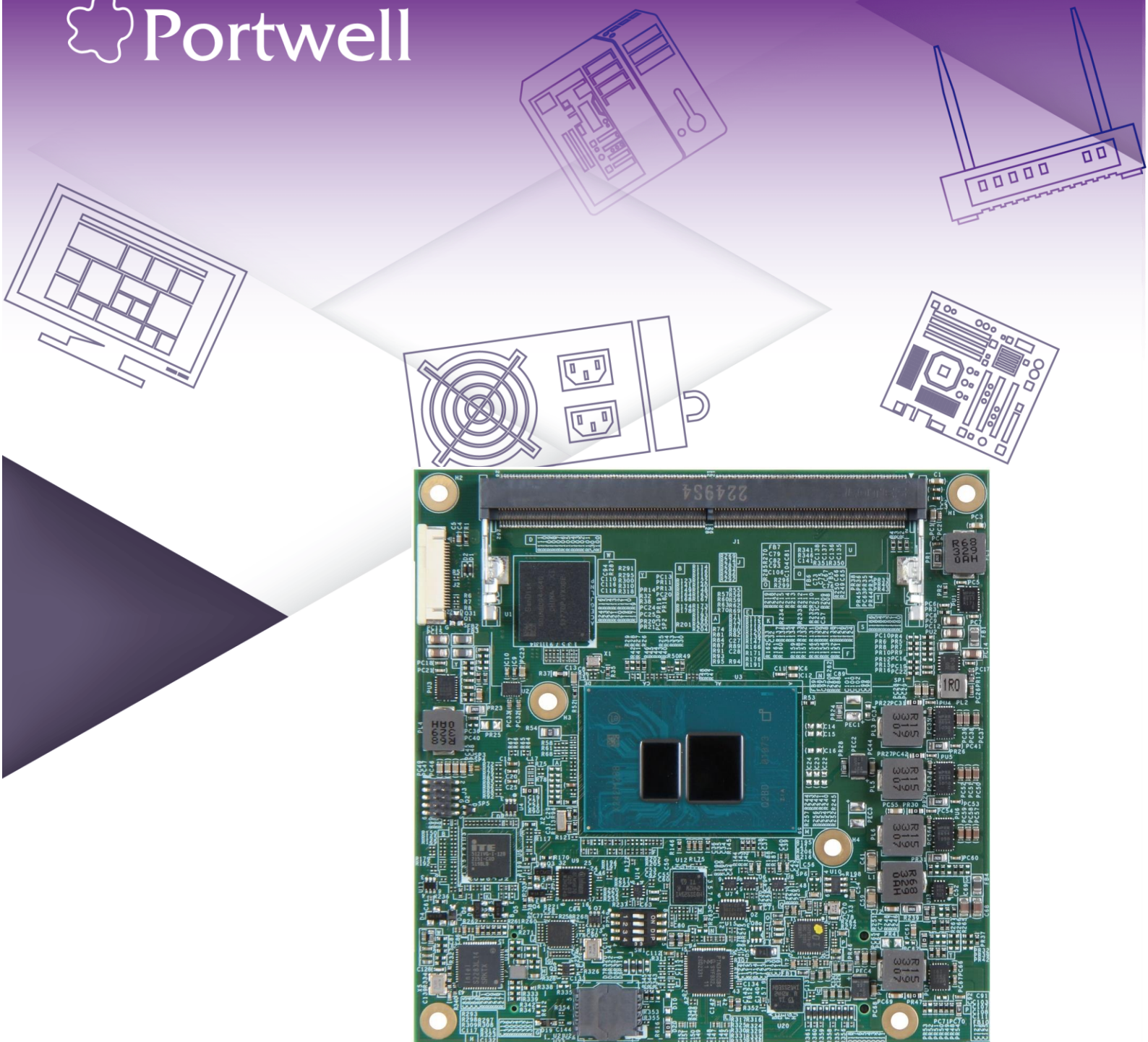




PCOM-B646 Series

COM EXPRESS TYPE 6

User Manual

Version R 0.2

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Revision History

Rev.	Date	Note
R0.1	June. 2024	Preliminary release
R0.2	April. 2025	Official Release

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Chapter 1

Overview

- 1 Introduction
- 1.1 PCOM-B646 SKU List

1. Introduction

PCOM-B646, a Type 6 COM Express® Compact size (95 x 95 mm) module which is based on Intel® Atom® x7000E/RE series processors. In this architecture, it provides up to 8 cores / 8 threads processors with the maximum TDP 15w. It supports 6x PCIe Gen3 x1 lanes, (up to) 4x USB 3.2 Gen 2, and 2x SATA III ports. MIPI-CSI. As storage, selected SKUs are equipped with eMMC 5.1 capacity up to 256GB. Support wide-temperature features.

1.1 PCOM-B646 SKU List

PCOM-B646 Series								
Ordering P/N	AB1-	AB1-3T03	AB1-3T04	AB1-3S22	AB1-3T05	AB1-3T06	AB1-3S86	AB1-3S85
CPU Specifications								
Processor	i3-N305	x7211E	x7213E	x7425E	x7211RE	x7213RE	x7433RE	x7835RE
# of Cores	8	2	2	4	2	2	4	8
# of Threads	8	2	2	4	2	2	4	8
Cache	6 MB	6 MB	6 MB	6 MB	6 MB	6 MB	6 MB	6 MB
Base Frequency	1.8 GHz	1.0 GHz	1.7 GHz	1.5 GHz	1.0 GHz	2.0 GHz	1.5 GHz	1.3 GHz
Turbo	3.8 GHz	3.2 GHz	3.2 GHz	3.4 GHz	3.2 GHz	3.4 GHz	3.4 GHz	3.6 GHz
TDP	9/15 W	6 W	10 W	12 W	6 W	9 W	9 W	12 W
Temperature Range	0 ° C ~ 60 ° C				-40 ° C ~ 85 ° C			
eMMC	256GB	32GB	32GB	64GB	32GB	32GB	64GB	256GB
Memory Specifications								
Capacity	1x SO-DIMM (64GB)							
Speed	4800 MT/s							
ECC	No							
I/O Specifications								
PCIe	6x PCIe 3.0							
USB 3.2 Gen2 /2.0	4x / 8x							
SATA	2x							
Ethernet	1x 2.5 GbE							

Table 1 PCOM-B646 SKU List

Chapter 2

Overview

2 Block Diagram

2. Block Diagram

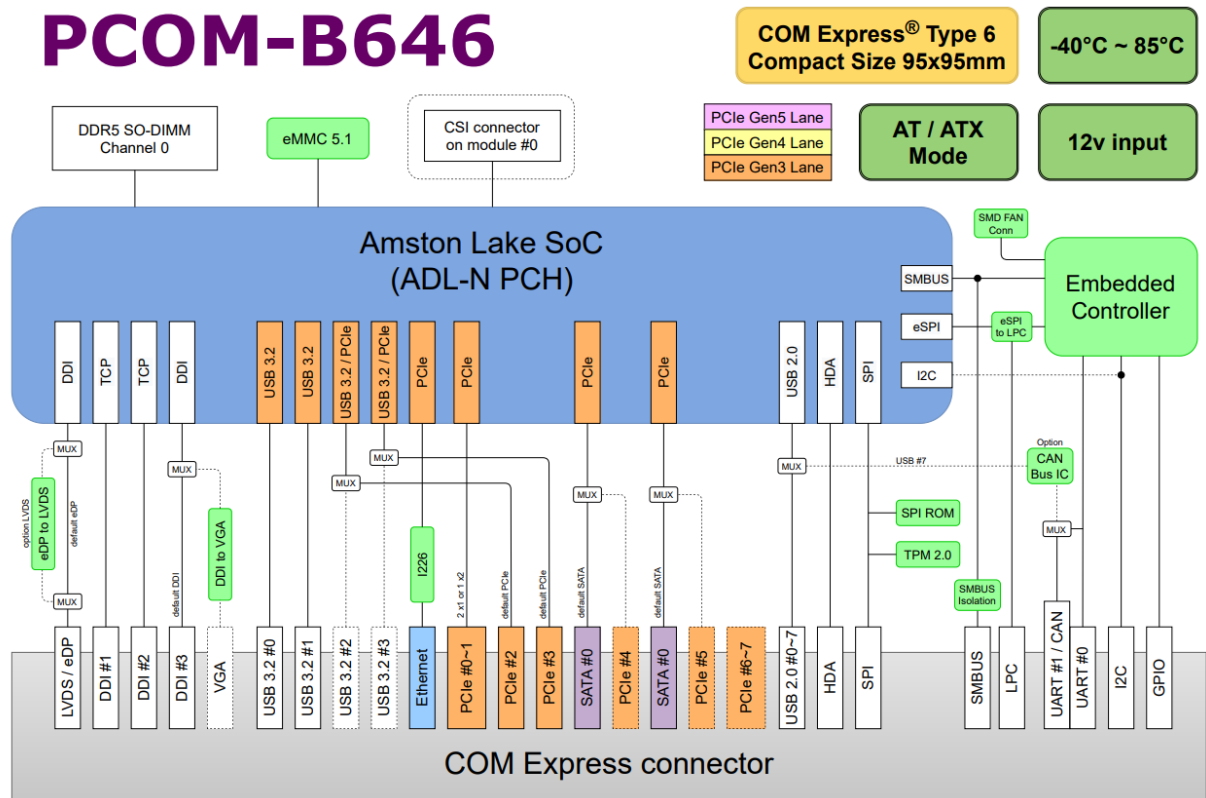


Figure 1 Block Diagram

Chapter 3

Overview

- 3 Specifications
- 3.1 Function switch
- 3.2 Ethernet
- 3.3 PCIe Configurations
- 3.4 Support Operating System
- 3.5 Windows OS Driver
- 3.6 Electrical Characteristics
- 3.7 Power Consumption
- 3.8 Mechanical Dimension
- 3.9 Environmental Specification
- 3.10 Ordering Guide
- 3.11 Fan Cable Instructions

3. Specification

Product	PCOM-B646
Form Factor	COM Express® Type 6, Compact Size (95mm x95mm)
Processor	Intel® Core™i3-N305 Intel® Atom® x7211E Intel® Atom® x7213E Intel® Atom® x7425E Intel® Atom® x7211RE Intel® Atom® x7213RE Intel® Atom® x7433RE Intel® Atom® x7835RE
BIOS	AMI UEFI BIOS
Memory	1x non-ECC DDR5 SO-DIMM Up to 64GB 4800MT/s
Ethernet	1x 2.5 GbE (via Intel® i226 series)
Graphic & Audio	Intel® UHD Graphics
PCI Express	Up to 6x PCIe 3.0 (2 lanes shared with SATA, 2 lanes & USB 3.2) No support PEG lanes
Storage	1x eMMC5.1 up to 256GB (Selected SKU)
I/O	Up to 4x USB 3.2 Gen2 (2 lanes shared with PCIe) 8x USB 2.0 2x SATA (share with PCIe) 8 bit GPIO (default 4 in / 4 out) I2C / SMBus 2x UART
Camera Input	1x MIPI-CSI 4-lane (Optional)
Hardware Monitors	ITE Series Embedded Controller, Voltage, Fan and Temperature
Security	TPM 2.0
Power Management	ACPI
Environment	Operating Temperature: 0° C ~+60° C Extended: -40° C ~+80° C (selected industrial SKU) Storage Temperature: -40° C ~+85° C Relative Humidity 5%~95%

Table 2 Specification

3.1 Function switch

PCOM-B646 support eDP / LVDS switching, DDI #3 / VGA switching, and 2x SATA / PCIe #6 #7 switching, an onboard physical switch is used for this function switching.

SW1	Option	SW1	Option
1 - ON	eDP	3 - ON	SATA1
1 - OFF	LVDS	3 - OFF	PCIe #5
2 - ON	DDI #3	4 - ON	SATA0
2 - OFF	VGA	4 - OFF	PCIe #4

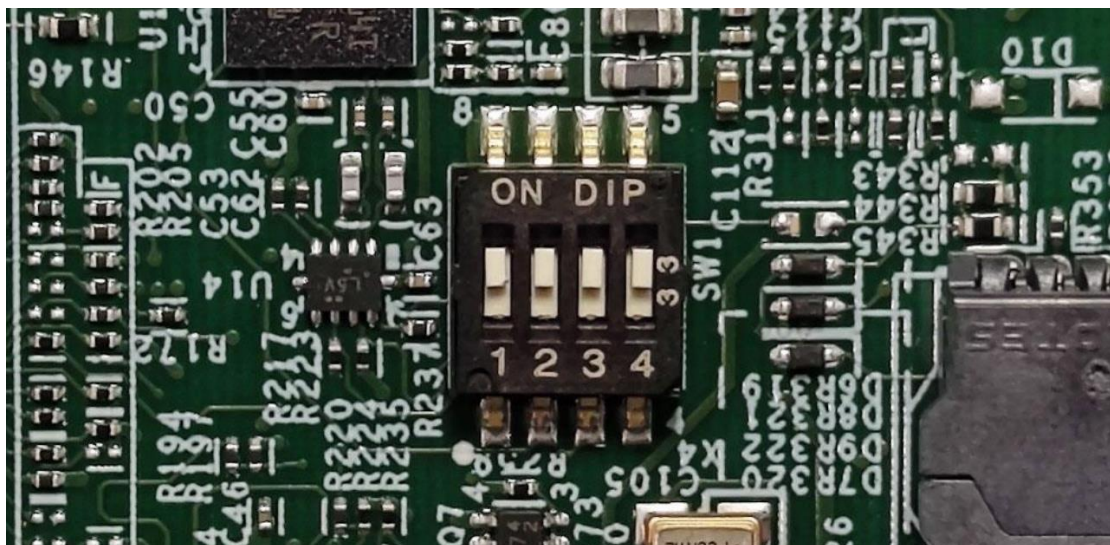


Table 3 Function switch

3.2 Ethernet

1G/2.5G:

The B646 supports 1x 1GbE/2.5GbE Base-T ethernet using Intel i226LM/IT ethernet controller for commercial and industrial grades:
 IT: Industrial grade (-40°C to 85°C). x7211RE, x7213RE, x7433RE, x7835RE.
 LM: Commercial grade (0°C to 70°C). i3-N305, x7211E, x7213E, x7425E.

3.3 PCIe Configurations

PCIe Table							
Type 6		Pow A,B					
		P0	P1	P2	P3	P4	P5
Default	Configurations	X1	X1	X1	X1	-	-
Option 1		X2		X1	X1	X2	
Option 2		X2		X2		X2	
Option 3		X4 <small>See the note below.</small>		X2		X4 <small>See the note below.</small>	

Please Note: To achieve Option 3, the PCIe x4 signal requires a custom carrier design that integrates **P0/P1** with **P4/P5**.

Table 4 PCIe Configurations

3.4 Support Operating System

The PCOM-B646 supports the following operating systems.

Vendor	Operating System	Support
Windows	Windows 10 IoT LTSC 21H2	Intel, Microsoft
	Windows 11 IoT LTSC 24H2	Intel, Microsoft
Linux	Linux LTS kernel v5.4.x & v5.10.x	Open Source
	Ubuntu 22.04 LTS / 24.04 LTS	Open Source

Table 5 Support OS List

Portwell does not endorse/validate/support any specific Linux distribution or entity mentioned on this list.

Portwell recommends customers to work with Linux vendors/open-source communities to find feature list and support model.

3.5 Windows OS Driver

Please download the drivers from Portwell download center website

<https://download.portwell.tw/>

3.6 Electrical Characteristics

Input Voltage	+12V $\pm 5\%$
RTC Battery	From Carrier
Power on Mode	ATX Mode & AT Mode

Table 6 Electrical Characteristics

ATX Power Sequence

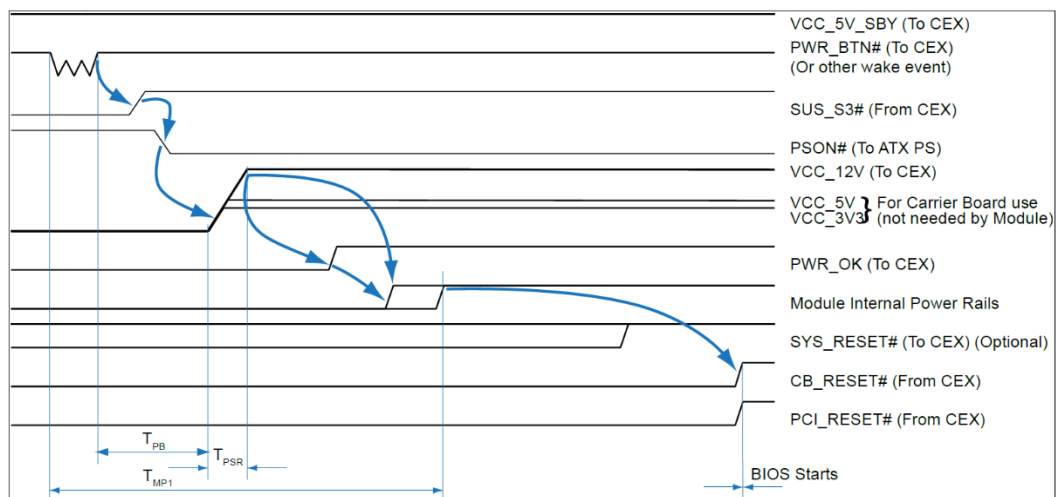


Figure 2 ATX Power Sequence

AT Power Sequence

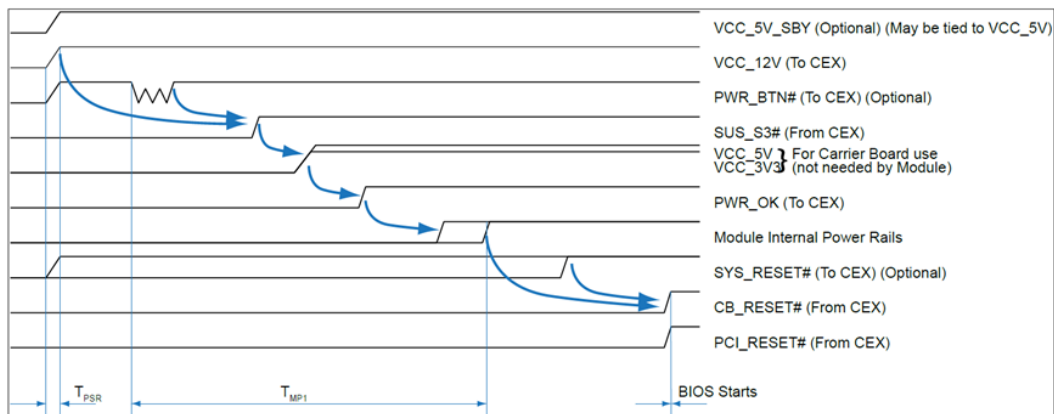


Figure 3 AT Power Sequence

PWR_OK Signal

Carrier board hardware must keep this signal low until all power rails and clocks are stable. Releasing PWR_OK too early or not driving it low at all may cause boot up abnormal symptom. It is a good design implementation to delay the PWR_OK signal a little (at least 100ms) after all carrier board power rails are up, to ensure a stable system.

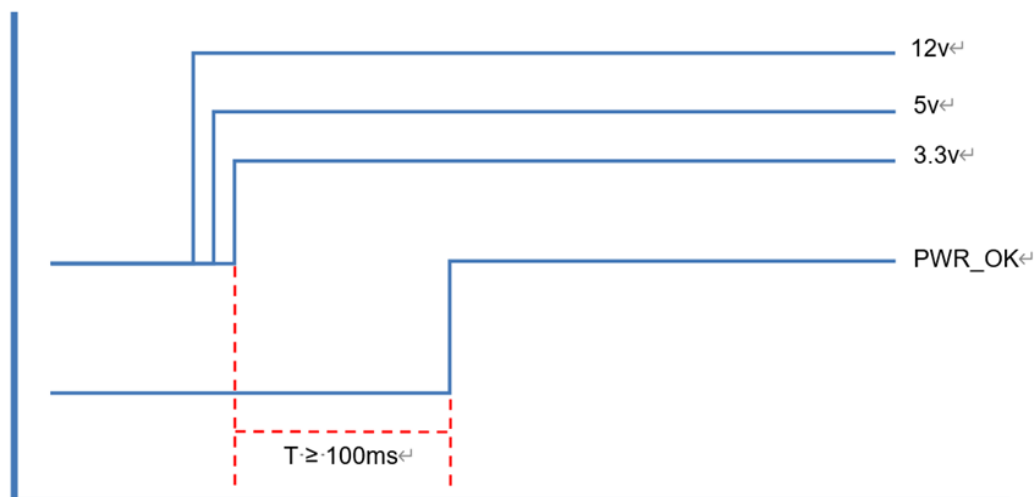


Figure 4 PWR OK Signal

3.7 Power Consumption

The power consumption values were measured with the following conditions:

- ATX power supply
- PCOM-B646 module
- PCOM-C60B carrier (modified module 12v input)
- PCOM-B646 standard cooler
- Windows 11 IoT LTSC 24H2

The power consumption values were recorded during the following methods:

- S0 Idle: 12v current, boot into Windows desktop and idle for 5 min
- 100% Workload with turbo: The average 12v current during 100% workload
- Peak Current: The maximum 12v current during the beginning of turbo mode running
- S3: 5v standby current, wait 5 min later after system into sleeping status
- S5: 5v standby current, wait 5 min later after system into shutdown status

Please Note: Power consumption results are measured at Portwell laboratory and are for reference only.

● PC Client / Embedded / Industrial SKU

PCOM-B646 Series								
P/N	AB1-3S21	AB1-3T03	AB1-3T04	AB1-3S22	AB1- 3T05	AB1-3T06	AB1-3S86	AB1-3S85
Processor	i3-N305	x7211E	x7213E	x7425E	x7211RE	x7213RE	x7433RE	x7835RE
Core / Threads	8	2	2	4	2	2	4	8
TDP	15W	6W	10W	12W	6W	9W	9W	12W
Power Consumption								
S0 Idle	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
100% Workload with turbo mode	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Peak Current	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
S3	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
S5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 7 Power Consumption

3.8 Mechanical Dimension

Top Side Dimension

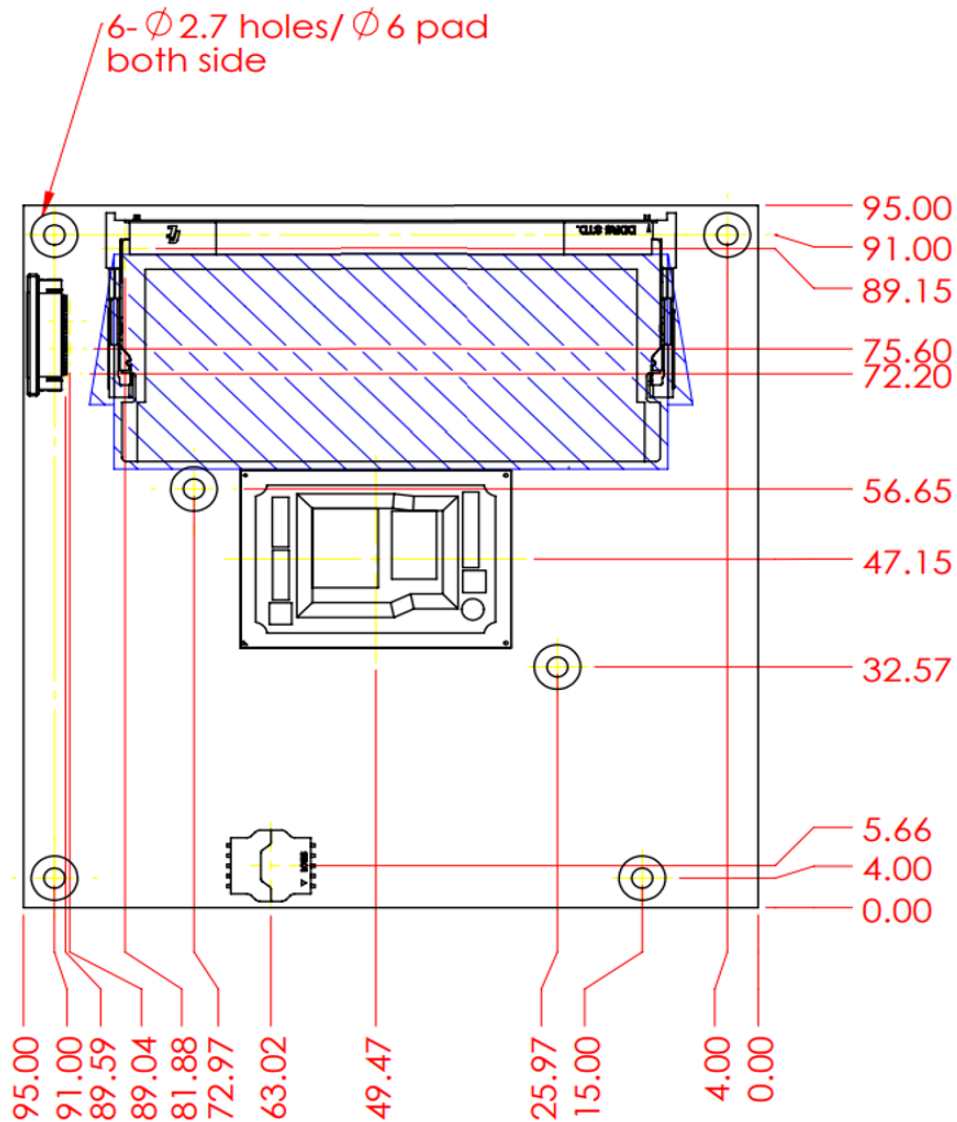


Figure 5 Mechanical Dimension - Top

Bottom Side Dimension

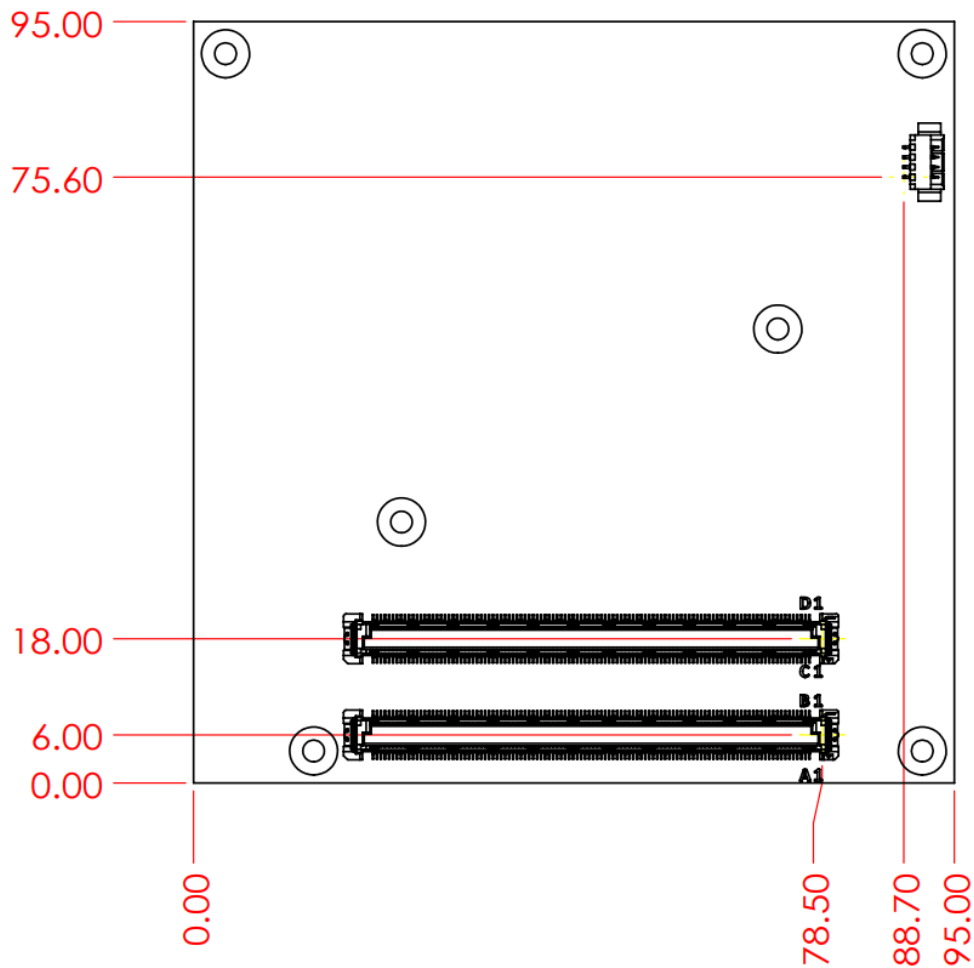


Figure 6 Mechanical Dimension – Bottom

3.9 Environmental Specification

Storage Temperature	-40°C~85°C
Operation Temperature	Standard: 0 0°C~60°C Extended: -40°C~85°C (Selected SKU)
Storage Humidity	0%~95%
Operation Humidity	0%~95%

Table 8 Environmental Specification

3.10 Ordering Guide

Module

Product	Ordering P/N
PCOM-B646-N305	AB1-3S21
PCOM-B646-x7211E	AB1-3T03
PCOM-B646-x7213E	AB1-3T03
PCOM-B646-x7425E	AB1-3S22
PCOM-B646-x7211RE	AB1-3T05
PCOM-B646-x7213RE	AB1-3T06
PCOM-B646-x7433RE	AB1-3S86
PCOM-B646-x7835RE	AB1-3S85

Table 9 Ordering Guide – Module

Accessory

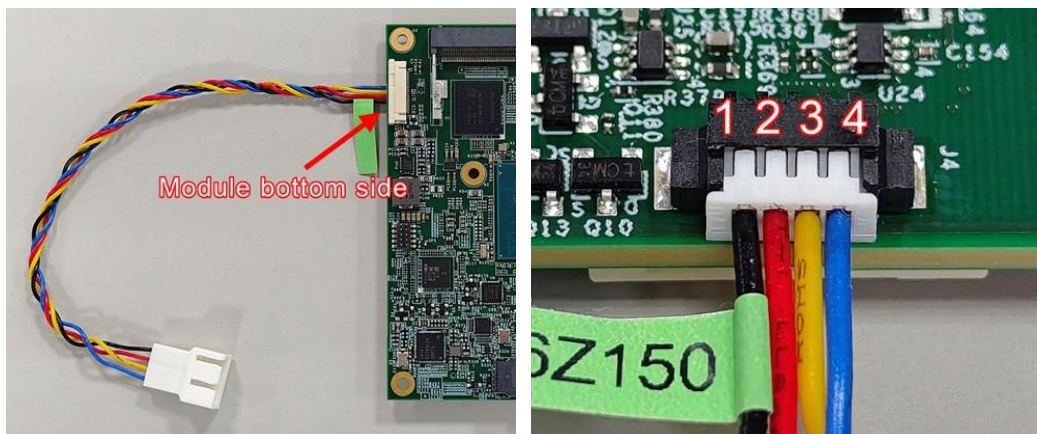
Accessory	Ordering P/N
Cooler (Copper Elastic Pad)	B9972370
Cooler (Aluminum)	B9972380
Heatsink(Copper Elastic Pad)	B830C810
Heatsink (Aluminum)	B830C840
Heatspreader (Copper Elastic Pad)	B830C820
Heatspreader (Aluminum)	B830C830
PCOM-C605R Mini-ITX (Carrier)	AB1-3P78
PCOM-C60B ATX Evaluation (Carrier)	AB1-3G22

Table 10 Ordering Guide – Accessory

3.11 Fan Cable Instructions

PCOM-B646 provides signals for a primary (onboard) and secondary (carrier) FAN, here is the picture indicating the location of onboard FAN connector. This FAN cable transforms the 4-pin standard FAN connector to a SMD type onboard connector.

J10 Fan	
1	GND
2	+12V
3	FAN_TACHIN
4	FAN_PWMOUT



Chapter 4

Overview

- 4 Thermal
- 4.1 Cooler Dimensions
- 4.2 Heatsink Dimensions
- 4.3 Heatspreader Dimensions

4. Thermal

4.1 Cooler Dimensions

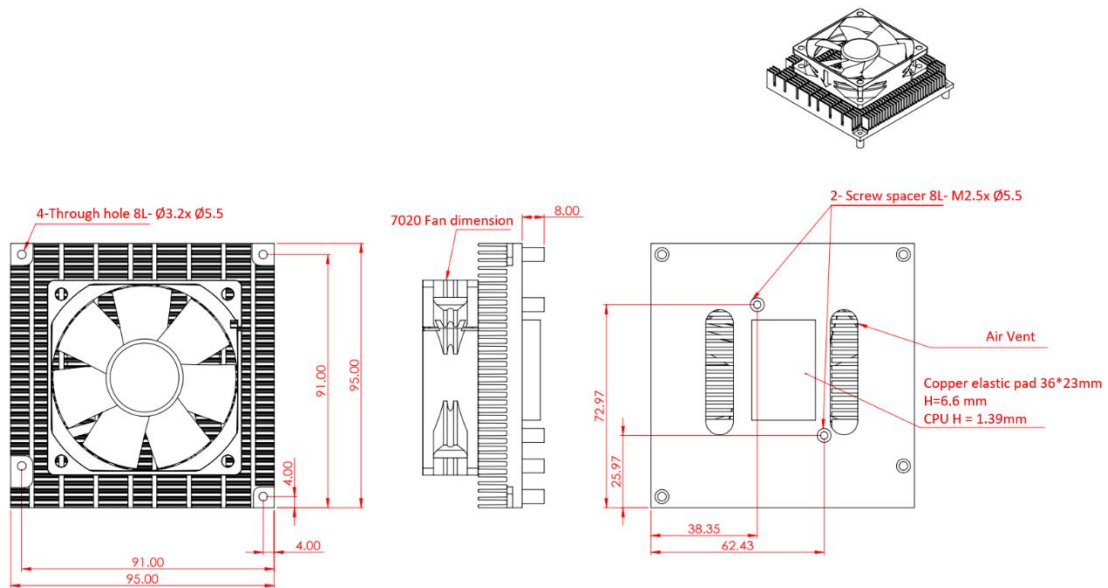


Figure 7 Cooler Mechanical Dimension

4.2 Heatsink Dimensions

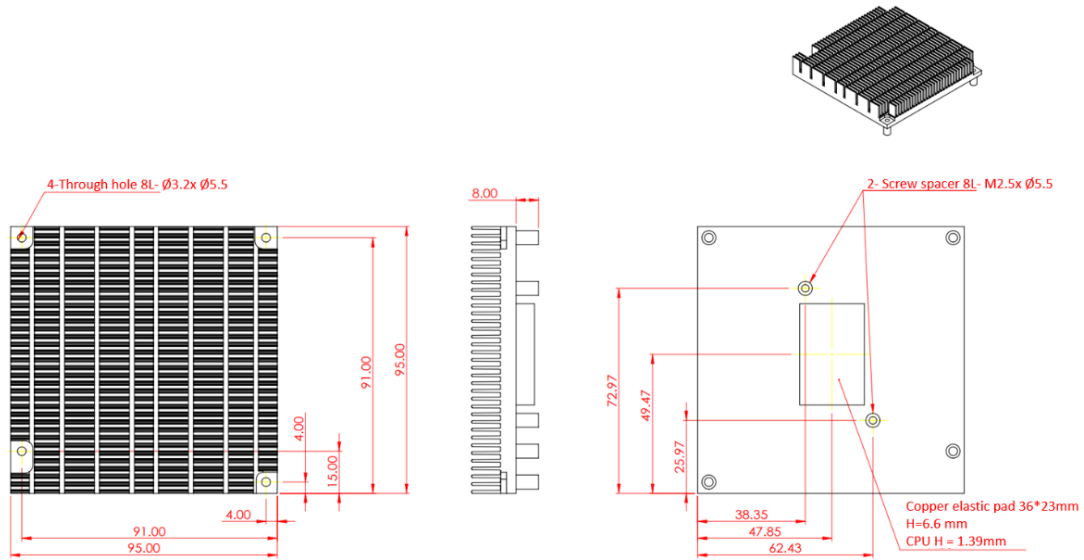


Figure 8 Heatsink Mechanical Dimension

4.3 Heatspreader Dimensions

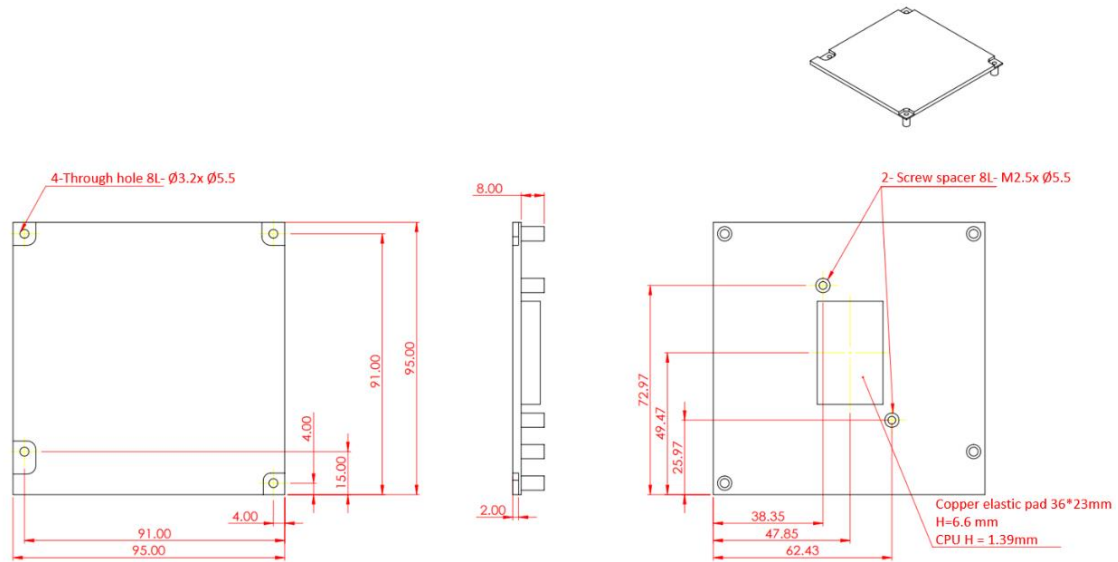


Figure 9 Heatspreader Mechanical Dimension

Chapter 5

Overview

5 Pin Out Table

5. Pin Out Table

Pin	Row A	Pin	Row B	Pin	Row C	Pin	Row D
A1	GND	B1	GND	C1	GND	D1	GND
A2	LAN_MDI3N	B2	LAN_LED_LNK_ACT_N	C2	GND	D2	GND
A3	LAN_MDI3P	B3	LFRAME#	C3	USB3_RN0	D3	USB3_TN0
A4	LAN_LED_100#	B4	LAD0	C4	USB3_RP0	D4	USB3_TP0
A5	LAN_LED_1000#	B5	LAD1	C5	GND	D5	GND
A6	LAN_MDI2N	B6	LAD2	C6	USB3_RP1	D6	USB3_TN1
A7	LAN_MDI2P	B7	LAD3	C7	USB3_RP1	D7	USB3_TP1
A8	LAN_LED_LINK_N	B8	NC	C8	GND	D8	GND
A9	LAN_MDI1N	B9	NC	C9	USB3_RN2	D9	USB3_TN2
A10	LAN_MDI1P	B10	LPC_CLK	C10	USB3_RP2	D10	USB3_TP2
A11	GND	B11	GND	C11	GND	D11	GND
A12	LAN_MDI0N	B12	PWRBTN#	C12	USB3_RN3	D12	USB3_TN3
A13	LAN_MDI0P	B13	SMB_CLK	C13	USB3_RP3	D13	USB3_TP3
A14	NC	B14	SMB_DATA	C14	GND	D14	GND
A15	KBC_SLP_S3#	B15	SMB_ALERT#	C15	NC	D15	DDI1_CTRLCLK_AUX_P
A16	SATA_TXP0	B16	SATA_TXP1	C16	NC	D16	DDI1_CTRLCLK_AUX_N
A17	SATA_TXN0	B17	SATA_TXN1	C17	NC	D17	NC
A18	KBC_SLP_S4#	B18	ICH_SUS_STAT_N	C18	GND	D18	PMC_ALERT_N
A19	SATA_RXP0	B19	SATA_RXP1	C19	NC	D19	PCIE_TXP11
A20	SATA_RXN0	B20	SATA_RXN1	C20	NC	D20	PCIE_TXN11
A21	GND	B21	GND	C21	GND	D21	GND
A22	NC	B22	NC	C22	NC	D22	NC
A23	NC	B23	NC	C23	NC	D23	NC
A24	KBC_SLP_S5#	B24	PWROK	C24	DDI1_HPD	D24	GND
A25	NC	B25	NC	C25	NC	D25	GND
A26	NC	B26	NC	C26	NC	D26	DDI1_PAIR0_P
A27	BATLOW#	B27	WDTO	C27	NC	D27	DDI1_PAIR0_N
A28	SATA_LED#	B28	HDA_SDI2	C28	NC	D28	GND
A29	HDA_SYNC	B29	HDA_SDI1	C29	NC	D29	DDI1_PAIR1_P
A30	HDA_RST#	B30	HDA_SDI0	C30	NC	D30	DDI1_PAIR1_N
A31	GND	B31	GND	C31	GND	D31	GND
A32	HDA_BITCLK	B32	SPKR	C32	DDI2_CTRLCLK_AUX_P	D32	DDI1_PAIR2_P

A33	HDA_SDO	B33	I2C_CLK	C33	DDI2_CTRLDATA_AUX_N	D33	DDI1_PAIR2_N
A34	BIOS_DIS0#	B34	I2C_DAT	C34	DDI2_AUX_SEL	D34	DDI1_AUX_SEL
A35	THERMTRIP#	B35	THRM#	C35	NC	D35	NC
A36	USB_PN6	B36	USB_PN7	C36	DDI3_CTRLCLK_AUX_P	D36	DDI1_PAIR3_P
A37	USB_PP6	B37	USB_PP7	C37	DDI3_CTRLDATA_AUX_N	D37	DDI1_PAIR3_N
A38	USB2_OC6/7	B38	USB_OC4/5	C38	DDI3_AUX_SEL	D38	GND
A39	USB_PN4	B39	USB_PN5	C39	DDI3_PAIR0_P	D39	DDI2_PAIR0_P
A40	USB_PP4	B40	USB_PP5	C40	DDI3_PAIR0_N	D40	DDI2_PAIR0_N
A41	GND	B41	GND	C41	GND	D41	GND
A42	USB_PN2	B42	USB_PN3	C42	DDI3_PAIR1_P	D42	DDI2_PAIR1_P
A43	USB_PP2	B43	USB_PP3	C43	DDI3_PAIR1_N	D43	DDI2_PAIR1_N
A44	USB2_OC2/3	B44	USB2_OC0/1	C44	DDI3_HPD	D44	DDI2_HPD
A45	USB_PN0	B45	USB_PN1	C45	NC	D45	GND
A46	USB_PP0	B46	USB_PP1	C46	DDI3_PAIR2_P	D46	DDI2_PAIR2_P
A47	VCC3P3_RTC	B47	ESPI_EN#	C47	DDI3_PAIR2_N	D47	DDI2_PAIR2_N
A48	RSMRST_OUT#	B48	NC	C48	NC	D48	GND
A49	LAN_SDP0	B49	RSTBTN#	C49	DDI3_PAIR3_P	D49	DDI2_PAIR3_P
A50	LPC_SERIRQ	B50	CB_PLTRST#	C50	DDI3_PAIR3_N	D50	DDI2_PAIR3_N
A51	GND	B51	GND	C51	GND	D51	GND
A52	PCIE_TXP5	B52	PCIE_RXP5	C52	NC	D52	NC
A53	PCIE_TXN5	B53	PCIE_RXN5	C53	NC	D53	NC
A54	GPI0	B54	GPO1	C54	TYPE0	D54	PEG_LAN_R_RV#
A55	PCIE_TXP4	B55	PCIE_RXP4	C55	NC	D55	NC
A56	PCIE_TXN4	B56	PCIE_RXN4	C56	NC	D56	NC
A57	GND	B57	GPO2	C57	TYPE1	D57	TYPE2
A58	PCIE_TXP3	B58	PCIE_RXP3	C58	NC	D58	NC
A59	PCIE_TXN3	B59	PCIE_RXN3	C59	NC	D59	NC
A60	GND	B60	GND	C60	GND	D60	GND
A61	PCIE_TXP2	B61	PCIE_RXP2	C61	NC	D61	NC
A62	PCIE_TXN2	B62	PCIE_RXN2	C62	NC	D62	NC
A63	GPI1	B63	GPO3	C63	GND	D63	GND
A64	PCIE_TXP1	B64	PCIE_RXP1	C64	GND	D64	GND
A65	PCIE_TXN1	B65	PCIE_RXN1	C65	NC	D65	NC
A66	GND	B66	PCIE_WAKE#	C66	NC	D66	NC
A67	GPI2	B67	WAKE1#	C67	RAPID_SHUT	D67	GND
A68	PCIE_TXP0	B68	PCIE_RXP0	C68	NC	D68	NC

A69	PCIE_TXN0	B69	PCIE_RXN0	C69	NC	D69	NC
A70	GND	B70	GND	C70	GND	D70	GND
A71	LVDS0_CHA_P	B71	LVDS_CHB_TXP0	C71	NC	D71	NC
A72	LVDS0_CHA_N	B72	LVDS_CHB_TXN0	C72	NC	D72	NC
A73	LVDS1_CHA_P	B73	LVDS_CHB_TXP1	C73	GND	D73	GND
A74	LVDS1_CHA_N	B74	LVDS_CHB_TXN1	C74	NC	D74	NC
A75	LVDS2_CHA_P	B75	LVDS_CHB_TXP2	C75	NC	D75	NC
A76	LVDS2_CHA_N	B76	LVDS_CHB_TXN2	C76	GND	D76	GND
A77	LVDS_VDDEN	B77	LVDS_CHB_TXP3	C77	GND	D77	GND
A78	LVDS3_CHA_P	B78	LVDS_CHB_TXN3	C78	NC	D78	NC
A79	LVDS3_CHA_N	B79	LVDS_BKLT_EN	C79	NC	D79	NC
A80	GND	B80	GND	C80	GND	D80	GND
A81	LVDSCK_CHA_P	B81	LVDS_CHB_CLKP	C81	NC	D81	NC
A82	LVDSCK_CHA_N	B82	LVDS_CHB_CLKN	C82	NC	D82	NC
A83	LVDS_I2CCLK	B83	LVDS_BKLT_CTRL	C83	GND	D83	GND
A84	LVDS_I2CDAT	B84	5VSB	C84	GND	D84	GND
A85	GPI3	B85	5VSB	C85	NC	D85	NC
A86	NC	B86	5VSB	C86	NC	D86	NC
A87	EDP_HPD	B87	5VSB	C87	GND	D87	GND
A88	PCIE_CLK_REF+	B88	BIOS_DIS1#	C88	NC	D88	NC
A89	PCIE_CLK_REF-	B89	VGA_R	C89	NC	D89	NC
A90	GND	B90	GND	C90	GND	D90	GND
A91	SPI_POWER	B91	VGA_G	C91	NC	D91	NC
A92	SPIO_MISO	B92	VGA_B	C92	NC	D92	NC
A93	GPO0	B93	VGA_HSY	C93	GND	D93	GND
A94	SPIO_CLK	B94	VGA_VSY	C94	NC	D94	NC
A95	SPIO_MOSI	B95	VGA_SCL	C95	NC	D95	NC
A96	TPM_PP (NC)	B96	VGA_SDA	C96	GND	D96	GND
A97	TYPE10#	B97	SPI_CS#	C97	GND	D97	GND
A98	SER0_TX	B98	NC	C98	NC	D98	NC
A99	SER0_RX	B99	NC	C99	NC	D99	NC
A100	GND	B100	GND	C100	GND	D100	GND
A101	SER1_TX	B101	FAN_PWMOUT	C101	NC	D101	NC
A102	SER1_RX	B102	FAN_TACHIN	C102	NC	D102	NC
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	B110	GND	C110	GND	D110	GND

Table 11 Pin Out Description

Chapter 6

Overview

- 6 System Resource
- 6.1 LPC
- 6.2 SMBUS

6. System Resource

6.1 LPC

Device	I/O Address	Note
Embedded Controller	0x6E / 0x6F	EC Address
	0x62 / 0x66	EC ACPI CMD Port
	0x200 / 0x201	EC BRAM Port for I2C function
	0xE300~0xE3FF	EC LPC IO Space
	0x3F8~0x3FF	EC UART 1
	0x3E8~0x3EF	EC UART 2
Carrier SIO	N/A	

Table 12 System Resource – LPC

6.2 SMBUS

SMBUS Address	Information
0x44	SMBus ARP
0x6C	PCIe Clock Buffer
0x10 / 0x12 / 0x16 / 0x48 / 0x6A	Reserved

Table 13 System Resource - SMBUS

Chapter 7

Overview

- 7 BIOS Setup Items
- 7.1 Entering Setup – Launch System Setup
- 7.2 Main
- 7.3 Configuration
- 7.4 Security
- 7.5 Boot
- 7.6 Save & Exit

7. BIOS Setup Items

The PCOM-B646 is equipped with AMI BIOS stored in Flash ROM. This BIOS includes a built-in setup program that allows users to easily modify the system's basic configuration. The configuration data is stored in SPI ROM, ensuring it is retained even during power-off periods. Upon startup, the PCOM-B646 communicates with peripheral devices and verifies the hardware resources against the configuration stored in the BIOS. If any discrepancies are found, or if the BIOS parameters need to be configured initially, the diagnostic program will prompt the user to enter the setup program. Some errors may be critical enough to abort the startup process.

7.1 Entering Setup

Launch System Setup

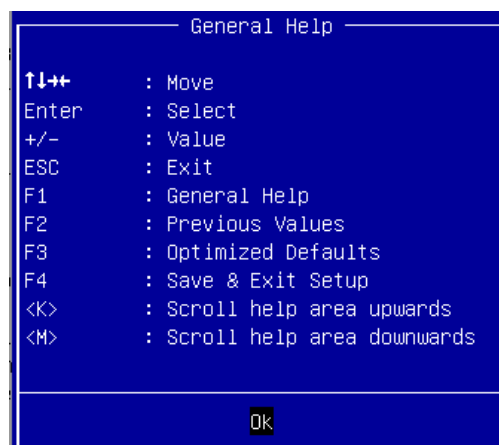
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press key will enter BIOS setup screen.

Press to enter SETUP

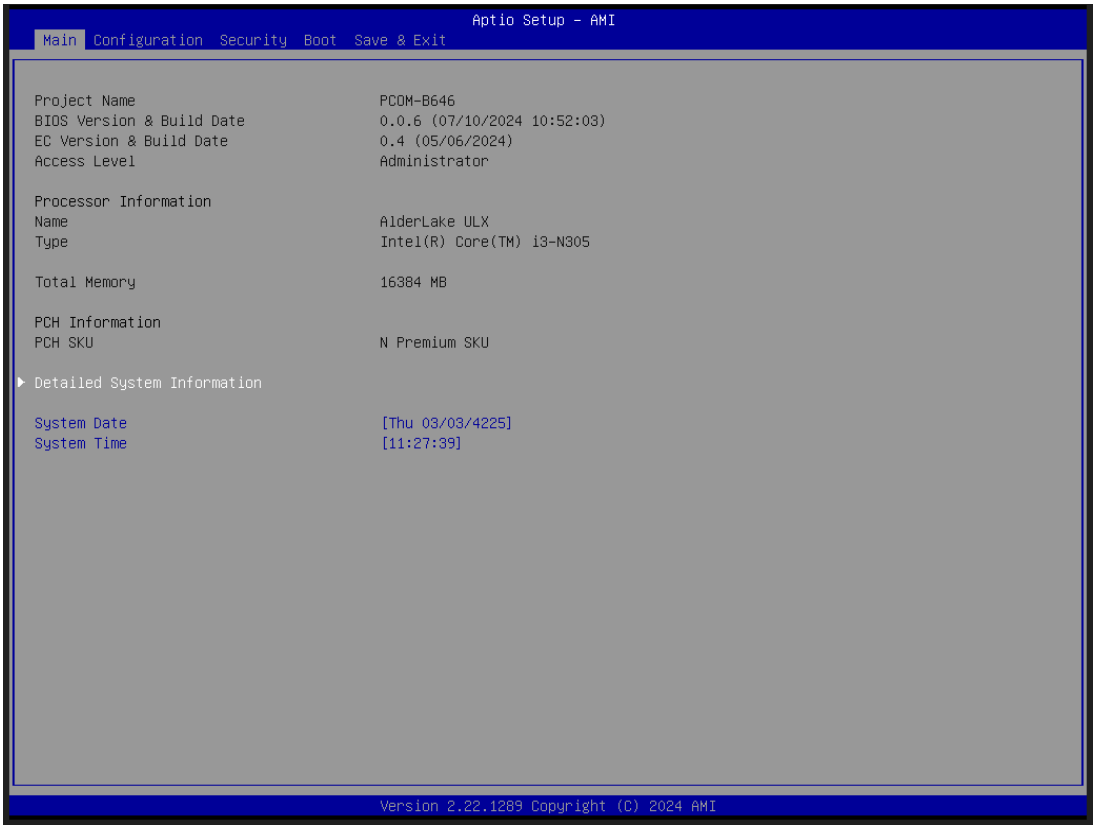
If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On or pressing the RESET button. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

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.



7.2 Main



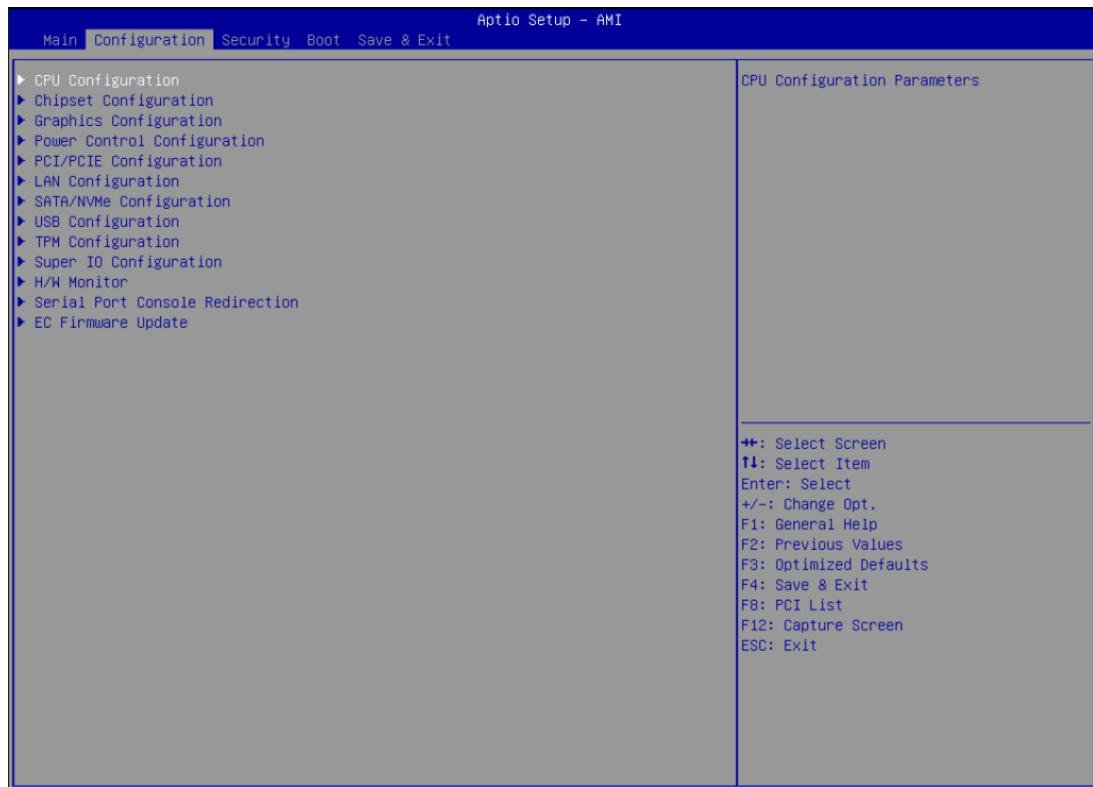
Feature	Description	Options
System Date	The date format is <Day>, <Month> <Date> <Year>. Use [+] or [-] to configure system Date.	
System Time	The time format is <Hour> <Minute> <Second>. Use [+] or [-] to configure system Time.	

Detailed System Information

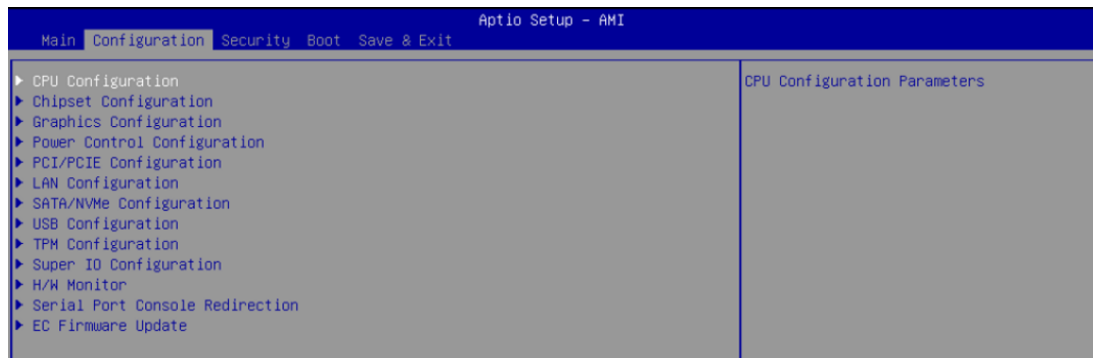
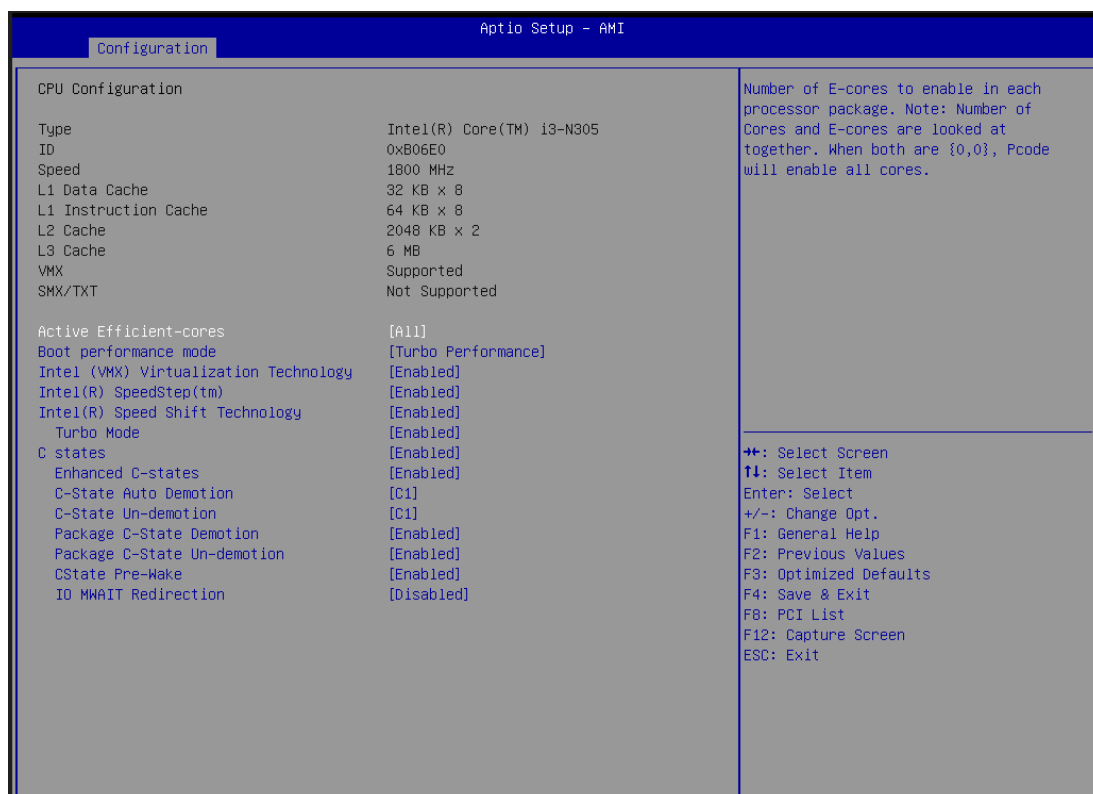
Main	
FSP Information	
FSP version	0C.02.89.40
RC version	0C.E0.89.40
Build Date	
FSP Mode	Dispatch Mode
Board Information	
Board Name	PCOM-B646
Board ID	N/A
Fab ID	Default string
LAN PHY Revision	N/A
Processor Information	
Name	AlderLake ULX
Type	Intel(R) Core(TM) i3-N305
Speed	1800 MHz
ID	0xB06E0
Stepping	A0
Package	Not Implemented Yet
Number of Efficient-cores	8Core(s) / 8Thread(s)
Microcode Revision	15
GT Info	0x46D0
eDRAM Size	N/A
IGFX GOP Version	21.0.1065
Memory RC Version	0.0.4.74
Total Memory	16384 MB
Memory Frequency	4800 MHz
MC 0 Ch 0 DIMM 0	Populated & Enabled
Size	16384 MB (DDR5)
MC 0 Ch 0 DIMM 1	Not Populated / Disabled
MC 0 Ch 1 DIMM 0	Not Populated / Disabled
MC 0 Ch 1 DIMM 1	Not Populated / Disabled

Main	
MC 0 Ch 0 DIMM 0	Populated & Enabled
Size	16384 MB (DDR5)
MC 0 Ch 0 DIMM 1	Not Populated / Disabled
MC 0 Ch 1 DIMM 0	Not Populated / Disabled
MC 0 Ch 1 DIMM 1	Not Populated / Disabled
MC 1 Ch 0 DIMM 0	Not Populated / Disabled
MC 1 Ch 0 DIMM 1	Not Populated / Disabled
MC 1 Ch 1 DIMM 0	Not Populated / Disabled
MC 1 Ch 1 DIMM 1	Not Populated / Disabled
PCH Information	
Name	PCH-N
PCH SKU	N Premium SKU
Stepping	A0
ChipsetInit Base Revision	2
ChipsetInit OEM Revision	0
Package	Not Implemented Yet
TXT Capability of Platform/PCH	Unsupported
Production Type	Production
eMMC Device	eMMC DA6256(250.1GB)
Dual Output Fast Read support	Supported
Read ID/Status Clock Freq	50 MHz
Write and Erase Clock Freq	50 MHz
Fast Read Clock Freq	50 MHz
Fast Read support	Supported
Number of Components	1 Component
SPI Component 0 Density	32 MB
eSPI Flash Sharing Mode	G3
EC PECI Mode	Legacy PECI mode
ME FW Version	16.50.10.1351
ME Firmware SKU	Consumer SKU
PMC FW Version	160.50.0.1009

7.3 Configuration

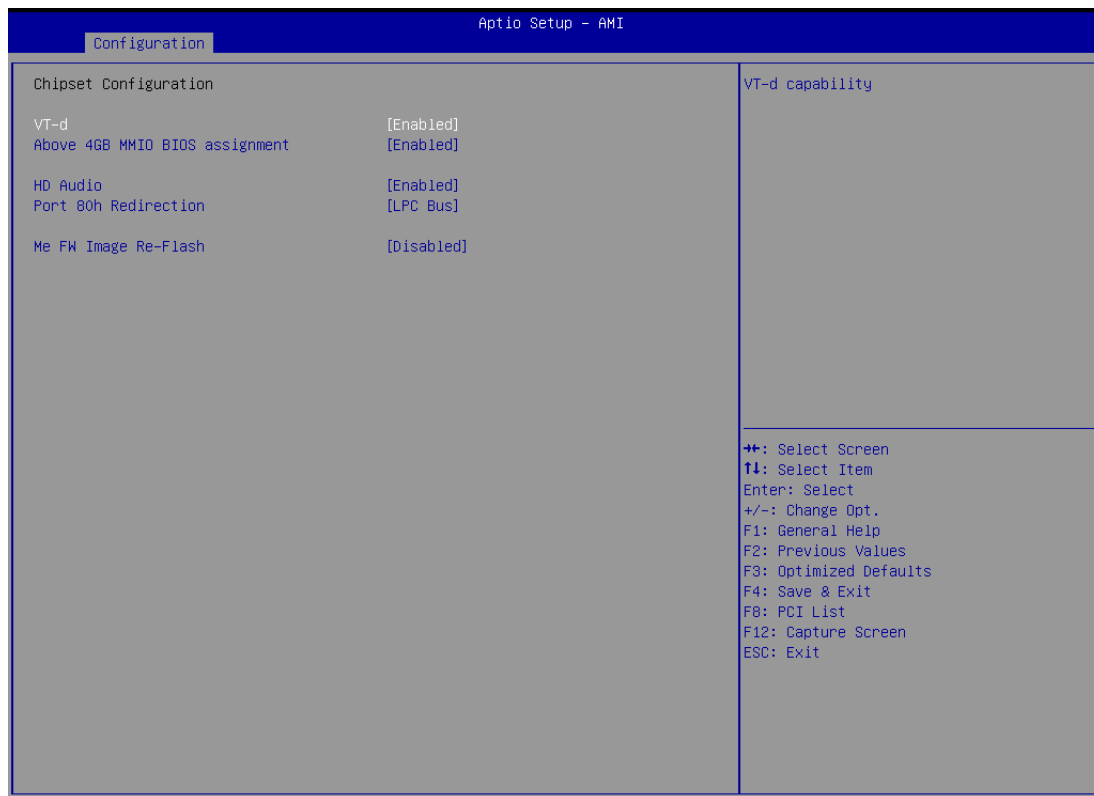


7.3.1 CPU Configuration



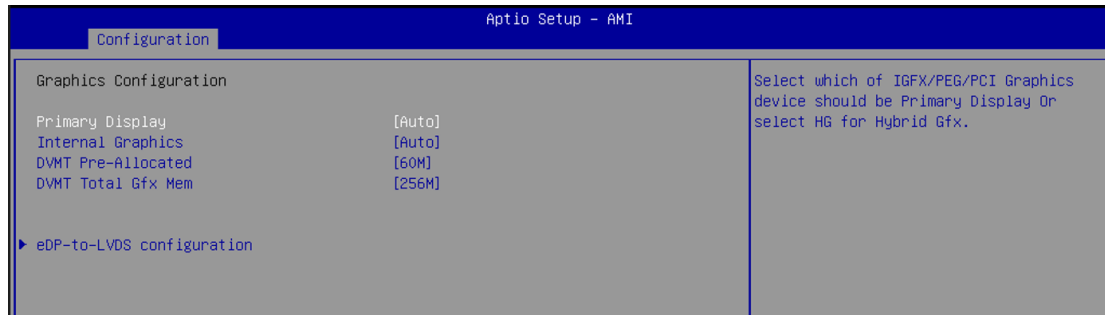
Feature	Description	Options
Active Efficient-Cores	Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together, When both are {0,0}, Pcode will enable all cores.	★All, 1, 2, 3, 4, 5, 6, 7
Boot performance mode	Select the performance state that the BIOS will set starting from reset vector	Max Battery Max Non-Turbo Performance ★Turbo Performance
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vander pool Technology.	Disabled,★Enabled
Intel® Speed Step™	Allow more than two frequency ranges to be supported.	Disabled,★Enabled
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	Disabled,★Enabled
Turbo Mode	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.	Disabled,★Enabled
C states	Enable/disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized	Disabled,★Enabled
Enhanced C-states	Enable/Disable C1E.When enabled, CPU will switch to minimum speed when all cores enter C-state	Disabled,★Enabled
C-State Auto Demotion	Configure C-State Auto Demotion	Disable, ★C1
C-State Un-demotion	Configure C-State Un-demotion	Disable, ★C1
Package C State Demotion	Package C-State Demotion	Disabled, ★Enabled
Package C State Un-demotion	Package C-State Un-demotion	Disabled, ★Enabled
CState Pre-Wake	Disable – Sets bit 30 of POWER_CTL MSR(0x1FC) to 1 to disable the Cstate Pre-Wake	Disabled, ★Enabled
IO MWAIT Redirection	When set, will map IO_read instructions sent to IO registers PMG_IO_BASE_ADDRBASE+offset to MWAIT(offset)	★Disabled, Enabled

7.3.2 Chipset Configuration



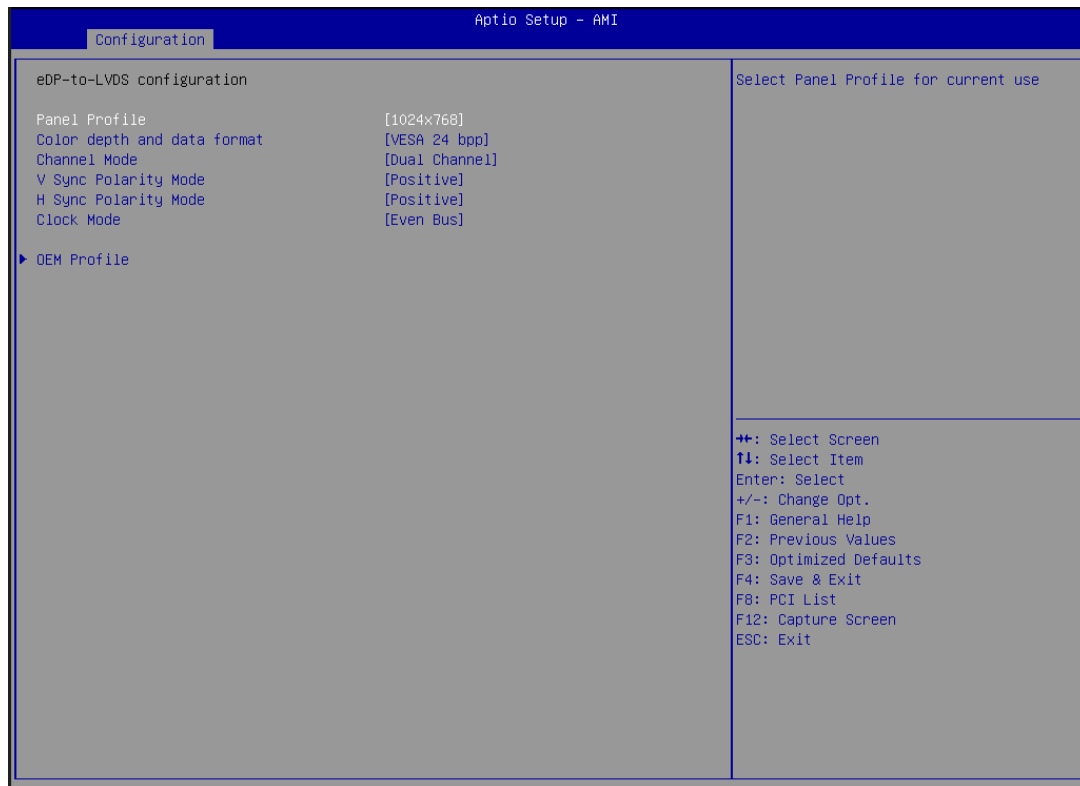
Feature	Description	Options
VT-d	VT-d Capability	Disabled,★Enabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB Memory Mapped IO BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB	★Enabled ,Disabled
HD Audio	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled	Disabled,★Enabled
Port 80h Redirection	Control when the Port 80h cycles are sent.	★LPC Bus, PCIE Bus
Me FW Image Re-Flash	Enable/Disable Me FW Image Re-Flash function.	★Disabled, Enabled

7.3.3 Graphics Configuration



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 Slot, PCH PCI
Internal Graphics	Keep IGFX enable based on the setup options.	★Auto, Disable, Enable
DVMT Pre-Allocated	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.	32M, 64M, 96M, 128M, 160M, 12M, 16M, 20M, 24M, 28M, 32M/F7, 36M, 40M, 44M, 48M, 52M, 56M, ★60M
DVMT Total Gfx Mem	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device	128M, ★256M, MAX
eDP-to-LVDS configuration	eDP-to-LVDS(PTN3460)	

eDP-to-LVDS configuration



Feature	Description	Options
Panel Profile	Select Panel Profile for current use	640x480, 800x480, 800x600, 1024x768, 1280x800, ★1280x1024, 1366x768, 1440x900, 1920x1080, OEM Profile
Color depth and data format	Select Color depth and data format.	★VESA 24 bpp, JEIDA 24 bpp, VESA and JEIDA 18 bpp
Channel Mode	Select LVDS Channel Mode	Single Channel ★Dual Channel
V Sync Polarity Mode	Select V Sync Polarity Mode	★Positive, Negative
H Sync Polarity Mode	Select H Sync Polarity Mode	★Positive, Negative
Clock Mode	Select clock output for LVDS.	Even Bus, Odd Bus, ★Both Buses
OEM Profile	PANEL 1 Help	

OEM Profile: PANEL 1 Configuration

Aptio Setup - AMI

Configuration

PANEL 1 Configuration

Profile Name : empty

Rename Profile

Color depth and data format [VESA and JEIDA 18 bpp]

Channel Mode [Single Channel]

Clock Mode [Even Bus]

Pixel Clock 0.000 Mhz 2500

H Active Pixels 0 640

H Blank Pixels 0 160

H Offset Pixels 0 16

H Width Pixels 0 96

V Active Lines 0 480

V Blank Lines 0 45

V Offset Lines 0 10

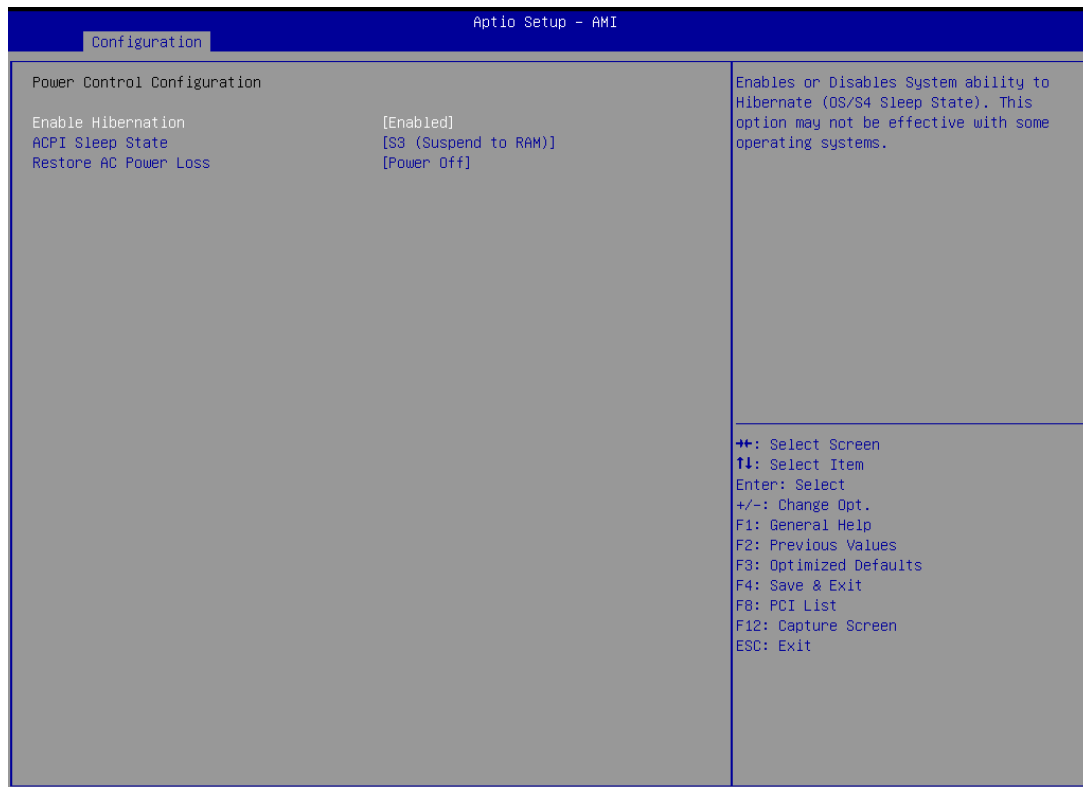
V Width Lines 0 2

H & V sync Signal Polarity [Postive]

⬆⬆: Select Screen
⬆⬆: Select Item

Feature	Description	Options
Rename Profile	Rename Profile name	
Color depth and data format	Select Color depth and data format.	VESA 24 bpp JEIDA 24 bpp ★VESA and JEIDA 18 bpp
Channel Mode	Select LVDS Channel Mode.	Dual channel ★Single channel
Clock Mode	Select Clock output for LVDS.	Both Buses, ★Even Bus, Odd Bus
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

7.3.4 Power Control Configuration



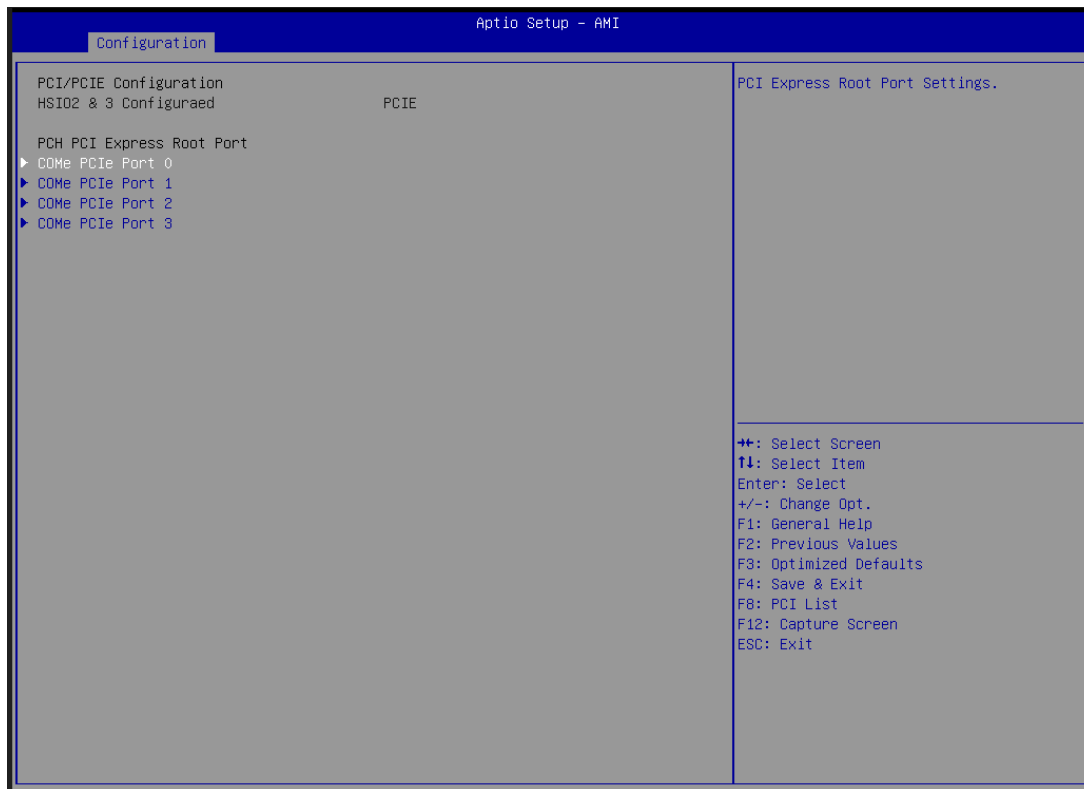
Feature	Description	Options
Enable Hibernation	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.	Disabled, ★Enabled
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.	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

7.3.5 LAN Configuration

Configuration		Aptio Setup - AMI	
LAN Configuration		Control OnBoard LAN enable or disable.	
Intel Ethernet Controller I226IT			
LAN MAC Address	00-90-FB-7E-82-EC		
OnBoard LAN Controller#1	[Enabled]		
PCIE_WAKE(Wake On Lan)	[Enabled]		
Launch UEFI PXE ROM	[Enabled]		
IPv4 PXE Support	[Enabled]		
IPv4 HTTP Support	[Enabled]		
IPv6 PXE Support	[Enabled]		
IPv6 HTTP Support	[Enabled]		
PXE boot wait time	0		
Media detect count	1		
		++: Select Screen F1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit	

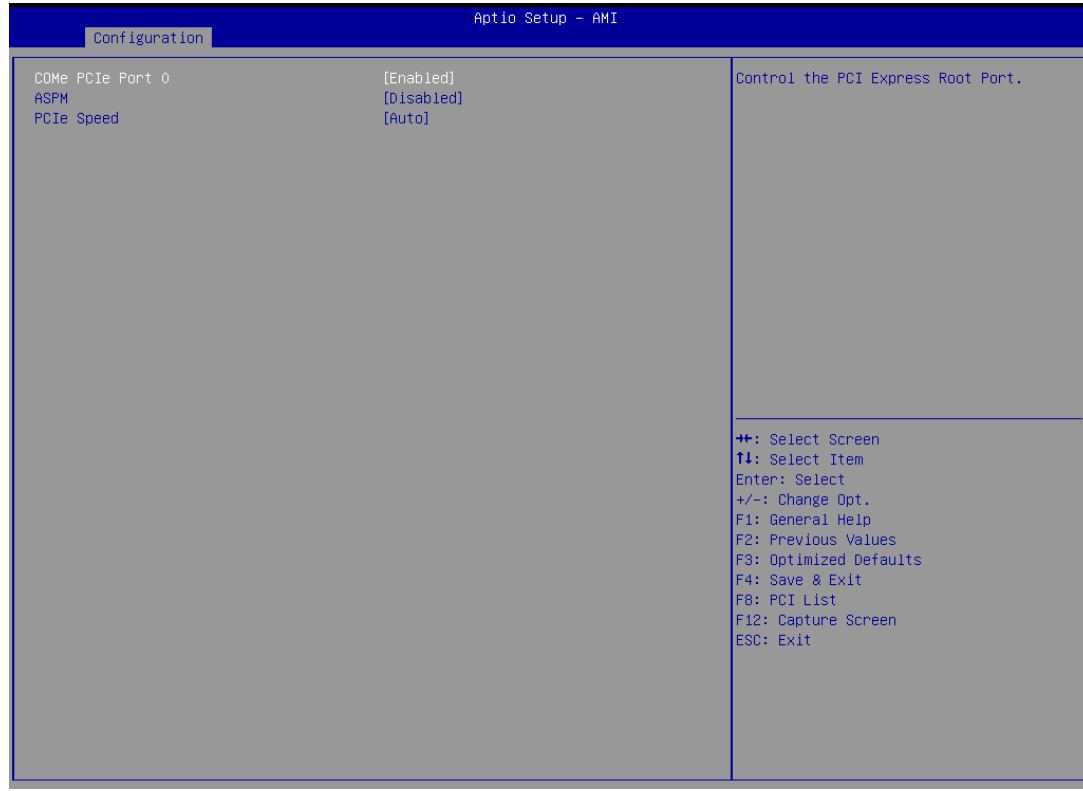
Feature	Description	Options
OnBoard LAN Controller#1	Control OnBoard LAN enable or disable.	★Enabled , Disabled
PCIE_WAKE(Wake On Lan)	Control PCIE Wake# pin for Wake On Lan function.	★Enabled , Disabled
Launch UEFI PXE ROM	Enable/Disable UEFI Network Stack	★Disabled, Enabled
IPv4 PXE Support	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.	Disabled, ★Enabled
IPv4 HTTP Support	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.	Disabled, ★Enabled
IPv6 PXE Support	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.	Disabled, ★Enabled
IPv6 HTTP Support	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.	Disabled, ★Enabled
PXE boot wait time	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.	★0
Media detect count	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.	★1

7.3.6 PCI/PCIE Configuration



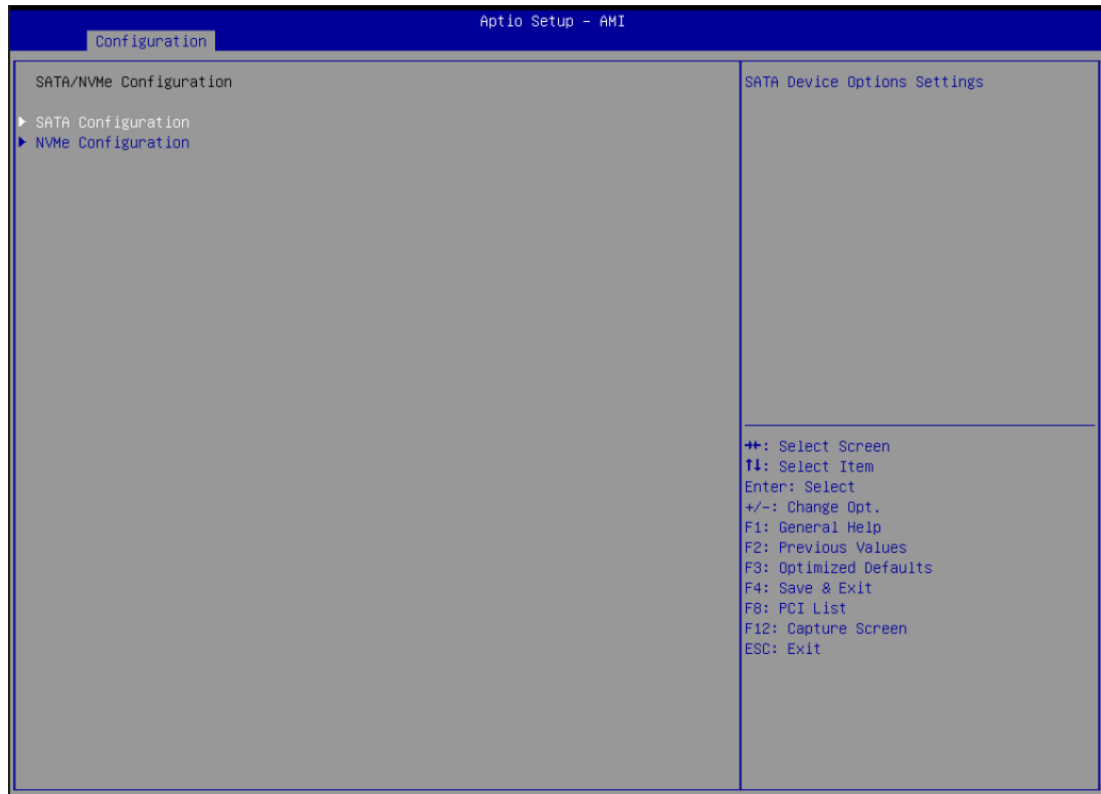
Feature	Description	Options
PCI Express Root Port 0, 1, 2, 3	PCI Express Root Port Setting	

7.3.7 COMe PCIe Port 0/1/2/3



Feature	Description	Options
PCI Express Root Port	Control the PCI Express Root Port.	Disabled, ★Enabled
ASPM	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE – Disables ASPM	★Disabled, L1, Auto
PCIe Speed	Configure PCIe Speed	★Auto, Gen1, Gen2, Gen3

7.3.8 SATA/NVMe Configuration



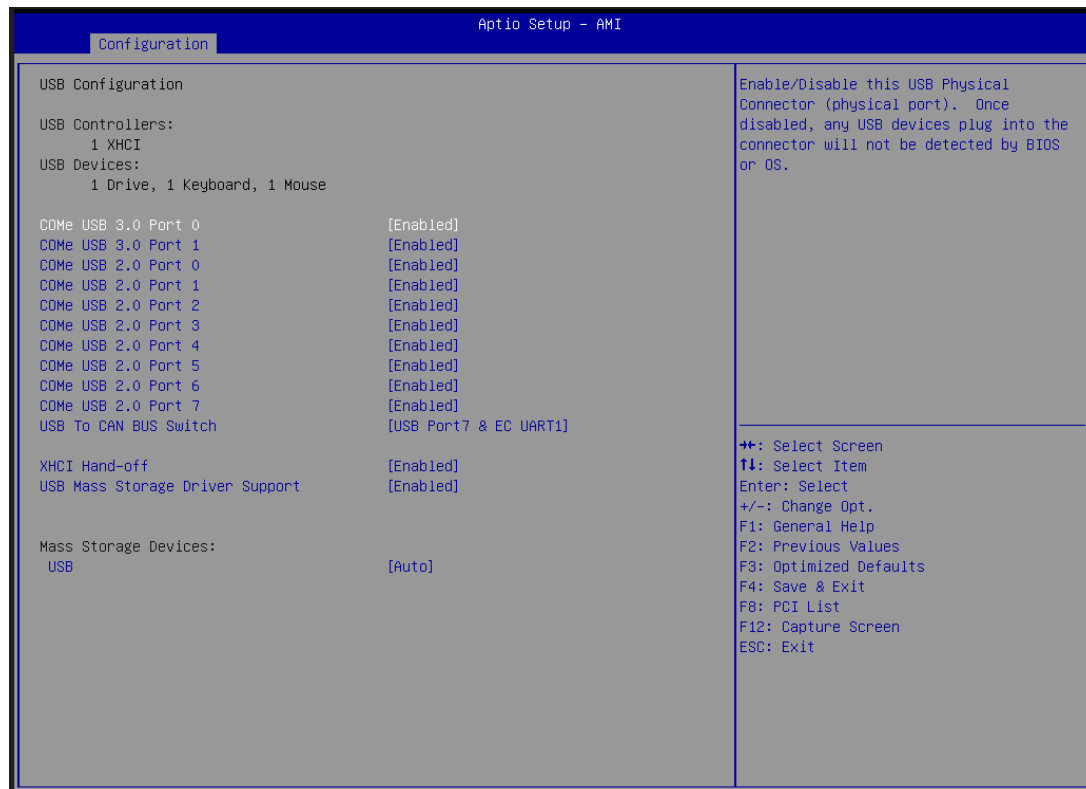
Feature	Description	Options
SATA Configuration	SATA Device Options Settings	
NVMe Configuration	NVMe Device Options Settings	

7.3.9 SATA Configuration



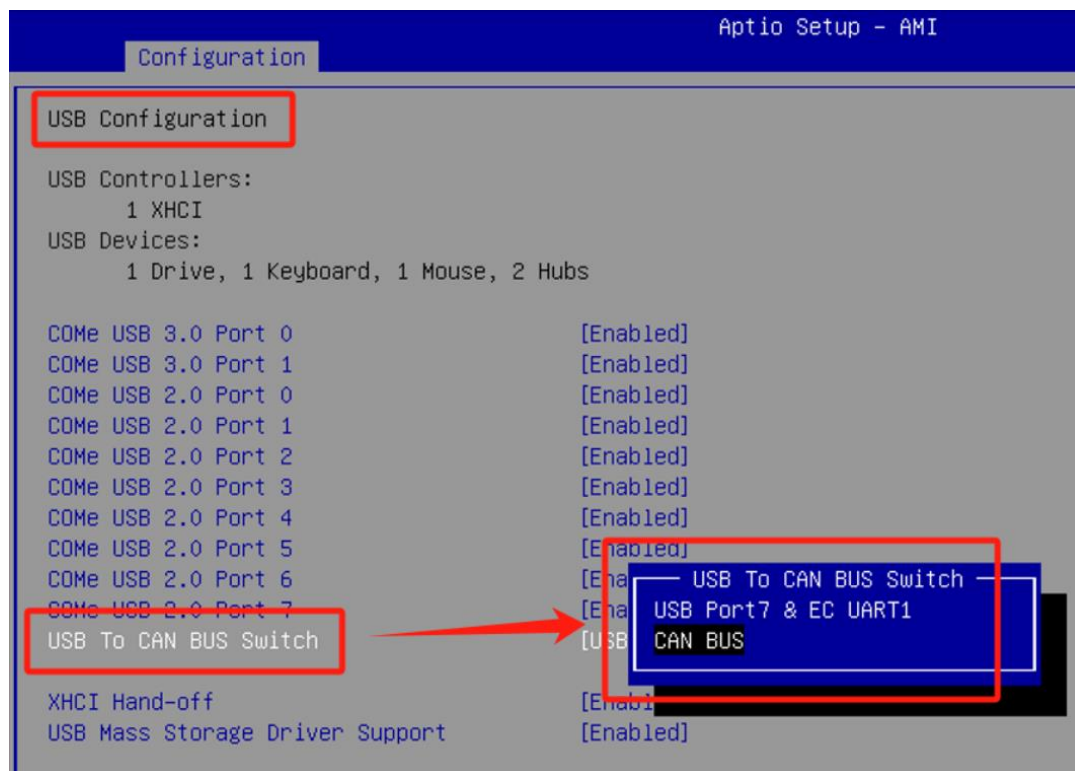
Feature	Description	Options
SATA Controller(s)	Enable/Disable SATA Device.	★Enabled , Disabled
Port 0	Enabled or Disabled SATA Port.	Disabled, ★Enabled
Hot plug	Designates this port as Hot pluggable.	★Disabled, Enabled
SATA Device Type	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.	★ Hard Disk Drive, Solid State Drive
Port 1	Enabled or Disabled SATA Port.	Disabled, ★Enabled
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

7.3.10 USB Configuration



Feature	Description	Options
COMe 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.	Disabled, ★Enabled
COMe 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.	Disabled, ★Enabled
USB To CAN BUS switch	Set USB To CAN BUS	★USB Port7 & EC UART1, CAN BUS
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	Disabled, ★Enabled
USB	Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM'; drives with no media will be emulated according to a drive type.	★Auto, Floppy, Forced FDD, Hard Disk, CD-ROM

CAN Bus (Option)



Please note: To enable the CAN bus function, a custom BOM is required, along with a CAN bus transceiver on the carrier board to support the physical layer.

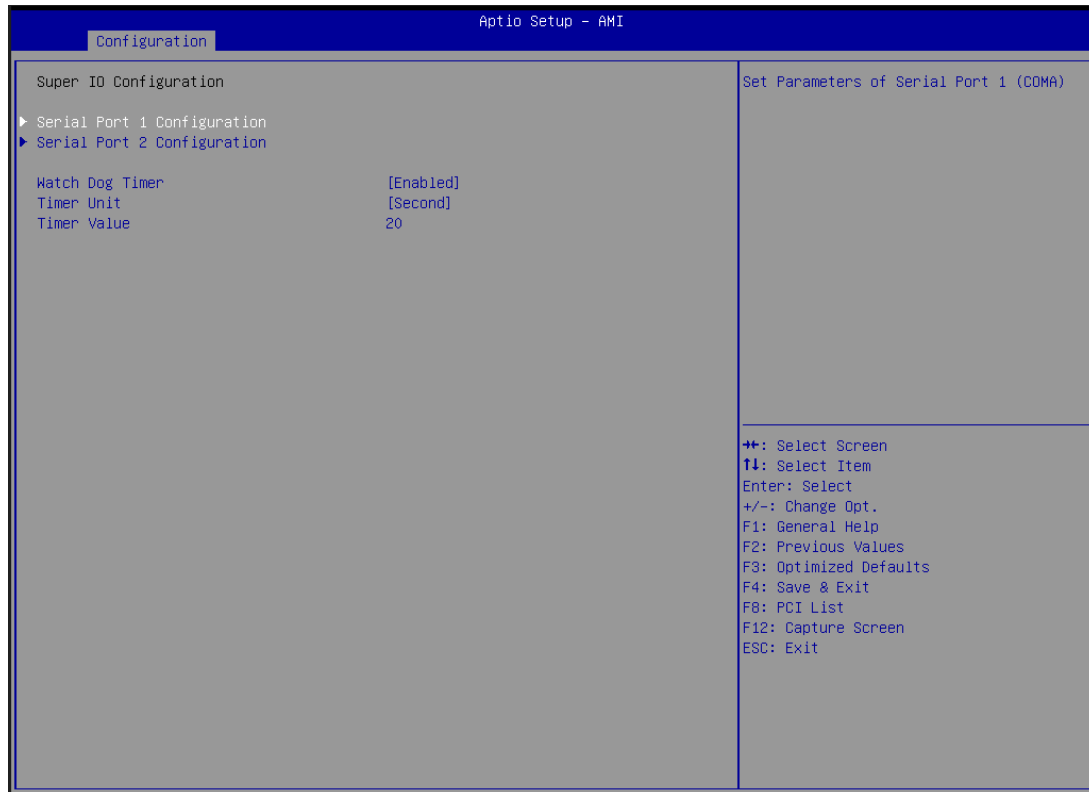
The CAN bus signals share lines with SER1 (UART1), and the controller is connected via USB 2.0 port #7. This USB port will be occupied when the CAN bus is enabled.

7.3.11 TPM Configuration

Configuration			Aptio Setup - AMI
TPM 2.0 Device Found			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.
Firmware Version:	13.11		
Vendor:	IFX		
Security Device Support	[Enable]		
Active PCR banks	SHA256		
Available PCR banks	SHA256		
SHA256 PCR Bank	[Enabled]		
Pending operation	[None]		
Platform Hierarchy	[Enabled]		
Storage Hierarchy	[Enabled]		
Endorsement Hierarchy	[Enabled]		
TPM 2.0 UEFI Spec Version	[TCG_2]		
Physical Presence Spec Version	[1.3]		
TPM 2.0 InterfaceType	[TIS]		
Device Select	[Auto]		
			++: Select Screen F1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit

Feature	Description	Options
Security Device Support	Enables or Disables BIOS support for security devices. O.S. will not show Security Device. TCG EFI protocol and INT1A Interface will not be available.	Disabled, ★Enabled
SHA256 PCR Bank	Enables or Disables SHA256 PCR Bank.	Disabled, ★Enabled
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.	Disabled, ★Enabled
Storage Hierarchy	Enables or Disables Storage Hierarchy.	Disabled, ★Enabled
Endorsement Hierarchy	Enables or Disables Endorsement Hierarchy.	Disabled, ★Enabled
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_1_2, ★TCG_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.	1.2, ★1.3
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.	TPM 1.2, TPM 2.0, ★Auto

7.3.12 Super IO Configuration



Feature	Description	Options
Module Serial Port 1	Set Parameters of Serial Port 1 (COMA)	
Module Serial Port 2	Set Parameters of Serial Port 2 (COMB)	
Watch Dog Timer	Enable/Disable Watch Dog Timer	★Disabled, Enabled
Timer Unit	Select Timer count unit of WDT	★Second, Minute
Timer value	Set WDT Timer value seconds / minutes	★20

7.3.13 Serial Port 1 Configuration



Feature	Description	Options
Module Serial Port 1	Enable or Disable Serial Port (COM)	Disabled, ★Enabled

7.3.14 Serial Port 2 Configuration



Feature	Description	Options
Module Serial Port 2	Enable or Disable Serial Port (COM)	Disabled, ★Enabled

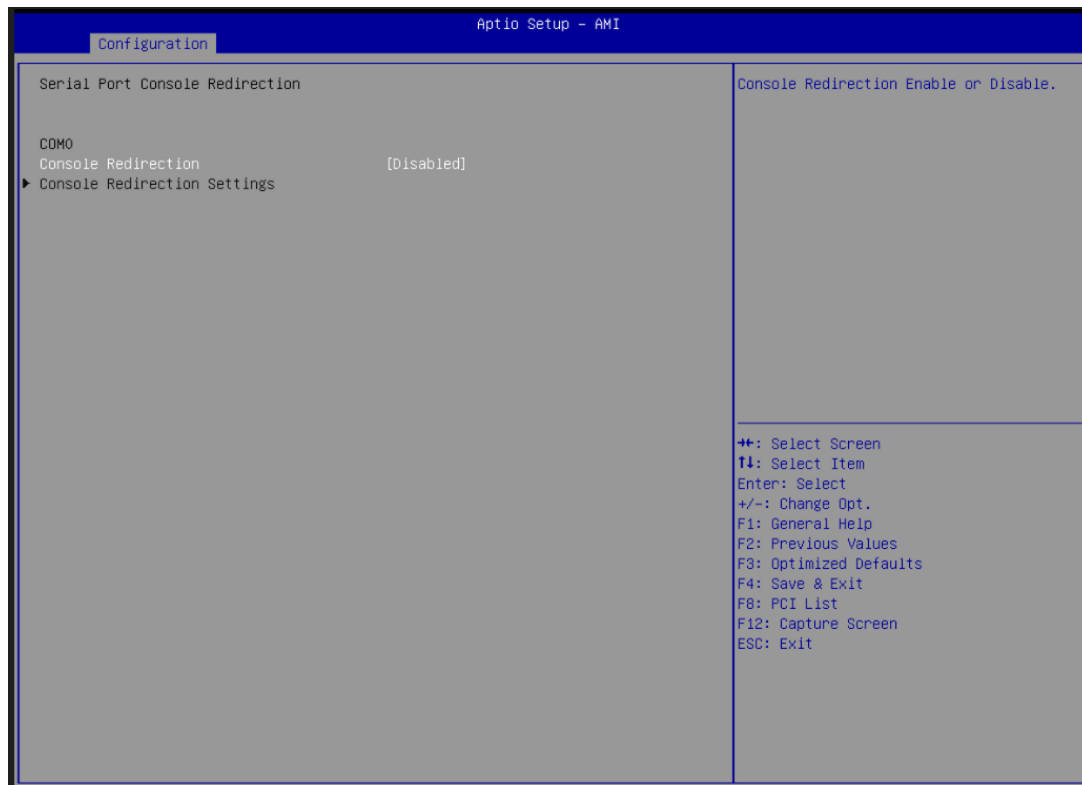
7.3.15 H/W Monitor

Configuration			Aptio Setup - AMI
Module Fan Function	[Enabled]	Disable / Enable the smart fan control.	
Module Fan Control Mode	[Thermal Cruise Mode]		
Module Fan Tolerance Temp	5		
Module Fan Start Target Temp	40		
Module Fan Full Target Temp	60		
Module Fan Low End	5		
Carrier Fan Function	[Enabled]		
Carrier Fan Control Mode	[Thermal Cruise Mode]		
Carrier Fan Tolerance Temp	5		
Carrier Fan Start Target Temp	40		
Carrier Fan Full Target Temp	60		
Carrier Fan Low End	5		
CPU Temperature	: +55 °C		
Module Fan Speed	: N/A		
Carrier Fan Speed	: N/A		
Vcore	: +0.702 V		
+3.3V	: +3.336 V		
+5V	: +5.174 V		
+12V	: +12.315 V		
VDIMM	: +1.122 V		
		++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit	

Feature	Description	Options
Module FAN Function	Disable / Enable the smart fan control	★Disabled, Enabled,
Module FAN Control Mode	Select smart fan control mode	★Thermal Cruise Mode, Fan Control Mode
Module FAN Tolerance Temp	In Thermal Cruise Mode: tolerance of target temperature	★5
Module FAN Start Target Temp	In Thermal Cruise Mode: start temperature	★40
Module FAN Full Target Temp	In Thermal Cruise Mode: full speed temperature	★60
Module FAN Low End	In Thermal Cruise Mode: low end of fan speed (0-100%)	★5
Carrier FAN Function	Disable / Enable the smart fan control	★Disabled, Enabled,
Carrier FAN Control Mode	Select smart fan control mode	★Thermal Cruise Mode, Fan Control Mode
Carrier FAN Tolerance Temp	In Thermal Cruise Mode: tolerance of target temperature	★5
Carrier FAN Start Target Temp	In Thermal Cruise Mode: start temperature	★40
Carrier FAN Full Target Temp	In Thermal Cruise Mode: full speed temperature	★60
Carrier FAN Low End	In Thermal Cruise Mode: low end of fan speed (0-100%)	★5

7.3.16 Serial Port Console

Redirection



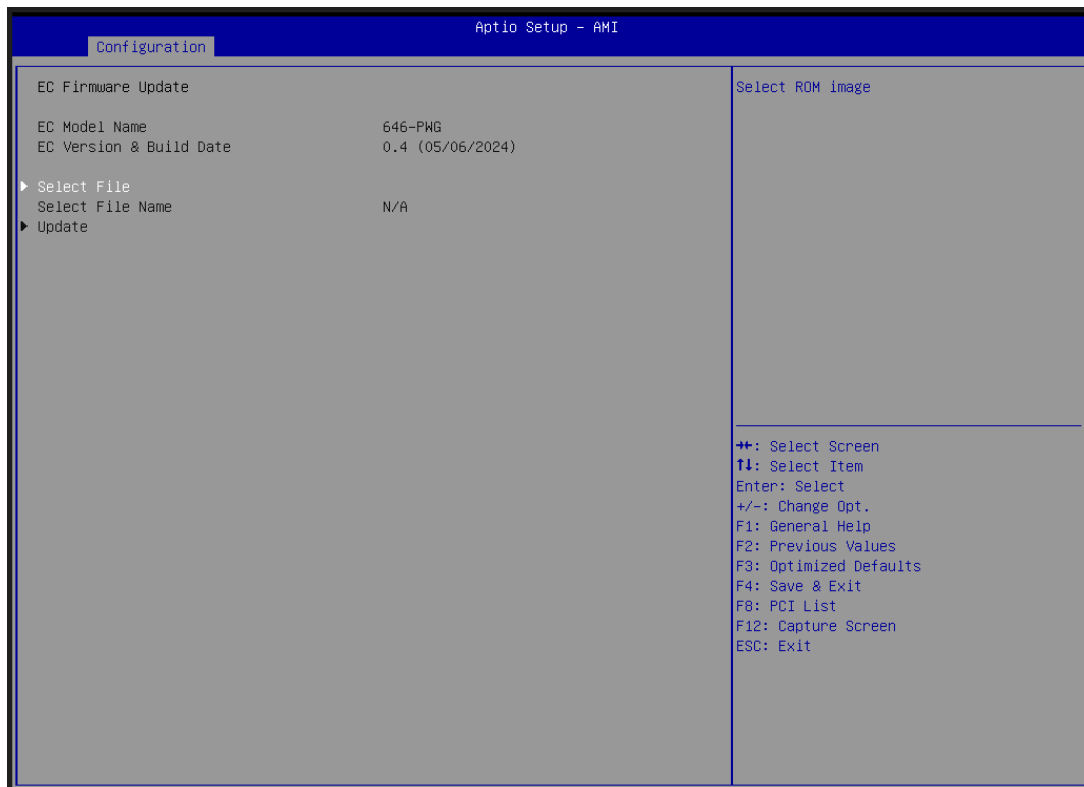
Feature	Description	Options
Console Redirection	Console Redirection Enable or Disable	★Disabled, Enabled

7.3.17 Console Redirection Settings

Configuration		Aptio Setup - AMI
COM0 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Terminal Type	[VT100Plus]	
Bits per second	[115200]	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F8: PCI List F12: Capture Screen ESC: Exit
Data Bits	[8]	
Parity	[None]	
Stop Bits	[1]	
Flow Control	[None]	
VT-UTF8 Combo Key Support	[Enabled]	
Recorder Mode	[Disabled]	
Resolution 100x31	[Disabled]	
Putty KeyPad	[VT100]	

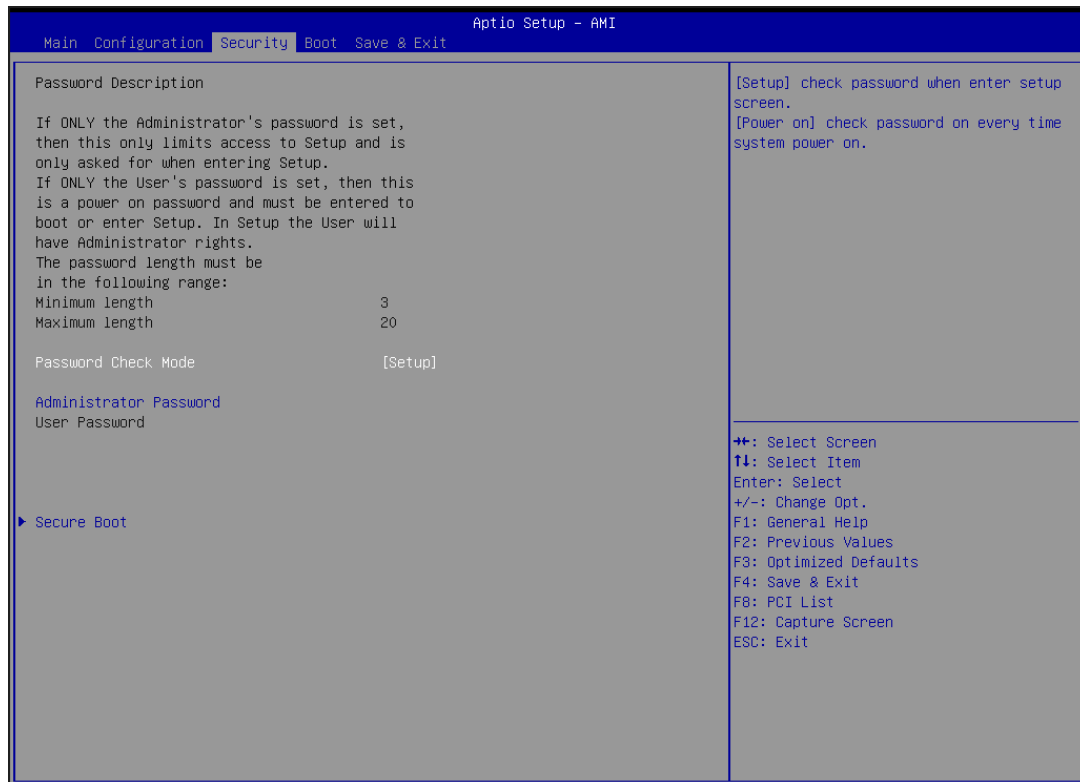
Feature	Description	Options
Terminal Type	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	VT100, ★VT100Plus, VT-UTF8, ANSI
Bits per second	Select Serial port transmission speed. The speed must be matched on other side. Long or noisy lines may require lower speeds.	9600, 19200, 38400, 57600, ★115200
Data bits	Data bits	7, ★8
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 1 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	Disabled, ★Enabled
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 FunctionKey and KeyPad on Putty	★VT100, LINUX, XTERMR6, SCO, ESCN, VT400

7.3.18 EC Firmware Update



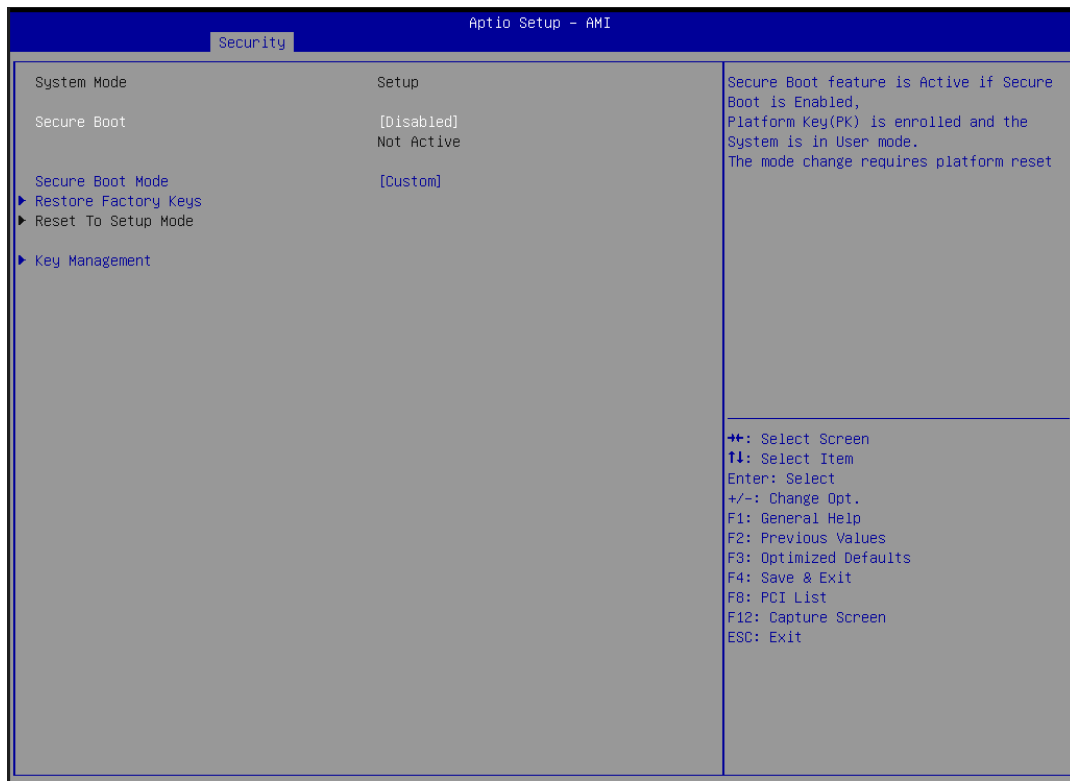
Feature	Description	Options
Select File	Select BIOS BIN file in (USB) drive to update	
Update	Start update ROM image	

7.4 Security



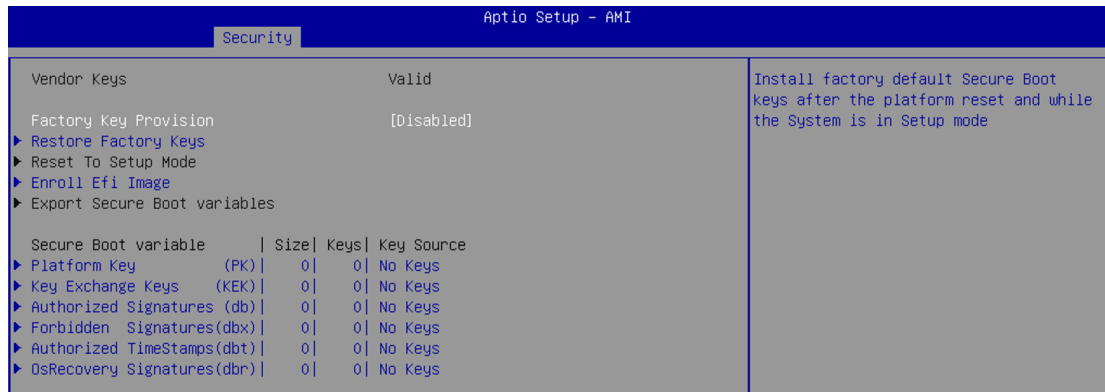
Feature	Description	Options
Password Check Mode	[Setup] check password when enter setup screen. [Power on] check password on every time system power on.	★Setup, Power On
Administrator Password	Set Administrator Password	
Secure Boot	Secure Boot configuration	

7.4.1 Secure Boot



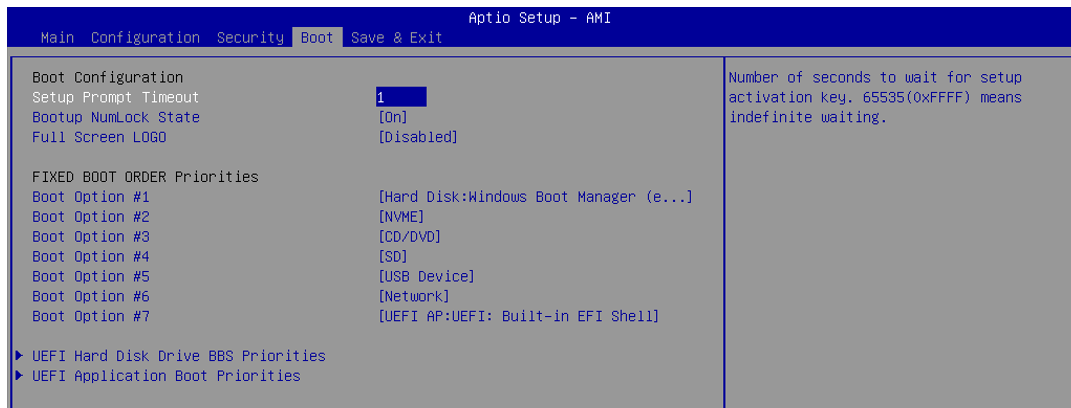
Feature	Description	Options
Secure Boot	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset.	★Disabled, Enabled
Secure Boot Mode	Secure Boot Mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication	Standard, ★Custom
Restore Factory keys	Force System to User Mode. Install factory default Secure Boot key databases	Yes, No
Key Management	Enables expert users to modify Secure Boot Policy variables without variable authentication	

7.4.2 Key Management



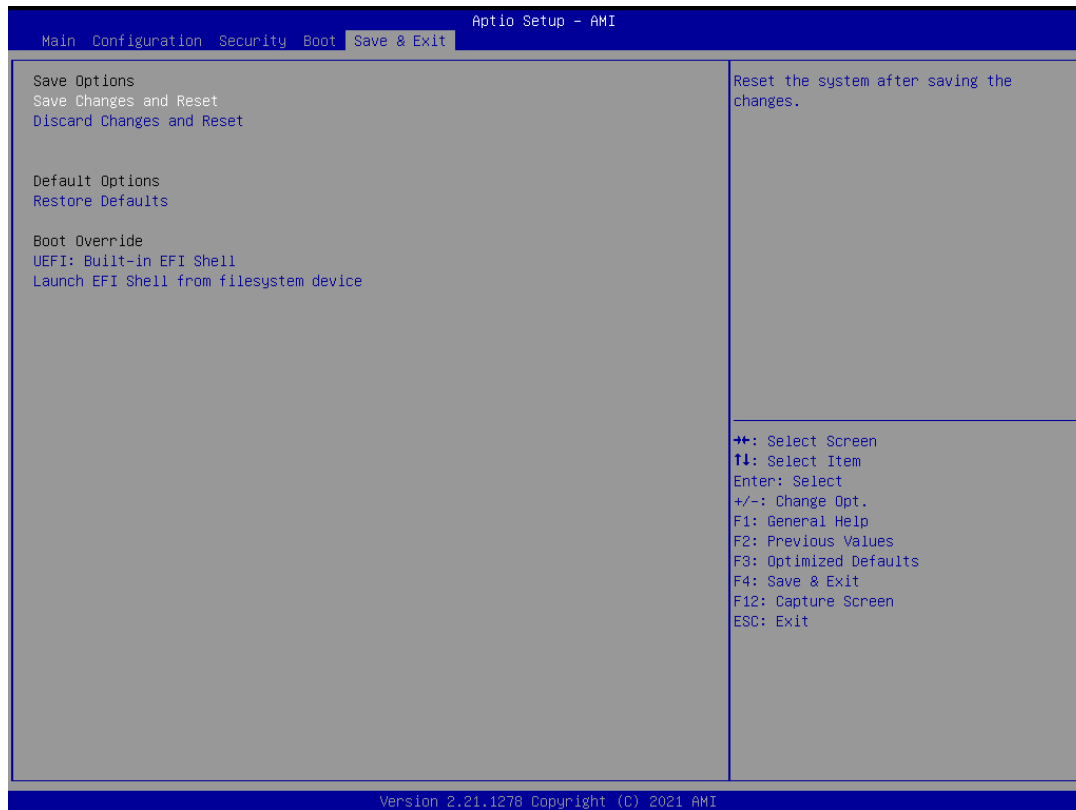
Feature	Description	Options
Factory keys Provision	Install factory default Secure Boot key after the platform reset and while the System is in Setup mode.	★Disabled, Enabled
Restore Factory keys	Force System to User Mode. Install factory default Secure Boot key databases	Yes, No
Enroll Efi Image	Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db)	
Platform Key(PK)	Enroll Factory Defaults or load certificates from a file:	
Key Exchange Keys(KEK)	1.Public Key Certificate:	
Authorized Signatures(db)	a)EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER)	
Forbidden Signatures(dbx)	c) EFI_CERT_RSA2048 (bin)	
Authorized TimeStamps(dbt)	d)EFI_CERT_SHAXXX	
OsRecovery Signatures(dbr)	2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed	

7.5 Boot



Feature	Description	Options
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.	★1
Bootup NumLock State	Select the keyboard NumLock state.	★On, Off
Full Screen LOGO	Enables or disables Quiet Boot option and Full screen Logo.	★Disabled, Enabled
Boot Option #1 ~ #5	Sets the system boot order	Hard Disk, UEFI AP: UEFI: Built-in EFI Shell, CD/DVD, USB Device; Network, Disabled
UEFI Application Boot Priorities	Specifies the Boot Device Priority sequence from available UEFI Application	

7.6 Save & Exit



Feature	Description	Options
Save Changes and Reset	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		
Launch EFI Shell from filesystem device	Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.	

Chapter 8

Overview

- 8 BIOS / EC Update
- 8.1 BIOS Update
- 8.2 EC Update

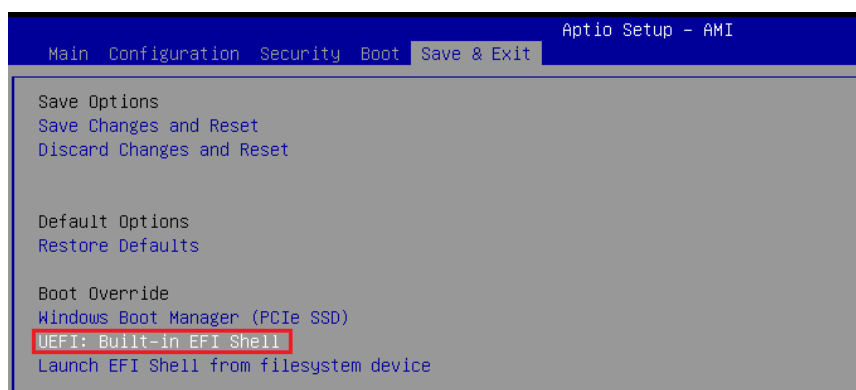
8. BIOS / EC Update

8.1 BIOS Update

Step 1. Unzip update file to the USB DOK (USB DOK must be FAT or FAT32 format)

Step 2. Plug the USB DOK on the target system and select "Built-in EFI Shell" in the BIOS "Save&Exit" page

Step 3. Shown as below picture



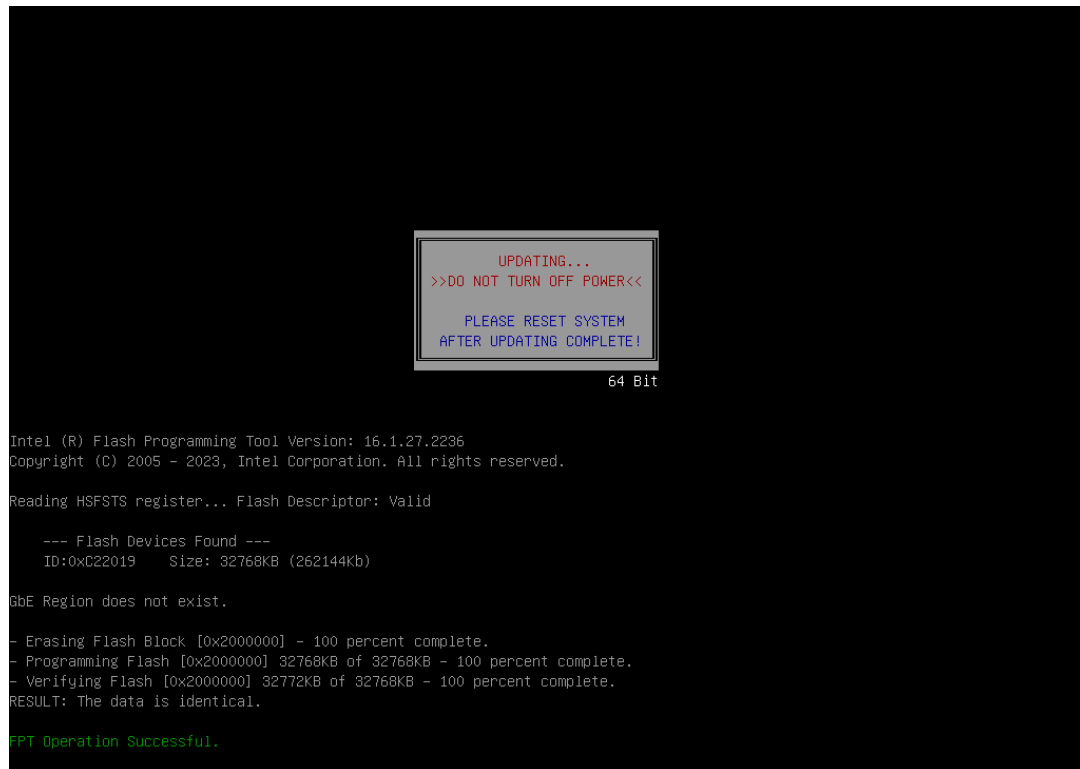
Step 3. Under the UEFI shell, change prompt to your USB DOK, the below example is "fs0: "

Step 4. Then change the folder with updated file and use command: "update " and press enter

```
EFI Shell version 2.80 [5.26]
Current running mode 1.1.2
Device mapping table
fs0      :Removable HardDisk - Alias hd14n0b blk0
          :PciRoot(0x0)/Pci(0x14,0x0)/USB(0xD,0x0)/HD(1,MBR,0xD4F264B2,0x3F,0x3A1FFC1)
blk0     :Removable HardDisk - Alias hd14n0b fs0
          :PciRoot(0x0)/Pci(0x14,0x0)/USB(0xD,0x0)/HD(1,MBR,0xD4F264B2,0x3F,0x3A1FFC1)
blk1     :Removable BlockDevice - Alias (null)
          :PciRoot(0x0)/Pci(0x14,0x0)/USB(0x6,0x0)/USB(0x0,0x0)
blk2     :Removable BlockDevice - Alias (null)
          :PciRoot(0x0)/Pci(0x14,0x0)/USB(0xD,0x0)

Press ESC in 4 seconds to skip startup.nsh, any other key to continue.
Shell> fs0:
fs0:\> update.efi_
```

Step 5. The updating process will start and show the updating progress



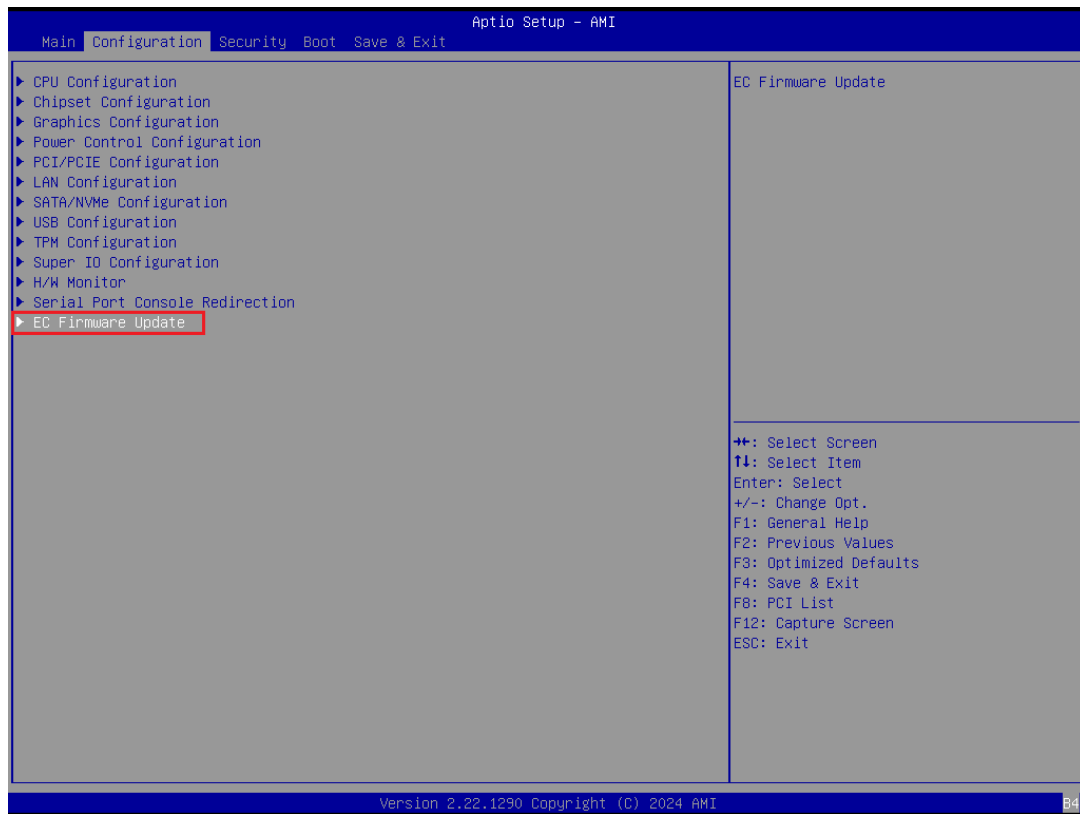
(BIOS updating finished)

Step 6. Please power off and restart the system once updating finished

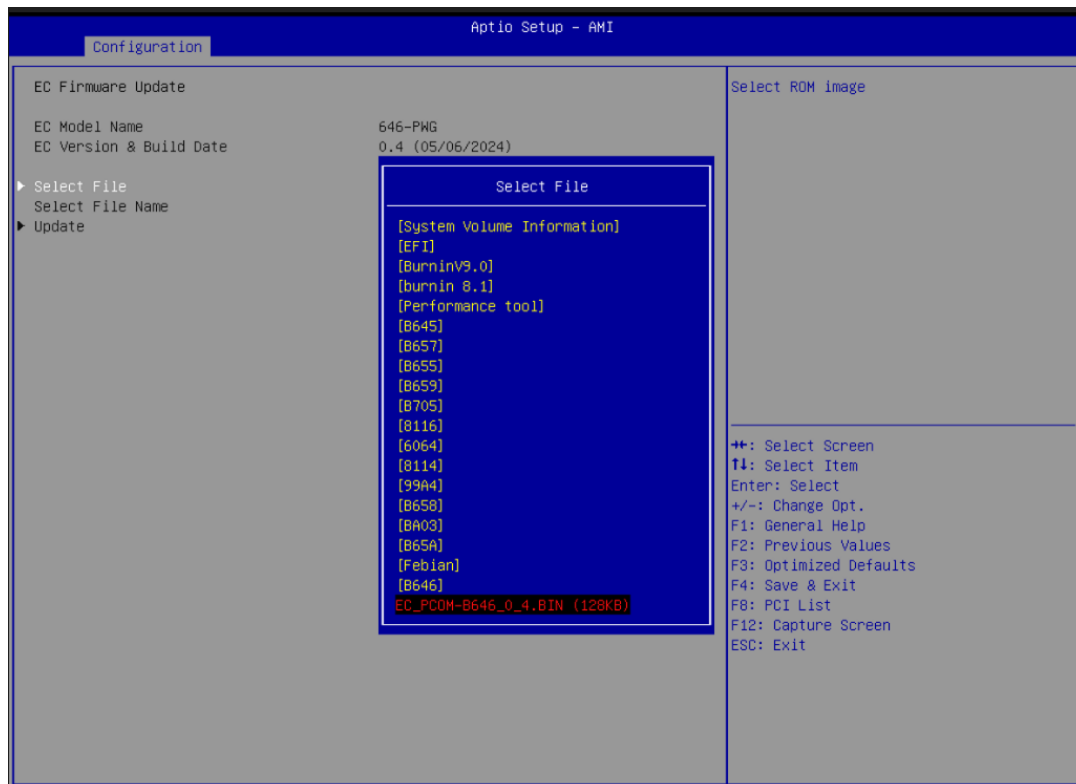
8.2 EC Update

Step 1. Unzip EC binary file to the USB DOK (USB DOK must be FAT or FAT32 format)

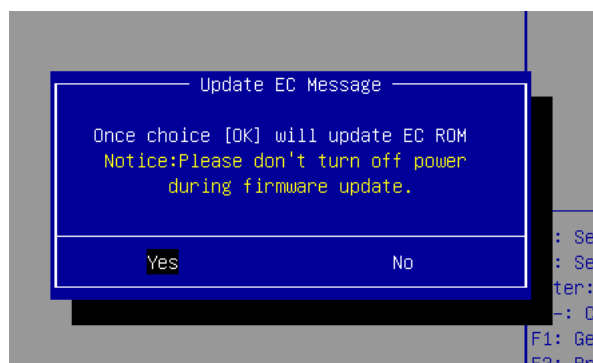
Step 2. Select “EC Firmware Update” item in BIOS setup menu



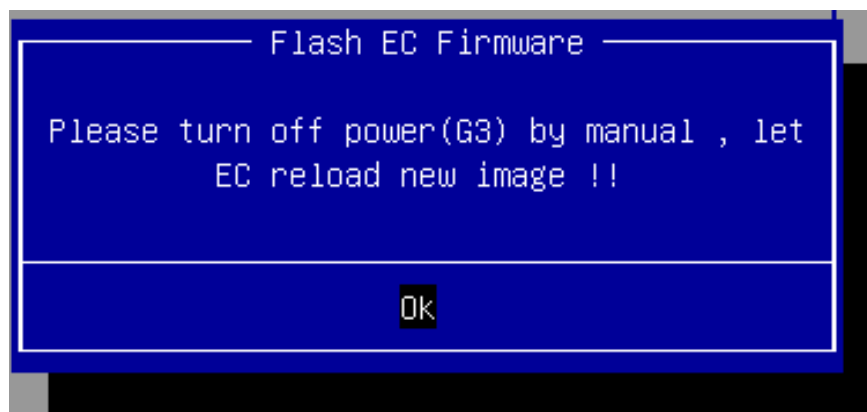
Step 3. Select EC binary file by option item shown as below



Step 4. Select “Yes” to start EC update (Please don’t turn off power during firmware update)



Step 5. Turn off power to make system into G3 status once updating finished, then power on the system



Chapter 9

Overview

9 Portwell Software Tool

9. Portwell Software Tool

PORTWELL Download Center

<https://www.portwell.com.tw/support-center/download-center/>

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 further information please contact PORTWELL.

Chapter 10

Overview

10 Packaging Information

10. Packaging Information

PCOM-B646 packaging specification will follow the Portwell standard style.

Package	Appearance	Dimension
Anti-Static Bubble Bag		180x130mm
White Paper Box		210x150x40mm
Shipping Box (10 in 1)		595x300x185mm

Table 14 Packaging Information

Chapter 11

Overview

11 Industrial Specification

11. Industrial Specification

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>



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