USER'S MANUAL

ACO-6000-CML

In-Vehicle Computer

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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2022/04/01

Disclaimer

All specifications and information in this User's Manual are believed to be accurate and up to date. Premio Inc. does not guarantee that the contents herein are complete, true, accurate or non-misleading. The information in this document is subject to change without notice and does not represent a commitment on the part of Premio Inc.
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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 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 Premio Inc website at www.premioinc.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	**ACO-6000-CML Series** Embedded System	1
2	Wall Mount Kit	1
3	DVI to VGA Adapter	1

Ordering Information

Model No.	Product Description
ACO-6000-CML	In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN
ACO-6000-CML-110V	In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN, 48-110V
ACO-6000-CML-P	In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, w/ Power Adapter
ACO-6000-CML-110V-P	In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, 48-110V, w/ Power Adapter
ACO-6000-CML-1E	In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN, 1x PCIe
ACO-6000-CML-1E-110V	In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN, 1x PCIe, 48-110V
ACO-6000-CML-1E-P	In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, 1x PCIe, w/ Power Adapter
ACO-6000-CML-1E-110V-P	In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, 1x PCIe, 48-110V, w/ Power Adapter

Optional Accessories

Model No.	Product Description
1-E09A22102	Adapter AC/DC 24V 9.2A 220W with 3pin Terminal Block Plug 5.0mm Pitch
1-E09A22801	Adapter AC/DC 24V/11.67A 280W with 3pin Terminal Block Plug 5.0mm Pitch
1-TPCD00005	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

The In-Vehicle Computer ACO-6000-CML series are designed with rich I/O, high flexibility and easy expansion capabilities which are ideal for diverse industrial applications.Support 10th Gen. Intel® Xeon® W-1290TE (4.5GHz, 10 Cores) / Intel® Xeon® W-1270TE (4.4GHz, 8 Cores) / Intel® Xeon® W-1250TE (3.8GHz, 6 Cores) or Intel® Core™ i9-10900E (4.7GHz, 10 Cores) / i9-10900TE (4.5GHz, 10 Cores) or i7-10700E (4.5GHz, 8 Cores) / i7-10700TE (4.4GHz, 8 Cores) or i5-10500T (4.2GHz, 6 Cores) / i5-10500TE (3.7GHz, 6 Cores) or i3-10100T (3.8GHz, 4 Cores) / i3-10100TE (3.6GHz, 4 Cores) Desktop processor, ACO-6000-CML Series is an extreme features integration, outstanding system performance, versatile I/O connections, and rugged reliability fanless embedded systems. It offers dramatically enhanced CPU and graphics performance, wide power and feature advanced features, rich connectivity interfaces, wide range 9~48 VDC power input, and high reliability even operating in temperature extremes (-20˚C ~ 70˚C).

Model No.	Rear Panel	Front Panel
ACO-6000-CML		
ACO-6000-CML-1E 1x PCIe		

Key Features

- LGA 1200 socket for 10th Gen. Intel® CML S Processor (65W/35W TDP)
- Intel® W480E chipset
- 2x DDR4 2666/2933MHz SODIMM. Max. up to 64GB
- Triple Independent Display by 1x DVI-I and 2x DisplayPort
- 2x Intel® GbE supporting Wake-on-LAN and PXE
- 2x Full-size Mini PCIe for communication or expansion modules, 2x SIM socket
- 3x 2.5" SATA HDD Bay (1x Internal) and with RAID 0, 1, 5 support
- 1x M.2 (E Key, PCIe x1, USB 2.0, 2230)
- 8x RS-232/422/485 (6x internal), 6x USB 3.2 Gen 2, 3x USB 3.2 Gen 1 (1x internal)
- 8x DI + 8x DO with isolation
- 9 to 48 or 48 to 110VDC Wide Range Power Input Supporting AT/ATX Mode
- Wide Operating Temperature -25˚C to 70˚C (35W/65W CPU)
- Power ignition management
- TPM 2.0 Supported
- 1x PCIe x16 (ACO-6000-CML-1E Only)

1.2 Hardware Specification

System

Processor

Support 10th Gen Intel® CML S Processor (LGA 1200, 65W/35W TDP)

- Intel® Xeon® W-1290TE, 10 Cores, 20MB Cache, up to 4.5 GHz
- Intel® Xeon® W-1270TE, 8 Cores, 16MB Cache, up to 4.4 GHz
- Intel® Xeon® W-1250TE, 6 Cores, 12MB Cache, up to 3.8 GHz
- Intel® Core™ i9-10900E, 10 Cores, 20MB Cache, up to 4.7 GHz
- Intel® Core™ i9-10900TE, 10 Cores, 20MB Cache, up to 4.5 GHz
- Intel® Core™ i7-10700E, 8 Core, 16MB Cache, up to 4.5 GHz
- Intel® Core™ i7-10700TE, 8 Cores, 116MB cache, up to 4.4 GHz
- Intel® Core™ i5-10500T, 6 Cores, 12MB Cache, up to 4.2 GHz
- Intel® Core™ i5-10500TE, 6 Core, 12MB Cache, 3.7 GHz
- Intel® Core™ i3-10100T, 4 Cores, 6MB cache, up to 3.8 GHz
- Intel® Core™ i3-10100TE, 4 Cores, 9MB Cache, up to 3.6 GHz

System Chipset	Intel® W480E Chipset
LAN Chipset	GbE1: Intel I219 (Support Wake-on-LAN and PXE) GbE2: Intel I210 (Support Wake-on-LAN and PXE)
Audio Codec	Realtek ALC888S
System Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)
Graphics	Intel® UHD Graphics 630
BIOS	AMI 256Mbit SPI BIOS
Watchdog	Software Programmable Supports 1~255 sec. System Reset
TPM	TPM 2.0

Storage	ACO-6000-CML	ACO-6000-CML-1E
SSD/HDD	1x Internal 2.5" SATA HDD/SSD Bay (support H=9mm) 2x Removable 2.5" SATA HDD/SSD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5	
SIM Socket	2x External SIM socket (Mini PCIe attached)	

Display

DisplayPort	2x DisplayPort, support resolution 4096 x 2304, DP++
DVI	1x DVI-I, support resolution 1920 x 1200
Multiple Display	Triple Display
VGA	Yes (by optional split cable)

Ethernet

- 4x 802.3at Compliant PoE Port, The Maximum DC Power Delivery on Each PoE is 25.5W [ACO-6000-CML-4P Series and ACO-6000-CML-4PM12 Series only]
- 8x 802.3at Compliant PoE Port, The Maximum DC Power Delivery on Each PoE is 25.5W. 80W total power budget [ACO-6000-CML-8P Series and ACO-6000-CML-8PM12 Series only]
- 16x 802.3at Compliant PoE Port, The Maximum DC Power Delivery on Each PoE is 25.5W. 160W total power budget [ACO-6000-CML-16P Series and ACO-6000-CML-16PM12 Series only]

Expansion

M.2	1x M.2 (E Key, PCIe x1, USB 2.0, 2230)
Mini PCIe	2x Full-size Mini PCIe
1x PCIe x16	• ACO-6000-CML-1E only
1x PCI (Optional)	• ACO-6000-CML-1I only
Expansion Modules	Occupied One Universal I/O Slot: • LAN/PoE or M12 LAN/PoE Module： 4-port GbE module with Intel® I350 Chipset, RJ-45 or M12 connector (PoE optional) • D10G Module： 2-Port RJ45 10GbE with Intel X710 Chipset • USB Module： 4-Port USB with Renesas uPD720201K8 host controller (share PCIe Gen2 x1 bandwidth) • 5G Module： 1x M.2 for 5G (B Key, PCIe x4, USB 3.0, 3042/3052), Including 2x SIM socket, 1x SIM switch (Support 1x Universal Slot Only)

Operating System

Windows	Windows 10/11
Linux	Linux kernel

I/O

Audio	1x Mic-in, 1x Line-out
CAN	2x CAN 2.0 A/B 2-pin Internal header
COM	2x RS-232/422/485 ; 6x RS-232/422/485 (internal)
DIO	8 in / 8 out (Isolated)
LAN	2x RJ45
Universal I/O Bracket	2x Universal I/O Bracket (By mini PCIe interface)
USB	6x USB 3.2 Gen 2 (10 Gbps) 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal) 2x USB 2.0 header (internal)
Others	5x WiFi Antenna Holes 1x Power Switch, 1x AT/ATX Switch, 1x Remote Power On/Off 1x PC/Car Mode Switch, 1x Delay Time Switch 1x Removable CMOS Battery 4x 4-Pin Power Connector, 1x 4-PIN FAN Connector

Power

Power Adapter	**ACO-6000-CML：** Optional AC/DC 24V/5A, 120W Optional AC/DC 24V/9.2A, 220W **ACO-6000-CML-1E：** Optional AC/DC 24V/5A, 120W Optional AC/DC 24V/9.2A, 220W Optional AC/DC 24V/11.67A, 280W
Power Mode	AT, ATX
Power Ignition Sensing	Power Ignition Management
Power Supply Voltage	• 9~48VDC • 48~110VDC (Optional)
Power Connector	5-pin Terminal Block (9~48VDC) 3-pin Terminal Block (48~110VDC, Optional)
Power Protection	OVP (Over Voltage Protection); OCP (Over Current Protection) Reserve Protection

Environment	ACO-6000-CML	ACO-6000-CML-1E
Operating Temp.	-25°C to 70°C (35W/65W CPU)	
Storage Temp.	-30°C to 85°C	
Relative Humidity	10% to 95% (non-condensing)	
Standards / Certification	CE, FCC Class A, E-Mark, EMC Conformity with EN 50155, EN 50121-3-2	
Vibration	With SSD: 5 Grms, 5 - 500 Hz, 0.5 hr/axis With HDD: 1 Grms, 5 - 500 Hz, 0.5 hr/axis	With SSD: 3 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	With SSD: 20G, half sine, 11ms

Physical

Construction	Extruded Aluminum with Heavy Duty Metal
Dimension	**ACO-6000-CML：** 240 (W) x 261 (D) x 79.2 (H) mm **ACO-6000-CML-1E：** 240 (W) x 261 (D) x 127.3 (H) mm
Weight	**ACO-6000-CML：** 3.1~3.5 kg
Mounting	Wall Mounting

* For 10th Gen Intel CPUs configured to run at 65W, operating temperatures will be limited to 70°C.
** 65W CPUS may experience thermal throttling depending on extreme application workloads; this is also due to an increase in the physical CPU cores from the Intel silicon (up to 10 cores). Please note, this does not indicate system malfunction or problems in the fanless design. Please consult our embedded engineers for the best configuration to match your application requirements.
*** All specifications and photos are subject to change without notice.

1.3 System I/O

1.3.1 ACO-6000-CML

Front Panel

ATX power on/off switch
Press to power-on or power-off the system

Power LED
Indicates the power status of the system

HDD LED
Indicates the status of the hard drive

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

USB 3.2 Gen 2 port (10 Gbps)
Used to connect USB 3.2 device

USB 3.2 Gen 1 port (5 Gbps)
Used to connect USB 3.2 device

Removable HDD
Removable 2.5" SATA HDD Bay
(support H=7mm, hot-swappable)
Support RAID 0, 1, 5

AT/ATX mode select switch
Used to select AT or ATX power mode

Clear CMOS
Used to clear CMOS

SIM card
Used to insert SIM card

Line-out
Used to connect a speaker

Mic-in
Used to connect a microphone

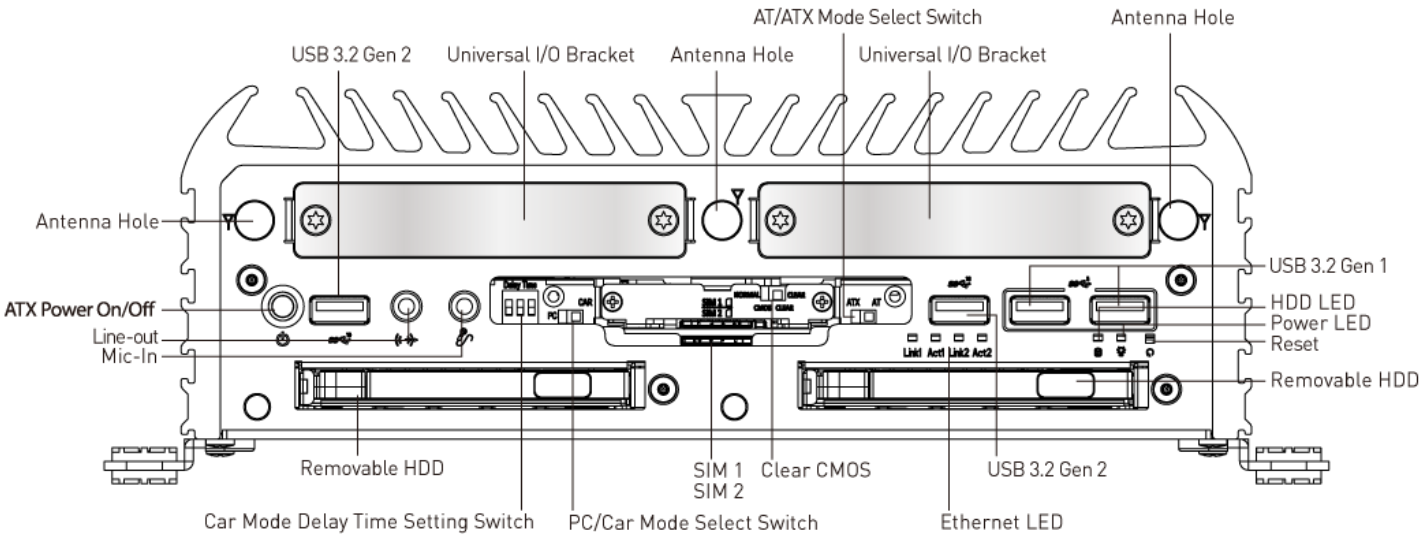
Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block

Car Mode Delay time select switch
Used to select car mode PC turn off delay time

PC/Car mode select switch
Used to select PC or Car mode

Universal I/O bracket (optional)
Used to customized I/O output

- 5G Module: 2x 5G SIM Slot
  (Support 1x Universal Slot Only)
- D10G Module: 2x 10Gb Ports
- LAN/PoE Module: 4x RJ45 LAN/PoE Ports
- M12 Module: 4x M12 LAN/PoE Ports
- USB Module: 4x USB 3.2 Gen 1 Ports



ACO-6000-CML

Rear Panel

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

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

DisplayPort
Used to connect a DisplayPort monitor

COM port
COM1 ~ COM2 support RS232/422/485 serial device

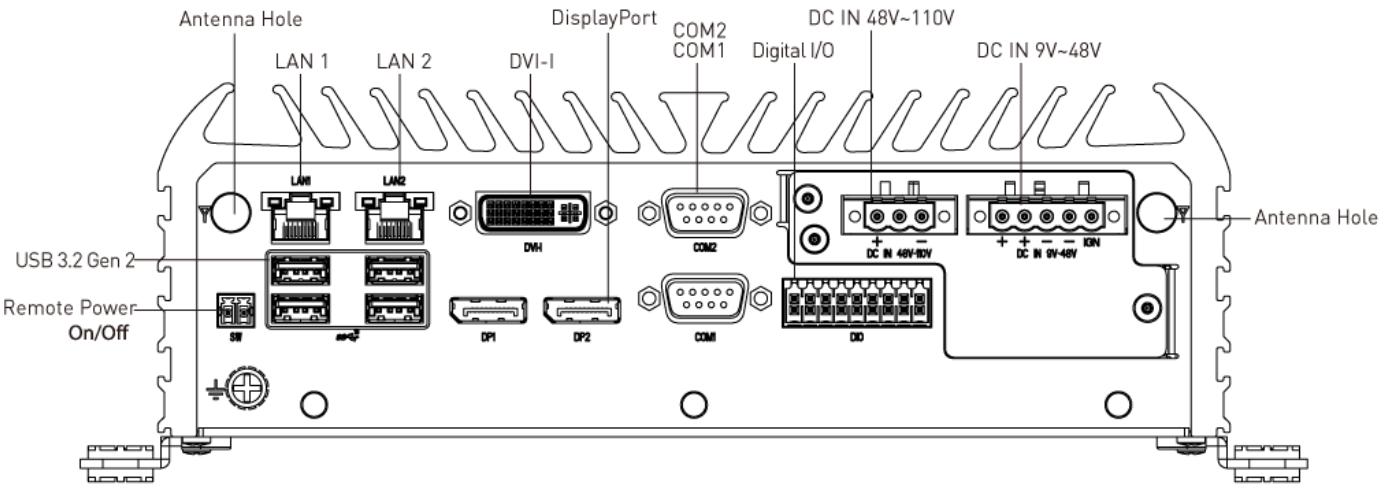
USB 3.2 Gen 2 port (10 Gbps)
Used to connect USB 3.2 device

LAN port
Used to connect the system to a local area network

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

DC IN (9V~48V)
Used to plug a DC power input with terminal block

DC IN (48V~110V) optional
Used to plug a DC power input with terminal block



1.3.2 ACO-6000-CML-1E

Front Panel

ATX power on/off switch
Press to power-on or power-off the system

Power LED
Indicates the power status of the system

HDD LED
Indicates the status of the hard drive

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

USB 3.2 Gen 2 port (10 Gbps)
Used to connect USB 3.2 device

USB 3.2 Gen 1 port (5 Gbps)
Used to connect USB 3.2 device

Removable HDD
Removable 2.5" SATA HDD Bay
(support H=7mm, hot-swappable)
Support RAID 0, 1, 5

AT/ATX mode select switch
Used to select AT or ATX power mode

Clear CMOS
Used to clear CMOS

SIM card
Used to insert SIM card

Line-out
Used to connect a speaker

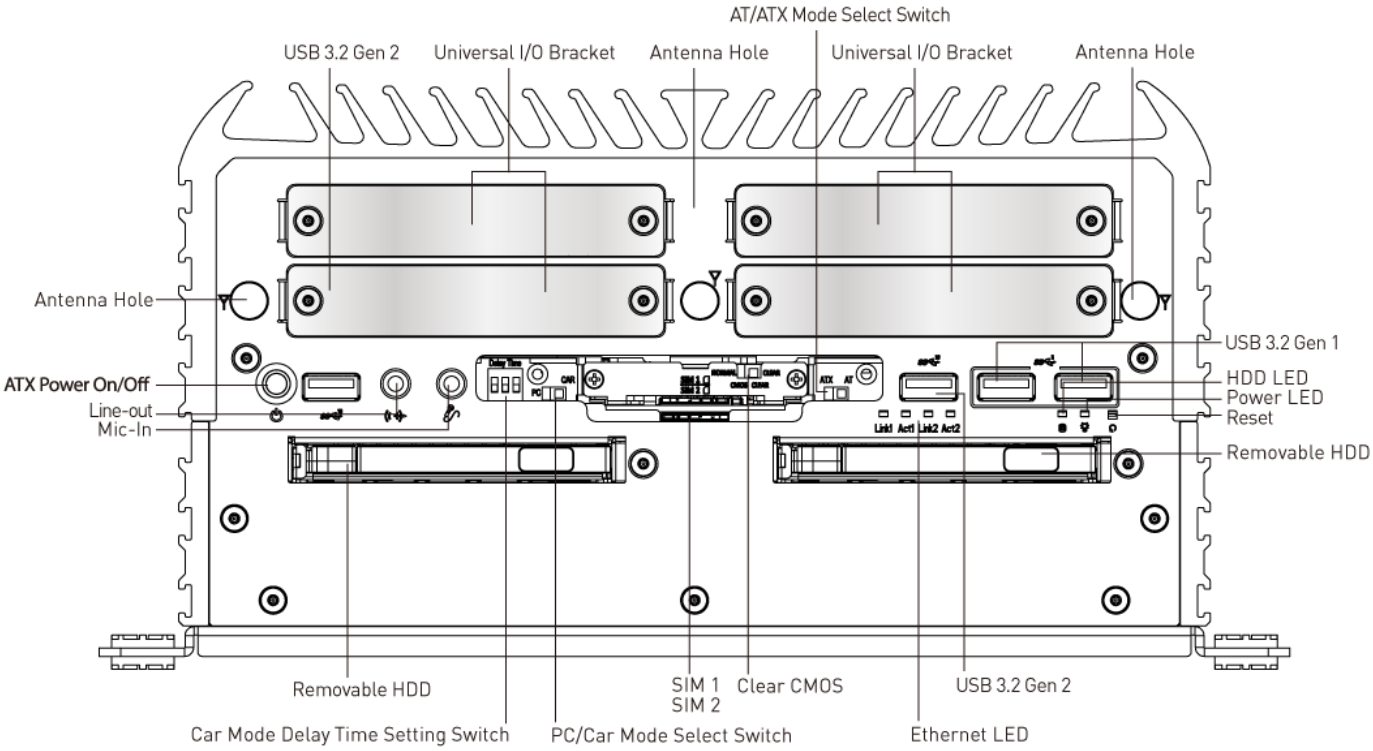
Mic-in
Used to connect a microphone

Remote Power on/off Terminal Block
Used to plug a remote power on/off terminal block

Car Mode Delay time select switch
Used to select car mode PC turn off delay time

PC/Car mode select switch
Used to select PC or Car mode

Universal I/O bracket (optional)
Used to customized I/O output
- LAN/PoE Module: 4x RJ45 LAN/PoE Ports
- M12 Module: 4x M12 LAN/PoE Ports
- USB Module: 4x USB 3.2 Gen 1 Ports



ACO-6000-CML-1E

Rear Panel

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

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

DisplayPort
Used to connect a DisplayPort monitor

COM port
COM1 ~ COM2 support RS232/422/485 serial device

Expansion
PCIe or PCI Slot

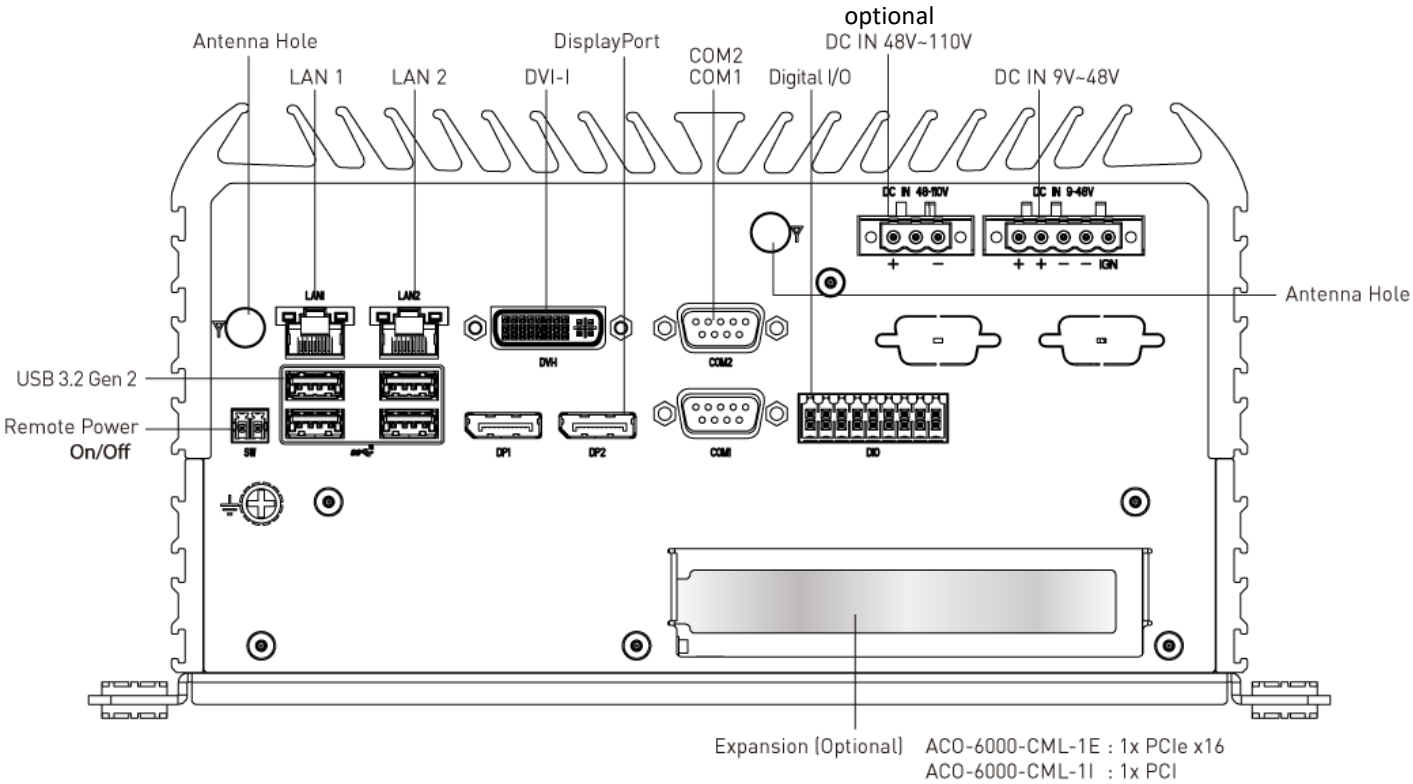
USB 3.2 Gen 2 port (10 Gbps)
Used to connect USB 3.2 device

LAN port
Used to connect the system to a local area network

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

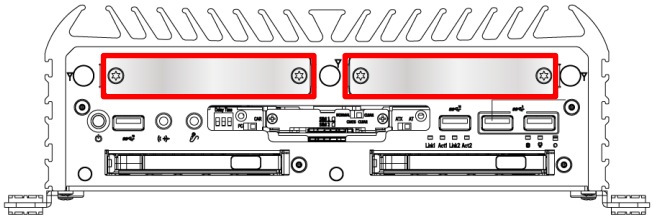
DC IN (9V~48V)
Used to plug a DC power input with terminal block

DC IN (48V~110V) optional
Used to plug a DC power input with terminal block



1.3.3 Universal I/O Bracket

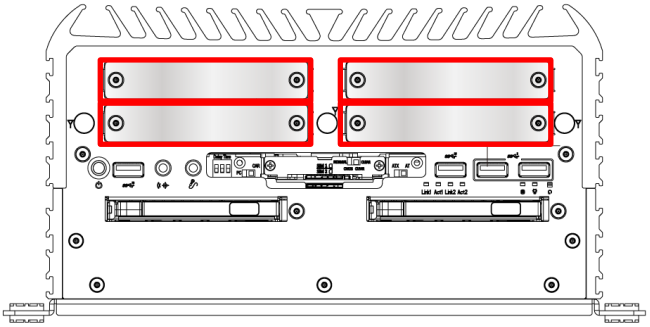
Model No :



ACO-6000-CML

Up to 2x Module :

- 5G Module (Support 1x Universal Slot Only)
- D10G Module
- USB Module
- LAN/PoE Module
- M12 Module



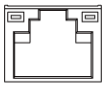
ACO-6000-CML-1E

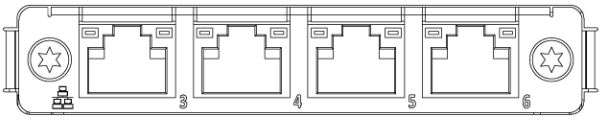
Up to 4x Module :

- USB Module
- LAN/PoE Module
- M12 Module

Available Module :

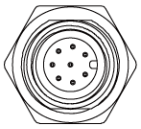
LAN/PoE Module

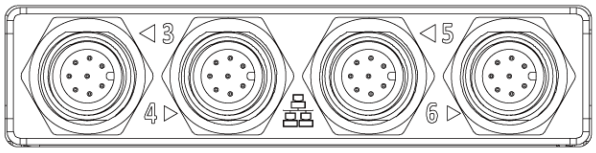




4x RJ45 LAN/PoE Ports

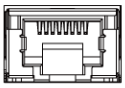
M12 Module

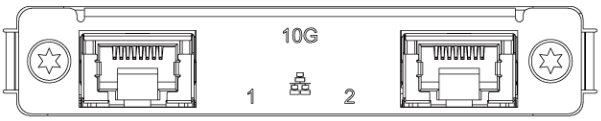




4x M12 LAN/PoE Ports

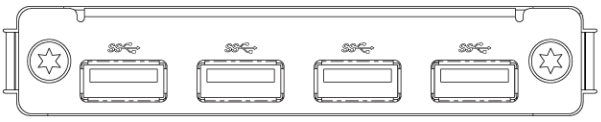
D10G Module





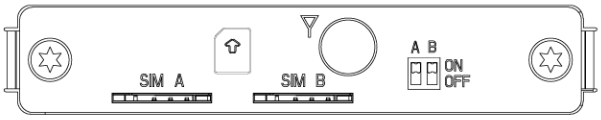
2x 10Gb Ports

USB Module



4x USB 3.2 Gen 1 Ports

5G Module

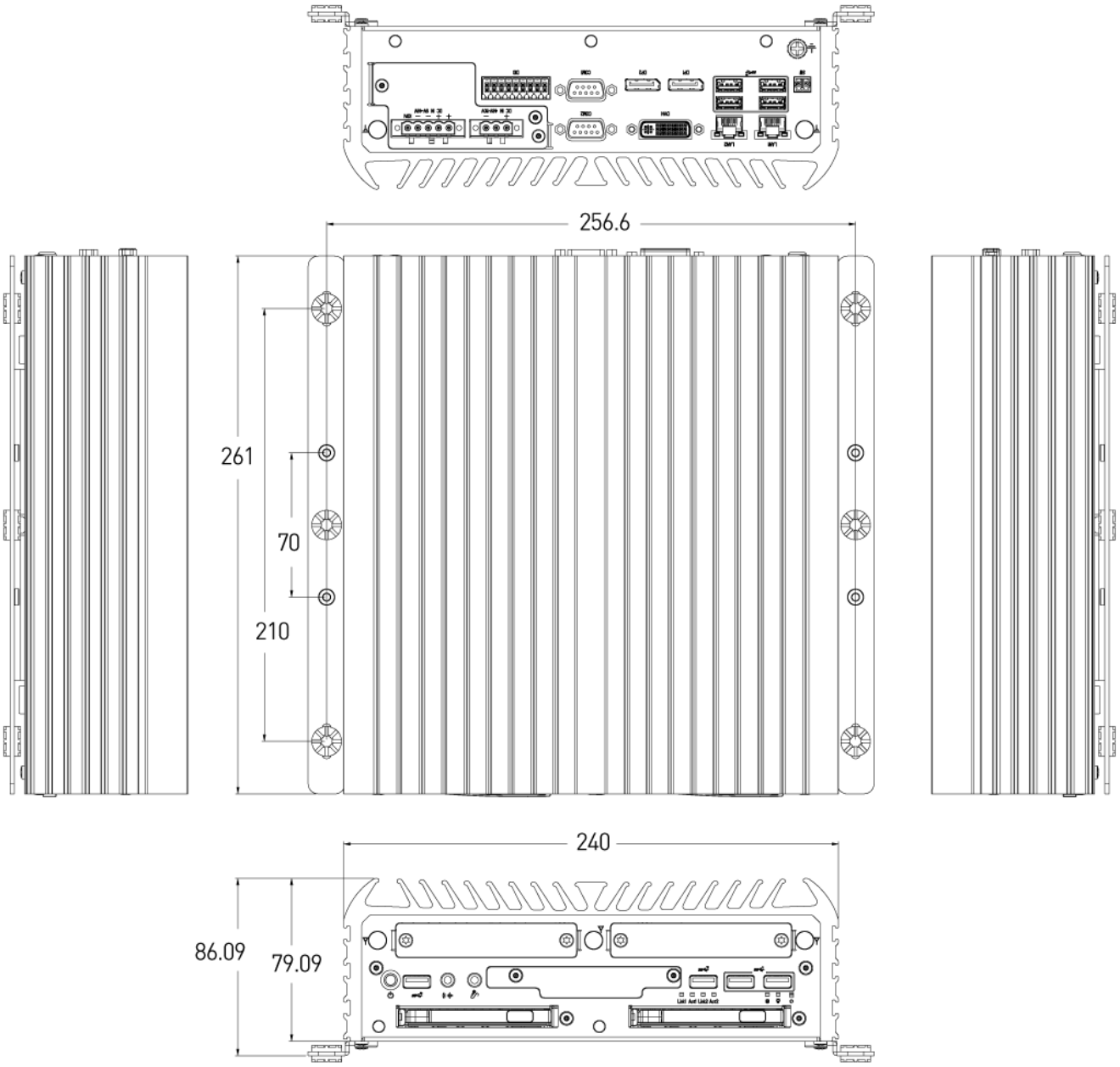


2x 5G SIM Slot
(Support 1x Universal Slot Only)

1.4 Mechanical Dimensions

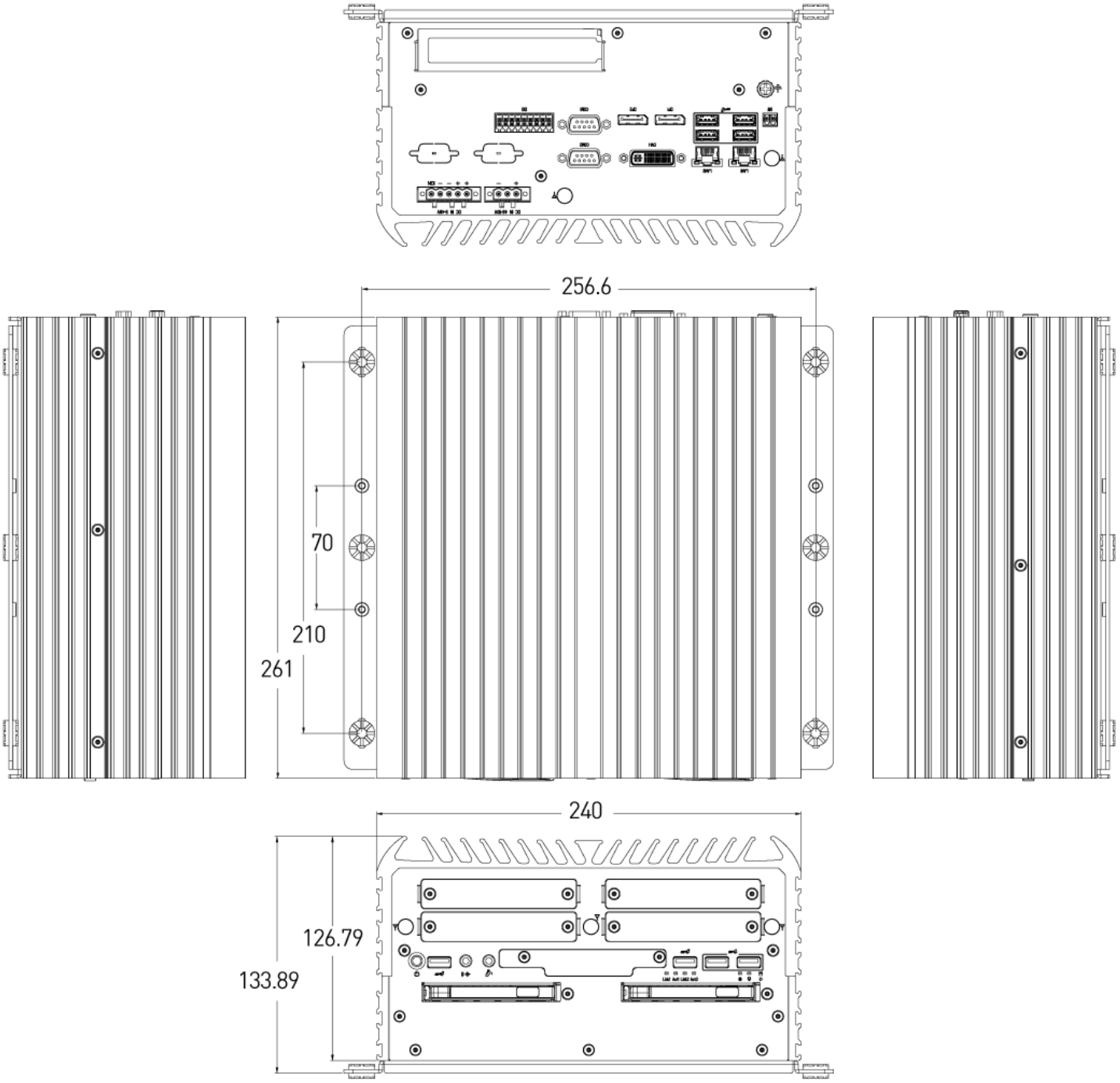
1.4.1 ACO-6000-CML

Unit: mm



1.4.2 ACO-6000-CML-1E

Unit: mm

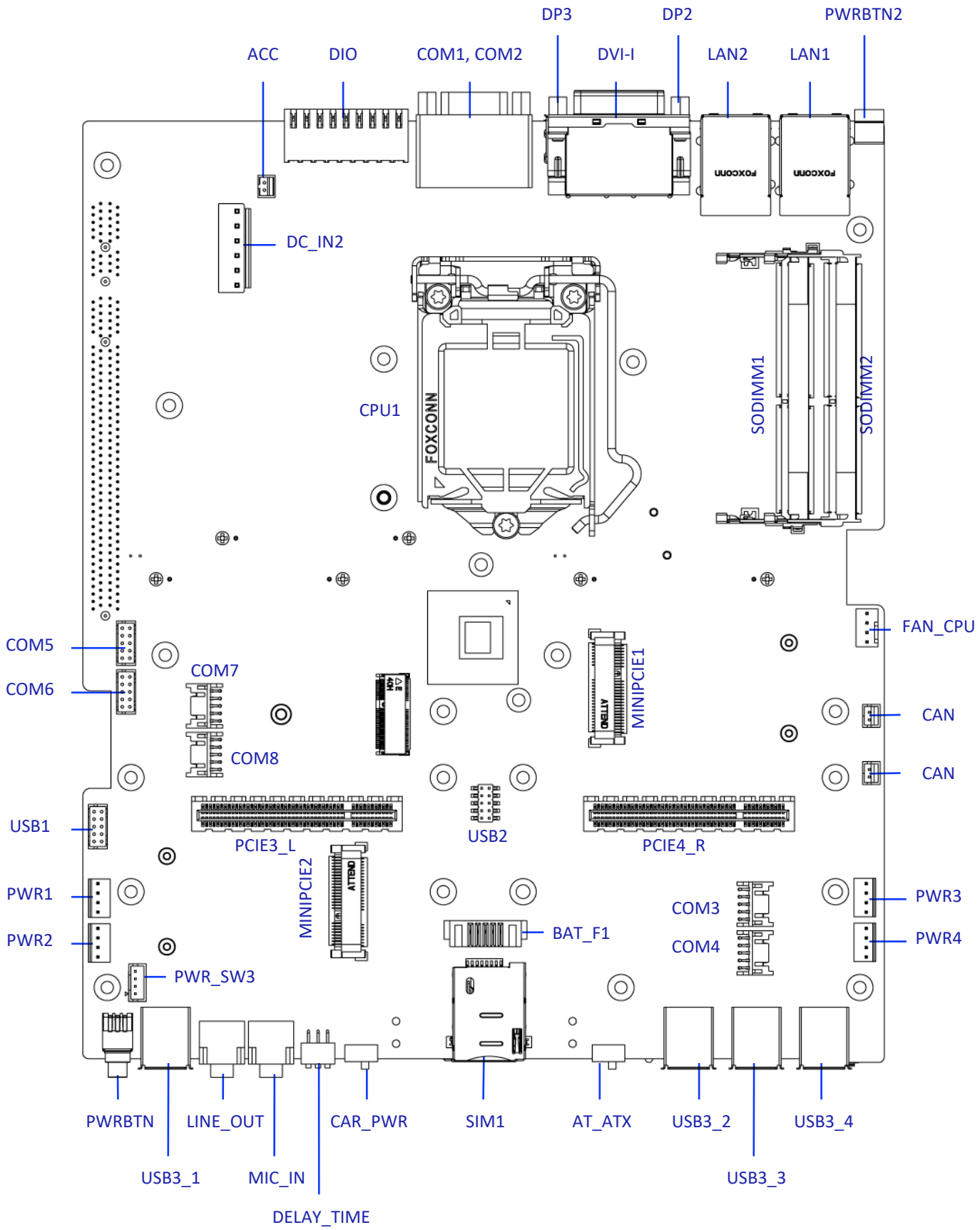


Chapter 2

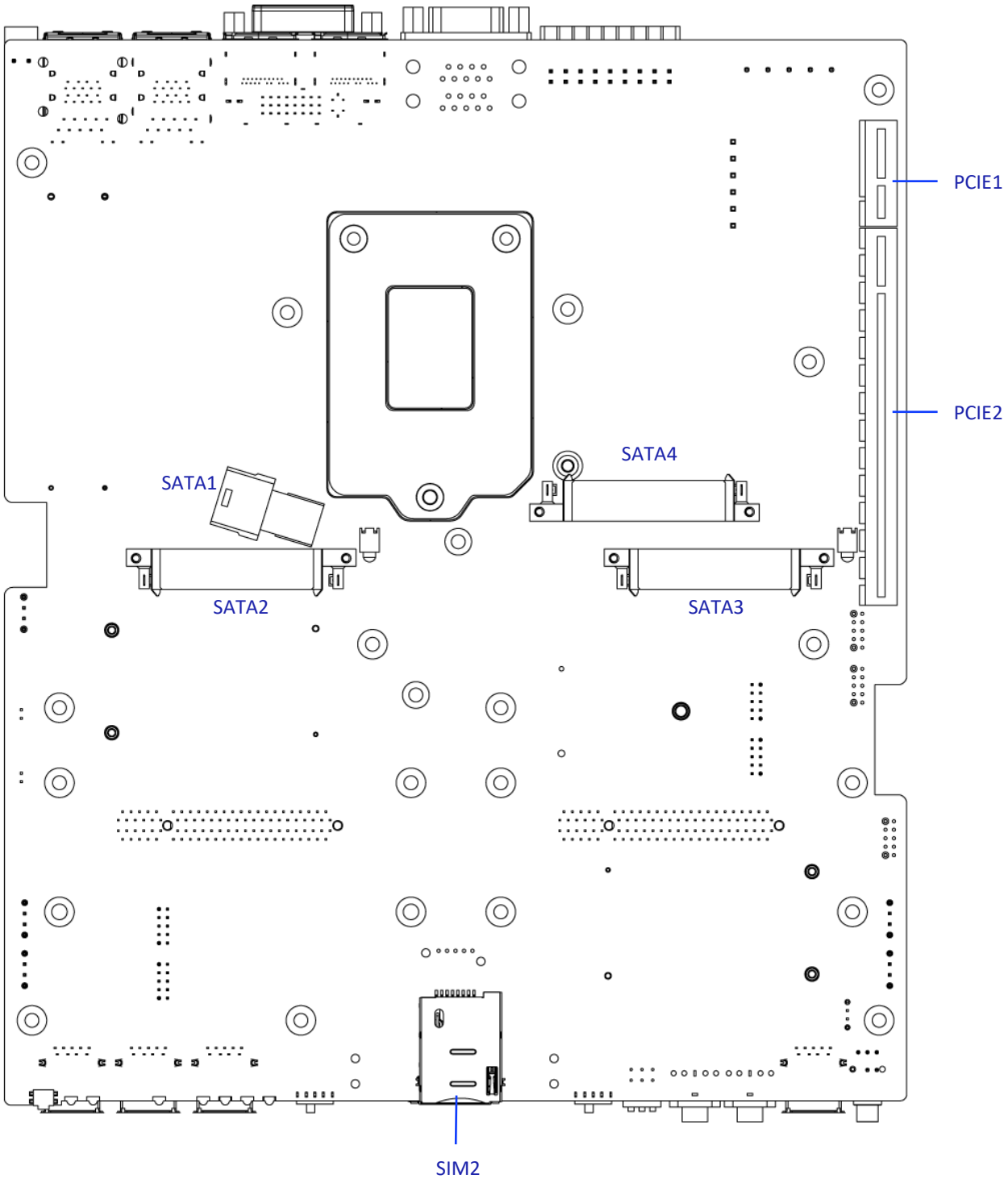
Mechanical Specifications

2.1 Switch and Connector Locations

2.1.1 Top View



2.1.2 Bottom View

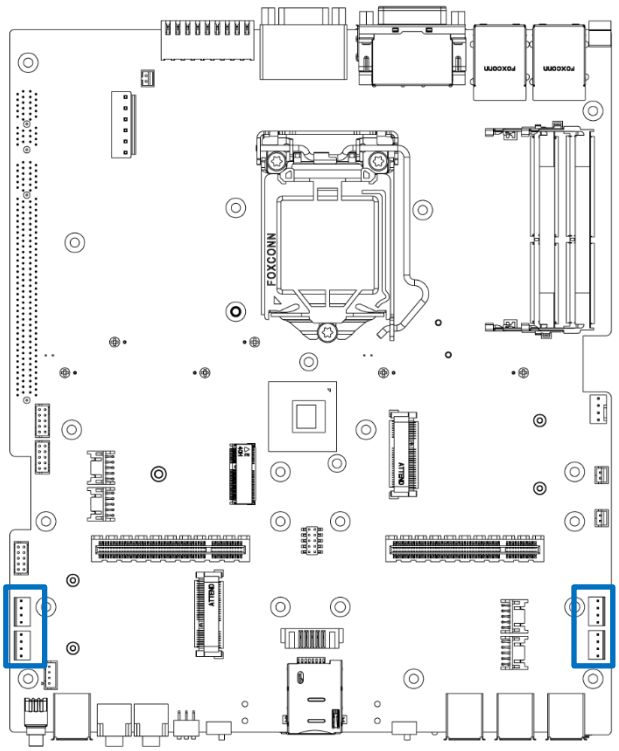


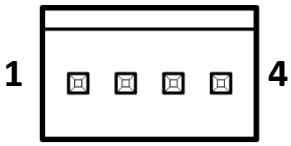
2.2 Connector / Switch Definition

Connector Location	Definition
AT_ATX1	AT / ATX Power Mode Switch
PWRBTN,2	Power Switch
RESET	Reset Switch
DC_IN2	6-pin DC +9~48V Power Input Connector
DIO1	8DI / 8DO Connector
COM1-8	RS232 / RS422 / RS485 Connector
DP2-3	DP Connector
DVI-I	DVI-I Connector
LAN1-2	LAN and USB3.2 Gen 2 Ports X2
FAN_CPU	Smart FAN Connector
PWR1-4	+12V / 5V Power Connector
USB3_1-4	USB 3.2 Gen 2 、USB 3.2 Gen 1、 USB2.0
SIM1, SIM2	SIM Card Socket
CAR_PWR	PC mode / CAR mode select
DELAY_TIME	CAR mode delay time setting
MIC_IN	Mic-in Jack
LINE_OUT	LINE-OUT Jack
PWR_SW3	Remote Power Switch
PCIE	PCI-Express X1 Slot, PCI-Express X8 Slot, PCI-Express X16 Slot
MPCIE1-2	Mini PCI-Express Socket
PWR_LED	Power LED Status
HDD_LED	HDD Access LED Status
WDT_LED1	Watchdog LED Status
SATA1	SATA X 4 Port
SATA2, SATA3, SATA4	SATA with Power Connector

2.3 I/O Interface Descriptions

2.3.1 Power Con

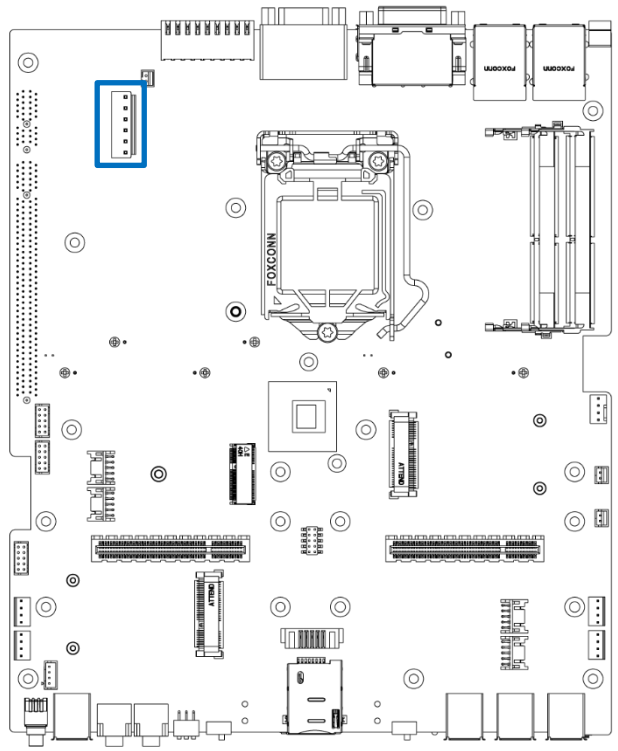


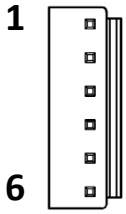


PWR1-4

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

2.3.2 DC IN/IGN IN (+9V ~ +48V)

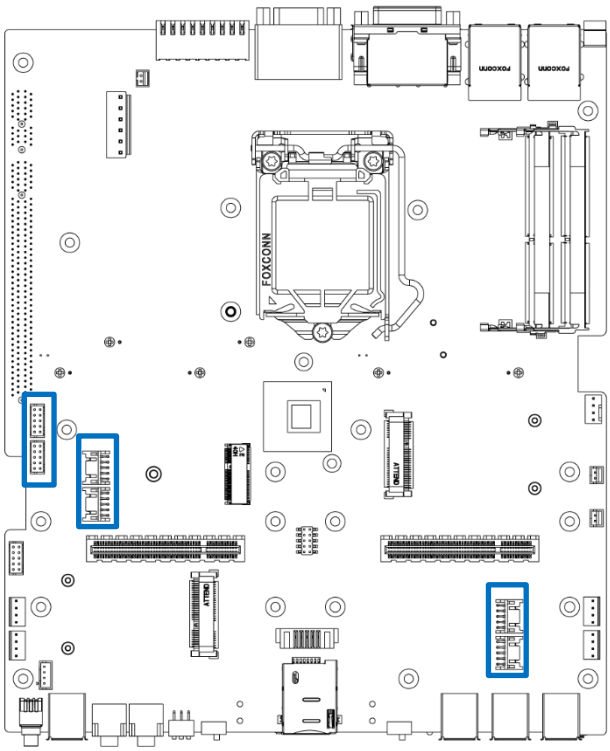


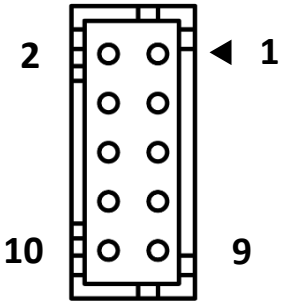


DC_IN2

Pin	Signal
1	+DC_IN
2	+DC_IN
3	+DC_IN
4	GND
5	GND
6	GND

2.3.3 COM Con





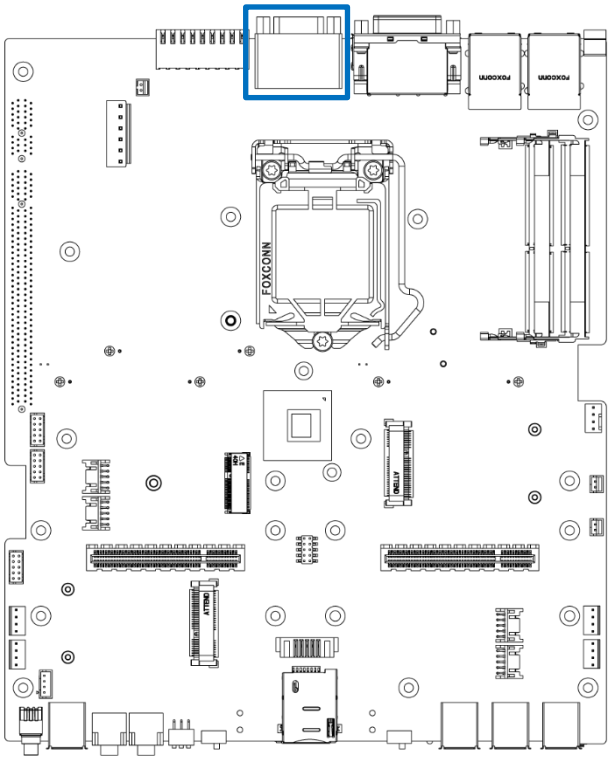
COM3, COM4, COM5, COM6, COM7, COM8

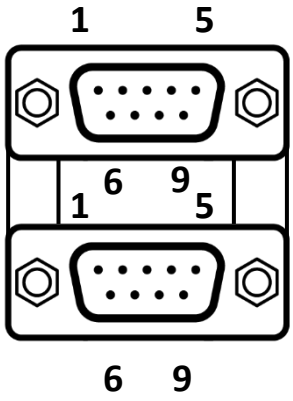
Pin	Signal	Pin	Signal
1	DCD#	2	DSR#
3	RXD	4	RTS#
5	TXD	6	CTS#
7	DTR#	8	RI#
9	GND	10	NC

RS232 / RS422 / RS485 Connector 2x5 10-pin box header, 2.0mm pitch

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

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

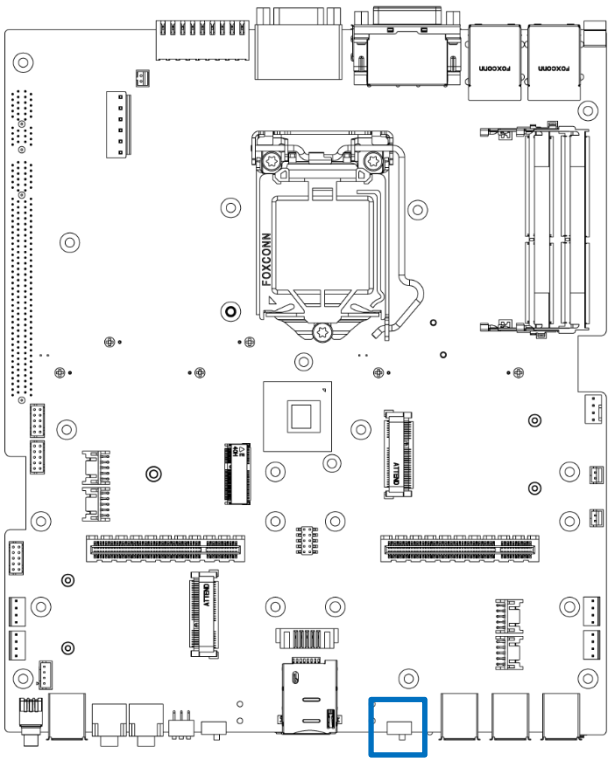


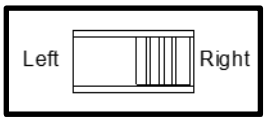


COM1, COM2

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#		

2.3.5 AT / ATX Power Mode Switch

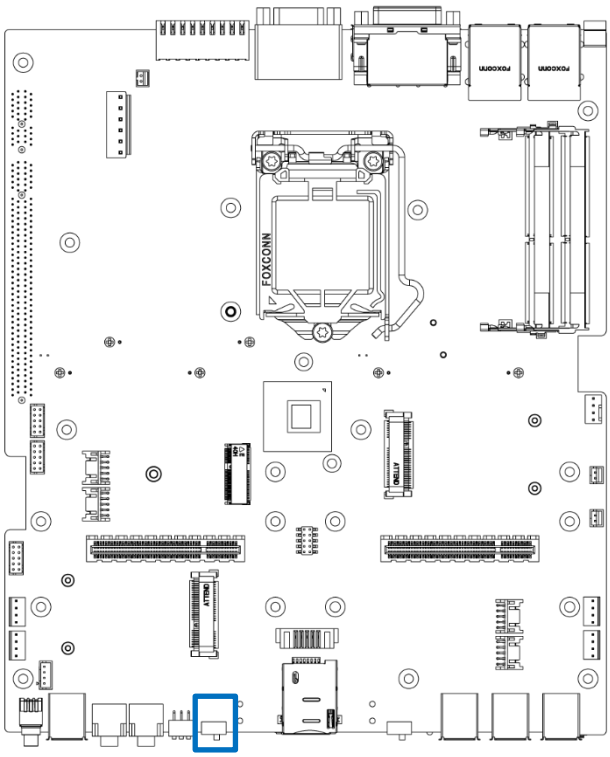


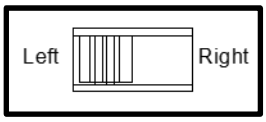


AT_ATX1

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

2.3.6 PC / Car Mode Switch

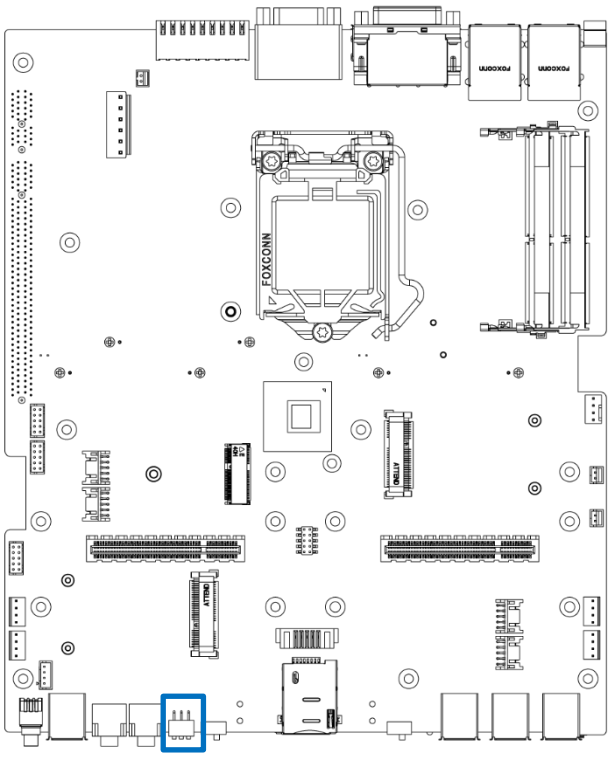


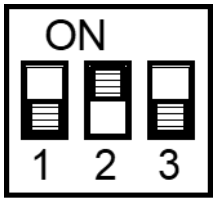


CAR_PWR1

Switch	Definition
1-2 (Left)	PC Power Mode (Default)
2-3 (Right)	Power Ignition Mode

2.3.7 Power off delay time setup Switch

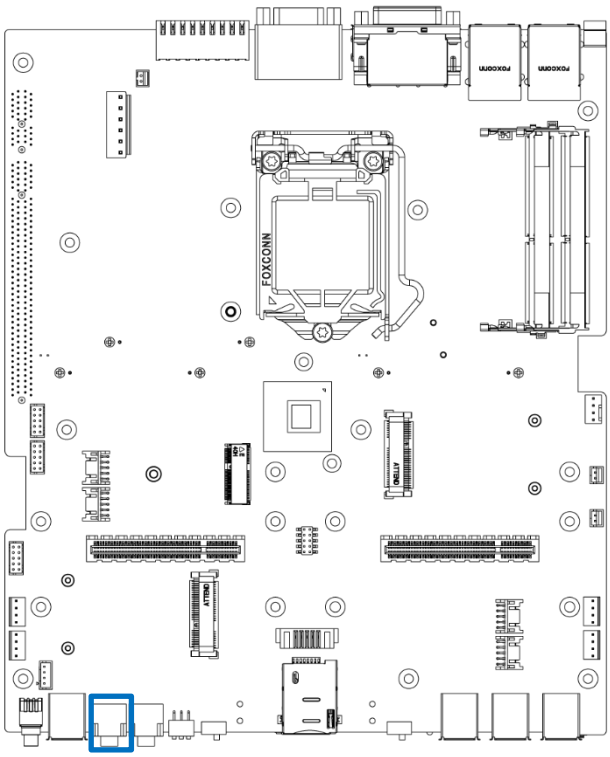


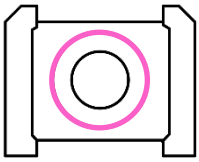


DELAY_TIME1

Switch 1 / 2 / 3	Definition
ON / ON / ON	3 sec.（Default Shutdown Timer by O.S）
ON / ON / OFF	1 min.
ON / OFF / ON	5 min.
ON / OFF / OFF	10 min.
OFF / ON / ON	30 min.
OFF / ON / OFF	1 hour
OFF / OFF / ON	2 hour

2.3.8 Line-out Jack (Green) Connector Type: 5-pin Phone Jack

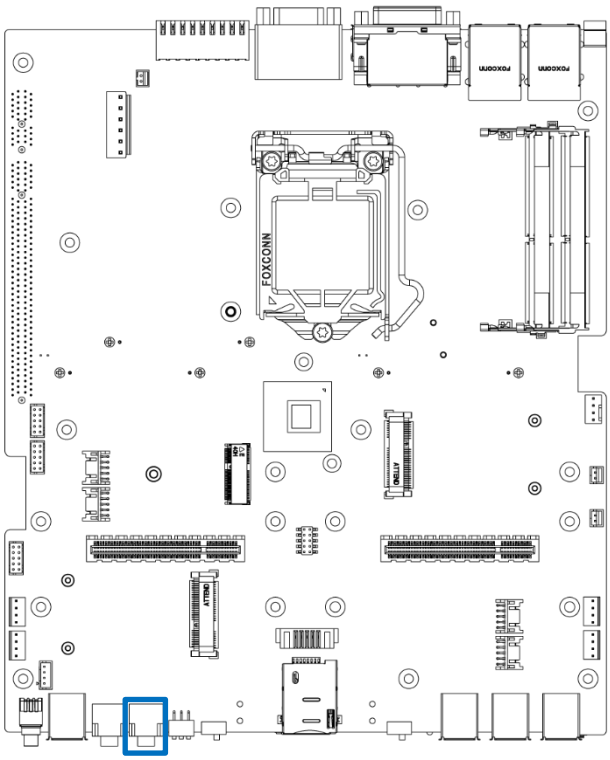


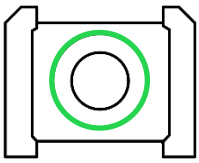


LINE_OUT1

Switch	Definition
1	GND
2	OUT_R
3	GND
4	GND
5	OUT_L

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

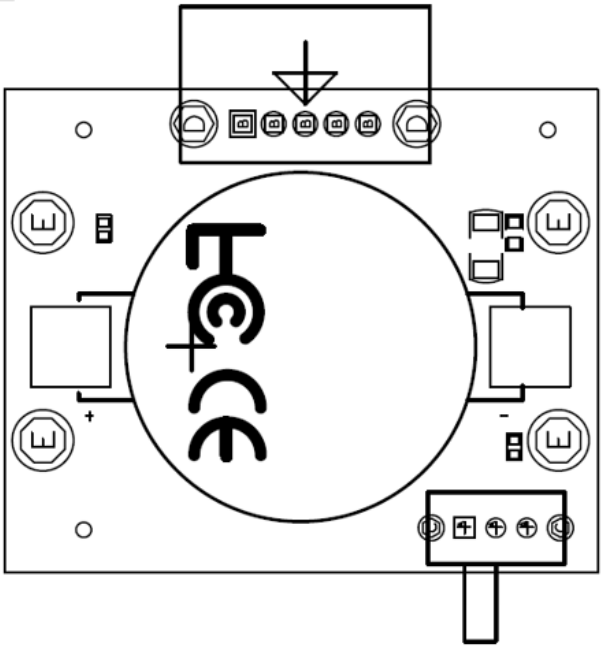




MIC_IN1

Switch	Definition
1	GND
2	MIC_R
3	GND
4	GND
5	MIC_L

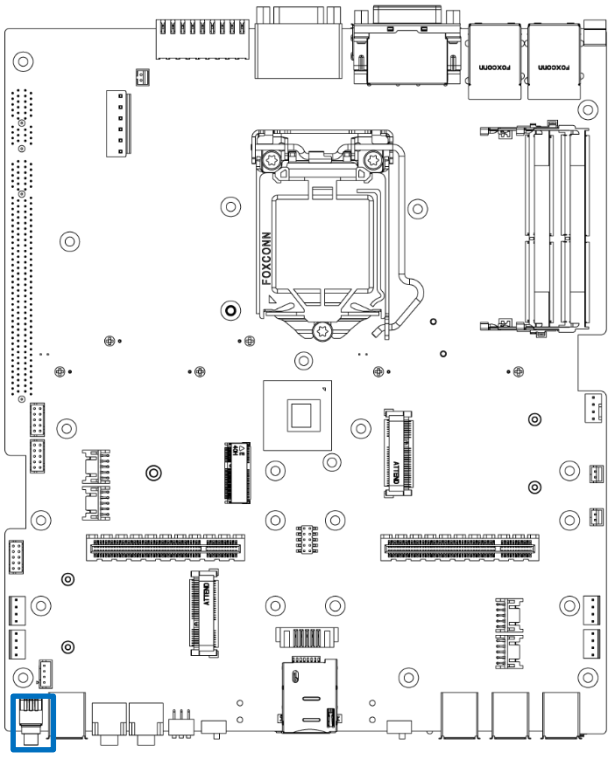
2.3.10 Clear BIOS Switch



LR_CMOS

Switch	Definition
1-2 (Left)	Normal Status (Default)
2-3 (Right)	Clear BIOS

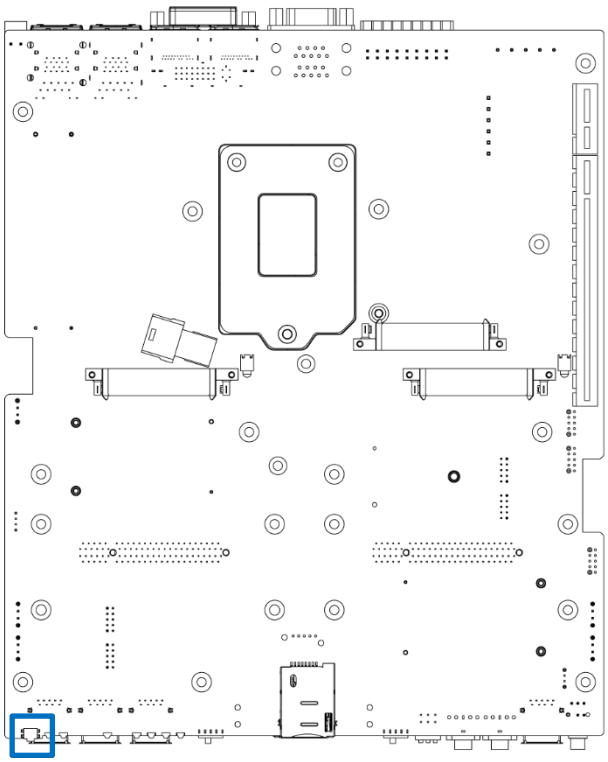
2.3.11 Power Button

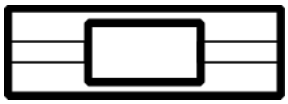


PWR_SW1

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

2.3.12 Reset Button

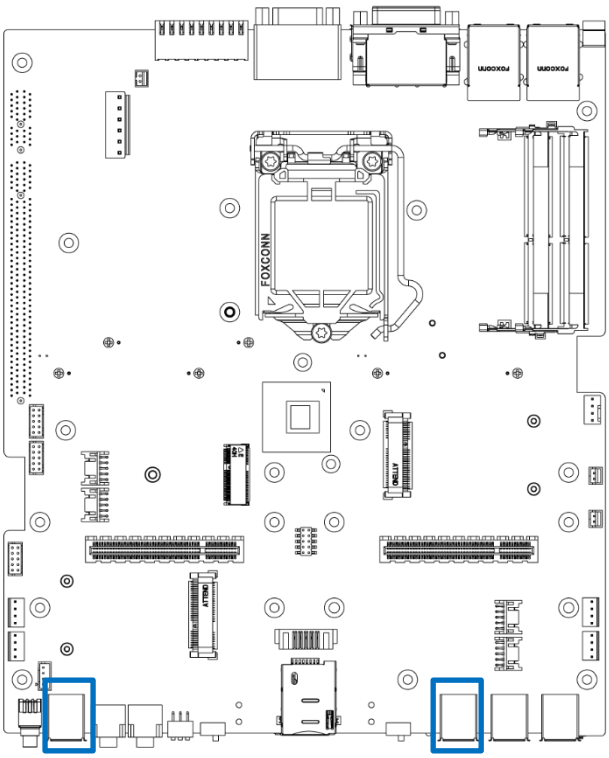


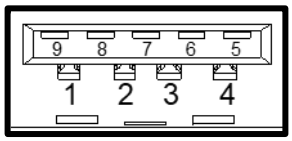


RESET1

Switch	Definition
1,2	RESET
3,4	GND

2.3.13 USB 3.2 Gen2 Connector, GEN2 , Type A

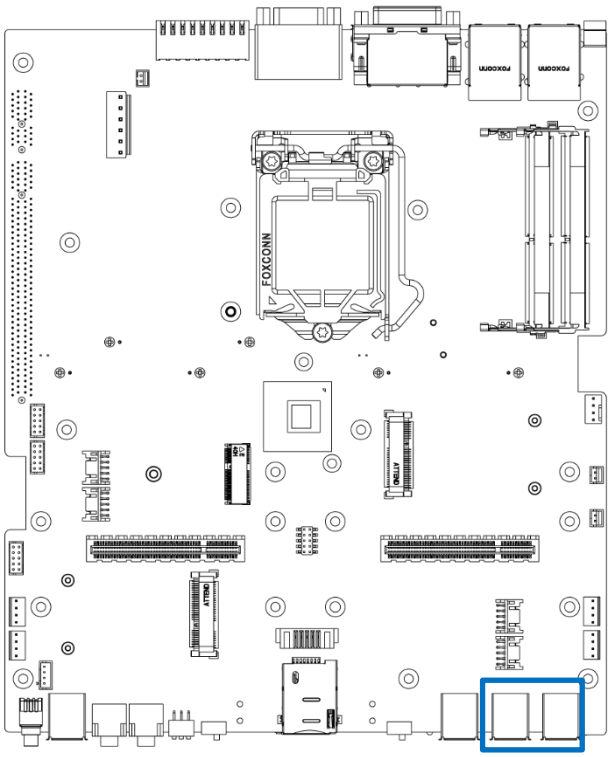


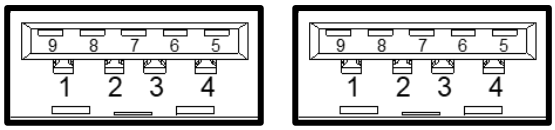


USB3_1, USB3_2

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

2.3.14 USB 3.2 Gen1 Connector, GEN1, Type A

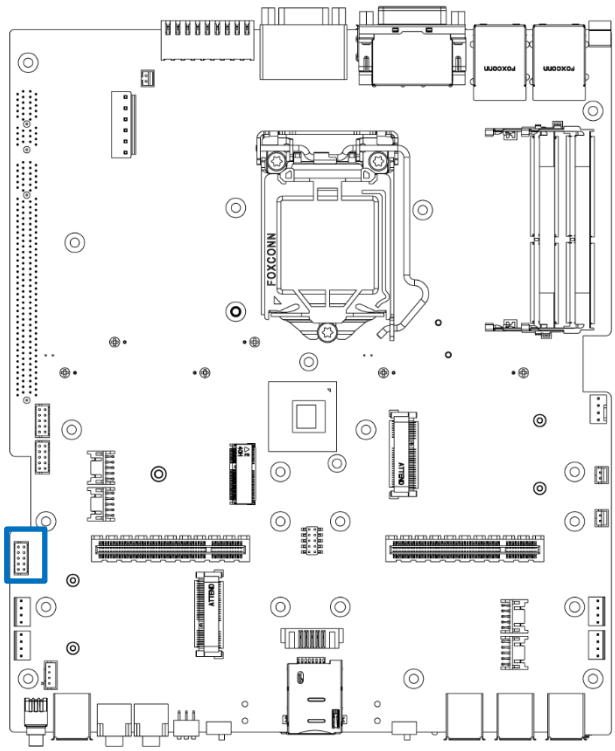


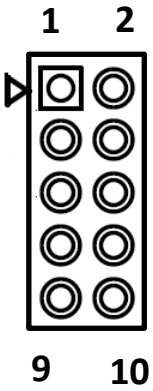


USB3_3, USB3_4

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-		

2.3.15 USB2.0 Connector 2x5 10-pin box header, 2.0mm pitch

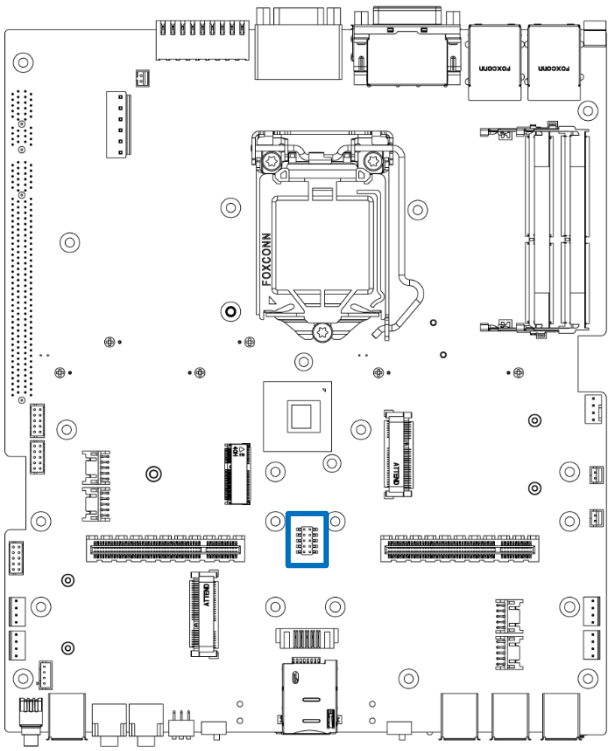


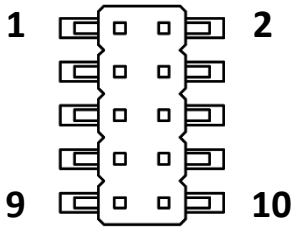


USB1

Pin	Definition	Pin	Definition
1	+5V	2	+5V
3	USB2_D-	4	USB2_D-
5	USB2_D+	6	USB2_D+
7	GND	8	GND
9	GND	10	GND

2.3.16 USB3.0 Connector 2x5 10-pin header, 2.0mm pitch

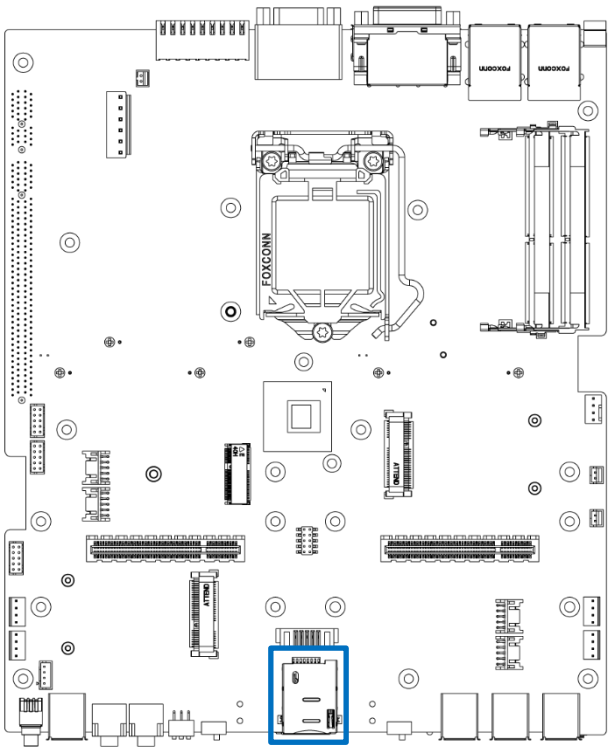


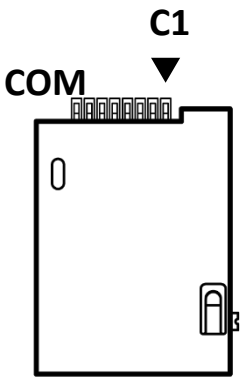


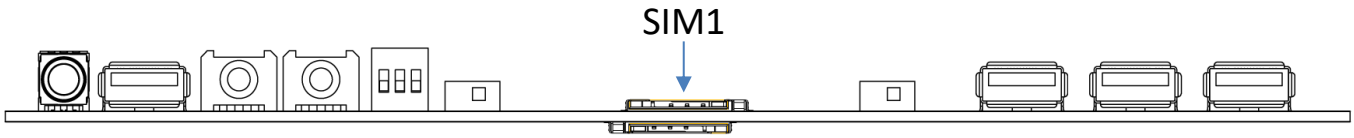
USB2

Pin	Definition	Pin	Definition
1	+5V	2	USB3_TX-
3	USB2_D-	4	USB3_TX+
5	USB2_D+	6	GND
7	GND	8	USB3_RX-
9	GND	10	USB3_RX+

2.3.17 Top size SIM Card Socket



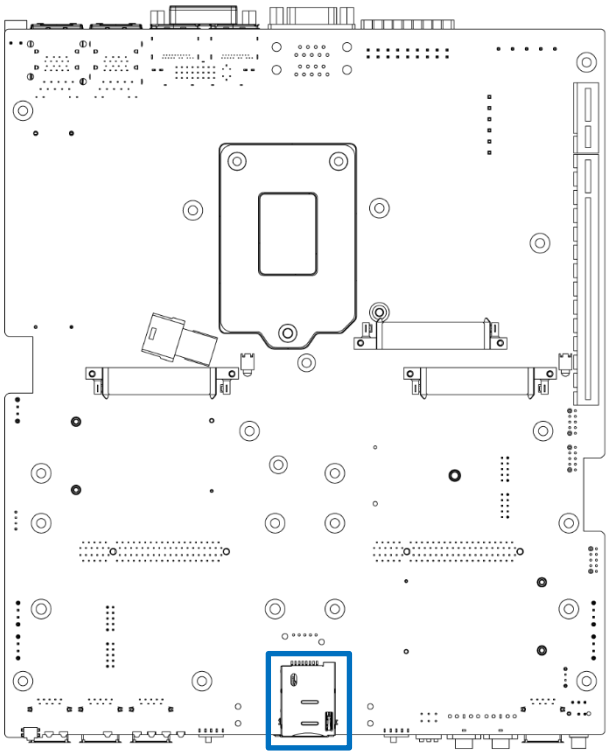


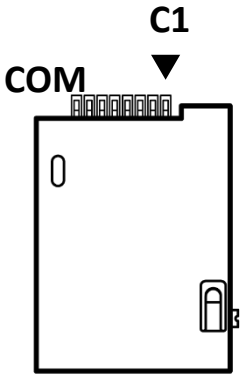


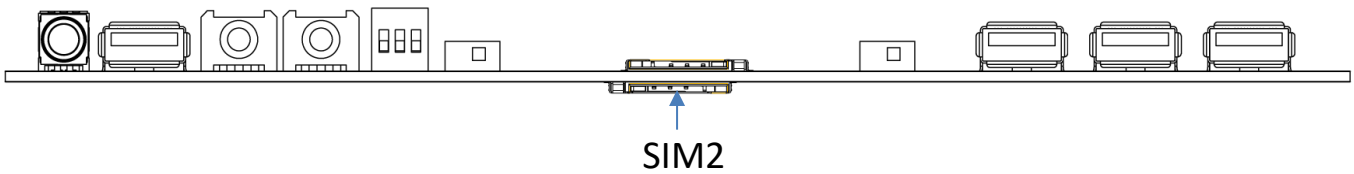
SIM1

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

2.3.18 Bottom size SIM Card Socket



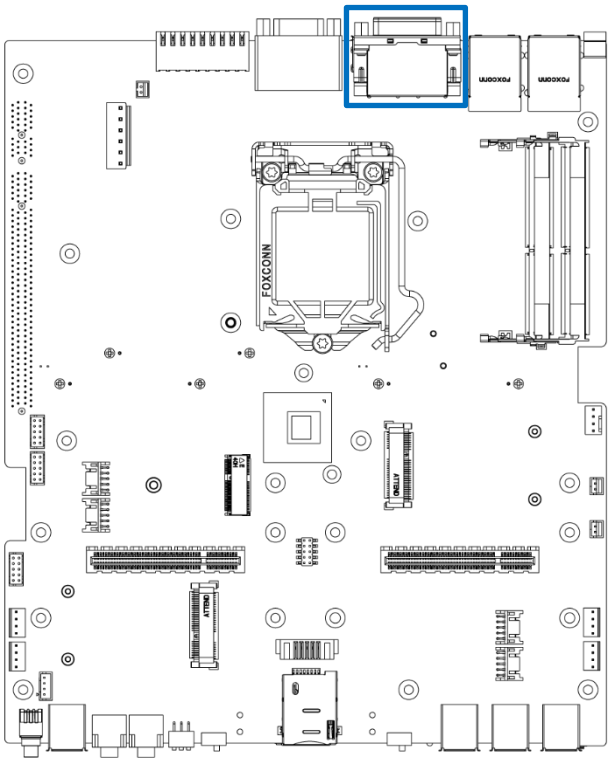


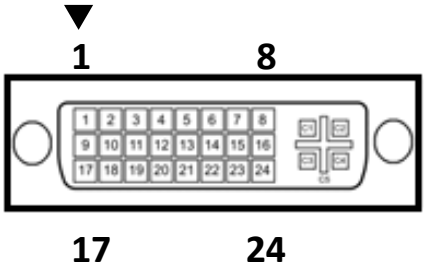


SIM2

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

2.3.19 DVI-I Connector

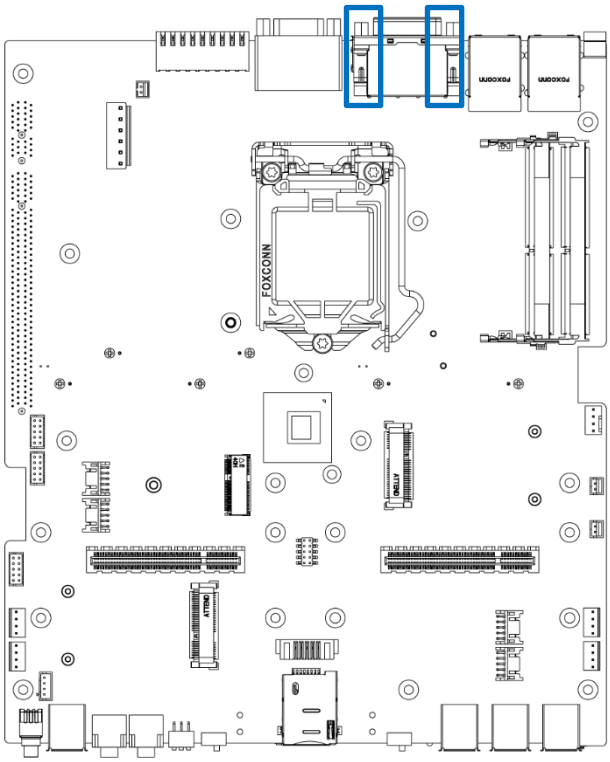


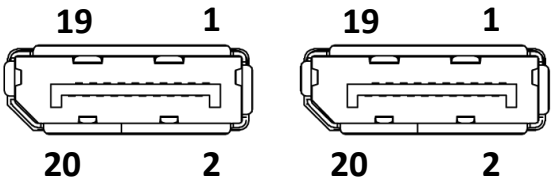


DVI_I1

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		

2.3.20 Display Port Connector

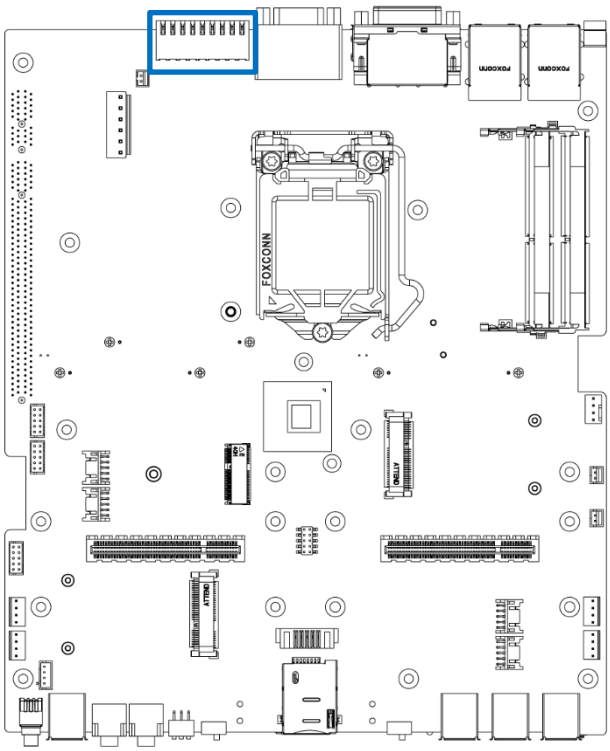


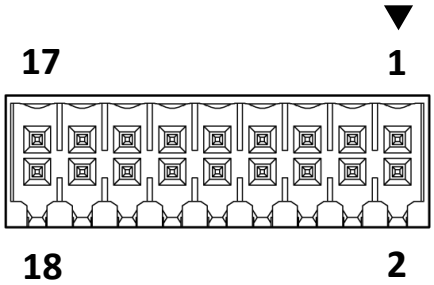


DP1 DP2

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

2.3.21 Digital Input / Output Connector Type: Terminal Block 2x9 18-pin, 3.5mm pitch

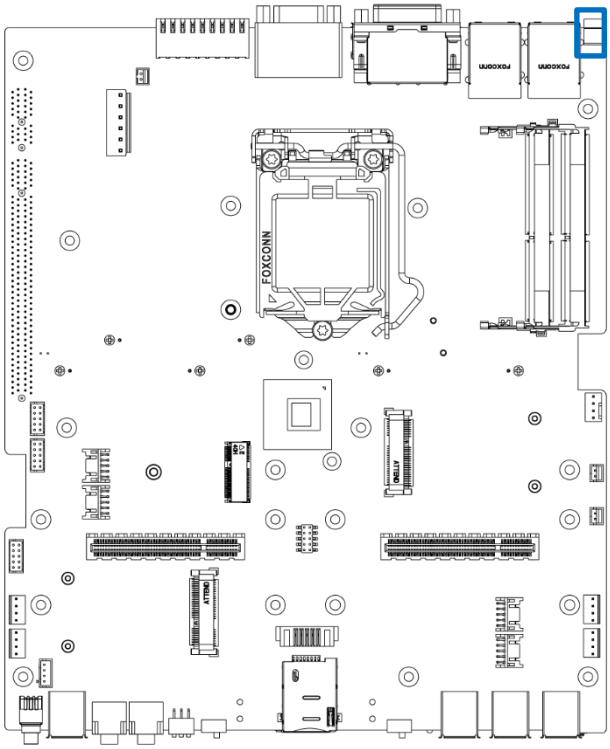


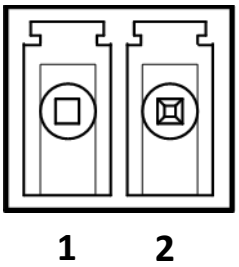


DIO

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

2.3.22 Remote Power Switch Type: Terminal Block 1x2 2-pin, 3.5mm pitch

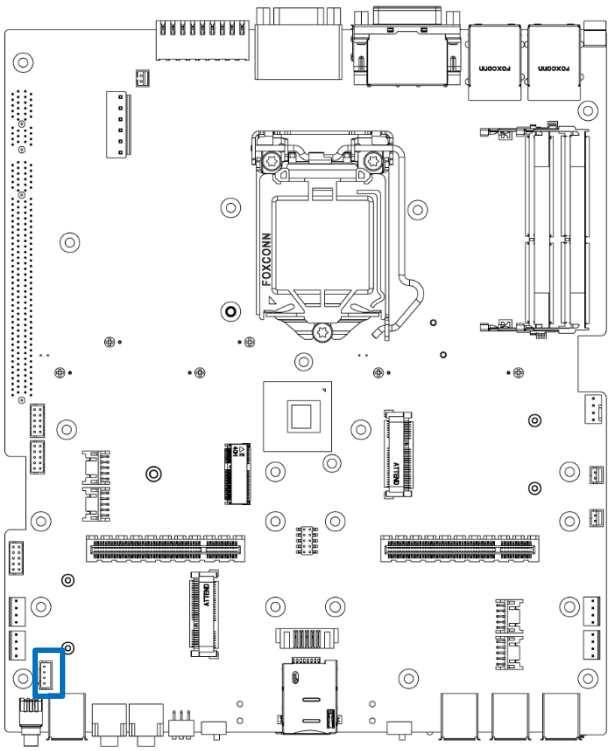


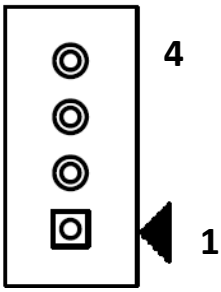


PWRBTN2

Pin	Definition
1	Power Button
2	GND

2.3.23 Remote Power Switch 1x4 pin box header, 2.0mm pitch

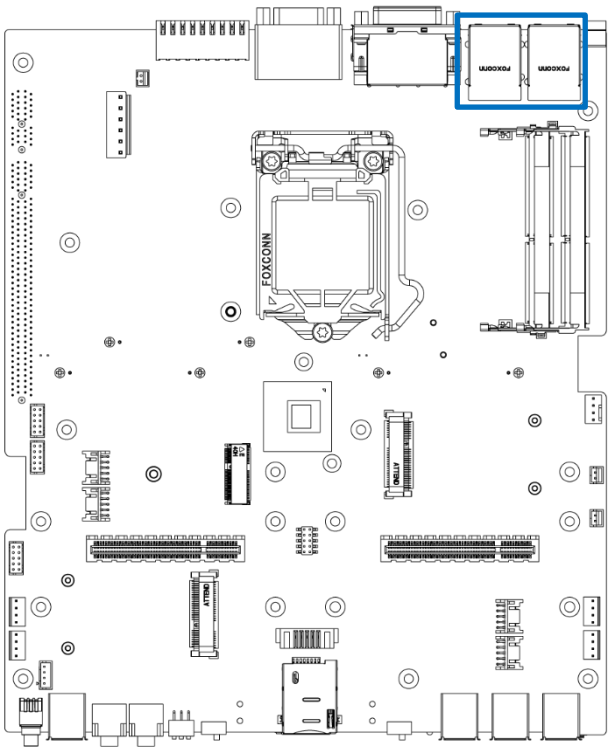


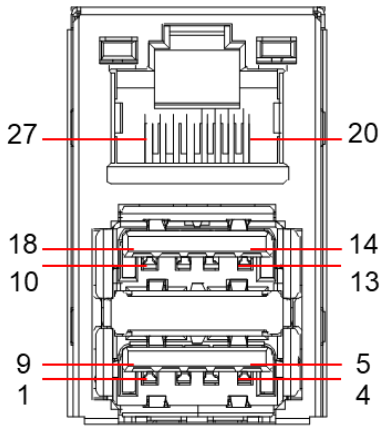


PWR_SW3

Pin	Definition
1	Power Button
2	PWR_LED
3	HDD_LED
4	GND

2.3.24 Connector Type, RJ45 port with LEDs and dual USB 3.2 Gen2 ports X2

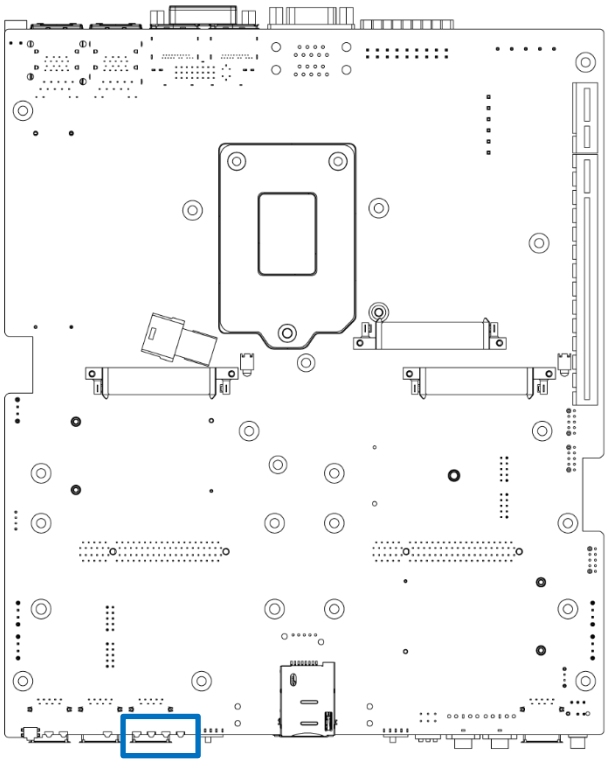




LAN1 LAN2 USB3.2 GEN 2 x4 Ports

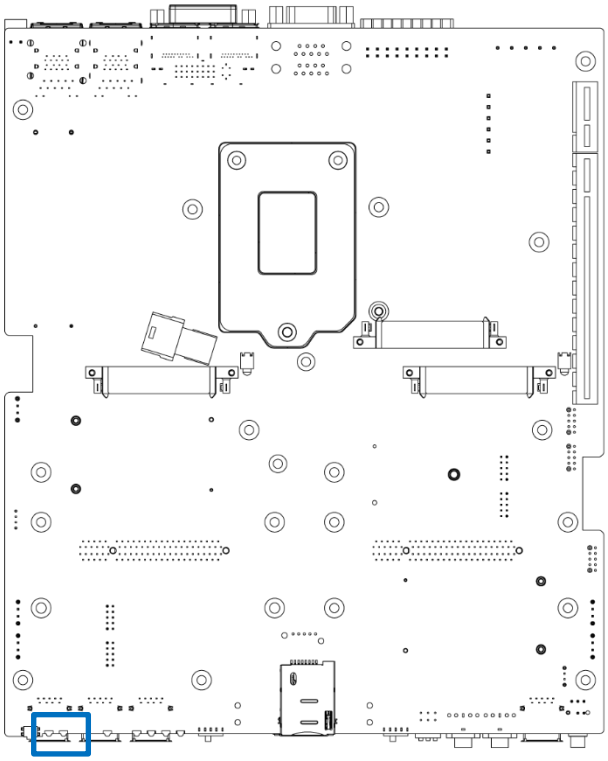
Pin	Definition	Pin	Definition	Pin	Definition
1	+5V	10	+5V	20	LAN1_MDI0P
2	USB2_D1-	11	USB2_D2-	21	LAN1_MDI0N
3	USB2_D1+	12	USB2_D2+	22	LAN1_MDI1P
4	GND	13	GND	23	LAN1_MDI2P
5	USB3_RX1-	14	USB3_RX2-	24	LAN1_MDI2N
6	USB3_RX1+	15	USB3_RX2+	25	LAN1_MDI1N
7	GND	16	GND	26	LAN1_MDI3P
8	USB3_TX1-	17	USB3_TX2-	27	LAN1_MDI3N
9	USB3_TX1+	18	USB3_TX2+		

2.3.25 LED Status



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



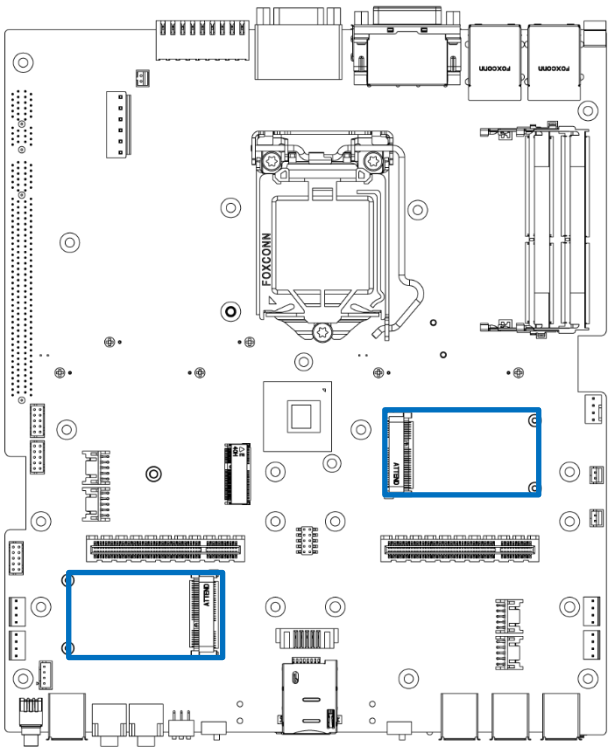
PWR_LED1: Power LED Status

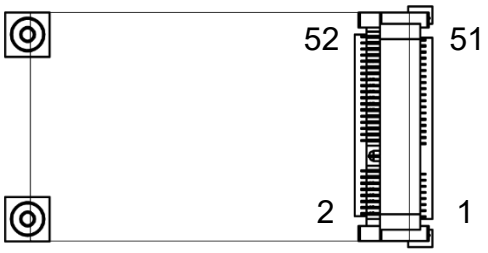
Pin	Definition
1	POWER LED +
2	POWER LED -

HDD_LED1: HDD Access LED Status

Pin	Definition
1	HDD LED+
2	HDD LED-

2.3.26 Mini PCI-Express Socket



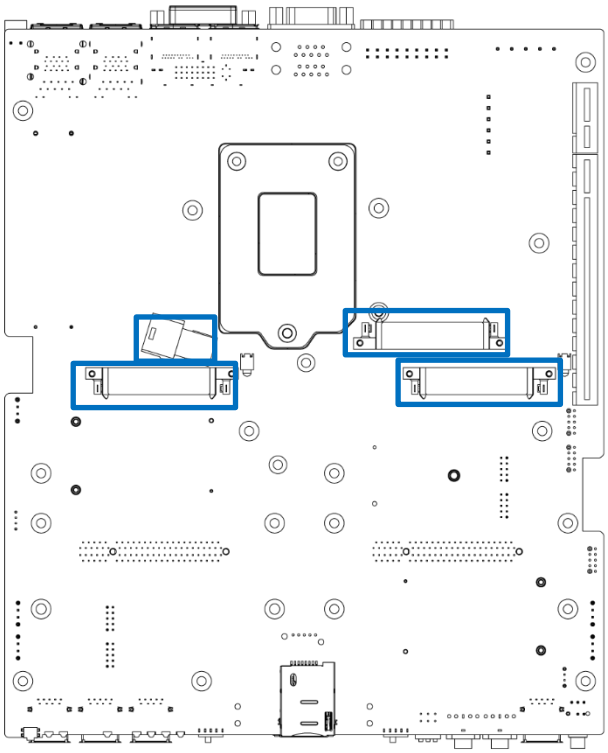


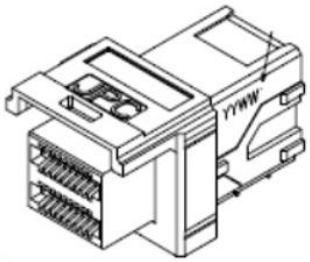
MINIPCIE1, MINIPCIE2

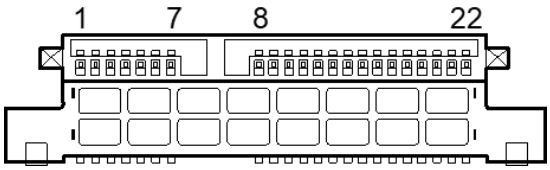
Pin	Definition	Pin	Definition
1	WAKE#	2	+3.3V
3	NC	4	GND
5	NC	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RST
15	GND	16	UIM_VPP
17	NC	18	GND
19	NC	20	NC
21	GND	22	RESET#
23	RxN	24	+3.3VAUX
25	RxP	26	GND
27	GND	28	+1.5V

Pin	Definition	Pin	Definition
29	GND	30	SMB_CLK
31	TxN	32	SMB_DATA
33	TxP	34	GND
35	GND	36	USB2_D-
37	GND	38	USB2_D+
39	+3.3V	40	GND
41	+3.3V	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V

2.3.27 SATA with Power Connector





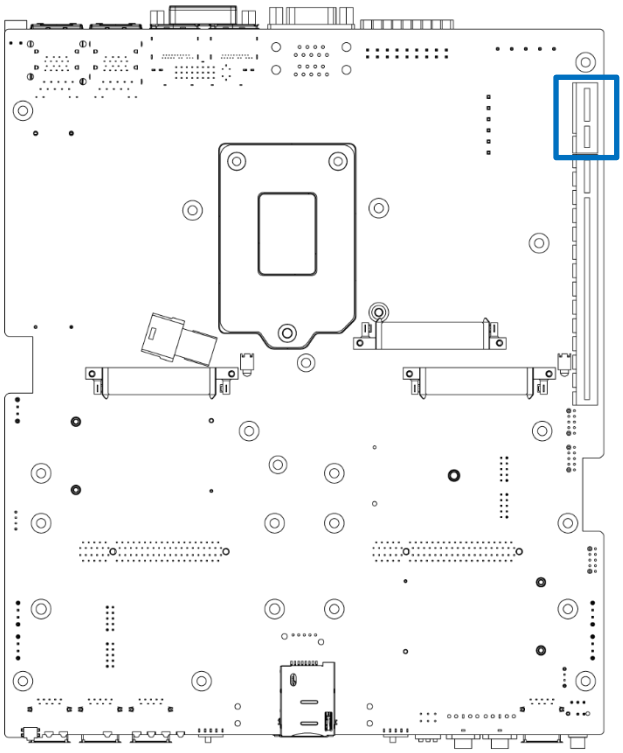


SATA1, SATA2, SATA3, SATA4

Pin	Definition
1	GND
2	TxP
3	TxN
4	GND
5	RxN
6	RxP
7	GND
8	NC
9	NC
10	DEVSLP
11	GND

Pin	Definition
12	GND
13	GND
14	+5V
15	+5V
16	+5V
17	GND
18	GND
19	GND
20	+12V
21	+12V
22	+12V

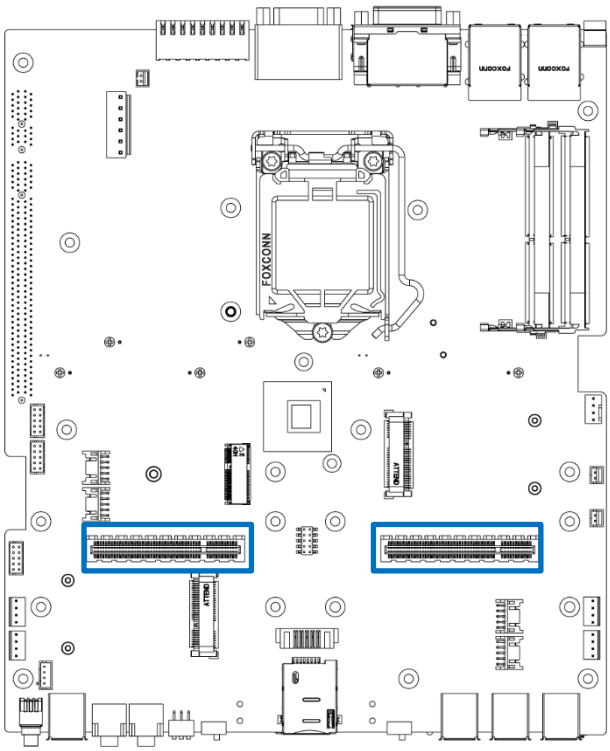
2.3.28 PCI-Express x1 Slot

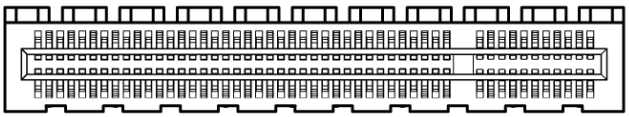


PCIE1

Pin	Definition	Pin	Definition
B1	+12V	A1	FAN_P4
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	RESET#
B12	FAN_P3	A12	GND
B13	GND	A13	REFCLK+
B14	TxP0	A14	REFCLK-
B15	TxN0	A15	GND
B16	GND	A16	RxP0
B17	FAN_PER	A17	RxN0
B18	GND	A18	GND

2.3.29 PCI-Express x8 Slot



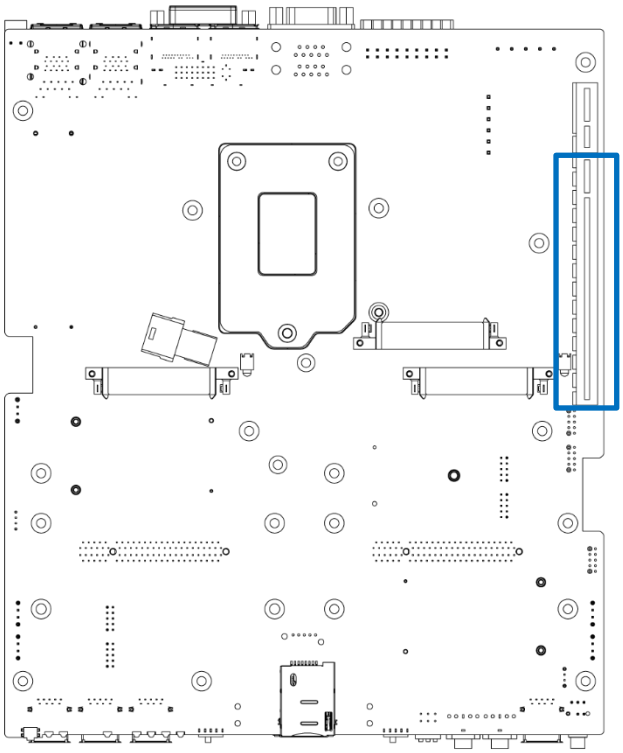


PCIE3_L, PCIE4_R

Pin	Definition	Pin	Definition
B1	+12V	A1	NC
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	RESET#
B12	NC	A12	GND
B13	GND	A13	REFCLK+
B14	TxP0	A14	REFCLK-
B15	TxN0	A15	GND

Pin	Definition	Pin	Definition
B16	GND	A16	RxP0
B17	NC	A17	RxN0
B18	GND	A18	GND
B19	TxP1	A19	NC
B20	TxN1	A20	GND
B21	GND	A21	RxP1
B22	GND	A22	RxN1
B23	TxP2	A23	GND
B24	TxN2	A24	GND
B25	GND	A25	RxP2
B26	GND	A26	RxN2
B27	TxP3	A27	GND
B28	TxN3	A28	GND
B29	GND	A29	RxP3
B30	NC	A30	RxN3
B31	NC	A31	GND
B32	GND	A32	NC
B33	9_48VSB_IN	A33	9_48VSB_IN
B34	9_48VSB_IN	A34	9_48VSB_IN
B35	9_48VSB_IN	A35	9_48VSB_IN
B36	9_48VSB_IN	A36	9_48VSB_IN
B37	9_48VSB_IN	A37	9_48VSB_IN
B38	9_48VSB_IN	A38	9_48VSB_IN
B39	9_48VSB_IN	A39	9_48VSB_IN
B40	9_48VSB_IN	A40	9_48VSB_IN
B41	9_48VSB_IN	A41	9_48VSB_IN
B42	9_48VSB_IN	A42	9_48VSB_IN
B43	+3.3VAUX	A43	+5V
B44	+3.3VAUX	A44	+5V
B45	+3.3VAUX	A45	+1.5V
B46	+3.3VAUX	A46	+1.5V
B47	+1.0VAUX	A47	+1.0VAUX
B48	+1.0VAUX	A48	+1.0VAUX
B49	NC	A49	NC

2.3.30 PCI-Express x16 Slot



PCIE2

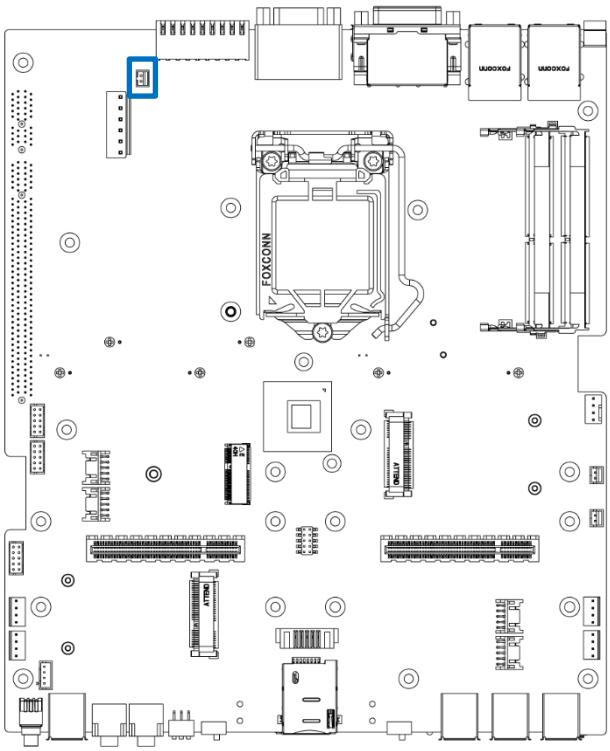
Pin	Definition	Pin	Definition
B1	+12V	A1	FAN_P4
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	RESET#
B12	FAN_P3	A12	GND
B13	GND	A13	REFCLK+

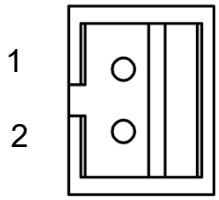
Pin	Definition	Pin	Definition
B14	TxP0	A14	REFCLK-
B15	TxN0	A15	GND
B16	GND	A16	RxP0
B17	FAN_PWR	A17	RxN0
B18	GND	A18	GND
B19	TxP1	A19	NC
B20	TxN1	A20	GND
B21	GND	A21	RxP1
B22	GND	A22	RxN1
B23	TxP2	A23	GND
B24	TxN2	A24	GND
B25	GND	A25	RxP2
B26	GND	A26	RxN2
B27	TxP3	A27	GND
B28	TxN3	A28	GND
B29	GND	A29	RxP3
B30	NC	A30	RxN3
B31	S3	A31	GND
B32	GND	A32	CFG_5
B33	TxP4	A33	CFG_6
B34	TxN4	A34	GND
B35	GND	A35	RxP4
B36	GND	A36	RxN4
B37	TxP5	A37	GND
B38	TxN5	A38	GND

Pin	Definition	Pin	Definition
B39	GND	A39	RxP5
B40	GND	A40	RxN5
B41	TxP6	A41	GND
B42	TxN6	A42	GND
B43	GND	A43	RxP6
B44	GND	A44	RxN6
B45	TxP7	A45	GND
B46	TxN7	A46	GND
B47	GND	A47	RxP7
B48	NC	A48	RxN7
B49	GND	A49	GND
B50	TxP8	A50	NC
B51	TxN8	A51	GND
B52	GND	A52	RxP8
B53	GND	A53	RxN8
B54	TxP9	A54	GND
B55	TxN9	A55	GND
B56	GND	A56	RxP9
B57	GND	A57	RxN9
B58	TxP10	A58	GND
B59	TxN10	A59	GND
B60	GND	A60	RxP10
B61	GND	A61	RxN10
B62	TxP11	A62	GND
B63	TxN11	A63	GND

Pin	Definition	Pin	Definition
B64	GND	A64	RxP11
B65	GND	A65	RxN11
B66	TxP12	A66	GND
B67	TxN12	A67	GND
B68	GND	A68	RxP12
B69	GND	A69	RxN12
B70	TxP13	A70	GND
B71	TxN13	A71	GND
B72	GND	A72	RxP13
B73	GND	A73	RxN13
B74	TxP14	A74	GND
B75	TxN14	A75	GND
B76	GND	A76	RxP14
B77	GND	A77	RxN14
B78	TxP15	A78	GND
B79	TxN15	A79	GND
B80	GND	A80	RxP15
B81	NC	A81	RxN15
B82	NC	A82	GND

2.3.31 IGN Sense 1x2 pin box header, 2.0mm pitch





ACC

Pin	Definition
1	+DC_IN
2	IGN_SENSE

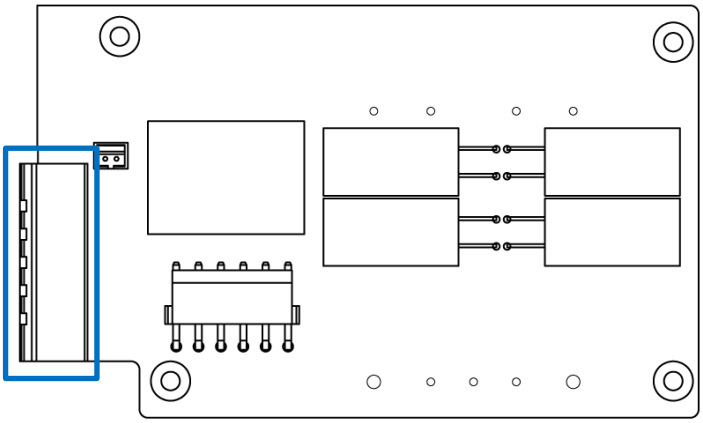
2.4 Power Board (9V ~48V)

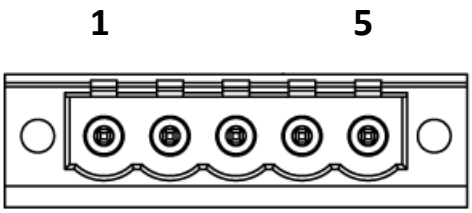
2.4.1 Pin out Definition

Connector Location	Definition
DC_IN	5-pin DC 9~48V Power Input Connector
DC_OUT	6-pin DC 9~48V Power Output Connector
ACC	2-pin IGN Connector

2.4.2 I/O Interface Descriptions

Power Input Connector

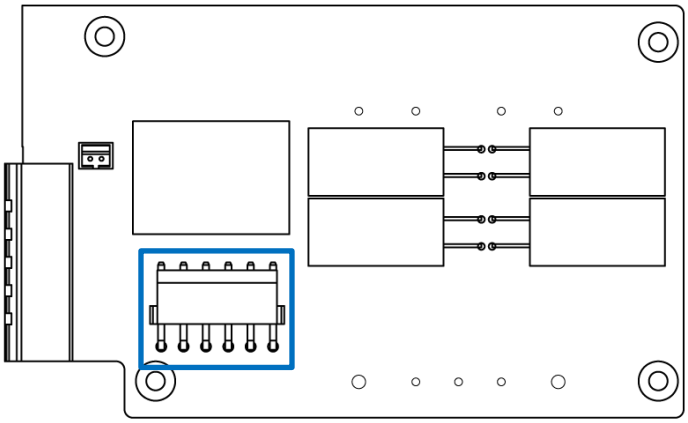


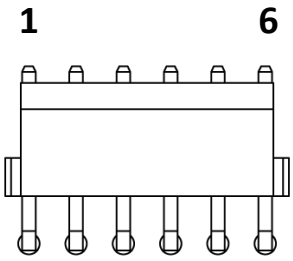


DC_IN

Pin	Definition	Pin	Definition
1	DC_IN	4	GND
2	DC_IN	5	IGN_SENSE
3	GND		

Power Output Connector

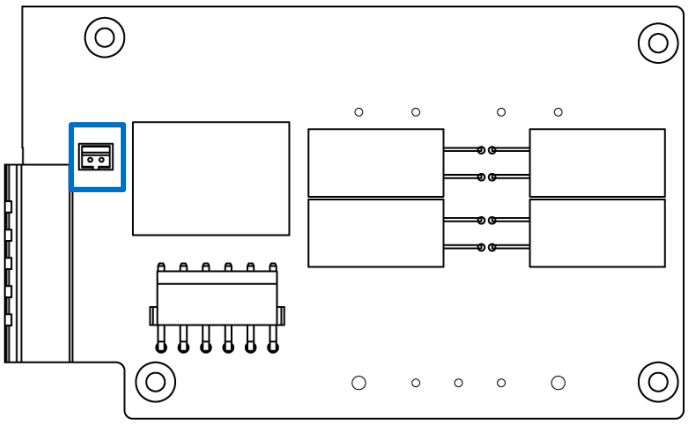


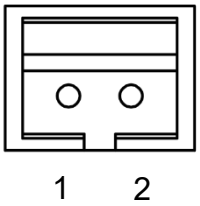


DC_OUT

Pin	Definition	Pin	Definition
1	GND	4	DC_OUT
2	GND	5	DC_OUT
3	GND	6	DC_OUT

IGN Sense 1x2 pin box header, 2.0mm pitch





ACC

Pin	Definition
1	DC_IN
2	IGN_SENSE

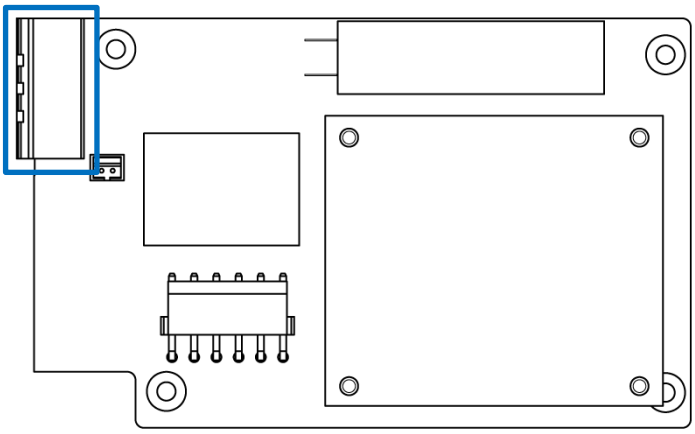
2.5 Power Board (48V ~110V, optional)

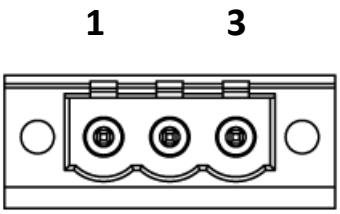
2.5.1 Pin out Definition

Connector Location	Definition
DC_IN	3-pin DC 48~110V Power Input Connector
DC_OUT	24V Power Output Connector
ACC	2-pin IGN Connector

2.5.2 I/O Interface Descriptions

Power Input Connector

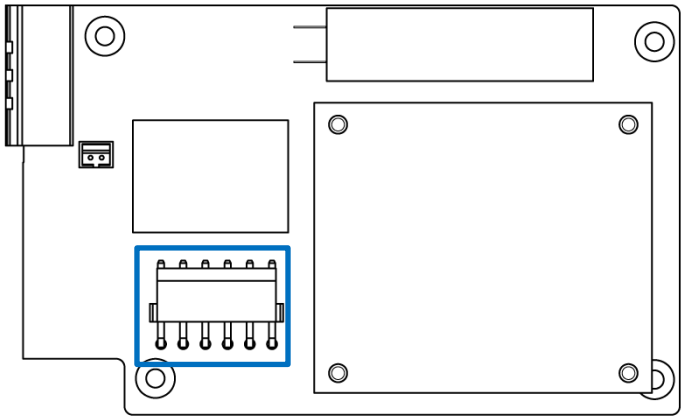


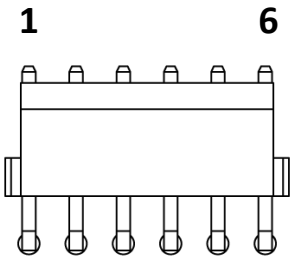


DC_IN

Pin	Definition
1	DC_IN
2	
3	GND

Power Output Connector

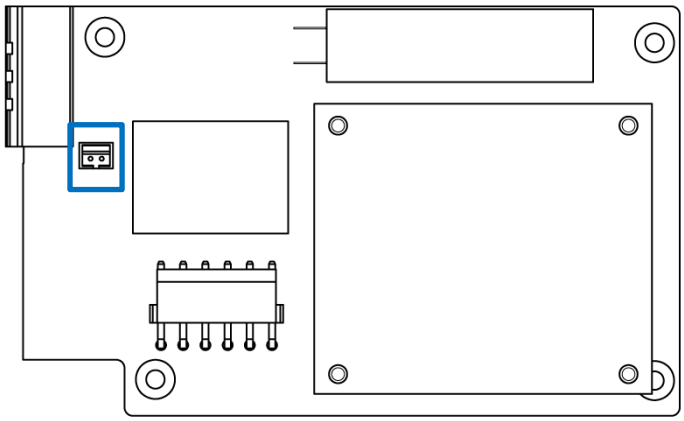


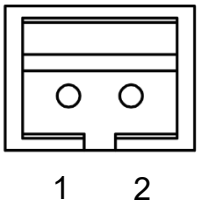


DC_OUT

Pin	Definition	Pin	Definition
1	GND	4	DC_OUT
2	GND	5	DC_OUT
3	GND	6	DC_OUT

IGN Sense 1x2 pin box header, 2.0mm pitch





ACC

Pin	Definition
1	DC_IN
2	IGN_SENSE

Chapter 3

System Setup

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

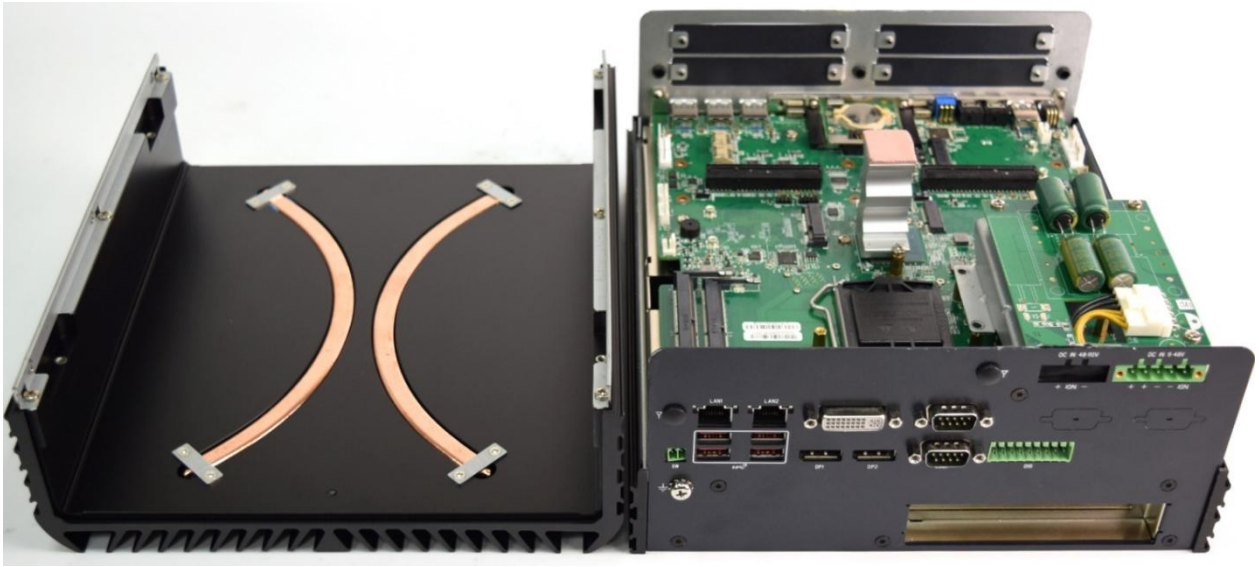
3.2 Disconnecting expansion module from computing module

WARNING

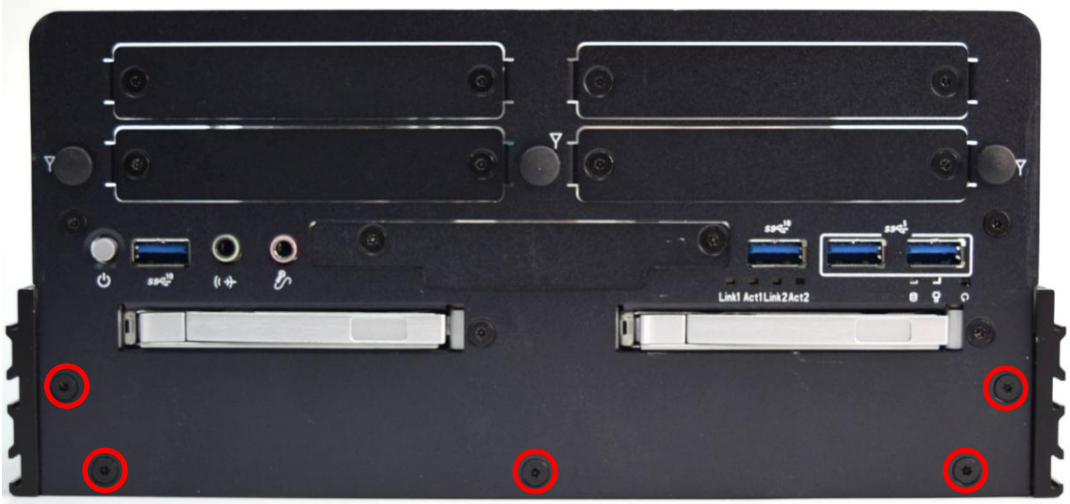
In order to prevent electric shock or system damage, before removing the chassis cover, must turn off power and disconnect the unit from power source.

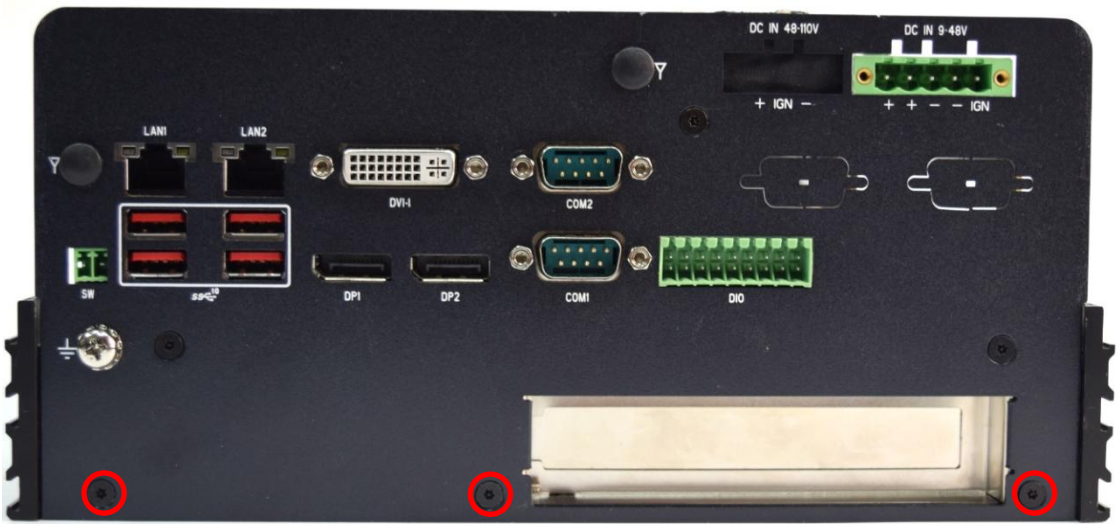
1. Remove the 3 screws on the left side of the system and the 3 screws on the right side

2. Top cover separated from the system body .



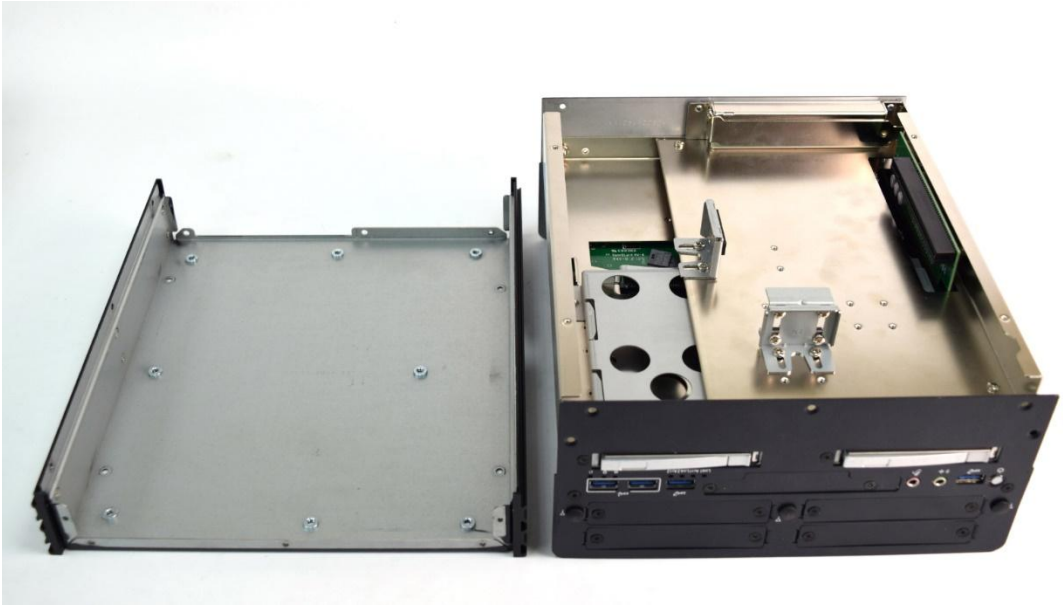
3. Remove the 8 screws highlighted below





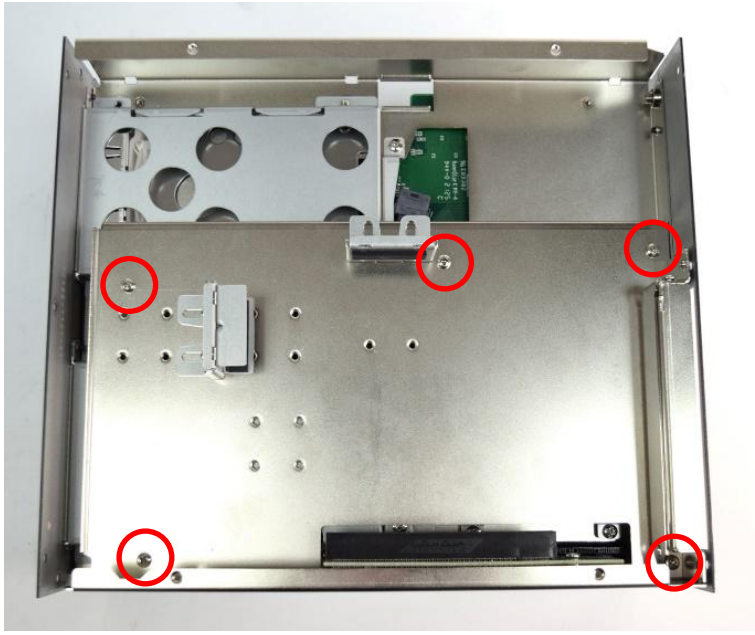
4. Remove the 4 screws highlighted below.

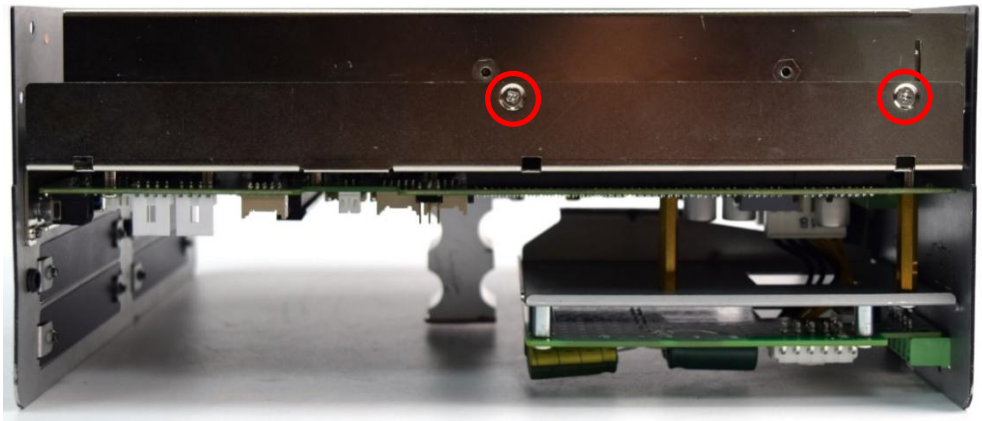
5. Bottom cover separated from the system body.



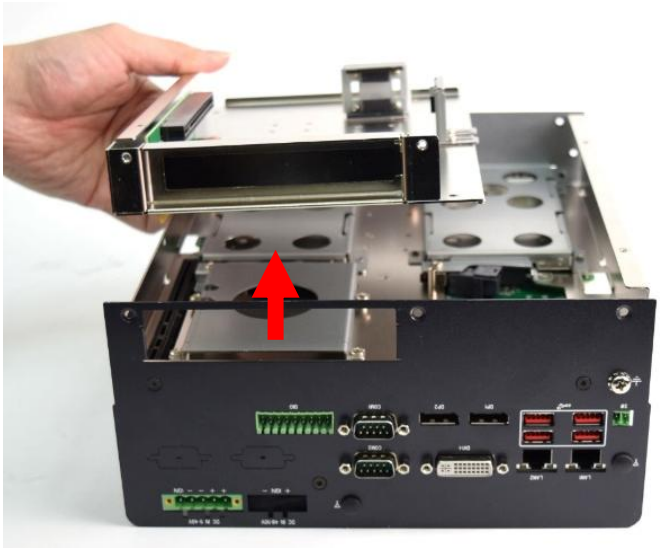
3.3 Removing PCIe expansion module

1. Unscrew the 7 screws highlighted below.



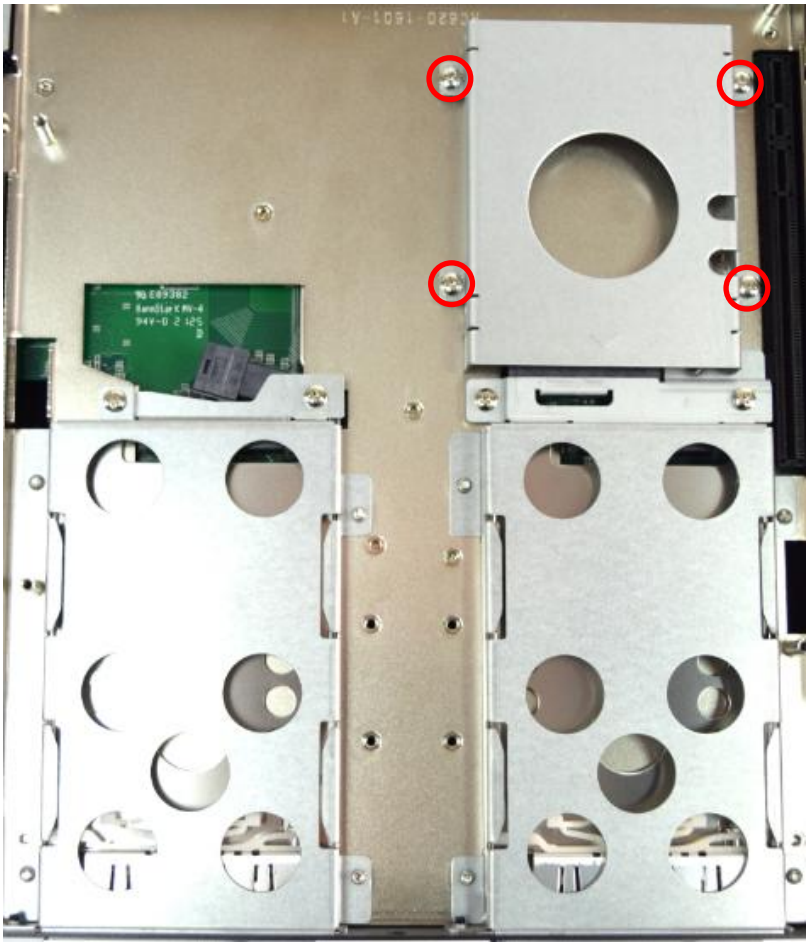


2. Now you can remove the PCIe expansion module.

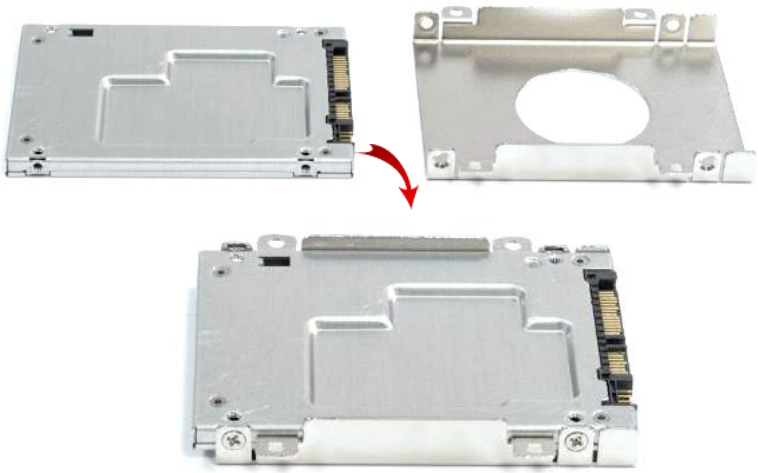


3.4 Install HDD/SSD on the internal SATA bay

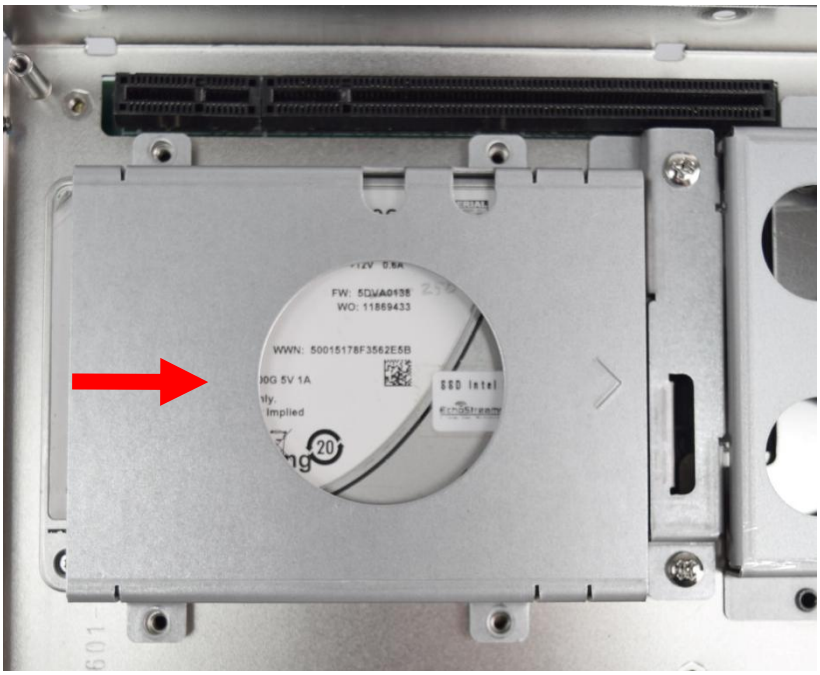
1. One internal SATA HDD/SSD bays are available for ACO-6000-CML series. Unscrew the 4 screws to remove the internal SATA HDD/SSD bay.



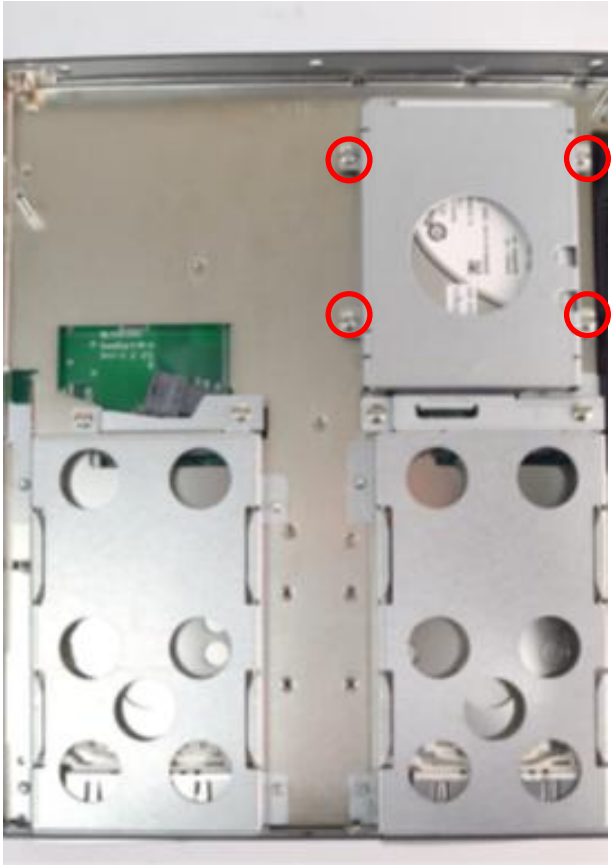
2. Lock the 2.5" HDD with HDD/SSD bracket using four screws (M3x4L).



3. Install the HDD/SSD bracket following the direction below.



4. Fasten the 4 screws to lock the internal HDD/SSD bracket.

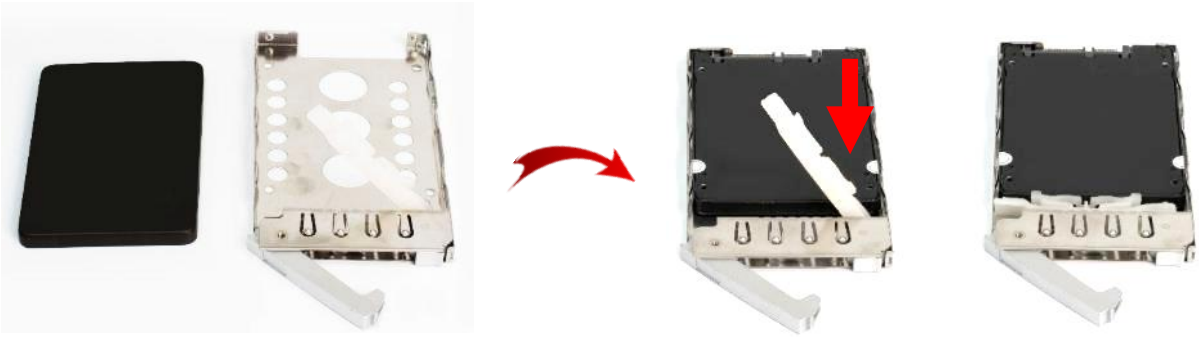


3.5 Installing HDD on removable SATA HDD/SSD bay

1. Open the tray lock (red circle) ,and remove the tray in the direction of the arrow.

2. Unlock the drive lock (red circle) and insert the HDD/SSD.

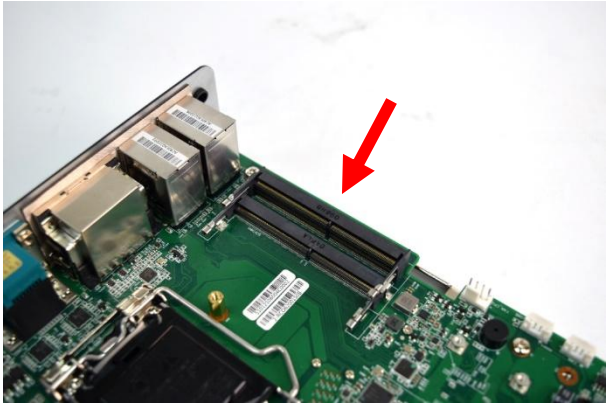
3. Close the drive lock in the direction of the arrow.



4. Put the tray in the direction of the arrow and close the tray lock.

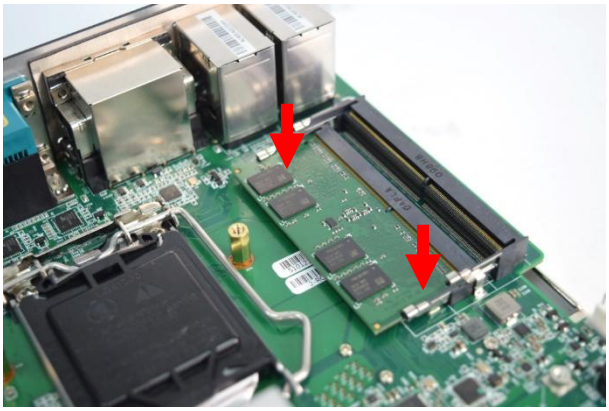
3.6 Installing SODIMM

1. Place the system body with SODIMM socket facing upward. Two SODIMM sockets are available for ACO-6000-CFL series on the top side.



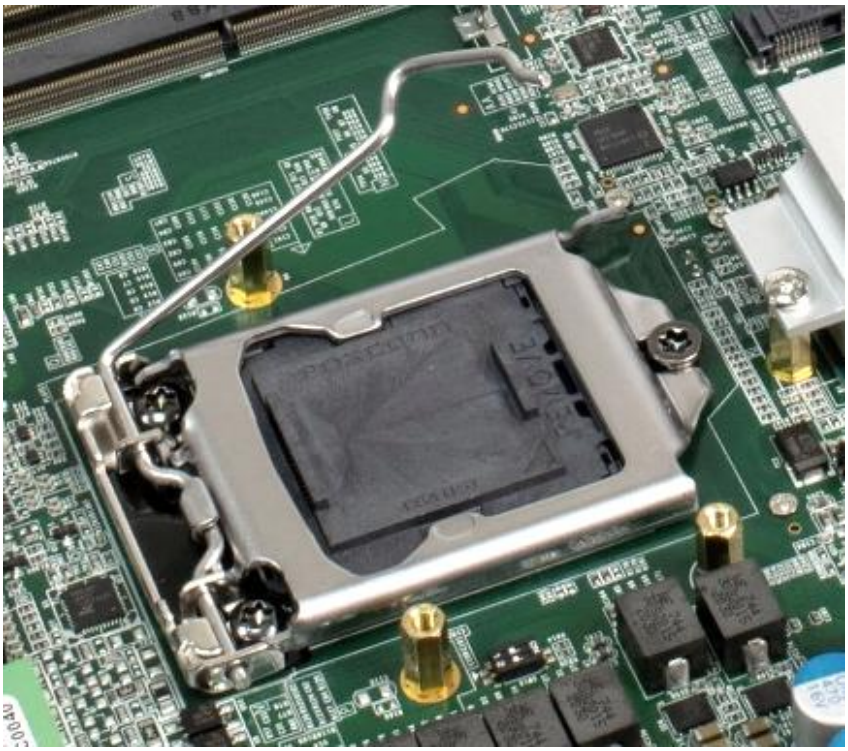
2. Insert memory module from 45 degree direction.

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



3.7 Installing CPU

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



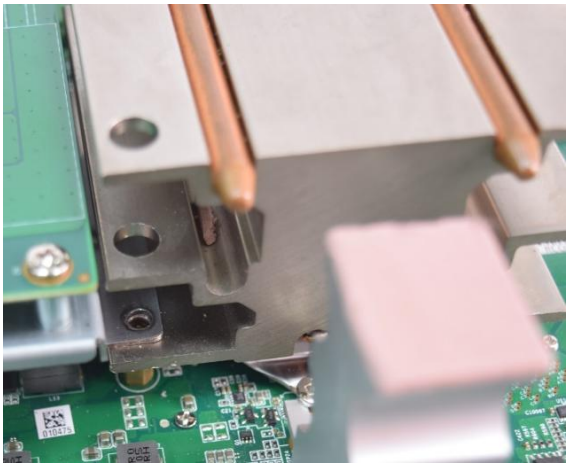
2. Remove the CPU protective cover.

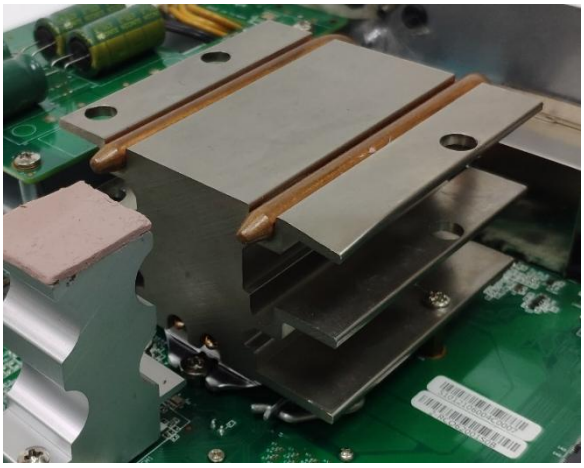
3. Insert CPU gently.

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

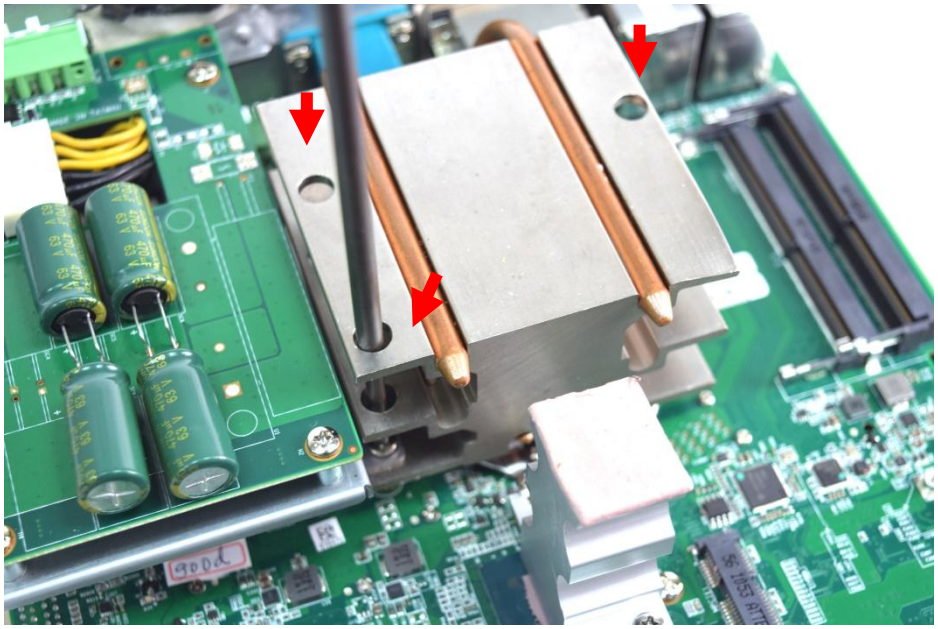
5. Paste thermal pad on the CPU.

6. Place the designated heat block onto the CPU with thermal pad.

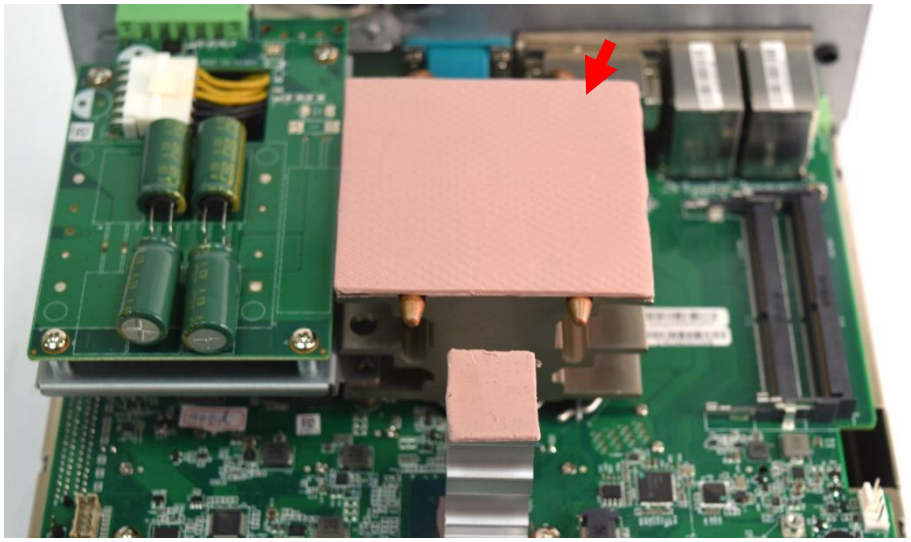




7. Lock the heat block with three screws (M3x8L). Screw driver will able to penetrate through the holes on the top in order to fasten the screws with copper stud.

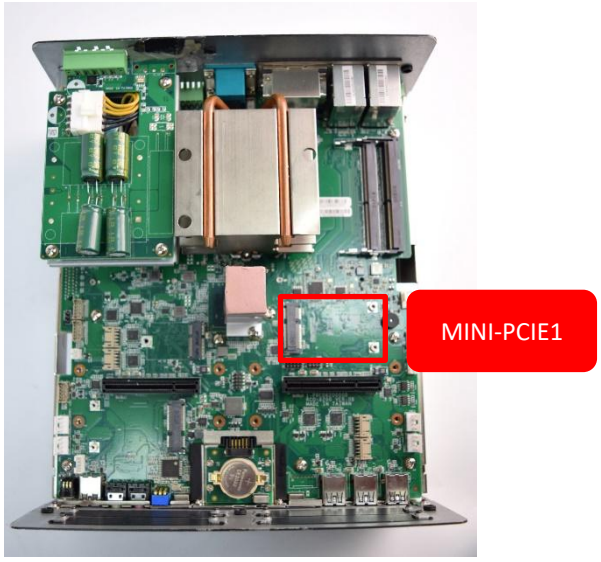


8. Paste the thermal pad onto the installed heat block.

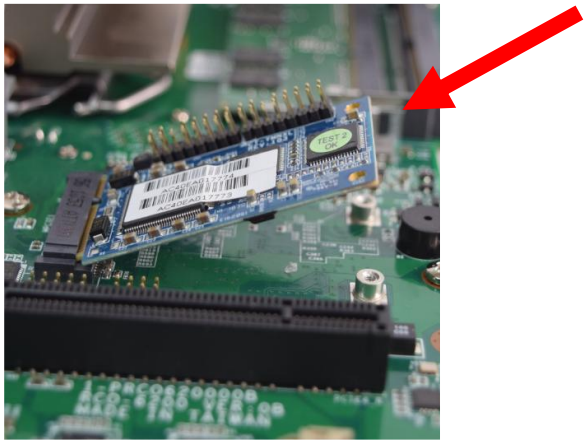


3.8 Installing Mini PCIe card

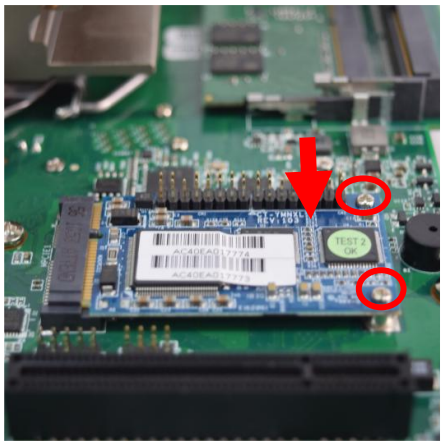
The ACO-6000-CML series has two Mini PCIe slots, both of which are on the top.



1. Insert Mini PCIe card from 45 degree direction.



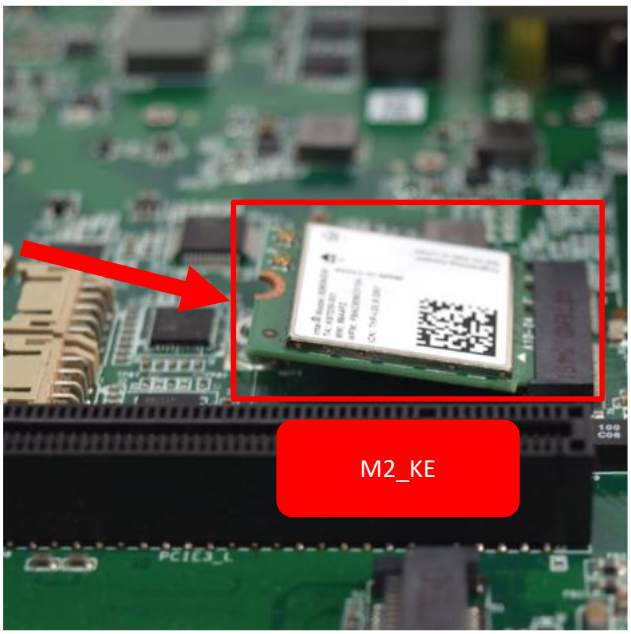
2. Press the Mini PCIe card down and lock it with two screws (M2x3.7L).



3.9 Installing WiFi Module

ACO-6000-CML series PCBA has an M.2 E key slot on the top, M2_KE currently supports WiFi application

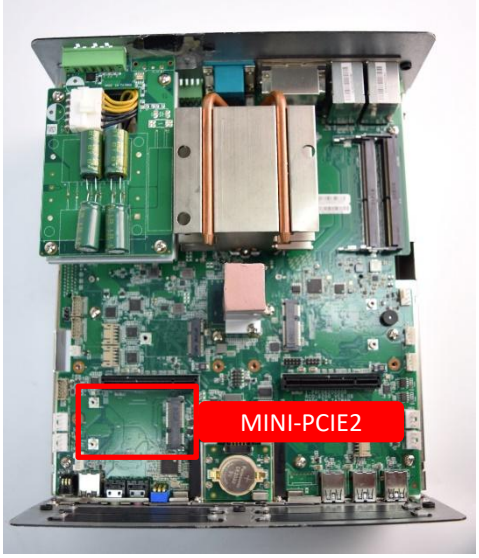
1. Insert M.2 E Key card from 45 degree direction.



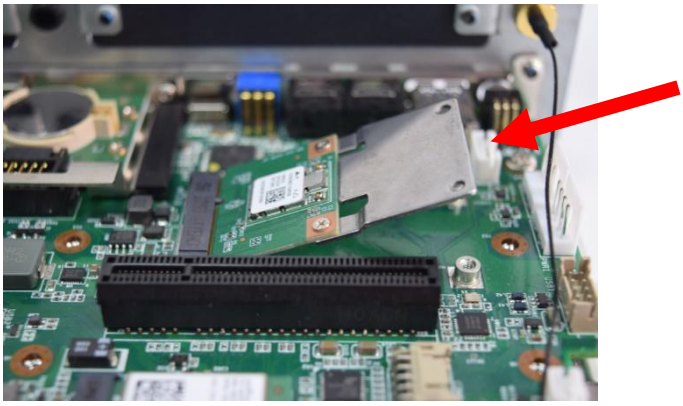
2. Press the M.2 E Key card down and lock it with one screw (M2x3.7L).

3.10 Installing Mini PCIe card / 4G LTE

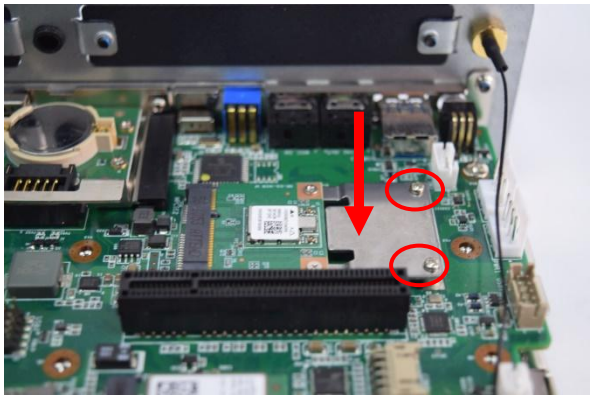
ACO-6000-CML series PCBA has two Mini PCIe slots on the top, both currently supports 4G LTE applications.



1. Insert Mini PCIe card from 45 degree direction.



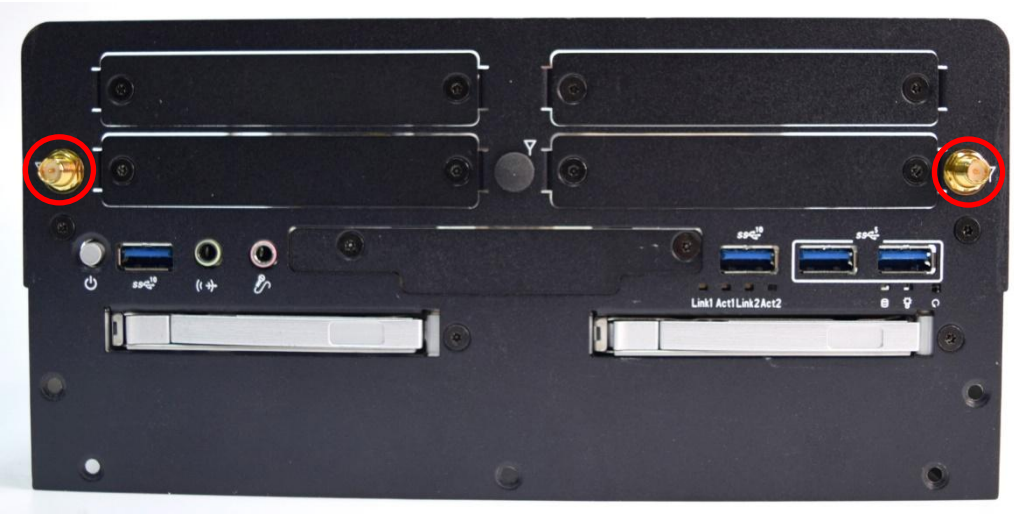
2. Press the Mini PCIe card down and lock it with two screws (M2x3.7L).



3.11 Installing Antenna

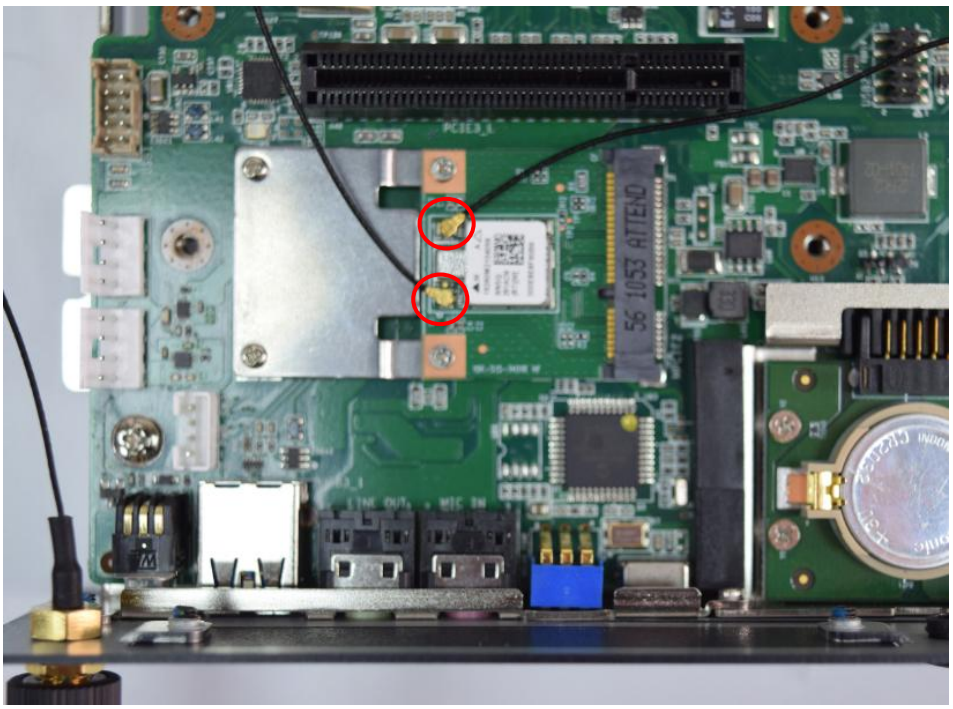
1. Remove antenna hole cover on the system panel.

2. Have antenna jack penetrate through the hole, and fasten the nut with SMA jack



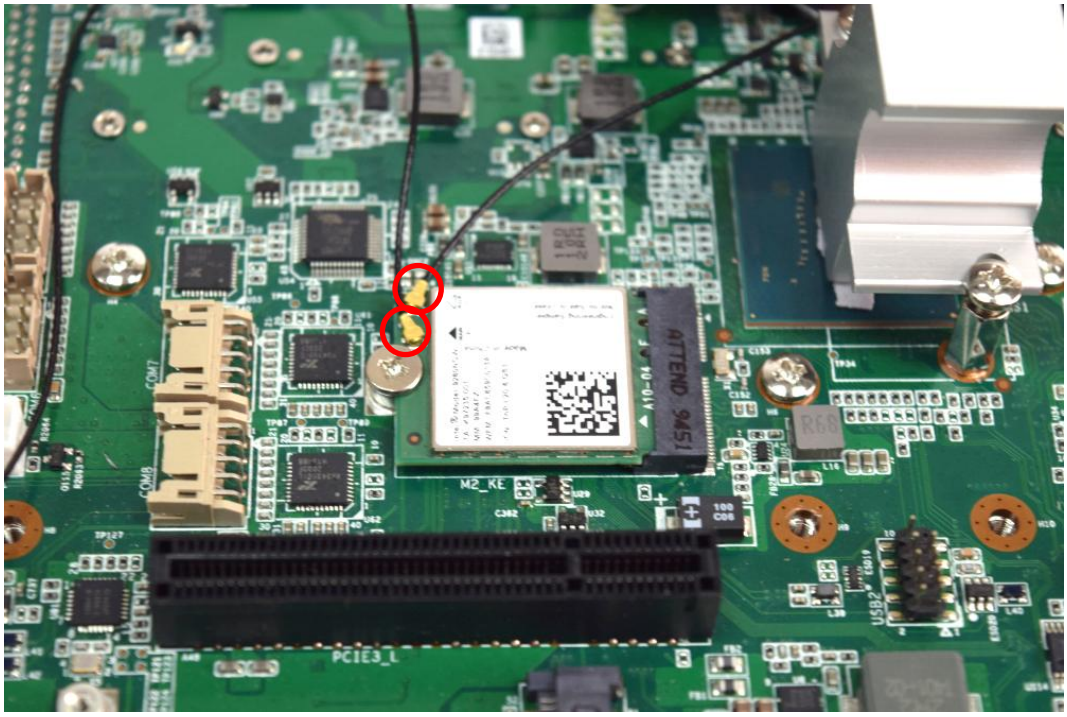
3. Assemble the antenna and SMA jack together.

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



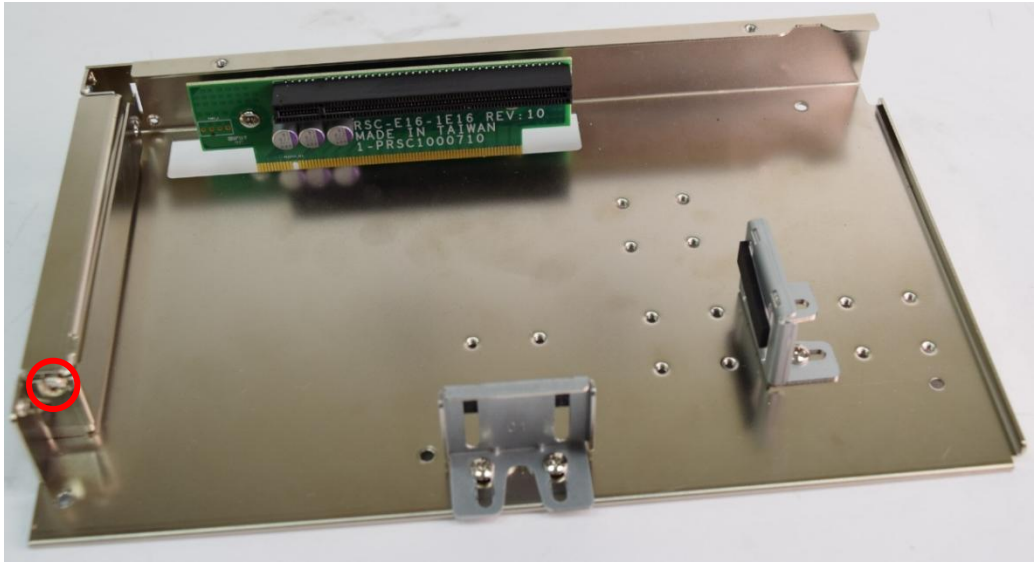
5. Assemble the antenna and SMA jack together.

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

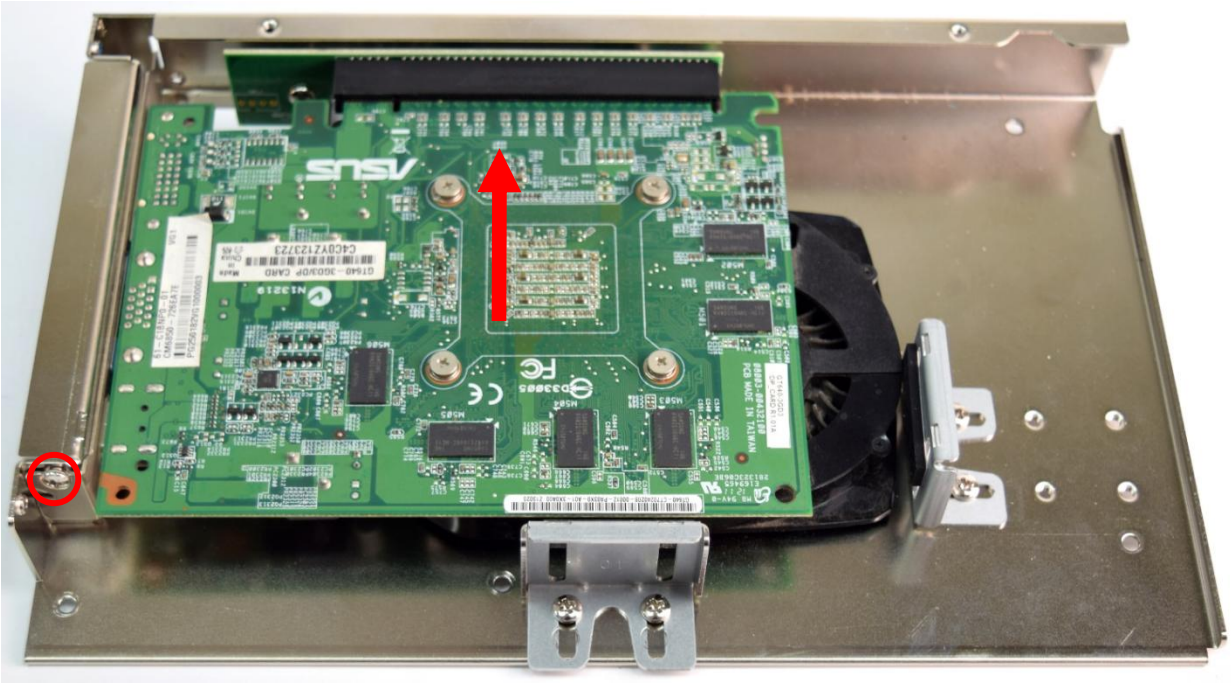


3.12 Installing PCIe expansion card

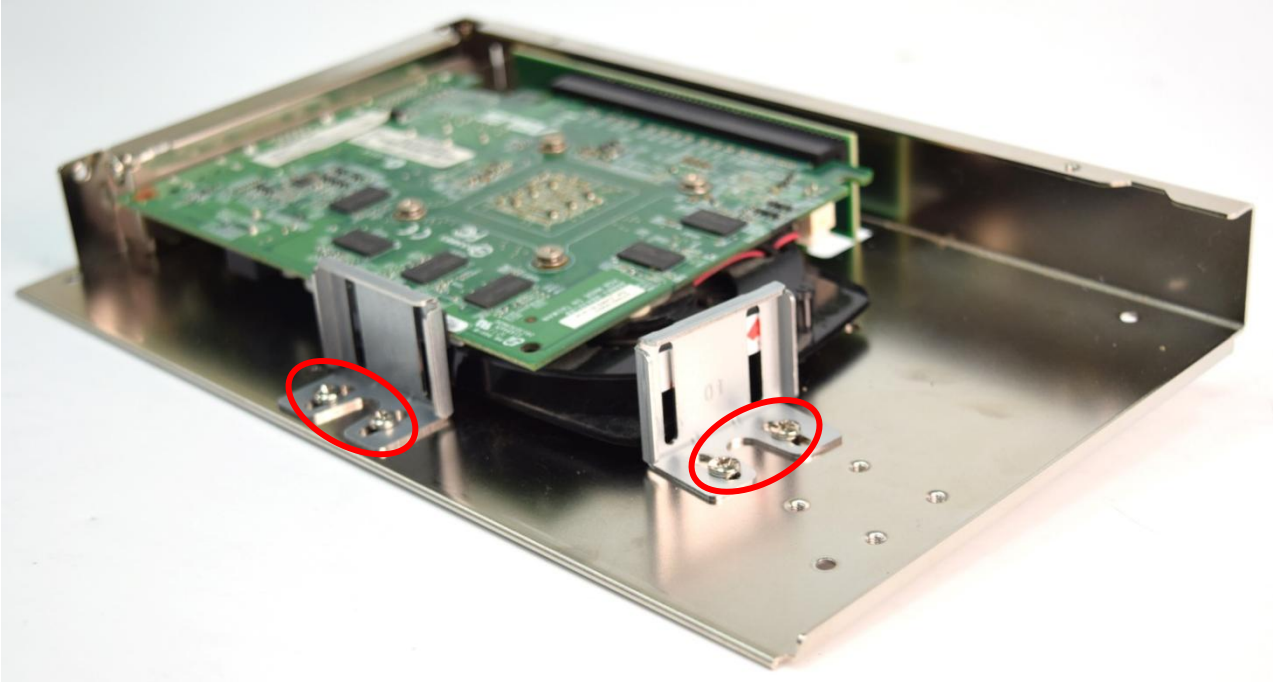
1. Unscrew the screw to remove the I/O shield



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

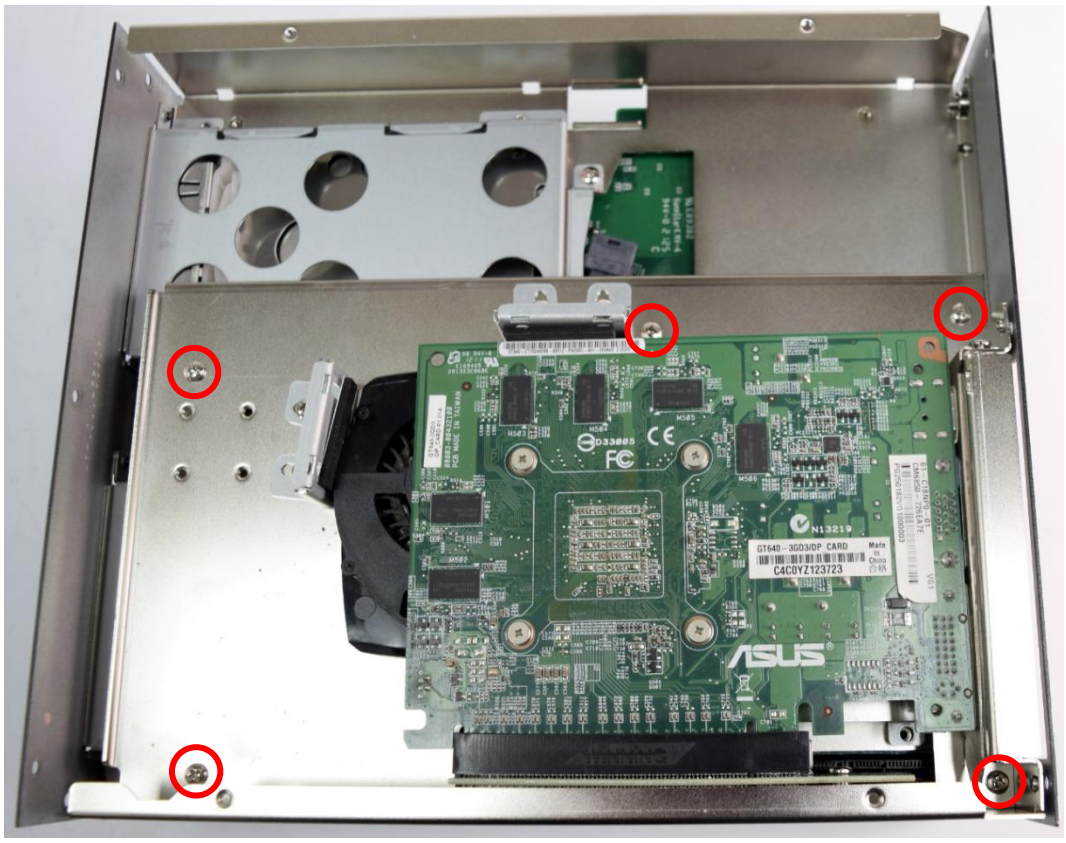


3. Adjust the holder until it holds the card firmly in place. Then fasten the screw on the bracket.

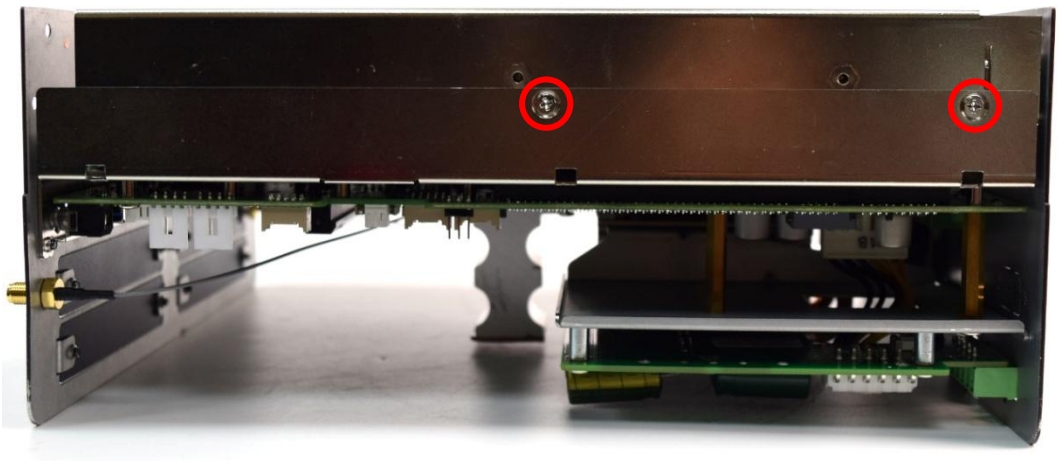


3.13 Installing PCIe expansion module

1. Install the expansion module back in place and ensure the golden finger is inserted into the expansion slot. Then fasten the 5 screws below to lock the expansion module.

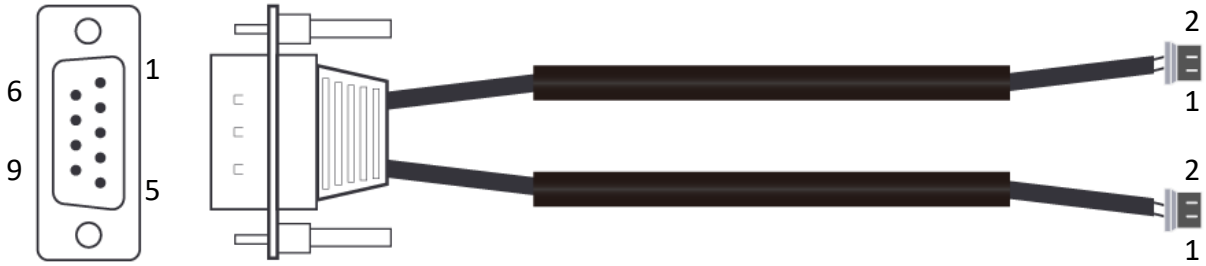


2. Fasten 2 screws in the circle .



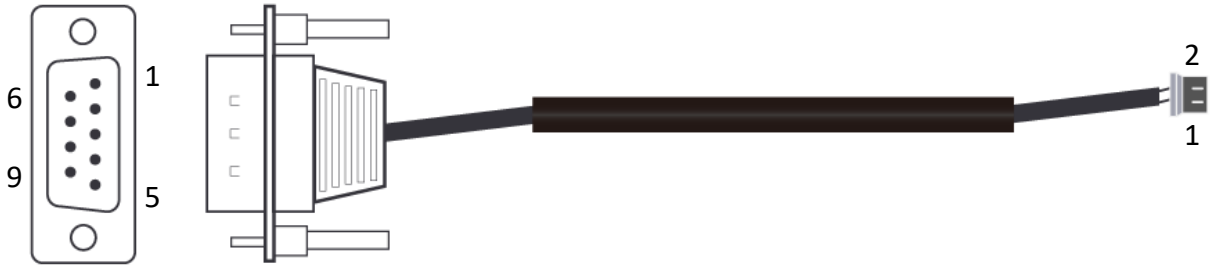
3.14 Appendix A Optional CANBus Cable

1. 1-TCAN00001 > Dual Channel



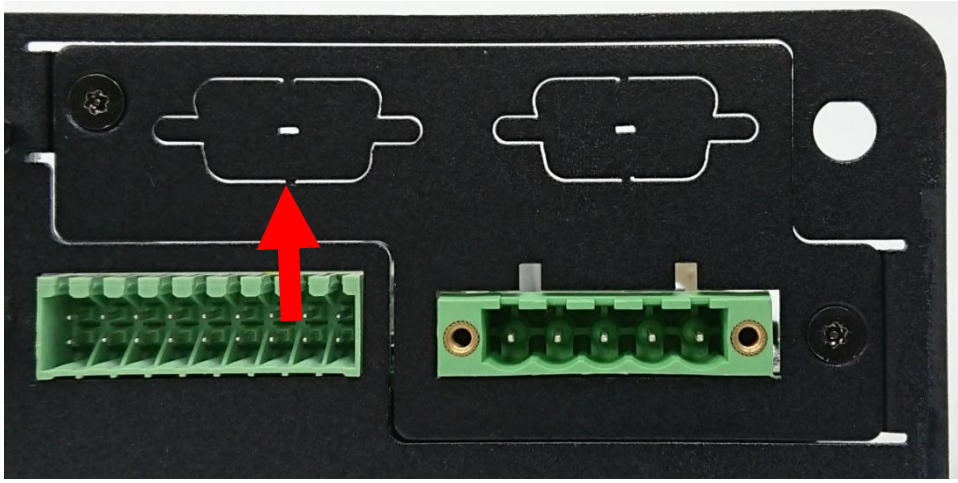
CONN1				CONN2	CONN3
PIN NO.		FUNCTION	COLOR	PIN NO.	PIN NO.
7	TWIST	CAN1 H	綠	2	–
2	TWIST	CAN1 L	白	1	–
5	TWIST	CAN2 H	藍	–	2
4	TWIST	CAN2 L	白	–	1

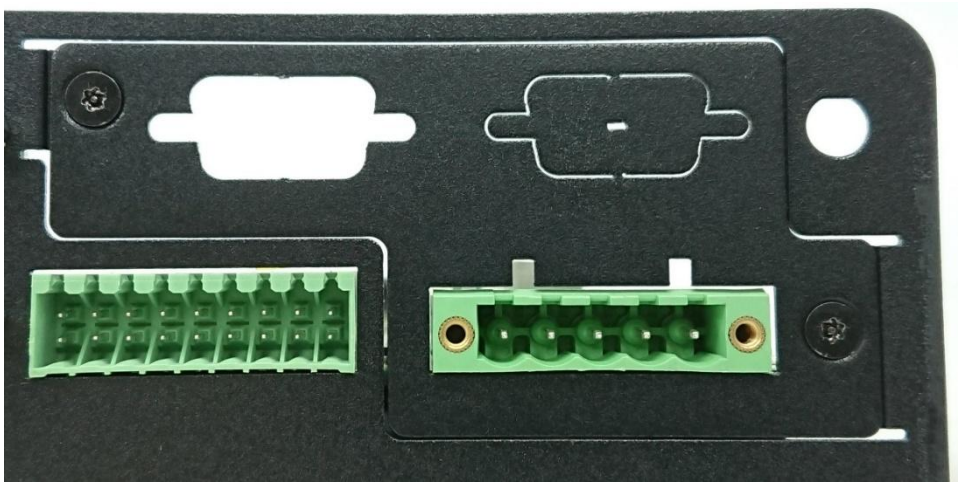
2. 1-TCAN00002 > Single Channel



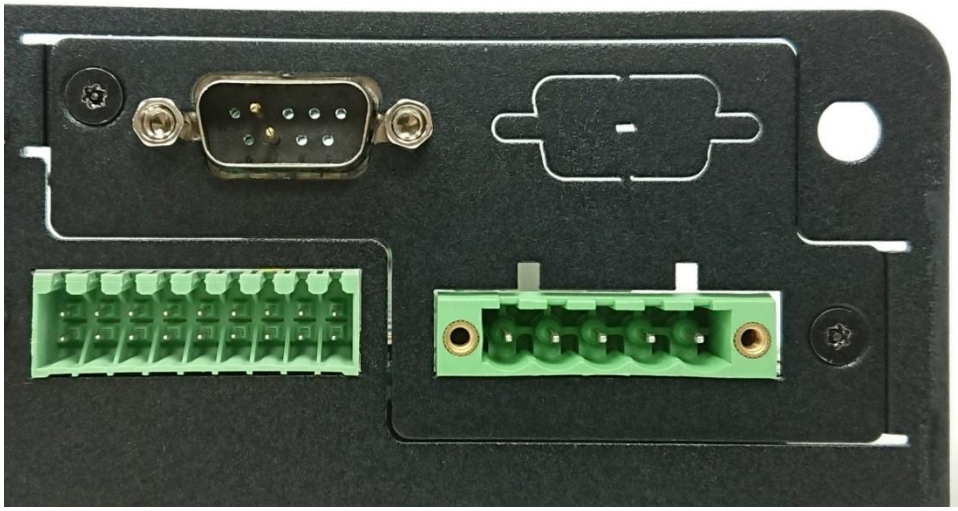
CONN1				CONN2
PIN NO.		FUNCTION	COLOR	PIN NO.
7	TWIST	CAN1 H	綠	2
2	TWIST	CAN1 L	白	1

3. Remove the cutting hole

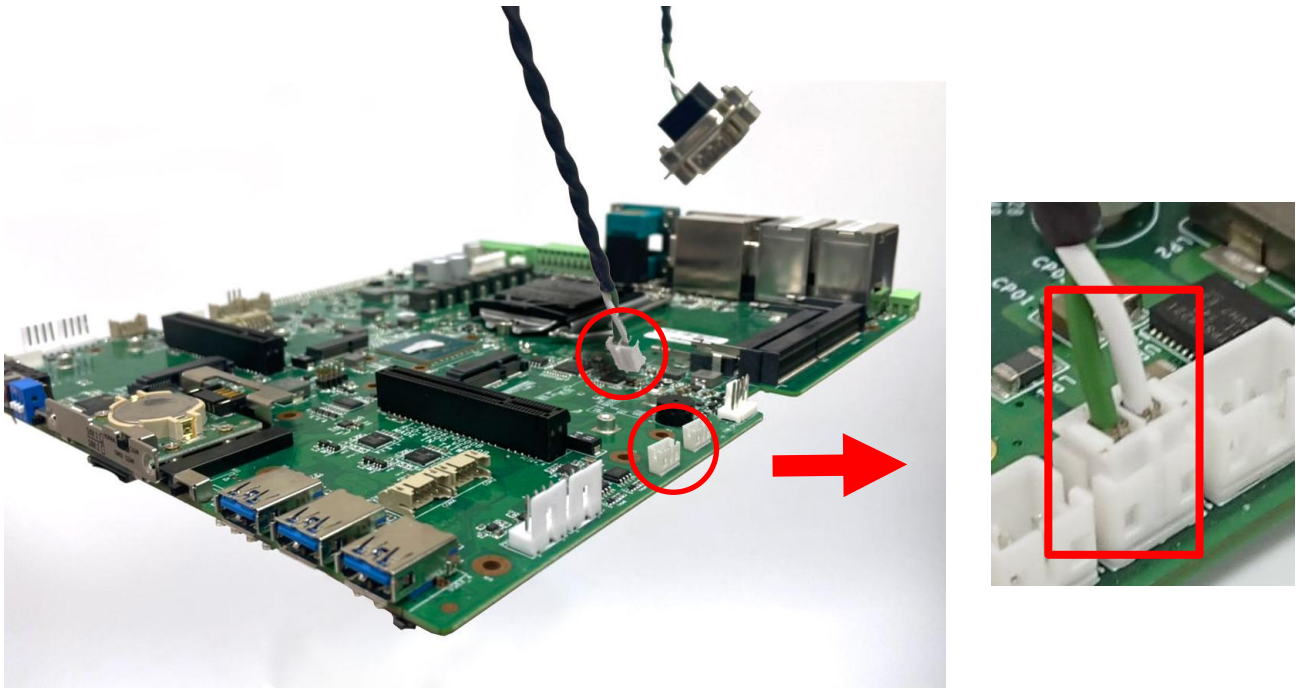


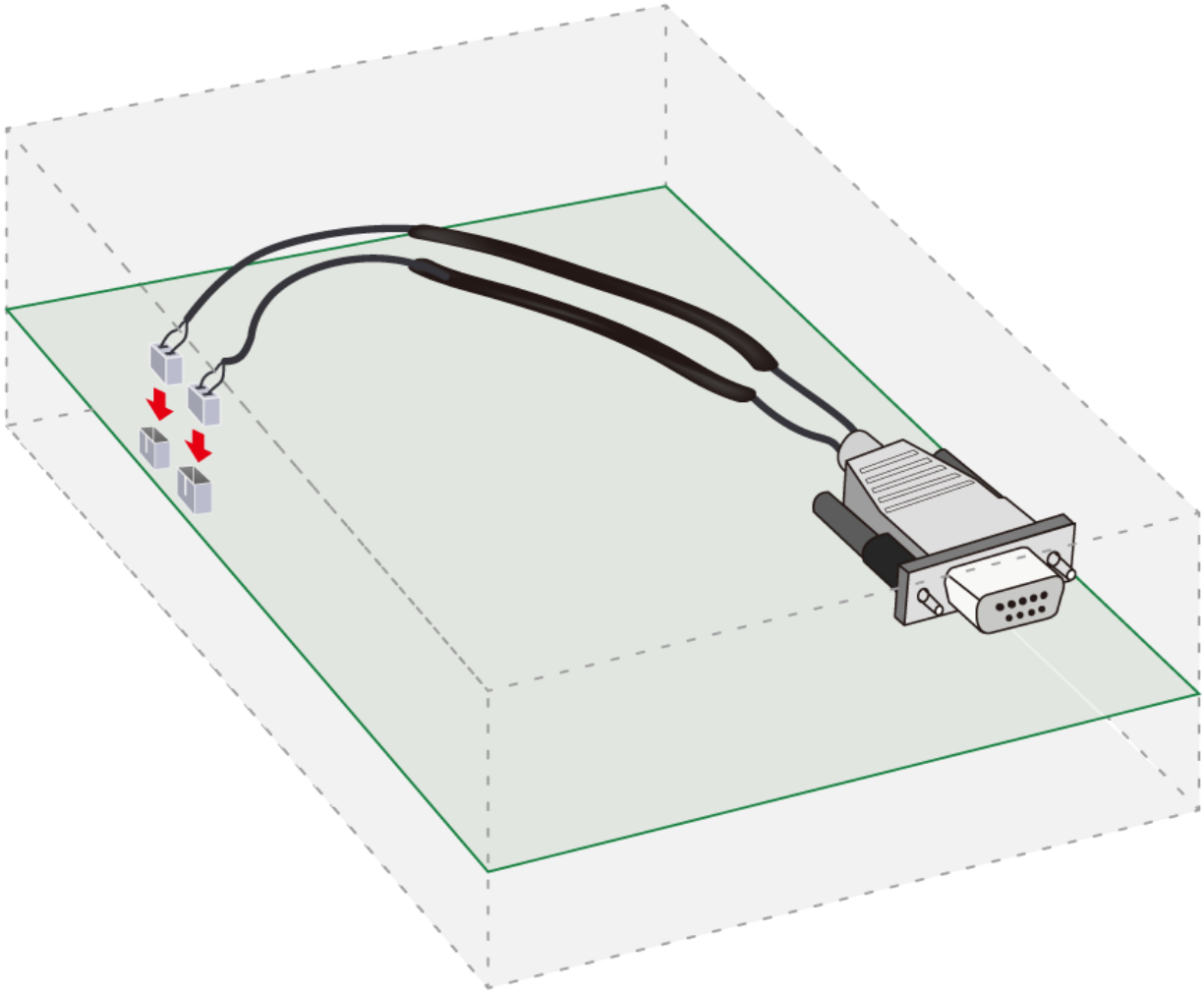


4. Install CANBus cable to the universal bracket



5. Insert CANBus cable to the Motherboard





3.15 Installing wall mount kit (ACO-6000-CML Series)

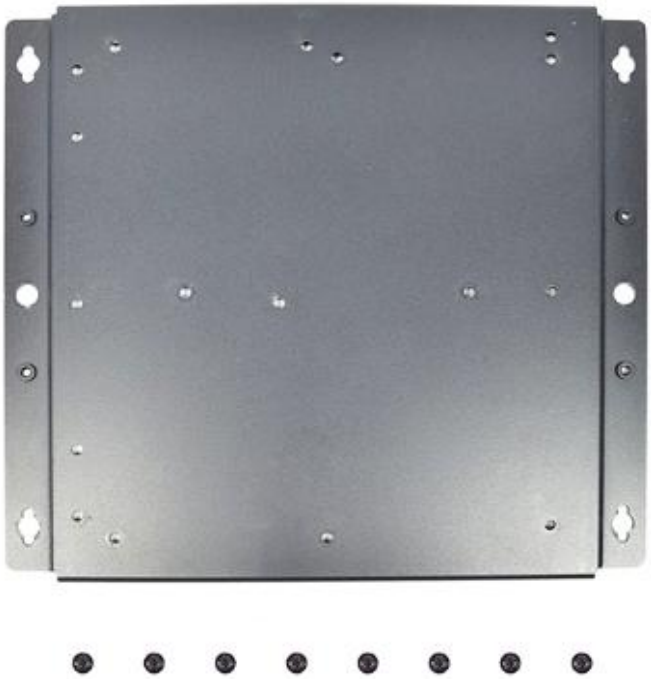
1. Wall mount kit is available for ACO-6000-CML series included in the standard package.

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

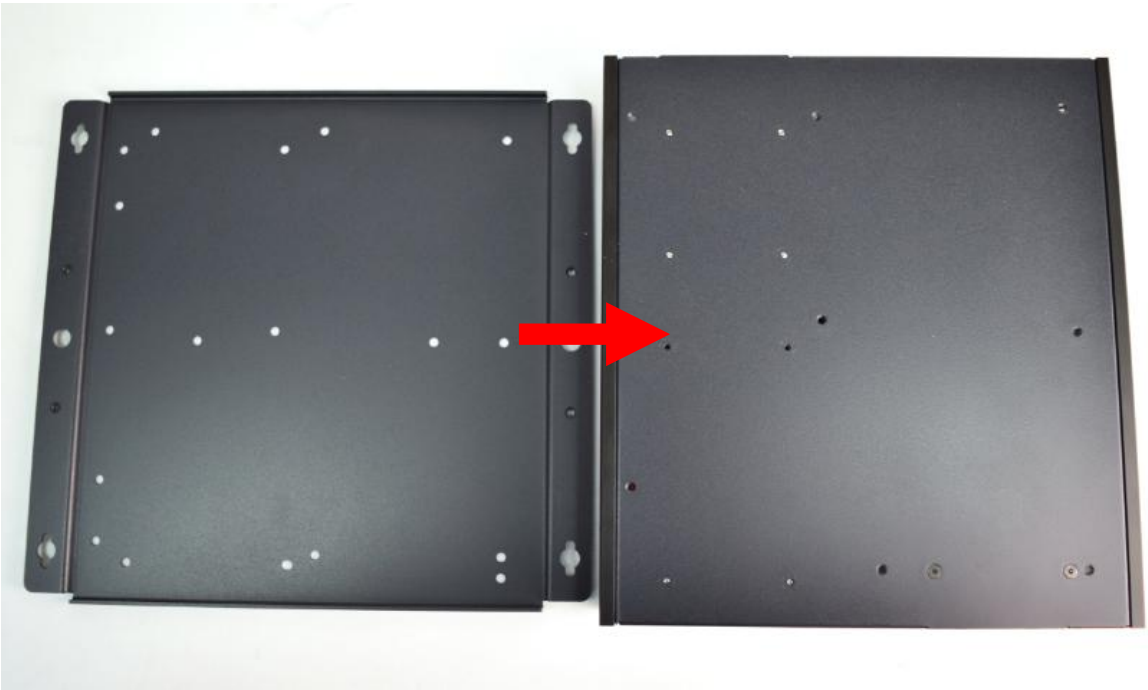
3. Lock the wall mount kit with eight screws (M3x5L, Nylok).

3.16 Installing wall mount kit (ACO-6000-CML-10 Series)

1. Wall mount kit is available for ACO-6000-CML-10 included in the standard package.

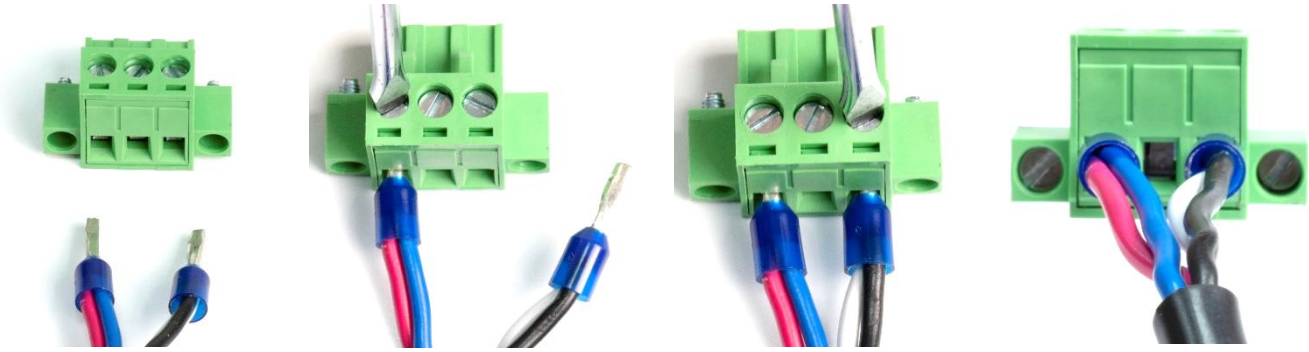


2. Lock the wall mount kit with 8 screws

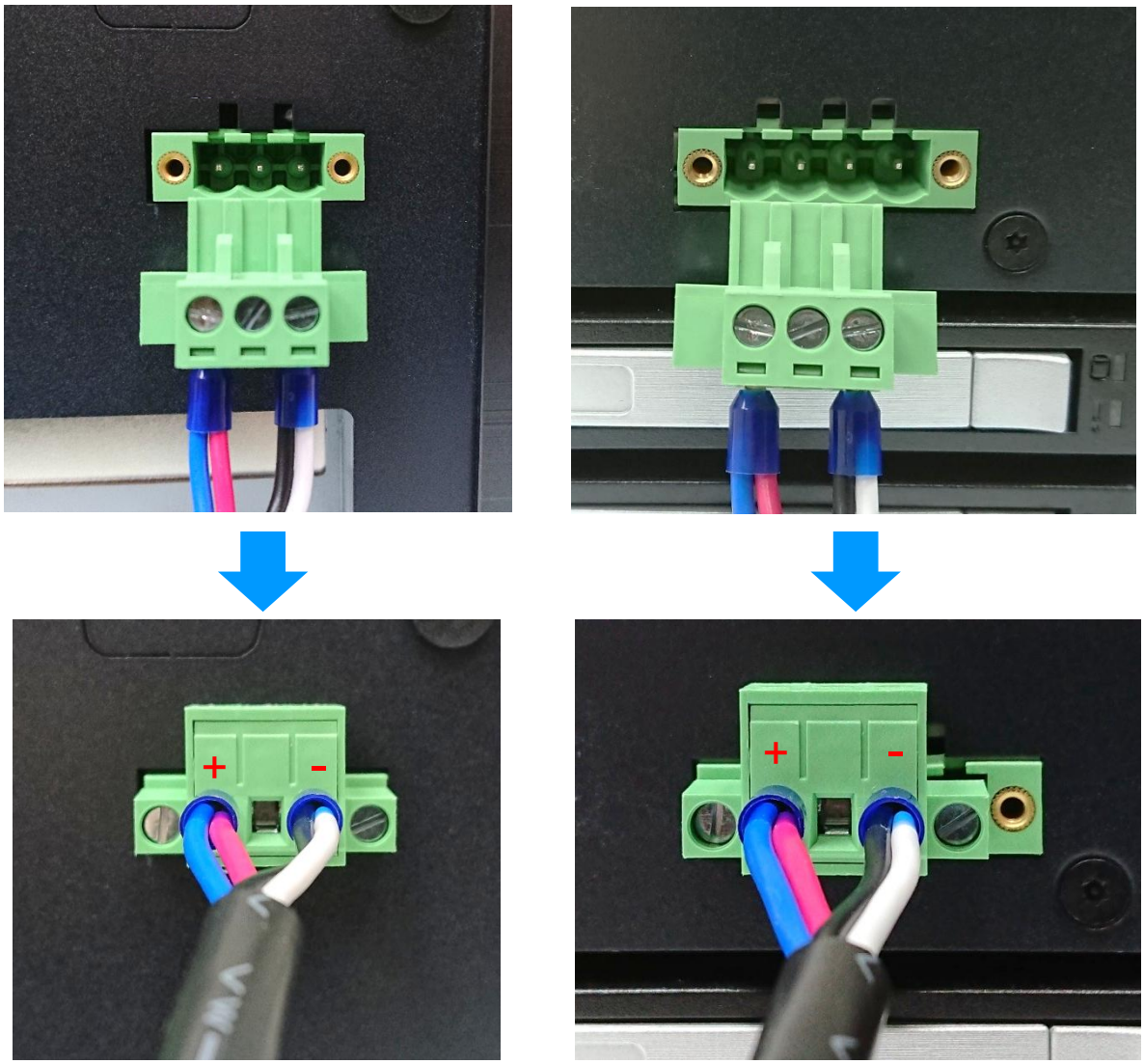


3.17 AC Adapter with 3P terminal block

1. 3P Wiring Diagram of AC Adapter



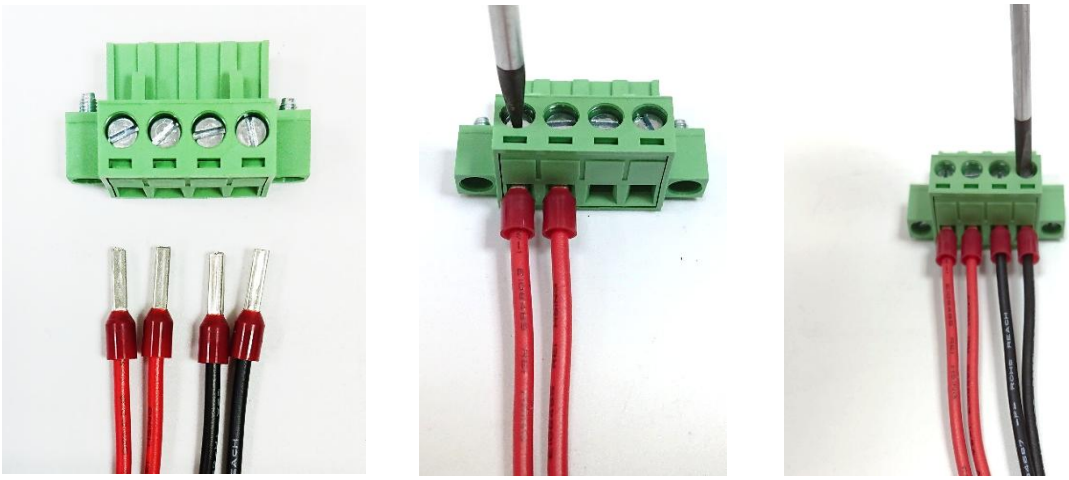
2. DC power input 3P wiring diagram



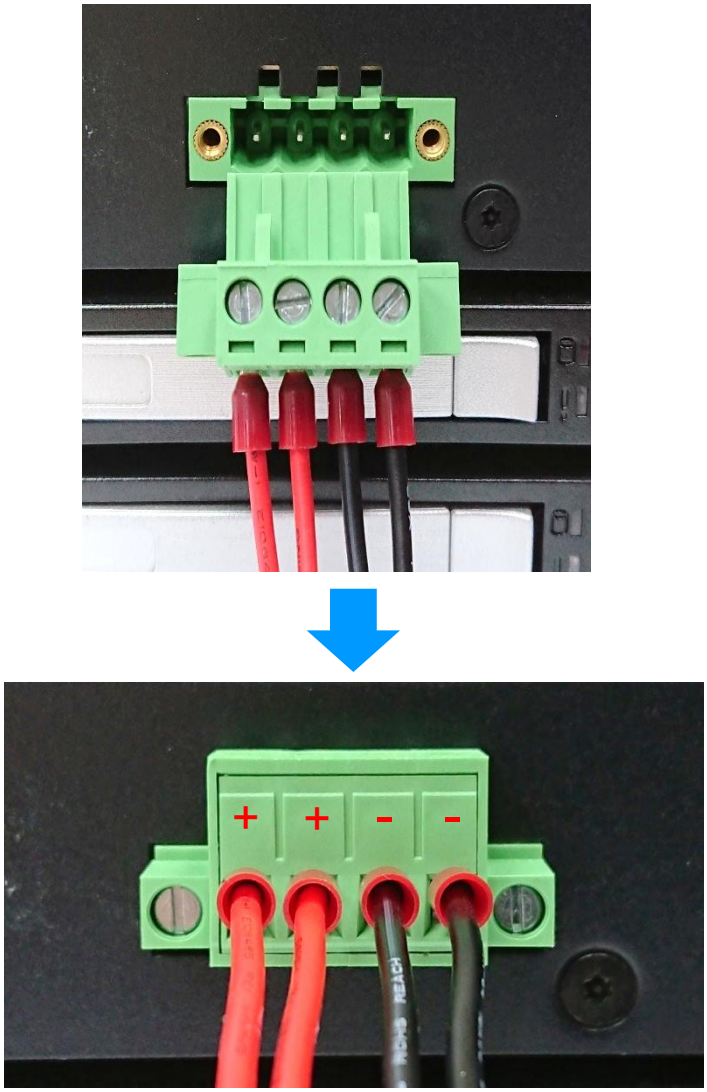
3.18 AC Adapter with 4P terminal block

* 12V requires 4-pin terminal block for card/storage expansion

1. AC adapter 4P wiring diagram



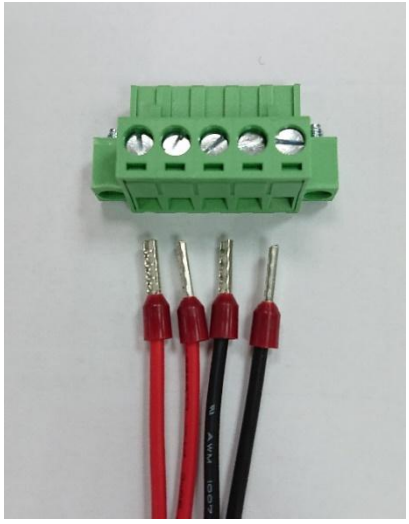
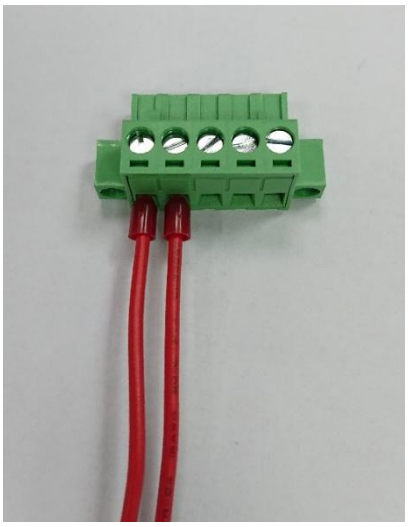
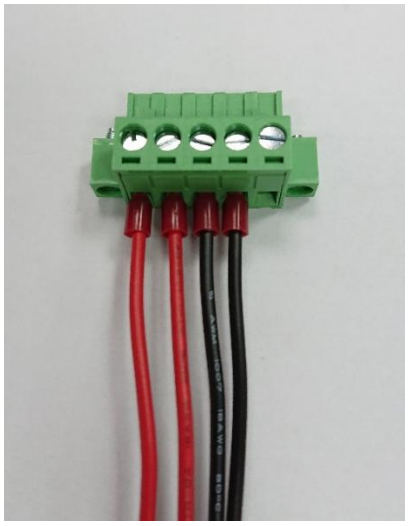
2. DC power input 4P wiring diagram



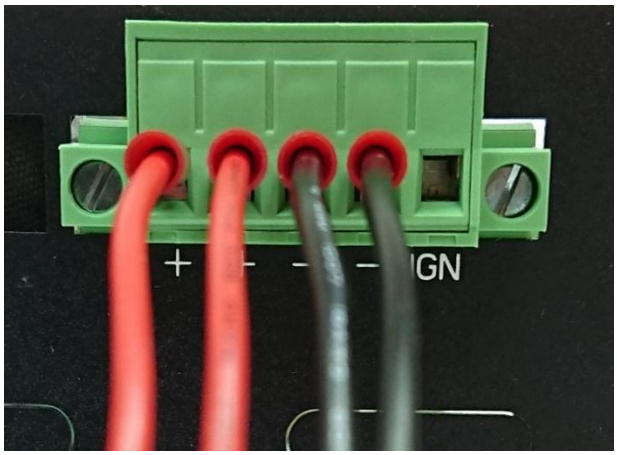
3.19 AC Adapter with 5P terminal block

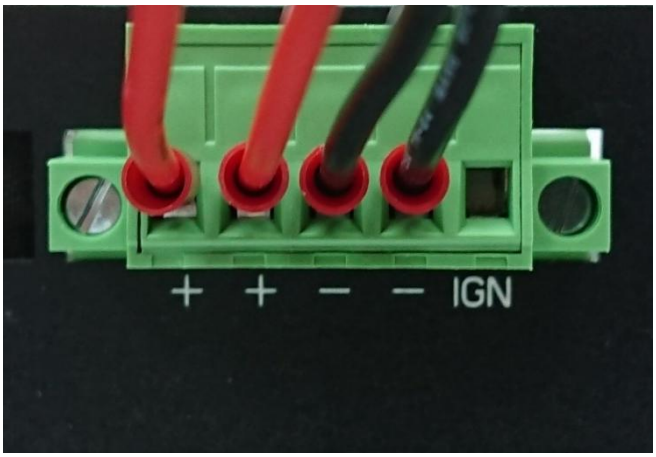
* 12V requires 4-pin terminal block for card/storage expansion

1. AC adapter 5P wiring diagram

2. DC power input 5P wiring diagram





Chapter 4

BIOS Setup

4.1 BIOS Introduction

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.

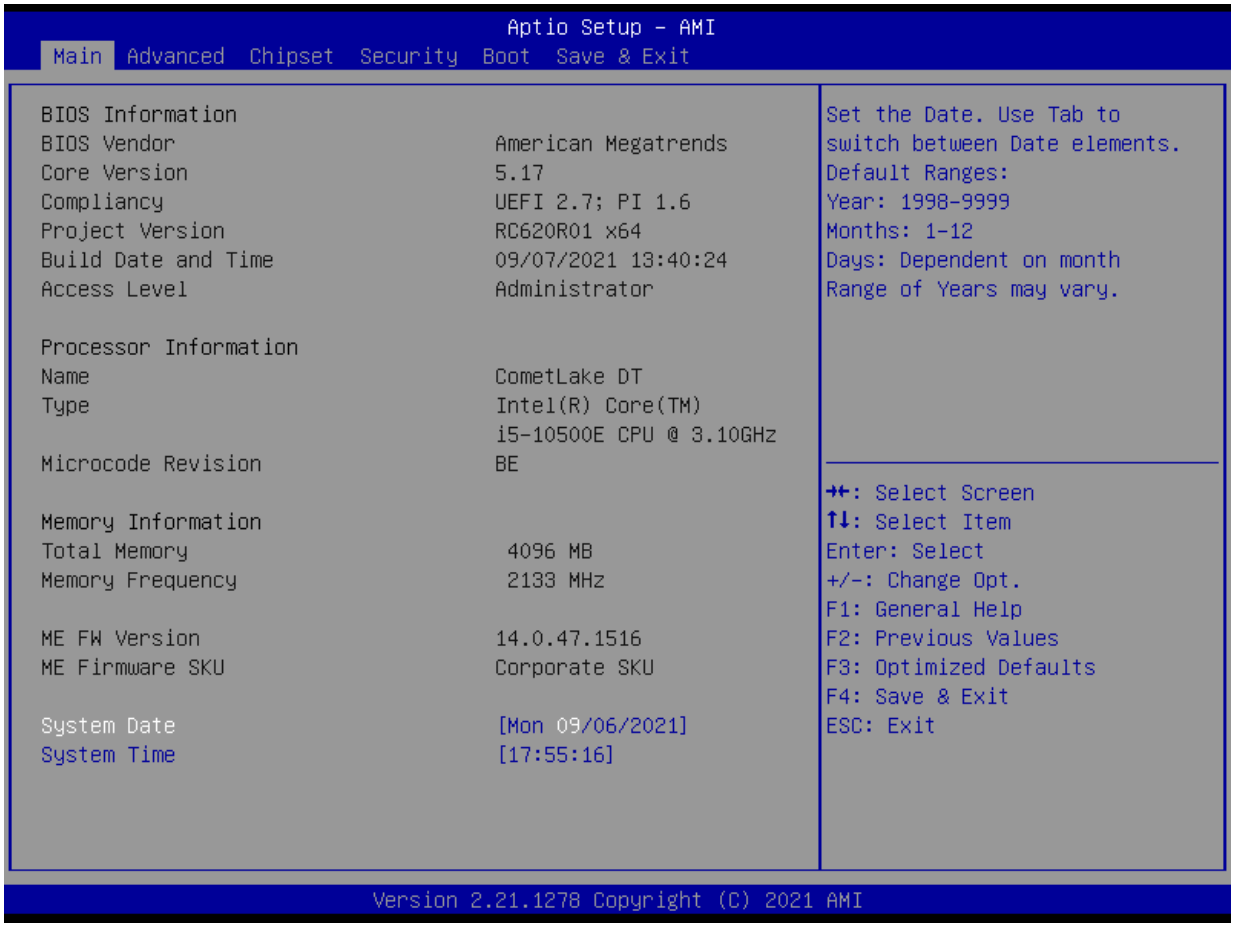
Control Keys	
<→> <←>	Select Screen
<↑> <↓>	Select Item
<Enter>	Select
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<F1>	General Help
<F2>	Previous Value
<F3>	Load Optimized Defaults
<F4>	Save Configuration and Exit
<Tab>	Select Setup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



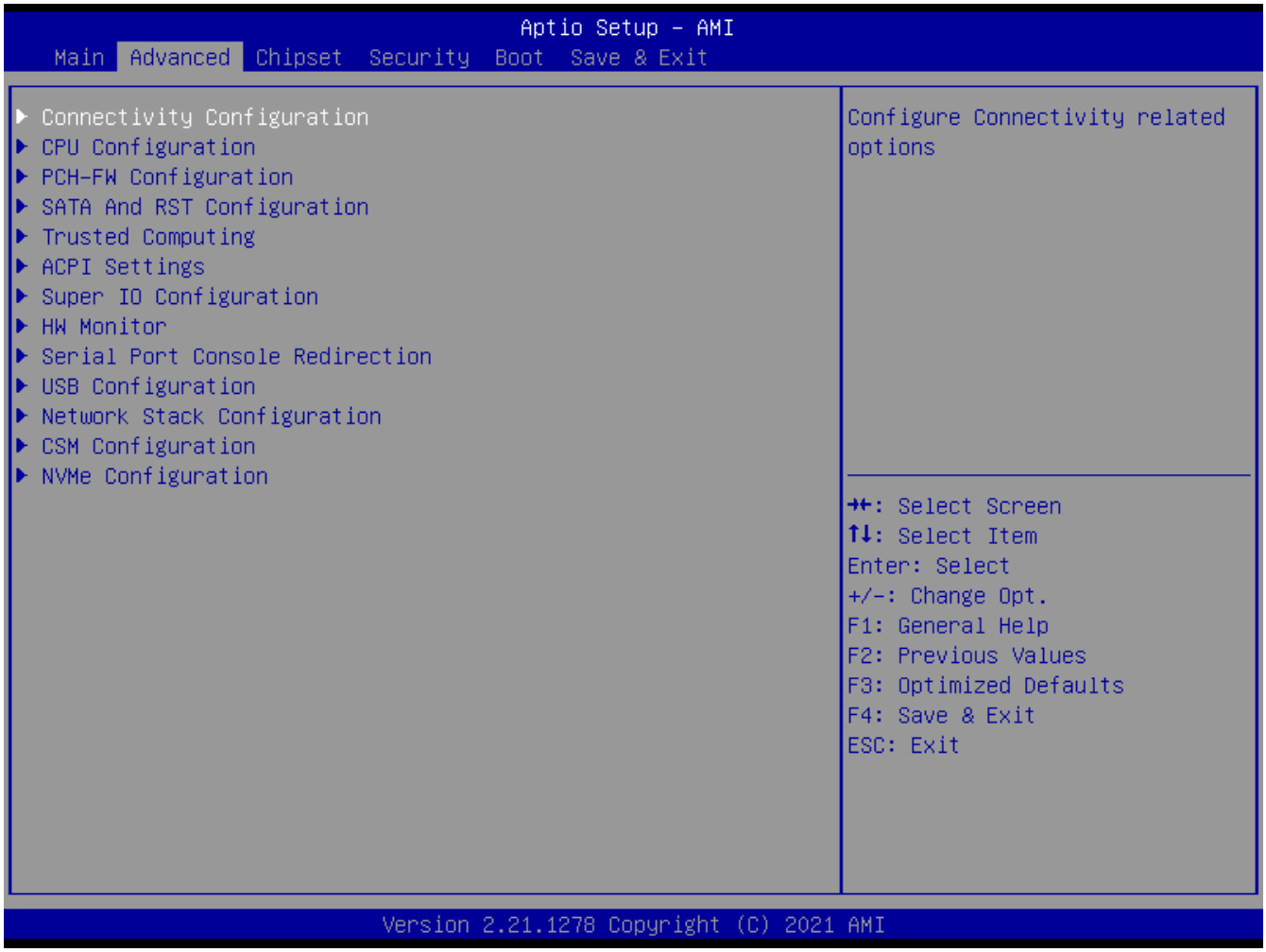
■ System Date

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

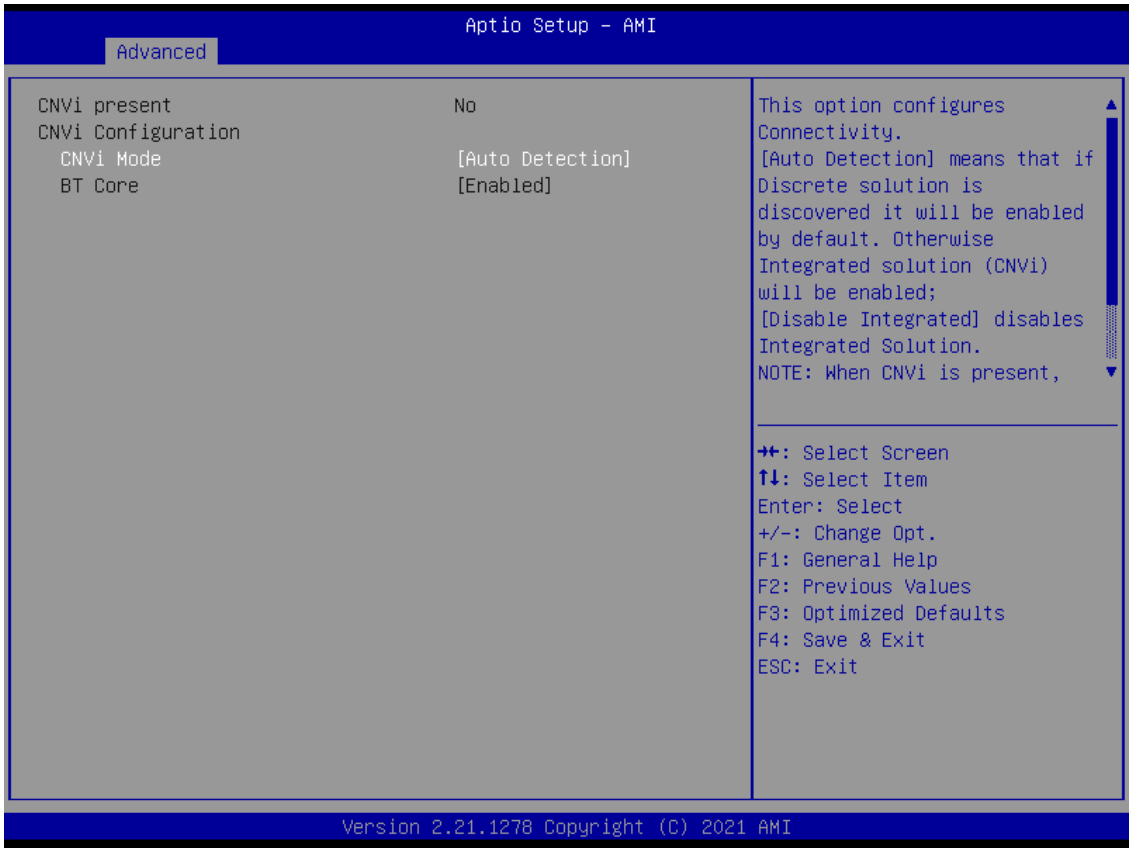
■ System Time

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

4.3 Advanced Setup

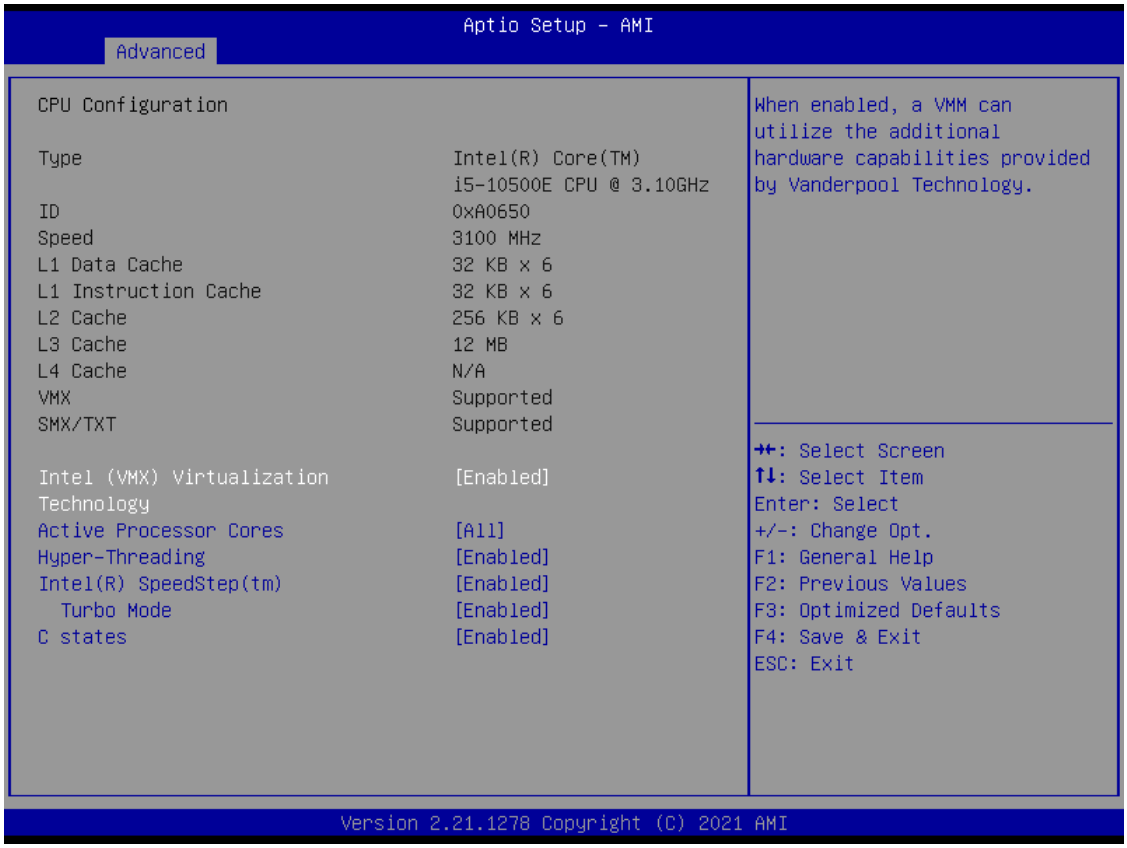


4.3.1 Connectivity Configuration



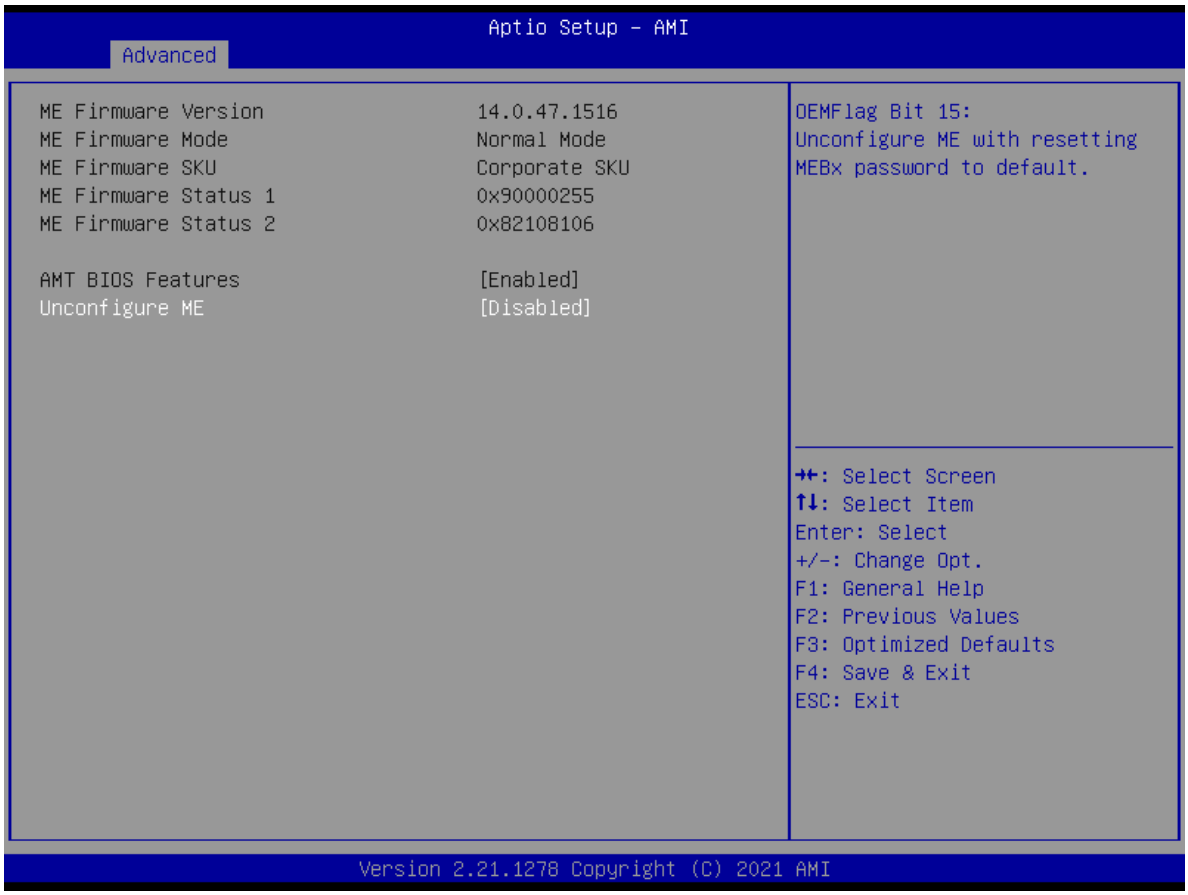
Item	Options	Description
CNVi Mode	Disable Integrated, Auto Detection**[Default]**	This option configures Connectivity. [Auto Detection] means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled; [Disable Integrated] disables Integrated Solution. NOTE: When CNVi is present, the GPIO pins that are used for radio interface cannot be assigned to the other native function.
BT Core	Enabled**[Default] ,** Disabled	This is an option intended to Enable/Disable BT Core in CNVi.

4.3.2 CPU Configuration



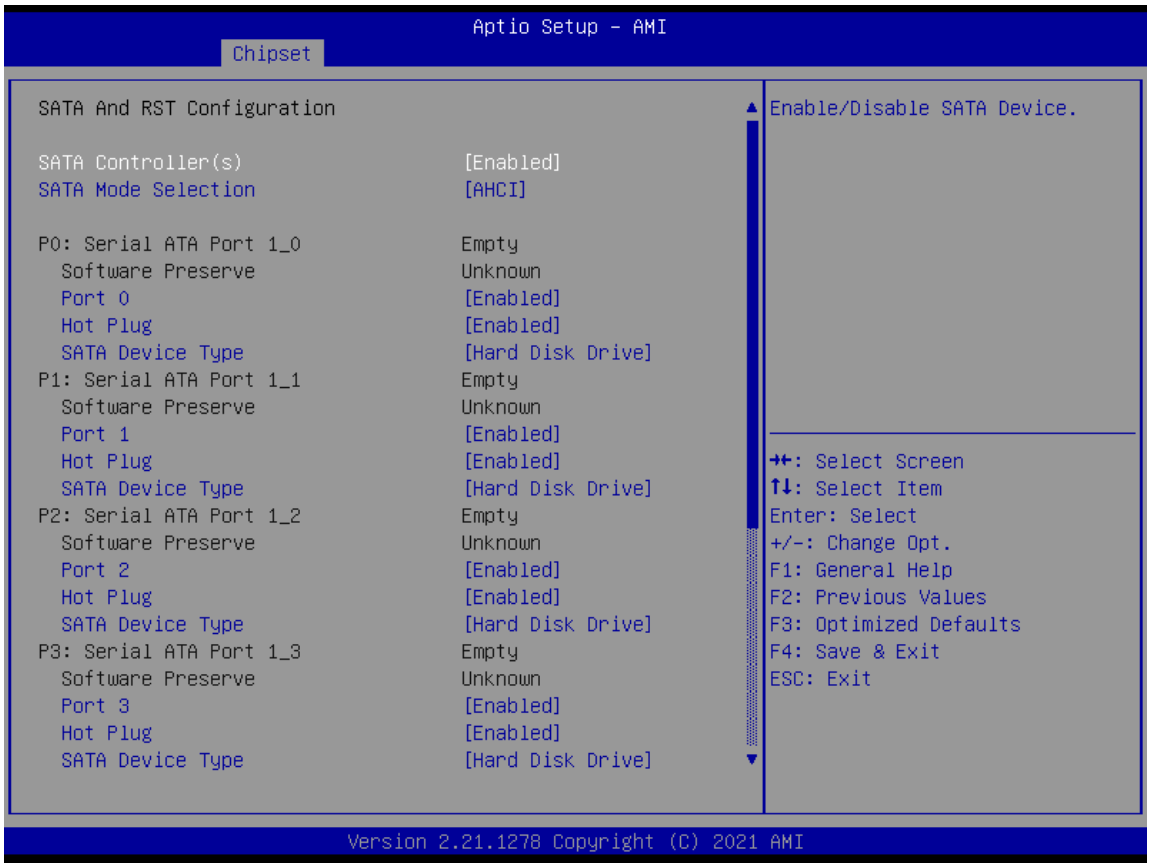
Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled, Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Virtualization Technology.
Active Processor Cores	All**[Default]** 1 2 3	Number of cores to enable in each processor package.
Hyper-Threading	Disabled, Enabled**[Default]**	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).
Intel SpeedStep	Disabled, Enabled**[Default]**	This item allows you to enable or disable the Intel SpeedStep.
Turbo Mode	Disabled, Enabled**[Default]**	This item allows you to enable or disable the Turbo Mode.
C states	Disabled, Enabled**[Default]**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

4.3.3 PCH-FW Configuration



Item	Options	Description
AMT BIOS Features	Disabled, Enabled**[Default]**	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note:This option does not disable Manageability Features in FW.
Unconfigure ME	Disabled**[Default]** , Enabled	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default.

4.3.4 SATA and RST Configuration

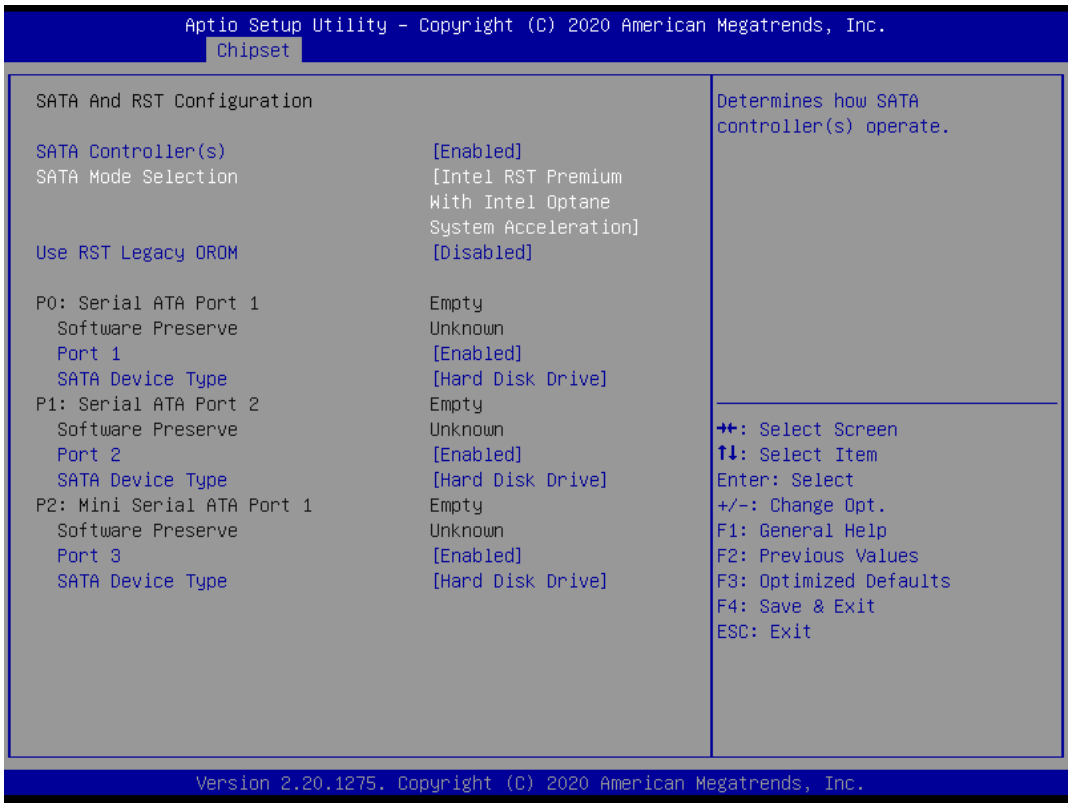


Item	Options	Description
SATA Controller(s)	Disabled, Enabled**[Default]**	Enable/Disable SATA Device.
SATA Mode Selection	**AHCI[Default] ,** Intel RST Premium With Intel Optane System Acceleration	Determines how SATA controller(s) operate.
Port0 ~6	Disabled, Enabled**[Default]**	Enable/Disable SATA Port.
SATA Device Type	Hard Disk Drive**[Default] ,** Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.
Hot Plug	Disabled, Enabled**[Default]**	Designates this port as Hot Pluggable.

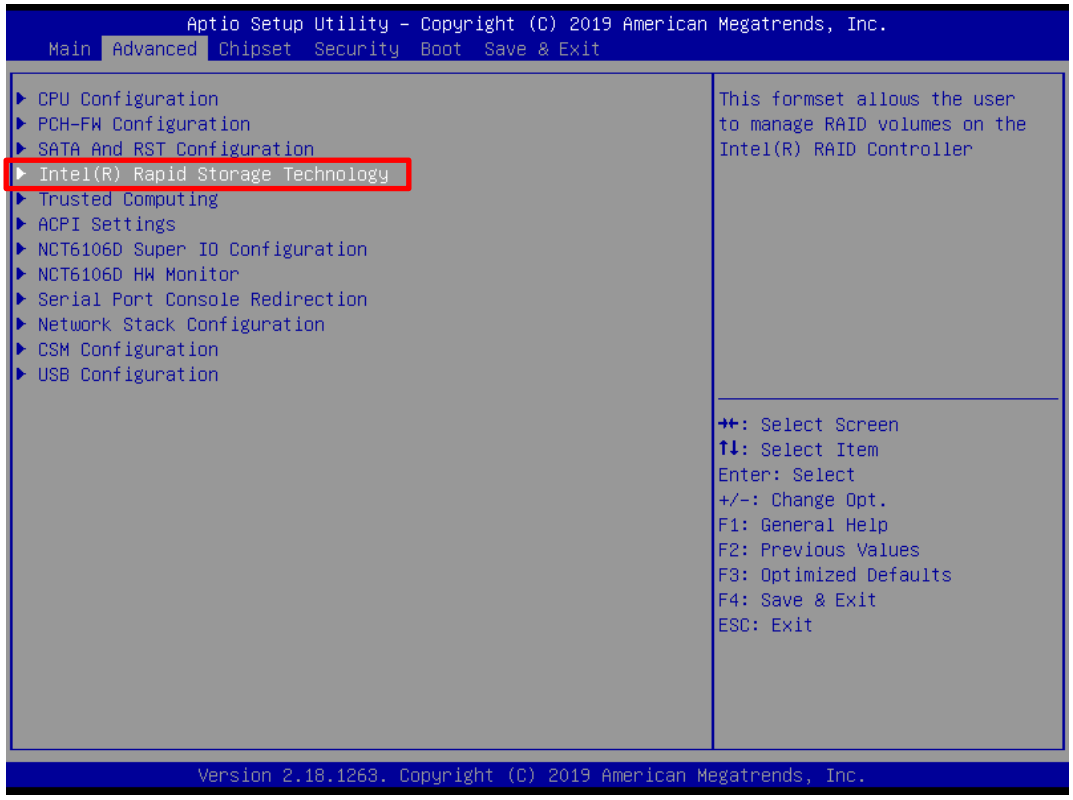
4.3.5 RST (UEFI RAID) Configuration

How to set the UEFI RAID:

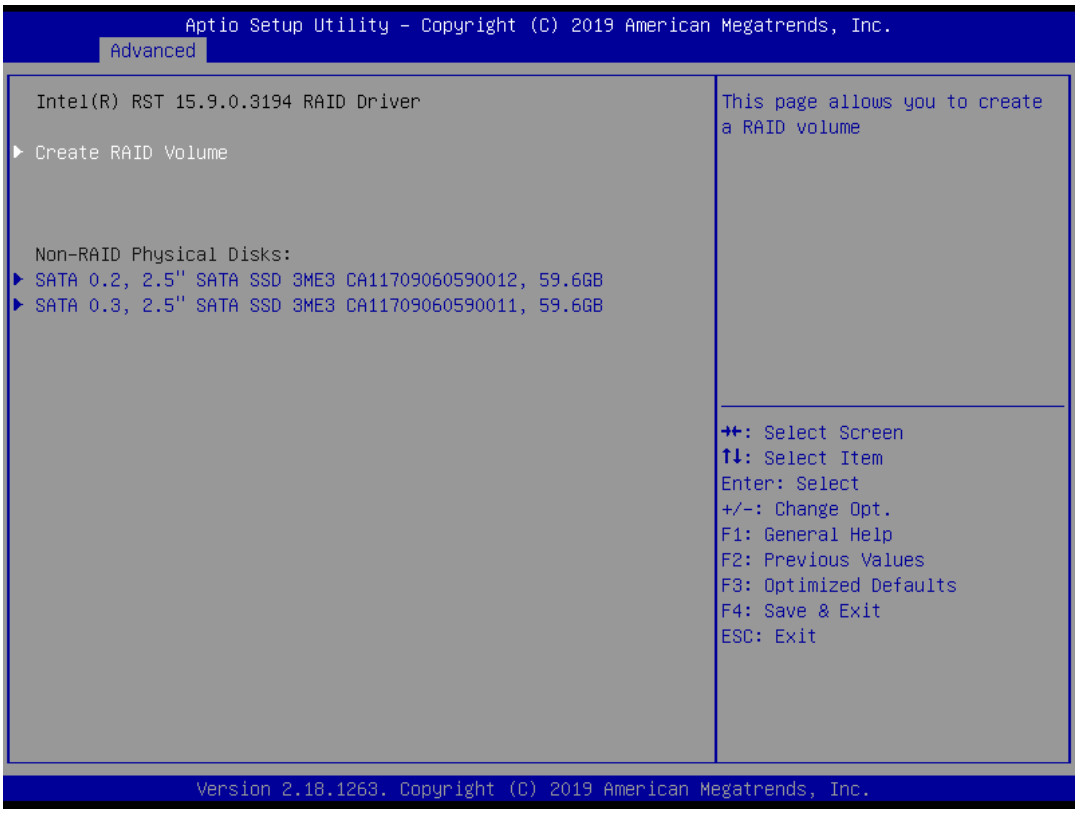
1. When set to "Intel RST Premium With Intel Optane System Acceleration", please save change reset system.



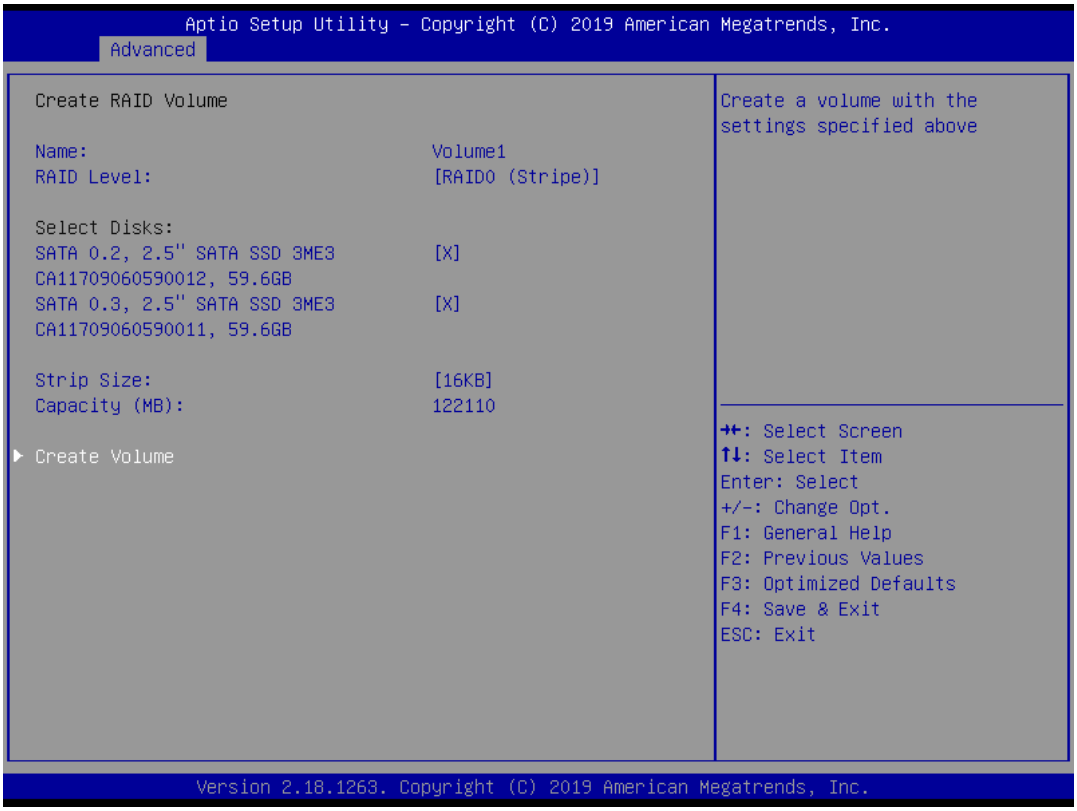
2. After reboot the system, please into BIOS utility and then will see "Intel (R) Rapid Storage Technology"



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



4. Start Create the RAID

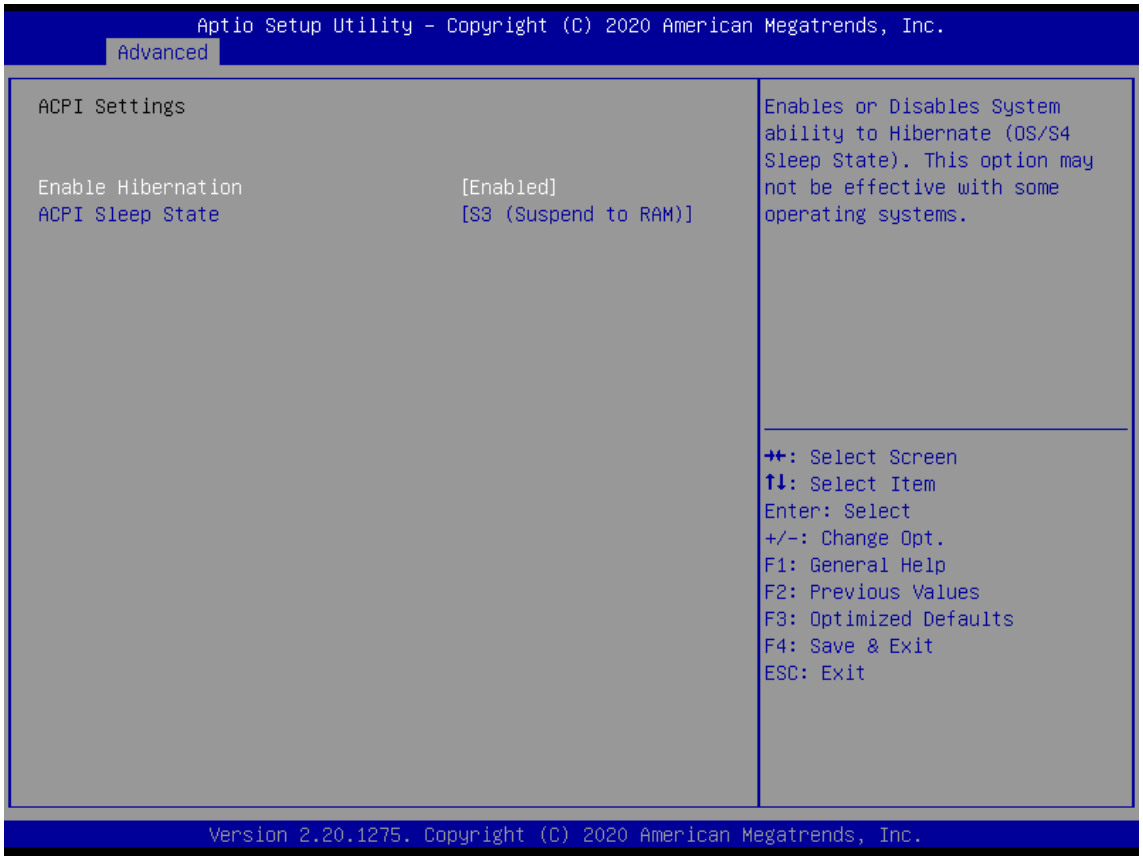


- Select Disk that you want to do the RAID
- Select [x]; No-Select [ ]

4.3.6 Trusted Computing

Item	Options	Description
Security Device Support	Enabled, Disabled**[Default]** ,	Enable/Disable BIOS support for security device. O.S. will not show Security Device.TCG EFI protocol and INT1A interface will not be available.
Pending operation	None**[Default]** , TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.

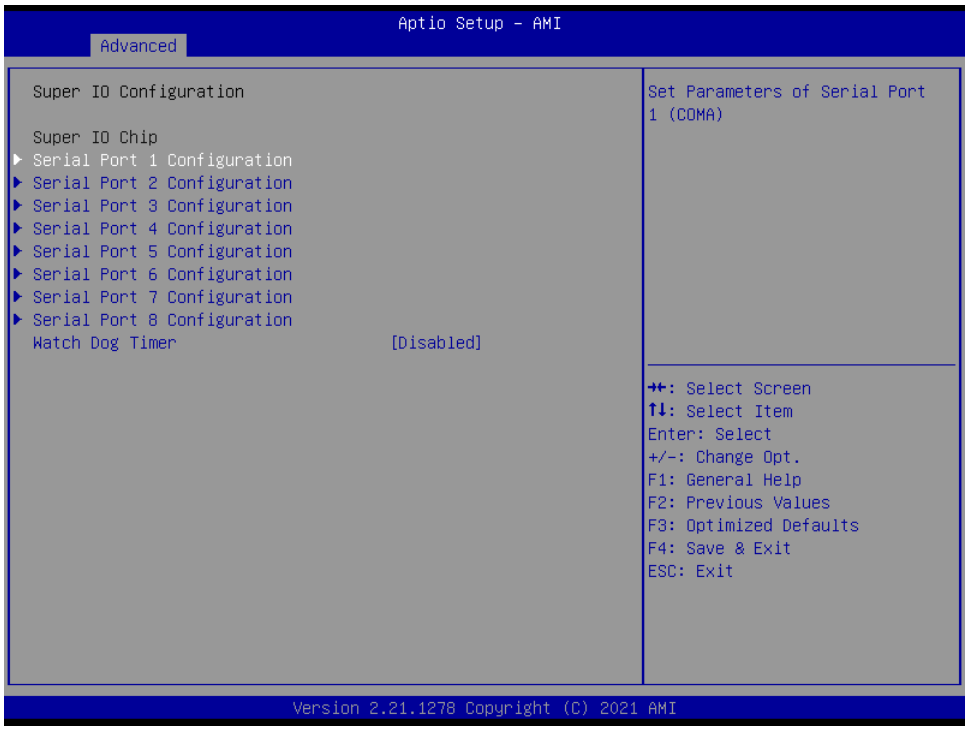
4.3.7 ACPI Settings



Item	Options	Description
Enable Hibernation	Disabled , Enabled**[Default],**	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEDN button is pressed.

4.3.8 Super IO Configuration

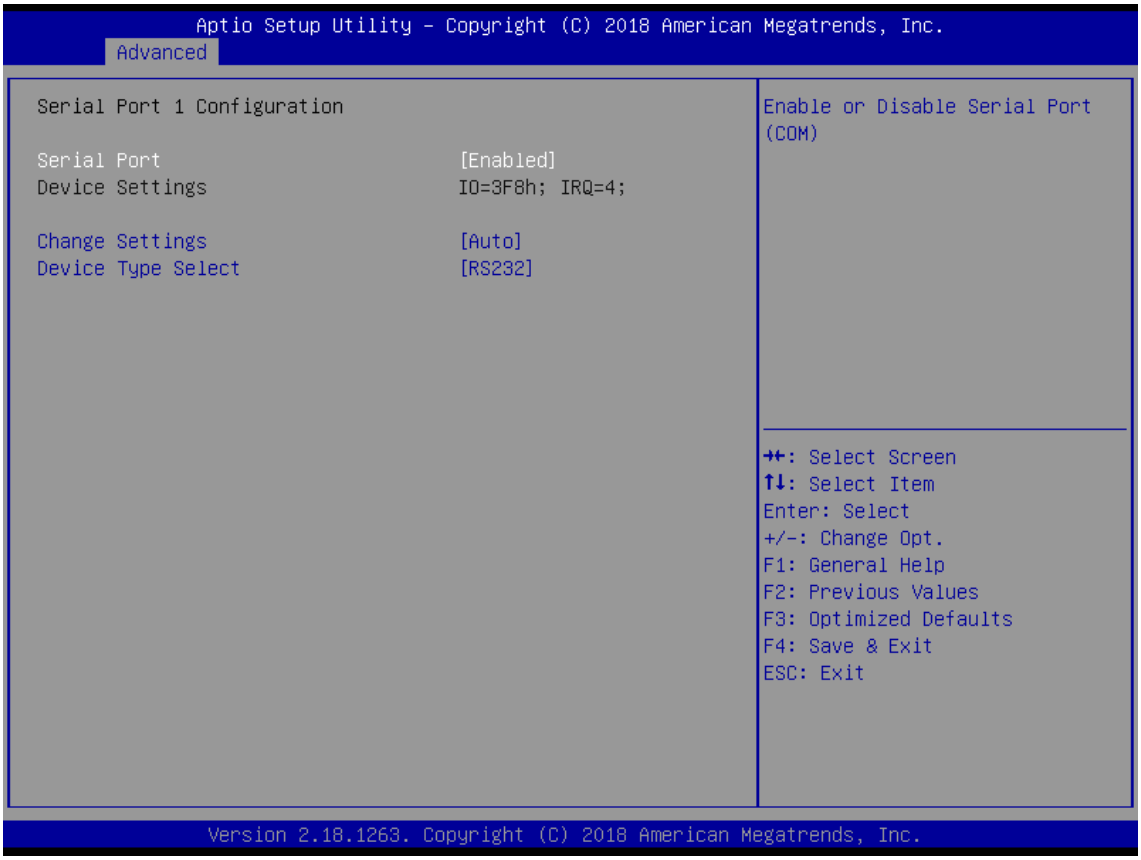
This setting allows you to select options for the Super IO Configuration, and change the value of the selected option.



Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Set Parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Set Parameters of Serial Port 6 (COMF).
Serial Port 7 Configuration	Set Parameters of Serial Port 7(COMG).
Serial Port 8 Configuration	Set Parameters of Serial Port 8 (COMH).

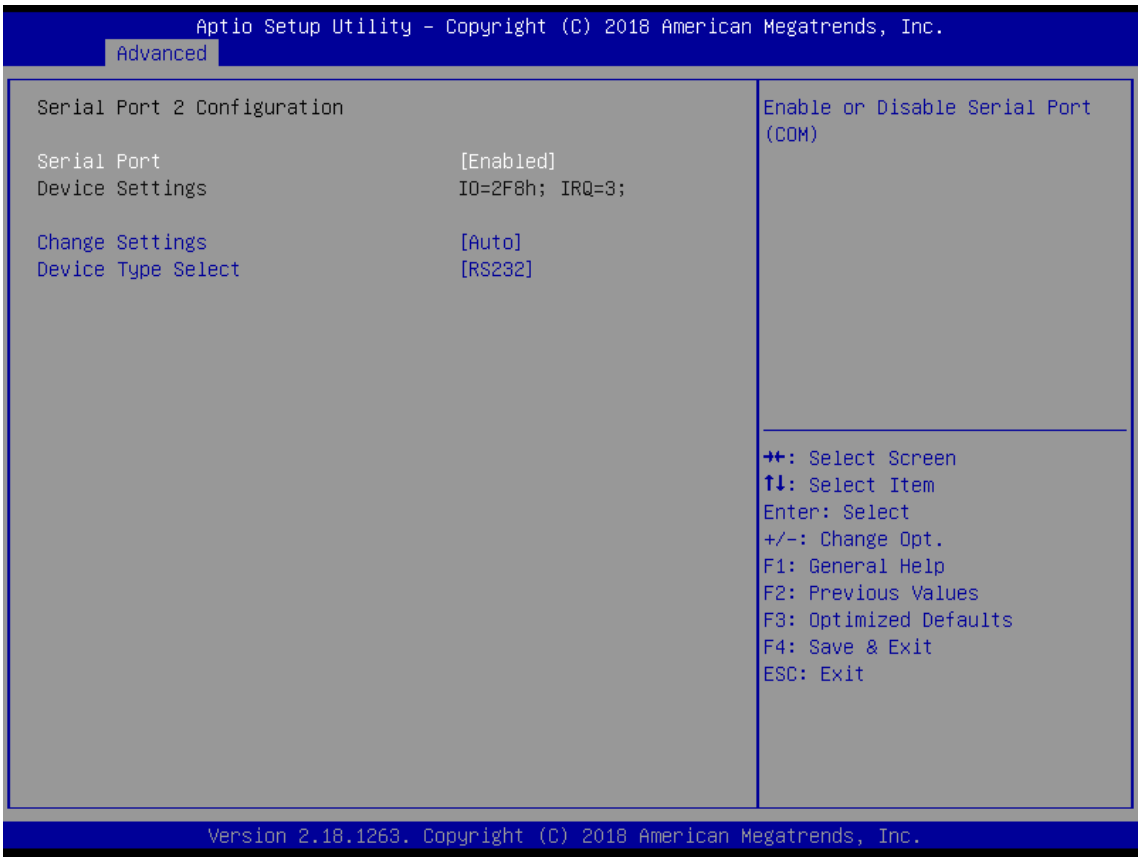
Item	Options	Description
Watch Dog Timer	Disabled **[Default],** Enabled	Enabled or Disabled Watch Dog Timer function.
Watch Dog Timer Count Mode	Second Mode**[Default]**, Minute Mode	Select Second Mode or Minute Mode.
Watch Dog Timer Time out Value	20~255(Second)**[Default],** 1~255(Minute)	Watch Dog Timer Time out Value.

Serial Port 1 Configuration



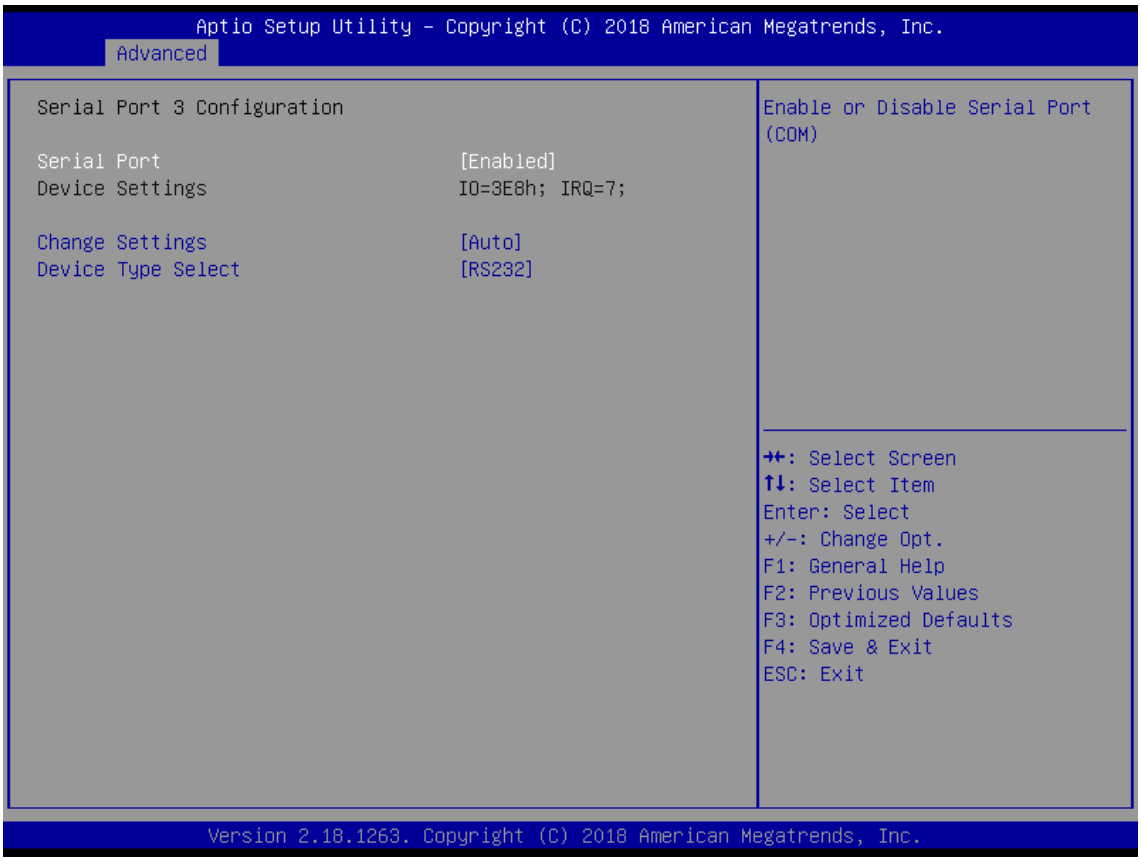
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=3F8h; IRQ=4; , IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 2 Configuration



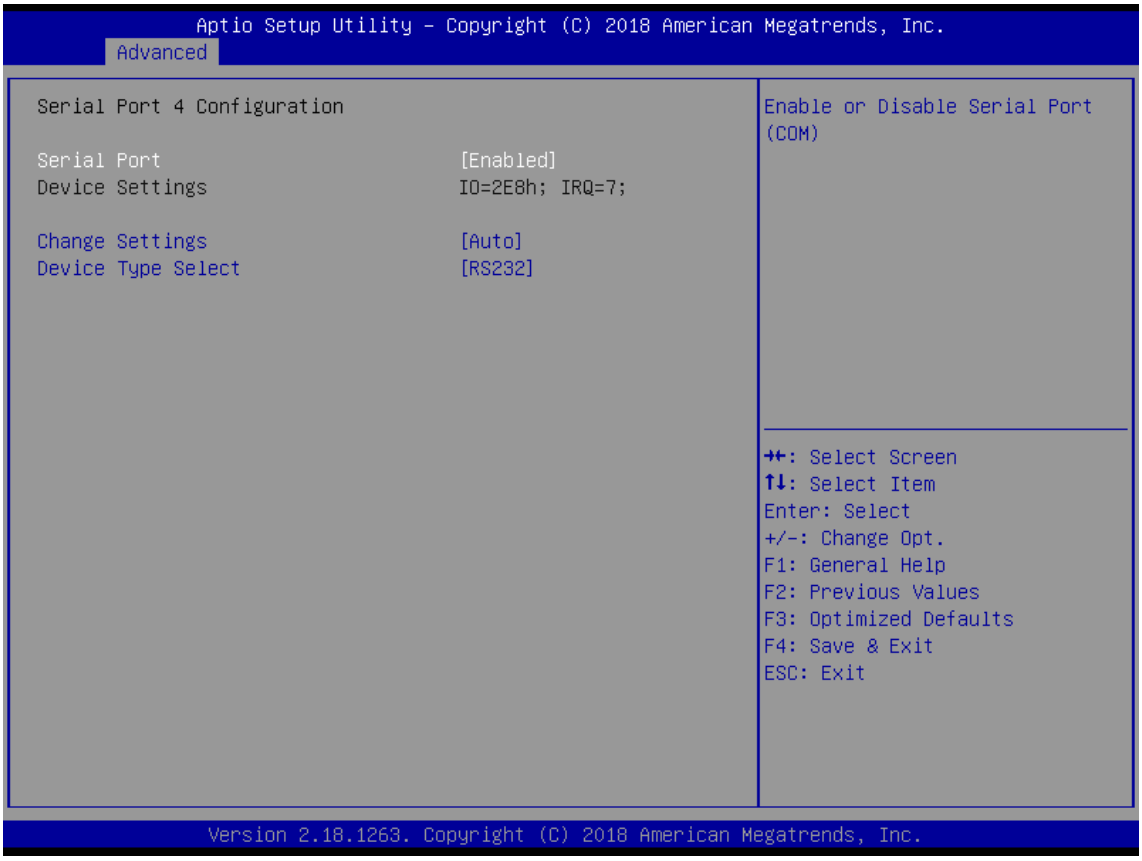
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=2F8h; IRQ=3; , IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 3 Configuration



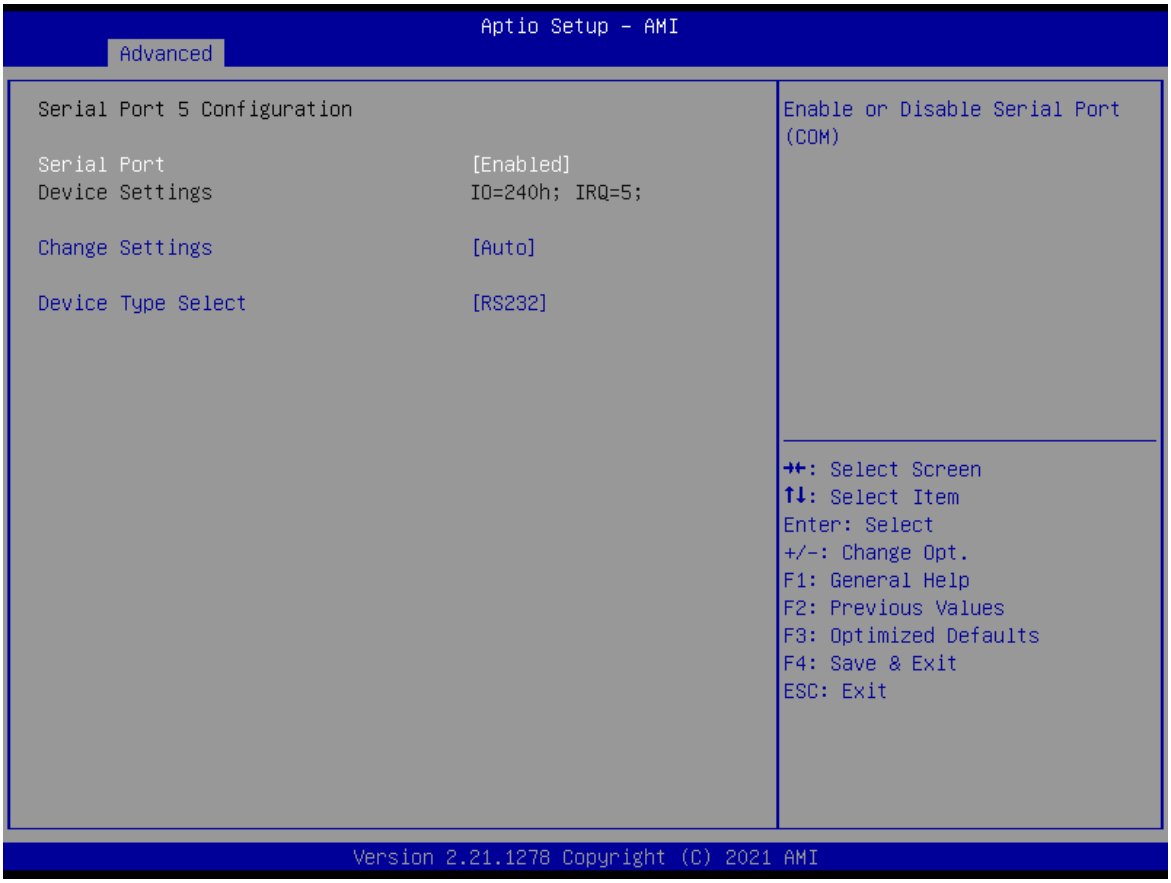
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=3E8h; IRQ=7; , IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 4 Configuration



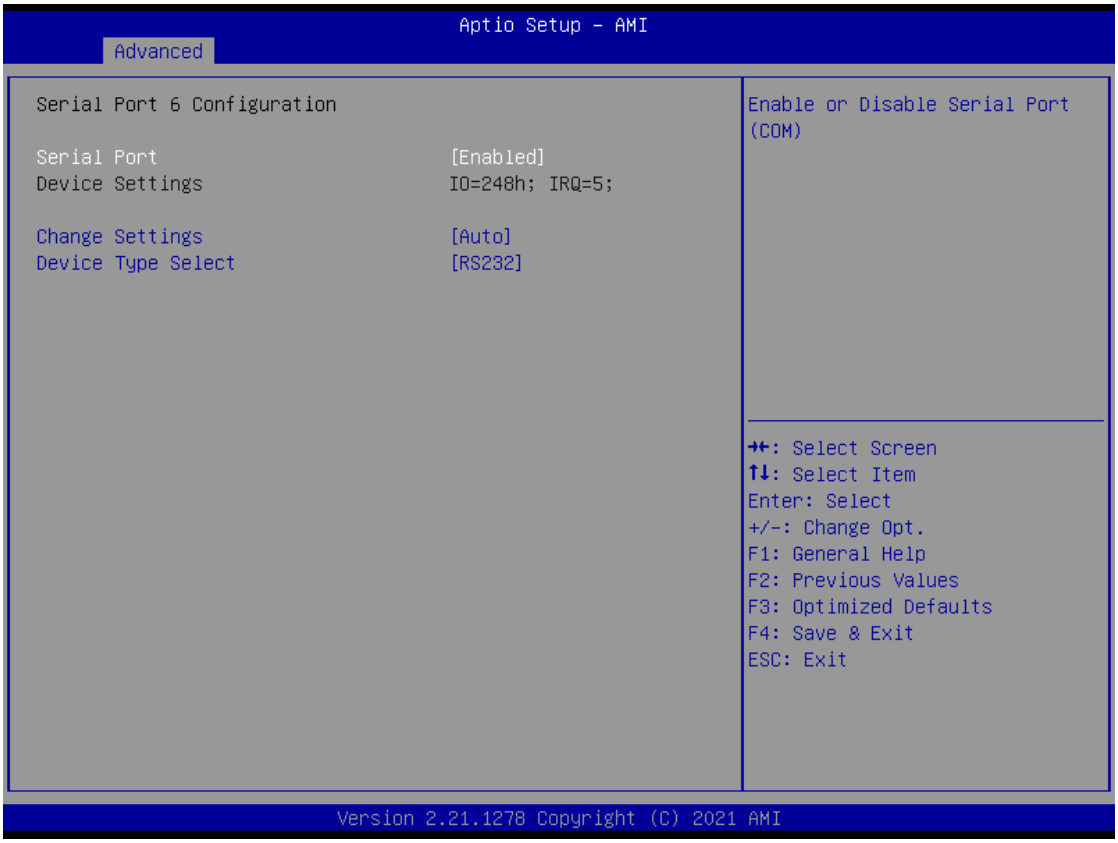
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=2E8h; IRQ=7; , IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; , IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;, IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 5 Configuration



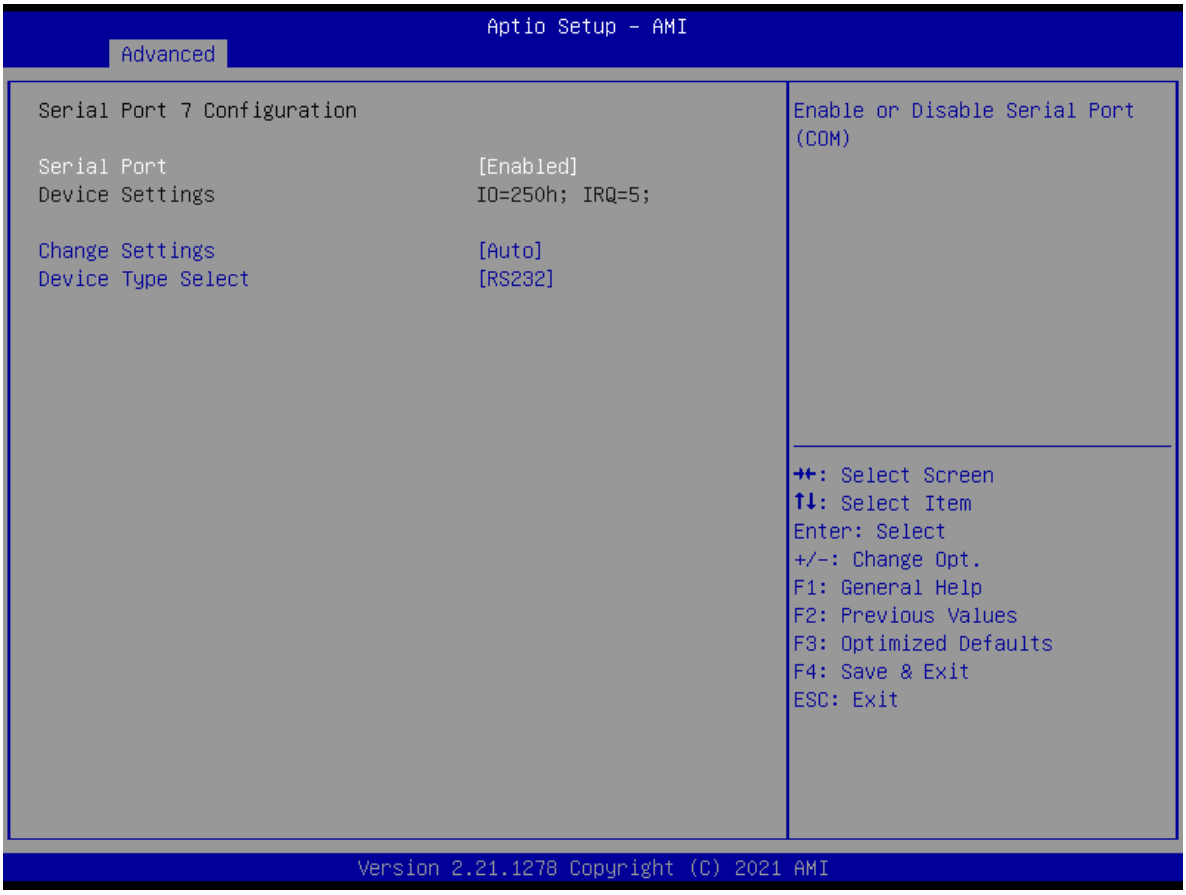
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=240h; IRQ=5; , IO=240h; IRQ=3,4,5,6,7,9,10,11,12; , IO=248h; IRQ=3,4,5,6,7,9,10,11,12;, IO=250h; IRQ=3,4,5,6,7,9,10,11,12;, IO=258h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 6 Configuration



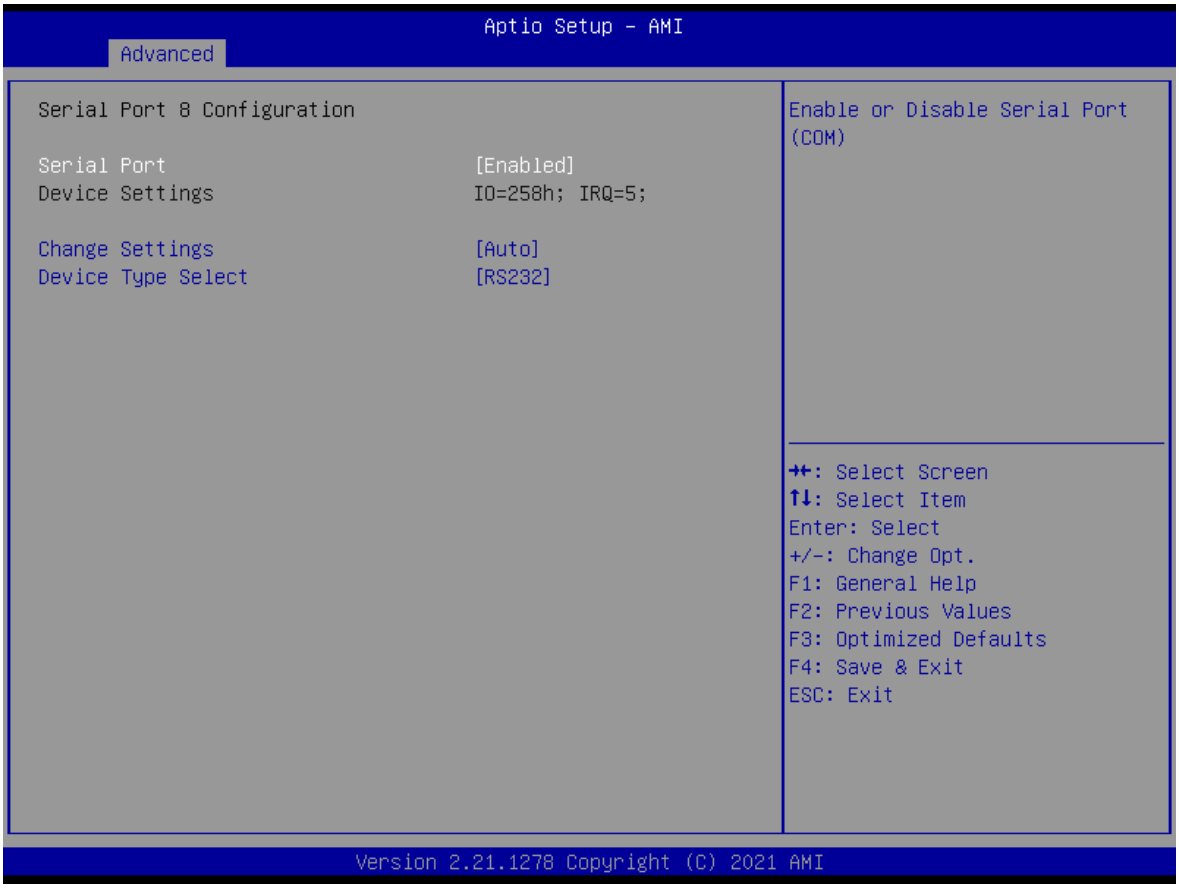
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=248h; IRQ=5; , IO=240h; IRQ=3,4,5,6,7,9,10,11,12; , IO=248h; IRQ=3,4,5,6,7,9,10,11,12;, IO=250h; IRQ=3,4,5,6,7,9,10,11,12;, IO=258h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 7 Configuration



Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=250h; IRQ=5; , IO=240h; IRQ=3,4,5,6,7,9,10,11,12; , IO=248h; IRQ=3,4,5,6,7,9,10,11,12;, IO=250h; IRQ=3,4,5,6,7,9,10,11,12;, IO=258h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

Serial Port 8 Configuration



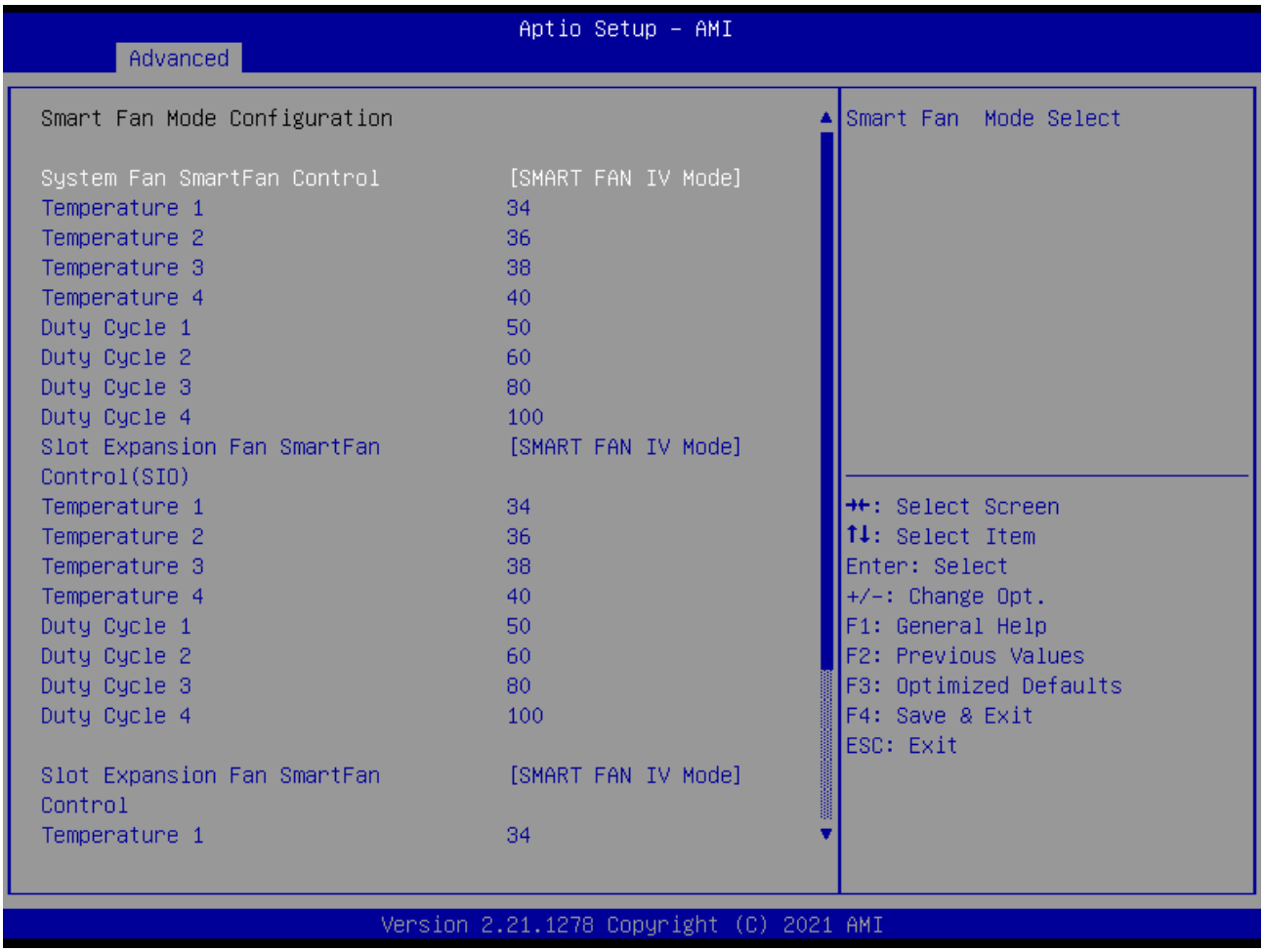
Item	Options	Description
Serial Port	Disabled, Enabled**[Default]**	Enable or Disable Serial Port (COM).
Change Settings	Auto**[Default]**, IO=258h; IRQ=5; , IO=240h; IRQ=3,4,5,6,7,9,10,11,12; , IO=248h; IRQ=3,4,5,6,7,9,10,11,12;, IO=250h; IRQ=3,4,5,6,7,9,10,11,12;, IO=258h; IRQ=3,4,5,6,7,9,10,11,12;	This item allows you to change the address & IRQ settings of the specified serial port.
Device Type Select	UART 232**[Default],** UART 422, UART 485	Set the Serial Port to RS232 & RS422 & RS485
RS-485 Auto Flow Function	Disabled, Enabled**[Default]**	Enabled/Disabled RS485 Autoflow Function
RS-422/RS-485 Terminal Function	Disabled, Enabled**[Default]**	RS-422/RS-485 Terminal Function

4.3.9 Hardware Monitor

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

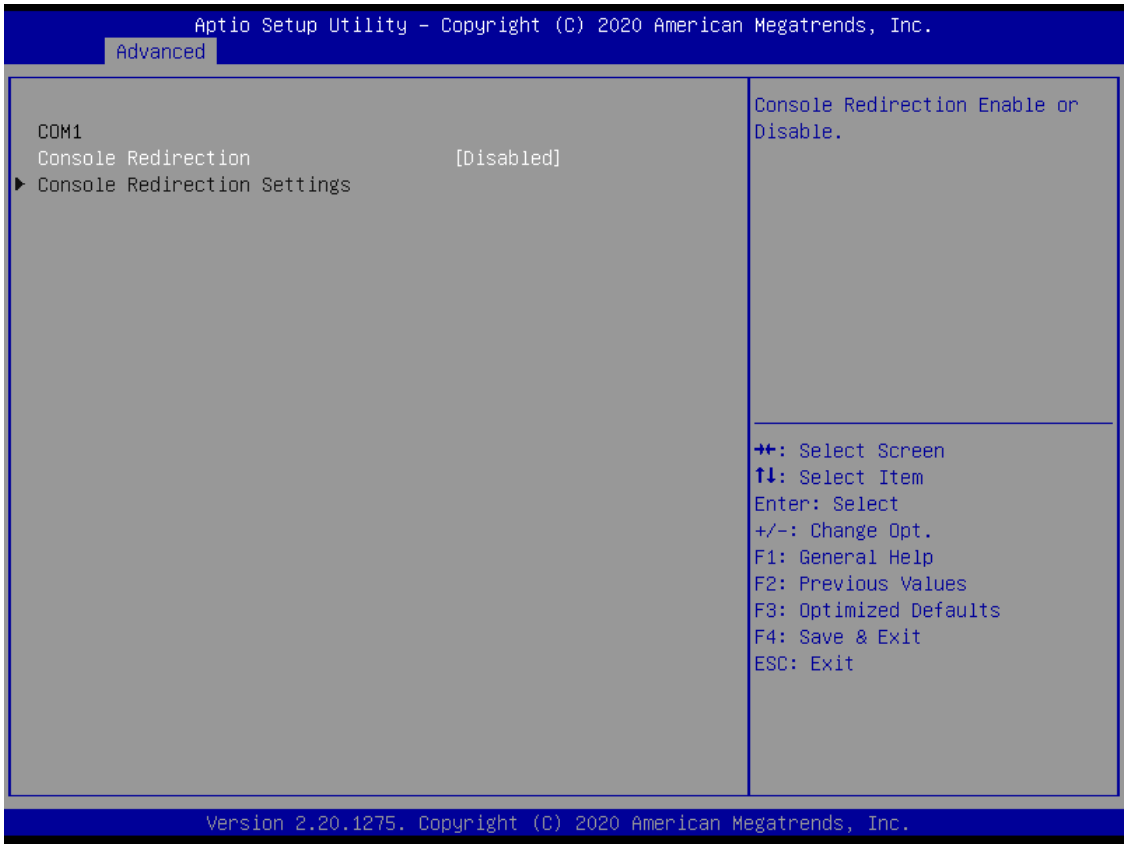
Item	Options	Description
Smart Fan Function	Disabled**[Default],** Enabled	Enabled or Disable Smart Fan

Smart Fan Mode Configuration



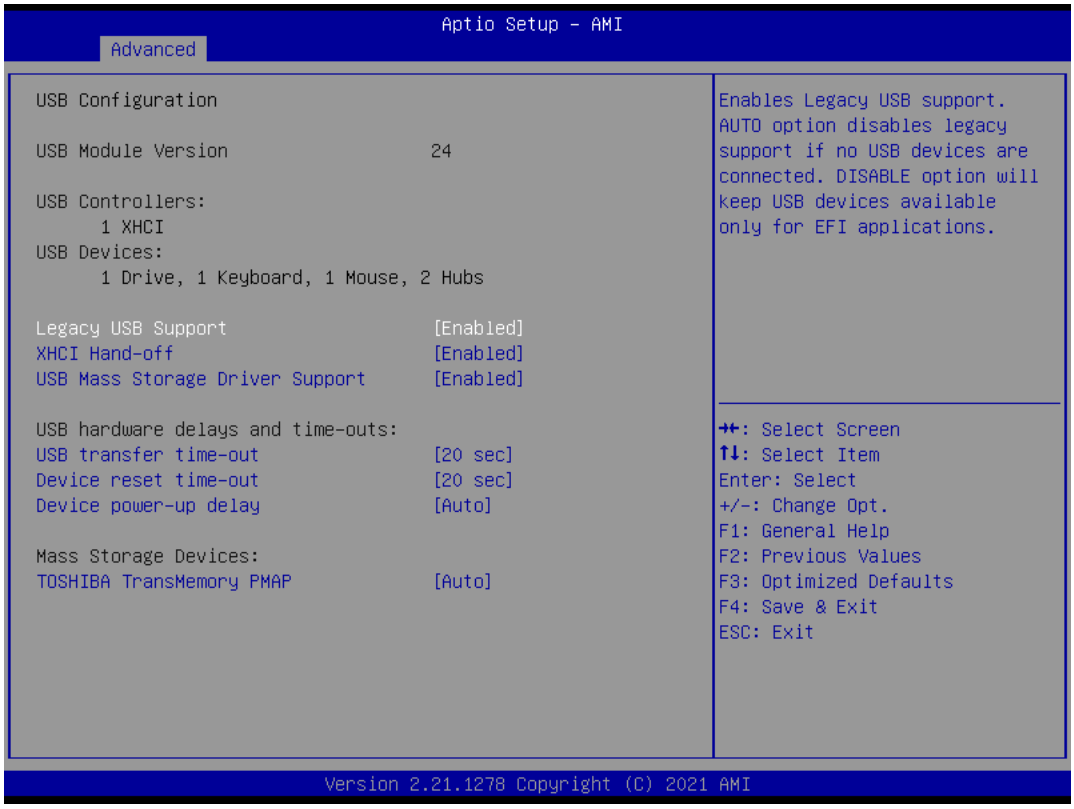
Item	Options	Description
Expansion Fan SmartFan Control	Manual Mode, SMART FAN IV Mode**[Default],**	Smart Fan Mode Select
Temperature 1~4	1~100	Auto fan speed control. SMART FAN IV
Duty Cycle 1~4	20~100	Auto fan speed control. SMART FAN IV

4.3.10 Serial Port Console Redirection



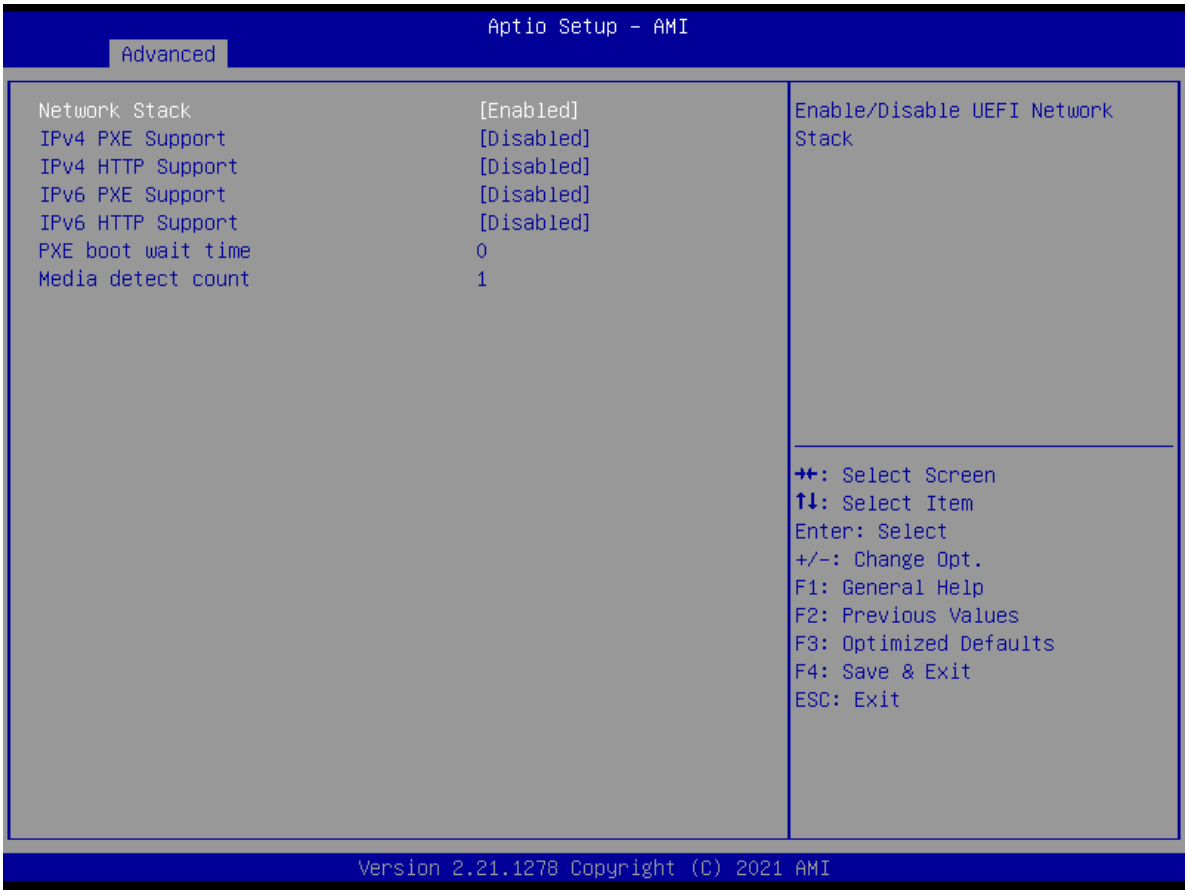
Item	Options	Description
Console Redirection	Disabled**[Default],** Enabled	These items allows you to enable or disable COM1 console redirection

4.3.11 USB Configuration



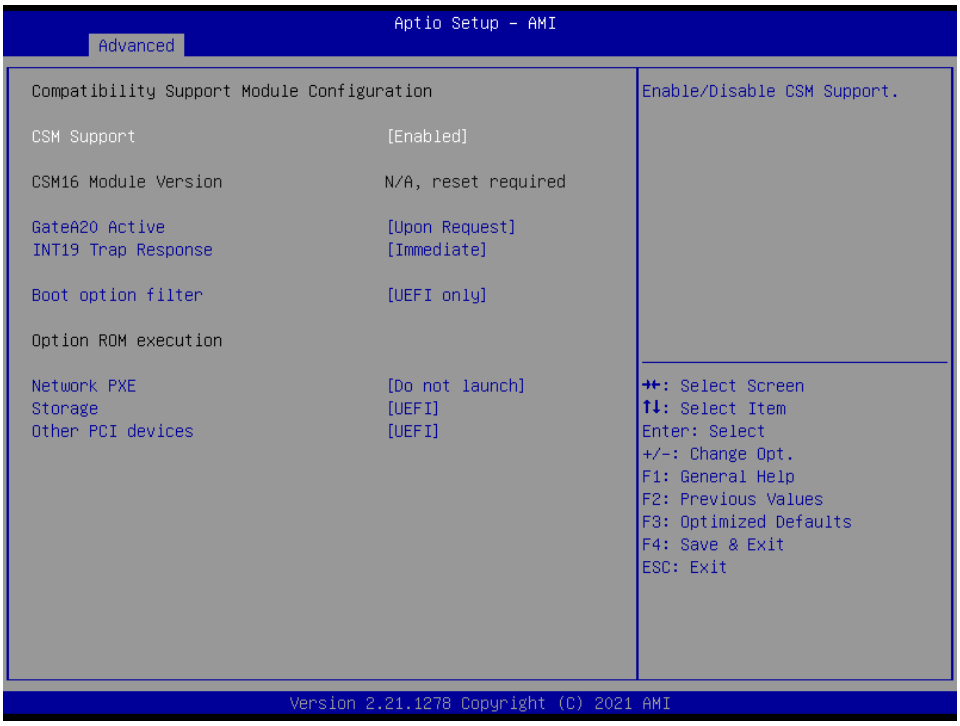
Item	Options	Description
Legacy USB Support	Enabled**[Default]** Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled**[Default]** Disabled	This is a workaround for OSew without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enabled**[Default]** Disabled	Enable/Disable USB Mass Storage Driver Support.
USB transfer time-out	1 sec , 5 sec , 10 sec , 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec , 20 sec**[Default] ,** 30 sec, 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	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 form Hub descriptor.

4.3.12 Network Stack Configuration



Item	Options	Description
Network Stack	Disabled**[Default]** , Enabled	Enable/Disable UEFI Network Stack.
IPv4 PXE Support	Disabled**[Default]** , Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	Disabled**[Default]** , Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	Disabled**[Default]** , Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	Disabled**[Default]** , Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	**0[Default]**	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	**1[Default]**	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

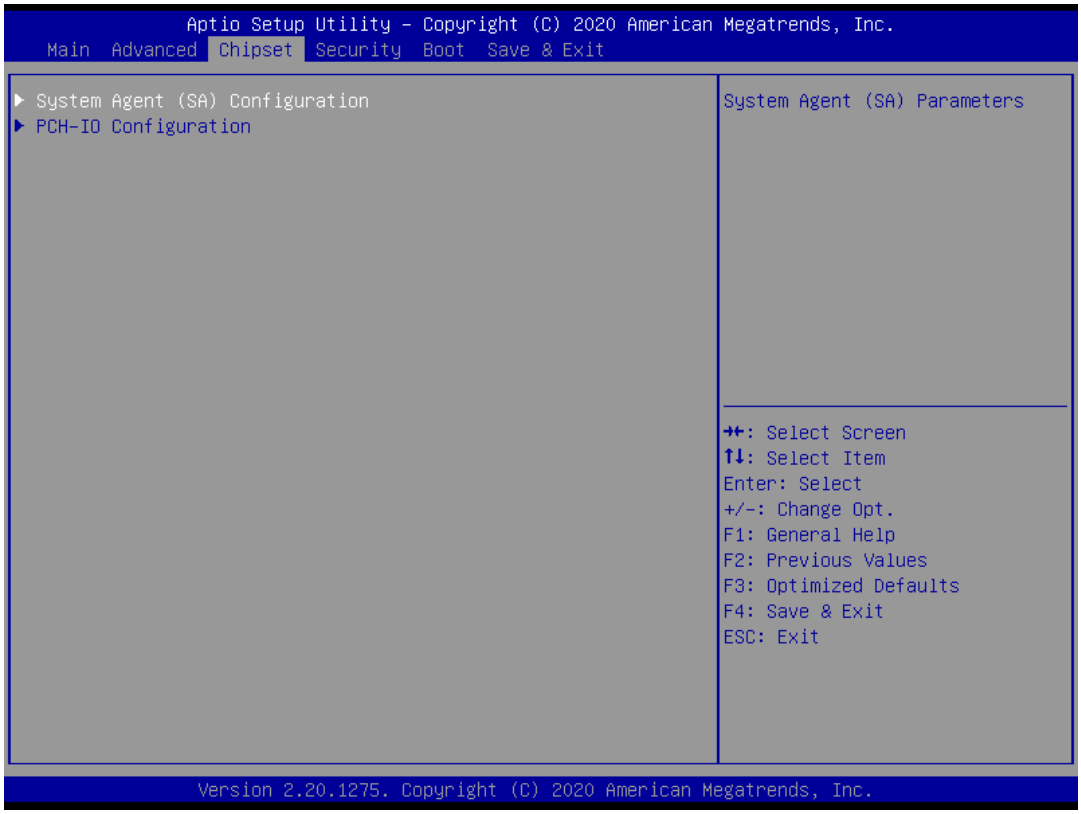
4.3.13 CSM Configuration



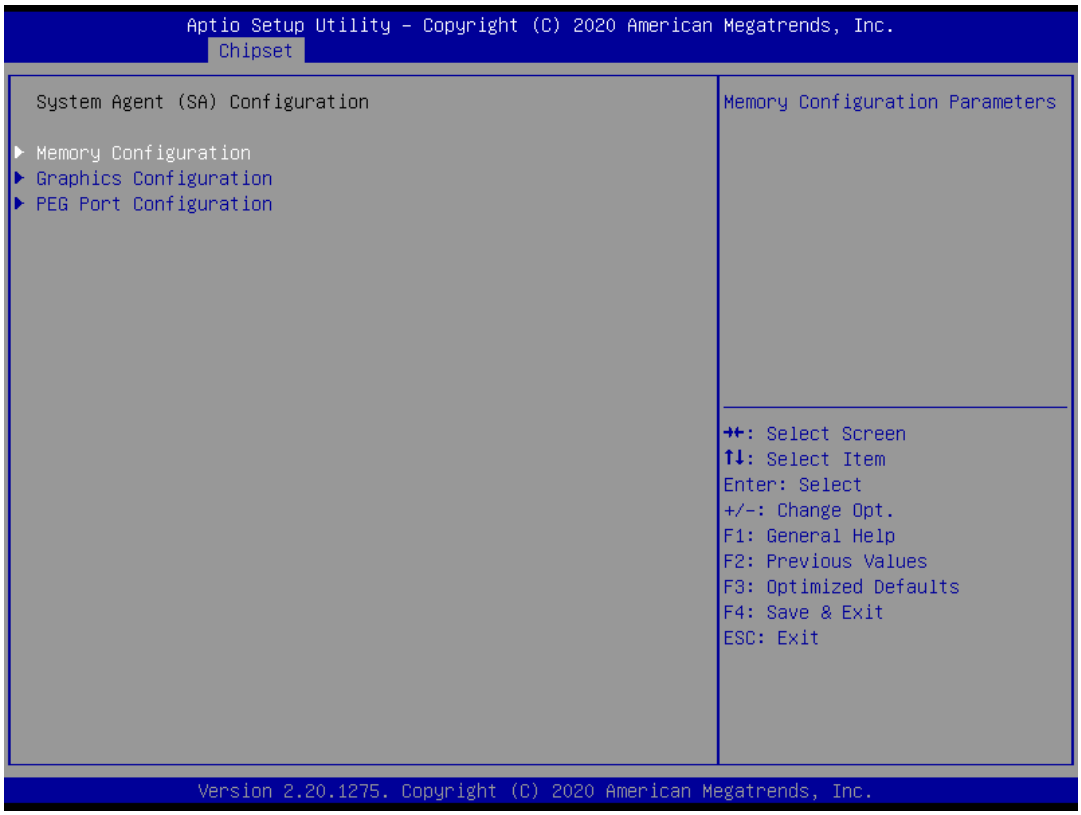
Item	Options	Description
CSM Support	Disabled**[Default]** , Enabled	This item allows users to enable or disable for "CSM Support".
GateA20 Active	Upon Request**[Default]** , Always	This item allows users to set Upon Request or Always for "GateA20 Active".
INT19 Trap Response	Immediate**[Default]** , Immediate	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	UEFI and Legacy**,** Legacy only, UEFI only**[Default]**	This item allows users to select which type of operating system to boot by option. This item is configurable only when CSM Support is set to Enabled.
Network PXE	Do not launch**[Default]** , UEFI, Legacy	Controls the execution of UEFI and Legacy Video OpROM.
Storage	Do not launch, UEFI**[Default]** , Legacy	Controls the execution of UEFI and Legacy Storage OpROM.
Other PCI devices	Do not launch, UEFI**[Default]** , Legacy	Determines OpROM execution policy for devices other than Network, Storage, or Video.

4.4 Chipset

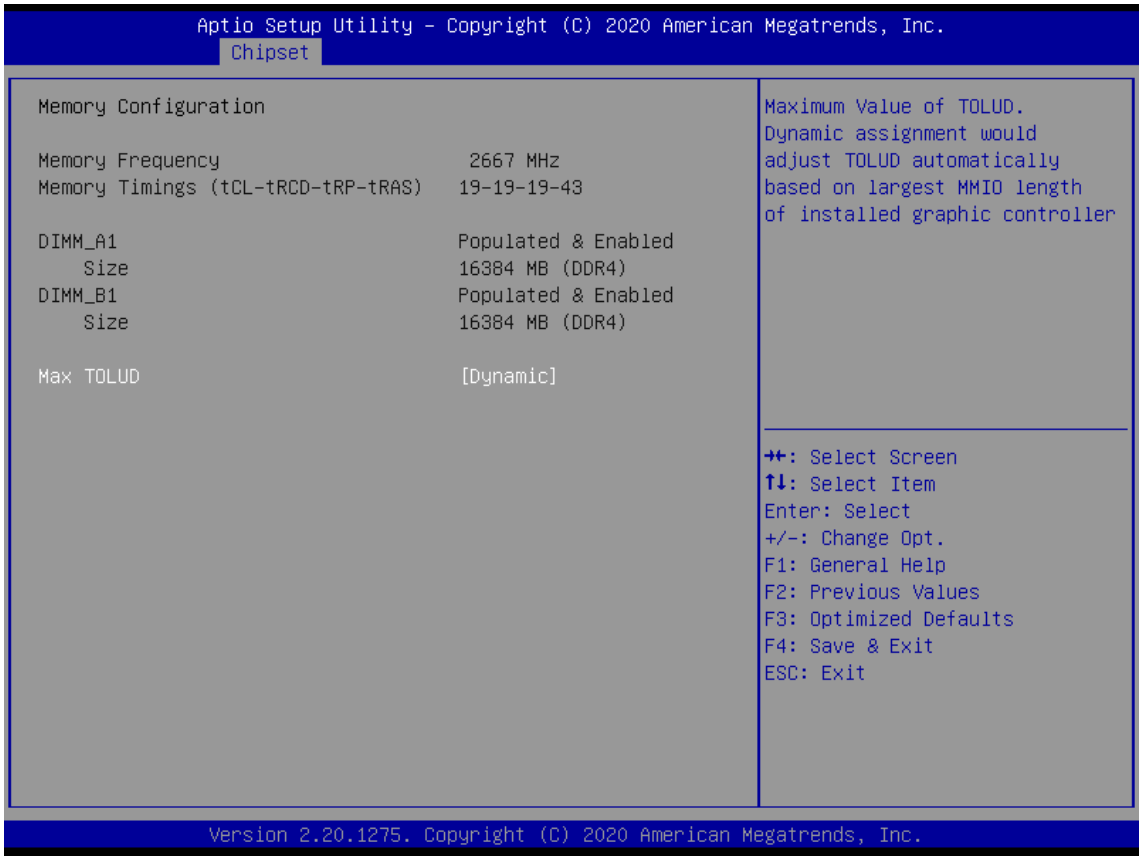
This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



4.4.1 System Agent (SA) Configuration

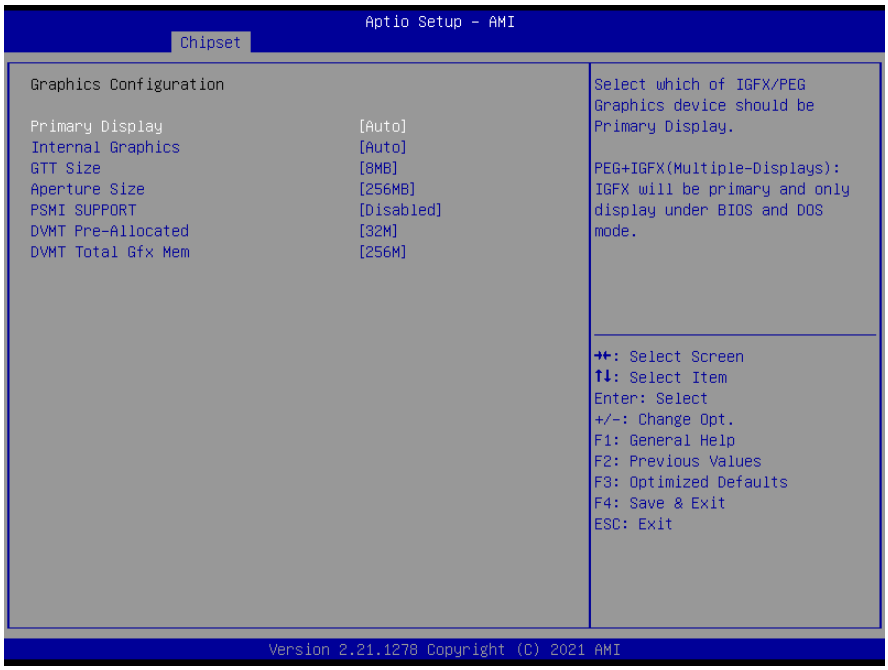


Memory Configuration



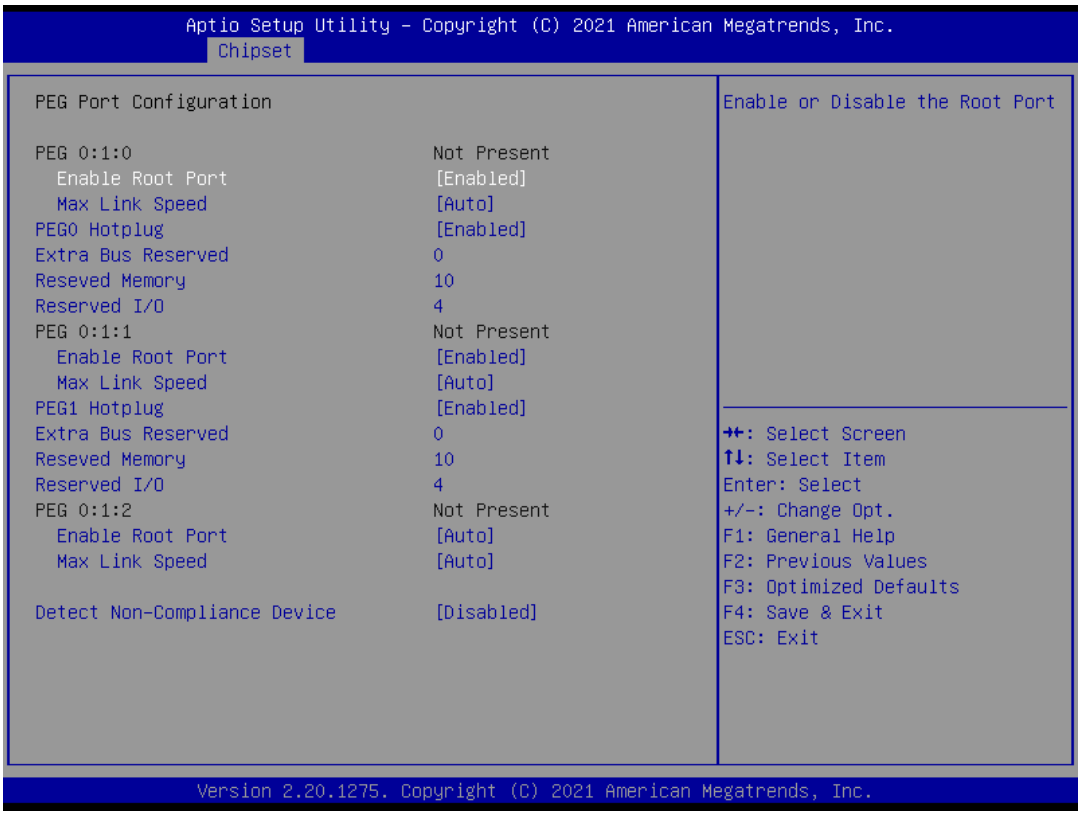
Item	Options	Description
Max TOLUD	Dynamic**[Default],** 1GB, 1.25GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB, 3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller

Graphic Configuration



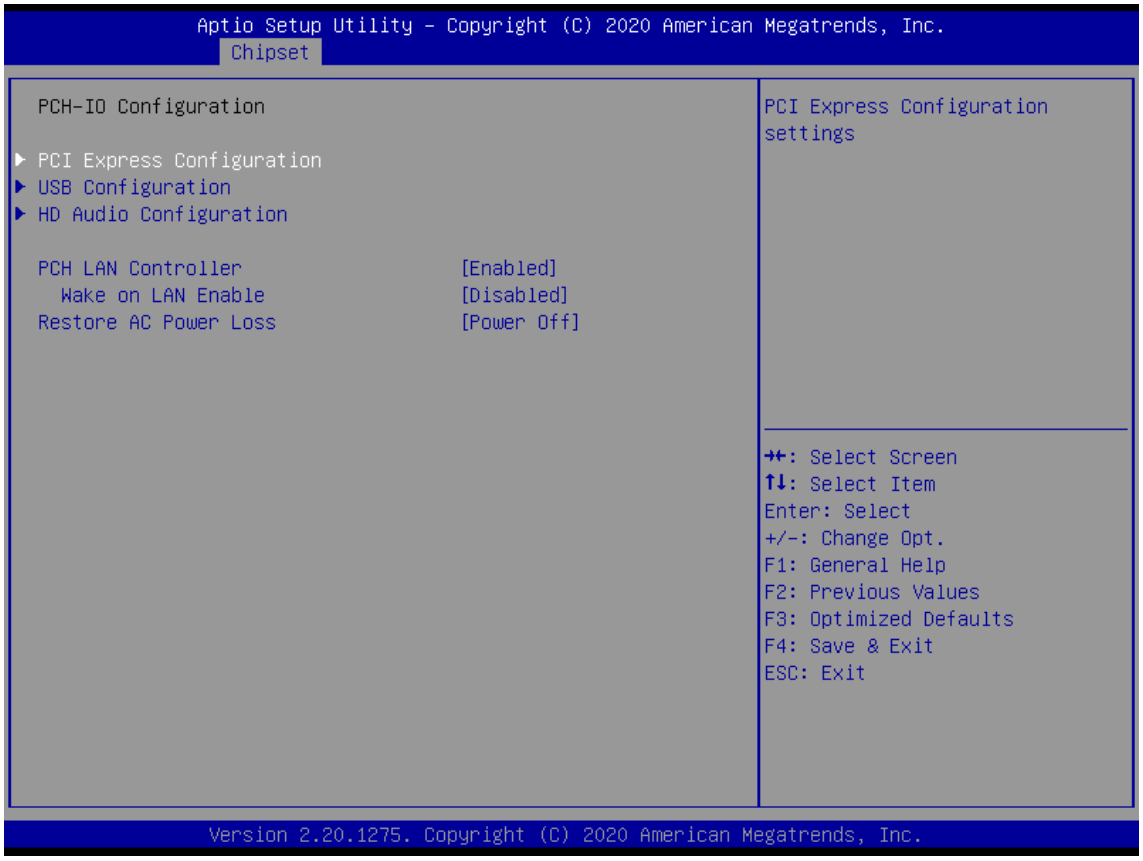
Item	Options	Description
Primary Display	Auto**[Default] ,** PEG + IGFX	Select which of IGFX/PEG Graphics device should be Primary Display. PEG+IGFX(Multiple-Displays): IGFX will be primary and only display under BIOS and DOS mode.
Internal Graphics	Auto**[Default] ,** Disabled, Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2MB, 4MB, 8MB**[Default]**	Select the GTT Size .
Aperture Size	128MB, 256MB**[Default] ,** 512MB, 1024MB, 2048MB	Select the Aperture Size. Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.
PSMI SUPPORT	Disabled **[Default] ,** Enabled	PSMI Enable/Disable.
DVMT Pre-Allocated	32M **[Default] ,** 64M,4M,8M, 12M,16M, 20M, 24M, 28M,32M/F7, 36M, 40M,44M, 48M,52M,56M,60M	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	128M, 256M**[Default] ,** MAX	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

■ PEG Port Configuration



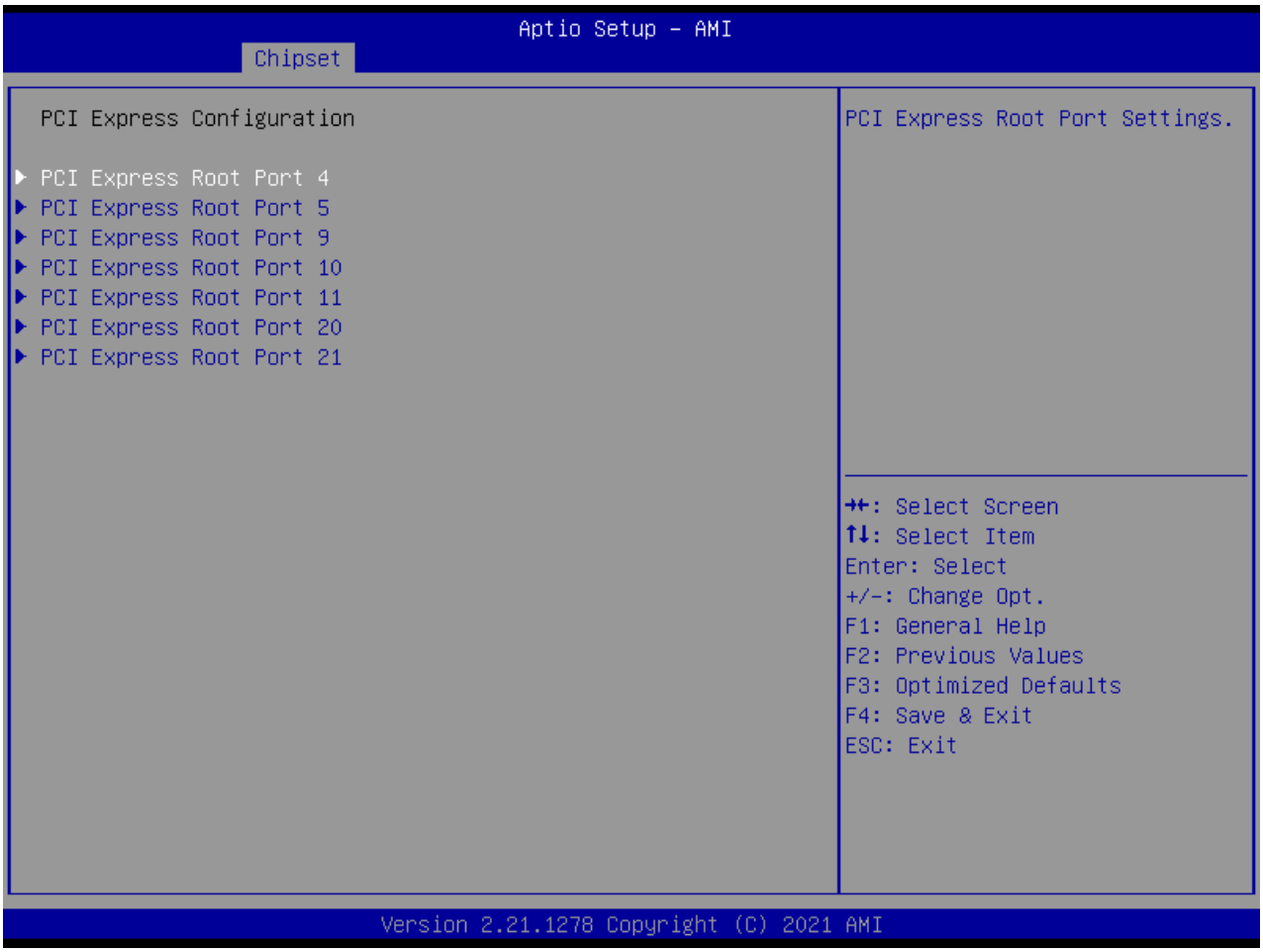
Item	Options	Description
Enable Root Port	Enabled**[Default]** , Disabled	Enable or Disable the Root Port
Max Link Speed	Auto**[Default]** , Gen1, Gen3, Gen3,	Configure PEG 0:X:X Max Speed
PEG0 Hotplug	Disabled**[Default]** , Enabled,	PCI Express Hot Plug Enable/Disable
Extra Bus Reserved	(0-7)	Extra Bus Reserved (0-7) for bridges behind this Root Bridge.
Reseved Memory	(1-4096)	Reserved Memory for this Root Bridge (1-4096) MB
Reserved I/O	(4K/8K/12K/16K/20K)	Reserved I/O (4K/8K/12K/16K/20K) Range for this Root Bridge.
Detect Non-Compliance Device	Disabled**[Default]** , Enabled,	Detect Non-Compliance PCI Express Device in PEG

4.4.2 PCH-IO Configuration

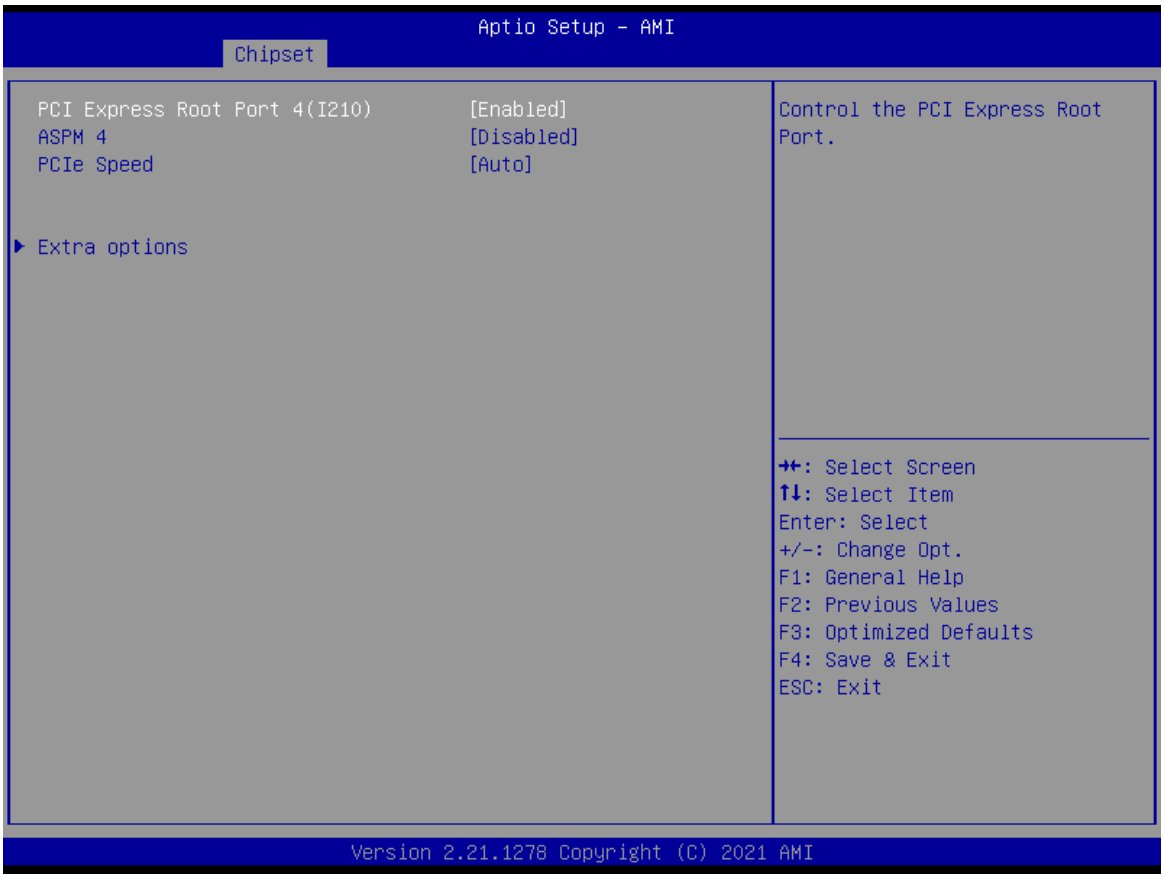


Item	Options	Description
PCH LAN Controller	Enabled **[Default]** , Disabled	Enable/Disable onboard NIC.
Wake on LAN Enable	Enabled**,** Disabled **[Default]**	Enable/Disable integrated LAN to wake the system.
Restore AC Power Loss	Power On, Power Off **[Default]** , Lase State	Specify what state to go to when power is re-applied after a power failure (G3 state).

PCI Express Configuration

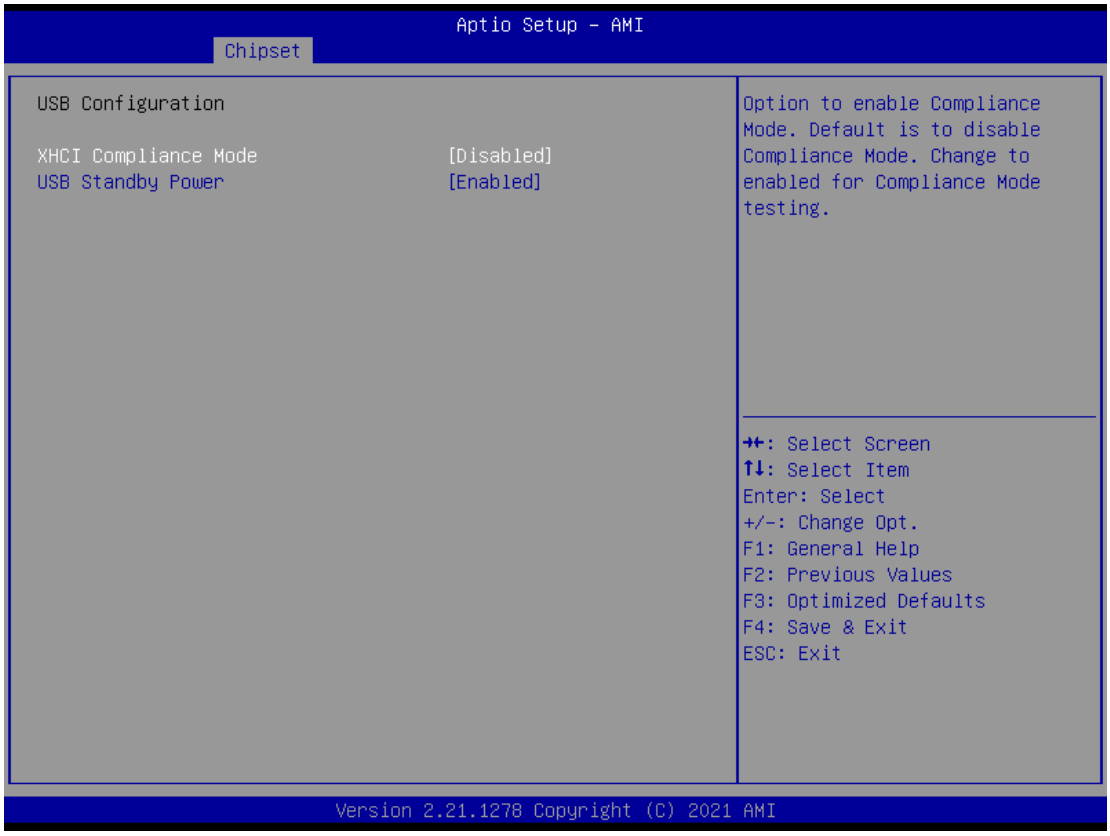


■ PCI Express Root Port 4 /5 /9 /10 /11 /20 /21



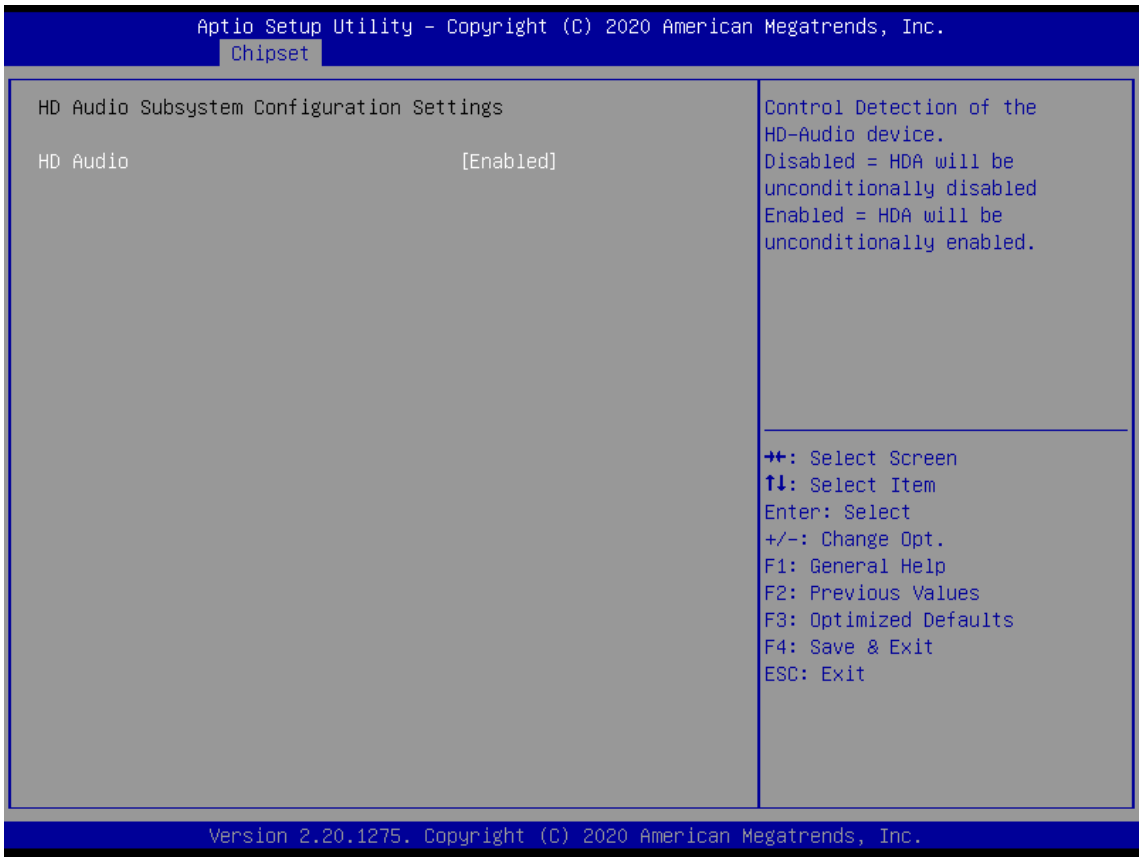
Item	Options	Description
PCI Express Root Port 4 /5 /9 /10 /11 /20 /21	Disabled **[Default]** , Enabled	Control the PCI Express Root Port.
ASPM	Disabled **[Default]** , L0s, L1, L0sL1, Auto	Set the ASPM Level: Force L0s - Force all links to L0s State, AUTO - BIOS auto configure, DISABLE - Disables ASPM,
PCIe Speed	Auto**[Default]** , Gen1, Gen2, Gen3	Configure PCIe speed.
Detect Non-Compliance Device	Disabled **[Default]** , Enabled	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.

USB Configuration



Item	Options	Description
XHCI Compliance mode	Disabled **[Default]** , Enabled	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.
USB Standby Power	Disabled, Enabled **[Default]**	Enable/Disable USB Standby Power during ACPI S3/S4/S5

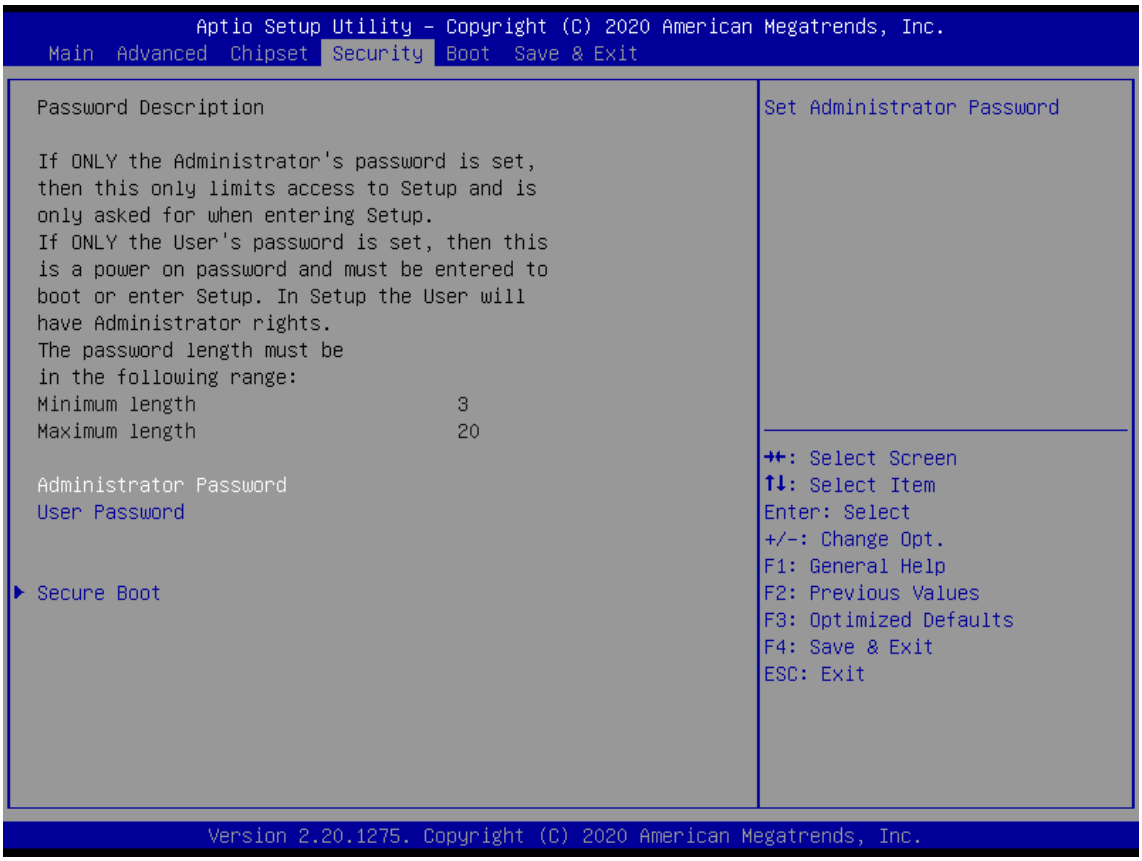
HD Audio Configuration



Item	Options	Description
HD Audio	Disabled, Enabled **[Default]**	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.

4.5 Security

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



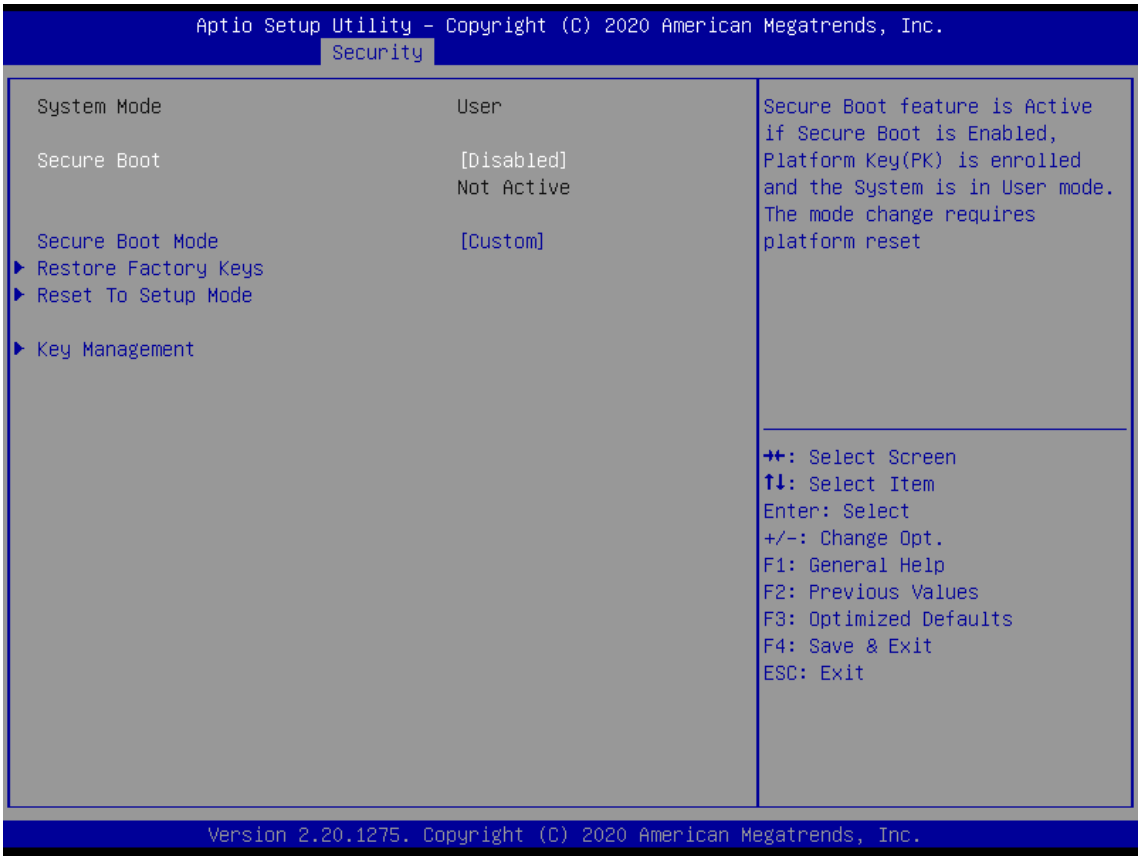
■ Administrator Password

This item allows you to set Administrator Password.

■ User Password

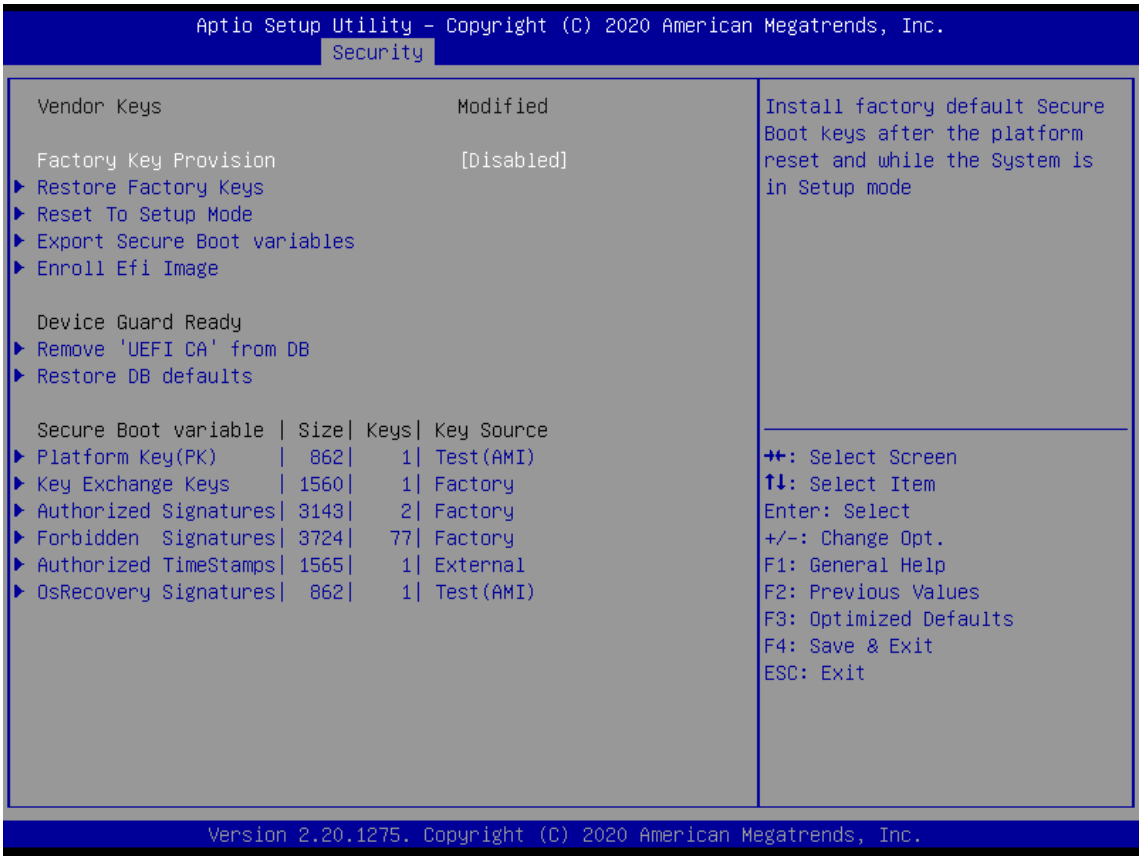
This item allows you to set User Password.

Security Boot



Item	Options	Description
Secure Boot	Disabled **[Default]** , Enabled	Secure Boot feature is Active if Secure Boot is Enabled,Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset
Secure Boot Mode	Standard, Custom**[Default]**	Secure Boot mode options:Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication

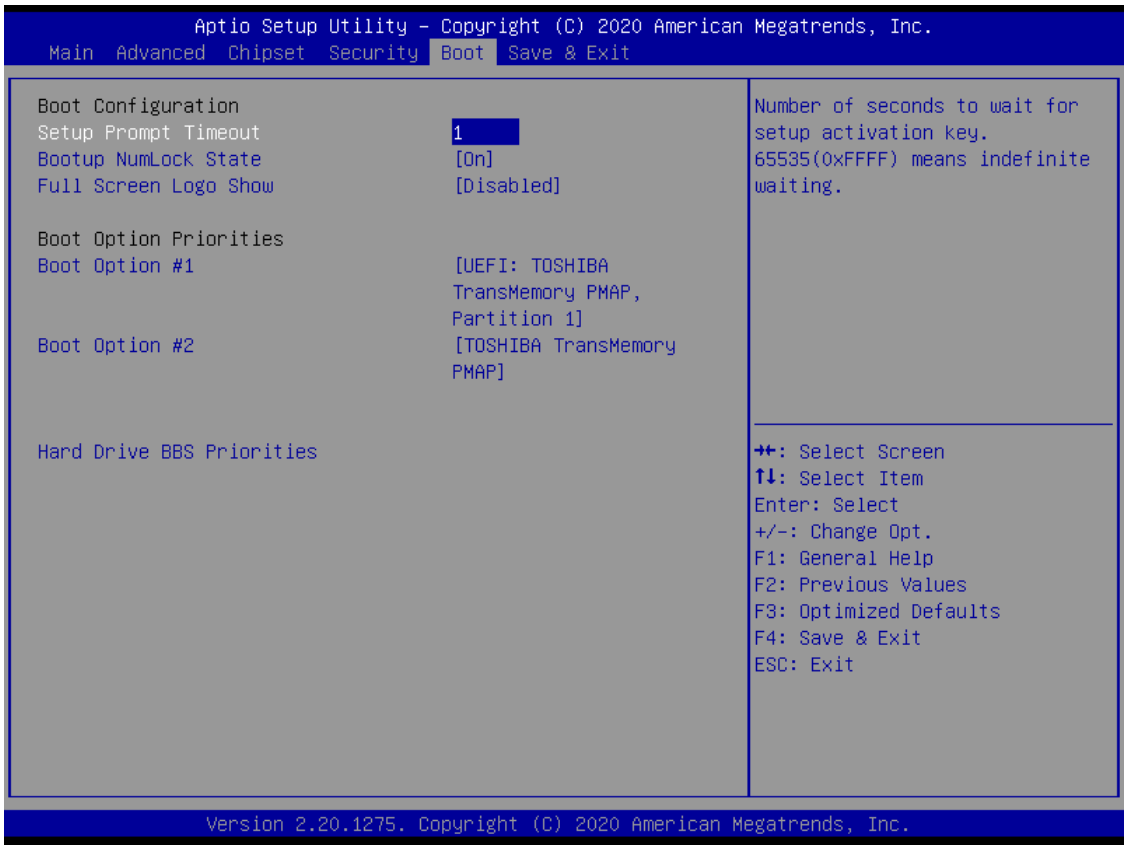
Key Management



Item	Options	Description
Factory Key Provision	Disabled **[Default]** , Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode

4.6 Boot

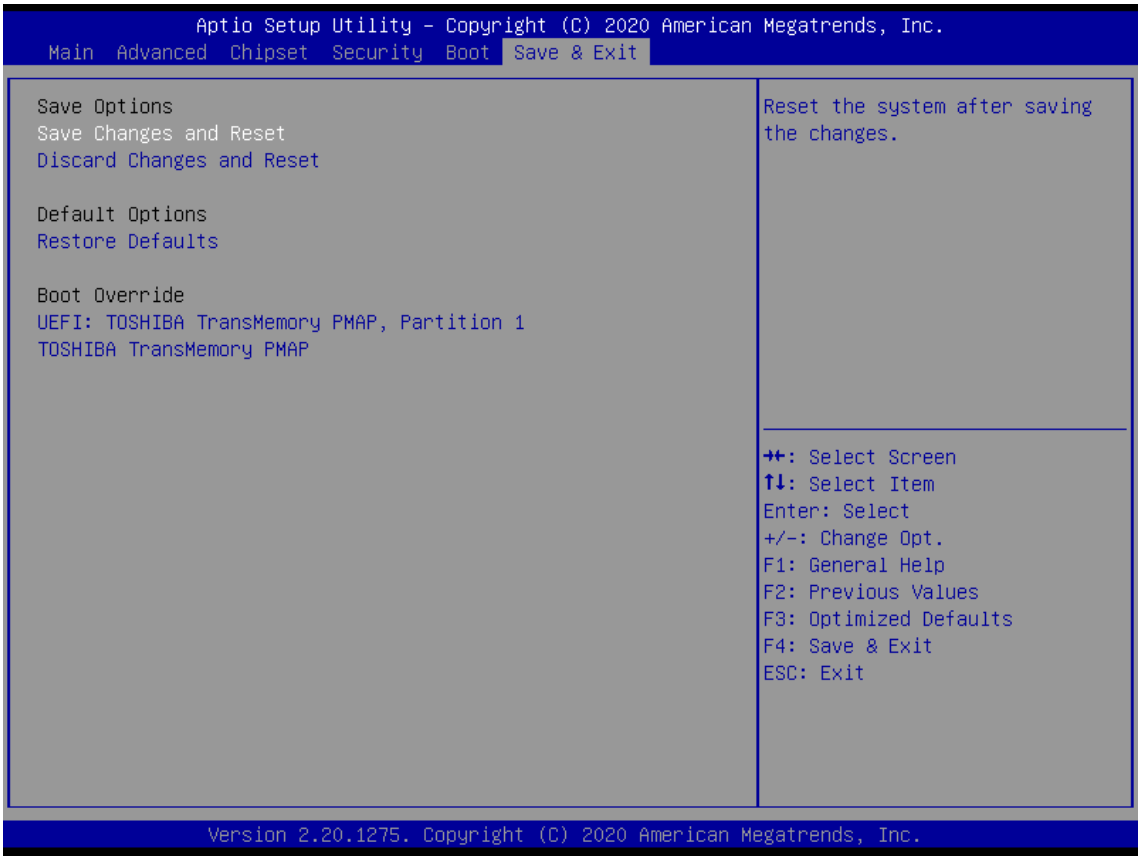
This menu allows you to setup the system boot options.



Item	Options	Description
Setup Prompt Timeout	1**[Default]**	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On**[Default]** , Off	Select the Keyboard NumLock state.
Full Screen Logo Show	Disabled**[Default]** , Enabled	Enables or disables Full Screen Logo Show option.
Boot Option #1		Set the system boot order.

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

WDT Setting

Psuedo Code

```
#define AddrPort                0x2e
#define DataPort                0x2f
#define SIO_UnLock_Value        0x87
#define SIO_Lock_Value          0xaa
#define WATCHDOG_LDN            0x08
#define GPIO_Port               0xF1

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

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

//Set count mode
WriteByte (AddrPort, 0xf0);
buf2 = ReadByte (DataPort) & 0xf4;   //clear "Select Watchdog Timer I count mode
buf2 |= 0x02;    //Enable the Watchdog Timer I output low pulse to the KBRST# pin
// buf2 |= 0x08;            //Bit3 = (1:Minute Mode/0:Second Mode)
WriteByte (DataPort, buf2);       //Write back

//Set watch dog time value
WriteByte (AddrPort, 0xf1)
WriteByte (DataPort, Time)     //Set watch dog time value

// close config mode
WriteByte (AddrPort, 0xaa);
```

GPIO Sample Code

GPIO Setting

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

The GPIO function is provided by Nuvoton NCT6106D, and it can be accessed through its GPIO index/data port. To access the GPIO register, write index to the index port, and then read/write from/to data port. The configuration on the ACO-6000 is described as below.

Psuedo Code

```
#define AddrPort            0x2e
#define DataPort            0x2f
#define SIO_UnLock_Value    0x87
#define SIO_Lock_Value      0xaa
#define SIO_LDN_GPIO        0x07
#define GPIO_Port           0xF1

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

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

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

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

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

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

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

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