

USER'S MANUAL

RCO-3000 Series

Advanced Fanless Embedded System



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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2017/10/26
1.1	Power Connector Definition Revised	2017/11/02
1.2	WDT & GPIO Sample Code Revised	2018/11/27
1.3	Remove VGA feature for RCO-3000 Series	2021/12/08

Disclaimer

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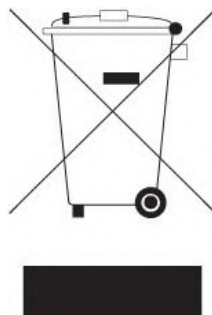
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Environmental Protection Announcement

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 -30°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 by 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	RCO-3000 Series Embedded System	1
2	Utility DVD Driver	1
3	Wall Mount Kit	1
4	Accessory Kit	1

Ordering Information

Model No.	Product Description
RCO-3000	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN
RCO-3000-4L	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 6x LAN
RCO-3000-4L-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 LAN
RCO-3000-4P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x PoE
RCO-3000-4P-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 PoE
RCO-3011E	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 1x PCIe x4 slot
RCO-3011E-4L	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 6x LAN, 1x PCIe x4 slot
RCO-3011E-4L-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 LAN, 1x PCIe x4 slot
RCO-3011E-4P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x PoE, 1x PCIe x4 slot
RCO-3011E-4P-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 PoE, 1x PCIe x4 slot
RCO-3011P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 1x PCI slot
RCO-3011P-4L	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 6x LAN, 1x PCI slot
RCO-3011P-4L-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 LAN, 1x PCI slot
RCO-3011P-4P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x PoE, 1x PCI slot
RCO-3011P-4P-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 PoE, 1x PCI slot

Model No.	Product Description
RCO-3022EE	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 2x PCIe x4 slot
RCO-3022EE-4L	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 6x LAN, 2x PCIe x4 slot
RCO-3022EE-4L-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 LAN, 2x PCIe x4 slot
RCO-3022EE-4P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x PoE, 2x PCIe x4 slot
RCO-3022EE-4P-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 PoE, 2x PCIe x4 slot
RCO-3022PP	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 2x PCI slot
RCO-3022PP-4L	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 6x LAN, 2x PCI slot
RCO-3022PP-4L-12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 LAN, 2x PCI slot
RCO-3022PP-4P	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x PoE, 2x PCI slot
RCO-3022PP-4P-M12	Advanced Fanless Embedded System with 5th Gen Intel® Broadwell Core™ i5/i3 or Celeron® Processor, 2x LAN, 4x M12 PoE, 2x PCI slot

Optional Accessories

Model No.	Product Description
1-E09A06002	Adapter AC/DC 12V 5A 60W with 3pin Terminal Block Plug 5.0mm Pitch, GSM60A12-CT
1-E09A22101	Adapter AC/DC 24V 9.2A 220W with 3pin Terminal Block Plug 5.0mm Pitch, GST220A24-CT
SFICBL022	Power Cord, 3-pin US Type, 180cm
1-TPCD00002	Power Cord, European Type, 180cm
1-TPCD00001	Power Cord, 3-pin UK Type, 180cm
3-DINR-0003	DIN-Rail Mount Kit

Chapter 1

Product Introductions

1.1 Overview

Based on 5th Gen. Intel® Core™ i5-5350U (2.9GHz) / i3-5010U (2.1GHz) or Celeron® 3765U (1.9GHz) Dual Core processor, RCO-3000 series 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 (9~48V) 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, RCO-3000 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 RCO-3000 series are safety system for all industrial applications.

RCO-3000 Series

RCO-3011 Series

RCO-3022 Series



1.1.1 Key Features

- Onboard Intel® Core™ i5-5350U (2.9GHz) / Core™ i3-5010U (2.1GHz) / Celeron® 3765U (1.9GHz) Dual Core processor
- 1x DDR3L SO-DIMM Max. up to 8GB
- Dual Display from 1x DVI-I and 1x DisplayPort
- 2x Intel® GbE Port, Support Wake-on-LAN and PXE (RCO-3000, RCO-3011E/P, RCO-3022EE/PP Only)
- 6x Intel® GbE Port, Support Wake-on-LAN and PXE (RCO-3000-4L, RCO-3000-4L-M12, RCO-3011E/P-4L, RCO-3011E/P-4L-M12, RCO-3022EE/PP-4L, RCO-3022EE/PP-4L-M12 Only)
- 6x Intel® GbE Port with 4x PoE Function, Support Wake-on-LAN and PXE (RCO-3000-4P, RCO-3000-4P-M12, RCO-3011E/P-4P, RCO-3011E/P-4P-M12, RCO-3022EE/PP-4P, RCO-3022EE/PP-4P-M12 Only)
- 2x USB 3.0, 6x USB 2.0
- 4x RS232/422/485 Port
- 4x Isolated DI, 4x Isolated DO
- 1x Removable 2.5" SATA HDD Bay and 1x Internal 2.5" SATA SSD/HDD Bay
- 2x mSATA (Shared by 2x Mini-PCIe Socket) and 2x SIM Card Socket
- 9~48VDC Power Input, support AT/ATX Mode
- 2x Mini-PCIe Socket for Wi-Fi, GSM, or I/O Expansion
- 1x PCIe x4 Expansion (RCO-3011E Series Only)
- 1x PCI Expansion (RCO-3011P Series Only)
- 2x PCIe x4 Expansion (RCO-3022EE Series Only)
- 2x PCI Expansion (RCO-3022PP Series Only)
- Remote Power On/Off Switch

1.2 Hardware Specification

Processor System

- Onboard Intel® Core™ i5-5350U / Core™ i3-5010U / Celeron® 3765U Dual Core Processor, 2.9 / 2.1 / 1.9GHz with AMI 64Mbit SPI BIOS

Memory

- 1x 204-Pin DDR3L-1066 / 1333MHz SO-DIMM (un-buffered and non-ECC), Max. up to 8GB

Display

Dual Display

1x DVI -D, 1x DisplayPort

Expansion

- RCO-3011E Series:** 1x PCIe x4
- RCO-3011P Series:** 1x PCI
- RCO-3022EE Series :** 2x PCIe x4
- RCO-3022PP Series:** 2x PCI
- 2x Full-size Mini PCIe Socket for Wi-Fi / GSM / Expansion Module
- 1x Universal I/O Bracket (RCO-3000, RCO-3011E-4L/4P, RCO-3011E-4L/4P-M12, RCO-3011P-4L/4P, RCO-3011E-4L/4P-M12, RCO-3022EE-4L/4P, RCO-3022EE-4L/4P-M12, RCO-3022PP-4L/4P, RCO-3022PP-4L/4P-M12 Only)
- 2x Universal I/O Bracket (RCO-3011E/P, RCO-3022EE/PP, Only)

Ethernet

- 2x Intel® i210-AT GbE LAN Port, Support Wake-on-LAN and PXE (RCO-3000, RCO-3011E/P, RCO-3022E/P Only)
- 6x Intel® i210-AT GbE LAN Port, LAN1 and LAN2 Support Wake-on-LAN (RCO-3000-4L, RCO-3000-4L-M12, RCO-3011E/P-4L, RCO-3011E/P-4L-M12, RCO-3022EE/PP-4L, RCO-3022EE/PP-4L-M12 Only)
- 4x 802.3at Compliant PoE Port, The Maximum DC Power Delivery on Each PoE is 25.5W (RCO-3000-4P, RCO-3000-4P-M12, RCO-3011E/P-4P, RCO-3011E/P-4P-M12, RCO-3022EE/PP-4P, RCO-3022EE/PP-4P-M12 Only)

Audio

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

Watchdog Timer

- Software Programmable Supports 1~255 sec. System Reset

Storage

- 1x Removable 2.5" SATA HDD Bay
- 1x Internal 2.5" SATA HDD Bay
- 2x mSATA Socket (Shared by 2x Mini-PCIe Socket)
- 2x External SIM Card Socket
- Support RAID 0, 1, 5, 10

I/O Ports

- 2x USB 3.0 Port
- 6x USB 2.0 Port
- 4 Isolated DI and 4 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

- 4x 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-)
- 4x 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 9~48VDC
- 1x Optional AC/DC 12V/5A, 60W Power Adapter
- 1x Optional AC/DC 24V/9.2A, 220W Power Adapter (RCO-3000-4P, RCO-3000-4P-M12, RCO-3011E/P-4P, RCO-3011E/P-M12, RCO-3022EE/PP-4P, RCO-3022EE/PP-4P-M12 Only)

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)

Physical

- RCO-3000 Series**
 - ✓ Dimension (WxDxH, mm): 185 x 197 x 57.4 mm
 - ✓ Weight: 2.16 kg ~ 2.54 kg
- RCO-3011 Series**
 - ✓ Dimension (WxDxH, mm): 185 x 197 x 85 mm
 - ✓ Weight: 2.64 kg ~ 3.09 kg
- RCO-3022 Series**
 - ✓ Dimension (WxDxH, mm): 185 x 197 x 105 mm
 - ✓ Weight: 2.87 kg ~ 3.33 kg
- Construction: Extruded Aluminum with Heavy Duty Metal
- Mounting: Wall/ DIN-Rail Mounting

Operating System

- Windows® 7
- WES7
- Windows® 8.1
- WES8.1
- Windows 10
- Linux kernel 3.X

Certifications

- CE
- FCC Class A

1.3 System I/O

1.3.1 RCO-3000

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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

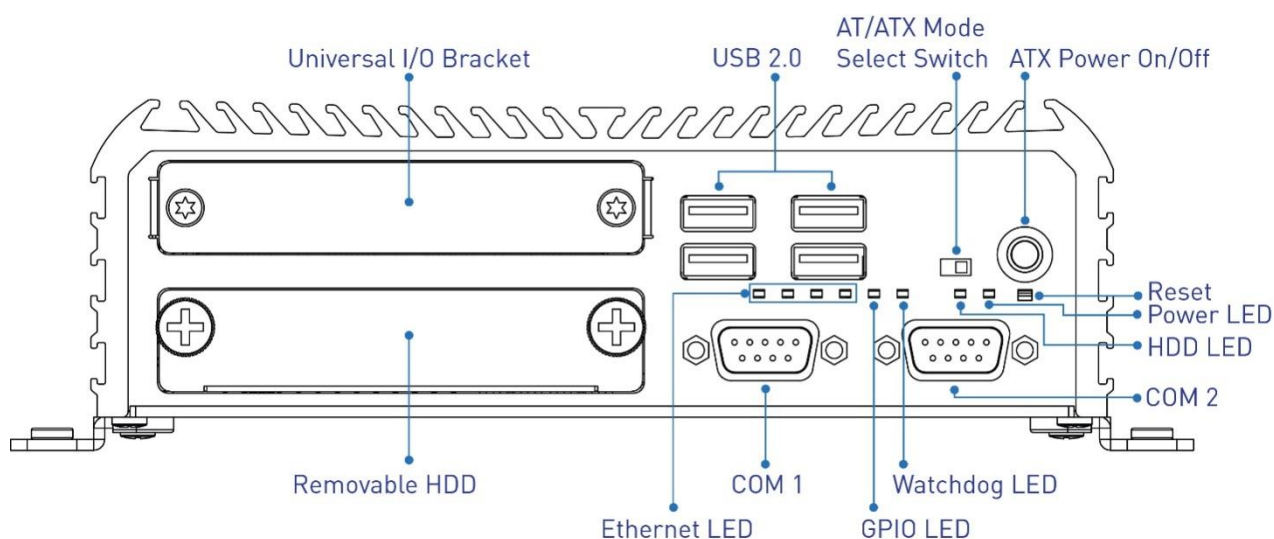
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

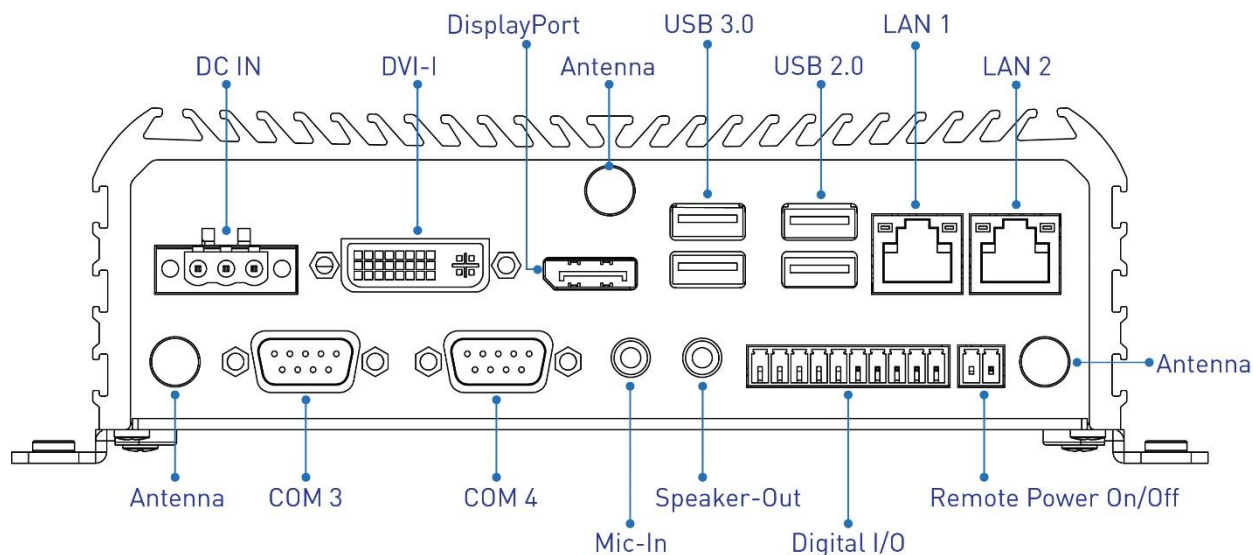
The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

Antenna hole

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



1.3.2 RCO-3000-4L(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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN Port

Used to connect the system to a local area network (RCO-3000-4L Only)

PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3000-4P Only)

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

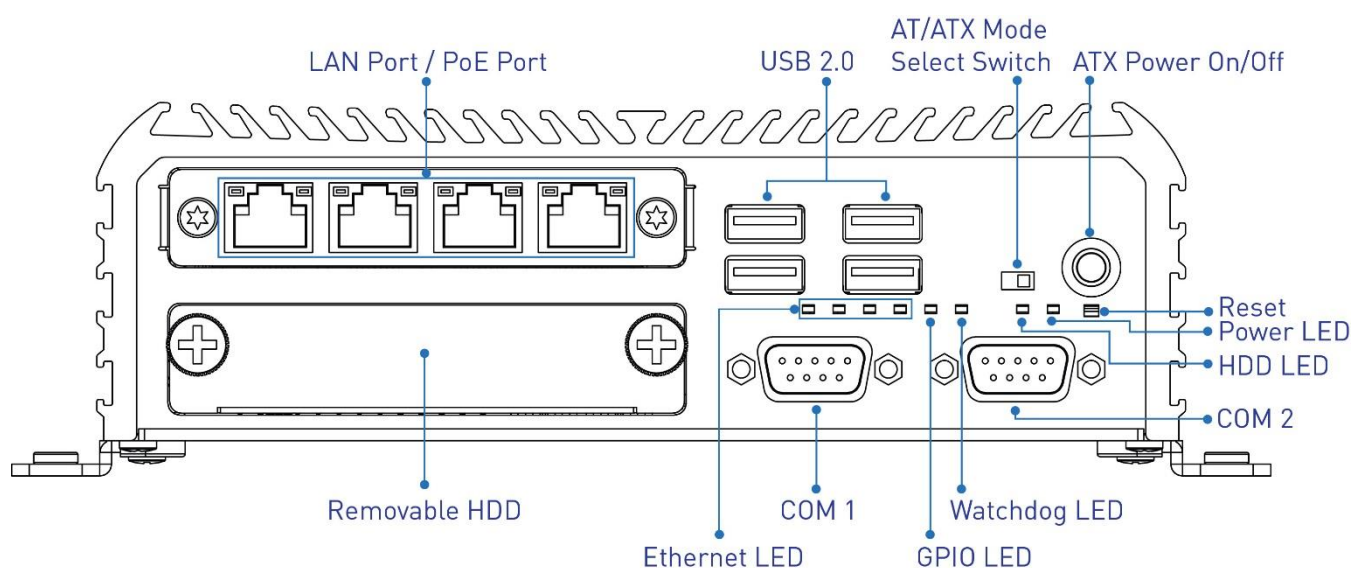
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

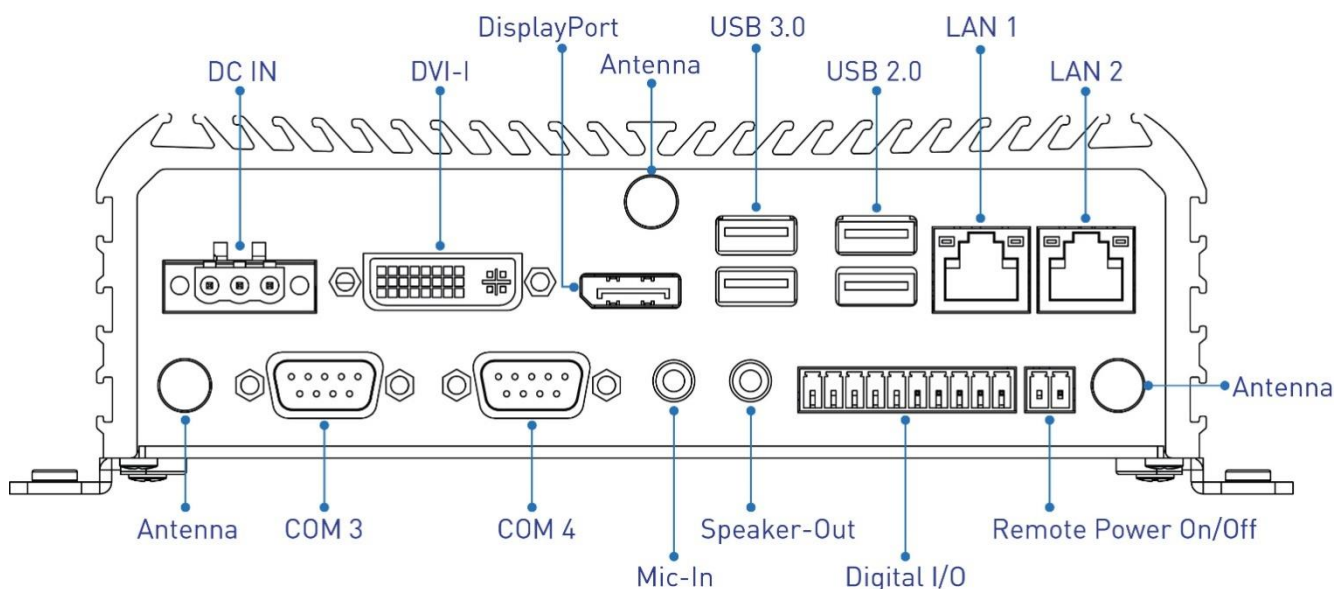
The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

Antenna hole

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



1.3.3 RCO-3000-4L(P)-M12

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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

M12 LAN Port

Used to connect the system to a local area network (RCO-3000-4L-M12 Only)

M12 PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3000-4P-M12 Only)

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

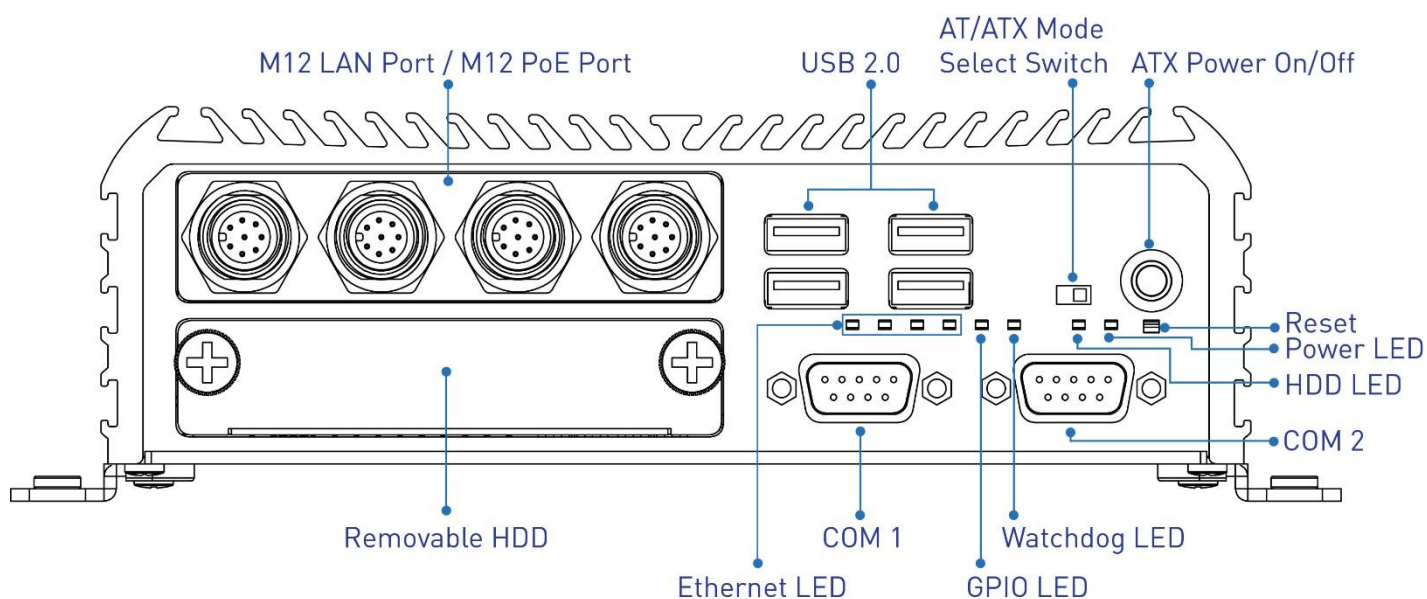
Indicates the status of the watchdog active

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Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

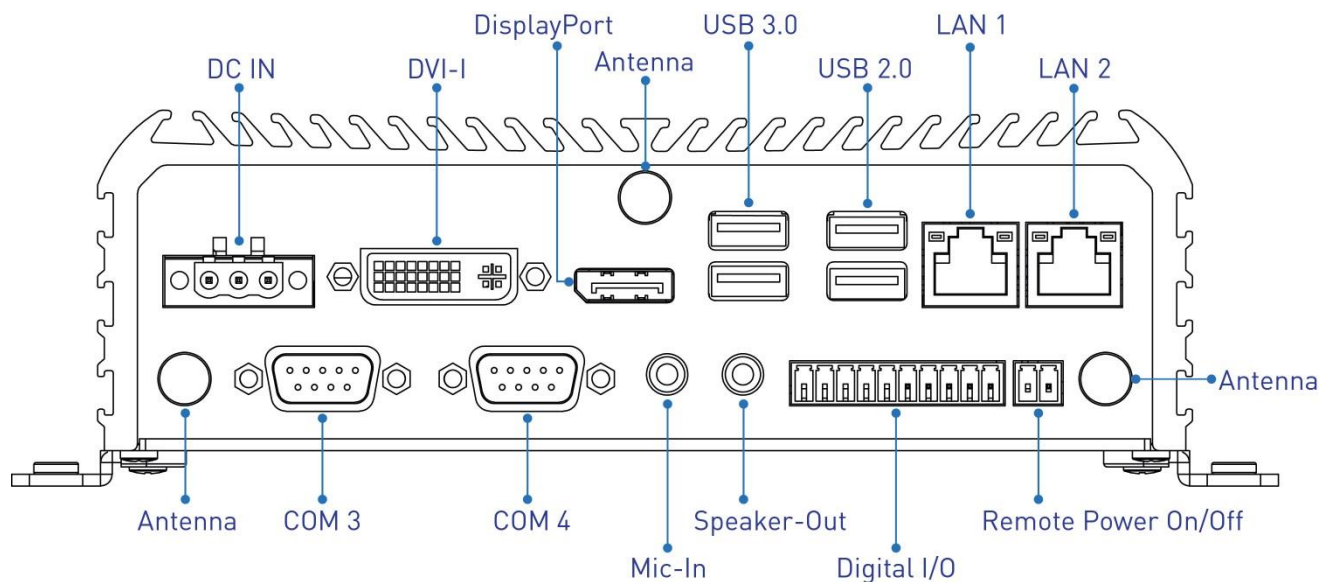
The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

Antenna hole

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



1.3.4 RCO-3011E(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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

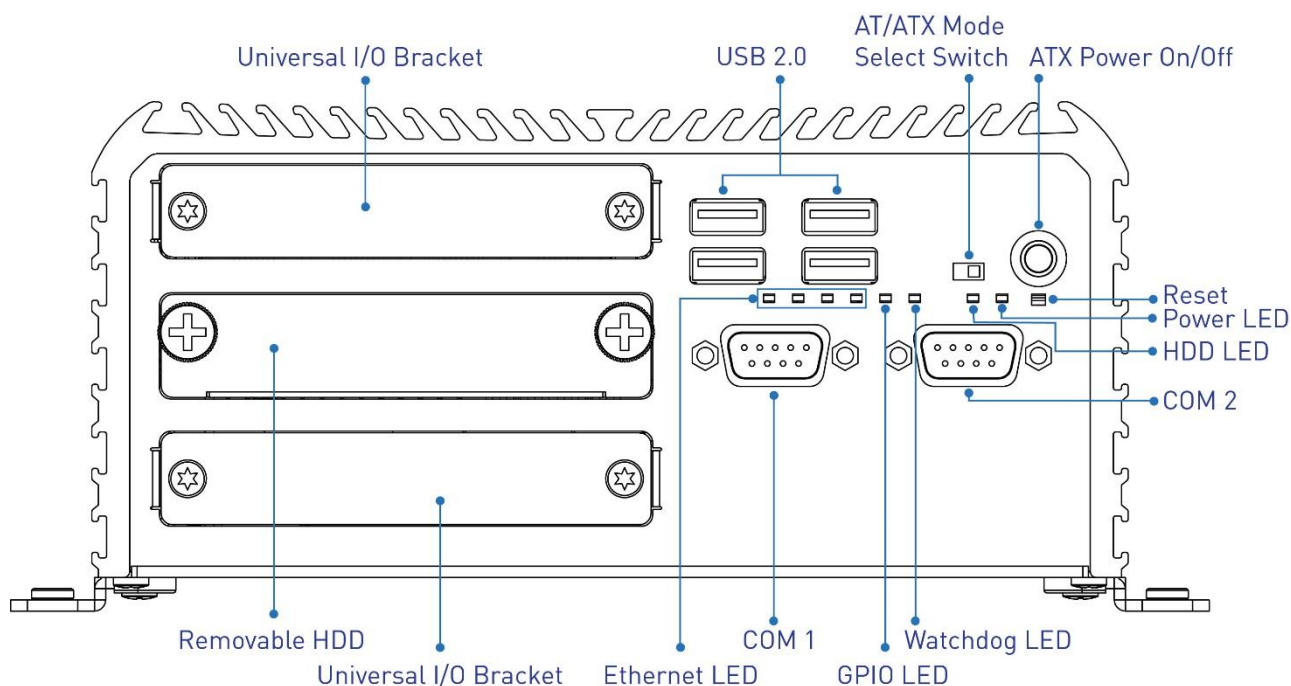
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

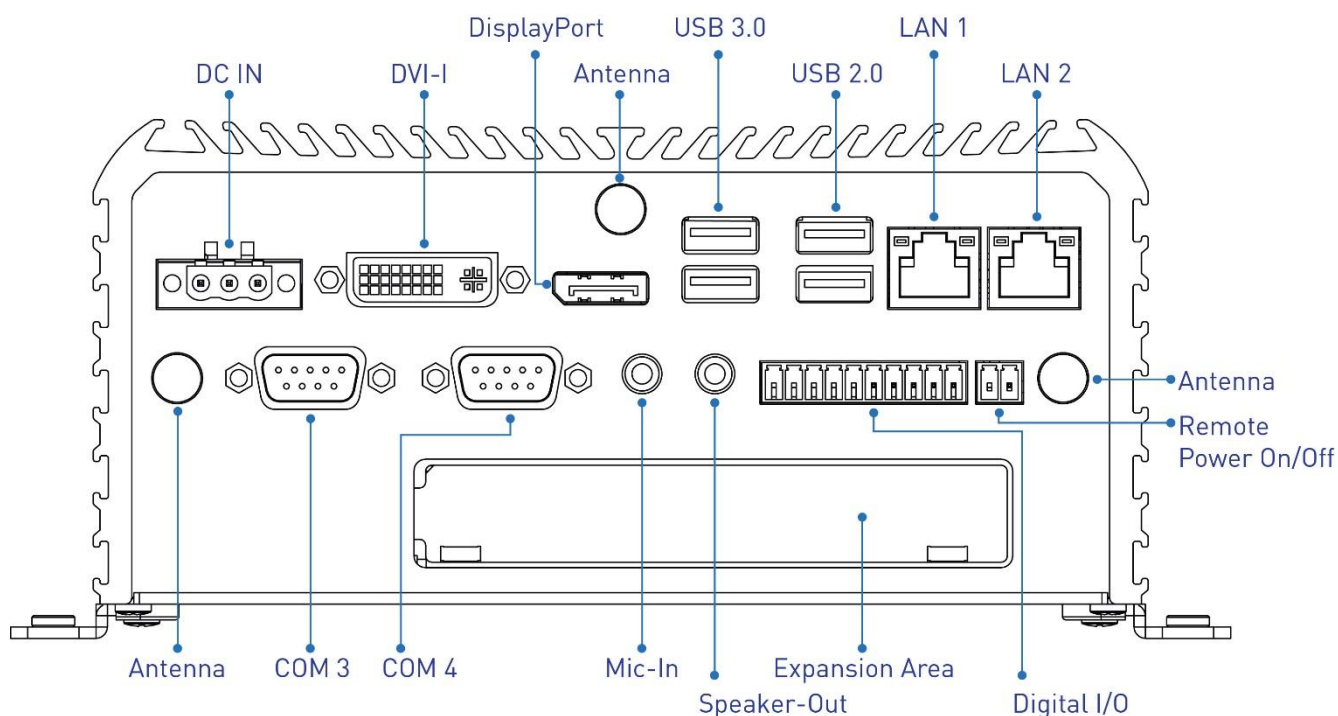
Expansion Area

Used to plug PCIe Card (RCO-3011E Only)

Used to plug PCI Card (RCO-3011P Only)

Antenna hole

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



1.3.5 RCO-3011E-4L(P) / RCO-3011P-4L(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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN Port

Used to connect the system to a local area network (RCO-3011E-4L, RCO-3011P-4L Only)

PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3011E-4P, RCO-3011P-4P Only)

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

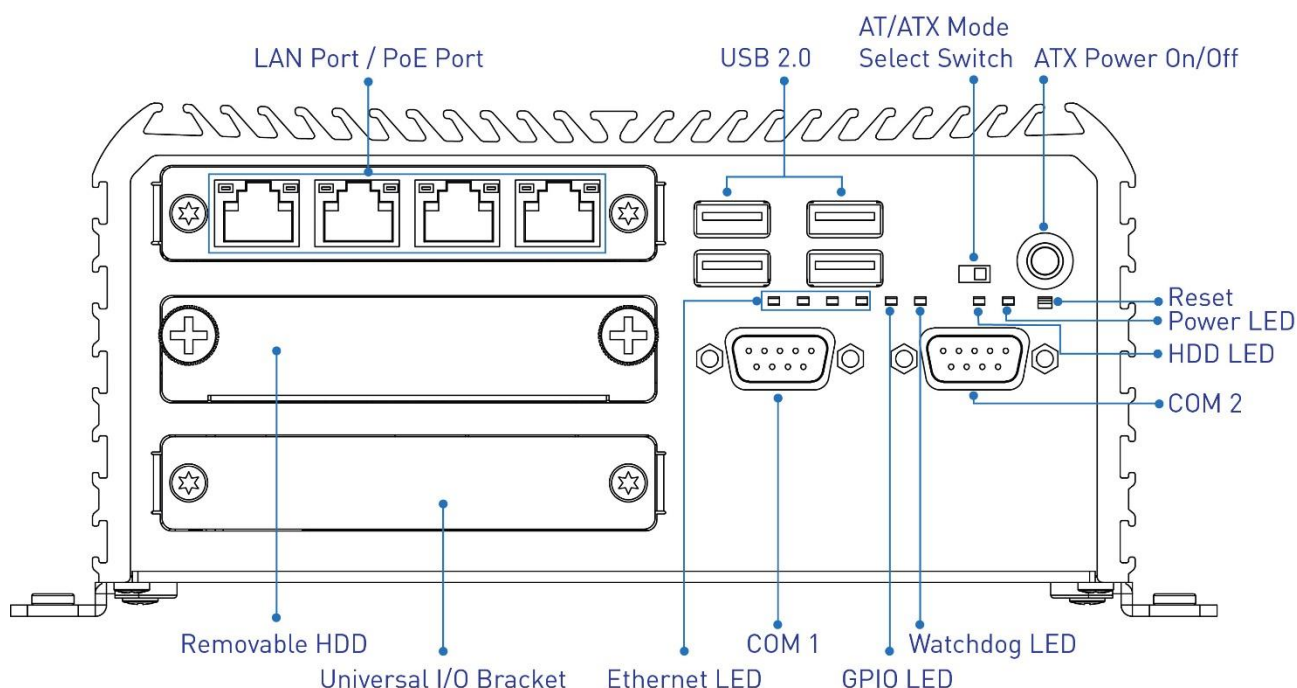
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

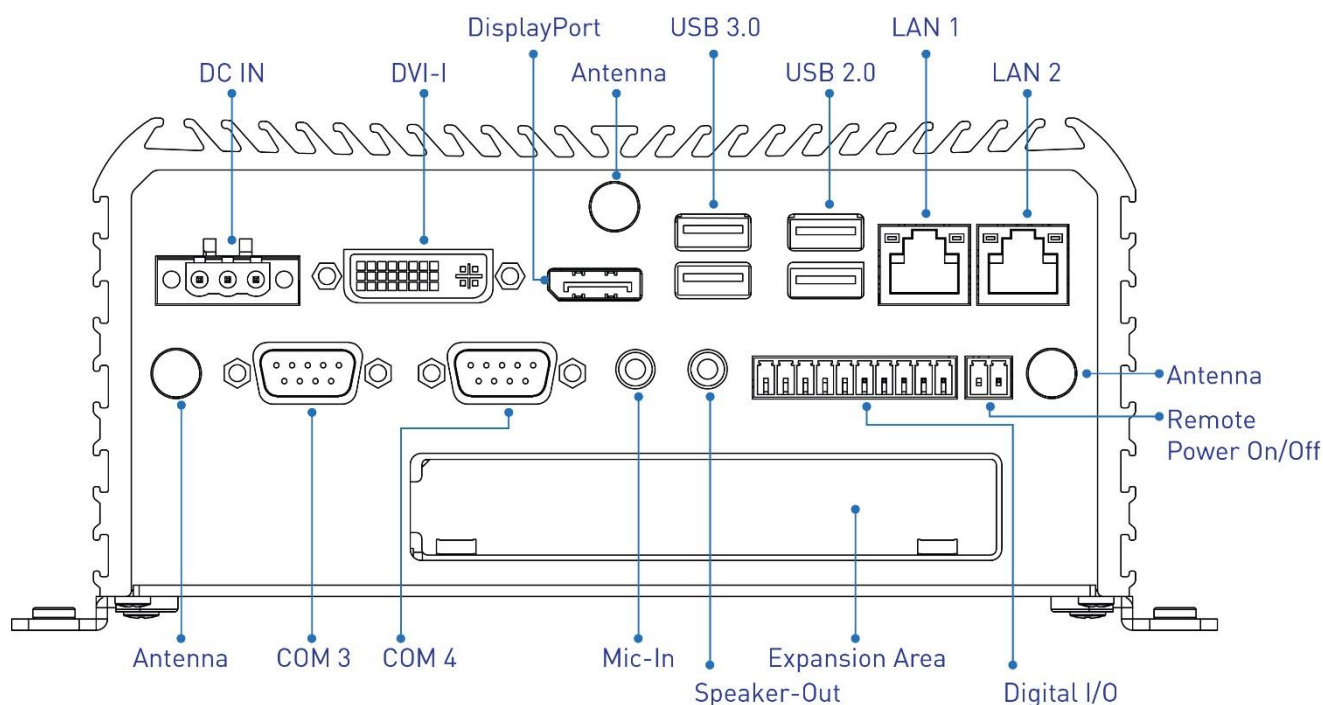
Used to plug a remote power on/off terminal block

Expansion Area

Used to plug PCIe Card (RCO-3011E-4L/4P Only)
Used to plug PCI Card (RCO-3011P-4L/4P Only)

Antenna hole

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



1.3.6 RCO-3011E-4L(P)-M12 / RCO-3011P-4L(P)-M12

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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

M12 LAN Port

Used to connect the system to a local area network (RCO-3011E-4L-M12, RCO-3011P-4L-M12 Only)

M12 PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3011E-4P-M12, RCO-3011P-4P-M12 Only)

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

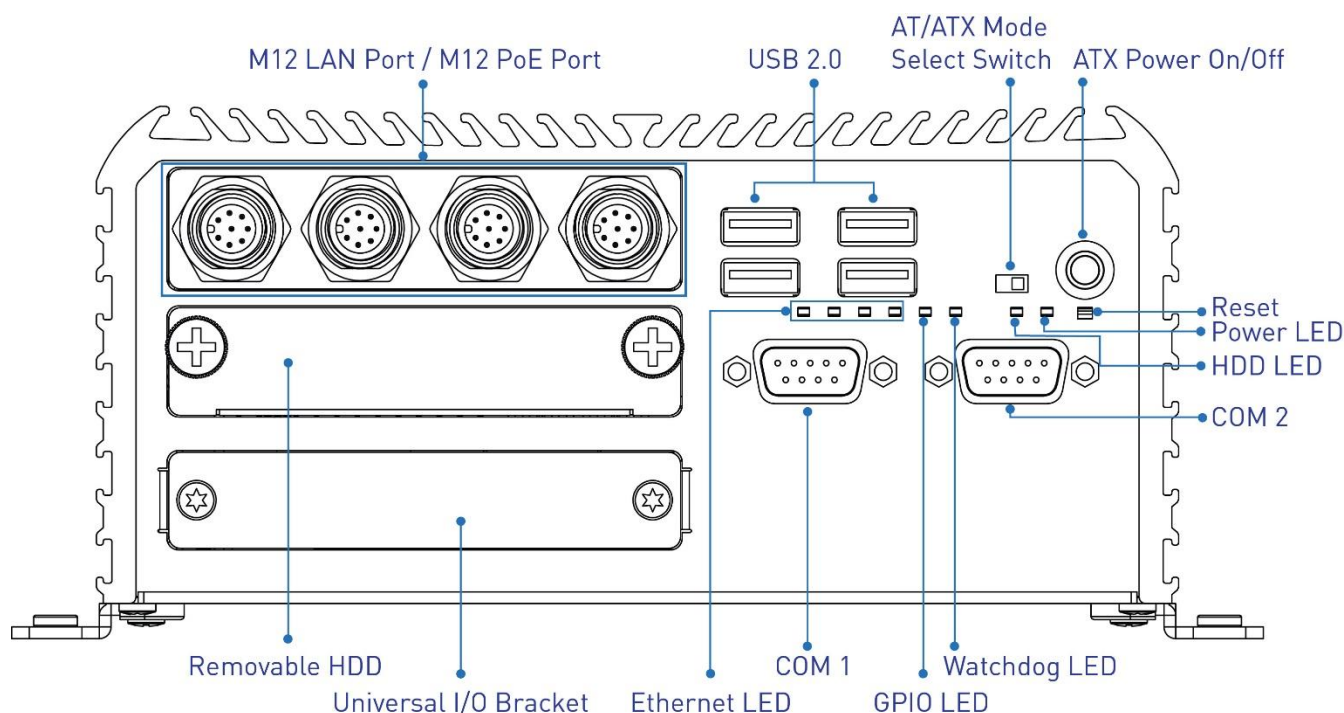
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

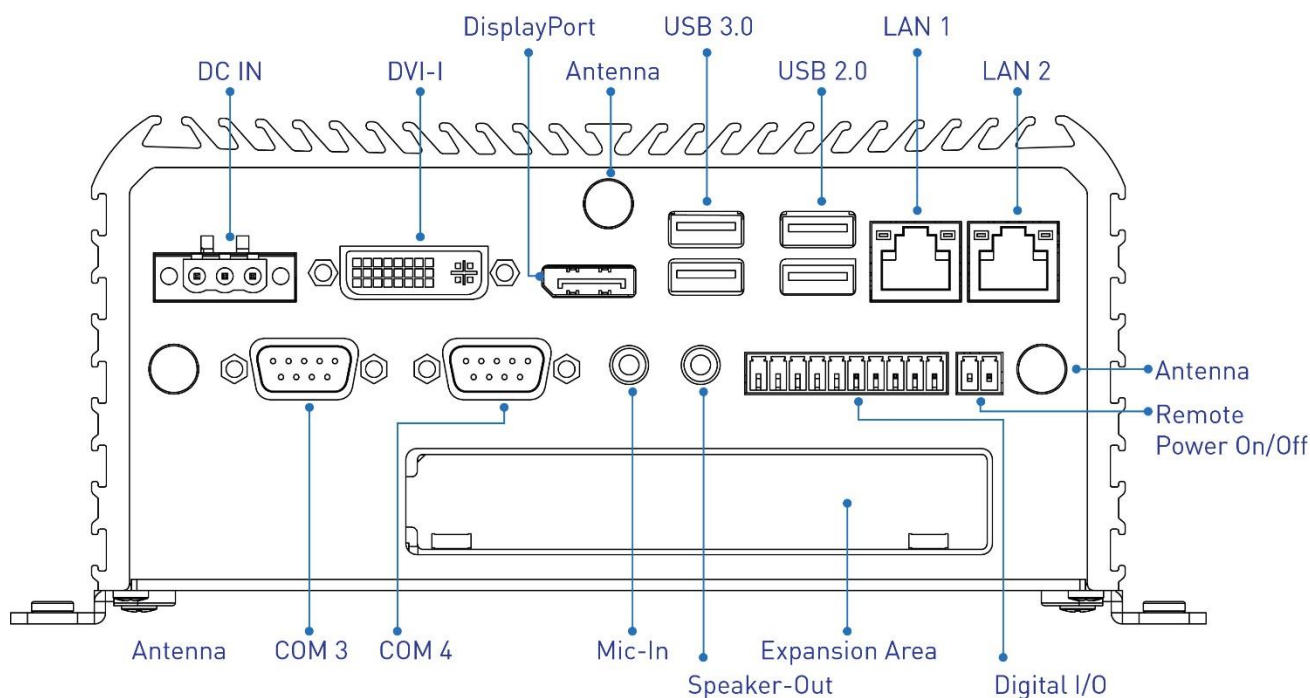
Expansion Area

Used to plug PCIe Card (RCO-3011E-4L/4P-M12 Only)

Used to plug PCI Card (RCO-3011P-4L/4P-M12 Only)

Antenna hole

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



1.3.7 RCO-3022EE(PP)

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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

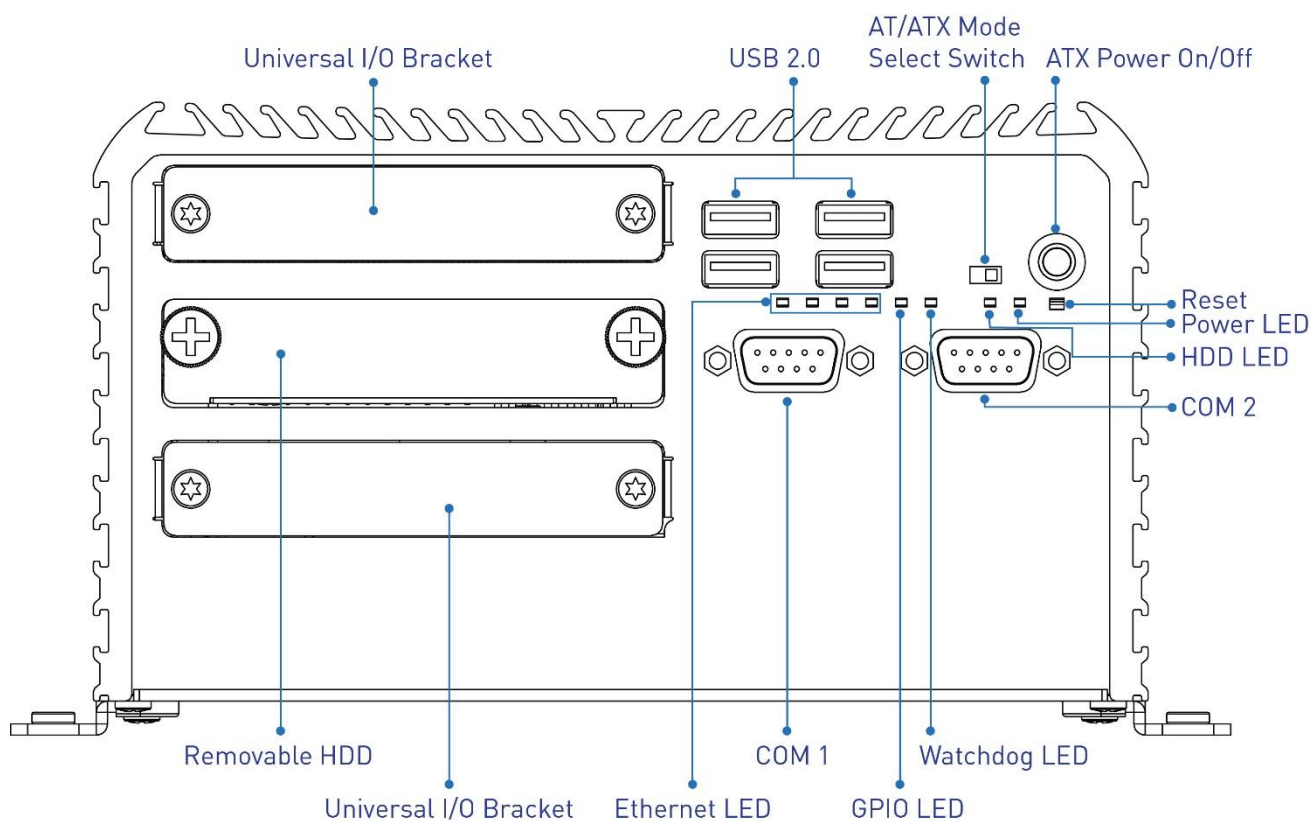
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

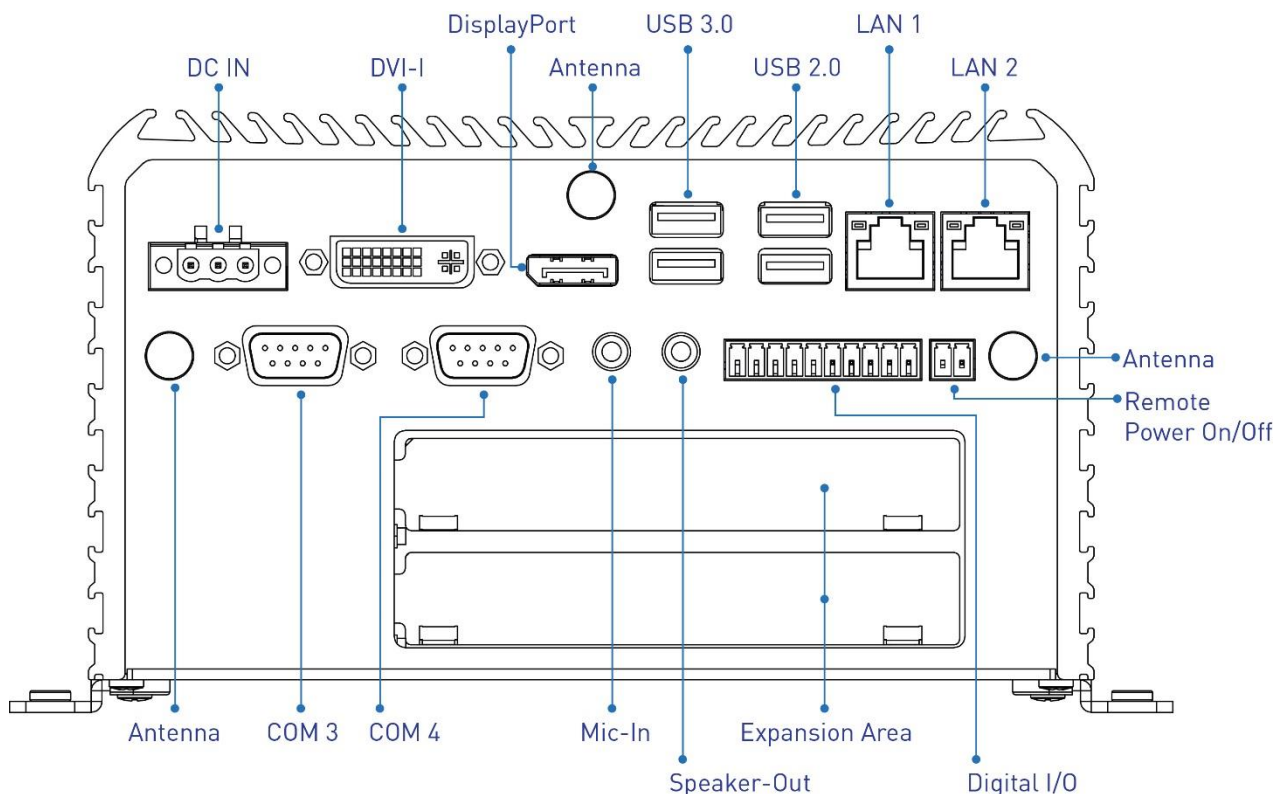
Used to plug a remote power on/off terminal block

Expansion Area

Used to plug PCIe Card (RCO-3011EE Only)
Used to plug PCI Card (RCO-3011PP Only)

Antenna hole

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



1.3.8 RCO-3022EE-4L(P) / RCO-3022PP-4L(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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN Port

Used to connect the system to a local area network (RCO-302EE-4L, RCO-3022PP-4L Only)

PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3022EE-4P, RCO-3022PP-4P Only)

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

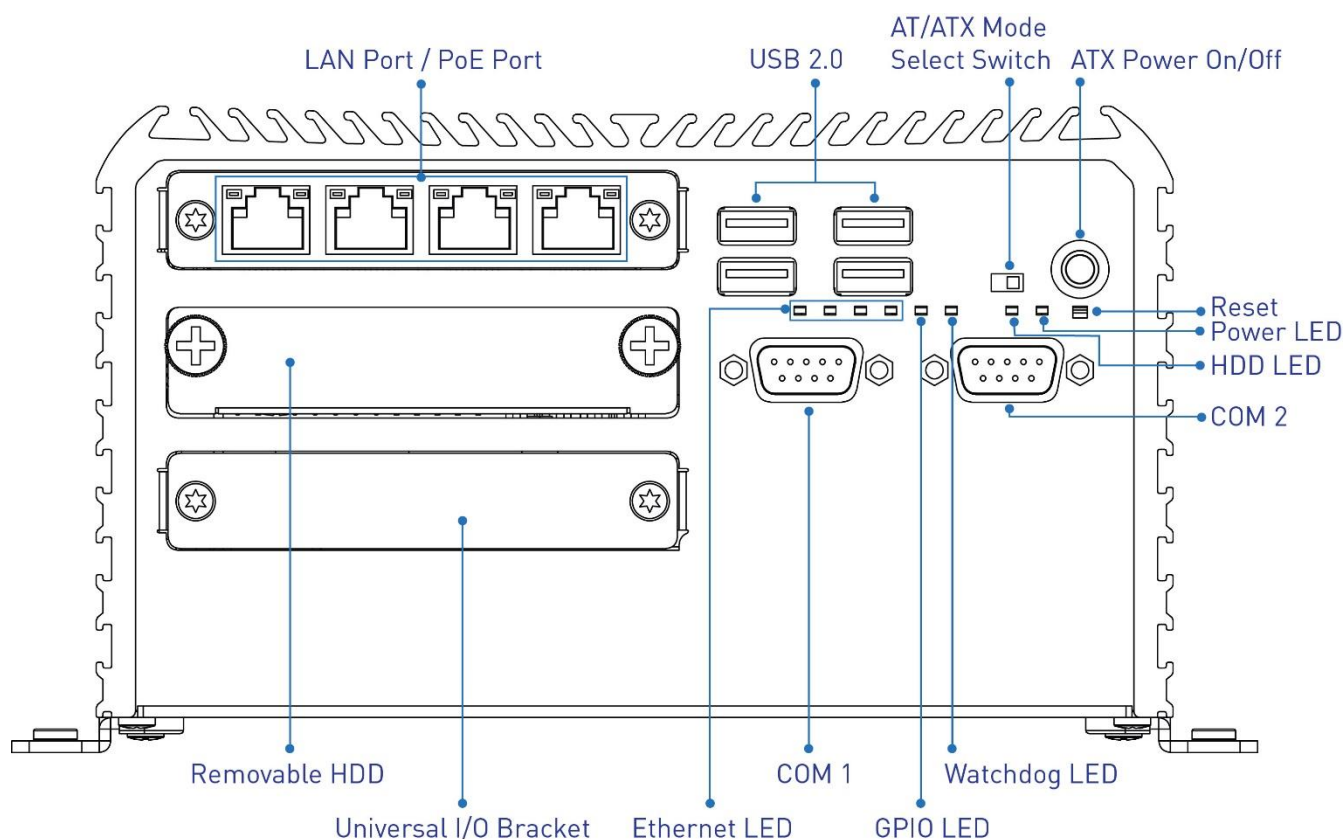
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

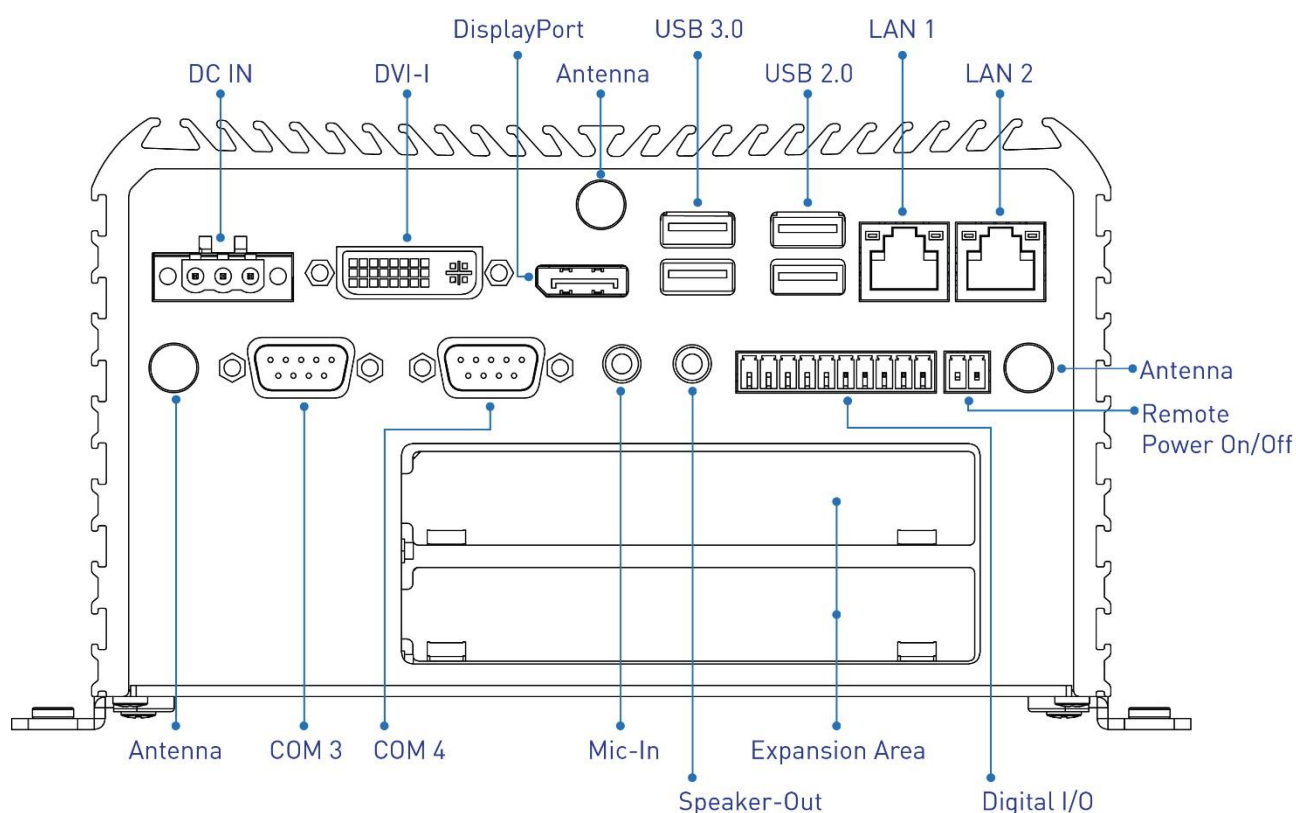
Expansion Area

Used to plug PCIe Card (RCO-3011EE-4L/4P Only)

Used to plug PCI Card (RCO-3011PP-4L/4P Only)

Antenna hole

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



1.3.9 RCO-3022EE-4L(P)-M12 / RCO-3022PP-4L(P)-M12

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

SIM card

Used to insert SIM card

COM port

COM1 ~ COM2 support RS232/422/485 serial device

USB 2.0 port

Used to connect USB 2.0/1.1 device

M12 LAN Port

Used to connect the system to a local area network (RCO-302EE-4L-M12, RCO-3022PP-4L-M12 Only)

M12 PoE Port

Used to connect the system to a local area network with power over Ethernet (RCO-3022EE-4P-M12, RCO-3022PP-4P-M12 Only)

Universal I/O Bracket

Used to customized I/O output

HDD port

Removable 2.5" SATA HDD Area

Power LED

Indicates the power status of the system

HDD LED

Indicates the status of the hard drive

Watchdog LED

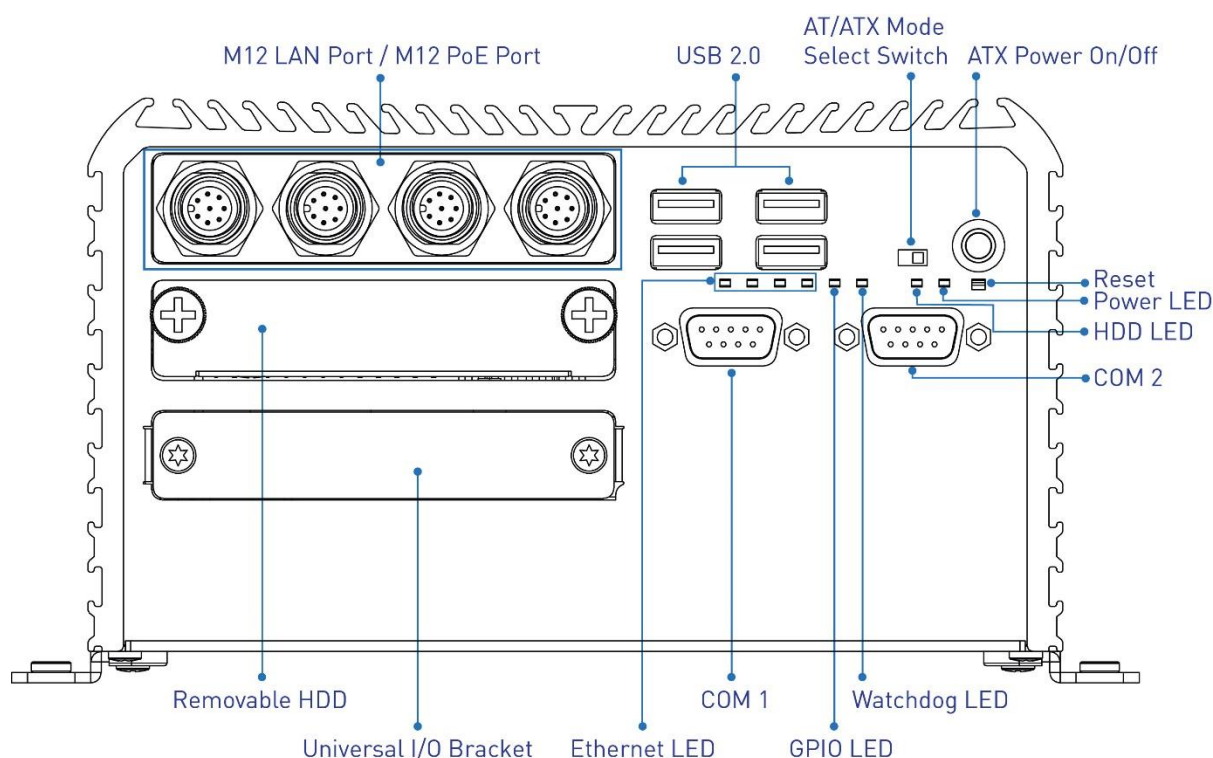
Indicates the status of the watchdog active

GPIO LED

Indicates the status of the customer define

Ethernet LEDs

Indicates the status of the LAN active



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

USB 3.0 port

Used to connect USB 3.0/2.0/1.1 device

USB 2.0 port

Used to connect USB 2.0/1.1 device

LAN port

Used to connect the system to a local area network

COM port

COM3 ~ COM4 support RS232/422/485 serial device

Mic-in

Used to connect a microphone

Speaker-out

Used to connect a speaker

Digital I/O Terminal Block

The Digital I/O terminal block supports 4 digital input and 4 digital output

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

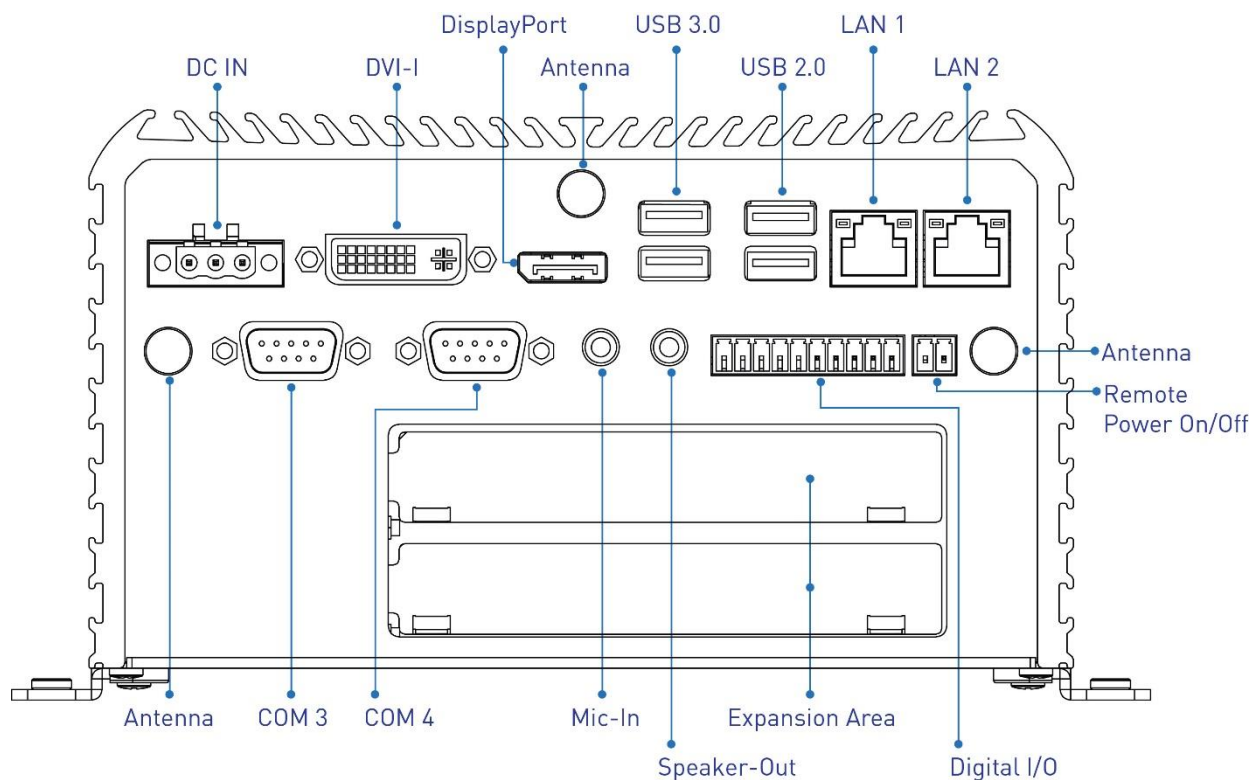
Expansion Area

Used to plug PCIe Card (RCO-3011EE-4L/4P-M12 Only)

Used to plug PCI Card (RCO-3011PP-4L/4P-M12 Only)

Antenna hole

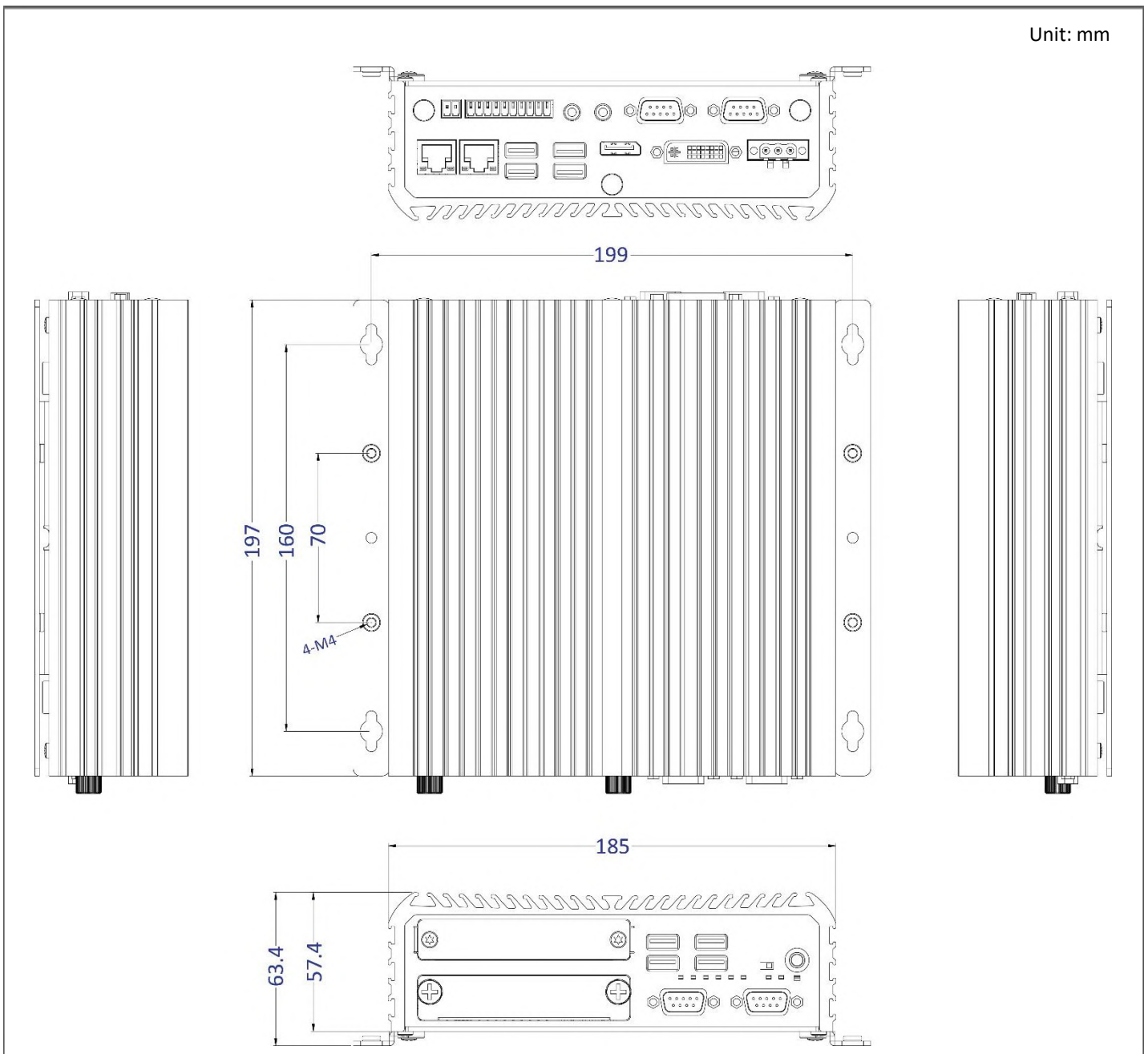
Used to connect an antenna for optional Mini-PCIe WiFi module



1.4 Mechanical Dimensions

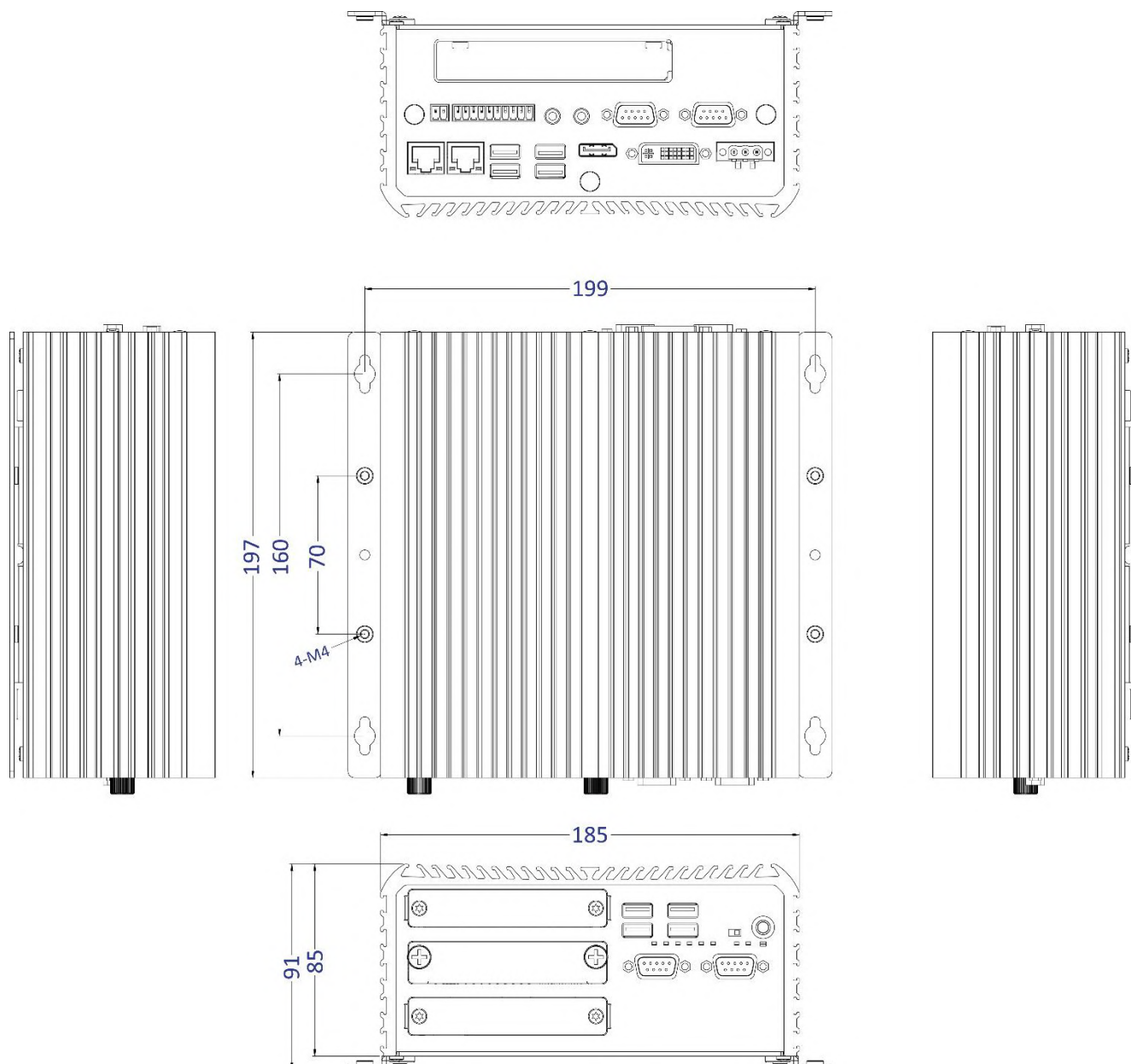
1.4.1 RCO-3000 / RCO-3000-4L(P) / RCO-3000-4L(P)-M12

Unit: mm



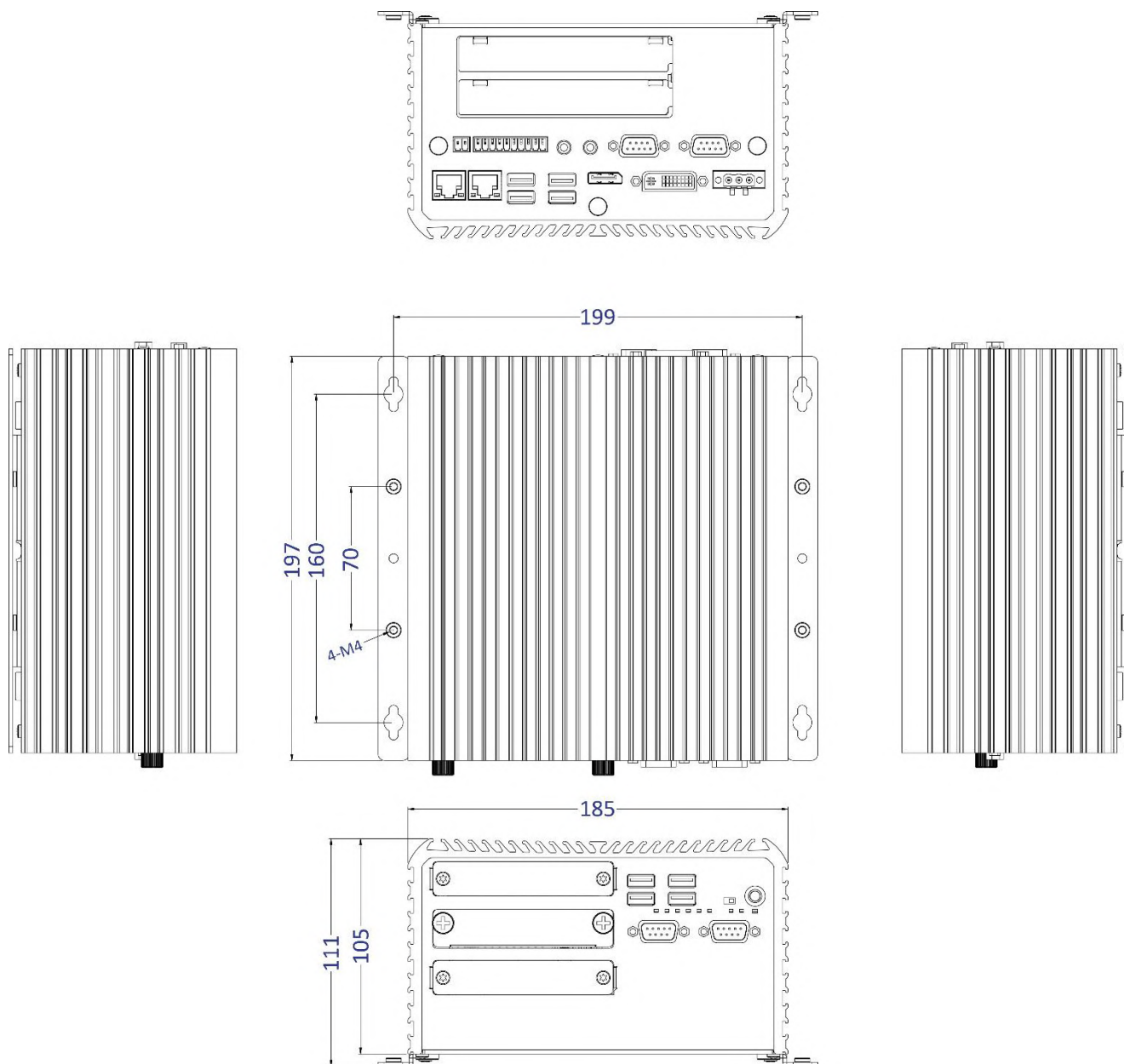
1.4.2 RCO-3011E(P) / RCO-3011E(P)-4L(P) / RCO-3011E(P)-4L(P)-M12

Unit: mm



1.4.3 RCO-3022EE(PP) / RCO-3022EE(PP)-4L(P) / RCO-3022EE(PP)-4L(P)-M12

Unit: mm

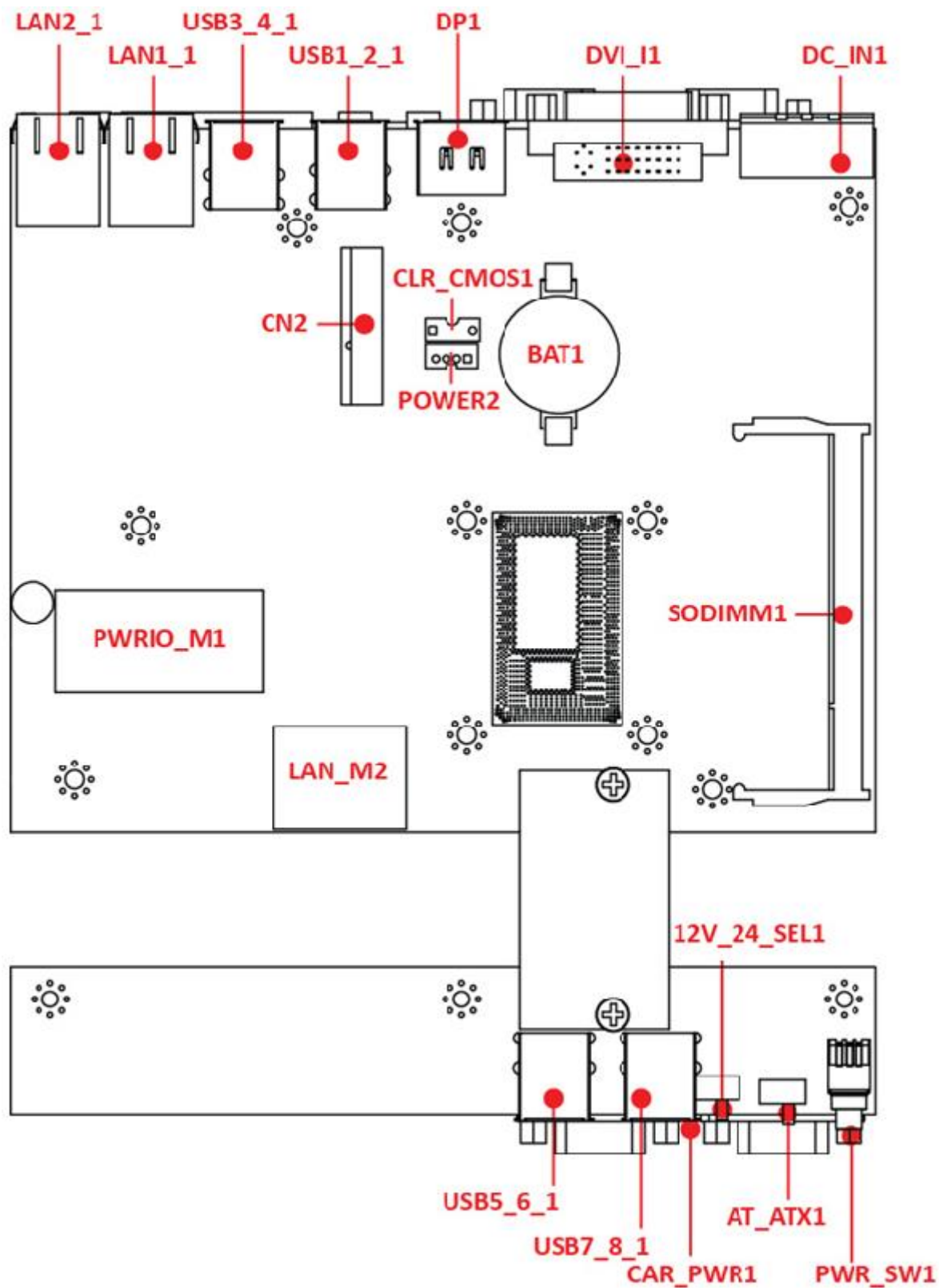


Chapter 2

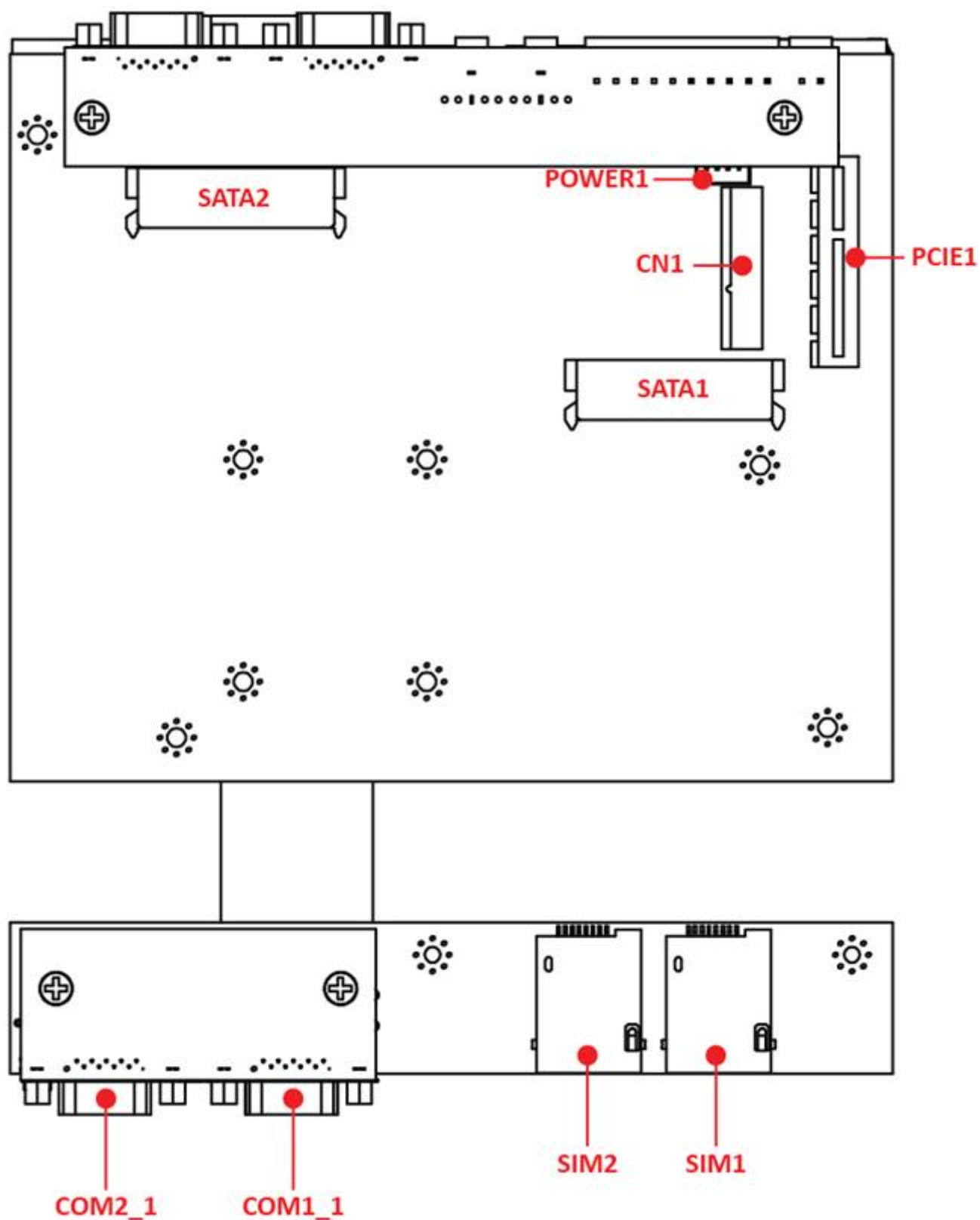
Switches and Connectors

2.1 Switch and Connector Locations

2.1.1 Top View



2.1.2 Bottom View



2.2 Connector / Switch Definition

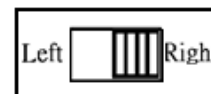
List of Connector / Switch

Connector Location	Definition
AT_ATX1	AT / ATX Power Mode Switch
CLR_CMOS1	Clear BIOS Switch
PWR_SW1	Power Switch
RESET1	Reset Switch
USB1_2_1	USB 3.0 Port
USB3_4_1, USB5_6_1, USB7_8_1	USB 2.0 Port
SIM1, SIM2	SIM Card Socket
COM1_1, COM2_1, COM3_1, COM4_1	RS232 / RS422 / RS485 Connector
LAN1_1, LAN2_1	LAN Port
LAN3, LAN4, LAN5, LAN6	LAN Port / M12 LAN Port
DC_IN1	3-pin DC 9~48V Power Input Connector
DVI_I1	DVI-I Connector
DP1	DisplayPort Connector
SPK_OUT1	Speaker-out Jack
MIC_IN1	Mic-in Jack
DIO1	4DI / 4DO Connector
PWR_SW2	Remote Power Switch
LAN_M2	LAN Module Connector
PWRIO_M1	Power Module Connector
CN1, CN2	Mini PCI-Express / mSATA Socket
SATA1, SATA2	SATA with Power Connector
POWER1, POWER2	Power Connector
PCIE1	PCI-Express X4 Slot
PWR_LED1	Power LED Status
HDD_LED1	HDD Access LED Status
WDT_LED1	Watchdog LED Status
GPIO_LED1	GPIO LED Status
LAN1_LINK1, LAN2_LINK1	LAN Link LED
LAN1_ACT1, LAN2_ACT1	LAN Active LED

2.3 Switches Definitions

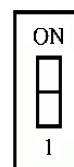
AT_ATX1: AT / ATX Power Mode Switch

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



CLR_CMOS1: Clear BIOS Switch

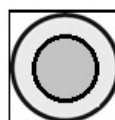
Switch	Definition
Off	Normal Status (Default)
ON	Clear BIOS



2.4 Connectors Definitions

PWR_SW1: Power Button

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



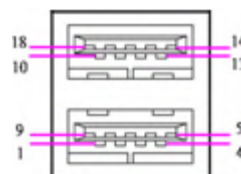
RESET1 : Reset Button

Pin	Definition
1	RESET
2	GND



USB1_2_1: USB3.0 Connector, Type A

Pin	Definition	Pin	Definition
1	+5V	10	+5V
2	USB2_D0-	11	USB2_D1-
3	USB2_D0+	12	USB2_D1+
4	GND	13	GND
5	USB3_RX1-	14	USB3_RX2-
6	USB3_RX1+	15	USB3_RX2+
7	GND	16	GND
8	USB3_TX1-	17	USB3_TX2-
9	USB3_TX1+	18	USB3_TX2+

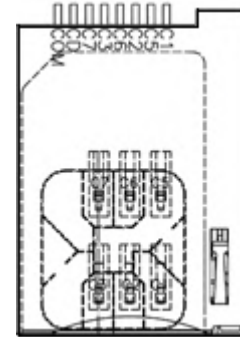


USB3_4_1, USB5_6_1, USB7_8_1: USB2.0 Connector, Type A

Pin	USB3_4_1 Definition	USB5_6_1 Definition	USB7_8_1 Definition
1	+5V	+5V	+5V
2	USB2_D2-	HUB_USB2_D0-	HUB_USB2_D2-
3	USB2_D2+	HUB_USB2_D0+	HUB_USB2_D2+
4	GND	GND	GND
5	+5V	+5V	+5V
6	USB2_D3-	HUB_USB2_D1-	HUB_USB2_D3-
7	USB2_D3+	HUB_USB2_D1+	HUB_USB2_D3+
8	GND	GND	GND

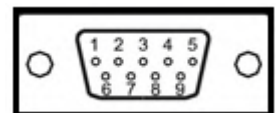
SIM1, SIM2 : SIM Card Socket

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

**COM1_1: RS232 / RS422 / RS485 Connector**

Connector Type: 9-pin D-Sub

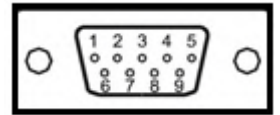
Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD1	TX1-	DATA1-
2	RxD1	TX1+	DATA1+
3	TxD1	RX1+	
4	DTR1	RX1-	
5	GND		
6	DSR1		
7	RTS1		
8	CTS1		
9	RI1		



COM2_1: RS232 / RS422 / RS485 Connector

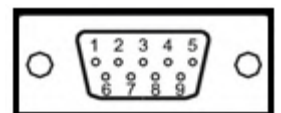
Connector Type: 9-pin D-Sub

Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD2	TX2-	DATA2-
2	RxD2	TX2+	DATA2+
3	TxD2	RX2+	
4	DTR2	RX2-	
5	GND		
6	DSR2		
7	RTS2		
8	CTS2		
9	RI2		

**COM3_1: RS232 / RS422 / RS485 Connector**

Connector Type: 9-pin D-Sub

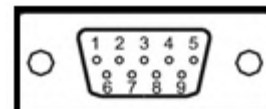
Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD3	TX3-	DATA3-
2	RxD3	TX3+	DATA3+
3	TxD3	RX3+	
4	DTR3	RX3-	
5	GND		
6	DSR3		
7	RTS3		
8	CTS3		
9	RI3		



COM4_1: RS232 / RS422 / RS485 Connector

Connector Type: 9-pin D-Sub

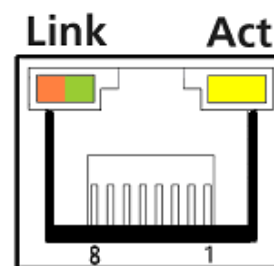
Pin	RS232 Definition	RS422 / 485 Full Duplex Definition	RS485 Half Duplex Definition
1	DCD4	TX4-	DATA4-
2	RxD4	TX4+	DATA4+
3	TxD4	RX4+	
4	DTR4	RX4-	
5	GND		
6	DSR4		
7	RTS4		
8	CTS4		
9	RI4		

**LAN1, LAN2: RJ45 with LEDs Port**

Connector Type: RJ45 Connector

Pin	Definition	Pin	Definition
1	LAN1_MDI0P	5	LAN1_MDI2N
2	LAN1_MDI0N	6	LAN1_MDI1N
3	LAN1_MDI1P	7	LAN1_MDI3P
4	LAN1_MDI2P	8	LAN1_MDI3N

Pin	Definition	Pin	Definition
1	LAN2_MDI0P	5	LAN2_MDI2N
2	LAN2_MDI0N	6	LAN2_MDI1N
3	LAN2_MDI1P	7	LAN2_MDI3P
4	LAN2_MDI2P	8	LAN2_MDI3N

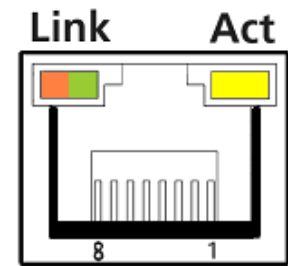


Link LED Status	Definition	Act LED Status	Definition
Steady Orange	1Gbps Network Link	Blinking Yellow	Data Activity
Steady Green	100Mbps Network Link	Off	No Activity
Off	10Mbps Network Link		

LAN3, LAN4, LAN5, LAN6: RJ45 with LEDs Port

Connector Type: RJ45 Connector

Pin	LAN3~LAN6 Definition	Pin	LAN3~LAN6 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

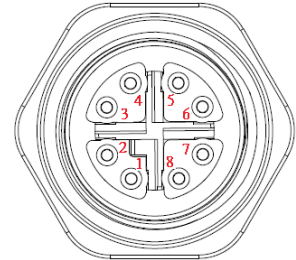


Link LED Status	LAN3~LAN6 Definition	Act LED Status	LAN3~LAN6 Definition
Steady Orange	1Gbps Network Link	Blinking Yellow	Data Activity
Steady Green	100Mbps Network Link	Off	No Activity
Off	10Mbps Network Link		

LAN3, LAN4, LAN5, LAN6: M12 Lan Port

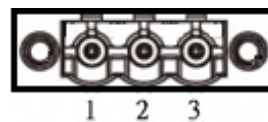
Connector Type: M12 X-code Female Connector

Pin	LAN3~LAN6 Definition	Pin	LAN3~LAN6 Definition
1	LAN_MDI0P	5	LAN_MDI3N
2	LAN_MDI0N	6	LAN_MDI3N
3	LAN_MDI1P	7	LAN_MDI2P
4	LAN_MDI1N	8	LAN_MDI2N

**DC_IN1: DC Power Input Connector (+9~48V)**

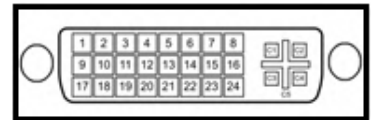
Connector Type: Terminal Block 1X3 3-pin, 5.0mm pitch

Pin	Definition
1	+9~48VIN
3	GND

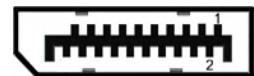


DVI_I1: DVI-I Connector

Pin	Definition	Pin	Definition
1	DVI_TX2-	16	DVI Hot Plug Detect
2	DVI_TX2+	17	DVI_TX0-
3	GND	18	DVI_TX0+
4	NC	19	GND
5	NC	20	VGA_DDC_CLOCK
6	DVI_DDC_CLOCK	21	VGA_DDC_DATA
7	DVI_DDC_DATA	22	GND
8	VGA_VSYNC	23	DVI_TXCLK+
9	DVI_TX1-	24	DVI_TXCLK-
10	DVI_TX1+	C1	VGA_RED
11	GND	C2	VGA_GREEN
12	NC	C3	VGA_BLUE
13	NC	C4	VGA_HSYNC
14	+5V	C5	GND
15	GND		

**DP1: 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	DP_PWR



SPK_OUT1 : Speaker-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)**

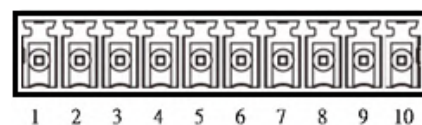
Connector Type: 5-pin Phone Jack

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

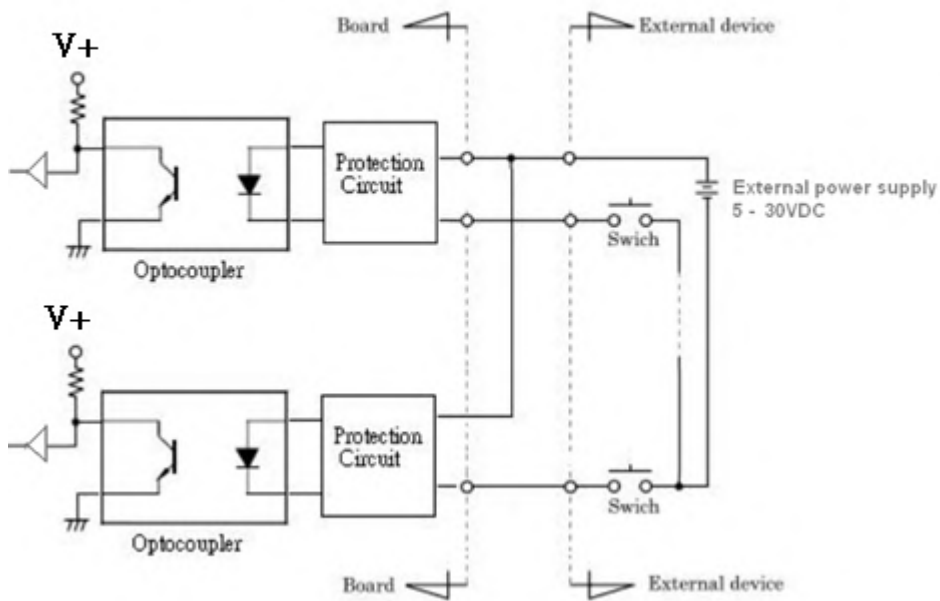
**DIO1: Digital Input / Output Connector**

Connector Type: Terminal Block 1X10 10-pin, 3.5mm pitch

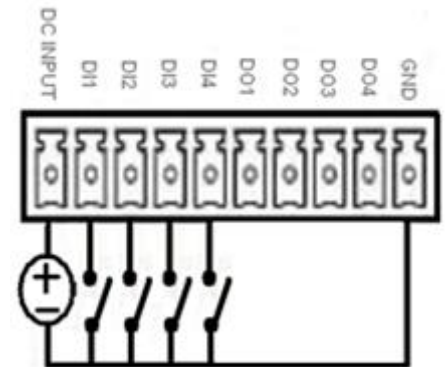
Pin	Definition	Pin	Definition
1	DC INPUT	6	DO1
2	DI1	7	DO2
3	DI2	8	DO3
4	DI3	9	DO4
5	DI4	10	GND



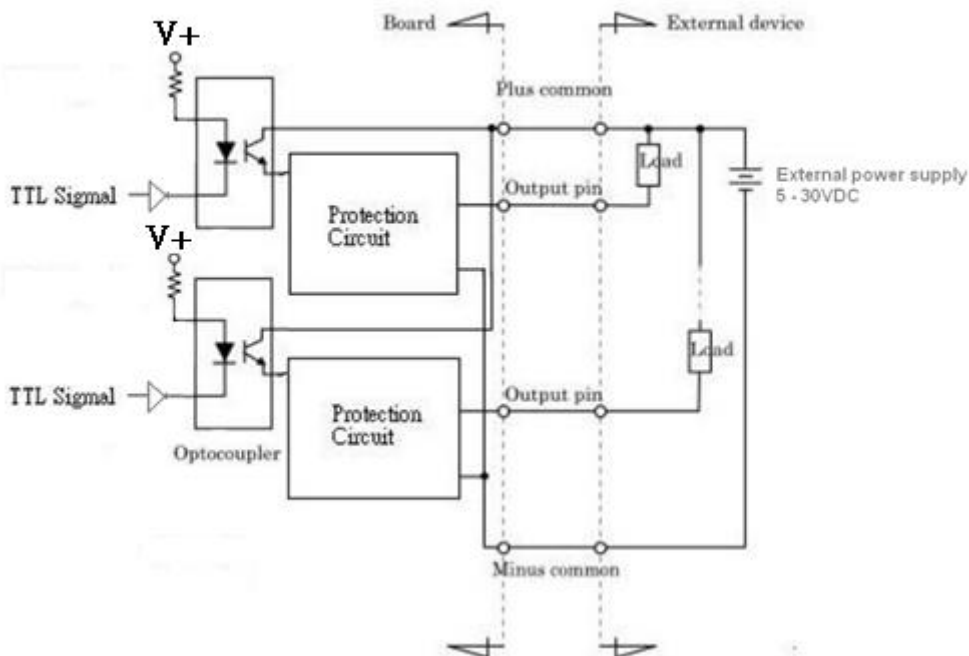
Reference Input Circuit



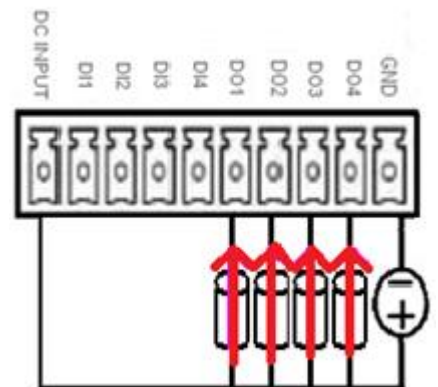
Digital Input Wiring



External Output Circuit



Digital Output Wiring

**PWR_SW2 : Remote Power Switch**

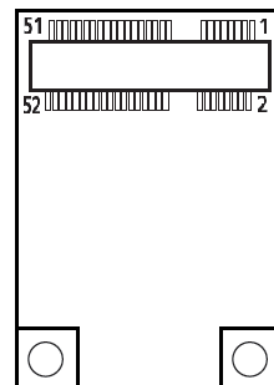
Connector Type: Terminal Block 1X2 2-pin, 3.5mm pitch

Pin	Definition
1	Power Button
2	GND

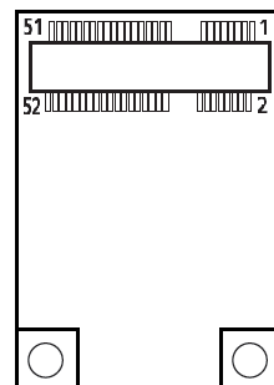


CN1: Mini PCI-Express / mSATA Socket

Pin	Definition	Pin	Definition	Pin	Definition
1	WAKE#	19	NC	37	GND
2	+3.3V	20	+3.3V	38	USB_D5+
3	NC	21	GND	39	+3.3V
4	GND	22	MINIPCI _E RST#	40	GND
5	NC	23	MINIPCI _E _RXN6_0 (SATA_RXN3)	41	+3.3V
6	+1.5V	24	+3.3V	42	NC
7	CLKREQ4#	25	MINIPCI _E _RXP6_0 (SATA_RXP3)	43	GND
8	USIM1_VCC	26	GND	44	NC
9	GND	27	GND	45	NC
10	USIM1_DATA	28	+1.5V	46	NC
11	MINIPCI _E _CLKN1	29	GND	47	NC
12	USIM1_CLK	30	SMB_CLK	48	+1.5V
13	MINIPCI _E _CLKP1	31	MINIPCI _E _TXN6_0 (SATA_TXN3)	49	NC
14	USIM1_RST	32	SMB_DATA	50	GND
15	GND	33	MINIPCI _E _TXP6_0 (SATA_TXP3)	51	NC
16	USIM1_VPP	34	GND	52	+3.3V
17	NC	35	GND		
18	GND	36	USB_D5-		

**CN2: Mini PCI-Express / mSATA Socket**

Pin	Definition	Pin	Definition	Pin	Definition
1	WAKE#	19	NC	37	GND
2	+3.3V	20	+3.3V	38	USB_D6+
3	NC	21	GND	39	+3.3V
4	GND	22	MINIPCI _E RST#	40	GND
5	NC	23	MINIPCI _E _RXN6_1 (SATA_RXP2)	41	+3.3V
6	+1.5V	24	+3.3V	42	NC
7	CLKREQ5#	25	MINIPCI _E _RXP6_1 (SATA_RXN2)	43	GND
8	USIM2_VCC	26	GND	44	NC
9	GND	27	GND	45	NC
10	USIM2_DATA	28	+1.5V	46	NC
11	MINIPCI _E _CLKN2	29	GND	47	NC
12	USIM2_CLK	30	SMB_CLK	48	+1.5V
13	MINIPCI _E _CLKP2	31	MINIPCI _E _TXN6_1 (SATA_TXP2)	49	NC
14	USIM2_RST	32	SMB_DATA	50	GND
15	GND	33	MINIPCI _E _TXP6_1 (SATA_TXN2)	51	NC
16	USIM2_VPP	34	GND	52	+3.3V
17	NC	35	GND		
18	GND	36	USB_D6-		



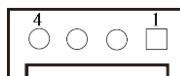
SATA1, SATA2: SATA with Power Connector

Pin	SATA1 Definition	Pin	SATA1 Definition	Pin	SATA2 Definition	Pin	SATA2 Definition
1	GND	12	GND	1	GND	12	GND
2	SATA_TXP0	13	GND	2	SATA_TXP1	13	GND
3	SATA_TXN0	14	+5V	3	SATA_TXN1	14	+5V
4	GND	15	+5V	4	GND	15	+5V
5	SATA_RXN0	16	+5V	5	SATA_RXN1	16	+5V
6	SATA_RXP0	17	GND	6	SATA_RXP1	17	GND
7	GND	18	GND	7	GND	18	GND
8	+3.3V	19	GND	8	+3.3V	19	GND
9	+3.3V	20	+12V	9	+3.3V	20	+12V
10	+3.3V	21	+12V	10	+3.3V	21	+12V
11	GND	22	+12V	11	GND	22	+12V

**POWER1, POWER2: Power Connector**

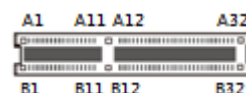
Connector Type: 1X4-pin Wafer, 2.0mm pitch

Pin	Definition
1	+5V
2	GND
3	GND
4	+12V

**PCIE1: PCI-Express X4 Socket**

Connector Type: PCI-Express X4 Slot

Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
A1	PCIE_PRSENT1	A17	PEG_RXN0	B1	+12V	B17	PRSNT2_1
A2	+12V	A18	GND	B2	+12V	B18	GND
A3	+12V	A19	NC	B3	+12V	B19	PEG_TXP1
A4	GND	A20	GND	B4	GND	B20	PEG_TXN1
A5	NC	A21	PEG_RXP1	B5	SMB_CLK	B21	GND
A6	NC	A22	PEG_RXN1	B6	SMB_DATA	B22	GND
A7	NC	A23	GND	B7	GND	B23	PEG_TXP2
A8	NC	A24	GND	B8	+3.3V	B24	PEG_TXN2
A9	+3.3V	A25	PEG_RXP2	B9	NC	B25	GND
A10	+3.3V	A26	PEG_RXN2	B10	+3.3VSB	B26	GND
A11	PCIE_RESET#	A27	GND	B11	PCIE_WAKE#	B27	PEG_TXP3
A12	GND	A28	GND	B12	NC	B28	PEG_TXN3
A13	PEG_CLK_P	A29	PEG_RXP3	B13	GND	B29	GND
A14	PEG_CLK_N	A30	PEG_RXN3	B14	PEG_TXP0	B30	NC
A15	GND	A31	GND	B15	PEG_TXN0	B31	PRSNT2_2
A16	PEG_RXP0	A32	NC	B16	GND	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-

**WDT_LED1: Watchdog LED Status**

Pin	Definition
1	WATCHDOG LED+
2	WATCHDOG LED-

**GPIO_LED1: GPIO LED Status**

Pin	Definition
1	GPIO LED+
2	GPIO 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-



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

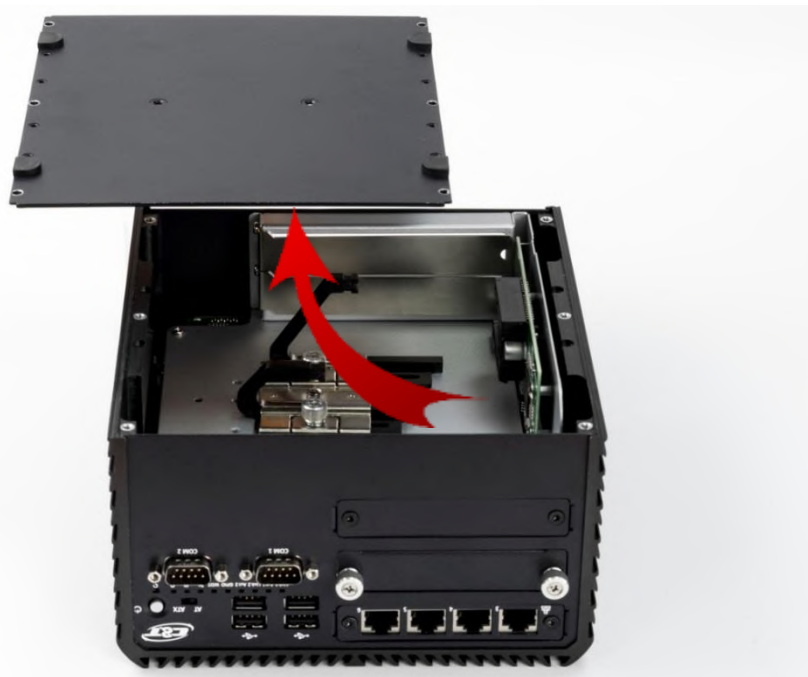
**WARNING**

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.

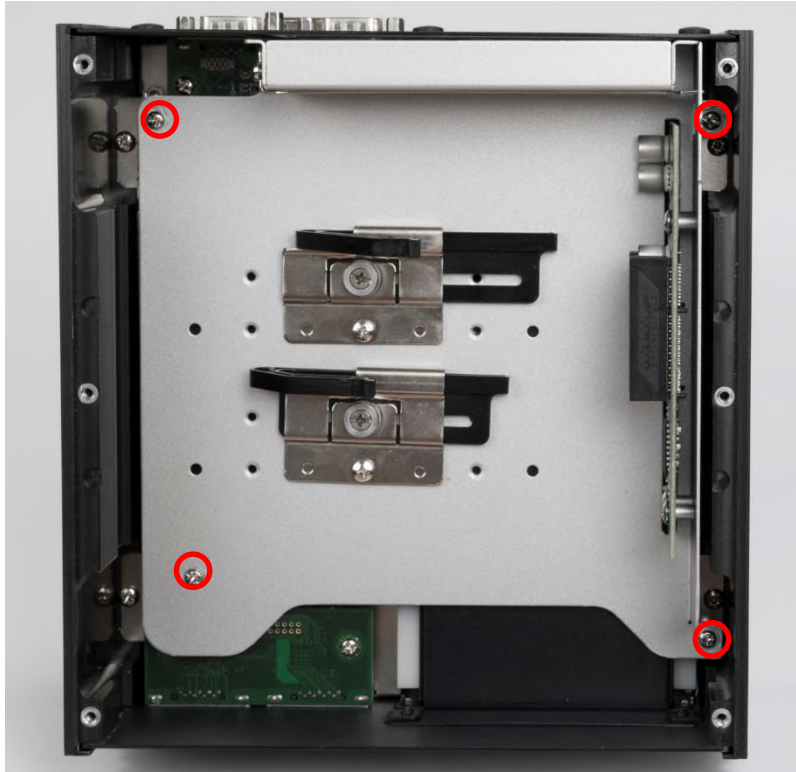


2. Now you can remove the bottom cover.

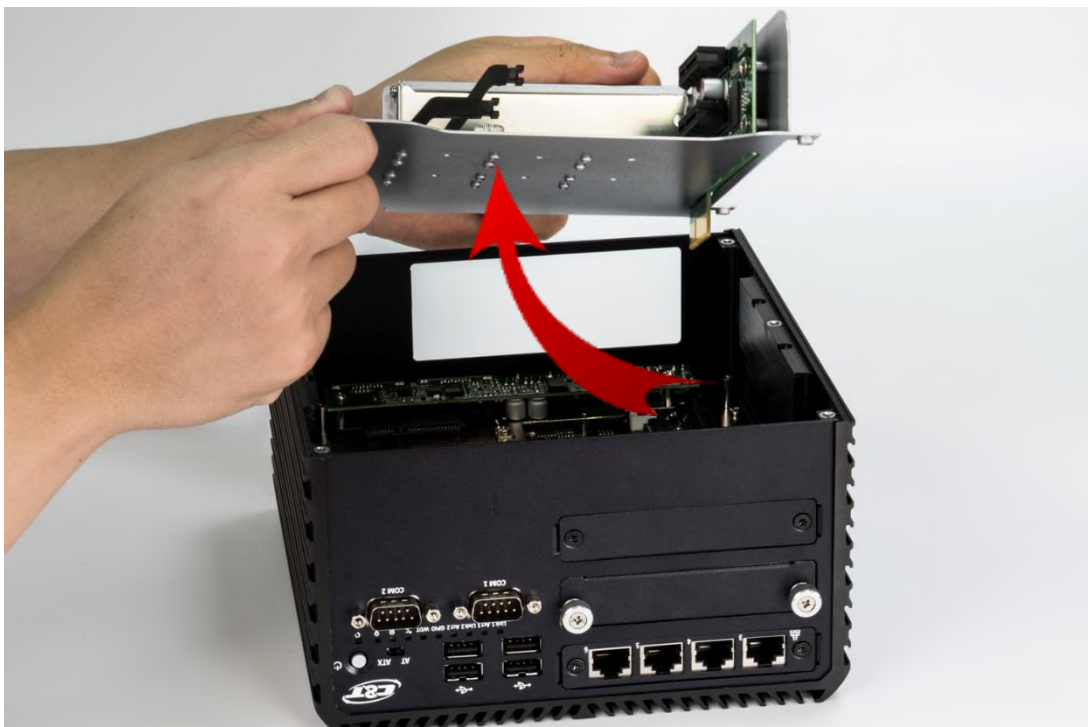


3.3 Removing PCIe/PCI expansion module

1. This step only applies to RCO-3011 and RCO-3022 series, which is equipped with PCIe/PCI expansion module. The following steps use RCO-3022 as example.
2. Unscrew four screws (M3x5L) circled below.

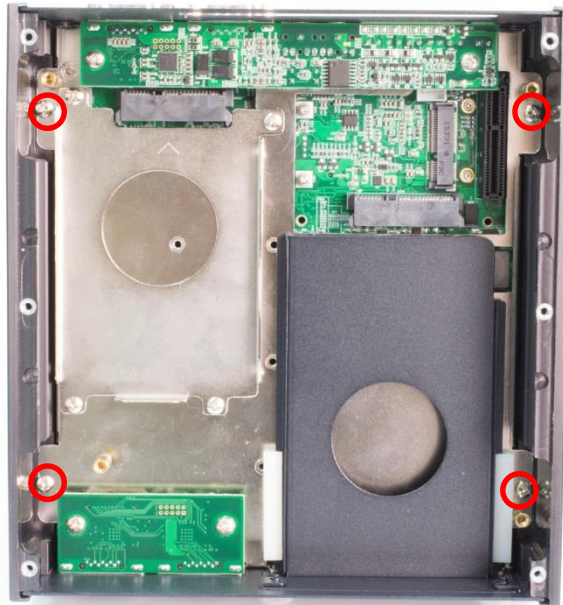


3. Now you can remove the PCIe/PCI expansion module.

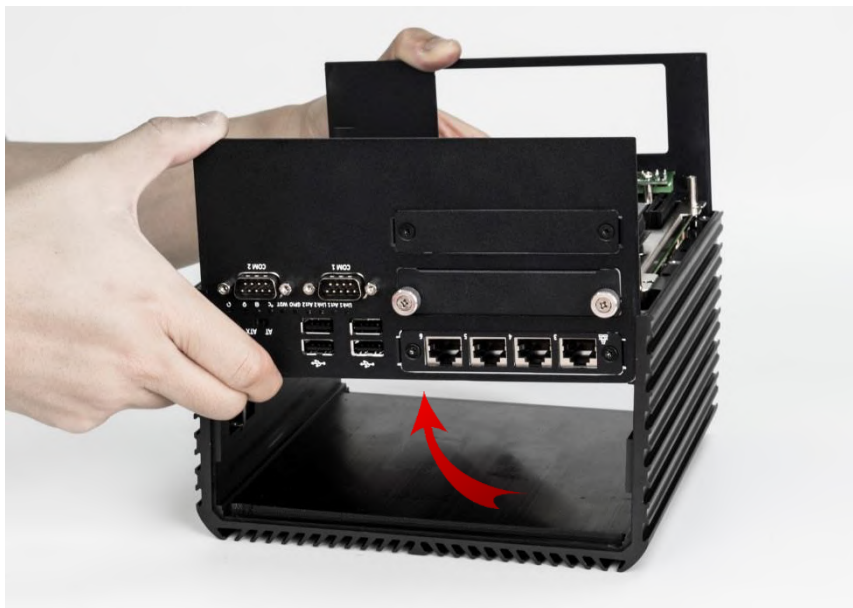


3.4 Removing chassis top cover

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.

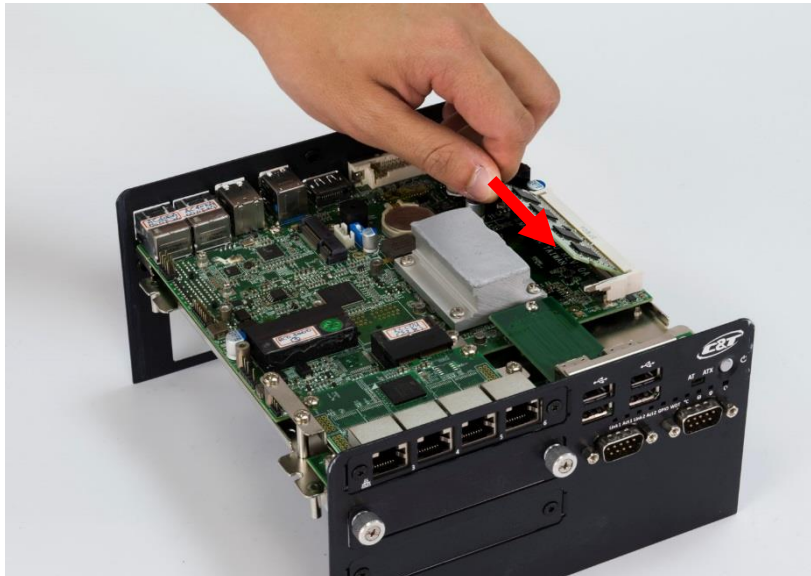


3.5 Installing SODIMM

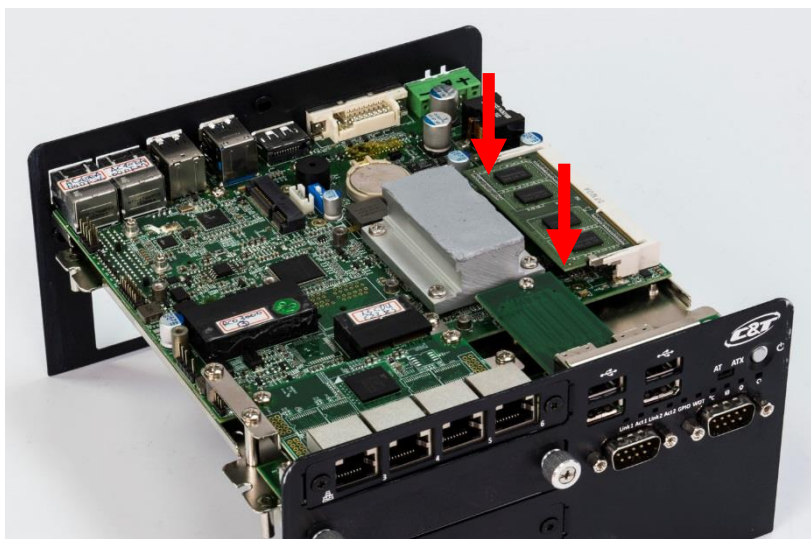
1. Place the system body with SODIMM socket facing upward.



2. Insert memory module from 45 degree direction.

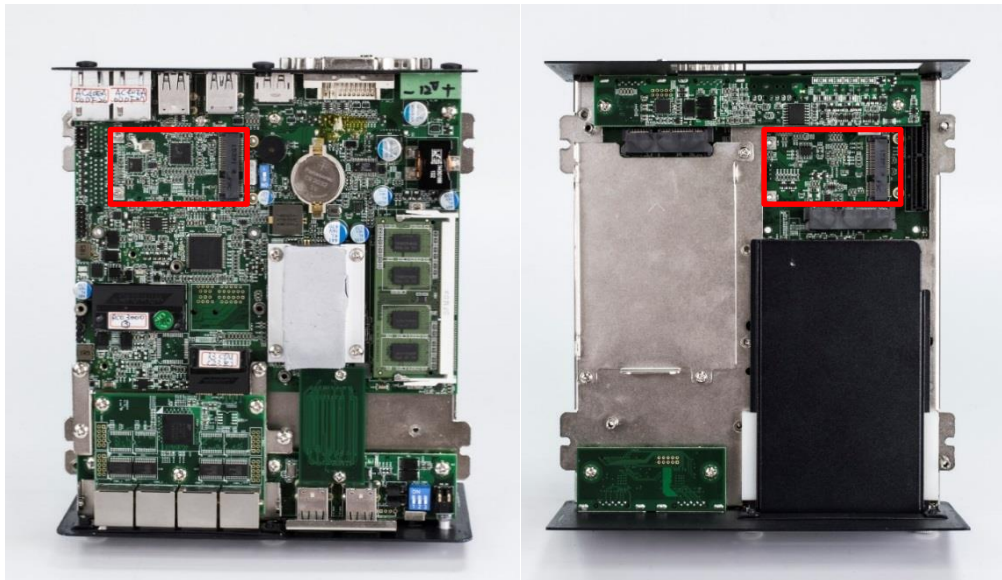


3. Press the memory module vertically downward until you hear the “click” sound. Make sure the memory module is firmly in place.



3.6 Installing mini PCIe card / mSATA

1. Two mini PCIe slots are available for RCO-3000 series. They both also support mSATA.



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

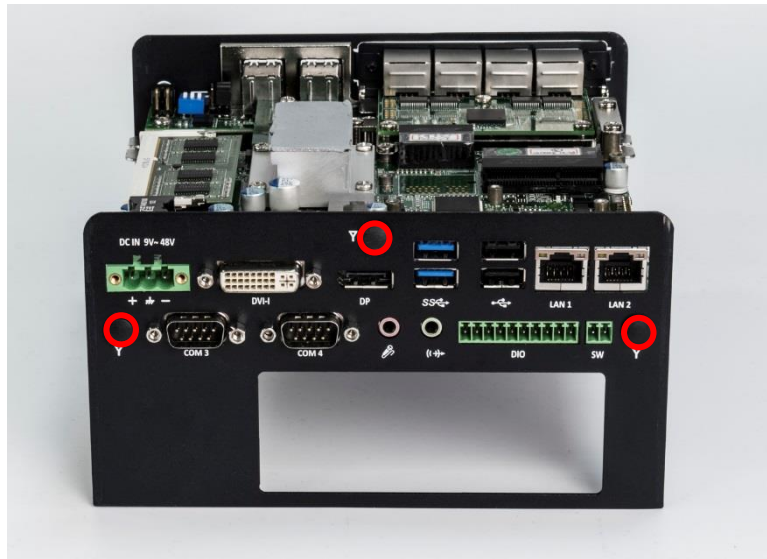


3. Press the mini PCIe card or mSATA module down and lock it with two screws (M2x3.7L).

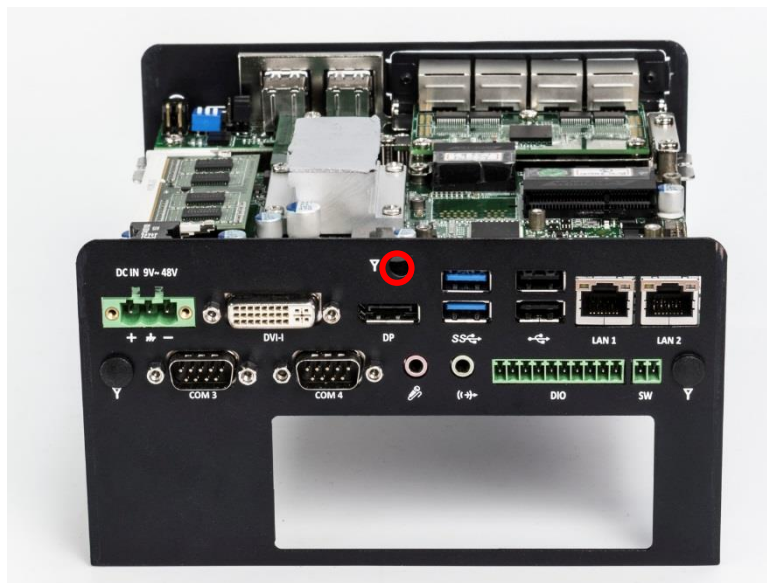


3.7 Installing antenna

1. Three antenna holes are available for RCO-3000 series on the rear panel.



2. Remove antenna hole cover on the system 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.

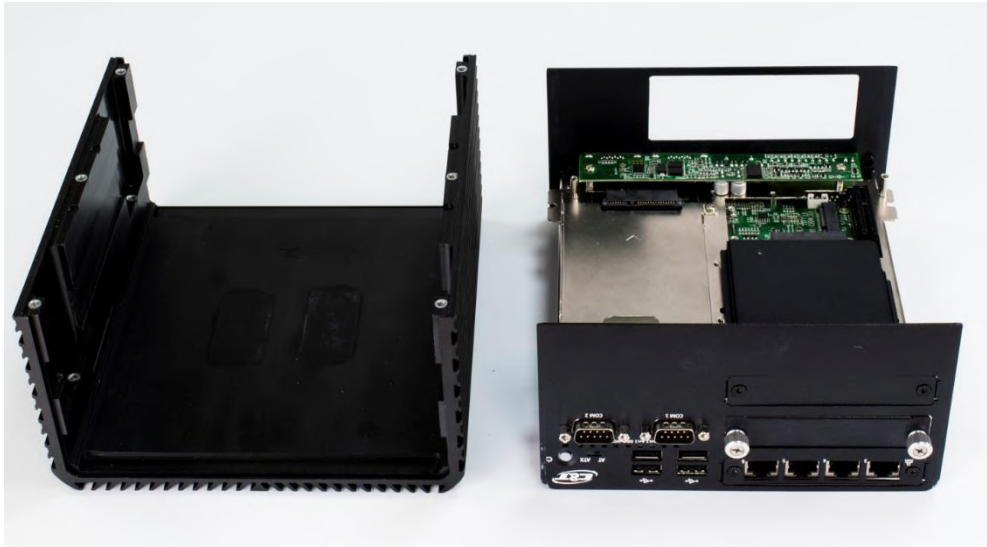


6. Attach the RF connector at the cable-end onto the communication module.

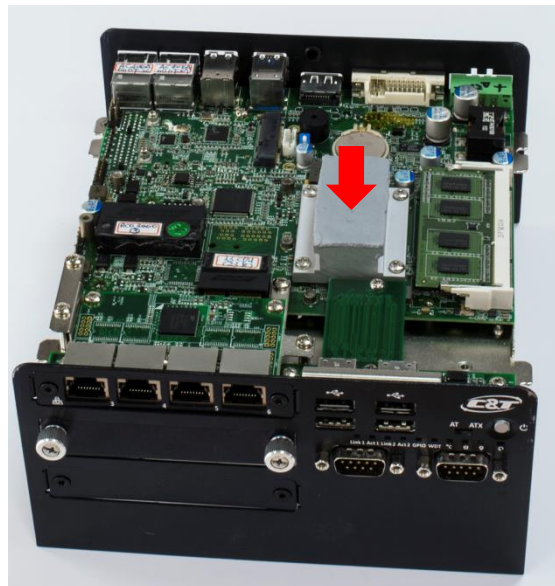


3.8 Assembly chassis top cover

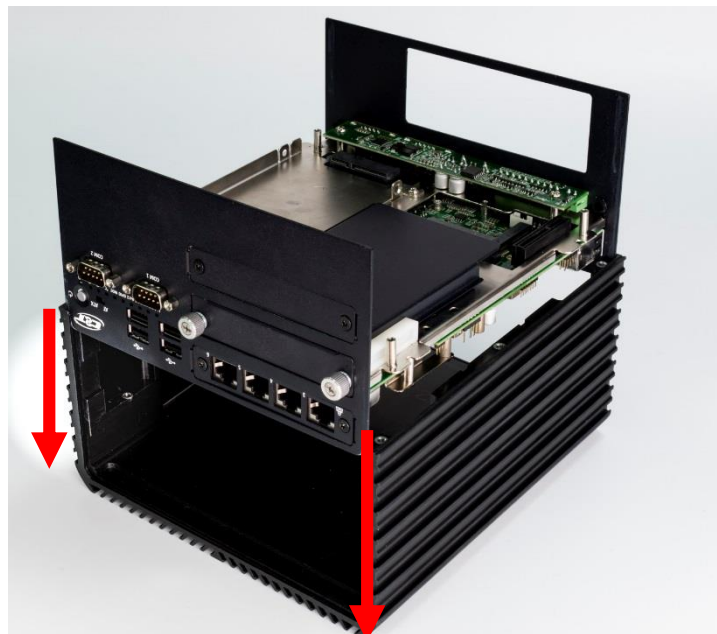
1. Place both top cover and system body upside down as shown below.



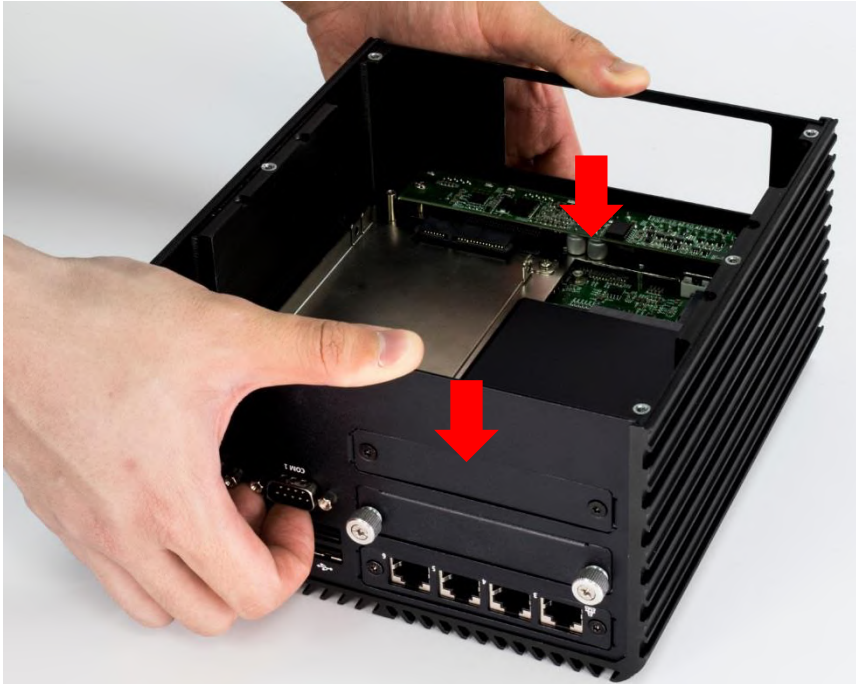
2. Ensure thermal pad is in place on the CPU thermal block.



3. Hold the system body and slide the front/rear panel into the slide rail on the top cover.



4. Push the system body down until it is firmly in place.

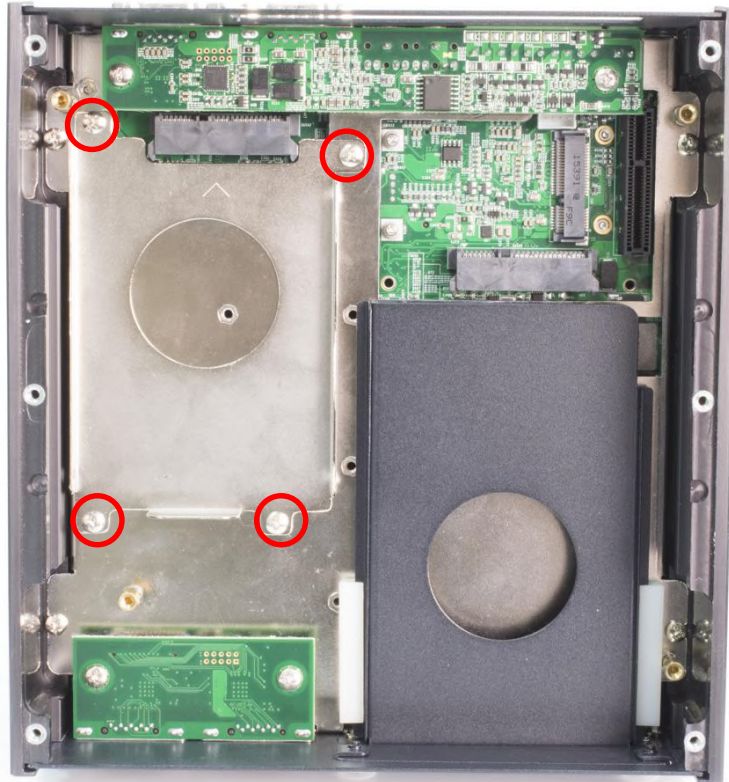


5. Fasten the six screws (M3x5L) to lock the system body with top cover.

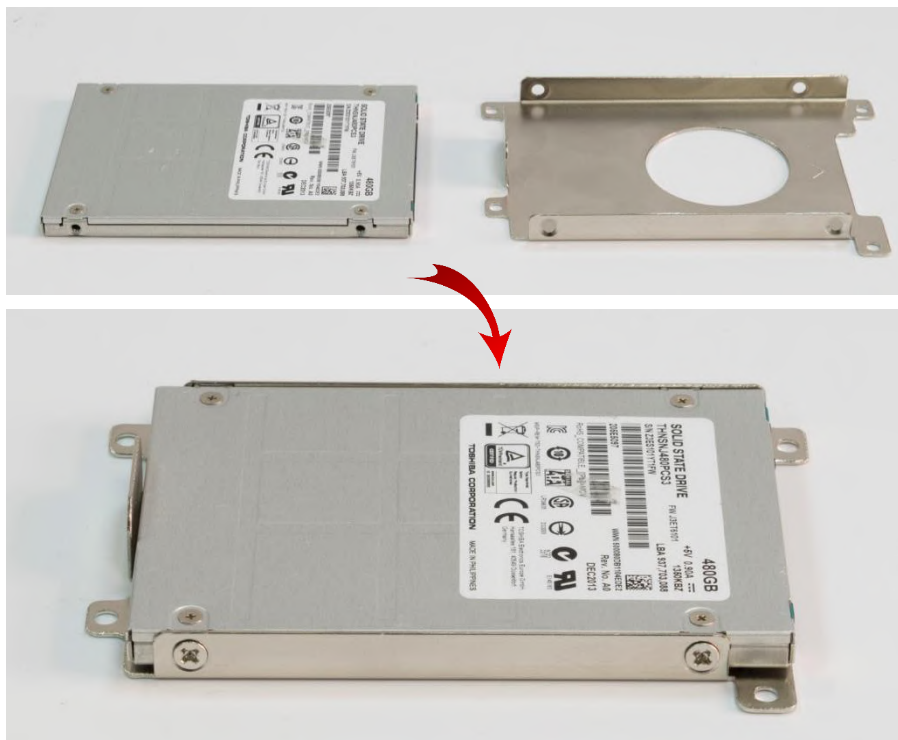


3.9 Installing HDD on internal SATA HDD bay

1. Unscrew the below three screws (M3x5L) to remove the internal SATA HDD bay.



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



3. Install the HDD bracket following the direction below.



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

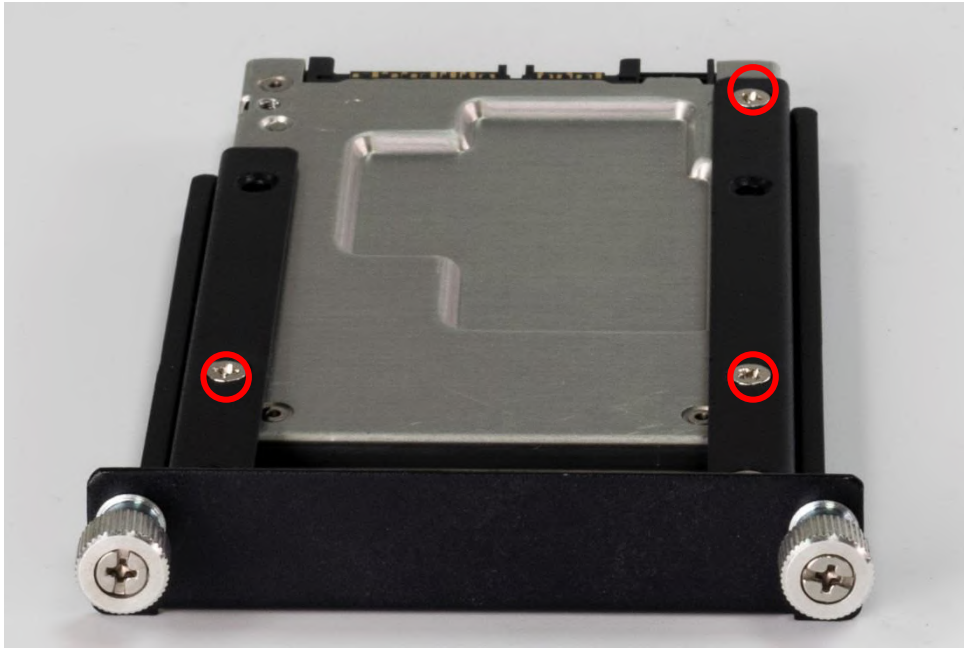


3.10 Installing HDD on removable SATA HDD bay

1. Unscrew the two sun screws circled below to take out the removable SATA HDD bay.



2. Lock the 2.5" HDD with HDD bracket using three screws (M3x4L).

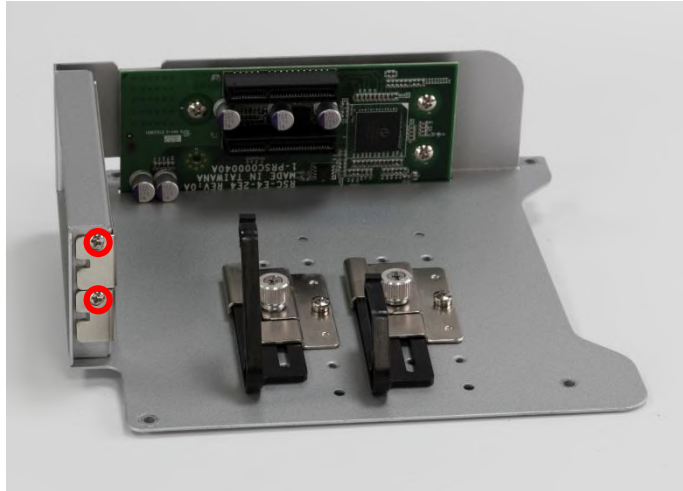


3. Slide the HDD bracket back and then fasten the sun screws.

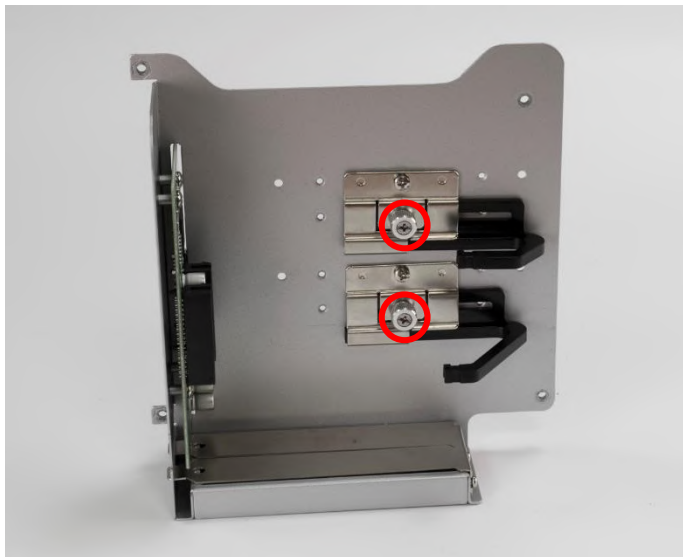


3.11 Installing PCIe/PCI expansion card

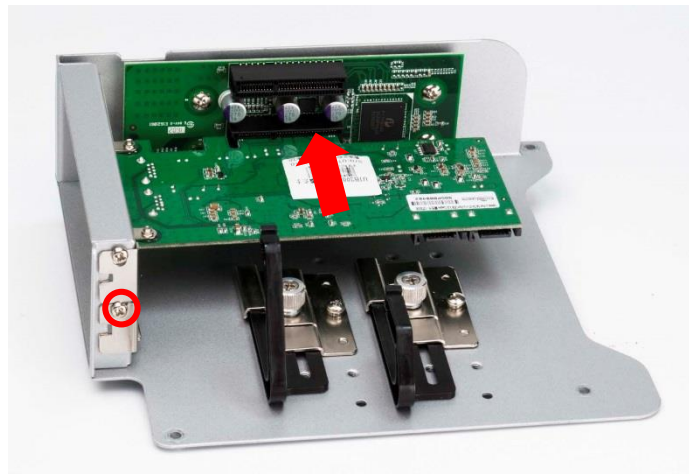
1. PCIe or PCI card with FHHL dimension is supported by RCO-3000 series.
2. Unscrew the screw (M3x5L) to remove the plane bracket.



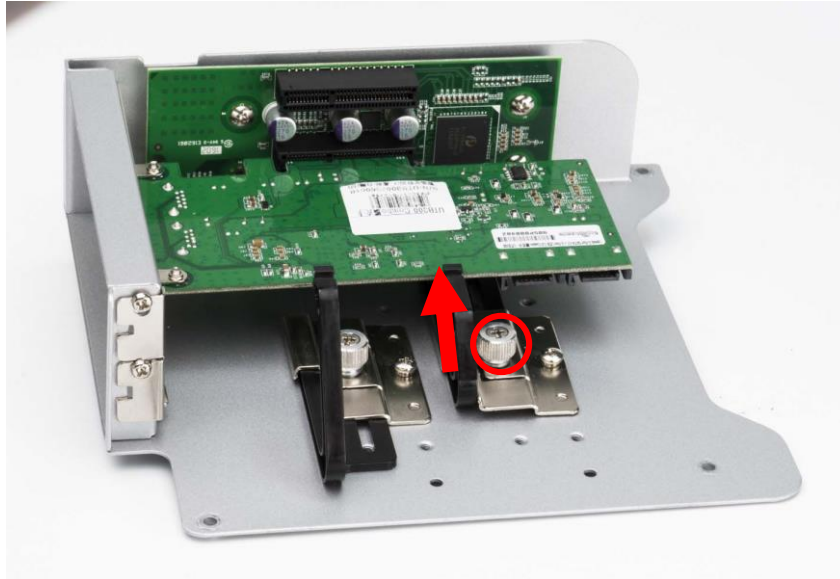
3. Loose the sun screw (circled below) on the holder so the pairing arm can be adjustable.



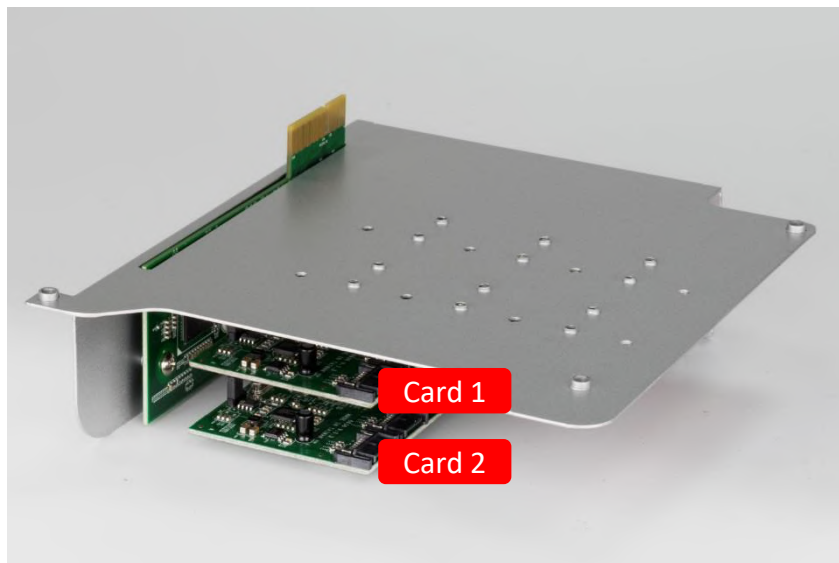
4. Install the PCIe/PCI card according to the below direction and ensure the gold finger is inserted into the slot. Then fasten the screw in the circle.



5. Adjust the arm until it holds the card firmly in place. Then fasten the sun screw on the holder.

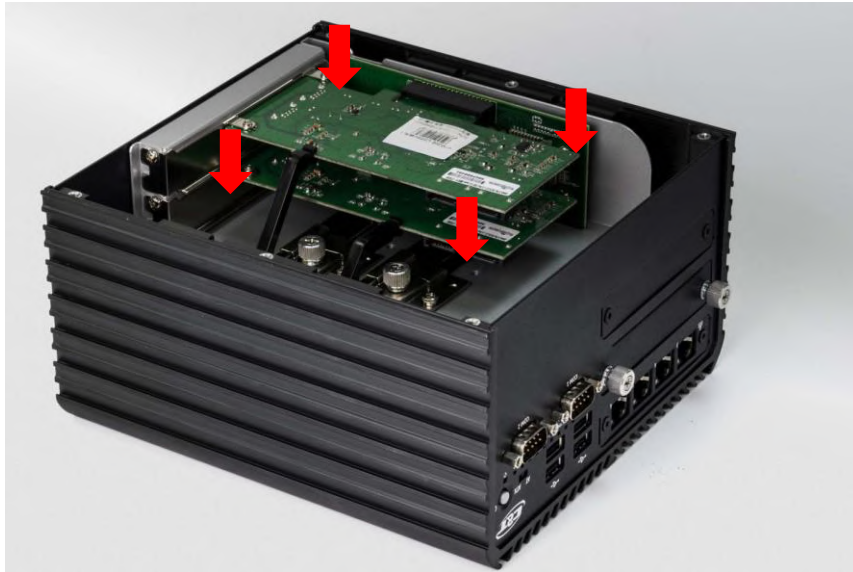


6. For RCO-3022 series, install the upper card (Card 1) first and then install the lower card (Card 2).



3.12 Assemble PCIe/PCI expansion module

1. Install the expansion module back in place and ensure the golden finger is inserted into the expansion slot.



2. Fasten the four screws (M3x5L) below.



3.13 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).



3.14 Installing SIM card

1. Take out the removable SATA HDD bay in order to locate the SIM card slot.



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.

3.15 Installing wall mount kit

1. Wall mount kit is available for RCO-3000 series included in the standard package.



2. Place the system upside down so you can see the bottom cover. The highlighted screw holes below will be used.



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



3.16 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 or <F2> 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

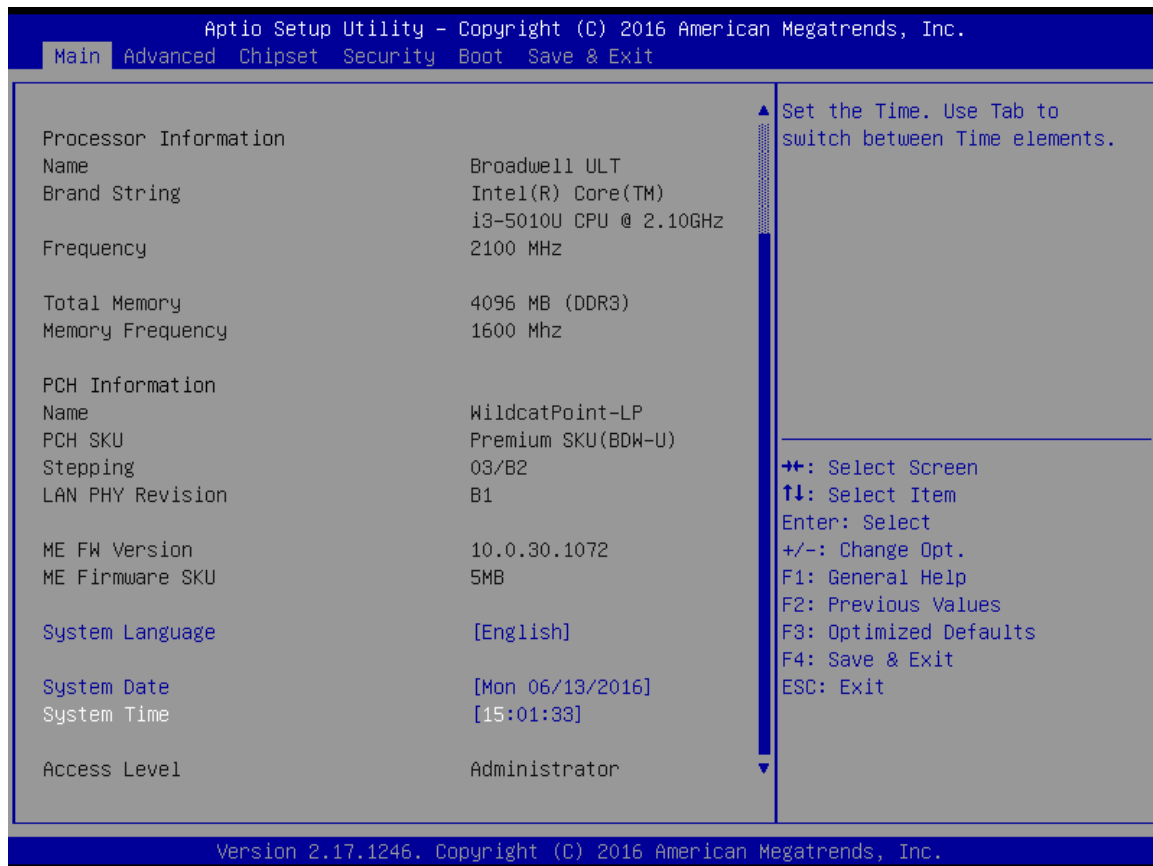
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

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 setup screen is showed as following when the setup utility is entered. System Date/Time is set up in the Main Menu.



4.2.1 System Language

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

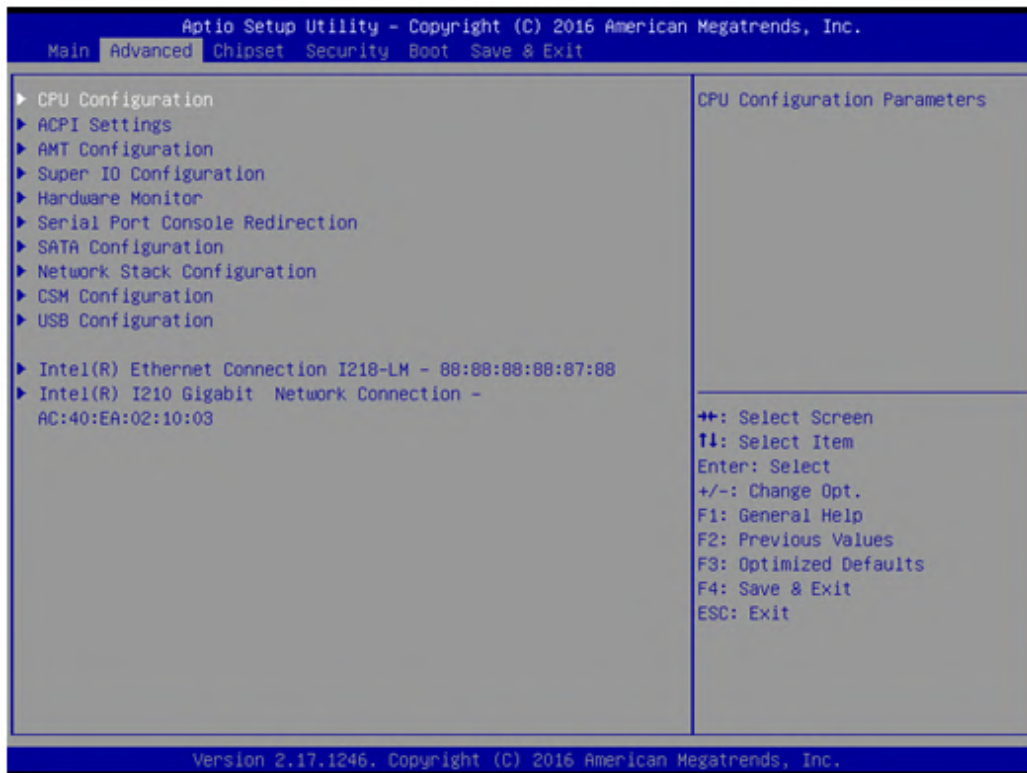
4.2.1 System Date

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

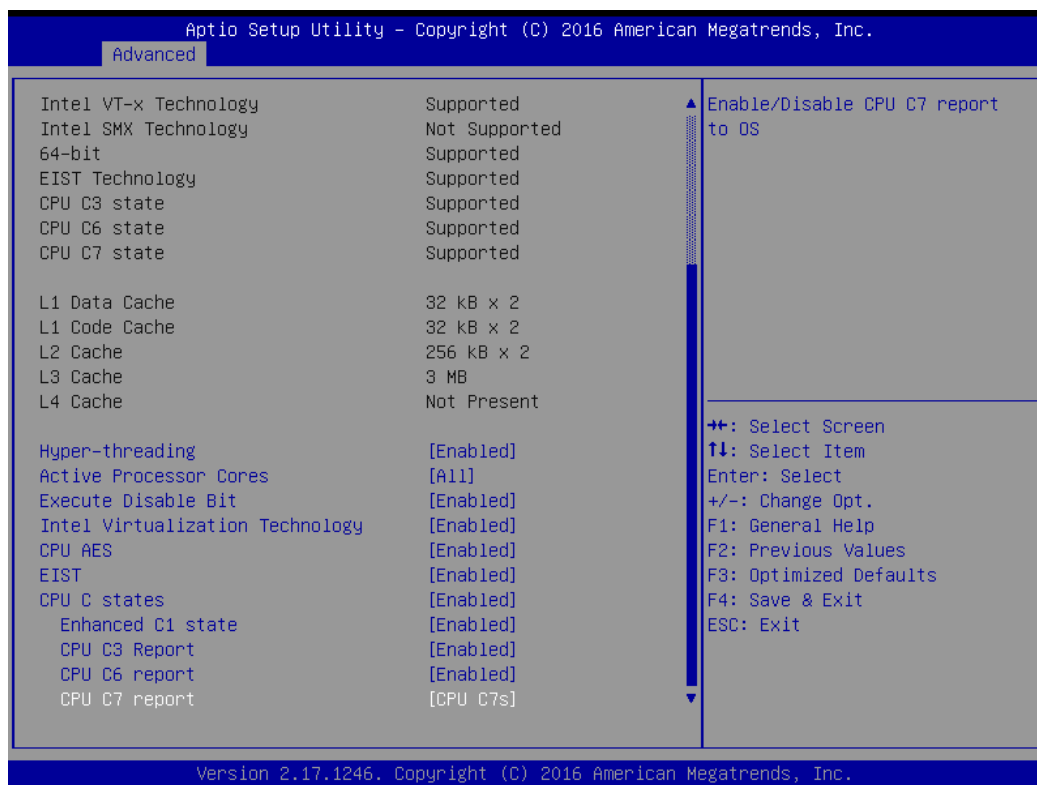
4.2.2 System Time

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

4.3 Advanced Setup



4.3.1 CPU Configuration



■ Hyper-Threading

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

■ Active Processor Cores

Set number of cores to be enabled. Select <All> or <1> mode.

■ Execute Disable Bit

Enable or disable the Execute Disable Bit (XD) of the processor. With the XD bit set to enabled, certain classes of malicious buffer overflow attacks can be prevented when combined with a supporting OS

■ Intel Virtualization Technology

When enabled, a VMM can utilize the integrated hardware virtualization support .

■ CPU AES

This item allows you to enable or disable CPU Advanced Encryption Standard (AES) instructions.

■ EIST

This item allows you to enable or disable Enhanced Intel SpeedStep Technology (EIST).

■ CPU C states

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

☐ Enhanced C1 State

This item allows your CPU reduce power consumption when the system is in idle mode.

☐ CPU C3 Report

This item allows you to enable or disable the CPU C3 report to the operating system.

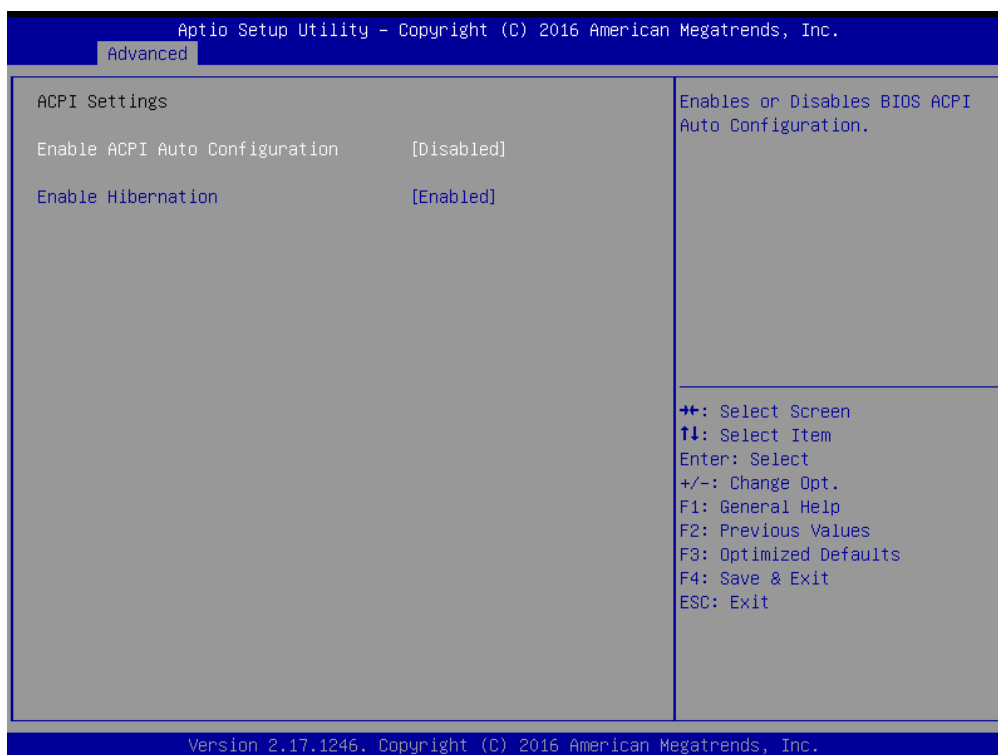
☐ CPU C6 Report

This item allows you to enable or disable the CPU C6 report to the operating system.

☐ CPU C7 Report

This item allows you to enable or disable the CPU C7 report to the operating system.

4.3.2 ACPI Settings



■ Enable ACPI Auto Configuration

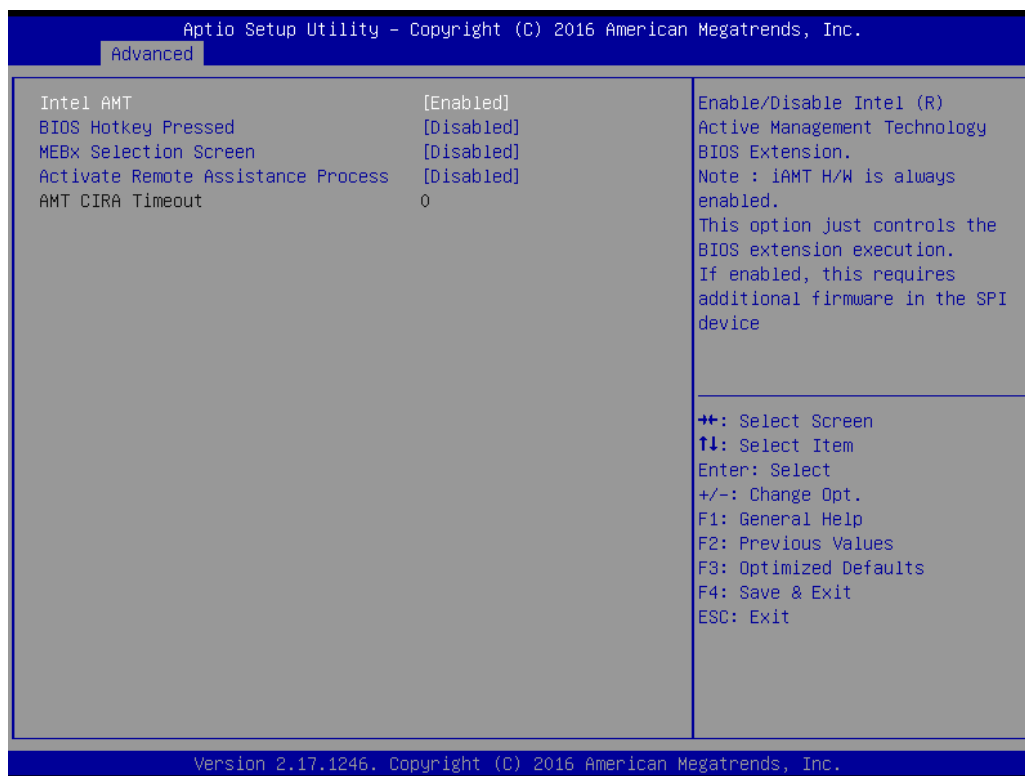
This item allows you to enable or disable BIOS ACPI Auto Configuration.

■ Enable Hibernation

This item allows you to enable or disable system ability to hibernate.

4.3.3 AMT Configuration

Use this screen to configure AMT parameters.



■ Intel AMT

This item allows you to enable or disable Intel Active Management Technology BIOS Extension.

■ BIOS Hotkey Pressed

This item allows you to enable or disable BIOS Hotkey Press function.

■ MEBx Selection Screen

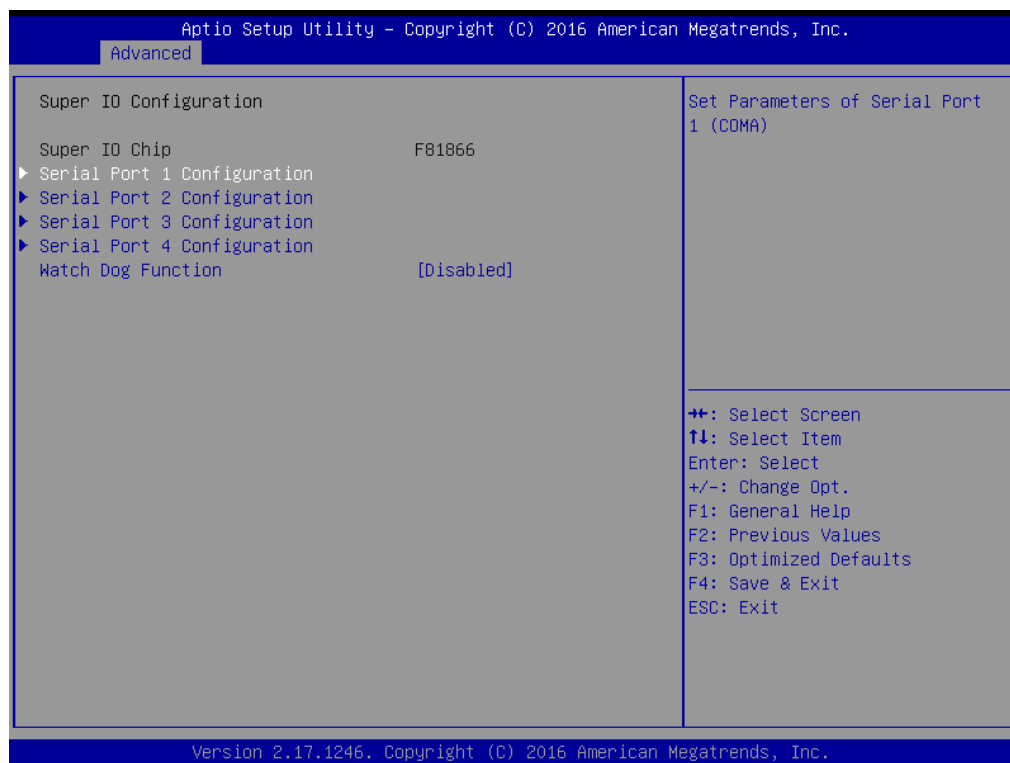
This item allows you to enable or disable MEBx Selection Screen function.

■ Active Remote Assistance Process

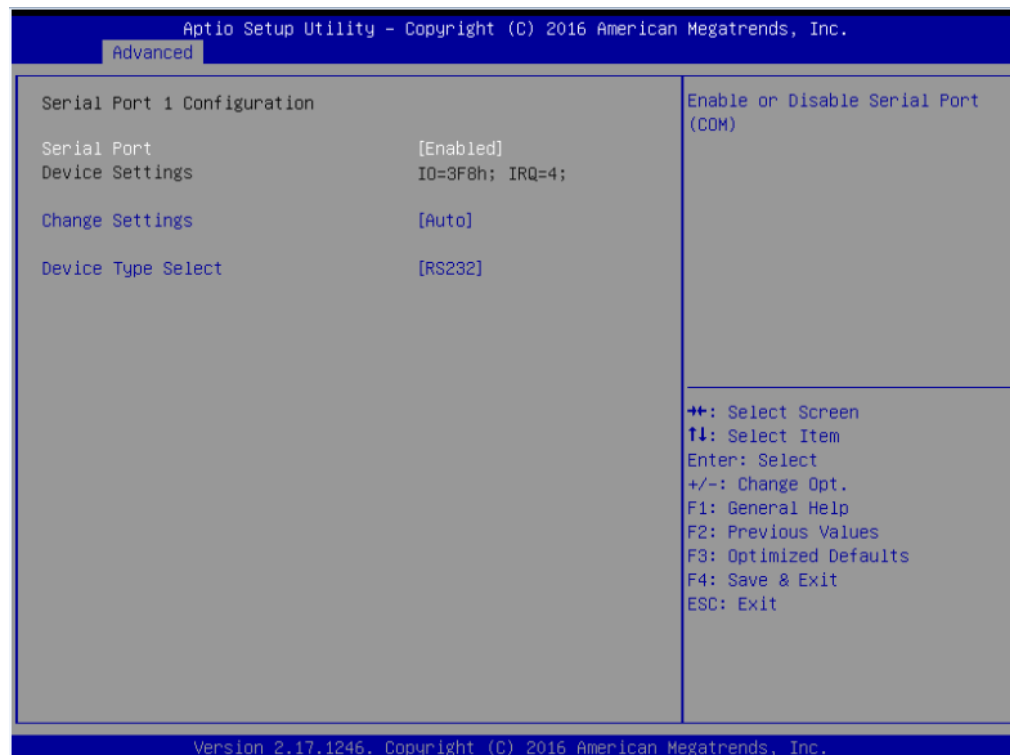
This item allows you to enable or disable Trigger CIRA boot function.

4.3.4 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.

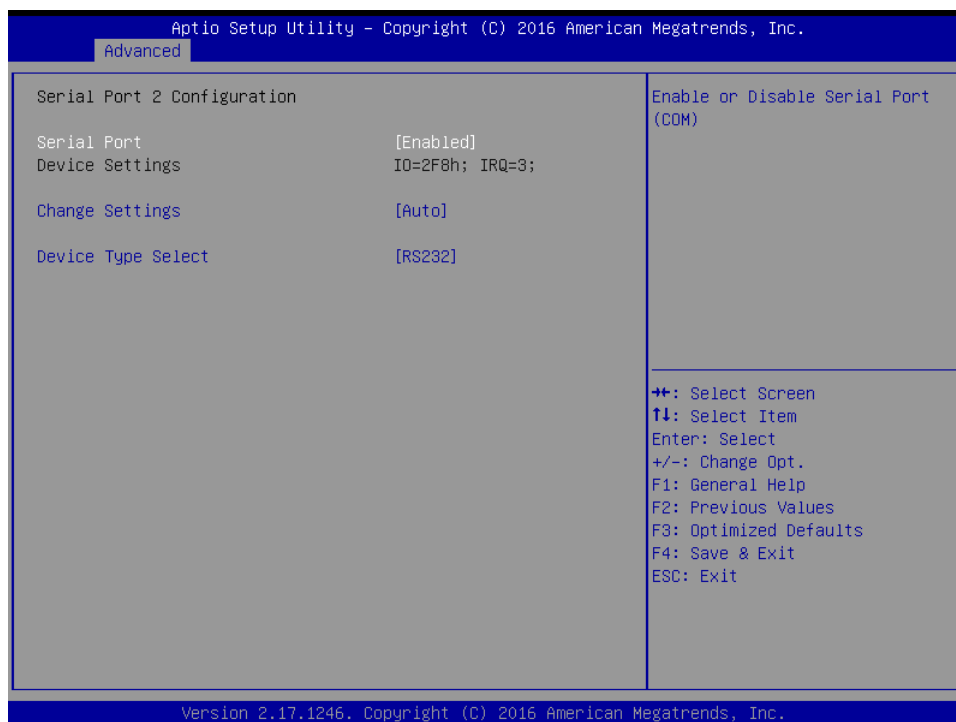
Change Settings

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 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 2 Configuration



☐ Serial Port

This item allows you to enable or disable serial port.

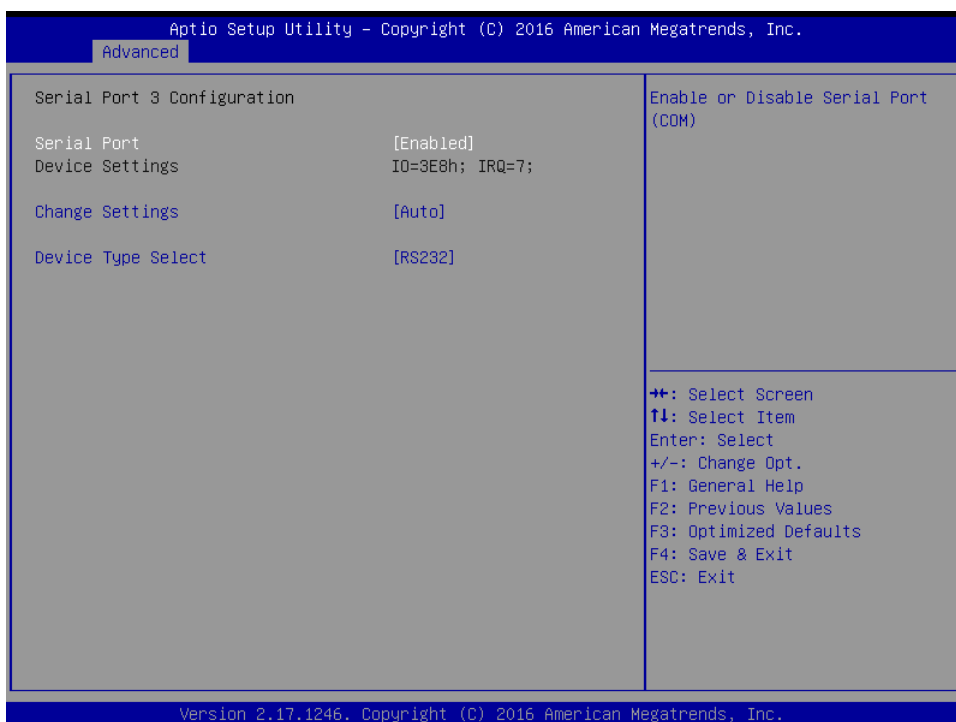
☐ Change Settings

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 Full Duplex> or <RS485 Half Duplex> interface.

Serial Port 3 Configuration



☐ Serial Port

This item allows you to enable or disable serial port.

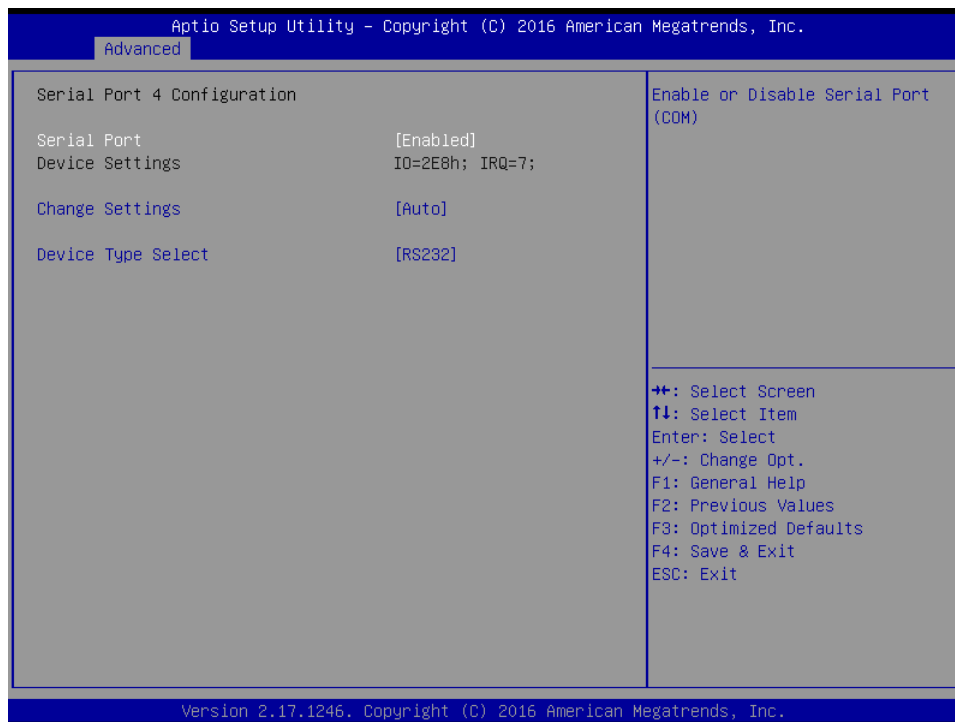
☐ Change Settings

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 Full Duplex> or <RS485 Half Duplex> 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 Full Duplex> or <RS485 Half Duplex> interface.

Watch Dog Function

You can setup the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

☐ Watch Dog Timer Count Mode

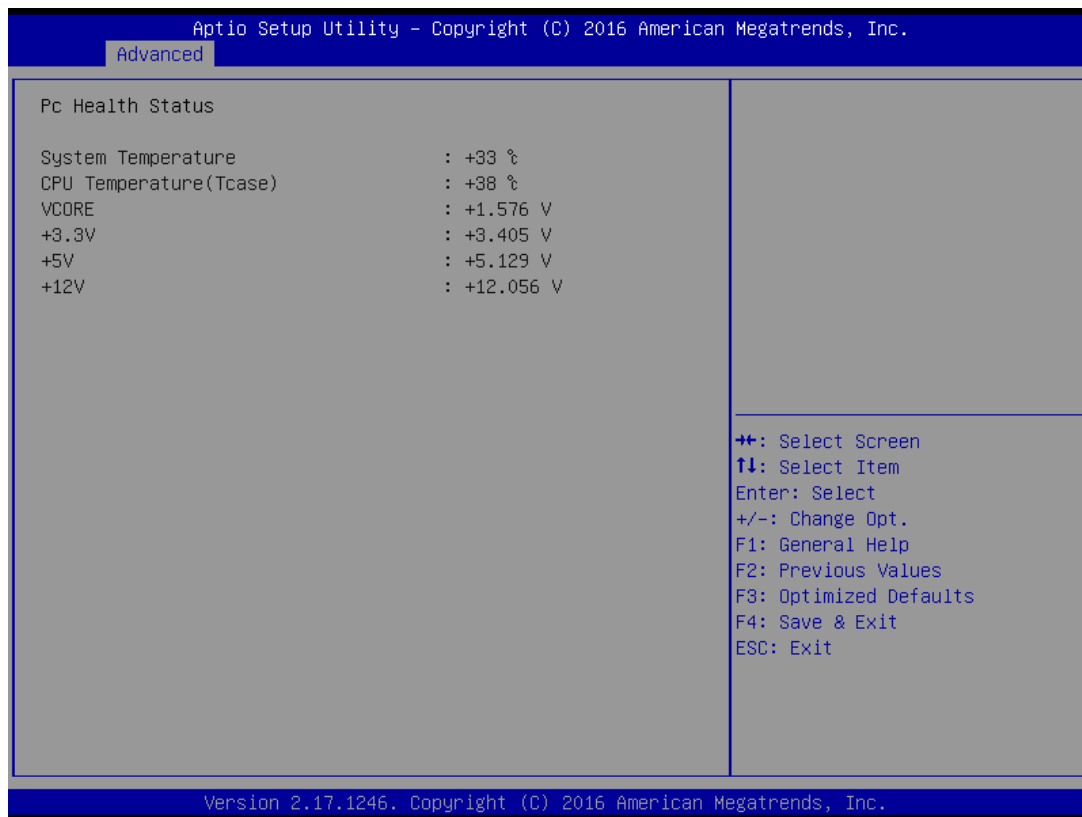
Change the Watch dog mode. Select <Second Mode> or <Minute Mode> mode.

☐ Watch Dog Timer Time Out Value

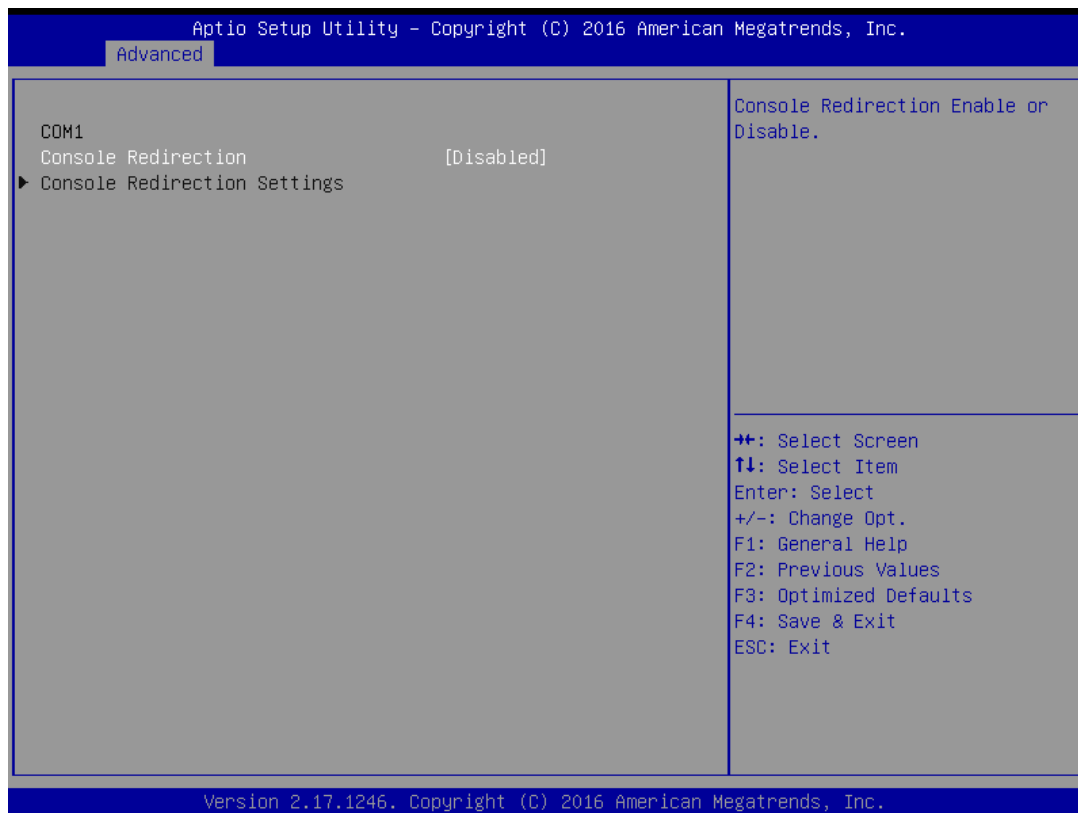
User can set a value in the range of 0 to 255.

4.3.5 Hardware Monitor

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



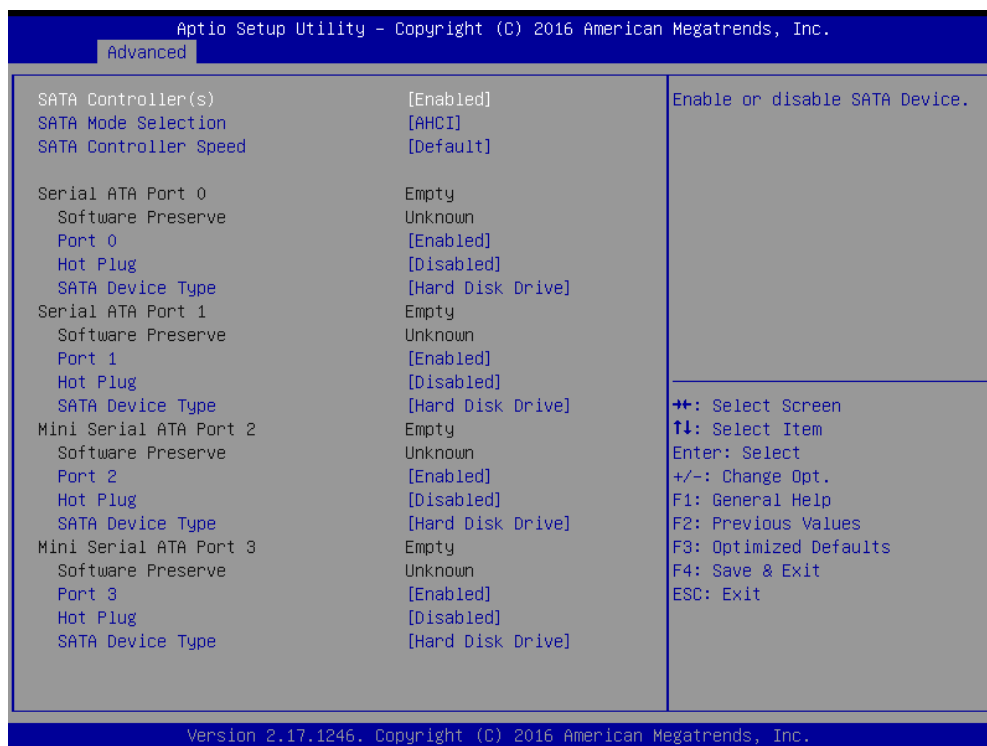
4.3.6 Serial Port Console Redirection



■ Console Redirection

This item allows you to enable or disable console redirection.

4.3.7 SATA Configuration



■ SATA Controller(s)

This item allows you to enable or disable SATA Controller.

■ SATA Mode Selection

This item allows you to select AHCI or RAID Mode.

■ SATA Controller Speed

The item is for user to set the maximum speed the SATA controller can support. Change the SATA Speed. Select <Default>, <Gen1>, <Gen2> or <Gen3> speed.

■ Serial ATA Port 0 / 1 / 2 / 3

□ Port 0 / 1 / 2 / 3

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

□ Hot Plug

This item allows you to enable or disable hot plug function.

□ SATA Device Type

Identify if the relevant SATA port is connected to Hard Disk Drive or Solid State Drive.

4.3.8 Network Stack Configuration



■ Network Stack

Use this item to enable or disable UEFI Network Stack.

4.3.9 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 manufactured had set the add-on device to do so.

■ 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>.

4.3.10 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>.

■ EHCI Hand-off

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

■ USB Mass Storage Driver Support

Enables or disables support for USB storage devices.

■ 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>.

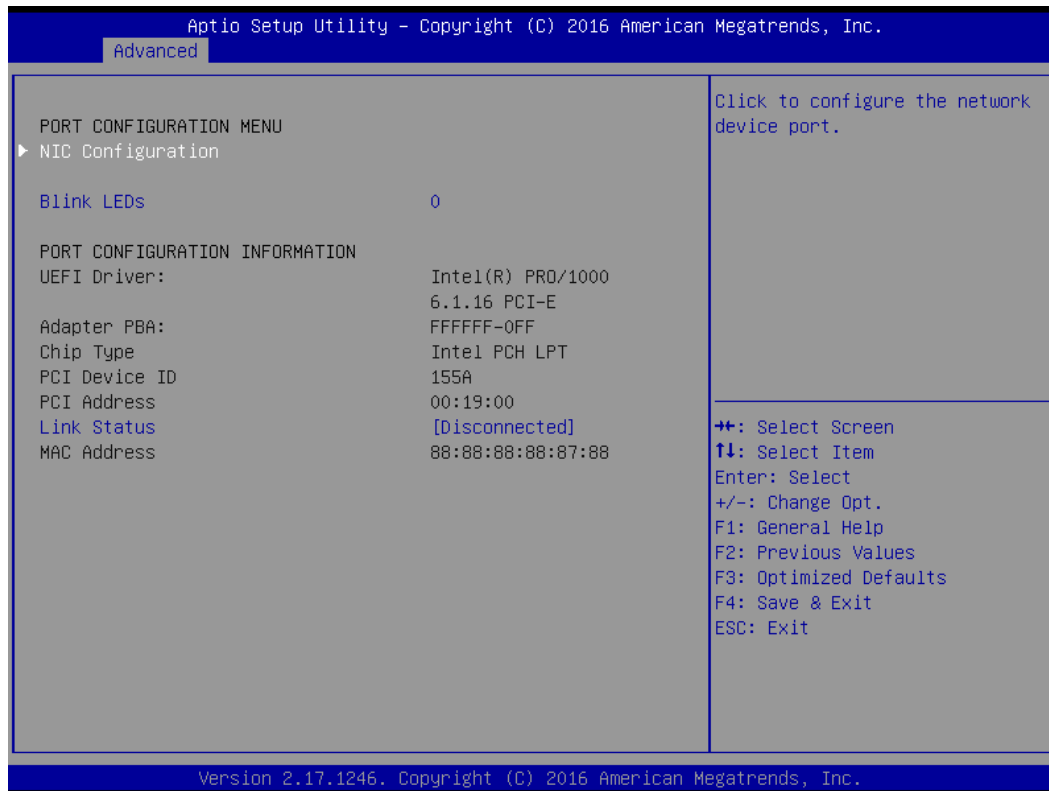
■ Device reset time-out

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.

4.3.11 Intel(R) Ethernet Connection I218-LM-XX:XX:XX:XX:XX:XX



■ NIC Configuration

Press enter to configure the network device port.

☐ Link Speed

Use this item to specify the port speed used for the selected boot protocol. Select <Auto Negotiated>, <10 Mbps Half>, <10 Mbps Full>, <100Mbps Half> or <100 Mbps Full>.

☐ Wake On LAN

Enables the server to be powered on using an in-band magic packet.

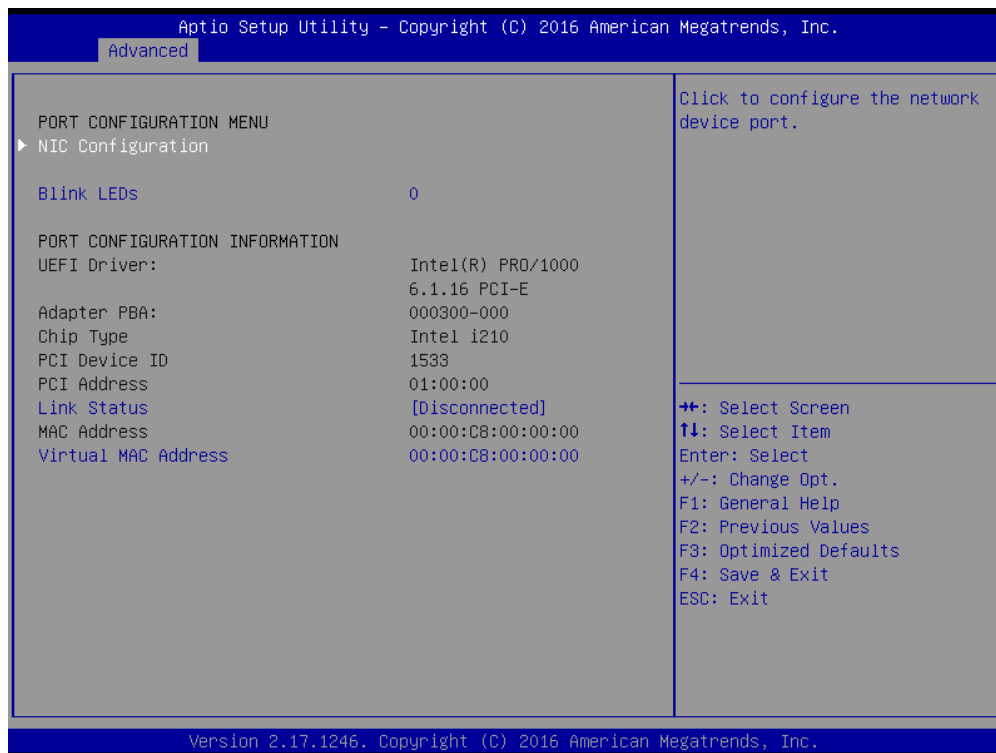
■ Blink LEDs

Use this item to identify the physical network port by blinking the associated LED.

■ Link Status

Use this item to specify the port speed used for the selected boot protocol. Select <Auto Negotiated>, <10 Mbps Half>, <10 Mbps Full>, <100 Mbps Half> or <100 Mbps Full>.

4.3.12 Intel(R) I210 Gigabit Network Connection- XX:XX:XX:XX:XX:XX



■ NIC Configuration

Press enter to configure the network device port.

☐ Link Speed

Use this item to specify the port speed used for the selected boot protocol. Select <Auto Negotiated>, <10 Mbps Half>, <10 Mbps Full>, <100Mbps Half> or <100 Mbps Full>.

☐ Wake On LAN

Enables the server to be powered on using an in-band magic packet.

■ Blink LEDs

Use this item to identify the physical network port by blinking the associated LED.

■ Link Status

Use this item to specify the port speed used for the selected boot protocol. Select <Auto Negotiated>, <10 Mbps Half>, <10 Mbps Full>, <100 Mbps Half> or <100 Mbps Full>.

■ Virtual MAC Address

Displays the programmatically assignable MAC Address.

4.4 Chipset



4.4.1 System Agent (SA) Configuration

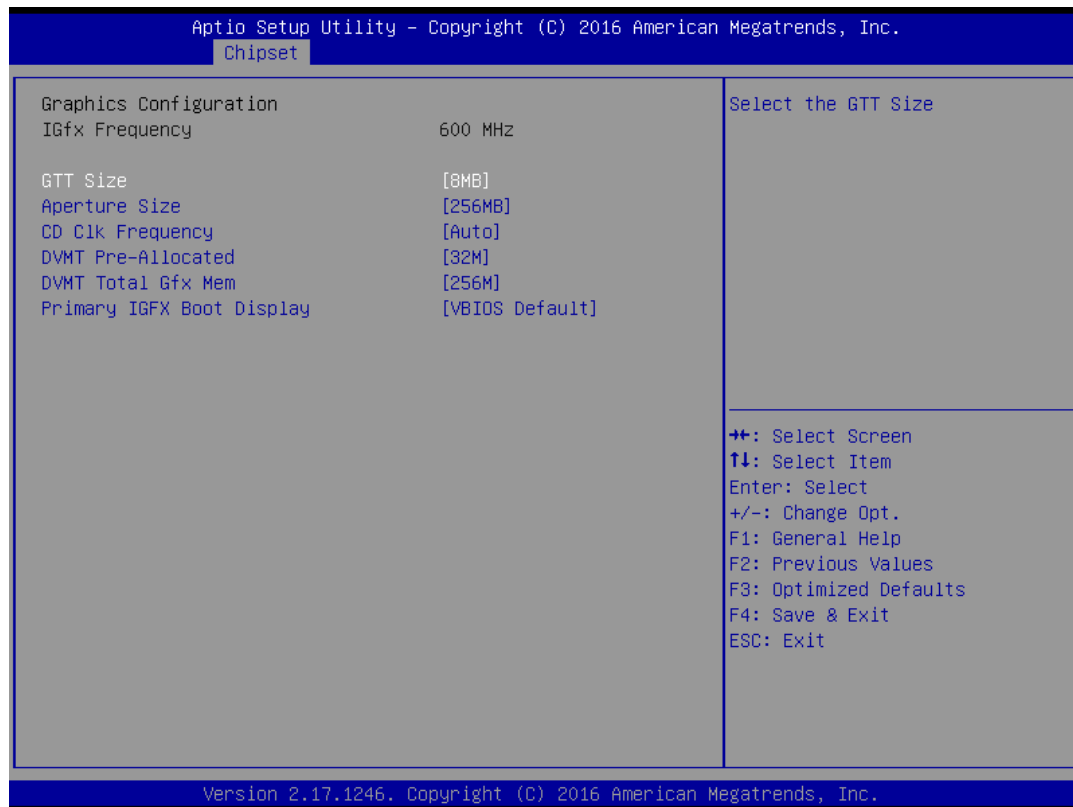


■ VT-d

This item allows you to enable or disable VT-d support.

► Graphics Configuration

Use this item to configure internal graphics controller.



☐ GTT Size

This item allows you to change the GTT size.

☐ Aperture Size

This item allows you to change the Aperture size.

☐ CD Clk Frequency

This item allows you to change the CD Clock Frequency.

☐ DVMT Pre-Allocated

Used the DVMT Pre-Allocated option to specify the amount of system memory that can be used by the internal graphics device.

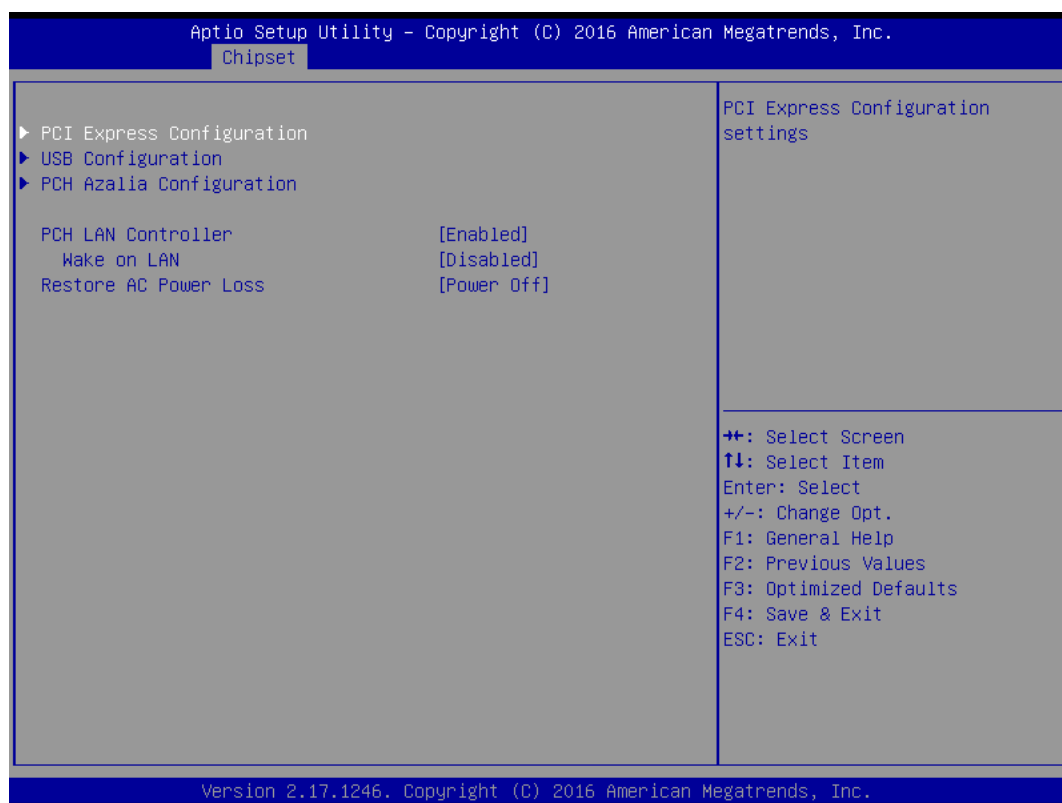
☐ DVMT Total Gfx Mem

This setting specifies the memory size for DVMT.

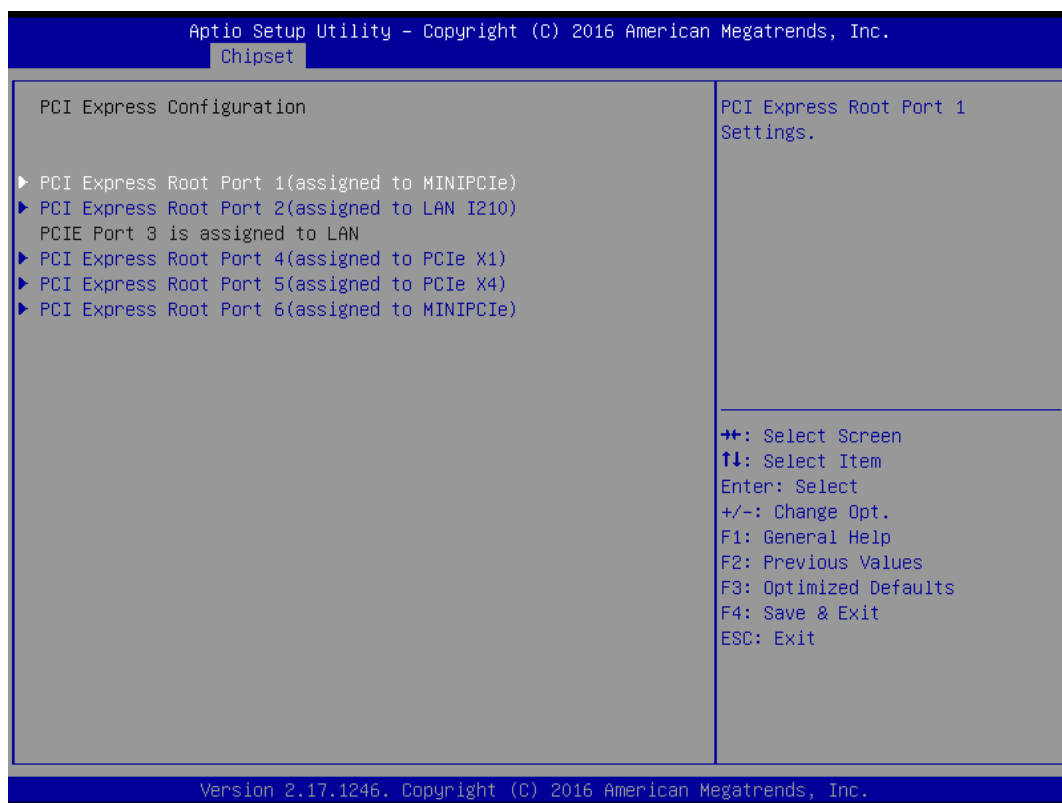
☐ Primary IGFX Boot Display

Use the field to select the type of device you want to use as the display(s) of the system.

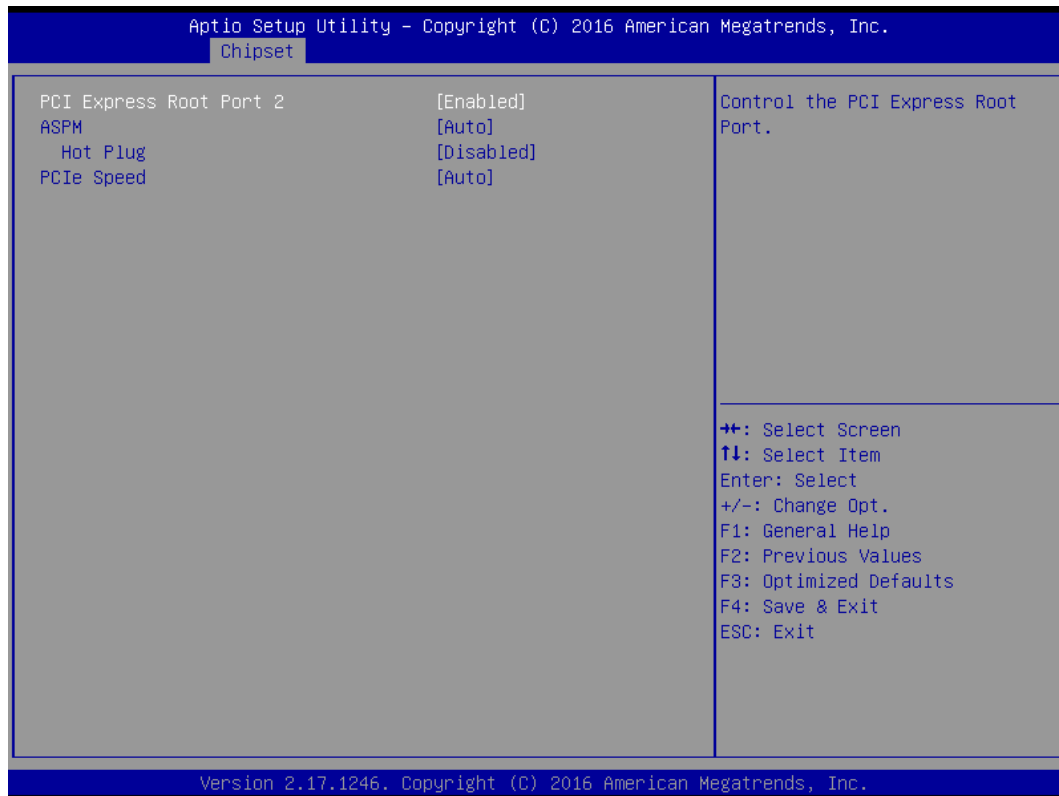
4.4.2 PCH-IO Configuration



► PCI Express Configuration



❑ PCI Express Root Port 1 / 2 / 4 / 5 / 6



➤ PCI Express Port 1 / 2 / 4 / 5 / 6

This item allows you to enable or disable PCI Express Port 2 / 4 / 5 / 6 in the chipset.

➤ ASPM

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

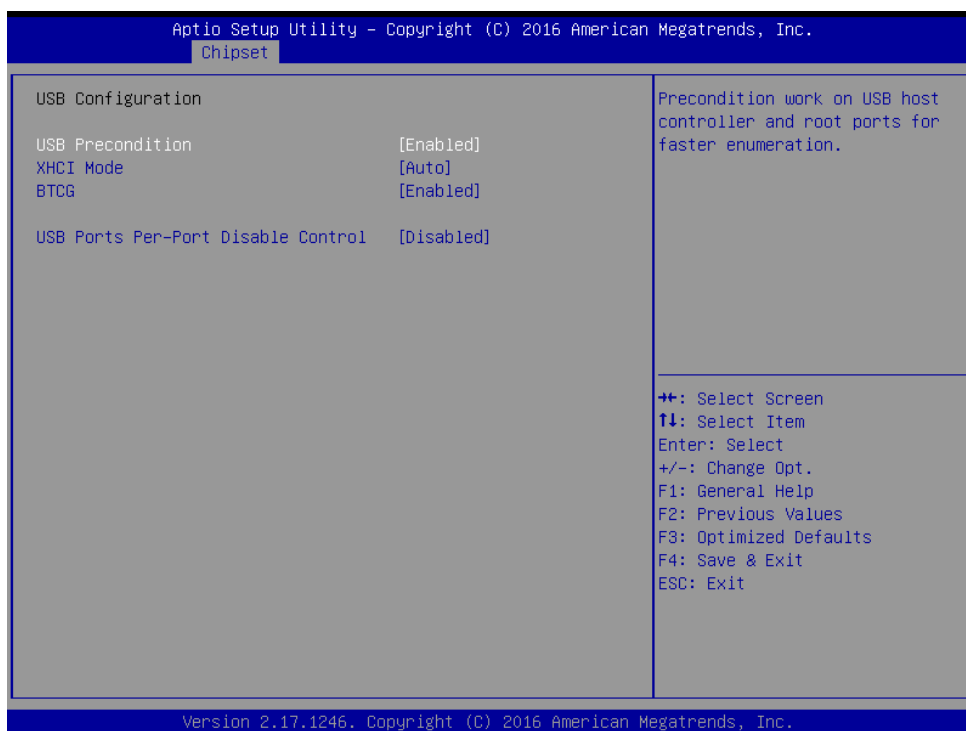
➤ Hot Plug

This item allows you to enable or disable hot plug function.

➤ PCIe Speed

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

► USB Configuration

☐ **USB Precondition**

Precondition work on USB host controller and root ports for faster enumeration.

☐ **XHCI Mode**

Mode of operation of XHCI controller.

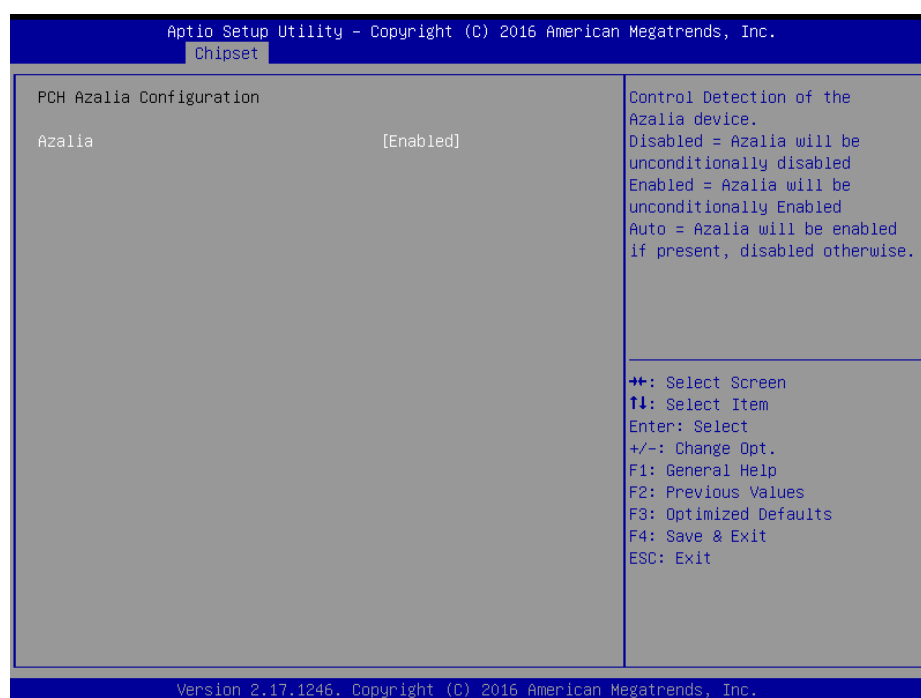
☐ **BTCG**

This item allows you to enable or disable trunk clock gating.

☐ **USB Ports Per-Port Disable Control**

This item allows you to enable or disable each of the USB ports.

► PCH Azalia Configuration

➤ **Azalia**

Control Detection of the Azalia 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.

■ PCH LAN Controller

This item allows you to enable or disable the onboard PCH integrated ethernet controller.

■ Wake on LAN

This item allows you to enable or disable wake on LAN function.

■ Restore AC Power Loss

This item specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

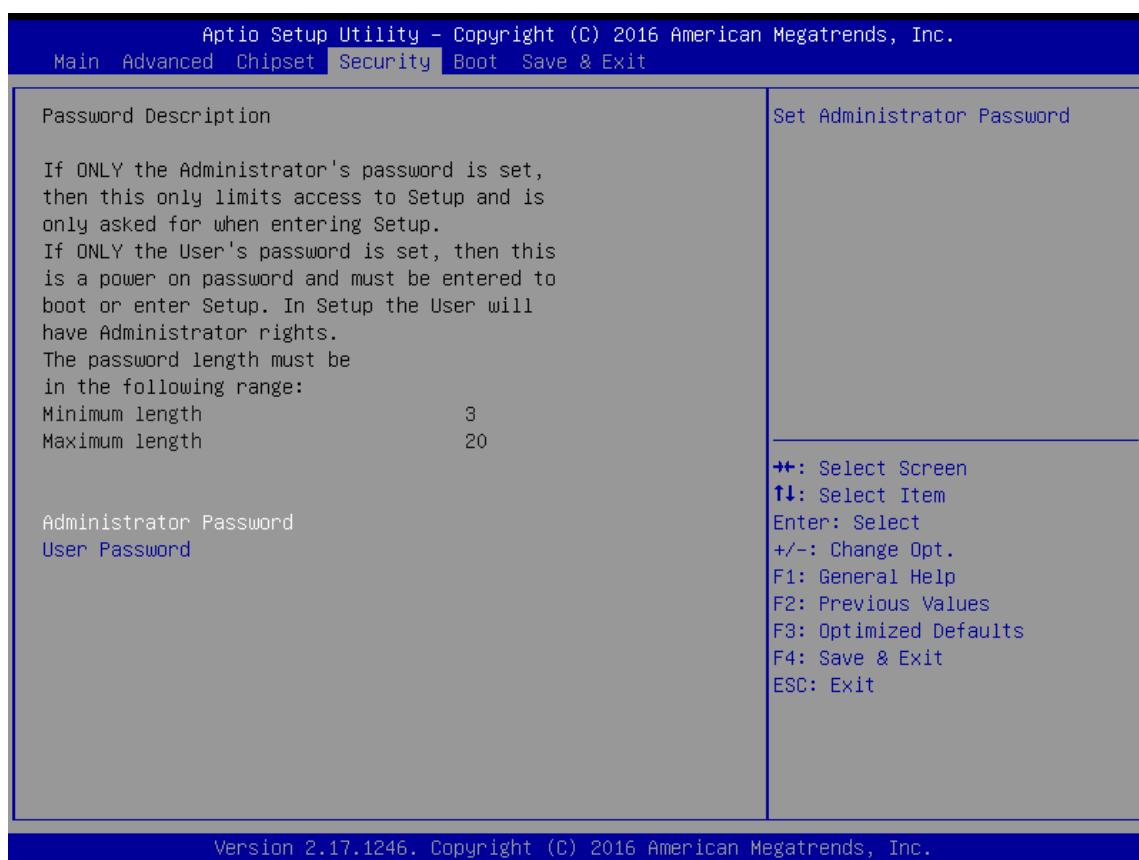
Power Off: Leave the computer in the power off state.

Power On: Leave the computer in the power on state.

Last State: Restore the system to the previous status before power failure or interrupt occurred.

4.5 Security

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



4.5.1 Administrator Password

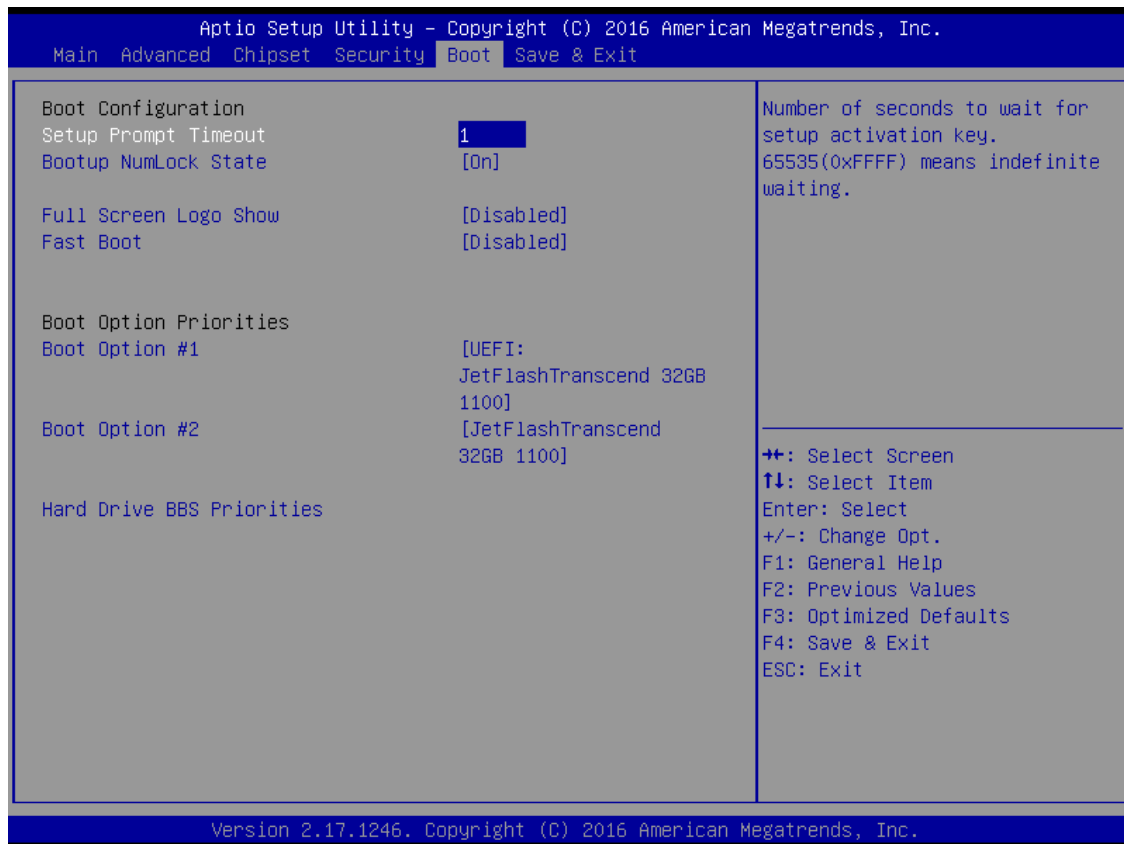
This item allows you to set Administrator Password.

4.5.2 User Password

This item allows you to set User Password.

4.6 Boot

This menu allows you to setup the system boot options.



4.6.1 Setup Prompt Timeout

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

4.6.2 Bootup NumLock State

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

4.6.3 Full Screen Logo Show

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

4.6.4 Fast Boot

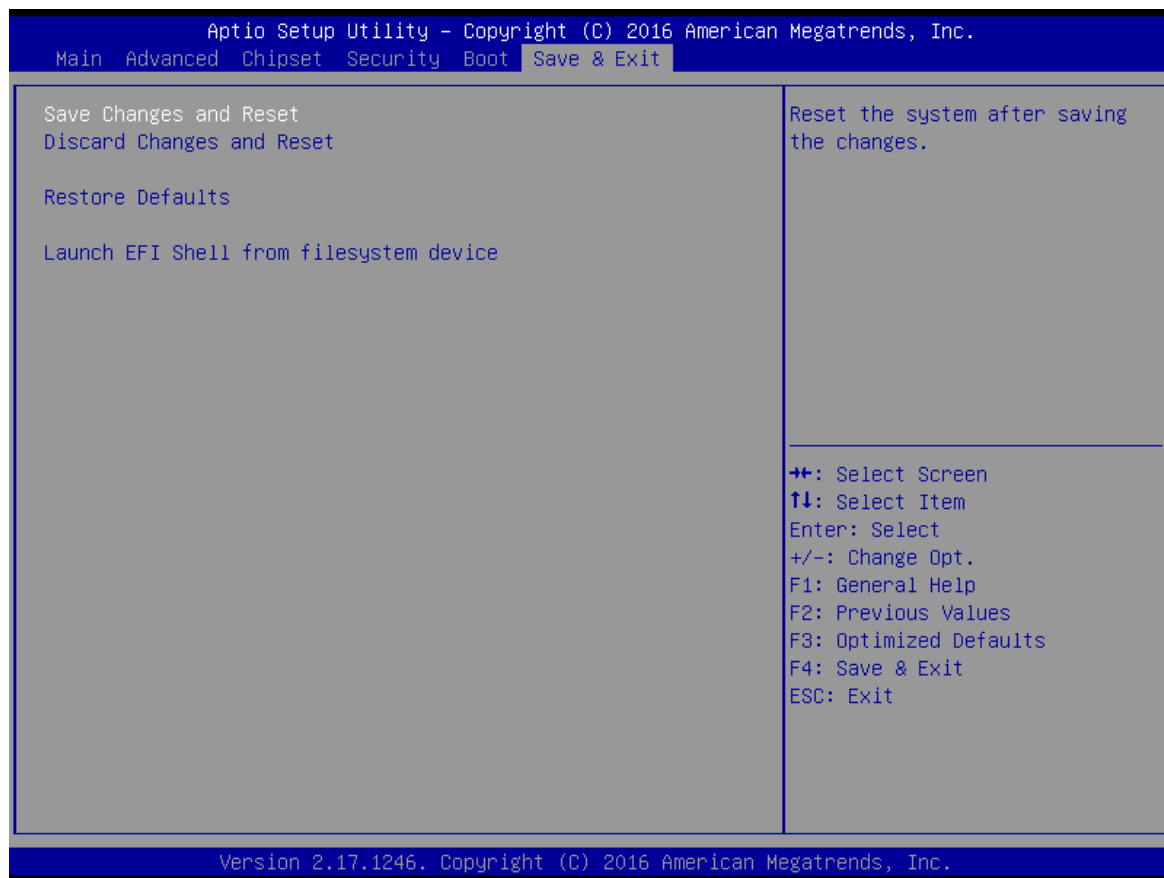
This item allows you to enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

4.6.5 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.



4.7.1 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.

4.7.2 Discard Changes and Reset

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

4.7.3 Restore Defaults

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

4.7.4 Launch EFI Shell from filesystem device

Use this item to launch EFI shell application (shell.efi) from one of the available filesystem device.

Appendix

WDT & GPIO

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

WDT Sample Code

WDT Setting

```
// 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, this 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

GPIO Setting

IO_DO4	I/O 0xA02h Bit3
IO_DO3	I/O 0xA02h Bit2
IO_DO2	I/O 0xA02h Bit1
IO_DO1	I/O 0xA02h Bit0
IO_DI4	I/O 0xA03h Bit7
IO_DI3	I/O 0xA03h Bit6
IO_DI2	I/O 0xA03h Bit5
IO_DI1	I/O 0xA03h Bit4

```
#define GPI_ADDR 0xA03
#define GPO_ADDR 0xA02h
```

1. // 0xA03h is Pin Status(default 0xF5)(at IO_DI1~ IO_DI4)
ByteData = ReadByte (GPI_ADDR) //Read current Pin Status
2. //Offset 0xA02h default setting is 0xFF (output pin set to output high) (at IO_DO1~ IO_DO4)
ByteData = 0x0F //set IO_DO1~ IO_DO4 to high
WriteByte (GPO_ADDR, ByteData)

