

SPC-6000 USER

Intel Atom® x6425RE (Elkhart Lake) Fanless Embedded System,
Ultra-Compact, Rugged, -40°C to 70°C Operation

Manual

Record of Revision

Version	Date	Page	Description	Remark
1.00	2021/05/13	All	Official Release	
1.10	2021/07/09	48, 54 ~ 61	Update	
1.20	2021/10/07	6, 62 ~ 66	Update	
1.30	2022/01/12	All	Update	
1.40	2022/10/04	68, 69, 70	Update	
1.50	2023/04/26	17	Update	
1.60	2023/07/26	2	Update	

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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

Model	GigE LAN	2.5G LAN	USB 3.1	USB 2.0	COM	SIM	DC-in
SPC-6000	1	1	2	2	4	1 (External)	12V

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-100W-12V	100W, 12V, 85V AC to 264V AC Power Adapter with 3-pin Terminal Block
M.2 Storage Module	M.2 Key M/Key B PCIe Storage Module
5G Module	5G Module with Antenna
4G Module	4G/GPS Module with Antenna
WiFi & Bluetooth	WiFi & Bluetooth Module with Antenna

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1

GENERAL INTRODUCTION

1.1 Overview

Vecow SPC-6000 is an Ultra-Compact Fanless Embedded Box PC. Featuring Quad-core Intel Atom® x6425RE Processor, compact integration, and smart manageability, Vecow SPC-6000 combines the benefits of low-power, outstanding performance and flexible capabilities to empower modern AIoT applications.

Powered by Intel Atom® x6425RE Processor, SPC-6000 is a low-power consumption fanless embedded Box PC to deliver up to 40% faster computing and up to 2X better 3D graphics performance than the former generation. SPC-6000 comes in a compact fanless design and provides rich I/O interfaces, including 1 GigE LAN, 2.5GigE LAN, 4 COM, 2 USB and 1 SIM sockets. Available with 12V DC-in and wide range temperature operation (-40°C to 70°C) Vecow SPC-6000 enables industrial-grade deployment and simplifies task-specific implementation with M.2 interfaces (Key B and Key E) for expansion. Equipped with Intel® SoC, support for DDR4 3200 MHz memory and Intel® UHD Graphics 32EU, this device delivers DVI-I and DisplayPort outputs, providing uncompromised visual performance in a compact form factor.

Vecow SPC-6000 is ideal for modern AI inferencing and computer vision applications at the edge including Smart Retail, Factory Automation, Traffic Vision, Robotic Control, and any AIoT/Industry 4.0 applications.

1.2 Features

- Quad-core Intel Atom® x6425RE processor (Elkhart Lake) delivers up to 40% faster compute and up to 2X better 3D graphics performance than the former generation solution
- Fanless, -40°C to 70°C operating temperature
- DDR4 3200MHz memory, up to 32GB
- DVI-I and DisplayPort dual display supports up to 4K resolution
- 1 Independent 2.5GigE LAN supports Intel® Time Coordinated Computing (TCC) and Time Sensitive Networking (TSN) for real-time data synchronization
- 1 Independent Gigabit Ethernet Controller supports 10/100/1000 Mbps data transfer
- 2 USB 3.1, 2 USB 2.0, 4 COM RS-232/422/485
- External Nano SIM socket supports 5G/WiFi/4G/3G/LTE/GPRS/UMTS
- 12V DC Power Input
- Supports TPM 2.0
- Optional VHub One-Stop AIoT Solution Service supports OpenVINO based AI accelerator and advanced Edge AI applications

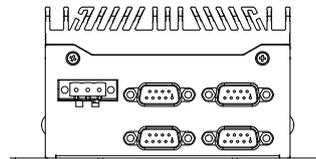
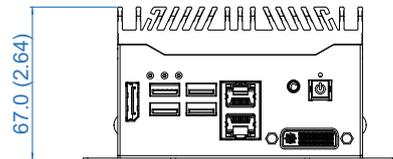
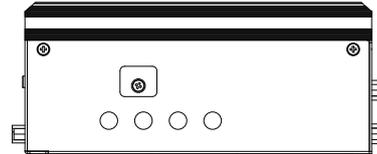
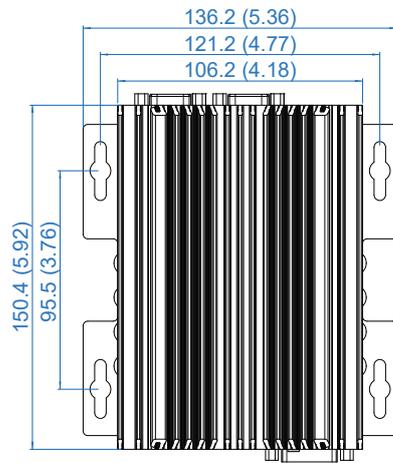
1.3 Specifications of SPC-6000

System	
Processor	Intel Atom® x6425RE Processor (Elkhart Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 3200MHz SO-DIMM, up to 32GB
OS	Windows 10, Linux
Graphics	
Processor	Intel® UHD Graphics for 10th Gen Intel® Processors
Interface	Dual Display : <ul style="list-style-type: none"> • DVI-I : Up to 3840 x 2160 @60Hz • DisplayPort : Up to 4096 x 2160 @60Hz
Ethernet	
LAN 1	Intel® Ethernet Controller I210 supports GigE LAN
LAN 2	Intel® Ethernet Controller I225 supports 2.5GigE LAN
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Line-out
Storage	
M.2	1 M.2 Key M Socket (2280, PCIe x2/SATA)
I/O Interface	
Serial	4 COM RS-232/422/485 (ESD 8kV)
USB	<ul style="list-style-type: none"> • 2 USB 3.1 (External) • 2 USB 2.0 (External)
LED	HDD, WLAN, Power, WWAN
SIM	1 External Nano SIM Card Socket
Expansion	
M.2	<ul style="list-style-type: none"> • 1 M.2 Key B Socket (3042/3052) • 1 M.2 Key E Socket (2230)
Power	
Power Input	12V DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Others	
TPM	Infineon SLB9670 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Mgmt.	Wake on LAN
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
OS	Windows 10, Linux

Mechanical	
Dimension	106.2mm x 150.4mm x 67.0 mm (4.18" x 5.92" x 2.64")
Weight	1.4 kg (3.1 lb)
Mounting	<ul style="list-style-type: none"> • Wallmount by mounting bracket • DIN Rail mount (Optional)
Environment	
Operating Temperature	-40°C to 70°C (-40°F to 157°F)
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	<ul style="list-style-type: none"> • IEC 60068-2-27 • SSD : 50G @wallmount, Half-sine, 11ms
Vibration	<ul style="list-style-type: none"> • IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN50155, EN50121-3-2

1.4 Mechanical Dimension

Unit : mm (inch)



2

GETTING TO KNOW YOUR SPC-6000

2.1 Packing List

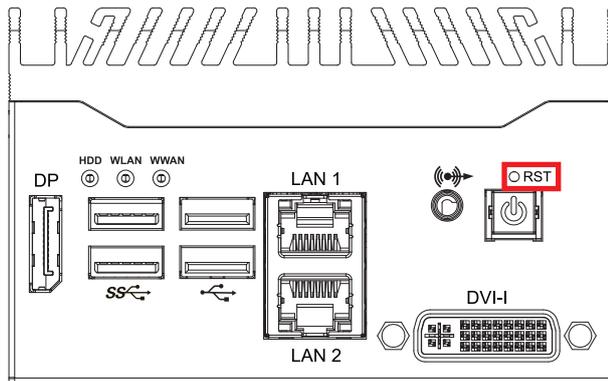
Item	Description	Qty
1	SPC-6000 Embedded System	1
2	Driver/User Manual DVD	1

Item	Description	Outlook	Usage	P/N	Qty
1	PHILLPIS M4x16L with washer, Ni		Mounting	53-24D6416-30B	4
2	PHILLPIS M3*6L		M.2	53-2426206-80B	3
3	PHILLPIS M3*4L		M.2 Extension Card	53-2426204-80B	1
4	M3x4L		Wall mount bracket	53-2466204-30B	4
5	Terminal block 3-pin (5.0mm)		DC-IN	51-2411R03-S1B	1
6	Foot Pad		Foot Pad	53-4000042-303	4
7	Wall-mounting bracket		Mount	62-03P0713-800	2
8	M.2 Extension Card		M.2 3042	62-01P0669-400	1

2.2 Front Panel I/O & Functions

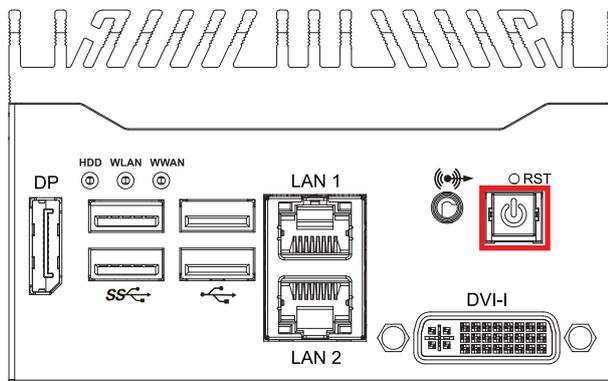
In Vecow's SPC-6000 series family, all I/O connectors are located on the front panel. Most of the general connections to the computer device, such as Display port, USB 3.2, USB 2.0, LAN Jack, Audio Jack and DVI-I, are placed on the front panel.

2.2.1 Reset Tact Switch



It is a hardware reset switch. Use this switch to reset the system without power off the system. Press the Reset Switch for a few seconds, and then reset will be enabled.

2.2.2 Power Button

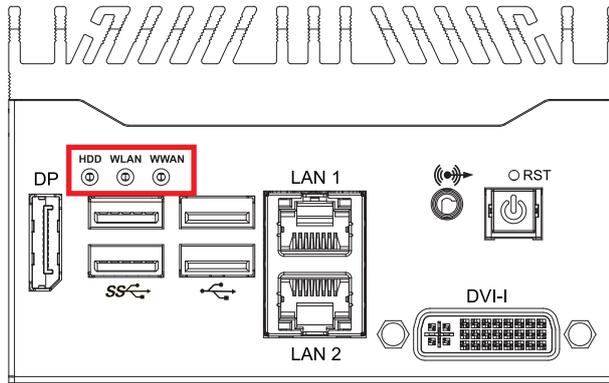


The Power Button is a non-latched switch with dual color LED indication. It indicates power status : S0, S3 and S5. More detail LED indications are listed as follows :

LED Color	Indication	System Status
Solid Blue	S0	System working
Solid Orange	S3, S5	Suspend to RAM, System off with standby power

To power on the system, 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 and then the Orange LED is lightened. 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)

2.2.3 HDD, WWAN, WLAN LED Indicator



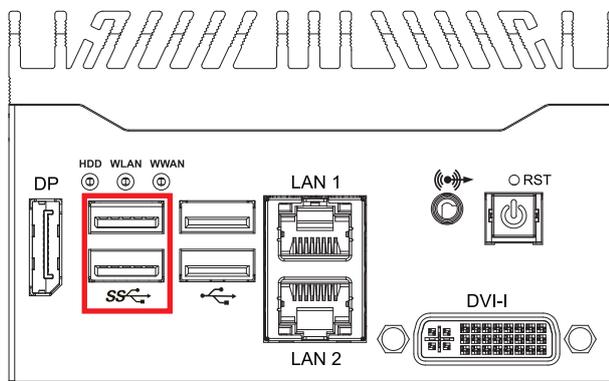
Orange-HDD LED : If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

Green-WWAN LED : If the LED is solid green, it indicates that the device on M2 key-B Socket is working.

Green-WLAN LED : If the LED is solid green, it indicates that the device on M2 key-E Socket is working.

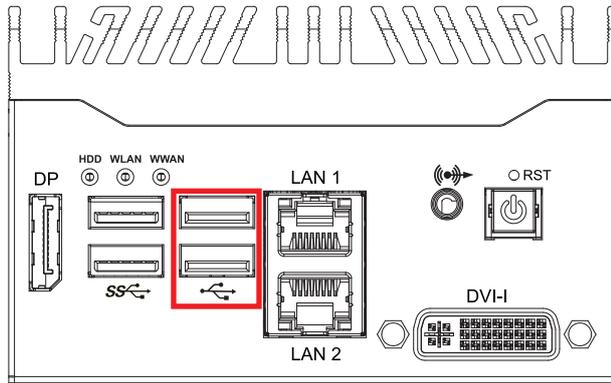
LED Color	Indication	System Status
Orange	HDD	<ul style="list-style-type: none"> On/Off : Storage status, function or not. Twinkling : Data transferring.
Green	HDD	Device is working or not
Green	HDD	Device is working or not

2.2.4 USB 3.2 Gen1



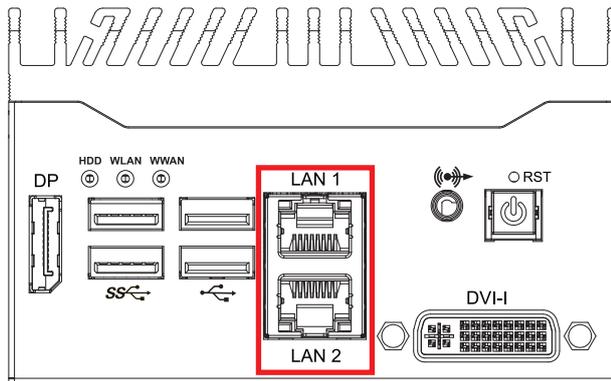
There are 2 USB 3.2 Gen1 connections available supporting up to 5GB per second data rate in the front side of SPC-6000. It is also compliant with the requirements of Super Speed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.5 USB 2.0



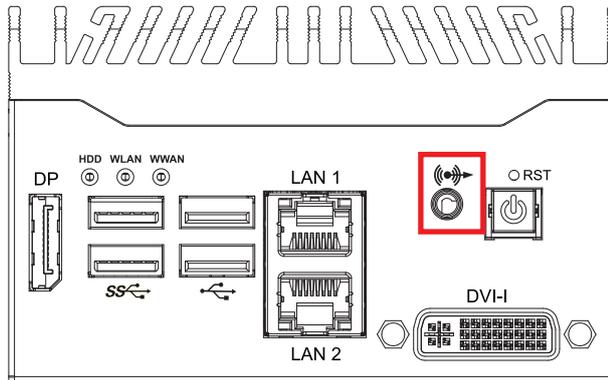
There are 2 USB 2.0 ports available supporting up to 480MB per second data rate in the front side of SPC-6000. They are also compliant with the requirements of high speed (HS), full speed (FS) and low speed (LS).

2.2.6 10/100/1000/2500 Mbps Ethernet Port



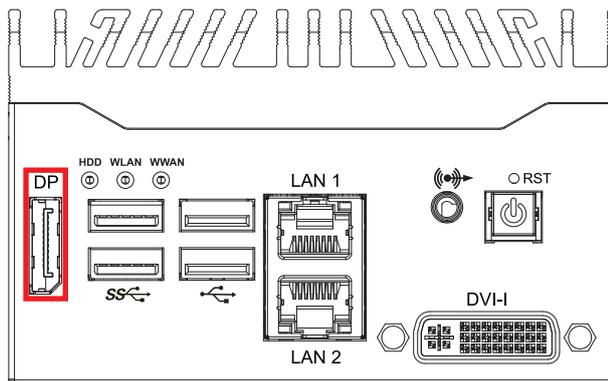
There are two 8-pin RJ-45 jacks supporting 10/100/1000/2500 Mbps Ethernet connections in the front side. LAN 2 at low side is powered by Intel® i225-IT Ethernet engine; LAN 1 at upper side is powered by Intel® i210-IT. When both of LANs work in normal status, iAMT function is enabled. Using suitable 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 of LANs support Wake on LAN and Pre-boot functions.

2.2.7 Audio Jack (Line-out only)



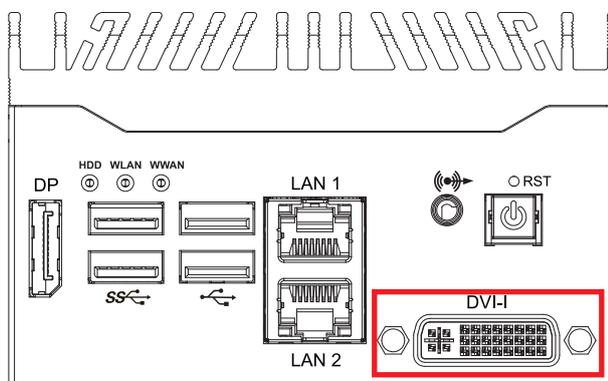
There is a Line-out only connectors which in the front side of SPC-6000. Onboard Realtek ALC888S-VD audio codec supports 7.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications. To utilize the audio function in Windows platform, you need to install corresponding drivers for Realtek ALC888S-VD codec.

2.2.8 Display Port



Display Port connection supports up to 4096 x 2160 resolution at 60Hz

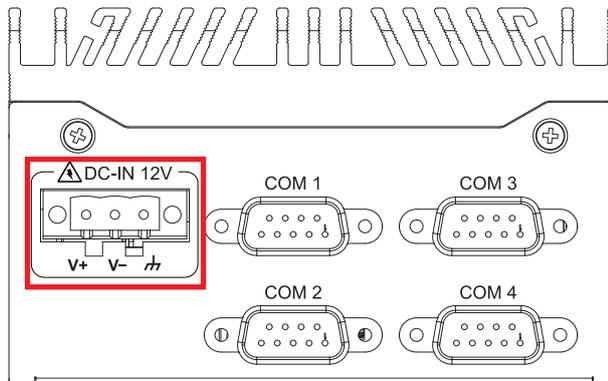
2.2.9 DVI-I



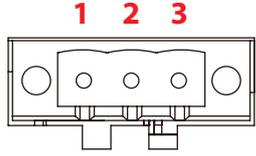
The DVI-I connector on the front panel supports both DVI and VGA display modes. This connector can output DVI or VGA signals. The DVI output mode supports up to 1920x1080 resolution. The DVI mode is automatically selected according to the display device connected. You will need a DVI-I cable when connecting to a display device. The VGA output mode supports up to 1920x1080 resolution.

2.3 Rear Panel I/O & Functions

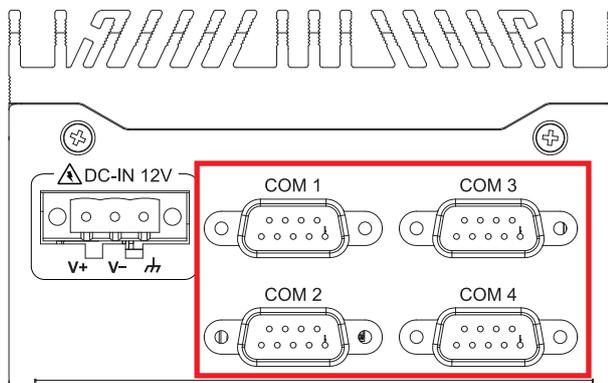
2.3.1 Power Terminal Block



This system supports 12V only DC power input by terminal block in the rear side.

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

2.3.2 Serial Port COM

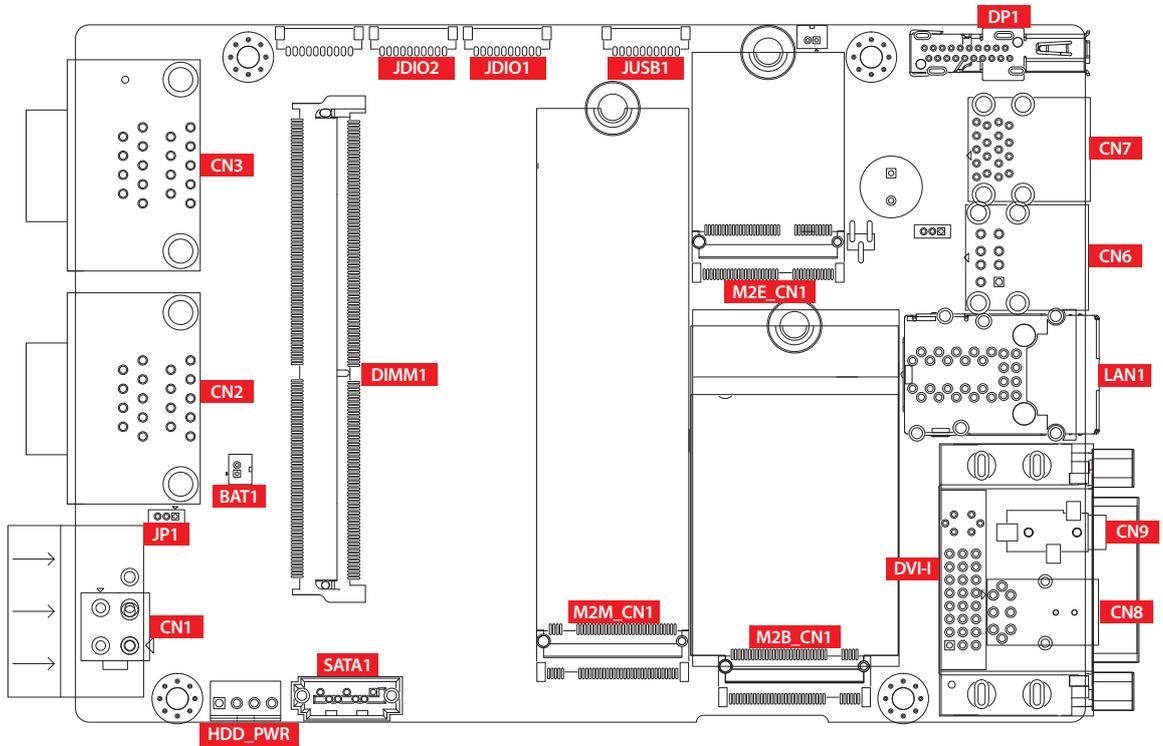


Serial port can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition is RS-232, but if you want to change to RS-422 or RS-485, you can find the settings in BIOS.

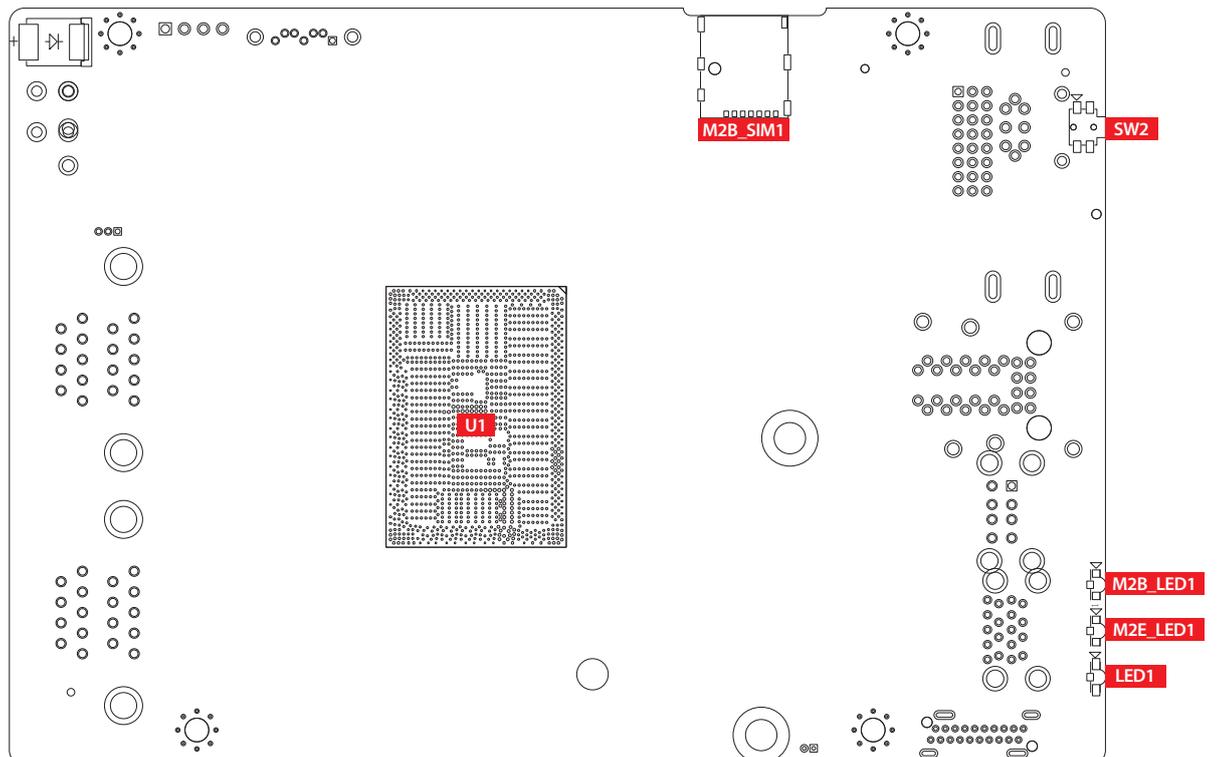
BIOS Setting	Function
COM 1 COM 2 COM 3 COM 4	RS-232
	RS-422 (5-wire)
	RS-422 (9-wire)
	RS-485
	RS-485 w/z auto-flow control

2.4 Connector/Jumper Locations

2.4.1 SPC-6000 Main Board Top Side View

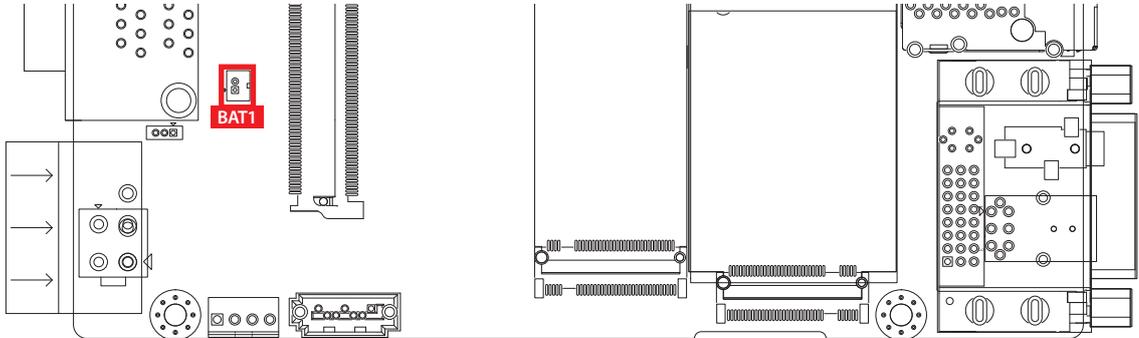


2.4.2 SPC-6000 Main Board Bottom Side View



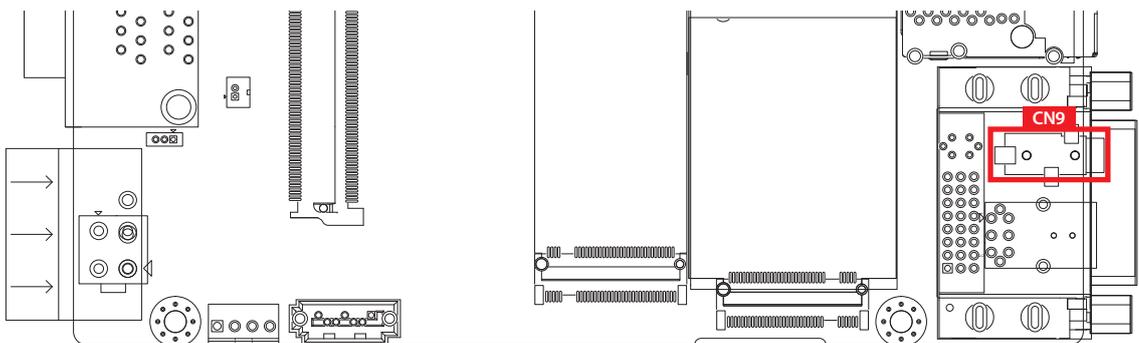
2.4.3 BAT : Battery

The SPC-6000 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.



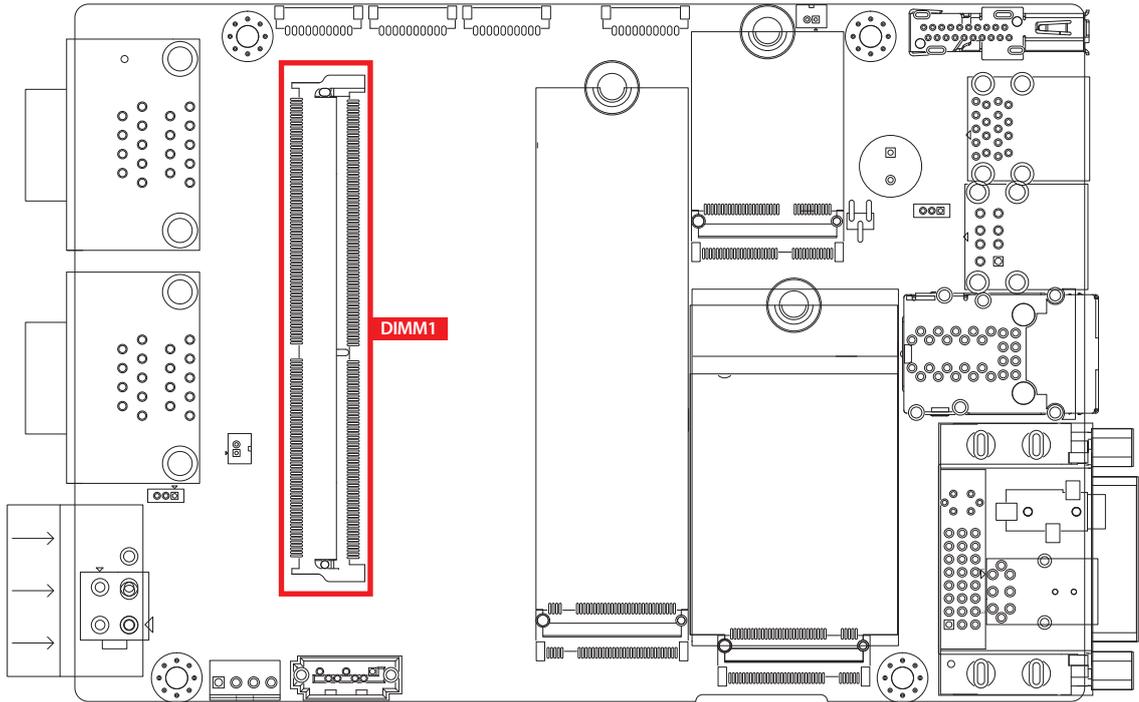
	Pin No.	Function
	1	+3V_BAT
	2	GND

2.4.4 CN9 : Audio Jack



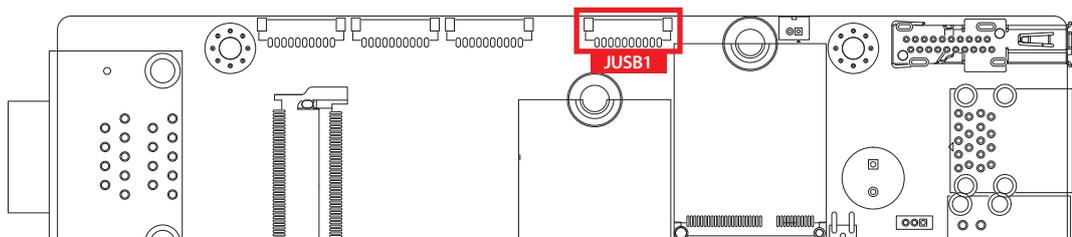
There is a audio line out connectors in the top side of SPC-6000. Onboard Realtek ALC888S-VD audio codec supports 7.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications. To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel® Eikhart Lake and Realtek ALC888SVD codec. Please refer to Chapter 4 for more details of driver installation.

2.4.5 DIMM1 : DDR4 Slot

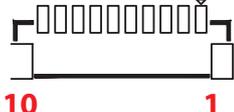


There is a DDR4 channel onboard, support DDR4 3200, max 32GB.

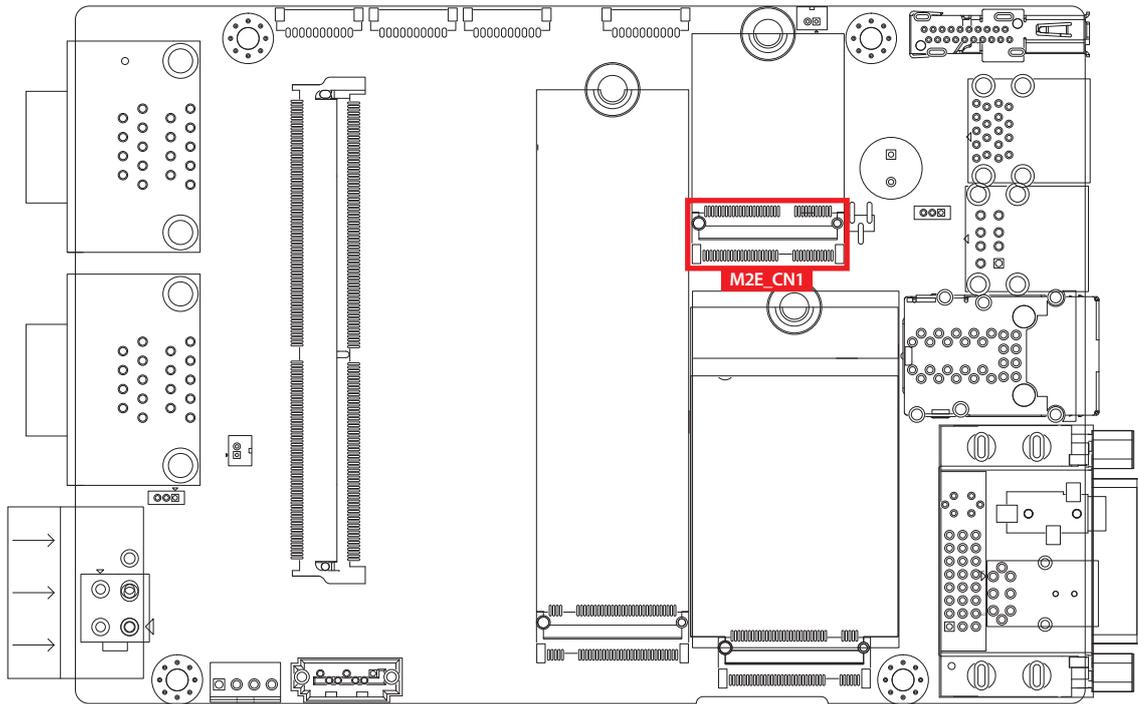
2.4.6 JUSB1 : Internal USB 2.0 Connector



The SPC-6000 series main board provides two 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 and is listed in the following table :

	Pin No.	Definition	Pin No.	Definition
	1	USB_VCC	2	USB_VCC
	3	USB_VCC	4	USB_D_6N
	5	USB_D_6P	6	USB_D_7N
	7	USB_D_7P	8	GND
	9	GND	10	GND

2.4.7 M2E_CN1 : M.2 key E Slot for USB 2.0, PCIe Gen3x1 support

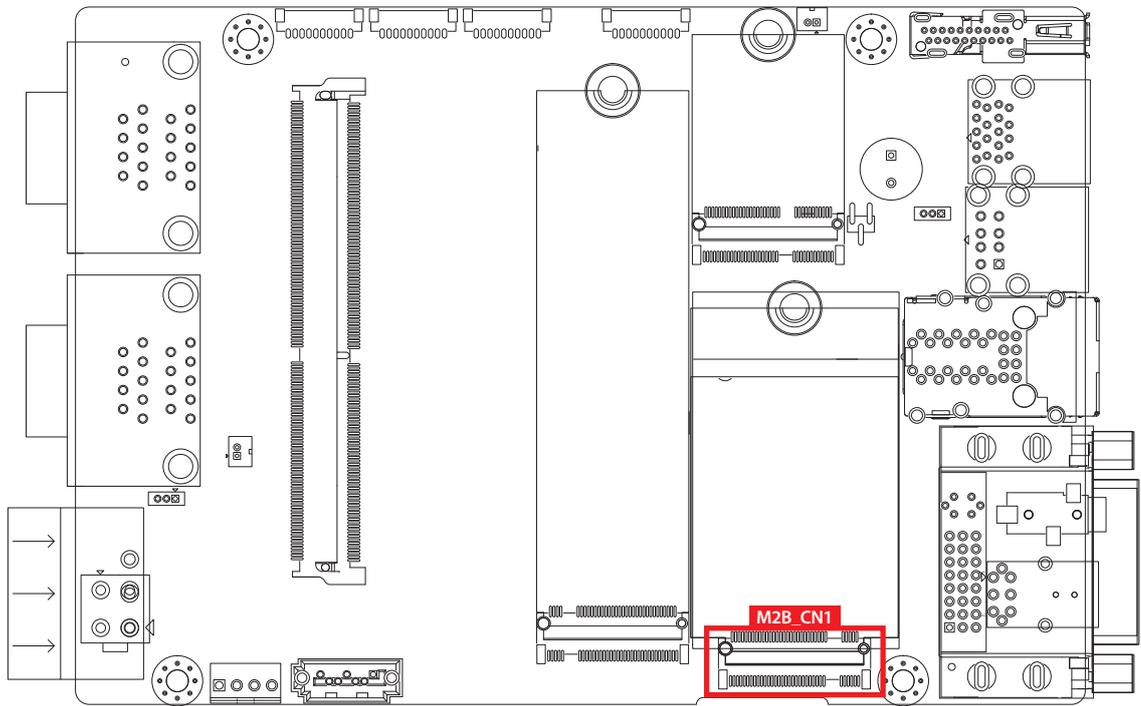


M.2 key E connector is suitable for applications that use wireless connectivity including Wi-Fi, Bluetooth, NFC or GNSS. Module card types include 2230. The pin assignments of M2E_CN1 are listed in the following table :

Pin No.	Signal Name	Pin No.	Signal Name
74	3.3V	75	GND
72	3.3V	73	NC
70	NC	71	NC
68	NC	69	GND
66	NC	67	NC
64	NC	65	NC
62	ALERT# (O)(0/3.3V)	63	GND
60	12C_CLK (I)(0/3.3V)	61	NC
58	12C_DATA (I/O)(0/3.3V)	59	NC
56	NC	57	GND
54	NC	55	PEWAKE0# (I/O)(0/3.3V)
52	PERST0# (I)(0/3.3V)	53	CLKREQ0# (I/O)(0/3.3V)
50	NC	51	GND
48	NC	49	REFCLKn0

Pin No.	Signal Name	Pin No.	Signal Name
46	NC	47	REFCLKp0
44	NC	45	GND
42	NC	43	PERn0
40	NC	41	PERp0
38	NC	39	GND
36	NC	37	PETn0
34	NC	35	PETp0
32	NC	33	GND
	Module Key		Module Key
	Module Key		Module Key
	Module Key		Module Key
	Module Key		Module Key
22	NC	23	NC
20	NC	21	NC
18	NC	19	NC
16	LED2# (O)(od)	17	NC
14	NC	15	NC
12	NC	13	NC
10	NC	11	NC
8	NC	9	NC
6	LED1# (O)(od)	7	GND
4	3.3V	5	USB_D-
2	3.3V	3	USB_D+
		1	GND

2.4.8 M2B_CN1 : M.2 key B Slot for PCIe Gen3x2 or USB 3.2 Gen1 support (Option by BIOS setting)

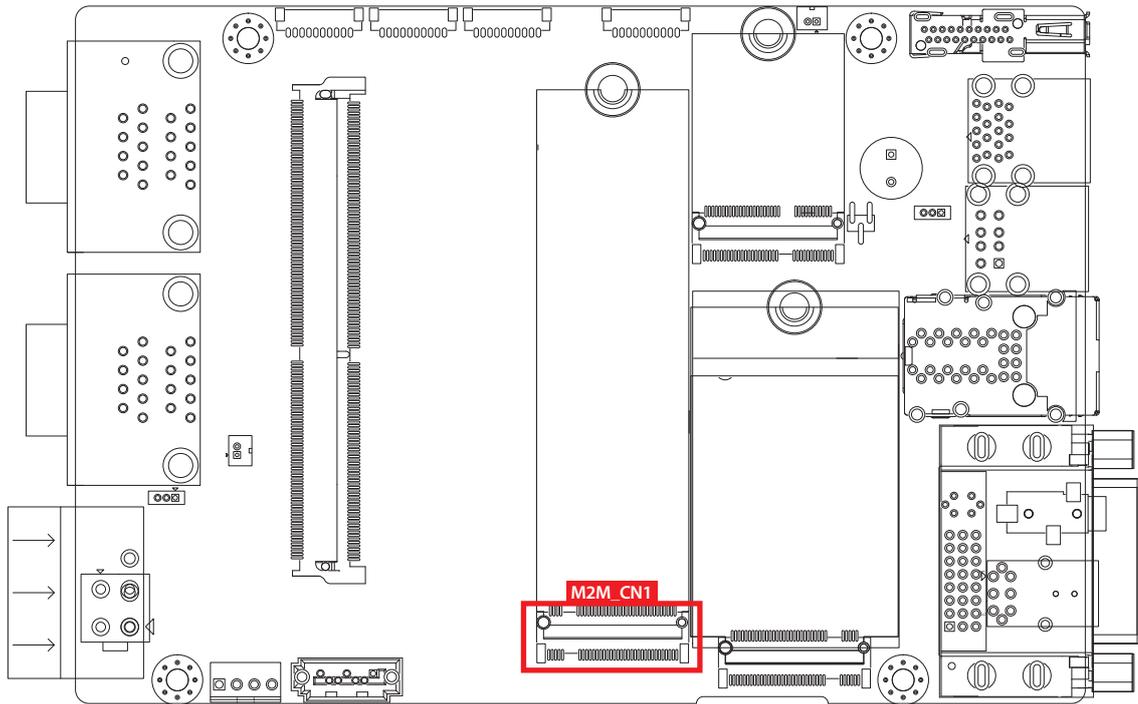


M.2 key B connector is suitable for applications that use wireless connectivity including LTE/5G module, and NVMe SSD (BW : PCIe x2) that types include 3042/3052. The pin assignments of M2B_CN1 are listed in the following table :

Pin No.	Signal Name	Pin No.	Signal Name
74	3.3V	75	NC
72	3.3V	73	GND
70	3.3V	71	GND
68	NC	69	CONFIG_1
66	SIM DETECT	67	NC
64	NC	65	NC
62	NC	63	NC
60	NC	61	NC
58	NC	59	NC
56	NC	57	GND
54	PEWAKE#	55	REFCLKp
52	CLKREQ#	53	REFCLKn
50	PERST#	51	GND

Pin No.	Signal Name	Pin No.	Signal Name
48	NC	49	PETp0
46	NC	47	PETn0
44	NC	45	GND
42	NC	43	PERp0
40	NC	41	PERn0
38	DEVSLP	39	GND
36	UIM-PWR	37	PETp1/USB3.1-TX+
34	UIM-DATA	35	PETp1/USB3.1-TX-
32	UIM-CLK	33	GND
30	UIM-RESET	31	PETp1/USB3.1-RX+
28	NC	29	PETp1/USB3.1-RX-
26	NC	27	GND
24	NC	25	NC
22	NC	23	NC
20	NC	21	NC
18	Module Key	19	Module Key
16	Module Key	17	Module Key
14	Module Key	15	Module Key
12	Module Key	13	Module Key
10	LED_1#	11	GND
8	W_DISABLE1	9	USB-
6	FULL_CARD_PWR_OFF/ON	7	USB+
4	3.3V	5	GND
2	3.3V	3	GND
		1	NC

2.4.9 M2M_CN1 : M.2 KEY M : PCIe x2/SATA Support

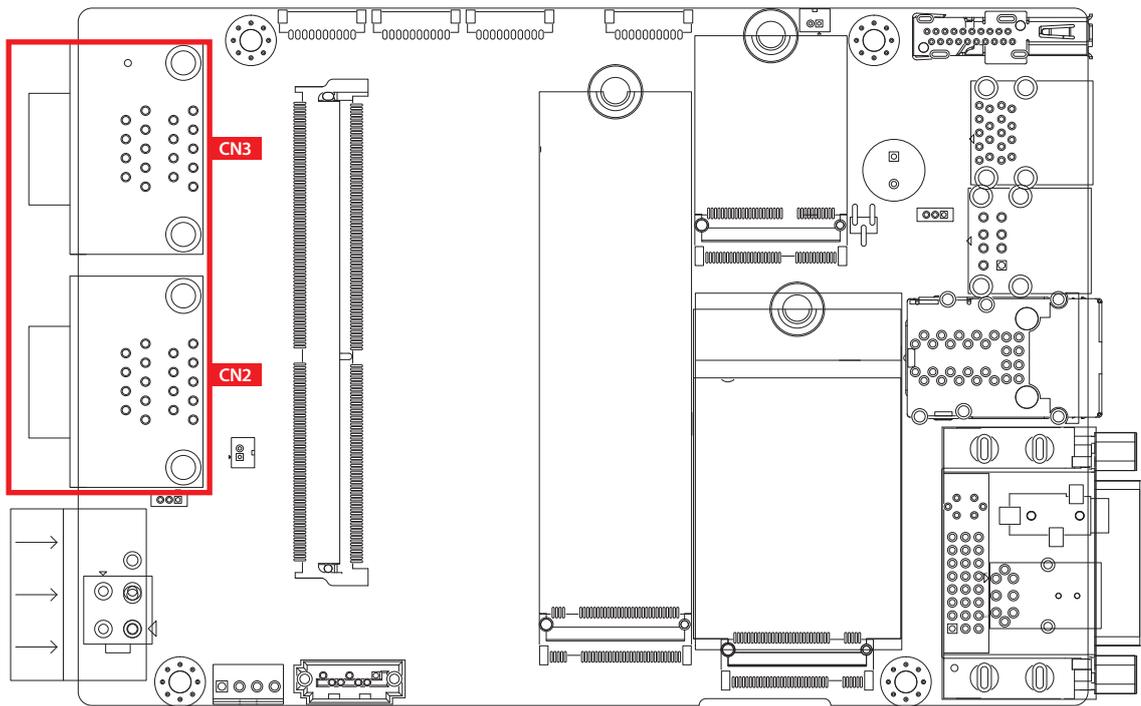


M.2 key M connector is suitable for applications that use Host I/Fs supported by either PCIe or SATA, or Solid State Storage Devices (SSD). Module card types include 2280.

Pin No.	Signal Name	Pin No.	Signal Name
74	3.3V	75	GND
72	3.3V	73	GND
70	3.3V	71	GND
68	NC	69	PEDET (NC-PCIe/GND-SATA)
66	Module Key	67	Module Key
64	Module Key	65	Module Key
62	Module Key	63	Module Key
60	Module Key	61	Module Key
58	NC	59	Module Key
56	NC	57	GND
54	PEWAKE#	55	REFCLKp
52	CLKREQ#	53	REFCLKn
50	PERST#	51	GND

Pin No.	Signal Name	Pin No.	Signal Name
48	NC	49	PETp0/SATA-A+
46	NC	47	PETp0/SATA-A-
44	NC	45	GND
42	NC	43	PERp0/SATA-B-
40	NC	41	PERp0/SATA-B+
38	DEVSLP	39	GND
36	NC	37	PETp1
34	NC	35	PETn1
32	NC	33	GND
30	NC	31	PERp1
28	NC	29	PERn1
26	NC	27	GND
24	NC	25	NC
22	NC	23	NC
20	NC	21	GND
18	3.3V	19	NC
16	3.3V	17	NC
14	3.3V	15	GND
12	3.3V	13	NC
10	LED1# (I)(0/3.3V)	11	NC
8	NC	9	GND
6	NC	7	NC
4	3.3V	5	NC
2	3.3V	3	GND
		1	GND

2.4.10 CN2, CN3 : Serial Port

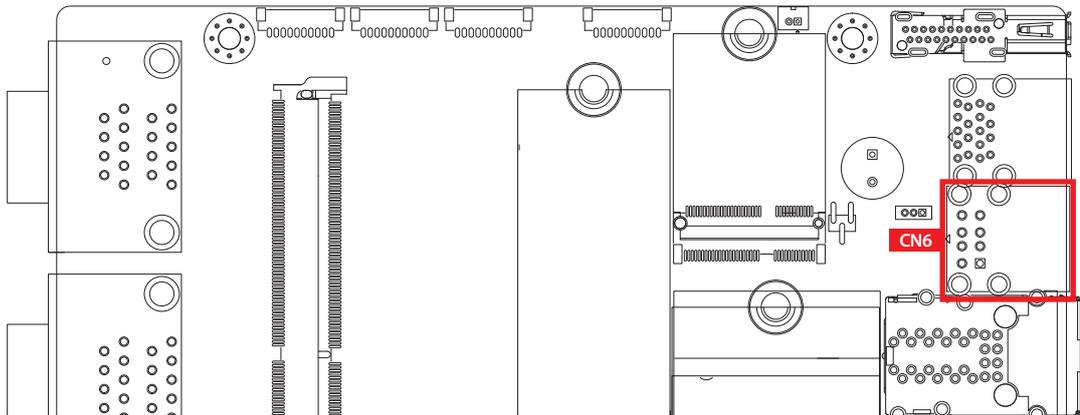


CN2 and CN3 can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition is RS-232, if you want to change to RS-422 or RS-485, you can find the setting in BIOS.

The pin assignments are listed in the following table :

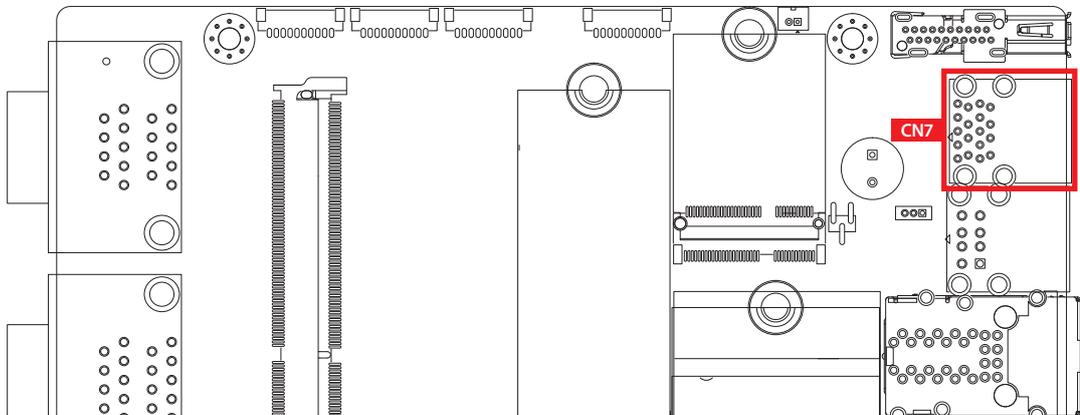
Serial Port	Pin No.	RS-232	RS-422 (5-wire)	RS-422 (9-wire)	RS-485 (3-wire)
CN2 CN3	1	DCD	TXD-	TXD-	DATA-
	2	RXD	TXD+	TXD+	DATA+
	3	TXD	RXD+	RXD+	-----
	4	DTR	RXD-	RXD-	-----
	5	GND	GND	GND	GND
	6	DSR	-----	RTS-	-----
	7	RTS	-----	RTS+	-----
	8	CTS	-----	CTS+	-----
	9	RI	-----	CTS-	-----

2.4.11 CN6 : External USB 2.0 Connector



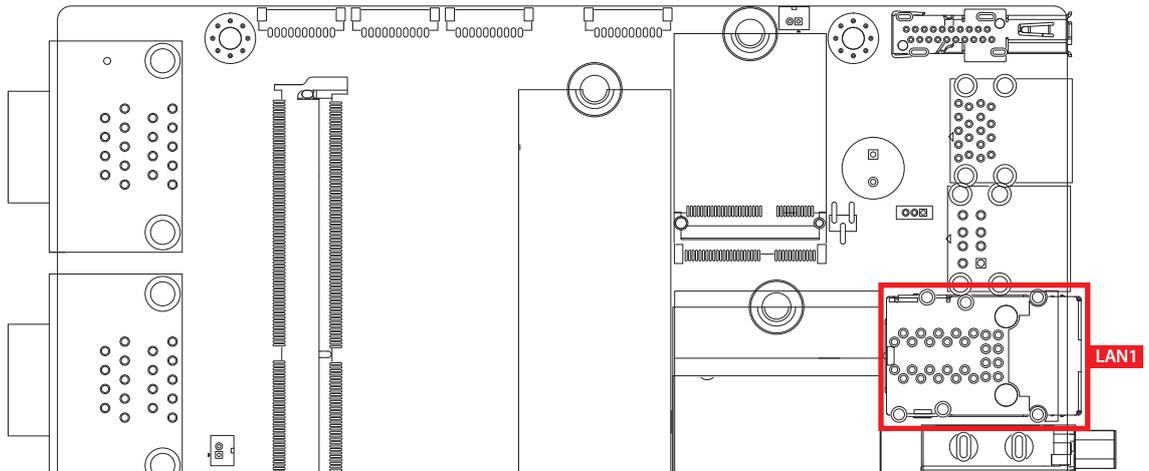
There are 2 USB 2.0 ports available supporting up to 480MB per second data rate in the front side of SPC-7000 series. They are also compliant with the requirements of high speed (HS), full speed (FS) and low speed (LS).

2.4.12 CN7 : External USB 3.2 Gen1 Connector



There are 2 USB 3.2 Gen1 connections available supporting up to 5GB per second data rate in the top side of SPC-6000 series. They are also compliant with the requirements of SuperSpeed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.4.13 LAN1 : LAN Connector



There are two 8-pin RJ-45 jacks supporting 10/100/1000/2500 Mbps Ethernet connections in the top side. LAN1 at low side is powered by Intel® i210-IT Ethernet engine; LAN2 at upper side is powered by Intel® i225-IT. When both of LANs work in normal status, iAMT function is enabled. 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 of LANs support Wake on LAN and Pre-boot functions.

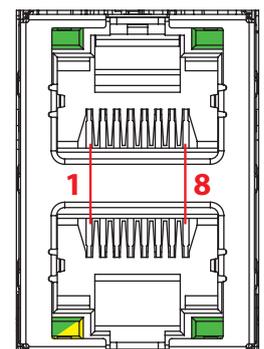
The pin-outs of LAN 1 and LAN 2 are listed as follows :

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

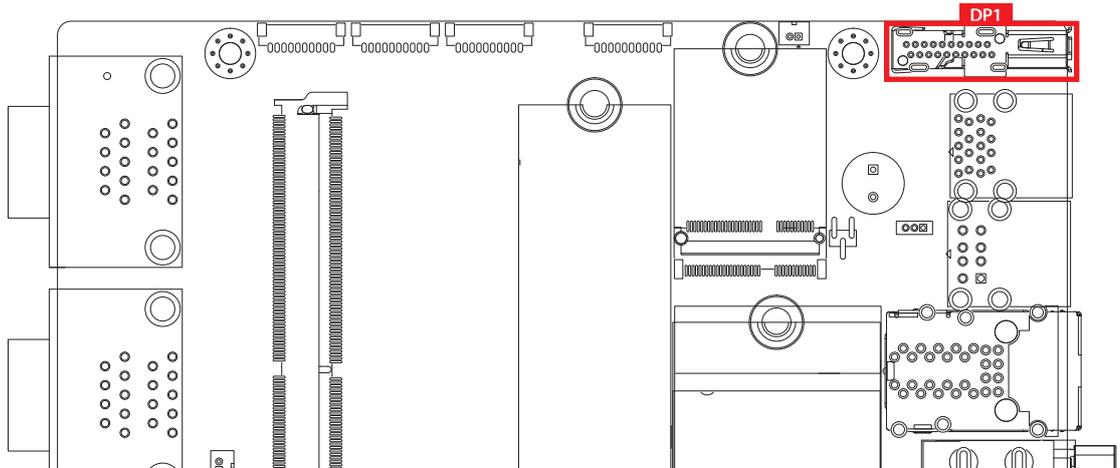
Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/Link/Speed status of the connection. The LED indicator on the left side lightens in solid green when the cable is properly connected to a 1000Mbps Ethernet network; The LED indicator on the left side lightens in solid Yellow when the cable is properly connected to a 2500Mbps Ethernet network; The left LED will keep twinkling/off when Ethernet data packets are being transmitted/receive

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

LED Location	LED Color	10/100Mbps	1000Mbps	2500Mbps
Left	Green/ Yellow	Off	Solid Green	Solid Yellow
Right	Green	Twinkling Green	Twinkling Green	Twinkling Green

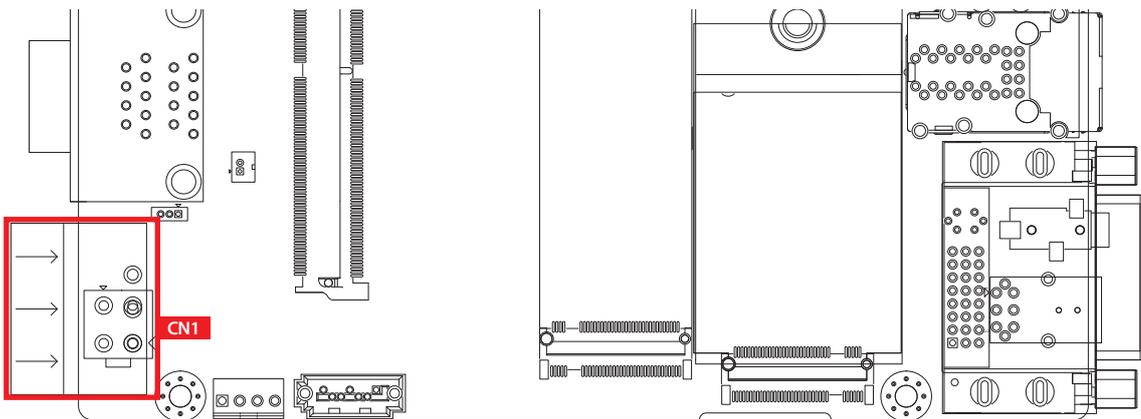


2.4.14 DP1 : Display port



SPC-6000 support a Display Ports and up to 4096 x 2304 pixels resolution.

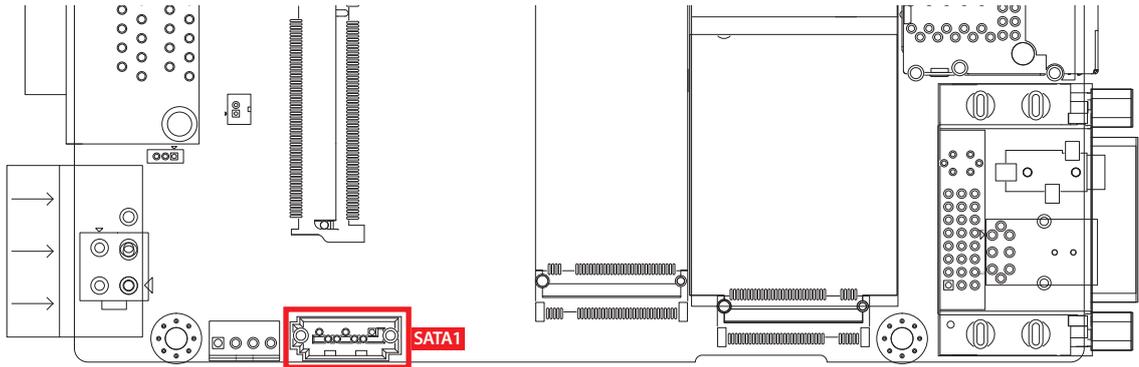
2.4.15 CN1 : DC Power Input



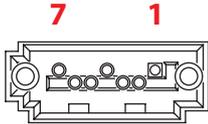
SPC-6000 supports 12V DC power input by wire-to-board connector in the top side.

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

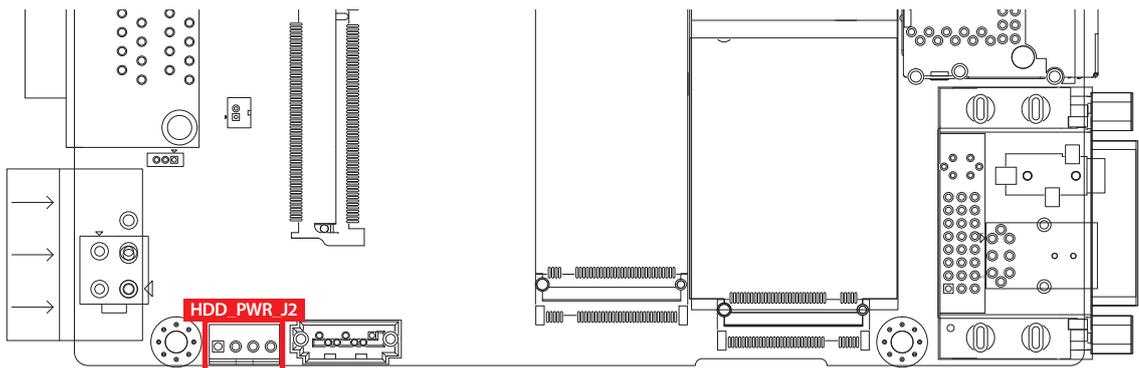
2.4.16 SATA1 : SATA III Connector



There are two high performance Serial ATA III (SATA III) on the SPC-6000 series. They support higher storage capacity with less cabling effort and smaller required space. The pin assignments of SATA1 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		

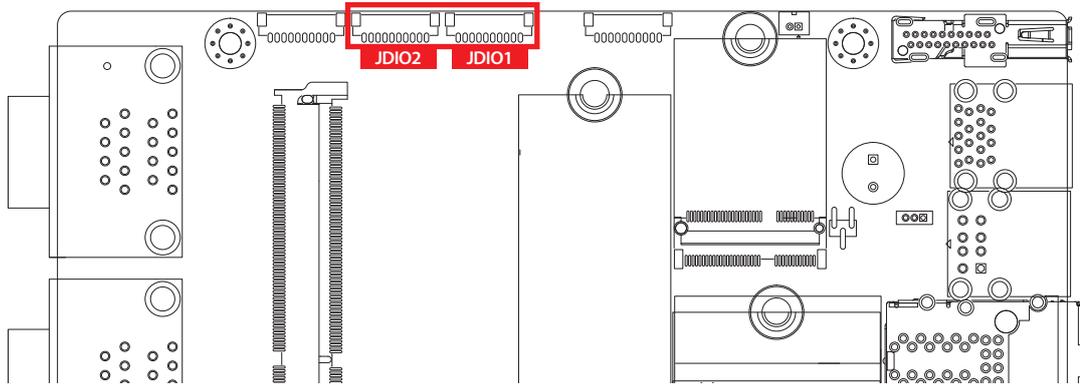
2.4.17 HDD_PWR_J2 : SATA Power Connector



The SPC-6000 series is also equipped with one SATA power connector. It supports 5V (Up to 2A) and 12V (Up to 2A) currents to the hard drive or SSD. The pin assignments of HDD_PWR_J2 is listed in the following table :

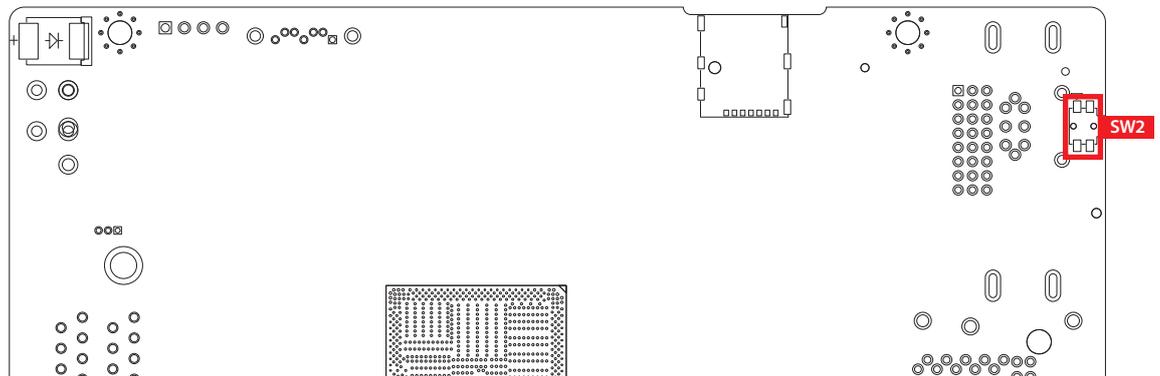
	Pin No.	Definition	Pin No.	Definition
	1	+12V	2	GND
	3	GND	4	+5V

2.4.18 JDIO1, JDIO2 : 8bit-in 8bit-out GPIO Header (only support 3.3V)



	Pin No.	JDIO1 Definition	JDIO2 Definition
	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	

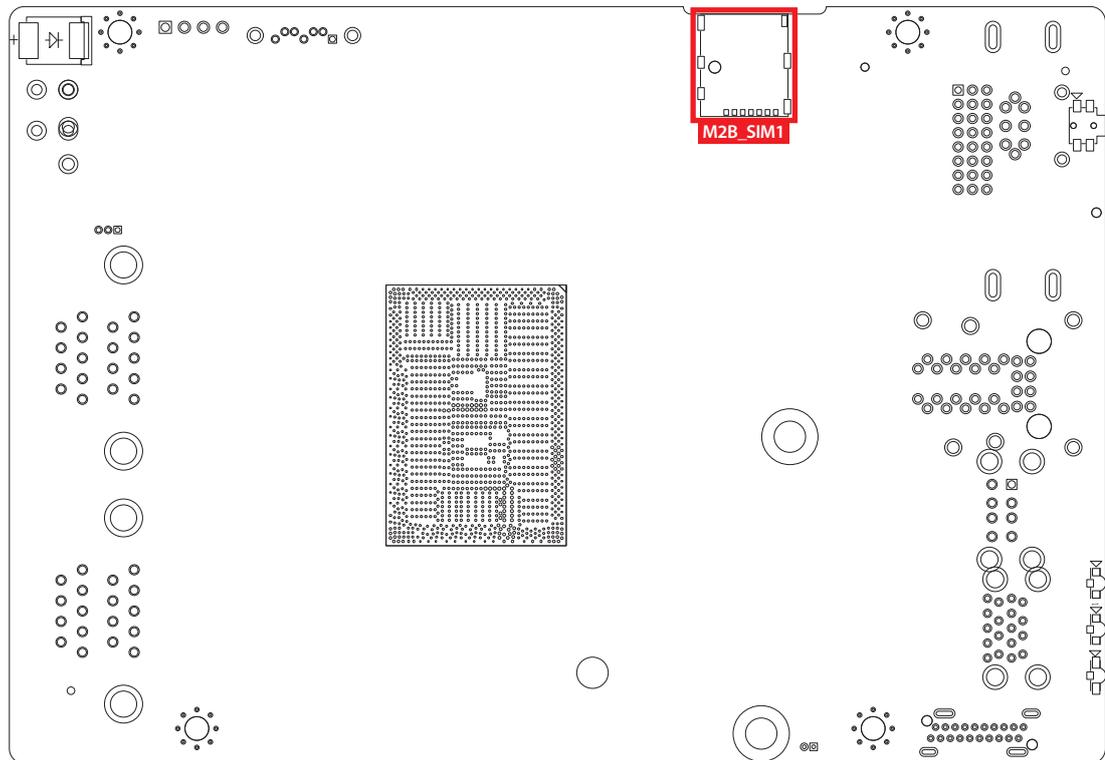
2.4.19 SW2 : RESET Button



Pin assignment as the following table :

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

2.4.20 M2B_SIM1 : Nano SIM Card Socket for M.2 key B Slot

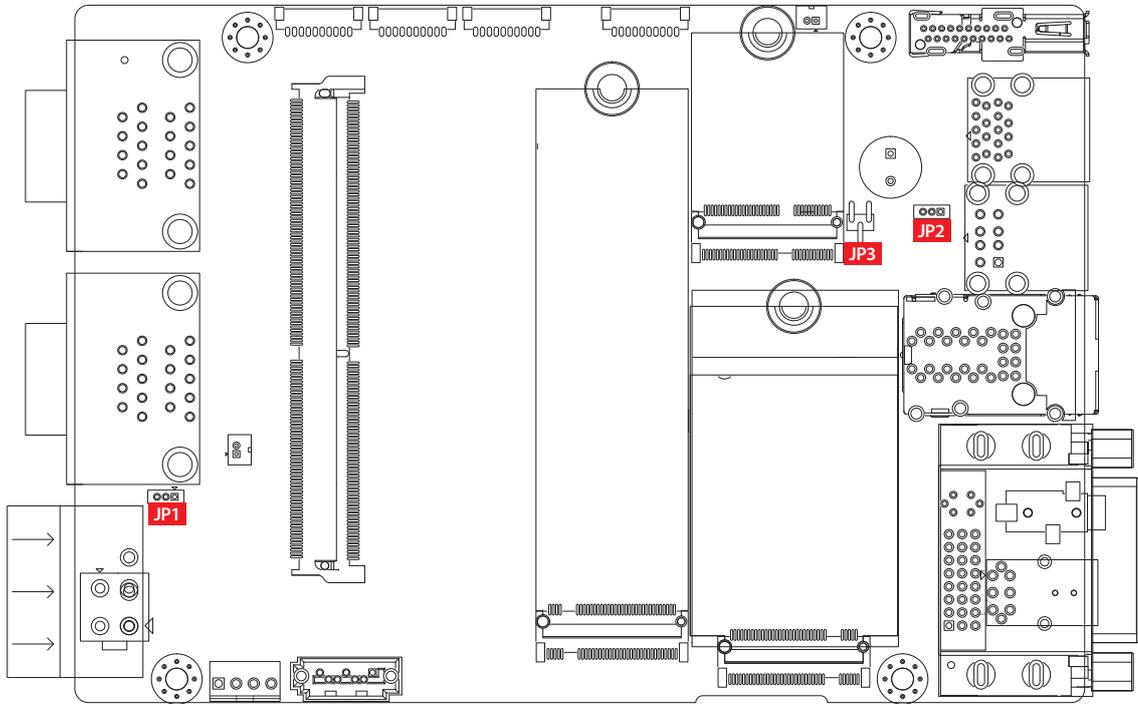


The Nano SIM card socket is support Push-Push type. Please make sure to unplug the system power before inserting the Nano SIM card.

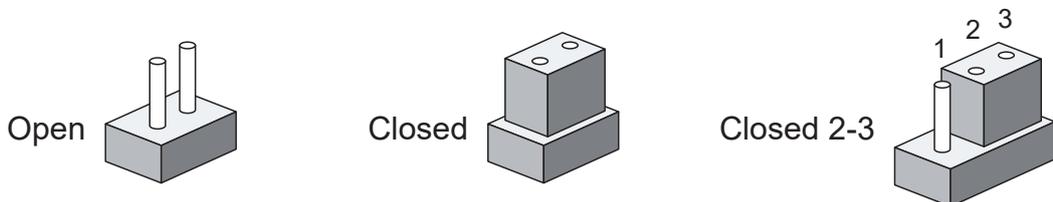
2.5 Main Board Jumper Settings

2.5.1 Top View of SPC-6000 Main Board With Jumper Location

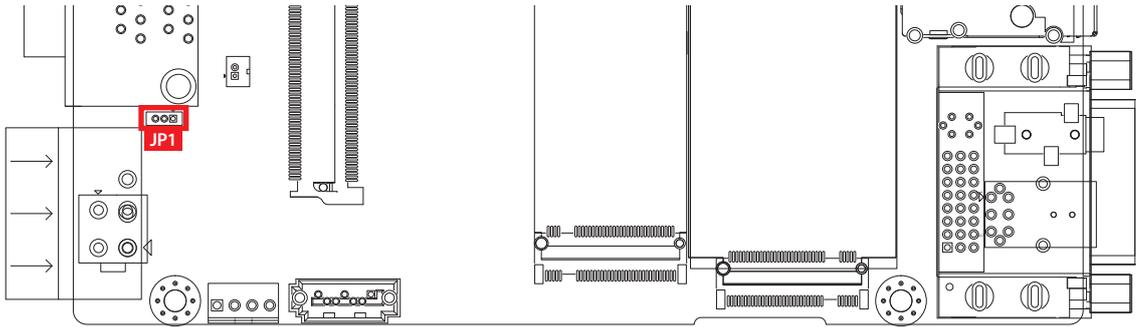
The figure below is the top view of the SPC-6000 main board. It shows the location of the jumpers



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.

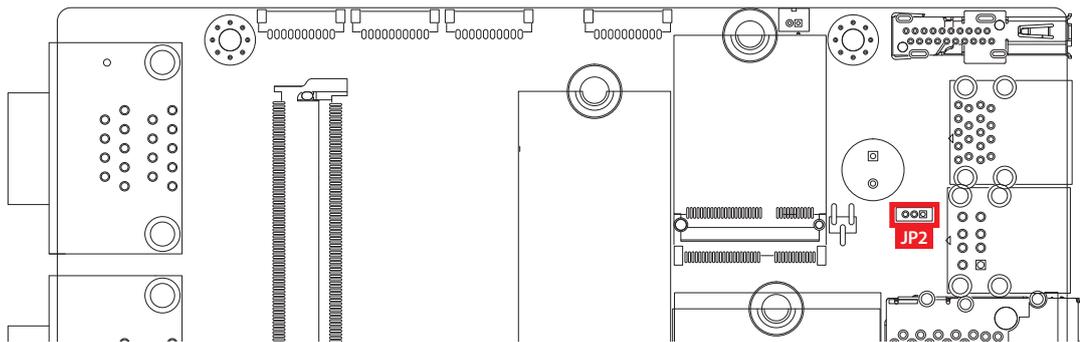


2.5.2 JP1 : Clear CMOS



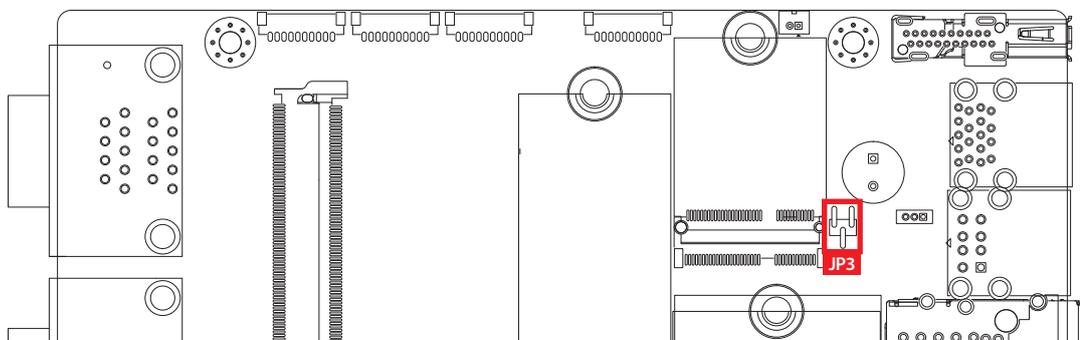
		Pin No.	Definition
1		3	
		1-2	Normal (default)
		2-3	Clear CMOS

2.5.3 JP2 : Power Selection for EXT and INT USB 3.2 Gen1/USB 2.0 Ports



		Pin No.	Definition
1		3	
		1-2	+5V Standby Power (default)
		2-3	+5V System Power

2.5.4 JP3 : I225 SPI Flash Security



		Pin No.	Definition
1		3	
		1-2	enable (default)
		2-3	disable

3

SYSTEM SETUP

3.1 How to Open Your SPC-6000

Step 1 Turn SPC-6000 bottom side up to remove two M3 screws.



Step 2 Remove the bottom cover.



3.2 Installing DDR4 SO-DIMM Modules

Step 1 Find DDR4 SO-DIMM socket.



Step 2 Install DDR4 RAM module into SO-DIMM socket.



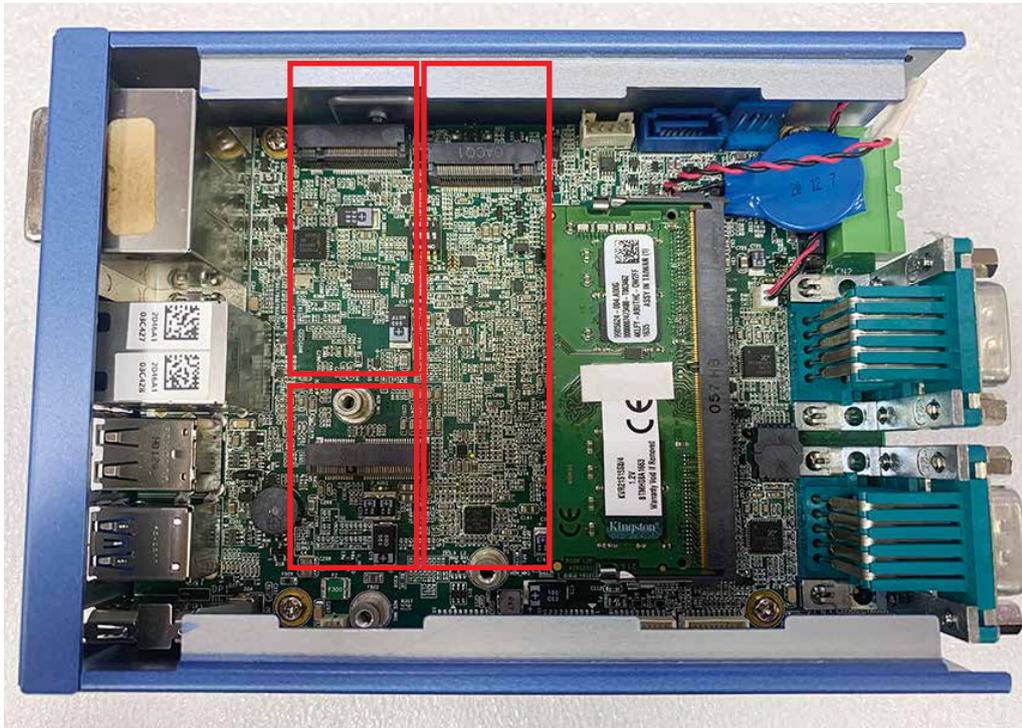
Step 3 Finished.



3.3 Installing M.2

3.3.1 Key E, Key M, Key B 3052

Step 1 Install M.2 into the M.2 slot.



Step 2 Fasten a PHILLIPS M3 screw.



3.3.2 Key B 3042

Install M.2 into the M.2Tary, and fasten one PH-M3x4L screw.



3.4 Installing SIM Card

Step 1 Open the SIM card cover.



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



3.5 Installing Antenna Cable

Step 1 Check antenna cable and washers.

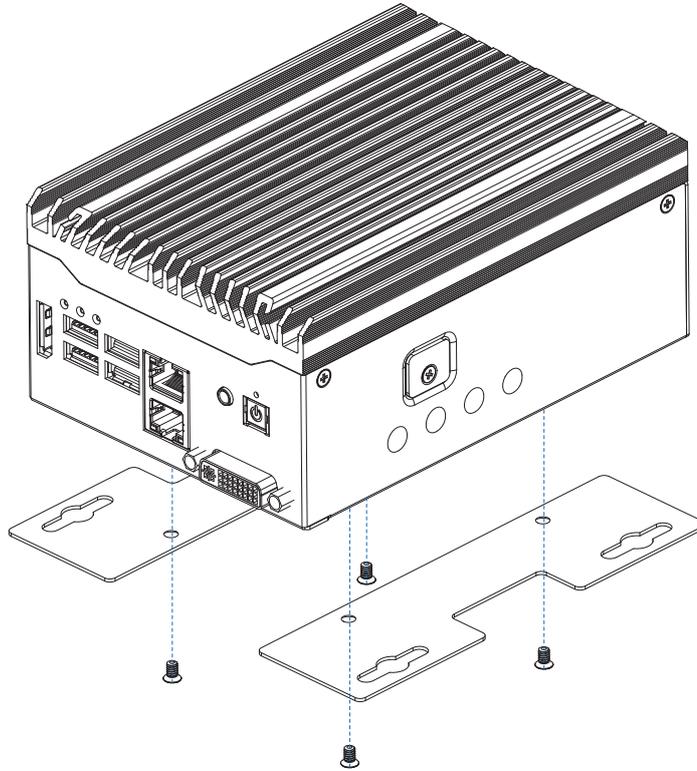


Step 2 Install antenna cable and then fasten washer and nut.

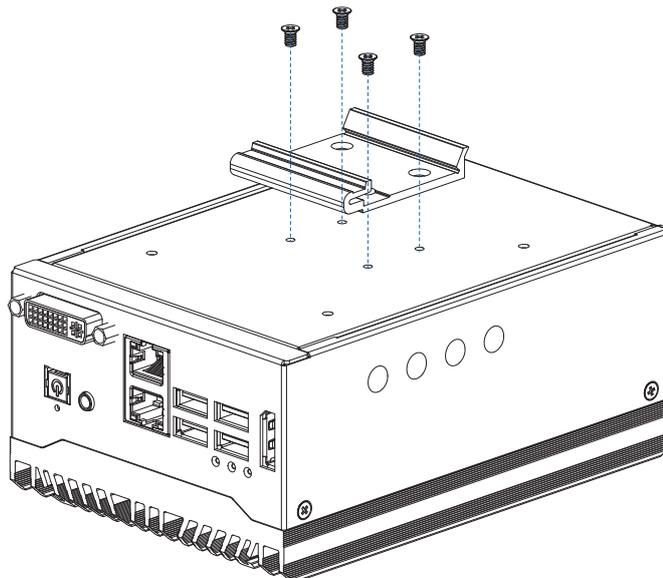


3.6 Mounting Your SPC-6000

3.6.1 Wall mount



3.6.2 DIN-Rail



4

BIOS SETUP

4.1 BIOS Setting

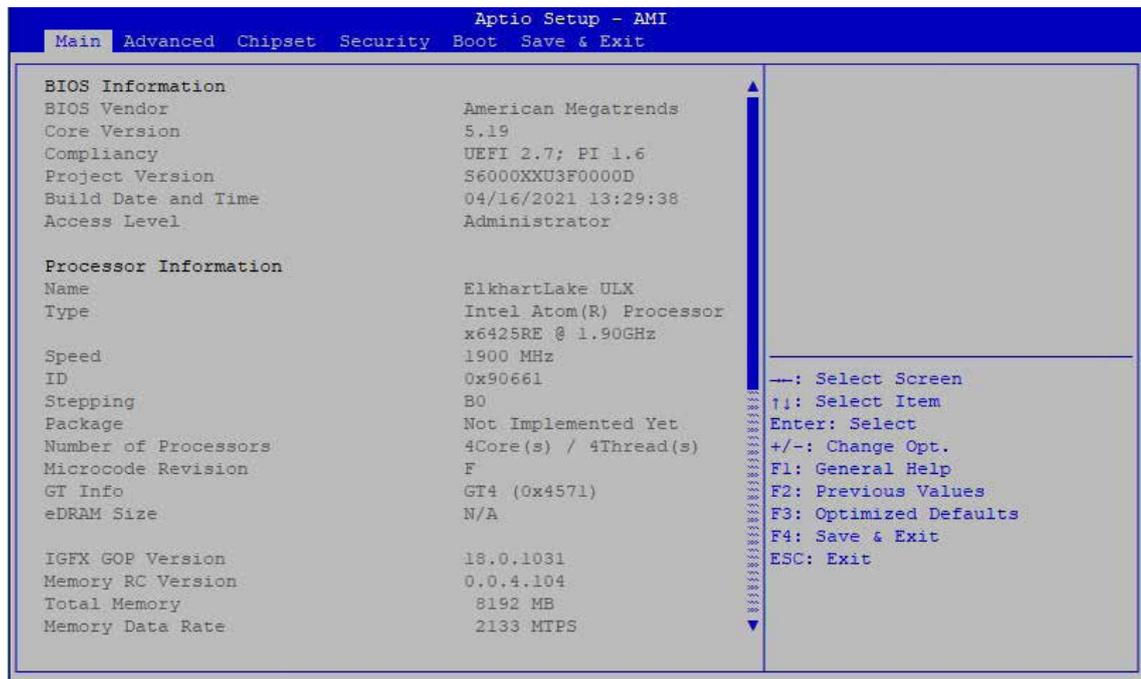


Figure 4-1 : Entering Setup Screen

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

4.2 Main Menu

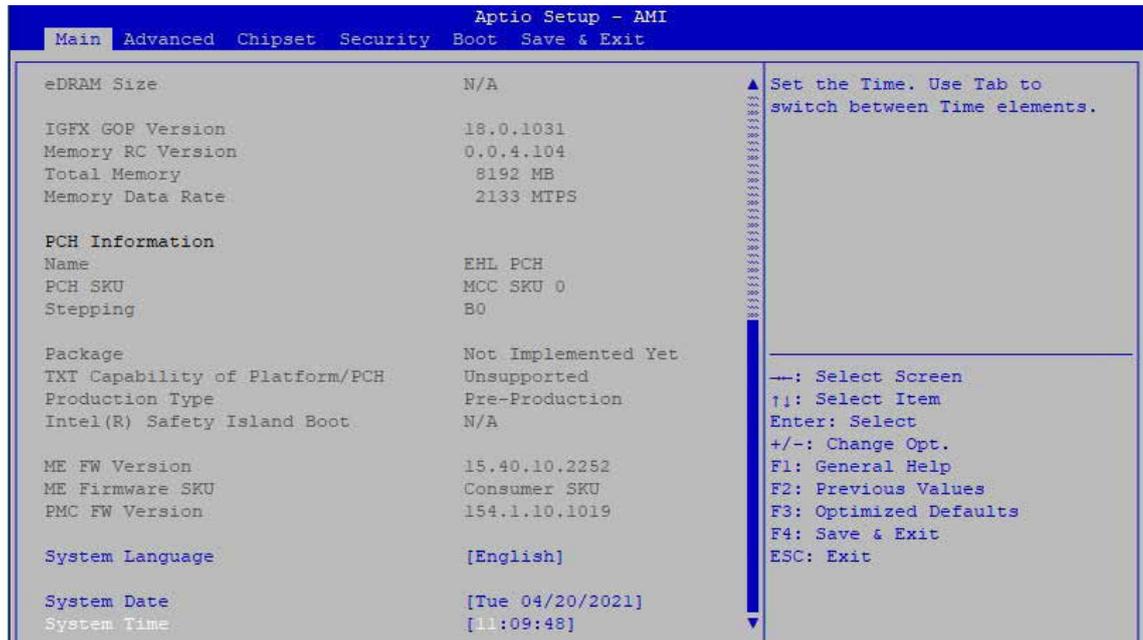


Figure 4-2 : BIOS Main Menu

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 Functions

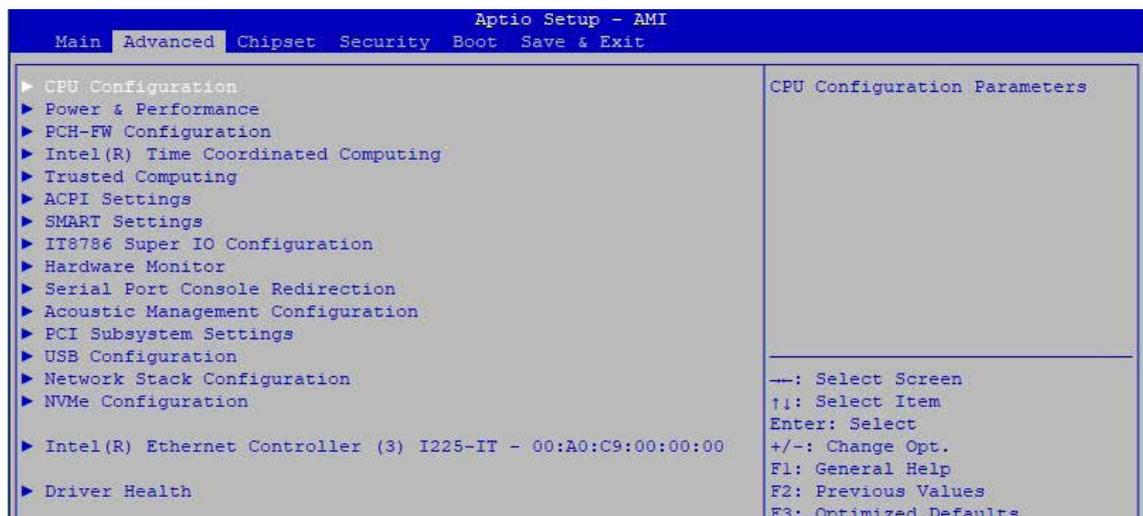


Figure 4-3 : BIOS Advanced Menu

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

4.3.1 CPU Configuration

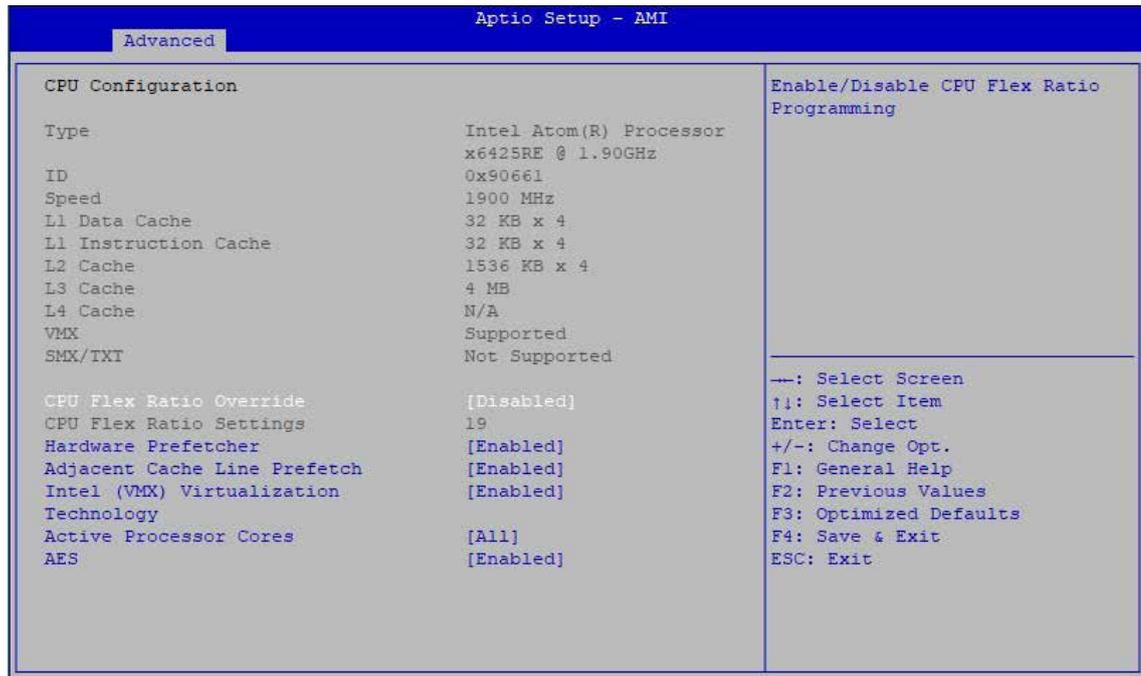


Figure 4-3-1 : CPU Configuration

CPU Flex Ratio Override

Enable/Disable CPU Flex Ratio Programming.

CPU Flex Ratio Override

Enable/Disable CPU Flex Ratio Programming.

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.

AES

Enable/disable AES (Advanced Encryption Standard).

4.3.2 Power & Performance

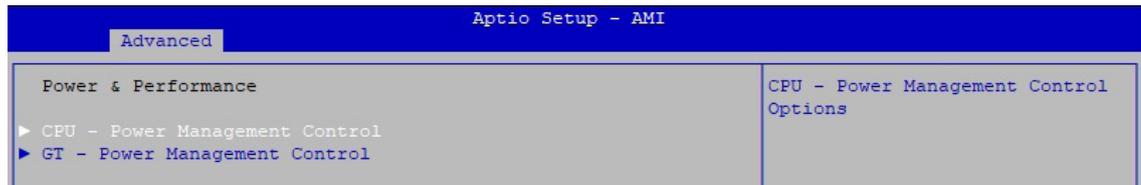


Figure 4-3-2 : Power & Performance

4.3.2.1 CPU - Power Management Control

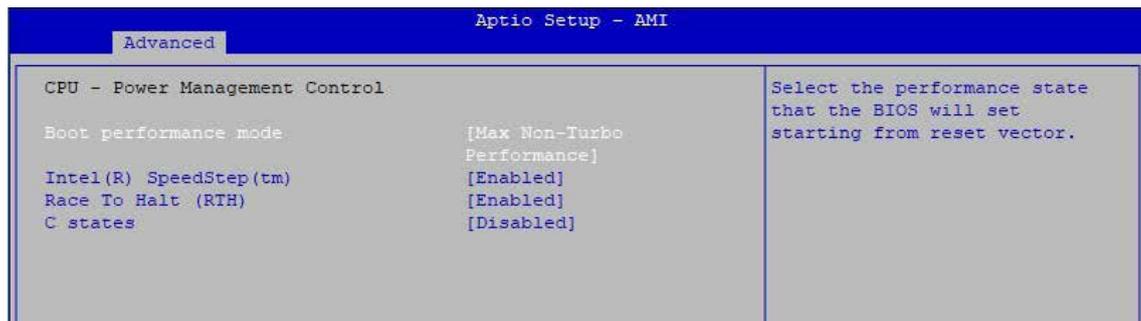


Figure 4-3-2-1 : CPU - Power Management Control

Boot performance mode

Select the performance state that the BIOS will set starting from reset vector.

Intel® SpeedStep™

Allows more than two frequency ranges to be supported.

Race To Halt (RTH)

Enable/Disable Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through MSR 1FC bit 20).

C states

Enable/Disable CPU Power Management. Allows CPU to go to C states when it's no 100% utilized.

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 200MHz (RPN) and 400 MHz (RP0). Value beyond the range will be clipped to min/max supported by SKU.

Disable Turbo GT frequency

Enabled : Disables Turbo GT frequency. Disabled : GT frequency is not limited.

4.3.3 PCH-FW Configuration

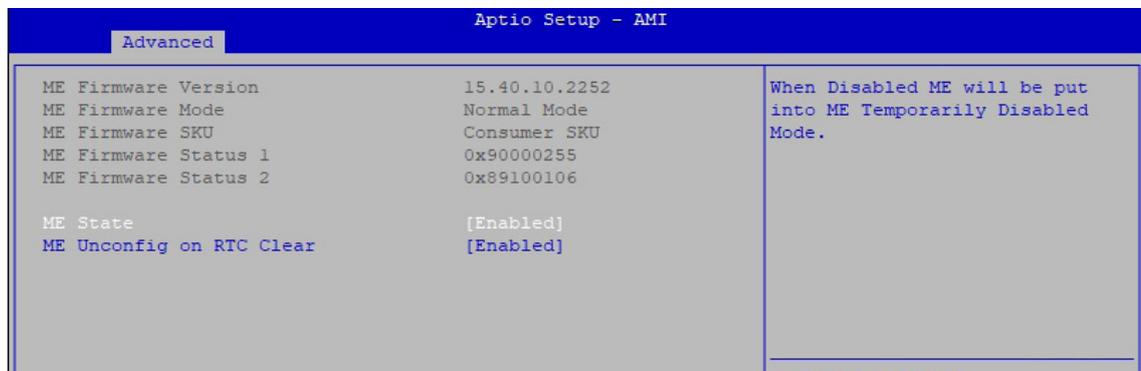


Figure 4-3-3 : PCH-FW Settings

ME State

When Disabled ME will be put into ME Temporarily Disabled Mode.

ME Unconfig on RTC Clear

When Disabled ME will not be unconfigured on RTC Clear.

4.3.4 Intel Time Coordinated Computing

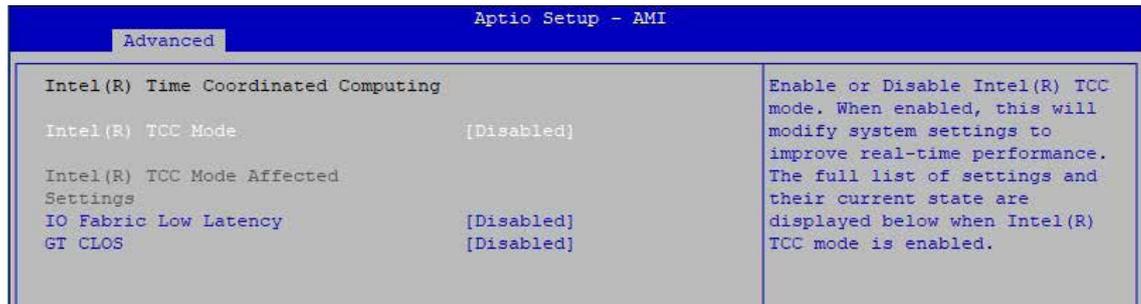


Figure 4-3-4 : Intel TCC

Intel® Time Coordinated Computing options.

Intel(R) TCC Mode

Enable or Disable Intel(R) TCC mode. When enabled, this will modify system settings to improve real-time performance. The full list of settings and their current state are displayed below when Intel(R) TCC mode is enabled.

IO Fabric Low Latency

Enable or Disable IO Fabric Low Latency. This will turn off some power management in the PCH IO fabrics. This option provides the most aggressive IO Fabric performance setting. S3 state is NOT supported.

GT CLOS

Enable or Disable Graphics Technology(GT) Class of Service. Enable will reduce Gfx LLC allocation to minimize impact of Gfx workload on LLC.

4.3.5 Trusted Computing

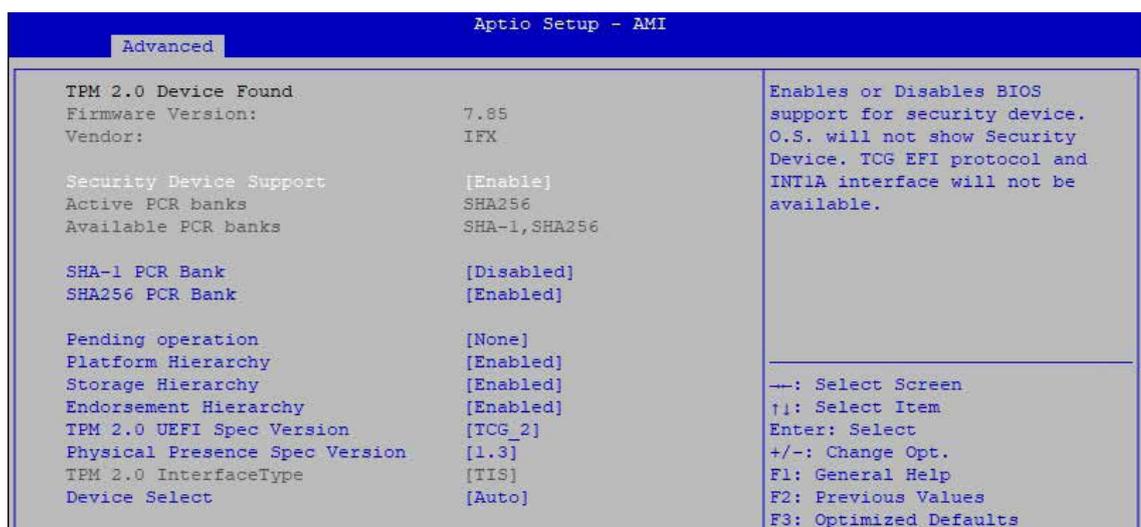


Figure 4-3-5 : Trusted Computing

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

4.3.6 ACPI Settings

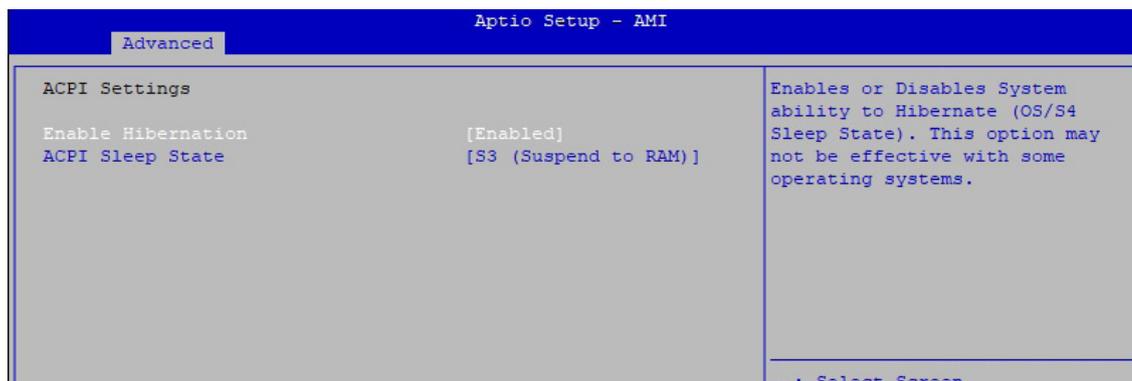


Figure 4-3-6 : ACPI Settings

Enable Hibernation

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

ACPI Sleep State

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

4.3.7 SMART Settings

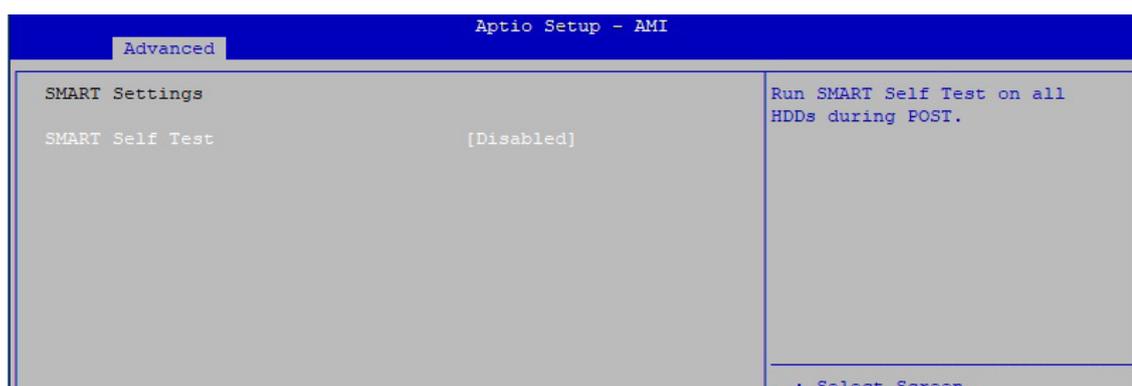


Figure 4-3-7 : SMART Settings

SMART Self Test

Run SMART Self-Test on all HDDs during POST.

4.3.8 IT8786 Super IO Configuration

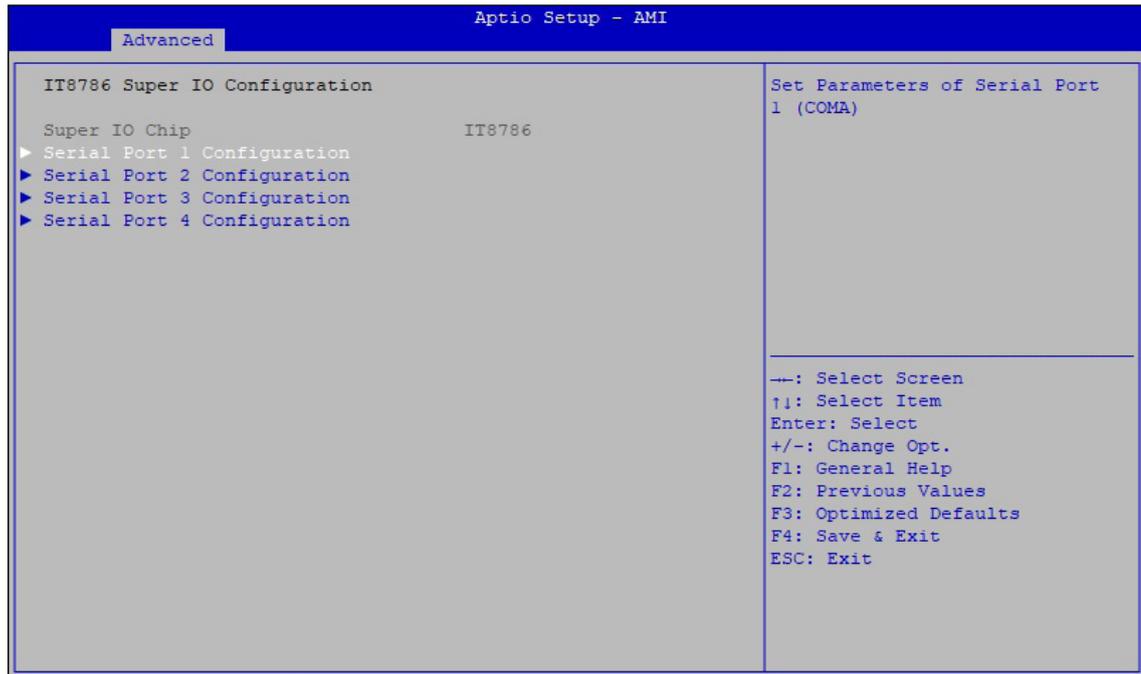


Figure 4-3-8 : Super IO Settings

Serial Port 1 Configuration

Set Parameters of Serial Port 1 (COM1).

Serial Port 2 Configuration

Set Parameters of Serial Port 2 (COM2).

Serial Port 3 Configuration

Set Parameters of Serial Port 3 (COM3).

Serial Port 4 Configuration

Set Parameters of Serial Port 4 (COM4).

4.3.9 Hardware Monitor

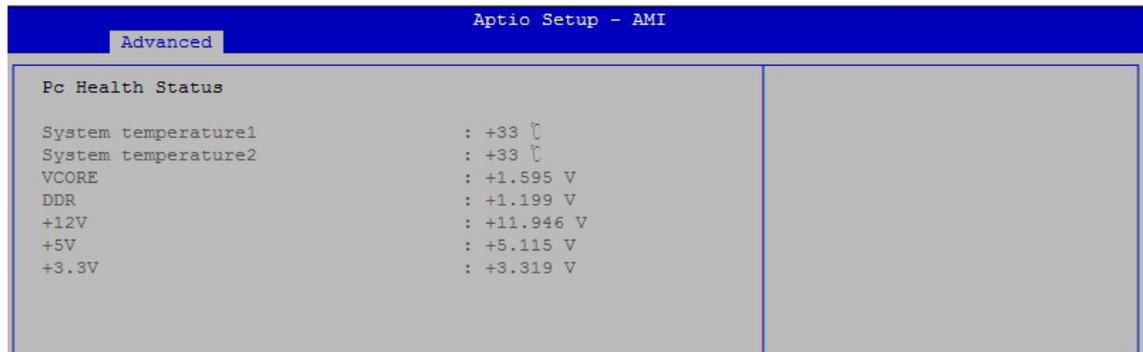


Figure 4-3-9 : Hardware Monitor Settings

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

4.3.10 Serial Port Console Redirection

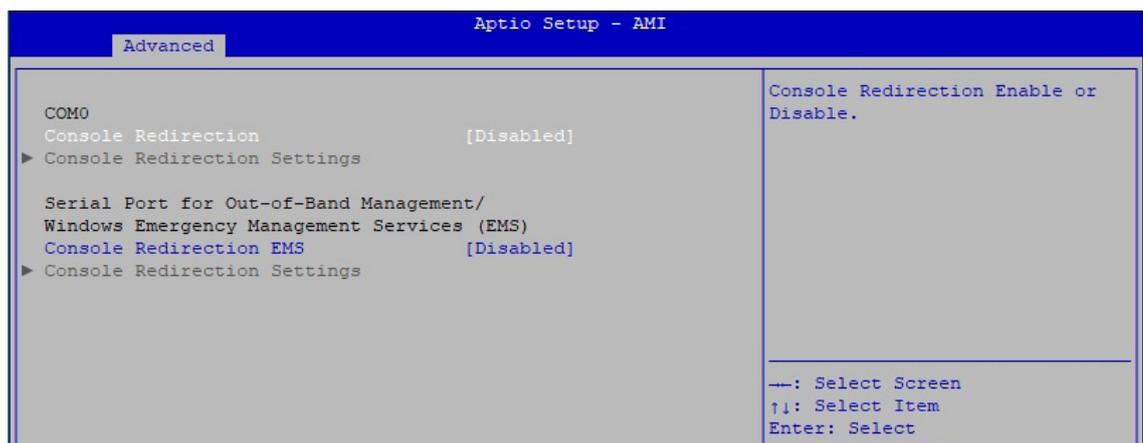


Figure 4-3-10 : Serial Port Console Redirection Settings

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

The 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.

Serial Port for Out-of-Band management/Windows Emergency Management

Services (EMS)

Console Redirection Enable or Disable.

4.3.11 Acoustic Management Configuration

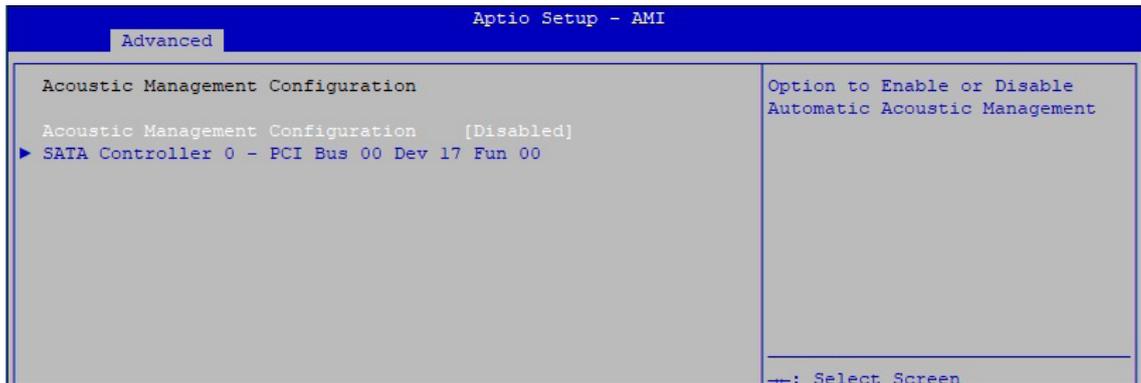


Figure 4-3-11 : Acoustic Management Settings

Acoustic Management Configuration

Option to Enable or Disable Automatic Acoustic Management.

4.3.12 PCI Subsystem Settings

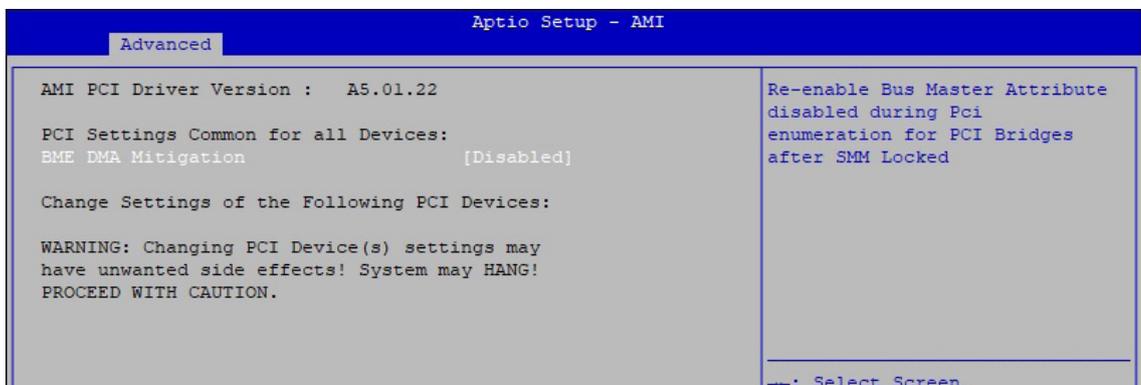


Figure 4-3-12 : PCI Subsystem Settings

BME DMA Mitigation

Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked.

4.3.13 USB Configuration

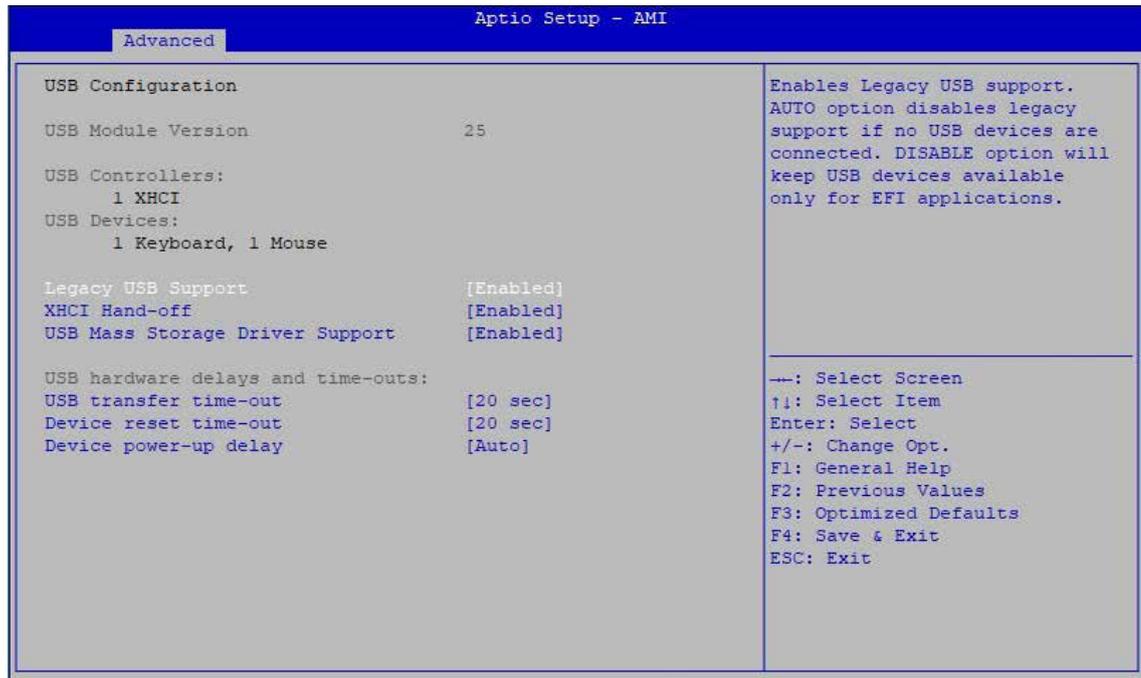


Figure 4-3-13 : USB Settings

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 OSES 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.

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 100ms, for a hub port the delay is taken from hub descriptor.

4.3.14 Network Stack Configuration

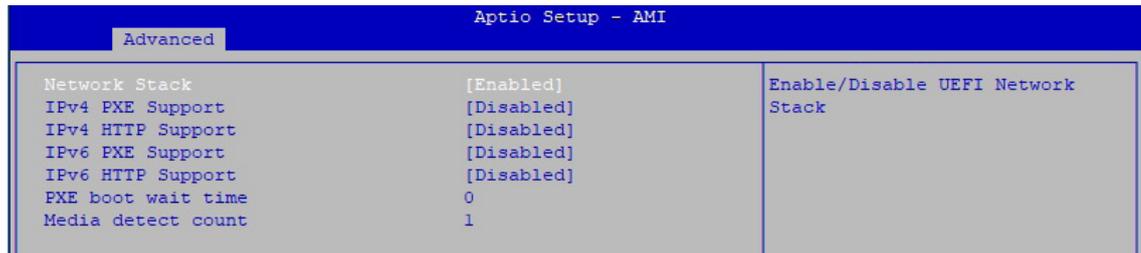


Figure 4-3-14 : Network Stack Configuration

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 to press ESC key to abort the PXE boot. User either +/- or numeric keys to set the value.

Media detect count

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

4.3.15 NVMe Configuration

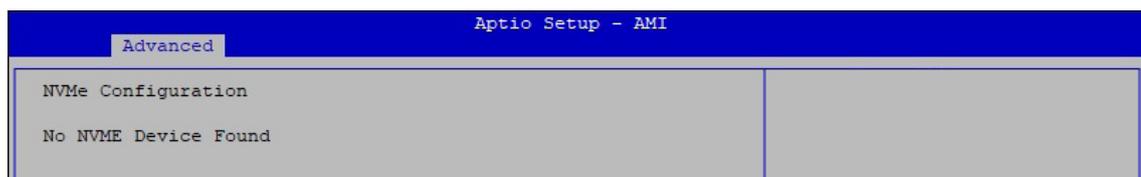


Figure 4-3-15 : NVMe Configuration

Display NVMe Controller and drive information.

4.4 Chipset Functions

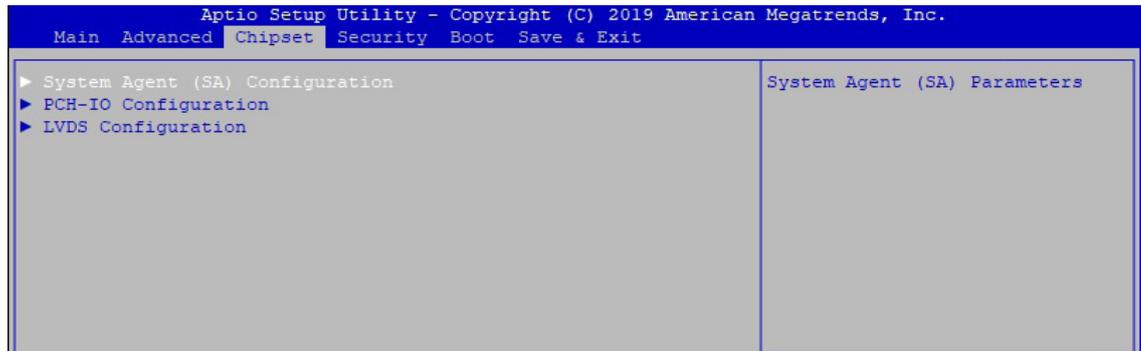


Figure 4-4 : BIOS Chipset Menu

System Agent (SA) Configuration

System agent (SA) parameters.

PCH-IO Configuration

PCH parameters.

DVI-I Port Configuration

VGA/DVI ports DDC selection.

4.4.1 System Agent (SA) Configuration

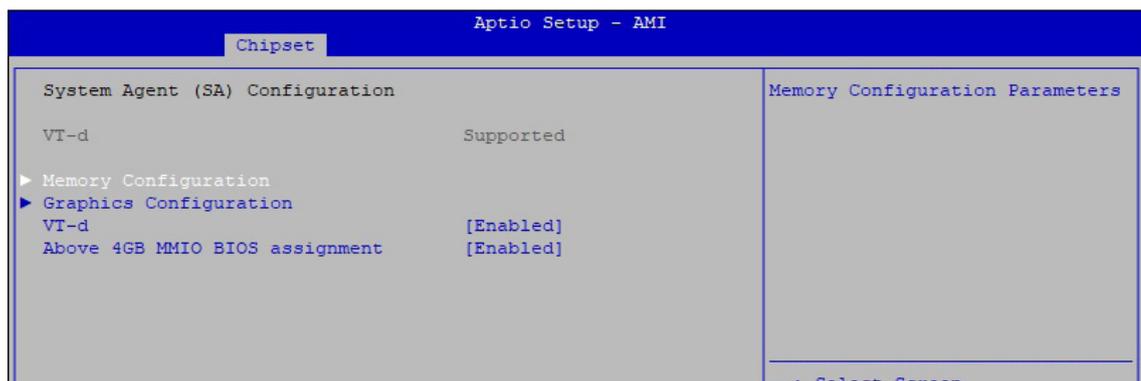


Figure 4-4-1 : System Agent Settings

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

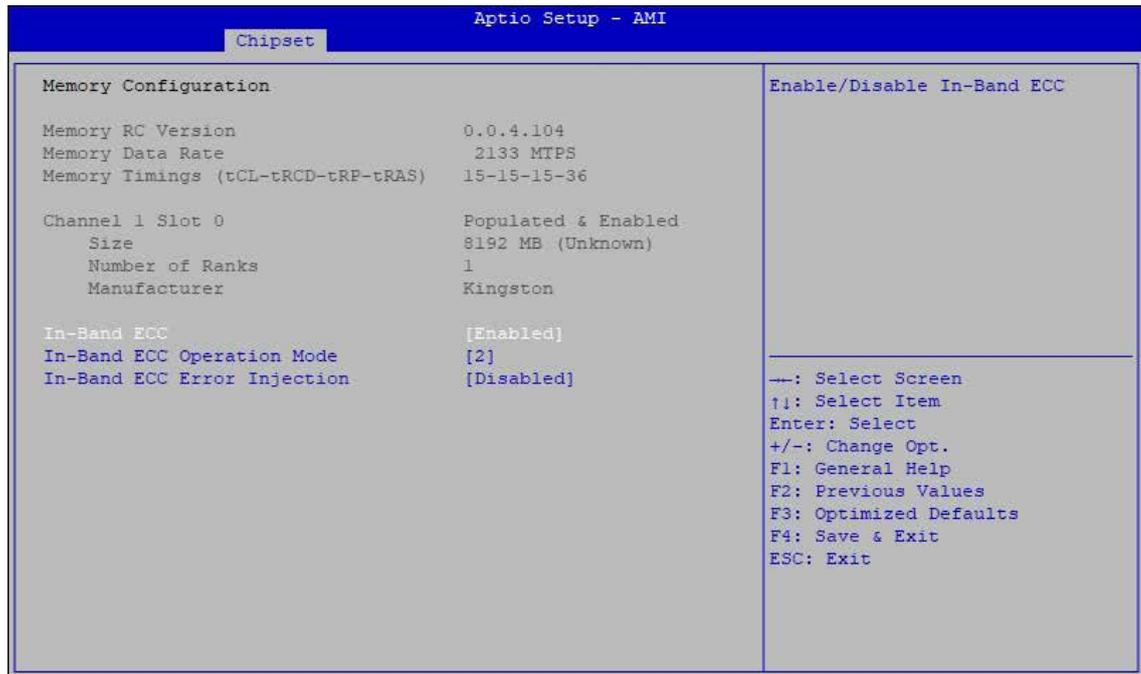


Figure 4-4-1-1 : Memory Information

Display memory information.

In-Band ECC Support

Enable/Disable In-Band ECC.

In-Band ECC Operation Mode

- 0 : Functional Mode protects requests based on the address range;
- 1 : Makes all requests non protected and ignore range checks;
- 2 : Makes all requests protected and ignore range checks;

In-Band ECC Error Injection

By enabling this Error Injection Enabling feature, the user acknowledges the security risks. Enabling Error Injection allows attackers who have access to the Host Operating System to inject IBECC errors that can cause unintended memory corruption and enable the leak of security data in the BIOS stolen memory regions.

4.4.1.2 Graphics Configuration

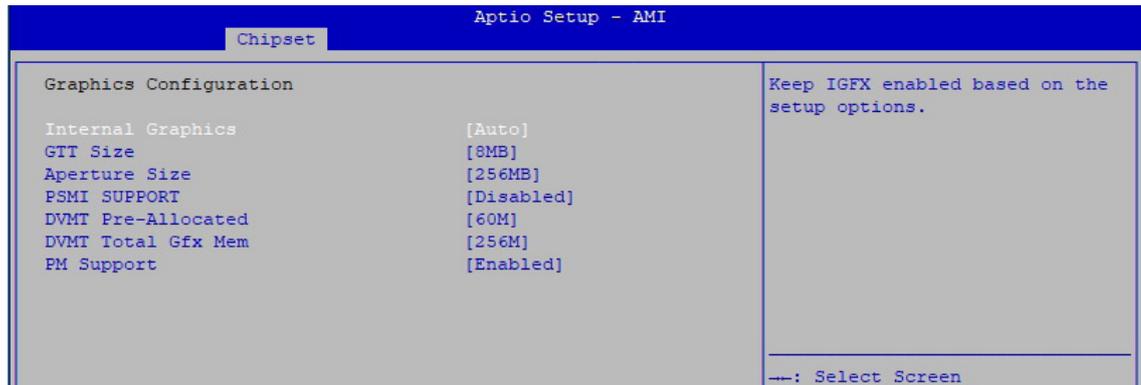


Figure 4-4-1-2 : Graphics Settings

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.

PSMI SUPPORT

PSMI Enable/Disable.

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.

PM Support

Enable/Disable PM Support.

4.4.2 PCH-IO Configuration

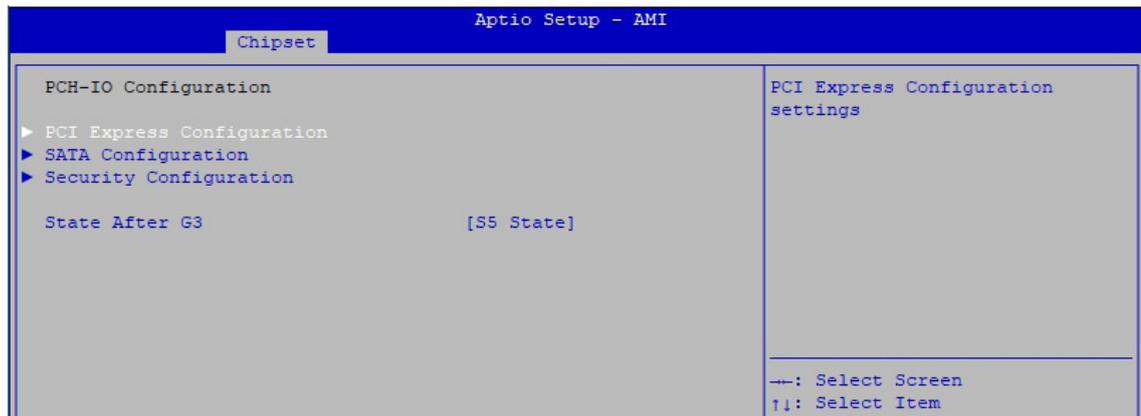


Figure 4-4-2 : PCH-IO Settings

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

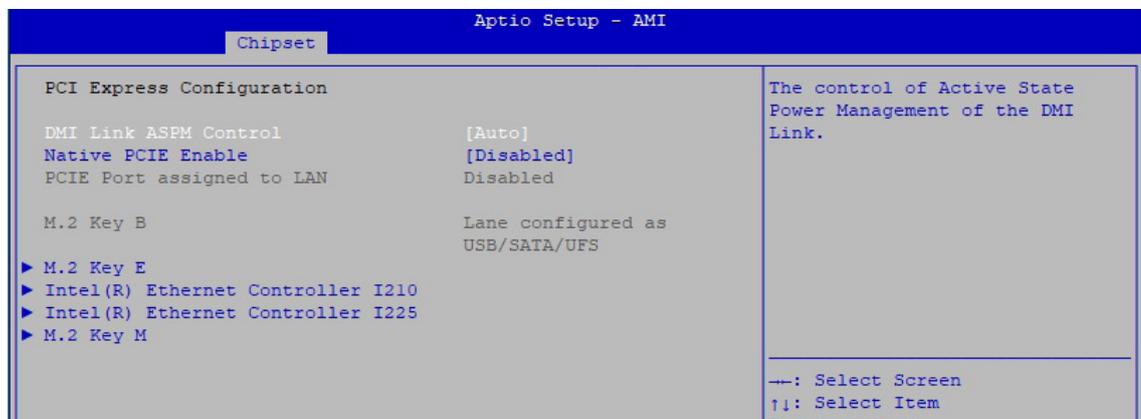


Figure 4-4-2-1 : PCI Express Configuration

DMI Link ASPM Control

The control of Active State Power Management of the DMI Link.

Native PCIE Enable

PCI Express Native Support Enable/Disable. This feature is available in Vista and beyond Windows OS.

PCI Express device settings

BIOS options for PCI Express device setting.

4.4.2.2 SATA Configuration



Figure 4-4-2-2 : SATA Devices Settings

SATA Controller(s)

Enable or disable SATA Device.

SATA Mode Selection

Determines how SATA controllers operate.

Software Feature Mask Configuration

RST Legacy OPROM/RST UEFI driver will refer to the SWFM configuration to enable/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

Designates this port as Hot Pluggable.

External

External

Spin Up Device

If enabled for any of ports staggered spin up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

SATA Device Type

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

4.4.2.3 BIOS Security Configuration of PCH-IO

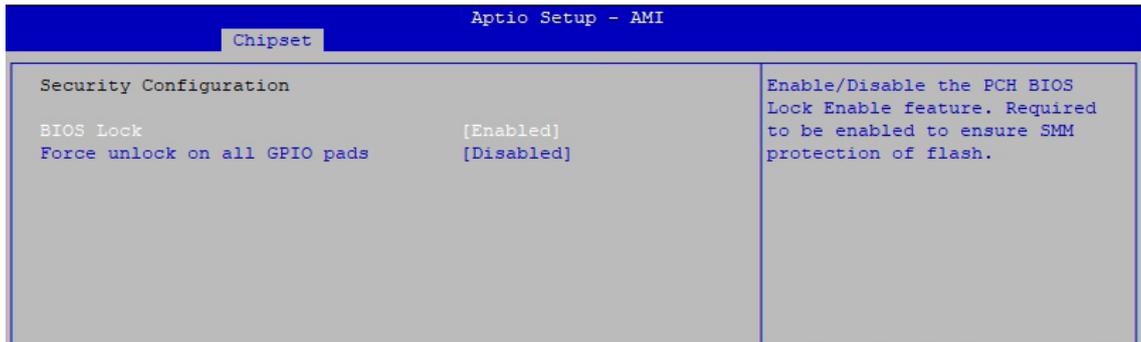


Figure 4-4-2-3 : BIOS Security Settings

BIOS Lock

Enable/disable the PCH BIOS lock enable (BLE bit) feature. Required to be enabled to ensure SMM protection of flash.

Force unlock on all GPIO pads

If Enabled BIOS will force all GPIO pads to be in unlocked state.

4.4.3 DVI-I Port Configuration

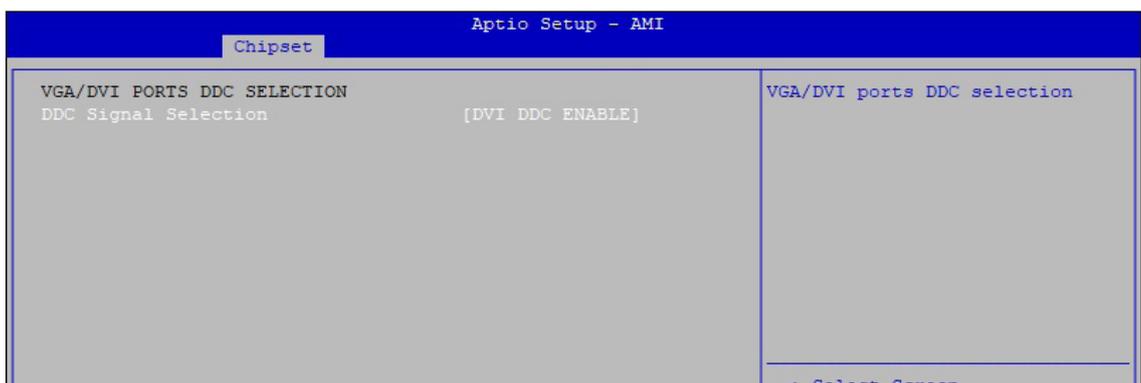


Figure 4-4-3 : DVI-I port configuration

DDC Signal Selection

VGA/DVI ports DDC selection.

4.5 Security

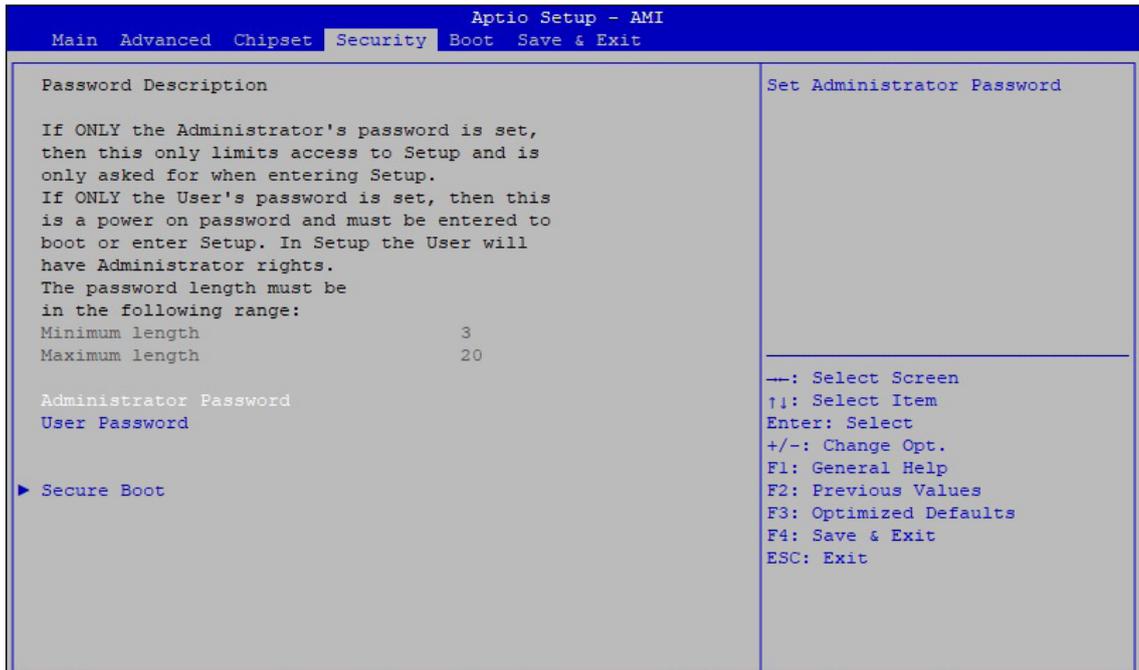


Figure 4-5 : BIOS Security Menu

Administrator Password

Set administrator password.

User Password

Set user password.

Secure Boot

Secure Boot configuration.

4.5.1 HDD Security Configuration

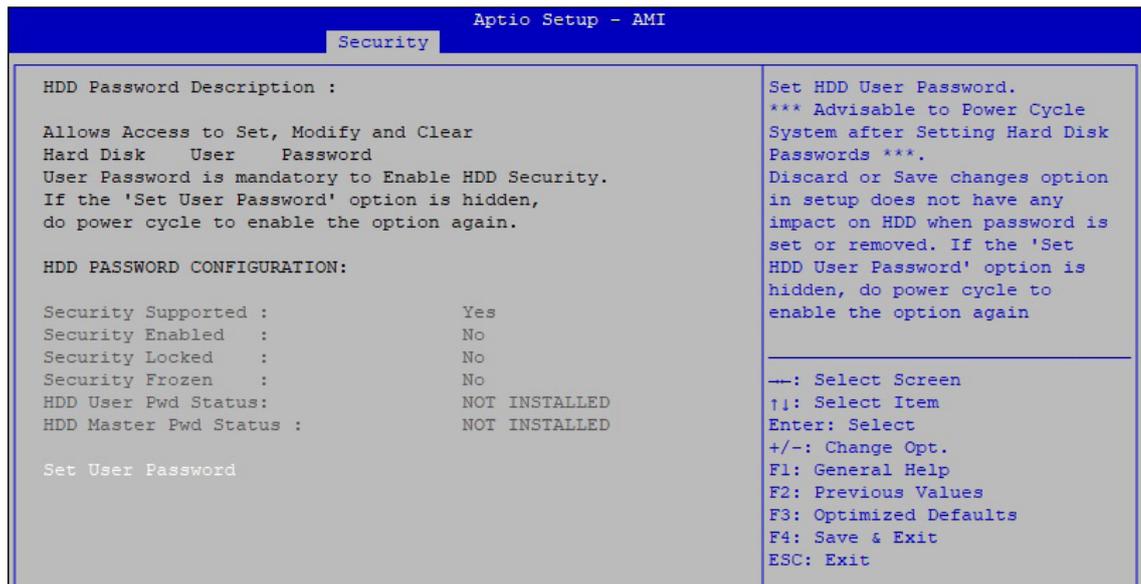


Figure 4-5-1 : HDD Security Settings

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

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.

Key Management

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

4.6 Boot Functions

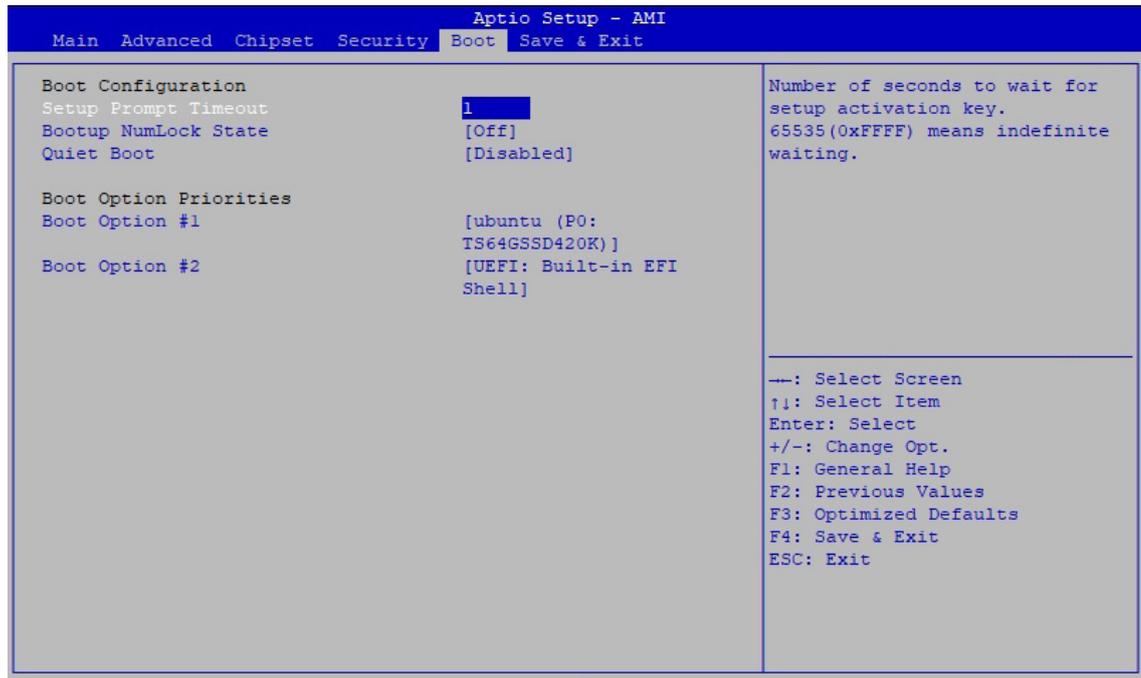


Figure 4-6 : BIOS Boot Menu

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 #x

Sets the system boot order.

4.7 Save & Exit

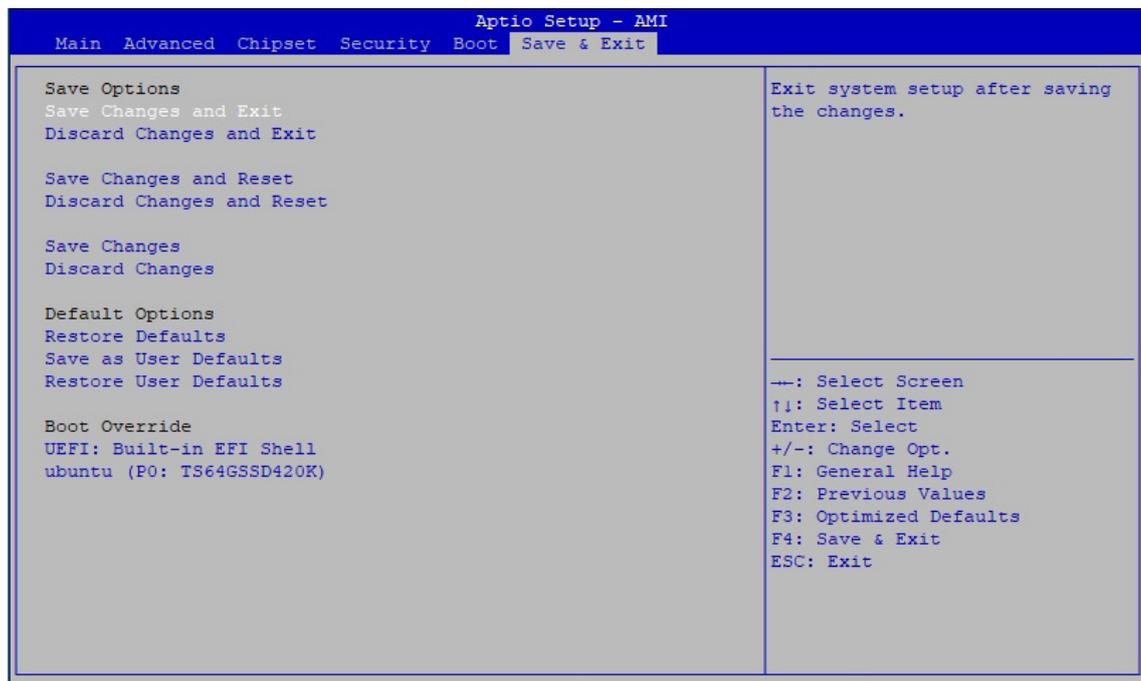


Figure 4-7 : BIOS Save and Exit Menu

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.

A

APPENDIX A : Power Consumption

Testing Board	SPC-6000
RAM	DDR4-2666 4GB x1
USB-1	USB Keyboard AOPEN CMS-730
USB-2	USB Mouse HP G1K28AA
SATA 0	WD GREEN WDS240G2G0A 240GB
Graphics	Intel® UHD Graphics 32 EUs
Graphics Output	DVI
Power Plan	Balance (Windows10 Power plan)
Power Source	Chroma 62006P-100-25
Test Program	BurnInTest V8.1 Pro

A.1 Intel Atom® x6425RE (1.5M Cache, 1.90GHz)

CPU	Power Input	Standby Mode		Power on and boot to Win 10 (64-bit)			
		Max Current	Max Consumption	Sleep Mode		idle status CPU usage less 3%	
				Max Current	Max Consumption	Max Current	Max Consumption
Intel Atom® x6425RE	12V	0.142A	1.71W	0.179A	2.15W	0.835A	10.02W

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
Intel Atom® x6425RE	12V	1.022A	12.26W	1.148A	13.77W

B

APPENDIX B : Supported Memory & Storage List

B.1 Supported Memory List

Testing Board	SPC-6000
Memory Test	MemTest86 V9.0 (build 2000)
BurnIn Test	BurnInTest Pro V8.1 (build 1025)

B.2 Test Item

Channel	Memory Test	Burn-in Test	Flash BIOS	Remove Battery	Sleep	Hibernate	Reset	HWiNFO64
*1 (DIMM 1)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

B.3 Supported Non-ECC Memory List

Brand	Info	Test Temp.(Celsius)
KINGSTON 4GB DDR4-2400 SODIMM	KVR24S17S6/4	25°C
MEMXPRO 4GB DDR4-2400 SODIMM	D4S-4G24H518W2	25°C
KINGSTON 4GB DDR4-2666 SODIMM	KVR26S19S6/4	25°C
Micron 4GB DDR4-2666 SODIMM	MTA4ATF51264HZ-2G6E3	25°C
Innodisk 8GB DDR4-2666 SODIMM	M4S0-8GSSOIK-H03	25°C
MEMXPRO 16GB DDR4-3200 SODIMM	D4S-AG32M2G8CA	25°C

B.4 Supported ECC Memory List

Brand	Info	Test Temp.(Celsius)
KINGSTON 16GB DDR4-2666 SODIMM	KSM26SED8/16HD	25°C
KINGSTON 8GB DDR4-3200 SODIMM	KVR32S22S6/8	25°C
KINGSTON 16GB DDR4-3200 SODIMM	KVR32S22S8/16	25°C

B.5 Supported Storage List

Type	Brand	Model	Capacity
SATA HDD	TOSHIBA	MQ01ABD050	500GB
	TOSHIBA	MQ01ABF050	500GB
	HGST	Z5K500-500 HTS545050A7E680	500GB
SATA SSD	innodisk	3MG2-P DGS25-64GD81BC1QC	64GB
	Patriot Burst	BURST	120GB
	Transcend	TS128GSSD230S	128GB
	WD	GREEN WDS240G2G0A	240GB
	SAMSUNG	860 EVO MZ-76E250	250GB
	LITE-ON	K8-L1256	256GB
	MEMXPRO	ET30	256GB
	MEMXPRO	PT31	256GB
	LITE-ON	K8-L1512	512GB
M.2 PCIe SSD	INTEL	760P SSDPEKKW128G8	128GB
	Transcend	TS128GMTE110S	128GB
	innodisk	M.2 (P80) 3TE6	128GB
	Kingston	A1000	240GB
	SAMSUNG	970 EVO PLUS MZ-V7S250	250GB
	Kingston	A2000	250GB
	SMART	M1400v (C-temp) SVM2PHA480GMT51	480GB
M.2 SATA SSD	MEMXPRO	M.2 2280 SATA PM31 512GB WT	512GB

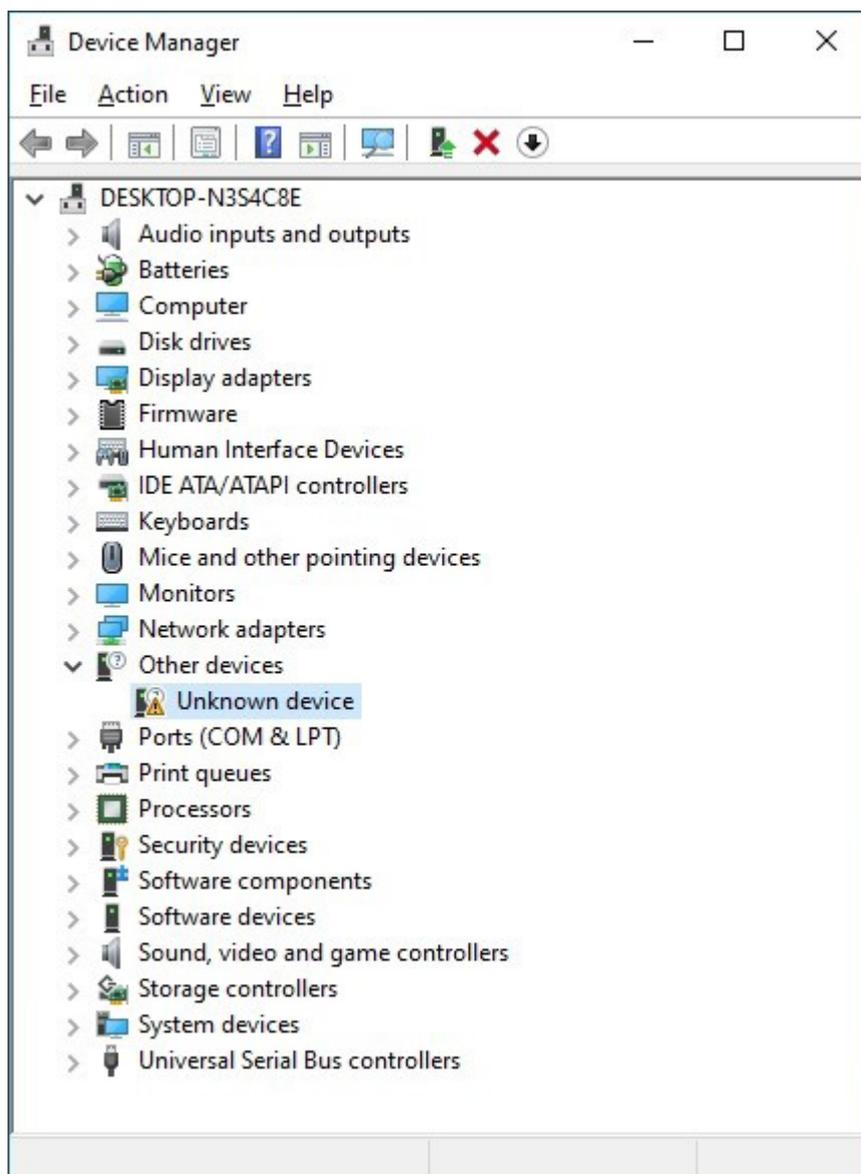
** If more help is needed, please contact Vecow Technical Support.

C

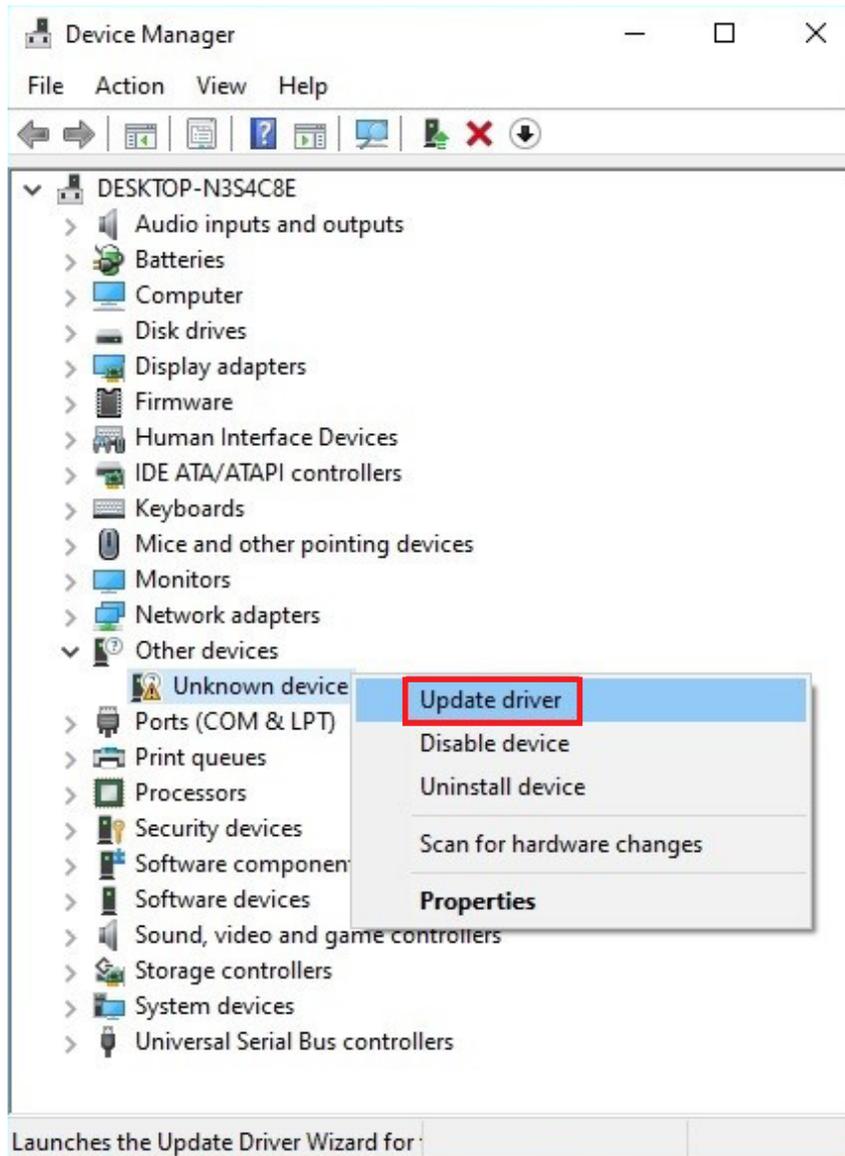
APPENDIX C : Driver installation for Serial I/O

Since the Serial I/O driver provided by the manufacturer doesn't include an installer application (like .exe or .msi). In this case, you have to use the Setup Information file (.INF) to manually install the driver.

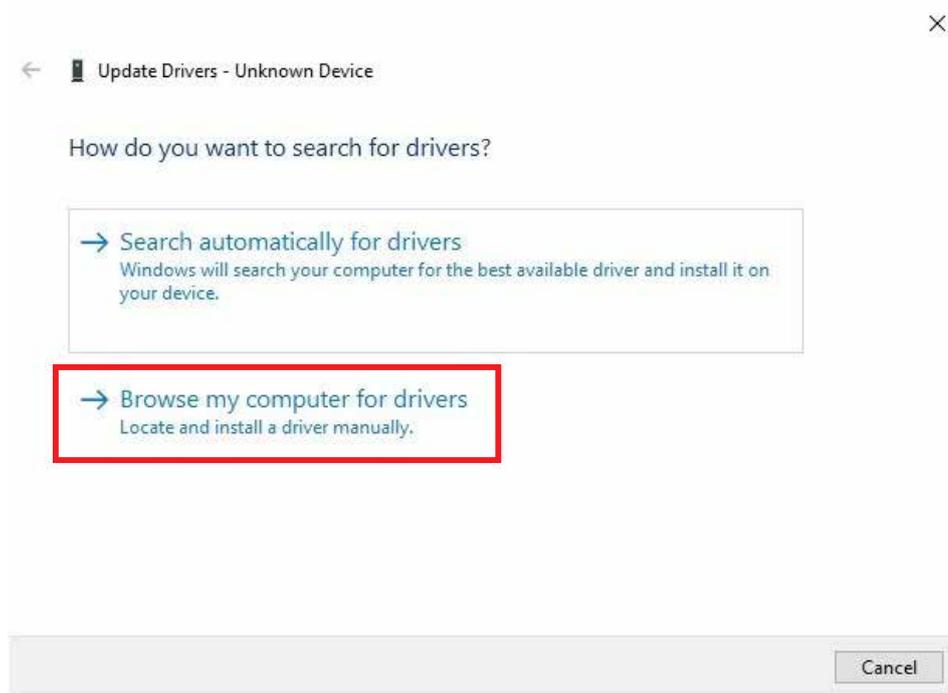
Step 1 Go to Device Manager.



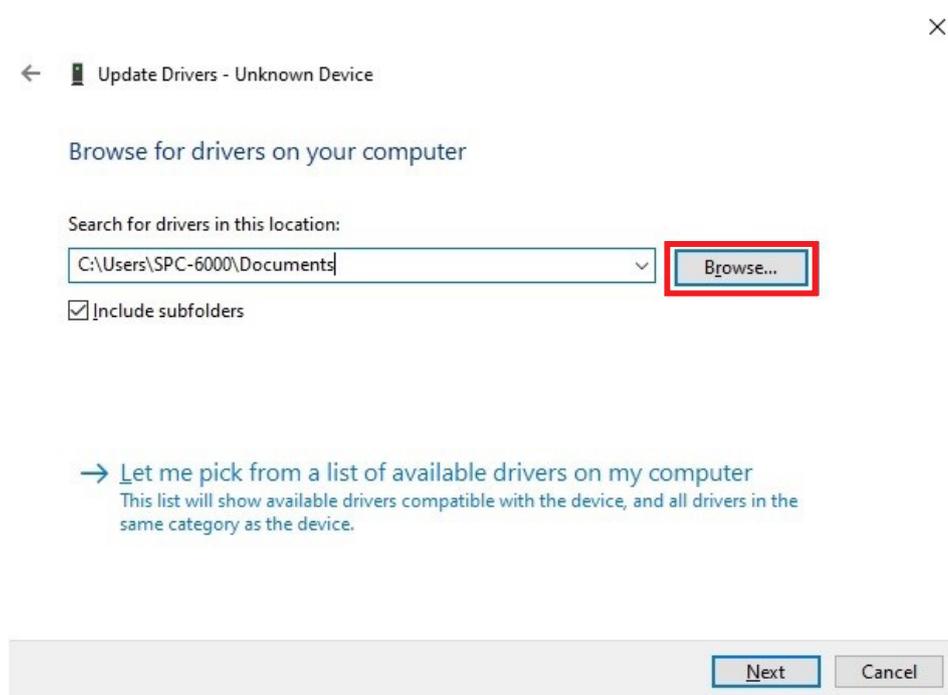
Step 2 Right-Click on the "Unknown device" and select "Update Driver".



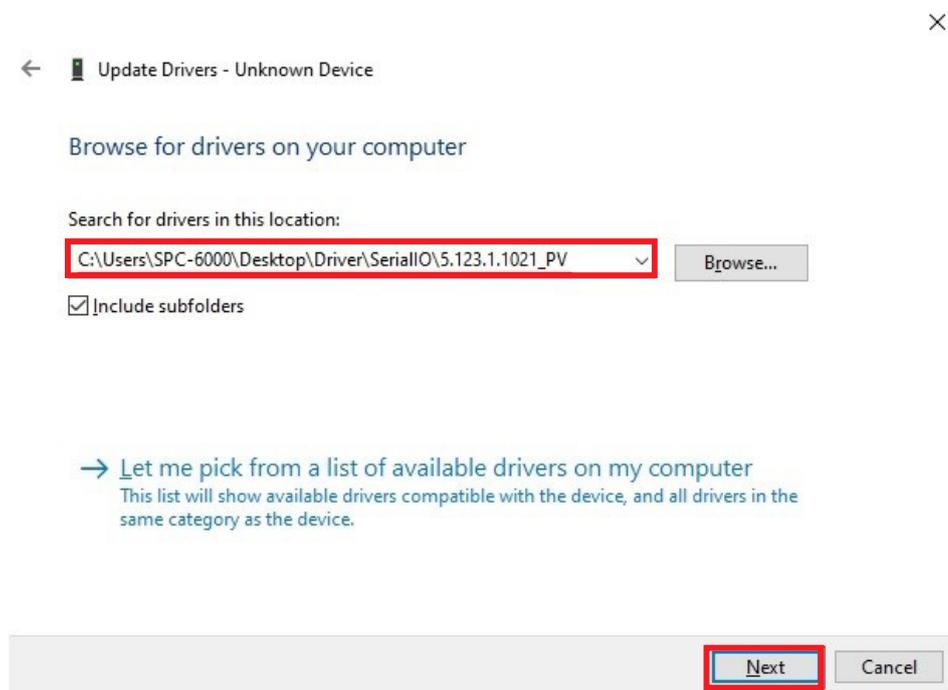
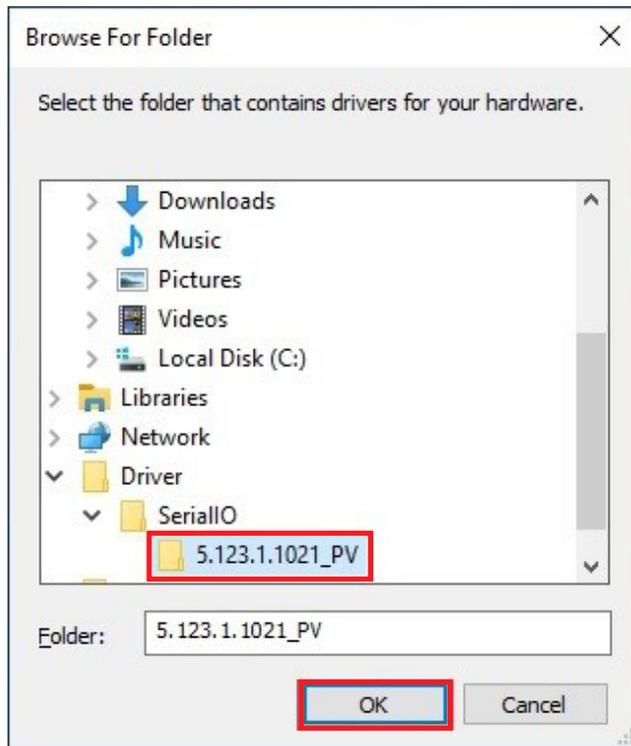
Step 3 Select "Browse my computer for drivers".



Step 4 Click "Browse..." button. Navigate to the folder where you saved the downloaded driver file.



Step 5 Click "OK" button then "Next" button to finish the installation.





← Update Drivers - Intel(R) Serial IO GPIO Host Controller - INTC1020

Windows has successfully updated your drivers

Windows has finished installing the drivers for this device:



Intel(R) Serial IO GPIO Host Controller - INTC1020

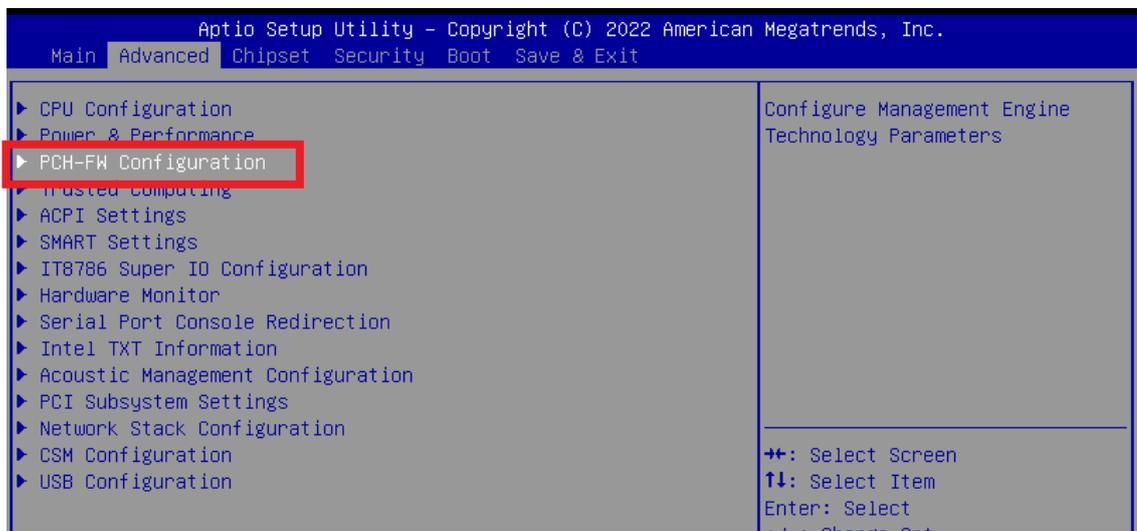
Close

- Intel(R) PMC SRAM - 4B7F
- Intel(R) Power Engine Plug-in
- Intel(R) Serial IO GPIO Host Controller - INTC1020
- Intel(R) Serial IO I2C Controller #0 - 4B78
- Intel(R) Serial IO I2C Controller #2 - 4B7A

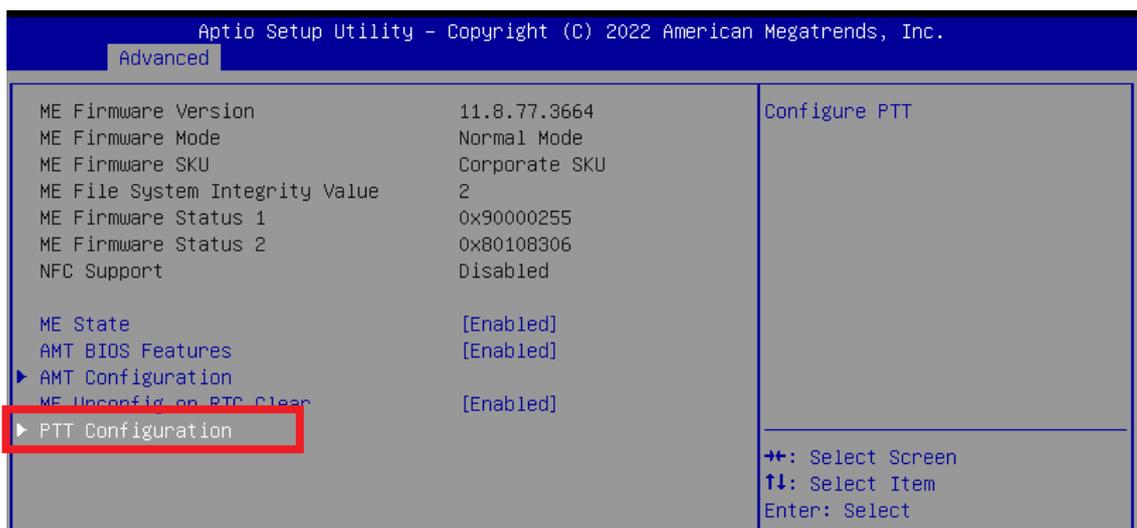
D

APPENDIX D : Install Win11 (BIOS TPM Setting)

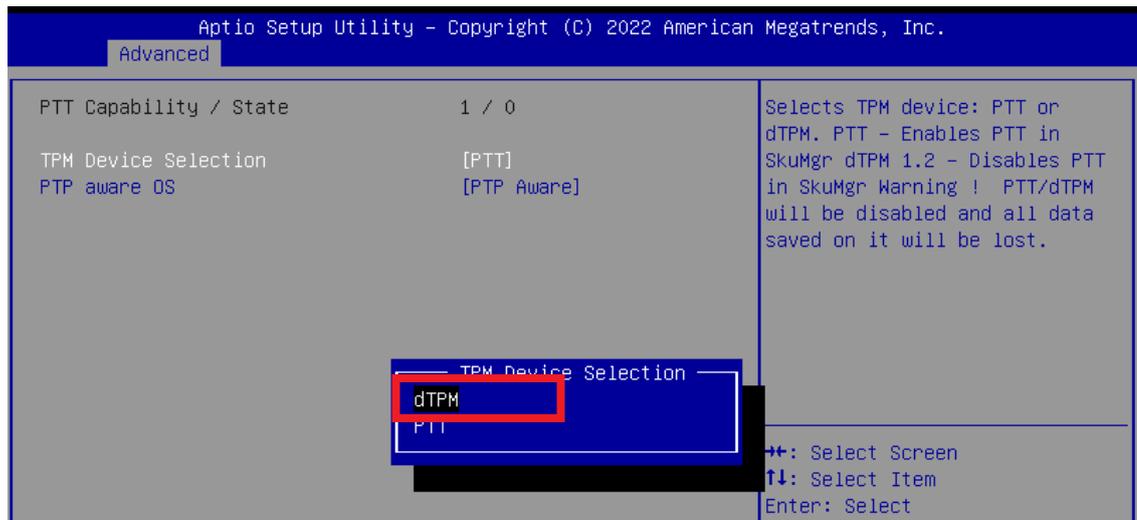
Step 1 Click on “Advanced”, then click on “PCH-FW Configuration”



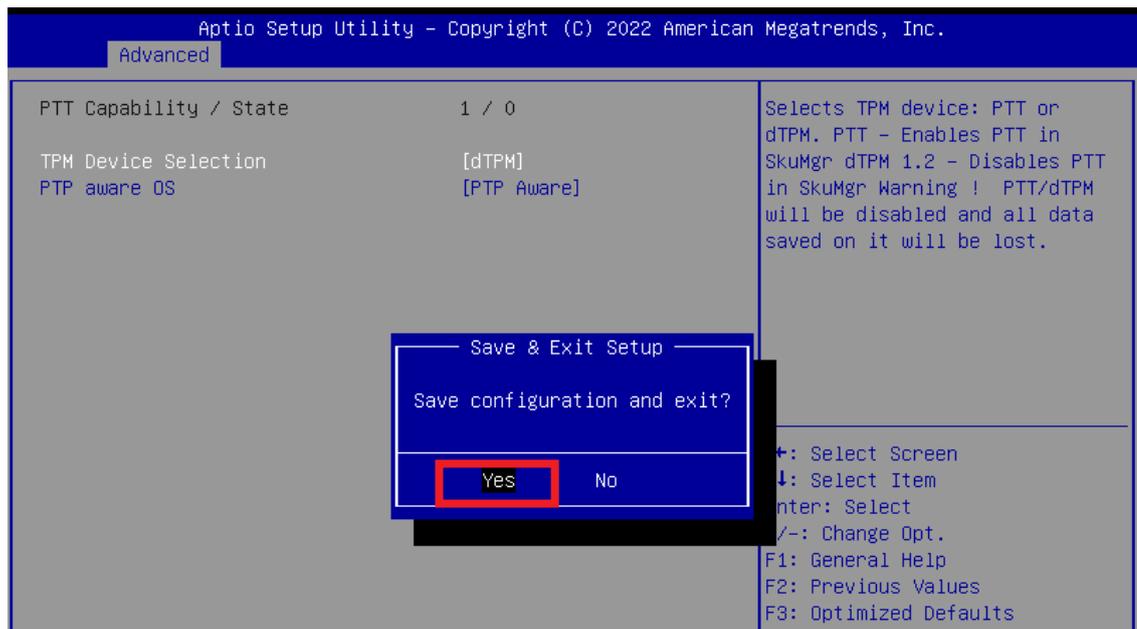
Step 2 Click on “PTT Configuration”



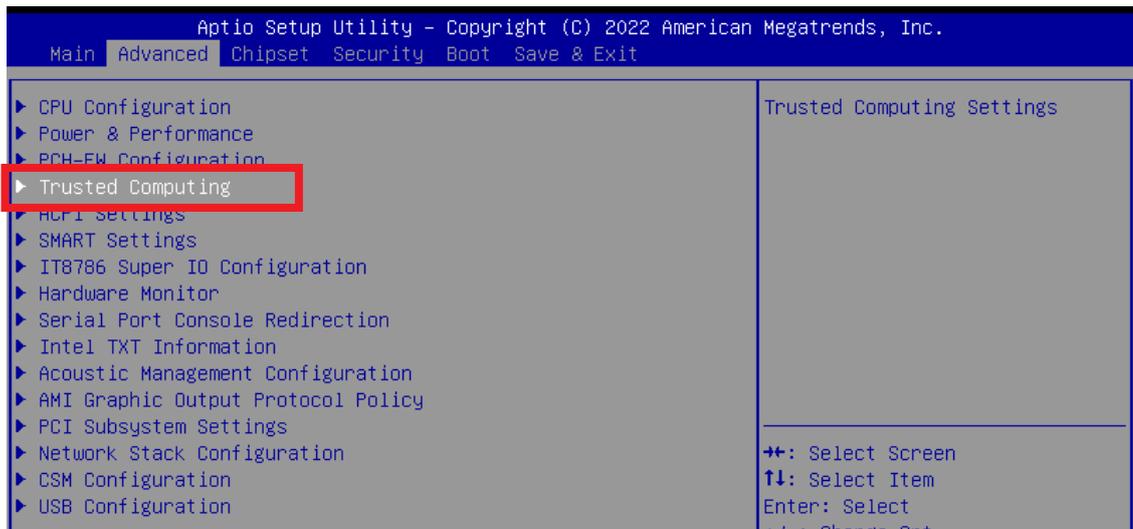
Step 3 Click on “dTPM” (TPM Device Selection)



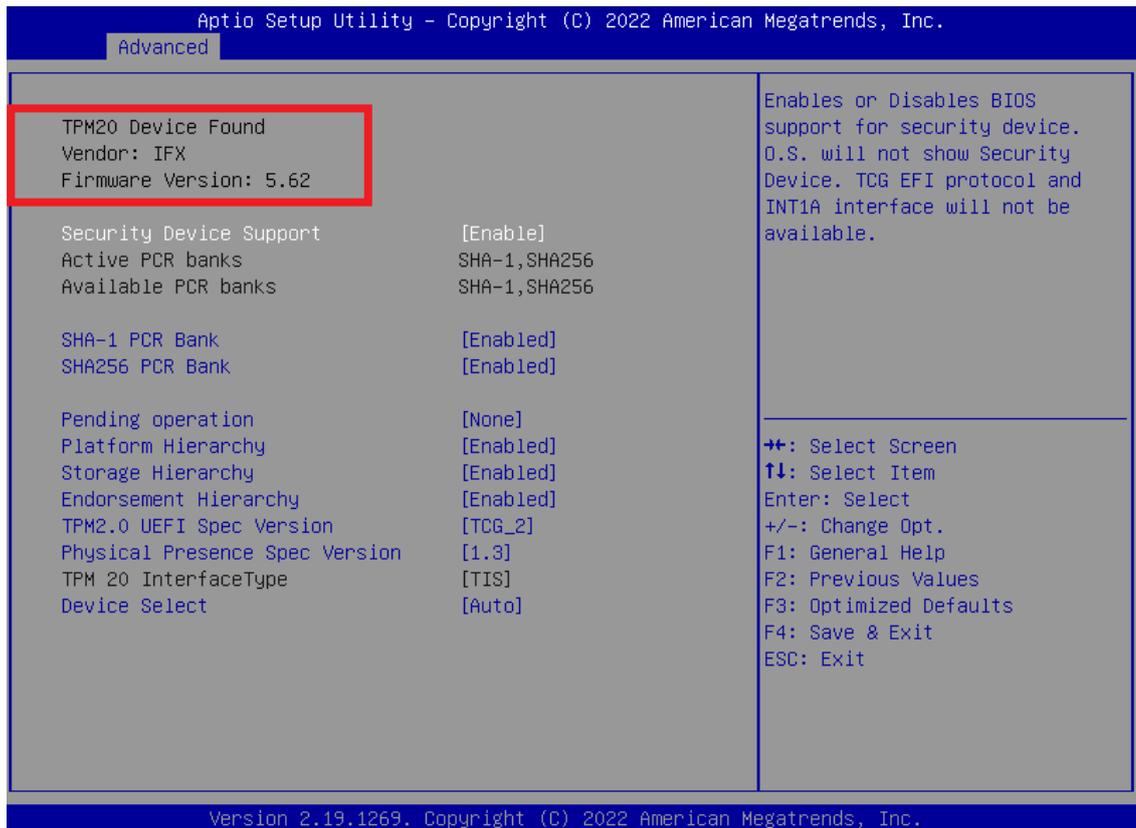
Step 4 Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks “Save configuration and exit?” appears. The computer will then restart.



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 ****



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

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