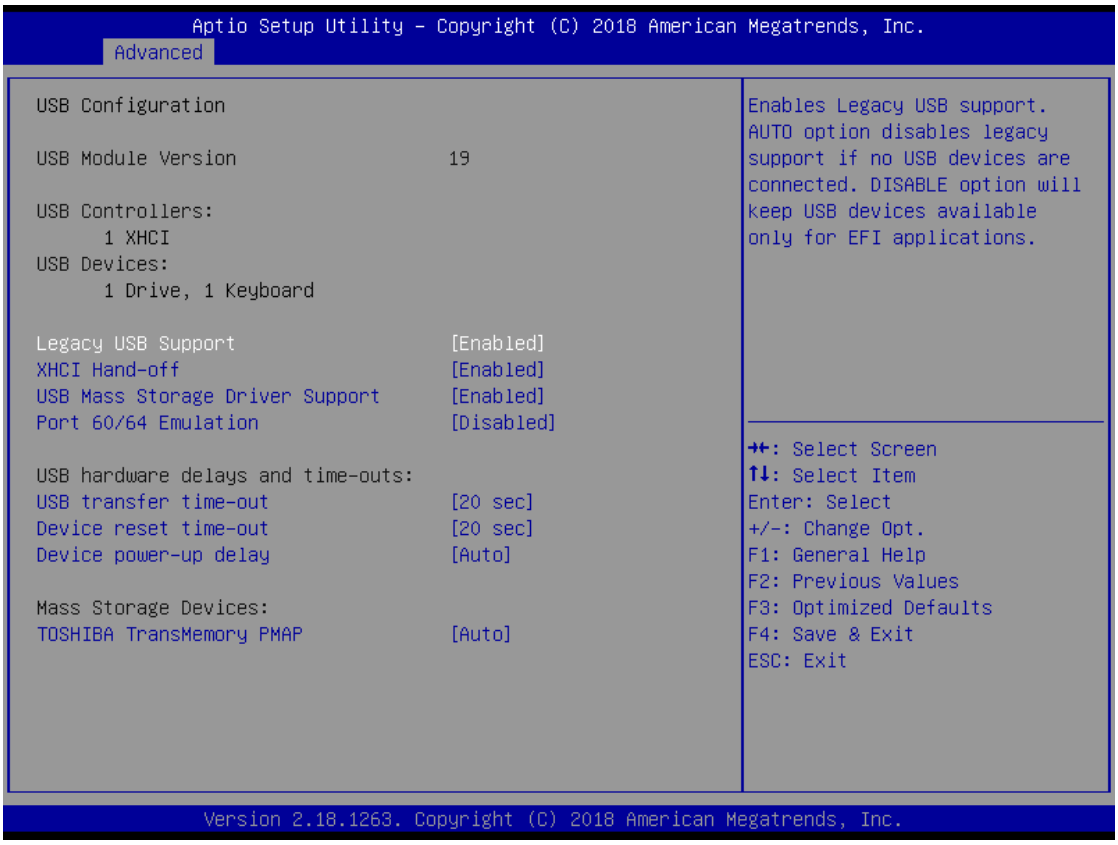
PXE Function
This item allows users to enable or disable PXE function.

Storage
This item allows users to set Do not launch or UEFI or Legacy for "Storage".

Video
This item allows users to set Do not launch or UEFI or Legacy for "Video".

Other PCI devices
This item allows users to set Do not launch or UEFI or Legacy for "Other PCI devices".

4.3.12 USB Configuration



■ Legacy USB Support
Allows USB keyboard/ mouse to be used in MS-DOS.

■ XHCI Hand-off
Determines whether to enable XHCI (USB3.0) Hand-off feature for an operating system without XHCI (USB3.0) Hand-off support.

■ USB Mass Storage Driver Support
Enables or disables support for USB storage devices.

■ Port 60/64 Emulation
Enables or disables support for Port 60/64 Emulation.

■ USB transfer time-out
This item allows users to set different time mode for "USB transfer time-out".

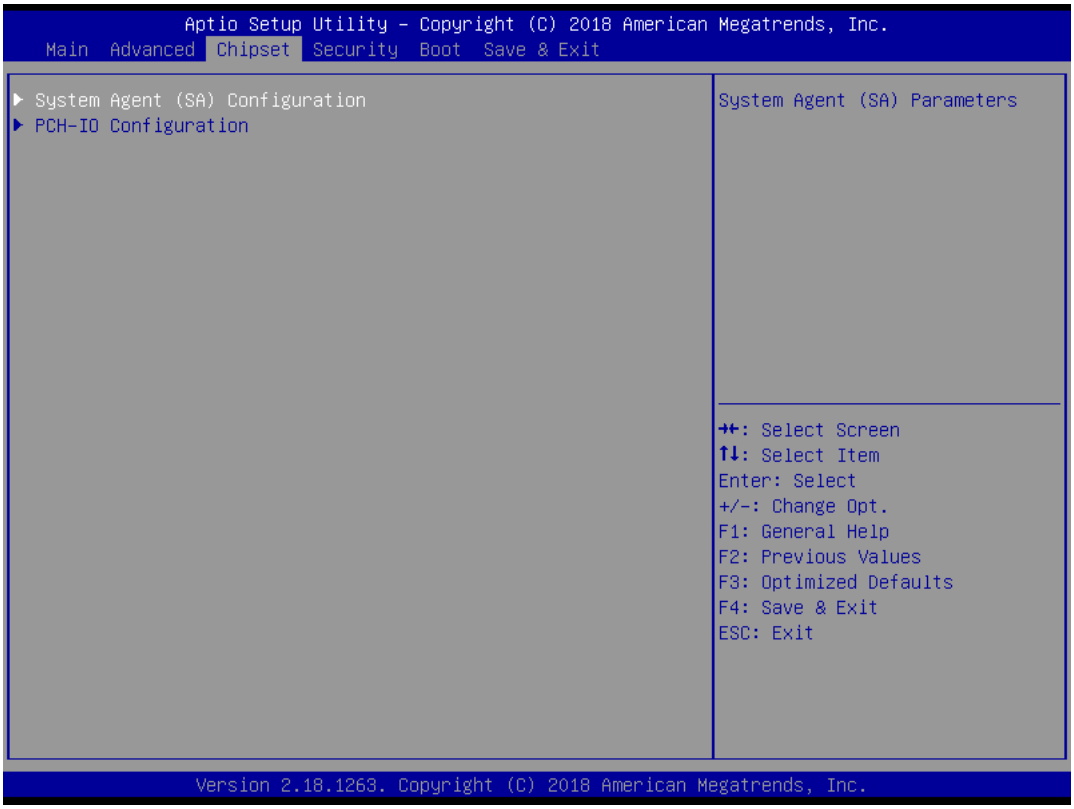
■ Device reset time-out
This item allows users to set different time mode for "Device reset time-out".

■ Device power-up delay
This item allows users to set different time mode for "Device power-up delay".

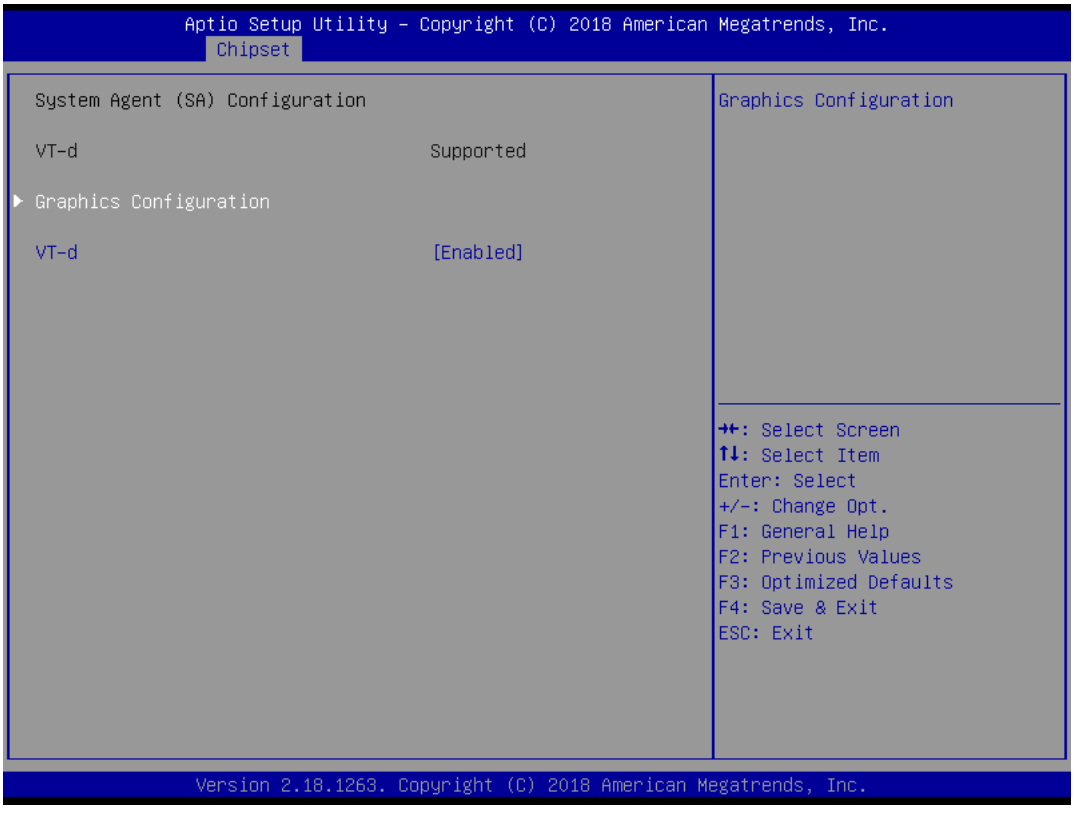
■ Mass Storage Devices
This item allows users to set different mode for "Mass Storage Devices".

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.



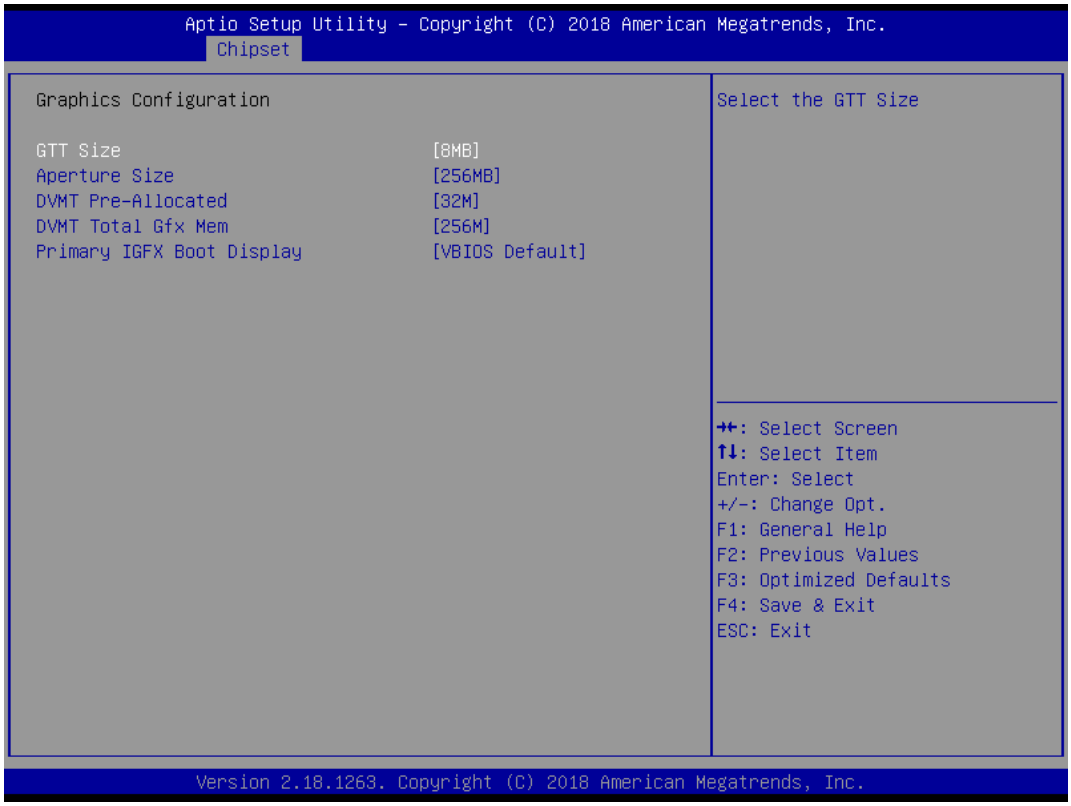
4.4.1 System Agent (SA) Configuration



■ VT-d

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

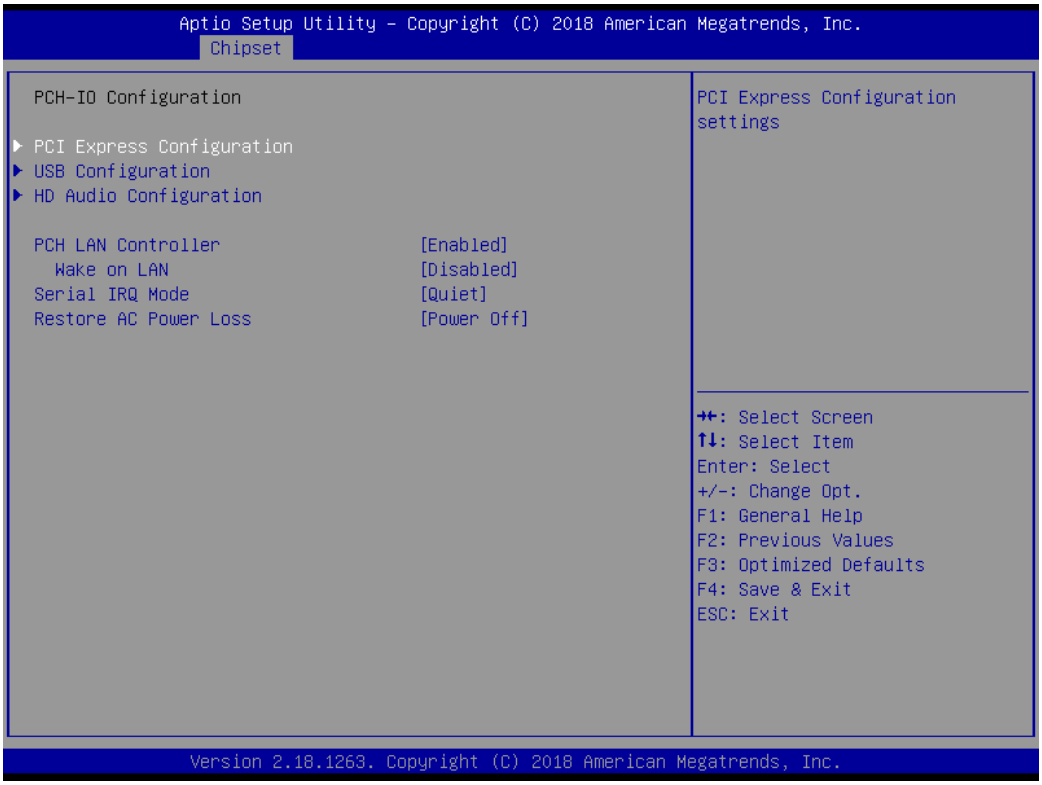
Graphic Configuration



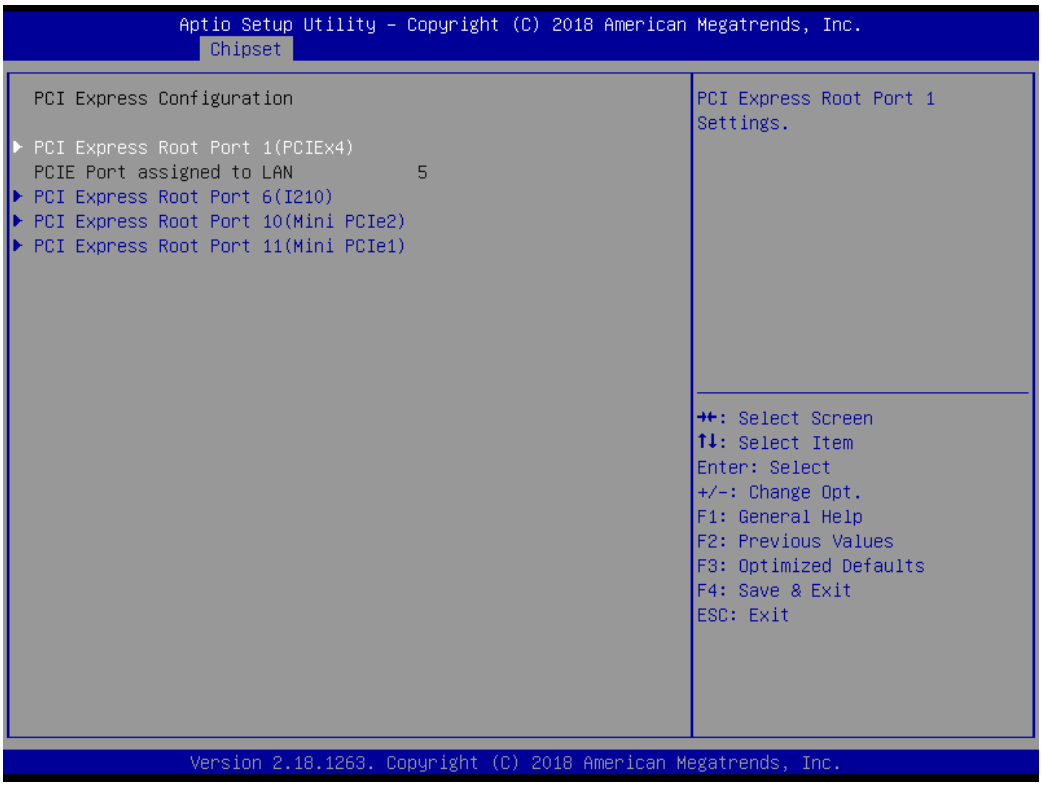
- **GTT Size**
  This item allows you to change the GTT size.
- **Aperture Size**
  Aperture size optimal between 128MB, 256MB, 512MB, 1024MB or 2048MB.
- **DVMT Pre-Allocated**
  DVMT pre-allocated (fixed) Graphics memory size optimal from 0M to 60M.
- **DVMT Total Gfx Mem**
  DVMT Total Gfx Mem optimal Between 128M, 256M or MAX.
- **Primary IGFX Boot Display**
  Use the field to select the type of device you want to use as the display(s) of the system.

4.4.2 PCH-IO Configuration

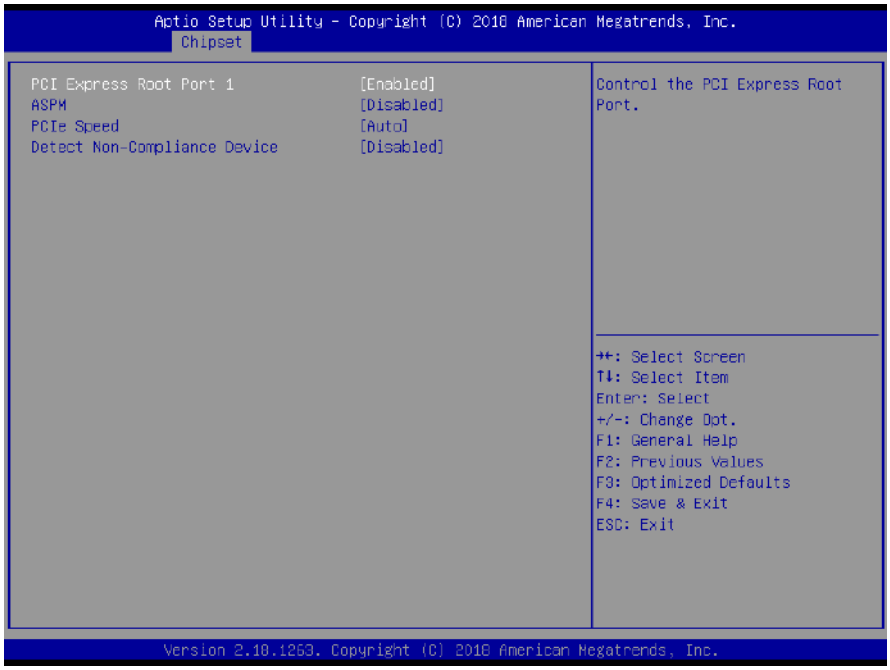
This section allows you to configure the chipset.



■ PCI Express Configuration



- **PCI Express Root Port 1 / 6 / 10 / 11**



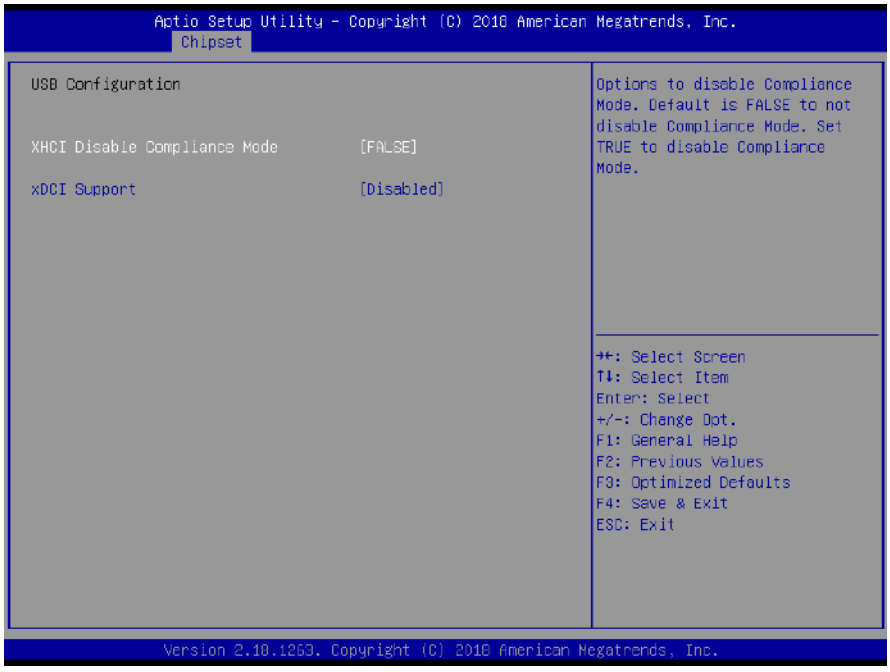
✓ **PCI Express Port 1 / 6 / 10 / 11**
This item allows you to enable or disable PCI Express Port 1 / 6 / 10 / 11 in the chipset.

✓ **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>, <Gen 2> or <Gen 3>

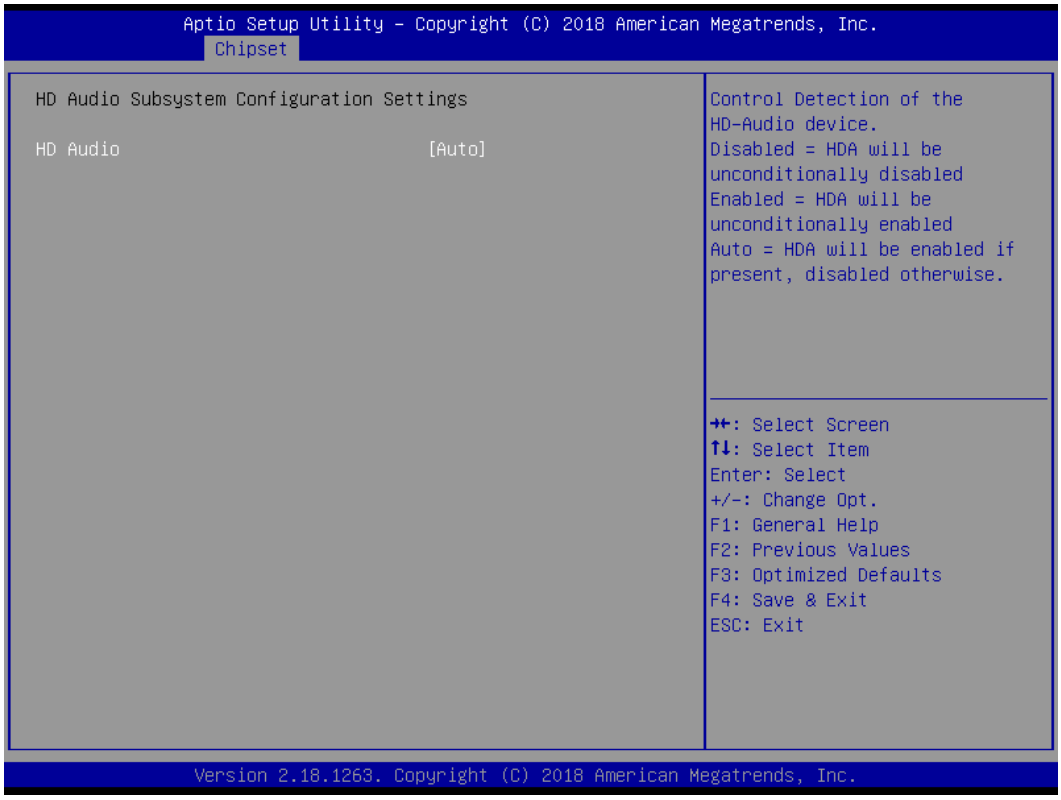
✓ **Detect Non-Compliance Device**
Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

■ 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.

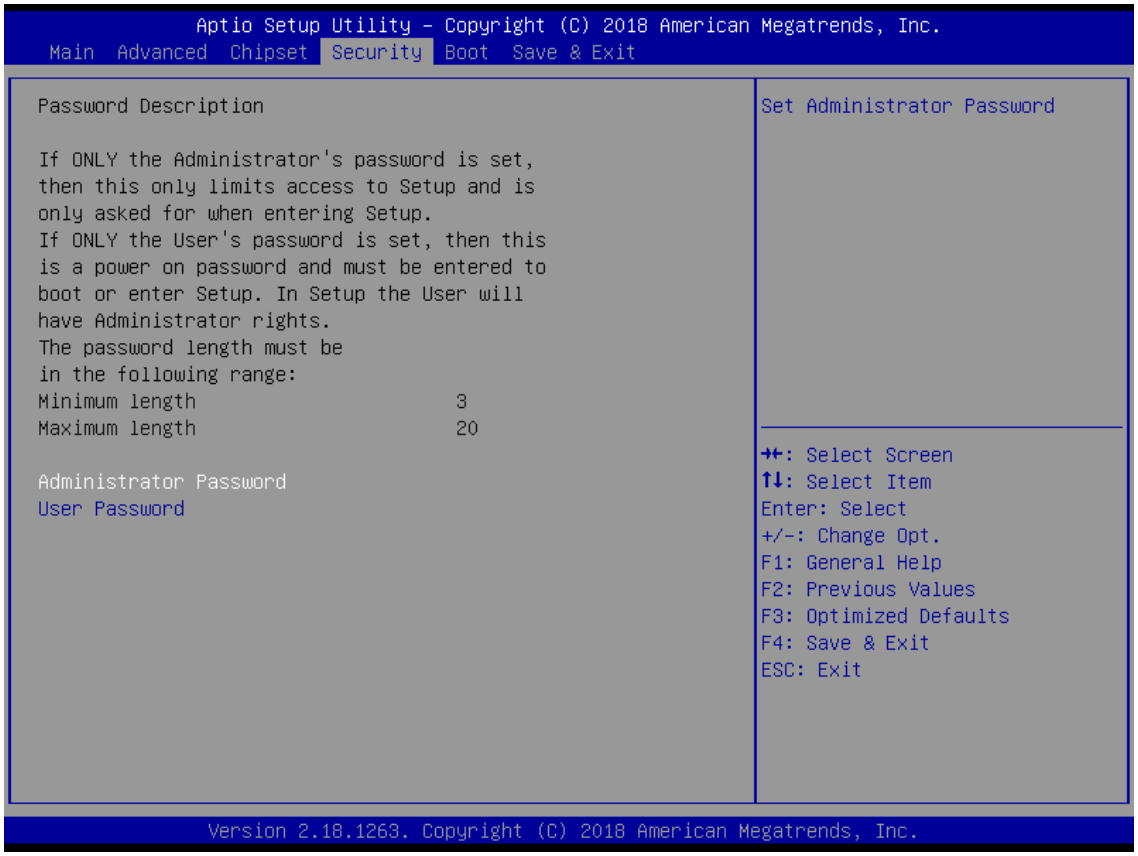
HD Audio Configuration



- **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

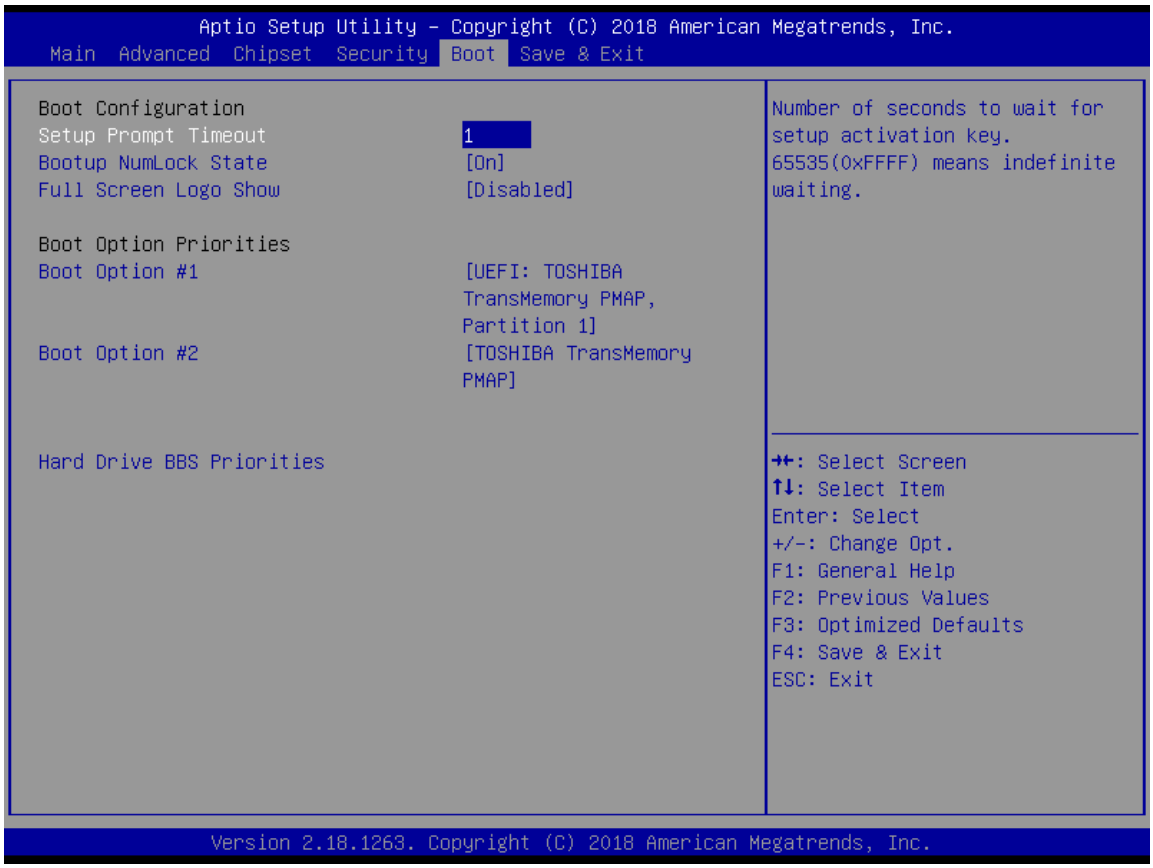
This item allows you to set Administrator Password.

■ 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

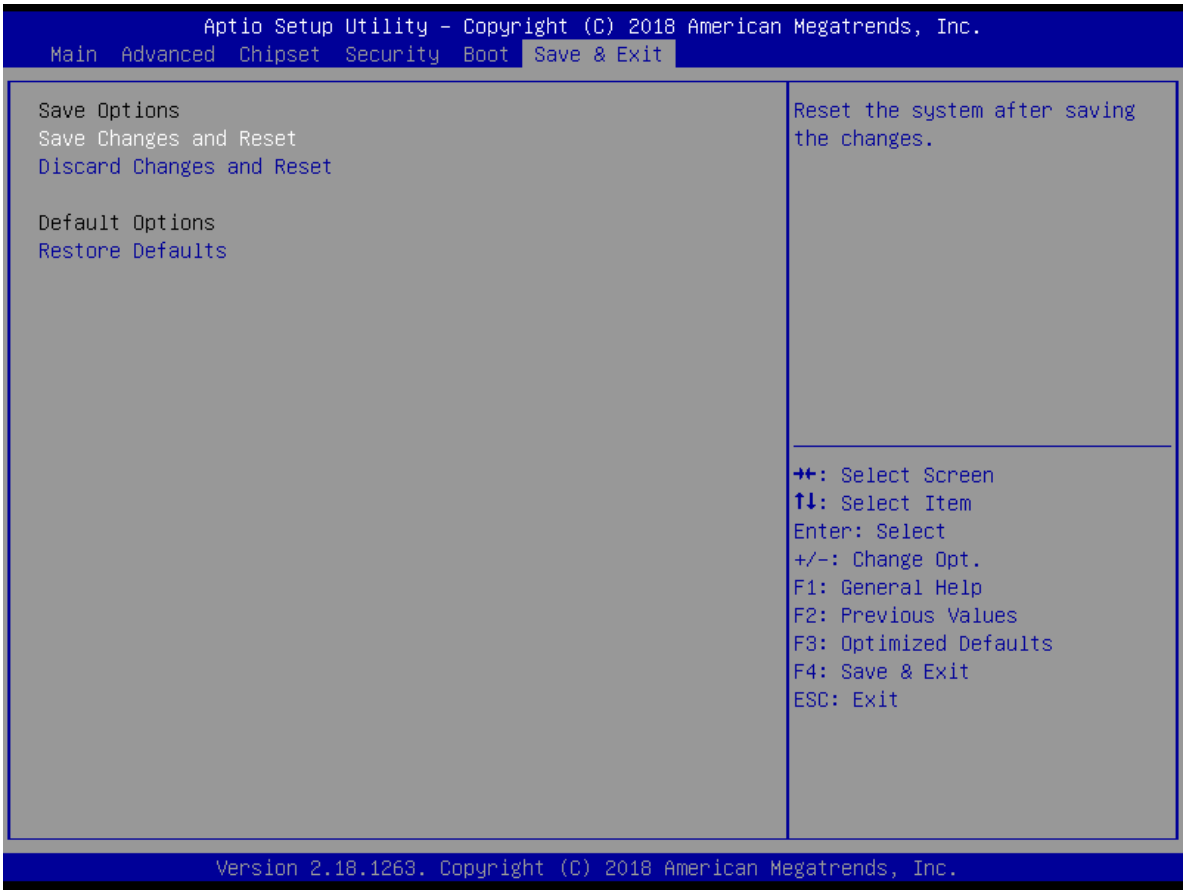
This item allows you to enable or disable Full Screen Logo Show function.

■ 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

// IO Address 0xA16 is time value
// IO Address 0xA15 is WDT enable and configuration
Example, Set 0xA16=-0x03, 0xA15=0x31, it will reset after 3 seconds

```
#define TimePort       0xA16
#define TimeEnablePort  0xA15

WriteByte (TimePort,0x03)
WriteByte (TimeEnablePort,0x31)
```

Watchdog Timer Configuration Register 1 – base address + 05h

Bit	Name	R/W	Reset	Default	Description
7	Reserved	R	-	0	Reserved
6	WDTMOUT_STS	R/W	5VSB	0	If watchdog timeout event occurred, this bit will be set to 1. Write a 1 to this bit will clear it to 0.
5	WD_EN	R/W	5VSB	0	If this bit is set to 1, the counting of watchdog time is enabled.
4	WD_PULSE	R/W	5VSB	0	Select output mode (0: level, 1: pulse) of RSTOUT# by setting this bit.
3	WD_UNIT	R/W	5VSB	0	Select time unit (0: 1 sec, 1: 60 sec) of watchdog timer by setting this bit.
2	WD_HACTIVE	R/W	5VSB	0	Select output polarity of RSTOUT# (1: high active, 0: low active) by setting this bit.
1-0	WD_PSWIDTH	R/W	5VSB	0	Select output pulse width of RSTOUT# 0: 1 ms 1: 25 ms 2: 125 ms 3: 5 sec

Watchdog Timer Configuration Register 2 – base address + 06h

Bit	Name	R/W	Reset	Default	Description
7-0	WD_TIME	R/W	5VSB	0	Time of watchdog timer

GPIO Sample Code

- GPI 1 ~ GPI 8

	GPI 1	GPI 2	GPI 3	GPI 4	GPI 5	GPI 6	GPI 7	GPI 8
IO Address	0xA03h	0xA03h	0xA03h	0xA03h	0xA06h	0xA06h	0xA06h	0xA06h
Bit	4	5	6	7	0	1	2	3
Sample code	#1							

- GPO 1 ~ GPO 8

	GPO 1	GPO 2	GPO 3	GPO 4	GPO 5	GPO 6	GPO 7	GPO 8
IO Address	0xA02h	0xA02h	0xA02h	0xA02h	0xA06h	0xA07h	0xA08h	0xA04h
Bit	0	1	2	3	4	7	0	7
Sample code	#2							

```
#define GPI1to4_ADDR            0xA03
#define GPI5to8_ADDR            0xA06

#define GPO1to4_ADDR            0xA02

#define GPO5_ADDR               0xA06
#define GPO6_ADDR               0xA04
#define GPO7_ADDR               0xA08
#define GPO8_ADDR               0xA04

#define GPO1_DataHigh           0x01
#define GPO2_DataHigh           0x02
#define GPO3_DataHigh           0x04
#define GPO4_DataHigh           0x08
#define GPO5_DataHigh           0x10
#define GPO6_DataHigh           0x80
#define GPO7_DataHigh           0x01
#define GPO8_DataHigh           0x80

#define WriteByte       outportb
#define ReadByte        inportb
```

Sample Code:
#1 :
// Get GPI 1 status
//Get GPI 0 Pin Status Register
printf("Input port value = %x\n", ReadByte**(**GPI1to4_ADDR**));** // bit4 = GPI 1 status

// Get GPI 5 status
//Get GPI 0 Pin Status Register
printf("Input port value = %x\n", ReadByte**(**GPI_REG5to8**));** // bit0 = GPI 5 status

#2 :
// Set GPO status to high
; Set GPO 1 Pin to High
Data = ReadByte(GPO1to4_ADDR) | GPO1_DataHigh;
WriteByte(GPO1to4_ADDR, Data); //Set IO_DO1 to High

; Set GPO 2 Pin to High
Data = ReadByte(GPO1to4_ADDR) | GPO2_DataHigh;
WriteByte(GPO1to4_ADDR, Data); //Set IO_DO2 to High

; Set GPO 3 Pin to High
Data = ReadByte(GPO1to4_ADDR) | GPO3_DataHigh;
WriteByte(GPO1to4_ADDR, Data); //Set IO_DO3 to High

; Set GPO 4 Pin to High
Data = ReadByte(GPO1to4_ADDR) | GPO4_DataHigh;
WriteByte(GPO1to4_ADDR, Data); //Set IO_DO4 to High

; Set GPO 5 Pin to High
Data = ReadByte(GPO5_ADDR) | GPO5_DataHigh;
WriteByte(GPO5_ADDR, Data); //Set IO_DO5 to High

; Set GPO 6 Pin to High
Data = ReadByte(GPO6_ADDR) | GPO6_DataHigh;
WriteByte(GPO6_ADDR, Data); //Set IO_DO6 to High

; Set GPO 7 Pin to High
Data = ReadByte(GPO7_ADDR) | GPO7_DataHigh;
WriteByte(GPO7_ADDR, Data); //Set IO_DO7 to High

; Set GPO 8 Pin to High
Data = ReadByte(GPO8_ADDR) | GPO8_DataHigh;
WriteByte(GPO8_ADDR, Data); //Set IO_DO8 to High

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