RMS-1000 USER Manual

Intel® Core™ i7/i5/i3 SoC (Whiskey Lake) 1U Rackmount Fanless Computing System, 8 GigE LAN w/6 X-coded M12, 4 10G USB, Ignition Control, -40°C to 70°C

Vecow

1.3.0 Edition 20230613

Record of Revision

Version	Date	Page	Description	Remark
0.10	2020/01/17	All	Preliminary Release	
1.00	2020/02/03	All	Official Release	
1.10	2021/03/24	3, 5, 12	Update	
1.20	2022/07/22	66-68	Update	
1.30	2023/06/13	9, 15, 57	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
RMS-1000-8665UE	RMS-1000, onboard Intel® Core™ i7-8665UE, 8 GigE LAN w/6X-coded M12, 2 COM, 4 10G USB 3.1 Gen2, 2 SSD Tray, 9V-48V DC-in
RMS-1100-8665UE	RMS-1100, onboard Intel® Core™ i7-8665UE, 8 GigE LAN w/6X-coded M12, 2 COM, 4 10G USB 3.1 Gen 2, 2 SSD Tray, 16V-160V DC-in

Optional Accessories

Part Number	Description
DDR4 32G	Certified DDR4 32GB 2666MHz RAM
DDR4 16G	Certified DDR4 16GB 2666/2400/2133 MHz RAM
DDR4 8G	Certified DDR4 8GB 2666/2400/2133 MHz RAM
DDR4 4G	Certified DDR4 4GB 2666/2400/2133 MHz RAM
PWA-120W	120W, 24V, 90V AC to 264V AC Power Adapter with 3-pin Terminal Block
PWA-160W-WT	160W, 24V, 85V AC to 264V AC Power Adaptor with 3-pin Terminal Block, Wide Temperature -30°C to +70°C
4G Module	Mini PCIe 4G/GPS Module with Antenna
WiFi & Bluetooth Module	WiFi & Bluetooth Module with Antenna

Table of Contents

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GENERAL INTRODUCTION

1.1 Overview

RMS-1000 is a series of Rackmount Fanless System. Powered by Quad-core 8th generation Intel® Core™ i7/i5/i3 U-series processor (Whiskey Lake), DDR4 2400MHz up to 32GB memory; Advanced Intel® HD Graphics 620 graphics engine supports DirectX 12 and OpenGL 4.5 API, DVI-D and DisplayPort dual display serving up to ultra HD 4K resolution; Multiple USB 3.1 Gen 2 (10G), Gen 3 PCIe (8GT/s), SATA III (6Gbps), USB 3.0 (5Gbps), GigE (1Gbps) LAN and flexible 5G/WiFi/4G/3G/LTE/GPRS/UMTS wireless connections make high-speed data conveying possible. Vecow RMS-1000 Series 1U Rackmount Fanless In-vehicle Computing System delivers more than 40% power productivity greater than former 7th Generation Intel Kaby Lake U-series SoC processor with only 15W CPU power consumption.

Featuring 8 Independent GigE LAN with 6 X-coded, iAMT 12.0 supported, 2 COM RS-232/422/485, 4 external USB 3.1 Gen 2 support up to 10Gbps data transfer, 2 Mini PCIe sockets for PCIe/USB/SIM socket/Optional mSATA expansion, 1 SIM card socket for 5G/WiFi/4G/3G/LTE/GPRS/UMTS, 2 SATA III, 9V to 48 wide range power input (RMS-1000) and 16V to 160V wide range power input (RMS-1100), ignition power control, fanless -40°C to 70°C operating temperature, smart manageability features, RMS-1000 is your trusted rackmount engine.

Vecow RMS-1000 Series 1U Rackmount Fanless In-vehicle Computing System delivers In-vehicle oriented, outstanding performance, Industrial-grade design and rugged reliability for your ADAS, In-vehicle Infotainment, Fleet Management, Traffic Control, Passenger Information System and any performance driven compact Industry 4.0 and AIoT applications.

1.2 Features

- 8th Generation Intel® Core™ i7/i5/i3 U-series processor (Whiskey Lake)
- DDR4 2400MHz memory, up to 32GB
- Fanless design, -40°C to 70°C Operating Temperature (RMS-1000)
- Fanless design, -40°C to 55°C Operating Temperature (RMS-1100)
- 8-port 10/100/1000 Base-T GigE LAN with 6 X-coded M12 connections, iAMT 12.0 supported
- 9V to 48V Wide range DC Power Input (RMS-1000)
- 16V to 160V Wide range DC Power Input (RMS-1100)
- 4 10G USB 3.1 Gen 2, 2 COM RS-232/422/485
- 2 Front-access 2.5" SSD/HDD Tray
- SIM Socket for 5G/WiFi/4G/3G/LTE/GPRS/UMTS
- Expansion : SATA III, mSATA and Mini PCIe
- Ignition Power Control

1.3 Product Specification

1.3.1 Specifications of RMS-1000

System	
Processor	8th Quad Core Intel® Core™ i7/i5/i3 U-series Processor (Whiskey Lake)
Chipset	Intel® SoC (Cannon Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® UHD Graphics 620
Interface	• DVI-D : Up to 1920 x 1200 @60Hz • DisplayPort : Up to 4096 x 2304 @60Hz
Ethernet	
LAN 1	Intel® I219LM GigE LAN supports iAMT 12.0
LAN 2	Intel® I210 GigE LAN
LAN 3 ~ LAN 8	M12 Type X-Coded 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, 3Gbps)
Storage Device	2 2.5" SSD/HDD Bracket (Internal)
I/O Interface	
Serial	2 COM RS-232/422/485 (ESD 8kV)
USB	4 USB 3.1 Gen 2 (External)
LED	Power, HDD
SIM Card	1 SIM Card Socket (Internal)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Full-Size for PCIe/USB/Internal SIM Card • 1 Full-size for PCIe/USB/Optional mSATA
Power	
Power Input	9V to 48V DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Ignition Control	16 Mode (Internal)
Remote Switch	3-pin Terminal Block : On, Off, IGN

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	
Microsoft	Windows 10
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension	482.6mm x 301.4mm x 44.0mm (19.00" x 11.87" x 1.73")
Weight	4.0 kg (8.8 lb)
Mounting	Rackmount
Environment	
Operating Temperature	-40°C to 70°C (-40°F to 158°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	• IEC 60068-2-27 • SSD : 50G, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN50155, EN50121-3-2

1.3.2 Specifications of RMS-1100

System	
Processor	8th Quad Core Intel® Core™ i7/i5/i3 U-series Processor (Whiskey Lake)
Chipset	Intel® SoC (Cannon Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel® UHD Graphics 620
Interface	• DVI-D : Up to 1920 x 1200 @60Hz • DisplayPort : Up to 4096 x 2304 @60Hz
Ethernet	
LAN 1	Intel® I219LM GigE LAN supports iAMT 12.0
LAN 2	Intel® I210 GigE LAN
LAN 3 ~ LAN 8	M12 Type X-Coded 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)
Storage Device	2 2.5" SSD/HDD Bracket (Internal)
I/O Interface	
Serial	2 COM RS-232/422/485 (ESD 8kV)
USB	4 USB 3.1 Gen 2 (External)
LED	Power, HDD
SIM Card	1 SIM Card Socket (Internal)
Expansion	
Mini PCIe	2 Mini PCIe Socket : • 1 Full-Size for PCIe/USB/Internal SIM Card • 1 Full-size for PCIe/USB/Optional mSATA
Power	
Power Input	16V to 160V DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Ignition Control	16 Mode (Internal)
Remote Switch	3-pin Terminal Block : On, Off, IGN

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	
Microsoft	Windows 10
Linux	Fedora 19, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimension	482.6mm x 301.4mm x 44.0mm (19.00" x 11.87" x 1.73")
Weight	4.0 kg (8.8 lb)
Mounting	Rackmount
Environment	
Operating Temperature	-40°C to 55°C (-40°F to 131°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 85°C
Shock	• IEC 60068-2-27 • SSD : 50G, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN50155, EN50121-3-2

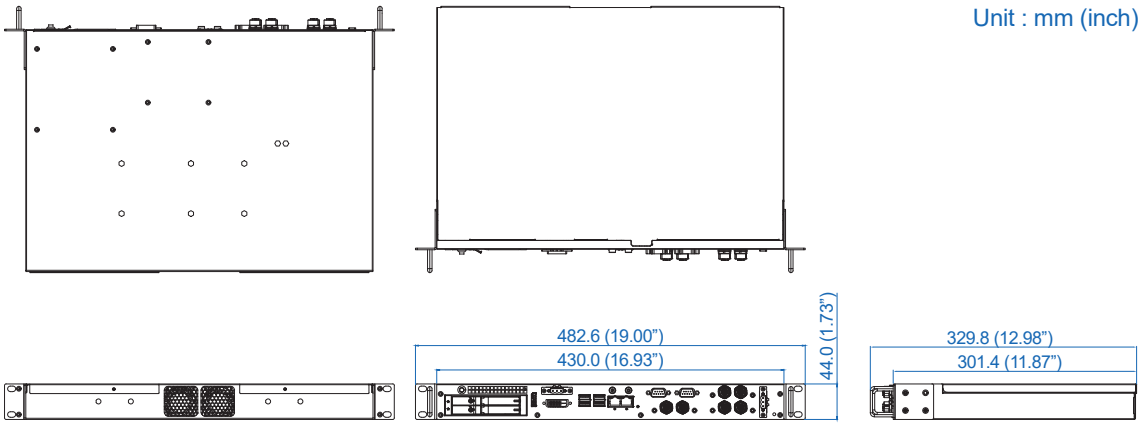
1.4 Supported CPU List

Processor No.	Cores	TDP	Cache	Max. Frequency	ECC Memory
Intel® Core™ i7-8665UE	4	15W	8M	Up to 4.4GHz	N
Intel® Core™ i5-8365UE	4	15W	6M	Up to 4.1GHz	N
Intel® Core™ i3-8145UE	2	15W	4M	Up to 3.9GHz	N
Intel® Celeron 4305UE	2	15W	2M	Up to 2.0GHz	N

1.5 Mechanical Dimension

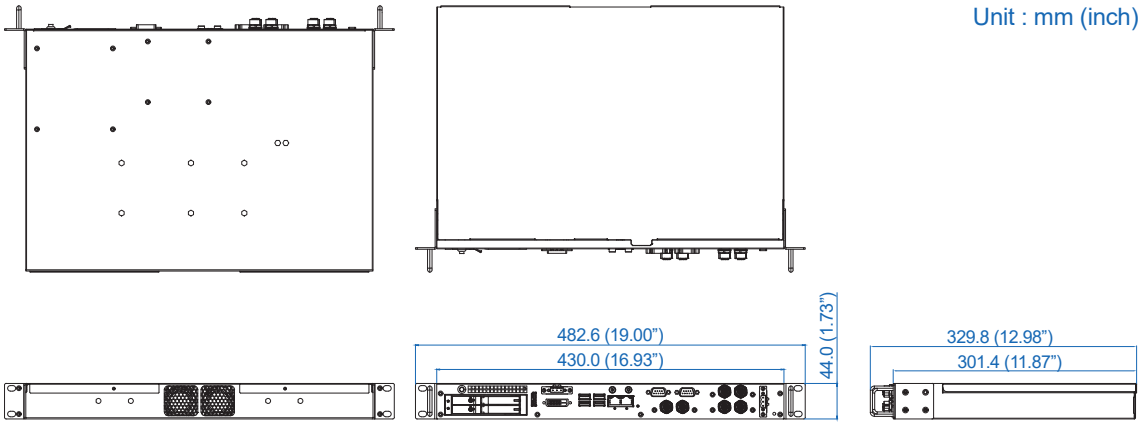
1.5.1 RMS-1000 Mechanical Drawing

Unit : mm (inch)



1.5.2 RMS-1100 Mechanical Drawing

Unit : mm (inch)



2

GETTING TO KNOW YOUR RMS-1000

2.1 Packing List

Item	Description	Qty
1	RMS-1000/RMS-1100 Embedded System	1

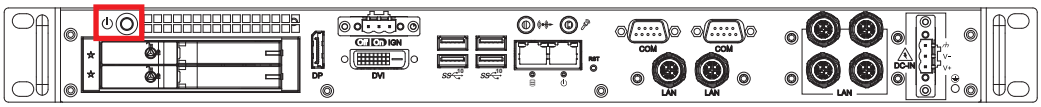
Item	Description	Outlook	Usage	P/N	Qty
1	HANDLE for 1U		For HANDLE	53-4001442-203	2
2	Ear for 1U		For HANDLE	62-03P0396-000	2
3	Flat head M3*8L Ni+Ny		For HANDLE	53-M000050-012	4
4	Flat head M4*6L		For HANDLE	N/A	8
5	PHILLPIS M2.5x6L, Ni		Mini PCIe slot	53-2426906-30B	2
6	Terminal block 3-pin (5.0mm)		DC-IN/Switch	51-2411R03-S1B	2
7	Key		SSD/HDD tray	N/A	1

2.2 Front Panel I/O & Functions

2.2.1 RMS-1000 Front I/O & Functions

In Vecow's RMS-1000 series family, all I/O connectors are located on the front panel. Most of the general connections to the computer device, such as DisplayPort, DVI-D, USB 3.1, audio, LAN Jack, COM port and DC-IN are placed on the front panel.

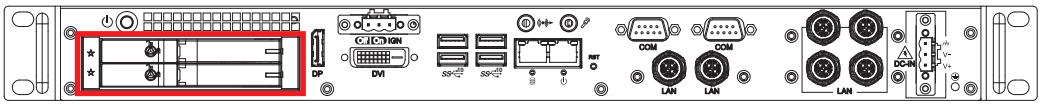
2.2.1.1 Power Button



The power button is a non-latched switch. In case of system halts, you can press and hold the power button for 4 seconds to compulsorily shut down the system. Please note that a 4 seconds interval is kept by the system between two on/off operations (i.e. once turning off the system, you shall wait for 4 seconds to initiate another power-on operation).

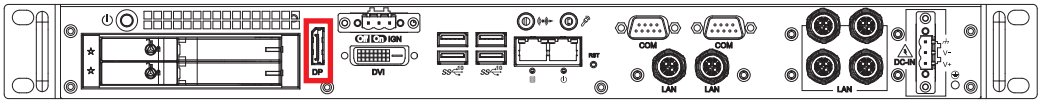
LED Color	Power Status	System Status
Green	Power	System power status (on/off)

2.2.1.2 SSD/HDD Tray



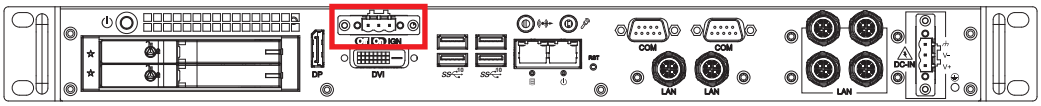
There are 2 front-access 2.5" SSD/HDD trays in the front side of RMS-1000. Just trigger to open the SSD/HDD tray, up to 4TB is available.

2.2.1.3 DisplayPort

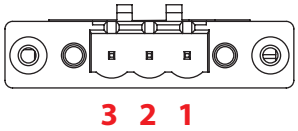


Onboard Display Port support auxiliary channel dual mode, connection supports up to 4096x2304 resolution at 60 Hz.

2.2.1.4 Remote Power On/Off Switch & LED Terminal Block

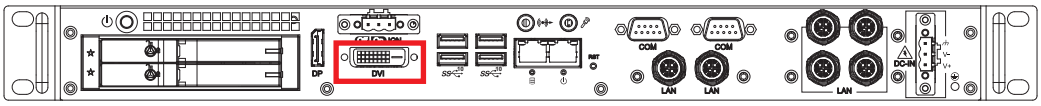


It is a 3-pin power-on/power-off switch through Phoenix Contact terminal block. You could turn on or off the system power by using this contact. This terminal block supports dual function on soft power-on/power-off (instant off or delay four seconds), and suspend mode. Another function is provided ignition power control feature for in-vehicle applications. The built-in MCU monitors the ignition signal and turns on/off the system according to pre-defined on/off delay period.



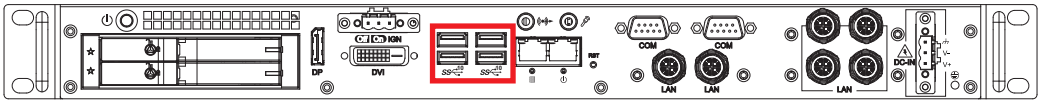
Pin No.	Definition
1	Ignition (IGN)
2	SW+
3	SW-

2.2.1.5 DVI Connector



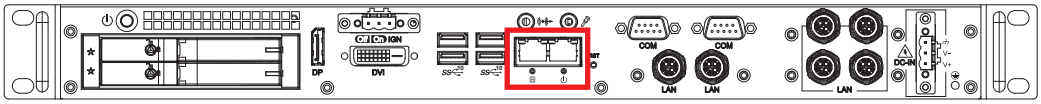
The DVI output mode supports up to 1920 x 1080 resolution. The DVI is automatically selected according to the display device connected. You will need a DVI-D cable when connecting to a display device.

2.2.1.6 USB 3.1 Connector



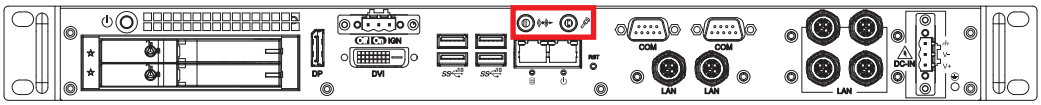
There are 4 USB 3.1 Gen2 connections available supporting up to 10GB per second data rate in the top side of RMS-1000. They are also compliant with the requirements of SuperSpeed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.1.7 RJ45 Connector



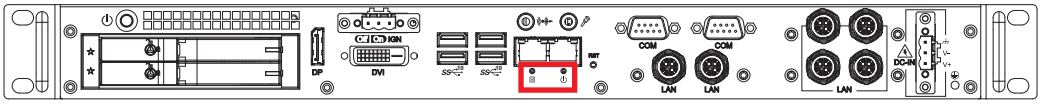
There are two 8-pin RJ-45 jacks supporting 10/100/1000 Mbps Ethernet connections in the front side of RMS-1000. LAN 1 is powered by Intel® I219-LM Ethernet engine; LAN 2 is powered by Intel® I210-IT Ethernet engine. When both LAN 1 and LAN 2 work in normal status, basic iAMT function is enabled. Using suitable RJ-45 cable, you can connect RMS-1000 system to a computer or to any other devices with Ethernet connection, for example, a hub or a switch. Moreover, both LAN 1 and LAN 2 supports Wake on LAN and Pre-boot functions.

2.2.1.8 Audio Connector



There are two audio connectors, mic-in and line-out, in the front side of RMS-1000. 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® Whiskey Lake-U chipset and Realtek ALC888S-VD codec.

2.2.1.9 PWR & HDD LED Indicator

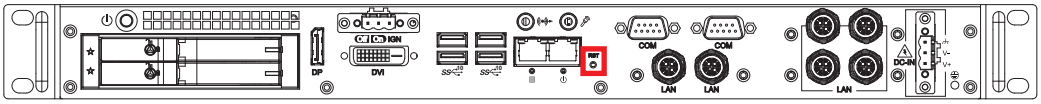


HDD LED/Orange : A Hard Disk LED. If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

Power LED/Green : If the LED is solid green, it indicates that the system is powered on.

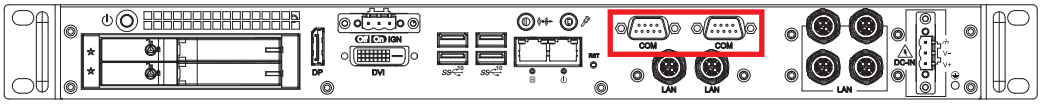
LED Color	Power Status	System Status
Orange	HDD	• On/Off : Storage status, function or not. • Twinkling : Data transferring
Green	Power	System power status (on/off)

2.2.1.10 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, then reset will be enabled.

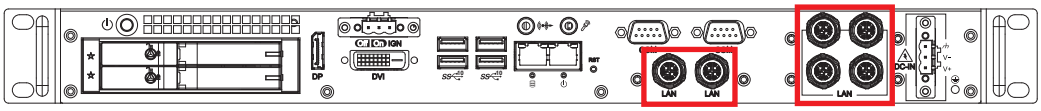
2.2.1.11 COM port connector



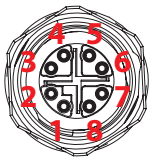
Serial port can be configured for RS-232, RS-422, or RS485 with auto flow control communication. The default definition of is RS-232. If you want to change to RS-422 or RS-485, you can find the setting in BIOS.

Pin NO.	Definition	Definition	Definition	Definition
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-	---------

2.2.1.12 LAN port connector

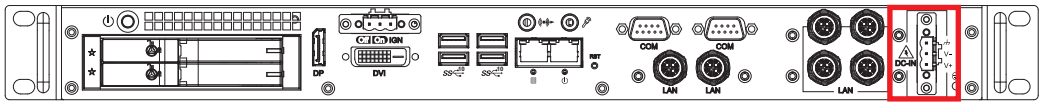


There are 6 M12 jacks supporting 10/100/1000 Mbps Ethernet connections in the front side of RSM-1000. All LANs is powered by Intel® I210-IT Ethernet engine. When both work in normal status, basic iAMT function is enabled. Using suitable M12 LAN cable, you can connect RMS-1000 system to a computer or to any other devices with Ethernet connection, for example, a hub or a switch. The pinouts of LAN are listed as follow :

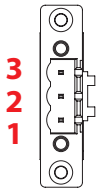


Pin No.	Definition	Pin No.	Definition
1	LAN_MDI_0P	2	LAN_MDI_0N
3	LAN_MDI_1P	4	LAN_MDI_1N
5	LAN_MDI_3P	6	LAN_MDI_3N
7	LAN_MDI_2N	8	LAN_MDI_2P

2.2.1.13 Power Terminal Block



This system supports 9V to 48V DC power input by terminal block in the rear side. In normal power operation, power LED lightens in solid green.



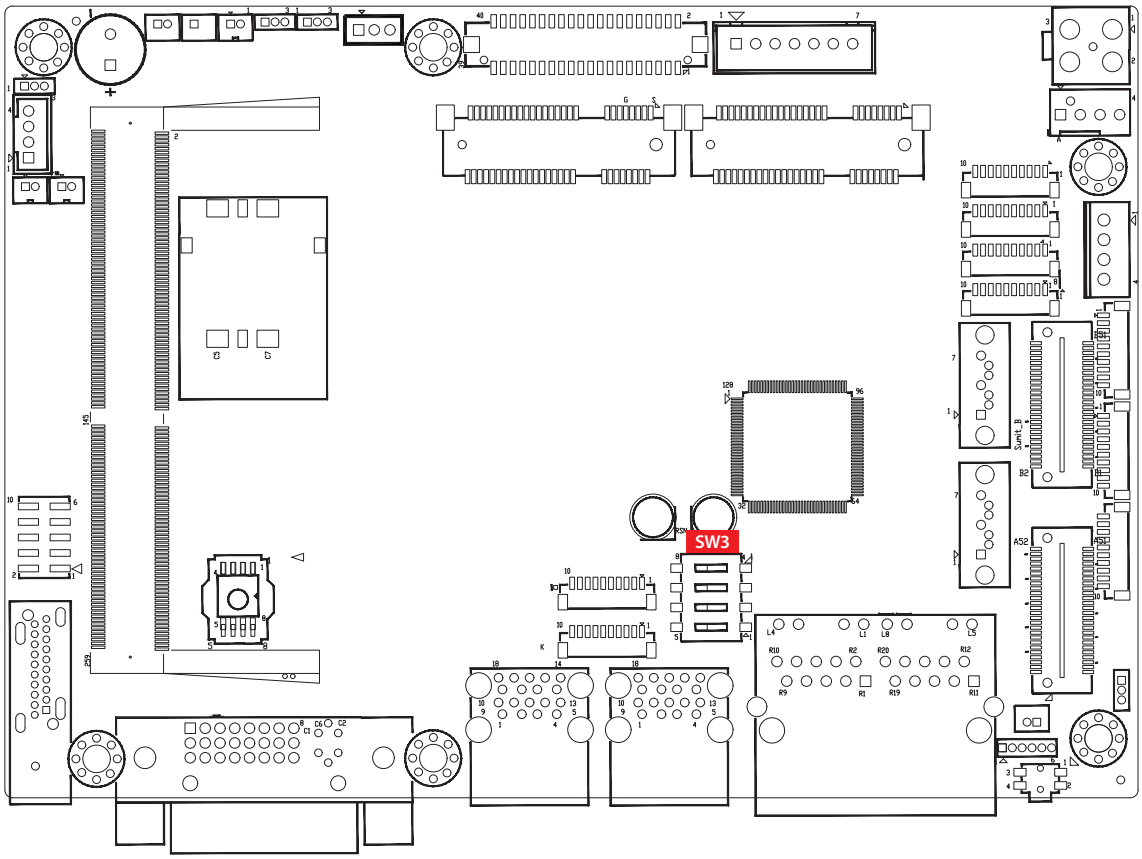
Pin No.	Definition
1	V+
2	V-
3	Chassis GND

2.3 Ignition Control

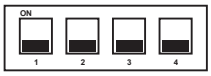
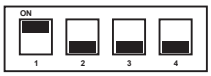
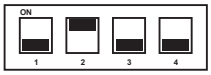
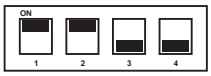
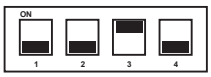
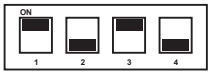
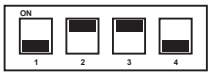
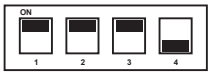
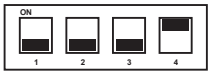
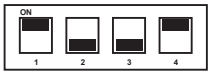
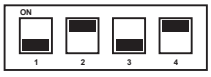
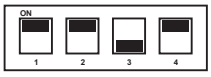
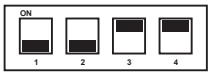
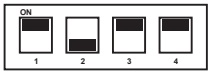
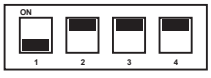
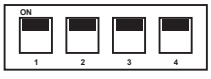
RMS-1000 series provides ignition power control feature for in-vehicle applications. The built-in MCU monitors the ignition signal and turns on/off the system according to pre-defined on/off delay period.

2.3.1 Adjust Ignition Control Modes

RMS-1000 series provides 16 modes of different power on/off delay periods adjustable via SW3 switch. The default rotary switch is set to 0 in ATX/AT power mode.



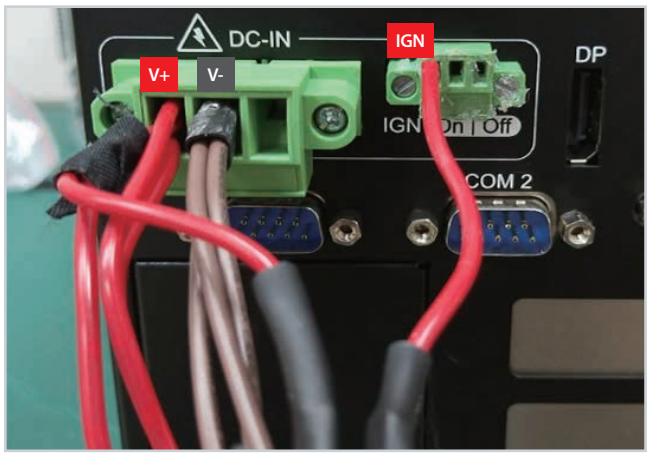
The modes are listed in the following table :

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

2.6.2 Ignition Control Wiring

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

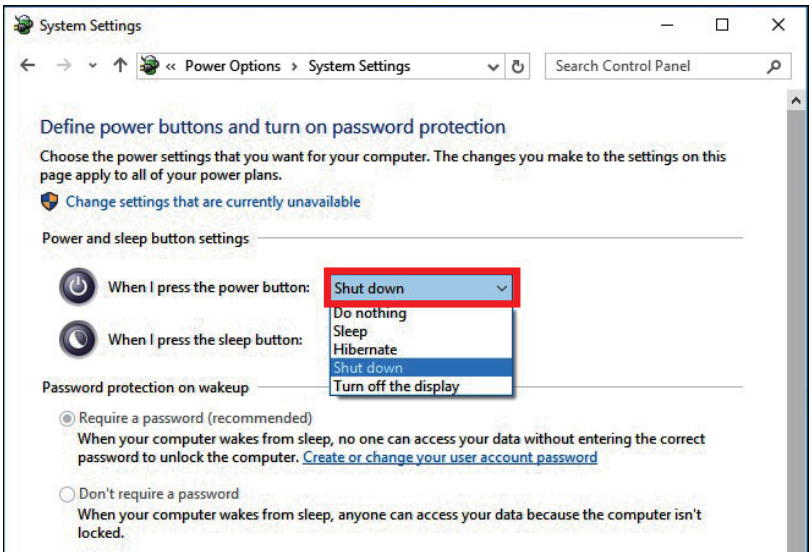
Pin No.	Definition
1	Ignition (IGN)
2	SW+
3	SW-



For testing purpose, you can refer to the picture blow to simulate ignition signal input controlled by a latching switch.

Note :

1. DC power source and IGN share the same ground.
2. RMS-1000 supports 9V to 48V wide range DC power input in ATX/AT mode. In Ignition mode, the input voltage is fixed to 12V/24V for car battery scenario.
3. For proper ignition control, the power button setting should be "Power Down" mode.



In Windows for example, you need to set "When I press the power button" to Shut down.

3

SYSTEM SETUP

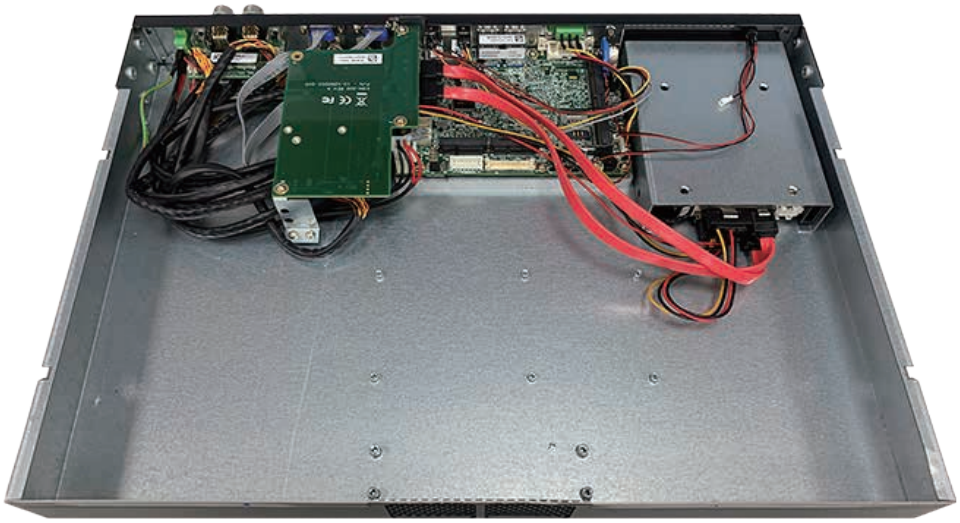
3.1 How to Open Your RMS-1000/RMS-1100

Step 1 Remove two PHILLIPS M3x6L screws.

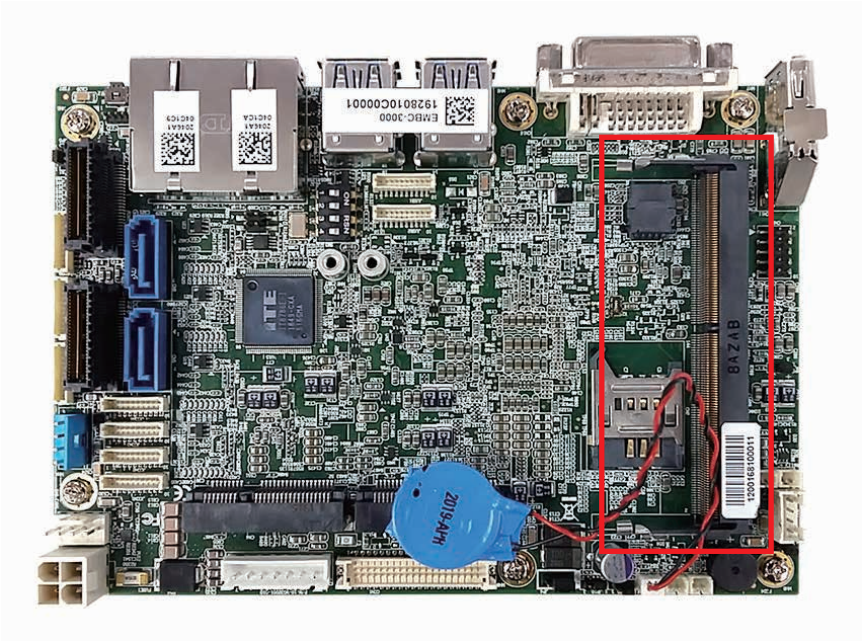
Step 2 Push top cover in this side.

Step 3 Remove top cover.

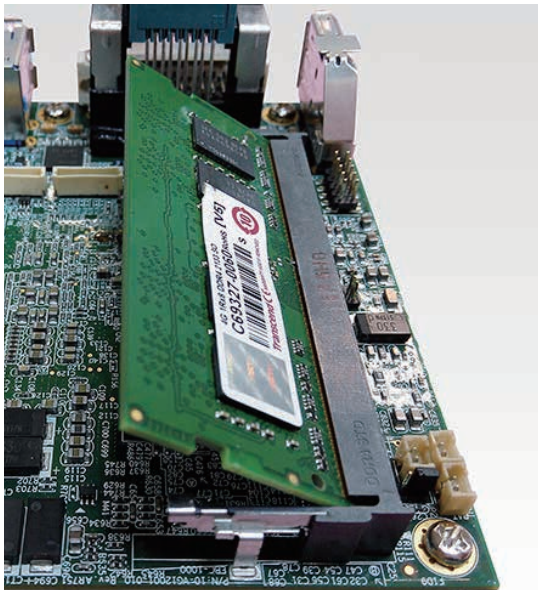
Step 4 Finish.



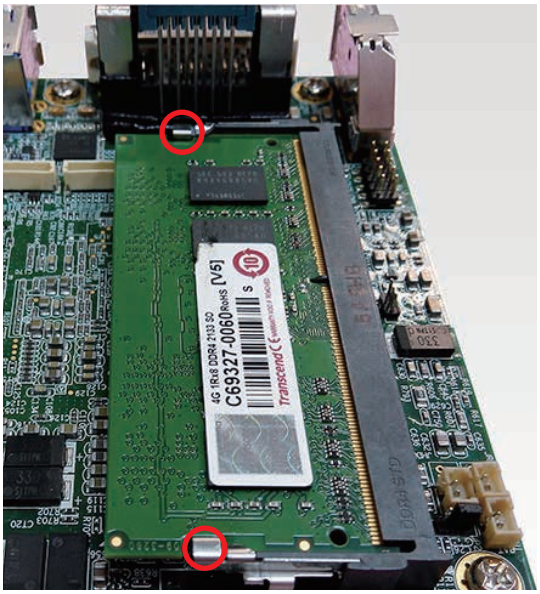
3.2 Installing DDR4 SO-DIMM Module



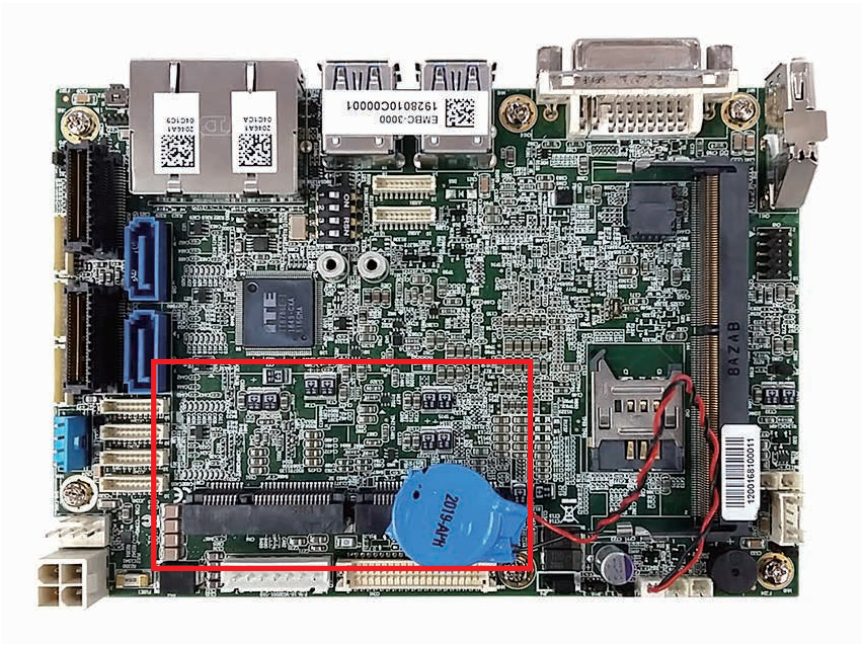
Step 1 Install DDR4 RAM module into SO-DIMM slot.



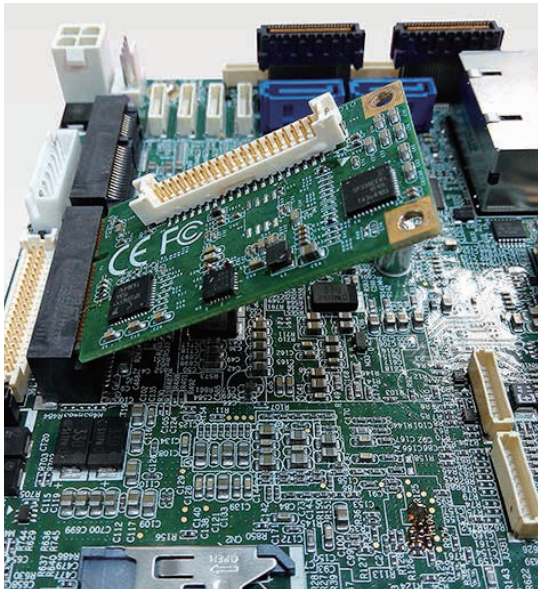
Step 2 Install DDR4 RAM module into SO-DIMM slot.



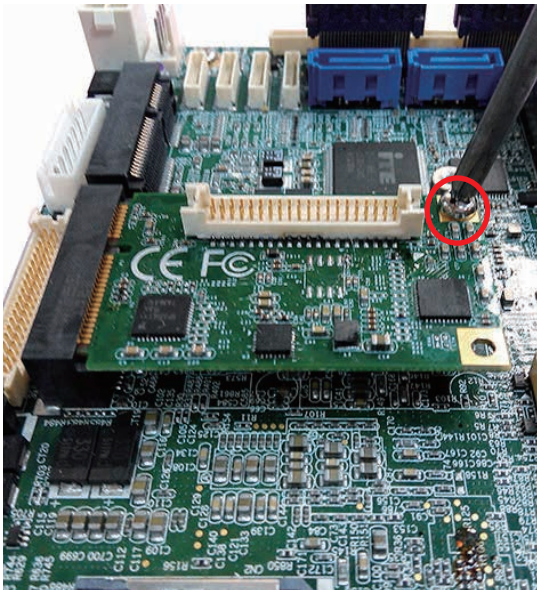
3.3 Installing Mini PCIe Card



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



Step 2 Fasten one M2.5 screw.

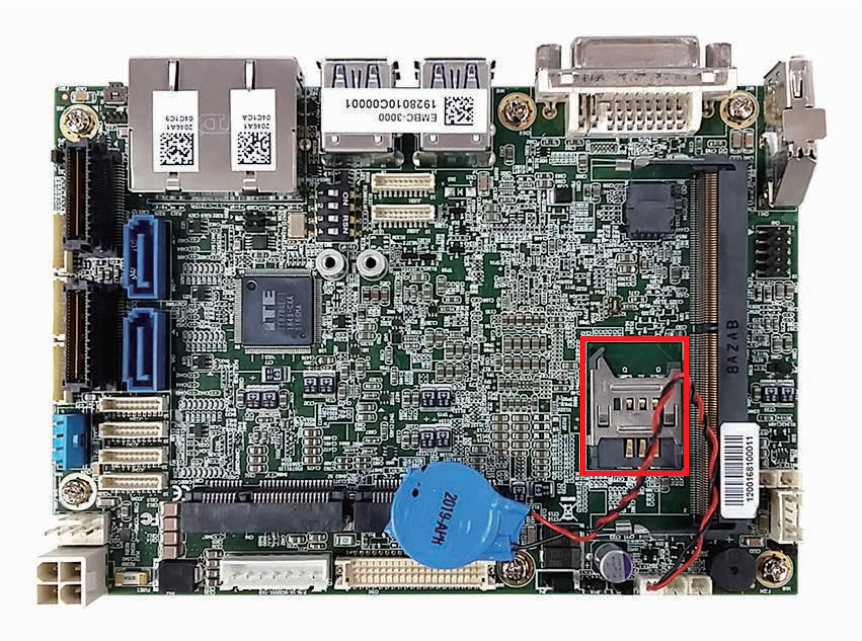


3.4 Installing Antenna Cable

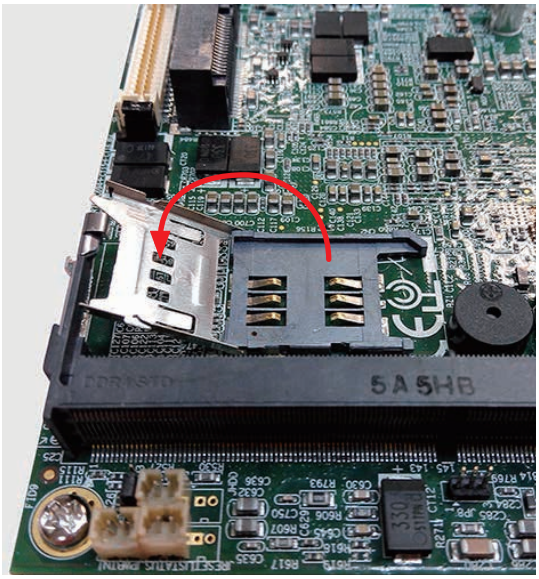
Step 1 Check antenna cable and washers.

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

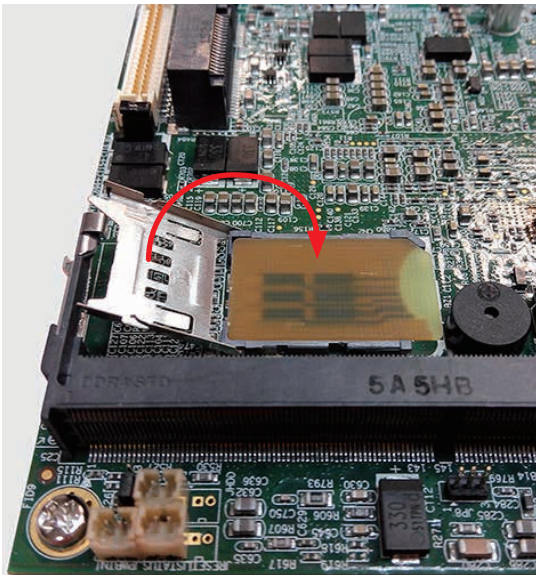
3.5 Installing SIM Card



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.



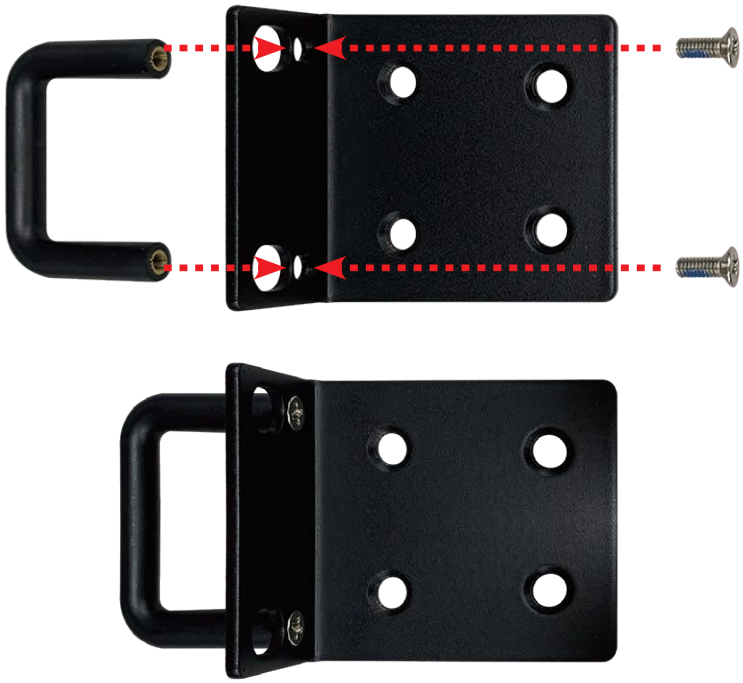
3.6 Installing SSD/HDD

Step 1 Pull the trigger and open SSD/HDD tray.

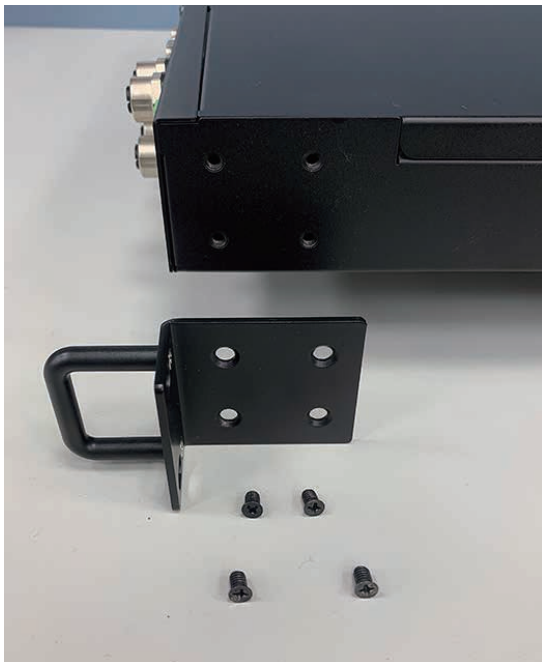
Step 2 Install 2.5" (up to 9.5mm) into the tray and push back to close the tray. (Can use included key locked.)

3.7 Mounting Your RMS-1000/RMS-1100

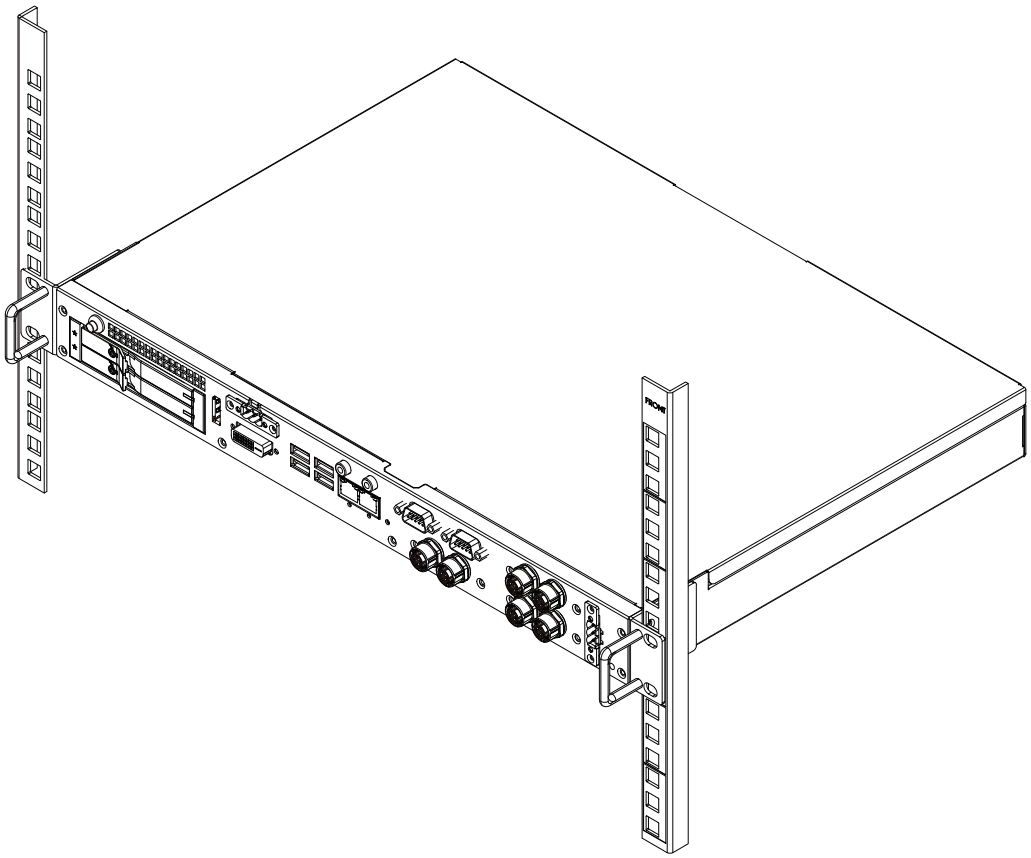
Step 1 Assembly handle and handle bracket.



Step 2 Install handle to rack mount for four flat head M4*6L screws. (Both side)



Step 3 Install with 19" cabinet.



4

BIOS SETUP

4.1 BIOS Setting

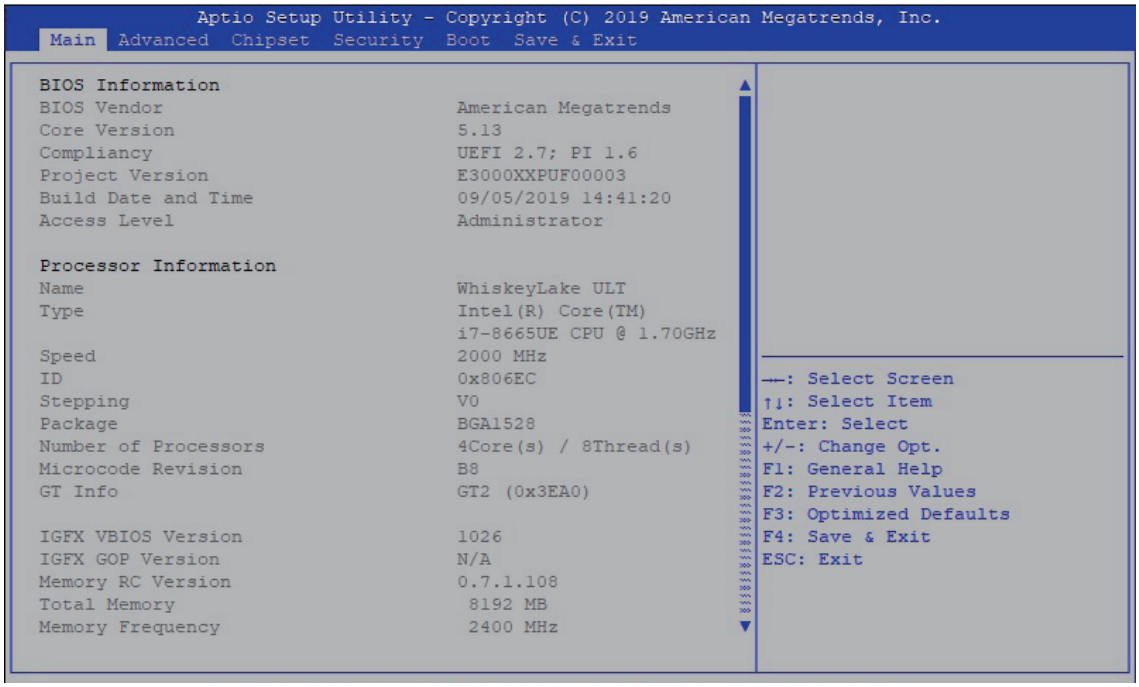


Figure 4-1 : Entering Setup Screen

BIOS provide an interface for user to check and change system configuration. The BIOS setup program is accessed by pressing the <Del> key when POST display output then main BIOS Setup menu screen is displayed.

4.2 Main Manu

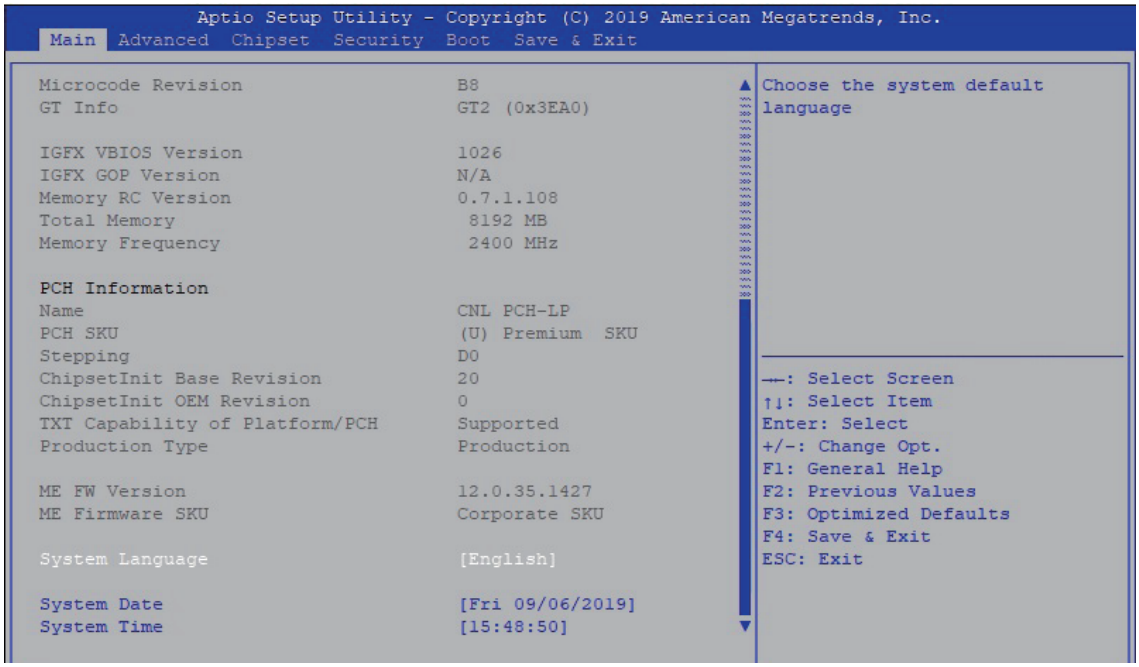


Figure 4-2 : BIOS Main Menu

The Main menu display 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

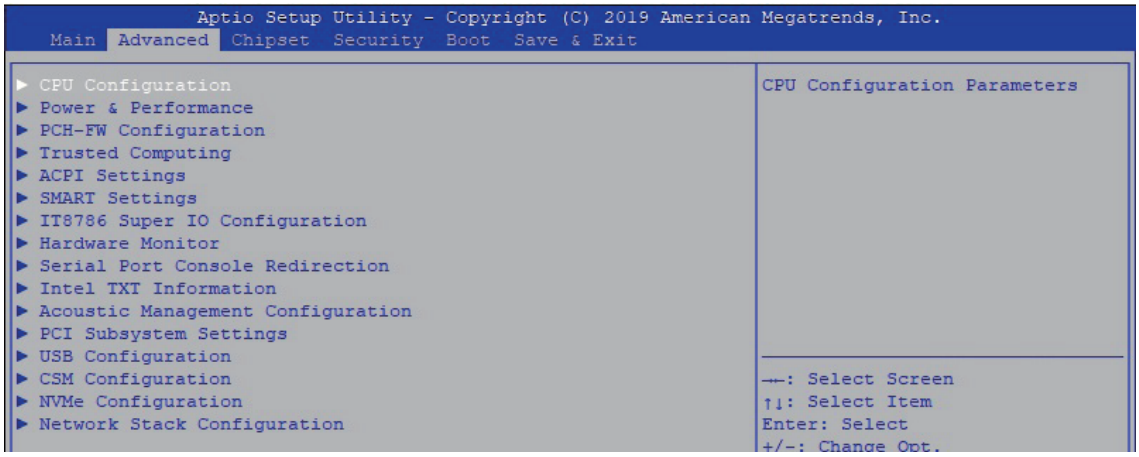


Figure 4-3 : BIOS Advanced Menu

Select Advanced tab to enter advanced BIOS Setup options such as CPU Configuration, SATA Configuration and USB Configuration.

4.3.1 CPU Configuration

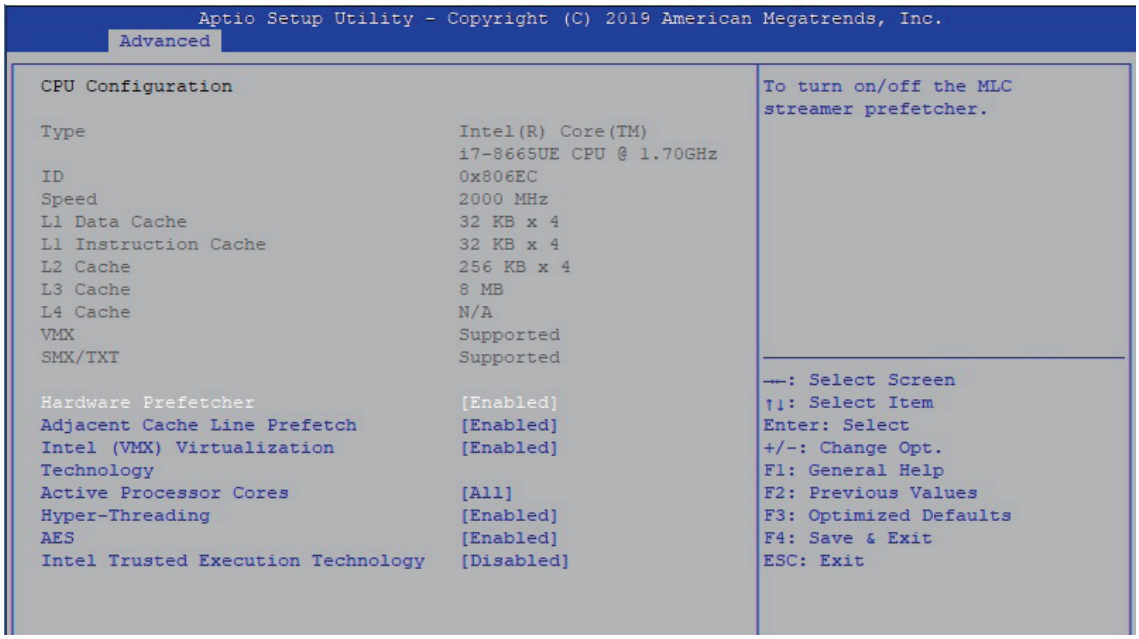


Figure 4-3-1 : CPU Configuration

Display CPU related information and features supported.

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 or Disabled Hyper-Threading Technology.

AES

Enable/Disable AES (Advanced Encryption Standard).

Intel Trusted Execution Technology

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

Changed require a full power cycle to take effect.

4.3.2 Power & Performance

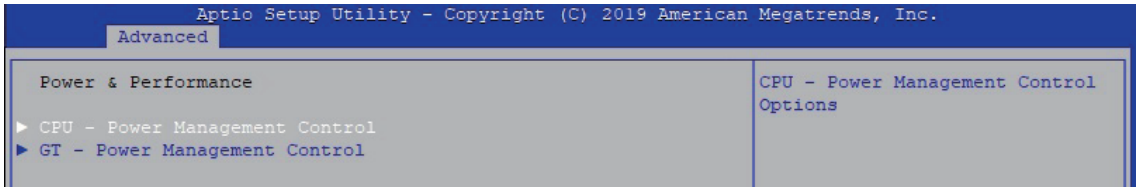


Figure 4-3-2 : Power & Performance

4.3.2.1 CPU - Power Management Control

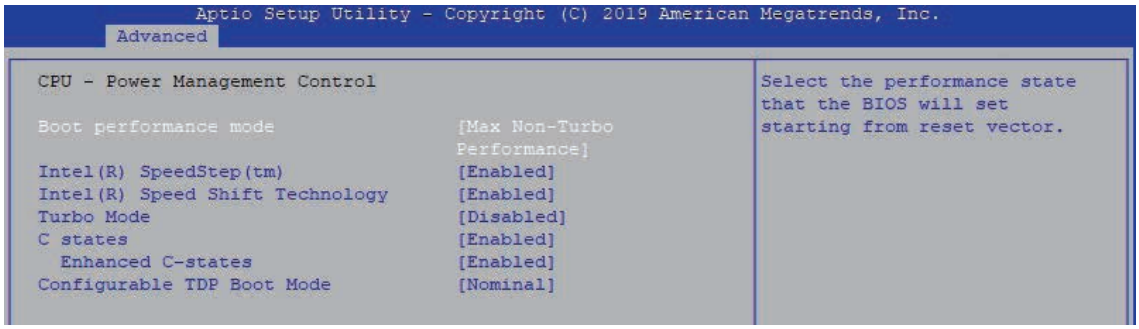


Figure 4-3-2-1 : CPU - Power Management Control

Boot performance mode

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

Intel® SpeedStep™

Allow more than two frequency ranges to be supported.

Intel® 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

Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).

C states

Enable or 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.

Configurable TDP Boot Mode

Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero. Configurable TDP allows operation in situation where extra cooling is available or situations where a cooler and quieter mode of operation is desired.

4.3.2.2 GT - Power Management Control

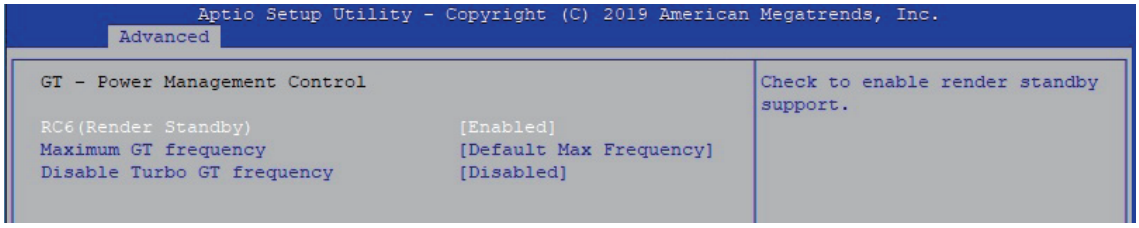


Figure 4-3-2-2 : GT - Power Management Control

RC6 (Render Standby)

Check to enable render standby support.

Maximum GT frequency

Maximum GT frequency limited by the user. Choose between 300MHz (RPN) and 1150 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

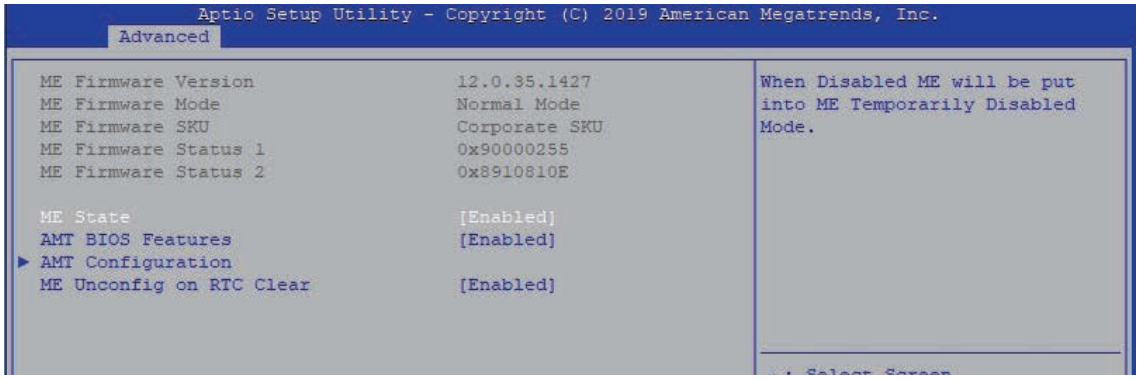


Figure 4-3-3 : PCH-FW Settings

ME State

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

AMT BIOS Features

When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note : This option does not disable Manageability Features in FW.

AMT Configuration

Configure Intel Active Management Technology Parameters.

ME Unconfig on RTC Clear

Disabling this option will cause ME not be unconfigured on RTC clear.

4.3.4 Trusted Computing

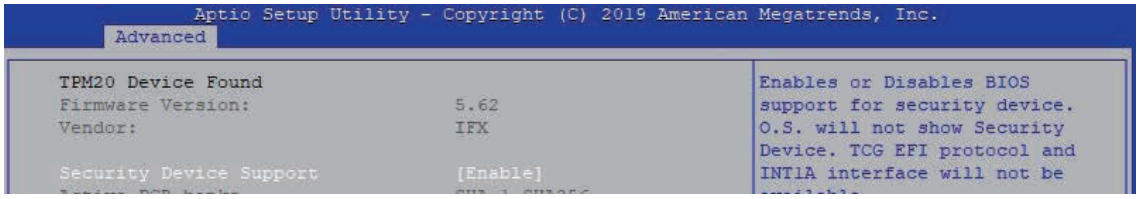


Figure 4-3-4 : Trusted Computing

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

4.3.5 ACPI Settings

igure 4-3-5 : ACPI Settings

Enable Hibernation :

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

ACPI Sleep State

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

S3 Video Repost

Enable or Disable S3 Video Repost.

4.3.6 SMART Settings

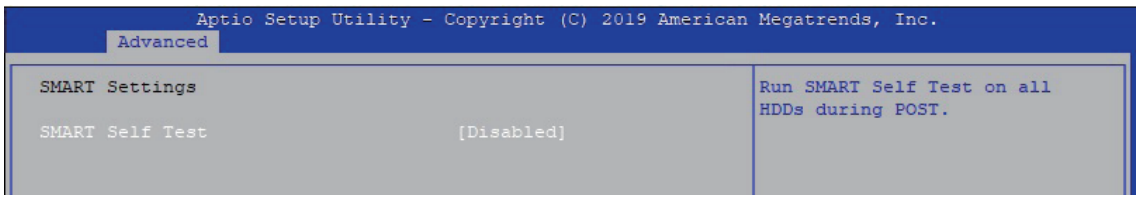


Figure 4-3-6 : SMART Settings

SMART Self Test

Run SMART Self-test on all HDDs during POST.

4.3.7 IT8786 Super IO Configuration

Figure 4-3-7 : 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).

4.3.8 Hardware Monitor

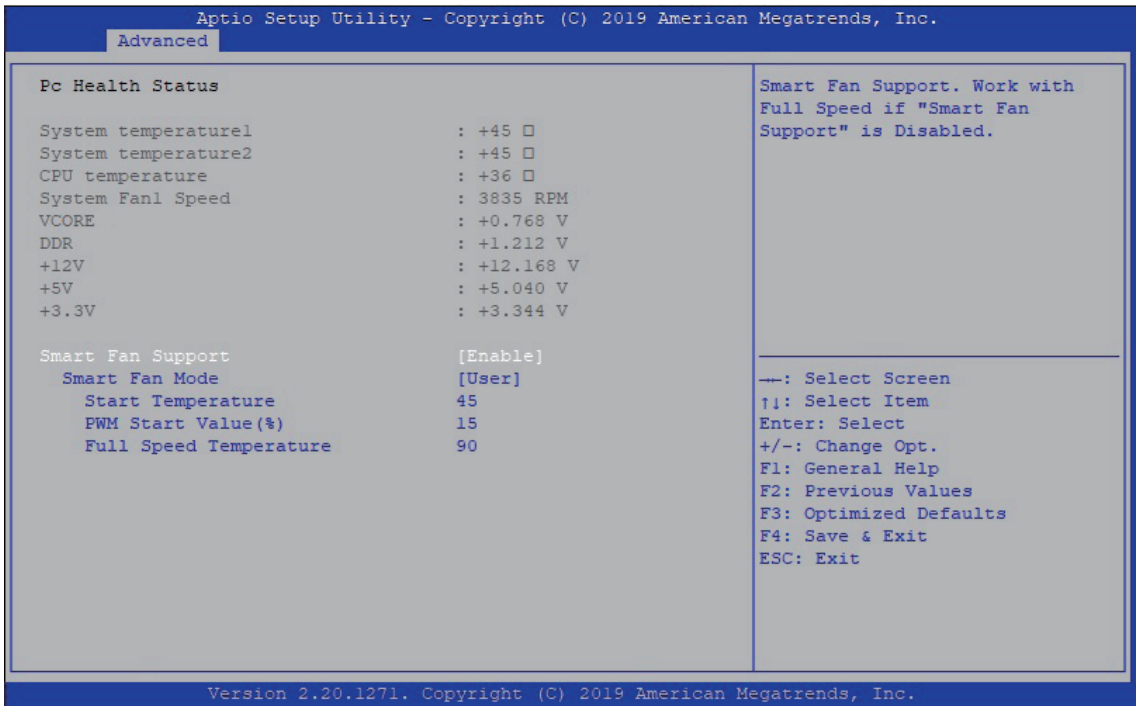


Figure 4-3-8 : Hardware Monitor Settings

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

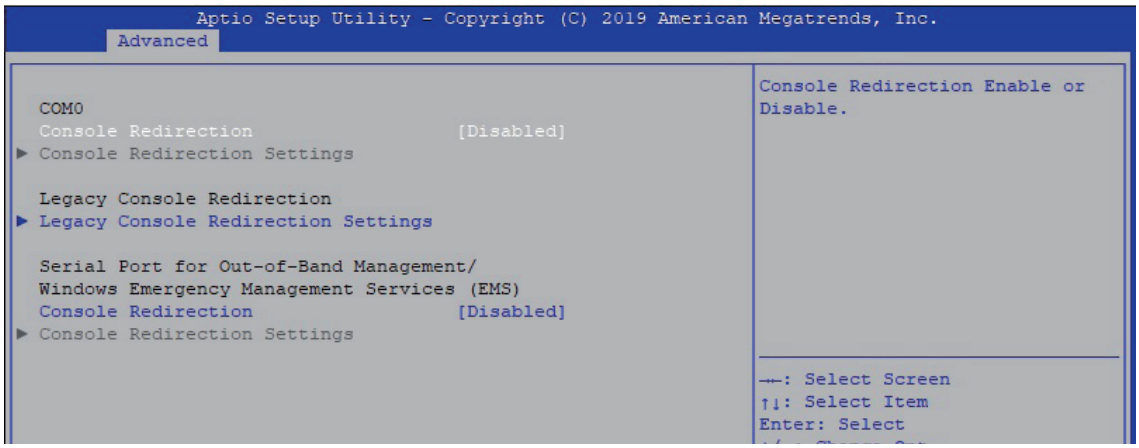


Figure 4-3-9 : Serial Port Console Redirection Settings

Console Redirection

Console Redirection Enable or Disable.

Console Redirection Settings

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.

Legacy Console Redirection Settings

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

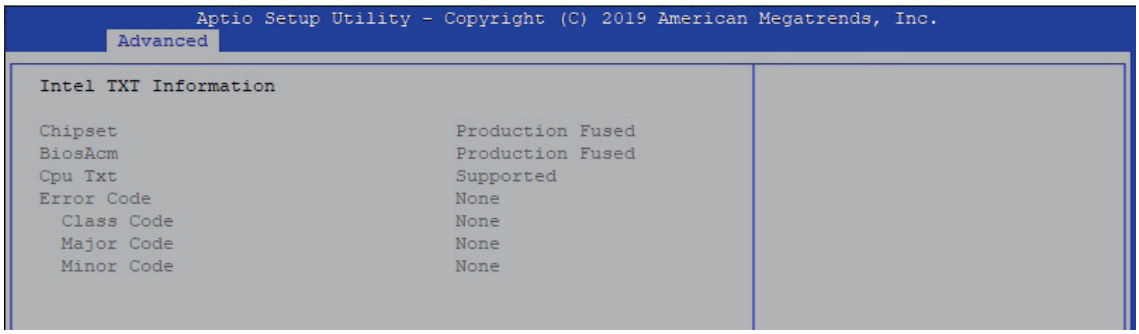


Figure 4-3-10 : Intel TXT Information

Display Intel TXT information.

4.3.11 Acoustic Management Configuration

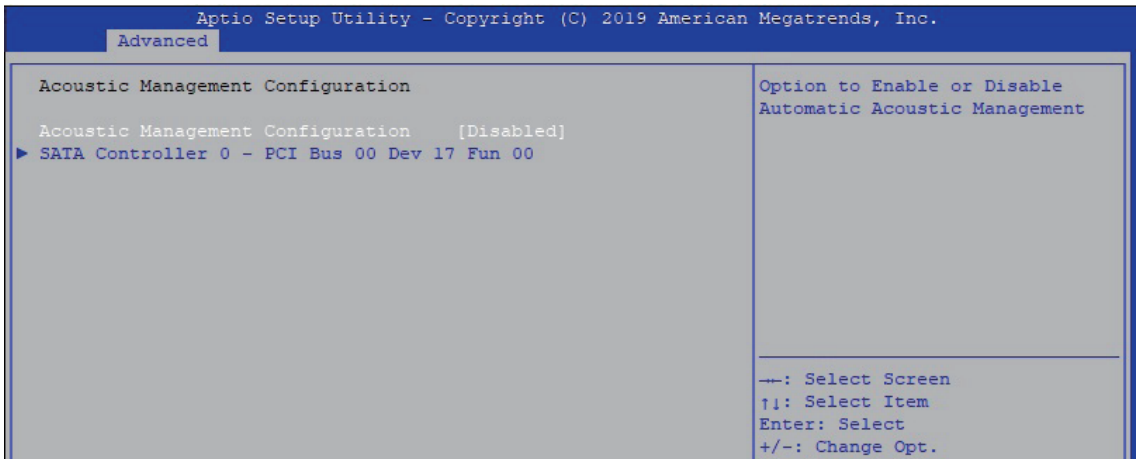


Figure 4-3-11 : Acoustic Management Settings

Acoustic Management Configuration

Option to Enable or Disable Automatic Acoustic Management.

4.3.12 PCI Subsystem Settings

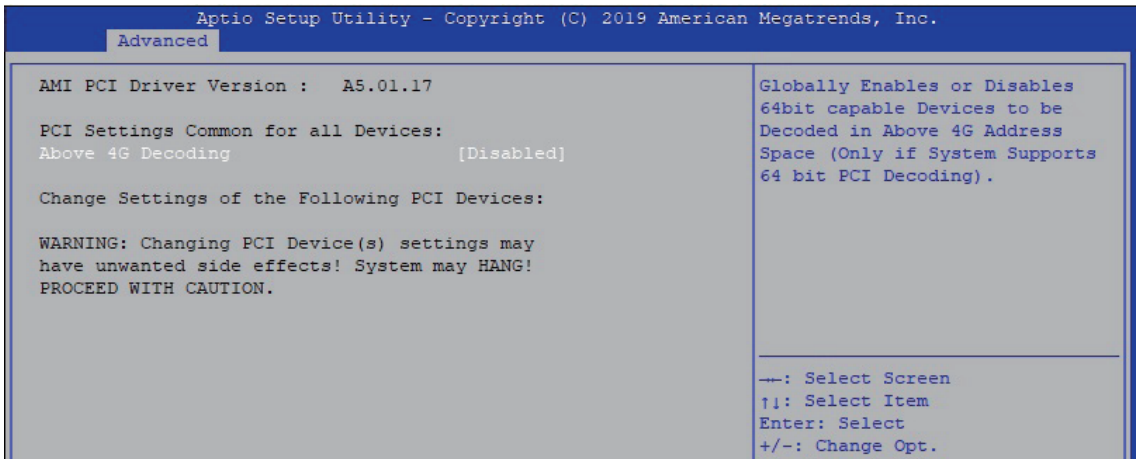


Figure 4-3-12 : PCI Subsystem Settings

Above 4G Decoding

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

4.3.13 USB Configuration

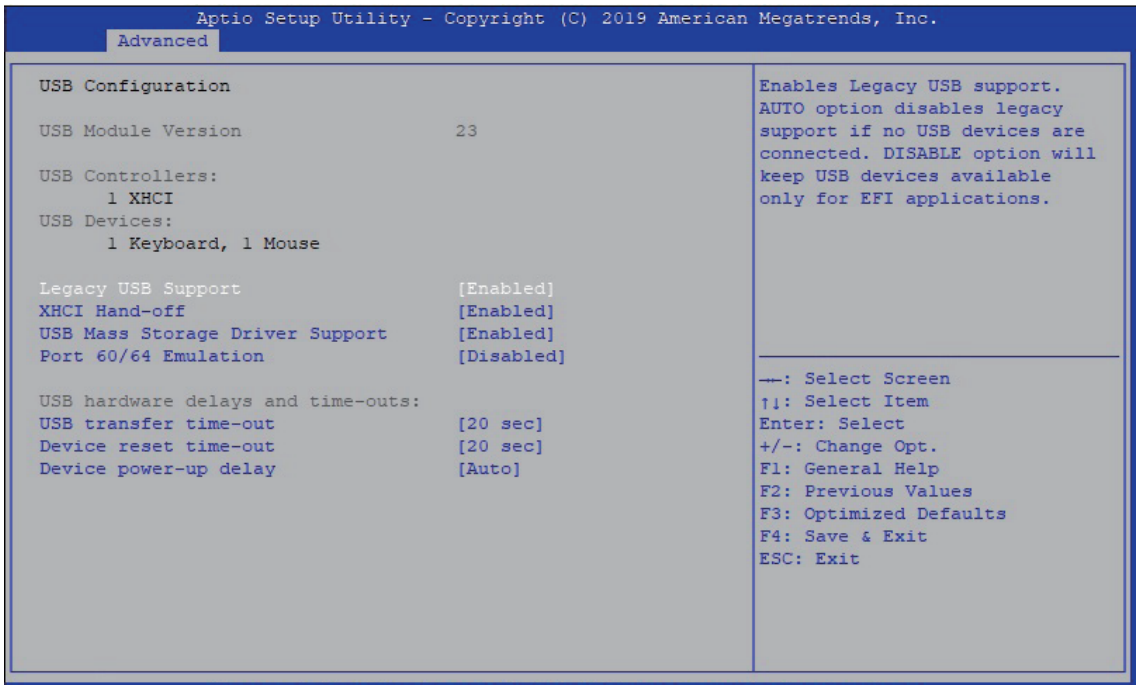


Figure 4-3-13 : USB Settings

Legacy USB Support

Enables Legacy USB support.
AUTO option disables legacy support if no USB devices are connected.
ISABLE 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.

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 Hub descriptor.

4.3.14 CSM Configuration

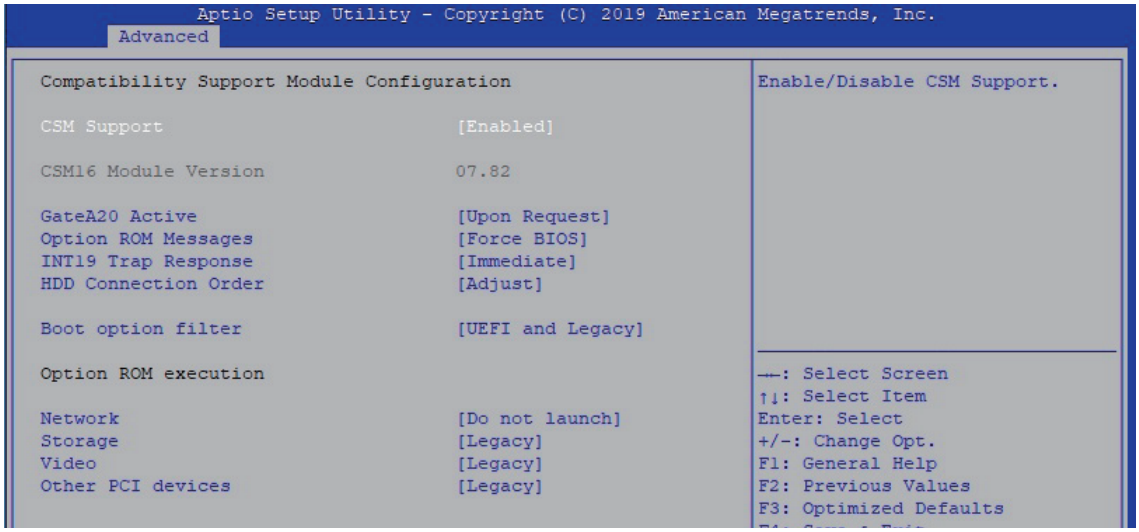


Figure 4-3-14 : CSM Settings

CSM Support

Enable/Disable CSM Support.

GateA20 Active

UPON REQUEST - GA20 can be disabled using BIOS services.
ALWAYS - do not allow disabling GA20; 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 ROMs priority.

Network

Controls the execution of UEFI and Legacy PXE OpROM.

Storage

Controls the execution of UEFI and Legacy Storage OpROM.

Video

Controls the execution of UEFI and Legacy Video OpROM.

Other PCI devices

Determines OpROM execution policy for devices other than Network, Storage, or Video.

4.3.15 NVMe Configuration

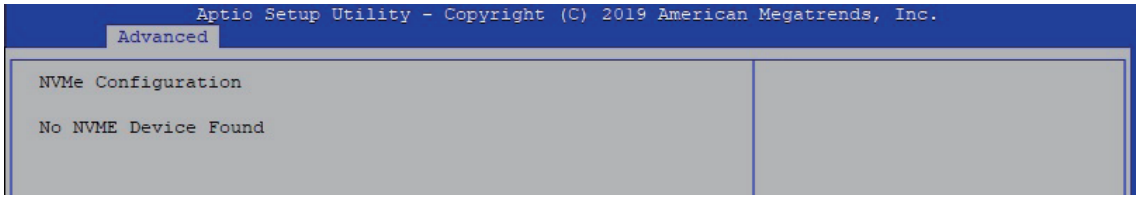


Figure 4-3-15 : NVMe Configuration

Display NVMe Controller and drive information.

4.3.16 Network Stack Configuration

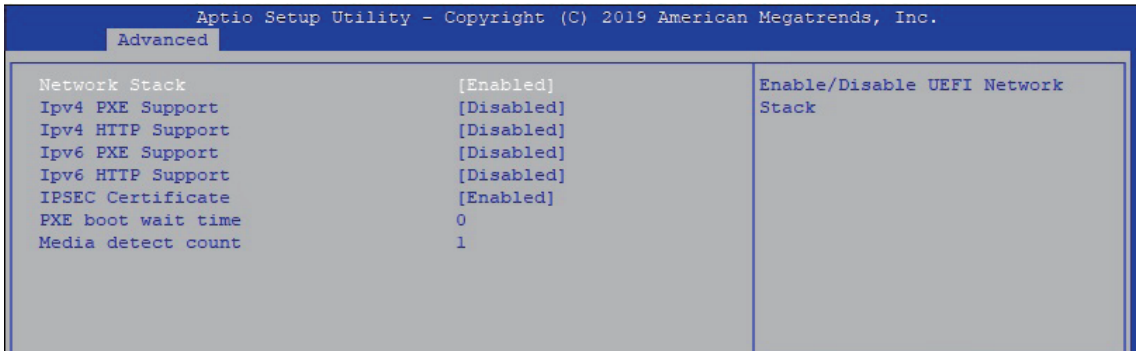


Figure 4-3-16 : Network Stack Settings

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.

IPSEC Certificate

Support to Enable/disable IPSEC certificate for Ikev.

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.

4.4 Chipset Functions

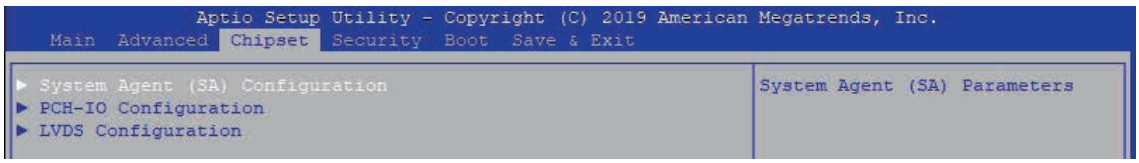


Figure 4-4 : BIOS Chipset Menu

System Agent (SA) Configuration
System Agent (SA) Parameters.

PCH-IO Configuration
PCH Parameters.

LVDS Configuration
LVDS Configuration.

4.4.1 System Agent (SA) Configuration

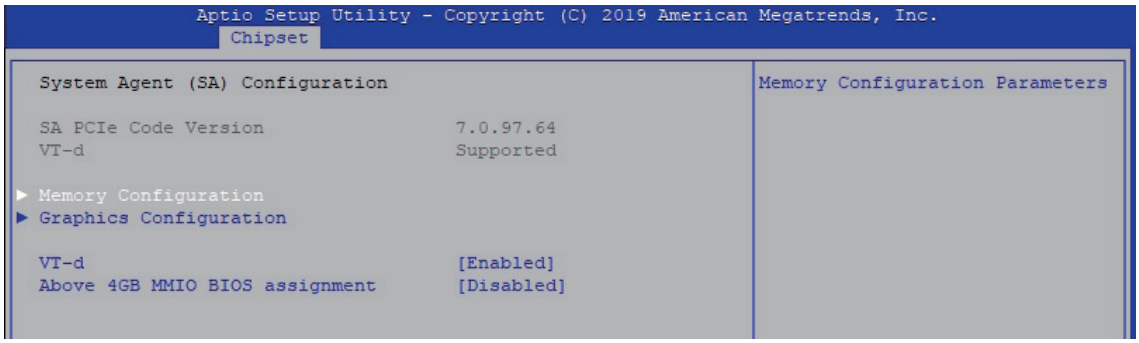


Figure 4-4-1 : System Agent Settings

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

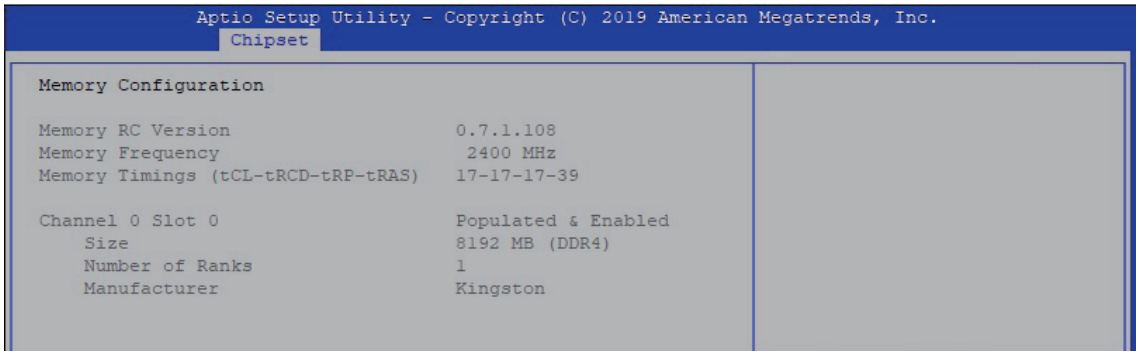


Figure 4-4-1-1 : Memory Information

Display memory information.

4.4.1.2 Graphics Configuration

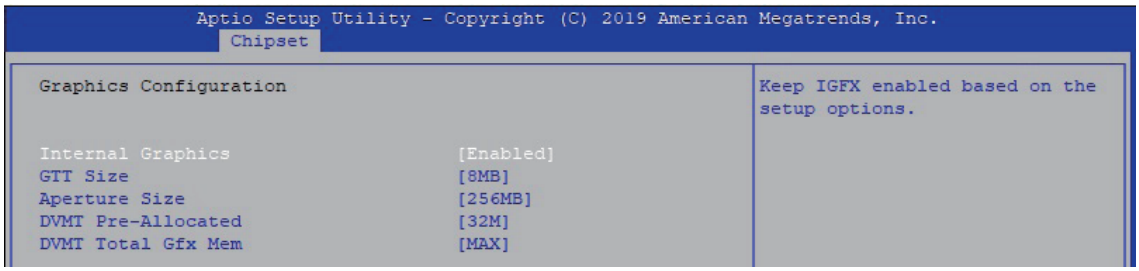


Figure 4-4-1-2 : Graphics Settings

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.

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

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

4.4.2 PCH-IO Configuration

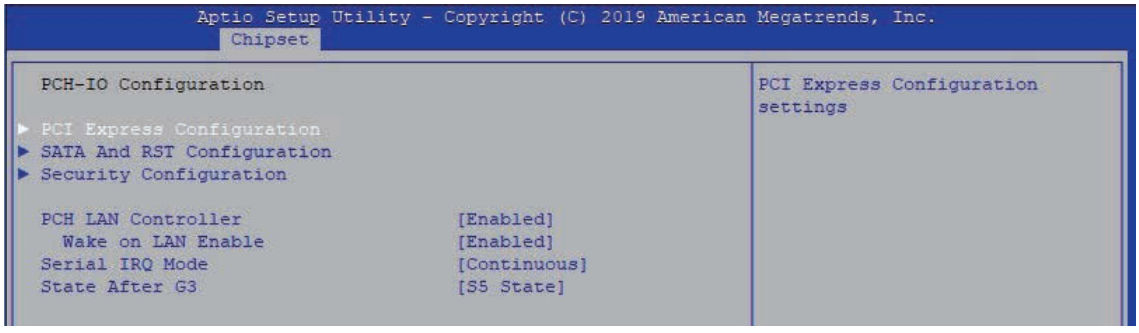


Figure 4-4-2 : PCH-IO Settings

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).

4.4.2.1 PCI Express Configuration of PCH-IO

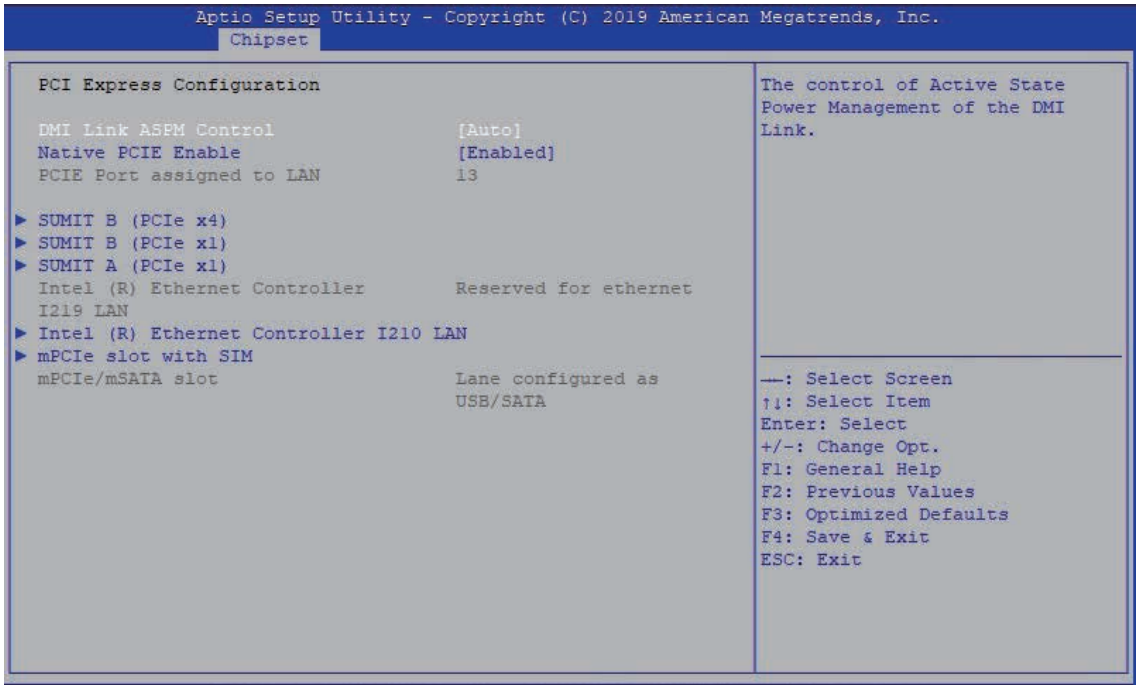


Figure 4-4-2-1 : PCI Express Configuration

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 And RST Configuration

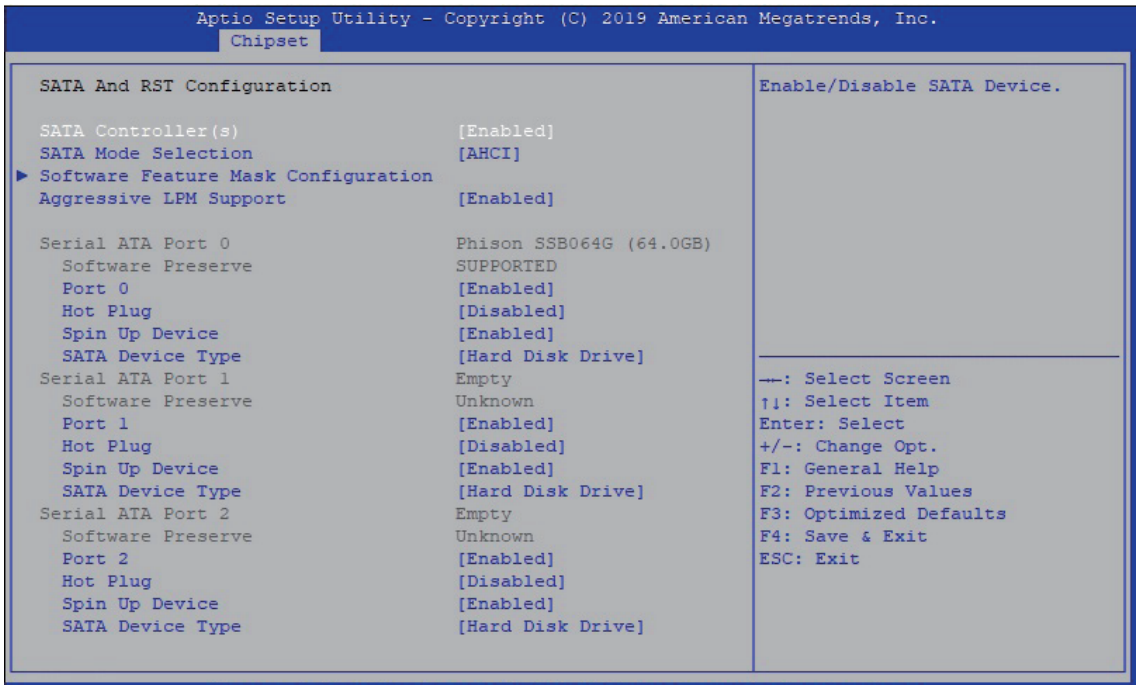


Figure 4-4-2-2 : SATA Devices Settings

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 SWFW 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.

Spin Up Device

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

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

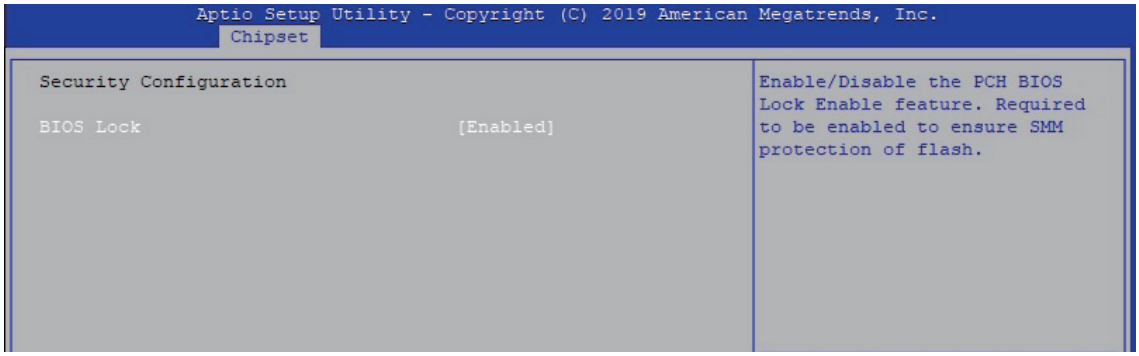


Figure 4-4-2-3 : BIOS Security Settings

BIOS Lock

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

4.4.3 LVDS Configuration

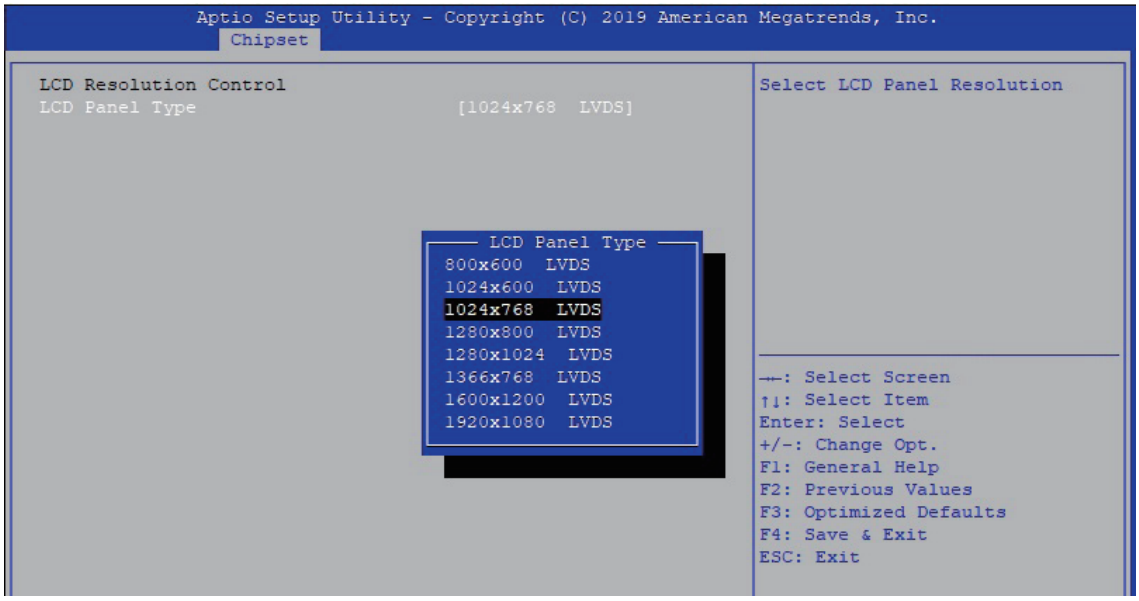


Figure 4-4-3 : LVDS Panel Settings

The LVDS Configuration option will be present if LVDS panel is connected on system.

LCD Panel Type

Select LCD Panel Resolution.

4.5 Security

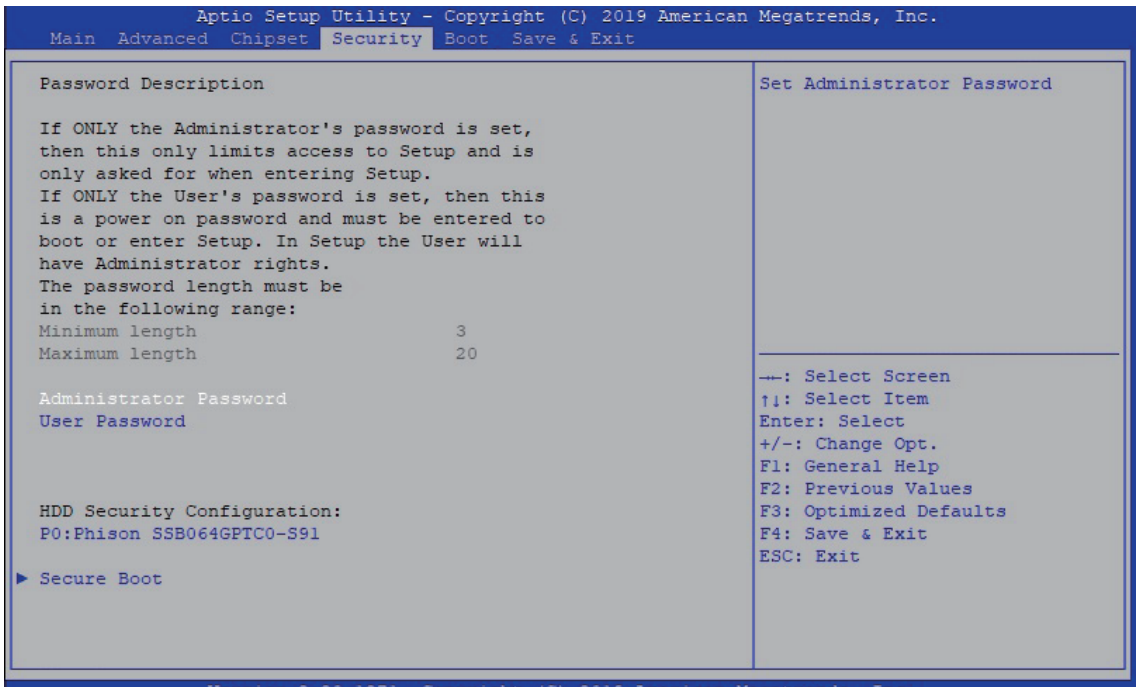


Figure 4-5 : BIOS Security Menu

Administrator Password

Set administrator password.

User Password

Set user password.

Secure Boot

Secure Boot coonfiguration.

4.5.1 HDD Security Configuration

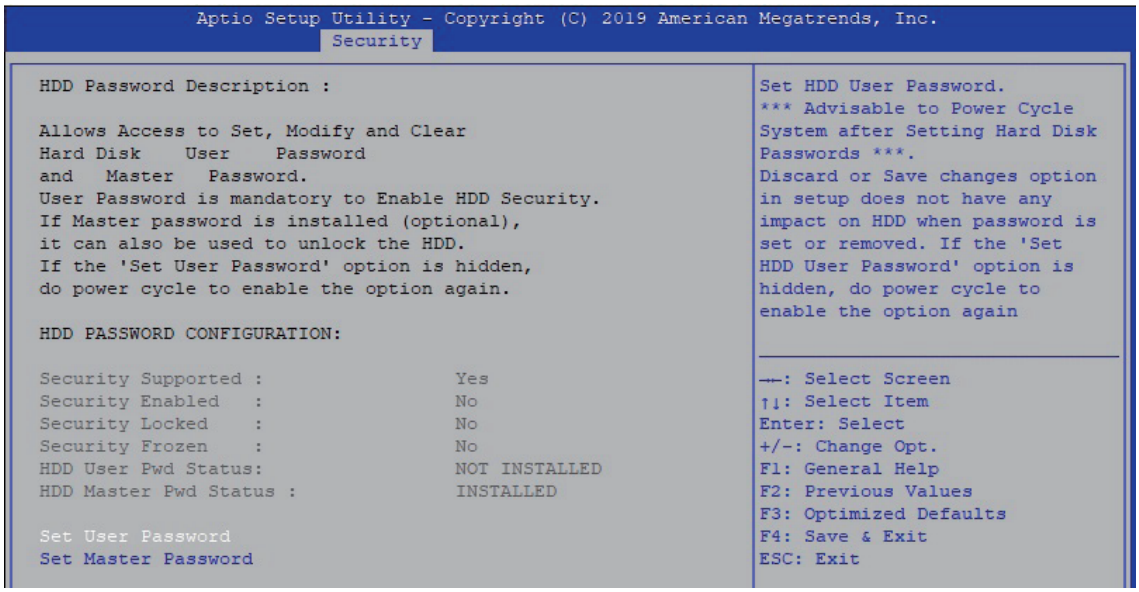


Figure 4-5-1 : HDD Security Settings

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

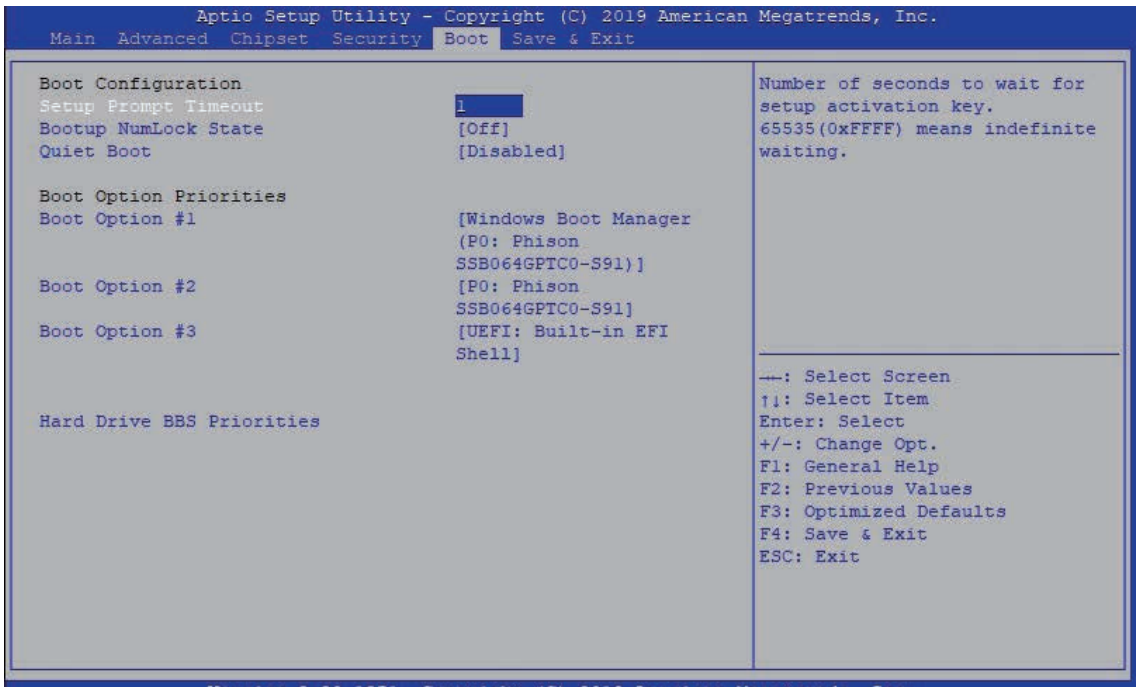


Figure 4-6 : BIOS Boot Menu

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.

Hard Drive BBS Priorities

Set the order of the legacy devices in this group.

4.7 Save & Exit

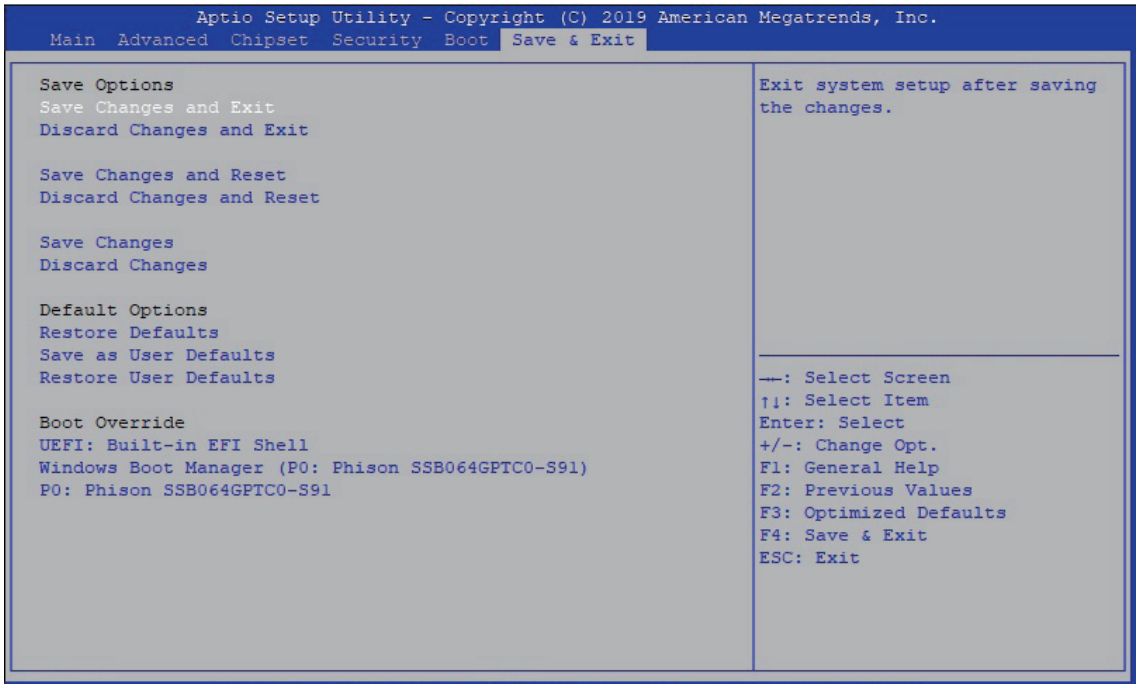


Figure 4-7 : BIOS Save and Exit Menu

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

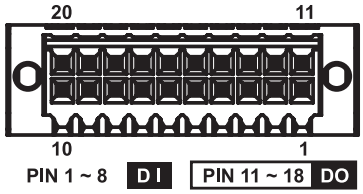
Restore the User Defaults to all the setup options.

APPENDIX A : Isolated DIO Guide

A.1 Function Description

The RMS-1000 offers a 16-bit DIO (Isolated/Non-Isolated) 20-pin terminal block connector, and a watchdog timer.

DIO definition is shown below :

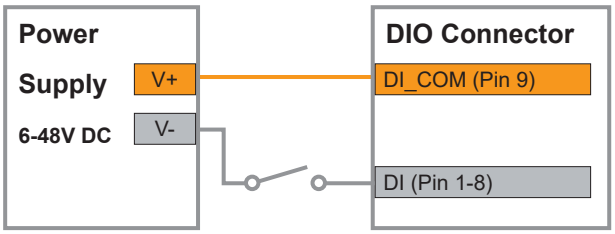


Pin No.	DIO Definition	Non-Isolated DIO Definition	Pin No.	JDIO2	Non-Isolated DIO Definition
1	DI0	DIO0	1	DO0	DIO8
2	DI1	DIO1	2	DO1	DIO9
3	DI2	DIO2	3	DO2	DIO10
4	DI3	DIO3	4	DO3	DIO11
5	DI4	DIO4	5	DO4	DIO12
6	DI5	DIO5	6	DO5	DIO13
7	DI6	DIO6	7	DO6	DIO14
8	DI7	DIO7	8	DO7	DIO15
9	DI COM	NC	9	DIO_GND	DIO_GND
10	DIO_GND	DIO_GND	10	External VDC	NC

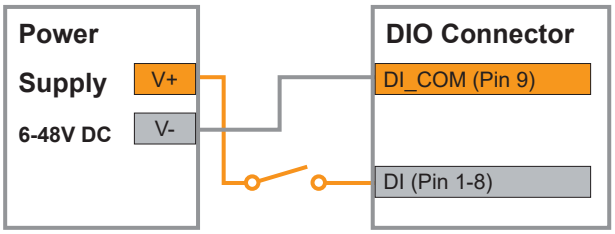
A.2 Isolated DIO Signal Circuit

DI reference circuit :

Sink Mode (NPN)

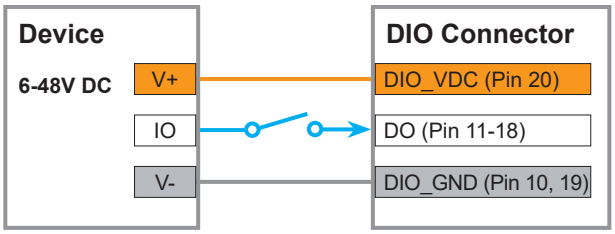


Source Mode (PNP)

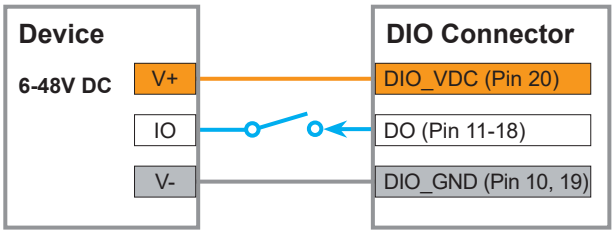


DO reference circuit :

Sink Mode (NPN, Default)



Source Mode (PNP)



A.3 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

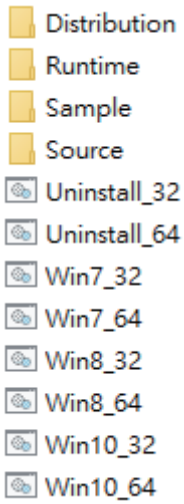
Uninstall_32.bat, and Uninstall_64.bat :

Uninstallation for driver

Run batch file as Administrator.

Support Windows 7 above.

Make sure Windows version before installation.



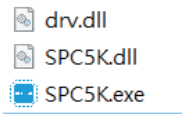
Runtime folder include head file for software developer or System Integration.

Sample folder include sample program, driver library, and API library.

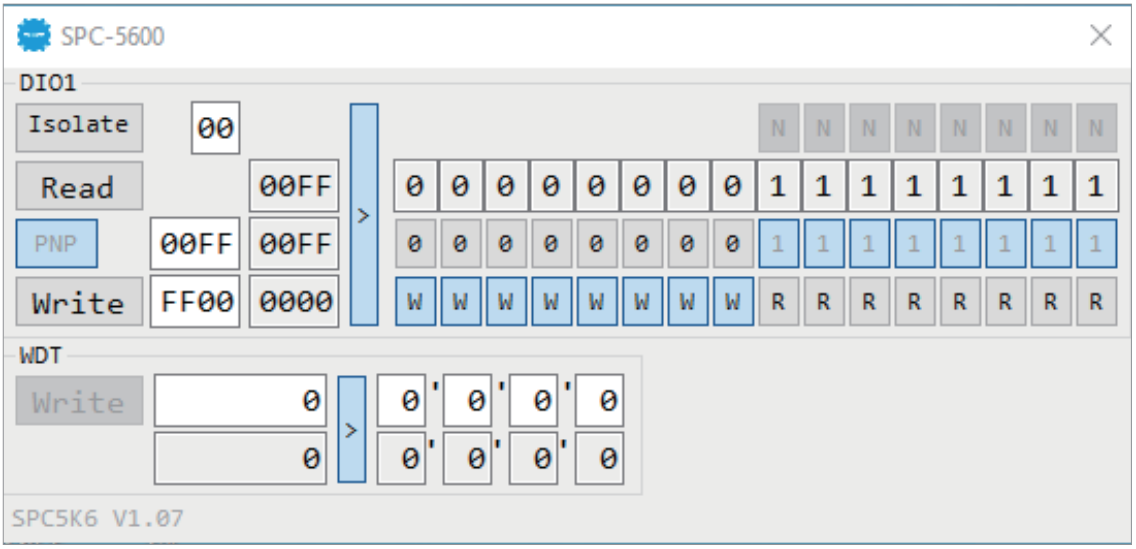
Source folder include sample program source code that compile on Visual Studio 2008.

A.4 Sample

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



Sample SPC5K.exe, as shown below :



DIO1 group :

Isolate check button :
DIO type of DIO configuration, isolated/non-isolated, defined in SPC-5000 series user manual.
Read button :
Set DIO configuration to get DI/DIO input state.
DO type check button :
User setting, DO type of DIO configuration to setup 8 pins - Source/Sink.
Use for Write (DO) button activate.
Write button :
Set DIO configuration to set DO/DIO output state.
DI preference text :
User setting, DI type of DIO configuration by hexadecimal bitmask - Source/Sink.
Use for Read (DI) button activate.
DO/DIO output text :
User setting, DO/DIO output state by hexadecimal bitmask - on/off.
Use for Write button activate.
DO/DIO writable text :
User setting, DO/DIO writable of DIO configuration by hexadecimal bitmask - yes/no.
Use for Read (DIO)/Write button activate.
DI/DIO input text (read only):
DI/DIO input state by hexadecimal bitmask – on/off.
Use for Read button activate.
DO/DIO text (read only):
DO/DIO output state with input state (DIO) and configuration.
Use for Write button activate.
DO/DIO output text (read only):
DO/DIO output state with configuration.
Use for Write button activate.
DI type pin check button (pin 8 ~ pin 1):
User setting, DI pin type of DIO configuration - Source/Sink.
DI/DIO input pin texts (read only, pin 8 ~ pin 1/pin 18 ~ pin 11, pin 8 ~ pin 1):
DI/DIO input pin state
Use for Read button activate.
DO/DIO output pin check button (pin 18 ~ pin 11/pin 18 ~ pin 11, pin 8 ~ pin 1):
User setting, DO/DIO output pin state
Use for Write button activate.
DO/DIO pin writable check button (pin 18 ~ pin 11/pin 18 ~ pin 11, pin 8 ~ pin 1):
User setting, DO/DIO pin writable of DIO configuration.
Use for Read (DIO)/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 SPC5K.h :

_DLL_IMPORT_ definition is used on LoadLibrary API for SPC5K.dll.
SPC5K_EXPORTS definition is used on SPC5K.dll building.

BOOL Initial (BYTE Isolate_Type, BYTE DIO_NPN)

Initial machine for DIO, watchdog timer, and POE

Isolate_Type : DIO type
1 : Isolated DIO;
0 : Non-Isolated DIO

DIO_NPN : DI/DO type
1 : PNP (Source) mode for European rule;
0 : NPN (Sink) mode for Japanese rule

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

BOOL GetDIO1Config (BYTE *Isolate_Type, BYTE *DI_NPN, BYTE *DO_NPN, WORD *Mask)

Get DIO configuration (by variable)

Isolate_Type : DIO type
1 : Isolated DIO;
0 : Non-Isolated DIO

DI_NPN ([7:0]) : DI type, pin setting by hexadecimal bitmask
1 : PNP (Source) mode for European rule;
0 : NPN (Sink) mode for Japanese rule

DO_NPN : DO type
1 : PNP (Source) mode for European rule;
0 : NPN (Sink) mode for Japanese rule

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 SetDIO1Config (BYTE *Isolate_Type, BYTE *DI_NPN, BYTE *DO_NPN, WORD *Mask)

Set DIO configuration

Isolate_Type : DIO type

1 : Isolated DIO;

0 : Non-Isolated DIO

DI_NPN ([7:0]): DI type, pin setting by hexadecimal bitmask

1 : PNP (Source) mode for European rule;

0 : NPN (Sink) mode for Japanese rule

DO_NPN : DO type

1 : PNP (Source) mode for European rule;

0 : NPN (Sink) mode for Japanese rule

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 GetDI1 (BYTE *DI)

Get isolated DIO input (DI)

DI ([7:0]) : 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 GetDO1 (BYTE *DO)

Get isolated DIO output (DO)

DO ([7:0]) : Output 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 SetDO1 (BYTE DO)

Set isolated DIO output (DO)

DO ([7:0]) : Output state, pin setting by hexadecimal bitmask

1 : High;

0 : Low

Return :

TRUE (1) : Success;

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

BOOL GetDIO1 (WORD *DI)

Get non-isolated DIO input (DIO 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 SetDIO1 (WORD DO)

Set non-isolated DIO output (DIO 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;

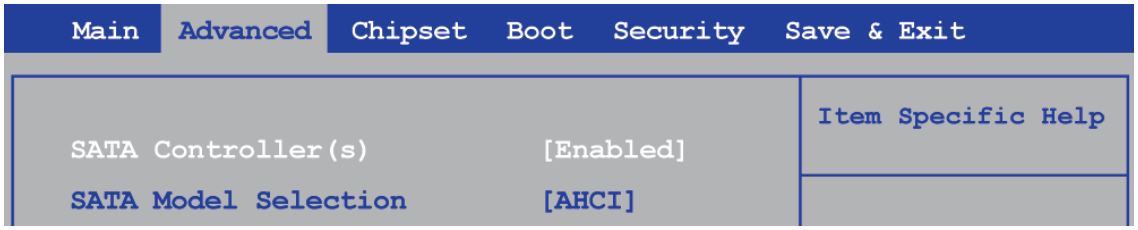
FALSE (0) : Fail (Initial error, or hardware problem)

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



C.2 OS Installation

The system is featured with three SATA, include two internal SATA, 1 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 latest information and the software directly from Intel website.

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

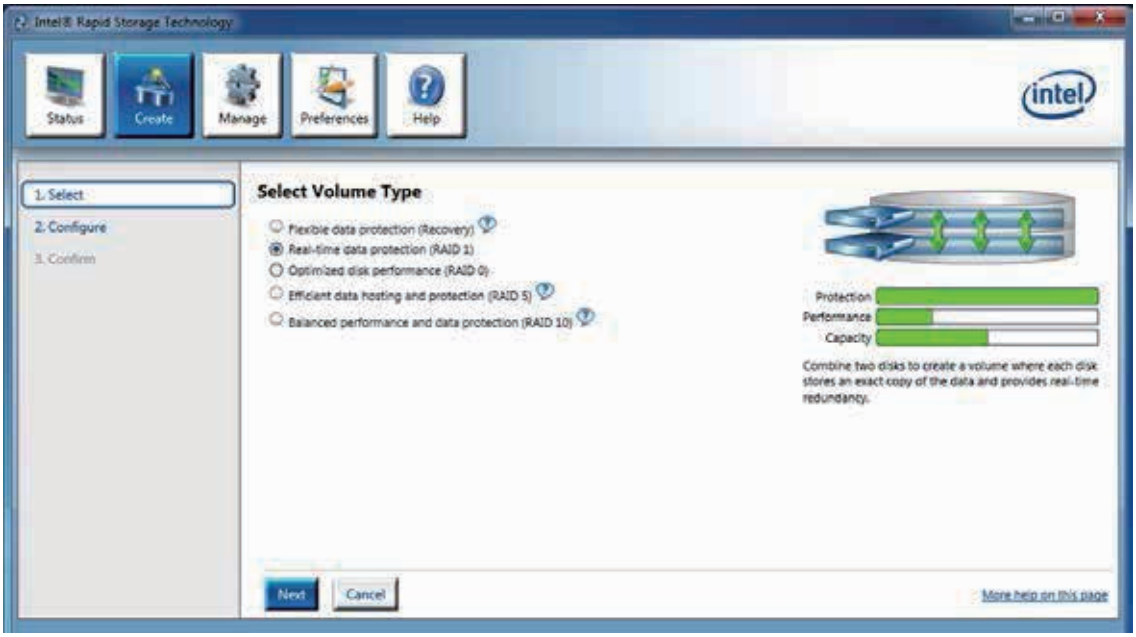
The RAID environment has been done if you completed the steps above.

C.5 To Insert SATA HDD for RAID 1

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

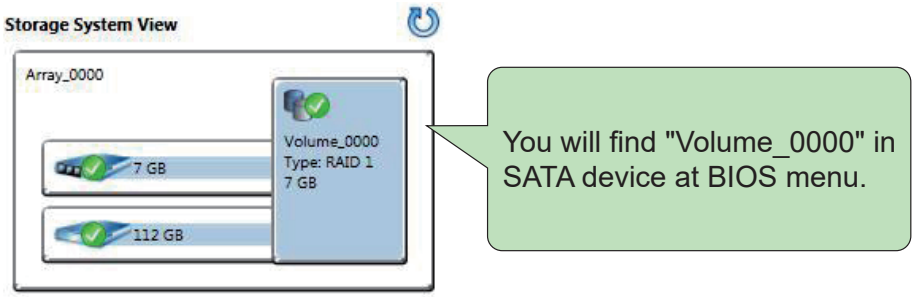
C.6 To Create RAID Volume on "Rapid Storage Technology" Software

The system is featured with three 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".



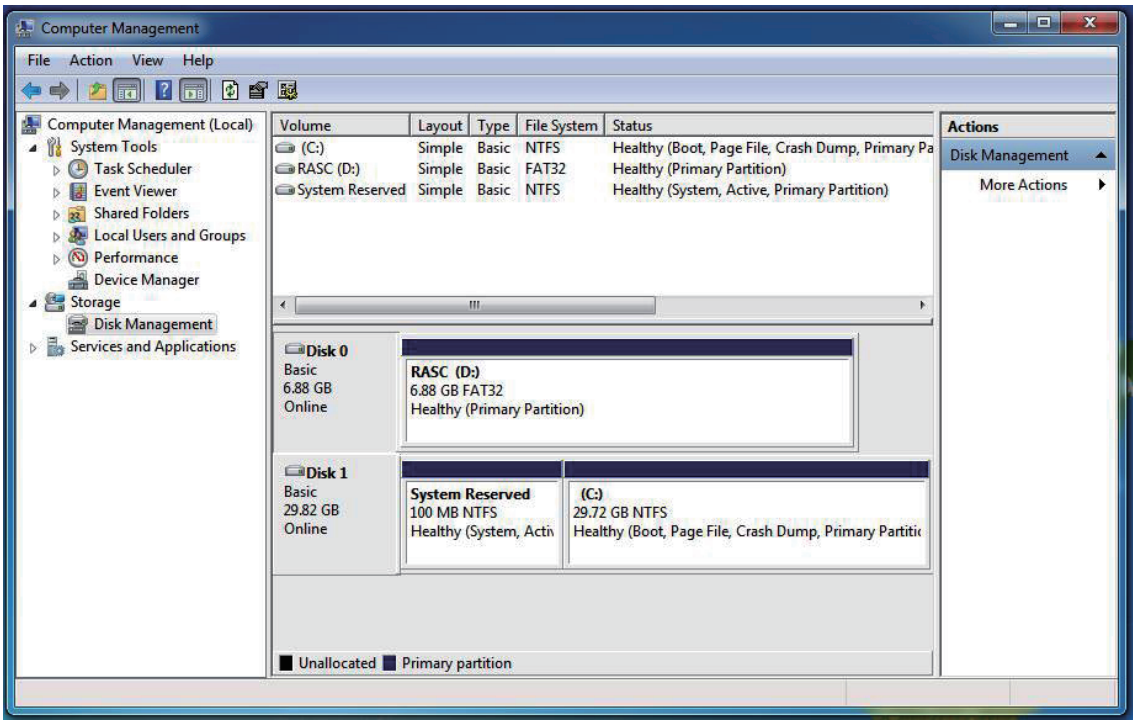
C.7 Disk Management : Partition the Disk

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



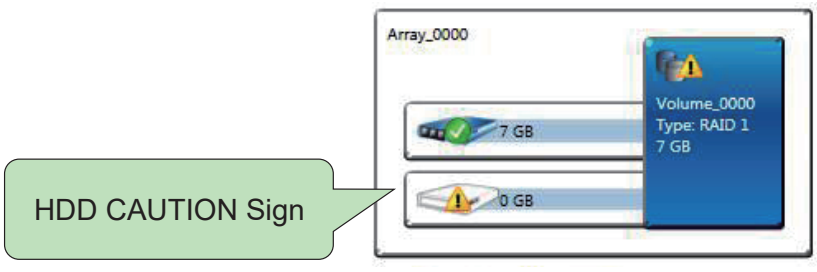
To start Disk Management tool and select "Initialize Disk".

Then add "Logical Device" for Windows access.

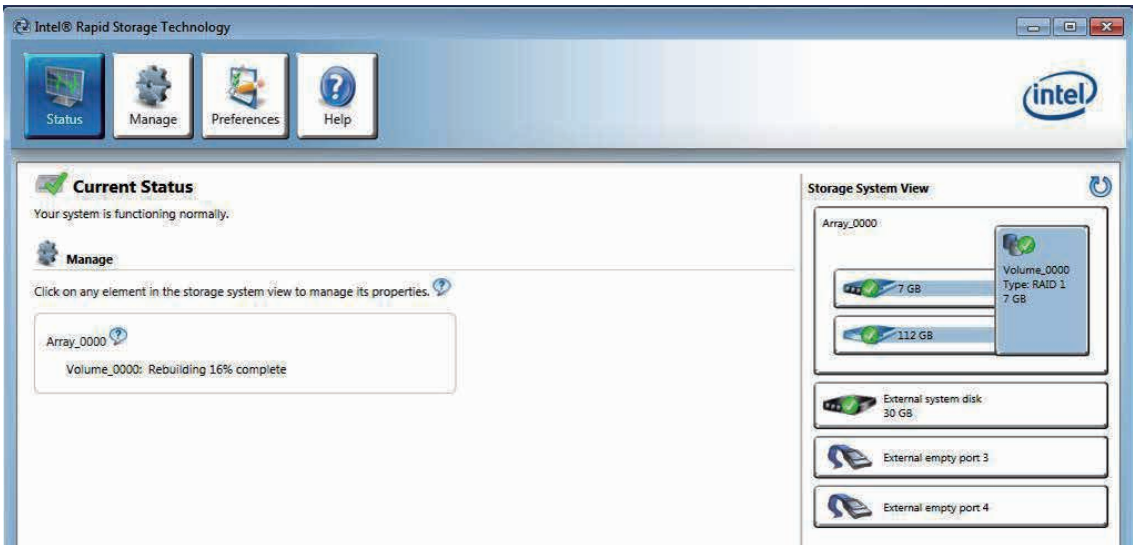


C.8 If One SATA HDD on RAID Volume is Out-of-use

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



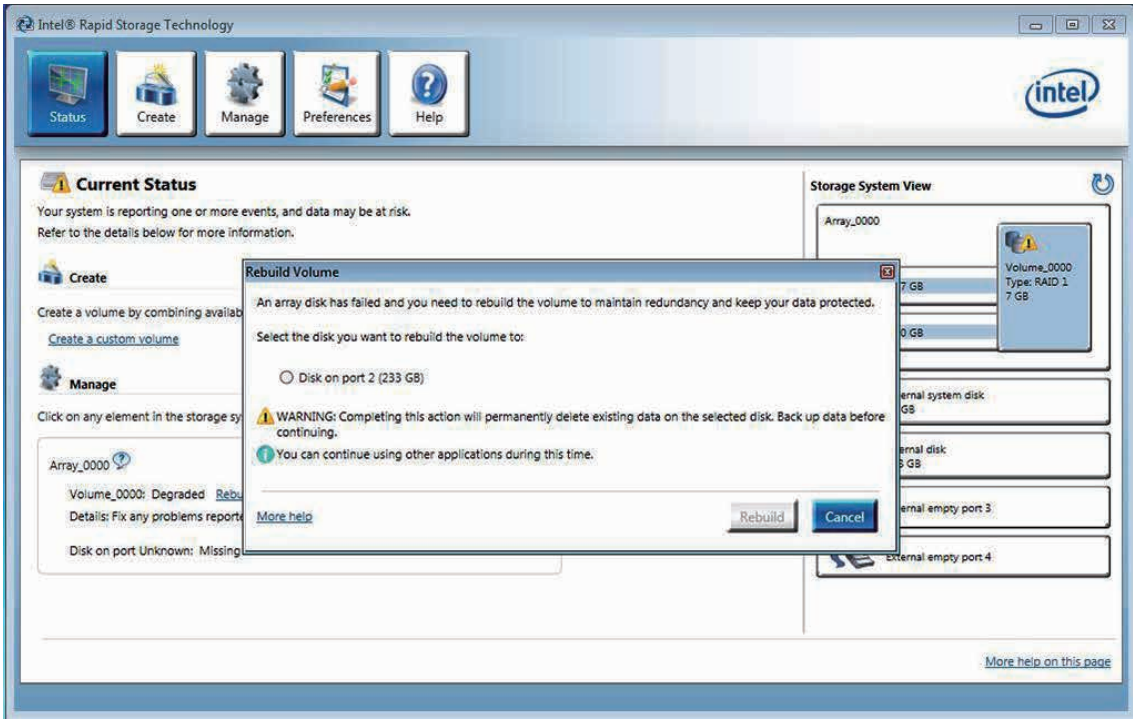
C.9 Recovery and Auto Re-build When Use the SAME RAID HDD



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

D.1.1 RMS-1000

Testing Board	RMS-1000
RAM	8GB * 1
USB-1 : (USB 3.0)	USB 3.0 Loopback Plug
USB-2 : (USB 3.0)	USB 3.0 Loopback Plug
USB-3 : (USB 3.0)	ASUS MM-5113 Mouse
USB-4 : (USB 3.0)	Microsoft Wired Keyboard 600 (model 1576)
SATA 0	Kingston SA400S371120G 120GB
SATA 1	Innodisk 3MG2-P DGS25-64GD81BC1QC 64GB
LAN 1 (i219)	1.0 Gbps
LAN 2 (i210)	1.0 Gbps
SUMIT	ESM-300 (LMX-200-M + LMX-200MX-E * 3)
Graphics Output	DVI
Power Plan	Balance (Windows10 Power plan)
Power Source	Chroma 62006P-100-25

D.1.2 Intel® Core i7-8665UE 1.70GHz (8M Cache, up to 4.40GHz)

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™ i7-8665UE	9V	0.416A	05.00W	0.592A	05.33W	1.657A	14.91W
	12V	0.233A	05.58W	0.451A	05.41W	1.251A	15.01W
	24V	0.143A	06.88W	0.250A	06.00W	0.670A	16.09W
	48V	0.416A	05.00W	0.152A	07.29W	0.368A	17.67W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage with 2D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-8665UE	9V	2.327A	20.94W	4.343A	39.09W
	12V	1.734A	20.80W	2.993A	35.92W
	24V	0.877A	21.05W	1.455A	34.92W
	48V	0.480A	23.04W	0.774A	37.16W

D.2.1 RMS-1100

Testing Board	RMS-1100
RAM	8GB * 1
USB-1 : (USB 3.0)	USB 3.0 Loopback Plug
USB-2 : (USB 3.0)	USB 3.0 Loopback Plug
USB-3 : (USB 3.0)	ASUS MM-5113 Mouse
USB-4 : (USB 3.0)	Microsoft Wired Keyboard 600 (model 1576)
SATA 0	Kingston SA400S371120G 120GB
SATA 1	Innodisk 3MG2-P DGS25-64GD81BC1QC 64GB
LAN 1 (i219)	1.0 Gbps
LAN 2 (i210)	1.0 Gbps
SUMIT	ESM-300 (LMX-200-M + LMX-200MX-E * 3)
Wide-Range power board	WPM-110
Graphics Output	DVI
Power Plan	Balance (Windows10 Power plan)
Power Source	Chroma 62006P-100-25

D.2.2 Intel® Core i7-8665UE 1.70GHz (8M Cache, up to 4.40GHz)

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™ i7-8665UE	16V	0.618A	09.89W	0.649A	10.38W	1.397A	22.36W
	24V	0.426A	10.22W	0.443A	10.62W	0.915A	21.96W
	36V	0.280A	10.06W	0.292A	10.50W	0.576A	20.73W
	100V	0.106A	10.64W	0.111A	11.07W	0.214A	21.40W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage with 2D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-8665UE	16V	1.630A	26.09W	2.719A	43.51W
	24V	1.086A	26.06W	1.590A	38.15W
	36V	0.720A	25.93W	1.126A	40.55W
	100V	0.259A	25.85W	0.413A	41.33W

APPENDIX E : Supported Memory & Storage List

E.1 Test Item

Testing Board	RMS-1000/RMS-1100
Memory Test	MemTest86 V8.2
BurnIn Test	BurnInTest Pro V8.1 (build 1025)

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

E.2 Supported Non-ECC Memory List

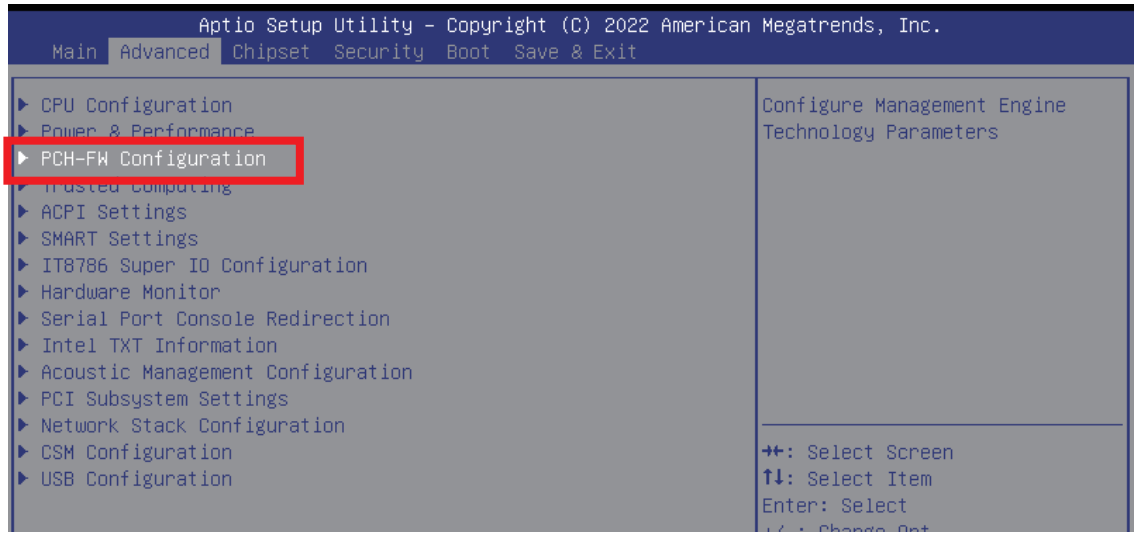
Brand	Info	Test Temp.(Celsius)
innodisk 4GB DDR4-2400 SODIMM	M4S0-4GSSN5SJ-H03	25ºC
innodisk 16GB DDR4-2400 SODIMM	M4S0-AGS1OCSJ-H03	25ºC
innodisk 4GB DDR4-2666 SODIMM	M4S0-4GSSNCIK-H03	25ºC
innodisk 4GB DDR4-2666 SODIMM	M4S0-4GSSN5IK-H03	25ºC
innodisk 8GB DDR4-2666 SODIMM	M4S0-8GS1N5IK-H03	25ºC
innodisk 8GB DDR4-2666 SODIMM	M4S0-8GS1NCIK-H03	25ºC
innodisk 8GB DDR4-2666 SODIMM	M4S0-8GSSOCIK-H03	25ºC
innodisk 16GB DDR4-2666 SODIMM	M4S0-AGS1OCIK-H03	25ºC
innodisk 16GB DDR4-2666 SODIMM	M4S0-AGS1O5IK-H03	25ºC
SL-Link 16GB DDR4-2666 SODIMM	J4AGSH1G8QHFC	25ºC
SL-Link 32GB DDR4-2666 SODIMM	J4BGSS2G8QHXI	25ºC

E.3 Supported Storage List

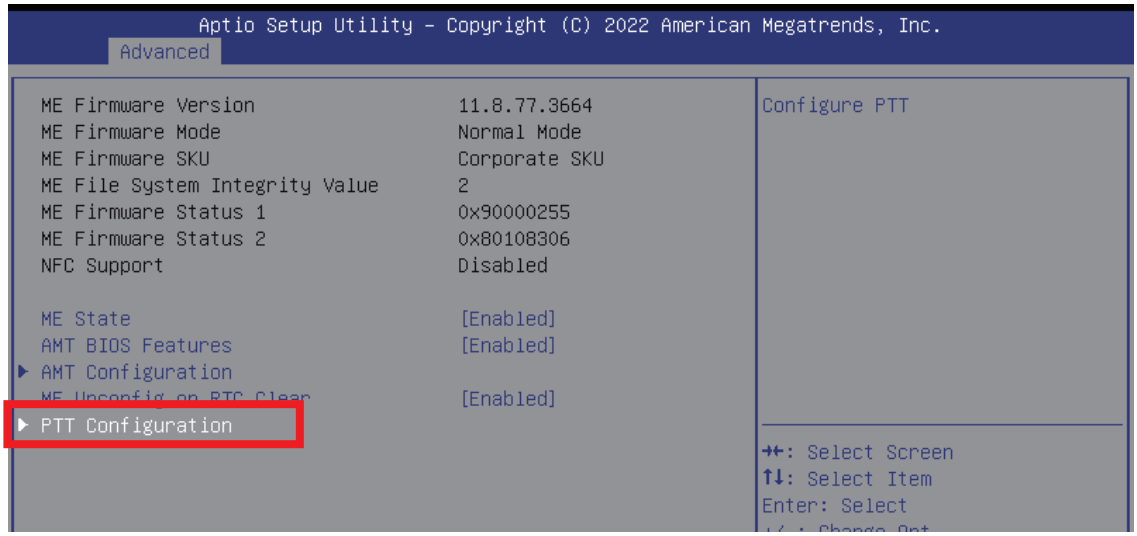
Type	Brand	Model	Capacity
mSATA	Intel	Intel-310 SSDMAEMC080G2	80GB
	Kingston	SUV500MS	120GB
SATA SSD	Transcend	SSD370 TS64GSSD370	64GB
	innodisk	3MG2-P DGS25-64GD81BC1QC	64GB
	Kingston	SA400S371120G	120GB
	Intel	SSD E 5400s SSDSC2KR120H6	120GB
	MEMXPRO	M3A MI3MA1212802WN	128GB
	FORESEE	S903S128G	128GB
	FORESEE	S903S256G	256GB
	LITE-ON	K8-L1256	256GB
	LITE-ON	K8-L1512	512GB

APPENDIX F : Install Win11 (BIOS TPM Setting)

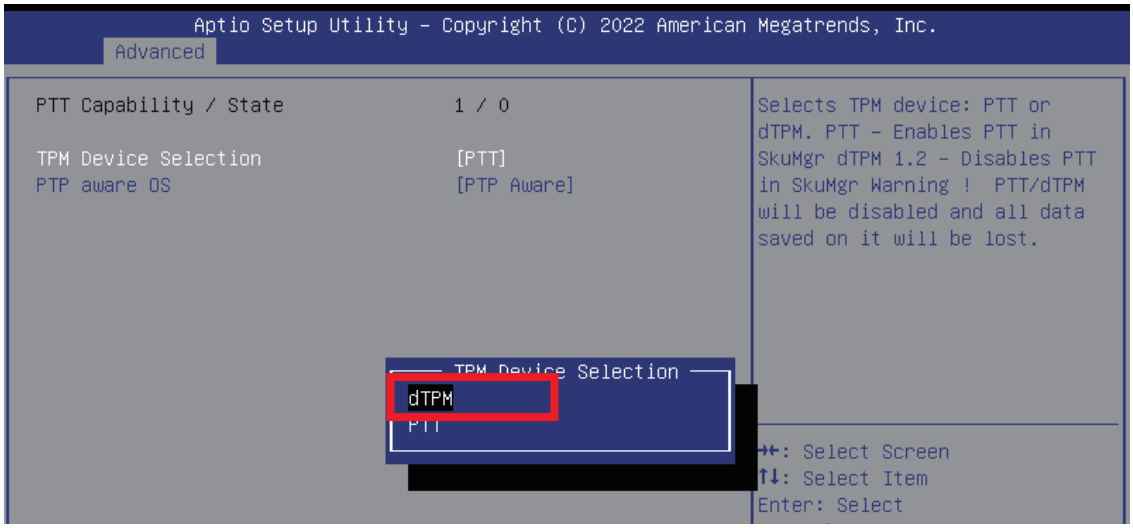
Step 1 Click on “Advanced”, then click on “PCH-FW Configuration”

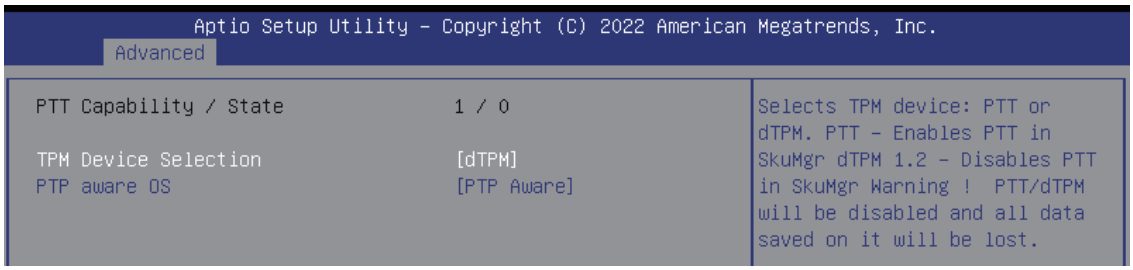


Step 2 Click on “PTT Configuration”

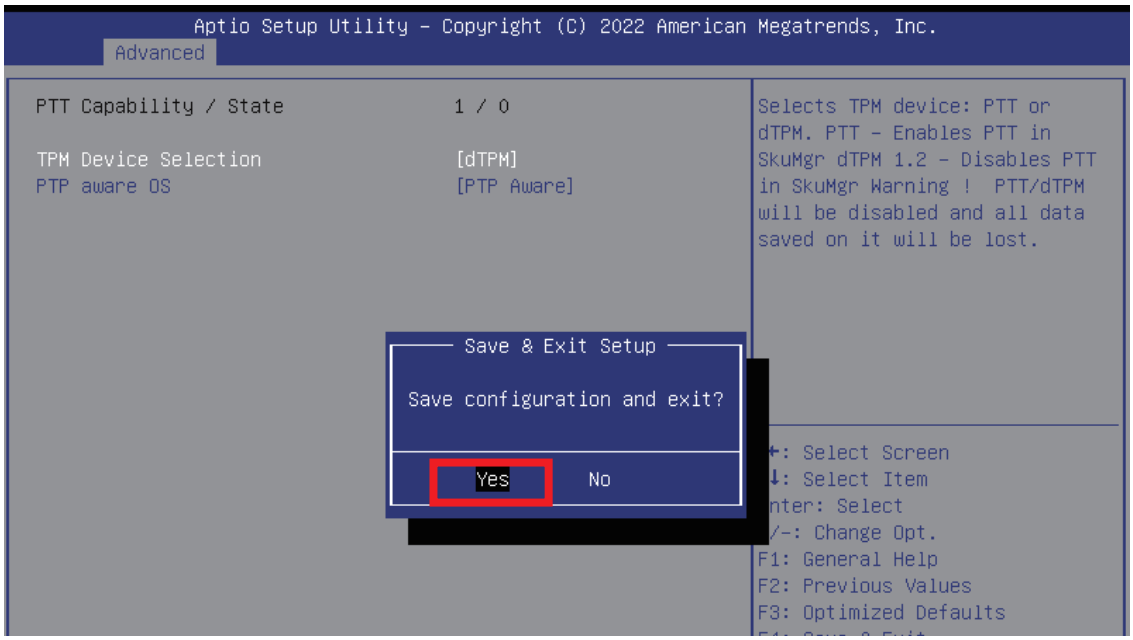


Step 3 Click on “dTPM” (TPM Device Selection)

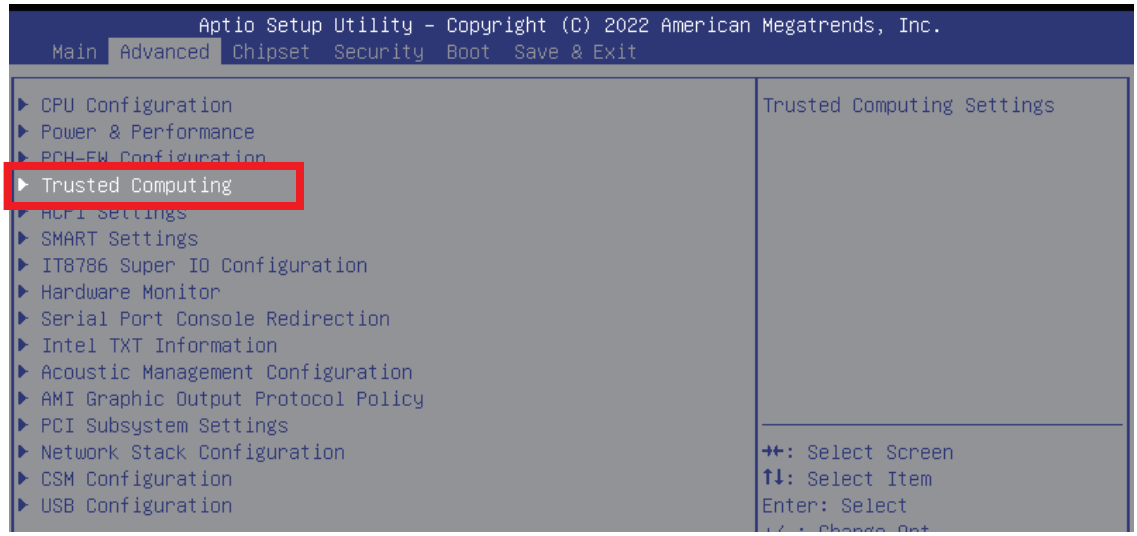




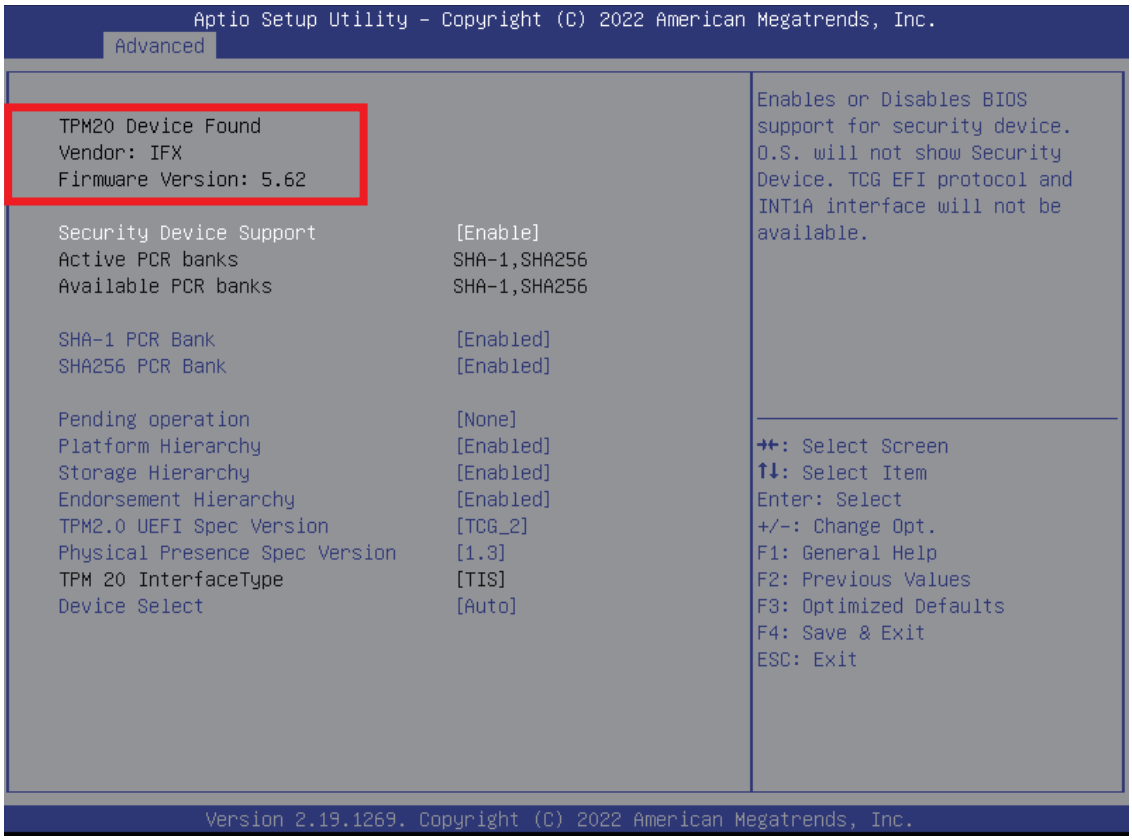
Step 4 Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks “Save configuration and exit?” appears. The computer will then restart.



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 **

Vecow

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