EmQ-i2401

Qseven® CPU Module

User's Manual

Version 1.1

2019.07

This page is intentionally left blank.

Revision History

Version	Release Time	Description
1.0	2017.06	Initial release
1.1	2019.07	1.4. Inside the Package: Remove Driver CD from the package. 1.5. Ordering Information: Revise memory from 8G to 4G. 1.6. Driver Installation Note: Revise installation description.

Copyright Notice

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

Warning

This is a class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class B

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1)This device may not cause harmful interference, and

(2)This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it:

1. Disconnect your Single Board Computer from the power source when you want to work on the inside.
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry.
3. Use a grounded wrist strap when handling computer components.
4. Place components on a grounded antistatic pad or on the bag that comes with the Single Board Computer, whenever components are separated from the system.

Replacing the Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash-can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please do not hesitate to call or e-mail our customer service.

http://www.arbor-technology.com

E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party. Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a

particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned

merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

This page is intentionally left blank.

Chapter 1

Introduction

1.1. The Product

- Soldered onboard Intel Apollolake SoC Processor
- Intergrated Gigabit Ethernet
- Dual Channel 24-bit LVDS and 1 x DDI port
- Anti-crash for automatically system BIOS recovering

1.2. About this Manual

This manual is intended for experienced users and integrators with hardware knowledge of computers. If you are not sure about the description in this manual, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

1.3. Specifications

Form Factor	Qseven® CPU Module
CPU	Soldered onboard Intel Celeron® N3350 2.4GHz processor/ Intel Pentium® N4200 2.5GHz processor
System Memory	Soldered onboard 8x512Mbx8 chips for supporting DDR3L 4GB memory capacity, upgradable to 8GB
BIOS	AMI BIOS, UEFI Code
USB	4 x USB 2.0 ports 2 x USB 3.0 SuperSpeed ports
Expansion Bus	4 x PCIex1 lanes, I2C Interface, SDIO
Storage	2 x Serial ATA ports Soldered onboard eMMC 5.0 up to 32GB (OEM Request)
Ethernet controller	1 x Intel® i210IT PCIe GbE controller
Audio	HD audio link
Graphics Chipset	Intergrated in Intel® Gen9 graphic
Graphics Interface	Dual Channel 24-bit LVDS, with resolution up to 1920x1200
	1 x DDI port
OS Support	Windows 10 64-bit Linux: Ubuntu
Power Requirement	DC 5V, 5VSB
Power Consumption	2A@5V with N4200 (Typical with PBQ-900L)
Operating Temp.	-20ºC ~ 85ºC(-4~158ºF) -20ºC ~ 70ºC for EmQ-i2401D series
Operating Humidity	10 ~ 95% @ 85°C (non-condensing)
Dimension (L x W)	70 x 70 mm (2.76” x 2.76”)

1.4. Inside the Package

Before starting with the installation, make sure the following items are shipped. If any of the items is missing or appears damaged, contact your local dealer or distributor.

1 x EmQ-i2401 Qseven® CPU Module

1 x Quick Installation Guide

1.5. Ordering Information

EmQ-i2401-N4200	Intel® Pentium® N4200 Qseven R2.0 CPU module w/ 4G memory soldered on module, -20~85°C
EmQ-i2401-N3350	Intel® Celeron® N3350 Qseven R2.0 CPU module w/ 4G memory soldered on module, -20~85°C
EmQ-i2401D-N4200	Intel® Pentium® N4200 Qseven R2.0 CPU modulew/ 4G memory soldered on module, w/ 32GB eMMC, -20~70°C (OEM Request)
EmQ-i2401D-N3350	Intel® Celeron® N3350 Qseven R2.0 CPU modulew/ 4G memory soldered on module, w/ 32GB eMMC, -20~70°C (OEM Request)
PBQ-900L	Qseven R2.0 w/ EPIC form factor Carrier Board
HS-2401-F1	Heat Spreader,W/PAD,70*65*8mm
CBK-06-900L-00	Cable kit: 2 x COM cables 1 x USB cable 1 x SATA cable 1 x SATA Power cable 1 x Audio cable

1.6. Driver Installation Note

The CPU module supports Windows 10. To install the drivers, please visit our website at **www.arbor-technology.com** and download the driver pack from the product page. If you need driver DVD, please contact your ARBOR sales representative.

Windows 10 64-bit

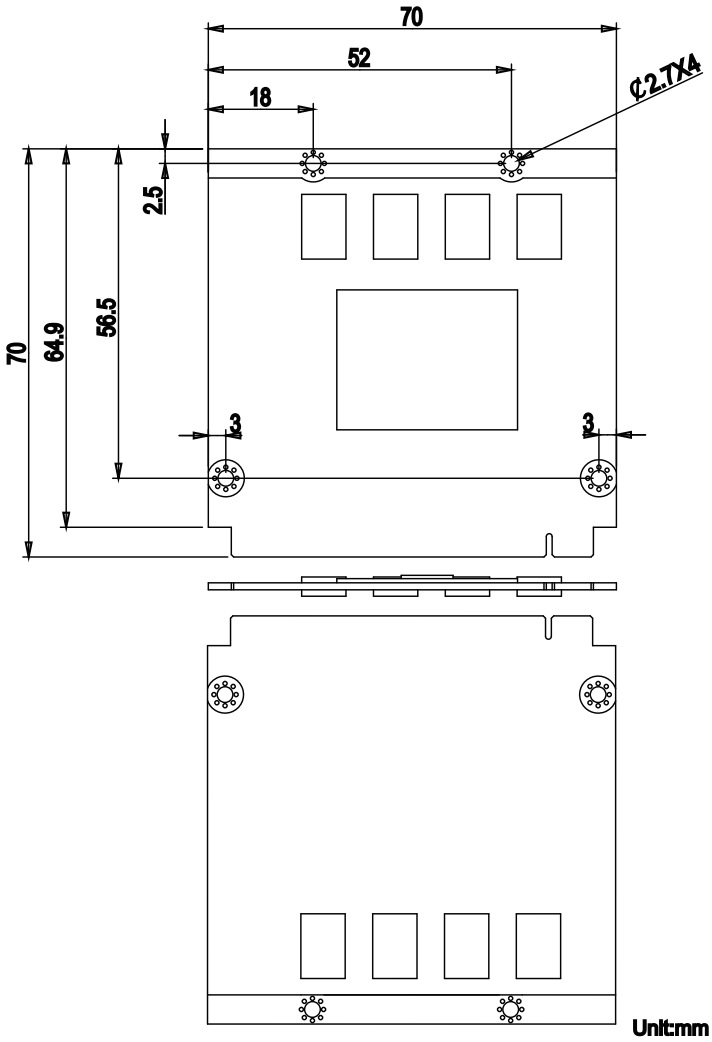
Driver	Path
Audio	\Apollolake-i240x\Audio\7687_PG436_Win10_Win8.1_Win8_Win7_WHQLx64
Chipset	\Apollolake-i240x\Chipset
Ethernet	\Apollolake-i240x\LAN
Graphics	\Apollolake-i240x\Graphic
Serial IO	\Apollolake-i240x\Serial IO\SerialIO_30.100.1620.02_APL_PV_Win10\x64
TXE	\Apollolake-i240x\TXE

This page is intentionally left blank.

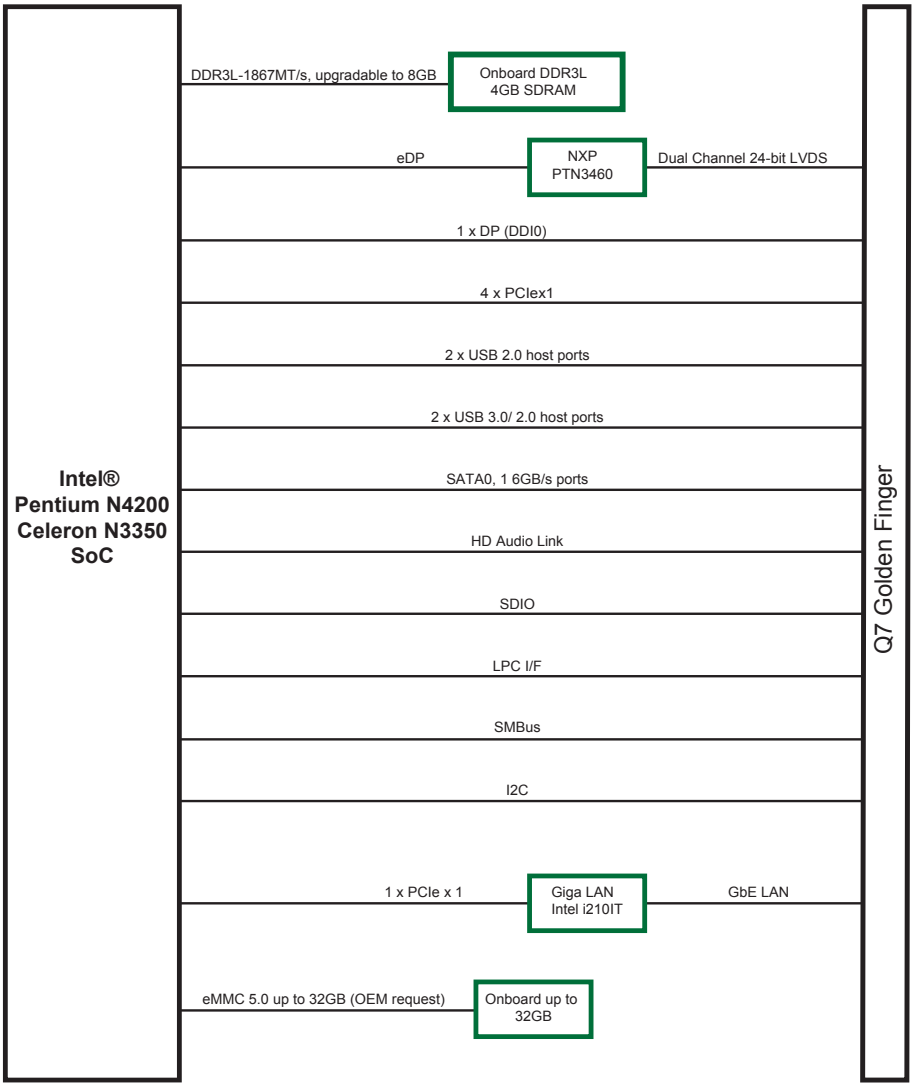
Chapter 2

Board Overview

2.1. Board Dimensions



2.2. Block Diagram



2.3. Connector Pin Definition

Pin	Signal	Pin	Signal
1	GND	2	GND
3	LAN1_MDI3-	4	LAN1_MDI2-
5	LAN1_MDI3+	6	LAN1_MDI2+
7	LAN_LINK100#	8	LAN_LINK_1000#
9	LAN1_MDI1-	10	LAN1_MDI0-
11	LAN1_MDI1+	12	LAN1_MDI0+
13	LED_LINK#	14	LAN_ACT#
15	GBE_CTREF (N/C)	16	SLP_S4#
17	WAKE#	18	SLP_S3#
19	SUS_STAT#	20	Q7_PWR_BTN#
21	SLEEP#	22	LID#
23	GND	24	GND
	KEY		KEY
25	GND	26	CB_PWRGD
27	Q7_BATLOW#	28	Q7_RSTBTN#
29	SATA_TXP0_C	30	SATA_TXP1_C
31	SATA_TXN0_C	32	SATA_TXN1_C
33	Q7_HDD_ACT#	34	GND
35	SATA_RXP0_C	36	SATA_RXP1_C
37	SATA_RXN0_C	38	SATA_RXN1_C
39	GND	40	GND
41	BIOS_DISABLE#	42	SD_CLK#
43	SD_CD#	44	SDIO_LED (N/C)
45	SD_CMD	46	SD_WP
47	SD_PWR#	48	SD_DATA1
49	SD_DATA0	50	SD_DATA3
51	SD_DATA2	52	SDIO_DAT5 (N/C)
53	SDIO_DAT4 (N/C)	54	SDIO_DAT7 (N/C)
55	SDIO_DAT6 (N/C)	56	RSVD (N/C)
57	GND	58	GND
59	Q7_AZ_SYNC	60	SMB_CLK_RESUME
61	Q7_AZ_RST#	62	SMB_DATA_RE-SUME
63	Q7_AZ_BIT_CLK	64	Q7_SMB_ALERT#

Pin	Signal	Pin	Signal
65	Q7_AZ_SDATA_IN	66	I2C_CLK0
67	Q7_AZ_SDATA_OUT	68	I2C_DATA0
69	THRM#	70	WDTRIG#
71	THRMTRIP#	72	WDOUT
73	GND	74	GND
75	USB3TXN0	76	USB3_RXN0
77	USB3TXP0	78	USB3_RXP0
79	USB_6_7_OC# (N/C)	80	USB_4_5_OC#(N/C)
81	USB3TXN1	82	USB3_RXN1
83	USB3TXP1	84	USB3_RXP1
85	USB_OC2/3	86	USB_OC0/1
87	USB_3N	88	USB_2N
89	USB_3P	90	USB_2P
91	USB_CC (N/C)	92	Q-7_USB_ID
93	USB_1N	94	USB_0N
95	USB_1P	96	USB_0P
97	GND	98	GND
99	LVDS_A0+	100	LVDS_B0+
101	LVDS_A0-	102	LVDS_B0-
103	LVDS_A1+	104	LVDS_B1+
105	LVDS_A1-	106	LVDS_B1-
107	LVDS_A2+	108	LVDS_B2+
109	LVDS_A2-	110	LVDS_B2-
111	Q7_VDDEN	112	Q7_BKLTEN
113	LVDS_A3+	114	LVDS_B3+
115	LVDS_A3-	116	LVDS_B3-
117	GND	118	GND
119	LVDS_A_CLK+	120	LVDS_B_CLK+
121	LVDS_A_CLK-	122	LVDS_B_CLK-
123	Q7_LCD_BKLT_CTRL	124	GP_1-Wire_Bus (N/C)
125	LVDS_I2C_DAT	126	eDP0_HPD#/LVDS_BLC_DAT (N/C)
127	LVDS_I2C_CLK	128	eDP1_HPD#/LVDS_BLC_CLK (N/C)
129	CAN0_TX (N/C)	130	CAN0_RX (N/C)

Pin	Signal	Pin	Signal
131	Q7_DDI0_TXP3	132	RSVD (N/C)
133	Q7_DDI0_TXN3	134	RSVD (N/C)
135	GND	136	GND
137	Q7_DDI0_TXP1	138	DDI0_AUXP
139	Q7_DDI0_TXN1	140	DDI0_AUXN
141	GND	142	GND
143	Q7_DDI0_TXP2	144	RSVD (N/C)
145	Q7_DDI0_TXN2	146	RSVD (N/C)
147	GND	148	GND
149	Q7_DDI0_TXP0	150	DDI0_DDI0_DDC-DATA
151	Q7_DDI0_TXN0	152	DDI0_DDC_DDCCLK
153	Q7_DDI0_HPDET#_R	154	DP_HDP#_RSV
155	Q7_PCIE_CLKP1	156	PCIE_WAKE#
157	Q7_PCIE_CLKN1	158	PLTRST#_BUFF
159	GND	160	GND
161	Q7_PCIE_TXP3	162	PCIE_RXP3
163	Q7_PCIE_TXN3	164	PCIE_RXN3
165	GND	166	GND
167	Q7_PCIE_TXP2	168	PCIE_RXP2
169	Q7_PCIE_TXN2	170	PCIE_RXN2
171	Q7_UART1_TXD	172	Q7_UART1_RTS
173	Q7_PCIE_TXP1	174	PCIE_RXP1
175	Q7_PCIE_TXN1	176	PCIE_RXN1
177	Q7_UART1_RXD	178	Q7_UART1_CTS#
179	Q7_PCIE_TXP0	180	PCIE_RXP0
181	Q7_PCIE_TXN0	182	PCIE_RXN0
183	GND	184	GND
185	LPC_LAD0	186	LPC_LAD1
187	LPC_LAD2	188	LPC_LAD3
189	LPC_CLK1	190	LPC_LFRAME#
191	LPC_SERIRQ	192	LPC_LDRQ#
193	VCC_RTC	194	Q7_SPKR
195	FAN_TACHOIN (N/C)	196	FAN_PWMOUT

Pin	Signal	Pin	Signal
197	GND	198	GND
199	Q7_SPI_MOSI	200	Q7_SPI_CS#0
201	Q7_SPI_MISO	202	Q7_SPI_CS#1
203	Q7_SPI_CLK	204	MFG_NC4 (N/C)
205	VCC_5V_SB	206	VCC_5V_SB
207	MFG_NC0 (N/C)	208	MFG_NC2 (N/C)
209	MFG_NC1 (N/C)	210	MFG_NC3 (N/C)
211	VCC	212	VCC
213	VCC	214	VCC
215	VCC	216	VCC
217	VCC	218	VCC
219	VCC	220	VCC
221	VCC	222	VCC
223	VCC	224	VCC
225	VCC	226	VCC
227	VCC	228	VCC
229	VCC	230	VCC

This page is intentionally left blank.

Chapter 3

BIOS

The BIOS Setup utility is featured by AMI BIOS to configure the system settings stored in the system's BIOS ROM. AMI BIOS is activated once the computer powers on.

After entering the utility, use the left/right arrow keys to navigate between the top menus and use the down arrow key to access one.

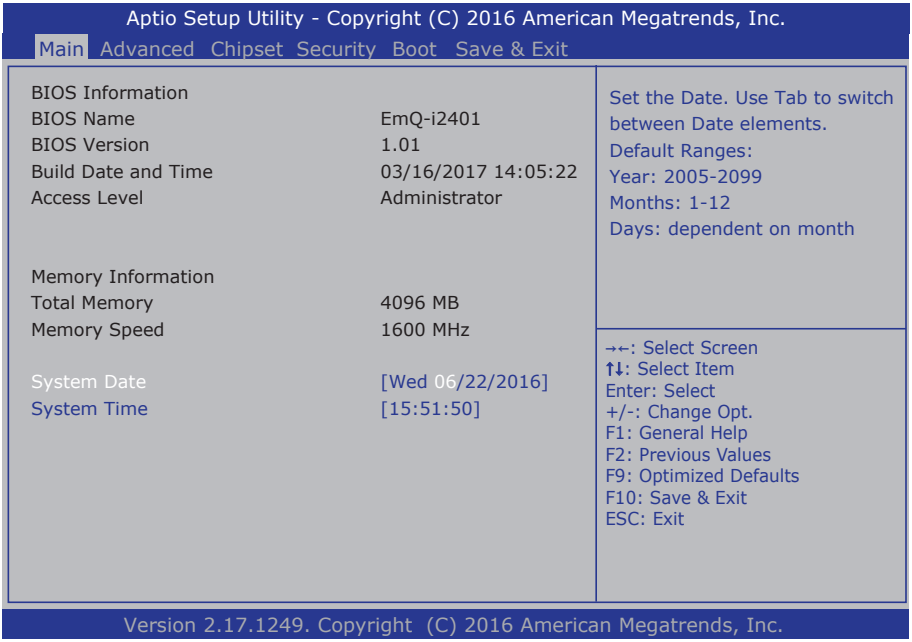
Menu	Description
Main	See 3.1 Main on page 15.
Advanced	See 3.2 Advanced on page 17.
Chipset	See 3.3 Chipset on page 26.
Boot	See 3.4 Security on page 30.
Security	See 3.5 Boot on page 31.
Save & Exit	See 3.6 Save & Exit on page 32.

NOTE: For system stability and performance, this BIOS utility is constantly improved. The screenshots demonstrated and descriptions hereinafter are for reference only and may not exactly meet what is presented onscreen.

3.1 Main

The AMI BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS RAM of the system stores the Setup utility and configurations. When you turn on the computer, the AMI BIOS is immediately activated. To enter the BIOS SETUP UTILITY, press **"Delete"** once the power is turned on. When the computer is shut down, the battery on the motherboard supplies the power for BIOS RAM.

The **Main Setup** screen lists the following information:



Info Item	Description
BIOS Name	Delivers the Project name.
BIOS Version	Delivers the version of BIOS.
Build Date and Time	Delivers the date and time the BIOS Setup utility was made/updated.
Access Level	Delivers the level by which the BIOS Setup utility is being accessed at the moment.
System Date	Sets system date.
System Time	Sets system time.

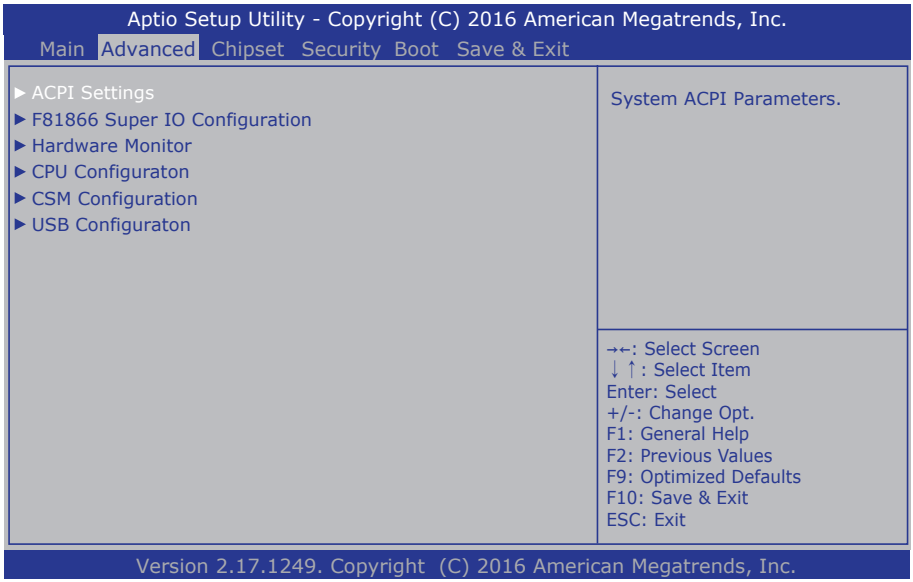
Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

Keystroke	Function
◄ ►	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
▼ ▲	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select “OK” or “Cancel” for exiting and discarding changes. Use “←” and “→” to select and press “Enter” to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down -	Decrease the numeric value on a selected setup item / make change
F1	Activate “General Help” screen
F0	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select “OK” or “Cancel” for exiting and saving changes. Use “←” and “→” to select and press “Enter” to confirm)

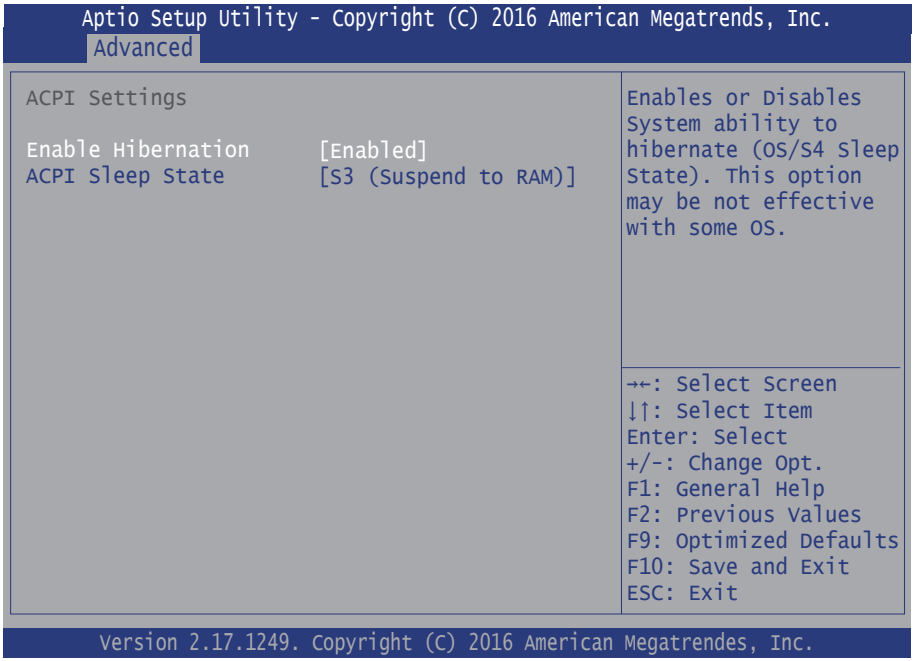
3.2 Advanced

The “Advanced” setting page provides you the options to configure the details of your hardware, such as ACPI, CPU, SATA, AMT, USB and Super IO.



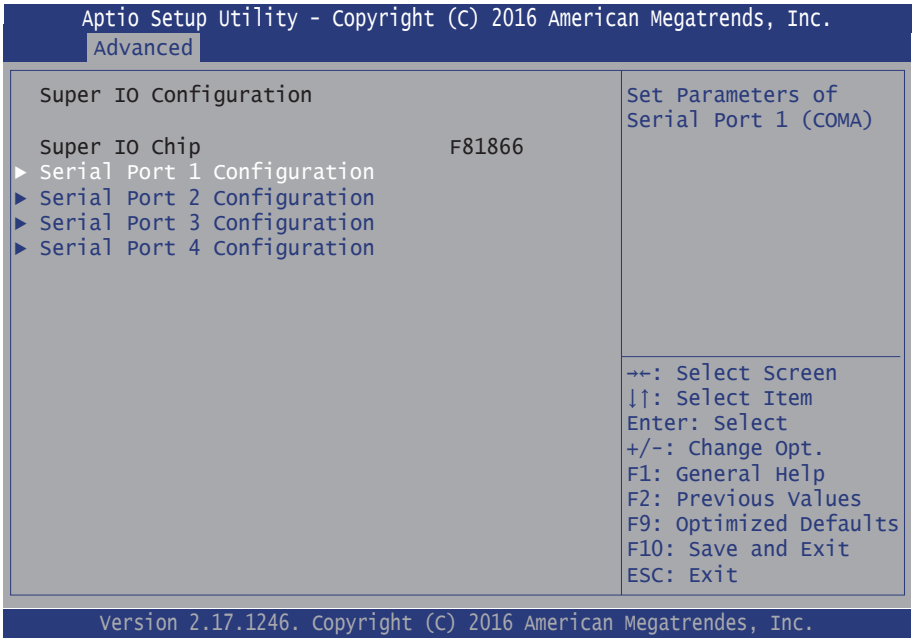
Setting	Description
ACPI Settings	See 3.2.1 ACPI Settings on the page 18
F81866 Super IO Configuration	See 3.2.2 F81899 Super IO Configuration on page 19
Hardware Monitor	See 3.2.3 Hardware Monitor on page 20
CPU Configuration	See 3.2.4 CPU Configuration on page 21
CSM Configuration	See 3.2.5 CSM Configuration on page 22
USB Configuration	See 3.2.6 USB Configuration on page 24

3.2.1 ACPI Settings



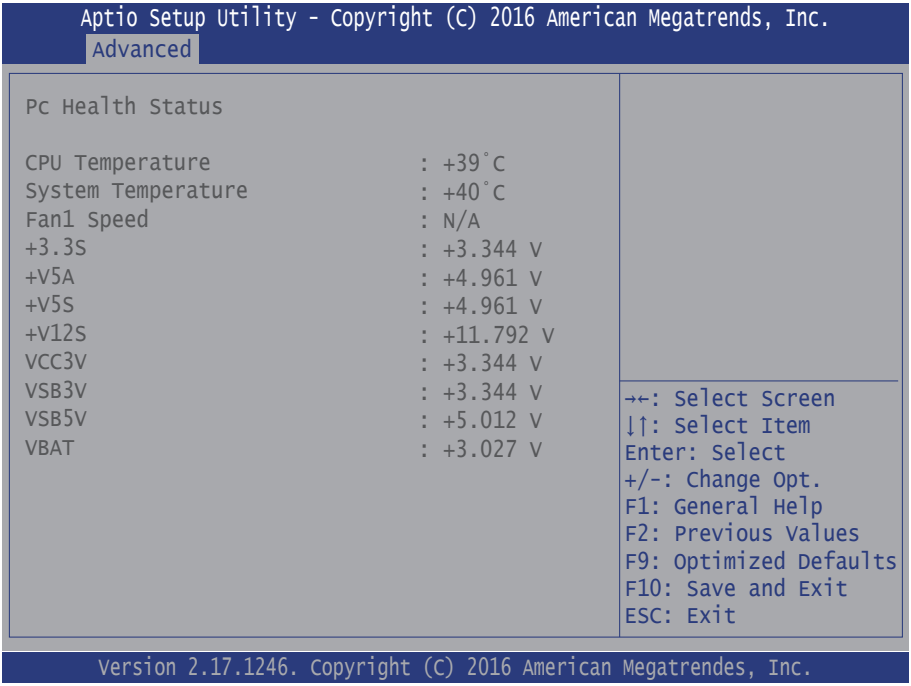
Setting	Description
Enable Hibernation	**Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: **Suspend Disabled** and **S3 (Suspend to RAM)** (default).

3.2.2 F81899 Super IO Configuration



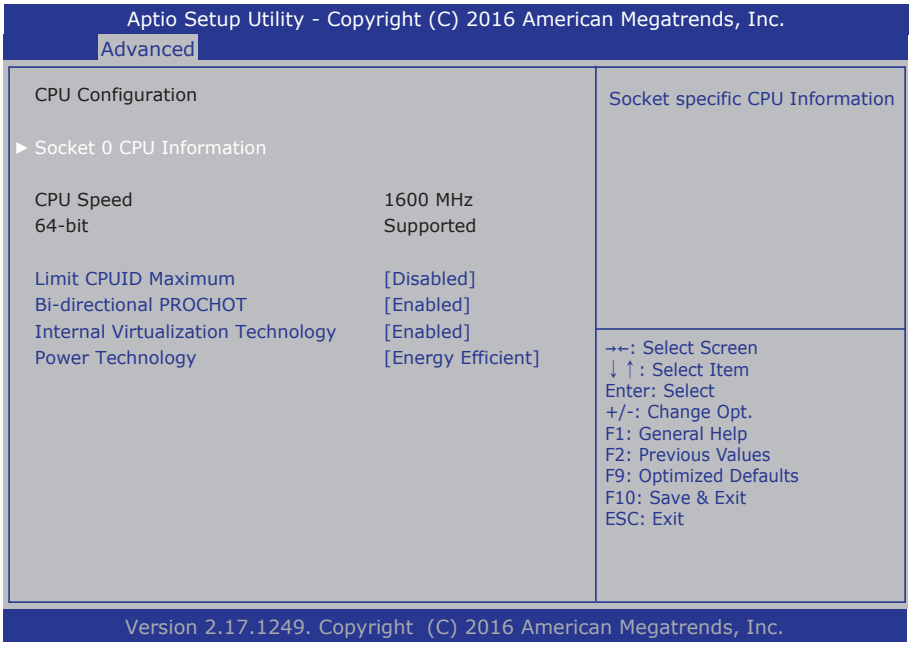
Setting	Description	
Serial Port 1/3/4 Configuration	Set the Parameters of Serial Port 1/3/4	
	Serial Port	Enable or disable Serial Port. ► **Enabled** is the default.
	Change Setting	Select an optimal setting for Super IO device.
Serial Port 2 Configuration	Set the Parameters of Serial Port 2	
	Serial Port	Enable or disable Serial Port. ► **Enabled** is the default.
	Change Setting	Select an optimal setting for Super IO device.
	RS485 AutoFlow	Enable or disable RS485 AutoFlow. ► **Disabled** is the default.

3.2.3 Hardware Monitor



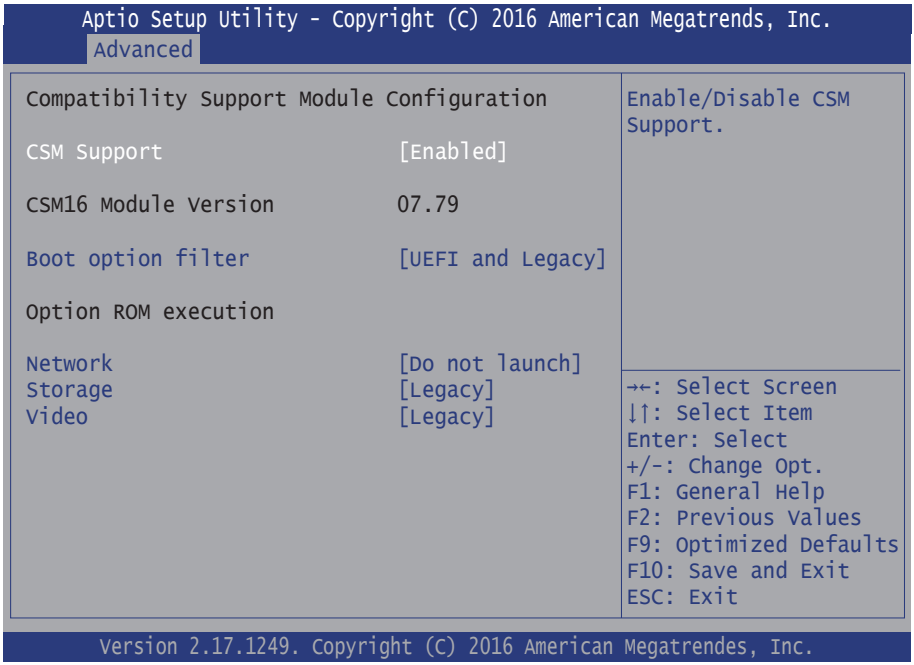
3.2.4 CPU Configuration

Access this submenu to configure the CPU features.



Setting	Description
Socket 0 CPU Information	Display Socket specific CPU Information.
EIST	Enables/disables Intel SpeedStep ▸ **Enabled** is the default.
Turbo Mode	Enables/disables Turbo Mode ▸ **Enabled** is the default.
Boot performance mode	Select the performance state that the BIOS will set before OS handoff. ► Options: **Max performance** (default), **Max Battery**
C-States	Enables/disables C states. ▸ **Enabled** is the default.

3.2.5 CSM Configuration



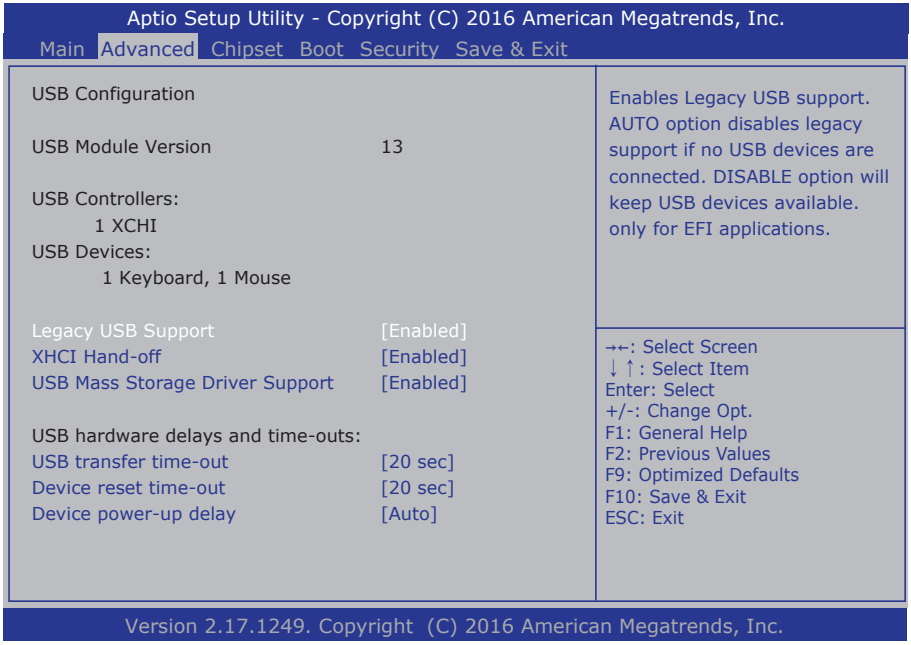
The featured submenus are:

Setting	Description
CSM Support	Enable and Disable CSM Support ► **Enabled** is the default.
CSM16 Module Version	Shows the CSM16 module version.
Boot option filter	Controls Legacy/UEFI ROMs priority. ► Options: **UEFI and Legacy** (default), **Legacy only** and **UEFI only**
Network	Control the execution of UEFI and Legacy PXE OpROM. ► Options: **Do not launch** and **Legacy** (default).
Storage	Control the execution of UEFI and Legacy Storage OpROM. ► Options: **Do not launch** and **Legacy** (default).

Video	Control the execution of UEFI and Legacy Video OpROM. ► Options: **Do not launch, UEFI** and **Legacy** (default).

3.2.6 USB Configuration

Select this submenu to view the status of the USB ports and configure USB features.

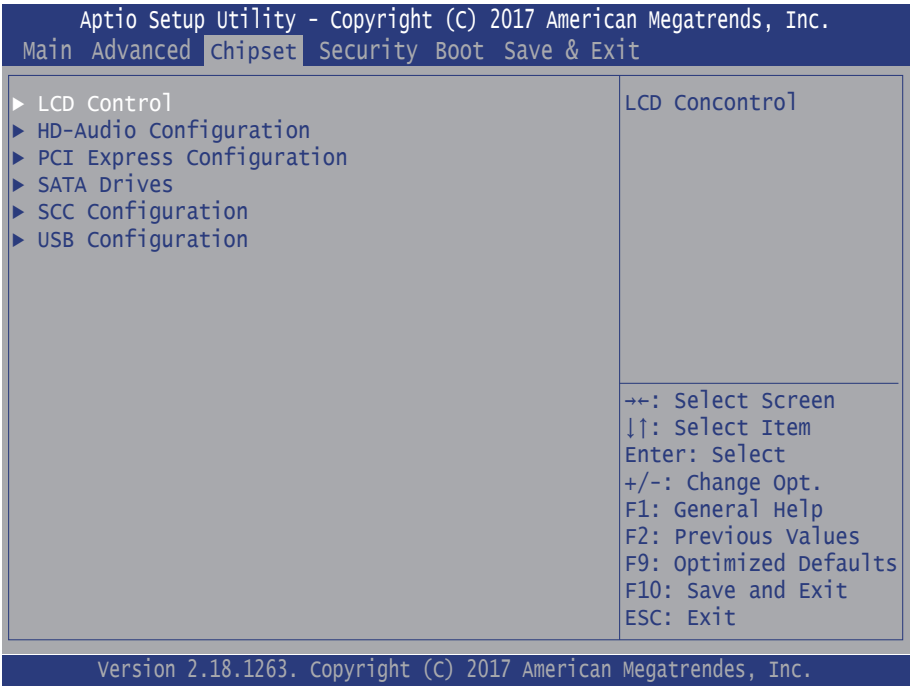


The featured settings and delivered info are:

Setting / Info	Description
Legacy USB Support	Enables/disables legacy USB support. ▸ Options available are **Enabled** (default), **Disabled** and **Auto**. ▸ Select **Auto** to disable legacy support if no USB device are connected. ▸ Select **Disabled** to keep USB devices available only for EFI applications.
XHCI Hand-off	Enables/disables a workaround for the operating systems that have no XHCI hand-off support ▸ **Enabled** is the default.

USB Mass Storage Driver Support	Enables/disables the support for USB mass storage driver. ▸ **Enabled** is the default.
USB transfer time-out	The time-out value for Control, Bulk and Interrupt transfers. ▸ Options: **1/5/10/20 sec** (default)
Device reset time-out	USB mass storage device Start Unit command time-out. ▸ Options: **10/20** (default)**/30/40 sec**
Device power-up delay	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor. ▸ Options: **Auto** (default)**, Manual**

3.3 Chipset



Setting	Description
LCD Control	See 3.3.1 LCD Control on page 27
HD-Audio Configuration	See 3.3.2 HD-Audio Configuration on page 28
PCI Express Configuration	See 3.3.3 PCI Express Configuration on page 28
SATA Drives	See 3.3.4 SATA Drives on page 28
SCC Configuration	See 3.3.5 SCC Configuration on page 29
USB Configuration	See 3.3.6 USB Configuration on page 29

3.3.1 LCD Control

Setting	Description
Primary IGFX Boot Display	Select the video device which will be activated during POST. This has no ffect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes wil be supported only on primary display. ► Options: **Auto** (default)**, EFP** and **LFP.**
Active LFP	Select the Active LFP Configuration. No LVDS: VBIOS does not enable LVDS. Int-LVDS: VBIOS enables LVDS driver by Integrated encoder. SDV0 LVDS: VBIOS enables LVDS driver by SDV0 encoder. eDP Port-A: LFP Driven by Int-DisplayPort encoder from Port-A. ► Options: **No LVDS** and **eDP Port-A** (default)
LCD Panel Type	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item. Default is **1024x768.**
Backlight Control	Select Light Control setting ► Options: **PWM Normal** (default) and **PWM Inverted**
LVDS Channel Type	Select single and dual channel. ► Options: **Dual** and **Single**(default)
LVDS Panel Color Format	Select LVDS color display mode. ► Options: **18-BIT** (default)**, 24-BIT**

3.3.2 HD-Audio Configuration

Item	Description
HD-Audio Support	Enable/disable HD-Audio Support. ► Options: **Disabled** and **Enabled** (default).

3.3.3 PCI Express Configuration

Item	Description
PCI Express Root Port 1/2/3/4/5/6	Control the PCI Express Root Port. ► Options: **Auto** (default): To disable unused root port automatically for the most optimum power savings. **Enable:** Enable PCIe root port **Disable:** Disable PCIe root port
ASPM	PCI Express Active State Power Management settings. ► Options: **Disabled** (default)**, L0s, L1, L0sL1** and **Auto**
PCIe Speed	Configure PCIe Speed. CHV A1 always with Gen1 speed. ► Options: **Auto** (default)**, Gen 2** and **Gen 1**

3.3.4 SATA Drives

Item	Description
Chipset SATA	Enables or disables the chipset SATA controller. ► Options: **Enabled** (default) and **Disabled**
Port 0/1	Enables or disables the SATA port ► Options: **Enabled** (default) and **Disabled**
SATA Device Type	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. ► Options: **Hard Disk Driive** (default) and **Solid State Drive.**

3.3.5 SCC Configuration

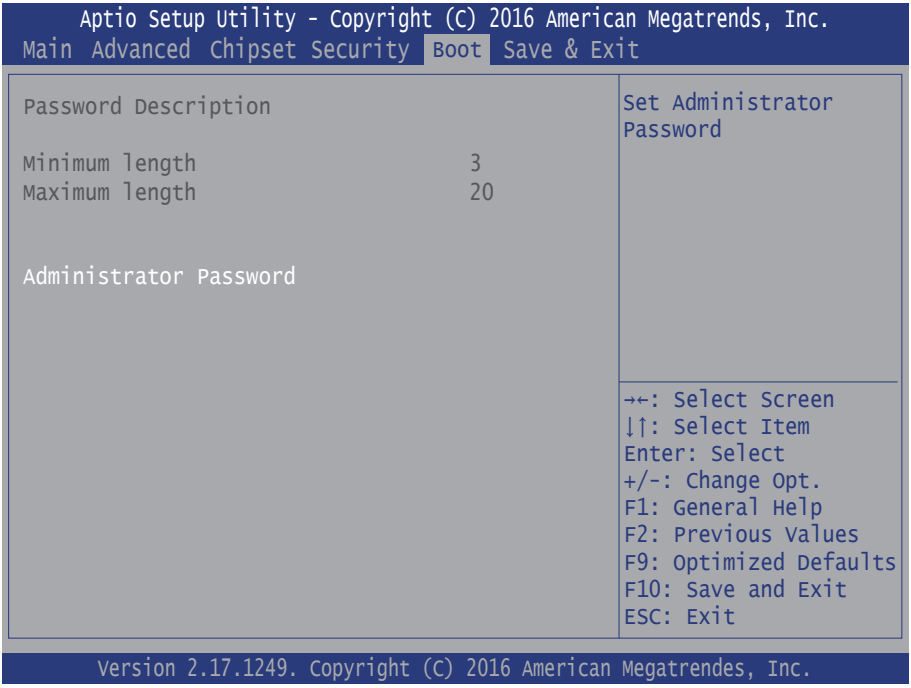
Item	Description
SCC SD Card Support	Enable/disable SCC SD Card Support. ► Options: **Disabled** and **Enabled** (default).

3.3.6 USB Configuration

Item	Description
XHCI Mode	**Enable** (default) or **Disable** XHCI Mode.
USB Port Disable Override	Selectively enable/disable the corresponding USB port from reporting a device connection to the controller. ► Options: **Disabled** (default) and **Enabled** .

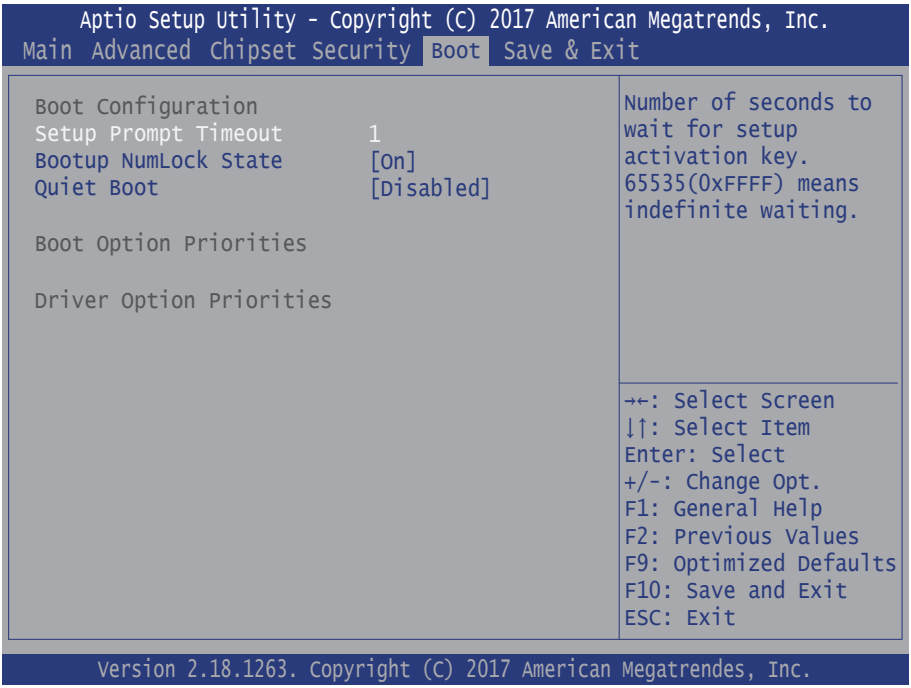
3.4 Security

The **Security** menu sets up the administrator password.



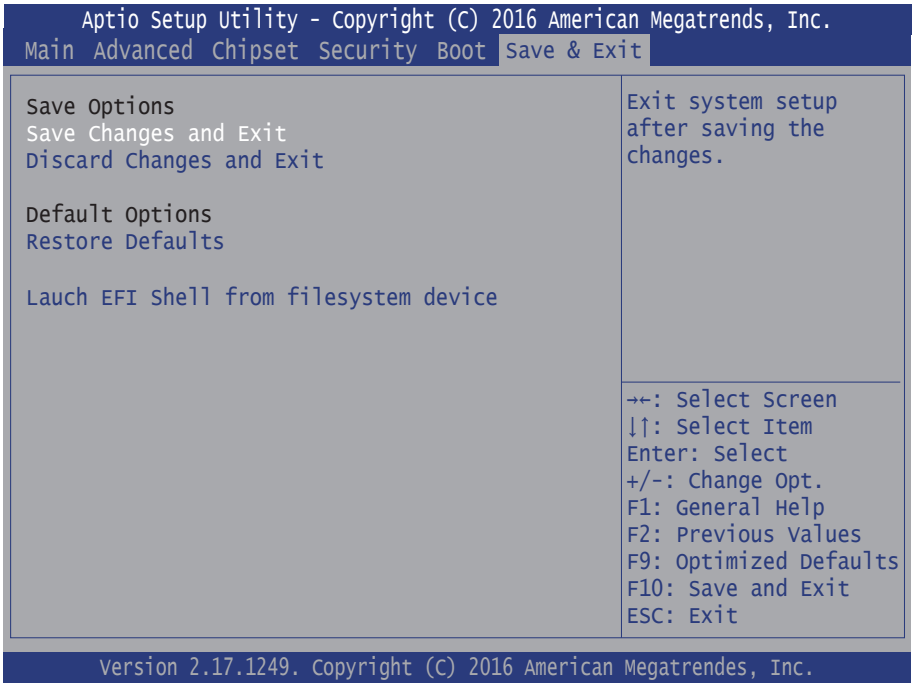
Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. The screen then pops up an **Create New Password** dialog. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.

3.5 Boot



Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Boot NumLock State	Select the keyboard NumLock state. ► Options: **On** (default) and **Off**.
Quiet Boot	**Enable** (default) or **Disable** Quiet Boot option.
Boot Option Priorities	Sets the boot priority among the available device types.

3.6 Save & Exit



Setting	Description
Save Changes and Exit	Exit system setup after saving the changes. ► Enter the item and then a dialog box pops up: **Save configuration and exit? (Yes/ No)**
Discard Changes and Exit	Exit system setup without saving the changes. ► Enter the item and then a dialog box pops up: **Quit without saving? (Yes/ No)**
Restore Defaults	Restore/Load Default values for all the setup options. ► Enter the item and then a dialog box pops up: **Load Optimized Defaults? (Yes/ No)**
Launch EFI Shell from filesystem device	Attempts to launch EFI shell application (Shell.efi) from one of the available filesystem devices.

Appendices

Appendix A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device.
The following table lists the I/O port addresses used.

Address	Device Description
0x000003F8-0x000003FF	Communications Port (CON1)
0x000002F8-0x000002FF	Communications Port (COM1)
0x000003E8-0x000003EF	Communications Port (COM2)
0x000002E8-0x000002EF	Communications Port (COM3)
0x000002F0-0x000002F7	Communications Port (COM4)
0x0000D000-0x0000D01F	Ethernet Controller
0x0000E000-0x0000E01F	Ethernet Controller
0x00000060-0x00000060	Microsoft PS/2 Mouse
0x00000064-0x00000064	Microsoft PS/2 Mouse
0x00000070-0x00000077	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000400-0x0000047F	Motherboard resources
0x00000500-0x000005FE	Motherboard resources
0x00000CF8-0x00000CFF	PCI bus
0x00000D00-0x0000FFFF	PCI bus
0x0000D000-0x0000D01F	PCI Express standard Root Port
0x0000E000-0x0000E01F	PCI Express standard Root Port
0x00000020-0x00000021	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x0000F040-0x0000F05F	SM Bus Controller
0x0000F060-0x0000F07F	Standard AHCI 1.0 Serial ATA controller
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x0000F000-0x0000F03F	Standard VGA Graphics Adapter
0x000003B0-0x000003BB	Standard VGA Graphics Adapter
0x000003C0-0x000003DF	Standard VGA Graphics Adapter
0x00000070-0x00000071	System CMOS/real time clock
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

Appendix B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System timer
IRQ1	Standard PS/2 Keyboard
IRQ3	Communications Port (COM1)
IRQ4	Communications Port (CON1)
IRQ5	Ethernet Controller
IRQ5	Ethernet Controller
IRQ5	SM Bus Controller
IRQ5	PCI Encryption/Decryption Controller
IRQ7	Communications Port (COM4)
IRQ10	Communications Port (COM3)
IRQ11	Communications Port (COM2)
IRQ12	Microsoft PS/2 Mouse
IRQ18	SDA Standard Compliant SD Host Controller
IRQ19	Standard AHCI 1.0 Serial ATA Controller
IRQ22	High Definition Audio Controller

Appendix C. BIOS Memory Map

Address	Device Description
0xFF000000-0xFFFFFFFF	Intel(R) 82802 Firmware Hub Device
0x81200000-0x8127FFFF	Ethernet Controller
0x81200000-0x8127FFFF	PCI Express standard Root Port
0x81280000-0x81283FFF	Ethernet Controller
0x8141C000-0x8141C7FF	Standard AHCI 1.0 Serial ATA Controller
0xFED80000-0xFED87FFF	Motherboard resources
0x81300000-0x8137FFFF	Ethernet Controller
0x81300000-0x8137FFFF	PCI Express standard Root Port
0x81380000-0x81383FFF	Ethernet Controller
0x80000000-0x80FFFFFF	Standard VGA Graphics Adapter
0x80000000-0x80FFFFFF	PCI bus
0x90000000-0x9FFFFFFF	Standard VGA Graphics Adapter
0xA0000-0xBFFFF	Standard VGA Graphics Adapter
0xA0000-0xBFFFF	PCI bus
0x81400000-0x8140FFFF	Intel(R) USB 3.0 extensible host controller
0x81410000-0x81413FFF	High Definition Audio Controller
0x81418000-0x8141801F	SM Bus Controller
0xC0000-0xDFFFF	PCI bus
0xE0000-0xFFFFF	PCI bus
0x8141D000-0x8141DFFF	SDA Standard Compliant SD Host Controller
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFEA00000-0xFEAFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0x8141B000-0x8141BFFF	Motherboard resources
0x81419000-0x81419FFF	Motherboard resources
0x81100000-0x811FFFFF	PCI Encryption/Decryption Controller
0x81000000-0x810FFFFF	PCI Encryption/Decryption Controller

Appendix D: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and reset the system automatically to avoid abnormal operation.

This board supports 255 levels watchdog timer by software programming I/O ports. Below are the source codes written in C, please take them as WDT application example.

```
#include "math.h"
#include "stdio.h"
#include "dos.h"

#define   DELAY_TIME                          10

#define _SMBBA                                0xF040          /* SMBus Base Address
*/
#define _SMBSA                                0x6E            /*    SMBus    Slave
Address , 75111R's Add = 6Eh or 9Ch */

unsigned char DIO_Set(unsigned char oMode, unsigned char oData);
unsigned char SMB_Byte_READ(int SMPORT, int DeviceID, int iREG_INDEX);
void SMB_Byte_WRITE(int SMPORT, int DeviceID, int oREG_INDEX, int oREG_DATA);

void main()
{
        WDT_Start(10);

        while(1)
        {
                iCount = WDT_Count();
                printf("\r Counts : %d ",iCount);

                delay(1000);
        }
}

void WDT_Start(int iCount)
{
        int iData;

        /* Configuration and function select Register - Enable WDTOUT2# output */
        iData = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x03);
        iData = iData | 0x03;
        SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x03,iData);
    delay(DELAY_TIME);

        /* Watchdog Timer Range Register */
        SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x37,iCount);
```

```
    delay(DELAY_TIME);

    /* Watchdog Timer Control Register */
    SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x36,0x72);
}

int WDT_Count(void)
{
    int iData;

    /* Watchdog Timer Range Register */
         iData = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x37);

    return iData;
}

void WDT_Clear(int iCount)
{
         /* Watchdog Timer Range Register */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x37,iCount);
}

void WDT_Stop(void)
{
         /* Watchdog Timer Control Register */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x36,0x52);
}
```