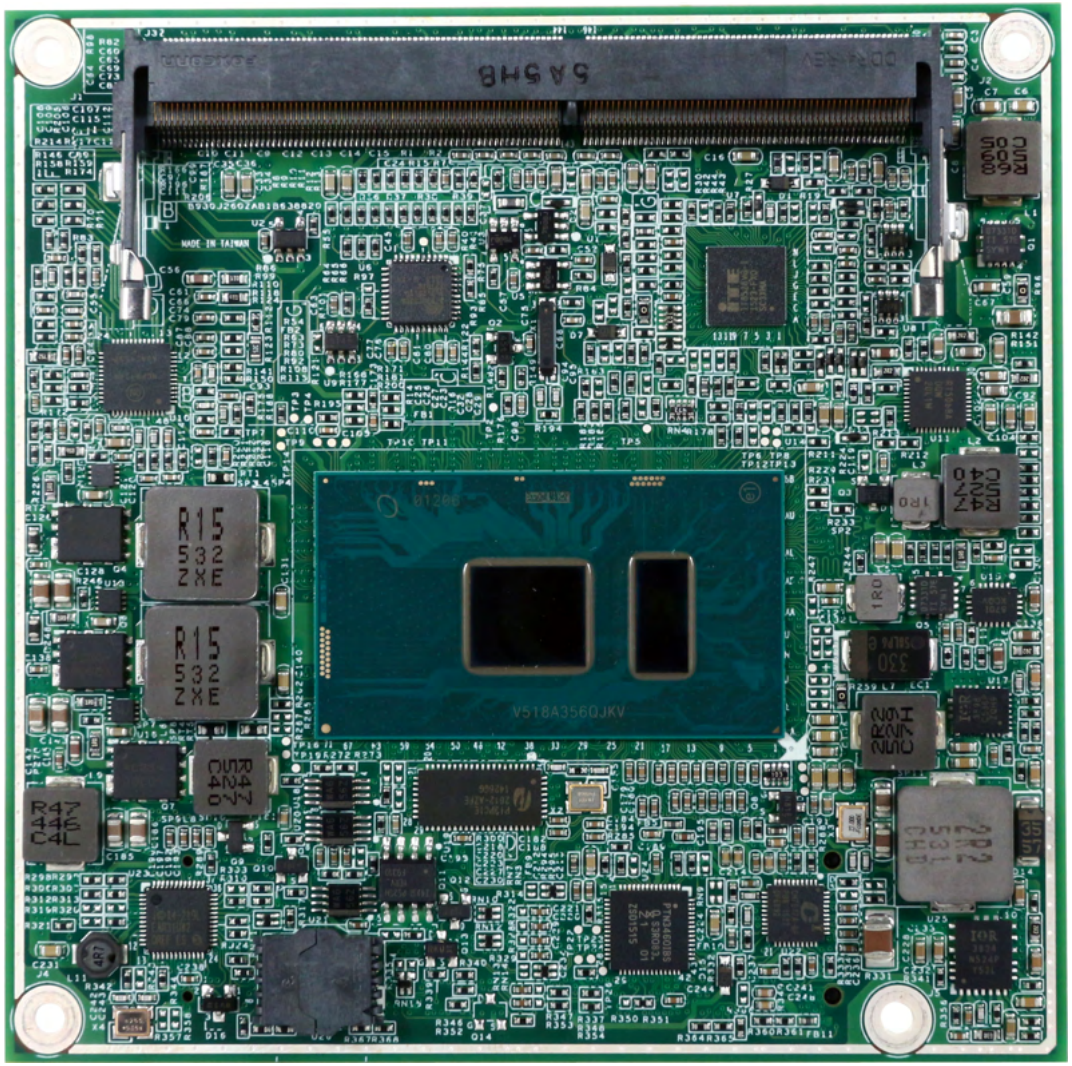

COM Express™ PCOM-B638VG User's Guide Rev 1.0

Revision History

R1.0	Official release Rev 1.0

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1 Introduction

This PCOM-B638VG User's Guide contains detail information of the product specifications, features, mechanical dimensions, heat sink/cooler and BIOS Setup.

PCOM-B638VG is designed according to COM (Computer On Module) PICMG Open Modular Computing Standards COM Express™ Specification Rev2.1 Type 6 and Compact form factor (95x95cm).

PCOM-B638VG, a COM Express Module with Intel 6th Generation processor code name Skylake U. PCOM-B638VG is the successor of PCOM-B633VG (Intel Broadwell U platform) targeted on Ultra low power processors 15W, 1-Chip processor includes a Platform Controller Hub (PCH) on the same die and suitable for wide working temperature from -40° C to +80° C. PCOM-B638 supports dual channel DDR4 ECC and Non-ECC memory. Display interfaces are VGA, LVDS, dual DDI, DP and HDMI display with 4K x 2K high resolution display.

2 Block Diagram

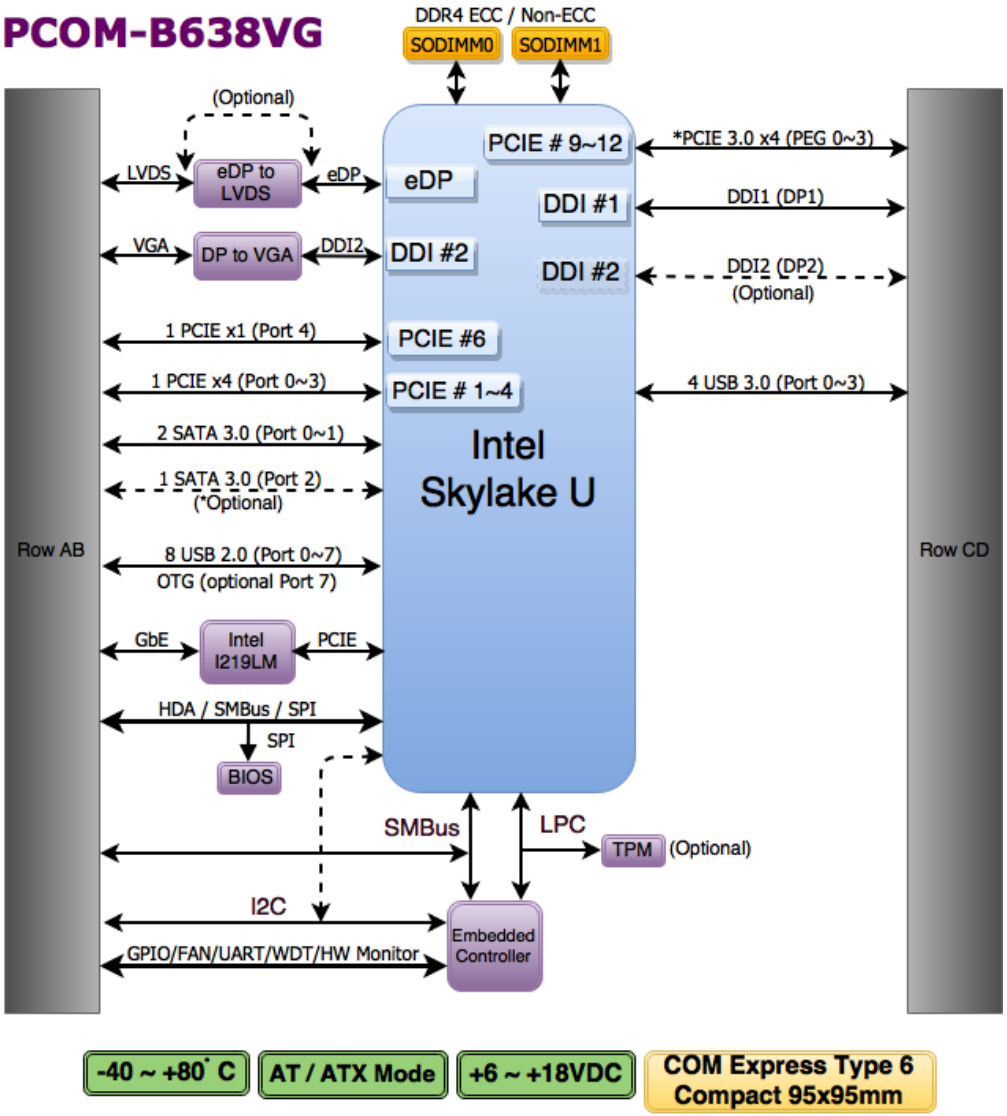


Figure 1 PCOM-B638VG Block Diagram

3 Specifications

General	
Product	➢ PCOM-B638VG
Form Factor	➢ Compact COM Express™ Type 6 Rev. 2.1
Processor	➢ Intel® Celeron® Processor 3955U ➢ Intel® Core™ i3-6100U Processor ➢ Intel® Core™ i5-6300U Processor ➢ Intel® Core™ i7-6600U Processor
Chipset	➢ SoC
BIOS	➢ AMI Aptio5 UEFI BIOS
Memory	➢ 2 DDR4 SODIMM Socket ➢ Dual channel ➢ Up to 32GB 2133MHz
Security	➢ TPM
I/O Interface	
Embedded Controller	➢ IT8528VG Embedded Controller, Voltage, Fan and Temperature
Serial IO	➢ 8 GPIO (4 GPI and 4 GPO) ➢ I2C (PCH or Embedded Controller) ➢ 2 Serial Ports (TX and RX) ➢ SMBus (EC and SoC)
Processor PCI Express	➢ 1 PCI Express x4 Gen2 (5.0 GT/s) ➢ 1 PCI Express x1 Gen2 (5.0 GT/s) ➢ 1 PCI Express x4 (PEG) Gen3 (5.0 GT/s)
USB	➢ 8 x USB2.0 (480 Mbps) (Port 0~7) ➢ USB OTG (Optional) (Port 7)

	➢ 4 x USB3.0 (5 Gbps) (Port 0/1/2/3)
SATA	➢ 2 x SATA3.0 (6 Gbps) (Port 0/1) ➢ 1 x SATA3.0 (6Gbps) (Port 2) (Optional)
Ethernet	➢ GbE Intel I219-LM 0°C to 85°C
Audio	➢ Intel® High Definition Audio
Display	
Graphic Controller	➢ Intel® HD Graphics 510 (Processor dependent) ➢ Intel® HD Graphics 520 (Processor dependent)
Graphics Options	➢ VGA (1920x1200 @ 60 Hz) ➢ DP 1.2 4096x2160@60Hz ➢ HDMI 1.4 3840x2160@30Hz (Optional) ➢ LVDS 1920x1600@60Hz
Mechanical & Environment	
Dimension	➢ COM Express™ standard pin out Type 6 Rev. 2.1 ➢ 95 x 95mm / 3.74” x 3.74” (Compact COM Express)
Hardware Monitors	➢ ITE8528 Embedded Controller, Voltage, Fan and Temperature
Power DC IN	➢ +12VDC (Nominal) ➢ + 6 VDC ~ + 18 VDC (Wide range)
Power Management	➢ ACPI 4.0
Environment	➢ Operating Temperature -40 ° C ~ +80 ° C (processor dependent) ➢ Storage Temperature -40 ° C ~ +80 ° C ➢ Relative Humidity 5%~95%
Certification	➢ CE ➢ FCC CLASS A
MTBF	➢ Over 100,000 hours at room ambient 40 ° C

Table 1 PCOM-B638VG Specifications

3.1 PCOM-B638 Processor list

PCOM-B638 Processor list

PCOM-B638VG	PCOM-B638VG-3955U	PCOM-B638VG-6100U	PCOM-B638VG-6300U	PCOM-B638VG-6600U
Ordering P/N	AB1-3E77Z	AB1-3E32Z	AB1-3E38Z	AB1-3E39Z
PCOM-B638 Processor list	Intel® Celeron® Processor 3955U	Intel® Core™ i3-6100U	Intel® Core™ i5-6300U	Intel® Core™ i7-6600U
Essentials				
Processor Number	3955U	i3-6100U	i5-6300U	i7-6600U
Cache	2 MB Intel® Smart Cache	3 MB Intel® Smart Cache	3 MB Intel® Smart Cache	4 MB Intel® Smart Cache
Performance				
# of Cores	2	2	2	2
# of Threads	2	4	4	4
Processor Base Frequency	2 GHz	2.3 GHz	2.4 GHz	2.6 GHz
TDP	15 W	15 W	15 W	15 W
Configurable TDP-down	10 W	7.5 W	7.5 W	7.5 W
Configurable TDP-down Frequency	NA	800 MHz	800 MHz	800 MHz
Max Turbo Frequency	NA	NA	3 GHz	3.4 GHz
Configurable TDP-up Frequency	NA	NA	2.5 GHz	2.8 GHz
Configurable TDP-up	NA	NA	25 W	25 W

Table 2 PCOM-B638VG Processor list 1-2

<continued>

PCOM-B638VG	PCOM-B638VG-3955U	PCOM-B638VG-6100U	PCOM-B638VG-6300U	PCOM-B638VG-6600U
Ordering P/N	AB1-3E77Z	AB1-3E32Z	AB1-3E38Z	AB1-3E39Z
PCOM-B638 Processor list	Intel® Celeron® Processor 3955U	Intel® Core™ i3-6100U	Intel® Core™ i5-6300U	Intel® Core™ i7-6600U
Graphics Specifications				
Processor Graphics	Intel® HD Graphics 510	Intel® HD Graphics 520	Intel® HD Graphics 520	Intel® HD Graphics 520
Graphics Base Frequency	300 MHz	300 MHz	300 MHz	300 MHz
Graphics Max Dynamic Frequency	900 MHz	1 GHz	1 GHz	1.05 GHz
Graphics Video Max Memory	32 GB	32 GB	32 GB	32 GB
4K Support	Yes, at 60Hz	Yes, at 60Hz	Yes, at 60Hz	Yes, at 60Hz
Max Resolution (HDMI 1.4)	4096x2304@24Hz	4096x2304@24Hz	4096x2304@24Hz	4096x2304@24Hz
Max Resolution (DP)	4096x2304@60Hz	4096x2304@60Hz	4096x2304@60Hz	4096x2304@60Hz
Max Resolution (eDP - Integrated Flat Panel)	4096x2304@60Hz	4096x2304@60Hz	4096x2304@60Hz	4096x2304@60Hz
Expansion Options				
PCI Express Revision	2.0	3.0	3.0	3.0
PCI Express Configurations	1x4, 2x2, 1x2+2x1 and 4x1	1x4, 2x2, 1x2+2x1 and 4x1	1x4, 2x2, 1x2+2x1 and 4x1	1x4, 2x2, 1x2+2x1 and 4x1
Max # of PCI Express Lanes	10	12	12	12

Table 3 PCOM-B638VG Processor list 1-2

3.2 Supported Operating Systems

The PCOM-B638VG supports the following operating systems.

Vendor	Operating System	Supported
Microsoft	Windows 7 (32/64bit)	Yes (Please refer to Portwell APP Note for installation)
	Windows 8 (32/64bit)	Yes
	Windows 8.1 (32/64bit)	Yes
	Windows 10 (64bit)	Yes
	Microsoft Windows 2008 R2 SP1 (32/64bit)	Yes
	Microsoft Windows 2012 (32/64bit)	Yes
	Microsoft Windows 2012 R2 (32/64bit)	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

Item	Driver version	Windows OS
Chipset	10.1.1.13	Driver_PCOM-B638_Chipset_WIN_7_8_10_2K8R2_2K12(R2)_32b_64b
Graphic	15.36.20.4206	Driver_PCOM-B638_GFX_WIN_7_8_10_2K8_Vista_32b
Graphic	15.40.15.64.4360	Driver_PCOM-B638_GFX_WIN_7_8_10_2K8(R2)_2K12(R2)_Vista_64b
Seriel IO	30.63.1519.07	Driver_PCOM-B638_Serial IO_WIN_8.1_2K12R2_10_64b
USB_3.0	MR3_PV_4.0.3.49	Driver_PCOM-B638_USB3.0_WIN_7_2K8R2(64b only)_32b_64b
ME_Driver	11_5M_11.0.0.1197	Driver_PCOM-B638_ME_WIN_All_32b_64b

Table 5 PCOM-B638VG Driver list

3.4 Electrical Characteristics

Input voltage	+12VDC (Nominal) + 6 VDC ~ + 18 VDC (Wide range)
RTC Battery power consumption	3.2uA
Power on mode	ATX / AT

Table 6 Electrical characteristics

3.5 Power sequence

PCOM-B638VG Power sequence

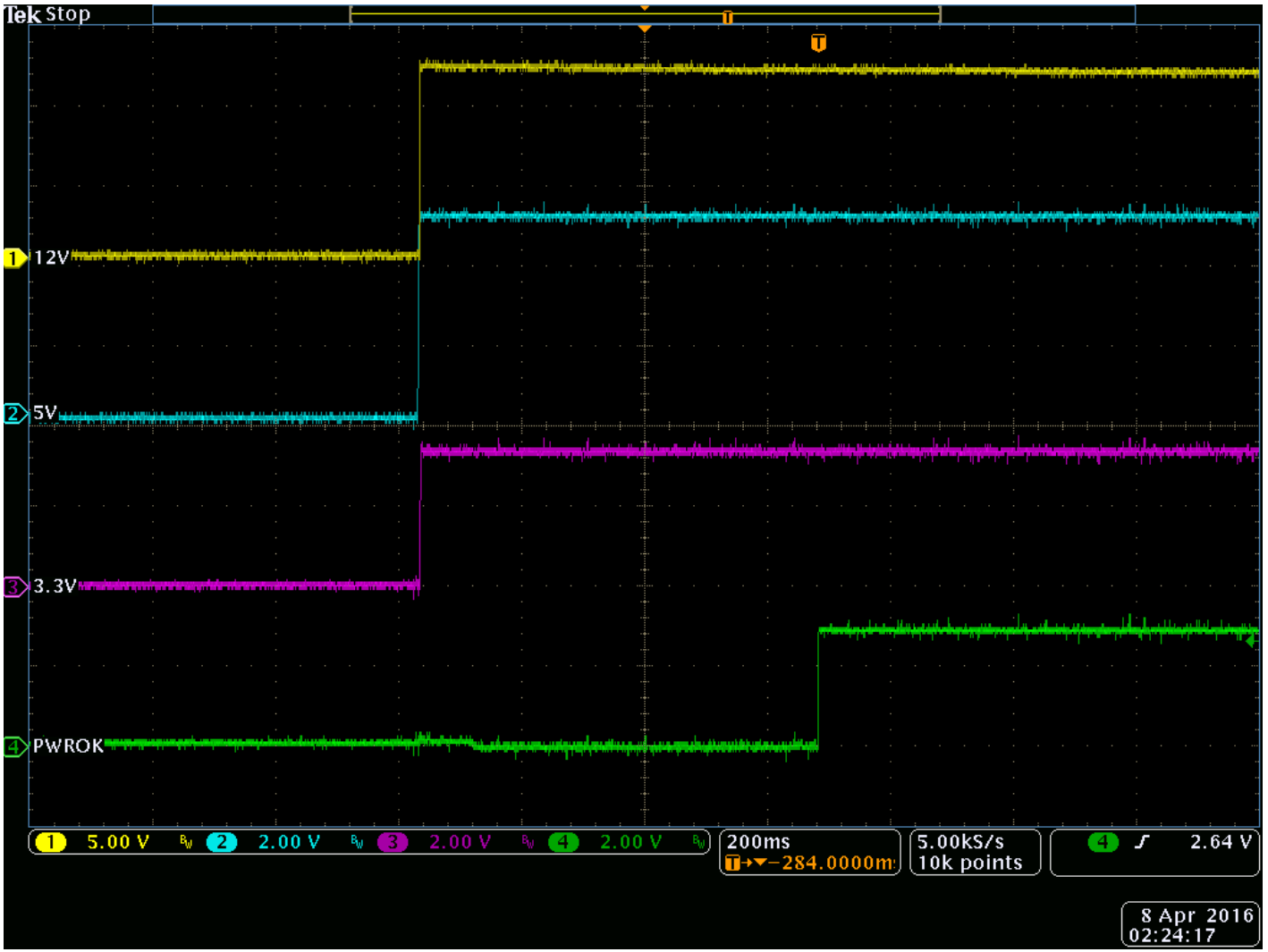


Figure 2 Power on sequence

3.6 Circuit protection design

PCOM-B638VG has designed Schottky diode protection on the module for Serial Port, FAN(PWMOUT & TACHIN), LID and SLEEP. Considerations must be taken while designing carrier board.

*Note : Pull up voltage VCC is 5V.

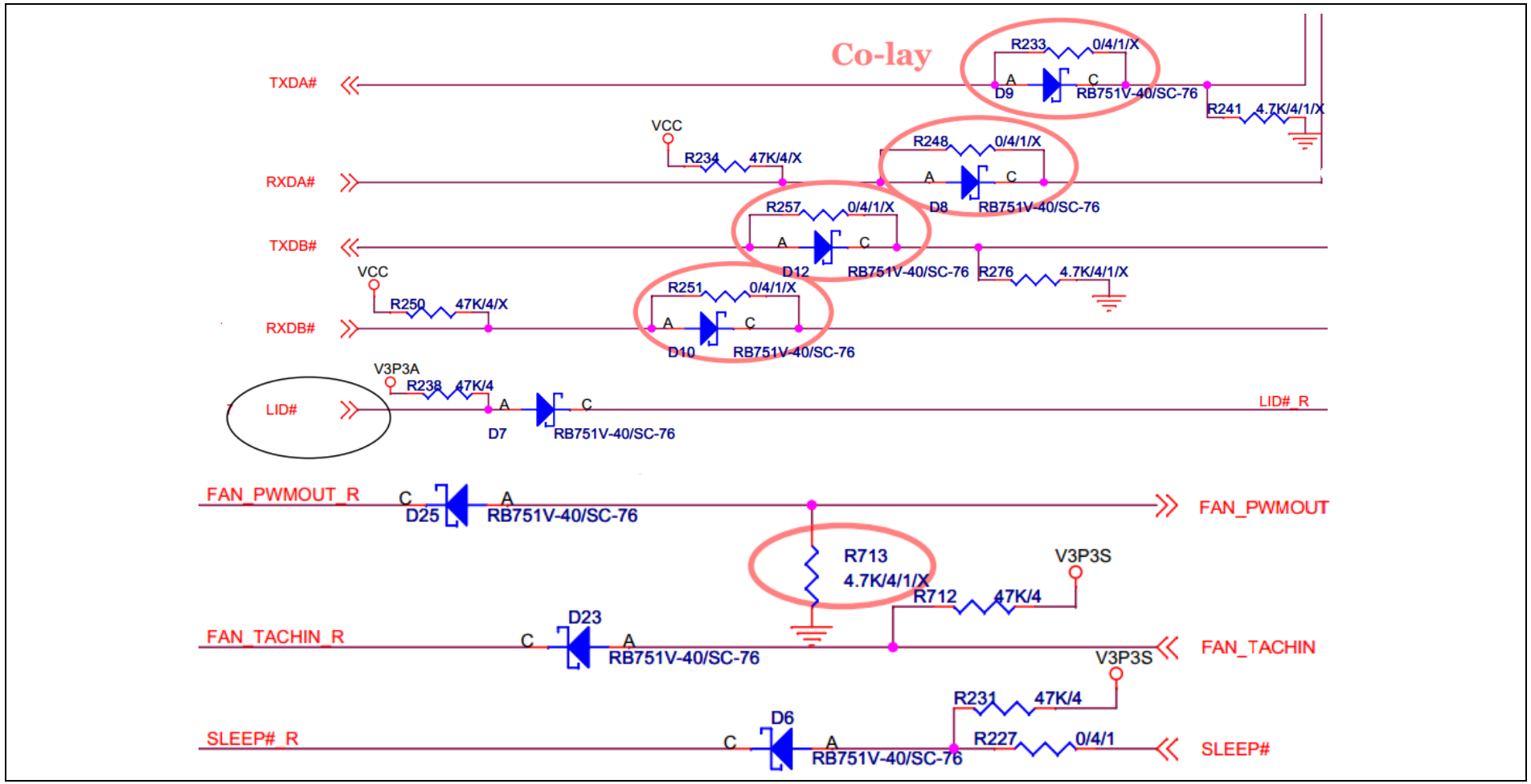


Figure 3 Circuit protection design

3.7 Mechanical Dimensions

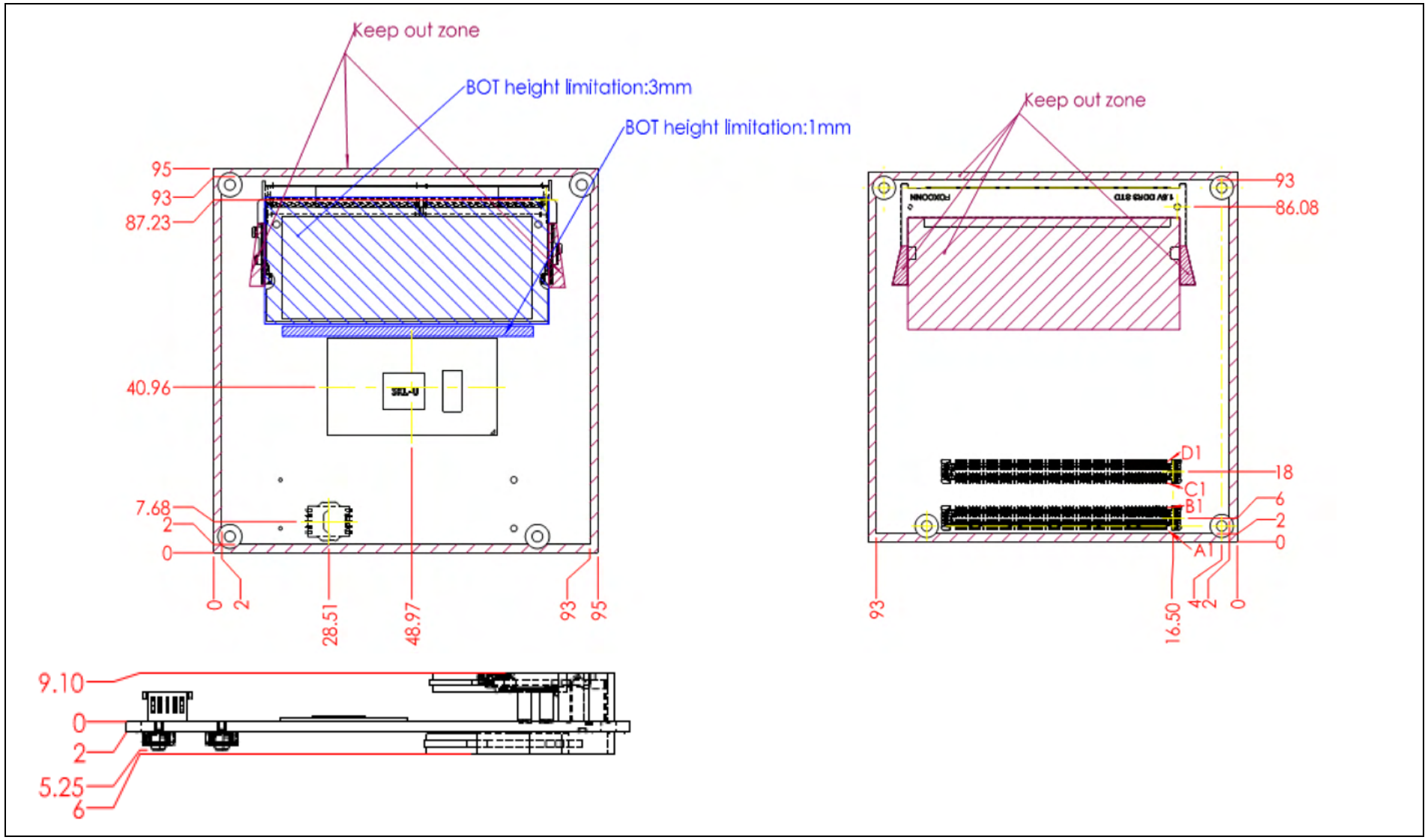


Figure 4 Mechanical Dimensions - Top & BOT & Assembly

3.8 Module and HS weight

Weight

Module	80.0g
Cooler (H/S+FAN)	227.0g
Accessory (Screws & Stand-off)	11.5g

Table 7 Module and HS weight

3.9 Environmental Specifications

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

Table 8 Environmental Specifications

3.10 Optional function rework SOP

1. Optional function rework SOP : eDP

PCOM-B638 Default display is LVDS, rework following SOP for eDP display interface.

- Step 1

Remove below resistors and caps :

R351,R531,C226,C221,RN10,C229,C234,RN12,RN14,RN8,C246,C240,R353,R347,R456

- Step 2

Add below resistors and caps :

R350,R521,R322,R314,R328,R329,RN13,RN7,C247,C239,R450

- Quick Tips

Remove 15 parts (Red color rectangle)

Add 11 parts (Block color rectangle)

Just move the Red component to next Black position for 11 resistors/caps.

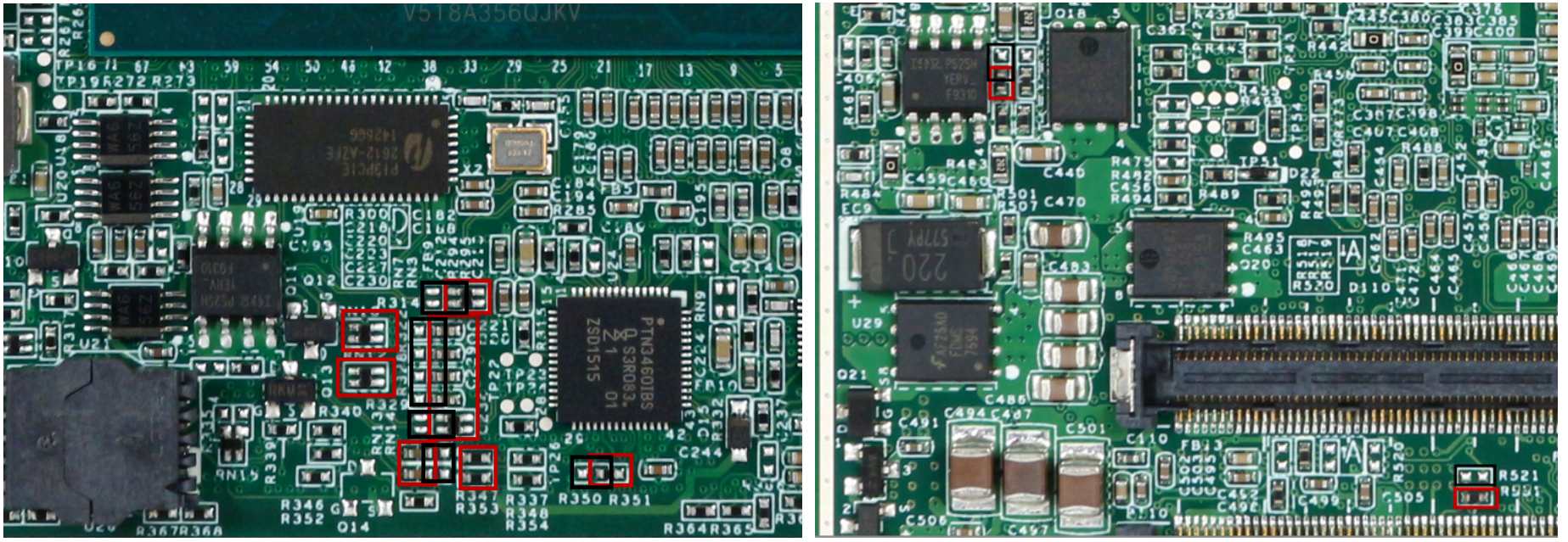


Figure 5 Optional function rework SOP : eDP

2. Optional function rework SOP : DDI2 (HDMI)

PCOM-B638 Default display is VGA, rework following SOP for DDI2 (HDMI) display interface.

- Step 1

Remove resistor R508 and place to R505.

- Step 2

Remove resistor R457 and add Q30.

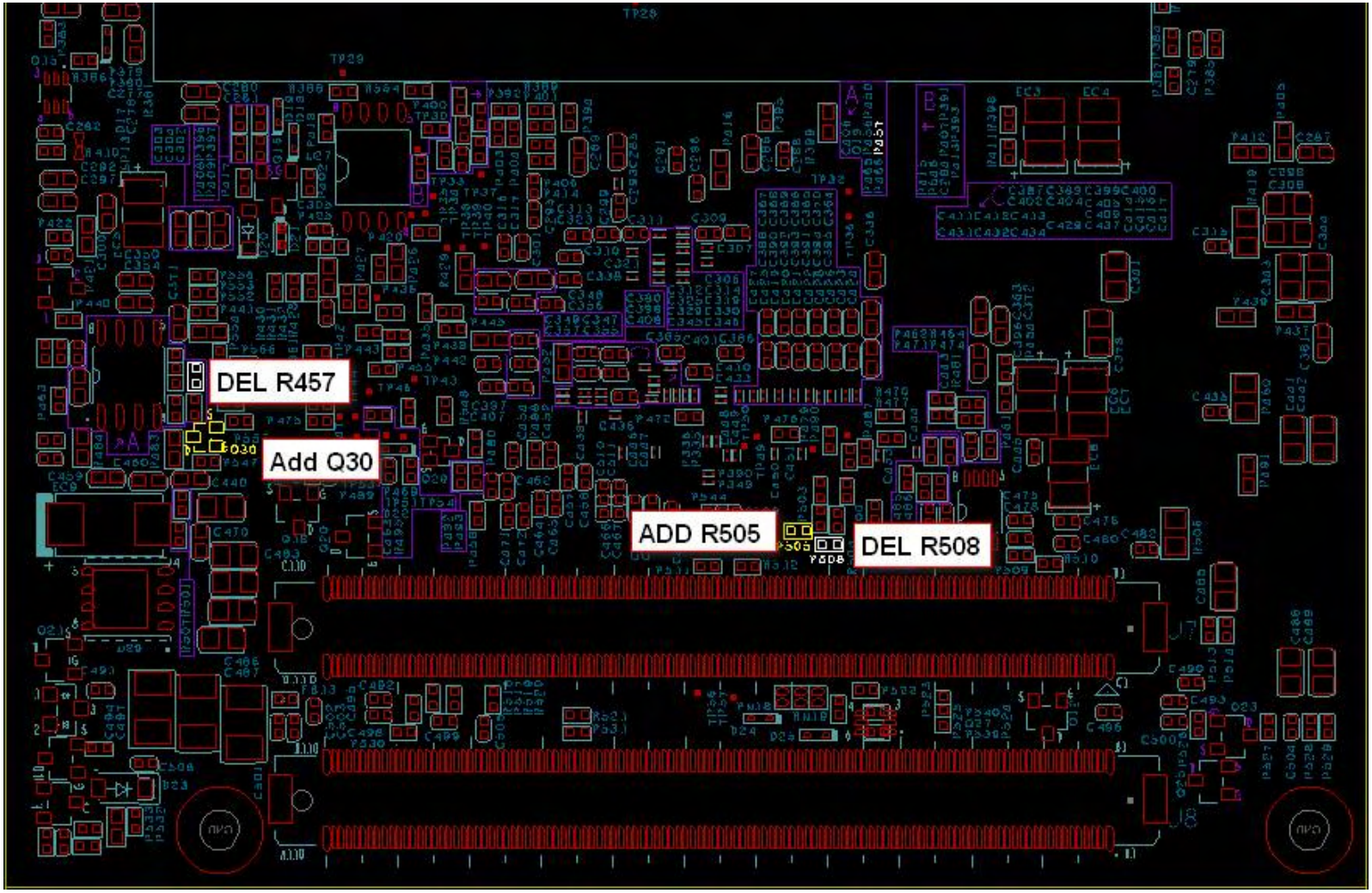


Figure 6 Optional function rework SOP : DDI2 (HDMI)

3. Optional function rework SOP : OTG

PCOM-B638 Default USB port 7 is USB 2.0, rework following SOP for USB OTG feature.

- Step 1

Remove resistor RN15A/RN15B.

- Step 2

Add 0 ohm resistors to R335 and R336 location.

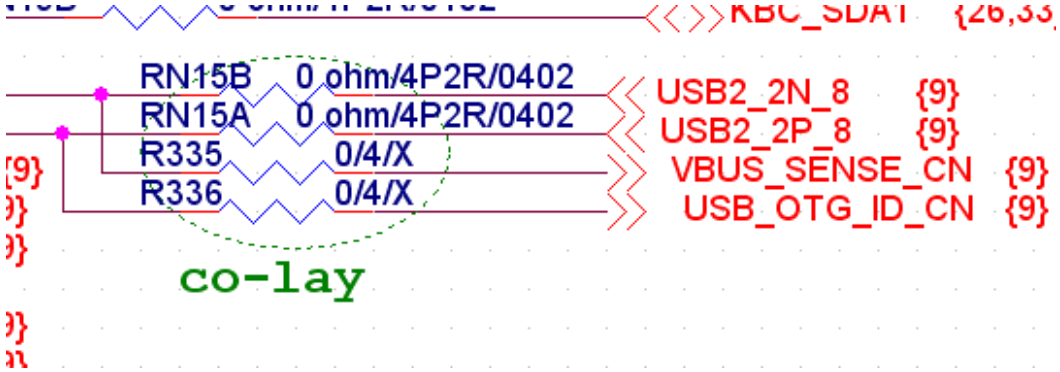


Figure 7 Optional function rework - OTG schematic

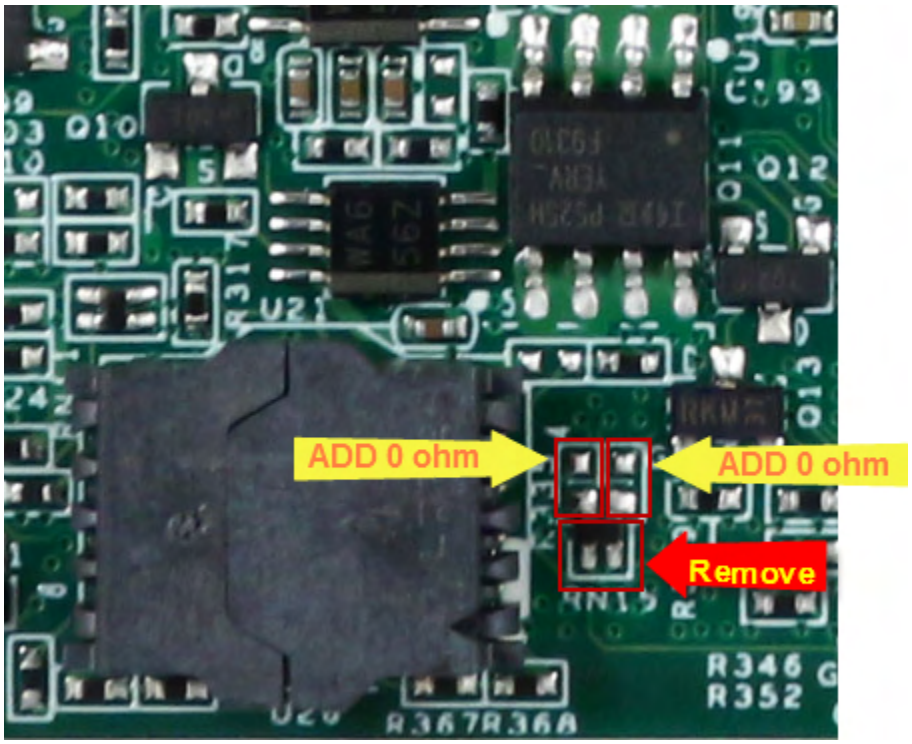


Figure 8 Optional function rework - OTG location

4 Heat sink / Cooler dimensions

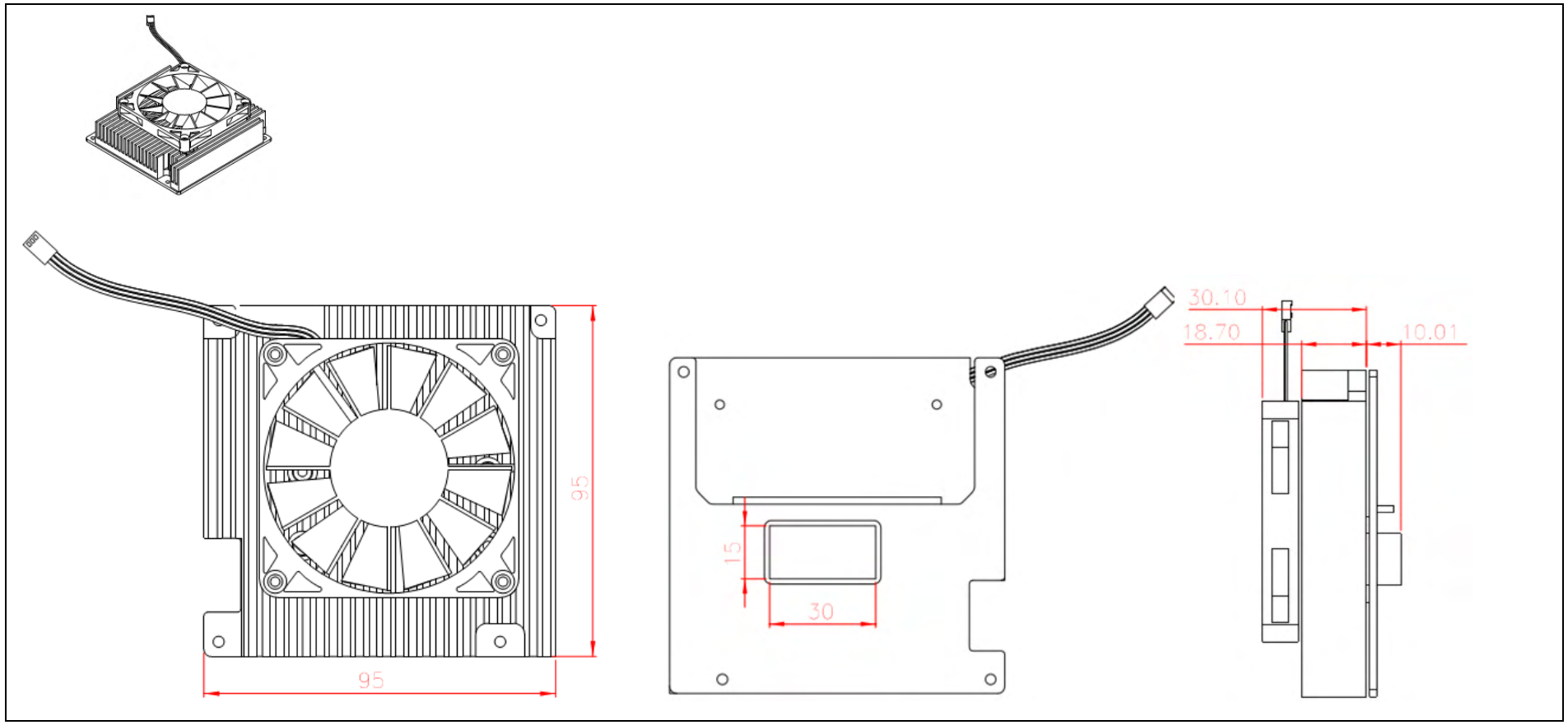


Figure 9 Heat sink / cooler mechanical dimensions

4.1 H/S Assembly

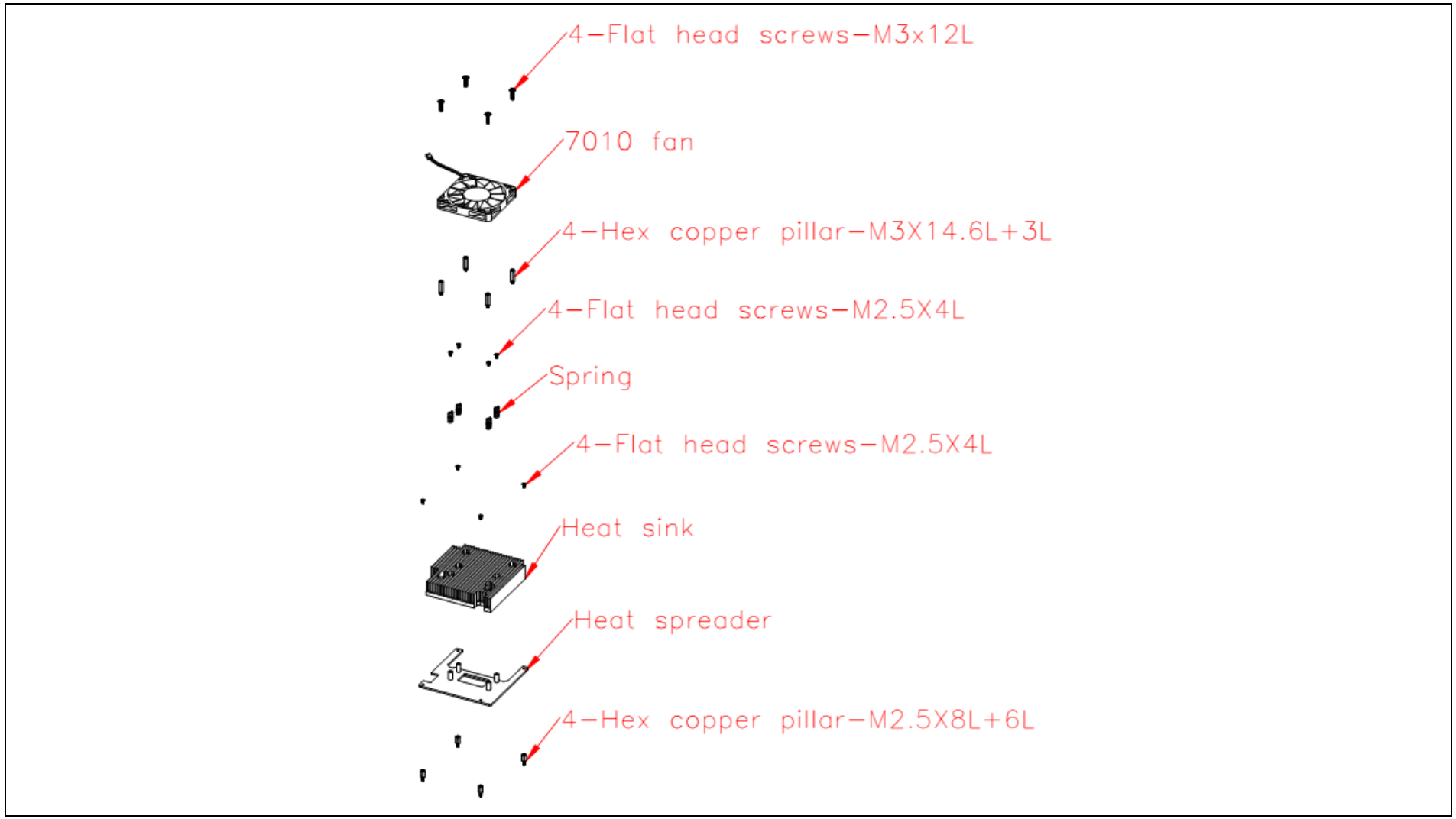


Figure 10 H/S Assembly guide

4.2 Packaging

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

Table 9 Packaging

4.3 Ordering Guide

PCOM-B638VG

Product	Ordering P/N	Status
PCOM-B638VG-3955U	AB1-3E77Z	Available
PCOM-B638VG-6100U	AB1-3E32Z	Available
PCOM-B638VG-6300U	AB1-3E38Z	Available
PCOM-B638VG-6600U	AB1-3E39Z	Available

Table 10 Ordering Guide - PCOM-B638

Accessory

Product	Ordering P/N	Status
PCOM-B638VG Cooler	B9971380	Available
PCOM-C605	AB1-3998	Available

Table 11 Ordering Guide - Accessory

5 Signal Descriptions and Pin out Tables

Below tables lists PCOM-B638VG AB and CD Row connectors Type 6 pin name, un-connected pins are present as NC

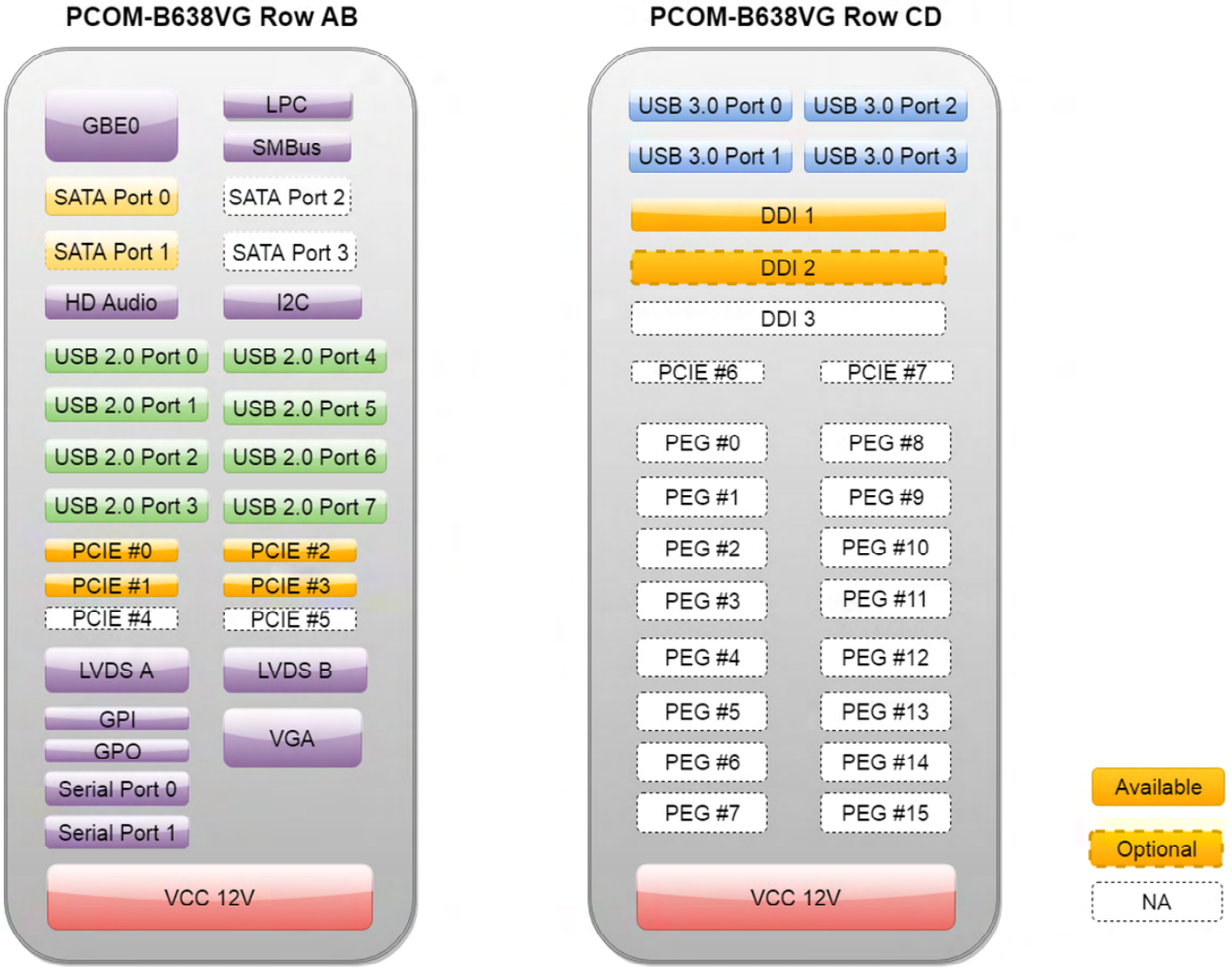


Figure 11 AB & CD Row connector signals

PCOM-B638-ZR0 Pin out (Original Type 6 pin definition)							
Pin	**Row A**	**Pin**	**Row B**	**Pin**	**Row C**	**Pin**	**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**	NC (LPC_DRQ0#)	**C8**	GND	**D8**	GND
A9	GBE0_MDI1-	**B9**	NC (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	NC (GBE0_CTREF)	**B14**	SMB_DAT	**C14**	GND	**D14**	GND
A15	SUS_S3#	**B15**	SMB_ALERT#	**C15**	NC (DDI1_PAIR6+)	**D15**	DDI1_CTRLCLK_AUX+

Table 12 PCOM-B638 Pin-out 1-7

A16	SATA0_TX+	**B16**	SATA1_TX+	**C16**	NC (DDI1_PAIR6-)	**D16**	DDI1_CTRLCLK_AUX-
A17	SATA0_TX-	**B17**	SATA1_TX-	**C17**	RSVD15	**D17**	RSVD15
A18	SUS_S4#	**B18**	SUS_SATA	**C18**	RSVD15	**D18**	RSVD15
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**	RSVD15
A25	SATA2_RX+	**B25**	SATA_RX+	**C25**	NC (DDI1_PAIR4+)	**D25**	RSVD15
A26	SATA2_RX-	**B26**	SATA_RX-	**C26**	NC (DDI1_PAIR4-)	**D26**	DDI1_PAIR0+
A27	BATLOW#	**B27**	WDT	**C27**	NC (RSVD15)	**D27**	DDI1_PAIR0-
A28	(S)ATA_ACT#	**B28**	NC (PCH_HDA_SDI1)	**C28**	NC (RSVD15)	**D28**	NC
A29	AC/HDA_SYNC	**B29**	AC/HDA_SDIN1	**C29**	NC (DDI1_PAIR5+)	**D29**	DPB_TXP1
A30	AC/HDA_RST#	**B30**	AC/HDA_SDIN0	**C30**	NC (DDI1_PAIR5-)	**D30**	DPB_TXN1

Table 13 PCOM-B638 Pin-out 2-7

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_CTRLCLK_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**	RSVD15	**D35**	GND(FIXED)
A36	USB6-	**B36**	USB7-	**C36**	DDI3_CTRLCLK_AUX+	**D36**	DDI1_PAIR3+
A37	USB6+	**B37**	USB7+	**C37**	DDI3_CTRLCLK_AUX-	**D37**	DDI1_PAIR3-
A38	USB_6_7_OC#	**B38**	USB_4_5_OC#	**C38**	DDI3_DDC_AUX_SEL	**D38**	RSVD15
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**	RSVD15	**D45**	RSVD15

Table 14 PCOM-B638 Pin-out 3-7

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**	RSVD15	**D48**	RSVD15
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	GP10	**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)

Table 15 PCOM-B638 Pin-out 4-7

A61	PCIE_TX2+	**B61**	PCIE_RX2+	**C61**	PCIE_RX12+	**D61**	PCIE_TX12+
A62	PCIE_TX2-	**B62**	PCIE_RX2-	**C62**	PCIE_RX12-	**D62**	PCIE_TX12-
A63	GPI1	**B63**	GPO3	**C63**	RSVD15	**D63**	RSVD15
A64	PCIE_TX1+	**B64**	PCIE_RX1+	**C64**	RSVD15	**D64**	RSVD15
A65	PCIE_TX1-	**B65**	PCIE_RX1-	**C65**	N/A	**D65**	N/A
A66	GND	**B66**	WAKE0#	**C66**	N/A	**D66**	N/A
A67	GPI2	**B67**	N/A (WAKE1#)	**C67**	RSVD15	**D67**	GND
A68	PCIE_TX0+	**B68**	PCIE_RX0+	**C68**	N/A	**D68**	N/A
A69	PCIE_TX0-	**B69**	PCIE_RX0-	**C69**	N/A	**D69**	N/A
A70	GND(FIXED)	**B70**	GND(FIXED)	**C70**	GND(FIXED)	**D70**	GND(FIXED)
A71	LVDS_A0+ / eDP_TX2+	**B71**	LVDS_B0+	**C71**	N/A	**D71**	N/A
A72	LVDS_A0- / eDP_TX2-	**B72**	LVDS_B0-	**C72**	N/A	**D72**	N/A
A73	LVDS_A1+ / eDP_TX1+	**B73**	LVDS_B1+	**C73**	GND	**D73**	GND
A74	LVDS_A1- / eDP_TX1-	**B74**	LVDS_B1-	**C74**	N/A	**D74**	N/A
A75	LVDS_A2+ / eDP_TX0+	**B75**	LVDS_B2+	**C75**	N/A	**D75**	N/A

Table 16 PCOM-B638 Pin-out 5-7

A76	LVDS_A2- / eDP_TX0-	**B76**	LVDS_B2-	**C76**	GND	**D76**	GND
A77	LVDS_VDD_EN / eDP_VDD_EN	**B77**	LVDS_B3+	**C77**	RSVD15	**D77**	RSVD15
A78	LVDS_A3+	**B78**	LVDS_B3-	**C78**	N/A	**D78**	N/A
A79	LVDS_A3-	**B79**	LVDS_BKLT_EN / eDP_BKLT_EN	**C79**	N/A	**D79**	N/A
A80	GND(FIXED)	**B80**	GND(FIXED)	**C80**	GND(FIXED)	**D80**	GND(FIXED)
A81	LVDS_A_CK+ / eDP_TX3+	**B81**	LVDS_B_CK+	**C81**	N/A	**D81**	N/A
A82	LVDS_A_CK- / eDP_TX3-	**B82**	LVDS_B_CK-	**C82**	N/A	**D82**	N/A
A83	LVDS_I2C_CK / eDP_AUX+	**B83**	LVDS_BKLT_CTRL / eDP_BKLT_CTRL	**C83**	RSVD15	**D83**	RSVD15
A84	LVDS_I2C_DAT / eDP_AUX-	**B84**	VCC_5V_SBY	**C84**	GND	**D84**	GND
A85	GPI3	**B85**	VCC_5V_SBY	**C85**	N/A	**D85**	N/A
A86	RSVD15	**B86**	VCC_5V_SBY	**C86**	N/A	**D86**	N/A
A87	eDP_HDP	**B87**	VCC_5V_SBY	**C87**	GND	**D87**	GND
A88	PCIE_CLK_REF+	**B88**	BIOS_DIS1#	**C88**	N/A	**D88**	N/A
A89	PCIE_CLK_REF-	**B89**	VGA_RED	**C89**	N/A	**D89**	N/A
A90	GND(FIXED)	**B90**	GND(FIXED)	**C90**	GND(FIXED)	**D90**	GND(FIXED)

Table 17 PCOM-B638 Pin-out 6-7

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	NC (TPM_PP)	**B96**	VGA_I2C_DAT	**C96**	GND	**D96**	GND
A97	NC (TYPE10#)	**B97**	SPI_CS#	**C97**	NC	**D97**	NC
A98	SER0_TX	**B98**	RSVD15	**C98**	PEG_RX14+	**D98**	PEG_TX14+
A99	SER0_RX	**B99**	RSVD15	**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 18 PCOM-B638 Pin-out 7-7

6 BIOS Setup Items

PCOM-B638VG 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-B638VG 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

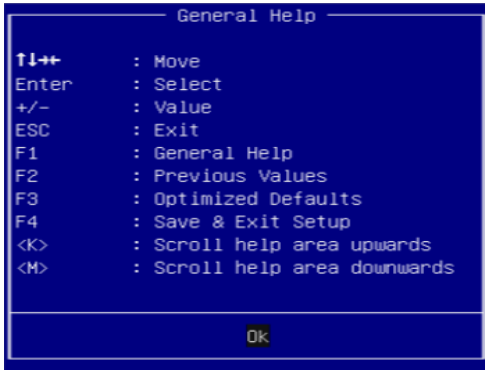
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del> key will enter BIOS setup screen.

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 from any menu by pressing <F1>. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press <Esc> to exit the Help screen.



6.2 Main

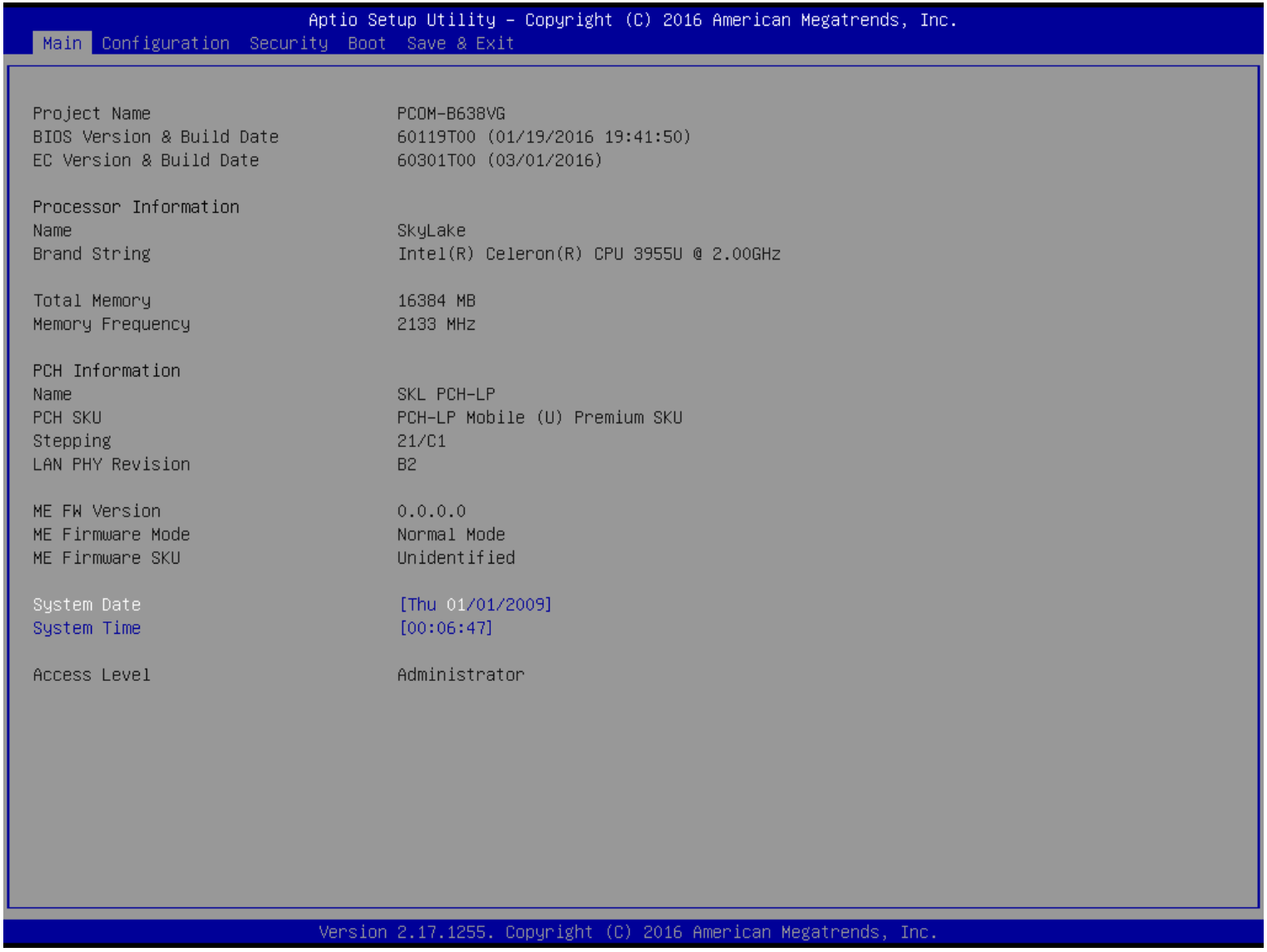


Figure 12 BIOS MAIN

6.3 Configuration

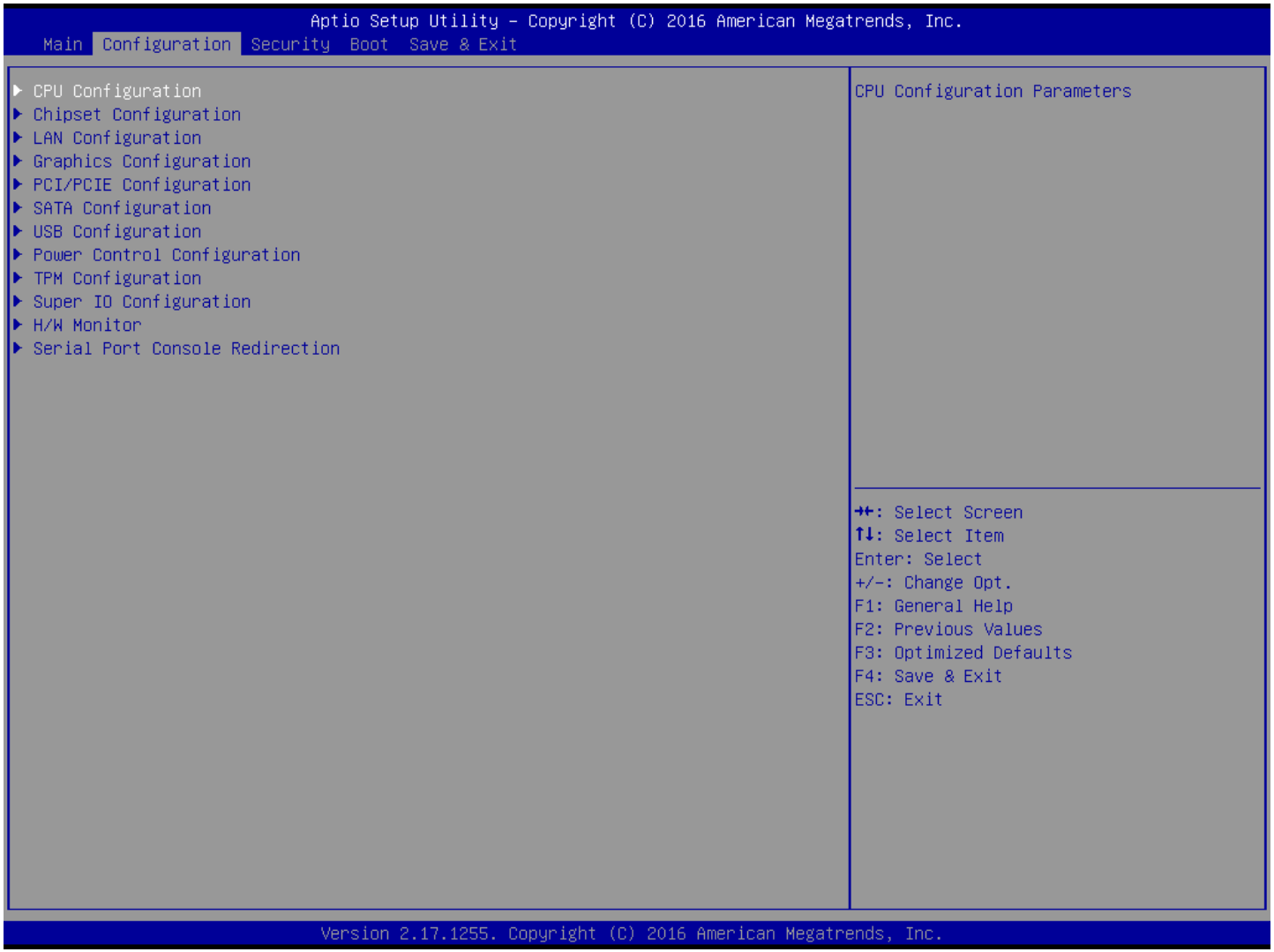


Figure 13 BIOS CONFIGURATION

6.4 CPU

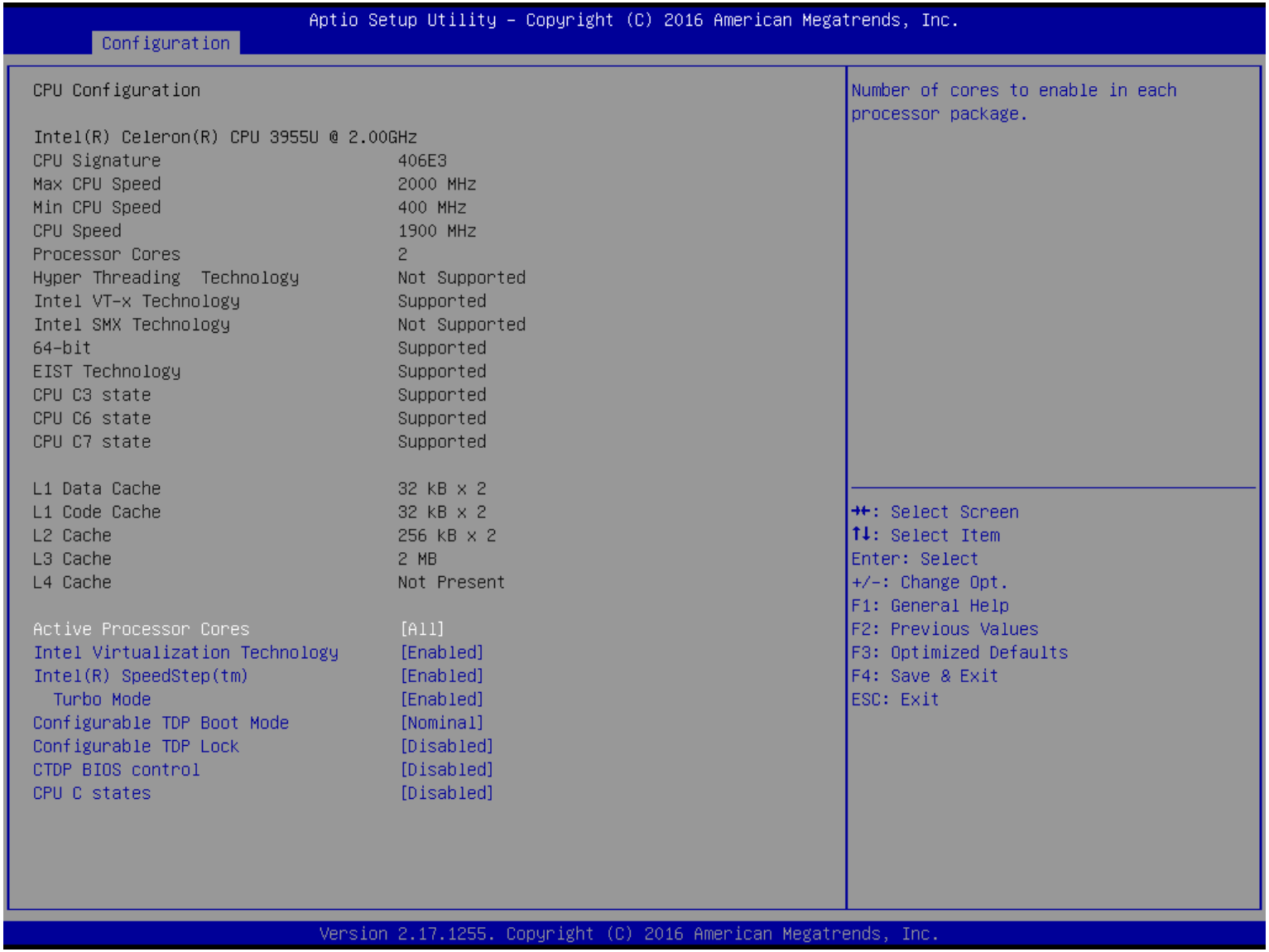


Figure 14 BIOS CPU

6.5 Chipset

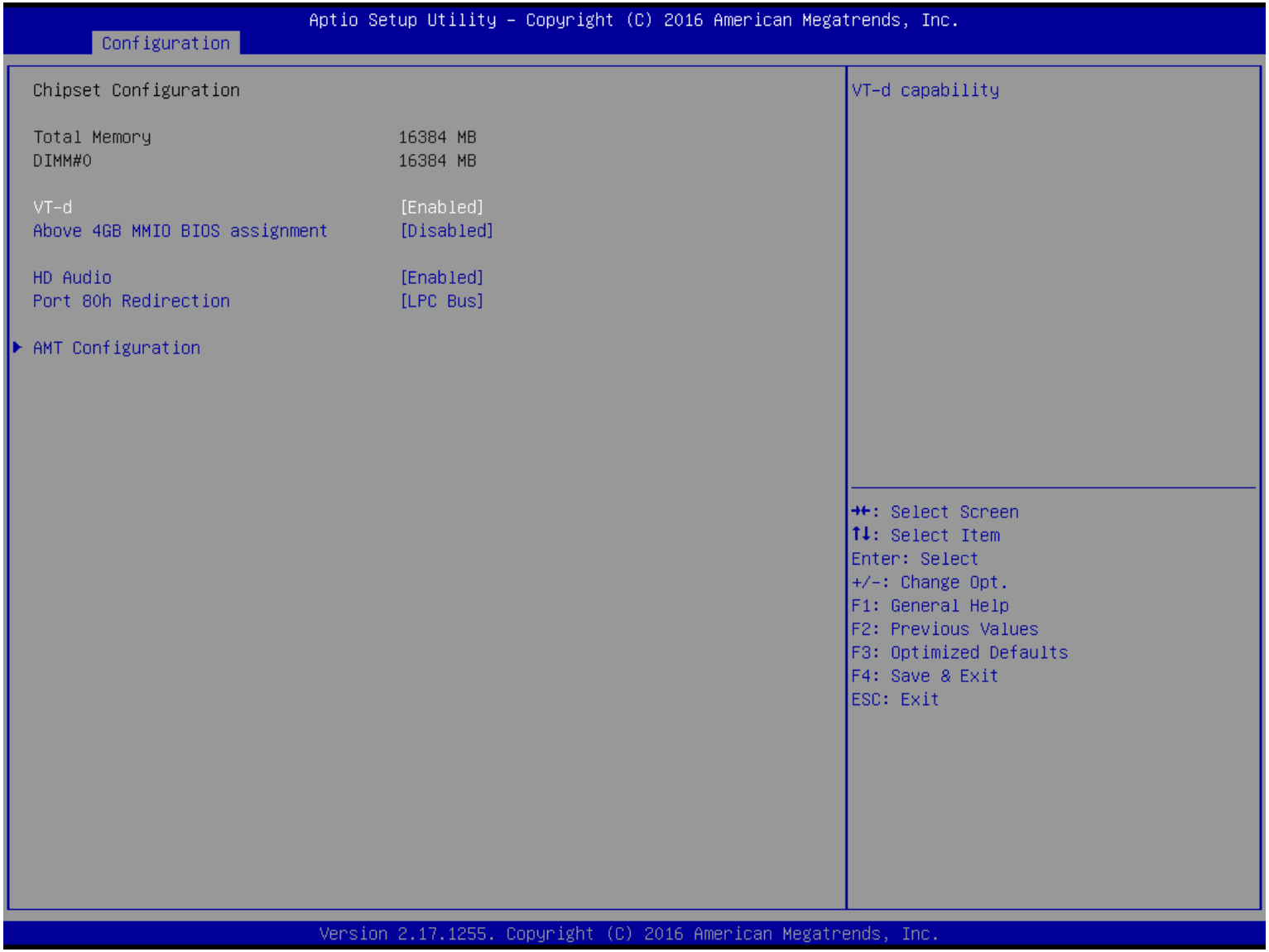


Figure 15 BIOS CHIPSET

6.6 LAN

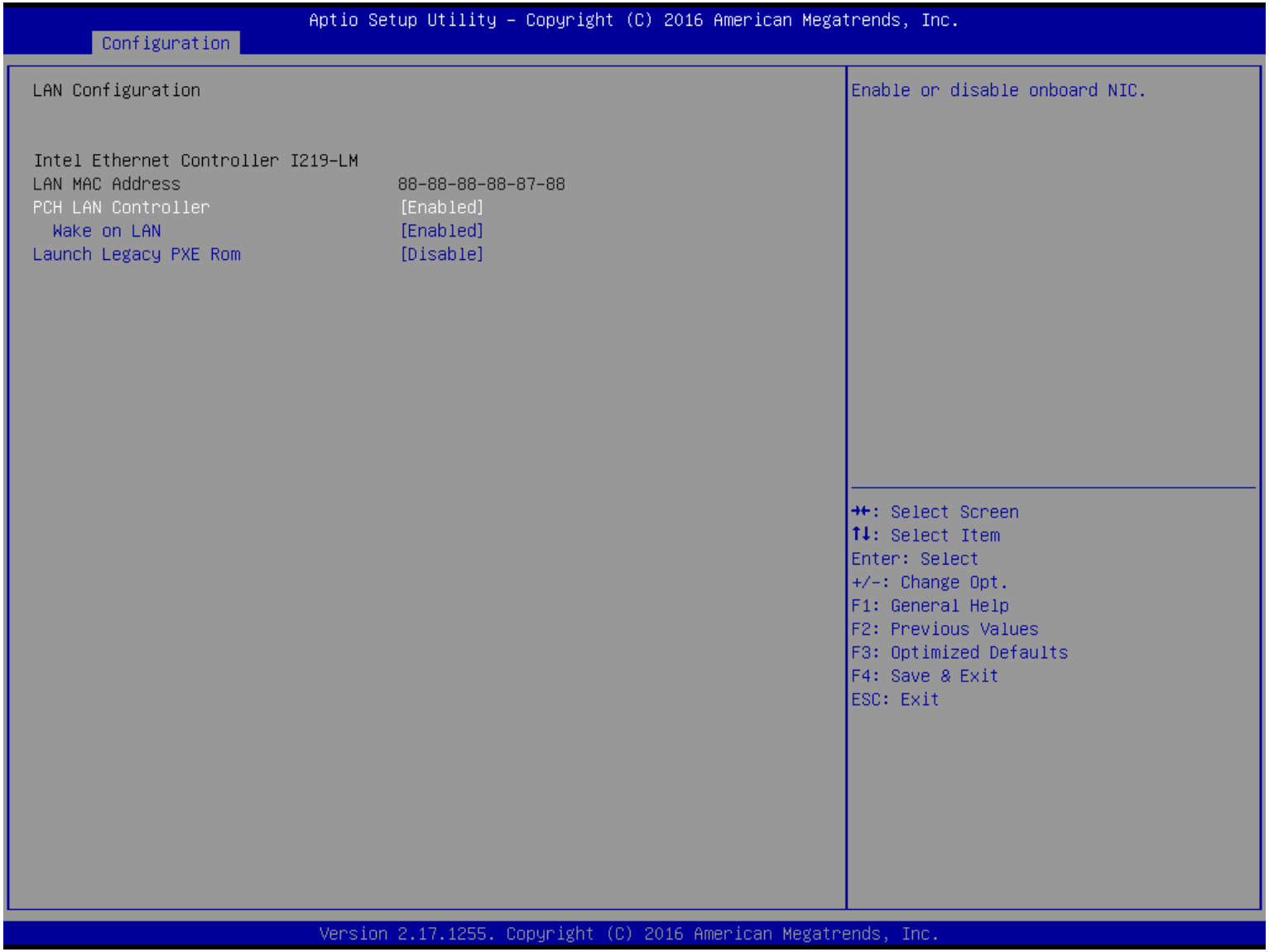


Figure 16 BIOS LAN

6.7 Graphics

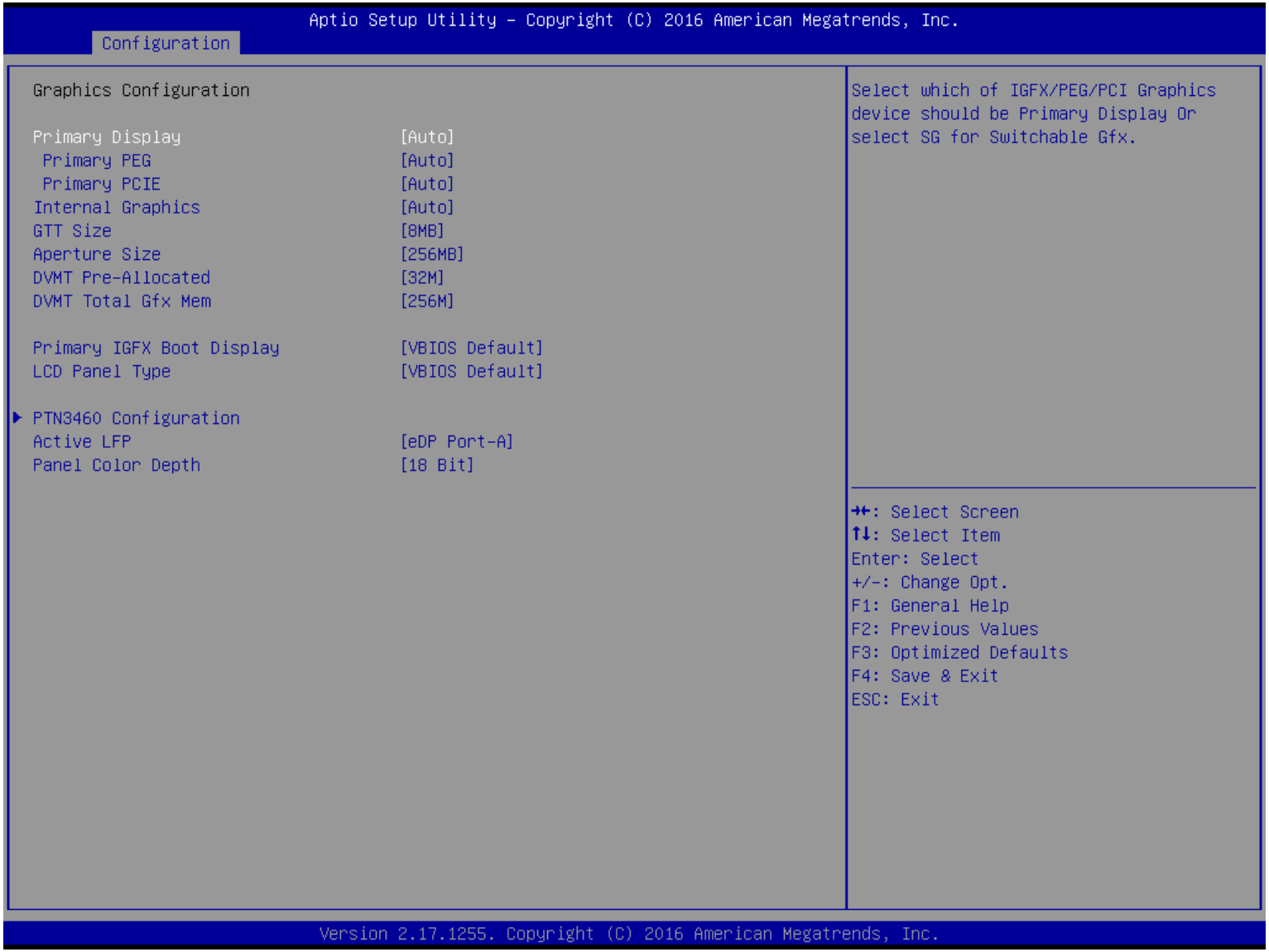


Figure 17 BIOS GRAPHICS

6.8 PCIE

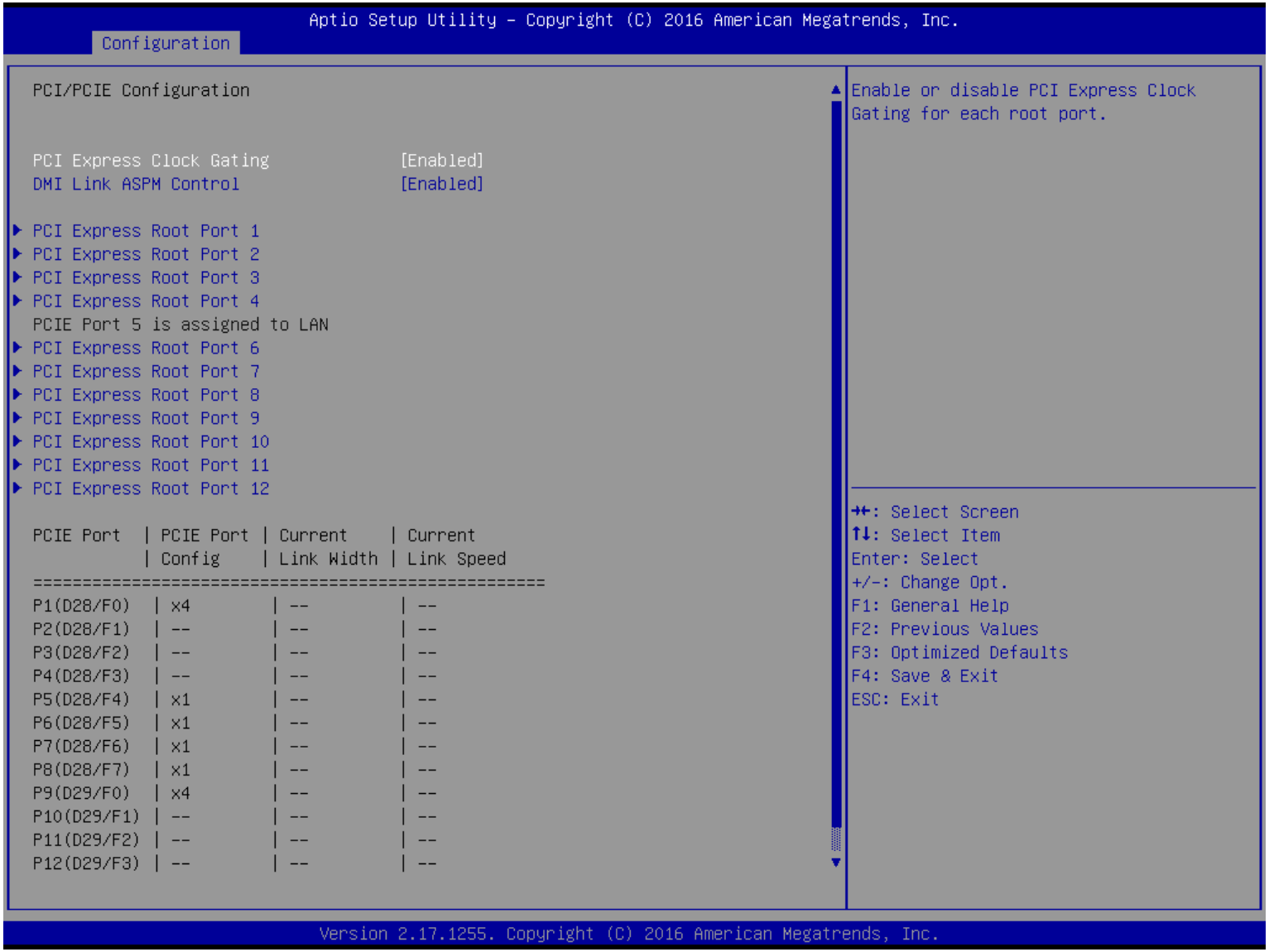


Figure 18 BIOS PCIE

6.9 SATA

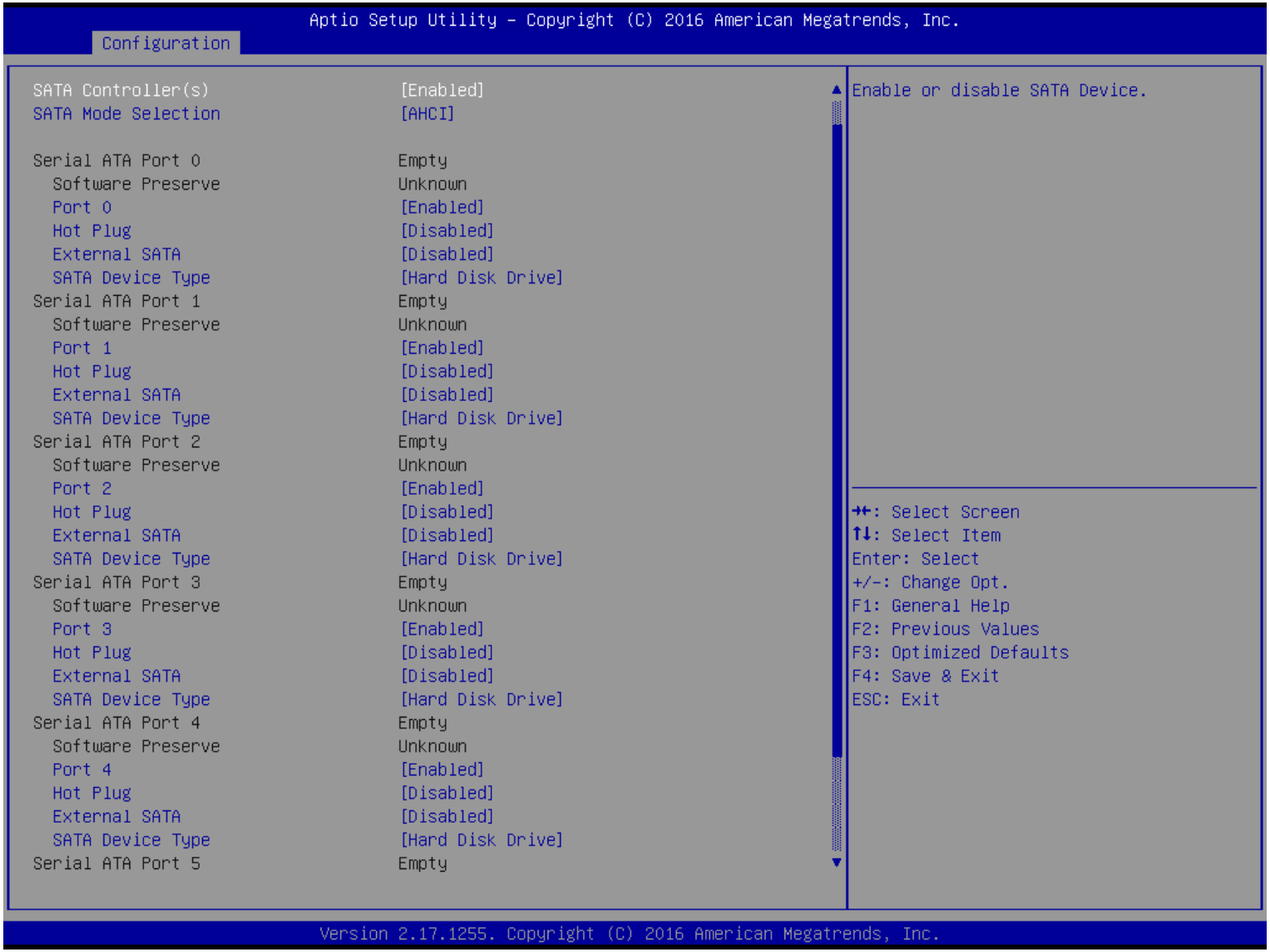


Figure 19 BIOS SATA

6.10 USB

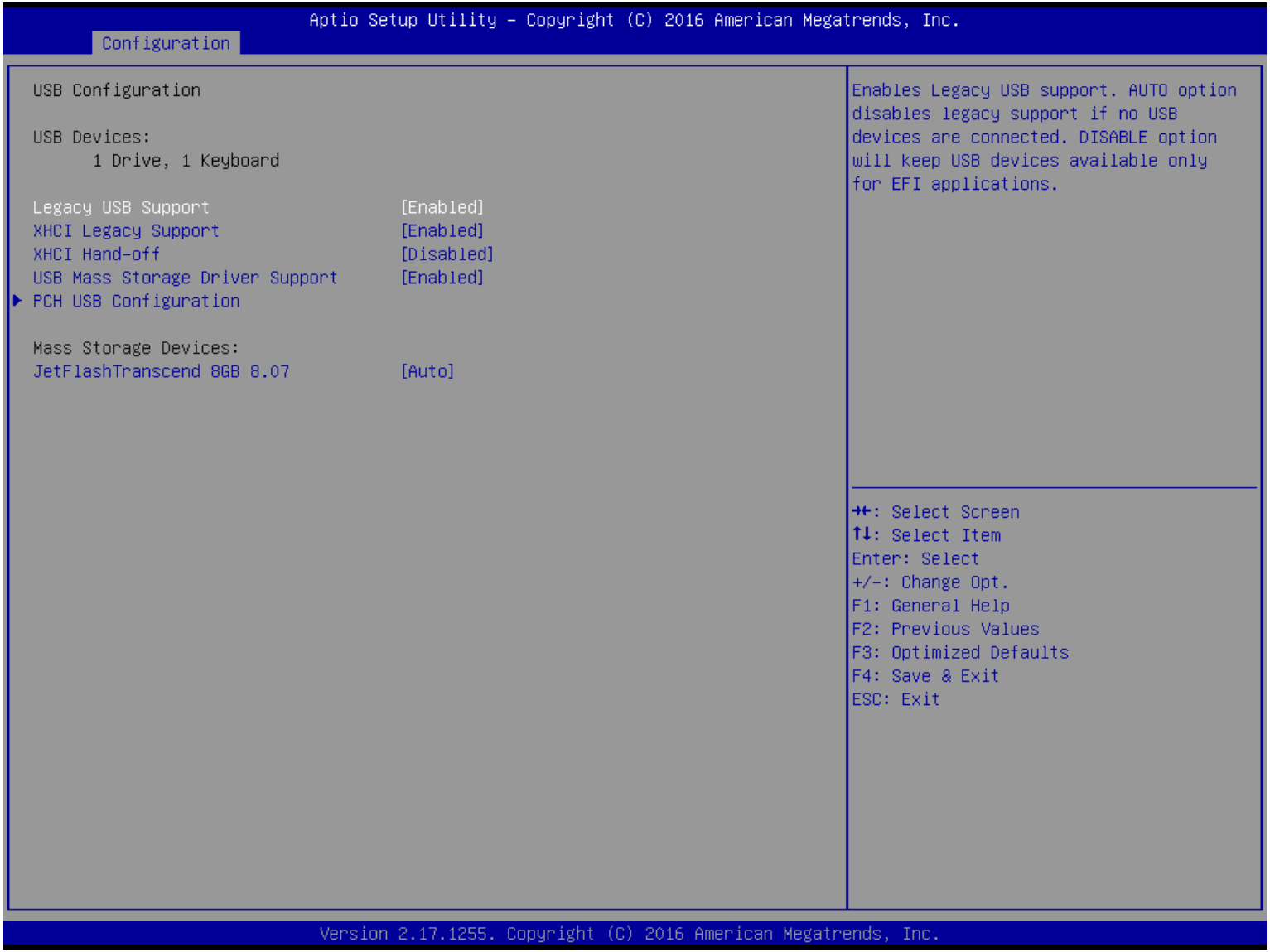


Figure 20 BIOS USB

6.11 Power

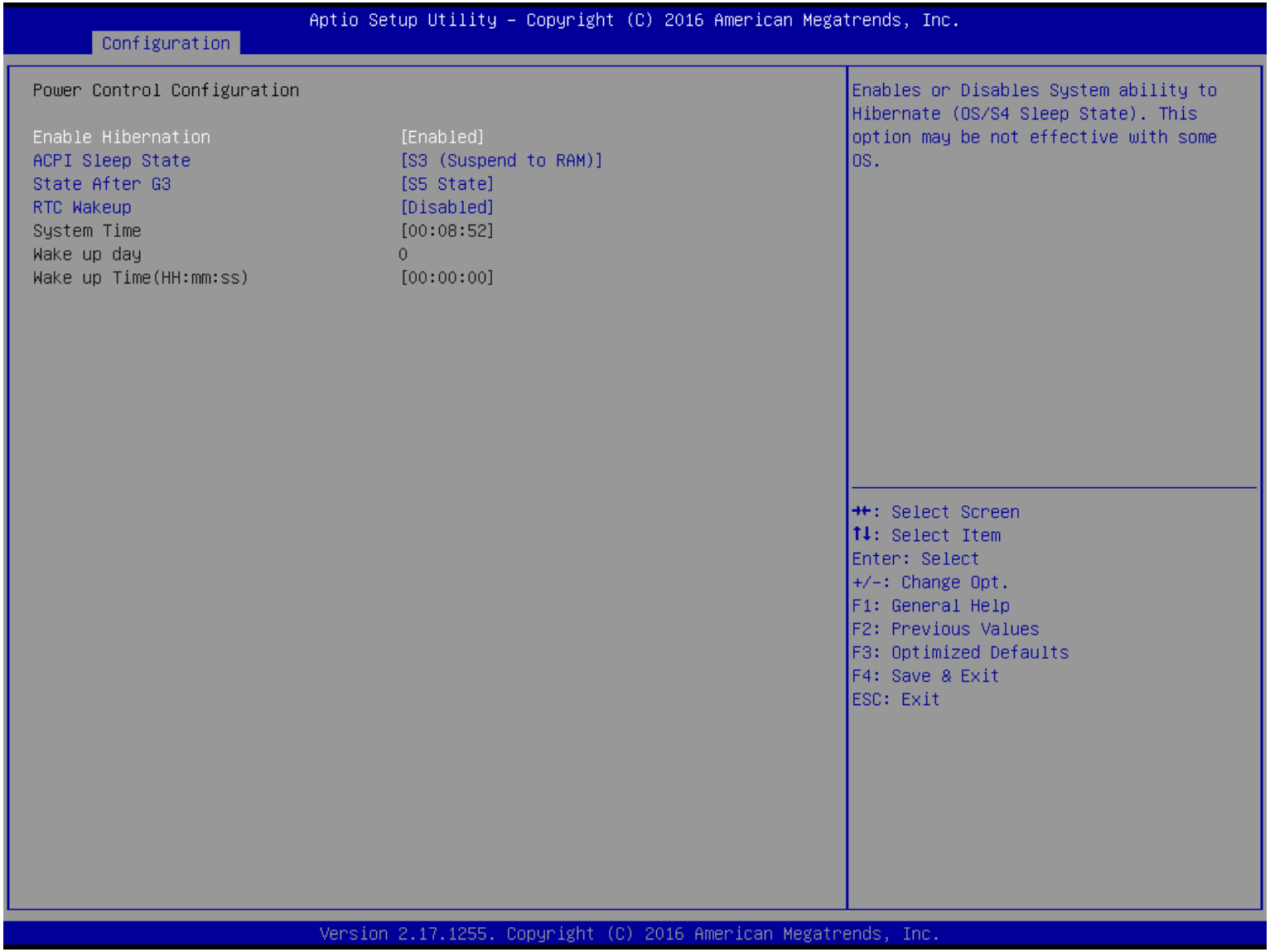


Figure 21 BIOS POWER

6.12 TPM

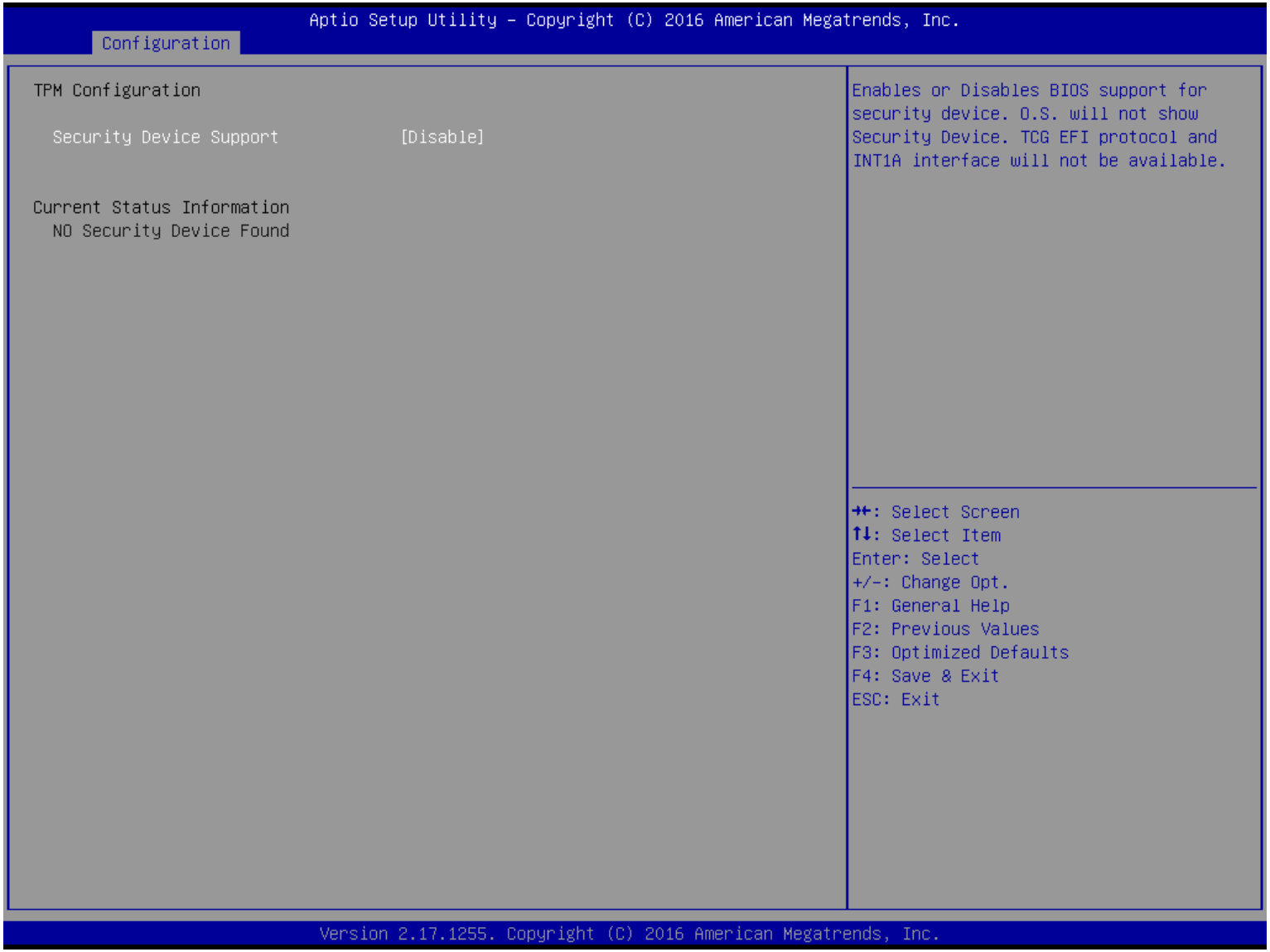


Figure 22 BIOS TPM

6.13 Super IO

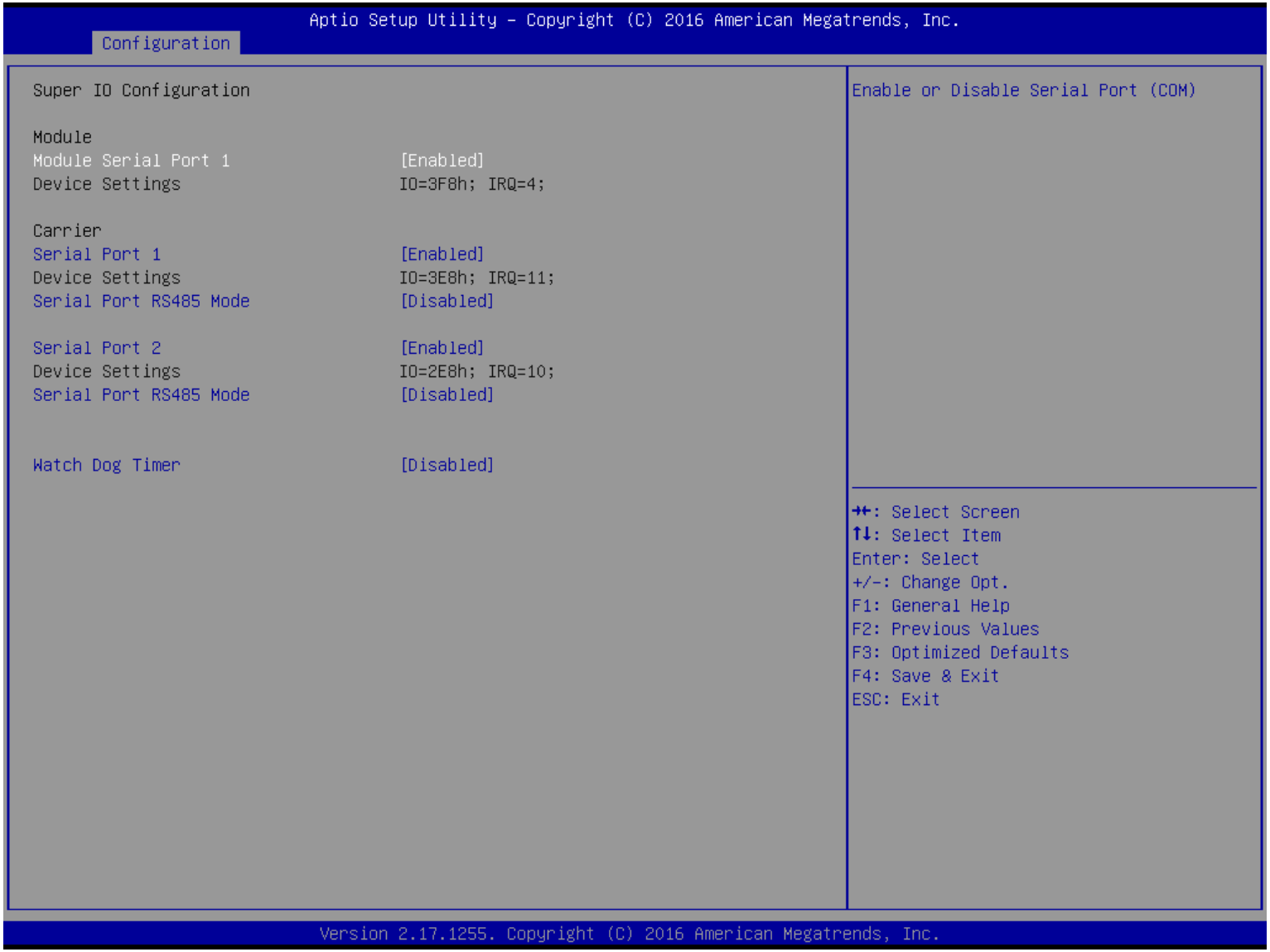


Figure 23 BIOS SUPER IO

6.14 H/W Monitor

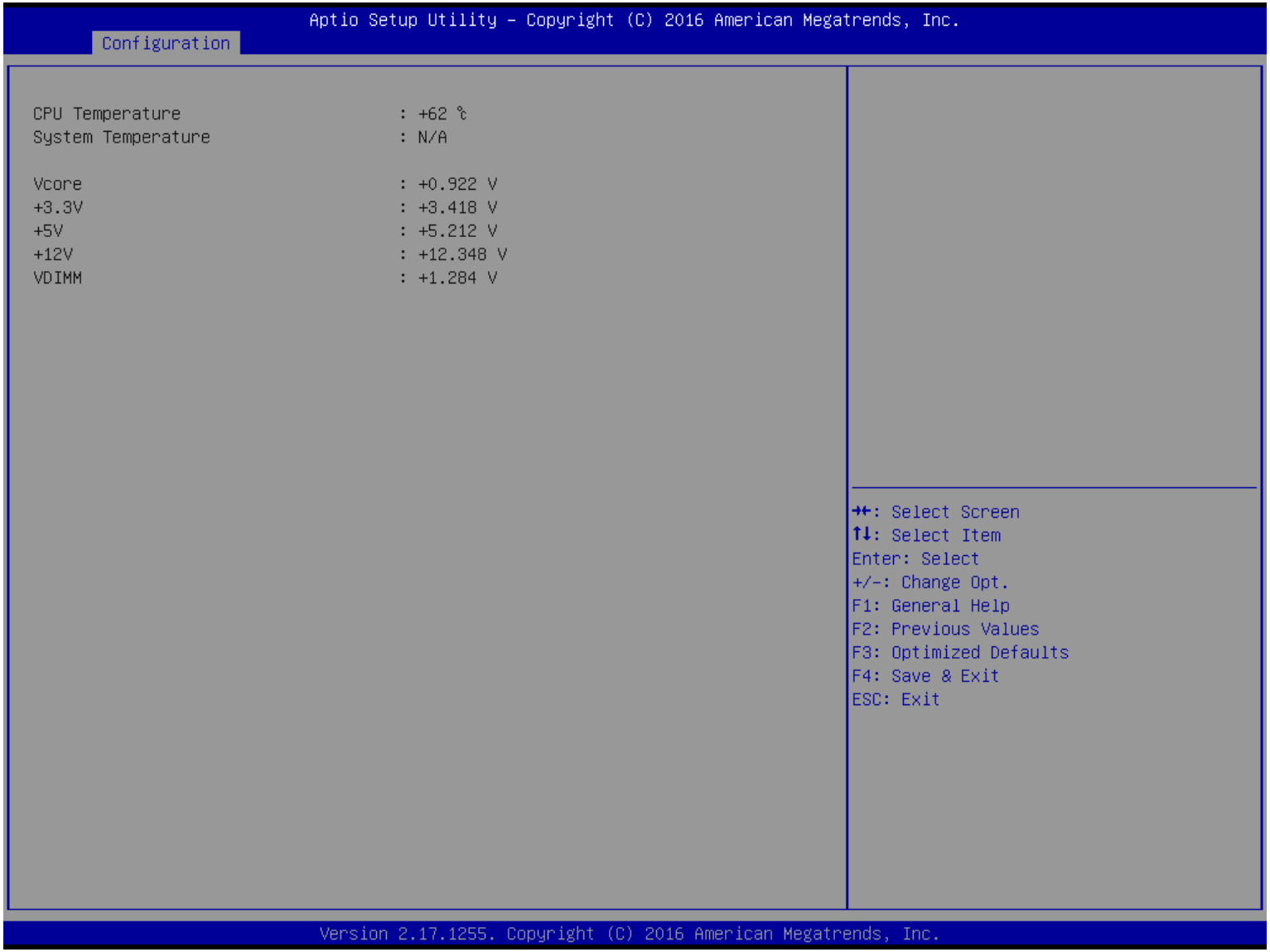


Figure 24 BIOS H/W MONITOR

6.15 Serial Port Console

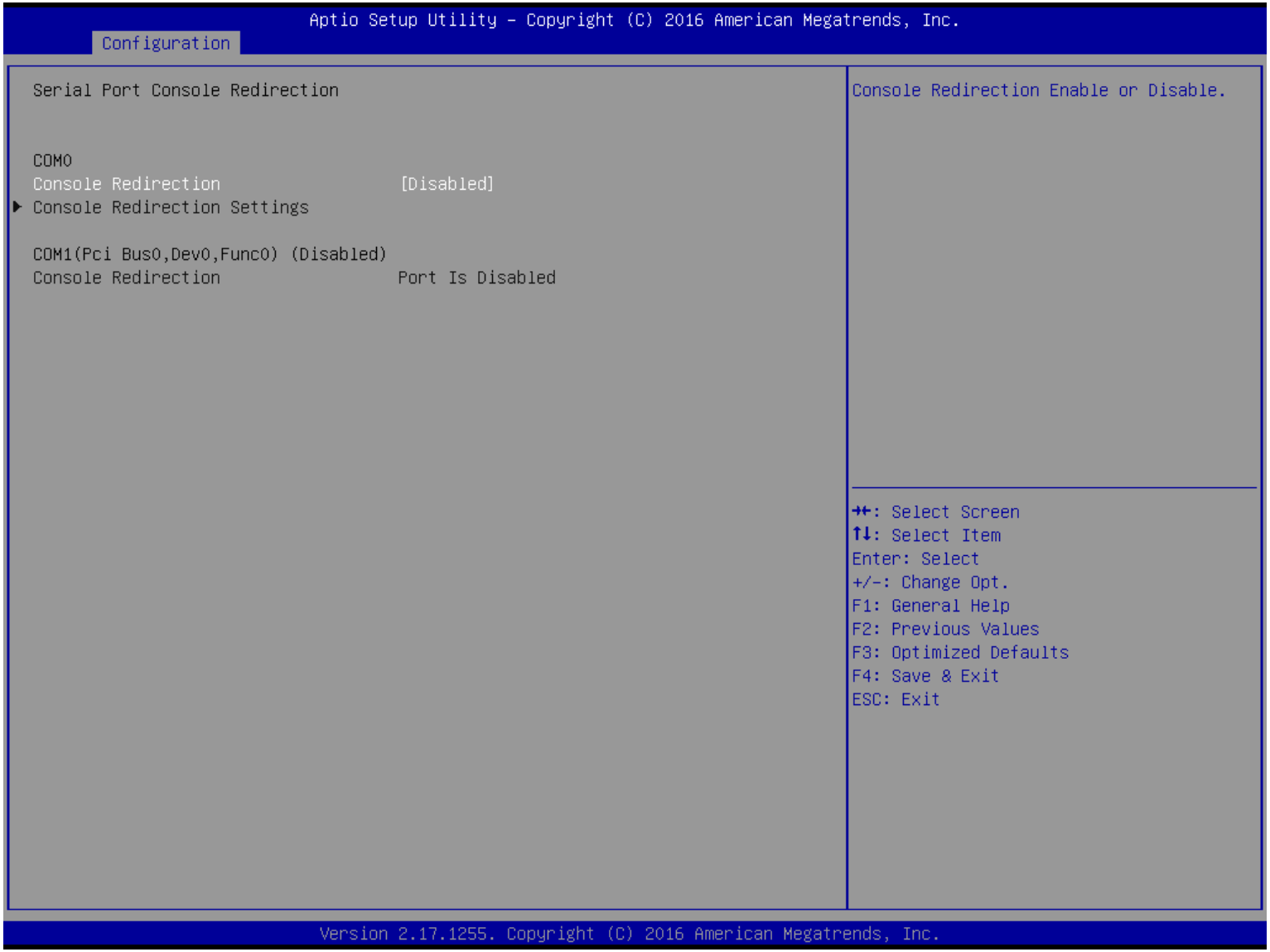


Figure 25 BIOS SERIAL PORT CONSOLE

6.16 Security

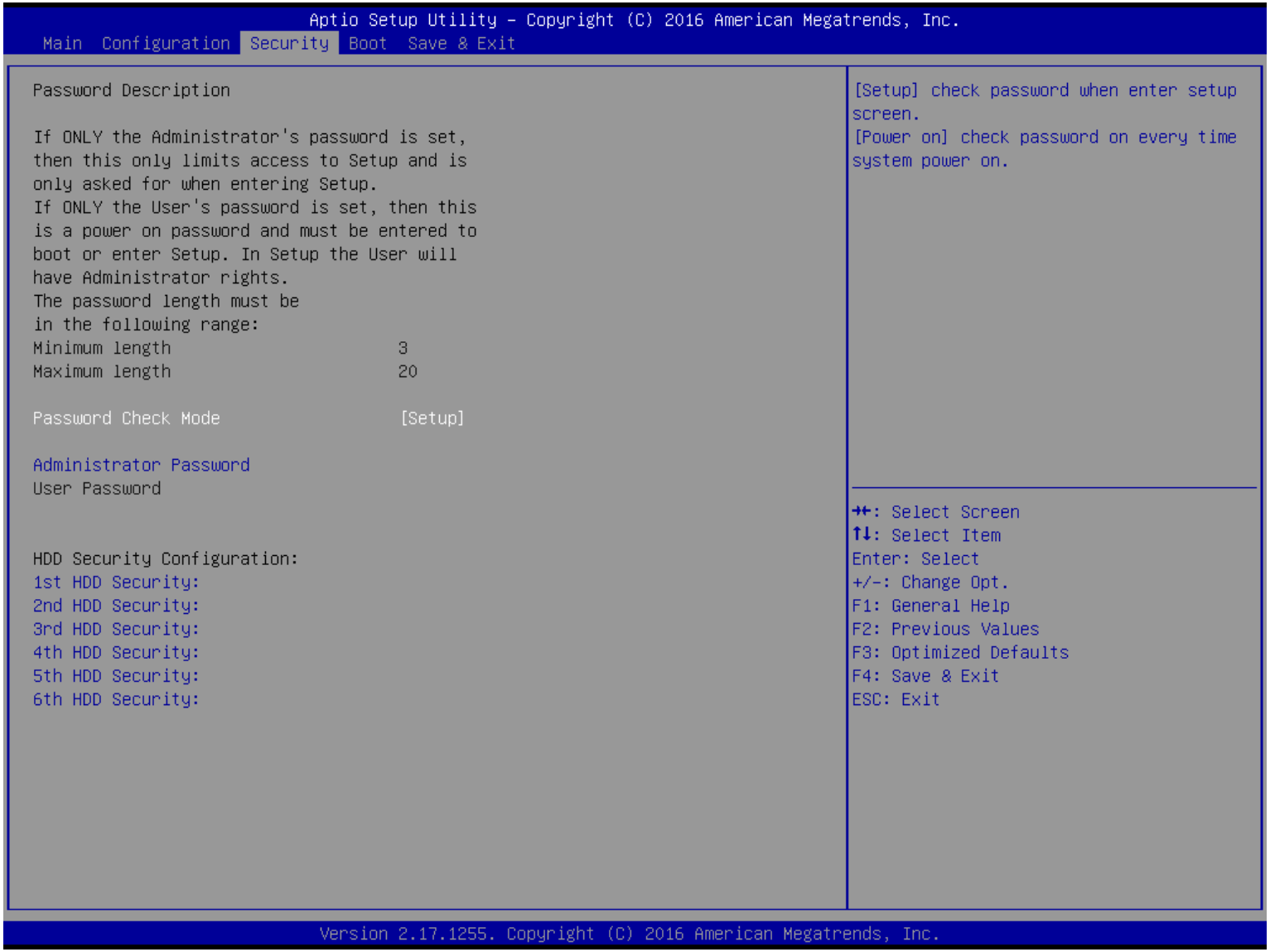


Figure 26 BIOS SECURITY

6.17 Boot

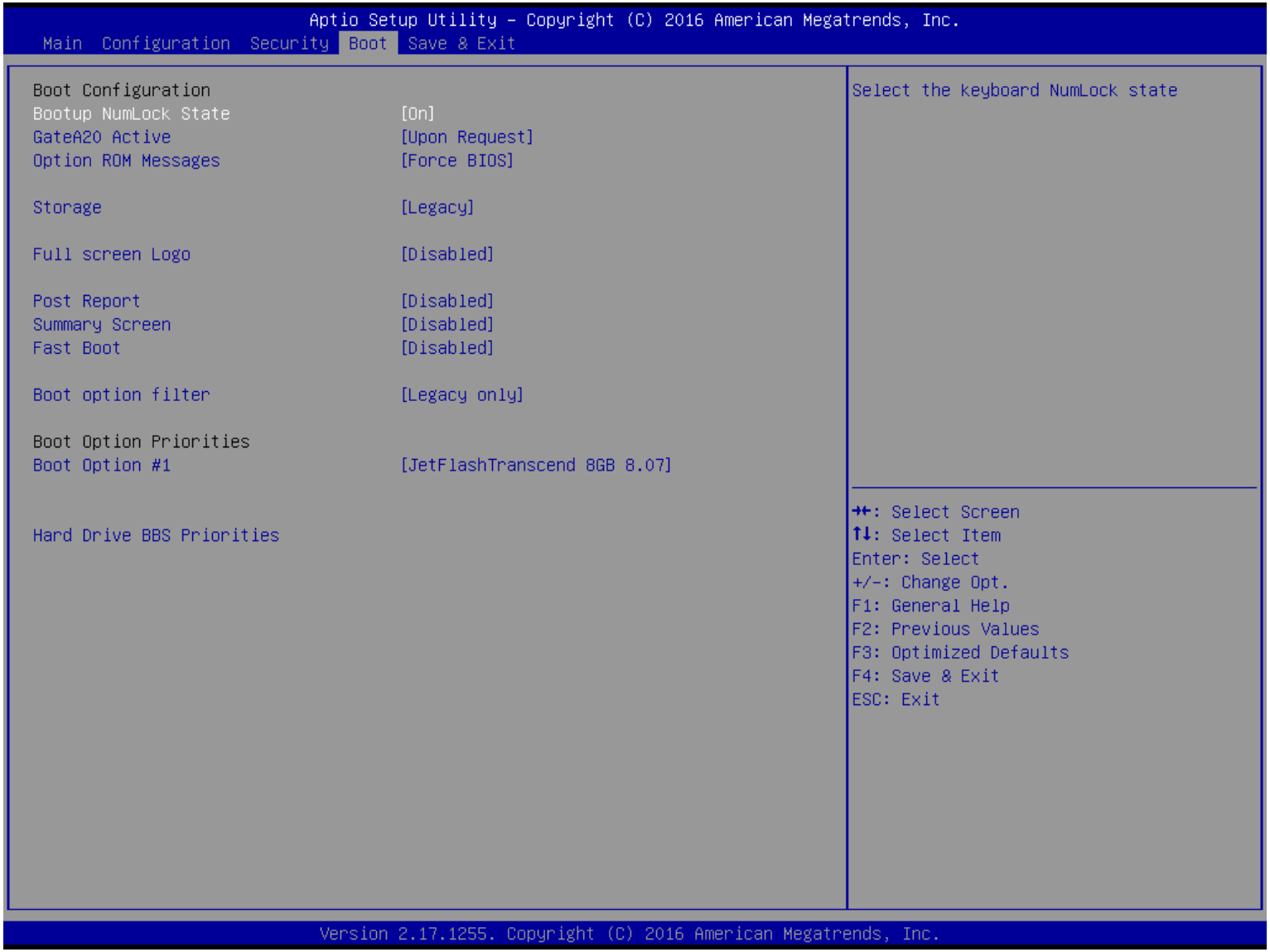


Figure 27 BIOS BOOT

6.18 Save & Exit

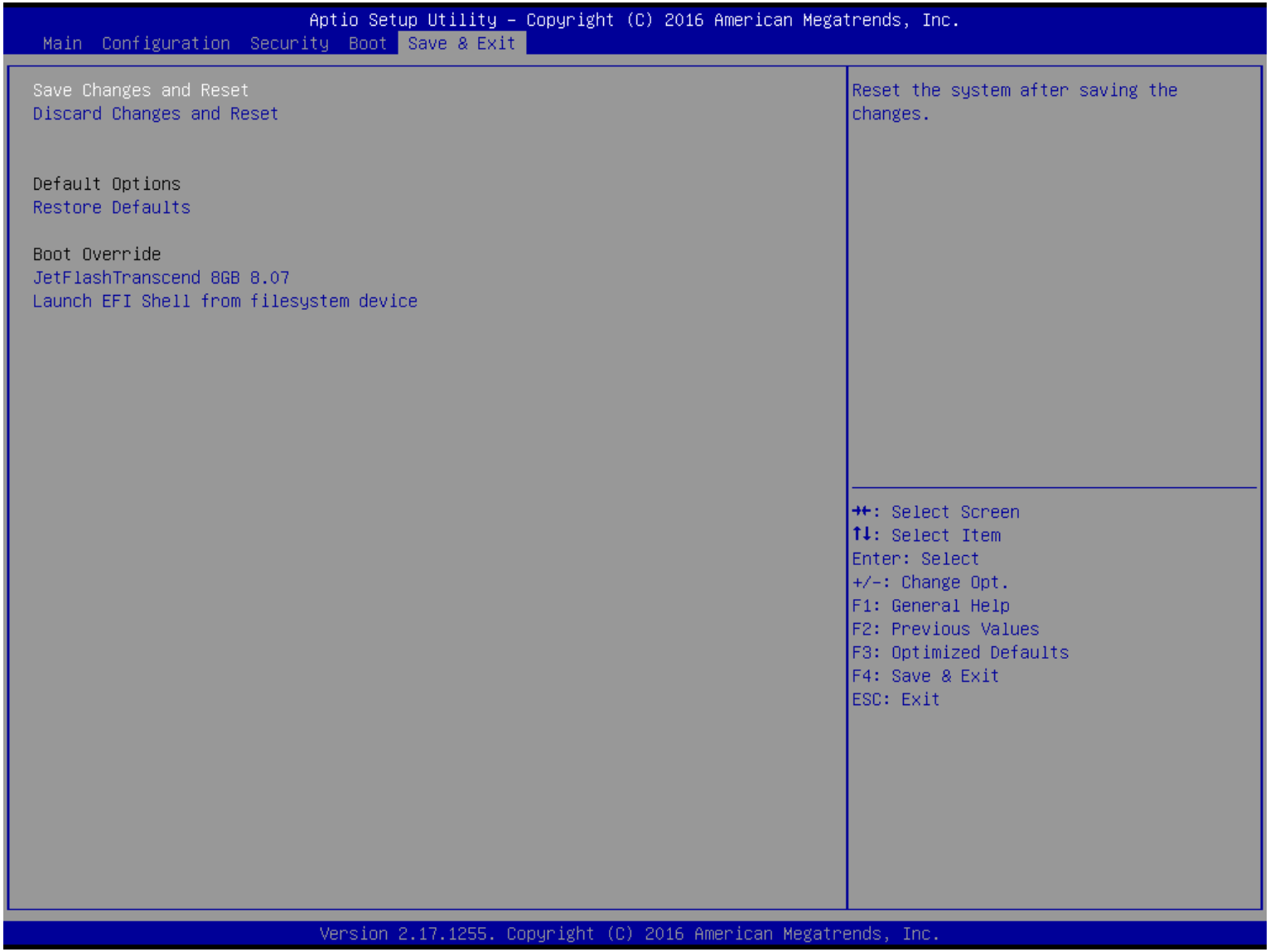


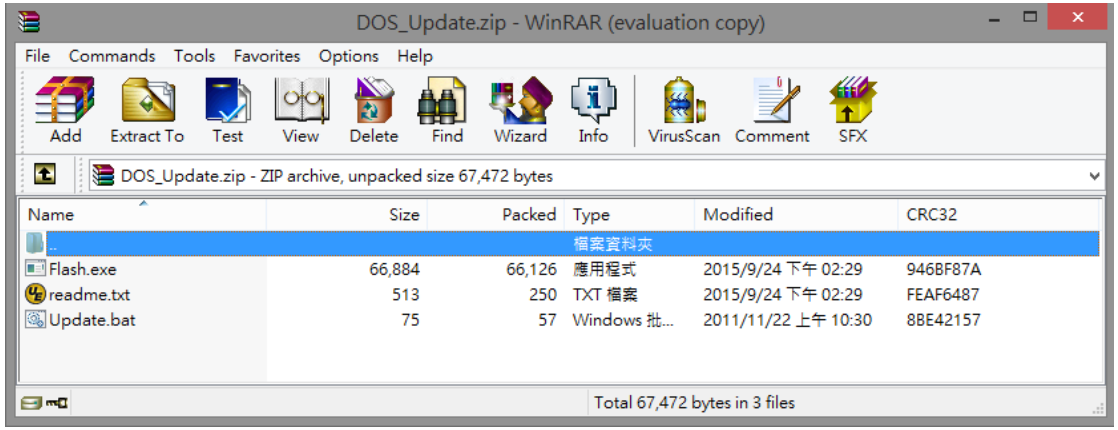
Figure 28 BIOS SAVE & EXIT

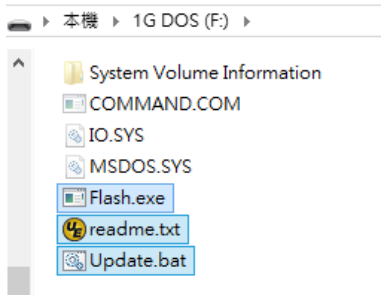
7 BIOS Update

BIOS/EC DOS Update SOP process

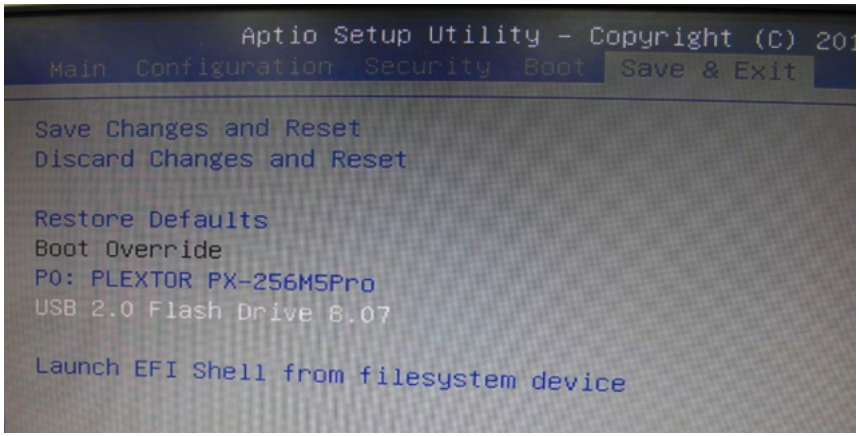
Step 1. Create a DOS USB DOK (Caution : Must be FAT or FAT32 format).

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

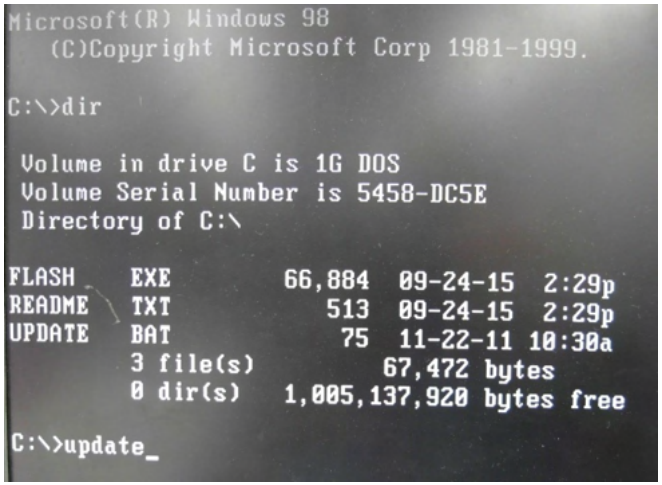




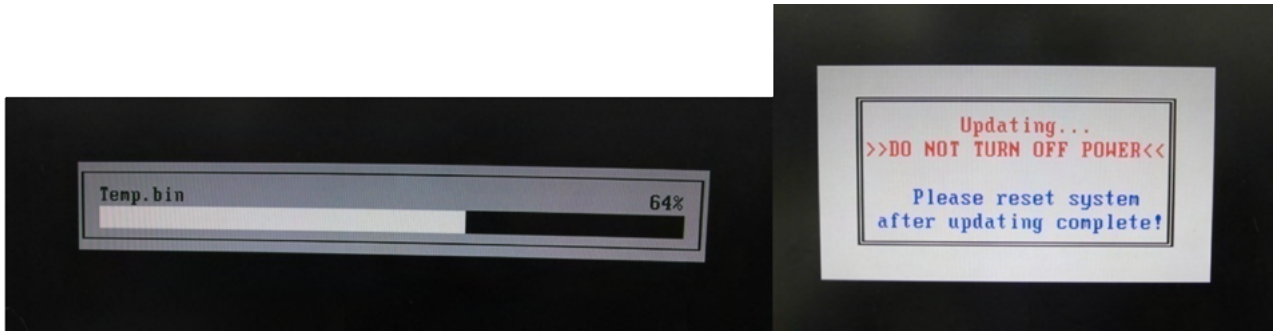
Step 3. Plug the DOS USB DOK to the target system and boot from the DOS USB DOK.

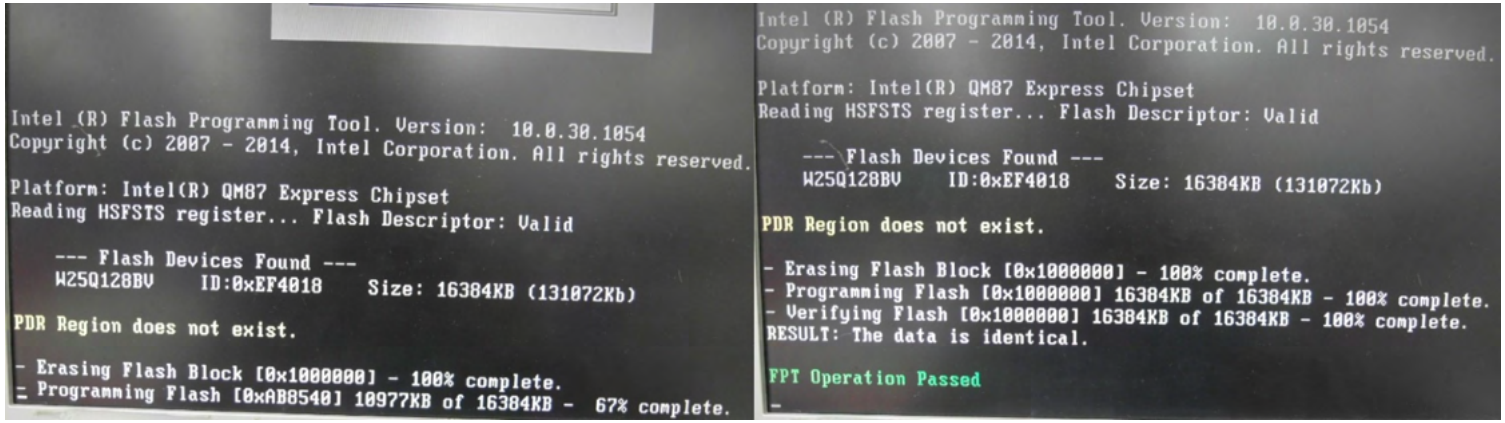


Step 4. Under the update file folder, type command : "update" and press enter.



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



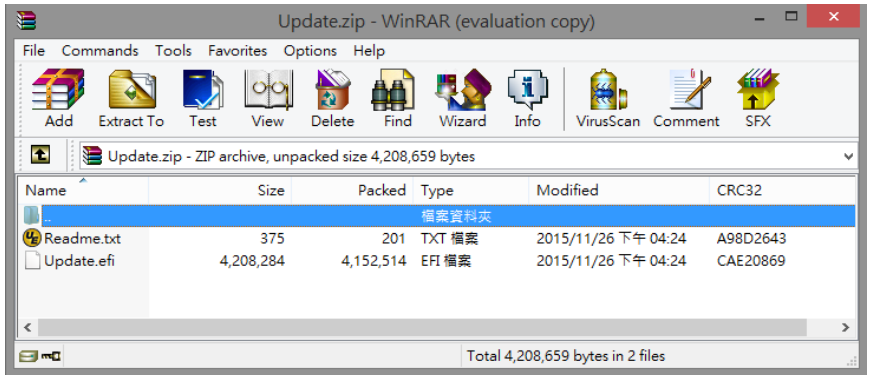


<End of BIOS/EC DOS update process>

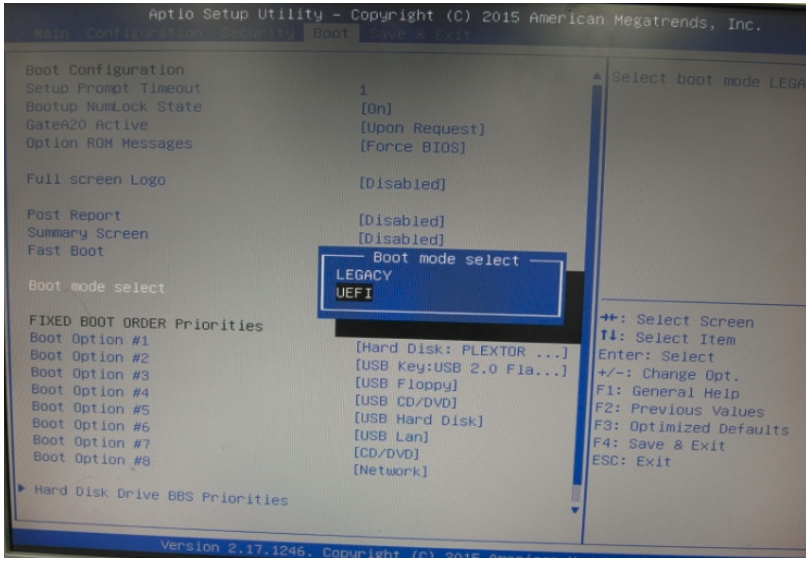
BIOS/EC UEFI Update SOP process

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

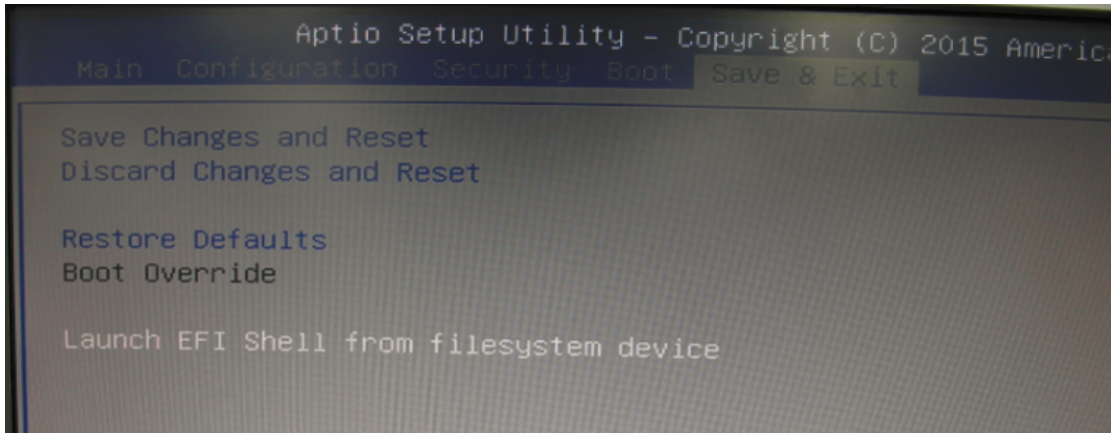
Step 2. Unzip update file to the USB DOK.



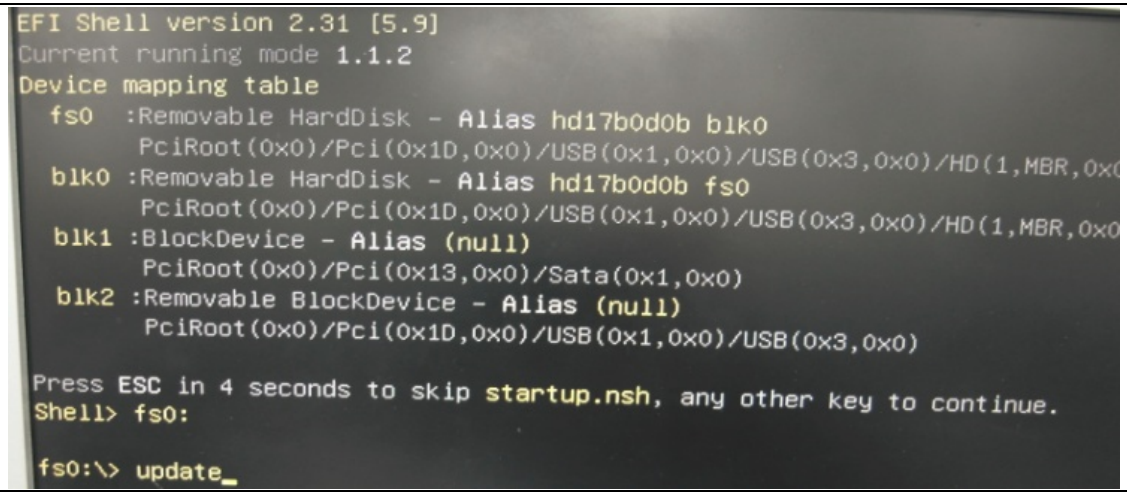
Step 3. Select UEFI boot mode in the BIOS boot menu and save, then restart the system.



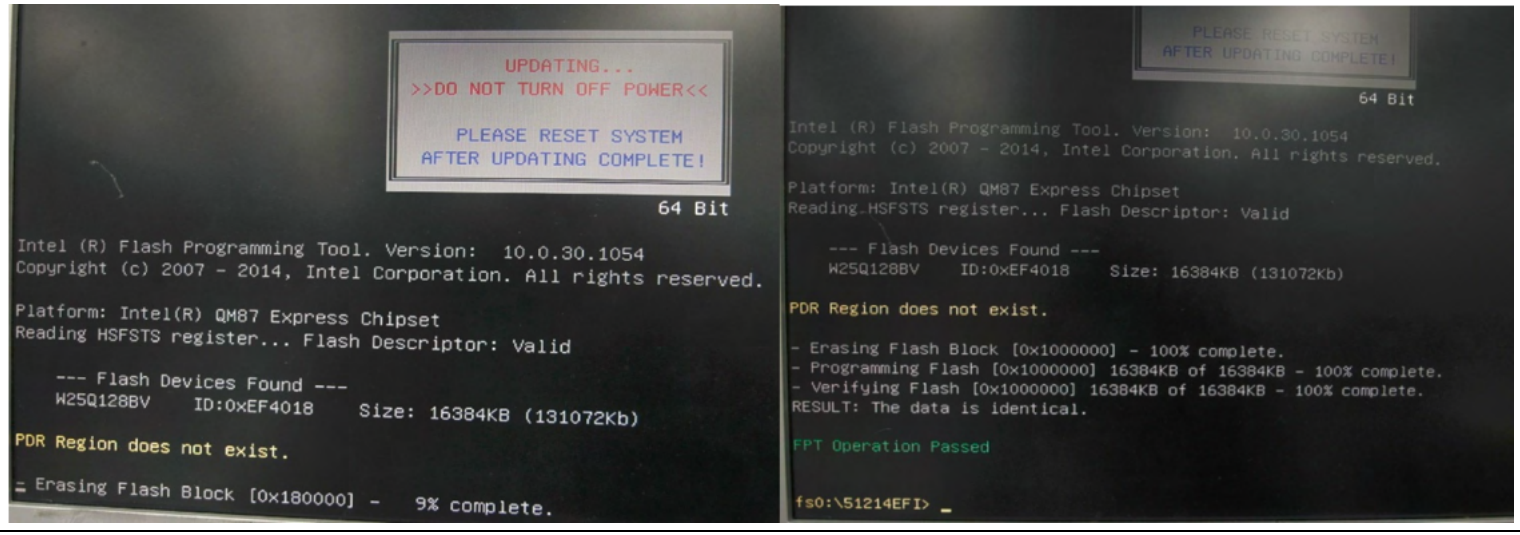
Step 4. Plug the USB DOK to the target system and boot from UEFI Shell.



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>

8 PORTWELL Software Tool

PORTWELL Evaluation Tool (PET)

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

PORTWELL BIOS web Tool (PBT)

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

PORTWELL EC Auto Test Tool (PECAT)

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

9 Industry Specifications

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

Low Pin Count Interface Specification, Revision 1.0 (LPC) http://www.intel.com/design/chipsets/industry/lpc.htm
Universal Serial Bus (USB) Specification, Revision 2.0 http://www.usb.org/home
PCI Specification, Revision 2.3 https://www.pcisig.com/specifications
Serial ATA Specification, Revision 3.0 http://www.serialata.org/
PICMG® COM Express Module™ Base Specification http://www.picmg.org/
PCI Express Base Specification, Revision 2.0 https://www.pcisig.com/specifications

10 Quick Start Guide

The PCOM-B638VG Quick Start Guide illustrates the Module and accessories assemble processes, and also guides users how to power on the product and enter BIOS menu. The contents include heat sink / cooler and Module introduction, assembling of heat sink / cooler and Carrier, and debug message.

10.1 PCOM-B638VG

This section introduces the Top and Bottom side of PCOM-B638VG..

Top side of PCOM-B638VG

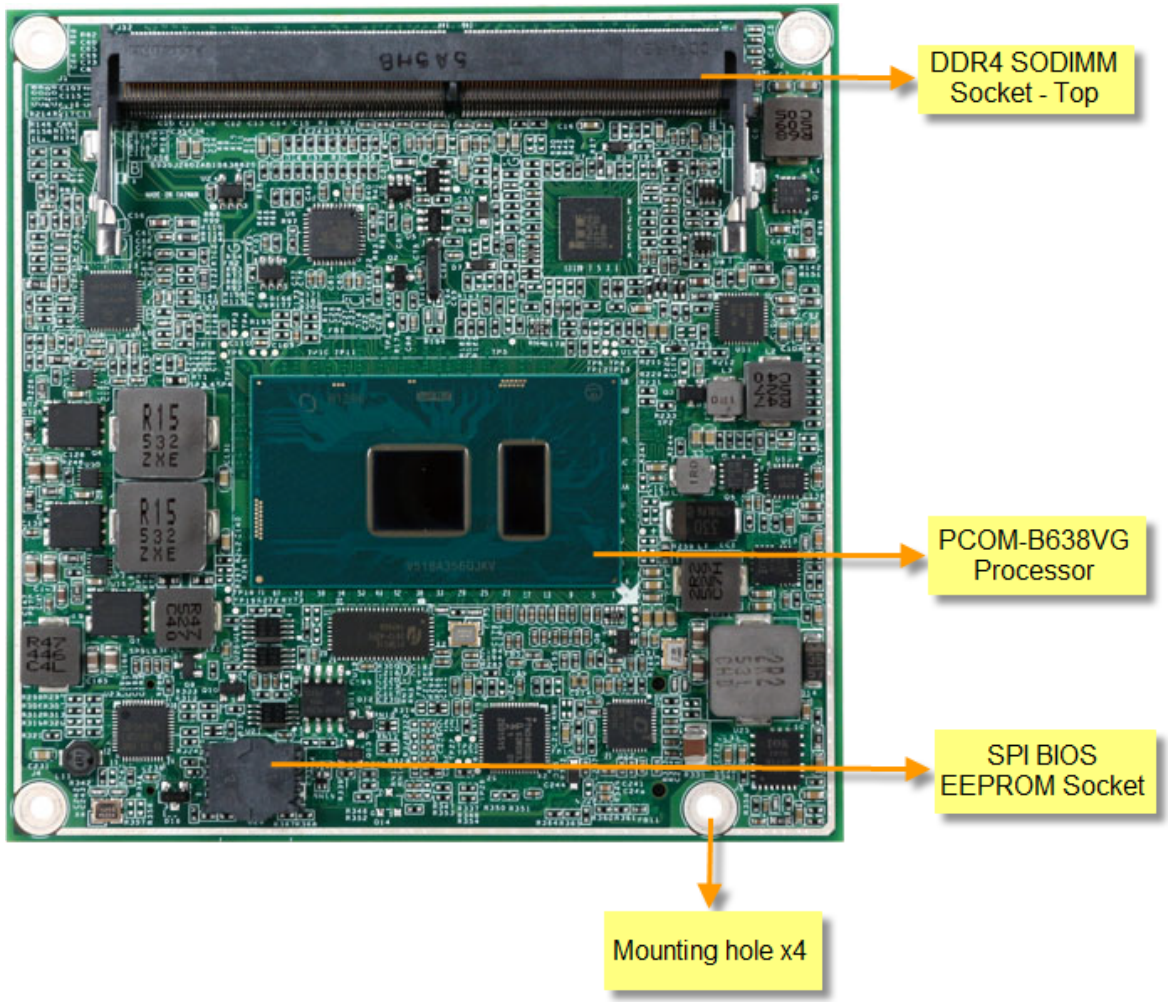


Figure 29 PCOM-B638VG - Top

Bottom side of PCOM-B638VG

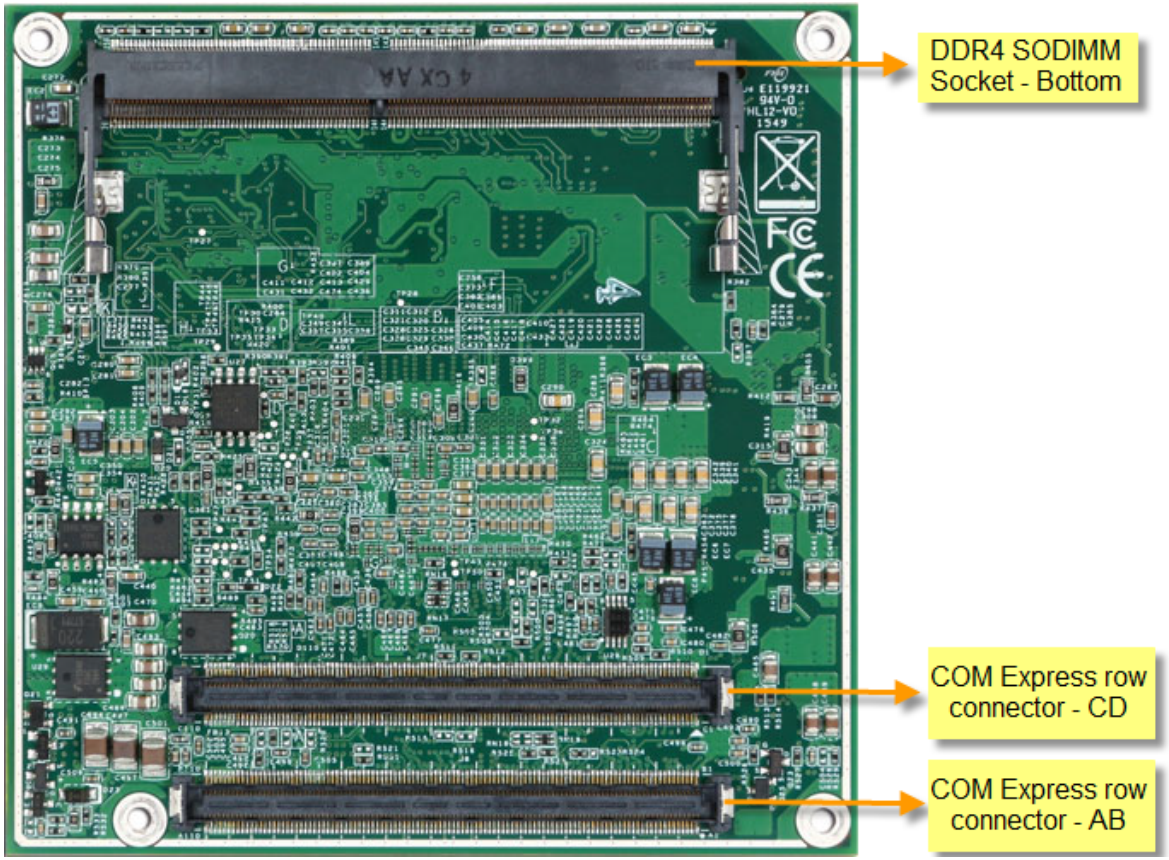


Figure 30 PCOM-B638VG - Bottom

10.2 Cooler

The section introduces PCOM-B638VG cooler.

Top view of PCOM-B638VG cooler

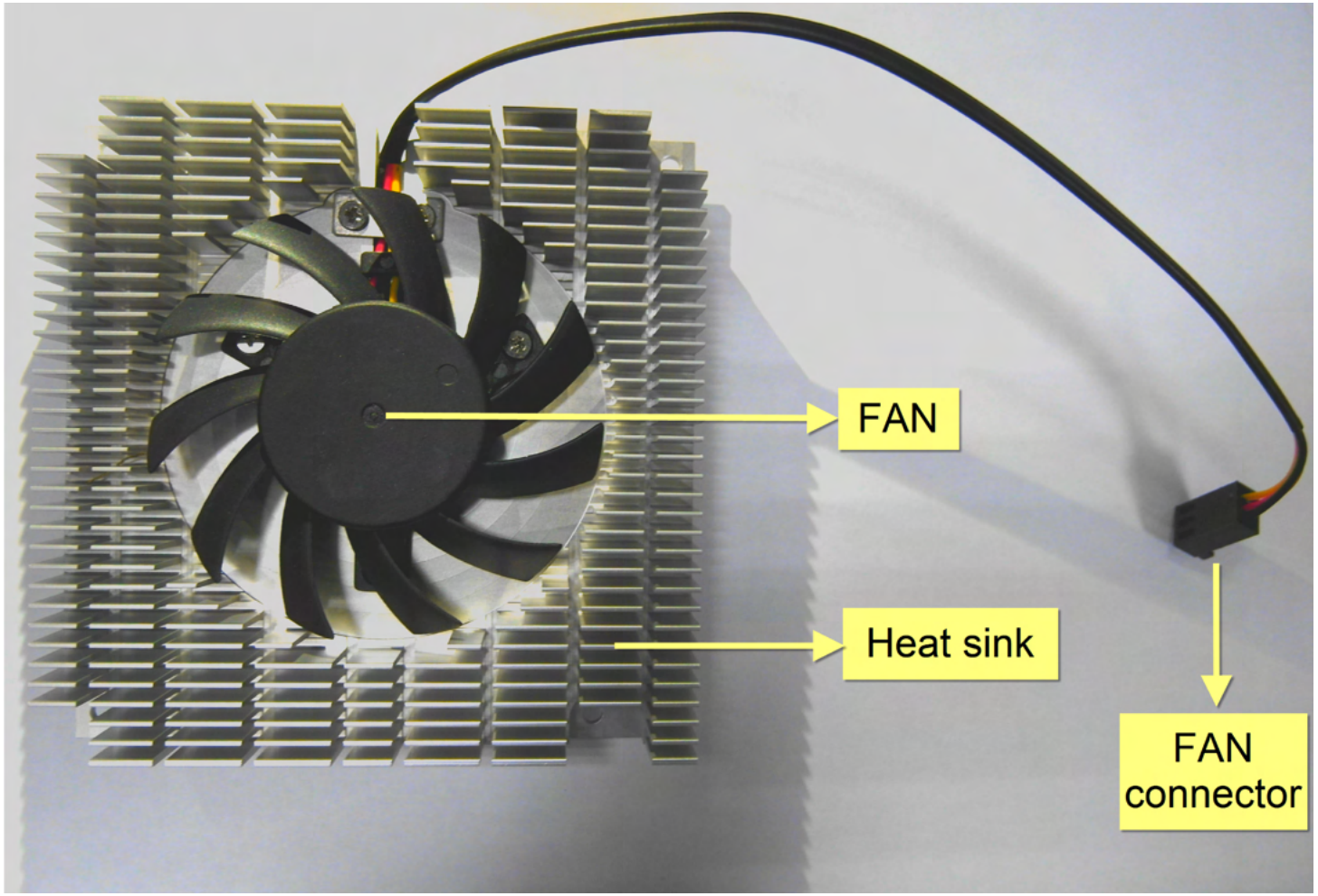


Figure 31 Cooler - Top

Bottom view of PCOM-B638VG cooler

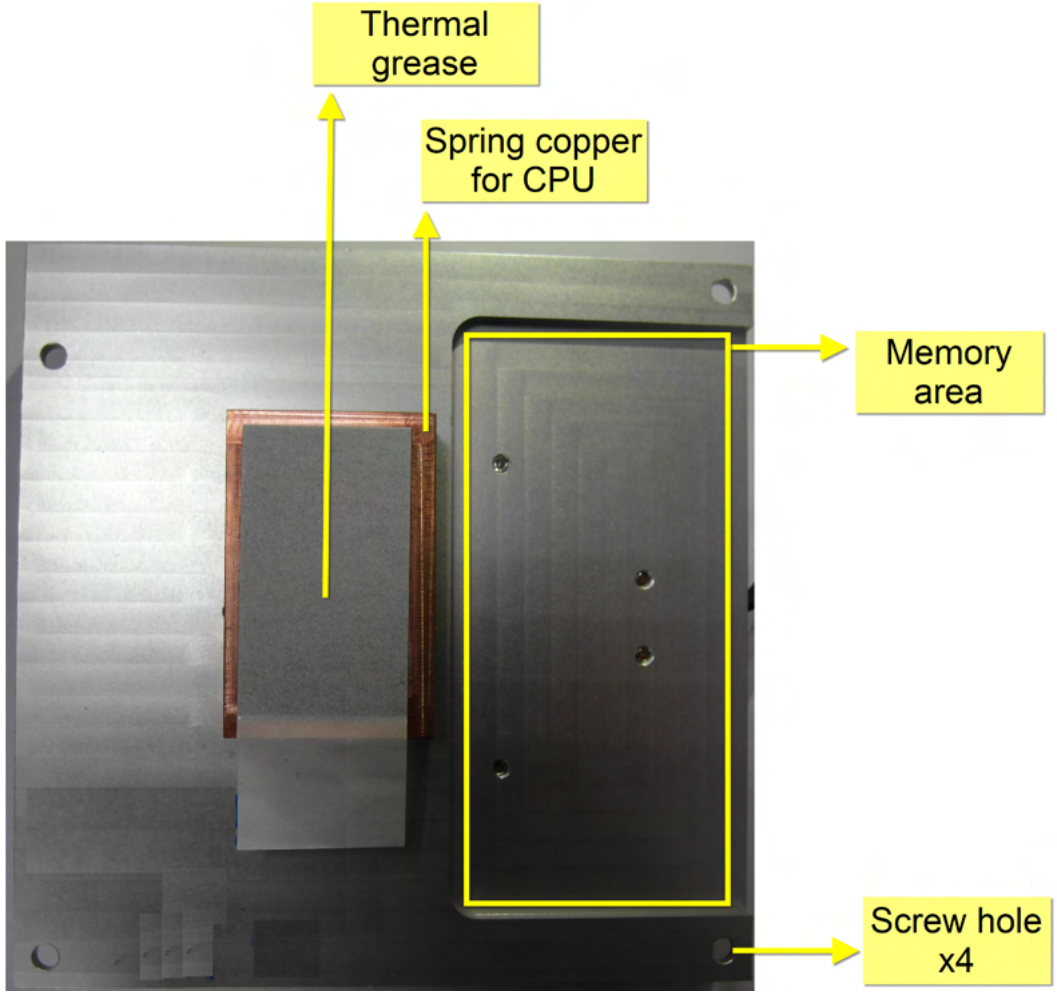


Figure 32 Cooler - Bottom

10.3 Accessory

This section presents PCOM-B638VG cooler accessories.

1. Copper pillar M2.5 (Female) x4 pcs
2. Copper pillar M2.5 (Male) x4 pcs
3. Flat head screws M2.5 x8 pcs

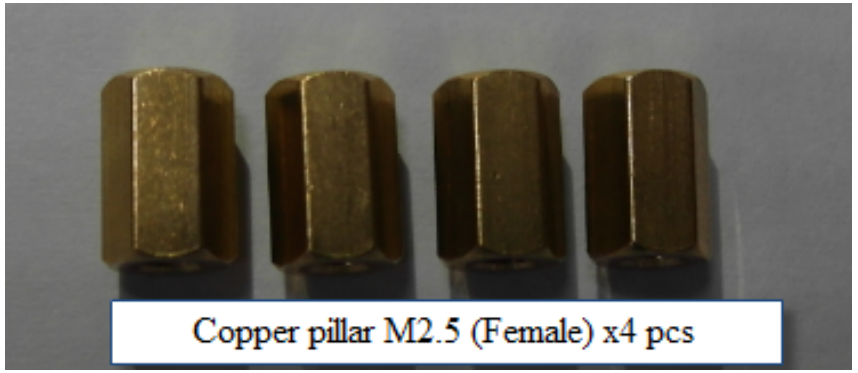


Figure 33 M2.5 Female Copper pillar

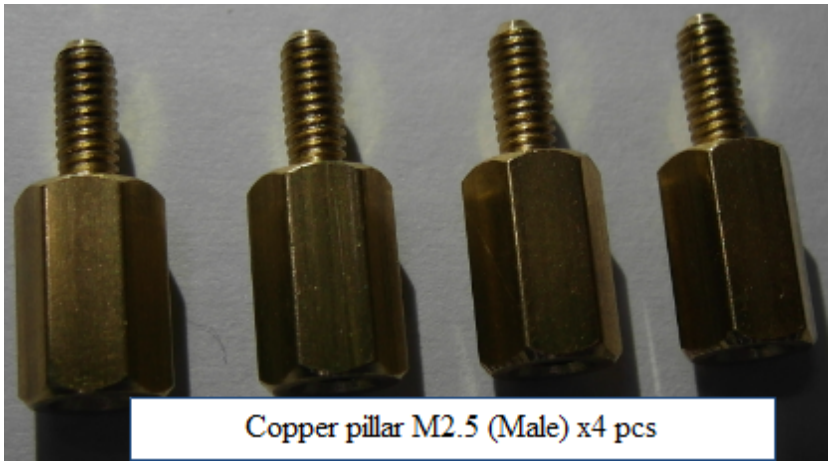


Figure 34 M2.5 Male Copper pillar M2.5

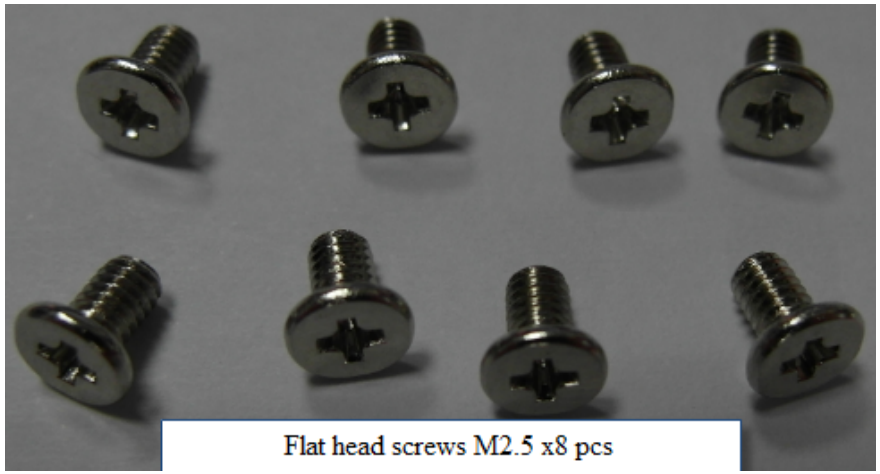


Figure 35 M2.5 Flat head screws

10.4 Assembly SOP

This section presents the step by step procedures for assembling PCOM-B638VG, cooler and PCOM-C605 carrier.

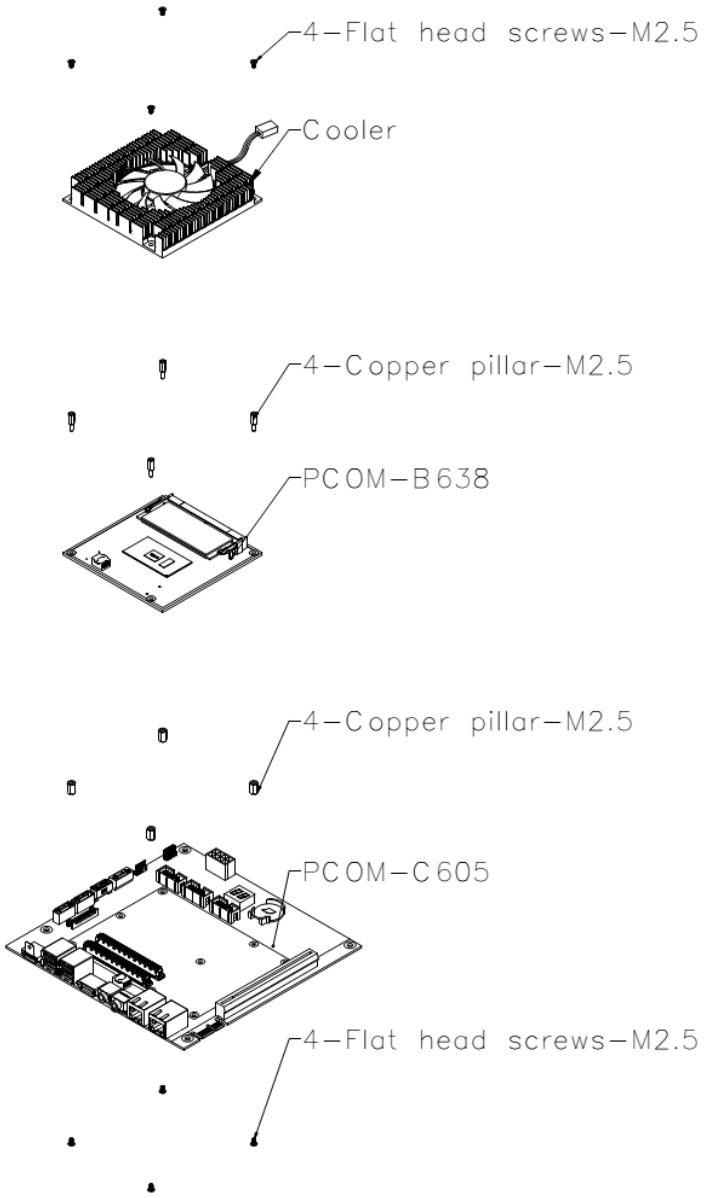


Figure 36 Assembly

Step 1

Accessories required :

1. PCOM-C605
2. Copper pillar M2.5 (Female) x4 pcs
3. Flat head screws M2.5 x4 pcs

Screws the 4 pcs Copper pillar M2.5 (Female) and 4 pcs Copper pillar M2.5 (Female) on the compact size position of PCOM-C605.

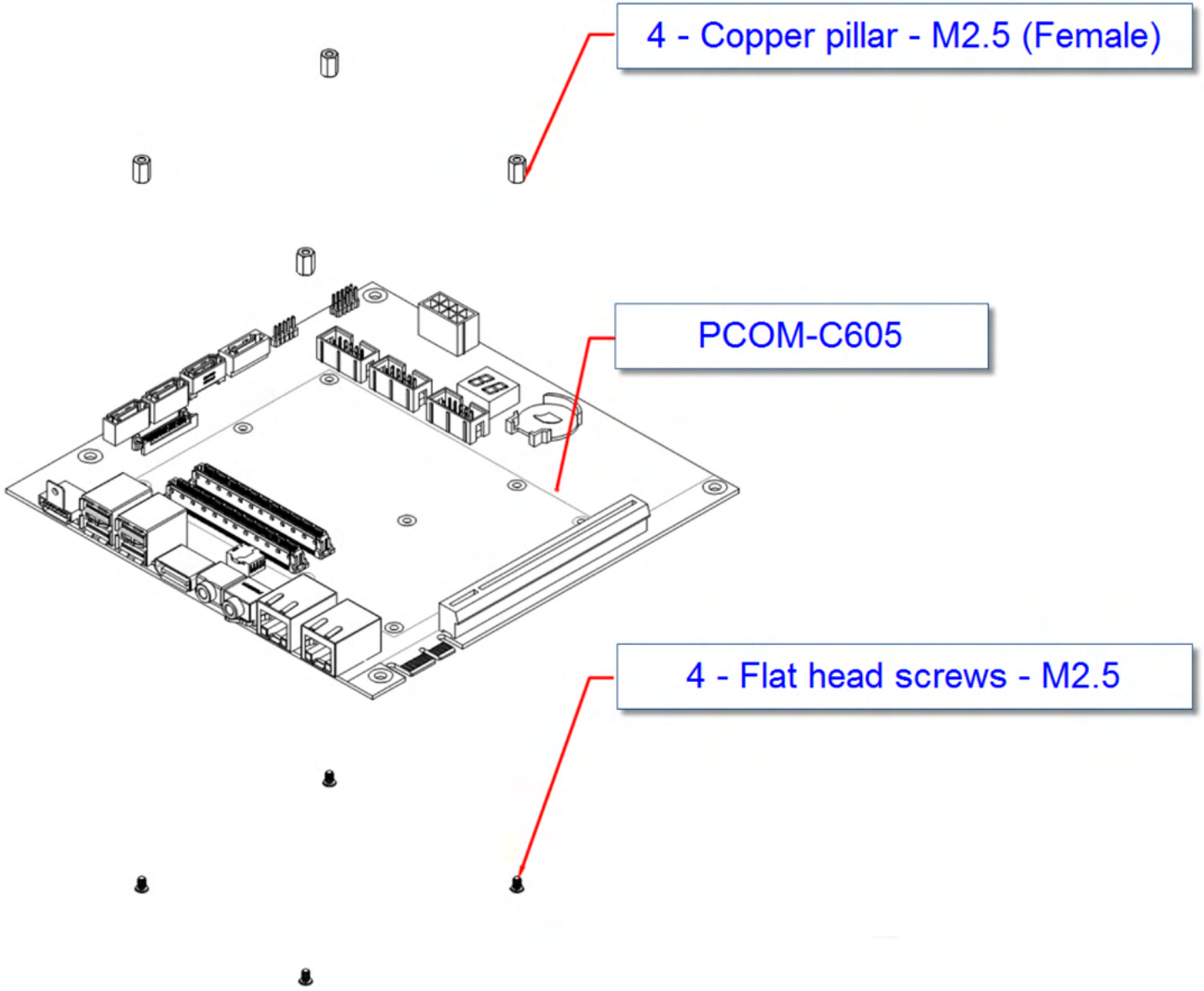


Figure 37 Assembly Step 1

Step 2

Accessories required :

1. PCOM-B638VG x1
2. DDR4 Memory x1
3. Copper pillar M2.5 (Male) x4 pcs
4. PCOM-C605 x1

Screwing the PCOM-B638VG(with DDR4 Memory connected) on PCOM-C605 from Step1 with 4 male M2.5 copper pillar.

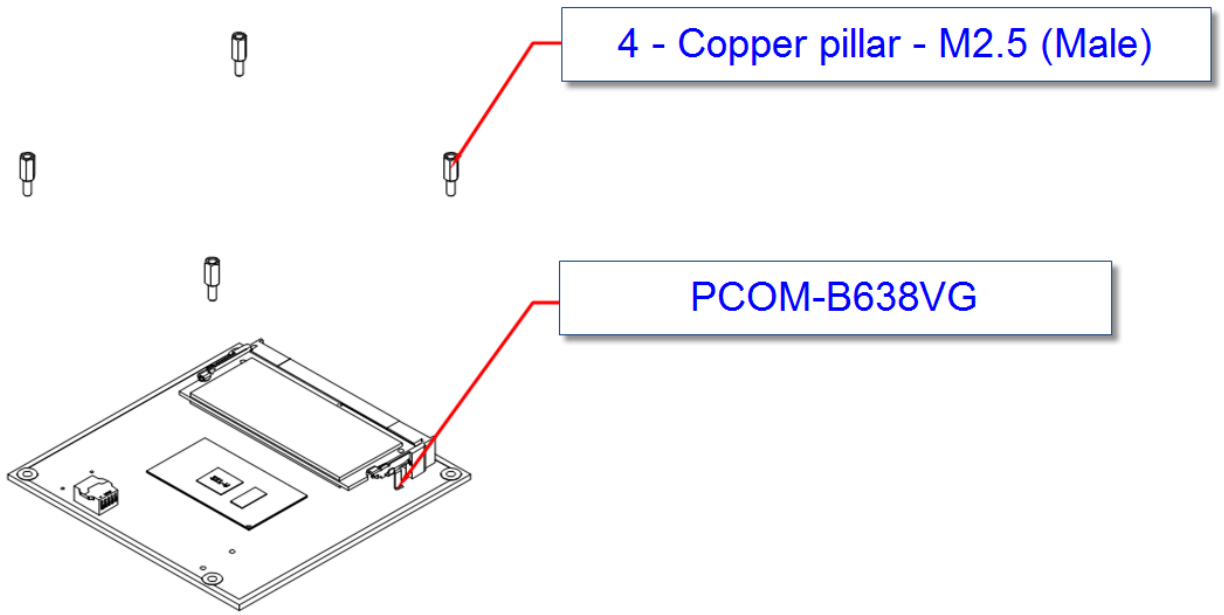


Figure 38 Assembly Step 2

Step 3

Accessories required :

1. PCOM-B638VG x1
2. Flat head screws M2.5 x4 pcs
3. PCOM-C605 x1

Add cooler on the PCOM-B638 from Step2 and screw with 4 M2.5 flat head screws.

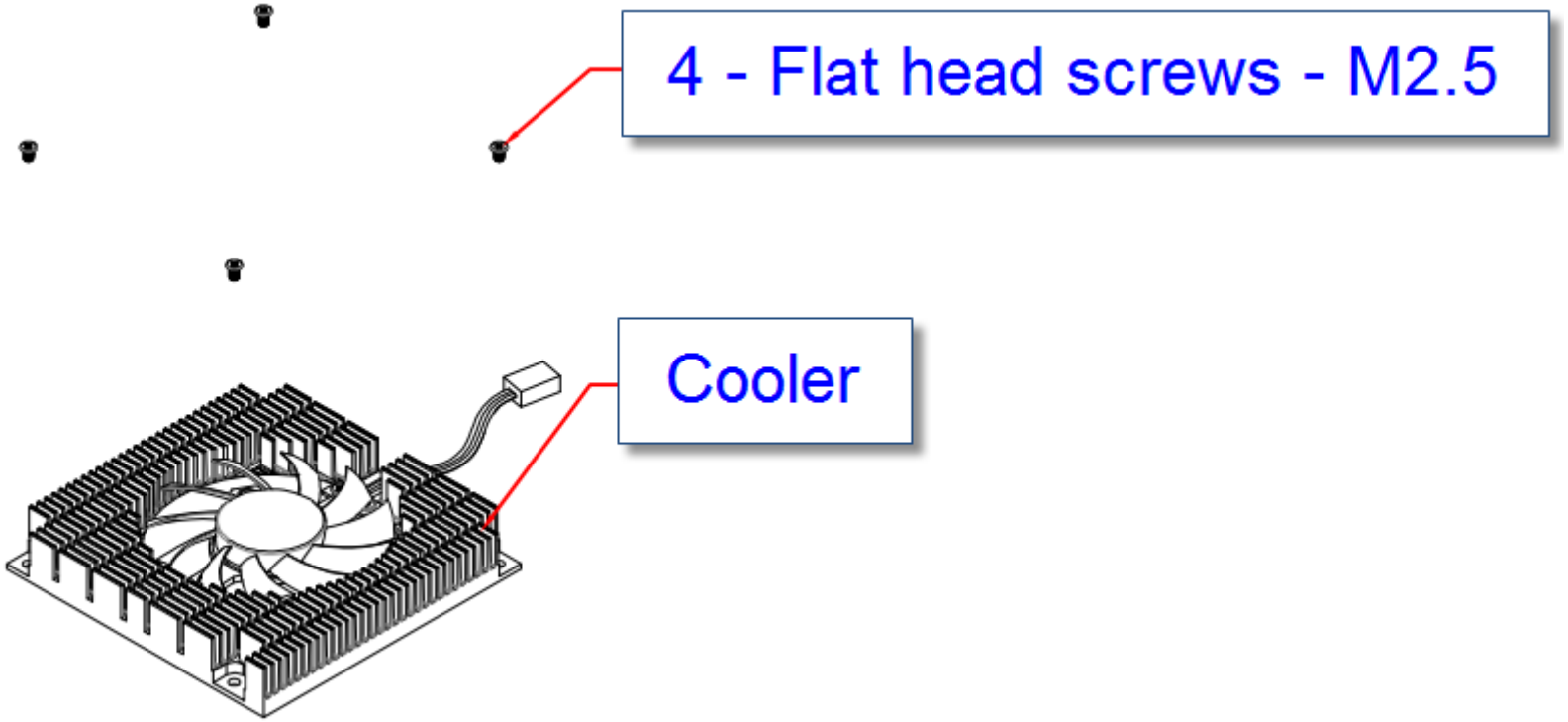


Figure 39 Assembly Step 3

10.5 Power ON

This section presents the required input voltage and how to power on PCOM-B638VG.

The nominal DC input voltage is +12V, for powering on PCOM-B638VG on PCOM-C605 Carrier with ATX power, make sure the PSON is low level, and connect the +12V cable to PCOM-C605 J21.

Auto Power ON

Every time PSU power on, PCOM-B638VG will automatically boot. Press PWR_BTN SW1 to turn on or off PCOM-B638VG.

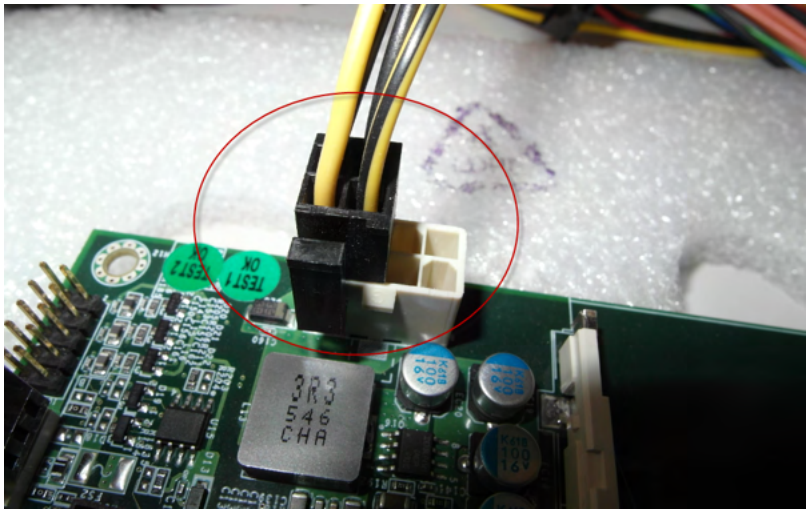


Figure 40 PCOM-C605 +12V

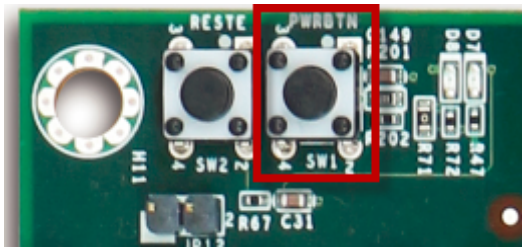


Figure 41 PWR_BTN SW1

BIOS Menu

After powering on, press Del on keyboard to enter BIOS menu, the BIOS version and EC version can be found.

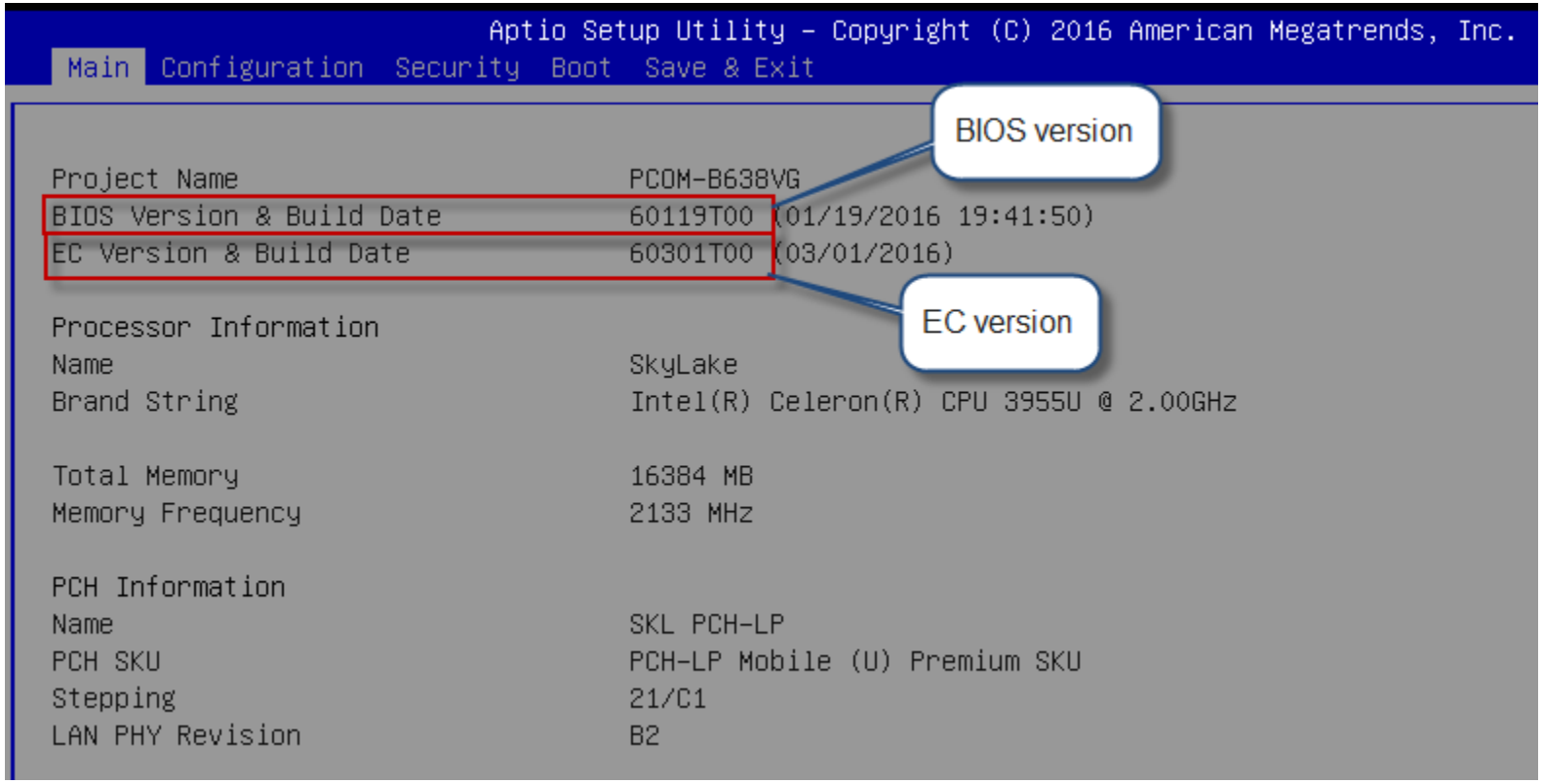


Figure 42 BIOS Menu

10.6 Debug message

This section presents the POST code of PCOM-B638VG, users can check the POST code for boot procedure diagnostic.

PCOM-C605 (R1 version) has a 8 segment LED display U33, which shows POST/debug code of PCOM-B638VG.

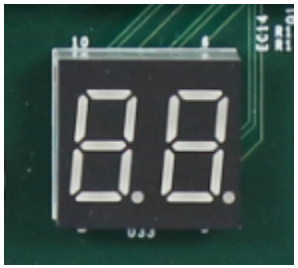


Figure 43 PCOM-C605 U33

PCOM-B638VG POST code table can be found below for reference.

POST code	Description
0x10	PEI_CORE_STARTED
0x11	CPU Initialization
0x15	North Bridge Initialization
0x19	South Bridge Initialization
0x2B	Memory SPD
0x2C	MEMORY DETECT
0x2D	MEMORY TIMING
0x2E	MEMORY CONFIG
0x2F	MEMORY Initialization
0x31	MEMORY INSTALLED
0x32	CPU Initialization
0x33	CPU CACHE Initialization
0x34	CPU AP Initialization

0x35	CPU BSP Initialization
0x36	CPU SMM Initialization
0x37	MEMORY North Bridge Initialization
0x3B	MEMORY South Bridge Initialization
0x4F	DXE IPL
0x60	DXE CORE
0x61	DXE NVRAM
0x62	DXE South BridgeRUN
0x63	DXE CPU Initialization
0x68	DXE North Bridge HB Initialization
0x69	DXE North Bridge Initialization
0x6A	DXE North Bridge SMM Initialization
0x70	DXE South Bridge Initialization
0x71	DXE South Bridge SMM Initialization
0x72	DXE South Bridge DEVICES Initialization
0x78	DXE ACPI
0x79	DXE CSM
0x90	DXE BDS
0x91	DXE BDS CONNECT DRIVRES
0x92	DXE PCI BUS
0x93	DXE PCI BUS HPC
0x94	DXE PCI BUS ENUM
0x95	DXE PCI BUS REQUEST RESOURCES
0x96	DXE PCI BUS ASSIGN RESOURCES
0x97	DXE_CON_OUT_CONNECT
0x98	DXE_CON_IN_CONNECT

0x99	DXE_SIO_Initialization
0x9A	DXE_USouth Bridge_BEGIN
0x9B	DXE_USouth Bridge_RESET
0x9C	DXE_USouth Bridge_DETECT
0x9D	DXE_USouth Bridge_ENABLE
0xA0	DXE_IDE_BEGIN
0xA1	DXE_IDE_RESET
0xA2	DXE_IDE_DETECT
0xA3	DXE_IDE_ENABLE
0xA4	DXE_SCSI_BEGIN
0xA5	DXE_SCSI_RESET
0xA6	DXE_SCSI_DETECT
0xA7	DXE_SCSI_ENABLE
0xA8	DXE_SETUP_VERIFYING_PASSWORD
0xA9	DXE_SETUP_START
0xAB	DXE_SETUP_INPUT_WAIT
0xAD	DXE_READY_TO_BOOT
0xAE	DXE_LEGACY_BOOT
0xAF	DXE_EXIT_BOOT_SERVICES
0xB0	RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN
0xB1	RT_SET_VIRTUAL_ADDRESS_MAP_END
0xB2	DXE_LEGACY_OPROM_Initialization
0xB3	DXE_RESET_SYSTEM
0xB4	DXE_USouth Bridge_HOTPLUG
0xB5	DXE_PCI_BUS_HOTPLUG
0xB6	DXE_NVRAM_CLEANUP

0xB7	DXE_CONFIGURATION_RESET
0xD0	DXE_CPU_ERROR
0xD1	DXE_North Bridge_ERROR
0xD2	DXE_South Bridge_ERROR,
0xD3	DXE_ARCH_PROTOCOL_NOT_AVAILABLE
0xD4	DXE_PCI_BUS_OUT_OF_RESOURCES
0xD5	DXE_LEGACY_OPROM_NO_SPACE
0xD6	DXE_NO_CON_OUT
0xD7	DXE_NO_CON_IN
0xD8	DXE_INVALID_PASSWORD
0xD9	DXE_BOOT_OPTION_LOAD_ERROR
0xDA	DXE_BOOT_OPTION_FAILED
0xDB	DXE_FLASH_UPDATE_FAILED
0xDC	DXE_RESET_NOT_AVAILABLE
0xE0	PEI_S3_STARTED
0xE1	PEI_S3_BOOT_SCRIPT
0xE2	PEI_S3_VIDEO_REPOST
0xE3	PEI_S3_OS_WAKE
0xF0	PEI_RECOVERY_AUTO
0xF1	PEI_RECOVERY_USER
0xF2	PEI_RECOVERY_STARTED
0xF3	PEI_RECOVERY_CAPSULE_FOUND
0xF4	PEI_RECOVERY_CAPSULE_LOADED
0xFF	Boot process not start

Table 19 PCOM-B638 Debug message