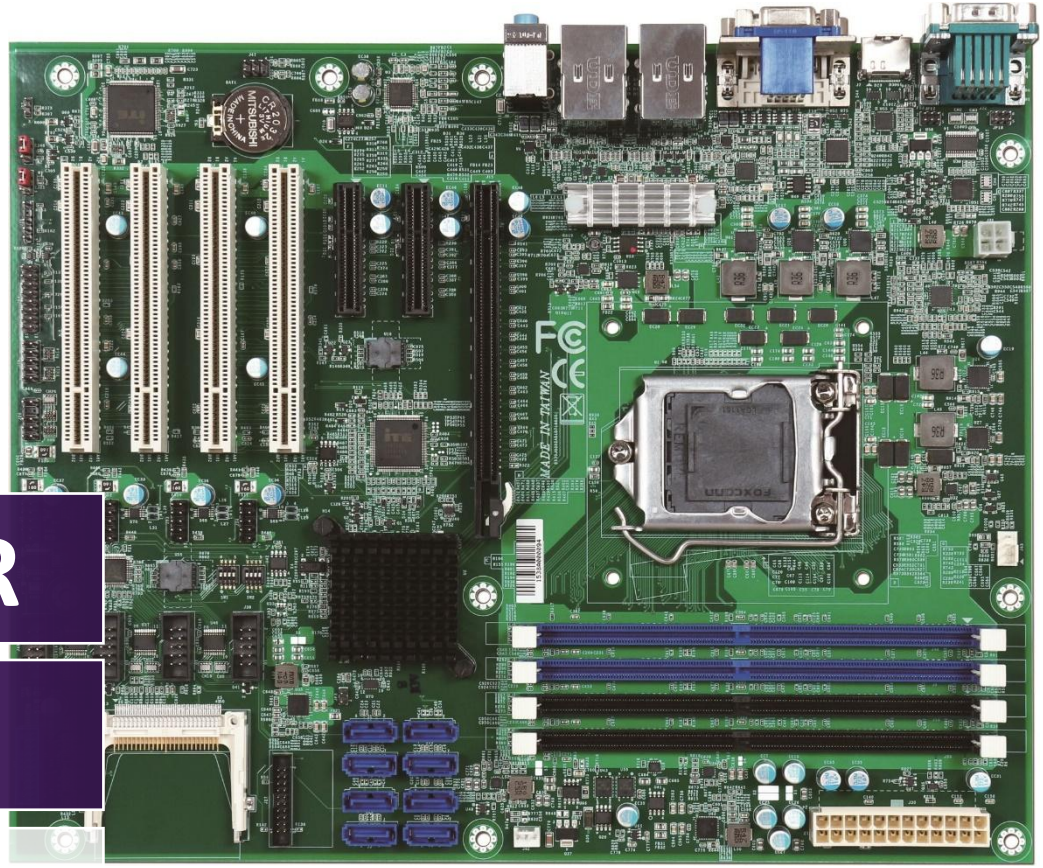


RUBY-D718VG2AR

Portwell

Version 1.3

Copyright © Portwell 2016

Revision History

R1.0	Preliminary
R1.1	Modify jumper(JP1)
R1.2	Update support KBL information
R1.3	Add support KBL information

Copyright © Portwell 2016

Contents

Preface 5
1 Introduction 7
2 Specifications 8
2.1 Supported Operating Systems 9
2.2 Mechanical Dimensions 10
2.3 Power Consumption 11
2.4 Environmental Specifications 12
3 Block Diagram 13
4 Hardware Configuration 14
4.1 Jumpers and Connectors 14
4.2 Jumpers Settings 15
4.3 Connector Settings 17
5 Signal Description 23
5.1 Watch Dog Signal 23
5.2 GPIO Signal 25
6 System Resources 27
6.1 Intel® Kabylake / Skylake-S PCH 27
6.2 Main Memory 27
6.3 Installing the Single Board Computer 27
6.3.1 Chipset Component Driver 28
6.3.2 Intel® HD Graphics 530 28

Copyright © Portwell 2016

6.3.3 Intel LAN I211AT/I219LM Gigabit Ethernet Controller 29
7 BIOS Setup Items 30
7.1 Introduction 30
7.2 BIOS Setup 30
7.2.1 Main 31
7.2.2 Configuration 32
7.2.3 Security 75
7.2.4 Boot 77
7.2.5 Save & Exit 79
8 Trobleshooting 81
8.1 Hardware Quick Installation 81
8.2 BIOS Setting 83
8.3 FAQ 84
9 Portwell Software Service 88
10 Industry Specicications 89

Copyright © Portwell 2016

Preface

This user's guide provides information about the components, features, connectors and BIOS Setup menus available on the RUBY-D718VG2AR. This document should be referred to when designing ATX application. The other reference documents that should be used include the following:

✧Intel Kaby Lake / Sky Lake -S Design Guide

✧Intel Kaby Lake / Sky Lake -S Specification

Please contact Portwell Sales Representative for above documents.

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Portwell provides no warranty with regard to this user's guide or any other information contained herein and hereby expressly disclaims any implied warranties of merchantability or fitness for any particular purpose with regard to any of the foregoing. Portwell assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide. In no event shall Portwell be liable for any incidental, consequential, special, or exemplary damages, whether based on tort, contract or otherwise, arising out of or in connection with this user's guide or any other information contained herein or the use thereof.

Trademarks

Product names, logos, brands, and other trademarks featured or referred to within this User's guide or the Portwell website, are the property of their respective trademark holders. These trademark holders are not affiliated with Portwell, our products, or our website.

Copyright © Portwell 2016

Warranty

Portwell makes no representation, warranty or guaranty, express or implied regarding the products except its standard form of limited warranty ("Limited Warranty"). Portwell may in its sole discretion modify its Limited Warranty at any time and from time to time.

Beginning on the date of shipment to its direct customer and continuing for the published warranty period, Portwell represents that the products are new and warrants that each product failing to function properly under normal use, due to a defect in materials or workmanship or due to non-conformance to the agreed upon specifications, will be repaired or exchanged, at Portwell's option and expense.

Certification

Portwell is certified to DIN EN ISO 9001:2000 standard.

Technical Support

Portwell technicians and engineers are committed to providing the best possible technical support for our customers so that our products can be easily used and implemented.

We request that you first visit our website at http://www.portwell.com.tw/support/ for the latest documentation, utilities and drivers, which have been made available to assist you. If you still require assistance after visiting our website then contact our technical support department by email at tsd@mail.portwell.com.tw for further assistance. Thank you!

1 Introduction

RUBY-D718VG2AR based on the Intel® Core™ Processor which offers 14nm Hi-K process technology with energy efficient architecture. RUBY- D718VG2AR adopts four DDR4 long DIMM sockets and supports up to 64GB memory.

Desktop solution is still popular in the market of DVR and Factory Automation which can fulfill most of these applications; therefore, with high performance and high-end specifications, RUBY-D718 is our first generation Kaby Lake / Sky Lake -S chip architecture on ATX product line.

Copyright © Portwell 2016

2 Specifications

Main Processor	◆Intel® Kaby Lake / Sky Lake -S Core™ i Processors
System Chipset	◆Intel®Q170 or C236 Express chipset
System BIOS	◆AMI UEFI BIOS
Main Memory	◆Up to 64 GB in 4 slots 288-pin DIMM sockets. Supports dual channel DDR4 1866/2133 MHz SDRAM.
Graphics	◆Controller: Intel® Gfx Gen 9, HD graphics ◆VGA: Supports VGA up to resolution 1920 x 1200 @ 60Hz ◆DVI-D: Supports DVI-D up to resolution 1920 x 1200 @ 60Hz ◆HDMI: Supports HDMI up to resolution 4096 x 2304 @ 24Hz ◆Support Triple Display
Expansion Interface	◆One PCIe x16 slot (Gen 3.0 8GT/s) ◆Two PCIe x4 slot ◆Four PCI slots
SATA Interface	◆Up to eight SATA 6Gb/s ports (Q170 supports six SATA 6Gb/s ports) ◆One SATA 6Gb/s CFEX (switch with one SATA port)
Input/ Output	◆Serial Ports: Six serial ports, 5 x RS-232 & 1 x RS-232/422/485 ◆Support PS/2 Keyboard and mouse connector (Pin Header) ◆USB Port: 6 x USB 3.0, 8 x USB 2.0 ◆GPIO connector: 8-bit general purpose Input/ Output ◆Audio Interface: Connector for Mic-In, Line-In and Line-Out

Copyright © Portwell 2016

Ethernet	◆Supports dual 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 bus which provides 500 MB/s data transmission rate ◆Controller:LAN1: Intel i219LM; LAN2: Intel i210AT
High Drive GPIO	◆One pin-header for 8 bit GPIO(4bit in & 4bit out)
Mechanical and environmental specifications	◆Operating temperature: 0 ~ 60° C ◆Storage temperature:-20 ~ 80° C ◆Humidity: 5 ~ 90% non-condensing ◆Power supply voltage: +3.3 V, +5 V, +12 V, 5 Vsb ◆Board size: 304.8mm x 234.8 mm (12" x 9.6")

2.1 Supported Operating Systems

✧Windows 7/e support

✧Windows 8.1 / WEI 8.1 support

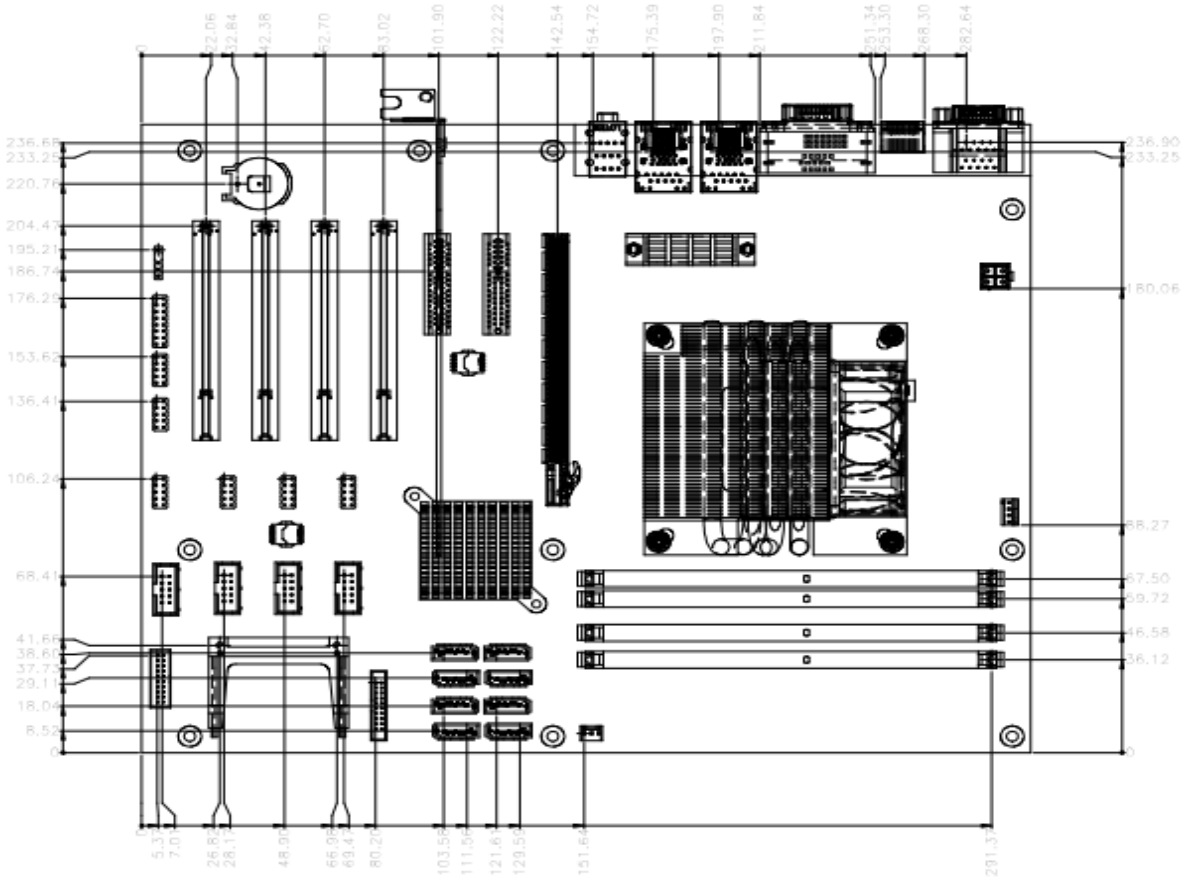
✧Windows 10 full support

✧Kernel.org Distribution

✧Yocto based Embedded Linux Distribution

Copyright © Portwell 2016

2.2 Mechanical Dimensions



Copyright © Portwell 2016

2.3 Power Consumption

\

System Configuration	
CPU Type	Intel® Core™ i7-6700TE CPU @2.4GHz
SBC BIOS	Portwell, Inc. RUBY-D718VG2AR TEST BIOS (51127T00)
Memory	WARIS DDR4 UB-DIMM 2133 8GB*4
VGA Card	Onboard Intel® HD Graphics 530
VGA Driver	Intel® HD Graphics 530 Ver:20.19.15.4326
LAN Card	Onboard Intel® Ethernet Connection I219-LM
LAN Driver	Intel® Ethernet Connection I219-LM Ver:12.13.17.7
LAN Card	Onboard Intel® I210 Gigabit Network Connection
LAN Driver	Intel® I210 Gigabit Network Connection Ver:12.14.7.0
Audio Card	Onboard Realtek ALC886 High Defintion Audio
Audio Driver	Realtek High Defintion Audio Ver:6.0.1.7312
Chip Driver	Intel® Chipset Driver Software Ver:10.0
USB3.0 Driver	Intel® USB3.0 Host Controller Adaptation Ver:1.0.1.45
EC Version	51106T00 (11/06/2015)
CFEX	WARID B473D35D
CDROM	ASUS DRW-24B3ST
Power Supply	FSP460-60PFB

Copyright © Portwell 2016

Power Consumption			
Item	*Power ON*	*Full Loading 10Min*	*Full Loading 30Min*
CPU +12V	1.27A	2.76A	3.11A
System +12V	0.06A	0.08A	0.16A
System +3.3V	0.68A	0.70A	0.77A
System +5V	1.29A	1.25A	1.37A
System+ Device +12V	A	2.94A	3.26A
System+ Device +5V	1.82A	2.15A	2.16A
USB2.0 Loading Test	4.86V/ 450 mA		
USB3.0 Loading Test	4.84V/ 900 mA		

2.4 Environmental Specifications

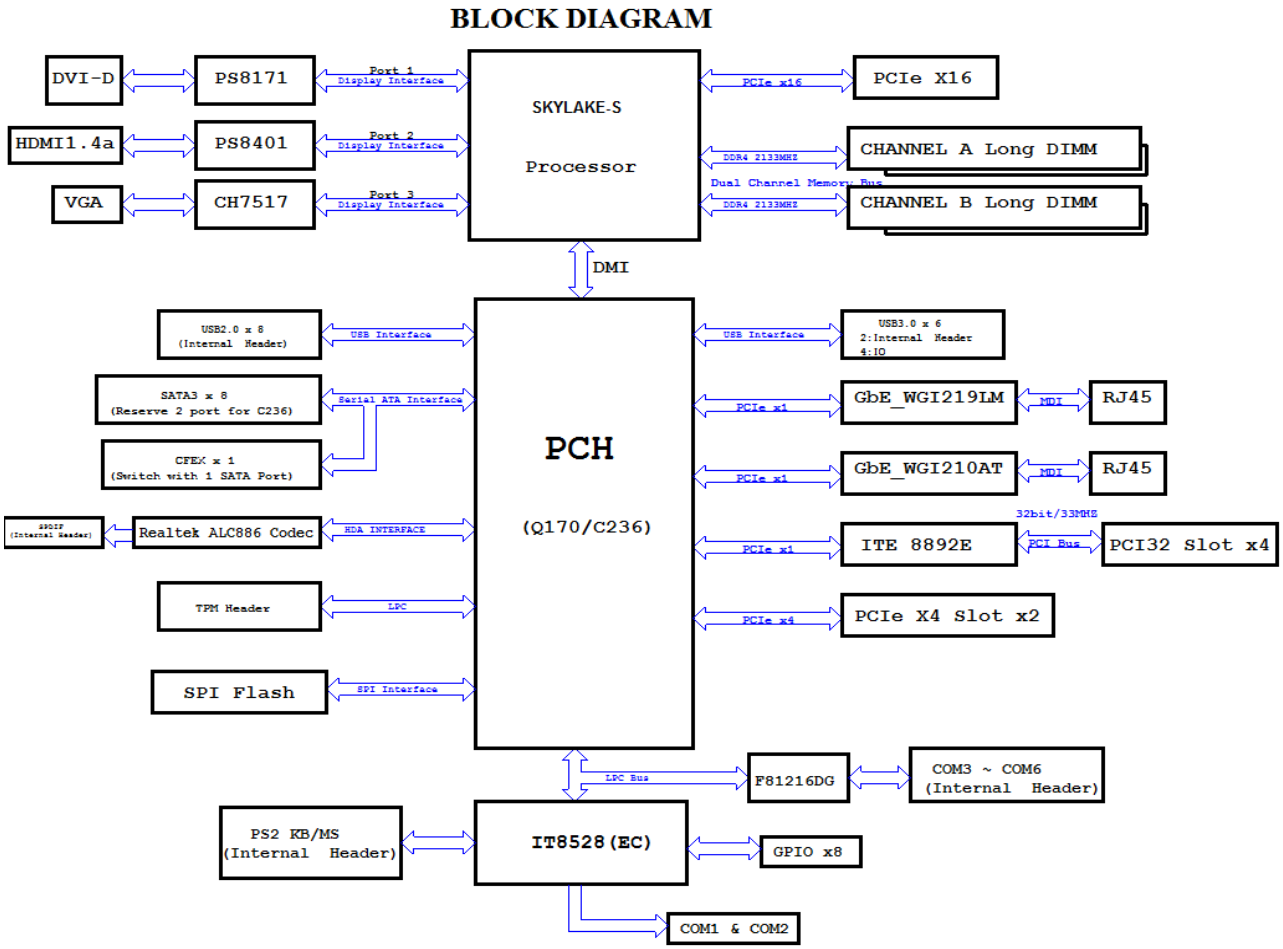
Storage Temperature : -20~80°C

Operation Temperature : 0~60°C

Storage Humidity : 5~90%

Operation Humidity: 10~90%

3 Block Diagram



4 Hardware Configuration

4.1 Jumpers and Connectors

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

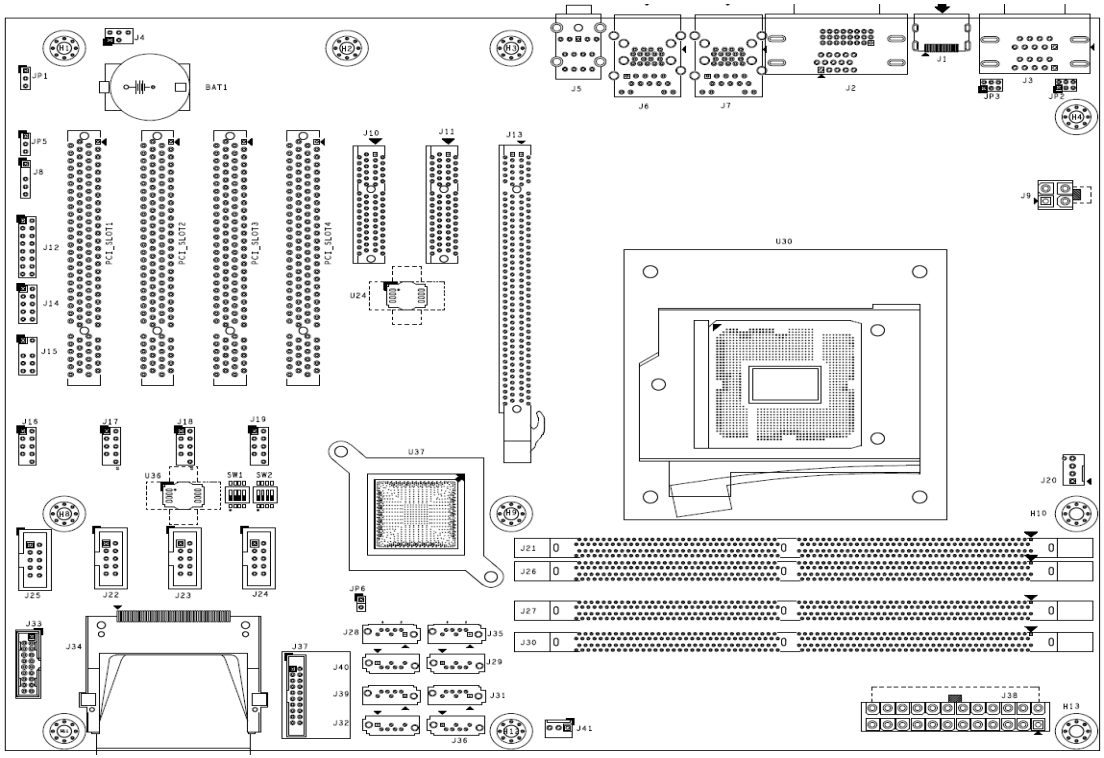


Figure 1, RUBY-D718VG2AR Top View

4.2 Jumpers Settings

For users to customize RUBY-D718VG2AR'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:

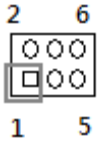
Jump Function List:

Jump	Function	Remark
JP1	AT /ATX Mode Select Jumper	
JP2	RI Function Select Jumper	COM2
JP3	RI Function Select Jumper	COM1
JP5	CMOS Clear Jumper	
JP6	CFEX/SATA Port Select	J34/J28

JP1: AT/ATX Mode Selection

PIN No.	Signal Description
1-2, Short	AT
2-3, Short	ATX

JP2: COM2 RI POWER Select



PIN No.	Signal Description
1-3, Short	5V
3-4, Short	RI
3-5, Short	12V

JP3: COM1 RI POWER Select

PIN No.	Signal Description
1-3, Short	5V
3-4, Short	RI
3-5, Short	12V

JP5: Clear CMOS

PIN No.	Signal Description
1-2 Short	Normal Operation
2-3 Short	Clear CMOS Contents

JP6: SATA Port Selection

PIN No.	Signal Description
1-2, Short	CFEX (J34)
1-2, Open	SATA Connector(J28)

Copyright © Portwell 2016

SW1: BIOS Boot Selection

PIN No.	Signal Description
SW1_ON , SW2_OFF	Boot from SPI Flash
SW1_OFF , SW2_ON	Boot from CFEX

4.3 Connector Settings

Connector Allocation

I/O peripheral devices are connected to the interface connectors

Connector Function List

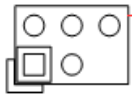
Connector	Function	Remark
J1	HDMI Connector	
J2	VGA + DVI Connector	
J3	COM1 & 2 Connector	COM2(RS-232/422/485)
J4	SPDIF Pin HDR	
J5	Audio Jack (Mic + Line in + Line out)	
J6	RJ45 + USB3.0 Connector	
J7	RJ45 + USB3.0 Connector	
J8	SMBUS Pin HDR	5x1 pin header
J9	+12V Power Connector	CPU Power
J10	PCIe x 4 Slot	Gen3

Copyright © Portwell 2016

J11	PCIe x 4 Slot	Gen3
J12	Front Panel Pin HDR	
J13	PCIe x 16 Slot	Gen3
J14	General Purpose I/O Pin HDR	
J15	PS/2 KB & MS Pin HDR	
J16/J17/J18/J19	Internal USB2.0 Pin HDR	
J20	CPU FAN Power Connector	
J21/J26/J27/J30	DDR4 Socket	
J22	COM5 Connector	RS-232
J23	COM4 Connector	RS-232
J24	COM3 Connector	RS-232
J25	COM6 Connector	RS-232
J28/J29/J31/J32 J35/J36/J39/J40	SATA GEN3 Connector	J35 & J29 For C236 PCH
J33	Internal USB3.0 Pin HDR	
J34	CFEX	
J37	TPM	
J38	ATX 24 Pin Power Connector	
J41	System FAN Power Connector	
PCI Slot1-4	PCI Slot	
U36	BIOS EEPROM Socket	
U24	EC EEPROM Socket	

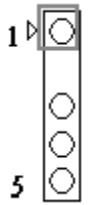
Copyright © Portwell 2016

J4: SPDIF Pin HDR



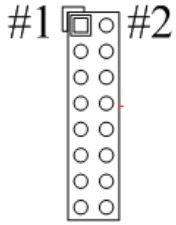
PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	SPDIF_IN	4	SPDIF_OUT
	Key	6	+5V

J8: SMBUS Pin HDR



PIN No.	Signal Description
1	SMB_CLK
	Key
3	GND
4	SMB_DATA
5	+5V

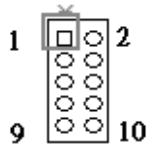
J12: Front Panel Pin HDR



PIN No.	Signal Description	PIN No.	Signal Description
1	PWR_LED (+)	2	Buzzer (+)
3	PWR_LED (-)	4	N/C
5	LAN1_ACT_LED (+)	6	N/C
7	LAN1_ACT_LED (-)	8	Buzzer (-)
9	LAN2_ACT_LED (-)	10	Power On (-)
11	LAN2_ACT_LED (+)	12	Power On (+)
13	HDD_LED (+)	14	Reset (+)
15	HDD_LED (-)	16	Reset (-)

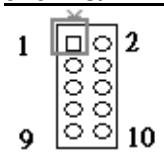
Copyright © Portwell 2016

J14: GPIO Pin HDR



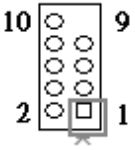
PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO	2	GPIO
3	GPIO	4	GPIO
5	GPIO	6	GPIO
7	GPIO	8	GPIO
9	Ground	10	+5V

J15: PS/2 KB & MS



PIN No.	Signal Description	PIN No.	Signal Description
1	Mouse Data	2	Keyboard Data
	Key		Key
5	Ground	6	Ground
7	+5V_Dual	8	+5V_Dual
9	Mouse Clock	10	Keyboard Clock

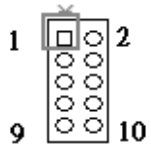
J16/J17/J18/J19: Internal USB2.0 Pin HDR



PIN No.	Signal Description	PIN No.	Signal Description
1	+5V_Dual	2	+5V_Dual
3	USB-	4	USB-
5	USB+	6	USB+
7	GND	8	GND
	Key	10	N/C

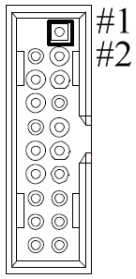
Copyright © Portwell 2016

J22/J23/J24/J25: COM3~COM6 Serial Port Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	DCD	2	RXD
3	TXD	4	DTR
5	Ground	6	DSR
7	RTS	8	CTS
9	RI	10	N/C

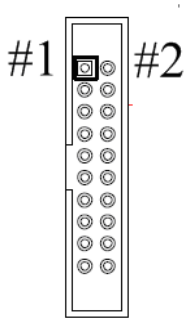
J33 : Internal USB3.0 Connector



PIN No.	Signal Description	PIN No.	Signal Description
	Key	1	+5V
19	USB3_RXN	2	USB3_RXN
18	USB3_RXP	3	USB3_RXP
17	GND	4	GND
16	USB3_TXN	5	USB3_TXN
15	USB3_TXP	6	USB3_TXP
14	GND	7	GND
13	USB2_N	8	USB2_N
12	USB2_P	9	USB2_P
11	GND	10	GND

Copyright © Portwell 2016

J37 : TPM Pin HDR



PIN No.	Signal Description	PIN No.	Signal Description
1	Clock	2	GND
3	LFRAME#	4	N/C
5	PLTRST#	6	+5V
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK	14	SMB_DATA
15	+3V_Dual	16	SERIRQ
17	GND	18	N/C
19	N/C	20	N/C

Copyright © Portwell 2016

5 Signal Description

5.1 Watch Dog Signal

WDT Control Command Example

```
#Define WDTCFG 0x06//WDT Timer Coutrol 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);
```

Copyright © Portwell 2016

```
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
```

Copyright © Portwell 2016

5.2 GPIO Signal

GPIO Control Command Example (C Language)

```
#Define GPCR 0x2B//GPIO Coutrol 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);
```

Copyright © Portwell 2016

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

6 System Resources

6.1 Intel® Kabylake / Skylake-S PCH

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

6.2 Main Memory

RUBY-D718 provides 4 x 288-pin Long-DIMM sockets which supports DDR4 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.

6.3 Installing the Single Board Computer

To install your RUBY-D718 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 RUBY-D718 into the dedicated position in the system
Step 4 : Attach cables to existing peripheral devices and secure it

Copyright © Portwell 2016

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

6.3.1 Chipset Component Driver

RUBY-D718 is based on Intel® Q170/H110/C236 chipset and desktop processors including 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 RUBY-D718 CD-title

6.3.2 Intel® HD Graphics 530

RUBY-D718 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. RUBY-D718 supports DVI-D, VGA, HDMI display port. This combination makes RUBY-D718 an excellent performance hardware.

Drivers Support

Please find the Graphic driver in the RUBY-D718 CD-title. The driver supports Windows 8.

Note:

If you select H110 chipset, the board only can support dual display.

6.3.3 Intel LAN I211AT/I219LM Gigabit Ethernet Controller

- Intel I210AT Gigabit Ethernet controller and 1x RJ45 connectors on rear I/O
- Intel I219LM Gigabit Ethernet controller and 1x RJ45 connectors on rear I/O

Drivers Support

Please find Intel I210AT/I219LM LAN driver in /Ethernet directory of RUBY-D718 CD-title. The driver supports Windows 8.

Copyright © Portwell 2016

7 BIOS Setup Items

7.1 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.

7.2 BIOS Setup

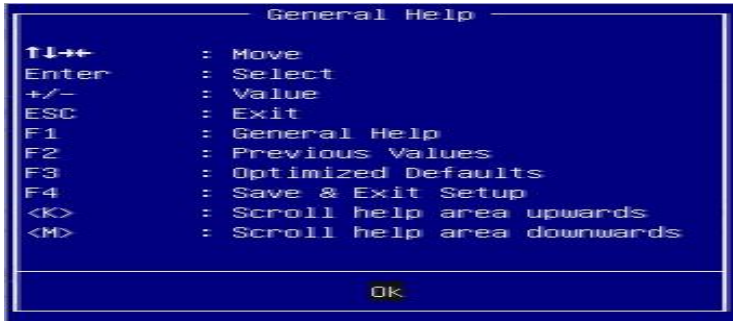
Power on the computer and the system will start POST (Power on Self Test) process. When the message below appears on the screen, press <Delete> or <Esc> key will enter BIOS setup screen.

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.

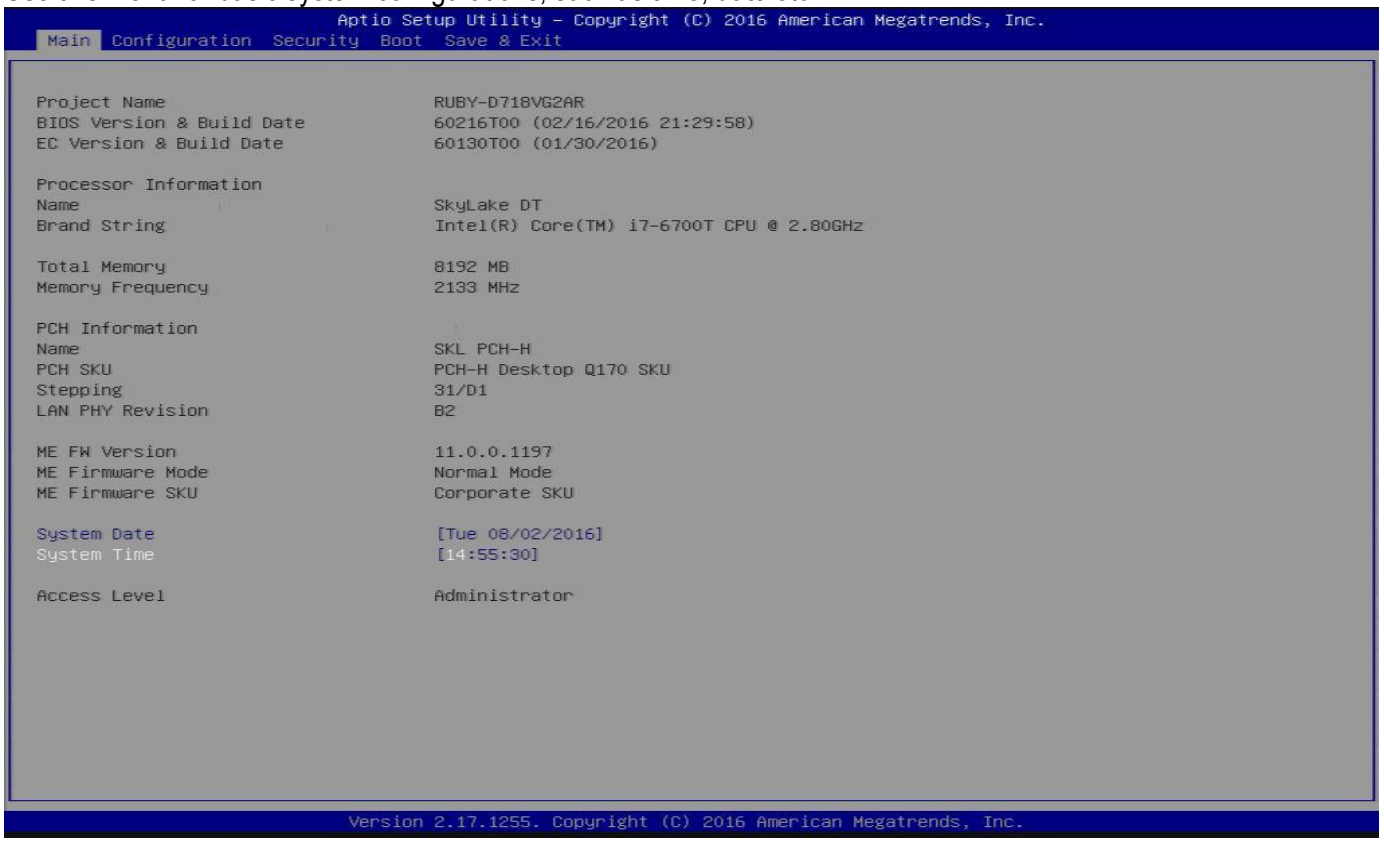
Press <F1> to Run General Help or Resume

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.



7.2.1 Main

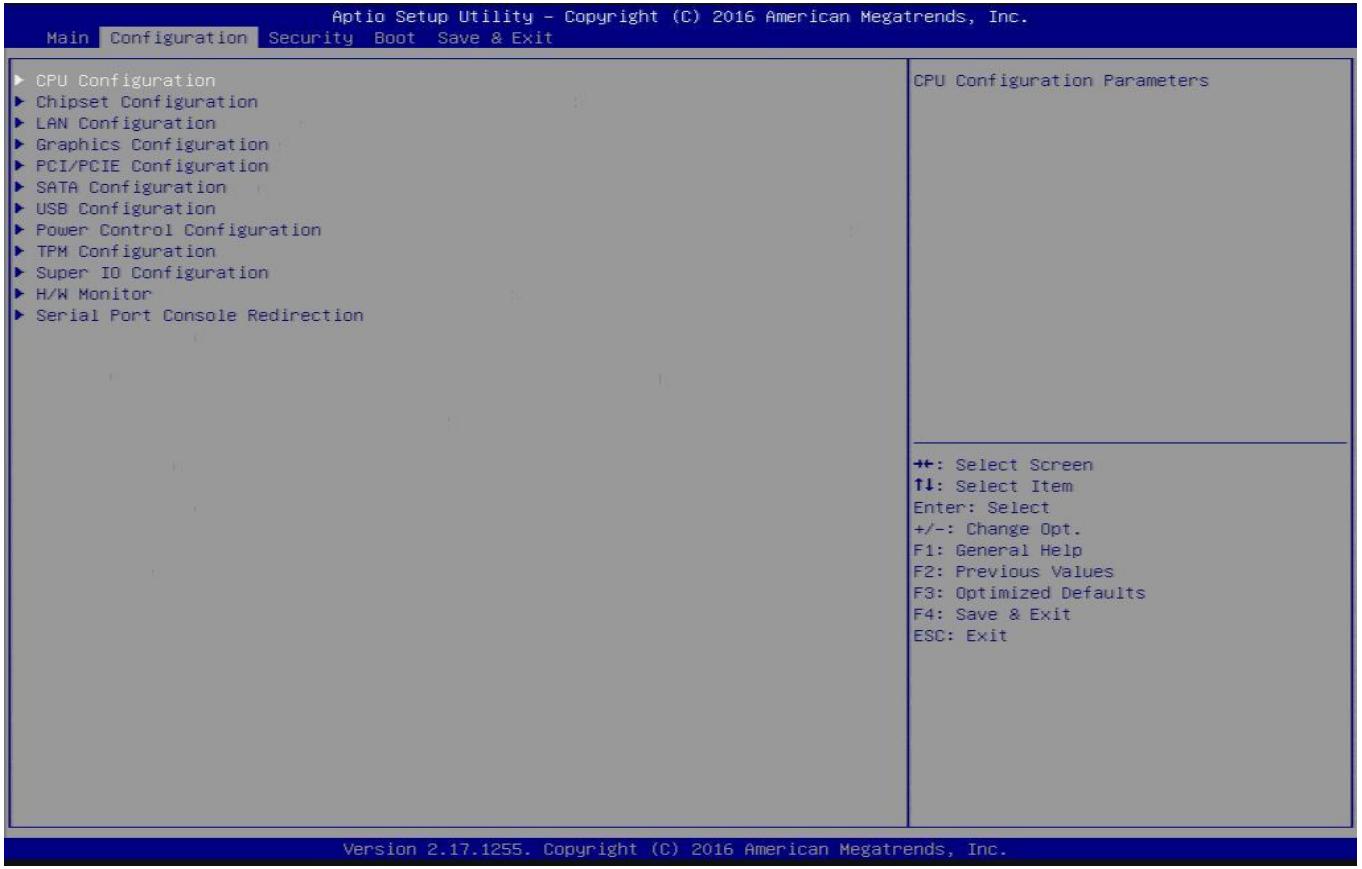
Use this menu for basic system configurations, such as time, date etc.



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.	

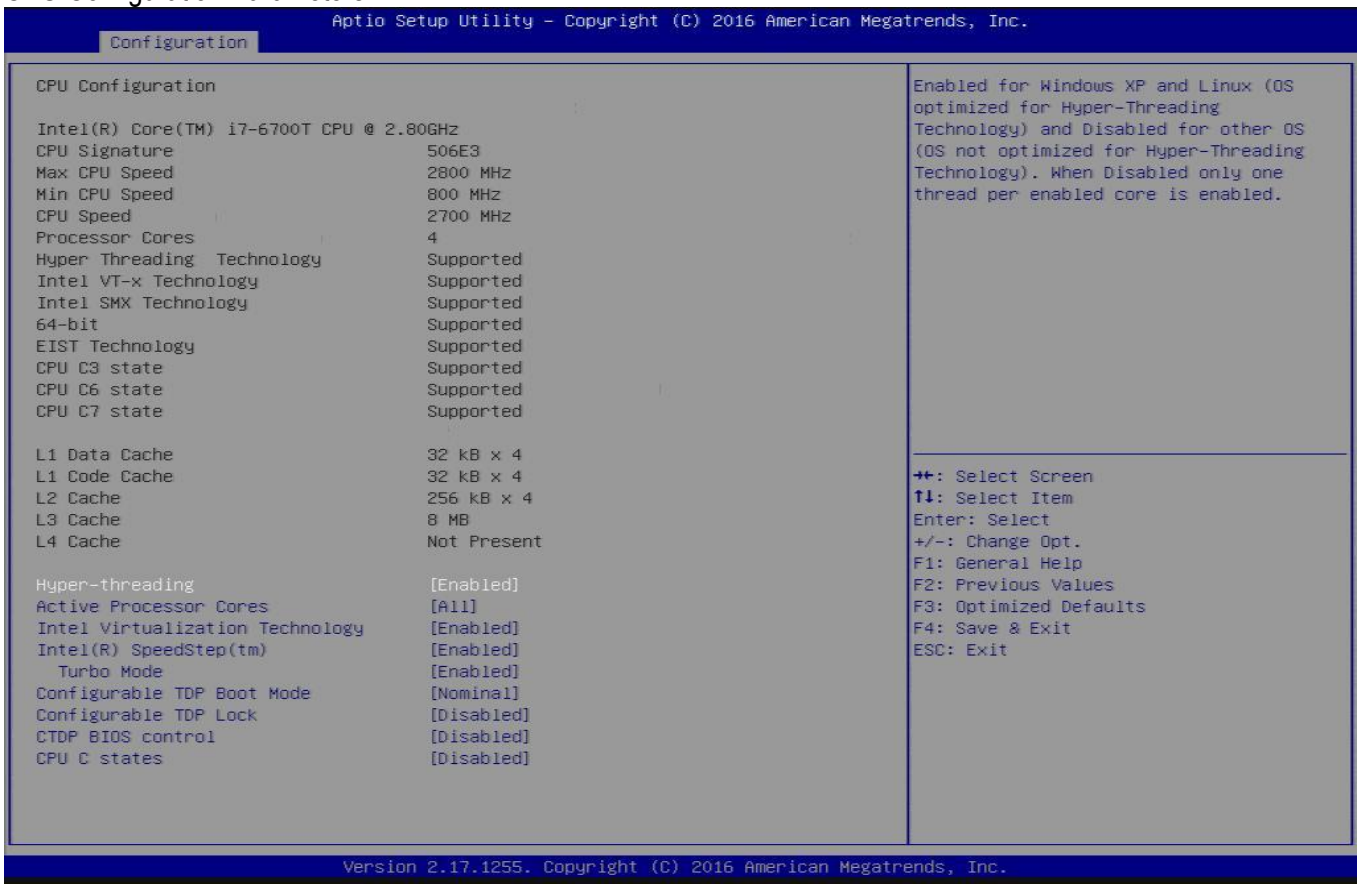
7.2.2 Configuration

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



CPU Configuration

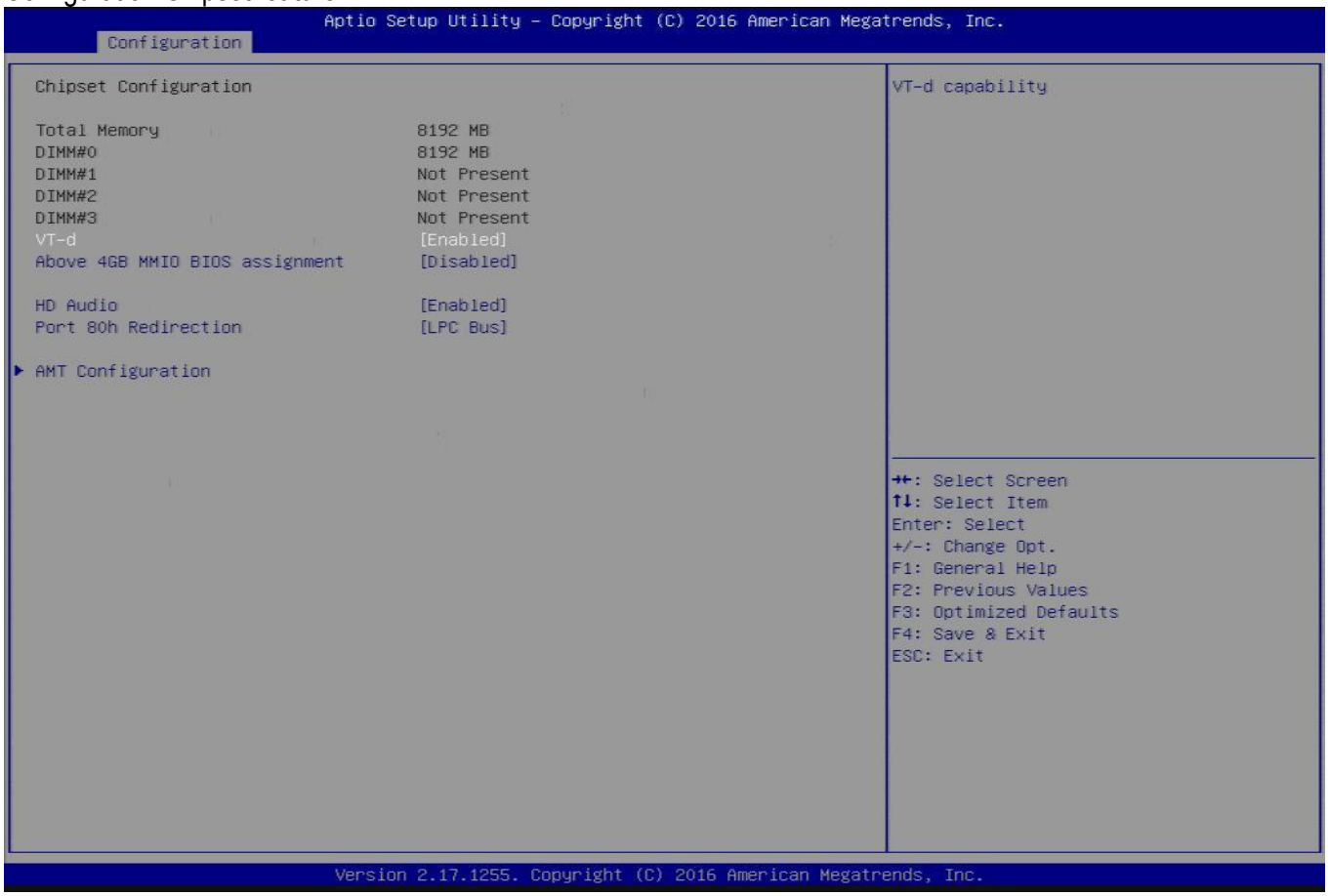
CPU Configuration Parameters



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.	Disabled, ★Enabled.
Active Processor Cores	Select the 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.	Disabled, ★Enabled.
Intel SpeedStep	Allows more than two frequency ranges to be supported	Disabled, ★Enabled.
Turbo Mode	Turbo Mode	Disabled, ★Enabled.
Configurable TDP Boot Mode	Configurable TDP Mode as Nominal/Down/Up/Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero	★Nominal,Down,Up, Deactivate
Configurable TDP Lock	Configurable TDP Mode Lcok sets the Lock bits on TURBO_ACTIVATION_RATIO and CONFIG_TDP_CONTROL. Note:When CTDP Lock is enabled Custom ConfigTDP Count will be forced to 1 and Custom ConfigTDP Boot Index will be forced to 0	★Disabled, Enabled.
CTDP BIOS control	Enabled CTDP control via runtime ACPI BIOS methods. This “BIOS only” feature does not require EC or driver support	★Disabled, Enabled.
CPU C states	Enable or disable CPU C states	★Disabled, Enabled.

Chipset Configuration

Configuration Chipset feature



Feature	Description	Options
VT-d	VT-d capability	Disabled, ★Enabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is disabled automatically when Aperture Size is set to 2048MB	★Disabled, Enabled
HD Audio	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled	Disabled, ★Enabled
Port 80h Redirection	Control where the port 80h cycles are sent	★LPC Bus,PCIE Bus

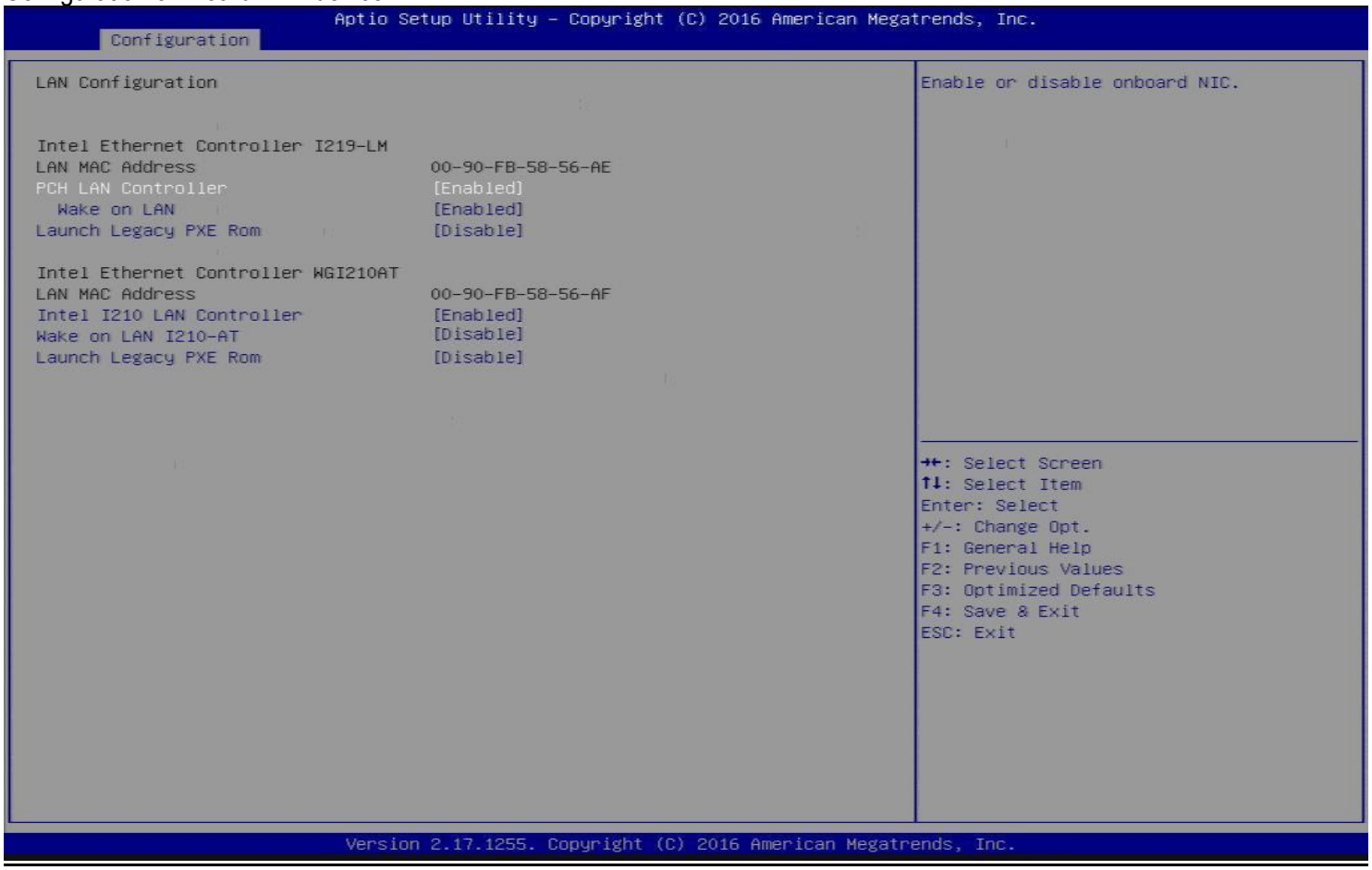
AMT Configuration

Configure Active Management Technology Parameters

Feature	Description	Options
Intel AMT	Enable/Disable Intel(R) 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

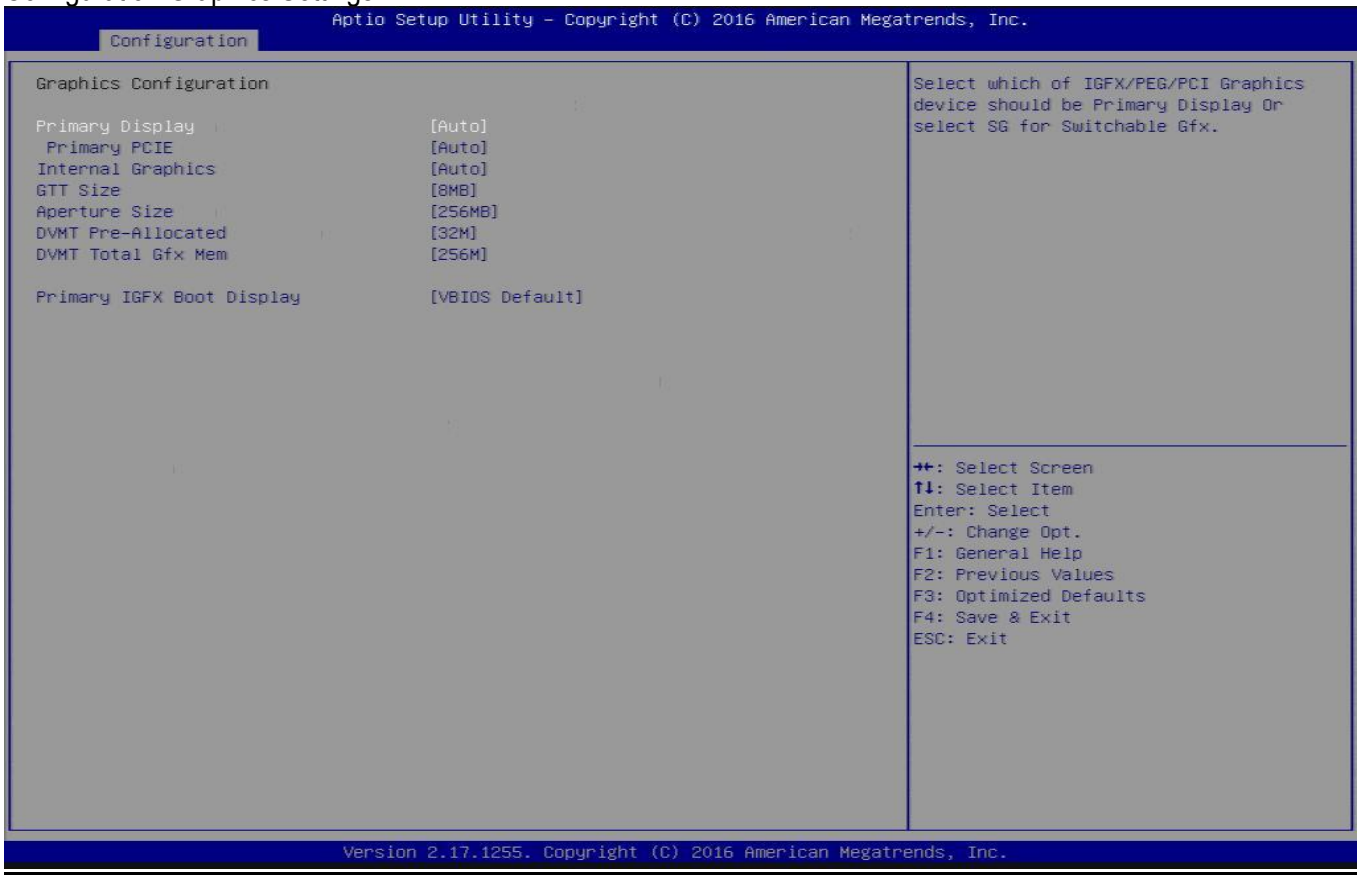
Configuration on Board LAN device.



Feature	Description	Options
PCH LAN Controller	Enable or Disable onboard NIC	Disabled, ★Enabled.
Wake on LAN	Enabled or disable integrated LAN to wake the system.	Disabled, ★Enabled
Launch Legacy PXE Rom	Launch Legacy PXE Rom.[Disable] Not launch Rom, [Enable] Force launch Rom,[Auto] Auto detect LAN Cable status to Enable/Disable Rom initial	★Disabled, Enabled,Auto
Intel I210 LAN Controller	Intel I210 LAN Controller	Disabled, ★Enabled.
Wake on LAN I210-AT	Enabled or disable integrated LAN to wake the system.	★Disabled, Enabled.
Launch Legacy PXE Rom	Launch Legacy PXE Rom.[Disable] Not launch Rom, [Enable] Force launch Rom,[Auto] Auto detect LAN Cable status to Enable/Disable Rom initial	★Disabled, Enabled,Auto

Graphics Configuration

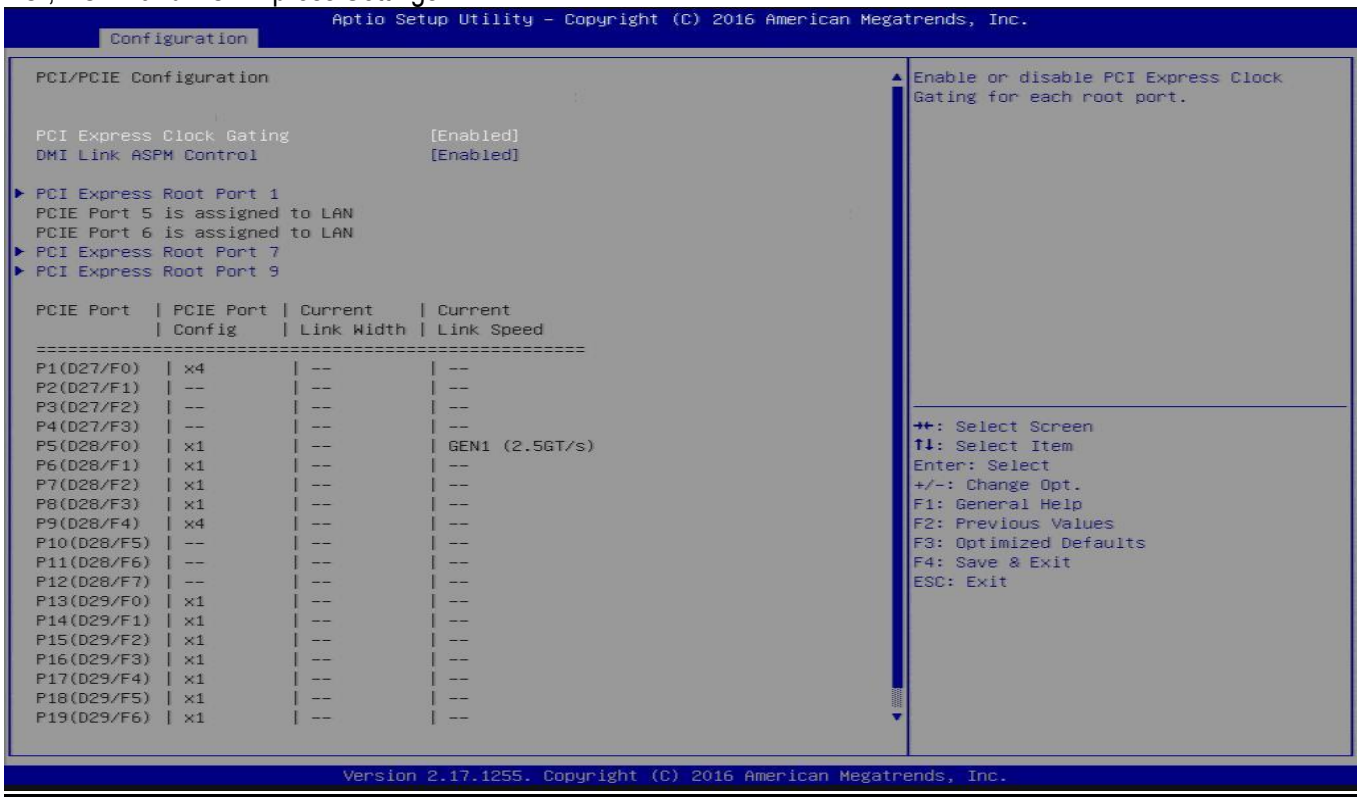
Configuration Graphics Settings



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 PCIE	Select Auto/PCIE1 of D28:F0,PCIE9 of D29:F1, Graphics device should be Primary PCIE	★Auto,PCIE1,PCIE9
Internal Graphics	Keep IGFX enabled based on the setup options.	★Auto, Disabled, Enabled.
GTT Size	Select the GTT Size	2MB,4MB, ★8MB
Aperture Size	Select the Aperture Size	128MB,★256MB,512MB, 1024MB,2048MB,4096MB
DVMT Pre-Allocated	Select DVMT 5.0 Pre-Allocated Graphics Memory size used by the Internal Graphics Device.	★ 32M, 64M, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M , 352M, 384M, 416M, 448M, 480M, 512M. 1024M,1536M,2048M…
DVMT Total Gfx Mem	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.	128MB,★256MB, MAX.
Primay 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, DVI,VGA, HDMI.

PCI/PCIE Configuration

PCI, PCI-X and PCI Express Settings.



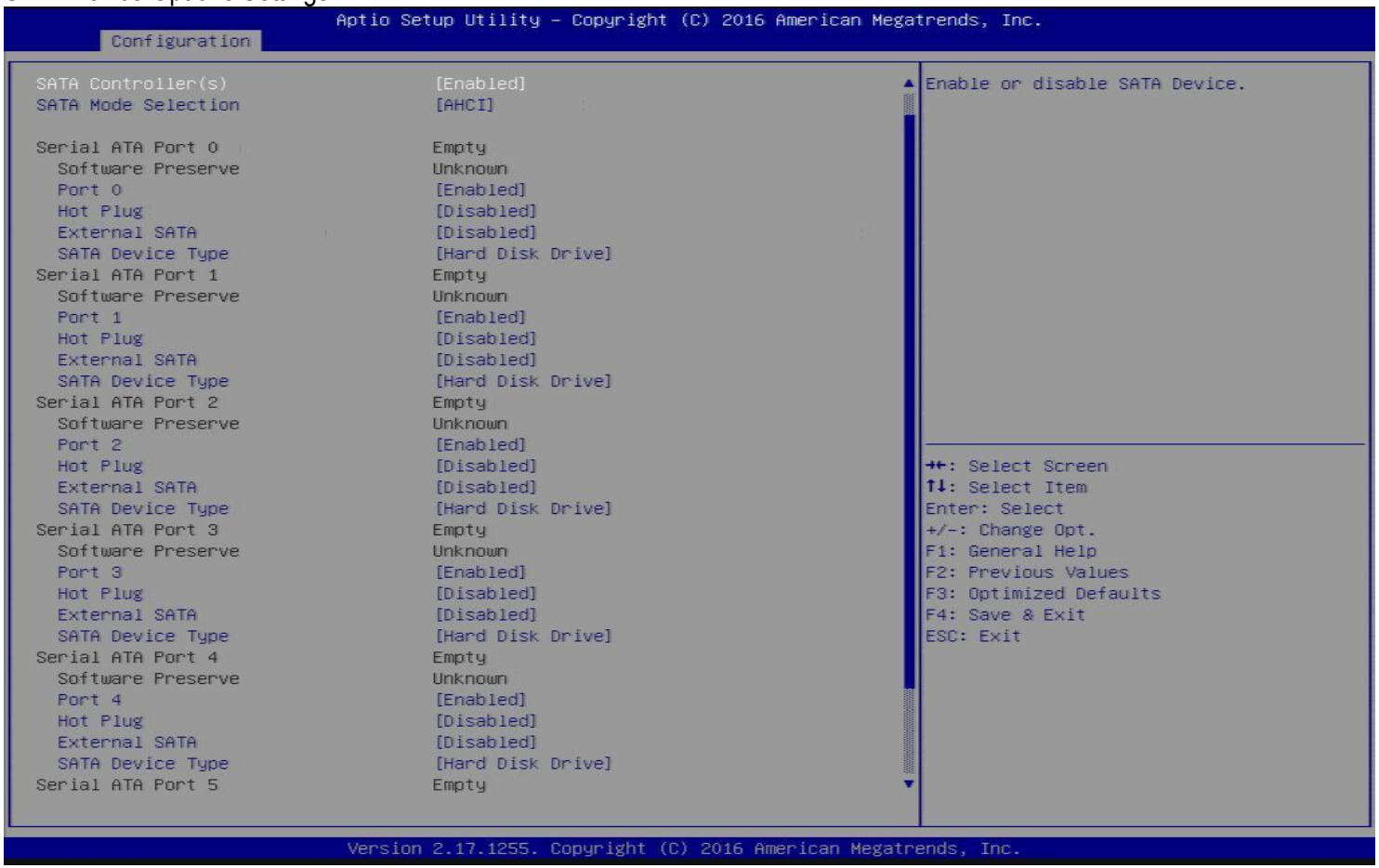
Feature	Description	Options
PCI Express clock Gating	Enable or disable PCI Express clock Gating for each root port.	Disabled ★Enabled
DMI Link ASPM Control	Enable/Disable the control of Active State Power Management on SA side of the DMI Link.	Disabled ★Enabled

PCI Express Root Port 1,7,9

Feature	Description	Options
PCI Express Root Port 1,7,9	Control the PCI Express Root Port.	Disabled, ★Enabled
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

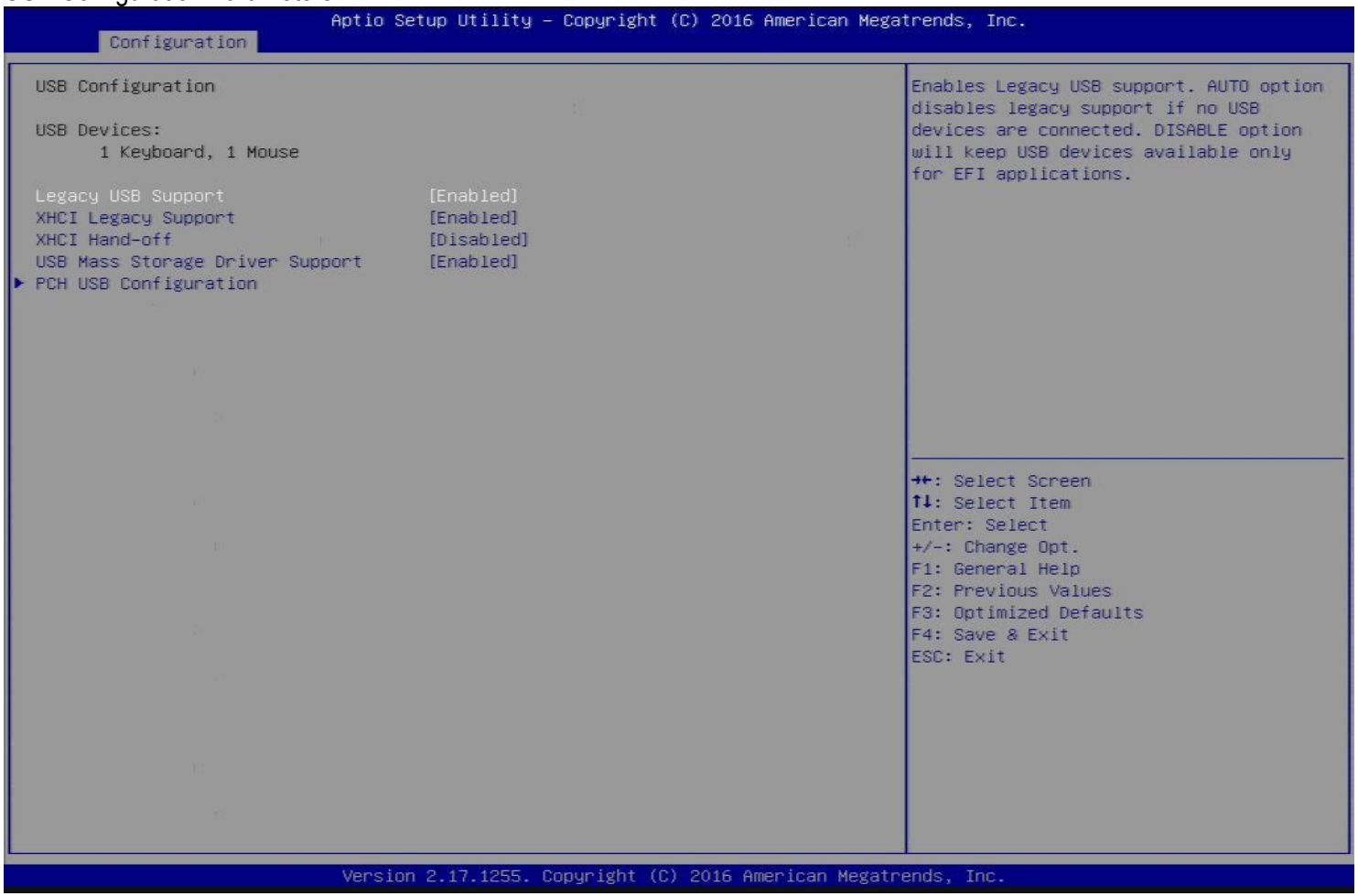
SATA Device Options Settings



Feature	Description	Options
SATA Controller(s)	Enable or disable SATA Device.	★Enabled, Disabled
SATA Mode Selection	Determines how SATA controller(s) operate.	★AHCI, RAID
Port 0-5	Enable or Disable SATA Port	Disabled, ★Enable
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

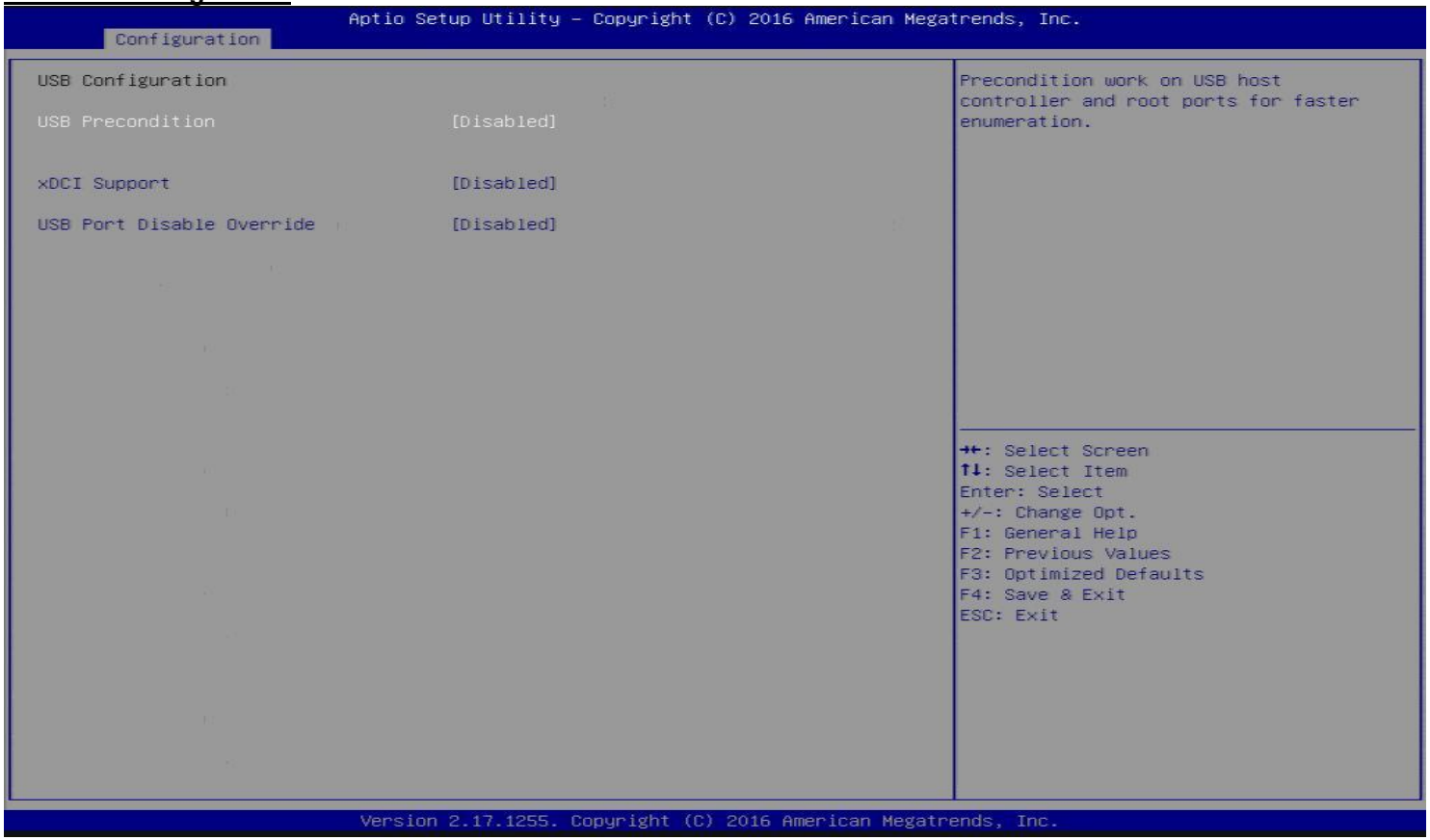
USB Configuration

USB Configuration Parameters.



Feature	Description	Options
Legacy USB Support	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE 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.	Enabled, ★Disabled
USB Mass Storage Driver Support	Enable/Disable USB Mass Storage Driver Support.	Disabled, ★Enabled

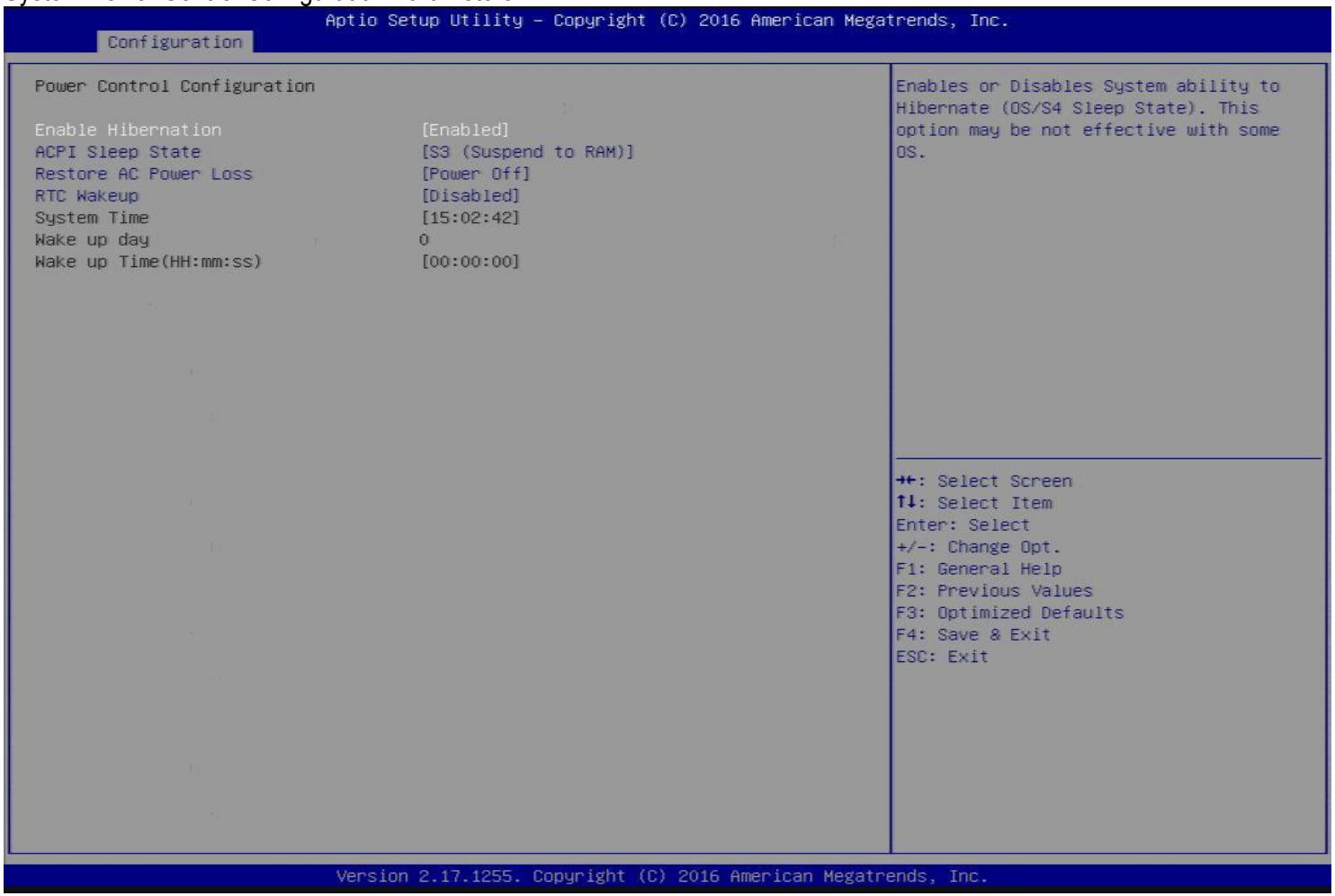
PCH USB Configuration



Feature	Description	Options
USB Precondition	Precondition work on USB host controller and root ports for faster enumeration.	Enabled, ★Disabled
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 #0-9,#12-13	Enable /Disable USB port.	★Enabled, Disabled

Power Control Configuration

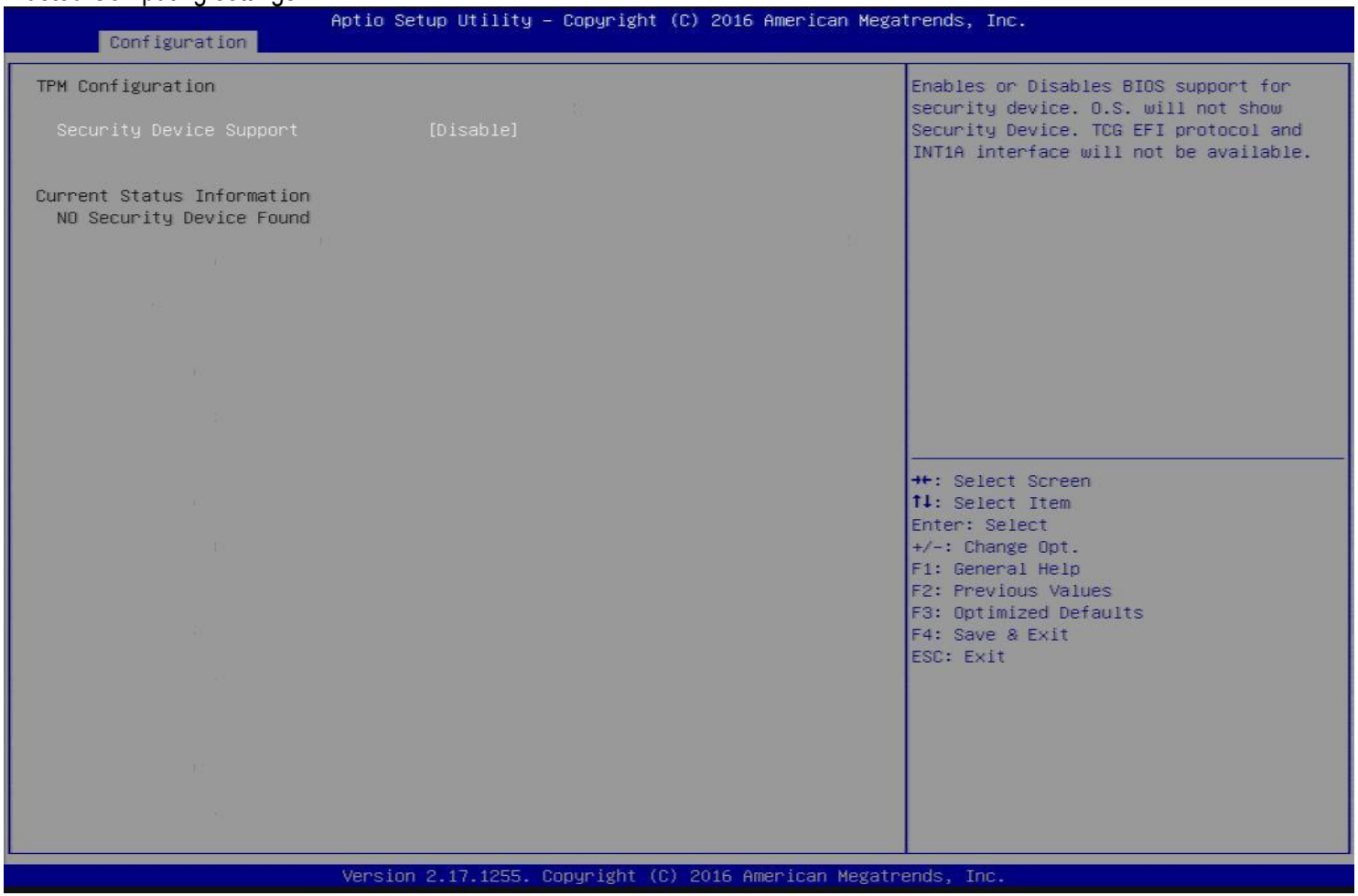
System Power Control Configuration Parameters



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.	Disabled, ★Enabled
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.	Suspend Disabled, ★S3 (Suspend to RAM)
Restore AC Power Loss	Specify what state to go to when power is re-applied after a power failure (G3 state)	Power On, ★Power Off
RTC Wakeup (Enabled)	Enable or disable System wake on alarm event. [Enabled], system will wake on 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	
Wake up Time(HH: mm: ss)	Use [Enter], [TAB] to select field, HH: 0-23, mm: 0-59, ss: 0-59	

TPM Configuration

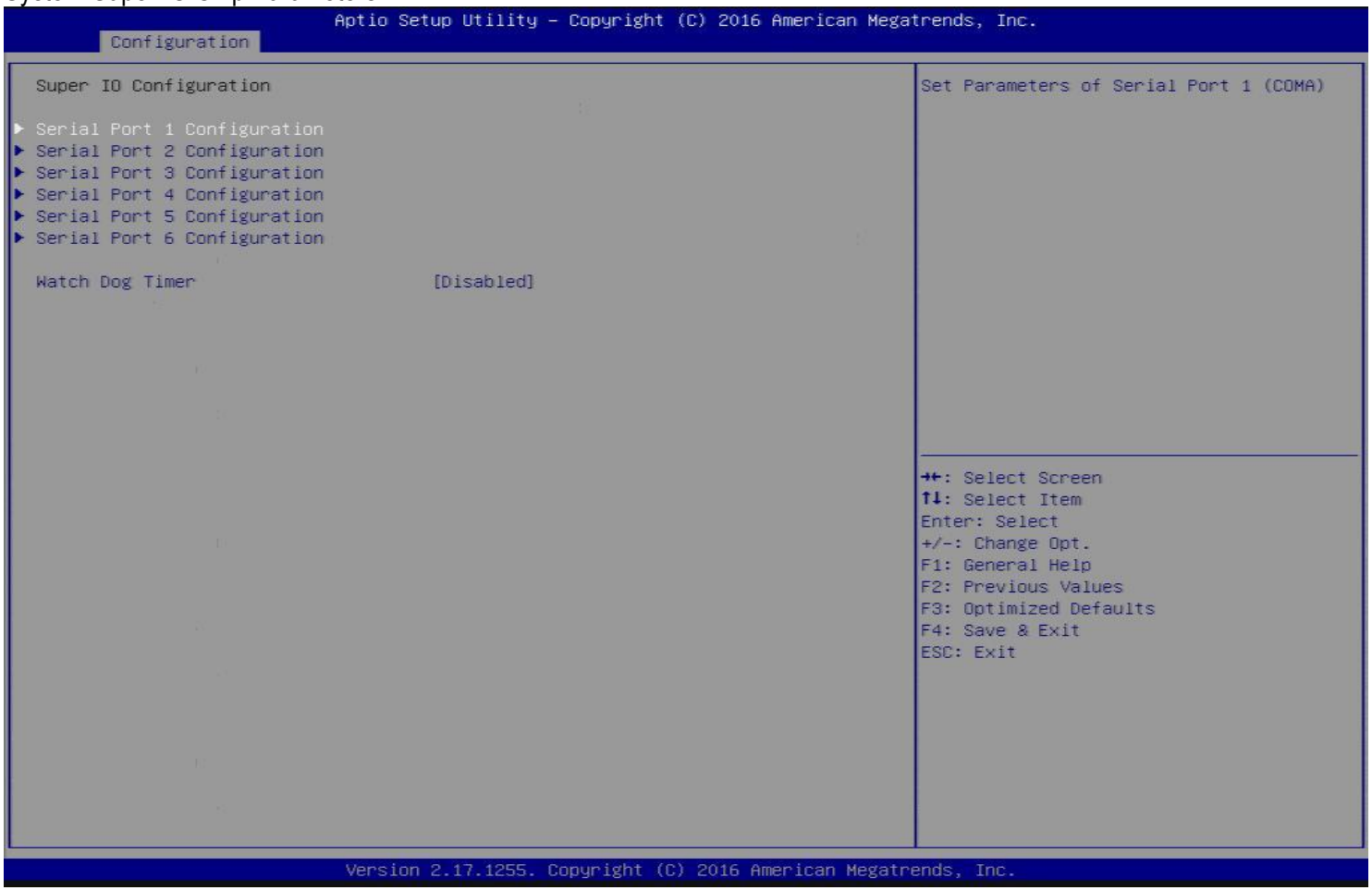
Trusted Computing settings



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.	TPM 1.2, TPM 2.0, ★Auto

Super IO Configuration

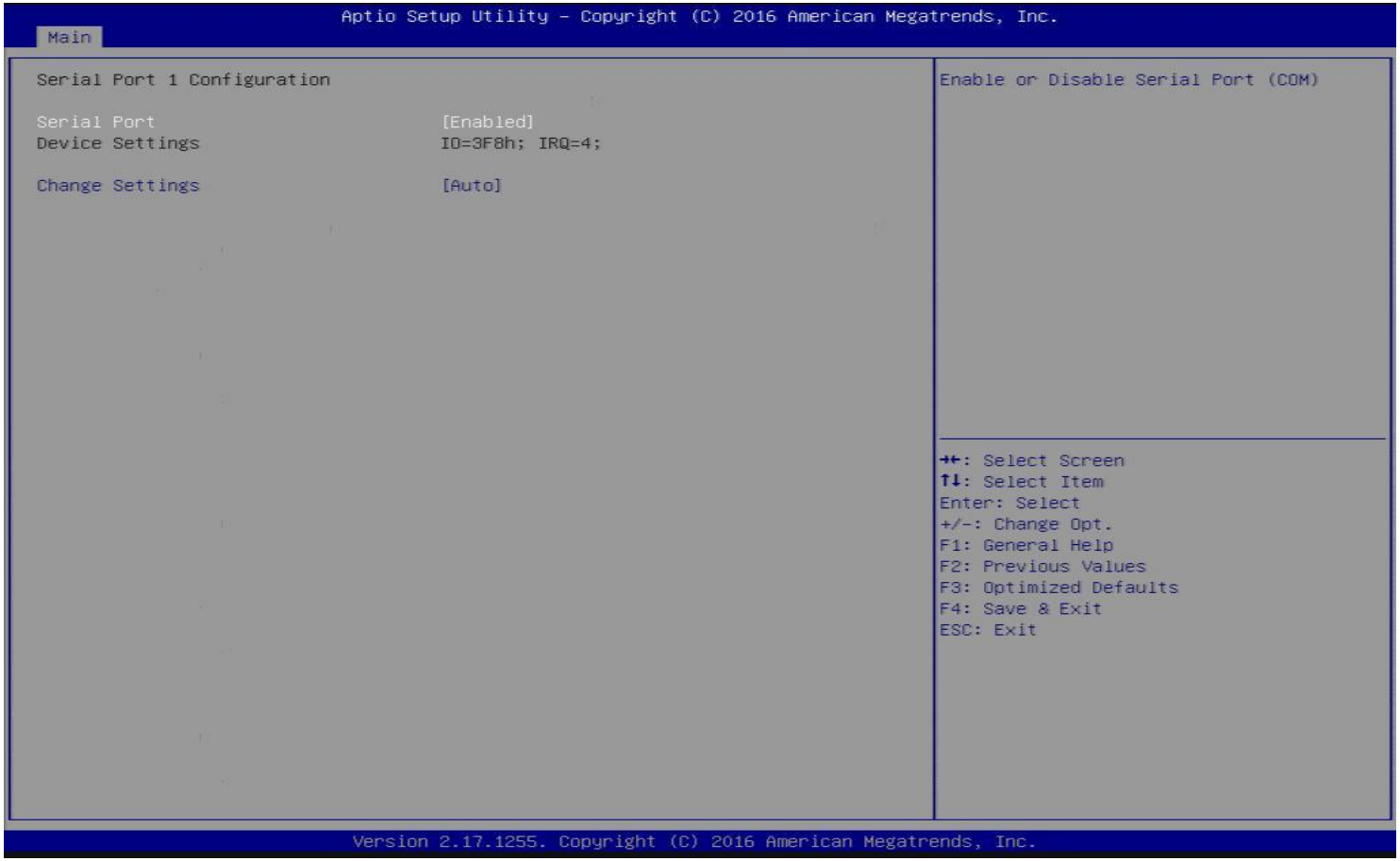
System Super IO Chip Parameters.



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

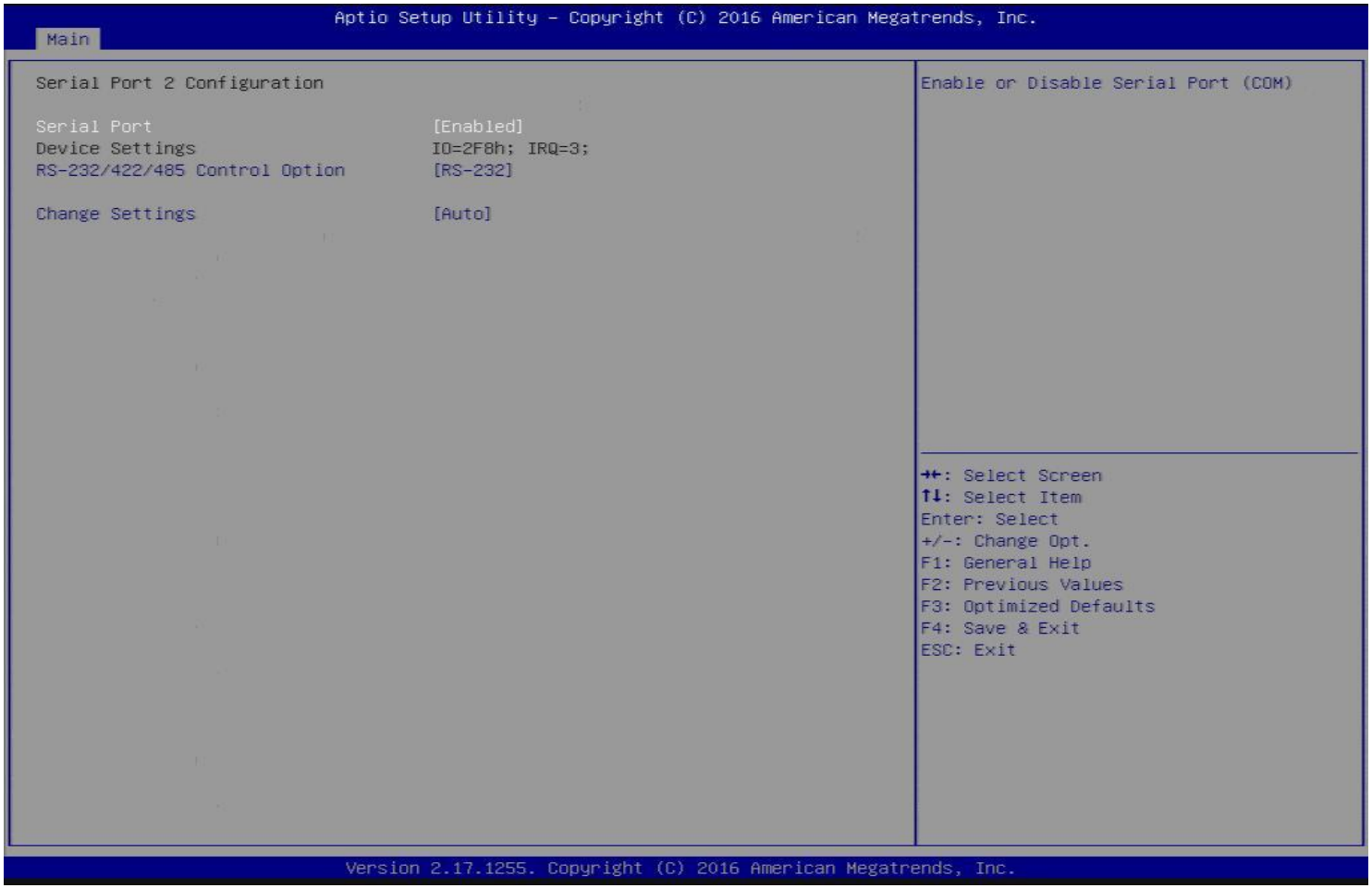
Set Parameters of Serial Port 1



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal settings for Super IO Device	★Auto, IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12 IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12 IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12

Serial Port 2 Configuration

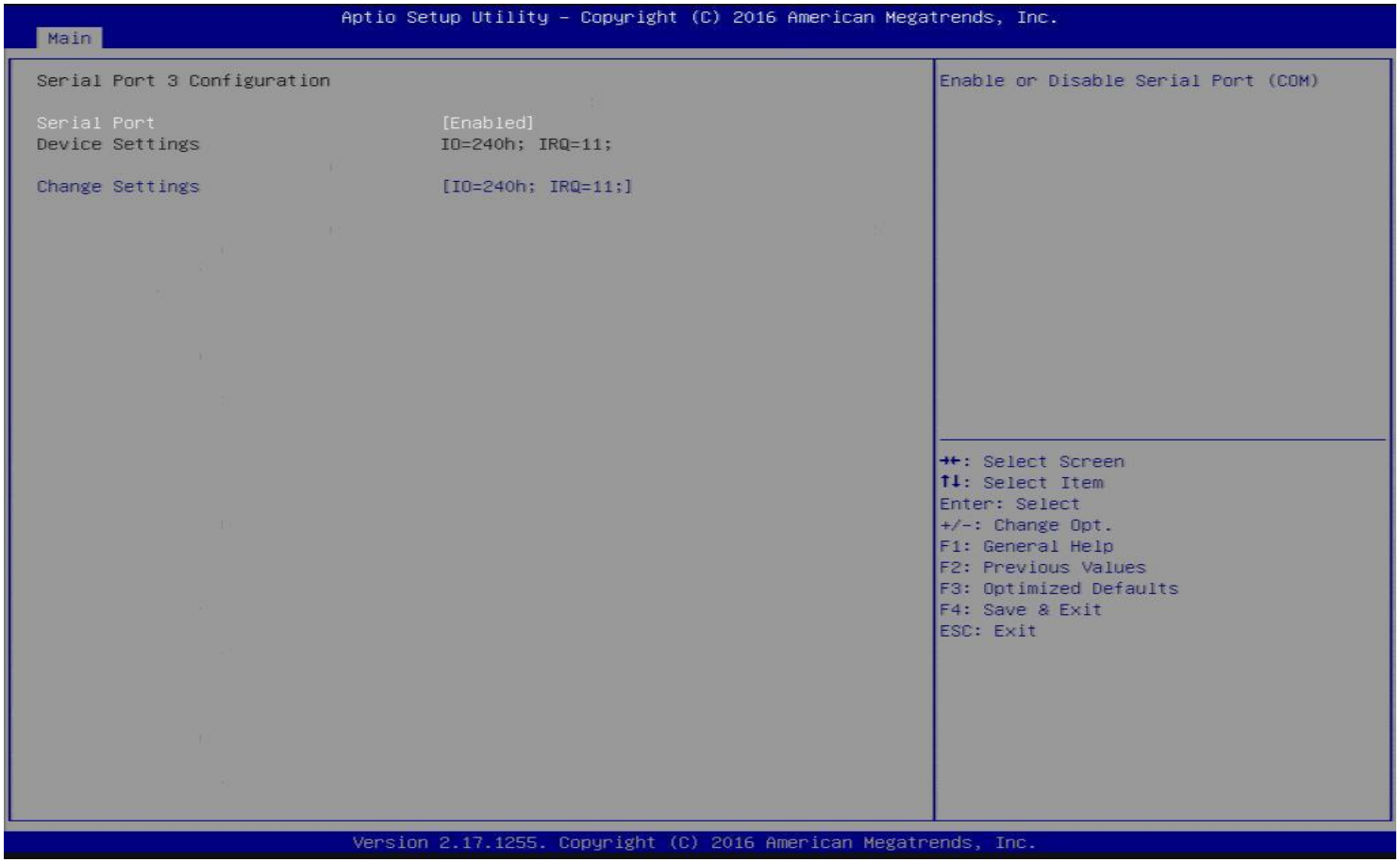
Set Parameters of Serial Port 2



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

Serial Port 3 Configuration

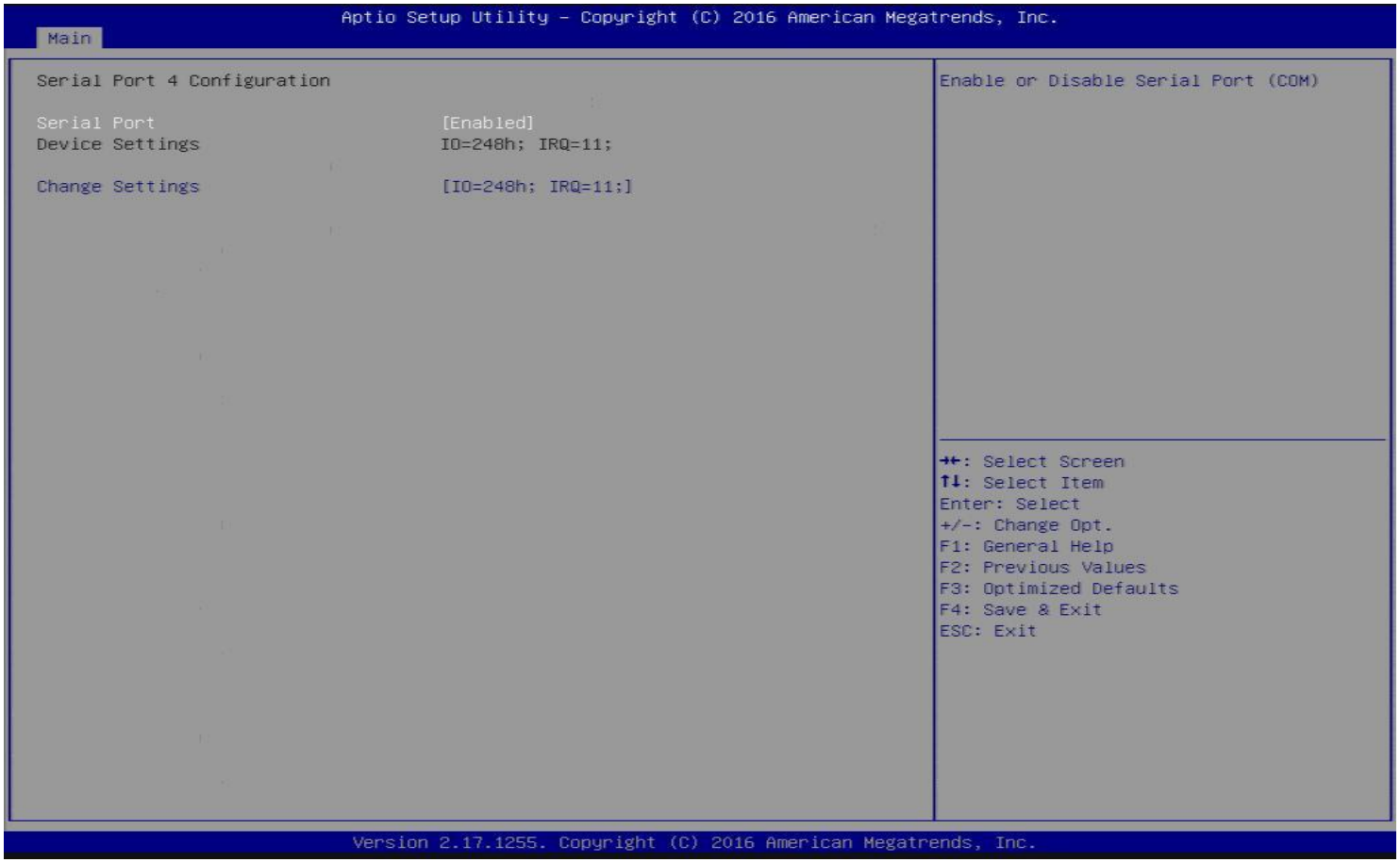
Set Parameters of Serial Port 3



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal setting for Super IO Device.	Auto, ★IO=240h; IRQ=11, 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

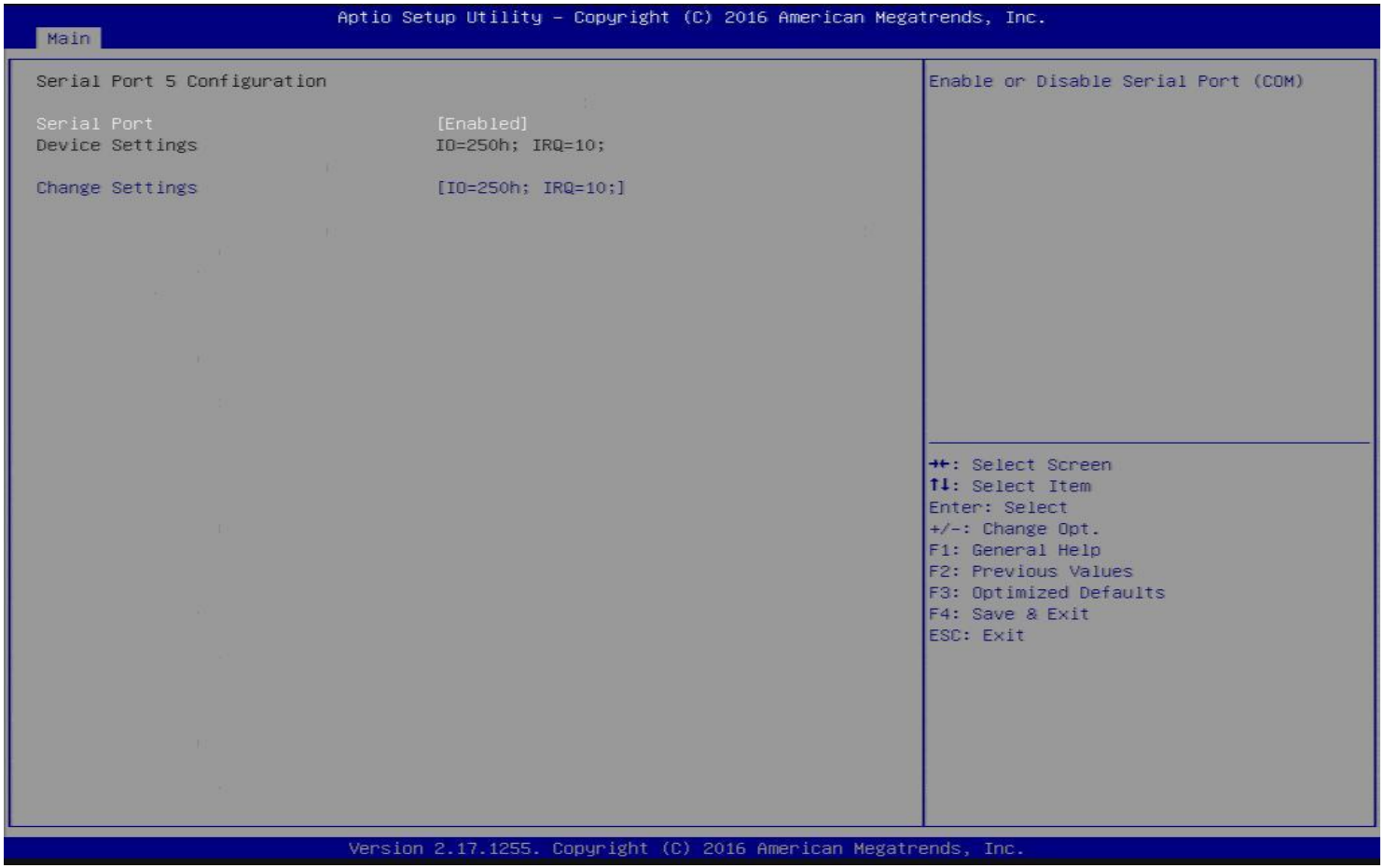
Set Parameters of Serial Port 4



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal settings for super IO Device	Auto, ★IO=248h; IRQ=11, 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 5 Configuration

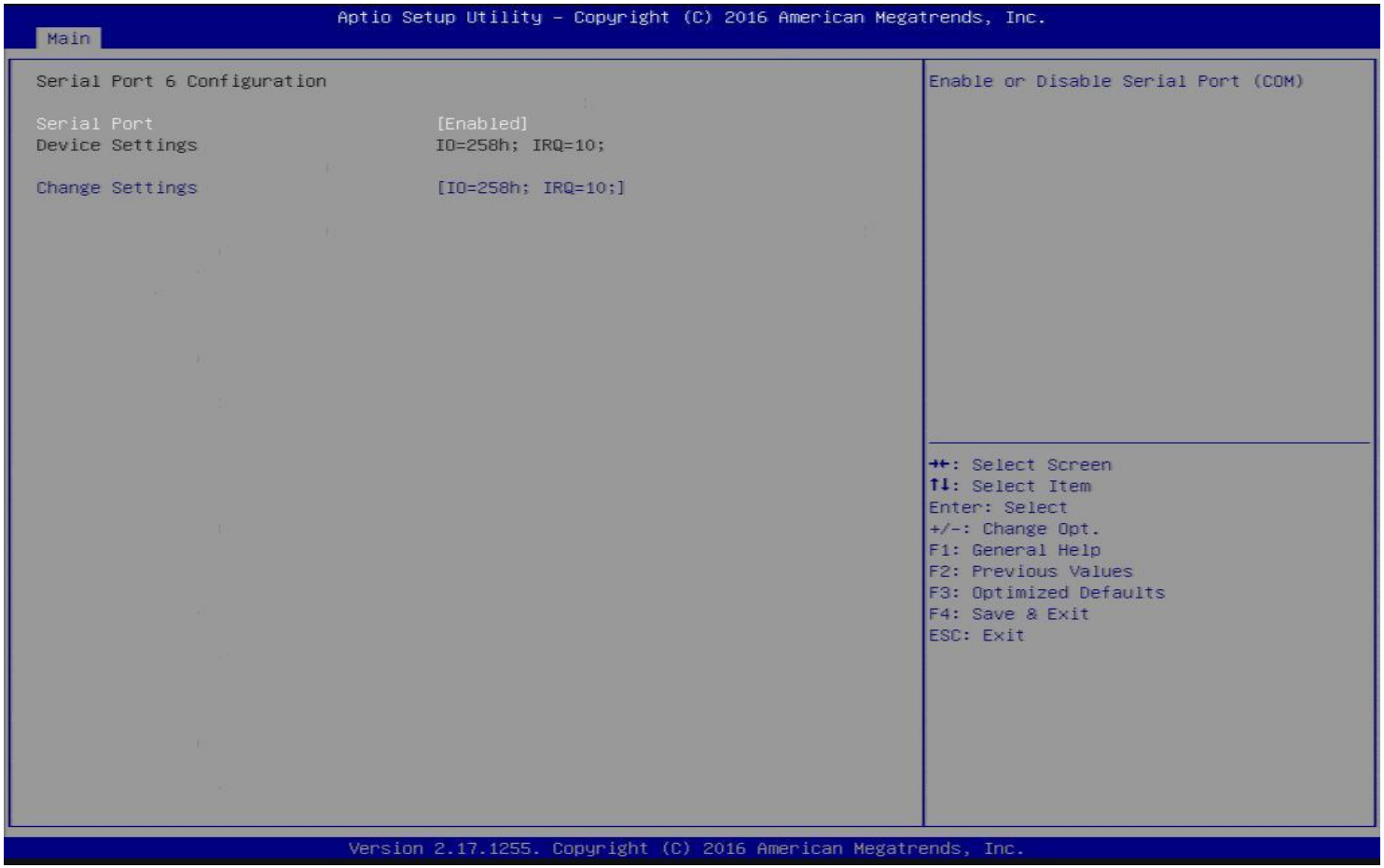
Set Parameters of Serial Port 5



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal settings for super IO Device	Auto, ★IO=250h; IRQ=10, 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 6 Configuration

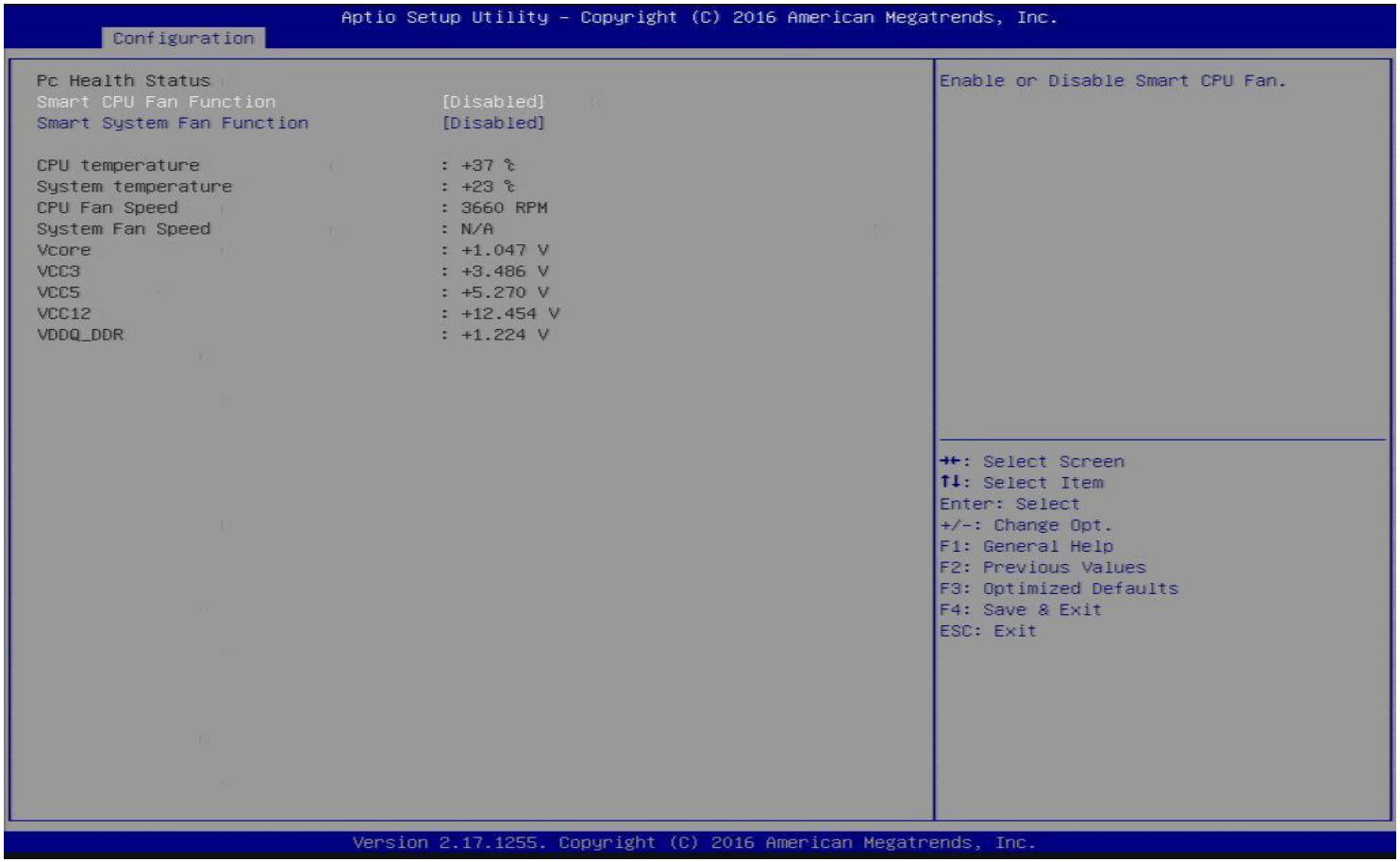
Set Parameters of Serial Port 6



Feature	Description	Options
Serial Port	Enable or Disable Serial Port (COM)	Disabled, ★Enabled
Change Settings	Select an optimal settings for Super IO Device	Auto, ★IO=258h; IRQ=10, 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

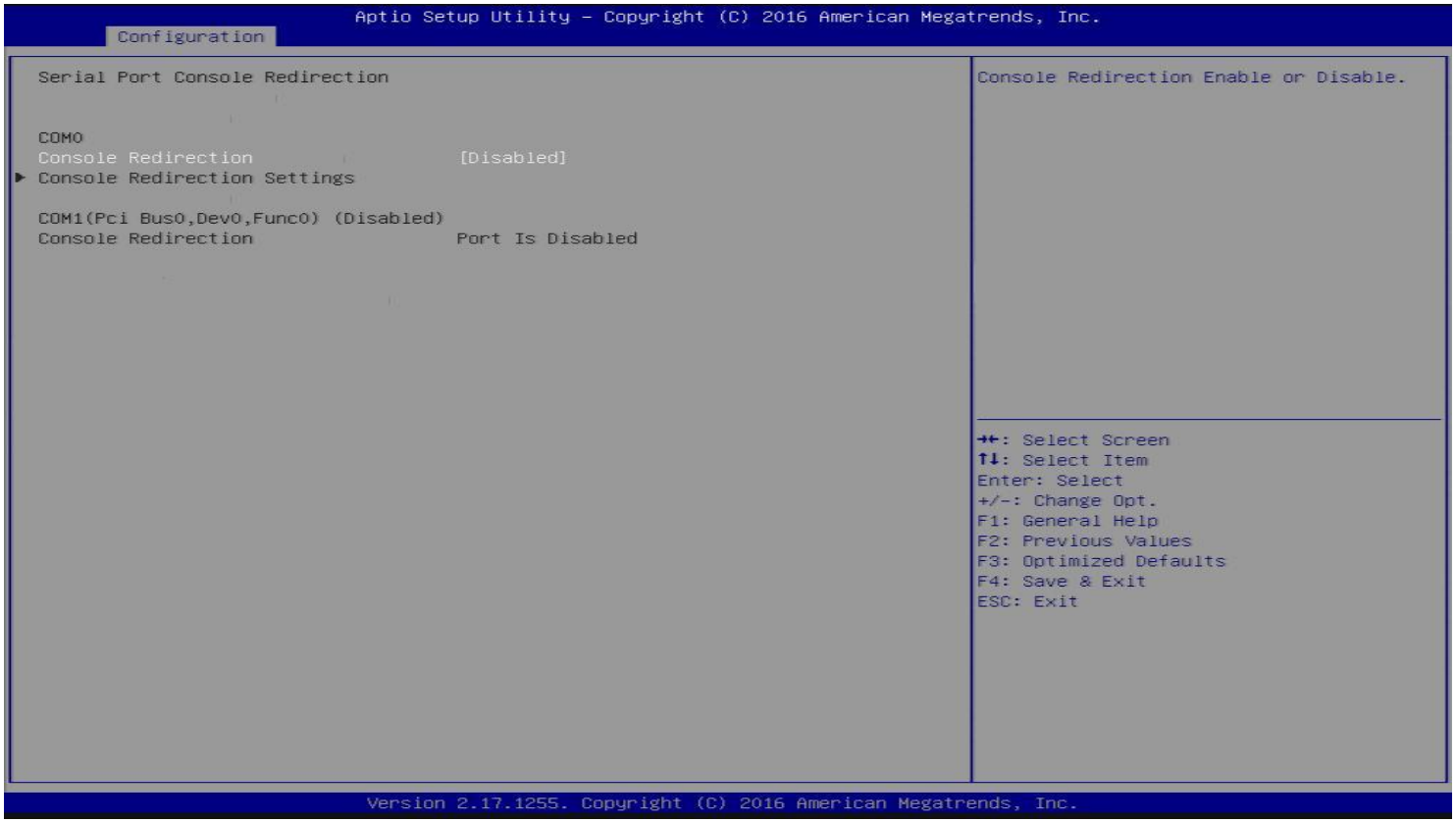
Monitor hardware status



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.	★50
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.	★50
System Full Target Temp	System Full fan target temperature.	★50

Serial Port Console Redirection

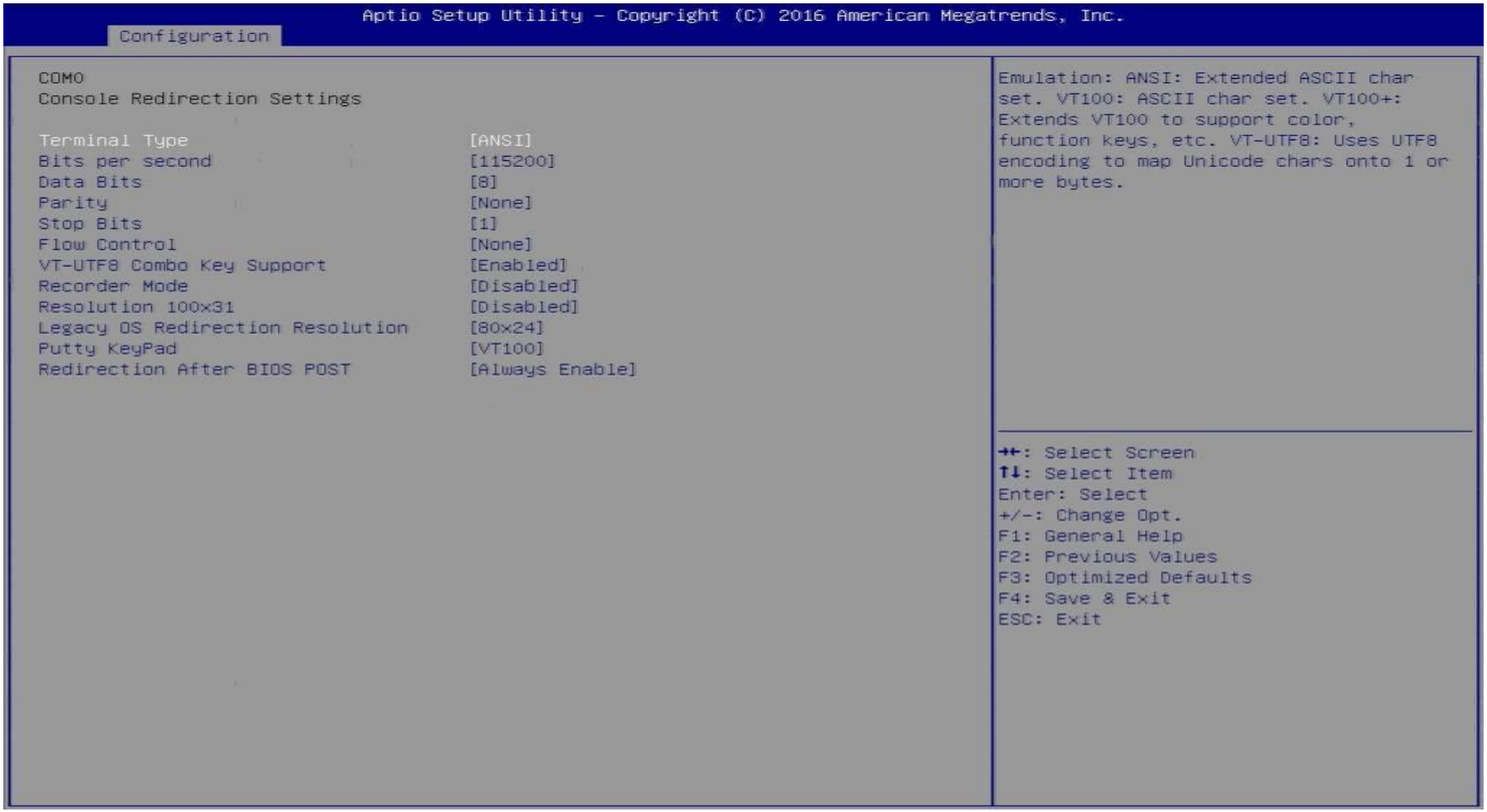
Serial Port Console Redirection



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

COM 0 Serial Port Console Redirection

Serial Port Console Redirection

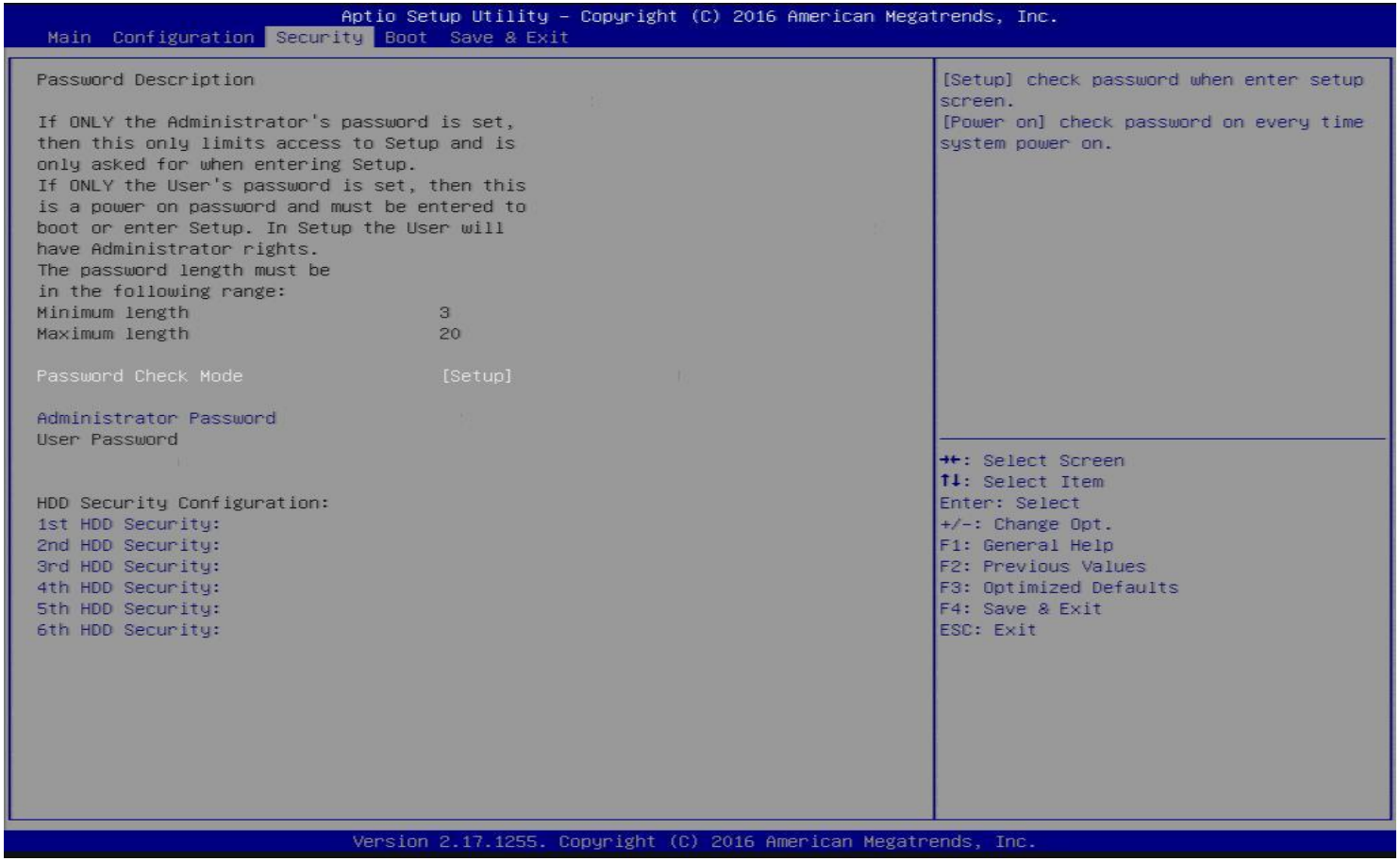


Feature	Description	Options
Terminal Type	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	VT100, VT100+, VT-UTF8, ★ANSI
Bits per second	Select Serial port transmission speed. The speed must be matched on other side. Long or noisy lines may require lower speeds.	9600, 19200, 38400,57600, ★115200
Data bits	Data bits	7, ★8
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 signals.	★None, Hardware RTS/CTS
VT-UTFB Combo Key Support	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals	Disabled, ★Enabled
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 supported 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 which means Legacy console Redirection is enabled for Legacy OS.	★Always Enable, BootLoader

7.2.3 Security

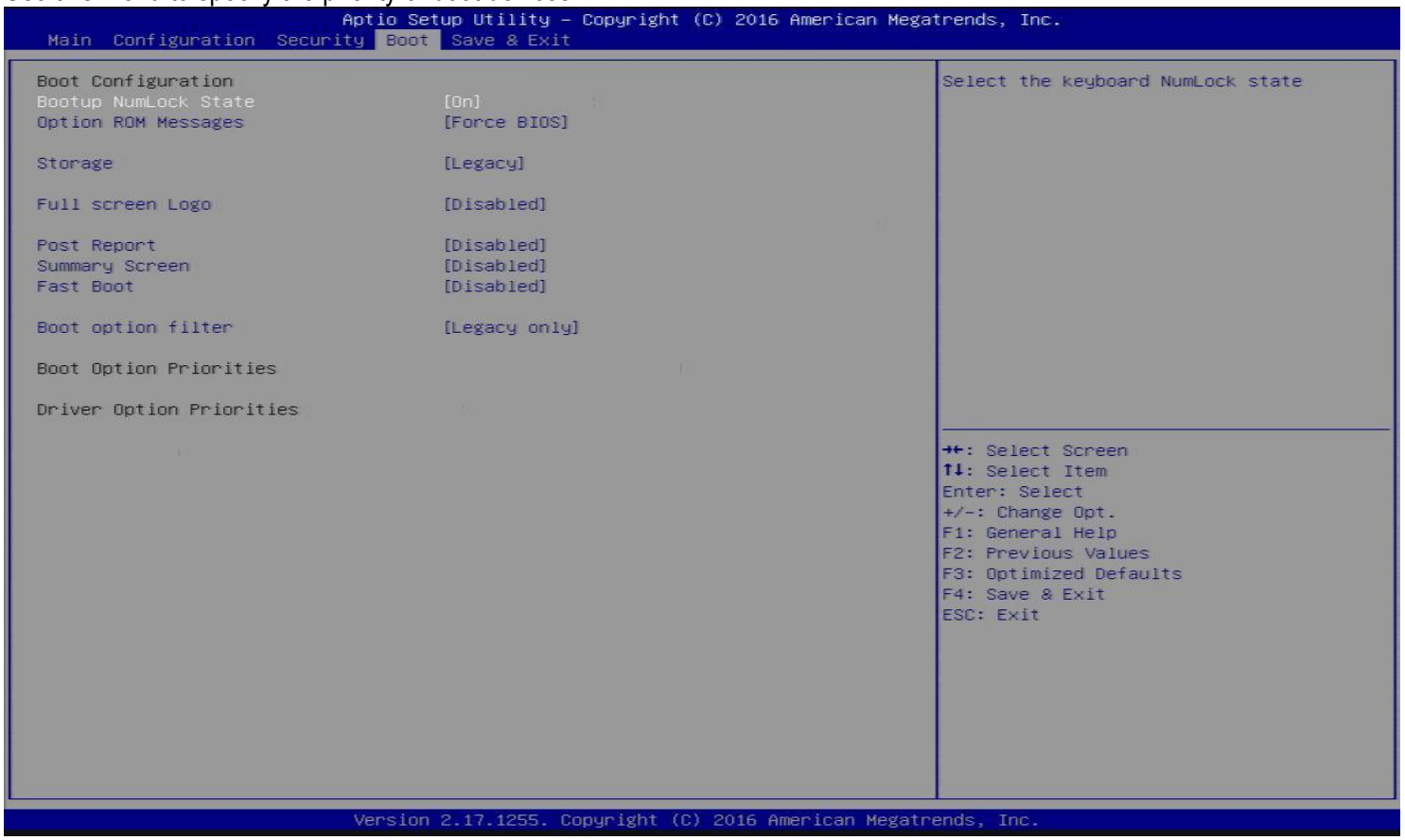
This section lets you set security passwords to control access to the system at boot time and/or when entering the BIOS setup program.



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	
1st - 6th HDD Security	HDD Security Configuration for selected drive.	

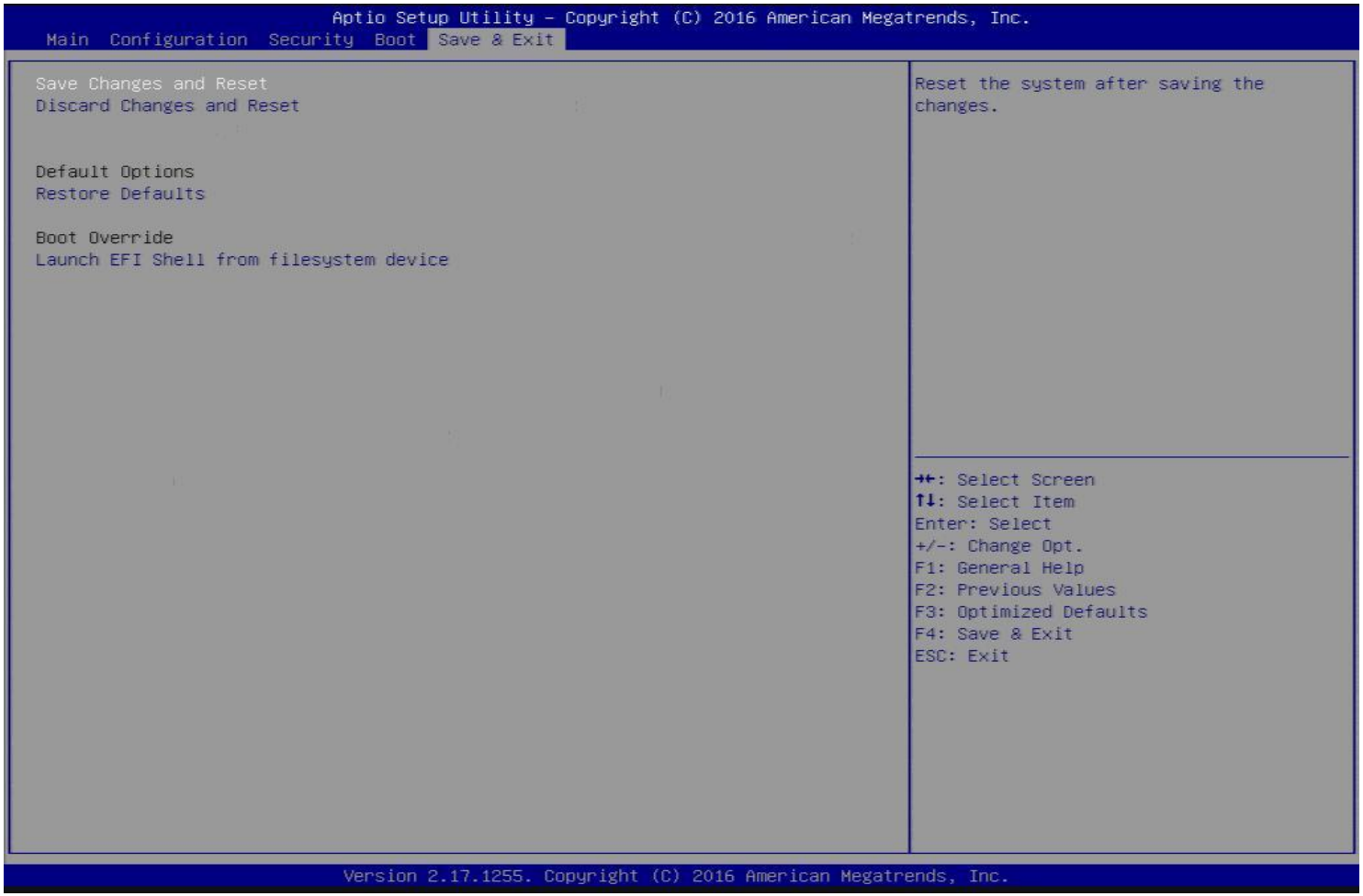
7.2.4 Boot

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 Option ROM	★Force BIOS, Keep Current
Storage	Controls the execution of UEFI and Legacy Storage OpROM	Do not Launch, UEFI, ★Legacy
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
Fast Boot	Enables or disables 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 option filter	This option controls Legacy/UEFI ROMs priority	★Legacy only, UEFI only

7.2.5 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.	
Launch EFI Shell from filesystem device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.	

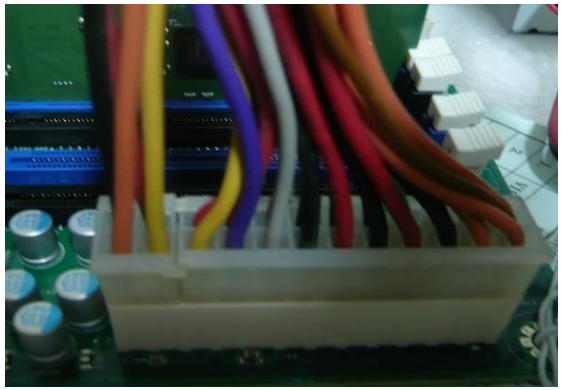
8 Trobleshooting

This section provides a few useful tips to quickly get RUBY-D718VG2AR running with success. This section will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

8.1 Hardware Quick Installation

ATX Power Setting

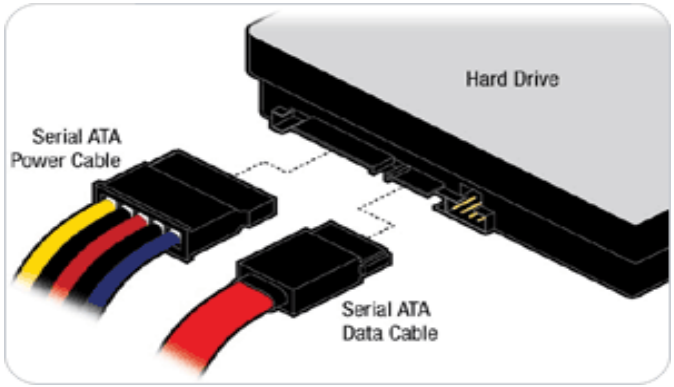
Unlike other Single board computer, RUBY-D718VG2AR supports ATX only. Therefore, there is no other setting that needs to be set up. However, there are only two connectors that must be connected—J9 (4 pins ATX power connector) & J38 (24 pins ATX Power Connector) on the RUBY-D718VG2AR board.



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.



RUBY-D718VG2AR can support Six SATA interface (SATAIII, 6.0Gb/s) with AHCI or IDE mode.

8.2 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on ATX power. 288-pin DDR4 Memory, keyboard, mouse, SATA hard disk, VGA 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 RUBY-D718VG2AR, it is recommended, when going with the boot-up sequence, to hit “Del ” 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.

8.3 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 JP5 of the RUBY-D718VG2AR 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.

JP5：CMOS Setting

Pin No	Jumper Setting Describe
*1-2	Default
2-3	Clean CMOS

Question: How to update the BIOS file of RUBY-D718VG2AR?

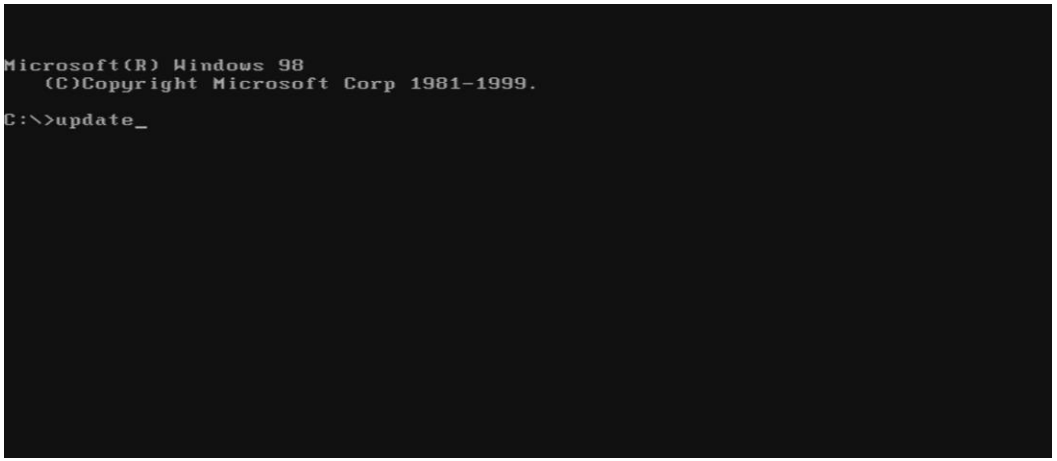
Answer:1. Please visit web site of **Portwell download center** as below hyperlink

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

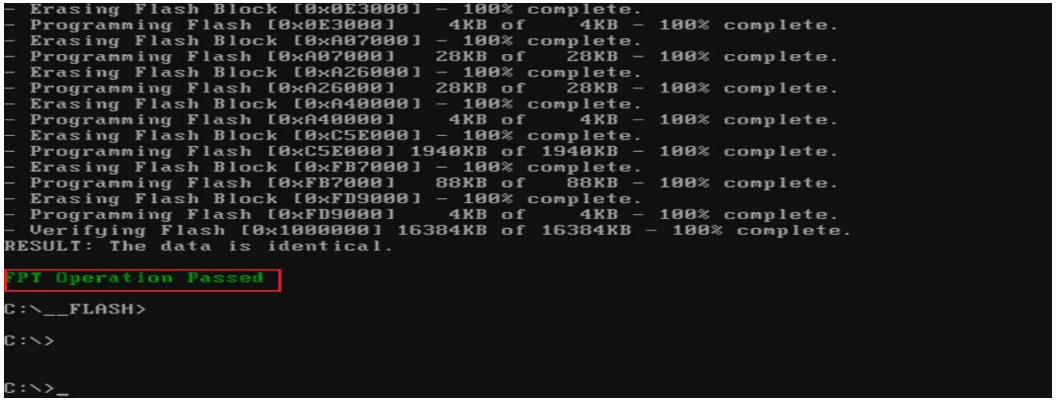
Registering an account in advance is a must. **(The E-Mail box should be an existing Company email address that you check regularly.)**

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

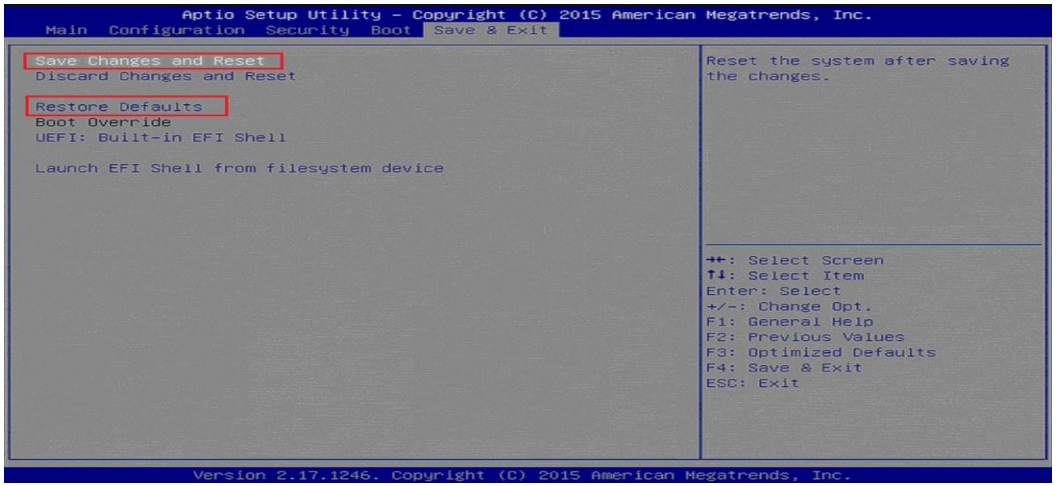
2. Type in your User name and password and log in the download center.
3. Select **"Search download"** and type the keyword **"RUBY-D718VG2AR"**.
4. Find the **"BIOS "**page and download the ROM file and flash utility.
5. Unzip file to bootable USB flash drive which can boot to dos mode. Then execute the **"update.bat"**. It will start 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.



7. Press **"del"** key into the BIOS setup menu and switch to **"Save & Exit"** page then select **"Restore Defaults"** option and press **"Yes"** then select **"Save Changes and Reset"** to finish all BIOS update processes.



Question: What are the display options while using RUBY-D718VG2AR ?

Answer: The RUBY-D718VG2AR supports DVI、VGA and HDMI display output.

Note:

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

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

9 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.

10 Industry Specicications

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