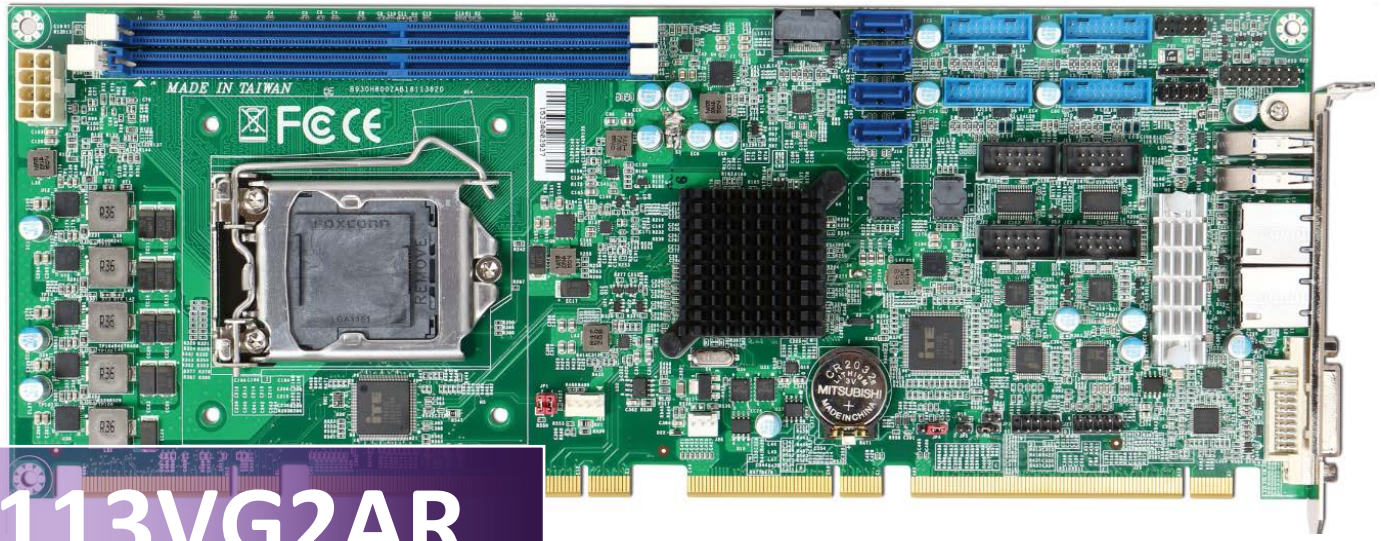

ROBO-8113VG2AR

PICMG 1.3 Single Host Board

Version 1.1

Revision History

R1.0	Preliminary

Contents

Preface

This user's guide provides information about the components, features, connectors and BIOS Setup menus available on the ROBO-8113VG2AR. This document should be referred to when designing PICMG 1.3 application. The other reference documents that should be used include the following:

- ✧Intel SkyLake-S/KabyLake-S Design Guide
- ✧Intel SkyLake-S/KabyLake-S Specification

Please contact Portwell Sales Representative for above documents.

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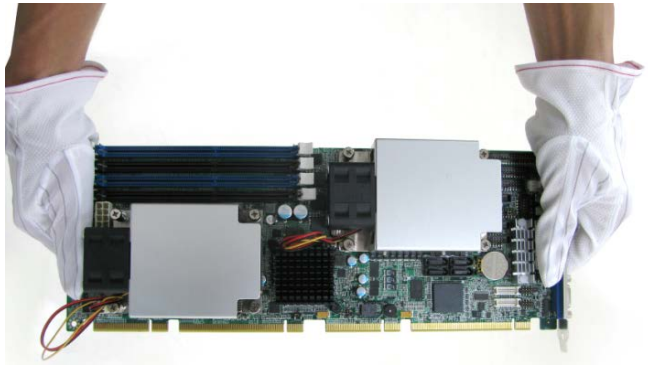
Notice

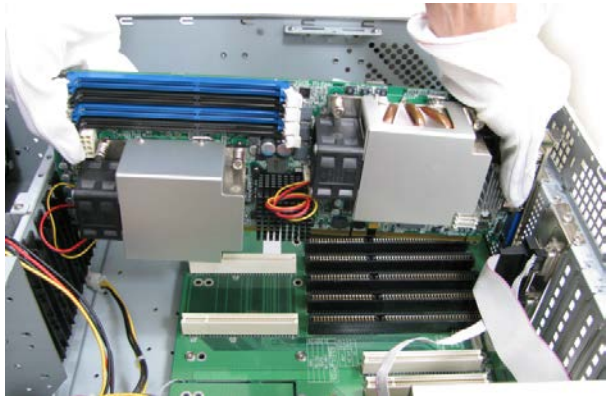
SBC Handling and Installation Notice

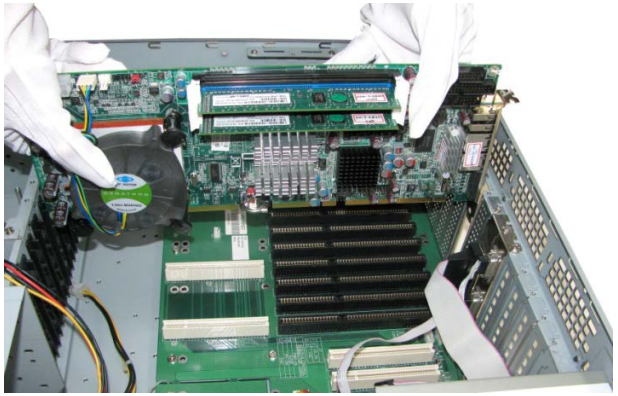
- Handling and Installing SBC

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.







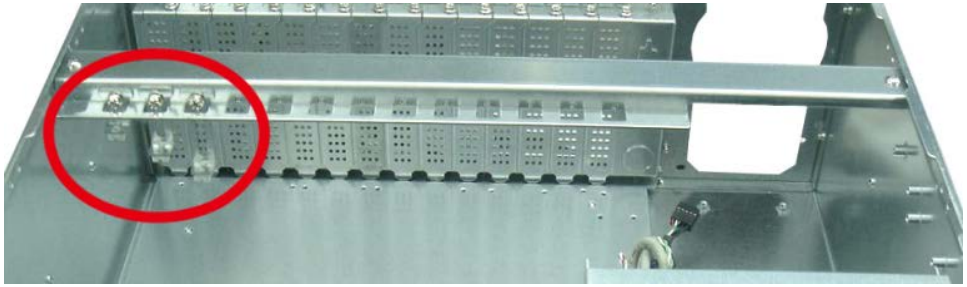
■ Fix your SBC in System

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.

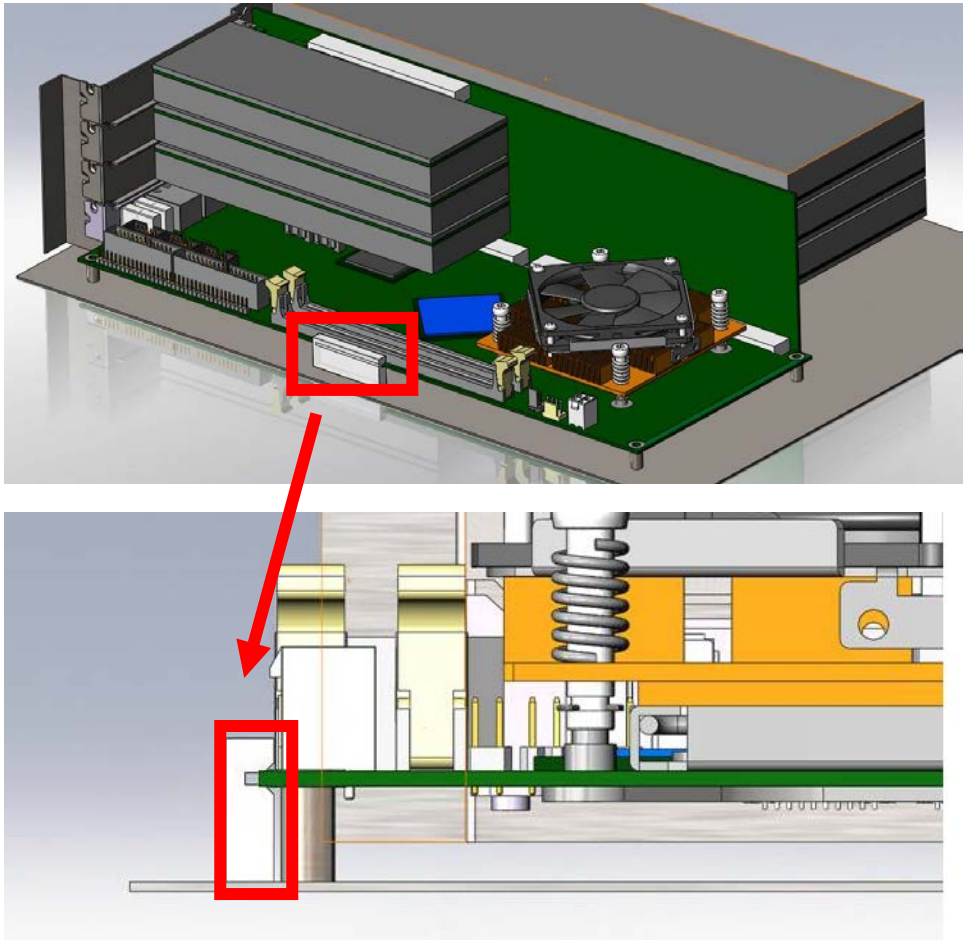
Example:

- 4U chassis :

➔ Use L type mental 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-8113VG2AR, a PICMG 1.3 Single Host Board (SHB) with the latest Intel 7th and 6th Generation Core processors supported from E3 class Xeon processors to Core i3 processors. Portwell's ROBO-8113VG2AR implements flexible PCI Express Gen 3 expansion by one PCI Express x16 or two PCI Express x 8 or one PCI Express x8 and two PCI Express x4 with dedicated processor sku, which is ideal for a range of applications, such as Industrial Automation, Digital Signage, and Medical.

ROBO-8113VG2AR adopt Intel C236 and Q170 PCH. Providing up to 32GB DDR4 system memory supported with ECC or non-ECC option.
ROBO-8113VG2AR with the 7th and 6th 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-I (VGA and DVI-D) and HDMI up to 4Kx2K. Rich I/O functions are also provided by ROBO-8113VG2AR single host board, which is 10x USB 3.0, 2x USB 2.0, 6x 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-8113VG2AR not only provides a way to upgrade to use the latest Intel processors, but also supporting legacy elements such as VGA, four PCI expansion, four Serial ports and PS/2 Keyboard and Mouse.

2 Specifications

Main Processor	◆ Intel® Kaby Lake-S/Skylake -S E3-12xxv5/v6 and Core™ i Processors
System BIOS	◆ AMI UEFI BIOS
Main Memory	◆ Up to 32 GB ECC or non-ECC DDR4 on two Long-DIMM sockets. Supports dual channel DDR4 1866/2133 MHz SDRAM
Graphics	◆ Controller: Intel® Gfx Gen 9, HD graphics ◆ VGA: Resolution up to 1920 x 1200 @ 60Hz ◆ DVI-D: Resolution up to 1920 x 1200 @ 60Hz (VGA+DVI-D on bracket by DVI-I port) ◆ HDMI: Resolution up to 4096 x 2160 @ 24Hz
Expansion Interface	◆ From CPU: 1x PCI Express x16 or 2x PCI Express x8 or 1x PCI Express x8 + 2x PCI Express x4 by jumper setting (Gen3 up to 8.0 GT/s) ◆ From PCH: 1x PCI Express x4 or 4x PCI Express x1 by different bios support (Gen 3 up to 8.0 GT/s)
SATA Interface	◆ Six 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: 2x USB 3.0 on bracket, 8x USB 3.0 on board header, 4x USB 2.0 ports through backplane ◆ GPIO connector: 8GPI + 8GPO ◆ Audio Interface: Mic-In / Line-Out / Line-in (on-board header)
Ethernet	◆ Supports dual 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 interface by Intel WGI219LM and WGI210AT controller ◆ Dual RJ45 connector on bracket
TPM	◆ On-board TPM 2.0 support (TPM IC: Infineon SLB9665TT2.0)
High Drive GPIO	◆ One pin-header for GPIO (8bit in &8bit out)

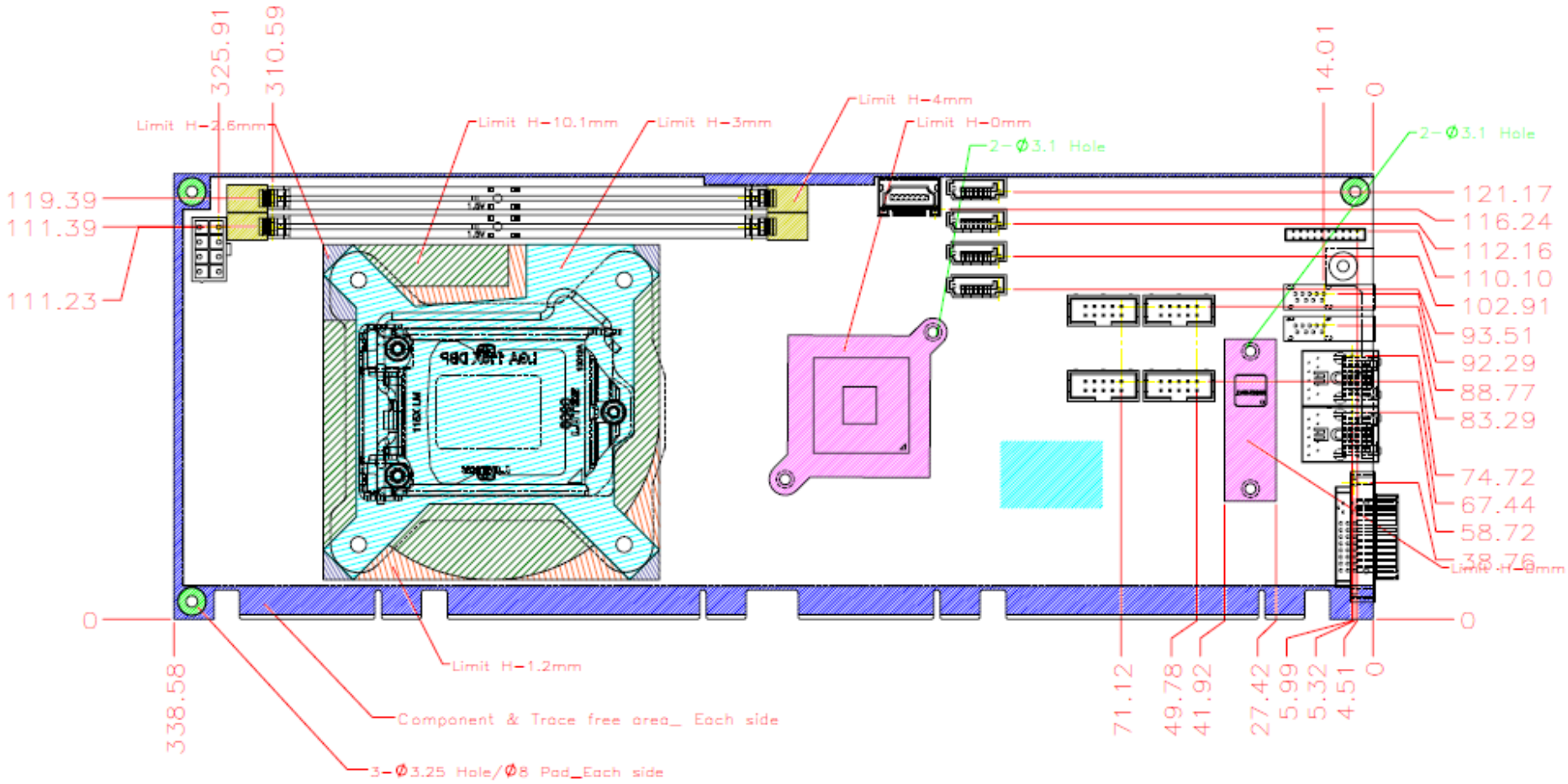
Mechanical and environmental specifications	◆ Operating temperature: 0 ~ 60° C ◆ Storage temperature:-20 ~ 80° C ◆ Humidity: 5 ~ 90% non-condensing ◆ Power supply voltage: ATX ◆ Board size: 338.5mm x 126.39mm, 13.33" (L) x 4.98" (W)

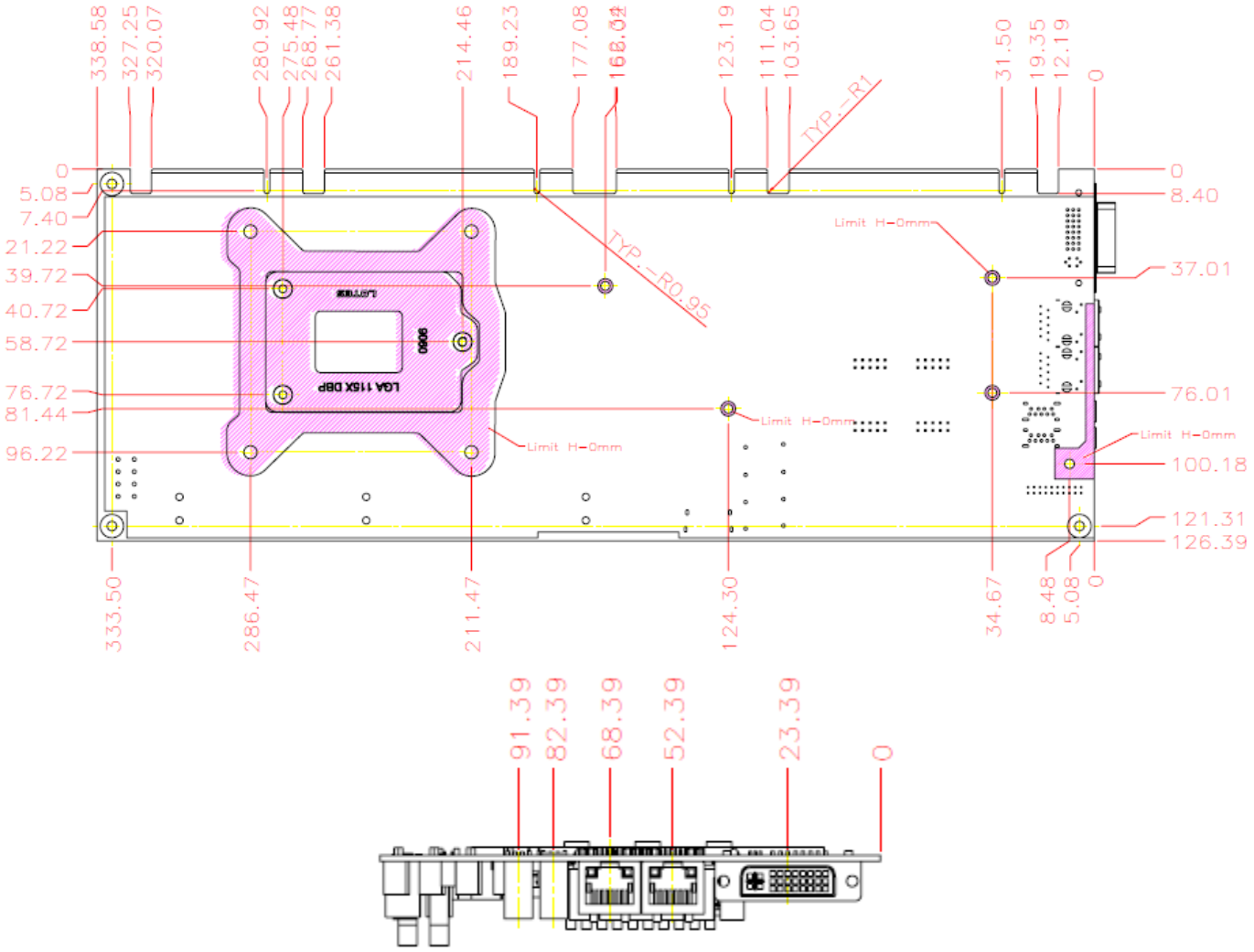
2.1 Supported Operating Systems

The ROBO-8113VG2AR supports the following operating systems.

✧ Windows 7 support
✧ Windows 8.1 / WEI 8.1 support
✧ Windows 10 full support
✧ Kernel.org Distribution

2.2 Mechanical Dimensions




338.58
327.25
320.07
280.92
275.48
268.77
261.38
214.46
189.23
177.08
123.19
111.04
103.65
31.50
19.35
12.19
0
TYP.--R1
TYP.--R0.95
Limit H-0mm
0
5.08
7.40
21.22
39.72
40.72
58.72
76.72
81.44
96.22
0
8.40
37.01
76.01
100.18
121.31
126.39
333.50
286.47
211.47
124.30
34.67
8.48
5.08
0
91.39
82.39
68.39
52.39
23.39
0

2.3 Power Consumption

Test Configuration	
CPU Type	Intel® Core™ i5-6500TE CPU @ 3.2GHz (ES) L3: 6MByte
SBC BIOS	Portwell, Inc. ROBO-8113VG2AR-Q170-PCIE1 TEST BIOS (60105T00)
Memory	WARIS UB-DIMM DDR4 2133 8GB*2 (SEC K4A4G085WD)
VGA Card	Onboard Intel® HD Graphics 530
VGA Driver	Intel® HD Graphics 530 Version: 20.19.15.4312
LAN Card	Onboard Intel® Ethernet Connection(2) I219-LM
LAN Driver	Intel® Ethernet Connection(2) I219-LM Version: 12.13.17.7
LAN Card	Onboard Intel® I210 Gigabit Network Connection
LAN Driver	Intel® I210 Gigabit Network Connection Version: 12.14.7.0
Audio Card	Onboard Realtek ALC886 High Definition Audio
Audio Driver	Realtek ALC886 High Definition Audio Version: 6.0.1.7312
Chip Driver	Intel® Skylake-S Chipset Device Software Version: 10.0.27
USB3.0 Driver	Intel® USB 3.0 eXtensible Host Controller Adaptation Driver Version: 1.0.1.45
EC Version	51124T00 (11/24/2015)
CDROM	Pioneer DVR-S19LBK
Power Supply	FSP460-60PFB 460W
Carrier Board	PBPE-11A3
USB3.0 HDD	SP Armor A30
SATA SSD	PLEXTOR DRAH1T-A74658844

Power consumption
ATX:

Item	*Power ON*	*Full Loading 10Min*	*Full Loading 30Min*
CPU +12V	1.09A	2.46A	2.38A
System +12V	0.31A	0.41A	0.38A
System +3.3V	1.27A	1.01A	1.02A
System +5V	1.19A	1.63A	1.63A
System+ Device +12V	0.40A	0.94A	0.89A
System+ Device +5V	2.39A	2.64A	2.68A

2.4 Environmental Specifications

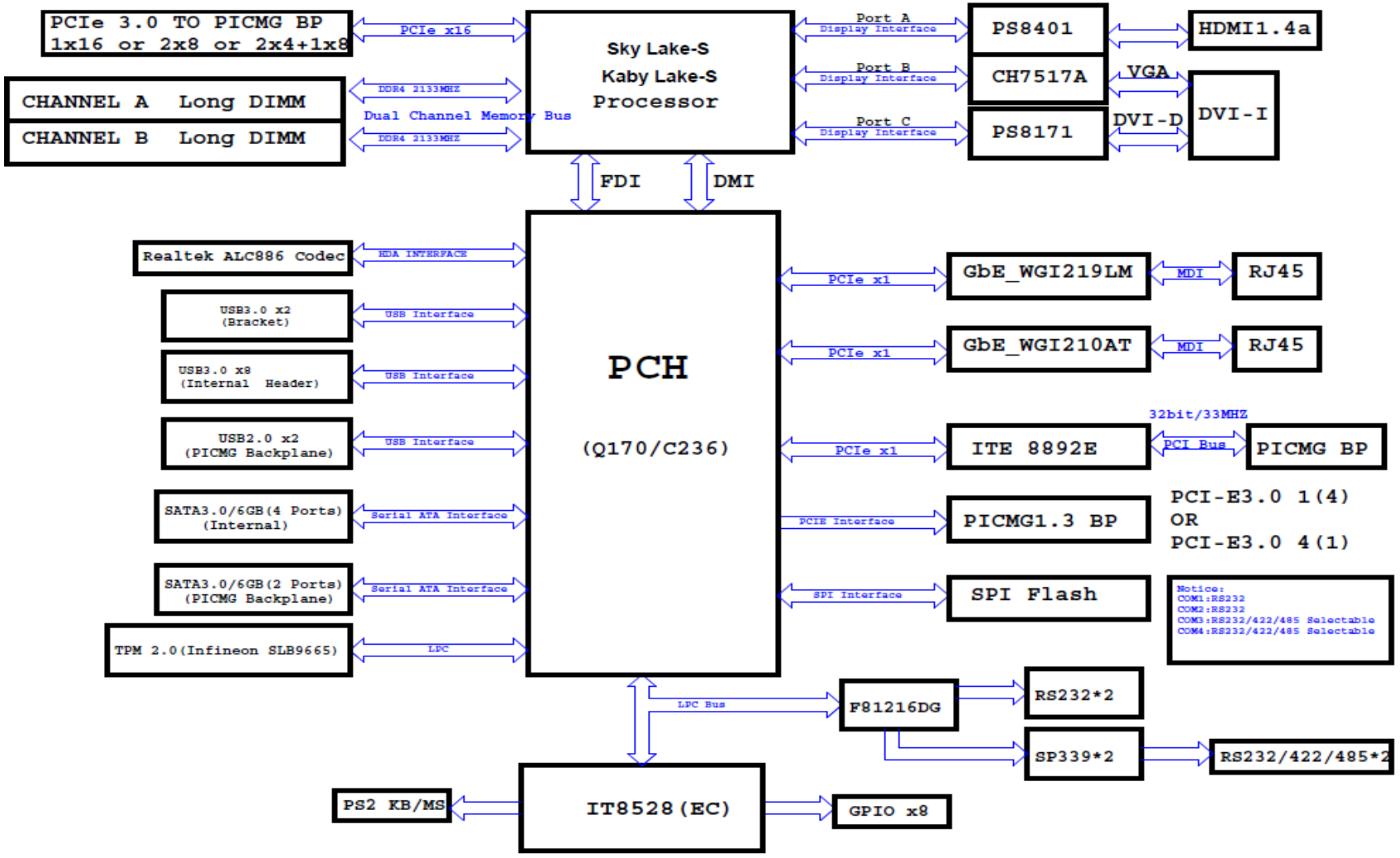
Storage Temperature : -20~80°C

Operation Temperature : 0~60°C

Storage Humidity : 5~90%

Operation Humidity: 10~90%

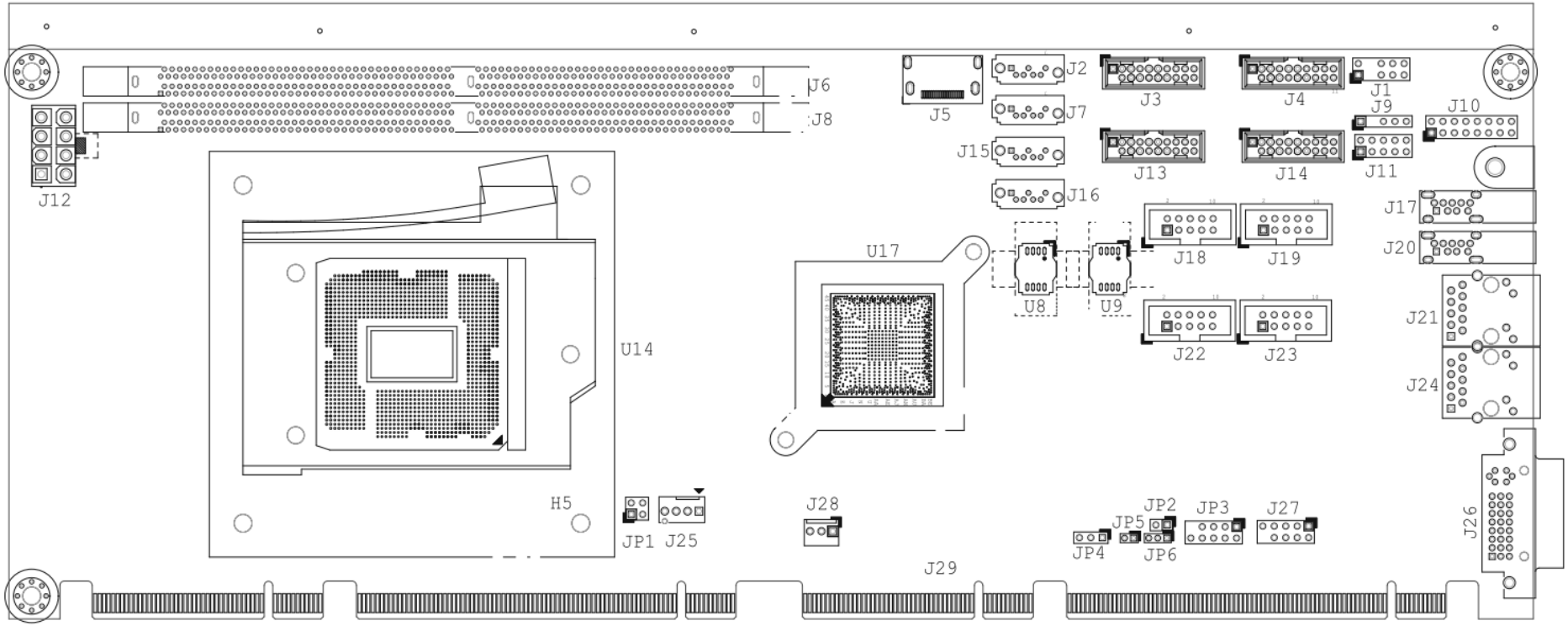
Block Diagram



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.



3.2 Jumpers Settings

For users to customize ROBO-8113VG2AR'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.

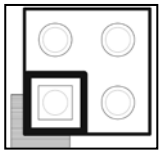
Jumper Table

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

Jump Function List:

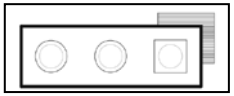
Jumper	Function	Remark
JP1	Configure PCIEx16, x8 (For C236/Q170 only)	Header2Px2/2.54mm
JP2	Auto Power Button(Reserve)	PH2Px1/2.54mm
JP3	LPC 80 Port Pin Header	Header5Px2/2mm
JP4	Clear CMOS Setup	PH3Px1/2.54mm
JP5	WDT Enable/Disable Pin	PH2Px1/2.54mm
JP6	ATX/AT Select Pin	PH3Px1/2.54mm

JP1: 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□

JP4: Clear CMOS Setup



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

JP5: WDT Enable/Disable Pin

PIN No.	Description
1-2 Short	WDT Enable
1-2 Open	WDT Disable

JP6: ATX/AT Select Pin

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

3.3 Connector Settings

Connector Allocation

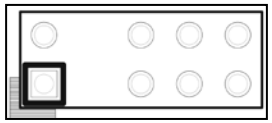
I/O peripheral devices are connected to the interface connectors

Connector Function List

Connector	Function	Remark
J1	Keyboard/Mouse Connector	Header 6Px2/2.54mm
J2/J7/J15/J16	SATA Connector	
J3/J4/13/14	USB2.0/3.0 connector	
J5	HDMI Connector	
J6	DDR4 Channel B Slot	
J8	DDR4 Channel A Slot	
J9	SM Bus Pin Header	PH5Px1/2.54mm
J10	Front Panel Pin Header	Header 8Px2/2.54mm
J11	GPIO Pin Header	Header 5Px2/2.54mm
J12	ATX 8 Pin Connector(For CPU Power)	
J17/J20	USB2.0/3.0 connector(D-Sub)	
J18	COM1 Pin Header	
J19	COM2 Pin Header	

J21	RJ45 Connector for I210	
J22	COM4 Pin Header	
J23	COM3 Pin Header	
J24	RJ45 Connector for I219	
J25	CPU Fan	
J26	DVI-I Connector	
J27	Audio Pin Header	Header 5Px2/2.54mm
J28	System Fan	

J1: Keyboard/Mouse Connector

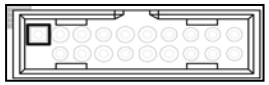


PIN No.	Signal Description	PIN No.	Signal Description
1	Mouse Data	2	Keyboard Data
3	N/C	4	N/C
5	Ground	6	Ground
7	PS2 Power	8	PS2 Power
9	Mouse Clock	10	Keyboard Clock

J2/J7/J15/J16：SATA Connector

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

J3/J4/13/14: USB2.0/3.0 connector

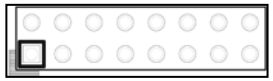


PIN No.	Description	PIN No.	Description
1	5V_Dual		
2	USB3.0_RX_N	19	5V_Dual
3	USB3.0_RX_P	18	USB3.0_RX_N
4	Ground	17	USB3.0_RX_P
5	USB3.0_TX_N	16	Ground
6	USB3.0_TX_P	15	USB3.0_TX_N
7	Ground	14	USB3.0_TX_P
8	USB2.0_N	13	Ground
9	USB2.0_P	12	USB2.0_N
10	Ground	11	USB2.0_P

J9: SM Bus Pin Header

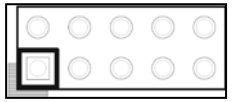
PIN No.	Description
1	Clock
2	NC
3	Ground
4	Data

J10: Front Panel Connector



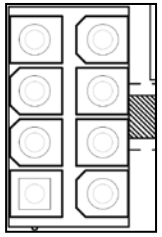
PIN No.	Description	PIN No.	Description
1	PWR_LED (+)	2	VCC
3	PWR_LED (-)	4	NC
5	I219_LAN (+)	6	NC
7	I219_LAN (-)	8	BUZZER
9	I210_LAN (-)	10	Ground
11	I210_LAN (+)	12	Power Button Signal
13	HDD_LED (+)	14	Reset Signal
15	HDD_LED (-)	16	Ground

J11: GPIO Pin Header



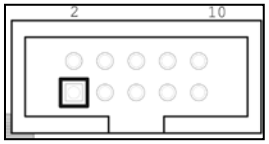
PIN No.	Description	PIN No.	Description
1	GPIO_0	2	GPIO_4
3	GPIO_1	4	GPIO_5
5	GPIO_2	6	GPIO_6
7	GPIO_3	8	GPIO_7
9	Ground	10	VCC

J12: ATX 8 Pin Connector(For CPU Power)



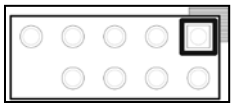
PIN No.	Description	PIN No.	Description
1	Ground	5	+12V
2	Ground	6	+12V
3	Ground	7	+12V
4	Ground	8	+12V

J18/J19/J22/J23: COM1/COM2/COM3/COM4 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

J27: 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	10	Ground

4 Signal Descriptions

4.1 Watch Dog Signal

```
#Define WDTCFG 0x06 //WDT Timer Counter Register
#Define WDTMIN 0x07  //WDT Timer Counter Register (Minute)
#Define WDTSEC 0x08 //WDT Timer Counter Register (Second)


VOID    Write_EC_SRAM(UINT8 Offset,UINT8 Value){

  IoWrite8(0xE300+Offset,Value);
}

Byte Read_EC_SRAM(UINT8 Offset){
  IoRead8(0xE300+offset,Value);
  return Value;
}

void WDT()
{
        // Enable WDT 30sec
```

```
    Write_EC_SRAM(WDTSEC,30);
    Write_EC_SRAM(WDTCFG,0x01);//Bit0: WDT Enable, BIT1: 0:Second Mode

    // Enable WDT 5min
    Write_EC_SRAM(WDTSEC,5);
    Write_EC_SRAM(WDTCFG,0x03);//Bit0: WDT Enable, BIT1: 1:Minute Mode

    // Enable WDT 10min, 20sec
    Write_EC_SRAM(WDTSEC,20);
    Write_EC_SRAM(WDTSEC,10);
    Write_EC_SRAM(WDTCFG,0x03);//Bit0: WDT Enable, BIT1: 1:Minute Mode
}
```

4.2 GPIO Signal

```
#Define GPCR 0x2B//GPIO Counter Register, Bit7 = GPIO7, Bit6 = GPIO6, ..., 0: Output; 1: Input
#Define GPDR 0x2C//GPIO Data Register, Bit7 = GPIO7, Bit6 = GPIO6, ..., 0: Low; 1: High

VOID    Write_EC_SRAM(UINT8 Offset,UINT8 Value){

  IoWrite8(0xE300+Offset,Value);
}

Byte Read_EC_SRAM(UINT8 Offset){
  IoRead8(0xE300+offset,Value);
  return Value;
}

void GPIO()
{
        int Temp;
        // Get GPIO data
        Temp = Read_EC_SRAM(GPDR);

        // Set GPIO7 High
        Temp |= 0x80;
        Write_EC_SRAM(GPDR,Temp);                    //Bit7: GPIO7 status, 0: Low 1: High
}
```

5 System Resources

5.1 Intel® Skylake-S PCH

Intel® Q170 Chipset (Intel® GL82Q170 PCH)
Intel® C236 Chipset (Intel® GL82C236 PCH)

5.2 Main Memory

ROBO-8113VG2AR provides 2 x 288-pin Long-DIMM sockets which supports DDR4 ECC/non-ECC memory. The maximum memory can be up to 32GB. 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-8113VG2AR 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-8113VG2AR 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-8113VG2AR is based on Intel® Q170/C236 chipset and desktop/workstation processors including Xeon E3-1200v5/Core™ i7 / i5 / i3 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 8, please install its INF before any of other Drivers are installed. You can find very easily this chipset component driver in ROBO-8113VG2AR CD-title

5.3.2 Intel® HD Graphics 530

ROBO-8113VG2AR has integrated Intel® HD Graphics 530 which supports DirectX 12、OpenCL 2.0、OpenGL 4.4. It is the most advanced design to gain an outstanding graphic performance. ROBO-8113VG2AR supports VGA+DVI-D by DVI-I connector on bracket, and on board HDMI display output. This combination makes ROBO-8113VG2AR an excellent performance hardware.

Drivers Support

Please find the Graphic driver in the ROBO-8113VG2AR CD-title. The driver supports Windows 8.

5.3.3 Intel LAN I210AT/I219LM Gigabit Ethernet Controller

- Intel I210AT Gigabit Ethernet controller and 1x RJ45 connectors on bracket
- Intel I219LM Gigabit Ethernet controller and 1x RJ45 connectors on bracket

Drivers Support

Please find Intel I210AT/I219LM LAN driver in /Ethernet directory of ROBO-8113VG2AR CD-title. The driver supports Windows 8.

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

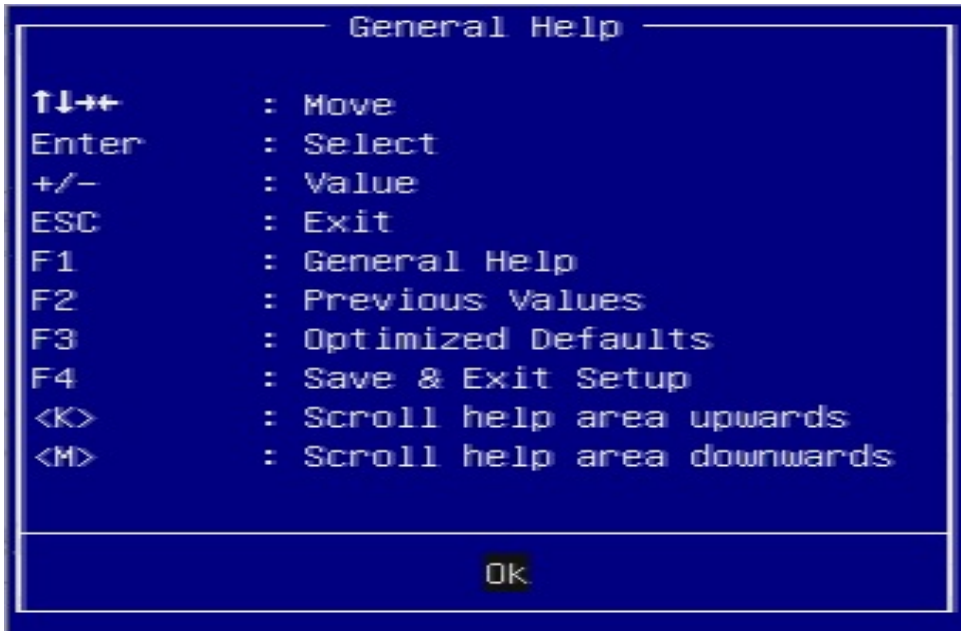
Power on the computer and the system will start POST (Power on Self Test) process. When the message below appears on the screen, press <Delete> or <ESC> key will enter BIOS setup screen.

Press<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.

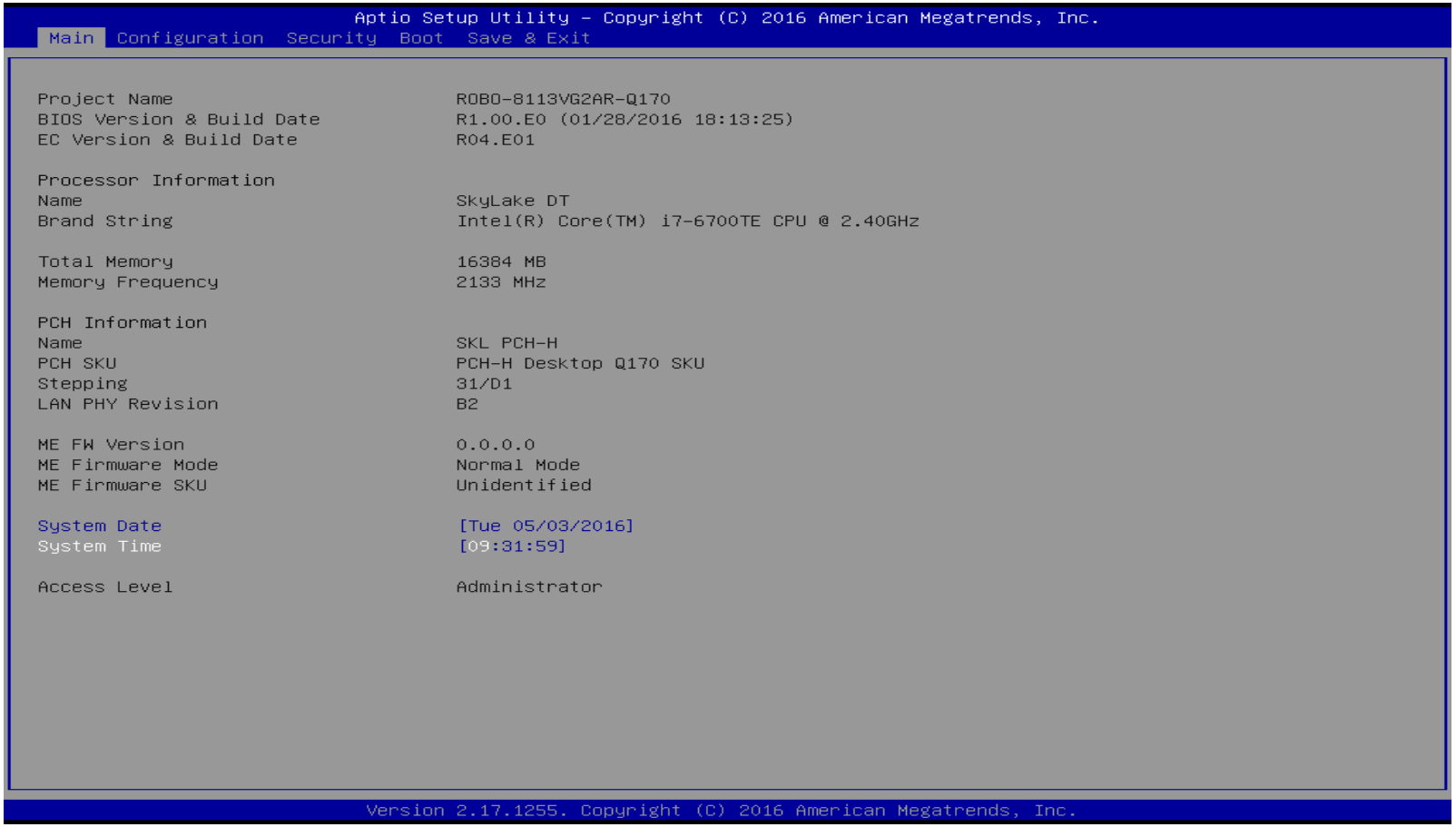
Press <F1> to Run General Help or Resume

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.


General Help
↑↓→← : Move
Enter : Select
+/- : Value
ESC : Exit
F1 : General Help
F2 : Previous Values
F3 : Optimized Defaults
F4 : Save & Exit Setup
<K> : Scroll help area upwards
<M> : Scroll help area downwards
Ok

6.2.1 Main

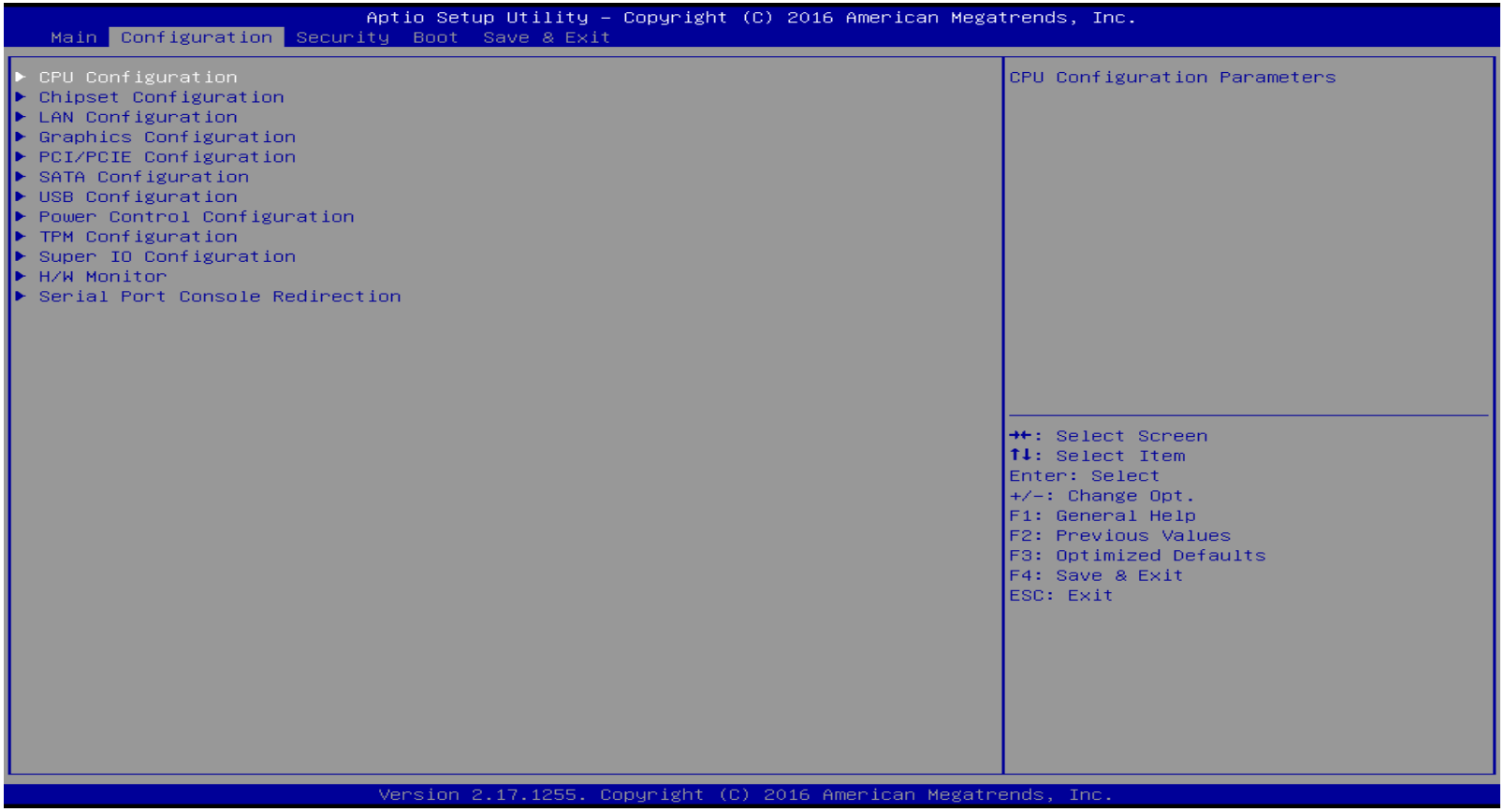
Use this menu for basic system configurations, such as time, date etc.



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.	

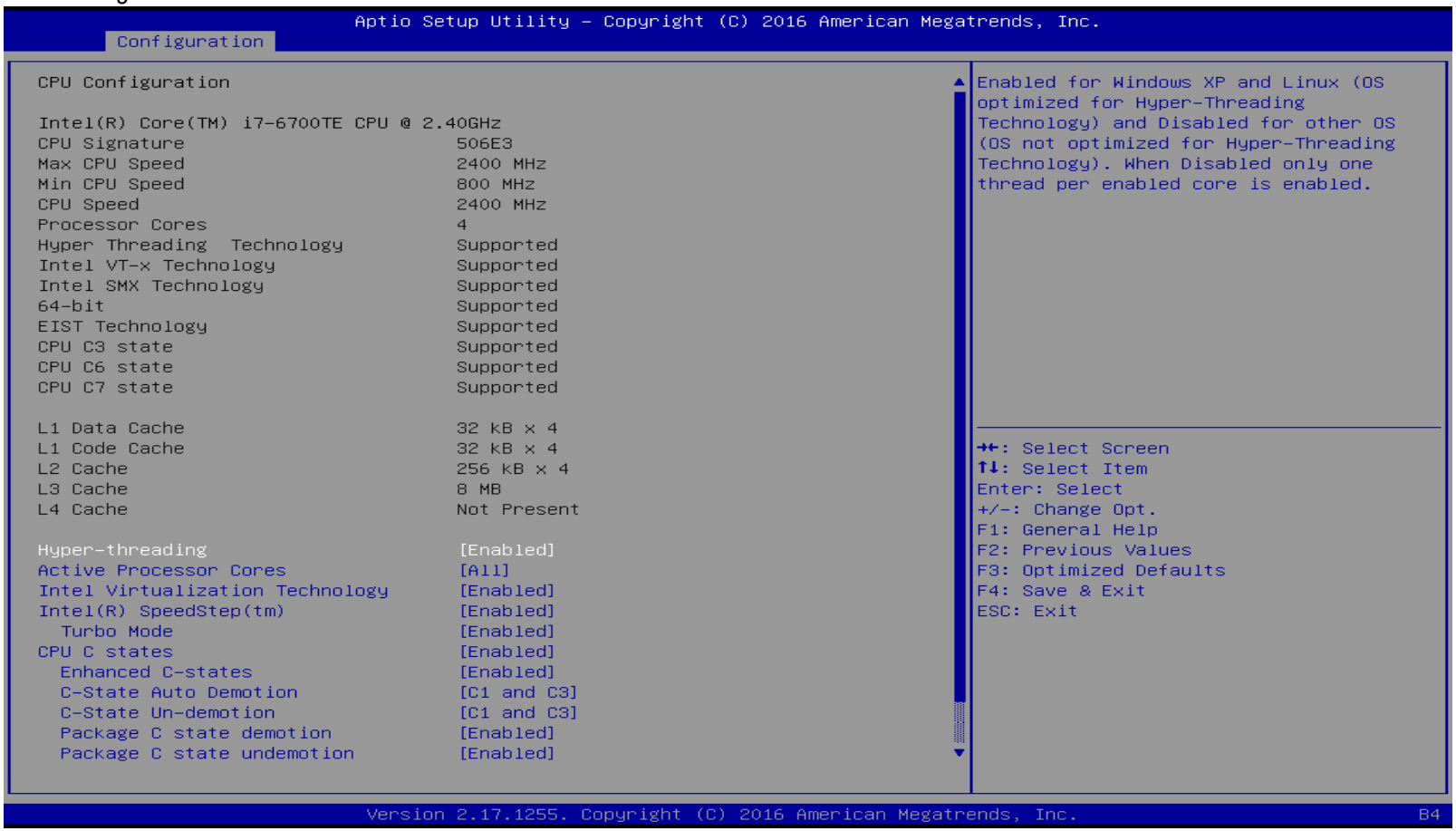
6.2.2 Configuration

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



CPU Configuration

CPU Configuration Parameters

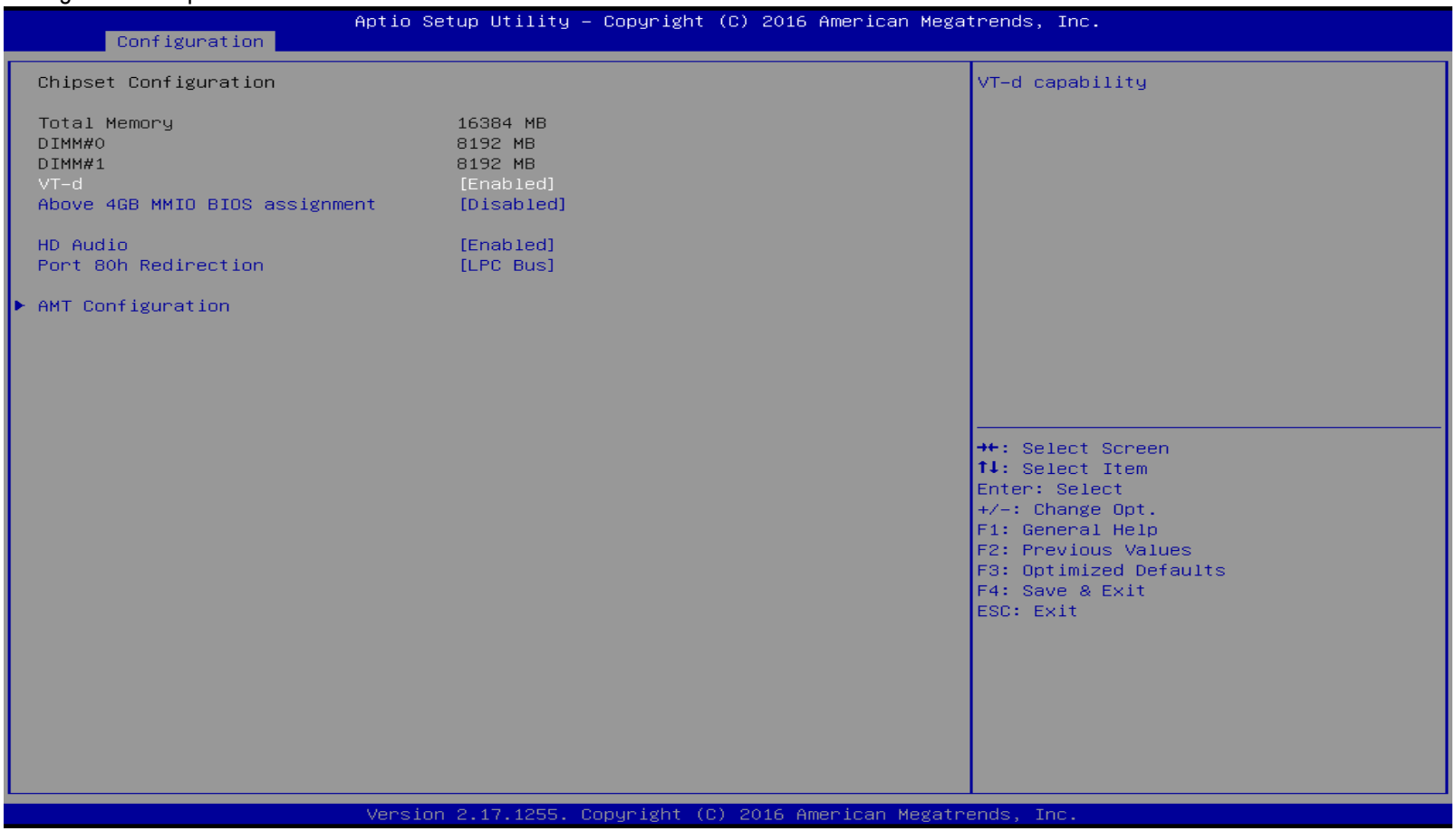


Feature	Description	Options
Hyper-threading	Enabled for Windows XP and Linux (OS optimized for Hyper-threading Technology) and Disabled for other OS (OS not optimized for Hyper-threading Technology). When Disabled only one thread per enabled core is enabled.	★Enabled, Disabled
Active Processor Cores	Number of cores to enable in each processor package.	★All, 1, 2, 3
Intel Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.	★Enabled, Disabled
Intel® Speed Step™	Allows more than two frequency ranges to be supported.	★Enabled, Disabled
Turbo Mode	Turbo Mode.	★Enabled, Disabled
Configurable TDP Boot Mode	Configurable TDP Mode as Nominal /Up/ Down/ Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero.	★Nominal, Down, Up, Deactivate
CPU C states (Enabled)	Enable or disable CPU C states	★Disabled, Enabled
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, Disabled, C1, C3,
C-State Un-demotion	Configure C-State Un-demotion.	★C1 and C3, Disabled, C1, C3,

Package C State demotion	Enable Package C state demotion.	★Enabled, Disabled
Package C state undemotion	Enable Package C state undemotion	★Enabled, Disabled
C State Pre-Wake	Disable – Sets bit 30 of POWER_CTL MSR(0x1FC) to 1 to disable the C State Pre-Wake	★Enabled, Disabled
Package C State limit	Package C State limit	★AUTO, C0/C1, C2, C3, C6, C7, C7s, C8
CFG lock	Configure MSR 0xE2 [15], CFG lock bit.	★Enabled, Disabled

Chipset Configuration

Configuration Chipset feature



Feature	Description	Options
VT-d	VT-d capability	★Enabled, Disabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB Memory Mapped IO BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB.	★Disabled, Enabled
HD Audio	Control Detect 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

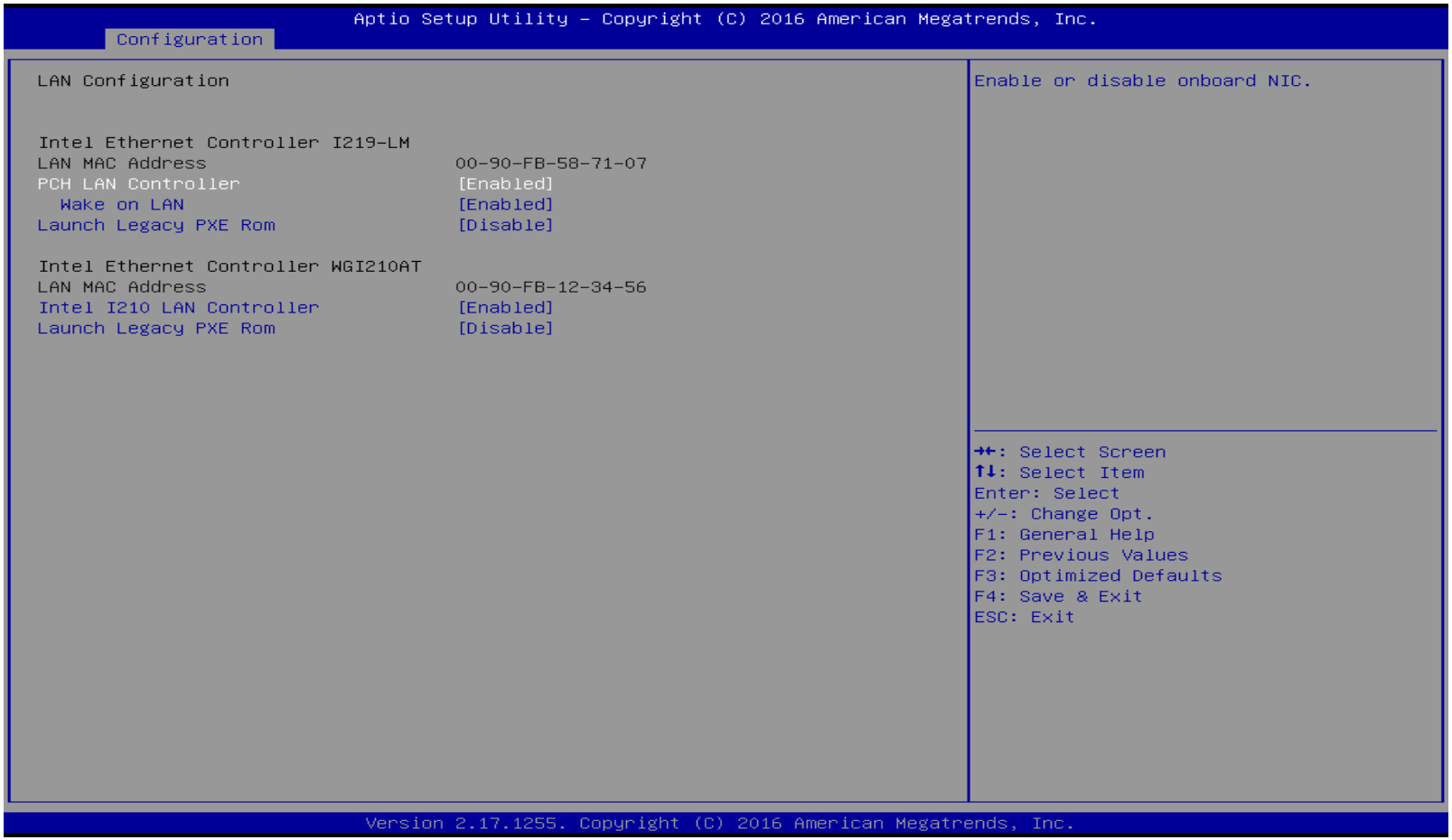
AMT Configuration

Configure Active Management Technology Parameters

Feature	Description	Options
Intel AMT (Enabled)	Enable/Disable Intel ® Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device	★Disabled, Enabled
Un-Configure ME	OEMFlag Bit 15: Un-Configure ME without password.	★Disabled, Enabled

LAN Configuration

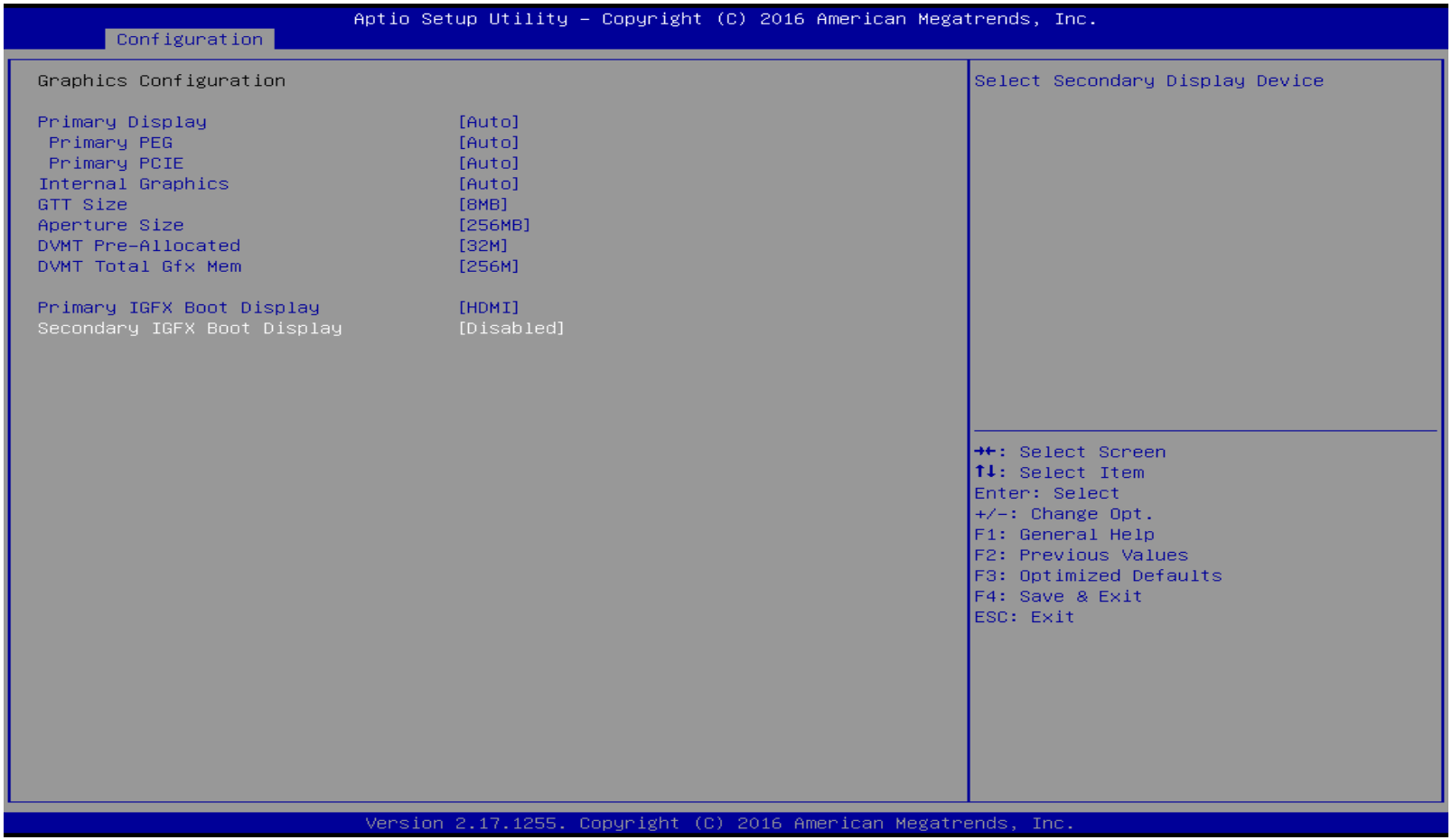
Configuration on Board LAN device.



Feature	Description	Options
PCH LAN Controller	Enable or disable onboard NIC	★Enabled, Disabled
Wake on LAN	Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)	★Enabled, Disabled
Launch Legacy PXE Rom	Launch Legacy PXE Rom. [Disable] Not launch Rom, [Enable] Force launch Rom, [Auto] Auto detect LAN Cable state to Enable/Disable Rom initial.	★Disable, Enable, Auto
Intel I210 LAN Controller	Intel I210 LAN Controller.	Disabled, ★Enabled
Launch Legacy PXE Rom	Launch Legacy PXE Rom. [Disable] Not launch Rom, [Enable] Force launch Rom, [Auto] Auto detect LAN Cable state to Enable/Disable Rom initial.	★Disable, Enable, Auto

Graphics Configuration

Configuration Graphics Settings

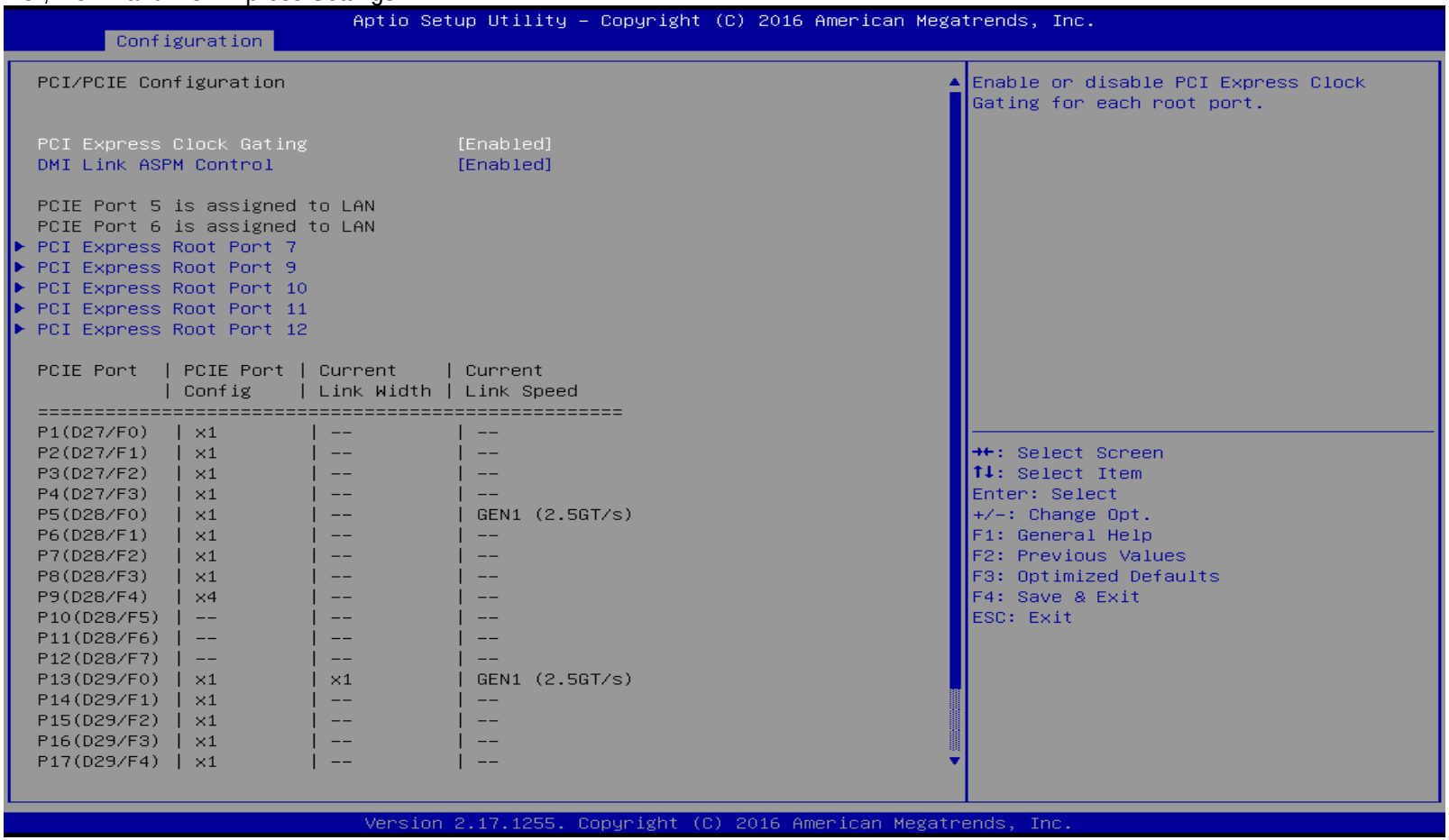


Feature	Description	Options
Primary Display	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.	★Auto, IGFX, PEG, PCIE
Primary PEG	Select Auto/PEG11/ PEG12 Graphics device should be Primary PEG.	★Auto, PEG11, PEG12
Primary PCIE	Select Auto/PCIE9 of D29: F1, Graphics device should be Primary PCIE.	★Auto, PCIE9
Internal Graphics	Keep IGFX enable based on the setup options.	★Auto, Disabled, Enabled
GTT Size	Select the GTT Size	★8MB, 2MB, 4MB
Aperture Size	Select the Aperture Size Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.	★256MB, 128MB, 512MB, 1024MB,2048MB,4096MB
DVMT Pre-Allocated	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.	★32M,64M,96M,128M, 160M,192M,224M,256M,288M ,320M,352M,384M,416M,448 M,480M,512M, 1024M,1536M,2048M, 4M, 8M,12M,16M,20M,24M,28M,3 2M,/F7,36M,40M,44M,48M,52 M,56M,60M

DVMT Total Gfx Mem	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device	★256M, 128M, MAX
Primary IGFX Boot Display	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.	★VBIOS Default, HDMI, DVI, VGA
Secondary IGFX Boot Display	Select Secondary Display Device.	★Disabled, HDMI, DVI, VGA

PCI/PCIE Configuration

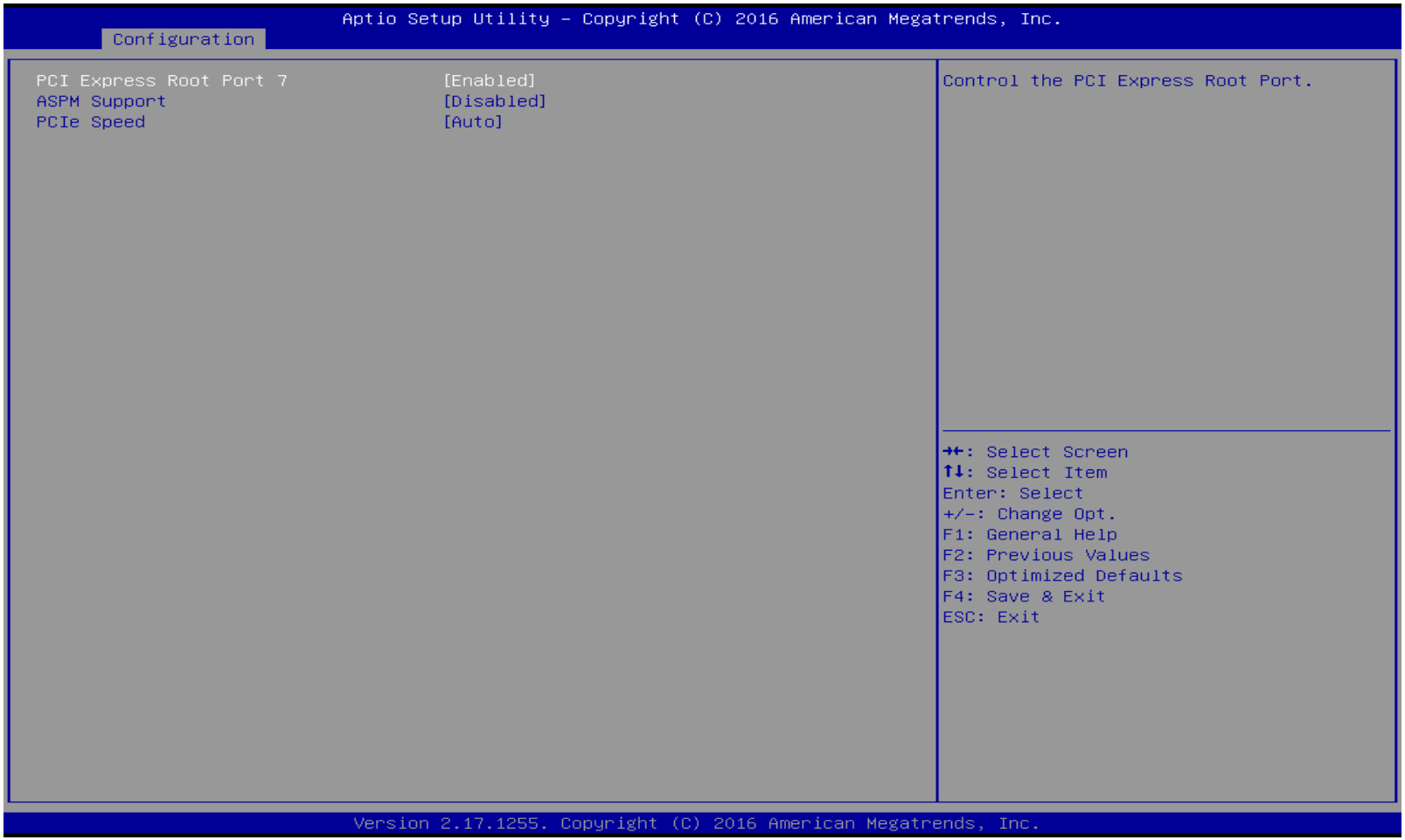
PCI, PCI-X and PCI Express Settings.



Feature	Description	Options
PCI Express Clock Gating	Enable or disable PCI Express Clock Gating for each root port.	Disabled ★Enabled
DMI Link ASPM Control	Enable/Disable the control of Active State Power Management on SA side of the DMI Link.	Disabled ★Enabled

PCI Express Root Port7, Port9, Port10, Port11, Port12

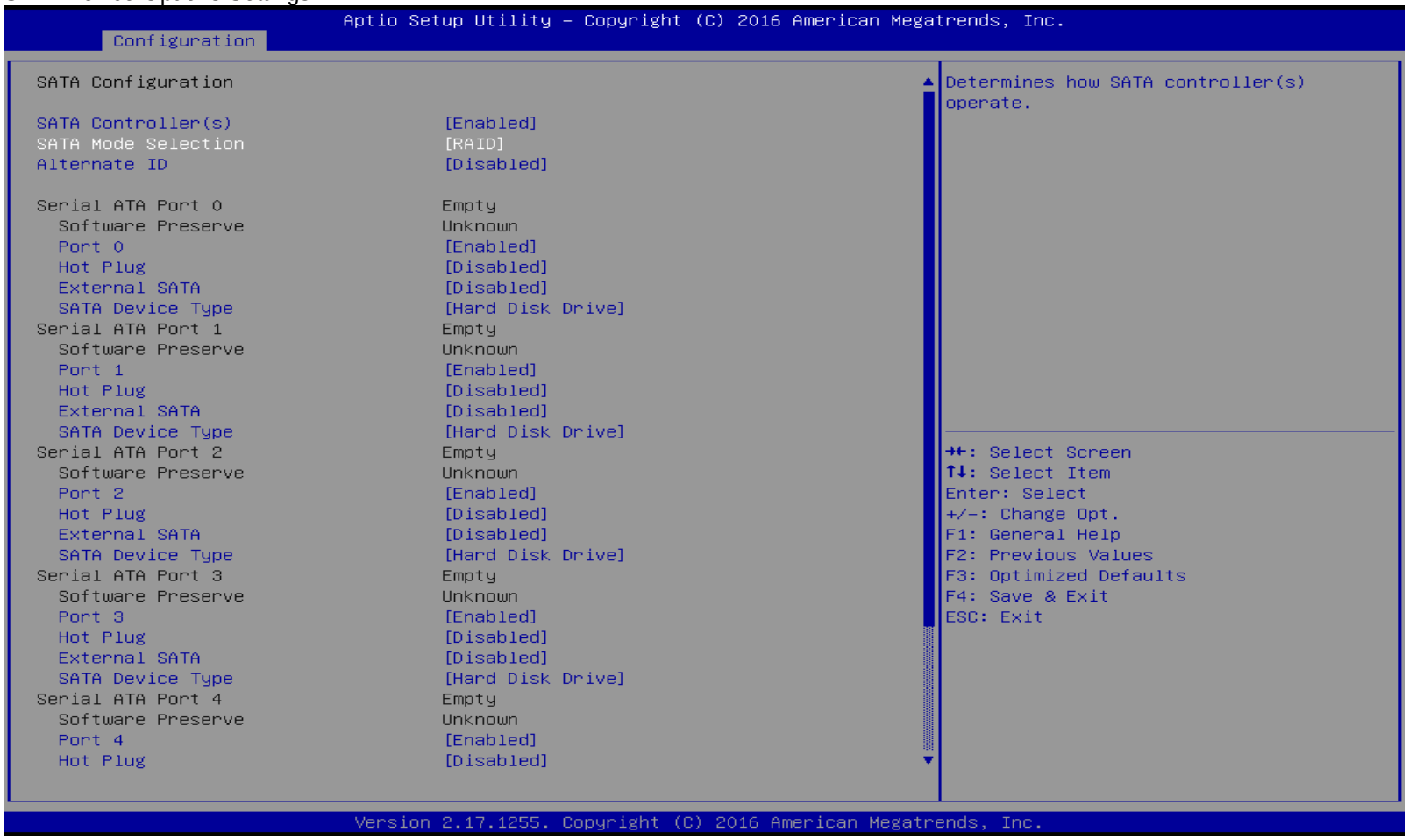
PCI Express Root Port7, Port9, Port10, Port11, Port12



Feature	Description	Options
PCI Express Root Port7, Port9, Port10, Port11, Port12	Control the PCI Express Root Port.	★Enabled, Disabled
ASPM Support	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

SATA Configuration

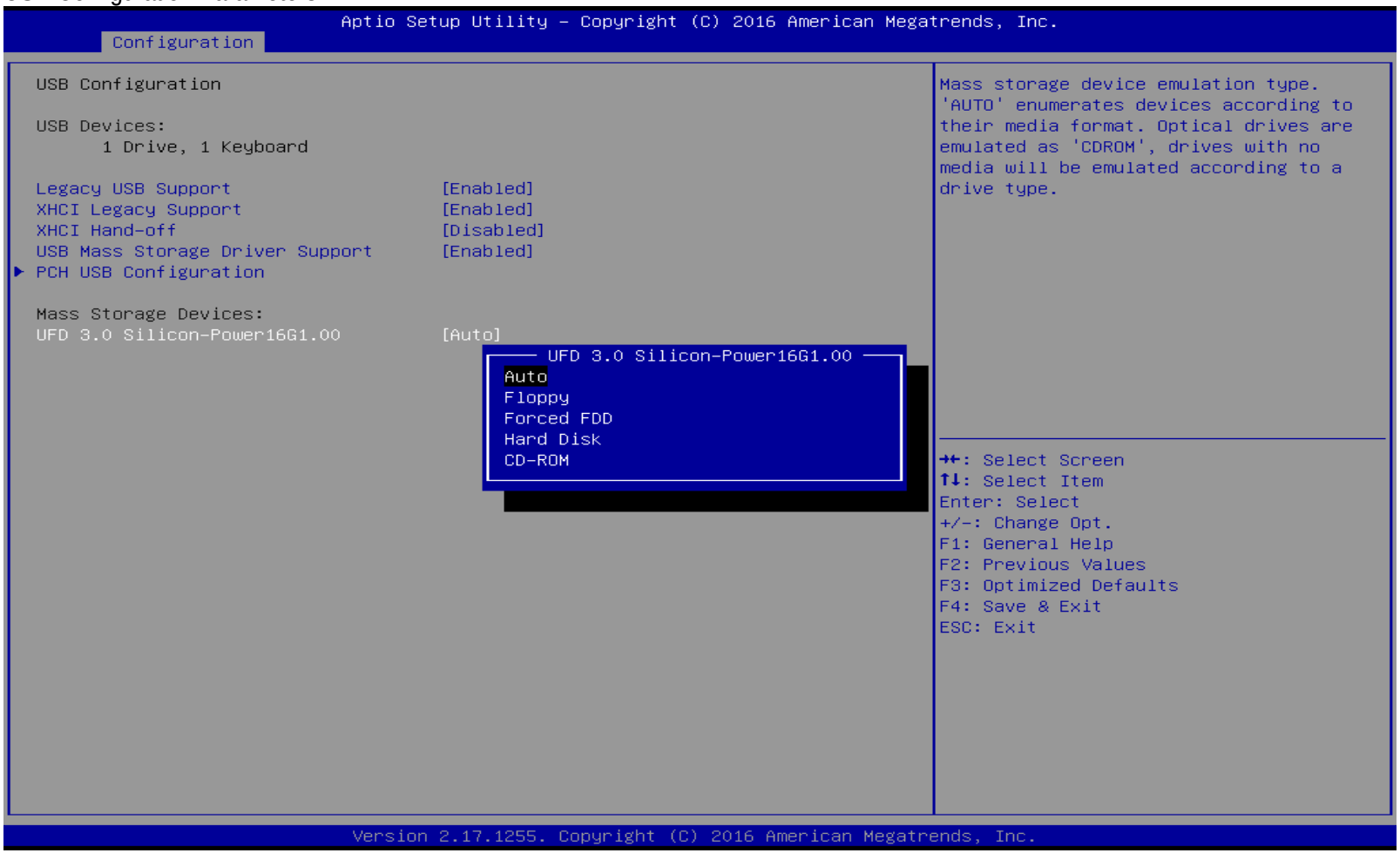
SATA Device Options Settings



Feature	Description	Options
SATA Controller(s)	Enable or disable SATA Device.	★Enabled, Disabled
SATA Mode Selection	Determines how SATA controller(s) operate.	★AHCI, RAID
Alternate ID	Report alternate Device ID	★Disabled, Enabled
Port 0 – Port 5	Enable or Disable SATA Port	★Enabled, Disabled
Hot Plug	Designates this port as Hot Pluggable	★Disabled, Enabled
External SATA	External SATA Support.	★Disabled, Enabled
SATA Device Type	Indentify the SATA port is connected to Solid State Drive or Hard Disk Drive.	★hard Disk Drive, Solid State Drive

USB Configuration

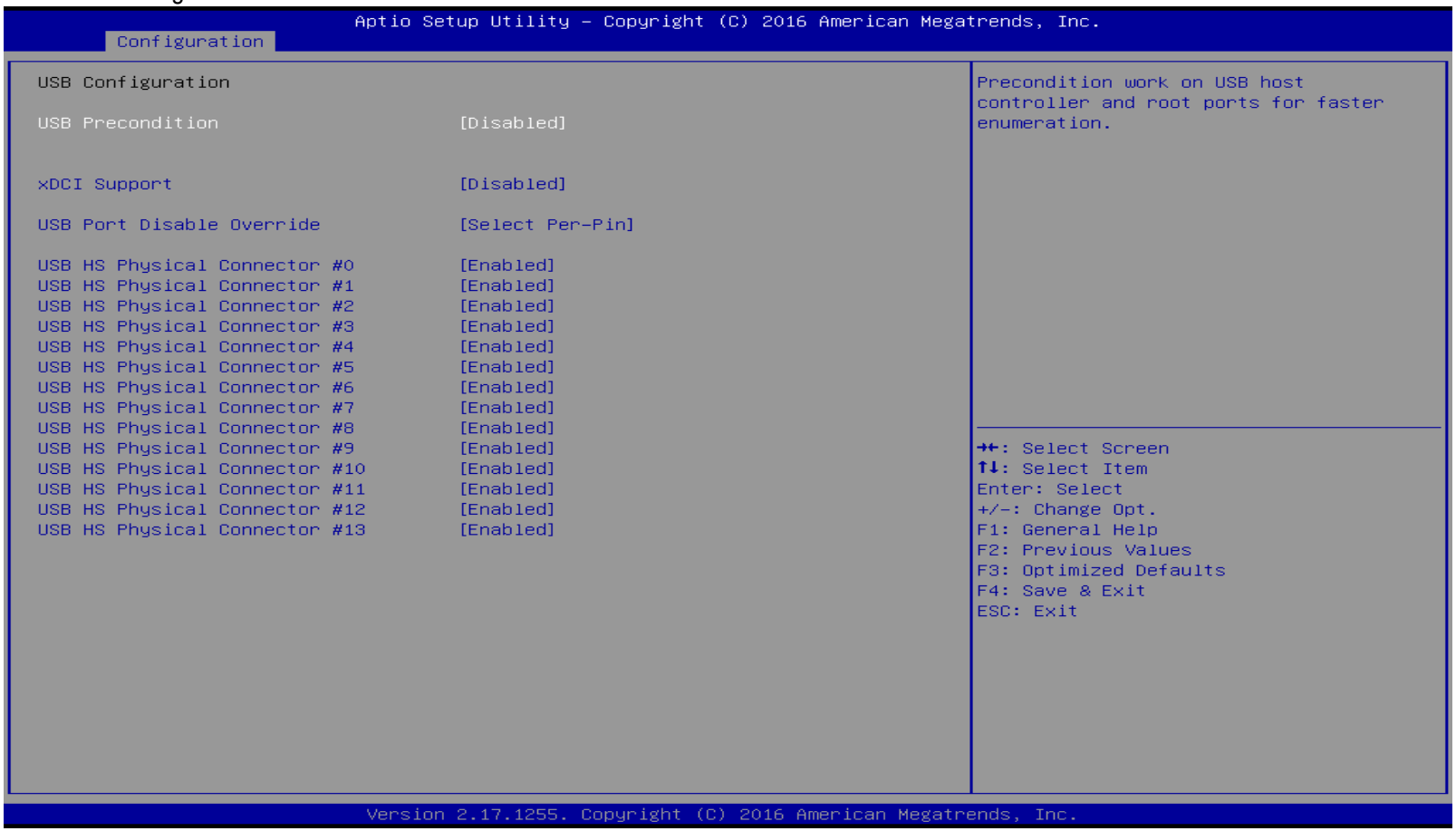
USB Configuration Parameters.



Feature	Description	Options
Legacy USB Support	Enables Legacy USB support. AUTO option disables legacy support if no USB Devices are connected. DISBLE option will keep USB devices available only for EFI applications.	★Enabled, Disabled, Auto
XHCI Legacy Support	Enable/Disable XHCI Controller Legacy support.	★Enable, Disabled
XHCI Hand-off	This is workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.	★Disabled, Enabled
USB Mass Storage Driver Support	Enable/Disable USB Mass Storage Driver Support.	★Enable, Disabled
Mass Storage Devices	Mass Storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.	★Auto, Floppy, Forced FDD, Hard Disk, CD-ROM

PCH USB Configuration

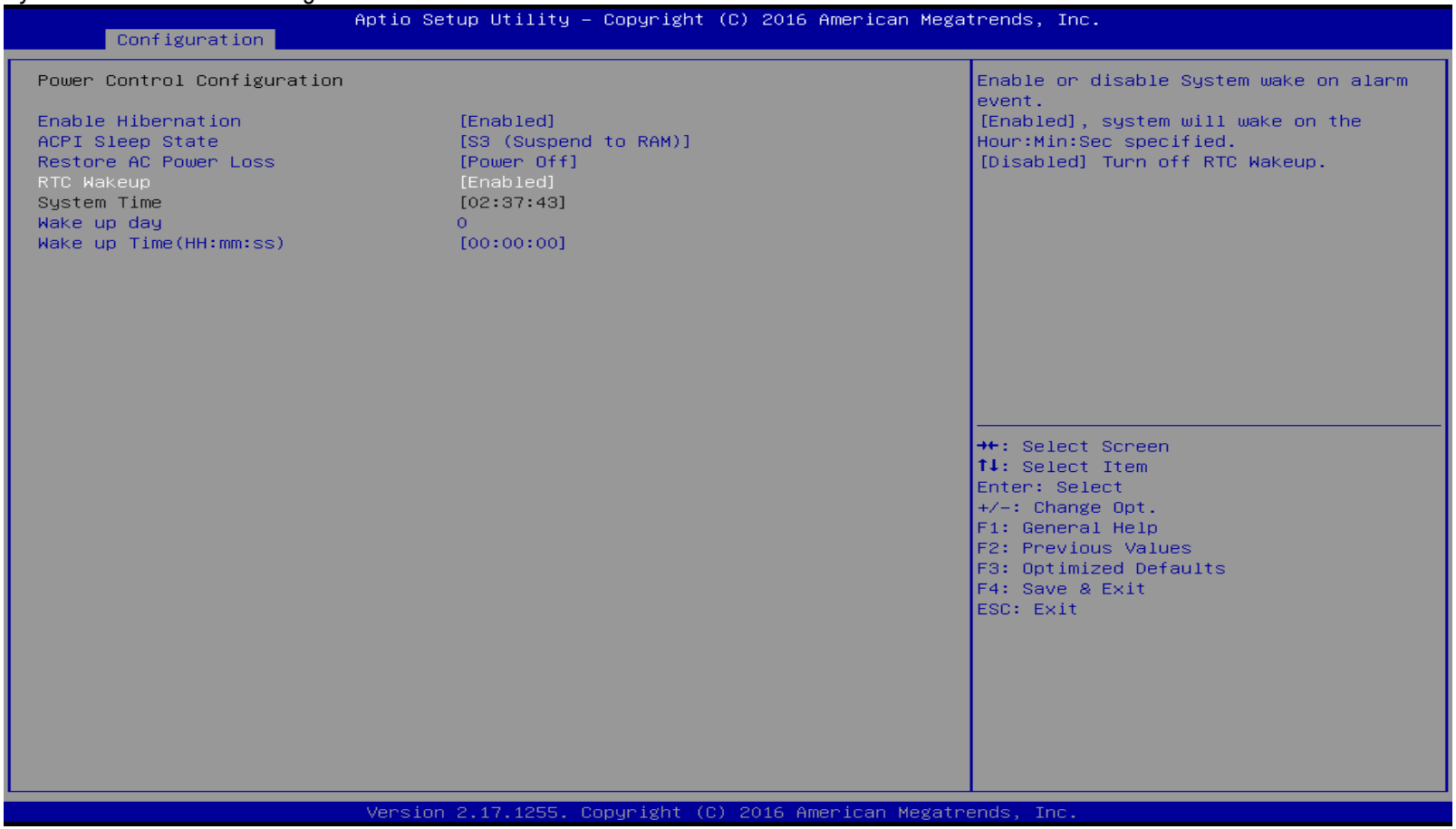
PCH USB Configurtion



Feature	Description	Options
USB Precondition	Precondition work on USB host controller and root ports for faster Enumeration.	★Disabled, Enabled
xDCI Support	Enable/Disable xDCI (USB OTG Device).	★Disabled, Enabled
USB Port Disable Override (Select Per-Pin)	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.	★Disabled, Select Per-Pin
USB HS Physical Connector #0 - #13	Enable/Disable USB Port.	★Enabled, Disabled

Power Control Configuration

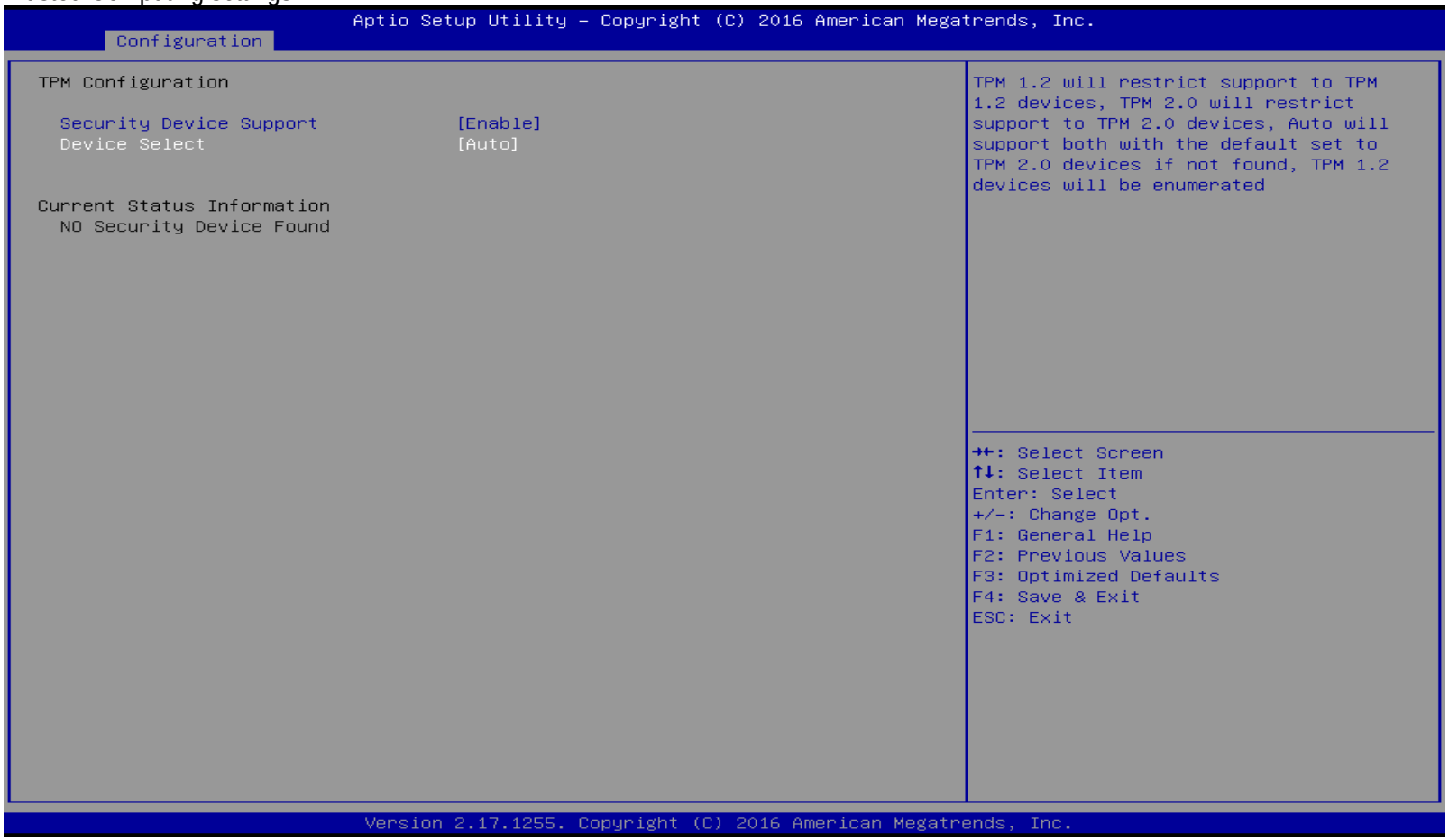
System Power Control Configuration Parameters



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
RTC Wake up (Enabled)	Enable or disable System wake on alarm event. [Enabled], system will wake up the Hour: Min: Sec specified. [Disabled] Turn off RTC Wakeup.	★Disabled, Enabled
Wake up day	Select 0 for daily system wake up 1-31 for which day of the month that you would like the system to wake up	1-31
Wake up Time(HH: mm: ss)	Use [Enter], [TAB] to select field, HH: 0-23, mm: 0-59, ss: 0-59	HH: 0-23, mm: 0-59, ss: 0-59

TPM Configuration

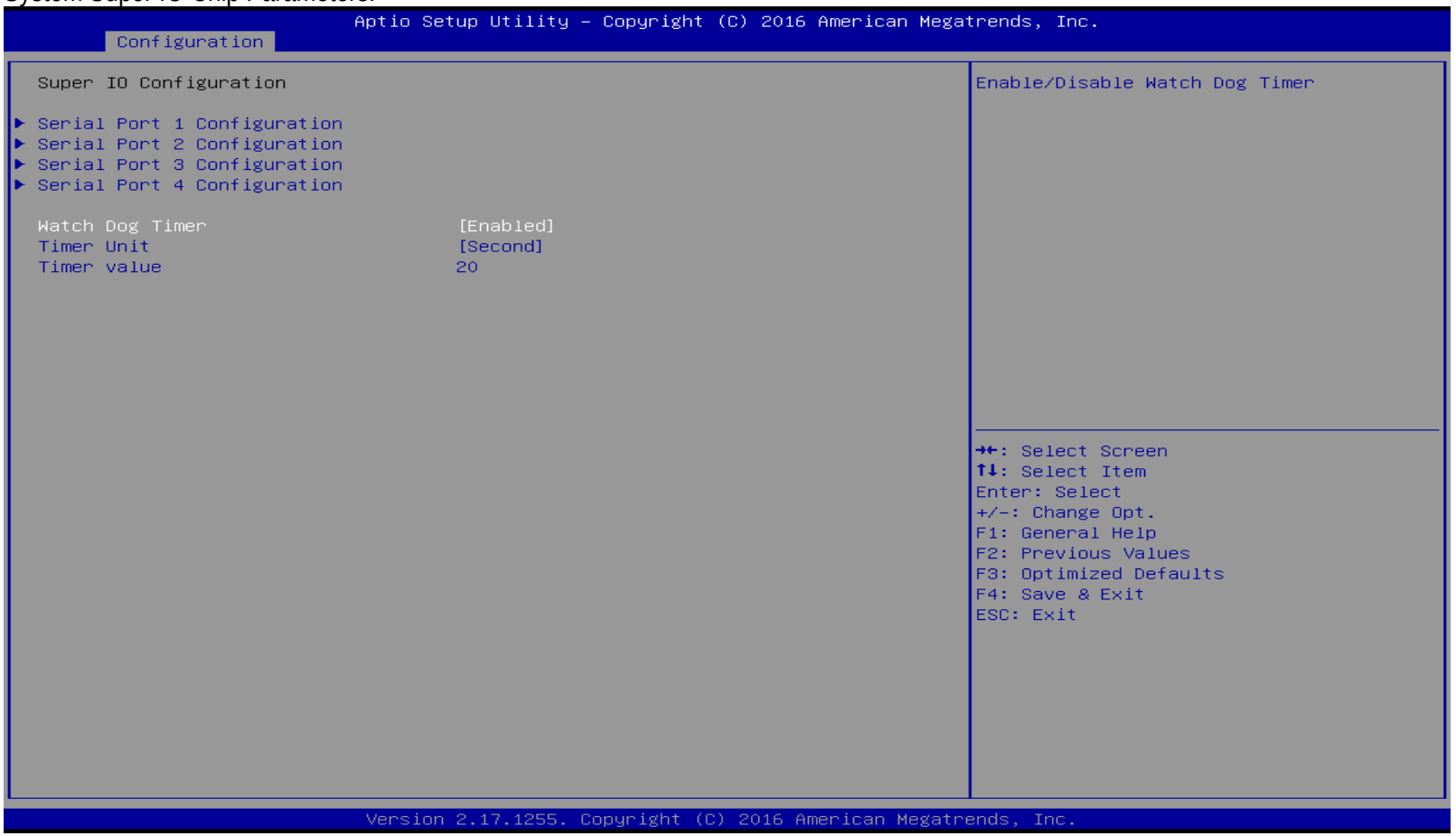
Trusted Computing settings



Feature	Description	Options
Security Device Support (Enabled)	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
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

Super IO Configuration

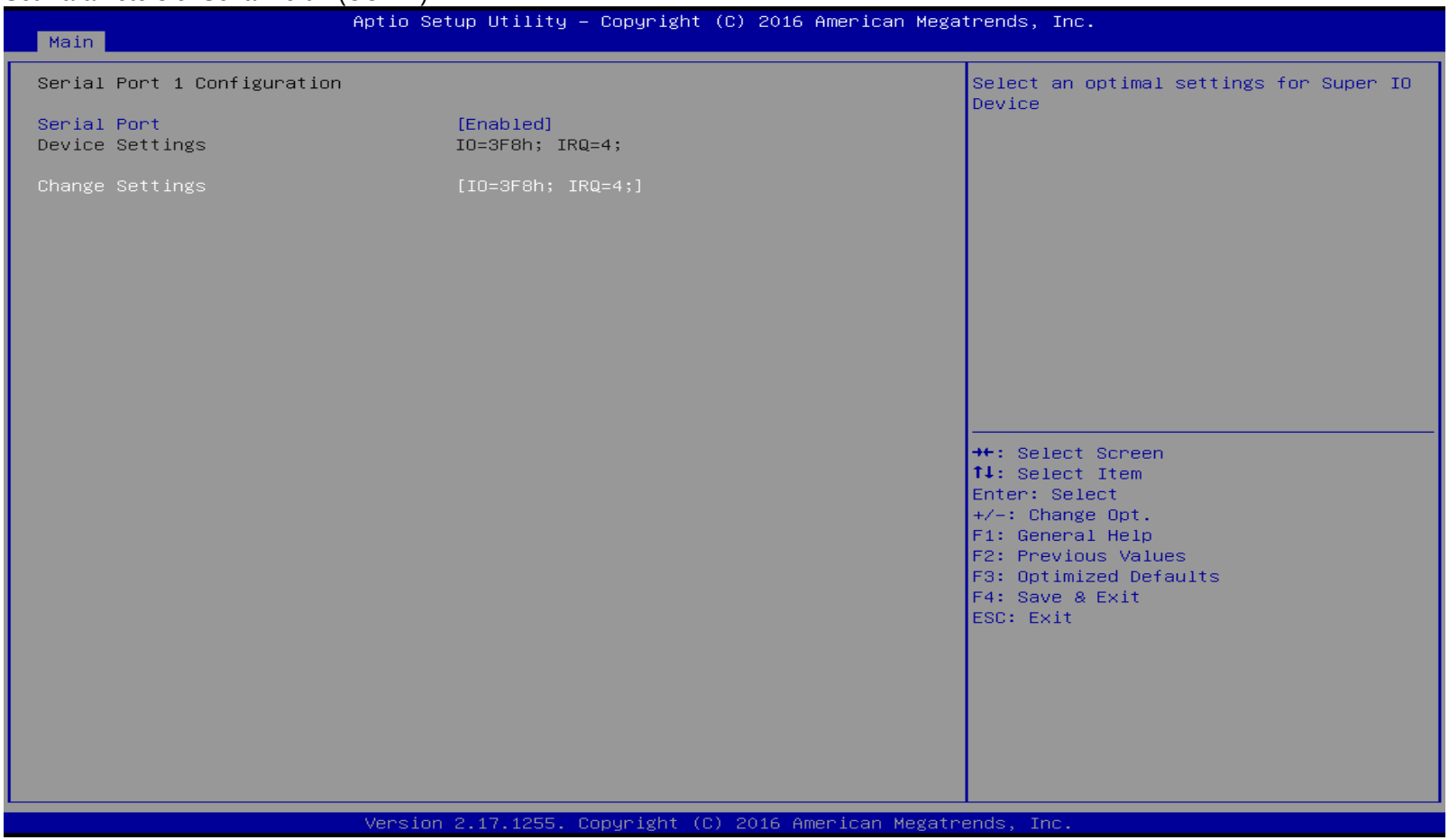
System Super IO Chip Parameters.



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

Serial Port 1 Configuration

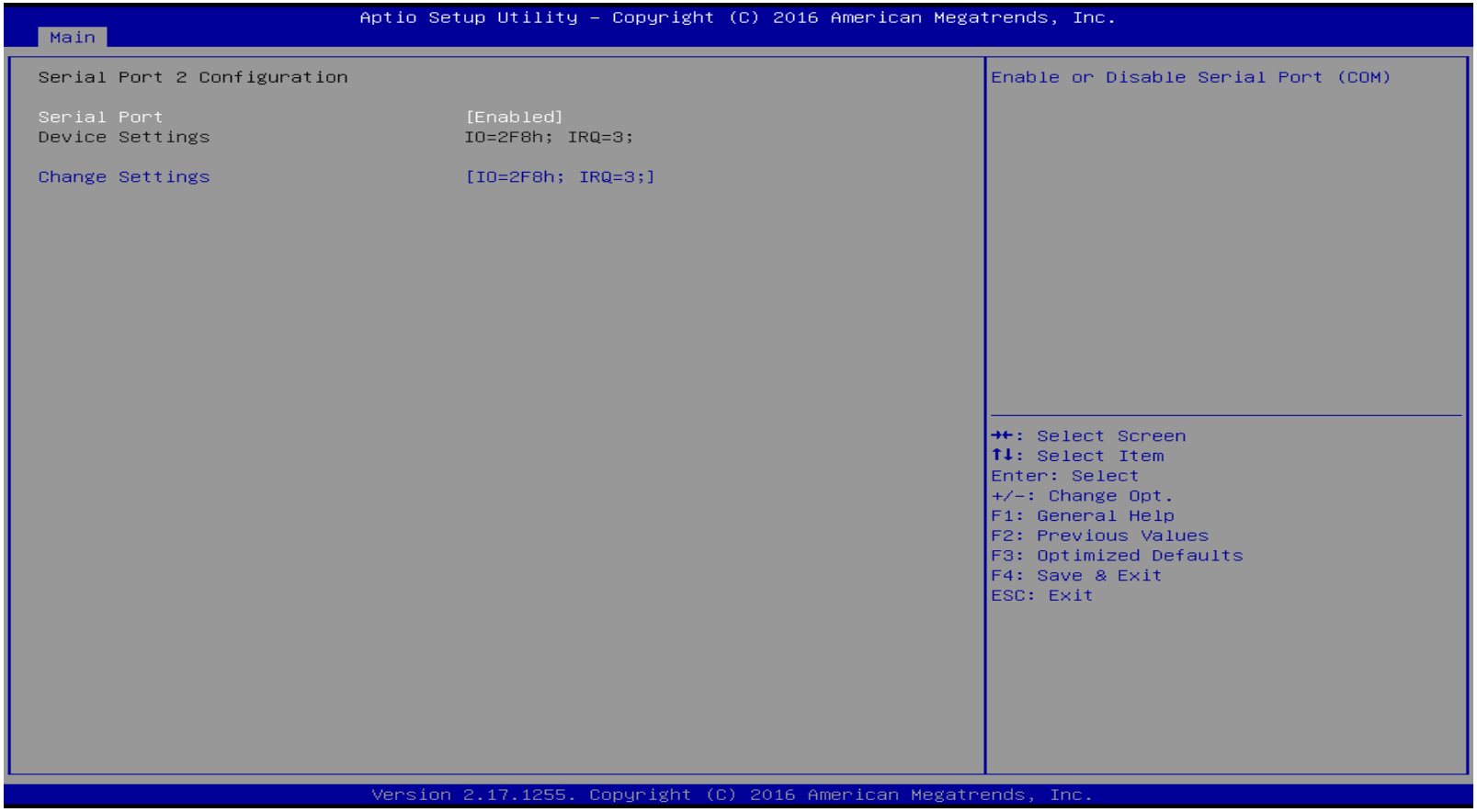
Set Parameters of Serial Port 1 (COM 1)



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★Enabled, Disabled
Change Settings	Select an optimal settings for Super IO Device	★IO=3F8h; IRQ=4, Auto, IO=240h; IRQ=3,4,5,6,7,10,11,12 IO=248h; IRQ=3,4,5,6,7,10,11,12 IO=250h; IRQ=3,4,5,6,7,10,11,12 IO=258h; IRQ=3,4,5,6,7,10,11,12

Serial Port 2 Configuration

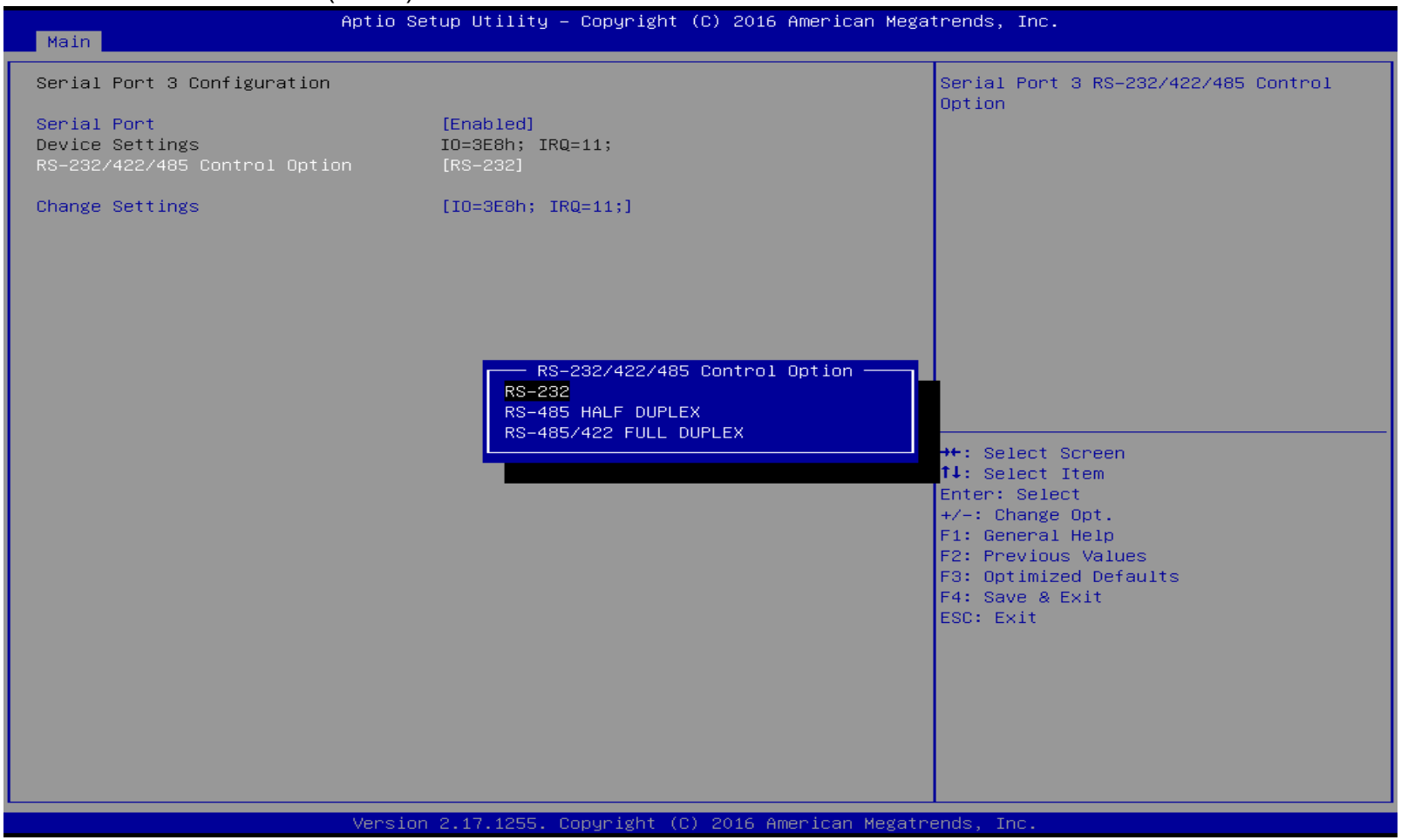
Set Parameters of Serial Port 2 (COM 2)



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal settings for Super IO Device.	★IO=2F8h; IRQ=3; Auto, IO=240h; IRQ=3,4,5,6,7,10,11,12 IO=248h; IRQ=3,4,5,6,7,10,11,12 IO=250h; IRQ=3,4,5,6,7,10,11,12 IO=258h; IRQ=3,4,5,6,7,10,11,12

Serial Port 3 Configuration

Set Parameters of Serial Port 3 (COM 3)



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	★Enabled, Disabled
RS-232/422/485 Control Option	Serial Port 3 RS-232/422/485 Control Option	★ RS-232, RS-485 HALF DUPLEX RS-485/422 FULL DUPLEX
Change Settings	Select an optimal setting for Super IO Device.	★IO=240h; IRQ=11, Auto, IO=240h; IRQ=3,4,5,6,7,10,11,12 IO=248h; IRQ=3,4,5,6,7,10,11,12 IO=250h; IRQ=3,4,5,6,7,10,11,12 IO=258h; IRQ=3,4,5,6,7,10,11,12

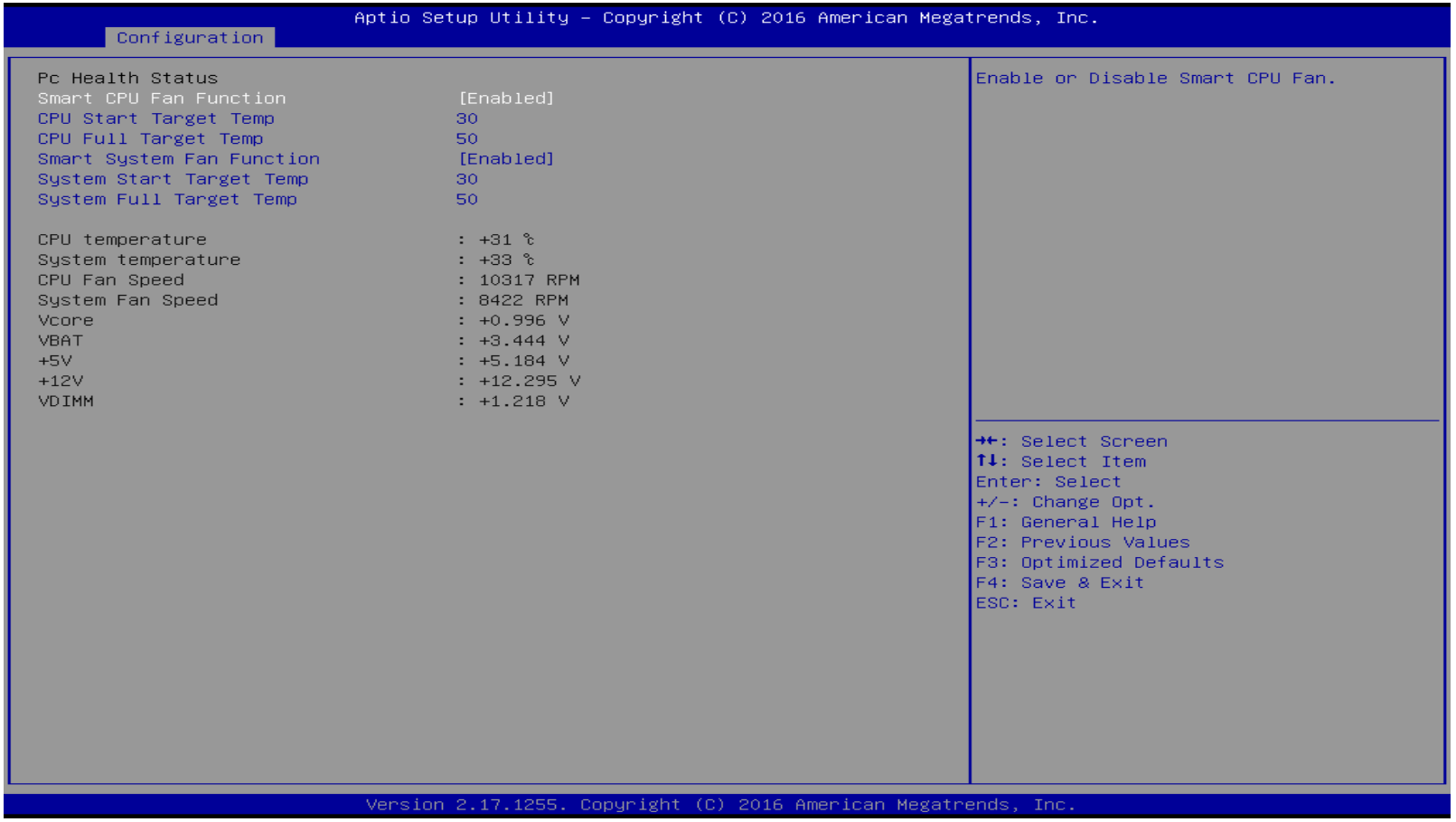
Serial Port 4 Configuration

Set Parameters of Serial Port 4 (COM 4)

Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
RS-232/422/485 Control Option	Serial Port 4 RS-232/422/485 Control Option	★ RS-232, RS-485 HALF DUPLEX RS-485/422 FULL DUPLEX
Change Settings	Select an optimal settings for super IO Device	★IO=248h; IRQ=11, Auto, IO=240h; IRQ=3,4,5,6,7,10,11,12; IO=248h; IRQ=3,4,5,6,7,10,11,12; IO=250h; IRQ=3,4,5,6,7,10,11,12; IO=258h; IRQ=3,4,5,6,7,10,11,12;

H/W Monitor Configuration

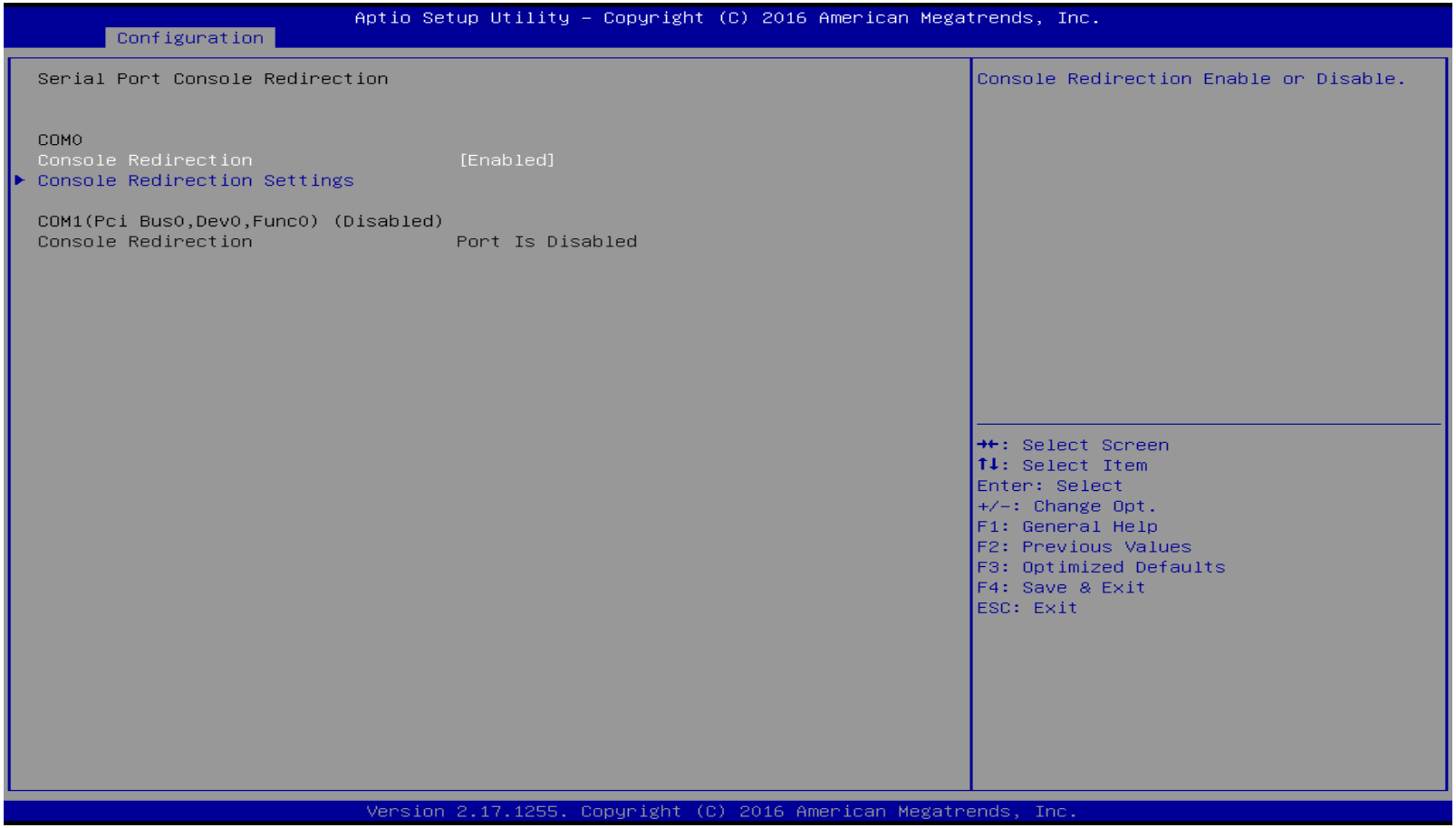
Monitor hardware status



Feature	Description	Options
Smart CPU Fan Function (Enabled)	Enable or Disable Smart CPU Fan	★Disabled, Enabled
CPU Start Target Temp	CPU Start Fan Target Temperature.	30
CPU Full Target Temp	CPU Full Fan Target Temperature.	50
Smart System Fan Function (Enabled)	Enable or Disable Smart System Fan	★Disabled, Enabled
System Start Target Temp	System Start Fan Target Temperature.	30
System Full Target Temp	System Full Fan Target Temperature.	50

Serial Port Console Redirection

Serial Port Console Redirection



Feature	Description	Options
Console Redirection (COM 0-5) (Enabled)	Console Redirection Enable or Disable.	★Disabled, Enabled

COM 0 Serial Port Console Redirection

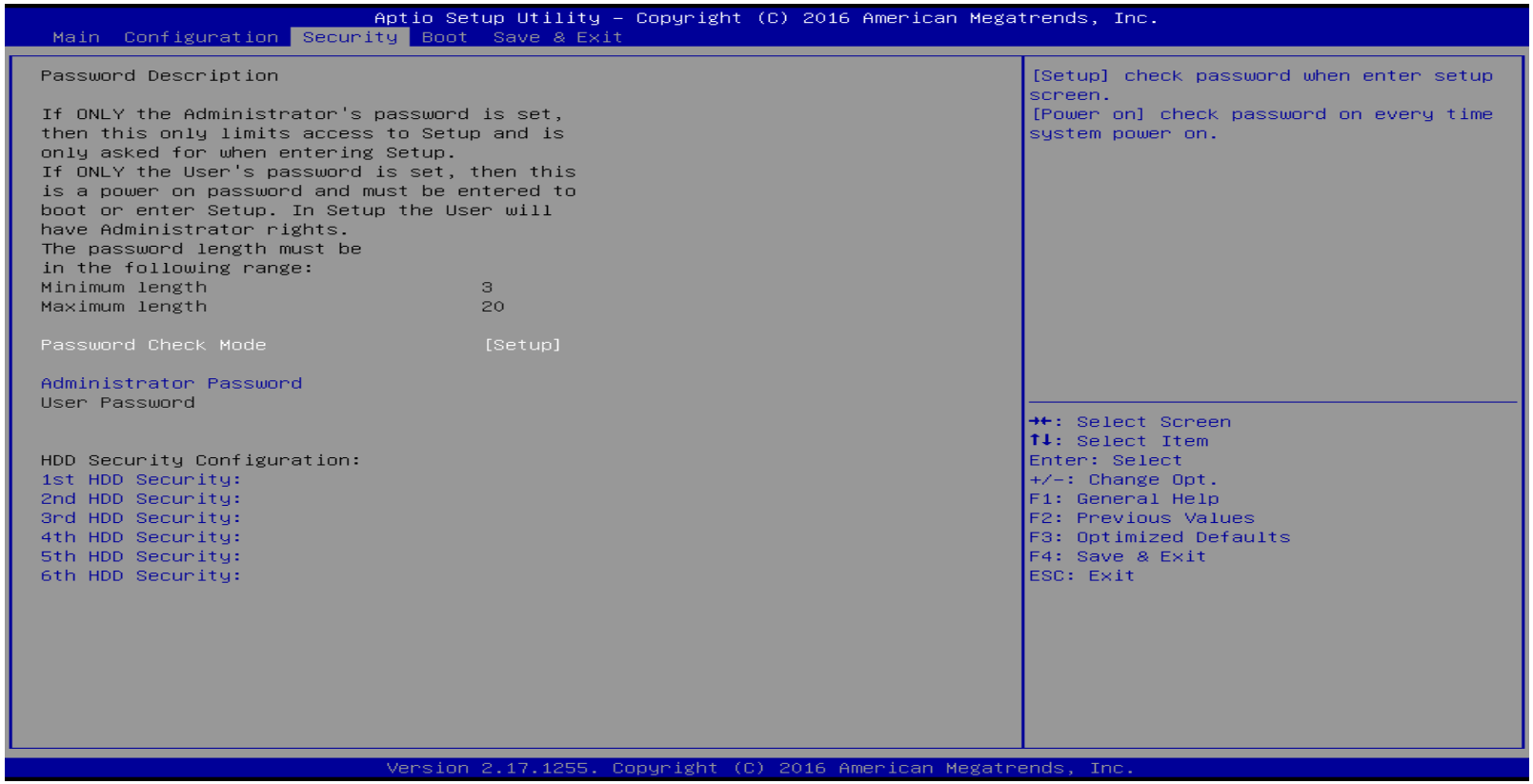
COM0 Serial Port Console Redirection

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 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-UTFB Combo Key Support	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals	★Enabled, Disabled
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
Legacy OS Redirection Resolution	On Legacy OS, the Number of Rows and Columns supports redirection	★80x24, 80x25
Putty KeyPad	Select FunctionKey and KeyPad on Putty	★VT100, LINUX,XTERMR6, SCO,ESCN,VT400
Redirection After BIOS POST	The settings specify if BootLoader is selected then Legacy console redirection is disabled before booting to legacy OS. Default value is Always Enable with means Legacy console Redirection is enabled for Legacy OS.	★Always Enable, BootLoader

6.2.3 Security

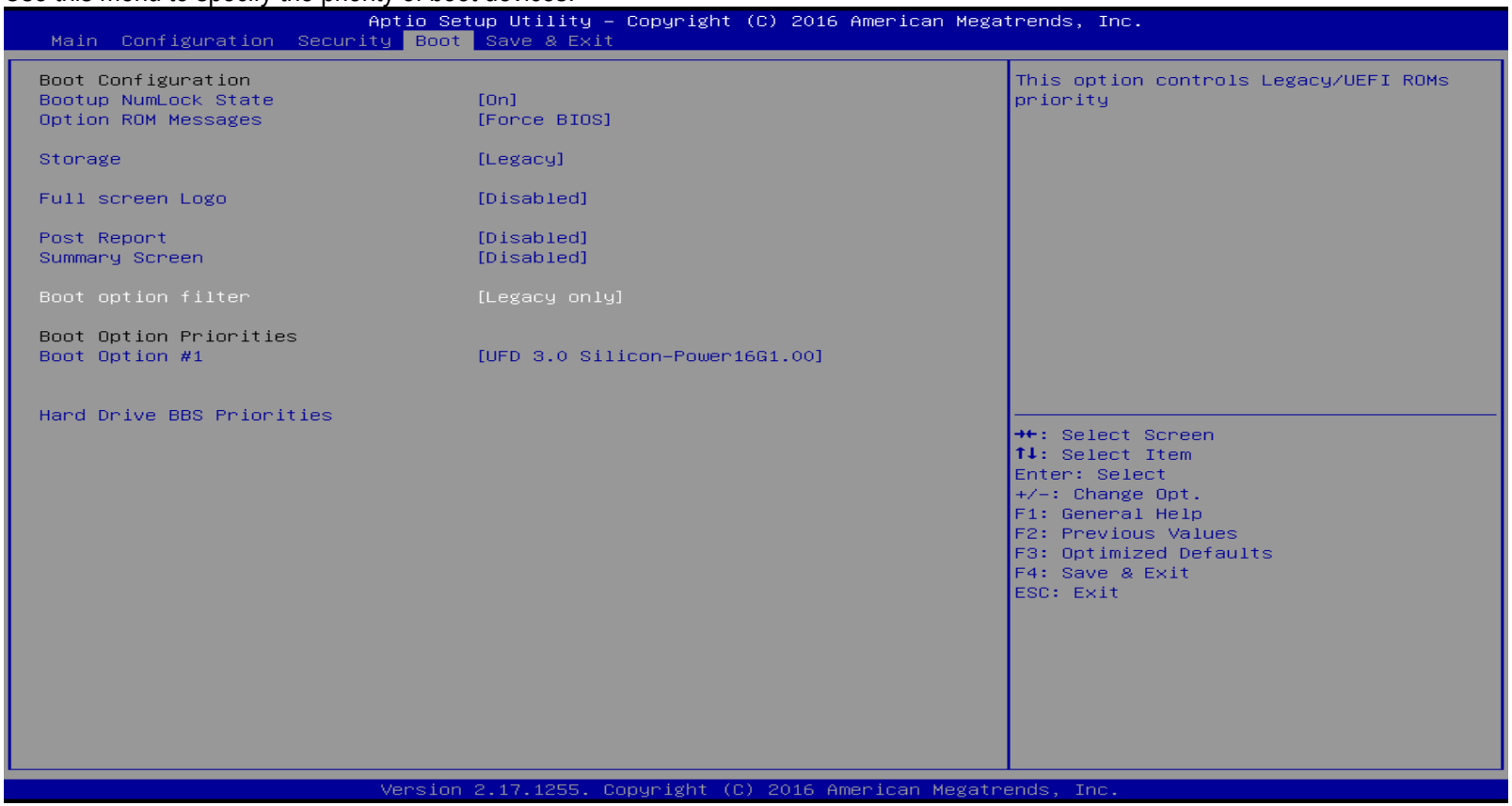
This section lets you set security passwords to control access to the system at boot time and/or when entering the BIOS setup program.



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	★No default setting
1st-6th HDD Security	HDD Security Configuration for selected drive.	

6.2.4 Boot

Use this menu to specify the priority of boot devices.



Feature	Description	Options
Bootup NumLock State	Select the keyboard NumLock state	★On, Off
Option ROM Messages	Set display mode for Opion ROM	★Force BIOS, Keep Current
Storage	Controls the execution of the UEFI and Legacy Storage OpROM	★Legacy, Do not Launch, UEFI
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 option filter	This option controls Legacy/UEFI ROMs priority	★Legacy only, UEFI only
Hard Drive BBS Priorities	Set the order of the legacy devices in this group	

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 (Boot option filter: UEFI only)	Reset the system after saving the changes.	
Launch EFI Shell from filesystem device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.	

7 Troubleshooting

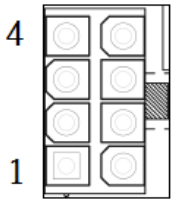
This chapter provides a few useful tips to quickly get ROBO-8113VG2AR running with success. As basic hardware installation has been addressed in Chapter 2, this chapter will focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

7.1 Hardware Quick Installation

ATX Power Setting

Unlike other Single board computer, ROBO-8113VG2AR supports ATX only. Therefore, there is no other setting that really needs to be set up. However, there are only two connectors that must be connected—J12 ATX 8Pin Connector (4 pins CPU+12V main power connector) & 24 pins ATX Power Connector (On PICMG Backplane).

J12: ATX 8 Pin Connector(For CPU Power)



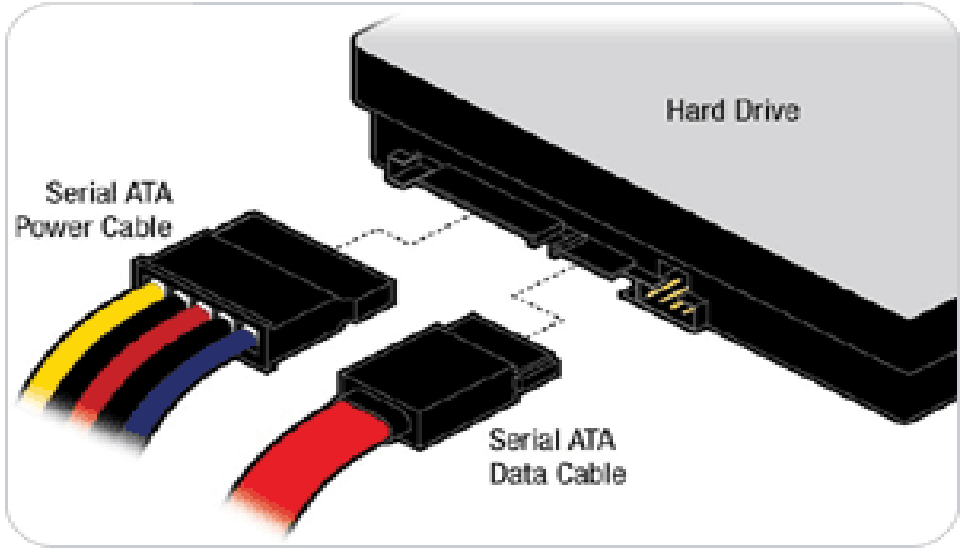
PIN No.	Description	PIN No.	Description
1	Ground	5	+12V
2	Ground	6	+12V
3	Ground	7	+12V
4	Ground	8	+12V

.

Serial ATA

Unlike IDE bus, each Serial ATA channel can only connect to one SATA hard disk at a time; there are total six connectors, SATA0~5 port. 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. All you need to operate AHCI, RAID (0/1/5/10) application for system, please follow up setting guide in BIOS setup utility.

ROBO-8113VG2AR can support six SATA interface (SATAIII, 6.0Gb/s) on board. It has four J2/J7/J15/J16 SATA ports on board; two SATA ports on PICMG Backplane. The SATA interface shall support both 1.5/3.0Gb & 6.0Gb operation per the SATA specification.



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. CPU, CPU Fan, 288-Pin DDR4 memory, keyboard, mouse, SATA hard disk, DVI-I connector, device power cables, 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-8113VG2AR, 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 JP4 on the ROBO-8113VG2AR 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.

JP4: Clear CMOS Setup

1

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

Question: How to update the BIOS file of ROBO-8113VG2AR?

Answer: 1. Please visit web site of Portwell download center as below hyperlink

http://www.portwell.com.tw/support/download_center.php

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

http://www.portwell.com.tw/member/newmember.php

2. Type in your User name and password and log in the download center.
3. Select "Search download" and type the keyword "ROBO-8113VG2AR".
4. Find the "BIOS "page and download the ROM file and flash utility.
5. 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 BIOS.
   NOTE: Once you use "update.efi" to update BIOS, it must be get into the SHELL MODE to update BIOS
6. When you see the "FPT Operation Passed" message, which means the BIOS update processes finished. Please cut the AC power off and wait for 10 seconds before powering on.

http://www.portwell.com.tw/support/download_center.php

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.

http://www.portwell.com.tw/support/problem_report.php

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

Thanks

Question: The steps of windows7 OS installation with USB3.0 driver.

Answer: 1. Windows 7* installation media does not include the native driver supports for USB 3.0, so during the installation, once you get into the screen for select your preferred language, when the keyboard or mouse connect to the USB 3.0 port, it won't have any response. In order to solve this problem, you could refer the following steps to install the Windows 7 on Skylake platform.

2. Installation needs:

(1) Preparing the valid copyright of Windows 7 on ISO or DVD, as the following you have administrator access to another working computer (the Admin system) with Windows 7 or later to follow these steps.

(2) To download and unzip the Windows 7 USB 3.0 driver.
https://downloadcenter.intel.com/download/22824/USB-3-0-Driver-Intel-USB-3-0-eXtensible-Host-Controller-Driver-for-Intel-8-9-100-Series-and-C220-C610-Chipset-Family

3. Create a USB flash drive installer:

Using the Windows 7 DVD or ISO image to create a bootable USB flash drive.

A. Using Windows USB/DVD Download Tool to create a bootable USB flash drive. You could find this tool in our driver CD or download it via http://wudt.codeplex.com/

B. Click the Windows Start button, and click Windows7 USB/DVD Download Tool to execute.

C. Choosing the ISO file, type the name and path of your Windows ISO file, or click Browse and select the file from the open dialog box. Click Next.

D. Select USB device to create a copy on the USB flash drive.

E. If you are copying the file to a USB flash drive, select your USB device in the drop-down list and click Begin copying.

F. Then you can see it starts to create the bootable USB device.

G. It shows the “Bootable USB device created successfully” message after finish all processes.

4. Extract the USB3.0 drivers:

The USB3.0 drivers which you downloaded must make a folder to place the driver. Example: “USB3 Fix”. Please create 2 folders in the USB3 Fix folder: “USB3” & “mount”. Then extract the USB3.0 drivers and copy the “Drivers” folder into USB3 folder.

5. Get the “boot.wim” & “install.wim” files from USB bootable device:

Please copy those two files to the “USB3 Fix” folder from \source of the root of your USB bootable device.

6. Update the “boot.wim” & “install.wim” files by “dism” command:

Please execute the cmd shell as an administrator. (Click Start on windows 7, type in “cmd” and then right click on the cmd application and choose Run as Administrator.)

Please navigate to the USB3_Fix folder in the cmd shell, and type in the following commands in this order to update the boot.wim file:

(1) dism /mount-wim /wimfile:boot.wim /index:2 /mountdir:mount

(2) dism /image:mount /add-driver:"usb3" /recurse

(3) dism /unmount-wim /mountdir:mount /commit

(4) Please type the command to get which type of your Win7 O/S.

dism /Get-WimInfo /WimFile:install.wim

Please select the correct index number for your Win7 O/S. (Example: We used the Win7 Ultimate N then we must choose “index 5”)

(5) Please type the command as below lists.

dism /mount-wim /wimfile:install.wim /index:5 /mountdir:mount

(6) Please type the command as below lists.

dism /image:mount /add-driver:"usb3" /recurse

(7) Please type the command as below lists.

dism /unmount-wim /mountdir:mount /commit

7. Please copy both two file back to the \source of the root of your USB bootable device.

Then you can install the Win7 O/S which has been included the USB3.0 driver by USB bootable device.

8 Portwell Software Service

Portwell Evaluation Tool (PET)

The Portwell Evaluation Tool (PET) is an API which Portwell's customers can access the GPIO, I2C, SMBus, etc under Windows and Linux OS. For more information please contact Portwell.

Portwell BIOS web Tool (PBT)

The Portwell BIOS web Tool (PBT) is a brand new on-line utility which innovated by Portwell. PBT now is available for Portwell's premiere customers who are able to add customized BIOS logo and change BIOS default settings on American Megatrends (AMI) BIOS. Please contact Portwell for more information.

Portwell EC Auto Test Tool (PECAT)

The Portwell EC Auto Test Tool (PECAT) is a brand new utility which innovated by Portwell. PECAT now is available for Portwell's premiere customers, who are able to Test Embedded Controller Function in UEFI Mode. Please contact Portwell for more information.

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