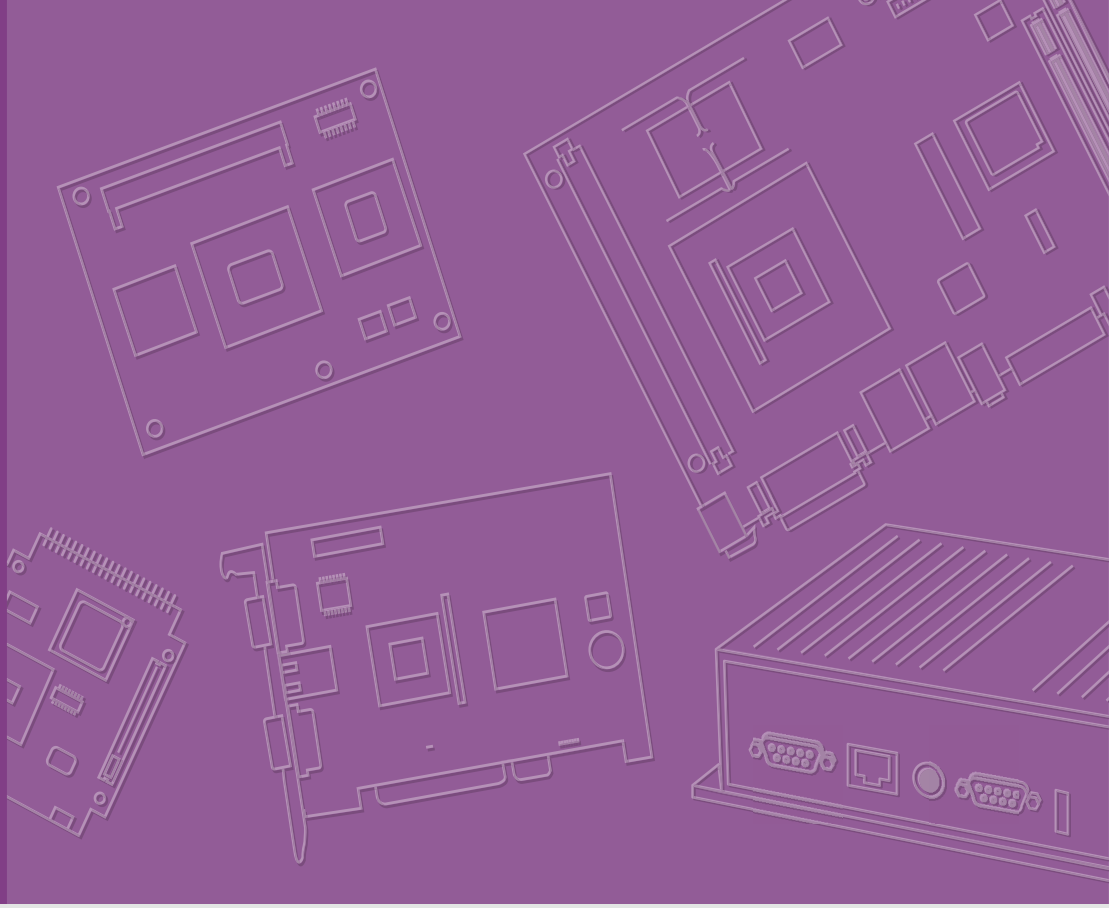

User Manual

MIO-5376

ADVANTECH

Enabling an Intelligent Planet

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Acknowledgments

For more information on this and other Advantech products, please visit our websites at:
http://www.advantech.com
http://www.advantech.com/eplatform

For technical support and service, please visit our support website at:
http://support.advantech.com/

This manual is for MIO-5376.

Part No. 2006537600 Edition 1
Published in March 2023

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 to be 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

CE

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 type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

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 instruction manual, 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

Packing List

Before system installation, check that the items listed below are included and in good condition. If any item does not accord with the list, contact your dealer immediately.

- 1 x MIO-5376 SBC
- 1 x SATA cable, 30 cm (P/N: 1700006291)
- 1 x SATA power cable, 35 cm (P/N: 1700031583-01)
- 1 x USB 2.0 cable, 20 cm (P/N: 1700030406-01)
- 1 x USB 3.2 cable, 35 cm (P/N: 1700032181-01)
- 1 x Audio cable, 20 cm (P/N: 1700019584-01)
- 2 x COM RS-232/422/485 cables, 20 cm (P/N: 1700030404-01)
- 2 x COM RS-232 cables, 20 cm (P/N: 1700031582-01)
- 1 x Heatsink for CPU cTDP 12W/15W (P/N: 1970005548T001)
- 1 x Screw kit (2 sets of screws for the M.2 device & 4 sets of screws and stand-off for the heatsink/cooler)
- 1 x Startup Manual
- 1 x DeviceOn package

Optional Accessories

- Heat spreader for MIO-5376 (P/N: 1970005615T001)
- Active cooler, 25W (P/N: 1970005512T001)*
- MIOe-PSE dual-port PSE power module, 15.4W x 2 (P/N: MIOe-PSE-DPA1)

Note:

*Suggested thermal solution: CPU cTDP (default 15W) with heatsink; optional 25W with cooler

Contents

Chapter 1

Introduction

1.1 Introduction

Advantech's MIO-5376 3.5" SBCs – powered by AMD Ryzen™ Embedded R2000 Series processors – is designed for vertical market applications and harsh industrial environments. MIO-5376 integrated 12V to 24V wide voltage range and multi-I/Os include three 2.5GbE ports (including two optional PoE ports), CANBus, and high-speed UARTs. Moreover, MIO-5376 provides network expansion through M.2 E-Key and B-Key ports and it supports Wi-Fi and 5G/LTE modules.

Advantech's MIO-5376 SBCs are available in 15W or 25W configurations to meet a diverse range of power and performance requirements. The 15W version is a fanless system design optimized for reliability and ruggedness. MIO-5376 can also be adapted to run at 25W with an efficient slim-line cooler for an additional performance boost.

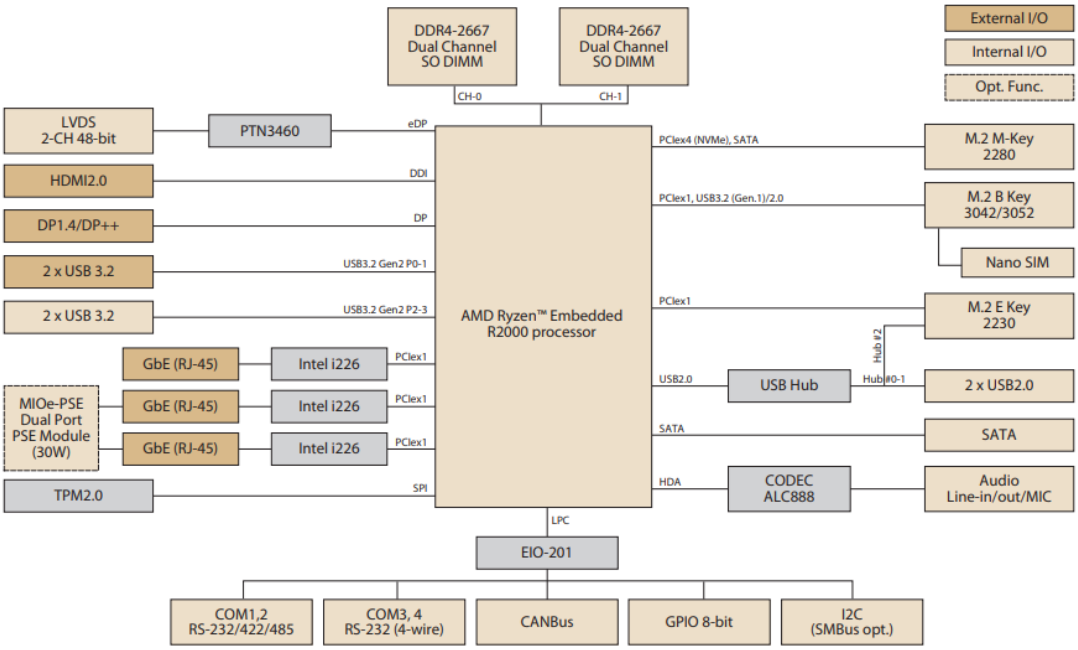
MIO-5376 offers the embedded iManager 3.0, SUSI 4.0 and Advantech WISE-PaaS/DeviceOn to monitor and control system operation effectively and remotely.

1.2 Specifications

Platform	Processor	R2314 SoC with AMD Radeon™ Graphics	R2514 SoC with AMD Radeon™ Graphics*
	Max. Frequency	3.50 GHz	3.70 GHz
	Base Frequency	2.1 GHz	2.1 GHz
	Core/Thread	4/4	4/8
	Chipset	AMD Ryzen™ Embedded R2000 processor	
	BIOS	AMI EFI 256 Mbit	
Memory	Technology	DDR4-2667	
	Max. Capacity	up to 32GB	
	Channel/Socket	dual channels / 2 sockets	
Graphics	Controller	Integrated AMD Radeon Graphics R2314: 6 computing units (CUs) R2514: 8 computing units (CUs)	
Display I/F	LCD	1 x LVDS: dual channel 18/24-bit, up to 1920 x 1200	
	HDMI	1 x HDMI 2.0b, up to 4Kx2Kx24 bpp @60Hz	
	DP	1 x DP1.4a, up to 4096x2304x36 bpp @60Hz or 5120x3200x24 bpp @60Hz	
	Multiple Displays	3 simultaneous displays	
Ethernet	Controller	3 x GbE, Intel® i226	
	Speed	2.5 GbE/port	
External I/O	Ethernet	3 x GbE, Intel® i226 2 x optional PSE compliant to 802.3af (15.4W per port) with external PSE power module (Model: MIOe-PSE)	
	HDMI/DP	1/1	
	USB 3.2	2 x USB 3.2 Gen2x1 10Gbps	
	LED	power status, SATA R/W	
	Power Connector	2-pin phoenix connector	

Internal I/O	SATA	1 x SATA Gen3 6.0Gbps
	USB 3.2	2
	USB 2.0	2
	COM Port	2 x RS-232/422/485, 2 x RS-232 (4-wire)
	CANBus	1 x CAN2.0
	Serial Bus	I2C, SMBus* (optional)
	Audio	Realtek ALC888s, Line-In/Line-Out/MIC
	GPIO	8-bit general purpose input output I/O
	Inverter	12V/5V/3.3V selectable
	Fan	12V, 1A (4-wire)
	Front Panel Control	Power-On, Reset, Buzzer, SATA LED, CaseOpen
Board Features	Watchdog Timer	65536 level, 0~65535 sec
	TPM	TPM 2.0
	iManager 3.0	SW API for Hardware Monitor, Smart Fan Control, Brightness Control, I2C, GPIO, WDT
Expansion	M.2 E-Key	1 x E-Key 2230 (PCIe x1, USB 2.0)
	M.2 B-Key	1 x B-Key 3042/ 3052 (PCIe x1, USB 3.2/2.0) w/ Nano-SIM
	M.2 M-Key	1 x M-Key 2280 (PCIe Gen3 x4 SSD, Optional SATA III)
Power	Supply Voltage	Vin: DC 12V~24V +/- 10%; RTC Battery: Lithium 3V/ 210mAH
	Connector	2-pin phoenix connector
	Power Management	AT, ATX
Environment	Temperature	Operating: Standard: 0 ~ 60 °C (32 ~ 140 °F), Extend: -40 ~ 85 °C (-40 ~ 185 °F) Storage: -40 ~ 85 °C (-40 ~ 185 °F)
	Humidity	Operating: 40 °C @ 95% relative humidity, non-condensing Storage: 60 °C @ 95%relative humidity, non-condensing
	Vibration Resistance	3.5 Grms
Certification	EMC	CE, FCC Class B
Mechanical	Dimensions	146 x 102 mm (5.7” x 4”)

1.3 Block Diagram



Chapter 2

Mechanical Specifications

2.1 Introduction

The MI/O compact form factor SBC is a new-generation SBC designed with a variety of mechanical improvements. This chapter includes board dimensions and assembly instructions for the standard thermal solution.

2.2 Board Layout: Dimensions

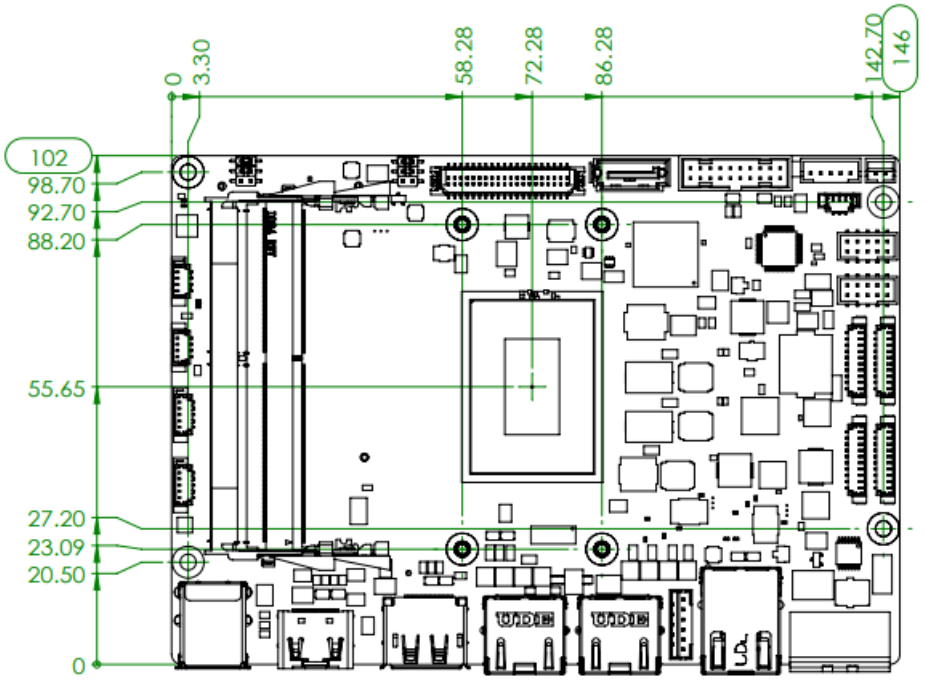


Figure 2.1 MIO-5376 Mechanical Diagram (Top Side)

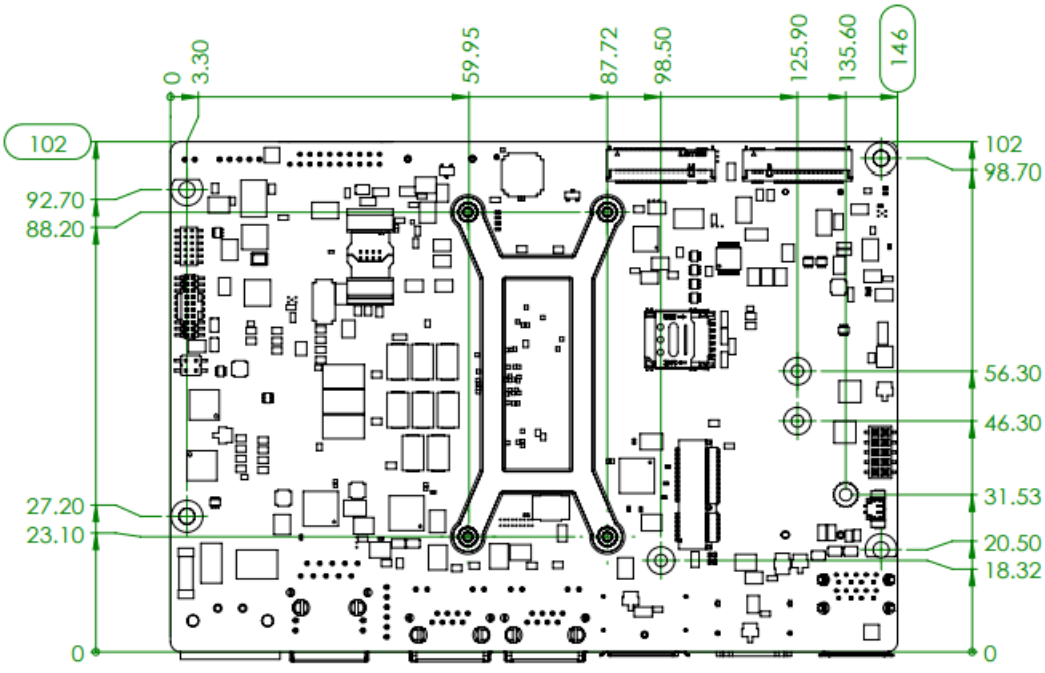


Figure 2.2 MIO-5376 Mechanical Diagram (Bottom Side)

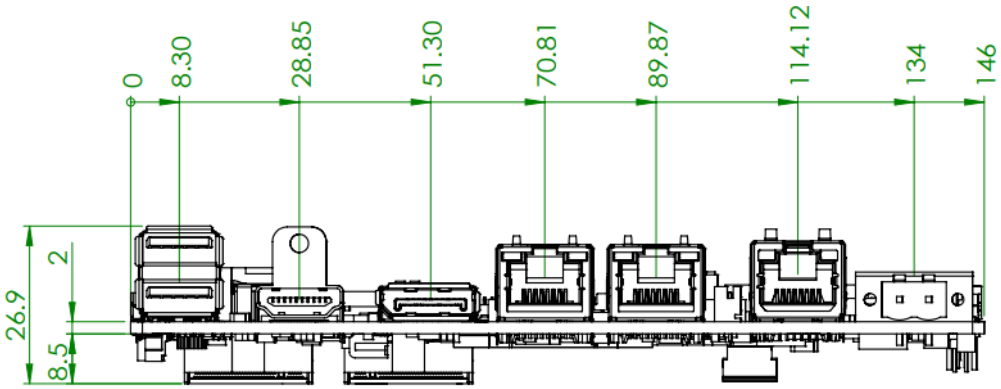


Figure 2.3 MIO-5376 Mechanical Diagram (Coastline)

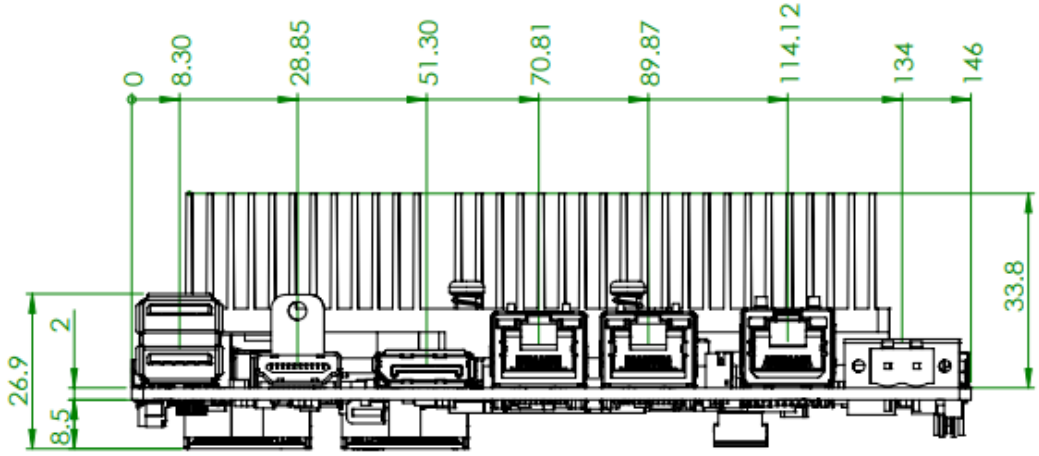


Figure 2.4 MIO-5376 Mechanical Diagram (with Heatsink)

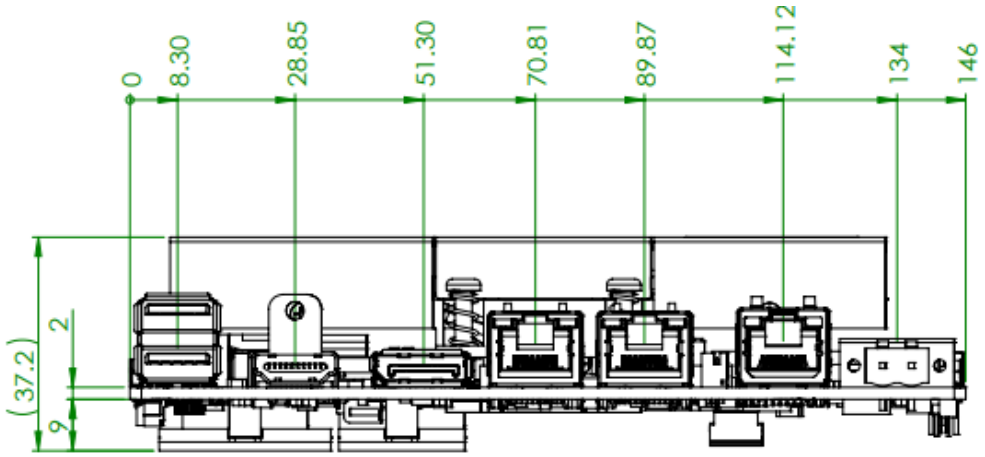


Figure 2.5 MIO-5376 Mechanical Diagram (with Optional Cooler)

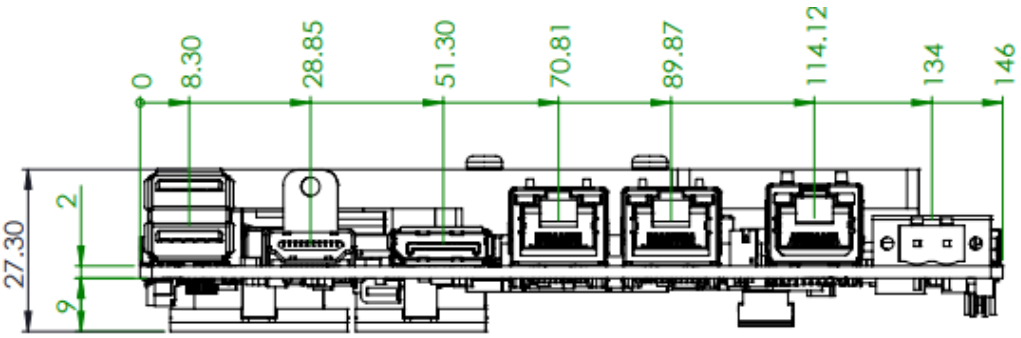


Figure 2.6 MIO-5376 Mechanical Diagram (with Optional Heat Spreader)

2.3 Quick Installation Guide

This section guides the installation of the heatsink and optional cooler, which is contained in the white box inside the package. Please assemble it as in the following diagram. Remember to remove the plastic from the thermal pad before assembling.

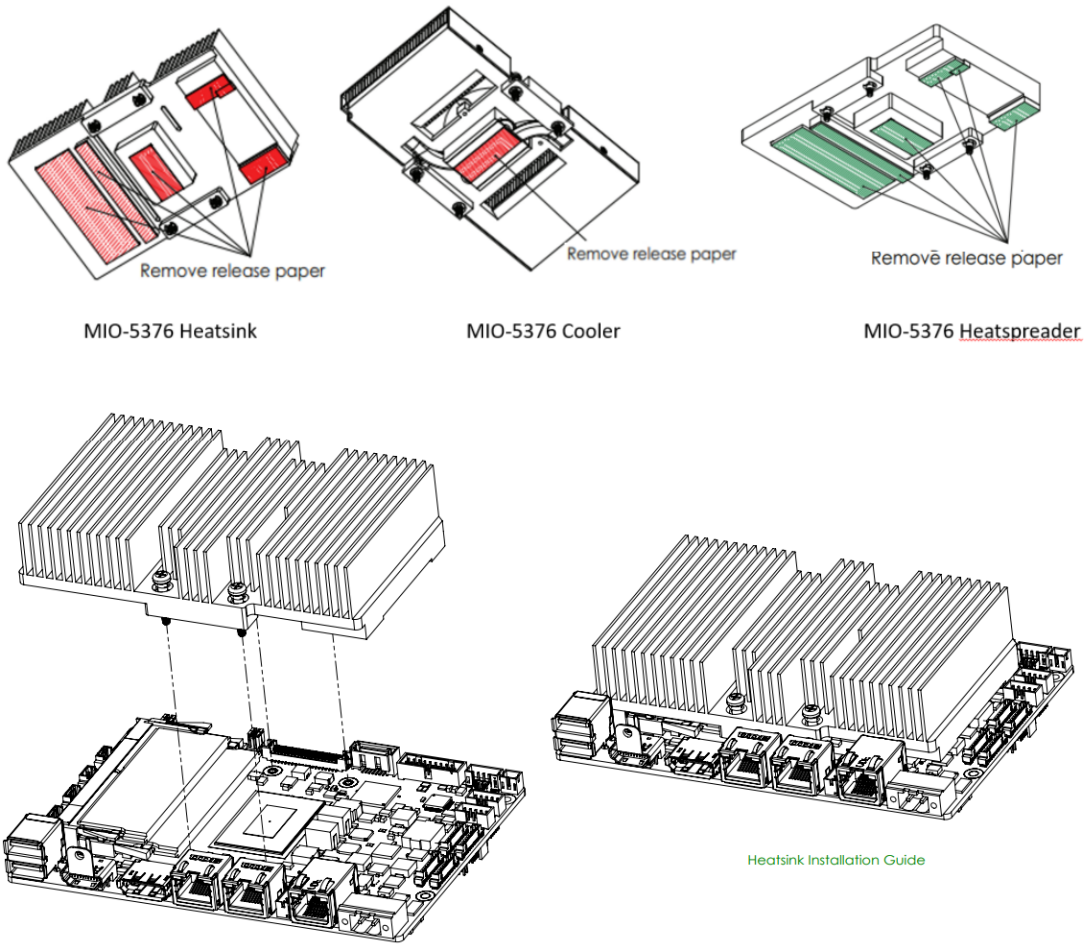


Figure 2.7 Heatsink Assembly Guide

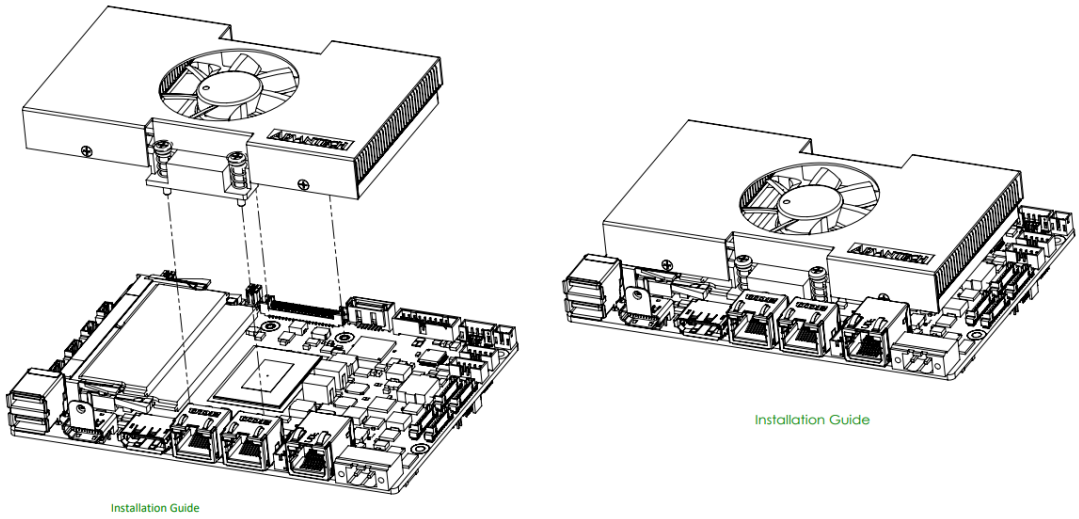


Figure 2.8 Cooler Assembly Guide (Optional)

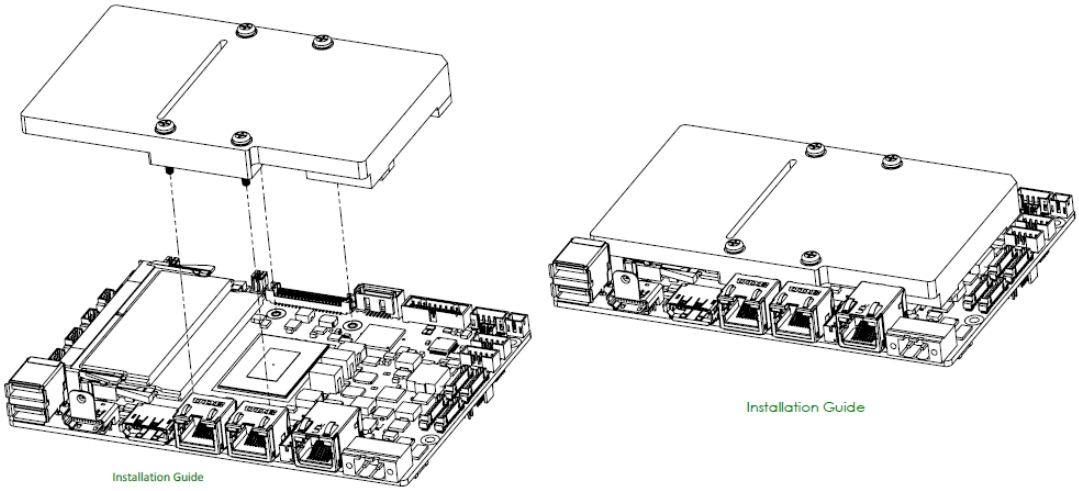


Figure 2.9 Heat Spreader Assembly Guide (Optional)

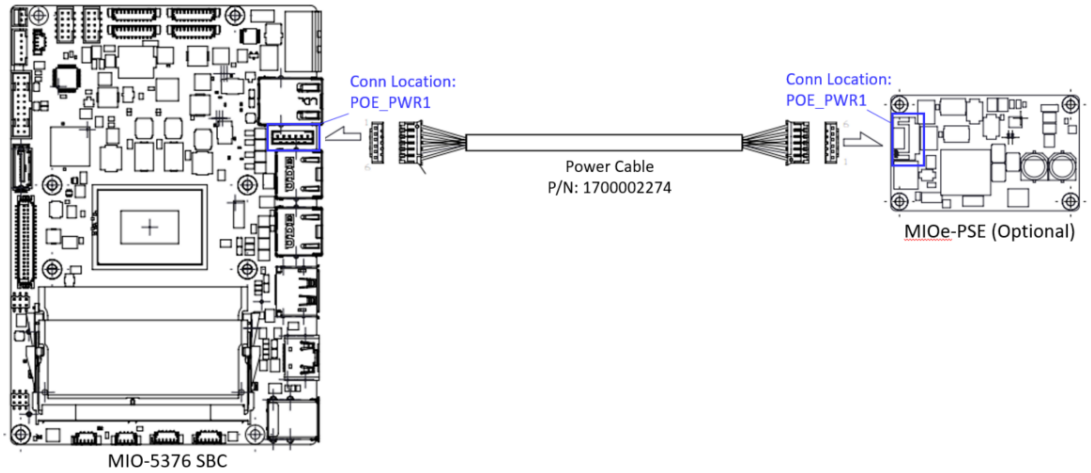


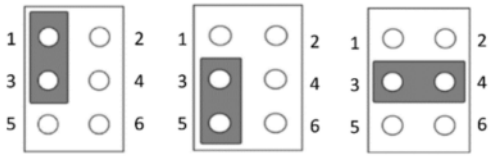
Figure 2.10 MIO-5376 and MIOe-PSE (Optional PoE Module) Assembly

Chapter 3

Jumpers

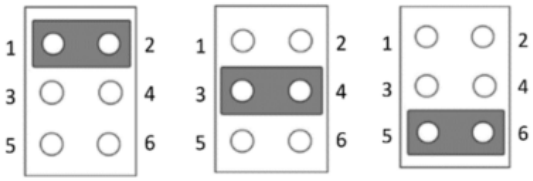
3.1 Jumpers

3.1.1 Panel Voltage Selection Jumper: VDD1



Jumper Short	Panel Voltage
1-3	+3.3V (Default)
3-5	+5V
3-4	+12V

3.1.2 AT Mode/Load BIOS Default: J1



Jumper Short	Panel Functional
1-2	On: AT mode* (default) Off: ATX mode
3-4	On: Reserved* (default) Off: Reserved
5-6	On: Load BIOS default Off: Normal* (default)

3.2 Connectors

No.	Location	Description
1	CN2	I2C/SMBus Internal Connector
2	FAN1	Smart FAN Internal Connector
3	COM3	COM-Port Internal Connector 3
4	COM4	COM-Port Internal Connector 4
5	USB1	USB 3.2 Dual-Port Connector
6	DIMM2	DDR4 SODIMM Connector 2
7	DIMM1	DDR4 SODIMM Connector 1
8	HDMI1	HDMI Connector
9	DP1	Display Connector
10	LAN3	RJ-45 LAN Port Connector 3 (Alt POE)
11	LAN2	RJ-45 LAN Port Connector 2 (Alt POE)
12	POE_PWR1	POE Power Internal Connector
13	LAN1	RJ-45 LAN Port Connector 1
14	DCIN1	DC Power Input Connector
15	COM1	COM-Port Internal Connector 1
16	COM2	COM-Port Internal Connector 2
17	CN1	Front Panel Internal Connector
18	GPIO1	GPIO Internal Connector
19	USB3	USB 2.0 Dual-Port Internal Connector
20	AUDIO1	Audio Internal Connector
21	CN3	CANBus Internal Connector
22	SATA_PWR1	SATA Power Connector
23	BL1	Panel Inverter Connector
24	USB2	USB 3.2 Dual-Port Internal Connector
25	SATA1	SATA Connector
26	LVDS1	LVDS Connector
27	VDD1	Panel Voltage Selection Jumper
28	J1	Miscellaneous Selection Jumper
29	BAT1	RTC battery Connector
30	M2_E1	M.2 E-Key Connector
31	M2_M1	M.2 M-Key Connector
32	M2_B1	M.2 B-Key Connector [3042/ 3052 Co-Lay]
33	SIM1	SIM (Subscriber Identity Module) Card

3.3 Locating Connectors

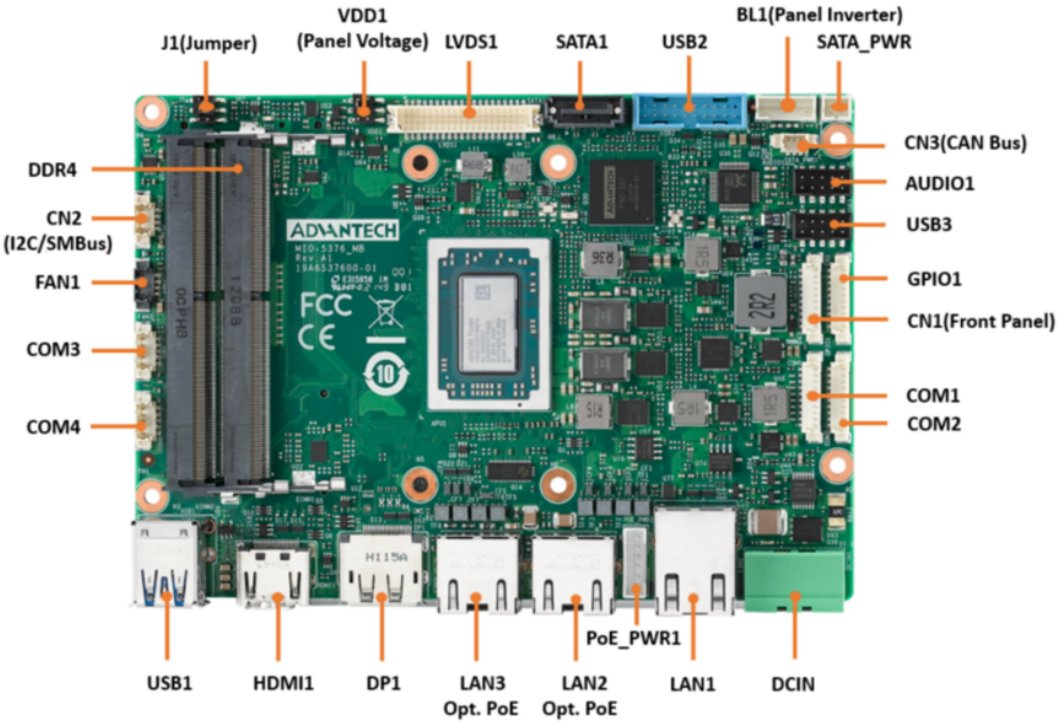


Figure 3.1 Locating Connectors (Front View)

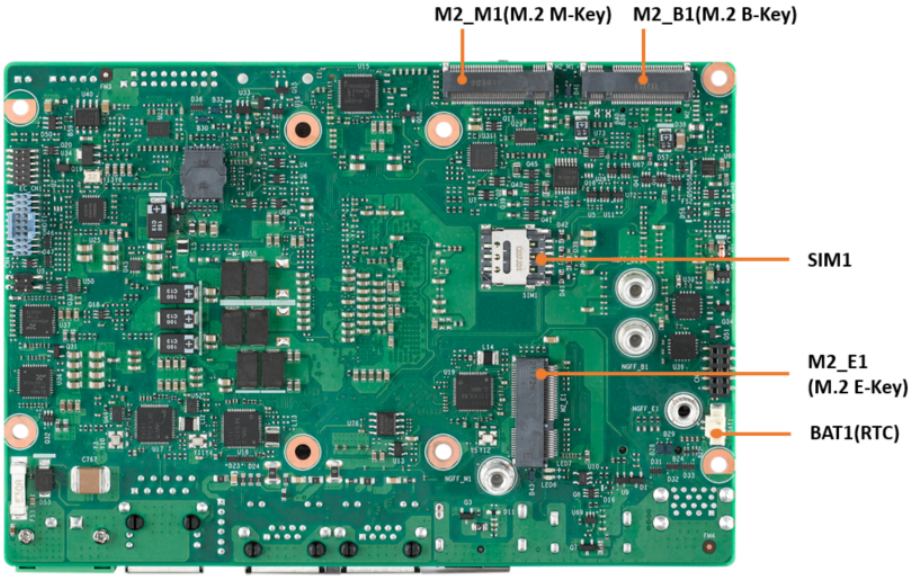
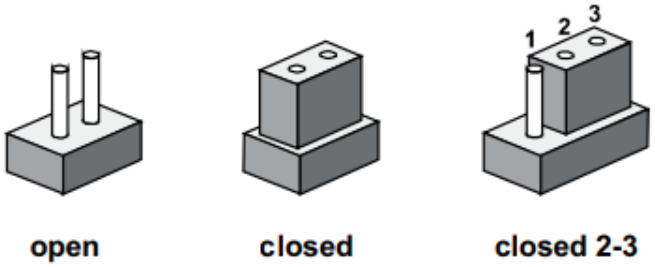


Figure 3.2 Locating Connectors (Bottom View)

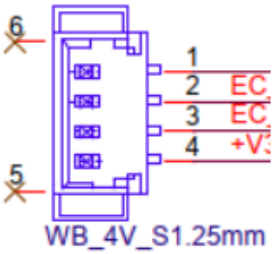
3.4 Setting Jumpers

You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric 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” a jumper, you connect the pins with the clip. To “open” a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either pins 1 and 2, or 2 and 3. The jumper settings are schematically depicted in this manual as follows:



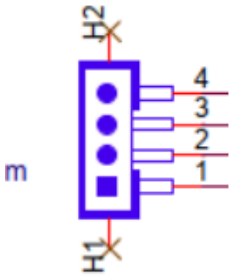
A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

3.4.1 I2C Internal Connector: CN2



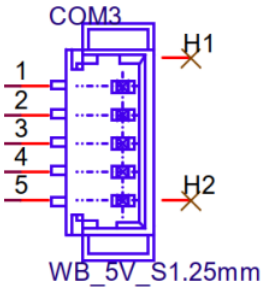
P/N	1655904020
Vendor/MPN	**Aces/85205-04001**
Pin	**Signal Pin Definition**
1	GND
2	EC_I2C0_z_DAT
3	EC_I2C0_z_CLK
4	+V33_I2CCONN

3.4.2 Smart FAN Internal Connector: FAN1



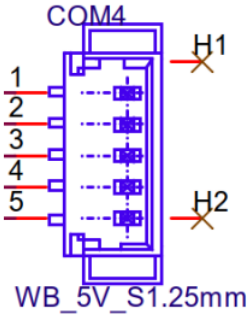
P/N	1653008788-01
Vendor/MPN	**Aces/50273-00401-001**
Pin	**Signal Pin Definition**
1	GND
2	+V12
3	FAN_SPEED
4	FAN_V5_PWM

3.4.3 COM-Port Internal Connector 3: COM3



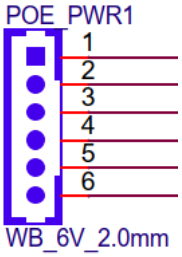
P/N	1655004032
Vendor/MPN	**Aces/85205-05701**
Pin	**Signal Pin Definition**
1	COM3_TXD
2	COM3_RTS#
3	COM3_RXD
4	COM3_CTS#
5	GND

3.4.4 COM-Port Internal Connector 4: COM4



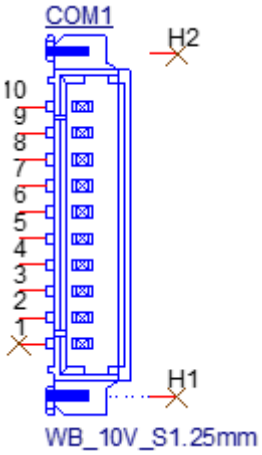
P/N	1655004032
Vendor/MPN	**Aces/85205-05701**
Pin	**Signal Pin Definition**
1	COM4_TXD
2	COM4_RTS#
3	COM4_RXD
4	COM4_CTS#
5	GND

3.4.5 POE Power Internal Connector: POE_PWR1



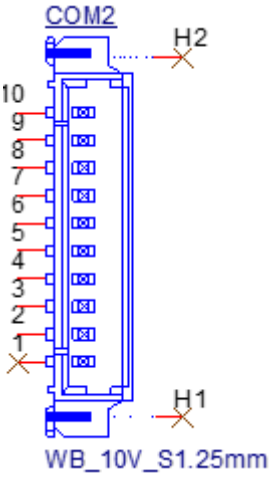
P/N	1655306020
Vendor/MPN	**Ho-Base/2001-WS-6**
Pin	**Signal Pin Definition**
1	+V48_LAN2+
2	+V48_LAN2-
3	+V48_LAN3+
4	+V48_LAN3-
5	GND
6	+VDCIN

3.4.6 COM-Port Internal Connector 1: COM1



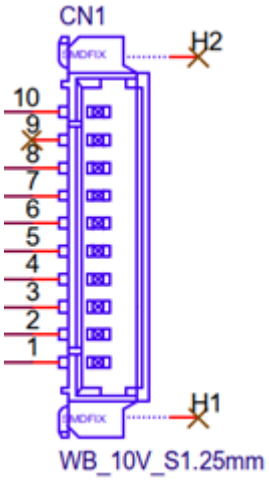
P/N	1653007728-01
Vendor/MPN	**Molex/53398-1071**
Pin	**Signal Pin Definition**
1	NC
2	COM1_RI#
3	COM1_DTR#
4	COM1_CTS#
5	COM1_TXD
6	COM1_RTS#
7	COM1_RXD
8	COM1_DSR#
9	COM1_DCD#
10	GND

3.4.7 COM-Port Internal Connector 2: COM2



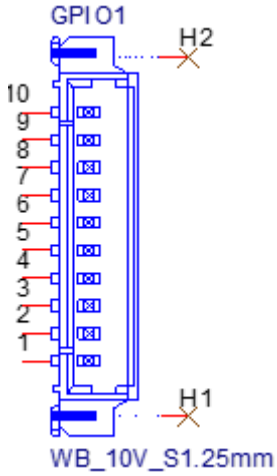
P/N	1653007728-01
Vendor/MPN	**Molex/53398-1071**
Pin	**Signal Pin Definition**
1	NC
2	COM2_RI#
3	COM2_DTR#
4	COM2_CTS#
5	COM2_TXD
6	COM2_RTS#
7	COM2_RXD
8	COM2_DSR#
9	COM2_DCD#
10	GND

3.4.8 Front Panel Internal Connector: CN1



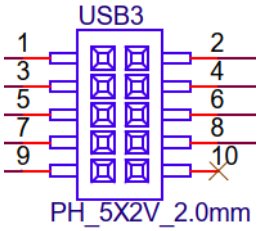
P/N	1653007728-01
Vendor/MPN	**Molex/53398-1071**
Pin	**Signal Pin Definition**
1	GND
2	BUZZER-
3	BUZZER+
4	RDC_CASEOPEN
5	SATA_HDD_LED#
6	FP_a_PSIN#
7	FP_a_RST#
8	+V3.3
9	NC
10	+V5

3.4.9 GPIO Internal Connector: GPIO1



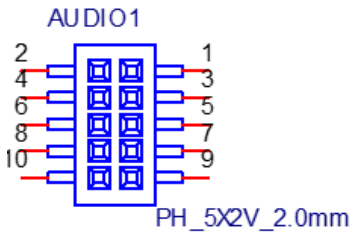
P/N	1653007728-01
Vendor/MPN	**Molex/53398-1071**
Pin	**Signal Pin Definition**
1	GND
2	EC_P1_GPIO7
3	EC_P1_GPIO2
4	EC_P1_GPIO6
5	EC_P1_GPIO1
6	EC_P1_GPIO5
7	EC_P1_GPIO0
8	EC_P1_GPIO4
9	+V5_P1_GPIO
10	EC_P1_GPIO3

3.4.10 USB 2.0 Dual-Port Internal Connector: USB3



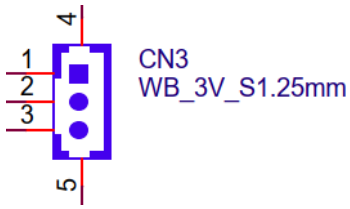
P/N	1653008214-01
Vendor/MPN	**Pinrex/52C-90-10GBE0**
Pin	**Signal Pin Definition**
1	+V5_USB3
2	+V5_USB3
3	USB_HUB0_D1-
4	USB_HUB0_D2-
5	USB_HUB0_D1+
6	USB_HUB0_D2+
7	GND
8	GND
9	GND
10	NC

3.4.11 Audio Internal Connector: AUDIO1



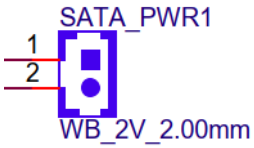
P/N	1653008214-01
Vendor/MPN	**Pinrex/52C-90-10GBE0**
Pin	**Signal Pin Definition**
1	A-FROUT_R
2	LINR
3	AUD_CONN_GND
4	AUD_CONN_GND
5	A-FROUT_L
6	LINL
7	AUD_CONN_GND
8	FRONT_JD
9	MIC1R
10	MIC1L

3.4.12 CANBus Internal Connector: CN3



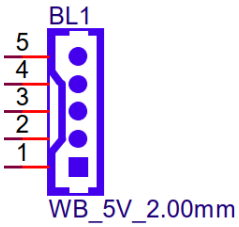
P/N	1654903500
Vendor/MPN	**Aces/85205-03001**
Pin	**Signal Pin Definition**
1	CAN1_D+
2	CAN1_D-
3	GND

3.4.13 SATA Power Connector: SATA_PWR1



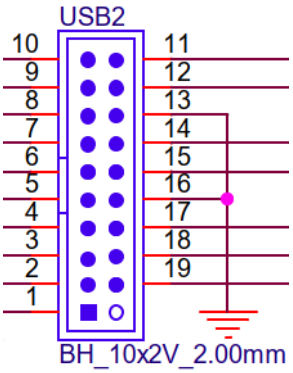
P/N	1653007538-01
Vendor/MPN	**Pinrex/721-81-02TW00**
Pin	**Signal Pin Definition**
1	+V5SATA0
2	GND

3.4.14 Panel Inverter Connector: BL1



P/N	1653007388-01
Vendor/MPN	**Pinrex/721-81-05TW00**
Pin	**Signal Pin Definition**
1	+V12_1_INVERTER_0
2	GND
3	LVDS1_z_ENABKL
4	EC_LVDS1_z_PWM
5	+V5_1_INVERTER_0

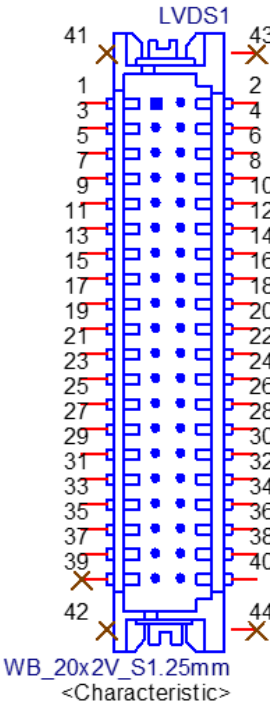
3.4.15 USB 3.2 Dual-Port Internal Connector: USB2



P/N	1653004847
Vendor/MPN	**Pinrex/52X-80-20GV52**
Pin	**Signal Pin Definition**
1	+V5_USB2
2	USB32X3_SSRX-
3	USB32X3_SSRX+
4	GND
5	USB32X3_z_TX-
6	USB32X3_z_TX+
7	GND
8	USB_D3-
9	USB_D3+
10	USB3_CONN_OC#
11	USB_D4+

12	USB_D4-
13	GND
14	USB32X4_z_TX+
15	USB32X4_z_TX-
16	GND
17	USB32X4_SSRX+
18	USB32X4_SSRX-
19	+V5_USB2

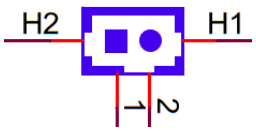
3.4.16 LVDS Connector: LVDS1



P/N	**1653008443-01**
Vendor/MPN	**Hirose/DF13E-40DP-1.25V(52)**
Pin	**Signal Pin Definition**
1	+V_LCD
2	+V_LCD
3	GND
4	GND
5	+V_LCD
6	+V_LCD
7	LVDS1_0_D0-
8	LVDS1_1_D0-
9	LVDS1_0_D0+
10	LVDS1_1_D0+
11	GND
12	GND
13	LVDS1_0_D1-
14	LVDS1_1_D1-

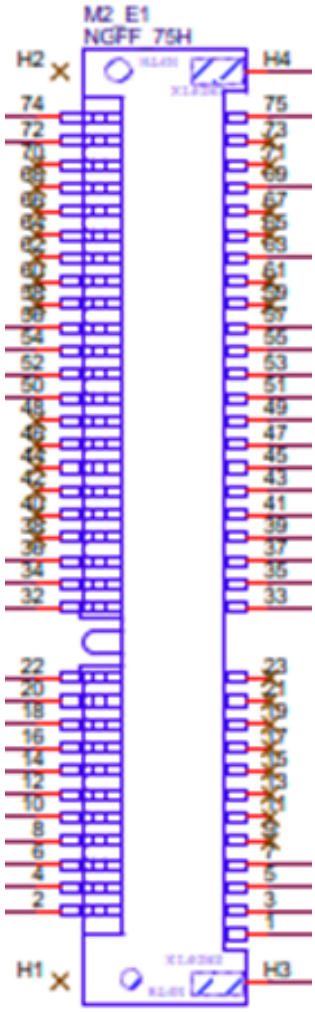
15	LVDS1_0_D1+
16	LVDS1_1_D1+
17	GND
18	GND
19	LVDS1_0_D2-
20	LVDS1_1_D2-
21	LVDS1_0_D2+
22	LVDS1_1_D2+
23	GND
24	GND
25	LVDS1_0_CLK-
26	LVDS1_1_CLK-
27	LVDS1_0_CLK+
28	LVDS1_1_CLK+
29	GND
30	GND
31	LVDS0_DDCCLK_AUX+
32	LVDS0_DDCCLK_AUX-
33	GND
34	GND
35	LVDS1_0_D3-
36	LVDS1_1_D3-
37	LVDS1_0_D3+
38	LVDS1_1_D3+
39	NC
40	LVDS1_VCON
41	NC
42	NC
43	NC
44	NC

3.4.17 RTC Battery Connector: BAT1



P/N	**1655005427-01**
Vendor/MPN	**Molex/53398-0271**
Pin	**Signal Pin Definition**
1	GND
2	+VBAT_a1

3.4.18 M.2 E-Key Connector: M2_E1

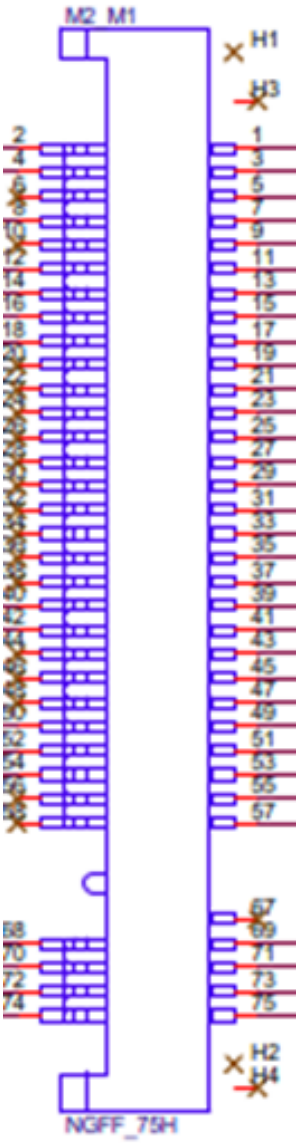


P/N	1654011871-01
Vendor/MPN	**TE CONNECTIVITY/2199230-2**
Pin	**Signal Pin Definition**
1	GND
2	+V3.3A_M.2_E
3	USB_HUB0_z_P3+
4	+V3.3A_M.2_E
5	USB_HUB0_z_P3-
6	M2E1_WiFi_LED#
7	GND
8	BT_I2S_SCK_R
9	NC
10	BT_I2S_WS_R
11	NC
12	BT_I2S_SDIN_R
13	NC
14	BT_I2S_SDOUT
15	NC

16	M2E1_BT_LED#
17	NC
18	GND
19	NC
20	M2E1_UART0_WAKE#
21	NC
22	BT_UART0_RX
23	NC
32	BT_UART0_TX
33	GND
34	BT_UART0_CTS#
35	PCIE1X2230_a_TX+
36	BT_UART0_RTS#
37	PCIE1X2230_a_TX-
38	NC
39	GND
40	NC
41	PCIE1X2230_RX+
42	NC
43	PCIE1X2230_RX-
44	NC
45	GND
46	NC
47	CLK100M_a_M2E1+
48	NC
49	CLK100M_a_M2E1-
50	M2E1_SUSCLK
51	GND
52	M2E1_PERST#
53	M2E1_a_CLKREQ#
54	M2E1_BT_DISABLE2#
55	M2E1_PCIEWAKE#
56	M2E1_WIFI_DISABLE1#
57	GND
58	NC
59	NC
60	NC
61	NC
62	NC
63	GND
64	NC
65	NC
66	NC
67	NC
68	NC
69	GND
70	NC
71	NC

72	+V3.3A_M.2_E
73	NC
74	+V3.3A_M.2_E
75	GND
H1	NC
H2	NC
H3	GND
H4	GND

3.4.19 M.2 M-Key Connector: M2_M1



P/N	**1654014529-01**
Vendor/MPN	**LOTES/APCI0556-P001A**
Pin	**Signal Pin Definition**
1	GND
2	+V3.3A_M.2_M
3	GND

4	+V3.3A_M.2_M
5	PCIE4X2280_RX3-
6	NC
7	PCIE4X2280_RX3+
8	M2M1_PLN#
9	GND
10	NC
11	PCIE4_KEY-M_a_TX3-
12	+V3.3A_M.2_M
13	PCIE4_KEY-M_a_TX3+
14	+V3.3A_M.2_M
15	GND
16	+V3.3A_M.2_M
17	PCIE4X2280_RX2-
18	+V3.3A_M.2_M
19	PCIE4X2280_RX2+
20	NC
21	GND
22	NC
23	PCIE4_KEY-M_a_TX2-
24	NC
25	PCIE4_KEY-M_a_TX2+
26	NC
27	GND
28	NC
29	PCIE4X2280_RX1-
30	NC
31	PCIE4X2280_RX1+
32	NC
33	GND
34	NC
35	PCIE4_KEY-M_a_TX1-
36	NC
37	PCIE4_KEY-M_a_TX1+
38	NC
39	GND
40	M2M1_SCLK0_SMBUS
41	MSATA_MPCIE_RX+
42	M2M1_SDATA0_SMBUS
43	MSATA_MPCIE_RX-
44	NC
45	GND
46	NC
47	MSATA_MPCIE_TX-
48	NC
49	MSATA_MPCIE_TX+
50	PLTRST_MKEY_BUFFER#
51	GND

52	CLK2_M2M1_a_PCIE_REQ#
53	CK_100M_a_MKEY_N
54	M2M1_PCIEWAKE#
55	CK_100M_a_MKEY_P
56	NC
57	GND
58	NC
67	NC
68	M2M1_SUSCLK
69	M2M1_SATA#_PCIE_SEL
70	+V3.3A_M.2_M
71	GND
72	+V3.3A_M.2_M
73	GND
74	+V3.3A_M.2_M
75	GND
H1	NC
H2	NC
H3	NC
H4	NC

3.4.20 M.2 B-Key Connector: M2_B1

P/N	1654012087-02
Vendor/MPN	**LOTES/APCI0161-P001A**
Pin	**Signal Pin Definition**
1	M2B1_CFG3
2	+V3.3A_M.2_B
3	GND
4	+V3.3A_M.2_B
5	GND
6	M2B1_FULL_CARD_OFF#
7	USB_M2B1_P
8	M2B1_W_DISABLE1#
9	USB_M2B1_N
10	M2B1_LED1#
11	GND
20	M2B1_PCIE_DIS

21	M2B1_CFG0
22	M2B1_ANT_CFG
23	NC
24	M2B1_ANT_TUNER
25	DM2B1_DPR
26	M2B1_W_DISABLE2#
27	GND
28	NC
29	M2B1_USB31_RX-
30	M2B1_UIM_RESET
31	M2B1_USB31_RX+
32	M2B1_UIM_CLK
33	GND
34	M2B1_UIM_DATA
35	M2B1_USB31_TX-
36	M2B1_UIM_PWR
37	M2B1_USB31_TX+
38	NC
39	GND
40	NC
41	PCIE1_M2B1_RX0-
42	NC
43	PCIE1_M2B1_RX0+
44	NC
45	GND
46	NC
47	M2B1_PCIE_TX-
48	NC
49	M2B1_PCIE_TX+
50	M2B1_PERST#
51	GND
52	M2B1_a_CLKREQ#
53	CLK100M_a_M2B1-
54	M2B1_PCIEWAKE#
55	CLK100M_a_M2B1+
56	NC
57	GND
58	NC
59	NC
60	NC
61	NC
62	NC
63	NC
64	NC
65	NC
66	NC
67	M2B1_a_RESET#
68	M2B1_SUSCLK

69	M2B1_CFG1
70	+V3.3A_M.2_B
71	GND
72	+V3.3A_M.2_B
73	GND
74	+V3.3A_M.2_B
75	M2B1_CFG2
H1	NC
H2	NC
H3	GND
H4	GND

Chapter 4

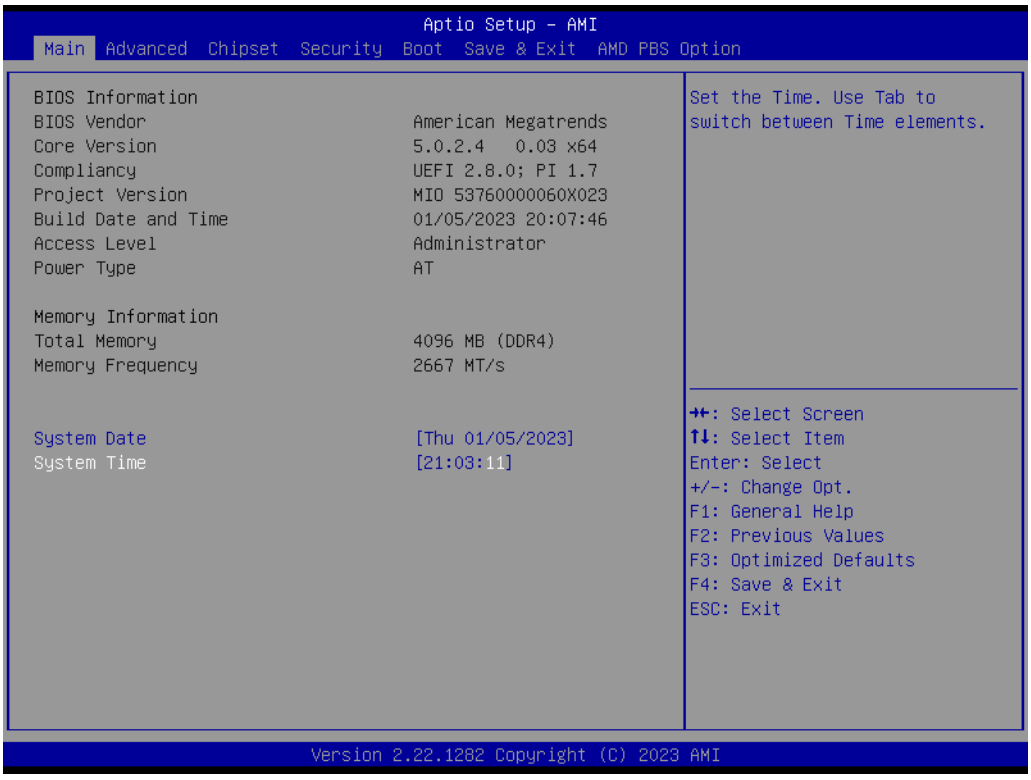
AMI BIOS Setup

4.1 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter Setup.

4.1.1 Main Setup

When you first enter the BIOS Setup Utility, you will encounter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



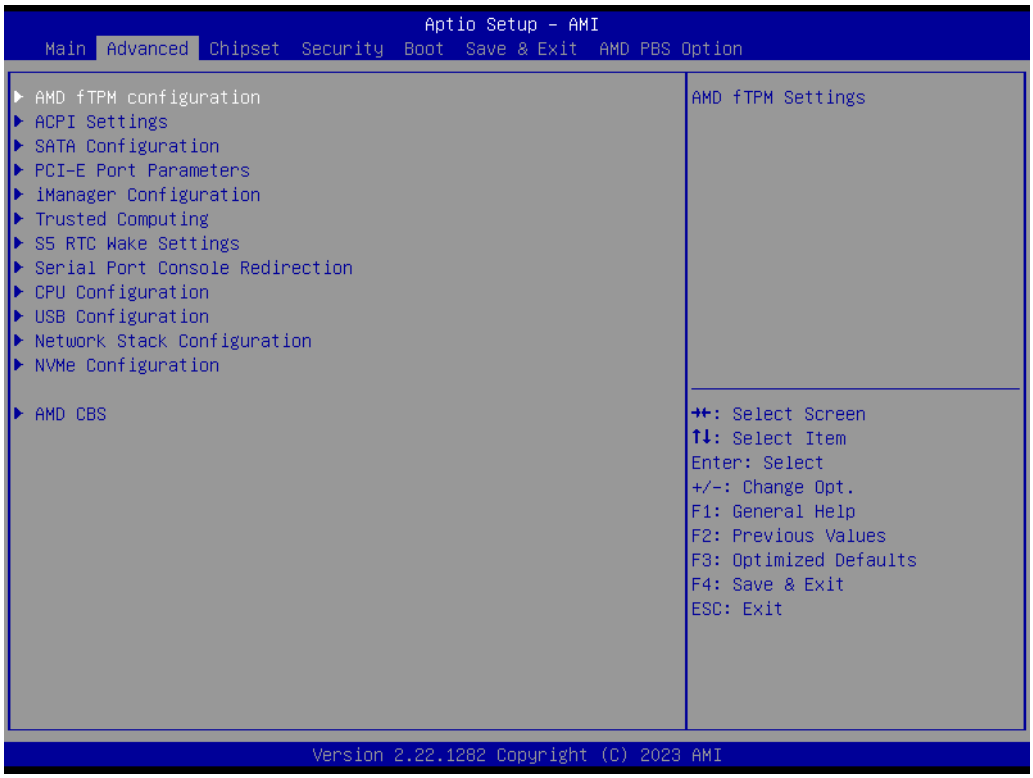
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key.

Above the key 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.

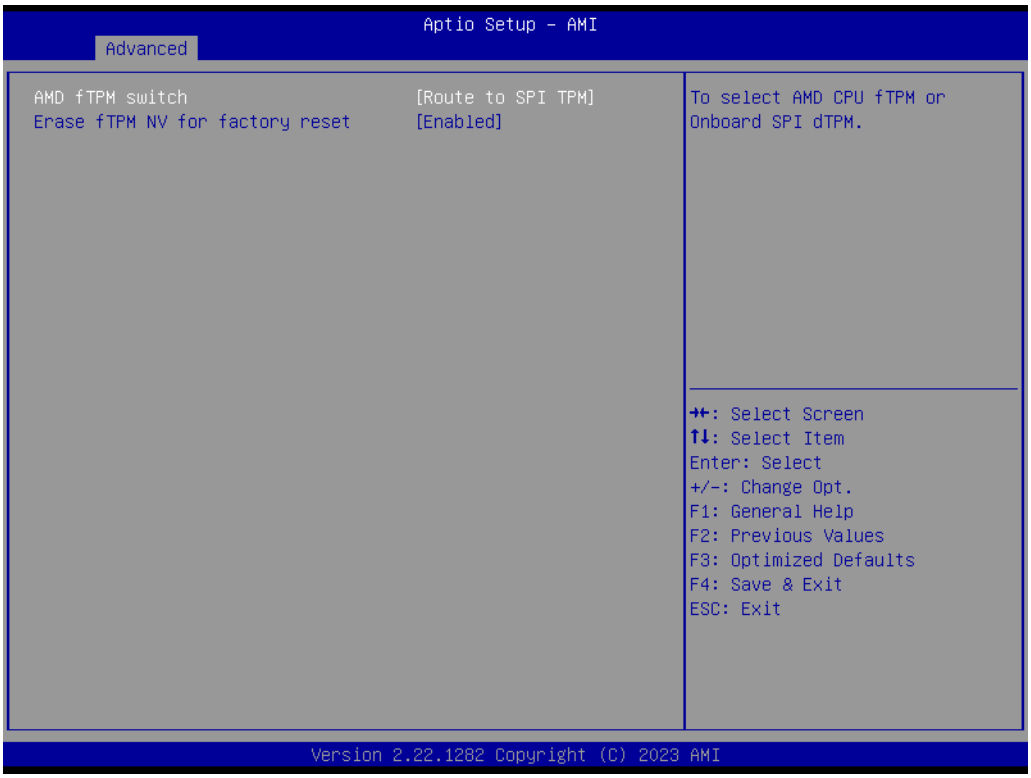
- **System Time / System Date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

4.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5376 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 submenu 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 submenus are described on the following pages.

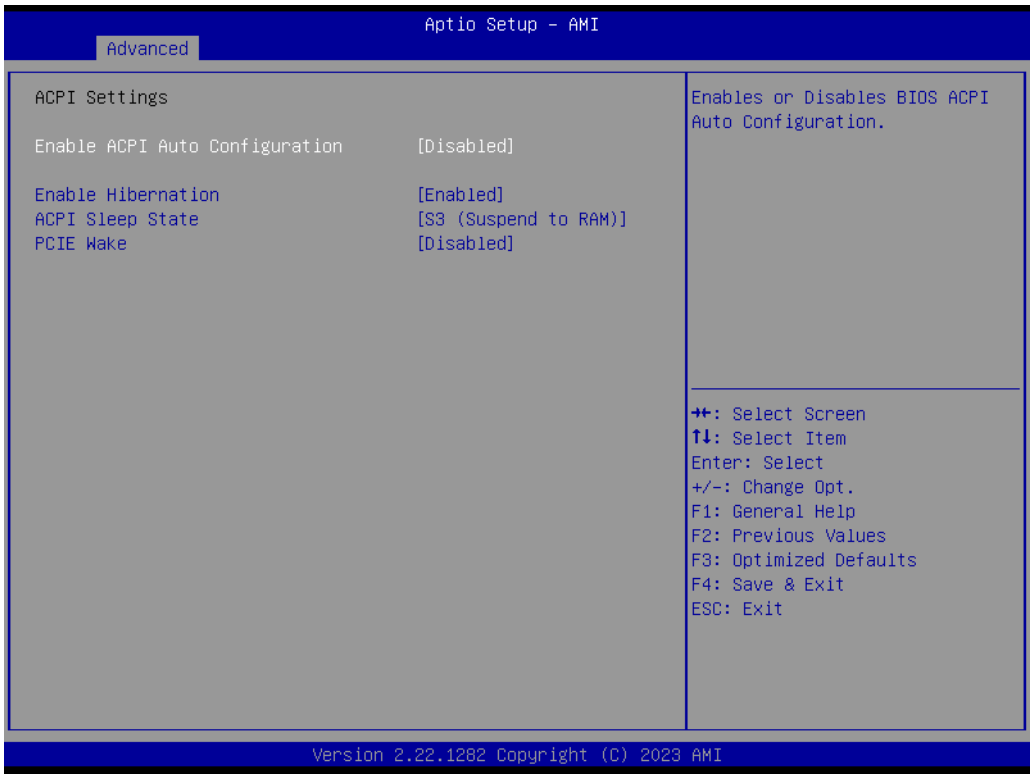


4.1.2.1 AMD fTPM Configuration



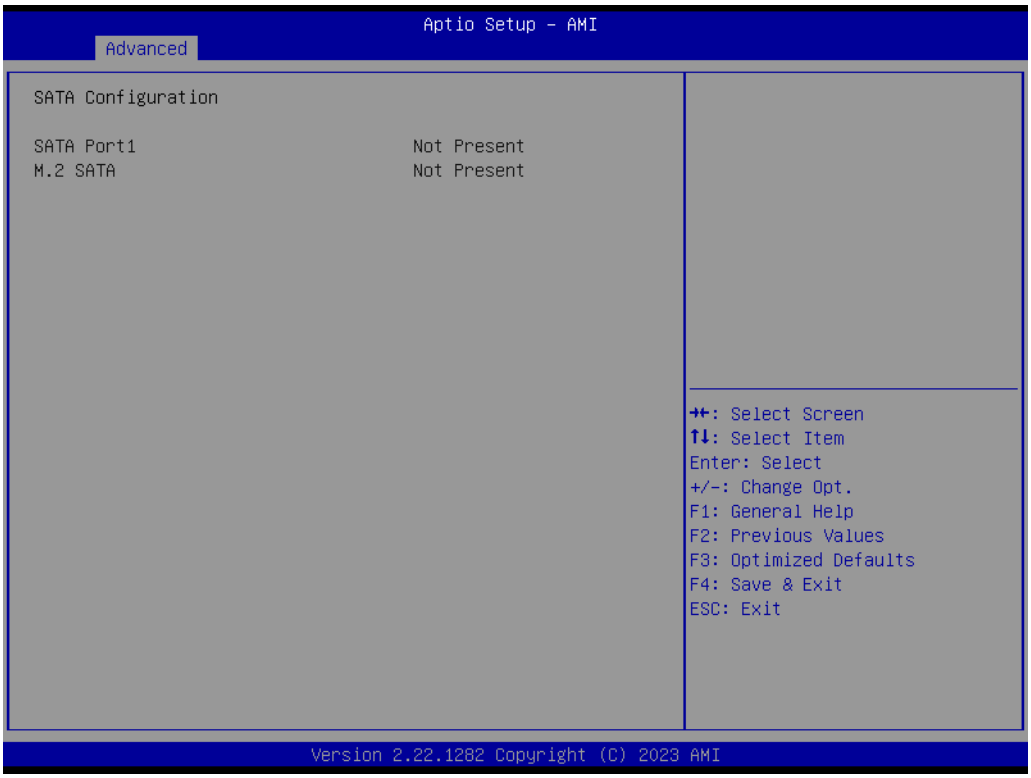
- **AMD fTPM switch**
  To select AMD CPU fTPM or Onboard SPI dTPM.
- **Erase fTPM NV for factory reset**
  When a new CPU is installed, Select “Enabled” to reset fTPM. Select “Disabled” to keep the previous fTPM record and continue the system boot.

4.1.2.2 ACPI Settings

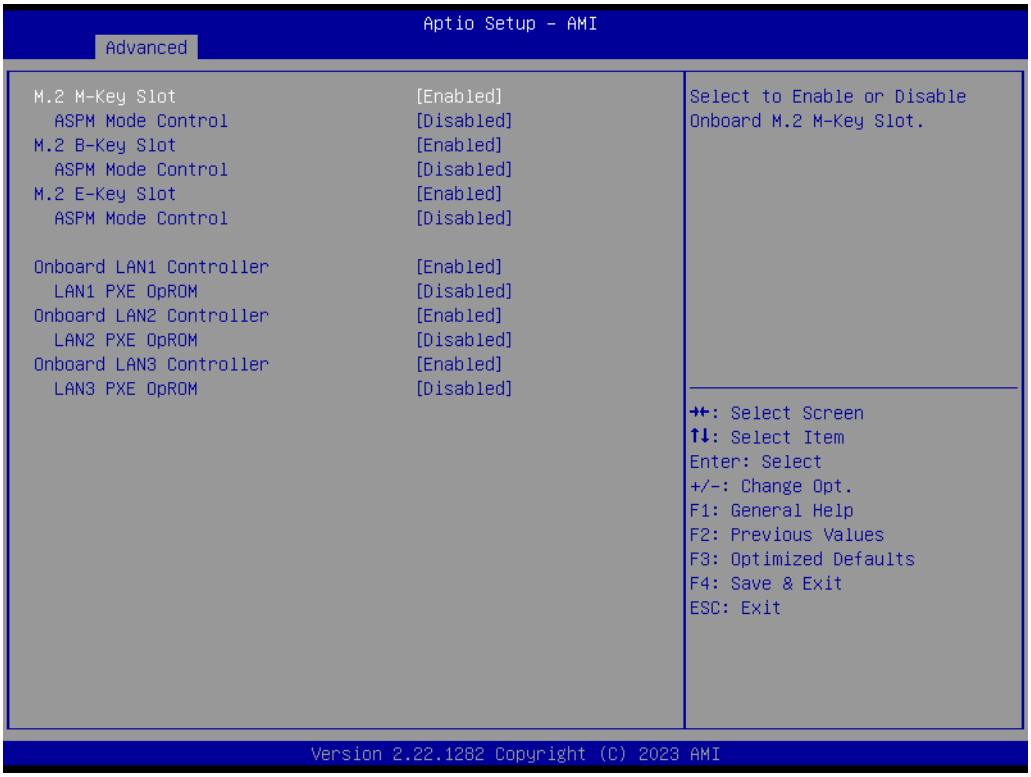


- **Enable ACPI Auto Configuration**
  Enable or Disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  Enables or Disables the system's ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **PCIE Wake**
  Enables or Disables PCIE to wake the system from S5.

4.1.2.3 SATA Configuration



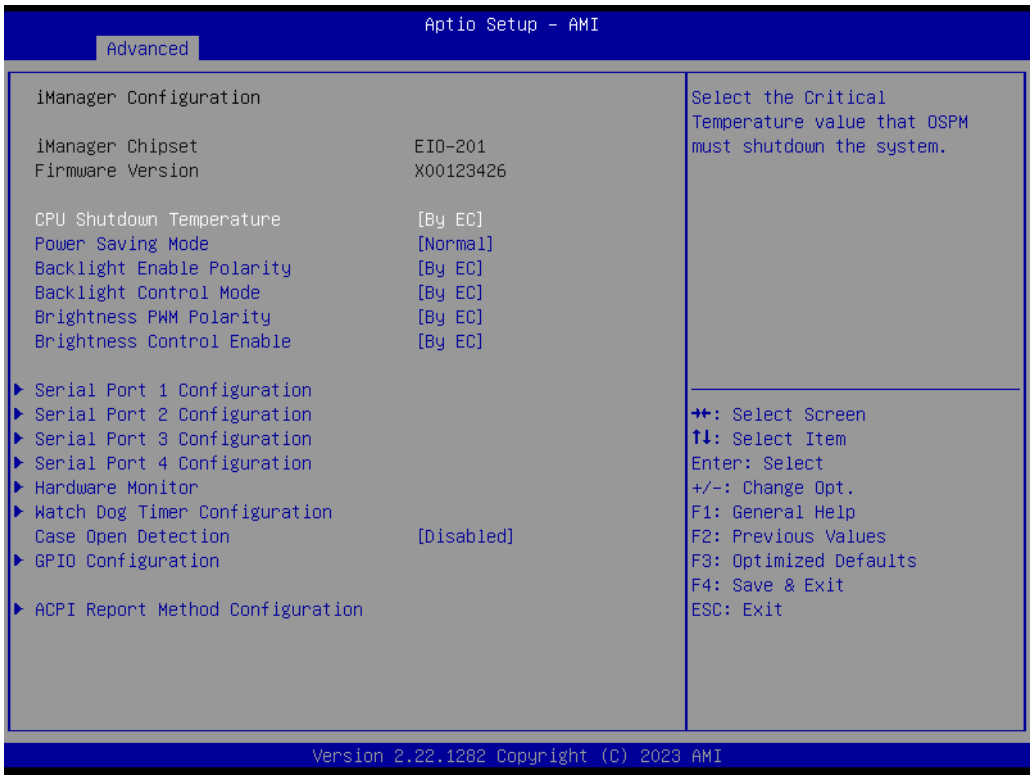
4.1.2.4 PCI-E Port Parameters



- **M.2 M-Key Slot / ASPM Mode Control**
  Select to Enable or Disable Onboard M.2 M-Key Slot. / NB Root Port ASPM Mode Control.

- **M.2 B-Key Slot / ASPM Mode Control**
  Select to Enable or Disable Onboard M.2 B-Key Slot. / NB Root Port ASPM Mode Control.
- **M.2 E-Key Slot / ASPM Mode Control**
  Select to Enable or Disable Onboard M.2 E-Key Slot. / NB Root Port ASPM Mode Control.
- **Onboard LAN1 Controller**
  Select to Enable or Disable Onboard LAN1 Controller.
- **LAN1 PXE OpROM**
  Enable or Disable boot option ROM for LAN1 Controller.
- **Onboard LAN2 Controller**
  Select to Enable or Disable Onboard LAN2 Controller.
- **LAN2 PXE OpROM**
  Enable or Disable boot option ROM for LAN2 Controller.
- **Onboard LAN3 Controller**
  Select to Enable or Disable Onboard LAN3 Controller.
- **LAN3 PXE OpROM**
  Enable or Disable boot option ROM for LAN3 Controller.

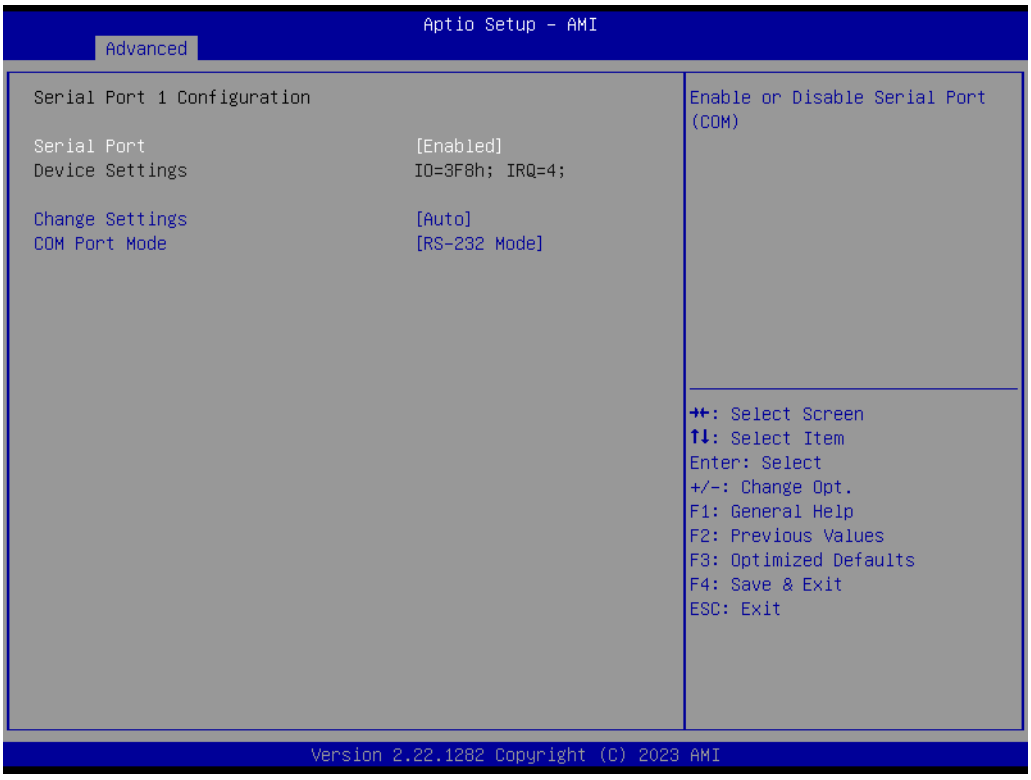
4.1.2.5 iManager Configuration



- **CPU Shutdown Temperature**
  Enable/Disable CPU Shutdown Temperature.
- **Power Saving Mode**
  Enable/Disable power saving mode.
- **Backlight Enable Polarity**
  Switch Backlight Enable Polarity for Native or Invert.
- **Backlight Control Mode**
  Switch Backlight Control to PWM or DC mode.

- **Brightness PWM Polarity**
  Backlight Control Brightness PWM Polarity for Native or Invert.
- **Brightness Control Enable**
  Choose to control the LVDS brightness value by EC or User override during POST stage.
- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2.
- **Serial Port 3 Configuration**
  Set Parameters of Serial Port 3.
- **Serial Port 4 Configuration**
  Set Parameters of Serial Port 4.
- **Hardware Monitor**
  Monitor hardware Status.
- **Watch Dog Timer Configuration**
  Watch Dog Timer Configuration Page.
- **Case Open Detection**
  Enable or Disable Case Open Detect Function.
- **GPIO Configuration**
  GPIO Configuration Settings.
- **ACPI Report Method Configuration**
  Select ACPI Reporting Method for EC Devices.

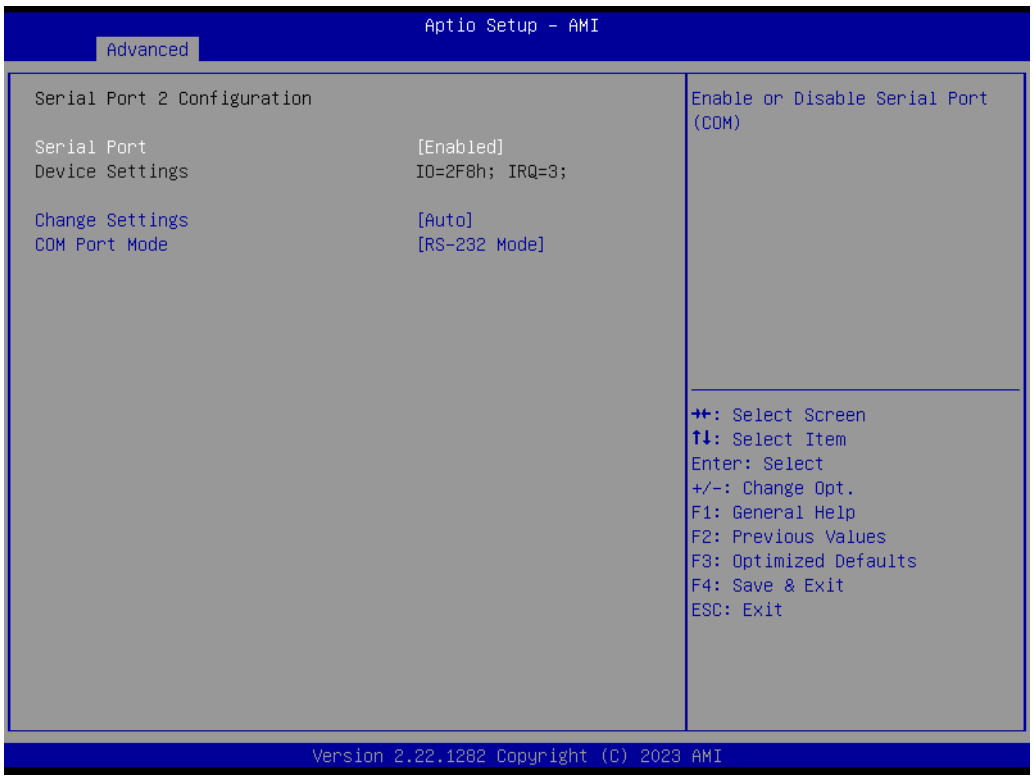
- **Serial Port 1 Configuration**



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

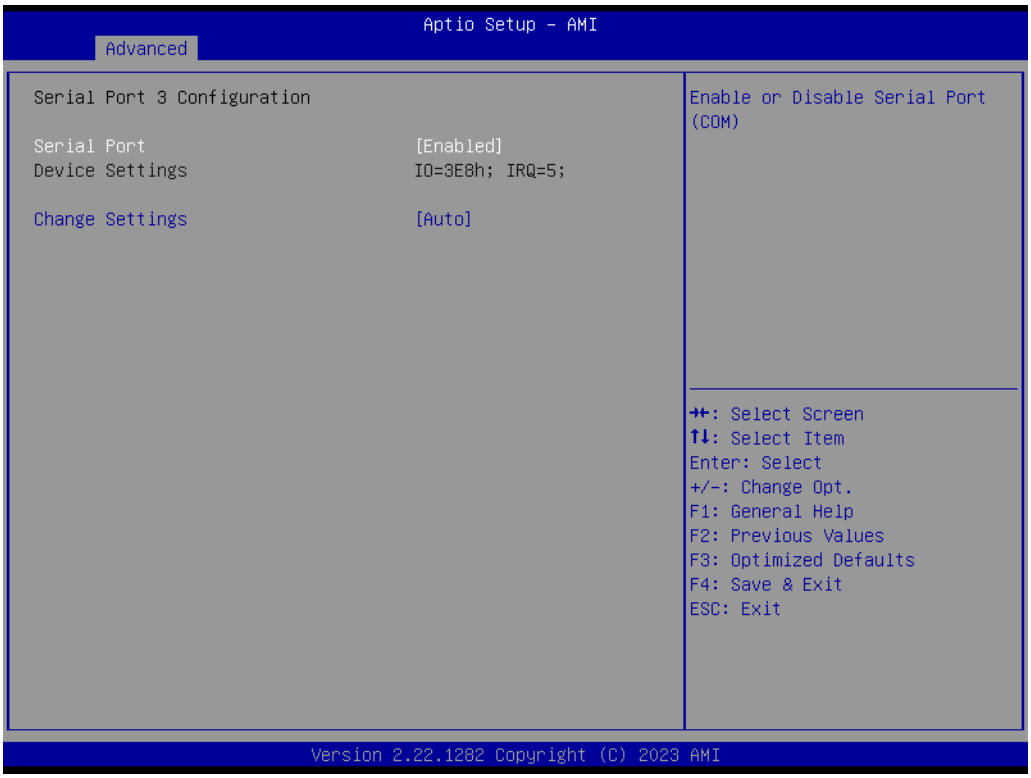
– **Change Settings**
  Select optimal settings for a Super IO device.
– **COM Port Mode**
  Select COM Port Mode.

■ Serial Port 2 Configuration



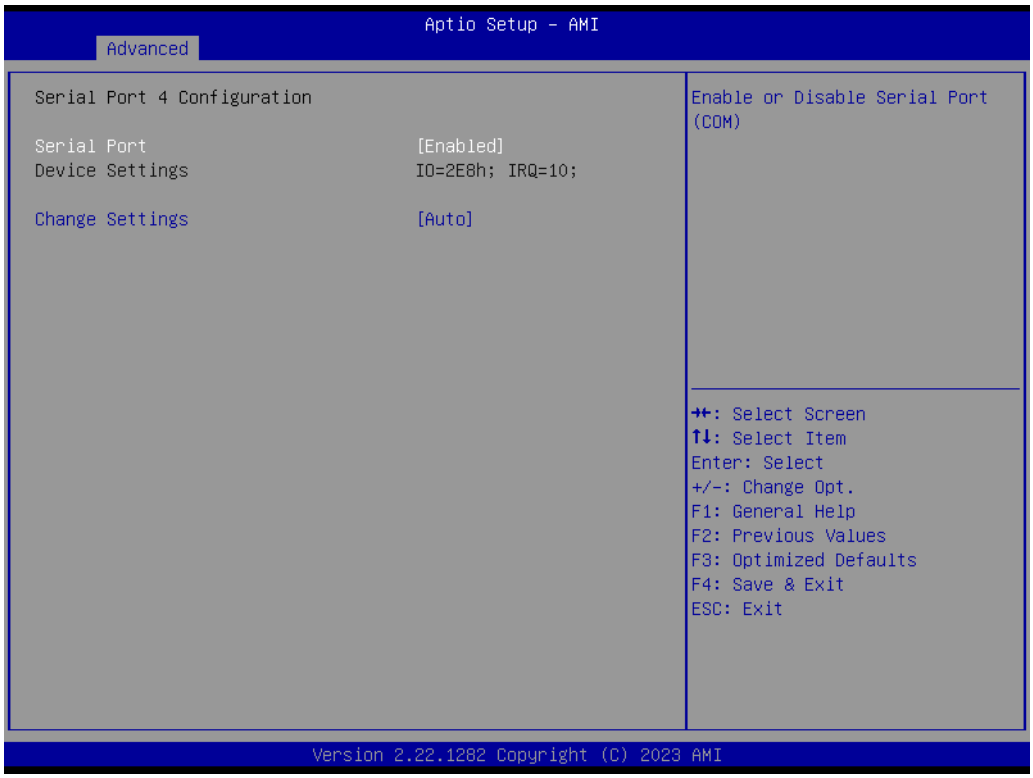
– **Serial Port**
  Enable or Disable Serial Port (COM).
– **Change Settings**
  Select optimal settings for a Super IO device.
– **COM Port Mode**
  COM Port Mode Select.

Serial Port 3 Configuration



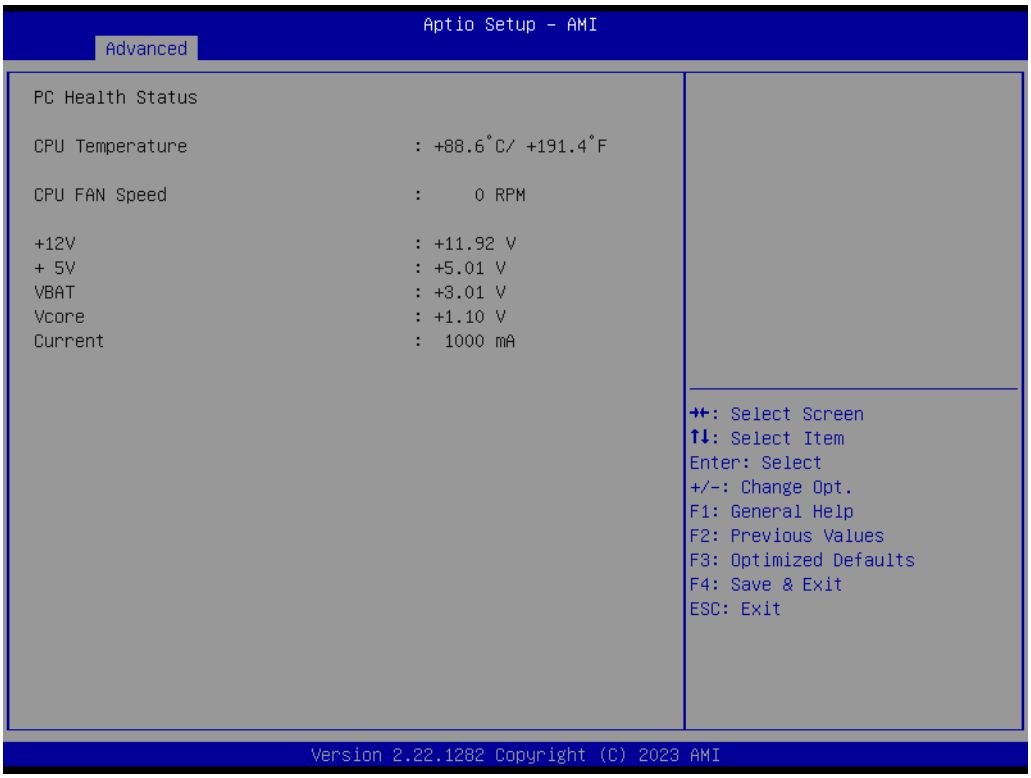
- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select optimal settings for a Super IO device.

Serial Port 4 Configuration

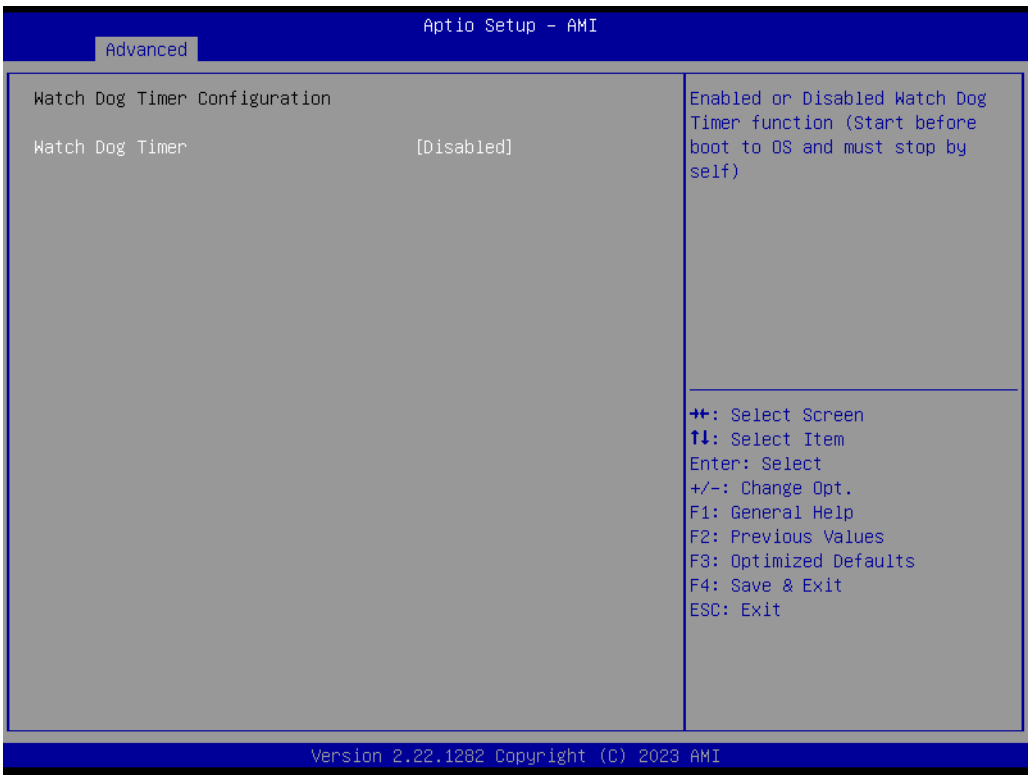


- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select optimal settings for a Super IO device.

Hardware Monitor

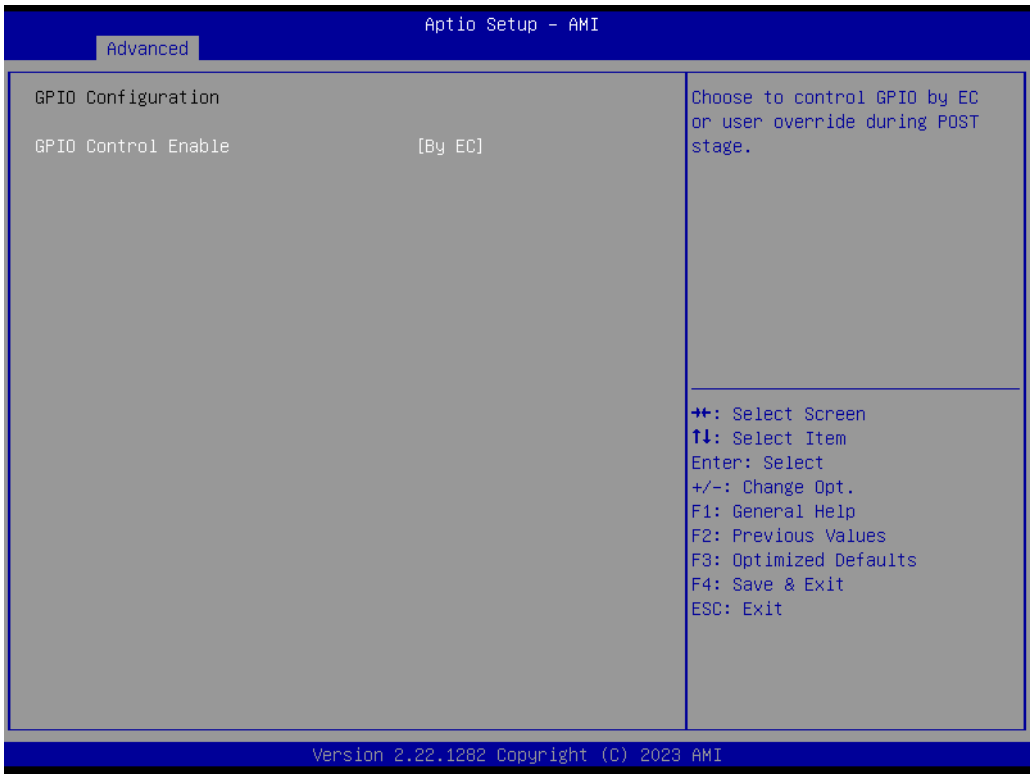


Watch Dog Timer Configuration



– **Watch Dog Timer**
  Enable or Disable the Watch Dog Timer function.

GPIO Configuration

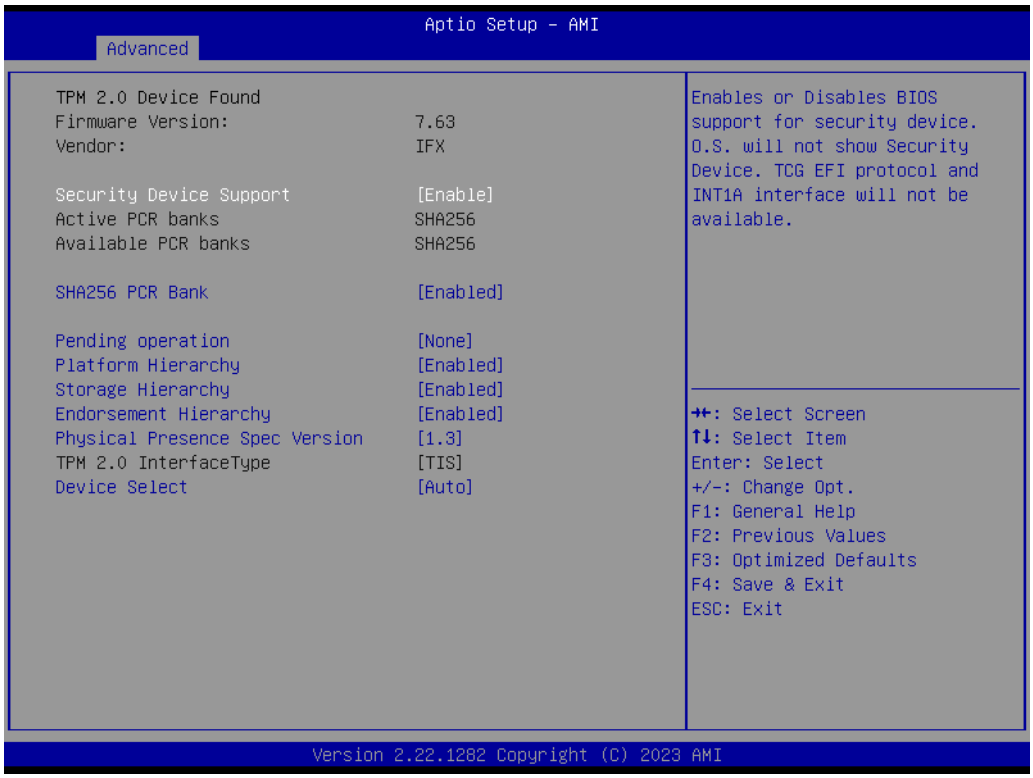


- **GPIO Control Enable**
  Choose to control GPIO by EC or user override during POST stage.
- **GPIO 0/1/2/3/4/5/6/7**
  Configure GPIO 0/1/2/3/4/5/6/7.

ACPI Report Method Configuration

- **CPI Report Method Control**
  Select ACPI Reporting Method for EC Devices.
- **Active High-Speed COM Port**
  Select to Enable High-Speed COM Port or Standard COM Port.
- **ACPI Report Method for I2C Bus**
  Select ACPI Reporting Method for EC I2C Bus.
- **ACPI Report Method for CAN Bus**
  Select ACPI Reporting Method for EC CAN Bus.
- **ACPI Report Method for GPIO**
  Select ACPI Reporting Method for EC GPIO.

4.1.2.6 Trusted Computing

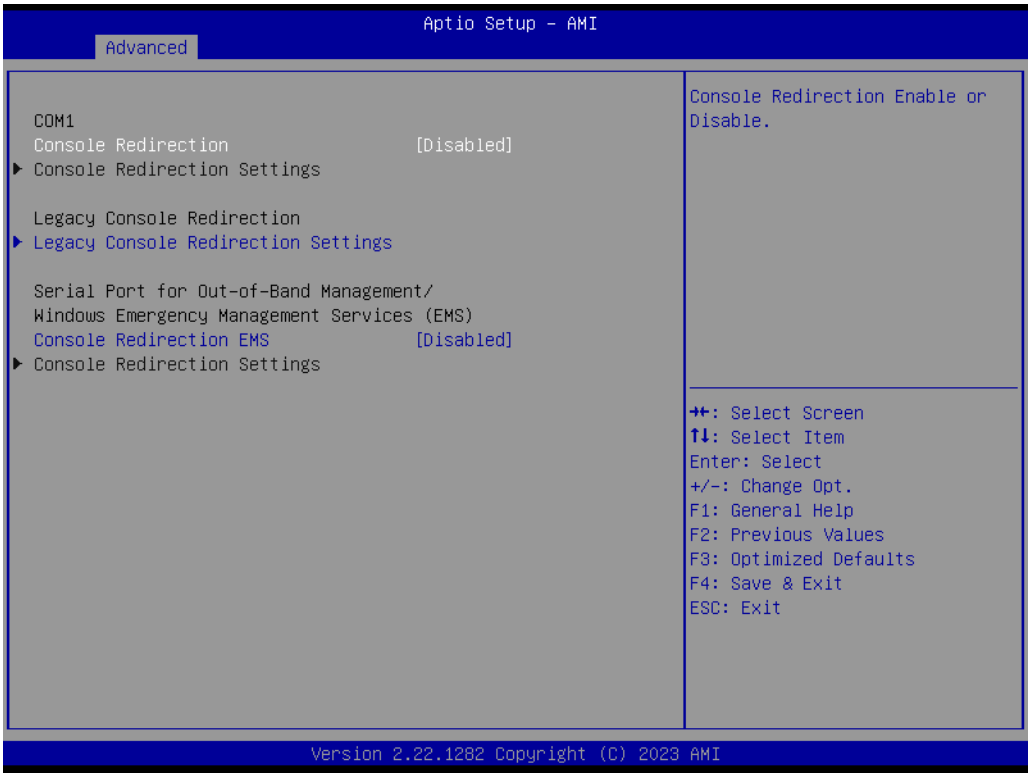


- **TPM Device Selection**
  Select TPM Device: fTPM or dTPM.
- **Security Device Support**
  Enable or disable BIOS support for security device.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **SHA384 PCR Bank**
  Enable or Disable SHA384 PCR Bank.
- **Pending Operation**
  Schedule an Operation for the Security Device.
- **Platform Hierarchy**
  Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable or Disable Endorsement Hierarchy.
- **Physical Presence Spec Version**
  Select to Tell the OS to support PPI Spec Version 1.2 or 1.3.
- **Device Select**
  TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices.

4.1.2.7 S5 RTC Wake Settings

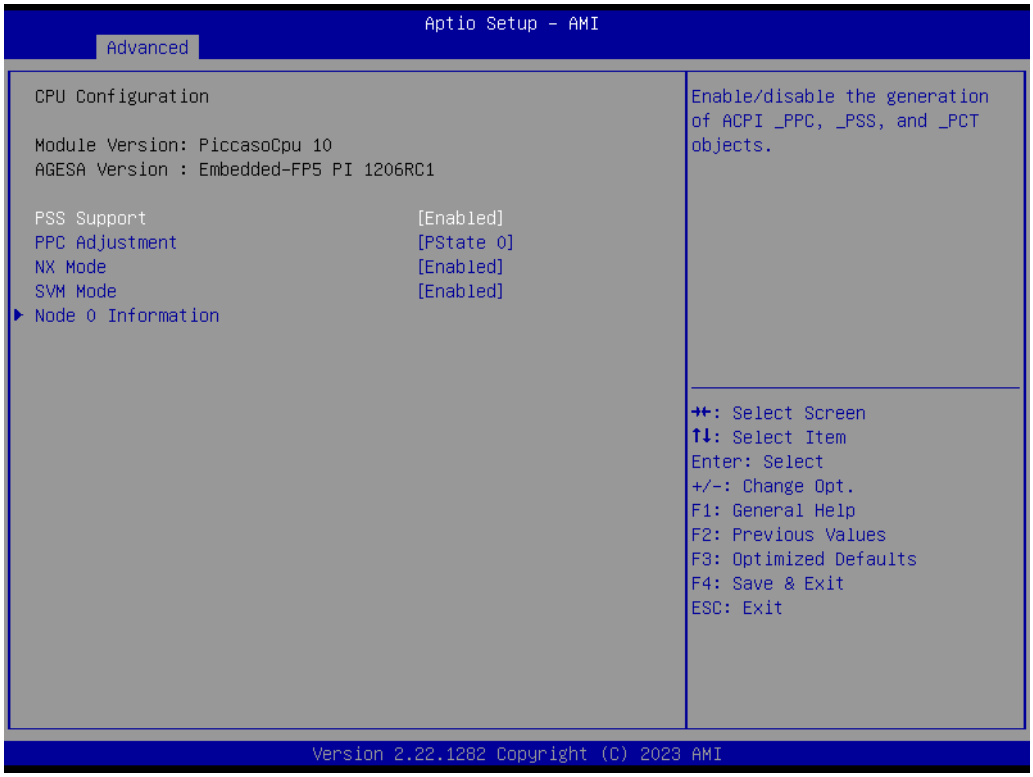
- **Wake System from S5**
  Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified.

4.1.2.8 Serial Port Console Redirection



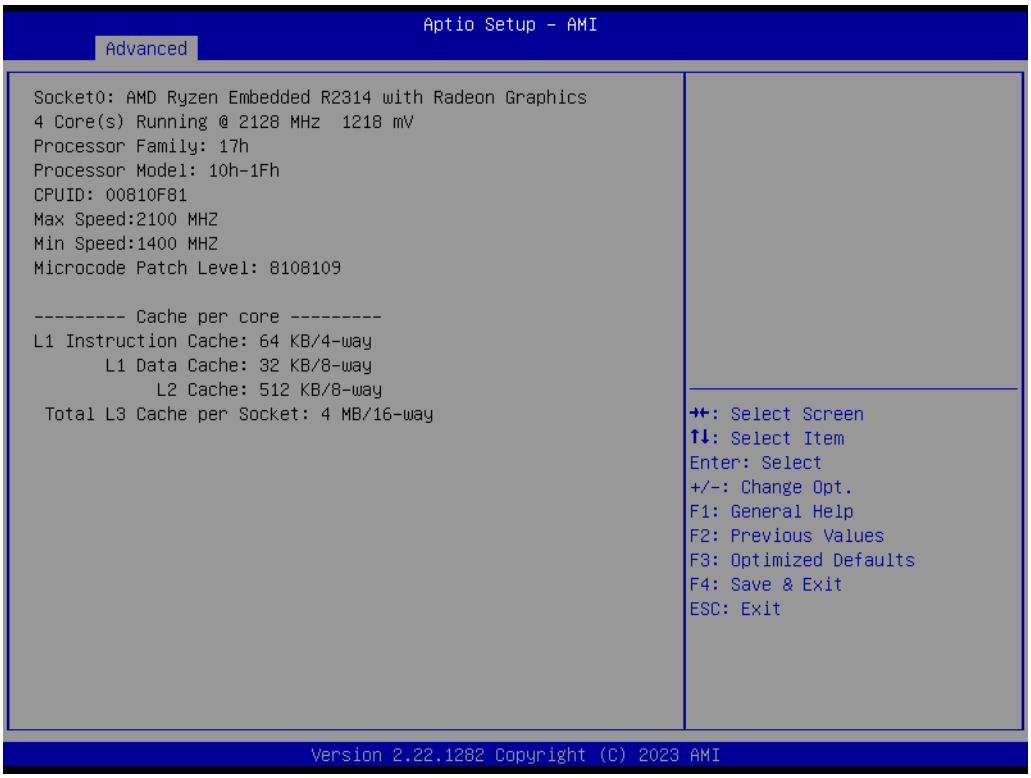
- **Console Redirection**
  This item allows users to configure console redirection detail settings.
- **Console Redirection EMS**
  This item allows users to enable or disable console redirection for Microsoft
- Windows Emergency Management Services (EMS).

4.1.2.9 CPU Configuration



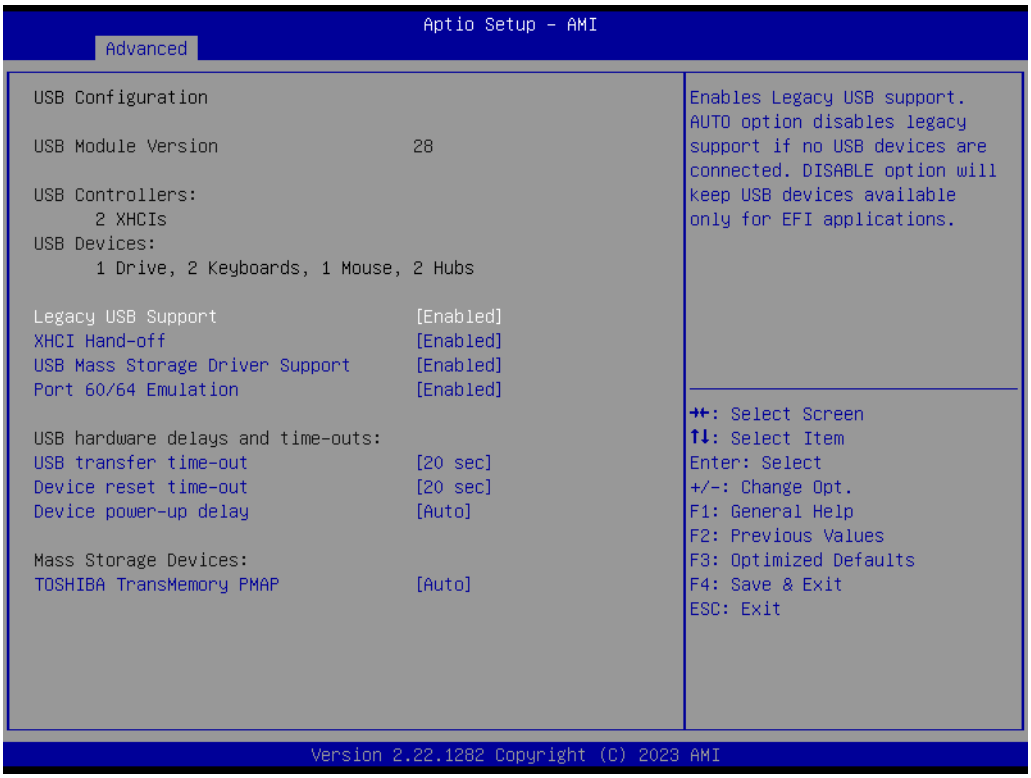
- **PSS Support**
  Enable/Disable the generation of ACPI_PPC, _PSS, and _PCT objects.
- **PPC Adjustment**
  Provide to adjust _PPC object.
- **NX Mode**
  Enable/Disable No-execute page protection function.
- **SVM Mode**
  Enable/Disable CPU Virtualization.

- **Node 0 Information**



  – **Node 0 Information**
    View information related to Node 0.

4.1.2.10 USB Configuration

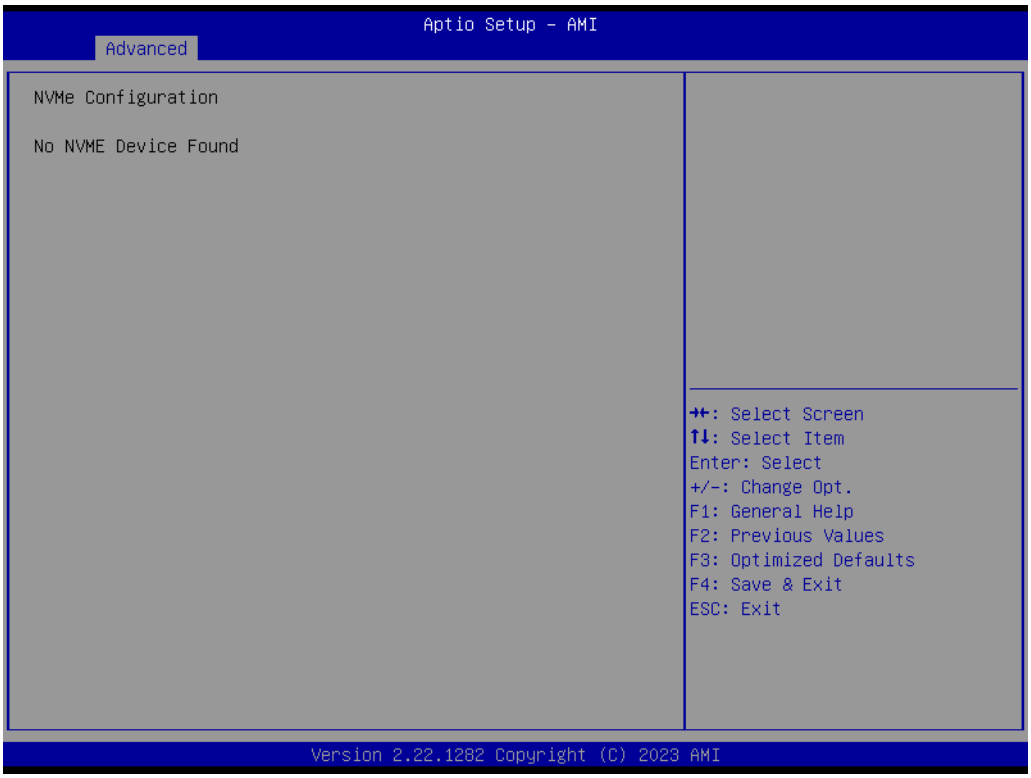


- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. The DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-Off**
  This is a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **USB Transfer Time-Out**
  Time-out value for control, bulk, and interrupt transfers.
- **Device Reset Time-Out**
  USB mass storage device start unit command time-out.
- **Device Power-Up Delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses a default value: for a Root port it is 100 ms, for a Hub port the delay is taken from the Hub descriptor.

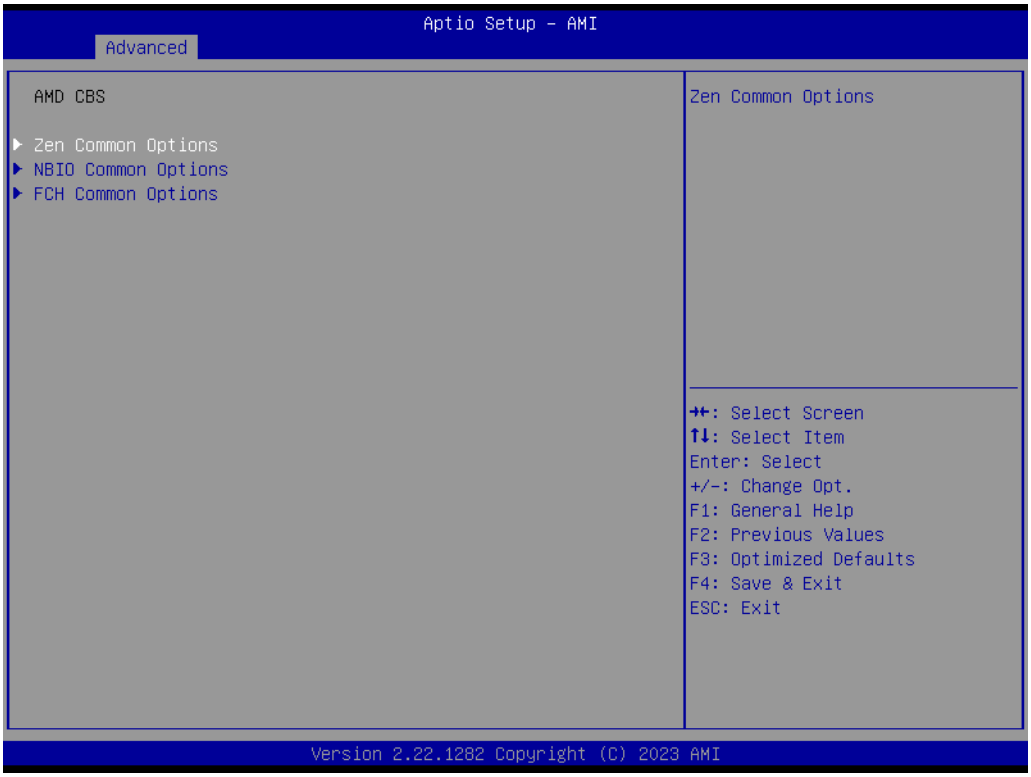
4.1.2.11 Network Stack Configuration

- **Network Stack**
  Enable/Disable UEFI Network Stack.

4.1.2.12 NVMe Configuration



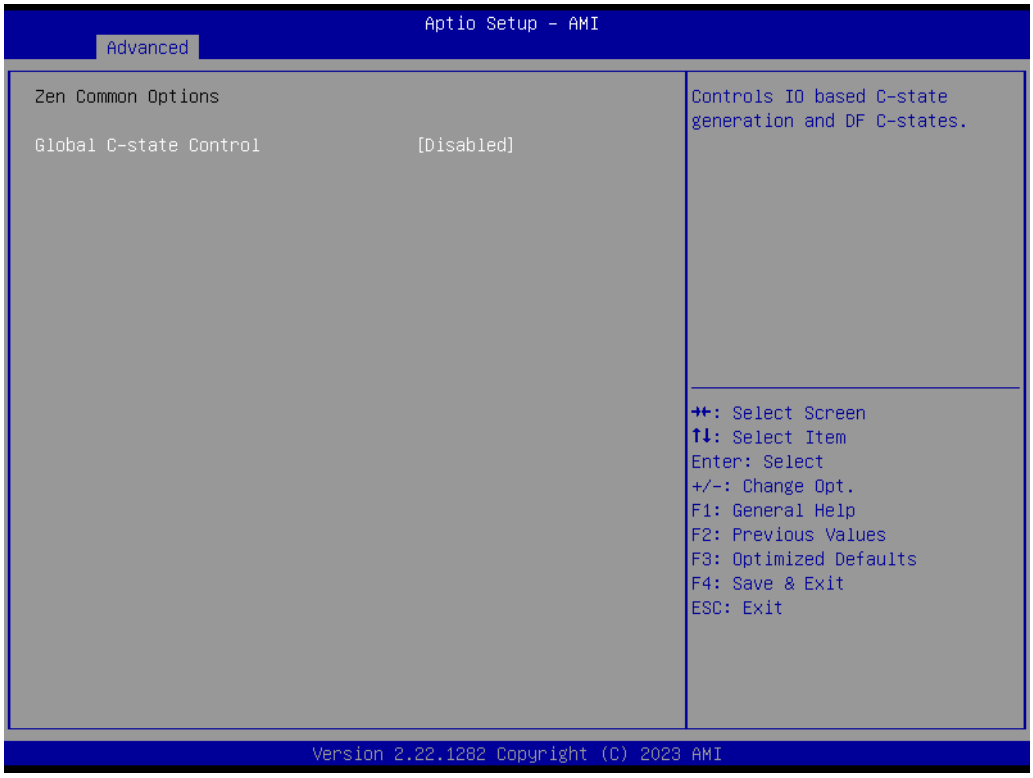
4.1.2.13 AMD CBS



- **Zen Common Options**
  Zen Common Options.

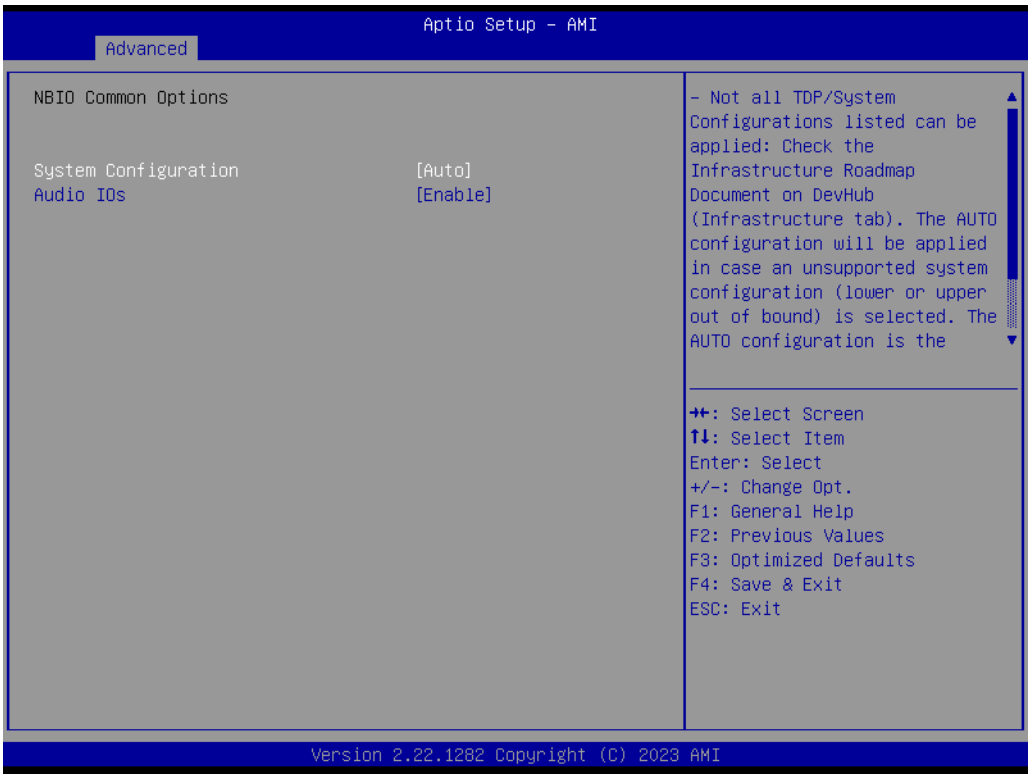
- **NBIO Common Options**
  NBIO Common Options.
- **FCH Common Options**
  FCH Common Options.

- **Zen Common Options**



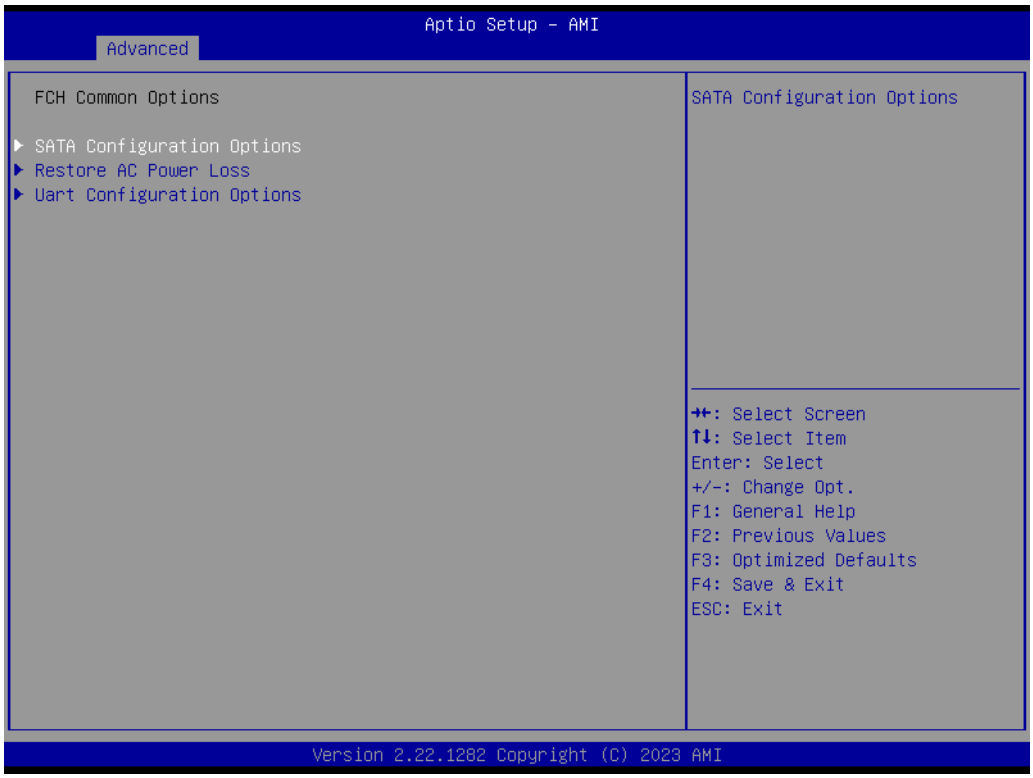
– **Global C-state Control**
  Controls IO-based C-State generation and DF C-State.

NBIO Common Options



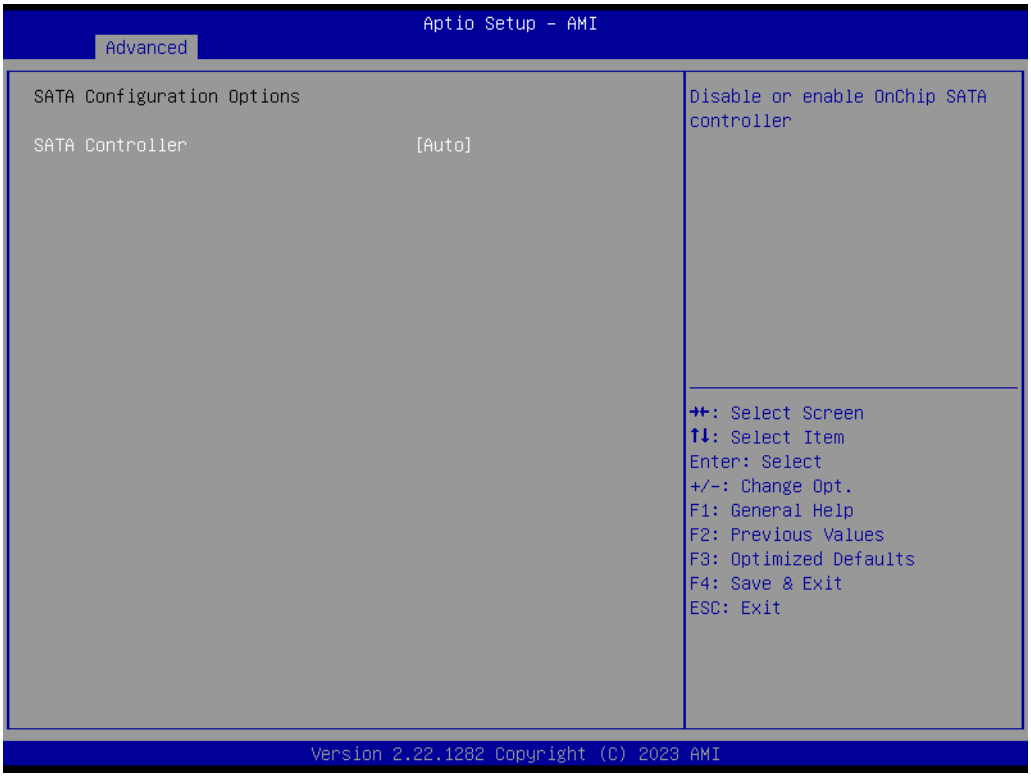
- **System Configuration**
  The AUTO configuration will be applied in case an unsupported system configuration is selected.
- **Audio IOs**
  Audio IO Control.

FCH Common Options



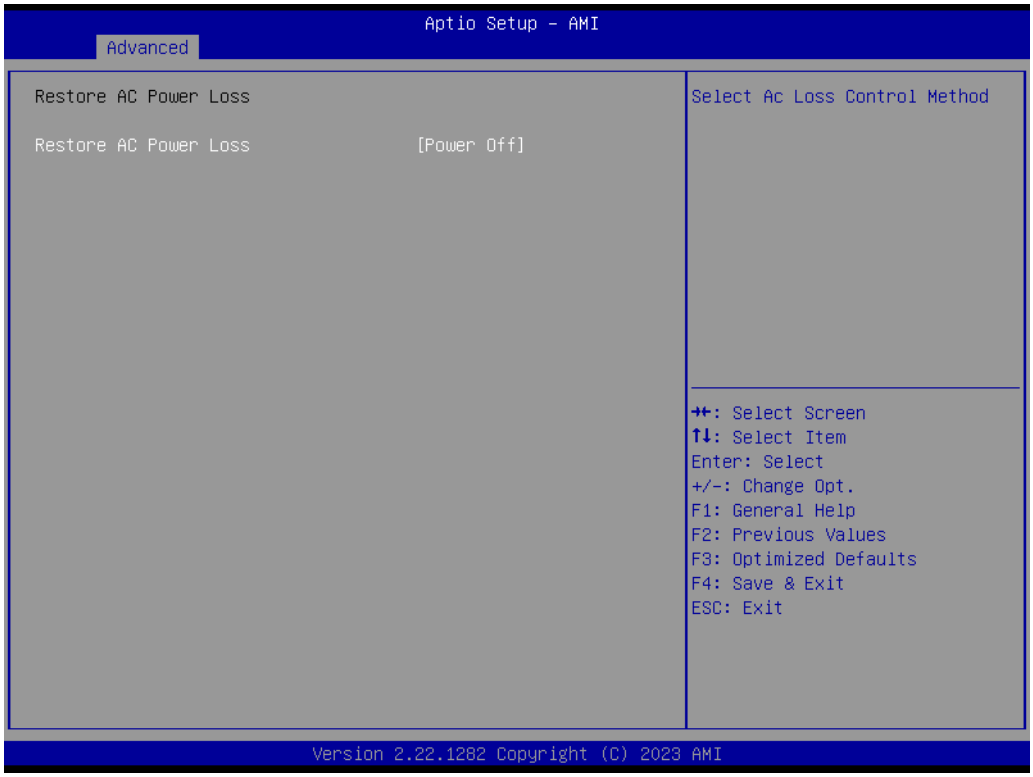
- **SATA Configuration Options**
  SATA Configuration Options.
- **Restore AC Power Loss**
  Restore AC Power Loss.
- **Uart Configuration Options**
  Uart Configuration Options.

SATA Configuration Options



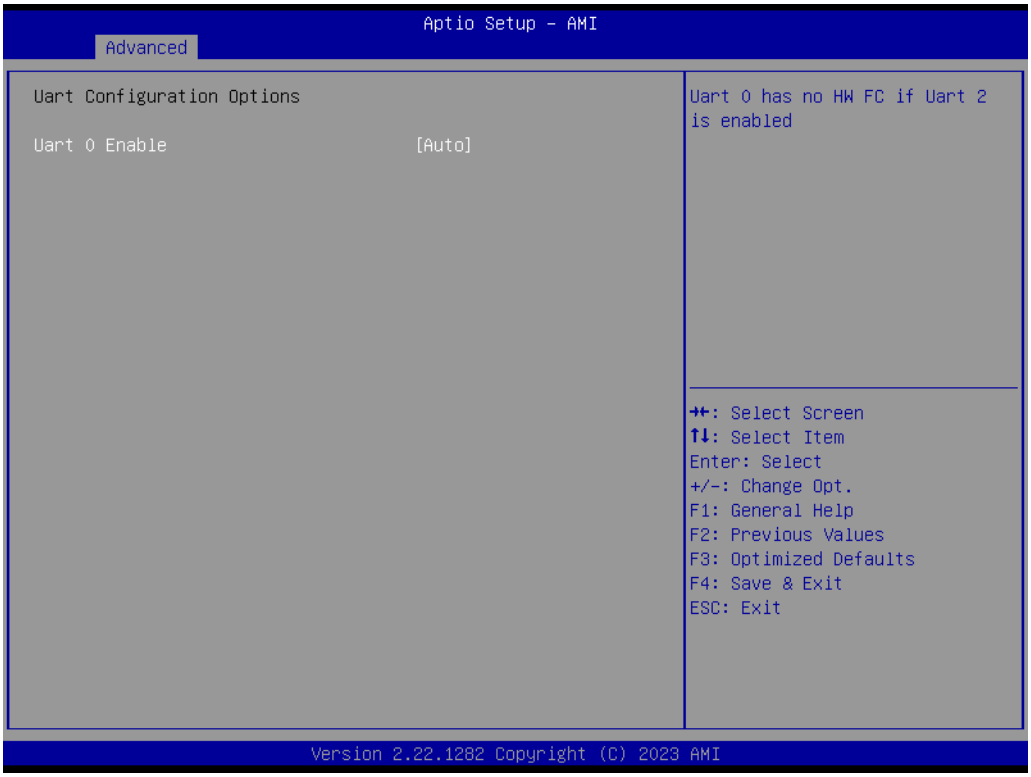
- **SATA Controller**
  Disable/Enable OnChip SATA controller.

Restore AC Power Loss



- **Restore AC Power Loss**
  Select AC Loss Control Method.

Uart Configuration Options

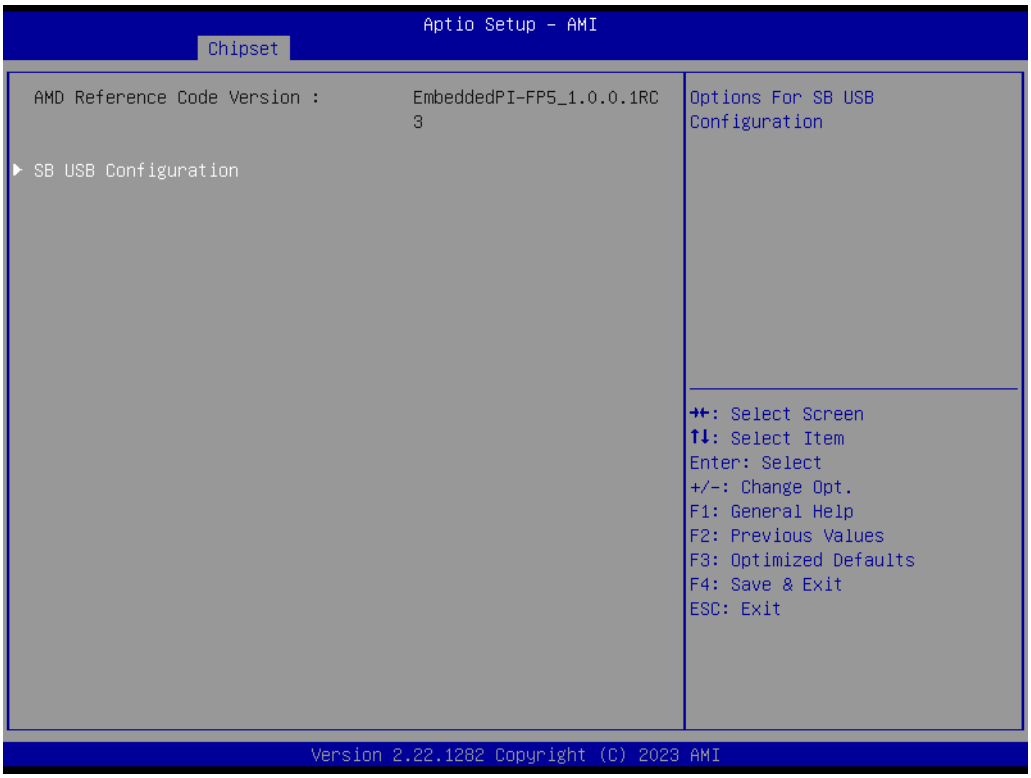


- **Uart 0 Enable**
  Enable/Disable Uart 0 controller.

4.1.3 Chipset Configuration

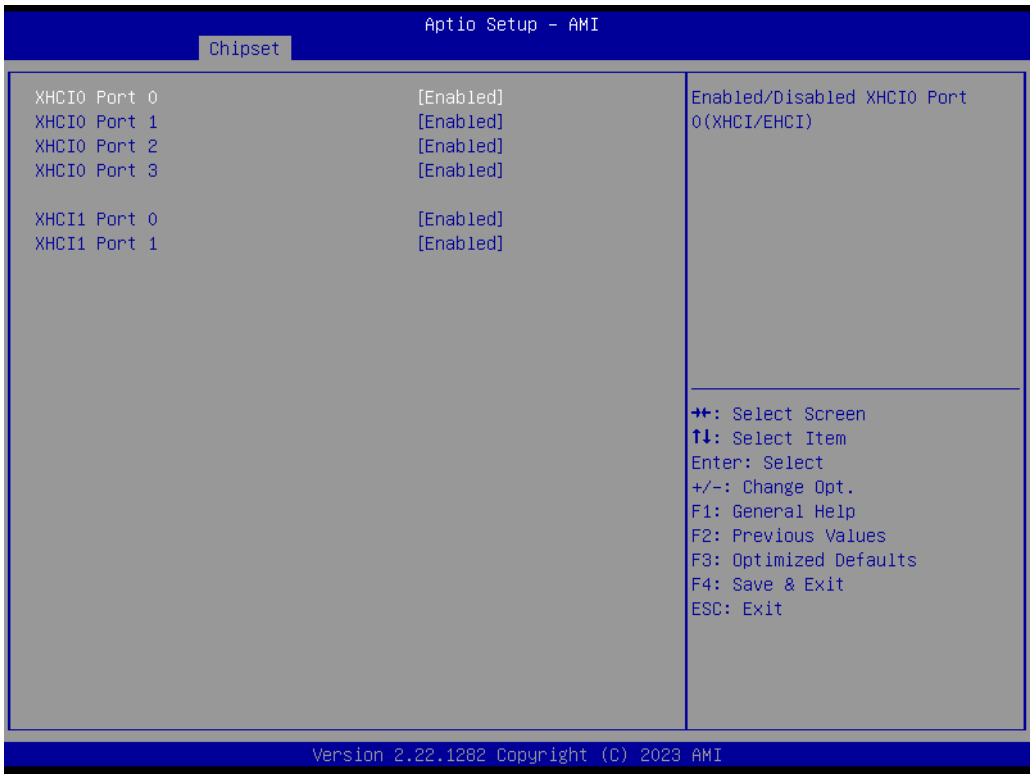
Select the Chipset tab from the MIO-5376 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

4.1.3.1 South Bridge



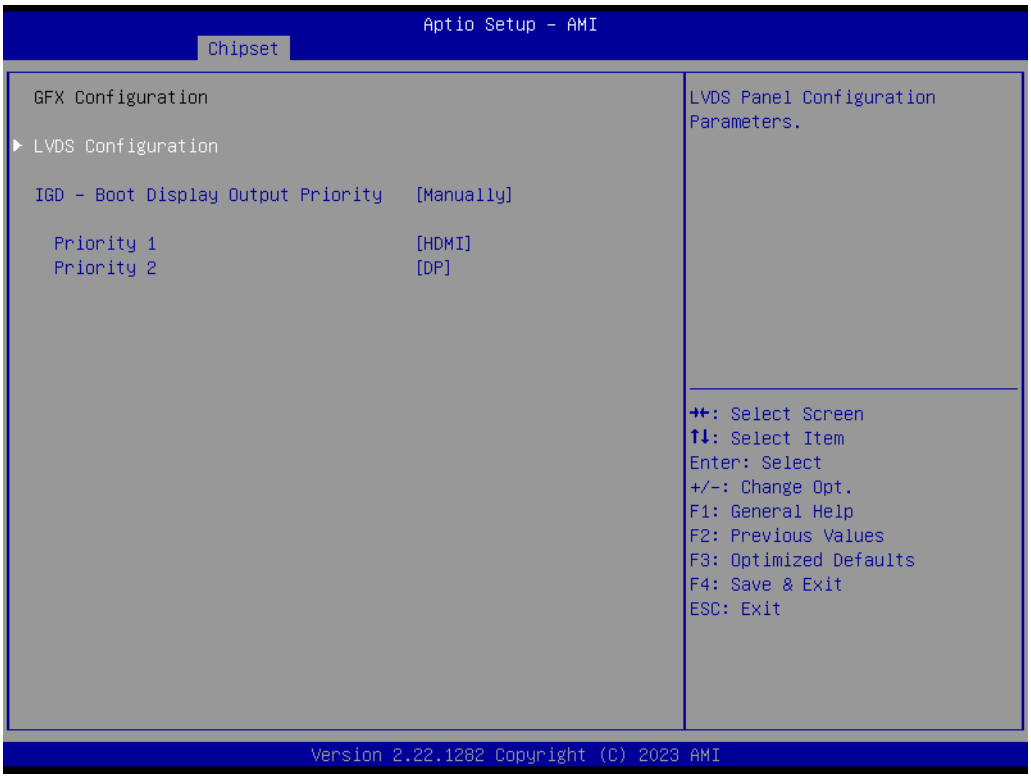
- **SB USB Configuration**
  Options for SB USB Configuration.

SB USB Configuration



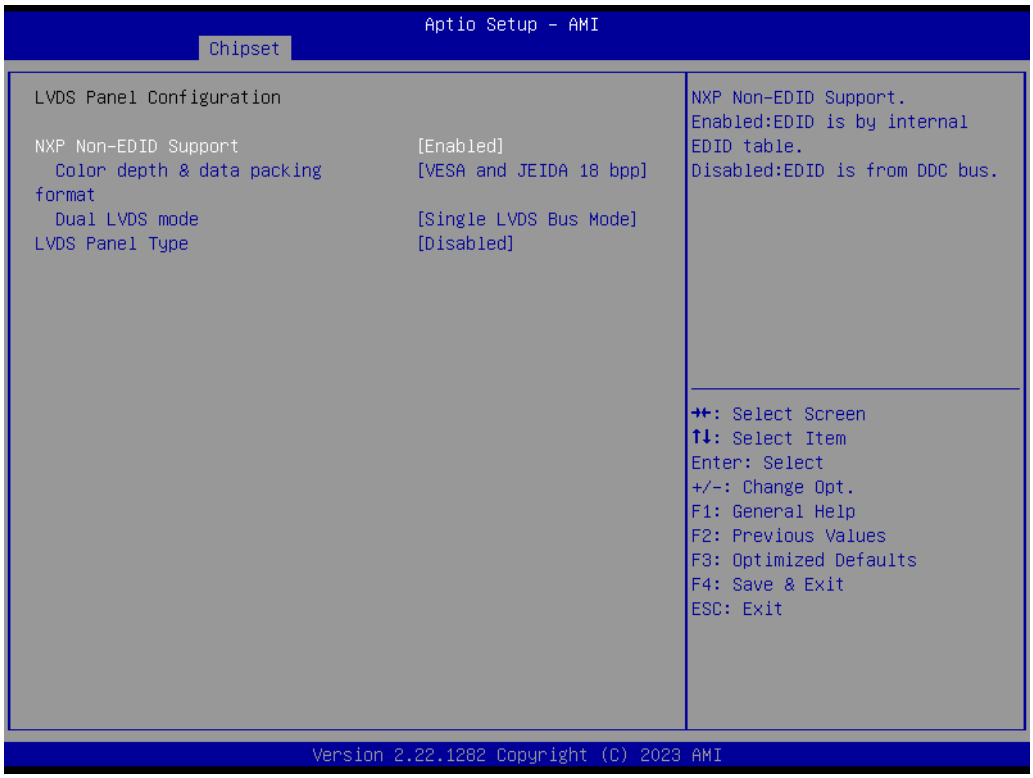
- **XHCI0 Port 0/1/2/3**
  Enable/Disable XHCI0 Port 0/1/2/3.
- **XHCI1 Port 0/1**
  Enable/Disable XHCI1 Port 0/1.

4.1.3.2 GFX Configuration



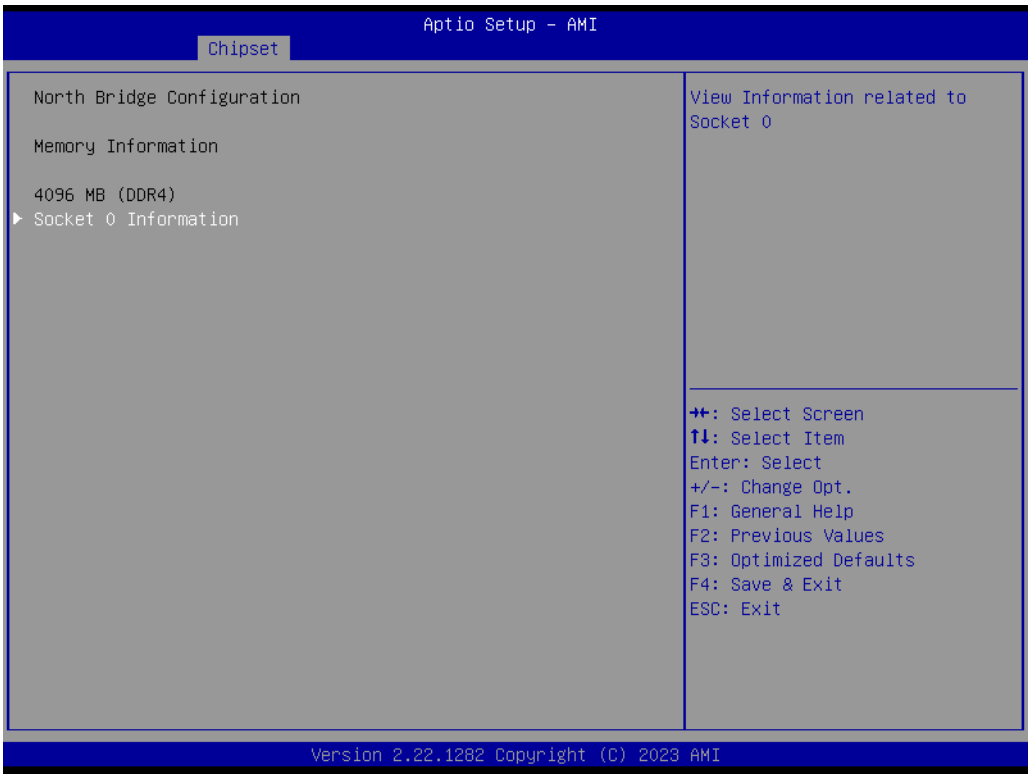
- **LVDS Configuration**
  LVDS Panel Configuration Parameters.
- **IGD – Boot Display Output Priority**
  Select Boot Display Output Priority.
- **Priority 1/2**
  For Multi Connector Display Priority.

LVDS Panel Configuration



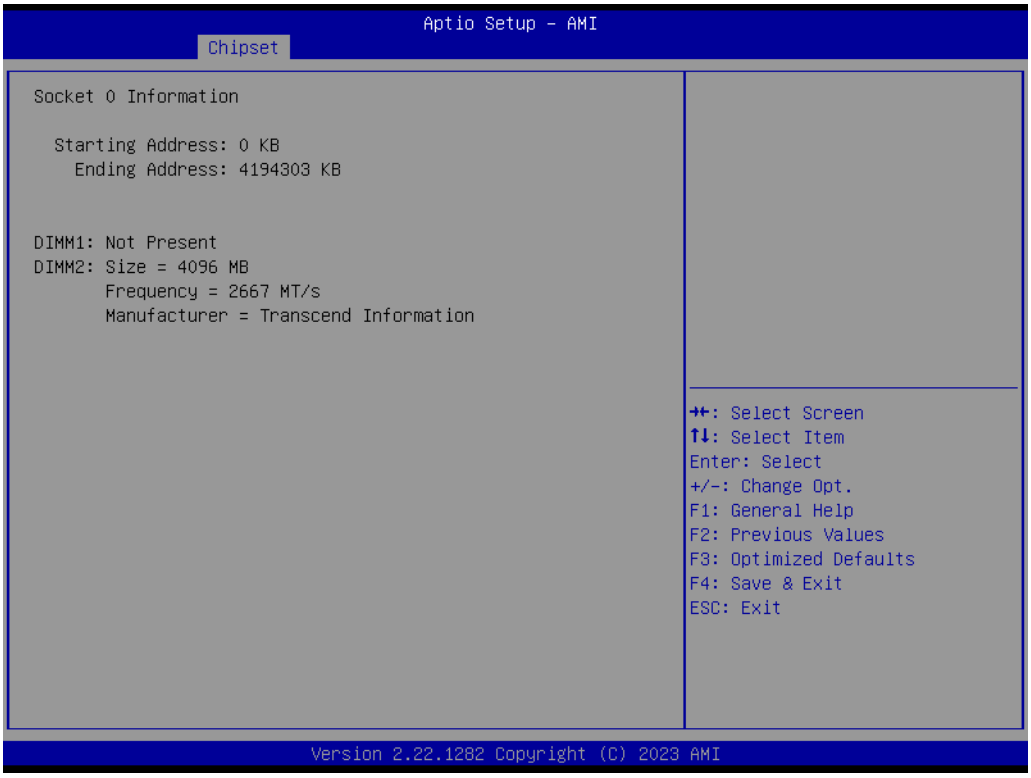
- **NXP Non-EDID Support**
  Non-EDID Support.
- **Color Depth & Data Packing**
  Color depth and data packing format for Non-EDID Support.
- **Dual LVDS Mode**
  Select LVDS bus to Single bus mode or Dual bus mode.
- **LVDS Panel Type**
  This item allows a user to select the LVDS panel resolution type.

4.1.3.3 North Bridge

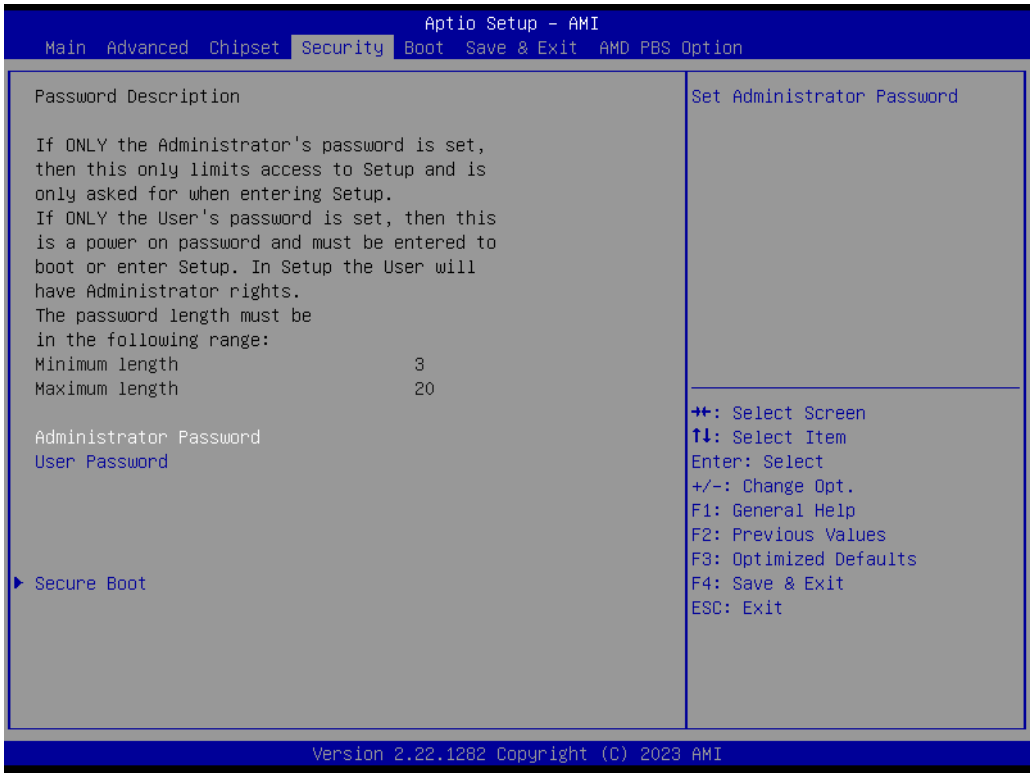


- **Socket 0 Information**
  View information related to Socket 0.

- **Socket 0 Information**



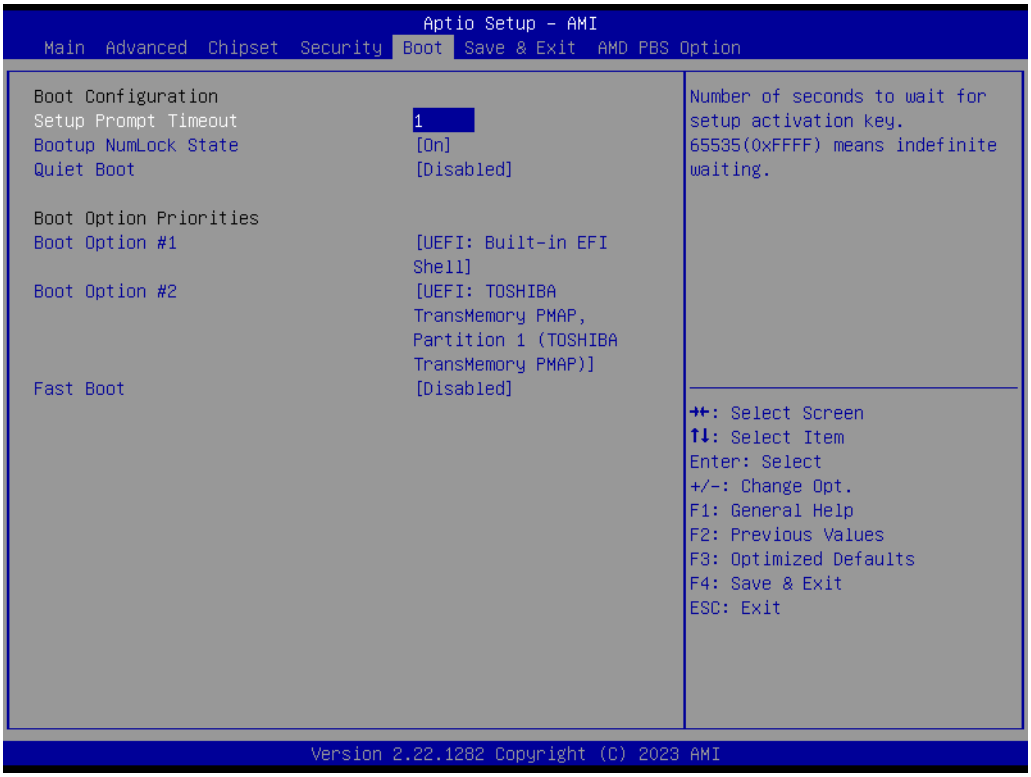
4.1.4 Security



Select Security Setup from the MIO-5376 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the submenu for the following items, select the item and press <Enter>:

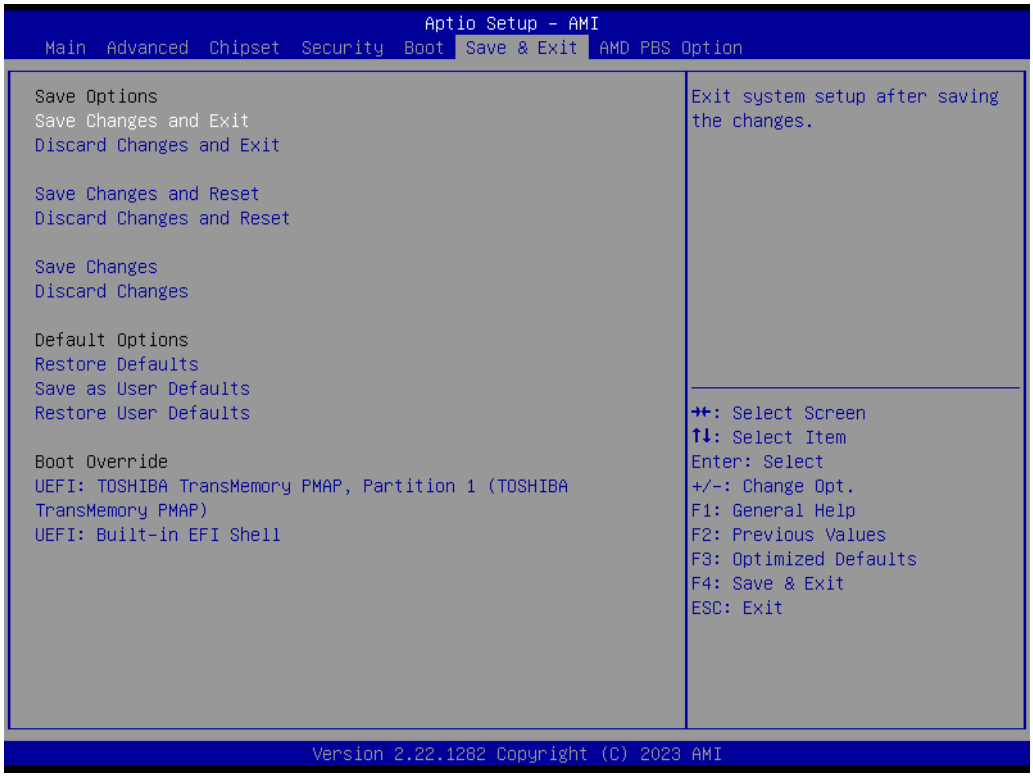
- **Change Administrator/User Password**
  Select this option and press <ENTER> to access the submenu, and then type in the password.
- **Secure Boot**
  Secure Boot Configuration.

4.1.5 Boot



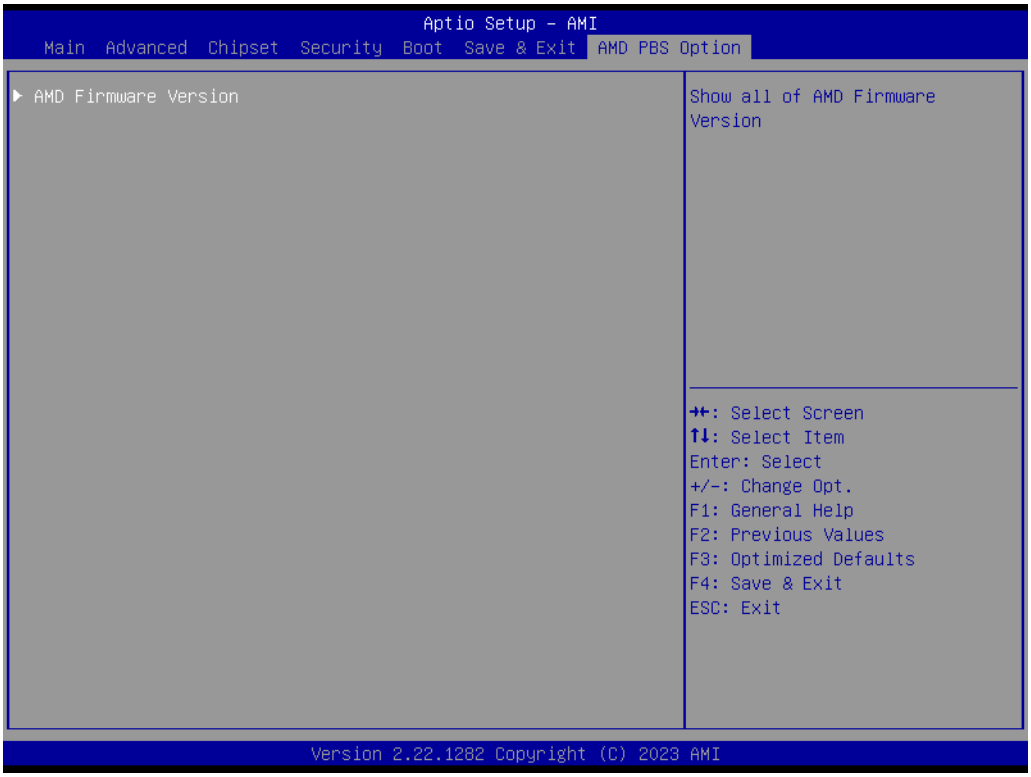
- **Setup Prompt Timeout**
  Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enables or disables the Quiet Boot option.
- **Boot Option #1**
  Sets the system boot order.
- **Fast Boot**
  Enables or disables boot with initialization of a minimal set of devices required to launch the active boot option. It has no effect for BBS boot options.

4.1.6 Save & Exit



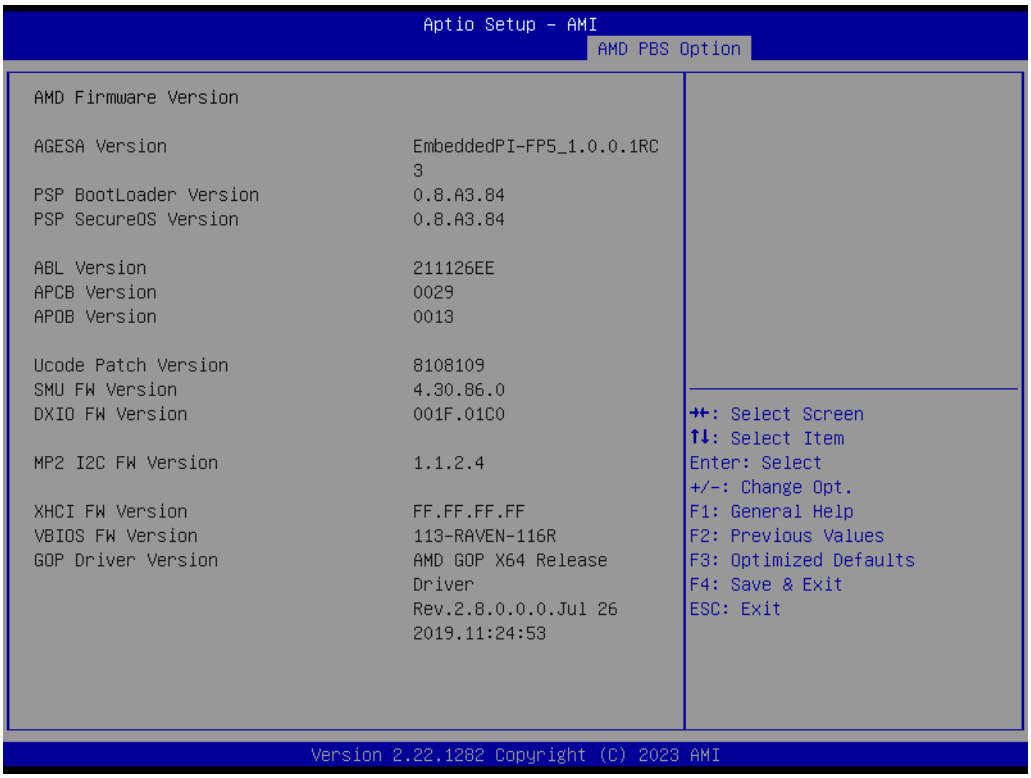
- **Save Changes and Exit**
  This item allows you to exit system setup after saving the changes.
- **Discard Changes and Exit**
  This item allows you to exit system setup without saving any changes.
- **Save Changes and Reset**
  This item allows you to reset the system after saving the changes.
- **Discard Changes and Reset**
  This item allows you to rest system setup without saving any changes.
- **Save Changes**
  This item allows you to save changes done so far to any of the options.
- **Discard Changes**
  This item allows you to discard changes done so far to any of the options.
- **Restore Defaults**
  This item allows you to restore/load default values for all the options.
- **Save as User Defaults**
  This item allows you to save the changes done so far as user defaults.
- **Restore User Defaults**
  This item allows you to restore the user defaults to all the options.
- **Boot Override**
  Boot device select can override your boot priority.

4.1.7 AMD PBS Option



- **AMD Firmware Version**
  Show all AMD Firmware Versions.

4.1.7.1 AMD Firmware Version



Appendix A

System I/O Ports

A.1 System I/O Ports

Addr. Range (Hex)	Device
00h-1Fh	DMA Controller
20h-2Dh	Interrupt Controller
2Eh–2Fh	Motherboard Resources
30h-3Dh	Interrupt Controller
40h-43h	Timer/Counter
4Eh–4Fh	Motherboard Resources
50h-53h	Timer/Counter
60h-6Fh	8042 (Keyboard Controller) / NMI Controller / Microcontroller
70h-7Fh	Real-Time Controller
80h-8Fh	Debug Port/Reserved
90h-9Fh	Debug Port/Reset Generator
A0h-ADh	Interrupt Controller
B0h-B1h	Interrupt Controller
B4h-BDh	Power Management
200h-27Fh	CANBus Controller
280h-28Fh	I2C Controller
290h-29Fh	EC Index Port and Data Port
2A0h-2BFh	GPIO Controller
2C0h-2DFh	SMBus Controller
2F0h-2F7h	EC/PMC Controller
2E8h-2EFh	Communications Port (COM4)
2F8h-2FFh	Communications Port (COM2)
300h-37Fh	CANBus Controller
3E8h-3EFh	Communications Port (COM3)
3F8h-3FFh	Communications Port (COM1)
480h-4CFh	Motherboard Resources
4D0h-4D1h	Interrupt Controller
680h-69Fh	Motherboard Resources
A00h-AFFh	Motherboard Resources
164Eh-164Fh	Motherboard Resources
1800h-18FFh	Motherboard Resources
CF9h-CF9h	Reset Generator

A.2 DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Available
3	Available
4	Direct memory access controller
5	Available
6	Available
7	Available

A.3 1st MB Memory Map

Addr. Range (Hex)	Device
E0000h - FFFFFh	System Board
D0000h - DFFFFh	PCI Bus
C0000h - CFFFFh	System Board
A0000h - BFFFFh	PCI Bus
A0000h - BFFFFh	Intel® HD Graphics
00000h - 9FFFFh	System Board

A.4 Interrupt Assignments

Interrupt#	Interrupt source
NMI	Parity error detected
IRQ0	System timer
IRQ1	Using SERIRQ, keyboard emulation
IRQ2	Interrupt from controller 2 (cascade)
IRQ3	Communications port (COM2)
IRQ4	Communications port (COM1)
IRQ5	Communications port (COM3)
IRQ6	CANBus controller
IRQ7	Available
IRQ8	System CMOS / real time clock
IRQ9	Microsoft ACPI-compliant system
IRQ10	Communications port (COM4)
IRQ11	Display controller
IRQ12	Available
IRQ13	Numeric data processor
IRQ14	GPIO controller
IRQ15	Reserved

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