Spectra 3000E Series PowerBox User Manual

Spectra PowerBox 3000E Series
Version 1.07 – May 2022
User Manual

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3000E Series PowerBox

Preface
Revision

Revision	Description	Date
1.00	First Release	6/28/2021
1.01	Add PB-3000E-LAN-xM12 installation steps	7/26/2021
1.02	Correction Made	7/30/2021
1.03	Correction Made	8/10/2021
1.04	Correction Made	8/31/2021
1.05	Correction Made	9/6/2021
1.06	Remove Pentium & Celeron CPU Specification	12/16/2021
1.07	Correction Made	5/13/2022

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Disclaimer
This manual is intended to be used as a practical and informative guide only and is subject to change without notice. It does not represent a commitment on the part of Spectra. This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication

Declaration of Conformity

FCC
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide
reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio
frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE
The product(s) described in this manual complies with all application European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant,
only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Product Warranty Statement
Warranty

Spectra products are warranted by Spectra GmbH & Co. KG to be free from defect in materials and workmanship starting from the date of purchase by the original purchaser. The actual warranty period of Spectra products vary with product categories. During the warranty period, we shall, at our option, either repair or replace any product that proves to be defective under normal operation.
Defects, malfunctions, or failures of the warranted product caused by damage resulting from natural disasters (such as by lightening, flood, earthquake, etc.), environmental and atmospheric disturbances, other external forces such as power line disturbances, plugging the board in under power, or incorrect cabling, and damage caused by misuse, abuse, and unauthorized alteration or repair, and the product in question is either software, or an expendable item (such as a fuse, battery, etc.), are not warranted.

RMA
Before sending your product in, you will need to fill in a Spectra RMA Request Form and obtain a RMA number from us. Please go to **www.spectra.de/RMA** to fill in this form. Our staff is available at any time to provide you with the most friendly and immediate service.

RMA Instruction

- Customers must fill in Spectra Return Merchandise Authorization (RMA) Request Form and obtain a RMA number prior to returning a defective product to Spectra for service.
- Customers must collect all the information about the problems encountered and note anything abnormal and describe the problems on the “Spectra Service Form” for the RMA number apply process.
- Charges may be incurred for certain repairs. Spectra will charge for repairs to products whose warranty period has expired. Spectra will also charge for repairs to products if the damage resulted from acts of God, environmental or atmospheric disturbances, or other external forces through misuse, abuse, or unauthorized alteration or repair. If charges will be incurred for a repair, Spectra lists all charges, and will wait for customer’s approval before performing the repair.
- Customers agree to insure the product or assume the risk of loss or damage during transit, to prepay shipping charges, and to use the original shipping container or equivalent.
- Customers can be send back the faulty products with or without accessories (manuals, cable, etc.) and any components from the system. If the components were suspected as part of the problems, please note clearly which components are included. Otherwise, Spectra is not responsible for the devices/parts.
- Repaired items will be shipped along with a “Repair Report” detailing the findings and actions taken.

Technical Support and Assistance

1. Visit the Spectra website at **www.spectra.de** where you can find the latest information about the product.
2. Contact your distributor or our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:

- Product 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.

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

CAUTION This indication provides additional information to complete a task easily.

Safety Precautions

Before installing and using this device, please note the following precautions.

1. Read these safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Disconnected this equipment from any AC outlet before cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
8. Use a power cord that has been approved for using with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

    If one of the following situations arises, get the equipment checked by service personnel:

    • The power cord or plug is damaged.

    • Liquid has penetrated into the equipment.

    • The equipment has been exposed to moisture.

    • The equipment does not work well, or you cannot get it work according to the user's manual.

    • The equipment has been dropped and damaged.

    • The equipment has obvious signs of breakage.
14. **CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
15. Equipment intended only for use in a RESTRICTED ACCESS AREA.

Ordering information

Before installation, please ensure all the items listed in the following table are included in the package.
Notify your sales representative if any of the above items are missing or damaged.

Available Models

Model No.	Product Description
Spectra PowerBox 30E	10th Generation Intel® Xeon/Core™ Series Processors, High Performance, Expandable and Modular Rugged Embedded Computer
Spectra PowerBox 31E	10th Generation Intel Xeon/Core Series Processors, High Performance, Expandable an d Modular Rugged Embedded Computer with 1x PCI/PCIe Expansion Slot
Spectra PowerBox 32E	10th Generation Intel Xeon/Core Series Processors, High Performance, Expandable an d Modular Rugged Embedded Computer with 2 PCI/PCIe Expansion Slot

Package Checklist

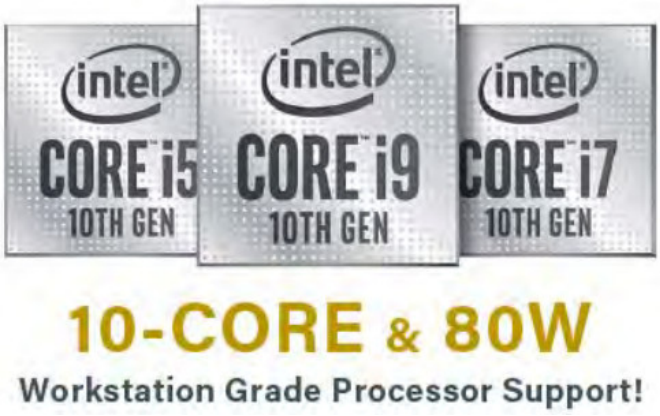
Item	Description	Q'ty
1	Embedded System	1
2	Heatsink Pack	1
3	Utility DVD Driver	1
4	Screw Pack	1
5	Wall Mount Kit	1
6	Power Terminal Block Connector	1
7	Remote Function Terminal Block Connector	2
8	Fan Terminal Block Connector	1

Chapter 1 Product Introductions

1.1 Overview

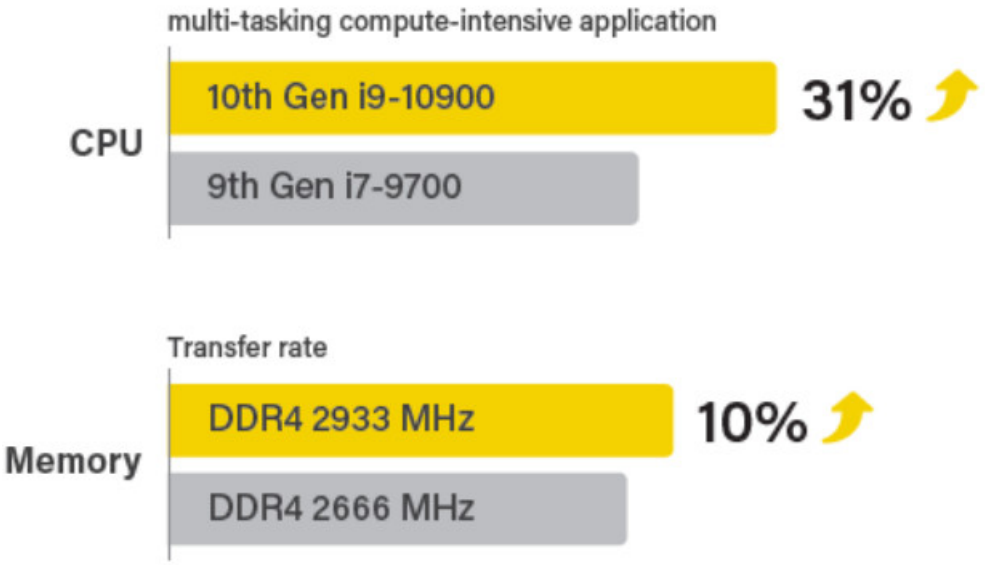
The Spectra PowerBox 3000E series is a powerful embedded computer and brings unrivalled performance. It has versatile functionalities and rich industrial I/O. And most importantly, it has one PCI/PCIe expansion capability (PowerBox 31E and PowerBox 32E). Equipped with CMI, CFM, MEC modular expansion, customization for additional I/O or other functionality to fulfill di¬fferent applications couldn't be easier. The Spectra PowerBox 3000 meets the requirements of industrial environments and is certified with industry standards. It delivers ultimate and reliable performance for factory automation, industrial automation and rolling stock applications.

1.2 Highlights



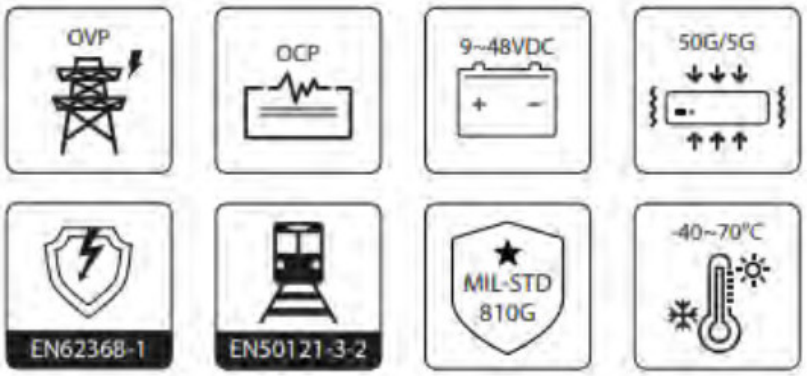
10-Core
Up to 80 W CPU
The Spectra PowerBox 3000E series powerd by a workstation-grade 10th-gen Intel® Xeon® or Core™ i9/i7/i5/i3 CPU with up to 10-core architecture, provides superior processing performance. It supports Xeon® CPU up to 80 W TDP. It incorporates DDR4 2933/2666 MHz memory up to 64 GB, delivering unparalleled performance in a rugged, fanless system

More powerful & Faster
Multiplies Productivity
The Spectra PowerBox 3000E series 10th -gen CPU brings to 31% better integer multi-tasking for comput-intensive application performance than 9th -gen CPUs*. DDR4 2933 MHz memory further increases speed by 10%**. The processing platform delivers the performance required to consolidate multiple workloads for intelligent devices and applications *31% increase for 10th-gen i9-10900E 65W vs. 9th -gen i7-9700 65W CPU **10% increase for 2933 MHz for PowerBox 3000C vs. 2666 MHz of PowerBox 3000E



Industrial I/O and
Modular Expansion
The Spectra PowerBox 3000E series offers a vast array of industrial-focused I/O including up to 2x GbE LAN, 6x USB 3.2 and 2x USB 2.0, 2x RS-232/422/485, 2x 2.5” SATA, 1x M.2 key M for NVMe SSD, 2x SIM card slots, 3x full-size Mini-PCIe and triple independent displays (DisplayPort, HDMI, VGA). It also features modular expansion through CMI/CFM modules, adding additional I/O or other functionality such as high-speed 10GbE LAN, PoE and ignition sending

Rugged Reliability
Against Rigorous Environments
The Spectra PowerBox 3000E's fanless and cableless industrial- grade design can withstand rigorous environments. Its unique thermal design supports an extended operating temperature range fom -40°C to 70°C. It has also passed stringent industry standards, including MIL-STD-
810G military standard (pending) and EN50155 (EN 50121-3-2
only) for rolling stock environments.



1.3 Product Pictures
Spectra PowerBox 30E

Front

Rear

Spectra PowerBox 31E

Front

Rear

Spectra PowerBox 32E

Front

Rear

1.4 Key Features

- 10-core 10th-gen Intel® Xeon® and Core™ i9/i7/i5/i3 CPU (max 80 W TDP)
- 2x GbE LAN and optional 2x 10GbE LAN
- 2x 2.5″ SATA storage, 3x mSATA sockets, 1x M.2 key M for NVMe SSD
- 2x PCI/PCIe expansion slots
- 3x full-size Mini PCIe sockets, 2x SIM card slots
- Optional CMI modules for I/O expansion
- Optional CFM modules for ignition sensing & PoE
- Wide operating temperature -40°C to 70°C
- MIL-STD-810G military standard and EN50155 (EN 50121-3-2 only)

1.5 Hardware Specification

System

Processor	Intel® Xeon® Series Processor (80W / 35W): • Intel® Xeon® W-1270E 8 Cores Up to 4.8 GHz, TDP 80W • Intel® Xeon® W-1250E 6 Cores Up to 4.7 GHz, TDP 80W • Intel® Xeon® W-1290TE 10 Cores Up to 4.5 GHz, TDP 35W • Intel® Xeon® W-1270TE 8 Cores Up to 4.4 GHz, TDP 35W • Intel® Xeon® W-1250TE 6 Cores Up to 3.8 GHz, TDP 35W Intel® Core® Series Processor (65W / 35W): • Intel® Core™ i9-10900E 10 Cores Up to 4.7 GHz, TDP 65W • Intel® Core™ i7-10700E 8 Cores Up to 4.5 GHz, TDP 65W • Intel® Core™ i5-10500E 6 Cores Up to 4.2 GHz, TDP 65W • Intel® Core™ i3-10100E 4 Cores Up to 3.8 GHz, TDP 65W • Intel® Core™ i9-10900TE 10 Cores Up to 4.5 GHz, TDP 35W • Intel® Core™ i7-10700TE 8 Cores Up to 4.5 GHz, TDP 35W • Intel® Core™ i5-10500TE 6 Cores Up to 3.7 GHz, TDP 35W • Intel® Core™ i3-10100TE 4 Cores Up to 3.6 GHz, TDP 35W
Chipset	• Intel® W480E Chipset
Memory	• 2x DDR4 SO-DIMM Socket, Support Up to 64GB (Un-buffered and nonECC) • Xeon / i9 / i7 Processor Supports Up to 2933MHz • i5 / i3 Processor Supports Up to 2666 MHz
BIOS	• AMI BIOS
Graphics	
Graphics Engine	• Integrated Intel® UHD-630 Graphics
Maximum Display Output	• Supports Triple Independent Display
HDMI	• 1x HDMI Connector (4096 x 2160@30Hz)
DP	• 2x DisplayPort Connector (4096 x 2340@60Hz)
VGA	• 1x VGA Connector (1920 x 1200 @60Hz)
Audio	
Audio Codec	• Realtek® ALC888, High Definition Audio
Line-out	• 1x Line-out, Phone Jack 3.5mm
Mic-in	• 1x Mic-in, Phone Jack 3.5mm
I/O	
LAN	• 2x GbE LAN, RJ45 – GbE1: Intel® I219-LM – GbE2: Intel® I210
COM	• 2x RS-232/422/485 with Auto Flow Control (Supports 5V/12V), DB9

USB	• 2x 10Gbps USB 3.2 Gen2, Type A • 4x 5Gbps USB 3.2 Gen1, Type A • 2x 480Mbps USB 2.0, Type A
PS/2	• 1x PS/2, 6 Pin Mini-DIN Female Connector
Storage	
SSD/HDD	• 1x 2.5” Front Accessible SATA HDD/SSD Bay (SATA3.0) • 1x 2.5” Internal SATA HDD/SSD Bay (SATA3.0)
mSATA	• 3x mSATA Socket (SATA 3.0, shared by Mini-PCIe socket)
M.2 SSD	• 1x M.2 Key M Type 2280 Socket, Support PCIe x4 NVMe SSD or SATA SSD (SATA3.0)
RAID	• Support RAID 0/1/5/10
Expansion	
PCI Express	• 1 x PCI/PCIe Expansion Slot with Optional Riser Card (PowerBox 31E) • 2x PCI/PCIe Expansion Slot with Optional Riser Card (PowerBox 32E) * Supports maximum dimensions of add-on card (H x L):110 x 237mm
Mini PCI Express	• 3x Full-size Mini-PCIe Socket
SIM Socket	• 2x SIM Socket
CMI (Combined Multiple I/O) Interface	• 2x High Speed CMI Interface for optional CMI Module Expansion • 2x Low Speed CMI Interface for optional CMI Module Expansion
CFM (Control Function Module) Interface	• 1x CFM IGN Interface for optional CFM-IGN Module Expansion
Other Function	
External FAN Connector	• 1x External FAN Connector, 4-pin Terminal Block (Support Smart Fan by BIOS)
Power Ignition Sensing	• Support Power Ignition Sensing Function with Delay Time Management and Selectable 12V/24V (With Optional CFM Module)
Clear CMOS Switch	• 1x Clear CMOS Switch
Reset Button	• 1x Reset Button
Instant Reboot	• Support 0.2sec Instant Reboot Technology
Watchdog Timer	• Software Programmable Supports 256 Levels System Reset

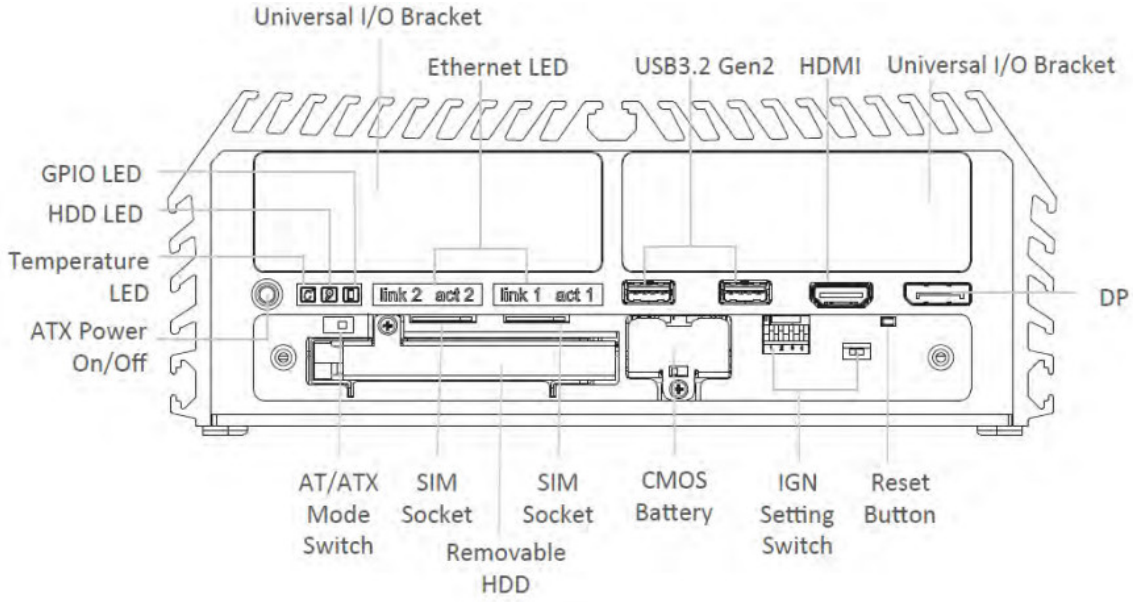
Power	
Power Button	• 1x ATX Power On/Off Button
Power Mode Switch	• 1x AT/ATX Mode Switch
Power Input	• 9 – 48VDC, 3-pin Terminal Block
Remote Power On/Off	• 1x Remote Power On/Off, 2-pin Terminal Block
Remote Power LED	• 1x Remote Power LED, 2-pin Terminal Block
Total Power Budget	• 180W
Physical	
Dimension (W x D x H)	• 227 x 261 x 88 mm (PowerBox 30E) • 227 x 261 x 108 mm (PowerBox 31E) • 227 x 261 x 128 mm (PowerBox 32E)
Weight Information	• 4.3 KG (PowerBox 30E) • 4.92 KG (PowerBox 31E) • 5.14 KG (PowerBox 32E)
Mechanical Construction	• Extruded Aluminum with Heavy Duty Metal
Mounting	• Wall Mount
Physical Design	• Fanless Design • Cableless Design • Jumper-less Design • Unibody Design
Reliability & Protection	
Reverse Power Input Protection	• Yes
Over Voltage Protection	• Protection Range: 51~58V • Protection Type: shut down operating voltage, re-power on at the present level to recover
Over Current Protection	• 15A
Surge Protection	• 3.84 kV (impedance 12 ohm 1.2/50us waveform)
CMOS Battery Backup	• SuperCap Integrated for CMOS Battery Maintenance-free Operation
MTBF	• MTBF: 371,393 hours – Database: Telcordia SR-332 Issue3, Method 1, Case 3

Environment	
Operating Temperature	• 35W TDP Processor: -40°C to 70°C • 58W – 65W TDP Processor: -40°C to 50° C (With External Fan Kit) • 80W TDP Processor: -40°C to 40°C (With External Fan Kit) * PassMark BurnInTest: 100% CPU, 2D/3D Graphics (without thermal throttling) * With extended temperature peripherals; Ambient with air flow * According to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14
Storage Temperature	• -40°C to 85°C
Relative Humidity	• 95%RH @ 70°C (non-Condensing)
Shock	• MIL-STD-810G
Vibration	• MIL-STD-810G
EMC	• CE, FCC, ICES-003 Class A, EN50121-3-2 (Railway)
Safety	• IEC/EN 62368-1
Operating System	
Windows	• Windows® 10
Linux	• Supports by project

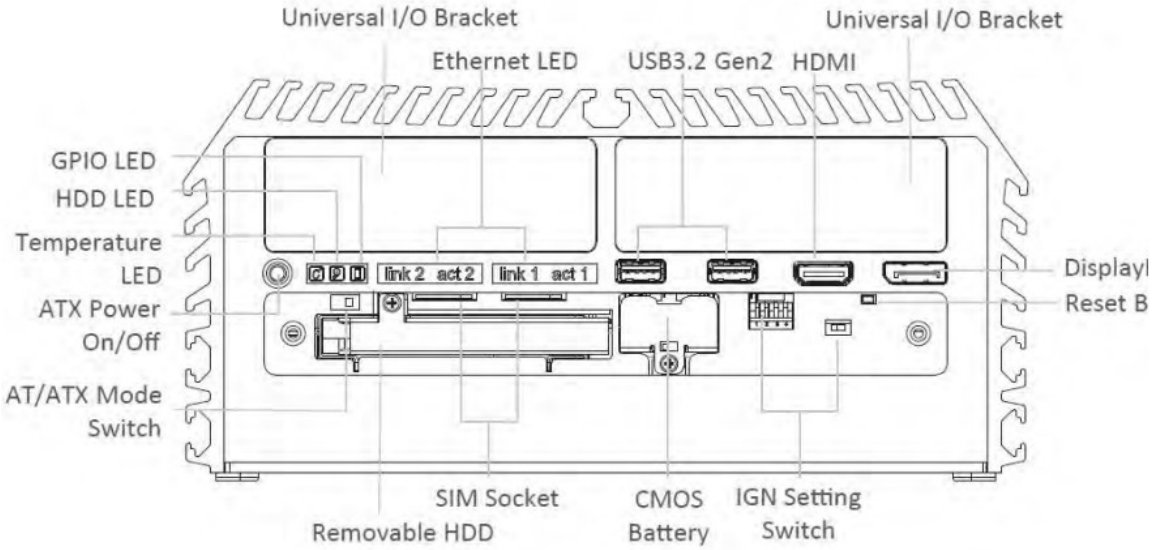
* Product Specifications and features are for reference only and are subject to change without prior notice. For more information, please refer to the latest product datasheet from our website.

1.6 System I/O
1.6.1 Front

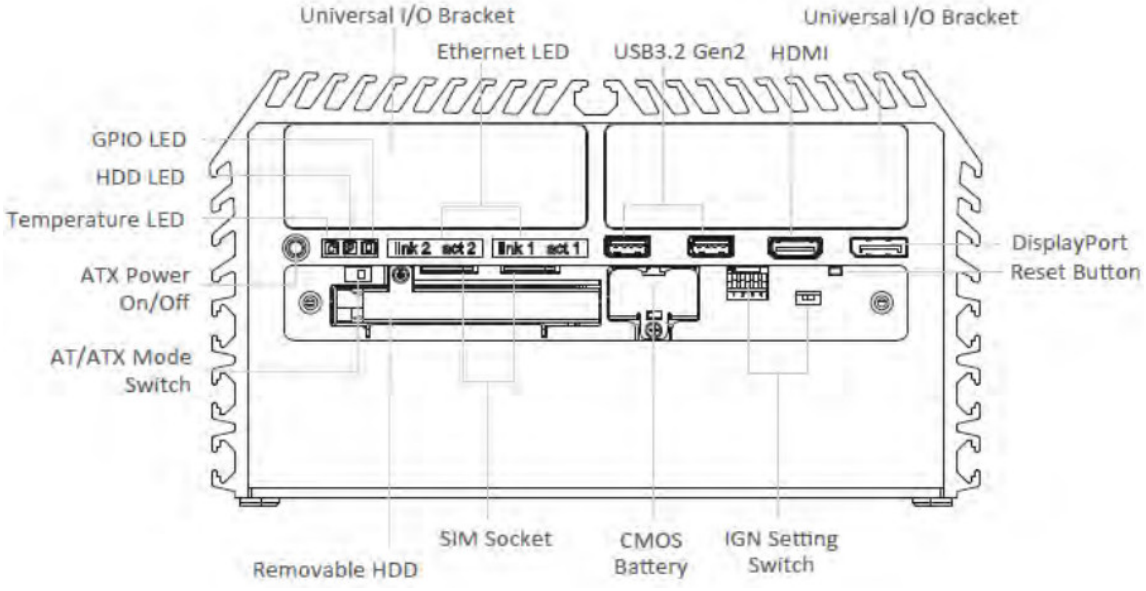
ATX Power On/Off Used to power-on or power-off the system Temperature LED Indicates the temperature of the system HDD LED Indicates the status of the hard drive GPIO LED Indicates the status of the GPIO Ethernet LED Indicates the status of the LAN ports Universal I/O Bracket Used to customized I/O output USB 3.2 Gen2 Used to connect USB 3.2 Gen2/3.2 Gen1/3.0/2.0/1.1 device	HDMI Used to connect the system wit DP Used to connect the system wit AT/ATX Mode Switch Used to select AT or ATX powe SIM Socket Used to inserts a SIM card Removable HDD Bay Used to inserts a 2.5” HDD CMOS Battery Used to inserts a CMOS batter IGN Setting Switch Used to set up IGN function Reset Button Used to reset the system



Spectra PowerBox 31E



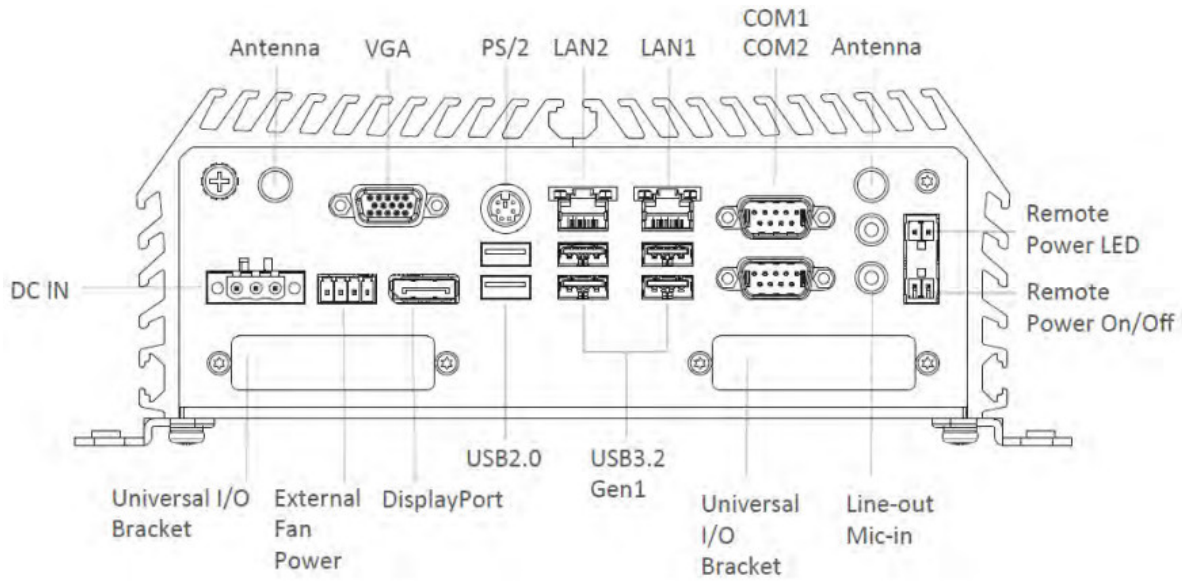
Spectra PowerBox 31E



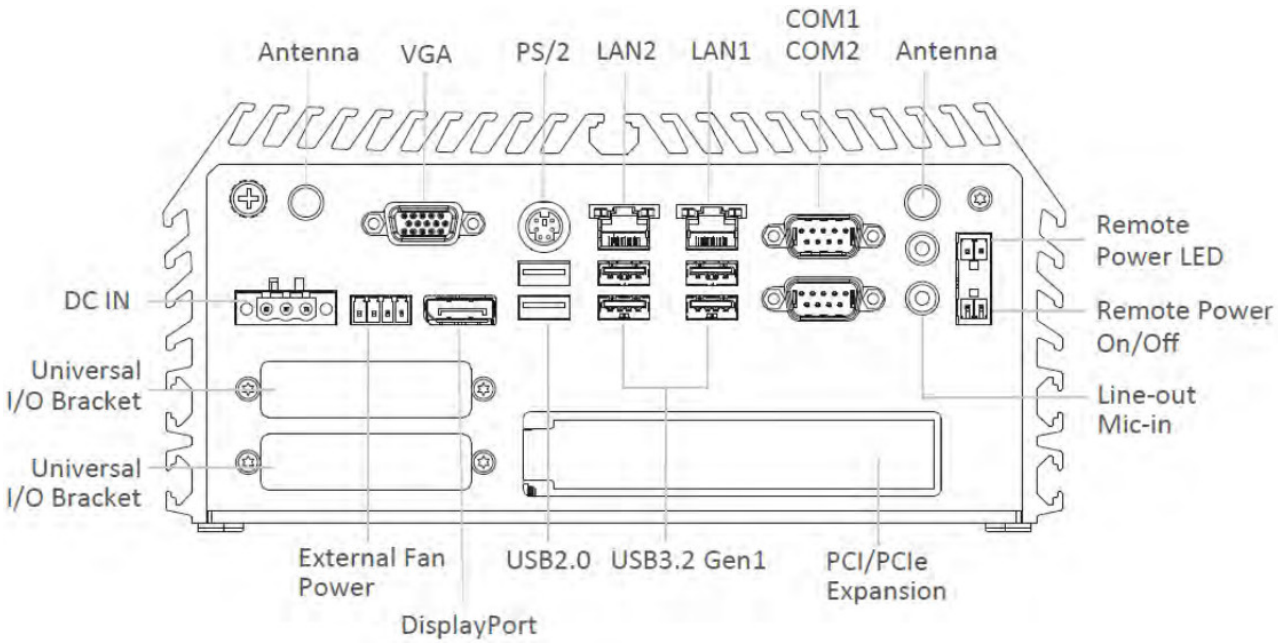
1.6.2 Rear

DC IN Used to plug a DC power input with terminal block Antenna Used to connect an antenna for optional wireless module External Fan Power Used to plug an external fan with terminal block VGA Used to connect a monitor with VGA interface DP Used to connect the system with DisplayPort monitor PS/2 Port Used to connect the PS/2 device USB 2.0 Used to connect USB 2.0/1.1 device LAN1, LAN2 Used to connect to local area network	USB 3.2 Gen1 Used to connect USB 3.2 (COM1, COM2 Used to connect to RS-232 Line-Out Used to connect a speaker Mic-In Used to connect a microph Remote Power LED A terminal block used to co Remote Power On/Off A terminal block used to co Universal I/O Bracket Used to customized I/O ou

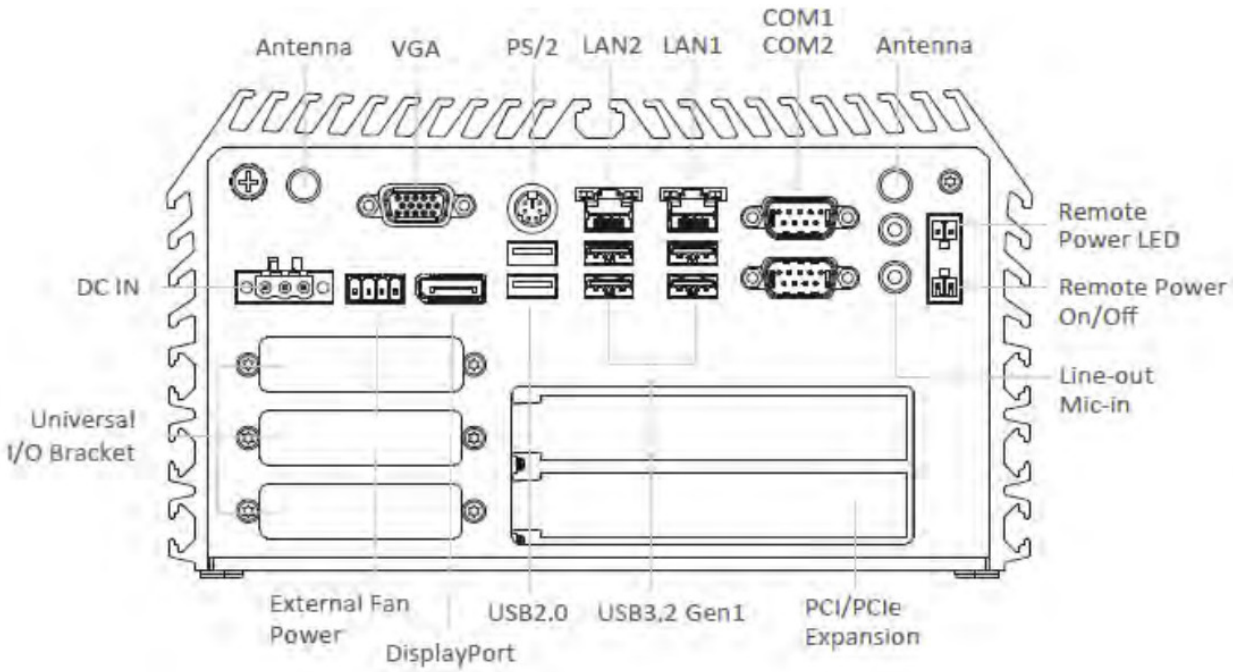
Spectra PowerBox 30E



Spectra PowerBox 31E

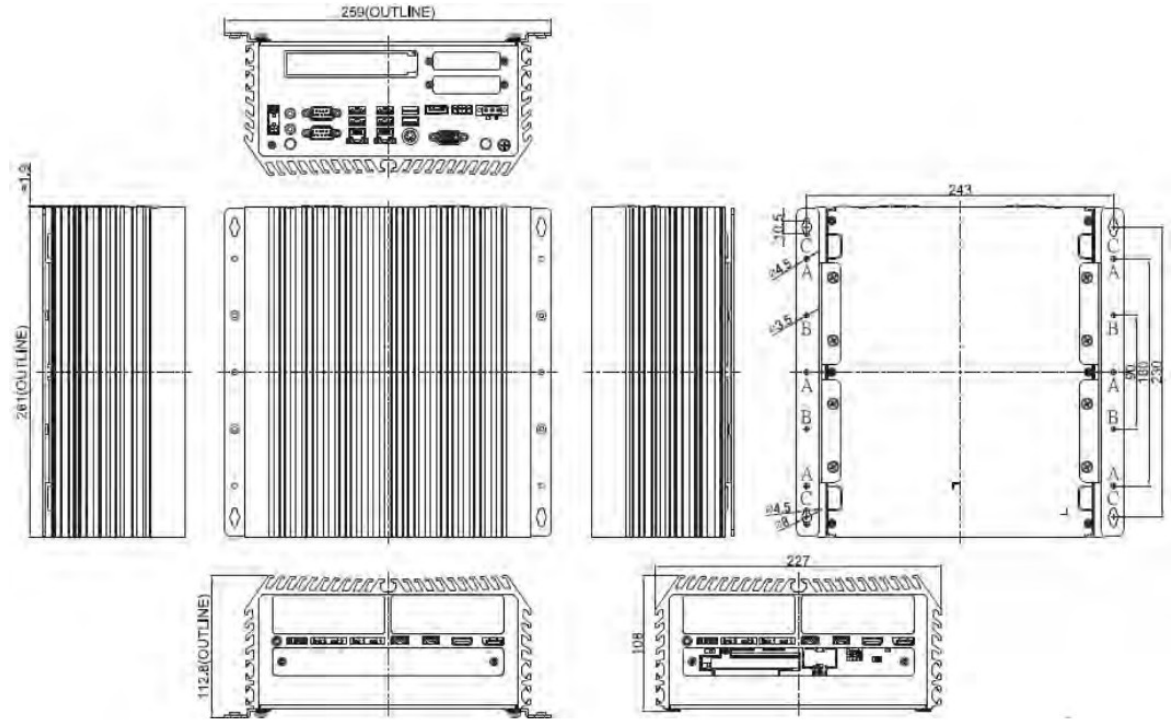


Spectra PowerBox 32E

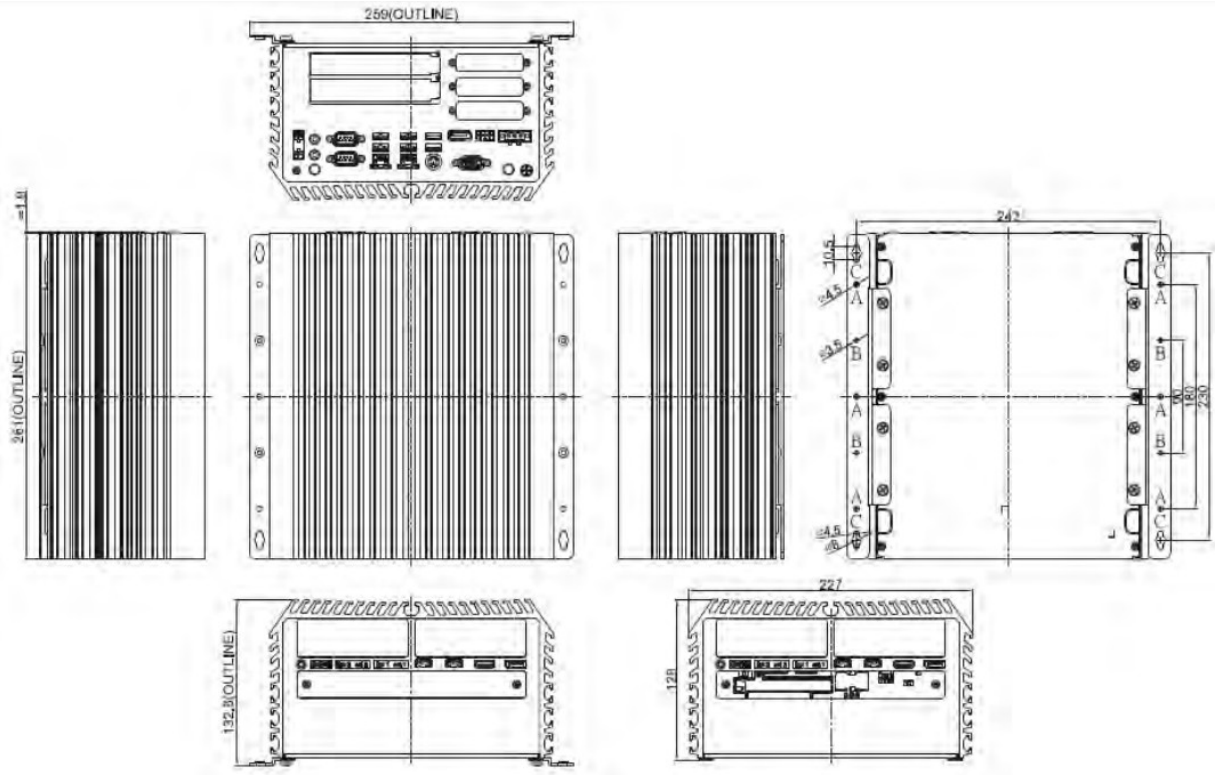


1.7 Mechanical Dimension

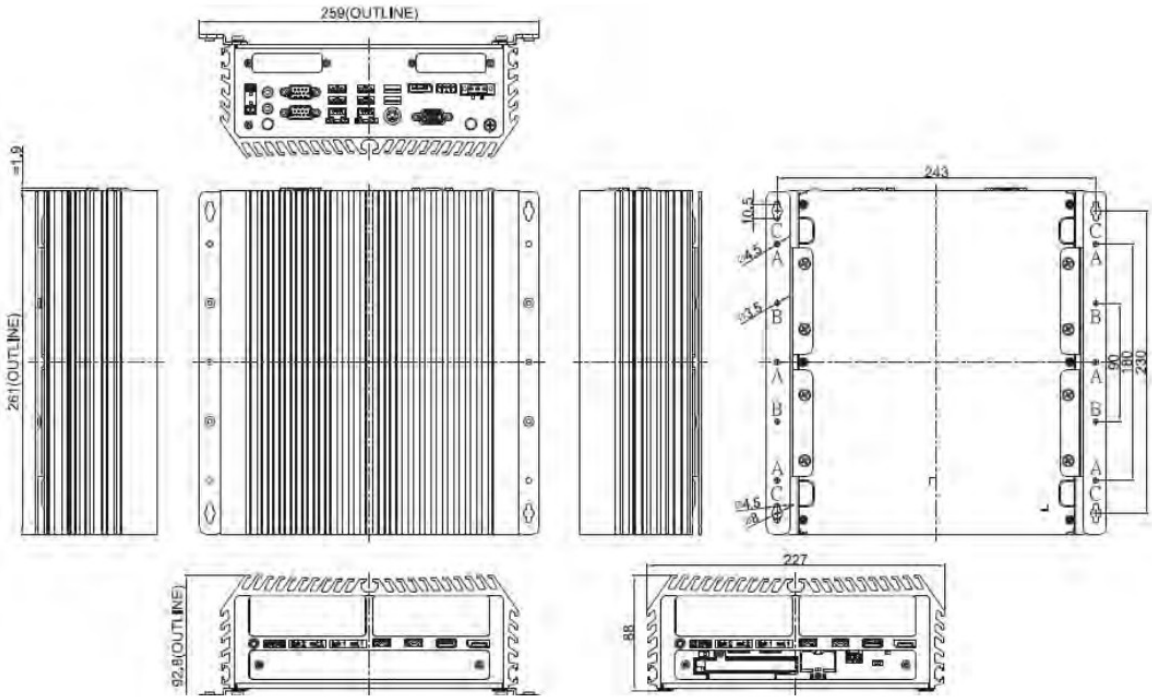
Spectra PowerBox 30E Unit: mm



Spectra PowerBox 31E Unit: mm



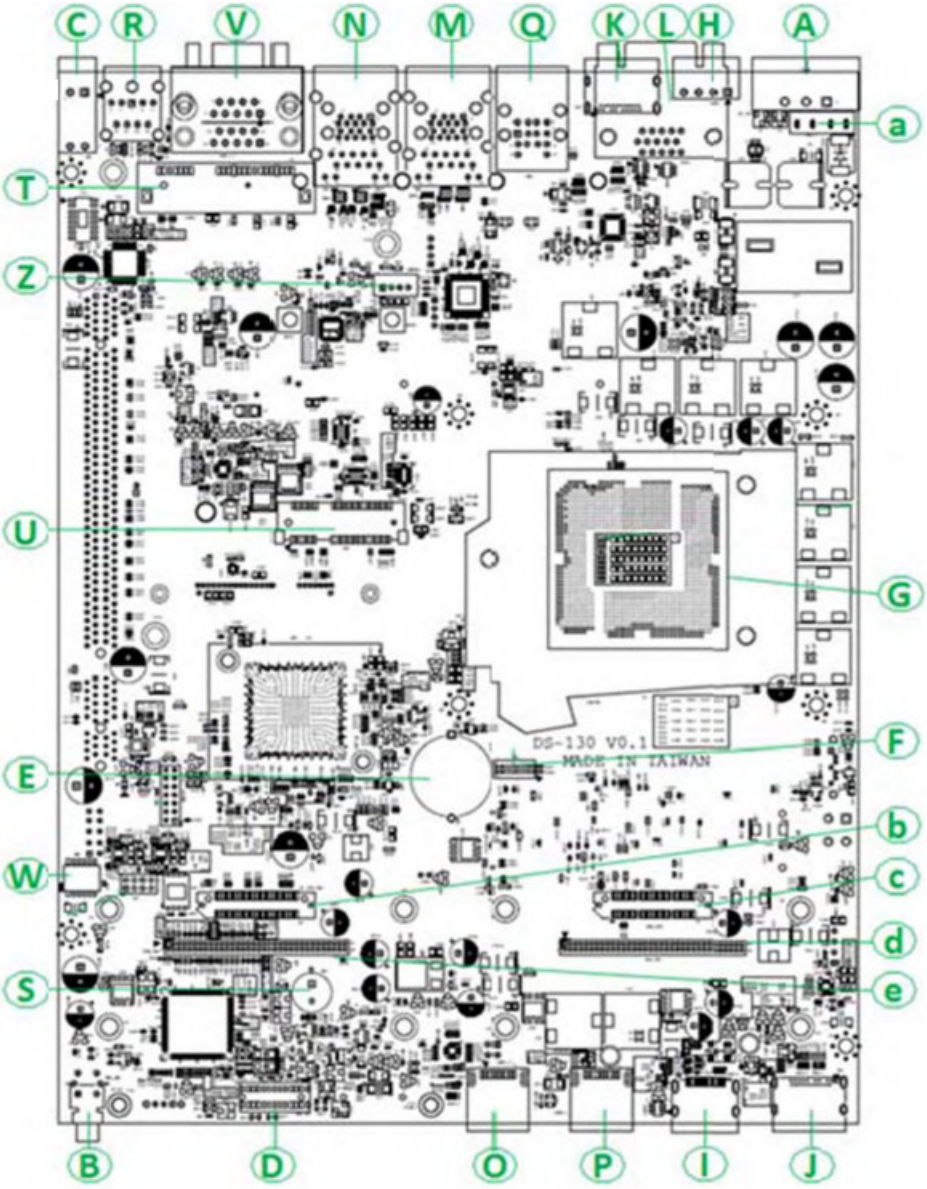
Spectra PowerBox 32E Unit: mm



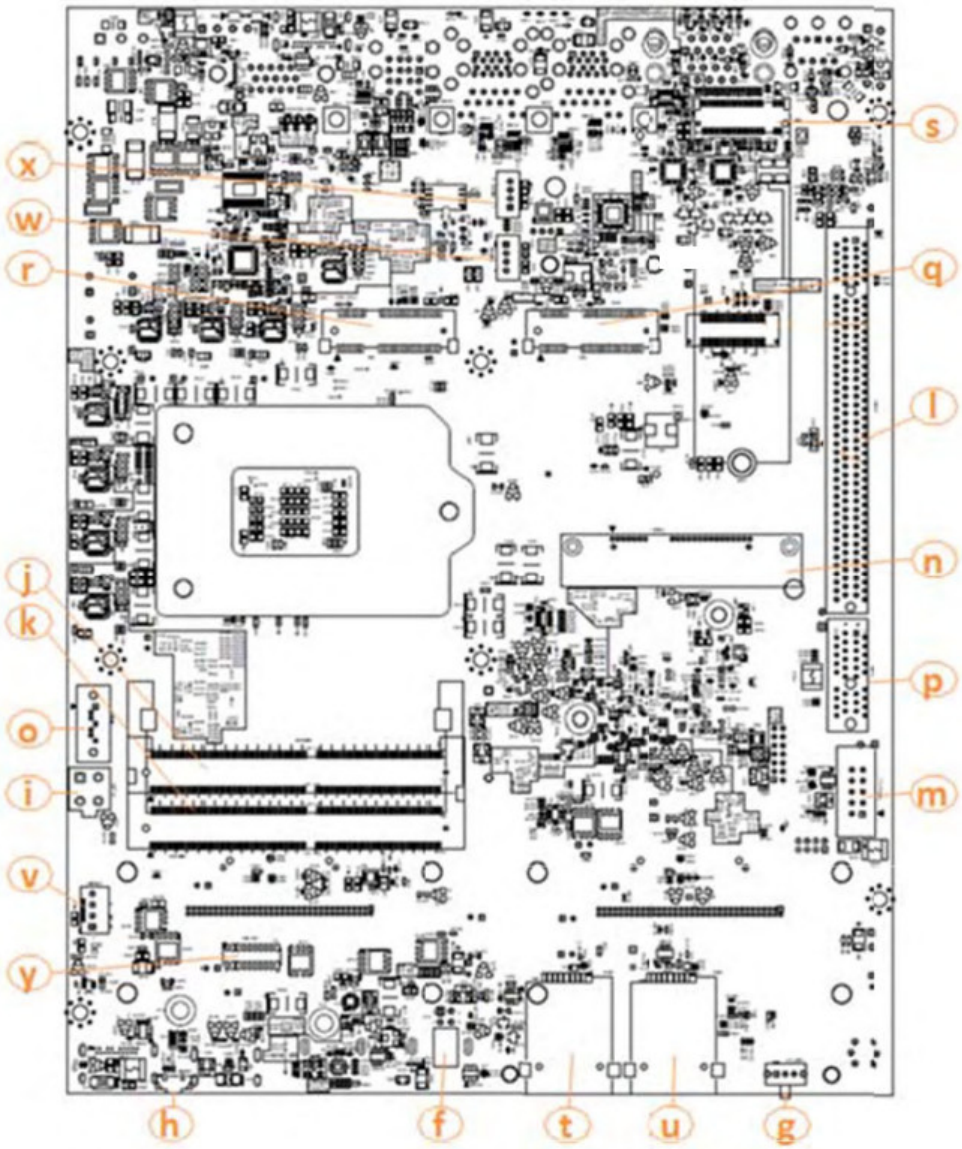
Chapter 2 Switches & Connectors

2.1 Location of Switches and Connectors

2.1.1 Top View



2.1.2 Bottom View



2.2 Switches and Connectors Definition
List of Switch & Connector

Location	Connector	Definition
	PWR_SW1	Power button with power on LED
	LED_PH1	LED board connector
	USB3_1, USB3_2	USB3.2 Gen2 port connector
	HDMI1	HDMI connector
	DP1, DP2	Display Port (DP++) connector
	BZ1	Buzzer
	BTB_FH2	CM BTB 50 pins Slot, support PCIE 1×4 or 4×1 4LAN/POE
	BTB_FH4	CM BTB 50 pins Slot, support PCIE 1×2 or 2×1 4LAN/POE
	BTB_FH1, BTB_FH3	CM BTB 68 pins Connector, support COM3-COM6/16 Bits DIO .
	SW1	SATA DOM/ COM1 and COM2 Power Select
	GDC1	Super CAP for CMOS Backup
	SW2	Super CAP switch
	U1	CPU Socket LGA1200
	CN5	Mini PCI-Express Socket (Support mPCIE/ mSATA / USB3 + SIM module)
	POWER1, POWER2, POWER3, POWER4	+5V/+12V power output connector
	SATA1	22 PINs SATA Connector
	FS_1	DC input power fuse 15A/58V
	CN7	Remote Power On/Off + Remote Power LED connector
	AUDIO1	2 IN 1 Audio Phone Jack for Headphone line out & MIC phone in

	COM_1_1	Dual COM connector (COM1-2), support RS232/RS422/RS485
	CN1, CN2	Dual USB3.2 Gen1 + GLAN RJ45 Connector
	CN6	Dual USB2.0 + PS2 Connector
	VGA1	VGA Connector (DB15)
	FAN1	CPU Smart FAN Connector
	DC_IN2	3 PINs DC 9-48V power input with power ignition connector
	RESET1	Reset button
	JP2	RTC battery board connector
	SIM1, SIM2	SIM card socket A and B
	AT_ATX	AT/ATX power mode switch (default AT mode)
	IGN_PH1	IGN control board connector
	DC_IN1	4 PINs DC 9~48V power input connector
	SATA3	7 PINs SATA/SATA DOM Connector
	SODIMM1, SODIMM2	DDR4 SO-DIMM
	USB2_13_1	USB2.0 BOX Header (2 Ports)

	PCIE1	PCIE x1 Slot
	SATA2	22 PINs SATA Connector
	PCIE2	PEG/PCIE x16 Slot
	CN3, CN4	Mini PCI-Express Socket (Support mPCIE/ mSATA / USB3 module)
	CN8	M.2 Key M Socket (Support AHCI or NVMe PCIe / SATA Storage)

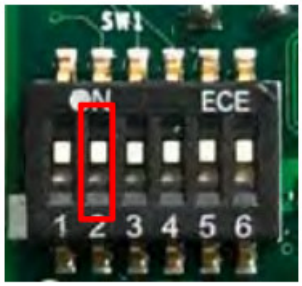
2.3 Definition of Switches
PWR_SW1: Power button with power on LED

Switch	**Definition**
Push	Power System

LED Type	**LED Status**	**Status**
Power LED	Blue	Power off (S4/S5)
	Green	Power on (S0)
	Blinking Blue & Green	Stand by (S3)

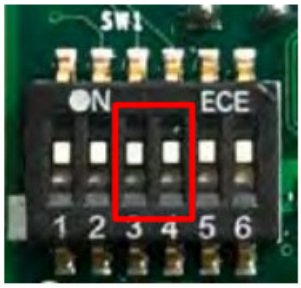
SW1: SATA DOM / COM1 / COM2 Power Select

Location	**Function**		**DIP1**	**DIP2**
SW1	SATA DOM	Disable	N/A	ON (Default)
		Enable		OFF
Location	**Function**		**DIP3**	**DIP4**
SW1	COM1	0V(RI)	ON (Default)	ON (Default)
		5V	ON	OFF
		12V	OFF	OFF
Location	**Function**		**DIP5**	**DIP6**
SW1	COM2	0V(RI)	ON (Default)	ON (Default)
		5V	ON	OFF
		12V	OFF	OFF



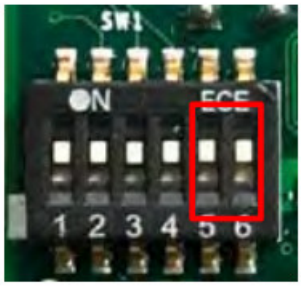
ON

OFF



ON

OFF



ON

OFF

SW2: Super CAP Switch

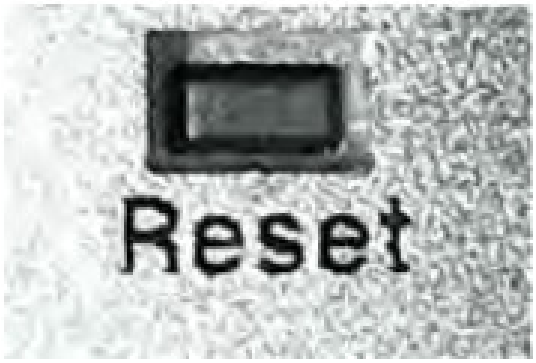
Location	Function		DIP1	DIP2
SW2	Super CAP	Enabled	ON (Default)	ON (Default)
		Disabled	OFF	

ON

OFF

RESET1: Reset Button

Switch	Definition
Push	Reset System



AT_ATX: AT / ATX Power Mode Switch

Switch	Definition
Left	AT Power Mode
Right	ATX Power Mode (Default)

CLR_CMOS1: Clear BIOS Switch

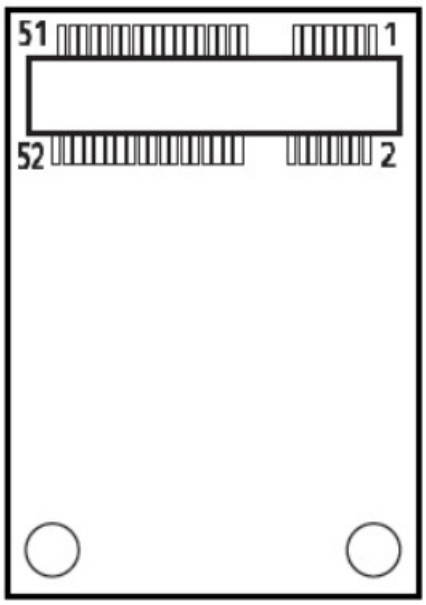
Pin	Definition
1-2 (Left)	Normal Status (Default)
2-3 (Right)	Clear BIOS

2.4 Definition of Connectors

CN5 Mini PCI-Express Socket (Support mPCIE/ mSATA / USB3 + SIM module)

PIN	Definition	PIN	Definition
1	WAKE#	27	GND
2	3.3Vaux	28	+1.5V
3	N/A	29	GND
4	GND	30	SMB_CLK
5	N/A	31	PETn0 / SATA_TXN
6	1.5V	32	SMB_DATA
7	UIM_RESET_B	33	PETp0 / SATA_TXP
8	UIM_PWR_A	34	GND
9	GND	35	GND
10	UIM_DATA_A	36	USB_D-
11	REFCLK-	37	GND
12	UIM_CLK_A	38	USB_D+
13	REFCLK+ / UIM_PWR_B	39	+3.3Vaux
14	UIM_RESET_A	40	GND
15	GND	41	+3.3Vaux

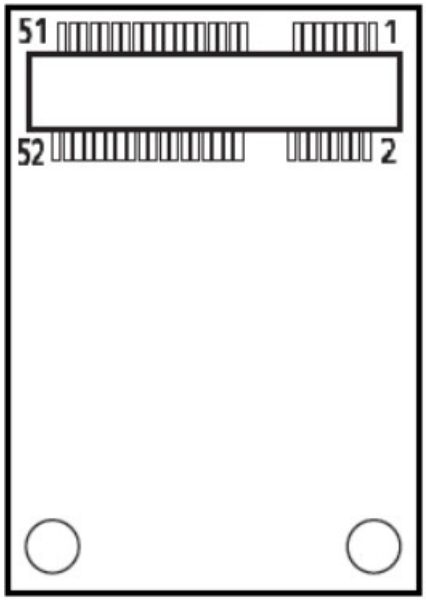
16	UIM_VPP_A	42	N/A
17	UIM_IC_DM / (UIM_CLK_B)	43	GND
18	GND	44	N/A
19	UIM_IC_DP / (UIM_DATA_B)	45	CL_CLK
20	W_DISABLE1#	46	N/A
21	GND	47	CL_DATA
22	PERST#	48	+1.5V
23	PERn0 / SATA_RXP	49	CL_RST
24	+3.3Vaux	50	GND
25	PERp0 / SATA_RXN	51	N/A
26	GND	52	+3.3Vaux



CN3/CN4 Mini PCI-Express Socket (Support mPCIE/ mSATA / USB3)

PIN	Definition	PIN	Definition
1	WAKE#	27	GND
2	3.3Vaux	28	+1.5V
3	N/A	29	GND
4	GND	30	SMB_CLK
5	N/A	31	PETn0 / SATA_TXN
6	1.5V	32	SMB_DATA
7	N/A	33	PETp0 / SATA_TXP
8	N/A	34	GND
9	GND	35	GND
10	N/A	36	USB_D-
11	REFCLK-	37	GND
12	N/A	38	USB_D+
13	REFCLK+	39	+3.3Vaux
14	N/A	40	GND
15	GND	41	+3.3Vaux

16	N/A	42	N/A
17	N/A	43	GND
18	GND	44	N/A
19	N/A	45	N/A
20	W_DISABLE1#	46	N/A
21	GND	47	N/A
22	PERST#	48	+1.5V
23	PERn0 / SATA_RXP	49	N/A
24	+3.3Vaux	50	GND
25	PERp0 / SATA_RXN	51	N/A
26	GND	52	+3.3Vaux



CN8 M.2 Key M Socket (Support AHCI or NVMe PCIe / SATA Storage)

(Pin 59~66 are connector keys)

Pin	Definition	Pin	Definition	Pin	Definition
1	CFG3	27	GND	53	REFCLKN
2	3.3V	28	NC	54	PEWAKE*/NC
3	GND	29	PERN1	55	REFCLKP
4	3.3V	30	NC	56	NC
5	PERN3-	31	PERP1	57	GND
6	NC	32	NC	58	NC
7	PERP3	33	GND	67	NC
8	NC	34	NC	68	SUSCLK
9	GND	35	PETN1	69	PEDET/CFG1
10	DAS/DSS*	36	NC	70	3.3V
11	PETN3	37	PETP1	71	GND
12	3.3V	38	DEVSLP	72	3.3V
13	PETP3	39	GND	73	GND
14	3.3V	40	SMB_CLK	74	3.3V
15	GND	41	PERN0/SATA_B+	75	CFG2
16	3.3V	42	SMB_DATA		

17	PERN2	43	PERP0/SATA_B-		
18	3.3V	44	ALERT#		
19	PERP2	45	GND		
20	NC	46	NC		
21	CFG0	47	PETN0/SATA_A-		
22	NC	48	NC		
23	PETN2	49	PETP0/SATA_A+		
24	NC	50	PERST*/NC		
25	PETP2	51	GND		
26	NC	52	CLKREQ*/NC		

POWER1, POWER2, POWER3: +5V/+12V Power Output Connector
Connector Type: 1X4-pin Wafer, 2.0 mm pitch

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

1 2 3 4

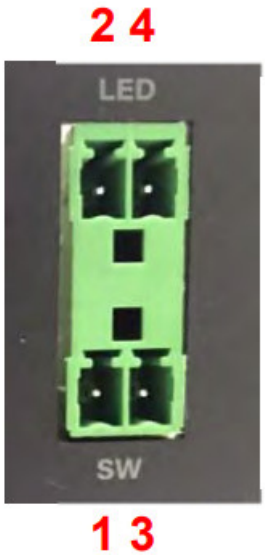
POWER4: Power Connector
Connector Type: 1X4-pin Wafer, 2.54mm pitch

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

1 2 3 4

CN7 Remote Power On/Off + Remote Power LED Connector
Remote Power LED connector can connect an external LED indicator up to 10mA.
Connector Type: Terminal Block 2X2 4-pin, 3.5mm pitch

Pin	Definition
1	RMT_PWR_BTN_N
2	RMT_PWR_LED_A
3	GND
4	GND



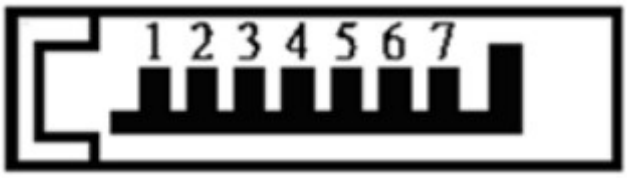
WARNING
Do not apply power to this connector!
This port is used to connect a SWITCH!

FAN1: CPU Smart Fan Connector
Connector Type: Terminal Block 1X4 4-pin, 3.5mm pitch

Pin	Definition
1	GND
2	+12V
3	FAN_IN
4	FAN_PWR

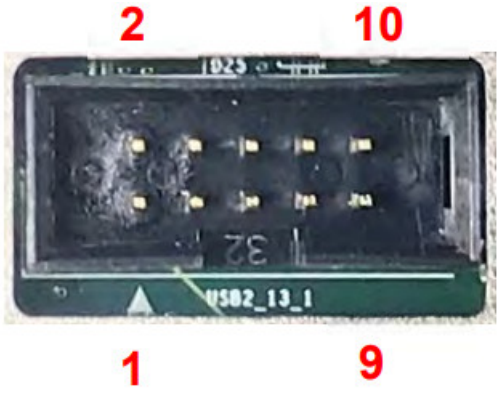
SATA3: 7 PINs SATA/SATA DOM Connector

Pin	Definition	Pin	Definition
1	GND	5	B-
2	A+	6	B+
3	A-	7	+5V
4	GND		



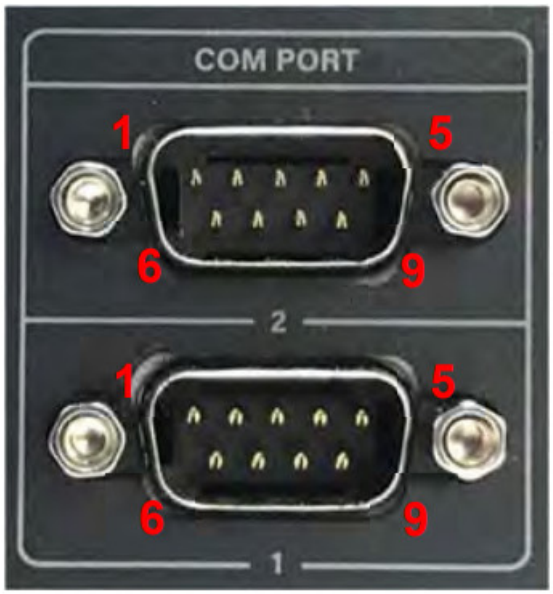
USB2_13_1: USB2.0 BOX Header (2 Ports)
Connector Type: Box Header, 2×5 10-pin, 2.54mm pitch

Pin	Definition	Pin	Definition
1	VBUS (+5V)	6	USB2_P1_DP
2	VBUS (+5V)	7	GND
3	USB2_P0_DN	8	GND
4	USB2_P1_DN	9	CGND
5	USB2_P0_DP	10	CGND



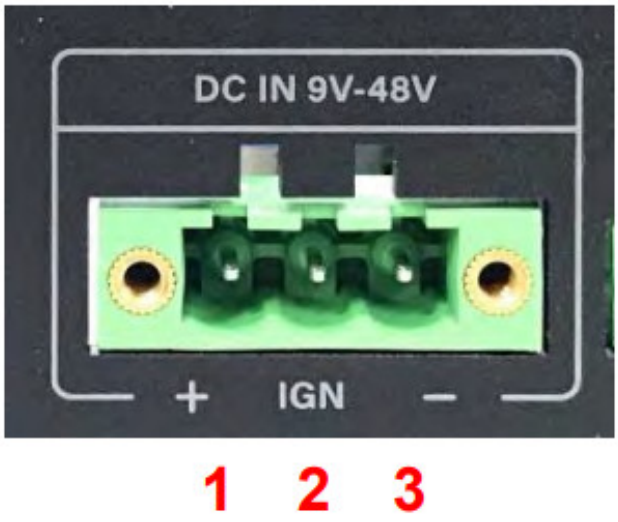
COM1 / COM2 RS232 / RS422 / RS485 Connector
Connector Type: 9-pin D-Sub

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



DC_IN2: 3 PINs DC 9-48V power input with power ignition connector
Connector Type: Terminal Block 1×3 3-pin, 5.0mm pitch

Pin	Definition
1	+9~48VIN
2	Ignition (IGN)
3	GND



CAUTION

Please disconnect the power source before mounting the DC power cables or connecting the DC power connector to system.

DC_IN1: 4 PINs DC 9~48V Power Connector

Connector Type: 2×2 4-pin, 4.2mm pitch

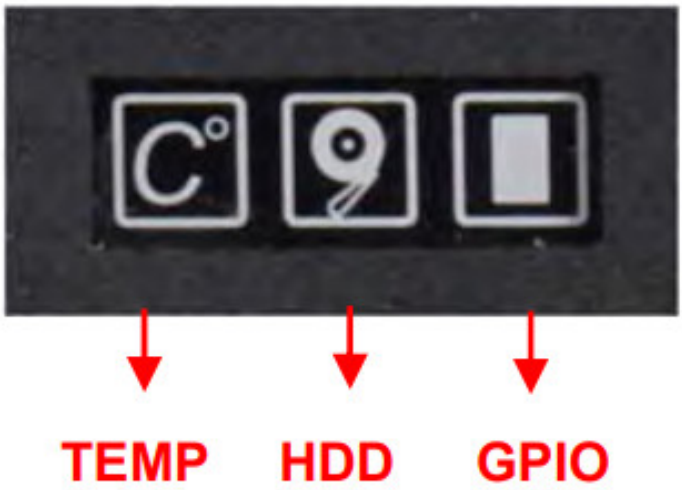
Pin	Definition
1	GND
2	GND
3	+9~48VIN
4	+9~48VIN

WARNING

Before using this connector, make sure that the PIN3 & PIN4 voltage meets the power requirements of the device.

LED_PH1: LED board connector

LED type	Status	LED Color
TEMP LED	System Temp ≤ 65°C	Colorless
	65°C < System Temp ≤ 70°C	Blue
	70°C < System Temp ≤ 75°C	Red
	75°C < System Temp	Blinking Red
HDD LED	Data activity	Yellow
	No activity	Off
GPIO LED	GPIO activity	Green
	No activity	Off

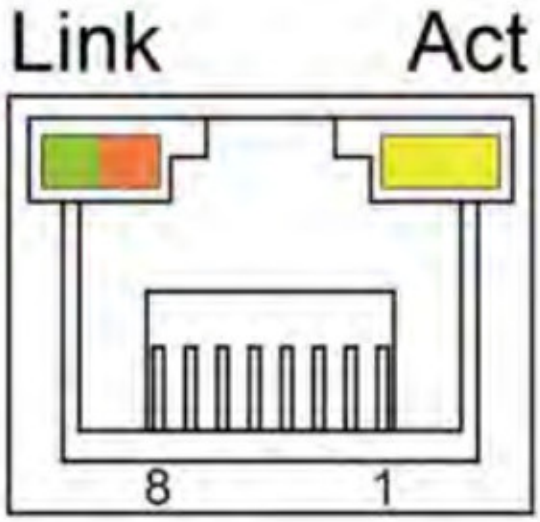


NOTE

The TEMP LED is only available when IGN module is installed.

LAN LED Status Definition

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

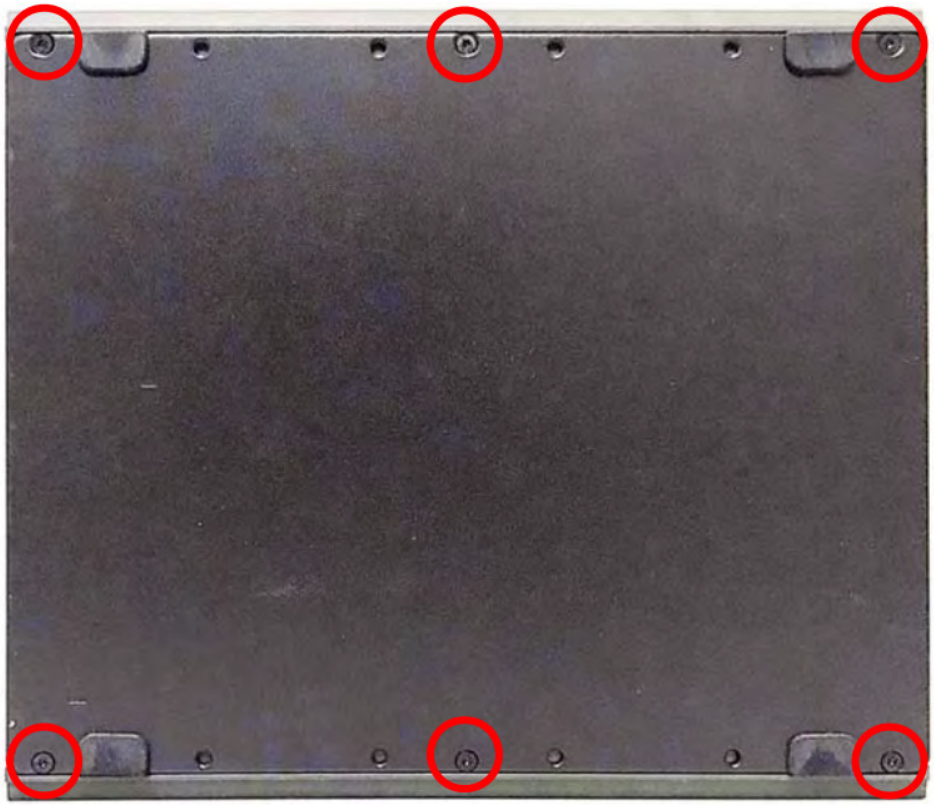


Chapter 3 System Setup

3.1 Removing Top Cover

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

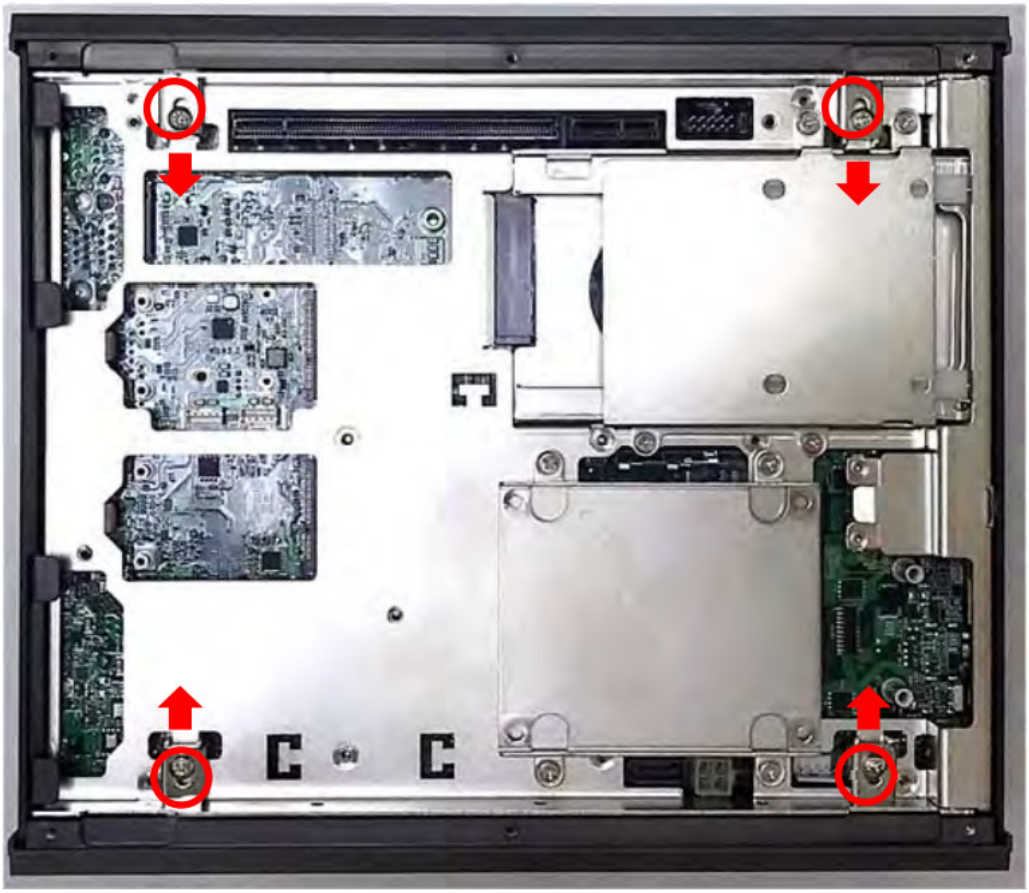
1. Turn over the unit to have the bottom side face up, loosen the 6 screws on the bottom cover and place them aside for later use.



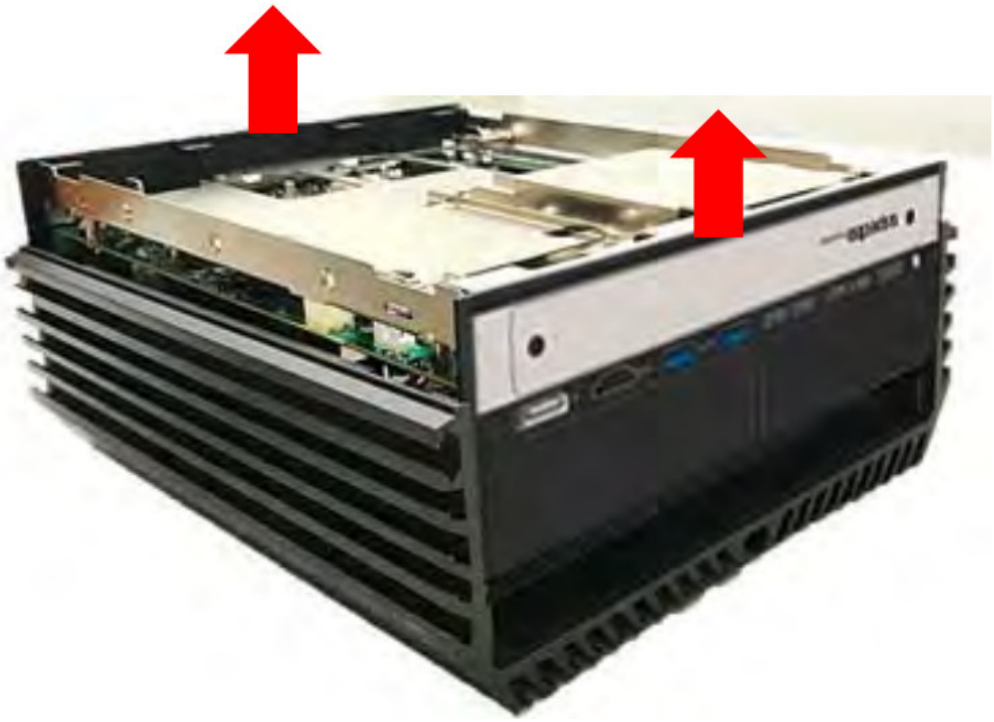
2. Remove the bottom cover from the chassis.

3. Unscrew the 2 screws at the rear bezel as indicated and place them aside for later use.

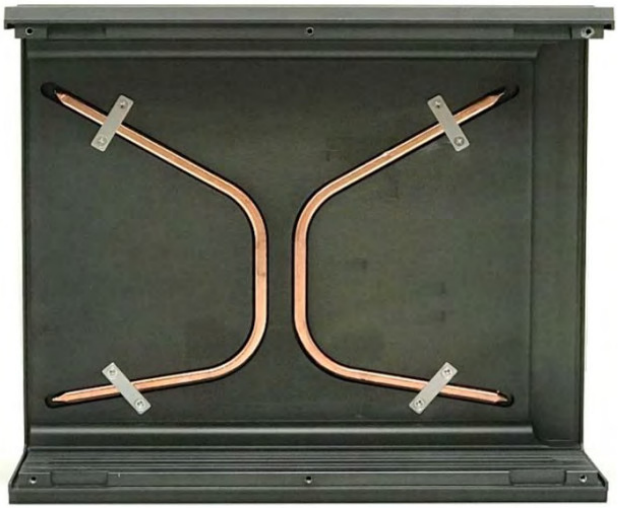
4. Loosen the 4 screws. Pull out the 4 latches as marked.



5. Lift up the unit vertically by holding the front and rear panel.

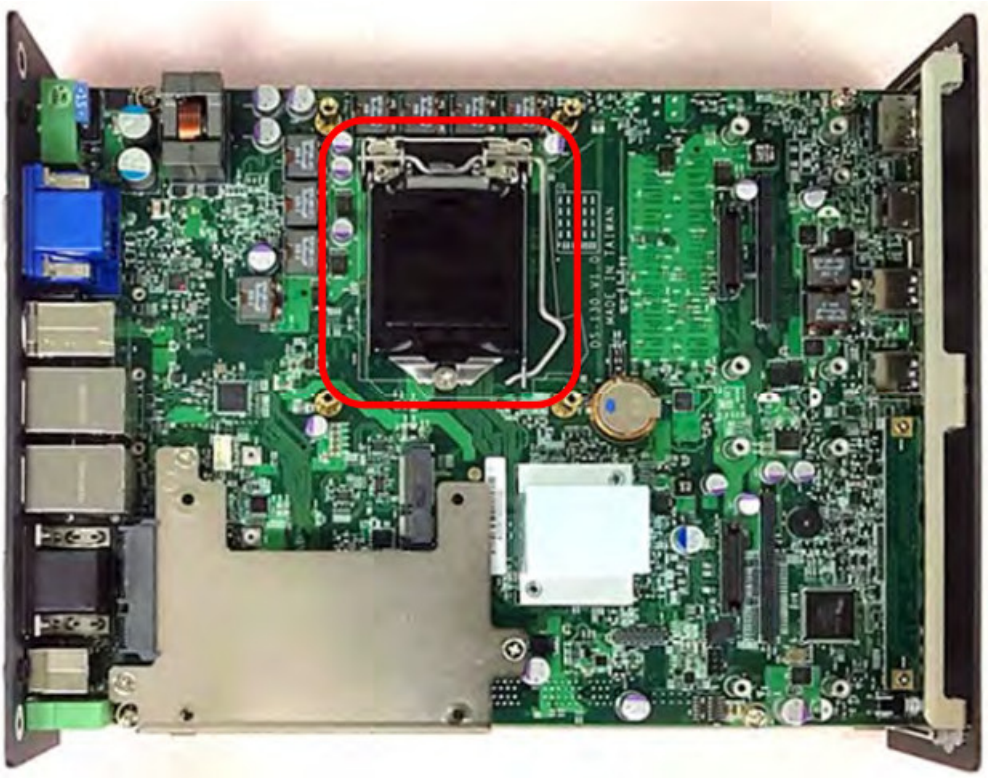


6. Turn over the body of the unit and place it gently.

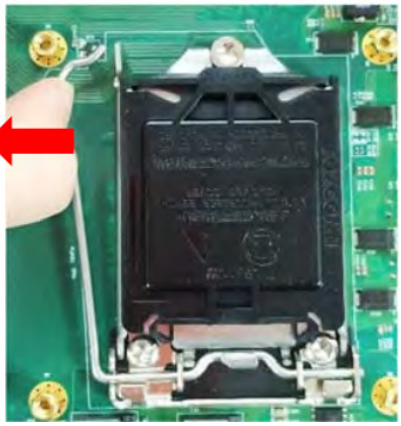


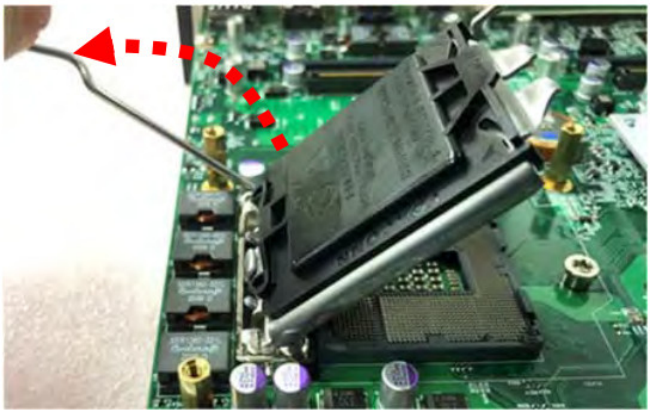
3.2 Installing CPU

1. Locate the CPU socket.

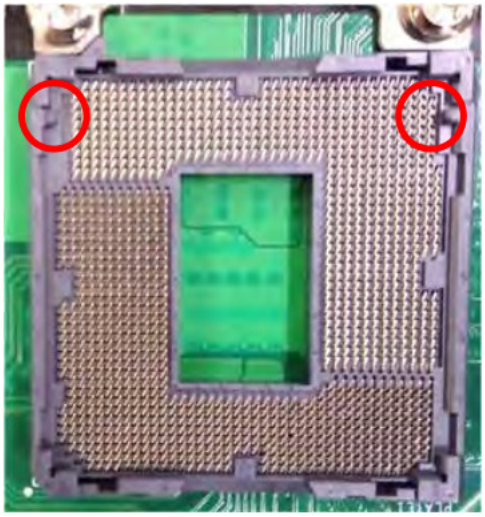


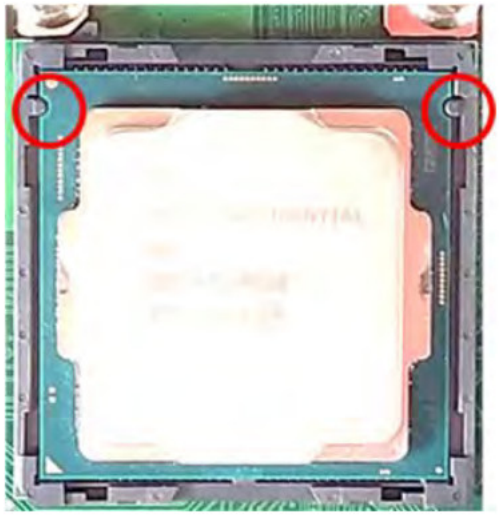
2. Pull aside and then lift up the socket lever to unlock the socket.





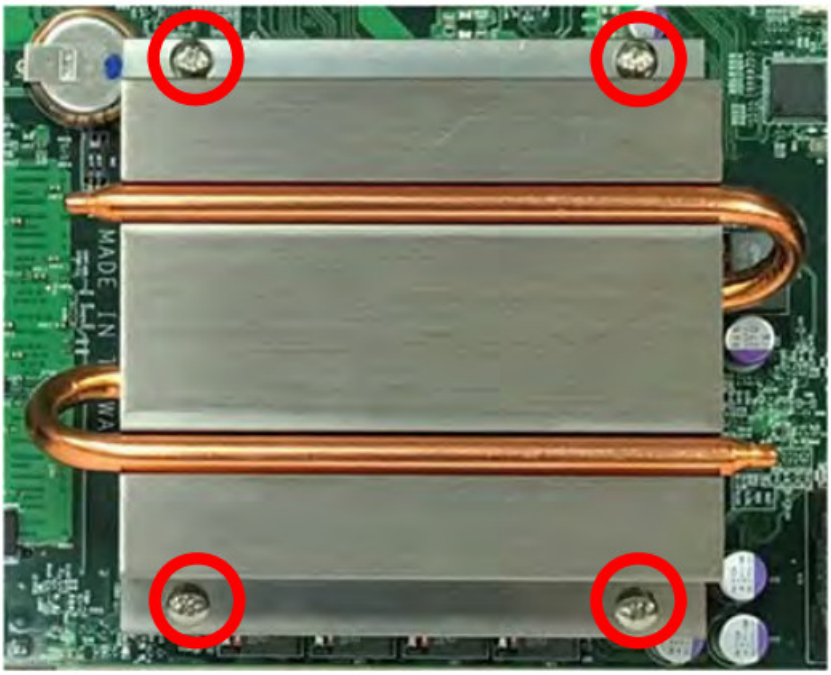
3. Align the notches on the CPU with protrusions on the socket. Hold the CPU by the edges and put on the CPU gently.





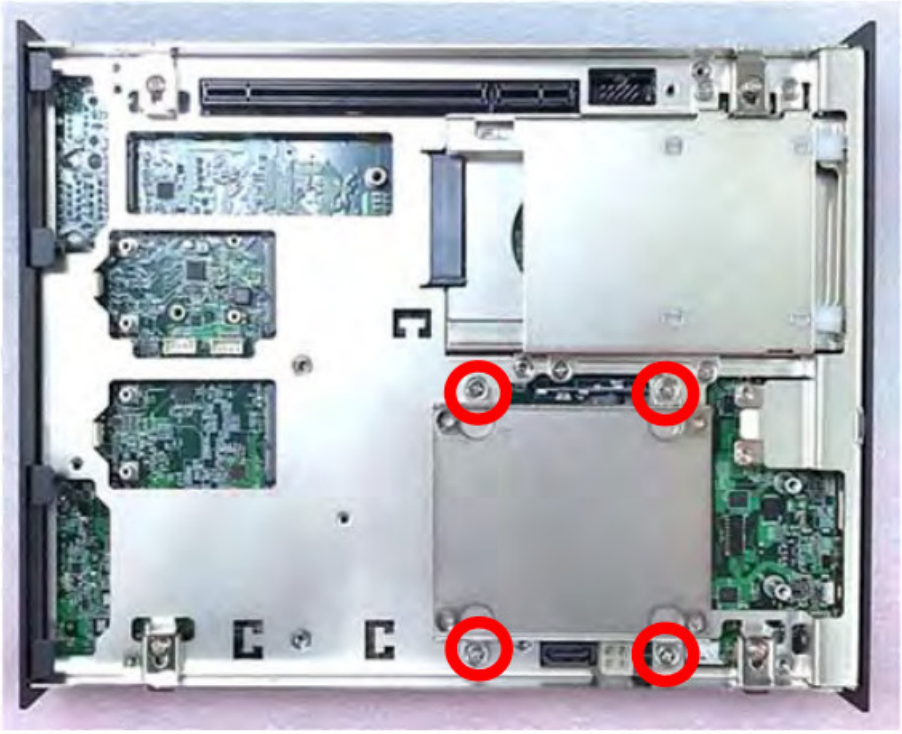
4. Press down the socket lever to lock the CPU.

5. Place the CPU heatsink on with aligning the four mounting holes of the heatsink and the nut studs and then fasten the heatsink with the provided 4 screws.

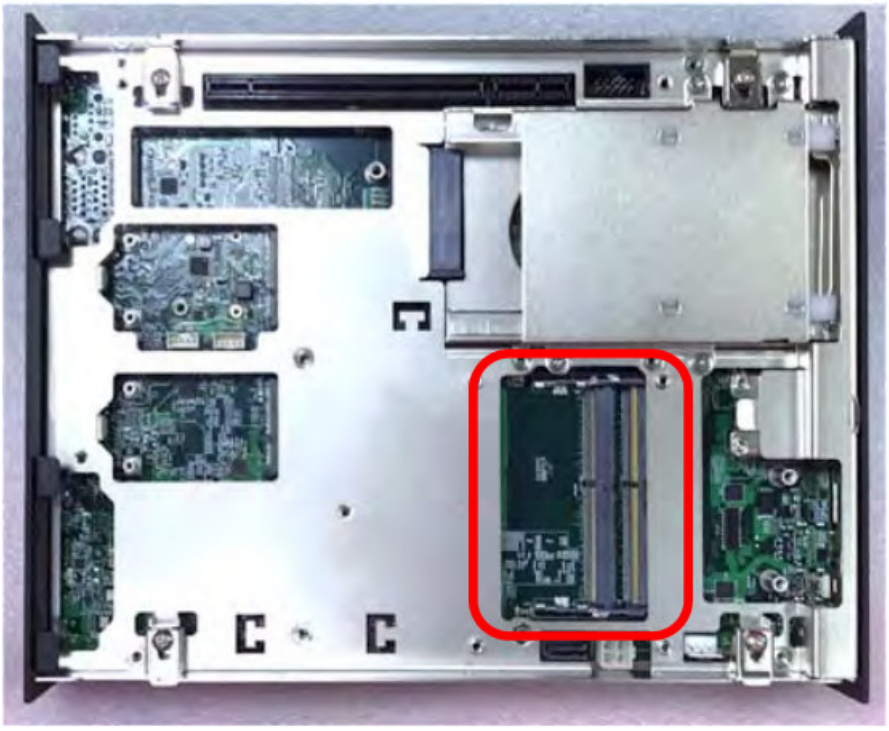


3.3 Installing SO-DIMM

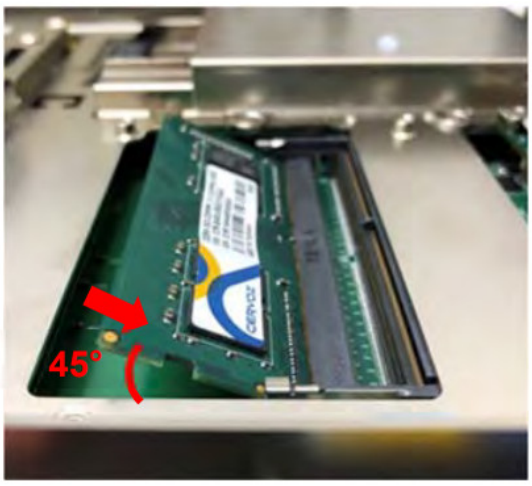
1. Turn the system to the bottom side. Unscrews the 4 screws and remove the bracket.



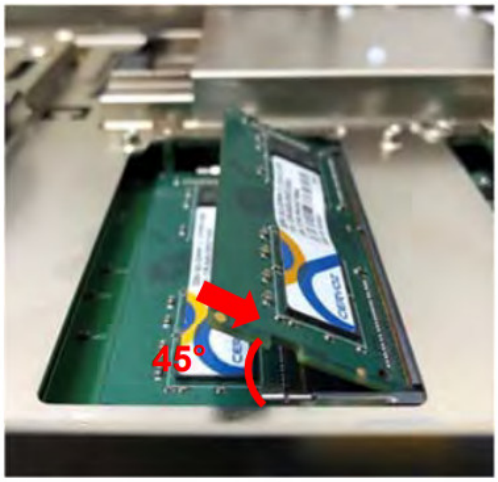
2. Locate two SO-DIMM sockets at the bottom.



3. Insert the SO-DIMM at a 45-degree angle until its edge connector is connected to the SO-DIMM socket firmly.



Lower socket



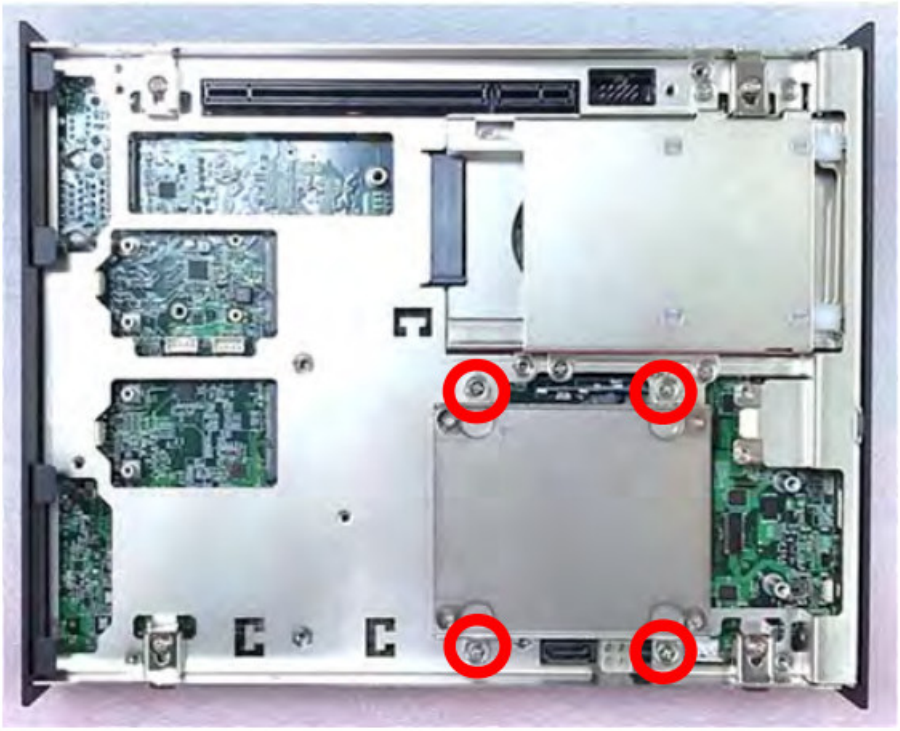
Upper socket

4. Press down the module until the retaining clips snap back in place.

Lower socket

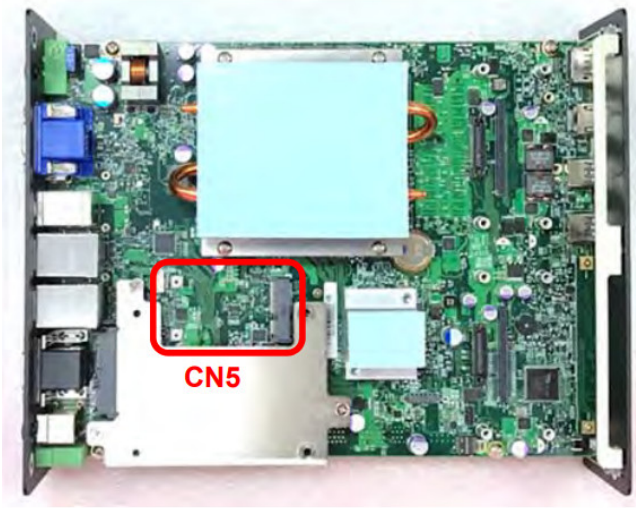
Upper socket

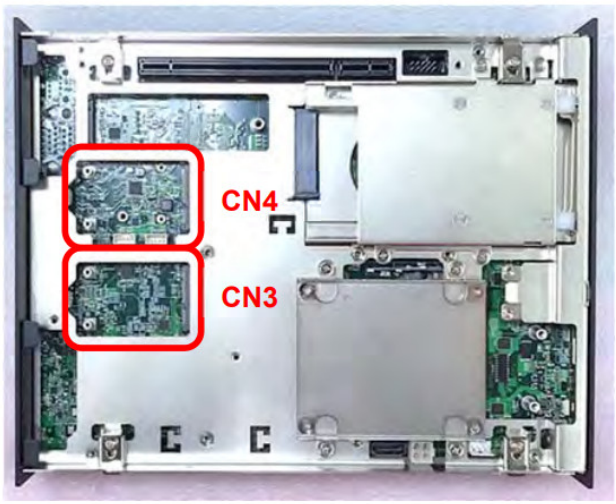
5. Put the cover back and fix the cover with 4 screws.



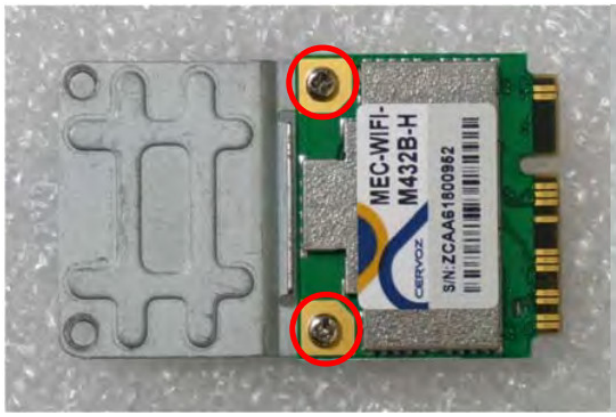
3.4 Installing Mini-PCIe Card

1. Locate the Mini PCIe socket CN5 on the top side and CN3/CN4 on the bottom side of the system.





2. Use provided two screws fasten the half size module and adapter bracket together as shown in Fig (a) below.



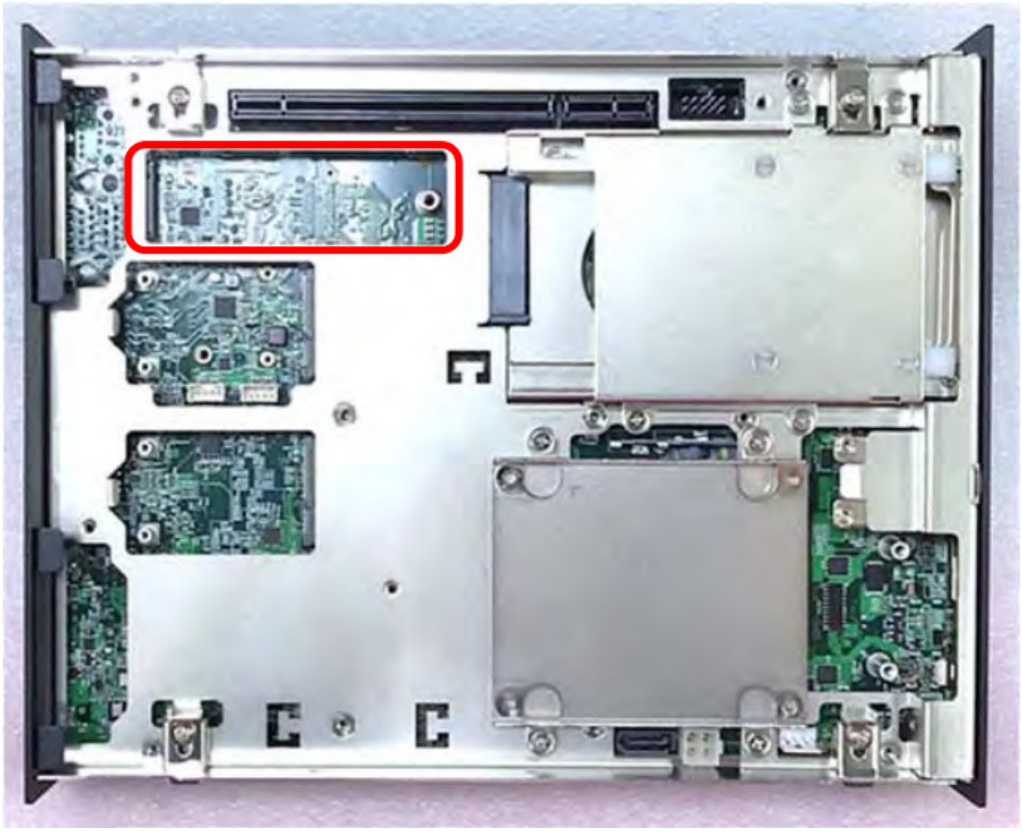
(a) Half Size Mini-PCIe (b) Full Size Mini-PCIe Card

3. Tilt a Mini PCIe card at a 45-degree angle and insert it to the socket until the golden finger connector of the card seated firmly.

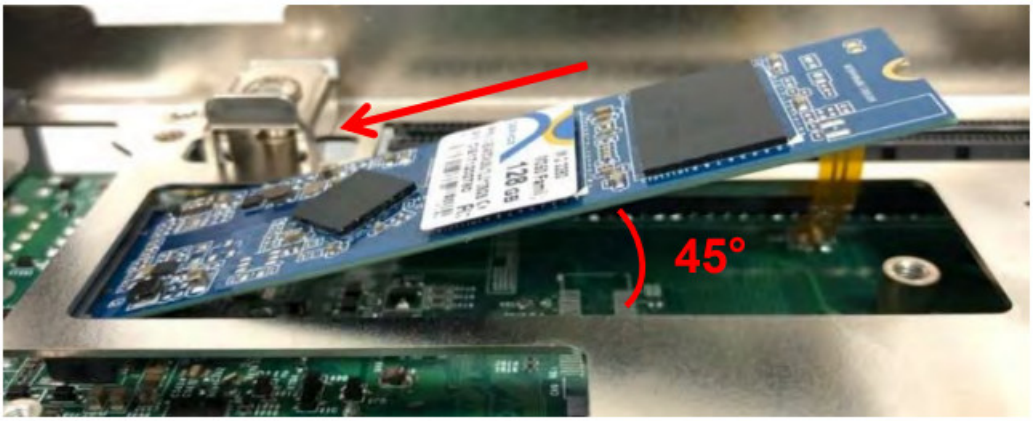
4. Press the card down and secure it with 2 screws.

3.5 Installing M.2 M Key Card

1. Turn the system to the bottom side, and locate the M.2 M Key slot (CN8).



2. Tilt the M.2 M Key card at a 45-degree angle and insert it to the socket until the golden finger connector of the card seated firmly.



3. Press the card down and secure it with the screw.

3.6 Installing Antenna

1. Remove the antenna rubber cover on the rear panel.

2. Penetrate the antenna jack through the hole.

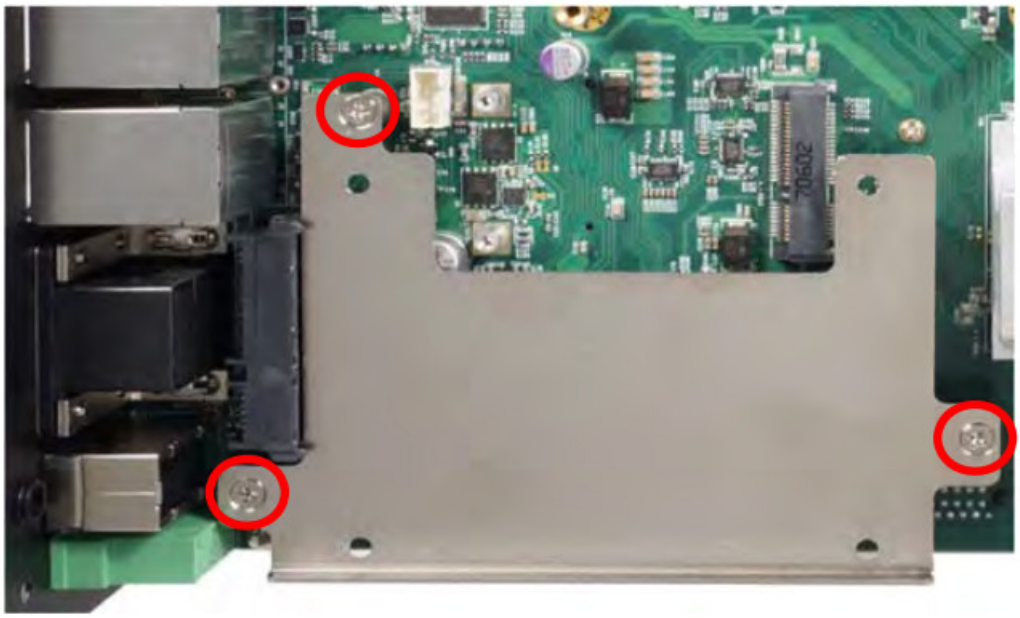
3. Put on the washer and fasten the nut of antenna jack.

4. Assemble the antenna and antenna jack together.

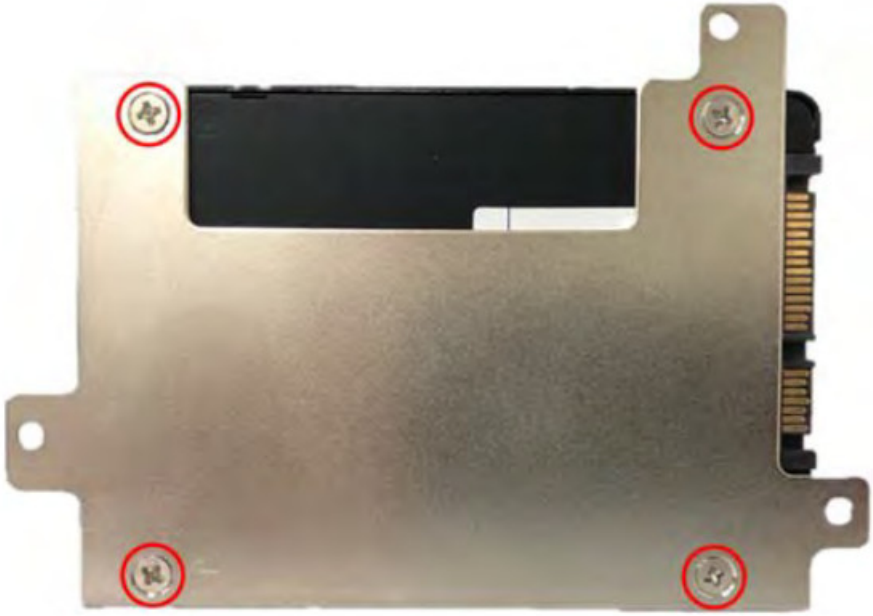
5. Attach the RF connector of the cable's another end onto the card.

3.7 Installing SATA Hard Drive on Top Side

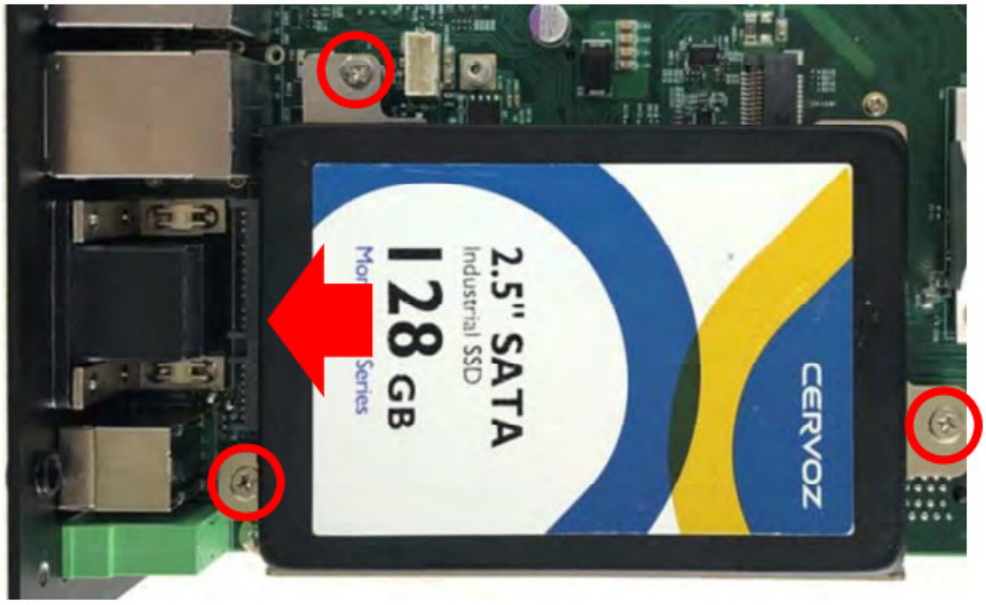
1. Unscrew the 3 screws on the HDD bracket and remove the bracket.



2. Make the PCB side of the HDD face up, and place the HDD bracket on it. Ensure the direction of bracket is correct and use the provided 4 screws to assemble HDD and HDD bracket together.



3. Turn over the HDD bracket. Connect the HDD bracket to the SATA connector and fasten the 3 screws.



3.8 Installing PCI/PCIe Add-on Card

(For PowerBox 31E and PowerBox 32E only)

The applicable riser cards for PowerBox 3000E series are listed in the following table.

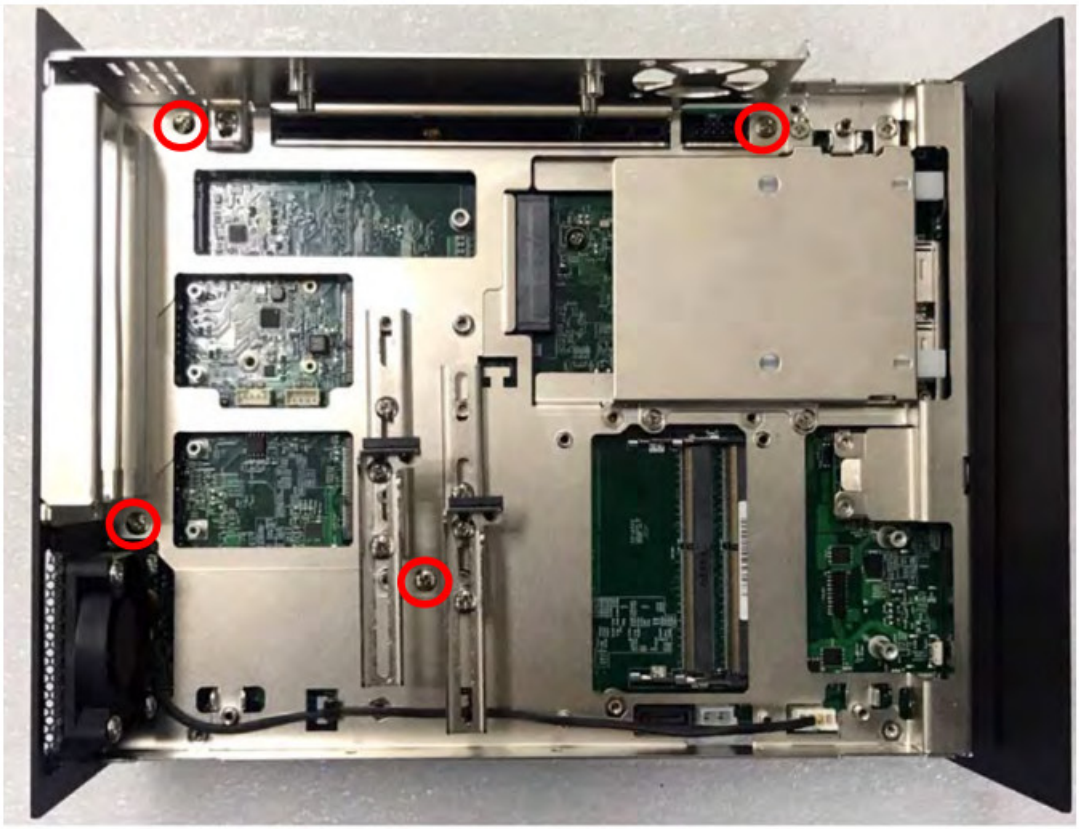
Model No.	Description	Compatible Model
RSC-E16	Riser Card with 1 x PCIex16 Slot	PowerBox-31xx
RSC-PI	Riser Card with 1 x PCI Slot	PowerBox-31xx
RSC-E8E8	Riser Card with 2 x PCIex8 Slots	PowerBox-32xx
RSC-E16E1	Riser Card with 1 x PCIex16 and 1 x PCIex1 Slots	PowerBox-32xx
RSC-E16PI	Riser Card with 1 x PCIex16 and 1 x PCI Slots	PowerBox-32xx
RSC-PIPI	Riser Card with 2 x PCI Slots	PowerBox-32xx

NOTE

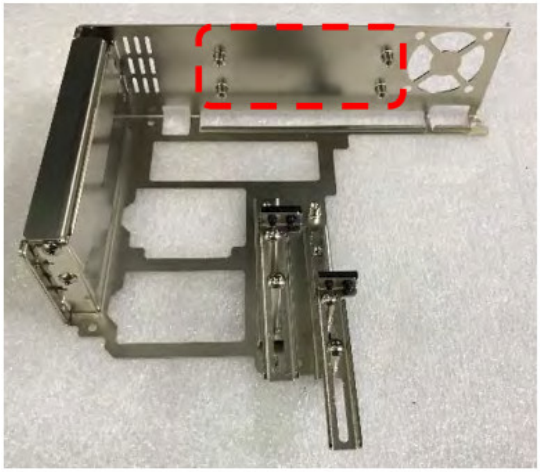
The photo example in this section is illustrated by RC-E8E8-R10 module.

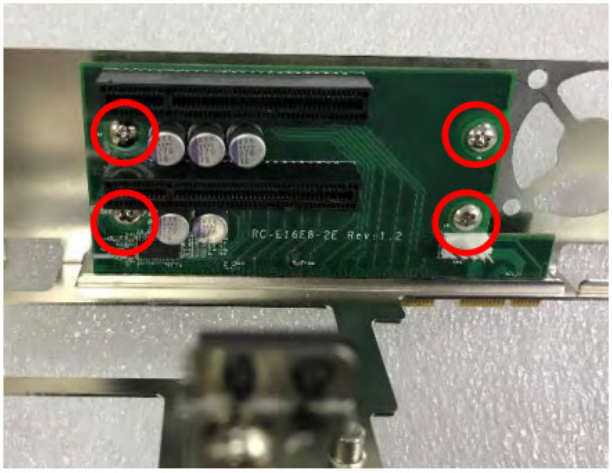
1. Prepare a Riser Card intended for installation.

2. Unscrew the 4 screws to remove the extension bracket.

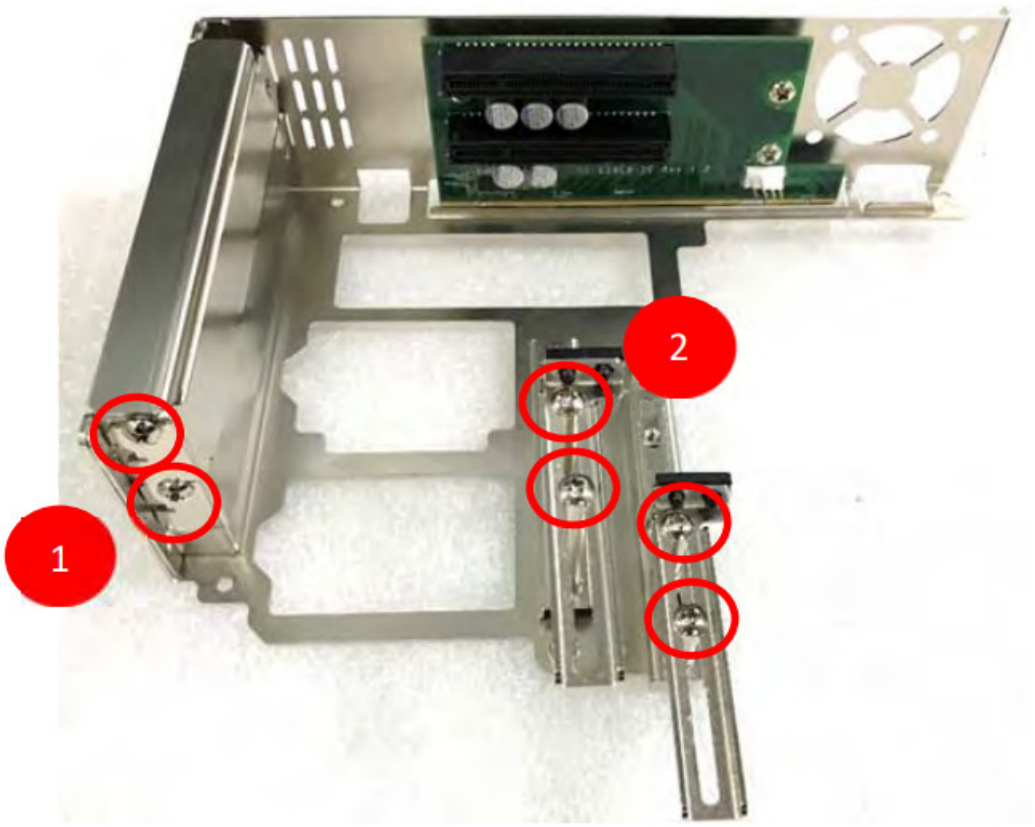


3. Assemble the riser card with extension bracket together and fasten with the 4 screws.

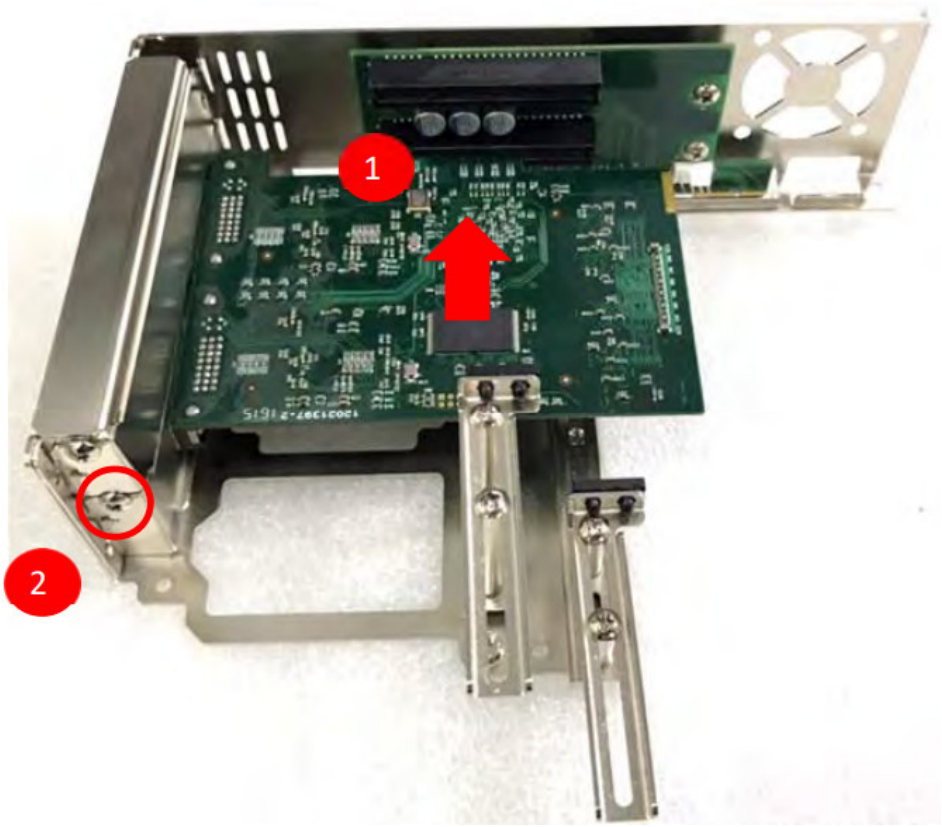




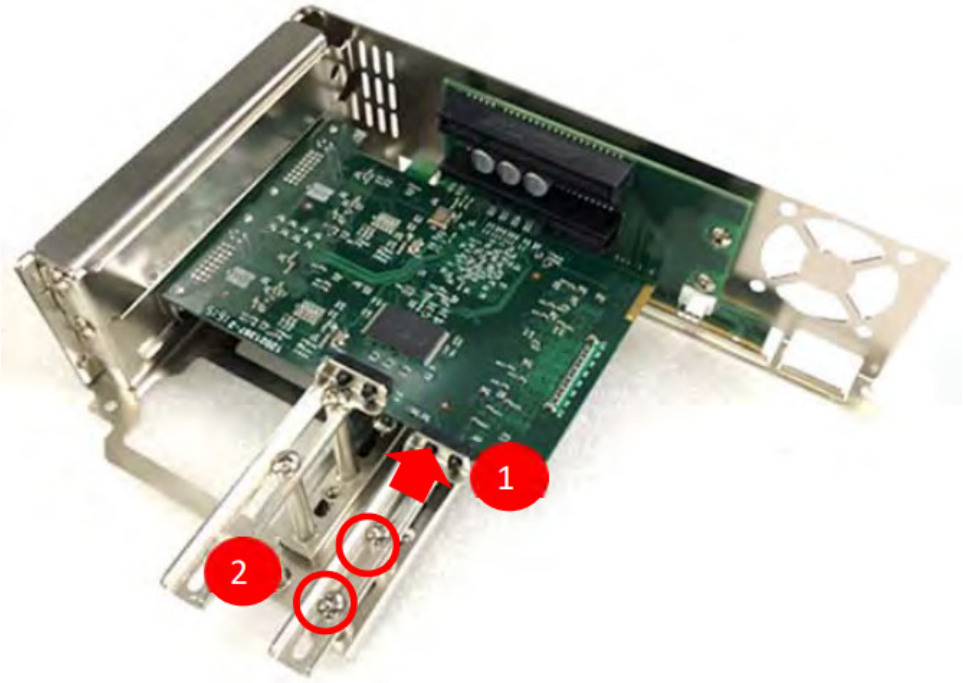
4. (1) Loosen the screw(s) to remove I/O bracket(s). (2) Loosen the screws halfway to allow the card retainer to be adjustable.



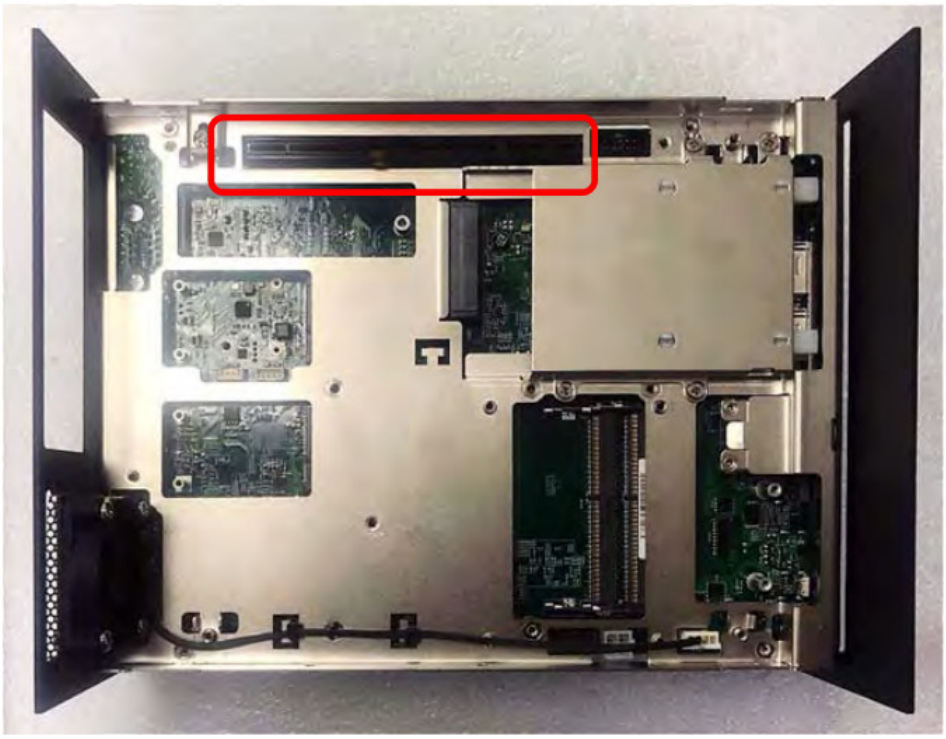
5. (1) Insert PCI(e) add-on card to the slot. (2) Fasten the screw to secure it



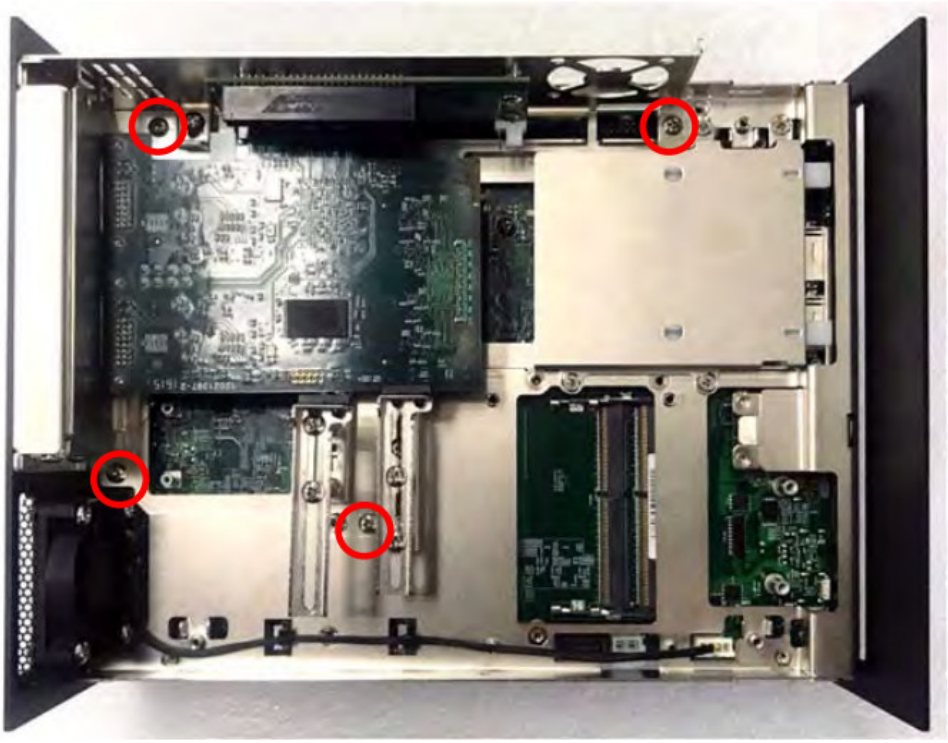
6. (1) Push the card retainer forward to against the edge of the add-on card. (2) Fasten the screws to fix the card retainer.



7. Locate the riser card slot on bottom side of system.

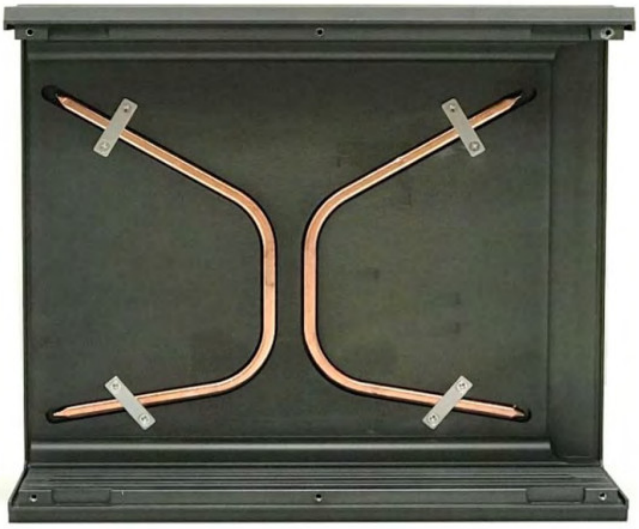


8. Install the module assembled in step 6 into the riser card slot, and fasten the 4 screws to secure it.



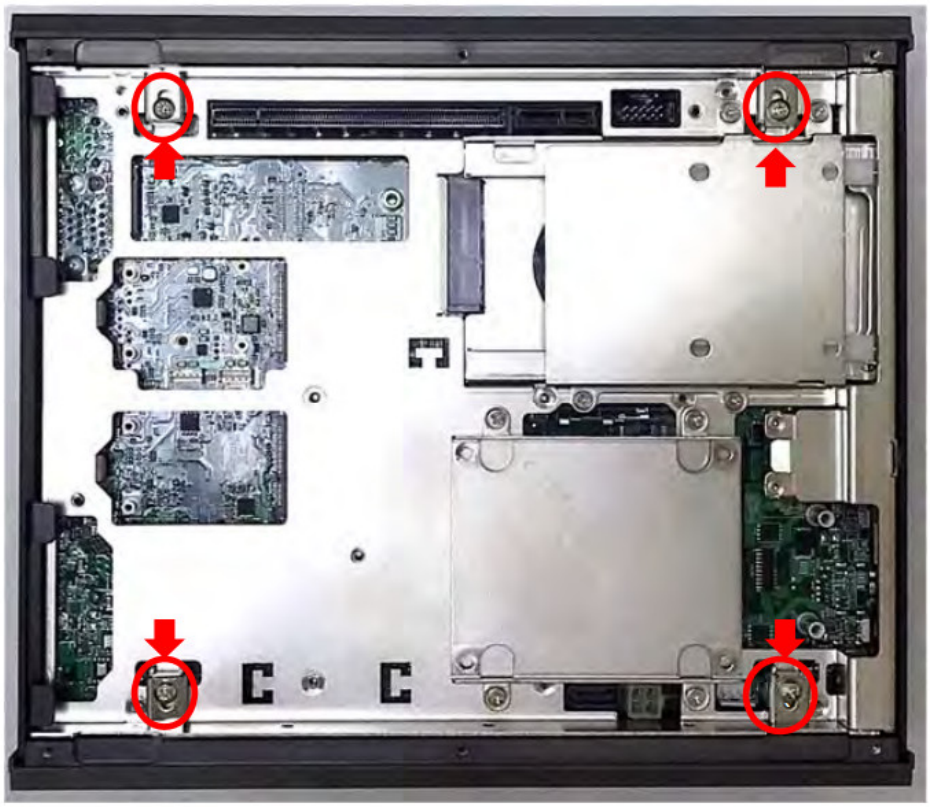
3.9 Assembling Top Cover

1. Make sure the notch on the chassis and the front bezel of the unit body are on the same side.



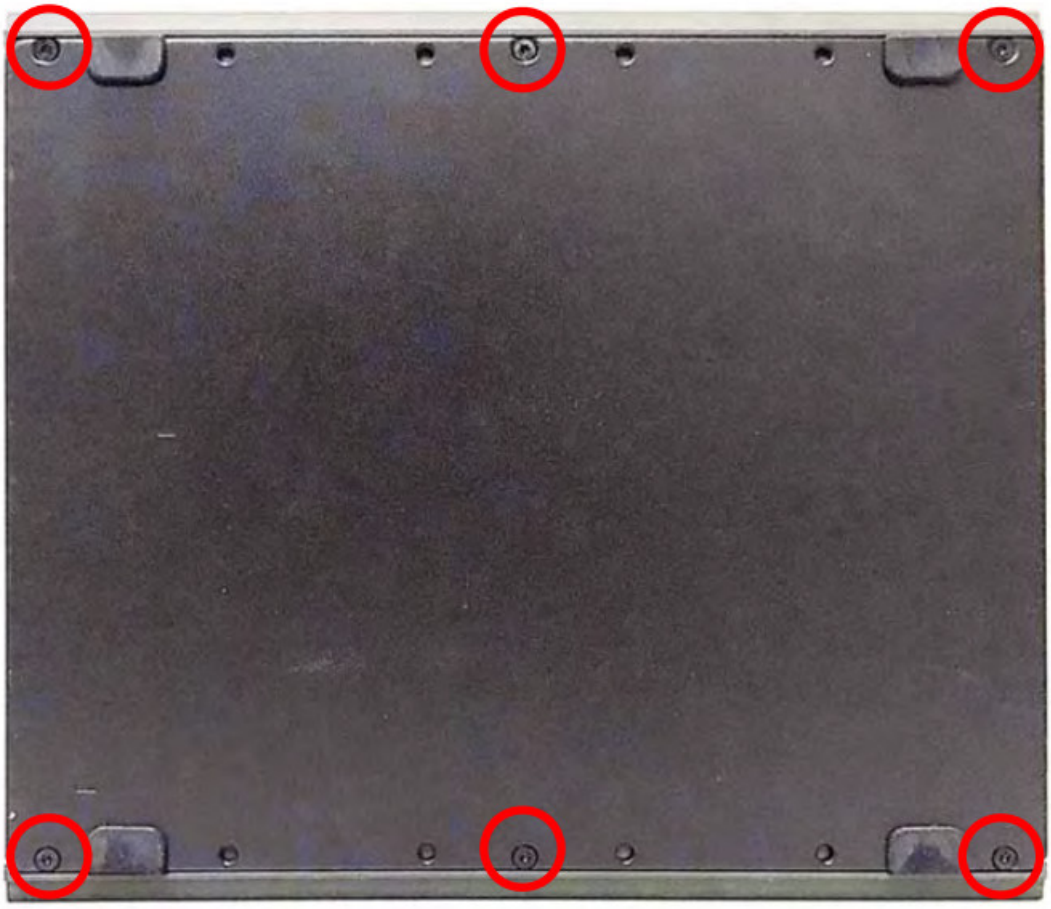
2. Lift the body of the unit, make sure that the front and rear panels are in the chassis groves, and then assemble the body into the chassis.

3. Push into the 4 latches as indicated and fasten the 4 screws.



4. Fasten the 2 screws at rear panel.

5. Be sure to align the grooves with front and rear panels. Put the bottom cover back on and fasten the 6 screws to fix the cover.

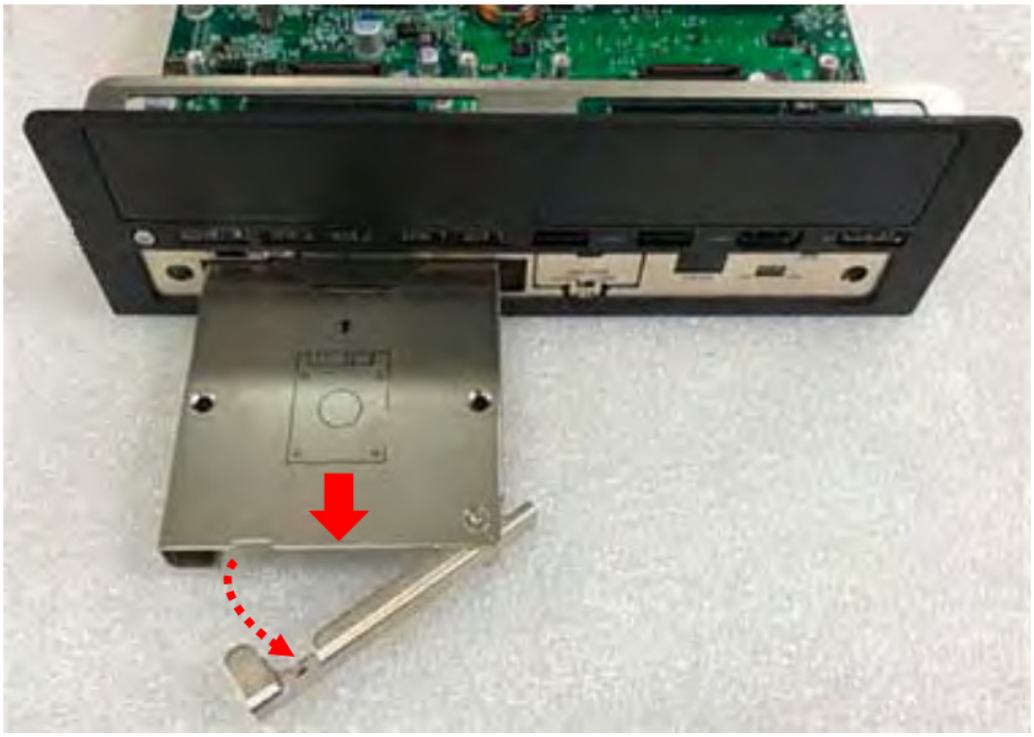


3.10 Installing SATA Hard Drives at Front Panel

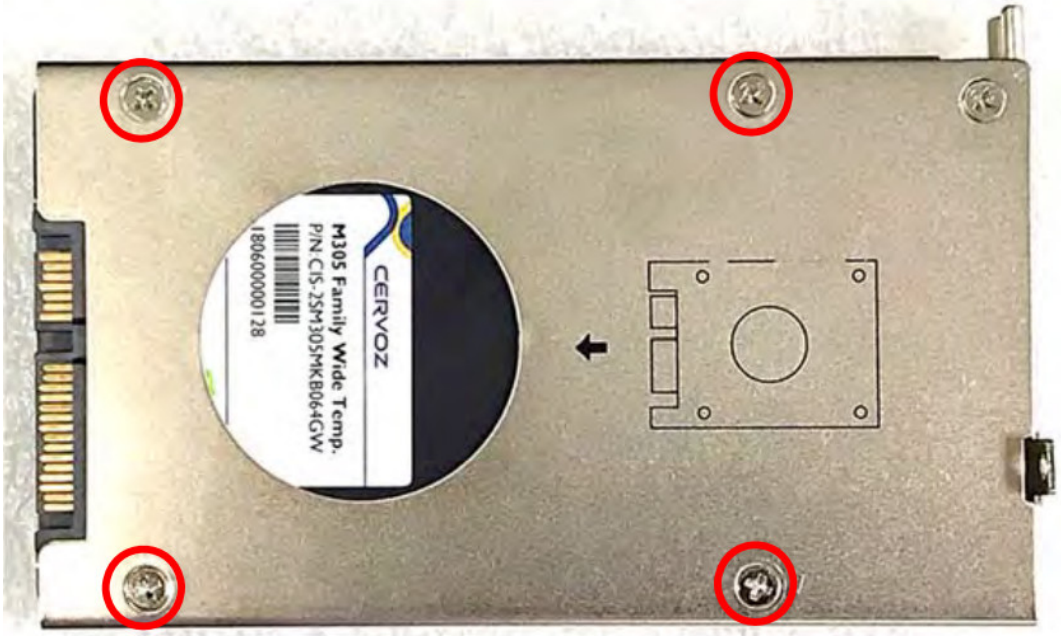
1. Loosen the two screws to remove the cover plate of maintenance zone.

2. Loosen the screw to remove the HDD bay cover bracket.

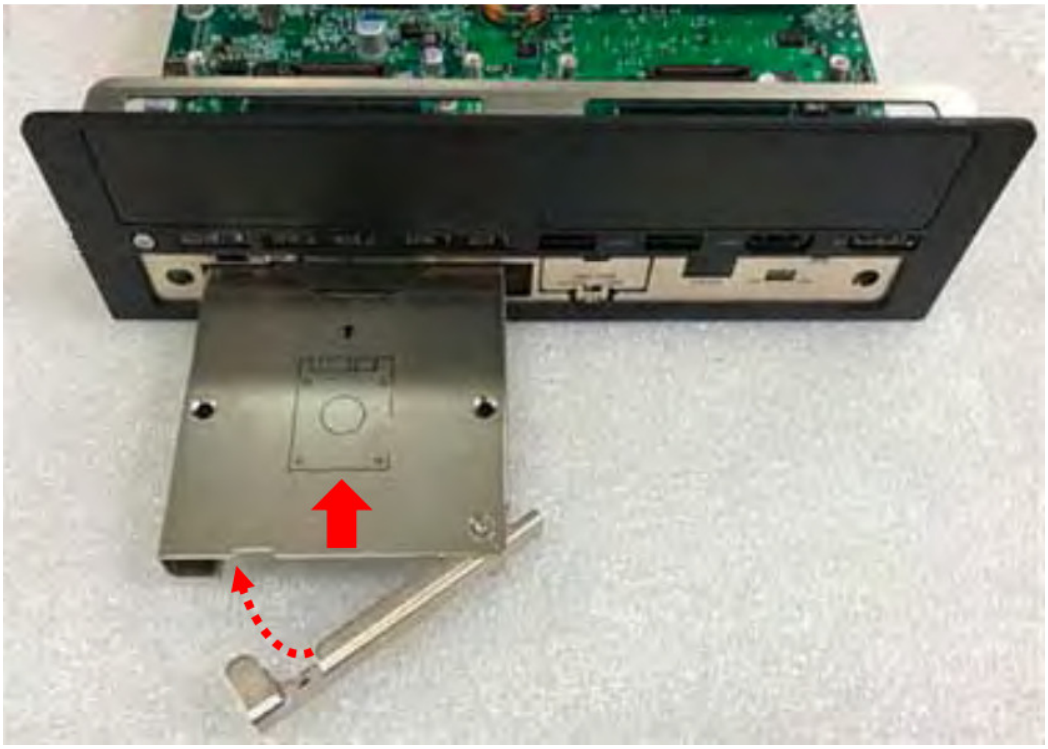
3. Pull the rotating arm and pull the HDD bracket out of system.



4. Make HDD bottom side face up, place the HDD bracket on it. Ensure the direction of bracket is correct and use 4 provided screws to assemble HDD and HDD bracket together.



5. Align the HDD bracket with the entrance of HDD bay. Insert the HDD bracket and push it until the HDD connector is fully inserted into the SATA slot.



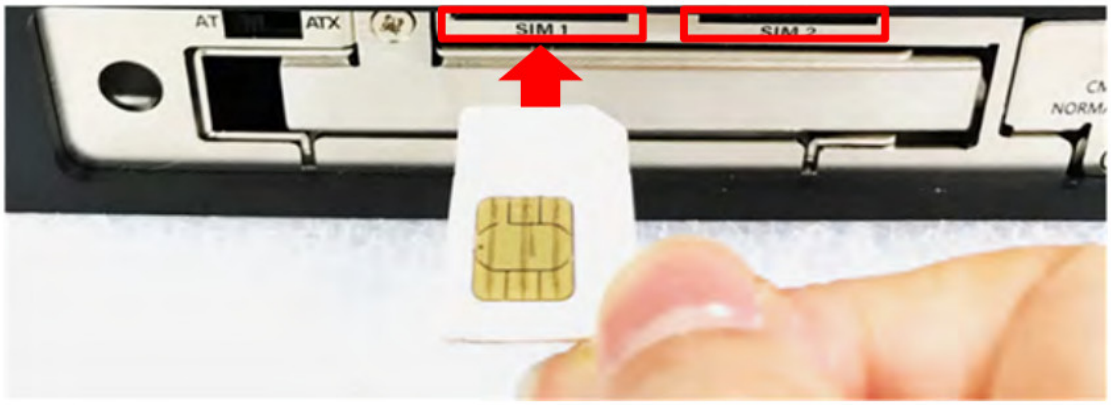
6. Place the rotating arm back and fasten the screw(s).

7. Fix the cover plate of maintenance zone by fastening the two screws.

3.11 Installing SIM Card

1. Loosen the two screws to remove the cover plate of maintenance zone.

2. Locate the SIM card slot at front side and insert a SIM card into a SIM slot with the gold contacts facing up. Please pay attention to the insert orientation as illustrated.



3. Fix the cover plate of maintenance zone by fastening the two screws.

3.12 Replacing CMOS Battery

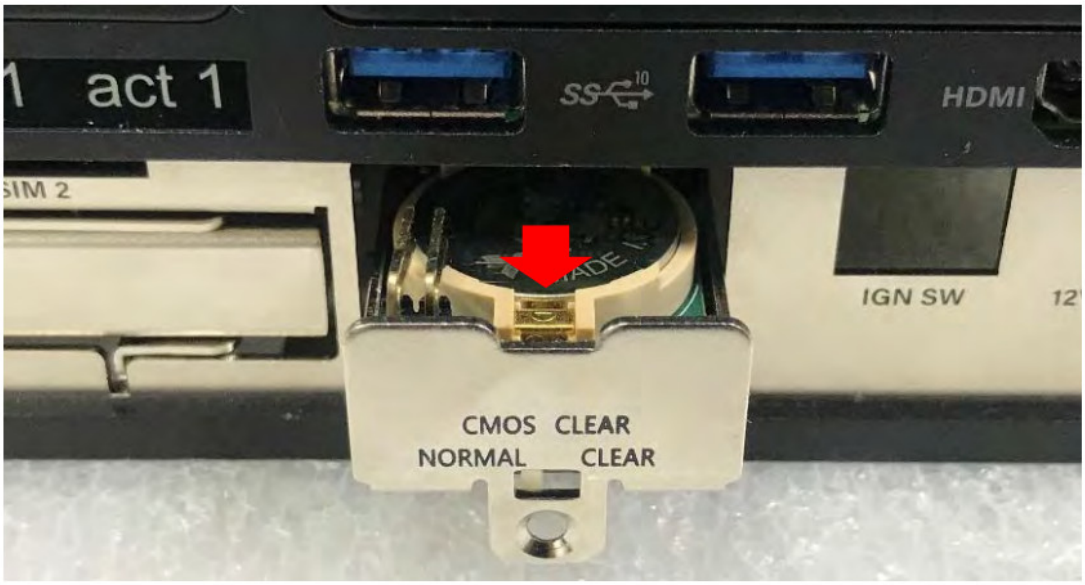
NOTE

This chapter is only for the situation that is required to replace the CMOS battery.

1. Loosen the two screws to remove the cover plate of maintenance zone.

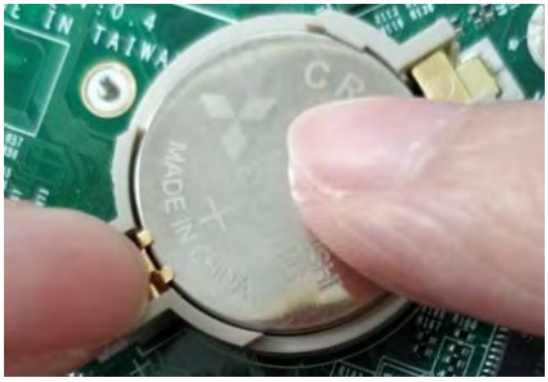
2. Locate the removable CMOS Battery and loosen the screw.

3. Pull out the CMOS battery bracket with assistance of a tweezer.

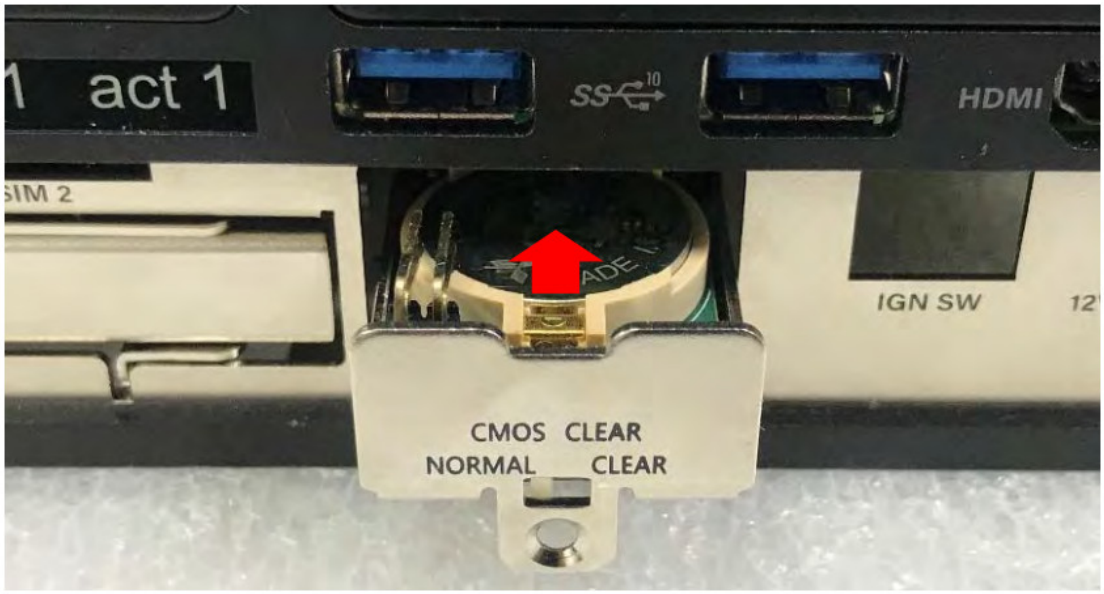


4. Remove the battery by pressing the metal tab backwards slightly as indicated.

5. Pay attention to the direction of “+” and “– “signs on the battery. Push the battery into the slot from the “-” side and pull the metal tab backwards to make the battery fully installed in the slot.



6. Insert the battery bracket firmly.



7. Fasten the screw.

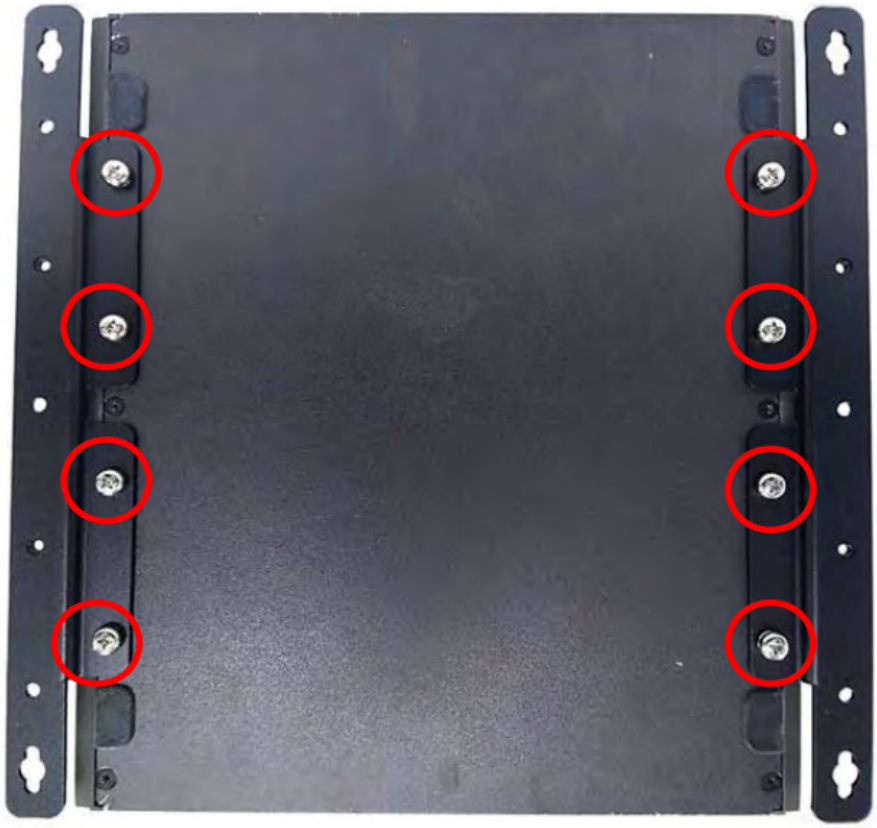
8. Fix the cover plate of maintenance zone by fastening the two screws.

3.13 Installing Wall Mount

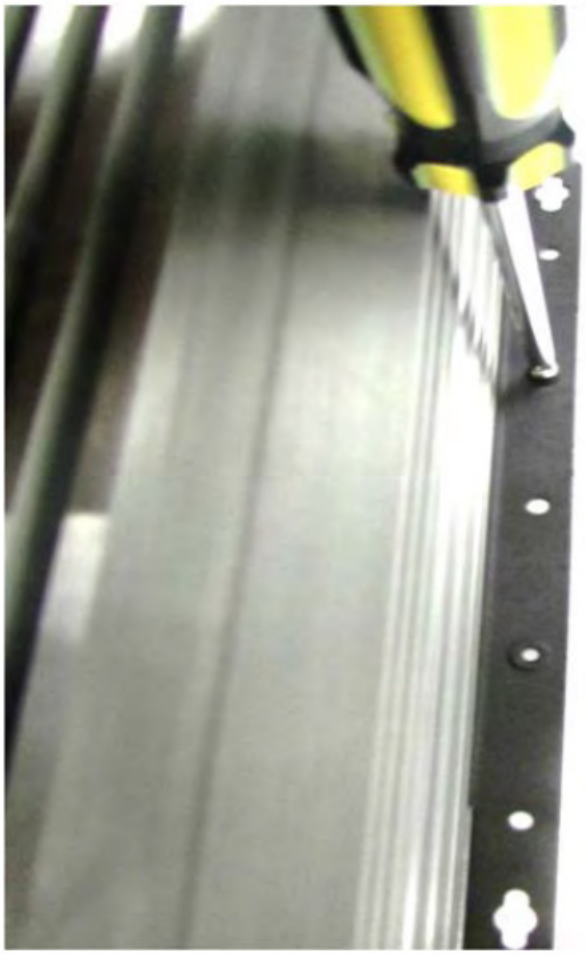
The Spectra PowerBox 3000E series offers wall mount kit that customers can install the system on the wall in a

convenient and economical way.

1. The mounting holes are at the bottom side of the system. Use the provided 8 screws to fasten the bracket and the system together.



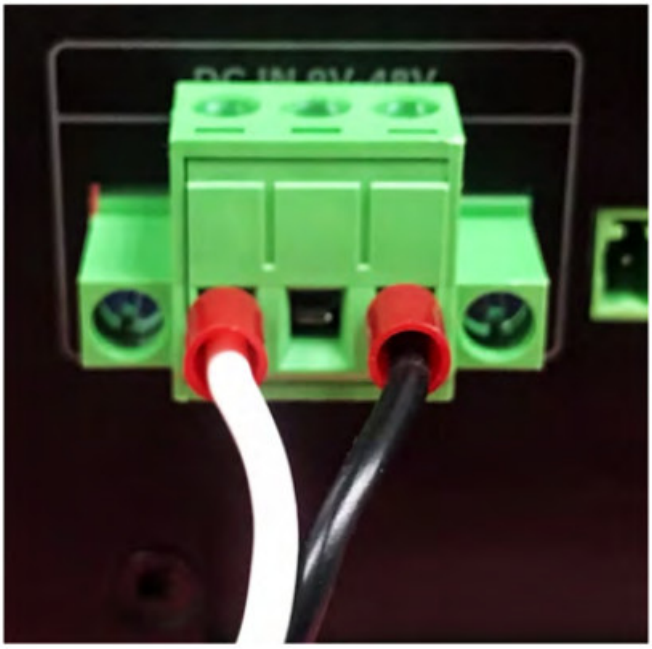
2. Fasten the screws through the bracket mounting holes to mount the system onto the wall.



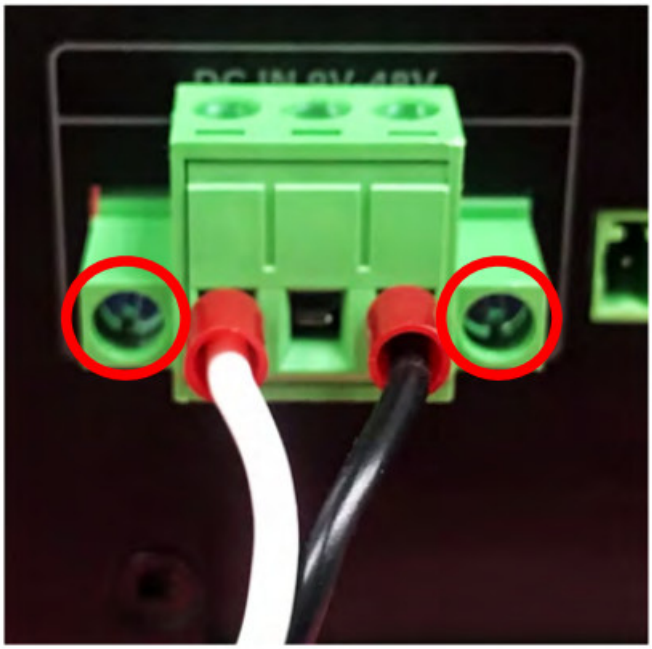
3.14 Connecting to Power Supply

1. Locate the DC_IN1 power connector.

2. Aim the V- wire at the V- port of the connector, and aim the V+ wire at the V+ port of the connector. Then connect the phoenix contacts of the power supply to the DC_IN connector.



3. Fasten the two screws to fix the phoenix contacts.



WARNING

In formal use, please use new Phoenix contacts and make sure the screws are tightened to avoid poor connection.

Chapter 4 BIOS Setup

4.1 BIOS Introduction

The BIOS (Basic Input/ Output System) is a program located on a Flash Memory on the motherboard. When you start the computer, the BIOS program will gain control. The BIOS first operates an auto-diagnostic test called POST (power on self-test) for all the necessary hardware, it detects the entire hardware device and configures the parameters of the hardware synchronization.

BIOS Setup

Power on the computer and by pressing <Del> immediately allows you to enter Setup. If the message disappears before your respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing <Ctrl>, <Alt> and <Delete> keys.

Control Keys	
<er—> <—>>	Move to select screen
<T> <1>	Move to select item
<Esc>	Quit the BIOS Setup
<Enter>	Select item
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<Tab>	Select setup fields
<F1>	General help
<F2>	Previous value
<F3>	Load Optimized defaults
<F10>	Save configuration and Exit

Main Menu

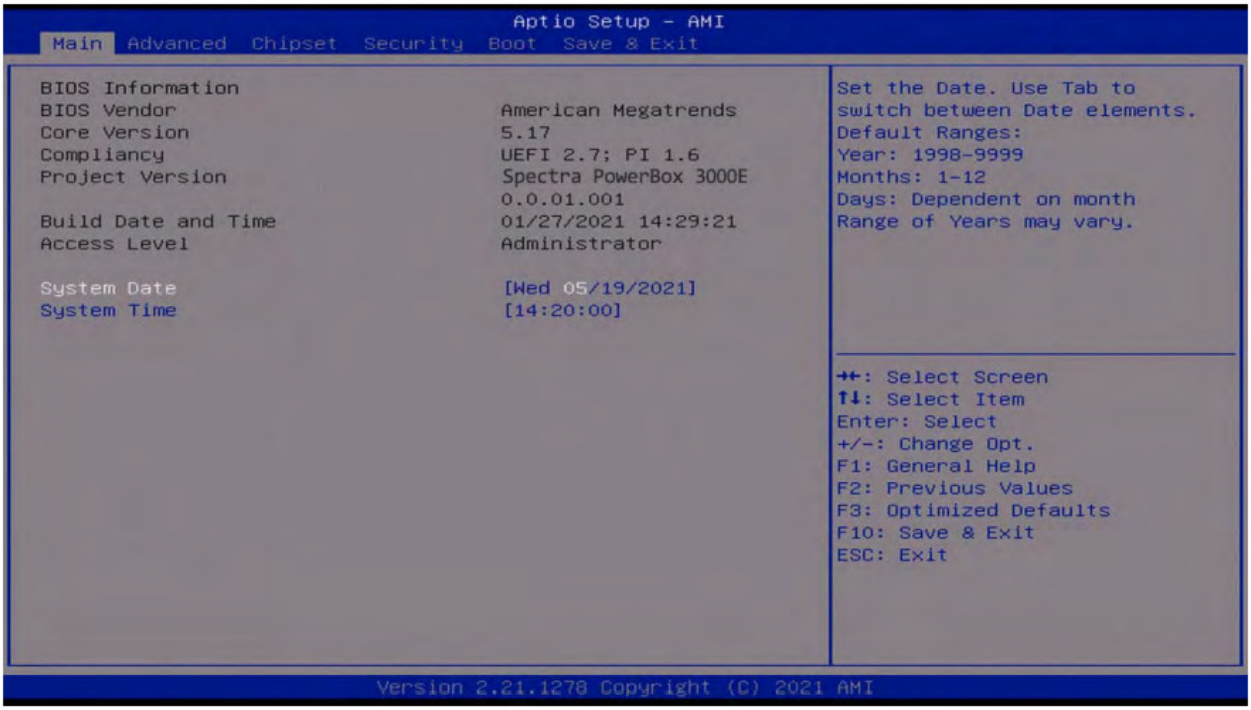
The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

4.2 Main Setup

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



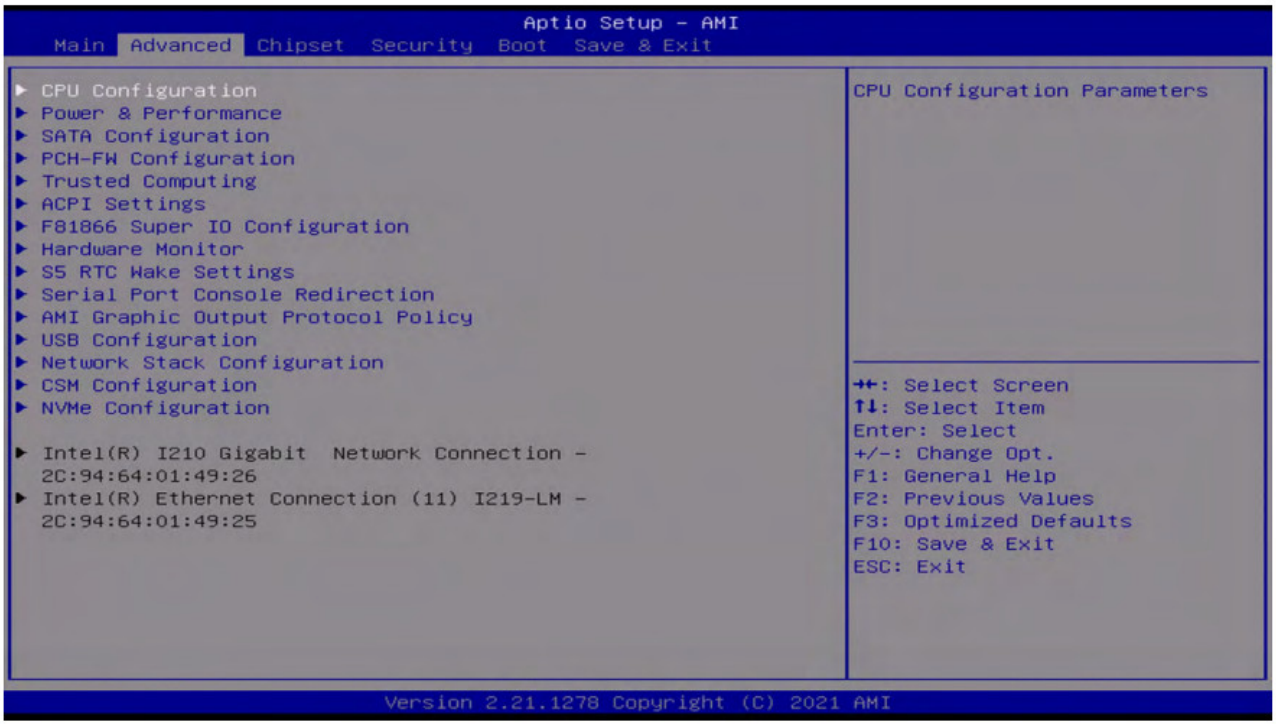
4.2.1 System Date

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

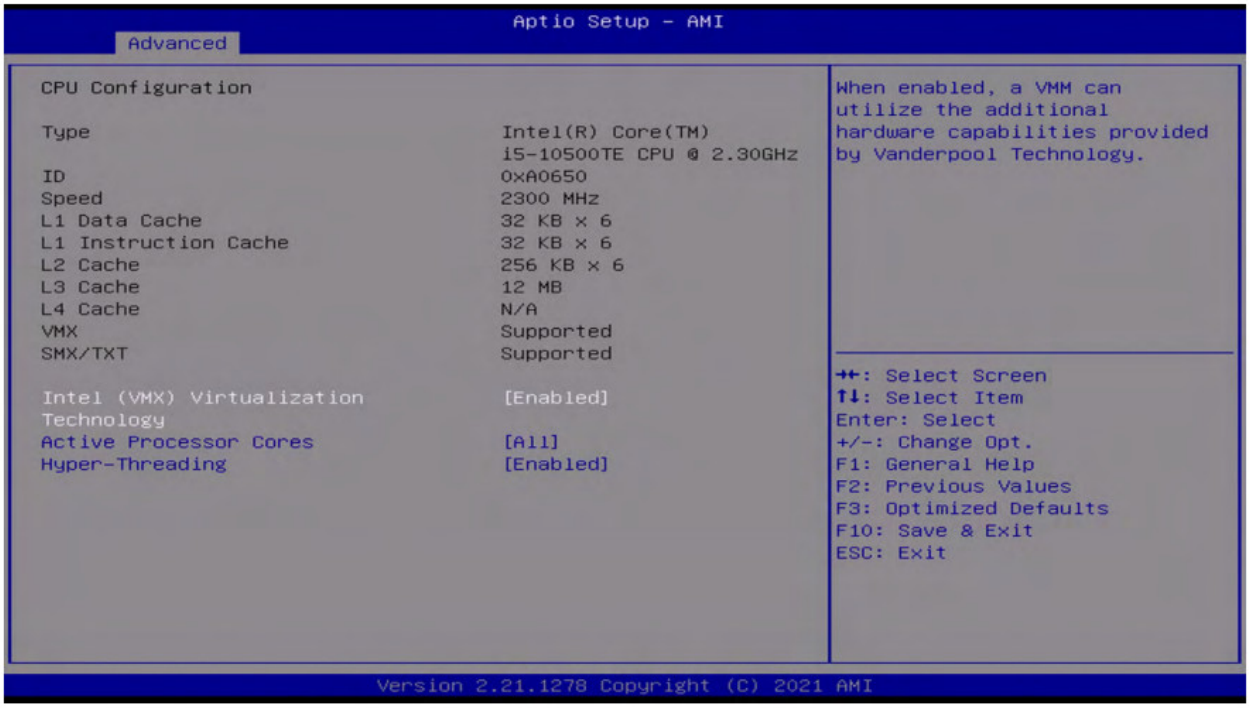
4.2.2 System Time

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

4.3 Advanced Setup



4.3.1 CPU Configuration



- Intel® (VMX) Virtualization Technology [Enabled]

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

- Active Process Cores [All]

  Allows users to choose the number of active processor cores.

  Configuration options: [All] [1] [2] [3] [4] [5]
- Hyper-threading

Enables or disables for Hyper-Threading Technology.

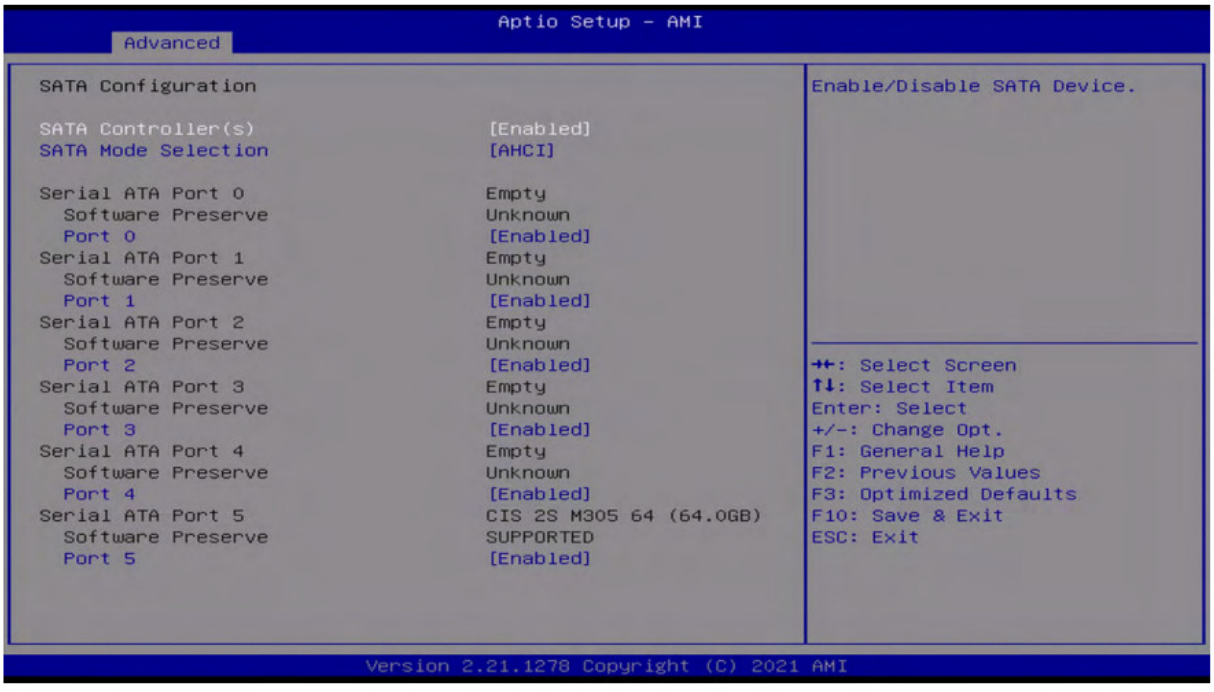
4.3.2 Power & Performance

- **SKU Power Config [Auto]**

  Allows users to choose the upper limit of CPU power.

  Configuration options: [Auto] [35W]

4.3.3 SATA Configuration



- **SATA Controller(s) [Enabled]**

  Enables or disables Serial ATA controller.
- **SATA Mode Selection [AHCI]**

This item allows users to choose [AHCI] or [RAID] mode.

- **Serial ATA Port 0**

  Port 0 [Enabled]

  Enables or disables SATA Port 0.
- **Serial ATA Port 1**

  Port 1 [Enabled]

  Enables or disables SATA Port 1.
- **Serial ATA Port 2**

  Port 2 [Enabled]

  Enables or disables SATA Port 2.
- **Serial ATA Port 3**

  Port 3 [Enabled]

  Enables or disables SATA Port 3.
- **Serial ATA Port 4**

  Port 4 [Enabled]

  Enables or disables SATA Port 4.
- **Serial ATA Port 5**

  Port 5 [Enabled]

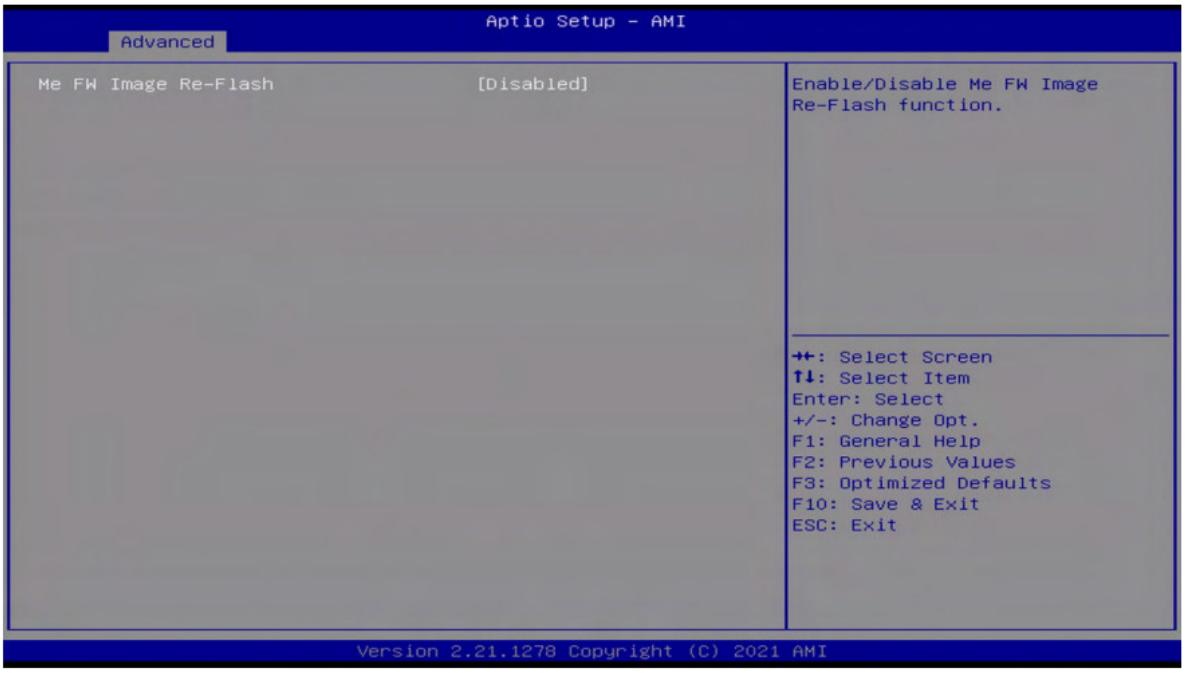
  Enables or disables SATA Port 5.

4.3.4 PCH-FW Configuration

- **Intel AMT [Enabled]**

Allows users to enable or disable Intel® Active Management Technology BIOS execution.

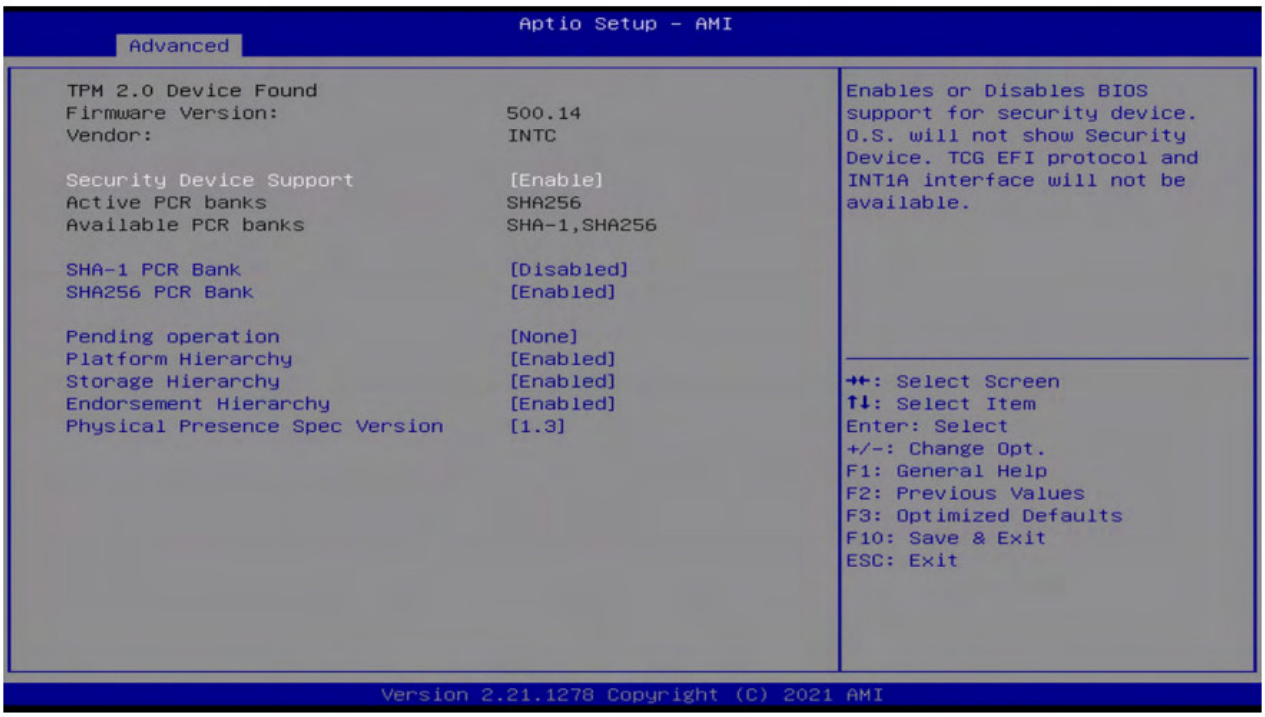
- **Firmware Update Configuration**



- **ME FW Image Re-Flash [Disabled]**

  Allows users to enable or disable ME firmware image re-flash function.

4.3.5 Trusted Computing



- **Security Device Support [Enable]**

  Allow users to enable or disable Security Device Support function.

- **SHA-1 PCR Bank [Disabled]**

  Enables or disables SHA-1 PCR Bank function.

- **SHA256 PCR Bank [Enabled]**

  Enables or disables SHA256 PCR Bank function.
- **Pending Operation [None]**

  Allows users to select which mode Pending Operation will operate.

  Configuration options: [None], [TPM Clear]
- **Platform Hierarchy [Enabled]**

  Enables or disables Platform Hierarchy function.
- **Storage Hierarchy [Enabled]**

  Enables or disables Storage Hierarchy function.
- **Endorsement Hierarchy [Enabled]**

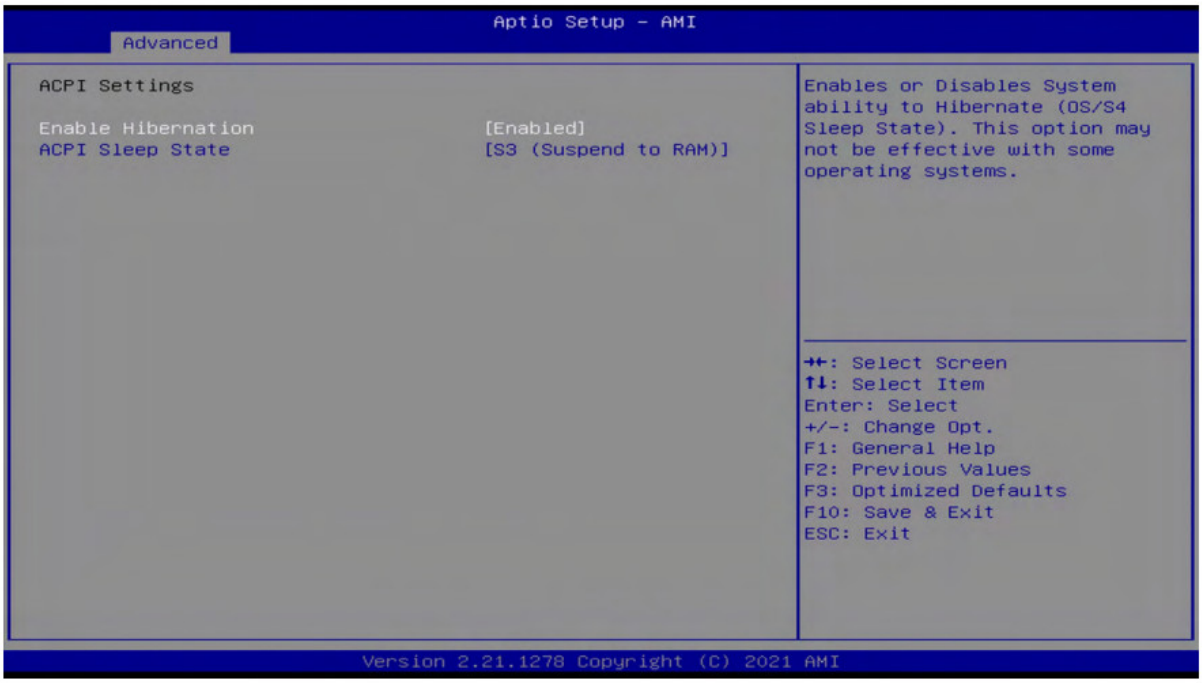
  Enables or disables Endorsement Hierarchy function.
- **Physical Presence Spec Version [1.3]**

  Allows users to select which mode Physical Presence Spec Version will operate.

  Configuration options: [1.2], [1.3]

4.3.6 ACPI Settings

This item allows users to configure ACPI settings.



- **Enable ACPI Auto Configuration [Enabled]**

  Enables or disables BIOS Advanced Configuration Power Interface® (ACPI) auto configuration.
- **ACPI Sleep State [S3 (Suspend to RAM)]**

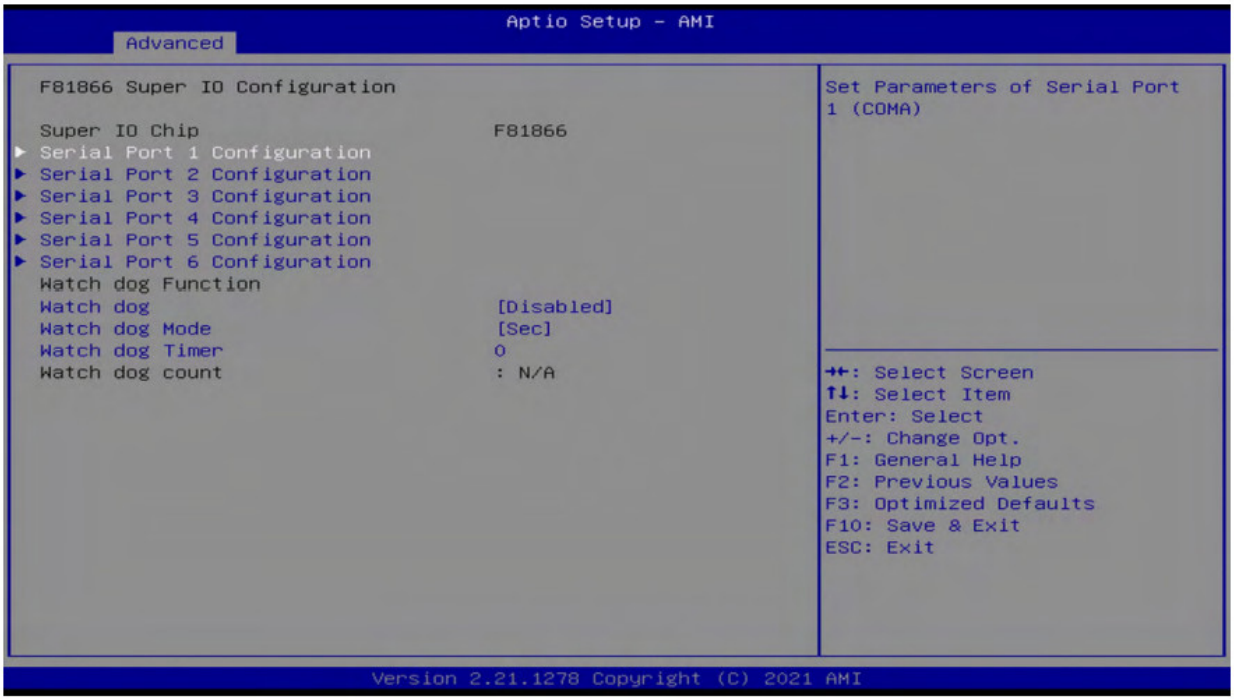
  Allows users to select the highest Advanced Configuration Power Interface® (ACPI) sleep state that system will enter when suspend button is pressed.

  [Suspend Disabled]: Disables entering suspend state.

  [S3 (suspend to RAM)]: Enables suspend to RAM state.

4.3.7 F81866 Super IO Configuration

The screen allows users to select options for the Super IO configuration, and change the value of the selected option.



- **Serial Port 1~4 Configuration**

- Serial Port [Enabled]

  This item allows users to enable or disable serial port.
- Change Settings [Auto]

  This item allows users to change the address & IRQ settings of the specified serial port.
- Onboard Serial Port 1 Mode [RS232]

  This item allows users to select Serial Port Mode.

  Configuration options: [RS232] [RS422/RS485 Full Duplex] [RS485 Half Duplex]

  ■ Watch Dog [Disabled]

  Enables or disables watch dog function.

  ■ Watch Dog Mode [Sec]

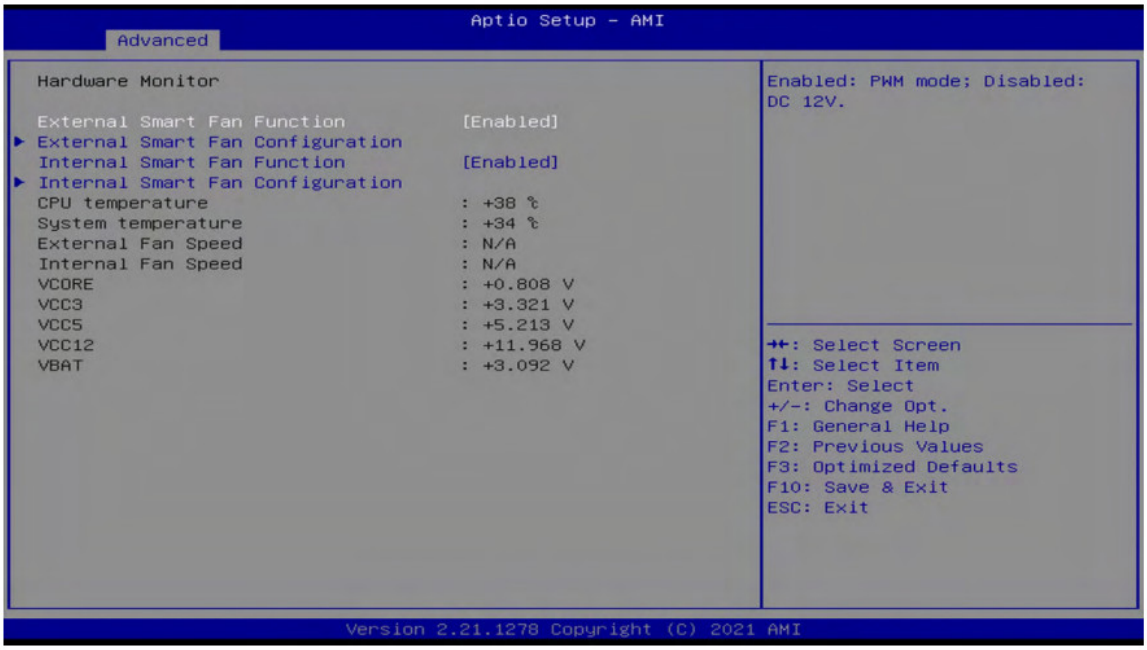
Changes the Watch dog mode. Select [Sec] or [Min] mode.

■ Watch Dog Timer [0]

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

4.3.8 Hardware Monitor

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



- External Smart Fan Function [Enabled]

  Enables or disables external smart fan function.

- External Smart Fan Configuration

  Allows users to setting external smart fan parameters.

  ■ Internal Smart Fan Function [Enabled]

  Enables or disables internal smart fan function.

  ■ Internal Smart Fan Configuration

  Allows users to setting internal smart fan parameters.

4.3.9 S5 RTC Wake Settings

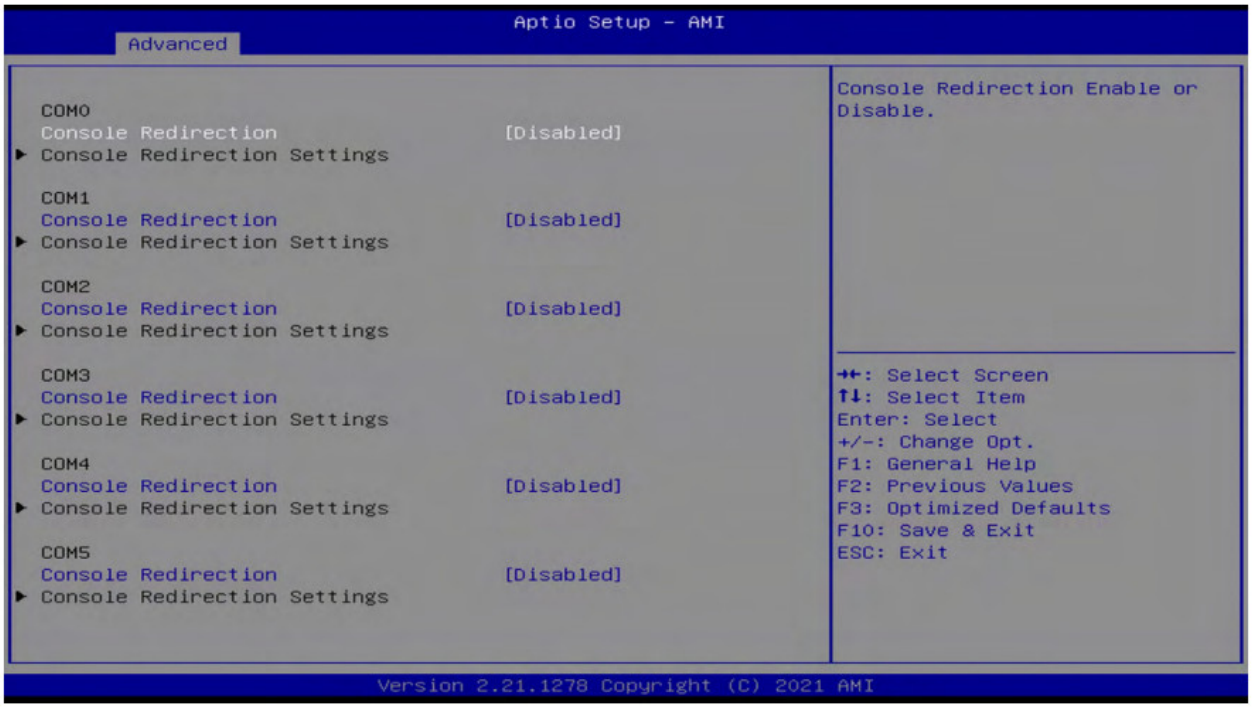
- **Wake System from S5 [Disabled]**

  This item allows users to change the way to wake system from S5 state.

  [Fixed Time]: Set the specified time (HH:MM:SS) to wake system.

  [Dynamic Time]: Set the increase time from current time to wake system.

4.3.10 Serial Port Console Redirection



- **Console Redirection [Disabled]**

  These items allow users to enable or disable COM0, COM1, COM2, COM3, COM4, COM5 console redirection function.

4.3.11 AMI Graphic Output Protocol Policy

- Output Select

  Allows users to select which Output Interface to display under BIOS mode. The options shown in this item depend on the displays connected to the system.

  [EDP1]: VGA

  [HDMI1]: HDMI

  [DP2]: DP (Front Panel)

  [DP3]: DP (Rear Panel)

4.3.12 USB Configuration

- Legacy USB Support [Enabled]

  This item allows users to enable or disable legacy USB support. When set to [Auto], legacy USB support will be disabled automatically if no USB devices are connected.

- XHCI Hand-off [Enabled]

  This item allows users to enable or disable XHCI (USB3.2) hand-off function.
- USB Mass Storage Driver Support [Enabled]

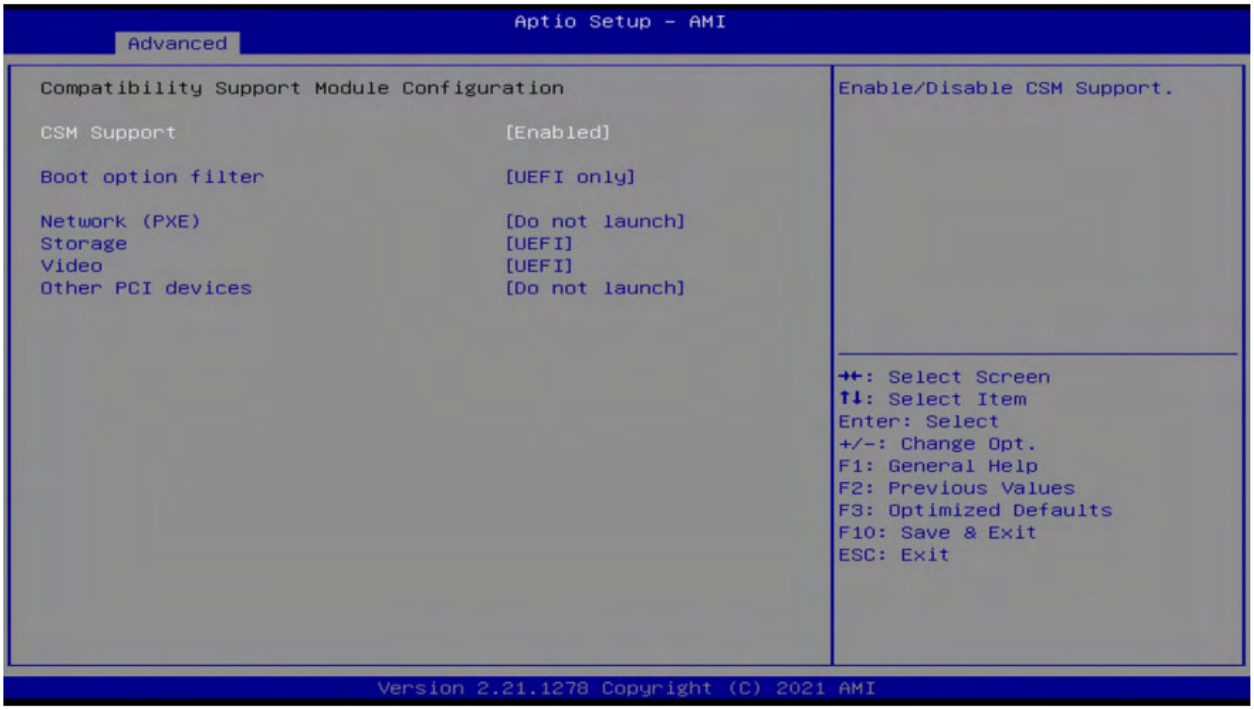
  Enables or disables support for USB mass storage devices.

4.3.13 Network Stack Configuration

- **Network Stack [Disabled]**

  Enables or disables UEFI Network Stack.

4.3.14 CSM Configuration



- **CSM Support [Enabled]**

  Enables or disables compatibility support module.
- **Boot option filter [UEFI only]**

  Allows users to select which type of operating system to boot.

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

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

  [UEFI only]: Allows booting operating systems that only support UEFI option ROM.
- **Network PXE [Do not launch]**

  Controls the execution of UEFI and Legacy PXE (Network Preboot eXecution Environment) option ROM.

  [Do not launch]: Disables option ROM execution.

  [UEFI]: Enables UEFI option ROM only. [Legacy]: Enables legacy option ROM only.
- **Storage [UEFI]**

  Controls the execution of UEFI and Legacy Storage option ROM.

  [Do not launch]: Disables option ROM execution.

  [UEFI]: Enables UEFI option ROM only.

  [Legacy]: Enables legacy option ROM only.
- Video [UEFI]

  Controls the execution of UEFI and Legacy Video option ROM.

  [Do not launch]: Disables option ROM execution.

  [UEFI]: Enables UEFI option ROM only.

  [Legacy]: Enables legacy option ROM only.
- Other PCI devices [Do not launch]

  Allows users to determine option ROM execution policy for devise other than network, storage, or video.

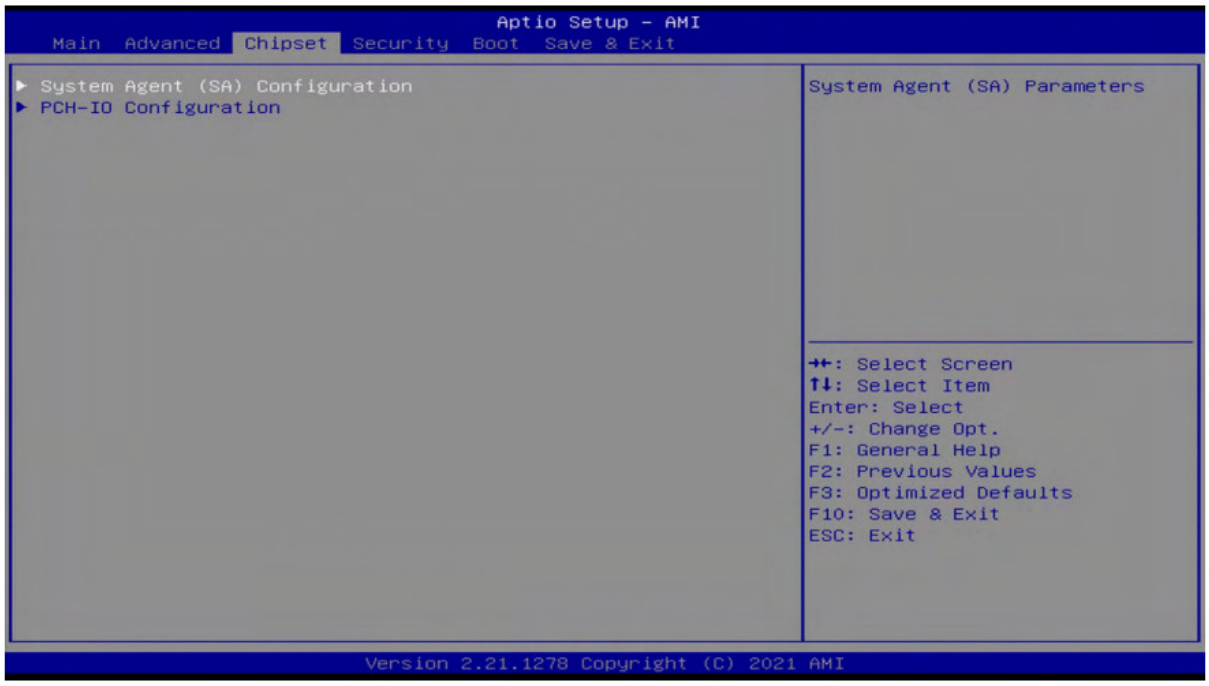
  Configuration options: [Do not launch] [UEFI] [Legacy]

4.3.15 NVMe Configuration

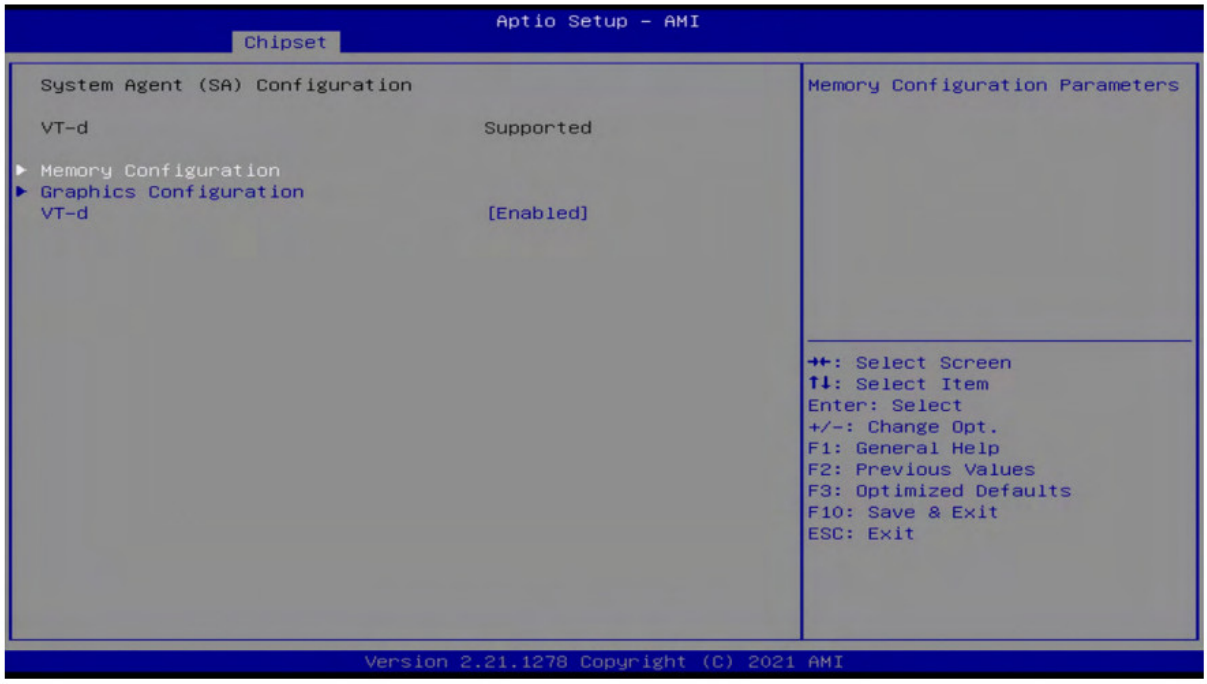
The screen allows users to select options for the NVMe configuration, and change the value of the selected option. If there is NVMe Device detected, the options will show as the NVMe Device is found.

4.4 Chipset Setup

This section allows you to configure chipset related settings according to user's preference.



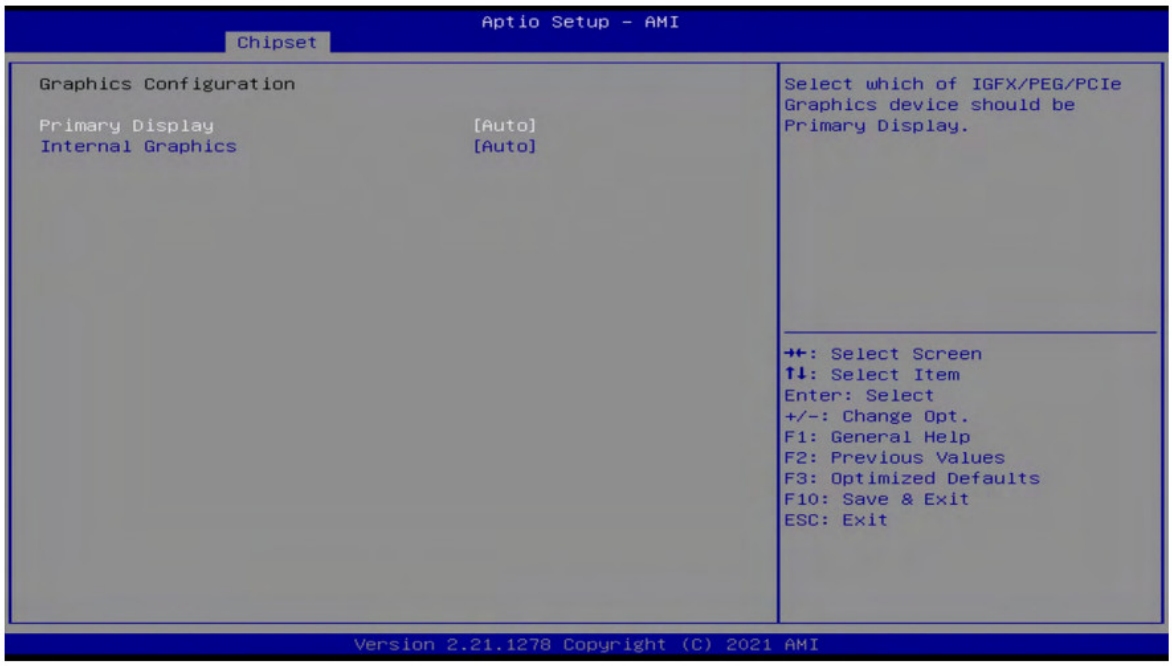
4.4.1 System Agent (SA) Configuration



- **Memory Configuration**

  This item displays detailed memory information in the system.

- Graphics Configuration



- Primary Display [Auto]

  Allows users to select which graphics device should be primary display or select SG for switchable graphics.

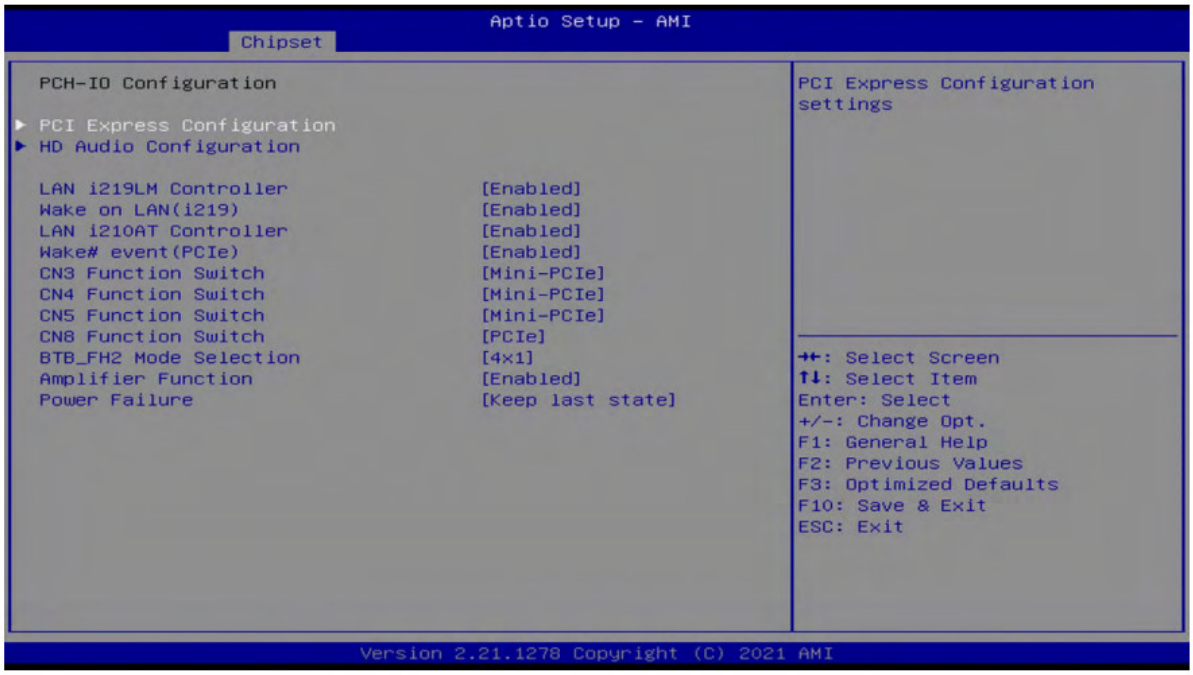
  Configuration options: [Auto] [IGFX] [PEG]
- Internal Graphics [Auto]

  This item allows users to enable or disable Internal Graphics. When set to [Auto], it will detect by BIOS.

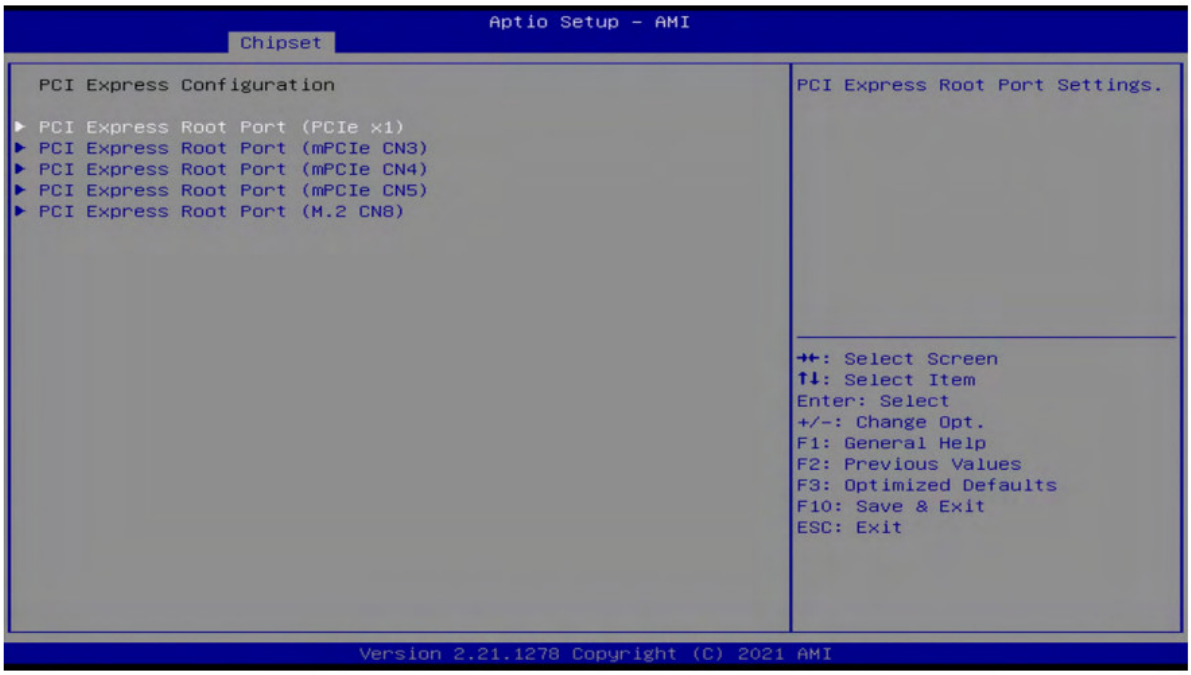
  Configuration options: [Auto] [Disabled] [Enabled]

This item allows users to enable or disable Intel® Virtualization Technology for Directed I/O (VT-d) function.

4.4.2 PCH-IO Configuration



- **PCI Express Configuration**



- PCI Express Root Port (PCIe x1)
- PCI Express Root Port [Enabled]

  Allows you to enable or disable the PCI Express Port.
- PCIe Speed [Auto]

  Allows you to select PCI Express interface speed.

  Configuration options: [Auto] [Gen1] [Gen2] [Gen3].
- PCI Express Root Port (mPCIe CN3)
- PCI Express Root Port [Enabled]

  Allows you to enable or disable the PCI Express Port.
- PCIe Speed [Auto]

  Allows you to select PCI Express interface speed.

Configuration options: [Auto] [Gen1] [Gen2] [Gen3].

- PCI Express Root Port (mPCIe CN4)
- PCI Express Root Port [Enabled]

  Allows you to enable or disable the PCI Express Port.
- PCIe Speed [Auto]

  Allows you to select PCI Express interface speed.

  Configuration options: [Auto] [Gen1] [Gen2] [Gen3].
- PCI Express Root Port (mPCIe CN5)
- PCI Express Root Port [Enabled]

  Allows you to enable or disable the PCI Express Port.
- PCIe Speed [Auto]

  Allows you to select PCI Express interface speed.

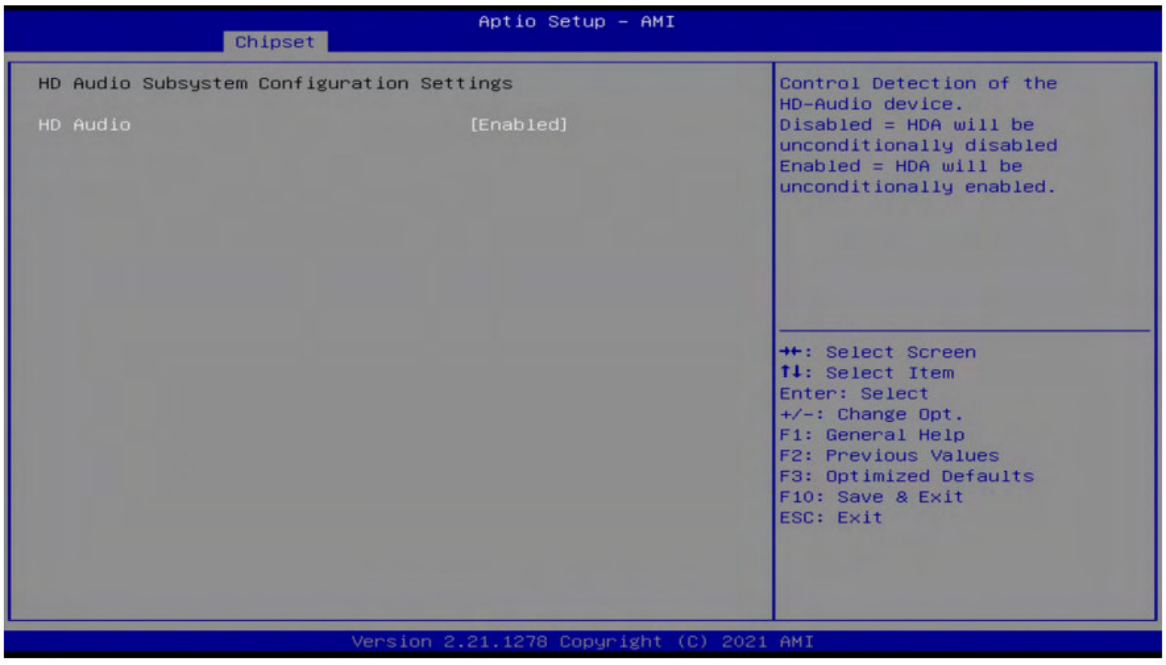
  Configuration options: [Auto] [Gen1] [Gen2] [Gen3].
- PCI Express Root Port (M.2 CN8)
- PCI Express Root Port [Enabled]

  Allows you to enable or disable the PCI Express Port.
- PCIe Speed [Auto]

  Allows you to select PCI Express interface speed.

  Configuration options: [Auto] [Gen1] [Gen2] [Gen3].

■ HD Audio Configuration



- HD Audio [Enabled]

Allows you to select HD Audio options.
[Enabled]: HD Audio device is unconditionally enabled.
[Disabled]: HD Audio device is unconditionally disabled.

- LAN i219LM Controller [Enabled]

Enables or disables i219LM LAN Controller.

- Wake On LAN (i219) [Enabled]

  Enables or disables integrated LAN i219LM Wake on LAN function.

- LAN i210AT Controller [Enabled]

  Enables or disables I210 LAN Controller.

- Wake# event (PCIe) [Enabled]

  Enables or disables integrated LAN i210 Wake on LAN function.

- CN3 Function Switch [Mini-PCIe]

  Allows users to select [Mini-PCIe] or [mSATA] or [USB3.0] for CN3 connector.

- CN4 Function Switch [Mini-PCIe]

  Allows users to select [Mini-PCIe] or [mSATA] or [USB3.0] for CN4 connector.

- CN5 Function Switch [Mini-PCIe]

  Allows users to select [Mini-PCIe] or [mSATA] or [USB3.0] for CN5 connector.

- CN8 Function Switch [PCIe]

  Allows users to select [PCIe] or [SATA] for CN8 connector.

- BTB_FH2 Mode Selection [4×1]

  Allows users to select [4×1] or [1×4] for BTB_FH2 Mode.

- Amplifier Function [Enabled]

  Enables or disables Amplifier Function.

- Power Failure [Keep last state]

  Allows you to specify which power state system will enter when power is resumed after a power failure (G3 state).

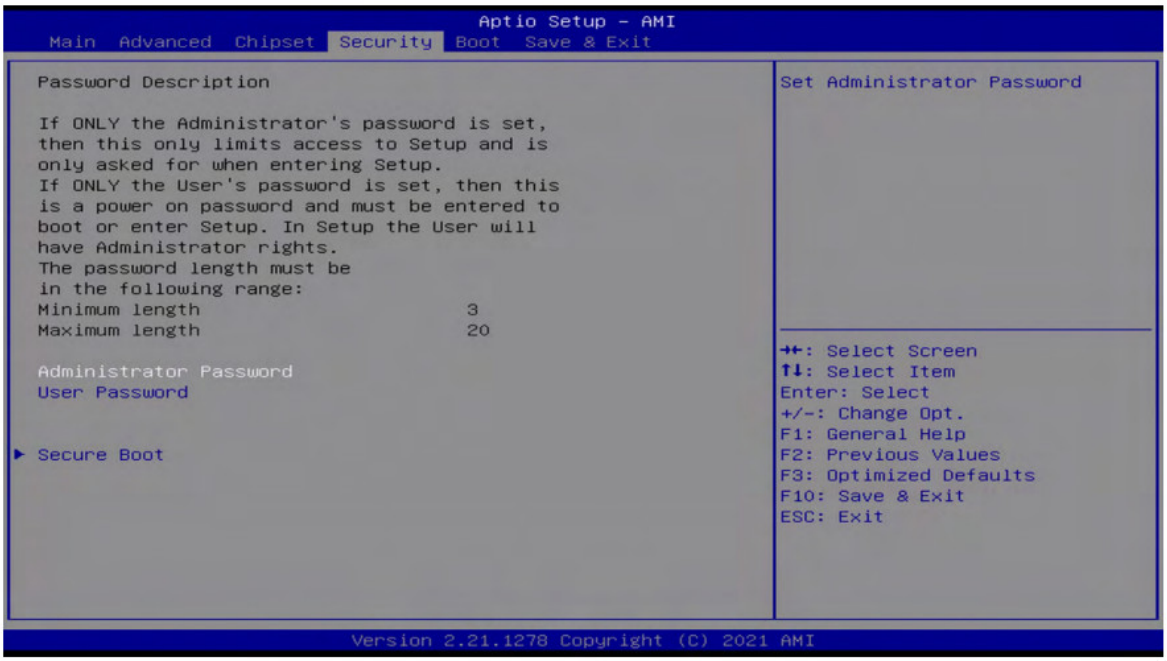
  [Always on]: Enters to power on state.

  [Always off]: Enters to power off state.

  [Keep last state]: Enters to the last power state before a power failure.

4.5 Security Setup

This section allows users to configure BIOS security settings.



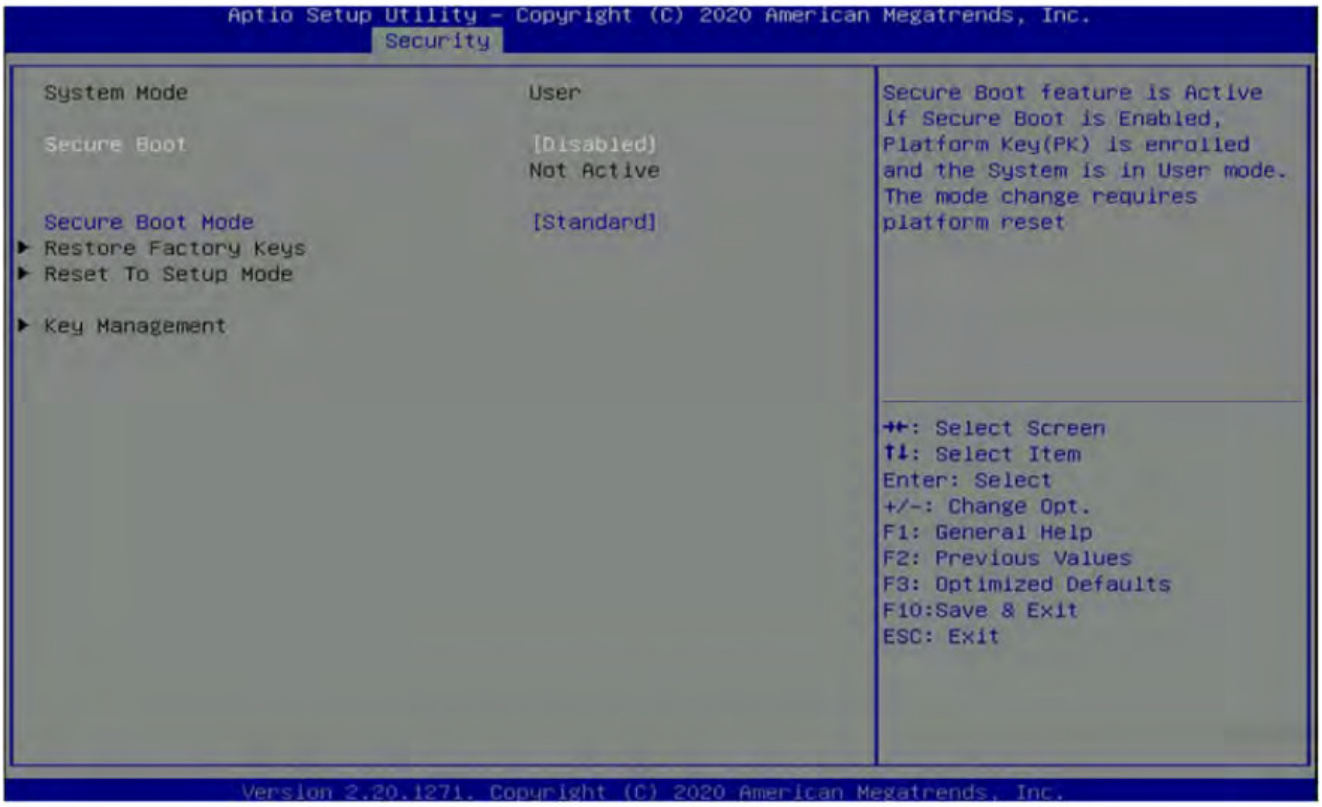
4.5.1 Administrator Password

Administrator Password controls access to the BIOS Setup utility.

4.5.2 User Password

User Password controls access to the system at boot and to the BIOS Setup utility.

4.5.3 Security Boot



- Secure Boot [Disabled]

  Enable or disable Secure Boot function.

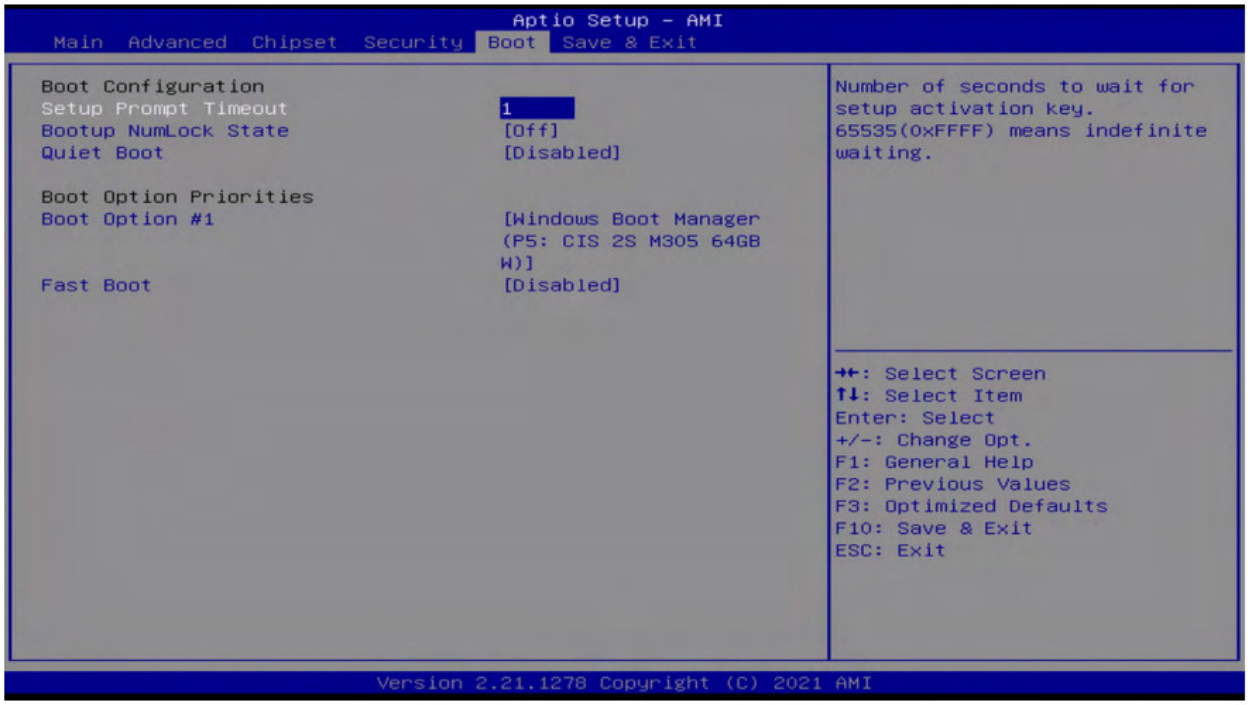
- Secure Boot Mode [Standard]

  Allows you to select Secure Boor Mode.

  Configuration options: [Standard] [Custom].

4.6 Boot Setup

This section allows you to configure Boot settings.



4.6.1 Setup Prompt Timeout [1]
Use this item to set number of seconds (1..65535) to wait for setup activation key.
4.6.2 Bootup NumLock State [Off]
Allows users to select the power-on state for keyboard NumLock.
4.6.3 Quiet Boot [Disabled]
Allows users to enable or disable Quiet Boot function.
4.6.4 Fast Boot [Disabled]
Allows users to enable or disable Fast Boot function.

4.7 Save & Exit

4.7.1 Save Changes and Exit
This item allows users to exit system setup after saving changes.
4.7.2 Discard Changes and Exit
This item allows users to exit system setup without saving changes.

4.7.3 Save Changes and Reset
This item allows users to reset the system after saving changes.
4.7.4 Discard Changes and Reset
This item allows users to reset system setup without saving any changes.
4.7.5 Save Changes
This item allows users to save changes done so far to any of the setup options.
4.7.6 Discard Changes
This item allows users to discard changes done so far to any of the setup options.
4.7.7 Restore Defaults
This item allows users to restore/ load default values for all the options.
4.7.8 Save as User Defaults
This item allows users to save the changes done so far as user defaults.
4.7.9 Restore User Defaults
This item allows users to restore the user defaults to all the options.

Chapter 5 Product Application

5.1 Digital I/O (DIO) application

This section describes DIO application of the product. The content and application development are better understood and implemented by well experienced professionals or developers.

5.1.1 Digital I/O Programming Guide

5.1.1.1 Pins for Digital I/O 1~8

Item	Standard	Item	Standard
GPIO70 (PIN 103)	DI	GPIO80 (PIN 111)	DO
GPIO71 (PIN 104)		GPIO81 (PIN 112)	
GPIO72 (PIN 105)		GPIO82 (PIN 113)	
GPIO73 (PIN 106)		GPIO83 (PIN 114)	
GPIO74 (PIN 107)		GPIO84 (PIN 115)	
GPIO75 (PIN 108)		GPIO85 (PIN 116)	
GPIO76 (PIN 109)		GPIO86 (PIN 117)	
GPIO77 (PIN 110)		GPIO87 (PIN 118)	

5.1.1.2 Pins for Digital I/O 9~16

Item	Standard	Item	Standard
GPIO30 (PIN 36)	DI	GPIO40 (PIN 44)	DO
GPIO31 (PIN 37)		GPIO41 (PIN 45)	
GPIO32 (PIN 38)		GPIO42 (PIN 46)	
GPIO33 (PIN 39)		GPIO43 (PIN 47)	
GPIO34 (PIN 40)		GPIO44 (PIN 48)	
GPIO35 (PIN 41)		GPIO45 (PIN 49)	
GPIO36 (PIN 42)		GPIO46 (PIN 50)	
GPIO37 (PIN 43)		GPIO47 (PIN 51)	

To program the Super I/O chip F81866A configuration registers, the following configuration procedures must be followed in sequence:

1. Enter the Extended Function Mode
2. Configure the configuration registers
3. Exit the Extended Function Mode

The configuration register is used to control the behavior of the corresponding devices. To configure the register, use the index port to select the index and then write data port to alter the parameters.
The default index port and data port are 0x4E and 0x4F, respectively.
Pull down the SOUT1 pin to change the default value to 0x2E/ 0x2F. To enable configuration, the entry key 0x87 must be written to the index port. To disable configuration, write exit entry key 0xAA to the index port.
Following is an example to enable configuration and to disable configuration by using debug.
-o 4e 87
-o 4e 87 (enable configuration)
-o 4e aa (disable configuration)

5.1.1.4 Relative Registers

To program the F81866A configuration registers, see the following configuration procedures.

Logic Device Number Register (LDN) — Index 07h

Bit	Name	R/W	Reset	Default	Description
7-0	LDN	R/W	LRESET#	00h	00h: Select FDC device configuration registers. 03h: Select Parallel Port device configuration registers. 04h: Select Hardware Monitor device configuration registers. 05h: Select KBC device configuration registers. 06h: Select GPIO device configuration registers. 07h: Select WDT device configuration registers. 0Ah: Select PME, ACPI and ERP device configuration registers. 10h: Select UART1 device configuration registers. 11h: Select UART2 device configuration registers. 12h: Select UART3 device configuration registers. 13h: Select UART4 device configuration registers. 14h: Select UART5 device configuration registers. 15h: Select UART6 device configuration registers. Otherwise: Reserved.

8.7.13.1GP107 Output Enable Register-Index 80h

Bit	Name	R/W	Reset	Default	Description
7	GPI077_OE	R/W	LRESET#	0	0: GP1077 is in input mode 1 GP1077 is in output mode
6	GPI076_OE	R/W	LRESET#		0 GP1076 is input mode 1: GP1075 is in output mode
In	GPI075_OE	R/W	LRESET#	0	0 GPI075 is in input mode 1 GP1075 is in output mode
4	GPI074_OE	R/W	LRESET#	0	0 GPI074 is in input mode 1 GPI074 is in output mode
3	GPI073_OE	R/W	LRESET#	0	0 GPI073 is in input mode I GPI073 is in output mode
2	GPI072_OE	R/W	LRESET#	0	0. 0PI072 is in input mode 1′ GP1072 is in output mode
1	GPI071_OE	R/W	LRESET#	0	0 GPIO71 is in input mode 1 GP1071 is in output mode
0	GPI070_OE	R/W	LRESET#	0	0: GPI070 is in input mode 1. GPI070 is in output mode

8.7.13.3 GP107 Pin Status Register- Index 82h (This byte could be also read by base address + 3)

Bit	Name	R/W	Reset	Default	Description
7	GPI077 IN	R	–	–	The pin status of GPI077/STB#
6	GPI076 IN	R	–	–	The pin status of GP1076/AFID
5	GPI075 IN	R	–	–	The pin status of GP1075/ERR#
4	GP1074_IN	R	–	–	The pin status of GPI074/INIT#
3	GPI073_IN	R	–	–	The pin status of GPI073/SLIN#
2	GPI072 IN	R			The pin status of GP1072/ACK4
1	GPI071 IN	R	–	–	The pin status of GPI071/BUSY
0	GPI070 IN	R	–	–	The pin status of GP1070/PE/FANCTL3/PWM/DAC3

8.7.9.1 GPIO3 Output Enable Register — Index C0h

Bit	Name	RAN	Reset	Default	Description
7	GPI037_OE	R/W	LRESET#	0	0: GPI037 is input. 1: GPI037 is output.
6	GPI036_0E	R/W	LRESET#	0	0: GPI036 is input. 1: GPI036 is output.
5	GPI035_0E	R/W	LRESET#	0	0: GPI035 is input. 1: GPI035 is output.
4	GPI034_OE	R/W	LRESET#	0	0: GPI034 is input. 1: GPI034 is output
3	GPI033_OE	R/W	LRESET#	0	0: GPI033 is input. 1: GPI033 is output.
2	GPI032_0E	R/W	LRESET#	0	0: GPI032 is input. 1: GPI032 is output.
1	GPI031_0E	R/W	LRESET#	0	0: 0PI031 is input. 1: GPIO31 is output.
0	GPI030_0E	R/W	LRESET#	0	0: GPI030 is input. 1: GPI030 is output.

8.7.9.3 GPIO3 Pin Status Register — Index C2h (This byte could be also read by base address + 9 if GPIO_DEC_RANGE is set to -“1”)

Bit	Name	R/W	Reset	Default	Description
7	GPI037_IN	R	–	–	The pin status of SIN3/GP1037
6	GPI036_IN	R	–	–	The pin status of SOUT3/GPI036
5	GP1035_IN	R	–	–	The pin status of DSR3#/GPI035
4	GPI034_IN	R	–	–	The pin status of RISS3#/GP1034
3	GP1033_IN	R		–	The pin status of DTR3#/GP1033
2	GP1032_IN	R	–	–	The pin status of CTS3#/GP1032
1	GPIO31_IN	R	–	–	The pin status of RI3#/GPI031
0	GPI030_IN	R	–	–	The pin status of DCD3#/GPI030

8.7.14.1 GPIO8 Output Enable Register — Index 88h

Bit	Name	R/W	Reset	Default	Description
7	GPI087_OE	R/W	LRESET#	1	0 GPI087 is in input mode 1 GPI087 is in output mode
6	GPI086_OE	R/W	LRESET#	1	0: GPI086 is input mode 1: GPIO85 is in output mode
5	GPI085_OE	R/W	LRESET#	1	0: GPI085 is in input mode 1: GPI085 is in output mode
4	GPI084_OE	R/W	LRESET#	1	0: GPI084 Is in input mode 1: GPI084 is in output mode
3	GPI083_OE	R/W	LRESET#	1	0: GPI083 is in input mode 1: GPI083 is in output mode
2	GPI082_OE	R/W	LRESET#	1	0: GPI082 is input mode 1: GPI082 is in output mode
1	GPI081_OE	R/W	LRESET#	1	0: GPI081 is in input mode 1: GP1081 is in output mode
0	GPI080_OE	R/W	LRESET#	1	0: GPI080 is input mode 1: GPI080 is in output mode

8.7.14.2 GP108 Output Data Register— Index 89h (This byte could be also written by base address + 2)

Bit	Name	R/W	Reset	Default	Description
7	GPI087_VAL	R/W	LRESET#	1	0: GPI087 outputs 0 when in output mode 1: GPI087 outputs 1 when in output mode
6	GPI086_VAL	R/W	LRESET#	1	0: GPI086 outputs 0 when in output mode 1: GPI086 outputs 1 when in output mode
5	GPI085_VAL	R/W	LRESET#	1	0: GPI085 outputs 0 when in output mode 1: GPI085 outputs 1 when in output mode
4	GPI084_VAL	R/W	LRESET#	1	0: GPI084 outputs 0 when in output mode 1: GPI084 outputs 1 when in output mode
3	GPI083_VAL	R/W	LRESET#	1	0: GPI083 outputs 0 when in output mode 1: GPI083 outputs 1 when in output mode
2	GP1082_VAL	R/W	LRESET#	1	0: GP1082 outputs 0 when in output mode 1: GPI082 outputs 1 when in output mode
1	GPI081_VAL	R/W	LRESET#	1	0: GPIO81 outputs 0 when in output mode 1: GPIO81 outputs 1 when in output mode
0	GPI080_VAL	R/W	LRESET#	1	0: GPI080 outputs 0 when in output mode 1: GPI080 outputs 1 when in output mode

8.7.10.1GP104 Output Enable Register—Index BOh

Bit	Name	R/W	Reset	Defau lt	Description
7	GPI047_OE	R/W	LRES ET#	1	0: GPI047 is input 1: GPI047 is output
6	GPI046_OE	R/W	LRES ET#	1	0: GPI046 is input 1: GPI046 is output
5	GPI045_OE	R/W	LRES ET#	1	0: GPI045 is input 1: GPI045 is output
4	GPI044_OE	R/W	LRES ET#	1	0: GPI044 is input 1: GP1044 is output
3	GPI043_OE	R/W	LRES ET#	1	0: GPI043 is input 1: GPI043 is output
2	GPI042_OE	R/W	LRES ET#	1	0: GP1042 is input 1: GPI042 is output
1	GPI041_OE	R/W	LRES ET#	1	0: GPIO4 1 is input 1: GP104 1 is output
0	GPI040_OE	R/W	LRES ET#	1	0: GPI040 is input 1: GPI040 is output

8.7.10.2 GP104 Output Data Register — Index Blh (This byte could be also written by base address + 10 if GPIO DEC RANGE is set to “1”)

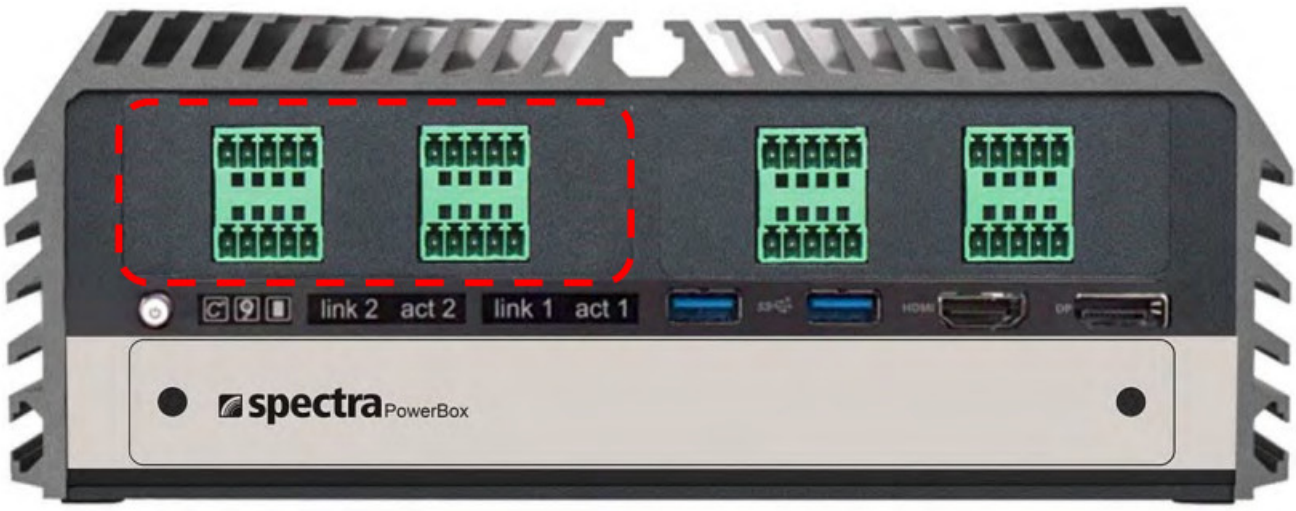
Bit	Name	R/W	Reset	Default	Description
7	GPI047_DATA	R/W	LRESET#	1	0: GP1047 outputs 0 when in output mode. 1: GPIO47 outputs 1 when in output mode
6	GPI046_DATA	R/W	LRESET#	1	0: GPI046 outputs 0 when in output mode 1: GPI046 outputs I when in output mode
5	GP1045_DATA	R/W	LRESET#	1	0: GPI045 outputs 0 when in output mode 1: GPI045 outputs 1 when in output mode
4	GPI044_DATA	R/W	LRESET#	1	0: GPI044 outputs 0 when in output mode 1: GPI044 outputs 1 when in output mode
3	GPI043_DATA	R/W	LRESET#	1	0: GP1043 outputs 0 when in output mode 1: GP1043 outputs I when in output mode
2	GPI042_DATA	R/W	LRESET#	1	0: GPI042 outputs 0 when in output mode 1: GPI042 outputs 1 when in output mode
1	GPIO41_DATA	R/W	LRESET#	1	0: GP104 1 outputs 0 when in output mode 1: GPIO4 I outputs 1 when in output mode
0	GPI040_DATA	R/W	LRESET#	1	0: GPI040 outputs 0 when in output mode 1: GP1040 outputs 1 when in output mode

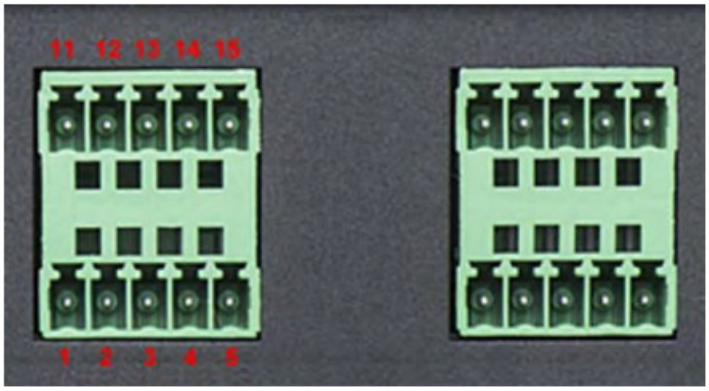
8.7.3Base Address High Register — Index 60h

Bit	Name	R/W	Reset	Default	Description
7-0	GP_BASE_ADDR_HI	R/W	LRESET#	00h	The MSB of GPIO I/O port address.

8.7.3.4Base Address Low Register — Index 61h

Bit	Name	R/W	Reset	Default	Description
7-0	BASE_ADDR_LO	R/W	LRESET#	00h	The LSB of KBC data port address. When GPIO_DEC_RANGE is -0′, only 8 bytes are decoded: Base + 0: Index port. Base + 1: data port. Base + 2: GP108 data register Base + 3: GP107 data register Base + 4: GP106 data register. Base + 5: GP105 data register Base + 6: GPIOO data register Base + 7: GP101 data register. If GPIO_DEC_RANGE is set to ‘I”. more 8 bytes are decoded Base + 8: GP102 data register. Base + 9: GPI03 data register. Base + 10: GP104 data register Otherwise: Reserved. There are three ways to access the GPIO registers. 1. Use configuration register port Ox4E/Ox4F (or Ox2E J0x2F). the LDN for GPIO rs 0x06. 2. Use GPIO indexidata port Write index to index port first and then read/write the register 3. Use digital I/O port. The way only access GPIO data register. Write data to this port will control the data output register. And read this port will read the pin status register


link 2 act 2
link 1 act 1
spectra PowerBox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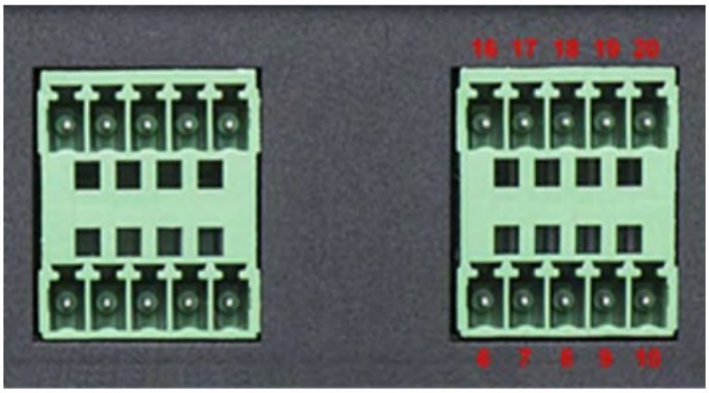
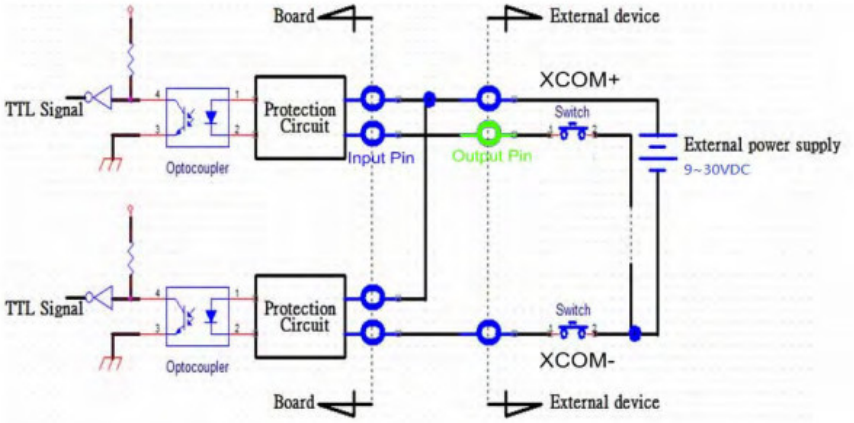
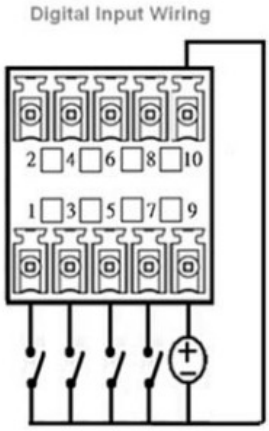
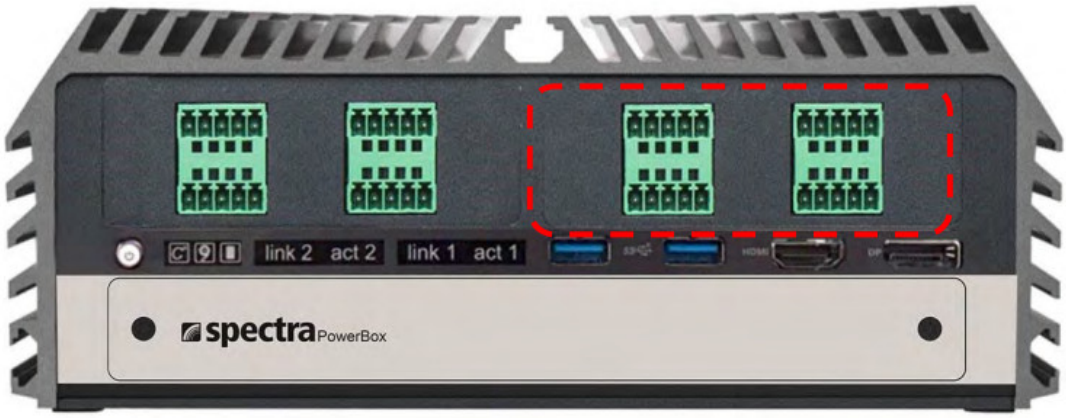
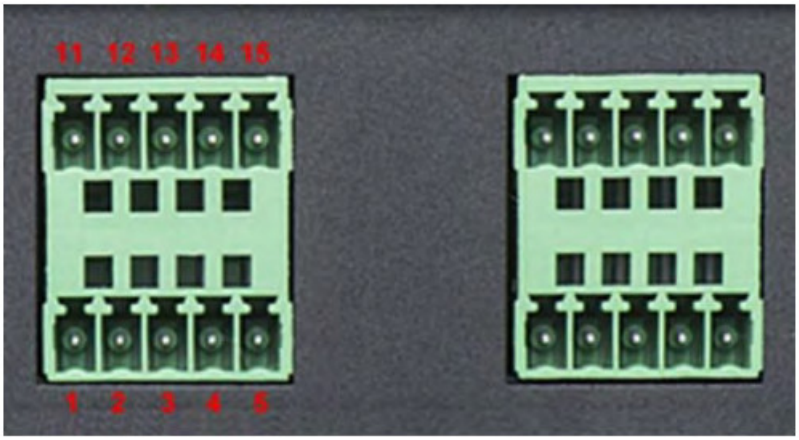
1 2 3 4 5


16 17 18 19 20
6 7 8 9 10


Board
External device
TTL Signal
Protection Circuit
Optocoupler
Input Pin
Output Pin
XCOM+
Switch
External power supply
9~30VDC
TTL Signal
Protection Circuit
Optocoupler
Switch
XCOM-
Board
External device


Digital Input Wiring
2 4 6 8 10
1 3 5 7 9


link 2 act 2
link 1 act 1
spectra PowerBox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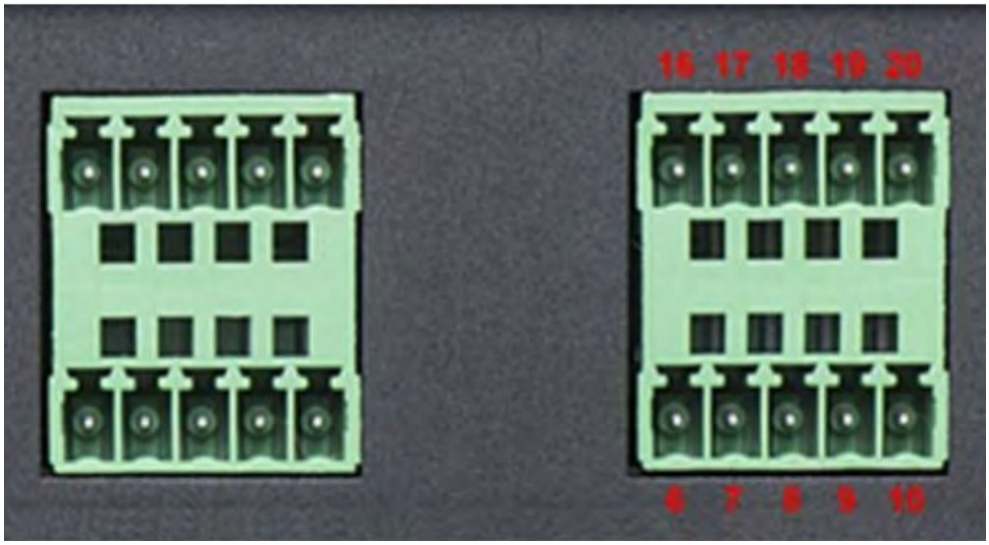
1 2 3 4 5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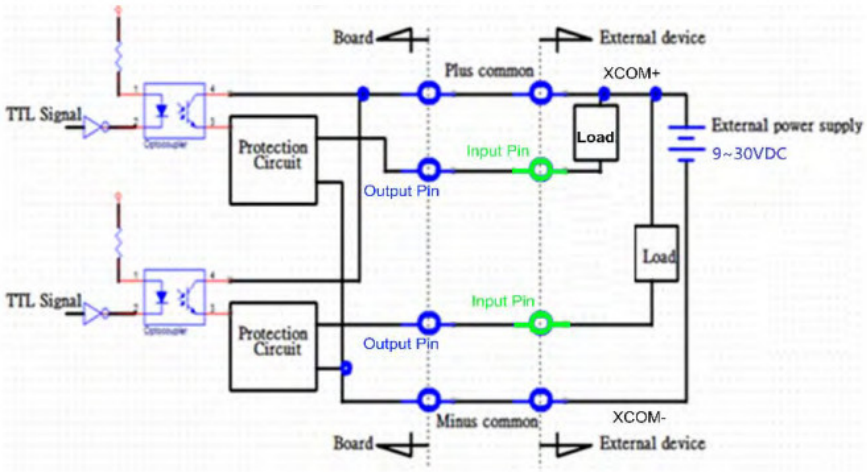
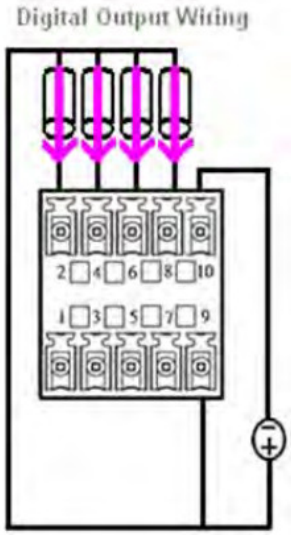
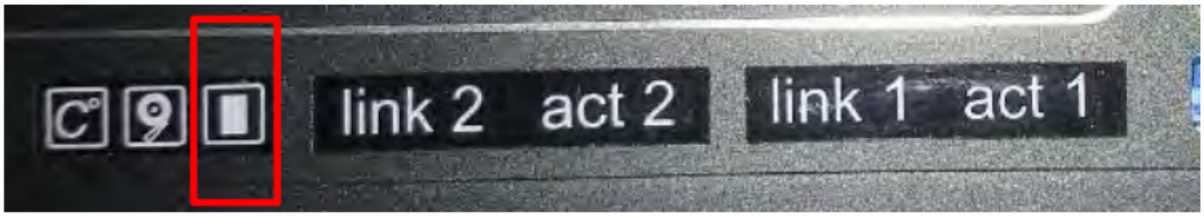
6 7 8 9 10





GPIO LED



GPIO1 Output Enable Register — Index E0h

Bit	Name	R/W	Reset	Default	Description
7	GPIO17_OE	R/W	5VSB	0	0: GPIO17 is in input mode. 1: GPIO17 is in output mode.
6	GPIO16_OE	R/W	5VSB	0	0: GPIO16 is in input mode. 1: GPIO16 is in output mode.
5	GPIO15_OE	R/W	5VSB	0	0: GPIO15 is in input mode. 1: GPIO15 is in output mode.
4	GPIO14_OE	R/W	5VSB	0	0: GPIO14 is in input mode. 1: GPIO14 is in output mode.
3	GPIO13_OE	R/W	5VSB	0	0: GPIO13 is in input mode. 1: GPIO13 is in output mode.
2	GPIO12_OE	R/W	5VSB	0	0: GPIO12 is in input mode. 1: GPIO12 is in output mode.
1	GPIO11_OE	R/W	5VSB	0	0: GPIO11 is in input mode. 1: GPIO11 is in output mode.
0	GPIO10_OE	R/W	5VSB	0	0: GPIO10 is in input mode. 1: GPIO10 is in output mode.

GPIO1 Output Data Register — Index E1h (This byte could be also written by base address + 7)

Bit	Name	R/W	Reset	Default	Description
7	GPIO17_VAL	R/W	5VSB	1	0: GPIO17 outputs 0 when in output mode. 1: GPIO17 outputs1 when in output mode.
6	GPIO16_VAL	R/W	5VSB	1	0: GPIO16 outputs 0 when in output mode. 1: GPIO16 outputs1 when in output mode.
5	GPIO15_VAL	R/W	5VSB	1	0: GPIO15 outputs 0 when in output mode. 1: GPIO15 outputs 1 when in output mode.
4	GPIO14_VAL	R/W	5VSB	1	0: GPIO14 outputs 0 when in output mode. 1: GPIO14 outputs 1 when in output mode.
3	GPIO13_VAL	R/W	5VSB	1	0: GPIO13 outputs 0 when in output mode. 1: GPIO13 outputs 1 when in output mode.
2	GPIO12_VAL	R/W	5VSB	1	0: GPIO12 outputs 0 when in output mode. 1: GPIO12 outputs 1 when in output mode.
1	GPIO11_VAL	R/W	5VSB	1	0: GPIO11 outputs 0 when in output mode. 1: GPIO11 outputs 1 when in output mode.
0	GPIO10_VAL	R/W	5VSB	1	0: GPIO10 outputs 0 when in output mode. 1: GPIO10 outputs 1 when in output mode.

Bit	Name	R/W	Reset	Default	Description
7-0	BASE_ADDR_LO	R/W	LRESET#	00h	The LSB of KBC data port address. When GPIO_DEC_RANGE is "0", only 8 bytes are decoded: Base + 0: index port. Base + 1: data port. Base + 2: GPIO8 data register. Base + 3: GPIO7 data register. Base + 4: GPIO6 data register. Base + 5: GPIO5 data register. Base + 6: GPIO0 data register. Base + 7: GPIO1 data register. If GPIO_DEC_RANGE is set to "1", more 8 bytes are decoded: Base + 8: GPIO2 data register. Base + 9: GPIO3 data register. Base + 10: GPIO4 data register. Otherwise: Reserved. There are three ways to access the GPIO registers. 1. Use configuration register port 0x4E/0x4F (or 0x2E/0x2F), the LDN for GPIO is 0x06. 2. Use GPIO index/data port. Write index to index port first and then read/write the register. 3. Use digital I/O port. The way only access GPIO data register. Write data to this port will control the data output register. And read this port will read the pin status register.

7	6	5	4	3	2	1	0	bit
0	0	0	0	0	0	0	1	Value
1								/h

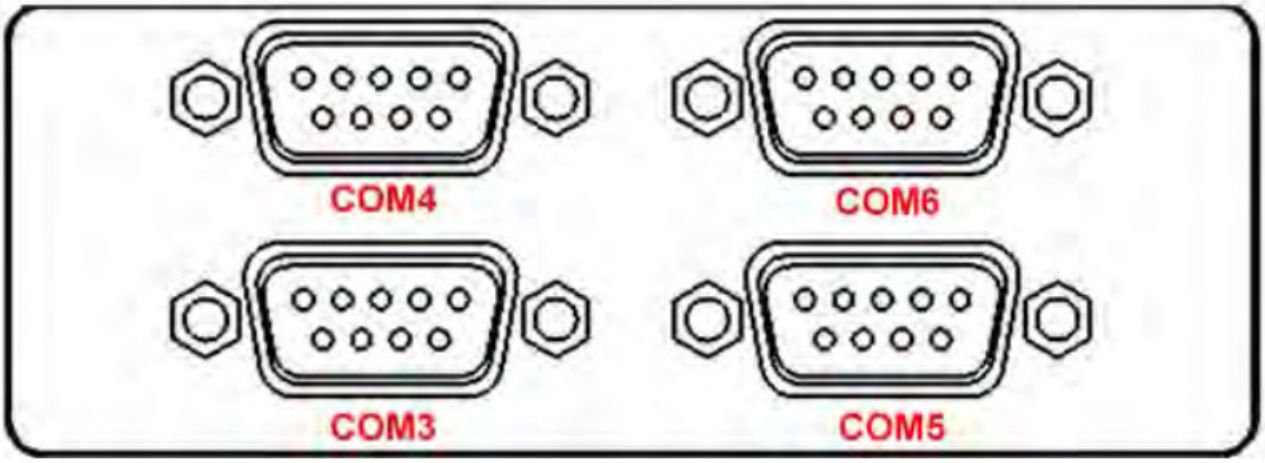
= LED

(Base address +7) (0xA07)

GPIO LED

1
2
8
7
3
6
4
5

4
5
3
6
2
7
1
8


COM4
COM6
COM3
COM5

ON

OFF

ON

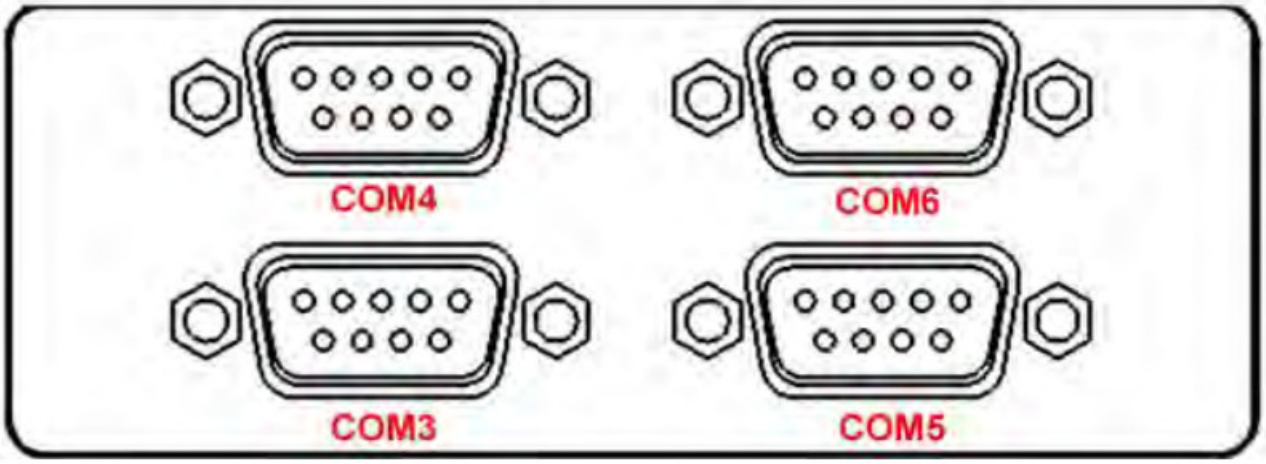
OFF

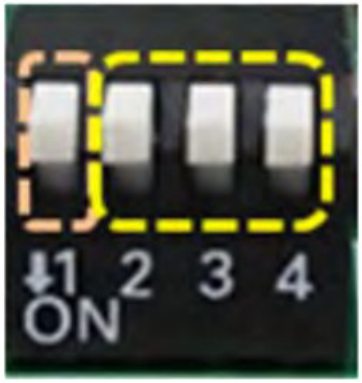
ON

OFF

ON

OFF

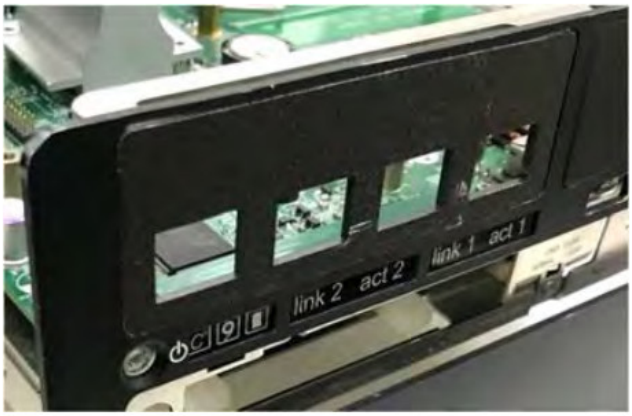




OFF

ON

12V 24V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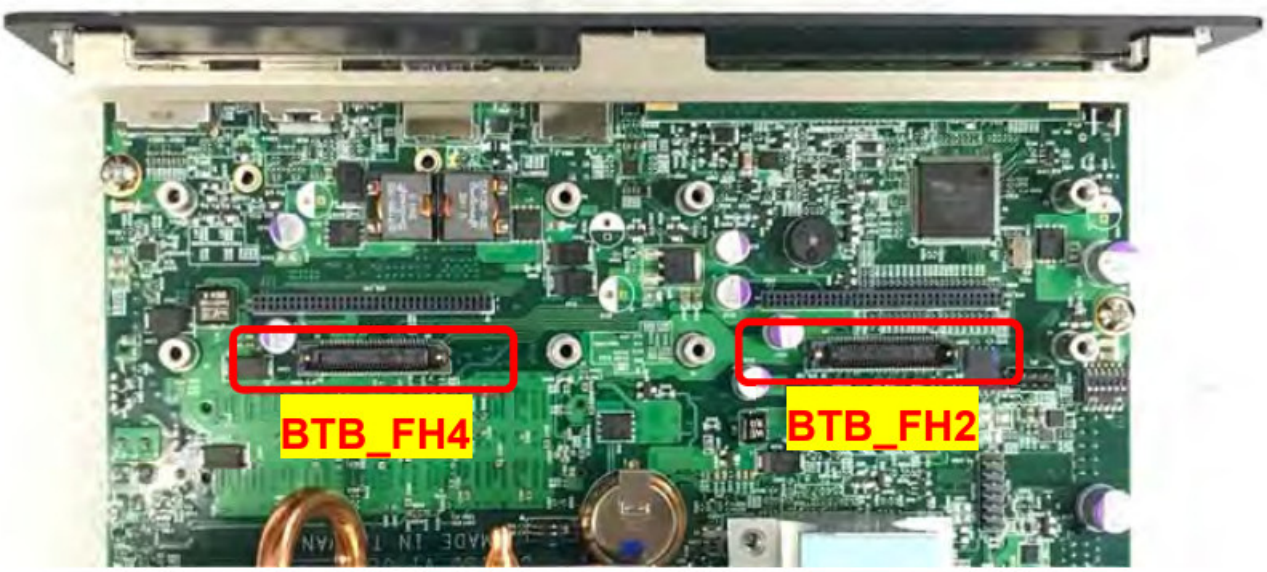
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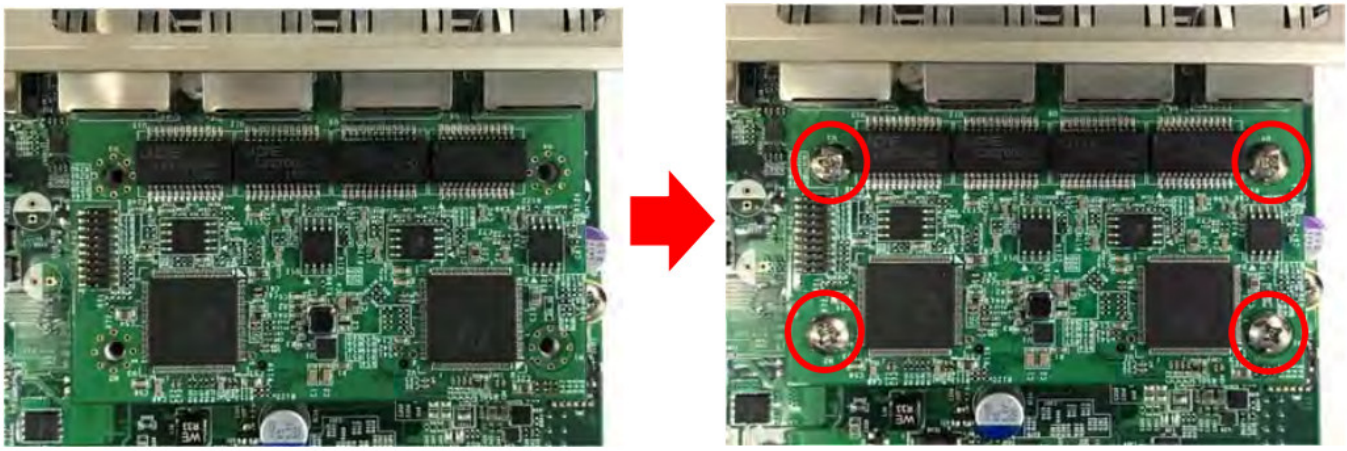
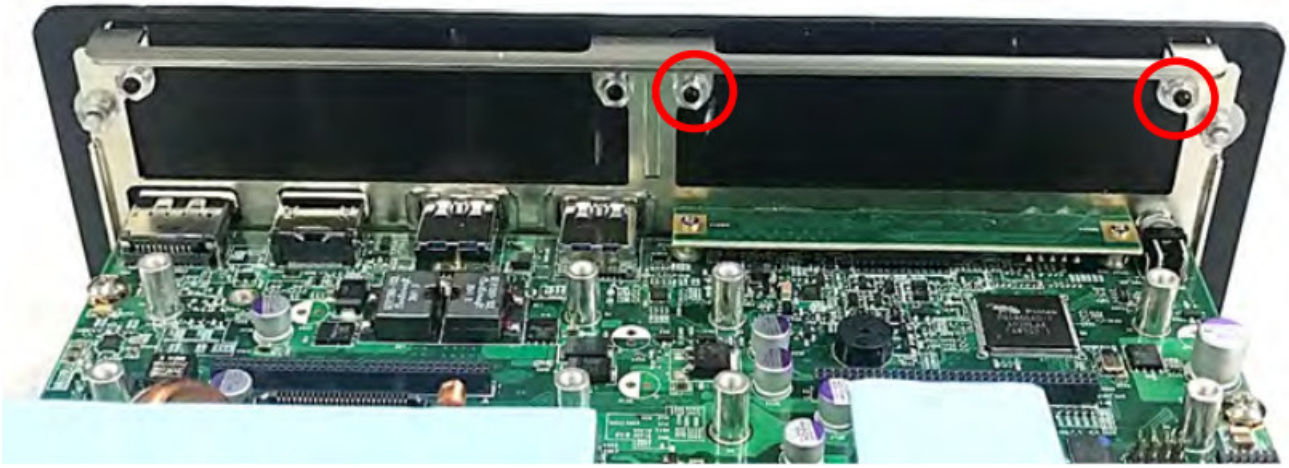
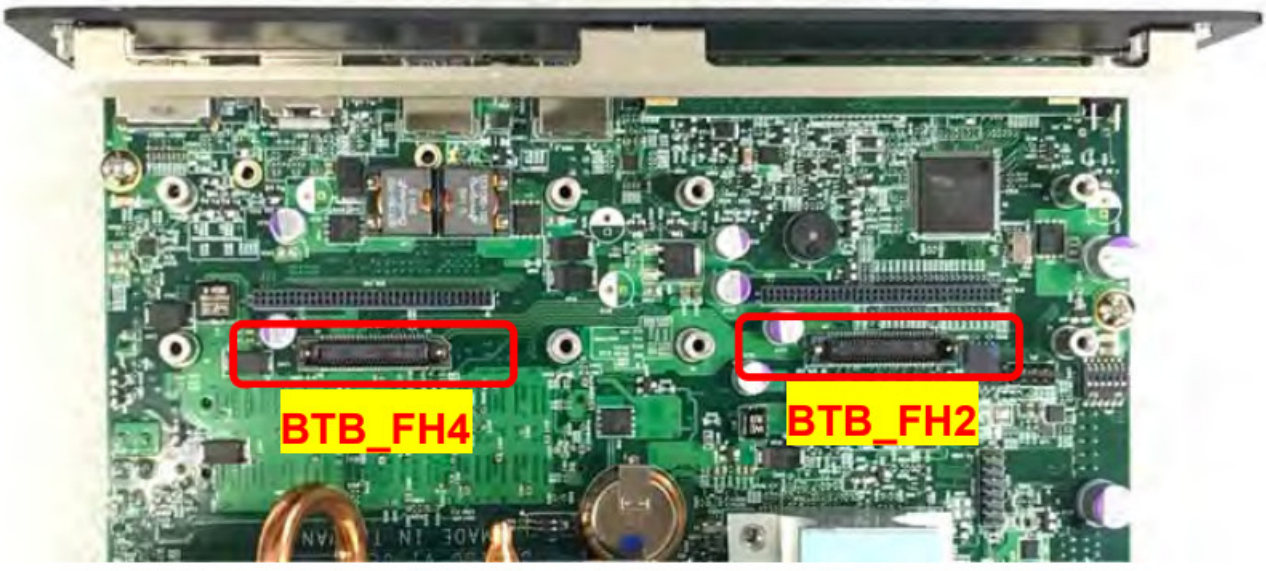
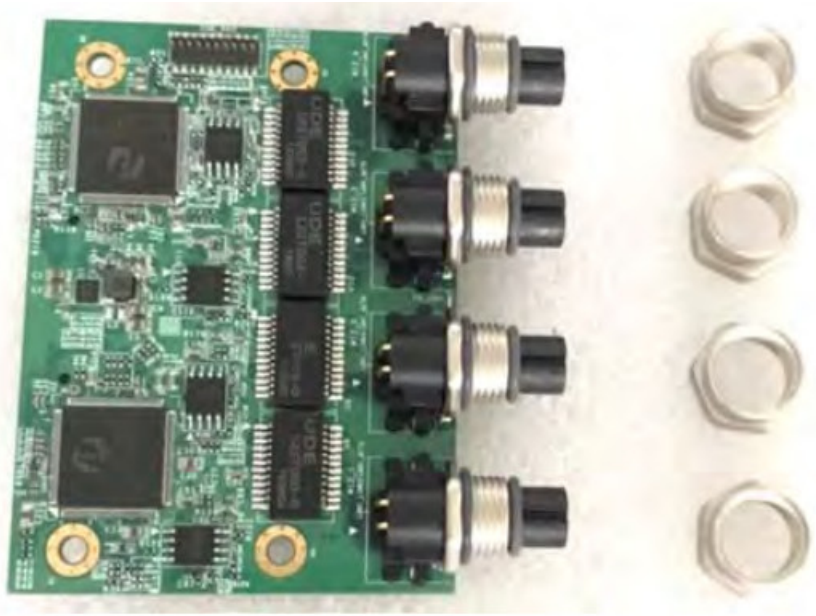
BTB_FH2

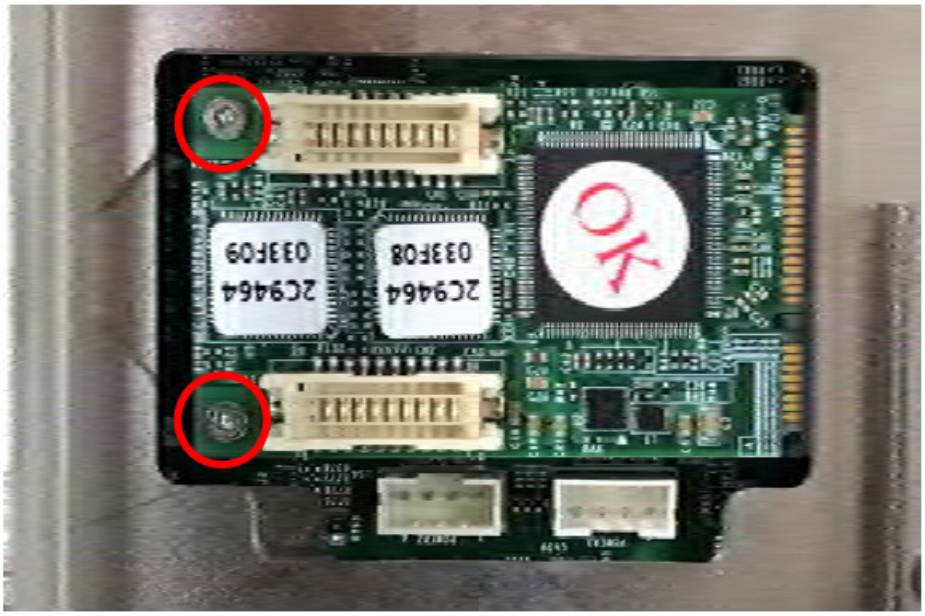




link 2
act 2
link 1
act 1


BTB_FH4
BTB_FH2

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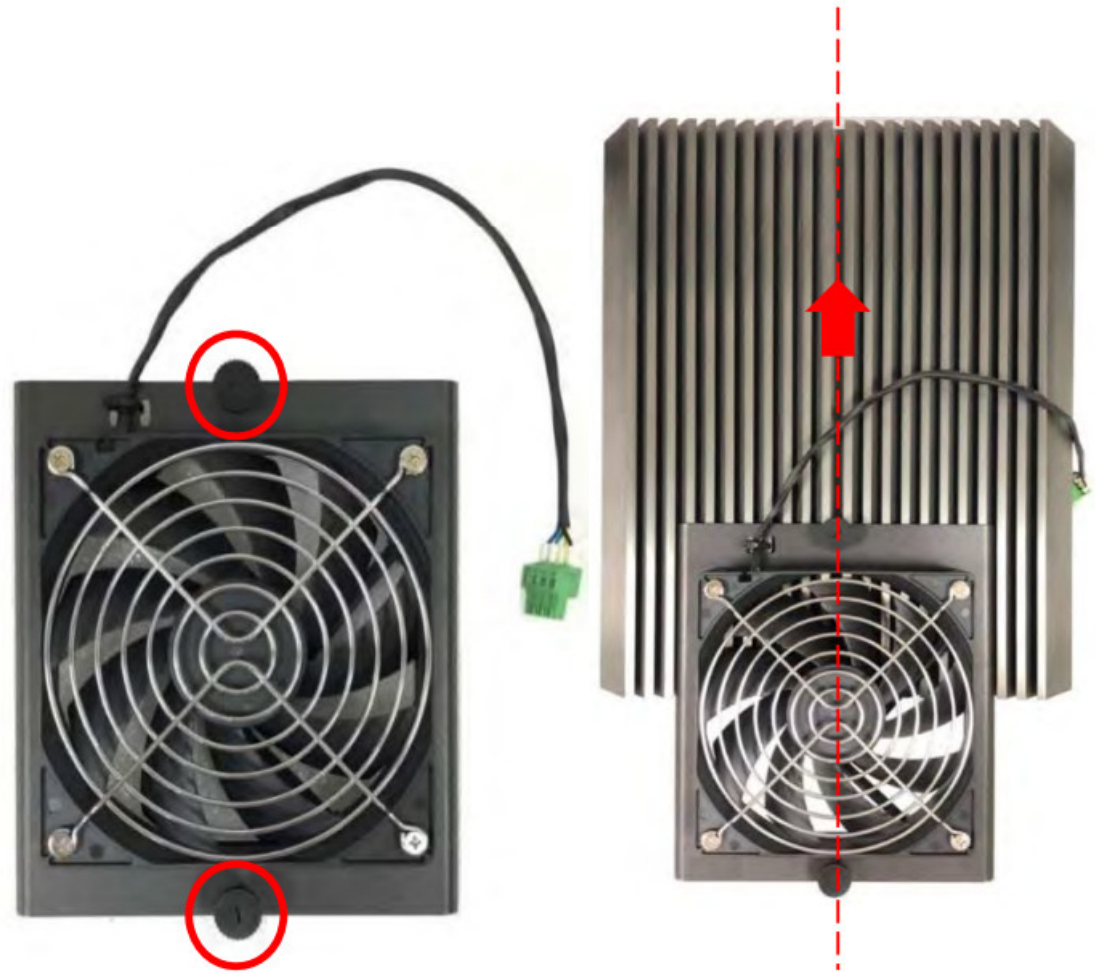
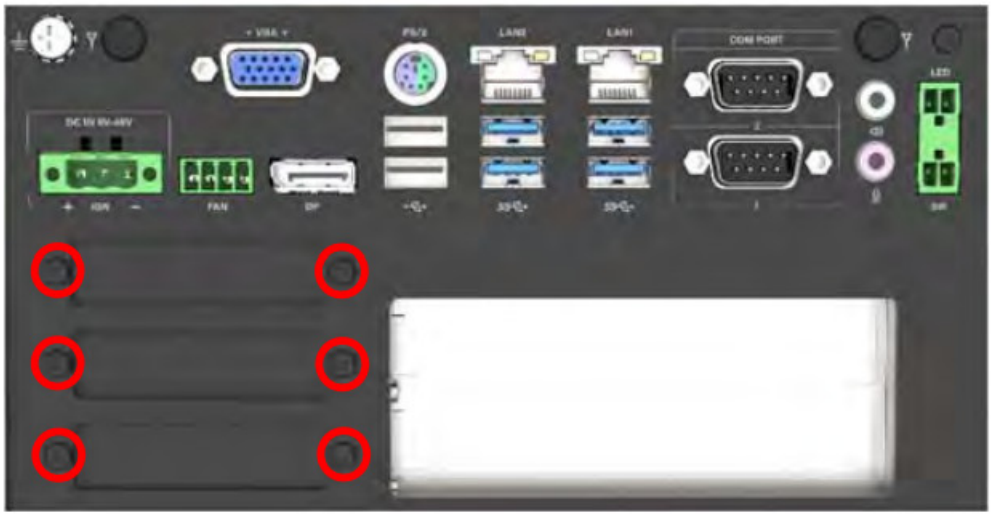
033F08
2C9464
033F09

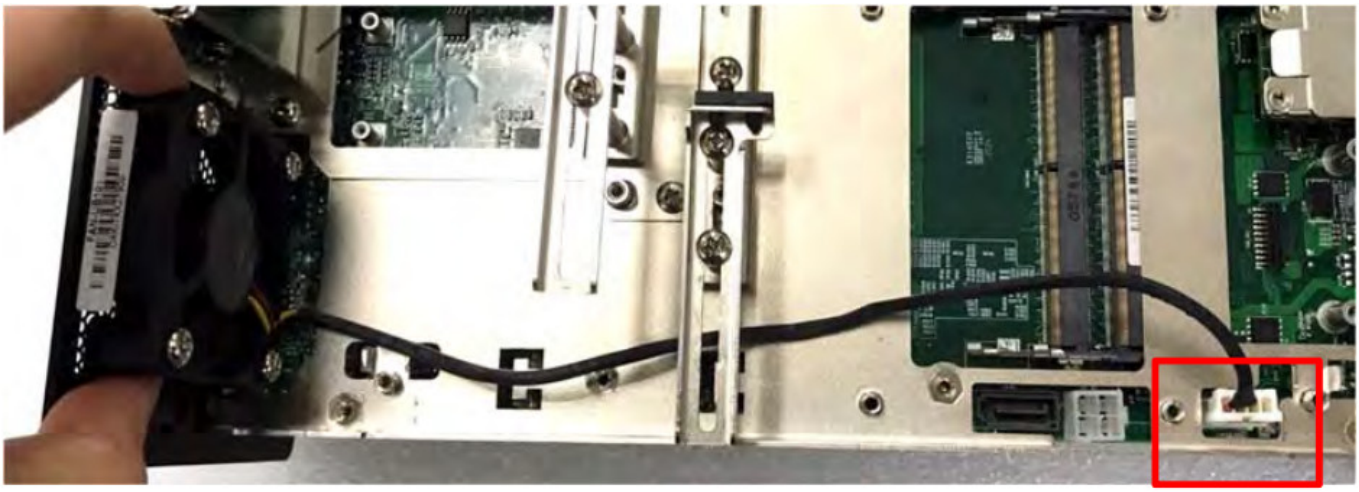
DP
FAN
IGN

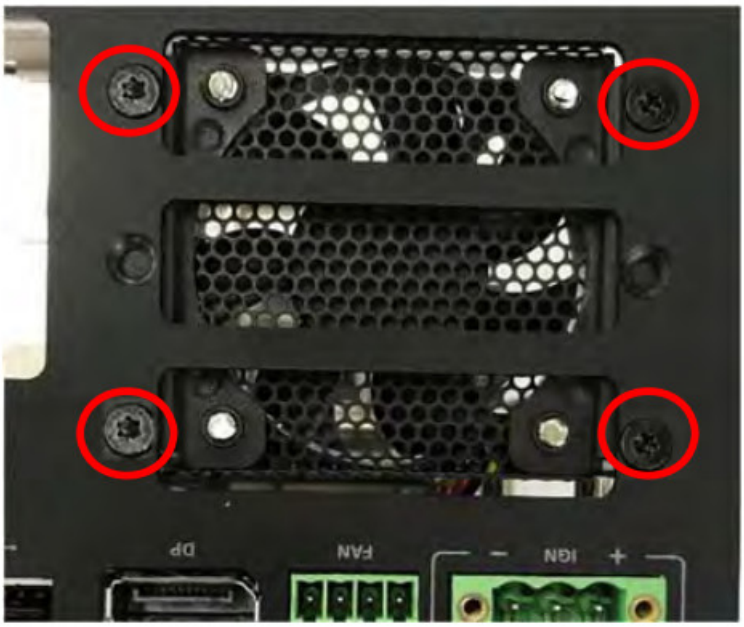
DP
FAN
IGN

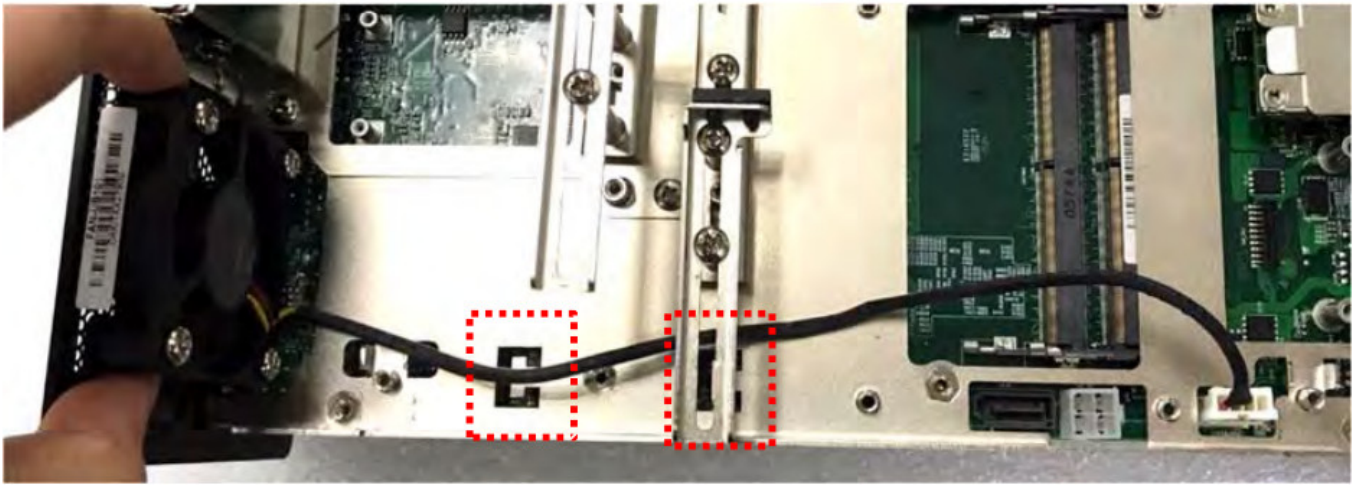


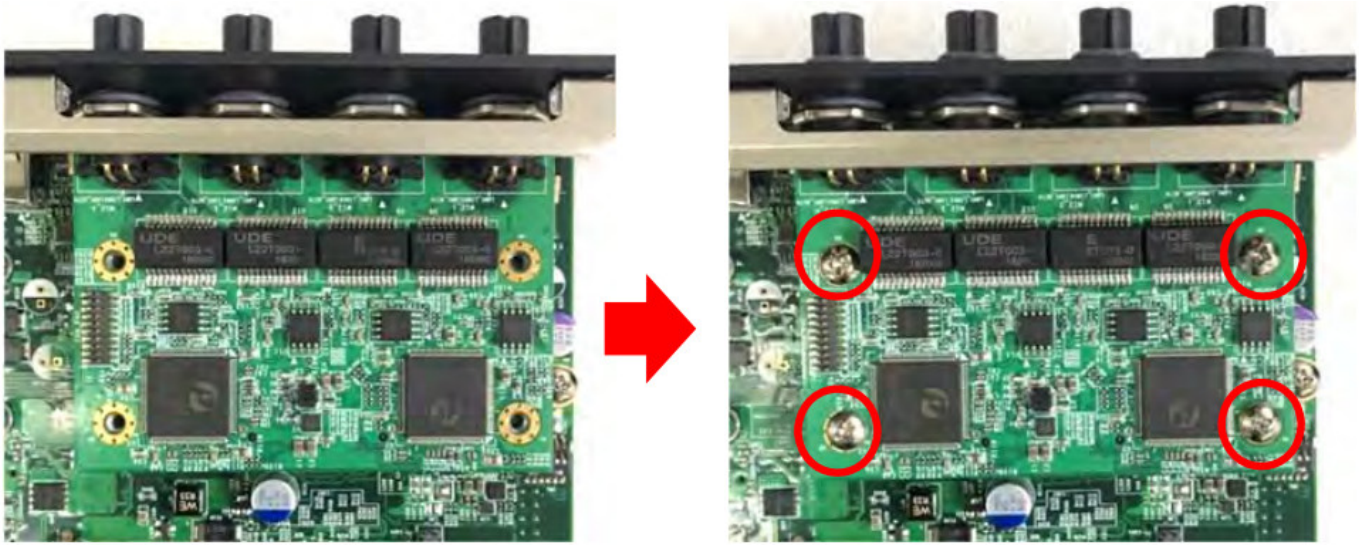
VGA
PS/2
LAN2
LAN1
COM PORT
LED
DC IN 9V-48V
IGN
DP


VGA
PS/2
LAN2
LAN1
COM PORT
LED
DC IN 9V-48V
IGN
FAN
DP




DP
FAN
IGN
–
+



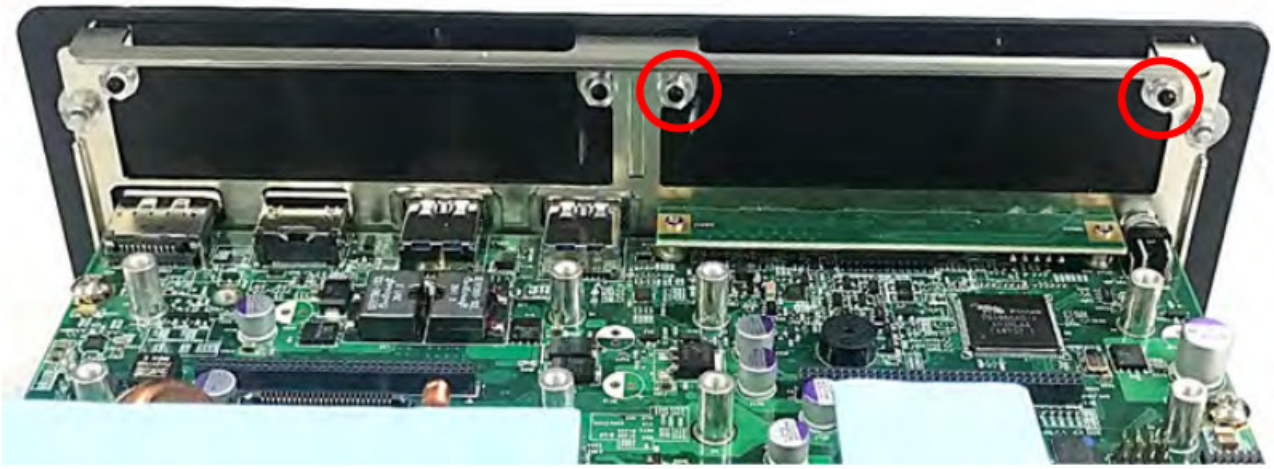


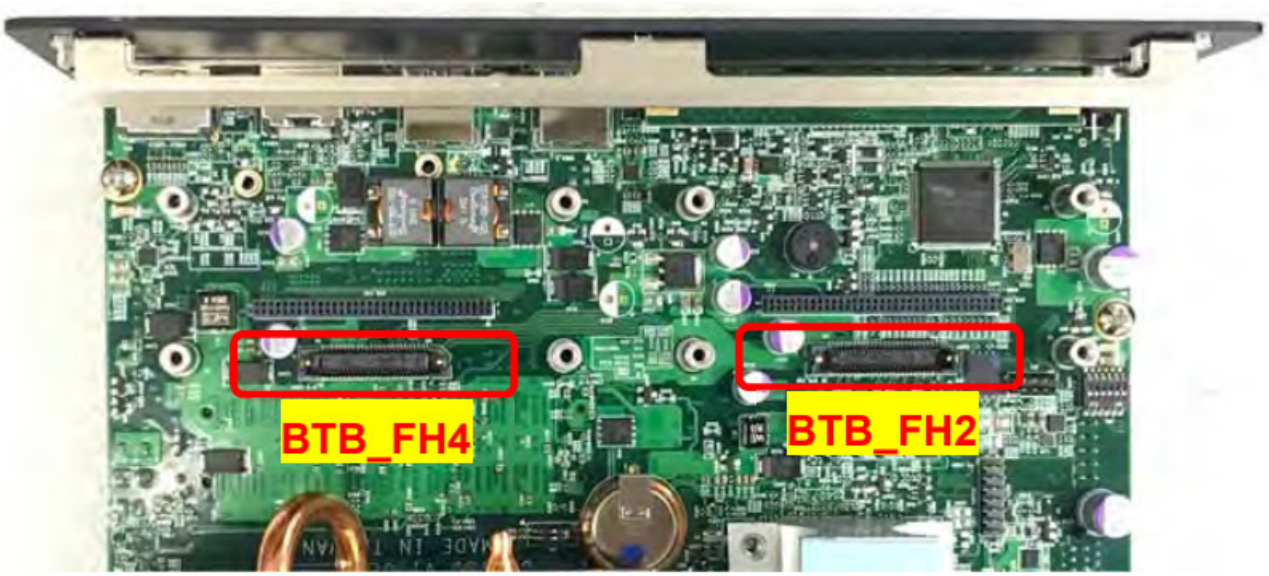
Hex washers

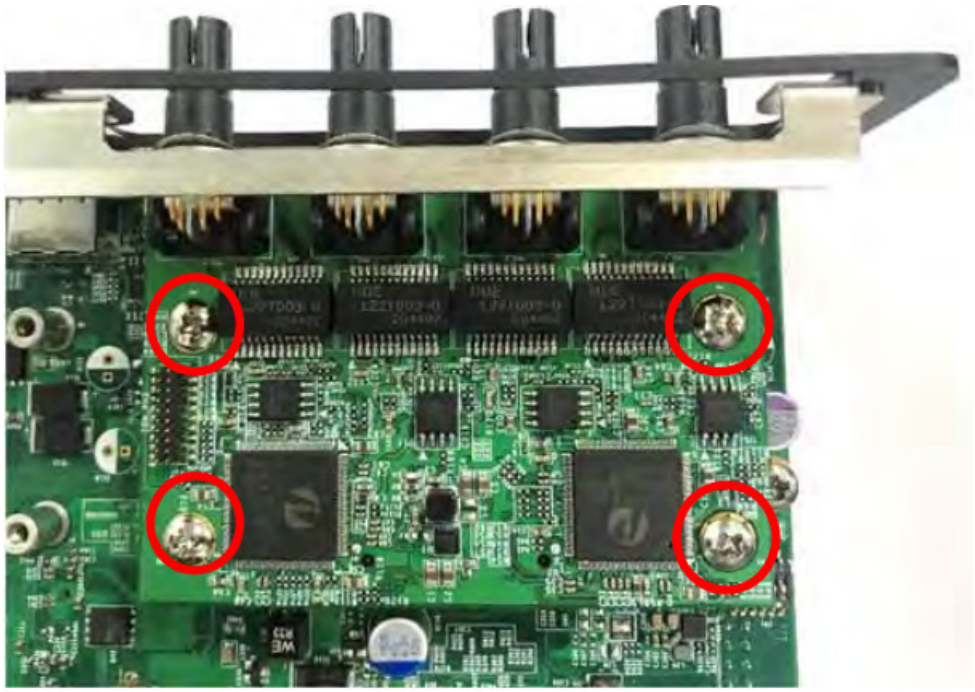
M12 I/O bracket

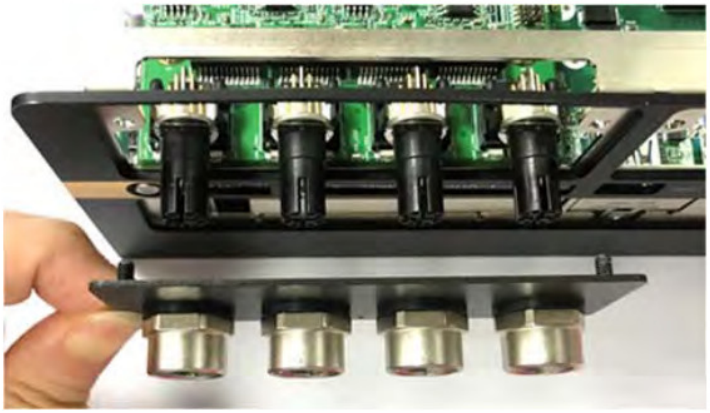
Hex rings

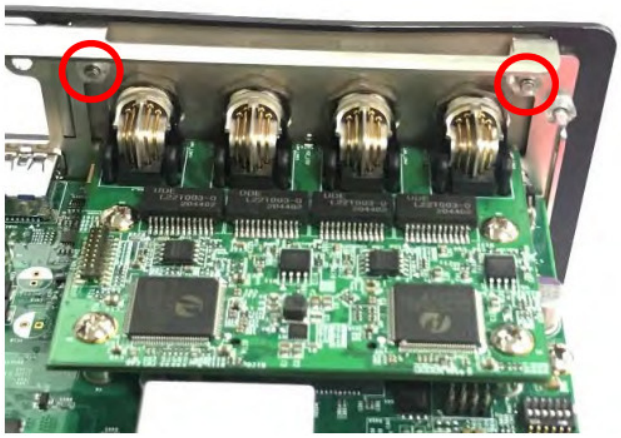
Rubber rings

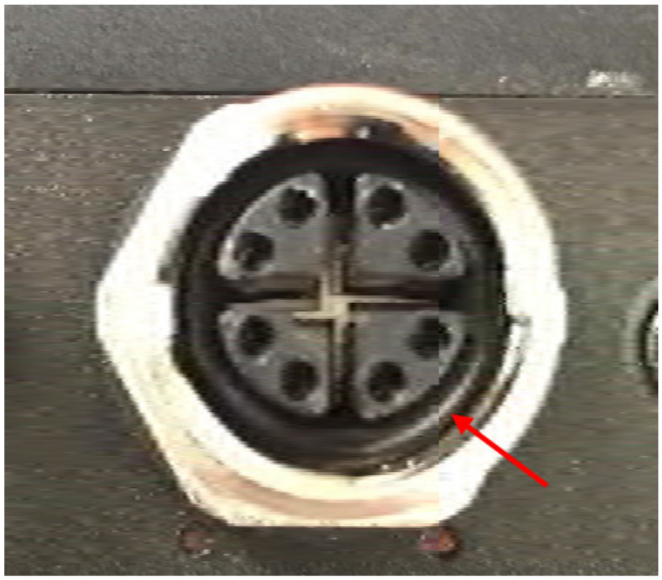


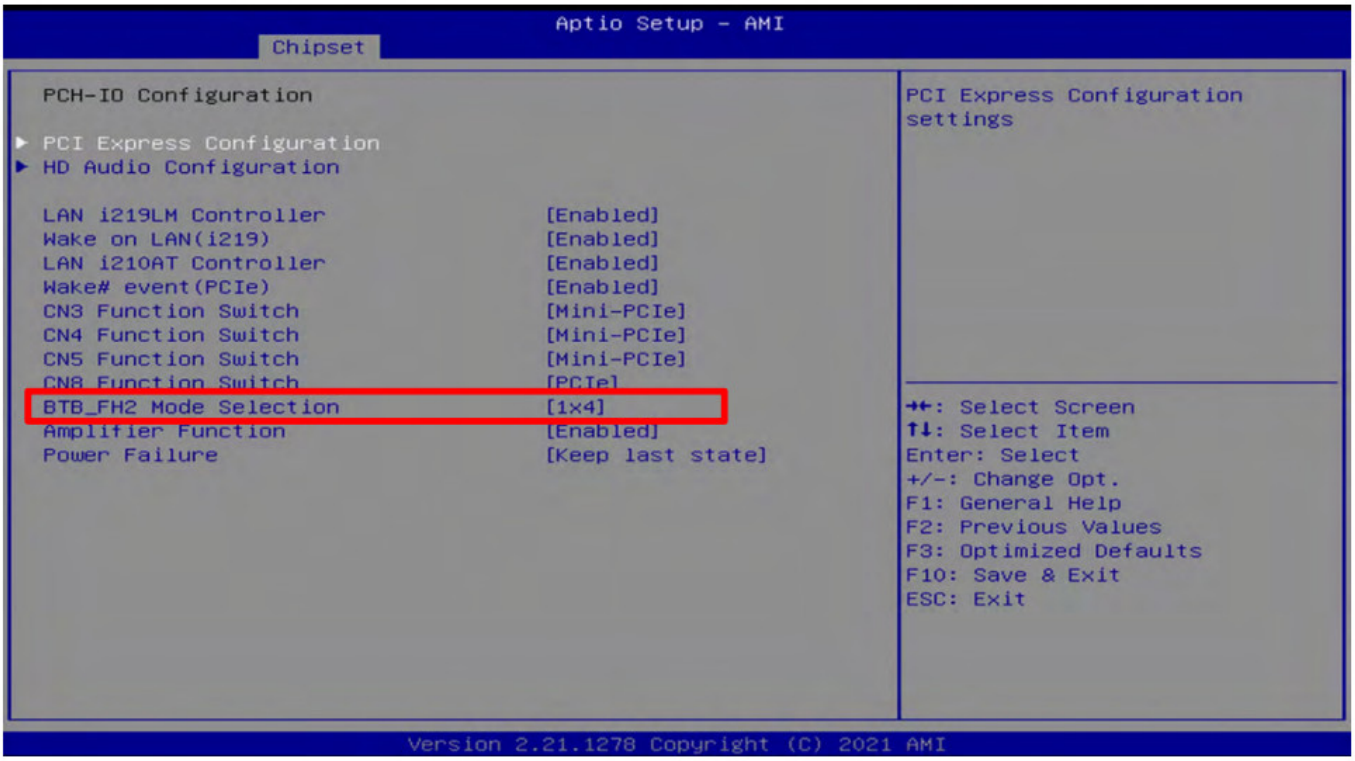

BTB_FH4
BTB_FH2





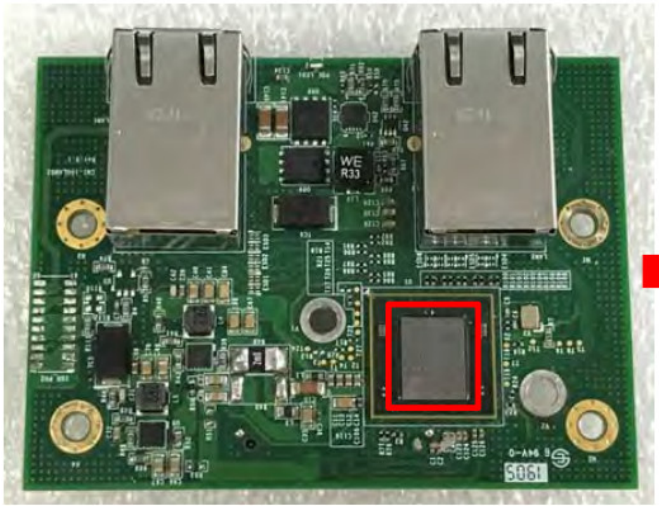


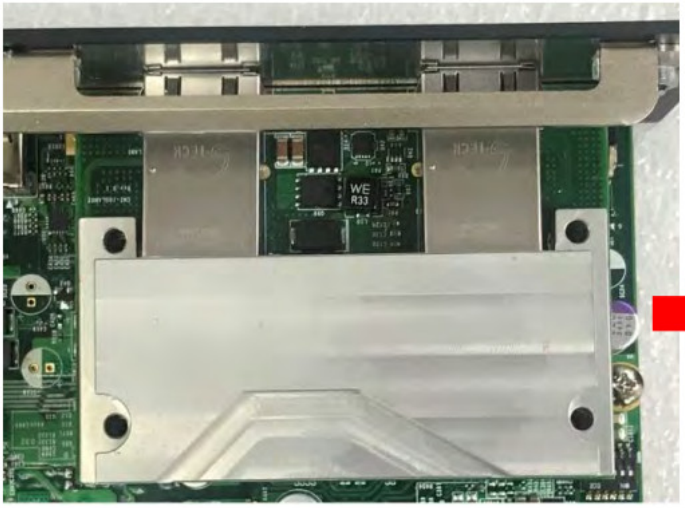


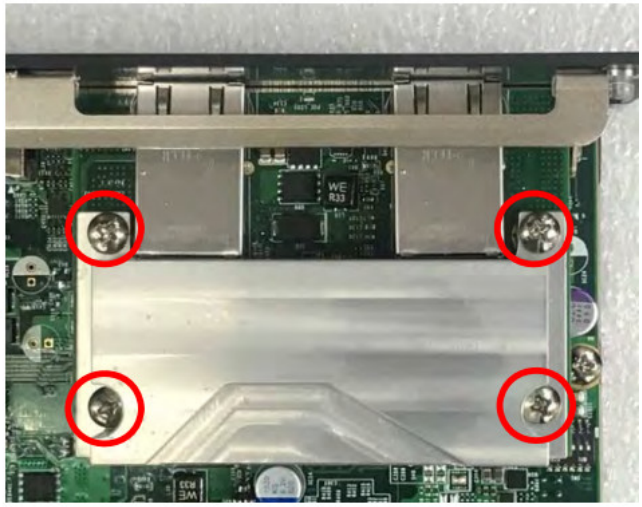

Aptio Setup – AMI
Chipset
PCH-IO Configuration
PCI Express Configuration
HD Audio Configuration
LAN i219LM Controller [Enabled]
Wake on LAN(i219) [Enabled]
LAN i210AT Controller [Enabled]
Wake# event(PCIe) [Enabled]
CN3 Function Switch [Mini-PCIe]
CN4 Function Switch [Mini-PCIe]
CN5 Function Switch [Mini-PCIe]
CN8 Function Switch [PCIe]
BTB_FH2 Mode Selection [1x4]
Amplifier Function [Enabled]
Power Failure [Keep last state]
PCI Express Configuration settings
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F10: Save & Exit
ESC: Exit
Version 2.21.1278 Copyright (C) 2021 AMI

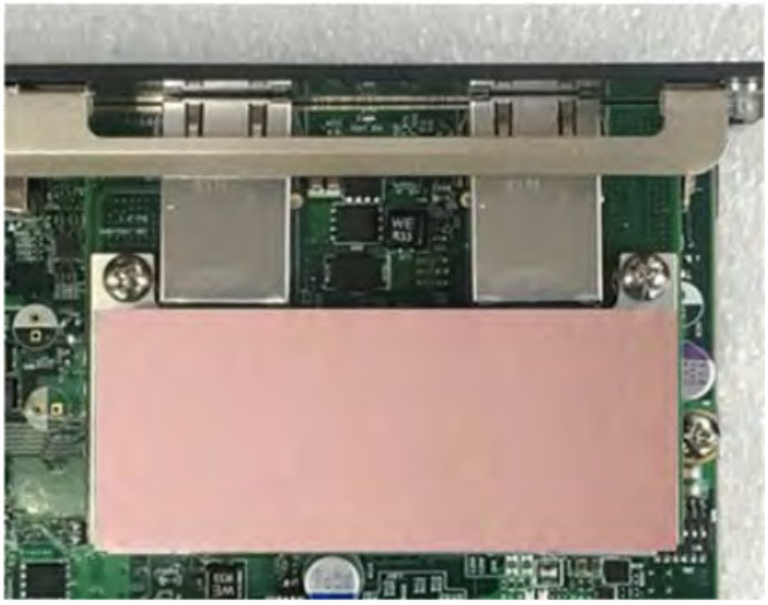
act 2
link 1
act 1

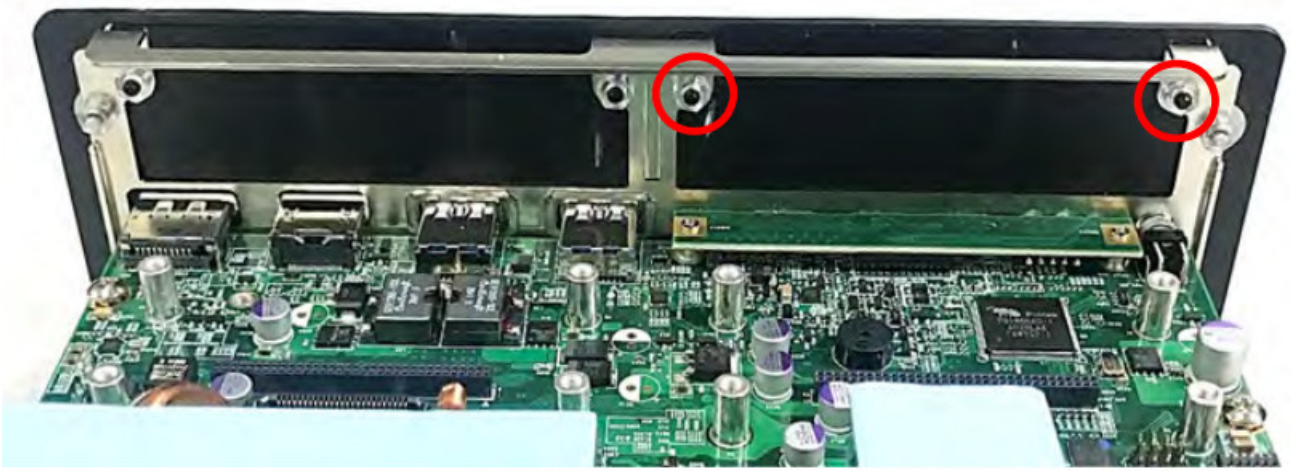
BTB_FH2



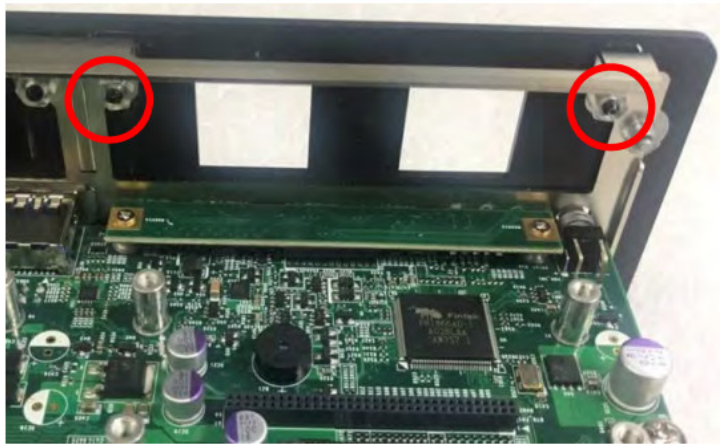


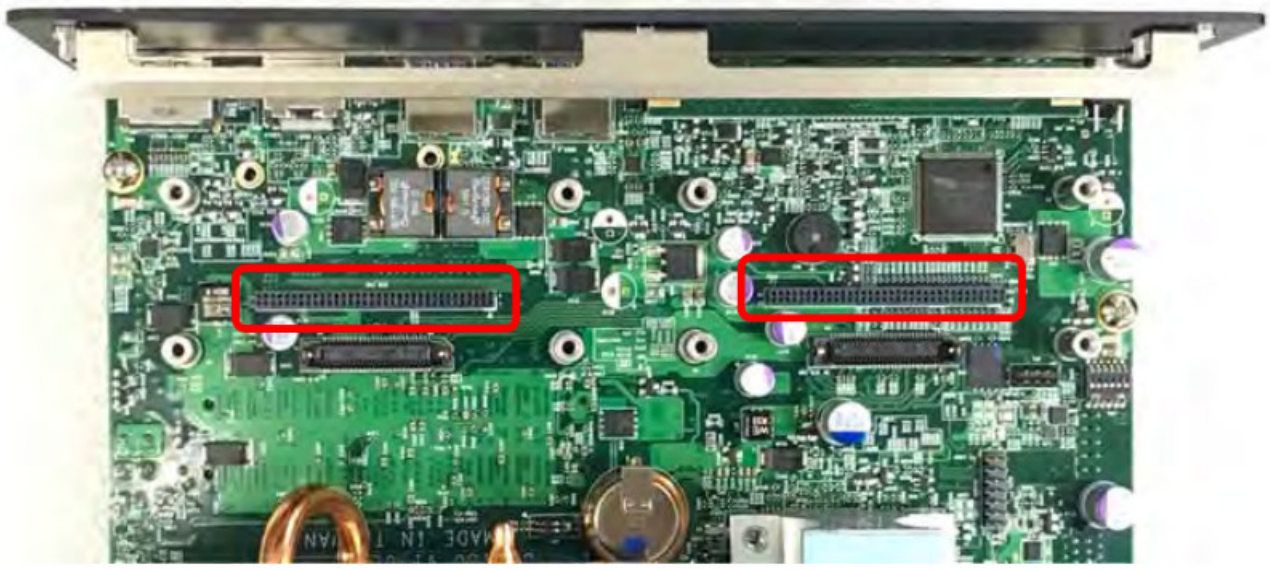


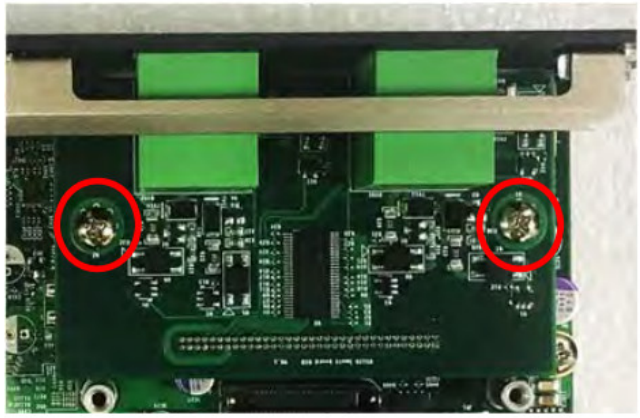


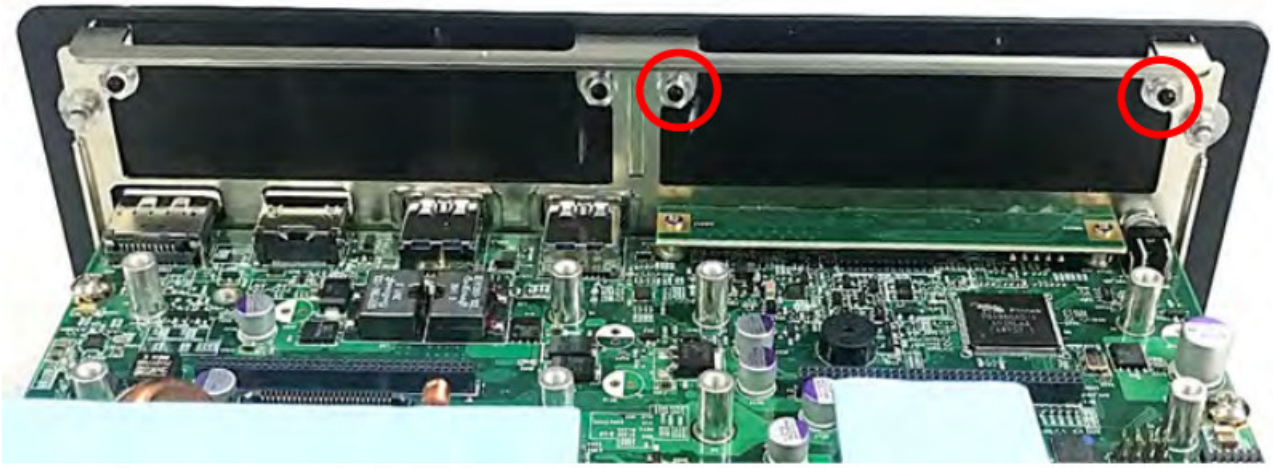


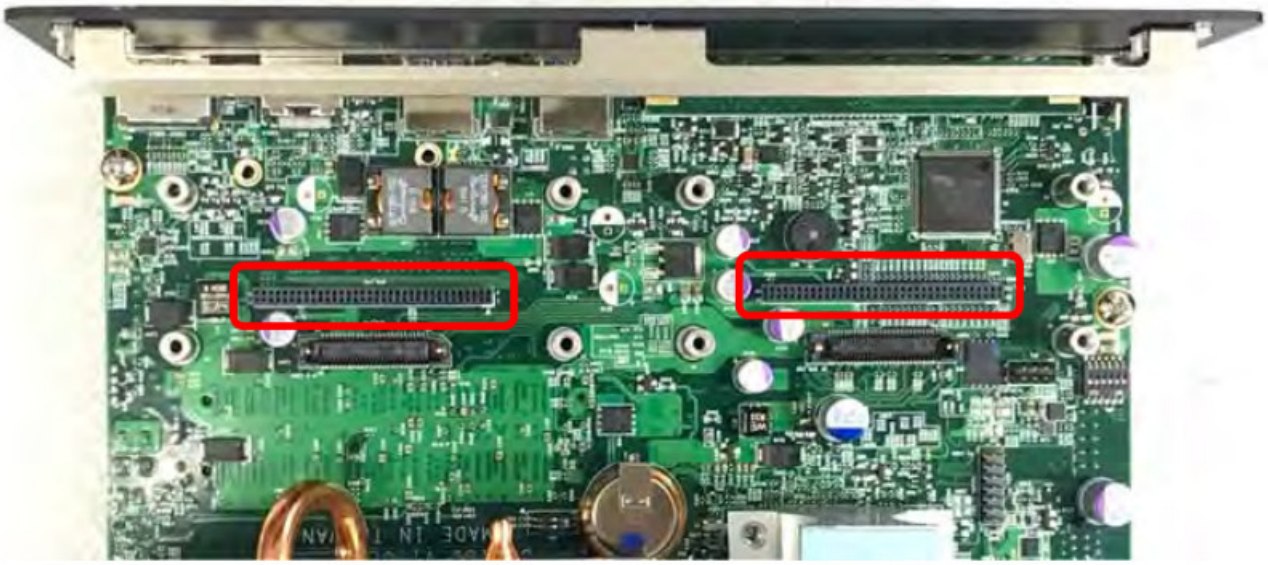
link 2 act 2 link 1 act 1

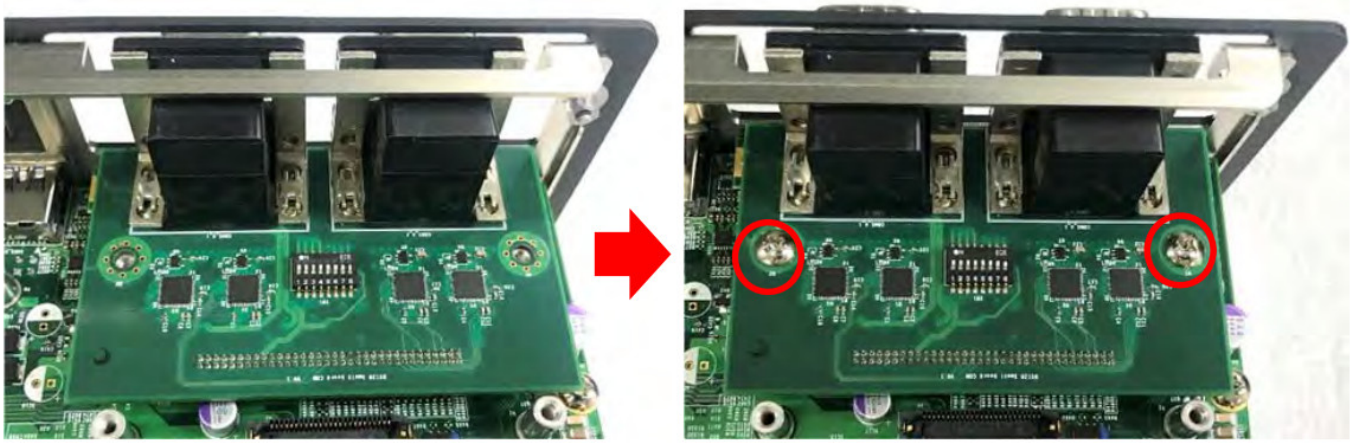












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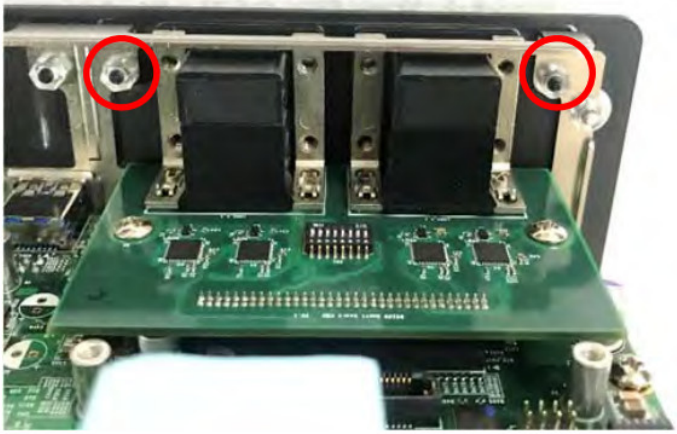
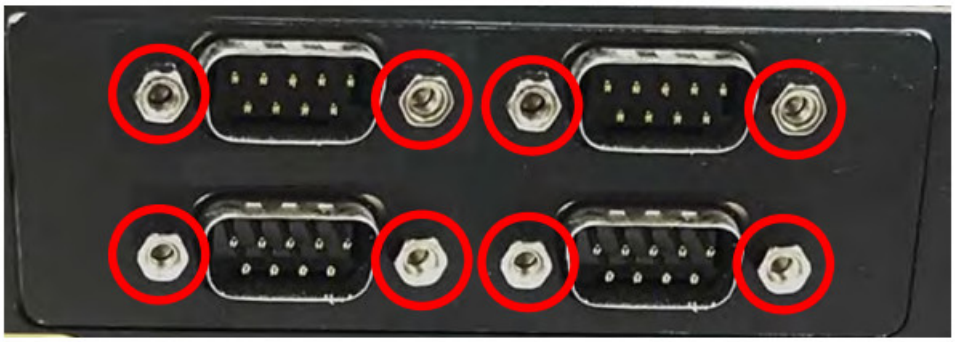
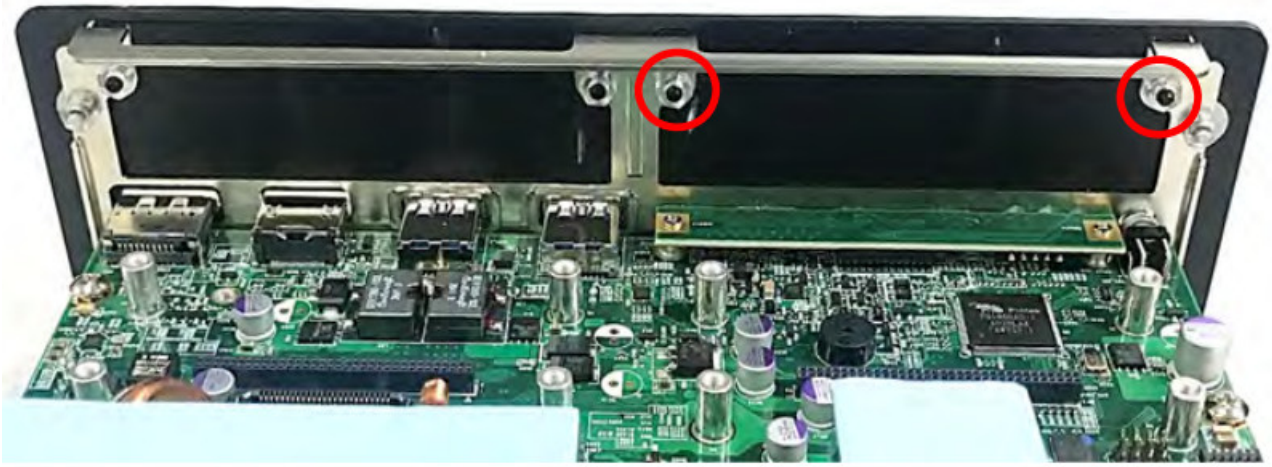
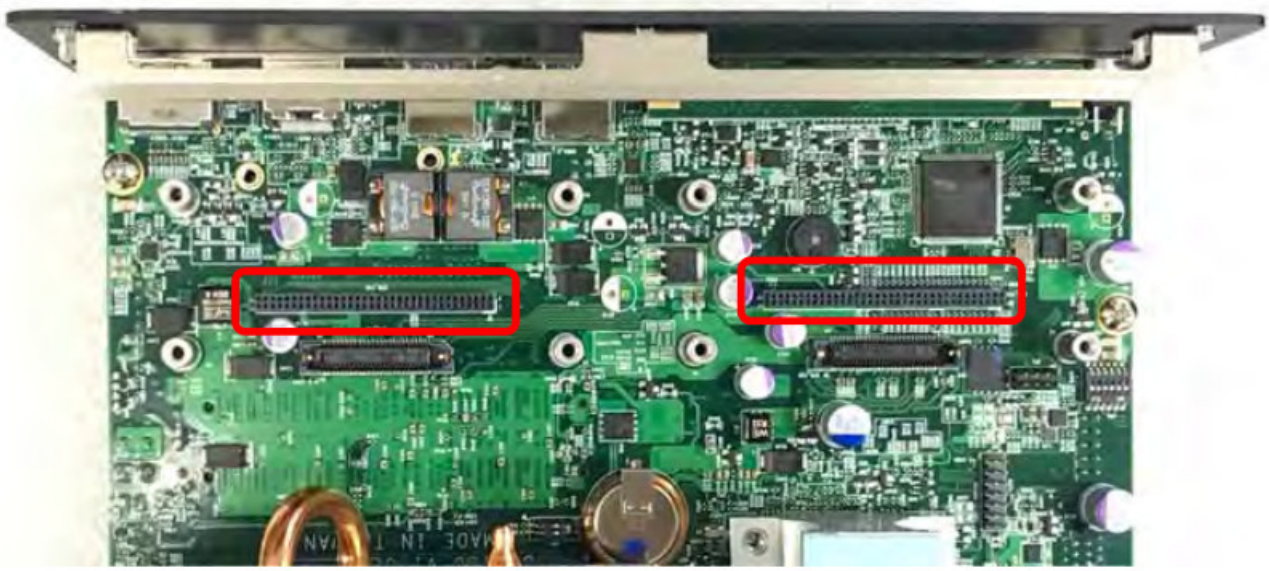
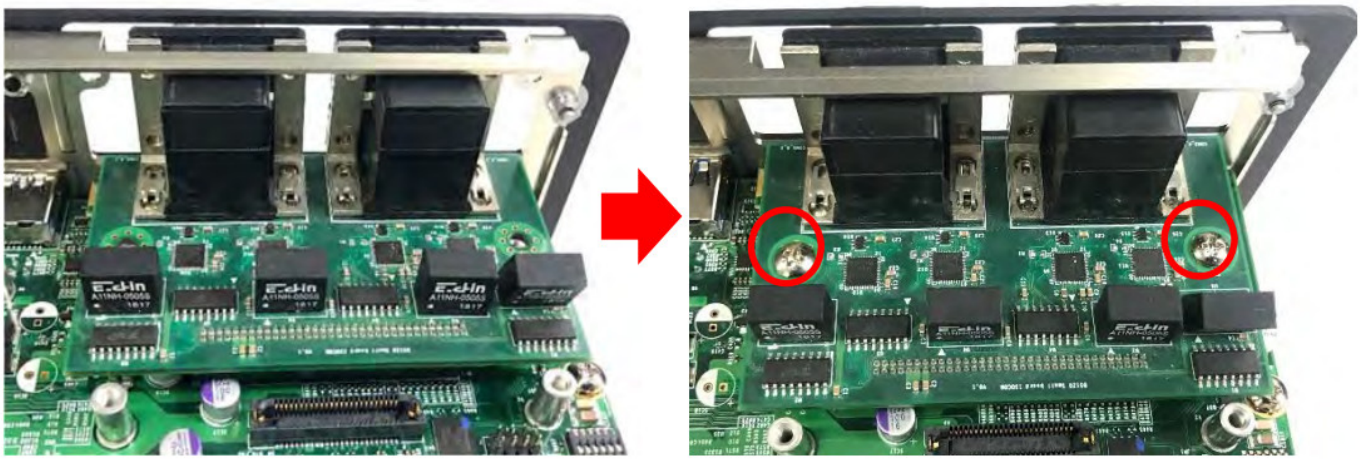
act 2
link 1
act 1











act 2
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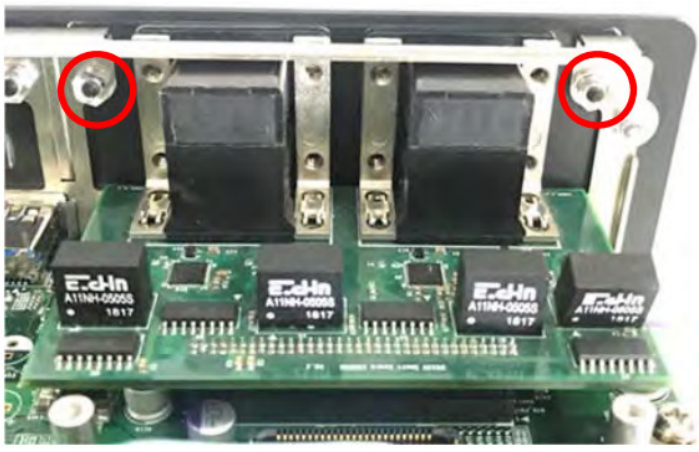

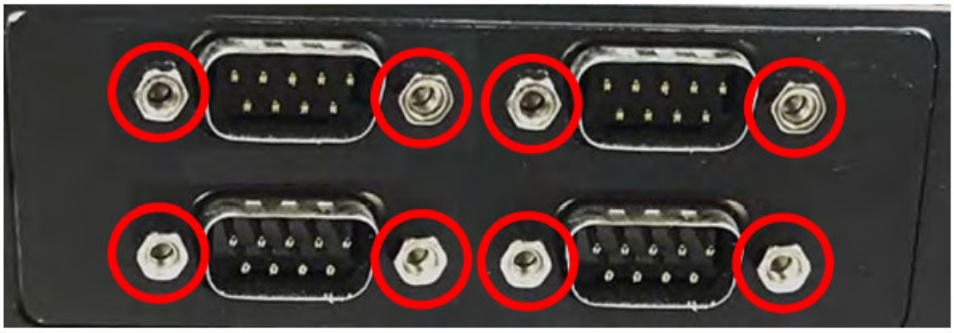

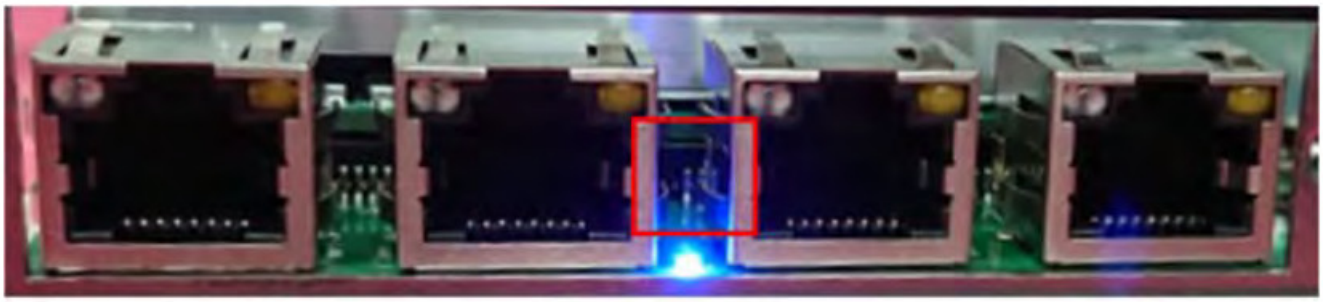

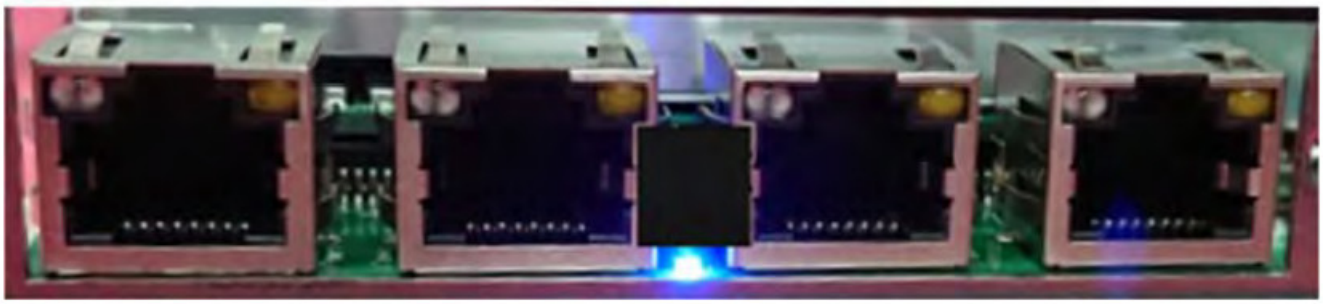

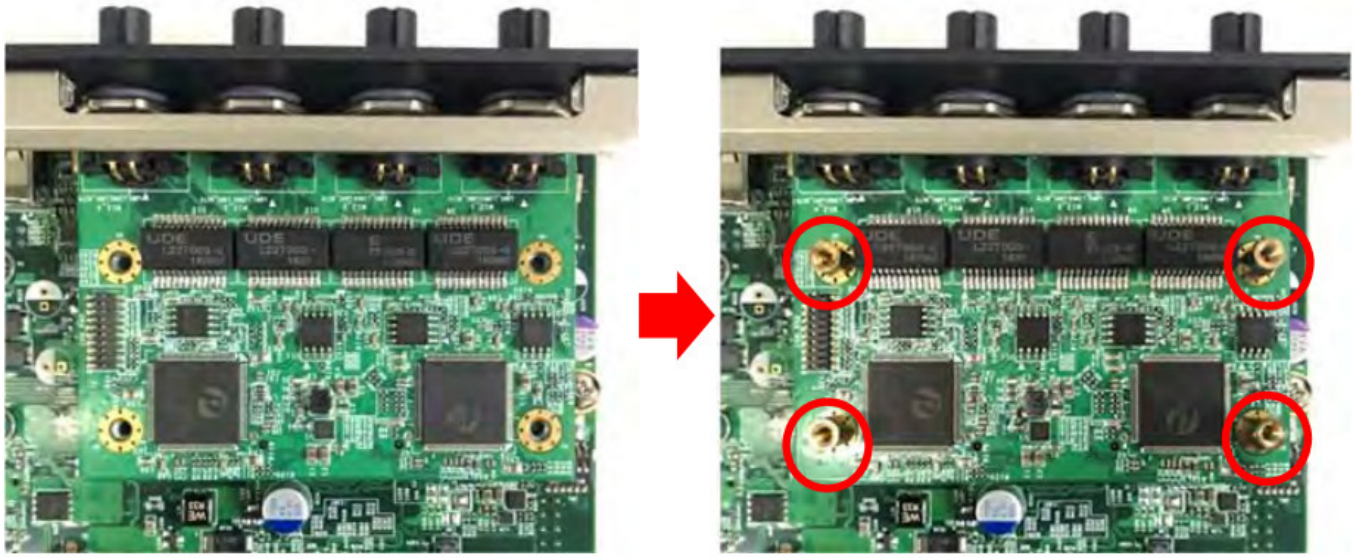

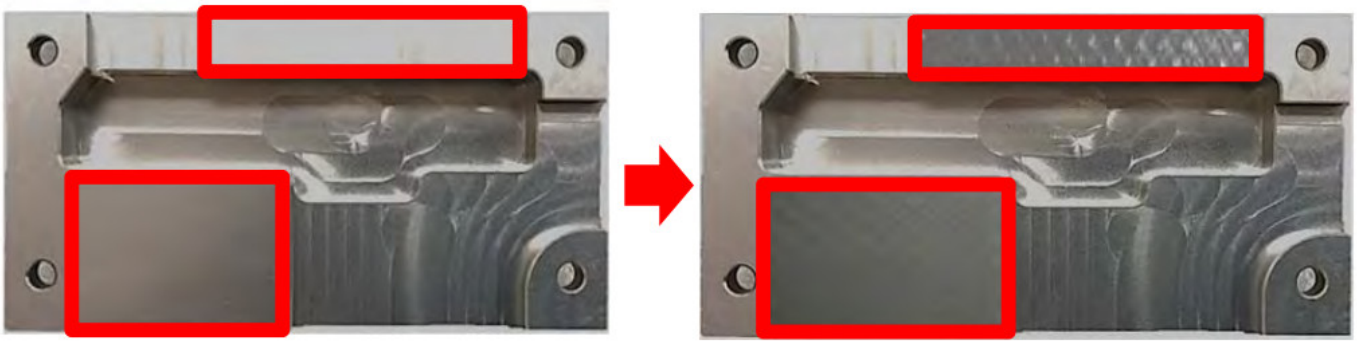

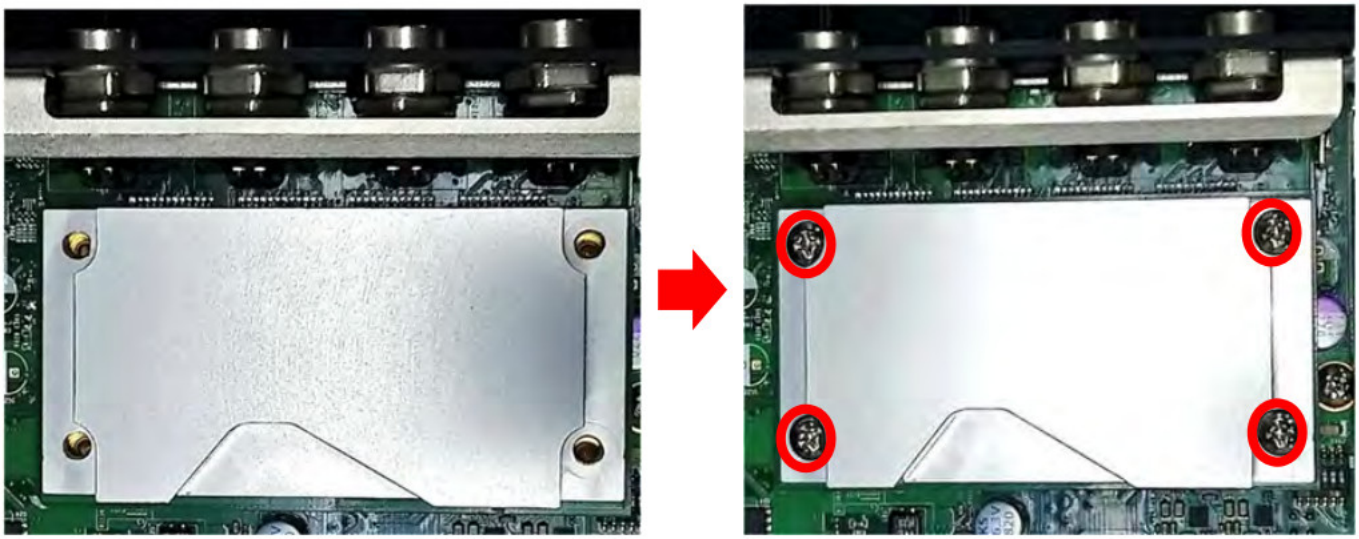

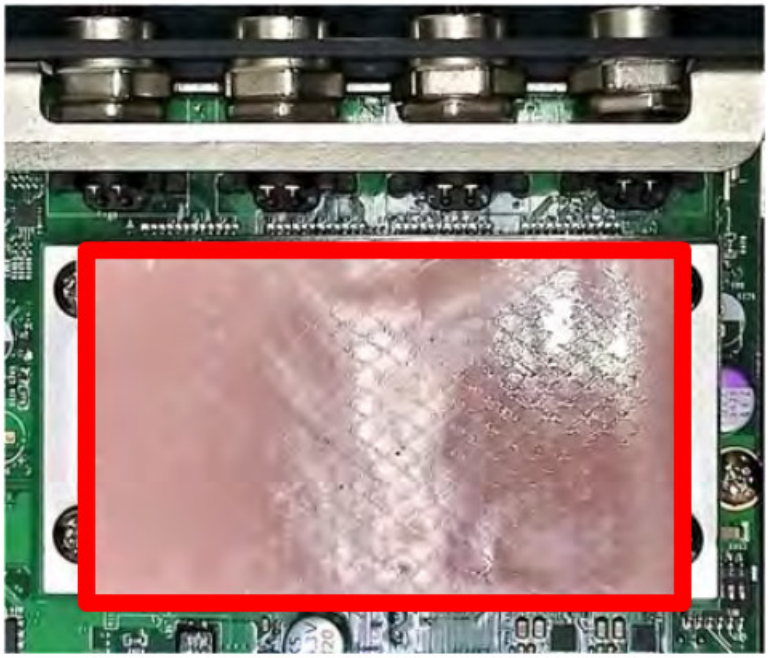

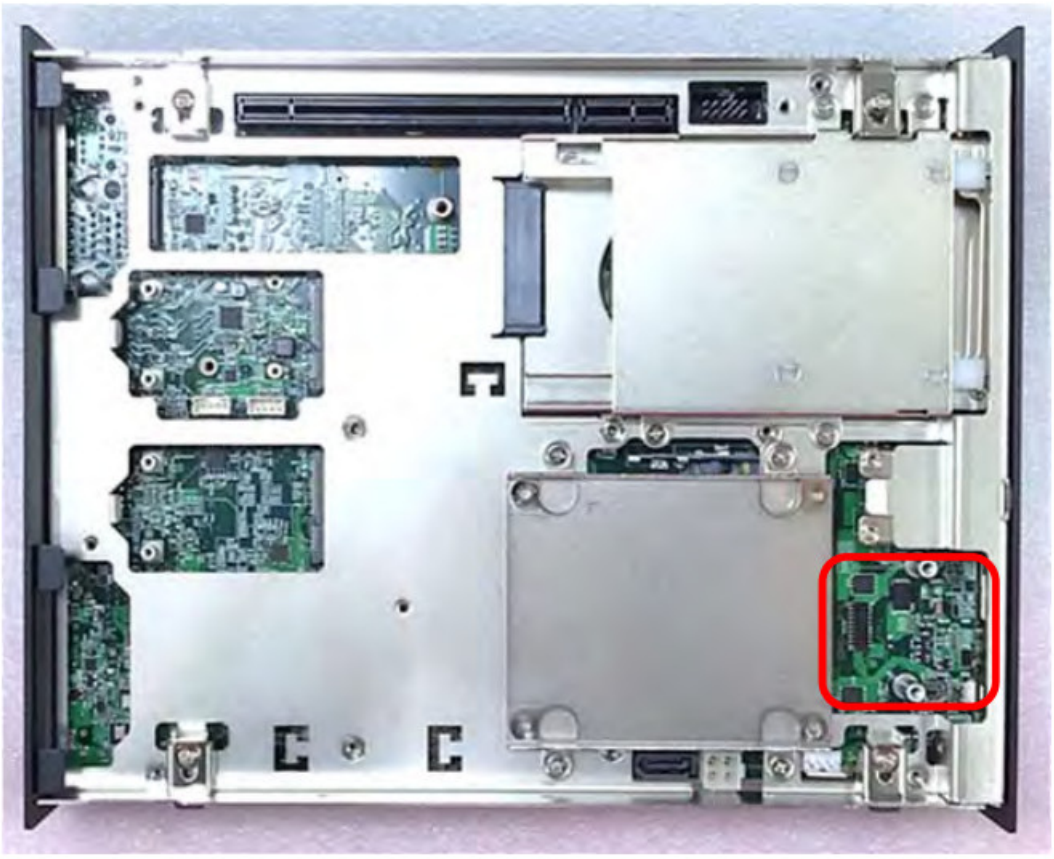

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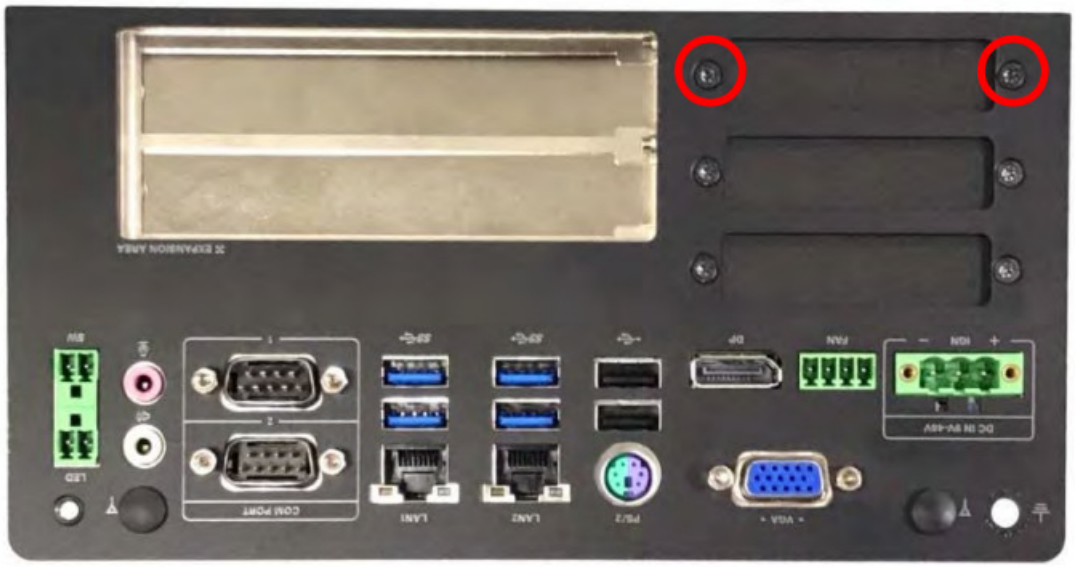
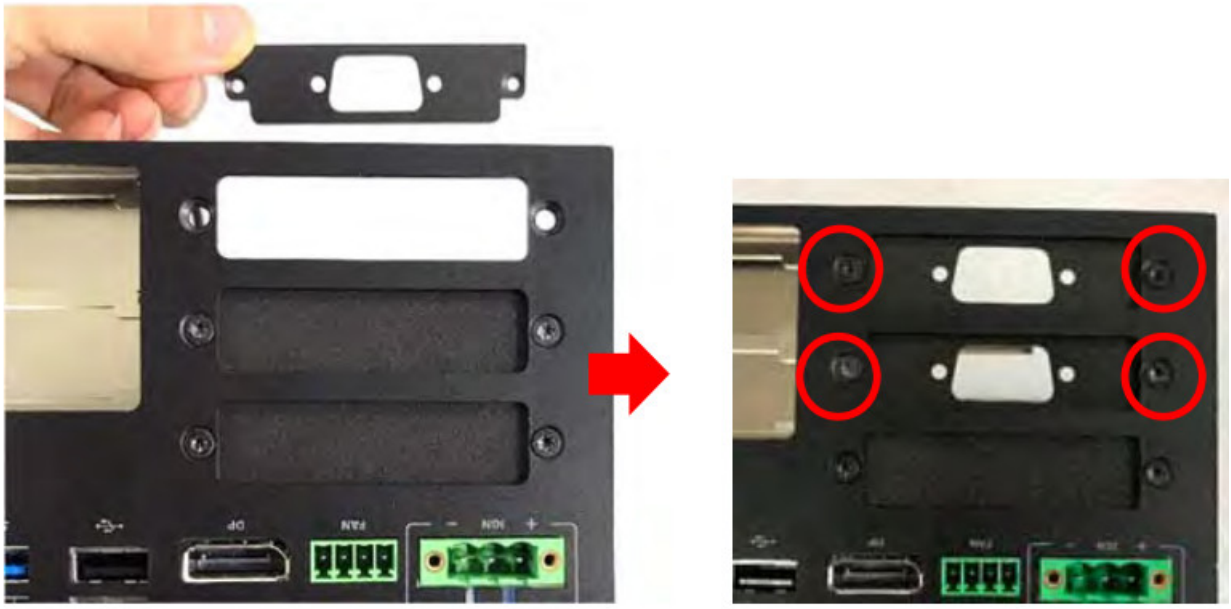
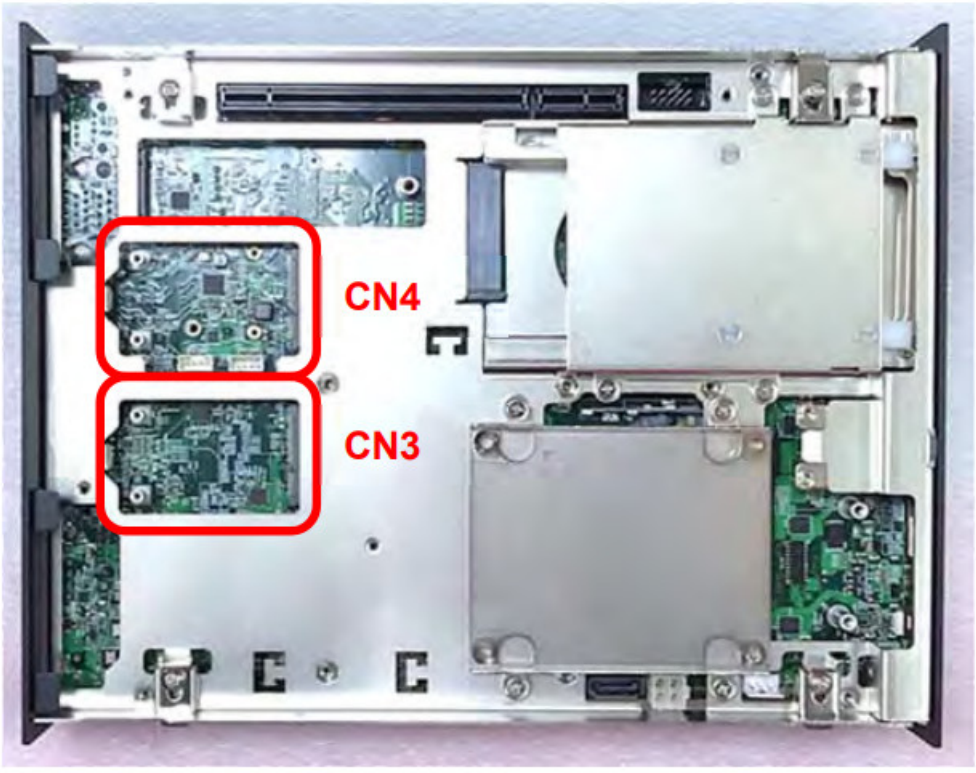
PIS110 Rev:1.0

CFM-IGN101
OMCFMXX00264
PIS110 Rev:1.0



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CN3

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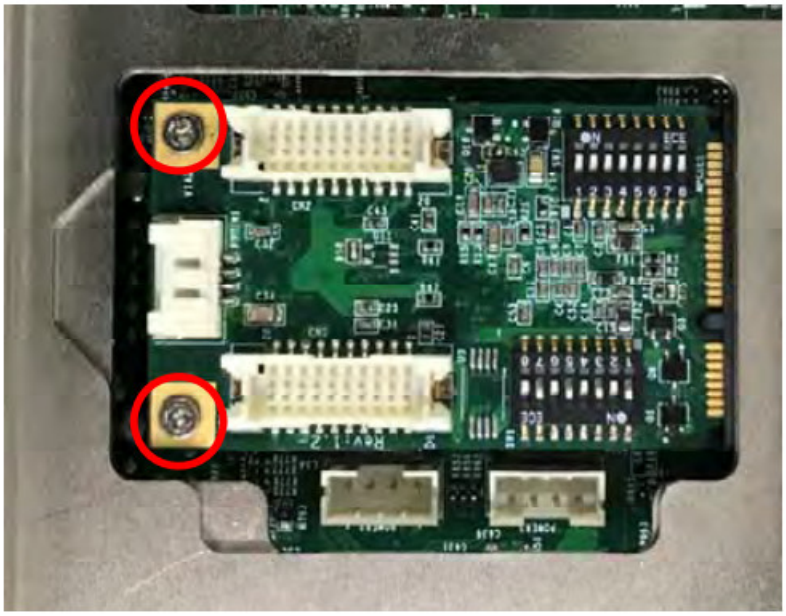

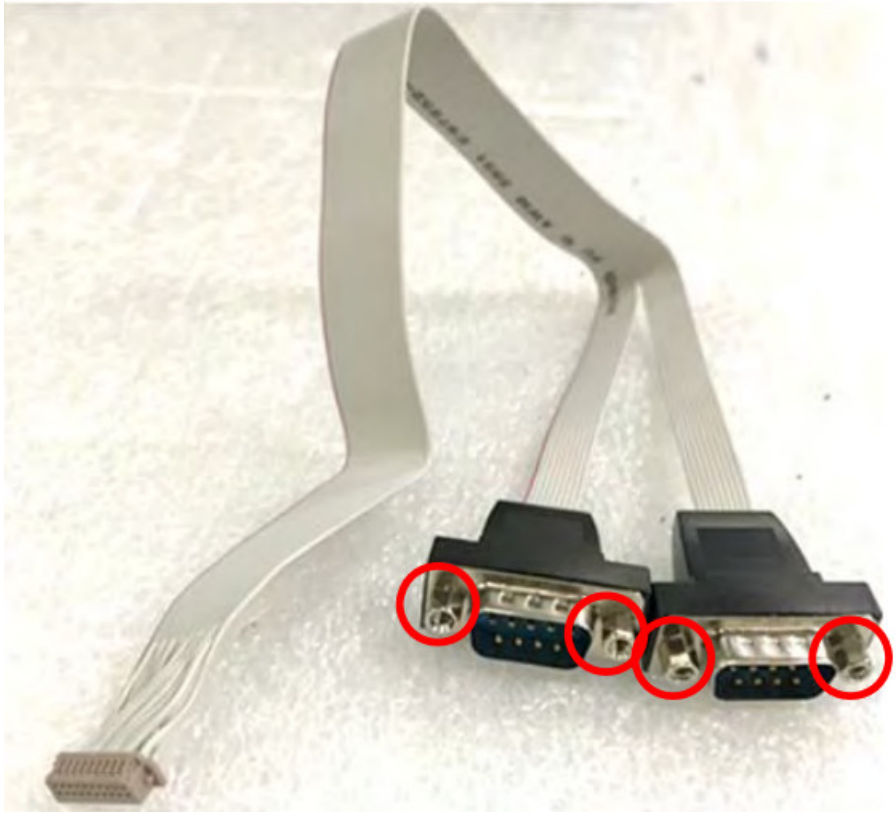

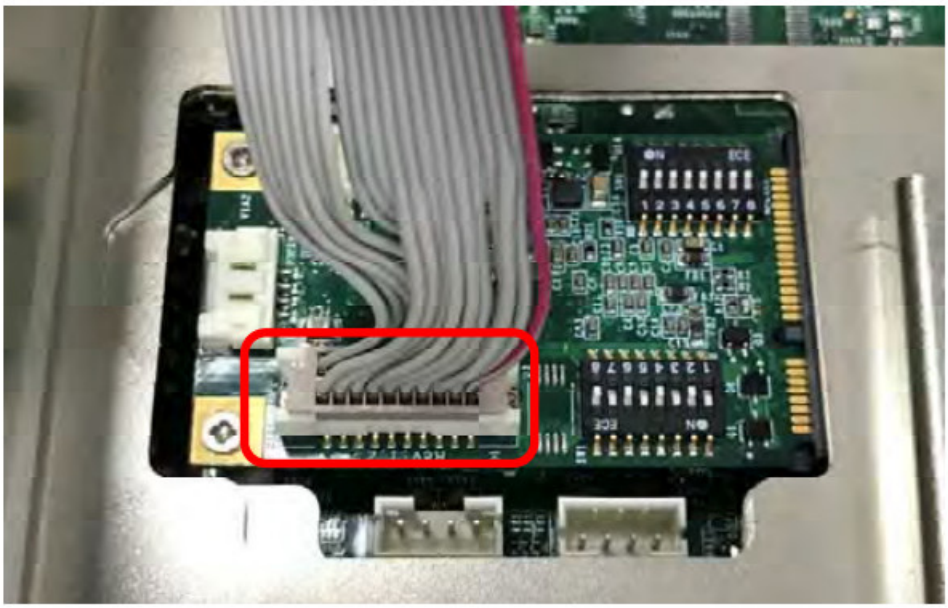

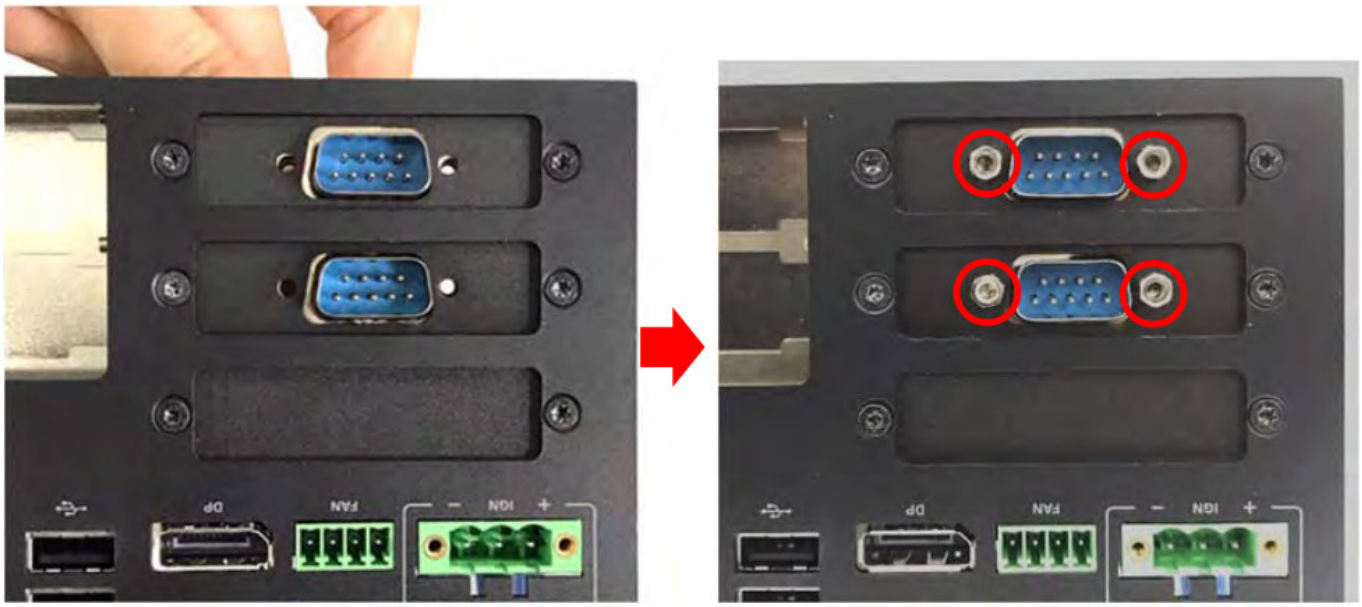
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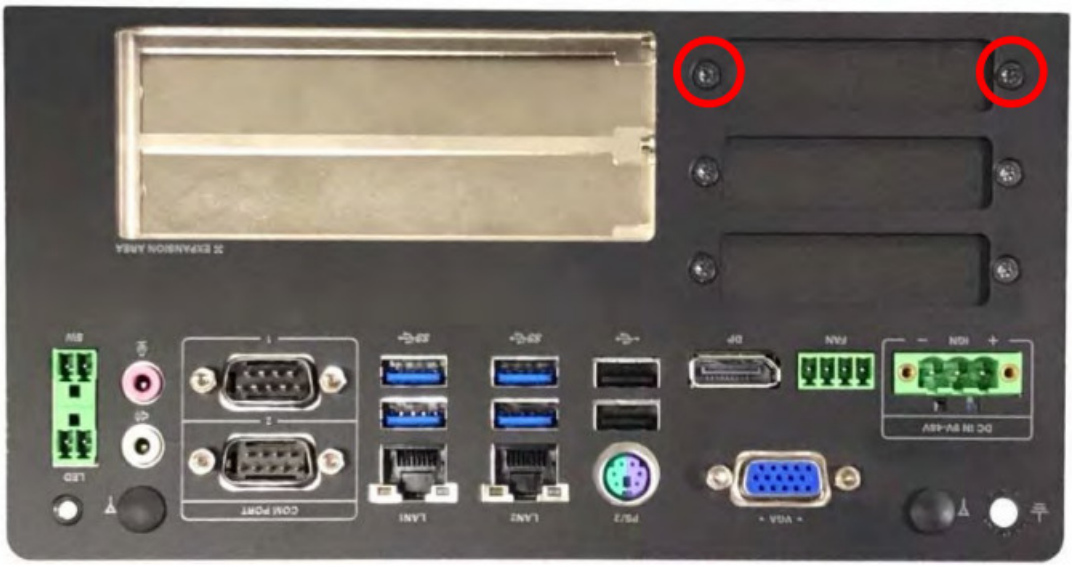

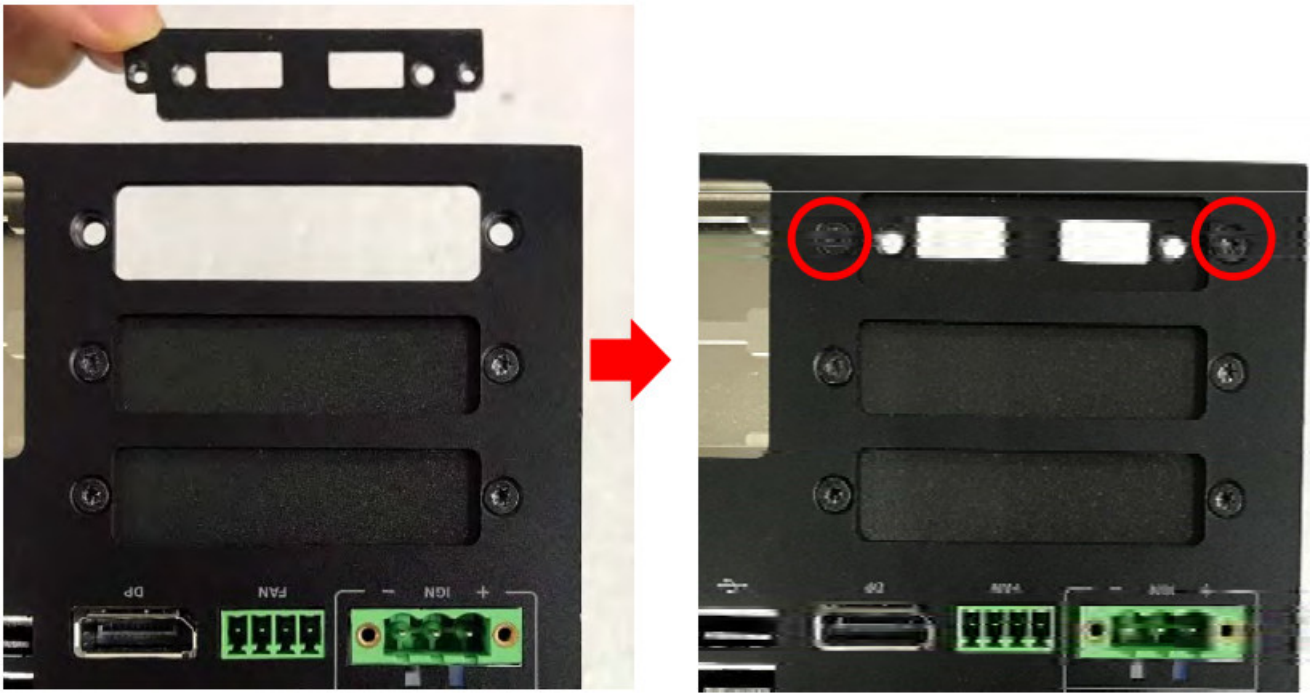
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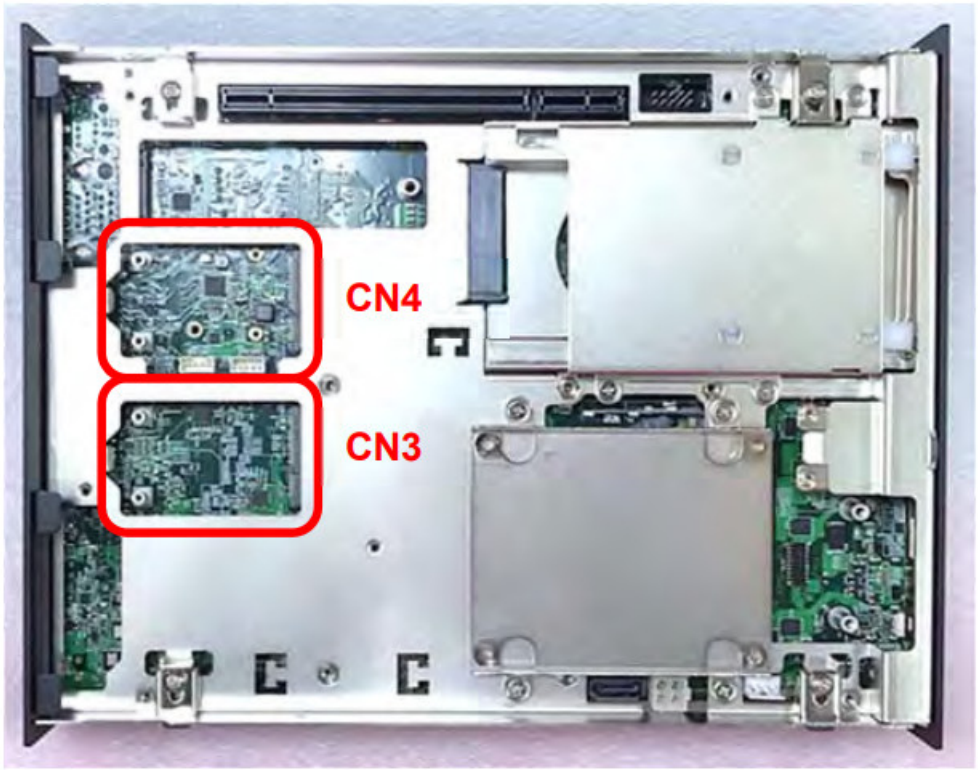
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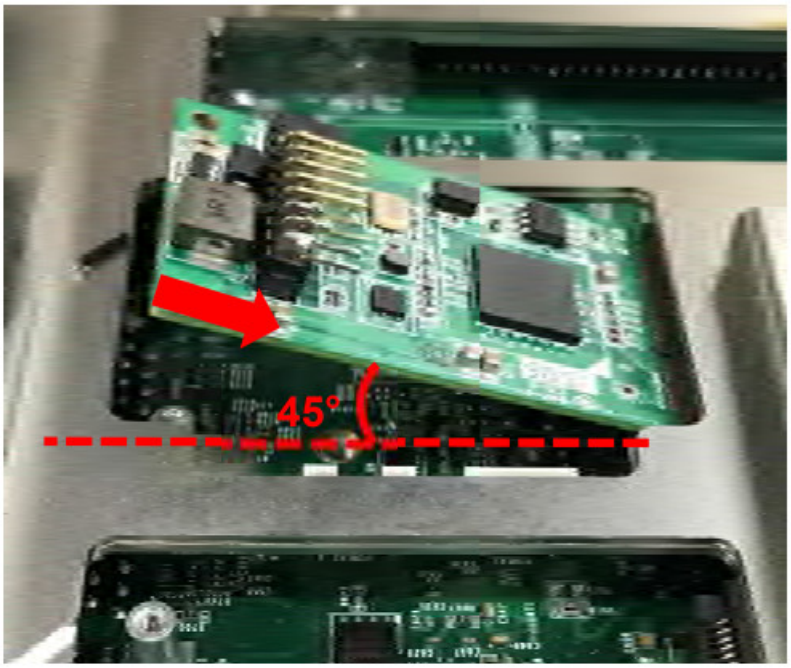
CN3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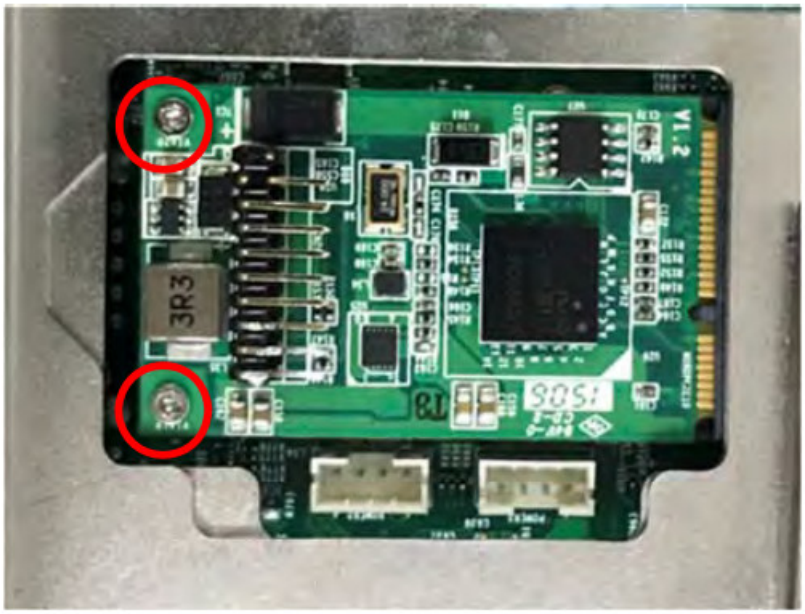
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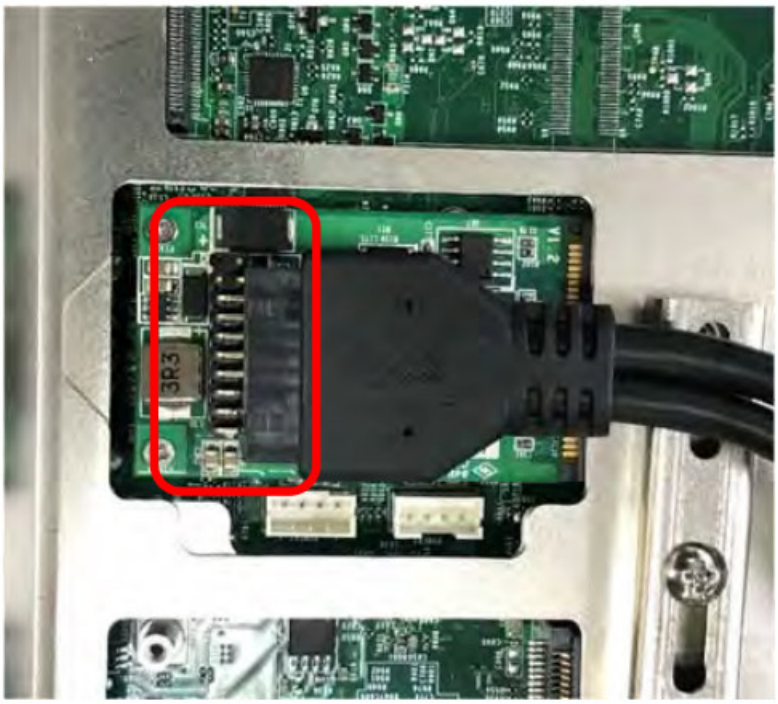
V1.2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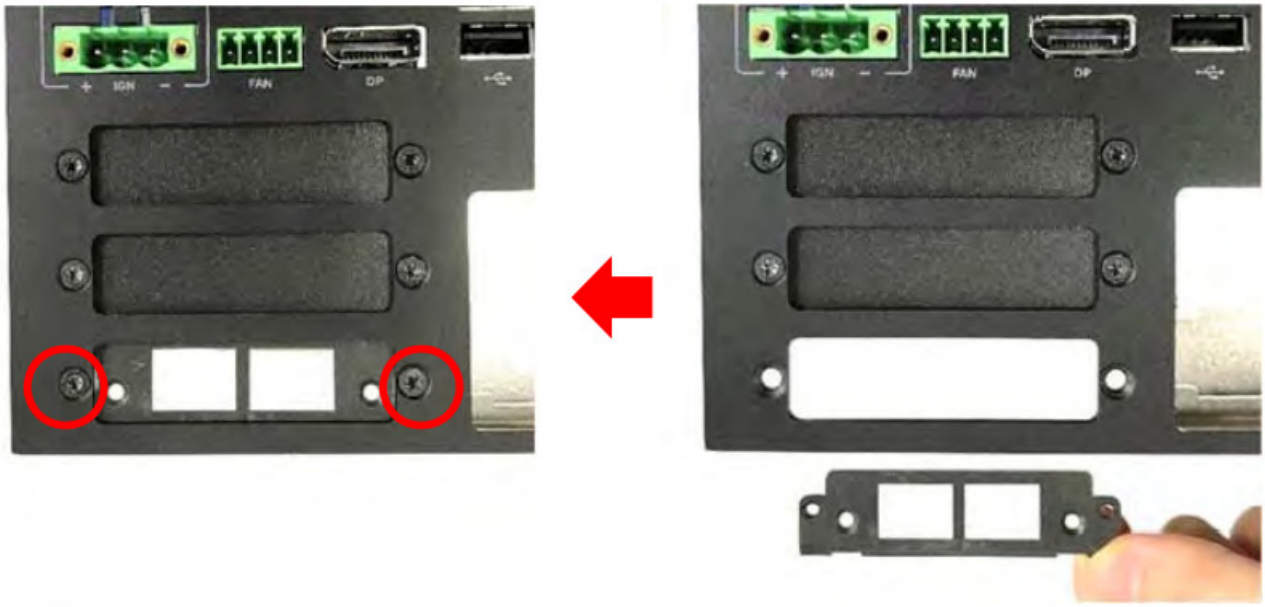
IGN
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LAN1
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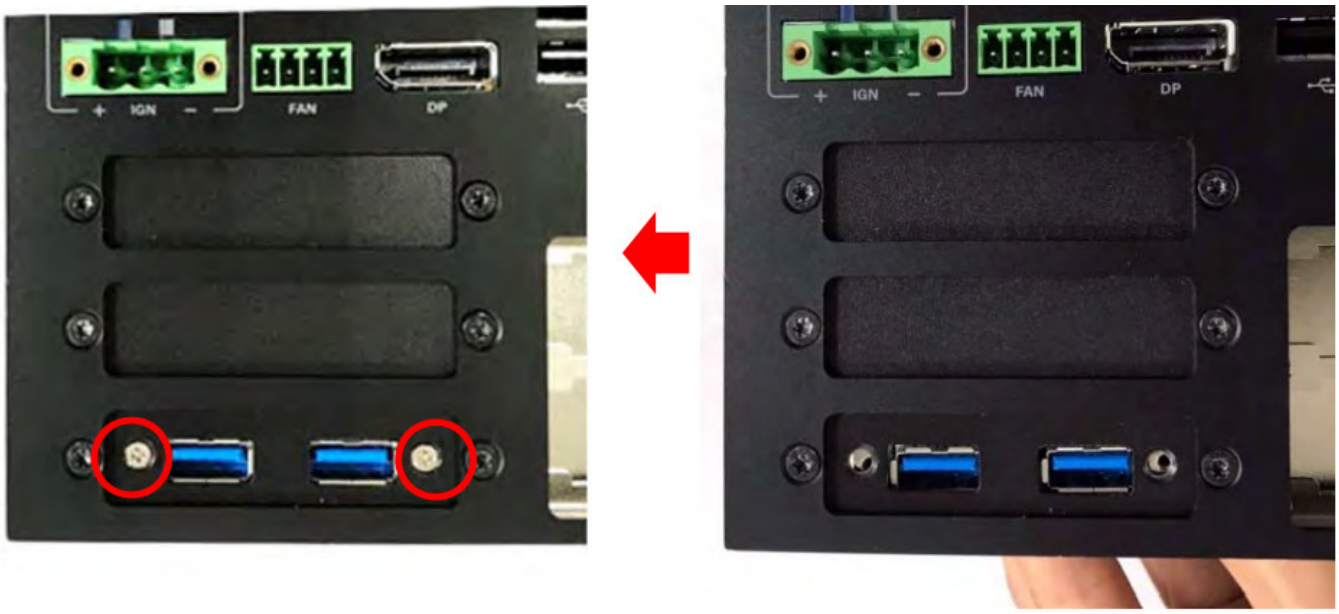
DC IN 9V-48V
IGN
FAN
DP
EXPANSION AREA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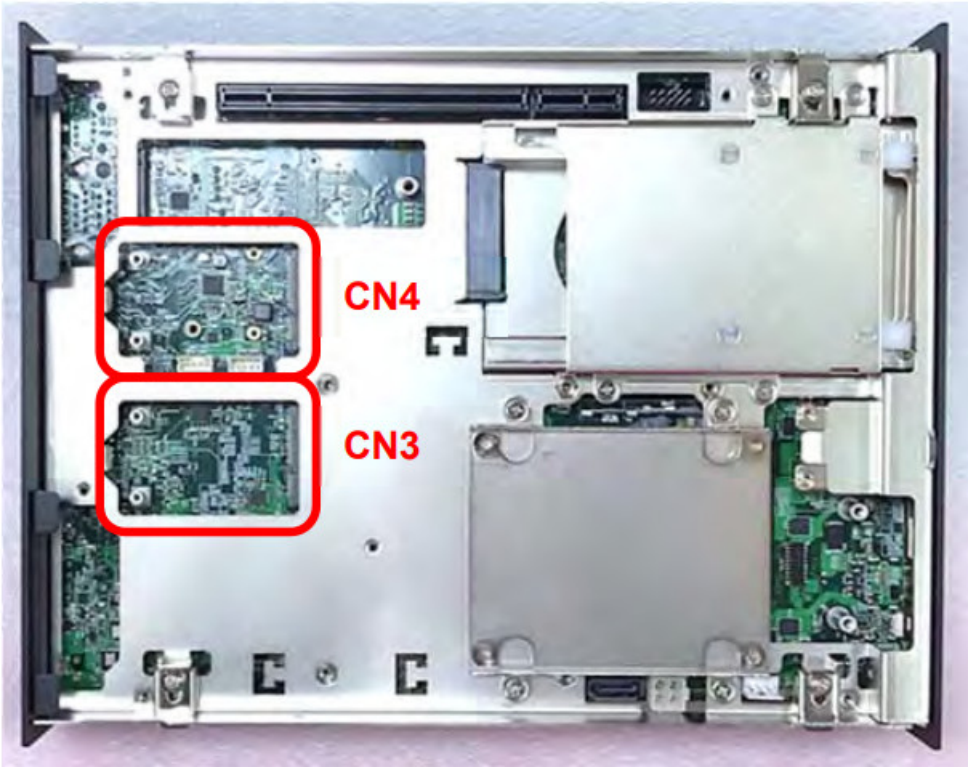

Documents / Resources

	Spectra 3000E Series PowerBox [pdf] User Manual 3000E Series PowerBox, 3000E Series, PowerBox

References

- Home - www.austria.at
- Spectra (Schweiz) AG | Industrial PCs & Automation
- Spectra GmbH & Co. KG | Industrial PCs & Automation
- Spectra GmbH & Co. KG | RMA Formular

Manuals+,