
EmQ-i2205

Qseven® CPU Module

User's Manual

Version 1.0

2017.08



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Revision History

Version	Release Time	Description
1.0	2017.08	Initial release

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Copyright Notice

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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.

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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 A 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.

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Chapter 1

Introduction

1.1. The Product

- Fanless Design
- Soldered Onboard Intel® Celeron N3000 family SoC processor
- Integrated Gigabit Ethernet
- 2 x DisplayPorts / 2 x eDP port
- Extended Operating Temp.: -20 ~ 70°C

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
Processor	Soldered onboard Intel® Celeron N3060 2.48GHz processor/N3160 2.24GHz processor
Memory	Soldered onboard 2GB DDR3L SDRAM, upgradable to 4GB
BIOS	AMI BIOS
Serial Port	1 x UART port(TX/RX only)
USB 2.0	4 x USB 2.0 ports 2 x USB3.0 SuperSpeed ports
Serial ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
Expansion	3 x PCIe1, I2C, SDIO
Ethernet Chipset	1 x Intel® i210AT PCIe GbE controller
Audio	HD Link
Graphics Chipset	Integrated Intel® HD Graphic 400
Graphics Interface	2 x DisplayPorts / 1 x eDP port
OS Support	Windows 8.1 64-bit Linux: Ubuntu
Power Requirement	DC 5V
Power Consumption	2.0A@5V with N3060
Operating Temp.	-20 ~ 70°C (-4 ~ 158°F)
Operating Humidity	10 ~ 95% @ 70°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-i2205 Qseven® CPU Module



1 x Driver CD



1 x Quick Installation Guide

1.5. Ordering Information

EmQ-i2205-N3060-2G	Intel® Celeron N3060 Qseven® R2.0 CPU Module w/2GB memory soldered on module
EmQ-i2205-N3160-4G	Intel® Celeron N3160 Qseven® R2.0 CPU Module w/4GB memory soldered on module

Optional Accessories

HS-2200-F1	Heat spreader,70x65x8mm
PBQ-3001	Qseven R2.0 w/ EPIC form factor Carrier Board
CBK-04-3001-00	Cable kit 2 x COM Cables 1 x SATA Cable 1 x SATA Power Cable

1.6. Driver Installation Note

The CPU board supports Windows 8.1. Find the necessary drivers on the CD that comes with your purchase. For different OS, the driver/utility installation may vary slightly, but generally they are similar.

Find the drivers on CD by the following paths:

Windows 8.1 64-bit

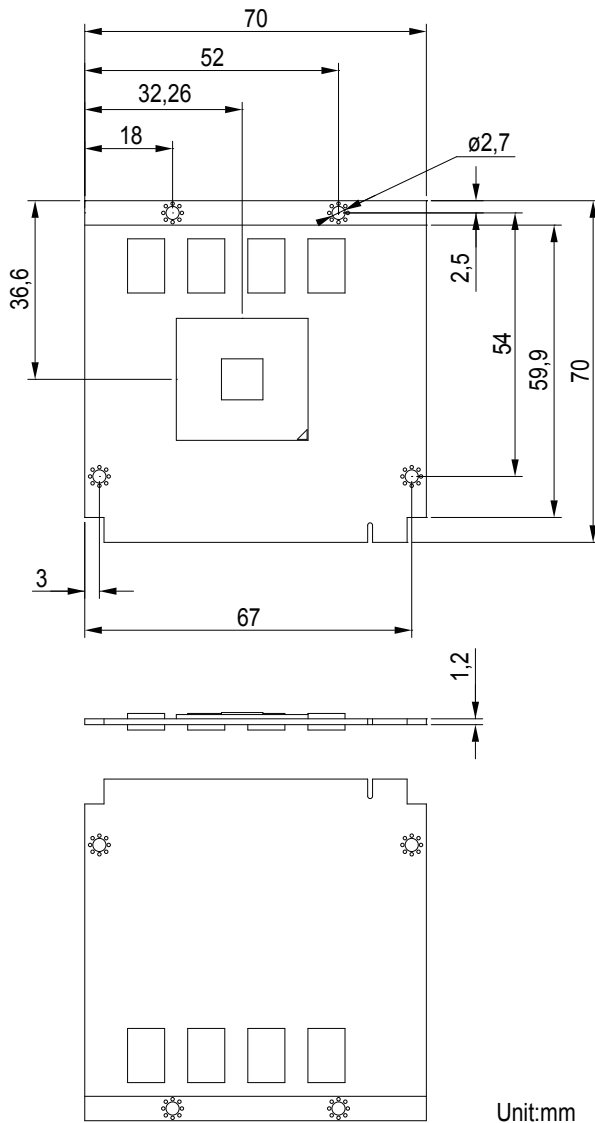
Driver	Path
Audio	\\i220x\Audio
Chipset	\\i220x\Chipset\Chipset_10.1.1.11_Public
Ethernet	\\i220x\Ethernet
Graphics	\\i220x\Graphic\IntelR Graphics Driver Production Version 15.40.14.64.4352
USB3.0	\\i220x\USB3.0\win8.1\Intel(R) USB 3.0 eXtensible PV 1.0.0.42
Serial IO	\\i220x\Serial IO\win8.1 64bit\SerialIO_BSW_x64
TXE	\\i220X\TXE\win8.1\Installers

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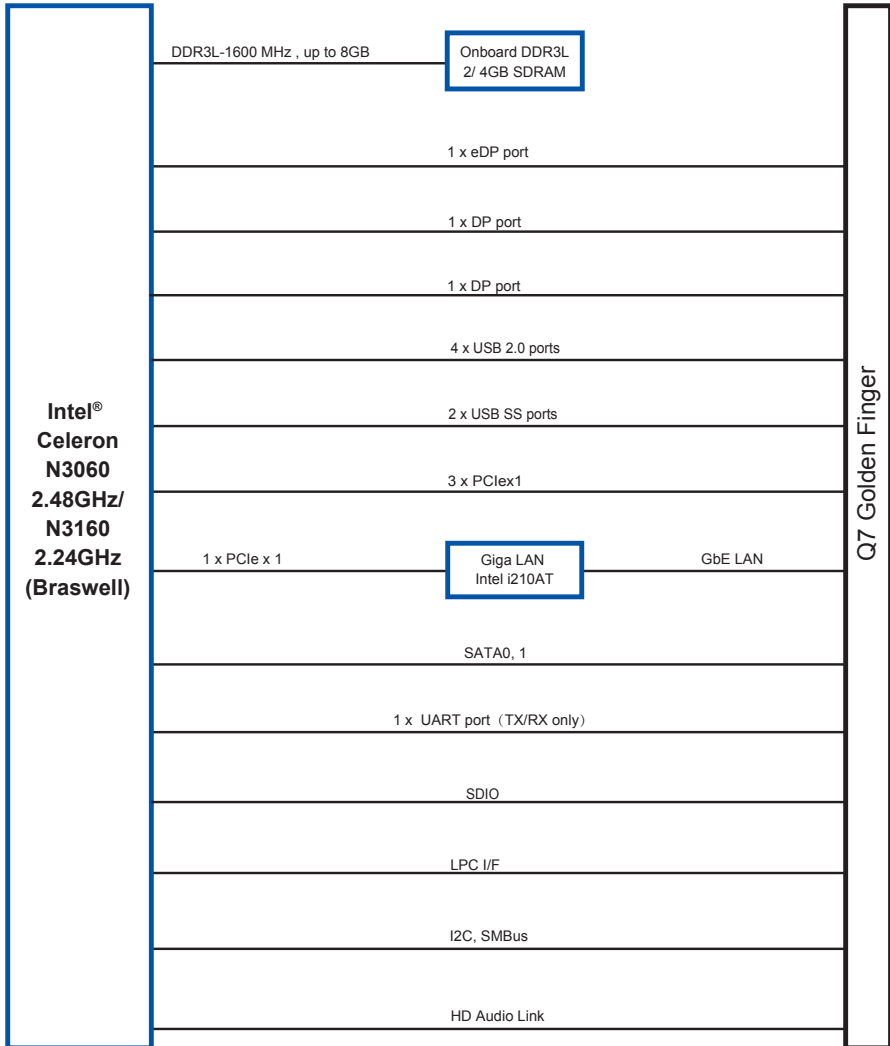
Chapter 2

Board Overview

2.1. Board Dimensions



2.2. Block Diagram



2.3. Connector Pin Definition

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	GND	65	AZ_SDATA_IN0	66	SMB_CLK
3	GBE_MDI3-	4	GBE_MDI2-	67	AZ_SDATA_OUT	68	SMB_DAT
5	GBE_MDI3+	6	GBE_MDI2+	69	THRM#	70	WDTRIG#
7	GBE_LINK100#	8	GBE_LINK1000#	71	THRMTRIP#	72	WDOUT
9	GBE_MDI1-	10	GBE_MDI0-	73	GND	74	GND
11	GBE_MDI1+	12	GBE_MDI0+	75	USB_SSTX0-	76	USB_SSRX0-
13	LED_LINK#	14	GBE_ACT#	77	USB_SSTX0+	78	USB_SSRX0-
15	(N/C)	16	SLP_S4#	79	USB_6_7_OC# (N/C)	80	USB_4_5_OC# (N/C)
17	WAKE#	18	SLP_S3#	81	USB_SSTX1-	82	USB_SSRX1-
19	SUS_STAT#	20	PWR_BTN#	83	USB_SSTX1+	84	USB_SSRX1+
21	SLEEP#	22	LID#	85	USB_OC2/3	86	USB_OC0/1
23	GND	24	GND	87	USB_P3-	88	USB_P2-
	KEY		KEY	89	USB_P3+	90	USB_P2+
25	GND	26	PWRGD	91	USB_CC(N/C)	92	USB_ID
27	BATLOW#	28	RSTBTN#	93	USB_P1-	94	USB_P0-
29	SATA0_TX+	30	SATA1_TX+	95	USB_P1+	96	USB_P0+
31	SATA0_TX-	32	SATA1_TX-	97	GND	98	GND
33	HDD_ACT#	34	GND	99	eDP_DDI0_TX0+	100	eDP_DDI1_TX0+
35	SATA0_RX+	36	SATA1_RX+	101	eDP_DDI0_TX0-	102	eDP_DDI1_TX0-
37	SATA0_RX-	38	SATA1_RX-	103	eDP_DDI0_TX1+	104	eDP_DDI1_TX1+
39	GND	40	GND	105	eDP_DDI0_TX1-	106	eDP_DDI1_TX1-
41	BIOS_DISABLE#	42	SD_CLK#	107	eDP_DDI0_TX2+	108	eDP_DDI1_TX2+
43	SD_CD#	44	SD_LED (N/C)	109	eDP_DDI0_TX2-	110	eDP_DDI1_TX2-
45	SD_CMD	46	SD_WP	111	LVDS_VDDEN	112	BLKTEN
47	SD_PWR#	48	SD_DAT1	113	eDP_DDI0_TX3+	114	eDP_DDI1_TX3+
49	SD_DAT0	50	SD_DAT3	115	eDP_DDI0_TX3-	116	eDP_DDI1_TX3-
51	SD_DAT2	52	SD_DAT5 (N/C)	117	GND	118	GND
53	SD_DAT4 (N/C)	54	SD_DAT7 (N/C)	119	eDP_DDI0_AUX+	120	eDP_DDI1_AUX+
55	SD_DAT6 (N/C)	56	RSVD (N/C)	121	eDP_DDI0_AUX-	122	eDP_DDI1_AUX-
57	GND	58	GND	123	LCD_BKLT_CTRL	124	GP_1-Wire_Bus (N/C)
59	AZ_SYNC	60	SMB_CLK	125	eDP_DDI0_DDCDATA	126	eDP0_HPDET#
61	AZ_RST#	62	SMB_DAT	127	eDP_DDI0_DDCCLK	128	eDP1_HPDET#
63	AZ_BIT_CLK	64	SMB_ALERT#	129	CAN0_TX (N/C)	130	CAN0_RX (N/C)

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
131	DP_DDI2_TX3+	132	STP23	197	GND	198	GND
133	DP_DDI2_TX3-	134	STP24	199	SPI_MOSI	200	SPI_CS0#
135	GND	136	GND	201	SPI_MISO	202	SPI_CS1#
137	DP_DDI2_TX1+	138	DP_DDI2_AUX+	203	SPI_SCK	204	MFG_NC4 (N/C)
139	DP_DDI2_TX1-	140	DP_DDI2_AUX-	205	VCC_5V_SB	206	VCC_5V_SB
141	GND	142	GND	207	MFG_NC0 (N/C)	208	MFG_NC2 (N/C)
143	DP_DDI2_TX2+	144	STP25	209	MFG_NC1 (N/C)	210	MFG_NC3 (N/C)
145	DP_DDI2_TX2-	146	STP26	211	VCC	212	VCC
147	GND	148	GND	213	VCC	214	VCC
149	DP_DDI2_TX0+	150	DP_DDI2_DDC-DATA	215	VCC	216	VCC
151	DP_DDI2_TX0-	152	DP_DDI2_DDC-CLK	217	VCC	218	VCC
153	DDI2_HPDET#	154	DDI2_HPDET#	219	VCC	220	VCC
155	PCIE_CLKP0	156	PCIE_WAKE#	221	VCC	222	VCC
157	PCIE_CLKN0	158	PCIE_RST#	223	VCC	224	VCC
159	GND	160	GND	225	VCC	226	VCC
161	PCIE3_TX+	162	PCIE3_RX+	227	VCC	228	VCC
163	PCIE3_TX-	164	PCIE3_RX-	229	VCC	230	VCC
165	GND	166	GND				
167	PCIE2_TX+	168	PCIE2_RX+				
169	PCIE2_TX-	170	PCIE2_RX-				
171	UART1_TXD	172	UART1_RTS				
173	PCIE1_TX+	174	PCIE1_RX+				
175	PCIE1_TX-	176	PCIE1_RX-				
177	UART1_RXD	178	UART1_CTS#				
179	PCIE0_TX+	180	PCIE0_RX+				
181	PCIE0_TX-	182	PCIE0_RX-				
183	GND	184	GND				
185	LPC_LAD0	186	LPC_LAD1				
187	LPC_LAD2	188	LPC_LAD3				
189	LPC_CLK1	190	LPC_FRAME#				
191	SERIRQ	192	LPC_LDRQ#				
193	VCC_RTC	194	SPKR				
195	FAN_TACHOIN (N/C)	196	FAN_PWMOUT				

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Chapter 3

BIOS

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.

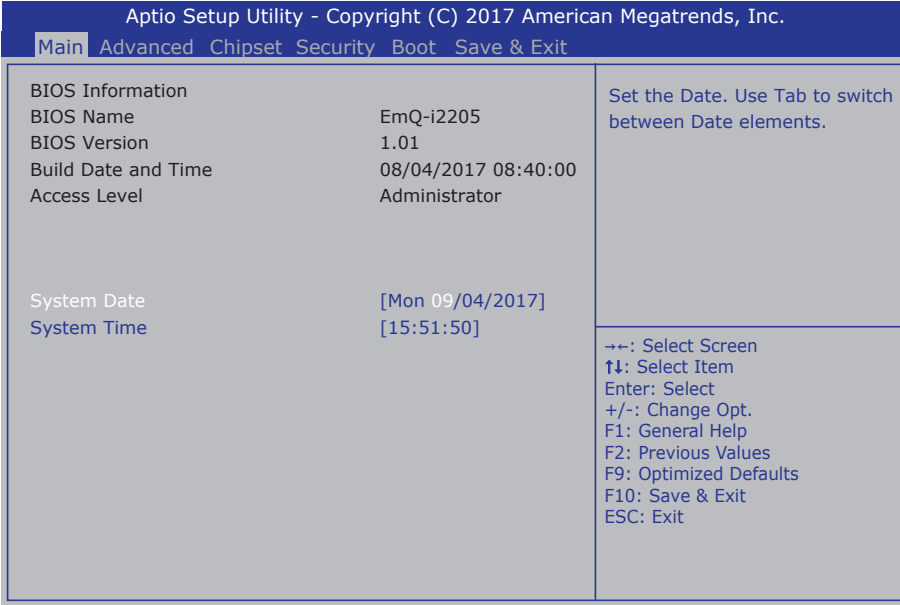
Menu	Description
Main	See 3.1 Main on page 15 .
Advanced	See 3.2 Advanced on page 17 .
Chipset	See 3.3 Chipset on page 32 .
Boot	See 3.4 Security on page 37 .
Security	See 3.5 Boot on page 38 .
Save & Exit	See 3.6 Save & Exit on page 39 .

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 ROM 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 ROM.

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



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Main Advanced Chipset Security Boot Save & Exit

BIOS Information BIOS Name EmQ-i2205 BIOS Version 1.01 Build Date and Time 08/04/2017 08:40:00 Access Level Administrator	Set the Date. Use Tab to switch between Date elements.
System Date [Mon 09/04/2017] System Time [15:51:50]	→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit

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Items	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.

The screenshot displays the Aptio Setup Utility interface. At the top, it reads "Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc." Below this, a navigation bar includes "Main", "Advanced" (which is highlighted), "Chipset", "Security", "Boot", and "Save & Exit". The main area is split into two columns. The left column contains a list of settings: "ACPI Settings", "F81866 Super IO Configuration", "Hardware Monitor", "S5 RTC Wake Settings", "CPU Configuration", "PPM Configuraton", "SATA Configuraton", "LPSS & SCC Configuration", "CSM Configuration", "SDIO Configuration", and "USB Configuration". The right column is titled "System ACPI Parameters." and contains a list of navigation instructions: "→←: Select Screen", "↓ ↑: Select Item", "Enter: Select", "+/-: Change Opt.", "F1: General Help", "F2: Previous Values", "F9: Optimized Defaults", "F10: Save & Exit", and "ESC: Exit". At the bottom of the screen, a version string reads "Version 2.17.1249. Copyright (C) 2017 American Megatrends, Inc."

Setting	Description
ACPI Settings	See 3.2.1 ACPI Settings on page 18
F81866 Super IO Configuration	See 3.2.2 F81866 Super IO Configuration on page 19
Hardware Monitor	See 3.2.3 Hardware Monitor on page 20
S5 RTC Wake Setting	See 3.2.4 S5 RTC Wake Settings on page 21
CPU Configuration	See 3.2.5 CPU Configuration on page 23
PPM Configuration	See 3.2.6 PPM Configuration on page 24
SATA Configuration	See 3.2.7 SATA Configuration on page 25
LPSS & SCC Configuration	See 3.2.8 LPSS & SCC Configuration on page 26
CSM Configuration	See 3.2.9 CSM Configuration on page 27
SDIO Configuration	See 3.2.10 SDIO Configuration on page 29
USB Configuration	See 3.2.11 USB Configuration on page 30

3.2.1 ACPI Settings

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Advanced

ACPI Settings		Enables or Disables System ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
Enable Hibernation	[Enabled]	
ACPI Sleep State	[S3 (Suspend to RAM)]	→+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit

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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 F81866 Super IO Configuration

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 Advanced

F81866 Super IO Configuration		Set Parameters of Serial Port 1 (COMA)
Super IO Chip	F81866	
▶ Serial Port 1 Configuration		
▶ Serial Port 2 Configuration		
▶ Serial Port 3 Configuration		
▶ Serial Port 4 Configuration		
		→+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit

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Setting	Description	
Serial Port 1/3/4 Configuration	Set the Parameters of Serial Port 2/4/5	
	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 3	
	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

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Advanced

Pc Health Status	
CPU Temperature	: +50 °C
System Temperature	: +43 °C
Fan1 Speed	: N/A
+3.3S	: +3.344 V
+V5A	: +4.961 V
+V5S	: +4.961 V
+V12S	: +11.792 V
VCC3V	: +3.344 V
VSB3V	: +3.344 V
VSB5V	: +5.012 V
VBAT	: +3.027 V

→+: Select Screen
↓↑: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save and Exit
ESC: Exit

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3.2.4 S5 RTC Wake Settings

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Advanced

Wake system from S5	[Disabled]	Enables or disables system wake on alarm event. When enabled, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s)
		→←: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit

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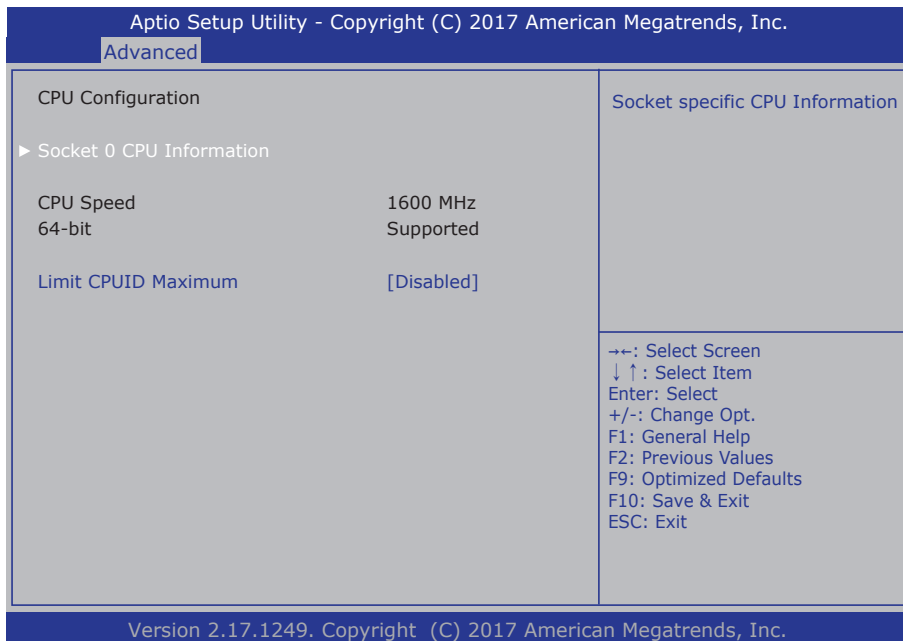
The featured submenus are:

Setting	Description
Wake system from S5	Select System wake on alarm Event ► Options: Disabled (default) /Fixed Time/Dynamic Time

Wake System with Fixed Time	Sets if to awake the system at a defined moment.	
	Wake up hour	Defines the (hour) time to wake the system. ▶ 0 to 23 configurable.
	Wake up Minute	Defines the (minute) time to wake the system. ▶ 0 to 59 configurable.
Wake System with Dynamic Time	Wake up second	Defines the (second) time to wake the system. ▶ 0 to 59 configurable.
	Sets if to awake the system some time in the future.	
	Wake up minute increase	Defines how long from now to wake the system. ▶ 1 to 5 minutes configurable.

3.2.5 CPU Configuration

Access this submenu to configure the CPU features.



Setting	Description
Socket 0 CPU Information	Display Socket specific CPU Information.
Limit CPUID Maximum	Enables/disables the maximum CPUID value limit. Enable this item to prevent the system from “rebooting” when trying to install Windows XP. ▶ Disabled is the default.

3.2.6 PPM Configuration

Access this submenu to setup the PPM Configuration.

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Advanced

PPM Configuration EIST [Enabled] CPU C state report [Enabled]	Enable/Disabled Intel Speedstep →←: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit
---	--

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Setting	Description
EIST	Enable/Disable Intel SpeedStep ▶ Enabled is the default.
CPU C state Report	Enable/Disable CPU C state report to OS ▶ Enabled is the default.

3.2.7 SATA Configuration

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Advanced	
SATA Configuration	Enable/Disable SATA Device.
SATA Controller	[Enabled]
SATA Interface Speed	[Gen3]
SATA Port0 Not Present	
Port 0	[Enabled]
SATA Port1 Not Present	
Port 1	[Enabled]
	→+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit
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Setting	Description
SATA Controller	Enables/disables SATA device. ▶ Enabled is the default.
SATA Interface Speed	Configures the maximum speed of SATA controller. ▶ Options available are Gen1 , Gen2 and Gen3 (default).
Port 0/1	Enables/disables SATA Port 0/1. ▶ Enabled is the default.

3.2.8 LPSS & SCC Configuration

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Advanced

<p>LPSS Configuration</p> <p>LPSS I2C #1(D24: F1) [ACPI Mode]</p> <p>Runtime D3 Support [Enabled]</p>	<p>SCC SD Card Support</p> <p>Enable\Disable.</p> <p>→←: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit</p>
--	---

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Setting	Description
LPSS I2C #1 (D24:F1)	Set the mode of LPSS I2C #1. ▶ Options: ACPI mode (default)/ PCI mode / Disabled
Runtime D3 Support	Enable or disable Runtime D3 Support. ▶ Enabled is the default.

3.2.9 CSM Configuration

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Advanced

Compatibility Support Module Configuration		Enable/Disable CSM Support.
CSM Support	[Enabled]	
CSM16 Module Version	07.79	
Boot option filter	[UEFI and Legacy]	
Option ROM execution		
Network	[Do not launch]	→+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit
Storage	[Legacy]	
Video	[Legacy]	
Other PCI devices	[Legacy]	

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The featured submenus are:

Setting	Description
CSM Support	Enable and Disable CSM Support ▶ Enabled is the default.
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 (default), UEFI and Legacy .
Storage	Control the execution of UEFI and Legacy Storage OpROM. ▶ Options: Do not launch, UEFI and Legacy (default).
Video	Control the execution of UEFI and Legacy Video OpROM. ▶ Options: Do not launch, UEFI and Legacy (default)

Other PCI device

Set the OpROM execution policy for devices other than Network, Storage, or Video.

- ▶ Options: **Do not launch, UEFI and Legacy** (default)

3.2.10 SDIO Configuration

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Advanced

<p>SDIO Configuration</p> <p>SDIO Access Mode [Auto]</p>	<p>SCC SD Card Support Enable\Disable.</p> <p>→+: Select Screen ↓ ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit</p>
--	---

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Setting	Description
SDIO Access Mode	<p>Configures SDIO Access Mode. Options:</p> <ul style="list-style-type: none"> ▶ Auto: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. ▶ ADMA/SDMA: Access SD device in DMA mode. ▶ PIO: Access SD device in PIO mode.

3.2.11 USB Configuration

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Main **Advanced** Chipset Boot Security Save & Exit

USB Configuration		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.
USB Module Version	13	
USB Controllers: 1 XHCI		→←: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save & Exit ESC: Exit
USB Devices: 1 Keyboard, 1 Mouse		
Legacy USB Support	[Enabled]	
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
USB hardware delays and time-outs:		
USB transfer time-out	[20 sec]	
Device reset time-out	[20 sec]	
Device power-up delay	[Auto]	

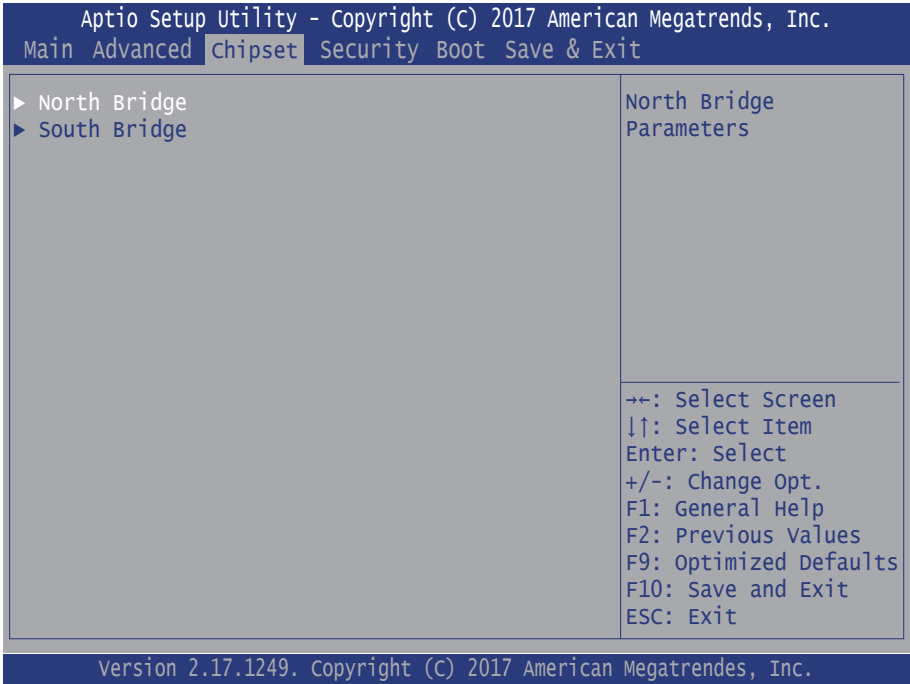
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The featured settings and delivered info are:

Settings	Description
Legacy USB Support	Enables/disables legacy USB support. <ul style="list-style-type: none"> ▶ 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 <ul style="list-style-type: none"> ▶ Enabled is the default.
USB Mass Storage Driver Support	Enables/disables the support for USB mass storage driver. <ul style="list-style-type: none"> ▶ 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
North Bridge	See 3.3.1 North Bridge on the page 33
South Bridge	See 3.3.2 South Bridge on the page 35

3.3.1 North Bridge

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Chipset

<ul style="list-style-type: none"> ▶ Intel IGD Configuration ▶ LCD Control <p>Memory Information</p> <p>Total Memory 4096 MB (LPDDR3)</p>	<p>Config Intel IGD Settings.</p>
	<p>→+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit</p>

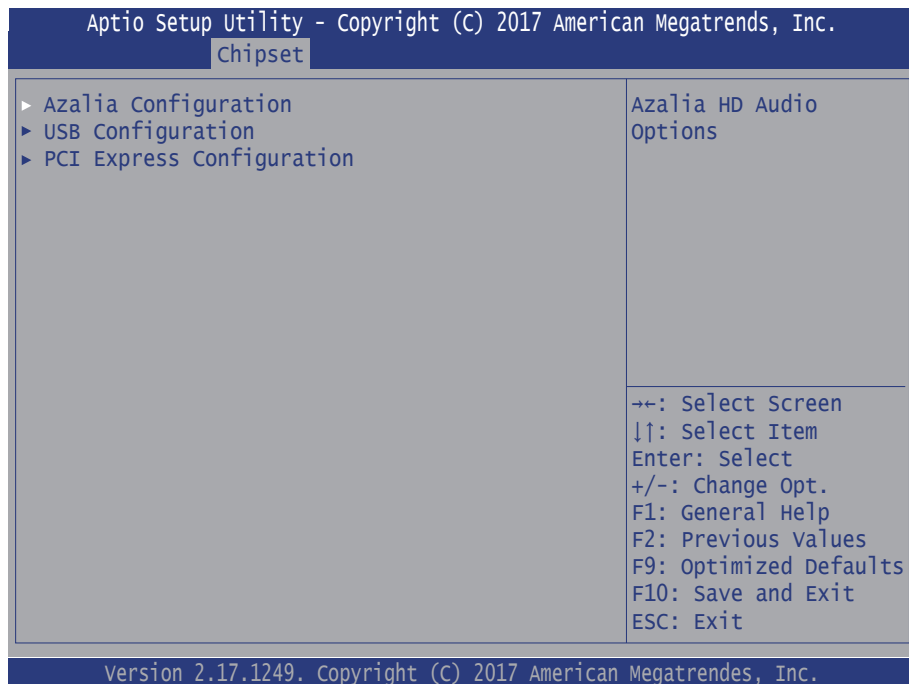
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Setting/Submenu	Description
Intel IGD Configuration	Configures the Intel IGD Configuration.
LCD Control	Configures the LCD Control.

3.3.1.1 Intel IGD Configuration

Setting	Description
GOP Driver	Enable / Disable GOP Driver. Enable GOP driver will unload VBIOS; disable it will load VBIOS. ▶ Enabled is the default.
Integrated Graphics Device	Enable / Disable Integrated Graphics Device (IGD). ▶ Enabled (default): Enable IGD when selected as the primary video adapter. ▶ Disabled: Always disable IGD.

3.3.2 South Bridge



The featured settings are:

Setting	Description
Azalia Configuration	Configures the Azalia Configuration
USB Configuration	Configures the USB Configuration
PCI Express Configuration	Configures the PCI Express Configuration

3.3.2.1 SB HD Azalia Configuration

Item	Description
Audio Controller	Control detection of the Azalia device ▶ Disabled : Azalia will be unconditionally disabled. ▶ Enabled (default): Azalia will be unconditionally enabled.

3.3.2.2 USB Configuration

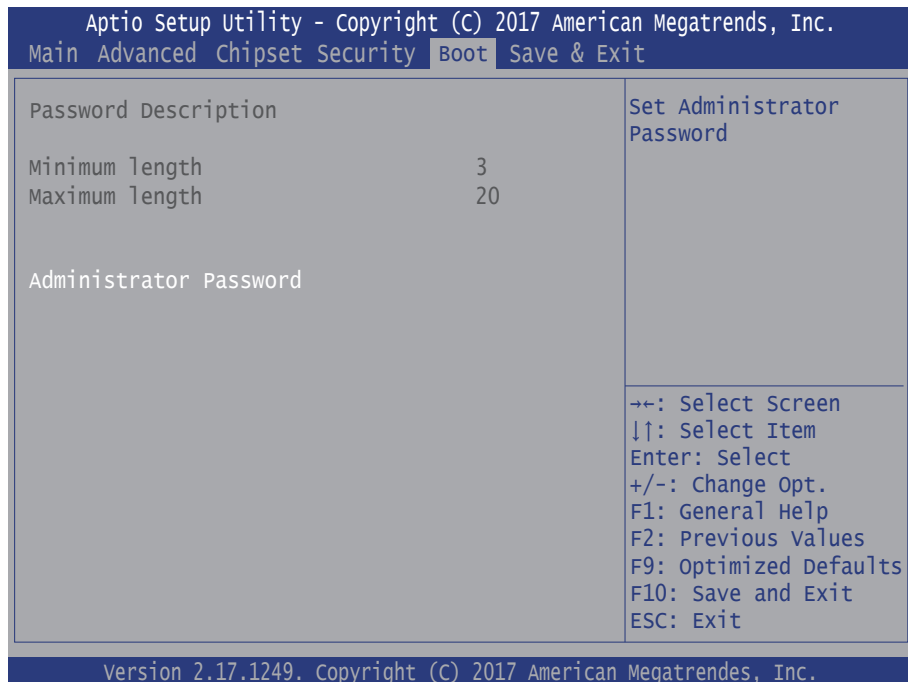
Item	Description
XHCI Mode	Enable (default) or Disable XHCI Mode (Mode of operation of xHCI controller).
USB Port 0/1/2/3/4	Enable (default) or Disable USB Port 0/1/2/3/4.

3.3.2.3 PCI Express Configuration

Item	Description
PCI Express Root Port 1/2/3/4	Control the PCI Express Root Port. ▶ Enabled is the default.
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

3.4 Security

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



Setting	Description
Administrator Password	<p>To set up an administrator password:</p> <ol style="list-style-type: none"> 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

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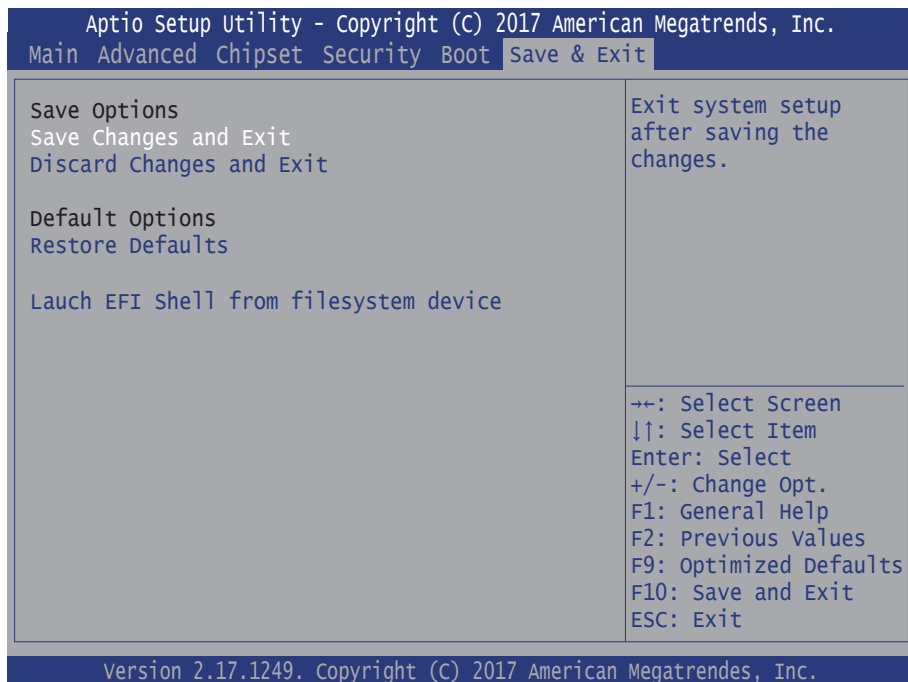
Main Advanced Chipset Security **Boot** Save & Exit

Boot Configuration Setup Prompt Timeout 1 Bootup NumLock State [On] Quiet Boot [Disabled] Boot Option Priorities	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting. →+: Select Screen ↓↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F9: Optimized Defaults F10: Save and Exit ESC: Exit
--	--

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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 or Disable (default) Quiet Boot option.

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.

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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

Address	Device Description
0x00000865- 0x0000086F	Standard VGA Graphics Adapter
0x00000870- 0x00000877	System CMOS/Realtime clock
0x00000880- 0x0000088F	Motherboard resources
0x00000920- 0x0000092F	Motherboard resources
0x00000B20- 0x00000B3F	Motherboard resources
0x00000400- 0x0000047F	Motherboard resources
0x00000500- 0x000005FF	Motherboard resources
0x0000CF80- 0x0000CFFF	PCI bus
0x0000D000- 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

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 (COM1)
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

Appendices

Address	Device Description
0xFE A00000- 0xFE AFFFFF	Motherboard resources
0xFE D01000- 0xFE D01FFF	Motherboard resources
0xFE D03000- 0xFE D03FFF	Motherboard resources
0xFE D06000- 0xFE D06FFF	Motherboard resources
0xFE D08000- 0xFE D09FFF	Motherboard resources
0xFE D1C000- 0xFE D1CFFF	Motherboard resources
0xFE E00000- 0xFE EFFFFFFF	Motherboard resources
0x8141B000- 0x8141BFFF	Motherboard resources
0x81419000- 0x81419FFF	Motherboard resources
0x81100000- 0x811FFFFFFF	PCI Encryption/Decryption Controller
0x81000000- 0x810FFFFFFF	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);
}
```

Appendix

```
    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);
}
```