

# COM Express™ PCOM-B639VG User's Guide Rev 1.3

## Revision History

Rev 1.0	Official release
Rev 1.1	Renew H/S assembly figure Revise supporting 0~60 ° C operating temperature
Rev 1.2	Add Kabylake information
Rev 1.3	Add i7-6820 sku on order list

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# Preface

This PCOM-B639VG User's Guide contains detail information of the product specifications, features, mechanical dimensions, heat sink/cooler and BIOS Setup.

PCOM-B639VG is designed and follow the COM (Computer On Module) PICMG Open Modular Computing Standards.

- ✧ COM Express™ Specification Rev2.1
- ✧ COM Express™ Design Guide Rev2.0

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# 1 Introduction

PCOM-B639VG User's Guide contains detail information of the product specifications, features, mechanical dimensions, heat sink/cooler and BIOS Setup.

PCOM-B639VG is designed according to COM (Computer On Module) PICMG Open Modular Computing Standards COM Express™ Specification Rev2.1 Type 6 and Basic form factor (125x95cm).

PCOM-B639VG, a brand new COM Express Type 6, Basic form factor Module product launched by Portwell Inc. PCOM-B639VG Module board is designed with Intel® Core™ 7<sup>th</sup>/6<sup>th</sup> Generation Kabylake/Skylake - H Mobile processor series. PCOM-B639VG Mobile Celeron and Core i series processors targeting on middle to high end performance, Thermal Design Power (TDP) available from 25W to 45W. Two DDR4 SO-DIMM slots support both ECC and Non-ECC type memory. For high bandwidth IO, one PEG(1x16 PCIE 3.0) and 8x1 PCIE 3.0, 4 SATA 3.0 ports, 4 USB3.0 ports and 1 GbE are integrated on PCOM-B639VG, which ensures the high speed signals are smoothly transferred to Carrier. HD Graphics 510/530 controller brings 4K high-definition resolution. Furthermore, PCOM-B639VG is able to operates in extreme environment from 0 ° C ~ 60 ° C.

## 2 Block Diagram

### PCOM-B639VG

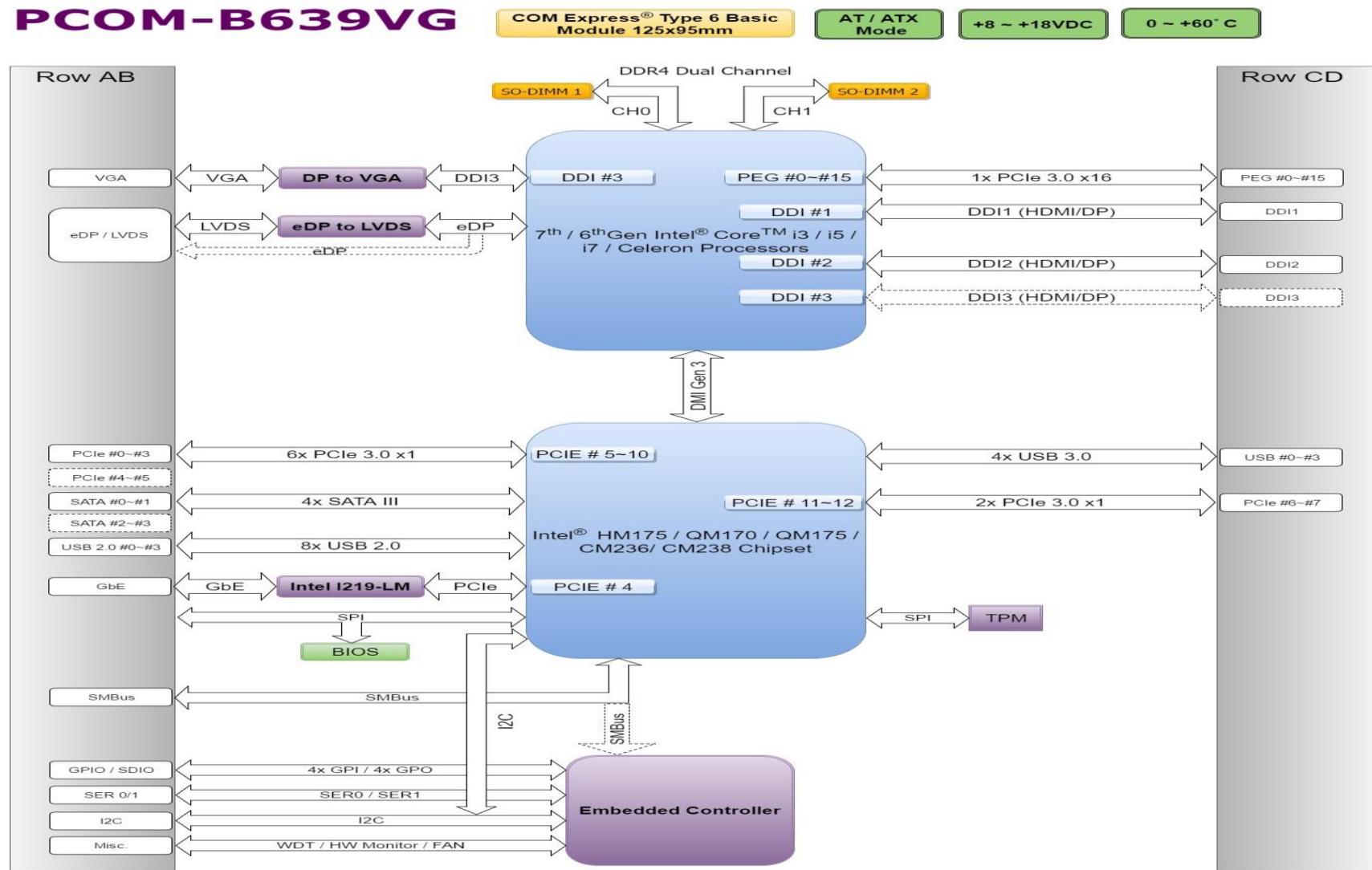


Figure 1 Block Diagram

### 3 Specifications

<b>General</b>	
Product	➤ <a href="#">PCOM-B639VG</a>
Form Factor	➤ COM Express™ standard pin out Type 6 Rev. 2.1 (Basic 125 x 95mm / 4.92" x 3.74").
Processor	➤ <a href="#">Intel® Celeron® Processor G3902E</a> ➤ <a href="#">Intel® Celeron® Processor G3900E</a> ➤ <a href="#">Intel® Core™ i3-6102E Processor</a> ➤ <a href="#">Intel® Core™ i3-6100E Processor</a> ➤ <a href="#">Intel® Core™ i5-6442EQ Processor</a> ➤ <a href="#">Intel® Core™ i5-6440EQ Processor</a> ➤ <a href="#">Intel® Core™ i7-6822EQ Processor</a> ➤ <a href="#">Intel® Core™ i7-6820EQ Processor</a> ➤ <a href="#">Intel® Core™ i7-7820EQ Processor</a> ➤ <a href="#">Intel® Core™ i5-7442EQ Processor</a> ➤ <a href="#">Intel® Core™ i5-7440EQ Processor</a> ➤ <a href="#">Intel® Core™ i3-7102E Processor</a> ➤ <a href="#">Intel® Core™ i3-7100E Processor</a>
Chipset	➤ <a href="#">QM170 (Non-ECC)</a> ➤ <a href="#">CM236 (ECC)</a> ➤ <a href="#">QM175 (Non-ECC)</a> ➤ <a href="#">CM238 (ECC)</a>
BIOS	➤ AMI Aptio5 BIOS

Memory	<ul style="list-style-type: none"> <li>➤ 2x SODIMM slots DDR4 ECC / Non-ECC</li> <li>➤ Dual channel</li> <li>➤ Up to 32GB 2133MHz</li> </ul>
Security	<ul style="list-style-type: none"> <li>➤ TPM 2.0</li> </ul>

Table 1 PCOM-B639VG Specification 1-2

<b>I/O Interface</b>	
Embedded Controller	<ul style="list-style-type: none"> <li>➤ ITE8528</li> </ul>
Serial IO	<ul style="list-style-type: none"> <li>➤ 8 GPIO (4 GPI and 4 GPO)</li> <li>➤ I2C (PCH or Embedded Controller)</li> <li>➤ 2 Serial Ports (TX and RX)</li> <li>➤ SMBus (PCH and Embedded Controller)</li> </ul>
Processor	<ul style="list-style-type: none"> <li>➤ 1 PCI Express x16 (PEG)</li> </ul>
PCI Express	<ul style="list-style-type: none"> <li>➤ Gen3 (8.0 GT/s)</li> <li>➤ 1x16 / 2x8 / 1x8 + 2x4 configurations</li> </ul>
PCH	<ul style="list-style-type: none"> <li>➤ 8 PCI Express</li> </ul>
PCI Express	<ul style="list-style-type: none"> <li>➤ Gen3 (8.0 GT/s)</li> <li>➤ 8x1 / 4x2 / 2x4 / 1x4 + 2x2 configurations</li> </ul>
USB	<ul style="list-style-type: none"> <li>➤ 8 x USB2.0 (480 Mbps)</li> <li>➤ 4 x USB3.0 (5 Gbps)</li> </ul>
SATA	<ul style="list-style-type: none"> <li>➤ 4 x SATA3.0 (6 Gbps)</li> </ul>
Ethernet	<ul style="list-style-type: none"> <li>➤ GbE (I219-LM)</li> </ul>
Audio	<ul style="list-style-type: none"> <li>➤ Intel® High Definition Audio</li> </ul>

<b>Display</b>	
Graphic Controller	<ul style="list-style-type: none"> <li>➤ Intel® HD Graphics 510 (Processor dependent)</li> <li>➤ Intel® HD Graphics 530 (Processor dependent)</li> </ul>
Graphics Options	<ul style="list-style-type: none"> <li>➤ VGA (1920x1200 @ 60 Hz)</li> <li>➤ LVDS (1920x1200 @ 60 Hz)</li> <li>➤ 3 DDI HDMI / DP (1 Optional)</li> <li>➤ DP : 3840x2160 @ 60 Hz</li> <li>➤ HDMI : 3840x2160 @ 60Hz</li> </ul>
<b>Mechanical &amp; Environment</b>	
Dimension	<ul style="list-style-type: none"> <li>➤ COM Express™ standard pin out Type 6 Rev. 2.1</li> <li>➤ 125 x 95mm / 4.92" x 3.74" (Basic COM Express)</li> <li>➤ 14 Layer PCB</li> </ul>
Hardware Monitors	<ul style="list-style-type: none"> <li>➤ Voltage, Fan and Temperature</li> </ul>
Power DC IN	<ul style="list-style-type: none"> <li>➤ +12VDC (Nominal)</li> <li>➤ + 8 VDC ~ + 18 VDC (Wide range)</li> </ul>
Power Management	<ul style="list-style-type: none"> <li>➤ ACPI 4.0</li> </ul>
Environment	<ul style="list-style-type: none"> <li>➤ Operating Temperature 0 ° C ~ +60 ° C</li> <li>➤ Storage Temperature 0 ° C ~ +60 ° C</li> <li>➤ Relative Humidity 5%~95%</li> </ul>
Certification	<ul style="list-style-type: none"> <li>➤ CE</li> <li>➤ FCC CLASS A</li> </ul>
MTBF	<ul style="list-style-type: none"> <li>➤ Over 100,000 hours at room ambient 40 ° C</li> </ul>

Table 2 PCOM-B639VG Specification 2-2

### 3.1 PCOM-B639 Processor list

PCOM-B639VG Series	PCOM-B639VG-G3902E	PCOM-B639VG-G3900E	PCOM-B639VG-6100E	PCOM-B639VG-6102E	PCOM-B639VG-6440EQ	PCOM-B639VG-6442EQ	PCOM-B639VG-6820EQ	PCOM-B639VG-6822EQ
Ordering P/N	AB1-3E35	AB1-3E25	AB1-3E27	AB1-3E26	AB1-3E29	AB1-3E28	AB1-3E31	AB1-3E06
<b>Essentials</b>								
Processor	Intel® Celeron® G3902E	Intel® Celeron® G3900E	Intel® Core™ i3-6100E	Intel® Core™ i3-6102E	Intel® Core™ i5-6440EQ	Intel® Core™ i5-6442EQ	Intel® Core™ i7-6820EQ	Intel® Core™ i7-6822EQ
Cache	2 MB Intel® Smart Cache	2 MB Intel® Smart Cache	3 MB Intel® Smart Cache	3 MB Intel® Smart Cache	6 MB Intel® Smart Cache	6 MB Intel® Smart Cache	8 MB Intel® Smart Cache	8 MB Intel® Smart Cache
Bus Type	DMI3							
System Bus	8 GT/s	8 GT/s DMI3	8 GT/s	8 GT/s				
Instruction Set	64-bit							
Instruction Set Extensions	SSE4.1/4.2	SSE4.1/4.2	SSE4.1/4.2, AVX 2.0					
<b>Performance</b>								
# of Cores	2	2	2	2	4	4	4	4
# of Threads	2	2	4	4	4	4	8	8
Processor Base Frequency	1.6 GHz	2.4 GHz	2.7 GHz	1.9 GHz	2.7 GHz	1.90 GHz	2.8 GHz	2 GHz
TDP	25 W	35 W	35 W	25 W	45 W	25 W	45 W	25 W
Max Turbo Frequency	NA	NA	NA	NA	3.4 GHz	2.70 GHz	3.5 GHz	2.8 GHz

<b>Graphics Specifications</b>								
Processor Graphics	Intel® HD Graphics 510	Intel® HD Graphics 510	Intel® HD Graphics 530					
Graphics Base Frequency	350 MHz	350.00 MHz	350 MHz	350 MHz				
Graphics Max Dynamic Frequency	950 MHz	950 MHz	950 MHz	950 MHz	1 GHz	1 GHz	1 GHz	1 GHz
Graphics Video Max Memory	64 GB							
Max Resolution (HDMI 1.4)	4096x2304 @24Hz							
Max Resolution (DP)	4096x2304 @60Hz							
Max Resolution (eDP - Integrated Flat Panel)	4096x2304 @60Hz							
DirectX* Support	12	12	12	12	12	12	12	12
OpenGL* Support	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
# of Displays Supported	3	3	3	3	3	3	3	3

<u>Expansion Options</u>								
PCI Express Revision	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCI Express Configurations	Up to 1x16, 2x8, 1x8+2x4							
Max # of PCI Express Lanes	16	16	16	16	16	16	16	16
<u>Package Specifications</u>								
T JUNCTION	100°C							
<u>Advanced Technologies</u>								
Intel® Turbo Boost Technology	No	No	No	No	2.0	2.0	2.0	2.0
Intel® vPro Technology	No	No	No	No	Yes	Yes	Yes	Yes
Intel® Hyper-Threading Technology	No	No	Yes	Yes	No	No	Yes	Yes
Intel® Virtualization Technology (VT-x)	Yes							

Intel® Virtualization Technology for Directed I/O (VT-d)	Yes							
Intel® VT-x with Extended Page Tables (EPT)	Yes							

&lt;Continue&gt;

PCOM-B639VG Series	PCOM-B639VG-7100E	PCOM-B639VG-7102E	PCOM-B639VG-7440EQ	PCOM-B639VG-7442EQ	PCOM-B639VG-7820EQ
Ordering P/N	AB1-3G45	AB1-3G44	AB1-3G47	AB1-3G46	AB1-3G48
<b>Essentials</b>					
Processor	Intel® Core® i3-7100E	Intel® Core® i3-7102E	Intel® Core™ i5-7440EQ	Intel® Core™ i5-7442EQ	Intel® Core™ i7-7820EQ
Cache	3 MB Intel® Smart Cache	3 MB Intel® Smart Cache	6 MB Intel® Smart Cache	6 MB Intel® Smart Cache	8 MB Intel® Smart Cache
Bus Type	DMI3	DMI3	DMI3	DMI3	DMI3
System Bus	8 GT/s				
Instruction Set	64-bit	64-bit	64-bit	64-bit	64-bit
Instruction Set Extensions	SSE4.1/4.2, AVX 2.0				
<b>Performance</b>					
# of Cores	2	2	4	4	4
# of Threads	4	4	4	4	8
Processor Base Frequency	2.9 GHz	2.1 GHz	2.9 GHz	2.1 GHz	3.0 GHz
TDP	35 W	25 W	45 W	25 W	45 W
Max Turbo Frequency	NA	NA	3.60 GHz	2.90 GHz	3.70 GHz

Processor Graphics	Intel® HD Graphics 630				
Graphics Base Frequency	350 MHz				
Graphics Max Dynamic Frequency	950 MHz	950 MHz	1.00 GHz	1.00 GHz	1.00 GHz
Graphics Video Max Memory	64 GB				
Max Resolution (HDMI 1.4)	4096x2160 @30Hz	4096x2160 @30Hz	4096x2160 @30Hz	4096x2160 @30Hz	4096x2160 @30Hz
Max Resolution (DP)	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz
Max Resolution (eDP - Integrated Flat Panel)	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz	4096x2304 @60Hz
DirectX* Support	12	12	12	12	12
OpenGL* Support	4.4	4.4	4.4	4.4	4.4
# of Displays Supported	3	3	3	3	3

<u>Expansion Options</u>					
PCI Express Revision	3.0	3.0	3.0	3.0	3.0
PCI Express Configurations	Up to 1x16, 2x8, 1x8+2x4				
Max # of PCI Express Lanes	16	16	16	16	16
<u>Package Specifications</u>					
T JUNCTION	100°C	100°C	100°C	100°C	100°C
<u>Advanced Technologies</u>					
Intel® Turbo Boost Technology	No	No	2.0	2.0	2.0
Intel® vPro Technology	No	No	Yes	Yes	Yes
Intel® Hyper-Threading Technology	Yes	Yes	No	No	Yes
Intel® Virtualization Technology (VT-x)	Yes	Yes	Yes	Yes	Yes
Intel® Virtualization Technology for Directed I/O (VT-d)	Yes	Yes	Yes	Yes	Yes
Intel® VT-x with Extended Page Tables (EPT)	Yes	Yes	Yes	Yes	Yes

Table 3 PCOM-B639 Processor list

### 3.2 Supported Operating Systems

The PCOM-B639VG 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
	Microsoft Windows 2008 R2 SP1	Yes
	Microsoft Windows 2012	Yes
	Microsoft Windows 2012 R2	Yes
Linux	Fedora 22 (kernel 4.0.4-301)	Yes
	Ubuntu 15.04 (kernel 3.11.6.4)	Yes

Table 4 Supported Operating Systems

### 3.3 Windows OS driver

Please download the drivers from Portwell download center website [http://www.portwell.tw/support/download\\_center.php](http://www.portwell.tw/support/download_center.php)

Item	Driver version	Description
Chipset	10.0.27	Driver_PCOM-B639_Chipset_WIN_7_8_10_2K8R2_2K12(R2)_32b_64b
Graphic	15.36.20.4206	Driver_PCOM-B639_GFX_WIN_7_8_10_2K8_Vista_32b
Graphic	15.40.14.64.4352	Driver_PCOM-B639_GFX_WIN_7_8_10_2K8(R2)_2K12(R2)_Vista_64b
Serial IO	30.63.1519.07	Driver_PCOM-B639_Serial IO_WIN_8.1_2K12R2_10_64b
USB_3.0	MR3_PV_4.0.3.49	Driver_PCOM-B639_USB3.0_WIN_7_2K8R2(64b only)_32b_64b
ME_Driver	25.11.2014.0925	Driver_PCOM-B639_ME_WIN_All_32b_64b
LAN I219	20.6	Driver_PCOM-B639_LAN_WIN_7_8_2K8R2_2K12(R2)_32b_64b

Table 5 Windows OS driver list

### 3.4 Electrical Characteristics

Input voltage	+12VDC (Nominal) + 8 VDC ~ + 18 VDC (Wide range)
RTC Battery	2.3uA
Power on mode	AT / ATX

Table 6 Electrical Characteristics

### 3.5 Power sequence

PCOM-B639VG Power sequence

ATX Mode

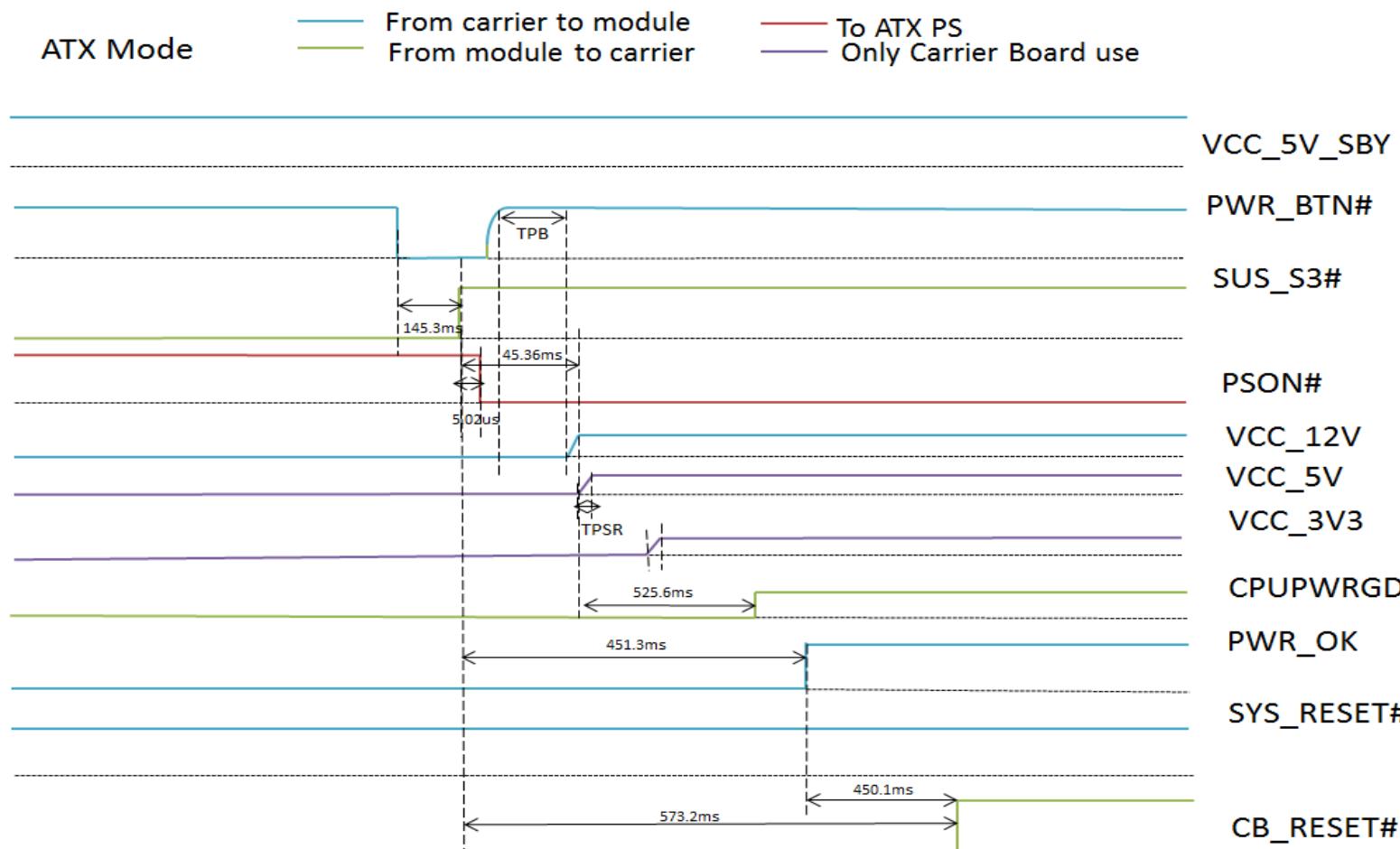


Figure 2 Power sequence ATX Mode

## AT Mode

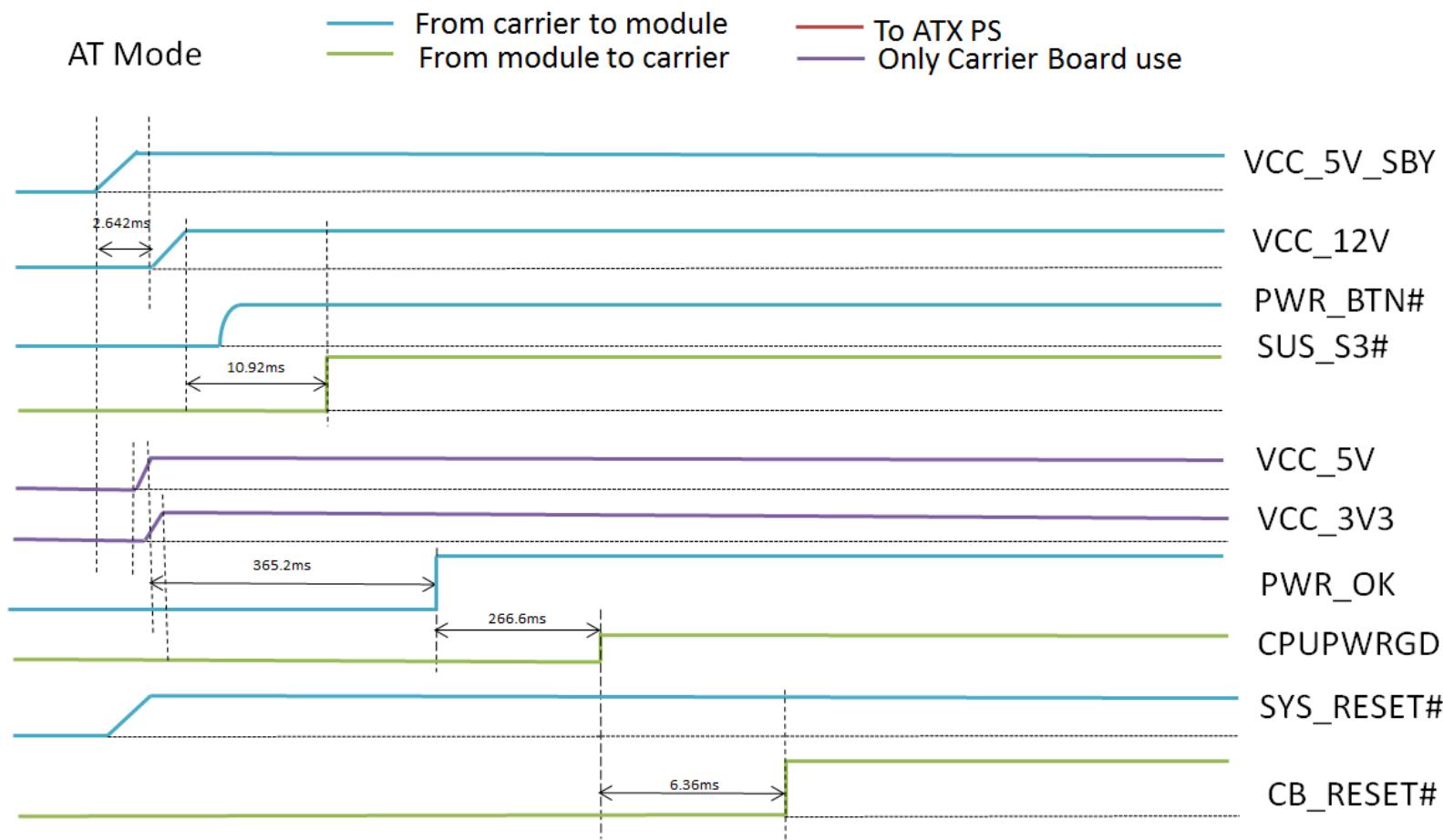
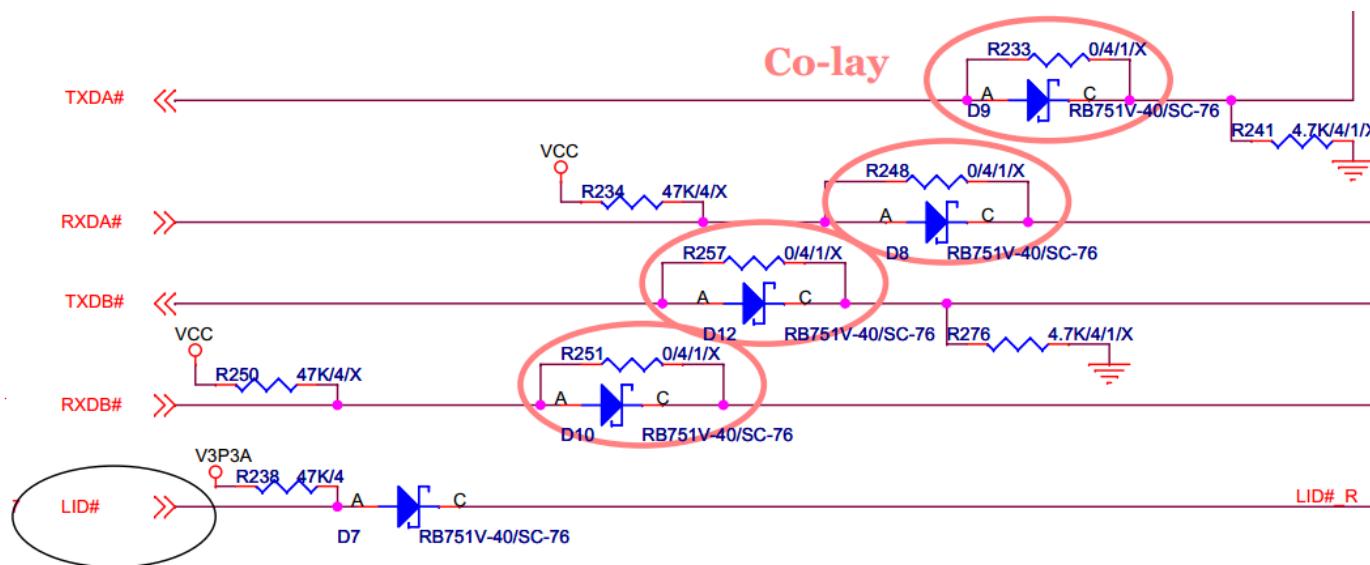


Figure 3 Power Sequence AT Mode

### 3.6 Circuit protection design

PCOM-B639VG Type 6 is also compatible with COM Express Type 2 carrier, Schottky diode protection has been design on the COM Express module for Serial Port, FAN(PWMOUT & TACHIN), LID and SLEEP. Considerations must be taken while designing carrier board.



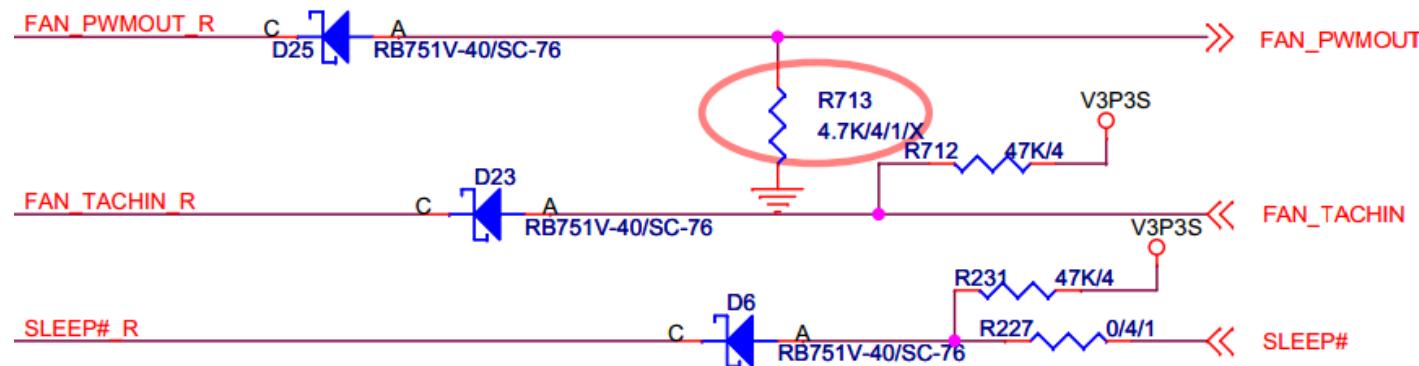
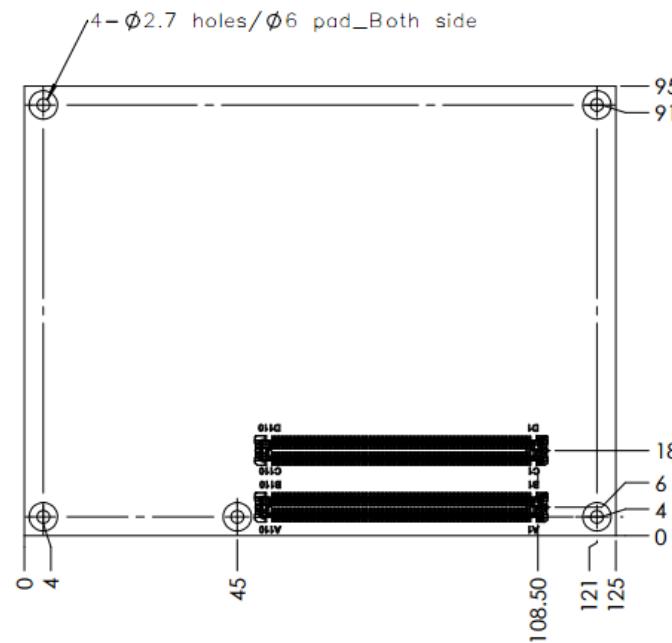
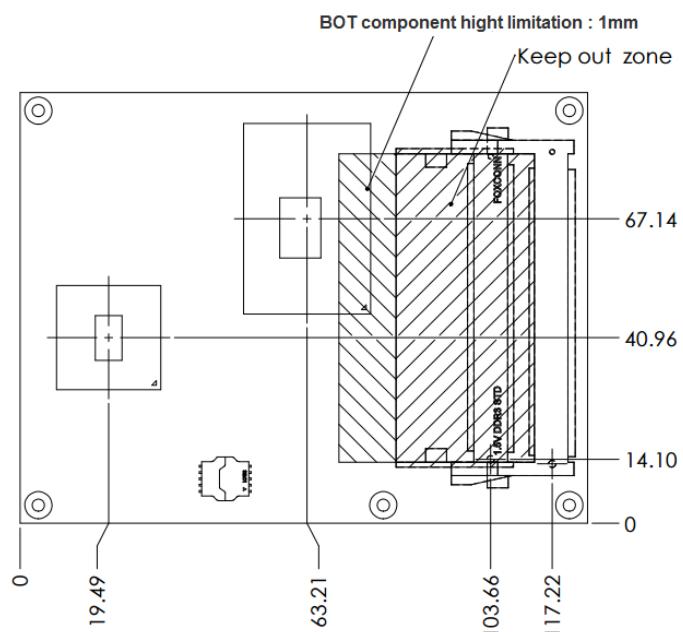


Figure 4 Circuit protection design

### 3.7 Mechanical Dimensions



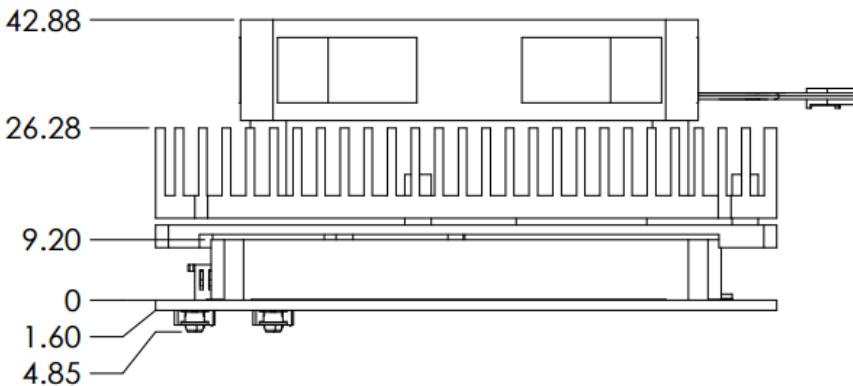


Figure 5 Mechanical Dimensions - Top/Bottom Assembly

Net weight

Module	102.0g +/- 2%
Cooler (H/S+FAN)	398.5g +/- 2%
H/S	346.0g +/- 2%

Table 7 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 8 Environmental Specifications

### 3.9 Ordering Guide

PCOM-B639VG

Product	Ordering P/N	Status
PCOM-B639VG-G3902E	AB1-3E35	Available
PCOM-B639VG-G3900E	AB1-3E25	Available
PCOM-B639VG-6100E	AB1-3E27	Available
PCOM-B639VG-6102E	AB1-3E26	Available
PCOM-B639VG-6440EQ	AB1-3E29	Available
PCOM-B639VG-6442EQ	AB1-3E28	Available
PCOM-B639VG-6820EQ	AB1-3E31	Available
PCOM-B639VG-6822EQ	AB1-3E06	Available
PCOM-B639VG-7100E	AB1-3G45	Available
PCOM-B639VG-7102E	AB1-3G44	Available
PCOM-B639VG-7440EQ	AB1-3G47	Available
PCOM-B639VG-7442EQ	AB1-3G46	Available
PCOM-B639VG-7820EQ	AB1-3G48	Available

Table 9 Ordering Guide - PCOM-B639VG

Accessory

Product	Ordering P/N	Status
PCOM-B639VG Cooler	B9971390	Available
PCOM-C605	AB1-3998	Available

Table 10 Ordering Guide - Accessory

## 4 Heat sink / Cooler dimensions

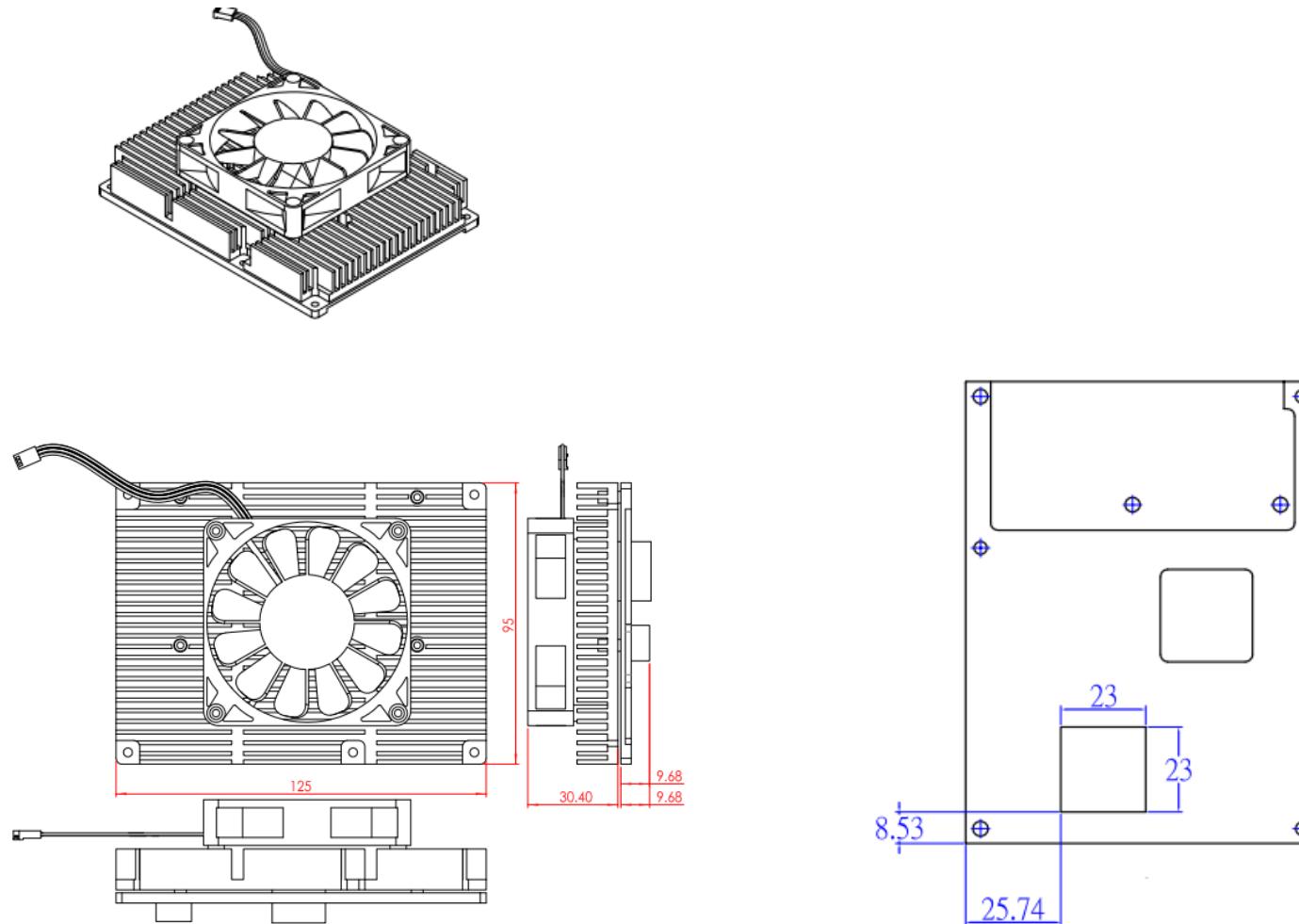


Figure 6 Heat sink / cooler mechanical dimensions

## 4.1 H/S Assembly

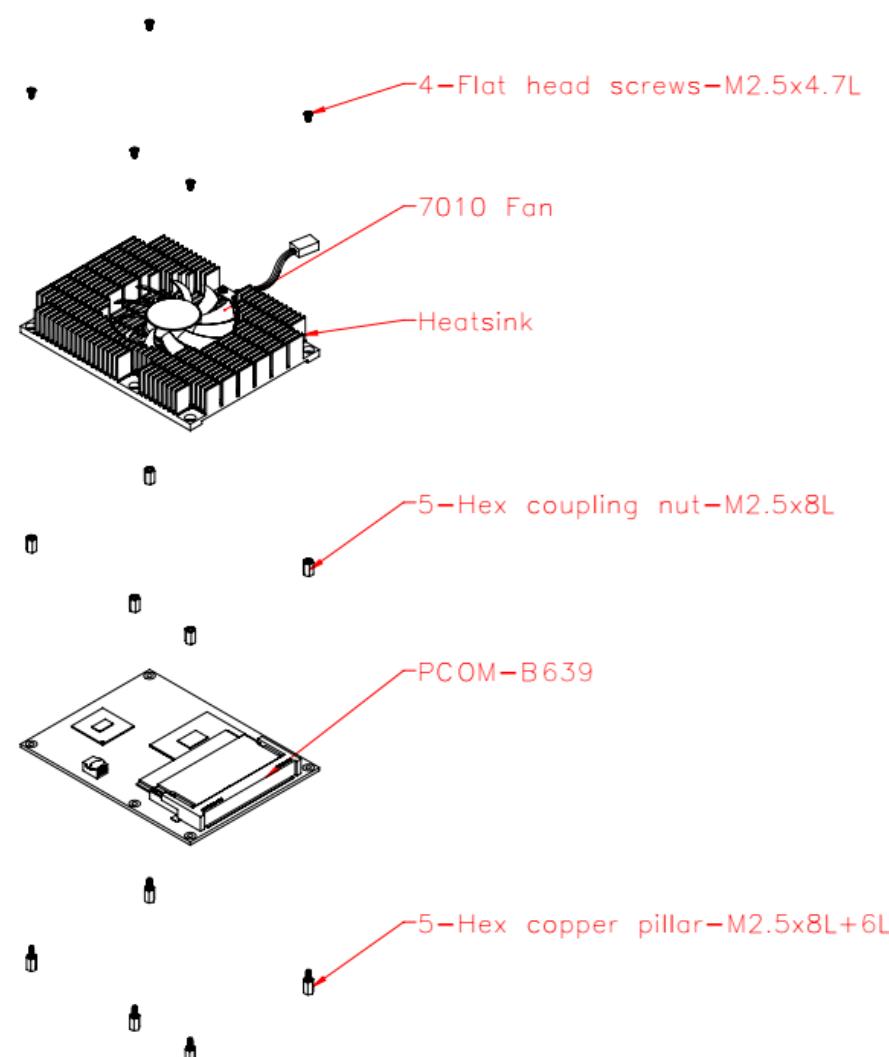


Figure 7 H/S Assembly guide

## 4.2 Packaging

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

Table 11 Packaging

## 5 Signal Descriptions and Pin out Tables

Below tables lists PCOM-B639VG AB and CD Row connectors Type 6 pin name, un-connected pins are highlighted as .

NC

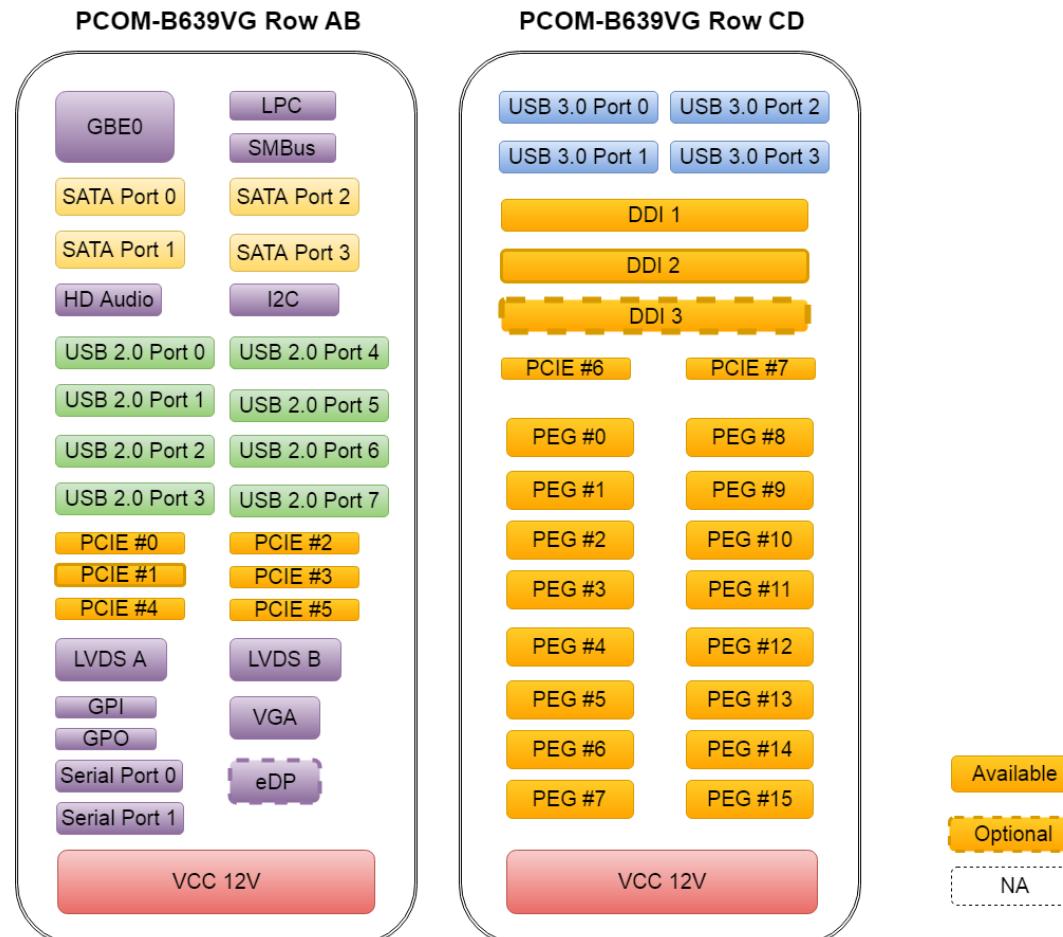


Table 42 PCOM-B639VG AB & CD row signals

PCOM-B639-ZR0 Pin out							
Pin	Row A		Row B		Row C		Row D
A1	GND(FIXED)	B1	GND(FIXED)	C1	GND(FIXED)	D1	GND(FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#	C2	GND	D2	GND
A3	GBE0_MDI3+	B3	LPC_FRAME#	C3	USB_SSRX0-	D3	USB_SSTX0-
A4	GBE0_LINK100#	B4	LPC_AD0	C4	USB_SSRX0+	D4	USB_SSTX0+
A5	GBE0_LINK1000#	B5	LPC_AD1	C5	GND	D5	GND
A6	GBE0_MDI2-	B6	LPC_AD2	C6	USB_SSRX1-	D6	USB_SSTX1-
A7	GBE0_MDI2+	B7	LPC_AD3	C7	USB_SSRX1+	D7	USB_SSTX1+
A8	GBE0_LINK#	B8	LPC_DRQ0#	C8	GND	D8	GND
A9	GBE0_MDI1-	B9	LPC_DRQ1#	C9	USB_SSRX2-	D9	USB_SSTX2-
A10	GBE0_MDI1+	B10	LPC_CLK	C10	USB_SSRX2+	D10	USB_SSTX2+
A11	GND(FIXED)	B11	GND(FIXED)	C11	GND(FIXED)	D11	GND(FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#	C12	USB_SSRX3-	D12	USB_SSTX3-
A13	GBE0_MDI0+	B13	SMB_CK	C13	USB_SSRX3+	D13	USB_SSTX3+
A14	GBE0_CTREF	B14	SMB_DAT	C14	GND	D14	GND
A15	SUS_S3#	B15	SMB_ALERT#	C15	DDI1_PAIR6+	D15	DDI1_CTRLCLK_AUX+
A16	SATA0_TX+	B16	SATA1_TX+	C16	DDI1_PAIR6-	D16	DDI1_CTRLDATA_AUX-
A17	SATA0_TX-	B17	SATA1_TX-	C17	RSVD19	D17	RSVD19
A18	SUS_S4#	B18	SUS_STAT#	C18	RSVD19	D18	RSVD19
A19	SATA0_RX+	B19	SATA1_RX+	C19	PCIE_RX6+	D19	PCIE_TX6+
A20	SATA0_RX-	B20	SATA1_RX-	C20	PCIE_RX6-	D20	PCIE_TX6-
A21	GND(FIXED)	B21	GND(FIXED)	C21	GND(FIXED)	D21	GND(FIXED)

A22	SATA2_TX+	B22	SATA3_TX+	C22	PCIE_RX7+	D22	PCIE_TX7+
A23	SATA2_TX-	B23	SATA3_TX-	C23	PCIE_RX7-	D23	PCIE_TX7-
A24	SUS_S5#	B24	PWR_OK	C24	DDI1_HPD	D24	RSVD19
A25	SATA2_RX+	B25	SATA3_RX+	C25	DDI1_PAIR4 +	D25	RSVD19
A26	SATA2_RX-	B26	SATA3_RX-	C26	DDI1_PAIR4-	D26	DDI1_PAIR0+
A27	BATLOW#	B27	WDT	C27	RSVD19	D27	DDI1_PAIR0-
A28	(S)ATA_ACT#	B28	AC/HDA_SDIN2	C28	RSVD19	D28	RSVD19
A29	AC/HDA_SYNC	B29	AC/HDA_SDIN1	C29	DDI1_PAIR5+	D29	DDI1_PAIR1+
A30	AC/HDA_RST#	B30	AC/HDA_SDIN0	C30	DDI1_PAIR5-	D30	DDI1_PAIR1-
A31	GND(FIXED)	B31	GND(FIXED)	C31	GND(FIXED)	D31	GND(FIXED)
A32	AC/HDA_BITCLK	B32	SPKR	C32	DDI2_CTRLCLK_AUX+	D32	DDI1_PAIR2+
A33	AC/HDA_SDOUT	B33	I2C_CK	C33	DDI2_CTRLDATA_AUX-	D33	DDI1_PAIR2-
A34	BIOS_DIS0#	B34	I2C_DAT	C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL
A35	THRMTRIP#	B35	THRM#	C35	RSVD19	D35	RSVD19
A36	USB6-	B36	USB7-	C36	DDI3_CTRLCLK_AUX+	D36	DDI1_PAIR3+
A37	USB6+	B37	USB7+	C37	DDI3_CTRLDATA_AUX-	D37	DDI1_PAIR3-
A38	USB_6_7_OC#	B38	USB_4_5_OC#	C38	DDI3_DDC_AUX_SEL	D38	RSVD19
A39	USB4-	B39	USB5-	C39	DDI3_PAIR0+	D39	DDI2_PAIR0+
A40	USB4+	B40	USB5+	C40	DDI3_PAIR0-	D40	DDI2_PAIR0-
A41	GND(FIXED)	B41	GND(FIXED)	C41	GND(FIXED)	D41	GND(FIXED)
A42	USB2-	B42	USB3-	C42	DDI3_PAIR1+	D42	DDI2_PAIR1+
A43	USB2+	B43	USB3+	C43	DDI3_PAIR1-	D43	DDI2_PAIR1-
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	DDI3_HPD	D44	DDI2_HPD

A45	USB0-	B45	USB1-	C45	RSVD19	D45	RSVD19
A46	USB0+	B46	USB1+	C46	DDI3_PAIR2+	D46	DDI2_PAIR2+
A47	VCC_RTC	B47	EXCD1_PERST#	C47	DDI3_PAIR2-	D47	DDI2_PAIR2-
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	C48	RSVD19	D48	RSVD19
A49	EXCD0_CPPE#	B49	SYS_RESET#	C49	DDI3_PAIR3+	D49	DDI2_PAIR3+
A50	LPC_SERIRQ	B50	CB_RESET#	C50	DDI3_PAIR3-	D50	DDI2_PAIR3-
A51	GND(FIXED)	B51	GND(FIXED)	C51	GND(FIXED)	D51	GND(FIXED)
A52	PCIE_TX5+	B52	PCIE_RX5+	C52	PEG_RX0+	D52	PEG_TX0+
A53	PCIE_TX5-	B53	PCIE_RX5-	C53	PEG_RX0-	D53	PEG_TX0-
A54	GPIO	B54	GPO1	C54	TYPE0#	D54	PEG_LANE_RV#
A55	PCIE_TX4+	B55	PCIE_RX4+	C55	PEG_RX1+	D55	PEG_TX1+
A56	PCIE_TX4-	B56	PCIE_RX4-	C56	PEG_RX1-	D56	PEG_TX1-
A57	GND	B57	GPO2	C57	TYPE1#	D57	TYPE2#
A58	PCIE_TX3+	B58	PCIE_RX3+	C58	PEG_RX2+	D58	PEG_TX2+
A59	PCIE_TX3-	B59	PCIE_RX3-	C59	PEG_RX2-	D59	PEG_TX2-
A60	GND(FIXED)	B60	GND(FIXED)	C60	GND(FIXED)	D60	GND(FIXED)
A61	PCIE_TX2+	B61	PCIE_RX2+	C61	PEG_RX3+	D61	PEG_TX3+
A62	PCIE_TX2-	B62	PCIE_RX2-	C62	PEG_RX3-	D62	PEG_TX3-
A63	GPIO1	B63	GPO3	C63	RSVD19	D63	RSVD19
A64	PCIE_TX1+	B64	PCIE_RX1+	C64	RSVD19	D64	RSVD19
A65	PCIE_TX1-	B65	PCIE_RX1-	C65	PEG_RX4+	D65	PEG_TX4+
A66	GND	B66	WAKE0#	C66	PEG_RX4-	D66	PEG_TX4-
A67	GPIO2	B67	WAKE1#	C67	RSVD19	D67	GND
A68	PCIE_TX0+	B68	PCIE_RX0+	C68	PEG_RX5+	D68	PEG_TX5+
A69	PCIE_TX0-	B69	PCIE_RX0-	C69	PEG_RX5-	D69	PEG_TX5-

A70	GND(FIXED)	B70	GND(FIXED)	C70	GND(FIXED)	D70	GND(FIXED)
A71	LVDS_A0+	B71	LVDS_B0+	C71	PEG_RX6+	D71	PEG_TX6+
A72	LVDS_A0-	B72	LVDS_B0-	C72	PEG_RX6-	D72	PEG_TX6-
A73	LVDS_A1+	B73	LVDS_B1+	C73	GND	D73	GND
A74	LVDS_A1-	B74	LVDS_B1-	C74	PEG_RX7+	D74	PEG_TX7+
A75	LVDS_A2+	B75	LVDS_B2+	C75	PEG_RX7-	D75	PEG_TX7-
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	RSVD19	D77	RSVD19
A78	LVDS_A3+	B78	LVDS_B3-	C78	PEG_RX8+	D78	PEG_TX8+
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	PEG_RX8-	D79	PEG_TX8-
A80	GND(FIXED)	B80	GND(FIXED)	C80	GND(FIXED)	D80	GND(FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	PEG_RX9+	D81	PEG_TX9+
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	PEG_RX9-	D82	PEG_TX9-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	C83	RSVD19	D83	RSVD19
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	GPI3	B85	VCC_5V_SBY	C85	PEG_RX10+	D85	PEG_TX10+
A86	RSVD19	B86	VCC_5V_SBY	C86	PEG_RX10-	D86	PEG_TX10-
A87	eDP_HPD	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#	C88	PEG_RX11+	D88	PEG_TX11+
A89	PCIE_CLK_REF-	B89	VGA_RED	C89	PEG_RX11-	D89	PEG_TX11-
A90	GND(FIXED)	B90	GND(FIXED)	C90	GND(FIXED)	D90	GND(FIXED)
A91	SPI_POWER	B91	VGA_GRN	C91	PEG_RX12+	D91	PEG_TX12+
A92	SPI_MISO	B92	VGA_BLU	C92	PEG_RX12-	D92	PEG_TX12-
A93	GPO0	B93	VGA_HSYNC	C93	GND	D93	GND
A94	SPI_CLK	B94	VGA_VSYNC	C94	PEG_RX13+	D94	PEG_TX13+

A95	SPI_MOSI	B95	VGA_I2C_CK	C95	PEG_RX13-	D95	PEG_TX13-
A96	TPM_PP	B96	VGA_I2C_DAT	C96	GND	D96	GND
A97	TYPE10#	B97	SPI_CS#	C97	RSVD19	D97	RSVD19
A98	SER0_TX	B98	RSVD19	C98	PEG_RX14+	D98	PEG_TX14+
A99	SER0_RX	B99	RSVD19	C99	PEG_RX14-	D99	PEG_TX14-
A100	GND(FIXED)	B100	GND(FIXED)	C100	GND(FIXED)	D100	GND(FIXED)
A101	SER1_TX	B101	FAN_PWNOUT	C101	PEG_RX15+	D101	PEG_TX15+
A102	SER1_RX	B102	FAN_TACHIN	C102	PEG_RX15-	D102	PEG_TX15-
A103	LID#	B103	SLEEP#	C103	GND	D103	GND
A104	VCC_12V	B104	VCC_12V	C104	VCC_12V	D104	VCC_12V
A105	VCC_12V	B105	VCC_12V	C105	VCC_12V	D105	VCC_12V
A106	VCC_12V	B106	VCC_12V	C106	VCC_12V	D106	VCC_12V
A107	VCC_12V	B107	VCC_12V	C107	VCC_12V	D107	VCC_12V
A108	VCC_12V	B108	VCC_12V	C108	VCC_12V	D108	VCC_12V
A109	VCC_12V	B109	VCC_12V	C109	VCC_12V	D109	VCC_12V
A110	GND(FIXED)	B110	GND(FIXED)	C110	GND(FIXED)	D110	GND(FIXED)

Table 13 PCOM-B639 Pin-out

## 6 BIOS Setup Items

PCOM-B639VG is equipped with the AMI BIOS stored in Flash ROM. These BIOS has a built-in Setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it is retained during power-off periods. When system is turned on, PCOM-B639VG communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. If any error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the SETUP program. Some errors are significant enough to abort the start up.

## 6.1 Entering Setup -- Launch System Setup

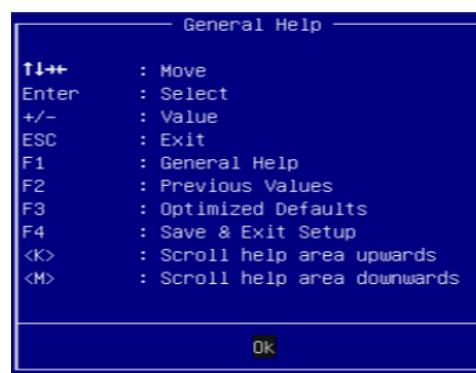
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del> key will enter BIOS setup screen.

### **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 Run General Help or Resume**

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

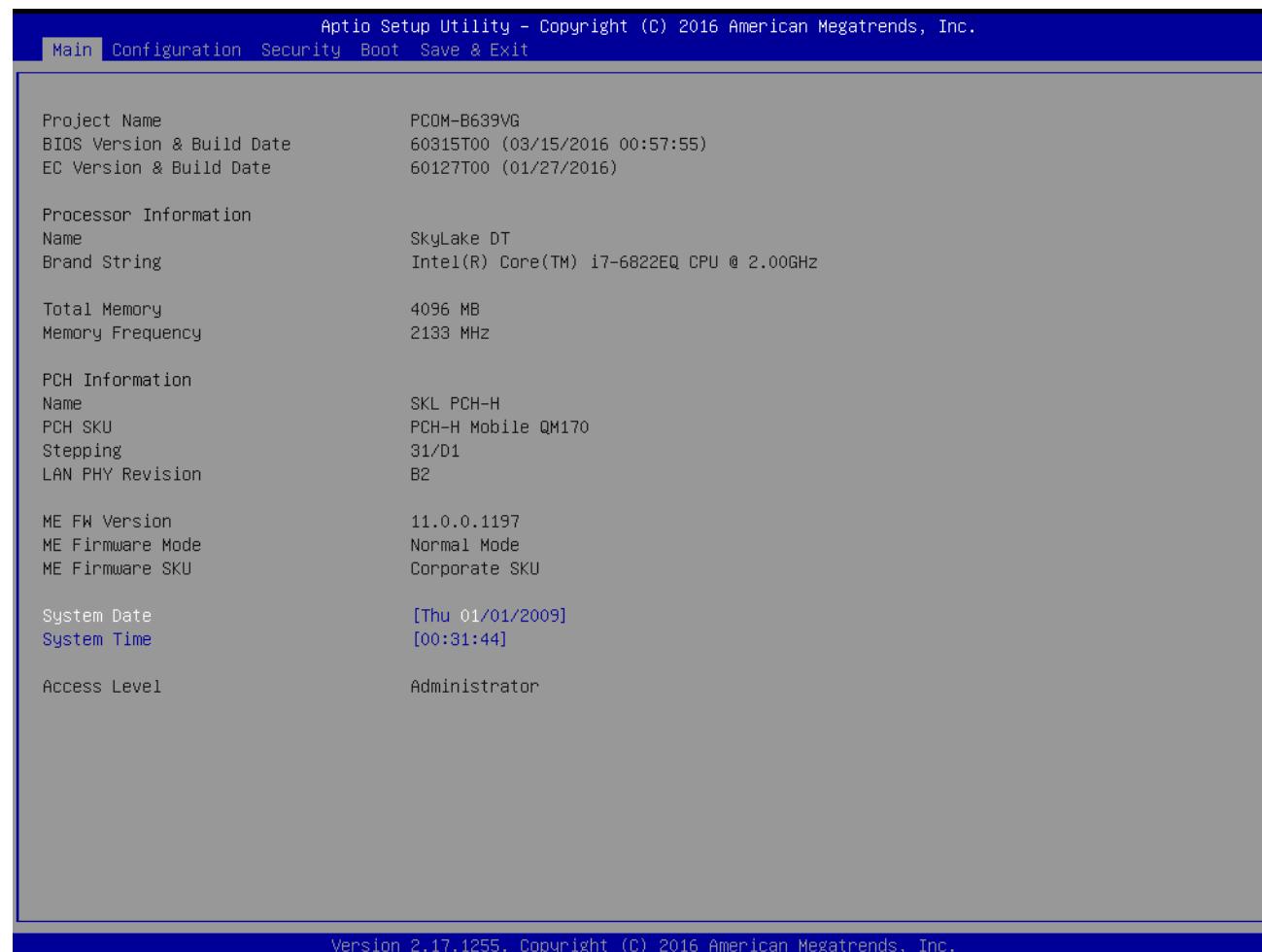


Figure 8 BIOS - Main

## 6.3 Configuration

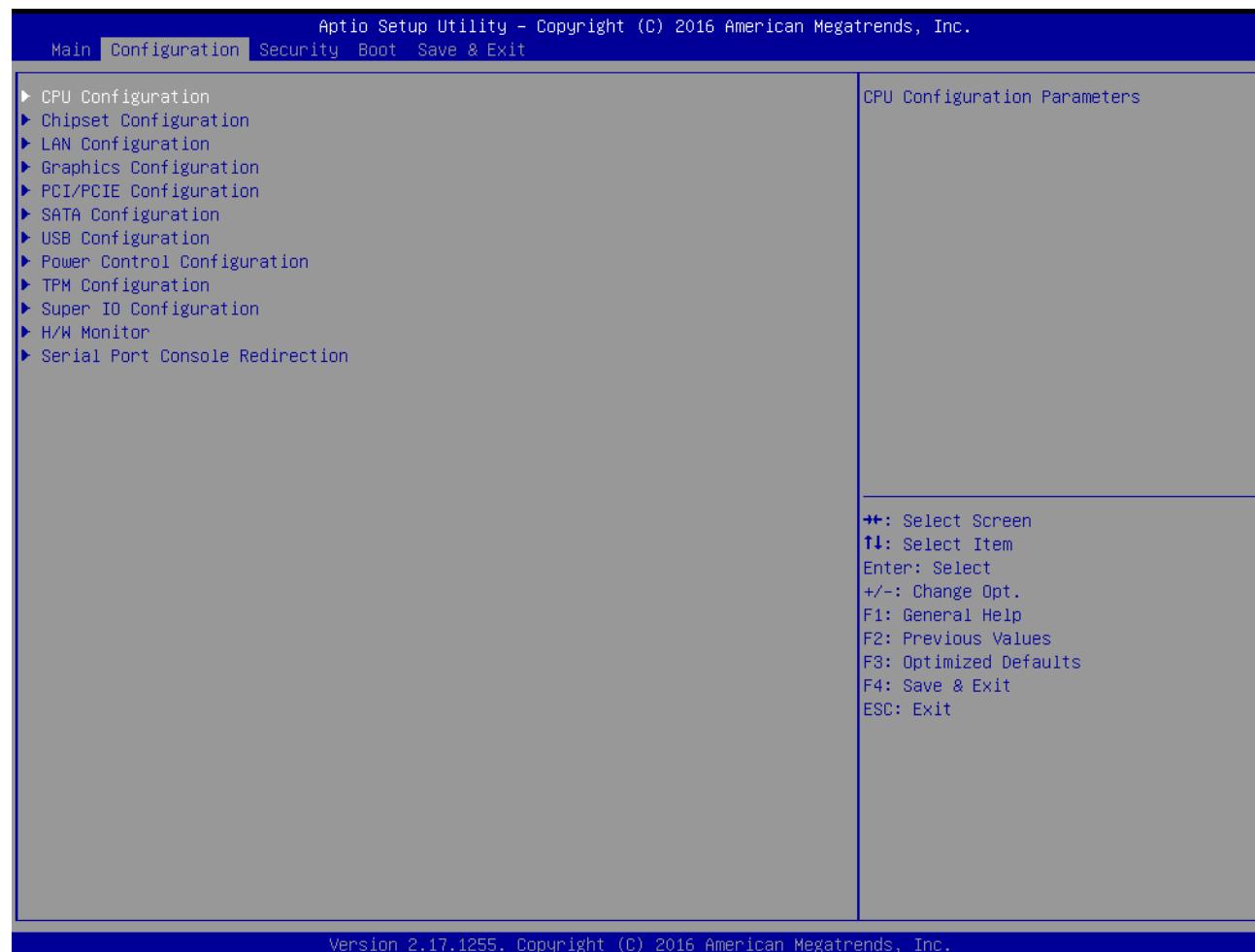


Figure 9 BIOS - Configuration

## 6.4 CPU

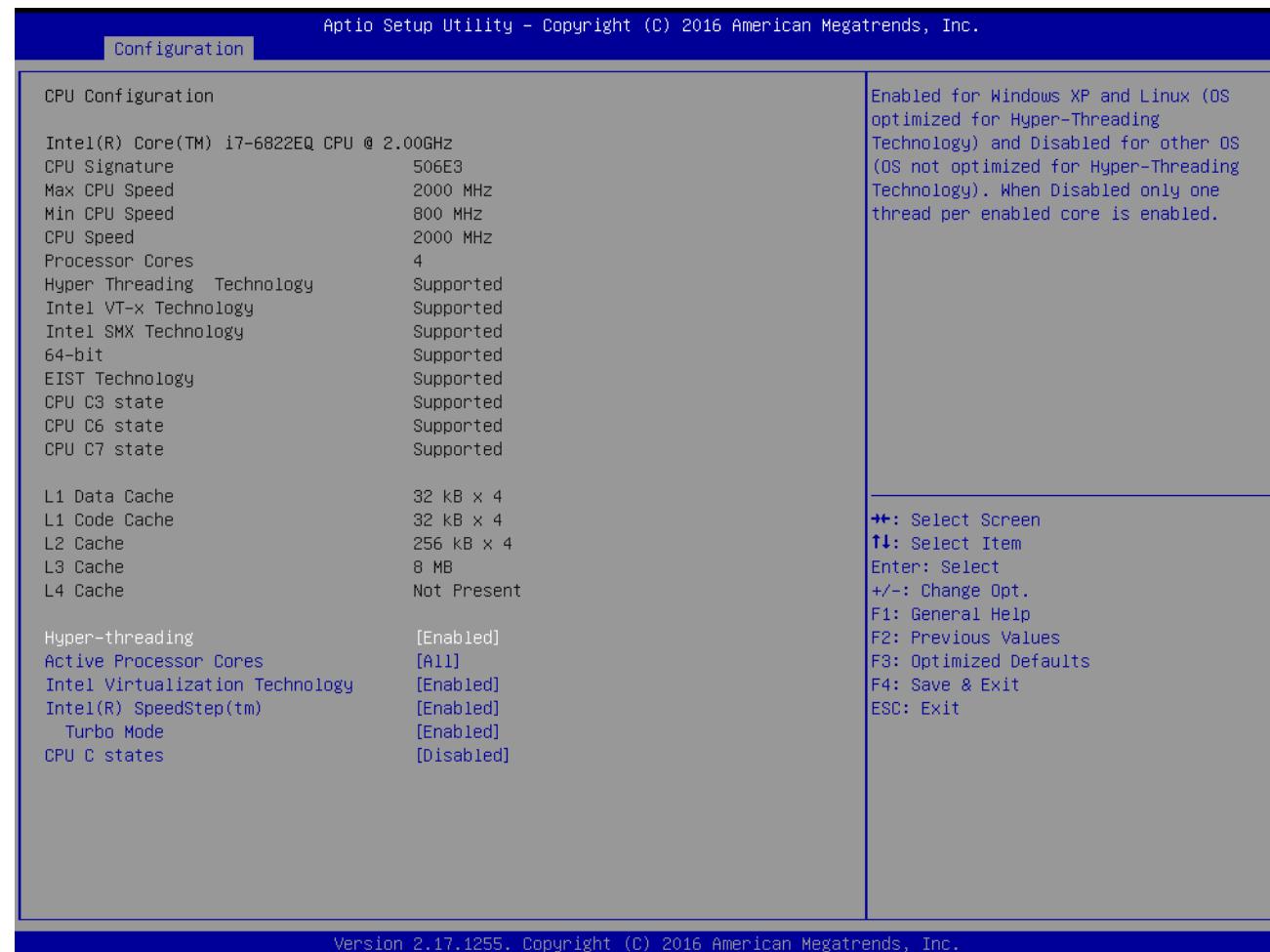


Figure 10 BIOS - Configuration - CPU

## 6.5 Chipset

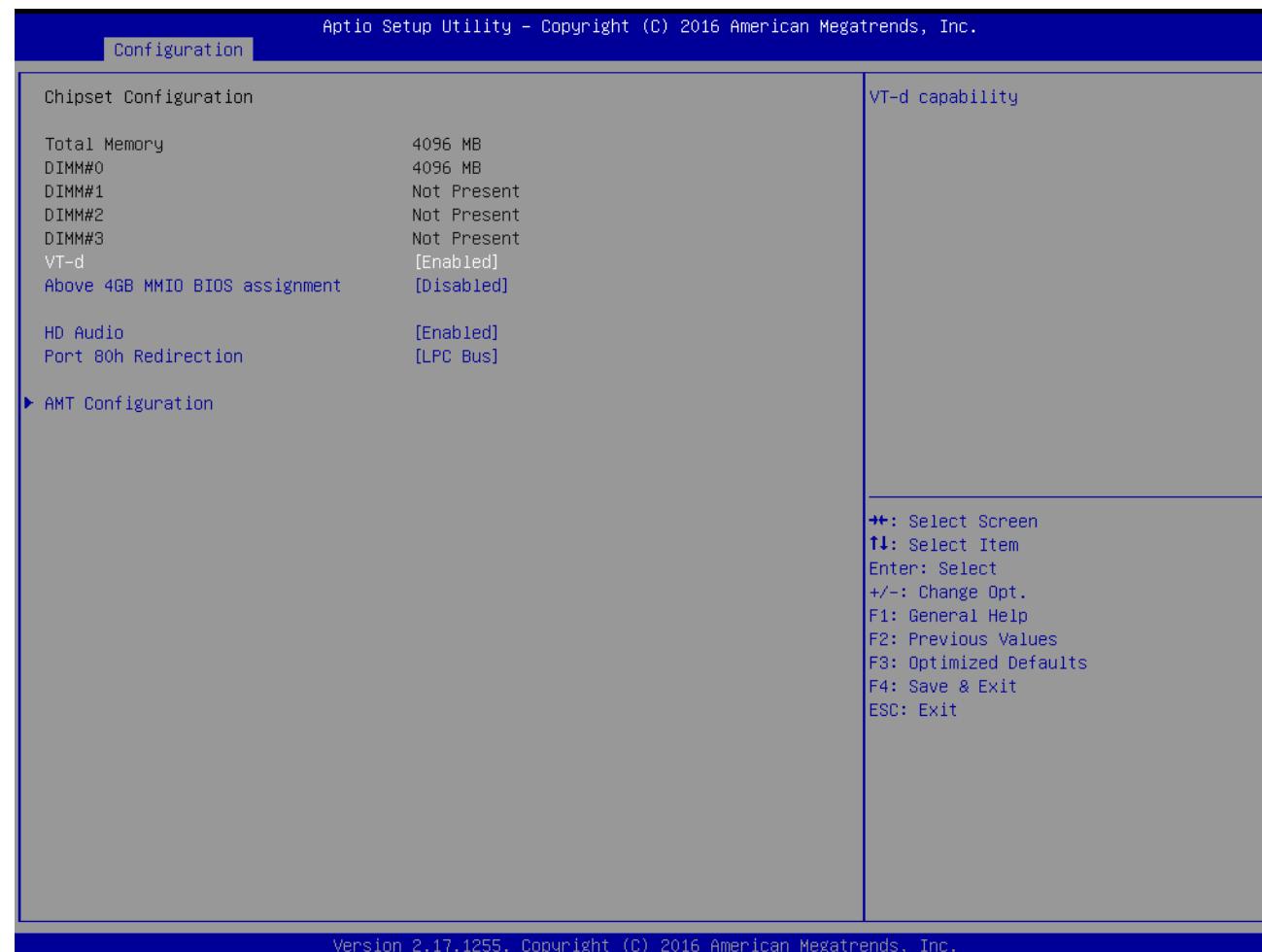


Figure 11 BIOS - Configuration - Chipset

## 6.6 LAN

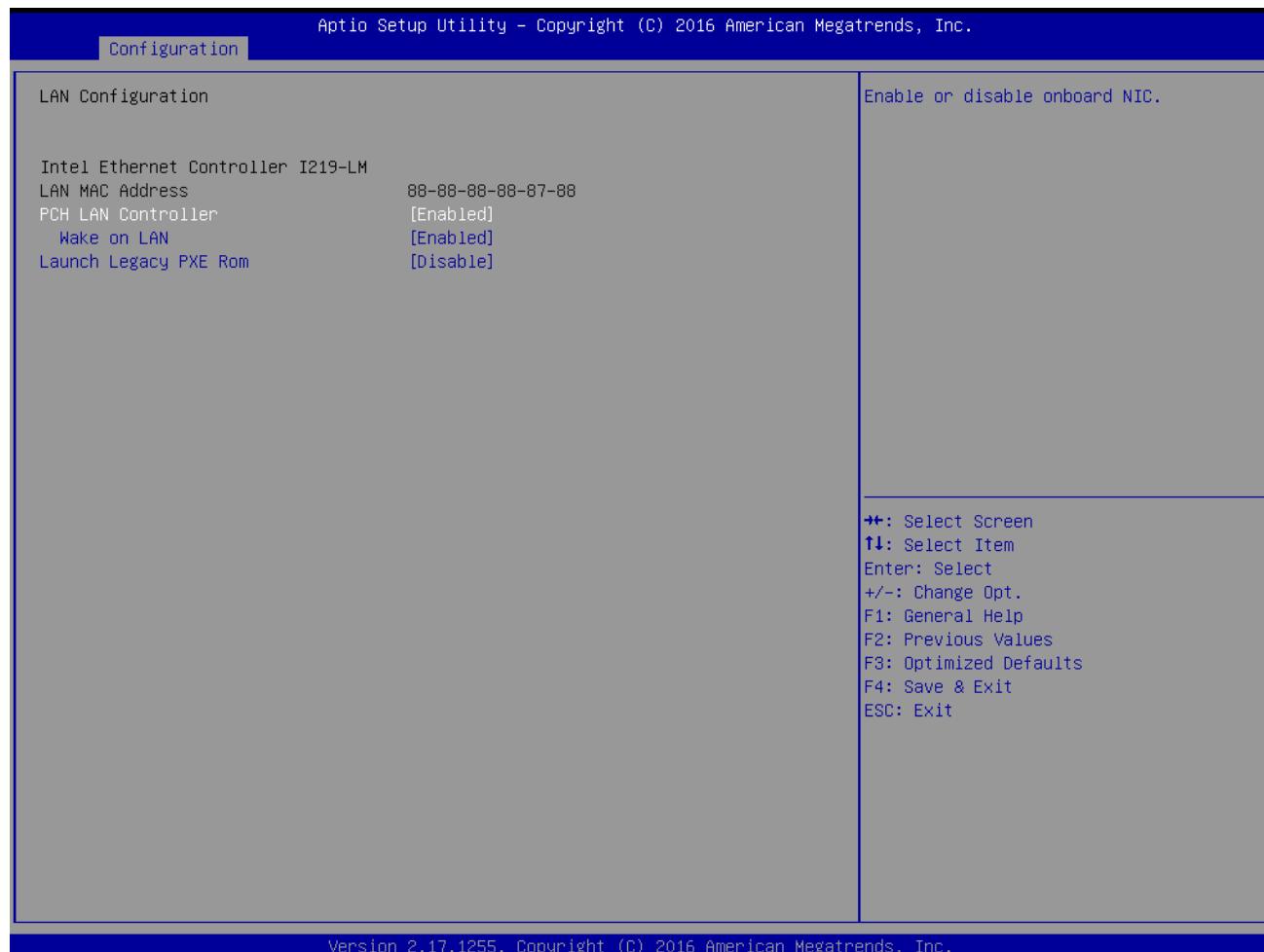


Figure 12 BIOS - Configuration - LAN

## 6.7 Graphics

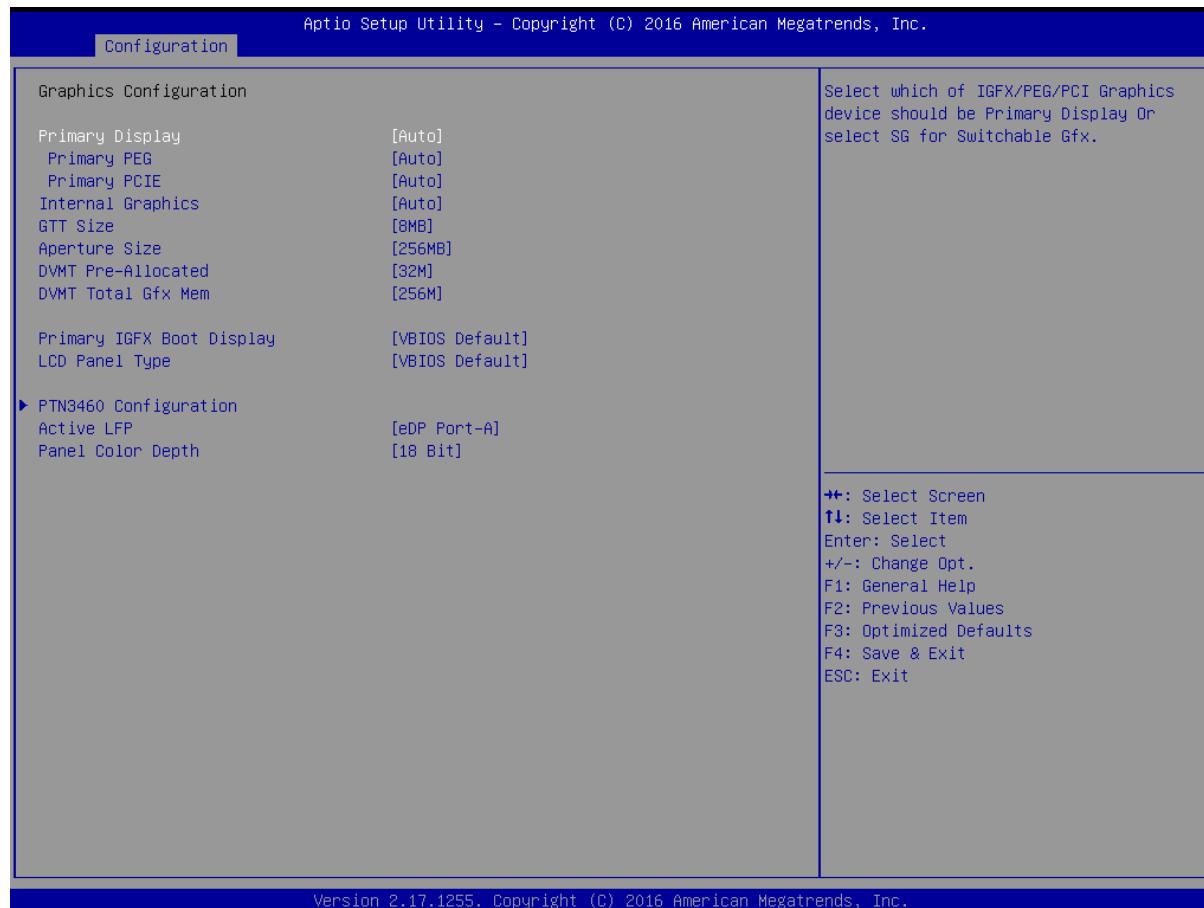


Figure 13 BIOS - Configuration - Graphics

## 6.8 PCIE

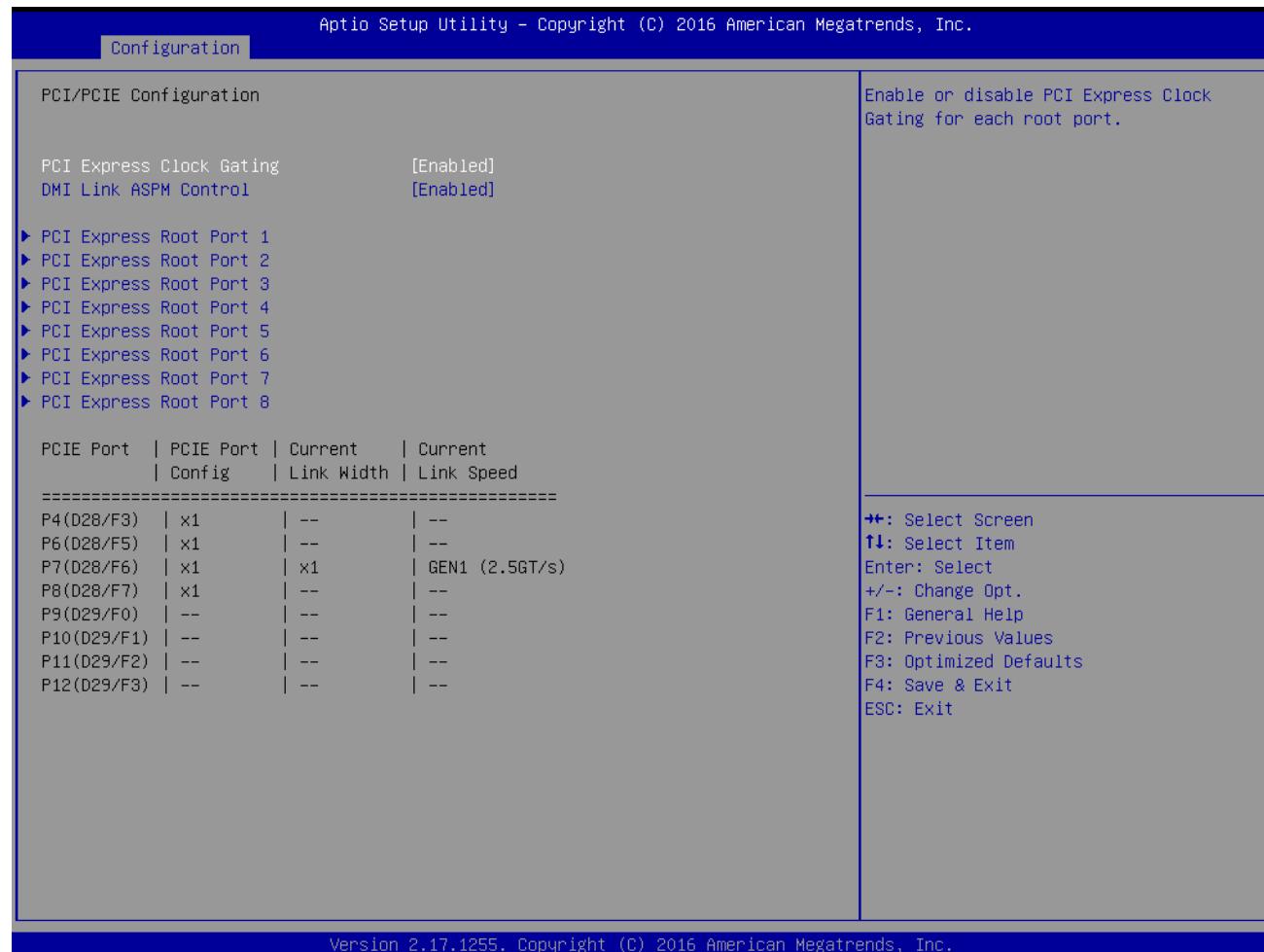


Figure 14 BIOS - Configuration - PCIE

## 6.9 SATA

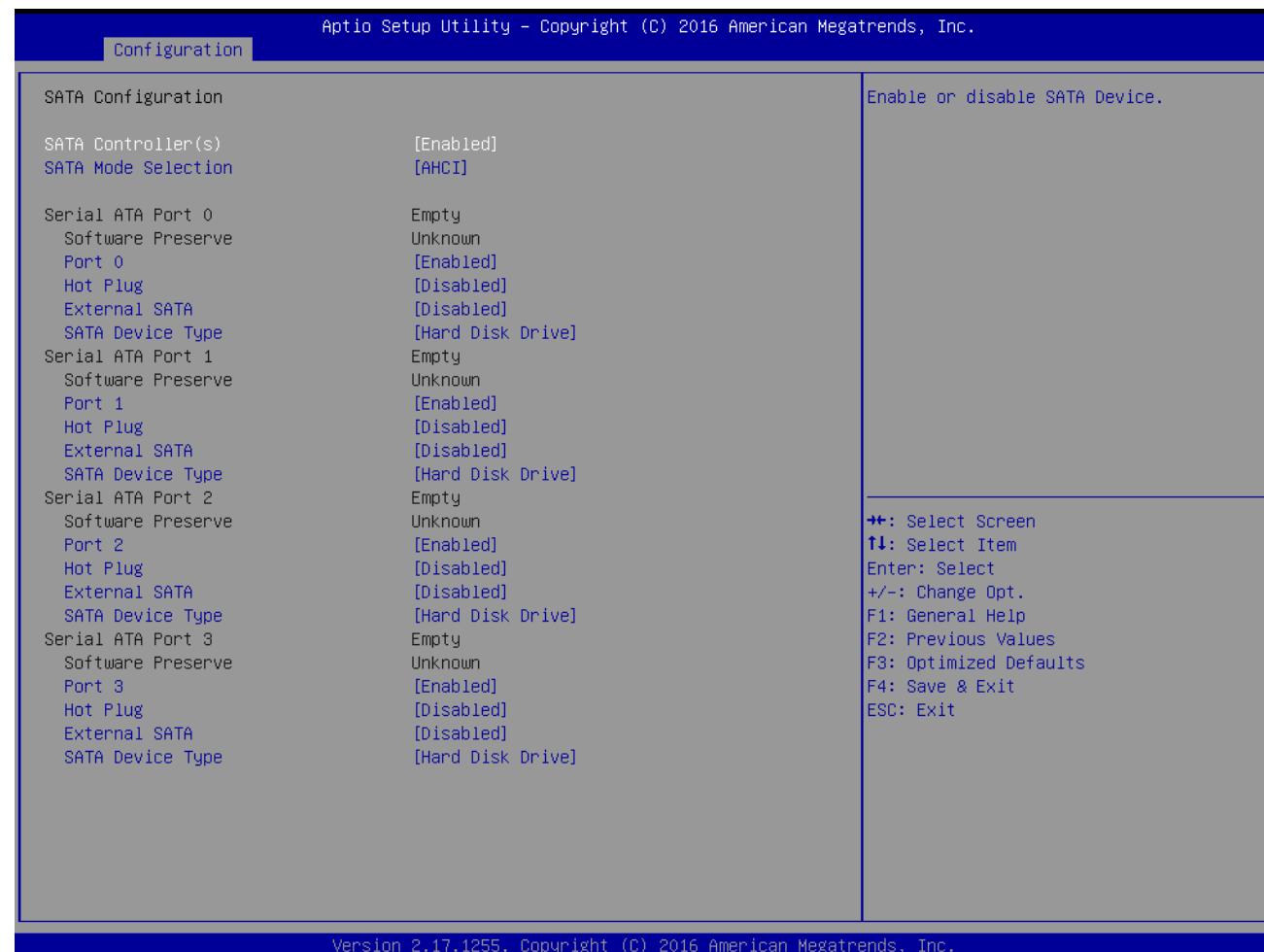


Figure 15 BIOS - Configuration - SATA

## 6.10 USB

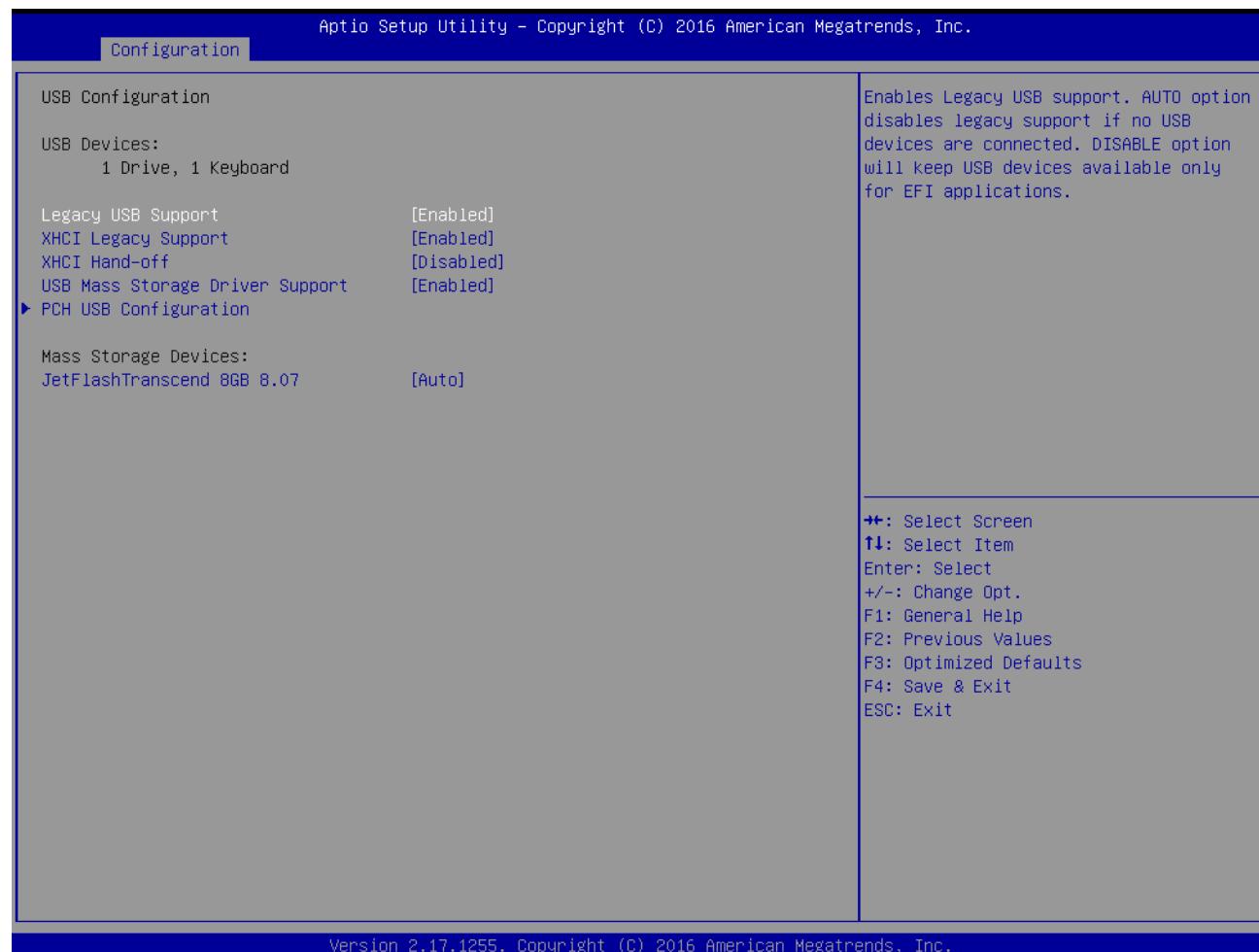


Figure 16 BIOS - Configuration - USB

## 6.11 Power

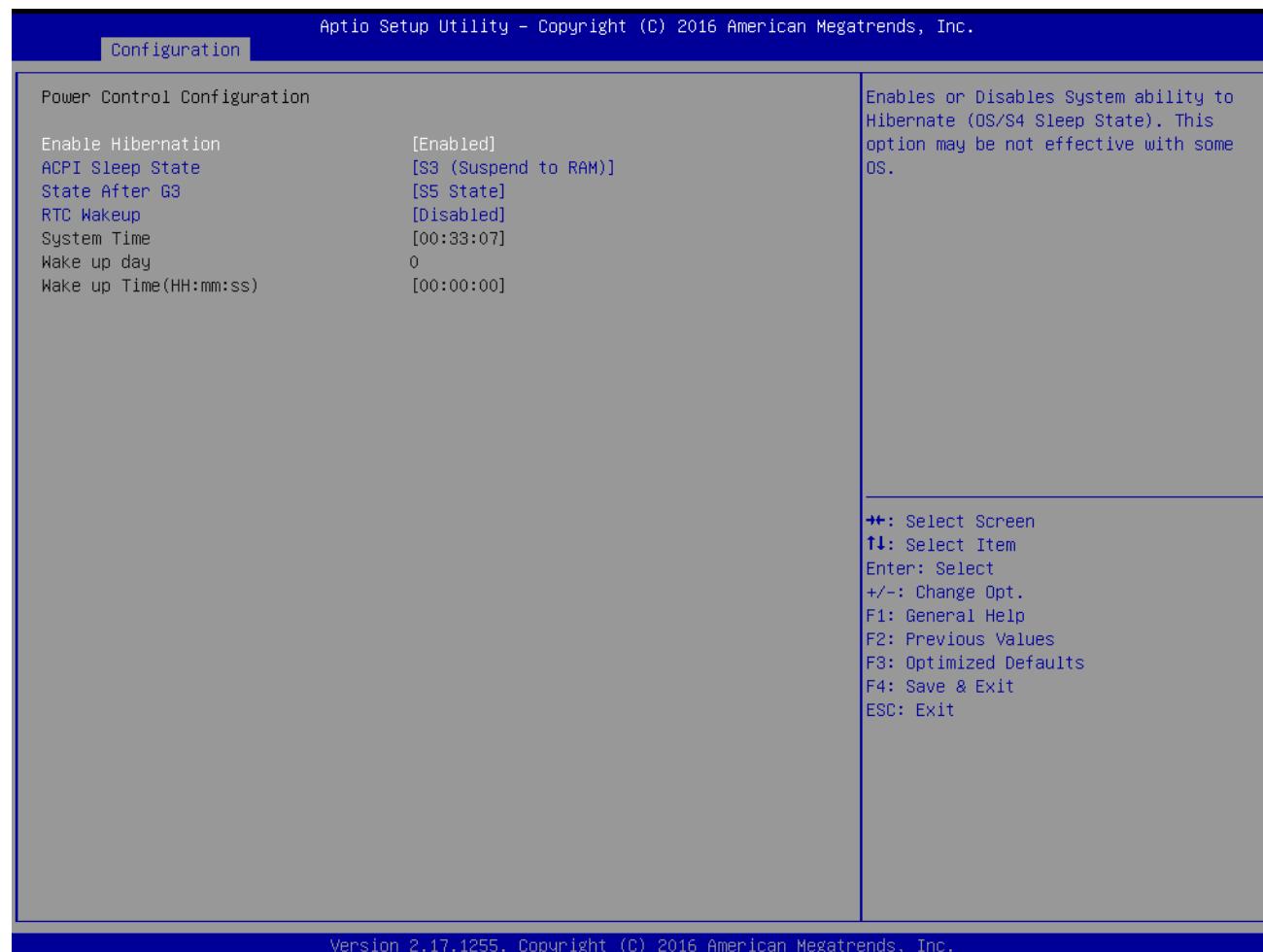


Figure 17 BIOS - Configuration - Power

## 6.12 TPM

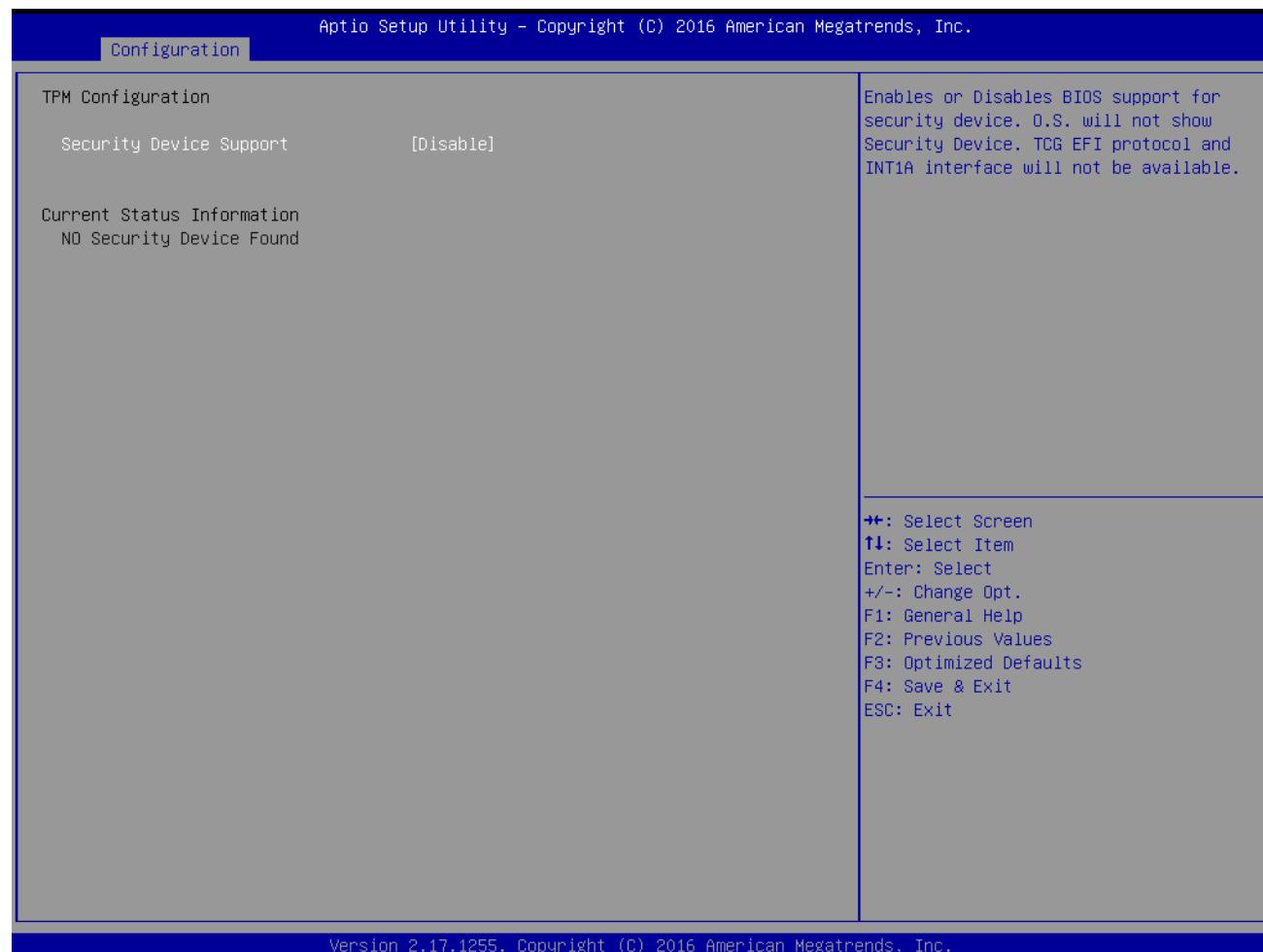


Figure 18 BIOS - Configuration - TPM

## 6.13 Super IO

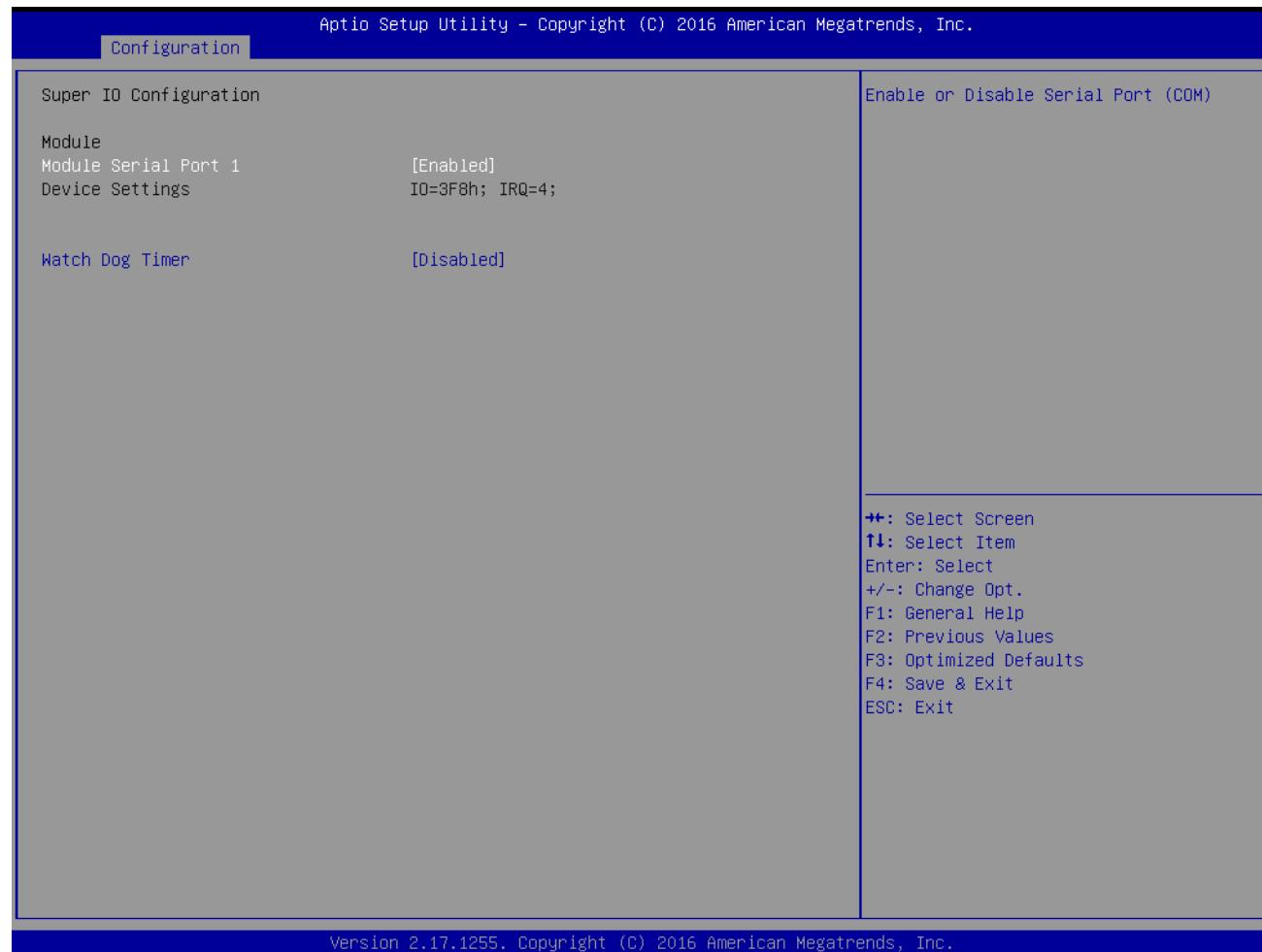


Figure 19 BIOS - Configuration - SuperIO

## 6.14 H/W Monitor

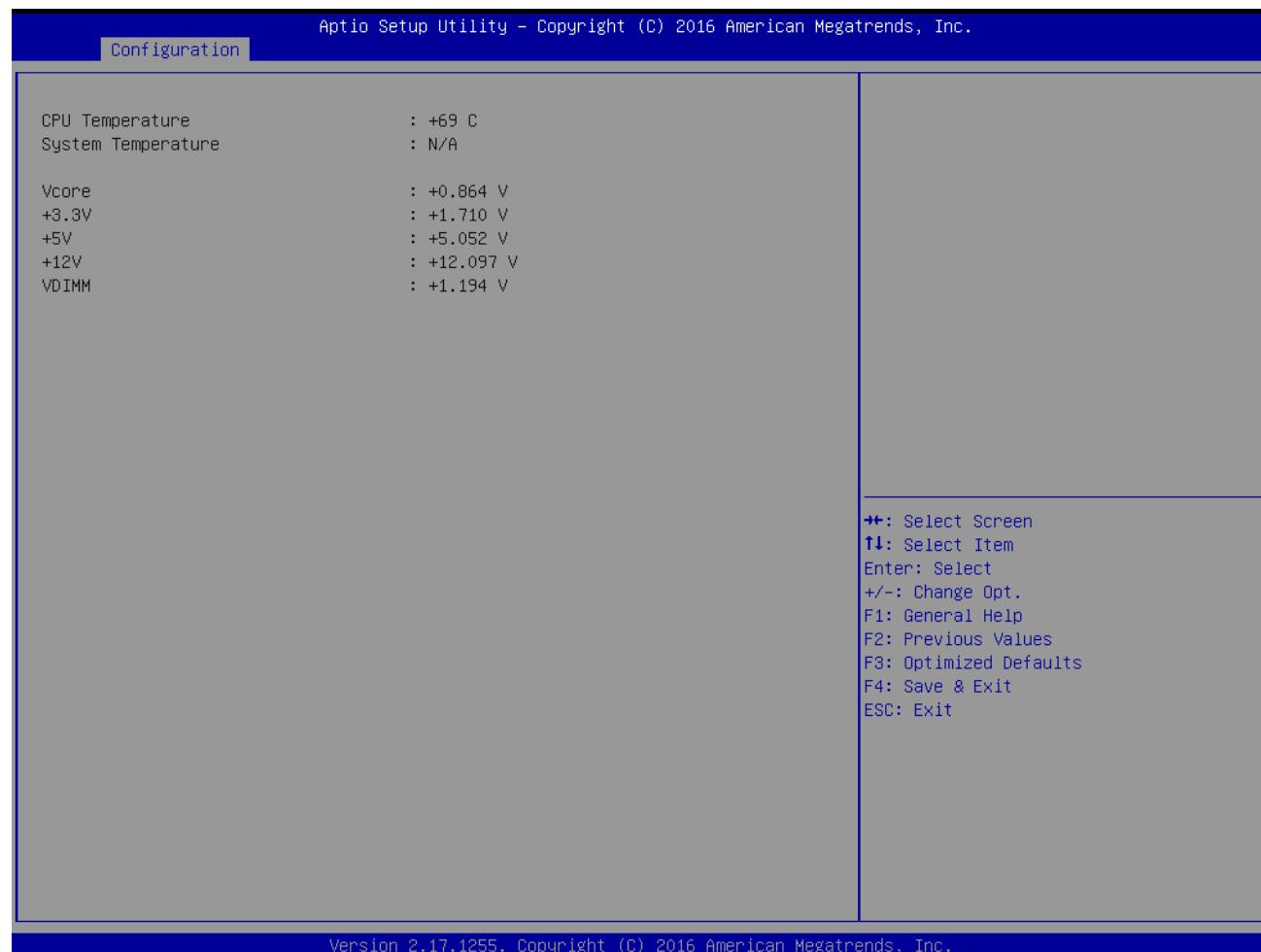


Figure 20 BIOS - Configuration - H/W Monitor

## 6.15 Serial Port Console

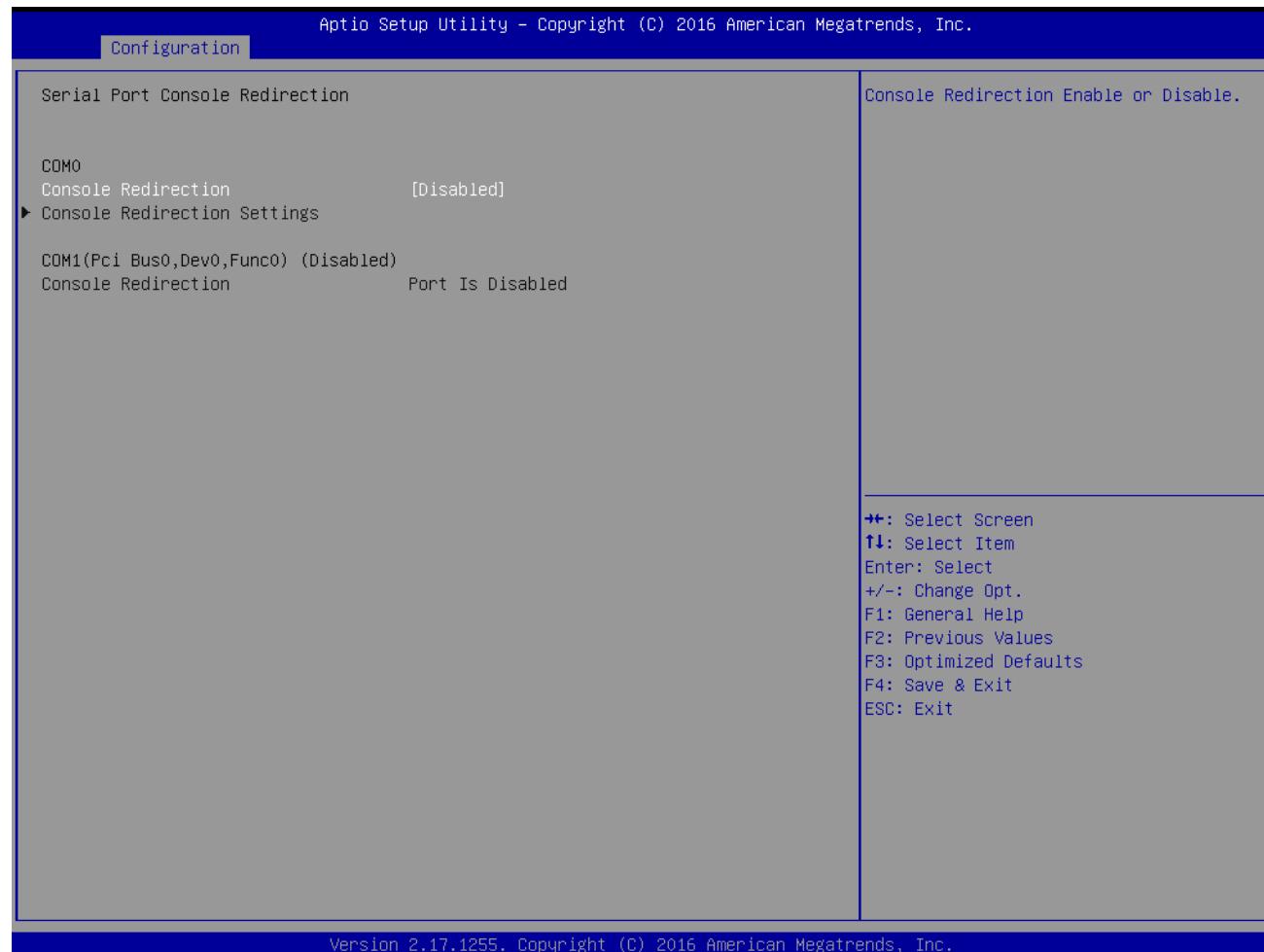


Figure 21 BIOS - Configuration - Serial Port Console

## 6.16 Security

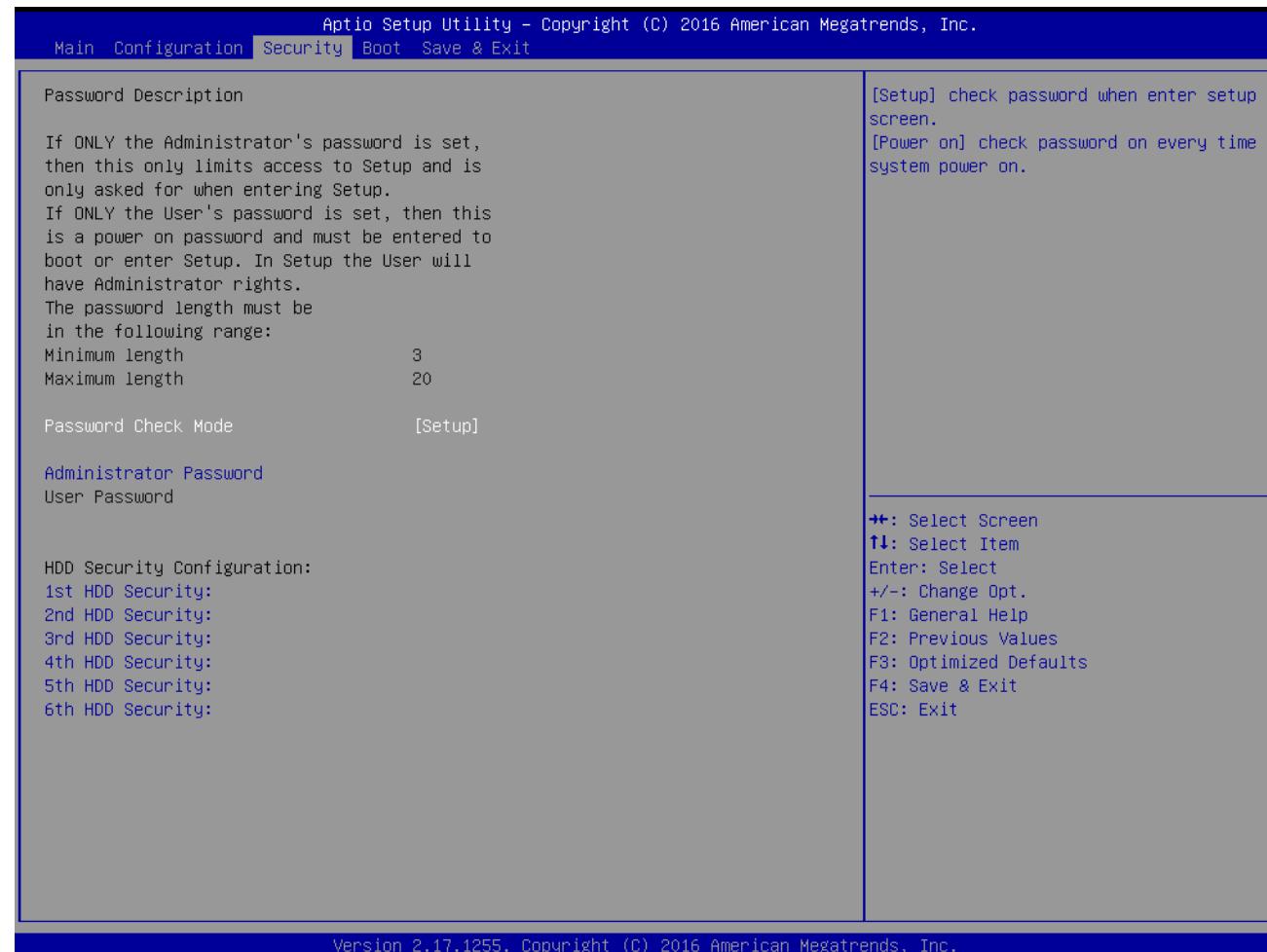


Figure 22 BIOS - Security

## 6.17 Boot

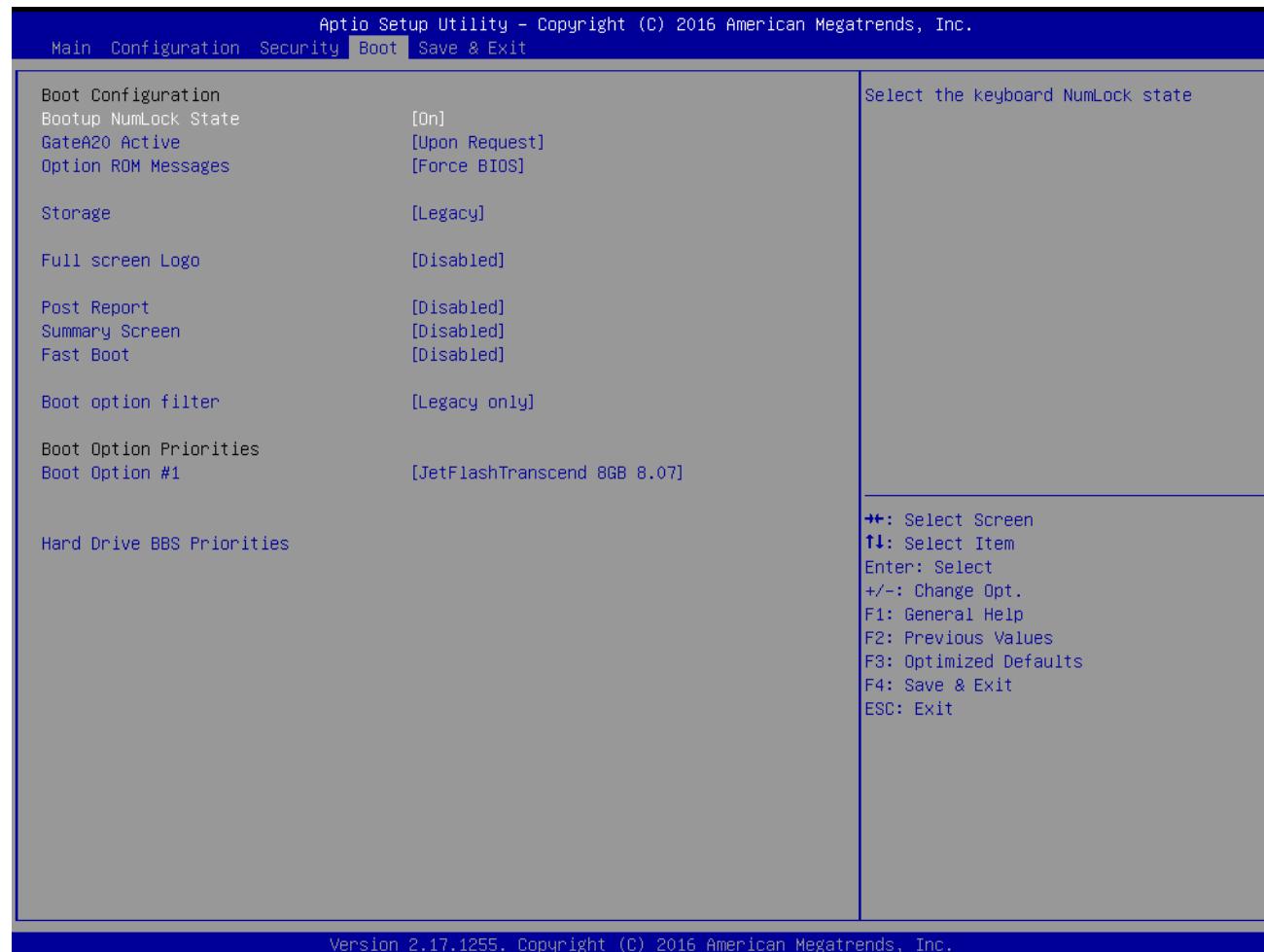


Figure 23 BIOS - Boot

## 6.18 Save & Exit

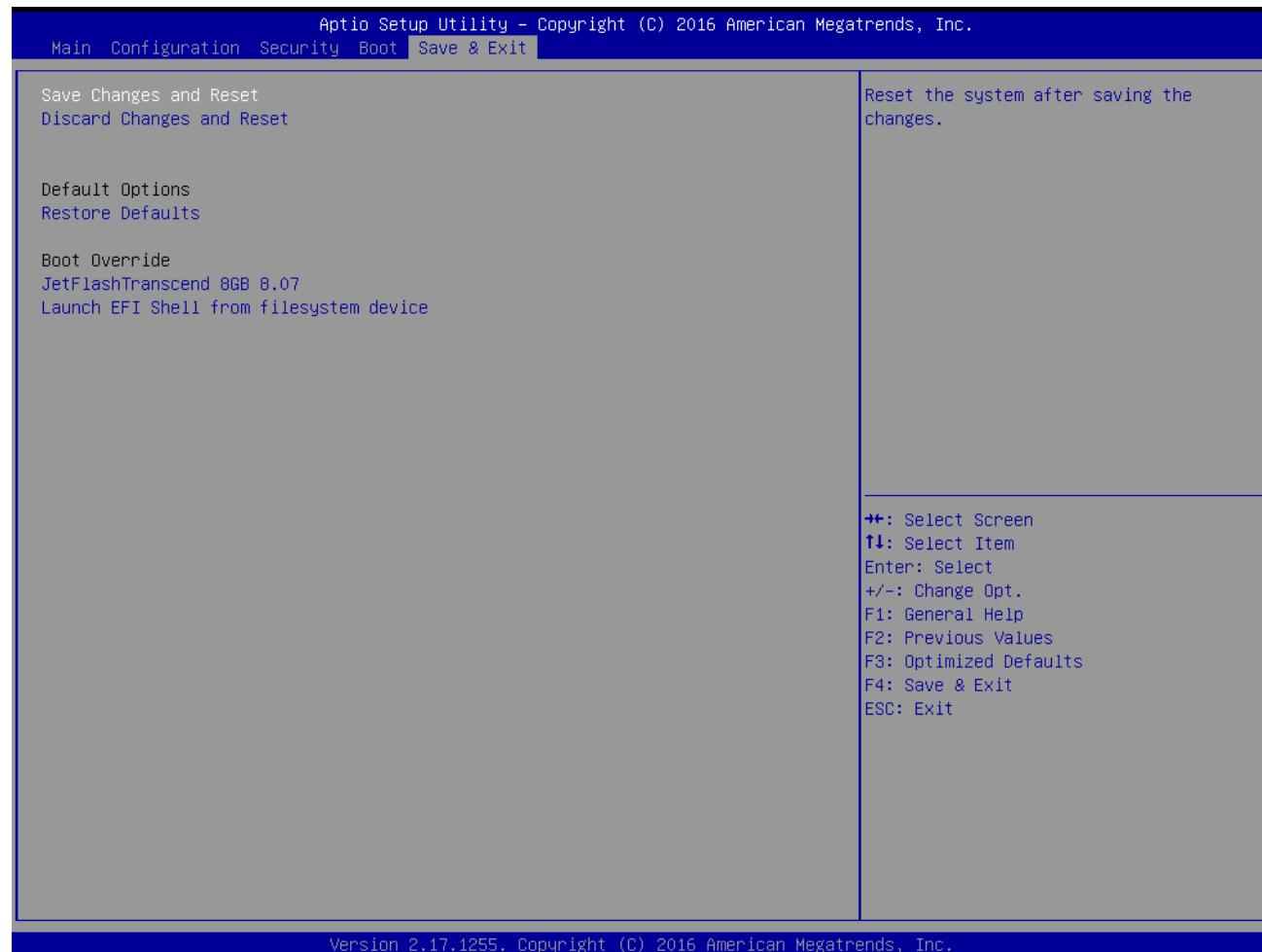


Figure 24 BIOS - Save & Exit

## 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
	E300	EC LPC IO Space
	03FB	EC UART1
	02FB	EC UART2

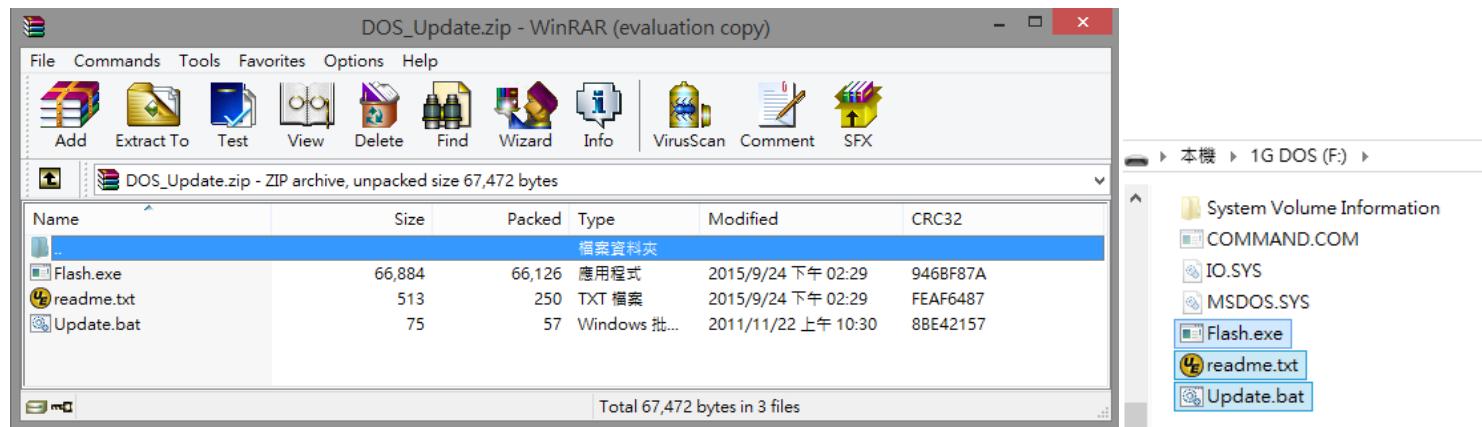
Table 14 System Resource - EC I/O Address

# 8 BIOS Update

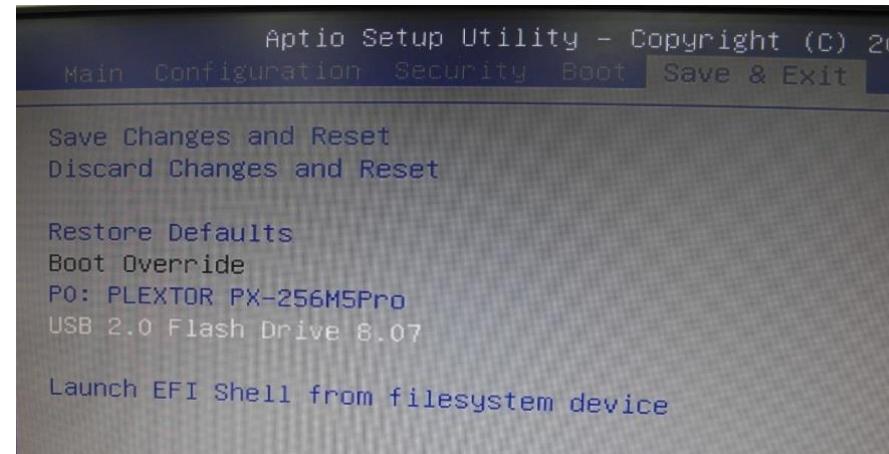
## BIOS/EC DOS Update SOP process

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

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



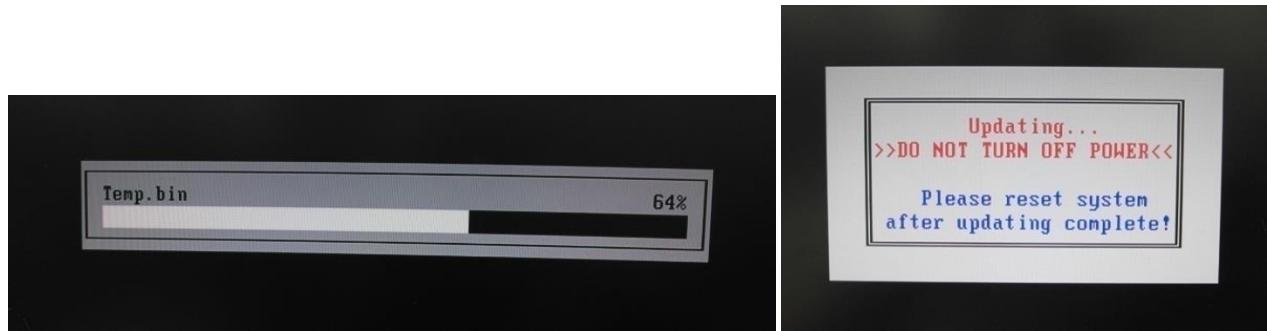
Step 3. Plug the DOS USB DOK into the target system and boot from the DOS USB DOK.



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

A screenshot of a Windows 98 command prompt window. The title bar reads 'Microsoft(R) Windows 98' and '(C)Copyright Microsoft Corp 1981-1999.' The command line shows 'C:>dir' followed by a detailed directory listing for drive C. The listing includes files like 'FLASH.EXE', 'README.TXT', and 'UPDATE.BAT'. Below the listing, the command 'C:>update\_' is typed, indicating the user is about to run an update command.

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



```
Intel (R) Flash Programming Tool. Version: 10.0.30.1054
Copyright (c) 2007 - 2014, Intel Corporation. All rights reserved.

Platform: Intel(R) QM87 Express Chipset
Reading HSFSTS register... Flash Descriptor: Valid

--- Flash Devices Found ---
W25Q128BV ID:0xEF4018 Size: 16384KB (131072Kb)

PDR Region does not exist.

- Erasing Flash Block [0x1000000] - 100% complete.
- Programming Flash [0x1000000] 16384KB of 16384KB - 100% complete.
- Verifying Flash [0x1000000] 16384KB of 16384KB - 100% complete.
RESULT: The data is identical.

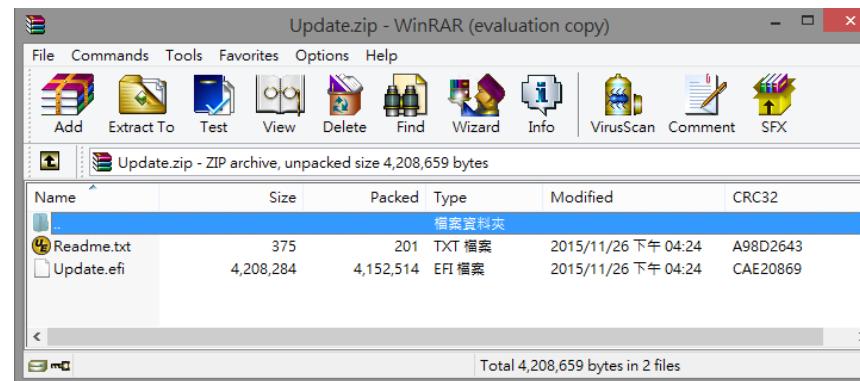
FPT Operation Passed
```

<End of BIOS/EC DOS update process>

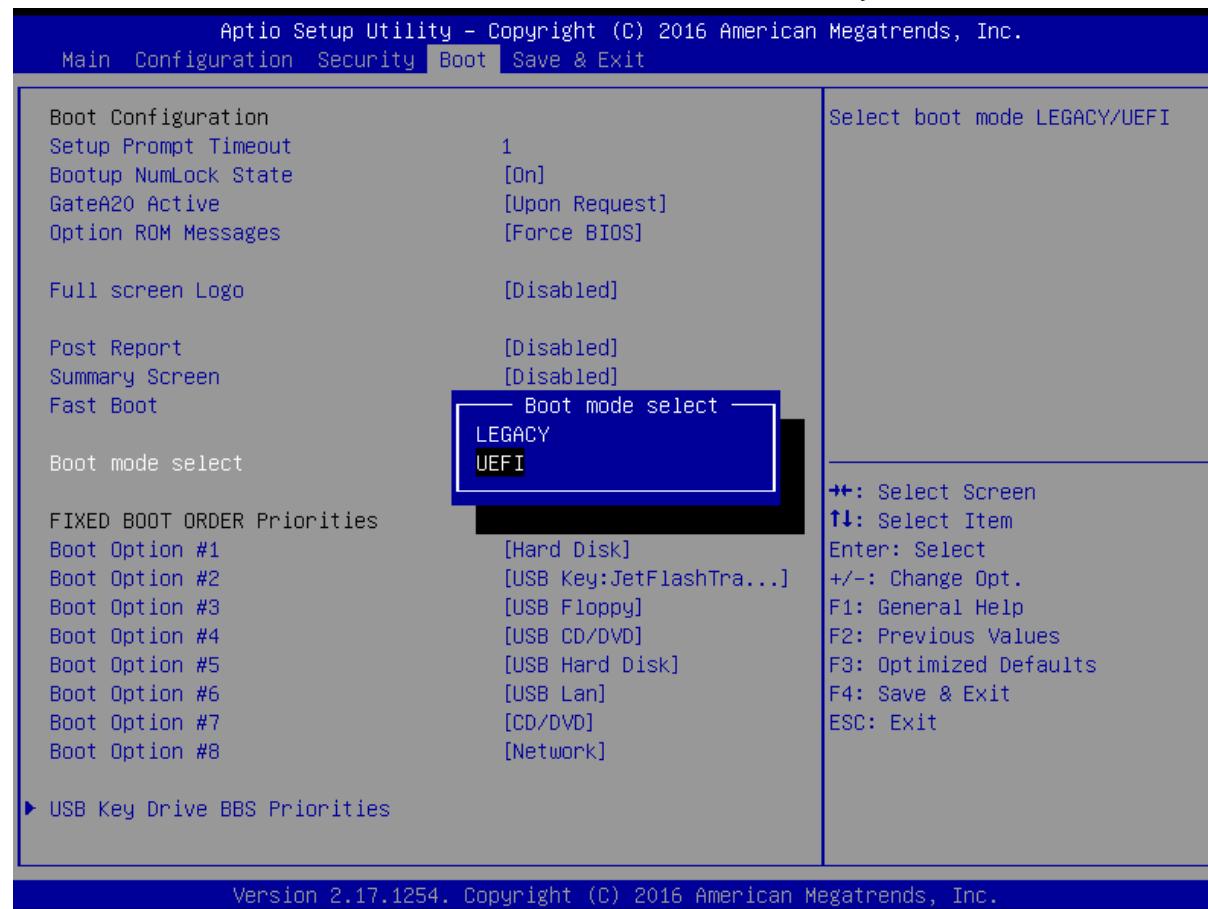
**BIOS/EC UEFI Update SOP process**

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

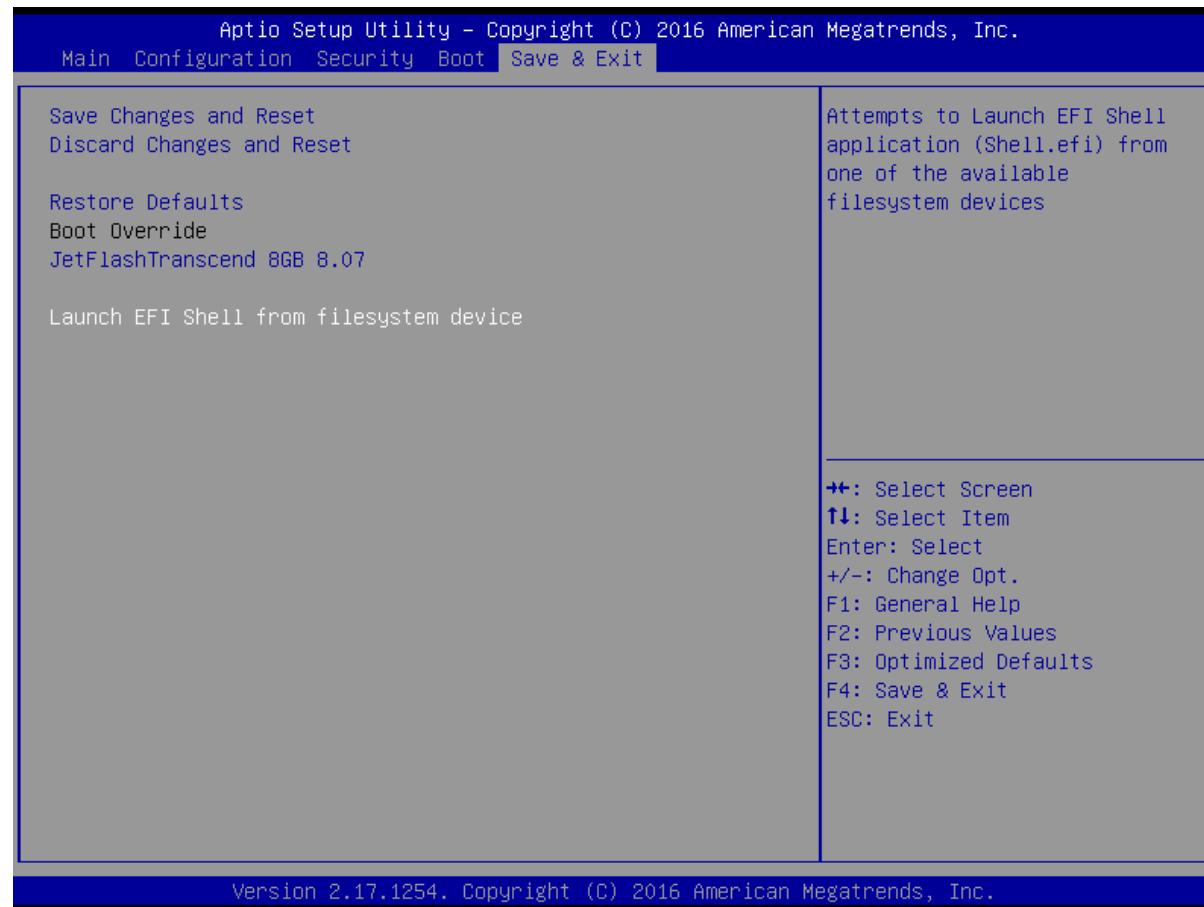
Step 2. Unzip update file to the USB DOK.



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



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



Step 5. Under the UEFI shell, direct to your USB DOK, below is an example uses fs0. Then direct to the folder with updated file and type command : "update" and press enter.

```
EFI Shell version 2.40 [5.10]
Current running mode 1.1.2
Device mapping table
  fs0 :Removable HardDisk - Alias hd18a0c0b blk0
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)/HD(1,MBR,0xEB7B8CCE,0x3F,0x1E17C1)
  blk0 :Removable HardDisk - Alias hd18a0c0b fs0
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)/HD(1,MBR,0xEB7B8CCE,0x3F,0x1E17C1)
  blk1 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)
  blk2 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(1,MBR,0x4E243949,0x800,0x61A8000)
  blk3 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(2,MBR,0x4E243949,0x61A8800,0x136EE000)
  blk4 :BlockDevice - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(3,MBR,0x4E243949,0x19896800,0x445C0000)
  blk5 :Removable BlockDevice - Alias (null)
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)

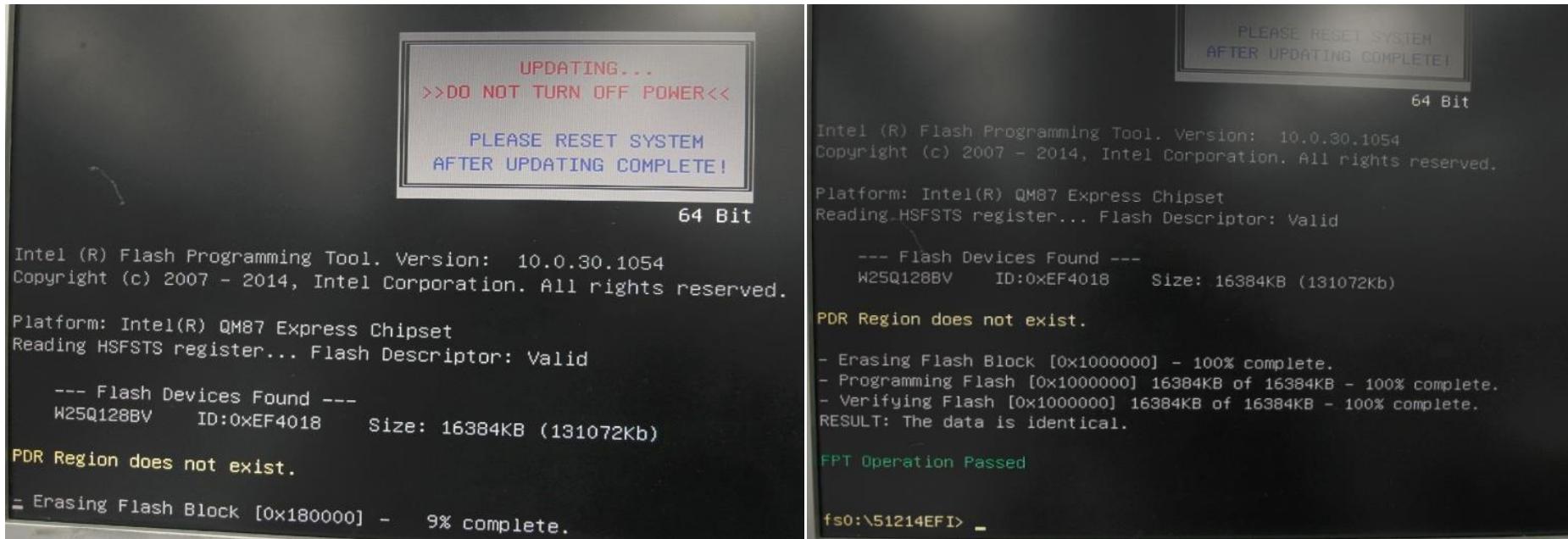
Press ESC in 1 seconds to skip startup.nsh, any other key to continue.
Shell> fs0:_
```

```
EFI Shell version 2.40 [5.10]
Current running mode 1.1.2
Device mapping table
  fs0 :Removable HardDisk - Alias hd18a0c0b blk0
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)/HD(1,MBR,0xEB7B8CCE,0x3F,0x1E17C1)
  blk0 :Removable HardDisk - Alias hd18a0c0b fs0
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)/HD(1,MBR,0xEB7B8CCE,0x3F,0x1E17C1)
  blk1 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)
  blk2 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(1,MBR,0x4E243949,0x800,0x61A8000)
  blk3 :HardDisk - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(2,MBR,0x4E243949,0x61A8800,0x136EE000)
  blk4 :BlockDevice - Alias (null)
    PciRoot(0x0)/Pci(0x1F,0x2)/Sata(0x0,0xFFFF,0x0)/HD(3,MBR,0x4E243949,0x19896800,0x445C0000)
  blk5 :Removable BlockDevice - Alias (null)
    PciRoot(0x0)/Pci(0x1D,0x0)/USB(0x0,0x0)/USB(0x2,0x0)

Press ESC in 1 seconds to skip startup.nsh, any other key to continue.
Shell> fs0:

fs0:\> cd 51214EFI
fs0:\51214EFI> update_
```

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



<End of BIOS/EC UEFI update process>

## 9 PORTWELL Software Tool

### PORIWELL Evaluation Tool (PET)

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

# 10 Industry Specifications

The list below provides links to industry specifications that apply to PORTWELL modules.

Low Pin Count Interface Specification, Revision 1.0 (LPC) <http://www.intel.com/design/chipsets/industry/lpc.htm>

Universal Serial Bus (USB) Specification, Revision 2.0 <http://www.usb.org/home>

PCI Specification, Revision 2.3 <https://www.pcisig.com/specifications>

Serial ATA Specification, Revision 3.0 <http://www.serialata.org/>

PICMG® COM Express Module™ Base Specification <http://www.picmg.org/>

PCI Express Base Specification, Revision 2.0 <https://www.pcisig.com/specifications>