

# PAOI-8041 Series

## AOI System User's Manual



Version 1.0

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# Table of Contents

## How to Use This Manual

<b>Chapter 1 System Overview</b> .....	<b>1-1</b>
1.1 Introduction.....	1-1
1.2 Check List.....	1-1
1.3 Product Specification.....	1-2
1.4 Mechanical Dimension.....	1-3
<b>Chapter 2 System Installation</b> .....	<b>2-1</b>
2.1 Embedded Board H/W Jumper Setting Introduction.....	2-1
2.1.1 M/B Block overview.....	2-1
2.1.2 M/B Jumper setting.....	2-3
2.2 Memory module Installation.....	2-9
2.3 HDD/SSD Installation.....	2-10
2.4 PCI/ PCIe Add-on Card Installation.....	2-11
2.5 Wall Mount Installation.....	2-12
2.6 I/O Interfaces.....	2-13
2.6.1 Front View.....	2-13
2.6.2 Rear View.....	2-14
2.7 Getting Started.....	2-15
<b>Chapter 3 BIOS Setup Information</b> .....	<b>3-1</b>
3.1 Introduction.....	3-1
3.2 BIOS Setup.....	3-1
3.2.1 Main.....	3-2
3.2.2 Configuration.....	3-3
3.2.3 Security.....	3-19
3.2.4 Boot.....	3-20
3.2.5 Save & Exit.....	3-21
3.3 Troubleshooting.....	3-22
<b>Chapter 4 Important Instructions</b> .....	<b>4-1</b>
4.1 Note on the Warranty.....	4-1
4.2 Exclusion of Accident Liability Obligation.....	4-1
4.3 Liability Limitations / Exemption from the Warranty Obligation.....	4-1
4.4 Declaration of Conformity.....	4-1
<b>Chapter 5 Frequent asked question</b> .....	<b>5-1</b>

## How to Use This Manual

The manual describes how to configure your PAOI-8041 system to meet various operating requirements. It is divided into four chapters, with each chapter addressing a basic concept and operation of Automatic Optical Inspection System.

**Chapter 1: System Overview.** Present what you have in the box and give you an overview of the product specifications and basic system architecture for this Automatic Optical Inspection System.

**Chapter 2: System Installation.** Show the definitions and locations of all the interfaces and describe a proper installation guide so that you can easily configure your system.

**Chapter 3: BIOS Setup Information.** Specify the meaning of each setup parameters, how to get advanced BIOS performance and update new BIOS. In addition, POST checkpoint list will give users some guidelines of troubleshooting.

**Chapter 4: Important Instructions.** Indicate some instructions which must be carefully followed when the Automatic Optical Inspection System is used.

The content of this manual is subject to change without prior notice. These changes will be incorporated in new editions of the document. The vendormay make supplement or change in the products described in this document at any time.

### Revision History

Revision	Date	Details of Change(s)
V1.0	2024/01/12	Initial Release

# Chapter 1 System Overview

## 1.1 Introduction

Portwell Inc., a world-leading innovator in the Industrial PC (IPC) market and a Premium Member of the Intel® Internet of Things (IoT) Solutions Alliance, announced PAOI-8041, a high performance Automatic Optical Inspection System. Powered by the with Intel 8th Generation processor code name coffee lake-S. PAOI-8041 supports dual channel DDR4 memory. Display interfaces are Dual mini-DP display with 4K x 2K high resolution.

Portwell's PAOI-8041 is designed to be power-optimized and value-optimized. PAOI-8041 utilizes a ROBO-6912VG2AR a Half size PICMG 1.3 Single Host Board (SHB) with Intel 8th Generation Core processors supported from E3 class Xeon processors to Core i3 processors.

The system further takes advantage of the Intel® Core™ processor technologies supporting dual channel DDR4 memory up to 32GB. Furthermore, the PAOI-8041 AOI system includes rich I/O interfaces and fast connectivity with dual independent mini-DP port interfaces, two Gigabit Ethernet ports, Six USB3 ports.

Portwell's PAOI-8041 implements flexible PCI Express Gen 3 expansion by one PCI Express x16 or two PCI Express x 8(select by BIOS) and two PCI slot with dedicated processor SKU, which is ideal for a range of applications, such as Automatic Optical Inspection System.

## 1.2 Check List

The PAOI-8041package should cover the following basic items:

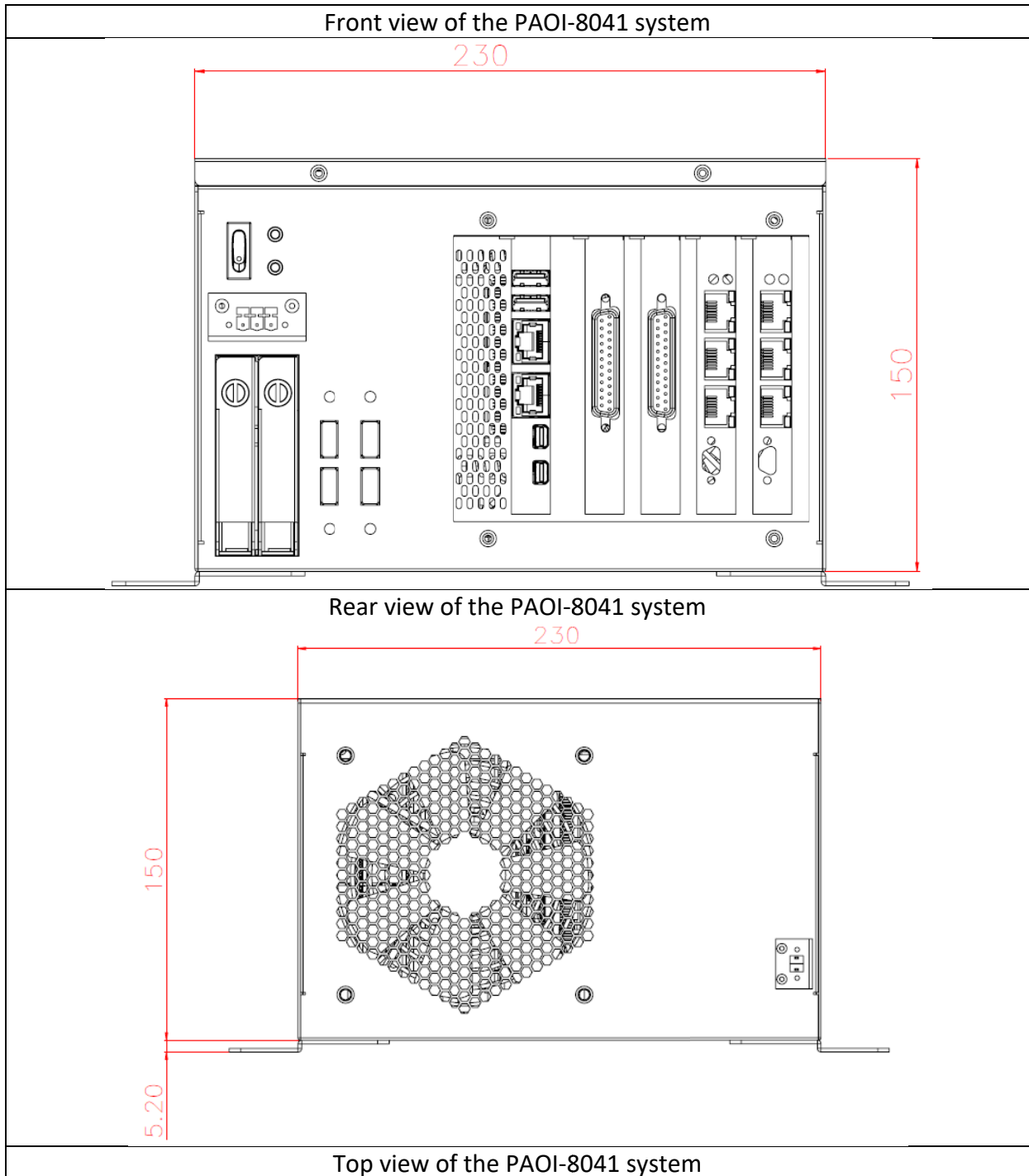
- ✓ One PAOI-8041 System
- ✓ Other Accessories

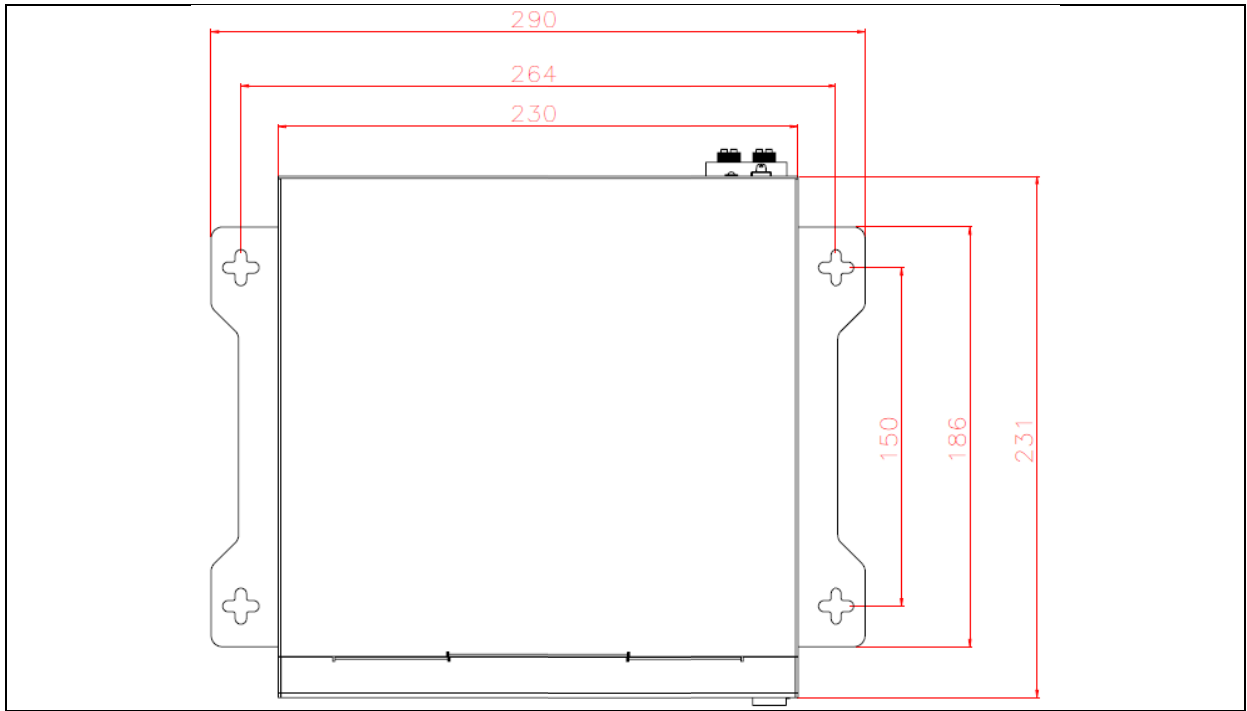
If any of these items is damaged or missing, please contact your vendor and keep all packing materials for future replacement and maintenance.

### 1.3 Product Specification

System	
M/B	ROBO-6912VG2AR
CPU	Intel® 8th Processor(optional)
BIOS	AMI UEFI BIOS
System Memory	<ul style="list-style-type: none"> <li>➤ 2 SO-DIMM DDR4</li> <li>➤ Dual channel</li> <li>➤ Up to 32GB (optional)</li> </ul>
Storage	2x 2.5" SATA HDD/SSD (optional)
Watchdog Timer	Programmable via S/W from 1 sec. to 255 sec.
H/W Status Monitor	-Temperature (CPU & System) -Voltage (CPU Vcore, VBAT, 5VSB, 12V, 5V, 3.3V)
External I/O	
Display	2x mini-DP
USB	4x USB3.2 Gen1, 2x USB3.2 Gen2
LAN	2x Gigabit Ethernet
Power Supply Unit	
Power Supply	DC 12~36V
Environment	
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 80°C
Relative Humidity	95% @ 40°C, non-condensing
Operating Vibration	Wall mount: 0.5 Grms (10 Hz to 500Hz) System: 1Grms (10 Hz to 500Hz)
Operating Shock	W mount: 15G, 11 msec System: 50G, 11 msec
Mechanical	
Dimension (WxDxH)	230 x 231 x 150 mm
Weight	5.8 kg
Mounting	Wall Mount

## 1.4 Mechanical Dimension





## Chapter 2 System Installation

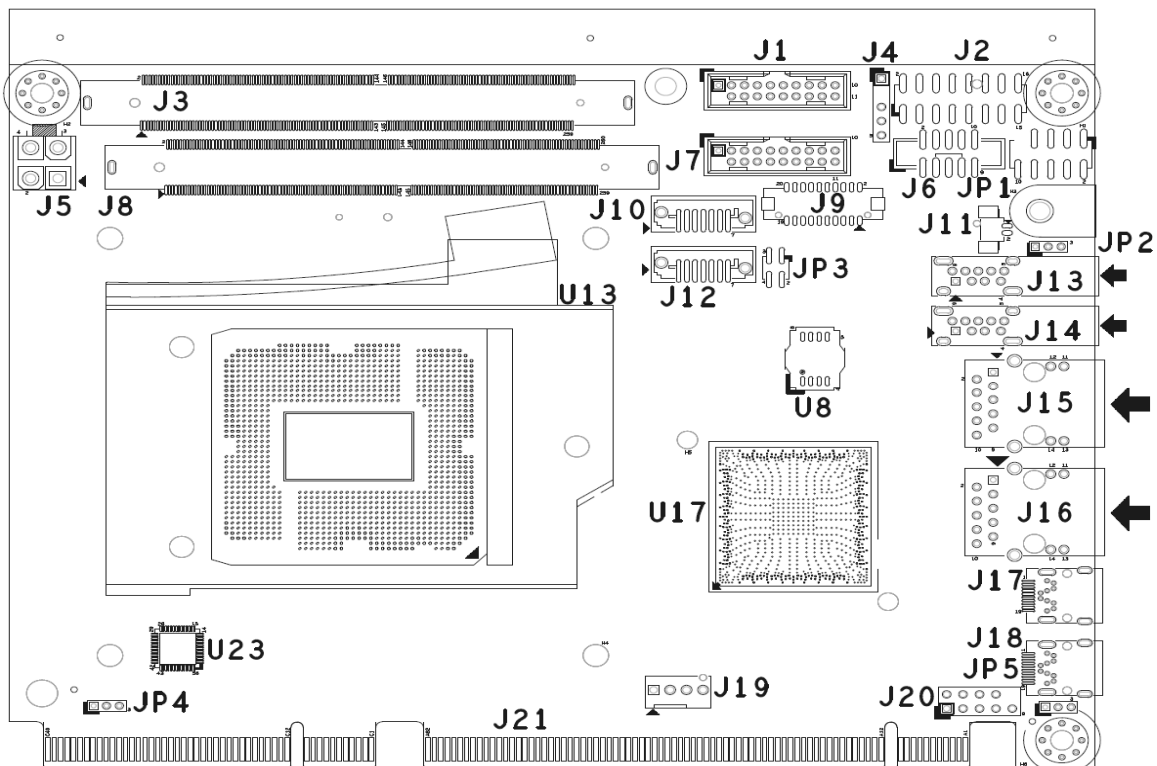
This chapter provides you with instructions to set up your system. Definitions and locations of all the interfaces are described so that you can easily configure your system. For more detailed PIN assignment and jumper setting, please refer to user's manual of ROBO-6912VG2AR.

### Important:

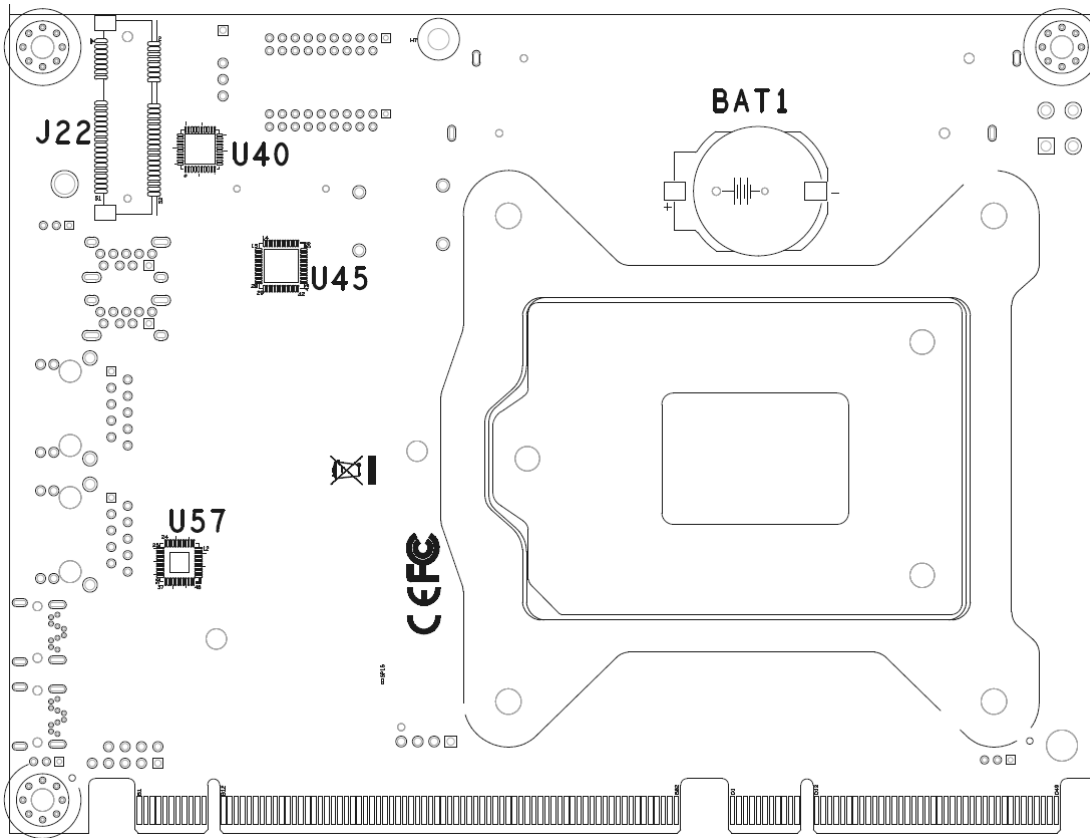
- Turn off the power of your IPC BOX PC and allow it to cool for at least 10 minutes before performing any installation/uninstallation and maintenance process.
- Professionals (Skilled person) are required for maintenance, assembly or disassembly, and the pluggable 2.5" SATAHDD/SSD can be replaced by end user.

### 2.1 Embedded Board H/W Jumper Setting Introduction

#### 2.1.1 M/B Block overview







## 2.1.2 M/B Jumper setting

### Pin Header Function List

Jumper	Function	Remark
JP4	IR35201 FW update/debug header (Reserve)	PH3Px1/2mm
JP1	LPC 80 Port Pin Header	Header5Px2/2.54mm
JP3	ConfigurePCIEx16, x8, x4	Header2Px2/2mm
JP5	Clear CMOS Setup	PH3Px1/2mm
JP2	ATX/AT Select Pin	PH3Px1/2mm

### JP3: PCI Express\* Bifurcation



PIN No.	Description
1-2, Short 3-4, Short	1x8 , 2x4
1-2, Open 3-4, Short	Reserved
1-2, Short 3-4, Open	2x8
1-2, Open 3-4, Open	1x16*

### JP5: Clear CMOS Setup



PIN No.	Description
1-2, Short	Normal *
2-3, Short	Clear CMOS

### JP2: ATX/AT Select Pin

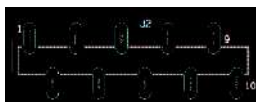


PIN No.	Description
1-2 Short	AT mode
1-2 Open	ATX mode*

## Connector Function List

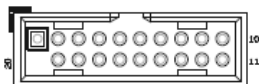
Connector	Function	Remark
J2	Front Panel Pin Header	Header 10Px1/2.0mm
J1/J7	USB2.0/3.1 connector	
J10/J12	SATA Connector	
J9	DVI-I Connector	
J8	DDR4 Channel A Slot	
J3	DDR4 Channel B Slot	
J20	Audio Pin Header	Header 5Px2/2.54mm
J5	ATX 4 Pin Connector (For CPU Power)	
J13/J14	USB2.0/3.1(Gen2)connector (Type-A)	
J6	COM1 Pin Header	Header 5Px2/2 mm
J19	CPU Fan	
J16	RJ45 Connector for I219	
J15	RJ45 Connector for I210	
J27	SM Bus Pin Header	PH5Px1/2.54mm
J9	DVI-I Connector	
J22	mSATA connector	

### J2: Front Panel Connector



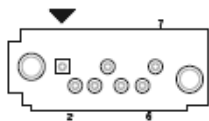
PIN No.	Description	PIN No.	Description
1	EXT_PWRBTN#	2	GND
3	RSTBTN#	4	GND
5	VCC	6	BUZZER
7	5VSB_FP	8	POWER-LED
9	VCC3_FP	10	SATA_LED#

### J1/J7: USB2.0/3.1 connector



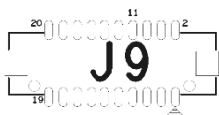
PIN No.	Description	PIN No.	Description
1	5VDual		
2	USB3_RX_N	19	5VDual
3	USB3_RX_P	18	USB3_RX_N
4	Ground	17	USB3_RX_P
5	USB3_TX_N	16	Ground
6	USB3_TX_P	15	USB3_TX_N
7	Ground	14	USB3_TX_P
8	USB2_N	13	Ground
9	USB2_P	12	USB2_N
10	Ground	11	USB2_P

### J10/J12 : SATA Connector



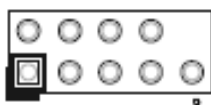
PIN No.	DESCRIPTION
1	Ground
2	TX_P
3	TX_N
4	Ground
5	RX_N
6	RX_P
7	Ground

### J9: DVI Header



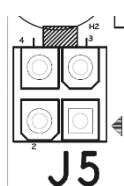
PIN No.	Description	PIN No.	Description
1	GND	2	GND
3	D_HDMI_D0_DP	4	D_HDMI_CLK_DP
5	D_HDMI_D0_DN	6	D_HDMI_CLK_DN
7	GND	8	GND
9	D_HDMI_D1_DP	10	DVI_POWER
11	D_HDMI_D1_DN	12	DVI_POWER
13	GND	14	D_HDMI_HPD_IN
15	D_HDMI_D2_DP	16	D_HDMI_DDC_CLK
17	D_HDMI_D2_DN	18	D_HDMI_DDC_DATA
19	GND	20	GND

### J20: Audio Pin Header



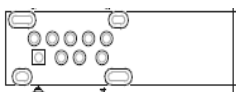
PIN No.	Description	PIN No.	Description
1	MIC_IN	2	Ground
3	LINE_IN_L	4	Ground
5	LINE_IN_R	6	Ground
7	AUDIO_OUT_L	8	Ground
9	AUDIO_OUT_R		

### J5: ATX 4 Pin Connector (For CPU Power)



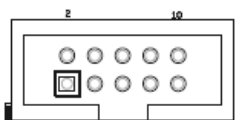
PIN No.	Description	PIN No.	Description
1	Ground	3	+12V
2	Ground	4	+12V

### J13/J14 : USB2.0/USB3.1(Gen2) Connector



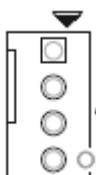
PIN No.	DESCRIPTION
1	5VDual
2	USB2_N
3	USB2_P
4	Ground
5	USB3_RX_N
6	USB3_RX_P
7	Ground
8	USB3_TX_N
9	USB3_TX_P

### J6: COM1 Pin Header



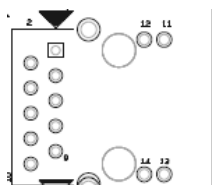
PIN No.	Description	PIN No.	Description
1	DCD#	2	RXD#
3	TXD#	4	DTR#
5	Ground	6	DSR#
7	RTS#	8	CTS#
9	RI#	10	NC

### J19: CPU FAN



PIN No.	Description
1	Ground
2	12V
3	Fanin
4	Fanout

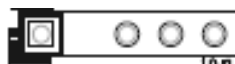
### J15: RJ45 Connector for I210



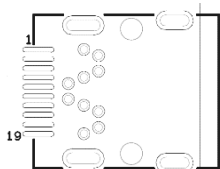
PIN No.	Description	PIN No.	Description
1	MDIO_P	2	MDIO_N
3	MDI1_P	4	MDI1_N
5	LAN_CT1	6	LAN_CT2
7	MDI2_P	8	MDI2_N
9	MDI3_P	10	MDI3_N
11	LED_100	12	LED_1000
13	LED_LINK#/ACT#	14	ACT_LED

**J16: RJ45 Connector for I219**

PIN No.	Description	PIN No.	Description
1	MDIO_P	2	MDIO_N
3	MDI1_P	4	MDI1_N
5	LAN_CT1	6	LAN_CT2
7	MDI2_P	8	MDI2_N
9	MDI3_P	10	MDI3_N
11	LED_100	12	LED_1000
13	LED_LINK#/ACT#	14	ACT_LED

**J4: SM Bus Pin Header**

PIN No.	Description
1	Clock
2	NC
3	Ground
4	Data
5	VCC

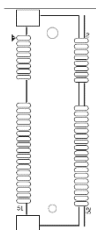
**J18: MINI DP 1 Connector**

PIN No.	Description	PIN No.	Description
1	GND	2	DP1_HPD
3	DDIA_TX0_DP_R	4	OC_1_AUX_EN#
5	DDIA_TX0_DN_R	6	DP1_CFG2
7	GND	8	GND
9	DDIA_TX1_DP_R	10	DDIA_TX3_DP_R
11	DDIA_TX1_DN_R	12	DDIA_TX3_DN_R
13	GND	14	GND
15	DDIA_TX2_DP_R	16	DP1_AUXP
17	DDIA_TX2_DN_R	18	DP1_AUXN
19	GND	20	W40_VCC3_DP1

**J17: MINI DP 2 Connector**

PIN No.	Description	PIN No.	Description
1	GND	2	DP2_HPD
3	DDIB_TX0_DP_R	4	OC_2_AUX_EN#
5	DDIB_TX0_DN_R	6	DP2_CFG2
7	GND	8	GND

9	DDIB_TX1_DP_R	10	DDIB_TX3_DP_R
11	DDIB_TX1_DN_R	12	DDIB_TX3_DN_R
13	GND	14	GND
15	DDIB_TX2_DP_R	16	DP2_AUXP
17	DDIB_TX2_DN_R	18	DP2_AUXN
19	GND	20	W40_VCC3_DP2

**J22: mSATA connector**





PIN No.	Description	PIN No.	Description
1	NC	2	VCC3
3	NC	4	GND
5	NC	6	MS_1P5S
7	NC	8	N/C
9	GND	10	NC
11	NC	12	NC
13	NC	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	N/C
21	GND	22	N/C
23	SATA_RX3_DP_C	24	VCC3
25	SATA_RX3_DN_C	26	GND
27	GND	28	MS_1P5S
29	GND	30	SMB_R1_CLK_MAIN
31	SATA_TX3_DN_C	32	SMB_R1_DATA_MAIN
33	SATA_TX3_DP_C	34	GND
35	GND	36	N/C
37	GND	38	NC
39	VCC3	40	GND
41	VCC3	42	N/C
43	DEV_SEL -	44	N/C
45	NC	46	N/C
47	NC	48	MS_1P5S
49	NC	50	GND
51	NC	52	VCC3

## 2.2 Memory module Installation

### Important:

- Turn off the power of your IPC BOX PC and allow it to cool for at least 10 minutes before performing any installation/uninstallation and maintenance process.
- Professionals (Skilled person) are required for maintenance, assembly, or disassembly, and the pluggable 2.5" SSD can be replaced by end user.



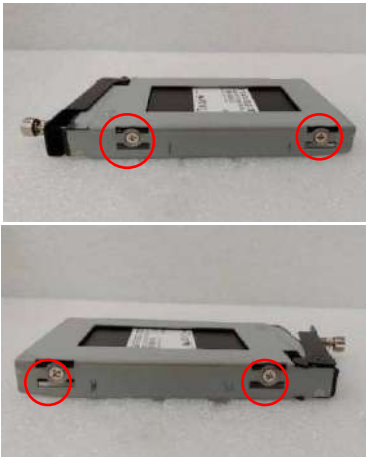
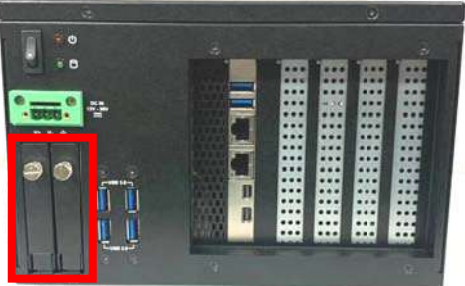
Equipped with Memory module by yourself if you purchase Memory module locally.

<p>Step 1. Open the top cover</p> 	<p>Step 2. Check system inside</p> 
<p>Step 3. To assemble a DDR4 SO DIMM Memory Module (If one RAM only please install on J8 first)</p> 	
<p>Step 4. Assemble top cover with chassis.</p>	<p>Step 5. Fixed the screws of top cover</p>
	



## 2.3 HDD/SSD Installation



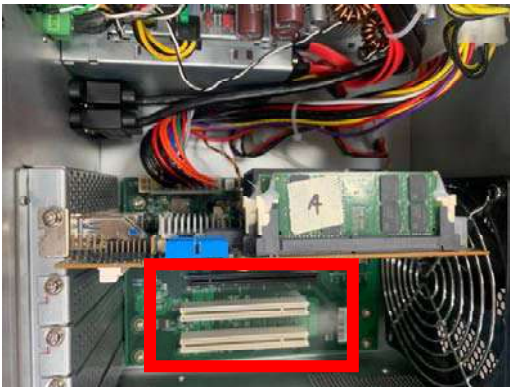


Unique design of the HDD/SDD tray allows easy installation and maintenance of 2.5" SATA. RAID function is supported with dual storage design.

<p>Step 1. Loosen the thumbscrews of the HDD/SDD cover</p>	<p>Step 2. Draw out the HDD/SSD tray from the system</p>
	
<p>Step 3. Install the HDD/SDD into tray with screws</p>	<p>Step 4. Push the HDD/SDD tray back and finish installation</p>
	

## 2.4 PCI/ PCIe Add-on Card Installation

Equipped with PCI/PCIe expansion module, user can easily install and replace their own expansion cards.

- 2x PCIe x16 slots (with PCIe x8 signal)
- 2x PCI slots

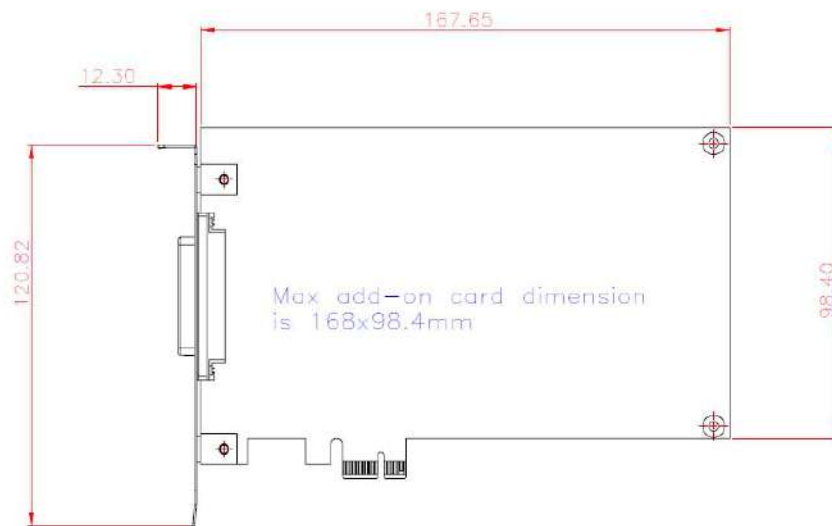
Step 1. Open the top cover	Step 2. Check system inside
	
Step 3. Check how to insert add-on card	Step 4. Loosen the screws of the expansion module bracket
	
Step 5. Insert PCIe add-on card	Step 6. Screw bracket of the add-on card
	

Step 7. Final picture.



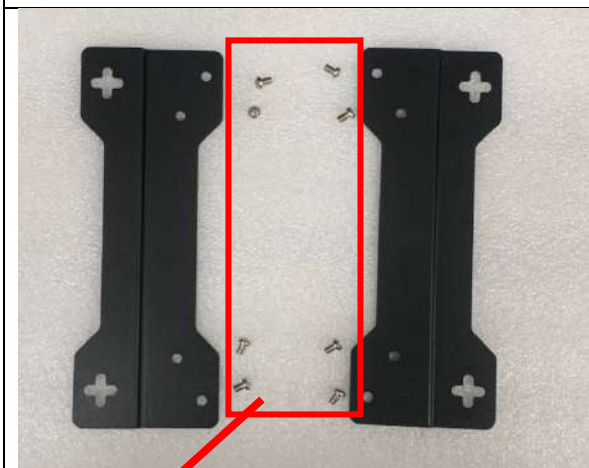
**Add-on card dimension limitation:**

Max dimension of add-on card is 167.65 x 98.4 mm.

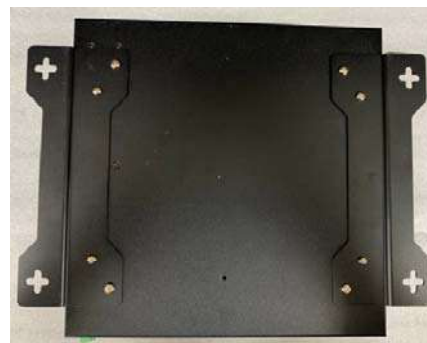




**2.5 Wall Mount Installation**

Step 1. Prepare wall mount kit and screws.



Step 2. System is ready for assembling.



	
Step 3. Assemble the mounting kit with system and fasten it using screws.	Step 4. Final picture.
	

## 2.6 I/O Interfaces

### 2.6.1 Front View



**Power Button:**

Press the power button to turn ON/OFF the system.  
Red color LED means Power on

**Storage LED:**

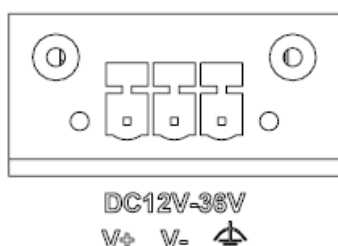
It demonstrates storage working status of the system.

**2.5" HDD/SSD Tray:**

Two removable 2.5" HDD/SSD trays for storage installation

**DC in 12-36V via 3-pin terminal block connector:**

Provide power connection of the system to the main power source via DC power cable or AC/DC power adapter.



**LAN:**

Two Gigabit Ethernet (10/100/1000 M bits/sec) LAN ports by using Intel® I219-LM & Intel® I210AT GbE Ethernet Controller

**USB3.2 Gen2&Gen1:**

Two USB 3.2 Gen2 and four USB 3.2 Gen1.

**Mini DP:**

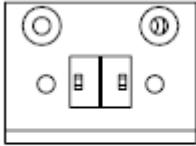
Mini DP (Display Port) display output

**2.6.2 Rear View**



**Ext Power Switch:**

It is for remote system ON/OFF control.

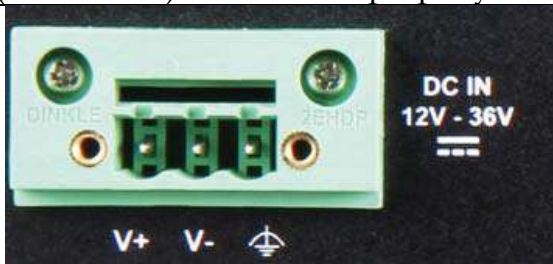


EXT  
PW SW

## 2.7 Getting Started

It is easy to get the system started.

Step 1. Make sure the power supply (DC:12~36V) is connected properly



Step 2. Press the power button to turn on the system



## Chapter 3 BIOS Setup Information

### 3.1 Introduction

The following section describes the BIOS setup program. The BIOS setup program can be used to view and change the BIOS settings for the module. Only experienced users should change the default BIOS settings.

### 3.2 BIOS Setup

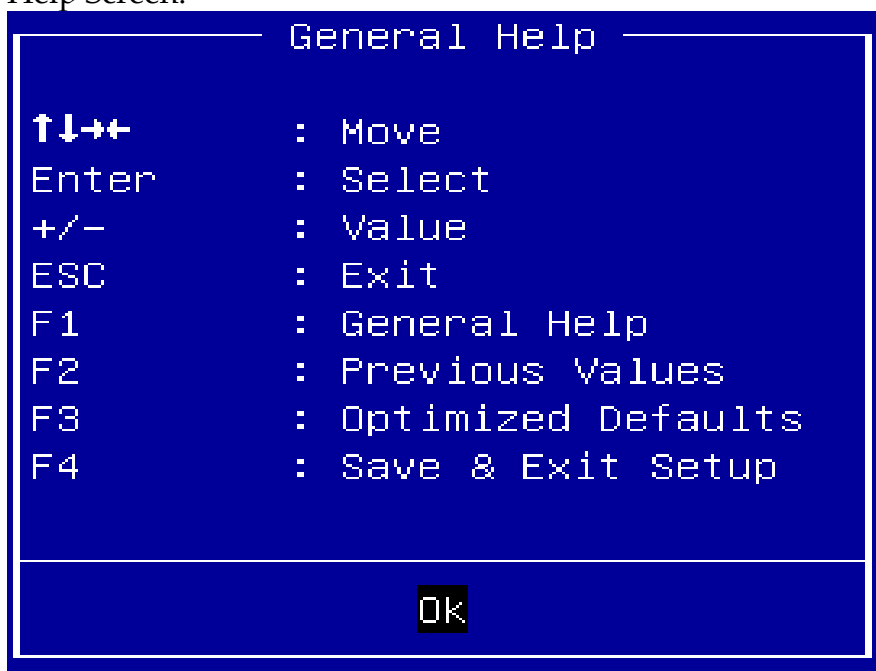
Power on the computer and the system will start POST (Power on Self Test) process. When the message below appears on the screen, press <Delete> or <ESC> key will enter BIOS setup screen.

#### **Press<Delete> or <ESC> to enter SETUP.**

If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On or pressing the RESET button. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

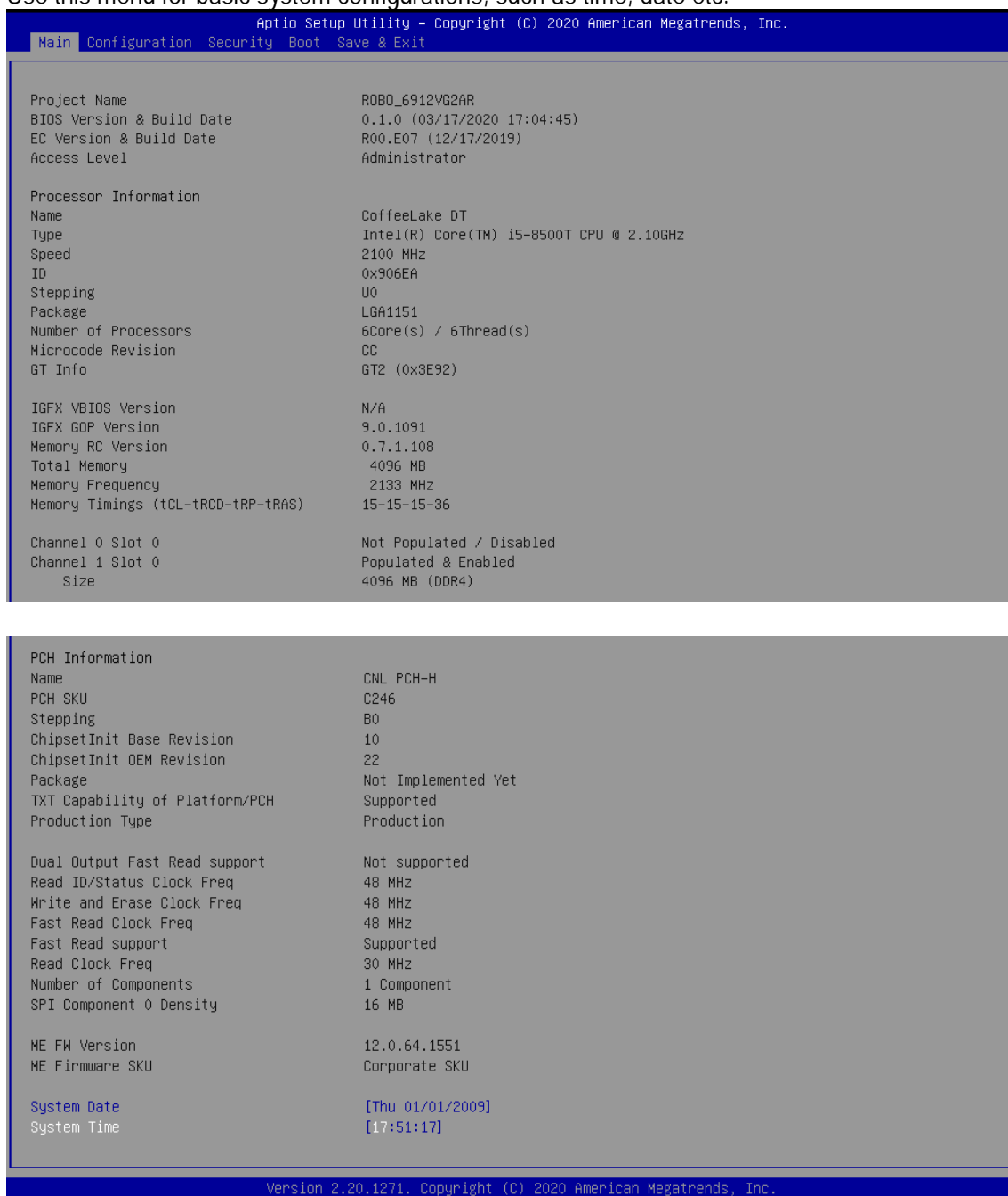
#### **Press <F1> to Run General Help or Resume**

The BIOS setup program provides a General Help screen. The menu can be easily called up from any menu by pressing <F1>. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press <Esc> to exit the Help Screen.



### 3.2.1 Main

Use this menu for basic system configurations, such as time, date etc.

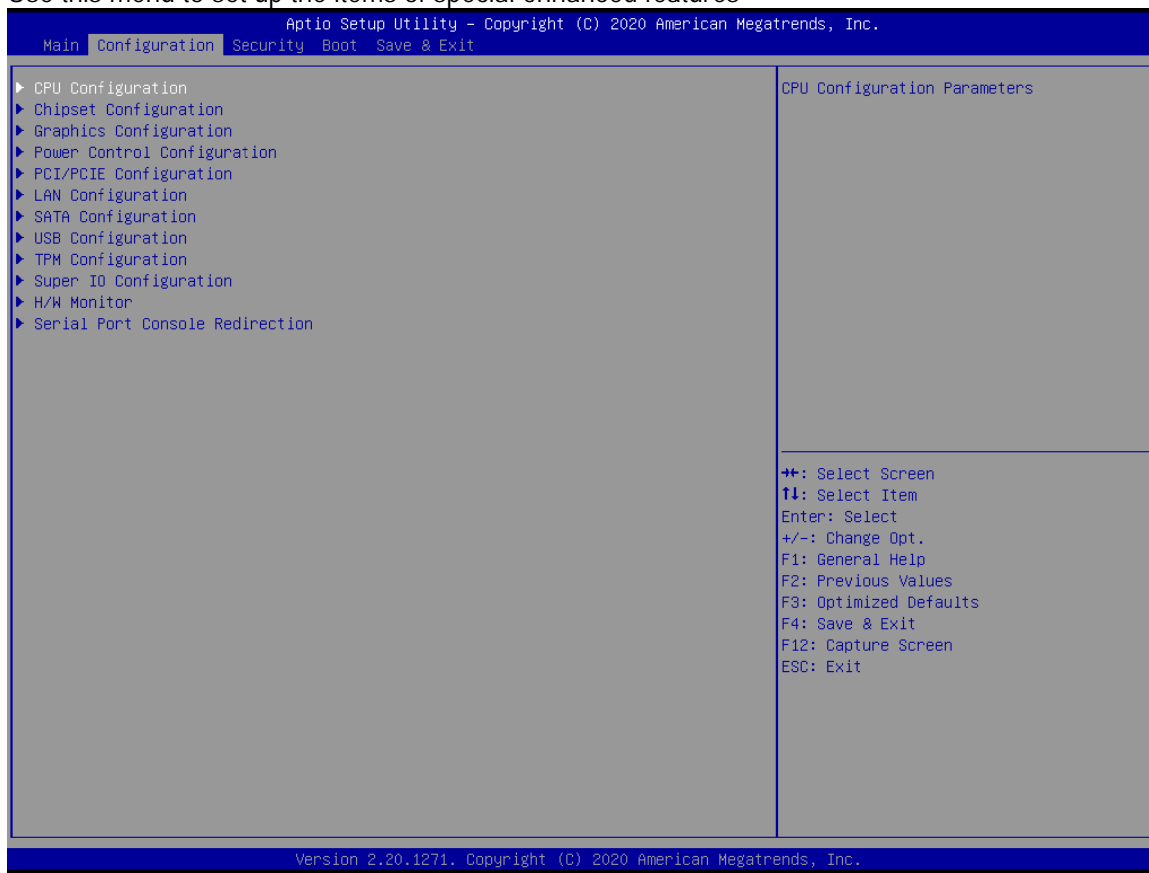


Feature	Description	Options
System Date	The date format is <Day>, <Month><Date><Year>. Use [+] or [-] to configure system Date.	
System Time	The time format is <Hour><Minute><Second>. Use [+] or [-] to configure system Time.	



### 3.2.2 Configuration

Use this menu to set up the items of special enhanced features



## CPU Configuration

### CPU Configuration Parameters

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Configuration	
CPU Configuration	
Type	Intel(R) Core(TM) i5-8500T CPU @ 2.1...
ID	0x906EA
Speed	2100 MHz
L1 Data Cache	32 KB x 6
L1 Instruction Cache	32 KB x 6
L2 Cache	256 KB x 6
L3 Cache	9 MB
L4 Cache	N/A
VMX	Supported
SMX/TXT	Supported
CPU Flex Ratio Override	[Enabled]
CPU Flex Ratio Settings	20
Active Processor Cores	[All]
Boot performance mode	[Max Non-Turbo Performance]
Intel (VMX) Virtualization Technology	[Enabled]
Intel(R) SpeedStep(tm)	[Enabled]
Intel(R) Speed Shift Technology	[Enabled]
Turbo Mode	[Enabled]
C states	[Enabled]
Enhanced C-states	[Enabled]
C-State Auto Demotion	[C1 and C3]
C-State Un-demotion	[C1 and C3]
Package C-State Demotion	[Disabled]
Package C-State Un-demotion	[Disabled]
CState Pre-Wake	[Enabled]
I/O MWAIT Redirection	[Disabled]
Package C State Limit	[Auto]

Enable/Disable CPU Flex Ratio Programming

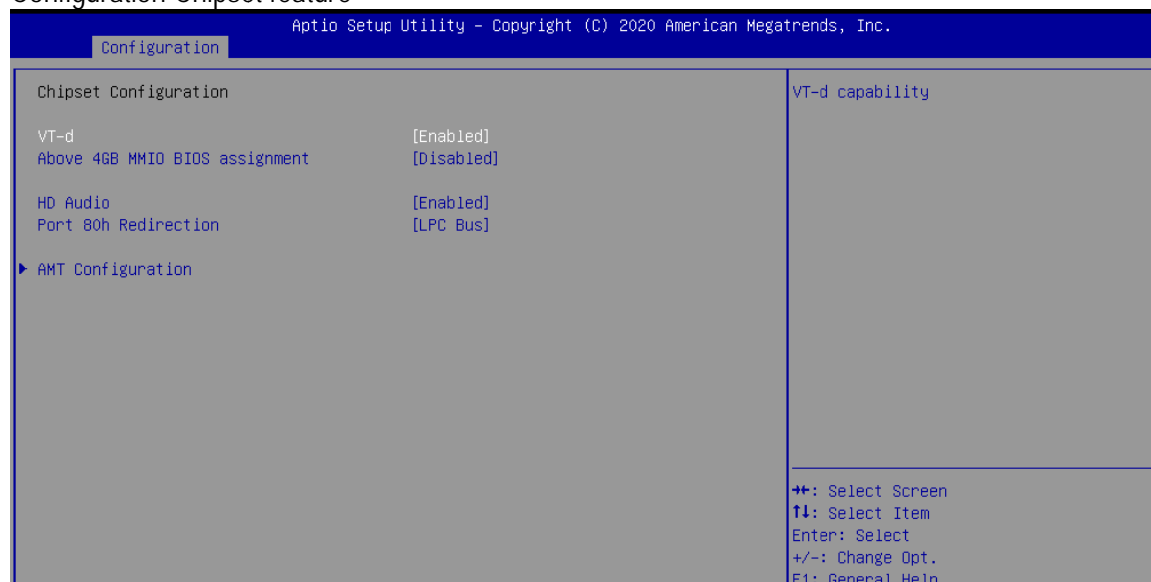
++: Select Screen  
 ↑↓: Select Item  
 Enter: Select  
 +/-: Change Opt.  
 F1: General Help  
 F2: Previous Values  
 F3: Optimized Defaults  
 F4: Save & Exit  
 F12: Capture Screen  
 ESC: Exit

Feature	Description	Options
CPU Flex Ratio Override	Enable/Disable CPU Flex Ratio Programming	★ Disabled, Enabled
CPU Flex Ratio Override[Enabled]		
CPU Flex Ratio Settings	This value must be between Max Efficiency Ratio (LFM) and Maximum non-turbo ratio set by Hardware (HFM).	★ 21
Active Processor Cores	Number of cores to enable in each processor package.	★ All, 1, 2, 3,4,5
Boot performance mode	Select the performance state that the BIOS will set starting from reset vector	★ Max Non-Turbo Performance, Turbo Performance, Max Battery
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vander pool Technology.	★ Enabled, Disabled
Intel® Speed Step™	Allows more than two frequency ranges to be supported.	★ Enabled, Disabled
Intel® Speed Shift Technology	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states	★ Enabled, Disabled
Turbo Mode	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled)	★ Enabled, Disabled
C states	Enable/disable CPU Power Management.	★ Enabled,

	Allows CPU to go to C states It's not 100% utilized	Disabled
Enhanced C-states	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-state	★ Enabled, Disabled
C-State Auto Demotion	Configure C-State Auto Demotion	★ C1 and C3, Disable, C1 ,C3
C-State Un-demotion	Configure C-State Un-demotion	★ C1 and C3, Disable, C1 ,C3
Package C State Demotion	Package C-State Demotion	★ Disabled, Enabled
Package C State Un-demotion	Package C-State Un-demotion	★ Disabled, Enabled
CState Pre-Wake	Disable – Sets bit 30 of POWER_CTL MSR(0x1FC) to 1 to disable the Cstate Pre-Wake	★ Enabled ,Disabled
IO MWAIT Redirection	When set, will map IO_read instructions sent to IO registers PMG_IO_BASE_ADDRBASE+offset to MWAIT(offset)	★ Disabled, Enabled
Package C State Limit	Maximum Package C State Limit Setting. Cpu Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C States Limit	★ Auto,C0/C1,C2,C3, C6,C7, C7S,C8,C9,C10,Cp u Default,

### Chipset Configuration

#### Configuration Chipset feature



Feature	Description	Options
VT-d	VT-d Capability	★ Enabled ,Disabled
Above 4GB MMIO BIOS	Enable/Disable above 4GB MemoryMappedIO	★ Disabled,

assignment	BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB	Enabled
HD Audio	Control Detection of the HD-Audio device. Disabled= HAD will be unconditionally disabled Enabled= HAD will be unconditionally enabled.	★ Enabled ,Disabled
Port 80h Redirection	Control where the Port 80h cycles are sent	★LPC Bus, PCIE Bus

### AMT Configuration

#### Configure Intel® Active Management Technology Parameters

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Configuration

AMT BIOS Features [Disabled] ME Unconfig on RTC Clear [Disabled]	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.
---	---

++: Select Screen  
 ↑↓: Select Item  
 Enter: Select  
 +/-: Change Opt.  
 F1: General Help  
 F2: Previous Values  
 F3: Optimized Defaults  
 F4: Save & Exit  
 F12: Capture Screen  
 ESC: Exit

Feature	Description	Options
AMT BIOS Features	When disable 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	★Disabled, Enabled
ME Unconfig on RTC Clear	When Disable ME will not be unconfigured on RTC Clear	★Disabled, Enabled

## Graphics Configuration Configuration Graphics Settings

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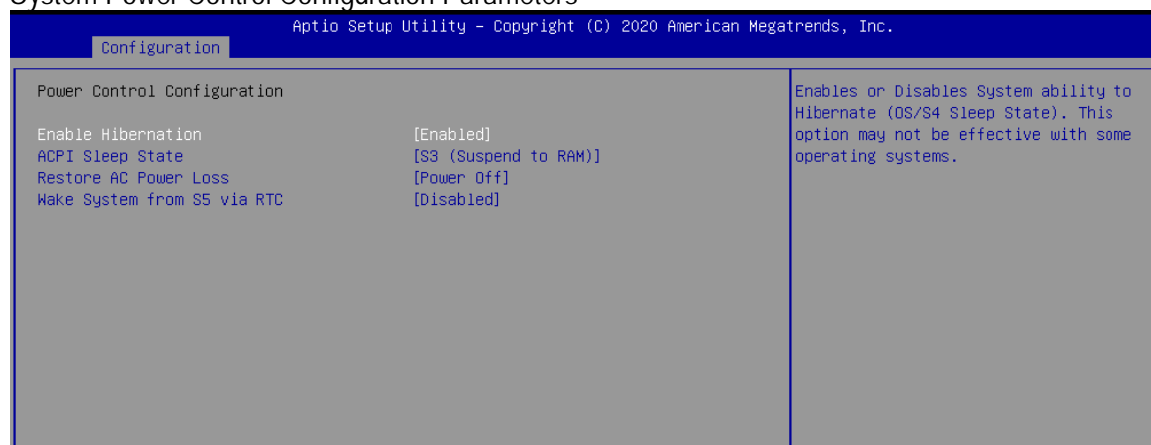
Configuration

<p>Graphics Configuration</p> <p>Primary Display [Auto]                  Internal Graphics [Auto]                  DVMT Pre-Allocated [32M]                  DVMT Total Gfx Mem [256M]</p>	<p>Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.</p>
<p>++: Select Screen                  ↑↓: Select Item                  Enter: Select                  +/-: Change Opt.                  F1: General Help</p>	

Feature	Description	Options
<b>Primary Display</b>	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.	★Auto, IGFX, PEG, PCIE
<b>Internal Graphics</b>	Keep IGFX enable based on the setup options.	★Auto, Disable, Enable
<b>DVMT Pre-Allocated</b>	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.	★32M,0M,64M,4M,8M,12M,16M,20M,24M,28M,32M/F7,36M,40M,44M,48M,52M,56M, 60M
<b>DVMT Total Gfx Mem</b>	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device	★256M, 128M, MAX

## Power Control Configuration

### System Power Control Configuration Parameters



Feature	Description	Options
Enable Hibernation	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.	★Enabled, Disabled
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.	★S3 (Suspend to RAM) ,Suspend Disabled
Restore AC Power Loss	Specify what state to go to when power is re-applied after a power failure (G3 state)	★Power Off ,Power On ,Last State
Wake System from S5 via RTC	Enable or disable System wake on alarm event. When enabled, System will wake on the hr::min::sec Specified/programmed by the Tools from OS	★Disabled, Enabled

## PCI/PCIE Configuration

### PCI, PCI-X and PCI Express Settings

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Configuration

PCI/PCIE Configuration  PEG Port Lane Width [1x16]  ▶ PCI Express Root Port 9	Set PEG port lane width.          ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F12: Capture Screen ESC: Exit
---	---

Feature	Description	Options
PEG Port Lane Width	Set PEG port Lane width	★1x16, 2x8, 1x8, 2x4

### PCI Express Root Port9

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Configuration

PCI Express Root Port 9 [Enabled] ASPM 9 [Disabled] PCIe Speed [Auto]	Control the PCI Express Root Port.          ++: Select Screen ↑↓: Select Item
---	--

Feature	Description	Options
PCI Express Root Port 9	Control the PCI Express Root Port.	★Enabled , Disabled
ASPM 9	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO-BIOS auto configure DISABLE – Disables ASPM	★Disabled, L0s, L1, L0sL1, Auto
PCIe Speed	Select PCI Express port speed	★Auto, Gen1, Gen2, Gen3

## LAN Configuration

Configuration On Board LAN device.

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Configuration	
<p>LAN Configuration</p> <p>Intel Ethernet Controller WGI219LM                      LAN MAC Address 00-90-FB-6D-DB-C0                      PCH LAN Controller [Enabled]                      Wake on LAN Enable [Enabled]</p> <p>Intel Ethernet Controller WGI210AT                      LAN MAC Address 00-90-FB-6D-DB-C1                      Intel LAN I210 Controller [Enabled]                      Wake on LAN Enable [Enabled]</p> <p>Launch UEFI PXE ROM [Enabled]                      Ipv4 PXE Support [Enabled]                      Ipv4 HTTP Support [Enabled]                      Ipv6 PXE Support [Enabled]                      Ipv6 HTTP Support [Enabled]                      IPSEC Certificate [Enabled]                      PXE boot wait time 0                      Media detect count 1</p>	<p>Enable/Disable onboard NIC.</p> <hr/> <p>++: Select Screen                      ↑↓: Select Item                      Enter: Select                      +/-: Change Opt.                      F1: General Help                      F2: Previous Values                      F3: Optimized Defaults                      F4: Save &amp; Exit                      F12: Capture Screen                      ESC: Exit</p>

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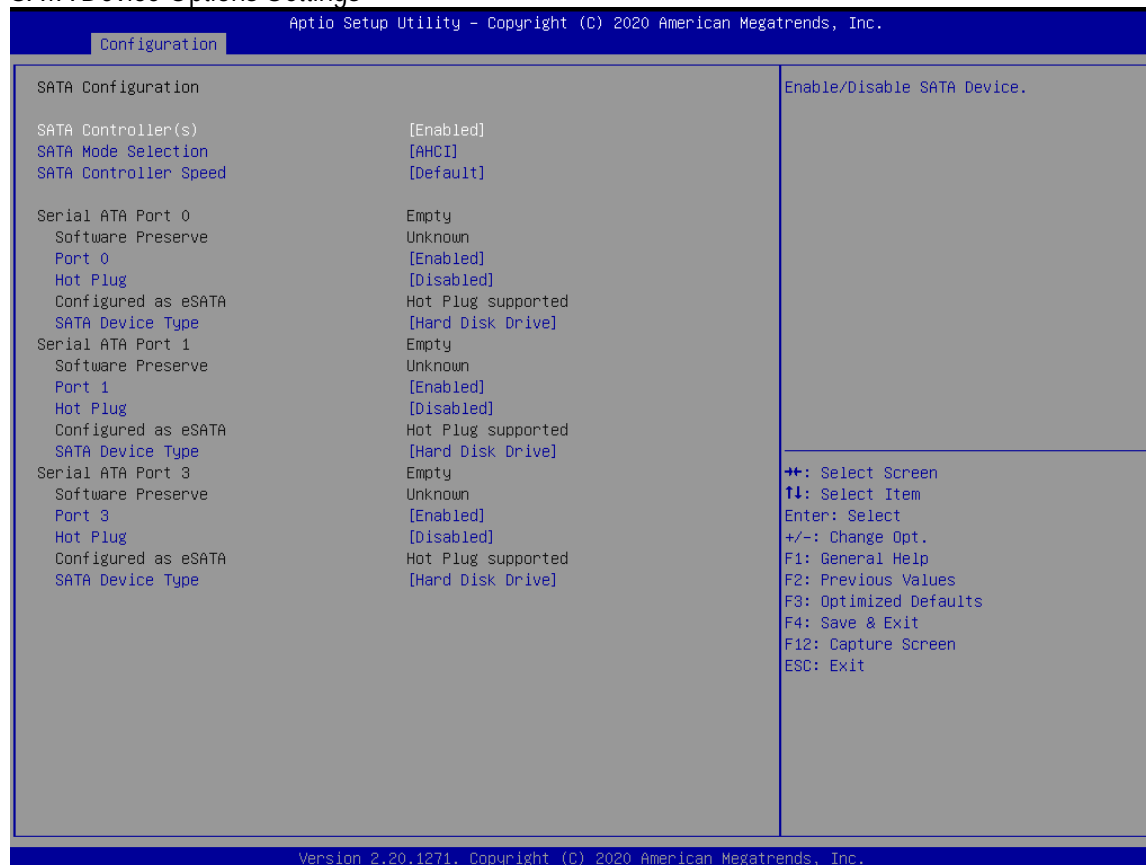
Feature	Description	Options
PCH LAN Controller	Enable/Disable onboard NIC	★ Enabled , Disabled
Wake on LAN Enable	Enable/Disable integrated LAN to wake the system.	★ Enabled , Disabled
Intel LAN I210 Controller	Enable or Disable the Intel LAN I210 Controller#1	★ Enabled , Disabled
Wake on LAN Enable	Enable/Disable integrated LAN to wake the system.	★ Enabled , Disabled
Launch UEFI PXE ROM	Enable/Disable UEFI Network Stack	★ Disabled, Enabled
Launch UEFI PXE ROM[Enable]		
Ipv4 PXE Support	Enable/Disable Ipv4 PXE boot support. If disable, IPv4 PXE boot support will not be available.	★ Enabled, Disabled
Ipv4 HTTP Support	Enable/Disable Ipv4 HTTP boot support. If disable, IPv4 HTTP boot support will not be available.	★ Enabled, Disabled
Ipv6 PXE Support	Enable/Disable Ipv6 PXE boot support. If disable, IPv6 PXE boot support will not be available.	★ Enabled, Disabled
Ipv6 HTTP Support	Enable/Disable Ipv6 HTTP boot support. If disable, IPv6 HTTP boot support will not be available.	★ Enabled, Disabled
IPSEC Certificate	Support to Enable/Disable IPSEC	★ Enabled, Disabled



	certificate for Ikev	
PXE boot wait time	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the values	★0
Media detect count	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the values.	★1

### SATA Configuration

#### SATA Device Options Settings

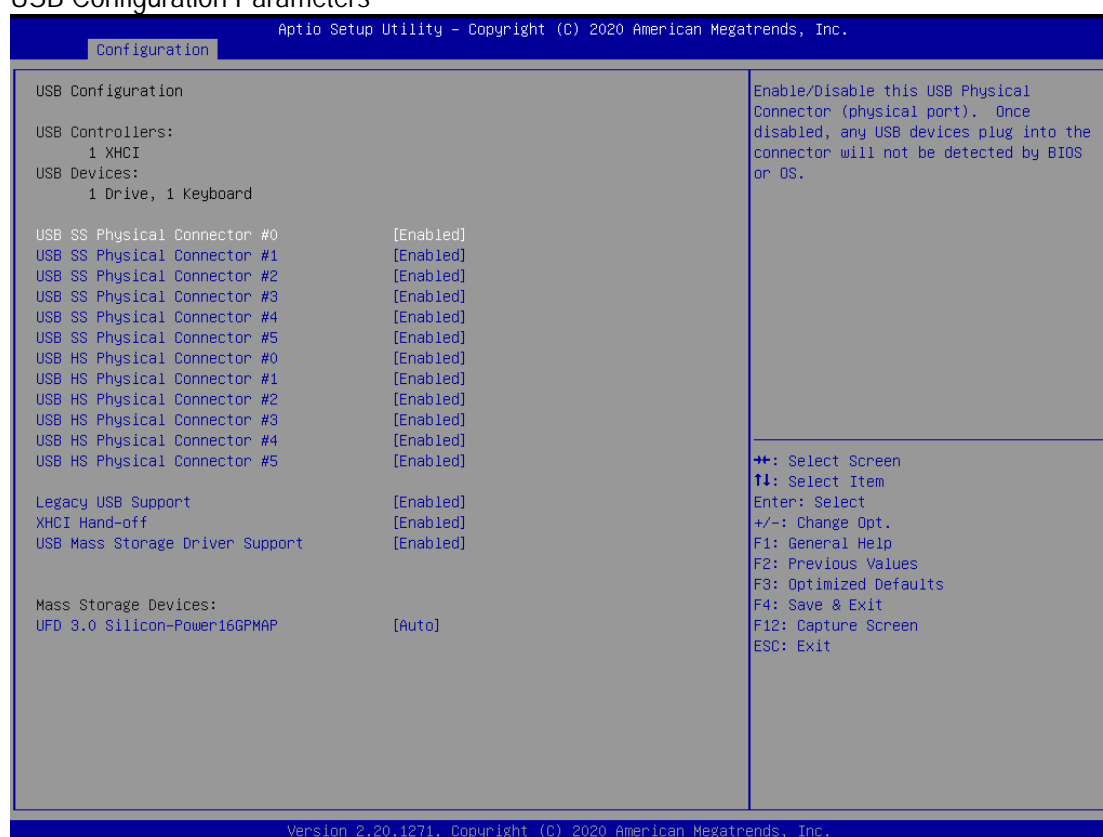


Feature	Description	Options
SATA Controller(s)	Enable/disable the SATA controllers.	★Enabled , Disabled
SATA Mode Selection	Determines how SATA controller(s) operate.	★AHCI, Intel RST Premium With Intel Optane System Acceleration
SATA Controller Speed	Indicates the maximum speed the SATA controller can support	★Default, Gen1, Gen2, Gen3
Serial ATA Port 0/1/3		

Port 0/1/3	Enable or Disable SATA Port	★Enabled ,Disabled
Hot Plug	Designates this port as Hot Pluggable	★Disabled, Enabled
SATA Device Type	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive	★Hard Disk Drive,Solid State Drive

## USB Configuration

### USB Configuration Parameters



Feature	Description	Options
USB SS/HS Physical Connector #0-5	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS	★Enabled ,Disabled
Legacy USB Support	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.	★Enabled , Disabled, Auto
XHCI Hand-off	This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver	★Enabled , Disabled
USB Mass	Enable/Disable USB Mass Storage Driver Support	★Enabled ,

Storage Driver Support	Disabled
------------------------	----------

### TPM Configuration

#### Trusted Computing Setting

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Configuration

<pre> TPM20 Device Found Firmware Version:      5.63 Vendor:                IFX  Security Device Support      [Enable] Active PCR banks           SHA-1,SHA256 Available PCR banks       SHA-1,SHA256  SHA-1 PCR Bank             [Enabled] SHA256 PCR Bank           [Enabled]  Pending operation          [None] Platform Hierarchy         [Enabled] Storage Hierarchy          [Enabled] Endorsement Hierarchy      [Enabled] TPM2.0 UEFI Spec Version   [TCG_2] Physical Presence Spec Version [1.3] TPM 20 InterfaceType      [IIS] Device Select              [Auto]                     </pre>	<p>Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.</p> <hr/> <p>                     ++: Select Screen                      ↑: Select Item                      Enter: Select                      +/-: Change Opt.                      F1: General Help                      F2: Previous Values                      F3: Optimized Defaults                      F4: Save &amp; Exit                      F12: Capture Screen                      ESC: Exit                 </p>
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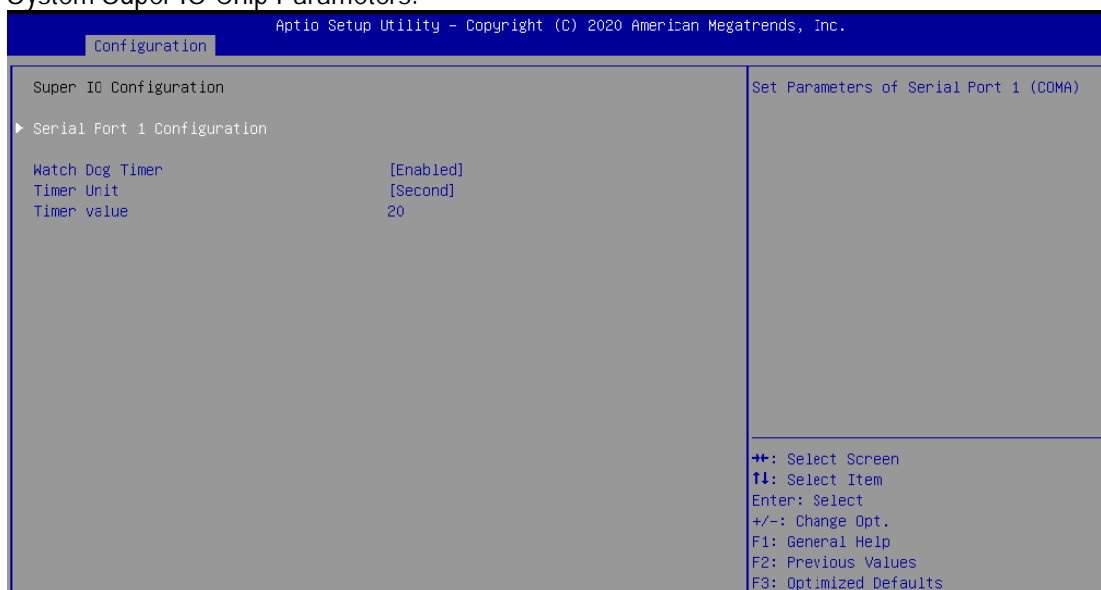
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Feature	Description	Options
<b>Security Device Support</b>	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A Interface will not be available.	★Enabled , Disabled
<b>SHA-1 PCR Bank</b>	Enables or Disables SHA-1 PCR Bank	★Enabled , Disabled
<b>SHA256 PCR Bank</b>	Enables or Disables SHA256 PCR Bank	★Enabled , Disabled
<b>Pending operation</b>	Schedule an Operation for the Security Device. Note: Your Computer will reboot during restart in order to change State of Security Device	★None, TPM Clear
<b>Platform Hierarchy</b>	Enables or Disables Platform Hierarchy	★Enabled , Disabled
<b>Storage Hierarchy</b>	Enables or Disables Storage Hierarchy	★Enabled , Disabled
<b>Endorsement Hierarchy</b>	Enables or Disables Endorsement Hierarchy	★Enabled , Disabled
<b>TPM2.0 UEFI Spec Version</b>	Select the TCG2 Spec Version Support TCG_1_2: the Compatible mode for Win8/Win10 TCG_2: Support new TCG2 protocol and event format	★TCG_2 ,TCG_1_2

	for Win10 or later	
<b>Physical Presence Spec Version</b>	Select to Tell O.S. to Support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3	★1.3,1.2
<b>Device Select</b>	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.	★Auto, TPM 1.2, TPM 2.0

### Super IO Configuration

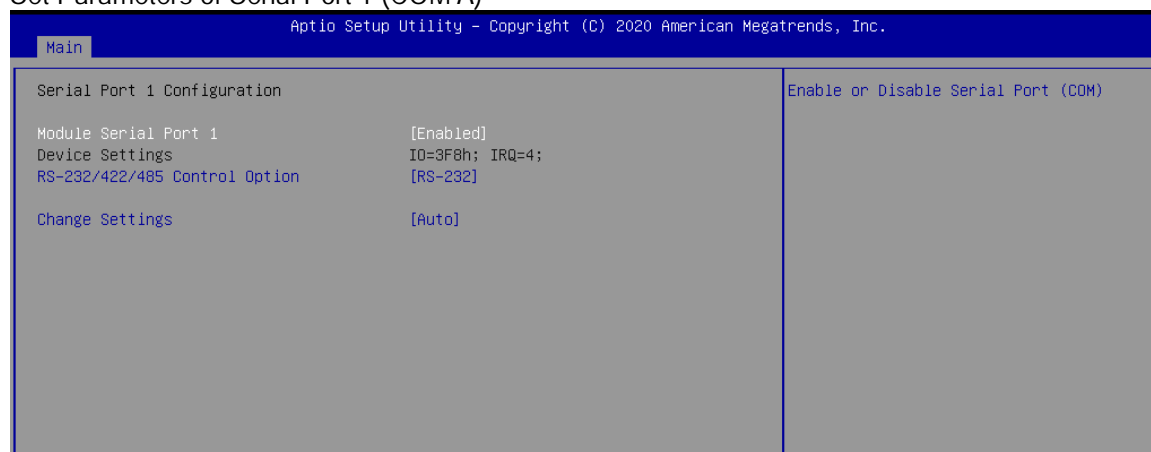
#### System Super IO Chip Parameters.



Feature	Description	Options
<b>Serial Port 1 Configuration</b>	Set Parameters of Serial Port1(COMA)	
<b>Watch Dog Timer</b>	Enable/Disable Watch Dog Timer	★Disabled, Enabled
<b>Watch Dog Timer[Enable]</b>		
<b>Timer Unit</b>	Select Timer count unit of WDT	★Second, Minute
<b>Timer value</b>	Set WDT Timer value seconds/minutes	★20

### Serial Port 1 Configuration

#### Set Parameters of Serial Port 1 (COM A)



Feature	Description	Options
Module Serial Port 1	Enable or Disable Serial Port (COM)	★Enabled, Disabled
RS-232/422/485 Control Option		★RS-232, RS-485 HALF DUPLEX, RS-422 FULL DUPLEX
Change Settings	Select an optimal settings for Super IO Device	★Auto ,IO=3F8h; IRQ=4, IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12 IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12 IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12

## H/W Monitor

### Monitor hardware status

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**Configuration**

Pc Health Status		Enable or Disable Smart CPU Fan.
Smart CPU Fan Function	[Enabled]	
CPU Fan Mode	[Thermal Cruise™ Mode]	
CPU Tolerance Temp	5	
CPU Start Target Temp	40	
CPU Full Target Temp	60	
CPU temperature	: +47 C	
Fan1 Speed	: N/A	
Vcore	: +0.813 V	
+3.3V	: +3.354 V	
+5V	: +5.145 V	
+12V	: +12.196 V	
VDIMM	: +1.203 V	

++: Select Screen

Feature	Description	Options
Smart CPU Fan Function	Enable or Disable Smart CPU Fan.	★ Disabled ,Enabled
Smart CPU Fan Function[Enable]		
CPU Fan Mode	Thermal Cruise™ Mode: The Fan was cruise controlled by temperature.	★ Thermal Cruise™ Mode
CPU Tolerance Temp	CPU Fan Tolerance Temperature	★ 5
CPU Start Target Temp	CPU Start Fan Target Temperature	★ 40
CPU Full Target Temp	CPU Full Fan Target Temperature	★ 60

### Serial Port Console Redirection

#### Serial Port Console Redirection

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**Configuration**

Serial Port Console Redirection		Console Redirection Enable or Disable.
COM0	Console Redirection [Disabled]	
▶ Console Redirection Settings		
COM1(Pci Bus0,Dev0,Func0) (Disabled)	Console Redirection Port Is Disabled	

++: Select Screen  
 ↑↓: Select Item  
 Enter: Select  
 +/-: Change Opt.  
 F1: General Help  
 F2: Previous Values  
 F3: Optimized Defaults  
 F4: Save & Exit  
 F12: Capture Screen  
 ESC: Exit

Feature	Description	Options
Console Redirection	Console Redirection Enable or Disable	★ Disabled, Enabled

### Console Redirection Settings

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Configuration

<pre> COMO Console Redirection Settings  Terminal Type                [ANSI] Bits per second              [115200] Data Bits                    [8] Parity                       [None] Stop Bits                    [1] Flow Control                 [None] VT-UTF8 Combo Key Support   [Enabled] Recorder Mode                [Disabled] Resolution 100x31           [Disabled] Putty KeyPad                 [VT100]                 </pre>	<p style="font-size: x-small;">Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.</p> <hr style="border: 0.5px solid black;"/> <p style="font-size: x-small;">                     ++: Select Screen                      ↑↓: Select Item                      Enter: Select                      +/-: Change Opt.                      F1: General Help                      F2: Previous Values                      F3: Optimized Defaults                      F4: Save &amp; Exit                      F12: Capture Screen                      ESC: Exit                 </p>
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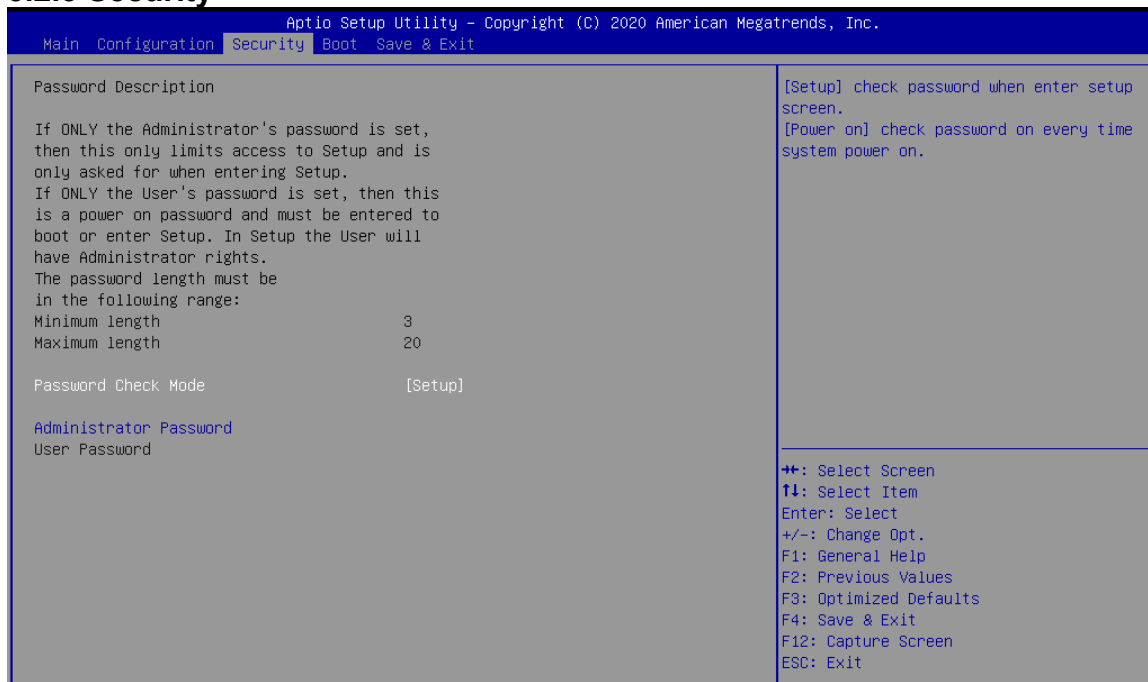
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Feature	Description	Options
Terminal Type	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color , function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	★ ANSI, VT100, VT100+, VT-UTF8
Bits per second	Select Serial port transmission speed. The speed must be matched on other side. Long or noisy lines may require lower speeds.	★ 115200, 9600, 19200, 38400, 57600
Data bits	Data bits	★ 8, 7
Parity	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.	★ None, Even, Odd, Mark, Space
Stop Bits	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.	★ 1,2
Flow Control	Flow control can prevent data loss from buffer	★ None, Hardware

	overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.	RTS/CTS
<b>VT-UTFB Combo Key Support</b>	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals	★Enabled, Disabled
<b>Recorder Mode</b>	With this mode enabled only text will be sent. This is to capture Terminal data.	★Disabled, Enabled
<b>Resolution 100x31</b>	Enables or disables extended terminal resolution	★Disabled, Enabled
<b>Putty KeyPad</b>	Select FunctionKey and KeyPad on Putty	★VT100, LINUX,XTERMR6, SCO,ESCN,VT400



### 3.2.3 Security



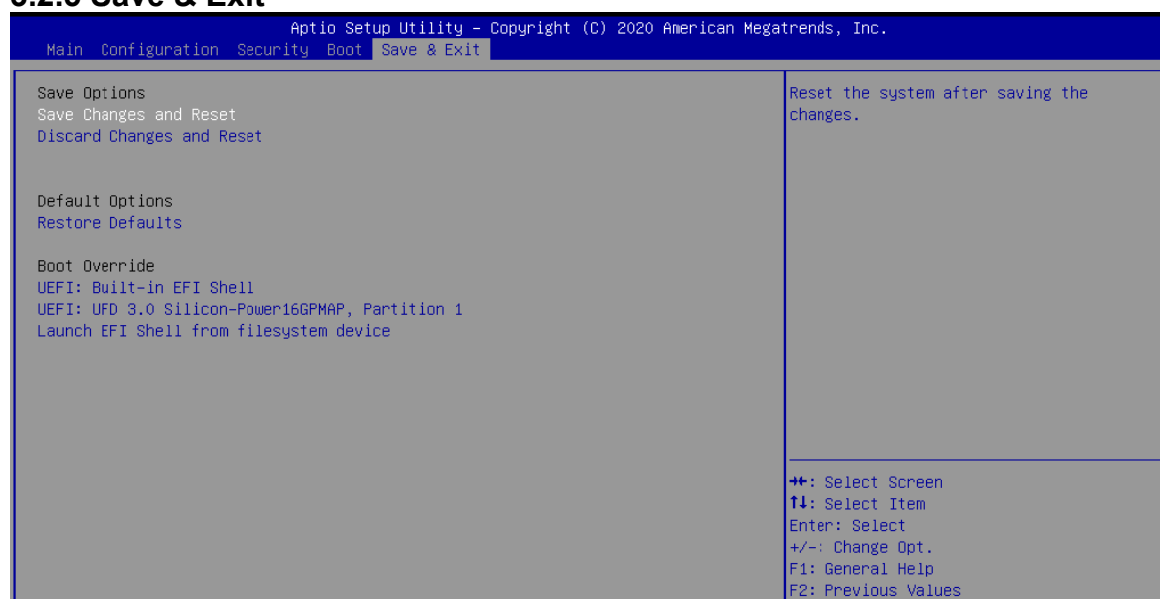
Feature	Description	Options
Password Check Mode	[Setup] check password when enter setup screen. [Power on] check password on every time system power on.	★ Setup, Power on
Administrator Password	Set Administrator Password	

### 3.2.4 Boot

Feature	Description	Options
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.	★1
Bootup NumLock State	Select the keyboard NumLock state	★On, Off
CSM Support	Enable/Disable CSM support	★Disabled, Enabled
CSM Support[Enable]		
Network	Controls the execution of UEFI and Legacy Network OpROM	★Legacy ,Do not launch, UEFI
Storage	Controls the execution of UEFI and Legacy Storage OpROM	★Legacy ,Do not launch, UEFI
Video	Controls the execution of UEFI and Legacy Video OpROM	★Legacy ,Do not launch, UEFI
Boot option filter	This option controls Legacy/UEFI ROMs priority.	★UEFI and Legacy, Legacy only, UEFI only
Full Screen LOGO	Enables or disables Quiet Boot option and Full Screen LOGO.	★Disabled, Enabled
Post Report	Post Report Support Enabled/Disabled	★Disabled, Enabled
Summary Screen	Summary Screen Support Enabled/Disabled	★Disabled, Enabled

Boot mode select	Select boot mode LEGACY/UEFI	★LEGACY,UEFI
Boot Option #1~6	Sets the system boot order	★Hard Disk, NVME,CD/DVD,SD, USB Device, Network, Disabled
UEFI Application Boot Priorities	Specifies the Boot Device Priority sequence from available UEFI Application	

### 3.2.5 Save & Exit



Feature	Description	Options
Save Changes andReset	Reset the system after saving the changes.	
Discard Changes and Reset	Reset system setup without saving any changes.	
Restore Defaults	Restore/Load Default values for all the setup options.	
UEFI: Built-in EFI Shell	Reset the system after saving the changes. (Boot option filter: UEFI only)	
Launch EFI Shell from filesystem device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.	

### 3.3 Troubleshooting

This section provides a few useful tips to quickly get ROBO-6912VG2AR running with success. This section will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

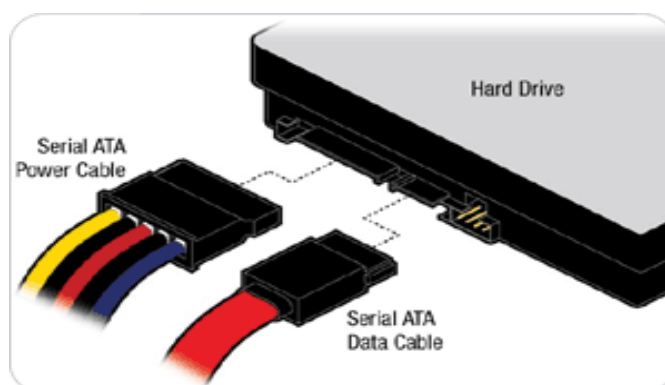
#### ■ Hardware Quick Installation

##### ATX Power Setting

Unlike other Single board computer, ROBO-6912VG2AR supports ATX only. Therefore, there is no other setting that needs to be set up. However, there are only two connectors that must be connected – J5 ATX 4 Pin Connector & 24 pins ATX Power Connector (On PICMG Backplane).

##### Serial ATA

Unlike IDE bus, each Serial ATA channel can only connect to one SATA hard disk at a time; The installation of Serial ATA is simpler and easier than IDE, because SATA hard disk does not require setting up Master and Slave, which can reduce mistake of hardware installation.



ROBO-6912VG2AR can support two (J10/J12) SATA interface (SATAIII, 6.0Gb/s) one mSATA (J22) interface on board; The SATA interface shall support 1.5Gb/3.0Gb & 6.0Gb operation per the SATA specification.

#### ■ BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on ATX power. DDR4 SO-DIMM Memory, keyboard, mouse, SATA hard disk, Mini-DP connector, power cable of the device, ATX accessories are good examples that deserve attention. With no assurance of properly and correctly accommodating these modules and devices, it is very possible to encounter system failures that result in malfunction of any device.

To make sure that you have a successful start with ROBO-6912VG2AR, it is recommended, when going with the boot-up sequence, to hit “delete ” or “ Esc”

key and enter the BIOS setup menu to tune up a stable BIOS configuration so that you can wake up your system far well.

**Loading the default optimal setting**

When prompted with the main setup menu, please scroll down to “Restore Defaults”, press “Enter” and select “Yes” to load default optimal BIOS setup. This will force your BIOS setting back to the initial factory configurations. It is recommended to do this so you can be sure the system is running with the BIOS setting that Portwell has highly endorsed. As a matter of fact, users can load the default BIOS setting at any time when system appears to be unstable in boot up sequence.

■ FAQ

**Information & Support**

**Question:** I forgot my password of system BIOS, what am I supposed to do?

**Answer:** You can switch off your power supply then find the JP5 on the ROBO-6912VG2AR SBC to set it from 1-2 short to 2-3 short and wait 5 seconds to clean your password then set it back to 1-2 short to switch on your power supply.



PIN No.	Description
1-2, Short	Normal
2-3, Short	Clear CMOS

## Chapter 4 Important Instructions

This chapter includes instructions which must be carefully followed when the fan-less embedded system is used.

### 4.1 Note on the Warranty

Due to their limited-service life, parts which, by their nature, are especially subject to wear are not included in the guarantee beyond the legal stipulations.

### 4.2 Exclusion of Accident Liability Obligation

Portwell, Inc. shall be exempt from the statutory accident liability obligation if users fail to abide by the safety instructions.

### 4.3 Liability Limitations / Exemption from the Warranty Obligation

In the event of damage to the system unit caused by failure to abide by the hints in this manual and on the unit (especially the safety instructions), Portwell, Inc. shall not be required to respect the warranty even during the warranty period and shall be free from the statutory accident liability obligation.

### 4.4 Declaration of Conformity

#### EMC

CE/FCC Class A

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This equipment may not cause harmful interference.
2. This equipment must accept any interference that may cause undesired operation.

#### **Applicable Standards:**

EN 55032: 2015 + A11: 2020

EN 55035: 2017 + A11: 2020

EN IEC 61000-3-2: 2019

EN IEC 62368-1:2020+A11:2020

EN 61000-3-3: 2013 + A1: 2019

BS EN 55032: 2015+A11:2020

BS EN 55035: 2017+A11:2020

BS EN IEC 61000-3-2:2019

BS EN IEC 62368-1:2020+A11:2020

BS EN 61000-3-3:2013+A1:2019

FCC 47 CFR PART 15 SUBPART B ANSI C63.4 : 2014

IECS-003: Issue 7

ANSI C63.4-2014 amended as per ANSI C63.4a-2017

## Chapter 5 Frequent asked question

### Question: How to update the BIOS file?

#### Answer:

Step1. Please visit web site of [Portwell download center](#)

Registering an account in advance is a must. (The E-Mail box should be an existing Company email address that you check regularly.)

Step2. Type in your User name and password and log in the download center.

Step3. Select **“Search download”** and type the keyword **“ROBO-6912VG2AR”**.

Step4. Find the **“BIOS”** page and download the ROM file and flash utility.

Step5. Unzip file to bootable USB flash drive which can boot to dos mode. Then execute the **“update.bat”** or **“update.efi”**. It will start to update Step BIOS. NOTE: Once you use “update.efi” to update BIOS, it must be get into the SHELL MODE to update BIOS

Step6. When you see the **“FPT Operation Passed”** message, which means the BIOS update processes finished. Please cut the AC power off and **wait for 10seconds** before powering on.

Step7. When you see the **“Programming success”** message, which means the BIOS update processes finished. Please cut the AC power off and **wait for 10 seconds** before powering on.

#### Note:

Please visit our Download Center to get the Catalog, User manual, BIOS, and driver files.

<https://www.portwell.com.tw/support-center/download-center/>

If you have other additional technical information or request which is not covered in this manual, please fill in the technical request form as below hyperlink.

<https://www.portwell.com.tw/support-center/technical-request/>

We will do our best to provide a suggestion or solution for you.

#### ■ Portwell Software Service

1. If you have customized requirements of BIOS, you can contact person of our company or branch.
2. If you have requirements of WDT、GPIO APP, you can contact our headquarter or branch, and we can render your assistance on developing.

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<a href="#">Shanghai Portwell</a>	E-mail: <a href="mailto:info@portwell.com.cn">info@portwell.com.cn</a>
<a href="#">Portwell Japan, Inc</a>	E-mail: <a href="mailto:info@portwell.co.jp">info@portwell.co.jp</a>
<a href="#">American Portwell Technology</a>	E-mail: <a href="mailto:info@portwell.com">info@portwell.com</a>
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