

AIMB-523

**AMD Ryzen™ Embedded 7000
Series Micro-ATX with 6 2.5GbE
LAN, DDR5, PCIe x16 Gen5**

Copyright

The documentation and the software included with this product are copyrighted 2025 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. The information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties that may result from its use.

Acknowledgements

AMI is a trademark of American Megatrends Inc.

IBM and PC are trademarks of International Business Machines Corporation.

AMD Ryzen™ Embedded 7000 Series is a trademark of AMD Corporation.

All other product names or trademarks are properties of their respective owners.

Product Warranty (2 Years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

CPU Compatibility

Processor Number	Code Name	Max TDP	Freq (GHz)	Mfg. Tech	Smart Cache (L2)	Smart Cache (L3)	Package Type	Result
AMD Ryzen 7 7700X	Raphael AM5	105W	5.4 GHz	5nm	8MB	32MB	OEM/tray	Pass
AMD Ryzen 5 7600X	Raphael AM5	105W	5.3 GHz	5nm	6MB	32MB	OEM/tray	Pass
AMD Ryzen 9 PRO 7945	Raphael	65W	5.4 GHz	5nm	12MB	64MB	OEM/tray	Pass
AMD Ryzen 7 PRO 7745	Raphael	65W	5.1 GHz	5nm	8MB	32MB	OEM/tray	Pass
AMD Ryzen 5 PRO 7645	Raphael	65W	5 GHz	5nm	6MB	32MB	OEM/tray	Pass

Memory Compatibility

Category	Speed	Capacity	Vendor	Module P/N	Chip P/N	Advantech P/N	ECC	Result
DDR5	4800	16GB	Advantech	SQR-UD5N16G4 K8SNBB	SEC 149 K4RAH08 6VB BCQK	SQR-UD5N16G4 K8SNBB	N	Pass
DDR5	4800	32GB	Advantech	SQR-UD5N32G4 K8SNBB	SEC252 K4RAH08 6VBBCQK	SQR-UD5N32G4 K8SNBB	N	Pass
DDR5	4800	32GB	Advantech	AQD-D5V32GN48-SB	SEC 210 K4RAH08 6VB BCQK	AQD-D5V32GN4 8-SB	N	Pass
DDR5	4800	16GB	Advantech	AQD-D5V16GN48-SB	SEC 213 K4RAH08 6VB BCQK	AQD-D5V16GN4 8-SB	N	Pass
DDR5	5600	8GB	Advantech	SQR-UD5N8G5K 6SNGPB	SEC337 K4RAH16 5VP8CWM	SQR-UD5N8G5K 6SNGPB	N	Pass
DDR5	5600	16GB	Advantech	SQR-UD5N16G5 K6SNPB	SEC346 K4RAH08 6VPBCWM	SQR-UD5N16G5 K6SNPB	N	Pass
DDR5	5600	32GB	Advantech	SQR-UD5N32G5 K6SNPB	SEC346 K4RAH08 6VPBCWM	SQR-UD5N32G5 K6SNPB	N	Pass
DDR5	5600	16GB	Advantech	AQD-D5V16GN56-SB	SEC337 K4RAH08 6VPBCWM	AQD-D5V16GN5 6-SB	N	Pass
DDR5	5600	32GB	Advantech	AQD-D5V32GN56-SB	SEC346 K4RAH08 6VPBCWM	AQD-D5V32GN5 6-SB	N	Pass

ECC Memory Compatibility

Category	Speed	Capacity	Vendor	Module P/N	Chip P/N	Advantech P/N	ECC	Result
DDR5	4800	32GB	Advantech	SQR-UD5N32G4 K8SEBB	SEC149 K4RAH08 6VBBCQK	SQR-UD5N32G4 K8SEBB	ECC	Pass
DDR5	4800	16GB	Advantech	AQD-D5V16GE48-SB	SEC 246 K4RAH08 6VB BCQK	AQD-D5V16GE4 8-SB	ECC	Pass
DDR5	4800	32GB	Advantech	AQD-D5V32GE48-SB	SEC 246 K4RAH08 6VB BCQK	AQD-D5V32GE4 8-SB	ECC	Pass
DDR5	5600	16GB	Advantech	SQR-UD5N16G5 K6SEPB	SEC346 K4RAH08 6VPBCWM	SQR-UD5N16G5 K6SEPB	ECC	Pass
DDR5	5600	32GB	Advantech	SQR-UD5N32G5 K6SEPB	SEC346 K4RAH08 6VPBCWM	SQR-UD5N32G5 K6SEPB	ECC	Pass
DDR5	5600	16GB	Advantech	AQD-D5V16GE56-SB	SEC337 K4RAH08 6VPBCWM	AQD-D5V16GE5 6-SB	ECC	Pass

Initial Inspection

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

- 1 x AIMB-523 Micro-ATX motherboard
- 2 x SATA HDD cables
- 1 x COM cable
- 1 x I/O port bracket
- 1 x Startup Manual
- 1 x M.2 screw
- 1 x Warranty Card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the AIMB-523 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the AIMB-523, check it for signs of shipping damage. (For example, damaged box, scratches, dents, etc.) If it is damaged or it fails to meet the specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the unit.

Contents

Chapter 1 General Information1

1.1	Introduction	2
1.2	Features	2
1.3	Specifications	2
1.3.1	System	2
1.3.2	Memory	2
1.3.3	Input/Output	2
1.3.4	Graphics	2
1.3.5	Ethernet LAN	3
1.3.6	Industrial Features	3
1.3.7	Mechanical and Environmental Specifications	3
1.4	Jumpers and Connectors	3
1.5	Board Layout: Jumper and Connector Locations	4
	Figure 1.1 Jumper and Connector Locations	4
	Table 1.1: Board Layout: Jumper and Connector Locations	4
1.6	AIMB-523 Board Diagram	6
	Figure 1.2 AIMB-523 Block Diagram	6
1.7	Safety Precautions	6
1.8	Jumper Settings	7
1.8.1	How to Set Jumpers	7
1.8.2	CMOS Clear (CMOS1)	7
	Table 1.2: CMOS1	7
1.8.3	PWRBTN# / RESET# / HDD LED / Serial Bus From HW Monitor IC / Internal Buzzer / External Speaker Header (JFP1)	7
	Table 1.3: JFP1	7
1.8.4	Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)	8
	Table 1.4: JWDT1+JOBS1	8
1.8.5	COM3_RI# Pin RI# / 5V / 12V Selection (JSETCOM3_V1)	8
	Table 1.5: JSETCOM3_V1	8
1.8.6	AT / ATX Mode Selection (PSON1)	9
	Table 1.6: PSON1	9
1.9	System Memory	9
1.10	Memory Installation Procedures	9

Chapter 2 Pin Assignments11

2.1	Introduction	12
2.1.1	DisplayPort + HDMI Connector (DP1_HDMI1)	12
	Table 2.1: DP1_HDMI1	12
2.1.2	HDMI 1 + USB 3.2 Gen2 Stack Connector (HDMI2_USB12)	13
	Table 2.2: HDMI2_USB12	13
2.1.3	RJ-45 + USB 3.2 GEN2 Stack Connector (LAN1_USB34/ LAN2_USB56)	14
	Table 2.3: LAN1_USB34/LAN2_USB56	14
2.1.4	RJ-45 Port Stack Connector (LAN3_LAN4)	15
	Table 2.4: LAN3_LAN4	15
2.1.5	RJ-45 Port Stack Connector with POE (LAN5_LAN6)	16
	Table 2.5: LAN5_LAN6	16
2.1.6	HD Audio Interface (AUDIO1)	16
	Table 2.6: AUDIO1	16
2.1.7	PCIe x16 Gen5 Slot (PCIEX16_1)	17
	Table 2.7: PCIEX16_1	17
2.1.8	PCIe x4 Gen4 Slot (PCIEX4_1)	19
	Table 2.8: PCIEX4_1	19

2.1.9	PCIe x1 Gen4 Slot (PCIEX1_1).....	20
	Table 2.9: PCIEX1_1.....	20
2.1.10	M.2 M-Key Connector (M.2_M1)	21
	Table 2.10: M.2_M1	21
2.1.11	Coin Battery Connector (BAT1).....	22
	Table 2.11: BAT1	22
2.1.12	CMOS Mode Selection (JCMOS1)	22
	Table 2.12: JCMOS1	22
2.1.13	Power Button Pin Header (JFP4)	22
	Table 2.13: JFP4	22
2.1.14	Power LED Pin Header (JFP3).....	23
	Table 2.14: JFP3	23
2.1.15	Watchdog Timer Output and OBS Beep (JWDT1+JOBS1).....	23
	Table 2.15: JWDT1+JOBS1	23
2.1.16	Power LED Pin Header (JFP2).....	23
	Table 2.16: JFP2	23
2.1.17	8-Bit General Purpose I/O Pin Header (GPIO1).....	24
	Table 2.17: GPIO1	24
2.1.18	System Fan #4 Connector (SYSFAN4)	24
	Table 2.18: SYSFAN4	24
2.1.19	System Fan #3 Connector (SYSFAN3)	24
	Table 2.19: SYSFAN3	24
2.1.20	FCH Fan Connector (FCHFAN1).....	25
	Table 2.20: FCHFAN1	25
2.1.21	Universal Serial Bus 3.0 Port 7 / 8 (USB78).....	25
	Table 2.21: USB78	25
2.1.22	Case Open Connector (JCASE1).....	26
	Table 2.22: JCASE1	26
2.1.23	COM 1 / 2 / 3 / 4 Box Header (COM1234).....	26
	Table 2.23: COM1234	26
2.1.24	COM3 RI / 12V / 5V Select Pin Header (JSETCOM3_V1).....	27
	Table 2.24: JSETCOM3_V1	27
2.1.25	Vertical Universal Serial Bus 2.0 Port 9 (USB9).....	27
	Table 2.25: USB9	27
2.1.26	System Fan #2 Connector (SYSFAN2)	27
	Table 2.26: SYSFAN2	27
2.1.27	System Fan #1 Connector (SYSFAN1)	28
	Table 2.27: SYSFAN1	28
2.1.28	Serial ATA III Port 4 (SATA1~4)	28
	Table 2.28: SATA1~4	28
2.1.29	LED Port 80 Connector (LED_P1).....	29
	Table 2.29: LED_P1	29
2.1.30	SPI TPM Module Connector (SPI_TPM1)	29
	Table 2.30: SPI_TPM1	29
2.1.31	SPI Pin Header (SPI_CN1).....	30
	Table 2.31: SPI_CN1	30
2.1.32	SPI BIOS Flash Socket1 (SPI1)	30
	Table 2.32: SPI1	30
2.1.33	ATX 24-Pin Power Connector (EATXPWR1)	31
	Table 2.33: EATXPWR1	31
2.1.34	AT/ATX Mode Selection (PSON1).....	31
	Table 2.34: PSON1	31
2.1.35	CPU FAN Connector (CPUFAN1)	31
	Table 2.35: CPUFAN1	31
2.1.36	ATX 4-Pin Main Power Connector (ATX12V2).....	32
	Table 2.36: ATX12V2	32
2.1.37	ATX 8-Pin Main Power Connector (ATX12V1).....	32
	Table 2.37: ATX12V1	32
2.1.38	AT/ATX Mode Selection (PSON1).....	32
	Table 2.38: PSON1	32

2.1.39	SPI BIOS Flash Socket1 (SPI1).....	33
	Table 2.39: SPI1	33
2.1.40	Case Open Connector (JCASE1)	33
	Table 2.40: JCASE1	33
2.1.41	ATX 24-Pin Power Connector (EATXPWR1).....	33
	Table 2.41: EATXPWR1	33
2.1.42	COM3 RI# Selection Pin Header (JSETCOM3_V1)	34
	Table 2.42: JSETCOM3_V1	34
2.1.43	8-Bit General Purpose I/O Pin Header (GPIO1)	34
	Table 2.43: GPIO1	34
2.1.44	System Fan #4 Connector (SYSFAN4)	34
	Table 2.44: SYSFAN4	34
2.1.45	System Fan #3 Connector (SYSFAN3)	35
	Table 2.45: SYSFAN3	35
2.1.46	System Fan #2 Connector (SYSFAN2)	35
	Table 2.46: SYSFAN2	35
2.1.47	System Fan #1 Connector (SYSFAN1)	35
	Table 2.47: SYSFAN1	35
2.1.48	CPU FAN Connector (CPUFAN1)	36
	Table 2.48: CPUFAN1	36
2.1.49	ATX 8-Pin Main Power Connector (ATX12V1)	36
	Table 2.49: ATX12V1	36

Chapter 3 BIOS Operation37

3.1	Introduction	38
3.2	BIOS Setup	38
	3.2.1 Main Menu	39
	3.2.2 Advanced BIOS Features	40
3.3	Chipset Configuration Setting	62
	3.3.1 SB USB Configuration	63
	3.3.2 GFX Configuration	63
	3.3.3 North Bridge	64
3.4	Security Settings	66
	3.4.1 Secure Boot	66
3.5	Boot Settings	67
3.6	Save & Exit	67

Chapter 4 Software Introduction & Service69

4.1	Introduction	70
4.2	Value-Added Software Services	70
	4.2.1 Software API	70
	4.2.2 Software Utility	72

Chapter 5 Chipset Software Installation Utility 73

5.1	Before You Begin	74
5.2	Introduction	74
5.3	Windows 10 Driver Setup	74

Chapter 6 LAN Configuration75

6.1	Introduction	76
6.2	Windows 10 Driver Setup	76

Appendix A Jumper Setting List 77

	Table A.1: Jumpers.....	78
A.1	CMOS Clear (JCOMS1).....	78
	Table A.2: JCOMS1	78
A.2	PWRBTN# / RESET# /HDD LED / Serial Bus From HW Monitor IC / Internal Buzzer / External Speaker Header (JFP1).....	78
	Table A.3: JFP1	78
A.3	Watchdog Timer Output and OBS Beep (JWDT1+JOBS1).....	79
	Table A.4: JWDT1+JOBS1	79
A.4	AT/ATX Mode Selection (PSON1).....	79
	Table A.5: PSON1	79
A.5	LVDS VESA, JEIDA Format Selection Pin Header (JLVDS_VCON1)....	80
	Table A.6: JLVDS_VCON1	80
A.6	COM3_RI# Pin RI# / 5V / 12V Selection (JSETCOM3_V1).....	80
	Table A.7: JSETCOM3_V1	80

Chapter 1

General Information

1.1 Introduction

AIMB-523 is designed with the AIMB-523 AMD Ryzen™ Embedded 7000 series processor with B650 chipset for industrial applications that require both performance computing and enhanced power management capabilities. The motherboard supports the AIMB-523 AMD Ryzen™ Embedded 7000 Series with B650 chipset with up to 64MB L3 cache and DDR5 5600 MHz up to 128GB (up to 32GB per slot). Abundant I/O connectivity is provided with 6 x 2.5 GbE LAN ports, 8 x USB 3.2, and 1 x USB 2.0 on-board Type-A.

1.2 Features

- **Rich I/O connectivity:** up to 6 x GbE LAN and dual 2.5 Gbe LAN via PCIe x1 bus, 1 x PCIe x16 slot (Gen5), 1 x PCIe x4 slot (Gen 4), 1 x PCIe x1 (Gen4), 2 x USB 3.2 Gen2, 2 x HDMI, 6 x Ethernet RJ-45 ports, 1 x DisplayPort.
- **Standard Micro-ATX form factor with industrial features:** The AIMB-523 is a full-featured Micro-ATX motherboard with balanced expandability and performance.
- **Diverse Storage Devices:** 4 x SATA and 1 x M.2 M-Key 2280
- **Optimized Integrated Graphics:** AMD Radeon™ Graphics

1.3 Specifications

1.3.1 System

- **CPU:** AMD Ryzen™ Embedded 7000 Series processors
- **BIOS:** AMI EFI 256 Mbit SPI
- **System chipset:** AMD B650
- **SATA hard disk drive interface:** Onboard SATA connectors with data transmission rate up to 600 MB/s

1.3.2 Memory

- **RAM:** Up to 128GB in 4 slots (288-pin DIMM sockets). Supports up to 5600MHz (4 DIMMS).

1.3.3 Input/Output

- **PCIe slots:** 1 x PCIe x16, 1 x PCIe x4, and 1 x PCIe x1 expansion slots
- **Serial ports:** Support for 4 x serial ports (COM1 & COM2 supporting RS-232/422/485; COM 3 & COM4 supporting RS-232)
- **USB ports:** Supports up to 8 x USB 3.2, and 1 x USB 2.0 on-board Type-A.
- **GPIO:** Supports 8-bit GPIO from super I/O for general purpose control.

1.3.4 Graphics

- **Controller:** Radeon™ Graphics
- **HDMI:** 2, resolution up to 4096 x 2160 @60Hz, supports HDR
- **DisplayPort:** 1, resolution up to 3840 x 2160 @60Hz
- **Dual Display:** HDMI/DP, HDMI/HDMI
- **Triple Display:** HDMI/HDMI/DP

1.3.5 Ethernet LAN

- **Controller:** LAN1/2/3/4/5/6 with Intel® i226V (523BF/523BL); i226LM (523BK)
- **Interface:** 10/100/1000/2500 Mbps

1.3.6 Industrial Features

- **Watchdog timer:** It can generate a system reset. The watchdog timer is programmable, with each unit equal to one second or one minute (255 levels).

1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60°C (depending on the CPU)
- **Storage temperature:** -40 ~ 85°C
- **Power supply voltage:** +5V, 3.3V, 12V, 12V_8P
- **Power requirements:**

Operation	+5V	3.3V	12V	12V_8P
Configuration: AMD Ryzen 9 Pro 7945 12- Core Processor 3.7GHz with UDIMM DDR5 5600 32GB*4pcs	4.37120A	1.59790A	1.26122A	10.17750A
Standby (5Vsb)	3A			

- **Board size:** 244 x 244 mm (9.6" x 9.6")
- **Board weight:** 1 kg

1.4 Jumpers and Connectors

Connectors on the AIMB-523 motherboard link it to devices such as hard disk drives and a keyboard. In addition, the board has a number of jumpers used to configure your system for your application.

The tables below list the function of each of the board jumpers and connectors. Later sections in this chapter give instructions on setting jumpers. Chapter 2 gives instructions for connecting external devices to your motherboard.

1.5 Board Layout: Jumper and Connector Locations

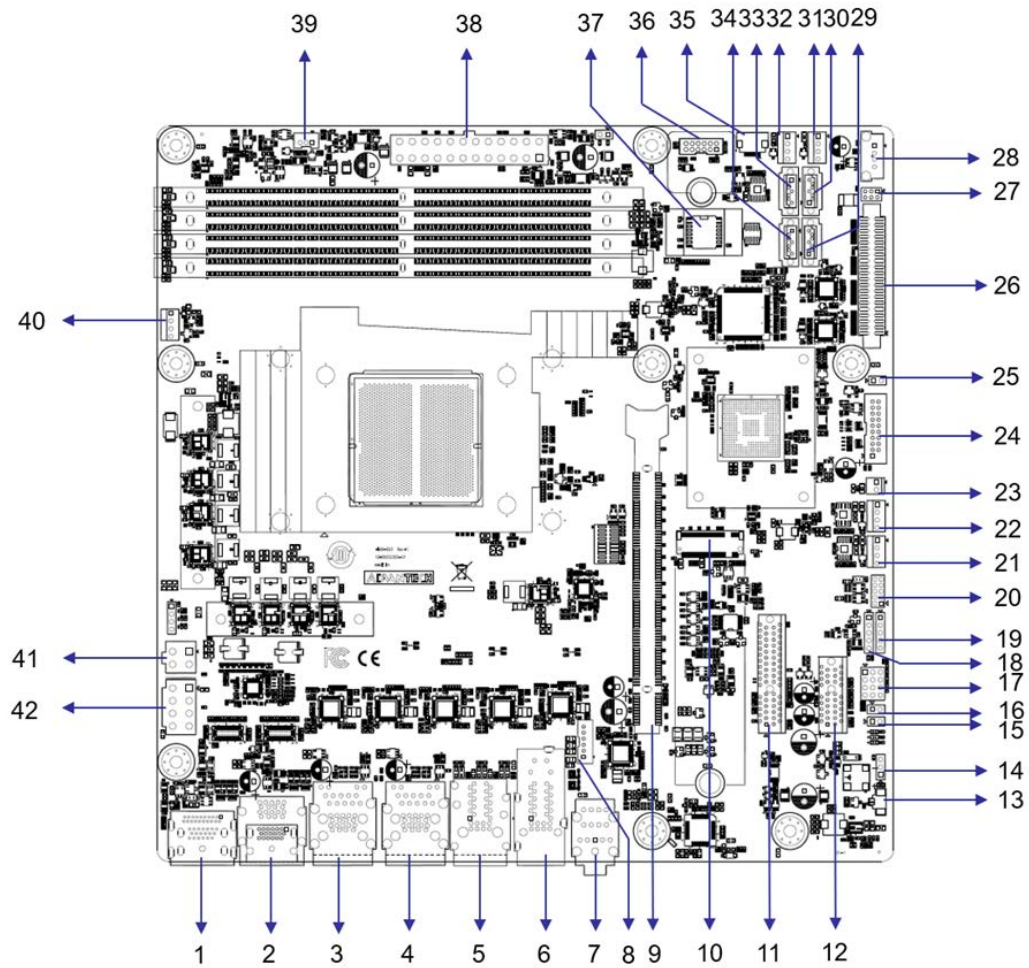


Figure 1.1 Jumper and Connector Locations

Table 1.1: Board Layout: Jumper and Connector Locations

Item	Description	Part Reference
1	DisplayPort 1 + HDMI 1 connector	DP1_HDMI1
2	HDMI 1 + USB 3.2 Gen2 stack connector	HDMI2_USB12
3	RJ-45 + USB 3.2 GEN2 stack connector	LAN1_USB34
4	RJ-45 + USB 3.2 GEN2 stack connector	LAN2_USB56
5	2-port RJ-45 stack connector	LAN3_LAN4
6	2-port RJ-45 stack connector With POE	LAN5_LAN6
7	Audio Jack	AUDIO1
8	LAN5_LAN6 POE Power Wafer	POE_PWR1
9	PCIe x16 Gen5 Slot	PCIEX16_1
10	M.2 M-Key Gen4 Slot	M2_M1
11	PCIe x4 Gen4 Slot	PCIEX4_1
12	PCIe x1 Gen4 Slot	PCIEX1_1
13	Coin Battery Connector	BAT1
14	CMOS Mode selection	JCMOS1
15	Power Button Pin Header	JFP4

Table 1.1: Board Layout: Jumper and Connector Locations

16	Power LED pin header	JFP3
17	PWRBTN# / RESET# / HDD LED / Serial bus from HW monitor IC / Internal Buzzer / External Speaker header	JFP1
18	Power LED pin header	JFP2
19	Watchdog timer output and OBS beep	JWDT1+JOBS1
20	8-bit General Purpose I/O pin header	GPIO1
21	System Fan #4 connector	SYSFAN4
22	System Fan #3 connector	SYSFAN3
23	FCH Fan connector	FCHFAN1
24	Universal Serial Bus 3.0 Port 7 / 8	USB78
25	Case Open connector	JCASE1
26	COM 1 / 2 / 3 / 4 Box Header	COM1234
27	COM3 RI / 12V / 5V Select Pin Header	JSETCOM3_V1
28	Vertical Universal Serial Bus 2.0 Port 9	USB9
29	Serial ATA III Port 4	SATA4
30	Serial ATA III Port 3	SATA3
31	System Fan #2 connector	SYSFAN2
32	System Fan #1 connector	SYSFAN1
33	Serial ATA III Port 1	SATA1
34	Serial ATA III Port 2	SATA2
35	LED port 80 connector	LED_P1
36	SPI TPM Module connector	SPI_TPM1
37	SPI BIOS flash socket1	SPI1
38	ATX 24-pin power connector	EATXPWR1
39	AT/ATX Mode selection	PSON1
40	CPU FAN connector	CPUFAN1
41	ATX 4-pin main power connector	ATX12V2
42	ATX 8-pin main power connector	ATX12V1

1.6 AIMB-523 Board Diagram

Block Diagram

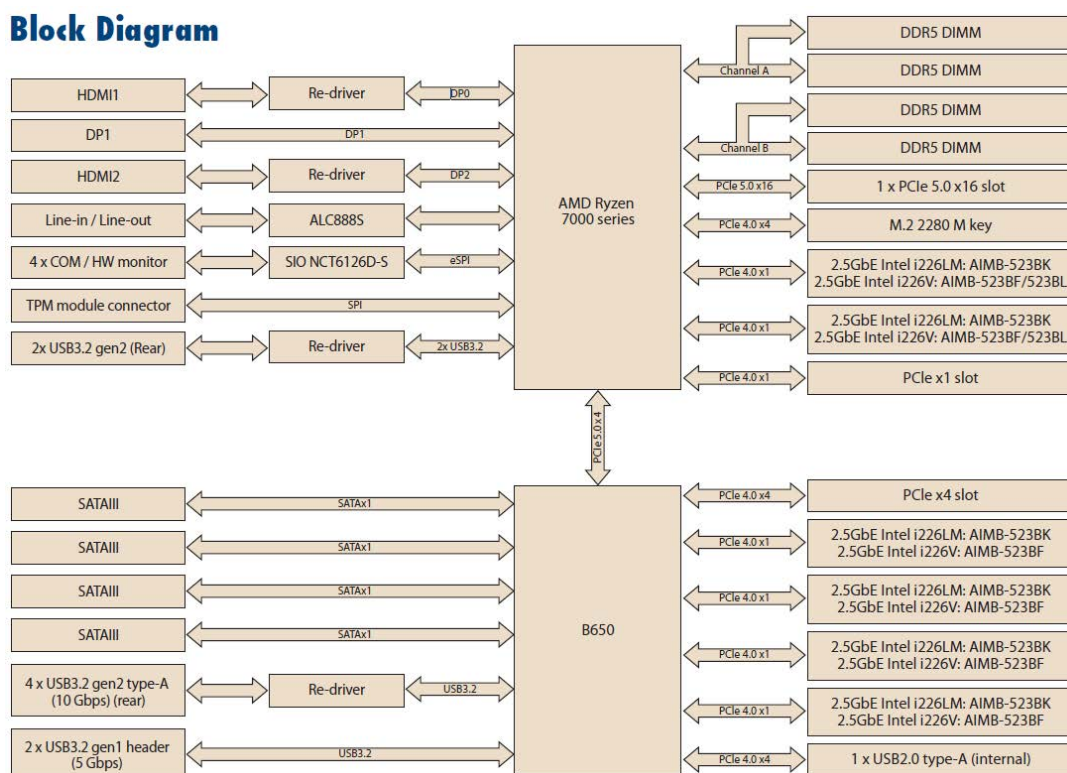


Figure 1.2 AIMB-523 Block Diagram

1.7 Safety Precautions

Warning! Always completely disconnect the power cord from the chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.



Caution! Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to electrostatic discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.



Caution! The computer is provided with a battery-powered real-time clock circuit. There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.



Caution! There is danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.



1.8 Jumper Settings

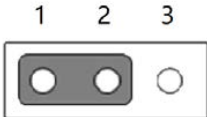
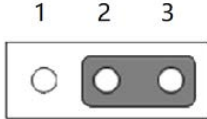
This section provides instructions on how to configure your motherboard by setting the jumpers. It also includes the motherboard's default settings and your options for each jumper.

1.8.1 How to Set Jumpers

Users can configure the motherboard to match the needs of an application by setting the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” (or turn ON) a jumper, you connect the pins with the clip. To “open” (or turn OFF) a jumper, you remove the clip. Sometimes a jumper consists of a set of three pins, labeled 1, 2, and 3. In this case you connect either pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

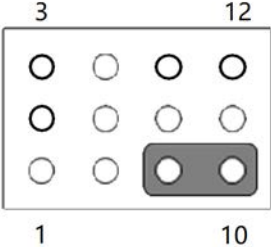
1.8.2 CMOS Clear (CMOS1)

Table 1.2: CMOS1

Function	Jumper Setting
Keep CMOS data (Default)	
Clear CMOS data	

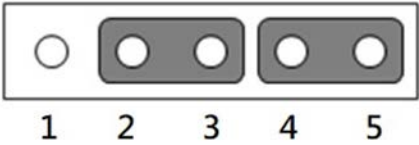
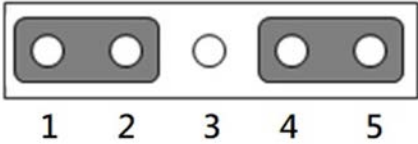
1.8.3 PWRBTN# / RESET# / HDD LED / Serial Bus From HW Monitor IC / Internal Buzzer / External Speaker Header (JFP1)

Table 1.3: JFP1

Function	Jumper Setting
Internal Buzzer (Default)	

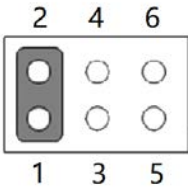
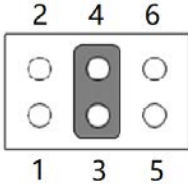
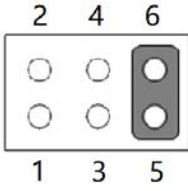
1.8.4 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

Table 1.4: JWDT1+JOBS1

Function	Jumper Setting
Watchdog Timer Output (2-3) (Default) OBS BEEP (4-5) (Default)	
Watchdog Timer Disable (1-2) OBS BEEP (4-5) (Default)	

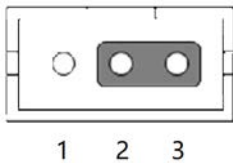
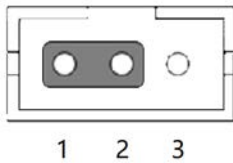
1.8.5 COM3_RI# Pin RI# / 5V / 12V Selection (JSETCOM3_V1)

Table 1.5: JSETCOM3_V1

Function	Jumper Setting
Jumper position for RI# (Default)	
Jumper position for +5V	
Jumper position for +12V	

1.8.6 AT / ATX Mode Selection (PSON1)

Table 1.6: PSON1

Function	Jumper Setting
ATX Mode (Default)	 1 2 3
AT Mode	 1 2 3

1.9 System Memory

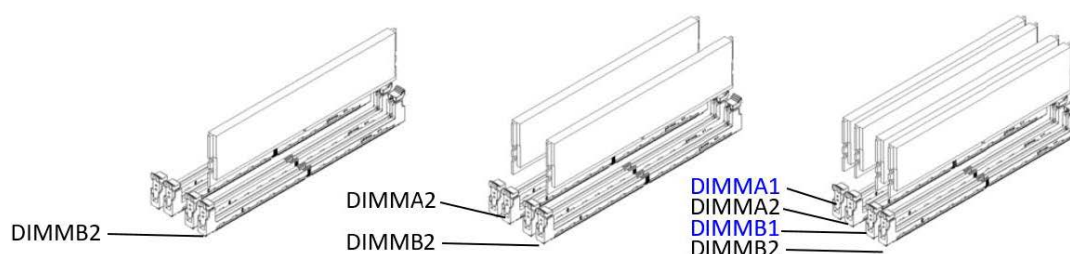
The AIMB-523 has four 288-pin memory sockets and supports up to 5600MHZ (4 DIMMS) SDRAM with maximum capacity of 128GB (Maximum 32GB for each DIMM).

1.10 Memory Installation Procedures

To install DIMMs, first make sure the two handles of the DIMM socket are in the “open” position, i.e., the handles lean outward. Slowly slide the DIMM module along the plastic guides on both ends of the socket. Then firmly but gently (avoid pushing down too hard) press the DIMM module well down into the socket, until you hear a click when the two handles have automatically locked the memory module into the correct position of the DIMM socket. To remove the memory module, just push both handles outward, and the memory module will be ejected by the mechanism.

DIMM installation

It is recommended that you use the same UDIMM memory module on the same channel and load the module from the 2nd slot if a single module is used, as shown in the picture below.



Chapter 2

Pin Assignments

2.1 Introduction

You can access most of the connectors from the top of the board as it is being installed in the chassis. If you have a number of cards installed or have a packed chassis, you may need to partially remove the card to make all the connections.

2.1.1 DisplayPort + HDMI Connector (DP1_HDMI1)

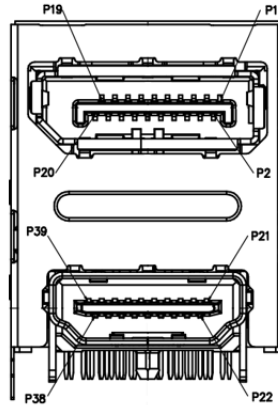


Table 2.1: DP1_HDMI1

Pin	Signal	Pin	Signal
P1	ML_Lane 0+	P21	TMDS Data2+
P2	GND	P22	GND
P3	ML_Lane 0-	P23	TMDS Data2-
P4	ML_Lane 1+	P24	TMDS Data1+
P5	GND	P25	GND
P6	ML_Lane 1-	P26	TMDS Data1-
P7	ML_Lane 2+	P27	TMDS Data0+
P8	GND	P28	GND
P9	ML_Lane 2-	P29	TMDS Data0-
P10	ML_Lane 3+	P30	TMDS Clock+
P11	GND	P31	GND
P12	ML_Lane 3-	P32	TMDS Clock-
P13	AUX_EN#	P33	NC
P14	GND	P34	NC
P15	AUX+	P35	SCL
P16	GND	P36	SDA
P17	AUX-	P37	GND
P18	HPD	P38	HDMI_PWR
P19	GND	P39	HPD
P20	DP_PWR		

2.1.2 HDMI 1 + USB 3.2 Gen2 Stack Connector (HDMI2_USB12)

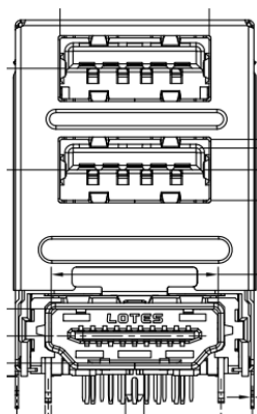


Table 2.2: HDMI2_USB12

Pin	Signal	Pin	Signal
A1	HDMI1_z_D2+	B11	+USBV0910
A2	GND	B12	USB2_D3-
A3	HDMI1_z_D2-	B13	USB2_D3+
A4	HDMI1_z_D1+	B14	GND
A5	GND	B15	USB31_P9_z_RX-
A6	HDMI1_z_D1-	B16	USB31_P9_z_RX+
A7	HDMI1_z_D0+	B17	GND
A8	GND	B18	USB31_P9_z_TX-
A9	HDMI1_z_D0-	B19	USB31_P9_z_TX+
A10	HDMI1_z_CLK+	B20	X
A11	GND	B21	+USBV0910
A12	HDMI1_z_CLK-	B22	USB2_D4-
A13	X	B23	USB2_D4+
A14	X	B24	GND
A15	HDMI1_SCL	B25	USB31_P10_z_RX-
A16	HDMI1_SDA	B26	USB31_P10_z_RX+
A17	GND	B27	GND
A18	+V5_HDMI1	B28	USB31_P10_z_TX-
A19	HDMI1_HPD	B29	USB31_P10_z_TX+

2.1.3 RJ-45 + USB 3.2 GEN2 Stack Connector (LAN1_USB34/LAN2_USB56)

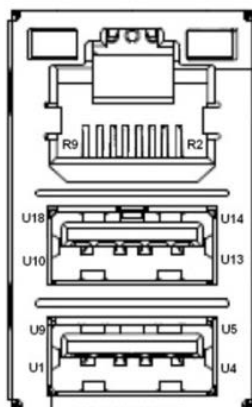


Table 2.3: LAN1_USB34/LAN2_USB56

Pin	Signal	Pin	Signal
U1	VBUS	U10	VBUS
U2	D-	U11	D-
U3	D+	U12	D+
U4	GND	U13	GND
U5	RX-	U14	RX-
U6	RX+	U15	RX+
U7	GND	U16	GND
U8	TX-	U17	TX-
U9	TX+	U18	TX+
Pin	Signal	Pin	Signal
R2	MDI_0+	R6	MDI_2+
R3	MDI_0-	R7	MDI_2-
R4	MDI_1+	R8	MDI_3+
R5	MDI_1-	R9	MDI_3-

2.1.4 RJ-45 Port Stack Connector (LAN3_LAN4)

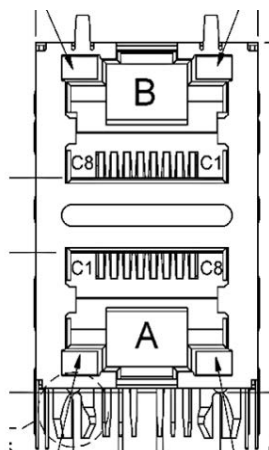


Table 2.4: LAN3_LAN4

Pin	Signal	Pin	Signal
RA1	MDI_0+	RA5	MDI_2+
RA2	MDI_0-	RA6	MDI_2-
RA3	MDI_1+	RA7	MDI_3+
RA4	MDI_1-	RA8	MDI_3-
AL1	ACT LED Green	AL3	Link LED Orange
AL2	ACT LED Orange	AL4	Link LED Green
Pin	Signal	Pin	Signal
RB1	MDI_0+	RB5	MDI_2+
RB2	MDI_0-	RB6	MDI_2-
RB3	MDI_1+	RB7	MDI_3+
RB4	MDI_1-	RB8	MDI_3-
BL1	ACT LED Green	BL3	Link LED Orange
BL2	ACT LED Orange	BL4	Link LED Green

2.1.5 RJ-45 Port Stack Connector with POE (LAN5_LAN6)

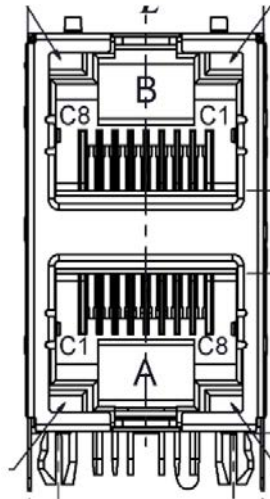


Table 2.5: LAN5_LAN6

Pin	Signal	Pin	Signal
RA1	MDI_0+	RA5	MDI_2+
RA2	MDI_0-	RA6	MDI_2-
RA3	MDI_1+	RA7	MDI_3+
RA4	MDI_1-	RA8	MDI_3-
RA11	POE PWR+	RA12	POE PWR-
AL1	ACT LED Orange	AL3	Link LED Orange
AL2	ACT LED Orange	AL4	Link LED Green
Pin	Signal	Pin	Signal
RB1	MDI_0+	RB5	MDI_2+
RB2	MDI_0-	RB6	MDI_2-
RB3	MDI_1+	RB7	MDI_3+
RB4	MDI_1-	RB8	MDI_3-
RB11	POE PWR+	RB12	POE PWR-
BL1	ACT LED Orange	BL3	Link LED Orange
BL2	ACT LED Orange	BL4	Link LED Green

2.1.6 HD Audio Interface (AUDIO1)

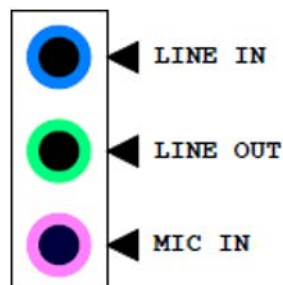


Table 2.6: AUDIO1

Pin	Signal
1	MIC IN
2	LINE OUT
3	LINE IN

2.1.7 PCIe x16 Gen5 Slot (PCIEX16_1)

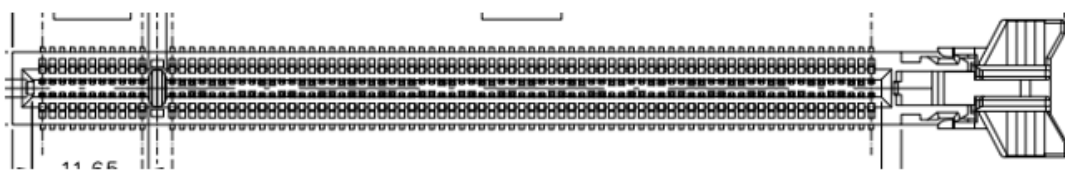


Table 2.7: PCIEX16_1

Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	Reserved
B6	SMB_DATA	A6	Reserved
B7	GND	A7	Reserved
B8	+3.3V	A8	Reserved
B9	Reserved	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	PWRGD
B12	Reserved	A12	GND
B13	GND	A13	REFCLK+
B14	TX0+	A14	REFCLK-
B15	TX0-	A15	GND
B16	GND	A16	RX0+
B17	Reserved	A17	RX0-
B18	DETECT#	A18	GND
B19	TX1+	A19	Advantech defined
B20	TX1-	A20	GND
B21	GND	A21	RX1+
B22	GND	A22	RX1-
B23	TX2+	A23	GND
B24	TX2-	A24	GND
B25	GND	A25	RX2+
B26	GND	A26	RX2-
B27	TX3+	A27	GND
B28	TX3-	A28	GND
B29	GND	A29	RX3+
B30	Reserved	A30	RX3-
B31	Reserved	A31	GND
B32	GND	A32	Advantech defined
B33	TX4+	A33	Reserved
B34	TX4-	A34	GND
B35	GND	A35	RX4+
B36	GND	A36	RX4-
B37	TX5+	A37	GND
B38	TX5-	A38	GND

Table 2.7: PCIEX16_1

B39	GND	A39	RX5+
B40	GND	A40	RX5-
B41	TX6+	A41	GND
B42	TX6-	A42	GND
B43	GND	A43	RX6+
B44	GND	A44	RX6-
B45	TX7+	A45	GND
B46	TX7-	A46	GND
B47	GND	A47	RX7+
B48	Reserved	A48	RX7-
B49	GND	A49	GND
B50	TX8+	A50	Reserved
B51	TX8-	A51	GND
B52	GND	A52	RX8+
B53	GND	A53	RX8-
B54	TX9+	A54	GND
B55	TX9-	A55	GND
B56	GND	A56	RX9+
B57	GND	A57	RX9-
B58	TX10+	A58	GND
B59	TX10-	A59	GND
B60	GND	A60	RX10+
B61	GND	A61	RX10-
B62	TX11+	A62	GND
B63	TX11-	A63	GND
B64	GND	A64	RX11+
B65	GND	A65	RX11-
B66	TX12+	A66	GND
B67	TX12-	A67	GND
B68	GND	A68	RX12+
B69	GND	A69	RX12-
B70	TX13+	A70	GND
B71	TX13-	A71	GND
B72	GND	A72	RX13+
B73	GND	A73	RX13-
B74	TX14+	A74	GND
B75	TX14-	A75	GND
B76	GND	A76	RX14+
B77	GND	A77	RX14-
B78	TX15+	A78	GND
B79	TX15-	A79	GND
B80	GND	A80	RX15+
B81	Reserved	A81	RX15-
B82	Reserved	A82	GND

2.1.8 PCIe x4 Gen4 Slot (PCIEX4_1)

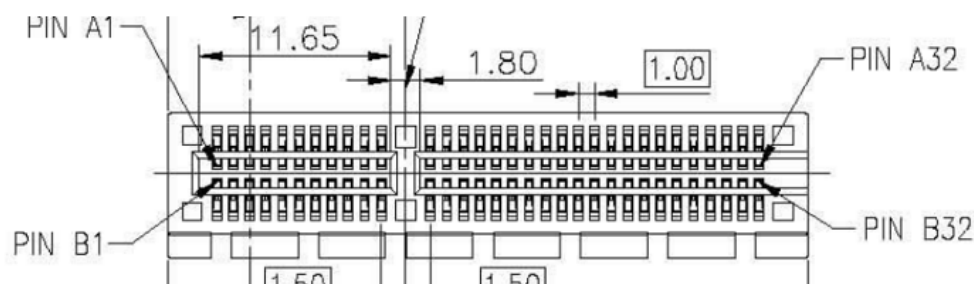


Table 2.8: PCIEX4_1

Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	Reserved
B6	SMB_DATA	A6	Reserved
B7	GND	A7	Reserved
B8	+3.3V	A8	Reserved
B9	Reserved	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	PWRGD
B12	Reserved	A12	GND
B13	GND	A13	REFCLK+
B14	TX0+	A14	REFCLK-
B15	TX0-	A15	GND
B16	GND	A16	RX0+
B17	Reserved	A17	RX0-
B18	DETECT#	A18	GND
B19	TX1+	A19	Reserved
B20	TX1-	A20	GND
B21	GND	A21	RX1+
B22	GND	A22	RX1-
B23	TX2+	A23	GND
B24	TX2-	A24	GND
B25	GND	A25	RX2+
B26	GND	A26	RX2-
B27	TX3+	A27	GND
B28	TX3-	A28	GND
B29	GND	A29	RX3+
B30	Reserved	A30	RX3-
B31	Reserved	A31	GND
B32	GND	A32	Reserved

2.1.9 PCIe x1 Gen4 Slot (PCIEX1_1)

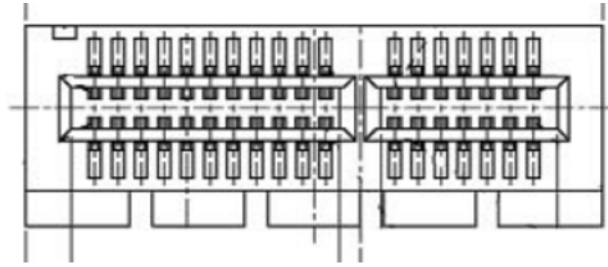


Table 2.9: PCIEX1_1

Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	Reserved
B6	SMB_DATA	A6	Reserved
B7	GND	A7	Reserved
B8	+3.3V	A8	Reserved
B9	Reserved	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	PWRGD
B12	Reserved	A12	GND
B13	GND	A13	REFCLK+
B14	TX0+	A14	REFCLK-
B15	TX0-	A15	GND
B16	GND	A16	RX0+
B17	Reserved	A17	RX0-
B18	GND	A18	GND

2.1.10 M.2 M-Key Connector (M.2_M1)

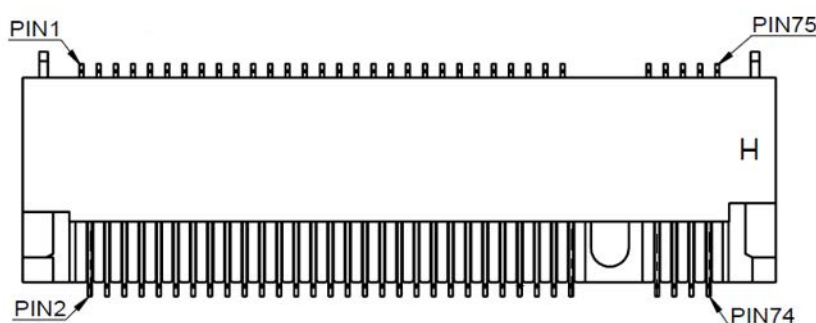


Table 2.10: M.2_M1

Pin	Signal	Pin	Signal
1	GND	2	3.3V
3	GND	4	3.3V
5	NC	6	N/C
7	NC	8	N/C
9	GND	10	DAS/DSS# (I/O)/LED1#
11	NC	12	3.3V
13	NC	14	3.3V
15	GND	16	3.3V
17	NC	18	3.3V
19	NC	20	N/C
21	GND	22	N/C
23	NC	24	N/C
25	NC	26	N/C
27	GND	28	N/C
29	PERn1	30	N/C
31	PERp1	32	N/C
33	GND	34	N/C
35	PETn1	36	N/C
37	PETp1	38	DEVSLP (O)
39	GND	40	N/C
41	PERn0	42	N/C
43	PERp0	44	N/C
45	GND	46	N/C
47	PETn0	48	N/C
49	PETp0	50	PERST# (O)(0/3.3V) or N/C
51	GND	52	CLKREQ# (I/O)(0/3.3V) or N/C
53	REFCLKn	54	PEWAKE# (I/O)(0/3.3V) or N/C
55	REFCLKp	56	N/C
57	GND	58	N/C
59	Connector Key	60	Connector Key
61	Connector Key	62	Connector Key
63	Connector Key	64	Connector Key
65	Connector Key	66	Connector Key
67	N/C	68	SUSCLK(32kHz) (O)(0/3.3V)
69	PEDET (NC-	70	3.3V

Table 2.10: M.2_M1			
71	GND	72	3.3V
73	GND	74	3.3V
75	GND		

2.1.11 Coin Battery Connector (BAT1)

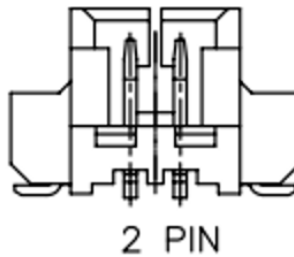


Table 2.11: BAT1	
Pin	Signal
1	VBAT
2	GND
2 pin	2 pin

2.1.12 CMOS Mode Selection (JCMOS1)



Table 2.12: JCMOS1	
Pin	Signal
1	+V3.3_BAT
2	+V3.3_RTC
3	GND

2.1.13 Power Button Pin Header (JFP4)

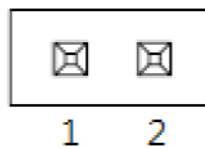


Table 2.13: JFP4	
Pin	Signal
1	FP_PANSWIN#
2	GND

2.1.14 Power LED Pin Header (JFP3)

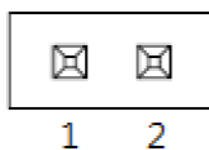


Table 2.14: JFP3

Pin	Signal
1	SIO_SUSLED_JFP3_R
2	SIO_SUSLED

2.1.15 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

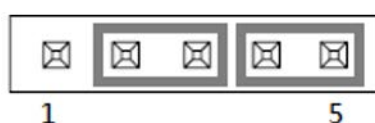


Table 2.15: JWDT1+JOBS1

Pin	Signal
1	NC
2	Watch Dog Reset# output
3	System Reset input#
4	SIO Warning Beep output
5	SP1 Buzzer Beep input

2.1.16 Power LED Pin Header (JFP2)



Table 2.16: JFP2

Pin	Signal
1	LED_PWR
2	NC
3	SUSLED
4	NC
5	GND

2.1.17 8-Bit General Purpose I/O Pin Header (GPIO1)

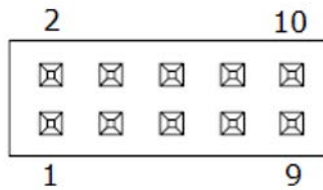


Table 2.17: GPIO1

Pin	Signal	Pin	Signal
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	VCC_GPIO	10	GND

2.1.18 System Fan #4 Connector (SYSFAN4)



Table 2.18: SYSFAN4

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.19 System Fan #3 Connector (SYSFAN3)



Table 2.19: SYSFAN3

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.20 FCH Fan Connector (FCHFAN1)

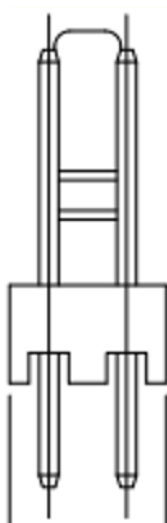


Table 2.20: FCHFAN1

Pin	Signal
1	GND
2	FCHFAN_VCC

2.1.21 Universal Serial Bus 3.0 Port 7 / 8 (USB78)

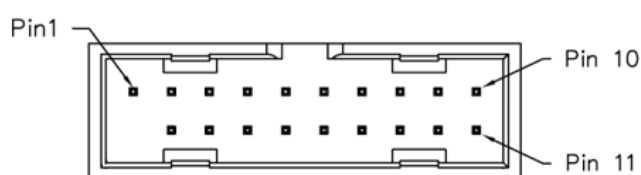


Table 2.21: USB78

Pin	Signal	Pin	Signal
1	+5V_USB	11	D+
2	RX-	12	D-
3	RX+	13	GND
4	GND	14	TX+
5	TX-	15	TX-
6	TX+	16	GND
7	GND	17	RX+
8	D-	18	RX-
9	D+	19	+5V_USB
10	NC		

2.1.22 Case Open Connector (JCASE1)

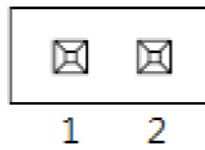


Table 2.22: JCASE1

Pin	Signal
1	Case Open
2	GND

2.1.23 COM 1 / 2 / 3 / 4 Box Header (COM1234)

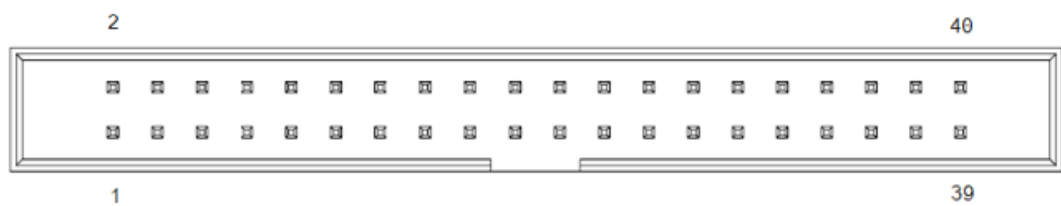


Table 2.23: COM1234

Pin	Signal	Pin	Signal
1	DCD# [1]	2	DSR# [1]
3	RXD [1]	4	RTS#[1]
5	TXD [1]	6	CTS# [1]
7	DTR# [1]	8	RI# [1]
9	GND	10	GND
11	DCD# [2]	12	DSR# [2]
13	RXD [2]	14	RTS#[2]
15	TXD [2]	16	CTS# [2]
17	DTR# [2]	18	RI# [2]
19	GND	20	GND
21	DCD# [3]	22	DSR# [3]
23	RXD [3]	24	RTS#[3]
25	TXD [3]	26	CTS# [3]
27	DTR# [3]	28	RI# [3]
29	GND	30	GND
31	DCD# [4]	32	DSR# [4]
33	RXD [4]	34	RTS#[4]
35	TXD [4]	36	CTS# [4]
37	DTR# [4]	38	RI# [4]
39	GND	40	GND

2.1.24 COM3 RI / 12V / 5V Select Pin Header (JSETCOM3_V1)

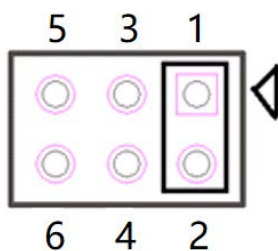


Table 2.24: JSETCOM3_V1

Pin	Signal	Pin	Signal
1	COM3_RI#	2	COM3_RI_VA#
3	COM3_RI_VA#	4	+5V
5	+12V	6	COM3_RI_VA#

2.1.25 Vertical Universal Serial Bus 2.0 Port 9 (USB9)

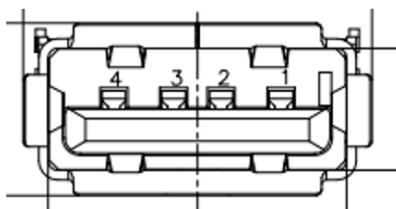


Table 2.25: USB9

Pin	Signal	Pin	Signal
1	+5V_USB	2	D-
3	D+	4	GND

2.1.26 System Fan #2 Connector (SYSFAN2)



Table 2.26: SYSFAN2

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.27 System Fan #1 Connector (SYSFAN1)

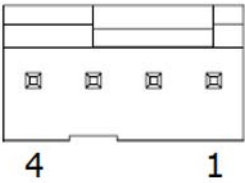


Table 2.27: SYSFAN1

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.28 Serial ATA III Port 4 (SATA1~4)

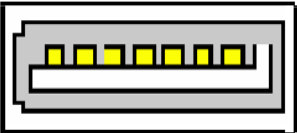


Table 2.28: SATA1~4

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

2.1.29 LED Port 80 Connector (LED_P1)

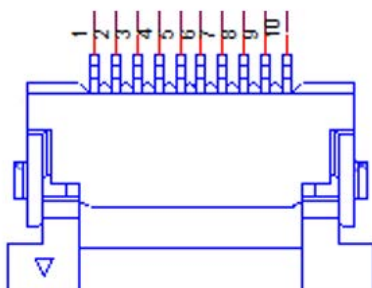


Table 2.29: LED_P1

Pin	Signal
1	SIO_DGL0#
2	SIO_DGH0#
3	SIO_LED_G
4	SIO_LED_F
5	SIO_LED_E
6	SIO_LED_D
7	SIO_LED_C
8	SIO_LED_B
9	SIO_LED_A
10	GND

2.1.30 SPI TPM Module Connector (SPI_TPM1)

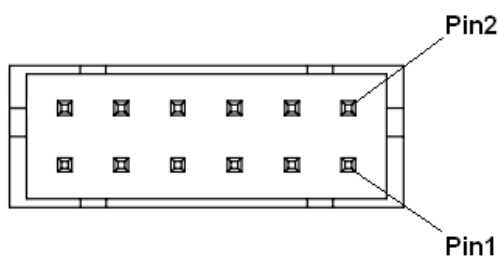


Table 2.30: SPI_TPM1

Pin	Signal	Pin	Signal
1	CS#	2	RSVD
3	SCLK	4	GND
5	MOSI	6	GND
7	MISO	8	NC
9	IRQ#	10	GND
11	PLTRST_TPM#_1V8	12	+V1.8_DUAL_TPM

2.1.31 SPI Pin Header (SPI_CN1)

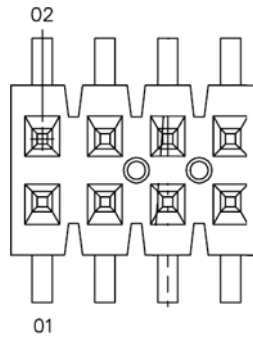


Table 2.31: SPI_CN1

Pin	Signal	Pin	Signal
1	SPI_SKT_CS1#_R	2	+V1.8_DUAL_SPI
3	SPI_SKT_MISO_R	4	NC
5	MISO	6	SPI_SKT_CLK_R
7	GND	8	SPI_SKT_MOSI_R

2.1.32 SPI BIOS Flash Socket1 (SPI1)

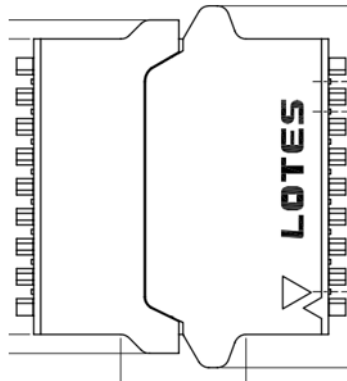


Table 2.32: SPI1

Pin	Signal	Pin	Signal
1	HOLD	9	WP#
2	+V1.8_DUAL_SPI	10	GND
3	SPI_RST#	11	NC
4	NC	12	NC
5	NC	13	NC
6	NC	14	NC
7	CS#	15	MOSI
8	MISO	16	CLK

2.1.33 ATX 24-Pin Power Connector (EATXPWR1)

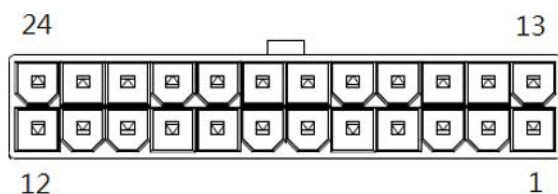


Table 2.33: EATXPWR1

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PSON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWROK	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

2.1.34 AT/ATX Mode Selection (PSON1)



Table 2.34: PSON1

Pin	Signal
1	AT
2	+3.3V
3	ATX

2.1.35 CPU FAN Connector (CPUFAN1)



Table 2.35: CPUFAN1

Pin	Signal
1	GND
2	CPU FAN VCC
3	CPU FAN SPEED
4	CPU FAN PWM

2.1.36 ATX 4-Pin Main Power Connector (ATX12V2)

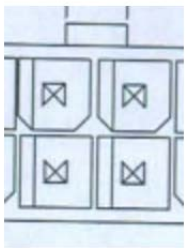


Table 2.36: ATX12V2

Pin	Signal	Pin	Signal
1	GND	3	+12V
2	GND	4	+12V

2.1.37 ATX 8-Pin Main Power Connector (ATX12V1)

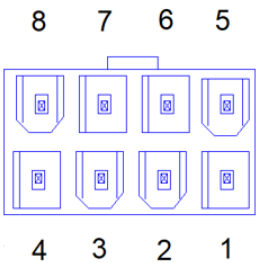


Table 2.37: ATX12V1

Pin	Signal	Pin	Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

2.1.38 AT/ATX Mode Selection (PSON1)



Table 2.38: PSON1

Pin	Signal
1	AT
2	+3.3V
3	ATX

2.1.39 SPI BIOS Flash Socket1 (SPI1)

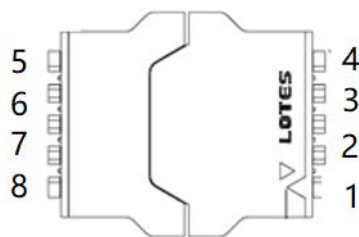


Table 2.39: SPI1

Pin	Signal	Pin	Signal
1	CS#	5	MOSI
2	MISO	6	SCLK
3	WP# / IO2	7	HOLD# / IO3
4	GND	8	+V3.3_SPI

2.1.40 Case Open Connector (JCASE1)

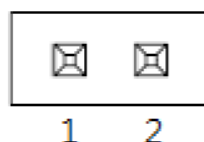


Table 2.40: JCASE1

Pin	Signal
1	Case Open
2	GND

2.1.41 ATX 24-Pin Power Connector (EATXPWR1)

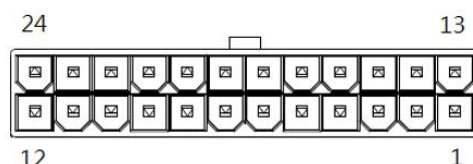


Table 2.41: EATXPWR1

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PSON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWROK	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

2.1.42 COM3 RI# Selection Pin Header (JSETCOM3_V1)

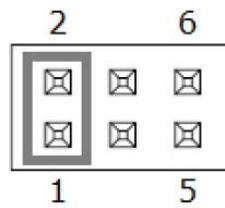


Table 2.42: JSETCOM3_V1

Pin	Signal	Pin	Signal
1	RI# [3]	2	Advantech define
3	Advantech define	4	+5V
5	+12V	6	Advantech define

2.1.43 8-Bit General Purpose I/O Pin Header (GPIO1)

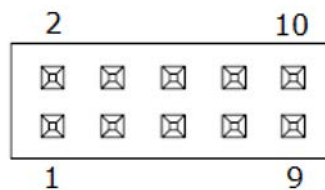


Table 2.43: GPIO1

Pin	Signal	Pin	Signal
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	VCC_GPIO	10	GND

2.1.44 System Fan #4 Connector (SYSFAN4)



Table 2.44: SYSFAN4

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.45 System Fan #3 Connector (SYSFAN3)



Table 2.45: SYSFAN3

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.46 System Fan #2 Connector (SYSFAN2)



Table 2.46: SYSFAN2

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.47 System Fan #1 Connector (SYSFAN1)



Table 2.47: SYSFAN1

Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

2.1.48 CPU FAN Connector (CPUFAN1)

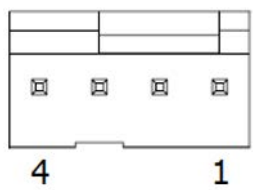


Table 2.48: CPUFAN1	
Pin	Signal
1	GND
2	CPU FAN VCC
3	CPU FAN SPEED
4	CPU FAN PWM

2.1.49 ATX 8-Pin Main Power Connector (ATX12V1)

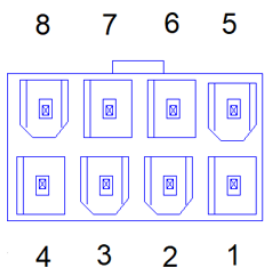


Table 2.49: ATX12V1			
Pin	Signal	Pin	Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

Chapter 3

BIOS Operation

3.1 Introduction

AMI BIOS has been integrated into many motherboards, and has been very popular for over a decade. With the AMI BIOS Setup program, you can modify BIOS settings to control the special features of your computer. The setup program uses a number of menus for making changes. This chapter describes the basic navigation of the AIMB-523 setup screens.

3.2 BIOS Setup

The AIMB-523 Series system has AMI BIOS built in, with a setup utility that allows users to configure required settings or to activate certain system features.

The setup saves the configuration in the FLASH of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to preserve the FLASH.

When the power is turned on, press the or <Esc> button during the BIOS POST (Power-On Self Test) to access the CMOS SETUP screen.

Control Keys	
< ← > < → >	Select Screen
< ↑ > < ↓ >	Select Item
<Enter>	Select
<+/->	Change Opt
<F1>	General help
<F2>	Previous Values
<F3>	Optimized Defaults
<F4>	Save & Exit
<Esc>	Exit

3.2.1 Main Menu

Press or <Esc> to enter the AMI BIOS CMOS Setup Utility. The Main Menu will appear on the screen. Use the arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.



The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

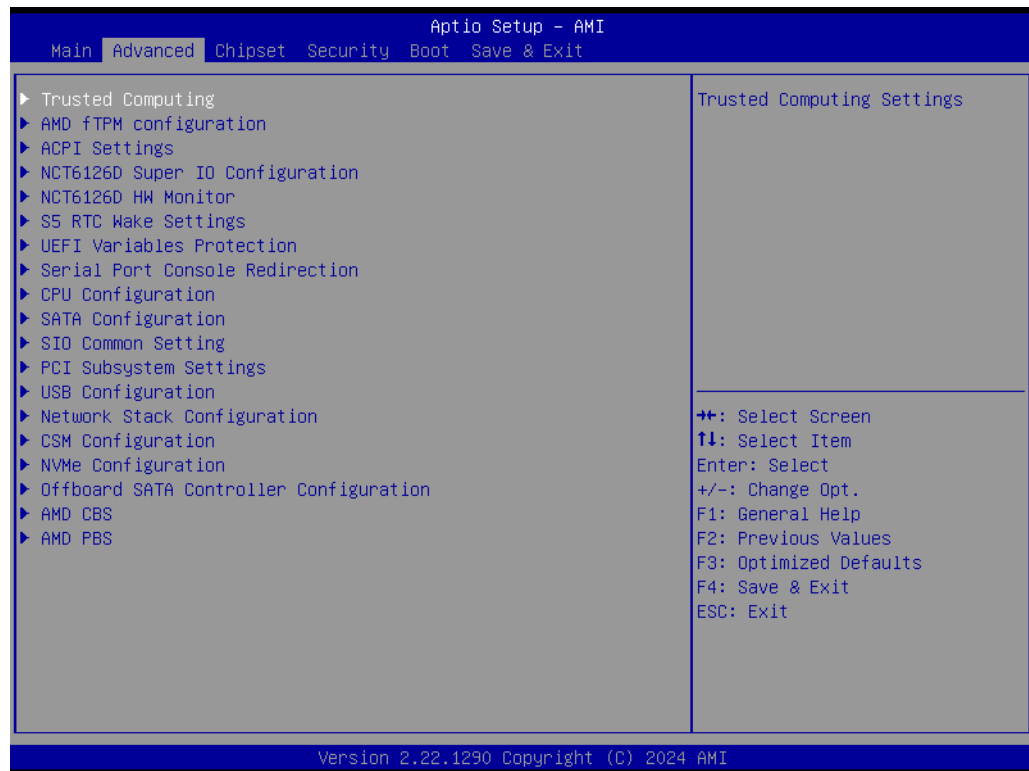
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ System Time / System Date

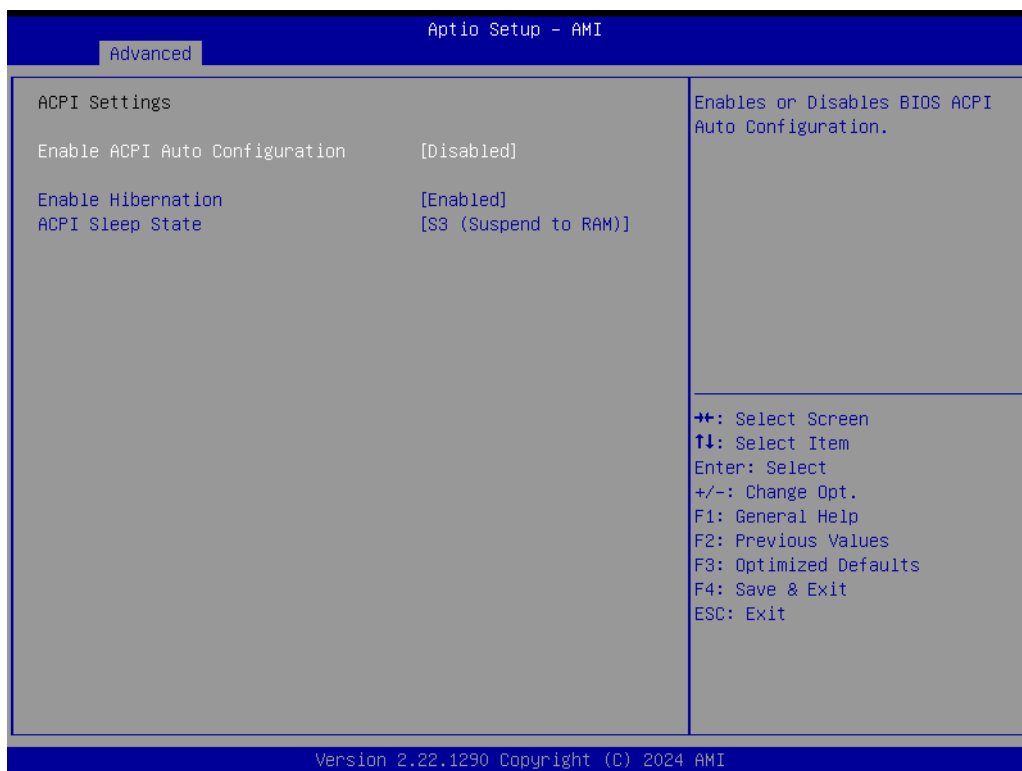
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features

Select the Advanced tab from the AIMB-523 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub-menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub-menus are described on the following pages.

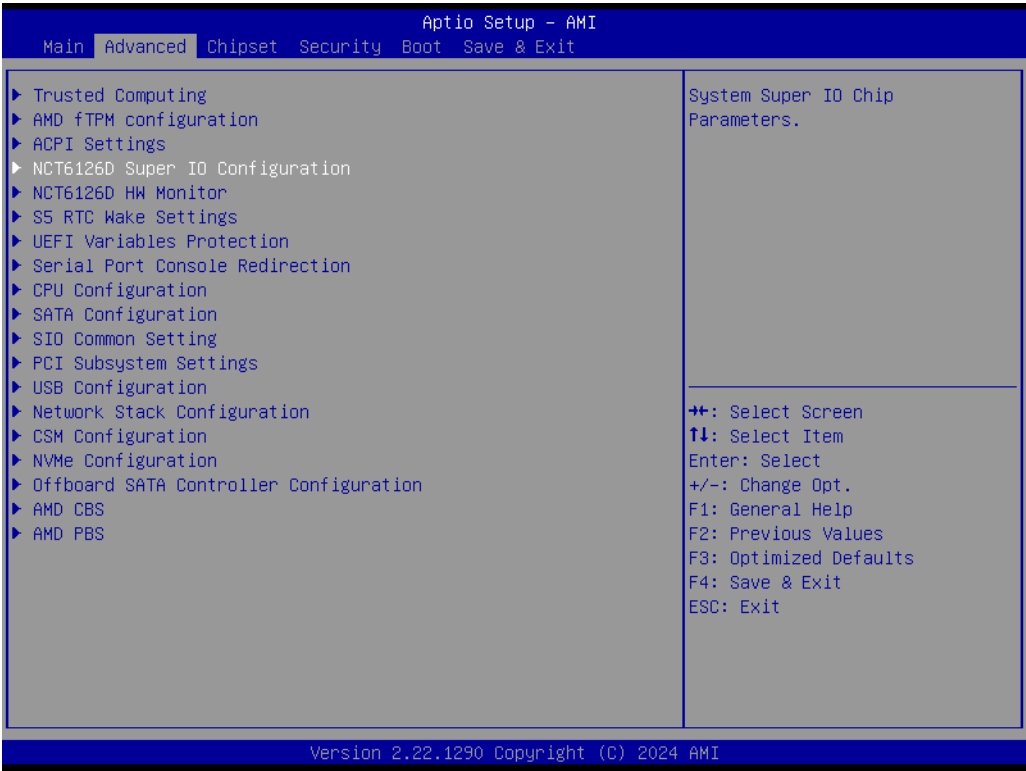


3.2.2.1 ACPI Settings

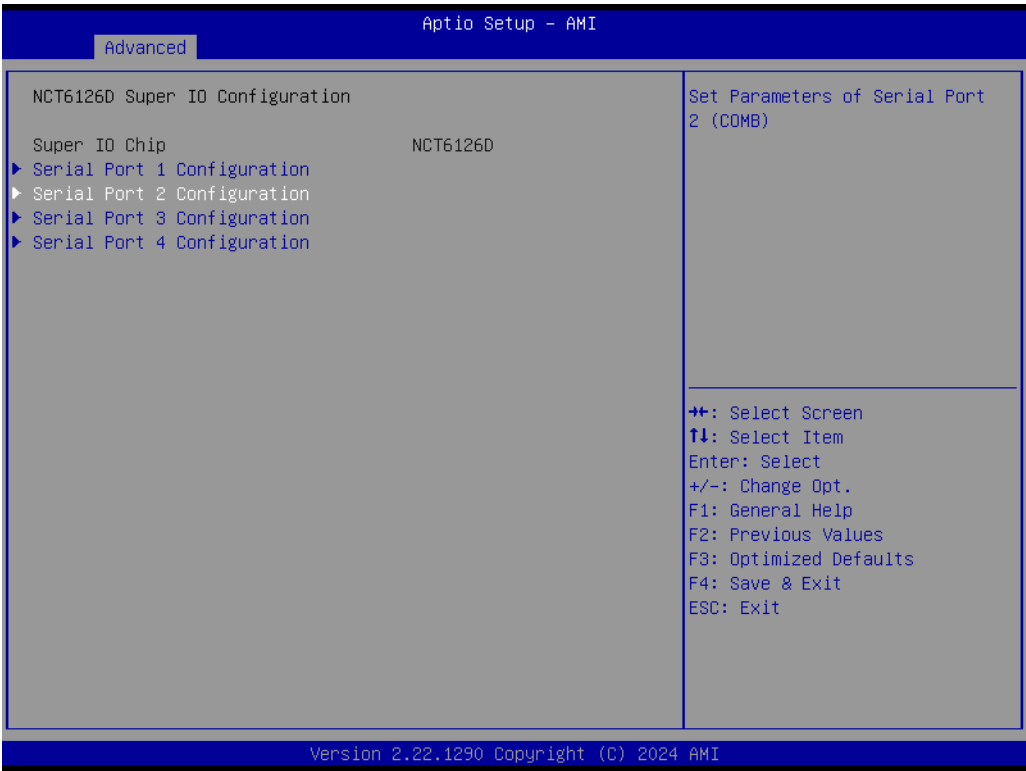


- **Enable ACPI Auto Configuration [Disabled]**
Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation [Enabled]**
Enables or disables the system's ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
- **ACPI Sleep State [S3 (Suspend to RAM)]**
Select the ACPI sleep state the system will enter when the SUSPEND button is pressed.

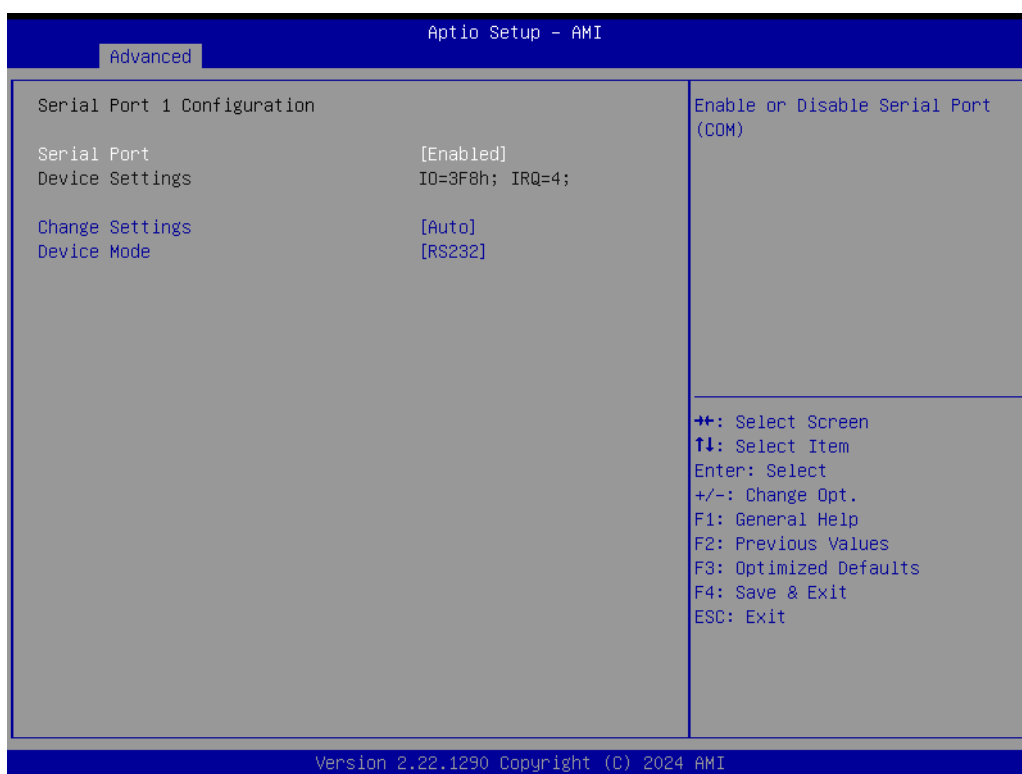
3.2.2.2 NCT6126D Super IO Configuration



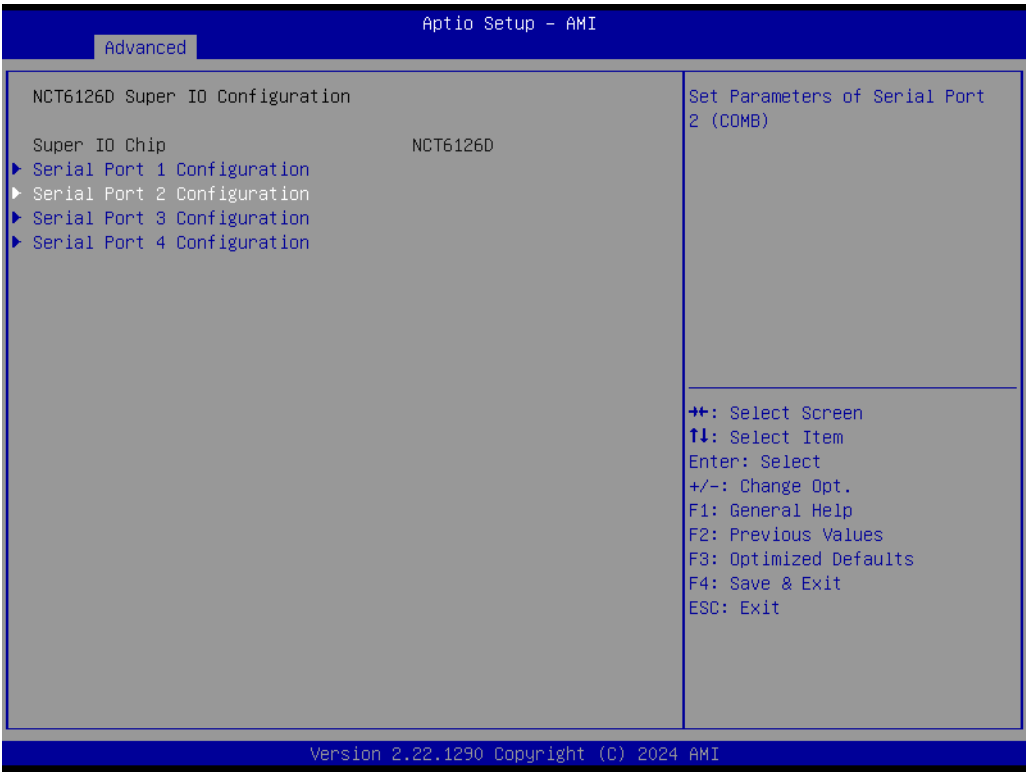
■ Serial Port 1 Configuration
Set Parameters of Serial Port1 (COMA)



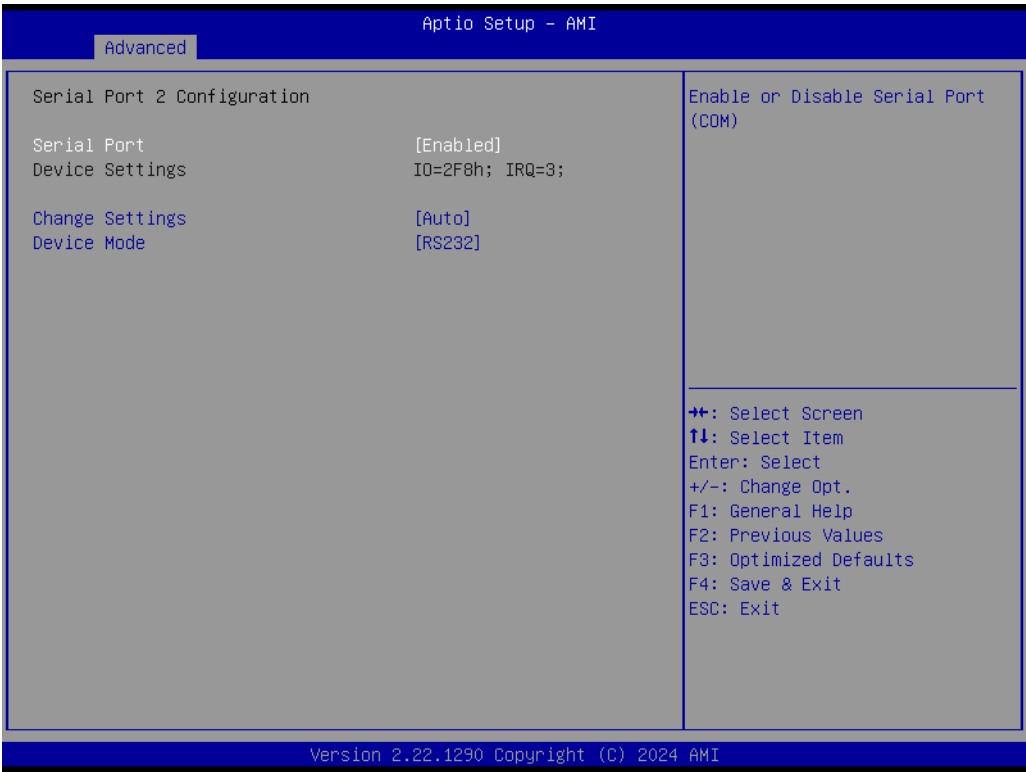
- **Serial Port**
Enable or Disable Serial Port (COM)



- **Serial Port [Enable]**
 - **Device Settings IO=3F8h; IRQ=4;**
 - **Change Settings [Auto]**
 - **Device Mode [RS232]**
- **Serial Port 2 Configuration**
Set Parameters of Serial Port2 (COMB)



■ **Serial Port**
Enable or Disable Serial Port (COM)



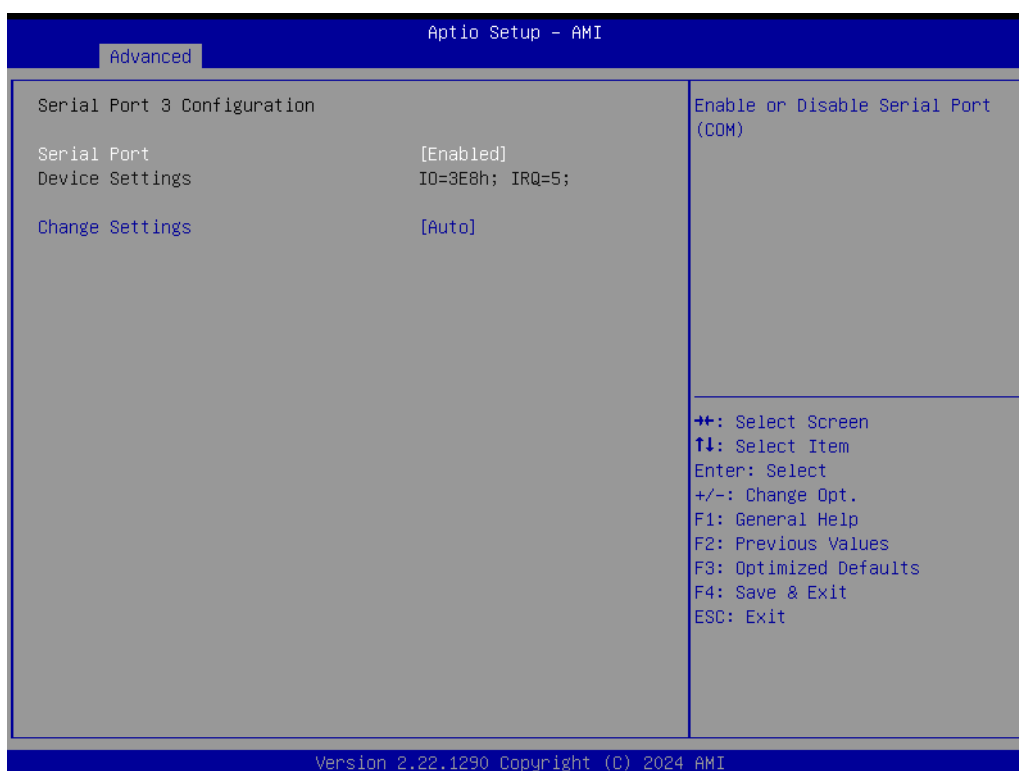
- **Serial Port [Enable]**
- **Device Settings IO=2F8h; IRQ=3;**
- **Change Settings [Auto]**

– Device Mode [RS232]

- **Serial Port 3 Configuration**
Set Parameters of Serial Port3 (COMC)

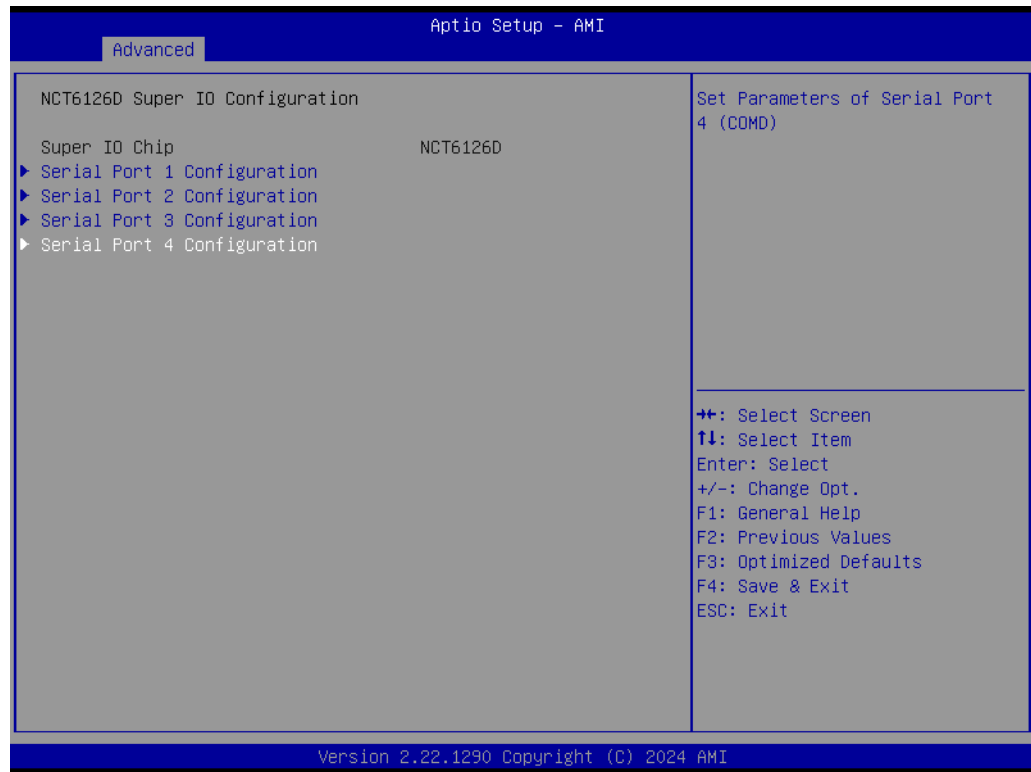


- **Serial Port**
Enable or Disable Serial Port (COM)

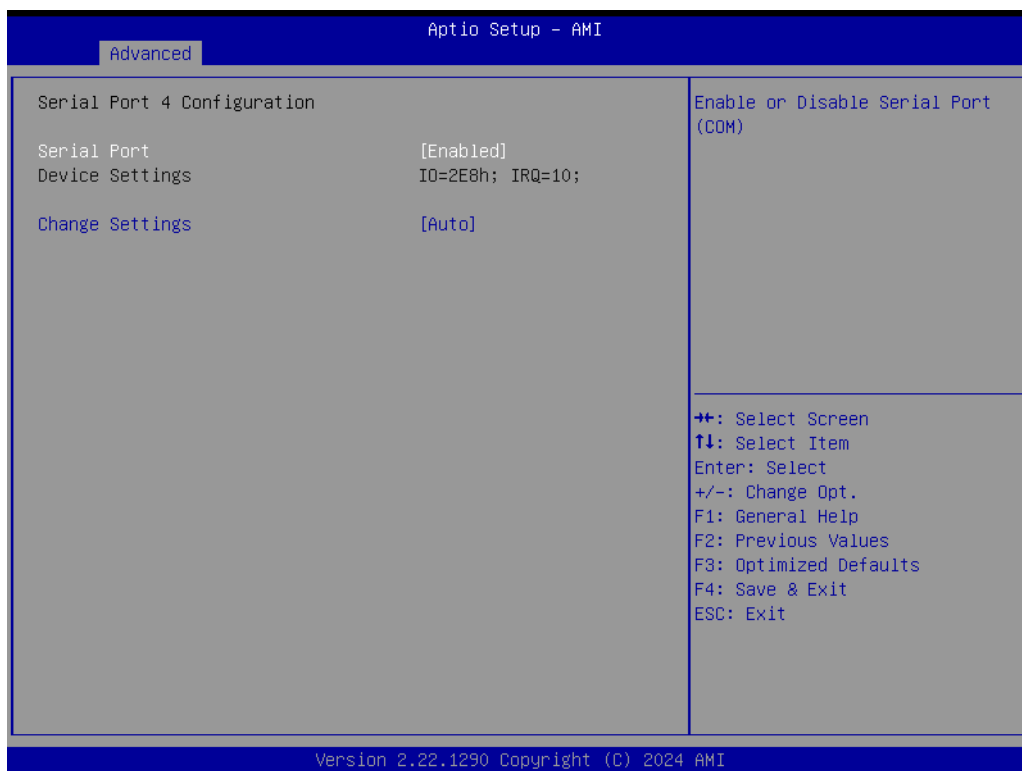


- **Serial Port [Enable]**
- **Device Settings IO=3E8h; IRQ=5;**
- **Change Settings [Auto]**

■ **Serial Port 4 Configuration** Set Parameters of Serial Port4 (COMD)



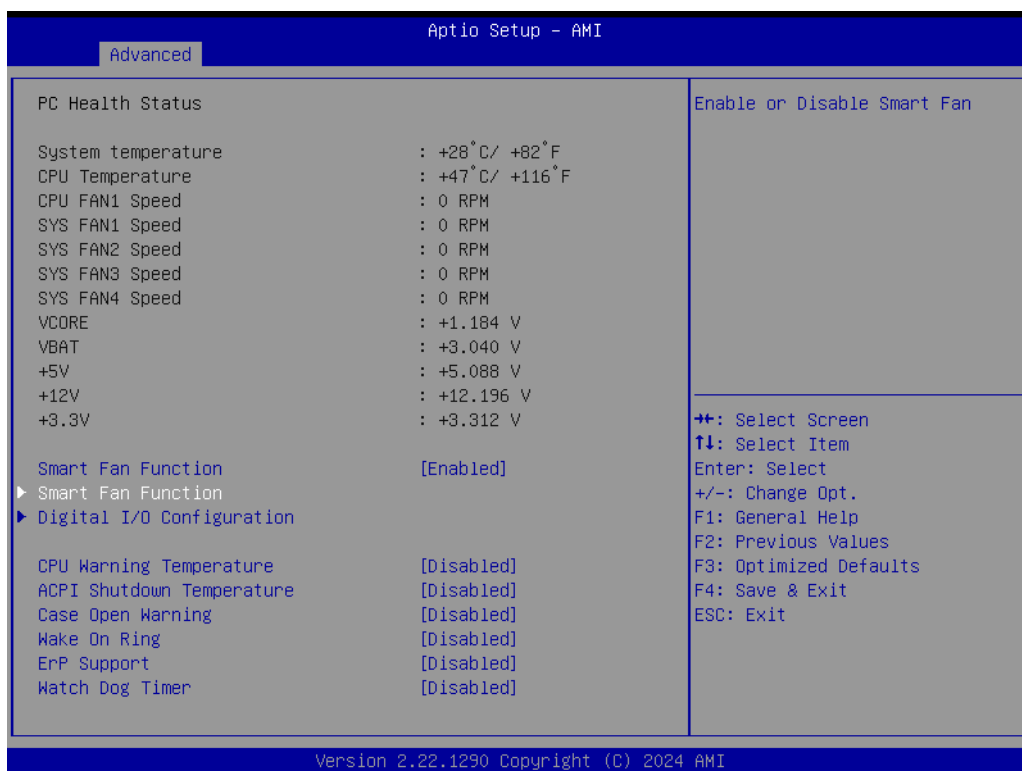
■ **Serial Port** Enable or Disable Serial Port (COM)



- **Serial Port [Enable]**
- **Device Settings IO=2E8h; IRQ=5;**
- **Change Settings [Auto]**

3.2.2.3 NCT6126D HW Monitor

■ PC Health Status



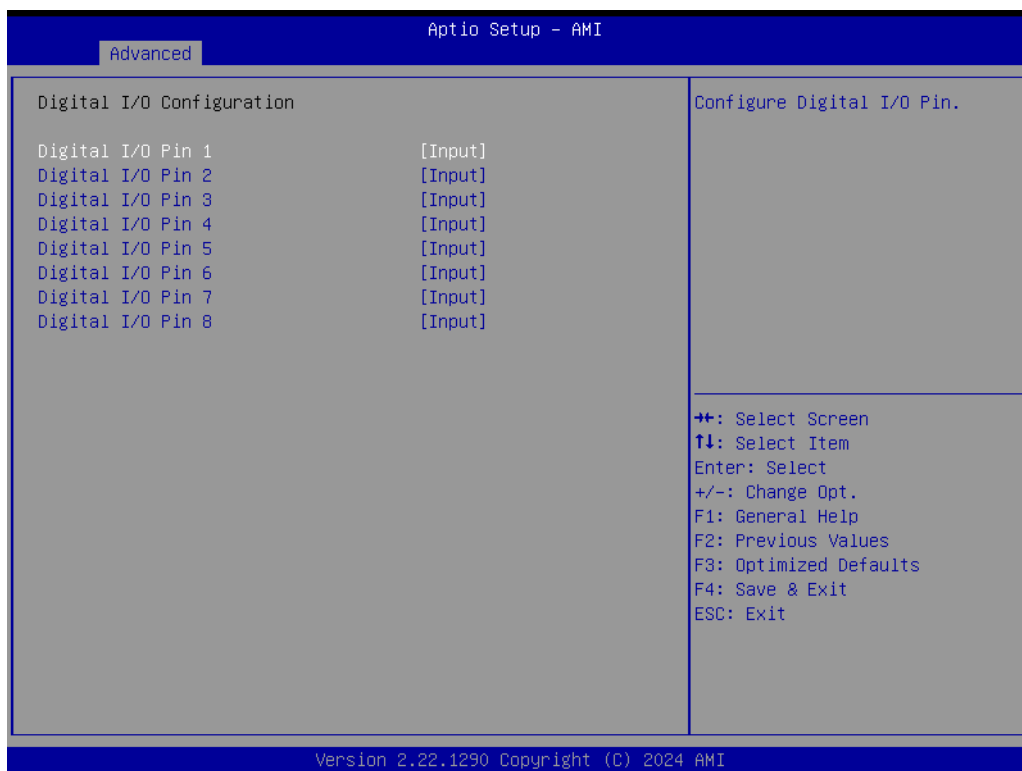
- **Smart Fan Function [Enabled]**
Smart Fan Mode Configuration – CPU Fan1 Mode [SMART FAN IV Mode]

Aptio Setup - AMI	
Advanced	
Smart Fan Mode Configuration	
CPU Fan Mode	[SMART FAN IV Mode]
CPUFAN Temperature 1	40
CPUFAN PWM 1	127
CPUFAN Temperature 2	57
CPUFAN PWM 2	170
CPUFAN Temperature 3	74
CPUFAN PWM 3	214
CPUFAN Temperature 4	90
CPUFAN PWM 4	255
CPUFAN Critical Temperature	90
CPUFAN Critical Temp Tolerance	1
System Fan1 Mode	
SYSFAN1 Temperature 1	30
SYSFAN1 DC/PWM 1	0
SYSFAN1 Temperature 2	40
SYSFAN1 DC/PWM 2	84
SYSFAN1 Temperature 3	50
SYSFAN1 DC/PWM 3	168
SYSFAN1 Temperature 4	60
SYSFAN1 DC/PWM 4	255
SYSFAN1 Critical Temperature	90
SYSFAN1 Critical Temp Tolerance	1
CPU Fan Mode Select	
++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.22.1290 Copyright (C) 2024 AMI	

- **Digital I/O Configuration**

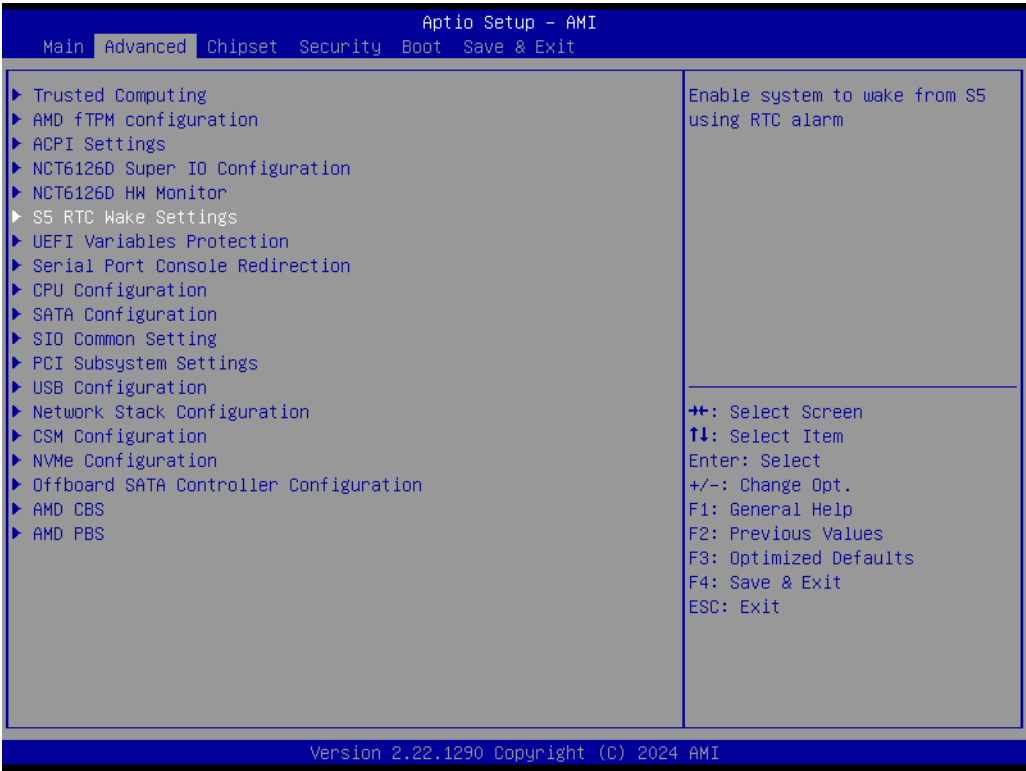
Aptio Setup - AMI	
Advanced	
PC Health Status	
System temperature	: +28°C/ +82°F
CPU Temperature	: +49°C/ +120°F
CPU FAN1 Speed	: 0 RPM
SYS FAN1 Speed	: 0 RPM
SYS FAN2 Speed	: 0 RPM
SYS FAN3 Speed	: 0 RPM
SYS FAN4 Speed	: 0 RPM
VCORE	: +1.184 V
VBAT	: +3.040 V
+5V	: +5.088 V
+12V	: +12.196 V
+3.3V	: +3.312 V
Configure the digital I/O pins	
++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Smart Fan Function [Enabled]	
▶ Smart Fan Function	
▶ Digital I/O Configuration	
CPU Warning Temperature	[Disabled]
ACPI Shutdown Temperature	[Disabled]
Case Open Warning	[Disabled]
Wake On Ring	[Disabled]
ErP Support	[Disabled]
Watch Dog Timer	[Disabled]
Version 2.22.1290 Copyright (C) 2024 AMI	

- **Digital I/O Pin1 [Input] – Configure Digital I/O pins**

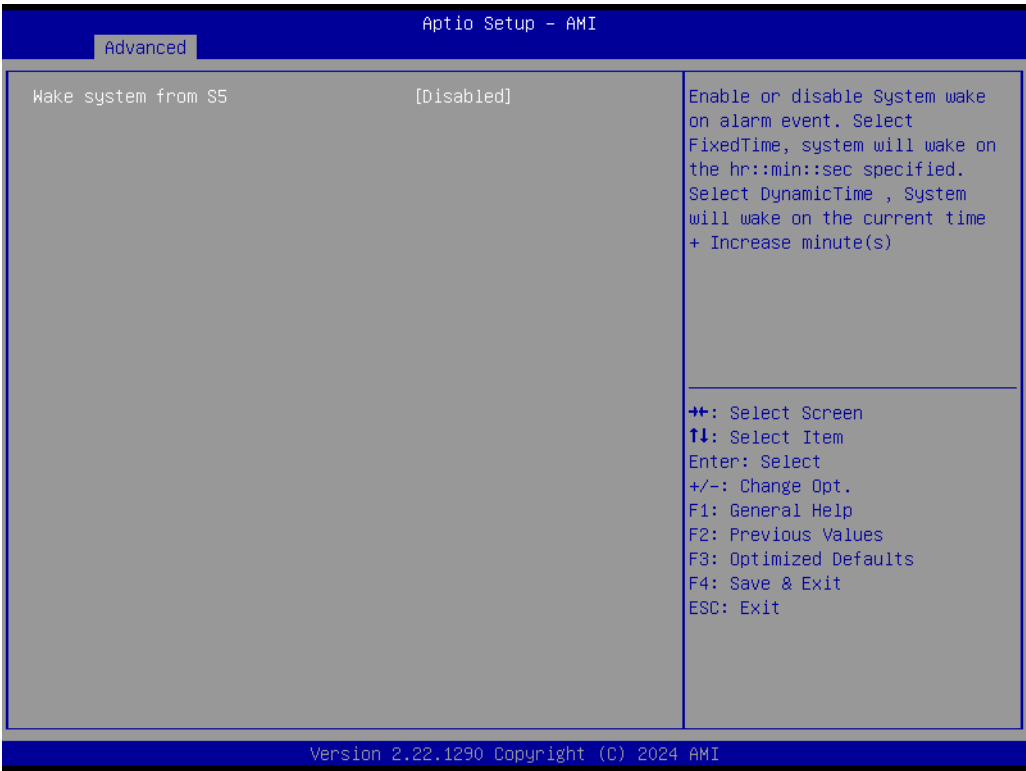


- **SIO Port 80 Control [Disabled]**
- **CPU Warning Temperature [Disabled]**
- **ACPI Shutdown Temperature [Disabled]**
- **Case Open Warning [Disabled]**
- **Wake On Ring [Disabled]**

3.2.2.4 S5 RTC Wake Settings



■ Wake system from S5 [Disabled]



Enable or disable system wake on alarm event. Select FixedTime for the system to wake on the hr:min:sec specified. Select DynamicTime for the system to wake on the current time + added minute(s).

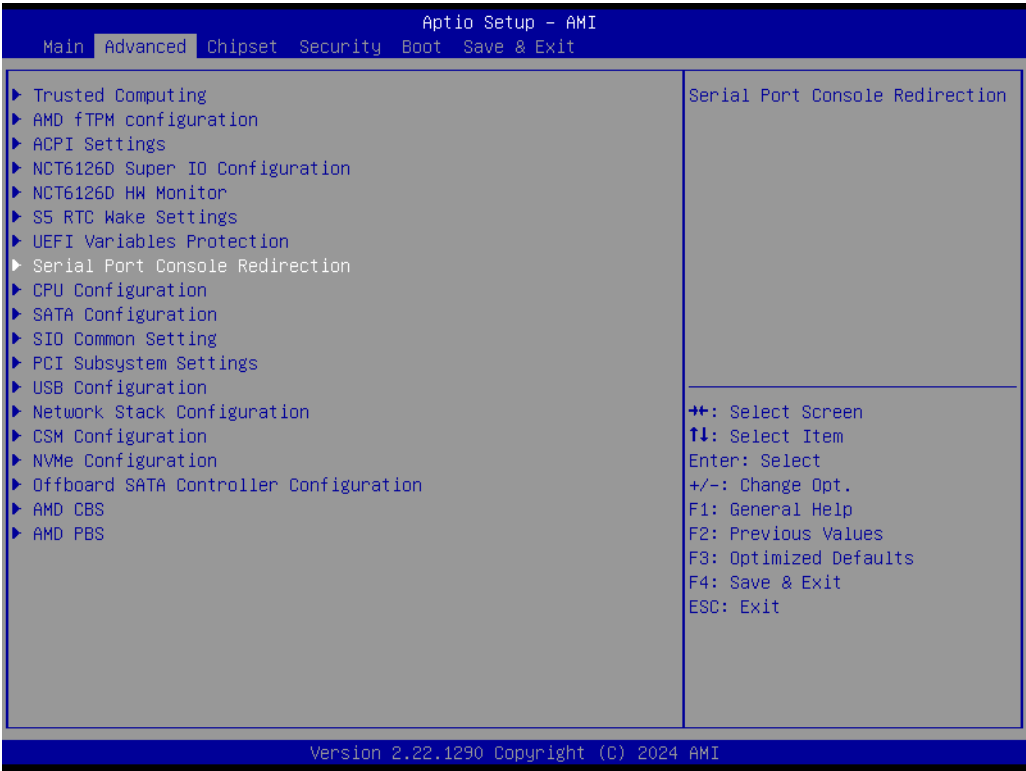
- **Password protection of Runtime Variables [Enable]**
Control the NVRAM Runtime Variable protection through System Admin Password.



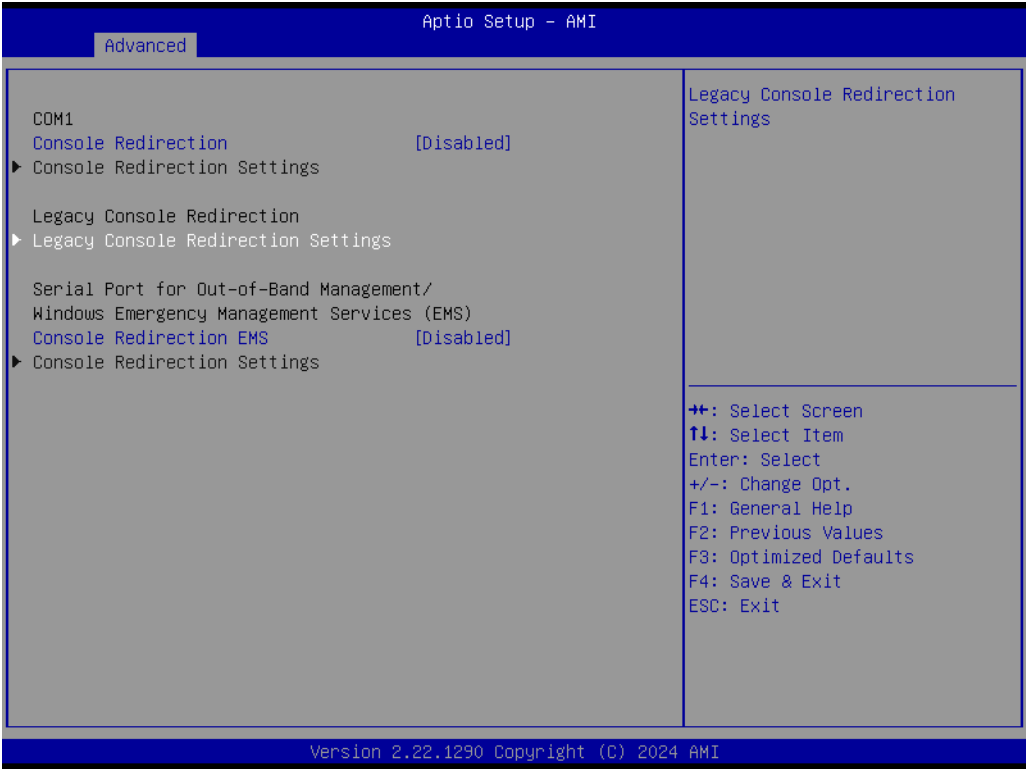
3.2.2.5 UEFI Variables Protection



3.2.2.6 Serial Port Console Redirection



■ Legacy Console Redirection Settings



– Redirection COM Port [COM1]

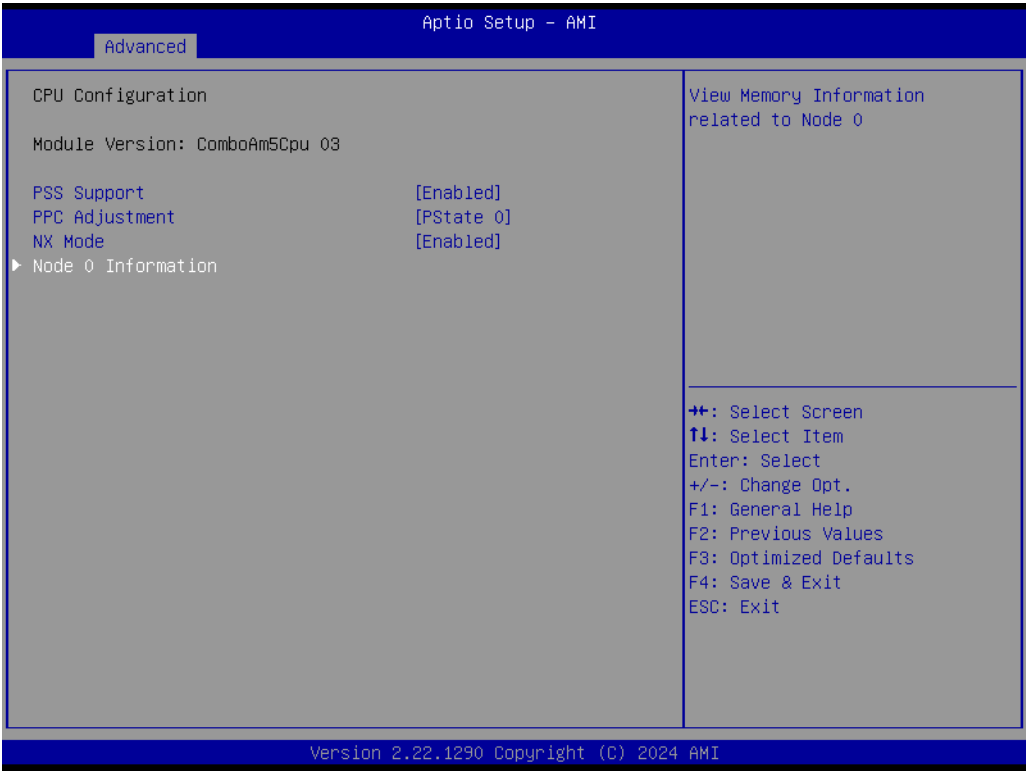


Select a COM port to display redirection of the Legacy OS and Legacy OPRM Messages.

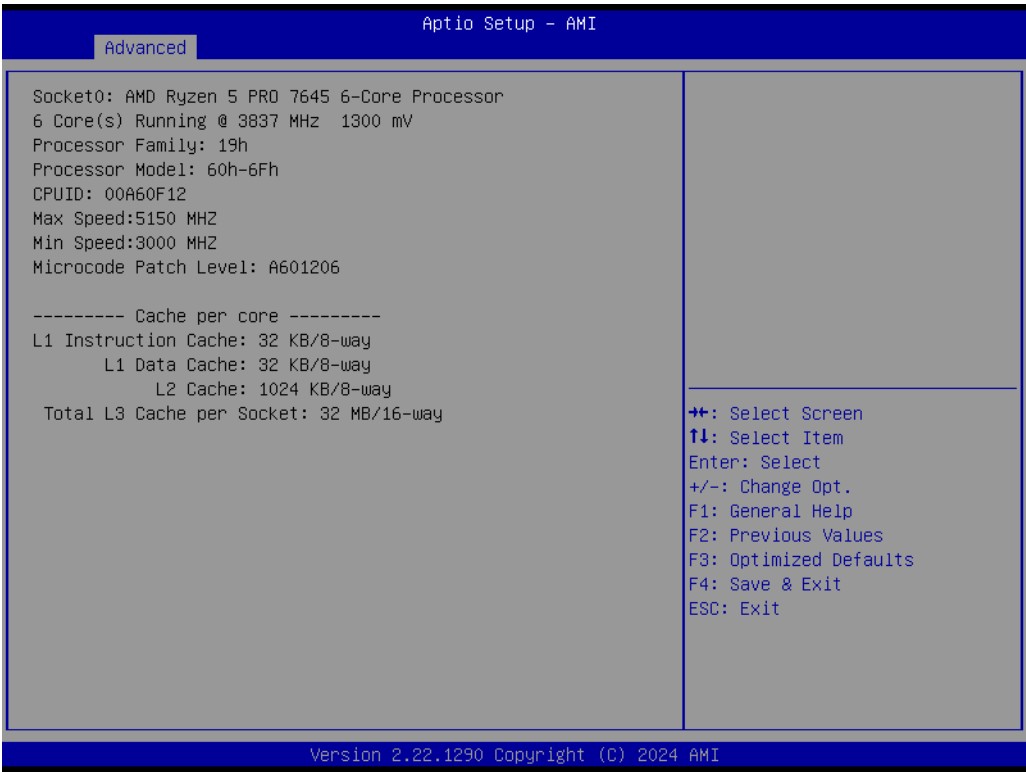
3.2.2.7 CPU Configuration



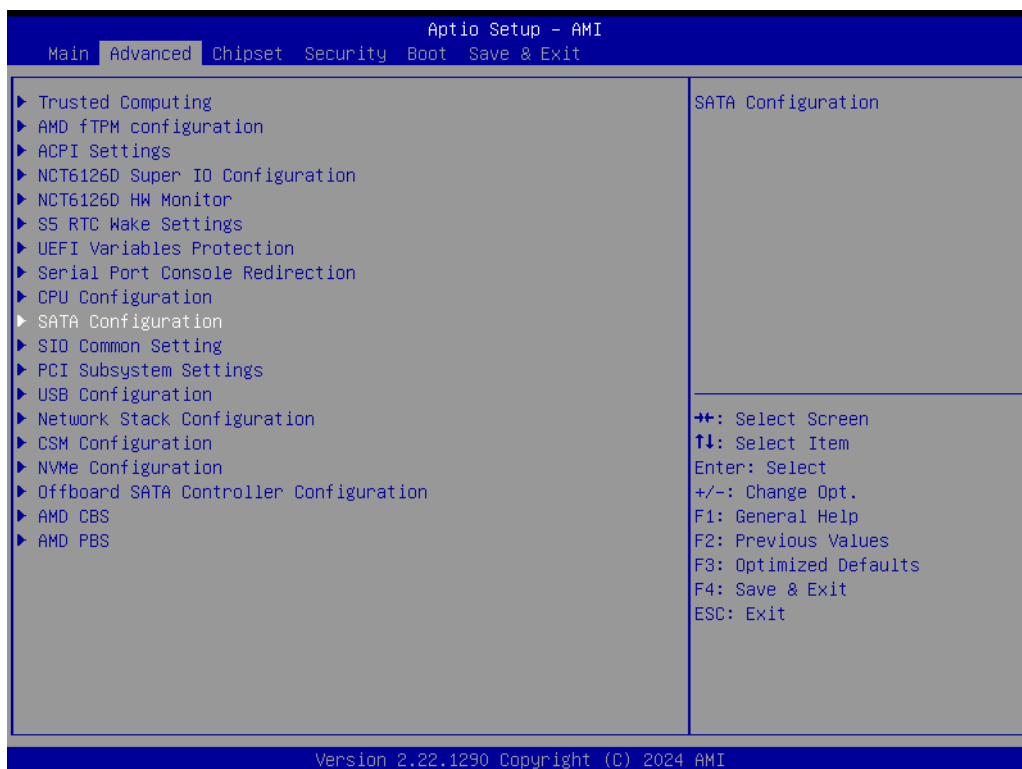
■ **Node 0 Information**



View Memory Information related to Node 0.



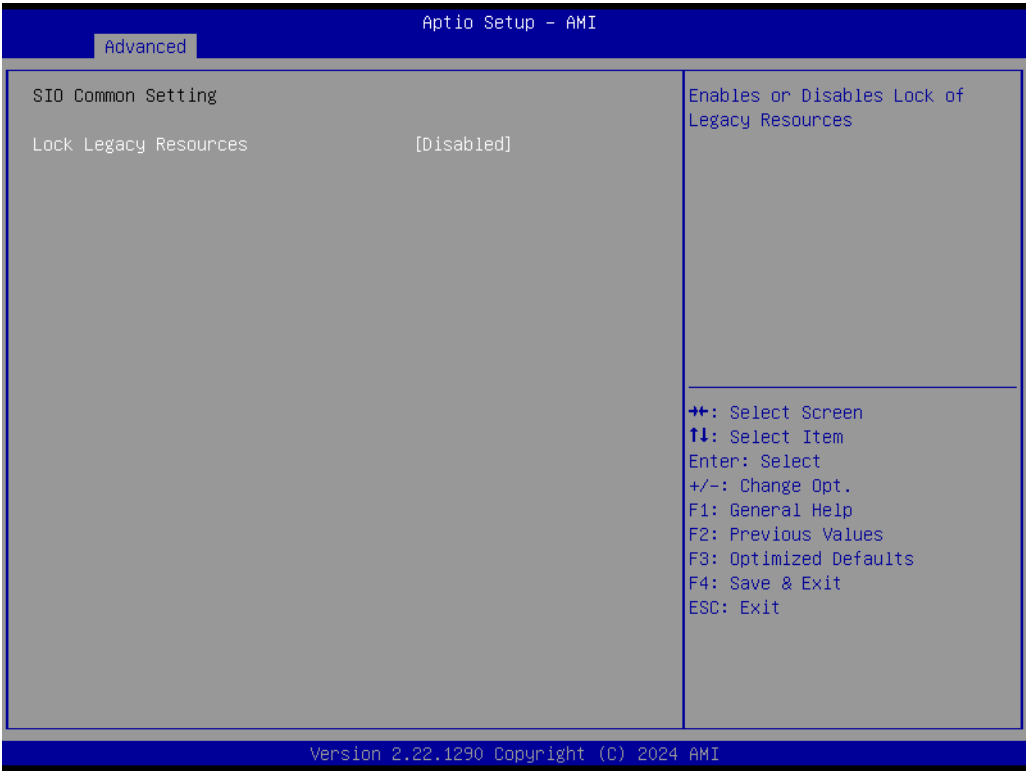
3.2.2.8 SATA Configuration



3.2.2.9 SIO Common Setting

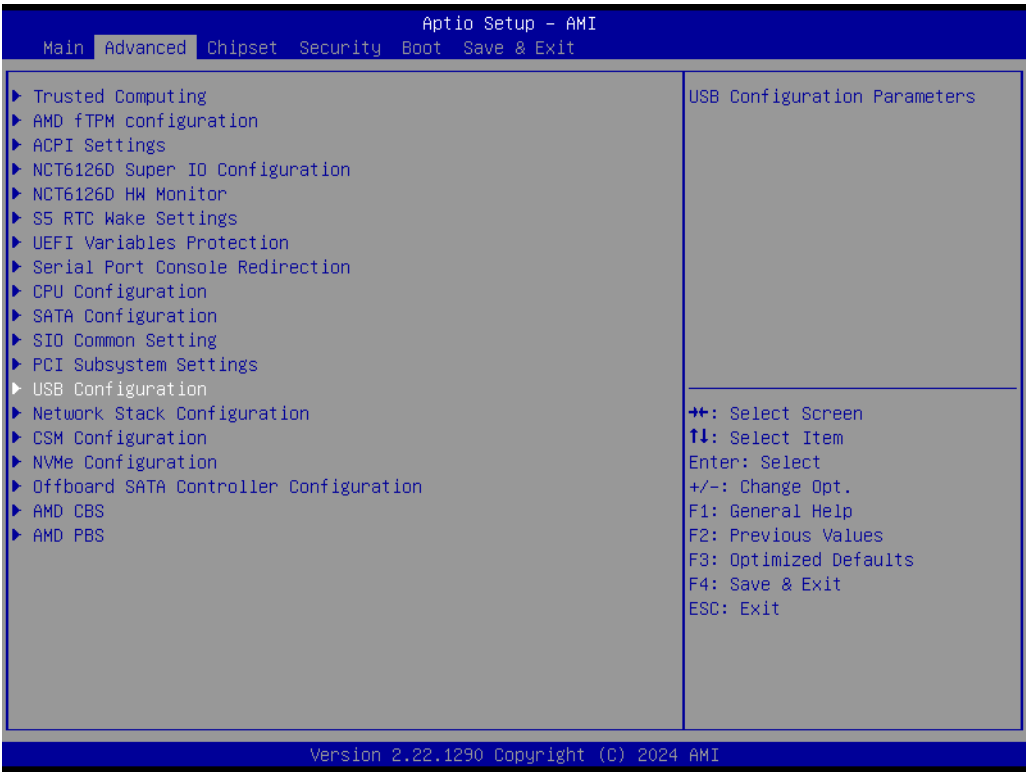


■ **Enable ACPI Auto Configuration**

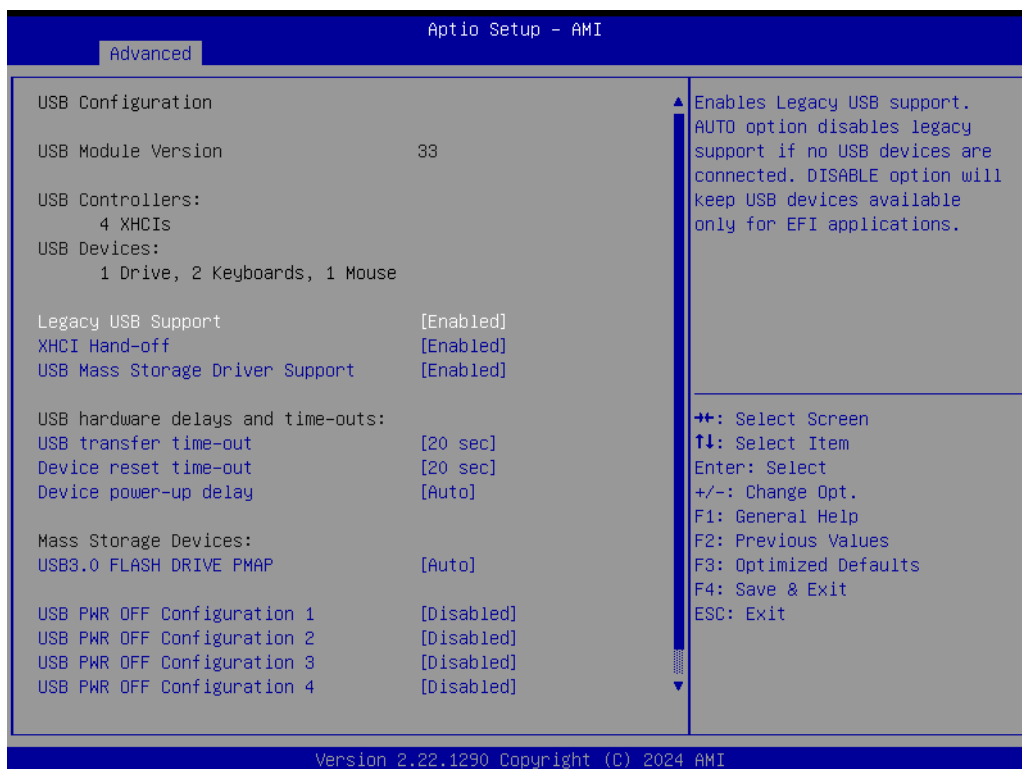


Enables or disables Lock of Legacy Resources.

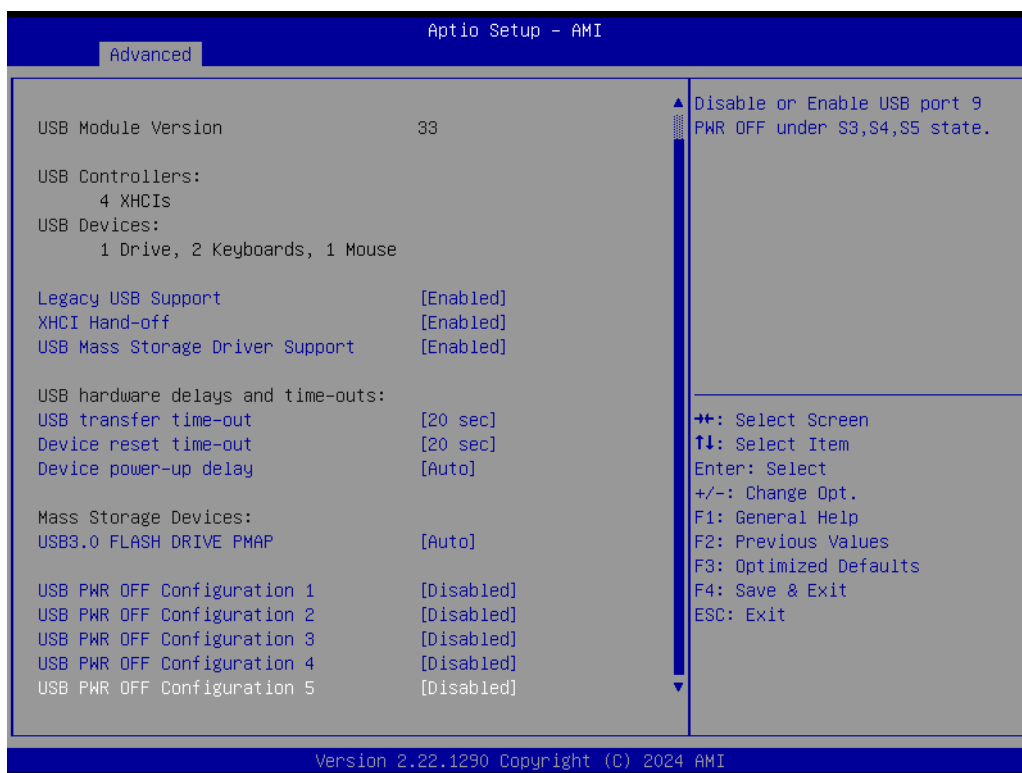
3.2.2.10 USB Configuration



Legacy USB Support

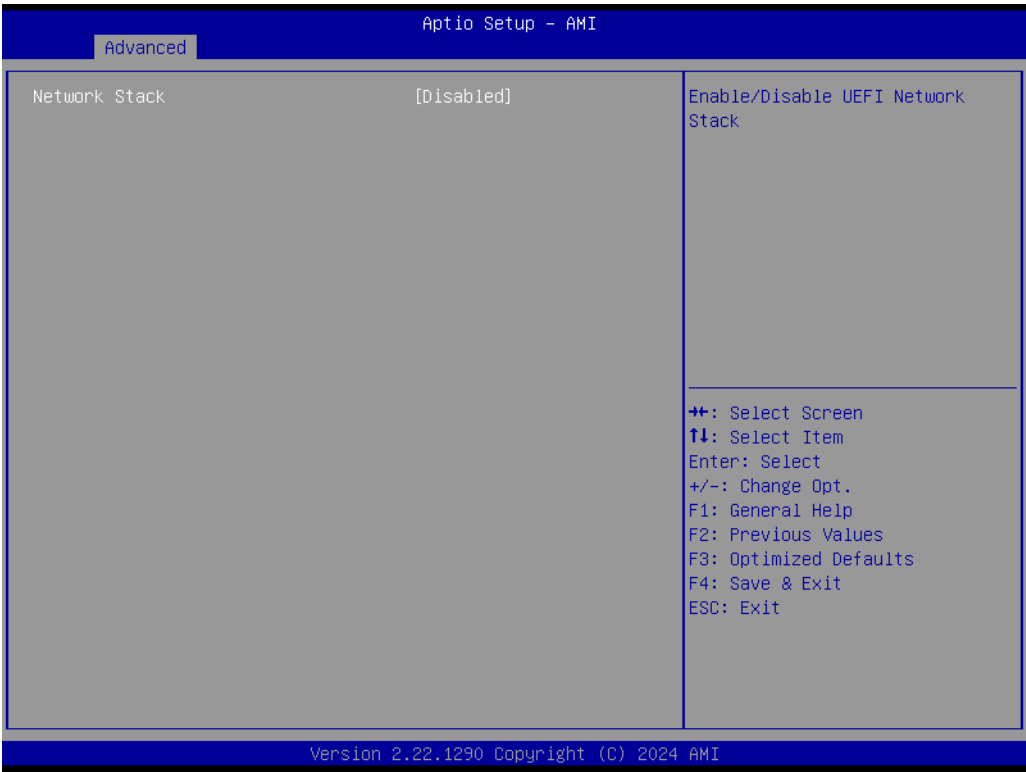
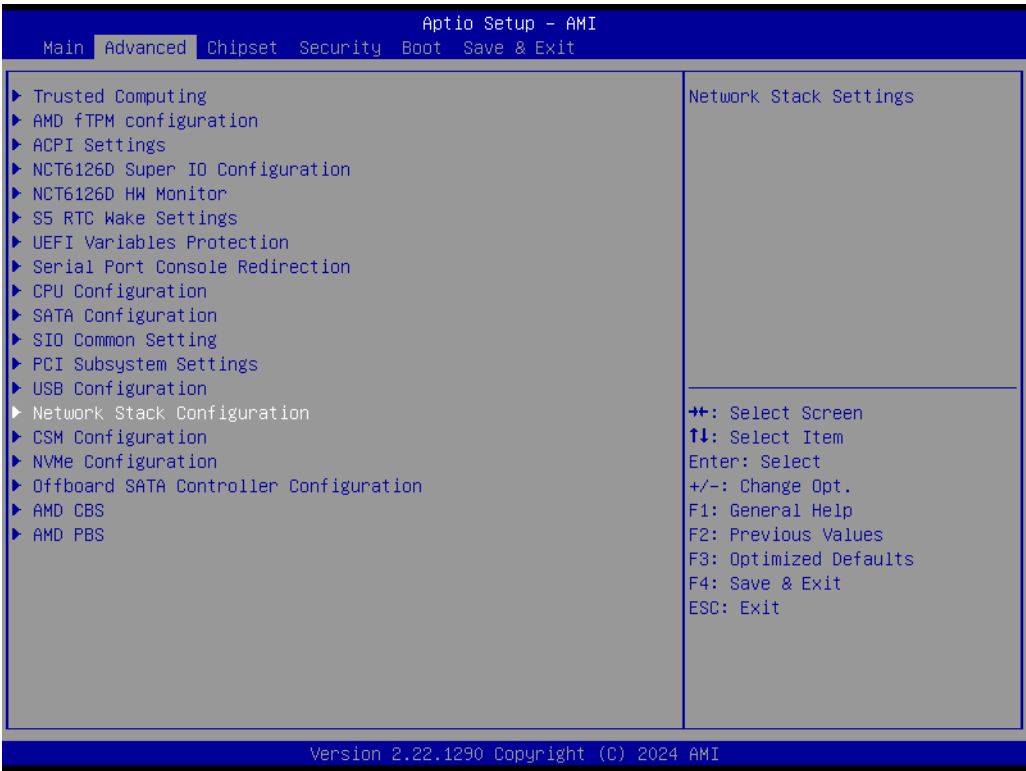


Enables Legacy USB support. The AUTO option disables legacy support if no USB devices are connected. The DISABLE option will keep USB devices available only for EFI applications.



- **USB PWR OFF Configuration 5 [Disabled]**
Disable or enable USB port 5 PWR OFF under S3, S4, S5 state.

3.2.2.11 Network Stack Configuration



- **Network Stack [Disabled]**
Enable/Disable UEFI Network Stack.

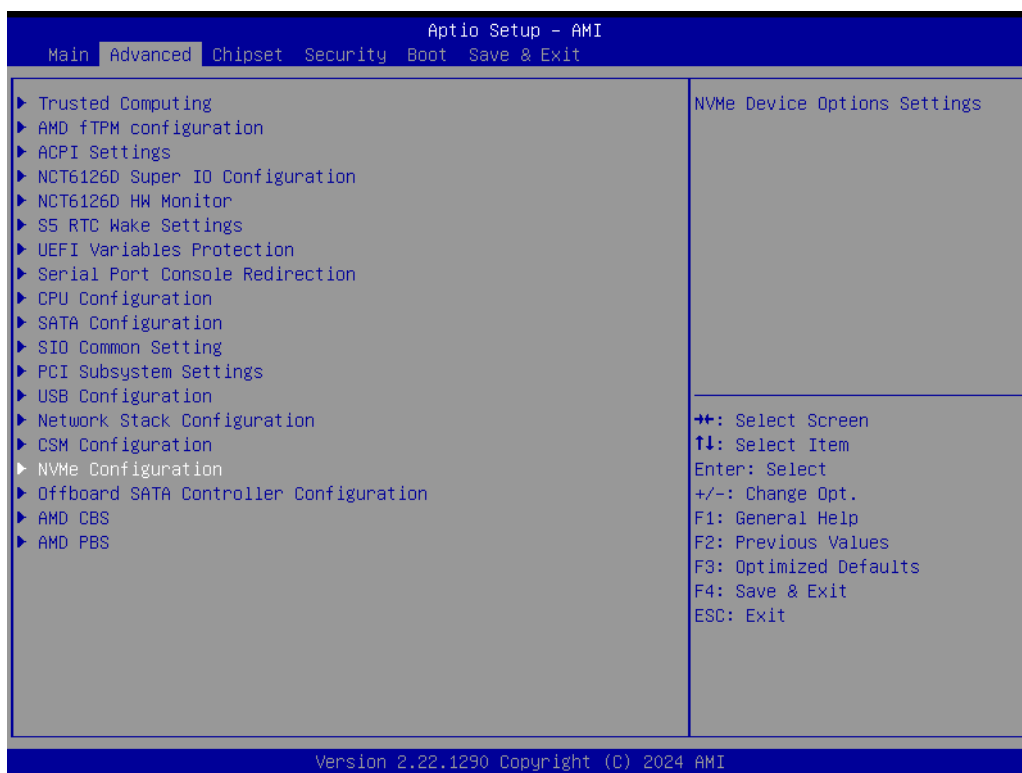
3.2.2.12 CSM Configuration

■ CSM Support [Disabled]

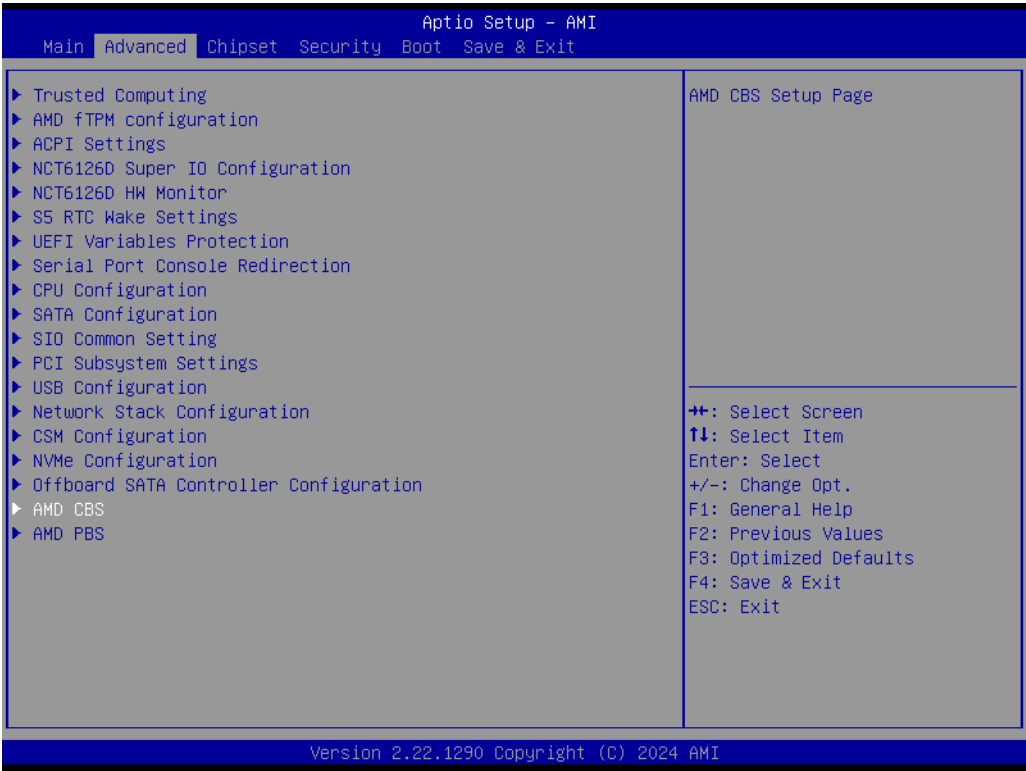


Enable/Disable CSM Support.

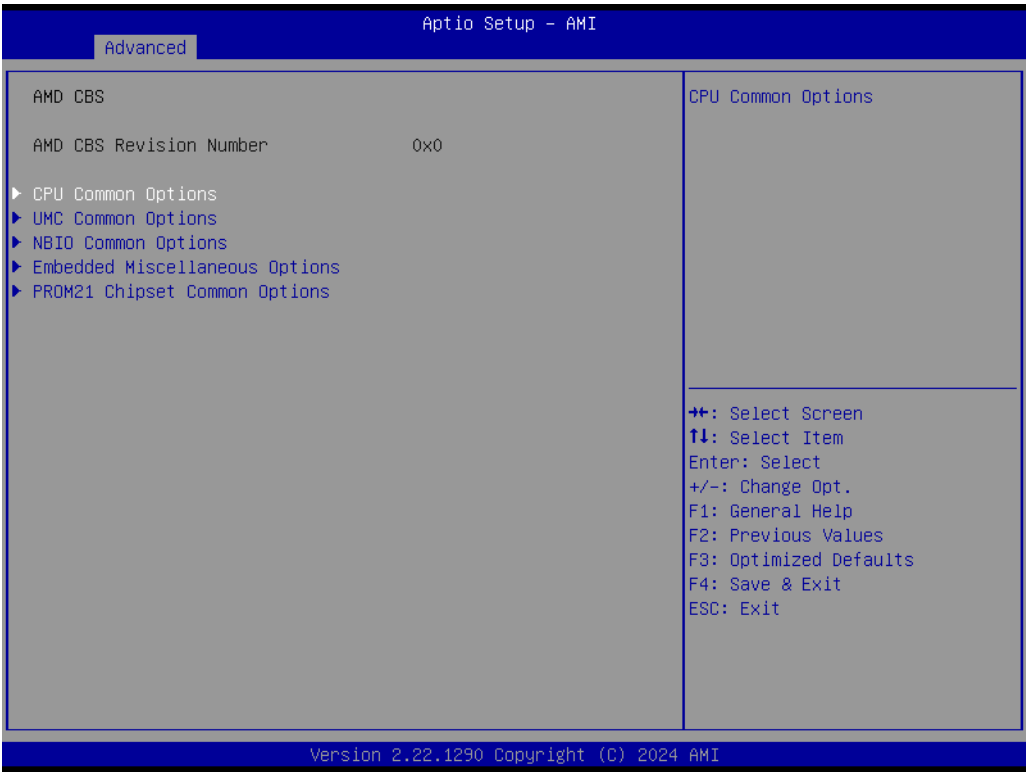
3.2.2.13 NVMe Configuration



3.2.2.14 AMD CBS



AMD CBS

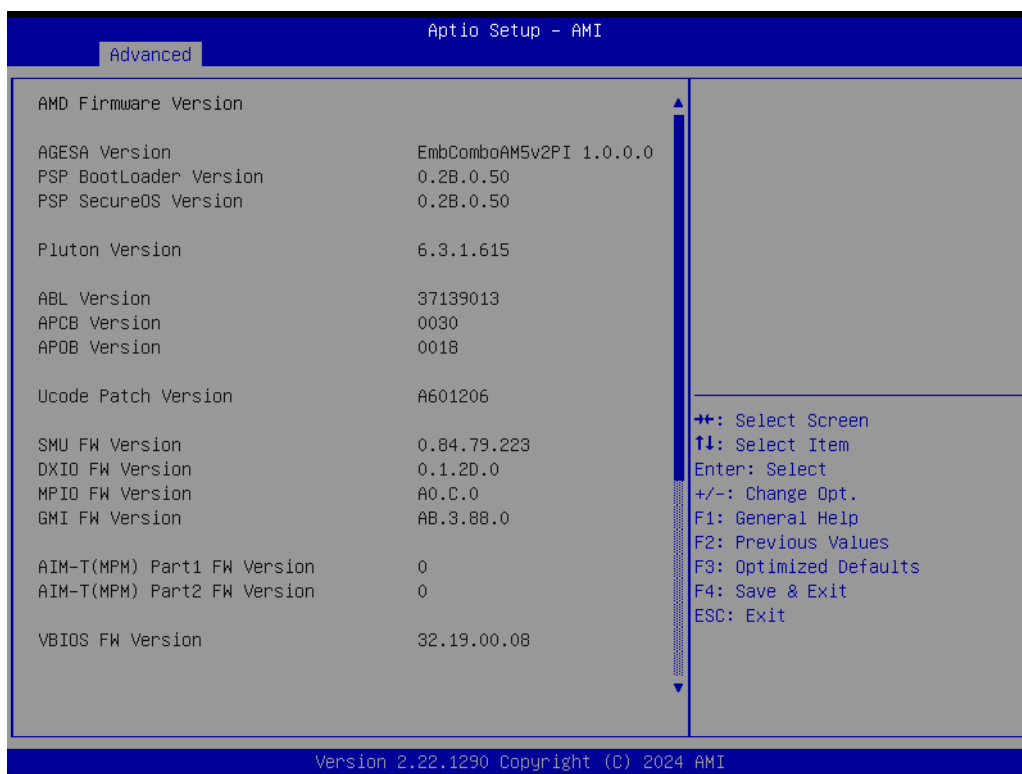


3.2.2.15 AMD PBS

AMD PBS Setup Page

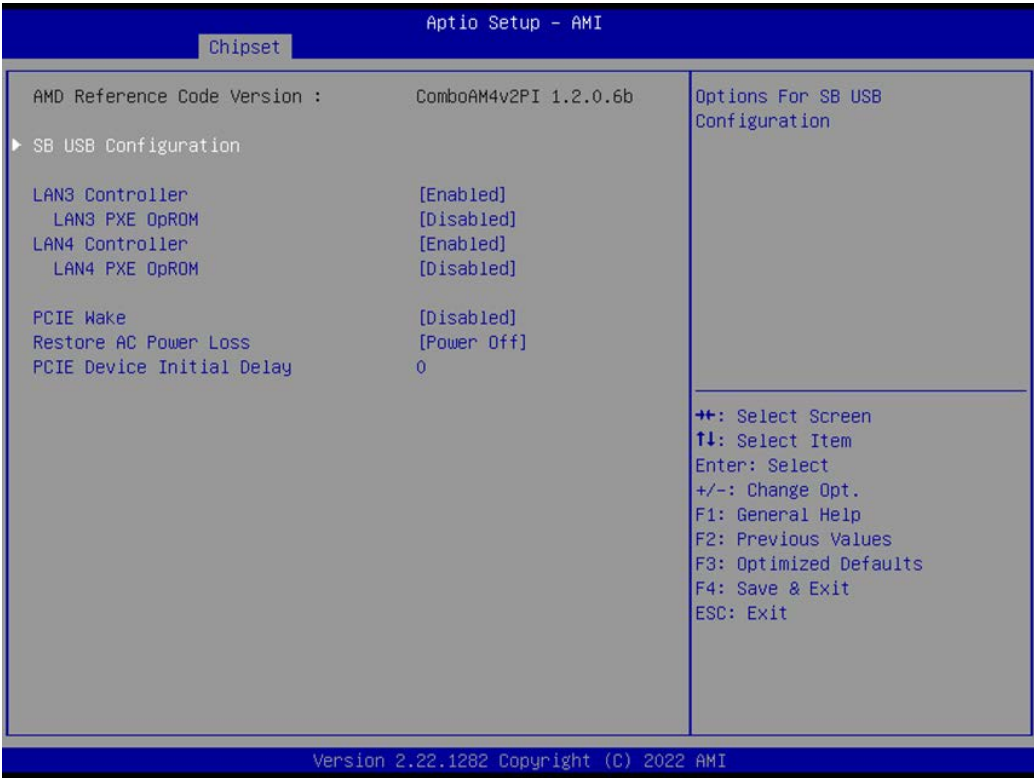
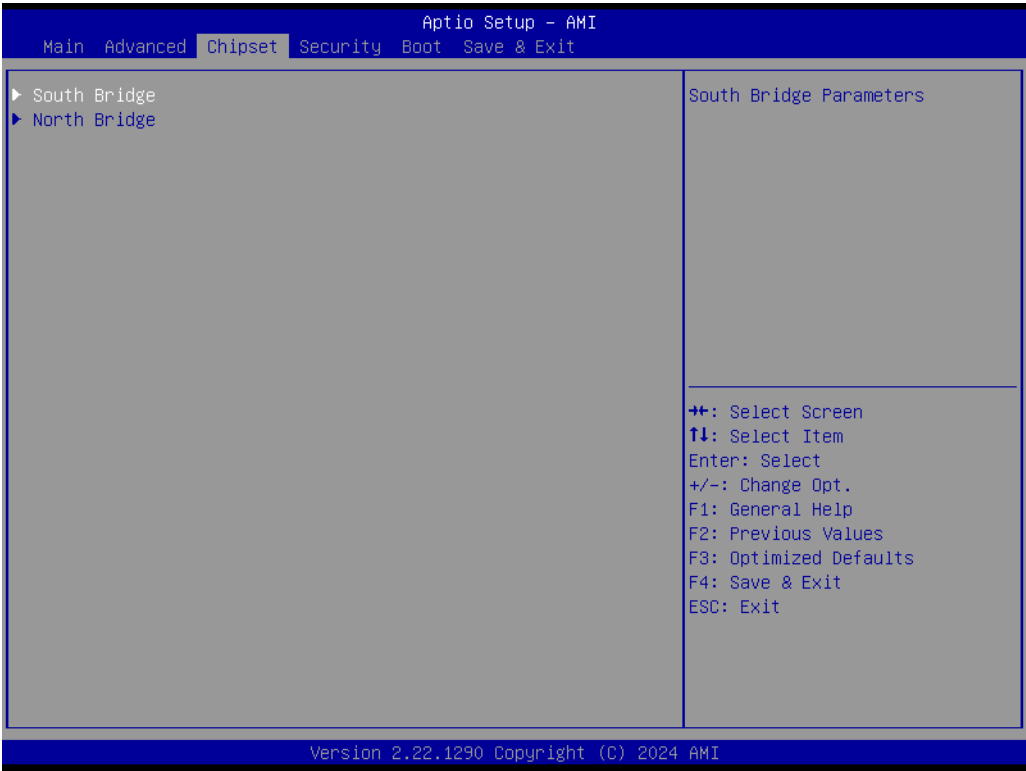


AMD PBS



3.3 Chipset Configuration Setting

Select the chipset tab from the BIOS setup screen to enter the Chipset Setup screen. Users can select any item in the left frame of the screen, such as South Bridge Parameters, to go to the sub-menu for that item. Users can display a Chipset Setup option by highlighting it using the <Arrow> keys. All Chipset Setup options are described in this section. The Chipset Setup screens are shown below. The sub-menus are described on the following pages.



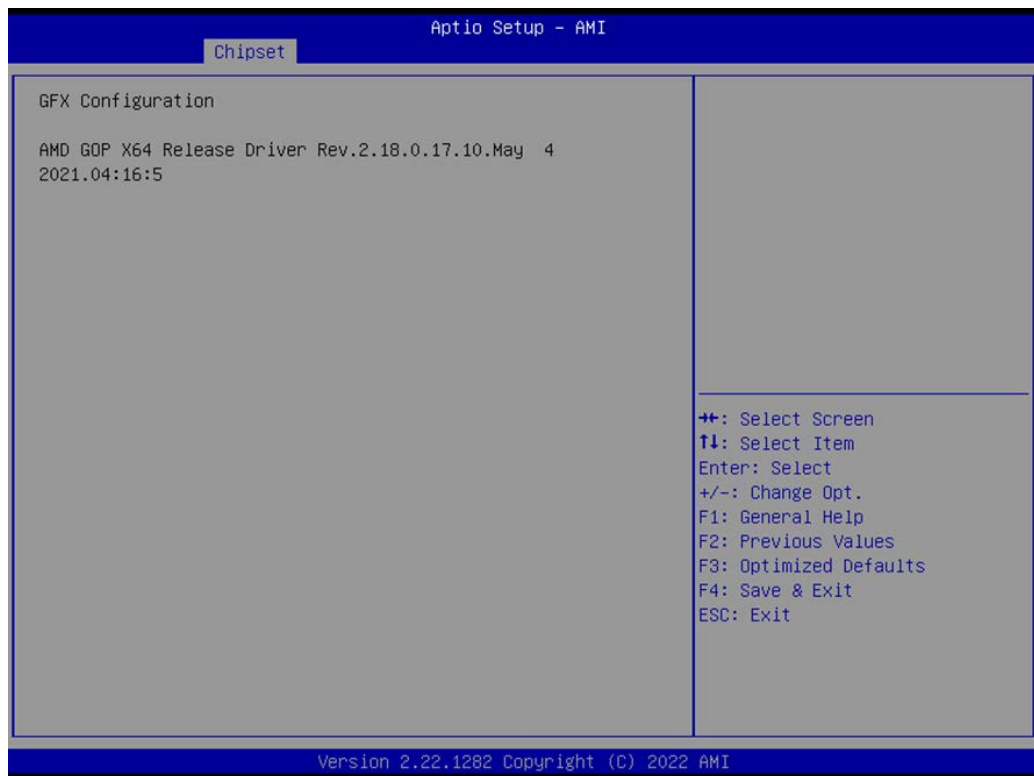
3.3.1 SB USB Configuration



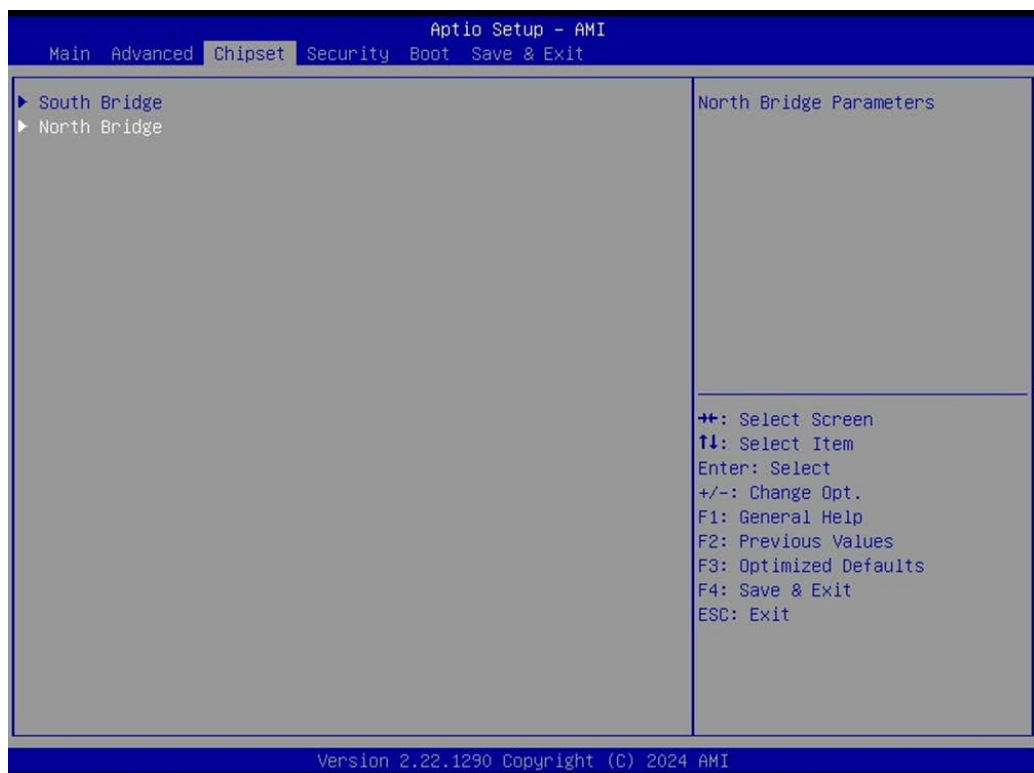
- **USB Port 1 [Enabled]**
Enable/Disable USB Port 1.

3.3.2 GFX Configuration

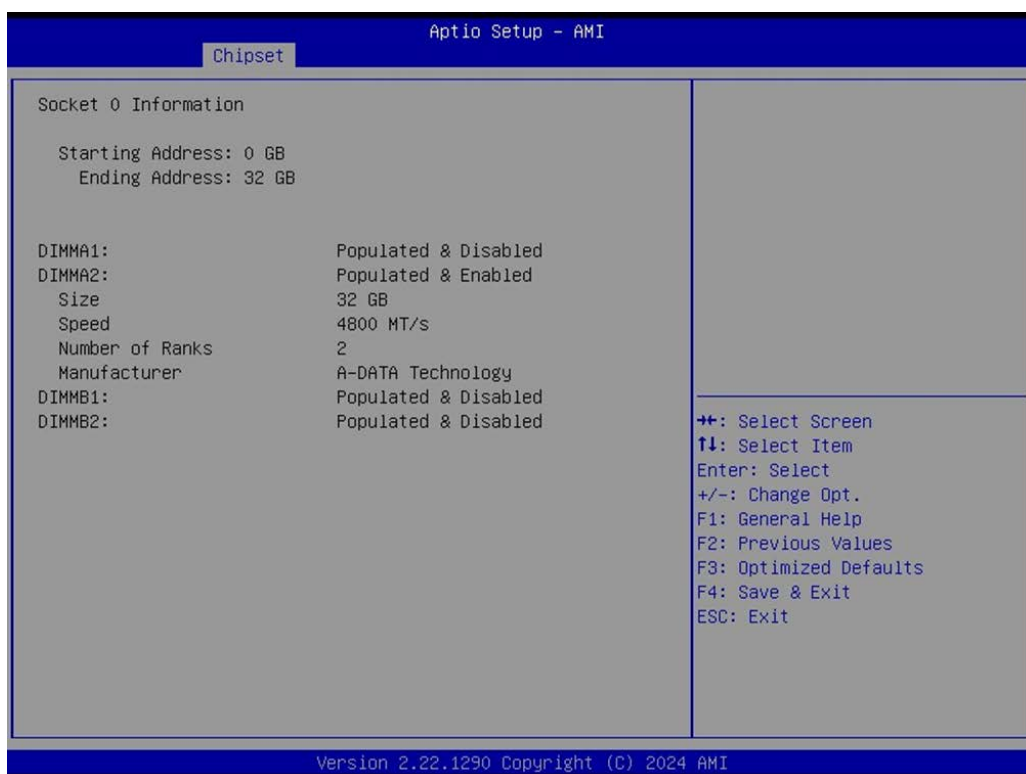




3.3.3 North Bridge

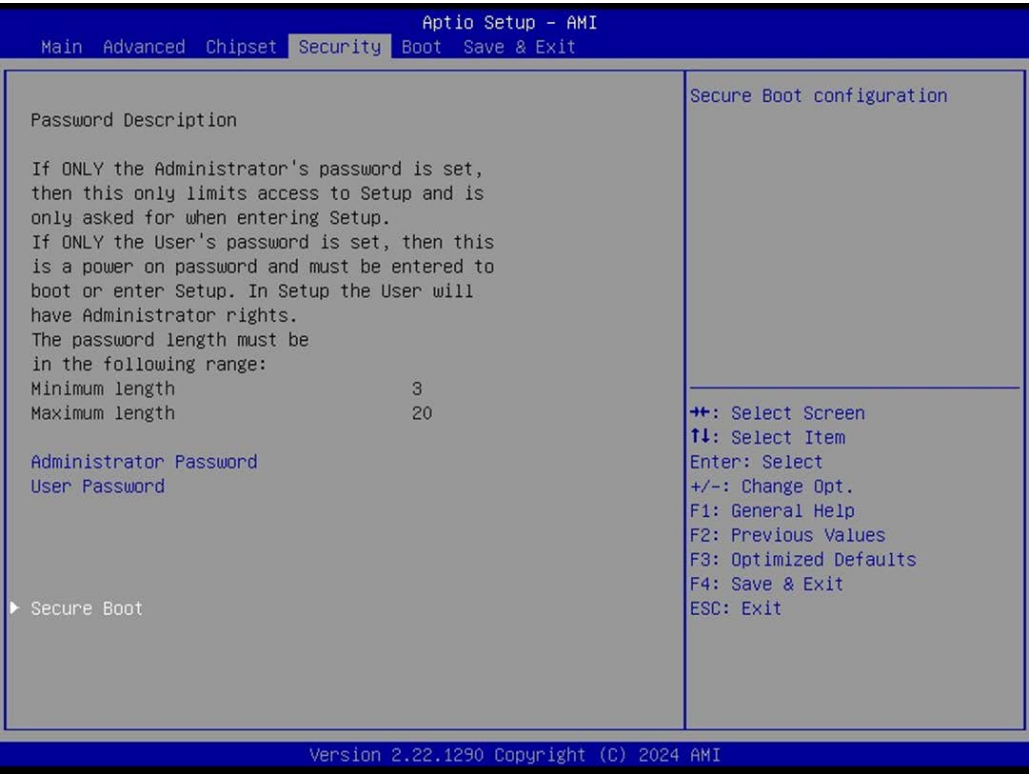


■ Socket 0 Information

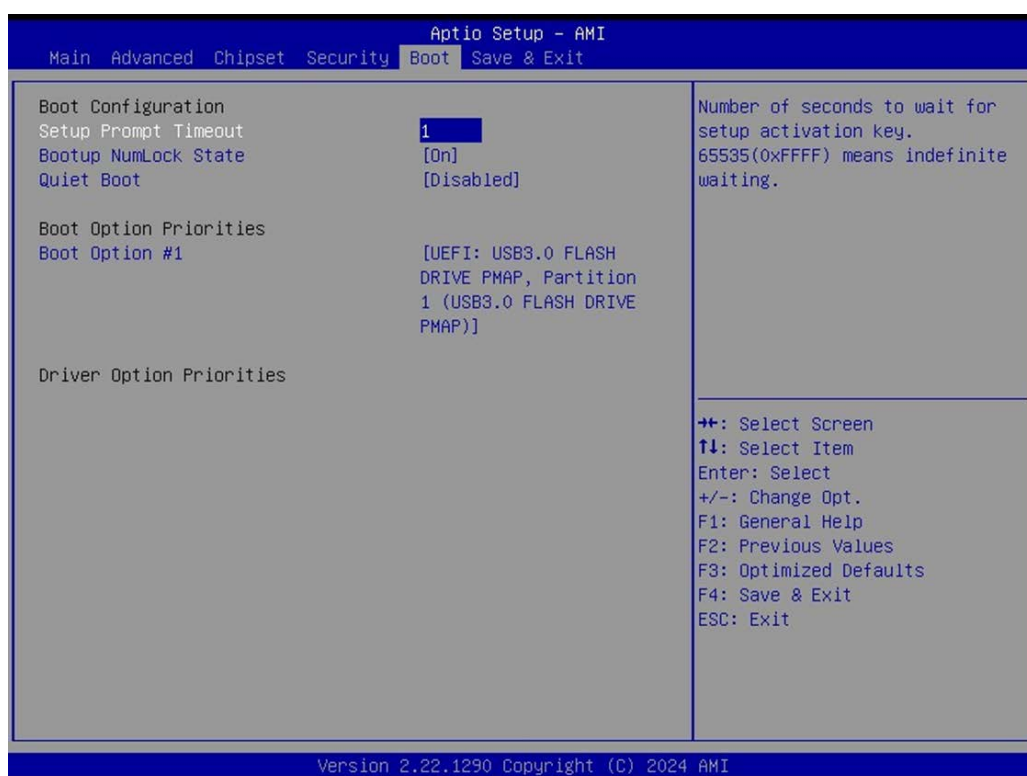


3.4 Security Settings

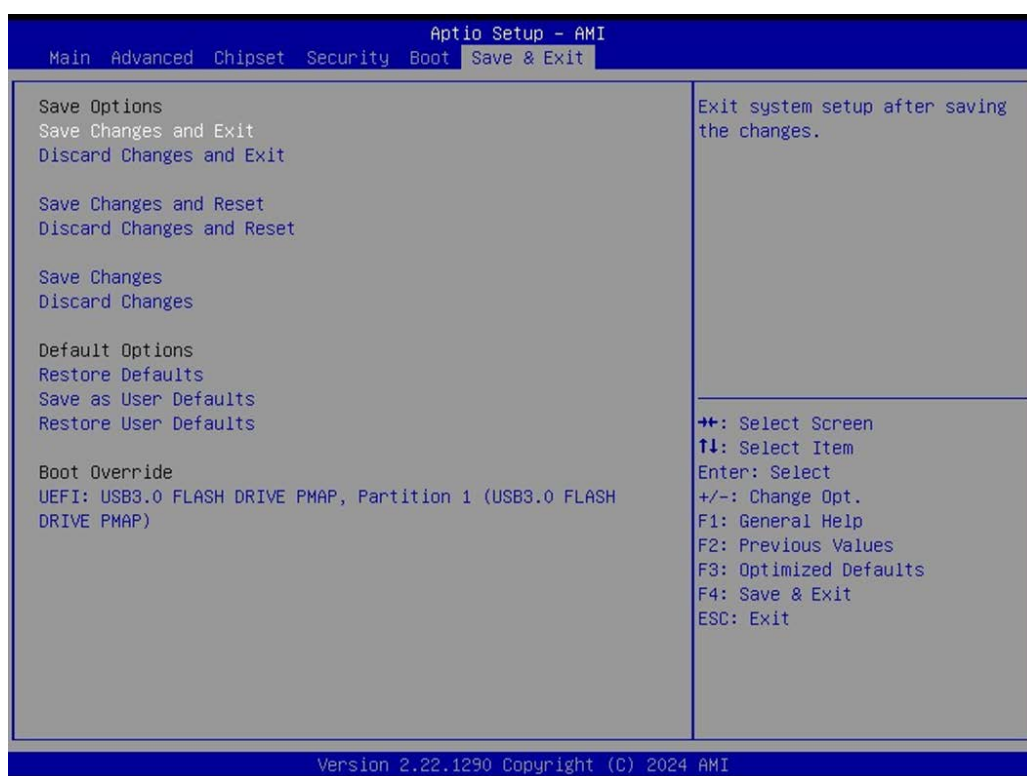
3.4.1 Secure Boot



3.5 Boot Settings



3.6 Save & Exit



Chapter 4

Software Introduction
& Service

4.1 Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft® Windows® embedded technology." We enable Windows® Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (hardware suppliers, system integrators, embedded OS distributors) for projects. Our goal is to make Windows® Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Value-Added Software Services

Software API: An interface that defines the ways by which an application program may request services from libraries and/or operating systems. It provides not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms. It plays the role of catalyst between developer and solution, and makes Advantech embedded platforms easier and simpler to adopt and operate with customer applications.

4.2.1 Software API

4.2.1.1 Control

GPIO



General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. It allows users to monitor the level of signal input or set the output status to switch on/off the device. Our API also provides Programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

SMBus



SMBus is the System Management Bus defined by Intel Corporation in 1995. It is used in personal computers and servers for low-speed system management communications. The SMBus API allows a developer to interface with an embedded system environment and transfer serial messages using the SMBus protocols, allowing multiple simultaneous device control.

4.2.1.2 Display

Brightness Control



The Brightness Control API allows a developer to access embedded devices and easily control brightness.

Backlight



The Backlight API allows a developer to control the backlight (screen) on/off in embedded devices.

4.2.1.3 Monitor

Watchdog



A watchdog timer (WDT) is a device that performs a specific operation after a certain period of time if something goes wrong and the system does not recover on its own. A watchdog timer can be programmed to perform a warm boot (restarting the system) after a certain number of seconds.

Hardware Monitor



The Hardware Monitor (HWM) API is a system health supervision API that inspects certain condition indexes, such as fan speed, temperature and voltage.

4.2.1.4 Power Saving

CPU Speed



This function makes use of Intel SpeedStep technology to save power consumption. The system will automatically adjust the CPU speed depending on the system loading.

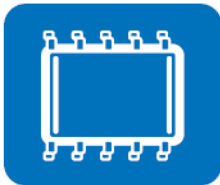
System Throttling



Refers to a series of methods for reducing power consumption in computers by lowering the clock frequency. This API allows the user to adjust the clock from 87.5% to 12.5%.

4.2.2 Software Utility

BIOS Flash



The BIOS Flash utility allows customers to update the flash ROM BIOS version, or use it to back up the current BIOS by copying it from the flash chip to a file on the customers' disk. The BIOS Flash utility also provides a command line version and an API for fast implementation into customized applications.

Monitoring



Monitoring is a utility for customers to monitor system health, like voltage, CPU and system temperature and fan speed. These items are important to a device, if critical errors occur and are not solved immediately, permanent damage may be caused.

Chapter 5

Chipset Software
Installation Utility

5.1 Before You Begin

To ensure problem-free installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the AIMB-523 can be downloaded from the Advantech website. Updates are provided via Microsoft service packs.

5.2 Introduction

The AMD Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Serial ATA interface support
- USB 2.0/3.2 support
- Identification of AMD chipset components in the Device Manager

Note! *This utility is used for the following versions of Windows, and it has to be installed **before** installing all the other drivers:*



- Windows 10 (64-bit)

5.3 Windows 10 Driver Setup

1. Navigate to the Advantech website, then search for the product AIMB-523. There will be a "Chipset" driver available there for download.

Chapter 6

LAN Configuration

6.1 Introduction

The AIMB-523 features six 2.5 Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (Intel i226LM or i226V) that support 10/100/1000/2500 Mbps Ethernet speed.

6.2 Windows 10 Driver Setup

Navigate to the Advantech website, then search for the product AIMB-523. There will be a "LAN" driver there available for download.

Appendix **A**

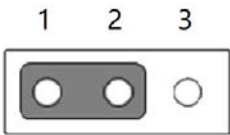
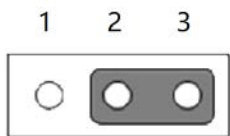
Jumper Setting List

Table A.1: Jumpers

Item	Description	Part Reference
1	EDP / LVDS Panel Voltage Selection	JLVDS1
2	RTC / CMOS clear	JCOMS1
3	PWRBTN# / RESET# /HDD LED / Serial bus from HW monitor IC / Internal Buzzer / External Speaker header	JFP1
4	Watchdog timer output and OBS beep	JWDT1+JOBS1
5	AT / ATX Mode selection	PSO1
6	LVDS VESA, JEIDA format selection pin header	JLVDS_VCON1
7	COM3 RI# selection pin header	JSETCOM3_V1
8	Intel ME header	JME1

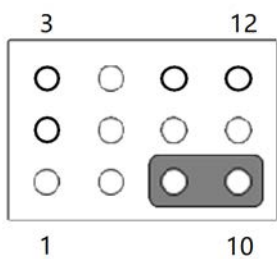
A.1 CMOS Clear (JCOMS1)

Table A.2: JCOMS1

Function	Jumper Setting
Keep CMOS Data (Default)	
Clear CMOS Data	

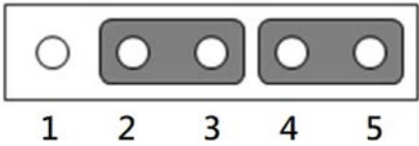
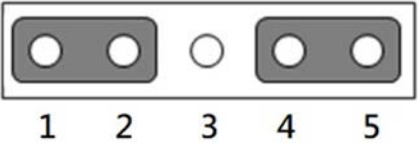
A.2 PWRBTN# / RESET# /HDD LED / Serial Bus From HW Monitor IC / Internal Buzzer / External Speaker Header (JFP1)

Table A.3: JFP1

Function	Jumper Setting
Internal Buzzer (Default)	

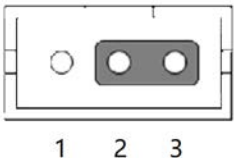
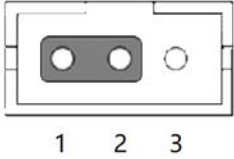
A.3 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

Table A.4: JWDT1+JOBS1

Function	Jumper Setting
Watchdog Timer Output (2-3) (Default) OBS BEEP(4-5) (Default)	
Watchdog Timer Disable (1-2) OBS BEEP(4-5) (Default)	

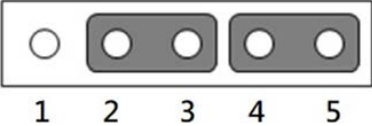
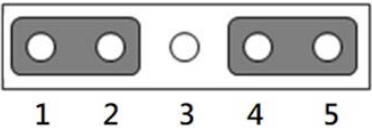
A.4 AT/ATX Mode Selection (PSON1)

Table A.5: PSON1

Function	Jumper Setting
ATX Mode (Default)	
AT Mode	

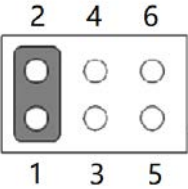
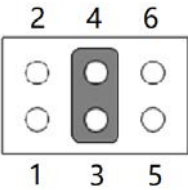
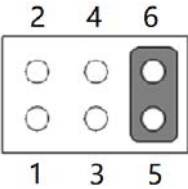
A.5 LVDS VESA, JEIDA Format Selection Pin Header (JLVDS_VCON1)

Table A.6: JLVDS_VCON1

Function	Jumper Setting
JEDIA format	
VESA format (Default)	

A.6 COM3_RI# Pin RI# / 5V / 12V Selection (JSETCOM3_V1)

Table A.7: JSETCOM3_V1

Function	Jumper Setting
Jumper position for RI# (Default)	
Jumper position for +5V	
Jumper position for +12V	



Enabling an Intelligent Planet

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

No part of this publication may be reproduced in any form or by any means, such as electronically, by photocopying, recording, or otherwise, without prior written permission from the publisher.

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2025