ABP-4000 USER Manual

Intel® Core™ i7/i5/i3 Processor (Raptor Lake-P) Ultra-slim Fanless
Embedded System, 2.5G LAN, USB 3.2 Gen 2x2, 2 COM,
9V to 55V DC-in, -25°C to 70°C

Vecow

Record of Revision

Version	Date	Page	Description	Remark
1.0.0	2024/08/01	All	Preliminary Release	
1.1.0	2025/02/13	28	Update	

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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 it is not installed and used in accordance with the instruction manual, it 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 products described in this manual comply with all applicable 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.

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Order Information

Part Number	Description
ABP-4000-1365U	ABP-4000, onboard Intel® Core™ i7-1365UE, 2 2.5G LAN, 1 USB 3.2 Gen 2x2 Type-C, 2 USB 3.2, 2 USB 2.0, 2 COM, 4 HDMI 2.0, 4 M.2
ABP-4000-1345U	ABP-4000, onboard Intel® Core™ i5-1345UE, 2 2.5G LAN, 1 USB 3.2 Gen 2x2 Type-C, 2 USB 3.2, 2 USB 2.0, 2 COM, 4 HDMI 2.0, 4 M.2
ABP-4000-1315U	ABP-4000, onboard Intel® Core™ i3-1315UE, 2 2.5G LAN, 1 USB 3.2 Gen 2x2 Type-C, 2 USB 3.2, 2 USB 2.0, 2 COM, 4 HDMI 2.0, 4 M.2

Optional Accessories

Part Number	Description
DDR4 32G	Certified DDR4 32GB 3200MHz RAM
DDR4 16G	Certified DDR4 16GB 3200MHz RAM
DDR4 8G	Certified DDR4 8GB 3200MHz RAM
DDR4 4G	Certified DDR4 4GB 3200MHz RAM
PWA-120W1	120W, 24V, 90V AC to 264V AC Power Adapter with 3-pin Terminal Block
VESA Mount	VESA Mounting Kit
DIN-RAIL	DIN-RAIL Kit
M.2 Storage Module	M.2 Key M/Key B Storage Module
5G Module	5G Module with Antenna
4G Module	4G/GPS Module with Antenna
WiFi & Bluetooth Module	WiFi & Bluetooth Module with Antenna

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GENERAL INTRODUCTION

1.1 Overview

The Vecow ABP-4000 is an Ultr-compact Fanless Embedded System powered by 10-core 13th Gen Intel® Core™ i7/i5/i3 processor with low TDP (15W). The ultra-slim design, measuring just 228.0 x 150.0 x 32.6 mm, makes it ideal for AI applications in various industries such as Machine Vision, AMR, Digital Signage, Kiosks, and other Edge AI applications.

The ABP-4000 supports a wide range of I/O and expansions, including 2 2.5G LAN ports, 5 USB ports with 2 USB 3.2 Gen 2 ports, 1 USB 3.2 Gen 2x2 Type-C port, 2 COM RS 232/422/485 ports, and 4 HDMI ports. The system includes M.2 Key B and Key E slots for expansions. With its industrial-grade features, the ABP-4000 is suited for AMR and Machine Vision applications where space is limited. Furthermore, leveraging the power of Intel® Iris Xe Graphics, the ABP-4000 supports industrial visualization needs and allows for up to 4 simultaneous 4K displays.

The ABP-4000 operates within a wide temperature range from -25°C to 70°C, thanks to Vecow's industrial-grade thermal design. Furthermore, it supports a 9V to 55V power input with software ignition power control.

1.2 Features

- 13th Gen Intel® Core™ i7/i5/i3 U-series Processor (Raptor Lake-P), 15W TDP CPU

- Ultra-slim and cableless design, fanless -25°C to 70°C operation

- 2 DDR4 3200MHz memory, up to 64GB

- 2 USB 2.0, 2 USB 3.1 Gen 2, 1 USB 3.2 Gen 2x2 max 20Gbps data transfer

- 4 HDMI up to 4K resolution

- DC 9V to 55V wide range Power Input, Software Ignition Power Control

- Fully supports OpenVINO™ toolkit for AI Computing

- 5G/WiFi/4G/LTE/GPRS/UMTS Wireless Communication, TPM 2.0 Optional VHub One-Stop AIoT Solution Service supports OpenVINO based AI accelerator and advanced Edge AI applications

1.3 Product Specification

System	
Processor	Quad Core Intel® i7-1365UE/i5-1345UE/i3-1315UE Processor (Raptor Lake-P)
Chipset	Intel® SoC
GPU	Intel® Iris X^e
BIOS	AMI
SIO	IT8786E
Memory	2 DDR4 3200MHz SO-DIMM, up to 64GB
Ethernet	
LAN 1	Intel® I226 2.5G LAN supports TSN
LAN 2	Intel® I226 2.5G LAN supports TSN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Storage	
SATA	1 SATA III (6Gbps)(Optional)
M.2	• 1 M.2 Key M Socket (2242/2280, PCIe4.0 x4) • 1 M.2 Key M Socket (2242/2280, PCIe x2, default/SATA)
I/O Interface	
Display	• 4 HDMI 2.0 : Up to 3840 x 2160 @60Hz • 1 DisplayPort 1.4a: Up to 3840 x 2160 @60Hz by USB Type-C
Serial	2 COM RS-232/422/485
USB	• 1 USB 3.2 Gen 2x2 Type-C, support DP 1.4a • 2 USB 3.2 • 2 USB 2.0
LED	Power, HDD, Wireless
SIM	1 External Nano SIM Card Socket
Expansion	
M.2	• 1 M.2 Key E Socket (2230, PCIe x1) • 1 M.2 Key B Socket (2242/3042, PCIe x1/USB3, default)

Power	
Power Input	9V to 55V DC-in
Power Interface	3-pin Terminal Block: V+, V-, Frame Ground
Ignition Control	16-mode Software Ignition Control
Remote Switch	3-pin Terminal Block : On, Off, IGN
Others	
TPM	Infineon SLB9672 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats
Software Support	
OS	Windows 11, Windows 10, Linux
Mechanical	
Dimension (W x L x H)	228.0mm x 150.0mm x 32.6mm (8.98" x 5.91" x 1.28")
Weight	1.6 kg (3.5 lb)
Mounting	• Wallmount by mounting bracket • VESA Mount (Optional) • DIN Rail Mount (Optional)
Environment	
Operating Temperature	-25°C to 70°C (-13°F to 158°F) with air flow
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	• IEC 60068-2-27 • SSD : 50G @wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, ICES, EN50155, EN50121-3-2

1.4 Mechanical Dimension

Unit : mm (inch)

282.1 (11.11)
260.3 (10.25)
228.0 (8.98)

100.0 (3.94)

150.0 (5.91)

32.6 (1.28)
36.6 (1.44)
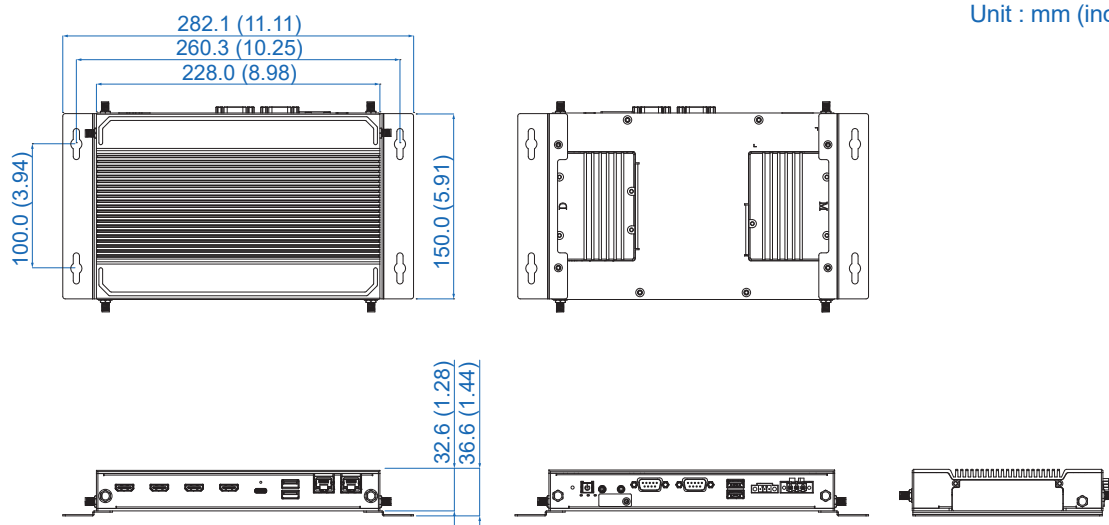
2

GETTING TO KNOW YOUR ABP-4000

2.1 Packing List

Item	Description	Qty
1	ABP-4000 Expandable Fanless Embedded System (According to the configuration of you order, the ABP-4000 series may contain M.2 and DDR4 SO-DIMM. Please verify these items if necessary.)	1
2	ABP-4000 series accessory box, which contains	

Item	Description	Outlook	Usage	P/N	Qty
3	PHILLIPS M3x4L, Ni+Ny		M.2	53-2426204-80B	4
4	I-M3x6L, Ni		Wall Mount Bracket	53-2456206-30B	4
5	Terminal block 3-pin (3.5mm)		IGN	51-2211R03-S1A	1
6	Terminal block 3-pin(5.0mm)		DC-IN	512411R03-S1B	1
7	Foot Pad		Foot Pad	53-4000042-303	4
8	Wall mount bracket		Mount	62-04P1577-30A	2

2.2 Front Panel I/O Functions

In Vecow ABP-4000 series family, all I/O connectors are located on front panel and rear panel. Most of the general connections to computer device, such as USB, HDMI, DisplayPort, LAN Jack and any additional storage, are placed on the front panel.

2.2.1 HDMI
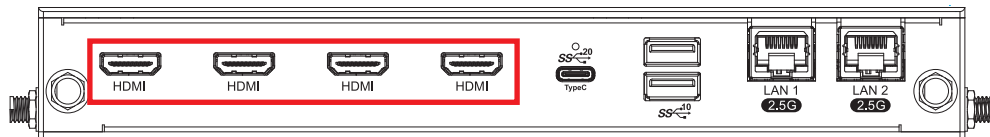
Onboard HDMI Port supports DDC channel mode. The connection supports up to 3840 x 2160 resolution at 60Hz.

2.2.2 TYPE C
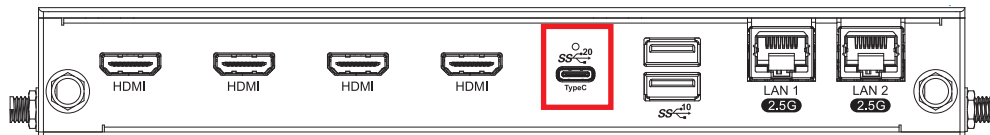
USB Type-C connector support up to 20GB per second data rate and DisplayPort 1.4a : Up to 3840 x 2160 @ 60Hz by USB Type-C in the front side of ABP-4000 series.

2.2.3 USB3.2

There are 2 USB 3.2 connections available supporting up to 10GB per second data rate in the front side of ABP-4000 series. It also compliant with the requirements of Super Speed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.4 Ethernet Port
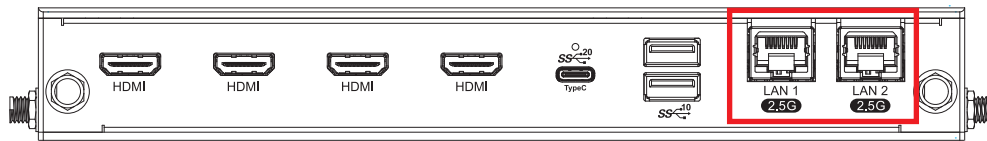
There are two 8-pin RJ-45 jacks supporting 10/100/1000/2500 Mbps Ethernet Connections on the front side of ABP-4000.
LAN1 and LAN 2 is powered by Intel I226 Ethernet engine.

LAN Chip	Function	Connetor
Intel I226	RJ45(10/100/1000/2500Mbps)	LAN1
Intel I226	RJ45(10/100/1000/2500Mbps)	LAN2

Using suitable RJ-45 cable, you can connect the system to a computer or to any other devices with Ethernet connection; for example, a hub or a switch. Moreover, both LAN 1 and LAN 2 support Wake on LAN and Pre-boot functions. The pin-outs of LAN 1 and LAN 2 are listed as follows:

Pin No.	10/ 100 Mbps	1000/2500 Mbps
1	E_TX+	MDI0_P
2	E_TX-	MDI0_N
3	E_RX+	MDI1_P
4	----	MDI2_P
5	----	MDI2_N
6	E_RX-	MDI1_N
7	-----	MDI3_P
8	-----	MDI3_N

Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/Link/Speed status of the connection.

The LED indicator on the left bottom corner lightens in solid green when the cable is properly connected to a 1000 Mbps Ethernet network; The LED indicator on the left bottom corner lightens in solid orange when the cable is properly connected to a 2500Mbps Ethernet network; The right LED will keep twinkling/off when Ethernet data packets are being transmitted/received.

LED Location	LED Color	10Mbps	100Mbps	1000Mbps	2500 Mbps
Right	Green/ Orange	Off	Off	Solid Green	Solid Or-ange
Left	Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow
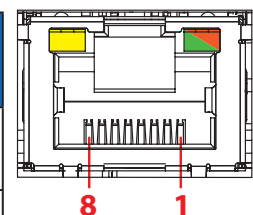
2.3 Rear Panel I/O Functions

2.3.1 Power Terminal Block
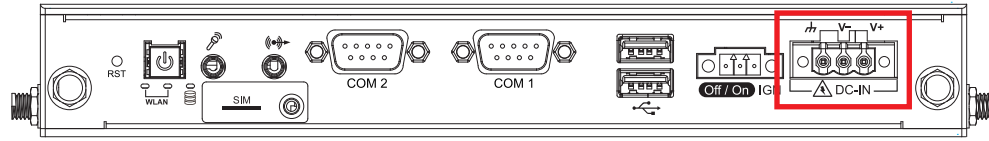
ABP-4000 supports 9V to 55V DC power input by terminal block in the rear side. In normal power operation (S0), power LED lightens in solid blue.

Pin No.	Definition
1	V+
2	V-
3	Chassis Ground

2.3.2 Remote Power On/Off Switch & Ignition
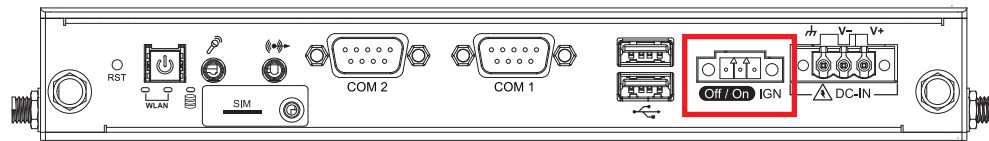
It is a 2-pin power-on or power-off switch through Phoenix Contact terminal block. You could turn on or off the system power by using this contact. This terminal block supports dual function of soft power-on/ power-off (instant off or delay 4 second), and suspending mode.

Pin No.	Definition
1	Ignition
2	SW+
3	SW-

2.3.3 USB2.0
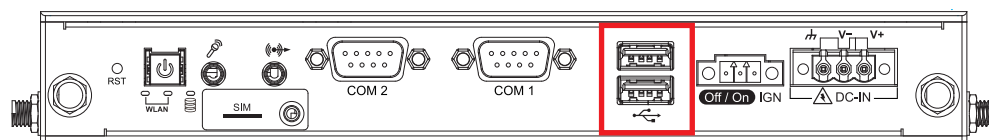
There are 2 USB 2.0 connections available supporting up to 480MB per second data rate.
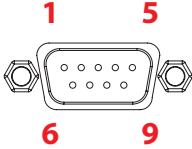
2.3.4 Serial Port
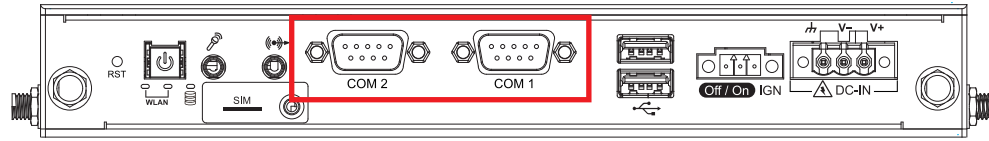
Serial port 1 to 4 (COM 1 to 4) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition is RS-232. If you want to change to RS-422 or RS-485, you can find the setting in BIOS.

BIOS Setting	Function
COM 1 COM 2	RS-232
	RS-422 (5-wire)
	RS-485
	RS-485 w/z auto-flow control

The pin assignments are listed in the table as follows :

Serial Port	Pin No.	RS-232	RS-422 (5-wire)	RS-485 (3-wire)
	1	DCD	TXD-	DATA-
	2	RXD	TXD+	DATA+
	3	TXD	RXD+	-----------
	4	DTR	RXD-	-----------
	5	GND	GND	GND
	6	DSR	-----------	-----------
	7	RTS	-----------	-----------
	8	CTS	-----------	-----------
	9	RI	-----------	-----------

2.3.5 Audio Jack
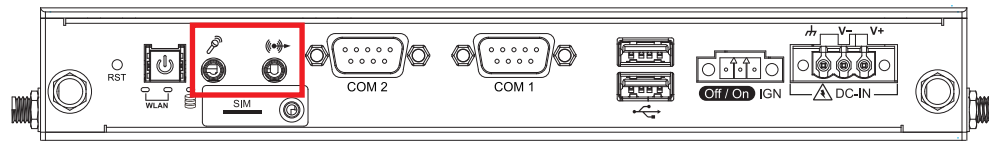
There are 2 audio connectors, Mic-in and Line-out, in the front side of ABP-4000 Onboard Realtek ALC888 audio codec supports 7.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications.

To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel Sunrise Point chipset and Realtek ALC888 codec.

2.3.6 WLAN LED, SIM Card Comparison
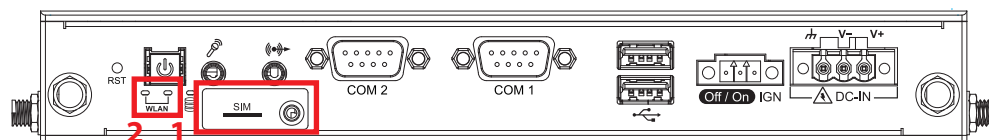
M.2/NANO SIM Slot/WLAN LED Mapping Table:

M.2	SIM	LED
M.2 B KEY	M2B_SIM1	1
M.2 E KEY	X	2

2.3.7 PWR & HDD LED Indicator
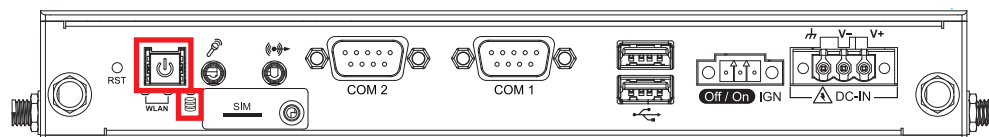
HDD LED/ Yellow: A hard disk/M.2 M key LED. If the LED is on, it indicates that ABP-4000 storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

Power LED:

Blue: If the LED is solid blue, it indicates that the system in power on (S0) status.

Orange: If the LED is solid orange, it indicates that the System in standby or Suspend to RAM (S3, S5) status.

LED Color	Function	Connetor
Yellow	M.2 M key	-On/Off : Storage status, function or not -Twinkling : Data transferring
Blue	S0	System in power on status.
Orange	S3, S5	System in standby or Suspend to RAM status.

2.3.8 Power Button
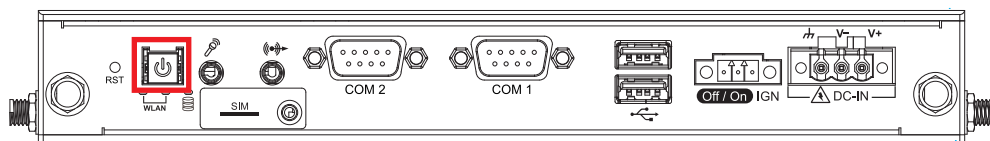
The Power Button is a non-latched switch with dual color LED indications. It indicates power status: S0, S3 and S5. More detail LED indications are listed as follows:

LED Color	Power Status	System Status
Solid Blue	S0	Power on status.
Solid Orange	S3, S5	Standby or Suspend to RAM status.

To power on ABP-4000, please press the power button and then the blue LED is lightened. To power off the system, you can either command shutdown by OS operation, or just simply press the power button.

If system error, you can just press the power button for 4-seconds to shut down the machine directly. Please do note that a 4-second interval between each 2 power-on/ power-off operation is necessary in normal working status. (For example, once turning off the system, you have to wait for 4 seconds to initiate another power-on operation.)

2.3.9 Reset Tact Switch
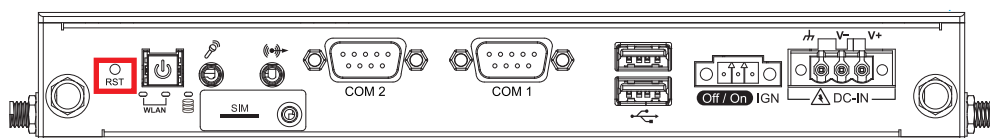
It is a hardware reset switch. Please use this switch to reset ABP-4000 without power off. Press the Reset Switch for a few seconds, and then reset will be enabled.

2.4 Main Board Expansion Connectors

2.4.1 Bottom View of ABP-4000 Main Board with Connector Location
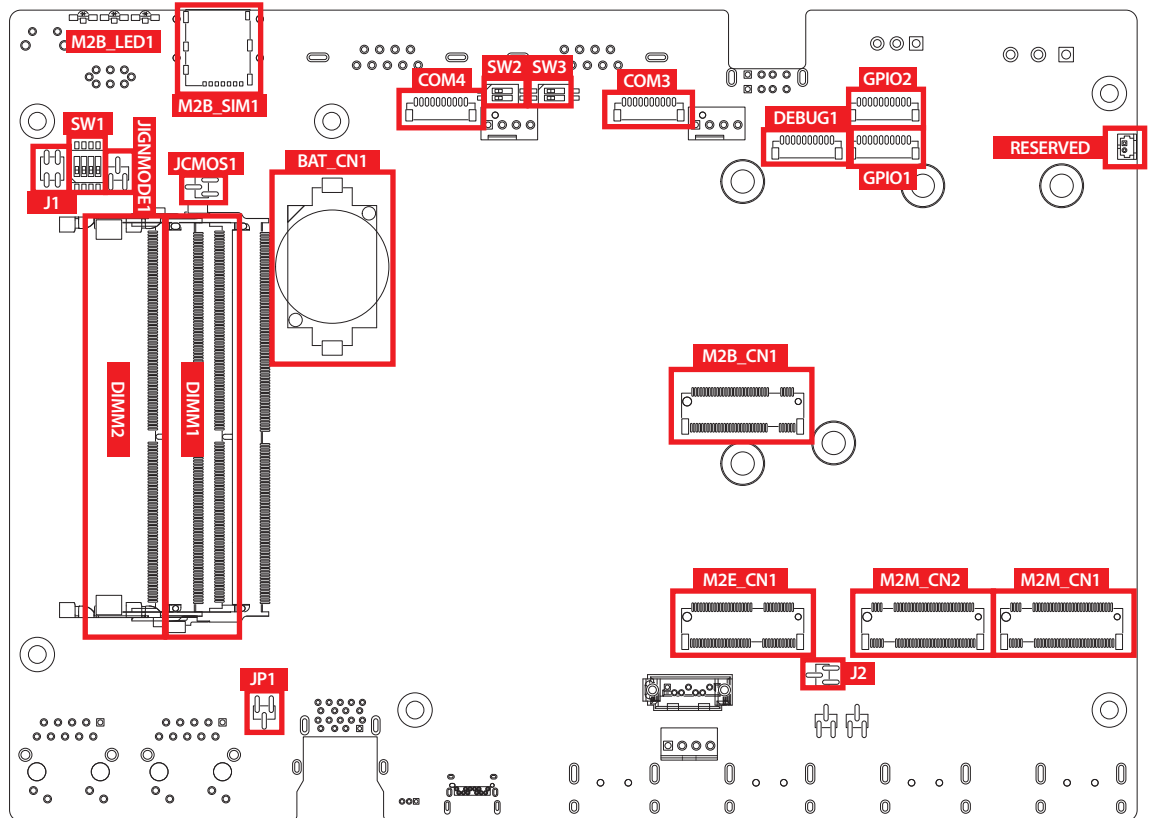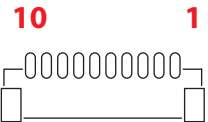
2.4.2 Top View of ABP-4000 Main Board with Connector Location
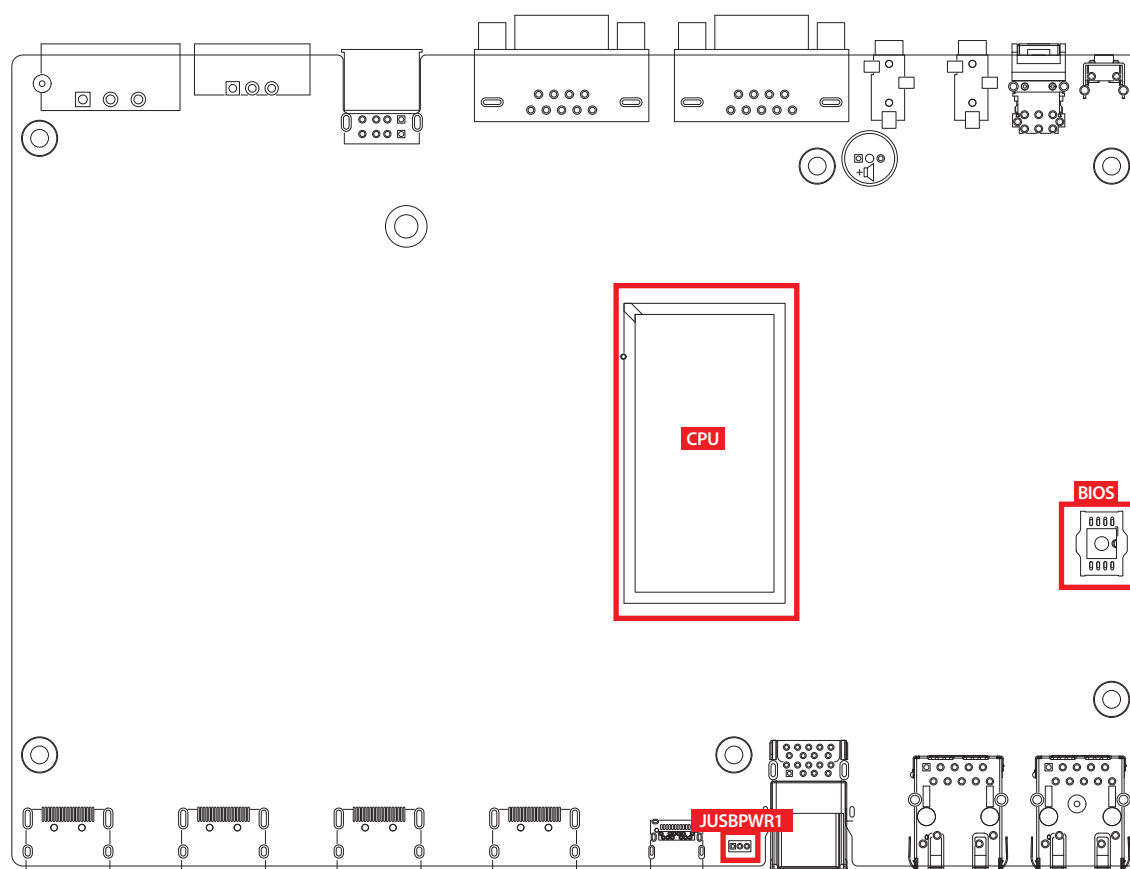
2.4.3 COM3, COM4: Serial Port cable Connector
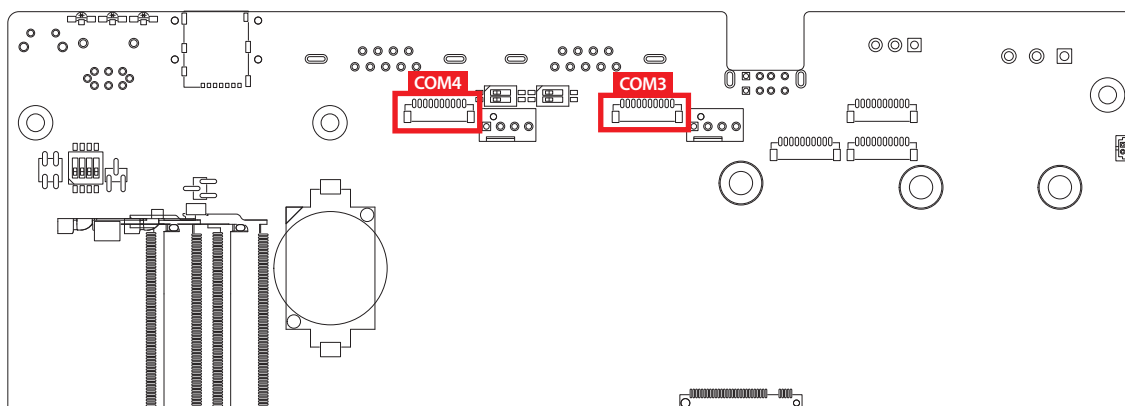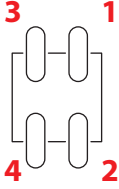
Location	Description
COM3	COM3
COM4	COM4

Pin No.	Function
1	NC
2	GND
3	RI
4	DTR
5	CTS
6	TXD
7	RTS
8	RXD
9	DSR 80_ESPI_RST#
10	DCD
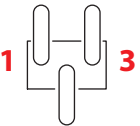
2.4.4 J1: IGNITION Firmware Programming Header
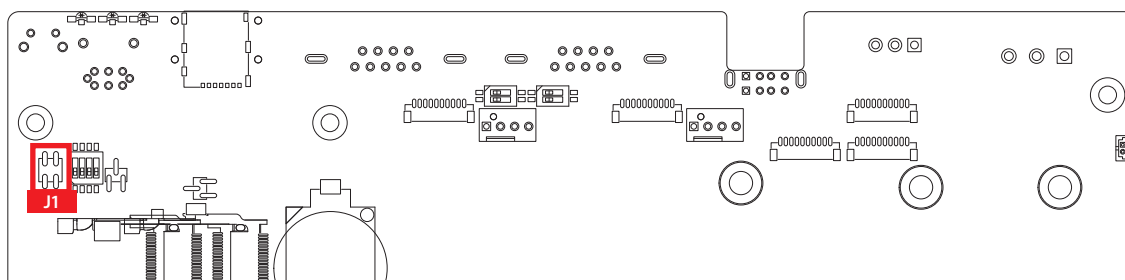
Pin No.	Function
1	GND
2	MCU_RST#
3	+V3.3_MCU
4	MCU_PRG

2.4.5 J2: VCORE FW Programming Header
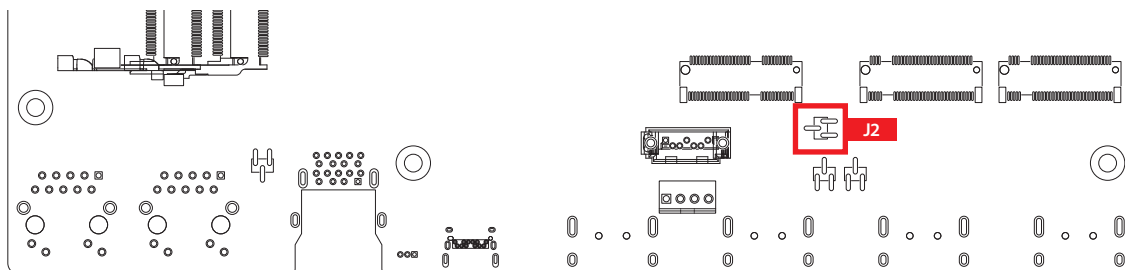
Pin No.	Function
1	SDA_P
2	SCL_P
3	GND

2.4.6 DEBUG1: ESPI Port 80 Header
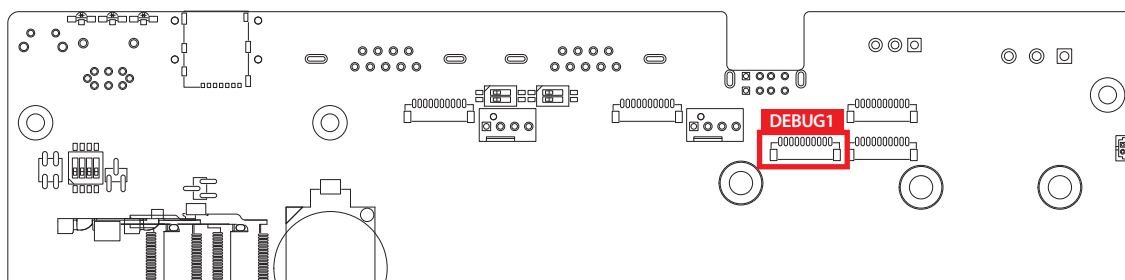
Pin No.	Function
1	+V3.3S
2	Port 80_ESPI_CS#
3	Port 80_ESPI_IO0
4	Port 80_ESPI_IO1
5	Port 80_ESPI_IO2
6	Port 80_ESPI_IO3
7	GND
8	Port 80_ESPI_CLK
9	RST 80_ESPI_RST#
10	GND

2.4.7 BAT_CN1: RTC Battery
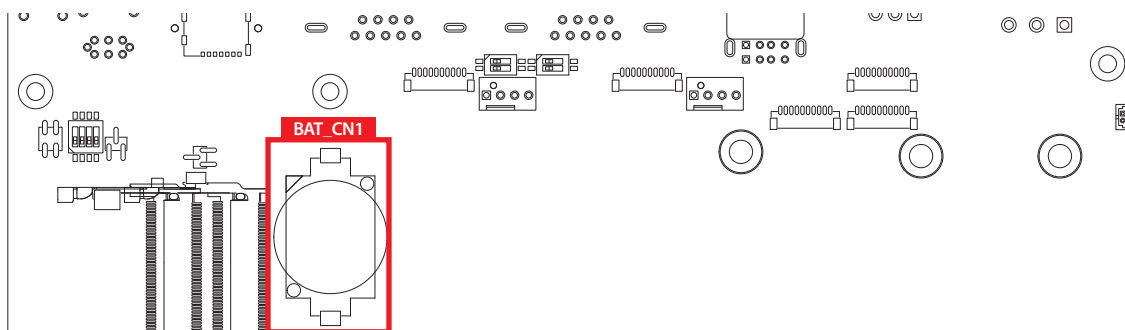
The ABP-4000's real-time clock is powered by a lithium battery. It is equipped with Panasonic CR2032 190mAh lithium battery. It is recommended that you not replace the lithium battery on your own, but if the battery needs to be changed, please contact the Vecow RMA service team.

2.4.8 GPIO1, GPIO2
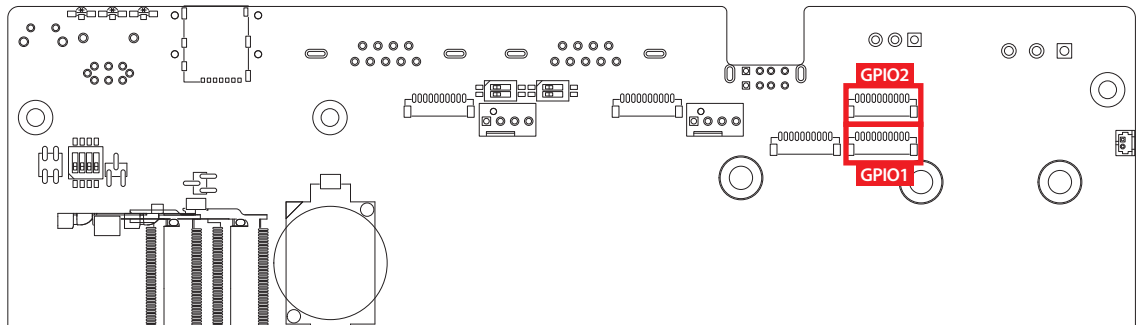
There is a 16-bit GPIO (8IN/8OUT) connector in the Top side. Each GPIO channel can be configuration GPI or GPO. Please refer to below table to see the pin definition in details. GPIO1 and GPIO2 Pin define as below:

Pin No.	Function	Connetor
1	SIO_GPI80	SIO_GPO70
2	SIO_GPI81	SIO_GPO71
3	SIO_GPI82	SIO_GPO72
4	SIO_GPI83	SIO_GPO73
5	SIO_GPI84	SIO_GPO74
6	SIO_GPI85	SIO_GPO75
7	SIO_GPI86	SIO_GPO76
8	SIO_GPI87	SIO_GPO77
9	3.3V	3.3V
10	GND	GND

2.4.9 M.2 KEY-B(M2B_CN1)

M.2 KEY-B support USB3.2/USB2.0 and PCIe x1, if you want to change to USB3.2 or PCIe x1, you can find the setting in BIOS. Module card types include 3052,2280.

Remind: The default BIOS setting is M.2 Key B for PCIe. If wanting to use USB3.2, an optional BIOS is required.
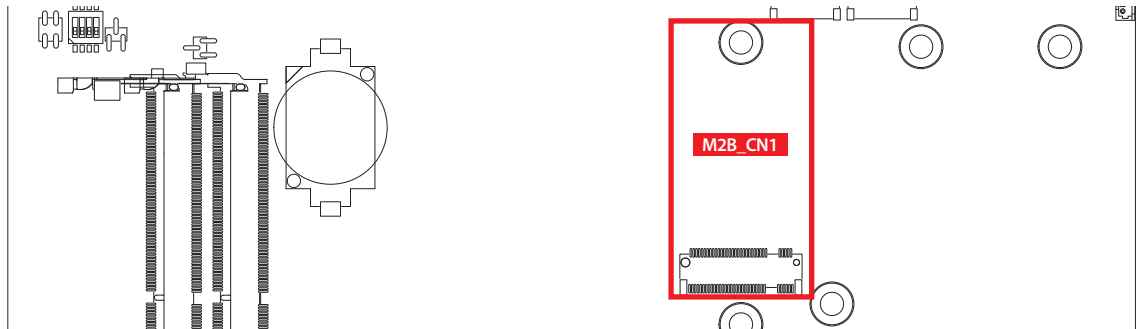
Pin No.	Signal Name	Pin No.	Signal Name
		80	NC
75	NC		
73	Ground	74	3.3V
71	Ground	72	3.3V
69	CONFIG_1	70	3.3V
67	NC	68	NC
65	NC	66	SIM DETECT
63	NC	64	NC
61	NC	62	NC
59	NC	60	NC
57	Ground	58	NC
55	REFCLKp	56	NC
53	REFCLKn	54	PEWAKE#
51	Ground	52	CLKREQ#
49	PETp0	50	PERST#
47	PETn0	48	NC
45	Ground	46	NC
43	PERp0	44	NC
41	PERn0	42	NC
39	Ground	40	NC
37	PETp1/USB3.1-TX+	38	DEVSLP
35	PETn1/USB3.1-TX-	36	UIM-PWR

Pin No.	Signal Name	Pin No.	Signal Name
33	Ground	34	UIM-DATA
31	PERp1/USB3.1-RX+	32	UIM-CLK
29	PERn1/USB3.1-RX-	30	UIM-RESET
27	Ground	28	NC
25	NC	26	NC
23	NC	24	NC
21	NC	22	NC
		20	NC
Mechanical Key			
11	Ground		
9	USB-	10	LED_1#
7	USB+	8	W_DISABLE1
5	Ground	6	FULL_CARD_PWR_OFF/ON
3	Ground	4	3.3V
1	NC	2	3.3V

2.4.10 M.2 KEY-E (M2E_CN1)

M.2 KEY E: USB2.0/PCIe x1 M.2 key E connector is suitable for applications that use wireless connectivity including Wi-Fi, Bluetooth, NFC of GNSS. Module card types include 2230
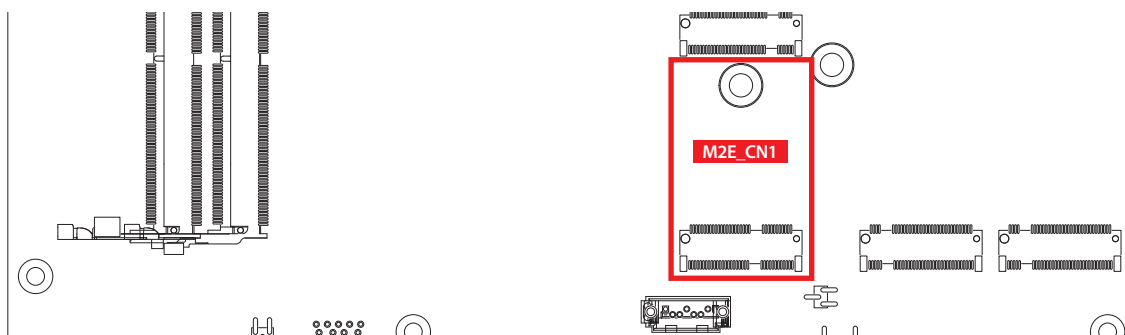
Pin No.	Signal Name	Pin No.	Signal Name
75	Ground		
73	NC	74	3.3V
71	NC	72	3.3V
69	Ground	70	PEWAKE1#
67	NC	68	NC
65	NC	66	NC
63	Ground	64	NC

Pin No.	Signal Name	Pin No.	Signal Name
61	NC	62	ALERT
59	NC	60	I2C_CLK
57	Ground	58	I2C_DATA
55	PEWAKE0#	56	NC
53	CLKREQ0#	54	NC
51	Ground	52	PERST0#
49	REFCLKn0	50	NC
47	REFCLKp0	48	NC
45	Ground	46	NC
43	PERn0	44	NC
41	PERp0	42	NC
39	Ground	40	NC
37	PETn0	38	DEVSLP
35	PETp0	36	NC
33	Ground	34	NC
		32	NC
Mechanical Key			
23	NC		
21	NC	22	NC
19	Ground	20	NC
17	NC	18	Ground
15	NC	16	NC
13	Ground	14	NC
11	NC	12	NC
9	NC	10	NC
7	Ground	8	NC
5	USB-	6	LED1#
3	USB+	4	3.3V
1	Ground	2	3.3V

2.4.11 M.2 KEY-M (M2M_CN1)

M.2 key M connector is suitable for applications that use Host I/Fs supported by either PCIeX4 Module card types include 2280 (Support PCIex4)

Pin No.	Signal Name	Pin No.	Signal Name
75	Ground		
73	Ground	74	3.3V
71	Ground	72	3.3V
69	PEDET	70	3.3V
67	Ground	68	NC
Mechanical Key			
57	Ground	58	NC
55	REFCLKp	56	NC
53	REFCLKn	54	PEWAKE#
51	Ground	52	CLKREQ#
49	PETp0/SATA_A+	50	PERST#
47	PETn0/SATA_A-	48	NC
45	Ground	46	NC
43	PERp0/SATA_B-	44	NC
41	PERn0/SATA_B+	42	NC
39	Ground	40	NC
37	PETp1	38	DEVSLP
35	PETn1	36	NC
33	Ground	34	NC

Pin No.	Signal Name	Pin No.	Signal Name
31	PERp1	32	NC
29	PERn1	30	NC
27	Ground	28	NC
25	PETp2	26	NC
23	PETn2	24	NC
21	Ground	22	NC
19	PERp2	20	NC
17	PERn2	18	3.3V
15	Ground	16	3.3V
13	PETp3	14	3.3V
11	PETn3	12	3.3V
9	Ground	10	LED1#
7	PERp3	8	NC
5	PERn3	6	NC
3	Ground	4	3.3V
1	Ground	2	3.3V

M.2 key M connector is suitable for applications that use Host I/Fs supported by either PCIeX2 Module card types include 2280 (Support PCIex2/SATA)

Pin No.	Signal Name	Pin No.	Signal Name
75	Ground		
73	Ground	74	3.3V
71	Ground	72	3.3V
69	PEDET	70	3.3V
67	Ground	68	NC
Mechanical Key			
57	Ground	58	NC
55	REFCLKp	56	NC
53	REFCLKn	54	PEWAKE#
51	Ground	52	CLKREQ#
49	PETp0/SATA_A+	50	PERST#
47	PETn0/SATA_A-	48	NC
45	Ground	46	NC
43	PERp0/SATA_B-	44	NC
41	PERn0/SATA_B+	42	NC

Pin No.	Signal Name	Pin No.	Signal Name
39	Ground	40	NC
37	PETp1	38	DEVSLP
35	PETn1	36	NC
33	Ground	34	NC
31	PERp1	32	NC
29	PERn1	30	NC
27	Ground	28	NC
25	NC	26	NC
23	NC	24	NC
21	Ground	22	NC
19	NC	20	NC
17	NC	18	3.3V
15	Ground	16	3.3V
13	NC	14	3.3V
11	NC	12	3.3V
9	Ground	10	LED1#
7	NC	8	NC
5	NC	6	NC
3	Ground	4	3.3V
1	Ground	2	3.3V

2.5 Main Jumper Settings

2.5.1 Bottom View of ABP-4000 Main Board with Jumper Location
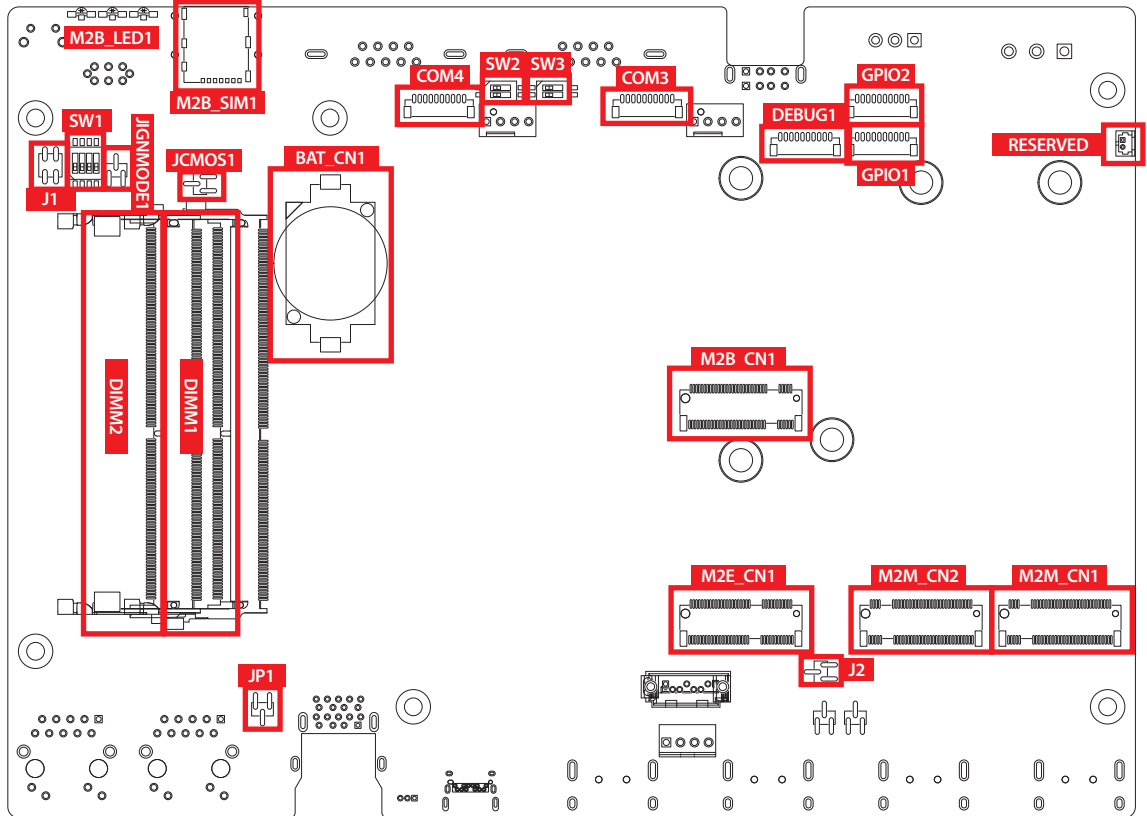
You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case you would connect either pins 1 and 2, or 2 and 3.
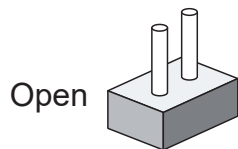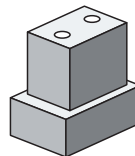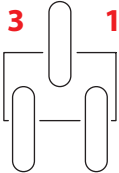
Open   Closed   Closed 2-3
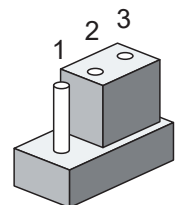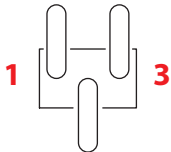
2.5.2 HDA_SDO (JP1)
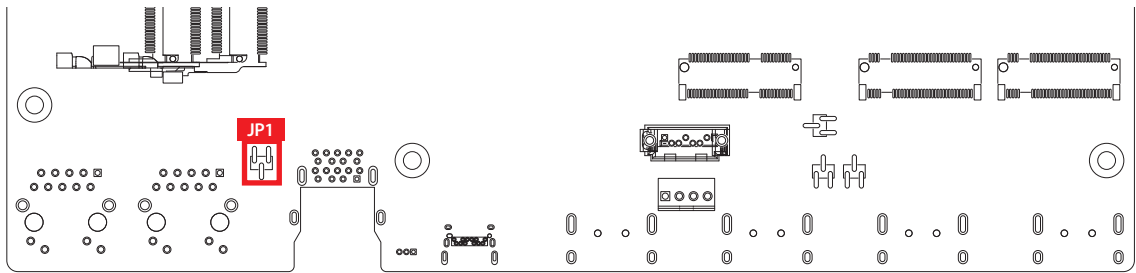
	Pin No.	Function
3 ☐ **1**	1-2	Enable security measures defined in the Flash Descriptor. (Default)
	2-3	Disable Flash Descriptor Security (override)

2.5.3 Clear CMOS (JCMOS1)
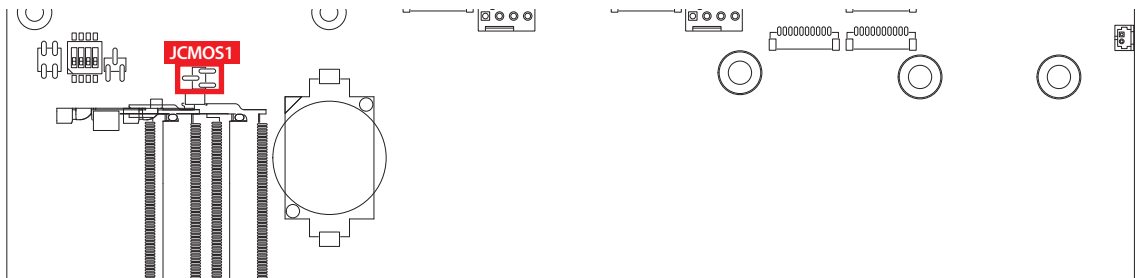
	Pin No.	Function
1 ☐ **3**	1-2	Normal (Default)
	2-3	Clear CMOS

2.5.4 SW2, SW3: RS-485/422 RECEIVER TERMINATION RESISTANCE
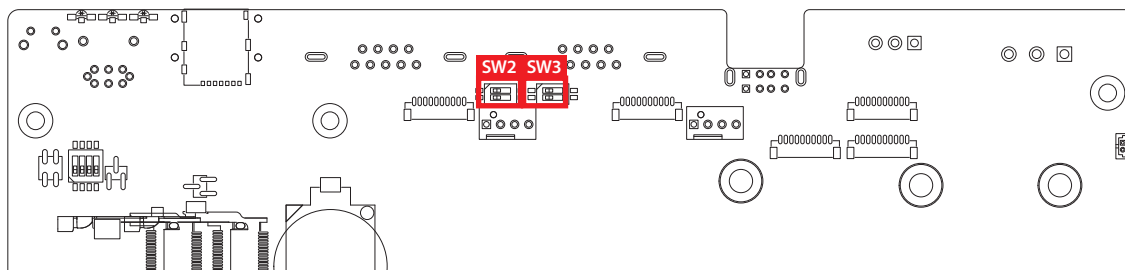
Function	Setting	Function
SW2	1(ON)	DCD / RXD Termination 120R enable
	1(OFF)	DCD / RXD Termination 120R Disable(default)
	2(ON)	DCD / RXD Termination 120R enable
	2(OFF)	DCD / RXD Termination 120R Disable(default)
SW3	1(ON)	DCD / RXD Termination 120R enable
	1(OFF)	DCD / RXD Termination 120R Disable(default)
	2(ON)	DCD / RXD Termination 120R enable
	2(OFF)	DCD / RXD Termination 120R Disable(default)
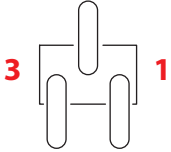
2.5.5 USB Power Jumper (JUSBPWR1)
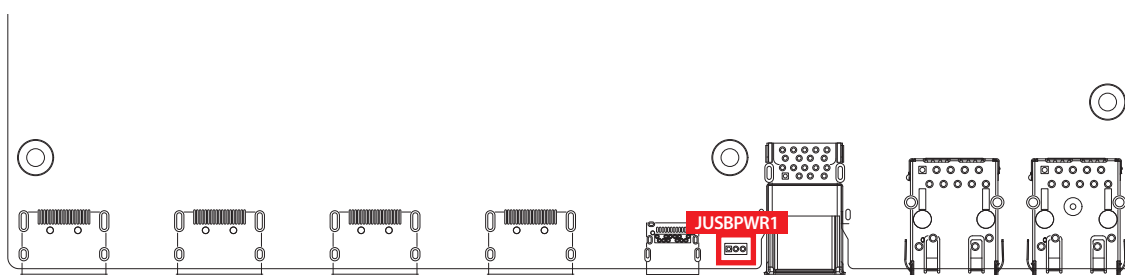
	Pin No.	Function
1 ⬚ 3	1-2	Supported Wake Up(Default)
	2-3	Non Wake Up support

2.5.6 JIGNMODE1 : IGNITION mode
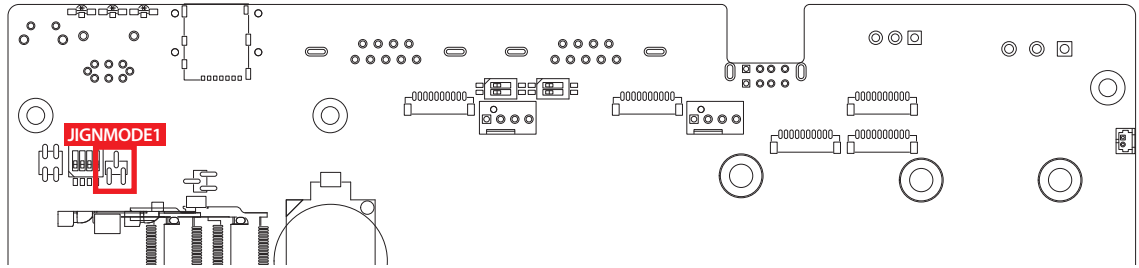
	Pin No.	Function
3 ⎍⎍⎍ **1**	1-2	H/W mode
	2-3	S/W mode(default)

2.6 Ignition Control
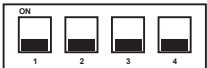
ABP-4000 series provides ignition power control feature for vehicle applications. The built-in MCU monitors the ignition signal and turns on/ off the system according to pre-defined on/off delay periods.

2.6.1 Adjust Ignition Control Modes

ABP-4000 series provide 16 modes of different power on/ off delay periods adjustable via rotary switch. The default rotary switch is set to 0 in ATX/AT power mode.
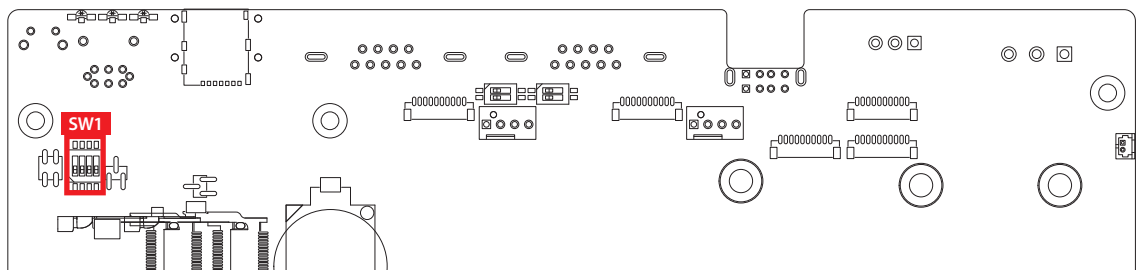
The modes are listed in below table :

DIP Switch Position	Power on delay	Power off delay	Switch Position
0	ATX/AT mode (Default)		
1	No delay	No delay	
2	No delay	5 seconds	
3	No delay	10 seconds	
4	No delay	20 seconds	
5	5 seconds	30 seconds	
6	5 seconds	60 seconds	
7	5 seconds	90 seconds	
8	5 seconds	30 minutes	
9	5 seconds	1 hour	
A	10 seconds	2 hours	
B	10 seconds	4 hours	
C	10 seconds	6 hours	
D	10 seconds	8 hours	
E	10 seconds	12 hours	
F	10 seconds	24 hours	

2.6.2 Ignition Control Wiring

To activate ignition control, you need to provide IGN signal via the 3-pin pluggable terminal block locates in the back panel. It is below the general wiring configuration.

Pin No.	Definition
1	Ignition (IGN)
2	SW+
3	SW-
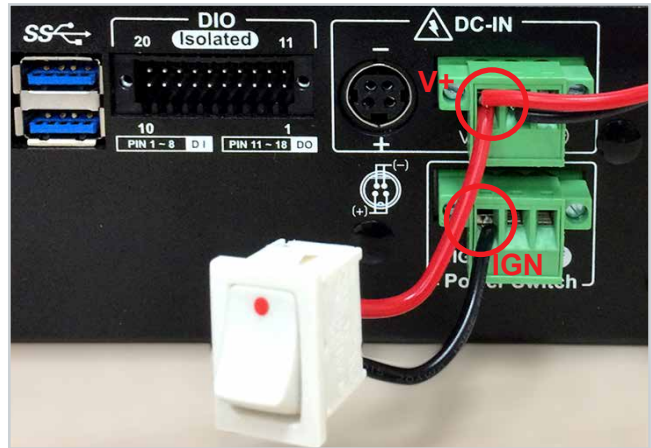
For testing purposes, you can refer to the picture below to simulate ignition signal input controlled by a latching switch.

Note :

1. DC power source and IGN share the same ground.

2. ABP-4000 supports 9V to 50V wide range DC power input in ATX/AT mode. In Ignition mode, the input voltage is fixed to 12V/24V for car battery scenario.

3. For proper ignition control, the power button setting should be "Power Down" mode.
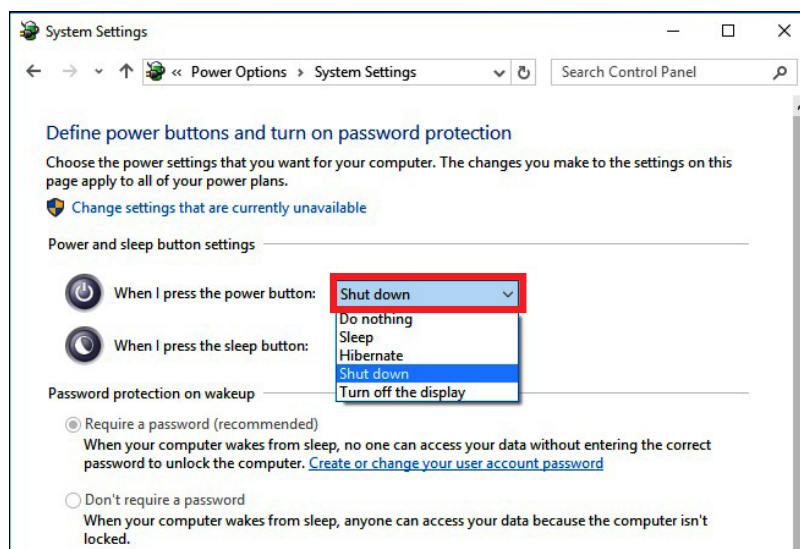
In Windows for example, you need to set "When I press the power button" to Shut down.

2.6.3 Smart Battery Protection

The system with "Ignition Control" can perform Smart Battery Protection, namely Low Battery Detection.

When the system is running on a battery and its voltage drops below the threshold, the system will automatically shut down. The Low Battery Detection is implemented in the ignition control MCU FW and as a default function.

Battery Voltage	Thresholds
12V	10.5~15V
24V	21.5~30V

3

SYSTEM SETUP

3.1 Installing DDR4 SO-DIMM Modules

Step 1 Remove four I-M3x6L screws, and take out DDR4 spreader.
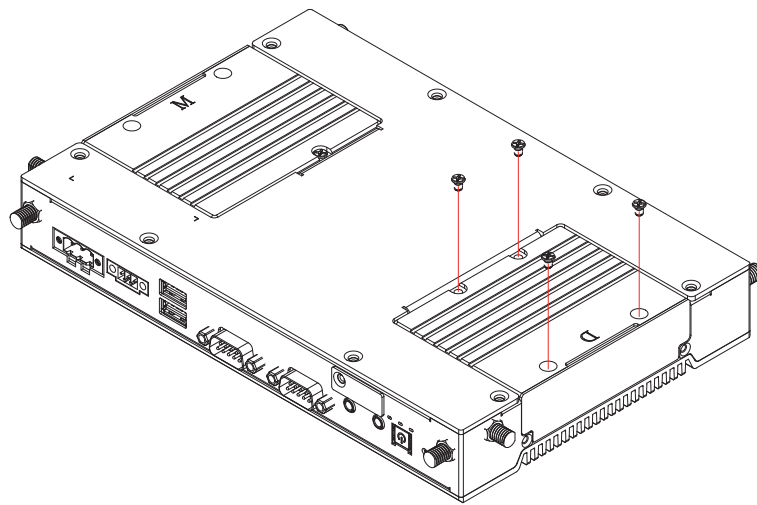
Step 2 Install DDR4 into SO-DIMM slot.
(Only install one DDR4, it is recommend to install on SODIMM_1)
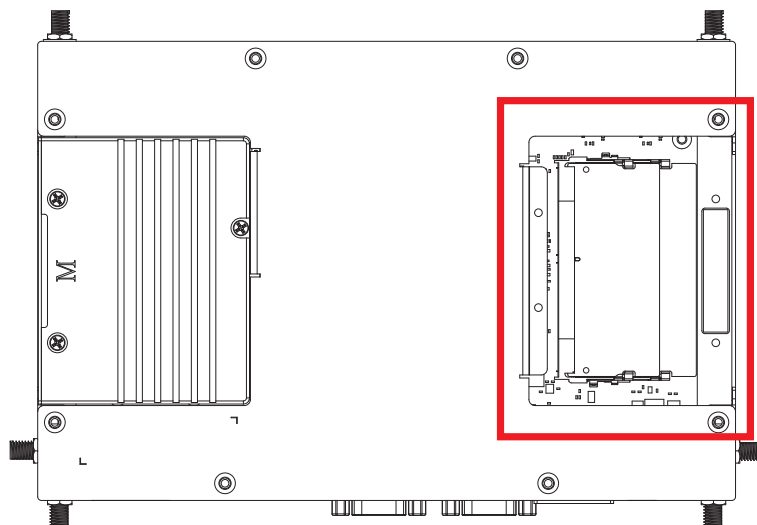
3.2 Installing Nano SIM Card

Step 1 Remove one Flat-M3x4L screw on SIM cover at front panel.
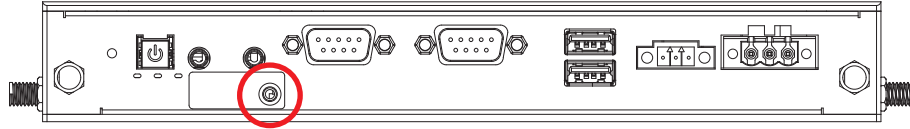
Step 2 Before inserting SIM card, make sure the system power is not plugged.

Step 3 Insert SIM card and push to lock.
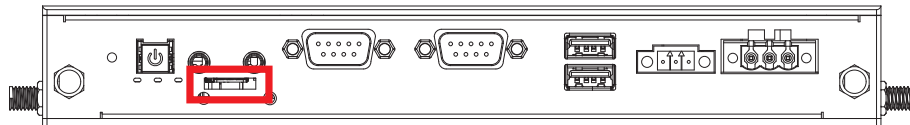
3.3 Installing M.2

3.3.1 M.2 Key M 2280

Step 1 Remove three I-M3x6L screws, and take out M.2 spreader.
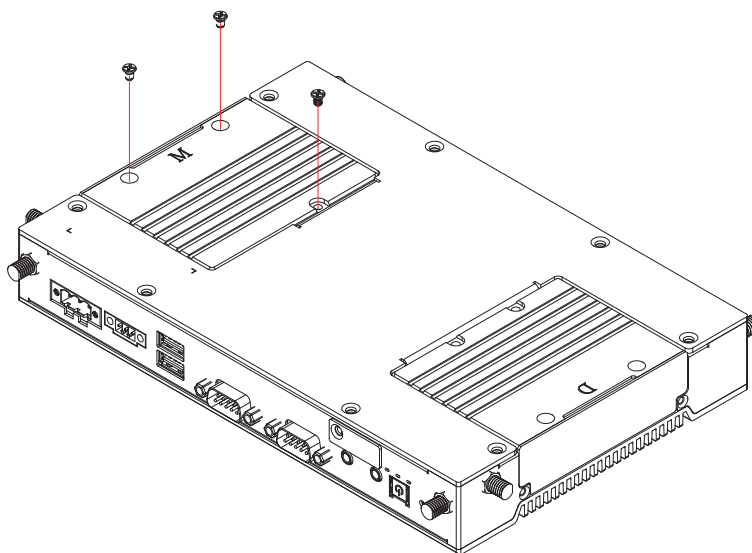
Step 2 Install M.2 Key M 2280 into slot and fasten Phillips M3x4 screw.
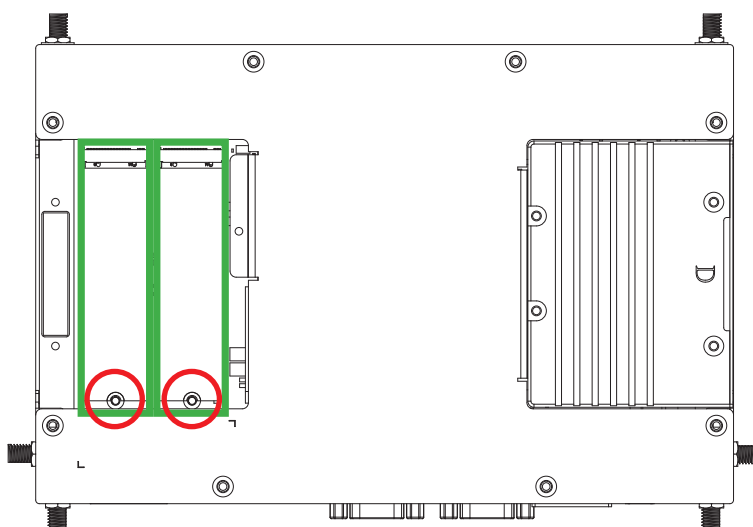
3.3.2 M.2 Key B 2242 / 3042 , Key E 2230

Step 1 Remove eight Flat-M3x4L screws, and take out bottom cover
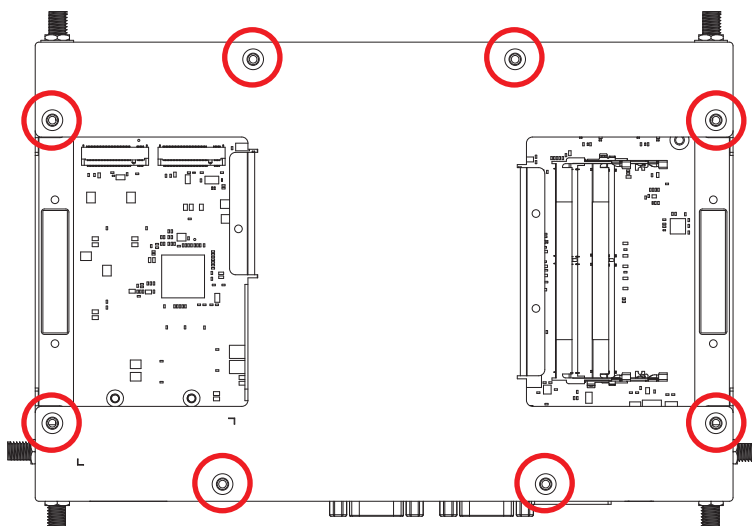
Step 2 Install M.2 Key E 2230/ Key B 2242_3042 into slot.
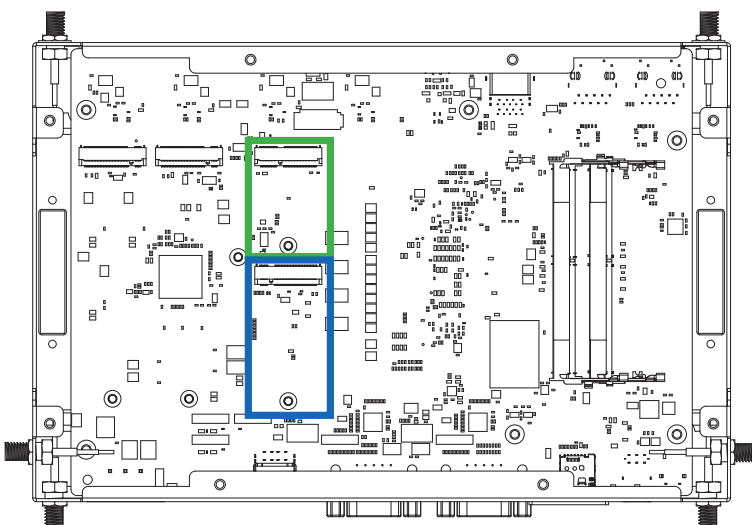
Step 3   Fasten Phillips M3x4 screw.
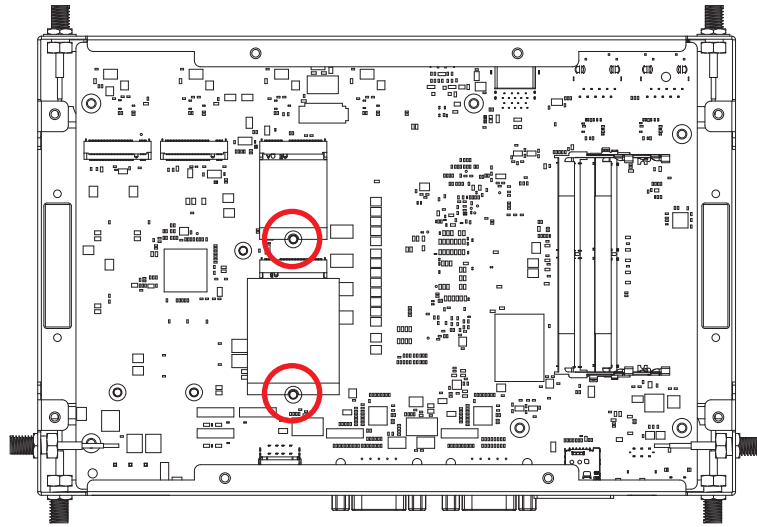
3.4 Installing Antenna Cable

Step 1 Remove the rubber cork on the panel.

Step 2 Put antenna cable connector into the hole on panel.
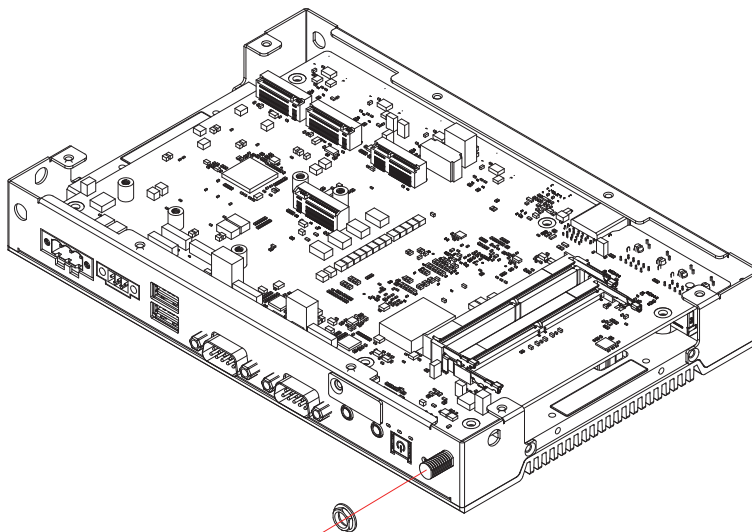
Step 3 Fasten washer on the antenna cable connector.
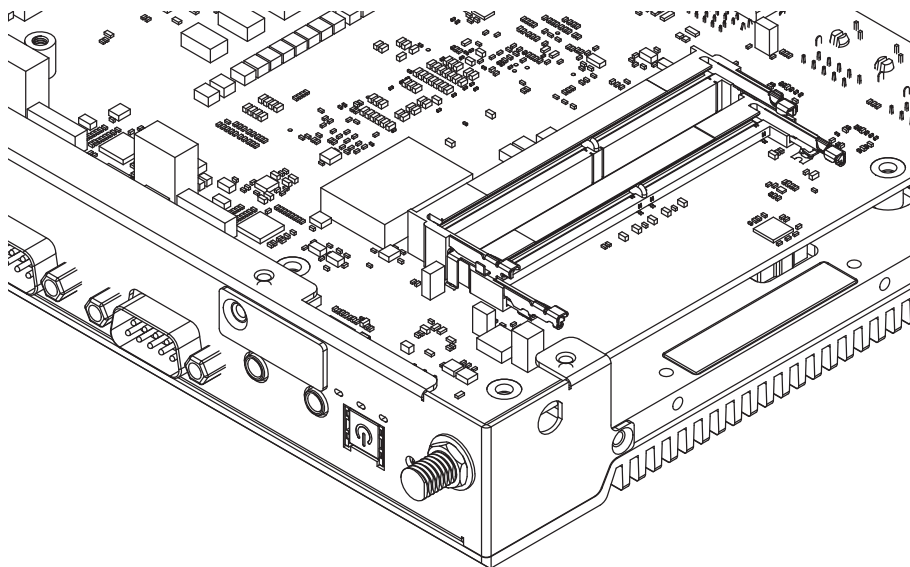
3.5 Mount Your ABP-4000

3.5.1 Wall Mount

Step 1 Remove four Flat-M3x4L screws.
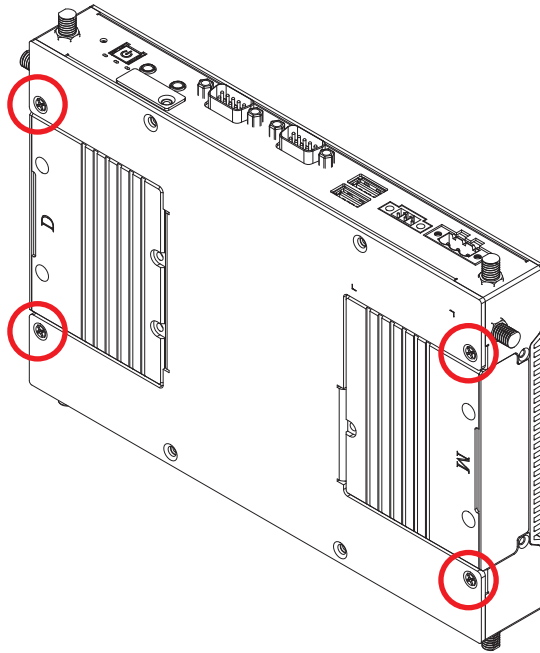
Step 2 Ensure the screw holes on the bottom case match ABP-4000 and fasten four I M3x6L screws.
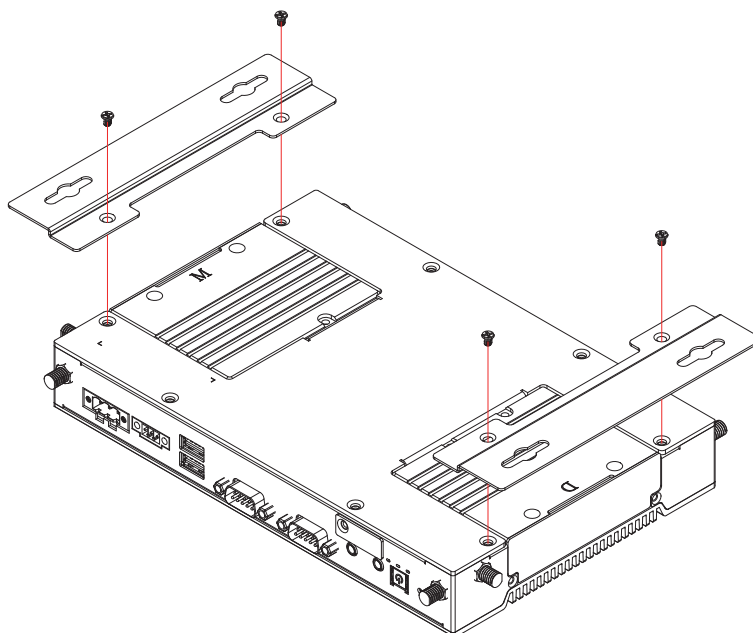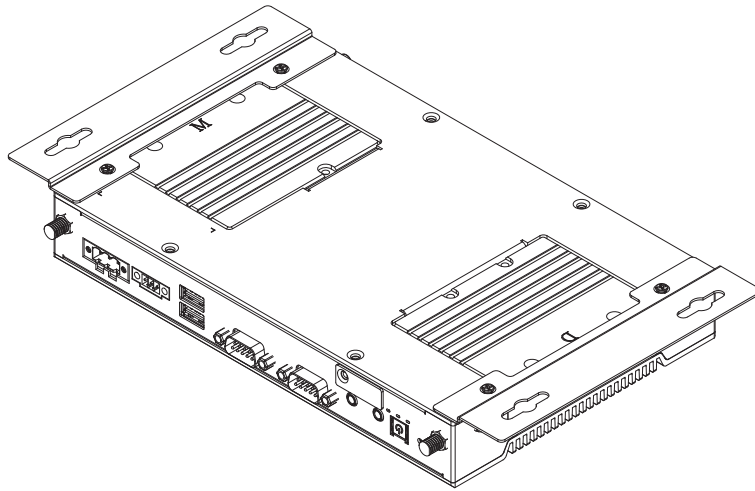
Step 3 Finish.

3.5.2 VESA Mount (75x75mm / 100x100mm)

Step 1 Remove four Flat-M3x4L screws.
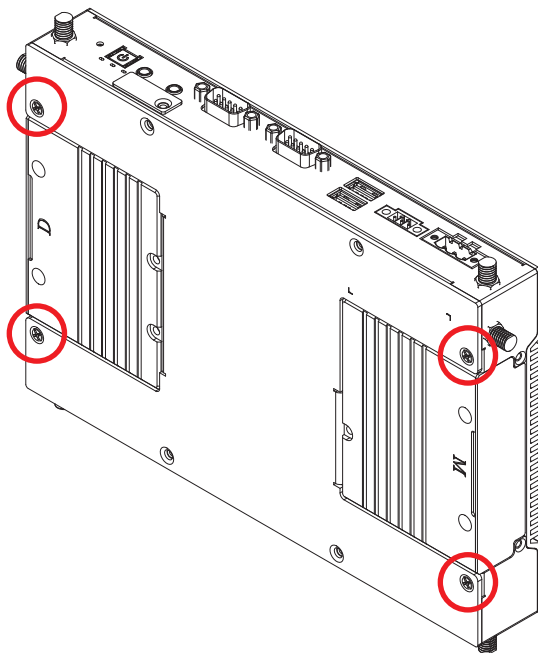
Step 2 Ensure the screw holes on the bottom case match ABP-4000 and fasten four I M3x6L screws.
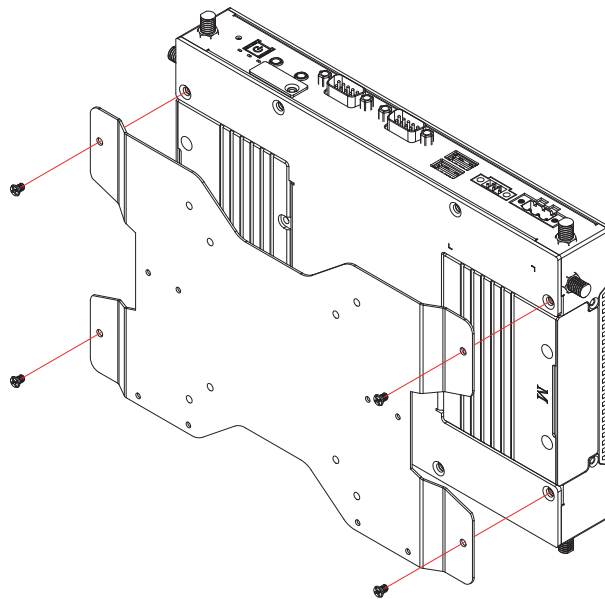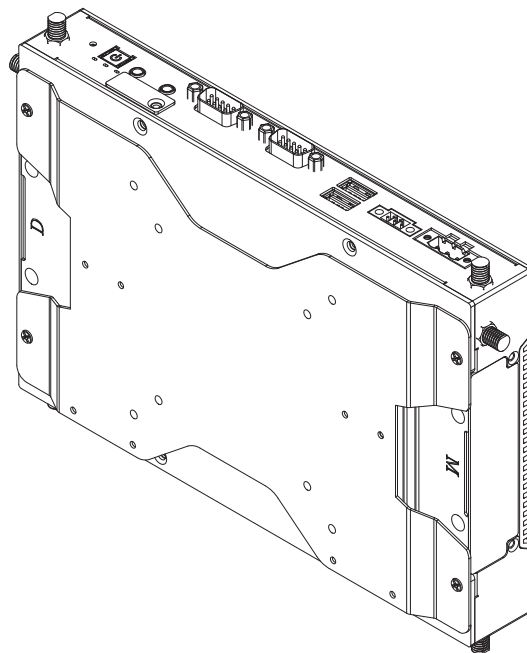
Step 3 Finish.

3.5.3 DIN Rail

Step 1 Remove four Flat-M3x4L screws.
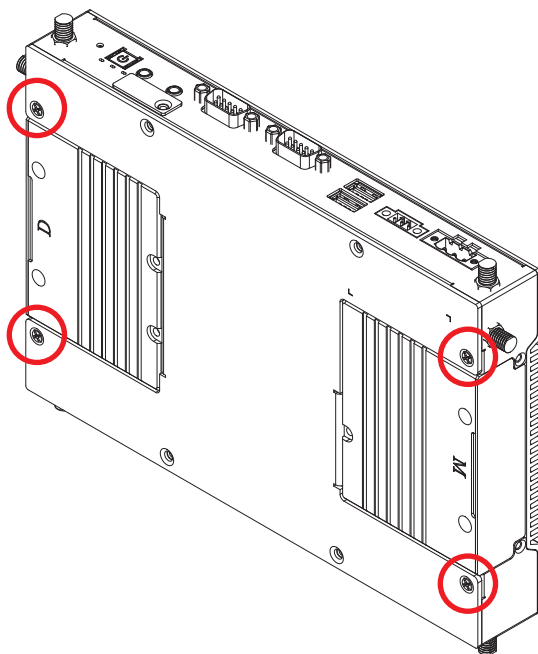
Step 2 Ensure the screw holes on the bottom case match ABP-4000 and fasten four I M3x6L screws.
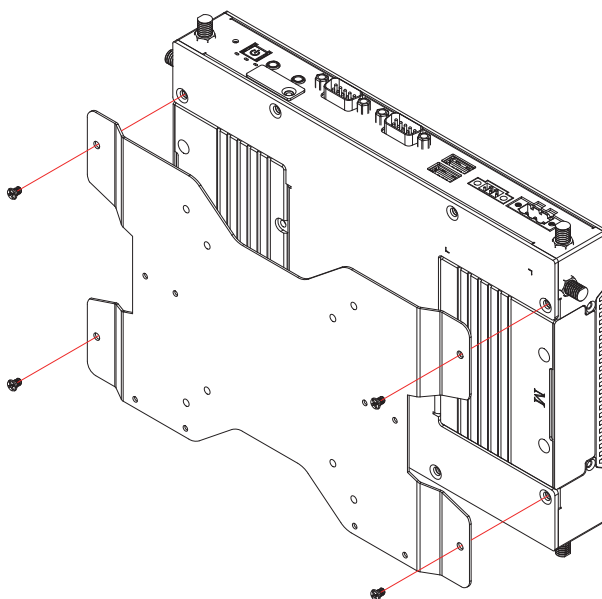
Step 3 Finish.
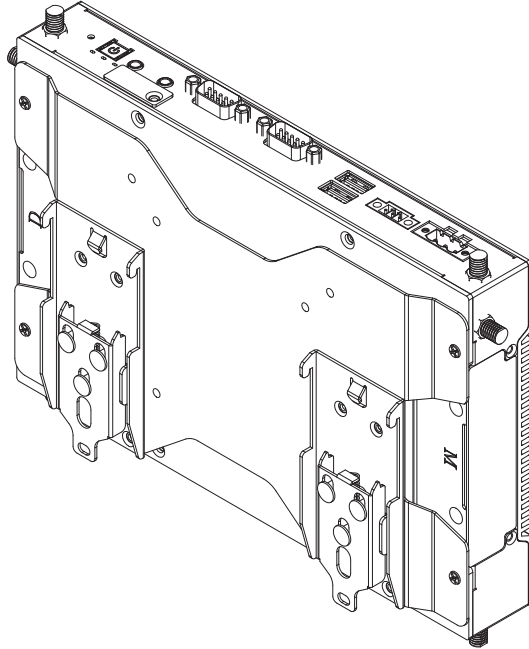
4

BIOS SETUP

4.1 BIOS Setting

```
                              Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

   BIOS Information                                    Set the Date. Use Tab to
   BIOS Version                 A4000BPPX00004         switch between Date elements.
   Build Date and Time          07/01/2024 15:46:19    Default Ranges:
   PCB Version                  B                      Year: 1998-9999
                                                       Months: 1-12
   Processor Information                               Days: Dependent on month
   Type                         13th Gen Intel(R)      Range of Years may vary.
                                Core(TM) i5-1345UE
   Stepping                     Q0
   Microcode Revision           4121

   IGFX GOP Version             21.0.1066
   ME FW Version                16.1.30.2361
   Total Memory                  4096 MB              ++: Select Screen
   Memory Frequency              2400 MHz             ↑↓: Select Item
                                                      Enter: Select
   PCH Information                                    +/-: Change Opt.
   PCH SKU                      RPL-P: Premium         F1: General Help
   Stepping                     A1                     F2: Previous Values
                                                       F3: Optimized Defaults
   System Date                  [Mon 07/01/2024]       F4: Save & Exit
   System Time                  [01:17:33]             ESC: Exit
```

Figure 4-1 : Entering Setup Screen

BIOS provides an interface for users to check and change system configuration. The BIOS setup program is accessed by pressing the <Del> key when POST display output is shown.

4.2 Main Manu


```
                              Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

    BIOS Information                                          Set the Date. Use Tab to
    BIOS Version                  A4000BPPX00004              switch between Date elements.
    Build Date and Time           07/01/2024 15:46:19         Default Ranges:
    PCB Version                   B                           Year: 1998-9999
                                                              Months: 1-12
    Processor Information                                     Days: Dependent on month
    Type                          13th Gen Intel(R)           Range of Years may vary.
                                  Core(TM) i5-1345UE
    Stepping                      Q0
    Microcode Revision            4121

    IGFX GOP Version              21.0.1066
    ME FW Version                 16.1.30.2361
    Total Memory                   4096 MB                    →←: Select Screen
    Memory Frequency               2400 MHz                   ↑↓: Select Item
                                                              Enter: Select
    PCH Information                                           +/-: Change Opt.
    PCH SKU                       RPL-P: Premium              F1: General Help
    Stepping                      A1                          F2: Previous Values
                                                              F3: Optimized Defaults
    System Date                   [Mon 07/01/2024]            F4: Save & Exit
```

Figure 4-2 : BIOS Main Menu

The main menu displays BIOS version and system information. There are two options on Main menu.

System Date
Set the Date. Use <Tab> to switch between Date elements.

Default Ranges:

Year: 1998-9999

Months: 1-12

Days: Dependent on month

Range of Years may vary.

System Time
Set the Time. Use <Tab> to switch between Time elements.

4.3 Advanced Functions
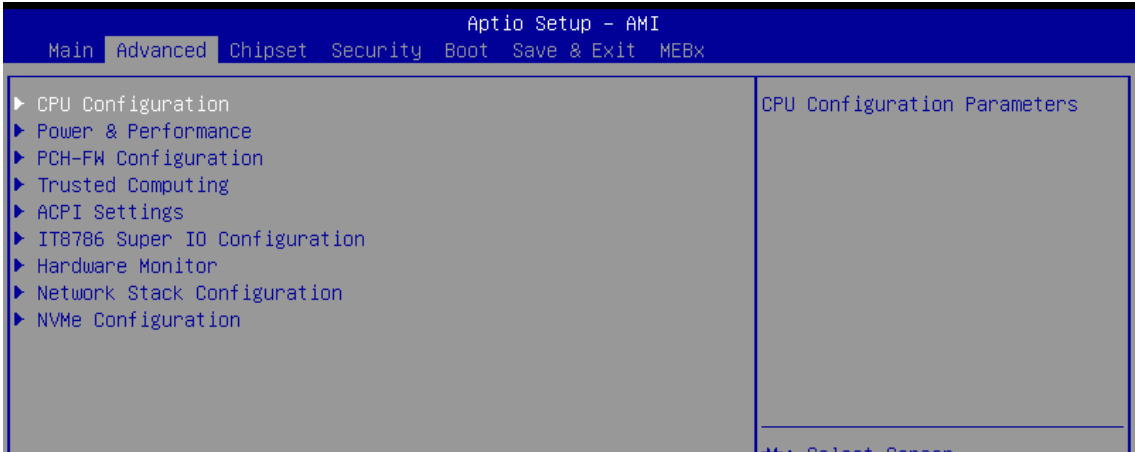
Figure 4-3 : BIOS Advanced Menu

Select advanced tab to enter advanced BIOS setup options, such as CPU configuration, ACPI settings, and Super IO configuration.

4.3.1 CPU Configuration

```
                        Aptio Setup - AMI
 ┌──────────┐
 │ Advanced │
 └──────────┘
 CPU Configuration                               Displays the E-core Information

 ▶ Efficient-core Information
 ▶ Performance-core Information

   ID                       0xB06A3
   Brand String             13th Gen Intel(R)
                            Core(TM) i5-1345UE
   VMX                      Supported
   SMX/TXT                  Supported

   Hardware Prefetcher          [Enabled]
   Adjacent Cache Line Prefetch [Enabled]
   Intel (VMX) Virtualization   [Enabled]
   Technology                              →←: Select Screen
   Active Performance-cores     [All]      ↑↓: Select Item
   Active Efficient-cores       [All]      Enter: Select
   Hyper-Threading              [Enabled]  +/-: Change Opt.
   AES                          [Enabled]  F1: General Help
                                           F2: Previous Values
                                           F3: Optimized Defaults
```

Figure 4-3-1 : CPU Configuration

Efficient-core Information
Displays the E-core Information.

Performance-core Information
Displays the P-core Information.

Hardware Prefetcher
To turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch
To turn on/off prefetching of adjacent cache lines.

Intel (VMX) Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Active Performance-cores
Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores..

Active Efficient-cores
Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

Hyper-Threading
Enable or Disable Hyper-Threading Technology.

AES
Enable/Disable AES (Advanced Encryption Standard).

4.3.2 Power & Performance
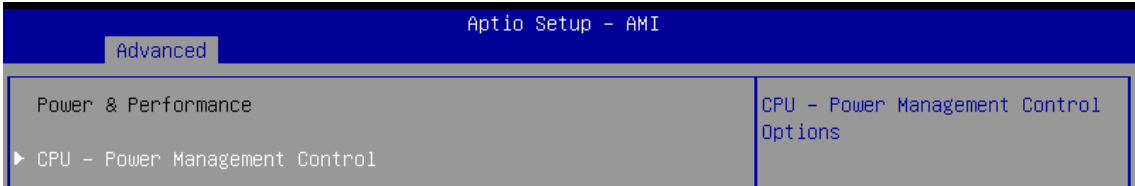
Figure 4-3-2 : Power & Performance

4.3.2.1 Power Management Control
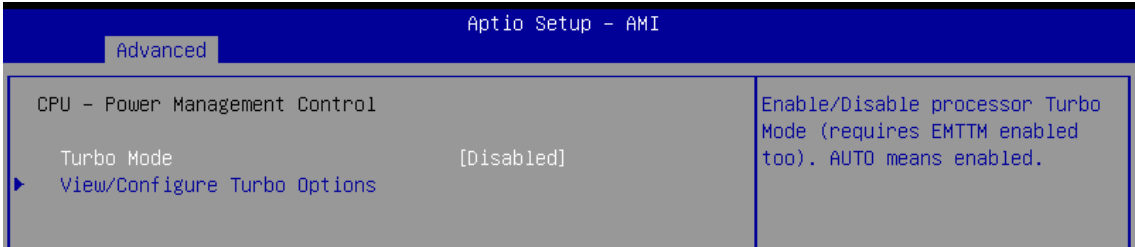
Figure 4-3-2-1 : Power Management Control

Turbo Mode
Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.

View/Configure Turbo Options
View/Configure Turbo Options.

4.3.3 PCH-FW Configuration

```
                              Aptio Setup – AMI
      Advanced

 ME Firmware Version           16.1.30.2361              Configure PTT
 ME Firmware Mode              Normal Mode
 ME Firmware SKU               Corporate SKU

▶ PTT Configuration
```

Figure 4-3-3 : PCH-FW Configuration

4.3.3.1 PTT Configuration

```
                              Aptio Setup – AMI
          Advanced

 PTT Capability / State        1 / 0                    Selects TPM device: PTT or
                                                        dTPM. PTT – Enables PTT in
 TPM Device Selection          [dTPM]                   SkuMgr dTPM 1.2 – Disables PTT
                                                        in SkuMgr Warning !  PTT/dTPM
                                                        will be disabled and all data
```

Figure 4-3-3-1 : PTT Configuration

TPM Device Selection

Selects TPM device: PTT or discrete TPM.

PTT - Enables PTT in SkuMgr dTPM - Disables PTT in SkuMgr Warning! PTT/dTPM will be disabled and all data saved on it will be lost.

4.3.4 Trusted Computing

```
                              Aptio Setup – AMI
         Advanced

    TPM 2.0 Device Found                                  Enables or Disables BIOS
    Firmware Version:          16.10                       support for security device.
    Vendor:                    IFX                         O.S. will not show Security
                                                           Device. TCG EFI protocol and
    Security Device Support    [Enable]                    INT1A interface will not be
    Active PCR banks           SHA256                      available.
    Available PCR banks        SHA256,SHA384

    SHA256 PCR Bank            [Enabled]
    SHA384 PCR Bank            [Disabled]

    Pending operation          [None]
    Platform Hierarchy         [Enabled]
    Storage Hierarchy          [Enabled]                  →←: Select Screen
    Endorsement Hierarchy      [Enabled]                  ↑↓: Select Item
    Physical Presence Spec Version  [1.3]                 Enter: Select
    TPM 2.0 InterfaceType      [TIS]                      +/-: Change Opt.
    Device Select              [Auto]                     F1: General Help
                                                          F2: Previous Values
```

Figure 4-3-4 : Trusted Computing

Control the TPM device status and display related information if TPM chip is present.

4.3.5 ACPI Settings

```
                              Aptio Setup – AMI
         Advanced

    ACPI Settings                                         Enables or Disables System
                                                          ability to Hibernate (OS/S4
                                                          Sleep State). This option may
    Enable Hibernation         [Enabled]                  not be effective with some
    ACPI Sleep State           [S3 (Suspend to RAM)]      operating systems.

```
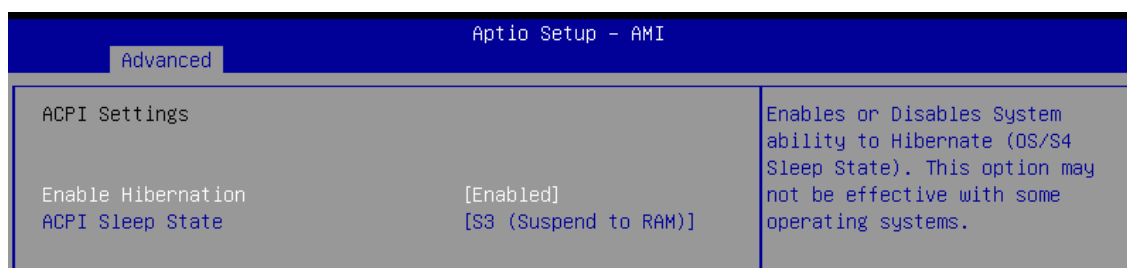
igure 4-3-5 : ACPI Settings

Enable Hibernation :

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.

ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

4.3.6 IT8786 Super IO Configuration

```
                            Aptio Setup - AMI
        Advanced

   IT8786 Super IO Configuration                          Set Parameters of Serial Port
                                                          1 (COMA)
   Super IO Chip                        IT8786
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration
▶ Serial Port 4 Configuration
```
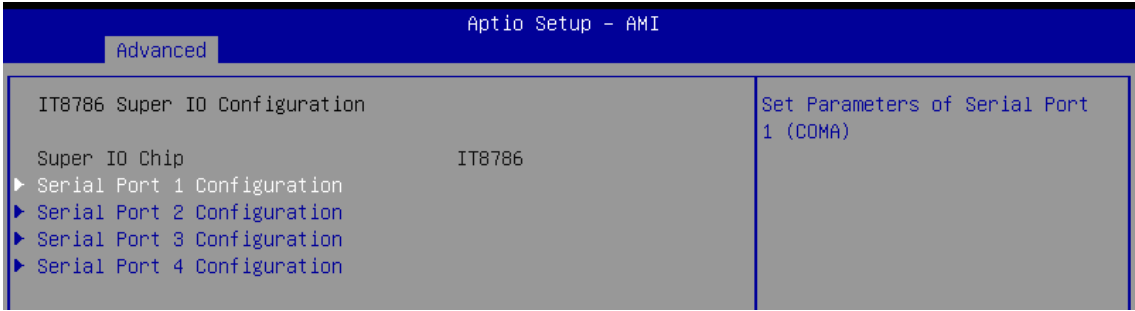
Figure 4-3-6 : IT8786 Super IO Configuration

4.3.6.1 Serial Port X Configuration

```
                            Aptio Setup - AMI
          Advanced

   Serial Port 1 Configuration                            Enable or Disable Serial Port
                                                          (COM)
   Serial Port                       [Enabled]
   Device Settings                   IO=3F8h; IRQ=4;

   Device Mode                       [RS232]
   PPS Mode                          [Disabled]
   High Speed Mode                   [Disabled]
```
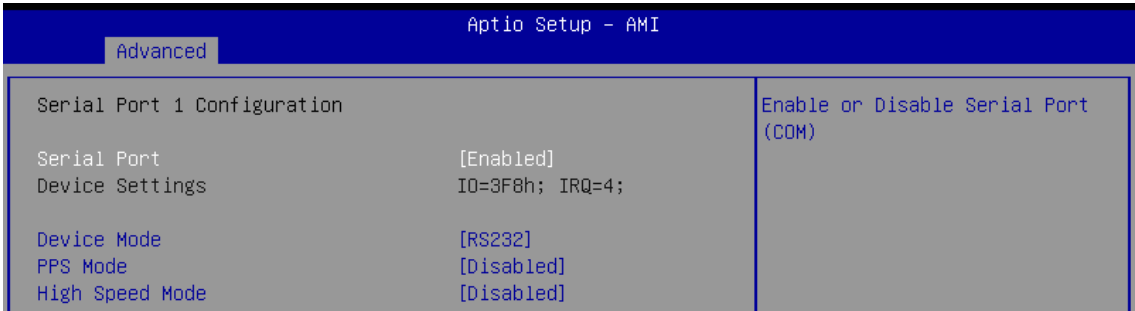
Figure 4-3-6-1 : Serial Port X Configuration

Serial Port X Configuration
Enable or Disable Serial Port (COM).

Device Mode
Select Device Mode.

PPS Mode
Enable or Disable PPS.

High Speed Mode (Port 1 only)
Enable or Disable Serial Port High Speed.

4.3.7 Hardware Monitor

```
                          Aptio Setup - AMI
      Advanced

  Pc Health Status

  CPU temperature                     : +50 ℃
  SYS temperature                     : +30 ℃
  VCORE                               : +0.654 V
  VRAM                                : +1.188 V
  12V                                 : +11.902 V
  5V                                  : +4.959 V
  3.3V                                : +3.343 V
```

Figure 4-3-7 : Hardware Monitor

The IT8786 SIO features an enhanced hardware monitor providing thermal and system voltage status monitoring.

4.3.8 Network Stack Configuration

```
                          Aptio Setup - AMI
      Advanced

   Network Stack                    [Enabled]              Enable/Disable UEFI Network
     IPv4 PXE Support               [Disabled]             Stack
     IPv4 HTTP Support              [Disabled]
     IPv6 PXE Support               [Disabled]
     IPv6 HTTP Support              [Disabled]
     PXE boot wait time             0
     Media detect count             1
```

Figure 4-3-8 : Network Stack Configuration

Network Stack

Enable/Disable UEFI Network Stack.

IPv4 PXE Support

Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.

IPv4 HTTP Support

Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.

IPv6 PXE Support

Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.

IPv6 HTTP Support

Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.

PXE boot wait time

Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

Media detect count

Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

4.3.9 NVMe Configuration

```
                        Aptio Setup - AMI
    Advanced

   NVMe Configuration

 ▶ M.2 2280 PCIe PT33
```
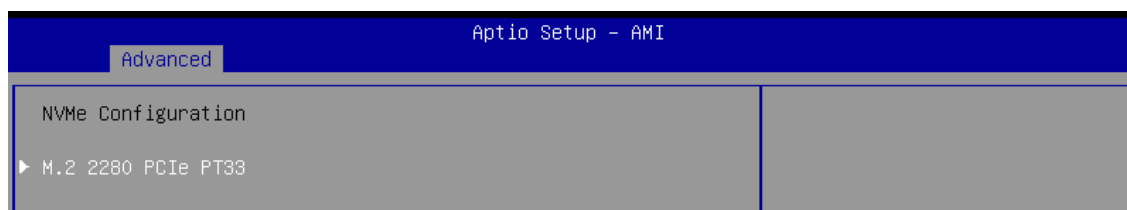
Figure 4-3-9 : NVMe Configuration

Display NVMe controller and Drive information.

4.4 Chipset Functions

```
                        Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

 ▶ System Agent (SA) Configuration          System Agent (SA) Parameters
 ▶ PCH-IO Configuration
 ▶ Module Management
 ▶ SW Ignition Configuration
```
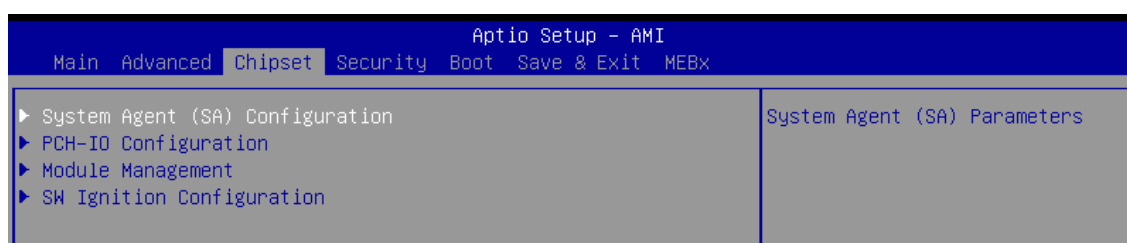
Figure 4-4 : Chipset Settings

Select Chipset tab to enter chipset BIOS setup options, such as System Agent (SA) Configuration, PCH-IO Configuration, and SW Ignition Configuration.

4.4.1 System Agent (SA) Configuration

```
                        Aptio Setup - AMI
    Chipset

   System Agent (SA) Configuration              Memory Configuration Parameters

   VT-d                          Supported

 ▶ Memory Configuration
 ▶ Graphics Configuration
 ▶ VMD setup menu
 ▶ PCI Express Configuration

   Above 4GB MMIO BIOS assignment      [Enabled]
```
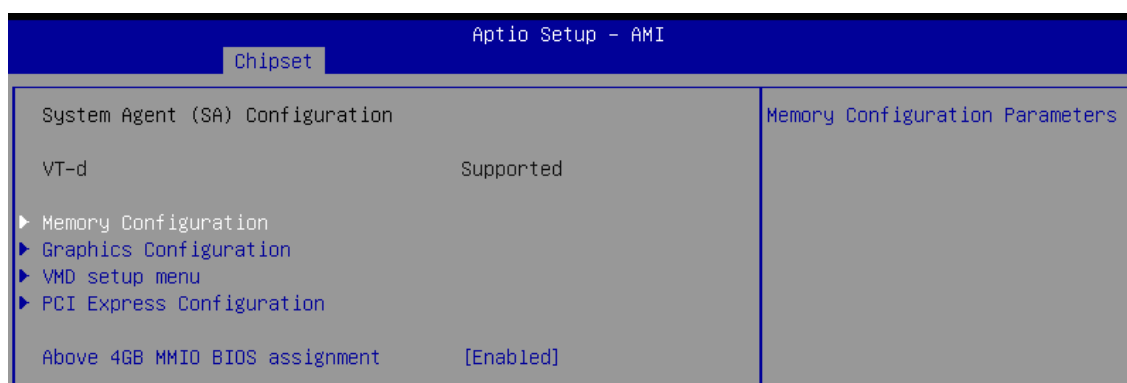
Figure 4-4-1 : System Agent (SA) Configuration

Above 4GB MMIO BIOS assignment

Enable/Disable above 4GB MemoryMappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

4.4.1.1 Memory Configuration

```
                            Aptio Setup - AMI
            Chipset

  Memory Configuration                              Maximum Memory Frequency
                                                    Selections in Mhz.
  Memory RC Version          0.0.4.204
  Memory Frequency            2400 MHz
  tCL-tRCD-tRP-tRAS          17-17-17-39
  MC 0 Ch 0 DIMM 0           Populated & Enabled
     Size                    4096 MB (DDR4)
     Number of Ranks         1
     Manufacturer            Kingston
  MC 0 Ch 0 DIMM 1           Not Populated / Disabled
  MC 1 Ch 0 DIMM 0           Not Populated / Disabled
  MC 1 Ch 0 DIMM 1           Not Populated / Disabled

  Maximum Memory Frequency   [Auto]                 →←: Select Screen
  Max TOLUD                  [Dynamic]              ↑↓: Select Item
                                                    Enter: Select
```

Figure 4-4-1-1 : Memory Information

Maximum Memory Frequency

Maximum Memory Frequency Selections in Mhz.

Max TOLUD

Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

4.4.1.2 Graphics Configuration

```
                            Aptio Setup - AMI
            Chipset

  Graphics Configuration                             If Enable, it will not scan
                                                     for External Gfx Card on PEG
  Skip Scaning of External Gfx Card   [Disabled]     and PCH PCIE Ports

  Primary Display            [Auto]
  Internal Graphics          [Enabled]
  GTT Size                   [8MB]
  Aperture Size              [256MB]
  DVMT Pre-Allocated         [60M]
  DVMT Total Gfx Mem         [256M]
```

Figure 4-4-1-2 : Graphics Configuration

Skip Scaning of External Gfx Card

If Enable, it will not scan for External Gfx Card on PEG and PCH PCIE Ports.

Primary Display

Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.

Internal Graphics

Keep IGFX enabled based on the setup options.

GTT Size
Select the GTT size.

Aperture Size
Select the aperture size.

Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting > 2048MB aperture. To use this feature, please disable CSM support.

DVMT Pre-Allocated
Select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.

DVMT Total Gfx Mem
Select DVMT 5.0 total graphic memory size used by the internal graphics device.

4.4.1.3 VMD setup menu

```
                         Aptio Setup - AMI
           Chipset

 VMD Configuration                                 Enable/Disable to VMD
                                                   controller
 Enable VMD controller              [Disabled]
```
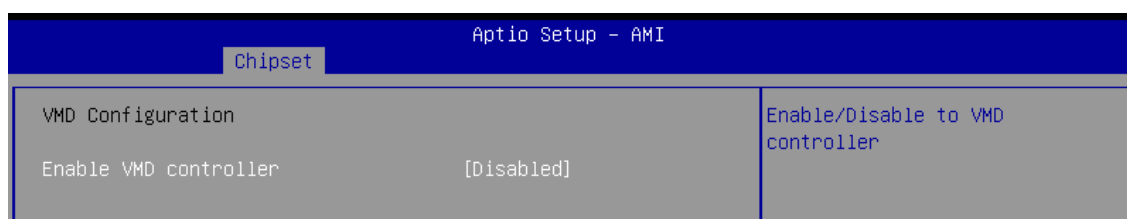
Figure 4-4-1-3 : VMD setup menu

Enable VMD controller
Enable/Disable to VMD controller.

4.4.1.4 PCI Express Configuration (SA)

```
                         Aptio Setup - AMI
           Chipset

  PCI Express Configuration                        PCI Express Root Port Settings.

▶ PCI Express Root Port 1
▶ PCI Express Root Port 2
▶ PCI Express Root Port 3
```

Figure 4-4-1-4 : PCI Express Configuration (SA)

4.4.1.4.1 PCI Express Root Port X (SA)

```
                              Aptio Setup – AMI
              Chipset

  PCI Express Root Port 1          [Enabled]          Control the PCI Express Root
  PCIe Speed                       [Auto]             Port.
```
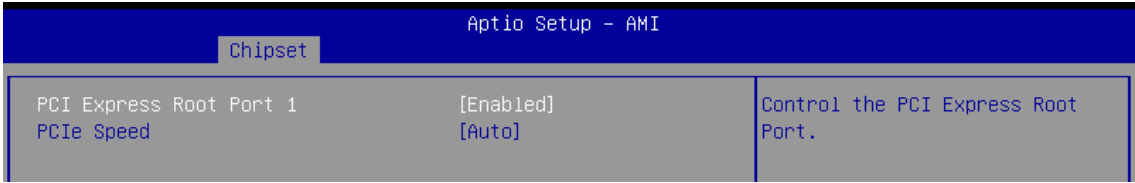
Figure 4-4-1-4-1 : PCI Express Root Port X (SA)

PCI Express Root Port X
Control the PCI Express Root Port.

PCIe Speed
Configure PCIe Speed.

4.4.2 PCH-IO Configuration

```
                              Aptio Setup – AMI
              Chipset

  PCH-IO Configuration                               PCI Express Configuration
                                                     settings
▶ PCI Express Configuration
▶ SATA Configuration

  State After G3                   [S5 State]
```
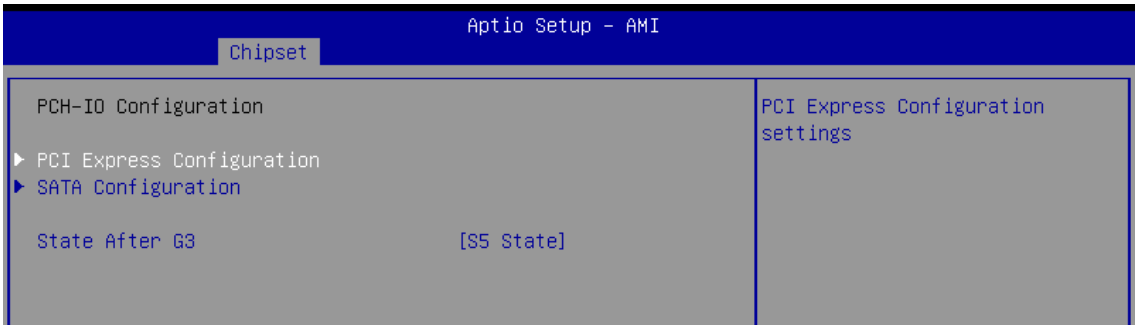
Figure 4-4-2 : PCH-IO Configuration

State After G3
Specify what state to go to when power is re-applied after a power failure (G3 state).

4.4.2.1 PCI Express Configuration (PCH-IO)

```
                              Aptio Setup - AMI
            Chipset

    PCI Express Configuration                               PCI Express Root Port Settings.

    PCI Express Root Port 1        Lane configured as
                                   USB/SATA/UFS
    PCI Express Root Port 2        Lane configured as
                                   USB/SATA/UFS
    PCI Express Root Port 3        Lane configured as
                                   USB/SATA/UFS
    PCI Express Root Port 4        Lane configured as
                                   USB/SATA/UFS
  ▶ PCI Express Root Port 5
  ▶ PCI Express Root Port 6
  ▶ PCI Express Root Port 7
  ▶ PCI Express Root Port 8                                 ↔: Select Screen
  ▶ PCI Express Root Port 9                                 ↑↓: Select Item
    PCI Express Root Port 10       Shadowed by x2/x4 port   Enter: Select
    PCI Express Root Port 11       Lane configured as       +/-: Change Opt.
                                   USB/SATA/UFS             F1: General Help
    PCI Express Root Port 12       Lane configured as       F2: Previous Values
                                   USB/SATA/UFS             F3: Optimized Defaults
```

Figure 4-4-2-1 : PCI Express Configuration (PCH-IO)

4.4.2.1.1 PCI Express Root Port X (PCH-IO)

```
                              Aptio Setup - AMI
            Chipset

    PCI Express Root Port 5        [Enabled]                Control the PCI Express Root
    PCIe Speed                     [Auto]                   Port.
```
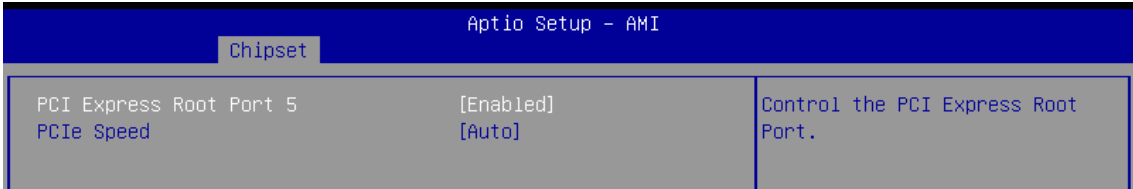
Figure 4-4-2-1-1 : PCI Express Root Port X (PCH-IO)

PCI Express Root Port X
Control the PCI Express Root Port.

PCIe Speed
Configure PCIe Speed.

4.4.2.2 SATA Configuration

```
                                  Aptio Setup - AMI
              Chipset

  SATA Configuration                                        Enable/Disable SATA Device.

  SATA Controller(s)              [Enabled]

  Serial ATA Port 0              Empty
  Serial ATA Port 1              Empty
```
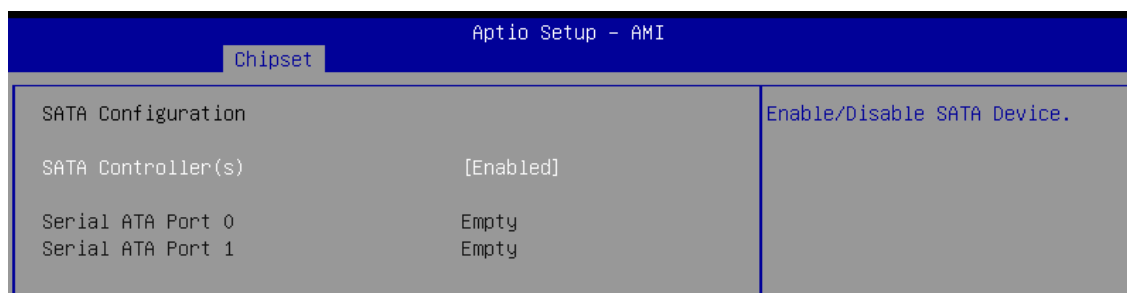
Figure 4-4-2-2 : SATA Configuration

SATA Controller(s)

Enable or disable SATA Device.

4.4.3 Module Management

```
                                  Aptio Setup - AMI
              Chipset

  Onboard Module Setting                                     Workaround for specific device.

  Specific device workaround      [Disabled]
  M2B_CN1 Type                    [USB]
  M2M_CN2 Type                    [PCIe]
```
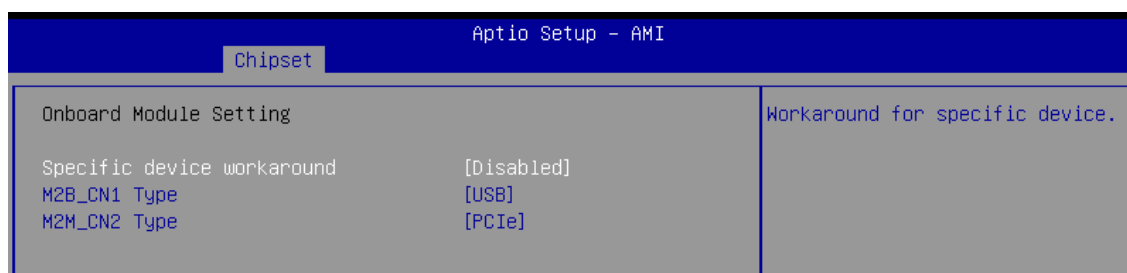
Figure 4-4-3 : Module Management

Specific device workaround

Workaround for specific device. (Boot delay / Warm reset / Cold reset).

Delay Time

0~255 (second).

M2B_CN1 Type

Select M2B_CN1 Type (USB / PCIe).

M2M_CN2 Type

Select M2M_CN2 Type (PCIe / SATA).

4.4.4 SW Ignition Configuration

```
                         Aptio Setup - AMI
              Chipset

  SW Ignition Configuration                               [Normal] System power on by
                                                          power button.
  Ignition F/W Version          00.08                     [Ignition] System power on by
  Current Ignition control method   Software              ignition pin.

  System power on method        [Normal]
    Delay On Timer (Seconds)    0
    Delay Off Timer (Seconds)   0
    Force Shutdown Timer (Minutes)   0

  Voltage Guard                 [Disabled]
    Voltage Guard Lower limit value   9
    Voltage Guard higher limit value  15
                                                          ↤↦: Select Screen
```

Figure 4-4-4 : SW Ignition Configuration

System power on method

[Normal] System power on by power button.

[Ignition] System power on by ignition pin.

Delay On Timer (Seconds)

The delay time after user trigger ignition on signal (Seconds).

Delay Off Timer (Seconds)

The delay time after user trigger ignition off signal (Seconds).

Force Shutdown Timer (Minutes)

Used to force cut off system power when OS unable gracefully shutdown system successfully.

Voltage Guard

Voltage Guard enable or disable, only effect on Ignition mode.

Voltage Guard Lower limit value

Voltage Guard lower limit value setting. Range: 9v ~ 40v.

Voltage Guard higher limit value

Voltage Guard Higher limit value setting. Range: 15v ~ 55v.

4.5 Security Function

```
                          Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx
  ┌──────────────────────────────────────────┬──────────────────────────────┐
  │                                           │  Set Administrator Password   │
  │  Password Description                     │                              │
  │                                           │                              │
  │  The password length must be              │                              │
  │  in the following range:                  │                              │
  │  Minimum length              3            │                              │
  │  Maximum length              20           │                              │
  │                                           │                              │
  │  Administrator Password                   │                              │
  │                                           │                              │
  │                                           │                              │
  │                                           │                              │
  │                                           │──────────────────────────────│
  │  HDD Security Configuration:              │  ↔: Select Screen             │
  │ ▶ M.2 2280 PCIe PT33                      │  ↑↓: Select Item              │
  │                                           │  Enter: Select                │
  │ ▶ Secure Boot                             │  +/-: Change Opt.             │
  │                                           │  F1: General Help             │
  └──────────────────────────────────────────┴──────────────────────────────┘
```
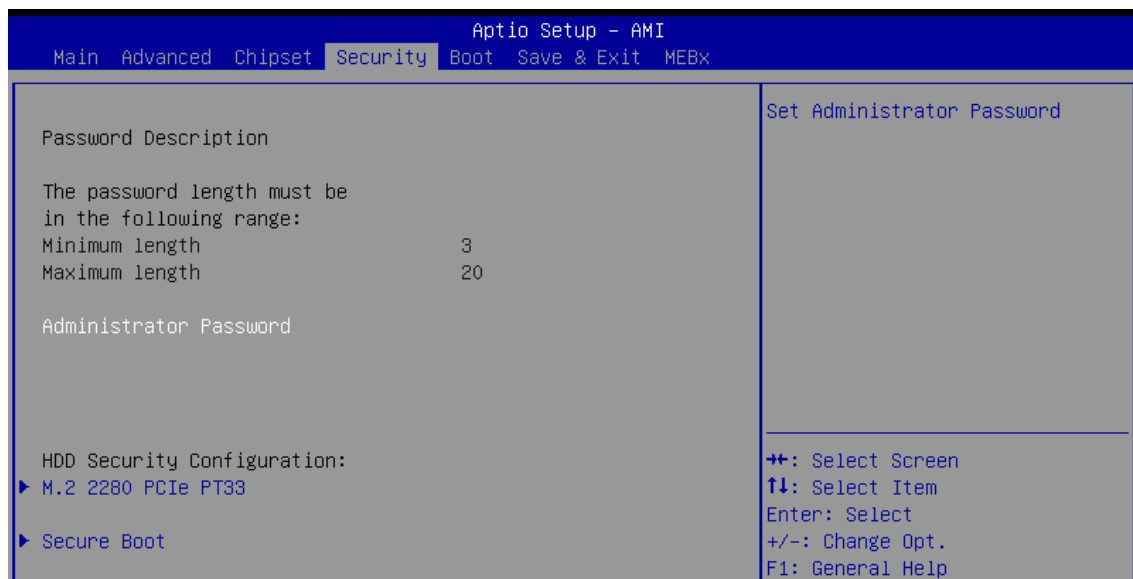
Figure 4-5 : BIOS Security Menu

Administrator Password
Set administrator password.

4.5.1 HDD Security Configuration

```
                          Aptio Setup - AMI
                    ┌──────────┐
                    │ Security │
  ┌──────────────────────────────────────────┬──────────────────────────────┐
  │  HDD Password Description :               │  Set HDD User Password.       │
  │                                           │  *** Advisable to Power Cycle │
  │  Allows Access to Set, Modify and Clear   │  System after Setting Hard Disk│
  │  HardDisk  User  Password                 │  Passwords ***.               │
  │  and  Master  Password.                   │  Discard or Save changes option│
  │  User Password is mandatory to Enable HDD Security. │  in setup does not have any │
  │  If Master password is installed (optional), │  impact on HDD when password is│
  │  it can also be used to unlock the HDD.   │  set or removed. If the 'Set  │
  │  If the 'Set User Password' option is hidden, │  HDD User Password' option is │
  │  do power cycle to enable the option again. │  hidden, do power cycle to    │
  │                                           │  enable the option again      │
  │  HDD PASSWORD CONFIGURATION:              │                              │
  │                                           │──────────────────────────────│
  │  Security Supported :        Yes          │  ↔: Select Screen             │
  │  Security Enabled   :        No           │  ↑↓: Select Item              │
  │  Security Locked    :        No           │  Enter: Select                │
  │  Security Frozen    :        Yes          │  +/-: Change Opt.             │
  │  HDD User Pwd Status:        NOT INSTALLED │  F1: General Help             │
  │  HDD Master Pwd Status  :    INSTALLED    │  F2: Previous Values          │
  │                                           │  F3: Optimized Defaults       │
  │  Set User Password                        │  F4: Save & Exit              │
  │  Set Master Password                      │  ESC: Exit                    │
  └──────────────────────────────────────────┴──────────────────────────────┘
```

Figure 4-5-1 : HDD Security Configuration

Set User Password
Set HDD user password.

*** Advisable to power cycle system after setting hard disk passwords***.

Discard or save changes option in setup does not have any impact on HDD when password is set or removed. If the 'Set HDD user Password' option is hidden, do power cycle to enable the option again.

Set Master Password

Set Master Password.

4.5.2 Security Boot

```
                              Aptio Setup - AMI
                      Security

 System Mode                    Setup                    Secure Boot feature is Active
                                                         if Secure Boot is Enabled,
 Secure Boot                    [Enabled]                Platform Key(PK) is enrolled
                                Not Active               and the System is in User mode.
                                                         The mode change requires
 Secure Boot Mode               [Standard]               platform reset
 ▶ Restore Factory Keys
 ▶ Reset To Setup Mode

 ▶ Key Management
```
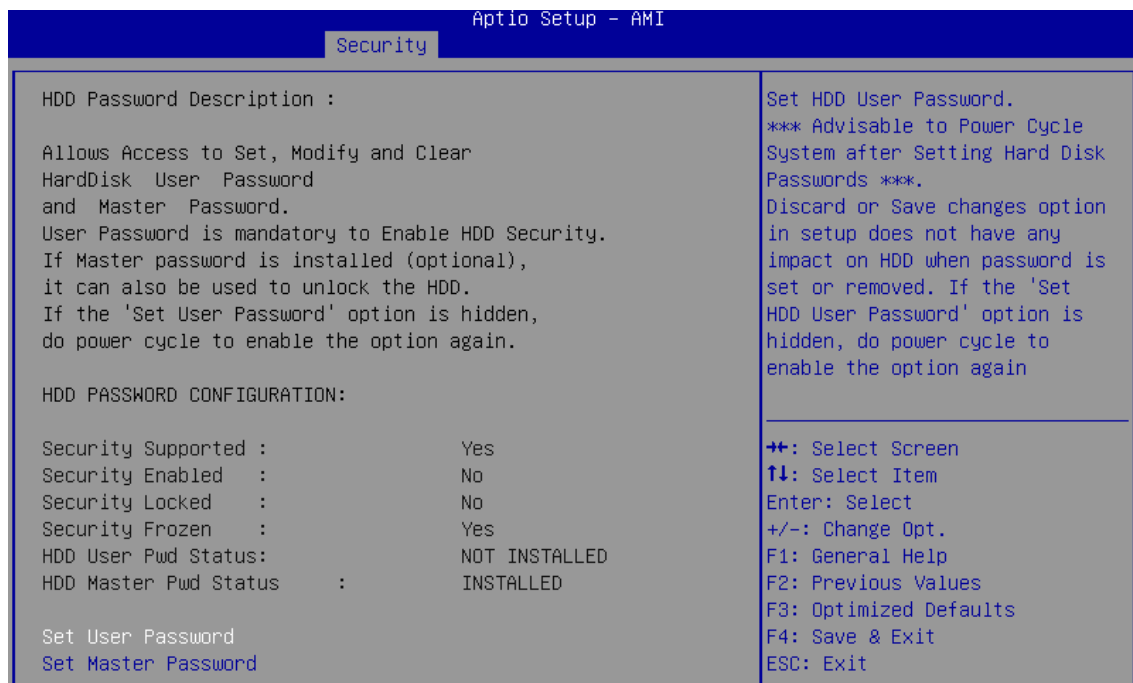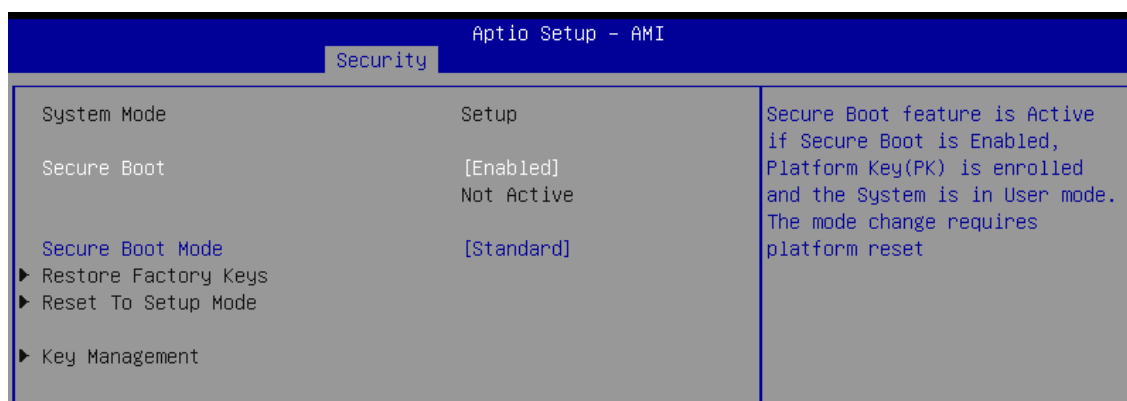
Figure 4-5-2 : Security Boot

Secure Boot

Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.

Secure Boot Mode

Secure Boot mode options : Standard or Custom.
In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

Restore Factory Keys

Force System to User Mode. Install factory default Secure Boot key databases.

Reset To Setup Mode

Delete all Secure Boot key databases from NVRAM.

Key Management

Enables expert users to modify Secure Boot Policy variables without variable authentication.

4.6 Boot Functions

```
                              Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

   Boot Configuration                                    Number of seconds to wait for
   Setup Prompt Timeout            1                     setup activation key.
   Bootup NumLock State            [On]                  65535(0xFFFF) means indefinite
   Quiet Boot                      [Disabled]            waiting.

   Boot Option Priorities
   Boot Option #1                  [UEFI:
                                   KingstonDataTraveler
                                   3.00000, Partition 1
                                   (KingstonDataTraveler
                                   3.00000)]
   Boot Option #2                  [Windows Boot Manager
                                   (M.2 2280 PCIe PT33)]
   Boot Option #3                  [UEFI: Built-in EFI    →←: Select Screen
                                   Shell]                 ↑↓: Select Item
                                                          Enter: Select
```
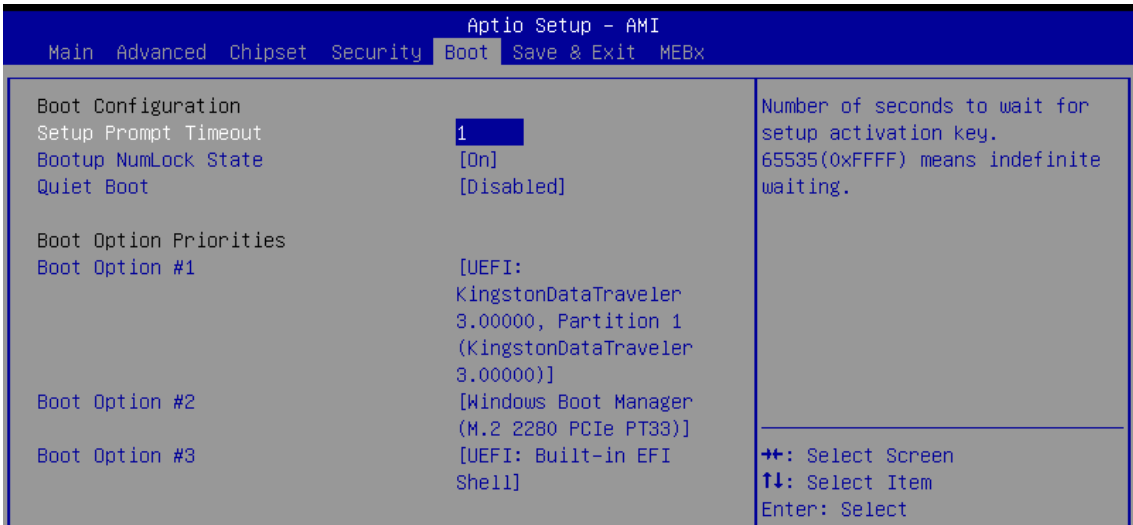
Figure 4-6 : BIOS Boot Menu

Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state.

Quiet Boot

Enables or disables Quiet Boot option.

Boot Option Priorities

Sets the system boot order.
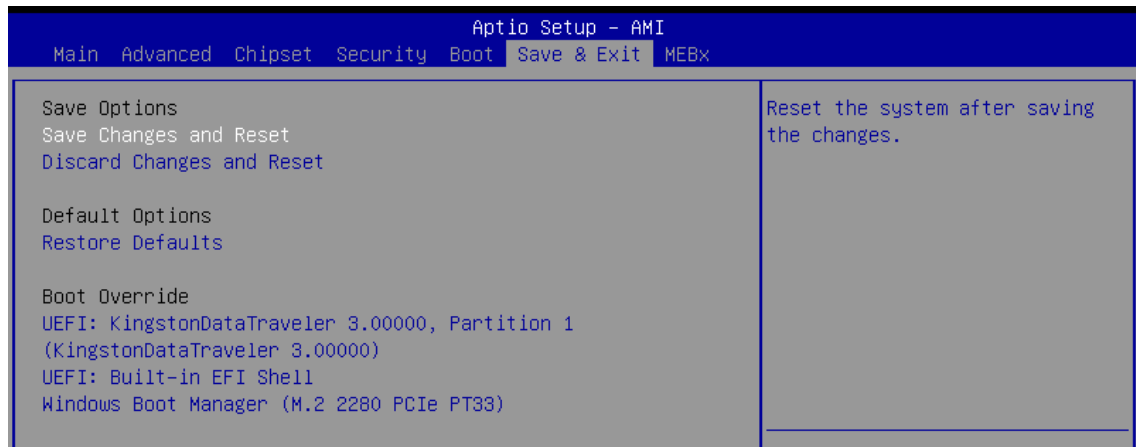
4.7 Save & Exit

Figure 4-7 : Save and Exit Menu

Save Changes and Reset
Reset the system after saving the changes.

Discard Changes and Reset
Reset system setup without saving any changes.

Restore Defaults
Restore/Load Default values for all the setup options.

A

APPENDIX A : Sofeware package contain

A.1 Software Package contain

· Distribution folder include x32 and x64 versions, use batch file for installation.
There are included as fallowed:
     Win10_32.bat, and Win10_64.bat:
        Installation for driver, and
     Uninstall_32.bat, and Uninstall_64.bat:
        Uninstallation for driver
Run batch file as Administrator.

Make sure Windows version before installation.
· Header folder include head file for software developer or
System Integration.
· Manual folder include API description.
· Sample folder include sample program, driver library, and API
library for Windows/Linux
· Source folder include sample program source code that
compile on Visual Studio 2008/Ubuntu18.04.

Distribution
Runtime
Sample
Source
Win7_64.bat
Win8_32.bat
Win8_64.bat
Win10_32.bat
Win10_64.bat
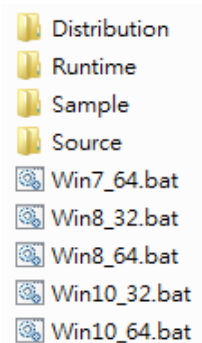
A.2 Sample

Execute demo tool.

Windows

Linux
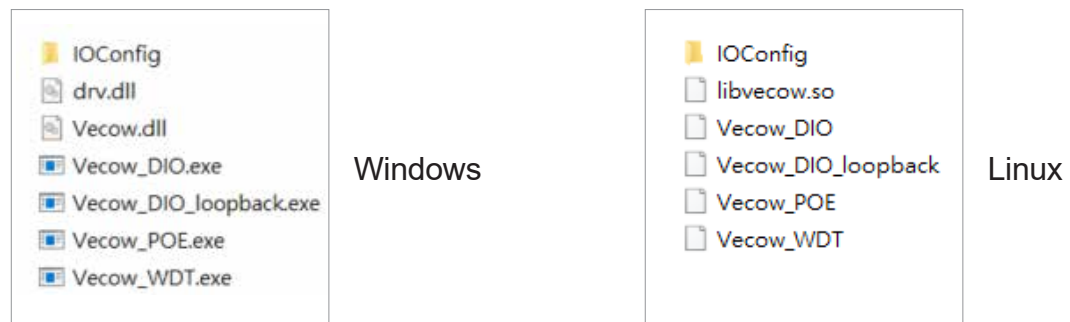
Sample, as shown below :

```
DIO sample version : v1.0.0609.0608
Load Vecow.dll at least v1.8.1409.0608
Vecow.dll Version : v1.8.1409.0608
Config : IO port  I - Isolated DIO
         IO port II - Non-Isolated DIO(GPIO)

Choose IO : (1/2)
```

Vecow_DIO

```
DIO loopback sample version : v1.0.1509.0608
Load Vecow.dll at least v1.8.1409.0608
Vecow.dll Version : v1.8.1409.0608
Config : IO port  I - Isolated DIO
         IO port II - Non-Isolated DIO(GPIO)

How many IO temp_port : (1/2)
```

Vecow_DIO_loopback

```
WDT sample version : v1.0.0509.0608
Load Vecow.dll at least v1.8.1409.0608
Vecow.dll Version : v1.8.1409.0608
Config : IO port  I - Isolated DIO
         IO port II - Non-Isolated DIO(GPIO)

Set WDT timer seconds (1~3932100) :
```

Vecow_WDT

B

APPENDIX B : Software Functions

B.1 Driver API Guide

In Header folder, Vecow.h and VecowLinux.h contain usabled API for Windows/Linux.

BOOL get_WDT(DWORD *WDT)

Get watchdog timer setup.

 • WDT: watchdog timer setup.

  Unit: second (Range: 0 ~ 65535 sec, 1093 ~ 65535 min (=65580 ~ 3932100 sec)).

 Return:
   TRUE (1): Success.
   FALSE (0): Fail (Initial error, or call by pointer error, or hardware problem).

BOOL set_WDT(DWORD WDT)

 Set watchdog timer setup.
  • WDT: watchdog timer setup.
sec)).   Unit: second (Range: 0 ~ 65535 sec, 1093 ~ 65535 min (=65580 ~ 3932100
 Return:
   TRUE (1): Success.
   FALSE (0): Fail (Initial error, or setup 0, or hardware problem).

BOOL cancel_WDT()

 Cancel watchdog timer.
  Return:
    TRUE (1): Success.
    FALSE (0): Fail (Initial error or hardware problem).
    FALSE (0): Fail (Driver not exists, or version is too old, or out of range error).

BOOL config_COMPORT(BYTE *PORT_NUM)

 Set COMPORT configuration.
  • PORT_NUM: Usable COMPORT number.
    Range: 1~6.
 Return:
   TRUE (1): Success.
   FALSE (0): Fail (Initial error, or setup 0, or hardware problem).

BOOL set_COMPORT_mode(BYTE port, BYTE mode, BYTE term)

Set COMPORT mode.

- port: which port set.
  Range: 1~6.
- mode: Usable COMPORT number.
  0: RS232 mode; 1: RS422-5Wire mode.
  2: RS422-9Wire mode; 4: RS485 mode.
  4: Loopback mode.
- term: Termination enable for RS422/RS485 mode.
  1: Enable; 0: Disable.

Return:
  TRUE (1): Success.
  FALSE (0): Fail (Initial error or hardware problem).

BOOL get_COMPORT_mode(BYTE port, BYTE *mode, BYTE term)

Get COMPORT mode.

- port: which port get.
  Range: 1~6.
- mode: Usable COMPORT number.
  0: RS232 mode; 1: RS422-5Wire mode.
  2: RS422-9Wire mode; 4: RS485 mode.
  4: Loopback mode.
- term: Termination enable for RS422/RS485 mode.
  1: Enable; 0: Disable.

Return:
  TRUE (1): Success.
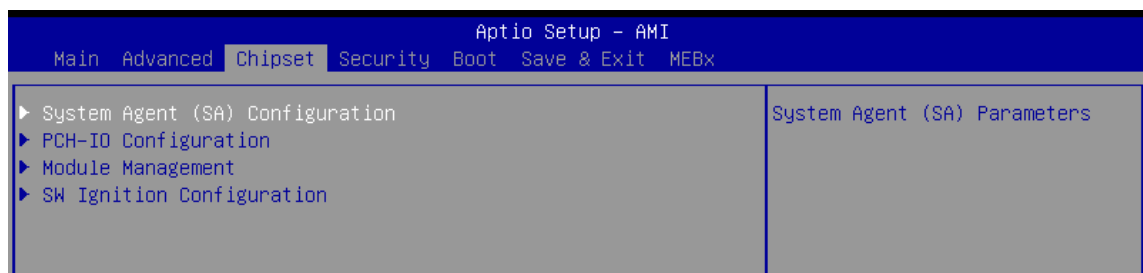 FALSE (0): Fail (Initial error or hardware problem).

C

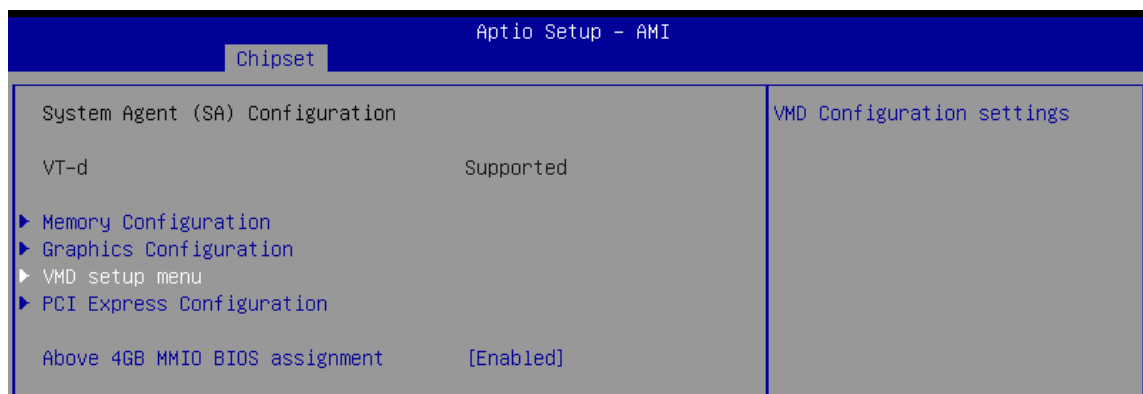# APPENDIX C : RAID Functions

C.1.1 VMD Mode for RAID

Please set Enable VMD controller as Enabled on BIOS menu.

Chipset → System Agent (SA) Configuration → VMD setup menu→ Enable VMD controller → Enabled → Save Changes and Reset.

1. Select System Agent (SA) Configuration.

```
                              Aptio Setup - AMI
      Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

  ▶ System Agent (SA) Configuration            System Agent (SA) Parameters
  ▶ PCH-IO Configuration
  ▶ Module Management
  ▶ SW Ignition Configuration
```

2. Select VMD setup menu.

```
                              Aptio Setup - AMI
                     Chipset

    System Agent (SA) Configuration              VMD Configuration settings

    VT-d                           Supported

  ▶ Memory Configuration
  ▶ Graphics Configuration
  ▶ VMD setup menu
  ▶ PCI Express Configuration

    Above 4GB MMIO BIOS assignment      [Enabled]
```

3. Enabled VMD controller. Then Save Changes and Reset.

```
                              Aptio Setup - AMI
                     Chipset

    VMD Configuration                            Enable/Disable to VMD
                                                 controller
    Enable VMD controller             [Enabled]
```
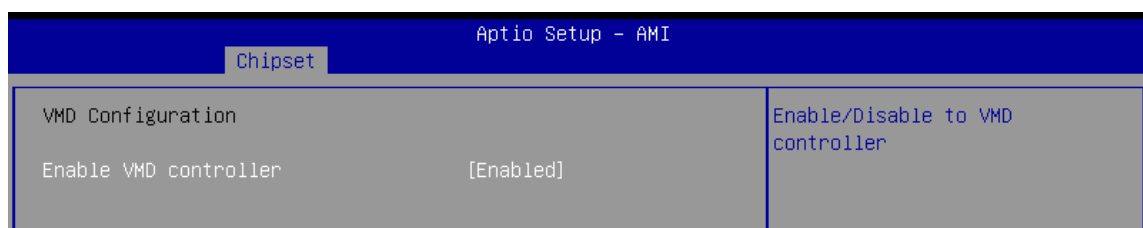
C.1.2 UEFI Mode for RAID

1. Into BIOS menu again, select Intel(R) Rapid Storage Technology on BIOS menu.
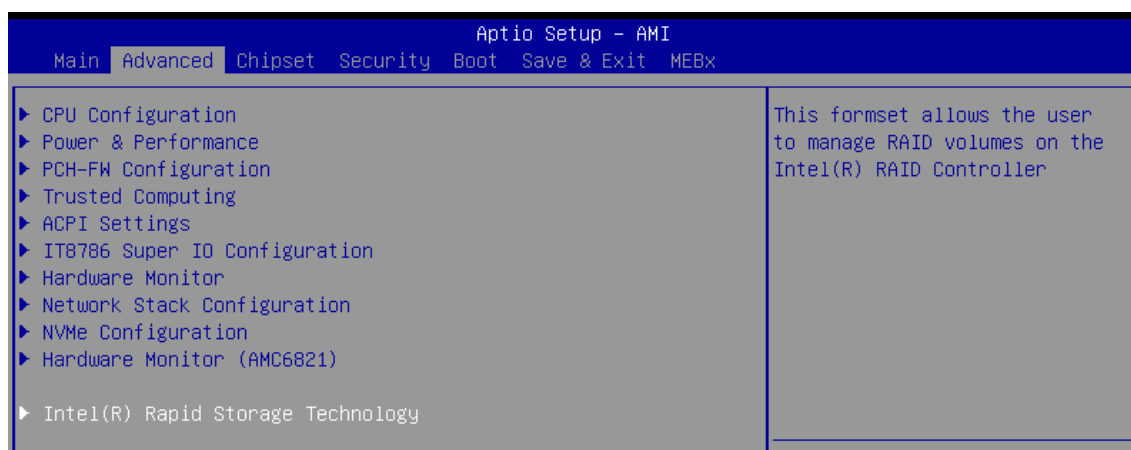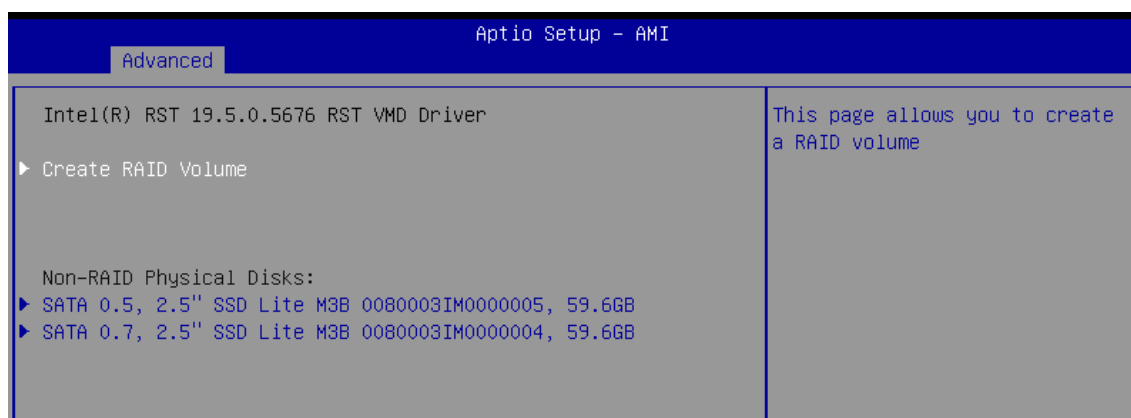
Advanced → Intel(R) Rapid Storage Technology.

```
                              Aptio Setup - AMI
        Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

    ▶ CPU Configuration                              This formset allows the user
    ▶ Power & Performance                            to manage RAID volumes on the
    ▶ PCH-FW Configuration                           Intel(R) RAID Controller
    ▶ Trusted Computing
    ▶ ACPI Settings
    ▶ IT8786 Super IO Configuration
    ▶ Hardware Monitor
    ▶ Network Stack Configuration
    ▶ NVMe Configuration
    ▶ Hardware Monitor (AMC6821)

    ▶ Intel(R) Rapid Storage Technology
```
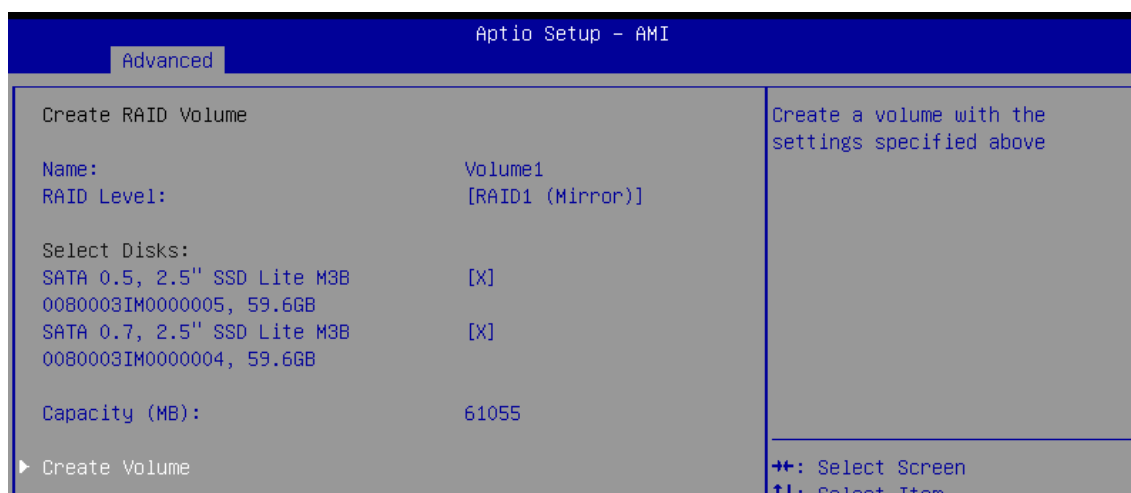
2. Select Create RAID Volume on BIOS menu.

This system is featured 2 M.2 Key M for NVMe SSD.

Please note. Storage device M.2 and SATA cannot be mixed to create a RAID Volume.

```
                              Aptio Setup - AMI
        Advanced

    Intel(R) RST 19.5.0.5676 RST VMD Driver          This page allows you to create
                                                     a RAID volume
    ▶ Create RAID Volume


    Non-RAID Physical Disks:
    ▶ SATA 0.5, 2.5" SSD Lite M3B 0080003IM0000005, 59.6GB
    ▶ SATA 0.7, 2.5" SSD Lite M3B 0080003IM0000004, 59.6GB
```

3. Select disks to create RAID Volume, then Save Changes and Reset to install OS.

```
                              Aptio Setup - AMI
        Advanced

    Create RAID Volume                               Create a volume with the
                                                     settings specified above
    Name:                        Volume1
    RAID Level:                  [RAID1 (Mirror)]

    Select Disks:
    SATA 0.5, 2.5" SSD Lite M3B      [X]
    0080003IM0000005, 59.6GB
    SATA 0.7, 2.5" SSD Lite M3B      [X]
    0080003IM0000004, 59.6GB

    Capacity (MB):               61055

    ▶ Create Volume                                  →←: Select Screen
                                                     ↑↓: Select Item
```
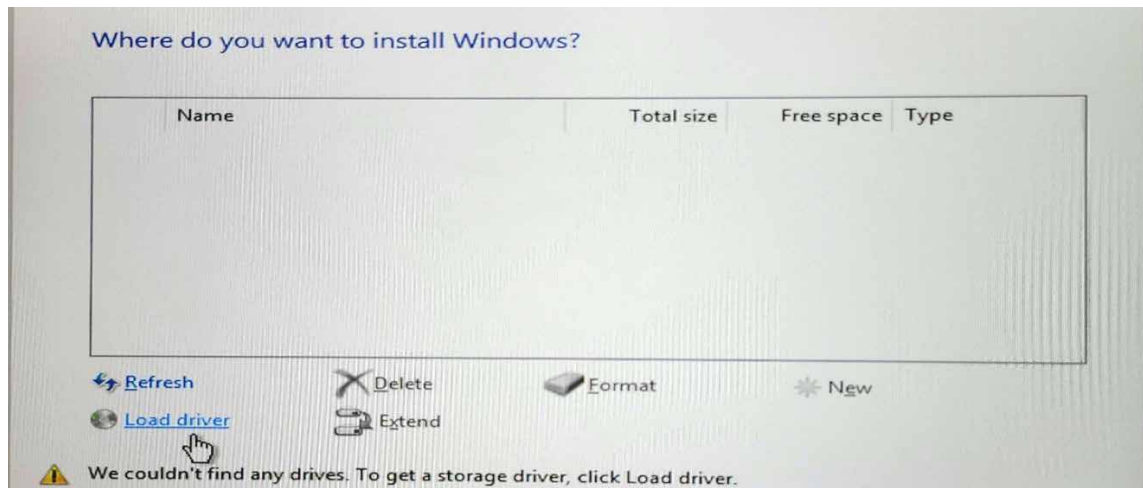
C.2 OS Installation

This system is featured 2 M.2 Key M for NVMe SSD, and 1 SATA slots for HDD.

We used SATA HDD for Windows 10 OS installation as an example.

Please note. After Enabled VMD controller needs to load the IRST driver first before it can read the hard disk.

You can find the latest information and software directly from Intel's website.

http://www.intel.com/p/en_US/support/highlights/chpsts/imsm

Download driver "SetupRST.exe" and decompress it.

You can refer to Intel official teaching.

https://www.intel.com/content/www/us/en/support/articles/000094664/technologies/intel-rapid-storage-technology-intel-rst.html
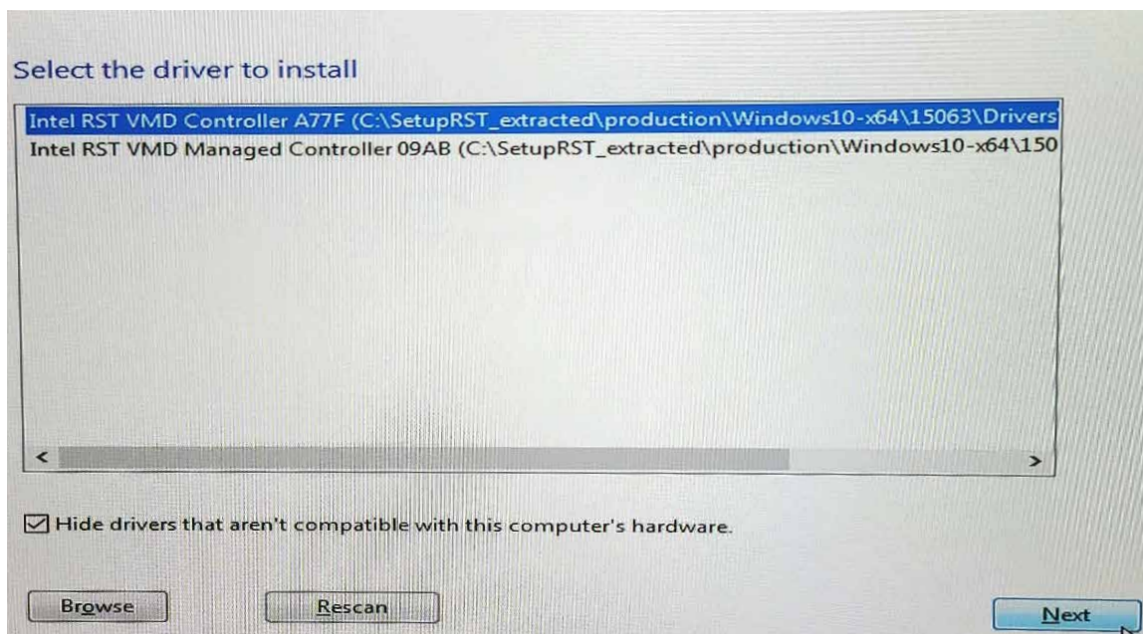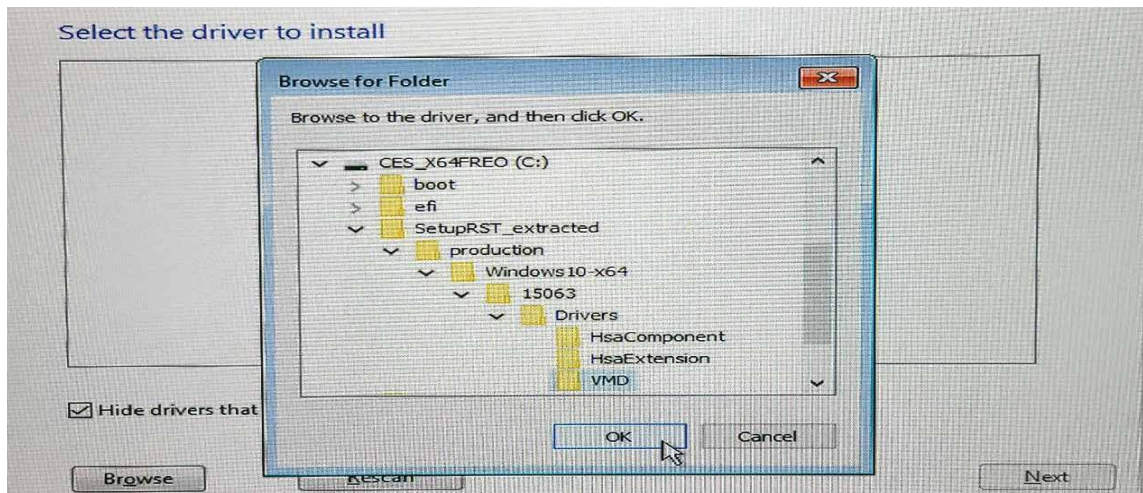
Open Windows PowerShell or CMD and navigate to the location of the SetupRST.exe file.
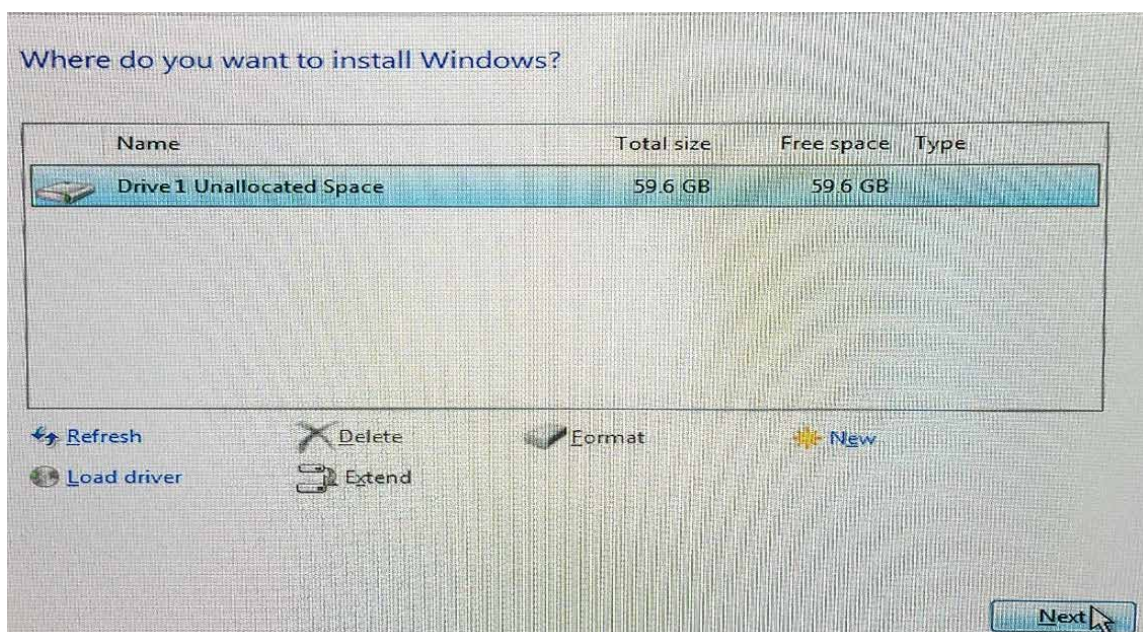
Enter the following command to extract:

./SetupRST.exe -extractdrivers SetupRST_extracted.

After extraction, a "SetupRST_extracted " folder will be created, then put the folder on the USB drive used for installing Windows.

Loading driver and install it when installing Windows.

Select the driver to install

Browse for Folder

Browse to the driver, and then click OK.

- CES_X64FREO (C:)
  - boot
  - efi
  - SetupRST_extracted
    - production
      - Windows 10-x64
        - 15063
          - Drivers
            - HsaComponent
            - HsaExtension
            - VMD

[OK] [Cancel]

Hide drivers that

Browse   Rescan   Next

Select the driver to install

Intel RST VMD Controller A77F (C:\SetupRST_extracted\production\Windows10-x64\15063\Drivers
Intel RST VMD Managed Controller 09AB (C:\SetupRST_extracted\production\Windows10-x64\150

☑ Hide drivers that aren't compatible with this computer's hardware.

Browse   Rescan   Next

Then you can select the hard drive and install the OS.

Where do you want to install Windows?

Name	Total size	Free space	Type
Drive 1 Unallocated Space	59.6 GB	59.6 GB	

Refresh   Delete   Format   New
Load driver   Extend

Next

C.3 To Install All Device Drivers of the System

The instructions are as follows:

1. Install Chipset driver

2. Install VGA driver

3. Install ME driver (if available)
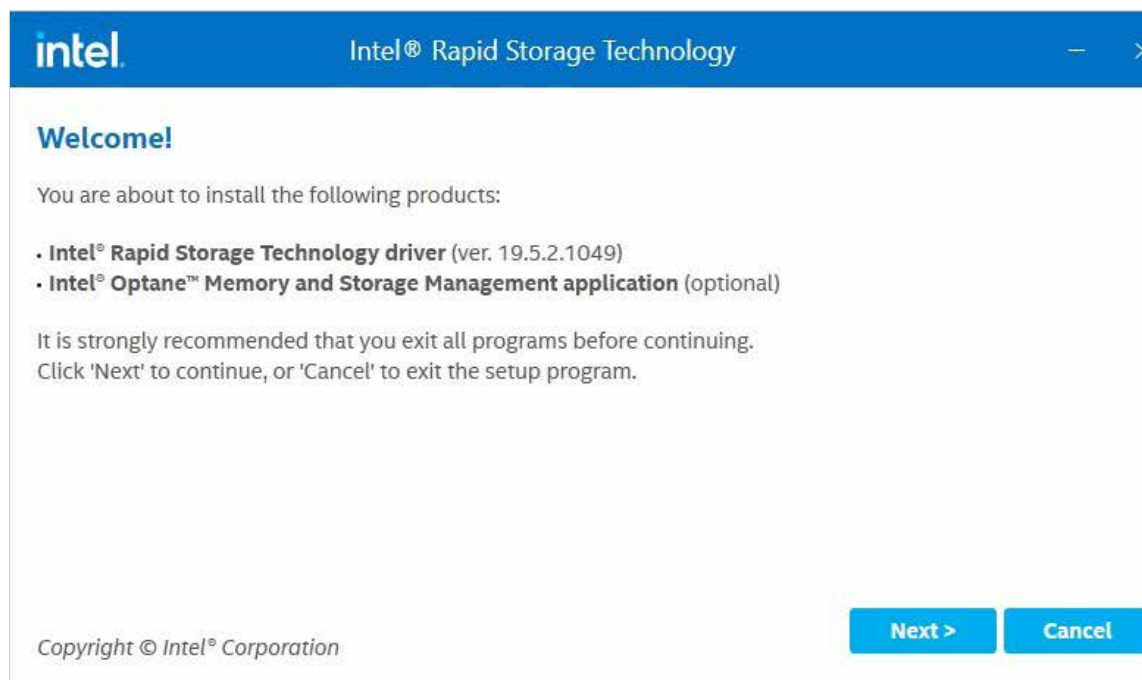
4. Install Network driver

5. Install Audio driver

C.4 To Install "Intel Rapid Storage Technology" driver

You can get the software from driver CD.

Also, you can find the latest information and software directly from Intel's website.

http://www.intel.com/p/en_US/support/highlights/chpsts/imsm

Install "SetupRST.exe"

The RAID environment has been done when you completed the steps above.

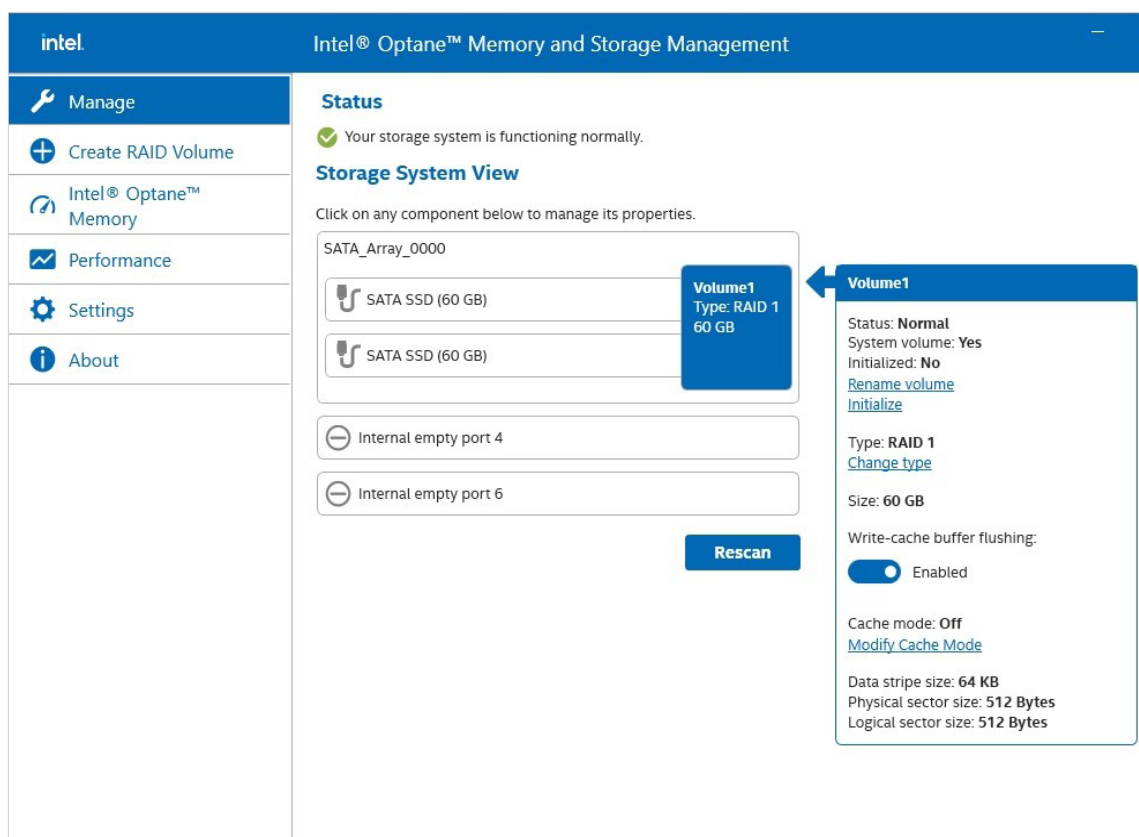At this point, the basic RAID Volume setup steps have concluded.

C.5 Manage RAID Volume on "Intel® Optane™ Memory and Storage Management" Software

You can download "Intel® Optane™ Memory and Storage Management" to manage and create RAID Volumes.

You can find it at Microsoft Store.

https://apps.microsoft.com/detail/9MZNG5HZWZ1T?activetab=pivot%3Aoverviewtab&hl=en-us&gl=US

After installation, the created RAID Volume will be displayed here.

C.6 To Insert SATA HDD for RAID

Please note, you can use additional two SATA ports for SATA HDD, except for mSATA slot. And storage device M.2 and SATA cannot be mixed to create a RAID Volume.

C.7 To Create RAID Volume on "Intel® Optane™ Memory and Storage Management" Software

You can connect additional SATA devices to build RAID Volumes, and use "Intel® Optane™ Memory and Storage Management" Software for management.

D

APPENDIX D : Power Consumption

Testing Board	ABP-4000
RAM	16GB * 2
USB-1 : (USB 3.0)	USB Flash Kingston 3.0 32GB
USB-2 : (USB 3.0)	USB Flash Kingston 3.0 32GB
USB-3 : (USB 2.0)	USB Logitech Keyboard K120 820-009375
USB-4 : (USB 2.0)	USB Logitech Mouse 810-002182
USB-5 : (Type C)	Micro USB to USB, USB Flash Kingston 3.0 32GB
M.2 PCIe SSD	Innodisk (P80) 4TG2-P GEN4x4 512GB
LAN 1 (i226)	1.0 Gbps
LAN 2 (i226)	1.0 Gbps
Graphics Output	HMDI
Power Plan	Balance (Windows10 Power plan)
Power Source	Chroma 62006P-100-25

D.1 Intel® Core™ i5-1345UE 1.40 GHz (12M Cache, up to 4.60 GHz)

CPU	Power Input	Standby Mode		Power on and boot to Win 10 (64-bit)			
				Sleep Mode		idle status CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-1345UE	9V	0.373A	03.36W	0.515A	04.64W	2.102A	18.92W
	12V	0.385A	04.62W	0.419A	05.03W	1.681A	20.17W
	24V	0.234A	05.61W	0.259A	06.23W	0.896A	21.49W
	50V	0.143A	07.14W	0.170A	08.50W	0.472A	23.59W
	55V	0.152A	08.37W	0.164A	09.00W	0.441A	24.28W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage with 2D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-1345UE	9V	3.211A	28.90W	3.393A	30.54W
	12V	2.587A	31.05W	2.599A	31.19W
	24V	1.354A	32.50W	1.363A	32.71W
	50V	0.703A	35.15W	0.704A	35.20W
	55V	0.647A	35.59W	0.650A	35.76W

E

APPENDIX E : Supported List (Memory/M.2)

E.1 Test Item

Testing Board	ABP-4000
Memory Test	MemTest86 V9.5
BurnIn Test	BurnInTest Pro V10

Channel	Memory Test	Burn-in Test	Flash BIOS	Remove Battery	Sleep	Hibernate	Reset	CPU-Z
*2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
*1(DIMM 1)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
*1(DIMM 2)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

E.2 Supported Non-ECC Memory List

Brand	Info	Test Temp. (Celsius)
SLLINK 32GB DDR4-3200 SODIMM	J4BGSH2G8TMFC	25ºC
SLLINK 16GB DDR4-2666 SODIMM	J4AGSH1G8QHFC	25ºC
SMART 16GB DDR4-3200 SODIMM	ST2046SO410825-SE	25ºC

E.3 Supported Storage List

Type	Brand	Model	Capacity
M.2 SSD (SATA)	SMART	AFBCK1125600007	256GB
	Memxpro	MD3MB11128D25N	128GB
M.2 SSD (PCIe)	Transcend	TS512GMTE720T G4x4	512GB
		TS512GMTE460T G3x2	512GB
	Innodisk	4TG2-P DGM28-C12DP1KCAEF-H003 GEN4x4	512GB
		3TE6 DEM28-C12DD1KCCQF-H03 G3x2	512GB

Vecow

For further support information, please visit www.vecow.com