
EmCOMe-i93U0 EmCOMe-i94U0

**COM Express® Compact
Type 6 CPU Module**

User's Manual **Version 1.1**

Revision History

Version	Date	Description
1.0	2024.12	Initial release
1.1	2025.04	Added EmCOMe-i93U0 specifications

Preface	iii
Copyright Notice	iii
Declaration of Conformity	iii
CE	iii
FCC Class A	iii
RoHS	iv
SVHC / REACH	iv
Warning	v
Replacing the Lithium Battery	v
Technical Support	v
Warranty	vi
Chapter 1 - Introduction	1
1.1 The Product	2
1.2 About This Manual	2
1.3 Specifications	3
1.4 Inside the Package	4
1.5 Ordering Information	5
1.5.1 Optional Accessories	5
Chapter 2 - Board Overview	7
2.1 What is “COM Express®”?	8
2.2 Board Dimensions	9
2.3 Block Diagram	10
2.4 Connector Pin Definition	11
Chapter 3 - Installation & Maintenance	15
3.1 Installing the CPU Module to Carrier Board	16
Chapter 4 - BIOS	19
4.1 Main	20
4.2 Advanced	22
4.2.1 CPU Configuration	23
4.2.2 Power & Performance	24
4.2.3 PCH-FW Configuration	25
4.2.4 Trusted Computing	26

4.2.5	ACPI Settings	27
4.2.6	Hardware Monitor	28
4.2.7	Super IO Configuration.....	29
4.2.8	S5 RTC Configuration	32
4.2.9	PCI Subsystem Settings.....	33
4.2.9.1	PCI Express Setting	34
4.2.10	USB Configuration.....	35
4.2.11	Network Stack Configuration	37
4.3	Chipset	38
4.3.1	System Agent (SA) Configuration.....	39
4.3.2	PCH-IO Configuration.....	41
4.3.2.1	PCI Express Configuration	42
4.4	Security.....	47
4.5	Boot	48
4.6	Save & Exit	49
Appendix		51
Appendix A: Watchdog Timer (WDT) Setting		52

Copyright Notice

All Rights Reserved.

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Single Board Computer from the power source when you want to work on the inside.
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry.
3. Use a grounded wrist strap when handling computer components.
4. Place components on a grounded antistatic pad or on the bag that comes with the Single Board Computer, whenever components are separated from the system.

Replacing the Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash-can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at:

<http://www.arbor-technology.com>

Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

<http://www.arbor-technology.com>

E-mail: info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.



Chapter 1

Introduction

1.1 The Product

The EmCOMe-i93U0/EmCOMe-i94U0 is a space-conscious CPU board of 95 mm x 95 mm to take up only small footprint in your system. By the architecture of Type 6, the board has two high-performance connectors to promise stable data passing rate. The soldered onboard 13th Generation Intel® Core™ processor, along with integrated Intel® Graphics chipset, bring LVDS, and DDI solution for most monitors or LCD video panels.

For system configuration, the board is supported by AMI UEFI BIOS. EmCOMe-i93U0/EmCOMe-i94U0 is an ideal choice for some demanding industrial control and data communications by its significant processing performance, low power consumption and these features:

- **EmCOMe-i93U0:** Soldered onboard 12th Generation Intel® Alder Lake Core™ i7-1265UE / i5-1245UE / i3-1215UE / Celeron7305E processor
- **EmCOMe-i94U0:** Soldered onboard 13th Generation Intel® Raptor Lake Core™ i7-1365UE / i5-1335UE / i3-1315UE / U300E processor
- Up to 6x Performance core + 8x Efficient core and up to 96x graphic execution units
- Dual channel DDR5 memory up to 64GB, 4800MT/s
- Support Max 4 independent displays
- 8.5V~20V Wide Range Voltage Input
- Wide Range Operating Temp.: -40 ~ 85°C

1.2 About This Manual

This user's manual provides general information and installation instructions about the product. This user's manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this booklet. Please consult your vendor before further handling.

1.3 Specifications

System	
CPU	EmCOMe-i93U0: Soldered onboard 12th Generation Intel® Alder Lake Core™ - i7-1265UE 3.5GHz (E-core) / 4.7GHz (P-core) - i5-1245UE 3.3GHz (E-core) / 4.4GHz (P-core) - i3-1215UE 3.3GHz (E-core) / 4.4GHz (P-core) - Intel® Celeron 7305E 1.0GHz
	EmCOMe-i94U0: Soldered onboard 13th Generation Intel® Raptor Lake Core™ - i7-1365UE 3.7GHz (E-core) / 4.9GHz (P-core) - i5-1335UE 3.4GHz (E-core) / 4.6GHz (P-core) - i3-1315UE 3.3GHz (E-core) / 4.5GHz (P-core) - U300E 3.2GHz (E-core) / 4.3GHz (P-core)
Memory	2 x DDR5 SO-DIMM 4800MHz up to 64GB
BIOS	AMI UEFI BIOS
TPM	Supports TPM 2.0
Watchdog Timer	1~255 levels reset
I/O Interface	
Storage	2 x SATA Gen3 ports
Serial Port	2 x UART ports (RX/TX only)
Others	I ² C, GPIO, SMBUS, LPC Interface
USB Port	8 x USB 2.0 ports 4 x USB 3.0 ports
Expansion Bus	2 x PCIe4 lanes (or 1 x PCIe8) 8 x PCIe1 lanes (or 1 x PCIe4 + 4 x PCIe1)
Ethernet Chipset	1 x Intel® i226 series PCIe 2.5GbE Ethernet controller
Audio	Intel® High Definition Audio
Display	
Graphic Chipset	Integrated Intel® Iris Xe or UHD Graphics (Depends on CPU SKU)

Graphic Interface	1 x Dual Channel 24-bit LVDS (default) or eDP 1 x Analog RGB port 3 x DDI ports Supports Max. 4 independent display
Graphic Resolution	VGA : up to 1920x1200 @ 60Hz DVI : up to 1920x1200 @ 60Hz LVDS: up to 1920x1200 @ 60Hz (dual channel 24-bit) DP: up to 3840x2160 @ 60Hz
OS Support	
Microsoft	Windows 10 64-bit / Windows 11 64-bit
Linux	Ubuntu
Mechanical & Environmental	
Power Requirement	8.5V ~ 20V wide range voltage input, +5VSB
Power Consumption	2.1A@12V 1.3A@20V (i7-1265UE/i7-1365UE CPU Module only)
Operating Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 85°C (non-condensing)
Dimensions (L x W)	95 x 95 mm (3.7" x 3.7")

1.4 Inside the Package

Before you begin installing your single board, please make sure that the following materials have been shipped:



1 x EmCOMe-i93U0 or EmCOMe-i94U0 COM Express CPU Module



1 x Quick Installation Guide

If any of the above items is damaged or missing, contact your vendor immediately.

1.5 Ordering Information

EmCOMe-i93U0-WT-1265UE	12 th Gen. Intel® Core™ i7-1265UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i93U0-WT-1245UE	12 th Gen. Intel® Core™ i5-1245UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i93U0-WT-1215UE	12 th Gen. Intel® Core™ i3-1215UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i93U0-WT-7305E	12 th Gen. Intel® Celeron 7305E WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i94U0-WT-1365URE	13 th Gen. Intel® Core™ i7-1365URE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i94U0-WT-1365UE	13 th Gen. Intel® Core™ i7-1365UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i94U0-WT-1335UE	13 th Gen. Intel® Core™ i5-1335UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i94U0-WT-1315UE	13 th Gen. Intel® Core™ i3-1315UE WT COME Compact Type 6 CPU Module, -40 ~ 85°C
EmCOMe-i94U0-WT-U300E	13 th Gen. Intel® U300E WT COME Compact Type 6 CPU Module, -40 ~ 85°C

1.5.1 Optional Accessories

HS-93U0-C1	Heat sink with Fan (95x95x36.5mm)
HS-93U0-F1-T	Heat spreader, threaded standoffs (bore hole) (95x95x11mm)
HS-93U0-F1-NT	Heat spreader, non-threaded standoffs (bore hole) (95x95x11mm)
PBE-1705	COM Express® Type 6 evaluation carrier board (ATX form factor)
CBK-03-1705-00	Cable kit 1 x SATA cable 2 x COM Flat cables

Driver Installation

To install the drivers, please visit our website at www.arbor-technology.com and download the driver pack from the product page.

This page is intentionally left blank.



Chapter 2

Board Overview

2.1 What is “COM Express®”?

With more and more demands on small and embedded industrial boards, a multi-functional COM (Computer-on-Module) surfaces as a great solution.

COM Express® supports seven pin-out types applying to Basic and Extended form factors:

Module Type 1 and 10 support single connector with two rows (220 pins).

Module Type 2, 3, 4, 5 and 6 support two connectors with four rows (440 pins).

EmCOMe-i94U0 is a Type-6 module.

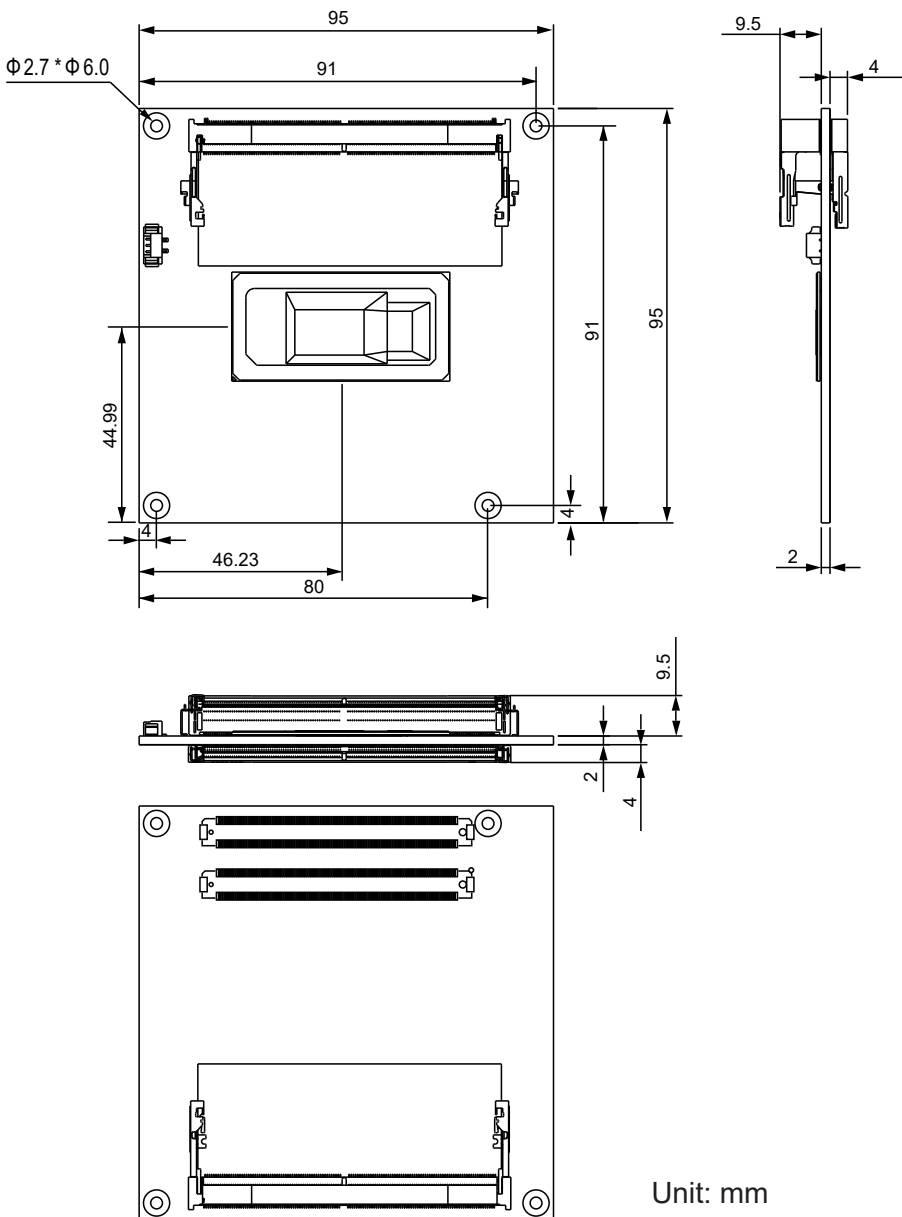
Difference between Standard Type 6 and EmCOMe-i93U0/EmCOMe-i94U0 is listed as below:

Module Type	Standard Type 6	EmCOMe-i93U0/ EmCOMe-i94U0
Connectors	2	2
Connector Rows	A, B, C, D	A, B, C, D
PCIe Lanes (Max)	24	16
LAN (Max)	1	1
Serial Ports (Max)	2	2
Digital Display I/F (Max)	3	3
USB 3.0 Ports (Max)	4	4

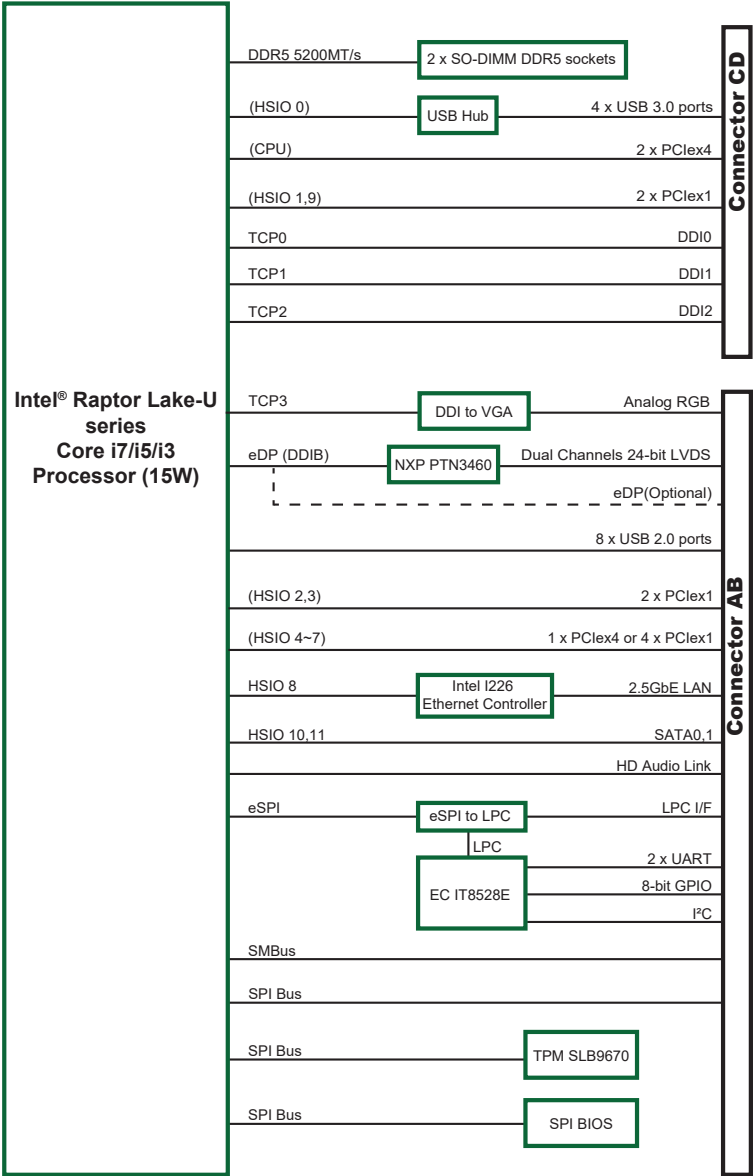
Row AB provides pins for PCI Express, SATA, LVDS, LCD channel, LPC bus, system and power management, VGA, LAN, and power and ground interfaces.

Row CD provides SDVO and legacy PCI signals next to additional PCI Express, LAN and power and ground signals. The COM are targeted at following applications:

- Retail & Advertising
- Medical
- Test & Measurement
- Gaming & Entertainment
- Industrial & Automation
- Military & Government
- Security



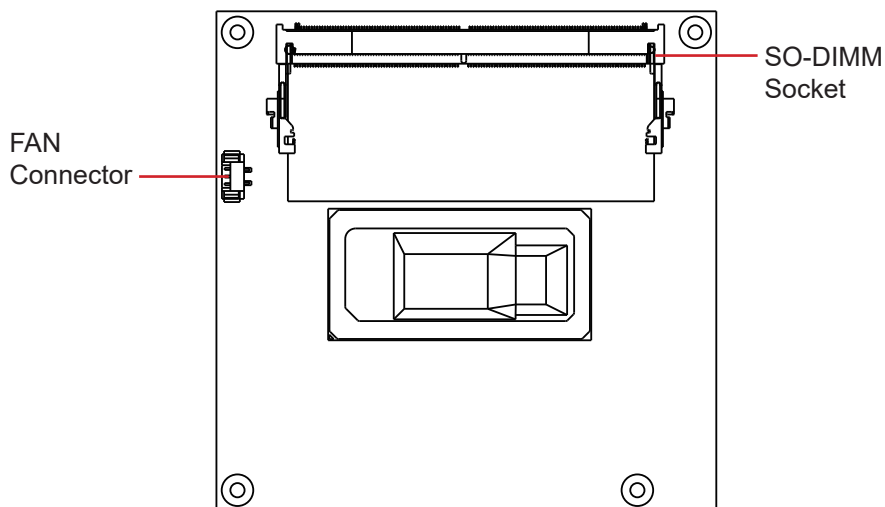
2.3 Block Diagram



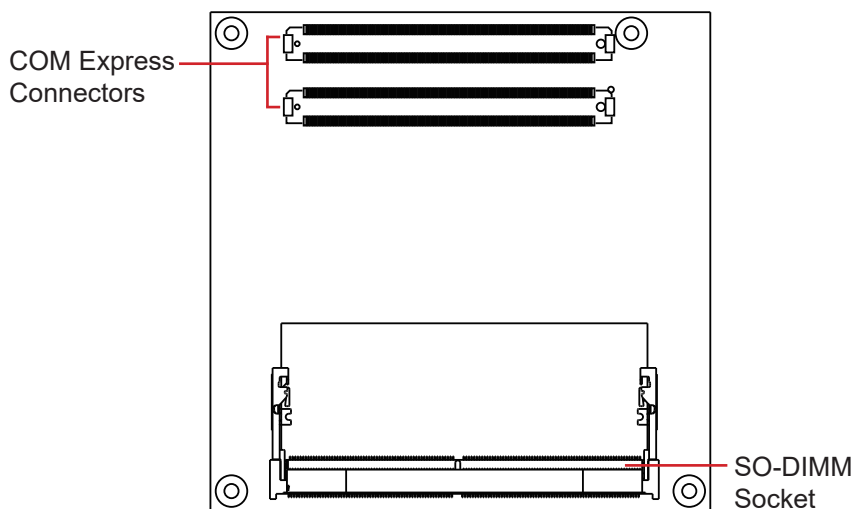
2.4 Connector Pin Definition

Being a most commonly-used Type 6, the EmCOMe-i93U0/EmCOMe-i94U0 features two board-to-board connectors on bottom side.

Top Side



Bottom Side



FAN: Fan connector

Connector type: Wafer 3-pin 1.25mm 85204-0300L

Pin	Description
1	GND
2	Fan out
3	Fan Tachometer Input



COM Express AB Connector (bottom side)

B1	GND	GND	A1	B56	PCIE3_P3_RXN	PCIE3_P3_TXN	A56
B2	LAN_LED_LNK#_ACT	LAN1_MDI3N	A2	B57	DIO_6	GND	A57
B3	LPC_FRAME#	LAN1_MDI3P	A3	B58	PCIE3_P8_RXP	PCIE3_P8_TXP	A58
B4	LPC_AD0	LAN_LED_1000#	A4	B59	PCIE3_P8_RXN	PCIE3_P8_TXN	A59
B5	LPC_AD1	LAN_LED_2500#	A5	B60	GND	GND	A60
B6	LPC_AD2	LAN1_MDI2N	A6	B61	PCIE3_P7_RXP	PCIE3_P7_TXP	A61
B7	LPC_AD3	LAN1_MDI2P	A7	B62	PCIE3_P7_RXN	PCIE3_P7_TXN	A62
B8	LPC_DRQ0#	LAN_LED_LNK#	A8	B63	DIO_7	DIO_1	A63
B9	LPC_DRQ1#	LAN1_MDI1N	A9	B64	PCIE3_P6_RXP	PCIE3_P6_TXP	A64
B10	LPC_CLK	LAN1_MDI1P	A10	B65	PCIE3_P6_RXN	PCIE3_P6_TXN	A65
B11	GND	GND	A11	B66	PCH_WAKE#	GND	A66
B12	CB_PWRBTN#	LAN1_MDI0N	A12	B67	EC_WAKE_IN#	DIO_2	A67
B13	CB_SMB_CLK	LAN1_MDI0P	A13	B68	PCIE3_P5_RXP	PCIE3_P5_TXP	A68
B14	CB_SMB_DATA	0V9_LAN	A14	B69	PCIE3_P5_RXN	PCIE3_P5_TXN	A69
B15	SMB_ALERT_N	SLP_S3#	A15	B70	GND	GND	A70
B16	SATA_TXP1	SATA_TXP0	A16	B71	LVDSB_DATA0P	LVDSA_DATA0P_EDP_TXP2	A71
B17	SATA_TXN1	SATA_TXN0	A17	B72	LVDSB_DATA0N	LVDSA_DATA0N_EDP_TXN2	A72
B18	SUS_STAT#	SLP_S4#	A18	B73	LVDSB_DATA1P	LVDSA_DATA1P_EDP_TXP1	A73
B19	SATA_RXP1	SATA_RXP0	A19	B74	LVDSB_DATA1N	LVDSA_DATA1N_EDP_TXN1	A74
B20	SATA_RXN1	SATA_RXN0	A20	B75	LVDSB_DATA2P	LVDSA_DATA2P_EDP_TXP0	A75
B21	GND	GND	A21	B76	LVDSB_DATA2N	LVDSA_DATA2N_EDP_TXN0	A76
B22	N/C	N/C	A22	B77	LVDSB_DATA3P	LVDS_VDD_EN	A77
B23	N/C	N/C	A23	B78	LVDSB_DATA3N	LVDS_DATA3P	A78
B24	CB_PWROK	SLP_S5#	A24	B79	LVDS_BKLTEN	LVDS_DATA3N	A79
B25	N/C	N/C	A25	B80	GND	GND	A80
B26	N/C	N/C	A26	B81	LVDSB_CLKP	LVDSA_CLKP_EDP_TXP3	A81
B27	WDT	PM_BATLOW#	A27	B82	LVDSB_CLKN	LVDSA_CLKN_EDP_TXN3	A82
B28	N/C	SATA_LED	A28	B83	COM_BKLT_CTRL	LVDS_DDC_CLK_EDP_AUXP	A83
B29	HDA_SDIN1	HDA_SYNC	A29	B84	VCC_5V_SBY	LVDS_DDC_DATA_EDP_AUXN	A84
B30	HDA_SDIN0	HDA_RST_N	A30	B85	VCC_5V_SBY	DIO_3	A85
B31	GND	GND	A31	B86	VCC_5V_SBY	H_RCIN#	A86
B32	SPKR	HDA_BIT_CLK	A32	B87	VCC_5V_SBY	COME_EDP_HPD	A87
B33	EC_I2C_CLK	HDA_SDOUT	A33	B88	BIOS_DISABLE1#	COM_EXP_CLK_P	A88
B34	EC_I2C_DATA	BIOS_DISABLE0#	A34	B89	VGA_RED	COM_EXP_CLK_N	A89
B35	THRM#	CB_TRIP#	A35	B90	GND	GND	A90
B36	USB2_P9_DN	USB2_P8_DN	A36	B91	VGA_GREEN	SPI_POWER_+V3.3A	A91
B37	USB2_P9_DP	USB2_P8_DP	A37	B92	VGA_BLUE	SPI_MISO	A92
B38	USB_OC6789_N	USB_OC6789_N	A38	B93	VGA_HSYNC	DIO_4	A93
B39	USB2_P7_DN	USB2_P6_DN	A39	B94	VGA_VSYNC	SPI_CLK	A94
B40	USB2_P7_DP	USB2_P6_DP	A40	B95	VGA_I2C_CK	SPI_MOSI	A95
B41	GND	GND	A41	B96	VGA_I2C_DAT	COM_TPM_PP	A96
B42	USB2_P5_DN	USB2_P4_DN	A42	B97	SPL_CS0#	N/C	A97
B43	USB2_P5_DP	USB2_P4_DP	A43	B98	N/C	UART_TX0	A98
B44	USB_OC2345_N	USB_OC2345_N	A44	B99	N/C	UART_RX0	A99
B45	USB2_P3_DN	USB2_P2_DN	A45	B100	GND	GND	A100
B46	USB2_P3_DP	USB2_P2_DP	A46	B101	FAN_PWMOUT	UART_TX1	A101
B47	PLTRST#_BUFF	+VRTC_BATT	A47	B102	FAN_TACHIN	UART_RX1	A102
B48	EXCD1_CCPE#	PLTRST#_BUFF	A48	B103	SLEEP#	LID#	A103
B49	CB_SYSRST#	EXCD0_CCPE#	A49	B104	VCC_12V	VCC_12V	A104
B50	CB_RESET#	LPC_SERIRQ	A50	B105	VCC_12V	VCC_12V	A105
B51	GND	GND	A51	B106	VCC_12V	VCC_12V	A106
B52	PCIE3_P4_RXP	PCIE3_P4_TXP	A52	B107	VCC_12V	VCC_12V	A107
B53	PCIE3_P4_RXN	PCIE3_P4_TXN	A53	B108	VCC_12V	VCC_12V	A108
B54	DIO_5	DIO_0	A54	B109	VCC_12V	VCC_12V	A109
B55	PCIE3_P3_RXP	PCIE3_P3_TXP	A55	B110	GND	GND	A110

COM Express CD Connector (bottom side)

D1	GND	GND	C1	D56	N/C	N/C	C56
D2	GND	GND	C2	D57	GND	N/C	C57
D3	USB3_DWN_TXN1	USB3_DWN_RXN1	C3	D58	N/C	N/C	C58
D4	USB3_DWN_TXP1	USB3_DWN_RXP1	C4	D59	N/C	N/C	C59
D5	GND	GND	C5	D60	GND	GND	C60
D6	USB3_DWN_TXN2	USB3_DWN_RXN2	C6	D61	N/C	N/C	C61
D7	USB3_DWN_TXP2	USB3_DWN_RXP2	C7	D62	N/C	N/C	C62
D8	GND	GND	C8	D63	N/C	N/C	C63
D9	USB3_DWN_TXN3	USB3_DWN_RXN3	C9	D64	N/C	N/C	C64
D10	USB3_DWN_TXP3	USB3_DWN_RXP3	C10	D65	N/C	N/C	C65
D11	GND	GND	C11	D66	N/C	N/C	C66
D12	USB3_DWN_TXN4	USB3_DWN_RXN4	C12	D67	GND	N/C	C67
D13	USB3_DWN_TXP4	USB3_DWN_RXP4	C13	D68	N/C	N/C	C68
D14	GND	GND	C14	D69	N/C	N/C	C69
D15	DDI0_CLK_AUXP	N/C	C15	D70	GND	GND	C70
D16	DDI0_DATA_AUXN	N/C	C16	D71	N/C	N/C	C71
D17	N/C	N/C	C17	D72	N/C	N/C	C72
D18	N/C	N/C	C18	D73	GND	GND	C73
D19	PCIE3_P2_TXP	PCIE3_P2_RXP	C19	D74	N/C	N/C	C74
D20	PCIE3_P2_TXN	PCIE3_P2_RXN	C20	D75	N/C	N/C	C75
D21	GND	GND	C21	D76	GND	GND	C76
D22	PCIE3_P10_TXP	PCIE3_P10_RXP	C22	D77	N/C	N/C	C77
D23	PCIE3_P10_TXN	PCIE3_P10_RXN	C23	D78	PCIE4_A_P0_EXP_TX_DP	PCIE4_A_P0_EXP_RX_DP	C78
D24	N/C	DDP0_HPD	C24	D79	PCIE4_A_P0_EXP_TX_DN	PCIE4_A_P0_EXP_RX_DN	C79
D25	N/C	N/C	C25	D80	GND	GND	C80
D26	DDI0_PAIR_0P	N/C	C26	D81	PCIE4_A_P1_EXP_TX_DP	PCIE4_A_P1_EXP_RX_DP	C81
D27	DDI0_PAIR_0N	N/C	C27	D82	PCIE4_A_P1_EXP_TX_DN	PCIE4_A_P1_EXP_RX_DN	C82
D28	N/C	N/C	C28	D83	N/C	N/C	C83
D29	DDI0_PAIR_1P	N/C	C29	D84	GND	GND	C84
D30	DDI0_PAIR_1N	N/C	C30	D85	PCIE4_A_P2_EXP_TX_DP	PCIE4_A_P2_EXP_RX_DP	C85
D31	GND	GND	C31	D86	PCIE4_A_P2_EXP_TX_DN	PCIE4_A_P2_EXP_RX_DN	C86
D32	DDI0_PAIR_2P	DDI1_CLK_AUXP	C32	D87	GND	GND	C87
D33	DDI0_PAIR_2N	DDI1_DATA_AUXN	C33	D88	PCIE4_A_P3_EXP_TX_DP	PCIE4_A_P3_EXP_RX_DP	C88
D34	DDI0_DDC_AUX_SEL	DDI1_DDC_AUX_SEL	C34	D89	PCIE4_A_P3_EXP_TX_DN	PCIE4_A_P3_EXP_RX_DN	C89
D35	N/C	N/C	C35	D90	GND	GND	C90
D36	DDI0_PAIR_3P	DDI2_CLK_AUXP	C36	D91	PCIE4_B_P0_EXP_TX_DP	PCIE4_B_P0_EXP_RX_DP	C91
D37	DDI0_PAIR_3N	DDI2_DATA_AUXN	C37	D92	PCIE4_B_P0_EXP_TX_DN	PCIE4_B_P0_EXP_RX_DN	C92
D38	N/C	DDI2_DDC_AUX_SEL	C38	D93	GND	GND	C93
D39	DDI1_PAIR_0P	DDI2_PAIR_0P	C39	D94	PCIE4_B_P1_EXP_TX_DP	PCIE4_B_P1_EXP_RX_DP	C94
D40	DDI1_PAIR_0N	DDI2_PAIR_0N	C40	D95	PCIE4_B_P1_EXP_TX_DN	PCIE4_B_P1_EXP_RX_DN	C95
D41	GND	GND	C41	D96	GND	GND	C96
D42	DDI1_PAIR_1P	DDI2_PAIR_1P	C42	D97	N/C	N/C	C97
D43	DDI1_PAIR_1N	DDI2_PAIR_1N	C43	D98	PCIE4_B_P2_EXP_TX_DP	PCIE4_B_P2_EXP_RX_DP	C98
D44	DDP1_HPD	DDP2_HPD	C44	D99	PCIE4_B_P2_EXP_TX_DN	PCIE4_B_P2_EXP_RX_DN	C99
D45	N/C	N/C	C45	D100	GND	GND	C100
D46	DDI1_PAIR_2P	DDI2_PAIR_2P	C46	D101	PCIE4_B_P3_EXP_TX_DP	PCIE4_B_P3_EXP_RX_DP	C101
D47	DDI1_PAIR_2N	DDI2_PAIR_2N	C47	D102	PCIE4_B_P3_EXP_TX_DN	PCIE4_B_P3_EXP_RX_DN	C102
D48	N/C	N/C	C48	D103	GND	GND	C103
D49	DDI1_PAIR_3P	DDI2_PAIR_3P	C49	D104	VCC_12V	VCC_12V	C104
D50	DDI1_PAIR_3N	DDI2_PAIR_3N	C50	D105	VCC_12V	VCC_12V	C105
D51	GND	GND	C51	D106	VCC_12V	VCC_12V	C106
D52	N/C	N/C	C52	D107	VCC_12V	VCC_12V	C107
D53	N/C	N/C	C53	D108	VCC_12V	VCC_12V	C108
D54	PEG_LANE_RV#	N/C	C54	D109	VCC_12V	VCC_12V	C109
D55	N/C	N/C	C55	D110	GND	GND	C110

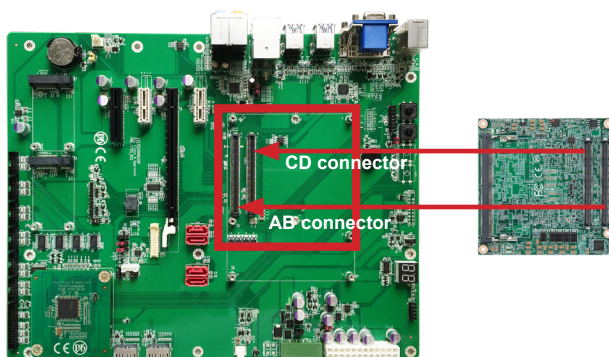


Chapter 3

Installation & Maintenance

3.1 Installing the CPU Module to Carrier Board

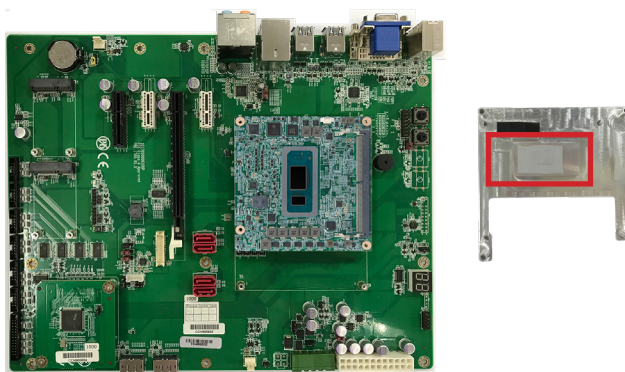
1. Mount the EmCOMe-i93U0 or EmCOMe-i94U0 into PBE-1705 via COM Express connectors as below; that is, COM Express AB to AB and CD to CD.

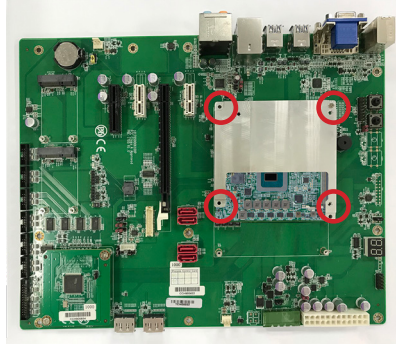


2. Install the optional heat spreader or heat sink with fan to the COM module.

For heat spreader

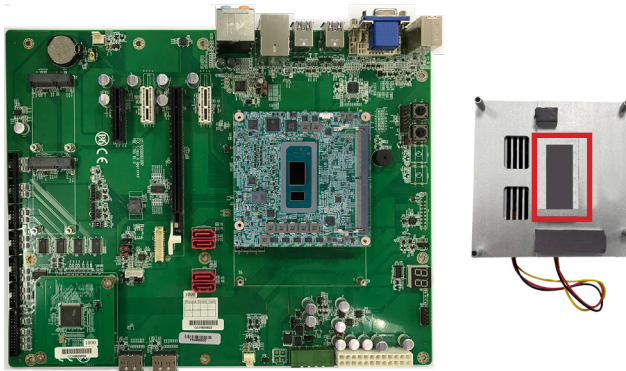
Apply thermal grease to the CPU area on the CPU module. Place the heat spreader over the CPU module and fasten the four screws to secure it in place.



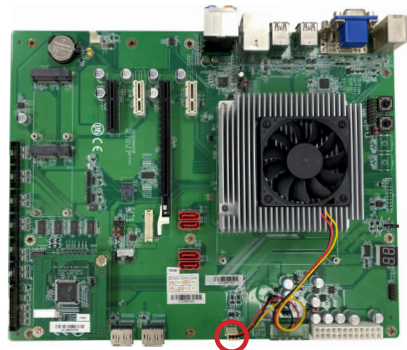


For heat sink with fan

Apply thermal grease to the CPU area on the CPU module. Place the heat sink over the CPU module and fasten the four screws to secure it in place.



Then connect the fan cable to the fan connector on the carrier board.



This page is intentionally left blank.



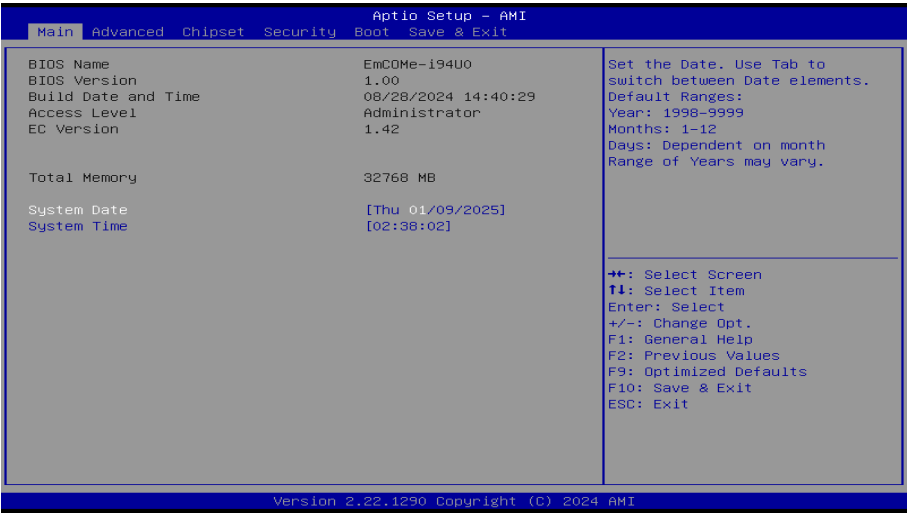
Chapter 4

BIOS

4.1 Main

The AMI BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS RAM of the system stores the Setup utility and configurations. When you turn on the computer, the AMI BIOS is immediately activated. To enter the BIOS SETUP UTILITY, press “Delete” once the power is turned on.

The **Main Setup** screen lists the following information:



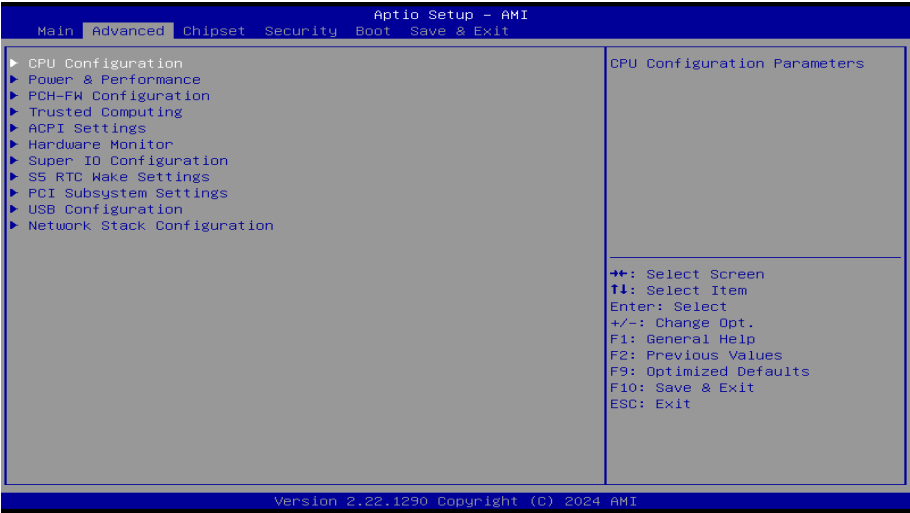
Setting	Description
System Date	Set the system date. Use Tab to switch between Date elements. Note that the ‘Day’ automatically changes when you set the date. ► The date format is: Day: Sun to Sat Month: 1 to 12 Date: 1 to 31 Year: 1998 to 9999
System Time	Set the system time. Use Tab to switch between Time elements. ► The time format is: Hour: 00 to 23 Minute: 00 to 59 Second: 00 to 59

Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

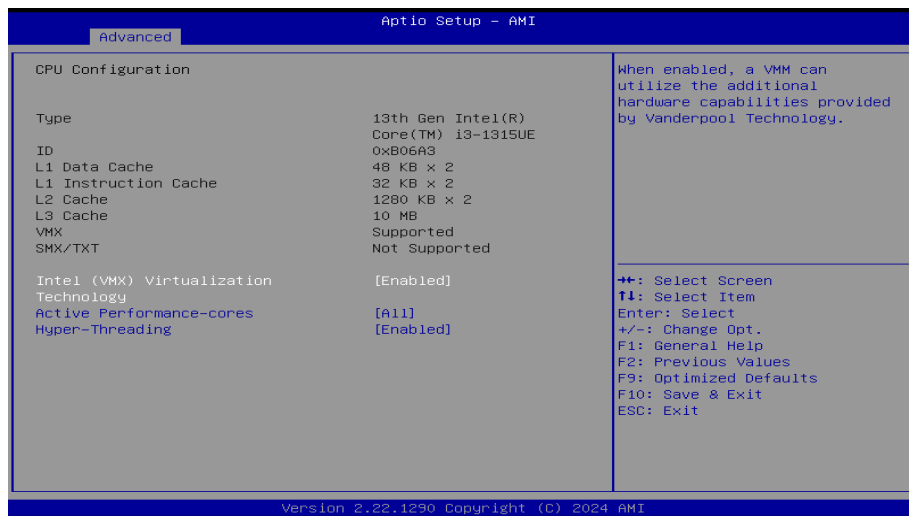
Keystroke	Function
◀ ▶	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
▼ ▲	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select “Yes” or “No” for exiting and discarding changes. Use “←” and “→” to select and press “Enter” to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down / -	Decrease the numeric value on a selected setup item / make change
F1	Activate “General Help” screen
F10	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select “Yes” or “No” for exiting and saving changes. Use “←” and “→” to select and press “Enter” to confirm)

4.2 Advanced



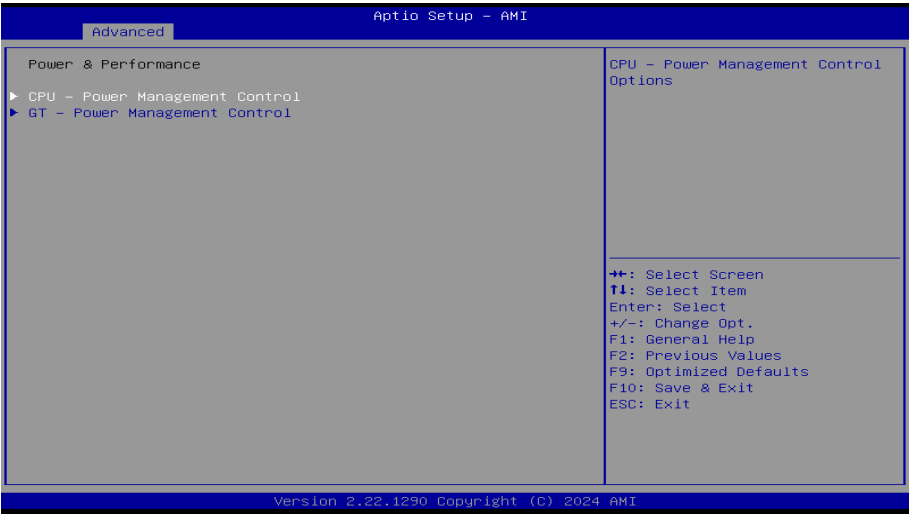
Setting	Description
CPU Configuration	See 4.2.1 CPU Configuration on page 23
Power & Performance	See 4.2.2 Power & Performance on page 24
PCH-FW Configuration	See 4.2.3 PCH-FW Configuration on page 25
Trusted Computing	See 4.2.4 Trusted Computing on page 26
ACPI Settings	See 4.2.5 ACPI Settings on page 27
Hardware Monitor	See 4.2.6 Hardware Monitor on page 28
Super IO Configuration	See 4.2.7 Super IO Configuration on page 29
S5 RTC Wake Settings	See 4.2.8 S5 RTC Configuration on page 32
PCI Subsystem Settings	See 4.2.9 PCI Subsystem Settings on page 33
USB Configuration	See 4.2.10 USB Configuration on page 35
Network Stack Configuration	See 4.2.11 Network Stack Configuration on page 37

4.2.1 CPU Configuration



Setting	Description
Intel (VMX) Virtualization Technology	Enable or disable Intel virtualization technology. When enabled, a VMM can utilize the additional hardware capabilities provide by Vanderpool Technology. ► Options: Enabled (Default) or Disabled
Active Performance-Cores	Number of cores to enable in each processor package. ► Options: All (Default), 1
Hyper-Threading	Enabled (Default) for Windows and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized or Hyper-Threading Technology). When disabled only one thread per enabled core is enabled.

4.2.2 Power & Performance



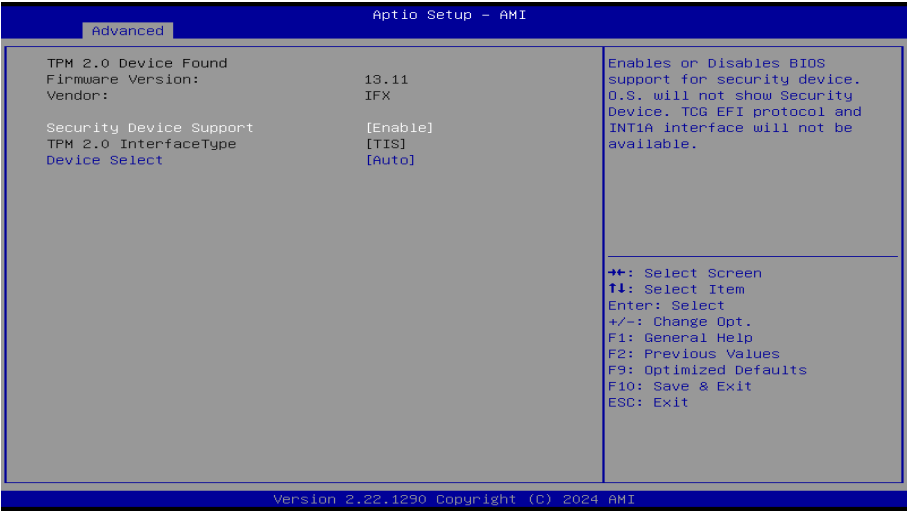
Setting	Description
CPU - Power Management Control	CPU - Power Management Control Options Control CPU Power Management: - Options: Boot performance mode: Max Battery, Max Non-Turbo Performance, Turbo Performance (Default) Intel(R) SpeedStep(tm) - Options: Enabled (Default), Disabled Turbo Mode: Enable/Disable processor Turbo Mode. - Options: Turbo mode: Enabled (Default), Disabled C States: Enable/Disable CPU C States - Options: Disabled (Default), Enabled
GT - Power Management Control	Maximum GT frequency: Maxium GT frequency limited by the user. Choose between 100MHz and 1200MHz. - Options: Default Max Frequency (Default), 100Mhz~1200Mhz Disable Turbo GT frequency: Enabled/Disabled GT Frequency. - Options: Disabled (Default), Enabled

4.2.3 PCH-FW Configuration



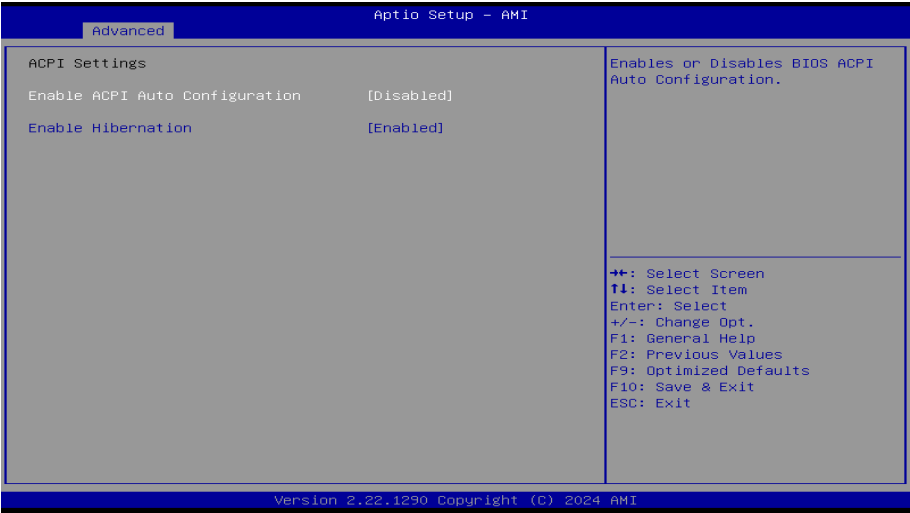
Setting	Description
ME State	Enable (Default) / Disable ME state. When disabled, ME will be put into ME Temporarily Disabled Mode.

4.2.4 Trusted Computing



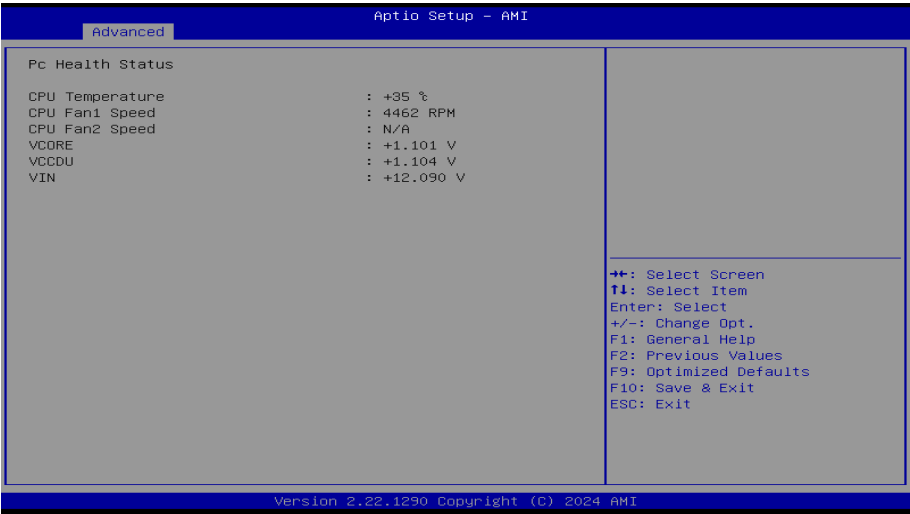
Setting	Description
Security Device Support	Enable (Default) or Disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Device Select	Select the TPM device: Options: TPM 1.2 , TPM 2.0 and Auto (Default) ▶ TPM 1.2 will restrict 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 device will be enumerated.

4.2.5 ACPI Settings



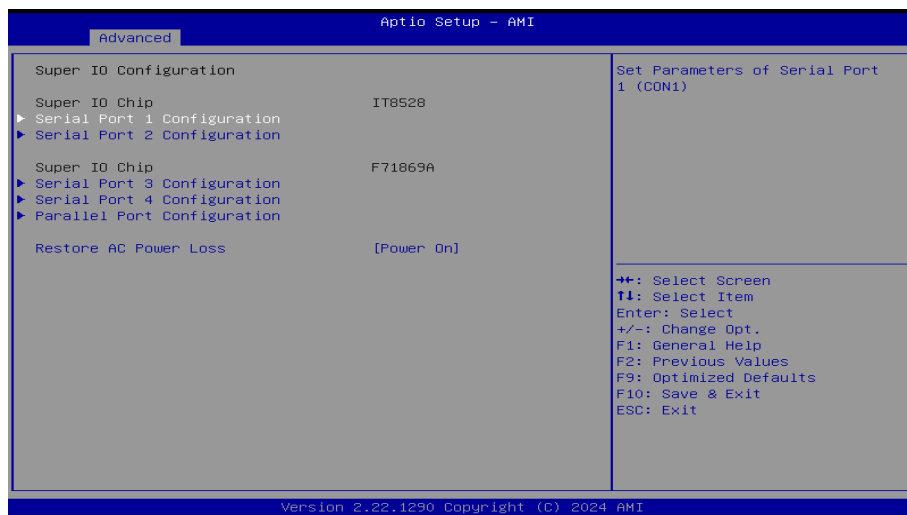
Setting	Description
Enable ACPI Auto Configuration	Enables or Disables BIOS ACPI Auto Configuration. (Disabled is the default)
Enable Hibernation	Enable (Default) or Disable System ability to Hiber-nate (OS/S4 Sleep State). This option may be not effective with some operating systems.

4.2.6 Hardware Monitor



Access this submenu to monitor the hardware status.

4.2.7 Super IO Configuration



Setting	Description
Serial Port 1/2/3/4 & Parallel Port Configuration	See next page.
Restore AC Power Loss	Specify what state to go to when power is re-applied after a power failure. ► Options: Last State , Power On (Default) and Power Off

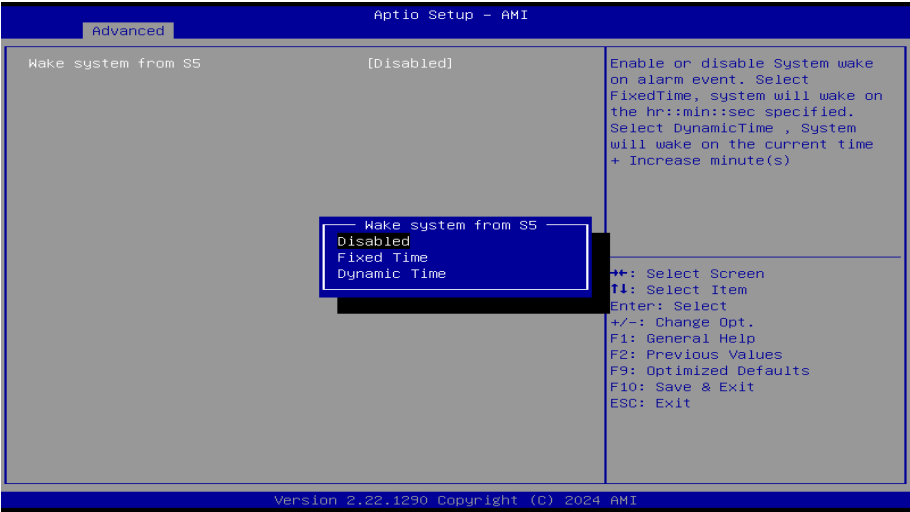
Serial Port 1/2/3/4 Configuration

Setting	Description
Serial Port	Enable (default) or Disable Serial Port (COM).
Change Settings	Select an optimal setting for Super IO device. ▶ Options for Serial Port 1: Auto IO=3F8h; IRQ=4 (Default) ; IO=3F8h; IRQ=3, 4, 7, 12 IO=2F8h; IRQ=3, 4, 7, 12 ▶ Options for Serial Port 2: Auto IO=2F8h; IRQ=3 (Default) IO=3F8h; IRQ=3, 4, 7, 12 IO=2F8h; IRQ=3, 4, 7, 12 ▶ Options for Serial Port 3: Auto IO=3E8h; IRQ=11 (Default) IO=3E8h; IRQ=7, 10, 11, 12 IO=2E8h; IRQ=7, 10, 11, 12 IO=2F0h; IRQ=7, 10, 11, 12 IO=2E0h; IRQ=7, 10, 11, 12 ▶ Options for Serial Port 4: Auto IO=2E8h; IRQ=10 (Default) IO=3E8h; IRQ=7, 10, 11, 12 IO=2E8h; IRQ=7, 10, 11, 12 IO=2F0h; IRQ=7, 10, 11, 12 IO=2E0h; IRQ=7, 10, 11, 12

Parallel Port Configuration

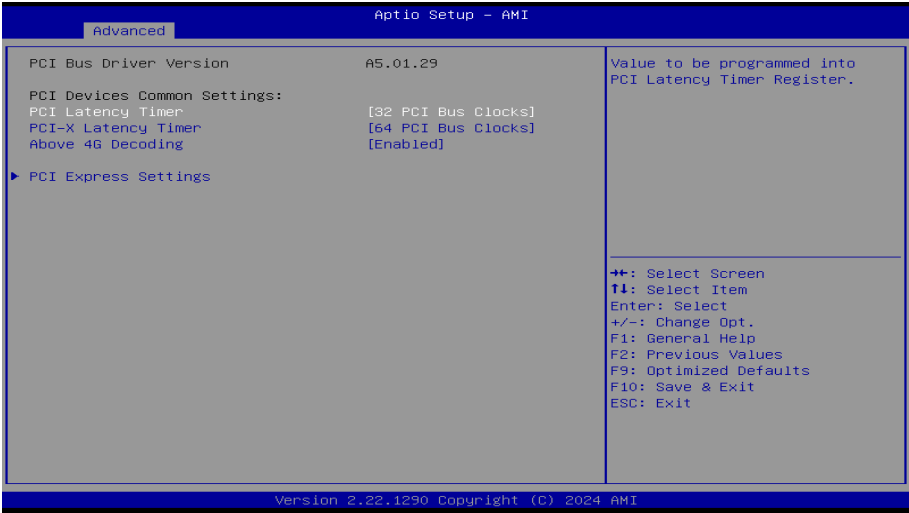
Setting	Description
Parallel Port	Enable (default) or Disable Parallel Port (LPT/LPTE).
Change Settings	Select an optimal setting for Super IO device. ► Options: Auto IO=378h; IRQ=7 (Default) IO=378h; IRQ=7, 10, 11, 12 IO=278h; IRQ=7, 10, 11, 12 IO=3BCh; IRQ=7, 10, 11, 12
Device Mode (only for Parallel Port Configuration)	Change the Printer Port mode. ► Options: STD Printer Mode (Default) SPP Mode EPP-1.9 and SPP Mode EPP-1.7 and SPP Mode ECP Mode ECP and EPP 1.9 Mode ECP and EPP 1.7 Mode.

4.2.8 S5 RTC Configuration



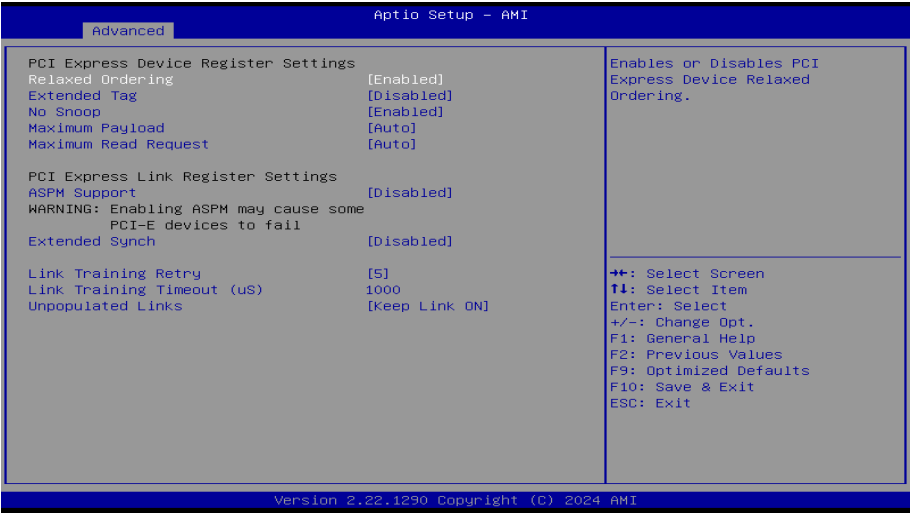
Setting	Description
Wake System from S5	Enable or Disable (Default) system wake on alarm event. Options available are: Disabled (Default): Fixed Time: System will wake on the hr::min::sec specified. DynamicTime: If selected, you need to set Wake up minute increase from 1 - 5. System will wake on the current time + increase minute(s).

4.2.9 PCI Subsystem Settings



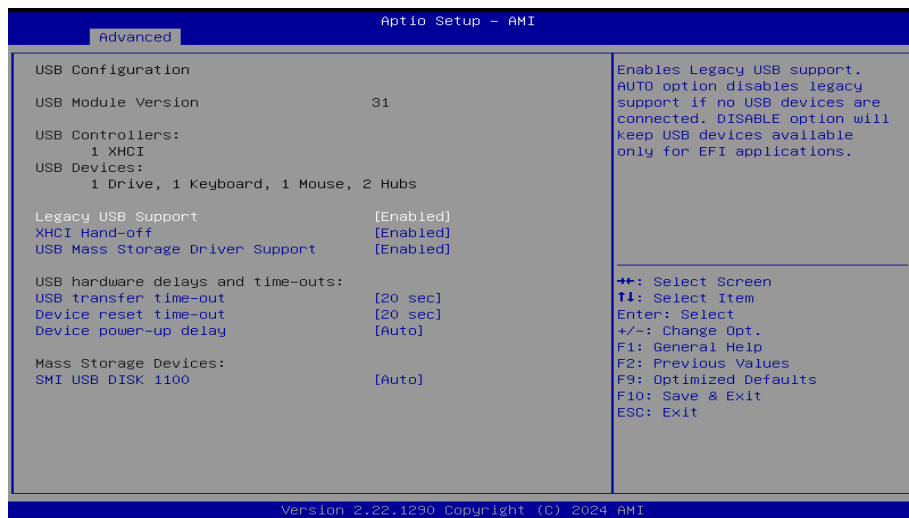
Setting	Description
PCI Latency Timer	Value to be programmed into PCI Latency timer Register. ► Default: 32 PCI Bus Clocks
PCI-X Latency Timer	Value to be programmed into PCI Latency timer Register. ► Default: 64 PCI Bus Clocks
Above 4G Decoding	Enable (Default)/ Disable 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).
PCI Express Setting	See next page.

4.2.9.1 PCI Express Setting



Setting	Description
Relaxed Ordering	Enable (Default) or Disable Relaxed Ordering.
Extended Tag	Enable or Disable (Default) Extended Tag.
No Snoop	Enable (Default)/ Disable No Snoop.
Maximum Payload	This item allows users to set the Maximum Payload.
Maximum Read Request	This item allows users to set the Maximum Read Request Size.
ASPM Support	Force L0s/Disable (Default) or Auto ASPM Support.
Extended Synch	Enable or Disable (Default) Extended Synch.
Link Training Retry	This item allows users to set the Link Training Retry.
Link Training Timeout (uS)	This item allows users to set the Link Training Timeout (uS)
Unpopulated Links	This item allows users to set the Unpopulated Links. (to Keep Link ON or Disable Link)

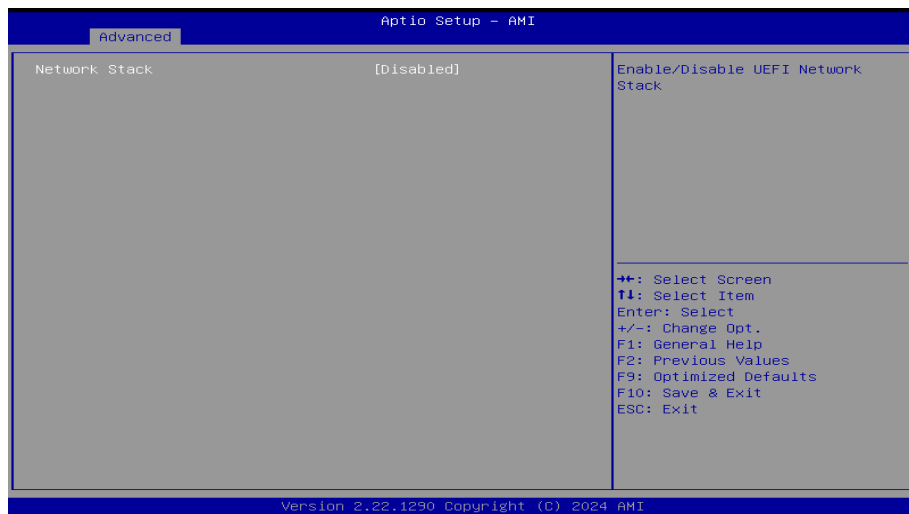
4.2.10 USB Configuration



Setting	Description
Legacy USB Support	Sets legacy USB support. ► Options: Enabled (default), Disabled and Auto . AUTO option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enable (default) or Disable XHCI Hand-off. This is a workaround for Oses without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enable (default) or Disable USB Mass Storage Driver Support.
USB hardware delay and time-out	
USB Transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► Options available are: 1 sec , 5 sec , 10 sec , 20 sec (default)

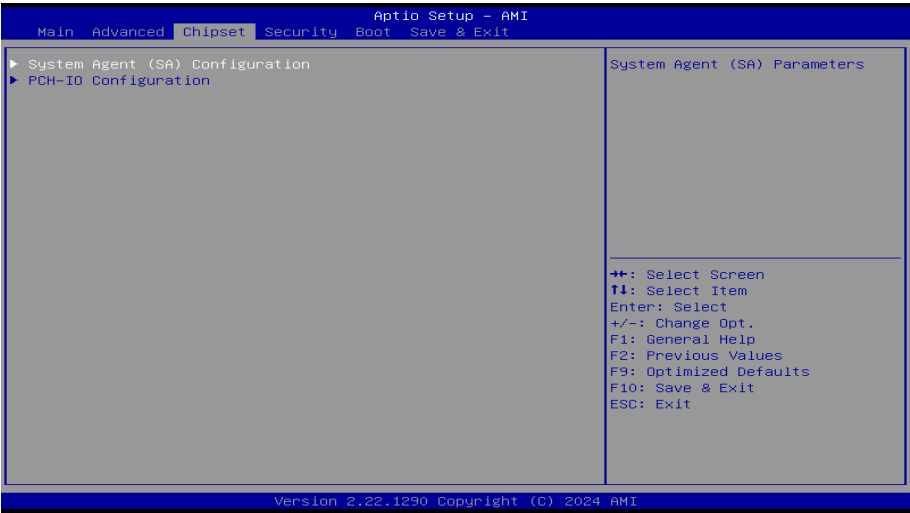
Device reset time-out	Use this item to set USB mass storage device start unit command time-out. Options available are: 10 sec, 20 sec (default), 30 sec, 40 sec
Device power-up delay	Use this item to set maximum time the device will take before it properly reports itself to the host controller. Options available are: Auto (Default): 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor. Manual: Select Manual you can set value for the following sub-item: 'Device power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments.
Mass Storage Devices	
SMI USB DISK 1100	Use this item to set mass device emulation type. Options available are: Auto (Default): 'Auto' enumerates devices according to their media format. CD-ROM: Optical drives are emulated as 'CD-ROM'. Floppy/Forced FDD/Hard Disk: Drives with no media will be emulated according to a drive type.

4.2.11 Network Stack Configuration



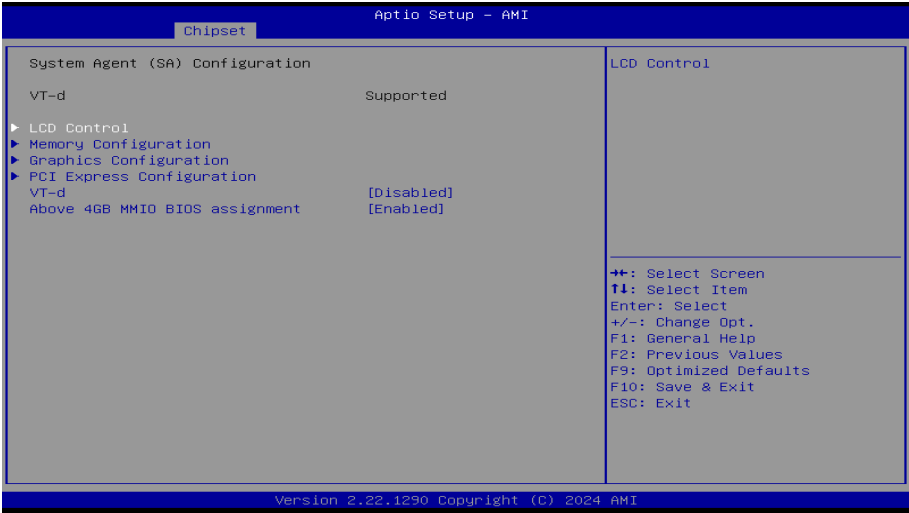
Setting	Description
Network Stack	Enables/disables UEFI network stack. ► Disabled is the default.

4.3 Chipset



Setting	Description
System Agent (SA) Configuration	See 4.3.1 System Agent (SA) Configuration on page 39
PCH-IO Configuration	See 4.3.2 PCH-IO Configuration on page 41

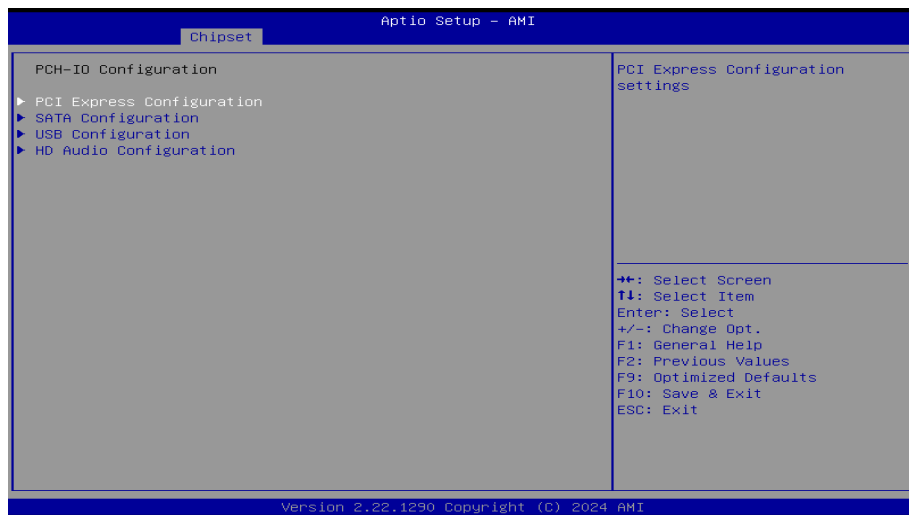
4.3.1 System Agent (SA) Configuration



Setting	Description
VT-d	Enable or Disable (default) VT-d capability.
Above 4GB MMIO BIOS assignment	Enable (default) or Disable Above 4GB MmemoryMapped BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.
LCD Control	
Active LFP	Configuring LFP usage ► Options: No eDP (default) and eDP Port-A
Memory Configuration	
Memory Configuration	Access to view the memory configuration.
Graphics Configuration	
Primary Display	Select which of IGFX/PEG/PCI Graphics devices should be Primary Display or select HG for Hybrid Gfx. ► Options: Auto (default), IGFX , PEG Slot , PCH PCI , HG .

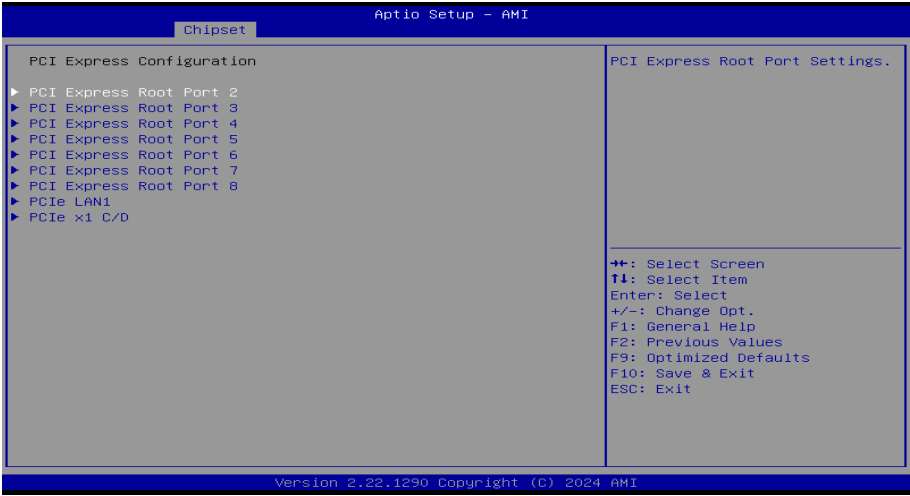
Aperture Size	Select the Aperture Size ► Options: 128MB, 256MB, 512MB, 1024MB Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting > 2048MB aperture. To use this feature, please disable CSM Support.
DVMT Pre-Allocated	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. ► Options: 0M, 32M, 64M, 96M, 128M, 160M, 4M, 8M, 12M, 16M, 20M, 24M, 28M, 32M/F7, 36M, 40M, 44M, 48M, 52M, 56M, 60M
DVMT Total Gfx Mem	Select DVMT 5.0 Total Graphic Memory size from 128MB to MAX used by the Internal Graphics Device . (256MB is the default)
PCI Express Configuration	
Fia Programming	Load Fia Configuration if Enabled for each root port. ► Options: Enabled, Disabled.
Compliance Test Mode	Enable when using Compliance Load Board. ► Options: Enabled, Disabled.
CDR Relock	Enable/Disable CDR Relock. ► Options: Enabled, Disabled.
Assertion on Link Down GPIOs	GPIO Assertion on Link Down. ► Options: Enabled, Disabled.
PCI Express Slot Selection	Select the PCIe M2 or CEMx4 slot. ► Options: M2, CEMx4 slot.
PCI Express Root Port 1/2/3	PCI Express Root Port1/2/3: Control the PCI Express Root Port. ► Options: Enabled, Disabled ASPM: Set the ASPM level. ► Options: Disabled, L0S, L1, L0sL1 L1 Substates: PCI Express L1 Substates settings. ► Options: Disabled, L1.1, L1.1&L1.2 PCIe Speed: Configure PCIe Speed. ► Options: Auto, Gen1, Gen2, Gen3, Gen4.

4.3.2 PCH-IO Configuration



Setting	Description
PCI Express Configuration	See 4.3.2.1 PCI Express Configuration on page 42
SATA Configuration	See 4.3.2.2 SATA Configuration on page 44
USB Configuration	See 4.3.2.3 USB Configuration on page 45
HD Audio Configuration	See 4.3.2.4 HD Audio Configuration on page 46

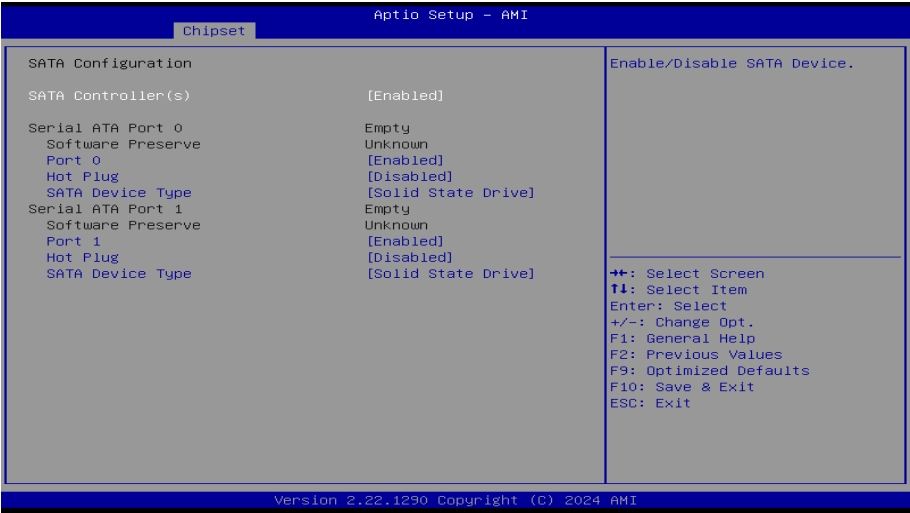
4.3.2.1 PCI Express Configuration



Setting	Description
PCI Express Root Port 2-8	PCI Express Root Port 2-8: Control the PCI Express Root Port. - Options: Enabled, Disabled ASPM: Set the ASPM level. - Options: Disabled, L1, Auto L1 Substates: PCI Express L1 Substates settings. - Options: Disabled, L1.1, L1.1&L1.2 PCIe Speed: Configure PCIe Speed. - Options: Auto, Gen1, Gen2, Gen3
PCIe LAN1	PCIe LAN1: Control the PCI Express Root Port. - Options: Enabled, Disabled ASPM: Set the ASPM level. - Options: Disabled, L1, Auto L1 Substates: PCI Express L1 Substates settings. - Options: Disabled, L1.1, L1.1&L1.2 PCIe Speed: Configure PCIe Speed. - Options: Auto, Gen1, Gen2, Gen3

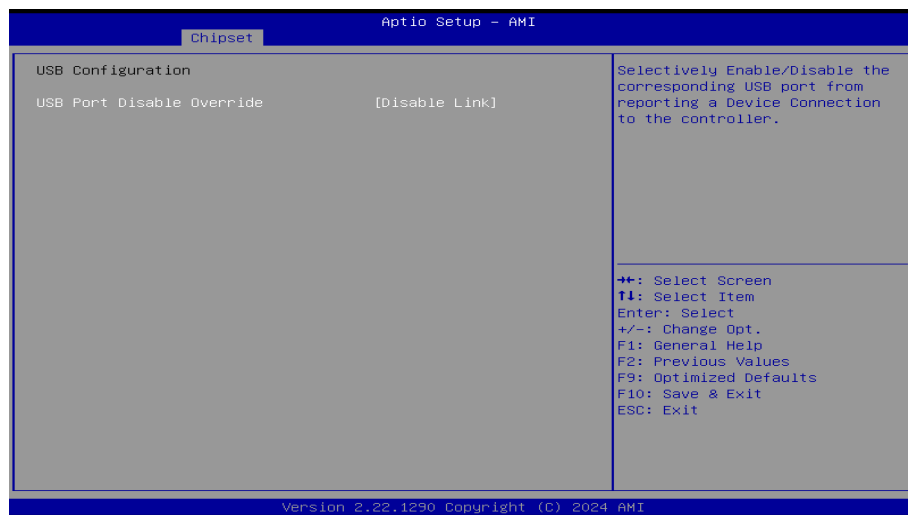
PCIe x1 C/D	PCIe x1 C/D: Control the PCI Express Root Port. ▶ Options: Enabled, Disabled ASPM: Set the ASPM level. ▶ Options: Disabled, L1, Auto L1 Substates: PCI Express L1 Substates settings. ▶ Options: Disabled, L1.1, L1.1&L1.2 PCIe Speed: Configure PCIe Speed. ▶ Options: Auto, Gen1, Gen2, Gen3
-------------	--

4.3.2.2 SATA Configuration



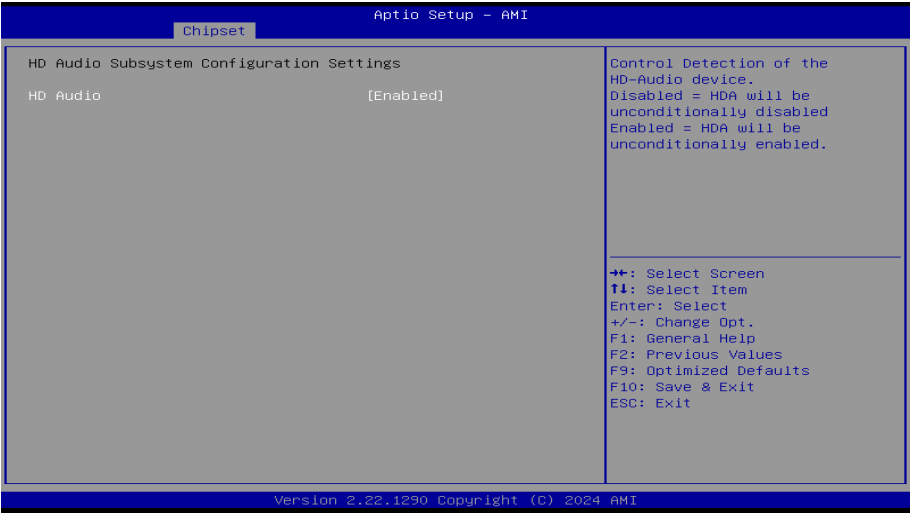
Setting	Description
SATA Controller(s)	Enable (default) or Disable SATA Device.
Port 0/1	Enable (default) or Disable SATA Port.
Hot Plug	Enable or Disable (default) the port as pluggable.
SATA Device Type	Identify the SATA port is connected to Solid State Drive or hard Disk Drive. ► Options: Hard Disk Drive and Solid State Drive (default).

4.3.2.3 USB Configuration



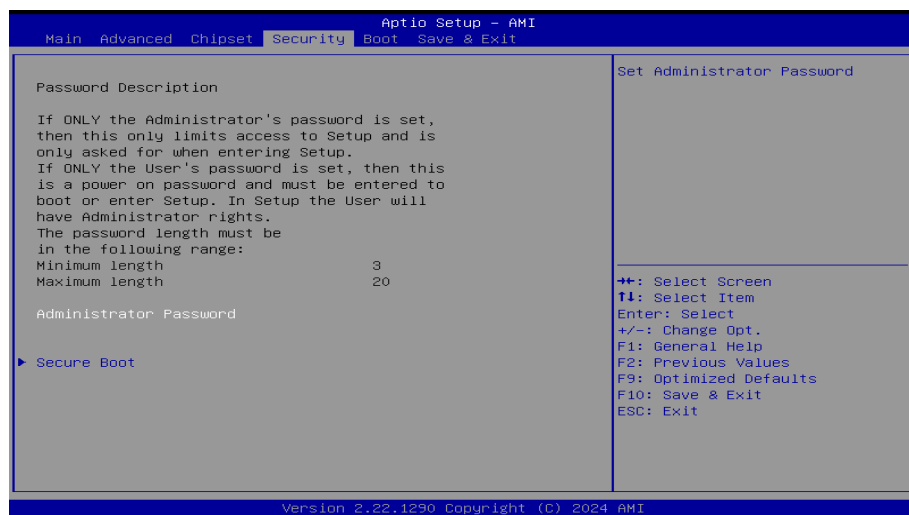
Setting	Description
USB Port Disable Override	Selectively Enable/Disable (default) the corresponding USB port from reporting a Device Connection to the controller. ► Options: Disable Link (default) and Select Per-Pin

4.3.2.4 HD Audio Configuration



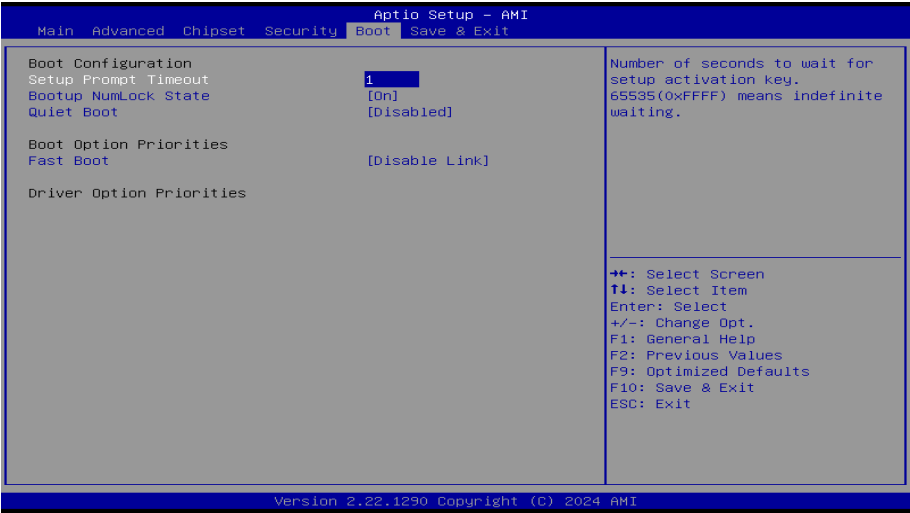
Setting	Description
HD Audio	Control Detection of the HD-Audio device. Options available are: Disabled: HDA will be unconditionally disabled Enabled (default): HDA will be unconditionally Enabled

4.4 Security



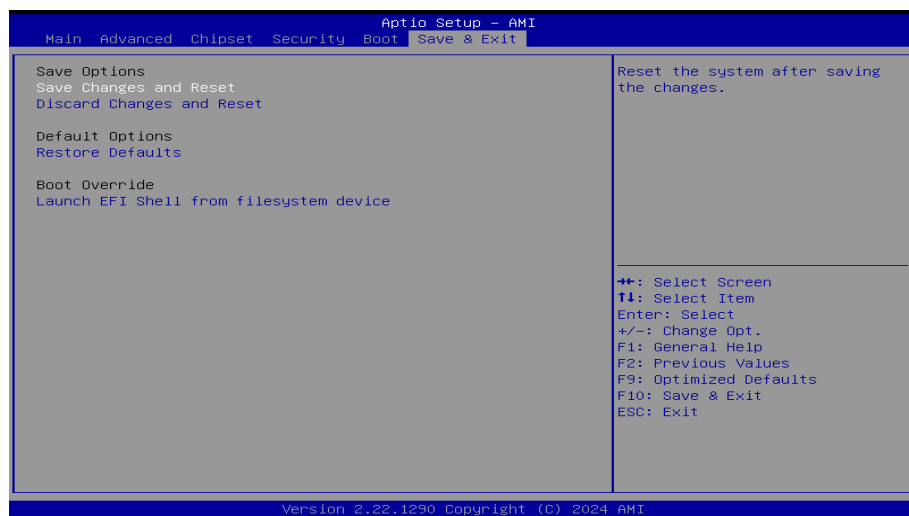
Setting	Description
Administrator Password	To set up an administrator password: 1. Select Administrator Password. The screen then pops up an Create New Password dialog. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.
Secure Boot menu	Secure Boot Press [Enter] to make customized secure settings: ► Options are: [Disabled] or [Enabled] Secure Boot Mode Secure Boot feature is Active if Secure Boot is Enabled: ► Options are: [Custom] or [Standard] Key Management ► This item enables expert users to modify Secure Boot Policy

4.5 Boot



Setting	Description
Setup Prompt Timeout	Use this item to set number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Boot NumLock State	Select the keyboard NumLock state. ► Options: On (default) and Off .
Quiet Boot	Enable (default) or Disable Quiet Boot option.
Fast Boot	Enable or Disable (default) boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

4.6 Save & Exit



Setting	Description
Save Changes and Reset	Exit system setup after saving the changes. ► Enter the item and then a dialog box pops up: Save configuration and reset? (Yes/ No)
Discard Changes and Reset	Exit system setup without saving the changes. ► Enter the item and then a dialog box pops up: Reset without saving? (Yes/ No)
Restore Defaults	Restore/Load Default values for all the setup options. ► Enter the item and then a dialog box pops up: Load Optimized Defaults? (Yes/ No)
Launch EFI Shell from filesystem device	Attempts to launch EFI shell application (Shell.efi) from one of the available filesystem devices.

This page is intentionally left blank.

Appendix

Appendix A: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and reset the system automatically to avoid abnormal operation.

This board supports 255 levels watchdog timer by software programming I/O ports. Below are the source codes written in C, please take them as WDT application example.

```
/*-----*/
#include <math.h>
#include <stdio.h>
#include <dos.h>

int WDTCount;

int main(void)
{
    unsigned char                iCount;

    printf("WDT Times ( 1 ~ 255 ) : ");
    scanf("%d",&iCount);
    printf("\n");

    WDT_Start(iCount);

    return 0;
}

void WDT_Start(int iCount)
{
    outportb(0x66,0xBA);                /* Enable Watch Dog */
    delay(2000);

    WDTCount = iCount;
    outportb(0x62, WDTCount);           /* Number is Watch Dog Down count
number */
    delay(2000);

    outportb(0x62, 0x00);                /* Minute is 1 count unit by minute */
                                           /* Minute is 0 count unit by second */
}
```

```
}

void WDT_Stop(void)
{
    outportb(0x66,0xBB);          /* Disable Watch Dog */
}

void WDT_Clear(void)
{
    outportb(0x66,0xBA);          /* Enable Watch Dog */
    delay(2000);

    outportb(0x62, WDTCount);      /* Number is Watch Dog Down count
number */
    delay(2000);

    outportb(0x62, 0x00);          /* Minute is 1 count unit by minute */
                                   /* Minute is 0 count unit by second */}
```