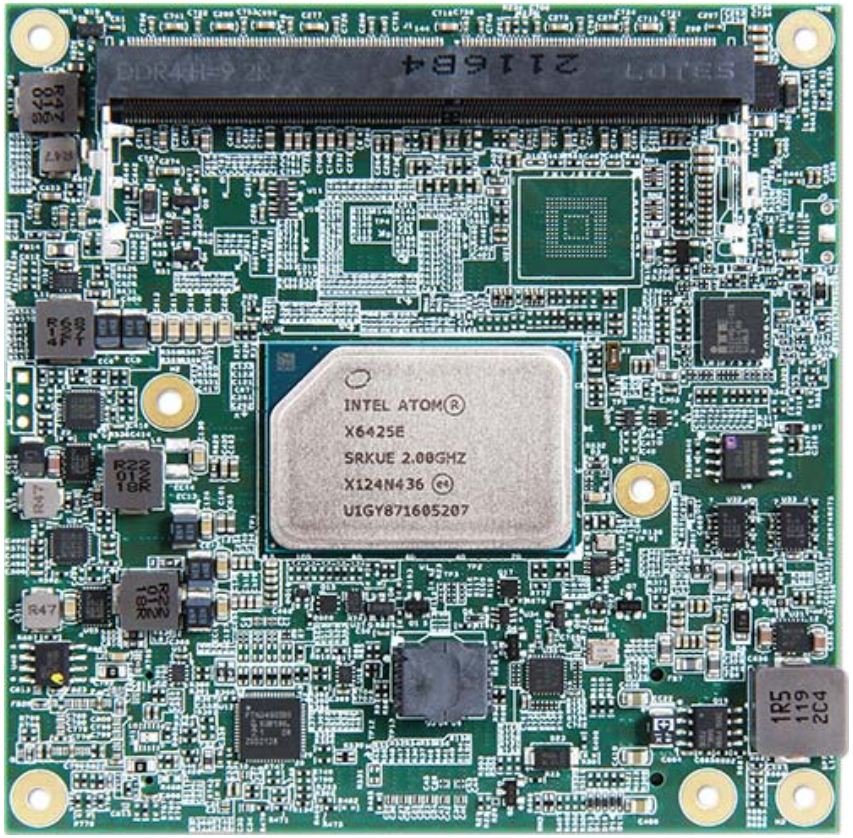

COM Express™ PCOM-B645VGL UserManual

Revision 1.0

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Revision History

R1.0	Official Release Rev 1.0
R1.1	Add note for GPY215 limitation

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1. Introduction

PCOM-B645VGLUser Manual contains detail information of the product specifications, features, mechanical dimensions, heat sink/heat spreader and BIOS settings.

PCOM-B645VGL is designed tofulfillPICMG Open Modular Computing Standards COM Express™ Specification Rev3.0 Type 6 with Basic form factor (95 x 95 mm).

PCOM-B645VGL, a brand-new COM-Express Type 6 compactmodule launched by Portwell Inc. PCOM-B645VGLisdesignedbased on Intel® Atom®Elkhart Lake series processors, and itplans to satisfy most of entryapplications.PCOM-B645 provides multiple interfaces like6xPCIe 3.0 x1, 2x SATA 3.0 ports, and 4x USB3.2 Gen2ports.With2.5GbE PHY, it provides option of Time Sensitive Networking(TSN) and Time Coordinated Computing(TCC) for real-time applications. Intel® UHD Graphics (Gen11) controller brings 4K high definitionresolution and supports three independent displays. Furthermore, PCOM-B645VGLalso cansupport in extreme environment from -40°C ~ 85°C.

2. Block Diagram

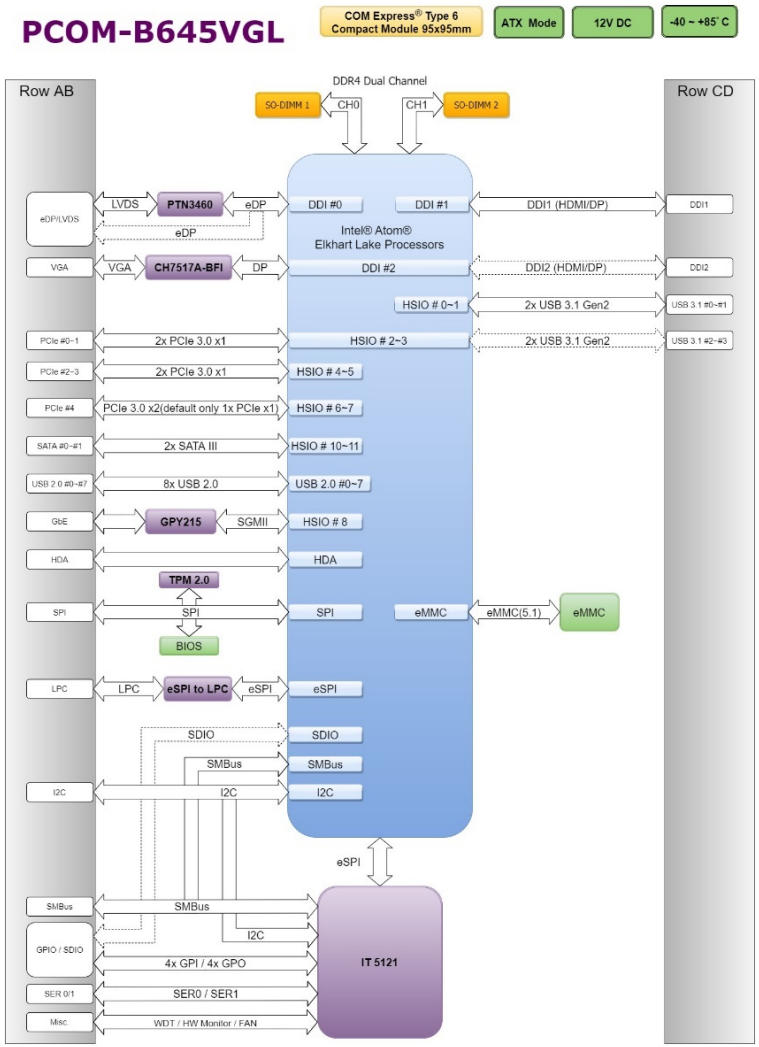

Figure 1Block Diagram

3. Specifications

General	
Product	➢ PCOM-B645VGL
Form Factor	➢ Compact COM Express™ Type 6 Rev. 3.0
Processor	➢ Intel®Atom® J6426 Processor ➢ Intel®Atom® x6211E Processor ➢ Intel®Atom®x6413E Processor ➢ Intel®Atom® x6425E Processor ➢ Intel®Atom® x6425RE Processor
Chipset	➢ SoChttp://ark.intel.com/products/90593/Intel-GL82CM236-PCH
BIOS	➢ AMI Aptio5 UEFI BIOS
Memory	➢ 2x SODIMM DDR4 ➢ Dual channel ➢ Up to 32GB 3200MT/s
Security	➢ TPM 2.0
I/O Interface	
Embedded Controller	➢ IT5121 Embedded Controller, Voltage, Fan and Temperature
Serial IO	➢ 8 GPIO (default 4xGPI/ 4x GPO) ➢ I2C (SoC& Embedded Controller) ➢ 2x Serial Ports (TX and RX) ➢ SMBus (EC and SoC)
Processor PCI Express	➢ 6x PCIe 3.0 x 1Gen3 (8.0 GT/s); (PCIE 0/1/2/3) can be configured to x1,x2,x4
USB	➢ 8x USB2.0 (480 Mbps) ➢ Up to 4x USB3.1Gen2 (10Gbps)(2x shared with 2x PCIe x1)

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SATA	➢ 2x SATA3.0 (6 Gbps)
Ethernet	➢ GPY215 with2.5 GbE PHY Note: GPY215 port default supports 1000Mbps. On Elkhart Lake platform, GPY215 cannot automatically downgrade to 10/100/1000 Mbps while setting speed to 2500Mbps
Audio	➢ Intel® High Definition Audio
Display	
Graphic Controller	➢ Intel®UHD Graphics 11th Processor dependent
Graphics Options	➢ VGA:1920x 1200 @ 60Hz ➢ LVDS:1920x 1200 @ 60Hz ➢ eDP:4096x 2160 @ 60Hz ➢ DP:4096x 2160 @ 60Hz ➢ HDMI: 4096x 2160 @ 60Hz
Mechanical & Environment	
Dimension	➢ COM Express™ standard pin out Type 6 Rev. 3.0 ➢ 95 x 95mm / 3.74” x 3.74” (Compact COM Express)
Hardware Monitors	➢ Voltage, Fan and Temperature
Power DC IN	➢ +12VDC (Nominal)
Power Management	➢ ACPI 5.0
Environment	➢ Operating Temperature -40°C ~ +85°C ➢ Storage Temperature-40°C~ +85°C ➢ Relative Humidity5%~95%
MTBF	➢ TBD

Table 1PCOM-B645VGL Specification

3.1. PCOM-B645VGLProcessorlist

PCOM-B645VGL Processor list

Processor Sku	Intel® Pentium® J6426	Intel® Atom® x6211E	Intel® Atom® x6413E	Intel® Atom® x6425E	Intel® Atom® x6425RE
Lithography	10 nm	10 nm	10 nm	10 nm	10 nm
# of Cores	4	2	4	4	4
# of Threads	4	2	4	4	4
Processor Base Frequency	2.0 GHz	1.3 GHz	1.5 GHz	2.0 GHz	1.9 GHz
Burst Frequency	3.0 GHz	3.0 GHz	3.0 GHz	3.0 GHz	N/A
Cache	1.5MB	1.5MB	1.5MB	1.5MB	1.5MB
TDP	10 W	6 W	9 W	12 W	12 W
Max Memory Size (dependent on memory type)	32 GB	32 GB	32 GB	32 GB	32 GB
Max # of Memory Channels	2	2	2	2	2
Processor Graphics	Intel® UHD Graphics (Gen11)	Intel® UHD Graphics (Gen11)	Intel® UHD Graphics (Gen11)	Intel® UHD Graphics (Gen11)	Intel® UHD Graphics (Gen11)
Graphics Base Frequency	400 MHz	350 MHz	500 MHz	500 MHz	400 MHz
Graphics Burst Frequency	850 MHz	750 MHz	750 MHz	750 MHz	N/A
DirectX* Support	12	12	12	12	12
OpenGL* Support	4.5	4.5	4.5	4.5	4.5
Intel® Quick Sync Video	Yes	Yes	Yes	Yes	
# of Displays Supported	3	3	3	3	3
4K Support	Yes	Yes	Yes	Yes	Yes
Max Resolution (HDMI 1.4b/2.0b)	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz
Max Resolution (DP 1.4)	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz	4096x2160 @ 60Hz

Max Resolution (eDP - Integrated Flat Panel)	4096x 2160 @ 60Hz	4096x 2160 @ 60Hz	4096x 2160 @ 60Hz	4096x 2160 @ 60Hz	4096x 2160 @ 60Hz
PCI Express Revision	3.0	3.0	3.0	3.0	3.0
PCI Express Configurations	x1, x2, x4	x1, x2, x4	x1, x2, x4	x1, x2, x4	x1, x2, x4
Max # of PCI Express Lanes	6	6	6	6	6
USB Revision	2.0/3.1	2.0/3.1	2.0/3.1	2.0/3.1	2.0/3.1
# of USB Ports	8	8	8	8	8
Total # of SATA Ports	2	2	2	2	2
TJUNCTION	105°C	105°C	105°C	105°C	110°C

Table 2PCOM-B645VGL Processor list

3.2. Supported Operating Systems

The PCOM-B645VGL supports the following operating systems.

Category	Operating System	Support
Microsoft	Windows 10 IoT Enterprise(64bit)	LTSC 2019, 2021
Linux	Kernel version	5.4
	Yocto	YP 3.0 Zeus

Table 3Supported 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 10 OS
Chipset	10.1.18768.8273-public-mup	Chipset-10.1.18768.8273-public-mup
Graphic	100.9565	Graphic Driver Production Version MR1_100.9565
ME_SW	15.40.15.2416	Intel CSE 15.40.15.2416 supporting Elkhart lake MR1
LAN	656543	Intel_Gbe-210620_20210820_646543

Table 4Windows OS driver list

3.4. Electrical Characteristics

Input voltage	+12VDC (Nominal) / +5VSB
RTC Battery	+3.0V
Power on mode	AT / ATX

Table 5Electrical Characteristics

3.5. Power sequence

Figure 29-43.Platform Power Up Sequence Timing - G3 to S0

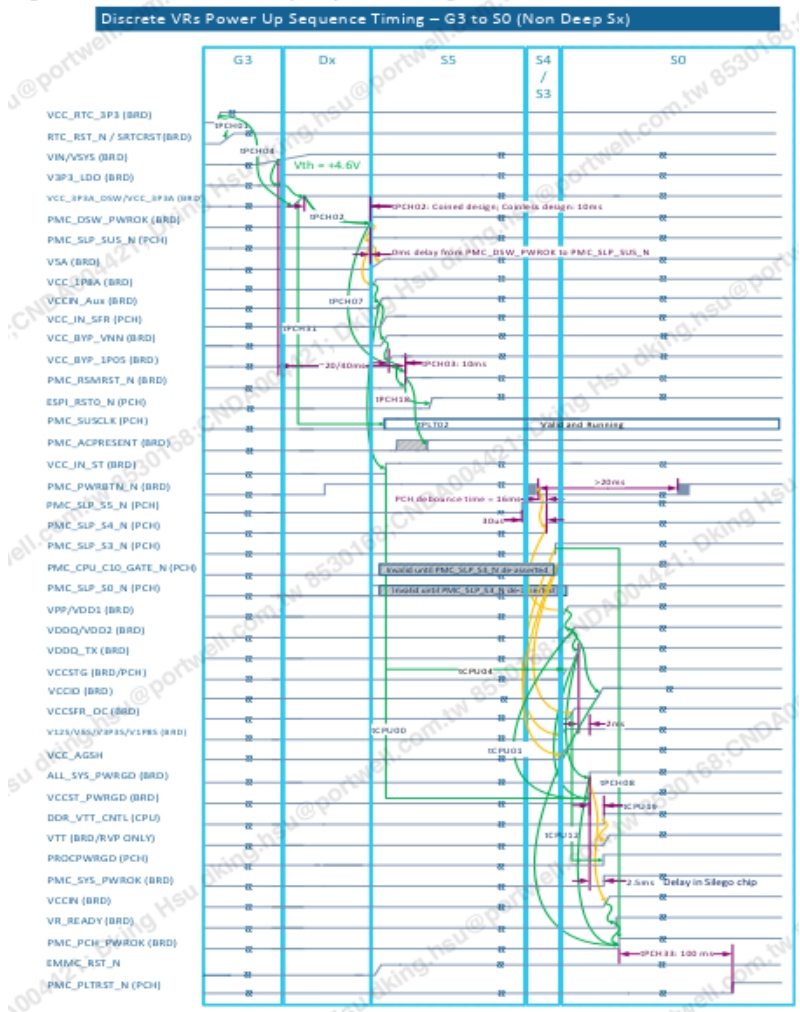


Figure 29-44.Platform Power Down Sequence Timing - S0 to G3

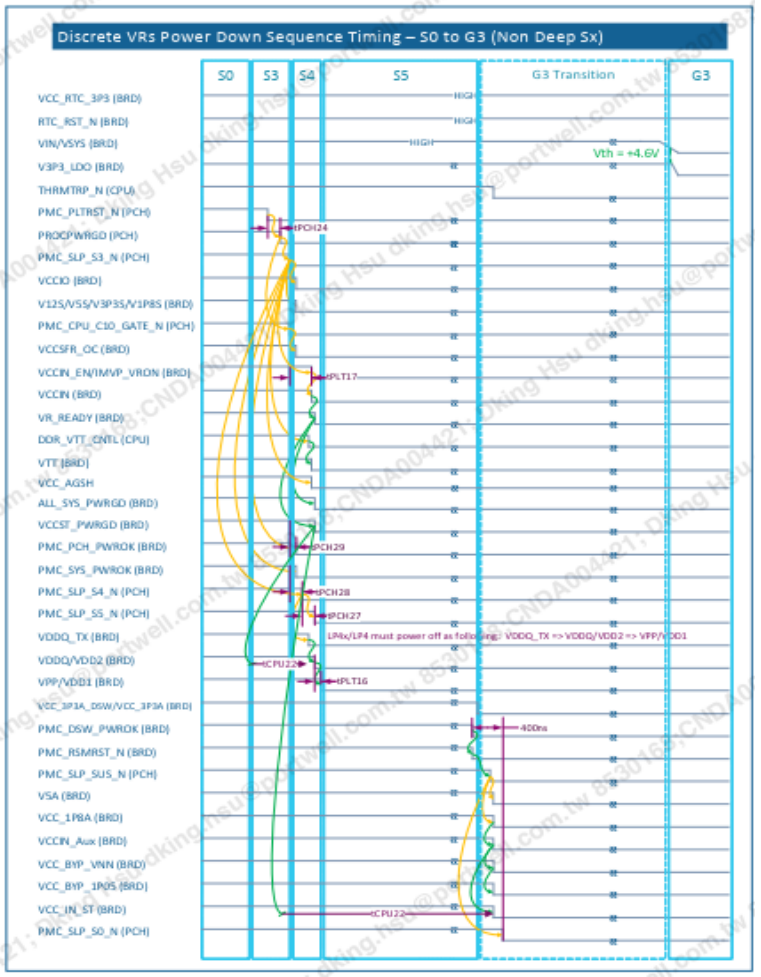


Figure 2PCOM-B645VGL Power On/Off Sequence

3.6. Circuit protection design

PCOM-B645VGL Type 6 is also compatible with COM Express Type 6 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.

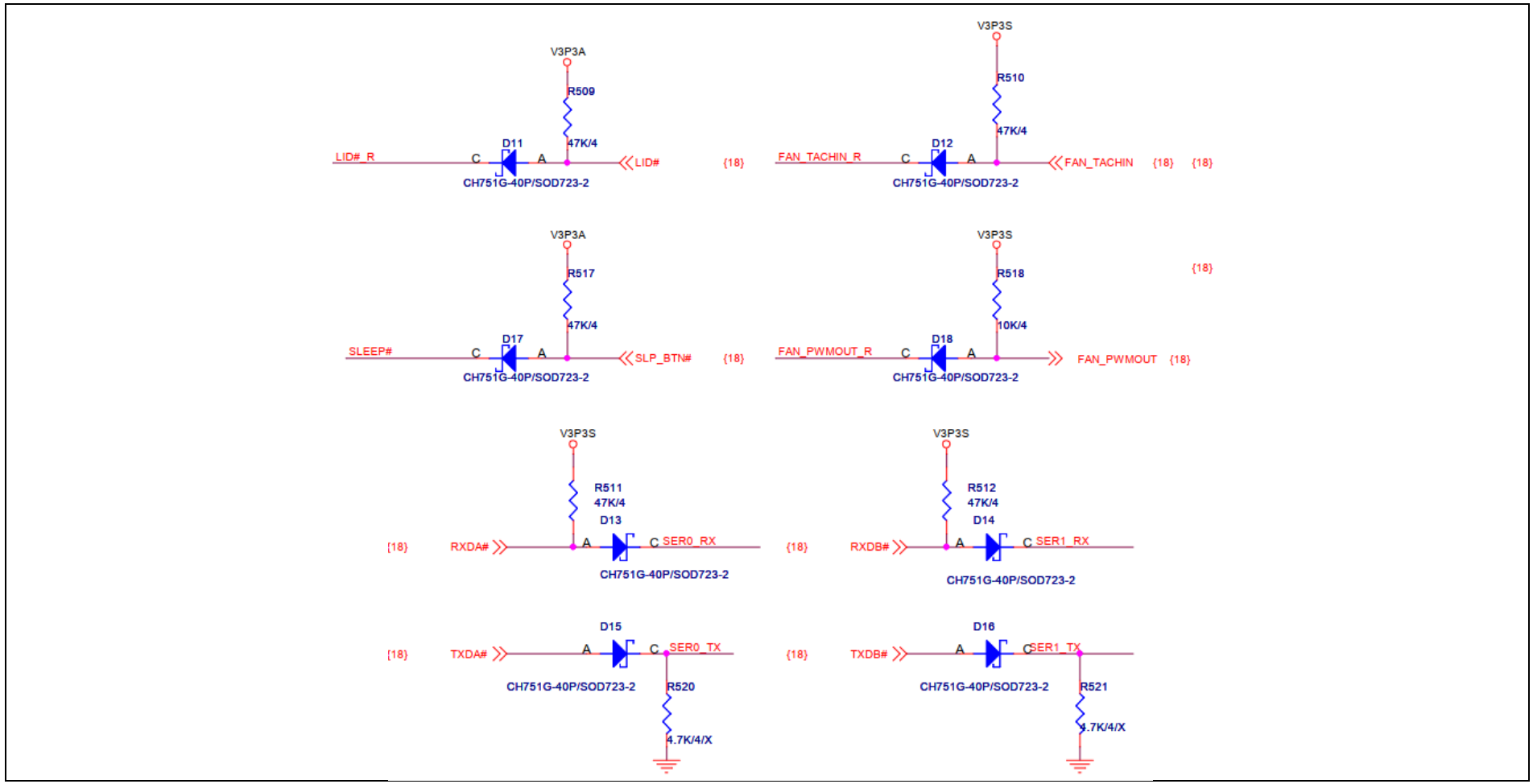


Figure 3Circuit protection design

3.7. Mechanical Dimensions

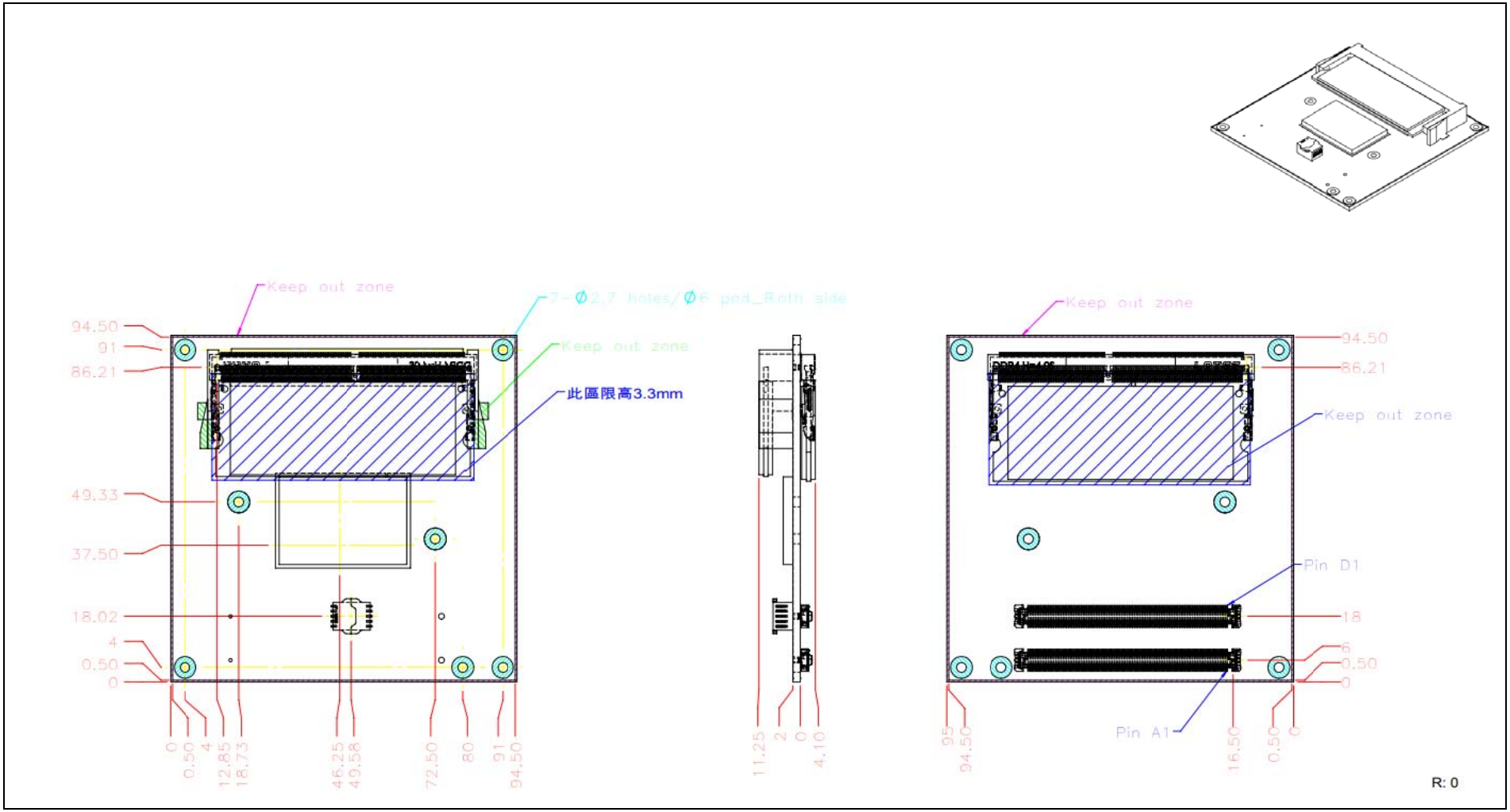


Figure 4Mechanical Dimensions - Top/Bottom

Restricted component height on the top side of the module :mm

Restricted component height on the bottom side of the module： mm

Do not place plugging component in the zone of restricted component height.

Do not place DIP type component in the zone of restricted component height.

3.8. PCOM-B645VGL and Cooler weight

PCOM-B645VGL	TBC +/- 2%
Cooler (H/S+FAN)	TBC+/- 2%
Heatsink	TBC +/- 2%

Table 6Net weight

3.9. Environmental Specifications

Storage Temperature	-40 ~ 85°C
Operation Temperature	-40~85°C
Storage Humidity	0%~95%
Operation Humidity	0%~95%

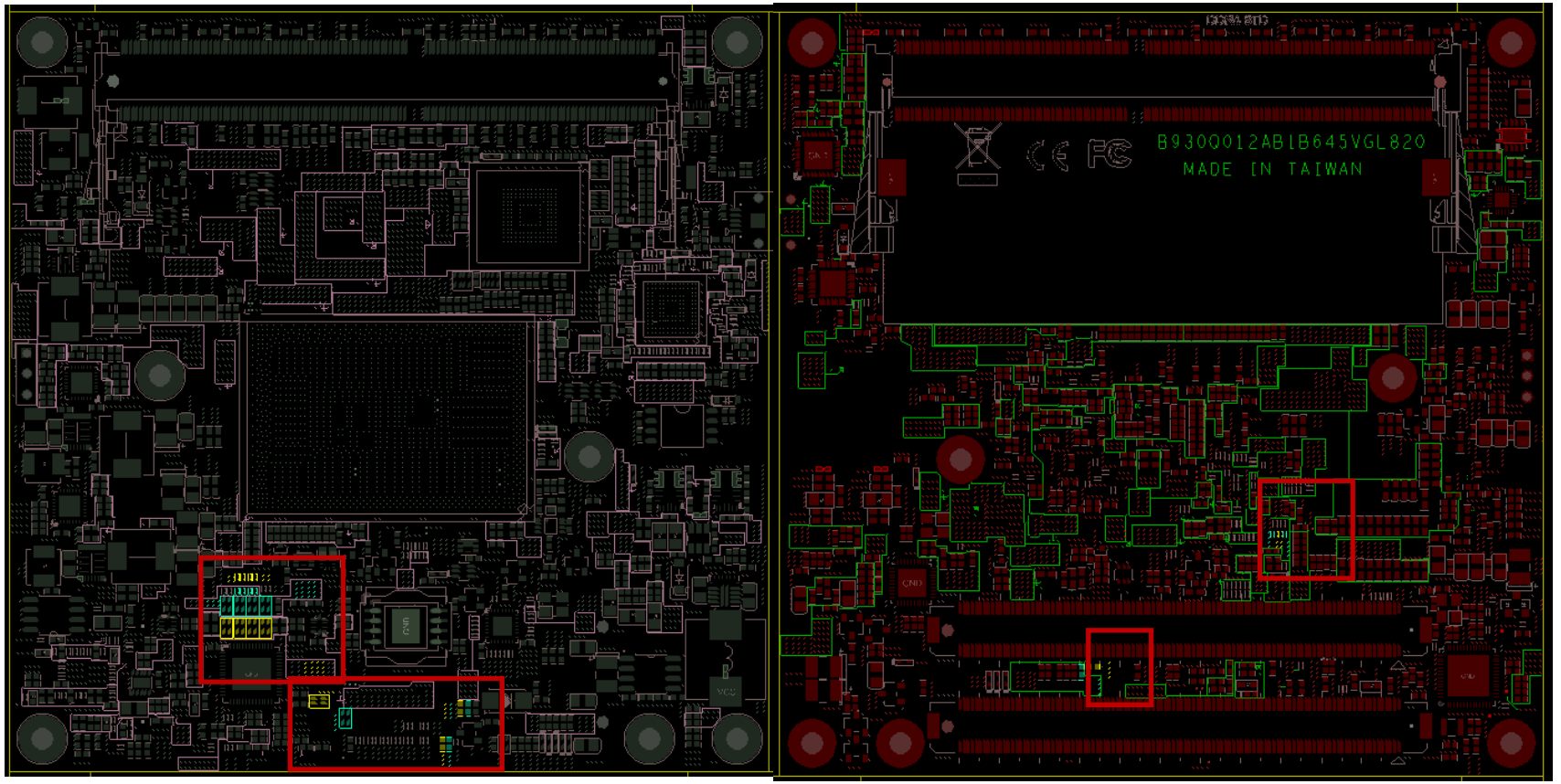
Table 7Environmental Specifications

3.10. Optional function rework SOP

1. Optional function rework SOP :eDP

PCOM-B645VGL Default display is LVDS, rework following SOP for eDP display interface.Note. eDP function, carrier must place ac cap.

Top view / Bot view


B930Q012AB1B645VGL820
MADE IN TAIWAN

- Step 1

Remove C1,C2,C3,C4

Add R1,R2,R3,R8, (0ohm 0201)

Solder the R522 component to R523

Solder the R514 component to R515

Solder the R506 component to R507

Solder the R526 component to R528

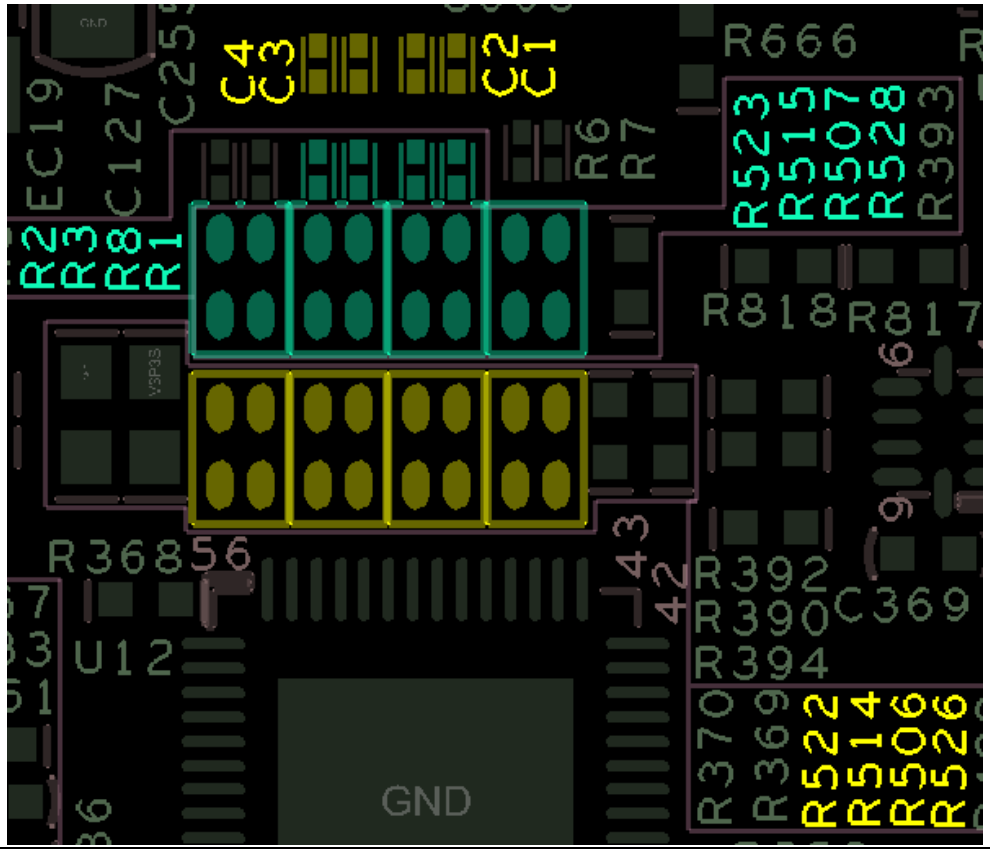


Figure 5 Optional function rework SOP : eDP 1-1

➢ Step 2

Solder the R530 component to R531

Solder the R503 component to R504

Solder the R21 component to R22

Rework position

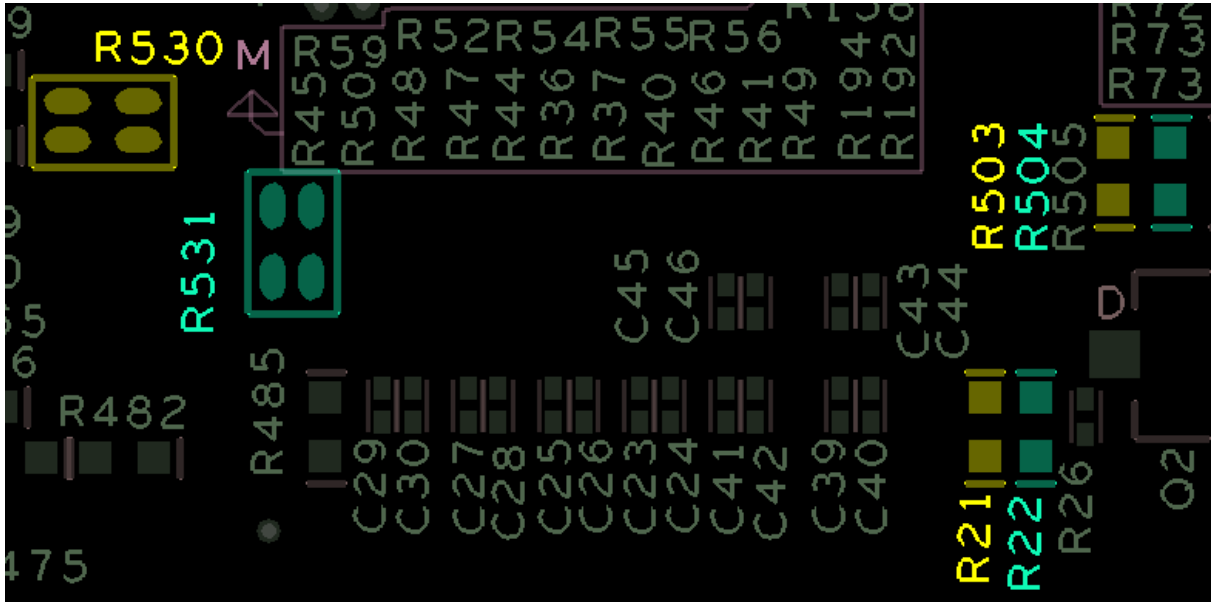


Figure 5 Optional function rework SOP : eDP 1-2

- Step 3

Remove C5, C6

Add R833, R834 (0ohm 0201)

Rework position

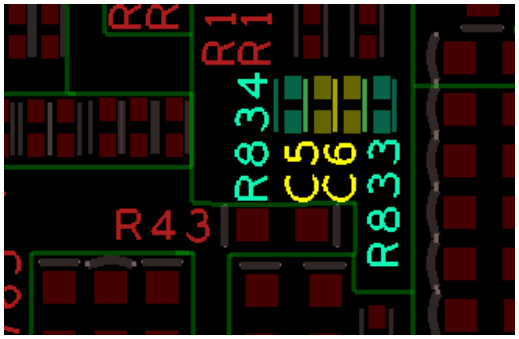


Figure 6Optional function rework SOP : eDP 1-3

- Step 4

Solder the R492 component to R494

Rework position

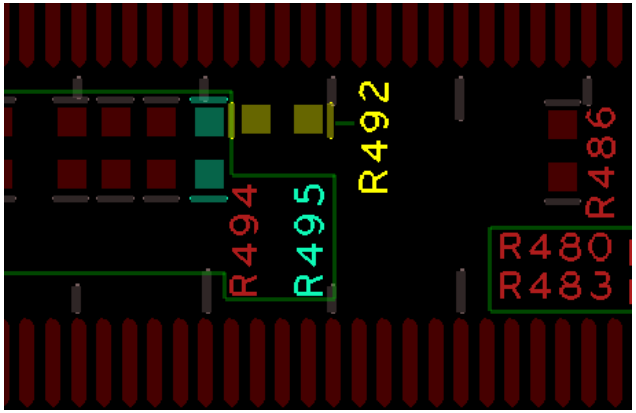


Figure 7Optional function rework SOP : eDP 1-4

4. Heatsink / Cooler dimensions

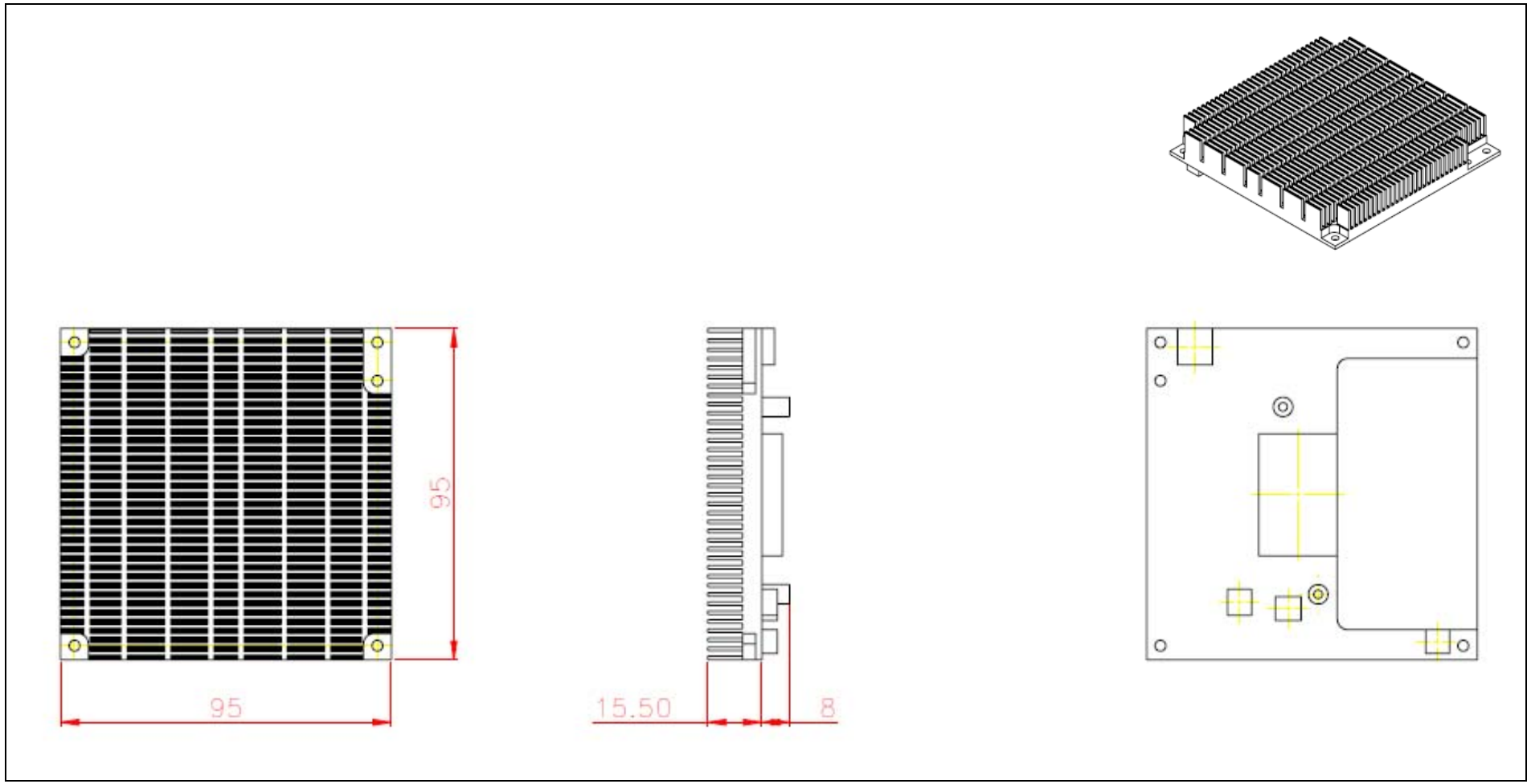


Figure 8Heat sink / cooler mechanical dimensions

4.1. H/S Assembly Guide

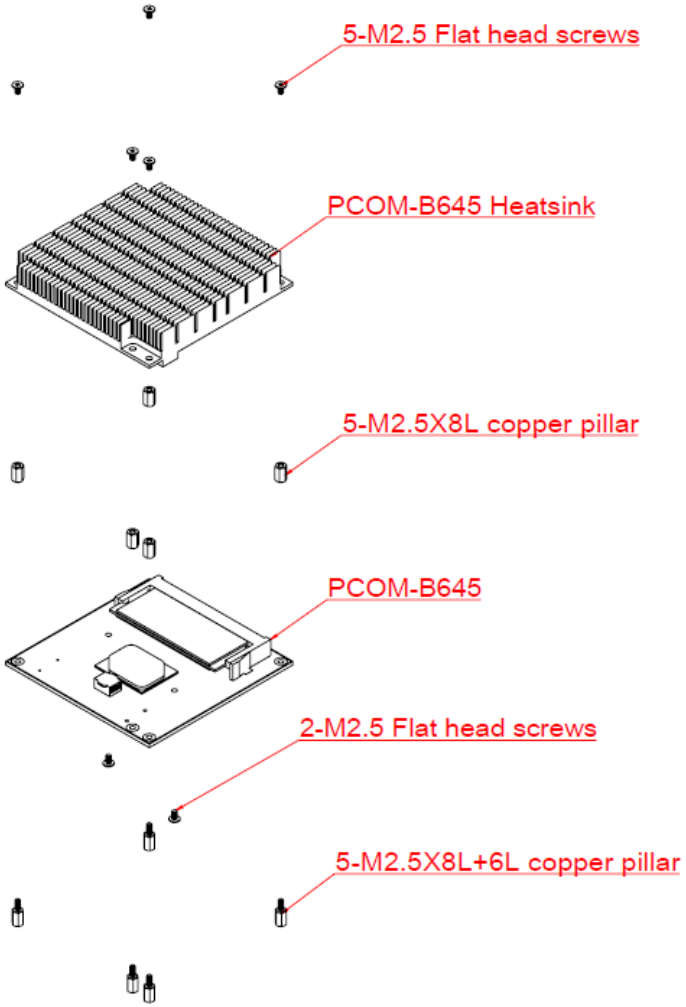


Figure 9 H/S Assembly guide

4.2. Packaging

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

Table 8Packaging

4.3. Ordering Guide

PCOM-B645VGL

Product	Ordering P/N	Status
PCOM-B645VGL-J6426.	AB1-3L84	Available
PCOM-B645VGL-x6211E	AB1-3L83	Available
PCOM-B645VGL-x6413E	AB1-3L82	Available
PCOM-B645VGL-x6425E	AB1-3K43	Available
PCOM-B645VGL-x6425RE	AB1-3L81	Available

Table 9Ordering Guide - PCOM-B645VGL

Accessory

Product	Ordering P/N	Status
Heat Sink J/N Series	B830B390	Available
Heat Sink X Series	B830B380	Available
Heat Spreader J/N Series	B830B460	Available
Heat Spreader X Series	B830B470	Available
PCOM-C60B	AB1-3G22Z	Contact us

Table 10Ordering Guide - Accessory

5. Pinout Tables

Below tables lists PCOM-B645VGL AB and CD Row connectors Type 6 pin name, un-connected pins are present as N/A.

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
1	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
2	GBE0_MDI3-	GBE0_ACT#	GND	GND
3	GBE0_MDI3+	LPC_FRAME#	USB_SSRX0-	USB_SSTX0-
4	GBE0_LINK100#	LPC_AD0	USB_SSRX0+	USB_SSTX0+
5	GBE0_LINK1000#	LPC_AD1	GND	GND
6	GBE0_MDI2-	LPC_AD2	USB_SSRX1-	USB_SSTX1-
7	GBE0_MDI2+	LPC_AD3	USB_SSRX1+	USB_SSTX1+
8	GBE0_LINK#	N/A	GND	GND
9	GBE0_MDI1-	N/A	USB_SSRX2-	USB_SSTX2-
10	GBE0_MDI1+	LPC_CLK	USB_SSRX2+	USB_SSTX2+
11	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
12	GBE0_MDI0-	PWRBTN#	USB_SSRX3-	USB_SSTX3-
13	GBE0_MDI0+	SMB_CK	USB_SSRX3+	USB_SSTX3+
14	N/A	SMB_DAT	GND	GND
15	SUS_S3#	SMB_ALERT#	N/A	DDI1_CTRLCLK_AUX+

Table 11PCOM-B645VGL Pin-out 1-6

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
16	SATA0_TX+	SATA1_TX+	N/A	DDI1_CTRLDATA_AUX-
17	SATA0_TX-	SATA1_TX-	RSVD19	RSVD19
18	SUS_S4#	SUS_STAT#	RSVD19	RSVD19
19	SATA0_RX+	SATA1_RX+	N/A	N/A
20	SATA0_RX-	SATA1_RX-	N/A	N/A
21	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
22	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A
24	SUS_S5#	PWR_OK	DDI1_HPD	RSVD19
25	N/A	N/A	N/A	RSVD19
26	N/A	N/A	N/A	DDI1_PAIR0+
27	BATLOW#	WDT	RSVD19	DDI1_PAIR0-
28	SATA_ACT#	HDA_SDIN2	RSVD19	RSVD19
29	HDA_SYNC	HDA_SDIN1	N/A	DDI1_PAIR1+
30	HDA_RST#	HDA_SDIN0	N/A	DDI1_PAIR1-
31	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
32	HDA_BITCLK	SPKR	DDI2_CTRLCLK_AUX+	DDI1_PAIR2+
33	HDA_SDOUT	I2C_CK	DDI2_CTRLDATA_AUX-	DDI1_PAIR2-
34	BIOS_DIS0#	I2C_DAT	DDI2_DDC_AUX_SEL	DDI1_DDC_AUX_SEL
35	THRMTRIP#	THRM#	RSVD19	RSVD19
36	USB6-	USB7-	N/A	DDI1_PAIR3+
37	USB6+	USB7+		DDI1_PAIR3-

Table 12PCOM-B645VGL Pin-out 2-6

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
38	USB_6_7_OC#	USB_4_5_OC#	N/A	RSVD19
39	USB4-	USB5-	N/A	DDI2_PAIR0+
40	USB4+	USB5+	N/A	DDI2_PAIR0-
41	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
42	USB2-	USB3-	N/A	DDI2_PAIR1+
43	USB2+	USB3+	N/A	DDI2_PAIR1-
44	USB_2_3_OC#	USB_0_1_OC#	N/A	DDI2_HPD
45	USB0-	USB1-	RSVD19	RSVD19
46	USB0+	USB1+	N/A	DDI2_PAIR2+
47	VCC_RTC	N/A	N/A	DDI2_PAIR2-
48	N/A	N/A	RSVD19	RSVD19
49	N/A	SYS_RESET#	N/A	DDI2_PAIR3+
50	LPC_SERIRQ	CB_RESET#	N/A	DDI2_PAIR3-
51	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
52	PCIE_TX5+	PCIE_RX5+	N/A	N/A
53	PCIE_TX5-	PCIE_RX5-	N/A	N/A
54	GPI0	GPO1	TYPE0#	N/A
55	PCIE_TX4+	PCIE_RX4+	N/A	N/A
56	PCIE_TX4-	PCIE_RX4-	N/A	N/A
57	GND	GPO2	TYPE1#	TYPE2#
58	PCIE_TX3+	PCIE_RX3+	N/A	N/A
59	PCIE_TX3-	PCIE_RX3-	N/A	N/A

Table 13PCOM-B645VGL Pin-out 3-6

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
60	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
61	PCIE_TX2+	PCIE_RX2+	N/A	N/A
62	PCIE_TX2-	PCIE_RX2-	N/A	N/A
63	GPI1	GPO3	RSVD19	RSVD19
64	PCIE_TX1+	PCIE_RX1+	RSVD19	RSVD19
65	PCIE_TX1-	PCIE_RX1-	N/A	N/A
66	GND	WAKE0#	N/A	N/A
67	GPI2	WAKE1#	RAPID_SHUT	GND
68	PCIE_TX0+	PCIE_RX0+	N/A	N/A
69	PCIE_TX0-	PCIE_RX0-	N/A	N/A
70	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
71	LVDS_A0+	LVDS_B0+	N/A	N/A
72	LVDS_A0-	LVDS_B0-	N/A	N/A
73	LVDS_A1+	LVDS_B1+	GND	GND
74	LVDS_A1-	LVDS_B1-	N/A	N/A
75	LVDS_A2+	LVDS_B2+	N/A	N/A
76	LVDS_A2-	LVDS_B2-	GND	GND
77	LVDS_VDD_EN	LVDS_B3+	RSVD19	RSVD19
78	LVDS_A3+	LVDS_B3-	N/A	N/A
79	LVDS_A3-	LVDS_BKLT_EN	N/A	N/A
80	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
81	LVDS_A_CK+	LVDS_B_CK+	N/A	N/A

Table 14PCOM-B645VGL Pin-out 4-6

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
82	LVDS_A_CK-	LVDS_B_CK-	N/A	N/A
83	LVDS_I2C_CK	LVDS_BKLT_CTRL	RSVD19	RSVD19
84	LVDS_I2C_DAT	VCC_5V_SBY	GND	GND
85	GPI3	VCC_5V_SBY	N/A	N/A
86	RSVD19	VCC_5V_SBY	N/A	N/A
87	eDP_HPD	VCC_5V_SBY	GND	GND
88	PCIE_CLK_REF+	BIOS_DIS1#	N/A	N/A
89	PCIE_CLK_REF-	VGA_RED	N/A	N/A
90	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
91	SPI_POWER	VGA_GRN	N/A	N/A
92	SPI_MISO	VGA_BLU	N/A	N/A
93	GPO0	VGA_HSYNC	GND	GND
94	SPI_CLK	VGA_VSYNC	N/A	N/A
95	SPI_MOSI	VGA_I2C_CK	N/A	N/A
96	TPM_PP	VGA_I2C_DAT	GND	GND
97	TYPE10#	SPI_CS#	RSVD19	RSVD19
98	SER0_TX	RSVD19	N/A	N/A
99	SER0_RX	RSVD19	N/A	N/A
100	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**
101	SER1_TX	FAN_PWNOUT	N/A	N/A

Table 15PCOM-B645VGL Pin-out 5-6

PCOM-B645VGL ZR5 Pin Out				
Pin	**Row A**	**Row B**	**Row C**	**Row D**
102	SER1_RX	FAN_TACHIN	N/A	N/A
103	LID#	SLEEP#	GND	GND
104	VCC_12V	VCC_12V	VCC_12V	VCC_12V
105	VCC_12V	VCC_12V	VCC_12V	VCC_12V
106	VCC_12V	VCC_12V	VCC_12V	VCC_12V
107	VCC_12V	VCC_12V	VCC_12V	VCC_12V
108	VCC_12V	VCC_12V	VCC_12V	VCC_12V
109	VCC_12V	VCC_12V	VCC_12V	VCC_12V
110	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**	**GND(FIXED)**

Table 16PCOM-B645VGL Pin-out 6-6

6. BIOS Setup Items

6.1. Introduction

The following section describes the BIOS setup program. The BIOS setup program can be used to view and change the BIOS settings for the module. Only experienced users should change the default BIOS settings.

6.2. BIOS Setup

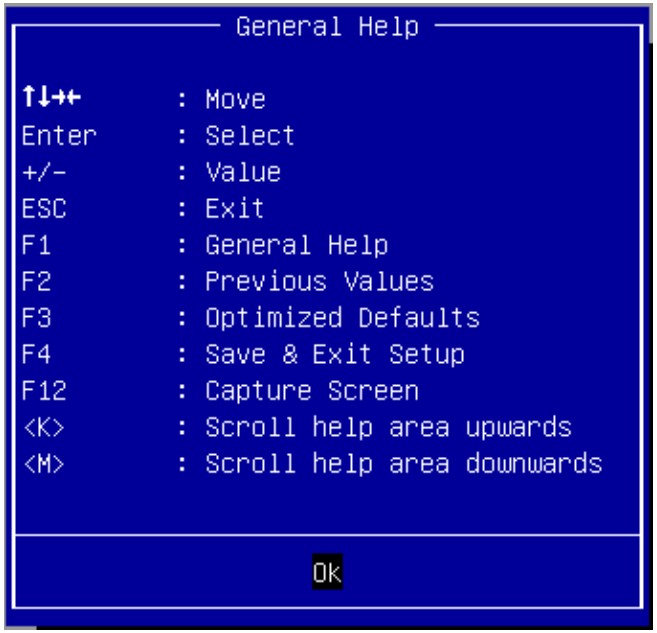
Power on the computer and the system will start POST (Power on Self Test) process. When the message below appears on the screen, press <Delete> or <ESC> key will enter BIOS setup screen.

Press <ESC > or <Delete> 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.

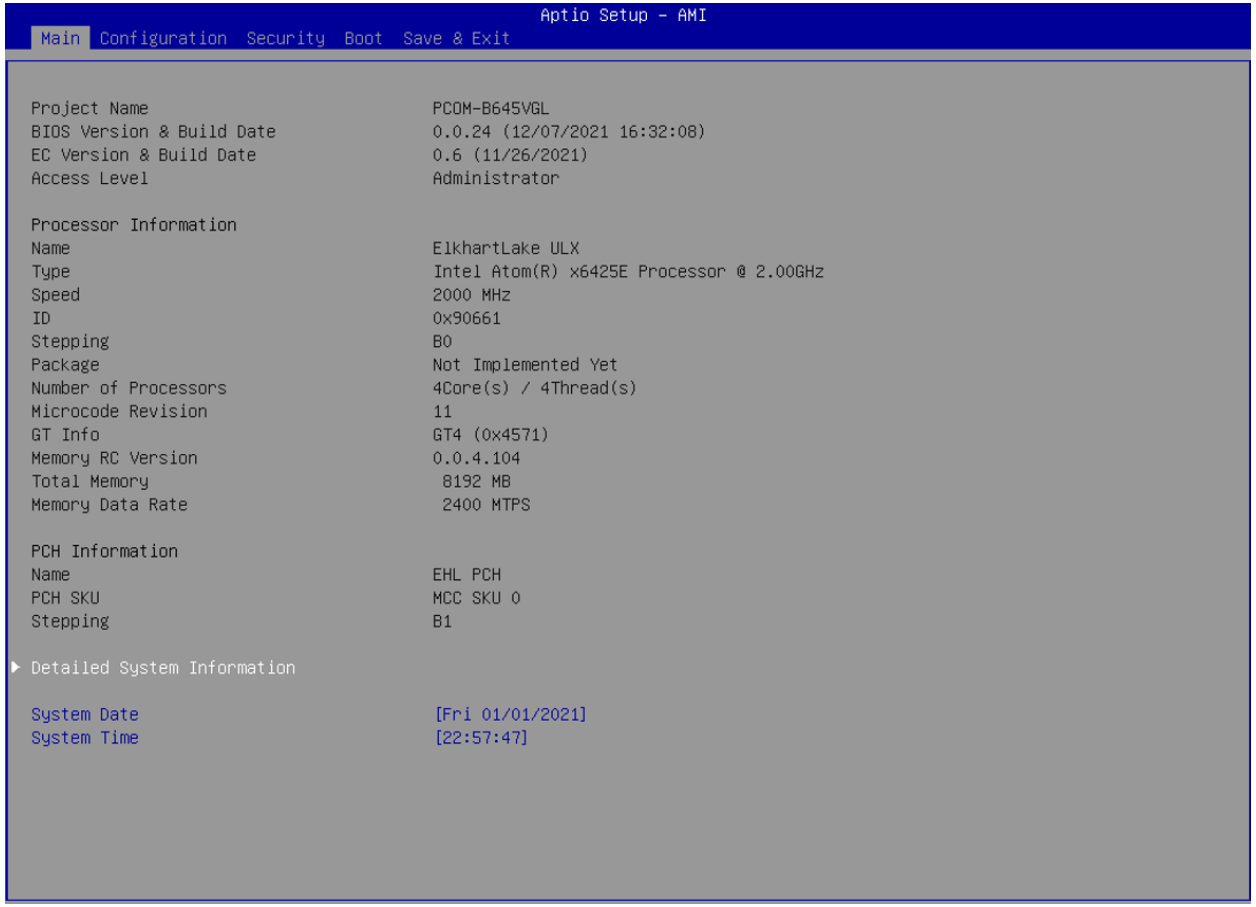
Press <F1> to Run General Help or Resume

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.

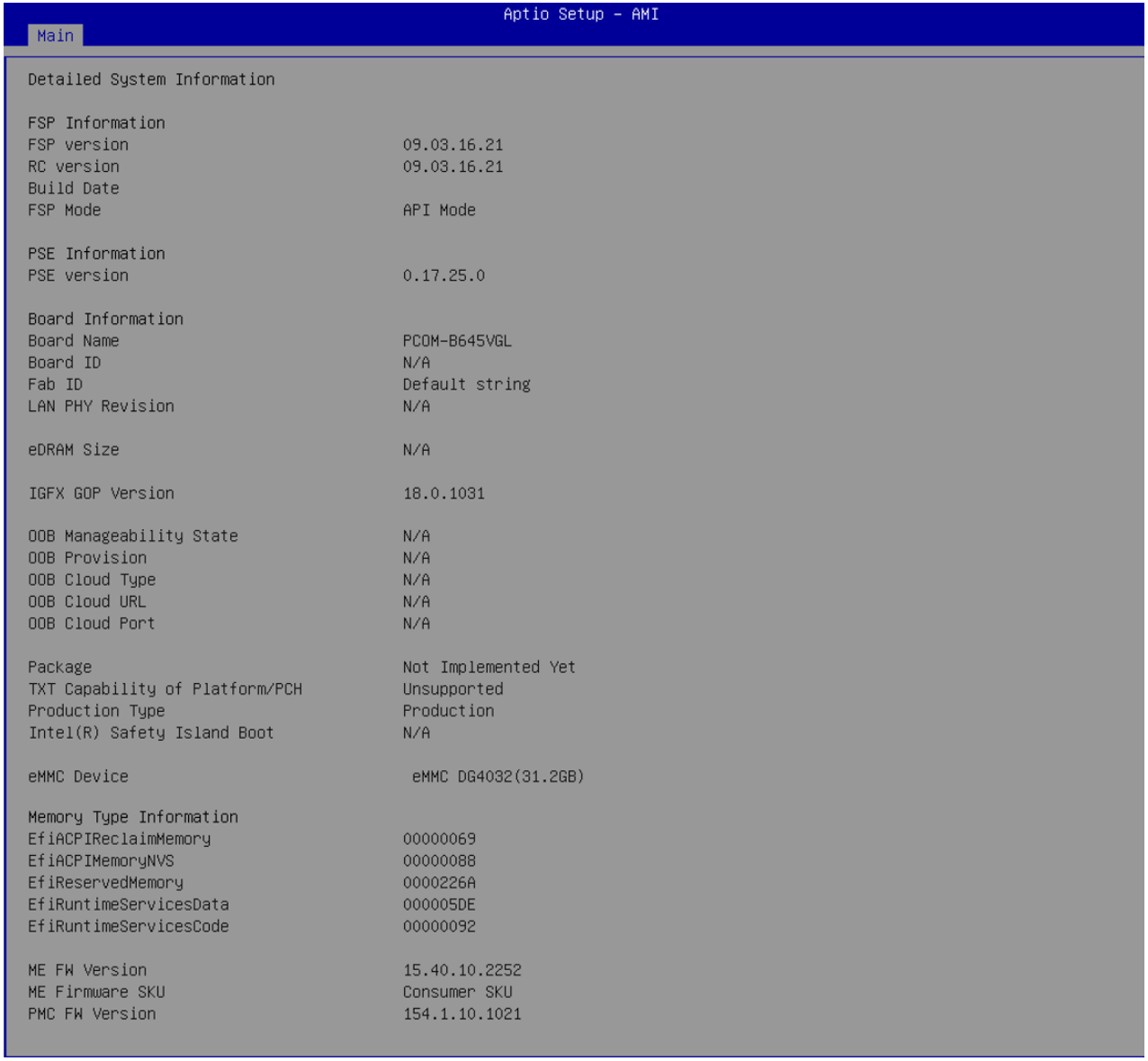

General Help
↑↓→← : Move
Enter : Select
+/- : Value
ESC : Exit
F1 : General Help
F2 : Previous Values
F3 : Optimized Defaults
F4 : Save & Exit Setup
F12 : Capture Screen
<K> : Scroll help area upwards
<M> : Scroll help area downwards
Ok

6.2.1 Main

Use this menu for basic system configurations, such as time, date etc.



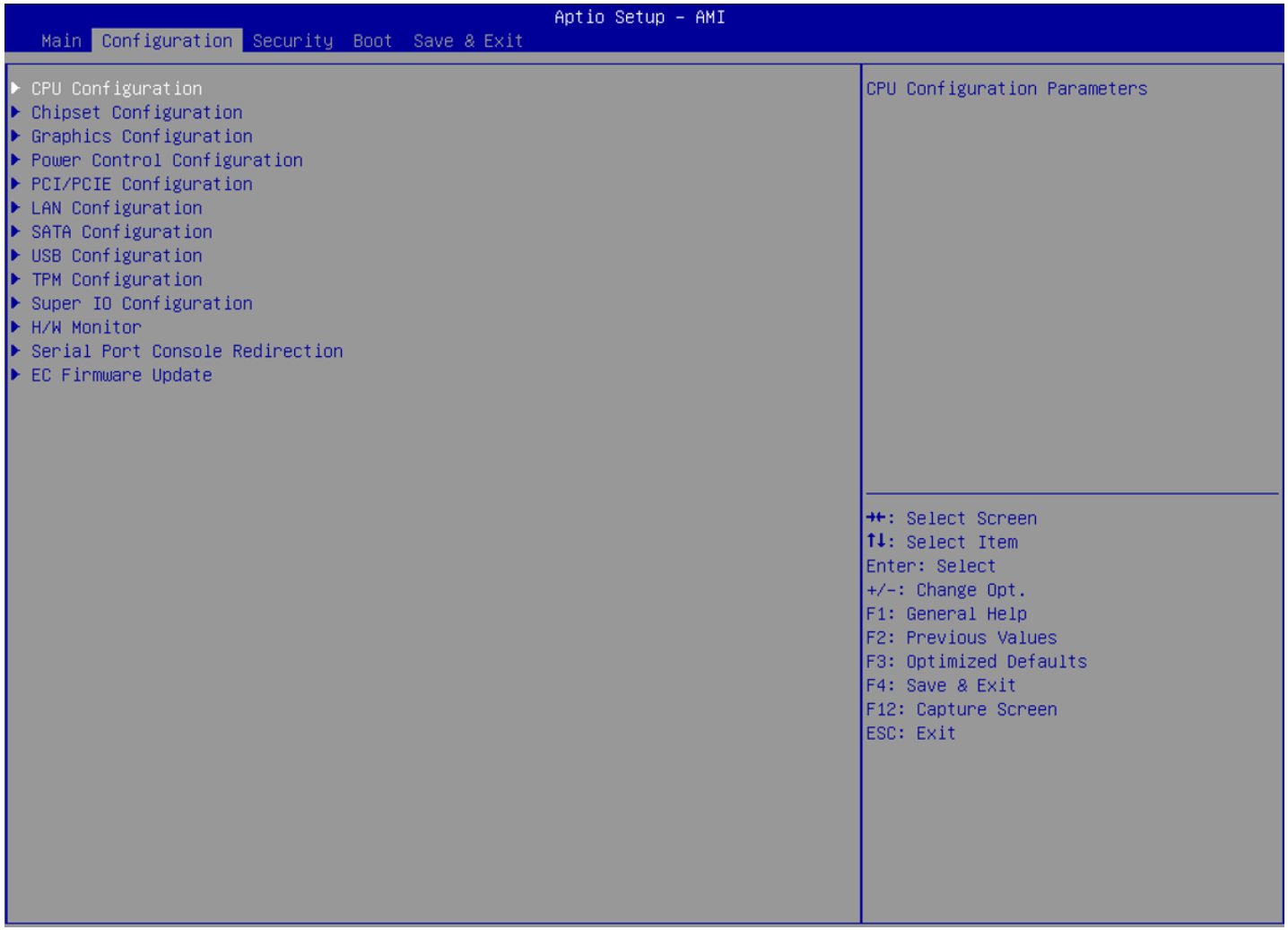
Detailed System Information



Feature	Description	Options
Detailed System Information		
System Date	The date format is <Day>, <Month><Date><Year>. Use [+] or [—] to configure system Date.	
System Time	The time format is <Hour><Minute><Second>. Use [+] or [—] to configure system Time.	

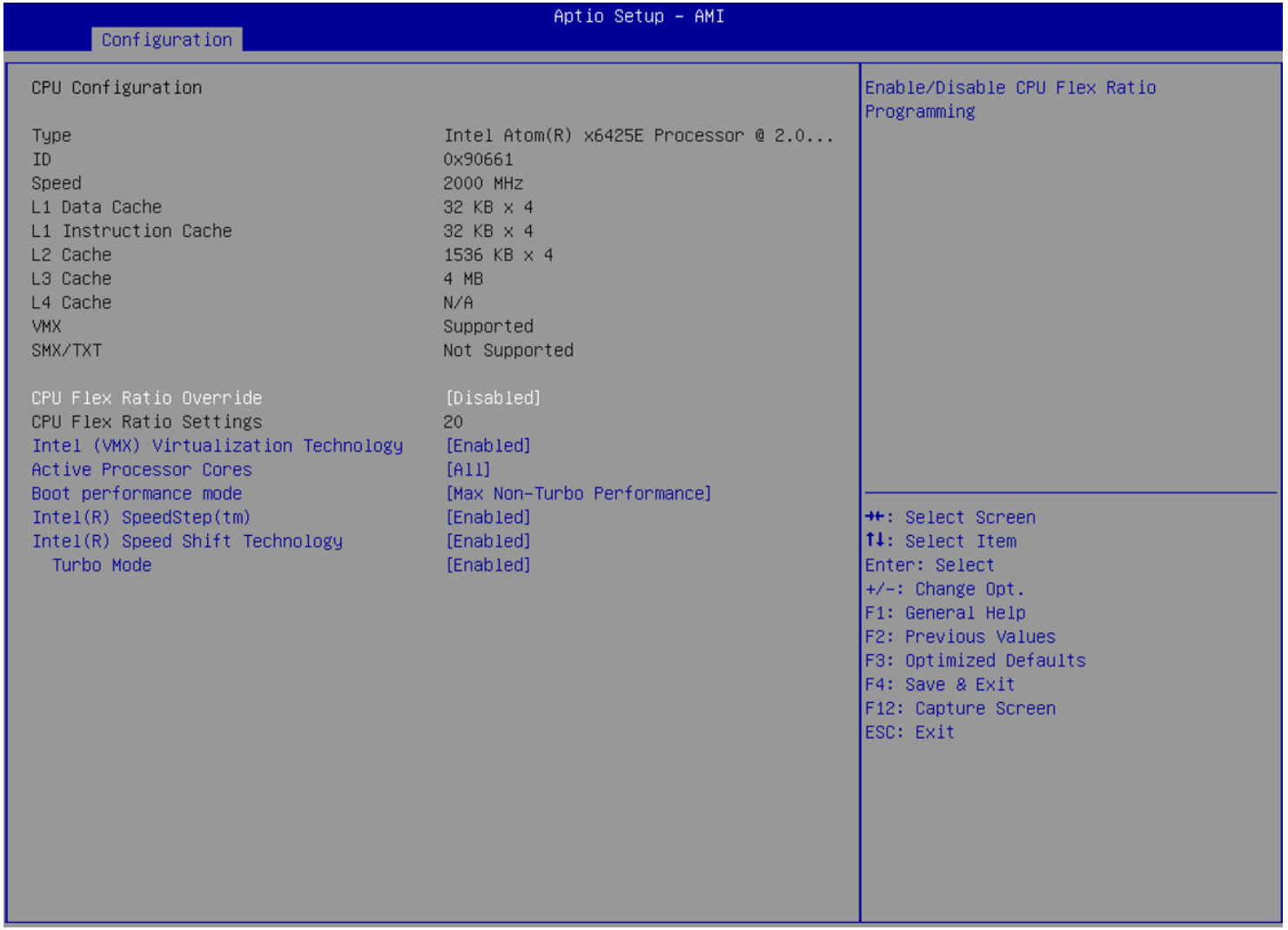
6.2.2 Configuration

Use this menu to set up the items of special enhanced features



CPU Configuration

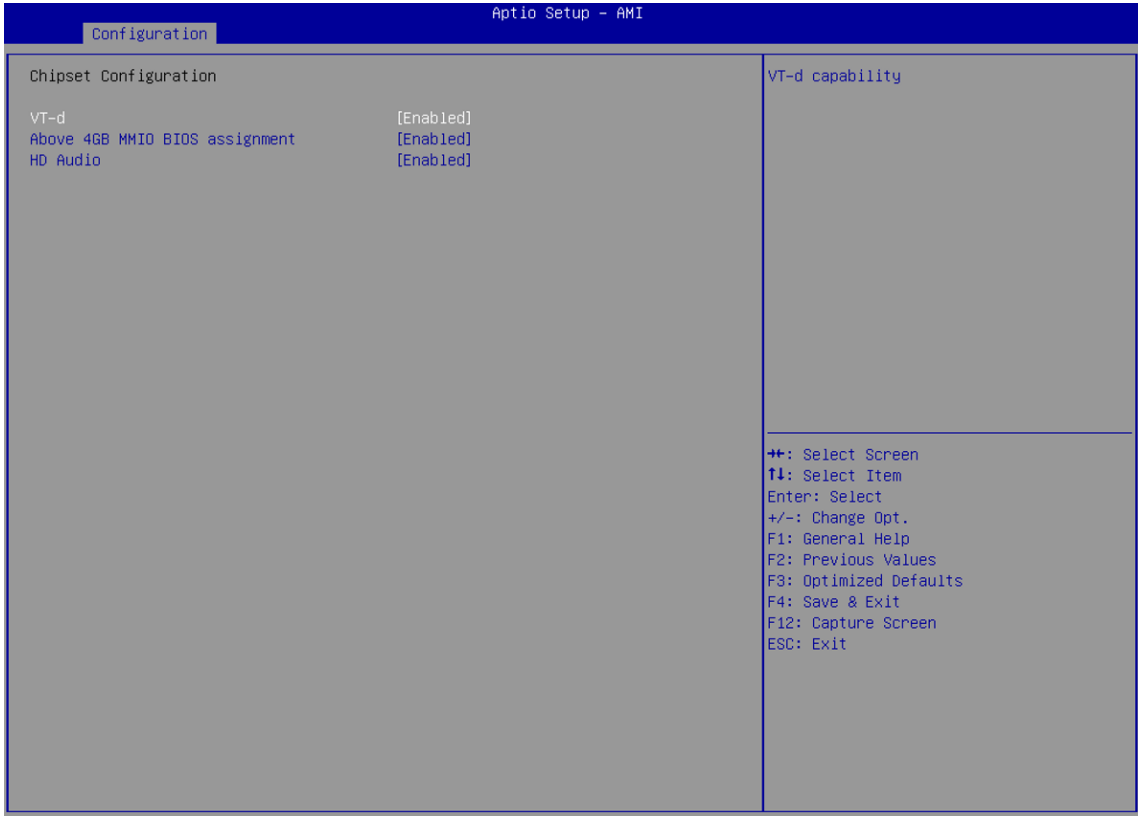
CPU Configuration Parameters



Feature	Description	Options
CPU Flex Ratio Override	Enable/Disable CPU Flex Ratio Programming	★Disabled, Enabled
CPU Flex Ratio Settings	This value must be between Max Efficiency Ratio (LFM) and Maximum non-turbo ratio set by Hardware (HFM).	★20
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.	★Enabled, Disabled
Active Processor Cores	Number of cores enable in each processor package.	★All, 1, 2, 3
Boot performance mode	Select the performance state that the BIOS will set starting from reset vector	★Max Non-Turbo Performance, Max Battery, Turbo Performance,
Intel® SpeedStep™	Allows more than two frequency ranges to be supported.	★Enabled, Disabled
Intel® Speed Shift Technology	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states	★Enabled, Disabled
Turbo Mode	Enable/Disable processor Turbo Mode (requires EMTTM enabled too.) AUTO means enabled.	★Enabled, Disabled

Chipset Configuration

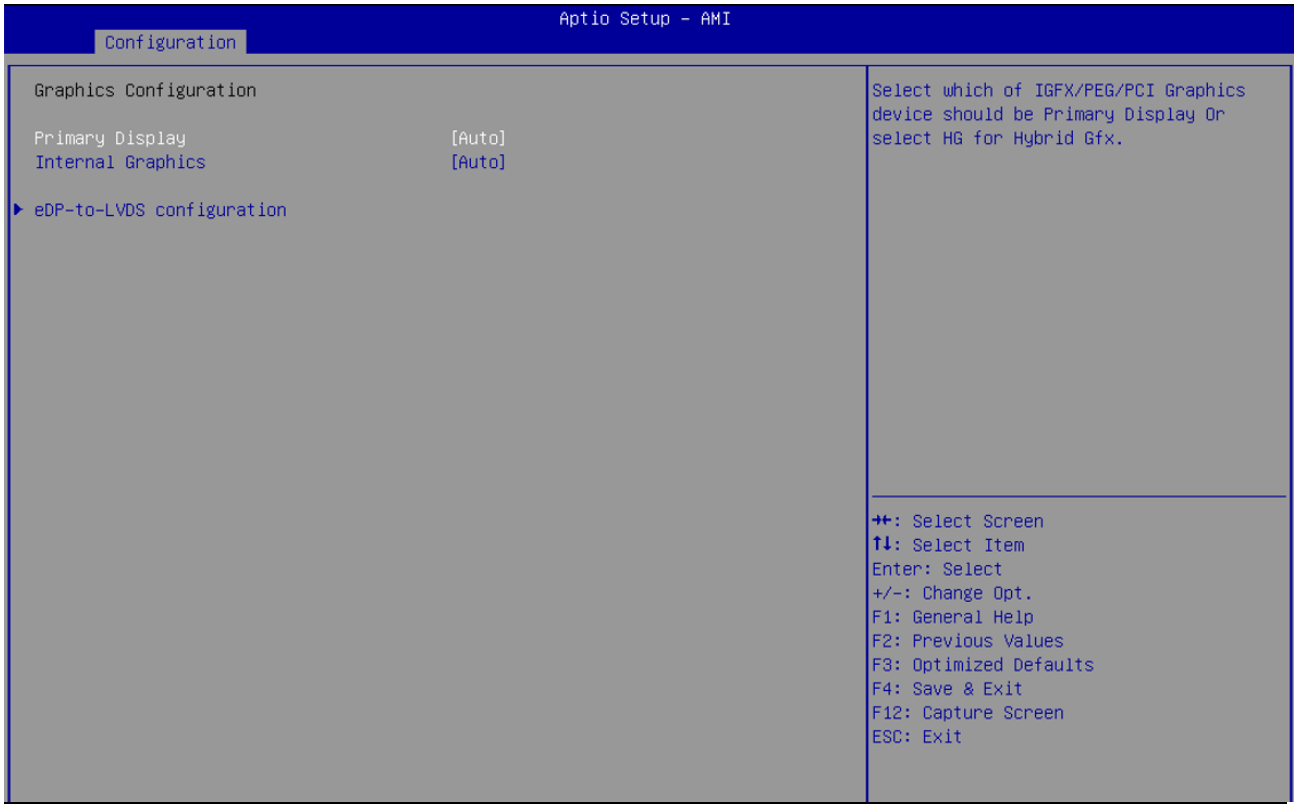
Configuration Chipset feature



Feature	Description	Options
VT-d	VT-d Capability	★Enabled ,Disabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB	★Enabled ,Disabled
HD Audio	Control Detection of the HD-Audio device. Disabled = HAD will be unconditionally disabled Enabled = HAD will be unconditionally enabled	★Enabled ,Disabled

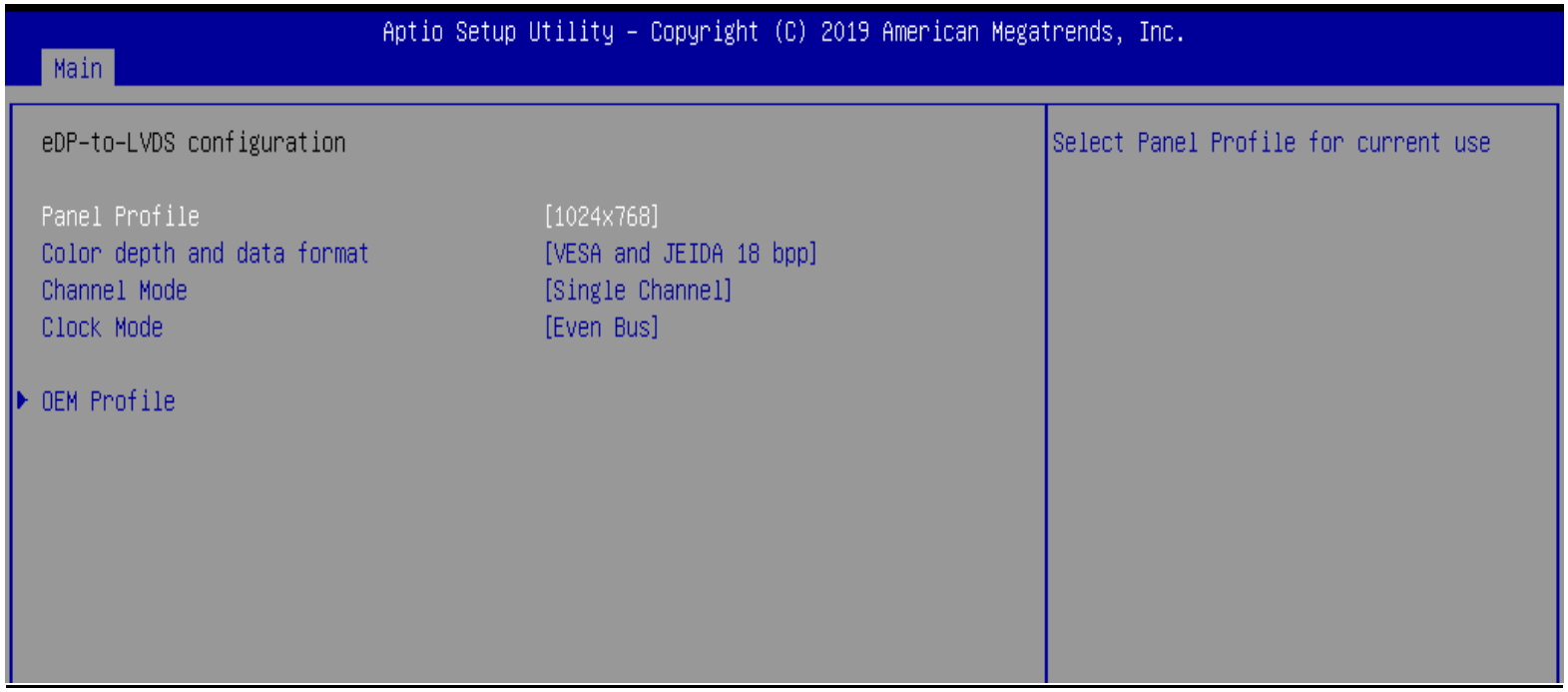
Graphics Configuration

Configuration Graphics Settings



Feature	Description	Options
Primary Display	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.	★Auto, IGFX, PEG, PCI
Internal Graphics	Keep IGFX enabled based on the setup options.	★Auto, Disabled, Enabled
eDP-to-LVDS configuration	eDP-to-LVDS(PTN3460)	

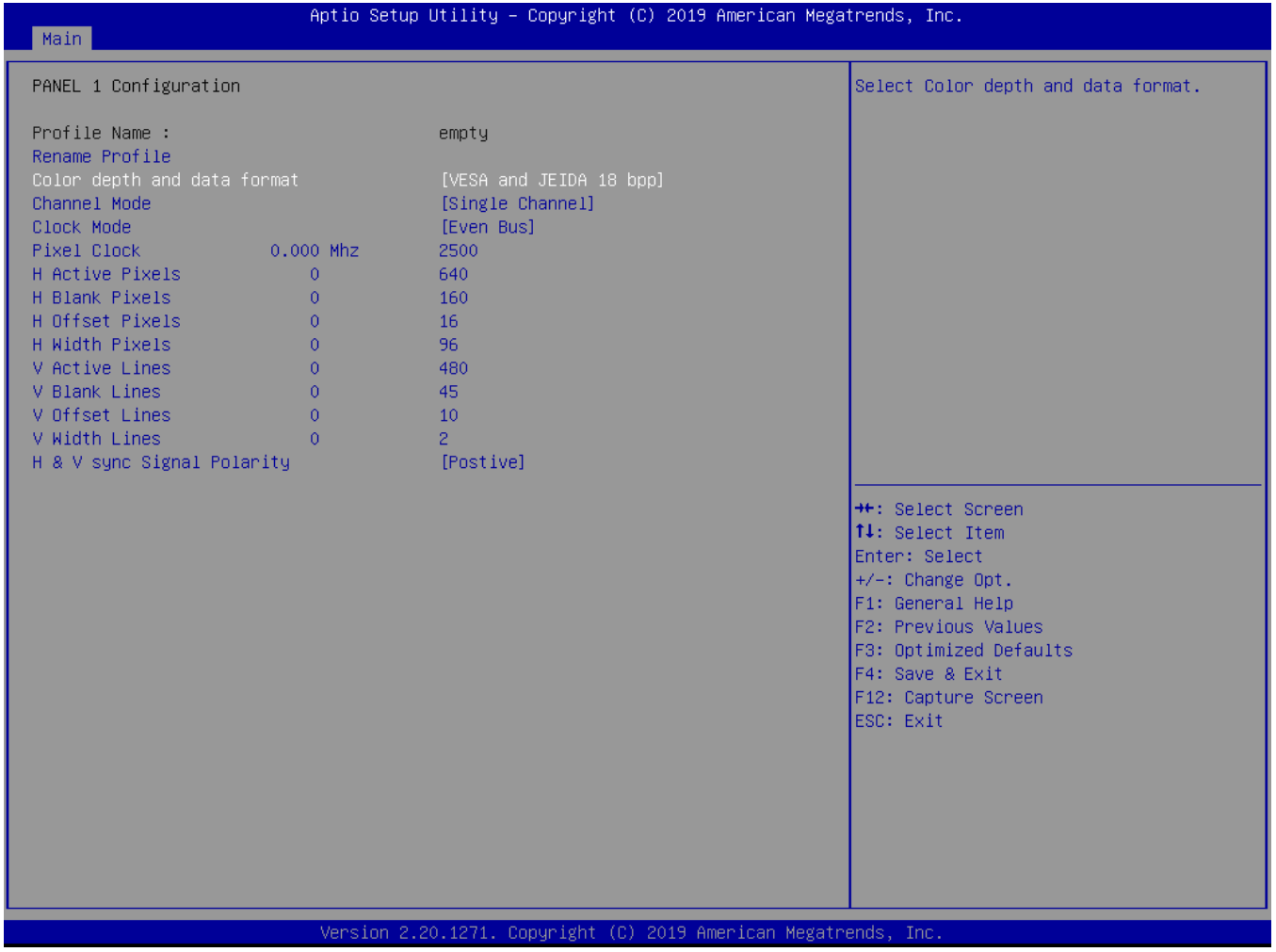
eDP-to-LVDS configuration



Feature	Description	Options
Panel Profile	Select Panel Profile for current use.	★1024x768,640x480,800x480,800x600,1280x800 1280x1024,1366x768,1440x900,1920x1080,OEM Profile
Color depth and data format	Select Color depth and data format	★VESA and JEIDA 18 bpp, VESA 24 bpp, JEIDA 24 bpp
Channel Mode	Select LVDS Channel Mode	★Single Channel, Dual Channel
Clock Mode	Select clock output for LVDS.	★Even Bus, Odd Bus, Both Buses

OEM Profile

PANEL 1 Configuration



Feature	Description	Options
Color depth and data format	Select Color depth and data format	★VESA and JEIDA 18 bpp, VESA 24 bpp, JEIDA 24 bpp
Channel Mode	Select LVDS Channel Mode	★Single Channel, Dual Channel
Clock Mode	Select clock output for LVDS.	★Even Bus, Odd Bus, Both Buses
Pixel Clock	Pixel Clock(10Khz)	★2500
H Active Pixels	H Active Pixels (Pixel)	★640
H Blank Pixels	H Blank Pixels (Pixel)	★160
H Offset Pixels	H Offset Pixels (Pixel)	★16
H Width Pixels	H Width Pixels (Pixel)	★96
V Active Lines	V Active Lines (Line)	★480
V Blank Lines	V Blank Lines (Line)	★45
V Offset Lines	V Offset Lines (Line)	★10
V Width Lines	V Width Lines (Line)	★2
H&V sync Signal Polarity	Flag: 0x1E Signal Polarity is Postive 0x18 Signal Polarity is Non-Postive	★Postive, Non-Postive

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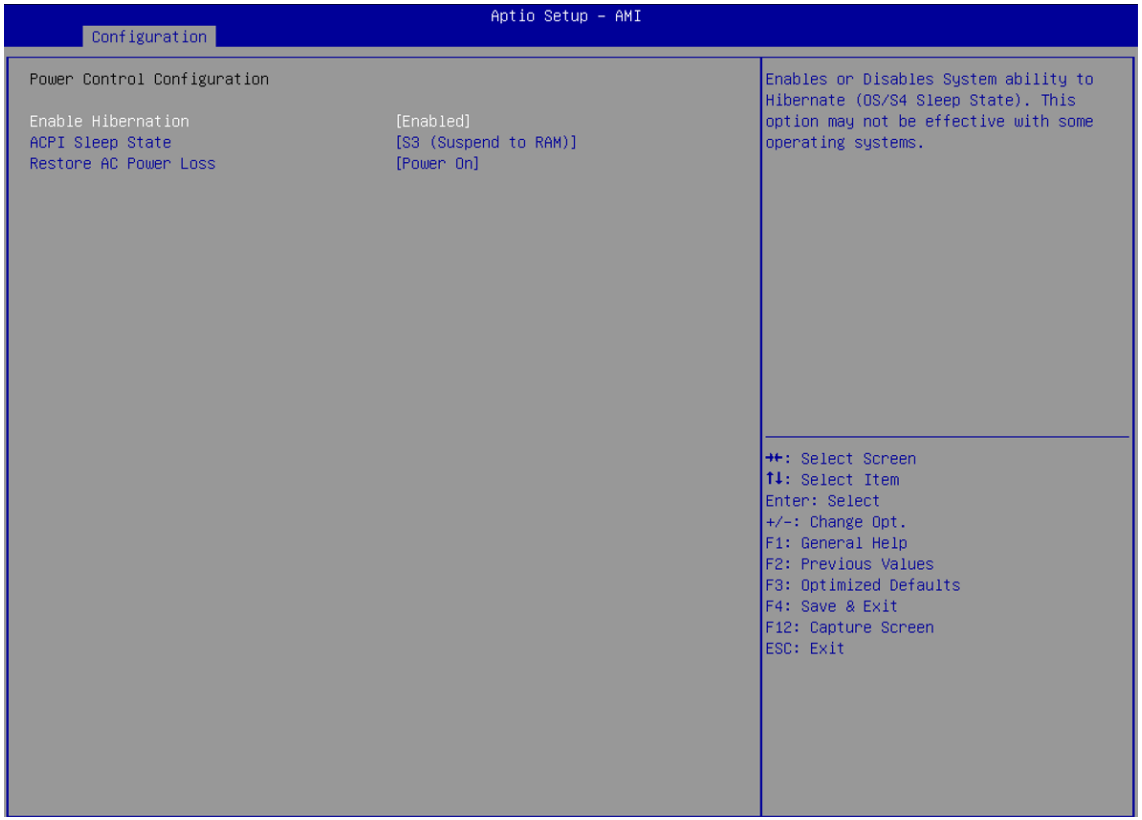
Power Control Configuration

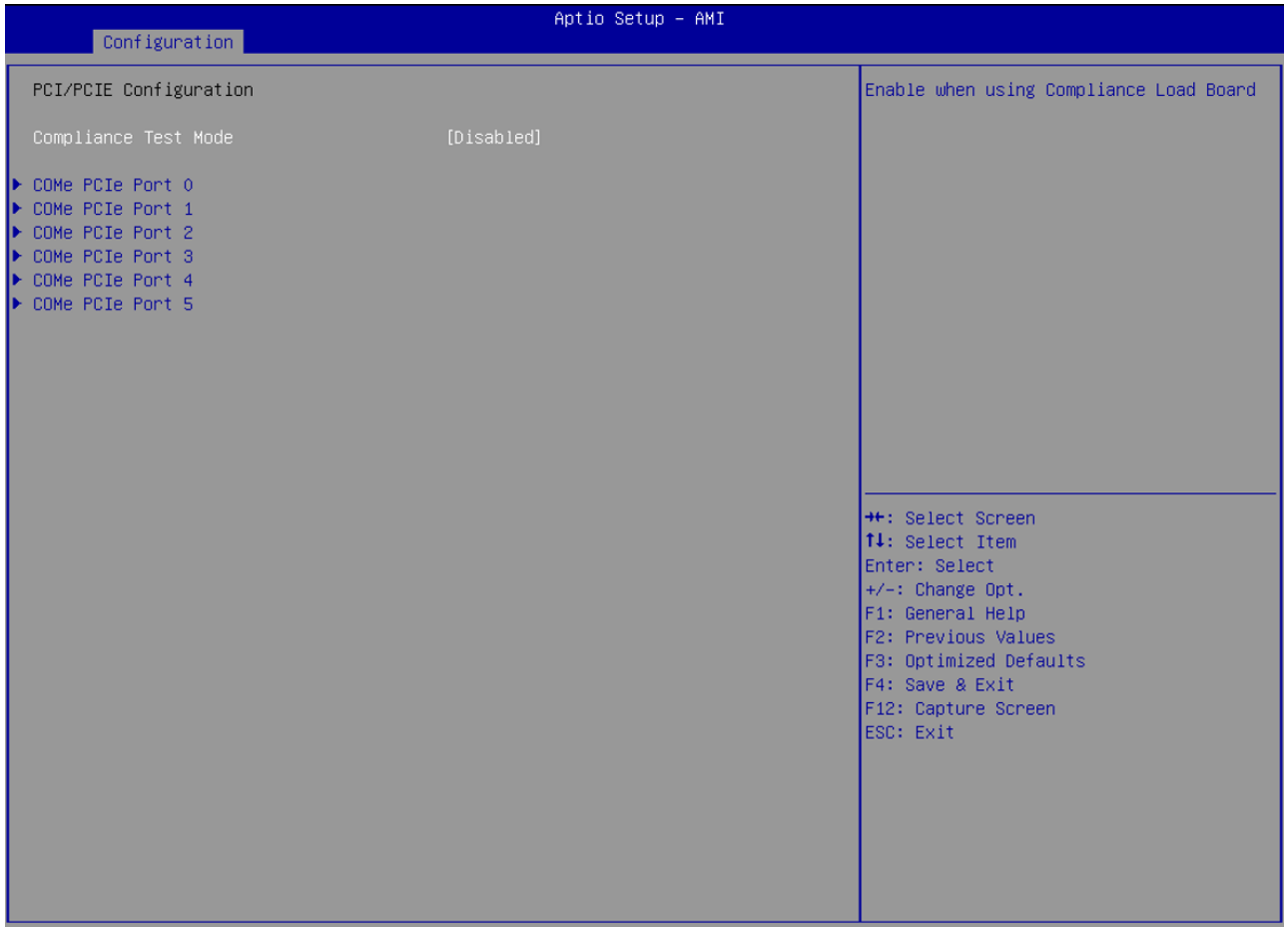
System Power Control Configuration Parameters



Feature	Description	Options
Enable Hibernation	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.	Disabled, ★Enabled
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.	Suspend Disabled ,★S3 (Suspend to RAM)
Restore AC Power Loss	Specify what state to go to when power is re-applied after a power failure (G3 state)	★Power On ,Power Off ,Last State

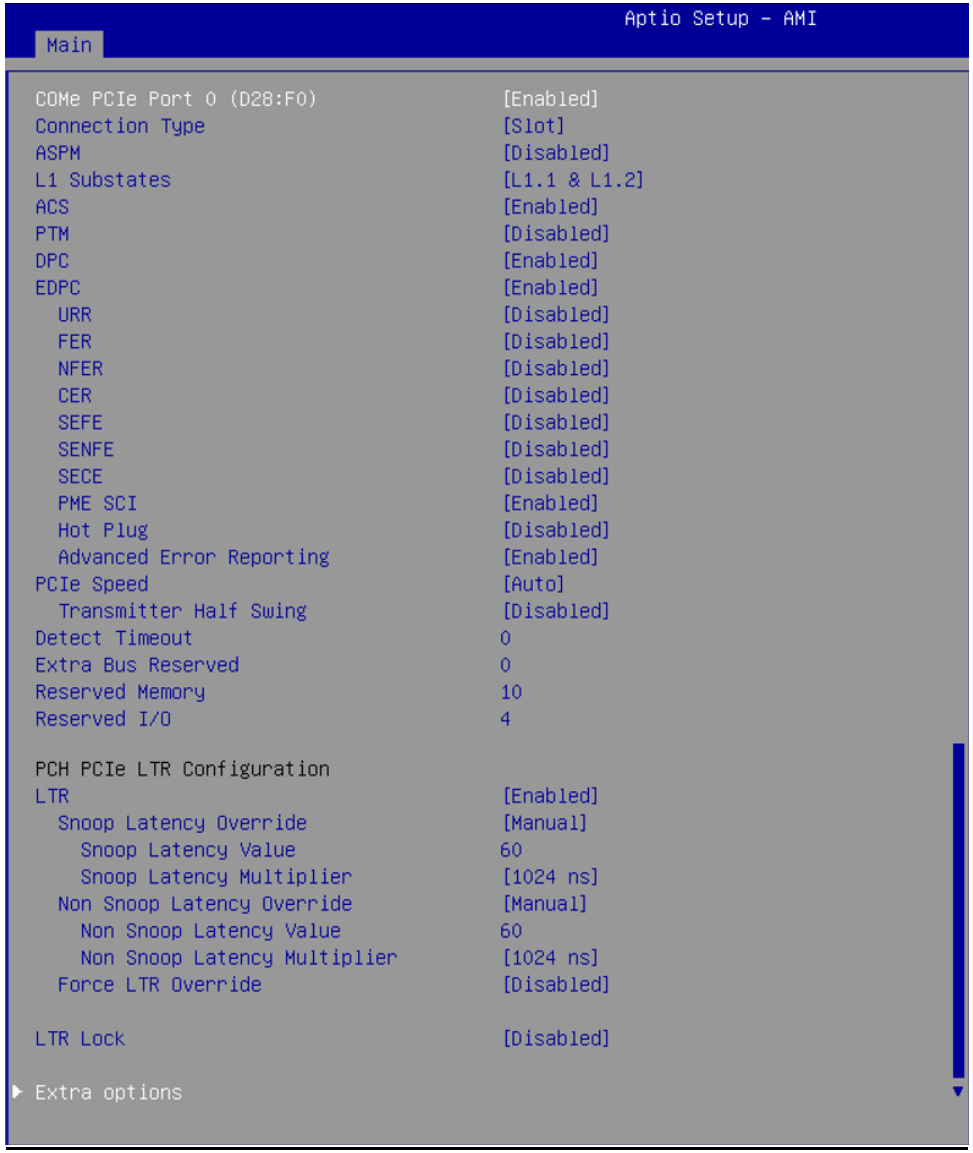
PCI/PCIE Configuration

PCI, PCI Express Settings



Feature	Description	Options
Compliance Test Mode	Enable when using Compliance Load Board	★Disabled, Enabled
COMe PCIe Port 0~5	PCI Express Root Port Settings.	

COMe PCIe Port



Feature	Description	Options
COMe PCIe Port	Control the PCI Express Root Port.	★Enabled , Disabled
Connection Type	Built-In: a built-in device is connected to this rootport. SlotImplemented bit will be clear. Slot: this rootport connects to user-accessible slot. SlotImplemented bit will be set.	★Slot, Built-in
ASPM	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE – Disables ASPM	★Disabled, L0s, L1, L0sL1, Auto
L1 Substates	PCI Express L1 Substates settings.	★L1.1 & L1.2, L1.1, Disabled
ACS	Enable/Disable Access Control Services Extended Capability	★Enabled , Disabled
PTM	Enable/Disable Precision Time Measurement	★Disabled, Enabled
DPC	Enable/Disable Downstream Port Containment	★Enabled , Disabled
EDPC	Enable/Disable Rootport extensions for Downstream Port Containment	★Enabled , Disabled
URR	PCI Express Unsupported Request Reporting Enable/Disable.	★Disabled, Enabled
FER	PCI Express Device Fatal Error Reporting Enable/Disable	★Disabled, Enabled
NFER	PCI Express Device Non-Fatal Error Reporting Enable/Disable	★Disabled, Enabled
CER	PCI Express Device Correctable Error Reporting Enable/Disable.	★Disabled, Enabled
SEFE	Root PCI Express System Error on Fatal Error Enable/Disable.	★Disabled, Enabled
SENFE	Root PCI Express System Error on Non-Fatal Error Enable/Disable.	★Disabled, Enabled
SECE	Root PCI Express System Error on Correctable Error Enable/Disable.	★Disabled, Enabled

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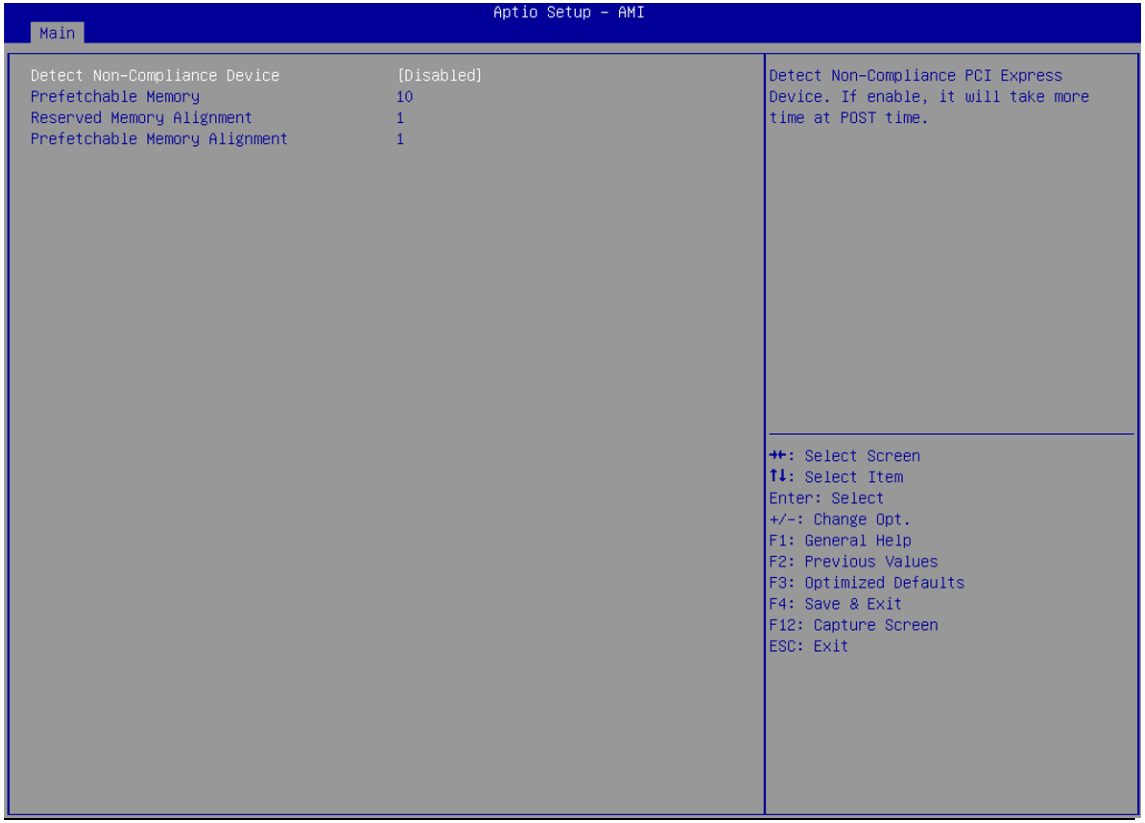
PME SCI	PCI Express PME SCI Enable/Disable.	★Enabled , Disabled
Hot Plug	PCI Express Hot Plug Enable/Disable.	★Disabled, Enabled
Advanced Error Reporting	Advanced Error Reporting Enable/Disable.	★Enabled , Disabled
PCIe Speed	Configure PCIe Speed	★Auto, Gen1, Gen2, Gen3
Transmitter Half Swing	Transmitter Half Swing Enable/Disable.	★Disabled, Enabled
Detect Timeout	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.	★0
Extra Bus Reserved	Extra Bus Reserved (0-7) for bridges behind this Root Bridge.	★0
Reserved Memory	Reserved Memory for this Root Bridge (1-20) MB	★10
Reserved I/O	Reserved I/O (4K/8K/12K/16K/20K) Range for this Root Bridge.	★4
LTR	PCH PCIE Latency Reporting Enable/Disable	★Enabled , Disabled
Snoop Latency Override	Snoop Latency Override for PCH PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto(default): Maintain default BIOS flow.	★Auto, Manual, Disabled
Snoop Latency Value	LTR Snoop Latency value of PCH PCIE	★60
Snoop Latency Multiplier	LTR Snoop Latency Multiplier of PCH PCIE	★1024ns, 1ns, 32ns, 32768ns, 1048576ns, 33554432ns
Non Snoop Latency Override	Non Snoop Latency Override for PCH PCIE. Disabled: Disable override. Manual: Manually enter override values. Auto(default): Maintain default BIOS flow.	★Auto, Manual, Disabled
Non Snoop Latency Value	LTR Non Snoop Latency value of PCH PCIE	★60
Non Snoop Latency Multiplier	LTR Non Snoop Latency Multiplier of PCH PCIE.	★1024ns, 1ns, 32ns, 32768ns, 1048576ns, 33554432ns
Force LTR Override	Force LTR Override for PCH PCIE.	★Disabled, Enabled

	Disabled: LTR override values will not be forced. Enable: LTR override values will be forced and LTR messages from the device will be ignored.	
LTR Lock	PCIE LTR Configuration Lock	★Disabled, Enabled
Extra options	PCI Express Root Port extra options.	

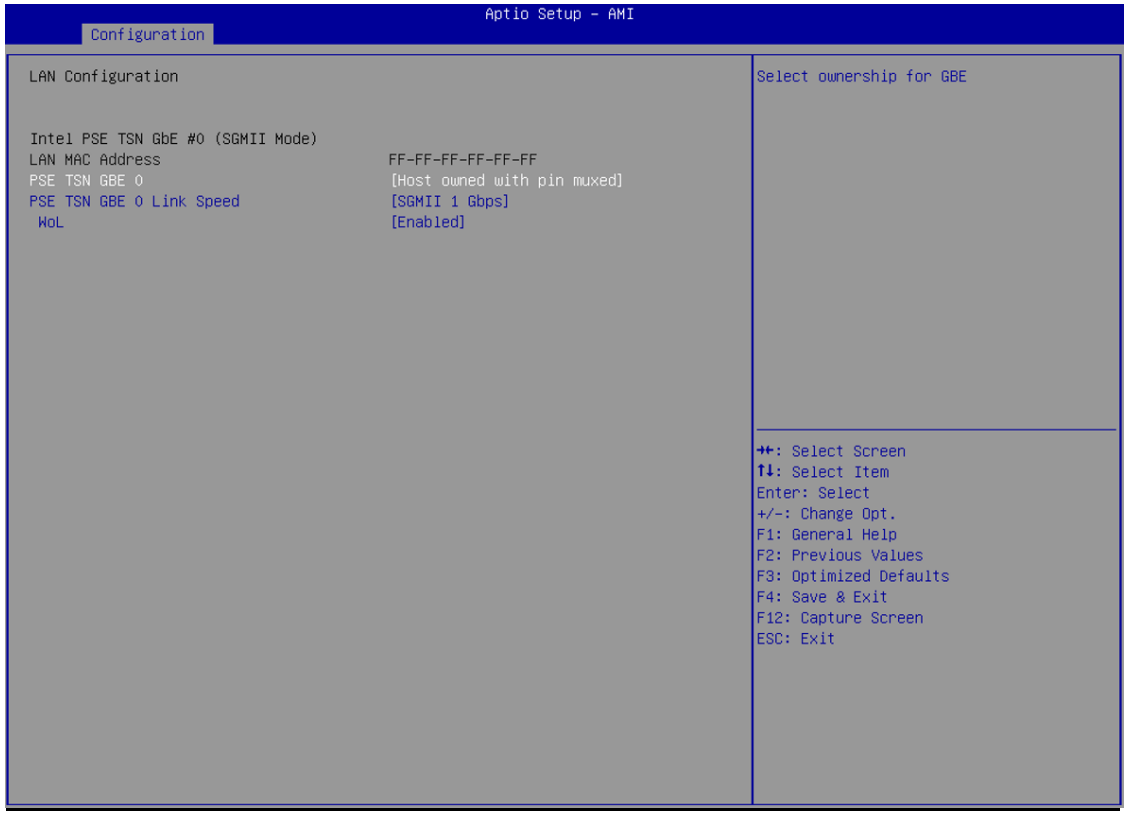
Extra options



Feature	Description	Options
Detect Non-Compliance Device	Detect Non-Compliance PCI Express Device. If enable, it will take more time at POST time.	★Disabled, Enabled
Prefetchable Memory	Prefetchable Memory Range for this Root Bridge.	★10
Reserved Memory Alignment	Reserved Memory Alignment (0 – 31 bits)	★1
Prefetchable Memory Alignment	Prefetchable Memory Alighnment (0 – 31 bits)	★1

LAN Configuration

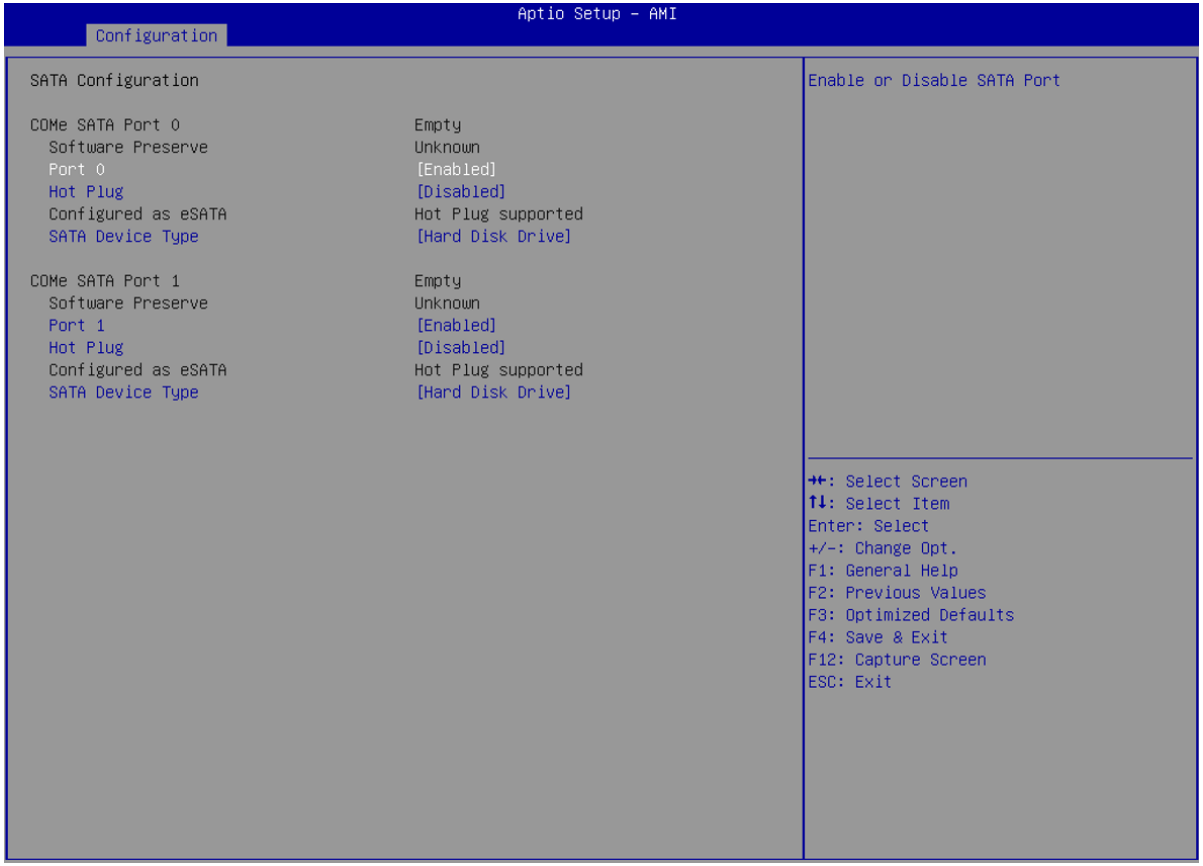
Configuration OnBoard LAN device.



Feature	Description	Options
PSE TSN GBE 0	Select ownership for GBE	★Host owned with pin muxed, PSE owned with pin muxed, None
PSE TSN GBE 0 Link Speed	PSE TSN GBE 0 Link Speed configuration.	★SGMII 1 Gbps, SGMII 2.5 Gbps
WoL	Enable/Disable PSE GBE WoL	★Enabled , Disabled

SATA Configuration

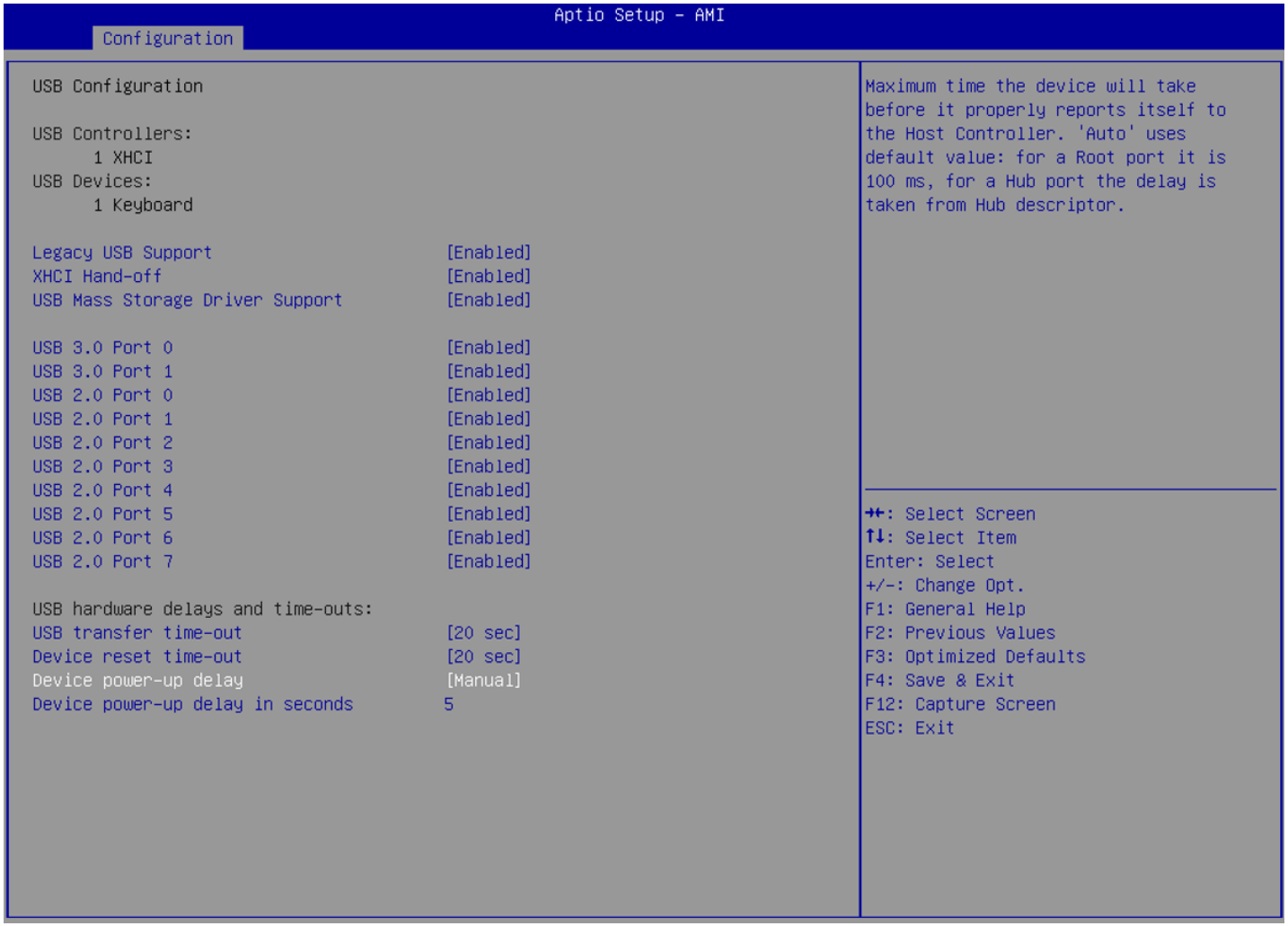
SATA Device Options Settings



Feature	Description	Options
Port 0~1	Enable or Disable SATA Port	★Enabled , Disabled
Hot Plug	Designates this port as Hot Pluggable	★Disabled, Enabled
SATA Device Type	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive	★Hard Disk Drive, Solid State Drive

USB Configuration

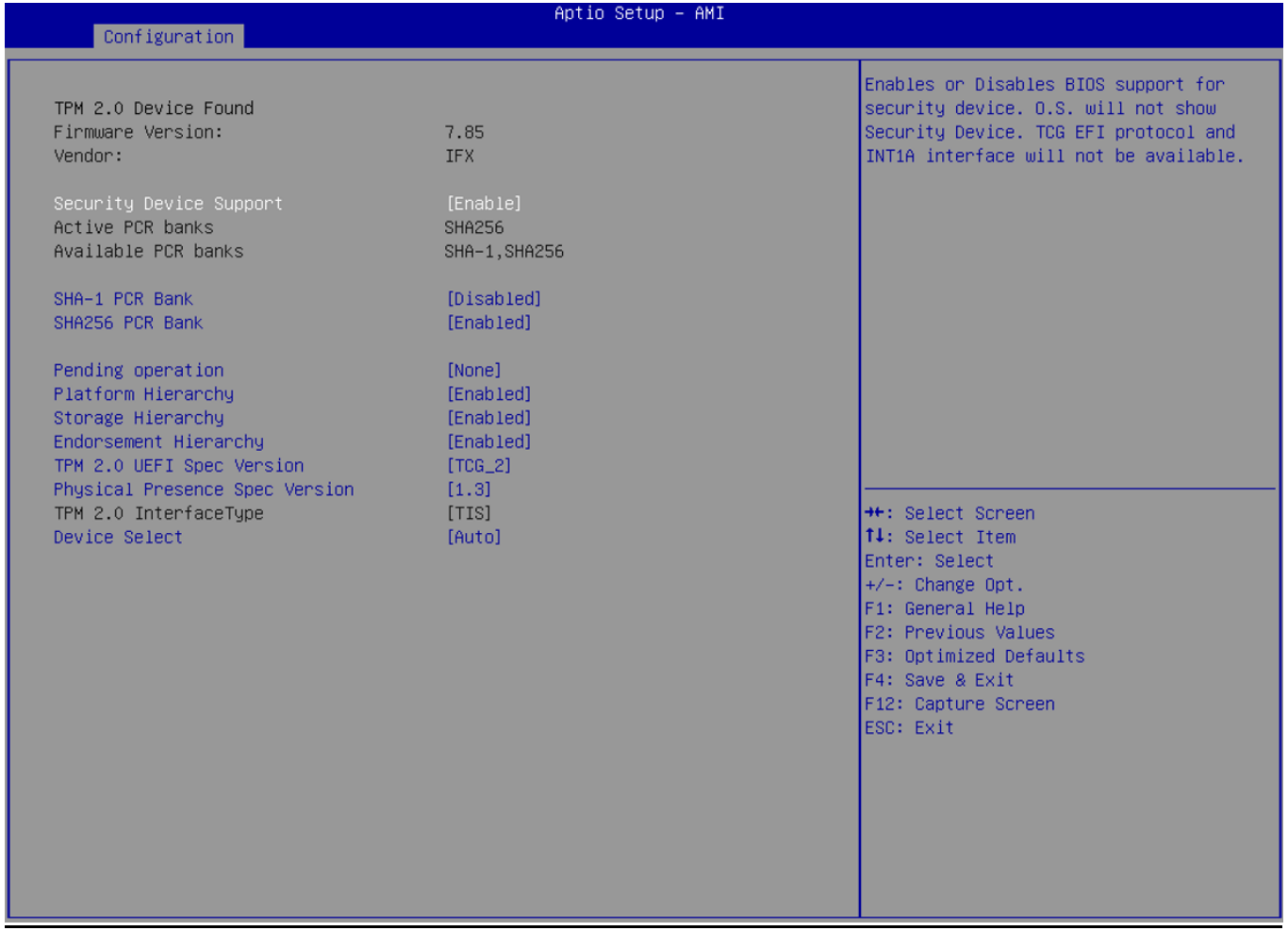
USB Configuration Parameters



Feature	Description	Options
Legacy USB Support	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI application	★Enabled , Disabled, Auto
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.	★Enabled , Disabled
USB Mass Storage Driver Support	Enable/Disable USB Mass Storage Driver Support	★Enabled , Disabled
USB 3.0 Port 0~1	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS	★Enabled ,Disabled
USB 2.0 Port 0~7	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS	★Enabled ,Disabled
USB transfer time-out	The time-out value for Control, Bulk, and Interrupt transfers.	★20 sec , 1, 5, 10
Device reset time-out	USB mass storage device Start Unit command time-out.	★20, 10, 30, 40 sec
Device power-up delay	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.	★Auto, Manual
Device power-up delay in seconds	Delay range is 1..40 seconds, in one second increments	★5

TPM Configuration

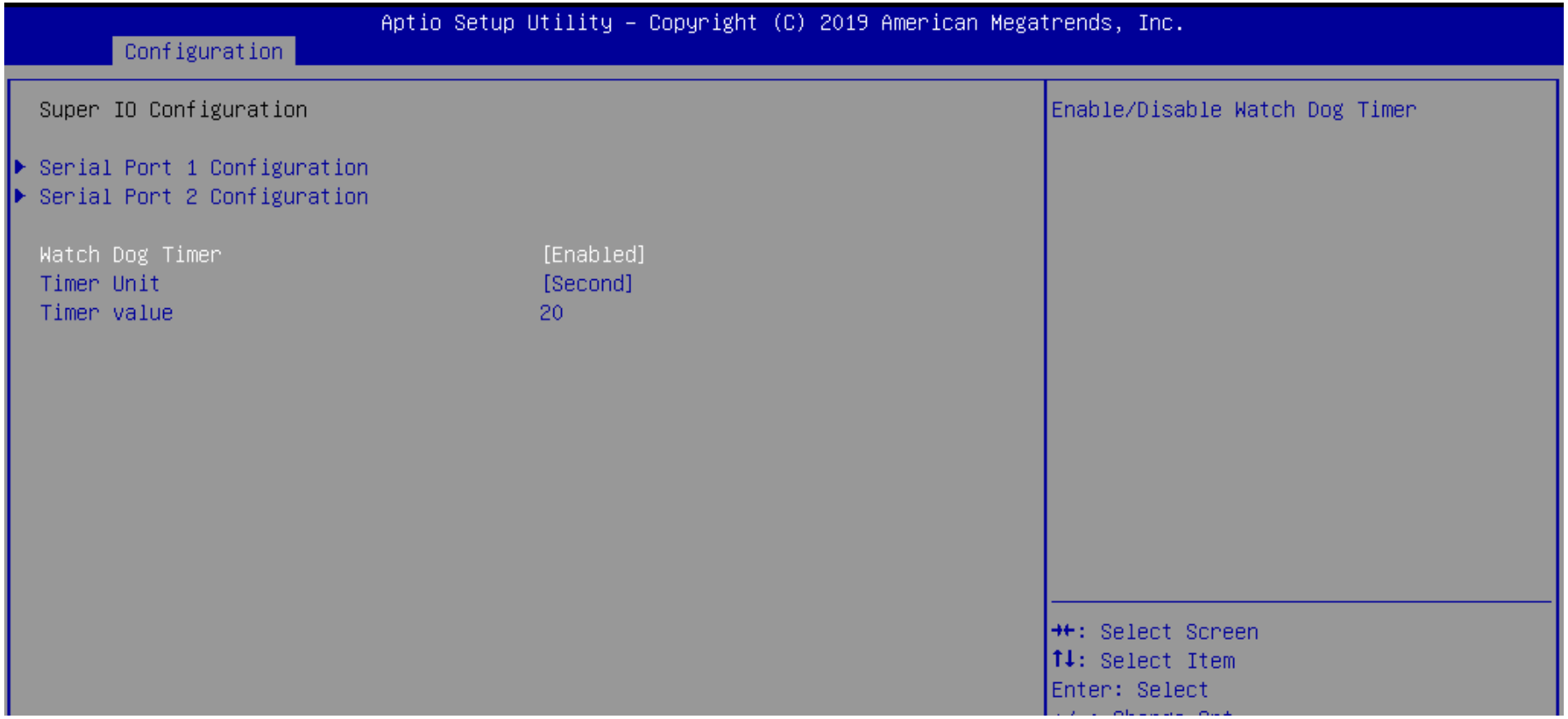
Trusted Computing Setting



Feature	Description	Options
Security Device Support	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A Interface will not be available.	★Enabled, Disabled
SHA-1 PCR Bank	Enables or Disables SHA-1 PCR Bank.	★Disabled, Enabled
SHA256 PCR Bank	Enables or Disables SHA256 PCR Bank.	★Enabled, Disabled
Pending operation	Schedule an Operation for the Security Device. Note: Your Computer will reboot during restart in order to change State of Security Device.	★None, TPM Clear
Platform Hierarchy	Enables or Disables Platform Hierarchy.	★Enabled, Disabled
Storage Hierarchy	Enables or Disables Storage Hierarchy.	★Enabled, Disabled
Endorsement Hierarchy	Enables or Disables Endorsement Hierarchy.	★Enabled, Disabled
TPM2.0 UEFI Spec Version	Select the TCG2 Spec Version Support. TCG_1_2: the Compatible mode for Win8/Win10. TCG_2: Support new TCG2 protocol and event format for Win10 or later.	★TCG_2, TCG_1_2
Physical Presence Spec Version	Select to Tell O.S. to Support PPI Spec Version 1.2 or 1.3. Not some HCK tests might not support 1.3.	★1.3, 1.2
Device Select	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.	★Auto, TPM 1.2, TPM 2.0

Super IO Configuration

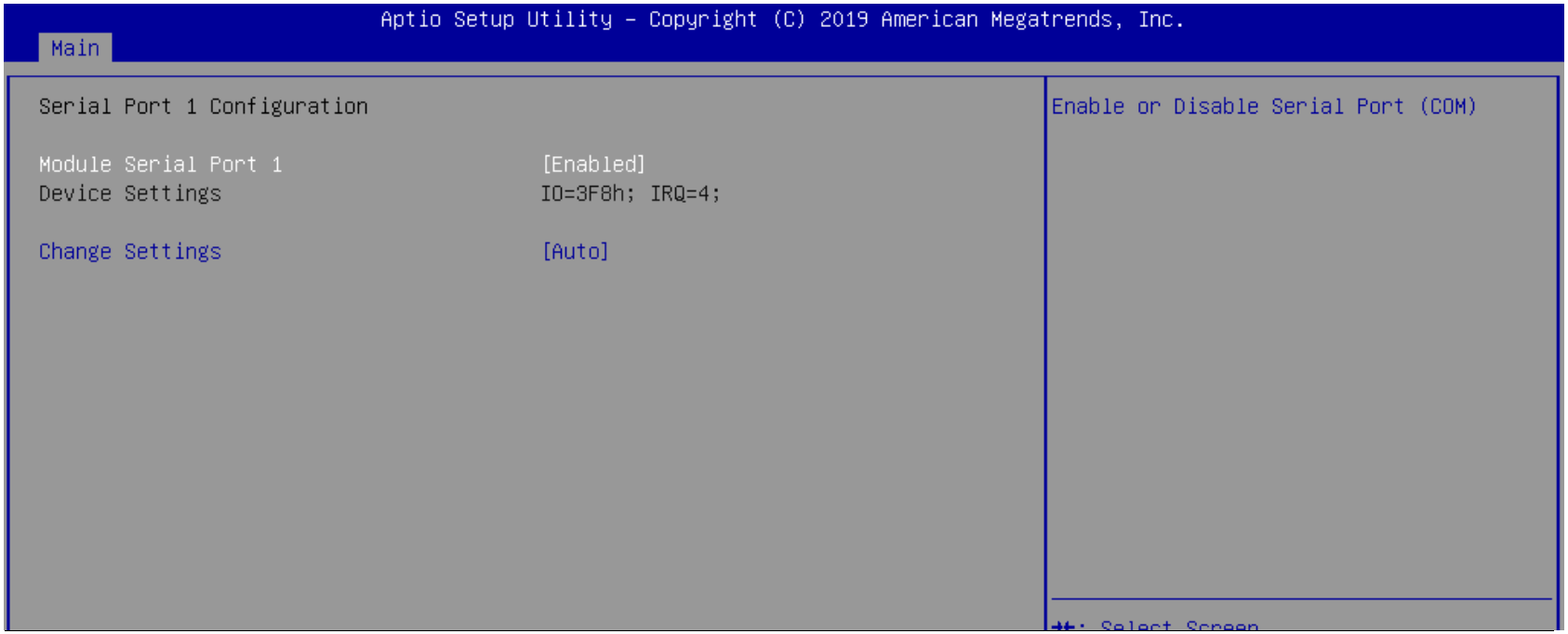
System Super IO Chip Parameters.



Feature	Description	Options
Watch Dog Timer	Enable/Disable Watch Dog Timer	★Disabled, Enabled
Watch Dog Timer[Enable]		
Timer Unit	Select Timer count unit of WDT	★Second, Minute
Timer value	Set WDT Timer value seconds/minutes	★20

Serial Port 1 Configuration

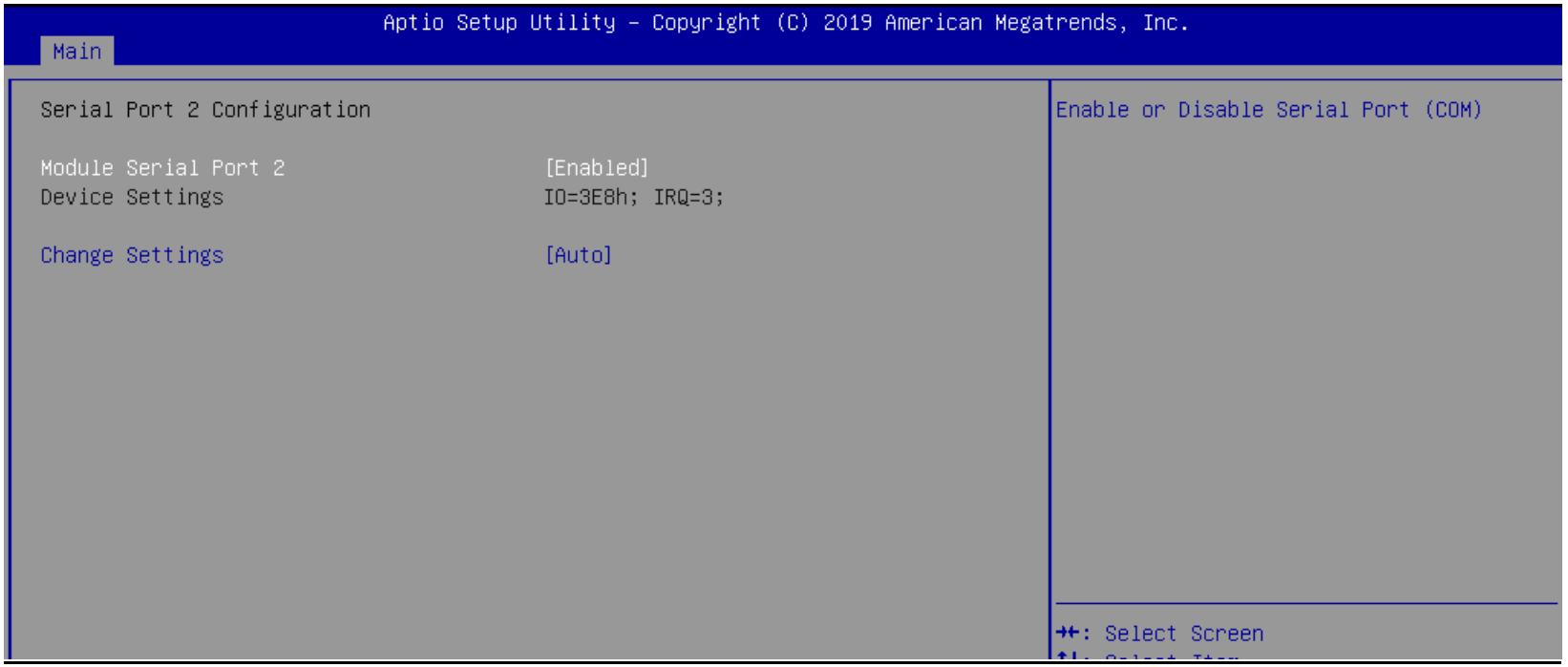
Set Parameters of Serial Port 1



Feature	Description	Options
Module Serial Port 1	Enable or Disable Serial Port (COM)	★Enabled, Disabled
Change Settings	Select an optimal settings for Super IO Device	★Auto ,IO=3F8h; IRQ=4, IO=3F8h; IRQ=3,4,10,11 IO=2F8h; IRQ=3,4,10,11 IO=3E8h; IRQ=3,4,10,11 IO=2E8h; IRQ=3,4,10,11

Serial Port 2 Configuration

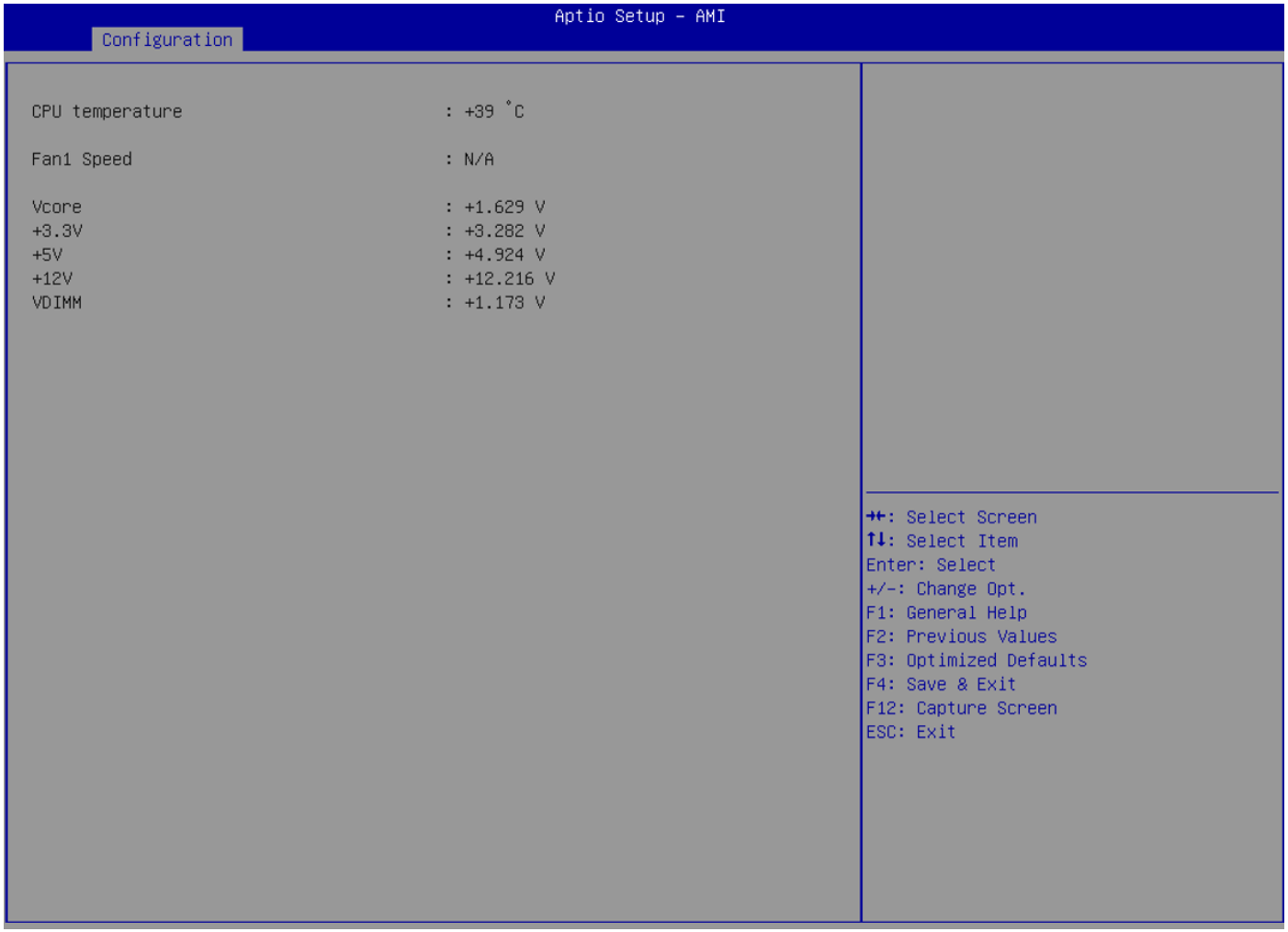
Set Parameters of Serial Port 2



Feature	Description	Options
Serial Port 2	Enable or Disable Serial Port (COM)	★Enabled, Disabled
Change Settings	Select an optimal settings for Super IO Device	★Auto ,IO=3E8h; IRQ=3, IO=3F8h; IRQ=3,4,10,11 IO=2F8h; IRQ=3,4,10,11 IO=3E8h; IRQ=3,4,10,11 IO=2E8h; IRQ=3,4,10,11

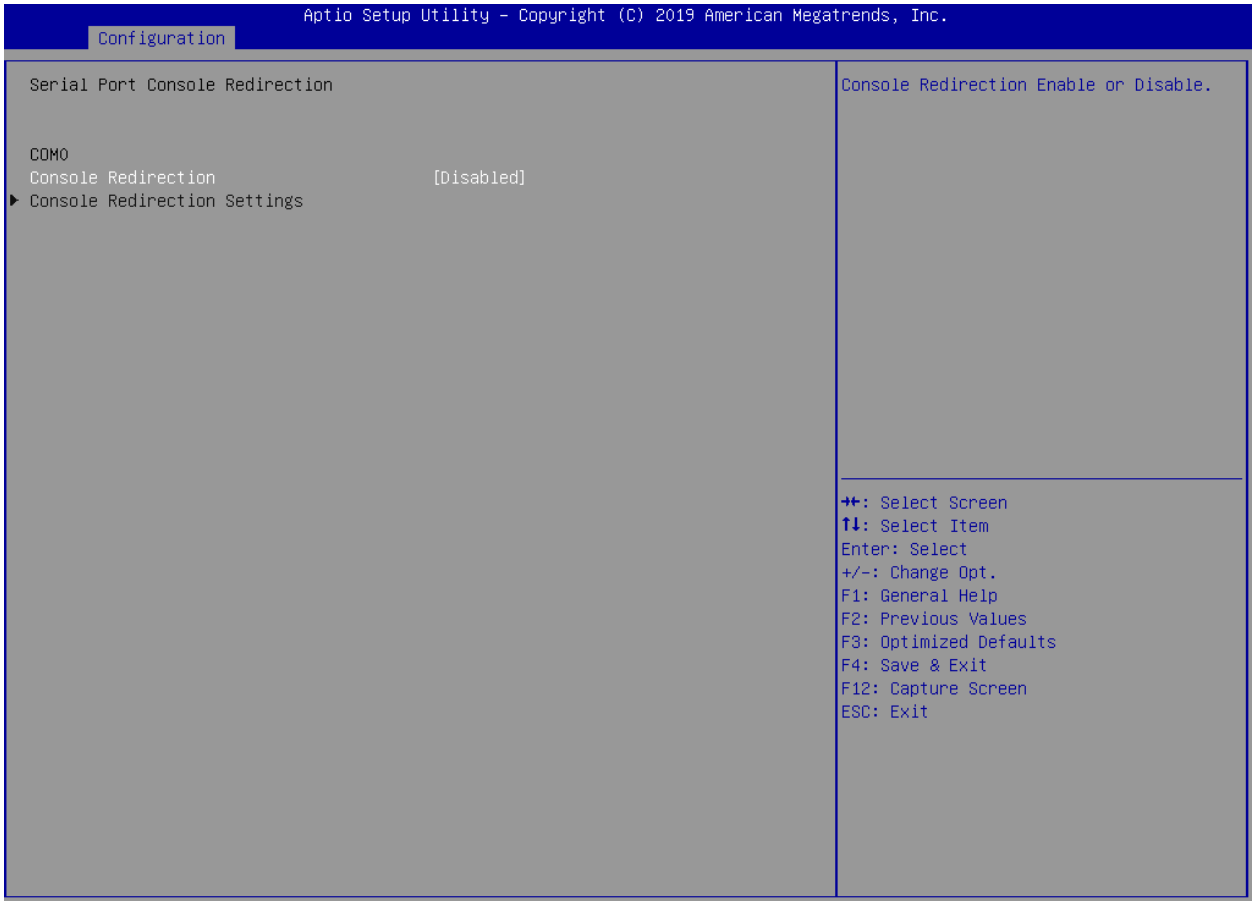
H/W Monitor

Monitor Hardware status



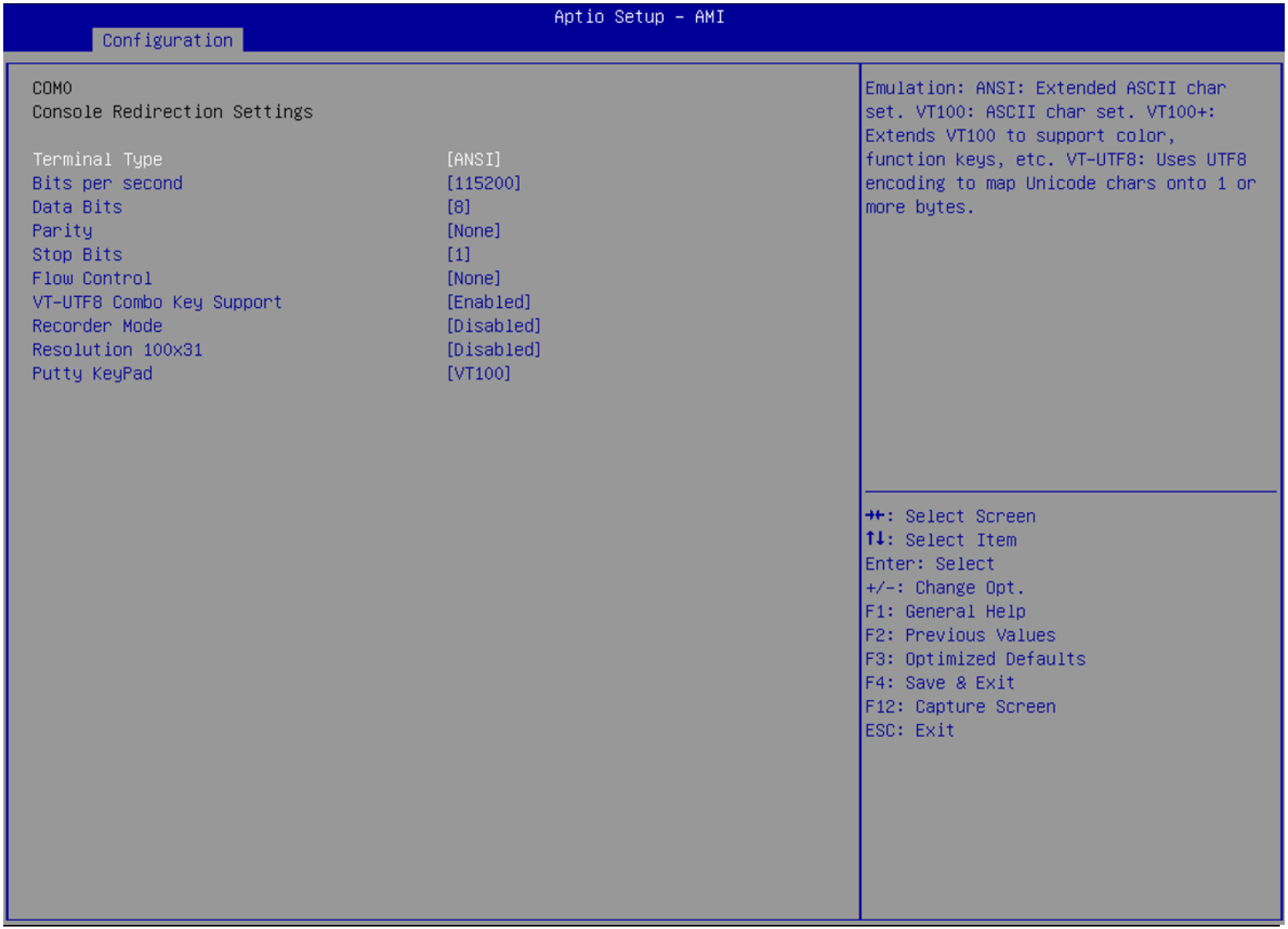
Serial Port Console Redirection

Serial Port Console Redirection



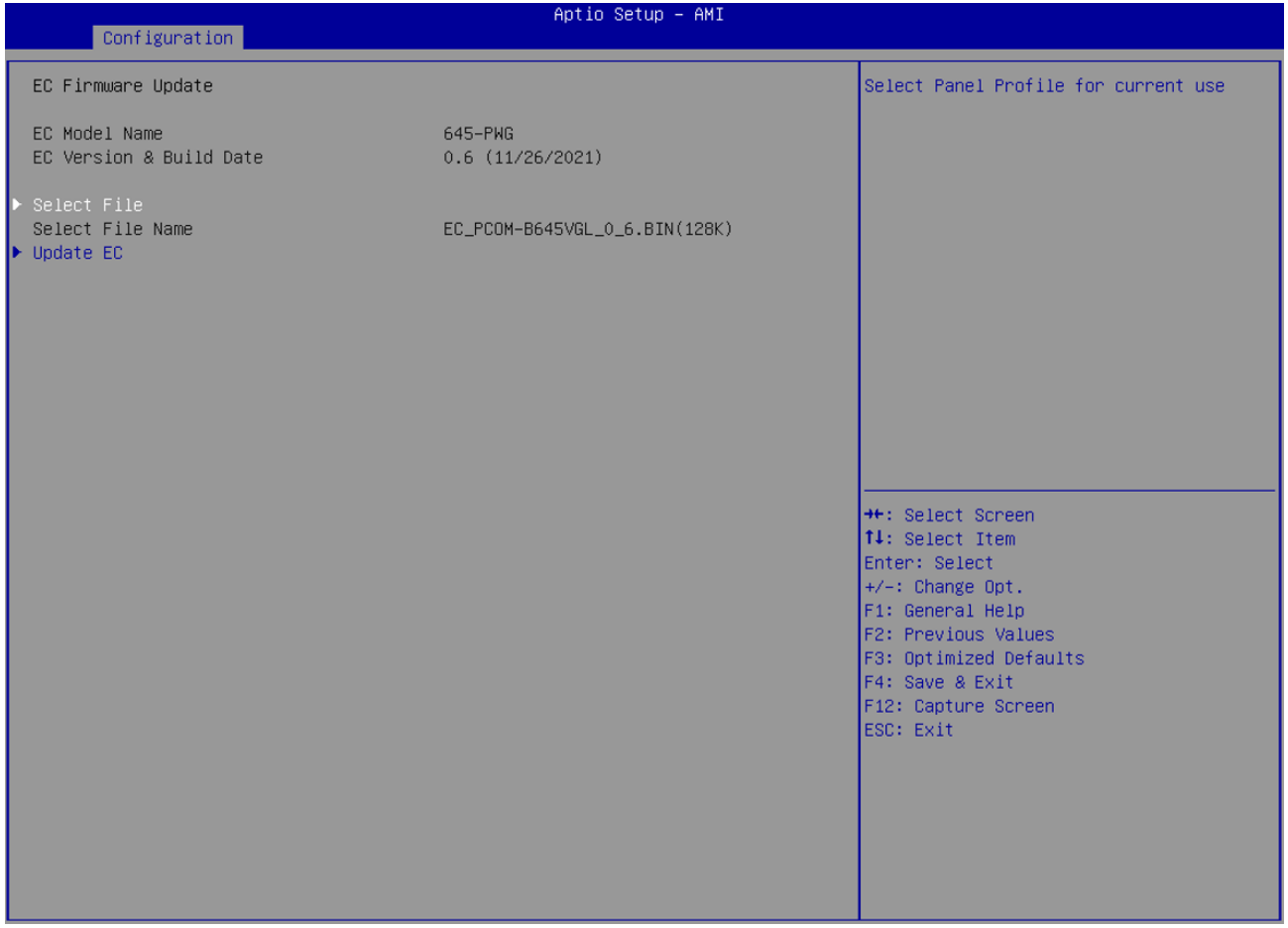
Feature	Description	Options
Console Redirection	Console Redirection Enable or Disable	★Disabled, Enabled

COM0 Console Redirection Settings

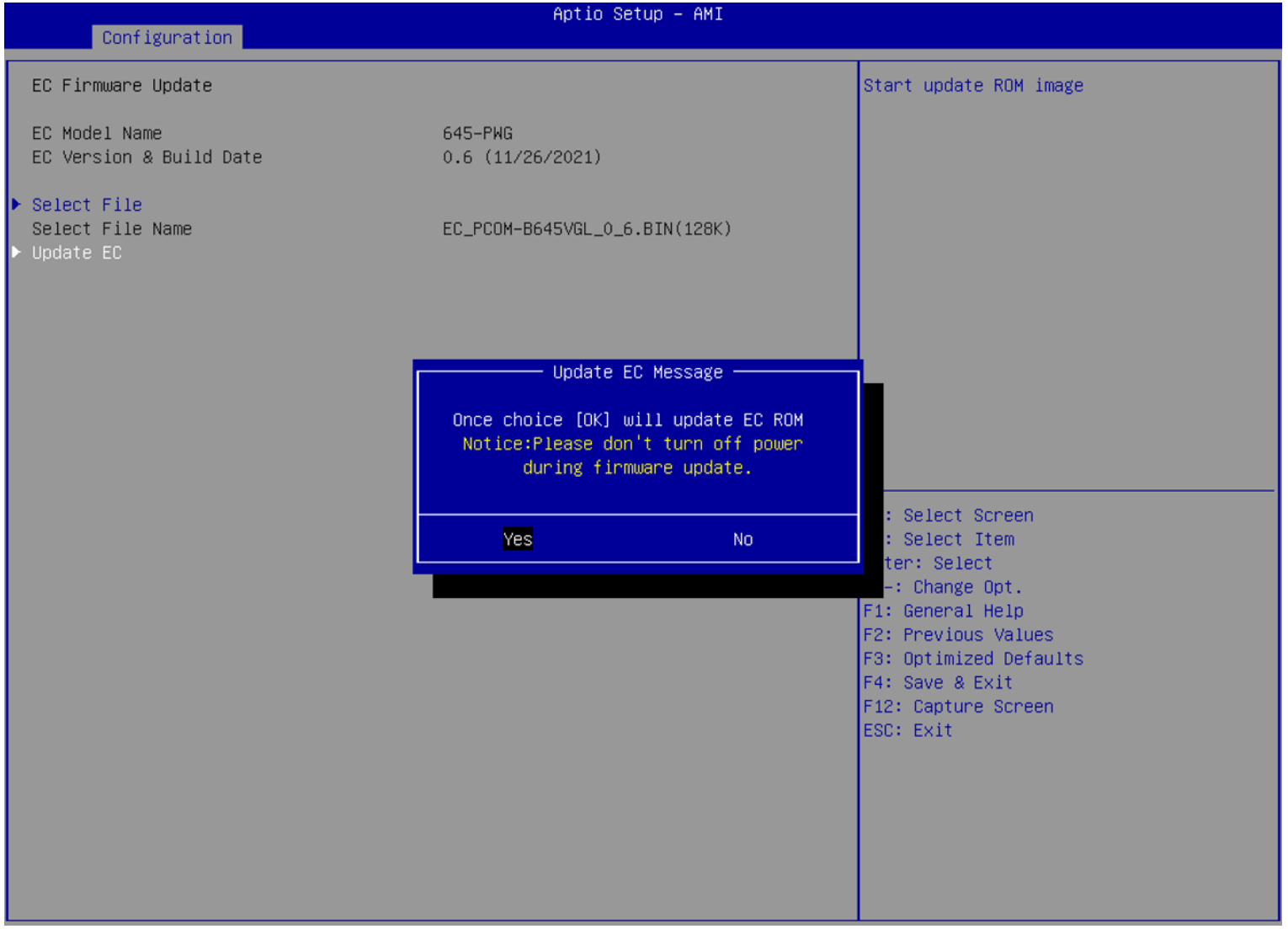


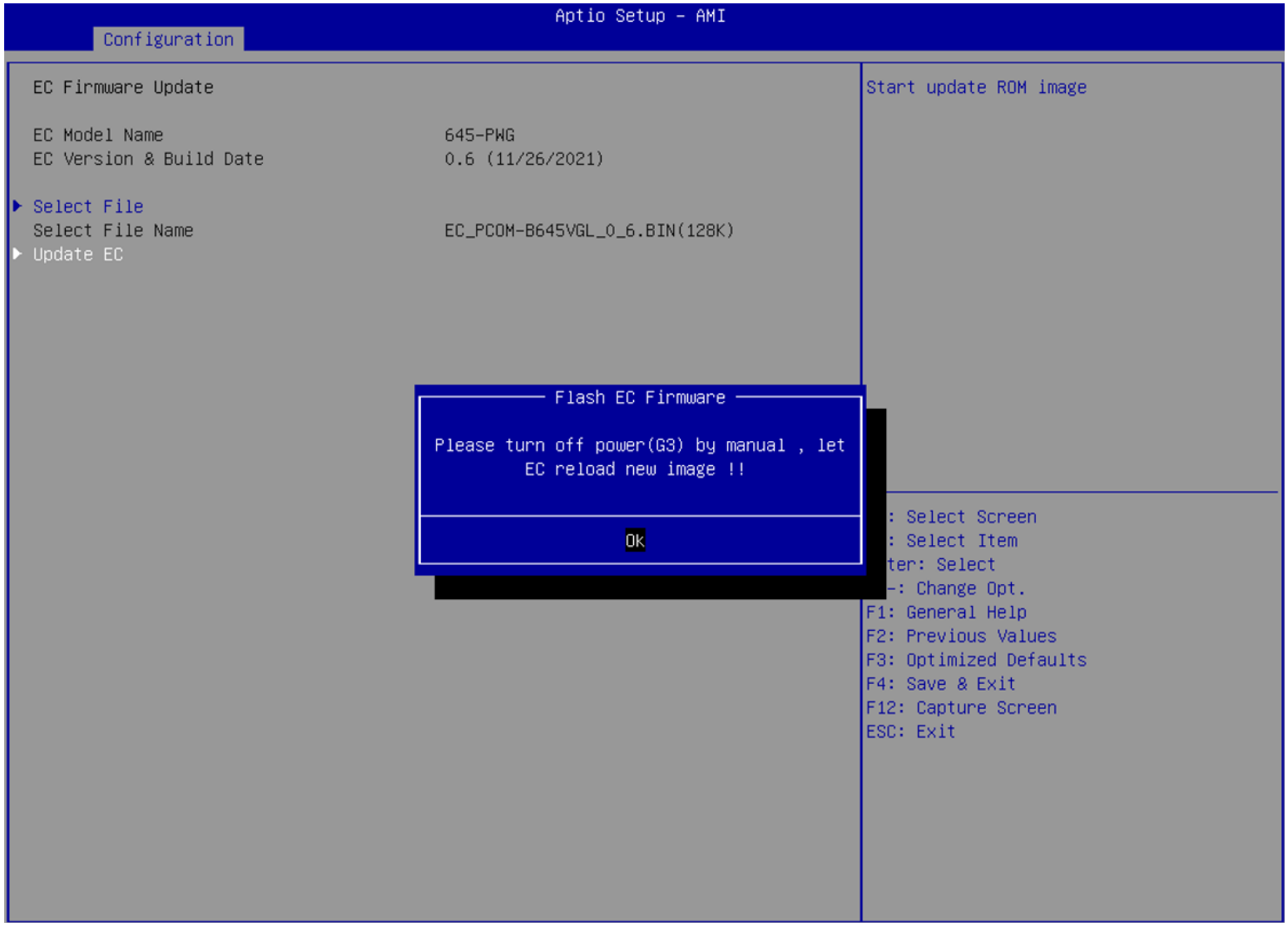
Feature	Description	Options
Terminal Type	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	★ANSI, VT100, VT100+, VT-UTF8
Bits per second	Select Serial port transmission speed. The speed must be matched on other side. Long or noisy lines may require lower speeds.	★115200, 9600, 19200, 38400, 57600
Data bits	Data bits	★8, 7
Parity	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.	★None, Even, Odd, Mark, Space
Stop Bits	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.	★1, 2
Flow Control	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signal.	★None, Hardware RTS/CTS
VT-UTF8 Combo Key Support	Enable VT-UTF8 Combination Key Support for ANSI / VT100 terminals	★Enabled, Disabled
Recorder Mode	With this mode enabled only text will be sent. This is to capture Terminal data.	★Disabled, Enabled
Resolution 100x31	Enables or disables extended terminal resolution	★Disabled, Enabled
Putty KeyPad	Select Function Key and KeyPad on Putty.	★VT100, LINUX, XTERMR6, SCO, ESCN, VT400

EC Firmware Update

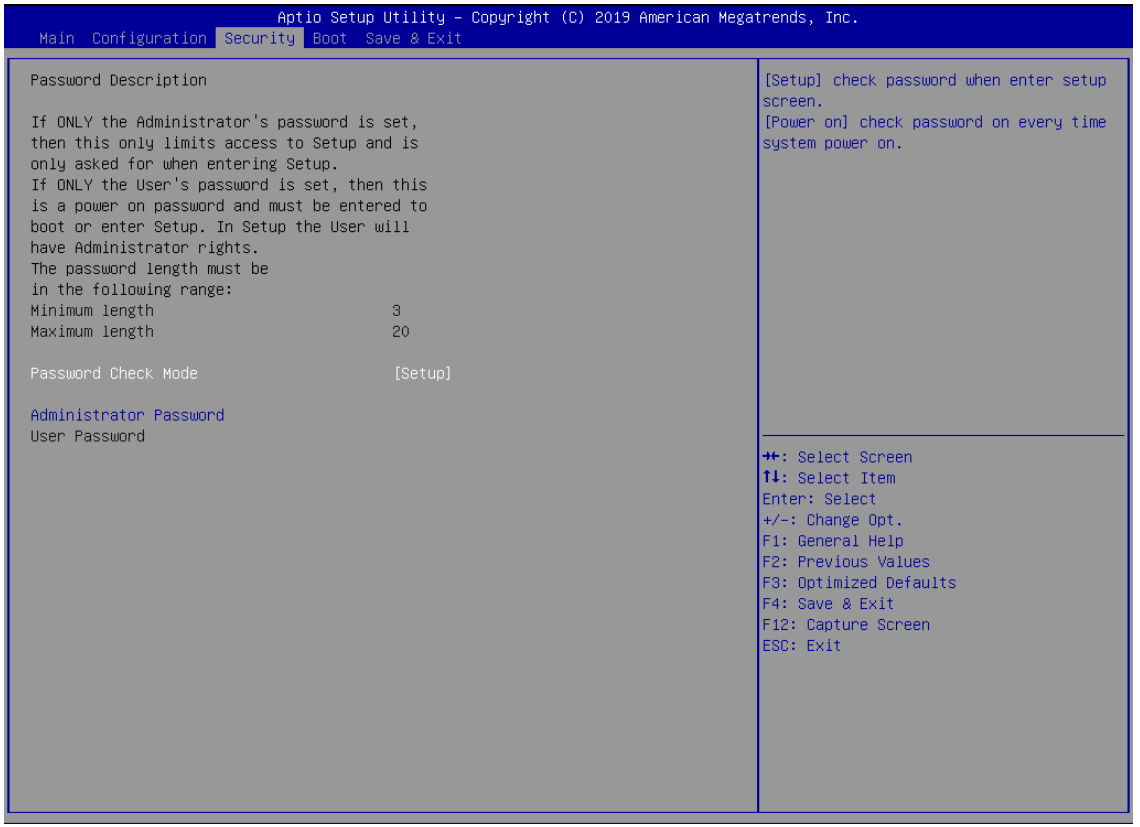


Feature	Description	Options
Select File	Select ROM image	Bin file to the USB DOK


Aptio Setup – AMI
Configuration
EC Firmware Update
EC Model Name 645-PWG
EC Version & Build Date 0.6 (11/26/2021)
Select File
Select File Name EC_PCOM-B645VGL_0_6.BIN(128K)
Update EC
Start update ROM image
Update EC Message
Once choice [OK] will update EC ROM
Notice:Please don't turn off power
during firmware update.
Yes
No
: Select Screen
: Select Item
ter: Select
-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
F12: Capture Screen
ESC: Exit

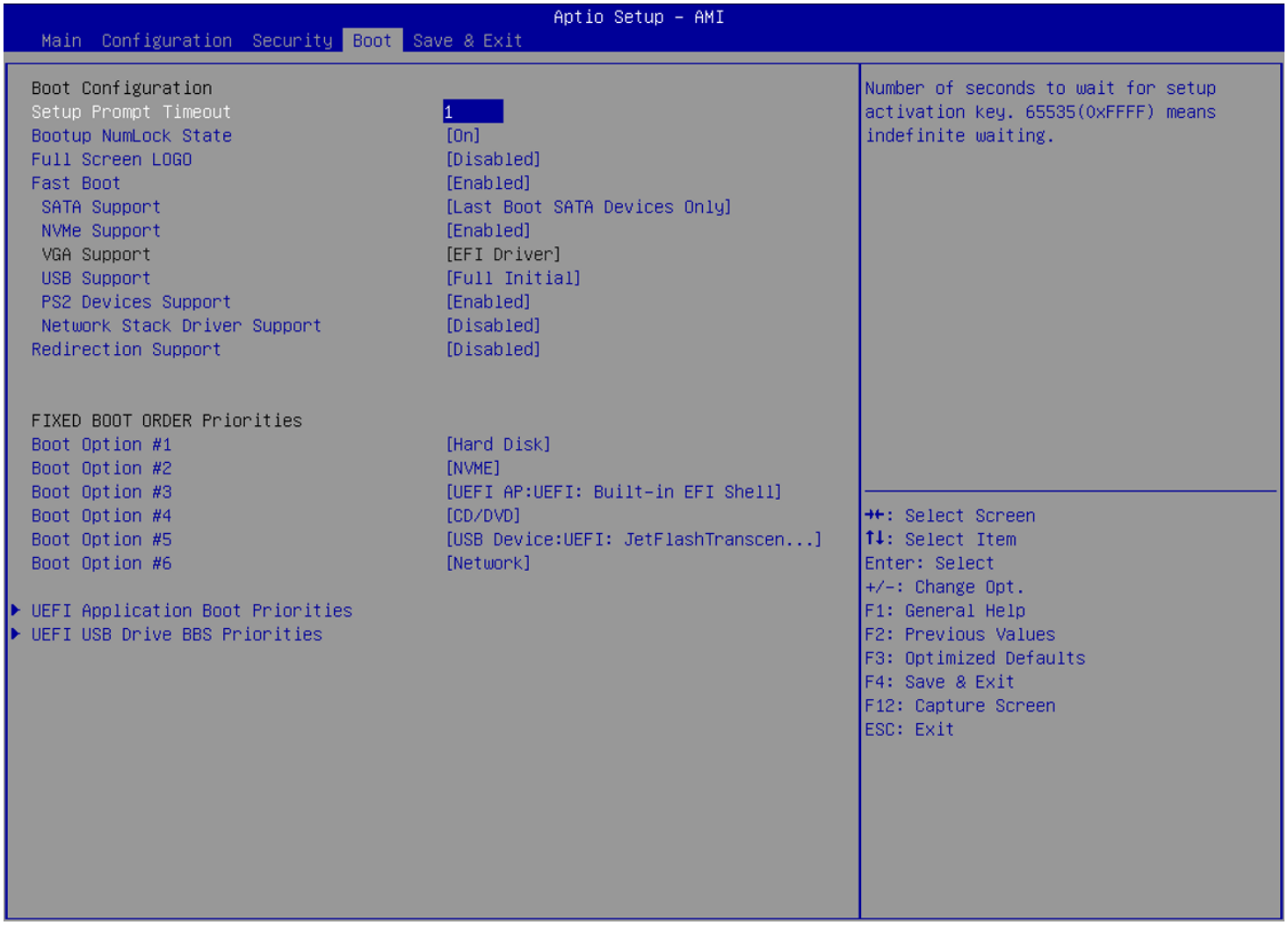

Aptio Setup – AMI
Configuration
EC Firmware Update
EC Model Name 645-PWG
EC Version & Build Date 0.6 (11/26/2021)
Select File
Select File Name EC_PCOM-B645VGL_0_6.BIN(128K)
Update EC
Start update ROM image
Flash EC Firmware
Please turn off power(G3) by manual , let EC reload new image !!
Ok
: Select Screen
: Select Item
ter: Select
-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
F12: Capture Screen
ESC: Exit

6.2.4 Security



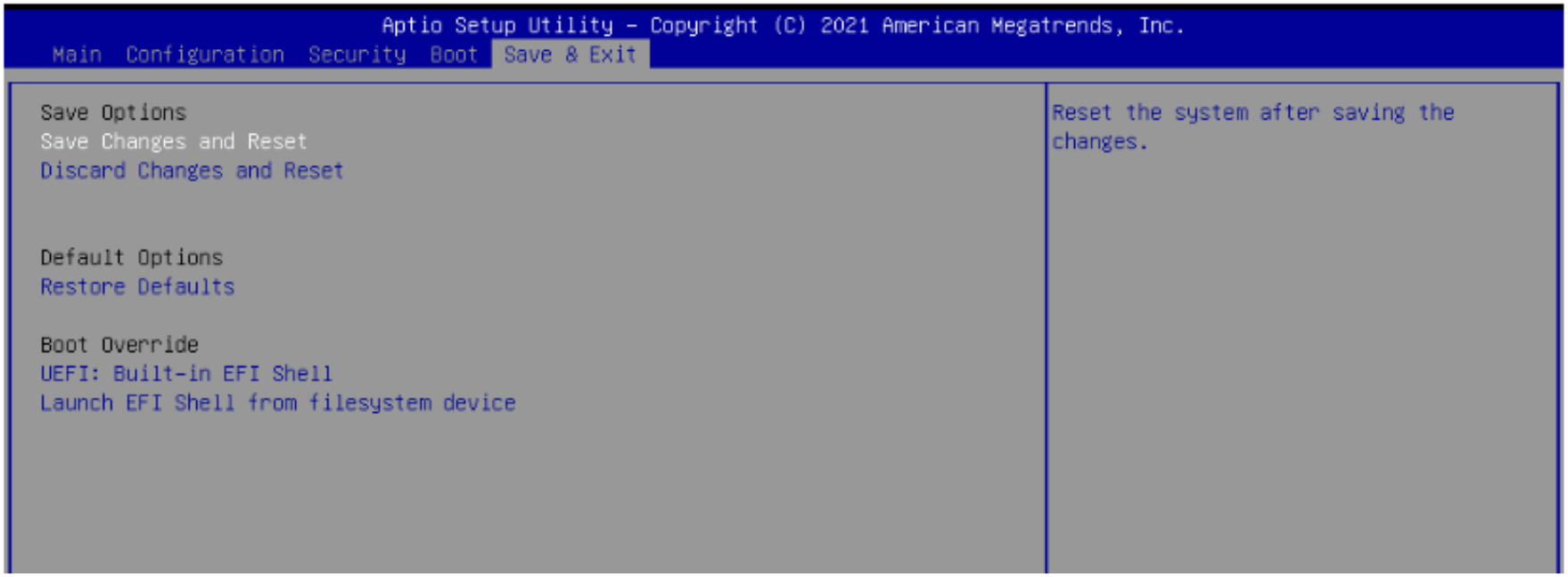
Feature	Description	Options
Password Check Mode	[Setup] check password when enter setup screen. [Power on] check password on every time system power on.	★Setup, Power on
Administrator Password	Set Administrator Password	

6.2.5 Boot


Aptio Setup – AMI
Main Configuration Security Boot Save & Exit
Boot Configuration
Setup Prompt Timeout 1
Bootup NumLock State [On]
Full Screen LOGO [Disabled]
Fast Boot [Enabled]
SATA Support [Last Boot SATA Devices Only]
NVMe Support [Enabled]
VGA Support [EFI Driver]
USB Support [Full Initial]
PS2 Devices Support [Enabled]
Network Stack Driver Support [Disabled]
Redirection Support [Disabled]
FIXED BOOT ORDER Priorities
Boot Option #1 [Hard Disk]
Boot Option #2 [NVME]
Boot Option #3 [UEFI AP:UEFI: Built-in EFI Shell]
Boot Option #4 [CD/DVD]
Boot Option #5 [USB Device:UEFI: JetFlashTranscen...]
Boot Option #6 [Network]
UEFI Application Boot Priorities
UEFI USB Drive BBS Priorities
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
F12: Capture Screen
ESC: Exit

Feature	Description	Options
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.	★1
BootupNumLockState	Select the keyboard NumLock state.	★On, Off
Full Screen LOGO	Enables or disables Quiet Boot option and Full screen Logo.	★Disabled, Enabled
Fast Boot	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.	★Disabled, Enabled
SATA Support	If Last Boot SATA Devices Only, Only last boot SATA device will be available in Post. If All SATA Devices, all SATA devices will be available in OS and Post.	★Last Boot SATA Devices Only, All SATA Devices
NVMe Support	If Disabled, NVMe device will be skipped.	★Enabled, Disabled
VGA Support		★EFI Driver
USB Support	If Disabled, all USB devices will NOT be available until after OS boot. If Partial Initial, USB Mass Storage and specific USB port/device will NOT be available before OS boot. If Enabled, all USB devices will be available in OS and Post.	★Full Initial, Partial Initial, Disabled
PS2 Devices Support	If Disabled, PS2 devices will be skipped.	★Enabled, Disabled
Network Stack Driver Support	If Disabled, NetWork Stack Driver will be skipped.	★Disabled, Enabled
Redirection Support	If disable, Redirection function will be disabled.	★Disabled, Enabled
Boot Option #	Sets the system boot order	Hard Disk NVME UEFI AP: UEFI: Built-in EFI Shell CD/DVD USB Device Network Disabled
Hard Drive BBS Priorities	Set the order of the legacy devices in this group.	
UEFI Application Boot Priorities	Specifies the Boot Device Priority sequence from available UEFI Application	

6.2.6 Save & Exit



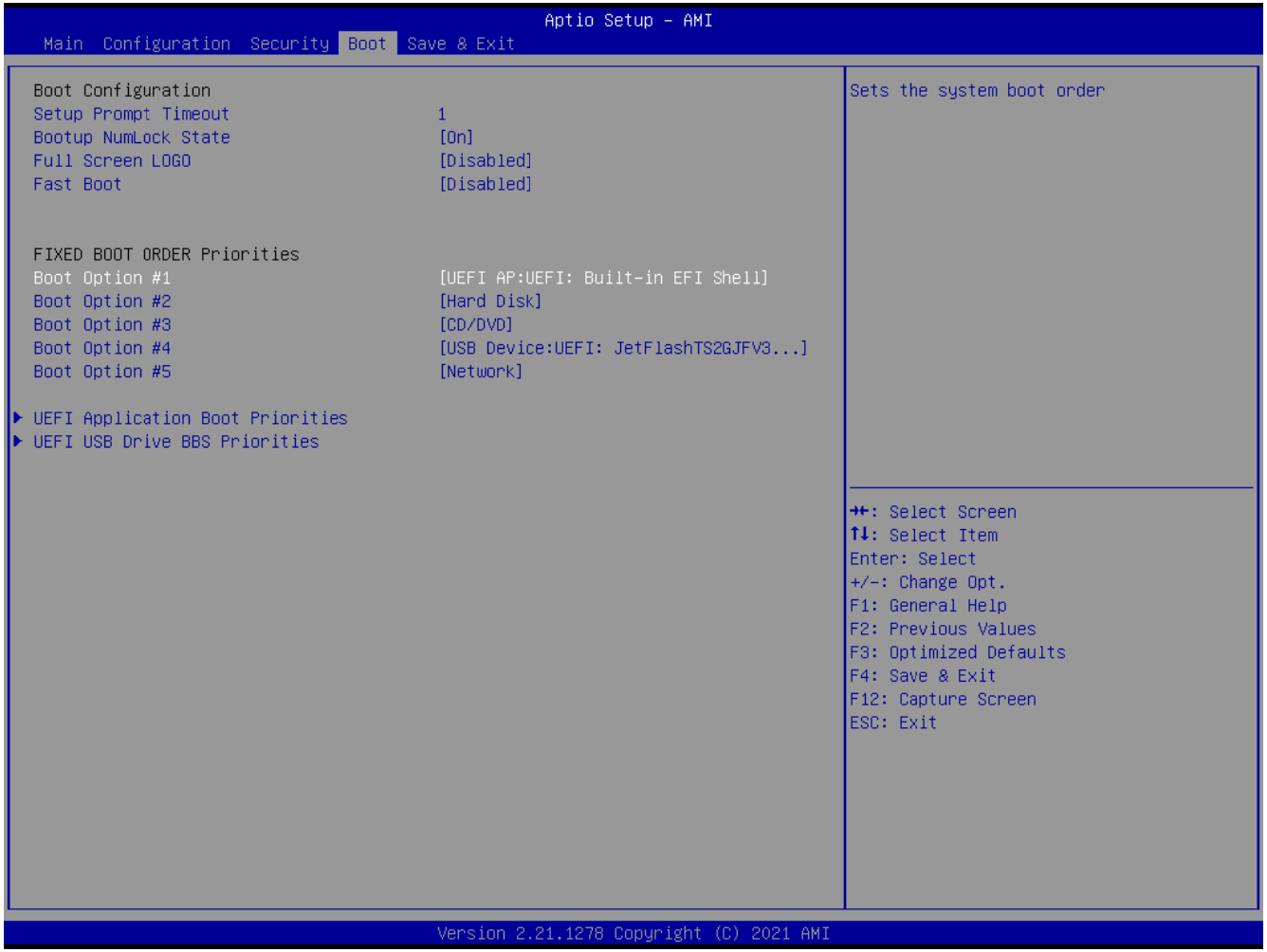
Feature	Description	Options
Save Changes andReset	Reset the system after saving the changes.	
Discard Changes and Reset	Reset system setup without saving any changes.	
Restore Defaults	Restore/Load Default values for all the setup options.	
UEFI: Built-in EFI Shell	Reset the system after saving the changes. (Boot option filter: UEFI only)	
Launch EFI Shell from filesystem device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.	

7. BIOS Update

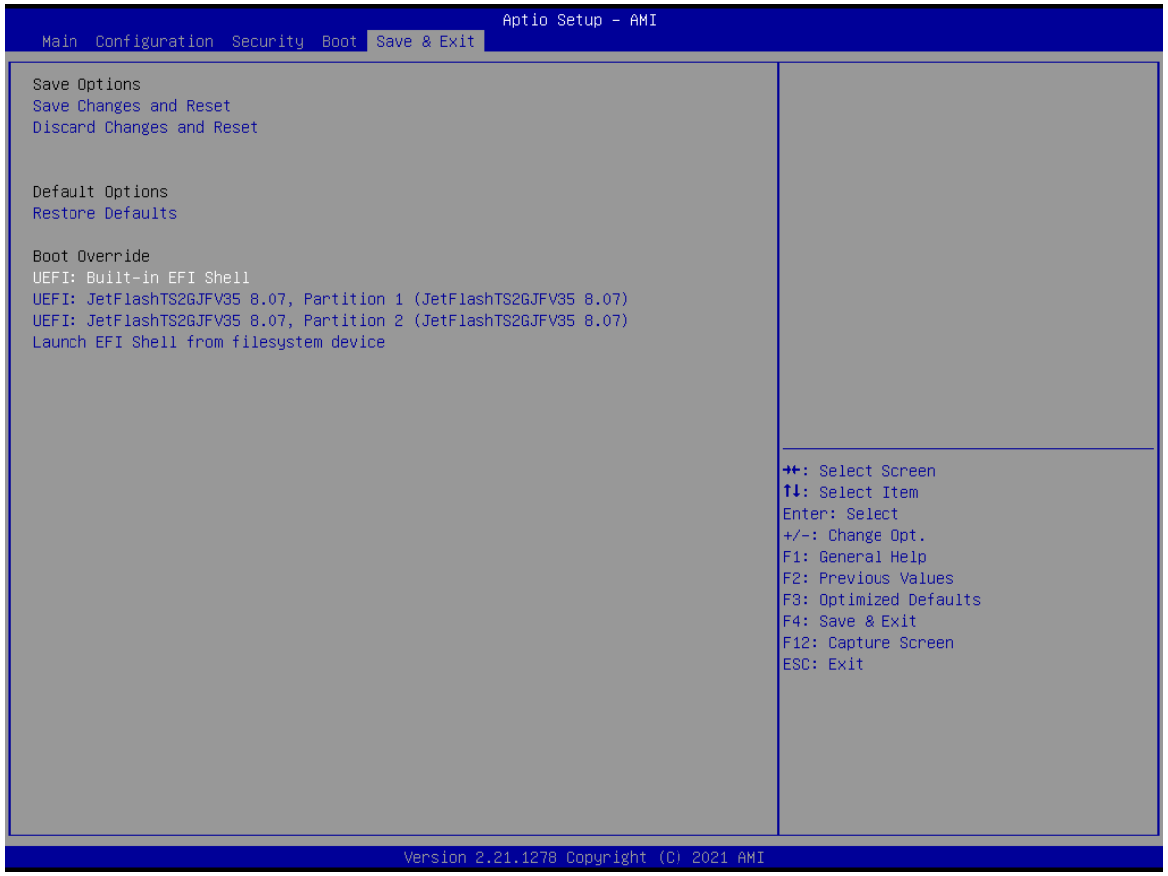
How to update the BIOS file of PCOM-B645?

Step1. Please visit web site of Portwell download center as below hyperlink
https://www.portwell.com.tw/support-center/download-center/
Step2. Select “Search download” and type the keyword “PCOM-B645”.
Step3. Find the**“BIOS “**page and download the ROM file and flash utility.
Step4. Unzip file to bootable USB flash drive which can boot to SHELL mode. Then execute the **“update.efi ”.** It will start to update Step BIOS.
NOTE: Once you use “update.efi” to update BIOS, it must be get into the SHELL MODE to update BIOS
Step5. When you see the “FPT Operation Passed” message, which means the BIOS update processes finished. Please cut the AC power off and **wait for 10seconds** before powering on.
Step6. When you see the “Programming success” message, which means the BIOS update processes finished. Please cut the AC power off and **wait for 10 seconds** before powering on
.
Please refer to the following steps in detail.
Step 1. Prepare a USB DOK.
Step 2. Unzip update file to the USB DOK.

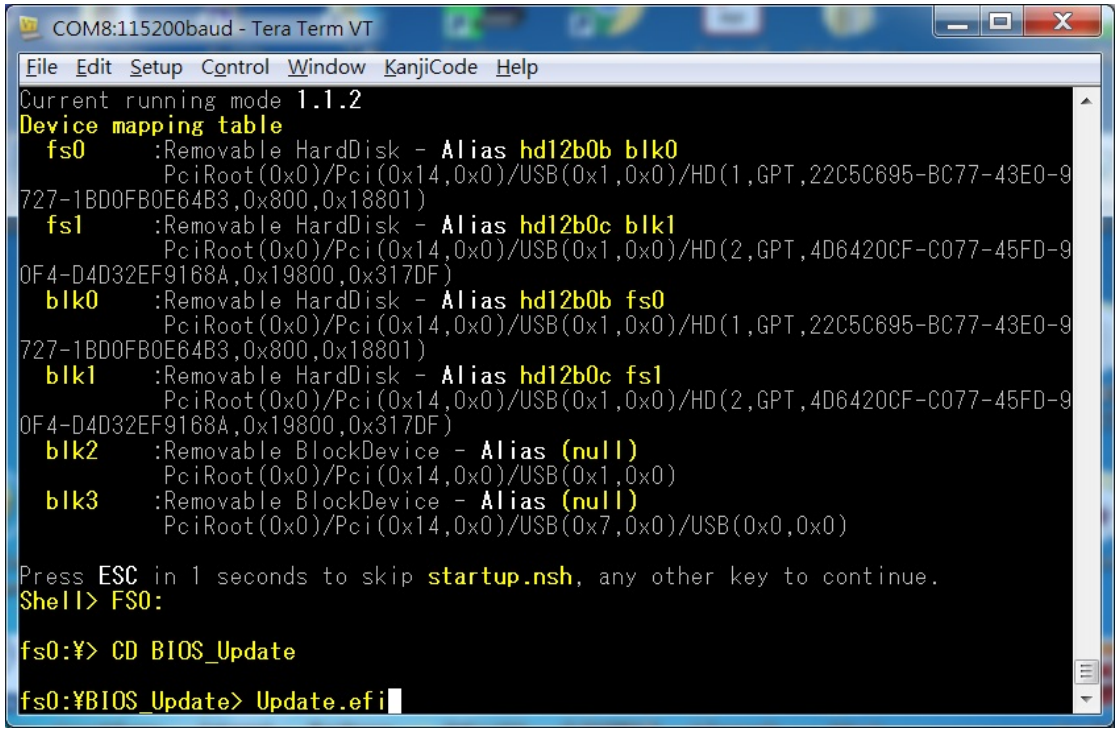
Step 3. Select UEFI: Built-in EFI Shell in the BIOS boot menu and save, then restarts the system.



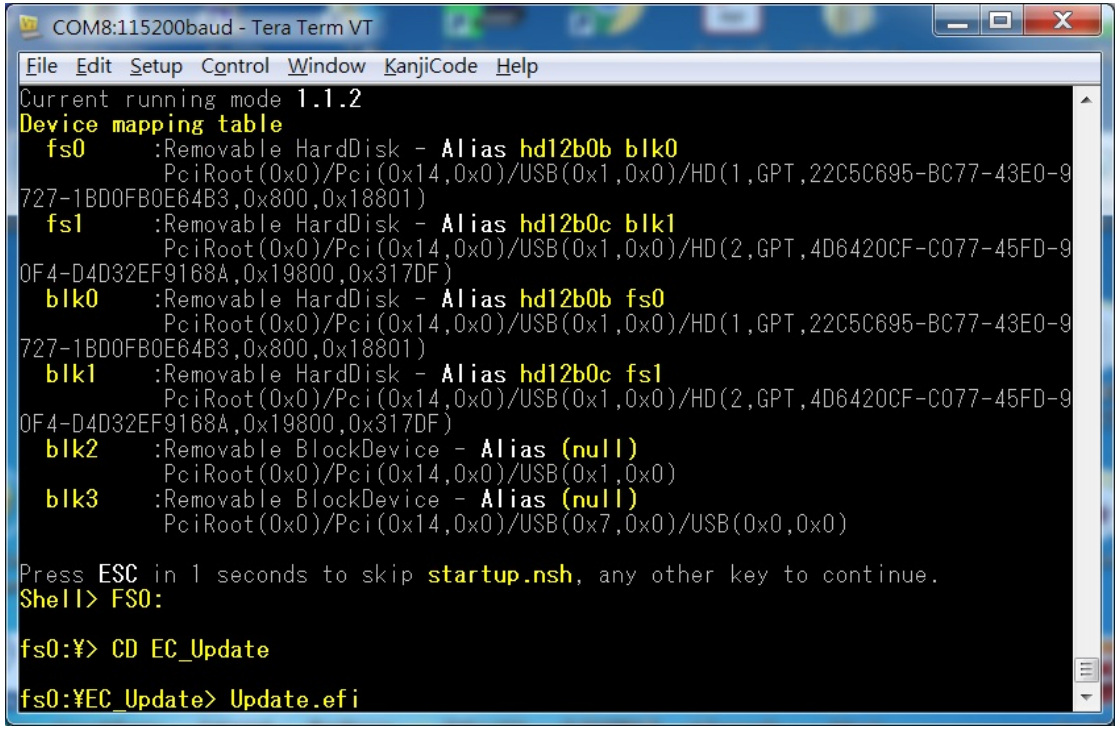
Step 4. Plug the USB DOK into the target system and boot from UEFI Shell.



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.

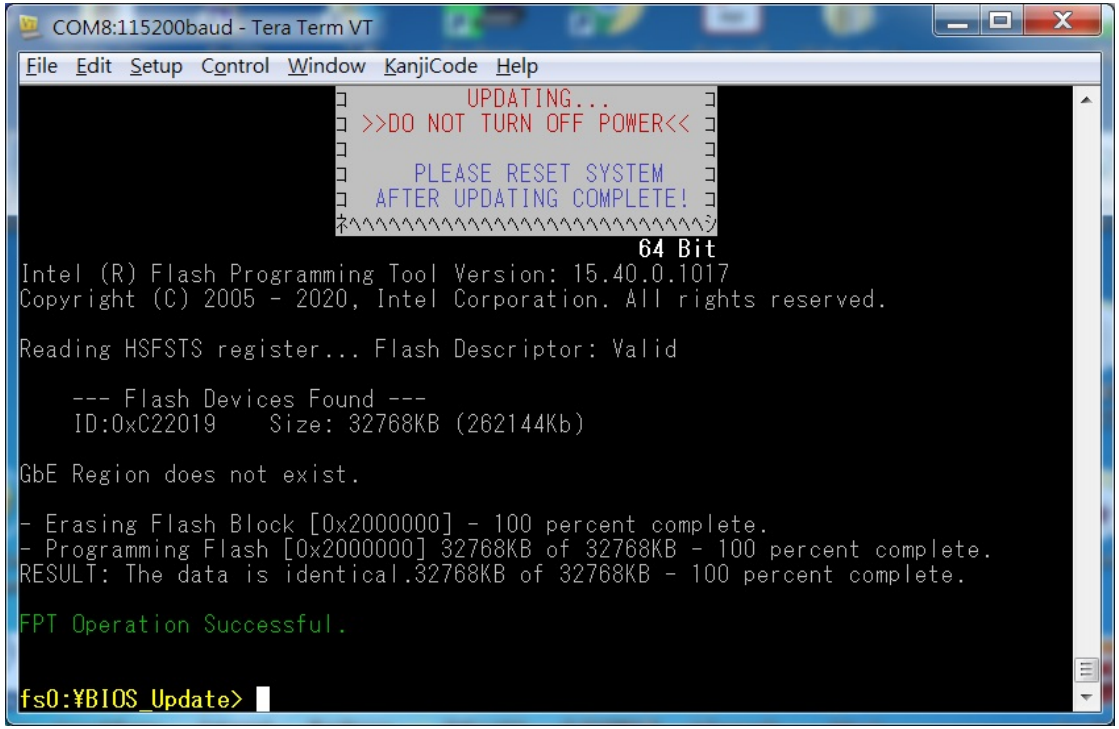


(BIOS File Update)

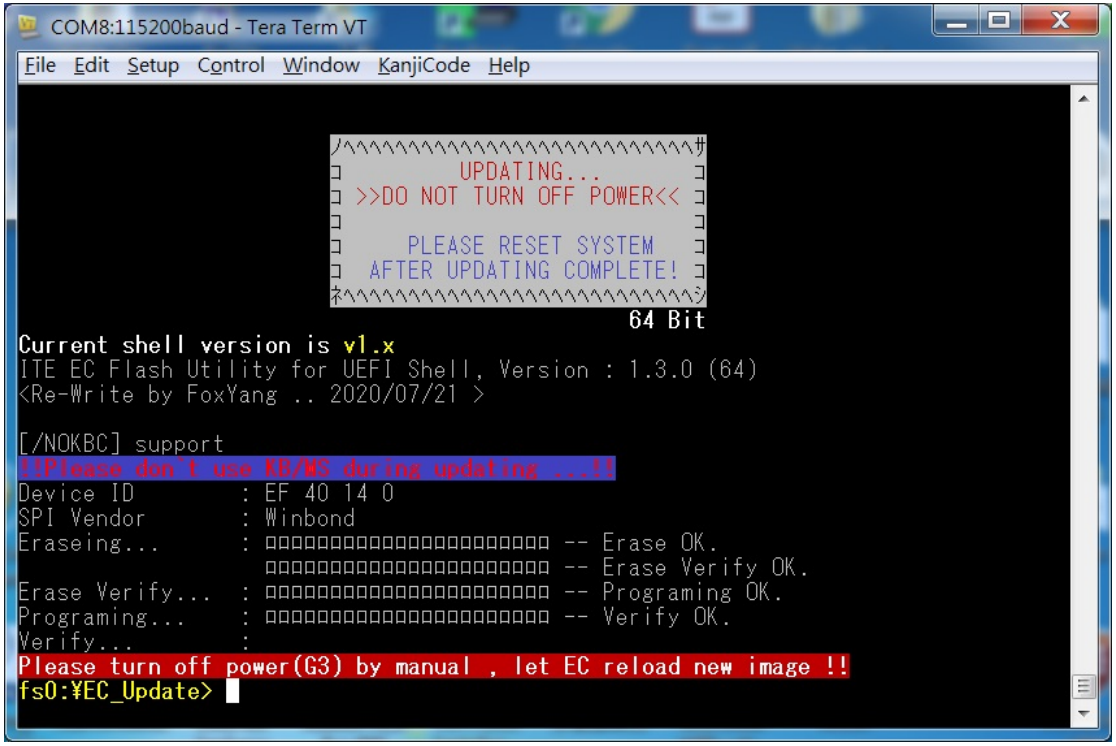


(EC File Update)

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



(BIOS updating progress)



(EC updating progress)

8. PORTWELL Software Tool

1. If you have customized requirements of BIOS, you can contact person of our company or branch.
2. If you have requirements of WDT、GPIO APP, you can contact our headquarter or branch, and we can render you assistance on developing.

Portwell Worldwide:	
Portwell, Inc.	E-mail: info@portwell.com.tw
Shanghai Portwell	E-mail: info@portwell.com.cn
Portwell Japan, Inc	E-mail: info@portwell.co.jp
American Portwell Technology	E-mail: info@portwell.com
European Portwell Technology	E-mail: info@portwell.eu
Portwell UK Ltd.	E-mail: info@portwell.co.uk
Portwell Deutschland GmbH	E-mail: info@portwell.eu
Portwell India Technology	E-mail: info@portwell.in
Portwell Korea, Inc.	E-mail:info@portwell.co.kr
Portwell Latin America	E-mail: vendas@portwell.com.br

9. Industry Specifications

9.1. 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 2.0http://www.usb.org/home
PCI Specification, Revision 2.3 https://www.pcisig.com/specifications
Serial ATA Specification, Revision 3.0 http://www.serialata.org/
PCI Express Base Specification, Revision 2.0 https://www.pcisig.com/specifications