RICH-61E0

NUC form factor board

Version 2.0

Revision History

R1.0	Preliminary
R2.0	Add Power Button Function

Contents

Preface

This user's guide provides information about the components, features, connectors and BIOS Setup menus available on the RICH-61E0. This document should be referred to when designing 4" Embedded board application. The other reference documents that should be used include the following:

- ✧ Intel Apollo Lake Design Guide
- ✧ Intel Apollo Lake I Specification

Please contact PORTWELL Sales Representative for above documents.

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1 Introduction

PORTWELL, Inc., (https://www.portwell.com) a world-leading innovator in the Medical Electronic market, today announces the release of the RICH-61E0 utilizing the Intel® NUC form factor based on the Intel® Atom™ processor E3900 series, includes integrated, enhanced graphics and memory controllers on 14nm process technology, delivering significant power reduction, performance improvements and smaller platform footprint over the previous Intel® Atom™ processor E3900 series. The RICH-61E0 can provide the low power consumption for low profile fan-less applications such as Medical, Panel PC, POS, Print Imaging, ATM, Kiosk, Digital Security and Digital Signage.

2 Specifications

Main Processor	◆ Intel® Kaby Lake-U Core™ i Processors
System Chipset	/
System BIOS	◆ AMI UEFI BIOS
Main Memory	◆ Up to 32 GB in 2 slots DDR4 So-DIMM sockets. Supports dual channel DDR4_2133 MHz SDRAM
Graphics	◆ Controller: Intel® HD Graphics 620 ◆ DP: Supports DP up to resolution 4096 x 2304 ◆ HDMI: Supports HDMI up to resolution 4096 x 2304
Expansion Interface	◆ One M.2 (Key E) support WiFi, B T, 3G & 4G
SATA Interface	◆ One SATA ports(SATA 6Gb/s) ◆ One M.2 (Key M) support SSD
Input/Output	◆ 3x USB 3.0 ports on REAR I/O ◆ 1x USB 3.0 type-C port on REAR I/O ◆ Audio Interface: Mic-In / Line-Out
Ethernet	◆ Supports single 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 bus which provides 500 MB/s data transmission rate

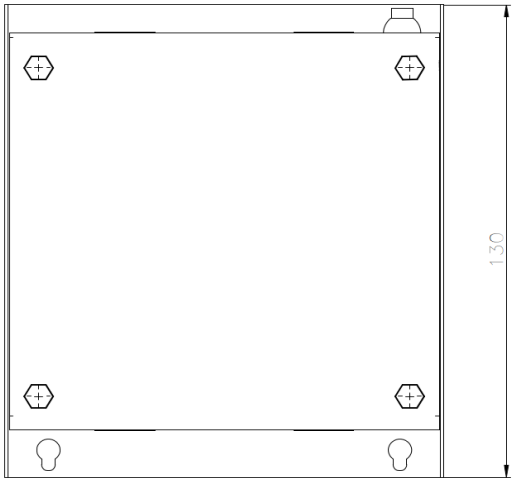
Mechanical and environmental specifications	◆ Operating temperature: 0 ~ 60° C ◆ Storage temperature:-20 ~ 80° C ◆ Humidity: 5 ~ 90% non-condensing ◆ Power supply voltage: ATX ◆ Board size: 170mm x 170 mm

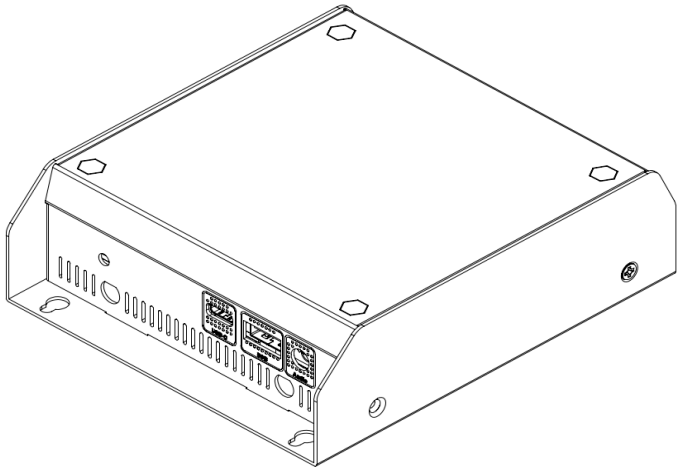
2.1 Supported Operating Systems

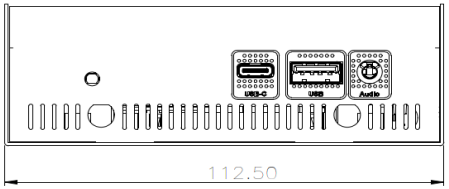
The RICH-61E0 supports the following operating systems.

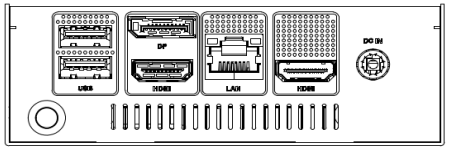
- ✧ Windows 10* (64 bit)
- ✧ Wind River* 8.0 Linux Distribution(64 bit)
- ✧ Yocto* Tool-based Embedded Linux Distribution (64 bit)
- ✧ Android* 6.0(64bit)
- ✧ VxWorks*7.0 (RTOS) (64 bit)

2.2 Mechanical Dimensions









2.3 Power Consumption

3 Test Configuration	
CPU Type	Intel® Core™ i5-7300U CPU @ 2.6GHz (ES), 3M Cache
SBC BIOS	Portwell, Inc. WUX-7XXXU SERIES TEST BIOS 2018/10/05
Memory	WARIS UB-DIMM DDR4 2133 8GB*2 (SEC K4A4G085WD)
LAN Card	Onboard Intel® Ethernet Connection(2) I219-LM
LAN Driver	Intel® Ethernet Connection(2) I219-LM Version: 12.15.22.6
Audio Card	Onboard Realtek ALC233 High Definition Audio
Audio Driver	Realtek ALC233 High Definition Audio Version: 6.0.1.7647
Chipset Driver	Intel® INF Version: 10.1.1.18
VGA Card	Intel® HD Graphics 620
VGA Driver	Intel® HD Graphics 620 Version: 24.20.100.6229
USB 3.0 Driver	Microsoft Version: 10.0.17134.1
SATA HDD	HITACHI Z5K320-250 250GB
Power Supply	FSP GROUP INC. FSP120-AHAN1

Power consumption(24V)			
ATX:			
Item	Power ON	Full Loading 10Min	Full Loading 30Min
CPU +12V	0.98A	2.05A	1.98A
System +12V	0.83A	1.48A	1.26A
System +3.3V	0.55A	0.65A	0.69A
System +5V	1.11A	1.37A	1.34A
System+ Device +12V	0.97A	1.81A	1.56A
System+ Device +5V	1.87A		
USB3.0 Loading Test	4.93V/ 990 mA		

2.4 Environmental Specifications

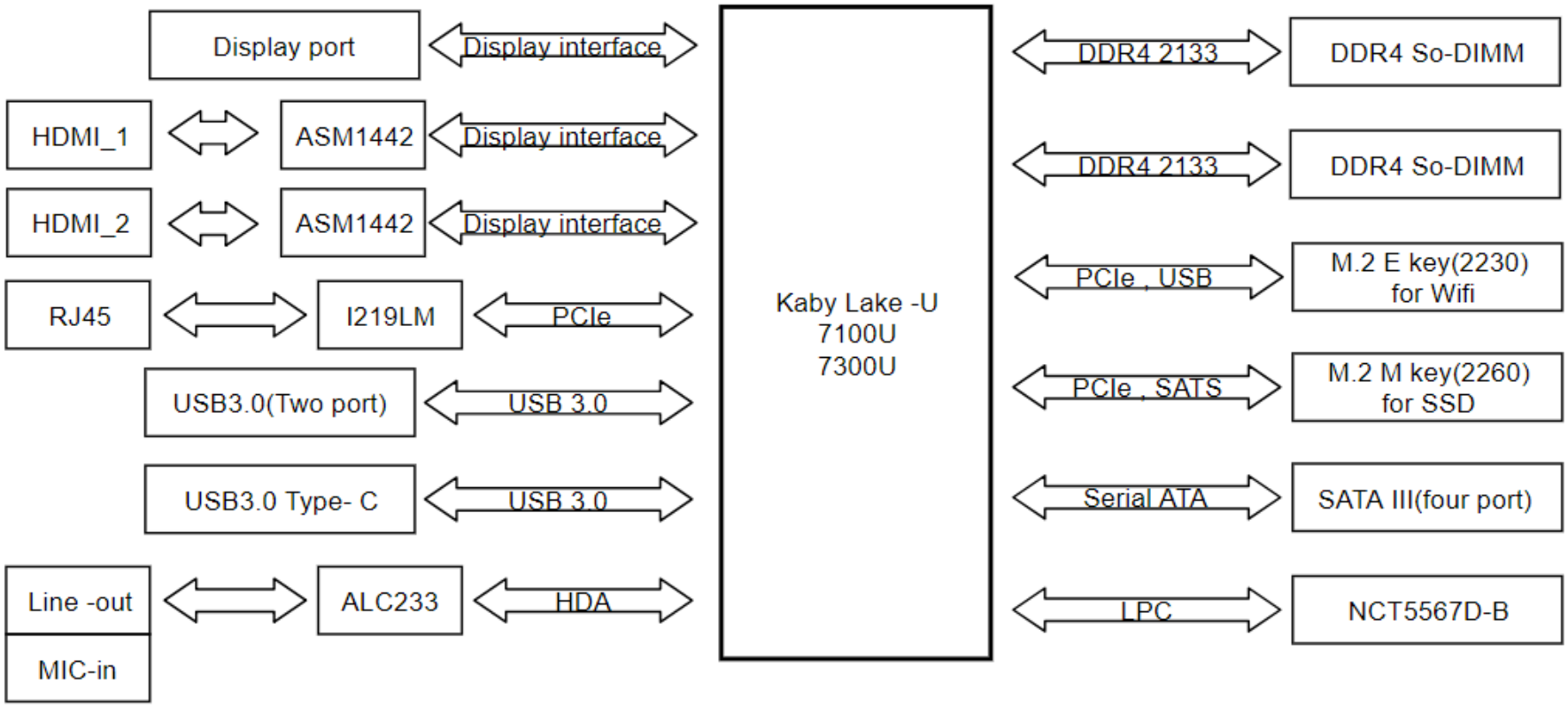
Storage Temperature : -40~85°C

Operation Temperature : 0~60°C

Storage Humidity : 5~90%

Operation Humidity: 10~90%

3 Block Diagram



4 Hardware Configuration

4.1 Connector Function

We have made a list of connector function. The following figure shows where the connectors are and what they are called in board file.

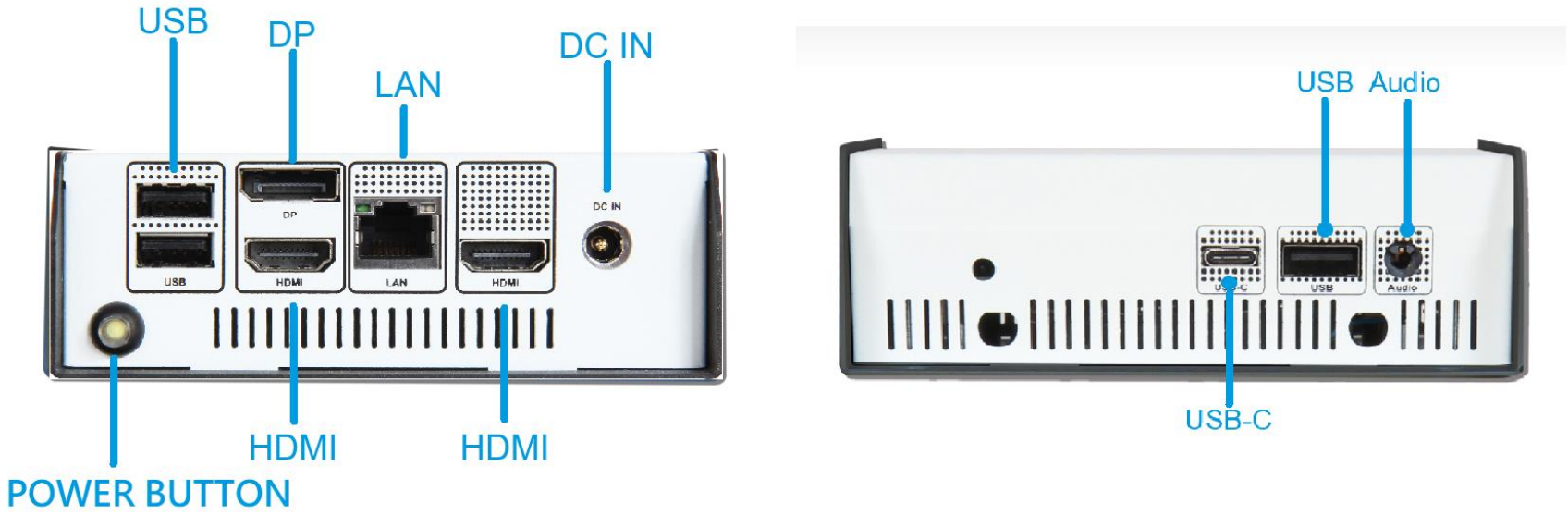


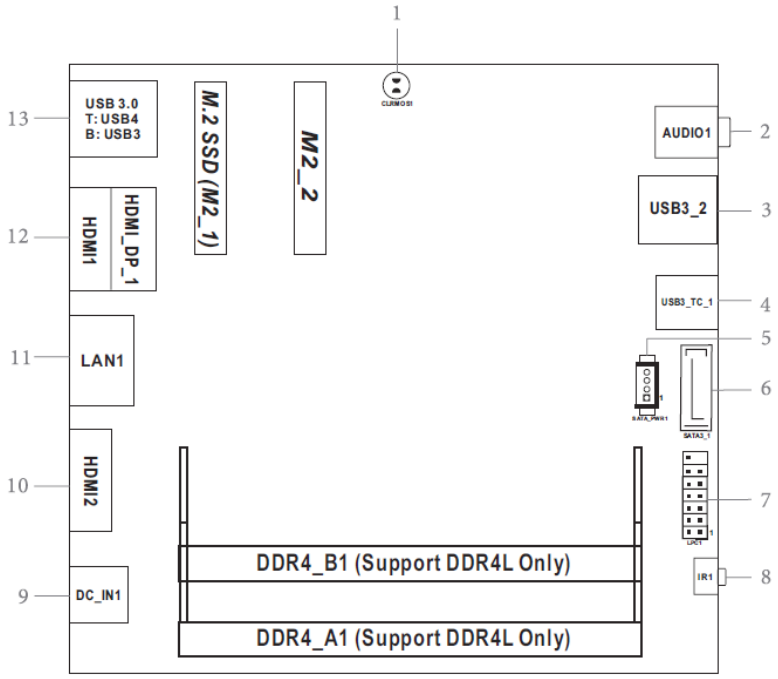
Figure1. RICH-61E0 System View

4.2 Jumper Settings

For users to customize RICH-61E0's features. In the following sections, Users can refer to Figure 1& 2 for the Jumper allocations.

Jumper Table

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



Connector Function List:

Jumper Function List	
1	Clear CMOS Pad(CLRMOS1)
2	Audio Jack(AUDIO1)
3	USB3.0 Port(USB3_2)
4	USB3.0 Type-C Port(USB3_TC_1)
5	SATA Power Output Connector(SATA_PWR1)
6	SATA3 Connector(SATA_1)
7	LPC Debug Header(LPC1)
8	Infrared LED(IR1)
9	DC-in Jack(DC_IN1)
10	HDMI Port(HDMI_2)
11	LAN Port(LAN1)
12	Top : Display Port(HDMI_DP_1) Bottom: HDMI Port(HDMI_1)
13	USB3.0 Ports(USB3_3_4)

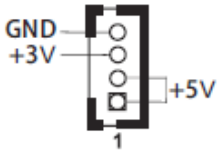
1: Clear CMOS Pad(CLRMOS1)

2: Audio Jack(AUDIO1)

3: USB3.0 Port(USB3_2)

4: USB3.0 Type-C Port(USB3_TC_1)

5: SATA Power Output Connector(SATA_PWR1)



6: SATA3 Connector(SATA_1)

7: LPC Debug Header(LPC1)

PIN	Signal Name	PIN	Signal Name
14	+3V	13	NC
12	+3V	11	+3V
10	GND	9	GND
8	LAD3	7	LAD2
6	LAD1	5	LAD0
4	LFRAME#	3	RESET#
2	GND	1	CLK

8: Infrared LED(IR1)

9: DC-in Jack(DC_IN1)

10: HDMI Port(HDMI_2)

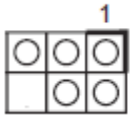
11: LAN Port(LAN1)

12: Top : Display Port(HDMI_DP_1)
Bottom: HDMI Port(HDMI_1)

13: USB3.0 Ports(USB3_3_4)

Back Side:

Power Button Header (PWR_BTN1)



PIN	Signal Name	PIN	Signal Name	PIN	Signal Name
5	GND	3	PLED+	1	PWRBTN#
6	X	4	PLED-	2	GND

5 System Resources

5.1 Intel® Kaby Lake-U SoC

WUX-7300U/7100U is based on Kaby Lake-U SoC family

5.2 Main Memory

RICH-61E0 provides 2 x 260-pin So-DIMM sockets which supports DDR4 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 RICH-61E0 into standard chassis or proprietary environment, please perform the following:
Step 1 : Check all jumpers setting on proper position
Step 2 : Install and configure memory module on right position

Step 3 : Place RICH-61E0 into the dedicated position in the system

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

WARNING

Please ensure that motherboard 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

The RICH-61E0 build with Intel® Pentium® Processor J/N Series including J3455 / N3350 / N4200 sku. It's a new chipset that some old operating systems might not be able to recognize. To overcome this compatibility issue, for Windows Operating Systems such as Windows 10, please install its INF before any of other Drivers are installed. You can find very easily this chipset component driver in RICH-61E0 CD-title

5.3.2 Intel® HD Graphics 620

RICH-61E0 has integrated Intel® HD Graphics 620 which supports DirectX 12、OpenGL 4.4. It is the most advanced design to gain an outstanding graphic performance. WUX-7300U/7100U supports DP, HDMI display output. This combination makes WUX-7300U/7100U an excellent performance hardware.

5.3.3 Intel LAN I219LM Gigabit Ethernet Controller

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

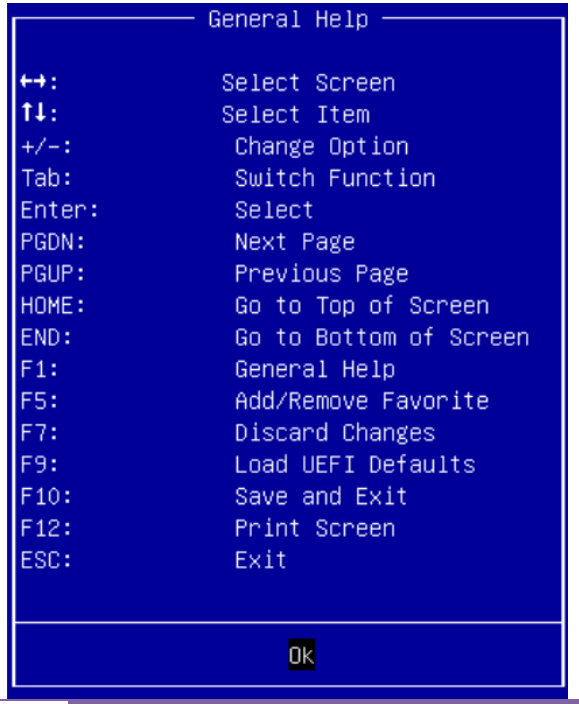
6 BIOS Setup Items

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

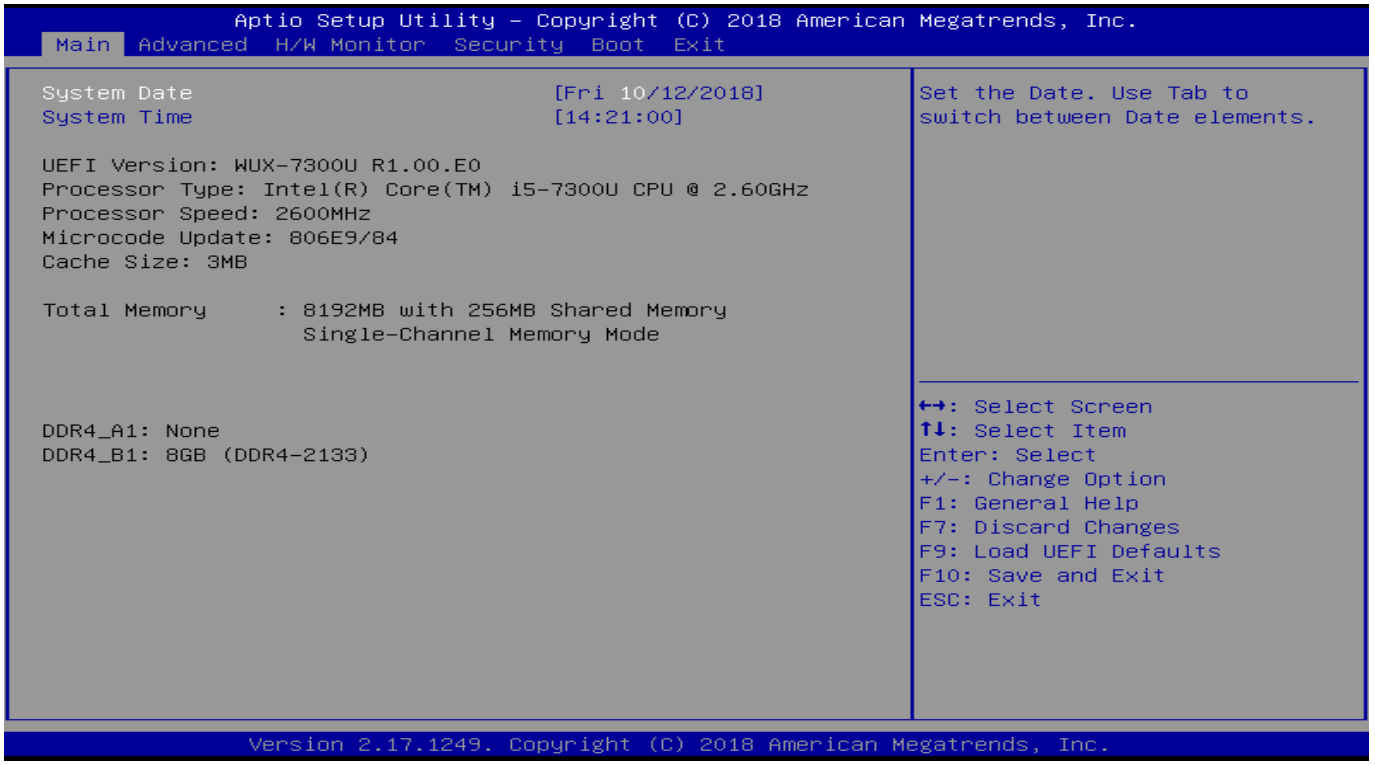
If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On or pressing the RESET button. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

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.

6.2.1 Main

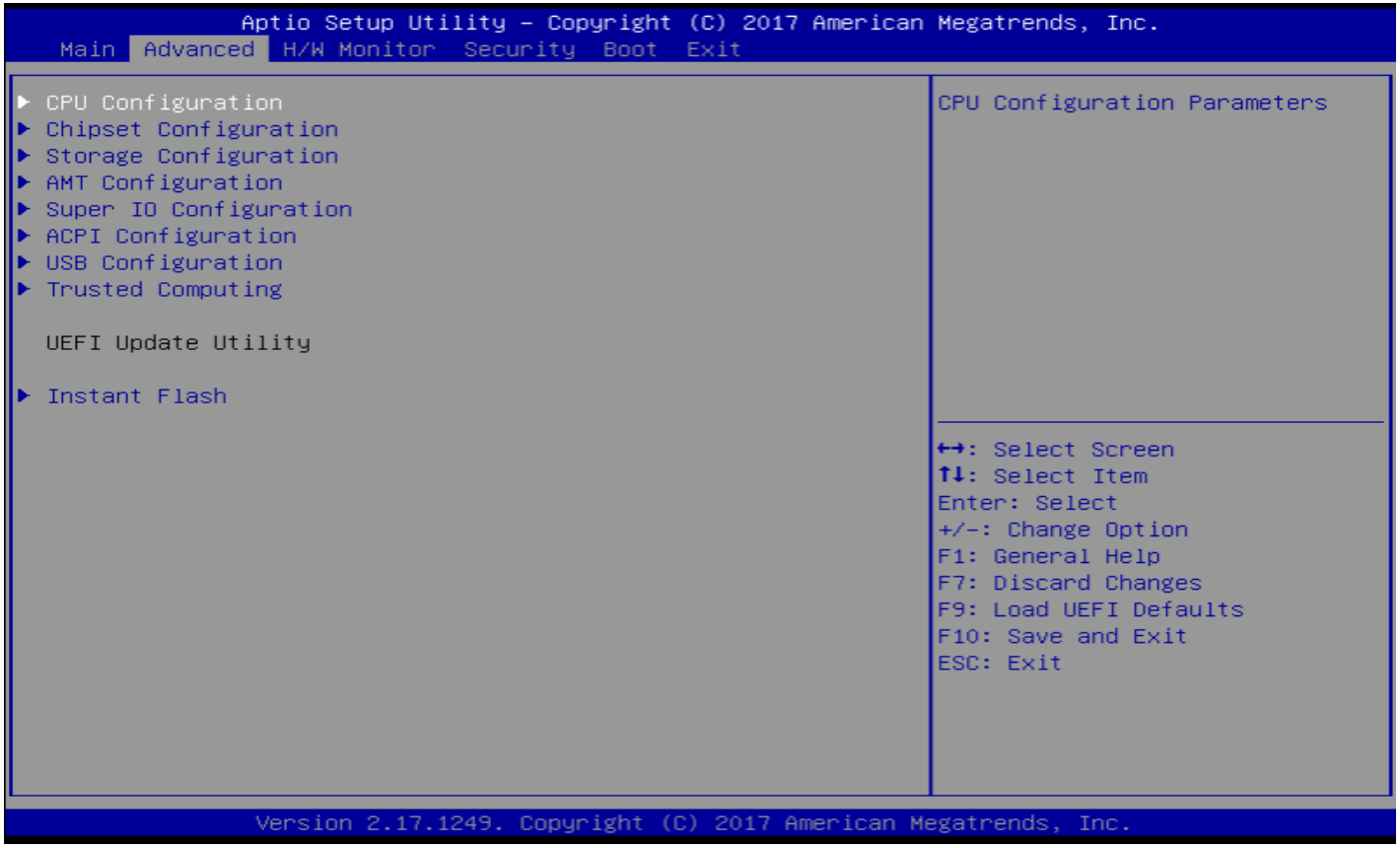
Use this menu for basic system configurations, such as time, date etc.



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.	

7.2.2 Advanced

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

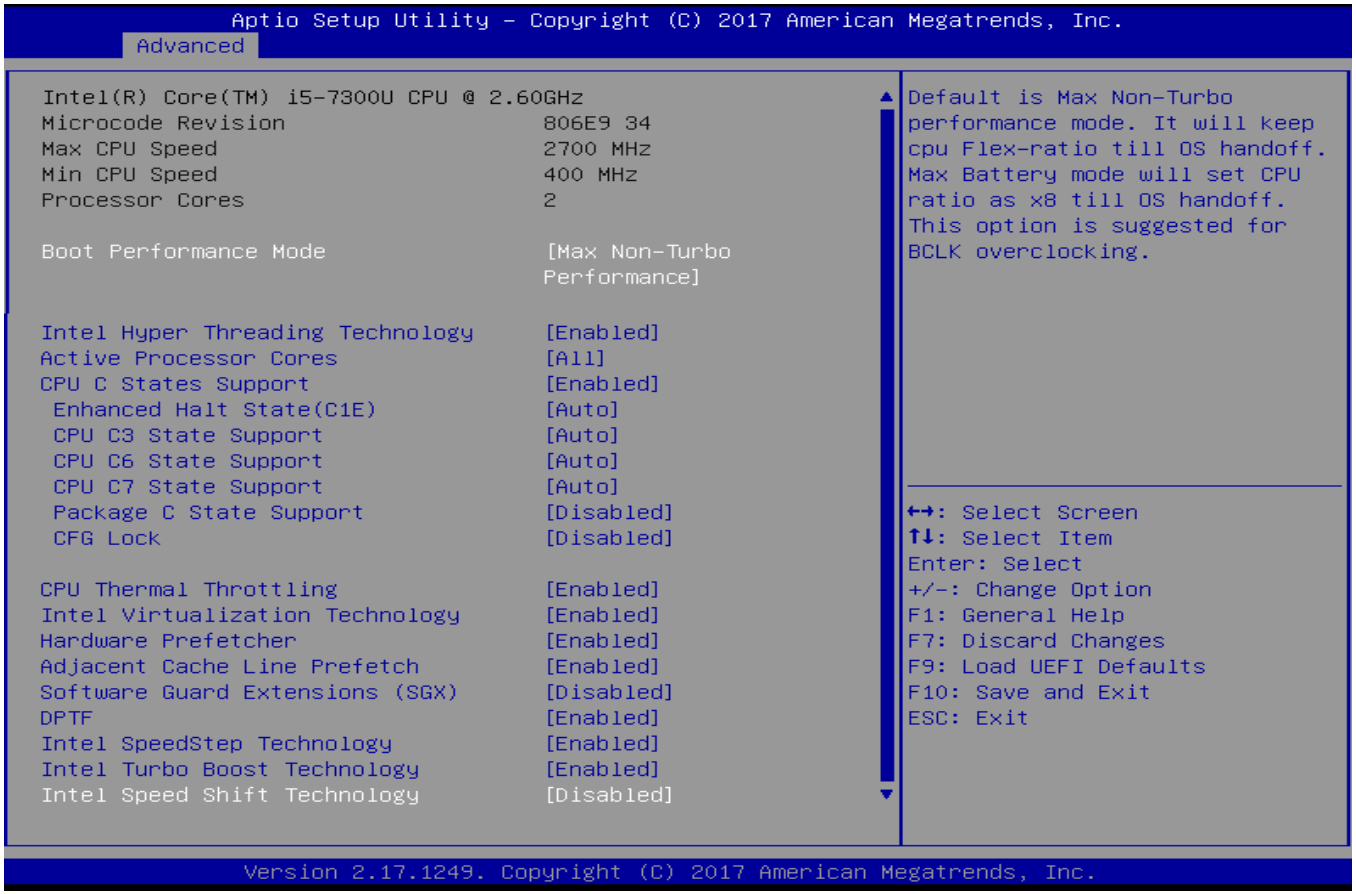


Instant Flash

Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows you to update system UEFI without entering operating systems first like MS-DOS or Windows®. Just launch this tool and save the new UEFI file to your USB flash drive, floppy disk or hard drive, then you can update your UEFI only in a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system. If you execute Instant Flash utility, the utility will show the UEFI files and their respective information. Select the proper UEFI file to update your UEFI, and reboot your system after UEFI update process completes.

CPU Configuration

CPU Configuration Parameters

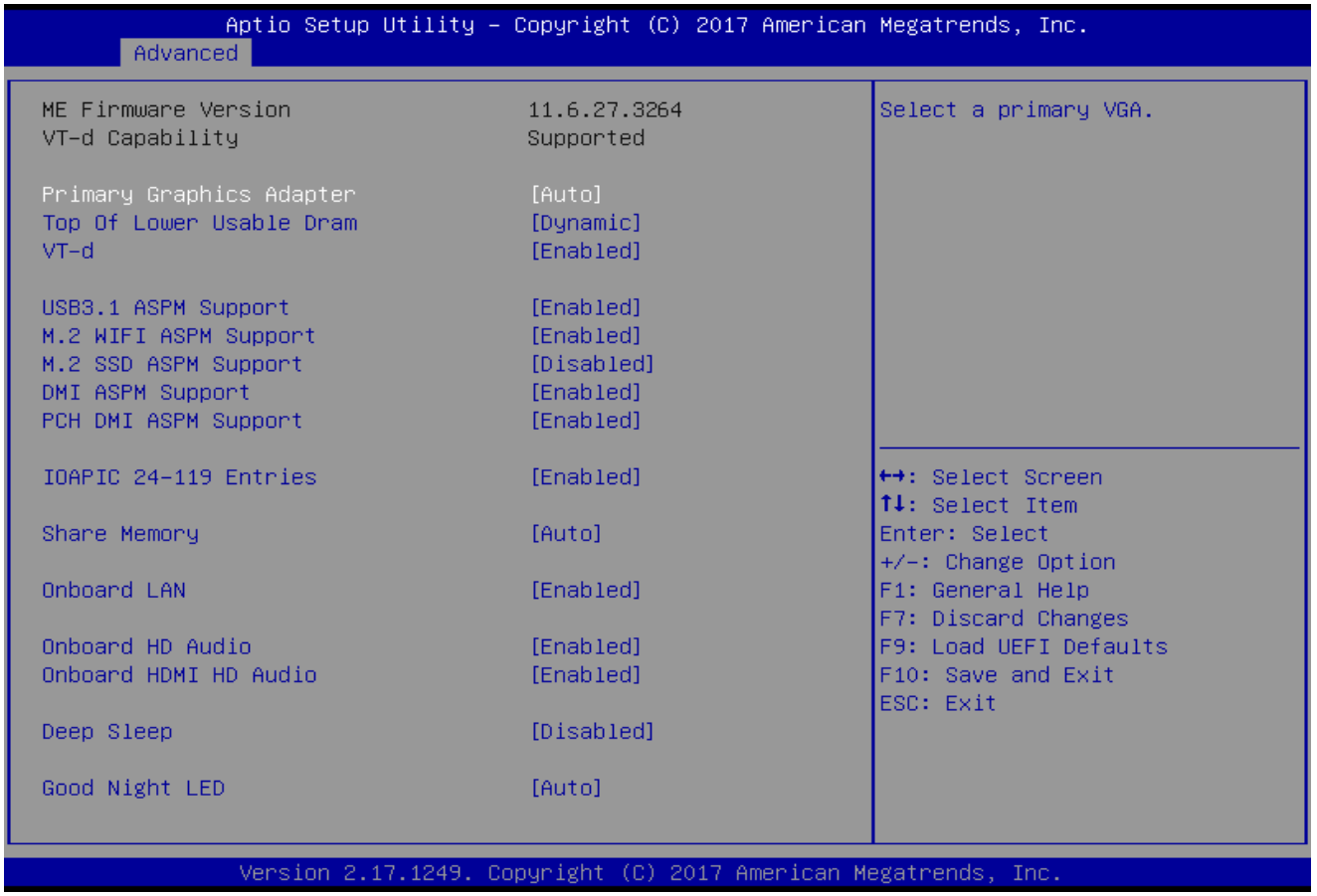


Feature	Description	Options
Boot Performance Mode	Default is MAX Non-Turbo performance mode. It will keep CPU Flex-ratio till OS handoff. Max battery mode will set CPU ratio as x8 till OS handoff. This option is suggested for BCLK overclocking.	Max Battery ★Max Non-Turbo Performance Turbo Performance
Intel Hyper Threading Technology	Intel Hyper Threading Technology allows multiple threads to run on each core, so that the overall performance on threaded software is improved.	★Enabled, Disabled
Active Processor Cores	Select the number of cores to enable in each processor package.	★All, 1
CPU C States Support	Enable CPU C States Support for power saving. It is recommended to keep C3, C6 and C7 all enabled for better power saving.	★Enabled, Disabled
Enhanced Halt State(C1E)	Enable Enhanced Halt State (C1E) for lower power consumption.	★Auto, Disabled, Enabled
CPU C3 State Support	Enable C3 sleep state for lower power consumption.	★Auto, Disabled, Enabled
CPU C6 State Support	Enable C6 sleep state for lower power consumption.	★Auto, Disabled, Enabled
CPU C7 State Support	Enable C7 sleep state for lower power consumption.	★Auto, Disabled, Enabled
Package C State Support	Enable CPU, PCIe, Memory, Graphics C State Support for power saving.	Auto, ★Disabled, Enabled
CFG Lock	This item allows you to disable or enable the CFG Lock.	★Disabled, Enabled
CPU Thermal Throttling	Enable CPU internal thermal control mechanisms to keep the CPU from overheating.	★Enabled, Disabled
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.	★Enabled, Disabled
Hardware Prefetcher	Automatically prefetch data and code for the processor. Enable for better performance.	★Enabled, Disabled
Adjacent Cache Line Prefetch	Automatically prefetch the subsequent cache line while retrieving the currently requested cache line. Enable for better performance.	★Enabled, Disabled
Software Guard Extensions (SGX)	Enabled / Disabled / Software Controlled Software Guard Extensions (SGX).	★Disabled, Enabled, Software Controlled
DPTF	Enable / Disable Intel Dynamic Platform Thermal Framework.	★Enabled, Disabled

Intel SpeedStep Technology	Allows more than two frequency ranges to be supported.	★Enabled, Disabled
Intel Turbo Boost Technology	Intel Turbo Boost Technology enables the processors to run above its base operating frequency when the operating system requests the highest performance state.	★Enabled, Disabled
Intel Speed Shift Technology	Enable / Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.	★Disabled, Enabled

Chipset Configuration

Configuration Chipset feature



Feature	Description	Options
Primary Graphics Adapter	Select a primary VGA.	★Auto, DP, HDMI
Top Of Lower Usable Dram	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.	★Dynamic, 1GB, 2.5GB, 3.5GB
VT-d	VT-d capability	★Enabled, Disabled
USB3.1 ASPM Support	This option enables / disables the ASPM support for USB3.1 devices.	★Enabled, Disabled
M.2 WIFI ASPM Support	This option enables / disables the ASPM support for M.2 WIFI devices.	★Enabled, Disabled
M.2 SSD ASPM Support	This option enables / disables the ASPM support for M.2 SSD devices.	★Disabled, Enabled
DMI ASPM Support	Enable / Disable the control of ASPM on CPU side of the DMI Link.	★Enabled, Disabled
PCH DMI ASPM Support	PCH DMI ASPM Setting.	★Enabled, Disabled
IOAPIC 24-119 Entries	Enables / Disables IOAPIC 24-119 Entries. IRQ24-119 may be used by PCH devices. Disabling those interrupts may cause certain devices failure.	★Enabled, Disabled
Share Memory	Configure the size of memory that is allocated to the integrated graphics processor when the system boots up.	★Auto, 32M, 64M, 128M, 256M, 512M, 1024M
Onboard LAN	To Enable or Disable Onboard LAN.	★Enabled, Disabled
Onboard HD Audio	Auto / Enable / Disable onboard HD audio. Set to Auto to enable onboard HD audio and automatically disable it when a sound card is installed.	★Enabled, Disabled
Onboard HDMI HD Audio	Enable audio for the onboard digital outputs.	★Enabled, Disabled
Deep Sleep	Configure deep sleep mode for power saving when the computer is shut down. We recommend disabling Deep Sleep for better system compatibility and stability.	★Disabled, Enabled
Good Night LED	By enabling Good Night LED, the Power LED will be switched off when the system is on. It will also automatically switch off the Power and Keyboard LEDs when the system enters into Standby/Hibernation mode.	★Auto, Enabled, Disabled

Storage Configuration

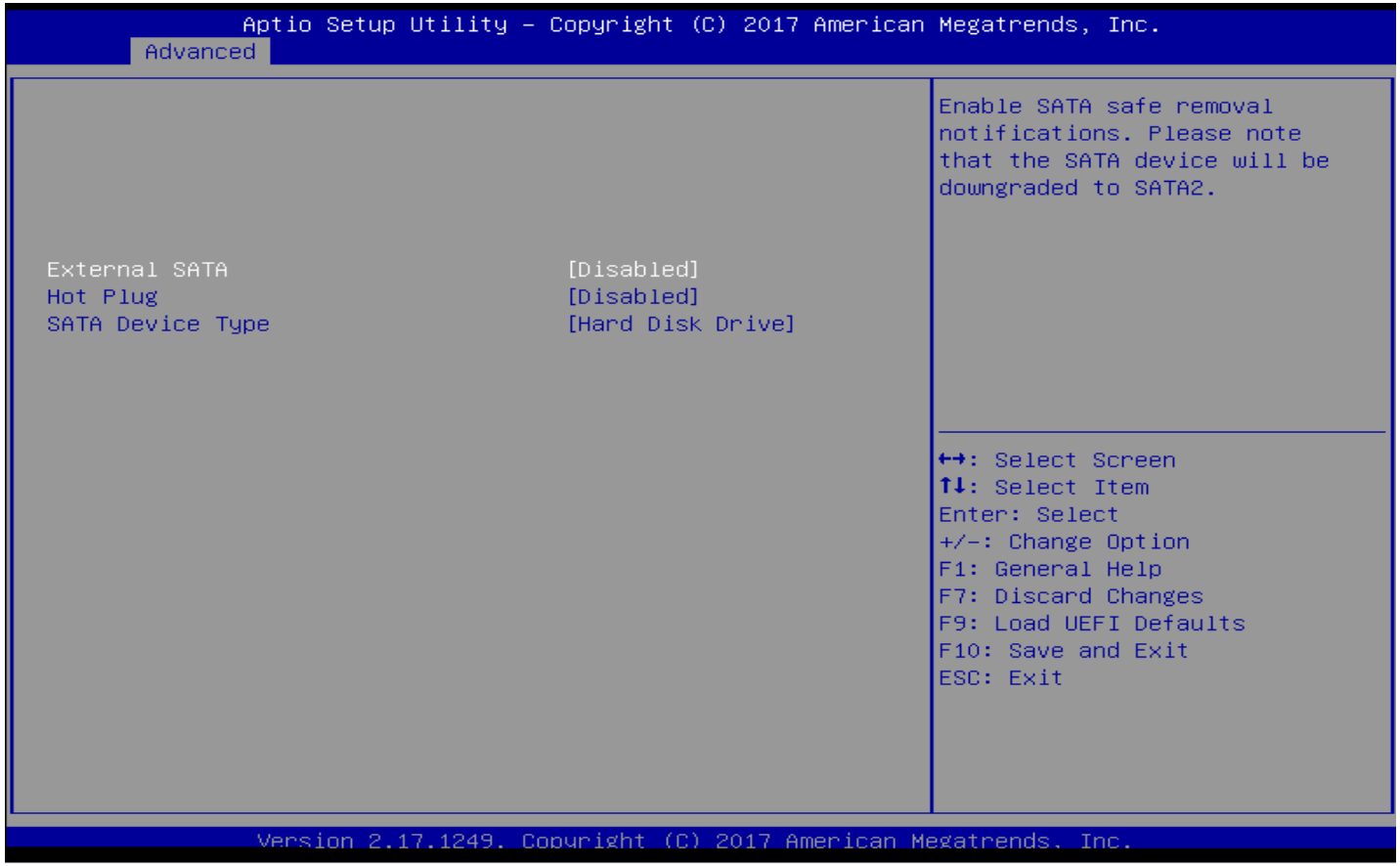
Configure Storage Parameters

Feature	Description	Options

SATA Controller(s)	Enable / disable the SATA Controllers.	★Enabled, Disabled
SATA Mode Selection	AHCI: Supports new features that improve performance. Intel RST Premium(RAID): Combine multiple disk drives into a logical unit. Please press <CTRL - I> to enter RAID ROM during UEFI POST process.	★AHCI Intel RST Premium(RAID Mode)
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.	★Legacy only UEFI only Do not launch
SATA Aggressive Link Power Management	SATA Aggressive Link Power Management allows SATA devices to enter a low power state during periods of inactively to save power. It is only supported by AHCI mode.	★Disabled, Enabled
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 drives to detect and report on various indicators of reliability.	★Enabled, Disabled

SATA3_1 Configuration

Configure SATA3_1 Parameters

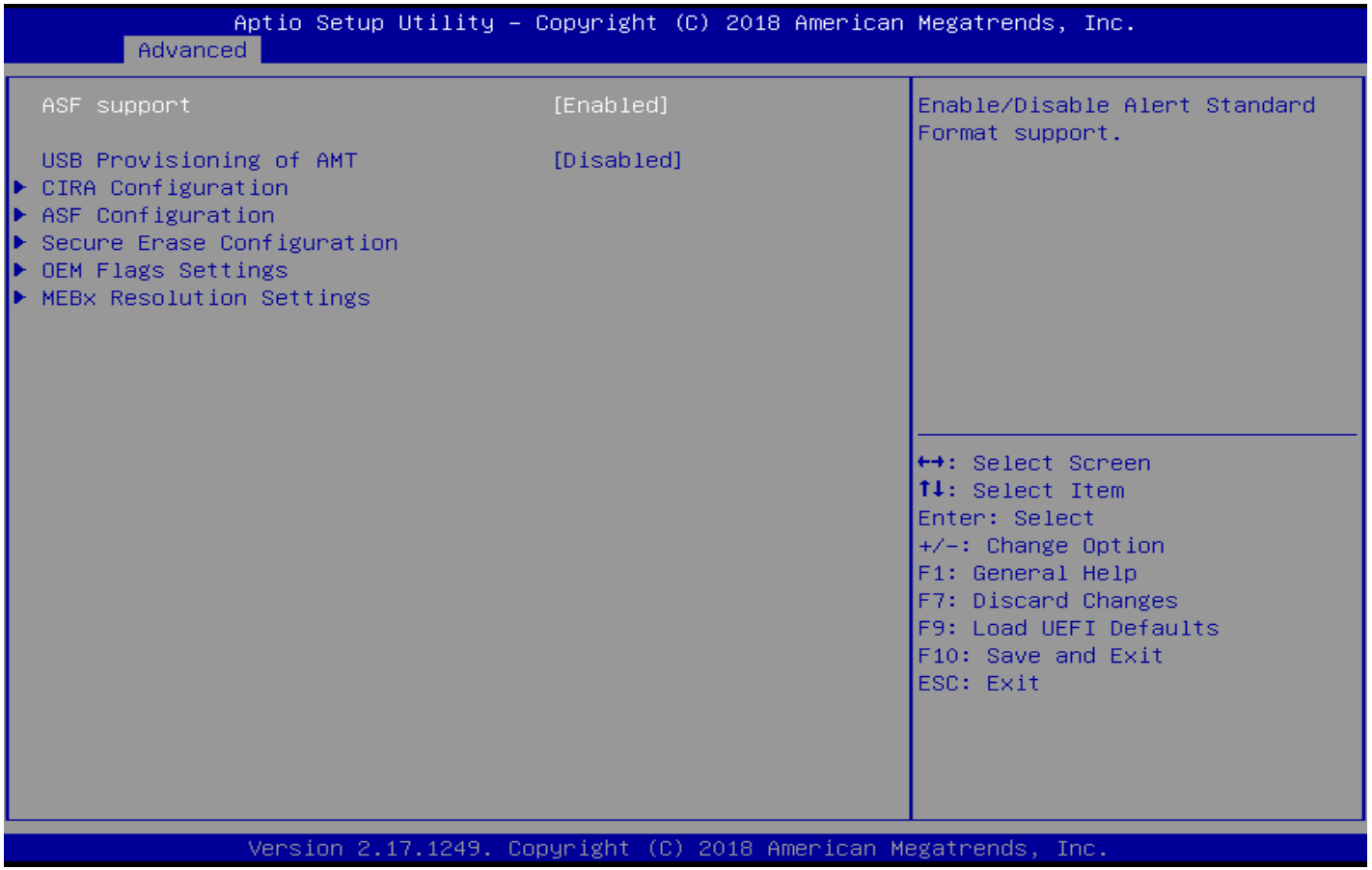


Feature	Description	Options

External SATA	Enable SATA safe removal notifications. Please note that the SATA device will be downgraded to SATA2.	★Disabled, Enabled
Hot Plug	Enable or disable Hot Plug for this port.	★Disabled, Enabled
SATA Device Type	Select device type according to your connected device.	★Hard Disk Drive Solid State Drive

AMT Configuration

Configure Active Management Technology Parameters

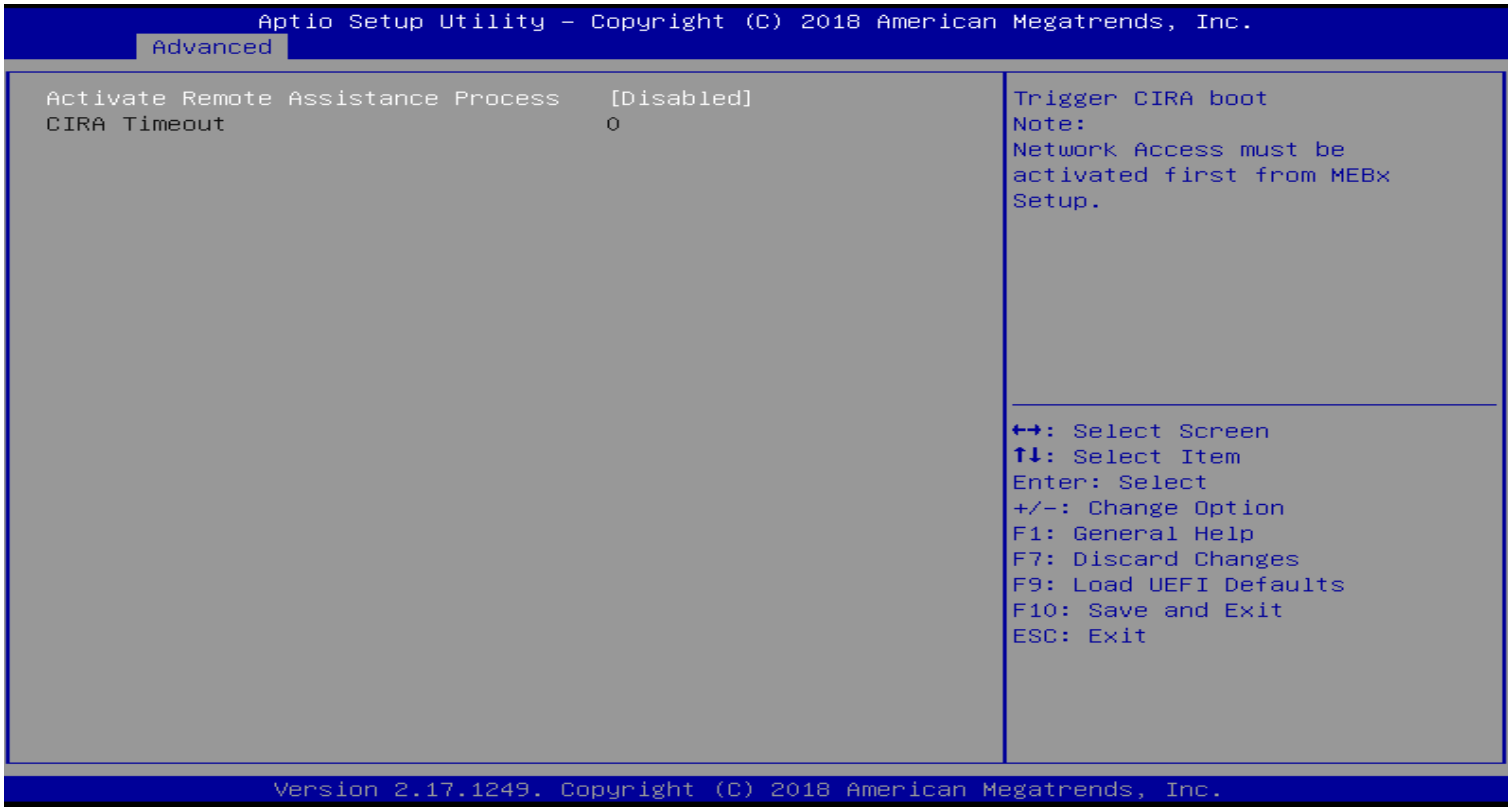


Feature	Description	Options

ASF support	Enable / Disable Alert Standard Format support.	★Enabled, Disabled
USB Provisioning of AMT	Enable / Disable of AMT USB Provisioning.	★ Disabled, Enabled
CIRA Configuration	Configure Remote Assistance Process parameters.	
ASF Configuration	Configure Alert Standard Format parameters.	
Secure Erase Configuration	Secure Erase configuration menu.	
OEM Flags Settings	Configure OEM Flags.	
MEBx Resolution Settings	Resolution settings for MEBx display modes.	

CIRA Configuration

Configuration of CIRA

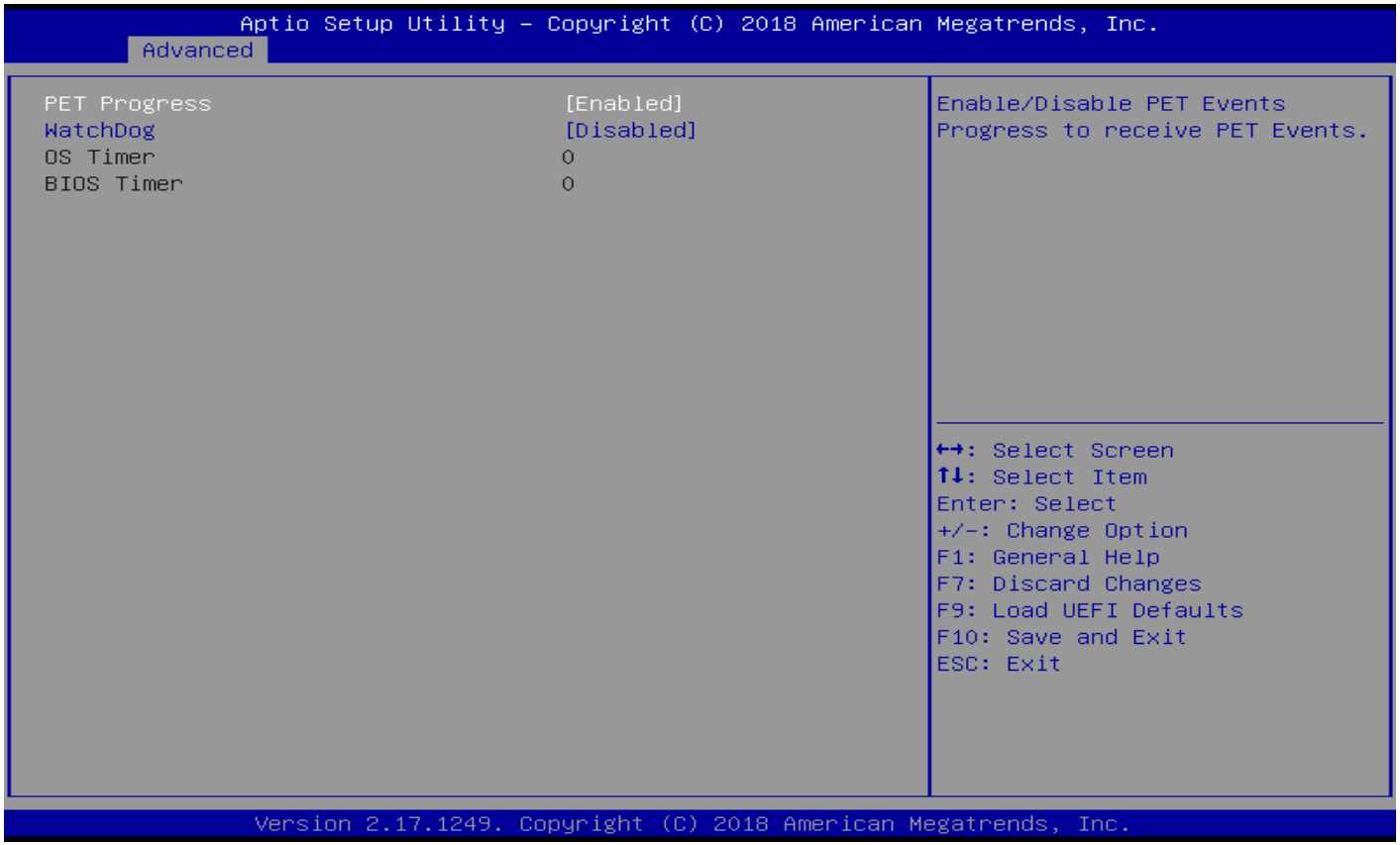


Feature	Description	Options
Activate Remote Assistance Process	Trigger CIRA boot Note:	★Disabled, Enabled

	Network Access must be activated first from MEBx Setup.	

ASF Configuration

Configuration of ASF

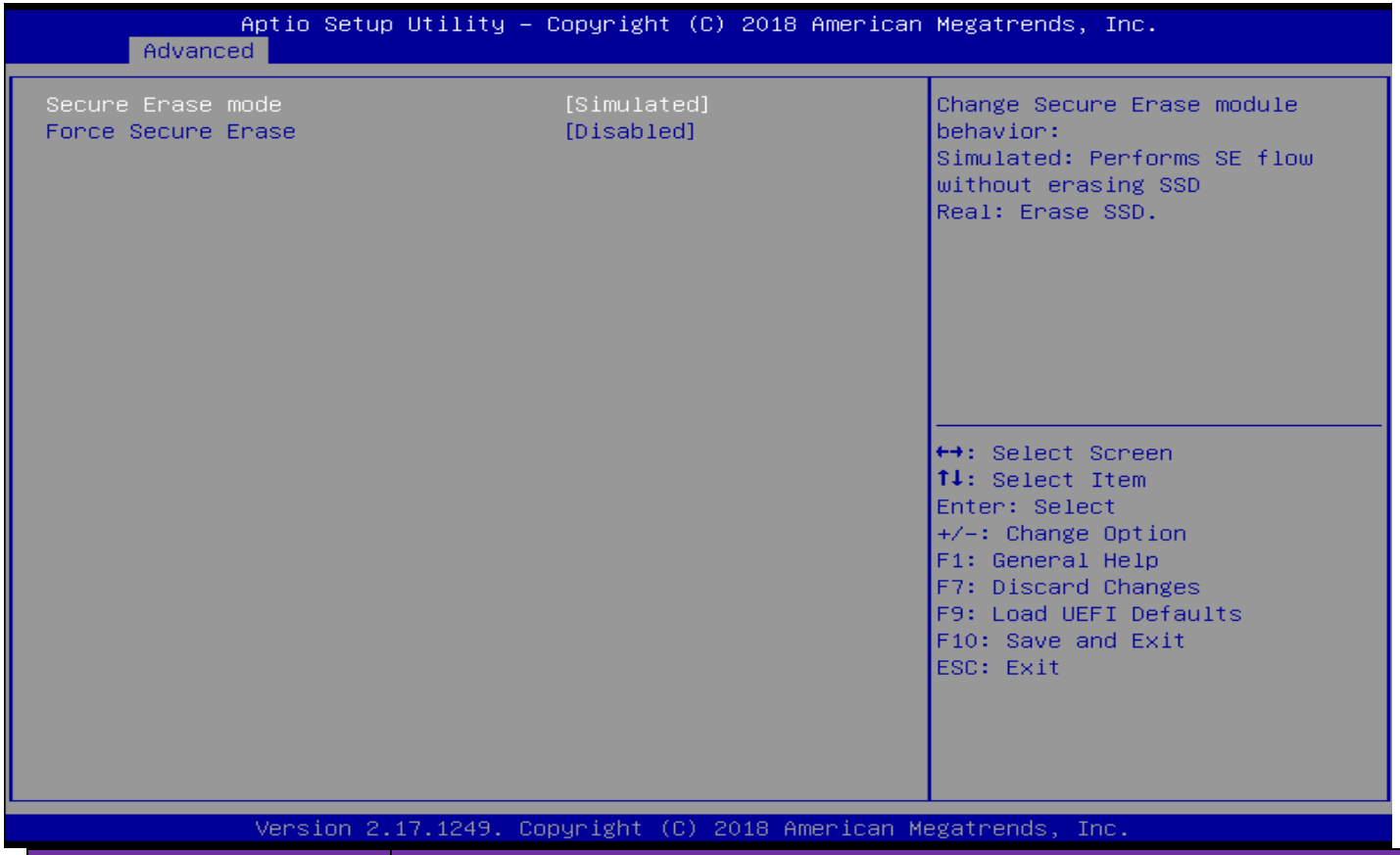


Feature	Description	Options
PET Progress	Enable / Disable PET Events Progress to receive PET Events.	★Enabled, Disabled

WatchDog	Enable / Disable WatchDog Timer.	★Disabled, Enabled

Secure Erase Configuration

Configuration of Secure Erase

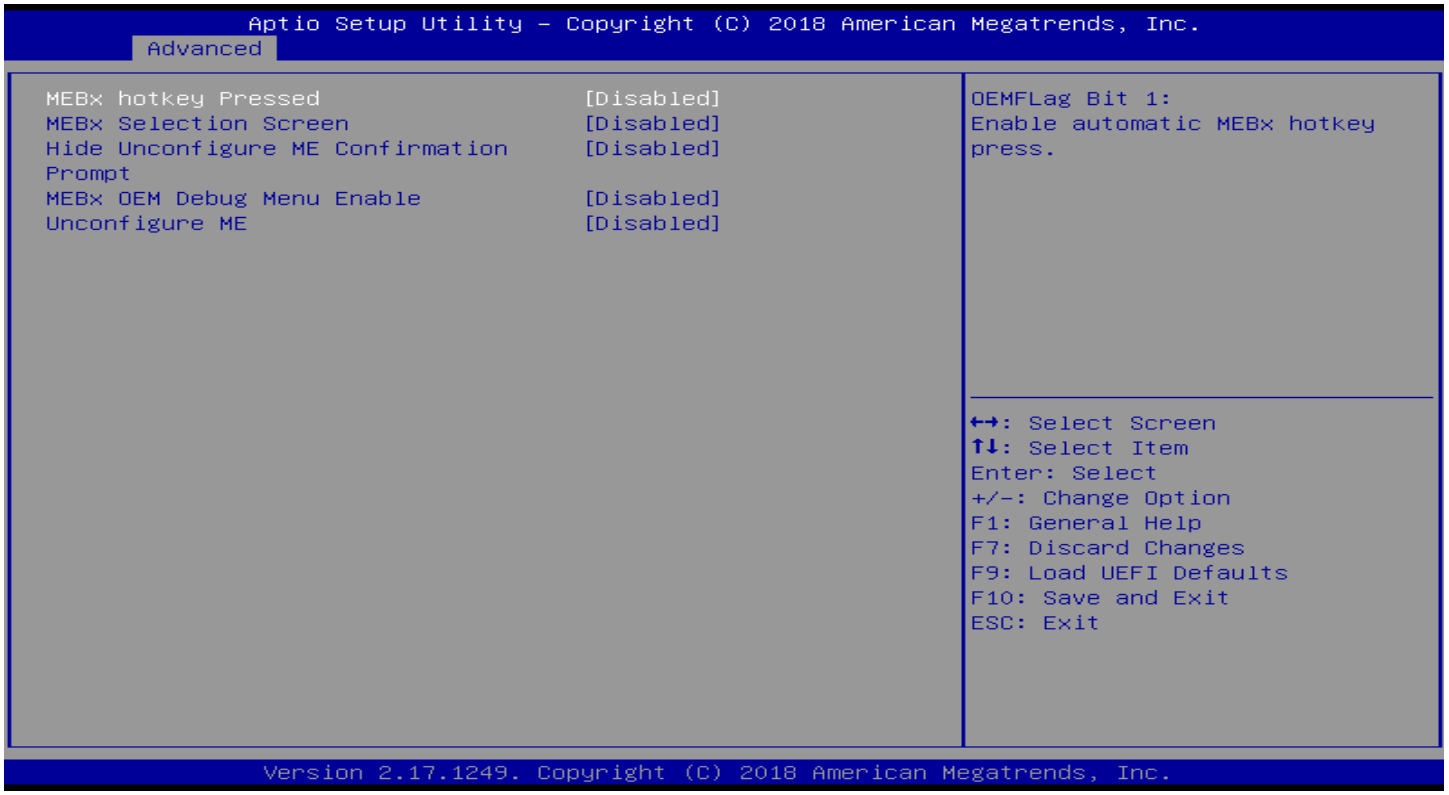


Feature	Description	Options
Secure Erase mode	Change Secure Erase module behavior	★Simulated, Real

	Simulated: Performs SE flow without erasing SSD Real: Erase SSD	
Force Secure Erase	Force Secure Erase on next boot.	★Disabled, Enabled

OEM Flags Settings

Configuration of OEM Flags Settings

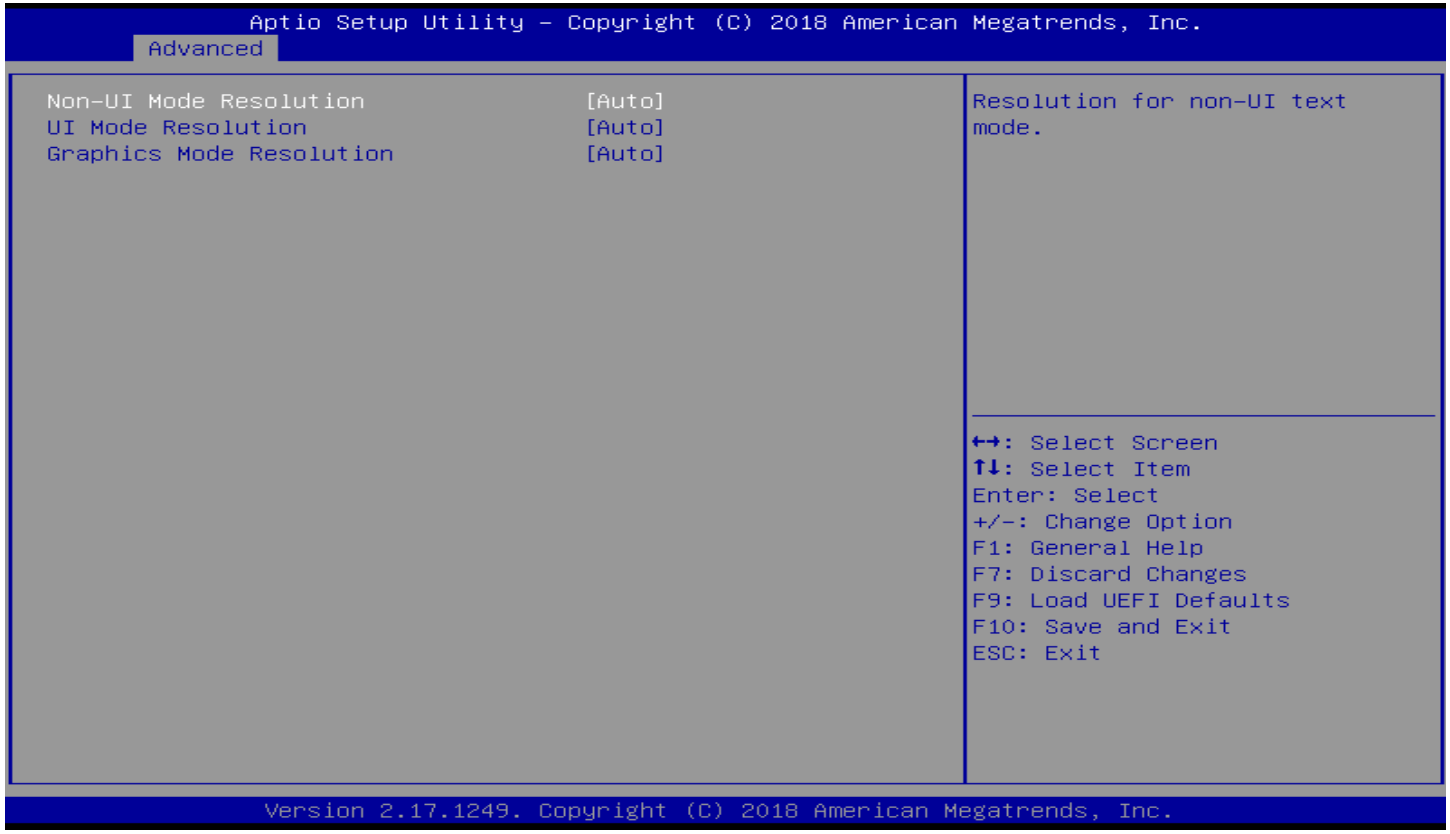


Feature	Description	Options
MEBx hotkey Pressed	OEMFLag Bit 1: Enable automatic MEBx hotkey press.	★Disabled, Enabled

MEBx Selection Screen	OEMFLag Bit 2: Enable MEBx selection screen with 2 options: Press 1 to enter ME Configuration Screens Press 2 to initiate a remote connection Note: Network Access must be activated from MEBx Setup for this screen to be displayed.	★Disabled, Enabled
Hide Unconfigure ME Confirmation Prompt	OEMFlag Bit 6: Hide Unconfigure ME confirmation prompt when attempting ME unconfiguration.	★Disabled, Enabled
MEBx OEM Debug Menu Enable	OEMFlag Bit 14: Enable OEM debug menu in MEBx.	★Disabled, Enabled
Unconfigure ME	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default.	★Disabled, Enabled

MEBx Resolution Settings

Configuration of MEBx Resolution Settings



Feature	Description	Options
Non-UI Mode Resolution	Resolution for non-UI text mode.	★Auto, 80x25, 100x31

UI Mode Resolution	Resolution for UI text mode.	★Auto, 80x25, 100x31
Graphics Mode Resolution	Resolution for graphics mode.	★Auto, 640x480, 800x600 1024x768

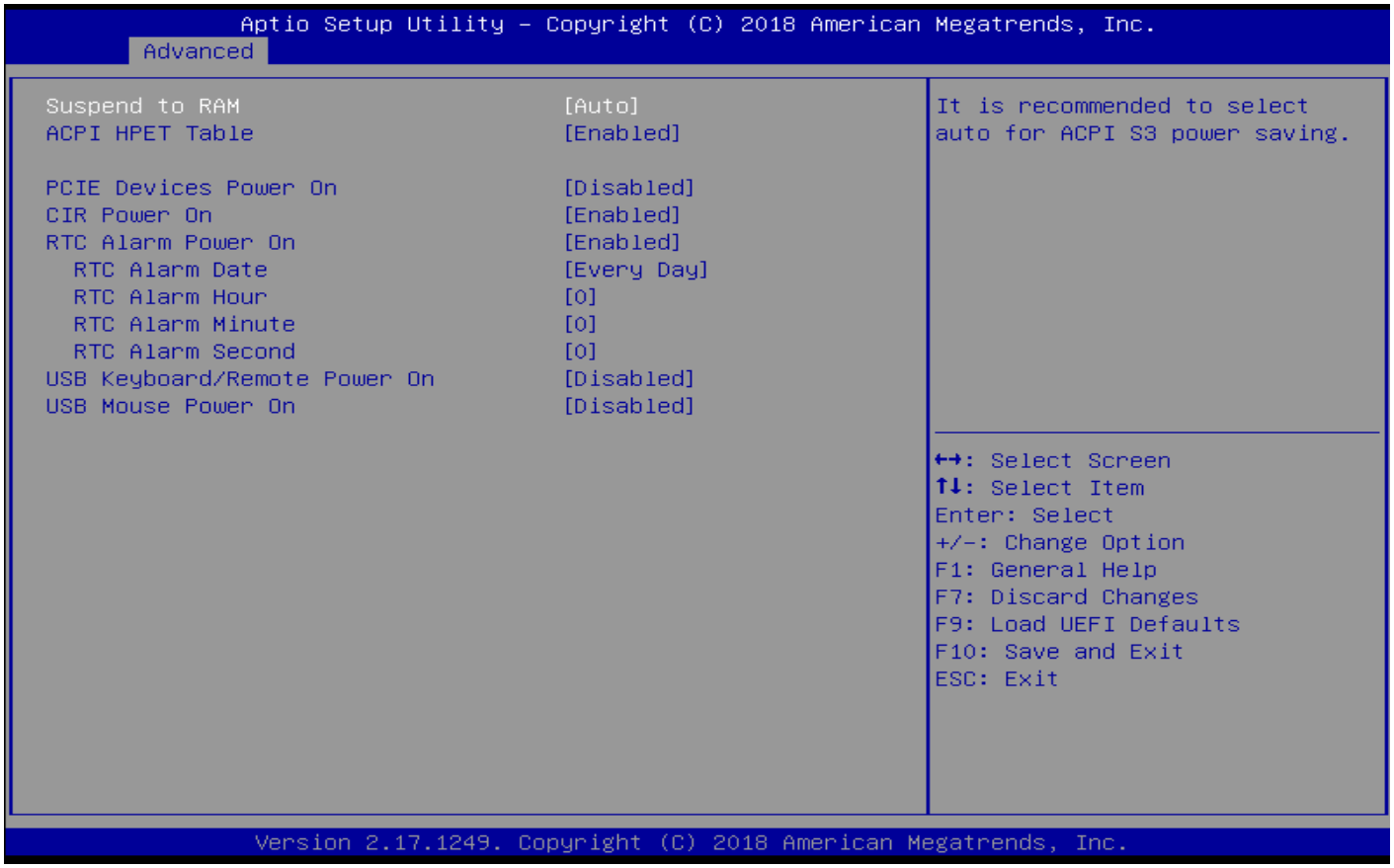
Super IO Configuration

Configure Super IO Parameters

Feature	Description	Options
CIR Controller	Enable or Disable CIR Controller	★Enabled, Disabled

ACPI Configuration

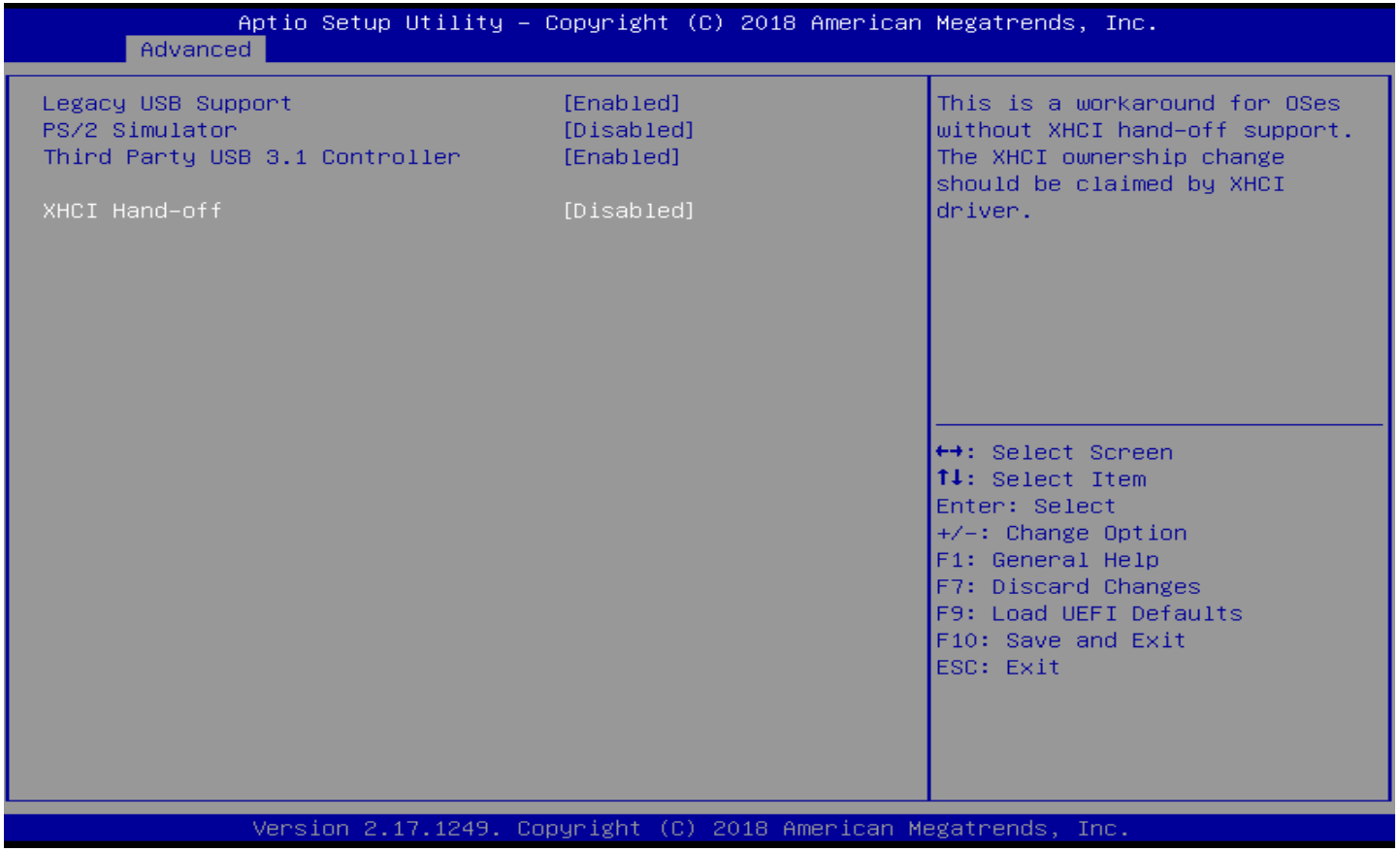
Configure ACPI Parameters



Feature	Description	Options
Suspend to RAM	It is recommended to select auto for ACPI S3 power saving.	★Auto, Disabled
ACPI HPET Table	Enable the High Precision Event Timer for better performance.	★Enabled, Disabled
PCIE Devices Power On	Allow the system to be waked up by a PCIE device and enable wake on LAN.	★Disabled, Enabled
CIR Power On	Enable or Disable the CIR power on feature.	★Enabled, Disabled
RTC Alarm Power On	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.	★By OS, Enabled, Disabled
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, 1~23
RTC Alarm Minute	Set Minute of RTC power on feature.	★0, 1~59
RTC Alarm Second	Set Second of RTC power on feature.	★0, 1~59
USB Keyboard/Remote Power On	Allow the system to be waked up by an USB keyboard or remote controller.	★Disabled, Enabled
USB Mouse Power On	Allow the system to be waked up by an USB mouse.	★Disabled, Enabled

USB Configuration

Configure USB Parameters

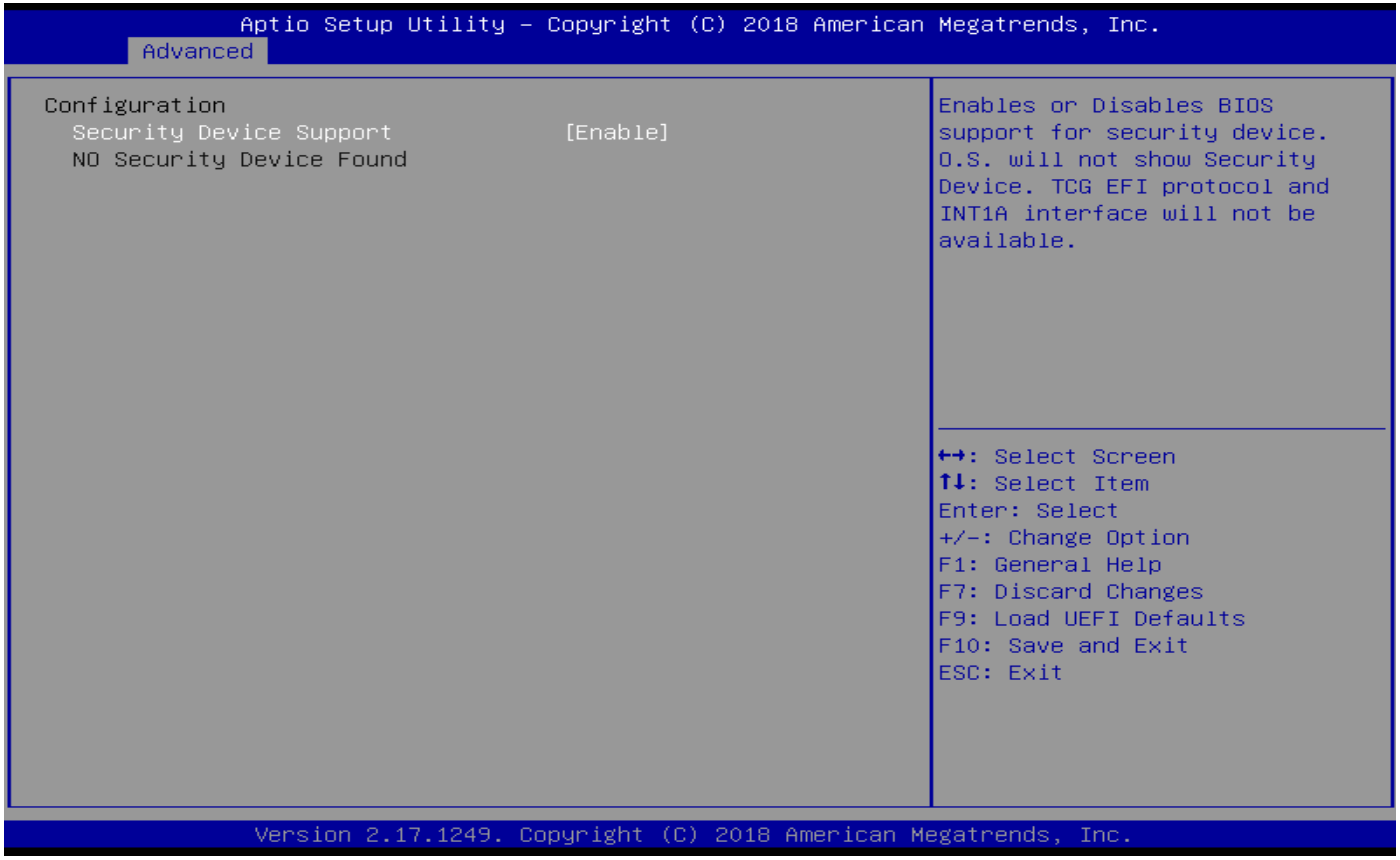


Feature	Description	Options

Legacy USB Support	Enable or Disable Legacy OS Support for USB2.0 devices. If you encounter USB compatibility issues it is recommended to disable legacy USB support. Select UEFI Setup Only to support USB devices under the UEFI setup and Windows/Linux operating system only.	★Enabled, Disabled, UEFI Setup Only
PS/2 Simulator	Enables PS/2 Simulator. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.	★Disabled, Enabled
Third Party USB3.1 Controller	Enable or Disable all the Third Party USB3.1 ports.	★Enabled, Disabled
XHCI Hand-off	This is a workaround for 0Ses without XHCI ownership change should be claimed by XHCI driver.	★Disabled, Enabled

Trusted Computing

Configure Trusted Computing Parameters

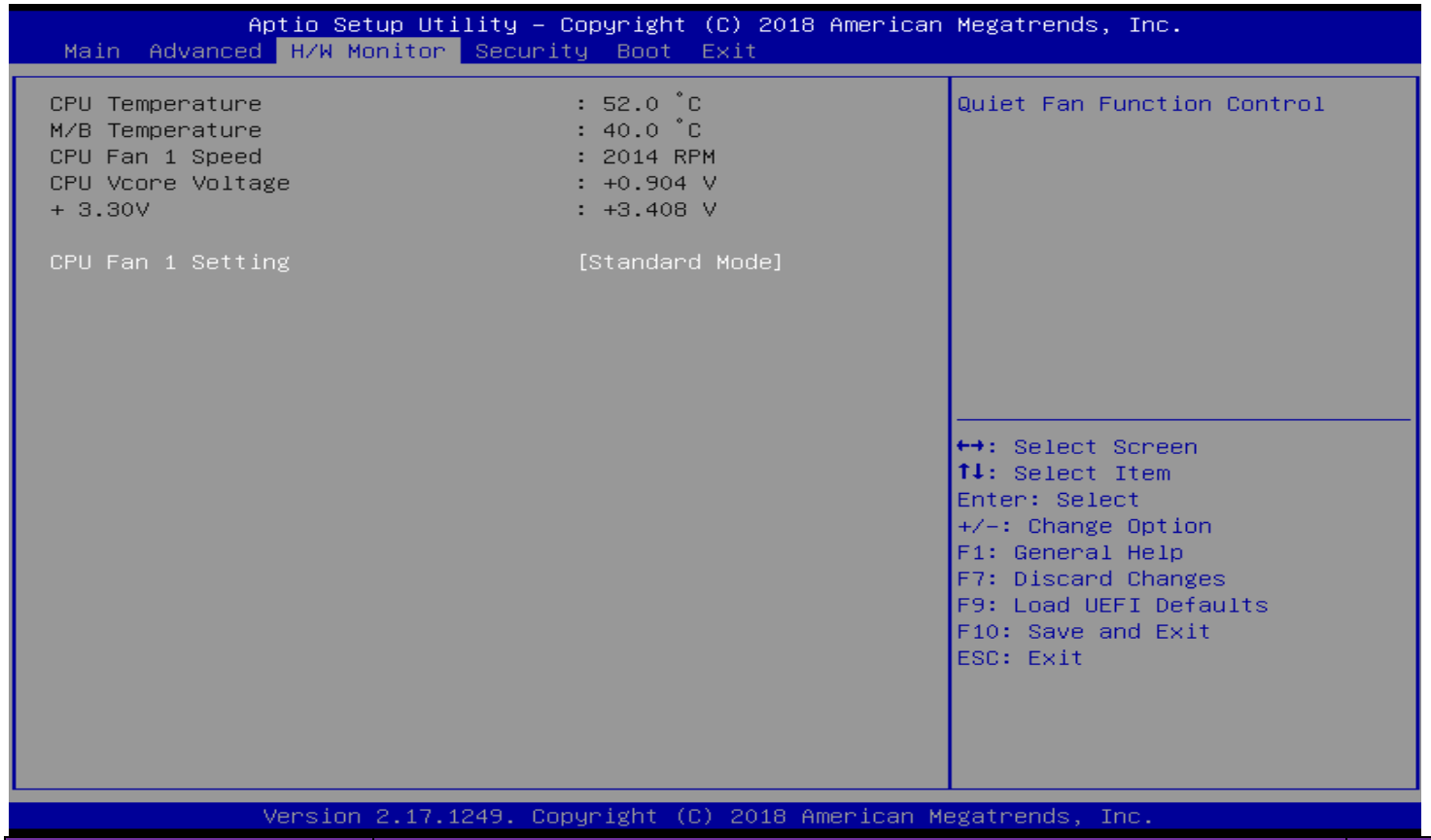


Feature	Description	Options
Security Device Support	Enables or Disables BIOS support for security device. O.S. will not show Security	★Enabled, Disabled

	Device. TCG EFI protocol and INT1A interface will not be available.	

7.2.3 H/W Monitor

Monitor hardware status

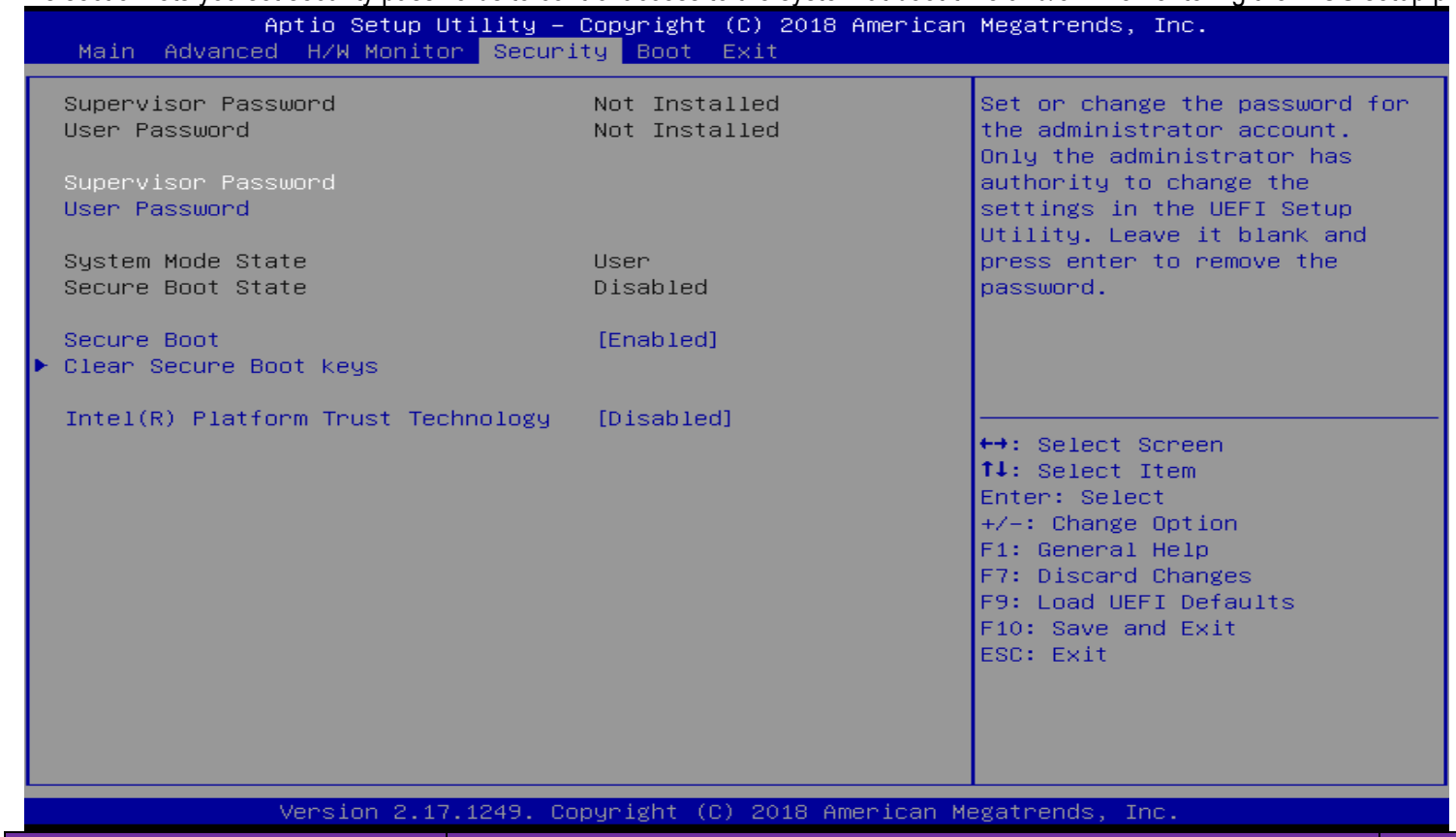


Feature	Description	Options
CPU Fan 1 Setting	Quiet Fan Function Control	★Standard Mode Silent Mode

		Performance Mode

7.2.4 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.

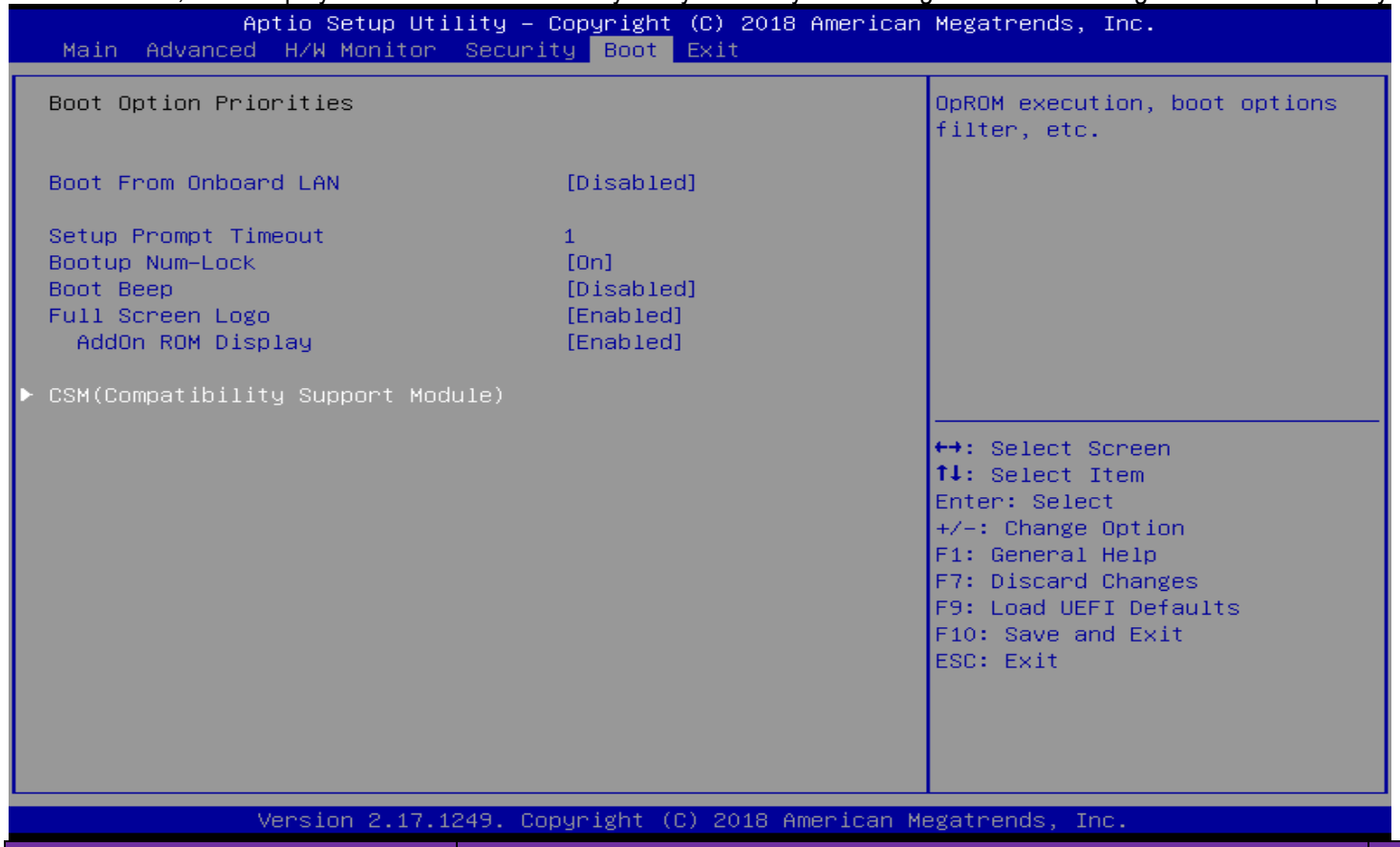


Feature	Description	Options
Supervisor Password	Set or change the password for the administrator account. Only the administrator	

	has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the 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.	
Secure Boot	Enable to support Windows 8 or later versions Secure Boot.	★Disabled, Enabled
Intel(R) Platform Trust Technology	Enabled / Disabled Intel PTT function. Enabled: Enable Intel PTT in ME Disabled: Disable Intel PTT in ME, Use discrete TPM Module.	★Disabled, Enabled

7.2.5 Boot

In this section, it will display the available devices on your system for you to configure the boot settings and the boot priority.

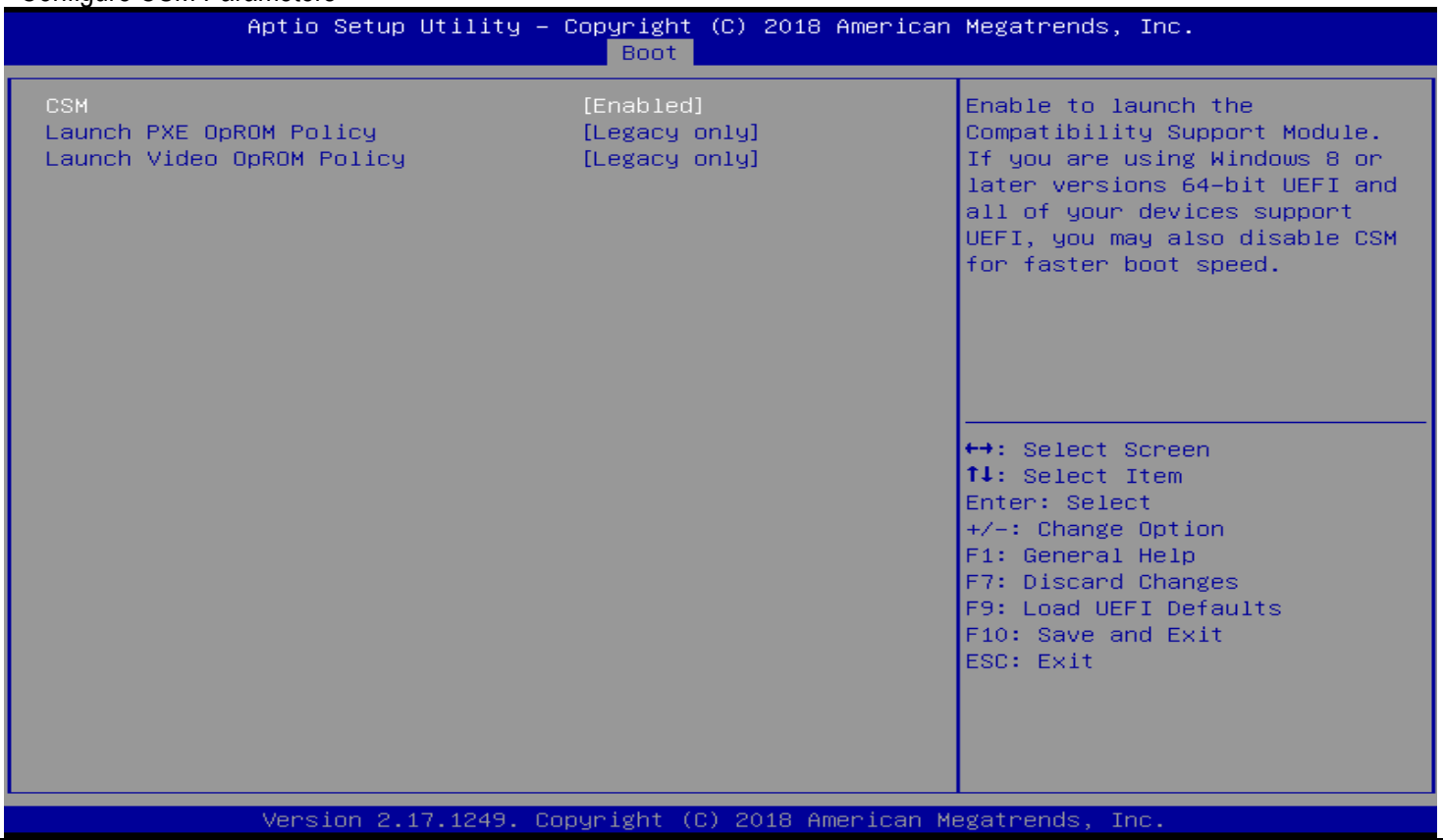


Feature	Description	Options

Boot From Onboard LAN	Boot From Onboard LAN	★Disabled, Enabled
Setup Prompt Timeout	Configure the number of seconds to wait for the UEFI setup utility.	★1
Bootup Num-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 message.	★Disabled, Enabled
AddOn ROM Display	Set display mode for Option ROM.	★Enabled, Disabled
CSM(Compatibility Support Module)	OpROM execution, boot options filter, etc.	

CSM(Compatibility Support Module)

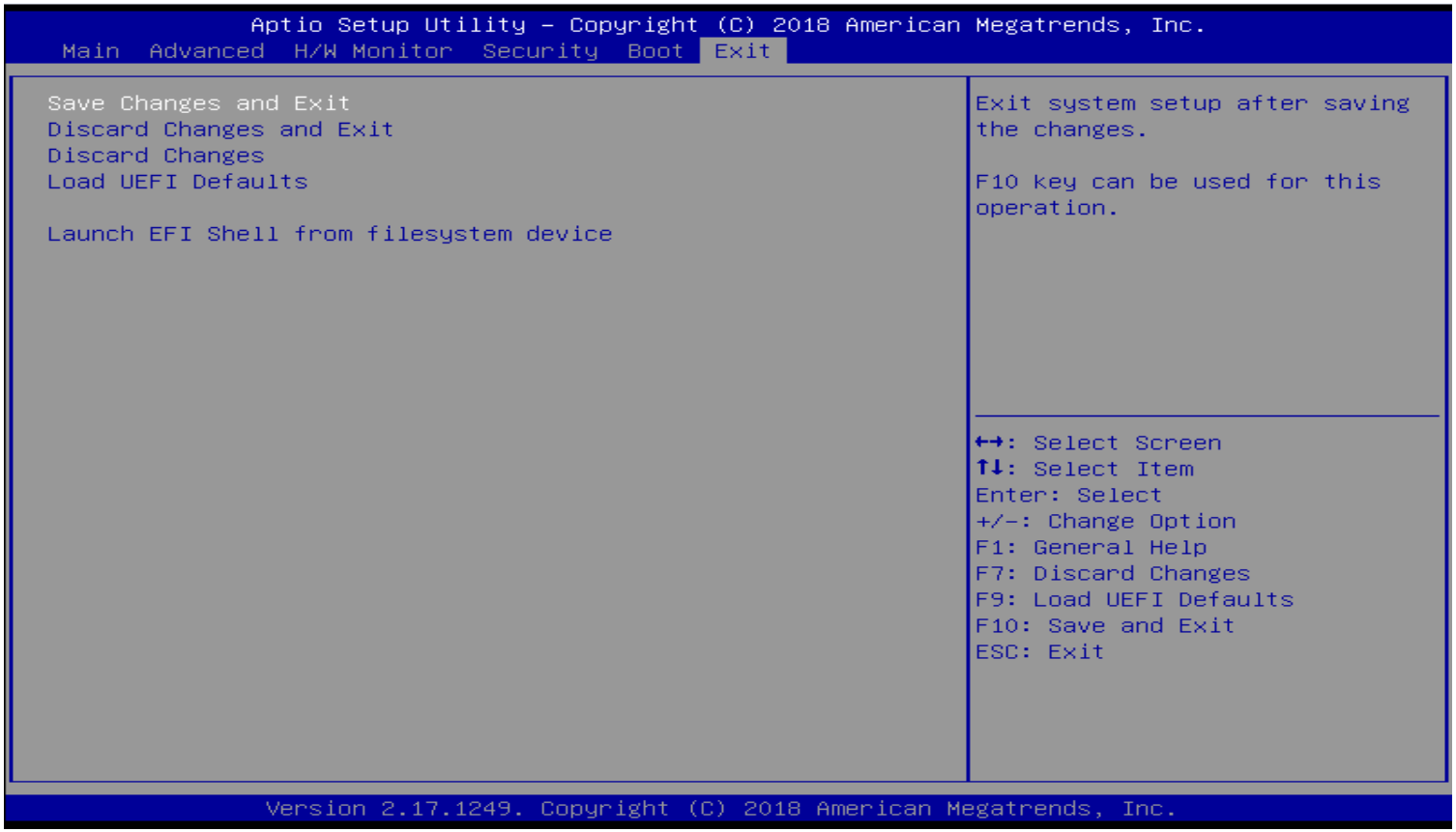
Configure CSM Parameters



Feature	Description	Options
CSM	Enable to launch the Compatibility Support Module. If you are using Windows 8 or later versions 64-bit UEFI and all of your devices support UEFI, you may also	★Enabled, Disabled

	disable CSM for faster boot speed.	
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.	★Legacy only UEFI only Do not launch
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.	★Legacy only UEFI only Do not launch

7.2.6 Exit



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 the setup options. F7 key can be used for 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 EFI Shell application (Shell.efi) from one of the available filesystem devices.	

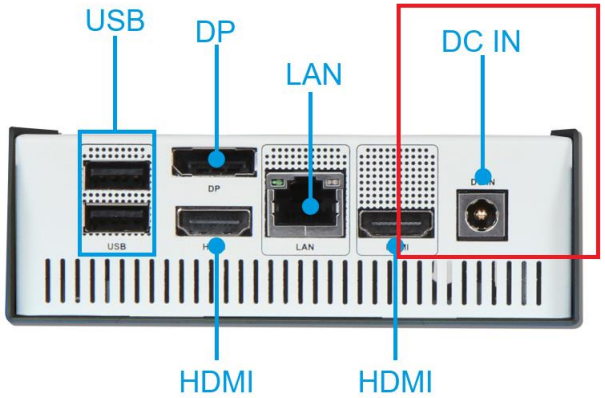
7 Troubleshooting

This chapter provides a few useful tips to quickly get RICH-61E0 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

DC Jack Power

There is one method to connect the power of RICH-61E0 which is 12V DC Jack (DC-IN).



7.2 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on DC power. 204-pin DDR3L 1333/1600/1866 MH/z SO-DIMM Memory, keyboard, mouse, DP/HDMI connector, device power cables, DC power Jack 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 RICH-61E0, it is recommended, when going with the boot-up sequence, to hit “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 “**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 RTC battery on the RICH-61E0 to remove it and wait 10 seconds to clean your password then insert it back to connector and switch on your power supply.

Question: How to update the BIOS file of RICH-61E0?

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 **"RICH-61E0"**.
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.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.

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

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