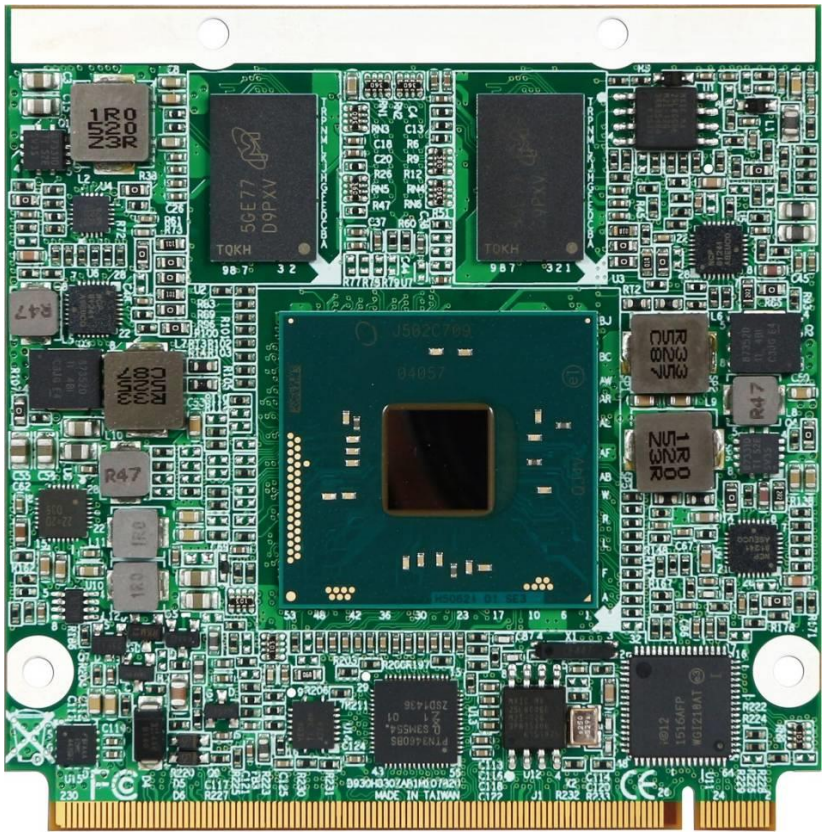

Qseven

PQ7-M107

User's Guide Revision 1.0

(Official)

Revision History

R0.1	Preliminary
R0.2	Add RTC BAT consumption Add section 3.8 weight information Revise section 2 block diagram - Memory 2 channel to 1 channel. Revise section 5 pin out - remove I2S, GPIO.
R0.3	Update BIOS page
R1.0	Update document format to official version

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1 Introduction

PQ7-M107, MITWELL's new Qseven Module product, the successor of PQ7-M107. Qseven is an Industrial Computer On Module standard, there are two form factors, 70 x 70 mm and smaller form factor 70 x 40 mm which known as uQseven. The Qseven connector use total 230 edge fingers that mate with MXM connector. The PQ7-M107 is powered by Intel Braswell platform, a new generation of its predecessor, Braswell. PQ7-M107 has many advantages such as better computing and graphics engine, 4K display (3840 x 2160 @ 30Hz) but lower power consumption, TDP from 4W to 6W. PQ7-M107 has on-board 4GB DDR3L 1600 MHz memory and an eMMC device of which few sizes storage is available.

2 Block Diagram

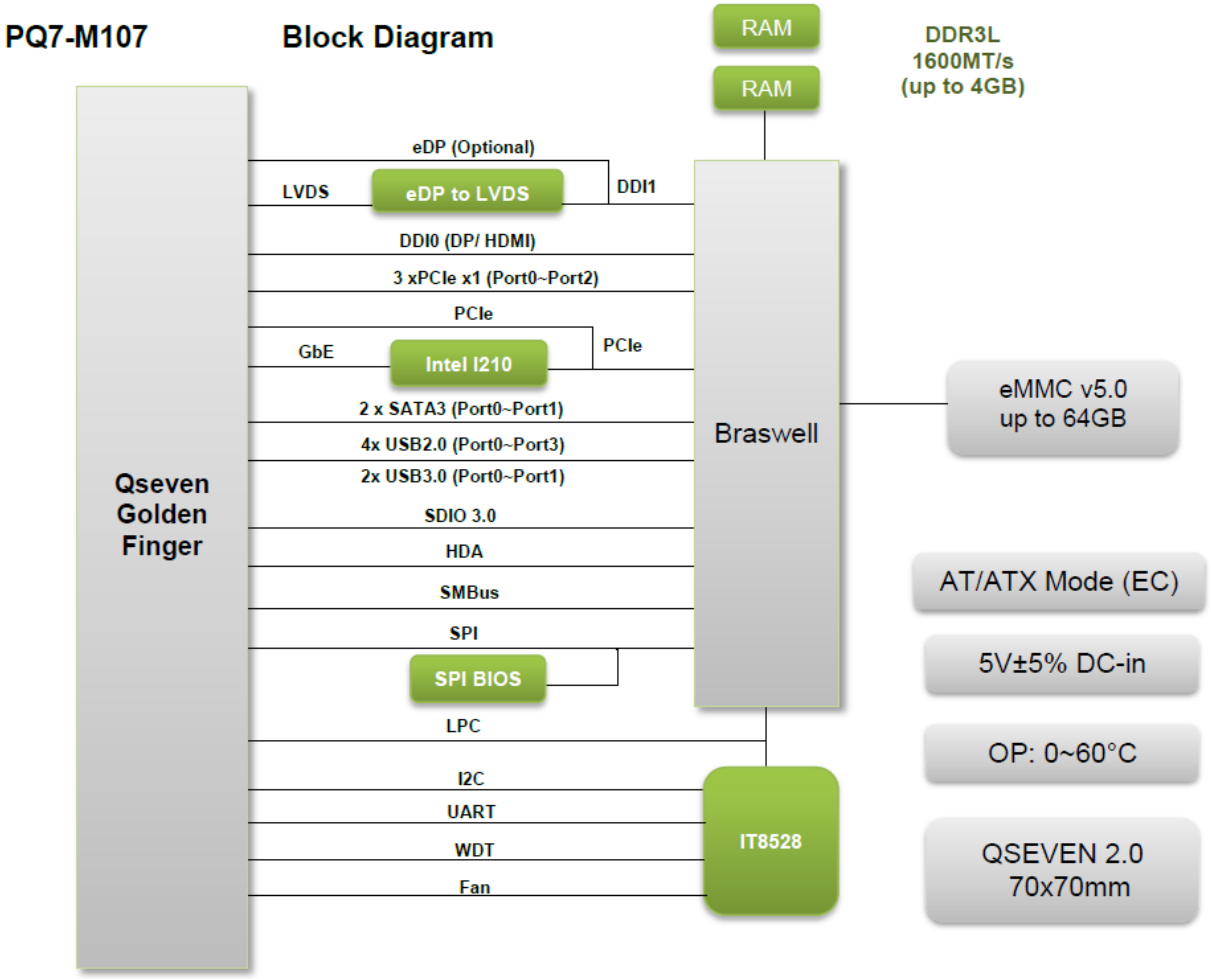


Figure 1 Block Diagram

3 Specifications

Product	➢ PQ7-M107
Form Factor	➢ Qseven 70 x 70mm / 2.76" x 2.76"
Processor	➢ N3710 (See below section for processor list)
BIOS	➢ AMI Aptio5 BIOS
Memory	➢ On Board 4GB DDR3L Non-ECC ➢ 2GB (Optional)
Storage	➢ On Board 8GB eMMC v4.5.1 (Optional)
Graphics Options	➢ LVDS ➢ eDP 1.4 (optional) (2560 x 1440 @ 60Hz) ➢ DP 1.1a (3840 x 2160 @ 30Hz) ➢ HDMI 1.4b (3840 x 2160 @ 30Hz)
Ethernet	➢ GbE Intel I210-AT
Audio	➢ Intel® High Definition Audio
Serial IO	➢ LPC ➢ I2C Full speed 400 kbit/s (Either EC or CPU) ➢ Serial Ports (TX / RX) ➢ SMBus

PCI Express	➢ 3 PCI Express x1 Gen2 (5.0 GT/s) ➢ 4 PCI Express x1 Gen2 (5.0 GT/s) (Optional)
USB	➢ 4 x USB2.0 (480 Mbps) ➢ 2 x USB3.0 (5 Gbps)
SATA	➢ 2 x SATA3.0 (6 Gbps)
Power DC IN	➢ +5VDC ± 5%
Hardware Monitors	➢ ITE8528 Embedded Controller, Voltage, Fan and Temperature
Power Management	➢ ACPI 4.0
Environment	➢ Operating Temperature 0 ° C ~ 60 ° C (processor dependent) ➢ Storage Temperature 0 ° C ~ +60 ° C ➢ Relative Humidity 5%~95%

Table 1 PQ7-M107 Specification

3.1 PQ7-M107 Processor list

ARK | Compare Intel® Products
7/15/2016 1:09:27 AM

PQ7-M107 Processor list	Intel® Pentium® Processor N3710	Intel® Celeron® Processor N3160	Intel® Celeron® Processor N3060	Intel® Celeron® Processor N3010
Cache	2 MB L2	2 MB L2	2 MB L2	2 MB L2
Instruction Set	64-bit	64-bit	64-bit	64-bit
Performance				
# of Cores	4	4	2	2
# of Threads	4	4	2	2
Processor Base Frequency	1.6 GHz	1.6 GHz	1.6 GHz	1.04 GHz
Burst Frequency	2.56 GHz	2.24 GHz	2.48 GHz	2.24 GHz
TDP	6 W	6 W	6 W	4 W
Scenario Design Power (SDP)	4 W	4 W	4 W	3 W
Memory Specifications				
Memory Types	DDR3L-1600	DDR3L-1600	DDR3L-1600	DDR3L-1600
Max # of Memory Channels	2	2	2	2
Graphics Specifications				
Processor Graphics	Intel® HD Graphics 405	Intel® HD Graphics 400	Intel® HD Graphics 400	Intel® HD Graphics 400
Graphics Base Frequency	400 MHz	320 MHz	320 MHz	320 MHz
Graphics Burst Frequency	700 MHz	640 MHz	600 MHz	600 MHz
Graphics Video Max Memory	8 GB	8 GB	8 GB	8 GB
Execution Units	16	12	12	12
Expansion Options				
PCI Express Revision	2.0	2.0	2.0	2.0

Table 2 PQ7-M107 Processor list

3.2 Supported Operating Systems

The PQ7-M107 supports the following operating systems.

Vendor	Operating System	Supported
Microsoft	Windows 7 (32/64bit)	Yes
	Windows 8 (32/64bit)	Yes
	Windows 8.1 (32/64bit)	Yes
	Windows 10 (32/64bit)	Yes
Linux	Fedora 22 (kernel 4.0.4-301)	TBD
	Ubuntu 15.04 (kernel 3.11.6.4)	TBD

Table 3 Supported Operating Systems

3.3 Windows OS driver

Please download the drivers from MITWELL download center website
http://www.MITWELL.tw/support/download_center.php

Item	Driver version	Description
Chipset	10.0.27	WIN7,8.1,10 x86,x64
Graphic	10.18.14.4299	WIN7,8.1,10 x64
Serial IO	2.4.3	WIN8.1 x64
USB_3.0	1.0.1.45	WIN8, 8.1, x64
TXE_Driver	2.0.0.2073	WIN7,8.1,10 x64
LAN I210	LAN_Rel_18.7_PV_315665	WIN7,8.1,10

Table 4 Windows OS driver list

3.4 Electrical Characteristics

Input voltage	+5VDC ± 5%
RTC Battery Consumption	3.5uA
Power on mode	AT / ATX

Table 5 Electrical Characteristics

3.5 Power sequence

ATX Mode for 1st Power on

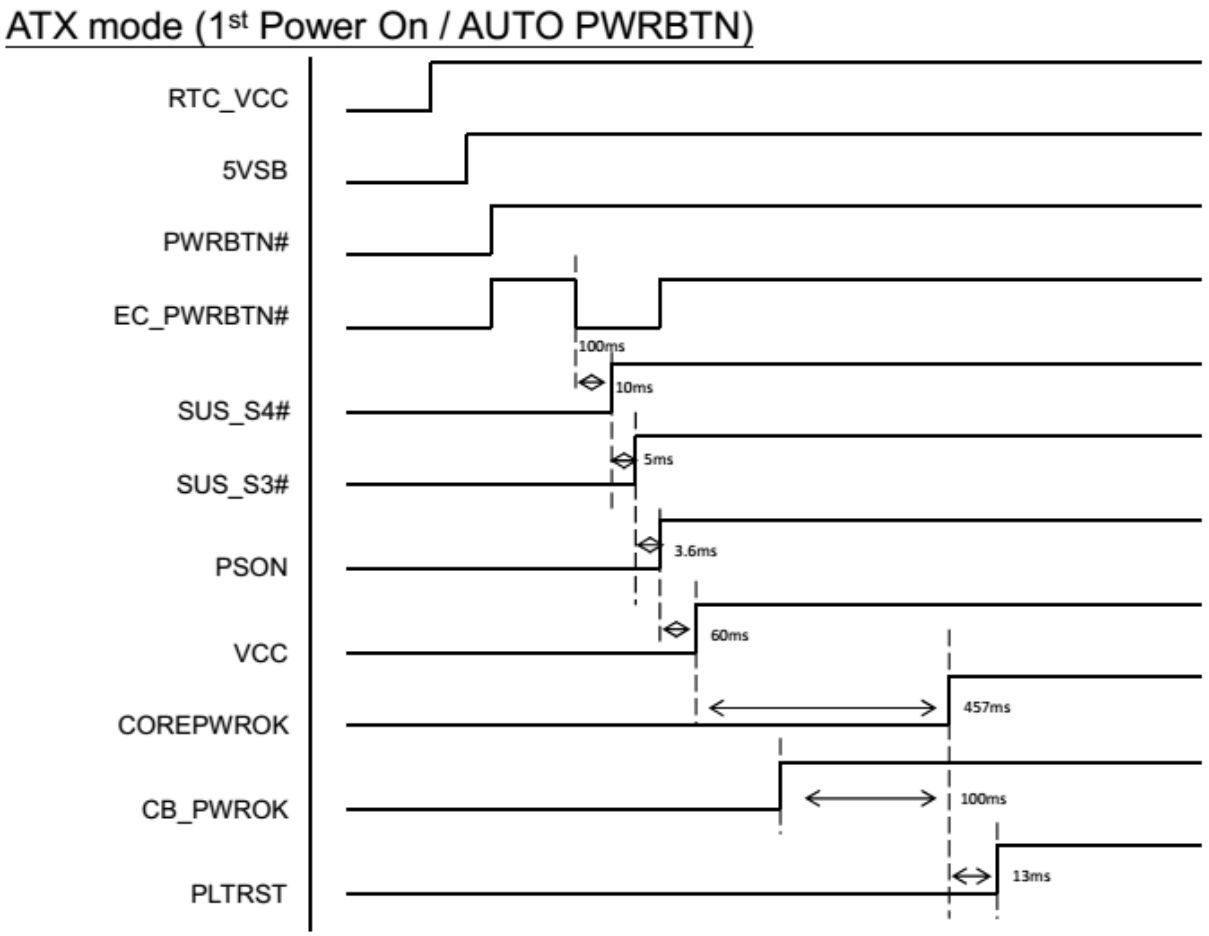


Figure 2 Power sequence ATX Mode (1st Power On)

ATX Mode (without Power Off)

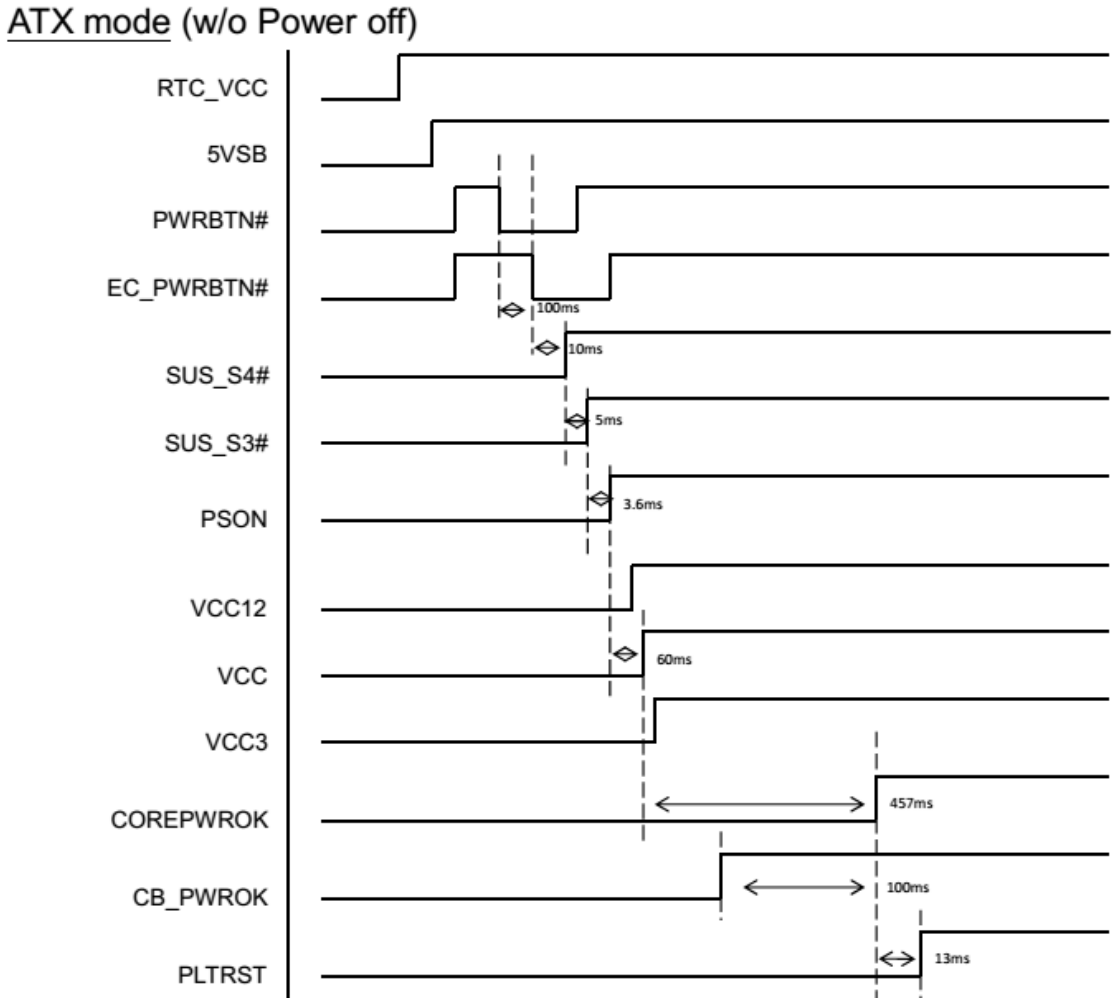


Figure 3 Power sequence ATX Mode (w/o power off)

AT Mode

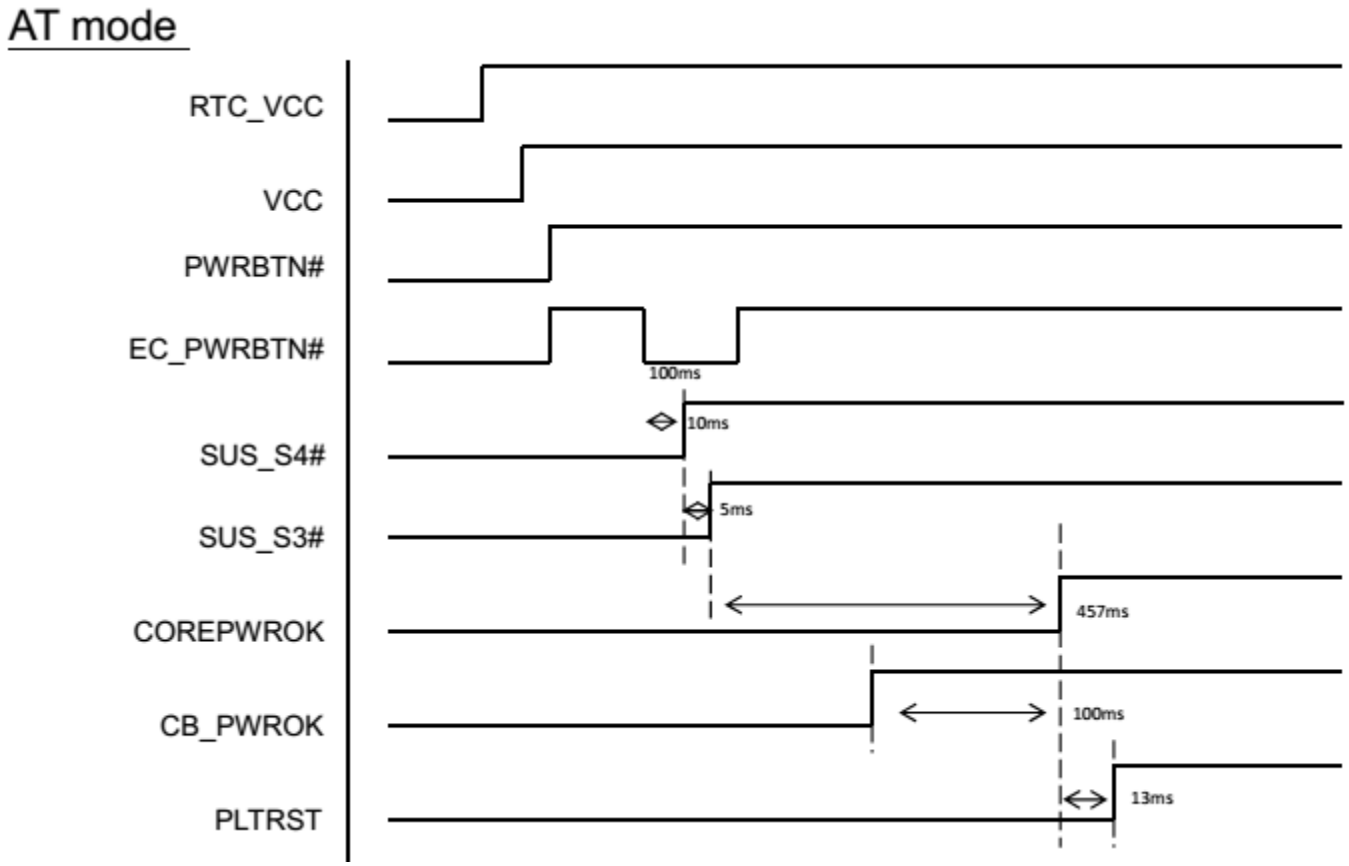


Figure 4 Power sequence AT Mode

3.6 Mechanical Dimensions

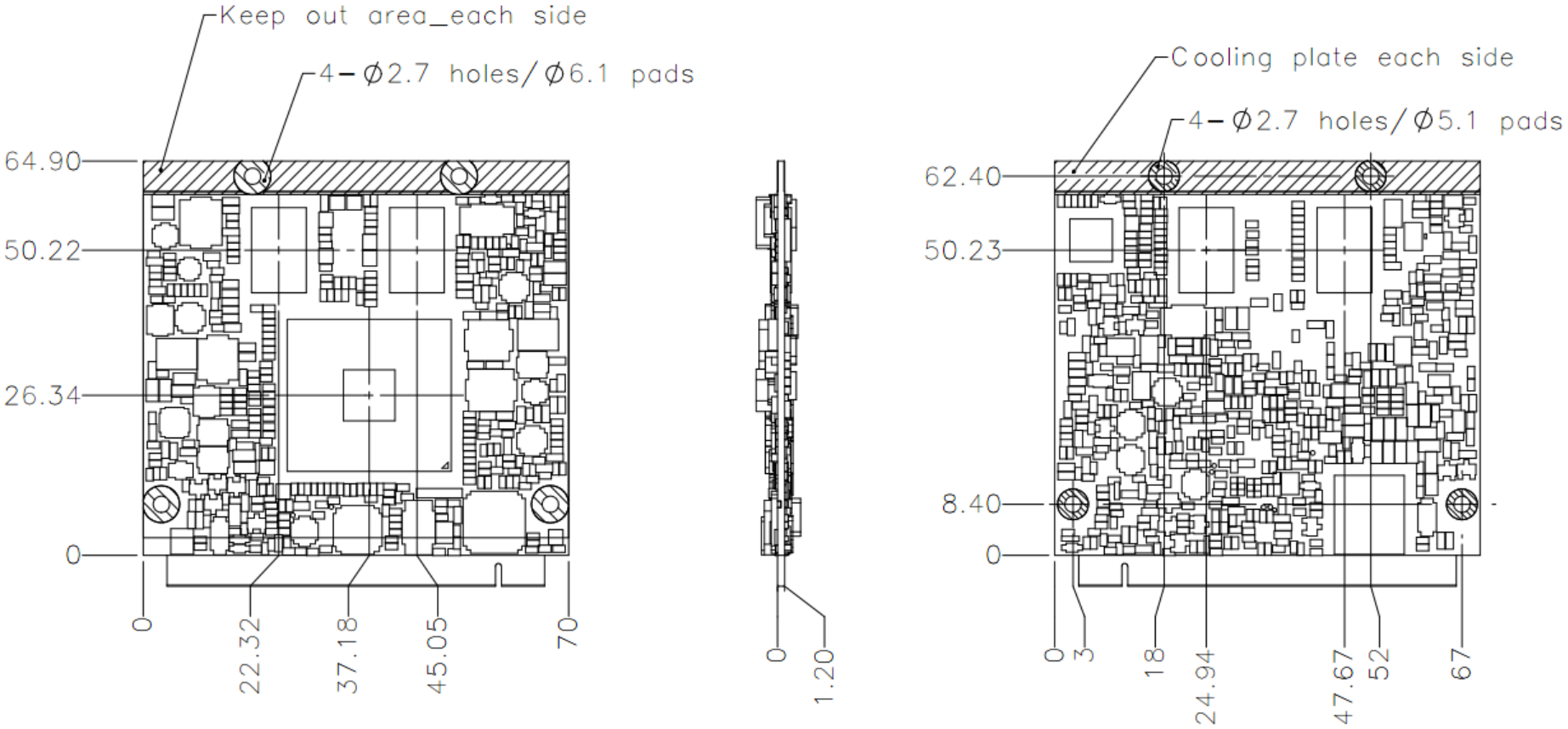


Figure 5 Mechanical Dimensions - Top/Bottom

3.7 PQ7-M107 and Cooler weight

PQ7-M107	27.0g
Heat Sink (with screws)	69.0g
Heat Spreader (with screws)	61.5g
Heat Sink + Heat spreader (with screws)	131.0g

Table 6 Net weight

3.8 Environmental Specifications

Storage Temperature	0 ~ 60°C
Operation Temperature	0 ~ 60°C
Storage Humidity	0% ~ 95%
Operation Humidity	0% ~ 95%

Table 7 Environmental Specifications

3.9 Label Definition

MAC LABEL

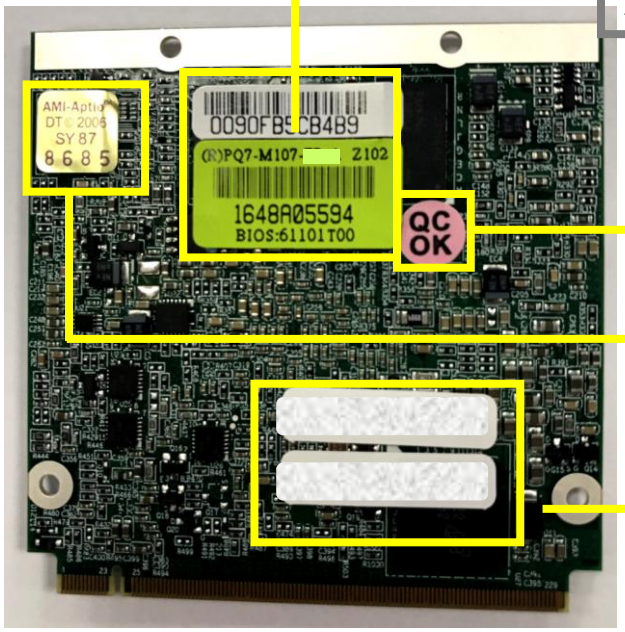
BOARD REVISION

PRODUCT NUMBER

SERIAL NUMBER

BIOS VERSION

MAC and S/N LABEL



QC LABEL

BIOS AUTHORITY LABEL

CUSTOMER LABEL BY REQUEST

4 Heat sink / Cooler dimensions

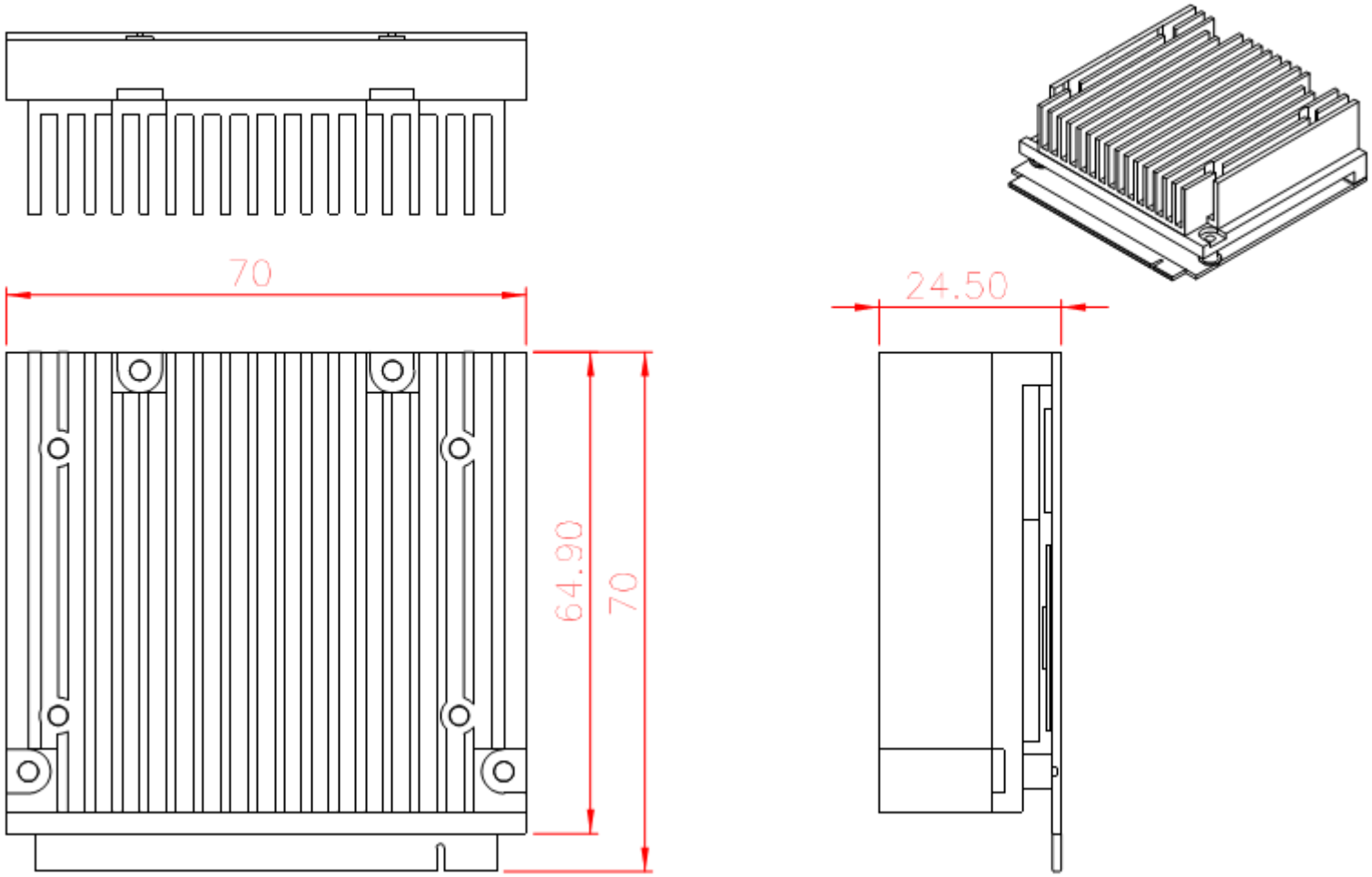


Figure 6 Heat sink / cooler mechanical dimensions

4.1 H/S Assembly Guide

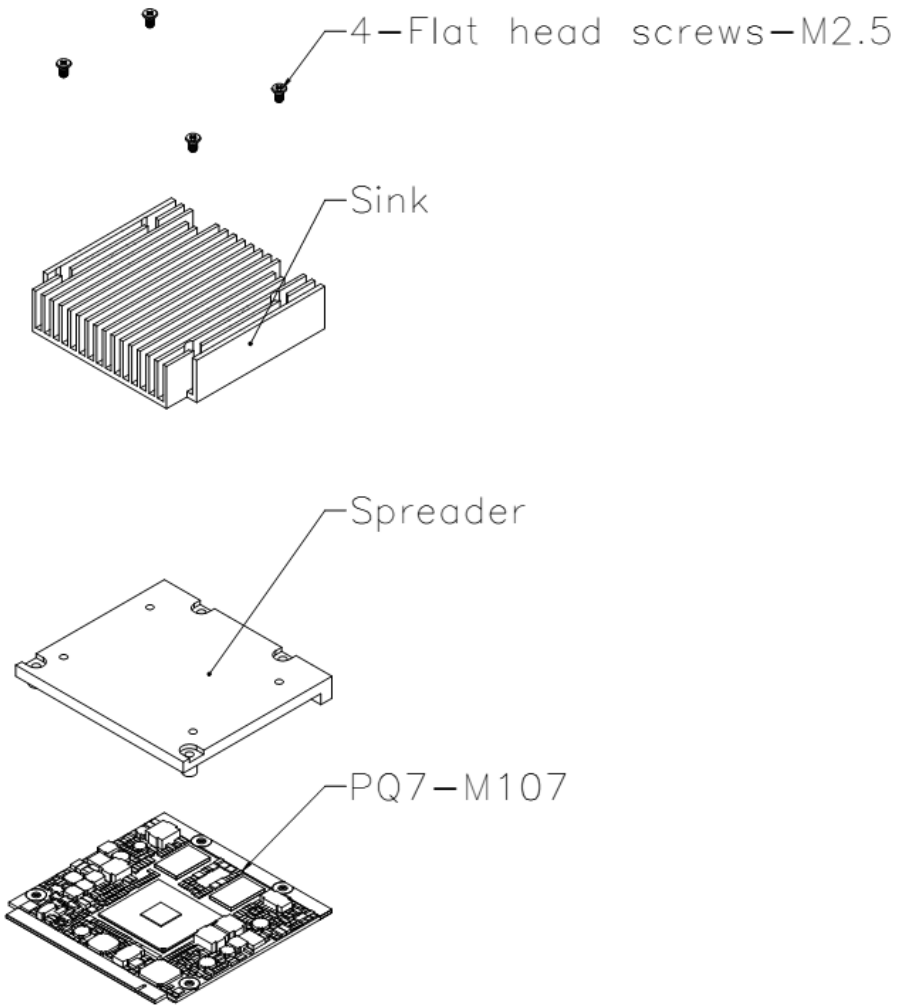


Figure 7 H/S Assembly guide

4.2 Packaging

Package	Appearance	Size
Anti-Static bubble bag		180x135mm
White Paper Box		210x151x40mm
Shipping Box (10 pcs White paper box)		595x300x195mm

Table 8 Packaging

4.3 Ordering Guide

PQ7-M107

Product	Ordering P/N	Status
PQ7-M107-N3710-4G-8G	AB1-3050Z	Available

Table 9 Ordering Guide - PQ7-M107

Accessory

Product	Ordering P/N	Status
PQ7-M107 Heat Spreader	B8308220	Available
PQ7-M107 Heat Sink Set	B8308050	Available
PQ7-C201	AB1-3B45	Available

Table 10 Ordering Guide - Accessory

5 Pin out Tables

Below tables lists PQ7-M107 230 edge pins , un-connected pins are present as NC.

PQ7-M107			
Pin	Signal	Pin	Signal
1	GND	2	GND
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	GBE_LINK100#	8	GBE_LINK1000#
9	GBE_MDI1-	10	GBE_MDI0-
11	GBE_MDI1+	12	GBE_MDI0+
13	GBE_LINK#	14	GBE_ACT#
15	GBE_CTREF	16	SUS_S5#
17	WAKE#	18	SUS_S3#
19	SUS_STAT#	20	PWRBTN#
21	SLP_BTN#	22	LID_BTN#
23	GND	24	GND
KEY			
25	GND	26	PWGIN
27	BATLOW#	28	RSTBTN#
29	SATA0_TX+	30	SATA1_TX+
31	SATA0_TX-	32	SATA1_TX-
33	SATA_ACT#	34	GND
35	SATA0_RX+	36	SATA1_RX+

Table 11 PQ7-M107 Pin-out 1-5

37	SATA0_RX-	38	SATA1_RX-
39	GND	40	GND
41	BIOS_DISABLE# / BOOT_ALT	42	SDIO_CLK#
43	SDIO_CD#	44	NC
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR#	48	SDIO_DAT1
49	SDIO_DAT0	50	SDIO_DAT3
51	SDIO_DAT2	52	NC
53	NC	54	NC
55	NC	56	NC
57	GND	58	GND
59	HDA_SYNC	60	SMB_CLK / GP1_I2C_CLK
61	HDA_RST#	62	SMB_DAT / GP1_I2C_DAT
63	HDA_BITCLK	64	SMB_ALERT#
65	HDA_SDI	66	GP0_I2C_CLK
67	HDA_SDO	68	GP0_I2C_DAT
69	THRM#	70	WDTRIG#
71	NC	72	WDOUT
73	GND	74	GND
75	USB_P7- / USB_SSTX0-	76	USB_P6- / USB_SSRX0-
77	USB_P7+ / USB_SSTX0+	78	USB_P6+ / USB_SSRX0+
79	NC	80	NC
81	USB_P5- / USB_SSTX1-	82	USB_P4- / USB_SSRX1-
83	USB_P5+ / USB_SSTX1+	84	USB_P4+ / USB_SSRX1+
85	USB_2_3_OC#	86	USB_0_1_OC#

Table 12 PQ7-M107 Pin-out 2-5

87	USB_P3-	88	USB_P2-
89	USB_P3+	90	USB_P2+
91	NC	92	NC
93	USB_P1-	94	USB_P0-
95	USB_P1+	96	USB_P0+
97	GND	98	GND
99	eDP0_TX0+ / LVDS_A0+	100	eDP1_TX0+ / LVDS_B0+
101	eDP0_TX0- / LVDS_A0-	102	eDP1_TX0- / LVDS_B0-
103	eDP0_TX1+ / LVDS_A1+	104	eDP1_TX1+ / LVDS_B1+
105	eDP0_TX1- / LVDS_A1-	106	eDP1_TX1- / LVDS_B1-
107	eDP0_TX2+ / LVDS_A2+	108	eDP1_TX2+ / LVDS_B2+
109	eDP0_TX2- / LVDS_A2-	110	eDP1_TX2- / LVDS_B2-
111	LVDS_PPEN	112	LVDS_BLEN
113	eDP0_TX3+ / LVDS_A3+	114	eDP1_TX3+ / LVDS_B3+
115	eDP0_TX3- / LVDS_A3-	116	eDP1_TX3- / LVDS_B3-
117	GND	118	GND
119	eDP0_AUX+ / LVDS_A_CLK+	120	eDP1_AUX+ / LVDS_B_CLK+
121	eDP0_AUX- / LVDS_A_CLK-	122	eDP1_AUX- / LVDS_B_CLK-
123	LVDS_BLT_CTRL /GP_PWM_OUT0	124	NC
125	GP2_I2C_DAT / LVDS_DID_DAT	126	eDP0_HPD# / LVDS_BLC_DAT
127	GP2_I2C_CLK / LVDS_DID_CLK	128	NC
129	NC	130	NC
131	DP_LANE3+ / TMDS_CLK+	132	NC
133	DP_LANE3- / TMDS_CLK-	134	NC
135	GND	136	GND

Table 13 PQ7-M107 Pin-out 3-5

137	DP_LANE1+ / TMDS_LANE1+	138	DP_AUX+
139	DP_LANE1- / TMDS_LANE1-	140	DP_AUX-
141	GND	142	GND
143	DP_LANE2+ / TMDS_LANE0+	144	NC
145	DP_LANE2- / TMDS_LANE0-	146	NC
147	GND	148	GND
149	DP_LANE0+ / TMDS_LANE2+	150	HDMI_CTRL_DAT
151	DP_LANE0- / TMDS_LANE2-	152	HDMI_CTRL_CLK
153	DP_HDMI_HPD#	154	NC
155	PCIE_CLK_REF+	156	PCIE_WAKE#
157	PCIE_CLK_REF-	158	PCIE_RST#
159	GND	160	GND
161	PCIE3_TX+	162	PCIE3_RX+
163	PCIE3_TX-	164	PCIE3_RX-
165	GND	166	GND
167	PCIE2_TX+	168	PCIE2_RX+
169	PCIE2_TX-	170	PCIE2_RX-
171	UART0_TX	172	UART0_RTS#
173	PCIE1_TX+	174	PCIE1_RX+
175	PCIE1_TX-	176	PCIE1_RX-
177	UART0_RX	178	UART0_CTS#
179	PCIE0_TX+	180	PCIE0_RX+
181	PCIE0_TX-	182	PCIE0_RX-
183	GND	184	GND
185	LPC_AD0	186	LPC_AD1

Table 14 PQ7-M107 Pin-out 4-5

187	LPC_AD2	188	LPC_AD3
189	LPC_CLK	190	LPC_FRAME#
191	SERIRQ	192	NC
193	VCC_RTC	194	SPKR / GP_PWM_OUT2
195	FAN_TACHOIN / GP_TIMER_IN	196	FAN_PWMOUT / GP_PWM_OUT1
197	GND	198	GND
199	SPI_MOSI	200	SPI_CS0#
201	SPI_MISO	202	SPI_CS1#
203	SPI_SCK	204	NC
205	VCC_5V_SB	206	NC
207	NC	208	NC
209	NC	210	NC
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

Table 15 PQ7-M107 Pin-out 5-5

6 BIOS Setup Items

PQ7-M107 enters the boot process by AMI Aptio5 BIOS which is stored in an EEPROM through SPI interface on Module. Boot from Carrier board is also supported; please consult with your Sales Representatives for PQ7-M107 Carrier Design Guide.

6.1 Entering Setup -- Launch System Setup

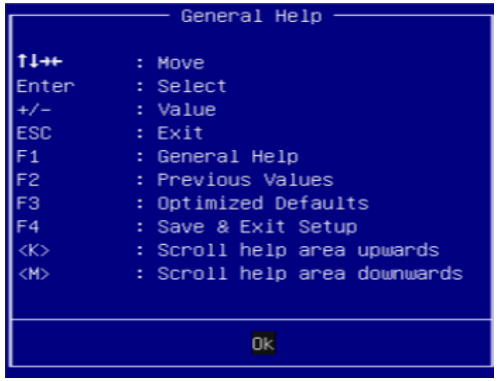
Power on PQ7-M107 Module and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del> key will enter BIOS setup screen.

Press <Del> 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 see General Help

The BIOS setup program provides a General Help screen. The menu can be easily called up 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 Main

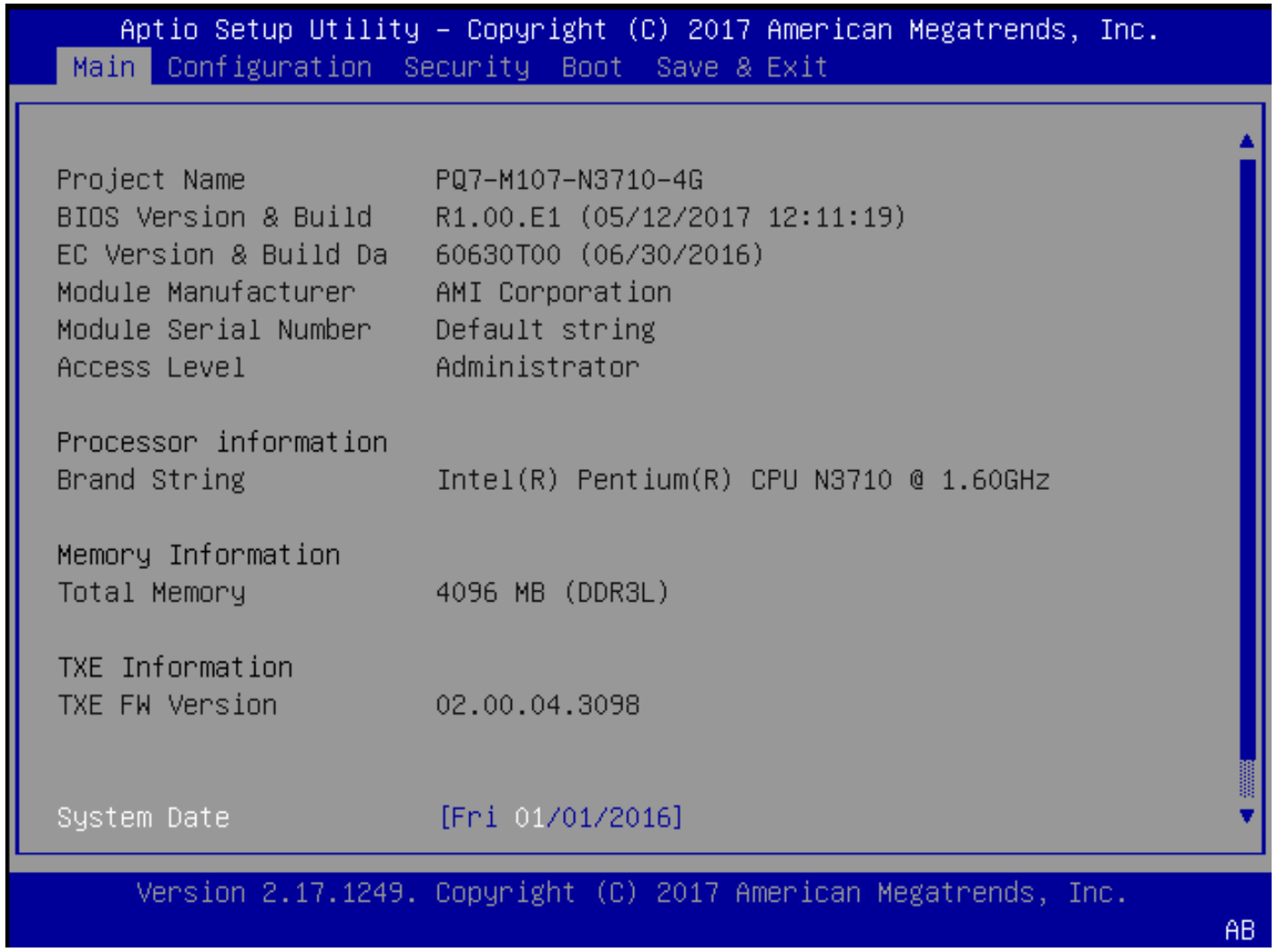


Figure 8 BIOS - Main 1-2

6.3 Configuration

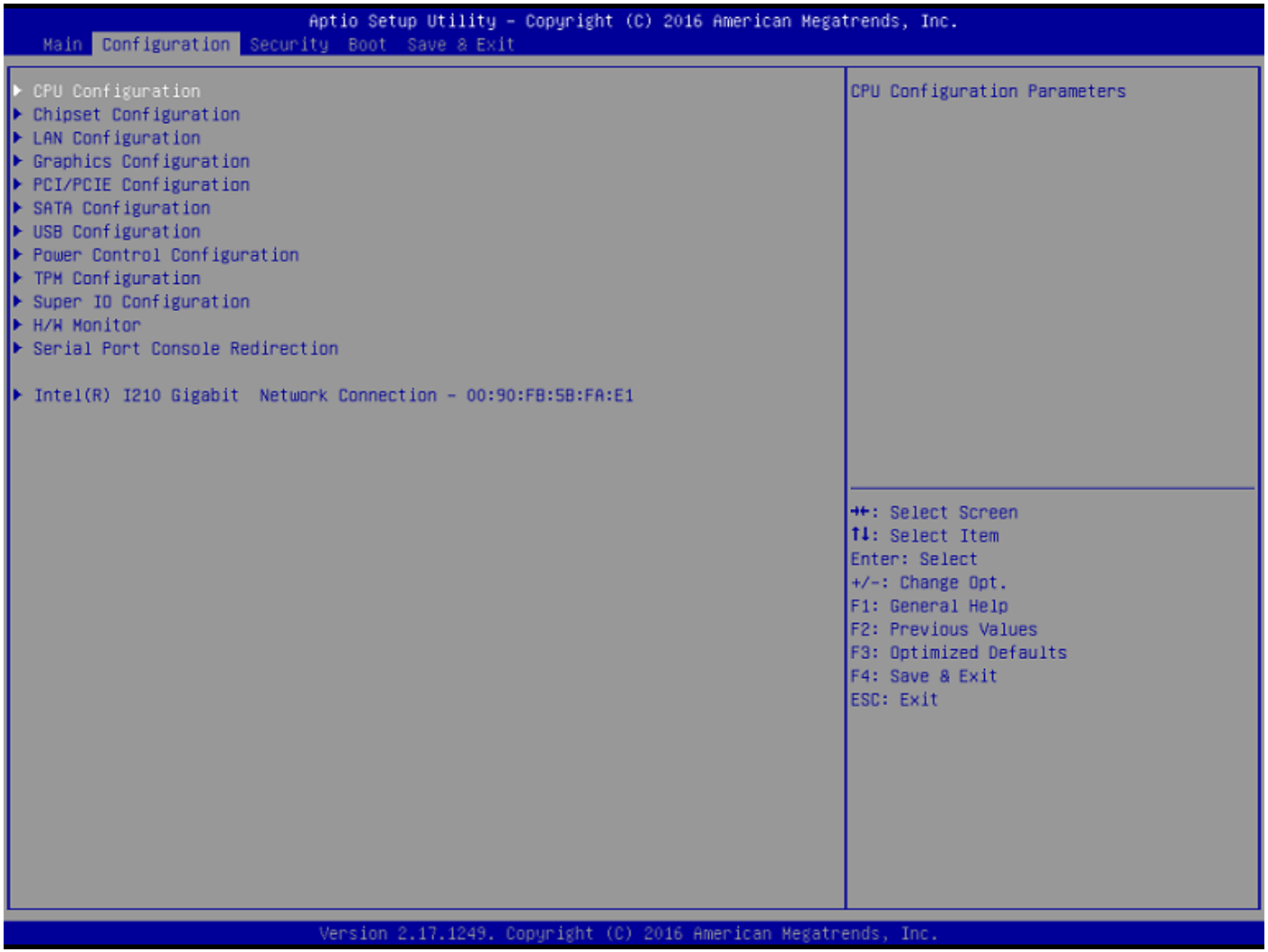


Figure 9 BIOS - Configuration

6.4 CPU

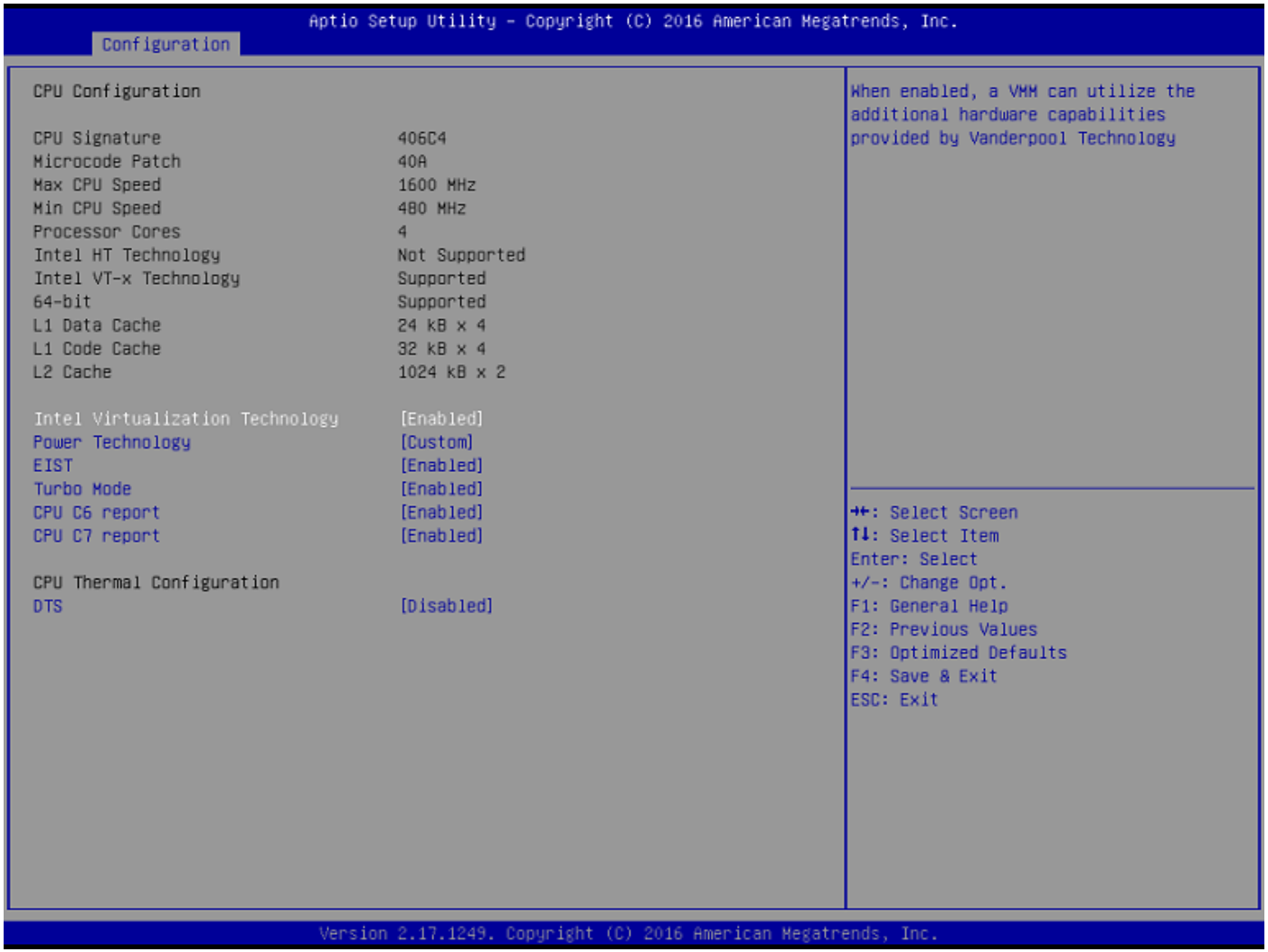


Figure 10 BIOS - Configuration - CPU 1-2

6.5 Chipset

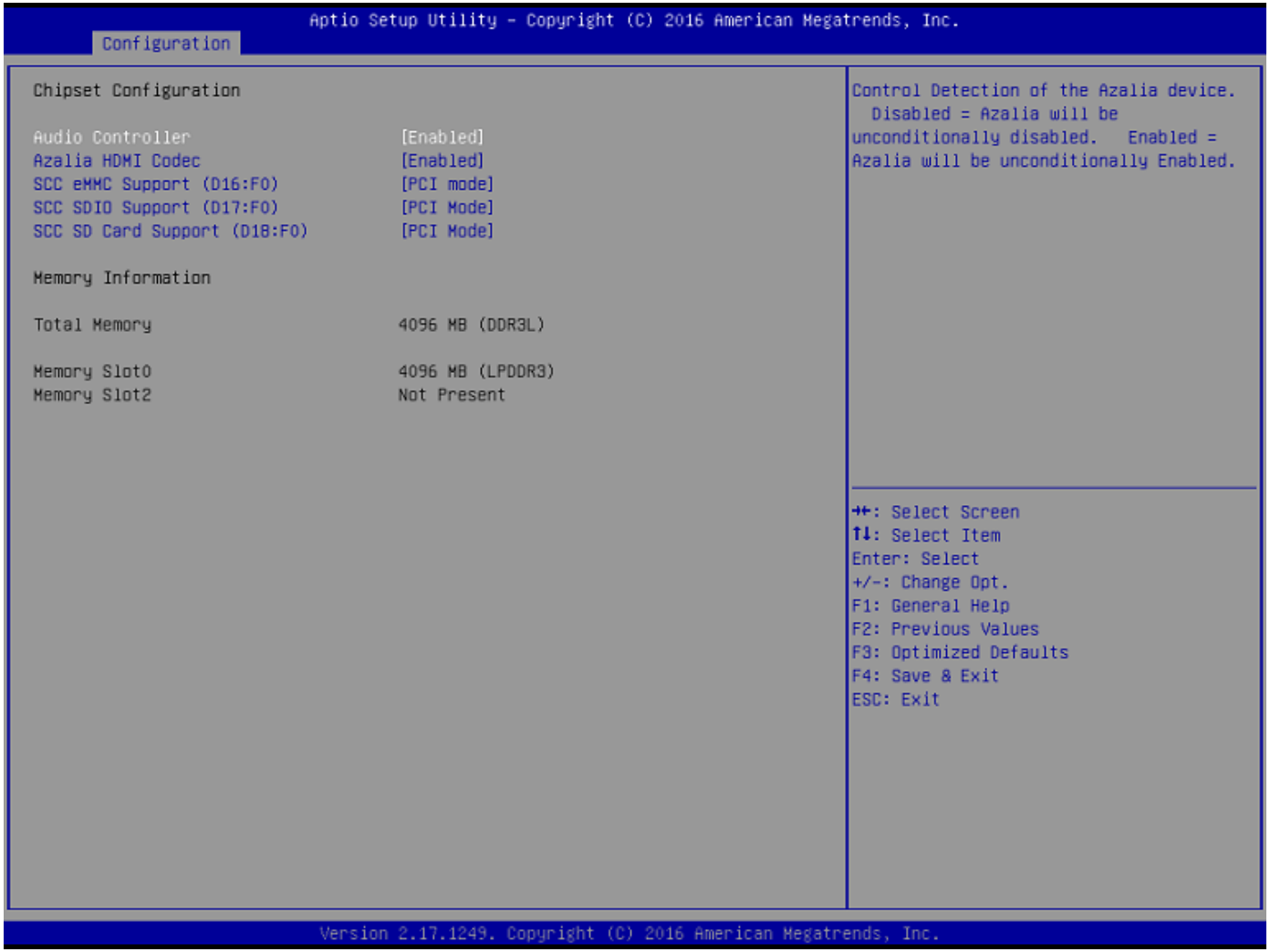


Figure 11 BIOS - Configuration - Chipset

6.6 LAN

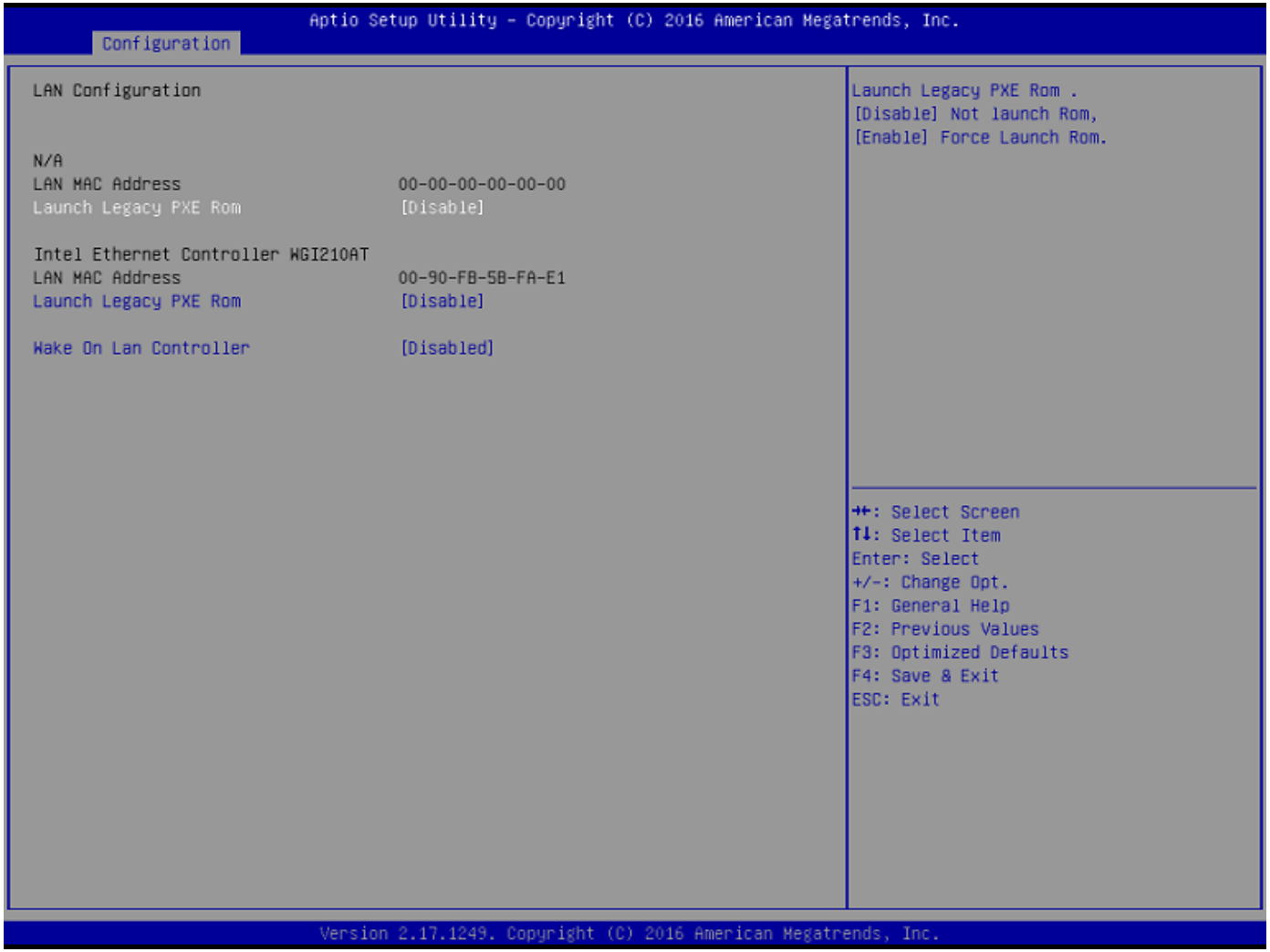


Figure 12 BIOS - Configuration - LAN

6.7 Graphics

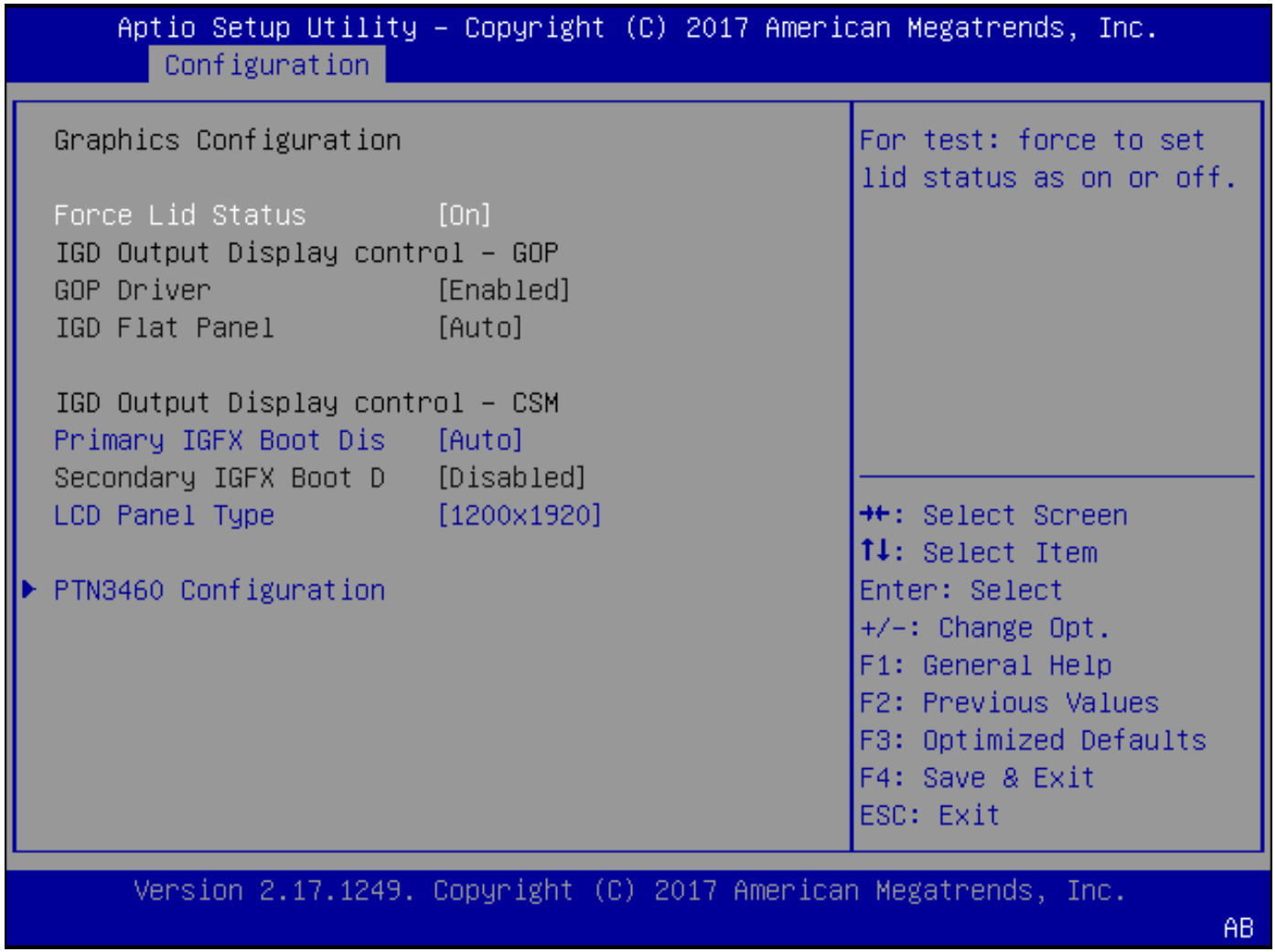


Figure 13 BIOS - Configuration – Graphics

6.7.1 PTN3460 Configuration

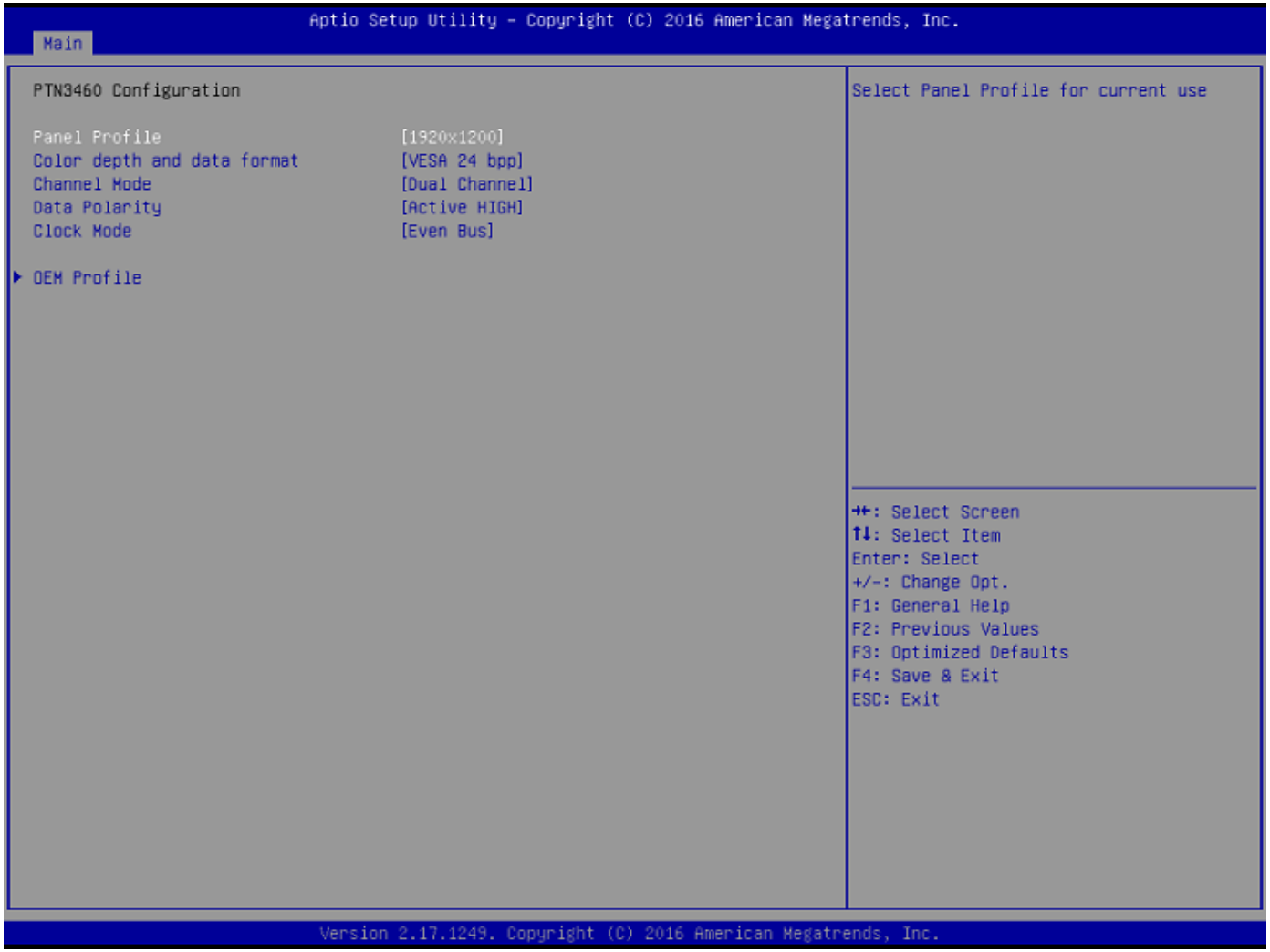


Figure 14 BIOS - Graphics - PTN3460

6.7.2 OEM Profile

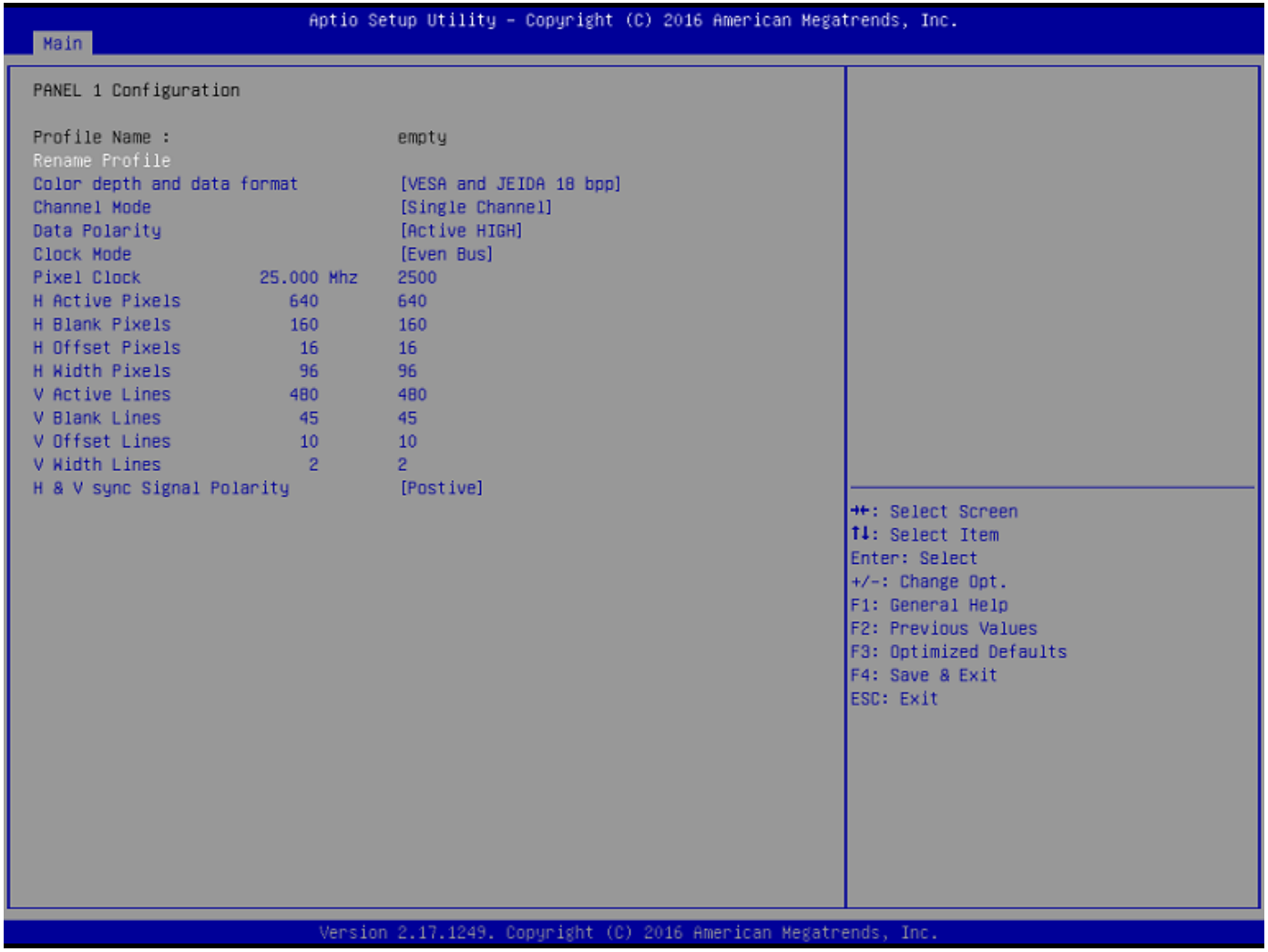


Figure 15 BIOS - PTN3460 - OEM

6.8 PCIE

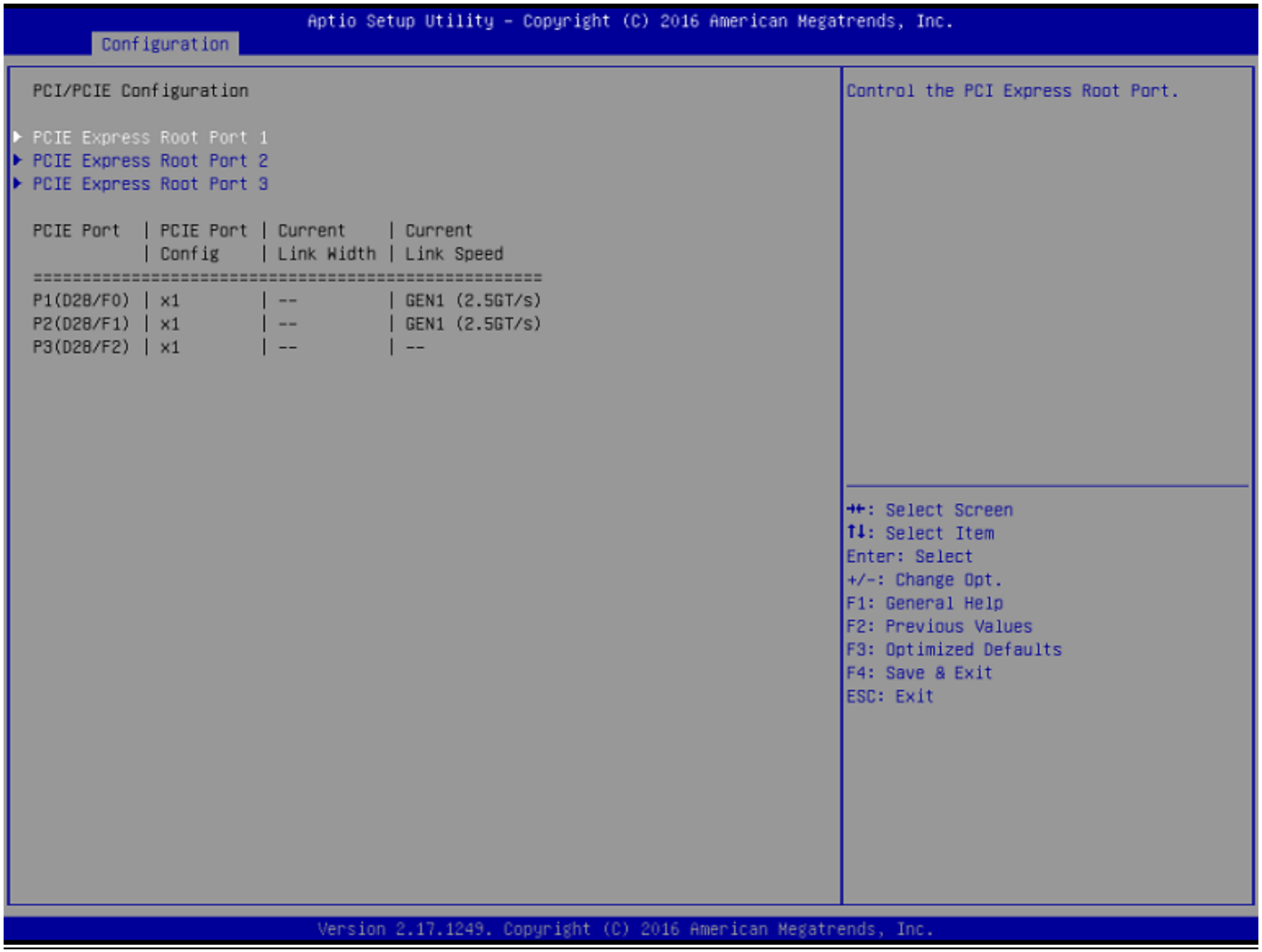


Figure 16 BIOS - Configuration - PCIE 1-2

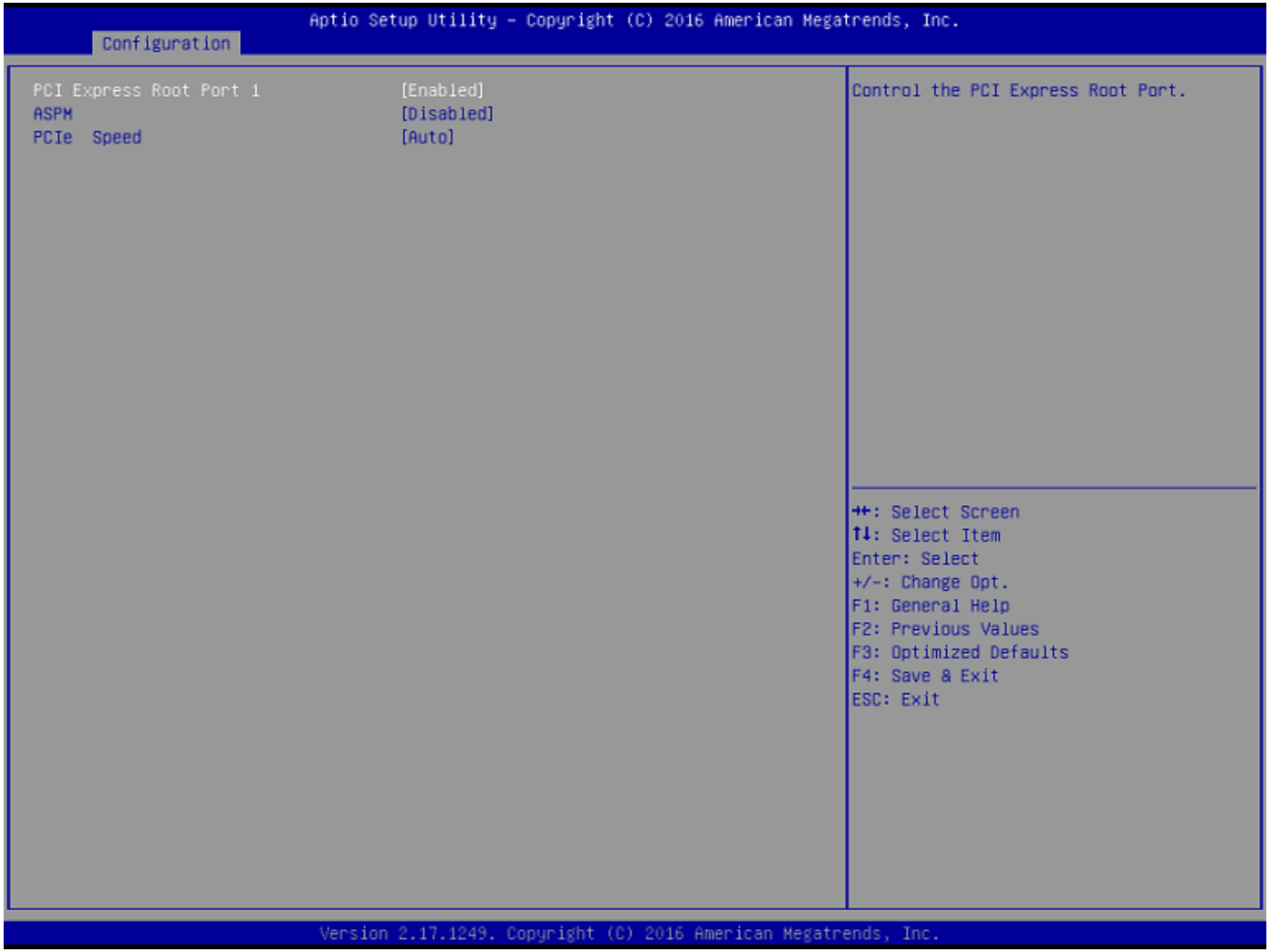


Figure 17 BIOS - Configuration - PCIE 2-2

6.9 SATA

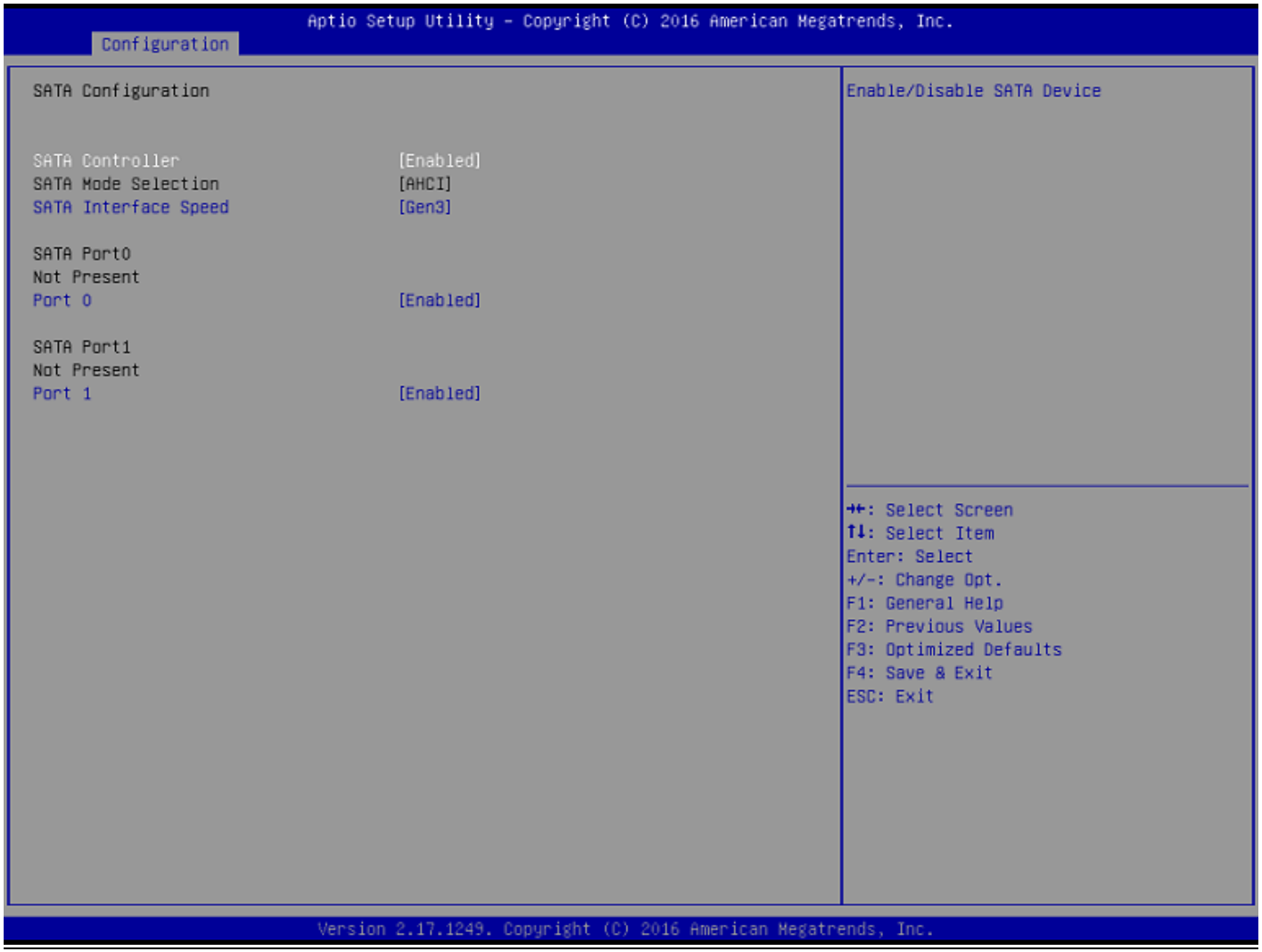


Figure 19 BIOS - Configuration - SATA

6.10 USB

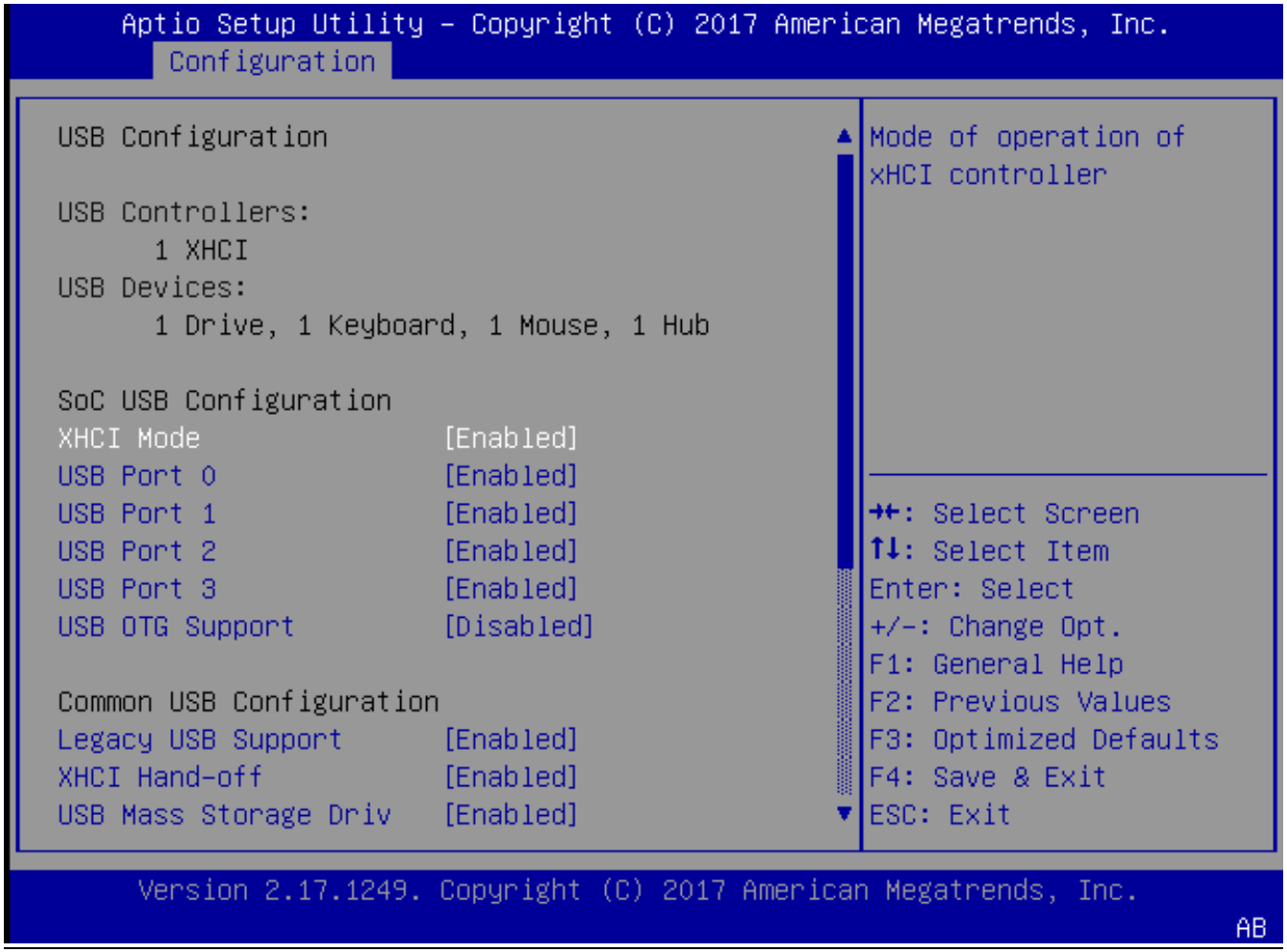


Figure 18 BIOS - Configuration - USB 1-2

6.11 Power Control

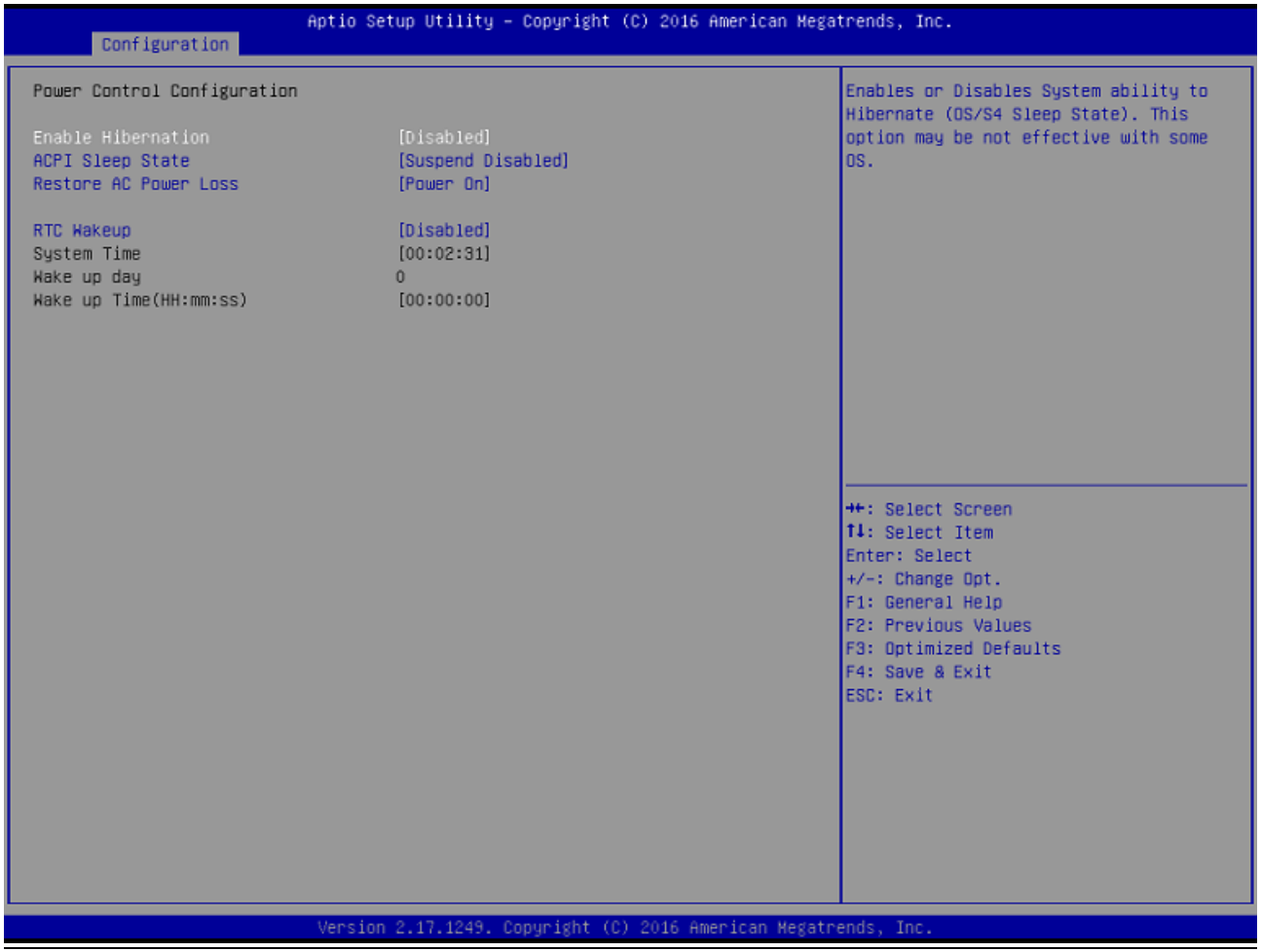


Figure 19 BIOS - Configuration - Power

6.12 TPM

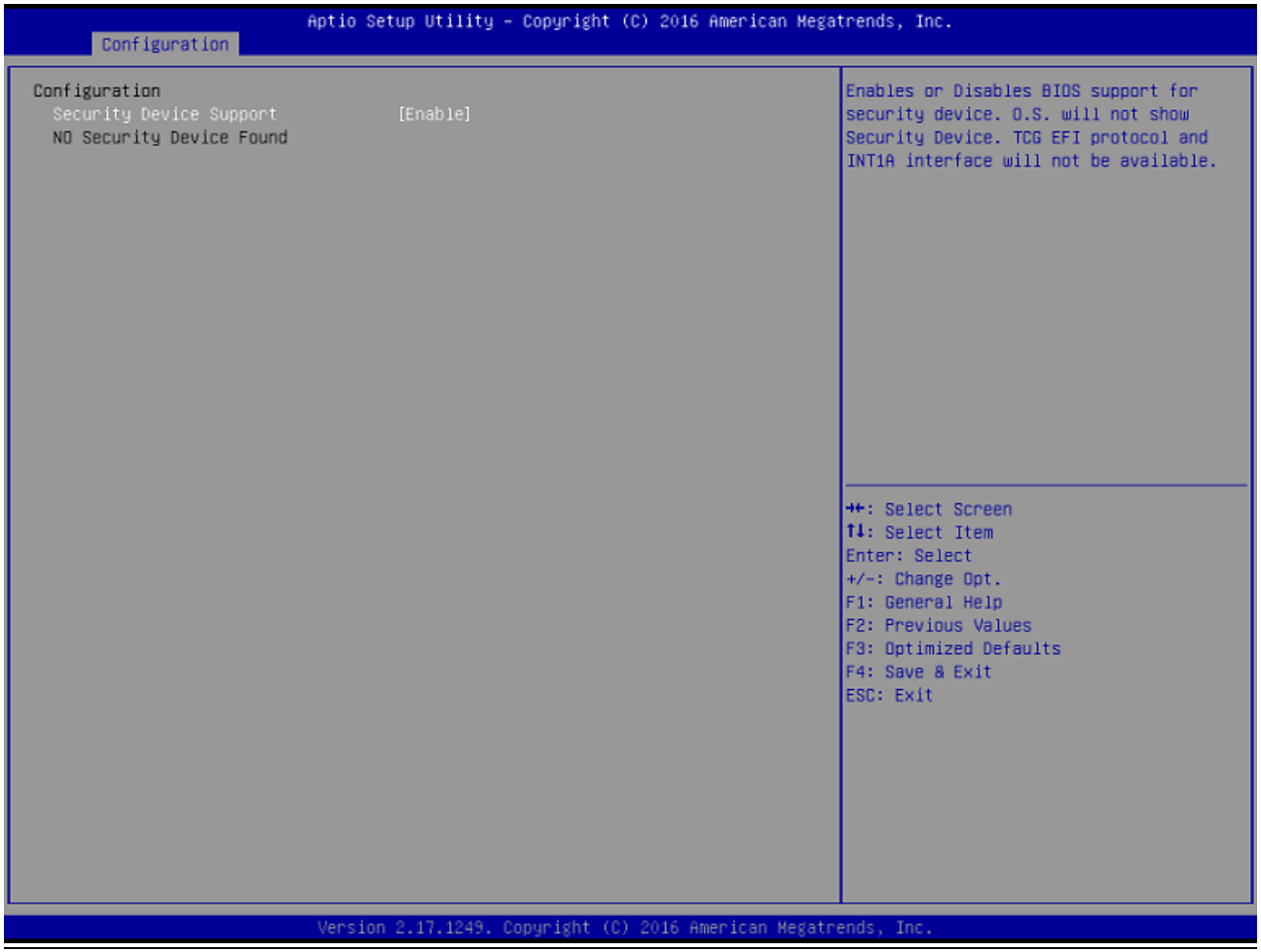


Figure 20 BIOS - Configuration - TPM

6.13 Super IO

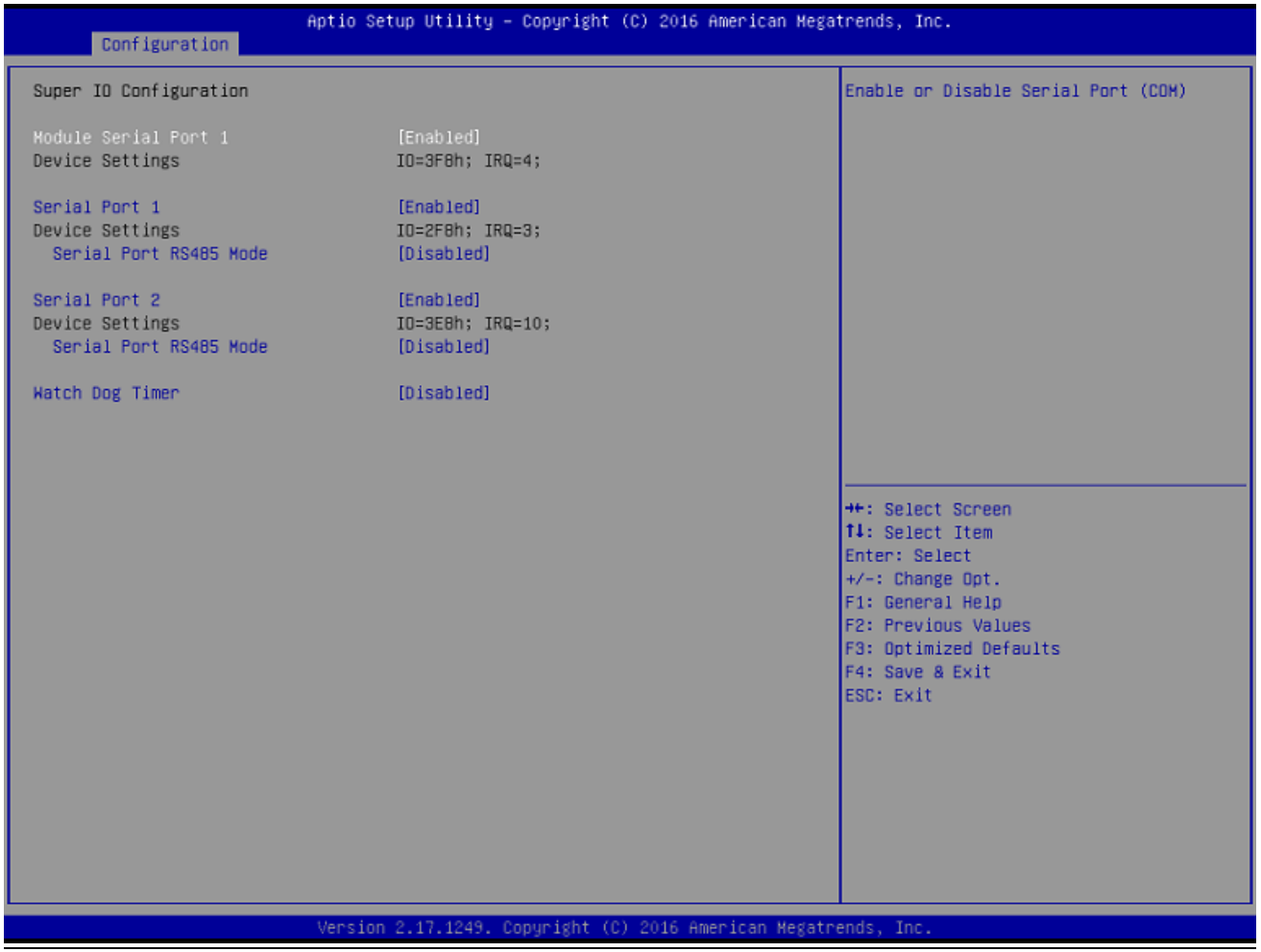


Figure 21 BIOS - Configuration - SuperIO

6.14 H/W Monitor

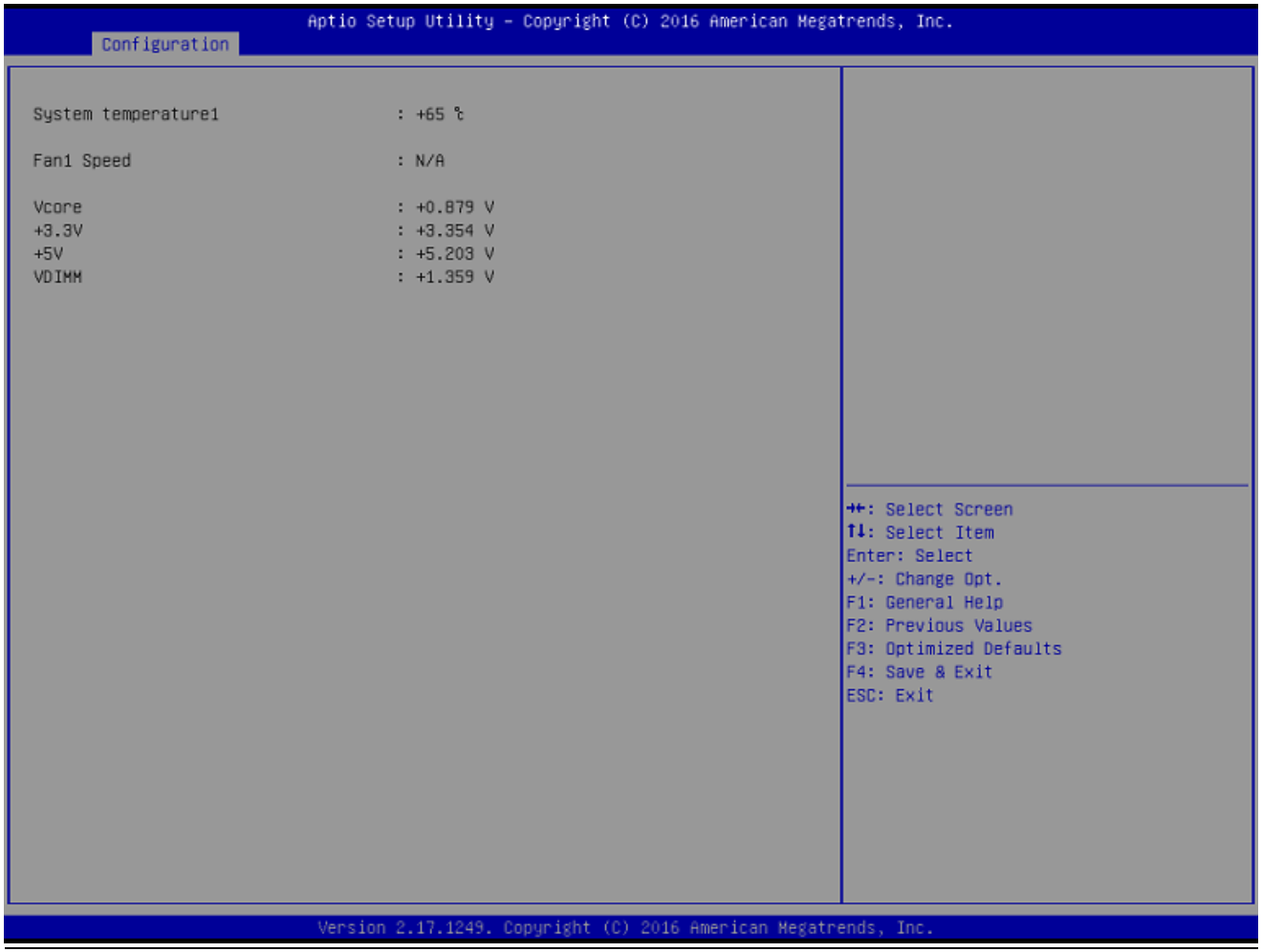


Figure 22 BIOS - Configuration - H/W Monitor

6.15 Serial Port Console

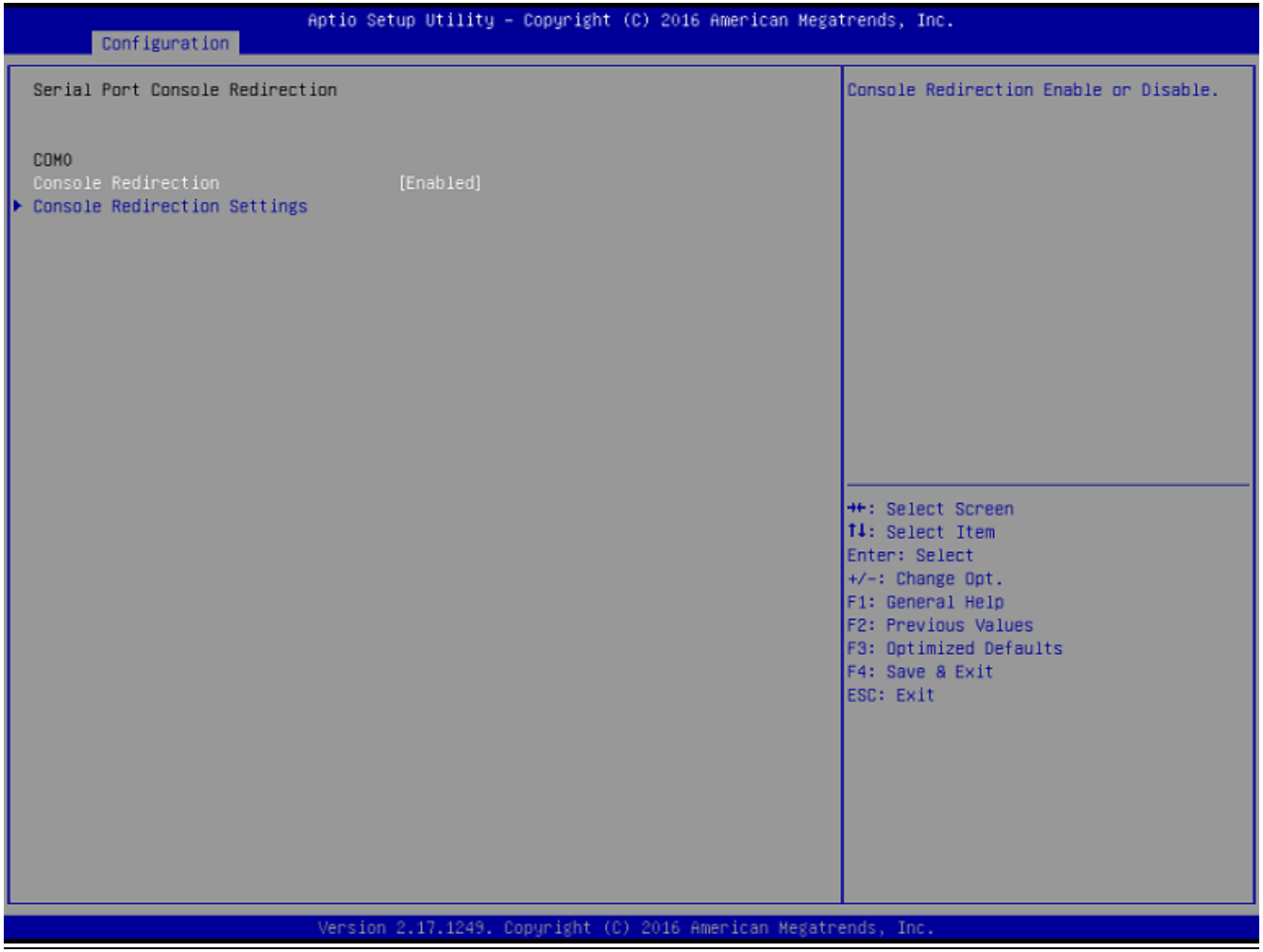


Figure 23 BIOS - Configuration - Serial Port Console

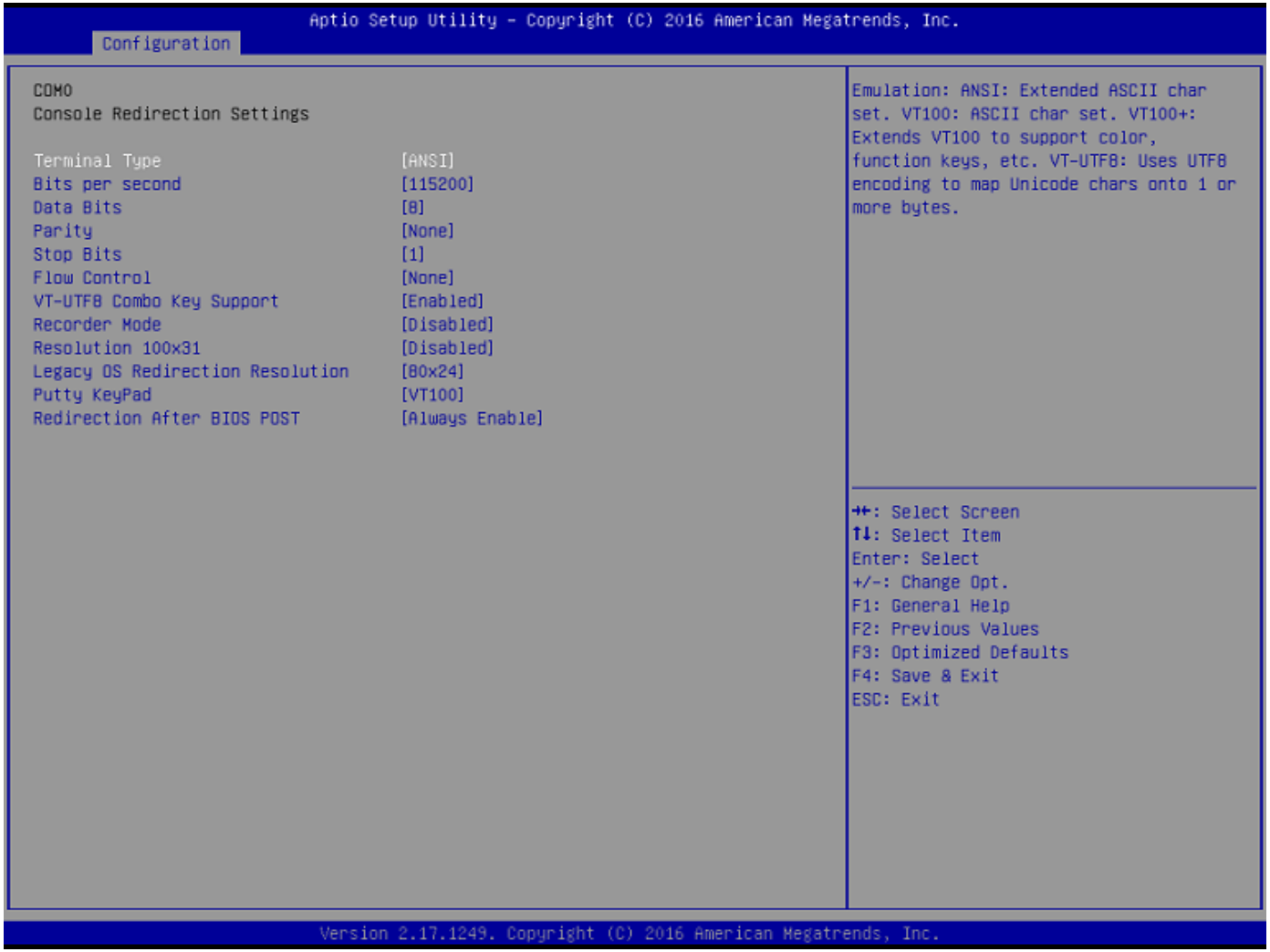


Figure 24 COM0 Console Redirection Settings

6.16 Security

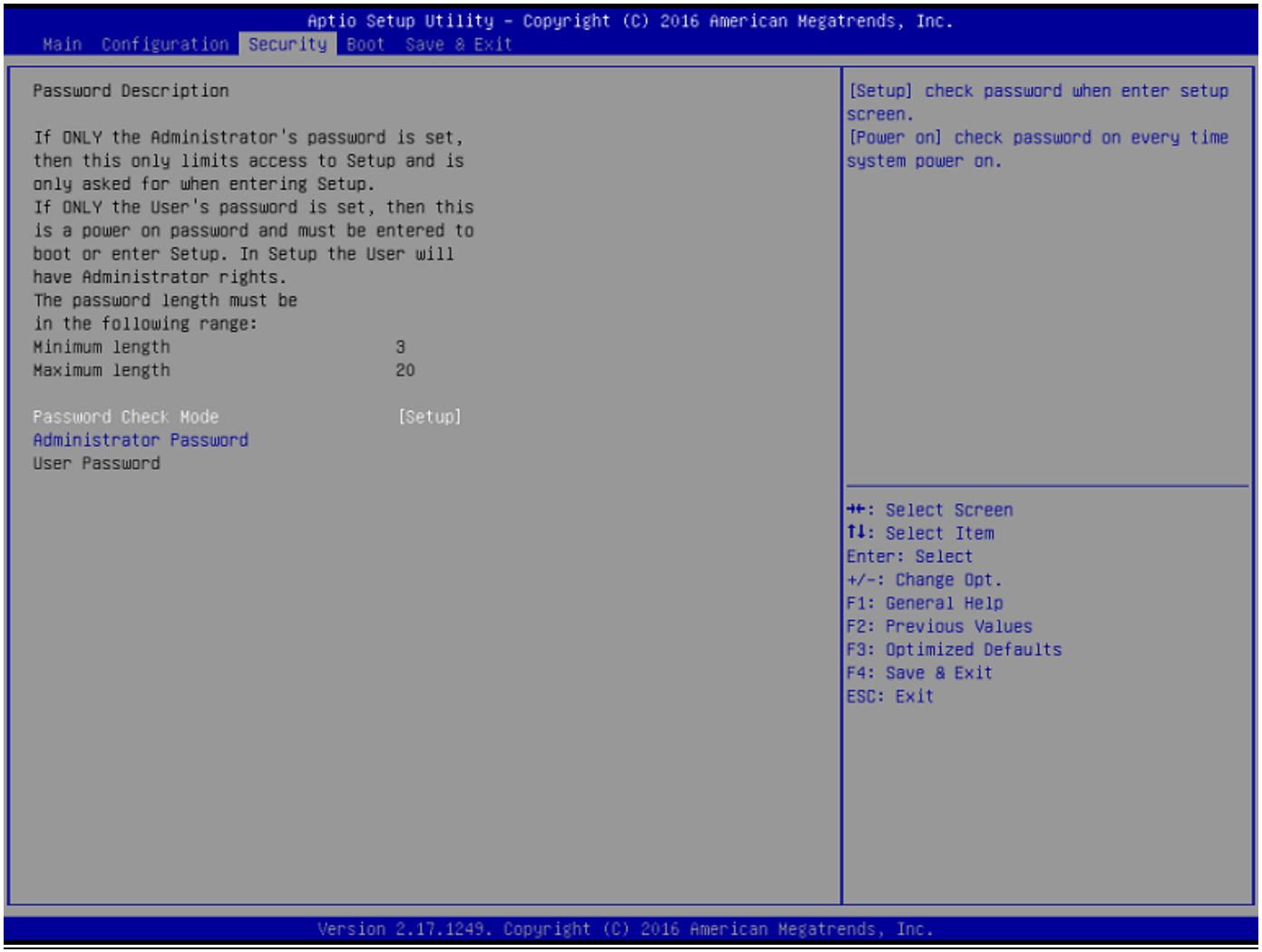


Figure 27 BIOS - Security

6.17 Boot

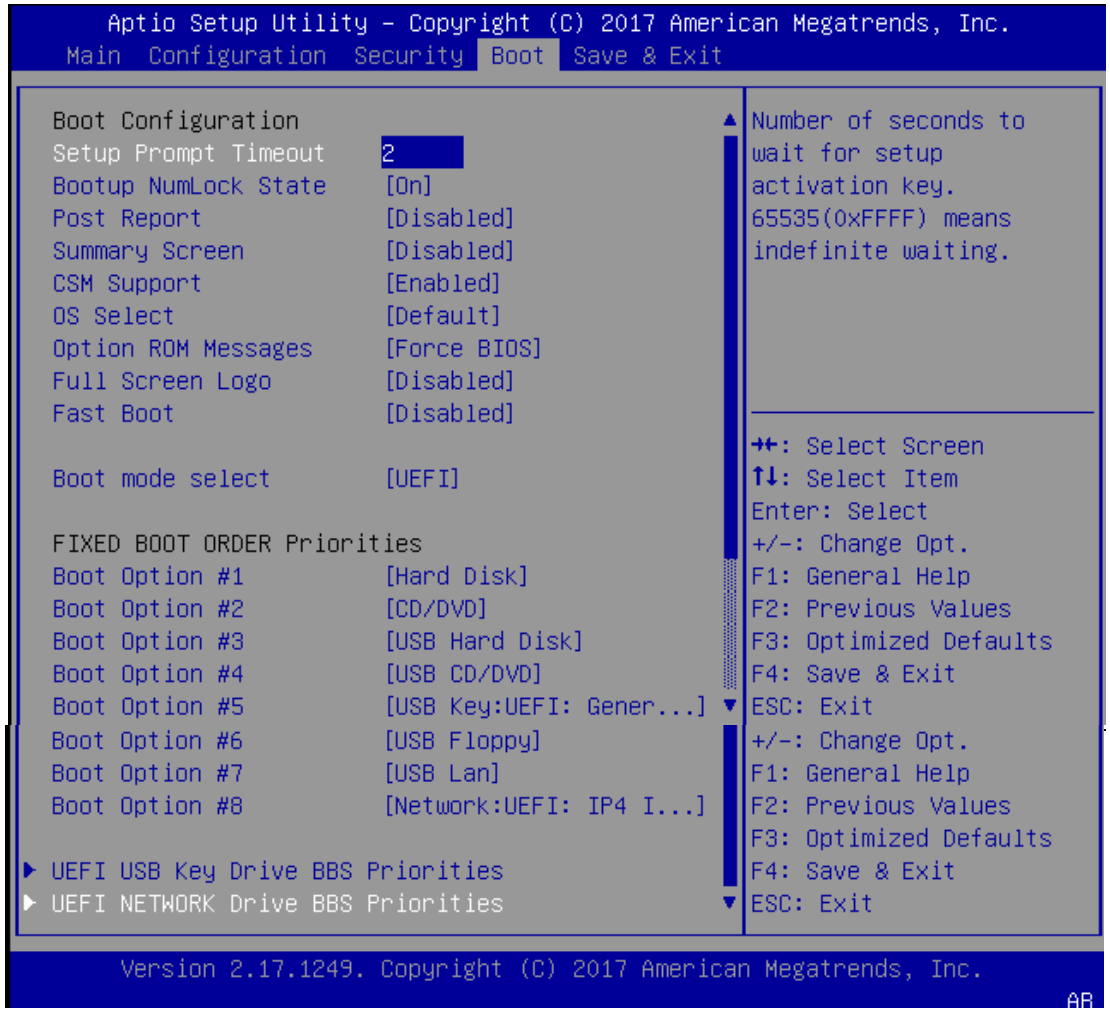


Figure 28 BIOS – Boot

6.18 Save & Exit

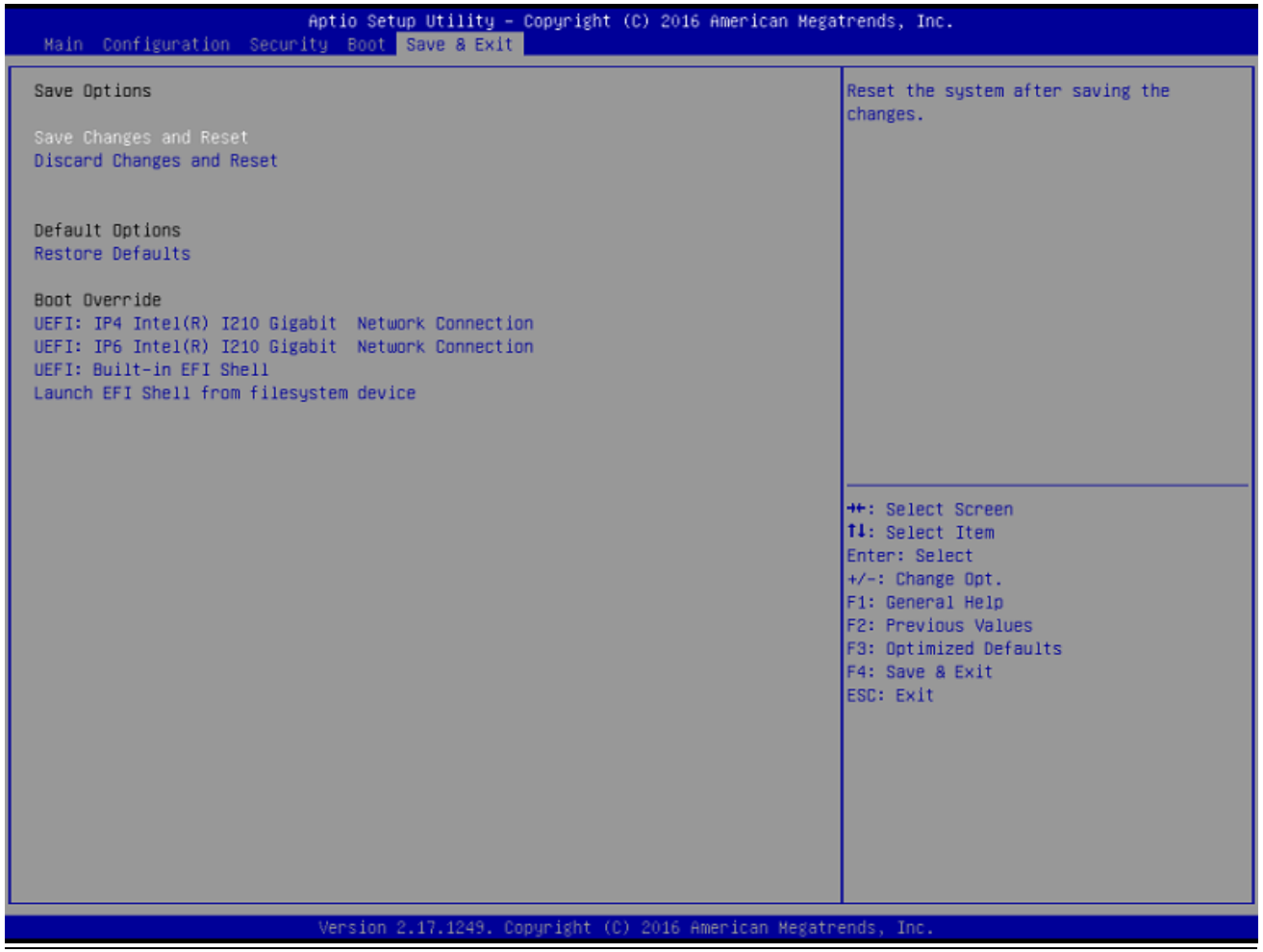


Figure 29 BIOS - Save & Exit

7 System Resources

Device	I/O Address	Note
Embedded Controller (ITE8528)	6E/6F	EC Address
	62/66	EC ACPI CMD Port
	200/201	EC BRAM Port for I2C function
	0x3F8~0x3FF	EC UART0

Table 16 System Resource - EC IO Address

Interrupt Request Lines IRQ		
IRQ#	*Current Use*	*Default Use*
IRQ 0	System ROM	System Timer
IRQ 1	System ROM	Keyboard Event
IRQ 2	【Unassigned】	Usable IRQ
IRQ 3	System ROM	COM2
IRQ 4	System ROM	COM1
IRQ 5	【Unassigned】	Usable IRQ
IRQ 6	System ROM	Diskette Event
IRQ 7	【Unassigned】	Usable IRQ
IRQ 8	System ROM	Real-Time Clock
IRQ 9	【Unassigned】	Usable IRQ
IRQ 10	【Unassigned】	Usable IRQ
IRQ 11	【Unassigned】	Usable IRQ
IRQ 12	System ROM	IBM Mouse Event
IRQ 13	System ROM	Coprocessor Error
IRQ 14	System ROM	Hard Disk Event
IRQ 15	【Unassigned】	Usable IRQ

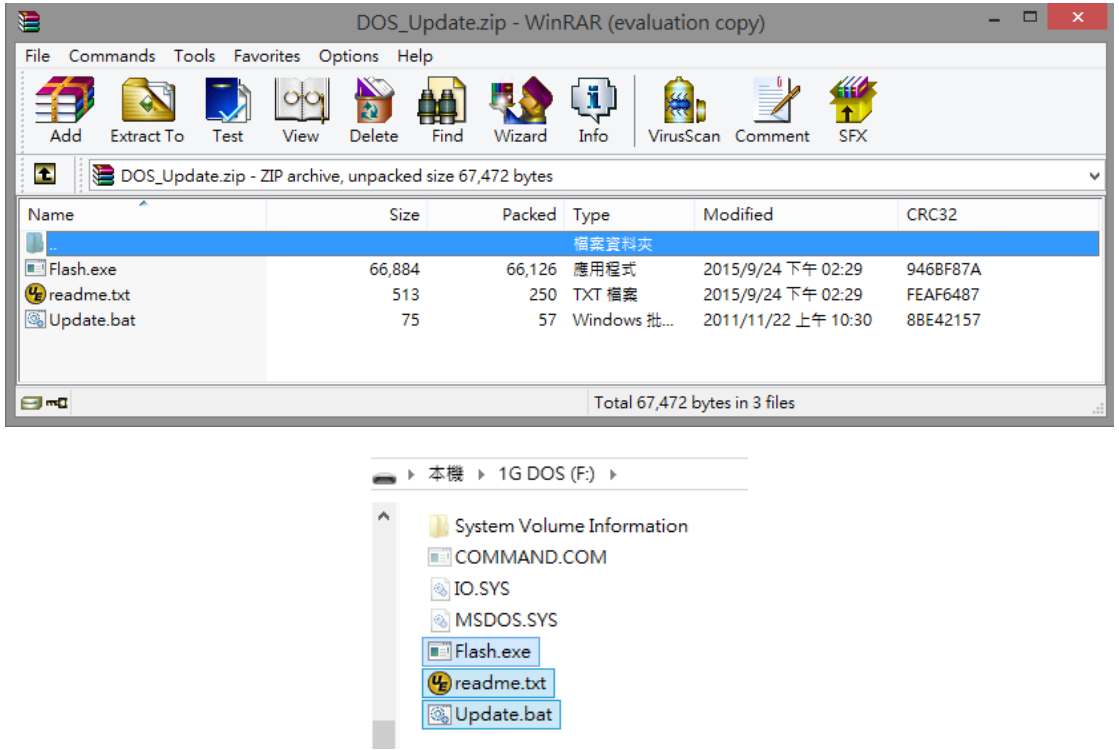
Table 17 System Resource IRQ

8 BIOS Update

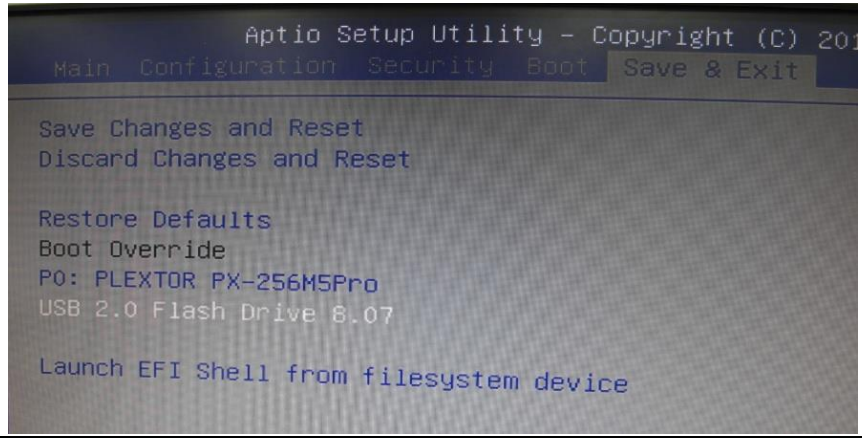
BIOS/EC DOS Update SOP process

Step 1. Create a DOS USB DOK (Caution : Must be FAT or FAT32 format).

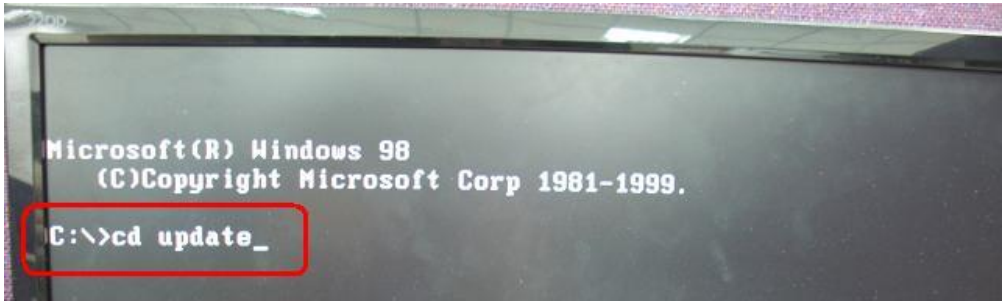
Step 2. Unzip update file to the DOS USB DOK.



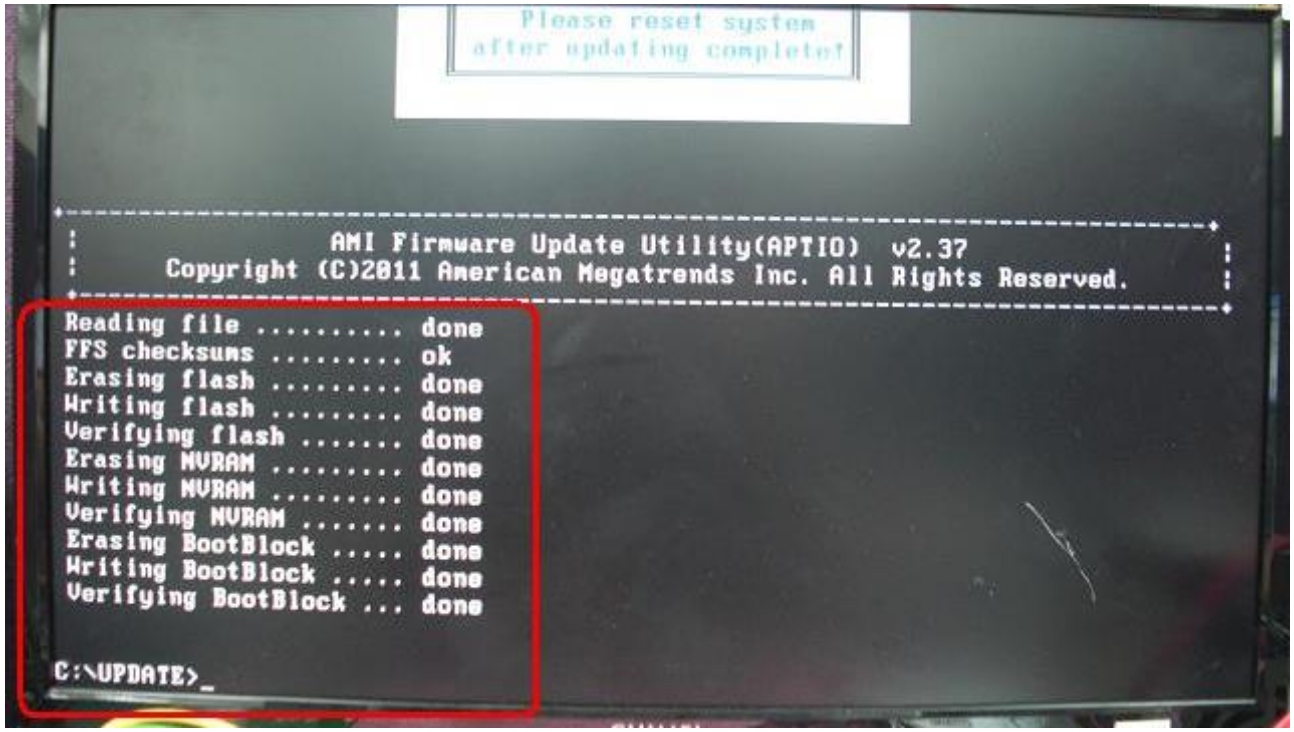
Step 3. Plug the DOS USB DOK to the target system and boot from the DOS USB DOK.



Step 4. Under the update file folder, type command: "update" and press enter.



Step 5. The update process will start and you can see the update progress. Once finished, please power off and restart the system.

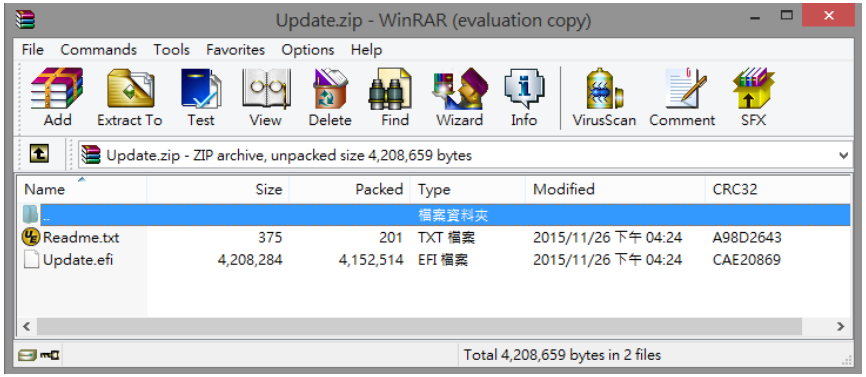


<End of BIOS/EC DOS update process>

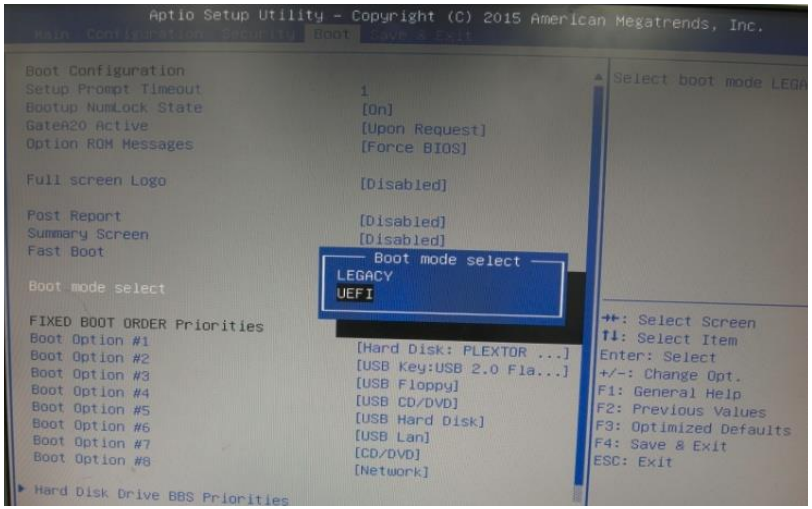
BIOS/EC UEFI Update SOP process

Step 1. Prepare a USB DOK (Caution : Must be FAT or FAT32 format).

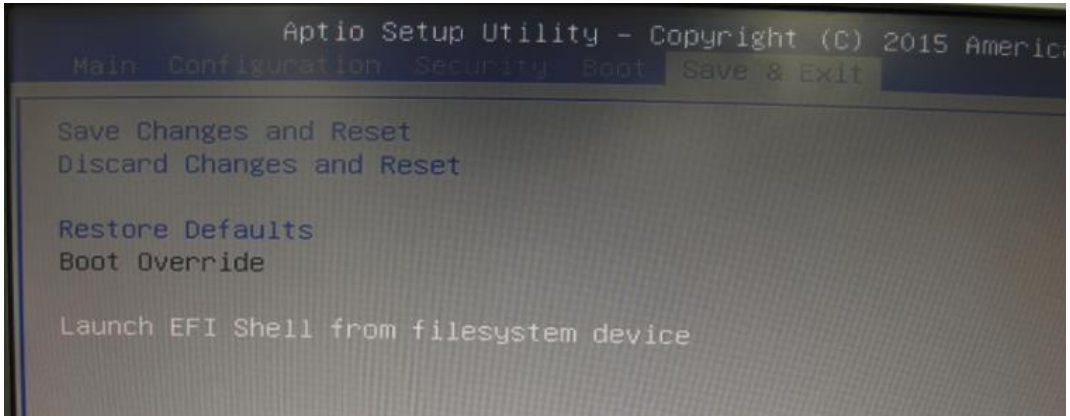
Step 2. Unzip update file to the USB DOK.



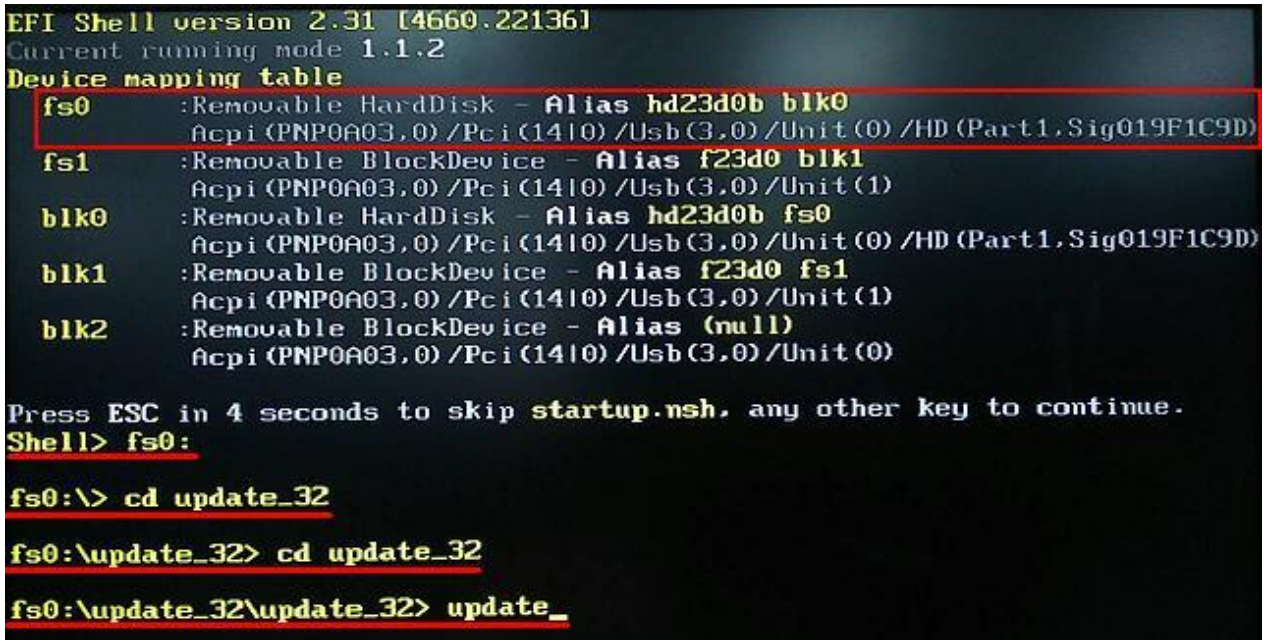
Step 3. Select UEFI boot mode in the BIOS boot menu and save, then restart the system.



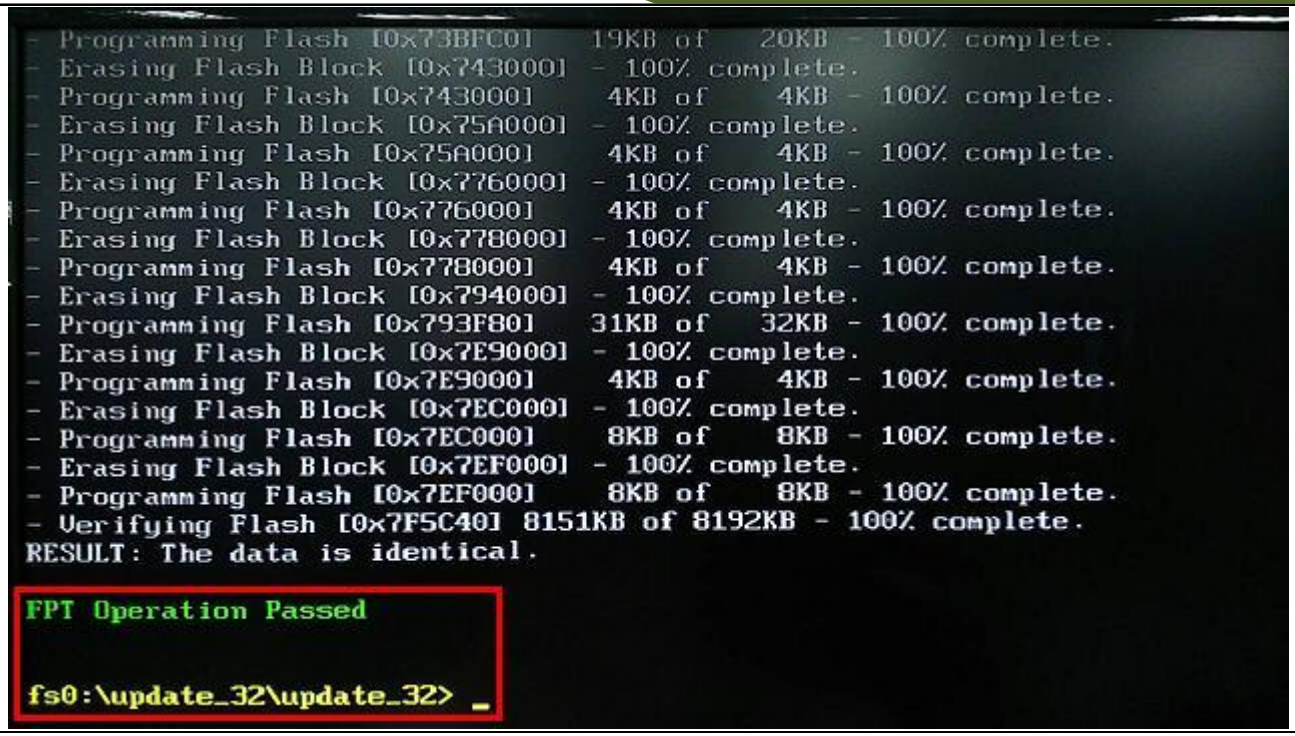
Step 4. Plug the USB DOK to the target system and boot from UEFI Shell.



Step 5. Under the UEFI shell, direct to your USB DOK, below example fs0 and type command: "update" and press enter.



Step 6. The update process will start and you can see the update progress. Once finished, please power off and restart the system.



<End of BIOS/EC UEFI update process>

9 MITWELL Software Tool

MITWELL Evaluation Tool (PET)

The MITWELL Evaluation Tool (PET) is an API which MITWELL's customers can access the GPIO, I2C, SMBus, etc under Windows and Linux OS. For more information please contact MITWELL.

MITWELL BIOS web Tool (PBT)

The MITWELL BIOS web Tool (PBT) is a brand new on-line utility which innovated by MITWELL. PBT now is available for MITWELL's premiere customers who are able to add customized BIOS logo and change BIOS default settings on American Megatrends (AMI) BIOS. Please contact MITWELL for more information.

MITWELL EC Auto Test Tool (PECAT)

The MITWELL EC Auto Test Tool (PECAT) is a brand new utility which innovated by MITWELL. PECAT now is available for MITWELL's premiere customers, who are able to Test Embedded Controller Function in UEFI Mode. Please contact MITWELL for more information.

10 Industry Specifications

The list below provides links to industry specifications that apply to MITWELL COM Express 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/
Qseven specification http://www.qseven-standard.org/