# RNS-1000 USER Intel® Core™ i7/i5/i3 SoC (Whiskey Lake) 1U Rackmount Fanless<br/>Computing System, 8 GigE LAN w/6 X-coded M12, 4 10G USB,<br/>Ignition Control, -40°C to 70°C National System



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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- 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 <sup>®</sup> 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 <sup>®</sup> 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

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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<sup>®</sup> Core<sup>™</sup> i7/i5/i3 U-series processor (Whiskey Lake), DDR4 2400MHz up to 32GB memory; Advanced Intel<sup>®</sup> 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 AloT applications.

## **1.2 Features**

- 8th Generation Intel<sup>®</sup> Core<sup>™</sup> 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 <sup>®</sup> Core™ i7/i5/i3 U-series Processor (Whiskey Lake)
Chipset	Intel <sup>®</sup> SoC (Cannon Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel <sup>®</sup> UHD Graphics 620
Interface	<ul> <li>DVI-D : Up to 1920 x 1200 @60Hz</li> <li>DisplayPort : Up to 4096 x 2304 @60Hz</li> </ul>
Ethernet	
LAN 1	Intel <sup>®</sup> I219LM GigE LAN supports iAMT 12.0
LAN 2	Intel <sup>®</sup> I210 GigE LAN
LAN 3 ~ LAN 8	M12 Type X-Coded Intel <sup>®</sup> 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 PCle	<ul> <li>2 Mini PCIe Socket :</li> <li>1 Full-Size for PCIe/USB/Internal SIM Card</li> <li>1 Full-size for PCIe/USB/Optional mSATA</li> </ul>
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	
ТРМ	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	<ul><li>IEC 60068-2-27</li><li>SSD : 50G, Half-sine, 11ms</li></ul>
Vibration	<ul> <li>IEC 60068-2-64</li> <li>SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

## 1.3.2 Specifications of RMS-1100

System	
Processor	8th Quad Core Intel <sup>®</sup> Core ™ i7/i5/i3 U-series Processor (Whiskey Lake)
Chipset	Intel <sup>®</sup> SoC (Cannon Lake)
BIOS	AMI
SIO	IT8786E
Memory	1 DDR4 2400MHz SO-DIMM, up to 32GB
Graphics	
Graphics Processor	Intel <sup>®</sup> UHD Graphics 620
Interface	<ul> <li>DVI-D : Up to 1920 x 1200 @60Hz</li> <li>DisplayPort : Up to 4096 x 2304 @60Hz</li> </ul>
Ethernet	
LAN 1	Intel <sup>®</sup> I219LM GigE LAN supports iAMT 12.0
LAN 2	Intel <sup>®</sup> I210 GigE LAN
LAN 3 ~ LAN 8	M12 Type X-Coded Intel <sup>®</sup> 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 PCle 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	<ul> <li>2 Mini PCIe Socket :</li> <li>1 Full-Size for PCIe/USB/Internal SIM Card</li> <li>1 Full-size for PCIe/USB/Optional mSATA</li> </ul>
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

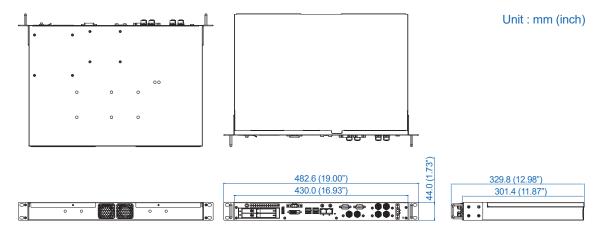
Others	
ТРМ	Optional Infineon SLB9665 supports TPM 2.0, LPC Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Software Support	
Microsoft	Windows 10
Linux	Fedora 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	<ul><li>IEC 60068-2-27</li><li>SSD : 50G, Half-sine, 11ms</li></ul>
Vibration	<ul> <li>IEC 60068-2-64</li> <li>SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

# 1.4 Supported CPU List

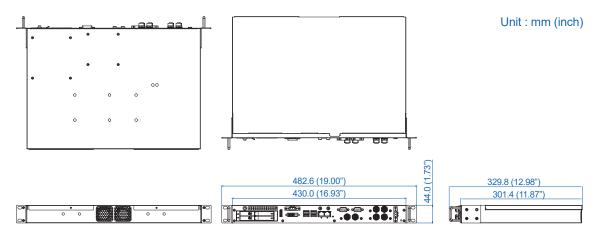
Processor No.	Cores	TDP	Cache	Max. Frequency	ECC Memory
Intel <sup>®</sup> Core™ i7-8665UE	4	15W	8M	Up to 4.4GHz	Ν
Intel <sup>®</sup> Core™ i5-8365UE	4	15W	6M	Up to 4.1GHz	Ν
Intel <sup>®</sup> Core™ i3-8145UE	2	15W	4M	Up to 3.9GHz	Ν
Intel <sup>®</sup> Celeron 4305UE	2	15W	2M	Up to 2.0GHz	Ν

# **1.5 Mechanical Dimension**

## 1.5.1 RMS-1000 Mechanical Drawing



1.5.2 RMS-1100 Mechanical Drawing





# **GETTING TO KNOW YOUR RMS-1000**

# 2.1 Packing List

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

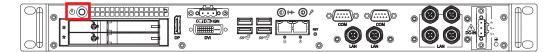
Item	Description	Outlook	Usage	P/N	Qty
1	HANDLE for 1U		For HANDLE	53-4001442-203	2
2	Ear for 1U	•1 • • •1 • •	For HANDLE	62-03P0396-000	2
3	Flat head M3*8L Ni+Ny	A statement	For HANDLE	53-M000050-012	4
4	Flat head M4*6L		For HANDLE	N/A	8
5	PHILLPIS M2.5x6L, Ni	S	Mini PCIe slot	53-2426906-30B	2
6	Terminal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

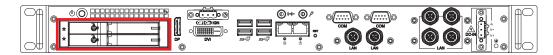
## 2.2.1.1 Power Button



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).

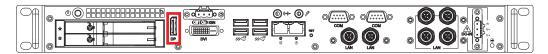
LED Color	Power Status	System Status
Green	Power	System power status (on/off)

## 2.2.1.2 SSD/HDD Tray



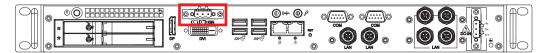
There are 2 front-access 2.5" SSD/HDD trays in the front side of RMS-1000. Just trigger to open the SSD/HDD tray, up to 4TB is available.

## 2.2.1.3 DisplayPort



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

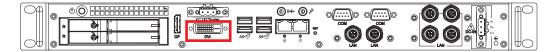
## 2.2.1.4 Remote Power On/Off Switch & LED Terminal Block



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.

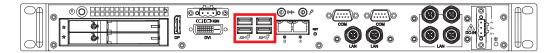
	Pin No.	Definition
	1	Ignition (IGN)
3 2 1	2	SW+
521	3	SW-

## 2.2.1.5 DVI Connector



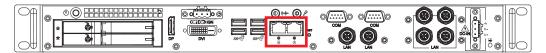
The DVI output mode supports up to 1920 x 1080 resolution. The DVI is automatically selected according to the display device connected. You will need a DVI-D cable when connecting to a display device.

## 2.2.1.6 USB 3.1 Connector



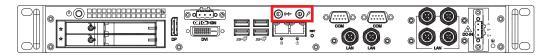
There are 4 USB 3.1 Gen2 connections available supporting up to 10GB per second data rate in the top side of RMS-1000. They are also compliant with the requirements of SuperSpeed (SS), high speed (HS), full speed (FS) and low speed (LS).

## 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<sup>®</sup> I219-LM Ethernet engine; LAN 2 is powered by Intel<sup>®</sup> 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<sup>®</sup> High Definition Audio (Azalia) specifications. To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel<sup>®</sup> Whiskey Lake-U chipset and Realtek ALC888S-VD codec.

## 2.2.1.9 PWR & HDD LED Indicator

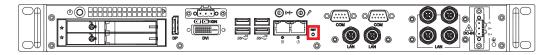


HDD LED/Orange : A Hard Disk LED. If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

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	<ul><li>On/Off : Storage status, function or not.</li><li>Twinkling : Data transferring</li></ul>
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.

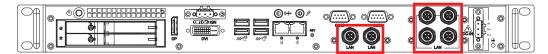
## 2.2.1.11 COM port connector

|--|--|--|--|

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-	

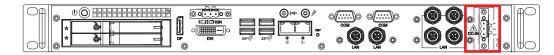
## 2.2.1.12 LAN port connector



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<sup>®</sup> 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.

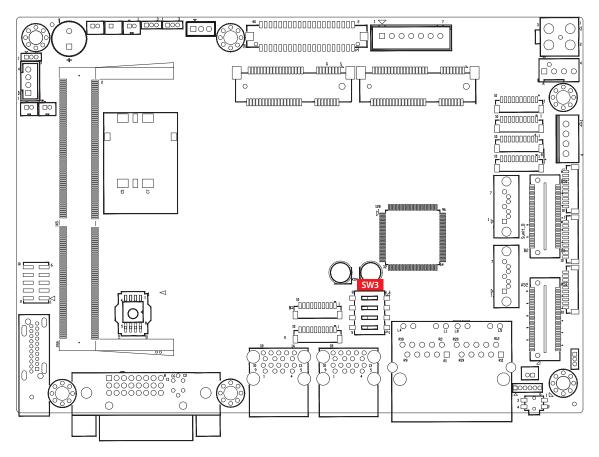
	Pin No.	Definition
3	1	V+
	2	V-
$\bigcirc$	3	Chassis GND

# **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 mo	de (Default)	ON 1 2 3 4
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	
А	10 seconds	2 hours	
В	10 seconds	4 hours	
С	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

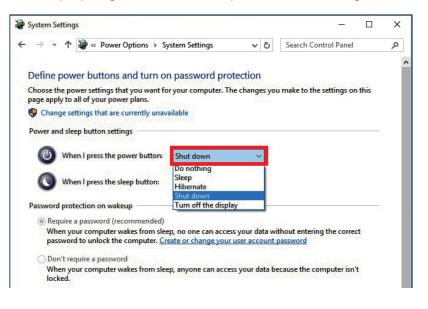
	GN DN OF	
Pin No.	Definition	
1	Ignition (IGN)	
2	SW+	
3	SW-	



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.



# **SYSTEM SETUP**

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

Step 1 Remove two PHILLIPS M3x6L screws.



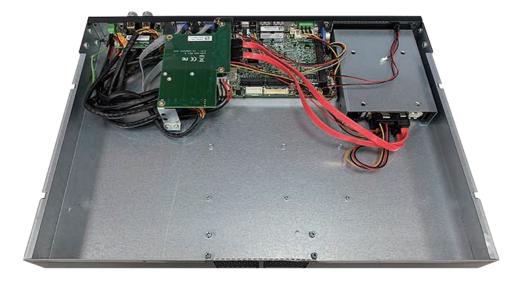
Step 2 Push top cover in this side.



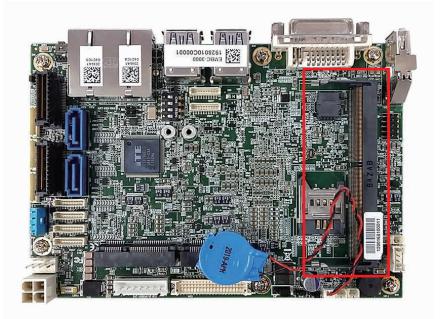
## Step 3 Remove top cover.







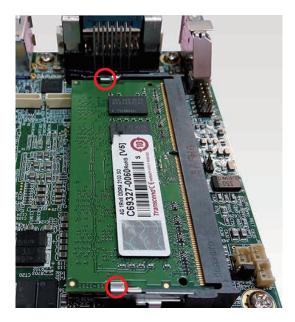
## 3.2 Installing DDR4 SO-DIMM Module



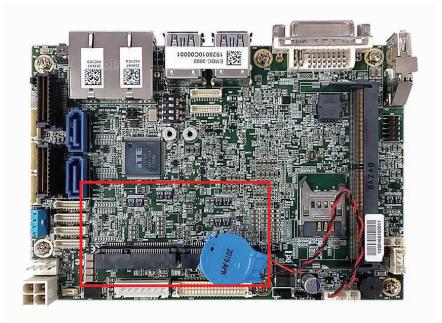
Step 1 Install DDR4 RAM module into SO-DIMM slot.



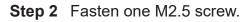
Step 2 Install DDR4 RAM module into SO-DIMM slot.



# 3.3 Installing Mini PCIe Card



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







# 3.4 Installing Antenna Cable

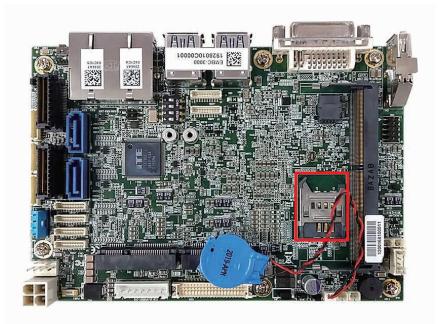
Step 1 Check antenna cable and washers.



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

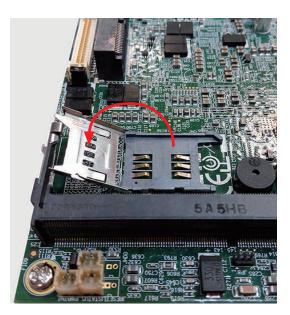


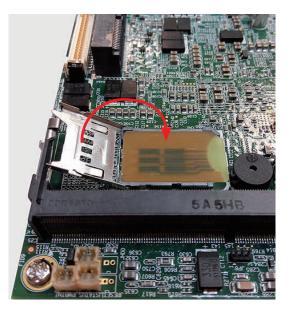
# 3.5 Installing SIM Card



**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.

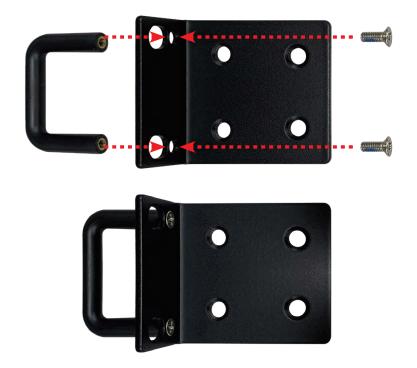


**Step 2** Install 2.5" (up to 9.5mm) into the tray and push back to close the tray. (Can use included key locked.)

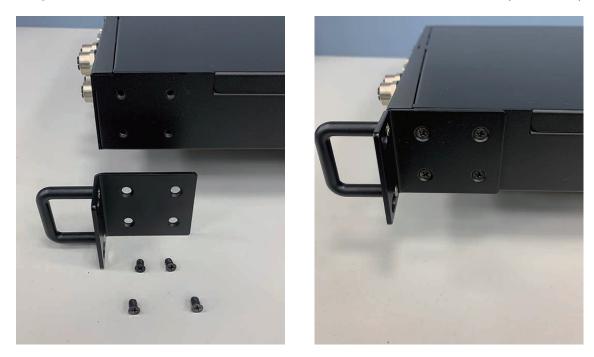


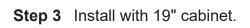
# 3.7 Mounting Your RMS-1000/RMS-1100

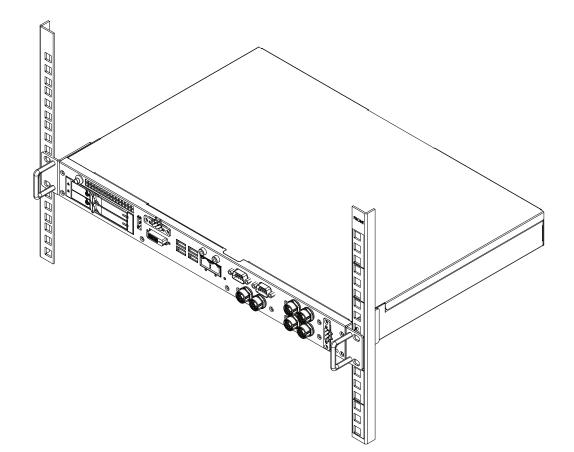
Step 1 Assembly handle and handle bracket.



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









# **BIOS SETUP**

# 4.1 BIOS Setting

BIOS Information		A
BIOS Vendor	American Megatrends	
Core Version	5.13	
Compliancy	UEFI 2.7; PI 1.6	
Project Version	E3000XXPUF00003	
Build Date and Time	09/05/2019 14:41:20	
Access Level	Administrator	
Processor Information		
Name	WhiskeyLake ULT	
Type	Intel(R) Core(TM)	
	17-8665UE CPU @ 1.70GHz	
Speed	2000 MHz	
ID	0x806EC	: Select Screen
Stepping	VO	↑↓: Select Item
Package	BGA1528	Enter: Select
Number of Processors	4Core(s) / 8Thread(s)	<pre>     +/-: Change Opt.     </pre>
Microcode Revision		📰 Fl: General Help
GT Info	GT2 (0x3EA0)	F2: Previous Values F3: Optimized Defaults
IGFX VBIOS Version	1026	F4: Save & Exit
IGFX GOP Version	N/A	ESC: Exit
Memory RC Version	0.7.1.108	900 900 900
Total Memory	8192 MB	
Memory Frequency	2400 MHz	V

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

Aptio Setup Utility Main Advanced Chipset Securit	- Copyright (C) 2019 Amer y Boot Save & Exit	ican Megatrends, Inc.
Microcode Revision	B8	Choose the system default
GT Info	GT2 (0x3EA0)	1anguage
IGFX VBIOS Version	1026	
IGFX GOP Version	N/A	
Memory RC Version	0.7.1.108	
Total Memory	8192 MB	
Memory Frequency	2400 MHz	30       30
PCH Information		
Name	CNL PCH-LP	
PCH SKU	(U) Premium SKU	
Stepping	DO	
ChipsetInit Base Revision	20	: Select Screen
ChipsetInit OEM Revision	0	†↓: Select Item
TXT Capability of Platform/PCH	Supported	Enter: Select
Production Type	Production	+/-: Change Opt.
ME FW Version	12.0.35.1427	F1: General Help F2: Previous Values
ME Firmware SKU	Corporate SKU	F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
System Date	[Fri 09/06/2019]	
System Time	[15:48:50]	▼

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

	CPU Configuration Parameters
Power & Performance	
PCH-FW Configuration	
Trusted Computing	
ACPI Settings	
SMART Settings	
IT8786 Super IO Configuration	
Hardware Monitor	
Serial Port Console Redirection	
Intel TXT Information	
Acoustic Management Configuration	
PCI Subsystem Settings	
USB Configuration	
CSM Configuration	: Select Screen
NVMe Configuration	†↓: Select Item
Network Stack Configuration	Enter: Select
	+/-: Change Opt.

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

CPU Configuration		To turn on/off the MLC streamer prefetcher.
ype	Intel(R) Core(TM)	
	17-8665UE CPU @ 1.70GHz	
ID	0x806EC	
Speed	2000 MHz	
Ll Data Cache	32 KB x 4	
ll Instruction Cache	32 KB x 4	
L2 Cache	256 KB x 4	
L3 Cache	8 MB	
14 Cache	N/A	
7MX	Supported	
5MX/TXT	Supported	-
		: Select Screen
		11: Select Item
Adjacent Cache Line Prefetch	[Enabled]	Enter: Select
Intel (VMX) Virtualization	[Enabled]	+/-: Change Opt.
Technology		Fl: General Help
Active Processor Cores	[A11]	F2: Previous Values
lyper-Threading	[Enabled]	F3: Optimized Defaults
AES	[Enabled]	F4: Save & Exit
Intel Trusted Execution Technology	[Disabled]	ESC: Exit

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

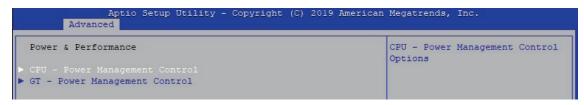


Figure 4-3-2 : Power & Performance

## 4.3.2.1 CPU - Power Management Control

CPU - Power Management Control		Select the performance state that the BIOS will set
		starting from reset vector.
Intel(R) SpeedStep(tm)	[Enabled]	
Intel(R) Speed Shift Technology	[Enabled]	
Turbo Mode	[Disabled]	
C states	[Enabled]	
Enhanced C-states	[Enabled]	
Configurable TDP Boot Mode	[Nominal]	

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<sup>®</sup> SpeedStep™

Allow more than two frequency ranges to be supported.

## Intel<sup>®</sup> Speed shift Technology

Enable/Disable Intel<sup>®</sup> 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

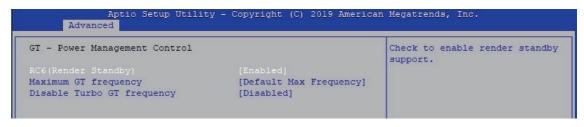


Figure 4-3-2-2 : GT - Power Management Control

# **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

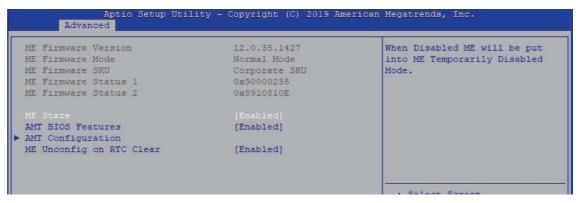


Figure 4-3-3 : PCH-FW Settings

# 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

Aptio Setup Utili Advanced	ty - Copyright (C) 2019 An	merican Megatrends, Inc.
TPM20 Device Found		Enables or Disables BIOS
Firmware Version:	5.62	support for security device.
Vendor:	IFX	0.S. will not show Security Device, TCG EFI protocol and
		INTIA interface will not be
Taniana DCD Mantas	CHA I CHAOFC	1000 12 02 2

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

Apti Advanced	io Setup Utility - Copyright (C) 2019 Ameri	ican Megatrends, Inc.
SMART Settings		Run SMART Self Test on all HDDs during POST.

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

IT8786 Super IO Configuration		Set Parameters of Serial Port
Super IO Chip Serial Port 1 Configuration Serial Port 2 Configuration Serial Port 3 Configuration Serial Port 4 Configuration	IT8786	1 (COM1)
		: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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

c Health Status		Smart Fan Support. Work with Full Speed if "Smart Fan
ystem temperaturel	: +45 🗆	Support" is Disabled.
ystem temperature2	: +45 🗆	
PU temperature	: +36 🗆	
ystem Fanl Speed	: 3835 RPM	
CORE	: +0.768 V	
DR	: +1.212 V	
12V	: +12.168 V	
5V	: +5.040 V	
3.3V	: +3.344 V	
mart Fan Support		· · · · · · · · · · · · · · · · · · ·
Smart Fan Mode	[User]	: Select Screen
Start Temperature	45	†↓: Select Item
PWM Start Value(%)	15	Enter: Select
Full Speed Temperature	90	+/-: Change Opt.
		Fl: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

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

СОМО	Console Redirection Enable or Disable.
Console Redirection Settings	
Legacy Console Redirection	
Legacy Console Redirection Settings	
Serial Port for Out-of-Band Management/	
Windows Emergency Management Services (EMS)	
Console Redirection [Disabled]	
Console Redirection Settings	· · · · · · · · · · · · · · · · · · ·
	: Select Screen
	11: Select Item
	Enter: Select

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

Intel TXT Information		
Chipset	Production Fused	
BiosAcm	Production Fused	
Cpu Txt	Supported	
Error Code	None	
Class Code	None	
Major Code	None	
Minor Code	None	

Figure 4-3-10 : Intel TXT Information

Display Intel TXT information.

# 4.3.11 Acoustic Management Configuration

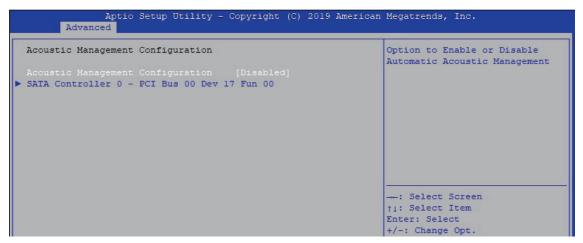


Figure 4-3-11 : Acoustic Management Settings

# **Acoustic Management Configuration**

Option to Enable or Disable Automatic Acoustic Management.

# 4.3.12 PCI Subsystem Settings

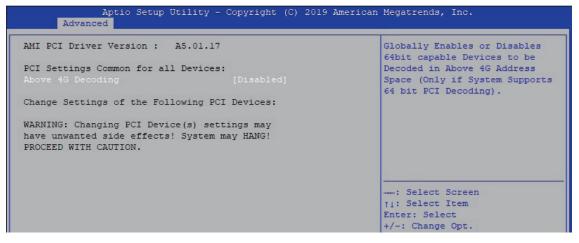


Figure 4-3-12 : PCI Subsystem Settings

# 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

USB Module Version 23 Support if no USB devices connected. DISABLE option keep USB devices availad only for EFI application I Keyboard, 1 Mouse Legacy USB Support [Enabled] USB Mass Storage Driver Support [Enabled] Port 60/64 Emulation [Disabled] : Select Screen 11: Select Item USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] +/-: Change Opt.	USB Configuration		Enables Legacy USB support. AUTO option disables legacy
USB Controllers: 1 XHCI USB Devices: 1 Keyboard, 1 Mouse Legacy USB Support [Enabled] XHCI Hand-off [Enabled] USB Mass Storage Driver Support [Enabled] Port 60/64 Emulation [Disabled] USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] Device power-up delay [Auto] F1: General Help F2: Previous Values	USB Module Version	23	support if no USB devices are
<pre>1 XHCI USB Devices: 1 Keyboard, 1 Mouse Legacy USB Support [Enabled] XHCI Hand-off [Enabled] USB Mass Storage Driver Support [Enabled] Port 60/64 Emulation [Disabled] USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] Device reset time-out [20 sec] Device power-up delay [Auto] F1: General Help F2: Previous Values</pre>	HCD Controllors.		connected. DISABLE option will
USB Devices: 1 Keyboard, 1 Mouse Legacy USB Support [Enabled] XHCI Hand-off [Enabled] USB Mass Storage Driver Support [Enabled] Port 60/64 Emulation [Disabled] USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] Device power-up delay [Auto] F1: General Help F2: Previous Values			
1 Keyboard, 1 Mouse         Legacy USB Support       [Enabled]         XHCI Hand-off       [Enabled]         USB Mass Storage Driver Support       [Enabled]         Port 60/64 Emulation       [Disabled]         USB hardware delays and time-outs:       1: Select Screen         USB transfer time-out       [20 sec]         Device reset time-out       [20 sec]         Pevice power-up delay       [Auto]         F1: General Help         F2: Previous Values			only for Eri applications.
XHCI Hand-off     [Enabled]       USB Mass Storage Driver Support     [Enabled]       Port 60/64 Emulation     [Disabled]       USB hardware delays and time-outs:     1: Select Screen       USB transfer time-out     [20 sec]       Device reset time-out     [20 sec]       Device power-up delay     [Auto]       F1: General Help       F2: Previous Values			
USB Mass Storage Driver Support [Enabled] Port 60/64 Emulation [Disabled] USB hardware delays and time-outs: 11: Select Screen USB transfer time-out [20 sec] Enter: Select Device reset time-out [20 sec] +/-: Change Opt. Device power-up delay [Auto] F1: General Help F2: Previous Values	Legacy USB Support		
Port 60/64 Emulation     [Disabled]      : Select Screen       USB hardware delays and time-outs:     11: Select Item       USB transfer time-out     [20 sec]       Device reset time-out     [20 sec]       Device power-up delay     [Auto]       F1: General Help       F2: Previous Values	XHCI Hand-off	[Enabled]	
: Select Screen USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] Device power-up delay Therefore the set the set of the	USB Mass Storage Driver Support	[Enabled]	
USB hardware delays and time-outs: USB transfer time-out [20 sec] Device reset time-out [20 sec] Device power-up delay Lato] F1: General Help F2: Previous Values	Port 60/64 Emulation	[Disabled]	
USB transfer time-out [20 sec] Enter: Select Device reset time-out [20 sec] +/-: Change Opt. Device power-up delay [Auto] F1: General Help F2: Previous Values			: Select Screen
Device reset time-out [20 sec] +/-: Change Opt. Device power-up delay [Auto] F1: General Help F2: Previous Values			
Device power-up delay [Auto] F1: General Help F2: Previous Values			
F2: Previous Values			
	Device power-up delay	[Auto]	
IF3: Optimized Defaults			
F4: Save & Exit			
ESC: Exit			LSC: LXIT

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

INT19 Trap Response [Immediate] HDD Connection Order [Adjust] Boot option filter [UEFI and Legacy] Option ROM execution: Select Screen 11: Select Item Network [Do not launch] Enter: Select Storage [Legacy] +/-: Change Opt. Video [Legacy] Fl: General Help	Compatibility Support Module Configuration		Enable/Disable CSM Support.
GateA20 Active     [Upon Request]       Option ROM Messages     [Force BIOS]       INT19 Trap Response     [Immediate]       HDD Connection Order     [Adjust]       Boot option filter     [UEFI and Legacy]       Option ROM execution    : Select Screen       Network     [Do not launch]       Storage     [Legacy]       Video     [Legacy]			
Option ROM Messages       [Force BIOS]         INT19 Trap Response       [Immediate]         HDD Connection Order       [Adjust]         Boot option filter       [UEFI and Legacy]         Option ROM execution      : Select Screen         Network       [Do not launch]         Storage       [Legacy]         Video       [Legacy]	CSM16 Module Version	07.82	
INT19 Trap Response [Immediate] HDD Connection Order [Adjust] Boot option filter [UEFI and Legacy] Option ROM execution: Select Screen 11: Select Item Network [Do not launch] Enter: Select Storage [Legacy] +/-: Change Opt. Video [Legacy] F1: General Help	GateA20 Active	[Upon Request]	
HDD Connection Order [Adjust] Boot option filter [UEFI and Legacy] Option ROM execution: Select Screen 11: Select Item Network [Do not launch] Enter: Select Storage [Legacy] +/-: Change Opt. Video [Legacy] F1: General Help	Option ROM Messages	[Force BIOS]	
Boot option filter     [UEFI and Legacy]       Option ROM execution    : Select Screen 11: Select Item Enter: Select       Network     [Do not launch]       Storage     [Legacy]       Video     [Legacy]	INT19 Trap Response	[Immediate]	
Option ROM execution    : Select Screen       Network     [Do not launch]       Storage     [Legacy]       Video     [Legacy]	HDD Connection Order	[Adjust]	
Image: state	Boot option filter	[UEFI and Legacy]	
Network     [Do not launch]     Enter: Select       Storage     [Legacy]     +/-: Change Opt.       Video     [Legacy]     Fl: General Help	Option ROM execution		: Select Screen
Storage     [Legacy]     +/-: Change Opt.       Video     [Legacy]     Fl: General Help			↑↓: Select Item
Video [Legacy] F1: General Help	Network	[Do not launch]	Enter: Select
	Storage	[Legacy]	+/-: Change Opt.
Other PCI devices [Legacy] F2: Previous Values	Video	[Legacy]	Fl: General Help
	Other PCI devices	[Legacy]	F2: Previous Values

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

Aptio Se Advanced	tup Utility - Copyright	(C) 2019 American	Megatrends, In	nc.
NVMe Configuration				
No NVME Device Found				

Figure 4-3-15 : NVMe Configuration

Display NVMe Controller and drive information.

# 4.3.16 Network Stack Configuration

Aptio Setup Advanced	) Utility - Copyright (C) 2019 Americ	an Megatrends, Inc.
Network Stack Ipv4 PXE Support Ipv4 HTTP Support Ipv6 PXE Support Ipv6 HTTP Support IPSEC Certificate PXE boot wait time Media detect count	[Enabled] [Disabled] [Disabled] [Disabled] [Disabled] [Enabled] 0 1	Enable/Disable UEFI Network Stack

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

Aptio Setup Utility - Copyright (C) 2019 Ame Main Advanced Chipset Security Boot Save & Exit	erican Megatrends, Inc.
System Agent (SA) Configuration PCH-IO Configuration LVDS Configuration	System Agent (SA) Parameters

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

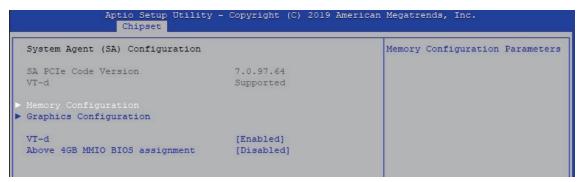


Figure 4-4-1 : System Agent Settings

# 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

Memory Configuration		
Memory RC Version	0.7.1.108	
Memory Frequency	2400 MHz	
Memory Timings (tCL-tRCD-tRP-tRAS)	17-17-17-39	
Channel 0 Slot 0	Populated & Enabled	
Size	8192 MB (DDR4)	
Number of Ranks	1	
Manufacturer	Kingston	

Figure 4-4-1-1 : Memory Information

Display memory information.

# 4.4.1.2 Graphics Configuration

Aptio Setup Uti Chipset	lity - Copyright (C) 2019 Ame	rican Megatrends, Inc.
Graphics Configuration		Keep IGFX enabled based on the setup options.
GTT Size	[8MB]	
Aperture Size	[256MB]	
DVMT Pre-Allocated	[32M]	
DVMT Total Gfx Mem	[MAX]	

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

PCH-IO Configuration		PCI Express Configuration settings
PCI Express Configuration		
SATA And RST Configuration		
Security Configuration		
PCH LAN Controller	[Enabled]	
Wake on LAN Enable	[Enabled]	
Serial IRQ Mode	[Continuous]	
State After G3	[S5 State]	

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

PCI Express Configuration		The control of Active State Power Management of the DMI
		Link.
Native PCIE Enable	[Enabled]	
PCIE Port assigned to LAN	13	
SUMIT B (PCIe x4)		
SUMIT B (PCIe x1)		
SUMIT A (PCIe x1)		
Intel (R) Ethernet Controller I219 LAN	Reserved for ethernet	
Intel (R) Ethernet Controller 12.	10 LAN	
mPCIe slot with SIM		
mPCIe/mSATA slot	Lane configured as USB/SATA	: Select Screen <pre> fi: Select Item Enter: Select +/-: Change Opt. Fi: General Help Fi: General Help Fi: Fi: Fi: Fi: Fi: Fi: Fi: Fi: Fi: Fi:</pre>
		F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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

SATA And RST Configuration		Enable/Disable SATA Device.
SATA Controller(s)		
SATA Mode Selection	[AHCI]	
Software Feature Mask Configuration		
Aggressive LPM Support	[Enabled]	
Serial ATA Port 0	Phison SSB064G (64.0GB)	
Software Preserve	SUPPORTED	
Port 0	[Enabled]	
Hot Plug	[Disabled]	
Spin Up Device	[Enabled]	
SATA Device Type	[Hard Disk Drive]	
Serial ATA Port 1	Empty	: Select Screen
Software Preserve	Unknown	†↓: Select Item
Port 1	[Enabled]	Enter: Select
Hot Plug	[Disabled]	+/-: Change Opt.
Spin Up Device	[Enabled]	Fl: General Help
SATA Device Type	[Hard Disk Drive]	F2: Previous Values
Serial ATA Port 2	Empty	F3: Optimized Defaults
Software Preserve	Unknown	F4: Save & Exit
Port 2	[Enabled]	ESC: Exit
Hot Plug	[Disabled]	
Spin Up Device	[Enabled]	
SATA Device Type	[Hard Disk Drive]	

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

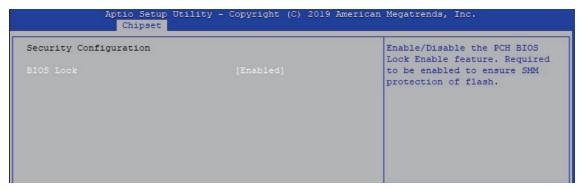


Figure 4-4-2-3 : BIOS Security Settings

# **BIOS Lock**

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

# 4.4.3 LVDS Configuration

Aptio Setup Utilit Chipset	y - Copyright (C) 2019 Ame	rican Megatrends, Inc.
LCD Resolution Control LCD Panel Type	[1024x768 LVDS]	Select LCD Panel Resolution
	LCD Panel Type	: Select Screen 1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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

Password Description		Set Administrator Password
If ONLY the Administrator'	s password is set,	
then this only limits acce		
only asked for when enteri		
If ONLY the User's passwor		
is a power on password and		
boot or enter Setup. In Se		
have Administrator rights.		
The password length must h	e	
in the following range:		
Minimum length	3	
Maximum length	20	
		: Select Screen
		11: Select Item
User Password		Enter: Select
		+/-: Change Opt.
		Fl: General Help
		F2: Previous Values
HDD Security Configuration		F3: Optimized Defaults
P0:Phison SSB064GPTC0-S91		F4: Save & Exit
		ESC: Exit
Secure Boot		

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

	ity - Copyright (C) 2019 Am rity	erican megatrends, inc.
HDD Password Description :		Set HDD User Password. *** Advisable to Power Cycle
Allows Access to Set, Modify and Clear		System after Setting Hard Disk
Hard Disk User Password		Passwords ***.
and Master Password.	Discard or Save changes option	
User Password is mandatory to	in setup does not have any	
If Master password is installe	impact on HDD when password is	
it can also be used to unlock	set or removed. If the 'Set	
If the 'Set User Password' option is hidden,		HDD User Password' option is
do power cycle to enable the option again.		hidden, do power cycle to
		enable the option again
HDD PASSWORD CONFIGURATION:		
Security Supported :	Yes	: Select Screen
Security Enabled :	No	<pre> †1: Select Item</pre>
Security Locked :	No	Enter: Select
Security Frozen :	No	+/-: Change Opt.
HDD User Pwd Status:	NOT INSTALLED	Fl: General Help
HDD Master Pwd Status :	INSTALLED	F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
Set Master Password		ESC: Exit

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

System Mode	Setup	Secure Boot mode options:
		Standard or Custom.
Secure Boot	[Disabled]	In Custom mode, Secure Boot
	Not Active	Policy variables can be configured by a physically
		present user without full
Restore Factory Keys		authentication
Reset To Setup Mode		authentication

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

Boot Configuration Secup Prompt Timeout Bootup NumLock State Ouiet Boot	1 [Off] [Disabled]	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
	[222002203]	, and any i
Boot Option Priorities		
Boot Option #1	[Windows Boot Manager (P0: Phison SSB064GPTC0-S91)1	
Boot Option #2	[P0: Phison SSB064GPTC0-S91]	
Boot Option #3	[UEFI: Built-in EFI Shell]	
		: Select Screen
Hard Drive BBS Priorities		Enter: Select
		+/-: Change Opt.
		F1: General Help F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

Figure 4-6 : BIOS Boot Menu

## **Setup Prompt Timeout**

Number of seconds to wait for setup activation key. 65535 (0xFFF) 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

Aptio Setup Utility - Copyright (C) 2019 Ameri Main Advanced Chipset Security Boot <mark>Save &amp; Exit</mark>	can Megatrends, Inc.
Save Options Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Changes Discard Changes	Exit system setup after saving the changes.
Default Options Restore Defaults Save as User Defaults Restore User Defaults Boot Override UEFI: Built-in EFI Shell Windows Boot Manager (P0: Phison SSB064GPTC0-S91) P0: Phison SSB064GPTC0-S91	: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: 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.

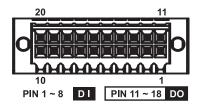


# **APPENDIX A : Isolated DIO Guide**

# **A.1 Function Description**

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

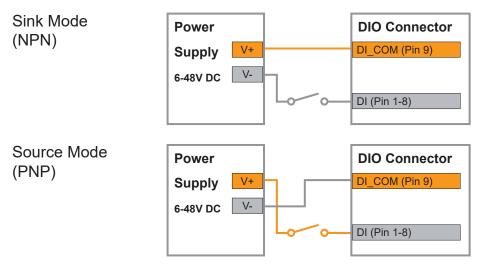
DIO definition is shown below :



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 :



# DO reference circuit :

Sink Mode (NPN, Default)	Device			DIO Connector
	6-48V DC	V+		DIO_VDC (Pin 20)
		10	$\rightarrow$ $\rightarrow$	DO (Pin 11-18)
		V-		DIO_GND (Pin 10, 19)
Source Mode	Device			DIO Connector
(PNP)	6-48V DC	V+		DIO_VDC (Pin 20)
		IO		DO (Pin 11-18)
		V-		DIO_GND (Pin 10, 19)

# 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	Distribution
Win7_64.bat :	Runtime
Windows update package which driver required	Sample
(need to restart), and Installation for 64-bit driver	Source
Win8_32.bat, Win8_64.bat :	Uninstall_32
Installation for driver, and guideline to Framework 3.5	Uninstall 64
distribution for sample	Win7_32
Win10_32.bat, and Win10_64.bat :	Win7_64
Installation for driver, and installation to Framework 3.5	=
distribution for sample	Win8_32
Uninstall_32.bat, and Uninstall_64.bat :	Win8_64
Uninstallation for driver	💿 Win10_32
Run batch file as Administrator.	💿 Win10_64
Support Windows 7 above.	
Make sure Windows version before installation	

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.

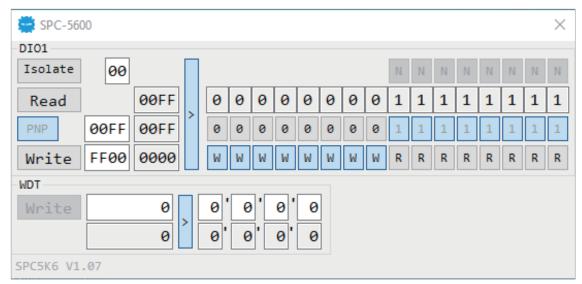
Source folder include sample program source code that compile on Visual Studio 2008.

# A.4 Sample

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

drv.dll
 SPC5K.dll
 SPC5K.exe

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  $8 \sim pin 1$ ):

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 day format text (read only) : WDT counting day format text (read only) :



# **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 \*lsolate\_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  $\rightarrow$  SATA Configuration  $\rightarrow$  SATA Mode Selection

Main	Advanced	Chipset	Boot	Security	Save &	Exit
					Item	Specific Help
SATA (	Controller	(s)	[Ena	abled]		
SATA 1	Model Seled	ction	[AH	CI]		

# **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.

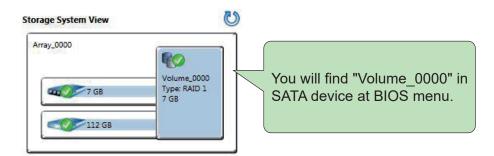
# C.6 To Create RAID Volume on "Rapid Storage Technology" Software

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".

2 Intel® Rapid Storage Technology		
Status	tanage Preferences	(intel)
1. Select 2. Configure 3. Confirm	Select Volume Type Perceive data protection (Recovery) Real-time data protection (RAID 1) Optimized disk performance (RAID 0) Efficient data hosting and protection (RAID 5) Balanced performance and data protection (RAID 10) Balanced performance and data protection (RAID 10)	Protection Performance Capacity Combine two disks to create a volume where each disk stores an exact copy of the data and provides real-time redundancy.
	Next	More help on this page

# C.7 Disk Management : Partition the Disk

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



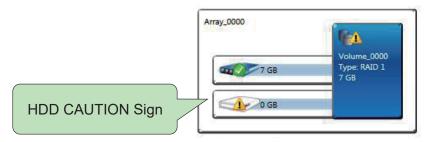
To start Disk Management tool and select "Initialize Disk".

Then add "Logical Device" for Windows access.

Le Computer Management						^
File Action View Help						
i 🗢 🔿 🙋 🖬 🚺 🖬 🖄 🖆	' 😼					
🜆 Computer Management (Local)	Volume	Layout Type Fi	ile System	Status	Actions	1
System Tools	(C:)	Simple Basic N Simple Basic F/		Healthy (Boot, Page File, Crash Dump, Primary P Healthy (Primary Partition)	a Disk Management	
<ul> <li>Task Scheduler</li> <li>Event Viewer</li> <li>Shared Folders</li> <li>Shared Folders</li> <li>Sea Local Users and Groups</li> <li>O Performance</li> </ul>	GRASC (D:)	More Actions	•			
<ul> <li>Device Manager</li> <li>Storage</li> <li>Disk Management</li> </ul>	< [	.m.		•		
Services and Applications	6.88 GB	RASC (D:) 6.88 GB FAT32 Healthy (Primary Pa	artition)			
	29.82 GB	<b>System Reserved</b> 100 MB NTFS Healthy (System, Ar	29.72	2 GB NTFS thy (Boot, Page File, Crash Dump, Primary Partitic		
	Unallocated R	rimary partition				

# 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 Intel® Rapid Storage Technology	
Status Manage Preferences	intel
Vour system is functioning normally.	Storage System View 🕑
Click on any element in the storage system view to manage its properties. Array_0000 Volume_0000: Rebuilding 16% complete	7 GB 7 GB 7 GB 7 GB 7 GB 7 GB 7 GB
	External system disk 30 G8 External empty port 3 External empty port 4

# 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.

Current Status		Storage System	View
our system is reporting one or more of efer to the details below for more inf		Array_0000	PA.
Create	Rebuild Volume	3	GB Volume_0000 Type: RAID 1
reate a volume by combining availab	and the second se	dancy and keep your data protected.	7 GB
Create a custom volume	Select the disk you want to rebuild the volume to:	0	GB
Manage	O Disk on port 2 (233 GB)	e	mal system disk
lick on any element in the storage sy	A WARNING: Completing this action will permanently delete existing data on continuing.	the selected disk. Back up data before	38 1
Array_0000 🧭	You can continue using other applications during this time.		mal disk GB
Volume_0000: Degraded Rebu			mal empty port 3
Details: Fix any problems reporte	More help	Rebuild Cancel	n an



# **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<sup>®</sup> Core i7-8665UE 1.70GHz (8M Cache, up to 4.40GHz)

				ver on and boo	er on and boot to Win 10 (64-bit)		
CPU Power Input				Slee	ep Mode	idle status CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
	9V	0.416A	05.00W	0.592A	05.33W	1.657A	14.91W
Core™ i7-	12V	0.233A	05.58W	0.451A	05.41W	1.251A	15.01W
8665UE	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

		Power on and boot to Win10 (64-bit)						
CPU	Power Input	Run 100 usage v		Run 100% CPU usage with 3D				
		Max Current	Max Consumption	Max Current	Max Consumption			
	9V	2.327A	20.94W	4.343A	39.09W			
Core™ i7-	12V	1.734A	20.80W	2.993A	35.92W			
8665UE	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<sup>®</sup> Core i7-8665UE 1.70GHz (8M Cache, up to 4.40GHz)

				Power on and				pot to Win 10 (64-bit)		
CPU Powe		Standby Mode		Sleep Mode		idle status CPU usage less 3%				
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption			
	16V	0.618A	09.89W	0.649A	10.38W	1.397A	22.36W			
Core™ i7-	24V	0.426A	10.22W	0.443A	10.62W	0.915A	21.96W			
8665UE	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			

		Power on and boot to Win10 (64-bit)						
CPU	Power Input	Run 100 usage v						
		Max Current	Max Consumption	Max Current	Max Consumption			
	16V	1.630A	26.09W	2.719A	43.51W			
Core™ i7-	24V	1.086A	26.06W	1.590A	38.15W			
8665UE	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

\*1 (DIMM 1) PASS

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

PASS

PASS

PASS

# E.2 Supported Non-ECC Memory List

PASS

PASS

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

PASS

PASS

# E.3 Supported Storage List

Туре	Brand	Model	Capacity
mSATA	Intel	Intel-310 SSDMAEMC080G2	80GB
IIISAIA	Kingston	SUV500MS	120GB
	Transcend	SSD370 TS64GSSD370	64GB
	innodisk	3MG2-P DGS25-64GD81BC1QC	64GB
	Kingston	SA400S371120G	120GB
	Intel	SSD E 5400s SSDSC2KR120H6	120GB
SATA SSD	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)

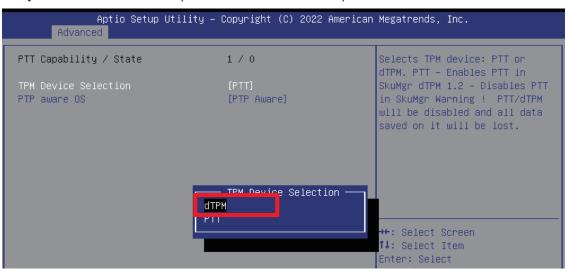
# Step 1 Click on "Advanced", then click on "PCH-FW Configuration"

Aptio Setup Utility – Copyright (C) Main <mark>Advanced</mark> Chipset Security Boot Save &	
<ul> <li>CPU Configuration</li> <li>Power &amp; Performance</li> <li>PCH-FW Configuration</li> </ul>	Configure Management Engine Technology Parameters
<ul> <li>ACPI Settings</li> <li>SMART Settings</li> <li>IT8786 Super IO Configuration</li> <li>Hardware Monitor</li> <li>Serial Port Console Redirection</li> <li>Intel TXT Information</li> <li>Acoustic Management Configuration</li> <li>PCI Subsystem Settings</li> </ul>	
<ul> <li>Network Stack Configuration</li> <li>CSM Configuration</li> <li>USB Configuration</li> </ul>	++: Select Screen ↑↓: Select Item Enter: Select

# Step 2 Click on "PTT Configuration"

Aptio Setup Utility Advanced	– Copyright (C) 2022 Am	erican Megatrends, Inc.
ME Firmware Version ME Firmware Mode ME Firmware SKU ME File System Integrity Value ME Firmware Status 1 ME Firmware Status 2 NFC Support	11.8.77.3664 Normal Mode Corporate SKU 2 0x90000255 0x80108306 Disabled	Configure PTT
ME State	[Enabled]	
AMT BIOS Features ▶ AMT Configuration	[Enabled]	
▶ PTT Configuration	[Enabled]	
		++: Select Screen ↑↓: Select Item Enter: Select ↓ ( ) Charge Set

F



# **Step 3** Click on "dTPM" (TPM Device Selection)



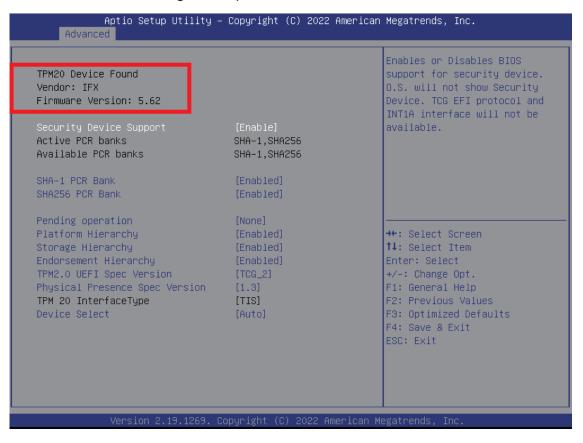
**Step 4** Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks "Save configuration and exit?" appears. The computer will then restart.

Aptio Setup U Advanced	tility – Copyright (C) 2022 America	n Megatrends, Inc.
PTT Capability ∕ State	1 / 0	Selects TPM device: PTT or dTPM. PTT – Enables PTT in
TPM Device Selection	[dTPM]	SkuMgr dTPM 1.2 – Disables PTT
PTP aware OS	[PTP Aware]	in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.
	Save & Exit Setup	
	Save configuration and exit?	
		←: Select Screen
	Yes No	↓: Select Item
		nter: Select
		∕–: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults

Step 5 Click on "Trusted Computing"

Aptio Setup Utility – Copyright (C) Main <mark>Advanced</mark> Chipset Security Boot Save &	
<ul> <li>CPU Configuration</li> <li>Power &amp; Performance</li> </ul>	Trusted Computing Settings
PCH-EW Configuration	
▶ Trusted Computing	
<ul> <li>KCF1 Settings</li> <li>SMART Settings</li> </ul>	
▶ IT8786 Super IO Configuration	
► Hardware Monitor	
▶ Serial Port Console Redirection	
▶ Intel TXT Information	
▶ Acoustic Management Configuration	
▶ AMI Graphic Output Protocol Policy	
▶ PCI Subsystem Settings	
▶ Network Stack Configuration	↔: Select Screen
▶ CSM Configuration	↑↓: Select Item
▶ USB Configuration	Enter: Select
	17 : Chanda Ont

# **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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