



RICH-33B0-8171

Industrial Box PC

Version 0.1

Revision History

R0.1	Preliminary

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Preface

This user's guide provides information about the components, features, connectors and BIOS Setup menus available on the RICH-333B0-8171. This document should be referred to when designing Mini-ITX application. The other reference documents that should be used include the following:

- ✧ Intel Braswell Design Guide
- ✧ Intel Braswell Specification

Please contact Portwell Sales Representative for above documents.

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1 Introduction

RICH-33B0-8171 based on the Intel® Core™ Processor which offers 14nm Hi-K process technology with energy efficient architecture.

RICH-33B0-8171 support dual channels DDR3LSO- DIMM up to 8GB.

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, Braswell SoC is our first generation Atom chip architecture on Mini-ITX Box PC line.

2 Specifications

Main Processor	◆Intel® Braswell SoC Processors
System BIOS	◆AMI UEFI BIOS
Main Memory	◆Up to 8 GB in 2 slots DDR3L SO-DIMM sockets. Supports dual channel DDR3L 1333/1600 MHz SDRAM
Graphics	◆Controller: Intel® Gfx Gen 8, HD graphics ◆VGA: Supports VGA up to resolution 1920 x 1200 ◆HDMI: Supports HDMI up to resolution 1920 x 1200 @ 60Hz
Expansion Interface	◆OneMini-PCIe socket ◆One mSATA socket
SATA Interface	◆One SATA ports(SATA 6Gb/s)
Input/Output	◆Serial Ports: Threeserial ports, 4 x RS-232 & 2 x RS-232/422/485 ◆Support Keyboard and PS/2 mouse connector (Rear I/O) ◆USB Port: 4 x USB 3.0 & 4 x USB 2.0 ◆Audio Interface: Connector for Mic-In and Line-Out
Ethernet	◆Supports dual 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 bus which provides 500 MB/s data transmission rate
High Drive GPIO	◆One pin-header for GPIO(8bit in &8bit out)

Mechanical and environmental specifications

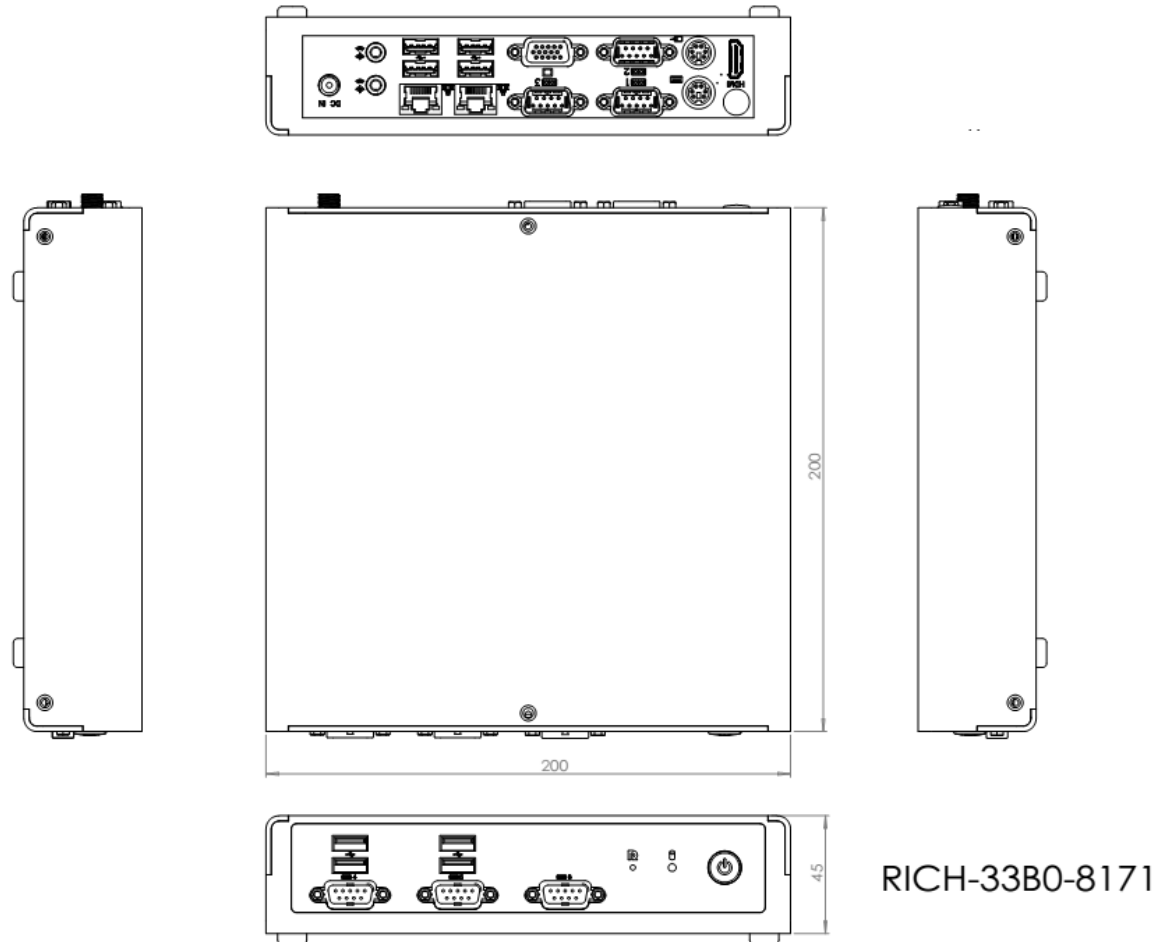
- ◆ Operating temperature: 0 ~ 50° C
- ◆ Storage temperature: -20 ~ 80° C
- ◆ Humidity: 5 ~ 90% non-condensing
- ◆ Board size: 170mm x 170 mm

2.1 Supported Operating Systems

The WADE-8171 supports the following operating systems.

- ◇ Windows* 8.1u (64 bit)
- ◇ * Windows* Embedded Industry 8.1 (64 bit)
- ◇ Windows* 7 (32/64 bit)
- ◇ Windows* 7 (POS ready 7 & WES7) (32/64 bit)
- ◇ Windows 10* (64 bit)
- ◇ Fedora* (19 or later) Distribution (64 bit)
- ◇ Ubuntu*, SuSe Enterprise*, Red hat* Enterprise (64 bit)
- ◇ ** Yocto* Tool-based Embedded Linux Distribution (64 bit)
- ◇ VxWorks* (RTOS) (64 bit)

2.2 Mechanical Dimensions



3. BIOS Setup Items

3.1 Introduction

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

3.2 BIOS Setup

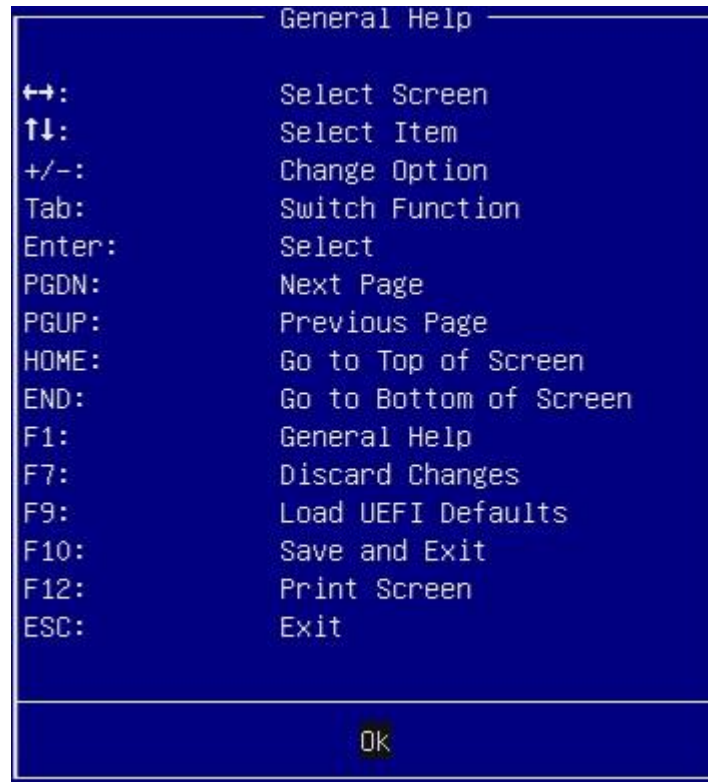
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <F2> or key will enter BIOS setup screen.

Press <F2>or to enter SETUP

If the message disappears before respondingand 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.

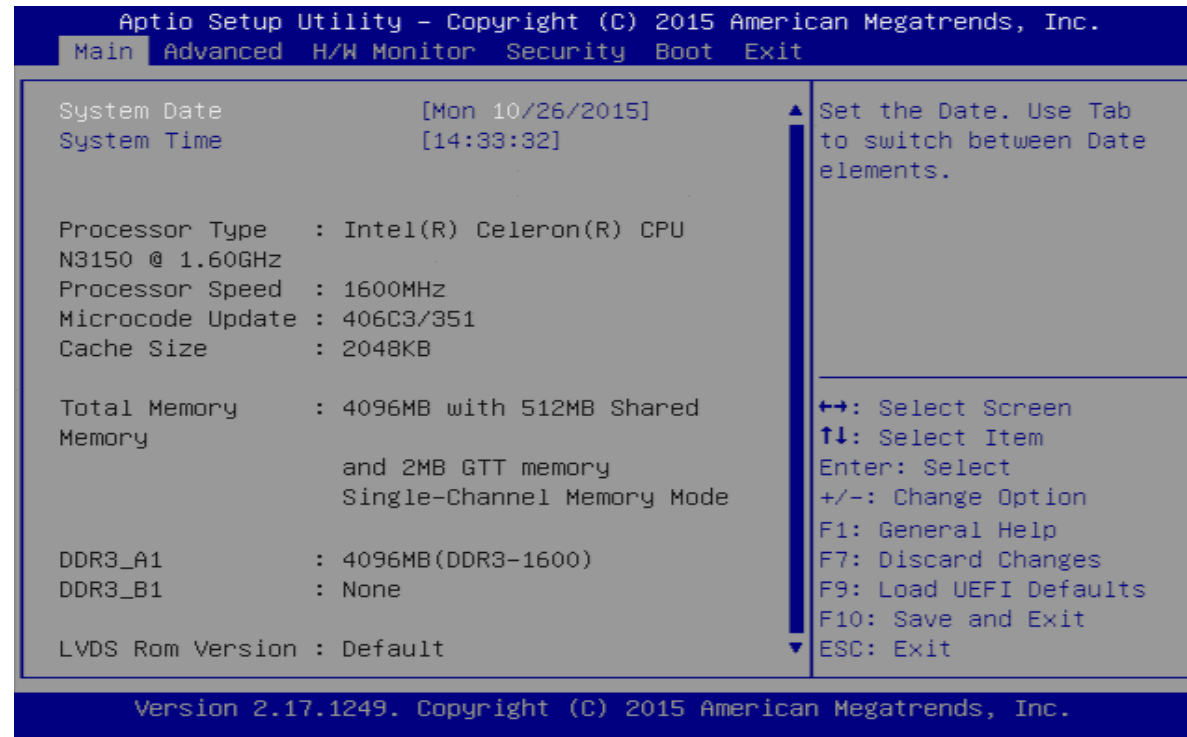
Press <F1> to Run General Help or Resume

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



3.2.1 Main

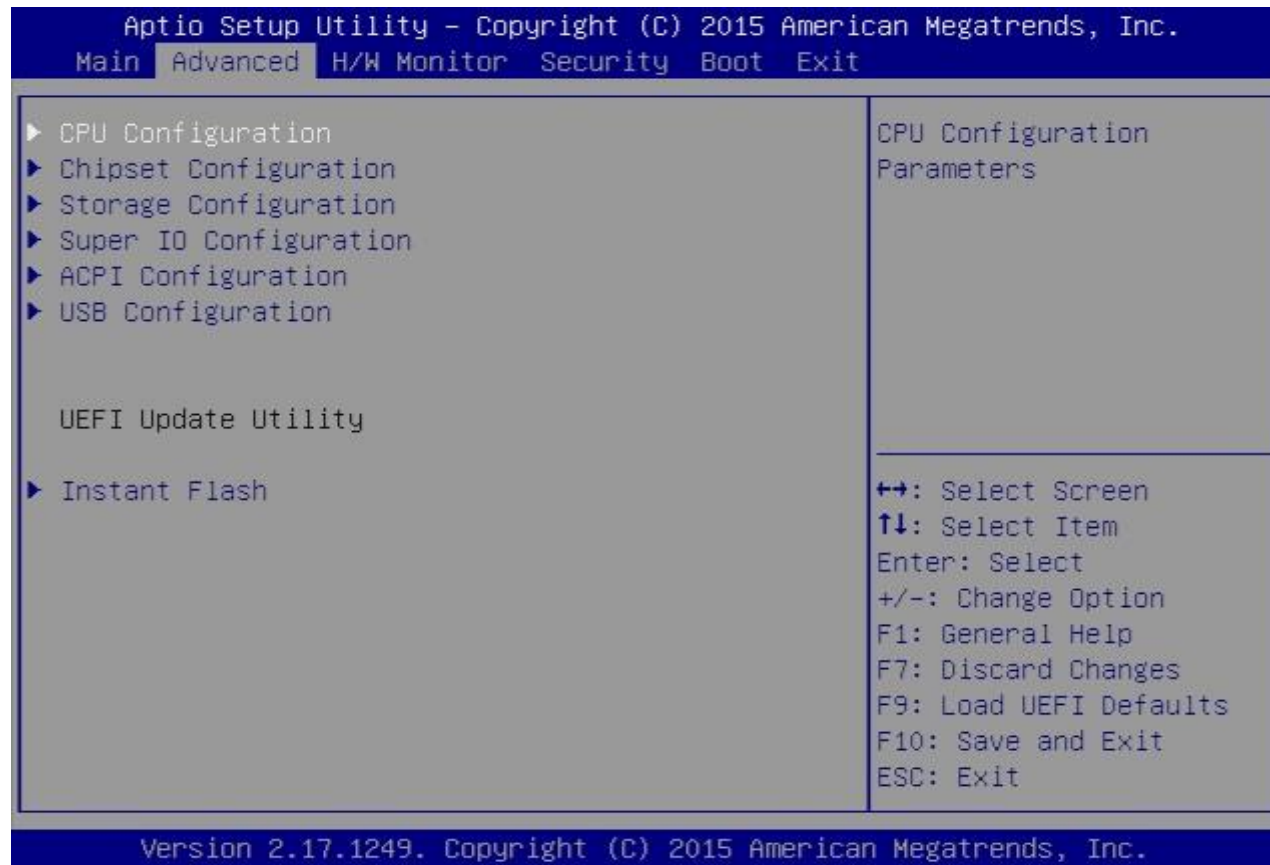
To set up the system time/date information.



Feature	Description	Options
System Date	Set the Date. Use Tab to switch between Date elements.	
System Time	Set the Time. Use Tab to switch between Time elements	

Advanced

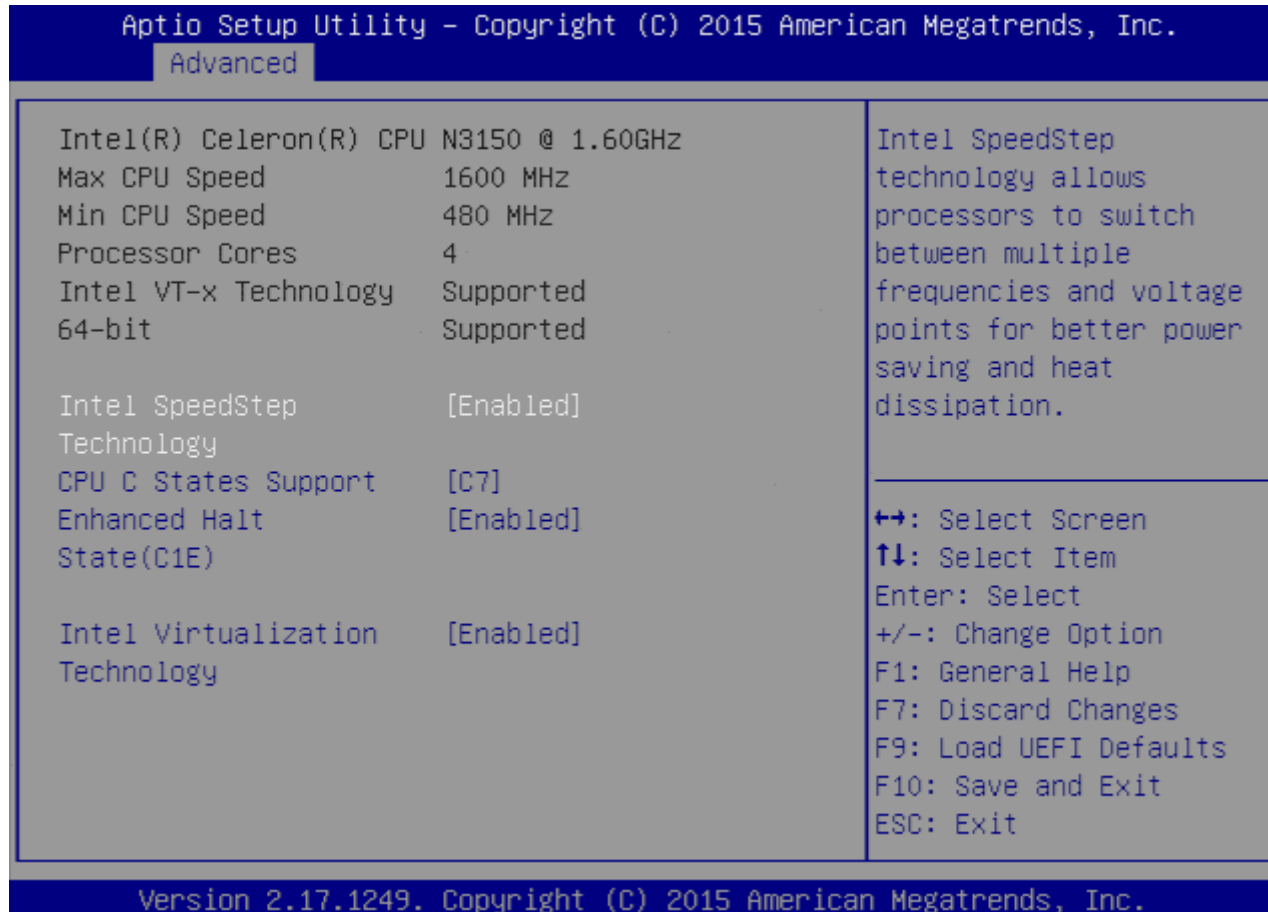
To set up the advanced UEFI features.



3.2.2 Configuration

CPU Configuration

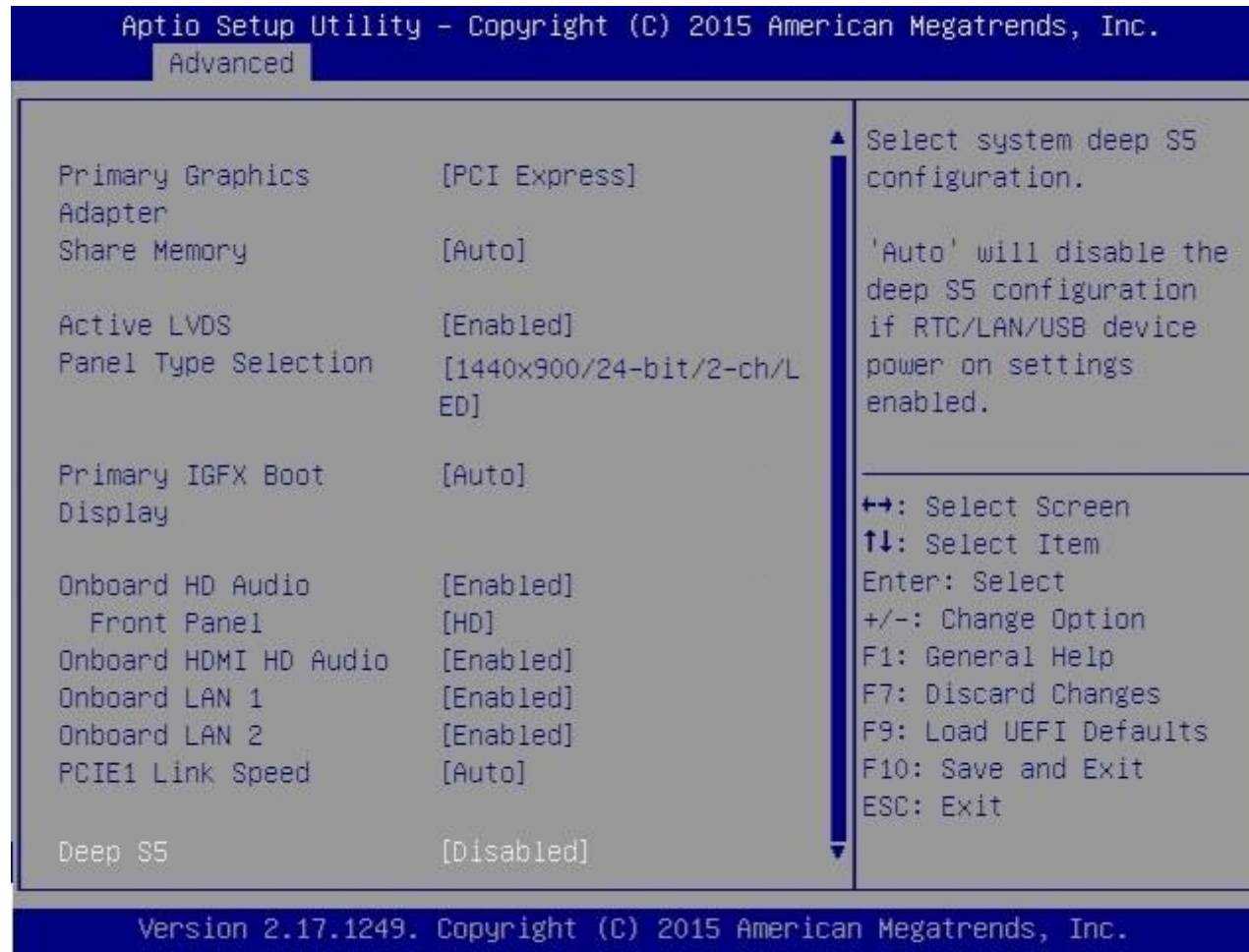
CPU Configuration Parameters.



Feature	Description	Options
Intel SpeedStep Technology	Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation.	Disabled, ★Enabled
CPU C States Support	Enable CPU C State Support for power saving. It is recommended to keep C1, C6 ad C7 all enabled for better power saving.	★C7, C6, C1, Disabled
Enhanced Halt State(C1E)	Enable Enhanced Halt State (C1E) for lower power consumption.	Disabled, ★Enabled
Intel Virtualization Technology	Intel Virtualization Technology allows a platform to run multiple operating systems and applications in independent partitions, so that one computer system can function as multiple virtual systems.	Disabled, ★Enabled

Chipset Configuration

Configure Chipset Settings.

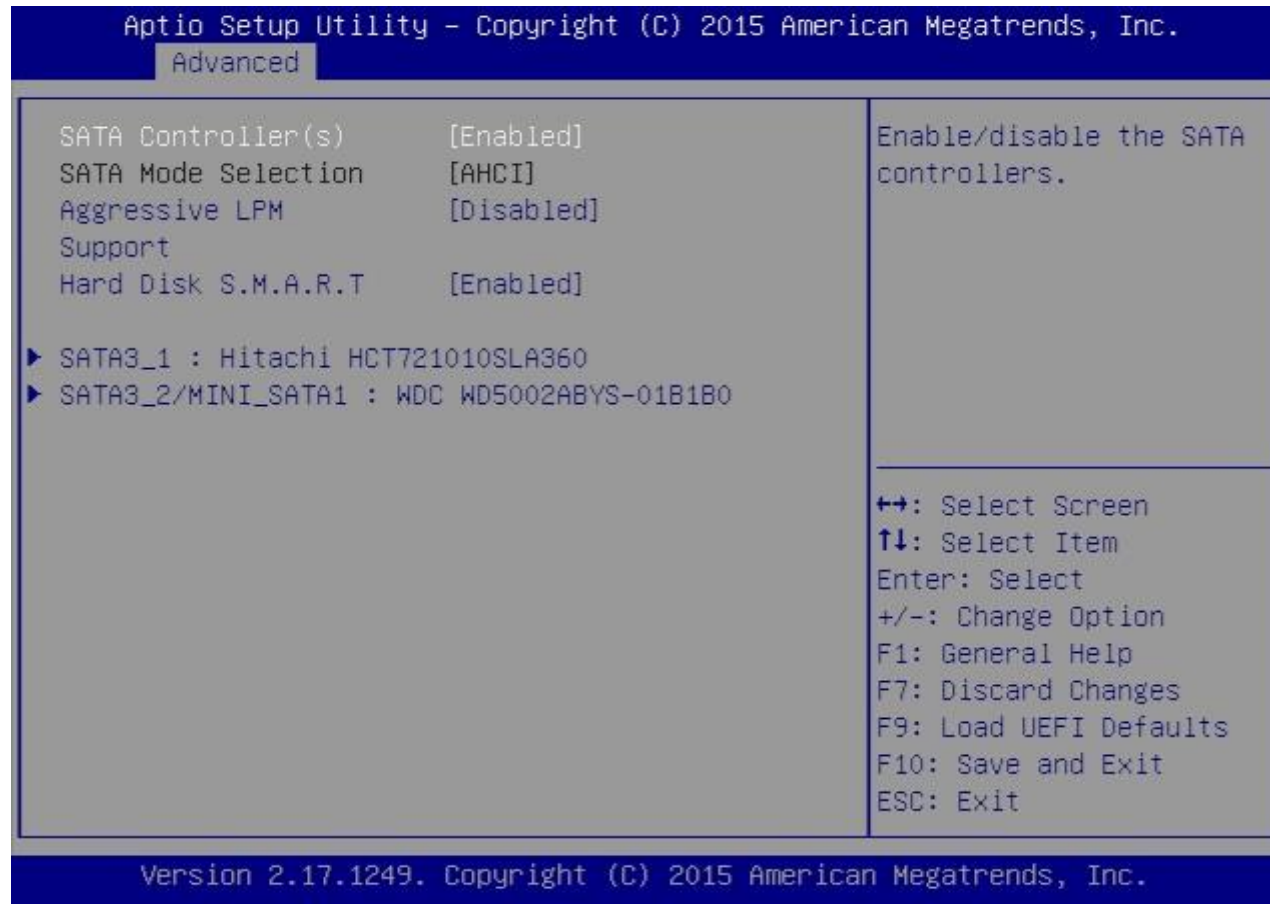


Feature	Description	Options
Primary Graphics Adapter	Select a primary VGA.	Onboard, ★PCI Express
Share Memory	Configure the size of memory that is allocated to the integrated graphics processor when the system boots up.	★Auto, 64MB, 128MB, 256MB, 512MB
Active LVDS	The enable or disable the LVDS.	★Enabled, Disabled
Panel Type Selection	Select Panel Type	1366x768/18-bit/1-ch/LED,800x600/18-bit/1-ch/CCFL, 1024x768/24-bit/1-ch/CCFL, 1280x1024/24-bit/2-ch/CCFL, 1366x768/24-bit/1-ch/CCFL, ★ 1440x900/24-bit/2-ch/LED, 1024x600/18-bit/1-ch/LED, 1440x900/24-bit/2-ch/LED, 1280x1024/24-bit/2-ch/LED, 1024x768/24-bit/1-ch/LED, 1600x900/18-bit/2-ch/LED,1366x768/24-bit/1-ch/LED, 1920x1080/24-bit/2-ch/LED, 800x600/24-bit/1-ch/LED, 640x480/24-bit/1-ch/LED,

		1024x768/18-bit/1-ch/LED
Primary IGFX Boot Display	Select the Video Device Which will be activated during POST. This has no effect is external graphics present. Secondary boot display selection will appear based on your selection. VGA mode will supported only on primary display.	★Auto, HDMI, LVDS,CRT
Secondary IGFX Boot Display (Primary choose: HDMI or LVDS or CRT)	Select Secondary Display Device	★Disabled, HDMI, LVDS, CRT
Onboard HD Audio	Enable/disable onboard HD audio.	Disabled,★Enabled
Front Panel	AC 97/HD/Disable front panel HD audio	AC 97,★HD, Disabled
Onboard HDMI HD Audio	Enable audio for the onboard digital outputs.	Disabled, ★Enabled
Onboard LAN 1	Enable or disable the onboard network interface controller.	★Enabled, Disabled
Onboard LAN 2	Enable or disable the onboard network interface controller.	★Enabled, Disabled
PCIE1 Link Speed	Configure PCIE1 Slot Link Speed.	★Auto, Gen2, Gen1
Deep S5	Select system deep S5 configuration. 'Auto' will disable the deep S5 configuration if RTC/LAN/USB device power on settings enabled.	★Auto, Disabled

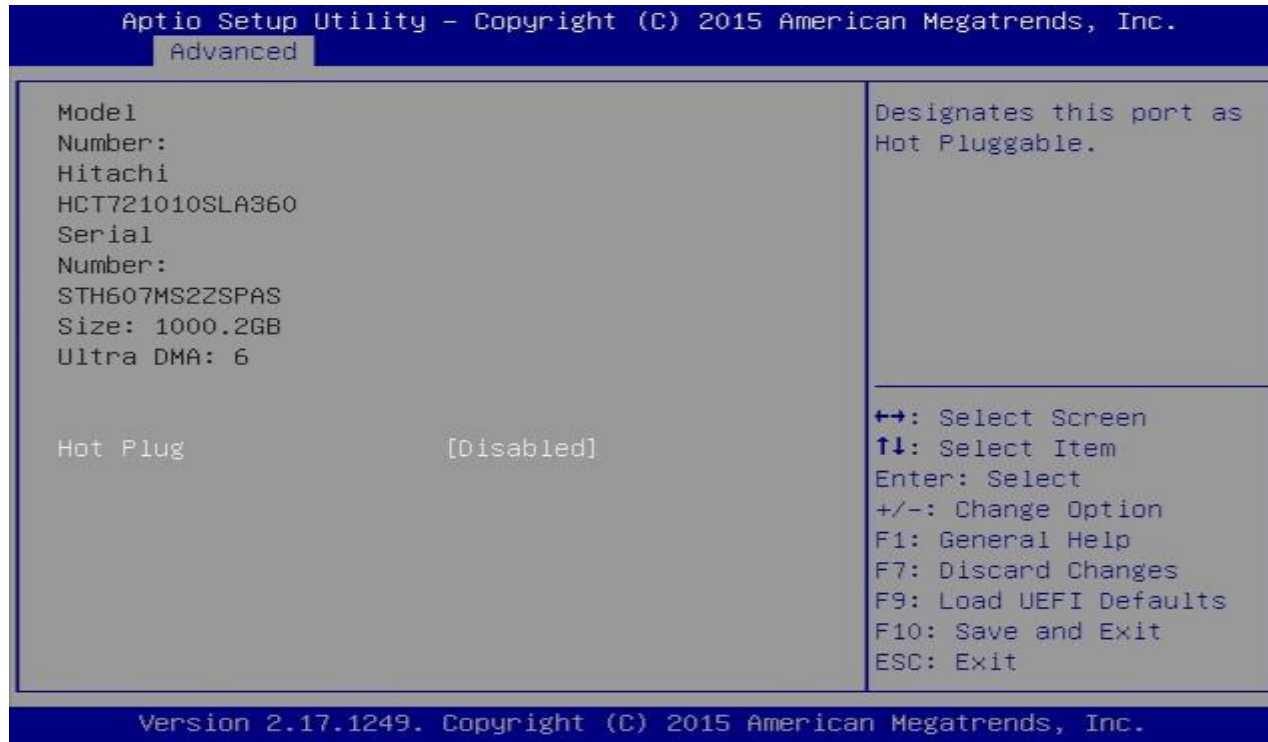
Storage Configuration

Configure storage devices.



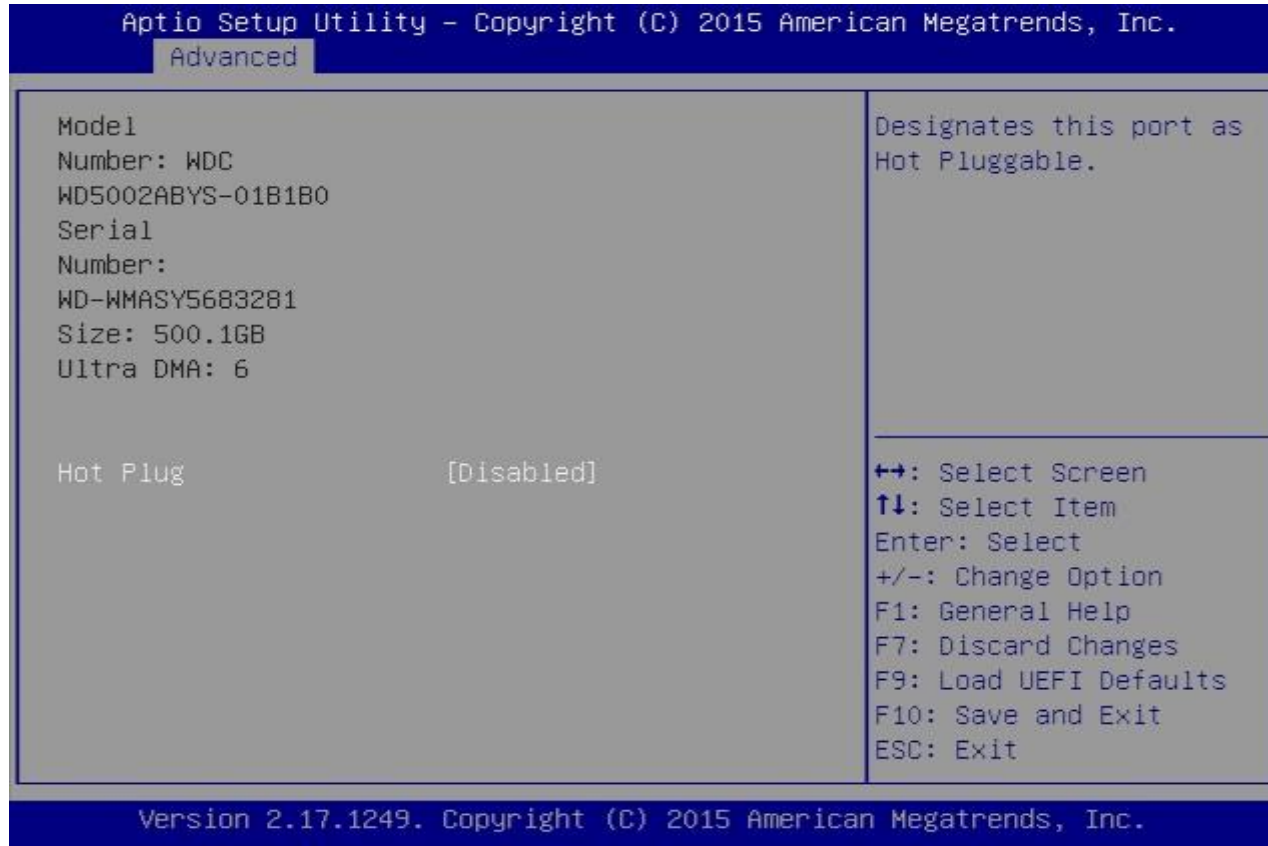
Feature	Description	Options
SATA Controller(s)	Enable/disable the SATA controllers.	★Enabled, Disabled
Aggressive LPM Support	Enable PCH to aggressively enter link power state.	Enabled, ★ Disabled
Hard Disk S.M.A.R.T	S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drivers to detect and report on various indicators of reliability.	Disabled, ★ Enabled

SATA3 1: Hitachi HCT721010SLA360



Feature	Description	Options
Hot Plug	Designates this port as Hot Pluggable.	Enabled, ★Disabled

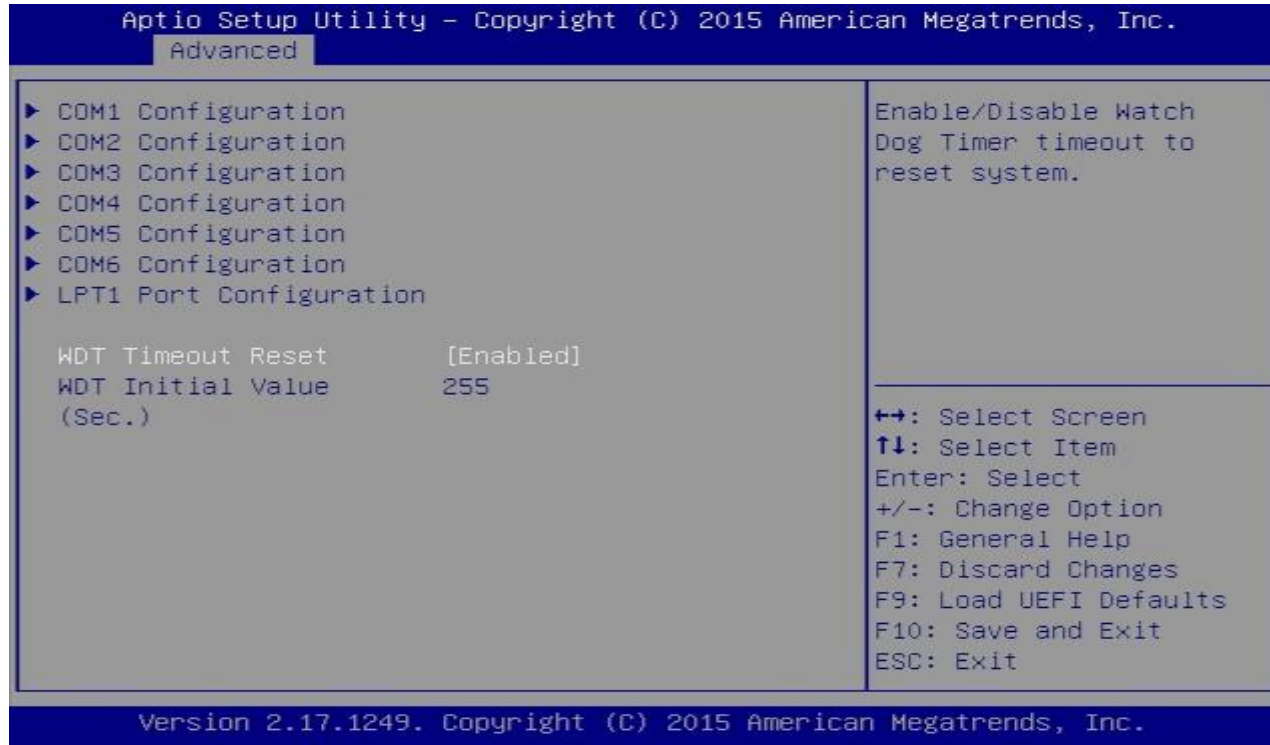
SATA3 2/MINI SATA1: WDC WD5002ABYS-01B1B0



Feature	Description	Options
Hot Plug	Designates this port as Hot Pluggable.	Enabled, ★Disabled

Super IO Configuration

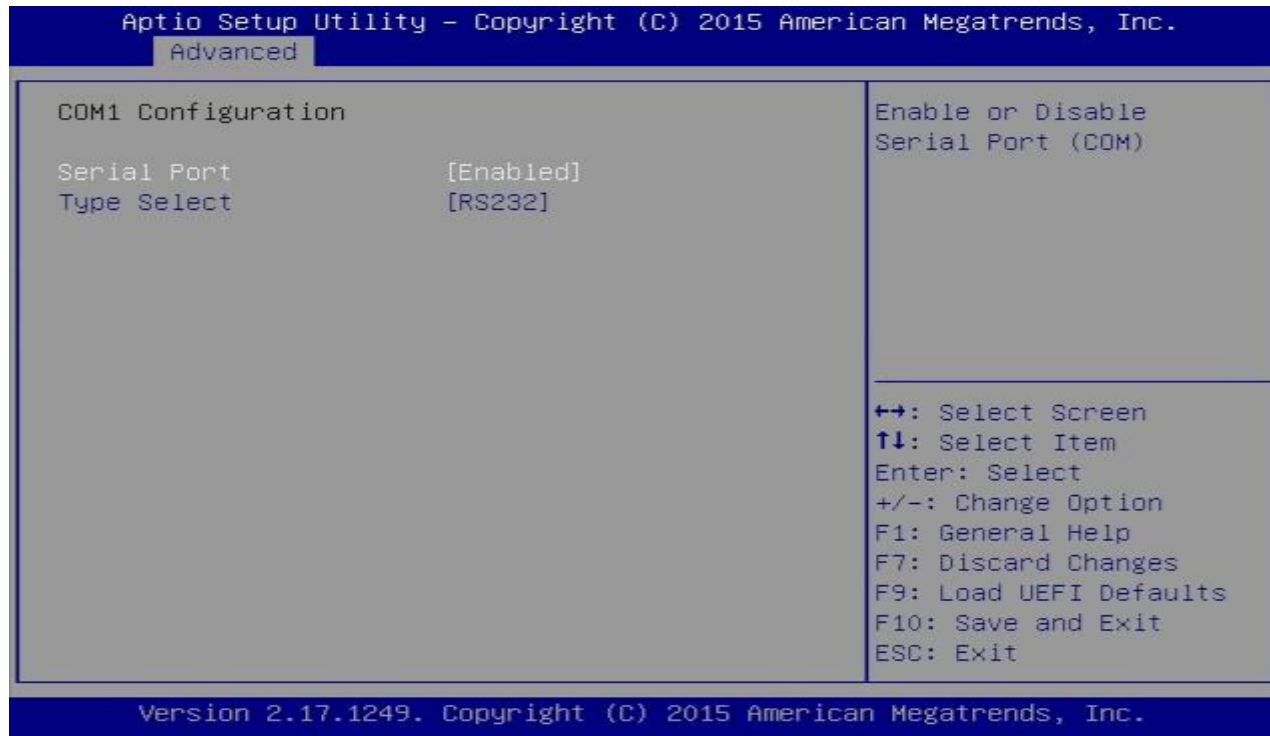
Configure Super IO Settings.



Feature	Description	Options
WDT Timeout Reset	Enable/Disable Watch Dog Timer timeout to reset system.	★ Disabled, Enabled
WDT Initial Value (Sec.)	Watch Dog Timer Initial Value to count down.	Range: 1-255

COM1 Configuration

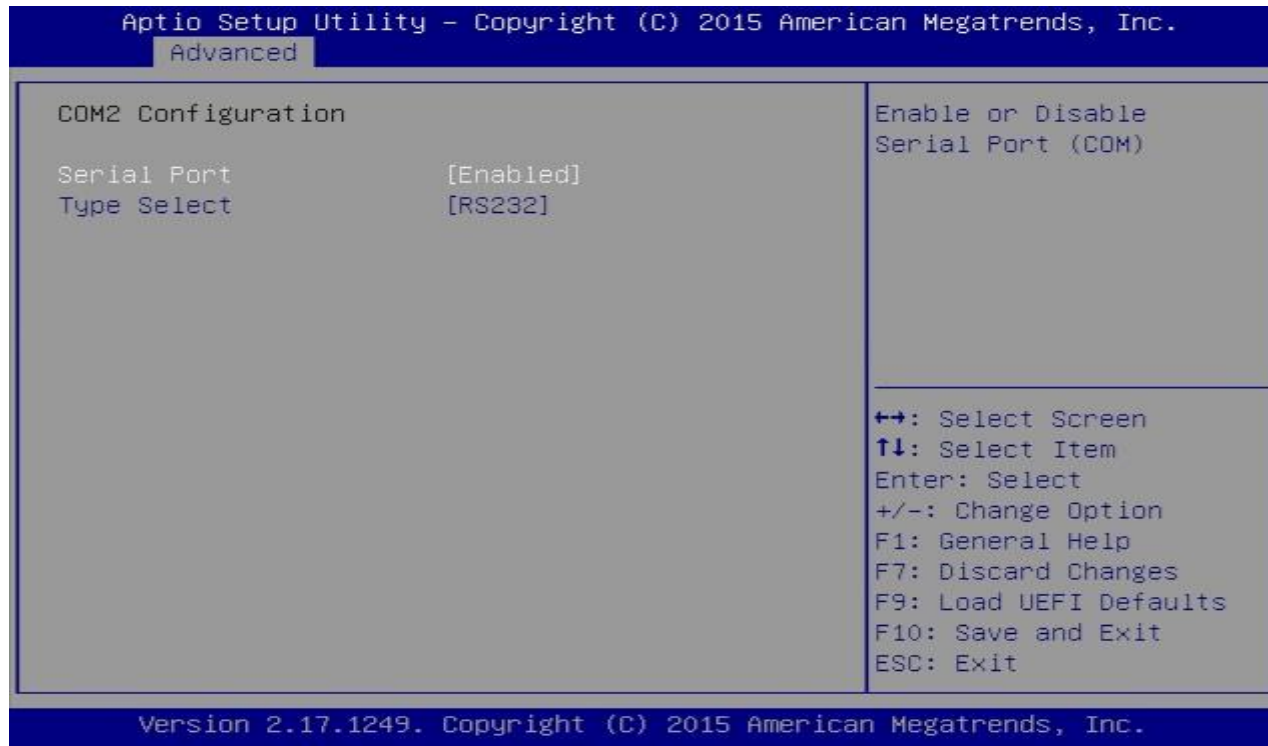
Set Parameter of COM1



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled, ★Enabled
Type Select	Set COM Type.	★RS-232, RS422, RS485

COM2 Configuration

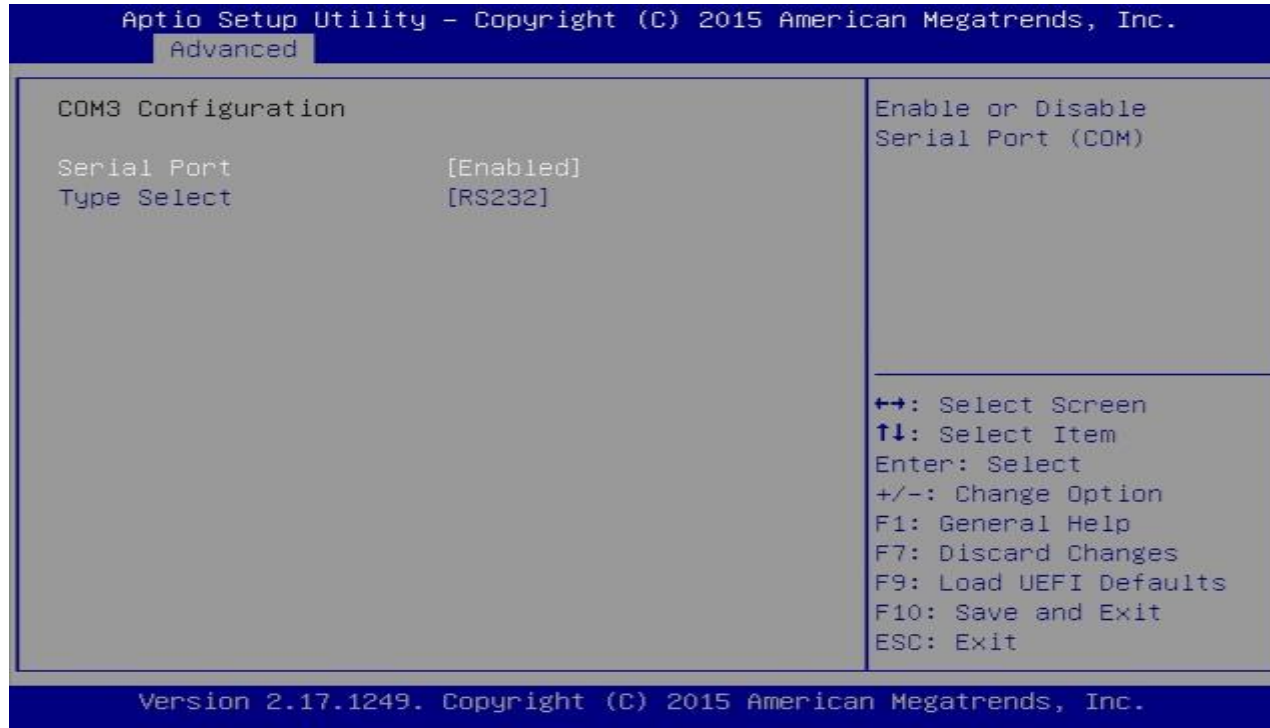
Set Parameter of COM2



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled, ★Enabled
Type Select	Set COM Type.	★RS-232, RS422, RS485

COM3 Configuration

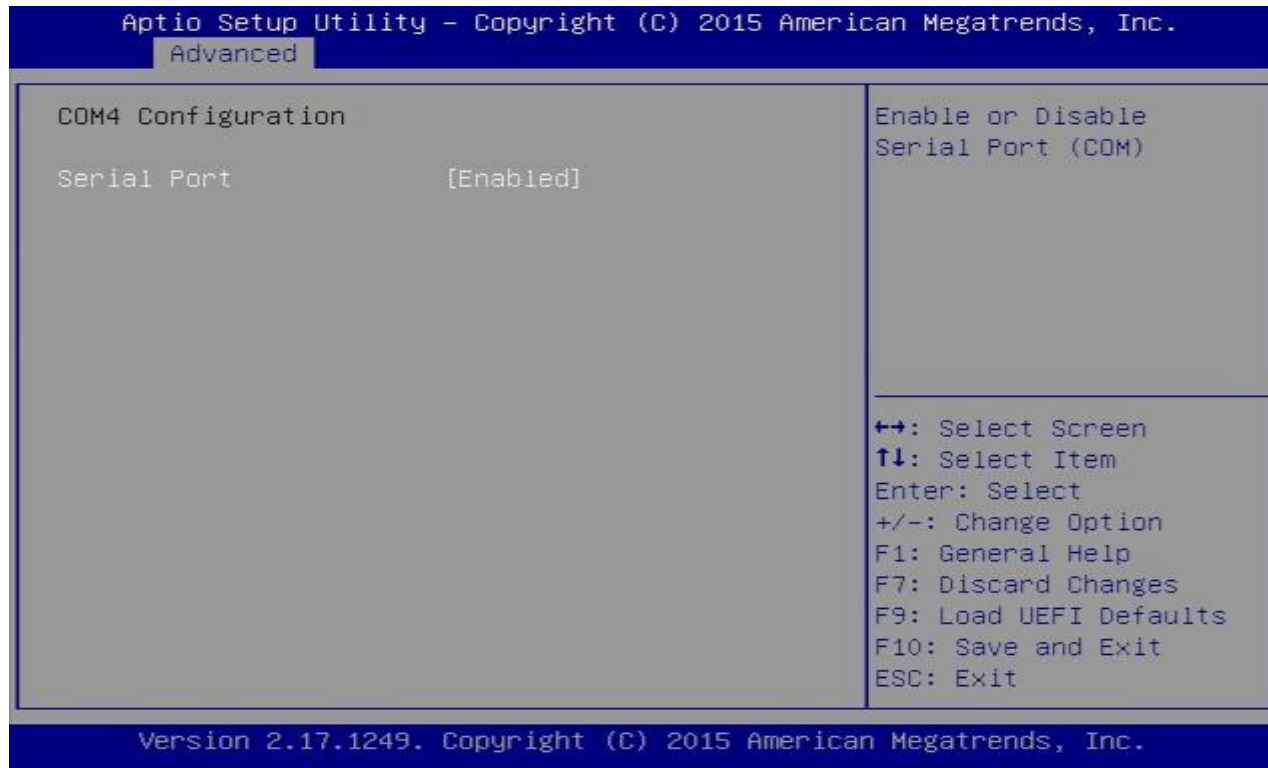
Set Parameter of COM3



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled, ★Enabled
Type Select	Set COM Type.	★RS-232, RS422, RS485

COM4 Configuration

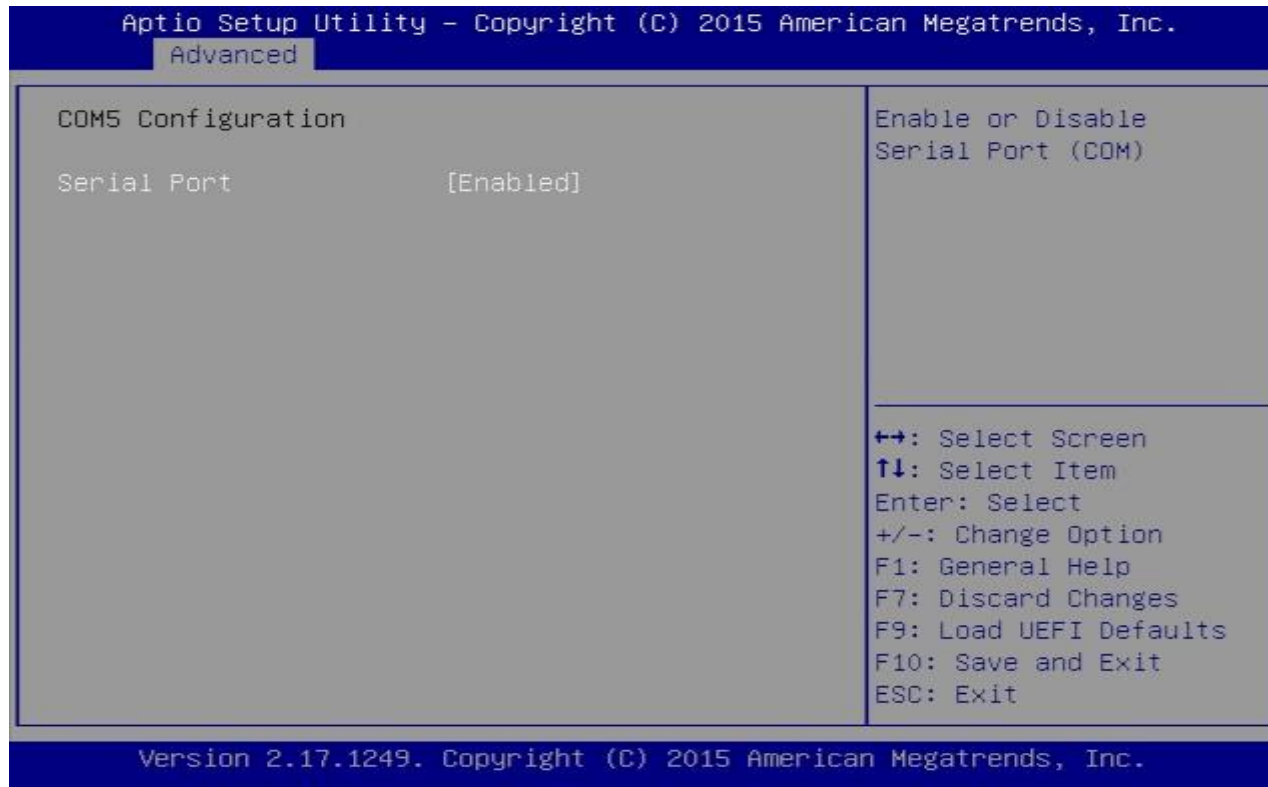
Set Parameter of COM4



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled,★Enabled

COM5 Configuration

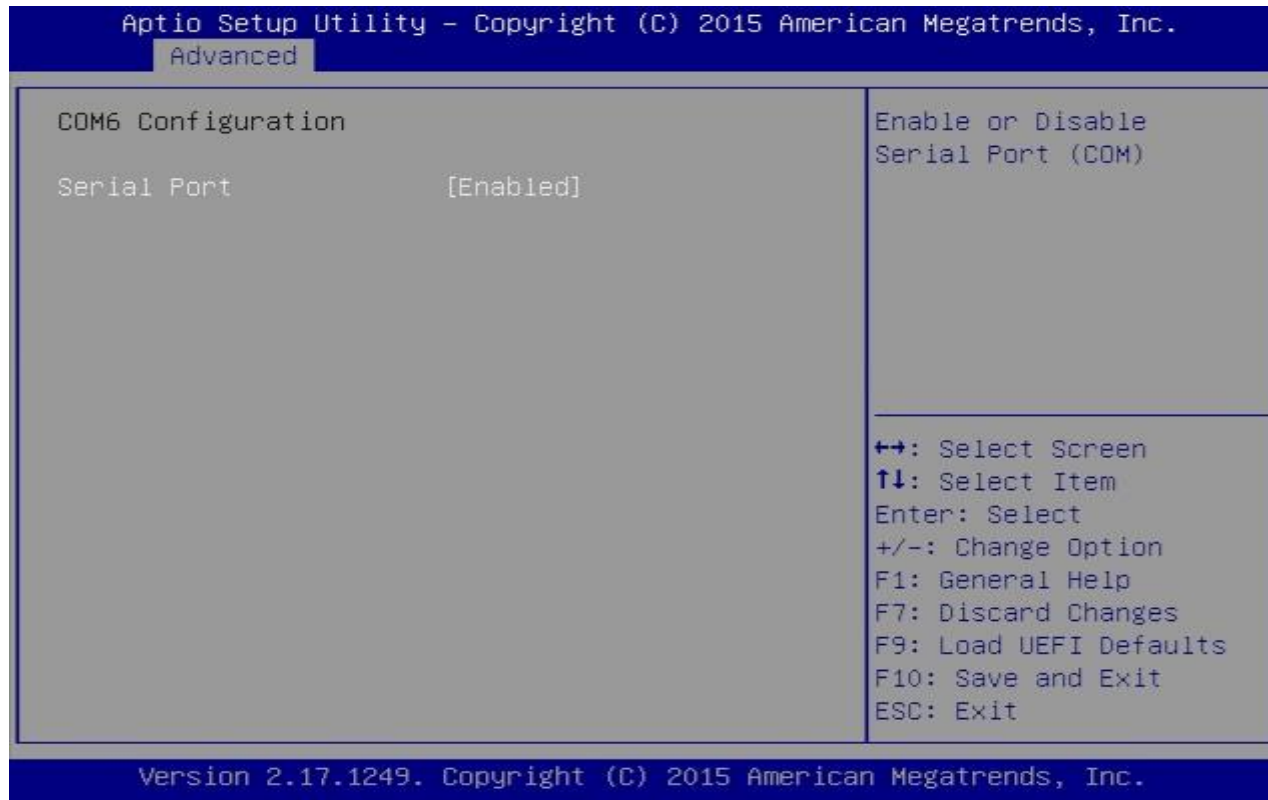
Set Parameter of COM5



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled,★Enabled

COM6 Configuration

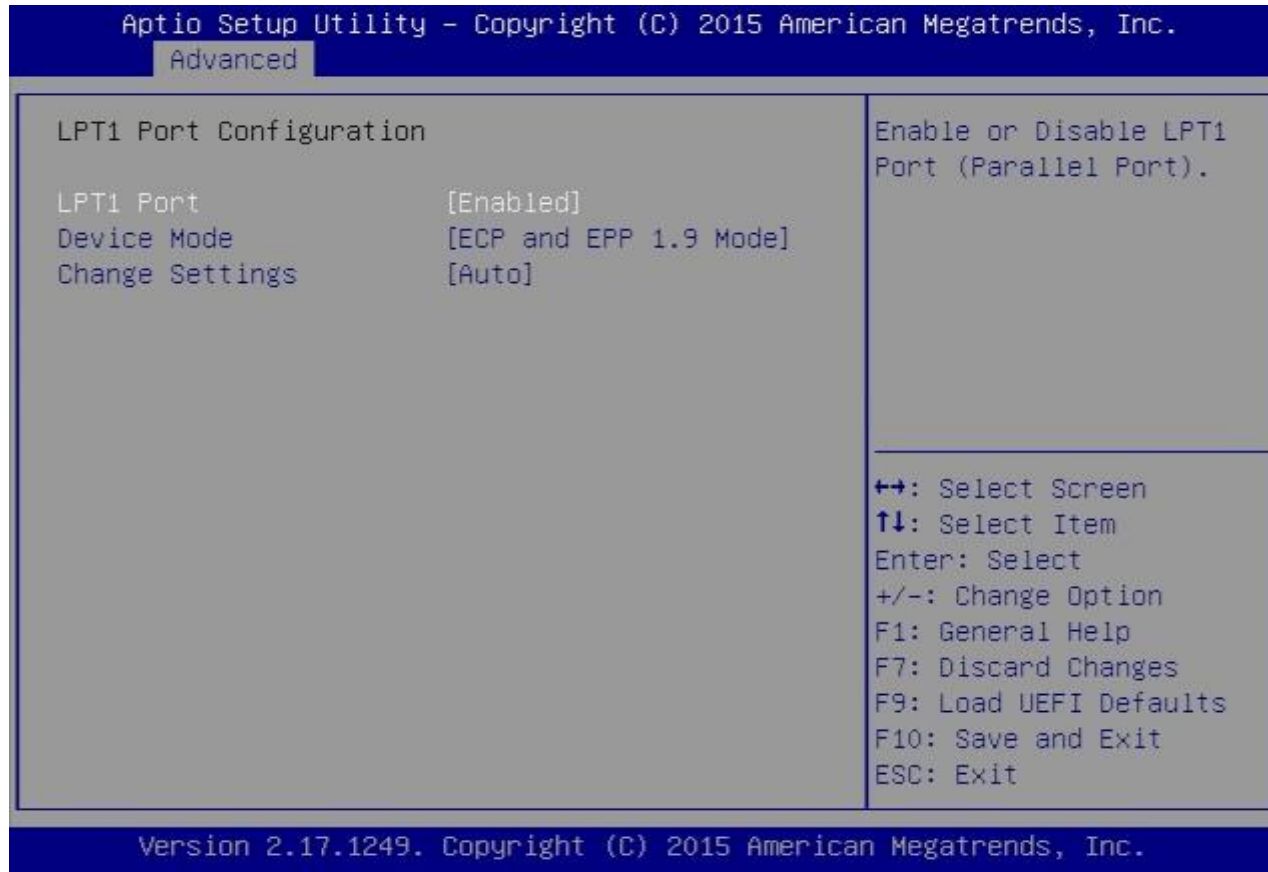
Set Parameter of COM6



Feature	Description	Options
Serial Port	Enable or Disable Serial Port(COM)	Disabled,★Enabled

LPT1 Port Configuration

Set Parameter of COM1



Feature	Description	Options
LPT1 Port	Enable or Disable LPT1 Port (Parallel Port).	Disabled, ★Enabled
Device Mode	Change the Printer mode.	Normal, Bi-Directional, ★ECP and EPP 1.9 Mode, ECP and EPP 1.7 Mode
Change Settings	Select an optimal settings for Super IO Device	★Auto IO=378h; IRQ=5, DMA=3 IO=378h; IRQ=5,6,7,9,10,11,12; DMA=1,3 IO=278h; IRQ=5,6,7,9,10,11,12; DMA=1,3

ACPI Configuration

Configure ACPI Settings

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
  Advanced
-----
Suspend to RAM          [Auto]
ACPI HPET Table         [Disabled]
PS/2 Keyboard Power On [Disabled]
PCIE Devices Power On  [Disabled]
RTC Alarm Power On     [Enabled]
  RTC Alarm Date       [Every Day]
  RTC Alarm Hour       [0]
  RTC Alarm Minute     [0]
  RTC Alarm Second     [0]
USB Keyboard/Remote Power On [Disabled]
USB Mouse Power On    [Disabled]
-----
It is recommended to
select auto for ACPI S3
power saving.

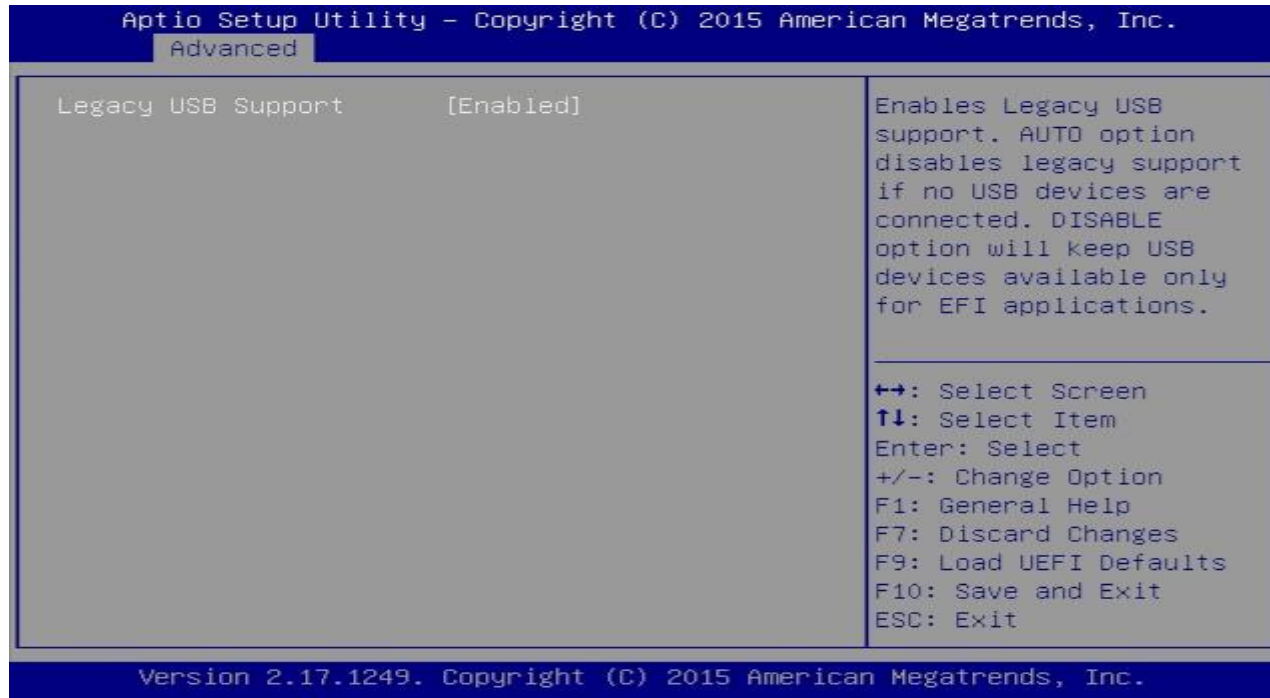
+↔: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Option
F1: General Help
F7: Discard Changes
F9: Load UEFI Defaults
F10: Save and Exit
ESC: Exit

Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
    
```


Feature	Description	Options
Suspend to RAM	It is recommended to select auto for ACPI S3 power saving.	Disabled, ★Enabled
ACPI HPET Table	Enable the High Precision Event Timer for better performance.	Enabled, ★Disabled
PS/2 Keyboard Power On	Allow the system to be waked up by a PS/2 Keyboard.	★Disabled, Any Key
PCIE Devices Power On	Allow the system to be waked up by a PCIE device and enable wake up on LAN.	★Disabled, Enabled
RTC Alarm Power On (Enabled)	Allow the system to be waked up by the real time clock alarm. Set it to by OS to let it be handled by your operating system.	Disabled, Enabled, ★By OS
RTC Alarm Date	Set Date of RTC power on feature.	Every Day 1~31
RTC Alarm Hour	Set Hour of RTC power on feature.	0~23
RTC Alarm Minute	Set Minute of RTC power on feature.	0~59
RTC Alarm Second	Set Second of RTC power on feature.	0~59
USB Keyboard/Remote Power On	Enable system to wake up from S5 using USB Keyboard/Remote.	★Disabled, Enabled
USB Mouse Power On	Enable system to wake up from S5 using USB Mouse	★Disabled, Enabled

USB Configuration

Configure the USB support.



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

Instant Flash

Save UEFI files in your USB storage device and run Instant Flash to update your UEFI. Please note that your USB storage device must be FAT32 /16 /12 file system.

H/W Monitor

To display current hardware status

```

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
Main  Advanced  H/W Monitor  Security  Boot  Exit

Hardware Health Event Monitoring
CPU Temperature      : +43.0 °C
M/B Temperature     : +43.0 °C
CPU_FAN1 Speed      : N/A
CHA_FAN1 Speed      : N/A
V CORE              : +0.856 V
+ 3.30V             : +3.456 V
+ 5.00V             : +5.160 V
+ 12.00V            : +12.302 V

CPU_Fan1 Setting    [Automatic mode]
  Target CPU        [50 °C/122 °F]
  Temperature
  Target Fan Speed  [Level 9]
CHA_FAN1 Setting    [Automatic mode]
  Target CPU        [50 °C/122 °F]
  Temperature
  Target Fan Speed  [Level 9]
Case Open Feature   [Disabled]

Quiet Fan Function Control

++: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Option
F1: General Help
F7: Discard Changes
F9: Load UEFI Defaults
F10: Save and Exit
ESC: Exit

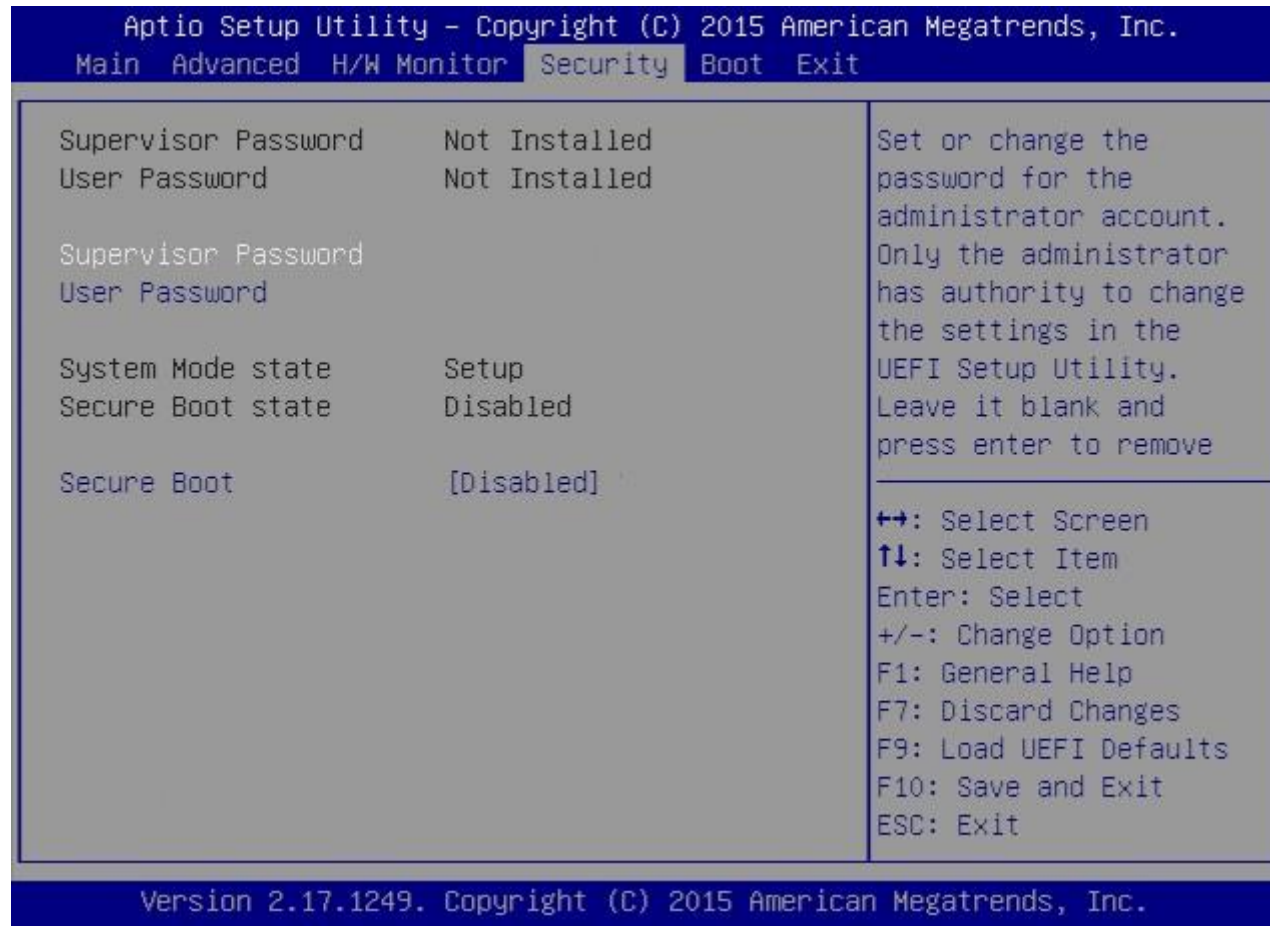
Version 2.17.1249. Copyright (C) 2015 American Megatrends, Inc.
  
```

Feature	Description	Options
CPU_Fan1 Setting (Automatic mode)	Quiet Fan Function Control	★Full On, Automatic mode
Target CPU Temperature	Target CPU Temperature Value.	45°C/ 113°F, 46°C/114°F, 47°C/116°F,48°C/118°F, 49°C/120°F,★50°C/ 122°F, 51°C/123°F, 52°C/125°F, 53°C/127°F, 54°C/129°F, 55°C/131°F, 56°C/132°F, 57°C/134°F, 58°C/136°F, 59°C/138°F, 60°C/140°F, 61°C/141°F, 62°C/143°F 63°C/145°F,64°C/147°F 65°C/149°F
Target Fan Speed	The higher the level, the higher the fan speed.	Level 1, Level 2, Level 3, Level 4, Level 5, Level 6 Level 7, Level 8, ★Level9
CHA_FAN1 Setting (Automatic mode)	Quiet Fan Function Control	★Full On, Automatic mode
Target CPU Temperature	Target CPU Temperature Value.	45°C/ 113°F, 46°C/114°F,

		47°C/116°F, 48°C/118°F, 49°C/120°F, ★50°C/ 122°F, 51°C/123°F, 52°C/125°F, 53°C/127°F, 54°C/129°F, 55°C/131°F, 56°C/132°F, 57°C/134°F, 58°C/136°F, 59°C/138°F, 60°C/140°F, 61°C/141°F, 62°C/143°F 63°C/145°F, 64°C/147°F 65°C/149°F
Target Fan Speed	The higher the level, the higher the fan speed.	Level 1, Level 2, Level 3, Level 4, Level 5, Level 6 Level 7, Level 8, ★Level9
Case Open Feature	Enable or disable the feature of Case Open.	★Disabled, Enabled

3.2.3 Security

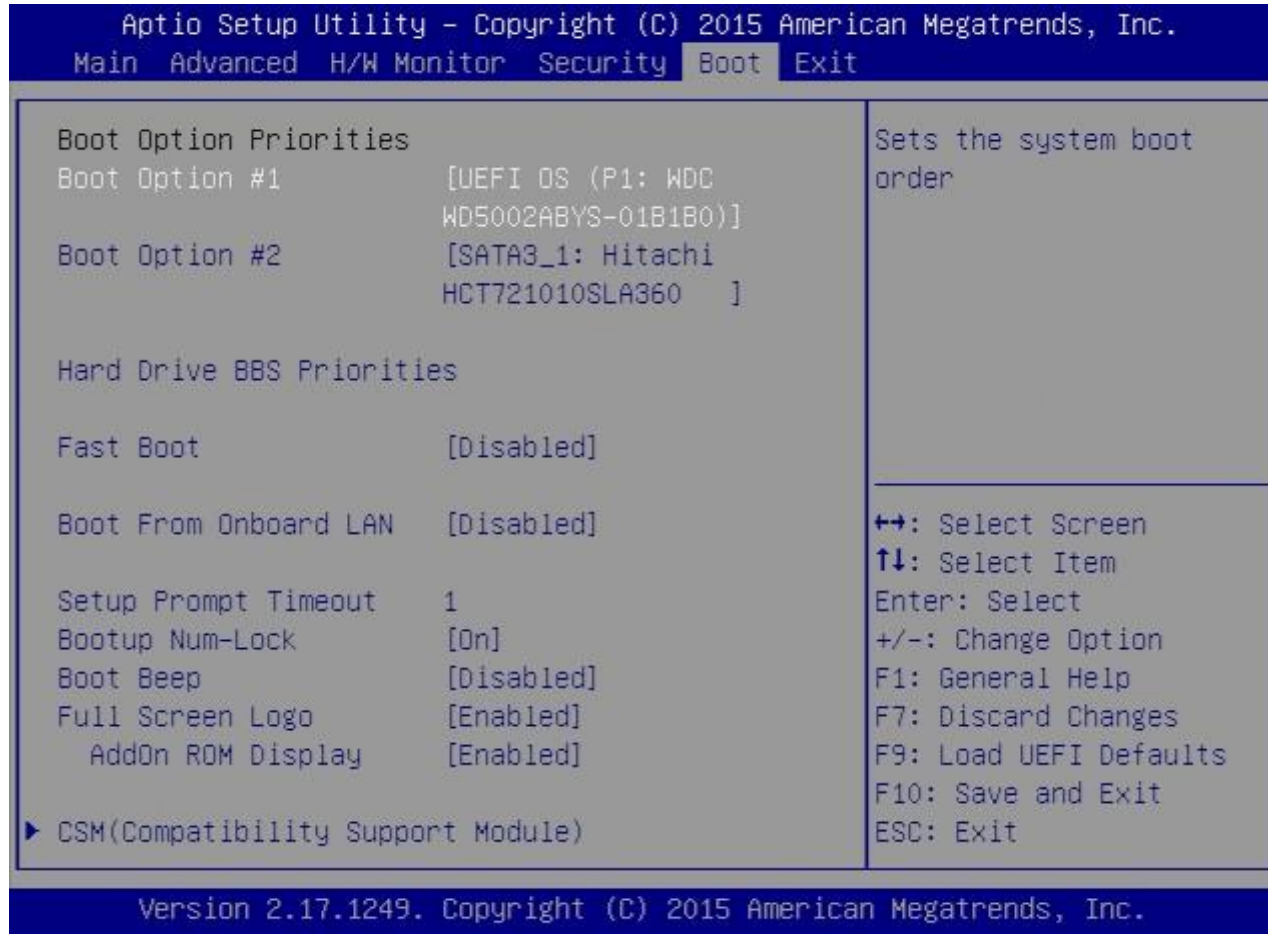
To setup the security features.



Feature	Description	Options
Supervisor Password	Set or change the password for the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.	Create New password
User Password	Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.	Create New password
Secure Boot	Enable to support Windows 8 Secure Boot.	★ Disabled, Enabled

3.2.4 Boot

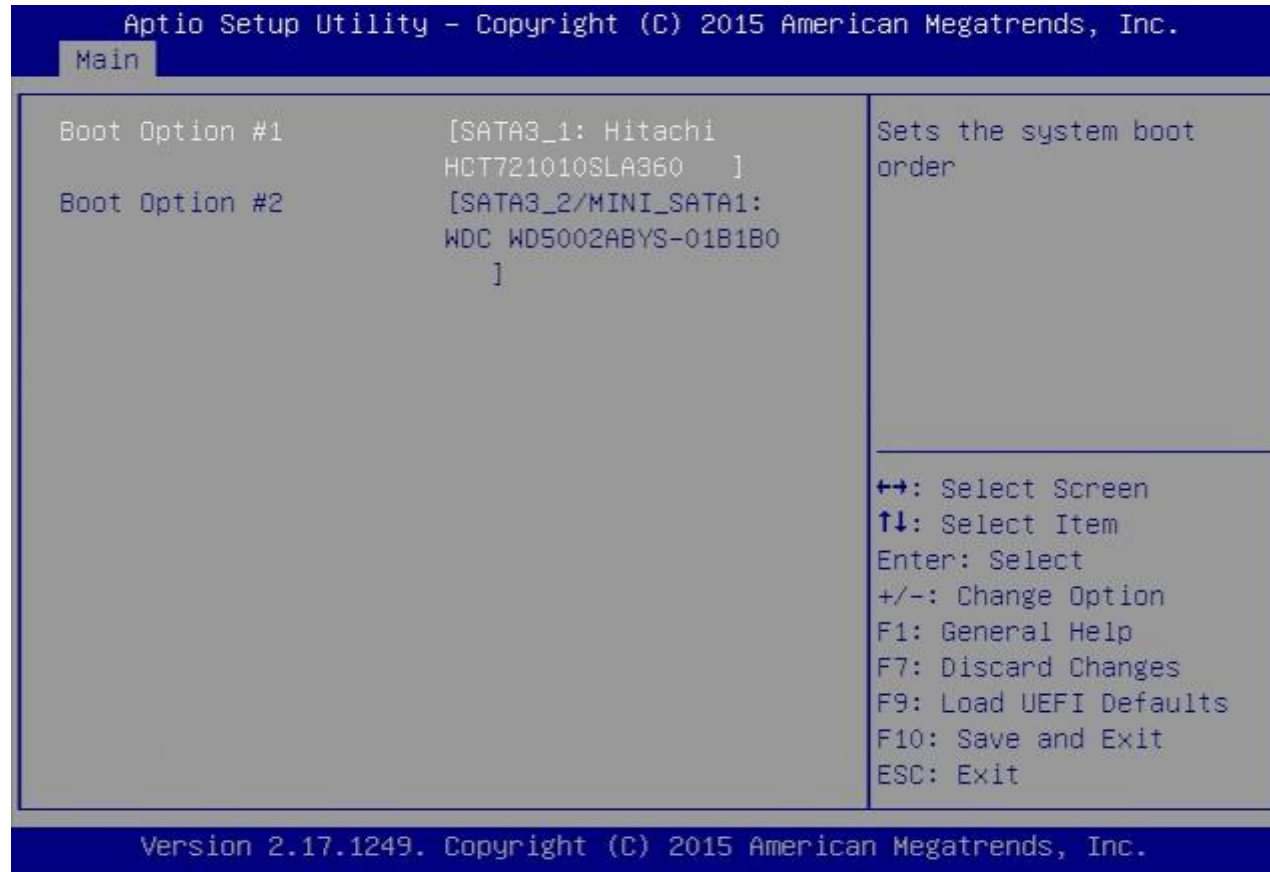
To setup the default system device to locate and load the Operating System.



Feature	Description	Options
Boot Option #1	Set the system boot order	★UEFI OS(P1:WDC W5002ABYS-01B1B0), SATA3_1: Hitachi HCT721010SLA360 Disabled
Boot Option #2	Set the system boot order	UEFI OS(P1:WDC W5002ABYS-01B1B0), ★SATA3_1: Hitachi HCT721010SLA360 Disabled
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 options.	★Disabled, Fast, Ultra Fast
Boot From Onboard LAN	Boot From Onboard LAN.	★Disabled, Enabled
Setup Prompt Timeout	Configure the number of second to wait for the setup hot key.	
BootupNum-Lock	Select whether Num Lock should be turned on or off when the system boots up.	★On, Off
Boot Beep	Select whether the Boot Beep Should be turned on or off when the system boots up. Please note that a buzzer is needed.	★Disabled, Enabled
Full Screen Logo	Enable to display the boot logo or disable to show normal POST messages.	Disabled, ★Enabled
AddOn ROM Display	Set display mode for Option Rom	★Enabled, Disabled

Hard Drive BBS Priorities

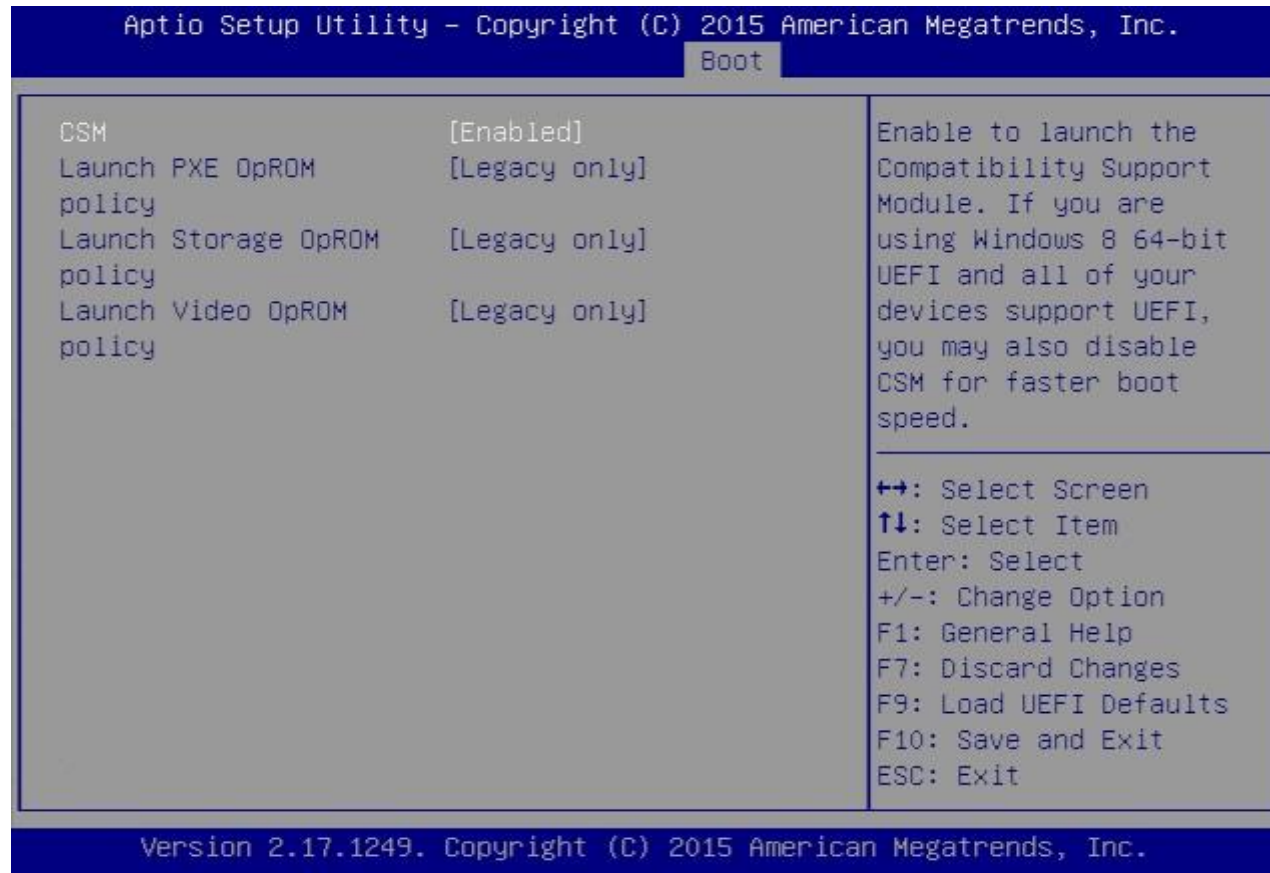
Set the order of the legacy devices in this group



Feature	Description	Options
Boot Option #1	Sets the system boot order	★SATA3_1: Hitachi HCT721010SLA360, SATA3_2/MINI_SATA: WDC WD5002ABYS-01B10, Disabled
Boot Option #2	Sets the system boot order	SATA3_1: Hitachi HCT721010SLA360, ★SATA3_2/MINI_SATA: WDC WD5002ABYS-01B10, Disabled

CSM(Compatibility Support Module)

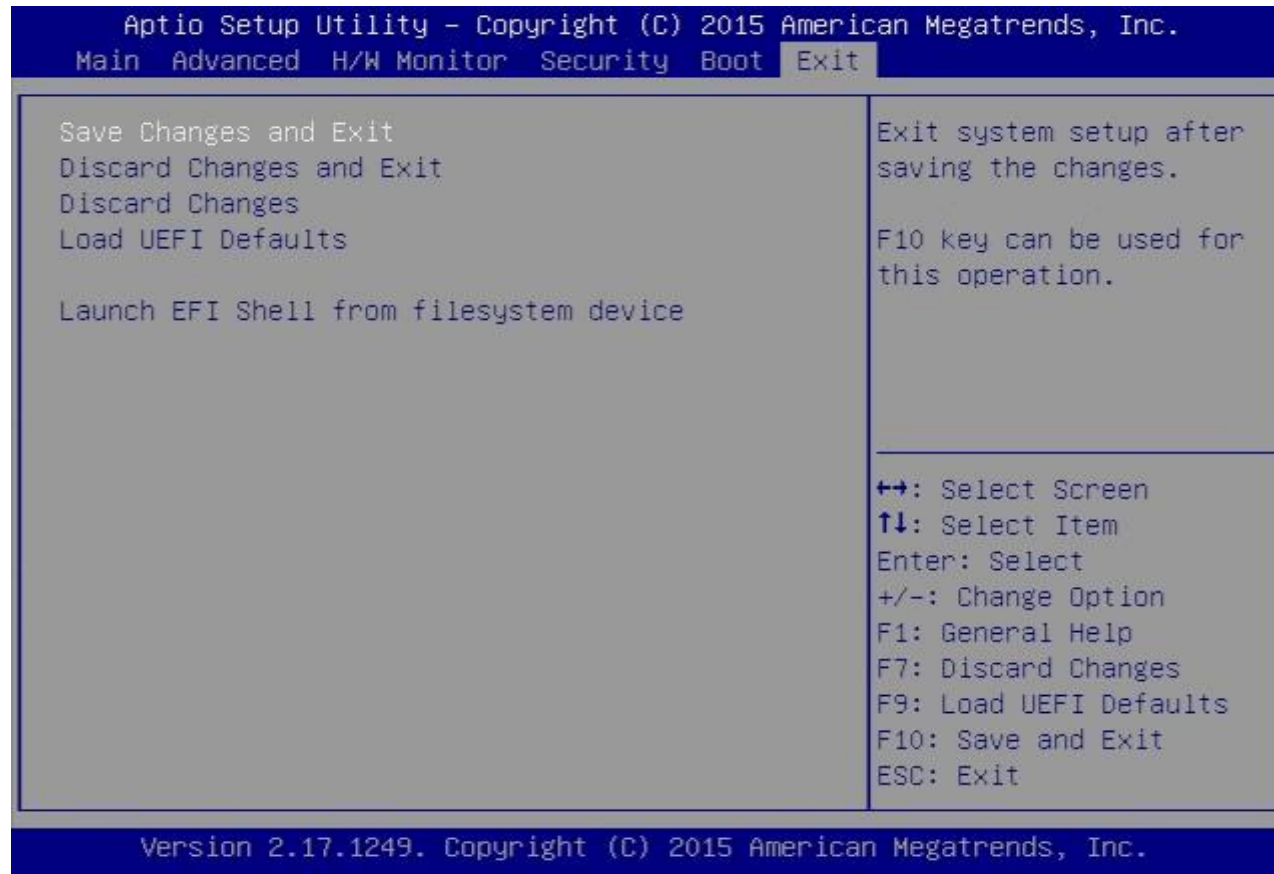
OpROM execution, boot options filter, etc.



Feature	Description	Options
CSM	Enable to launch the Compatibility Support Module. If you are using Windows 8 64 bit UEFI and all of your devices support UEFI, you may also disable CSM for faster boot speed.	Disabled, ★ Enabled
Launch PXE OpROM policy	Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.	Do not launch, UEFI only, ★Legacy only
Launch Storage OpROM policy	Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM	Do not launch, UEFI only, ★Legacy only
Launch Video OpROM policy	Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.	Do not launch, UEFI only, ★Legacy only

3.2.5 Exit

To exit the current screen or the UEFI SETUP UTILITY'



Feature	Description	Options
Save Changes and Exit	Exit system setup after saving the changes. F10 key can be used for this operation.	
Discard Changes and Exit	Exit system setup without saving any changes. Esc key can be used for this operation.	
Discard Changes	Discard Changes done so far to any of this operation.	
Load UEFI Defaults	Load UEFI Default values for all the setup questions. F9 key can be used for this operation.	
Launch EFI Shell from filesystem device	Attempts to Launch FEI Shell application (Shell.efi) from one of the available filesystem devices	

4 Troubleshooting

This section provides a few useful tips to quickly get WADE-8171 running with success. This section will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

4.1 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on ATX power. 204-pin DDR3L 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 WADE-8171, it is recommended, when going with the boot-up sequence, to hit “F2 ” or “ Del” 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 **“Load UEFIDefaults”**, 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.

4.2 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 27(Clear CMOS Header) 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.

JP1 : CMOS Setting

	Jumper Setting Describe
*1-2	Default
2-3	Clean CMOS

Question: How to update the BIOS file of RICH-33B0-8171?

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 "WADE-8171".
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.

```

- Erasing Flash Block [0x0E3000] - 100% complete.
- Programming Flash [0x0E3000] 4KB of 4KB - 100% complete.
- Erasing Flash Block [0xA07000] - 100% complete.
- Programming Flash [0xA07000] 28KB of 28KB - 100% complete.
- Erasing Flash Block [0xA26000] - 100% complete.
- Programming Flash [0xA26000] 28KB of 28KB - 100% complete.
- Erasing Flash Block [0xA40000] - 100% complete.
- Programming Flash [0xA40000] 4KB of 4KB - 100% complete.
- Erasing Flash Block [0xC5E000] - 100% complete.
- Programming Flash [0xC5E000] 1940KB of 1940KB - 100% complete.
- Erasing Flash Block [0xFB7000] - 100% complete.
- Programming Flash [0xFB7000] 88KB of 88KB - 100% complete.
- Erasing Flash Block [0xFD9000] - 100% complete.
- Programming Flash [0xFD9000] 4KB of 4KB - 100% complete.
- Verifying Flash [0x1000000] 16384KB of 16384KB - 100% complete.
RESULT: The data is identical.

FPT Operation Passed

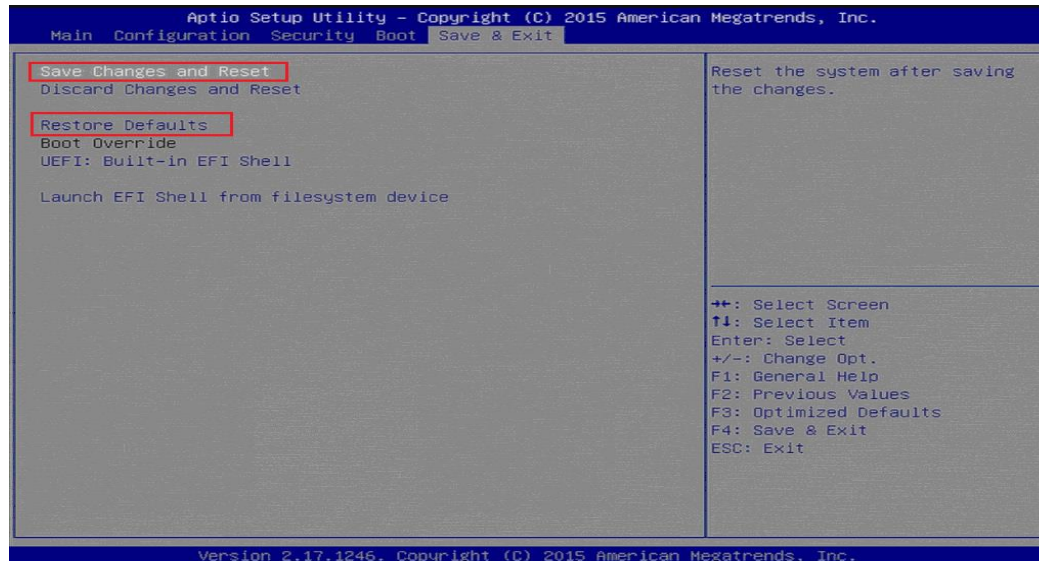
C:\_FLASH>

C:\>

C:\>_

```

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.



Note:

Please visit our DownloadCenter 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

5 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

6 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>