



ROBO-8116G2AR

PICMG 1.3 Single Host Board

Version 1.0

Revision History

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ROBO-8116G2AR User's Guide

ROBO-8116G2AR

R1.0	Preliminary

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Preface

This user's guide provides information about the components, features, connectors and BIOS Setup menus available on the ROBO-8116G2AR. This document should be referred to when designing PICMG 1.3 application. The other reference documents that should be used include the following:

- ✧ Intel Alder Lake-S Design Guide
- ✧ Intel Alder Lake-S Specification

Please contact Portwell Sales Representative for above documents.

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Notice

SBC Handling and Installation Notice

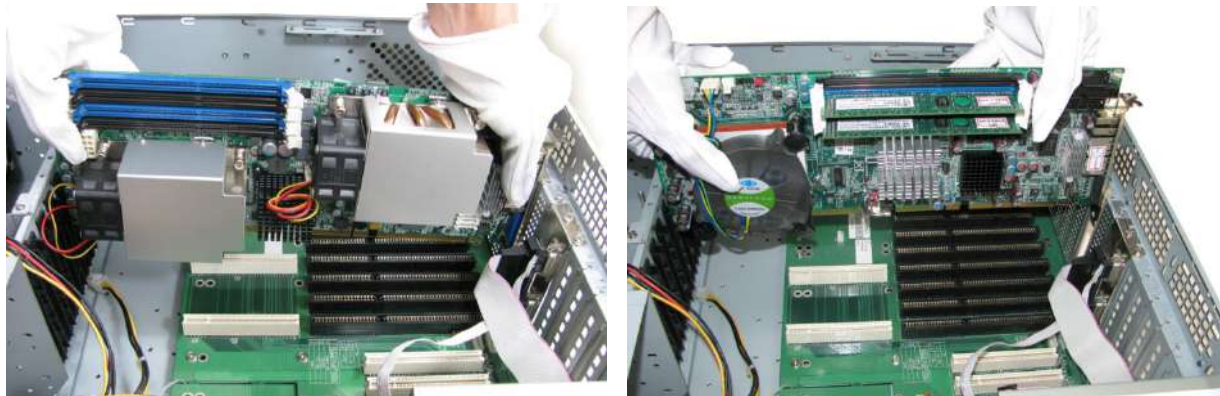
■ Handling and Installing SBC

Caution: *Do not just hold any single side of the SBC; hold evenly on both sides!*

- Heavy processor cooler may bend the SBC when SBC being held just on one side.
- The bending may cause soldering or components damaged.



ROBO-8116G2AR



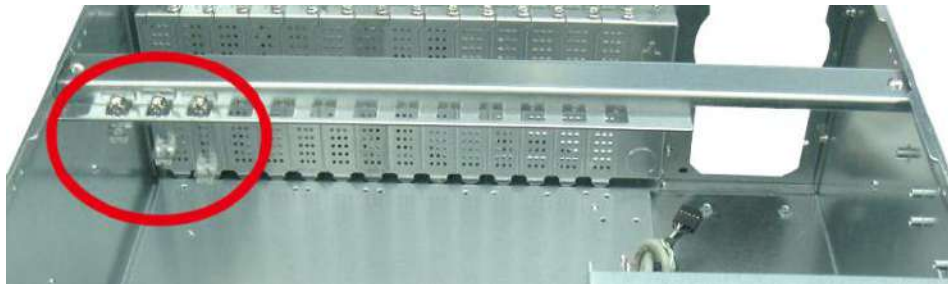
■ Fix your SBC in System

Caution: Suggest your S.I or vendor to use a metal bracket to hold/fix the desktop or server grade SBC to avoid the vibration damage during transportation. Heavy processor cooler may bend the SBC when systems are during transportation without any holder.

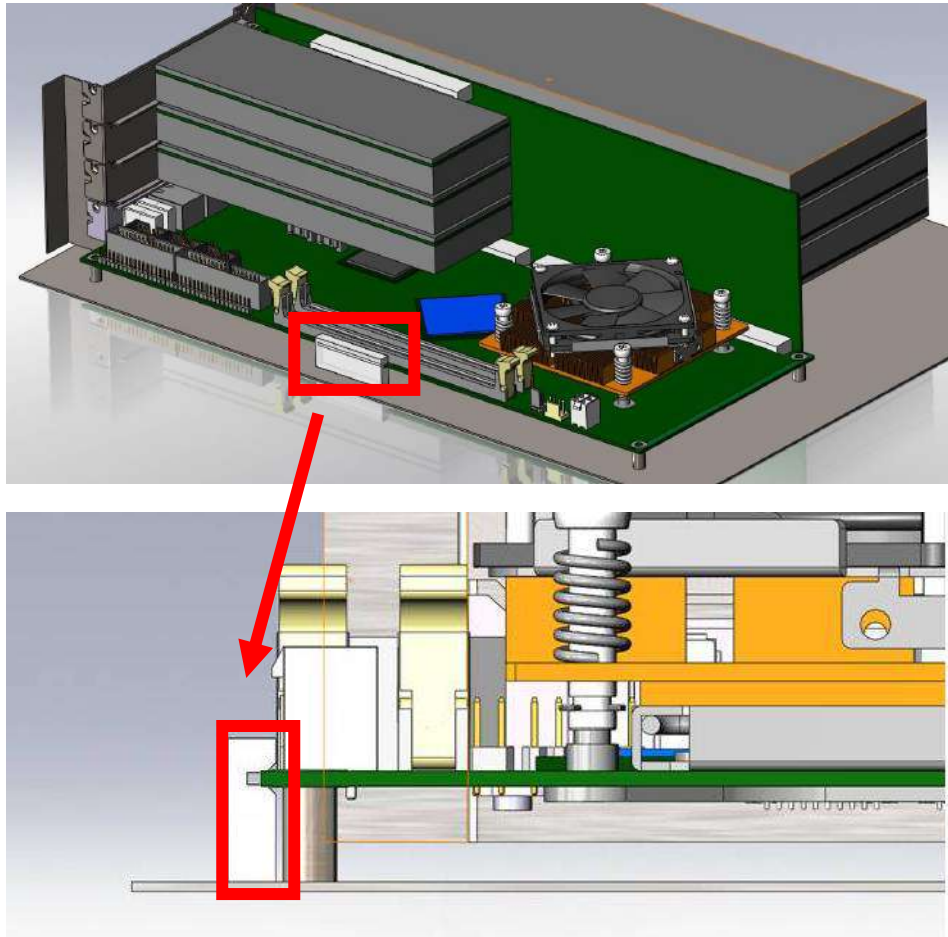
Example:

- 4U chassis :

→ Use L type metal or plastic or rubber bracket to hold SBC.



- 2U or 1U chassis: a mental bracket on the bottom of chassis to balance and support SBC from bending.



1 Introduction

ROBO-8116G2AR, a PICMG 1.3 Single Host Board (SHB) with the latest Intel 12th Generation Core processors supported Core i3/i5/i7/i9 processors. Portwell's ROBO-8116G2AR implements flexible PCI Express Gen 5 expansion by one PCI Express x16 (or two PCI Express x 8) with dedicated processor sku, which is ideal for a range of applications, such as Industrial Automation, Digital Signage, and Medical.

ROBO-8116G2AR adopt Intel R680E and Q670E PCH. Providing up to 64GB DDR5 4800 So-DIMM system memory supported with ECC or non-ECC option. ROBO-8116G2AR with the 12th generation Intel® processor family features and integrated, enhanced graphics engine which provides significant 3D performance, up to DirectX® 12. It supports triple display function via DVI-D ,HDMI and DP. Rich I/O functions are also provided by ROBO-8116G2AR single host board, which is 1x USB 3.2(Gen2x2_ Type C), 2x USB 3.2(Gen2) , 2x USB 3.2(Gen1), 8x USB 2.0 (4 ports via backplane), 4x SATA III ports (dual ports via backplane), 2x RS232 ports, 2x smart COM ports which select RS232/422/485 mode by bios adjustment, and dual Intel GbE LAN ports. It also supports on board TPM 2.0 to secure your applications.

For the industries who already have large install based systems, ROBO-8116G2AR not only provides a way to upgrade to use the latest Intel processors, but also supporting legacy elements such as four PCI expansion, four Serial ports.

2 Specifications

Main Processor	◆ Intel® Alder Lake-S Core™ i Processors
System BIOS	◆ AMI UEFI BIOS
Main Memory	◆ Up to 64 GB ECC or non-ECC DDR5 on two So-DIMM sockets. Supports dual channel DDR5 4800 MHz SDRAM
Graphics	◆ Controller: Intel® GfX Gen 12, HD graphics 730 /770 ◆ DP: Resolution up to 4096 x 2160 ◆ DVI-D: Resolution up to 1920 x 1200 ◆ HDMI: Resolution up to 4096 x 2160
Expansion Interface	◆ From CPU: 1x PCI Express x16 or 2x PCI Express x8 by BIOS setting 1x PCI Express x4(Gen4) via B2B card support connect with Backplane ◆ From PCH: 1x PCI Express x4 or 4x PCI Express x1 by different bios support 1x PCI Express x4(Gen4) & 1x PCI Express x4 (Gen3) via B2B card connect with Backplane
SATA Interface	◆ Four SATA III ports (SATA 6Gb/s), dual ports via backplane
Input/Output	◆ Serial Ports: 2x RS-232 & 2x RS-232/422/485 selectable by bios ◆ USB Port: 1x USB 3.2(Gen2x2) ,2x USB 3.2(Gen2) on bracket, 2x USB 3.2(Gen1) board header & 8x USB 2.0 (4 ports via backplane) ◆ GPIO connector: 8GPI + 8GPO ◆ Audio Interface: Mic-In / Line-Out / Line-in (on-board header)
Ethernet	◆ Supports dual 100/1000/2500 Mbps Ethernet port (s) via PCI Express x1 interface by Intel WGI255LM controller ◆ Dual RJ45 connector on bracket
TPM	◆ On-board TPM 2.0 support (TPM IC: Infineon SLB9670TT2.0)

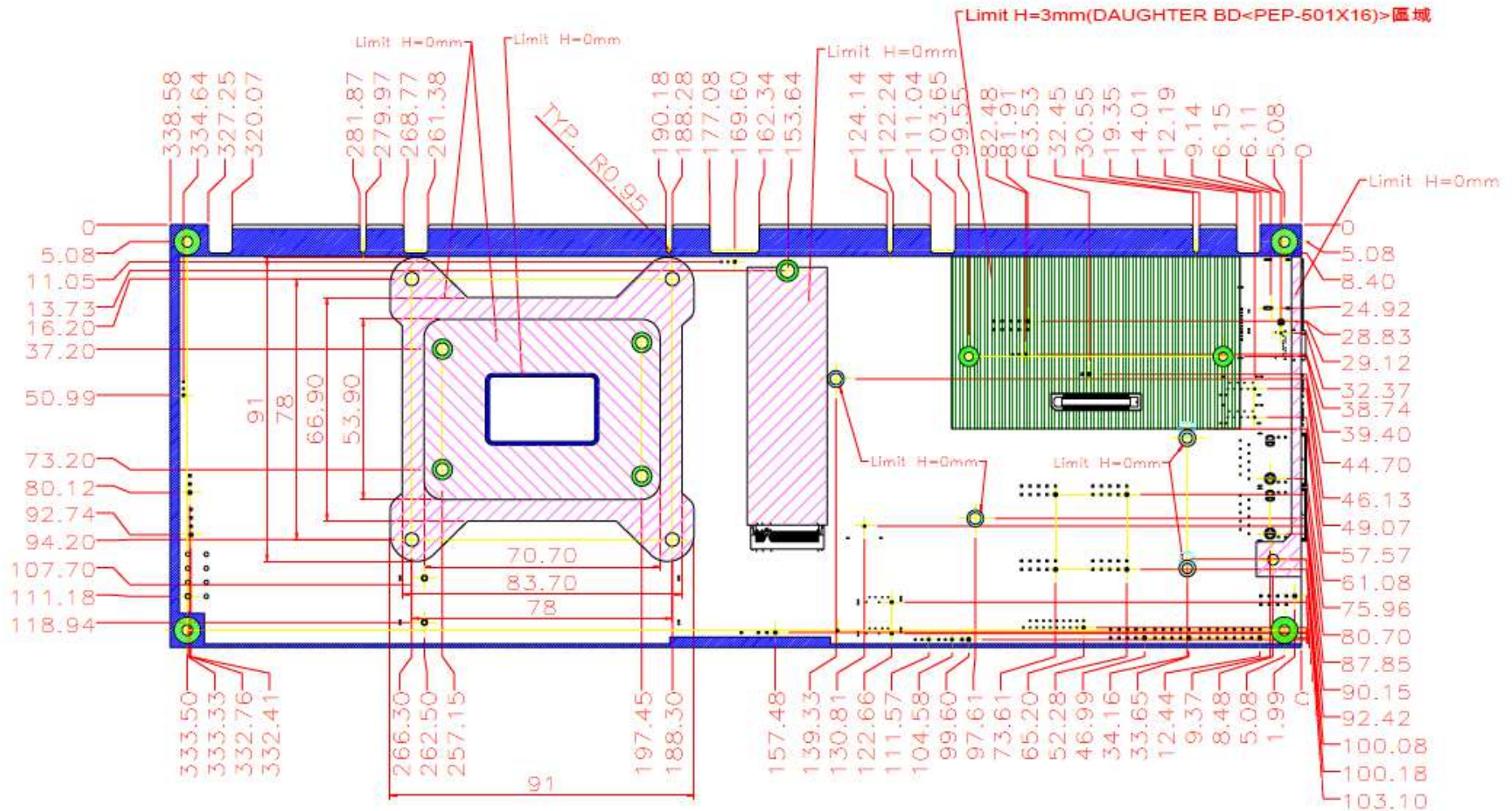
High Drive GPIO	◆ One pin-header for GPIO (8bit in & 8bit out)
SMBus	ROBO-8116 series reserve SMBus address (F0, F2, F4, F6, B0, B2) for PBPE-11P4 PCIe slot use ◆ F0, F2, F4, F6 for PBPE-11P4_J5,J6 slot ◆ B0, B2 for PBPE-11P4_J1,J2,J3,J4 slot
Mechanical and environmental specifications	◆ Operating temperature: 0 ~ 60° C ◆ Storage temperature:-20 ~ 80° C ◆ Humidity: 5 ~ 90% non-condensing ◆ Power supply voltage: ATX ◆ Board size: 338.5mm x 126.39mm, 13.33" (L) x 4.98" (W)

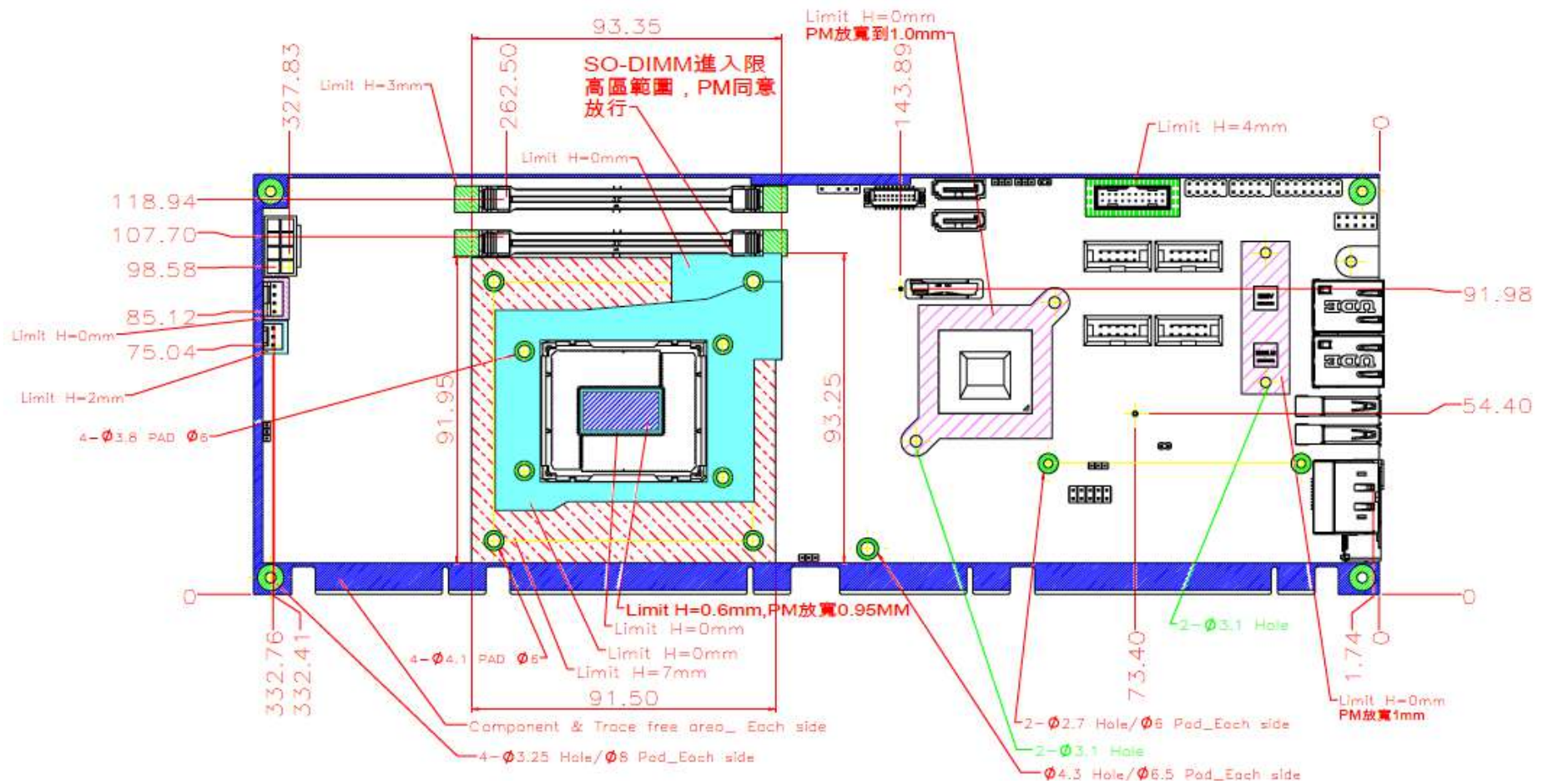
2.1 Supported Operating Systems

The ROBO-8116G2AR supports the following operating systems.

- ✧ Windows 10 IoT Enterprise 2021 LTSC
- ✧ Windows Server 2022 (Only Intel® Core™i5-i9 Processors with R680E)
- ✧ Ubuntu, Redhat Enterprise, WR Linux
- ✧ Yocto Project BSP tool-based embedded Linux distribution1 (64-bit)
- ✧ Wind River VxWorks 7.0

2.2 Mechanical Dimensions





2.3 Power Consumption

Test Configuration	
CPU Type	12th Gen Intel® Core™ i5-12400 @ 2.50GHz L3:18MB
SBC BIOS	Portwell , Inc. ROBO-8116VG2AR BIOS Rev.:0.0.8 (05042022)
Memory	Innodisk 32GB DDR5 4800 SODIMM (SEC 149 K4RAH08 6VB BCQK)
Graphic Card	Intel(R) UHD Graphics 730
Graphic Driver	Intel(R) UHD Graphics 730 , Version:30.0.101.1960
LAN Card #1	Intel(R) Ethernet Controller (3)I225-LM
LAN Driver #1	Intel(R) Ethernet Controller (3)I225-LM , Version:1.0.2.14
LAN Card #2	Intel(R) Ethernet Controller (3)I225-LM#2
LAN Driver #2	Intel(R) Ethernet Controller (3)I225-LM#2 , Version:1.0.2.14
Audio Card	HD Audio Driver for Display Audio
Audio Driver	HD Audio Driver for Display Audio , Version:30.0.101.1960
Chip Driver	Intel(R) Chipset Device Software , Version:3.1.7.143
USB 3.0 Driver	Intel(R) USB3.20 eXtensible Host Controller – 120 (Microsoft) Version:10.0.19041.1566
EC Version	0.2 (01/10/2022)
Hard Drive	SEAGATE (ST1000VX005-2EZ102)
Power Supply	Portwell-PLUTO-D3501PJ
Backplane	B930Q5217AA1PBPE10P2821(S/N : 2215A009297)
Boot Mode Select	UEFI

Power consumption		
ATX:		
Item	Power ON	Full Loading 10Min
CPU +12V	2.63A	7.78A
System +12V	0.77A	1.21A
System +3.3V	0.84A	0.93A
System +5V	0.51A	0.29A
System+ Device +12V	1.66A	0.74A
System+ Device +5V	0.78A	1.13A
CPU +Device +12V	2.86A	7.02A
Full USB 2.0 port Loading Test	4.70V/ 0.45A	
Full USB 3.0 port Loading Test	4.62V/ 1.0A	

2.4 Environmental Specifications

Storage Temperature : -20~80°C

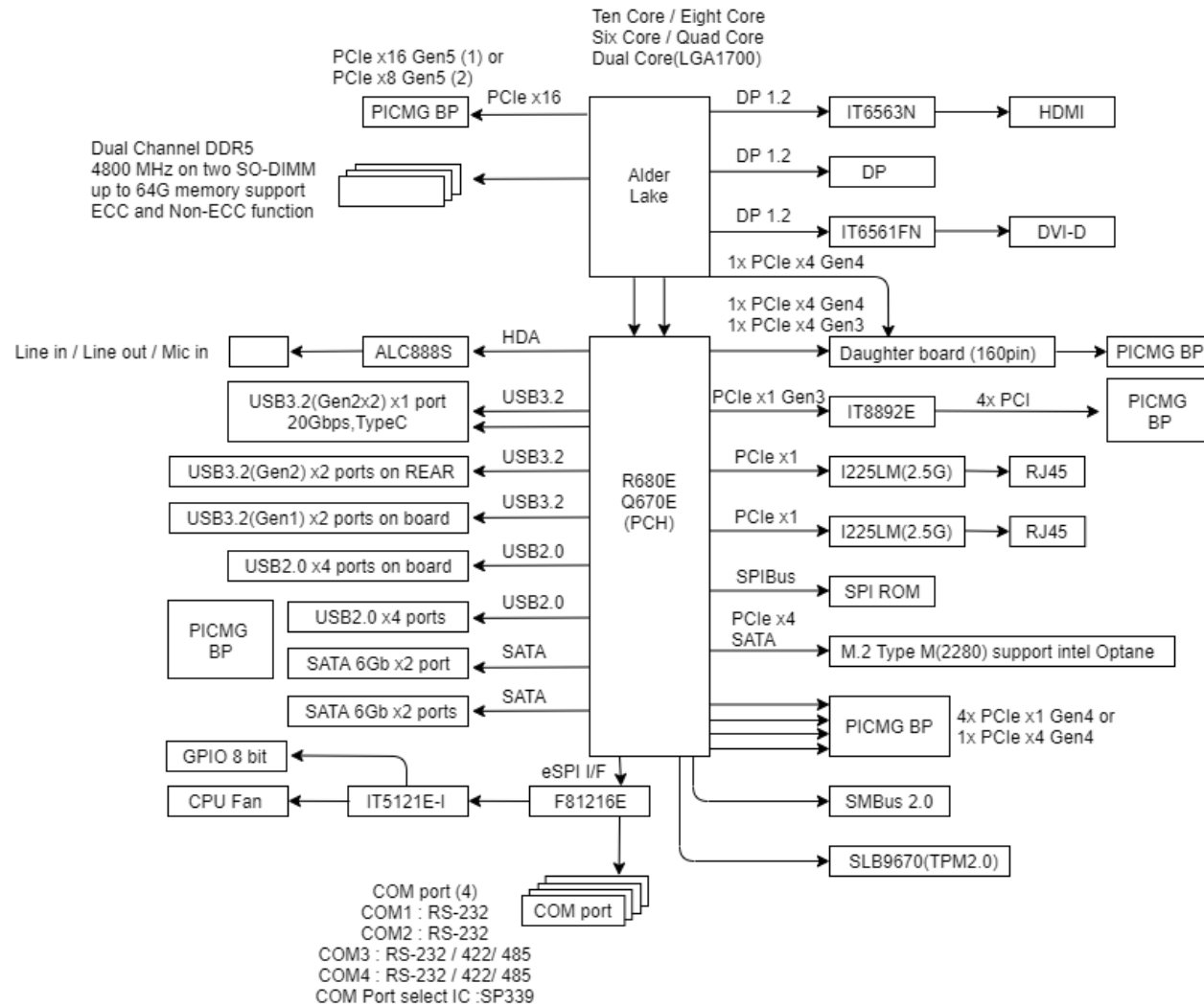
Operation Temperature : 0~60°C

Storage Humidity : 5~90%

Operation Humidity: 10~90%

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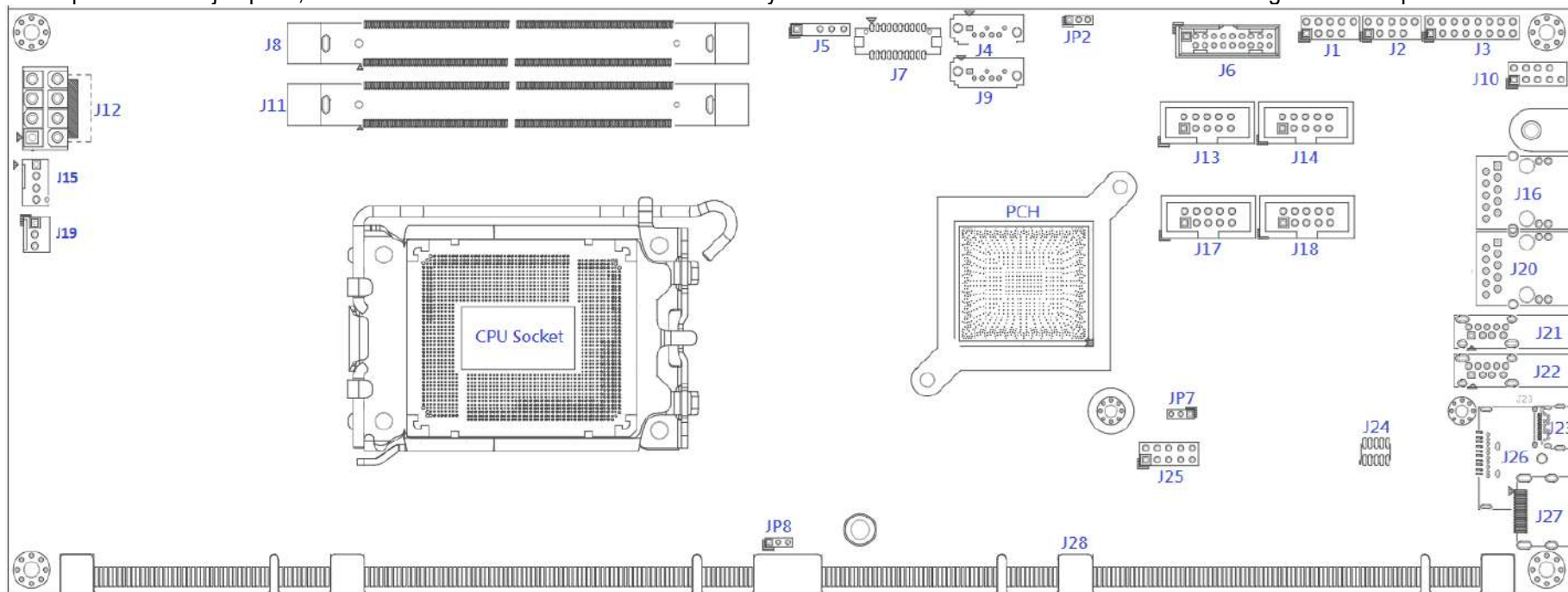
Block Diagram



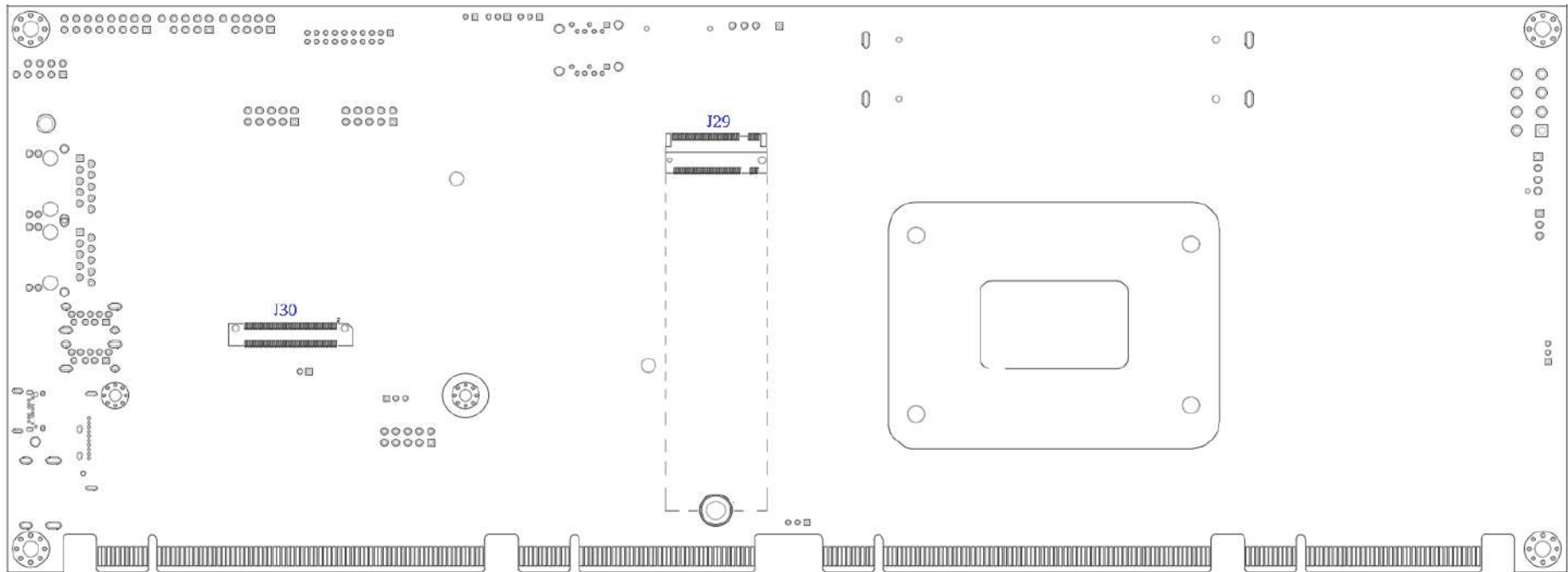
3 Hardware Configuration

3.1 Jumpers and Connectors

This chapter indicates jumpers', headers' and connectors' locations. Users may find useful information related to hardware settings in this chapter.



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3.2 Jumpers Settings

For users to customize ROBO-8116G2AR's features. In the following sections, Short means covering a jumper cap over jumper pins; Open or N/C (Not Connected) means removing a jumper cap from jumper pins. Users can refer to Figure 1 for the Jumper allocations.

Jumper Table

The jumper settings are schematically depicted in this manual as follows:

Jump Function List:

Header	Function	Remark
JP2	RTC & CMOS CLR Jumper	
JP7	AT & ATX MODE	
JP8	CPU PCIe16 & x8x2 Config	

JP2: RTC CLR Jumper



PIN No.	Signal Description
1-2	CLR_RTC
3	NC
2-3	NORMAL_Default

JP7: AT & ATX MODE



PIN No.	Signal Description
1-2	AT MODE
2-3	ATX MODE_Default

JP8: CPU PCIEx16 & x8x2 Config



PIN No.	Signal Description
1-2	CPU PCIE x8 x2
2-3	CPU PCIE x16_Default

3.3 Connector Settings

Connector Allocation

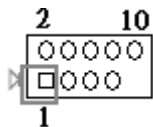
I/O peripheral devices are connected to the interface connectors

Connector Function List

Connector	Function	Remark
J1	USB2.0 Header	USB2.0 Port9 & 10
J2	USB2.0 Header	USB2.0 Port7 & 8
J3	Front panel Header	
J4	SATA3 Connector	
J5	SMBus Header	
J6	USB3.0 Box Header	
J7	DVI Connector	
J8	DDR5 SODIMM	Channel B
J9	SATA3 Connector	
J10	Audio Header	
J11	DDR5 SODIMM	Channel A
J12	ATX 8pin +12V Power Connector	
J13	COM1 Connector	
J14	COM2 Connector	
J15	CPU FAN Connector	
J16	RJ45 Connector/2.5G	LAN_i225LM
J17	COM4/485/422 Connector	
J18	COM3/485/422 Connector	
J19	System FAN Connector	

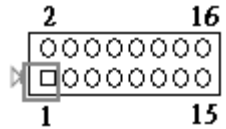
J20	RJ45 Connector/2.5G	LAN_i225LM
J21	USB.30 TYPEA connector	USB3.0 Port1
J22	USB.30 TYPEA connector	USB3.0 Port2
J23	USB TYPEC Connector	USB3.2 Gen2x2
J24	Port 80 Header	
J25	GPIO Header	
J26	DP Connector	
J27	HDMI Connector	
J28	PICMG1.3 Gold Finger	
J29	M.2 Connector/M Key	Only support PCIe x4
J30	PCIE B2B Connector	

J1/J2:USB2.0 header



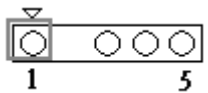
PIN No.	Signal Description	PIN No.	Signal Description
1	5V Dual	2	5V Dual
3	USB-	4	USB-
5	USB+	6	USB+
7	Ground	8	Ground
	Key (no pin)	10	N/C

J3: Front panel Header



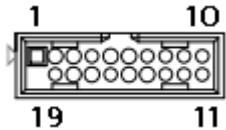
PIN No.	Signal Description	PIN No.	Signal Description
1	PWR_LED(+)_5VDual	2	Speaker(+)_+5V
3	PWR_LED(-)	4	N/C
5	J22 LAN1_ACT(+)	6	N/C
7	J22 LAN1_ACT(-)	8	Speaker(-)
9	J21 LAN2_ACT(-)	10	GND
11	J21 LAN2_ACT(+)	12	PWRBTN#
13	HDD_LED(+)_+3.3V	14	RSTBTN#
15	HDD_LED(-)	16	GND

J5: SMBus Header



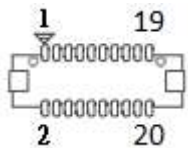
Pin No.	Signal Description
1	SMBus_CLK
2	N/C
3	Ground
4	SMBus_DAT
5	+5V

J6: USB3 Box Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	5V Dual	2	USB3_RX4_DN
3	USB3_RX4_DP	4	Ground
5	USB3_TX4_DN	6	USB3_TX4_DP
7	Ground	8	USB2_DN3
9	USB2_DP3	10	Ground
11	USB2_DP2	12	USB2_DN2
13	Ground	14	USB3_TX3_DP
15	USB3_TX3_DN	16	Ground
17	USB3_RX3_DP	18	USB3_RX3_DN
19	5V Dual	20	N/C

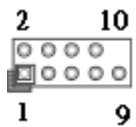
J7: DVI Connector



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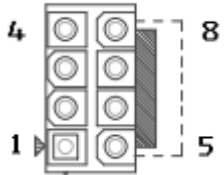
PIN No.	Signal Description	PIN No.	Signal Description
1	DVI_D2_SHIELD	2	DVI_CLOCK_SHIELD
3	DVI_D2_DP	4	DVI_CLOCK_DP
5	DVI_D2_DN	6	DVI_CLOCK_DN
7	DVI_D1_SHIELD	8	GND
9	DVI_D1_DP	10	+5V
11	DVI_D1_DN	12	+5V
13	DVI_D0_SHIELD	14	DVI_HPD
15	DVI_D0_DP	16	DVI_DDC_CLK
17	DVI_D0_DN	18	DVI_DDC_DATA
19	GND	20	GND

J10: Audio Header



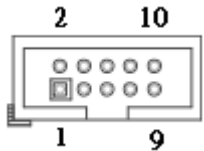
PIN No.	Signal Description	PIN No.	Signal Description
1	MIC	2	Analog Ground
3	Line-in Left	4	Analog Ground
5	Line-in Right	6	Analog Ground
7	Line-out Left	8	Analog Ground
9	Line-out Right	10	N/C

J12: ATX 8pin +12V Power Connector



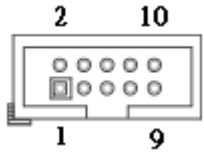
PIN No.	Signal Description	PIN No.	Signal Description
1	Ground	2	Ground
3	Ground	4	Ground
5	+12V	6	+12V
7	+12V	8	+12V

J13: COM1 Connector



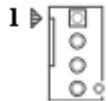
PIN No.	Signal Description	PIN No.	Signal Description
1	DCD (Data Carrier Detect)	2	RXD (Receive Data)
3	TXD (Transmit Data)	4	DTR (Data Terminal Ready)
5	GND	6	DSR (Data Set Ready)
7	RTS (Request to Send)	8	CTS (Clear to Send)
9	RI (Ring Indicator)	10	NC

J14: COM2 Connector



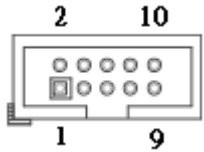
PIN No.	Signal Description	PIN No.	Signal Description
1	DCD (Data Carrier Detect)	2	RXD (Receive Data)
3	TXD (Transmit Data)	4	DTR (Data Terminal Ready)
5	GND	6	DSR (Data Set Ready)
7	RTS (Request to Send)	8	CTS (Clear to Send)
9	RI (Ring Indicator)	10	NC

J15: CPU FAN Connector



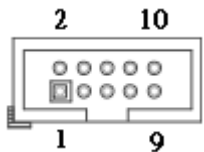
Pin No.	Signal Description
1	Ground
2	+12V
3	Fan Speed output
4	Fan Out control

J17: COM4/485/422 Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	DCD# / DT-	2	RXD# / DT+
3	TXD# / 422R+	4	DTR# / 422R-
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI#	10	NC

J18: COM3/485/422 Connector

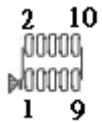


PIN No.	Signal Description	PIN No.	Signal Description
1	DCD# / DT-	2	RXD# / DT+
3	TXD# / 422R+	4	DTR# / 422R-
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI#	10	NC

J19: SYSTEM FAN Connector

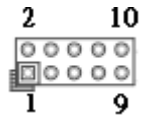
Pin No.	Signal Description
1	Ground
2	Fan speed control
3	Fan on/off output

J24: Port 80 Header



PIN No.	Signal Description	PIN No.	Signal Description
1	LED_A	2	+3.3V
3	LED_B	4	LED_E
5	LED_C	6	LED_F
7	LED_D	8	LED_G
9	DEG_N	10	GND

J25: GPIO Header



PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	GND	10	+5V

J30: PCIE B2B Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	CPU_PCIE_P0_RX_DP	4	CPU_PCIE_P0_TX_DP
5	CPU_PCIE_P0_RX_DN	6	CPU_PCIE_P0_TX_DN
7	GND	8	GND
9	CPU_PCIE_P1_RX_DP	10	CPU_PCIE_P1_TX_DP
11	CPU_PCIE_P1_RX_DN	12	CPU_PCIE_P1_TX_DN
13	GND	14	GND

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15	CPU_PCIE_P2_RX_DP	16	CPU_PCIE_P2_TX_DP
17	CPU_PCIE_P2_RX_DN	18	CPU_PCIE_P2_TX_DN
19	GND	20	GND
21	CPU_PCIE_P3_RX_DP	22	CPU_PCIE_P3_TX_DP
23	CPU_PCIE_P3_RX_DN	24	CPU_PCIE_P3_TX_DN
25	GND	26	GND
27	PCH_PCIE_P1_RX_DP	28	PCH_PCIE_P1_TX_DP
29	PCH_PCIE_P1_RX_DN	30	PCH_PCIE_P1_TX_DN
31	GND	32	GND
33	PCH_PCIE_P2_RX_DP	34	PCH_PCIE_P2_TX_DP
35	PCH_PCIE_P2_RX_DN	36	PCH_PCIE_P2_TX_DN
37	GND	38	GND
39	PCH_PCIE_P3_RX_DP	40	PCH_PCIE_P2_TX_DP
41	PCH_PCIE_P3_RX_DN	42	PCH_PCIE_P2_TX_DN
43	GND	44	GND
45	PCH_PCIE_P4_RX_DP	46	PCH_PCIE_P3_TX_DP
47	PCH_PCIE_P4_RX_DN	48	PCH_PCIE_P3_TX_DN
49	GND	50	GND
51	PCH_PCIE_P21_RX_DP	52	PCH_PCIE_P21_TX_DP
53	PCH_PCIE_P21_RX_DN	54	PCH_PCIE_P21_TX_DN
55	GND	56	GND
57	PCH_PCIE_P22_RX_DP	58	PCH_PCIE_P22_TX_DP
59	PCH_PCIE_P22_RX_DN	60	PCH_PCIE_P22_TX_DN
61	GND	62	GND
63	PCH_PCIE_P23_RX_DP	64	PCH_PCIE_P23_TX_DP
65	PCH_PCIE_P23_RX_DN	66	PCH_PCIE_P23_TX_DN
67	GND	68	GND

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69	PCH_PCIE_P24_RX_DP	70	PCH_PCIE_P24_TX_DP
71	PCH_PCIE_P24_RX_DN	72	PCH_PCIE_P24_TX_DN
73	GND	74	GND
75	PEG_P1_CLK_DP	76	PCH_P3_CLK_DP
77	PEG_P1_CLK_DN	78	PCH_P3_CLK_DN
79	GND	80	GND

4 Signal Descriptions

4.1 Watch Dog Signal

```
#include <stdio.h>
#include <unistd.h>
#include <stdint.h>
#include <sys/io.h>

#define EC_IOSpace 0xE300 // EC IO Space Base Addr = 0xE000
                        // EC Internal Offset = 0x300
                        // EC IO Address = Base Addr + Internal offset

#define WDTCFG      0x06 // WDT Timer Control Register
                        // Bit 6: Write 1 to clear WDT pin event (COMe Only)
                        // Bit 4: 1: Driving WDT pin to Carrier (COMe Only)
                        //      0: System Reset
                        // Bit 1: 1: Min Mode
                        //      0: Second Mode
                        // Bit 0: 1: Enable WDT

#define WDTMIN      0x07 // WDT Timer Counter Register (Minute)
#define WDTSEC      0x08 // WDT Timer Counter Register (Second)
int Read_EC_SRAM(int offset)
```

```
{
    int Temp;
    Temp = inb_p(EC_IOSpace+offset);
    return Temp;
}

void Write_EC_SRAM(int offset, int value)
{
    outb_p(value,EC_IOSpace+offset);
}

//-----
// Reset WDT pin status
//-----
int WDT_Reset()
{
    int Temp;

    Temp = Read_EC_SRAM(WDTCFG);
    Write_EC_SRAM(WDTCFG,(Temp|0x40)); // Bit 6: Write 1 to clear WDT pin event
}

//-----
// Main Function
//-----
int main (int argc, char ** argv)
```

```
{
    int Temp;

    // Initial
    if(iopl(3)!=0){
        printf("error: I/O Permission Error!\n");
        return 1;
    }

    // Enable WDT 10min, 20sec
    Write_EC_SRAM(WDTSEC,5);      // 5 Sec
    Write_EC_SRAM(WDTMIN,1);      // 1 min

    // Enable WDT 5sec and WDT pin mode
    Temp = Read_EC_SRAM(WDTCFG);
    Write_EC_SRAM(WDTCFG,(Temp|0x13)); // Bit4: 1: Driving WDT pin
                                     // BIT1: 1: Minute Mode
                                     // Bit0: 1: Enable WDT

    // Check Current WDT status
    while((Read_EC_SRAM(WDTCFG)&0x01) != 0)
    {
        printf("WDT Counting: %d M., %d S!\n",Read_EC_SRAM(WDTMIN),Read_EC_SRAM(WDTSEC));
    }
}
```

```
}
```

4.2 GPIO Signal

```
#include <stdio.h>
#include <unistd.h>
#include <stdint.h>
#include <sys/io.h>

#define EC_IOSpace 0xE300 // EC IO Space Base Addr = 0xE000
                        // EC Internal Offset = 0x300
                        // EC IO Address = IO Space Base Addr + Internal offset

#define GPCR 0x2B      // GPIO Control Register, Bit7 = GPO3, Bit6 = GPO2, ...,
                        //                      Bit3 = GPI3, Bit2 = GPI2, ...,
                        // 0: Output; 1: Input

#define GPDR 0x2C      // GPIO Status Register, Bit7 = GPO3, Bit6 = GPO2, ...,
                        //                      Bit3 = GPI3, Bit2 = GPI2, ...,
                        // 0: Low; 1: High

int Read_EC_SRAM(int offset)
{
    int Temp;
    Temp = inb_p(EC_IOSpace+offset);
}
```

```
    return Temp;
}

void Write_EC_SRAM(int offset, int value)
{
    outb_p(value, EC_IOSpace+offset);
}

int main (int argc, char ** argv)
{
    int Temp;

    // Initial
    if(iopl(3)!=0){
        printf("error: I/O Permission Error!\n");
        return 1;
    }
    // Get GPI status
    Temp = Read_EC_SRAM(GPDR);           //Bit3-0: GPI3-0 status

    // Set GPO4 Output & High
    Temp = Read_EC_SRAM(GPDR);
    Write_EC_SRAM(GPDR, Temp|0x80);      //Bit7-4: Set GPO3-0 status, 0: Low 1: High
}
```

```
return 0;  
}
```


5 System Resources

5.1 Intel® Alder Lake-S PCH

Intel® Q670E Chipset

Intel® R680E Chipset

5.2 Main Memory

ROBO-8116G2AR provides 2 x 262-pin SO-DIMM sockets which supports DDR5 ECC/non-ECC memory. The maximum memory can be up to 64GB. Memory clock and related settings can be detected by BIOS via SPD interface.

Watch out the contact and lock integrity of memory module with socket, it will impact on the system reliability. Follow normal procedures to install memory module into memory socket. Before locking, make sure that all modules have been fully inserted into the card slots.

5.3 Installing the Single Board Computer

To install your ROBO-8116G2AR into standard chassis or proprietary environment, please perform the following:

Step 1 : Check all jumpers setting on proper position

Step 2 : Install and configure CPU,CPU cooling and memory module on right position

Step 3 : Place ROBO-8116G2AR into the dedicated position in the system

Step 4 : Attach cables to existing peripheral devices and secure it

WARNING

Please ensure that mother board is properly inserted and fixed by mechanism.

Note:

Please refer to section 6.3.1 to 6.3.4 to install INF/Graphic/LAN

5.3.1 Chipset Component Driver

ROBO-8116G2AR is based on Intel® Q670E/R680E chipset and desktop processors including Core™i3 / i5 / i7 / i9 sku . It's a new chipset that some old operating systems might not be able to recognize. To overcome this compatibility issue, for Windows Operating Systems such as Windows 10, please install its INF before any of other Drivers are installed. You can find very easily this chipset component driver in Portwell download center

5.3.2 Intel® HD Graphics 730 / 770

ROBO-8116G2AR has integrated Intel® HD Graphics 730(i3) / 770(i5/i7/i9) which supports DirectX 12 、OpenGL 4.6. It is the most advanced design to gain an outstanding graphic performance. ROBO-8116G2AR supports DVI-D, HDMI, Display output on ERAR IO Bracket. This combination makes ROBO-8116G2AR an excellent performance hardware.

Drivers Support

Please find the Graphic driver in Portwell download center. The driver supports Windows 10.

5.3.3 Intel LAN I255LM Gigabit Ethernet Controller

- Intel I255LM 2.5Gigabit Ethernet controller and 2x RJ45 connectors on bracket

Drivers Support

Please find Intel I255LM LAN driver in Ethernet directory in Portwell download center. The driver supports Windows 10.

PCI Express Base Specification, Revision 2.0 <https://www.pcisig.com/specifications>

6 BIOS Setup Items

6.1 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.

6.2 BIOS Setup

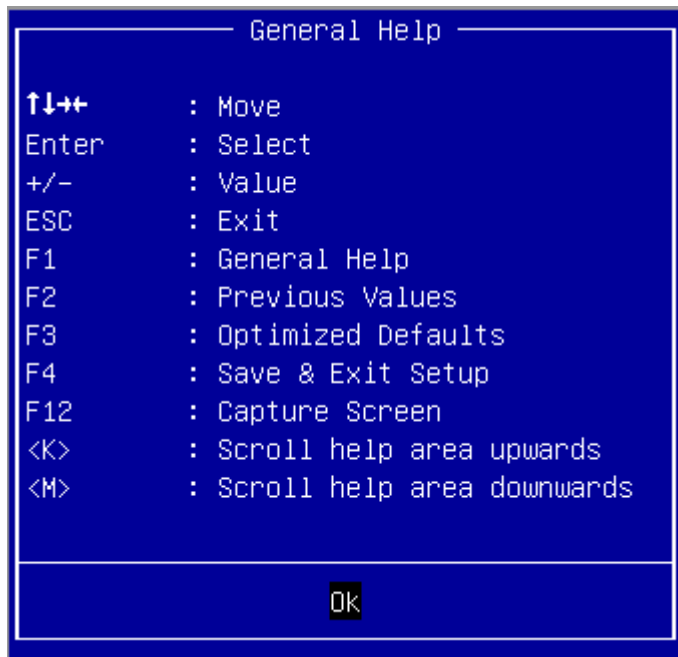
Power on the computer and the system will start POST (Power on Self Test) process. When the message below appears on the screen, press <Delete> or <ESC> key will enter BIOS setup screen.

Press <ESC > or <Delete> 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.

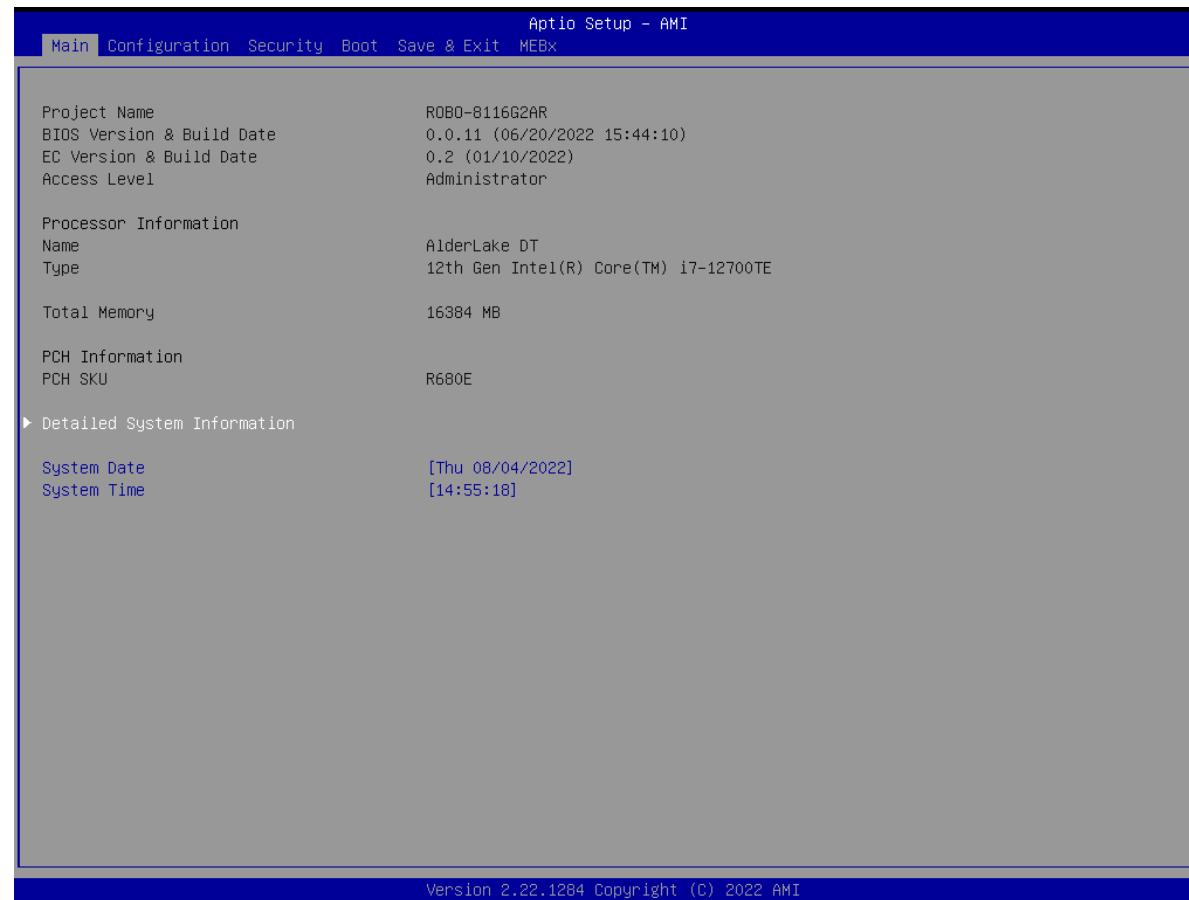
Press <F1> to Run General Help or Resume

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.



6.2.1 Main

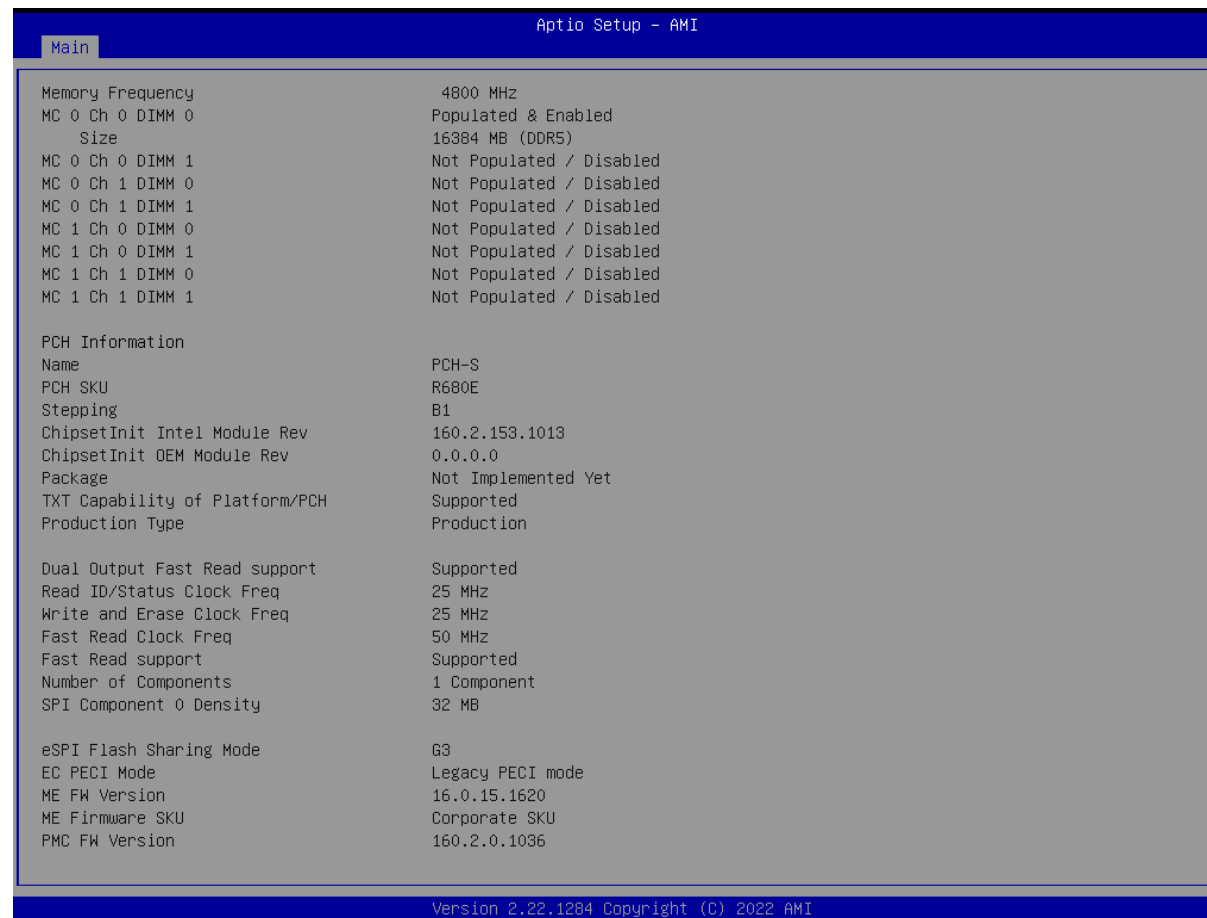
Use this menu for basic system configurations, such as time, date etc.



ROBO-8116G2AR



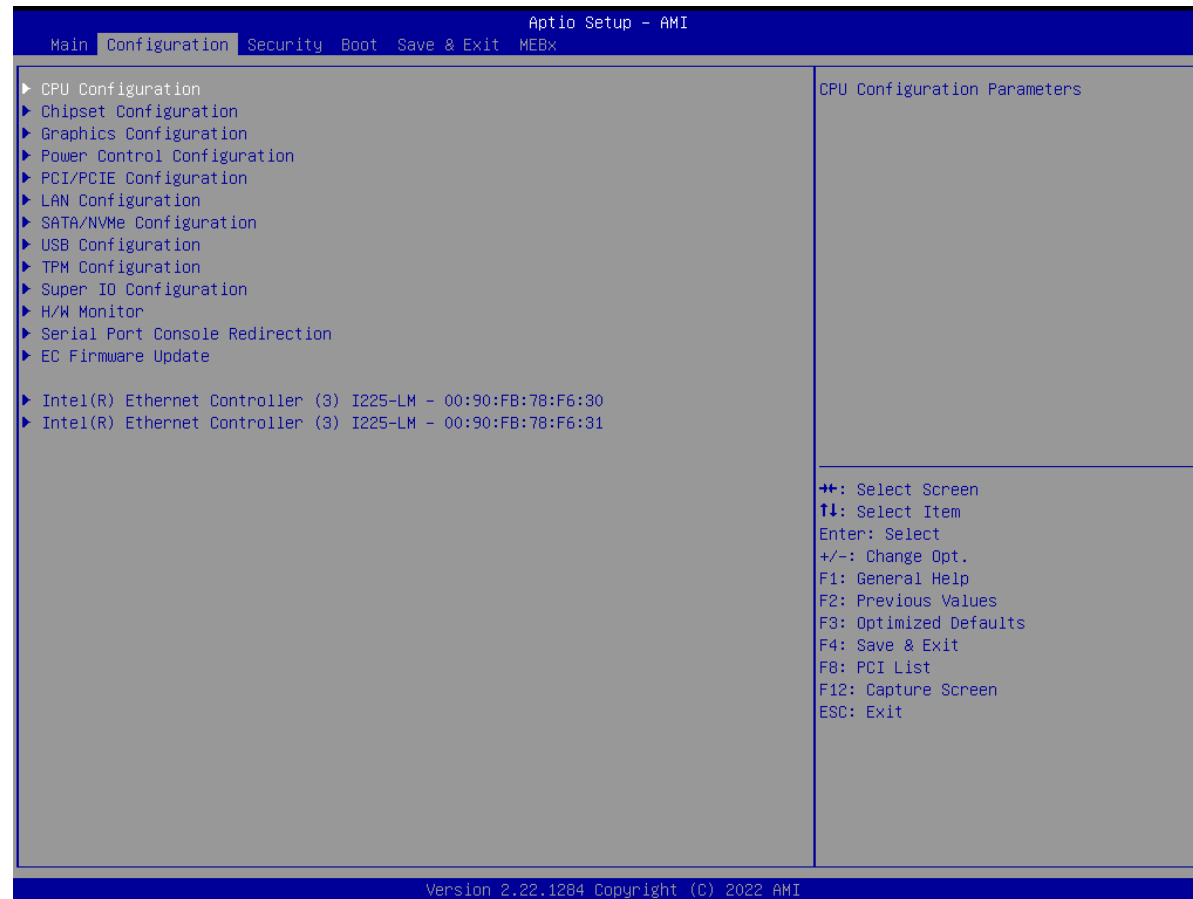
ROBO-8116G2AR



Feature	Description	Options
Detail system information	Detail system information	
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.	

6.2.2 Configuration

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



ROBO-8116G2AR

CPU Configuration

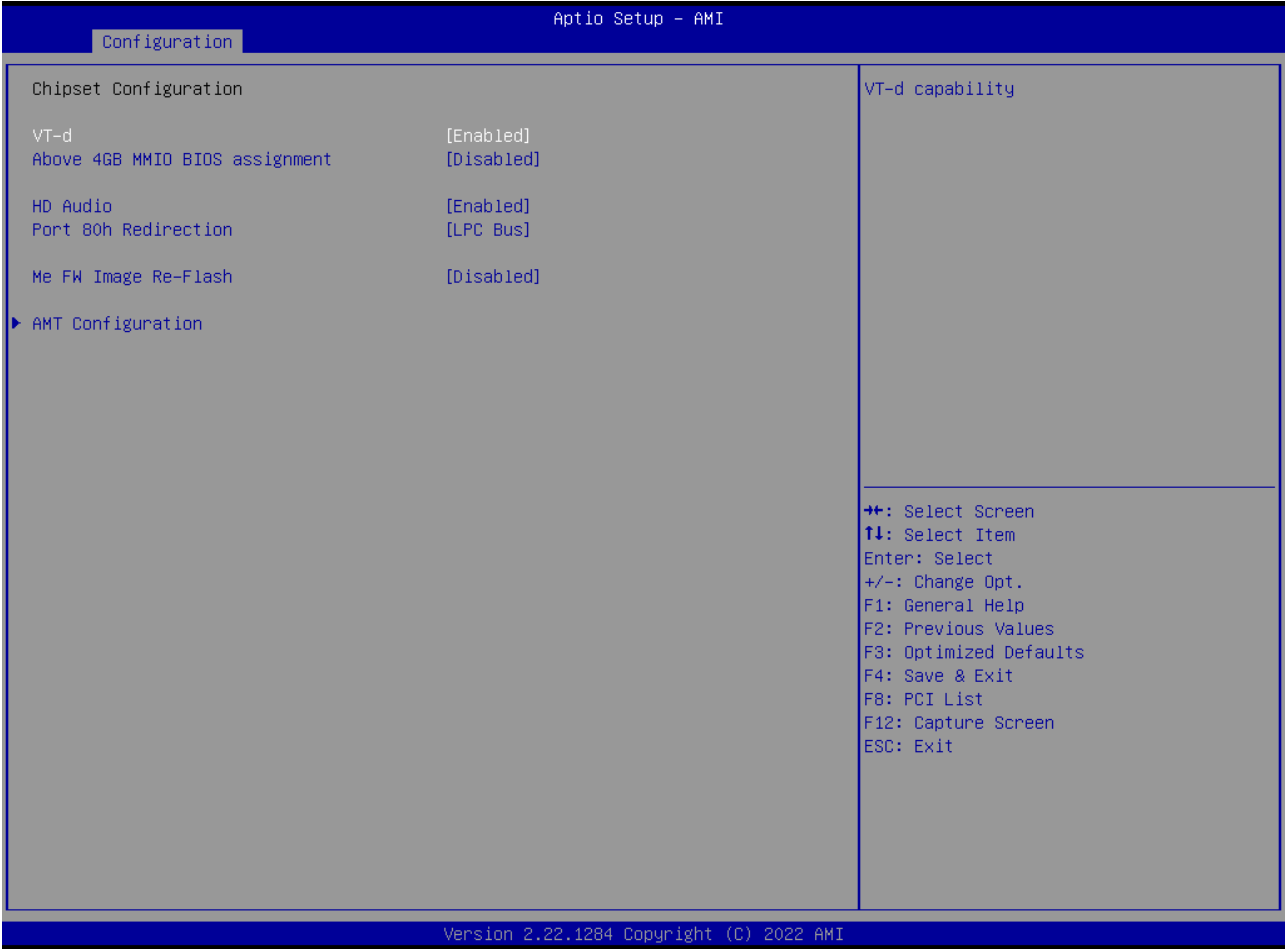
CPU Configuration Parameters

Aptio Setup - AMI		
Configuration		
CPU Configuration		Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.
Type	12th Gen Intel(R) Core(TM) i7-12700TE	
ID	0x90672	
Speed	1400 MHz	
L1 Data Cache	48 KB x 8	
L1 Instruction Cache	32 KB x 8	
L2 Cache	1280 KB x 8	
L3 Cache	25 MB	
L4 Cache	N/A	
VMX	Supported	
SMX/TXT	Supported	
Active Performance-cores	[All]	
Hyper-Threading	[Enabled]	
Boot performance mode	[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]	
C-State Un-demotion	[C1]	
Package C-State Demotion	[Enabled]	
Package C-State Un-demotion	[Enabled]	
CState Pre-Wake	[Enabled]	
IO MWAIT Redirection	[Disabled]	
Package C State Limit	[Auto]	
		++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit

Version 2.22.1284 Copyright (C) 2022 AMI

Feature	Description	Options
Active Processor Cores	Number of cores to enable in each processor package.	★All, 1, 2, 3,4,5
Hyper-Threading	Enable or Disable Hyper-Threading Technology	Disabled, ★Enabled
Boot performance mode	Select the performance state that the BIOS will set starting from reset vector	Max Battery ★Max Non-Turbo Performance Turbo Performance
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vander pool Technology.	Disabled, ★Enabled
Intel® Speed Step™	Allows more than two frequency ranges to be supported.	Disabled, ★Enabled
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	Disabled, ★Enabled
Turbo Mode	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled)	Disabled, ★Enabled
C states	Enable/disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized	Disabled, ★Enabled
Enhanced C-states	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-state	Disabled, ★Enabled
C-State Auto Demotion	Configure C-State Auto Demotion	Disable, C1 ,C3 ★C1 and C3
C-State Un-demotion	Configure C-State Un-demotion	Disable, C1 ,C3 ★C1 and 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	Disabled, ★Enabled
IO MWAIT Redirection	When set, will map IO_read instructions sent to IO registers PMG_IO_BASE_ADDRESS+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	C0/C1,C2,C3,C6,C7,C7S,C8,C9,C10,Cpu Default, ★Auto

Chipset Configuration
Configuration Chipset feature



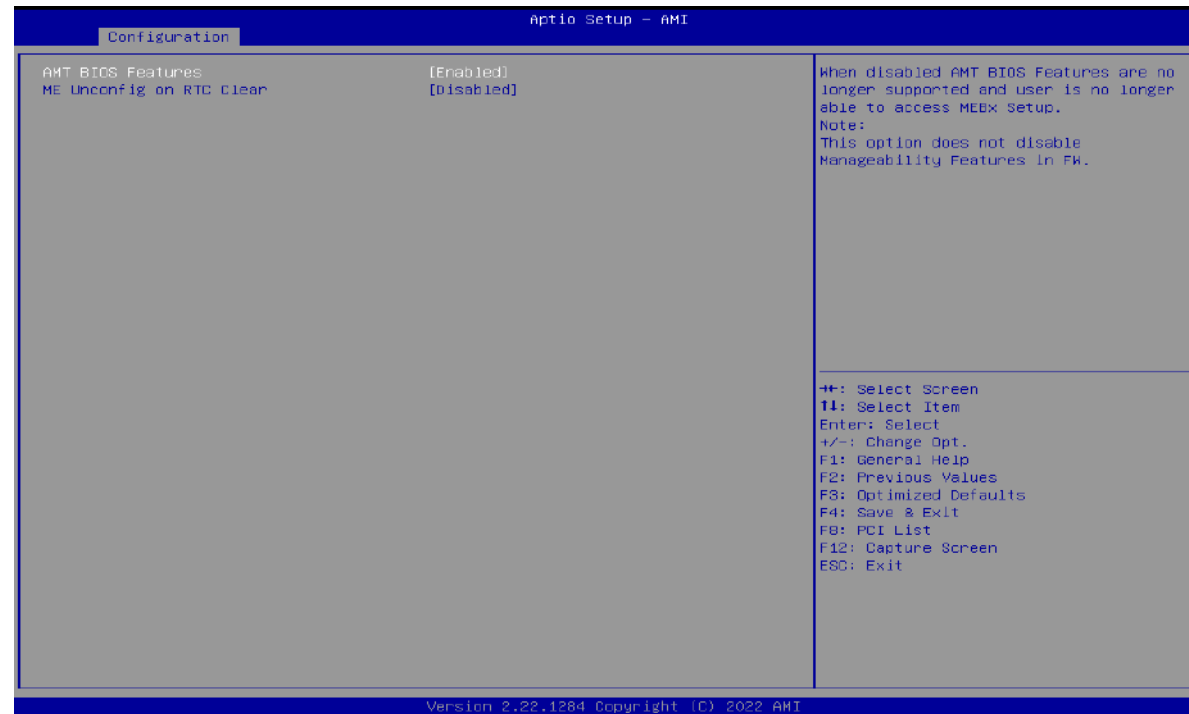
ROBO-8116G2AR

Feature	Description	Options
VT-d	VT-d Capability	Disabled, ★Enabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB	★Disabled, Enabled
HD Audio	Control Detection of the HD-Audio device	Disabled, ★Enabled
Port 80h Redirection	Control where the Port 80h cycles are sent	★LPC Bus, PCIE Bus
Me FW Image Re-Flash	Enable/Disable Me FW Image Re-Flash function.	★Disabled, Enabled

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AMT Configuration

Configure Intel® Active Management Technology Parameters



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

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Graphics Configuration

Configuration Graphics Settings

Aptio Setup - AMI

Configuration

Graphics Configuration	
Primary Display	[Auto]
Internal Graphics	[Auto]
DVT Pre-Allocated	[60M]
DVT Total Gfx Mem	[256M]

Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.

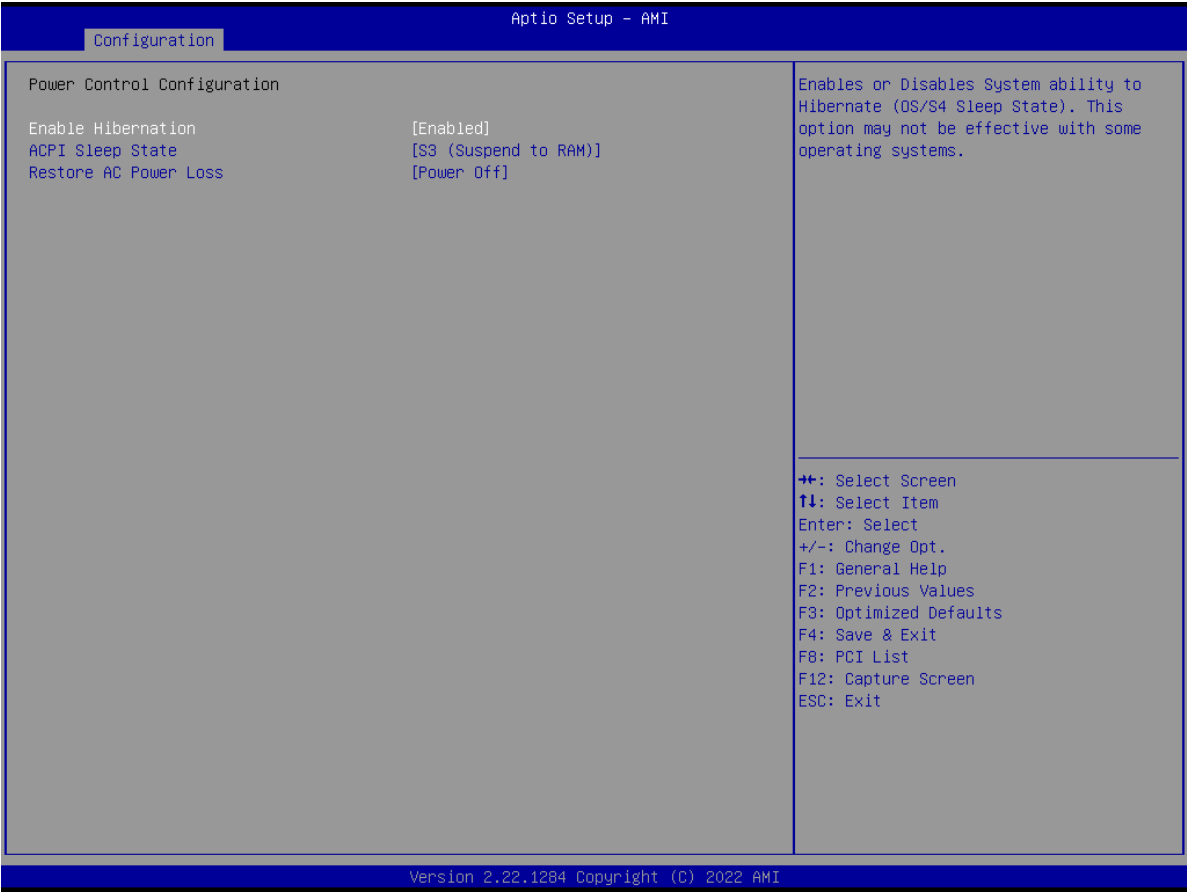
++: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
F8: PCI List
F12: Capture Screen
ESC: Exit

Version 2.22.1284 Copyright (C) 2022 AMI

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

Power Control Configuration

System Power Control Configuration Parameters

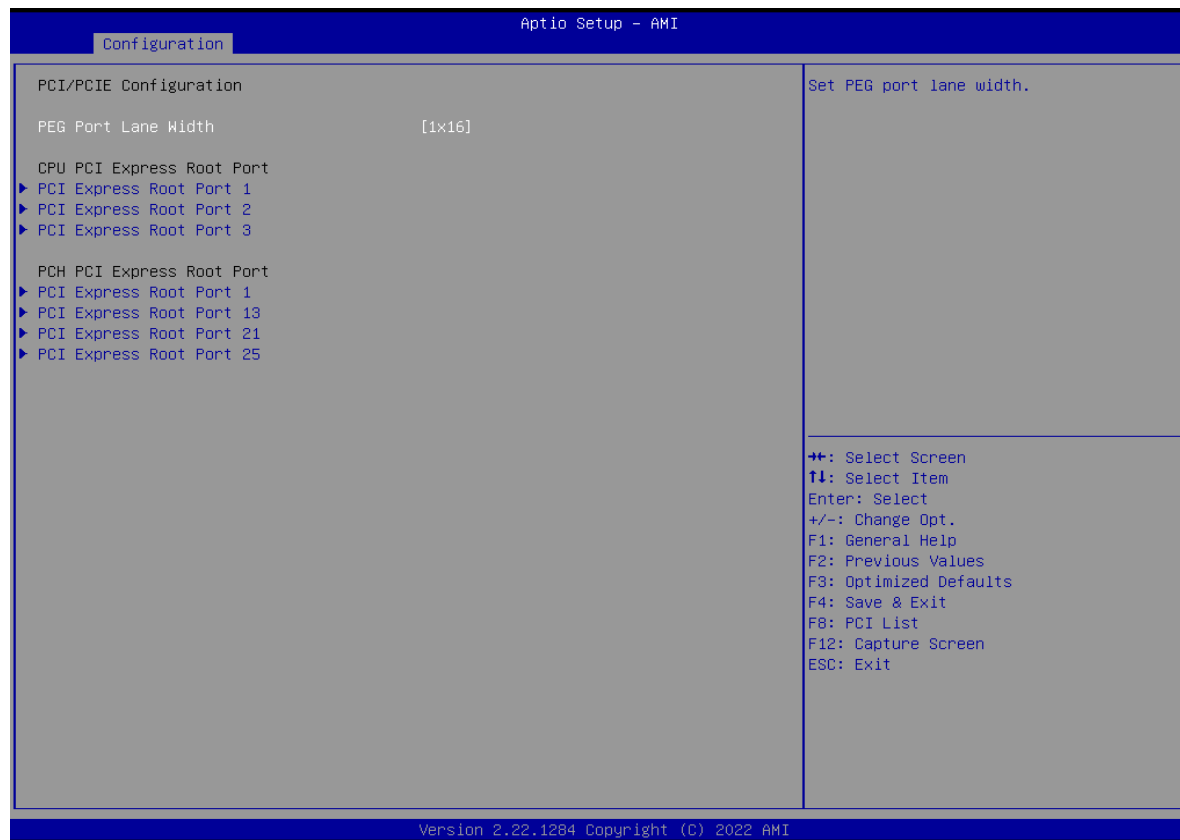


Feature	Description	Options
Enable Hibernation	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.	★Enabled , Disabled
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.	★S3 (Suspend 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

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PCI/PCIE Configuration

PCI, PCI-X and PCI Express Settings

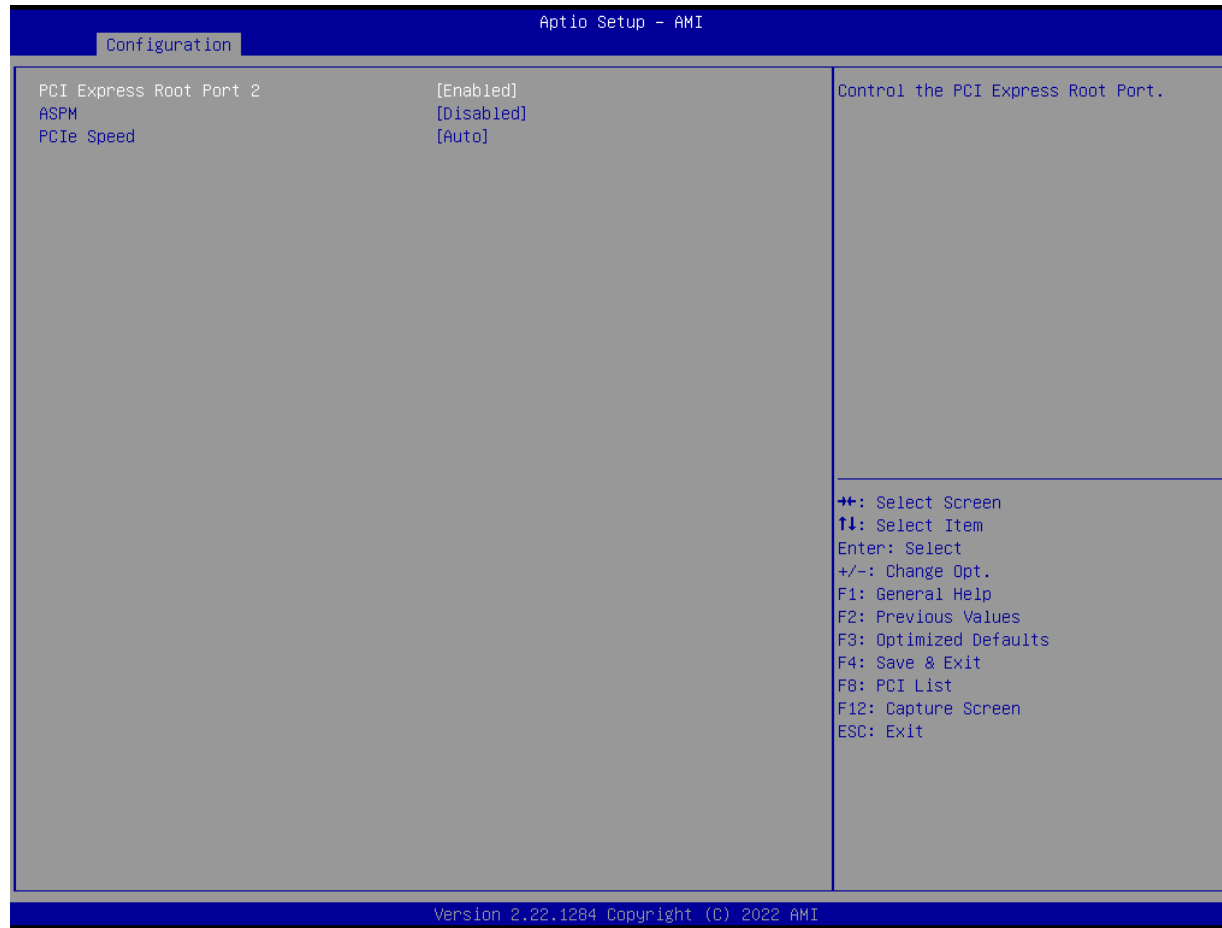


Feature	Description	Options
PEG Port Lane Width	Set PEG port Lane width	★1x16, 2x8

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CPU PCI Express Root Port

PCI Express Root Port 1 - PCI Express Root Port 3

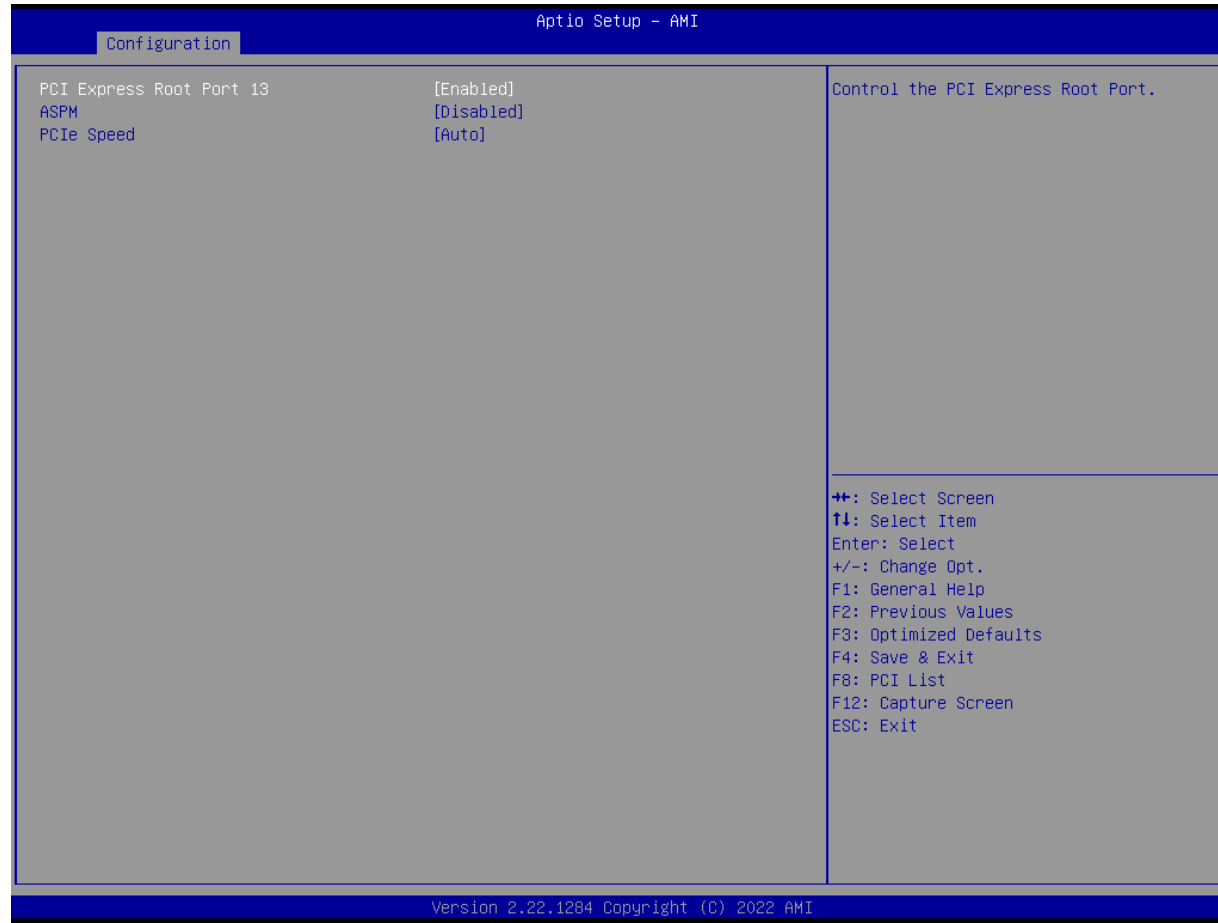


Feature	Description	Options
PCI Express Root Port 1 – Port 3	Control the PCI Express Root Port.	★ Enable, Disable
ASPM	Set the ASPM Level: Force L0s – Force all links to L0s State Disabled – Disables ASPM	★ Disabled, L0s, L1, L0sL1
PCIe Speed (Root Port 1)	Configuration PCIe Speed	★ Auto, Gen x1, Gen x 2, Gen x3, Gen x 4,
PCIe Speed (Root Port 2 / Port 3)	Configuration PCIe Speed	★ Auto, Gen x1, Gen x 2, Gen x3, Gen x 4, Gen x 5

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PCH PCI Express Root Port

PCI Express Root Port 1 / Port 13 / Port 21 / Port 25



Feature	Description	Options
PCI Express Root Port 1 / Port 13 / Port 21 / Port 25	Control the PCI Express Root Port.	★ Enable, Disable
ASPM	Set the ASPM Level: Force L0s – Force all links to L0s State Auto - BIOS auto configure / Disabled – Disables ASPM	★ Disabled, L1, Auto
PCIe Speed	Configuration PCIe Speed	★ Auto, Gen x1, Gen x 2, Gen x3, Gen x 4,

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LAN Configuration

Configuration onboard LAN device.

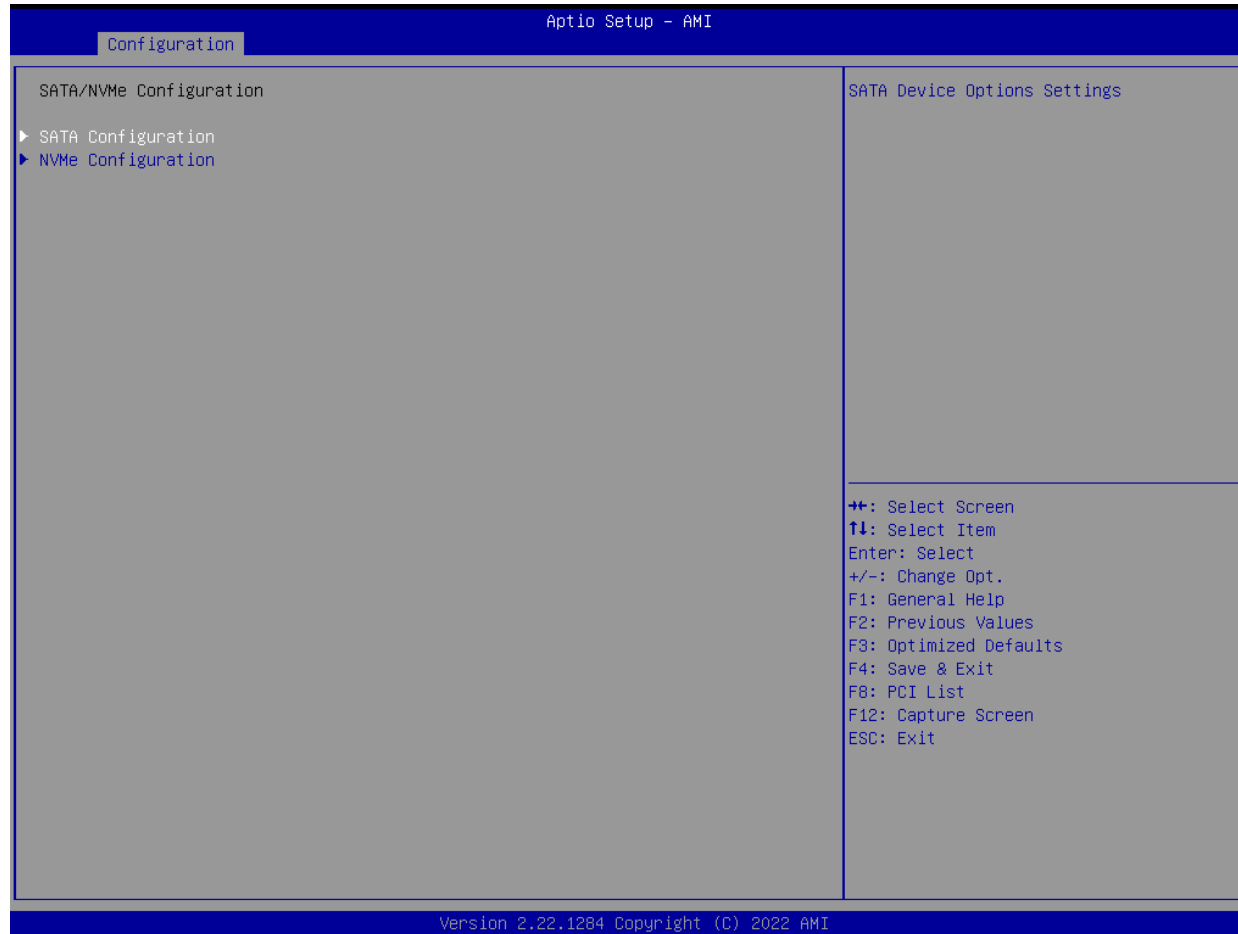


Feature	Description	Options
Intel Ethernet I225 Controller #2	Control the PCI Express Root Port.	★Enabled , Disabled
Intel Ethernet I225 Controller #3	Control the PCI Express Root Port.	★Enabled , Disabled
PCIE_WAKE (Wake on Lan)	Control PCIE_WAKE pin for Wake on Lan function.	★Enabled , Disabled
Launch UEFI PXE Rom	Enable/Disable UEFI Network Stack.	★Disabled, Enabled
Launch UEFI PXE Rom – [Enabled]		
Ipv4 PXE Support	Enable/Disable IPv4 PXE boot support. If disable, IPv4 PXE boot support will not be available.	Disabled, ★Enabled
Ipv4 HTTP Support	Enable/Disable IPv4 HTTP boot support. If disable, IPv4 HTTP boot support will not be available.	Disabled, ★Enabled
Ipv6 PXE Support	Enable/Disable IPv6 PXE boot support. If disable, IPv6 PXE boot support will not be available.	Disabled, ★Enabled
Ipv6 HTTP Support	Enable/Disable IPv6 HTTP boot support. If disable, IPv6 HTTP boot support will not be available.	Disabled, ★Enabled
PXE boot wait time	Wait time in seconds to press ESC key to abort the PXE boot. The PXE boot. Use either +/- or numeric keys to set the value.	★0
Media detect count	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.	★1

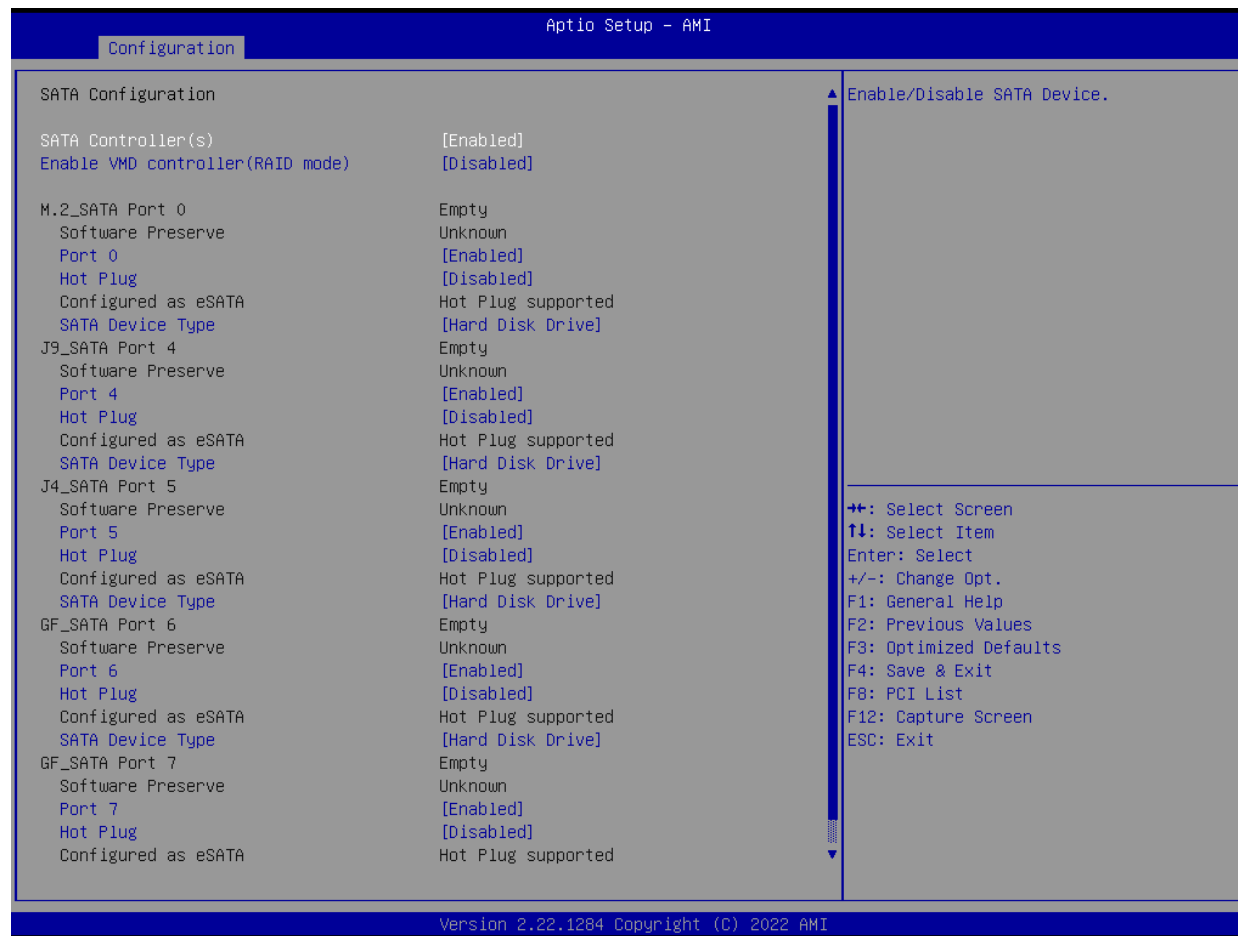
ROBO-8116G2AR

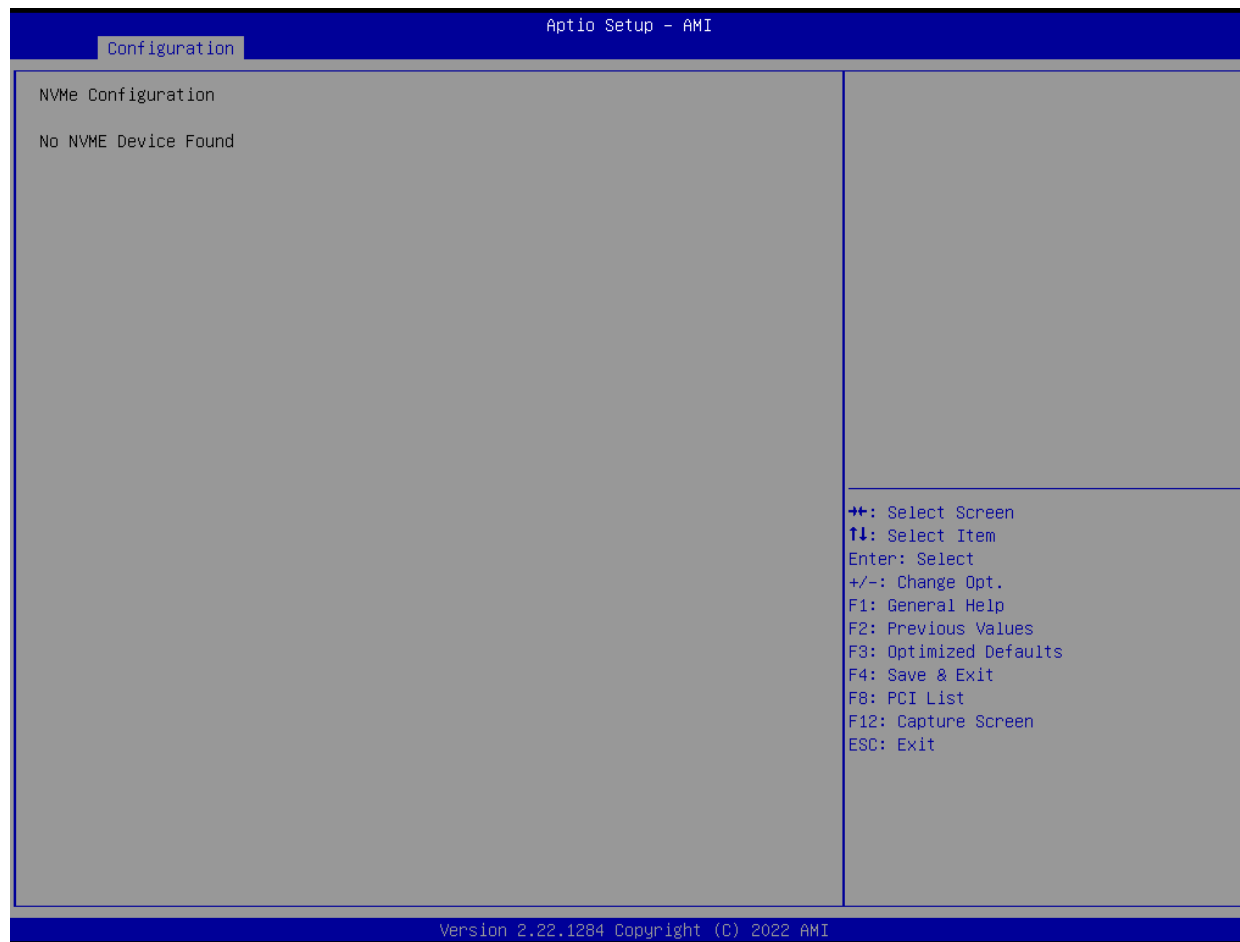
SATA / NVMe Configuration

SATA / NVMe Device Options Settings



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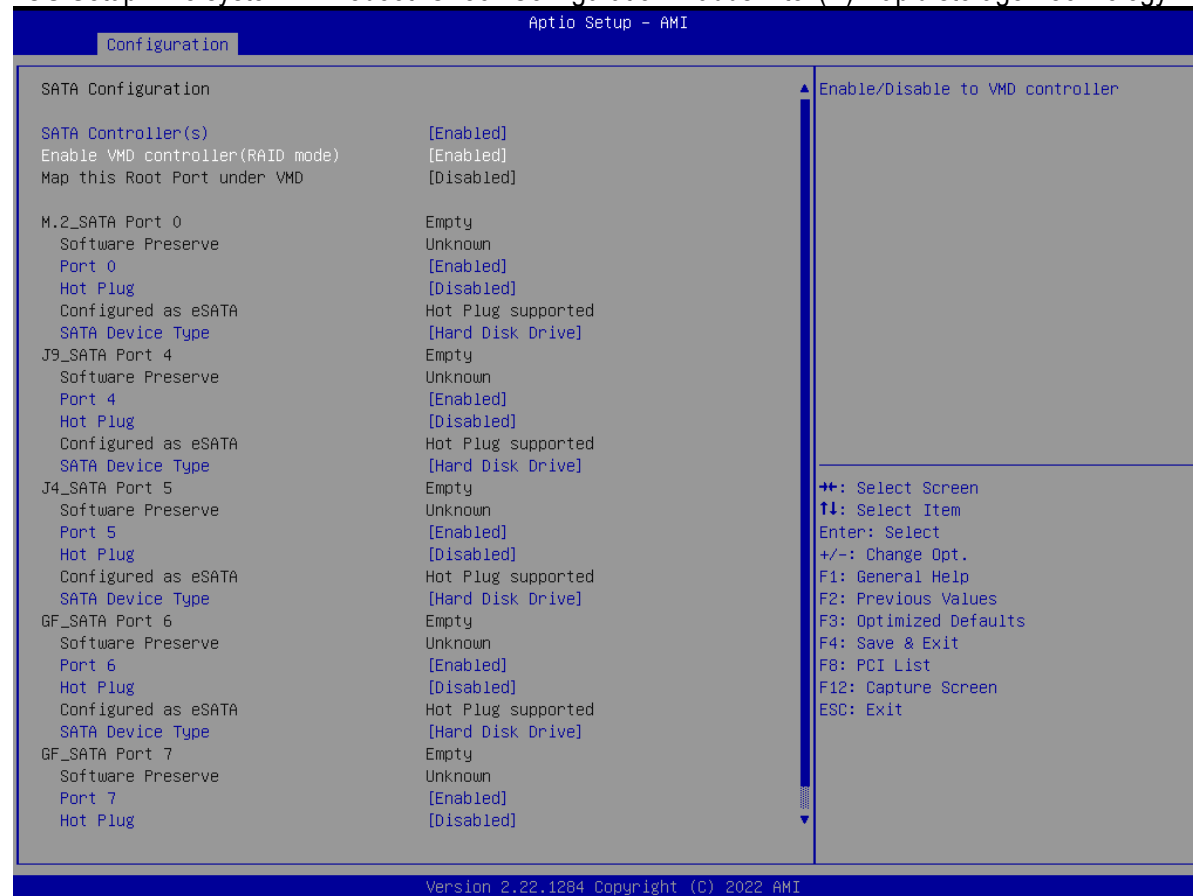




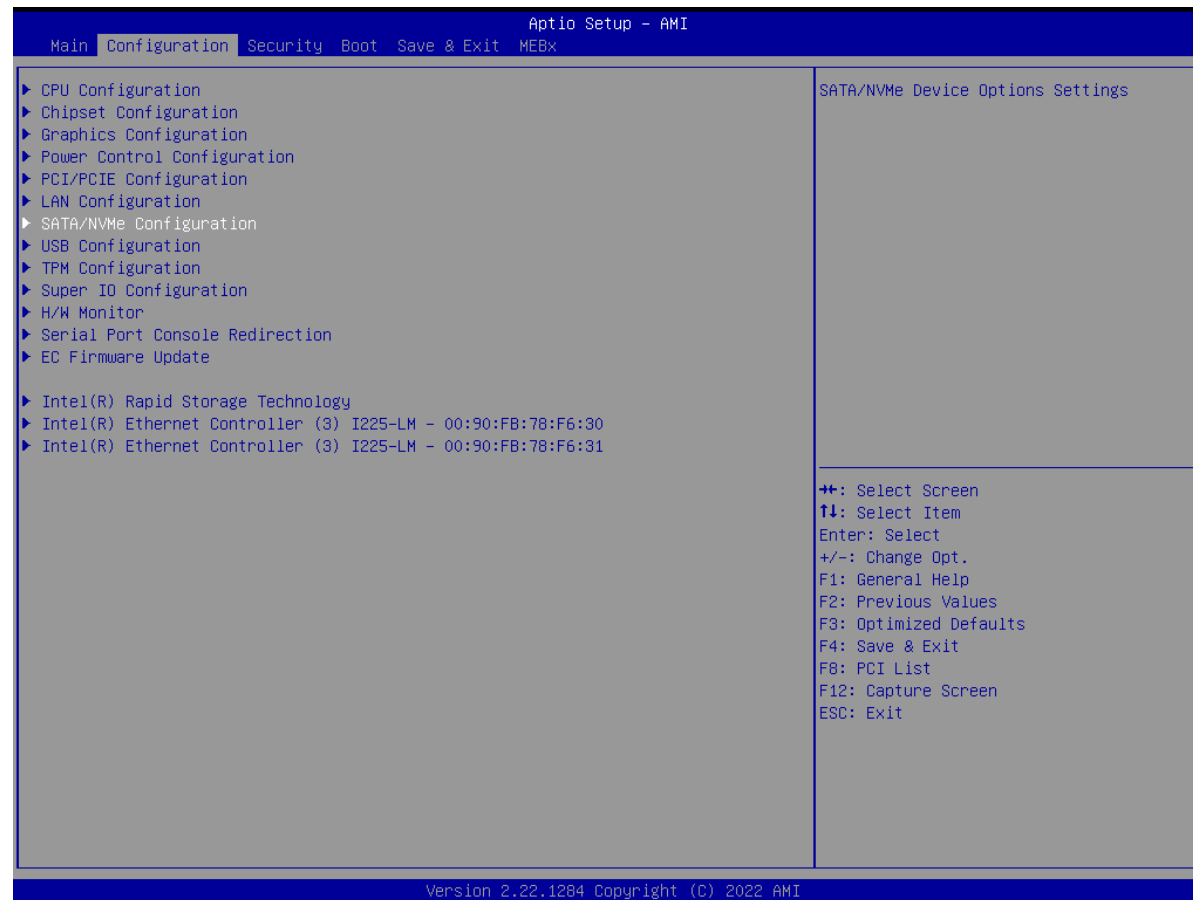
Feature	Description	Options
SATA Controller(s)	Enable/disable SATA Device.	★Enabled , Disabled
Enable VMD controller (RAID mode)	Enable/disable to VMD controller.	★Disabled , Enabled
Map this Root Port under VMD	Enable VMD controller setting [Disabled] / Map this Root Port under VMD in [Disabled] Enable VMD controller setting [Enabled] / Map this Root Port under VMD in [Enabled] (Need Save and Exit BIOS Setup)	★Disabled
M.2_SATA Port 0		
Port 0	Designates this port as Hot Pluggable	★Enabled , Disabled
Hot Plug	Designates this port as Hot Pluggable	★Disabled, Enabled
J9_SATA Port 4 / J4_SATA Port 5	Enable or Disable SATA Port	Disabled, ★Enabled
Port 4 / Port 5	Designates this port as Hot Pluggable	★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
GF_SATA Port 6 / GP_SATA Port 7	Enable or Disable SATA Port	Disabled, ★Enabled
Port 6 / Port 7	Designates this port as Hot Pluggable	★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

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★Set Enable VMD controller (RAID mode) to [Enable]. [Enable] both Maps this Root Port under VMD.
Press F10 to Save and Exit BIOS Setup. The system will reboot. Check Configuration > adds Intel (R) Rapid storage Technology.



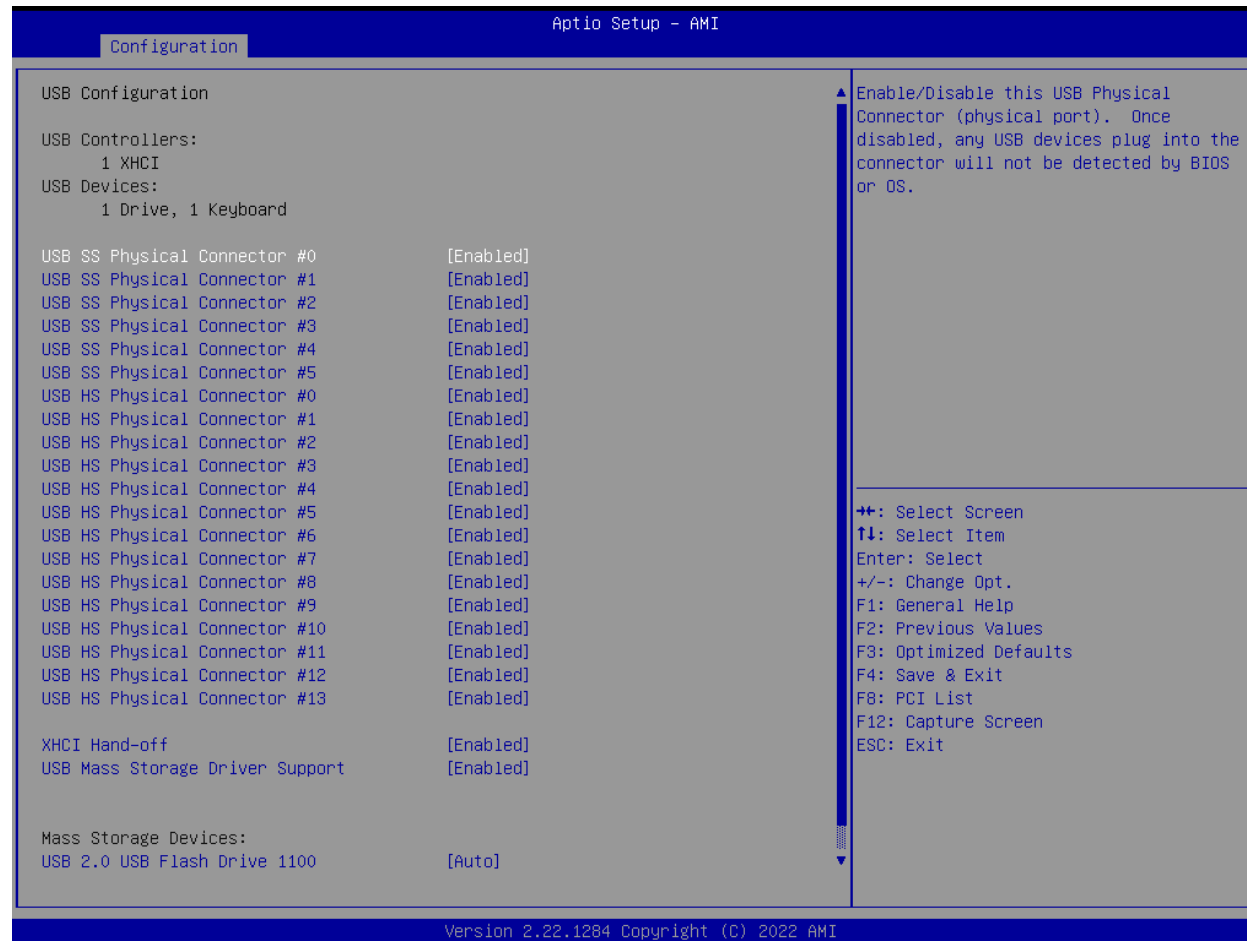
ROBO-8116G2AR



ROBO-8116G2AR

USB Configuration

USB Configuration Parameters

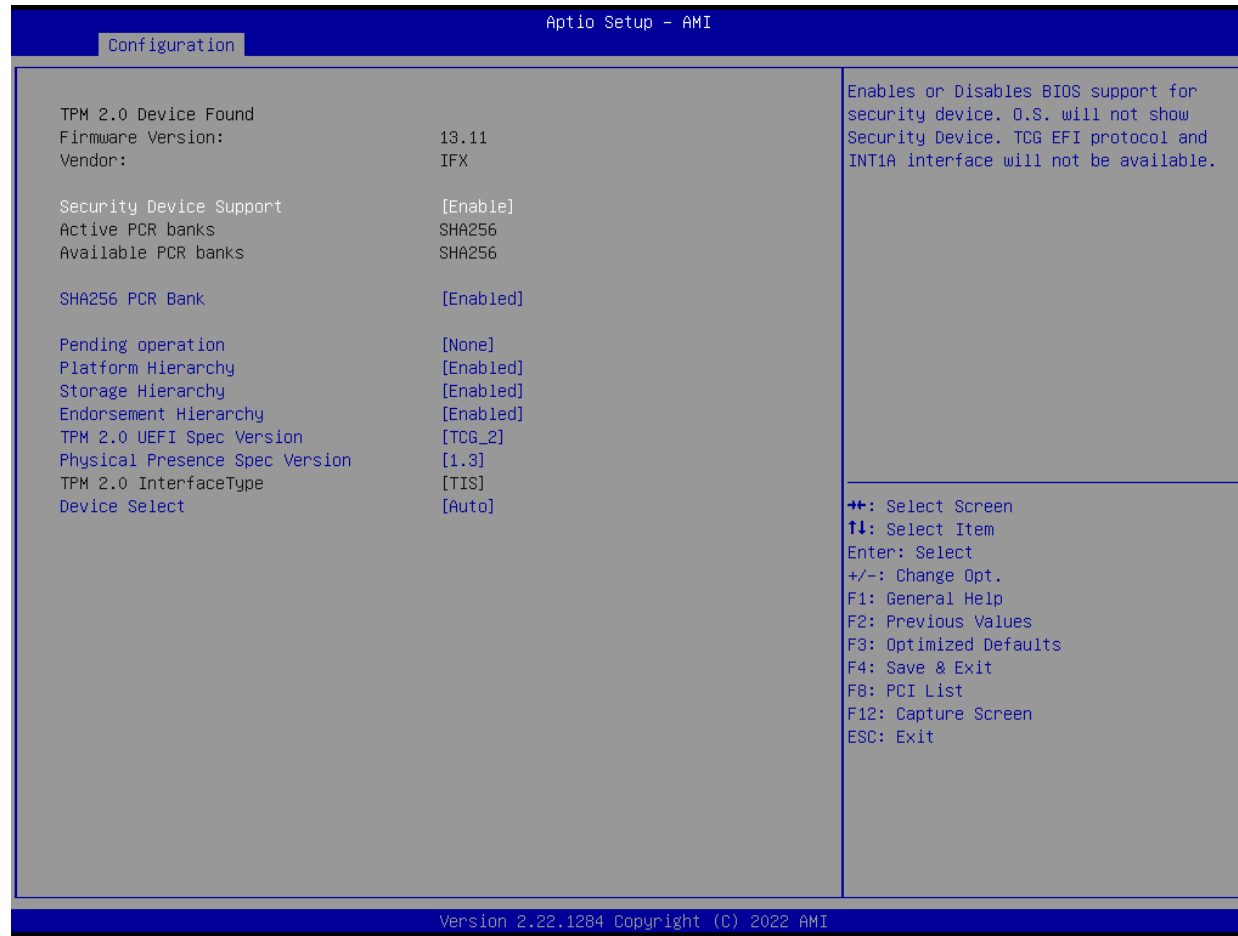


Feature	Description	Options
USB SS Physical Connector #0 ~ #5	Enable/Disable this USB Physical connector (Physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.	★Enabled , Disabled,
USB HS Physical Connector #0 ~ #13	Enable/Disable this USB Physical connector (Physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.	★Enabled , Disabled
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 Storage Driver Support	Enable/Disable USB Mass Storage Driver Support	★Enabled , Disabled

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TPM Configuration

Trusted Computing Setting

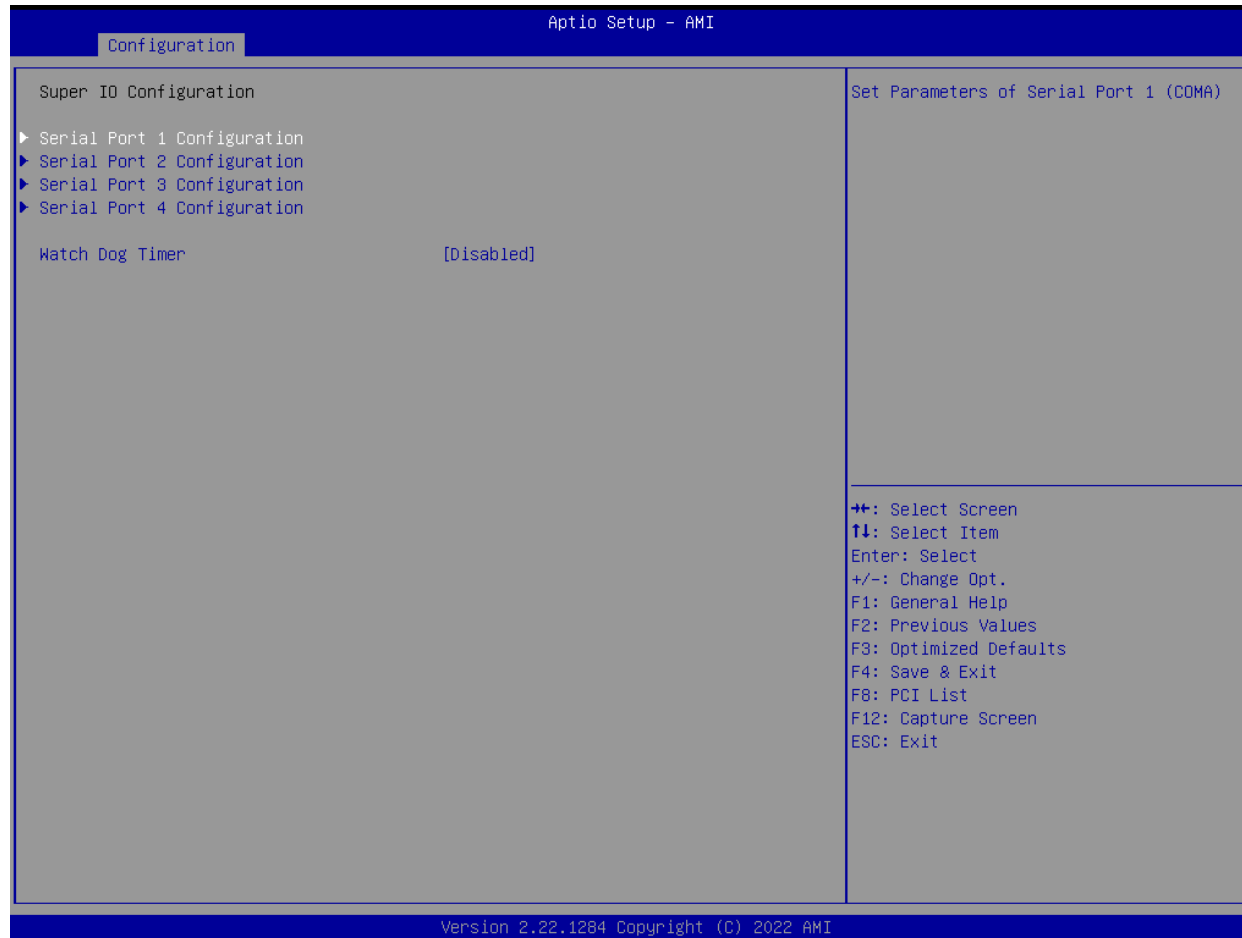


Feature	Description	Options
Security Device Support	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A Interface will not be available.	★Disabled, Enabled
SHA256 PCR Bank	Enables or Disables SHA256 PCR Bank	Disabled, ★Enabled
Pending operation	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
Platform Hierarchy	Enables or Disables Platform Hierarchy	Disabled, ★Enabled
Storage Hierarchy	Enables or Disables Storage Hierarchy	Disabled, ★Enabled
Endorsement Hierarchy	Enables or Disables Endorsement Hierarchy	Disabled, ★Enabled
TPM2.0 UEFI Spec Version	Select the TCG2 Spec Version Support TCG_1_2: the Compatible mode for Win8/Win10 TCG_2: Support new TCG2 protocol and event format for Win10 or later	TCG_1_2, ★TCG_2
Physical Presence Spec Version	Select to Tell O.S. to Support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.	1.2, ★1.3
Device Select	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

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Super IO Configuration

System Super IO Chip Parameters.

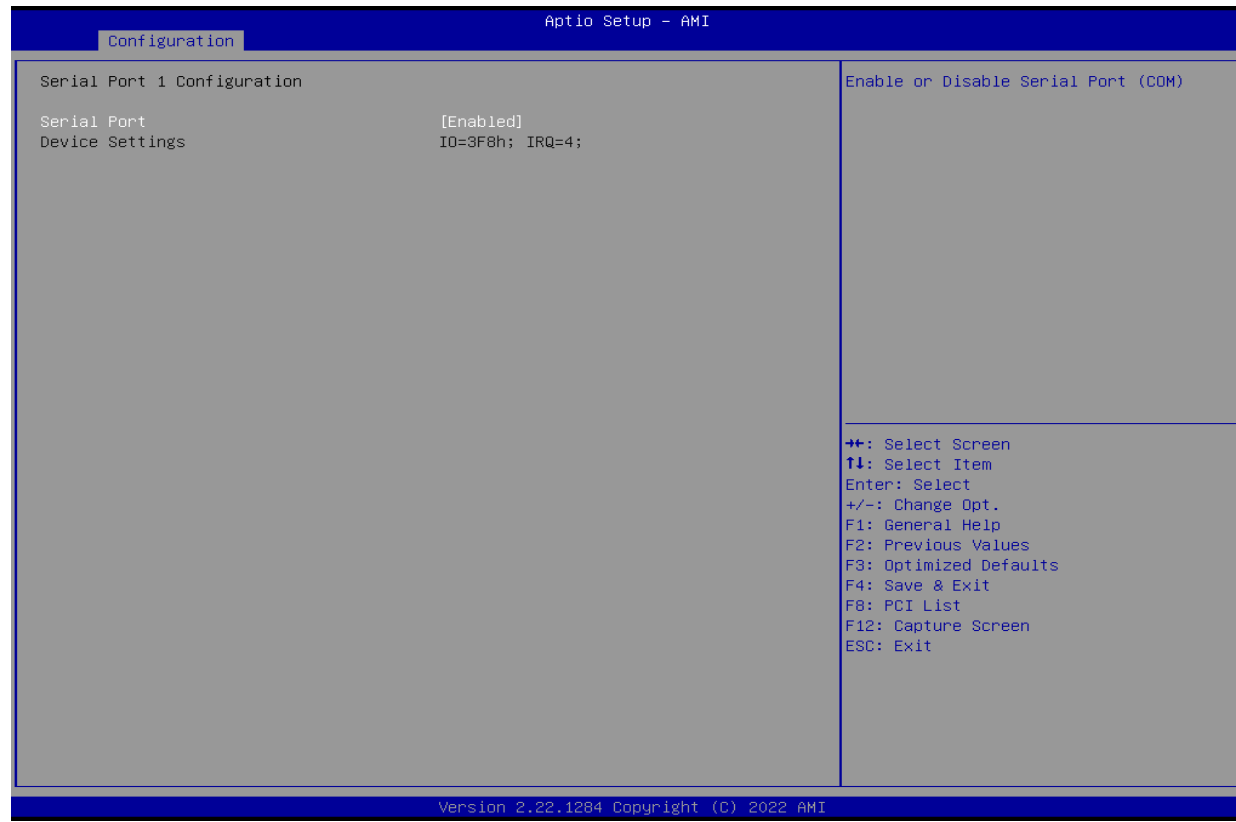


Feature	Description	Options
Watch Dog Timer	Enable/Disable Watch Dog Timer	★Disabled, Enabled
Watch Dog Timer [Enabled]		
Timer Unit	Select Timer count unit of WDT	★Second, Minute
Timer value	Set WDT Timer value	★20

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Serial Port 1 Configuration

Set Parameters of Serial Port 1

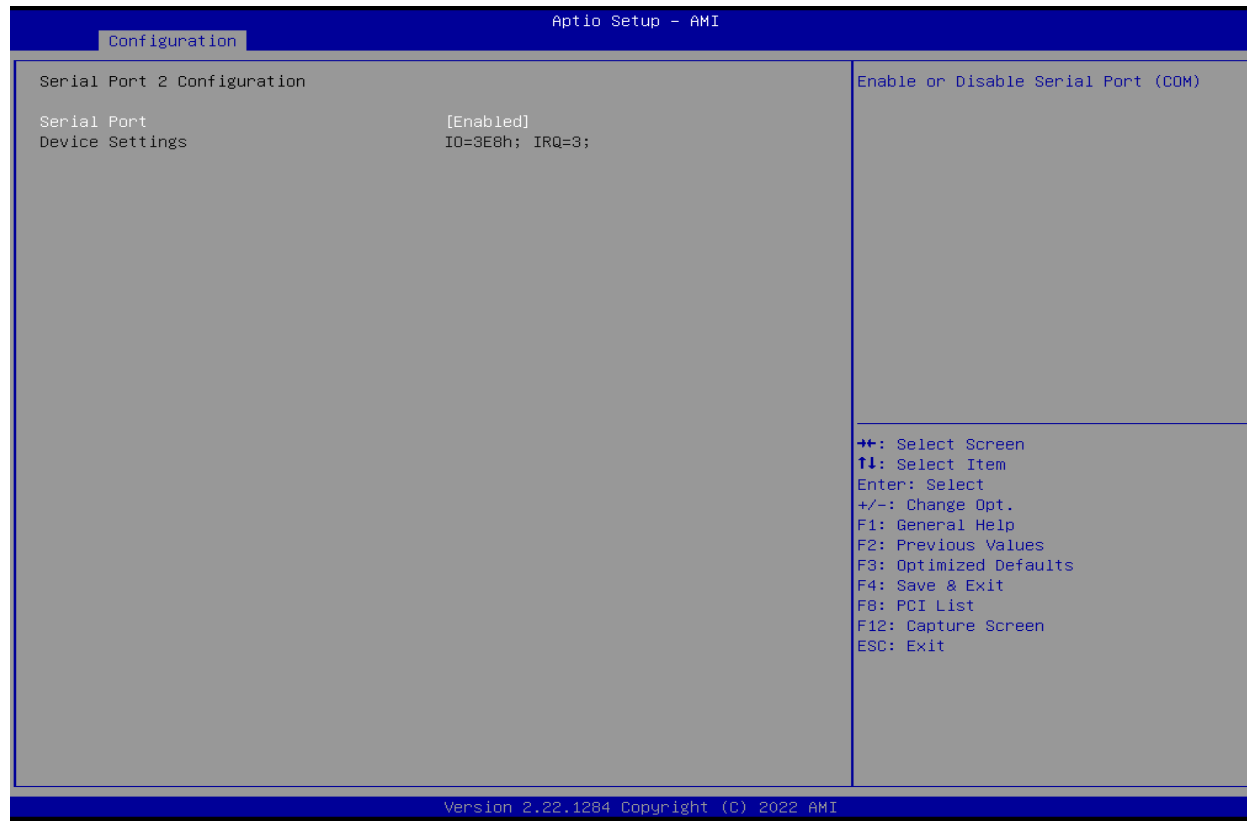


Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★ Enabled, Disabled
Device Settings		★ IO=3F8h; IRQ=4;

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Serial Port 2 Configuration

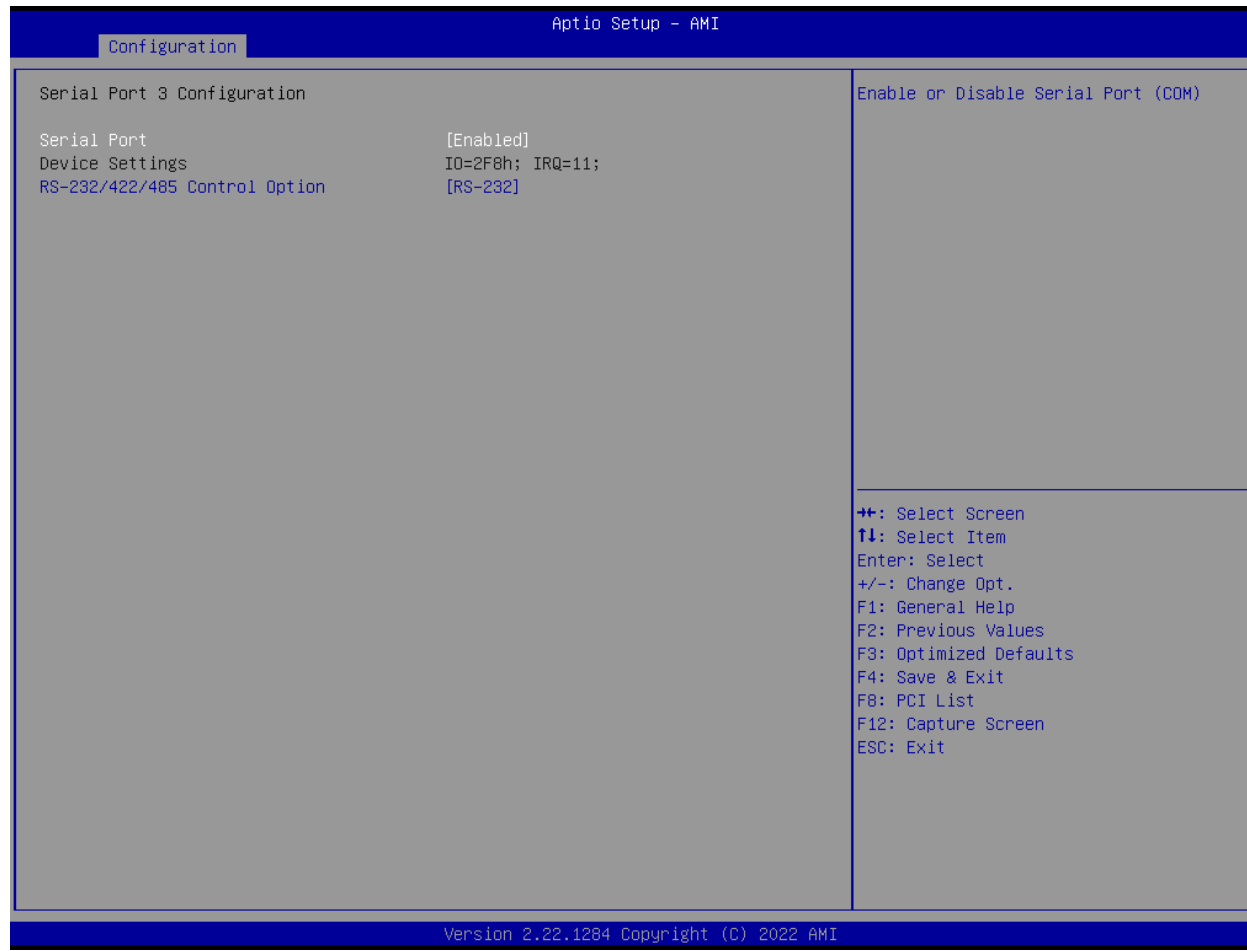
Set Parameters of Serial Port 2



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★ Enabled, Disabled
Device Settings		★ IO=3E8h; IRQ=3;

Serial Port 3 Configuration

Set Parameters of Serial Port 3



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★ Enabled, Disabled
Device Settings		★ IO=2F8h; IRQ=11;
RS-232/422/485 Control Option	Serial port 3 RS-232/422/485 Control Option	★ RS-232, RS 485 HALF DUPLEX, RS-422 FULL DUPLEX
RS-422 FULL DUPLEX		
Termination Resistance	Serial port 3 enabled or disabled termination resistance 120ohm	★ Disabled, Enabled
RS 485 HALF DUPLEX		
Termination Resistance	Serial port 3 enabled or disabled termination resistance 120ohm	★ Disabled, Enabled
RS-485 Auto Flow Control	Enable/Disable RS-485 Auto Flow Function	★ Disabled, Enabled

Serial Port 4 Configuration

Set Parameters of Serial Port 4

The screenshot shows the 'Aptio Setup - AMI' interface with the 'Configuration' tab selected. The main area is titled 'Serial Port 4 Configuration'. It contains a table with the following settings:

Serial Port	[Enabled]
Device Settings	IO=2E8h; IRQ=10;
RS-232/422/485 Control Option	[RS-232]

To the right of the table is a section titled 'Enable or Disable Serial Port (COM)'. Below this section is a list of navigation and function keys:

- +/: Select Screen
- ↑↓: Select Item
- Enter: Select
- +/-: Change Opt.
- F1: General Help
- F2: Previous Values
- F3: Optimized Defaults
- F4: Save & Exit
- F8: PCI List
- F12: Capture Screen
- ESC: Exit

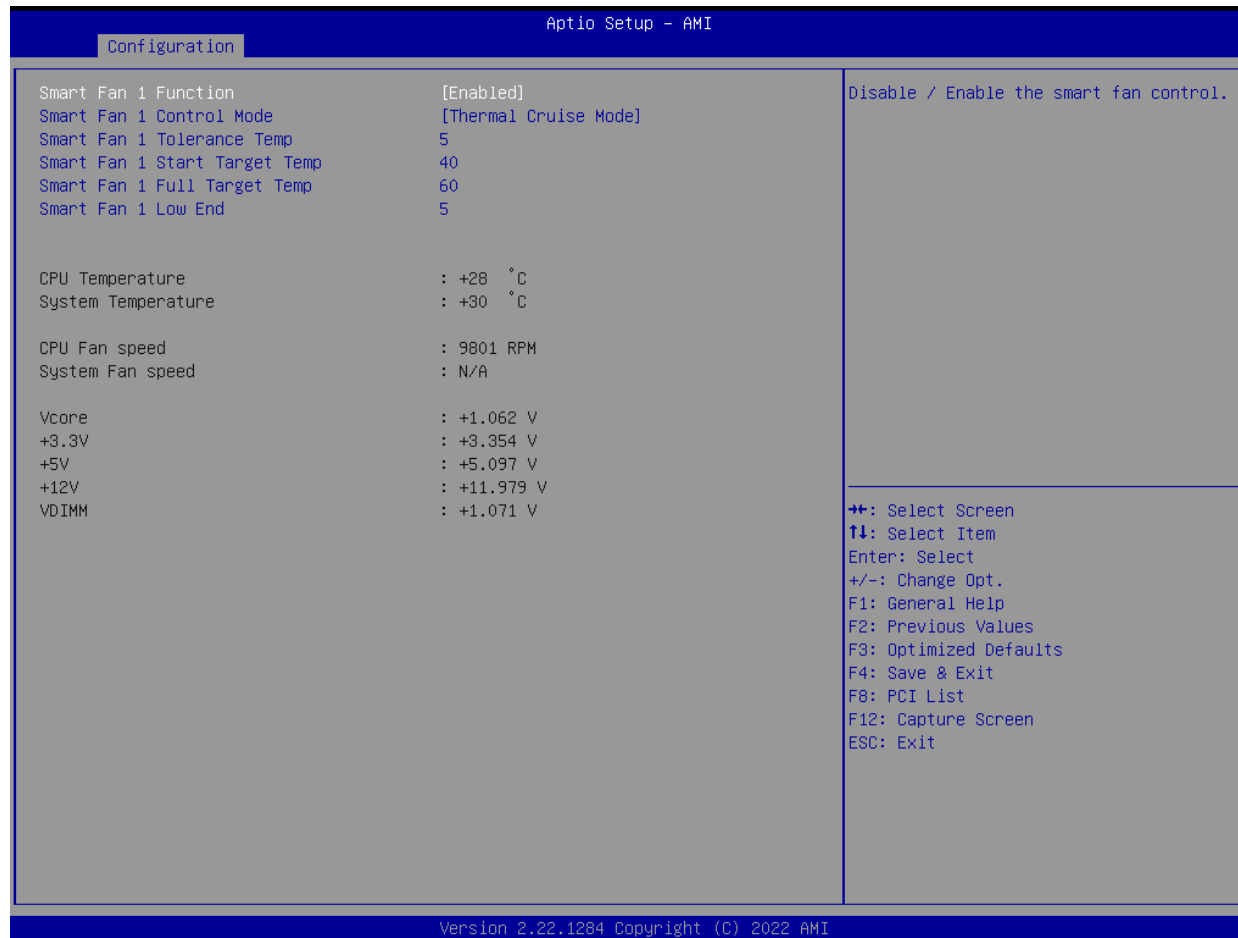
At the bottom of the screen, the text 'Version 2.22.1284 Copyright (C) 2022 AMI' is displayed.

Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★ Enabled, Disabled
Device Settings		★ IO=2E8h; IRQ=10;
RS-232/422/485 Control Option	Serial port 4 RS-232/422/485 Control Option	★ RS-232, RS 485 HALF DUPLEX, RS-422 FULL DUPLEX
RS-422 FULL DUPLEX		
Termination Resistance	Serial port 4 enabled or disabled termination resistance 120ohm	★ Disabled, Enabled
RS 485 HALF DUPLEX		
Termination Resistance	Serial port 4 enabled or disabled termination resistance 120ohm	★ Disabled, Enabled
RS-485 Auto Flow Control	Enable/Disable RS-485 Auto Flow Function	★ Disabled, Enabled

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H/W Monitor

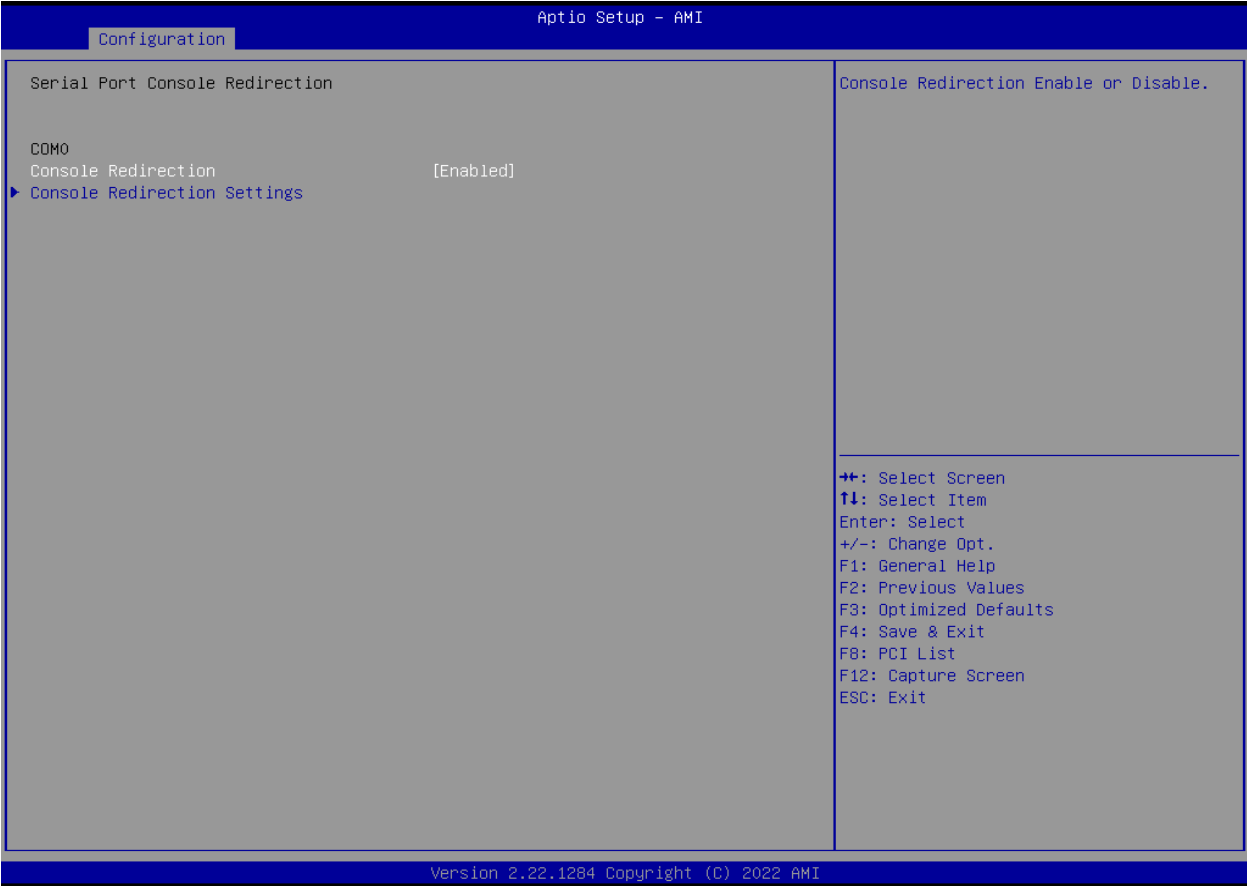
Monitor hardware status



Feature	Description	Options
Smart Fan1 Function	Enable / Disable the Smart Fan Control.	★ Disabled, Enabled
Smart Fan1 Function [Enable]		
Smart Fan1 Control Mode	Select smart fan control mode.	★ Thermal Cruise Mode, Fan Control Mode
Fan1 Tolerance Temp	In Thermal Cruise Mode: tolerance of target temperature.	★ 5
Fan1 Start Target Temp	In Thermal Cruise Mode: start temperature.	★ 40
Fan1 Full Target Temp	In Thermal Cruise Mode: full speed temperature.	★ 60
Fan1 Low End	In Thermal Cruise Mode: low end of fan speed (0-100%)	★ 5
Smart Fan1 Control Mode [Control Mode]		
Smart Fan1 Speed (%)	Set smart speed. 0-100%	★ 100

Serial Port Console Redirection

Serial Port Console Redirection



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

Console Redirection Settings

Configuration		Aptio Setup - AMI
COM0 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Terminal Type	[VT100Plus]	
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]	
		⇧+: Select Screen ⇧↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit
Version 2.22.1284 Copyright (C) 2022 AMI		

Feature	Description	Options
Terminal Type	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	★VT100Plus, ANSI, 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 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 signal.	★None, Hardware RTS/CTS
VT-UTF8 Combo Key Support	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals	★Enabled, Disabled

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Recorder Mode	With this mode enabled only text will be sent. This is to capture Terminal data.	★Disabled, Enabled
Resolution 100x31	Enables or disables extended terminal resolution	★Disabled, Enabled
Putty KeyPad	Select FunctionKey and KeyPad on Putty	★VT100, LINUX,XTERMR6, SCO,ESCN,VT400

EC Firmware Update



Feature	Description	Options
Select File	Select ROM image	Bin file to the USB DOK

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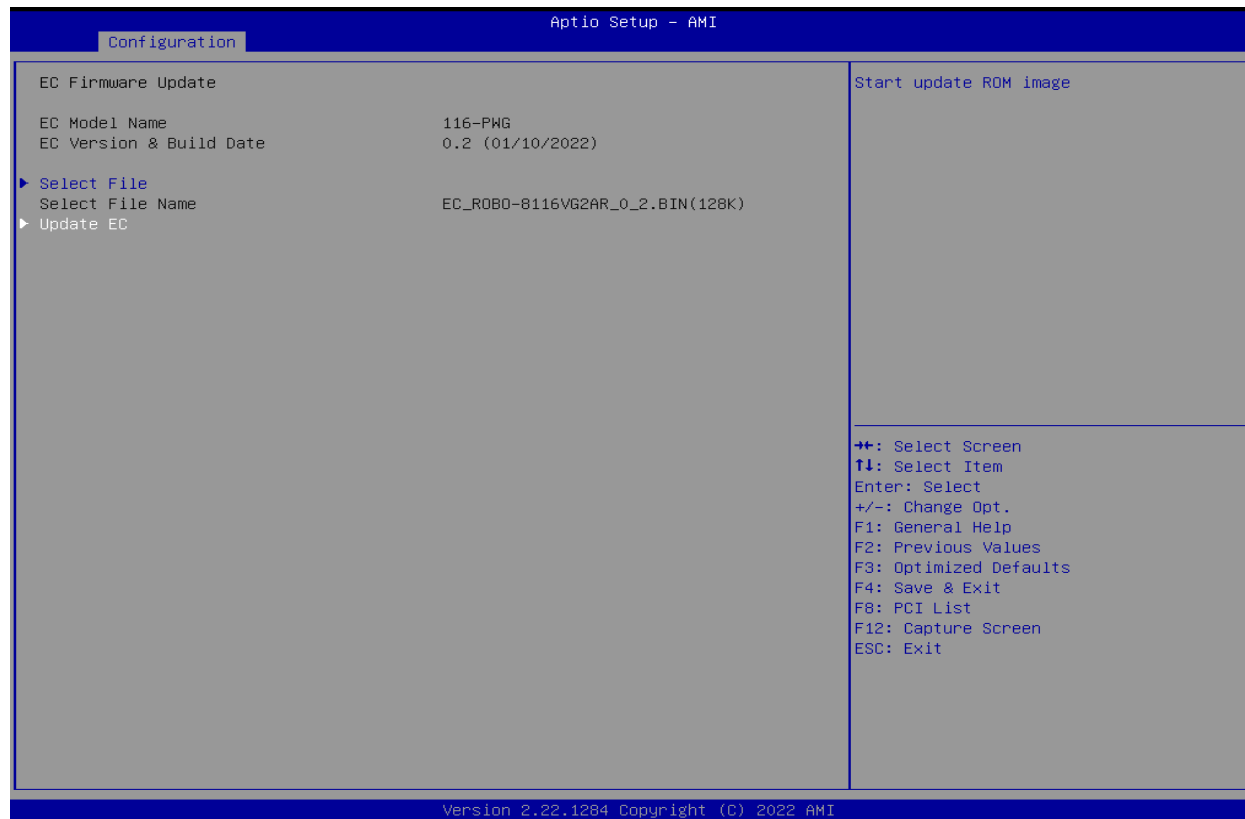
Update EC

Step 1. Prepare a USB DOK.

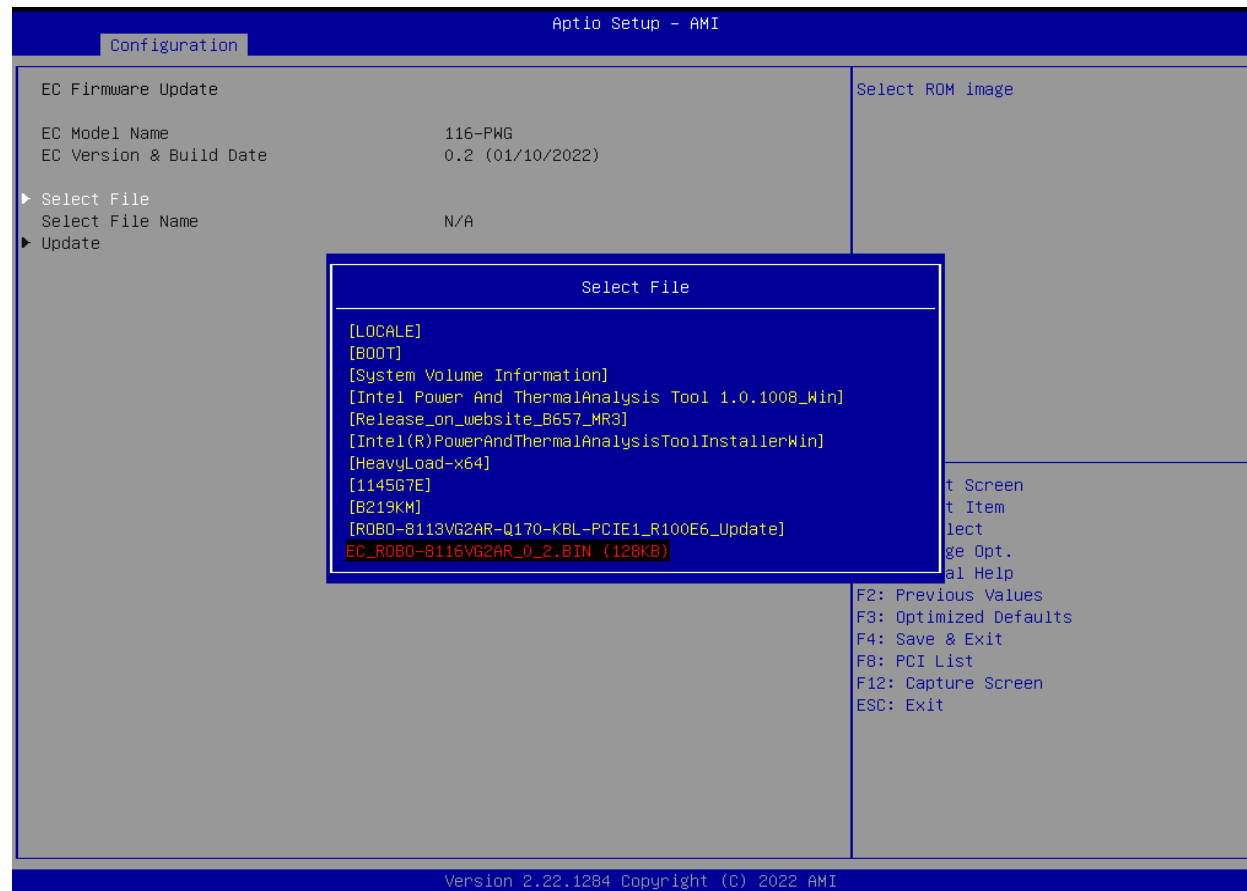
Step 2. Unzip update file to the USB DOK.

Step 3. Select File System (USB DOK)

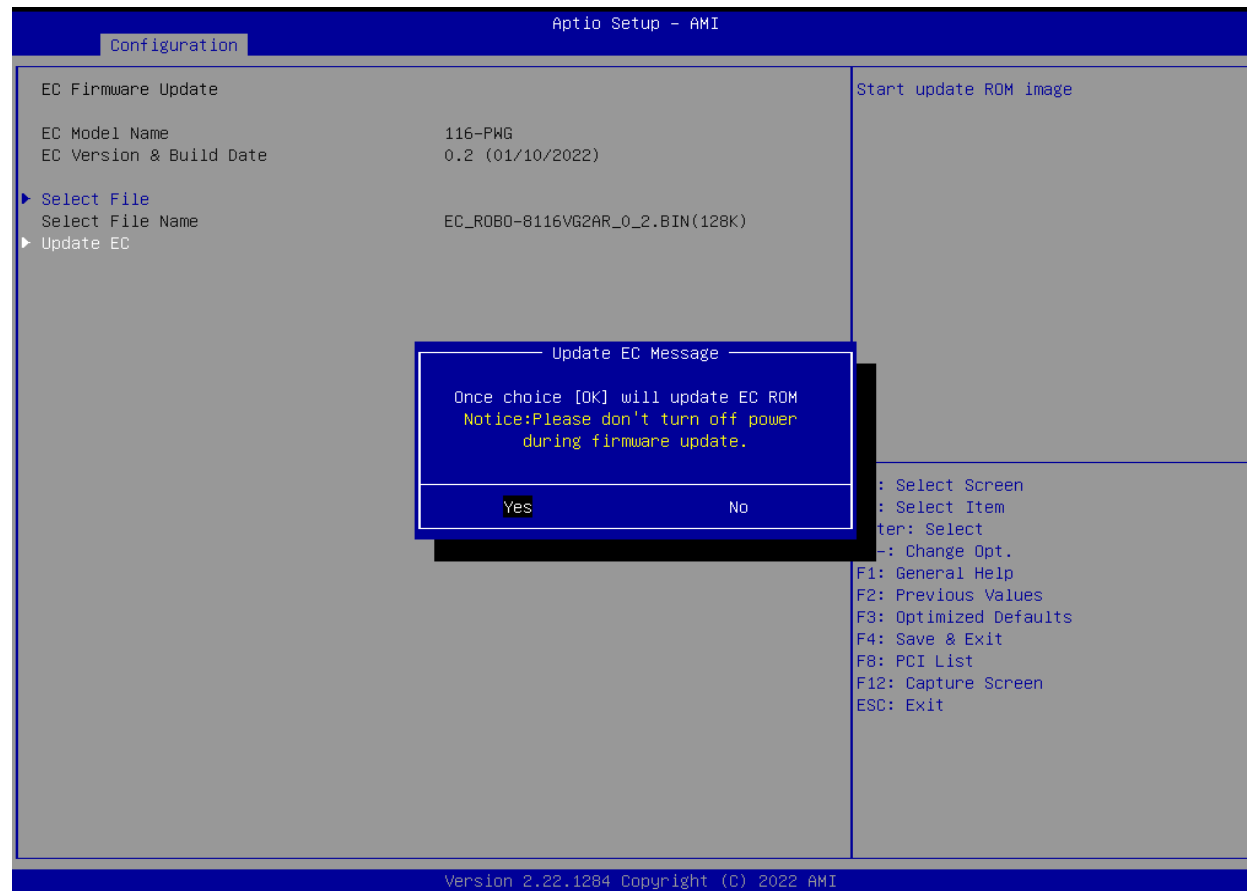
Step 4. Select Update EC



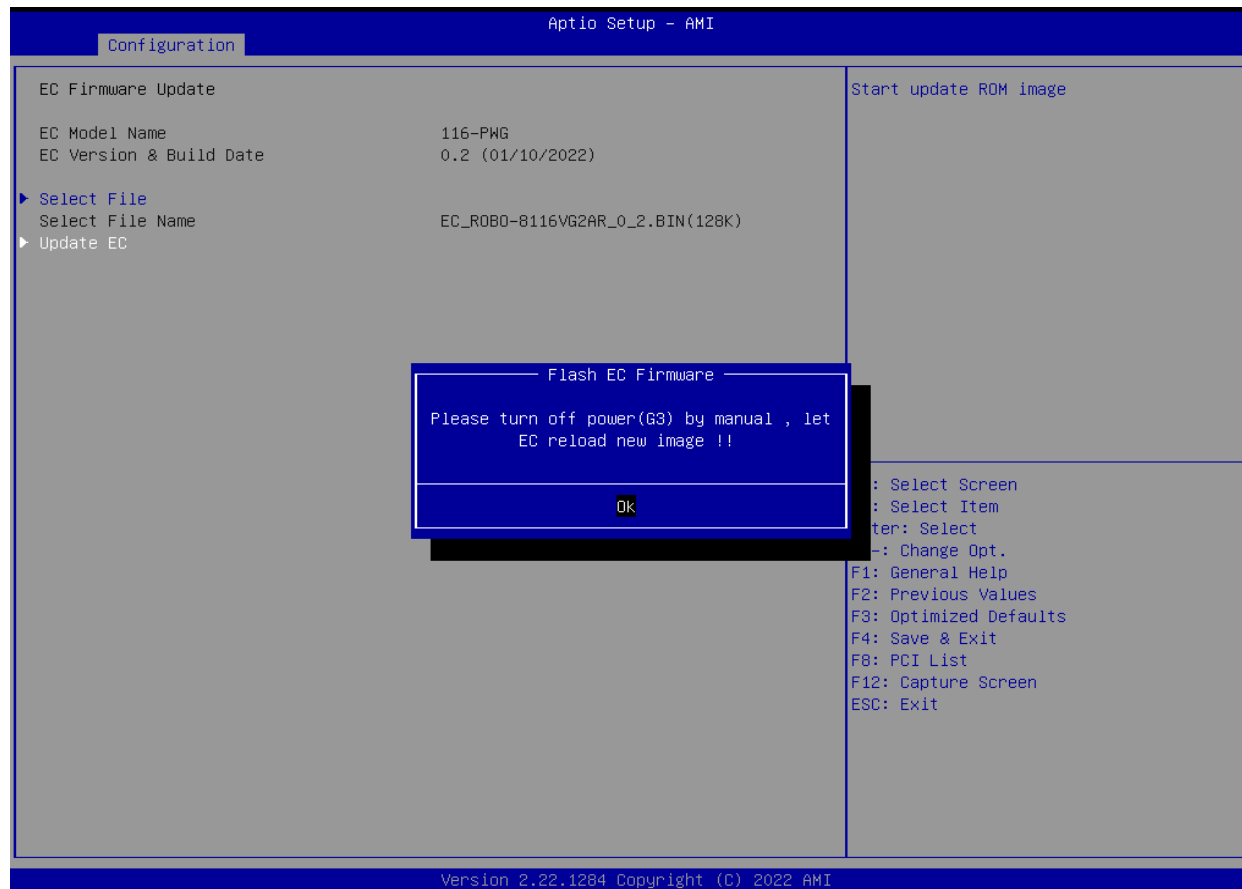
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ROBO-8116G2AR



ROBO-8116G2AR



6.2.3 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	

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Secure Boot

Secure Boot configuration

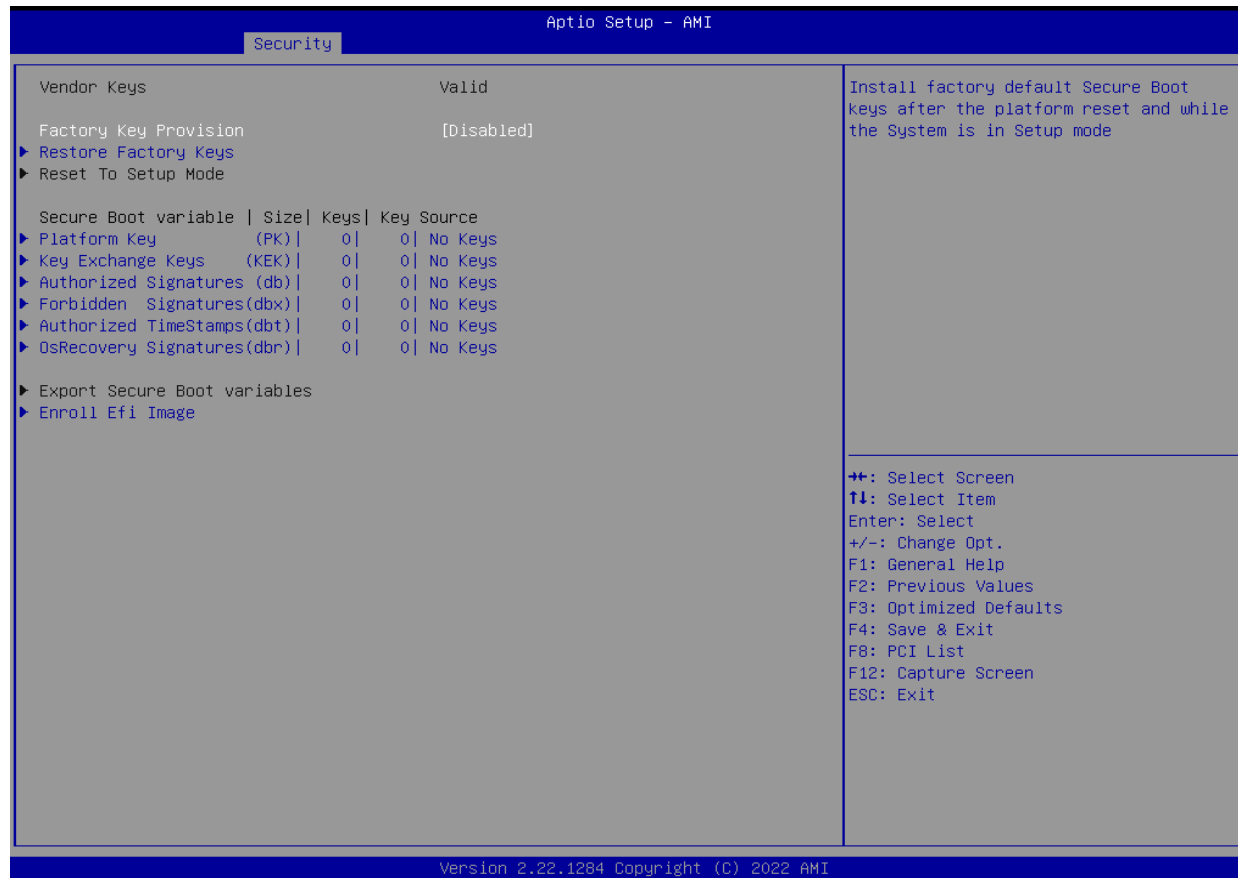


Feature	Description	Options
Secure Boot	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.	★ Disabled, Enabled
Secure Boot Mode	Secure Boot Mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication	★ Custom ,Standard
Restore Factory keys	Force System to User Mode. Install factory default Secure Boot key databases	★ Yes, No

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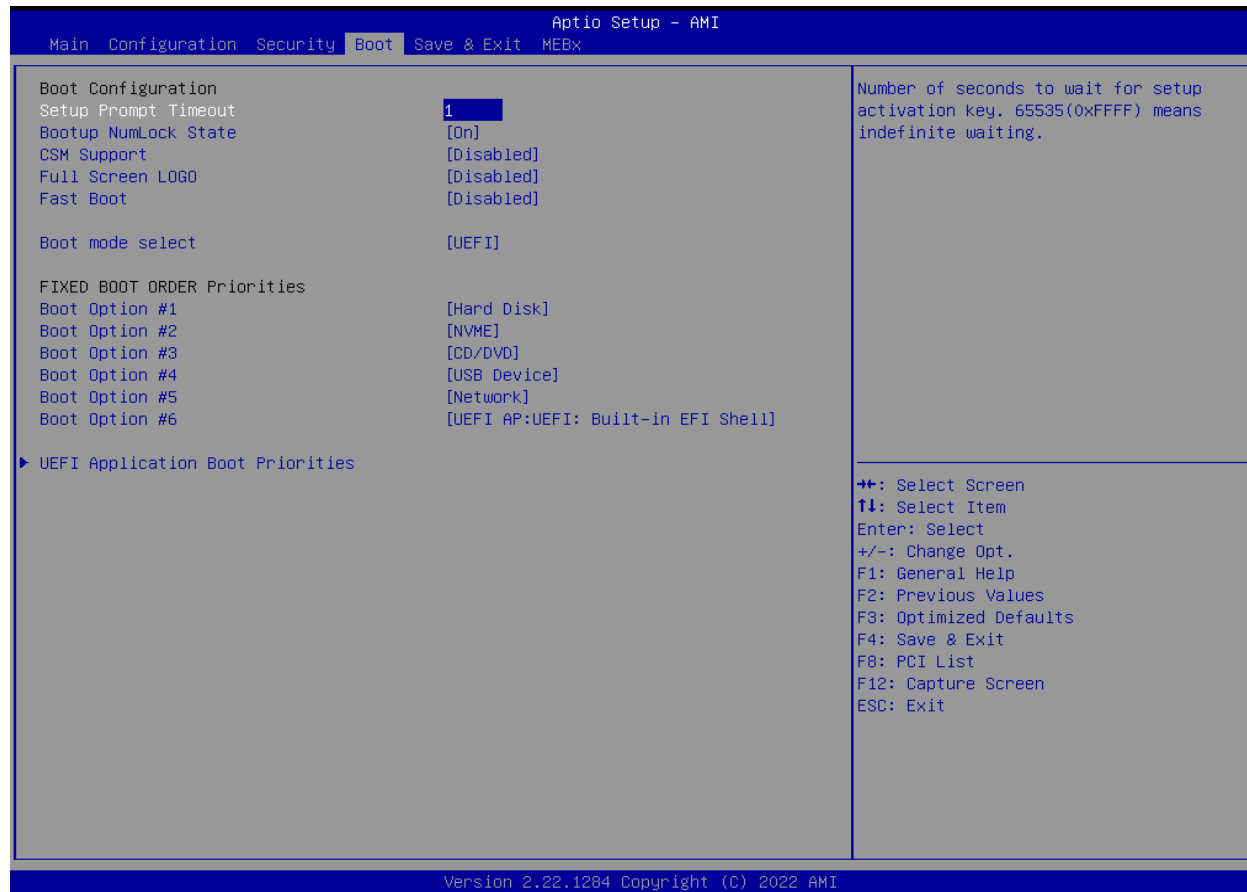
Key Management

Enabled expert users to modify secure Boot Policy variables without variable authentication

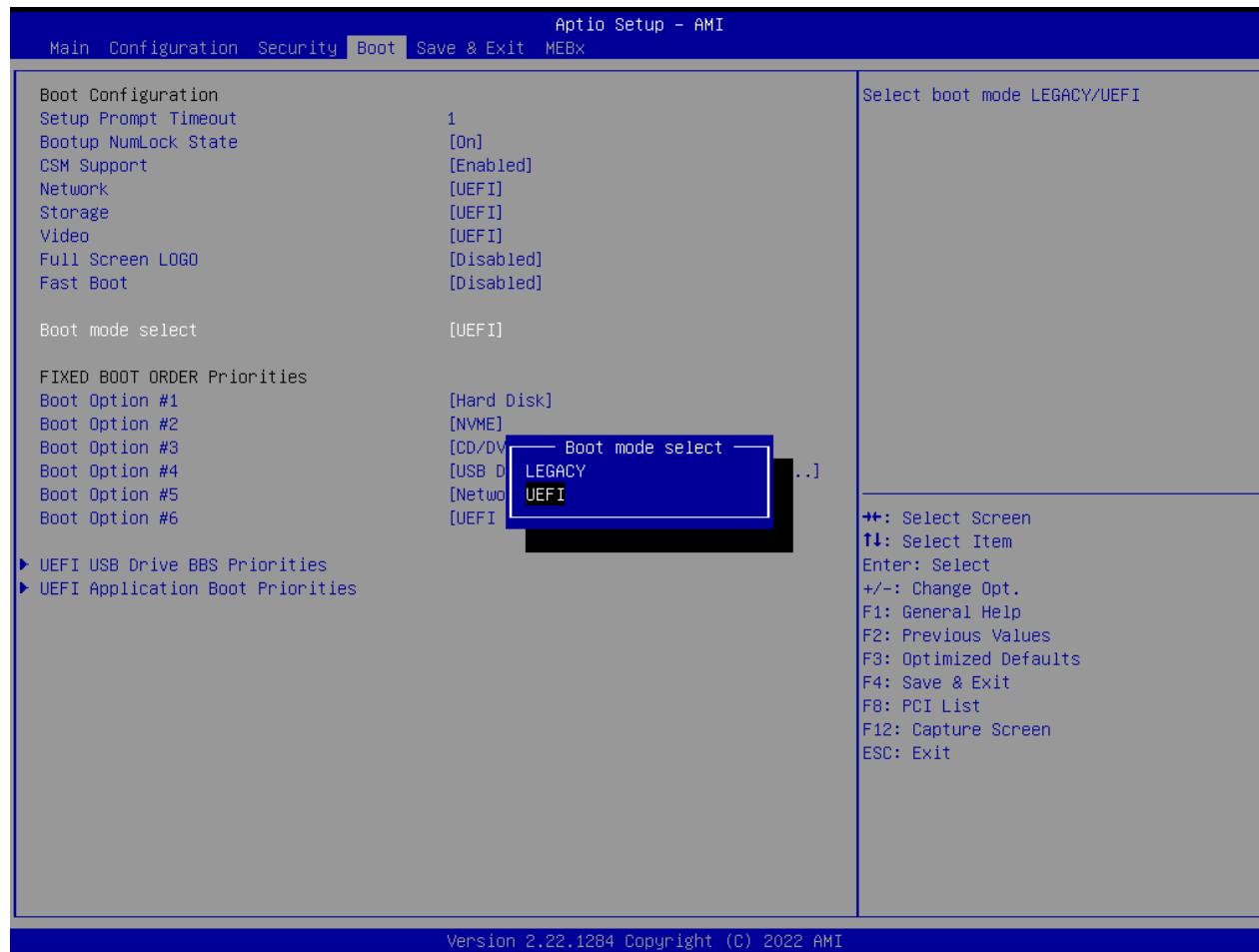


Feature	Description	Options
Factory keys Provision	Install factory default Secure Boot key after the platform reset and while the System is in Setup mode.	★ Disabled, Enabled
Restore Factory keys	Force System to User Mode. Install factory default Secure Boot key databases	★ Yes, No
Platform Key(PK)	Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed	
Key Exchange Keys		
Authorized Signatures		
Forbidden Signatures		
Authorized TimeStamps		
OsRecovery Signatures		
Enroll Efi Image	Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of PE image into Authorized Signature Database (db)	

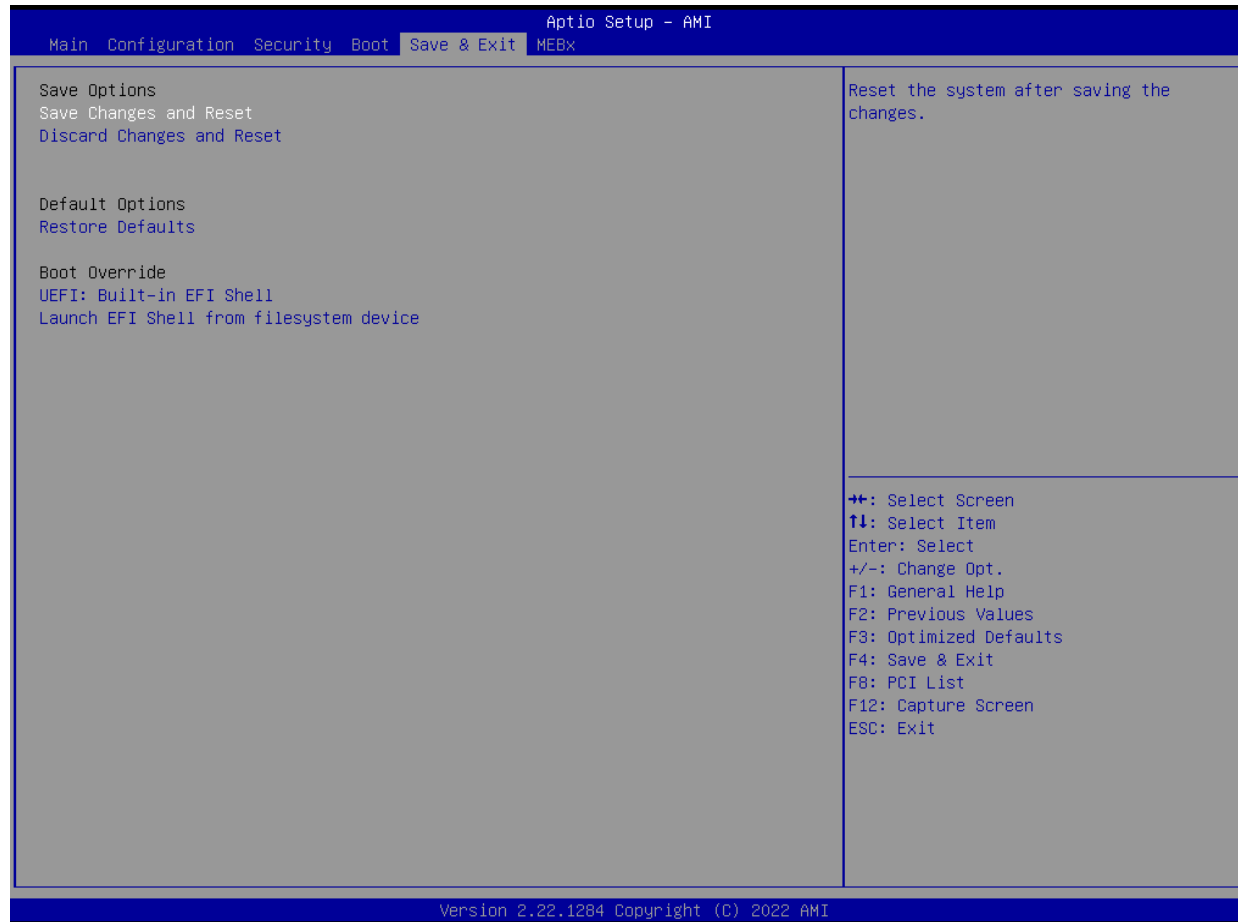
6.2.4 Boot Boot Configuration



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 or disable CSM Support.	★Disabled, Enabled
Network	Controls the execution of UEFI and Legacy Network 0pROM	Do not launch, ★UEFI, Legacy
Storage	Controls the execution of UEFI and Legacy Storage 0pROM	Do not launch, ★UEFI, Legacy
Video	Controls the execution of UEFI and Legacy Video 0pROM	Do not launch, ★UEFI, Legacy
Full Screen LOGO	Enable or disable Quiet Boot option and Full screen Logo.	★Disabled, Enabled
Fast Boot	Enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.	★Disabled, Enabled
Boot mode select	Select boot mode LEGACY/UEFI	★UEFI, Legacy
Boot Option #1 ~ #6	Sets the system boot order	★Hard Disk, NVME, CD/DCD, USB Device, Network, UEFI AP:UEFI: Built-in EFI Shell, Disabled
UEFI Application Boot Priorities	Specifies the Boot Device Priority sequence from available UEFI Application	



6.2.5 Save & Exit



Feature	Description	Options
Save Changes and Reset	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.	

6.2.6 MEBx



Feature	Description	Options
Intel (R) ME Password	MEBx Login	

7 Troubleshooting

This section provides a few useful tips to quickly get ROBO-8116 running with success. This section will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

7.1 Hardware Quick Installation

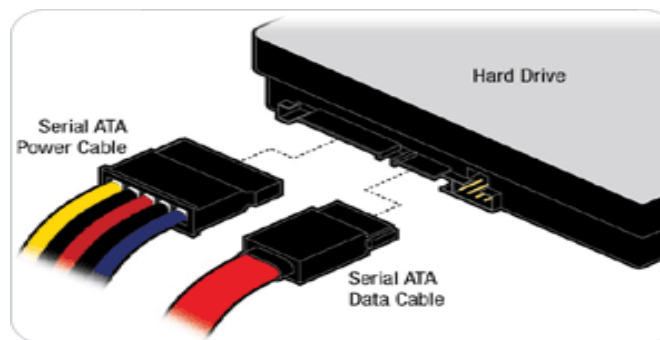
ATX Power Setting

Unlike other Single board computer, ROBO-8116 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— J12 (ATX 8 Pin Connector (For CPU Power)) on the ROBO-8116 board & 20 + 4 pins ATX Power Connector on the carrier board

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 doesn't require setting up Master and Slave, which can reduce mistake of hardware installation.



7.2 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on ATX power. DDR5 So-DIMM Memory, keyboard, mouse, SATA hard disk, HDMI or 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-8116, 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.

7.3 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 JP2 on the ROBO-8116 board to set it from 1-2 short wait 5 seconds to clean your password then set it back to 1-2 open to switch on your power supply.

JP2: RTC & CMOS CLR Jumper



PIN No.	Signal Description
1-2	CLR_CMOS
2-3	CLR_RTC
1/3-x	NORMAL_Default

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Question: How to update the BIOS file of ROBO-8116

Answer: 1. Please visit web site of [Portwell download center](http://www.portwell.com.tw/support/download) as below hyperlink

<http://www.portwell.com.tw/support/download>

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

3. Select "Search download" and type the keyword "ROBO-8116"

4. ROBO-8116 BIOS UEFI Update SOP process

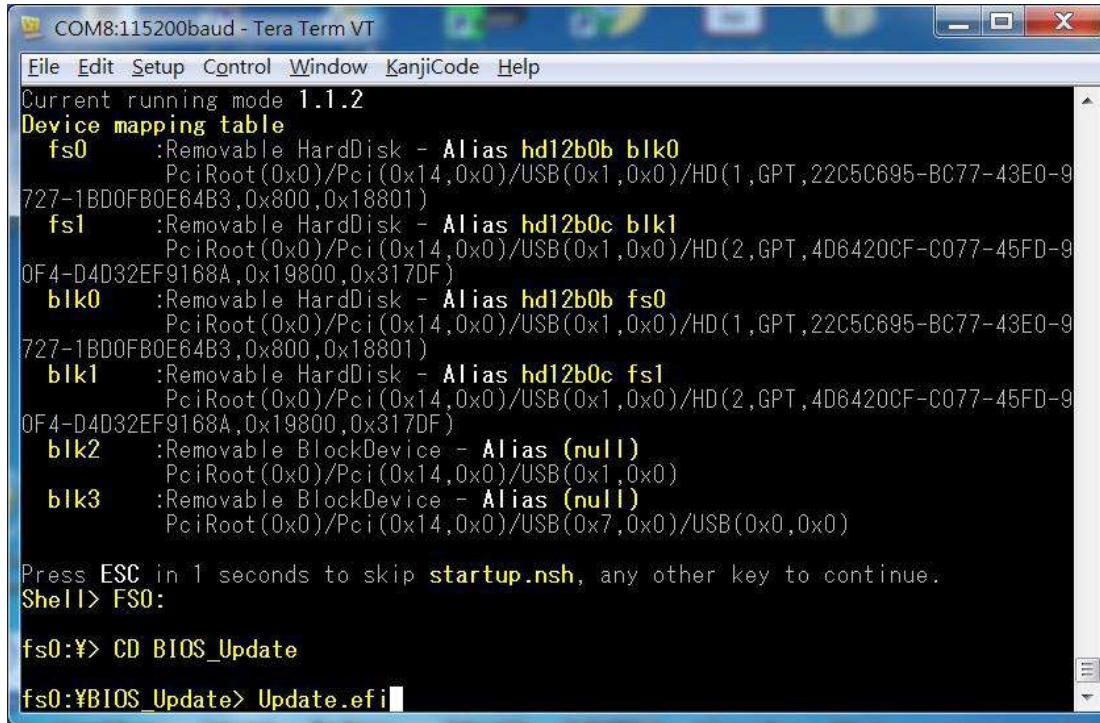
Step 1. Prepare a USB DOK.

Step 2. Unzip update file to the USB DOK.

Step 3. Plug the USB DOK into the target system and boot from UEFI Shell. (Diagrammatic sketch)



Step 4. Under the UEFI shell, direct to your USB DOK, below is an example uses fs0. Then direct to the folder with updated file and type command: "update" and press enter. (Diagrammatic sketch)



```
COM8:115200baud - Tera Term VT
File Edit Setup Control Window KanjiCode Help
Current running mode 1.1.2
Device mapping table
fs0      :Removable HardDisk - Alias hd12b0b blk0
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x1,0x0)/HD(1,GPT,22C5C695-BC77-43E0-9
          727-1BD0FB0E64B3,0x800,0x18801)
fs1      :Removable HardDisk - Alias hd12b0c blk1
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x1,0x0)/HD(2,GPT,4D6420CF-C077-45FD-9
          0F4-D4D32EF9168A,0x19800,0x317DF)
blk0     :Removable HardDisk - Alias hd12b0b fs0
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x1,0x0)/HD(1,GPT,22C5C695-BC77-43E0-9
          727-1BD0FB0E64B3,0x800,0x18801)
blk1     :Removable HardDisk - Alias hd12b0c fs1
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x1,0x0)/HD(2,GPT,4D6420CF-C077-45FD-9
          0F4-D4D32EF9168A,0x19800,0x317DF)
blk2     :Removable BlockDevice - Alias (null)
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x1,0x0)
blk3     :Removable BlockDevice - Alias (null)
          PciRoot(0x0)/Pci(0x14,0x0)/USB(0x7,0x0)/USB(0x0,0x0)

Press ESC in 1 seconds to skip startup.nsh, any other key to continue.
Shell> FS0:

fs0:¥> CD BIOS_Update
fs0:¥BIOS_Update> Update.efi
```

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Step 5. The updating process will start and you can see the updating progress. Once finished, please power off and restart the system. (Diagrammatic sketch)

```
COM8:115200baud - Tera Term VT
File Edit Setup Control Window KanjiCode Help

UPDATING...
>>DO NOT TURN OFF POWER<<

PLEASE RESET SYSTEM
AFTER UPDATING COMPLETE!
*****
64 Bit
Intel (R) Flash Programming Tool Version: 15.40.0.1017
Copyright (C) 2005 - 2020, Intel Corporation. All rights reserved.
Reading HSFSTS register... Flash Descriptor: Valid

--- Flash Devices Found ---
ID:0xC22019 Size: 32768KB (262144Kb)

GbE Region does not exist.

- Erasing Flash Block [0x2000000] - 100 percent complete.
- Programming Flash [0x2000000] 32768KB of 32768KB - 100 percent complete.
RESULT: The data is identical.32768KB of 32768KB - 100 percent complete.

FPT Operation Successful.

fs0:¥BIOS_Update>
```

Step 6. 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.

Question: What are the display options while using ROBO-8116 board?

Answer: - The ROBO-8116 supports DVI-D port on bracket (via cable) and On-Board HDMI / On-Board DP display output.

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/?lang=zh-hant>

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

Thanks

8 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 you assistance on developing.

Portwell Worldwide:	
Portwell, Inc.	E-mail: info@portwell.com.tw
Shanghai Portwell	E-mail: info@portwell.com.cn
Portwell Japan, Inc	E-mail: info@portwell.co.jp
American Portwell Technology	E-mail: info@portwell.com
European Portwell Technology	E-mail: info@portwell.eu
Portwell UK Ltd.	E-mail: info@portwell.co.uk
Portwell Deutschland GmbH	E-mail: info@portwell.eu
Portwell India Technology	E-mail: info@portwell.in
Portwell Korea, Inc.	E-mail: info@portwell.co.kr
Portwell Latin America	E-mail: vendas@portwell.com.br

9 Industry Specifications

9.1 Industry Specifications

The list below provides links to industry specifications that apply to Portwell modules.

Low Pin Count Interface Specification, Revision 1.0 (LPC) <http://www.intel.com/design/chipsets/industry/lpc.htm>

Universal Serial Bus (USB) Specification, Revision 2.0 <http://www.usb.org/home>

PCI Specification, Revision 2.3 <https://www.pcisig.com/specifications>

Serial ATA Specification, Revision 3.0 <http://www.serialata.org/>

PCI Express Base Specification, Revision 2.0 <https://www.pcisig.com/specifications>