EXBC-1000 USER Manual

Intel® Xeon®/Core™ i7/i5/i3 Processor 5.25" Single Board Computer
Workstation-grade, 4 GigE LAN, 4 10G USB, 4 COM, 1 PCIe, SUMIT A, B

Vecow

1.5.0 Edition 20240816

Record of Revision

Version	Date	Page	Description	Remark
0.10	2019/08/07	All	Preliminary Release	
1.00	2019/08/16		Official Release	
1.10	2021/03/17	65	Update	
1.20	2021/03/22	3, 5, 7	Update	
1.30	2022/06/23	72-74	Update	
1.40	2023/04/18	1, 5, 7, 13, 20, 60	Update	
1.50	2024/08/16	3, 5, 7, 25	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 complies 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
EXBC-1000	EXBC-1000 5.25" Embedded Single Board Computer, Intel® H310 with Intel® Core™ i7/i5/i3 Processor (CFL-R S/CFL-S), 4 GigE LAN, 4 USB 3.1, 4 COM, 1 PCIe, 2 Mini PCIe, 16 GPIO
EXBC-1100	EXBC-1000 5.25" Embedded Single Board Computer, Intel® C246 with Intel® Xeon®/Core™ i7/i5/i3 Processor (CFL-R S/CFL-S), 4 GigE LAN, 4 10G USB 3.1 Gen 2, 4 COM, 1 PCIe, 2 Mini PCIe, 16 GPIO
EXBC-1100E	EXBC-1000 5.25" Embedded Single Board Computer, Intel® C246 with Intel® Xeon®/Core™ i7/i5/i3 Processor (CFL-R S/CFL-S), 4 GigE LAN, 4 10G USB 3.1 Gen 2, 4 COM, 1 PCIe, 2 Mini PCIe, SUMIT A, B, 16 GPIO

CPU List

Part Number	Description
E-2278GE	9th Gen Intel® Xeon® E-2228GE Processor (XXM Cache, up to 4.70GHz)
E-2278GEL	9th Gen Intel® Xeon® E-2278GEL Processor (XXM Cache, up to 3.90GHz)
E-2226GE	9th Gen Intel® Xeon® E-2226GE Processor (XXM Cache, up to 4.60GHz)
E-2176G	8th Gen Intel® Xeon® E-2176G Processor (XXM Cache, up to 4.60GHz)
E-2124G	8th Gen Intel® Xeon® E-2124G Processor (XXM Cache, up to 4.50GHz)
i7-9700E	9th Gen Intel® Core™ i7-9700E Processor (XXM Cache, up to 4.40GHz)
i7-9700TE	9th Gen Intel® Core™ i7-9700TE Processor (XXM Cache, up to 3.80GHz)
i7-8700	8th Gen Intel® Core™ i7-8700 Processor (XXM Cache, up to 4.60GHz)
i7-8700T	8th Gen Intel® Core™ i7-8700T Processor (XXM Cache, up to 4.00GHz)
i5-9500E	9th Gen Intel® Core™ i5-9500E Processor (XXM Cache, up to 4.20GHz)
i5-9500TE	9th Gen Intel® Core™ i5-9500TE Processor (XXM Cache, up to 3.60GHz)
i5-8500	8th Gen Intel® Core™ i5-8500 Processor (XXM Cache, up to 4.10GHz)
i5-8500T	8th Gen Intel® Core™ i5-8500T Processor (XXM Cache, up to 3.50GHz)
i3-9100E	9th Gen Intel® Core™ i3-9100E Processor (XXM Cache, up to 3.70GHz)
i3-9100TE	9th Gen Intel® Core™ i3-9100TE Processor (XXM Cache, up to 3.20GHz)
i3-8100	8th Gen Intel® Core™ i3-8100 Processor (XXM Cache, up to 3.60GHz)
i3-8100T	8th Gen Intel® Core™ i3-8100T Processor (XXM Cache, up to 3.10GHz)

Optional Accessories

Part Number	Description
DDR4 32G	Certified DDR4 32GB 2666MHz RAM
DDR4 16G	Certified DDR4 16GB 2666MHz RAM
DDR4 8G	Certified DDR4 8GB 2666MHz RAM
DDR4 4G	Certified DDR4 4GB 2666MHz RAM
61-13Q1009-0DA	COM Port Cable
61-13B0707-386	SATA Data Cable
61-13P0430-08A	SATA Power Cable
61-193102U-156	USB 2.0 Cable
75-VL1HSK0-010	Heat Sink for EXBC-1000 Series
75-VL1HSP0-010	Heat Spreader for EXBC-1000 Series
75-VL1FBK1-010	Fan Bracket for EXBC-1000 Series

Table of Contents

1

GENERAL INTRODUCTION

1.1 Overview

Vecow EXBC-1000 is a workstation-grade 5.25" Embedded Single Board Computer. Workstation-grade Intel® C246/H310 chipset flexible supports 8-core 9th Generation Intel® Xeon®/Core™ i7/i5/i3 processor (CFL-R S/CFL-S), dual channel DDR4 2666MHz up to 64GB ECC memory, advanced Intel® UHD Graphics 630 supporting DirectX 12, OpenGL 4.5, OpenCL 2.0 API, and up to Ultra HD 4K resolution, Vecow EXBC-1000 5.25" SBC delivers leading CPU & chipset performance, power efficiency, and graphics performance; Multiple 10G SuperSpeed USB 3.1 Gen 2 (10Gbps), PCIe 3.0 (8GT/s), SATA III (6Gbps), USB 3.1 (5Gbps), GigE LAN (1Gbps) and wireless connections make seamless real-time high-speed data conveying possible.

Fanless design supporting -25°C to 60°C operating temperature, multiple DisplayPort, DVI and dual channel 24-bit LVDS display interfaces support triple independent displays and up to 4K resolution; 4 USB 3.1 Gen 2 ports support up to 10Gbps SuperSpeed data delivery; 4 GigE LAN, 4 COM RS-232/422/485, 2 SATA III (optionally support software RAID function), 16 GPIO; SIM socket for WiFi, 4G, 3G, LTE, GPRS or UMTS wireless data transfer; 1 PCIe expansion for PCIe x16, PCIe x4, PCIe x1 or USB 2.0; 2 Mini PCIe for PCIe, USB, SIM Card or optional mSATA; optional full function SUMIT A, B expansion supports multiple SIM sockets, 10GigE RJ45 or 10G SPF+ Fiber connections; iAMT 12.0, TPM 2.0, Wake on LAN and PXE smart manageability, Vecow ECX-1000 Series 5,25" SBC serves compact & flexible solutions to meet your project requirements.

Workstation-grade Intel® Xeon®/Core™ i7/i5/i3 processor (Coffee Lake), running with Intel® C246/H310 chipset, fanless, leading performance, flexible expansion, easy customization, industrial-grade reliability and compact integrated features, Vecow EXBC-1000/1100 Series 5.25" Embedded Single Board Computer is your powerful solution for Smart Manufacturing, Healthcare Service, Robotics Control, Public Infotainment, Gaming, Kiosk/POS and any Industrial 4.0/AIoT applications.

1.2 Features

- Workstation-grade Platform : LGA 1151 Socket supports 8 cores 9th Generation Intel® Xeon®/Core™ i7/i5/i3 Processor (Coffee Lake-Refresh S) running with Intel® C246/H310 Chipset
- Fanless, -25°C to 60°C Operating Temperature
- 2 DDR4 2666MHz Memory, up to 64GB (ECC/Non-ECC)
- Display : Multiple DisplayPort, DVI and dual channel 24-bit LVDS display interfaces support triple independent display, up to 4K resolution
- 4 USB 3.1 Gen 2 support up to 10Gbps data transfer
- 4 independent GigE LAN, iAMT 12.0 supported
- SIM Card socket support WiFi/4G/3G/LTE/GPRS/UMTS
- 4 COM RS-232/422/485, 16 GPIO
- Expansion : 1 PCIe, 2 Mini PCIe, 1 SUMIT A, B
- 12V DC Power Input
- Easy to customize for low-profile system applications

1.3 Product Specification

1.3.1 Specifications of EXBC-1000

System	
Processor	8 cores Intel® Core™ i7/i5/i3 Processor (CFL-R S/CFL-S)
Chipset	Intel® H310 Chipset
BIOS	AMI
SIO	IT8786E
Memory	• DDR4 2666MHz (ECC/Non-ECC) • Up to 64GB • 2 260-pin SO-DIMM Socket
Graphics	
Graphics Processor	Intel® UHD Graphics 630
Interface	4 display interfaces : • 1 DVI-D : Up to 1920 x 1200 @60Hz • 2 DisplayPort : Up to 4096 x 2304 @60Hz • LVDS : Dual channel 24-bit, up to 1920 x 1200
Ethernet	
LAN1	Intel® I219LM GigE LAN supports iAMT 12.0
LAN2	Intel® I210 GigE LAN
LAN3	Intel® I210 GigE LAN
LAN4	Intel® I210 GigE LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Storage	
SATA	2 SATA III (6Gbps)
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.1 Connector • 4 RJ45 Connector • 1 Mic-in • 1 Line-out • 1 Power Button • 1 Reset Button

Internal I/O	• 1 ATX 6-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 2 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Data Connector • 1 SATA Power Connector • 1 GPIO Header • 2 Fan Connector • 1 PCIe Slot • 1 USB 2.0 Wafer with 2 ports • 1 PS/2 MB/MS Header • 1 Reset ON/OFF Connector • 1 Clear CMOS Header
Expansion	
PCIe Slot	1 PCIe Slot for PCIe x16
Mini PCIe	2 Mini PCIe sockets : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
Power	
Input Voltage	12V DC-in (±5%)
Power Interface	ATX Power Connector
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC 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 10, Linux
Mechanical	
Dimension (W x L)	203mm x 146mm (7.99" x 5.75")
Weight	351 g (0.77 lb)
Environment	
Operating Temperature	**35W TDP CPU with Heat Sink :** -25°C to 60°C (-13°F to 140°F) **65W TDP CPU with Fan :** -25°C to 60°C (-13°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 60°C
EMC	CE, FCC

1.3.2 Specifications of EXBC-1100

System	
Processor	8 cores Intel® Xeon®/Core™ i7/i5/i3 Processor (CFL-R S/CFL-S)
Chipset	Intel® C246 Chipset
BIOS	AMI
SIO	IT8786E
Memory	• DDR4 2666MHz (ECC/Non-ECC) • Up to 64GB • 2 260-pin SO-DIMM Socket
Graphics	
Graphics Processor	Intel® UHD Graphics 630
Interface	4 display interfaces : • 1 DVI-D : Up to 1920 x 1200 @60Hz • 2 DisplayPort : Up to 4096 x 2304 @60Hz • LVDS : Dual channel 24-bit, up to 1920 x 1200
Ethernet	
LAN1	Intel® I219LM GigE LAN supports iAMT 12.0
LAN2	Intel® I210 GigE LAN
LAN3	Intel® I210 GigE LAN
LAN4	Intel® I210 GigE LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Storage	
SATA	2 SATA III (6Gbps), support S/W RAID 0, 1
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.1 Connector • 4 RJ45 Connector • 1 Mic-in • 1 Line-out • 1 Power Button • 1 Reset Button

Internal I/O	• 1 ATX 6-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 2 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Data Connector • 1 SATA Power Connector • 1 GPIO Header • 2 Fan Connector • 1 PCIe Slot • 1 USB 2.0 Wafer with 2 ports • 1 PS/2 MB/MS Header • 1 Reset ON/OFF Connector • 1 Clear CMOS Header
Expansion	
PCIe Slot	1 PCIe Slot for PCIe x16/PCIe x4/PCIe x1/USB 2.0
Mini PCIe	2 Mini PCIe sockets : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
Power	
Input Voltage	12V DC-in (±5%)
Power Interface	ATX Power Connector
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC 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 10, Linux
Mechanical	
Dimension (W x L)	203mm x 146mm (7.99" x 5.75")
Weight	351 g (0.77 lb)
Environment	
Operating Temperature	**35W TDP CPU with Heat Sink :** -25°C to 60°C (-13°F to 140°F) **65W TDP CPU with Fan :** -25°C to 60°C (-13°F to 140°F) **80W TDP CPU with Fan :** -25°C to 60°C (-13°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 60°C
EMC	CE, FCC

1.3.3 Specifications of EXBC-1100E

System	
Processor	8 cores Intel® Xeon®/Core™ i7/i5/i3 Processor (CFL-R S/CFL-S)
Chipset	Intel® C246 Chipset
BIOS	AMI
SIO	IT8786E
Memory	• DDR4 2666MHz (ECC/Non-ECC) • Up to 64GB • 2 260-pin SO-DIMM Socket
Graphics	
Graphics Processor	Intel® UHD Graphics 630
Interface	4 display interfaces : • 1 DVI-D : Up to 1920 x 1200 @60Hz • 2 DisplayPort : Up to 4096 x 2304 @60Hz • LVDS : Dual channel 24-bit, up to 1920 x 1200
Ethernet	
LAN1	Intel® I219LM GigE LAN supports iAMT 12.0
LAN2	Intel® I210 GigE LAN
LAN3	Intel® I210 GigE LAN
LAN4	Intel® I210 GigE LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Storage	
SATA	2 SATA III (6Gbps), support S/W RAID 0, 1
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
I/O Interface	
Front I/O	• 1 DVI-D Connector • 1 DisplayPort Connector • 4 USB 3.1 Connector • 4 RJ45 Connector • 1 Mic-in • 1 Line-out • 1 Power Button • 1 Reset Button

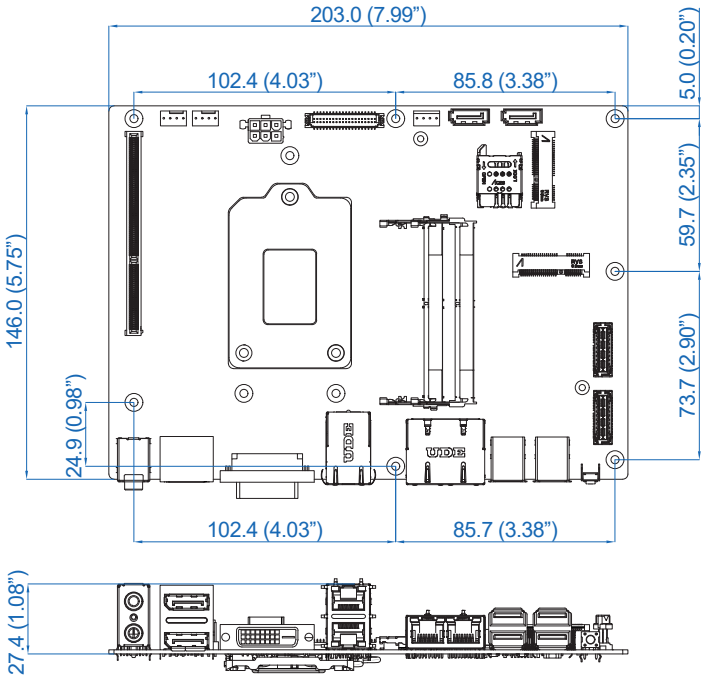
Internal I/O	• 1 ATX 6-pin Power Connector • 4 COM RS-232/422/485 Connector • 2 Mini PCIe Connector • 1 SIM Card Socket • 2 DDR4 SO-DIMM Socket • 1 LVDS Connector • 1 LVDS Backlight Connector • 2 SATA Data Connector • 1 SATA Power Connector • 1 GPIO Header • 2 Fan Connector • 1 PCIe Slot • 1 USB 2.0 Wafer with 2 ports • 1 PS/2 MB/MS Header • 1 Reset ON/OFF Connector • 1 Clear CMOS Header
Expansion	
SUMIT	• 1 SUMIT Connector A (Internal) • 1 SUMIT Connector B (Internal)
PCIe Slot	1 PCIe Slot for PCIe x16/PCIe x4/PCIe x1/USB 2.0
Mini PCIe	2 Mini PCIe sockets : • 1 Mini PCIe for PCIe/USB/SIM Card • 1 Mini PCIe for PCIe/USB/Optional mSATA
Power	
Input Voltage	12V DC-in (±5%)
Power Interface	ATX Power Connector
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC 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 10, Linux
Mechanical	
Dimension (W x L)	203mm x 146mm (7.99" x 5.75")
Weight	351 g (0.77 lb)
Environment	
Operating Temperature	**35W TDP CPU with Heat Sink :** -25°C to 60°C (-13°F to 140°F) **65W TDP CPU with Fan :** -25°C to 60°C (-13°F to 140°F) **80W TDP CPU with Fan :** -25°C to 60°C (-13°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% humidity, non-condensing
Relative Humidity	95% at 60°C
EMC	CE, FCC

1.4 Supported CPU List

Processor No.	Cores	TDP	Cache	Max. Frequency	ECC Memory
Intel® Xeon® E-2278GE	8	80W	16M	Up to 4.7GHz	Y
Intel® Xeon® E-2278GEL	8	35W	16M	Up to 3.9GHz	Y
Intel® Xeon® E-2226GE	6	80W	12M	Up to 4.6GHz	Y
Intel® Xeon® E-2176G	6	80W	12M	Up to 4.6GHz	Y
Intel® Xeon® E-2124G	4	71W	8M	Up to 4.6GHz	Y
Intel® Core™ i7-9700E	8	65W	12M	Up to 4.4GHz	N
Intel® Core™ i7-9700TE	8	35W	12M	Up to 3.8GHz	N
Intel® Core™ i7-8700	6	65W	12M	Up to 4.6GHz	N
Intel® Core™ i7-8700T	6	35W	12M	Up to 4.0GHz	N
Intel® Core™ i5-9500E	6	65W	9M	Up to 4.2GHz	N
Intel® Core™ i5-9500TE	6	35W	9M	Up to 3.6GHz	N
Intel® Core™ i5-8500	6	65W	9M	Up to 4.1GHz	N
Intel® Core™ i5-8500T	6	35W	9M	Up to 3.5GHz	N
Intel® Core™ i3-9100E	4	65W	6M	Up to 3.7GHz	Y
Intel® Core™ i3-9100TE	4	35W	6M	Up to 3.2GHz	Y
Intel® Core™ i3-8100	4	65W	6M	Up to 3.6GHz	Y
Intel® Core™ i3-8100T	4	35W	6M	Up to 3.1GHz	Y

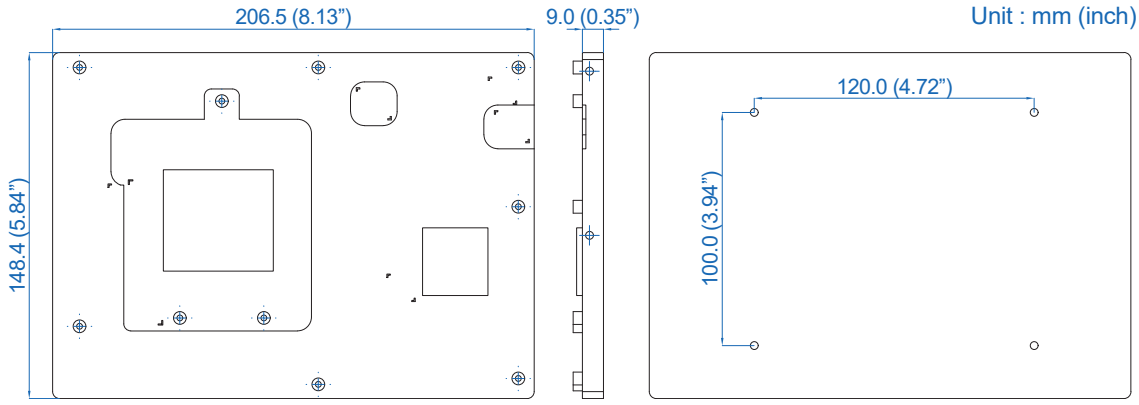
1.5 Mechanical Dimension

1.5.1 Dimensions of EXBC-1000 Series



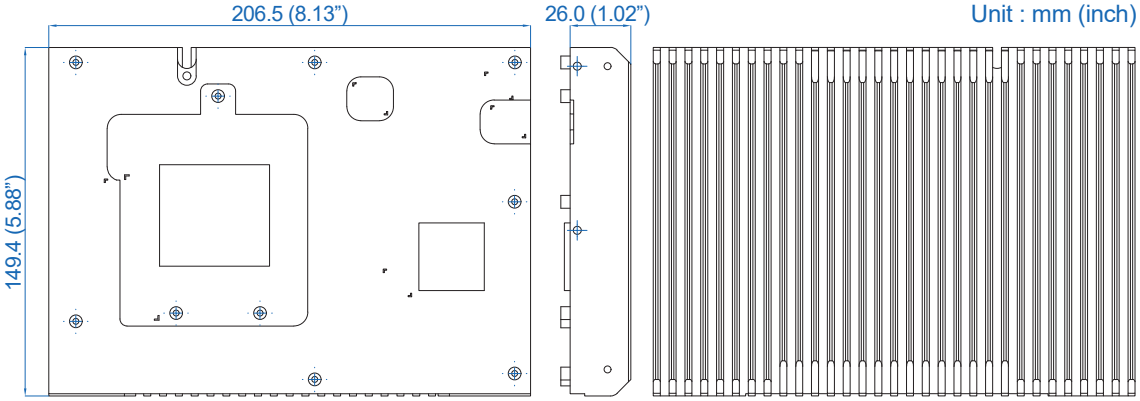
Unit : mm (inch)

1.5.2 Dimensions of Heat Spreader



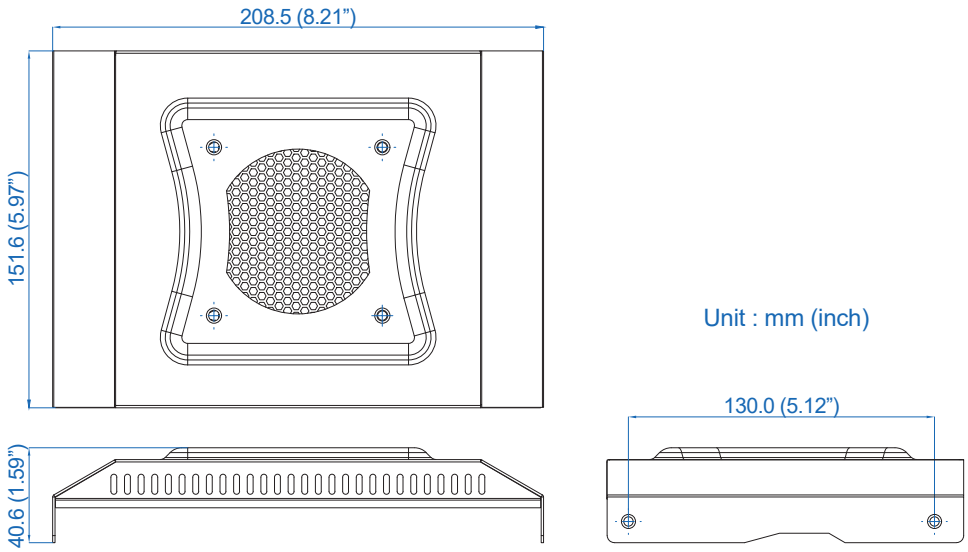
Unit : mm (inch)

1.5.3 Dimensions of Heat Sink

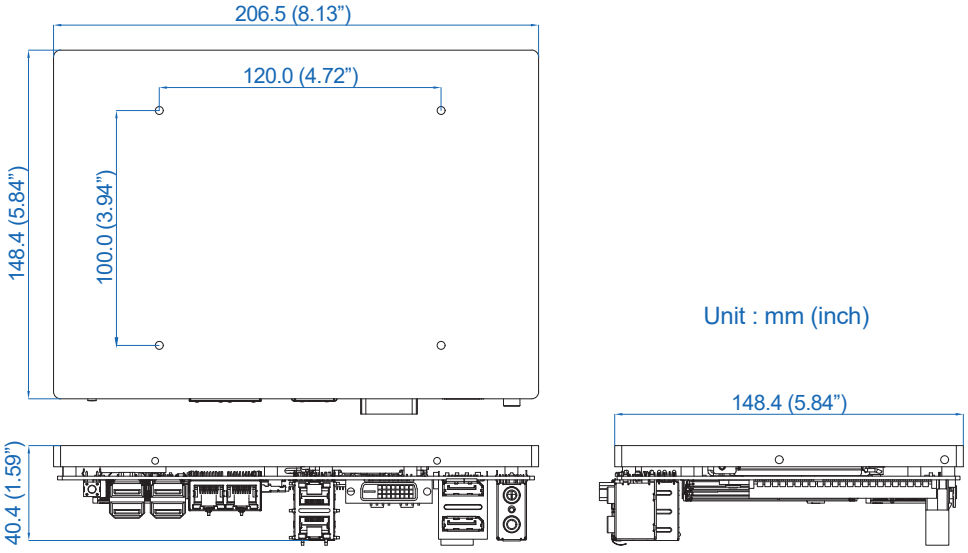


Unit : mm (inch)

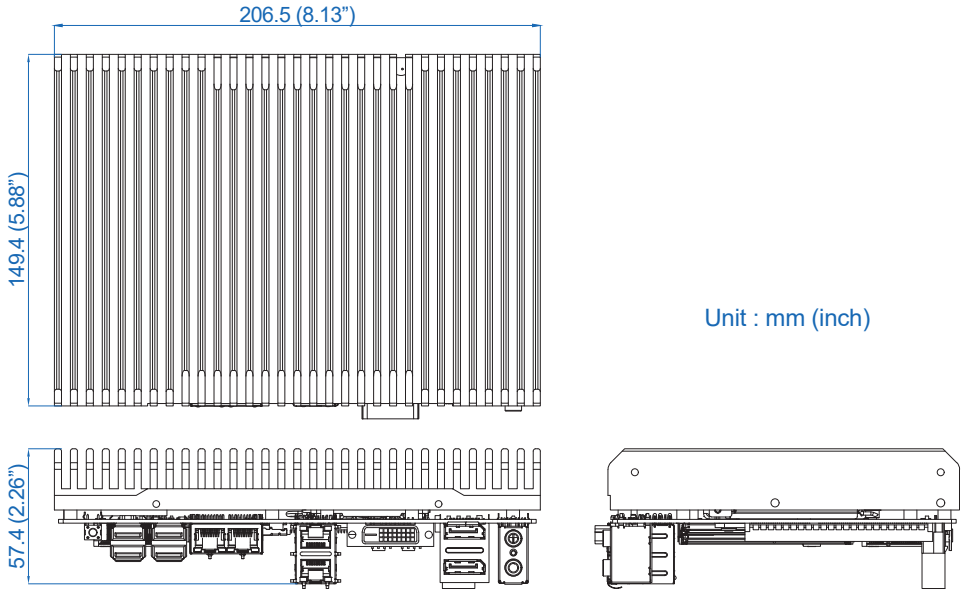
1.5.4 Dimensions of Fan Bracket



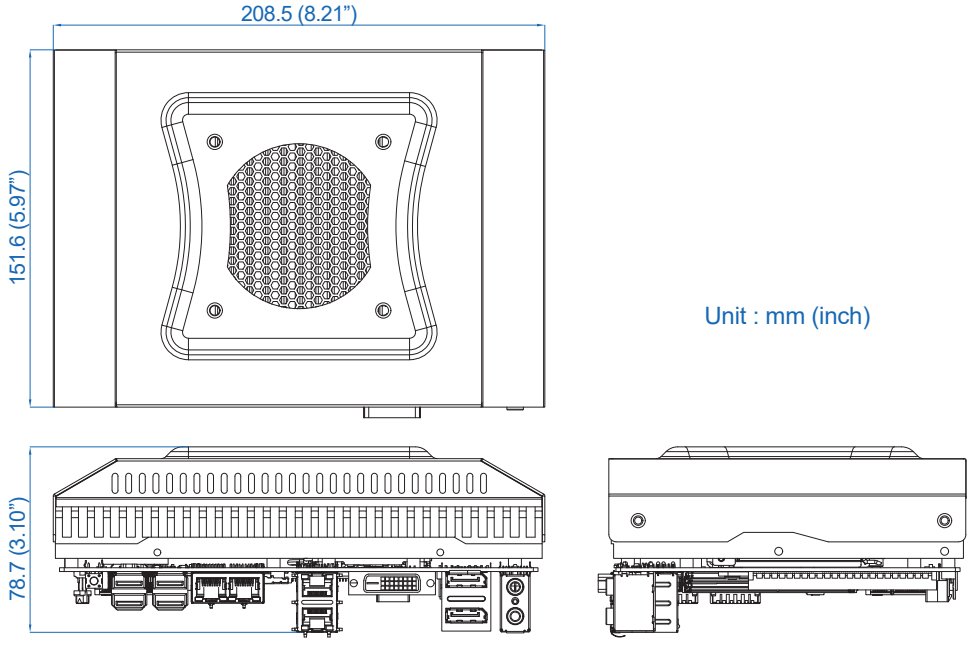
1.5.5 Dimensions of EXBC-1000 Series + Heat Spreader



1.5.6 Dimensions of EXBC-1000 Series + Heat Sink



1.5.7 Dimensions of EXBC-1000 Series + Fan Sink



2

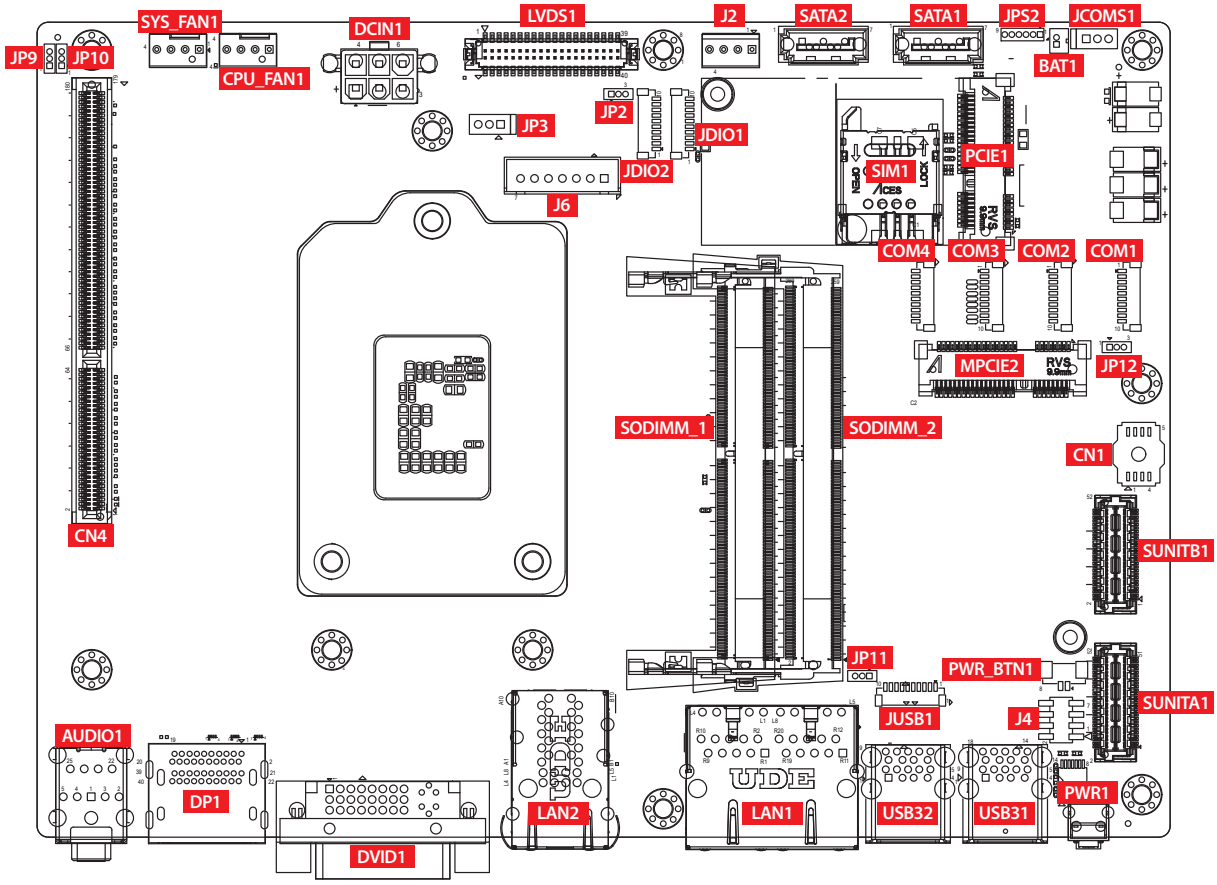
GETTING TO KNOW YOUR EXBC-1000

2.1 Packing List

Item	Description	Qty
1	EXBC-1000 5.25 Embedded Single Board Computer	1
2	Cable Kit • COM Port Cable • COM Screw#4-40, L=5mm • SATA Data Cable • SATA Power Cable • USB 2.0 Cable	 2 4 1 1 1

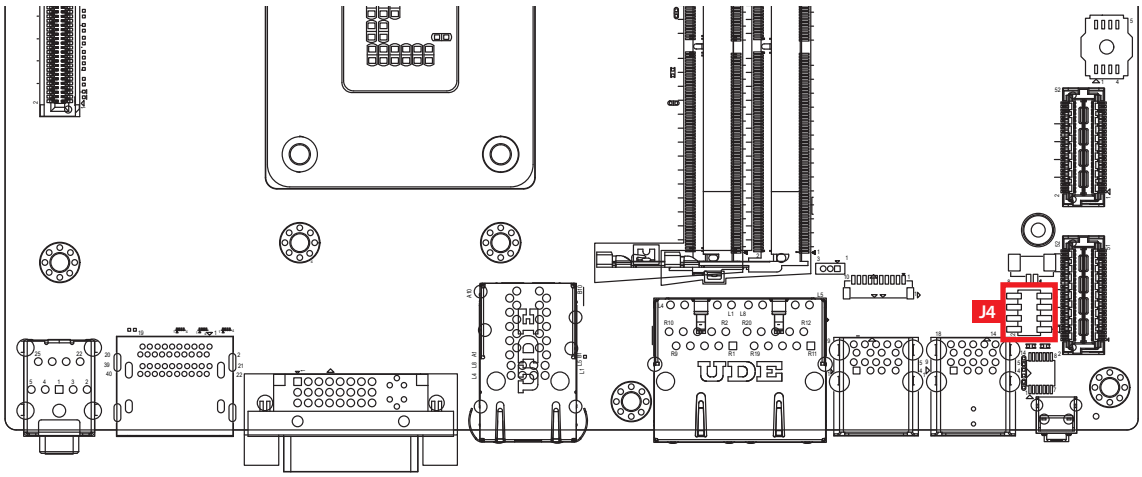
2.2 Connector/Jumper Locations

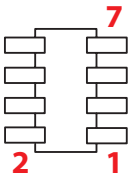
2.2.1 Top Side



2.2.2 J4 : Miscellaneous Pin Header

These pin headers can be used as a backup for the following functions : hard drive, LED indicator, reset button, power LED indicator, and power on/off buttons, which already can be accessed by front panel and top panel. The pinouts of Miscellaneous port are listed in following table :

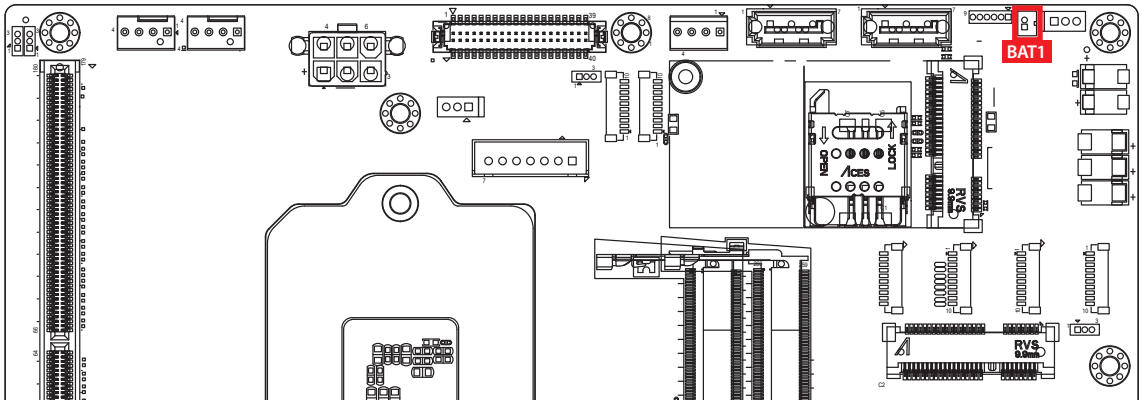




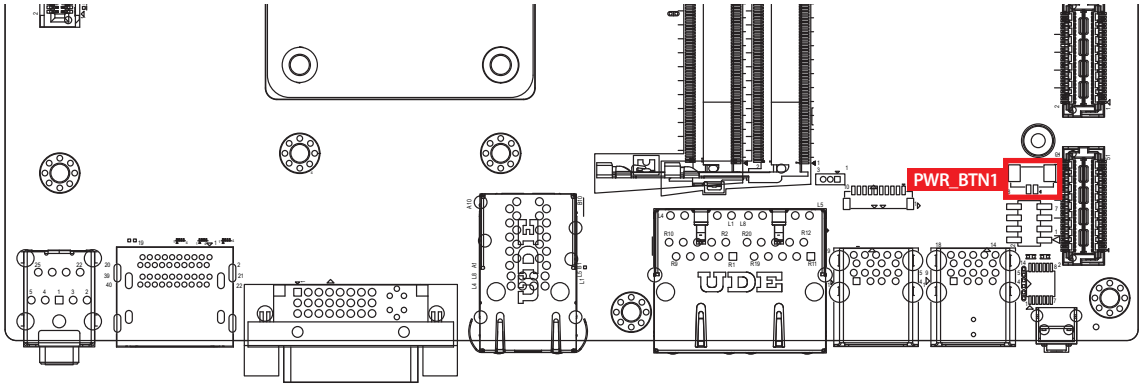
Group	Pin No.	Description
HDD LED	1	HDD_LED_P
	3	HDD_LED_N
RESET BUTTON	5	FP_RST_BTN_N
	7	Ground
POWER LED	2	PWR_LED_P
	4	PWR_LED_N
POWER BUTTON	6	PWR_BTN_P
	8	Ground

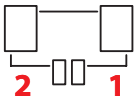
2.2.3 BAT1 : RTC Battery

The EXBC-1000's real-time clock is powered by a lithium battery. It is equipped with Panasonic BR2032 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.



2.2.4 PWR_BTN1 : Remote ON/OFF Connector





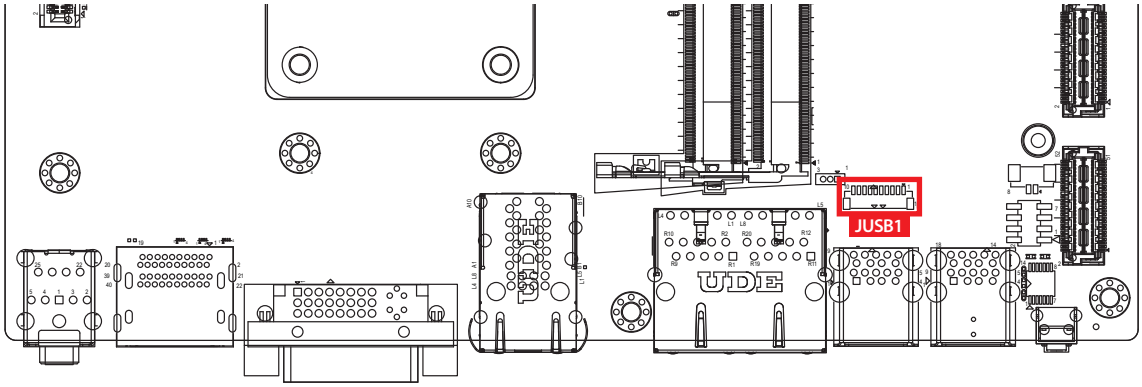
Pin No.	Description
1	PWR_BTN_P
2	GND

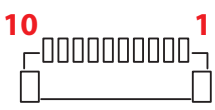
2.2.5 JUSB1 : Internal USB 2.0 Connector

The EXBC-1000 main board provides maxima eight expansion USB ports. The USB interface supports 480Mbps transfer rate which comply with high speed USB specification Rev. 2.0.

The USB interface is accessed through one 10-pin JST 1.0mm connector. You will need an adapter cable if you use a standard USB connector. The adapter cable has a 10-pin connector on one end and a USB connector on the other.

The pin assignments of JUSB1 are listed in the following table :





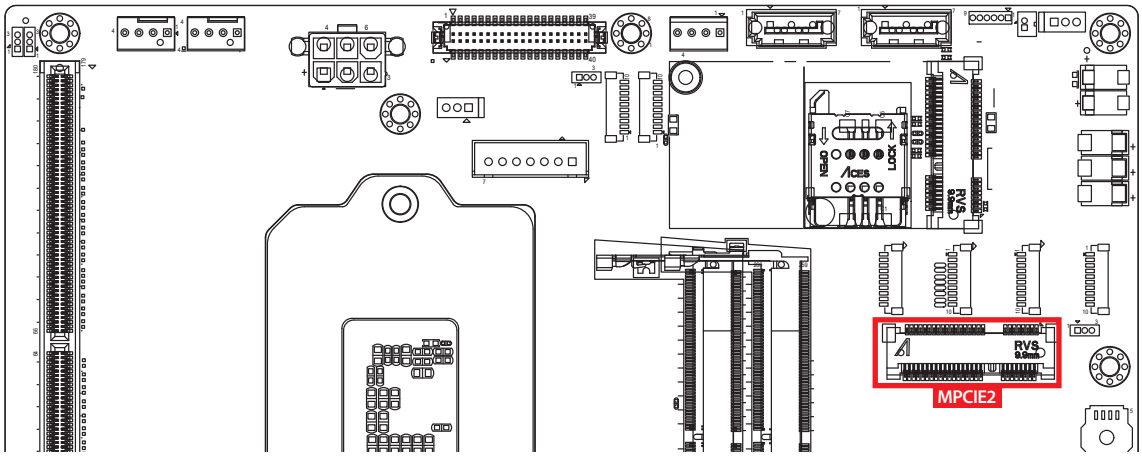
Pin No.	Definition	Pin No.	Definition
1	USB_VCC	2	USB_VCC
3	USB_VCC	4	USBD1-
5	USBD1+	6	USBD2-
7	USBD2+	8	GND
9	GND	10	GND

2.2.6 MPCIE2 : Mini PCIe, mSATA

Both mSATA and Mini PCIe share the same form factor and similar electrical pinout assignments on their connectors. There was no clear mechanism to distinguish if a mSATA drive or a Mini PCIe device is plugged into the socket until recently that SATA I/O issued an ECN change (ECN #045) to redefine pin43 on mSATA connector as "no connect" instead of "return current path" (or GND).

When an mSATA drive is inserted, its pin-43 is "no connect", and the respective pin on the socket is being pulled-up to logic 1. When a Mini PCIe device is inserted, its pin-43 forces the respective pin on the socket to ground, or logic 0.

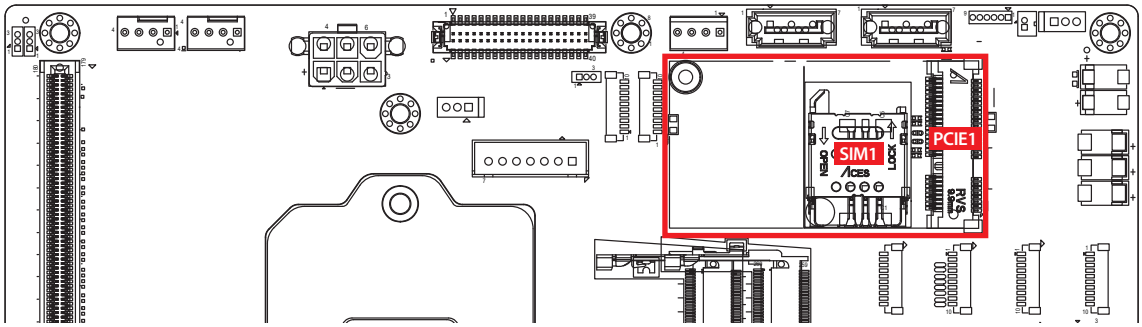
The pin assignments of MPCIE2 are listed in the following table :



Pin No.	Signal Name	Pin No.	Signal Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	SATA_PCIE_SEL	44	Reserved
41	+3.3Vaux	42	Reserved
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	reserved
17	Reserved	18	GND
Mechanical Key			

Pin No.	Signal Name	Pin No.	Signal Name
15	GND	16	Reserved
13	REFCLK+	14	Reserved
11	REFCLK-	12	Reserved
9	GND	10	Reserved
7	CLKREQ#	8	Reserved
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.2.7 MPCIE1 : Mini PCIe, SIM

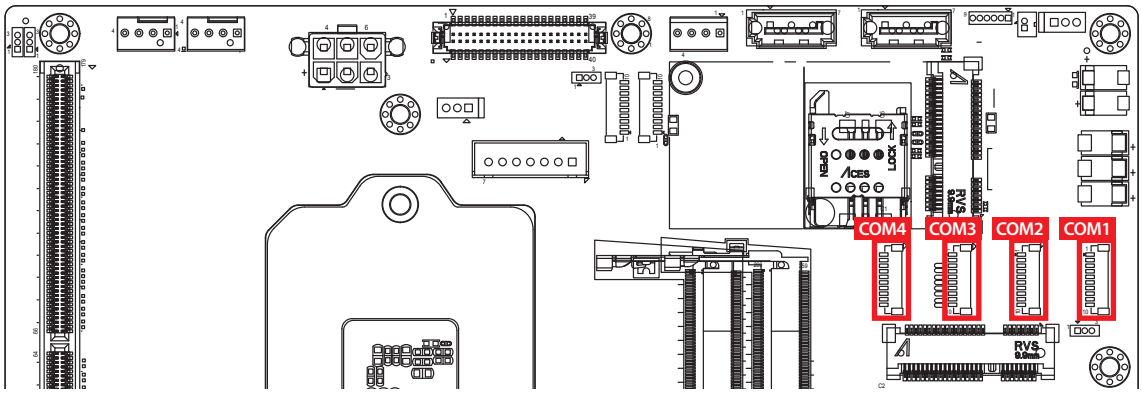


Pin No.	Signal Name	Pin No.	Signal Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	GND	44	Reserved
41	+3.3Vaux	42	Reserved
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	reserved
17	Reserved	18	GND
Mechanical Key			

Pin No.	Signal Name	Pin No.	Signal Name
15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.2.8 COM1~COM4 : Serial Port

Serial port 1 to 4 (COM1 to 4) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition of COM1 and COM2 is RS-232, if you want to change to RS-422 or RS-485, you can find the setting in BIOS.



BIOS Setting	Function
COM1 COM2 COM3 COM4	RS-232
	RS-422 (5-wire)
	RS-422 (9-wire)
	RS-485
	RS-485 w/z auto-flow control

The pin assignments are listed in the following table :

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

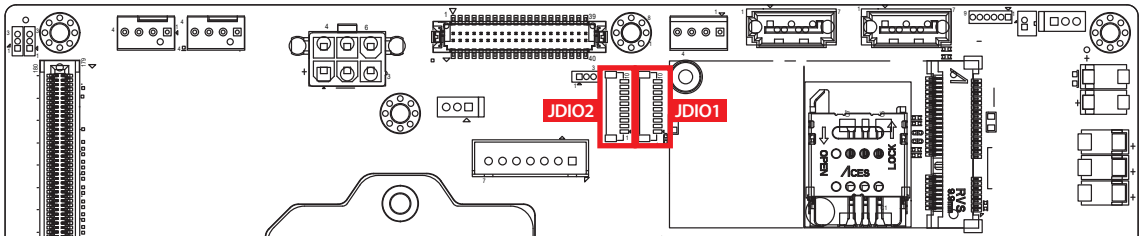
COM1 to COM4 MB connector table :

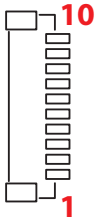
COM Port	MB Connector	COM Port	MB Connector
COM1	COM1	COM2	COM2
COM3	COM3	COM4	COM4

CN	Pin No.	Signal Name
COM1 to 4	1	NC
	2	GND
	3	RI
	4	DTR
	5	CTS
	6	TXD
	7	RTS
	8	RXD
	9	DSR
	10	DCD

2.2.9 JDIO1~JDIO2 : GPIO Connector

There is a 16-bit GPIO connector on the top side. Each GPIO channel can be configuration GPI or GPO. Detail setting see APPENDIX. JDIO1 and JDIO2 Pin define are as below.

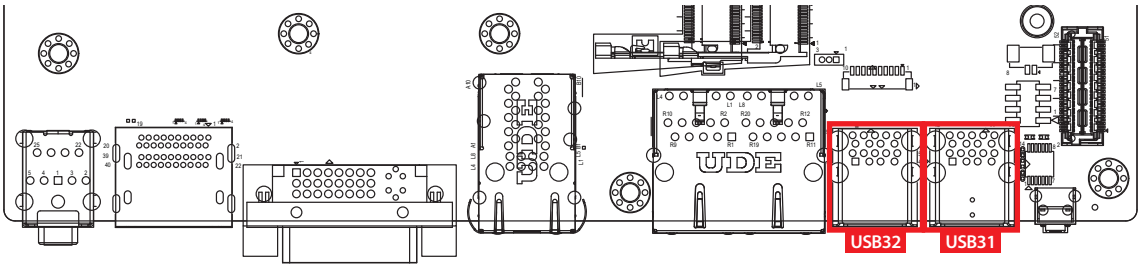




Pin No.	JDIO1 Definition	JDIO2 Definition
1	SIO_GPO70	SIO_GPI80
2	SIO_GPO71	SIO_GPI81
3	SIO_GPO72	SIO_GPI82
4	SIO_GPO73	SIO_GPI83
5	SIO_GPO74	SIO_GPI84
6	SIO_GPO75	SIO_GPI85
7	SIO_GPO76	SIO_GPI86
8	SIO_GPO77	SIO_GPI87
9	+3.3V	+3.3V
10	GND	GND

2.2.10 USB31, USB32 : External USB 3.1 Gen2

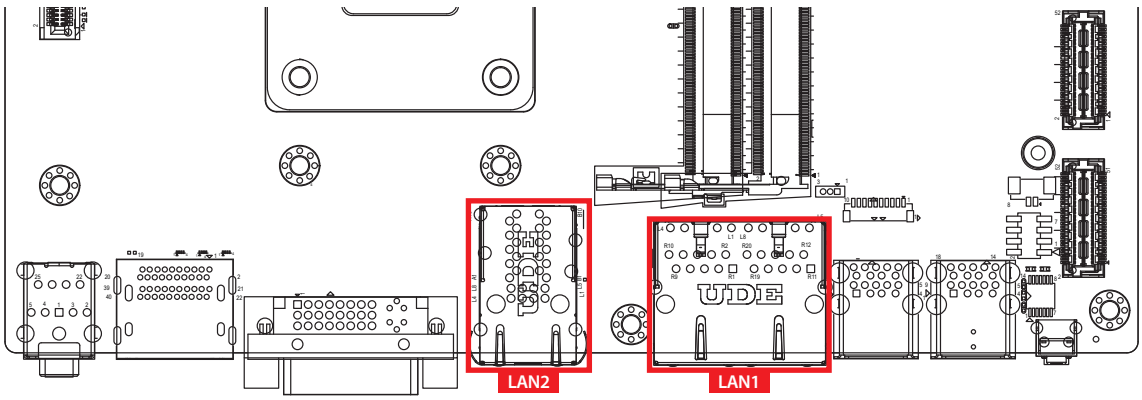
There are 4 USB 3.1 Gen2 connections available supporting up to 10GB per second data rate in the front side of EXBC-1000. It also compliant with the requirements of Super Speed (SS), high speed (HS), full speed (FS) and low speed (LS).



2.2.11 CN13 : LAN

There are 4 8-pin RJ-45 jacks supporting 10/100/1000 Mbps Ethernet connections. LAN1 (Right side)/LAN2 (Left side) are powered by Intel® I210 and I219 Ethernet engine. When both LAN1 and LAN2 work in normal status, basic iAMT function is enabled.

Using suitable RJ-45 cable, you can connect EXBC-1000 system to a computer, or to any other devices with Ethernet connection, for example, a hub or a switch. Moreover, both of LAN1 and LAN2 supports Wake on LAN and Pre-boot functions. The pinouts of LAN1 and LAN2 are listed as follows :

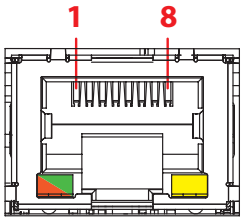


Pin No.	10/100 Mbps	1000Mbps
1	E_TX+	MDI0_P
2	E_TX-	MDI0_N
3	E_RX+	MDI1_P
4	------	MDI2_P
5	------	MDI2_N
6	E_RX-	MDI1_N
7	------	MDI3_P
8	------	MDI3_N

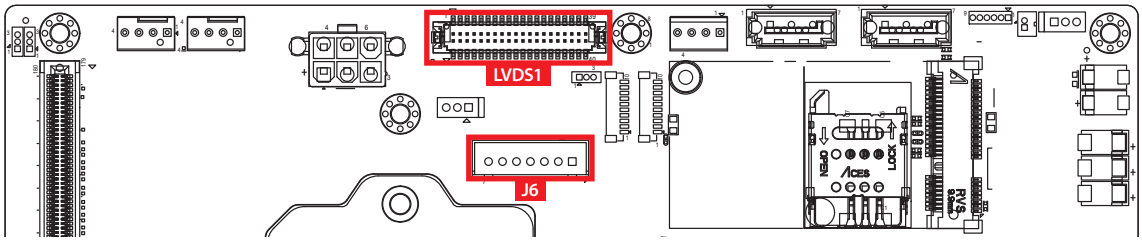
Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/Link/Speed status of the connection.

The LED indicator on the right bottom corner lightens in solid green when the cable is properly connected to a 100Mbps Ethernet network; The LED indicator on the right bottom corner lightens in solid orange when the cable is properly connected to a 1000Mbps Ethernet network; The left LED will keep twinkling/off when Ethernet data packets are being transmitted/received.

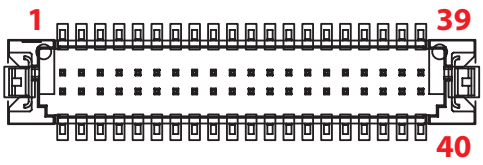
LED Location	LED Color	10Mbps	100Mbps	1000Mbps
Left	Green/ Orange	Off	Solid Green	Solid Orange
Right	Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow



2.2.12 LVDS1, J6 : LVDS



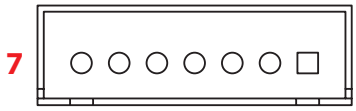
EXBC-1000 supports dual-channel 24-bit LVDS display and up to 1920 x 1200 pixels resolution. The pin assignments of LVDS are listed in the following table :



Pin No.	Definition	Pin No.	Definition
1	PANEL_VDD	2	TXO0-
3	PANEL_VDD	4	TXO0+
5	PANEL_VDD	6	TXO1-
7	GND	8	TXO1+
9	GND	10	TXO2-
11	GND	12	TXO2+
13	GND	14	TXOC-
15	GND	16	TXOC+
17	GND	18	TXO3-
19	GND	20	TXO3+

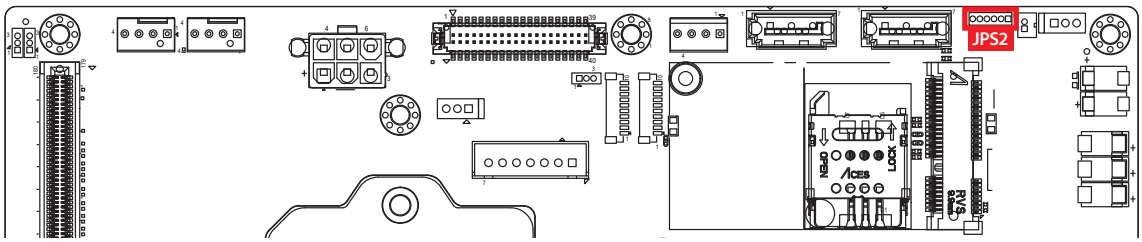
Pin No.	Definition	Pin No.	Definition
21	GND	22	TXE0-
23	GND	24	TXE0+
25	GND	26	TXE1-
27	GND	28	TXE1+
29	GND	30	TXE2-
31	GND	32	TXE2+
33	GND	34	TXEC-
35	GND	36	TXEC+
37	GND	38	TXE3-
39	LVDS_DET#	40	TXE3+

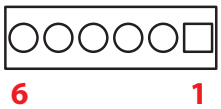
The LCD inverter is connected to J6 via a JST 7-pin, 2.5mm connector providing +5V/+12V power to LCD display. The pin assignments are listed in the following table :



Pin No.	Definition	Pin No.	Definition
1	+5V	2	+12V
3	+12V	4	LBKLT_CTL
5	GND	6	GND
7	LBKLT_EN		

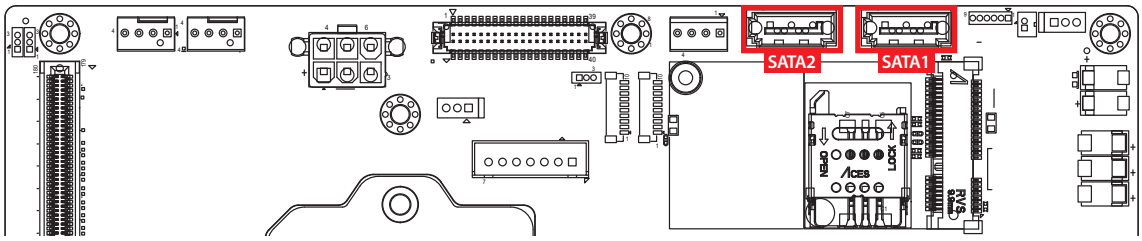
2.2.13 JPS2 : PS/2 Mouse Keyboard Pin Head



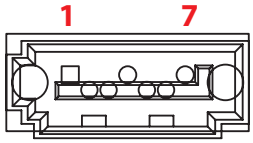


Pin No.	Definition	Pin No.	Definition
1	SIO_MCLK	2	SIO_MDAT
3	GND	4	SIO_KCLK
5	SIO_KDAT	6	VCC5_KBMS

2.2.14 SATA1, SATA2 : SATA III Connector

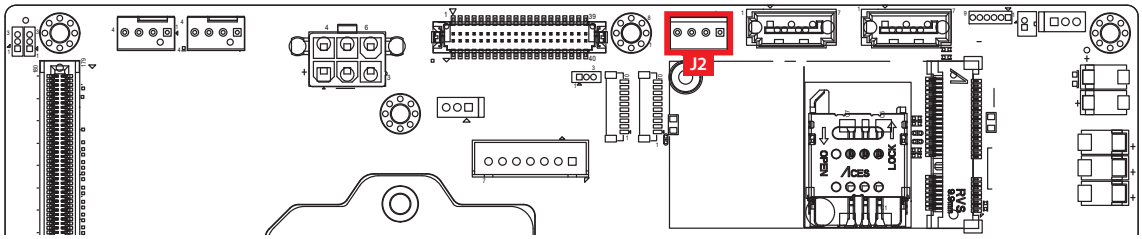


There are 2 onboard high performance Serial ATA III (SATA III) on EXBC-1000. It supports higher storage capacity with less cabling effort and smaller required space. The pin assignments of SATA1 and SATA2 are listed in the following table :

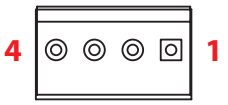


Pin No.	Definition	Pin No.	Definition
1	GND	2	TXP
3	TXN	4	GND
5	RXN	6	RXP
7	GND		

2.2.15 J2 : SATA Power Connector

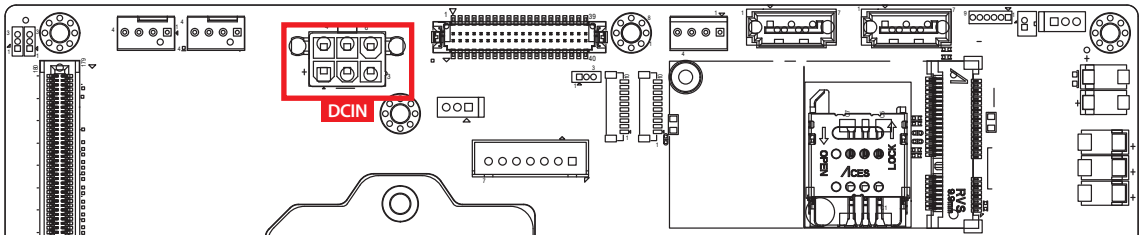


EXBC-1000 is also equipped with one SATA power connector. It supports 5V (Up to 2A) and 12V (Up to 1A) current to the hard drive or SSD. The pin assignments of J2 is listed in the following table :

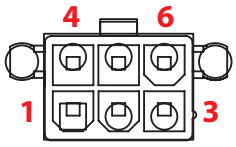


Pin No.	Definition	Pin No.	Definition
1	+12V	2	GND
3	GND	4	+5V

2.2.16 DCIN1 : DC INPUT Power Connector

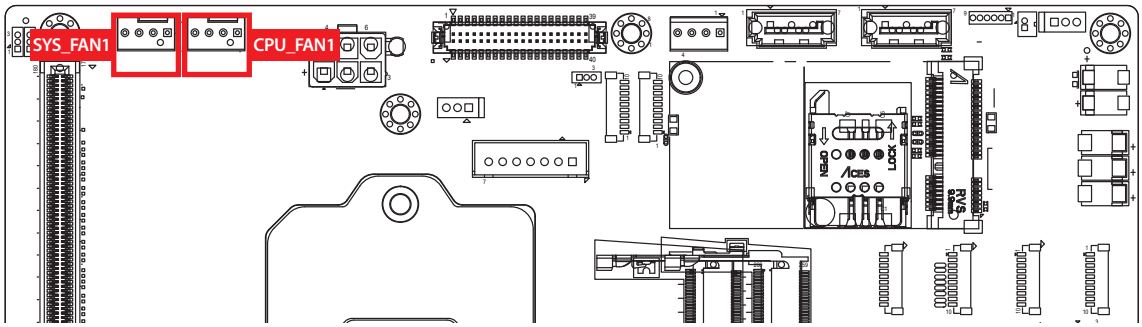


EXBC-1000 supports 12V DC power input by wire-to-board connector on the top side.

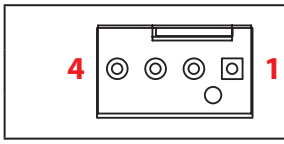


Pin No.	Definition	Pin No.	Definition
1	+12V	2	+12V
3	+12V	4	GND
5	GND	6	GND

2.2.17 CPU_FAN1, SYS_FAN1 : FAN Connector

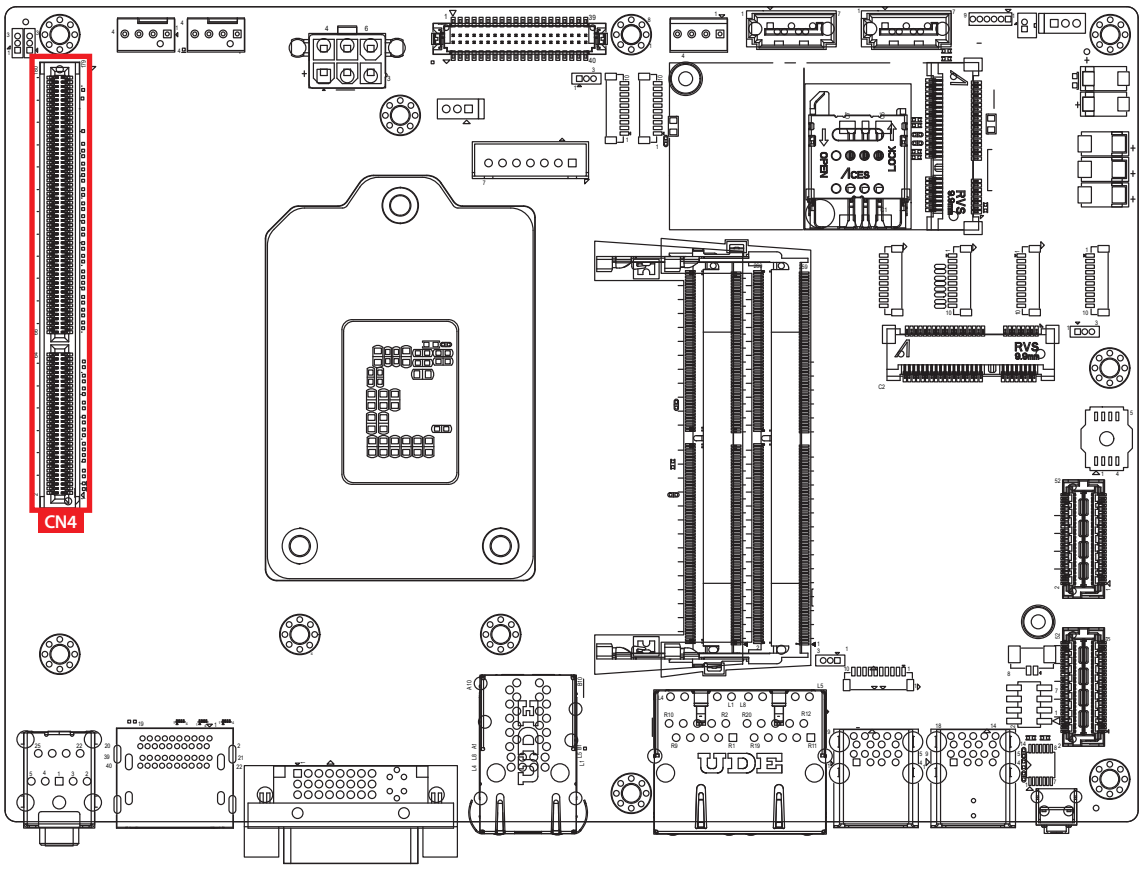


Fan connectors support for additional thermal requirement. The pin assignments of FAN are listed in the following table.



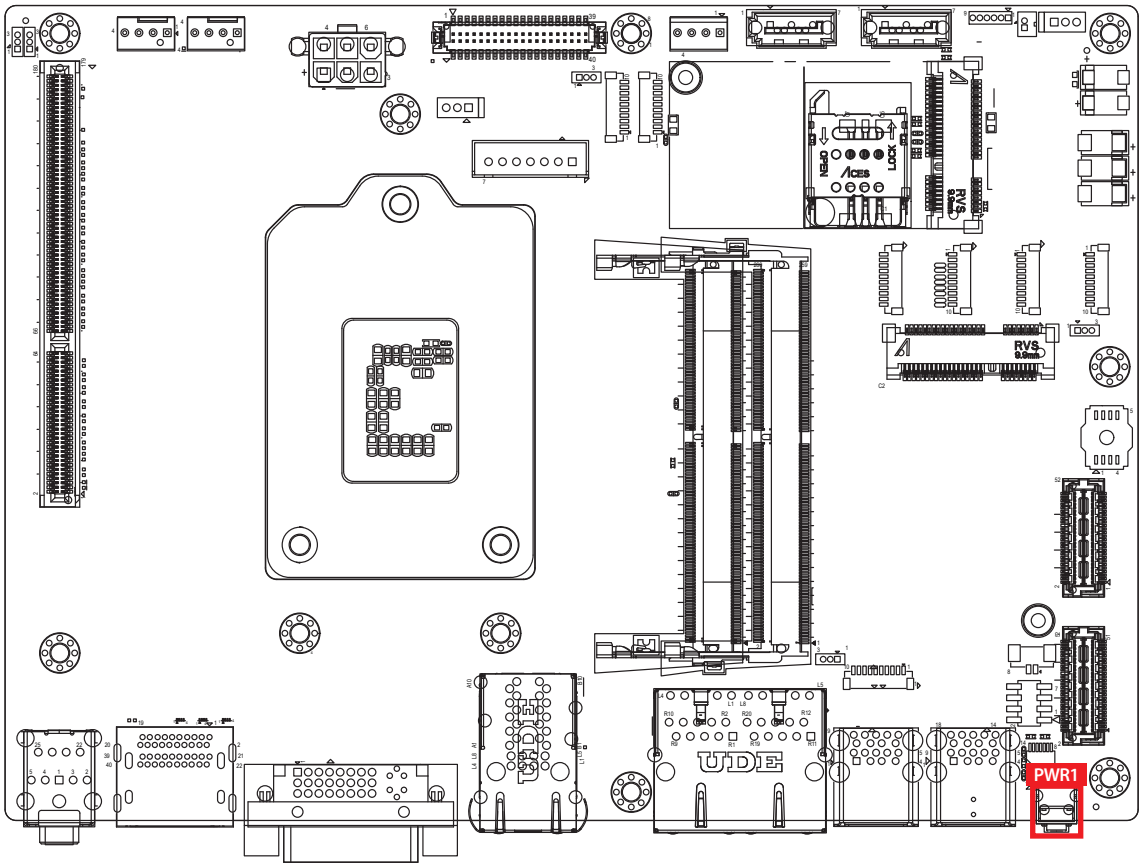
Pin No.	Definition	Pin No.	Definition
1	GND	2	+12V (1.5A max)
3	Fan speed sensor	4	Fan PWM

2.2.18 CN4 : PCIe Riser Slot



CN4 slot is used to connect with Backplane.

2.2.19 PWR1 : Power Buttom



To power on the system, press the power button and then the LED is lightened.

To power off the system, you can either command shutdown by OS operation, or just simply press the power button.

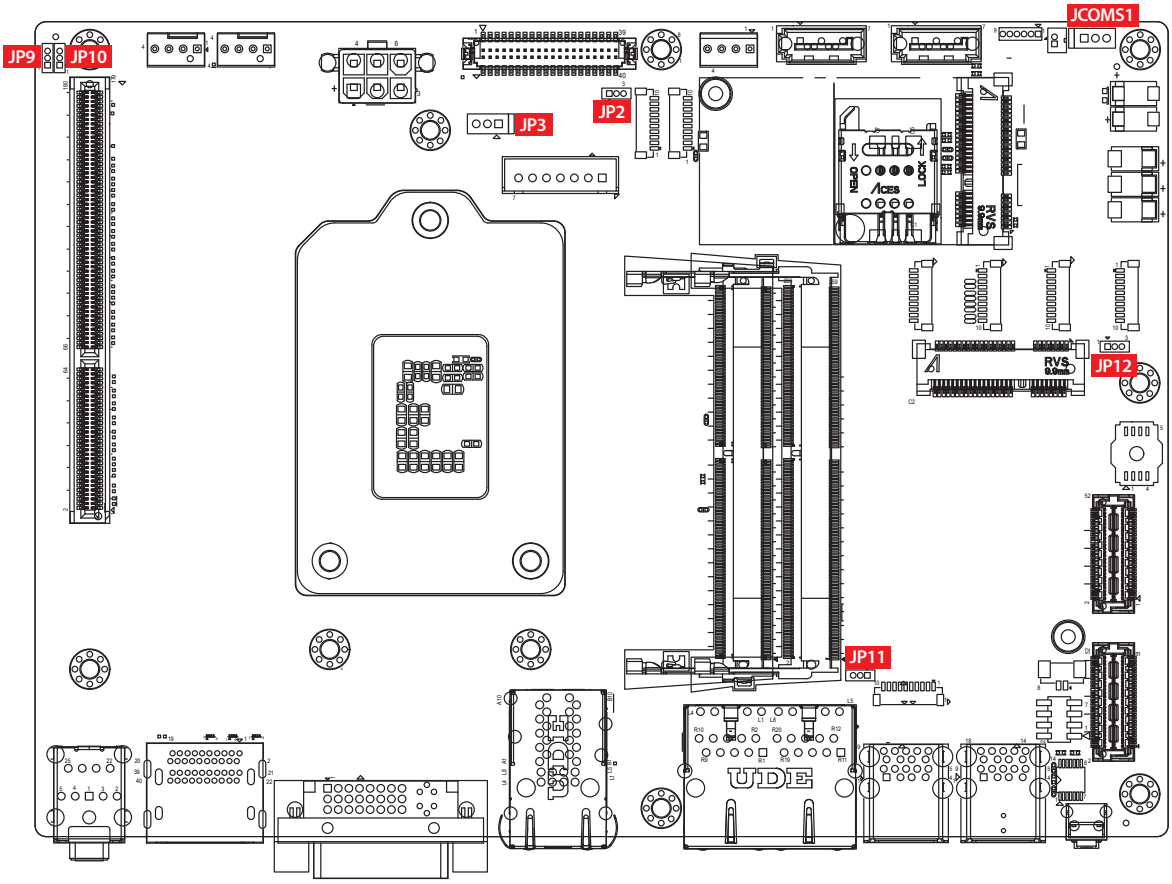
If system error, you can just press the power button for 4 seconds to shut down the machine directly.

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).

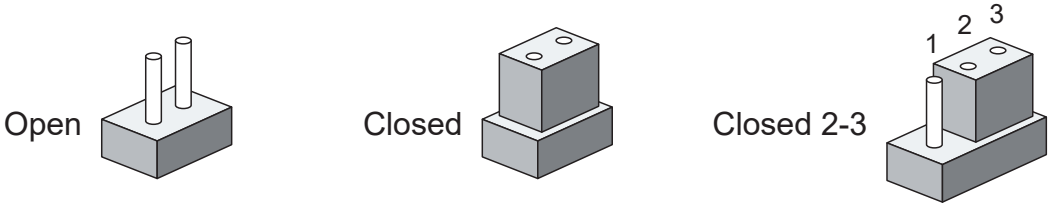
Pin No.	Definition	Pin No.	Definition
1	GND	2	GND
3	PWR_BTN_P	4	GND

2.3 Jumper Settings

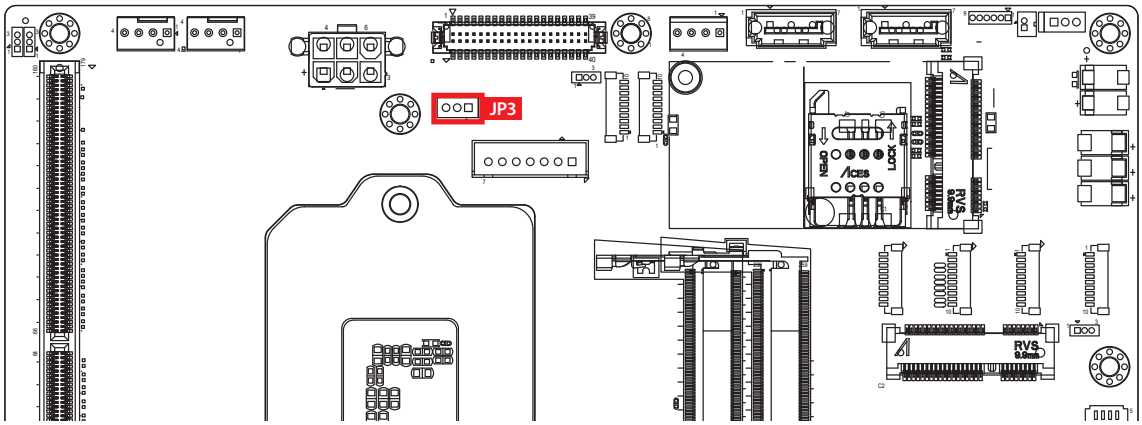
2.3.1 Front View of EXBC-1000 Main Board With Jumper Location



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.



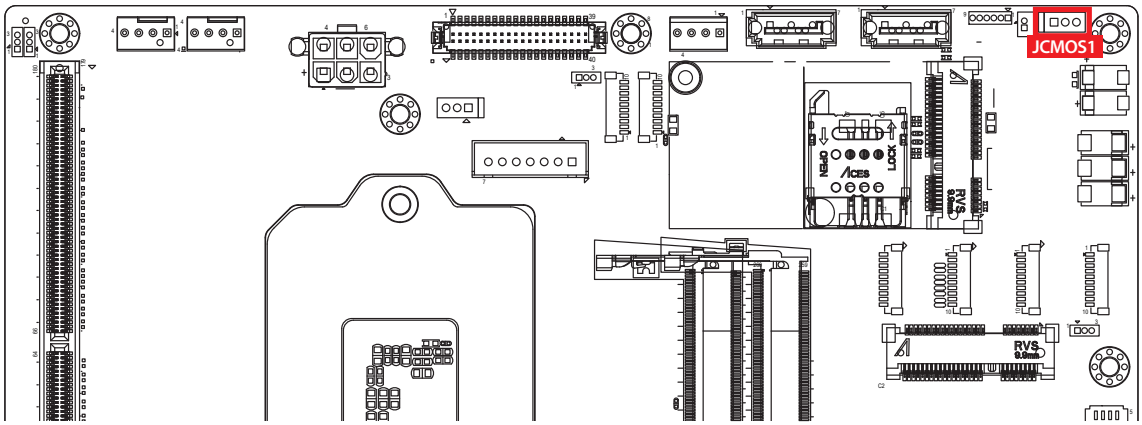
2.3.2 JP3 : LVDS Module, Power Selection



JP3 provides LVDS voltage selection function, Closing Pin 1 and Pin 2 is for 3.3V LVDS power input; closing Pin 2 and Pin 3 is for 5V LVDS power input.

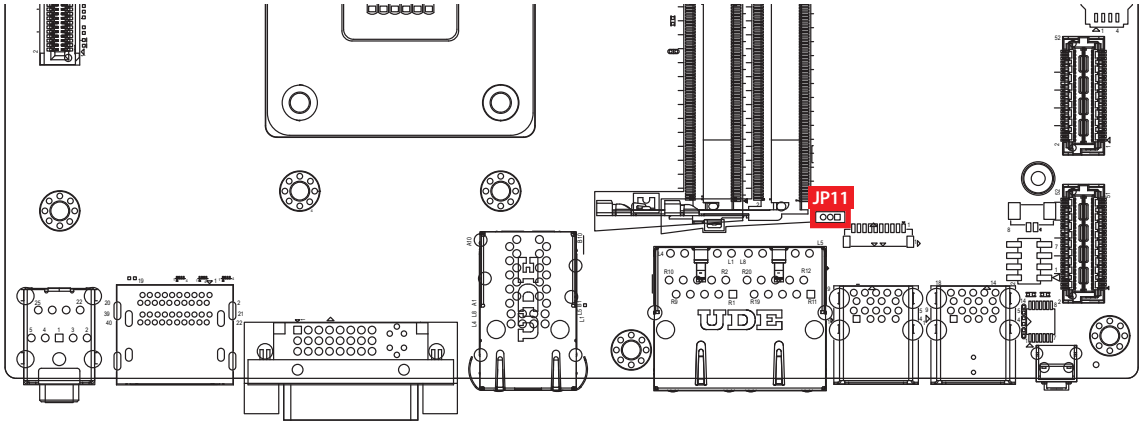
Pin No.	Definition
1-2	+3.3V (Default)
2-3	+5V

2.3.3 JCMOS1 : Clear CMOS



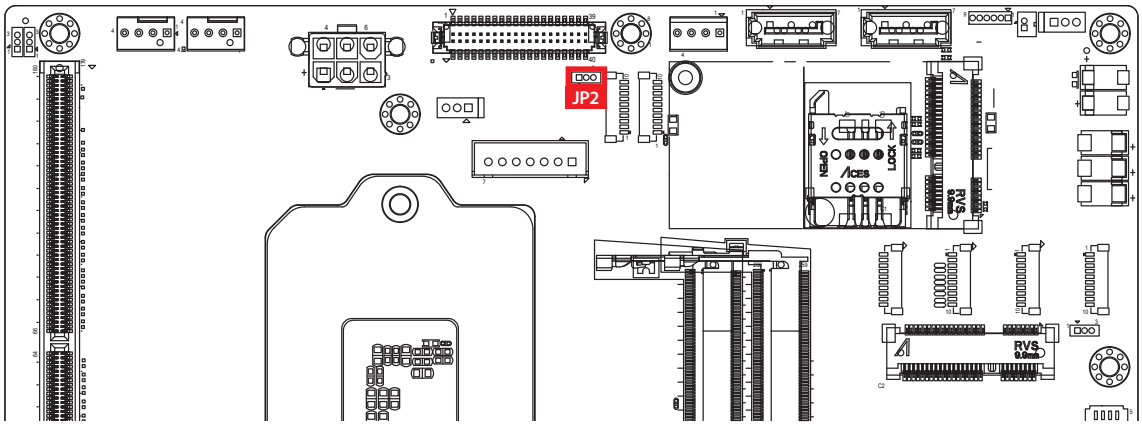
CMOS	Header
1-2	Normal
2-3	Clear CMOS

2.3.4 JP11 : External USB 3.0/2.0 Power Select



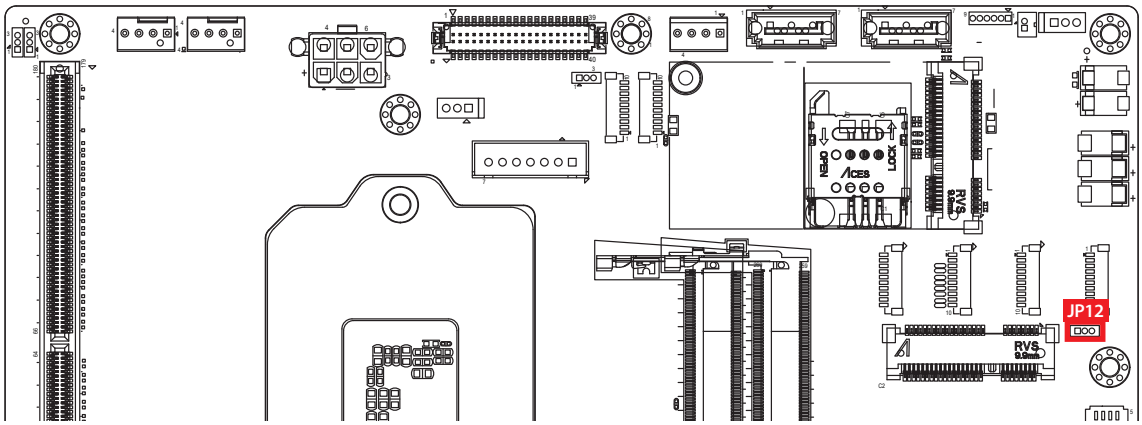
	Pin No.	Power
3 ○○□ 1	1-2	+5V Standby Power
	2-3	+5V System Power

2.3.5 JP2 : Backlight Control Level Select



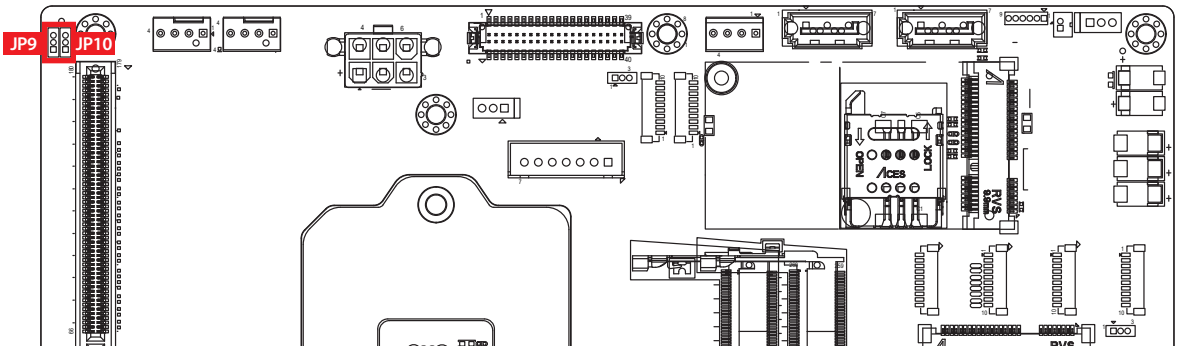
	Pin No.	Definition
1 □○○ 3	1-2	3.3V
	2-3	5V

2.3.6 JP12 : Mini PCIE mSATA, mPCIE Select



	Pin No.	Power
1 □○○ 3	1-2	Mini PCIE
	2-3	Auto
	OPEN	Mini SATA

2.3.7 JP9, JP10 : PCI Express* Configuration



JP9, JP10 provide PCIe configuration function, Closing Pin 1 and Pin 2 is logic "0". Closing Pin 2 and Pin 3 is logic "1"

JP9, JP10 logic setting are listed in the following table.

	JP9	Logic
3 ○ 1 □	1-2	0
	2-3	1

	JP10	Logic
3 ○ 1 □	1-2	0
	2-3	1

JP9, JP10 PCI Express configurations are listed in the following table.

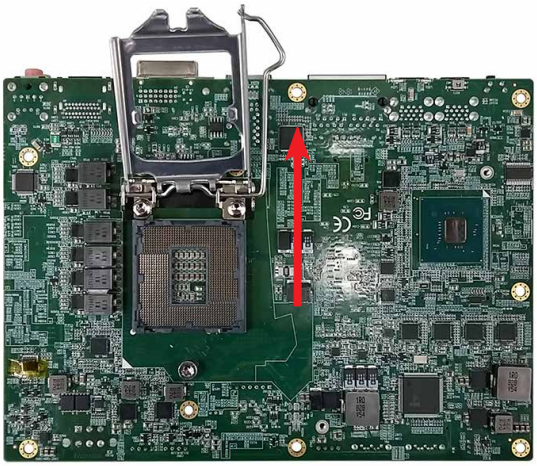
JP10	JP9	PCI Express* Bifurcation
0	0	1 x8 PCI Express*
1	0	2 x8 PCI Express*
1	1	1 x16 PCI Express*

3

SYSTEM SETUP

3.1 Installing CPU

Step 1 Open CPU Slot cover.

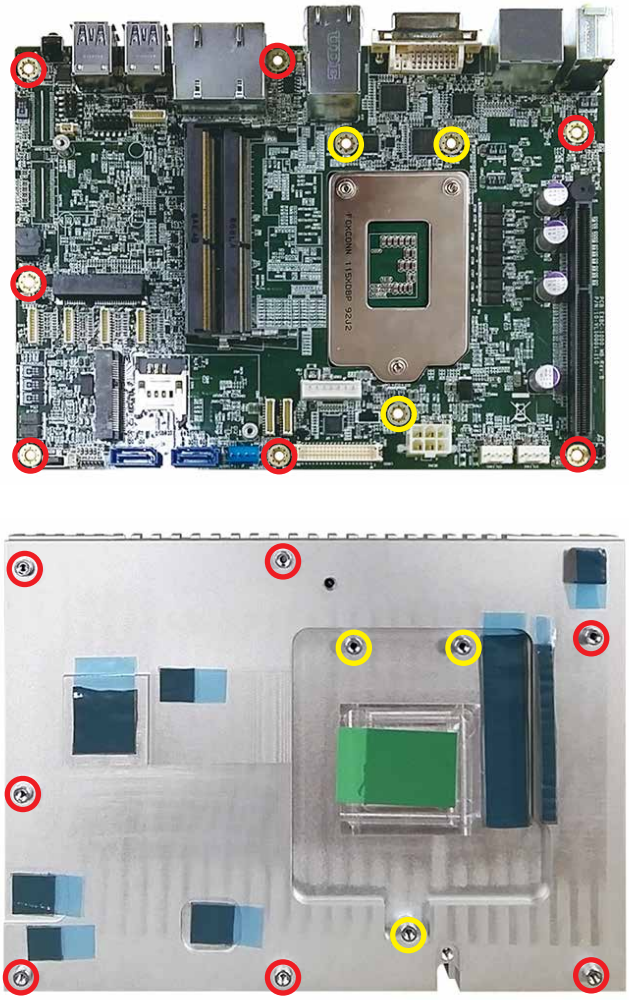


Step 2 Install CPU into the CPU Slot.

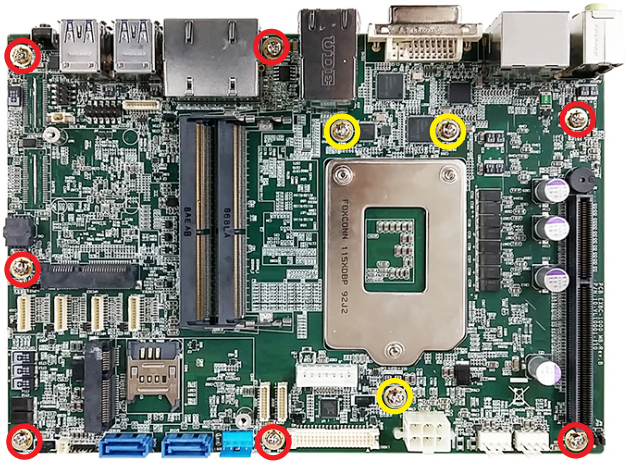
Step 3 Close and lock CPU Slot cover.

3.2 Installing Heat Spreader

Step 1 Place the motherboard and heat sink in position.

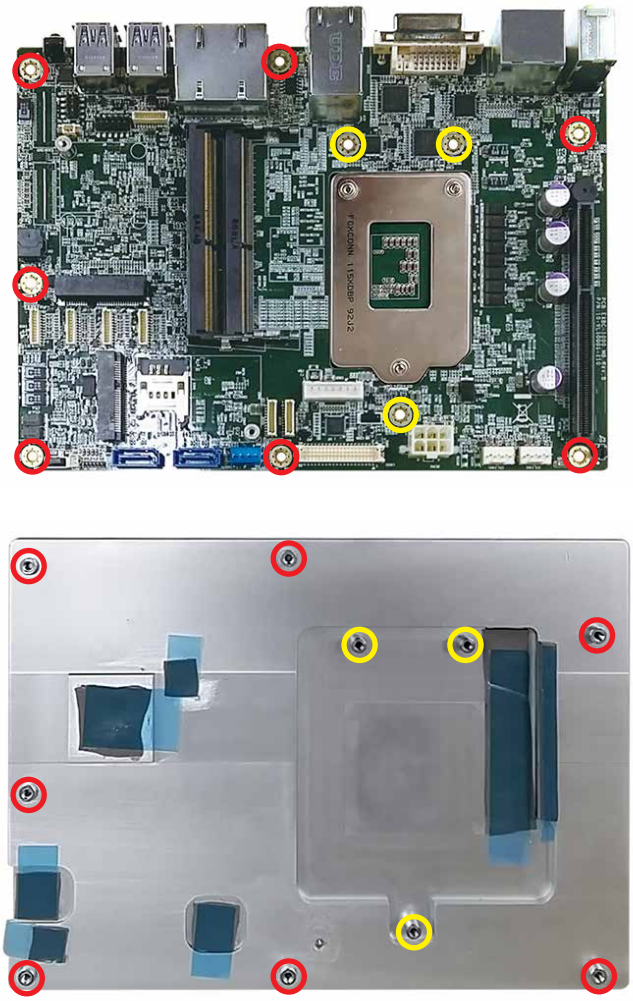


Step 2 Fasten five PH-M3x6 screws (circled in red, yellow).

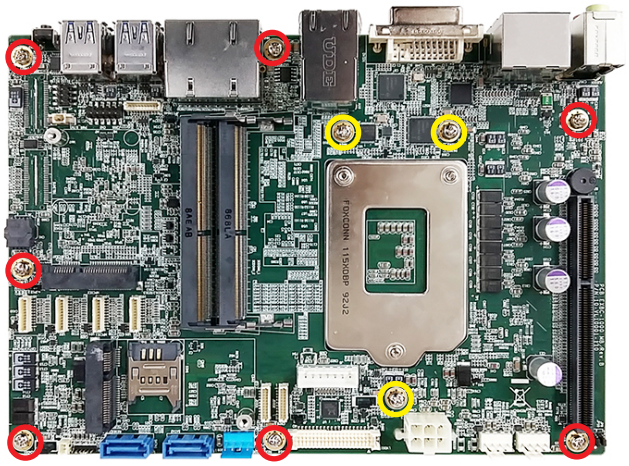


3.3 Installing Heat Sink

Step 1 Ensure the screw locations on EXBC-1000 fit the ones on the heat sink.



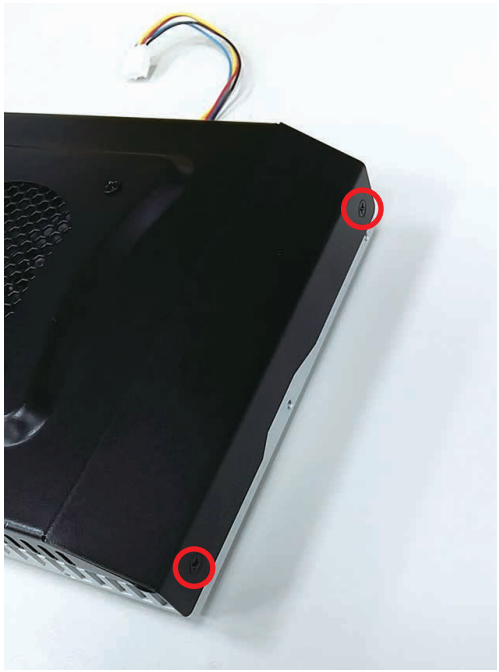
Step 2 Fasten five PH-M3x6 screws (circled in red, yellow).

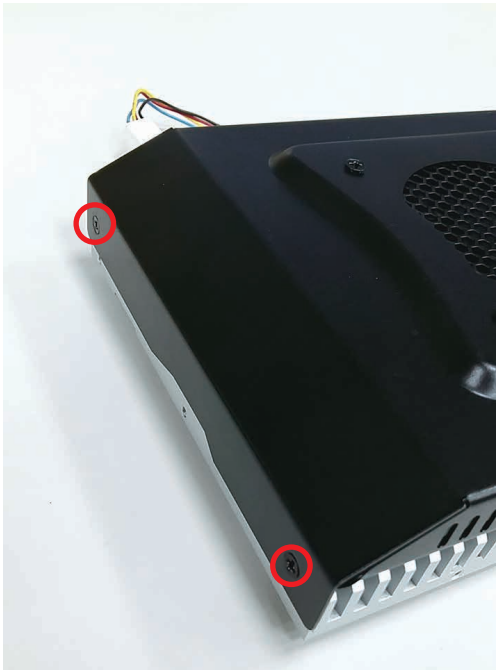


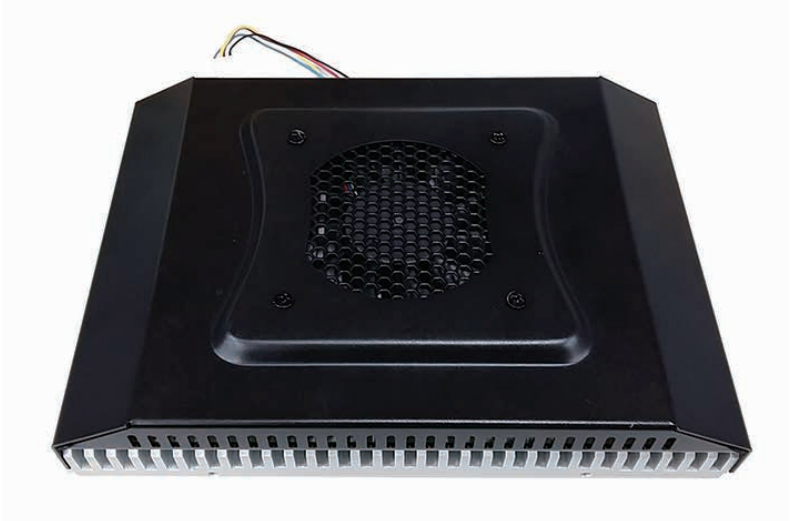
3.4 Installing Fan Sink

Step 1 Ensure the screw locations on fan bracket fit the ones on the heat sink.

Step 2 Fasten four #6-32*6L screws (circled in red).

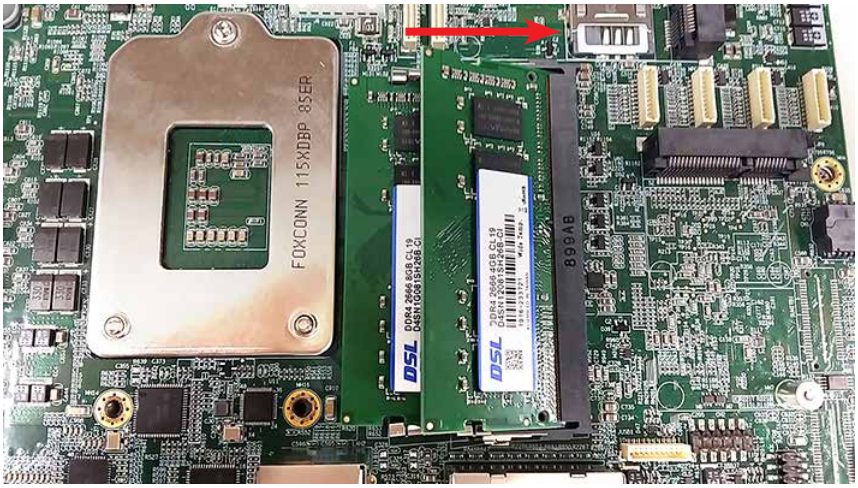




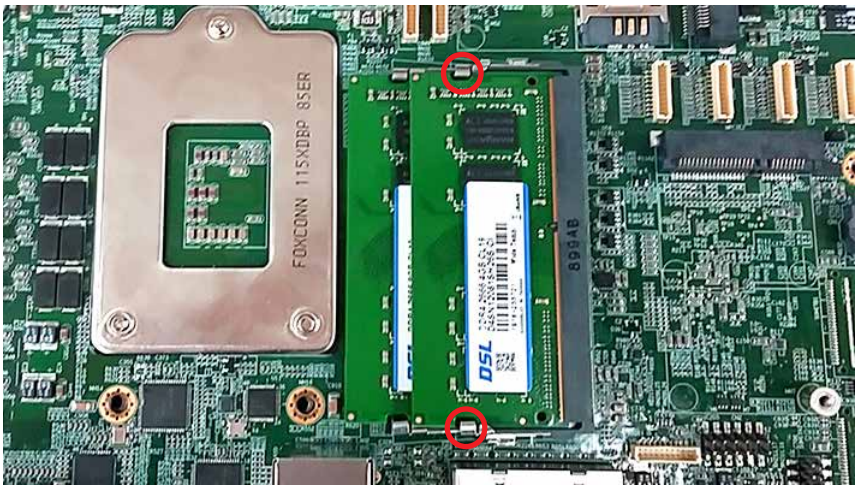


3.5 Installing DDR4 SO-DIMM Modules

Step 1 Install DDR4 RAM module into SO-DIMM slot.



Step 2 Make sure the RAM module is locked by the memory slot.



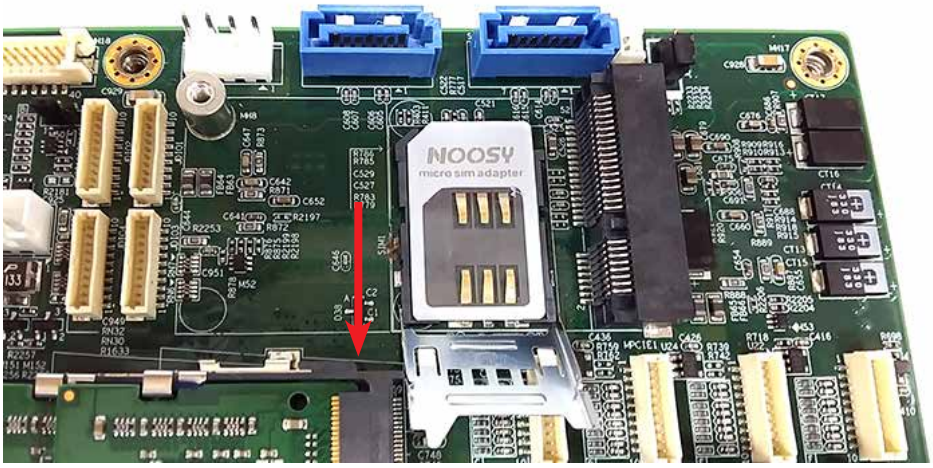
3.6 Installing Mini PCIe Card

Step 1 Install Mini PCIe card into the Mini PCIe slot.

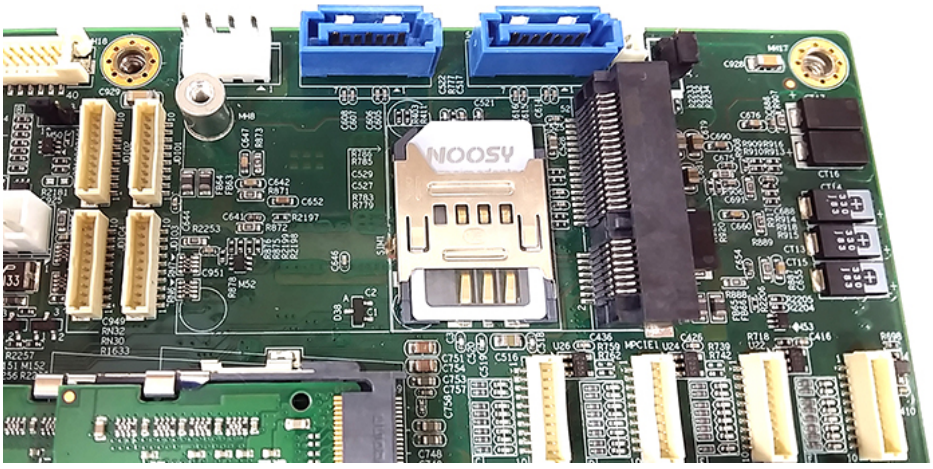
Step 2 Fasten one M2.5 screw.

3.7 Installing SIM Card

Step 1 Open the SIM card cover.



Step 2 Install SIM card into the SIM card slot and then close and lock the SIM card cover.



4

BIOS SETUP

4.1 Entering BIOS Setup

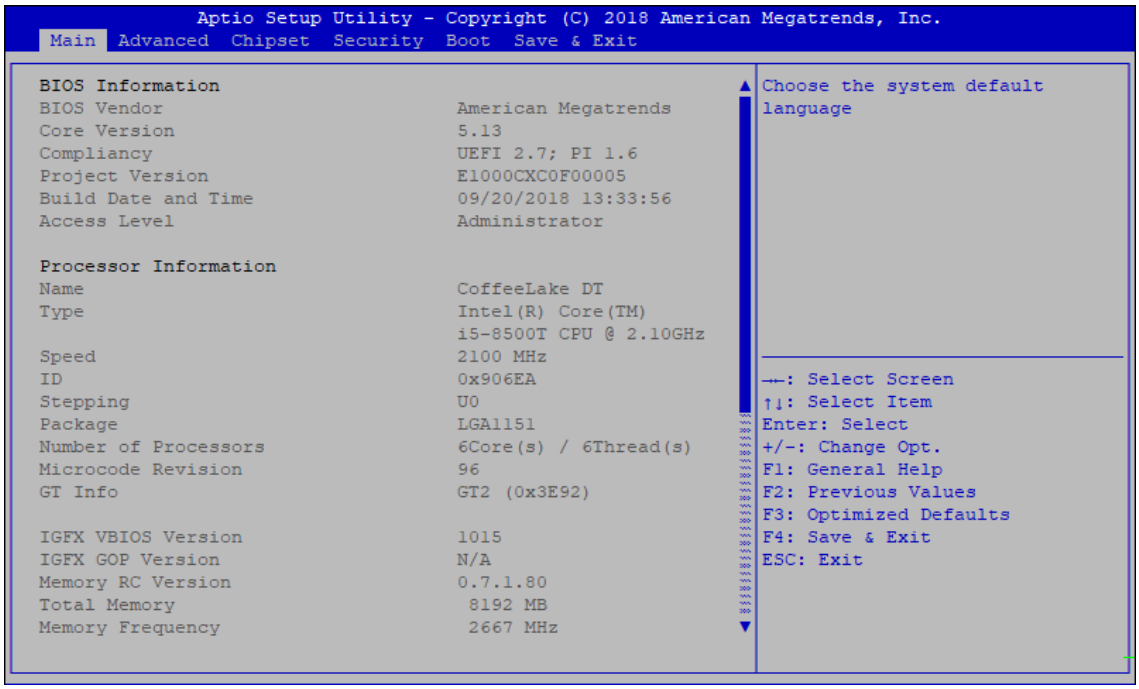


Figure 4-1 : Entering Setup Screen

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

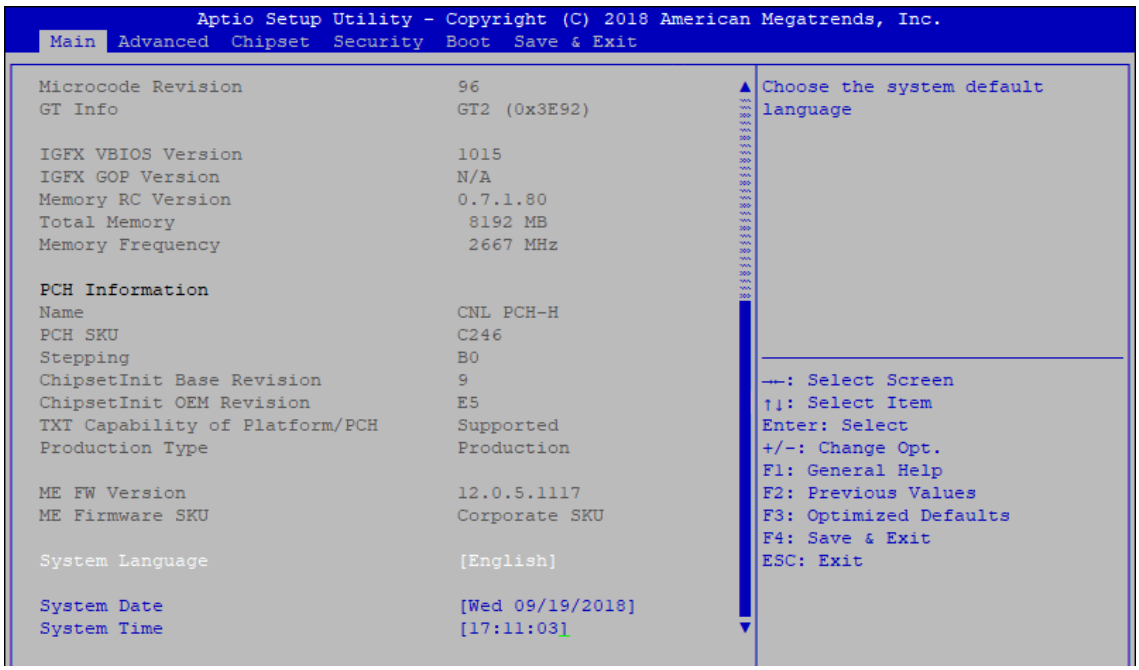


Figure 4-2 : BIOS Main Menu

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.

System Time

Set the time. Use <Tab> to switch between time elements.

4.3 Advanced

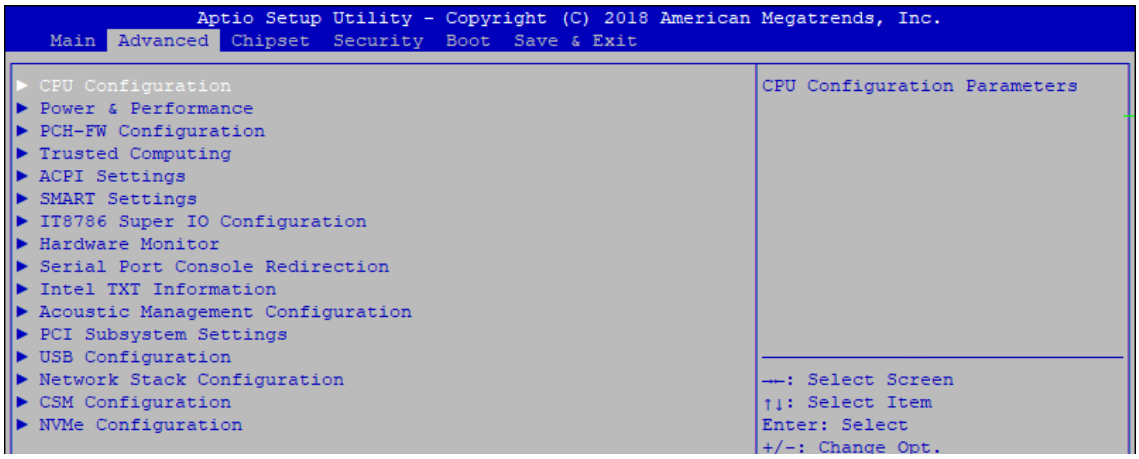


Figure 4-3 : BIOS Advanced Menu

Select advanced tab to enter advanced BIOS setup options, such as CPU configuration, SATA configuration, and USB configuration.

4.3.1 CPU Configuration

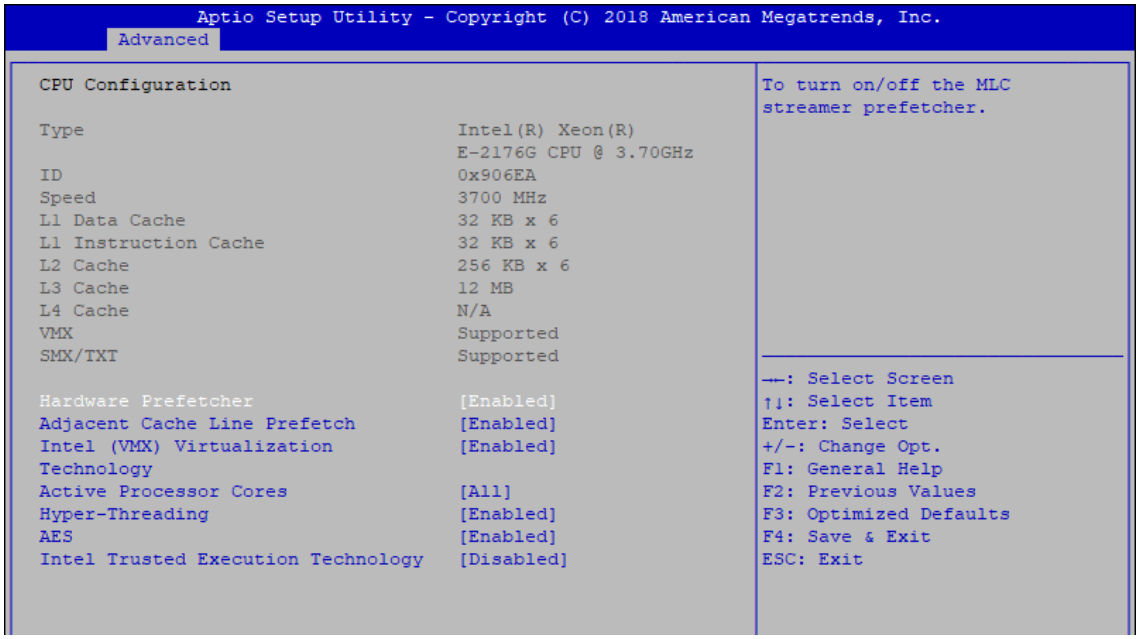


Figure 4-3-1 : CPU Configuration

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 Processor Cores

Number of cores to enable in each processor package.

Hyper-threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and disabled for other OS (OS not optimized for Hyper-Threading Technology). When disabled only one thread per core is enabled.

AES

Enable/disable CPU Advanced Encryption Standard instructions.

Intel Trusted Execution Technology

Enables utilization of additional hardware capabilities provided by Intel® Trusted Execution Technology.

Changes require a full power cycle to take effect.

4.3.2 Power & Performance

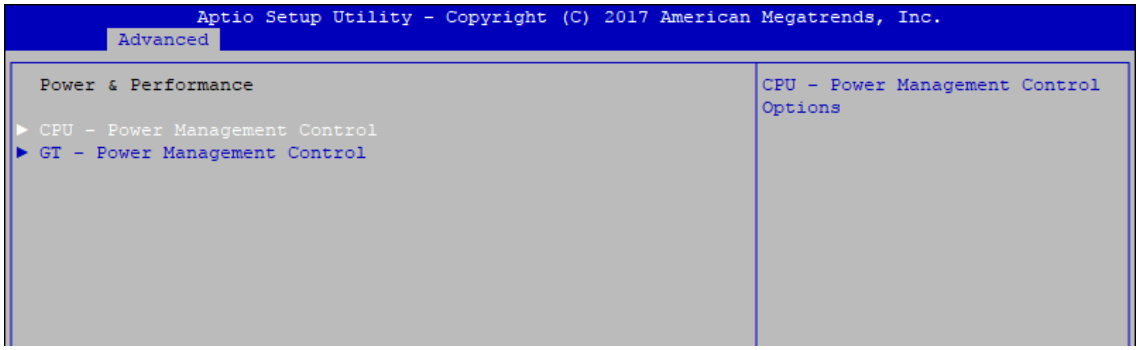


Figure 4-3-2 : Power & Performance

4.3.2.1 CPU – Power Management Control

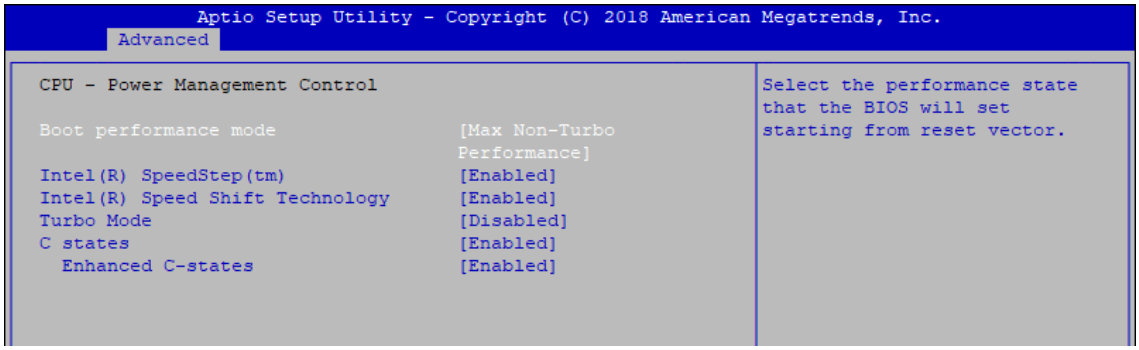


Figure 4-3-2-1 : CPU – Power Management Control

Boot performance mode

Select the performance state that the BIOS will set before OS handoff.

Intel(R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

Intel(R) Speed shift Technology

Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPCv2 interface to allow for hardware controlled P-states.

Turbo Mode

Turbo Mode.

C states

Enable or disable CPU C states.

Enhanced C-states

Enable/disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

4.3.2.2 GT – Power Management Control

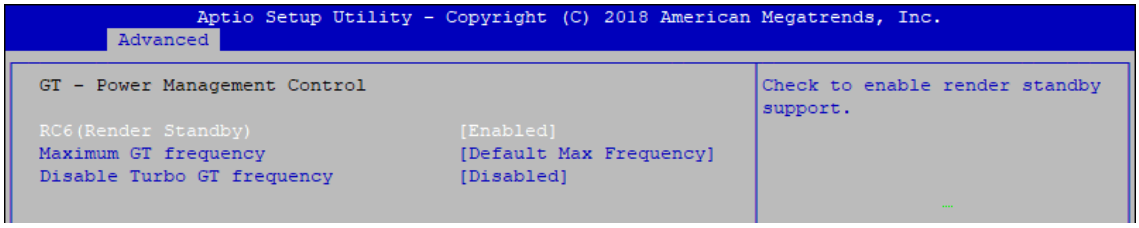


Figure 4-3-2-2 : GT – Power Management Control

RC6 (Render Standby)

Check to enable render standby support.

Maximum GT frequency

Maximum GT frequency limited by the user. Choose between 350MHz (RPN) and 1150MHz (RP0). Value beyond the range will be clopped to min/max supported by SKU

Disable Turbo GT frequency

Check to enable render standby support.

4.3.3 PCH-FW Configuration

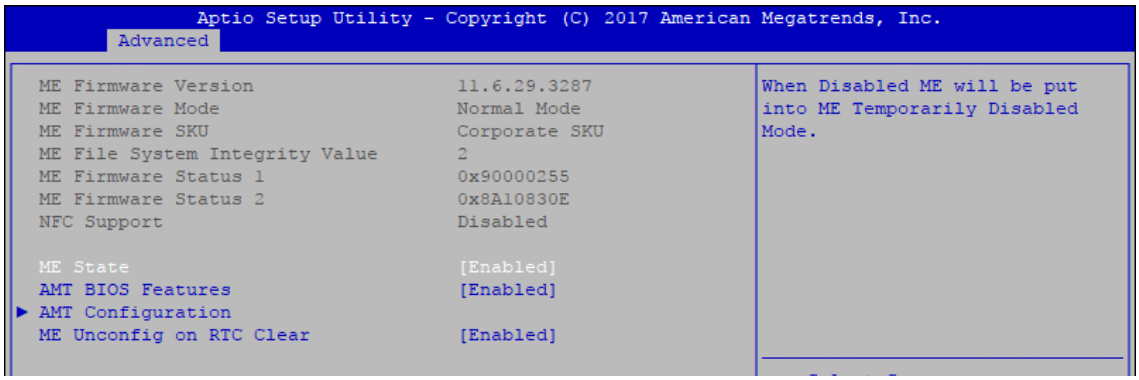


Figure 4-3-3 : PCH-FW Settings

ME State

Set ME to Soft temporarily disabled.

AMT BIOS Features

When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup.

AMT Configuration

Configure Intel® Active Management Technology Parameters.

ME Unconfig on RTC Clear State

Disabling this option will cause ME not to unconfigure on RTC clear.

4.3.4 Trusted Computing

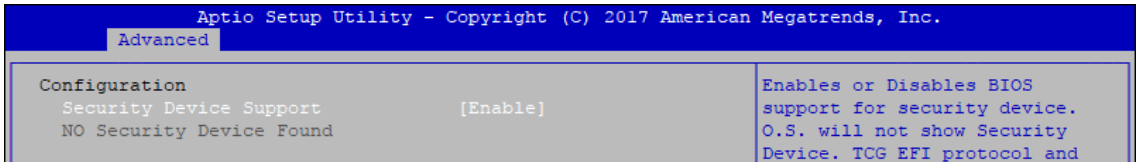


Figure 4-3-4 : Trusted Computing

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

4.3.5 ACPI Settings

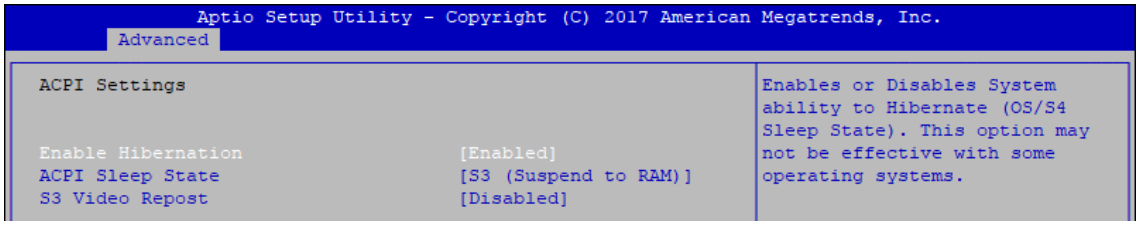


Figure 4-3-5 : ACPI Settings

Enable Hibernation

Enables or disables system's ability to hibernate (OS/S4 sleep state). This option may not be effective with some OS.

ACPI Sleep State

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

S3 Video Repost

Enables or disables S3 video repost.

4.3.6 SMART Settings

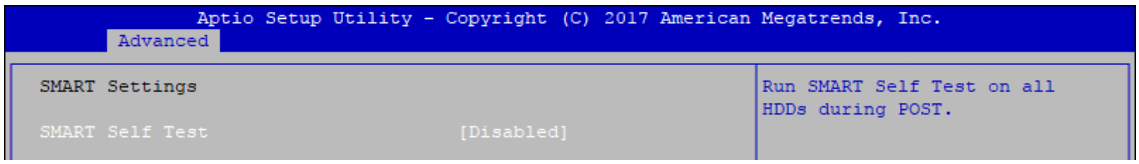


Figure 4-3-6 : SMART Settings

SMART Self Test

Run SMART self test on all HDDs during POST.

4.3.7 IT8786 Super IO Configuration

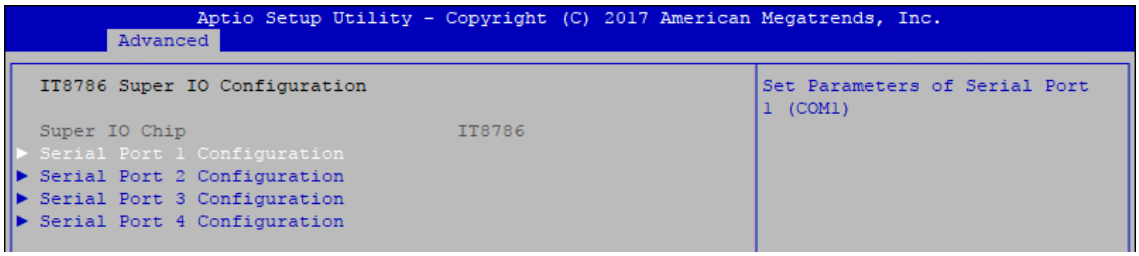


Figure 4-3-7 : IT8786 Super IO Settings

4.3.7.1 Serial Port X Configuration

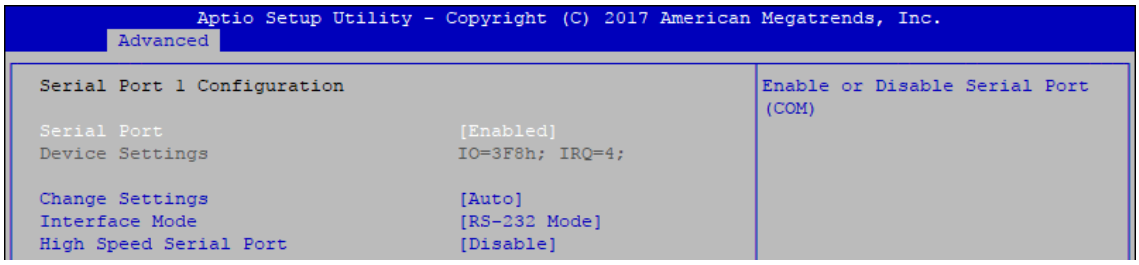


Figure 4-3-7-1 : Serial Port X Configuration

Serial Port 1 to port 4 Configuration

Options for Serial Port 1 to Serial Port 4.

Entering the corresponding Port option then end user can change the settings such as I/O resource and UART mode (High Speed Serial Port is Port 1 only).

4.3.8 Hardware Monitor

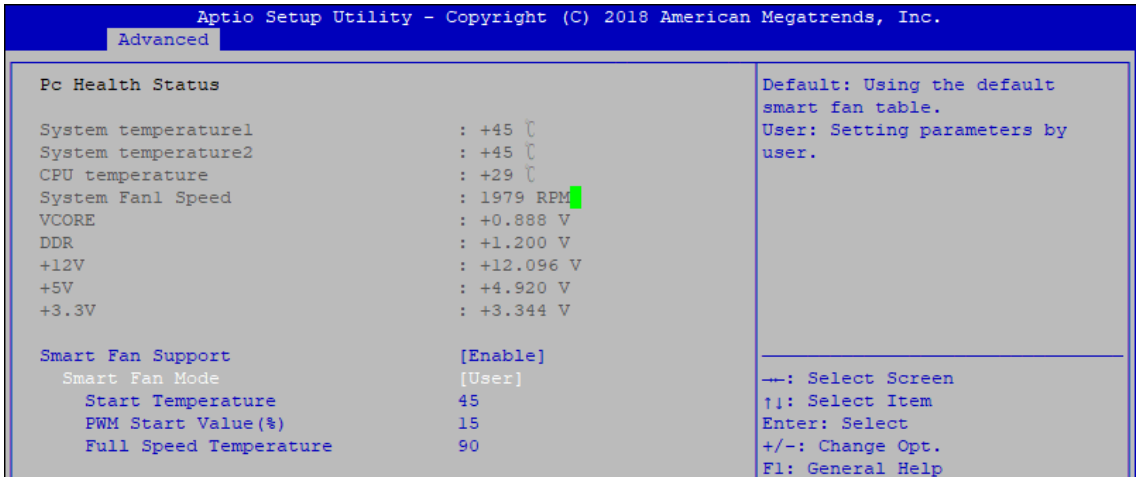


Figure 4-3-8 : Hardware Monitor Settings

The IT8786 SIO features an enhanced hardware monitor providing thermal, fan speed, and system voltages' status monitoring.

Smart Fan Support

Smart Fan Support. Work with Full Speed if "Smart Fan Support" is Disabled.

Smart Fan Mode

Default : Using the default smart fan table.
User : Setting parameters by user.

Start Temperature

Temperature Limit value of Fan Start (Degree C).
(Range : 10~80)

PWM Start Value (%)

Default PWM Value of Fan.
(Range : 15%~100%)

Full Speed Temperature

Temperature Limit value of Fan Full Speed (Degree C).
(Range : 50~90)

4.3.9 Serial Port Console Redirection

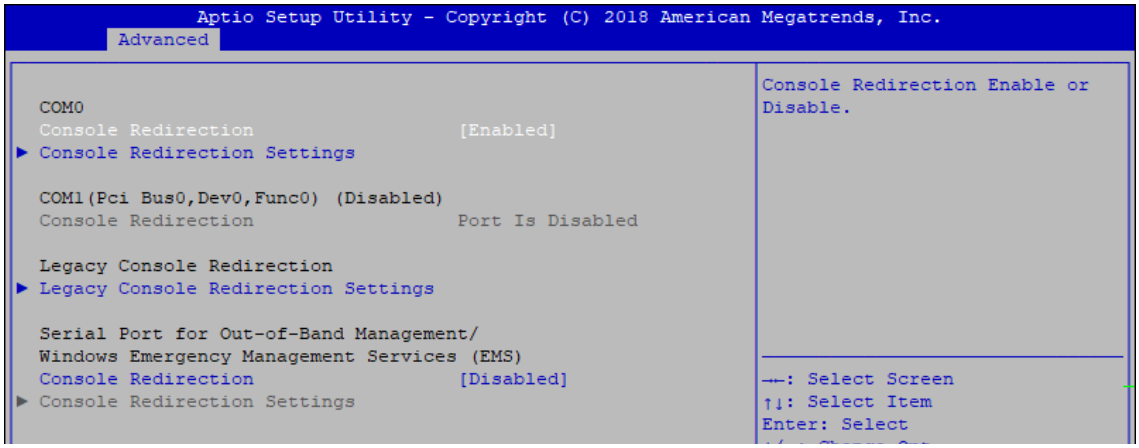


Figure 4-3-9 : Serial Port Console Redirection Settings

Console Redirection

Console redirection enable or disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Legacy Console Redirection

Legacy Console Redirection Settings.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

Console redirection enable or disable.

4.3.10 Intel TXT Information

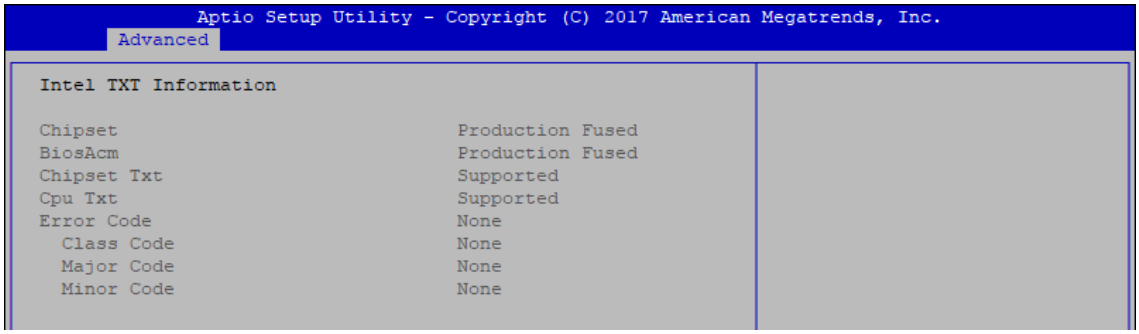


Figure 4-3-10 : Intel TXT Information

Display Intel TXT information.

4.3.11 Acoustic Management Configuration

Figure 4-3-11 : Acoustic Management Settings

Acoustic Management Configuration

Option to enable or disable automatic acoustic management.

4.3.12 PCI Subsystem Setting

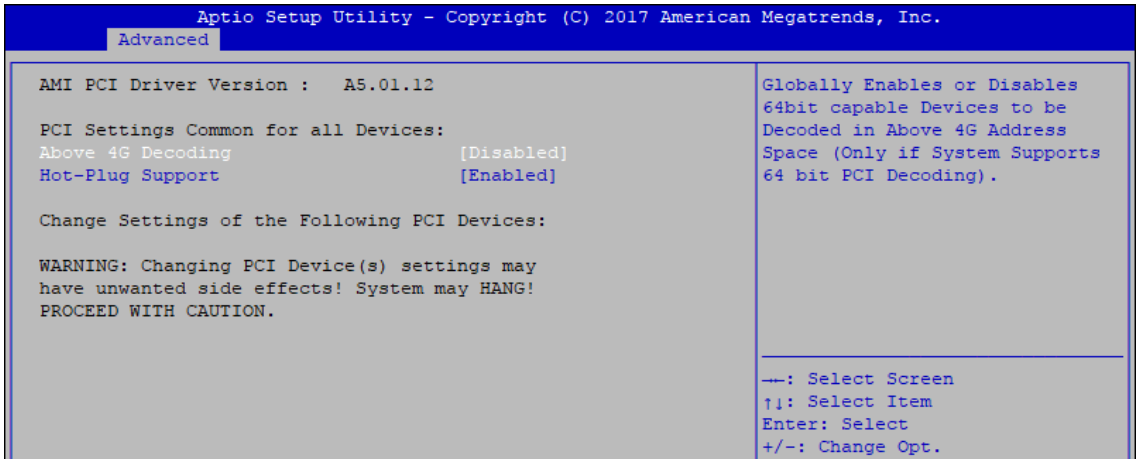


Figure 4-3-12 : PCI Subsystem Settings

Above 4G Decoding

Globally Enables or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports bot PCI Decoding)

Hot-Plug Support

Globally Enables or Disables Hot-Plug support for the entire System. If system has Hot-Plug Capable Slots and this option set to Enabled, it provides a Setup screen for selecting PCI resource padding for Hot-Plug.

4.3.13 Network Stack Configuration

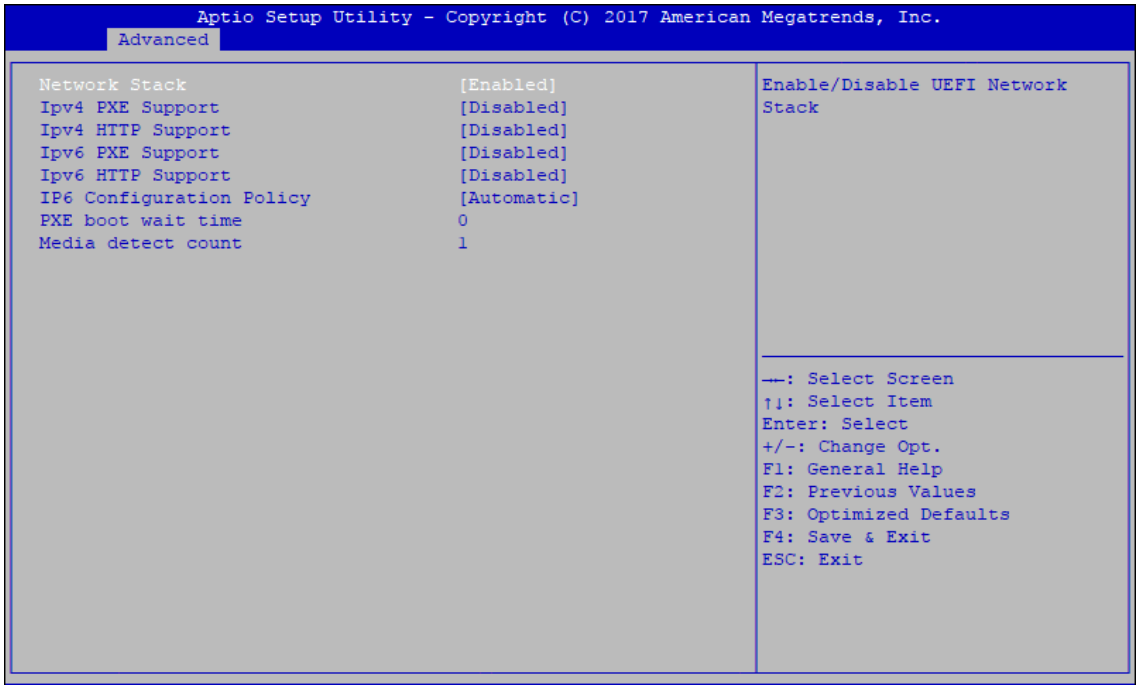


Figure 4-3-13 : Network Stack Settings

Network Stack
Enable/Disable UEFI Network Stack

Ipv4 PXE Support
Enable/Disable IPv4 PXE boot support.

Ipv4 HTTP Support
Enable/Disable IPv4 HTTP boot support.

Ipv6 PXE Support
Enable/Disable IPv6 PXE boot support.

Ipv6 HTTP Support
Enable/Disable IPv6 HTTP boot support.

IP6 Configuration Policy
Set IP6 Configuration Policy.

PXE boot wait time
Wait time to press ESC key to abort the PXE boot.

Media detect count
Number of times presence of media will be checked.

4.3.14 CSM Configuration

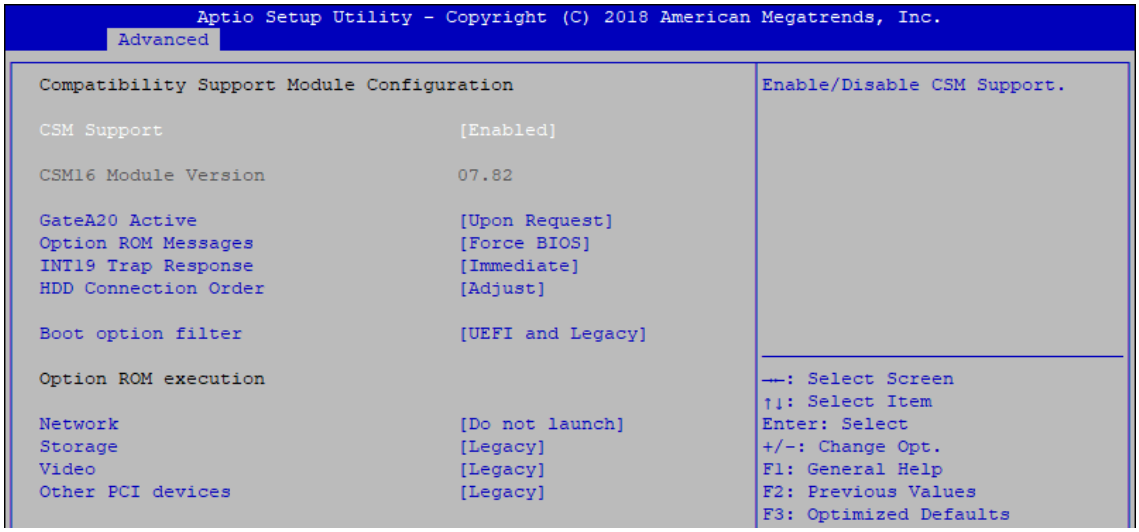


Figure 4-3-14 : CSM Settings

CSM Support

Enable/disable CSM support

GateA20 Active

UPON REQUEST - GA20 can be disabled using BIOS services.

ALWAYS - do not allow GA20 to be disabled; this option is useful when any RT code is executed above 1MB.

Option ROM Messages

Set display mode for Option ROM.

INT19 Trap Response

BIOS reaction on INT19 trapping by Option ROM :
IMMEDIATE - execute the trap right away;
POSTPONED - execute the trap during legacy boot.

HDD Connection Order

Some OS require HDD handles to be adjusted, i.e. OS is installed on drive 80h.

Boot option filter

This option controls Legacy/UEFI ROM's priority.

Network

Controls the execution of UEFI and Legacy PXE OpROM.

Storage

Controls the execution of UEFI and Legacy Storage OpROM.

Video

Allows more than two frequency ranges to be supported.

Other PCI devices

Determines OpROM execution policy for devices other than network, storage, or video.

4.3.15 NVMe Configuration

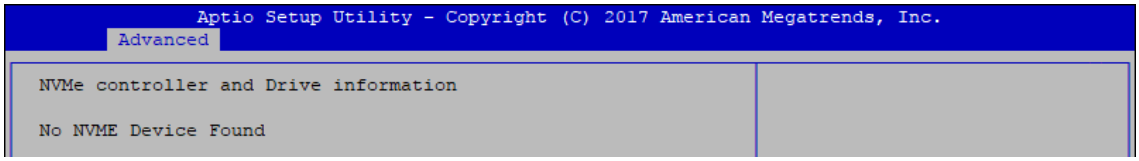


Figure 4-3-15 : NVMe Settings

Display NVMe controller and Drive information.

4.3.16 USB Configuration

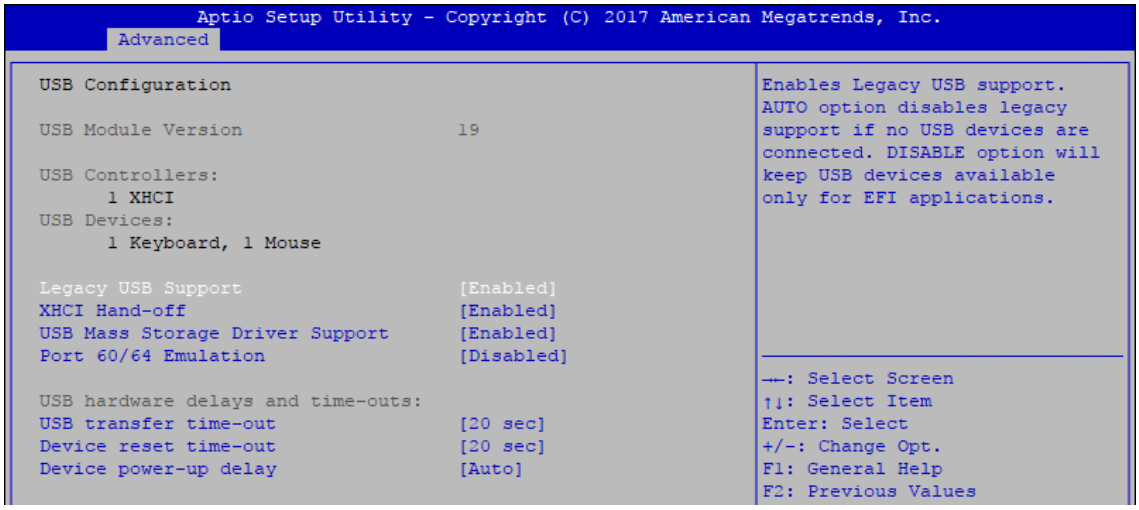


Figure 4-3-16 : USB Settings

Legacy USB Support

Enables Legacy USB support.
AUTO option disables Legacy support if no USB devices are connected.
DISABLE option will keep USB devices available only for EFI applications.

XHCI Hand-off

This is a workaround for OS-es without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

USB Mass Storage Driver Support

Enable/disable USB mass storage driver support.

Port 60/64 Emulation

Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.

USB transfer time-out

The time-out value for control, bulk, and interrupt transfers.

Device reset time-out

USB mass storage device start unit command time-out.

Device power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value, for a root port it is 100 ms, for a hub port the delay is taken from the hub descriptor.

4.4 Chipset

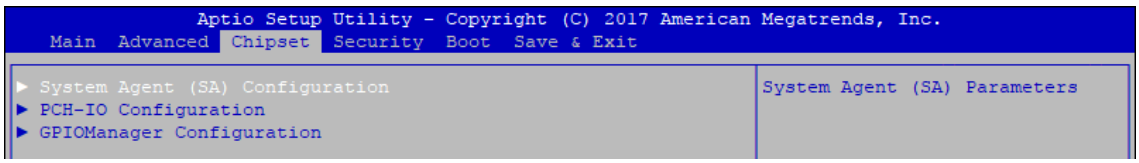


Figure 4-4 : BIOS Chipset Menu

System Agent (SA) Configuration

System Agent (SA) parameters.

PCH-IO Configuration

PCH parameters.

GPIOManager Configuration

GPIOManager Configuration.

4.4.1 System Agent (SA) Configuration

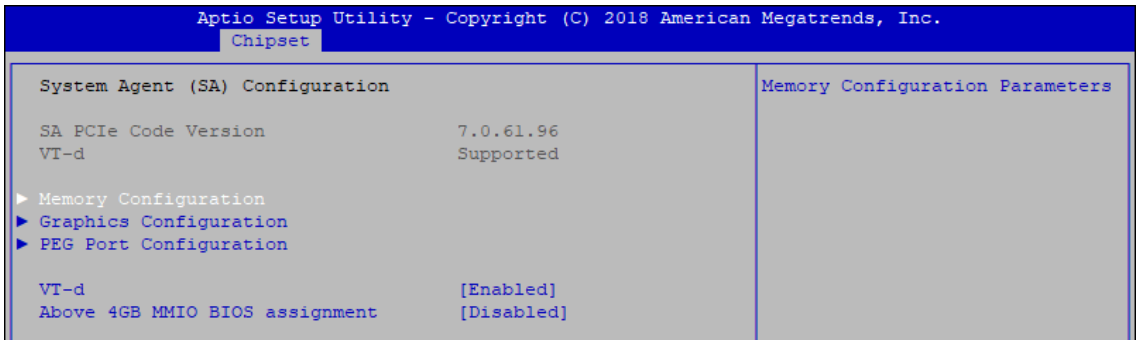


Figure 4-4-1 : System Agent Settings

VT-d

VT-d capability.

Above 4GB MMIO BIOS assignment

Enable/disable above 4GB MemoryMappedIO BIOS assignment. This is disabled automatically when aperture size is set to 2048MB.

4.4.1.1 Memory Configuration

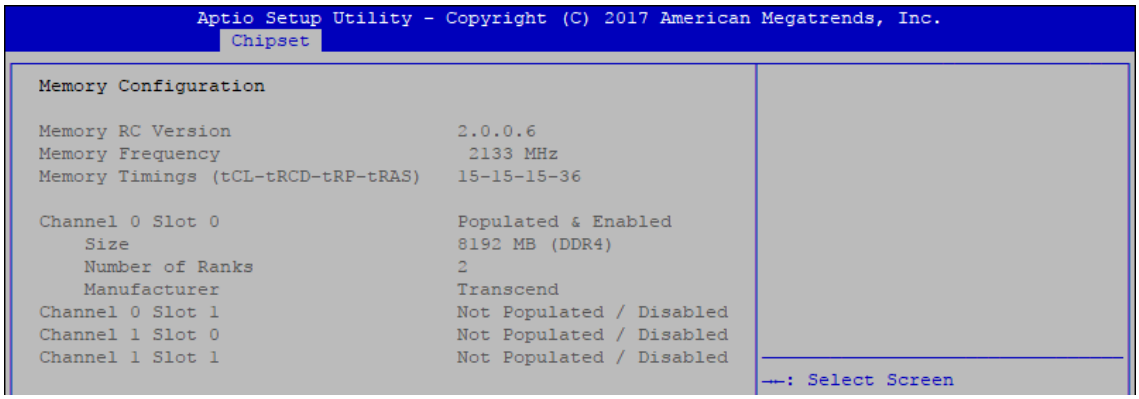


Figure 4-4-1-1 : Memory Information

Displays memory information.

4.4.1.2 Graphics Configuration

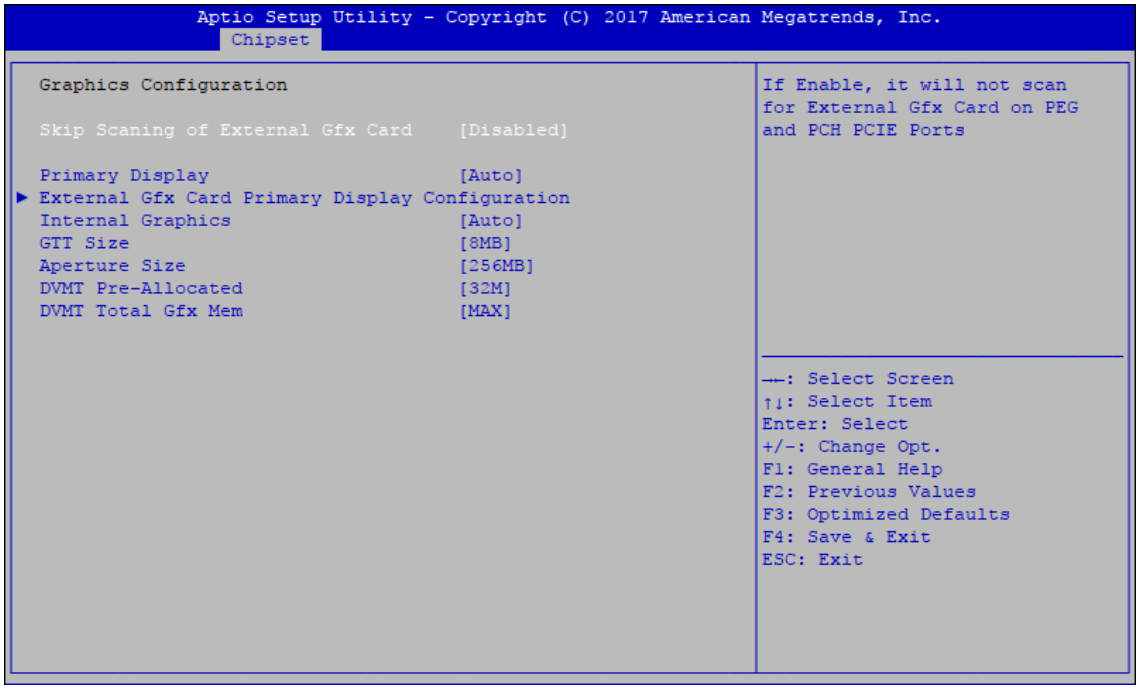


Figure 4-4-1-2 : Graphics Settings

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 SG for Switchable 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 DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

4.4.1.3 PEG Port Configuration

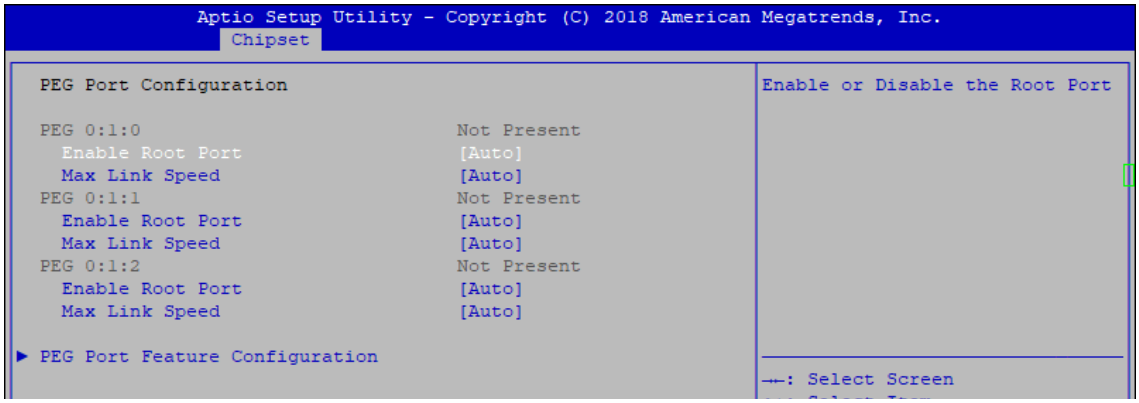


Figure 4-4-1-3 : PEG Port Configuration

PEG port options for PCIe device.

4.4.2 PCH-IO Configuration

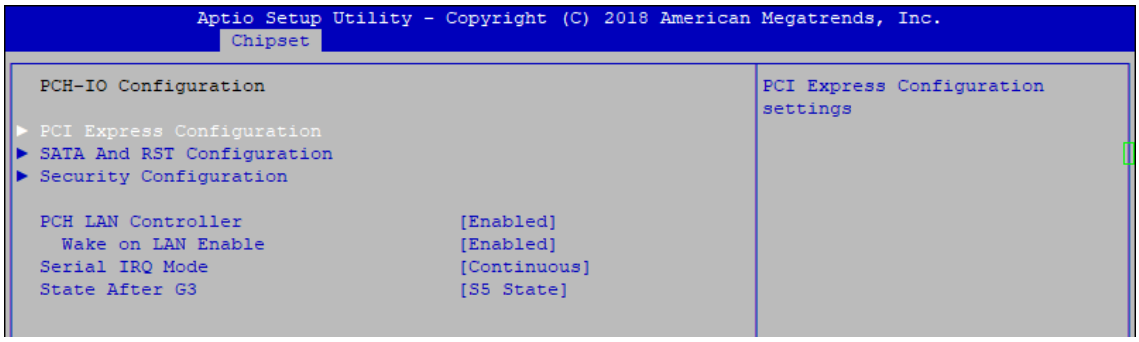


Figure 4-4-2 : PCH-IO Settings

PCH LAN Controller

Enable or disable onboard NIC.

Wake on LAN

Enable or disable integrated LAN to wake the system. (The wake On LAN cannot be disabled if ME is on at Sx state.)

Serial IRQ Mode

Configure serial IRQ mode.

State After G3

Specify what state to go to when power is re-applied after a power failure (G3 state).
S0 State : Always turn-on the system when power source plugged-in.
S5 State : Always turn-off the system when power source plugged-in.

4.4.2.1 PCI Express Configuration of PCH-IO

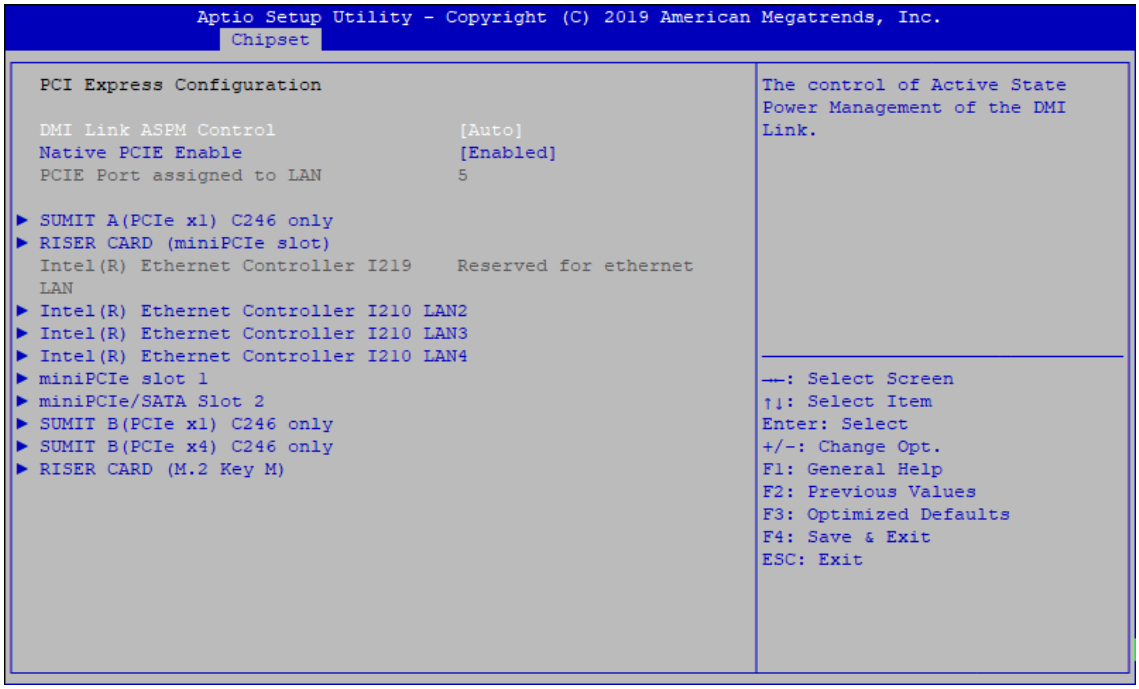


Figure 4-4-2-1 : PCH-IO Settings

DMI Link ASPM Control

Enable/Disable the control of Active State Power Management on SA side of the DMI Link.

Native PCIE Enable

PCIE Express Native Support Enable/Disable.

PCI Express device settings

Bios options for PCI Express device setting.

4.4.2.2 SATA and RST Configuration

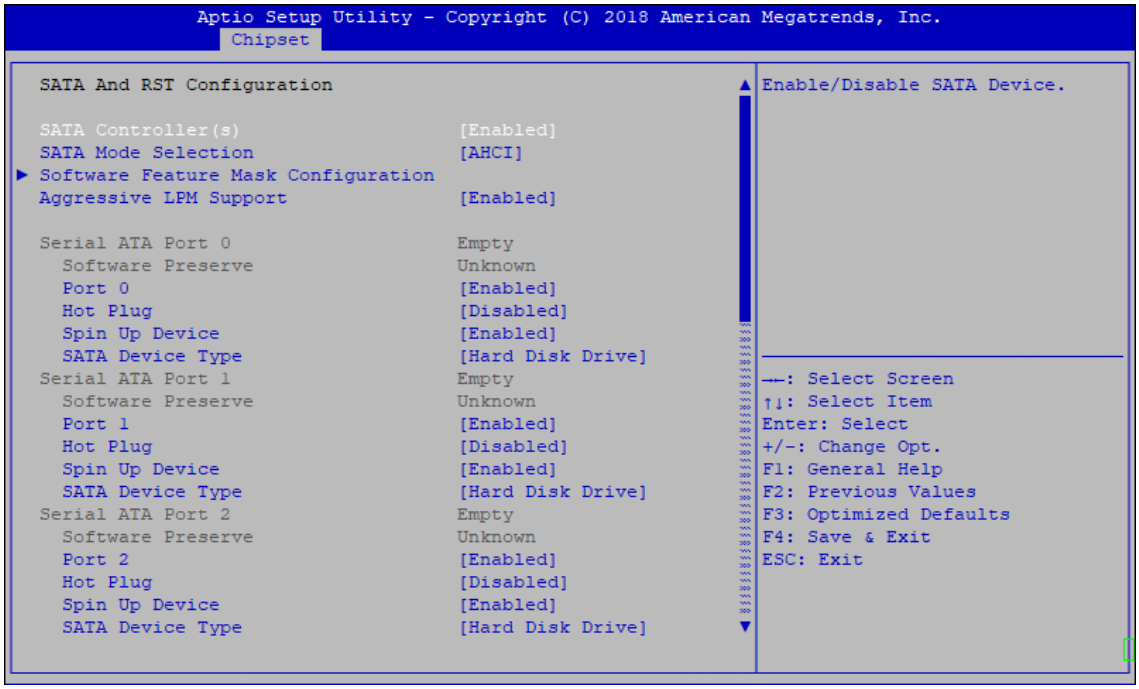


Figure 4-4-2-2 : SATA and RST Settings

SATA Controller(s)

Enable or disable SATA Device.

SATA Mode Selection

Determines how SATA controller(s) operate.

Software Feature Mask Configuration

RAID OROM/RST driver will refer to the SWFM configuration to enable or disable the storage features.

Aggressive LPM Support

Enable PCH to aggressively enter link power state.

Options for each SATA port :

Port n
Enable or disable SATA Port.

Hot Plug

Designated this port as Hot Pluggable.

Spin Up Device

On an edge detect from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.

SATA Device Type

Identifies that the SATA port is connected to solid state drive or hard disk drive.

4.4.2.3 Security Configuration

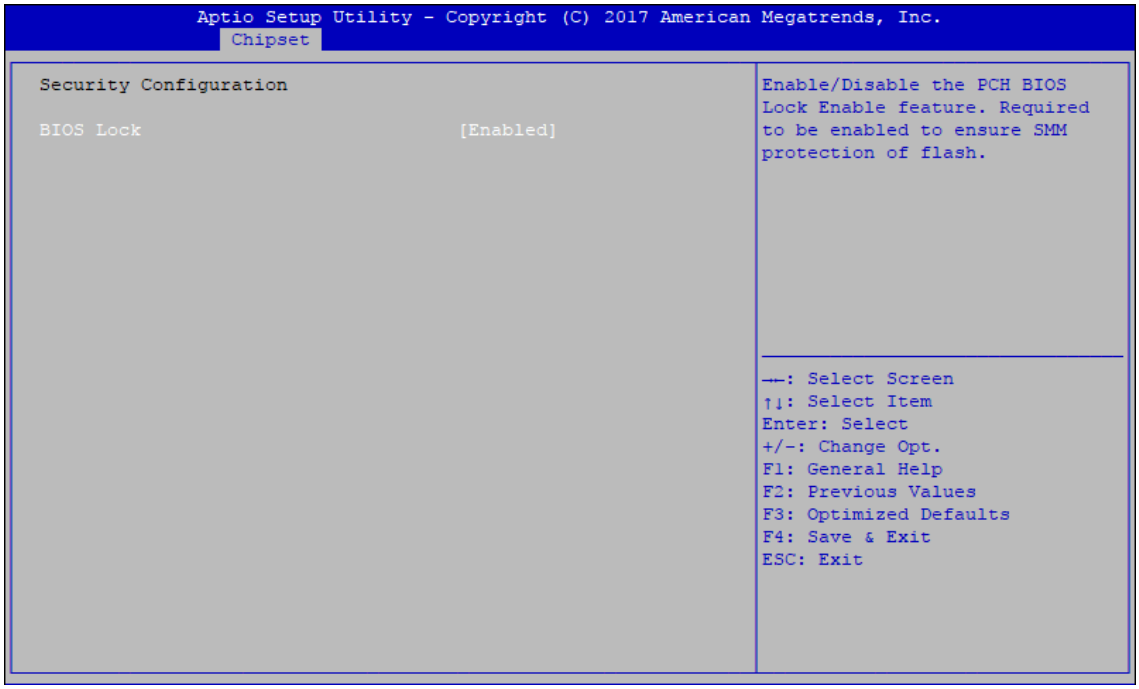


Figure 4-4-2-3 : Security Settings

BIOS Lock

Enable/disable the PCH BIOS Lock Enable (BLE bit) feature.

4.5 Security

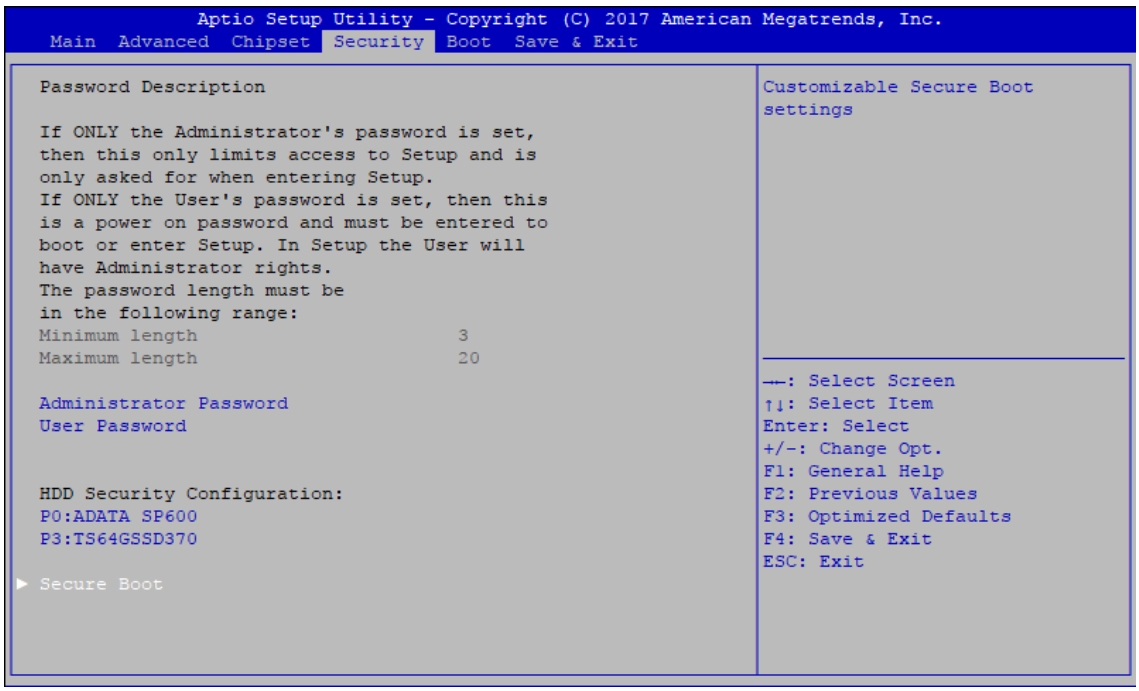


Figure 4-5 : BIOS Security Menu

Administrator Password

Set administrator password.

User Password

Set user password.

Secure Boot

Customizable Secure Boot Settings.

4.5.1 HDD Security Configuration

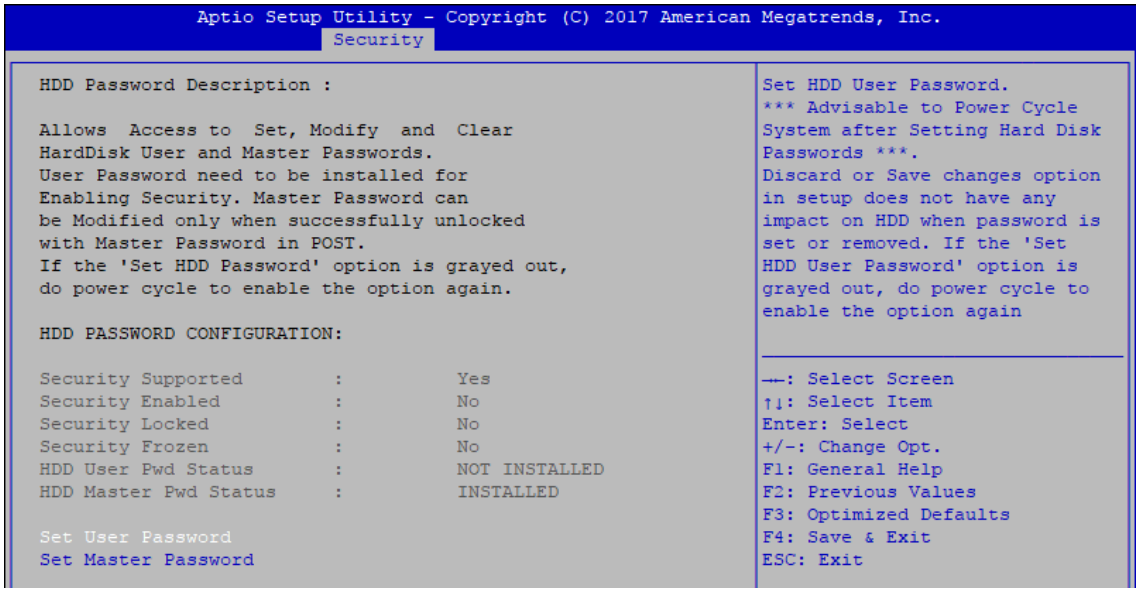


Figure 4-5-1 : HDD Security Settings

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 gray, do power cycle to enable the option again.

4.5.2 Security Boot

Figure 4-5-2 : Security Boot Settings

Attempt Secure Boot

Secure Boot activated when Platform Key (PK) is enrolled, System mode is User/Deployed, and CSM function is disabled.

Secure Boot Mode

Secure Boot mode selector Standard/Custom.
In custom mode Secure Boot Variables can be configured without authentication

Key Management

Enables expert users to modify Secure boot policy variables without full authentication

4.6 Boot

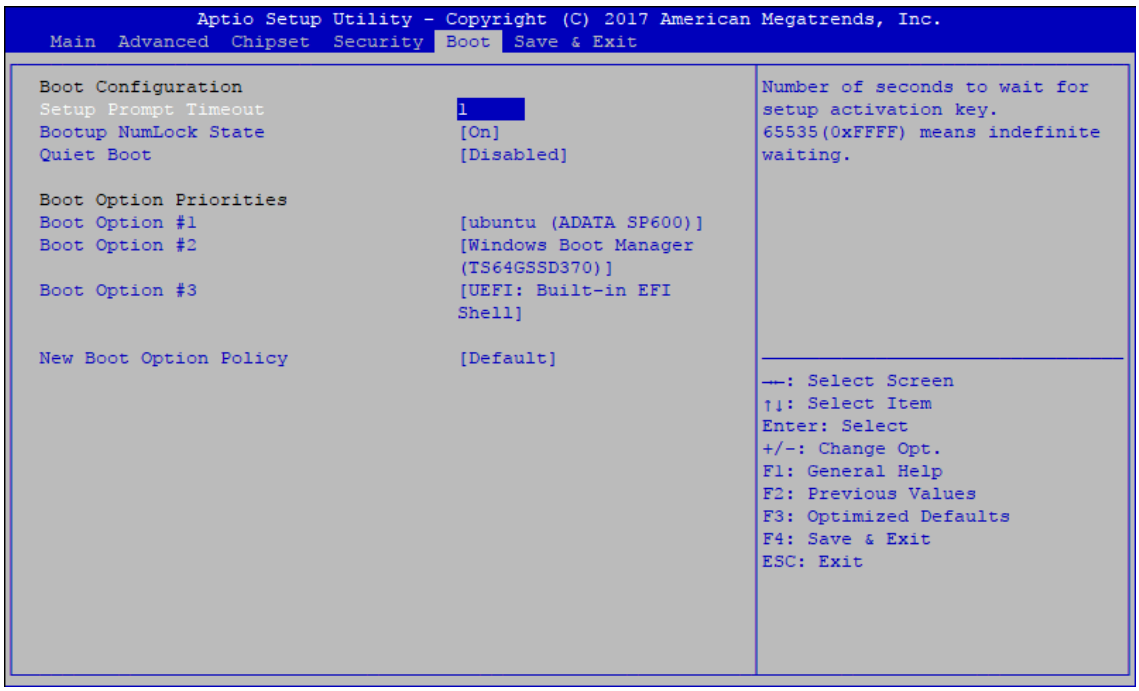


Figure 4-6 : BIOS Boot Menu

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

Sets the system boot order.

New Boot Option Policy

Controls the placement of newly detected UEFI boot options.

Hard Drive BBS Priorities

Set the order of the Legacy devices in this group.

4.7 Save & Exit

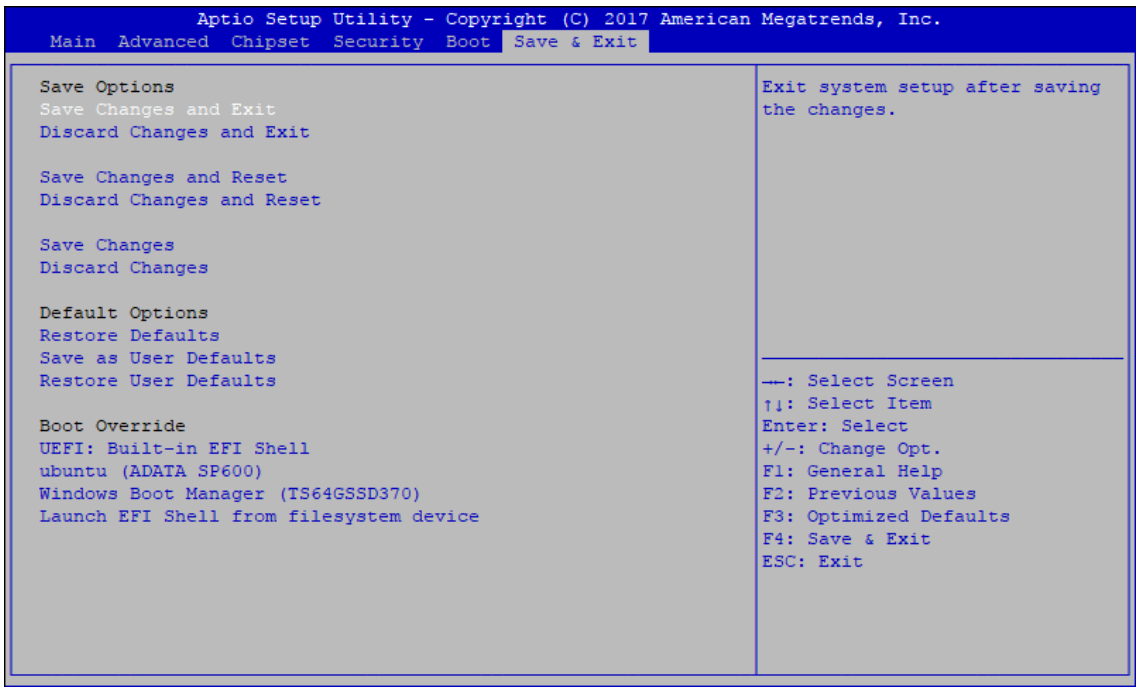


Figure 4-7 : BIOS Save and Exit Menu

Save Changes and Exit

Exit system setup after saving the changes.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save Changes done so far to any of the setup options.

Discard Changes

Discard Changes done so far to any of the setup options.
Default Options

Restore Defaults

Restore/Load Default values for all the setup options.

Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

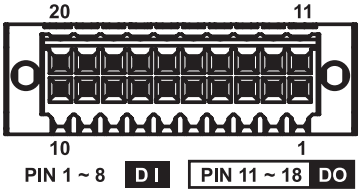
Restore the User Defaults to all the setup options

APPENDIX A : GPIO GUIDE

A.1 Function Description

The EXBC-1000 offers a 16-bit GPIO a pair of 20-bit internal connector, and a watchdog timer.

GPIO definition is shown below :



Pin No.	JDIO1 Definition	JDIO2 Definition
1	SIO_GPO70	SIO_GPI80
2	SIO_GPO71	SIO_GPI81
3	SIO_GPO72	SIO_GPI82
4	SIO_GPO73	SIO_GPI83
5	SIO_GPO74	SIO_GPI84
6	SIO_GPO75	SIO_GPI85
7	SIO_GPO76	SIO_GPI86
8	SIO_GPO77	SIO_GPI87
9	+3.3V	+3.3V
10	GND	GND

A.2 Software Package Contain

Distribution folder include x32 and x64 versions, use batch file for installation.

There are included as fallowed :

Win7_32.bat :

Installation for 32-bit driver

Win7_64.bat :

Windows update package which driver required (need to restart), and Installation for 64-bit driver

Win8_32.bat, Win8_64.bat :

Installation for driver, and guideline to Framework 3.5 distribution for sample

Win10_32.bat, and Win10_64.bat :

Installation for driver, and installation to Framework 3.5 distribution for sample

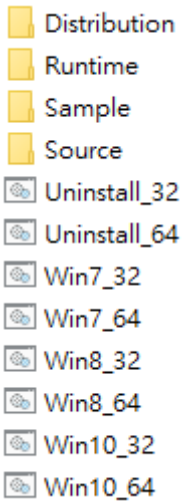
Uninstall_32.bat, and Uninstall_64.bat :

Uninstallation for driver

Run batch file as Administrator.

Support Windows 7 above.

Make sure Windows version before installation.

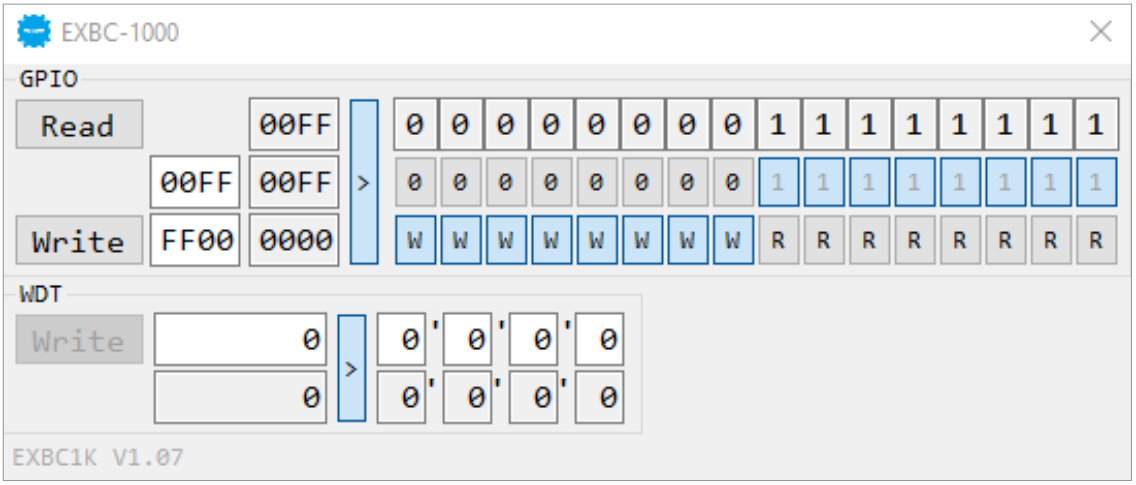


Runtime folder include head file for software developer or System Integration. Sample folder include sample program, driver library, and API library.Source folder include sample program source code that compile on Visual Studio 2008.

A.3 Sample

Sample folder include x32 and x64 versions, as shown below :

Sample EXBC-1000.exe, as shown below :



GPIO group :

Read button :
Set GPIO configuration to get GPIO state.
Write button :
Set GPIO configuration to set GPIO state.
GPIO output text :
User setting, GPIO output state by hexadecimal bitmask - High/Low.
Use for Write button activate.
GPIO writable text :
User setting, GPIO writable of GPIO configuration by hexadecimal bitmask - yes/no.
Use for Read/Write button activate.
GPIO input text (read only) :
GPIO input state by hexadecimal bitmask - High/Low.
Use for Read button activate.
GPIO text (read only) :
GPIO output state with input state and configuration.
Use for Write button activate.
GPIO output text (read only) :
GPIO output state with configuration.
Use for Write button activate.
GPIO input pin text (read only, pin 18 ~ pin 11, pin 8 ~ pin 1) :
GPIO input pin state
Use for Read button activate.
GPIO output pin check button (pin 18 ~ pin 11, pin 8 ~ pin 1) :
User setting, GPIO output pin state
Use for Write button activate.
GPIO pin writable check button (pin 18 ~ pin 11, pin 8 ~ pin 1) :
User setting, GPIO pin writable of GPIO configuration.
Use for Read/Write button activate.

WDT group :

Write button :
Set WDT when WDT setup text is valid.
Stop button :
Cancel WDT and counting.
Use after Write button action.
WDT setup text :
User setting, WDT value, unit : second.
Use for Write button activate.
WDT counting text (read only) :
WDT counting by program timer after set WDT.
Shown after Write button action.
WDT setup day format texts (user setting) :
User setting, WDT value, format : day'hour'minute'second.
WDT counting day format text (read only) :
WDT counting, format : day'hour'minute'second.

B

APPENDIX B : Software Functions

B.1 Driver API Guide

In Runtime folder, on EXBC1K.h :

_DLL_IMPORT_ definition is used on LoadLibrary API for EXBC1K.dll.
EXBC1K_EXPORTS definition is used on EXBC1K.dll building.

BOOL Initial()

Initial machine for GPIO, and watchdog timer

Return :

TRUE (1) : Success;
FALSE (0) : Fail (Driver not exists, or initial error (version is too old, or machine not match))

BOOL GetGPIOConfig(WORD *Mask)

Get GPIO configuration (by variable)

Mask ([15:0]) : In/Out, pin setting by hexadecimal bitmask

1 : Output;
0 : Input

Return :

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

BOOL SetGPIOConfig(WORD Mask)

Set GPIO configuration

Mask ([15:0]) : In/Out, pin setting by hexadecimal bitmask

1 : Output;
0 : Input

Return :

TRUE (1) : Success;
FALSE (0) : Fail (Initial error, or hardware problem)

BOOL GetGPIO(WORD *DI)

Get GPIO input

DI ([15:0]) : Input state, pin setting by hexadecimal bitmask

1 : High;
0 : Low

Return :

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

BOOL SetGPIO(WORD DO)

Set GPIO output

DO ([15:0]): output state, pin setting by hexadecimal bitmask

1 : High;

0 : Low

Return :

TRUE (1) : Success;

FALSE (0) : Fail (Initial error, or hardware problem)

BOOL GetWDT(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 SetWDT(DWORD WDT)

Set watchdog timer setup

WDT : watchdog timer setup

Unit : second. (Range : 1 ~ 65535 sec, 1093 ~ 65535 min (=65580 ~ 3932100 sec))

Return :

TRUE (1) : Success;

FALSE (0) : Fail (Initial error, or setup 0 error, or hardware problem)

BOOL CancelWDT()

Cancel watchdog timer

Return :

TRUE (1) : Success;

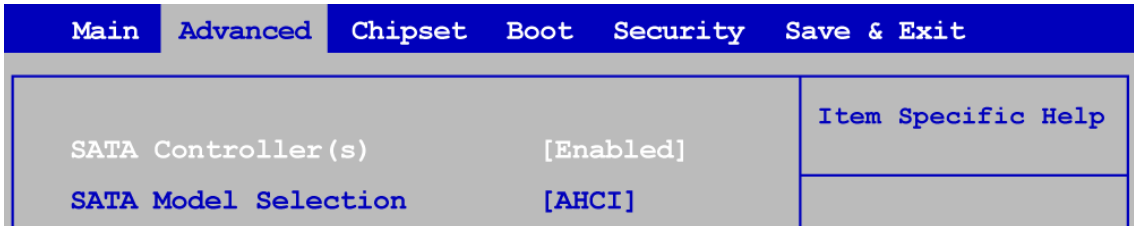
FALSE (0) : Fail (Initial error, or hardware problem)

APPENDIX C : RAID Functions

C.1 SATA Mode for RAID*

Please select SATA Device to RAID mode on BIOS menu.

Advanced → SATA Configuration → SATA Mode Selection



* RAID function is supported in EXBC-1100(E).

C.2 OS Installation

The system is featured with 4 SATA, include two internal SATA, two mSATA

You can select one of SATA ports for OS installation

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

C.3 To Install All Device Drivers of the System

The instructions are as follows :

1. To install Chipset driver
2. To install VGA driver
3. To install ME driver (if available)
4. To install Network driver
5. To install Audio driver

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

You can get the software from the driver CD.

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

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

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

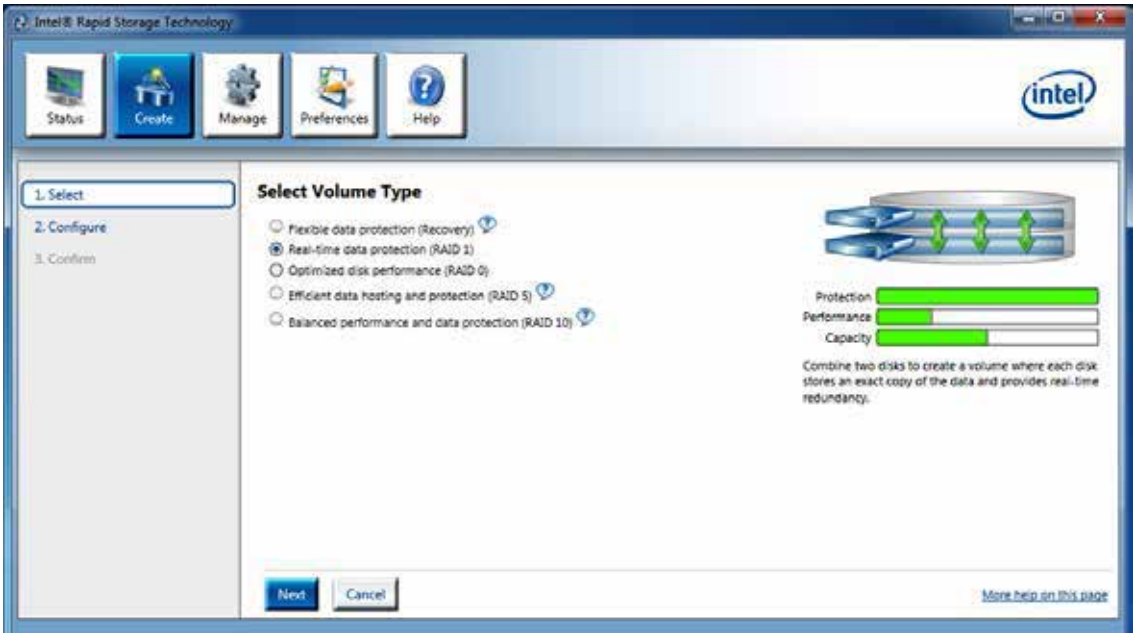
C.5 To Insert SATA HDD for RAID 1

Please notice, you can use 4 SATA ports for SATA storage devices.

C.6 To Create RAID Volume on "Rapid Storage Technology" Software

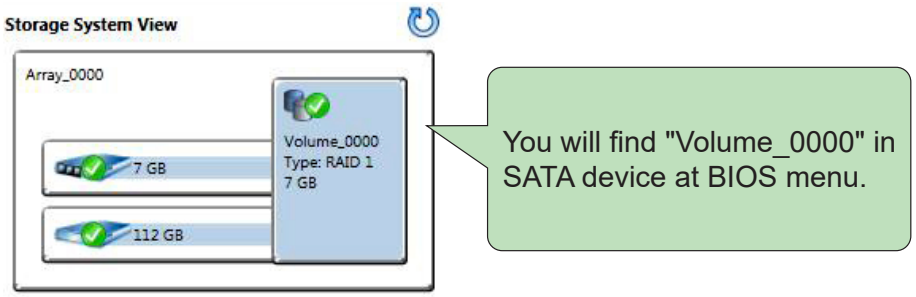
The system is featured with two SATA HDD's for RAID volume, so there are two options to choose on this page. Let's take RAID 1 as an example, select

"RAID 1".



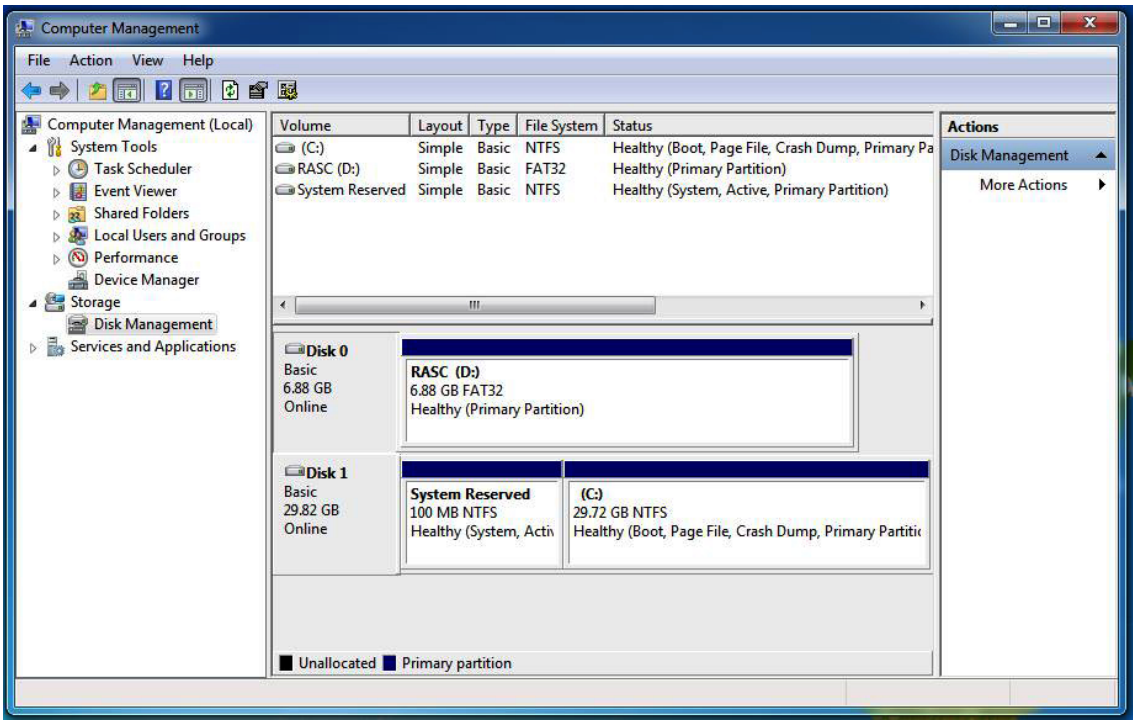
C.7 Disk Management : Partition the Disk

After RAID 1 volume created, you can see the figure of SATA device allocation.



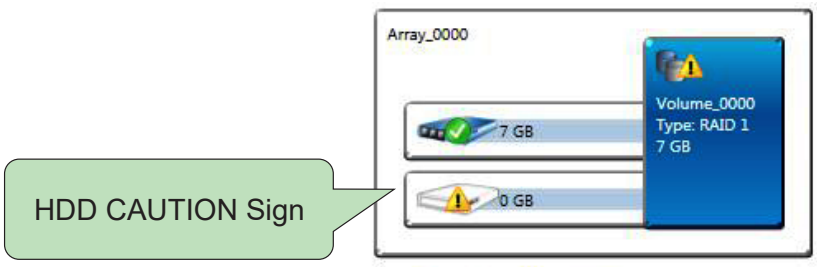
To start disk management tool, select "initialize disk".

Then add "Logical Device" for Windows access.

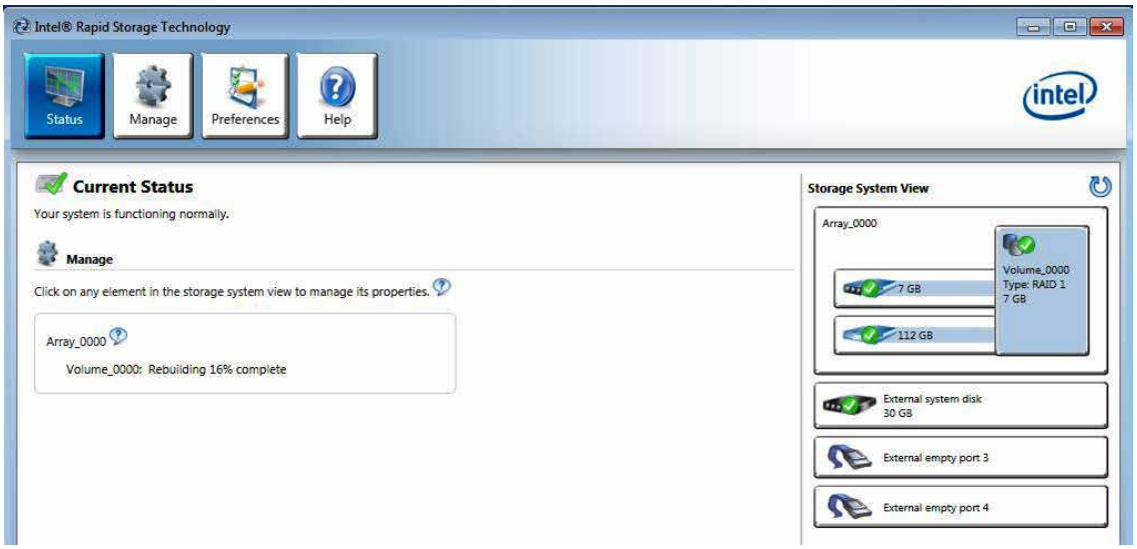


C.8 If One SATA HDD on RAID Volume is Out-of-use

After RAID 1 volume created, you can see the figure of SATA device allocation.



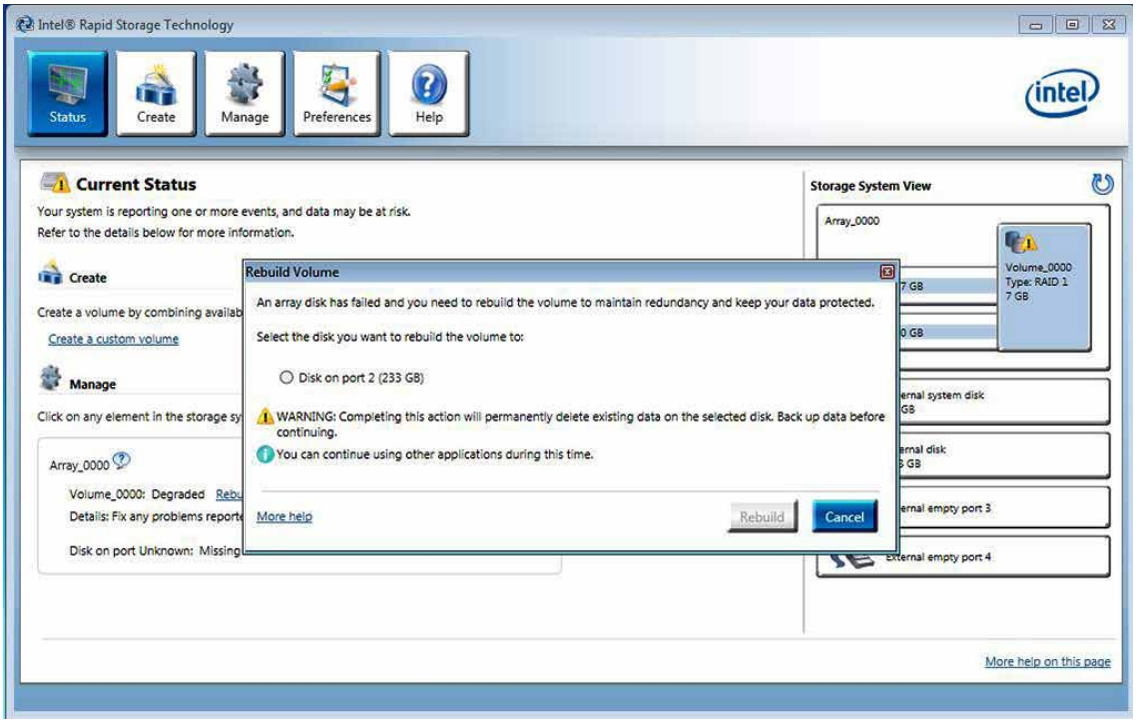
C.9 Recovery and Auto Re-build When Use the SAME RAID HDD



C.10 Recovery and Auto Re-build When Use DIFFERENT RAID HDD

There is a warning will pop-up to ask you if the disk is not a member of original RAID volume.

If you press "Rebuild", it will replace the broken SATA HDD to the last one SATA HDD of RAID volume.



D

APPENDIX D : Power Consumption

Testing Board	EXBC-1000
RAM	16GB X 2
USB-1	USB Keyboard Microsoft Wired Keyboard 600
USB-2	USB Mouse Logitech M105
USB-3	USB Flash Transecnd 3.0 8GB
USB-4	USB Flash Transcend 3.0 8GB
CFAST	N/A
SATA 0	INTEL E5400S 120GB
SATA 1	WD WD5000BPVT 500GB
LAN 1 (i219)	1.0 Gbps
LAN 2 (i210)	1.0 Gbps
Graphics Output	DVI
Power Plan	Balance (Windows 10 Power plan)
Power Source	Chroma 62006P-100-25
Power Source	Chroma 62006P-100-25
Test Program-1	BurnInTest
Test Program-2	FurMark

D.1 Intel® Xeon® E-2176G (12M Cache, 3.70GHz)

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
Xeon® E-2176G	12V	0.220A	02.64W	0.310A	03.72W	1.126A	13.51W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Xeon® E-2176G	12V	5.740A	68.88W	7.716A	92.59W

D.2 Intel® Core™ i7-8700 (12M Cache, 3.20GHz)

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™ i7-8700	12V	0.236A	02.83W	0.307A	03.68W	1.071A	12.85W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-8700	12V	4.173A	50.08W	6.844A	82.13W

D.3 Intel® Core™ i7-8700T (12M Cache, 2.40GHz)

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™ i7-8700T	12V	0.226A	02.71W	0.322A	03.86W	1.058A	12.70W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-8700T	12V	3.000A	36.00W	4.149A	49.79W

APPENDIX E : Supported Memory & Storage List

E.1 Supported Memory List

Testing Board	EXBC-1000
Memory Test	version : 5.1
BurnInTest	V8.1

E.2 Supported Non-ECC Memory List

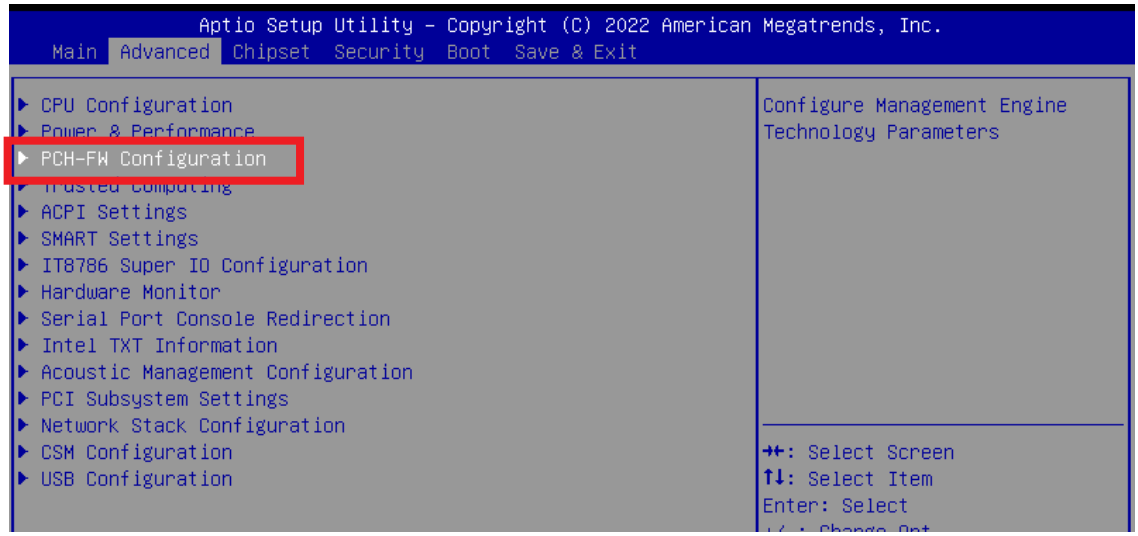
Brand	Info	Test Temp.(Celsius)
Innodisk 4GB DDR4 2666 SODIMM	M4S0-4GSSNCIK-H03	25ºC
		25ºC
innodisk 8GB DDR4 2666 SODIMM	M4S0-8GSSOCIK-H03	25ºC
		25ºC
Innodisk 8GB DDR4 2666 SODIMM	M4S0-8GS1NCIK-H03	25ºC
		25ºC
innodisk 16GB DDR4 2666 SODIMM	M4S0-AGS1OCIK-H03	25ºC
		25ºC
Innodisk 16GB DDR4 2666 SODIMM	M4S0-AGS1O5IK-H03	25ºC
		25ºC
Innodisk 4GB DDR4 2666 W/T SODIMM	M4S0-4GSSN5IK-H03	25ºC
		25ºC

E.3 Supported Storage Device List

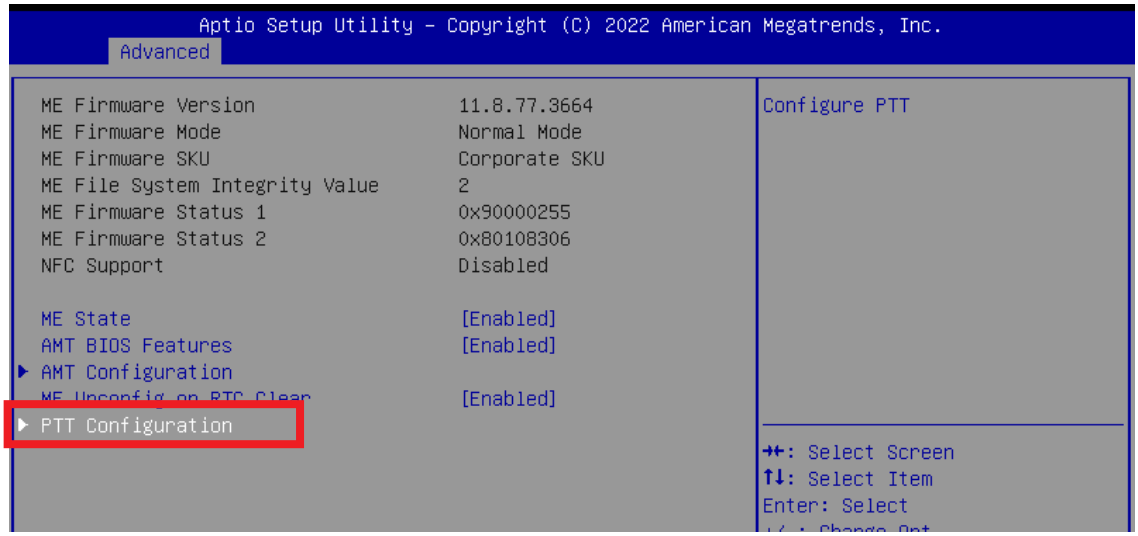
Type	Brand	Model	Capacity
mSATA	Intel	Intel-310 SSDMAEMC080G2	80GB
SSD	Intel	SSD 530 SSDSC2BW120A4	120GB
		SSD E 5400s SSDSC2KR120H6	120GB
	LITE-ON	K8-L1512	512GB
	MEMXPRO	2.5" SSD M3A 128GB	128GB
	FORESEE	2.5" 256GB SSD SATA6.0 S903S256G	256GB
		2.5" 128GB SSD SATA6.0 S903S128G	128GB

APPENDIX F : Install Win11 (BIOS TPM Setting)

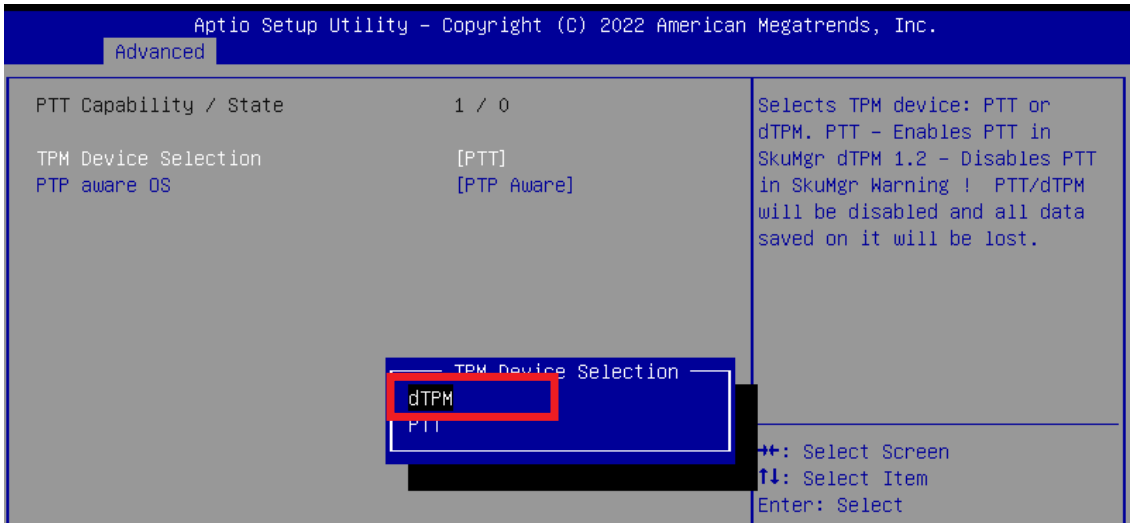
Step 1 Click on “Advanced”, then click on “PCH-FW Configuration”

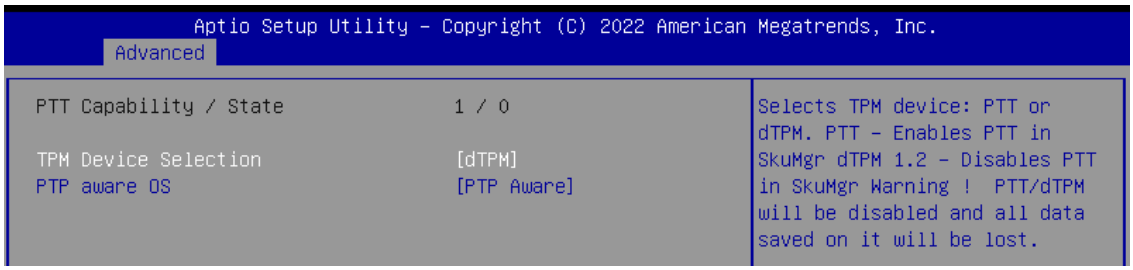


Step 2 Click on “PTT Configuration”

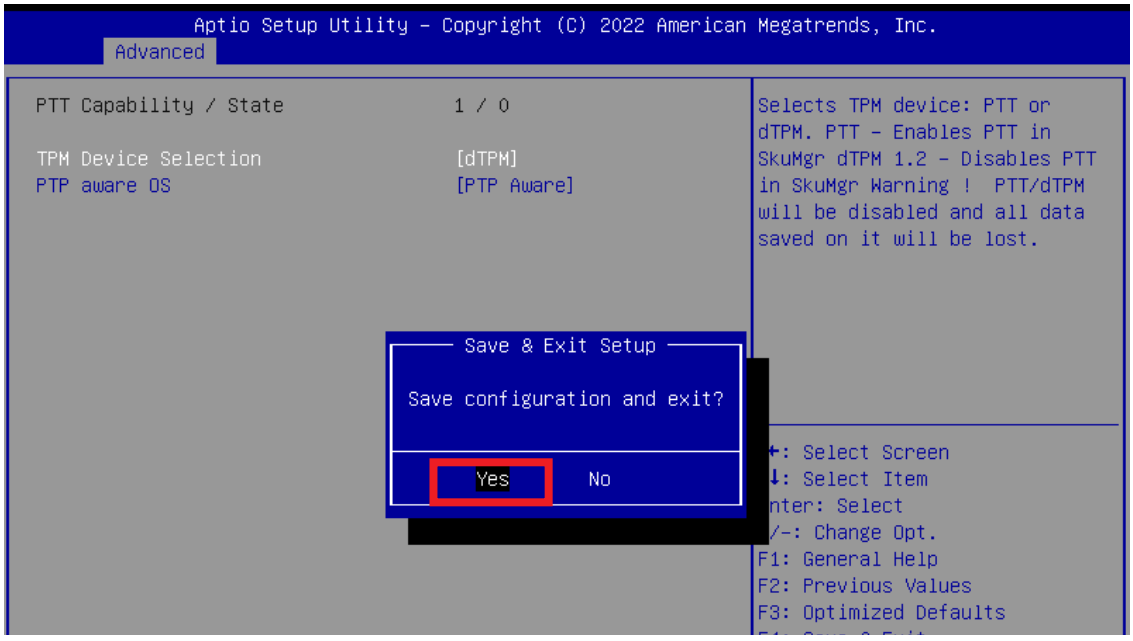


Step 3 Click on “dTPM” (TPM Device Selection)

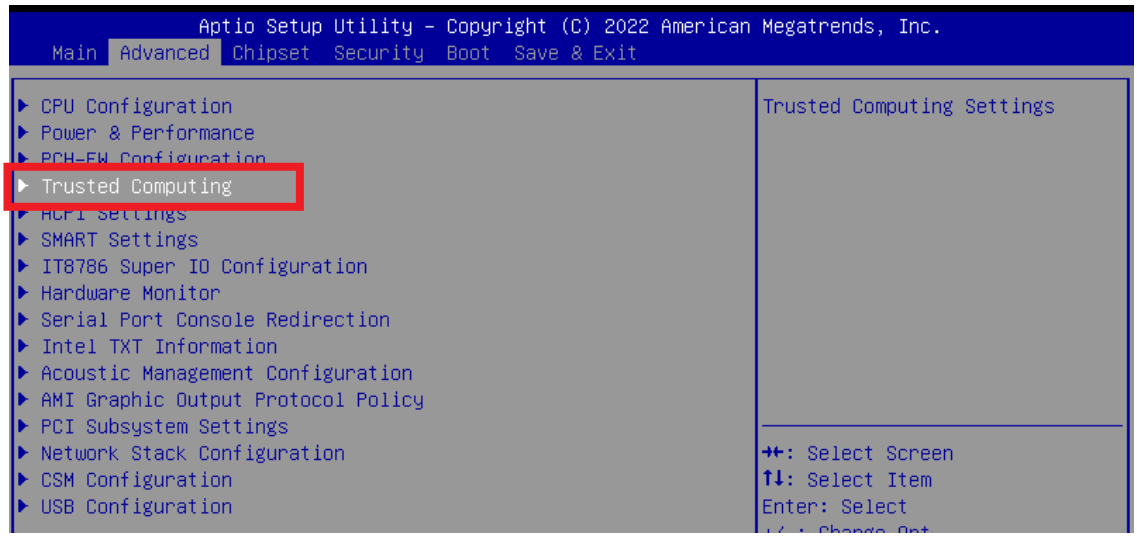




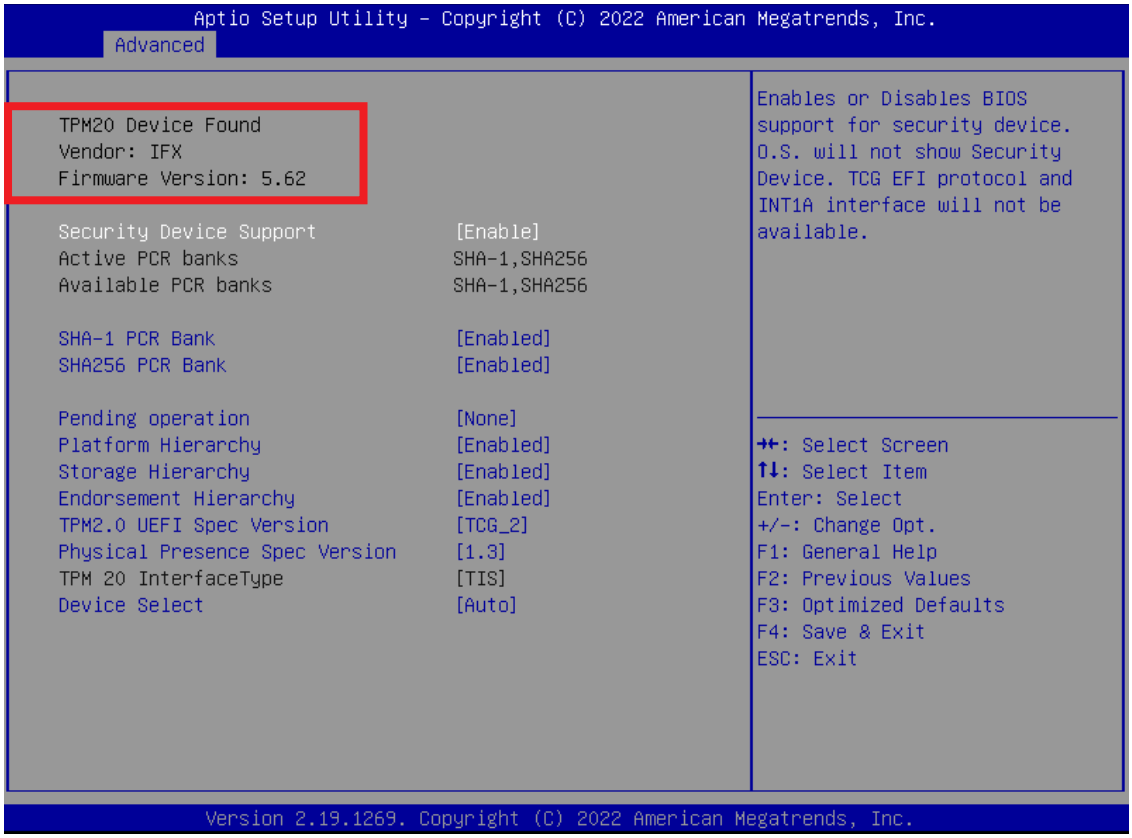
Step 4 Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks “Save configuration and exit?” appears. The computer will then restart.



Step 5 Click on “Trusted Computing”



Step 6 If the window shows “TPM2.0 Device Found Firmware Version:5.62”, then the setting is completed.



** If more help is needed, please contact Vecow technical support **

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