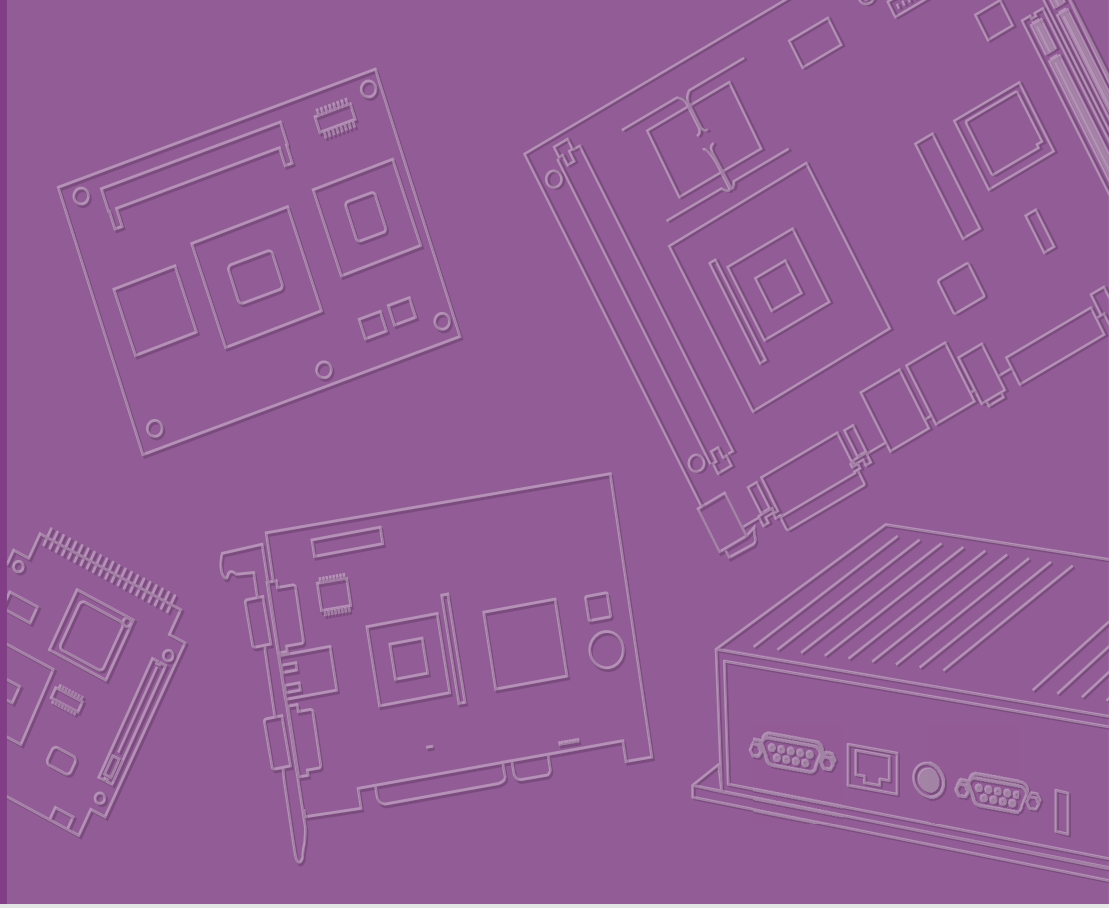

User Manual

MIO-5377

12th Gen Intel® Core™ i7/i5/i3/ Celeron® Series 3.5" SBC

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 the MIO-5377.

Part No. 2006537700 Edition 1

January 2023

Product Warranty (2 Years)

Advantech warrants to you, 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 which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which 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 of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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 on-screen messages you get 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 an return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by 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 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 help.

FM

This equipment has passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. This equipment is compliant with the specifications of Class I, Division 2, Groups A, B, C and D indoor hazards.

Technical Support and Assistance

1. Visit the Advantech website at http://support.advantech.com where you can find the latest information about the product.
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 you call:
   - 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 setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x MIO-5377 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 Audio Cable 20 cm (p/n: 1700019584-01)
- 2 x COM RS-232/422/485 Cable 20 cm (p/n: 1700030404-01)
- 2 x COM RS-232 Cable 20 cm (p/n: 1700031582-01)
- 1 x Cooler (Heatsink) (p/n: 1970005512T001 (1970005548T001))
- 1 x Startup manual (p/n: 2046537700)
- 1 x Screw kit (3 x screws for M.2 device & 4 x screws and stand-off for Heatsink/ Cooler)
- 1 x DeviceOn Package

Optional Accessories

1 x MIO-5377 Heat spreader (p/n: 1970005615T001)

Contents

Chapter 1

General Information

1.1 Introduction

MIO-5377 is powered by 12th Gen Intel® Core™ P/U series processors and offers Advantech embedded iManager 3.0, SUSI 4.0 and WISE-PaaS/DeviceOn. These SW solutions help monitor and control system operation effectively and remotely.

MIO-5377 adopts the latest hybrid core design processor to engender improvements in CPU processing, graphics, security and I/O flexibility.

1.2 Specifications

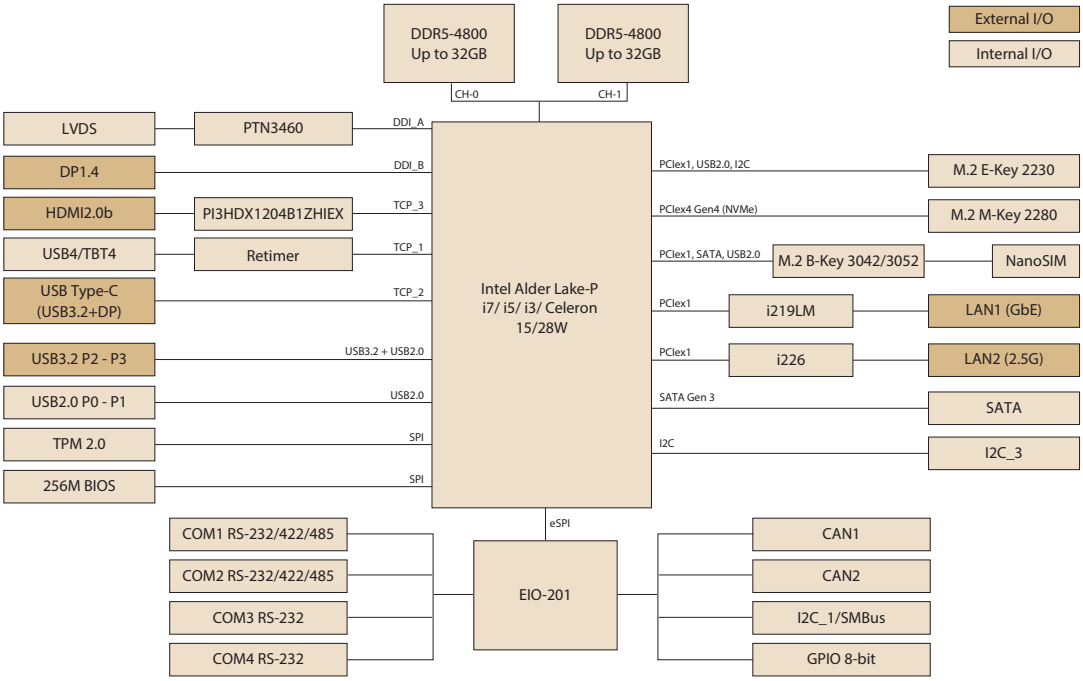
Platform	Processor	i7-1270PE	i7-1265UE	i5-1245UE	i3-1215UE	7305E
	Max. Frequency	4.5GHz	4.7GHz	4.4GHz	4.4GHz	N/A
	Base Frequency	1.8GHz	1.7GHz	1.5GHz	1.2GHz	1.0GHz
	Core/Thread	4P+8E/16T	2P+8E/12T	2P+8E/12T	2P+4E/8T	1P+4E/6T
	LLC	18MB	12MB	12MB	10MB	8MB
	CPU TDP	28W	15W	15W	15W	15W
	Chipset	On-package Intel 600 Series Chipset				
	BIOS	AMI EFI 256Mbit				
Memory	Technology	DDR5-4800				
	Max. Capacity	Up to 64GB				
	Channel/Socket	Dual Channels / 2 Sockets				
Graphics	Controller	Intel® Iris® Xe Graphics				
	Max. Frequency	1.35GHz	1.25GHz	1.2GHz	1.1GHz	1.1GHz
	Execution Unit	96	96	80	64	48
	3D/HW Acceleration	DX12, OGL4.0, OCL1.2, HW Encode: H.265/HEVC, H.264, MPEG2, HW Decode: H.265				
Display I/F	LCD	1 x LVDS: Dual Channel 18/24-bit, up to 1920 x 1200				
	HDMI/DP	1 x HDMI 2.0b, up to 4096 x 2160 x 24bpp@60Hz 1 x DP1.4a, up to 4096 x 2304 x 36bpp@60Hz				
	Multiple Display	4 simultaneous displays via LVDS + HDMI + DP + USB Type-C Alt. Mode				
Ethernet	Controller	LAN1: Intel i219LM, LAN2: Intel i226				
	Speed	LAN1: GbE; LAN2: 2.5GbE				
External I/O	Ethernet	2 x RJ-45				
	HDMI/DP	1/1				
	USB Type-C	1 x USB 3.2 Gen2, support DisplayPort1.4a Alt. Mode				
	USB 3.2	4 x USB 3.2 Gen2 x1 10Gbps				
	LED	Power status, SATA R/W				
	Power DC-Jack	Optional				

Internal I/O	SATA	1 x SATA Gen3 6.0Gbps
	USB4 (TBT4)	1 x (Type-C)
	USB 2.0	2 x
	COM Port	2 x RS-232/422/485, 2 x RS-232 (4-wire), max. 1Mbps
	CANBus	2 x CAN2.0
	Serial Bus	3 x I2C 1Mbps (default), 1 x SMBus* (optional to I2C1)
	Audio	Realtek ALC888s, Line-in/Line-out/MIC
	GPIO	8-bit general purpose input output I/O
	Invertor	12V/5V/3.3V selectable
	Fan	12V, 1A (4-wire)
	Front Panel Control	Power-on, Reset, Buzzer, SATA LED, CaseOpen
Board Feature	Watchdog Timer	65536 level, 0~65535 sec
	TPM	TPM2.0
	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 (PCIex1, USB2.0)
	M.2 B-Key	1 x B-Key 3042 LTE/3052 5G** w/ Nano SIM, B-Key default 3042 length
	M.2 M-Key	1 x M-Key 2280 (PCIex4 Gen.4 NVMe)
Power	Supply Voltage	Vin: DC 12V~24V +/- 10%; RTC Battery: Lithium 3V/210mAH
	Connector	ATX 2x2 pin 90D, optional DC-Jack or ATX 2x2 pin 180D
	Power Management	AT, ATX
Environment	Temperature	Operating: Standard: 0 ~ 60 °C (32 ~ 140 °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 in)

* Support by request

** 5G module test with Fibocom FM350 (MediaTek)

1.3 Block Diagram



Chapter 2

Mechanical Specifications

2.1 Introduction

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

2.2 Board Layout: Dimensions

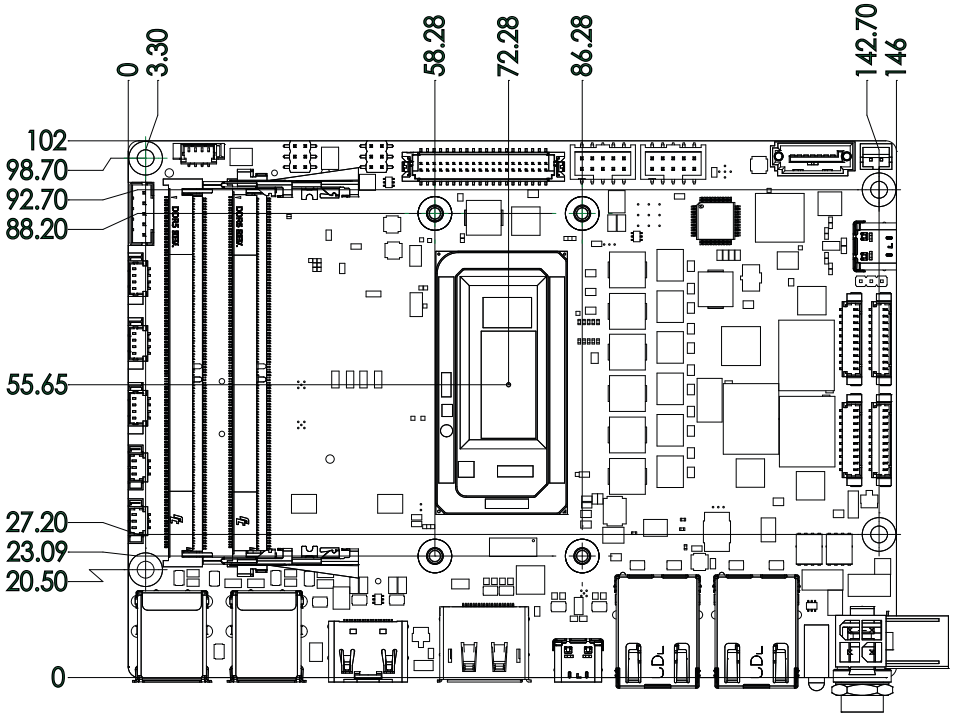


Figure 2.1 MIO-5377 Mechanical Diagram (Top Side)

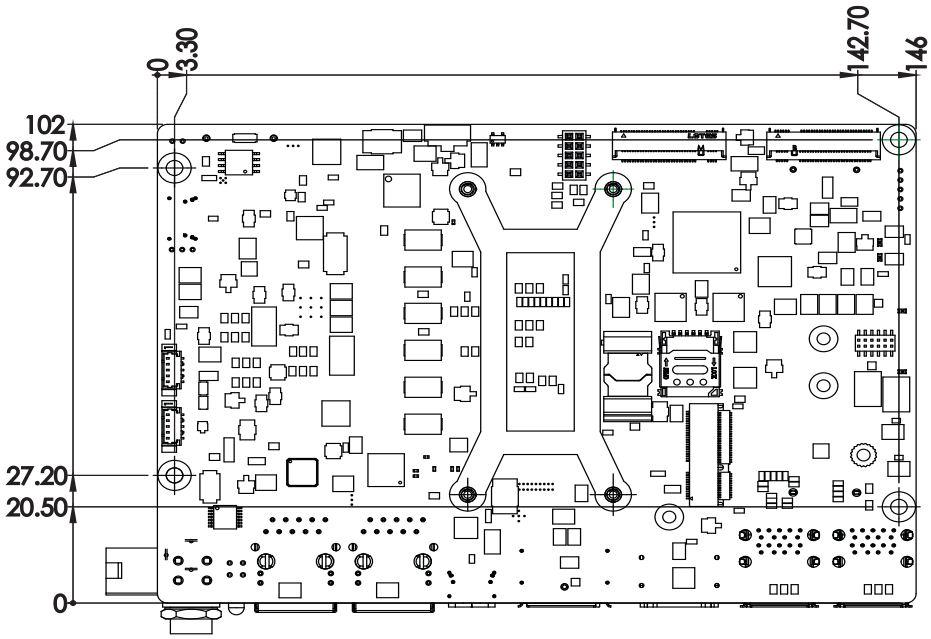


Figure 2.2 MIO-5377 Mechanical Diagram (Bottom Side)

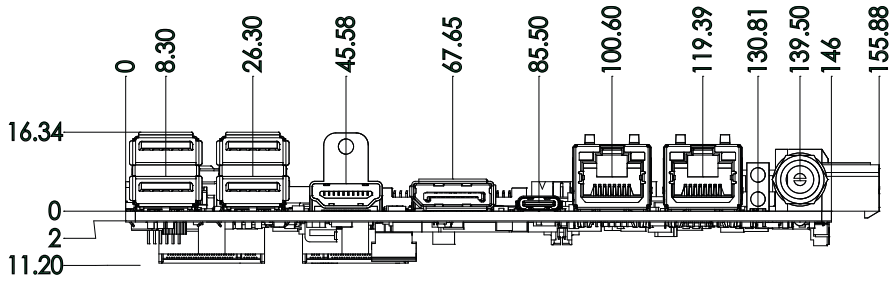


Figure 2.3 MIO-5377 Mechanical Diagram (Coastline)

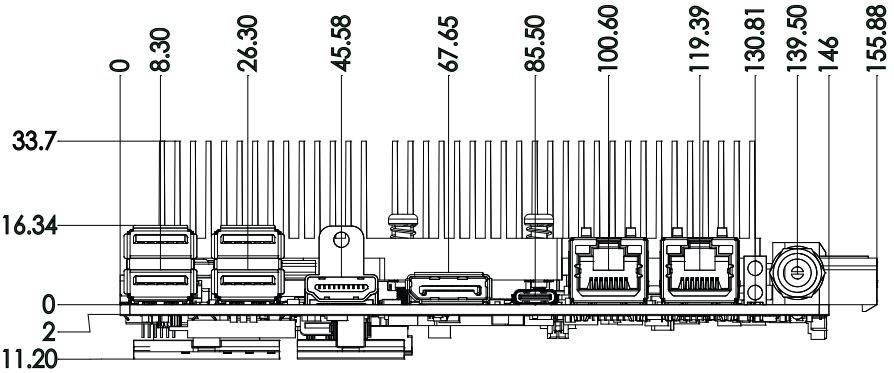


Figure 2.4 MIO-5377 Mechanical Diagram (with Heatsink)

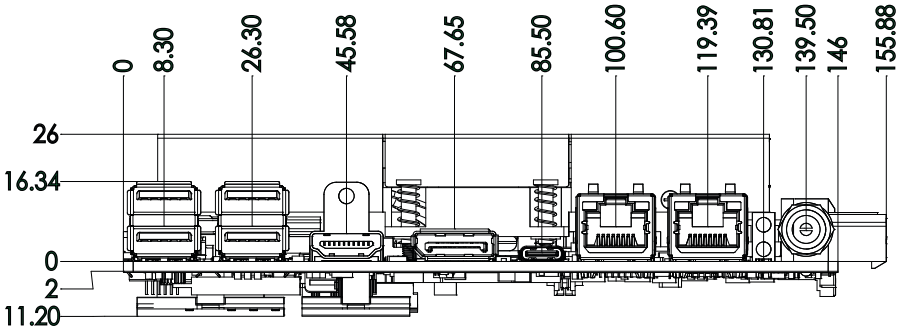


Figure 2.5 MIO-5377 Mechanical Diagram (with Cooler)

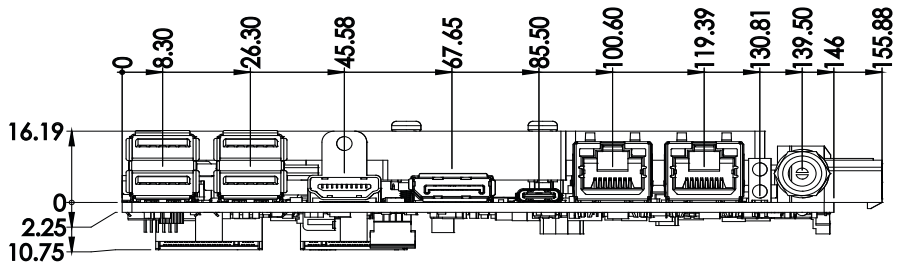


Figure 2.6 MIO-5377 Mechanical Diagram (with Heatspreader)

2.3 Quick Installation Guide

This section introduces the installation of the heatsink found inside a white box inside the package. Please assemble it by following the diagram below. Remember to remove the plastic from thermal pad before assembly.

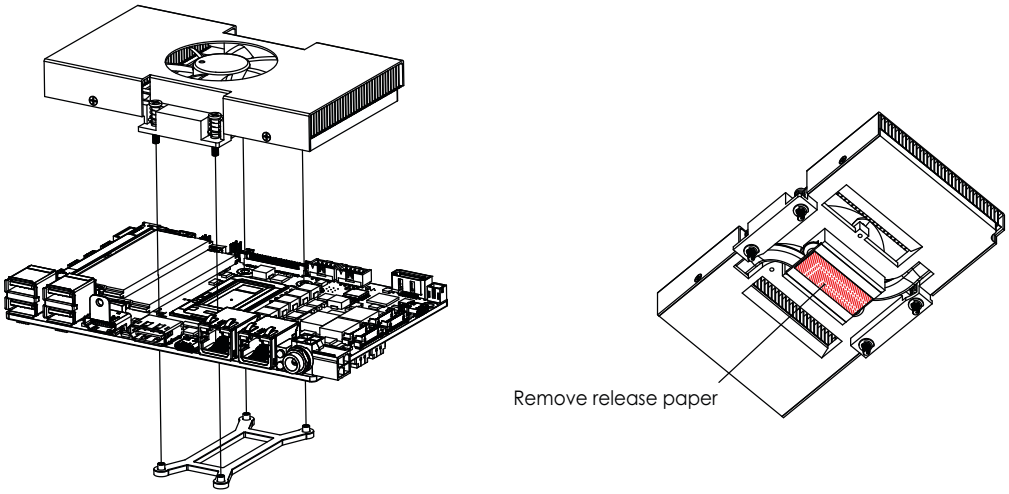


Figure 2.7 MIO-5377 Cooler Installation

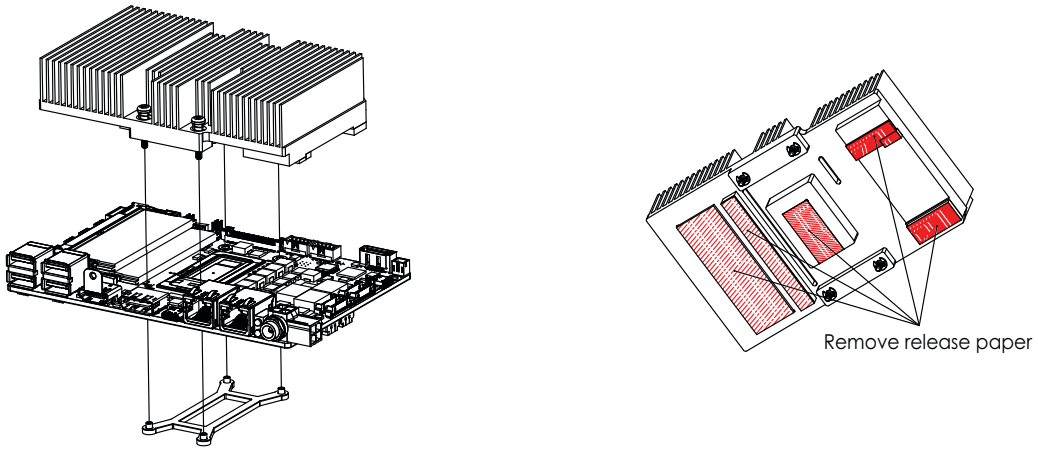


Figure 2.8 MIO-5377 Heatsink Installation

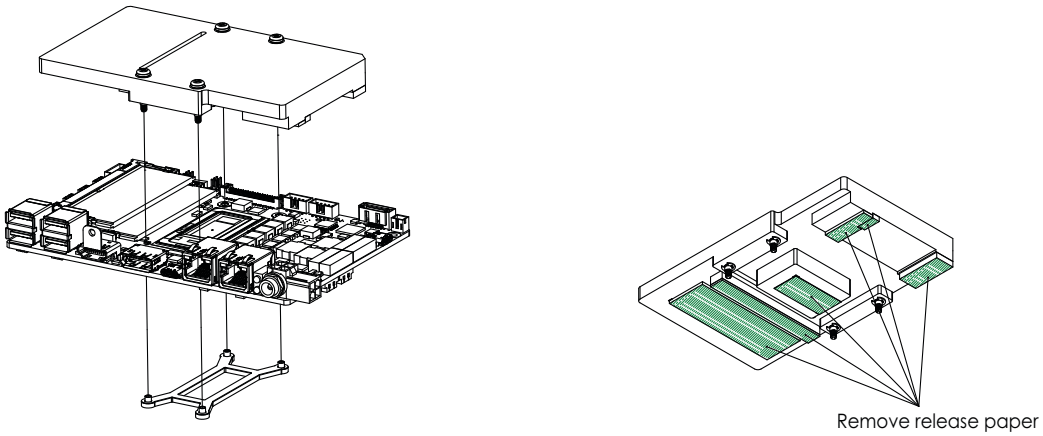


Figure 2.9 MIO-5377 Heatspreader Installation

Chapter 3

Jumpers and Connectors

3.1 Jumpers

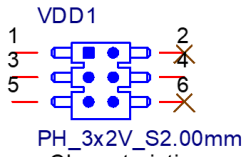


Table 3.1: Panel Voltage Selection Jumper: VDD1

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

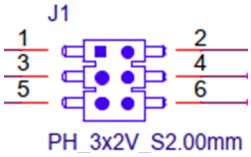


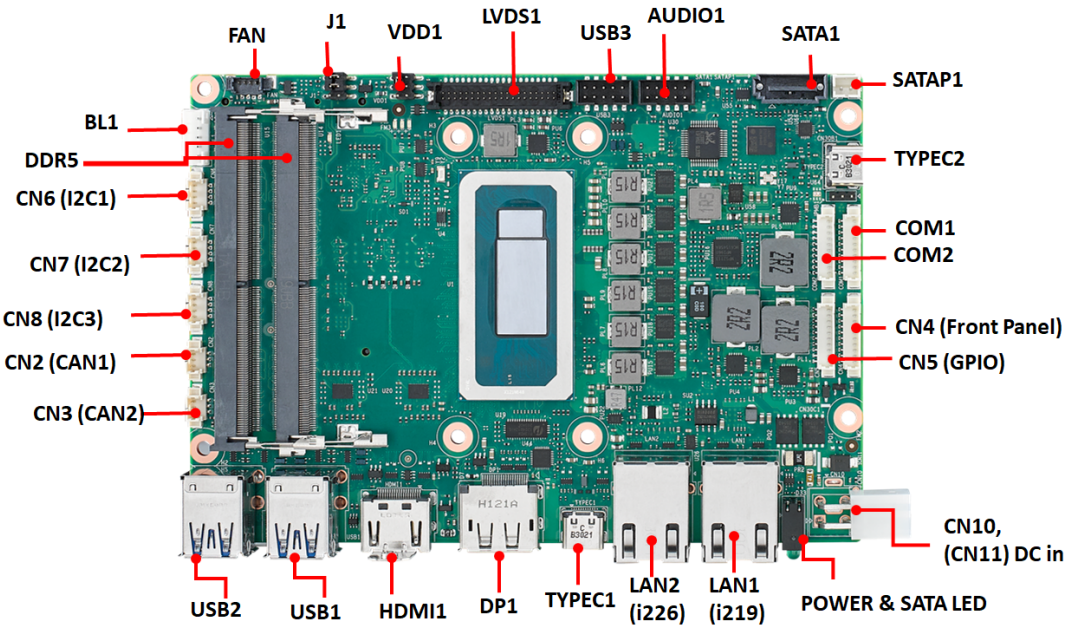
Table 3.2: AT mode /Load BIOS default: J1

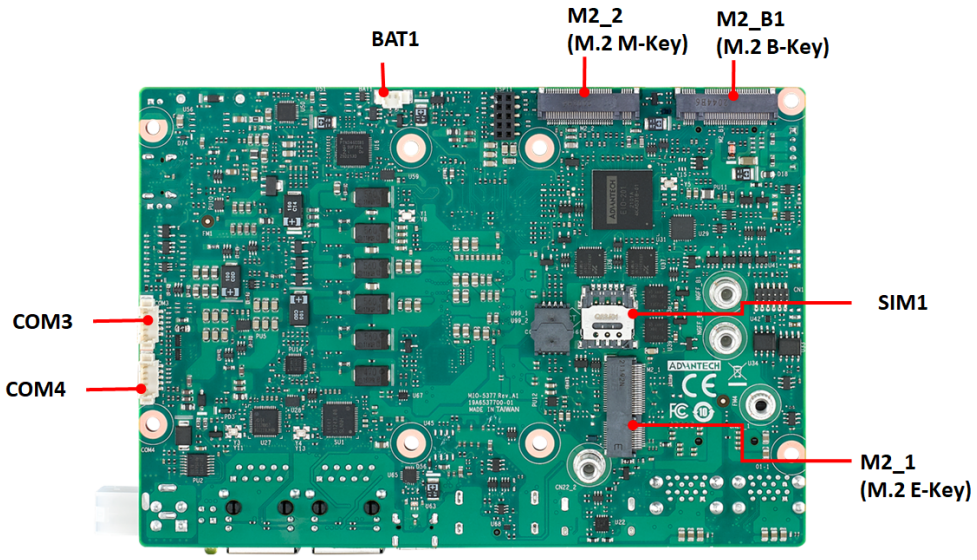
Jumper Short	Panel Functional
1-2	AT/ ATX MODE Selection 1-2 open: ATX mode 1-2 short: AT mode*
3-4	NORMAL_BIOS (Default) 3-4 open: Reserve 3-4 short: Reserve*
5-6	LOAD_BIOS_Default: 5-6 open: Noraml* 5-6 short: Load BIOS Default

3.2 Connectors

1	CN10	DC Power Input Connector(90D)
2	CN10_1	DC Power Input Connector(180D)
3	CN11	DC Jack
4	D33	Power & SATA LED
5	LAN1	I219 RJ45 LAN Ports
6	LAN2	I226 RJ45 LAN Ports
7	TYPEC1	TypeC Port (USB3.2/DP)
8	DP1	Display Port Connector
9	HDMI1	HDMI Connector
10	USB1	USB3.2 Connector
11	USB2	USB3.2 Connector
12	CN3	CAN Bus Port 1
13	CN2	CAN Bus Port 0
14	CN8	SOC_I2C Port1
15	CN7	SOC_I2C Port0
16	CN6	EC_I2C Port
17	BL1	Panel Inverter Connector
18	FAN	Smart FAN
19	J1	AT mode /Load BIOS default
20	VDD1	Panel Voltage Selection Jumper
21	LVDS1	LVDS Connector
22	USB3	USB2.0 Internal Connector
23	AUDIO1	Audio Internal Connector
24	SATA1	SATA Connector
25	SATAP1	SATA Power Connector
26	TYPEC2	TypeC Port (TBT4)
27	COM1	COM Port Internal Connector 1
28	CN4	Front Panel Internal Connector
29	COM2	COM Port Internal Connector 2
30	CN5	GPIO Internal Connector
31	U14	DDR5 SO-DIMM 5.2mm
32	U15	DDR5 SO-DIMM 9.2mm
33	M2_1	M.2 Key-E Connector
34	COM4	COM Port Internal Connector 4
35	COM3	COM Port Internal Connector 3
36	BAT1	RTC battery Connector
37	M2_2	M.2 Key-M Connector
38	M2_B1	M.2 Key-B Connector
39	SIM1	NANO SIM SLOT

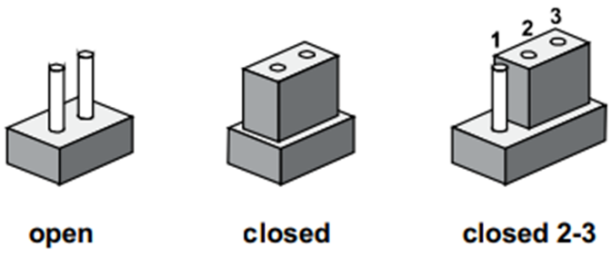
3.3 Locating Connectors





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.

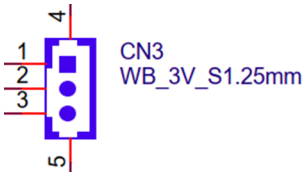


Table 3.3: CANBus Internal Connector: CN3	
PN	**1654903500**
Vendor/ MPN	**Aces/85205-03001**
Pin	**Signal Pin Definition**
1	CAN1_D+
2	CAN1_D-
3	GND

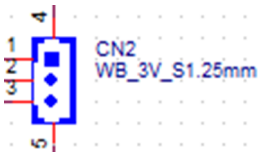


Table 3.4: CANBus Internal Connector: CN2	
PN	**1654903500**
Vendor/ MPN	**Aces/85205-03001**
Pin	**Signal Pin Definition**
1	CAN0_D+
2	CAN0_D-
3	GND

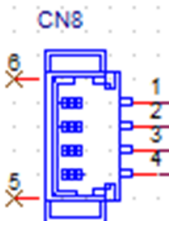


Table 3.5: I2C Internal Connector: CN8	
PN	**1655904020**
Vendor/ MPN	**Aces/85205-04001**
Pin	**Signal Pin Definition**
1	GND
2	SOC_I2C1_z_DAT
3	SOC_I2C1_z_CLK
4	+V33_I2CCONN1

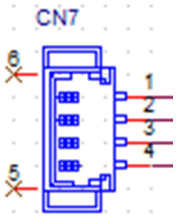


Table 3.6: I2C Internal Connector: CN7	
PN	**1655904020**
Vendor/ MPN	**Aces/85205-04001**
Pin	**Signal Pin Definition**
1	GND
2	SOC_I2C0_z_DAT
3	SOC_I2C0_z_CLK
4	+V33_I2CCONN0

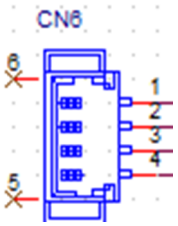


Table 3.7: I2C Internal Connector: CN6	
PN	**1655904020**
Vendor/ MPN	**Aces/85205-04001**
Pin	**Signal Pin Definition**
1	GND
2	EC_I2C0_z_DAT
3	EC_I2C0_z_CLK
4	+V33_I2CCONN

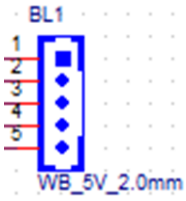


Table 3.8: Panel Inverter Connector: BL1	
PN	**1653007388-01**
Vendor/ MPN	**Pinrex/ 721-81-05TWR0**
Pin	**Signal Pin Definition**
1	+V12_1_INVERTER_0
2	GND
3	LVDS1_z_ENABKL
4	EC_LVDS1_z_PWM
5	+V5_1_INVERTER_0

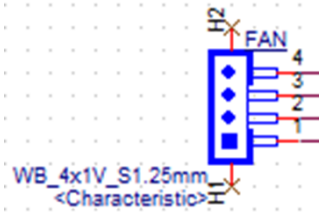


Table 3.9: Smart FAN Internal Connector: FAN	
PN	**1653008788-01**
Vendor/ MPN	**Aces/ 50273-00401-001**
Pin	**Signal Pin Definition**
1	GND
2	+V12
3	FAN_SPEED
4	FAN_V5_PWM

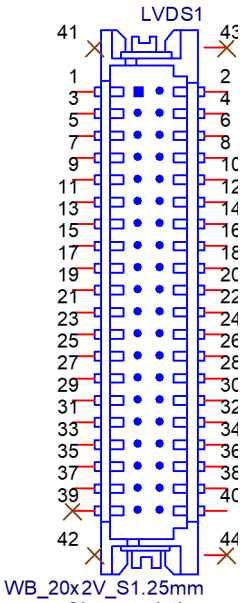


Table 3.10: LVDS Connector: LVDS1	
PN	**1653008443-01**
Vendor/ MPN	**Hirose/DF13E-40DP-1.25V(52)**
Pin	**Signal Pin Definition**
1	+V_LCD
2	+V_LCD
3	GND
4	GND
5	+V_LCD
6	+V_LCD
7	LVDS1_0_D0-
8	LVDS1_1_D0-
9	LVDS1_0_D0+
10	LVDS1_1_D0+
11	GND
12	GND
13	LVDS1_0_D1-
14	LVDS1_1_D1-
15	LVDS1_0_D1+
16	LVDS1_1_D1+
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

Table 3.10: LVDS Connector: LVDS1	
44	NC

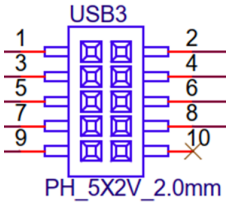


Table 3.11: USB 2.0 Dual-Ports Internal Connector: USB 3	
PN	**1653008214-01**
Vendor/ MPN	**Pinrex/ 52C-90-10GBE0**
Pin	**Signal Pin Definition**
1	+V5SB_USB_UTC
2	+V5SB_USB_UTC
3	USB8_z_P-
4	USB9_z_P-
5	USB8_z_P+
6	USB9_z_P+
7	GND
8	GND
9	GND
10	NC

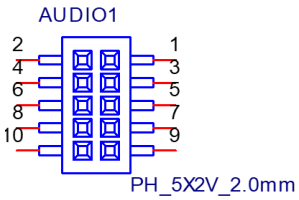


Table 3.12: Audio Internal Connector: AUDIO1	
PN	**1653008214-01**
Vendor/ MPN	**Pinrex/ 52C-90-10GBE0**
Pin	**Signal Pin Definition**
1	LOUTR
2	LINR
3	AUD_CONN_GND
4	AUD_CONN_GND
5	LOUTL
6	LINL
7	AUD_CONN_GND
8	FRONT_JD
9	MIC1R
10	MIC1L

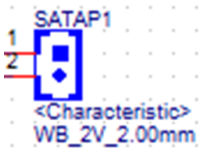


Table 3.13: SATA Power Connector: SATA_P1	
PN	**1653007538-01**
Vendor/ MPN	**Pinrex/ 721-81-02TW00**
Pin	**Signal Pin Definition**
1	+V5SATA0
2	GND

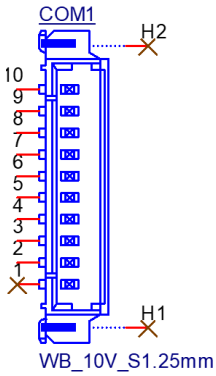


Table 3.14: COM-Port Internal Connector 1: COM1	
PN	**1653007728-02**
Vendor/ MPN	**Aces/ 50273-0107N-002**
Pin	**Signal Pin Definition**
1	NC
2	COM1_RI#
3	COM1_DTR#
4	COM1_CTS#
5	COM1_TXD
6	COM1_RTS#
7	COM1_RXD
8	COM1_DSR#
9	COM1_DCD#
10	GND

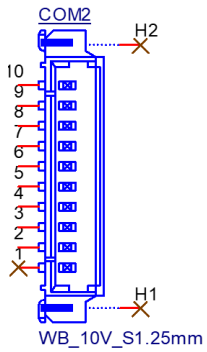


Table 3.15: COM-Port Internal Connector 2: COM2	
PN	**1653007728-02**
Vendor/ MPN	**Aces/ 50273-0107N-002**
Pin	**Signal Pin Definition**
1	NC
2	COM2_RI#
3	COM2_DTR#
4	COM2_CTS#
5	COM2_TXD
6	COM2_RTS#
7	COM2_RXD
8	COM2_DSR#
9	COM2_DCD#
10	GND

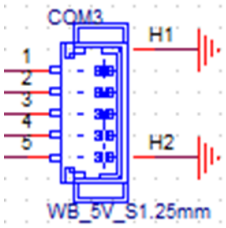


Table 3.16: COM-Port Internal Connector 3: COM3	
PN	**1655004032**
Vendor/ MPN	**Aces/ 85205-05701**
Pin	**Signal Pin Definition**
1	COM3_TXD
2	COM3_RTS#
3	COM3_RXD
4	COM3_CTS#
5	GND

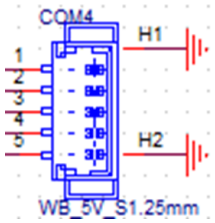


Table 3.17: COM-Port Internal Connector 4: COM4	
PN	**1655004032**
Vendor/ MPN	**Aces/ 85205-05701**
Pin	**Signal Pin Definition**
1	COM4_TXD
2	COM4_RTS#
3	COM4_RXD
4	COM4_CTS#
5	GND

Table 3.18: Front Panel Internal Connector: CN4	
PN	**1653007728-02**
Vendor/ MPN	**Aces/ 50273-0107N-002**
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

Table 3.19: GPIO Internal Connector: CN5	
PN	**1653007728-02**
Vendor/ MPN	**Aces/ 50273-0107N-002**
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

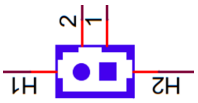


Table 3.20: RTC battery Connector: BAT1	
Pin	**Signal Pin Definition**
1	GND
2	+VBAT_a1

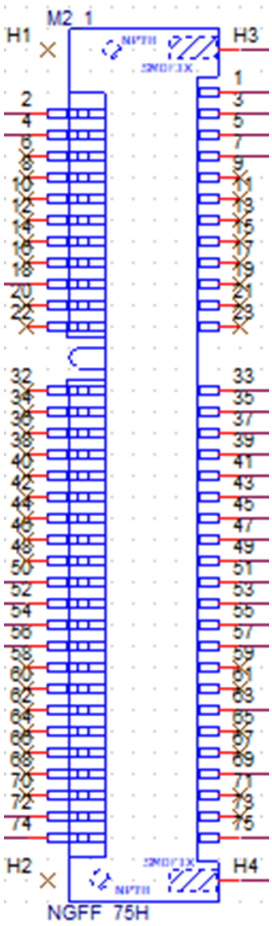


Table 3.21: M.2 Key-E Connector: M2_1

Pin	Signal Pin Definition
1	GND
2	+V3.3SB_M.2_E
3	USB6_z_P+
4	+V3.3SB_M.2_E
5	USB6_z_P-
6	NC
7	GND
8	NC
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC
17	NC
18	GND
19	NC
20	NC
21	NC
22	NC

Table 3.21: M.2 Key-E Connector: M2_1	
23	NC
32	NC
33	GND
34	NC
35	PCIE_M2_z_TX7+
36	NC
37	PCIE_M2_z_TX7-
38	NC
39	GND
40	NC
41	PCIE_M2_RX11+
42	NC
43	PCIE_M2_RX11-
44	NC
45	GND
46	NC
47	CLK_M2E_z_PCIE+
48	NC
49	CLK_M2E_z_PCIE-
50	SUSCLK_z_EKEY
51	GND
52	PLTRST_BUFFER#
53	PCIE_a_CLKREQ2#
54	BT_DISABLE#
55	PCIE_WAKE#
56	WIFI_DISABLE#
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	+V3.3SB_M.2_E
73	NC
74	+V3.3SB_M.2_E
75	GND
H1	NC
H2	NC

Table 3.21: M.2 Key-E Connector: M2_1	
H3	GND
H4	GND

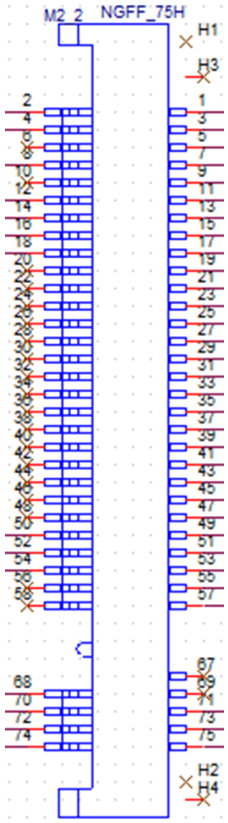


Table 3.22: M.2 Key-M Connector: M2_2	
Pin	**Signal Pin Definition**
1	GND
2	+V3.3_M.2
3	GND
4	+V3.3_M.2
5	PCIE4_KEY-M_RX3-
6	NC
7	PCIE4_KEY-M_RX3+
8	M.2_PLN#
9	GND
10	NC
11	PCIE4_KEY-M_a_TX3-
12	+V3.3_M.2
13	PCIE4_KEY-M_a_TX3+
14	+V3.3_M.2
15	GND
16	+V3.3_M.2
17	PCIE4_KEY-M_RX2-
18	+V3.3_M.2
19	PCIE4_KEY-M_RX2+
20	NC
21	GND

Table 3.22: M.2 Key-M Connector: M2_2	
22	NC
23	PCIE4_KEY-M_a_TX2-
24	NC
25	PCIE4_KEY-M_a_TX2+
26	NC
27	GND
28	NC
29	PCIE4_KEY-M_RX1-
30	NC
31	PCIE4_KEY-M_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	NC
41	PCIE4_KEY-M_RX0-
42	NC
43	PCIE4_KEY-M_RX0+
44	NC
45	GND
46	NC
47	PCIE4_KEY-M_a_TX0-
48	NC
49	PCIE4_KEY-M_a_TX0+
50	PLTRST_MKEY_BUFFER#
51	GND
52	CLK2_M2MB_a_PCIE_REQ#
53	CK_100M_a_MKEY_N
54	M.2_PCIE_WAKE#
55	CK_100M_a_MKEY_P
56	NC
57	GND
58	NC
67	NC
68	PCH_SUSCLK_R_MKEY
69	NC
70	+V3.3_M.2
71	GND
72	+V3.3_M.2
73	GND
74	+V3.3_M.2
75	GND
H1	NC

Table 3.22: M.2 Key-M Connector: M2_2	
H2	NC
H3	NC
H4	NC

Table 3.23: M.2 Key-B Connector: M2_B1	
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	M2B1_WAKE_ON_WWAN#
24	M2B1_ANT_TUNER
25	M2B1_DPR
26	M2B1_W_DISABLE2#

Table 3.23: M.2 Key-B Connector: M2_B1	
27	GND
28	NC
29	NC
30	M2B1_UIM_RESET
31	NC
32	M2B1_UIM_CLK
33	GND
34	M2B1_UIM_DATA
35	NC
36	M2B1_UIM_PWR
37	NC
38	NC
39	GND
40	NC
41	M2B1_PCIE_RX-
42	NC
43	M2B1_PCIE_RX+
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	M2_SATA1B_PEDET
70	+V3.3A_M.2_B
71	GND
72	+V3.3A_M.2_B
73	GND

Table 3.23: M.2 Key-B Connector: M2_B1	
74	+V3.3A_M.2_B
75	M2B1_CFG2
H1	NC
H2	NC
H3	GND
H4	GND

Chapter 4

AMI BIOS Setup

AMIBIOS has been integrated into motherboards for decades. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the MIO-5377 BIOS setup screens.

AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the Setup information when the power is turned off.

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 the 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.

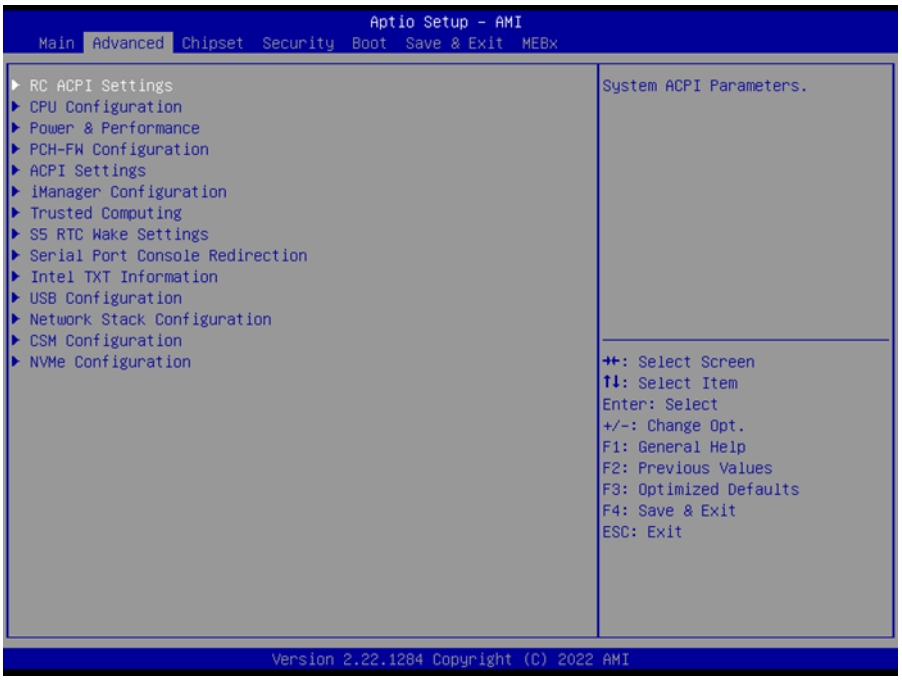
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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.

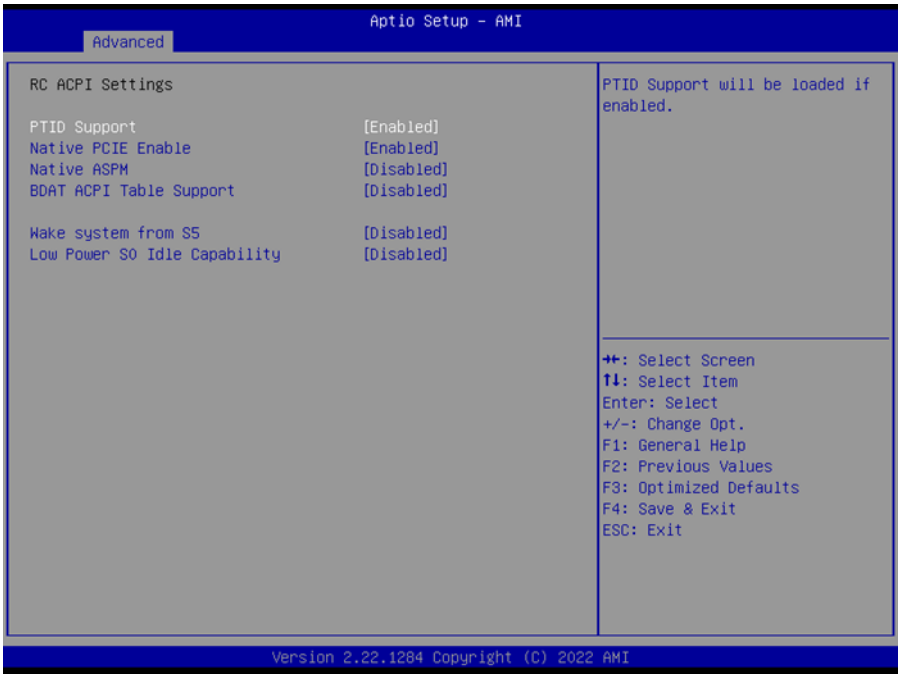
- **System time / System date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

4.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5377 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 screens is shown below. The sub menus are described on the following pages.



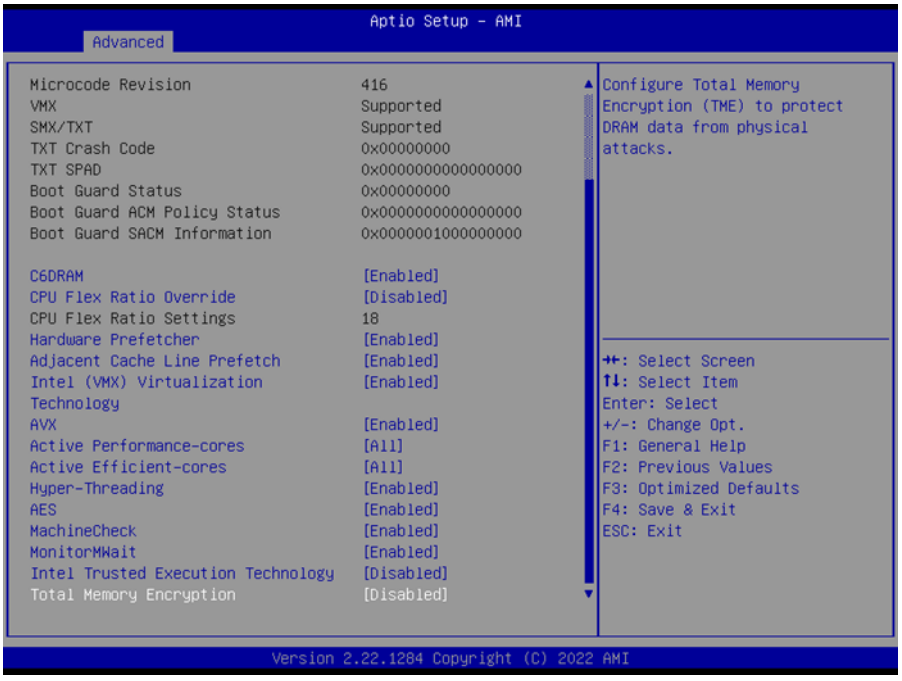
4.1.2.1 RC ACPI Settings



- **PTID Support**
  Determines if Enabled to load PTID Table.
- **Native PCIE Enable**
  Enable/Disable PCIE Native Control reported in ACPI Table.
- **Native ASPM**
  Choose ASPM feature is controlled by OS or BIOS.
- **BDAT ACPI Table Support**
  Determines if Enabled to support BDAT ACPI Table.
- **Low Power S0 Idle Capability**

This item determines to Enable/Disable ACPI Low Power S0 Idle Capability under OS.

4.1.2.2 CPU Configuration



- **C6DRAM**
  Enable/Disable moving of dram contents to PRM memory when CPU is in C6 state.
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming.
- **Hardware Prefetcher**
  This item allows users to enable or disable the hardware prefetcher feature.
- **Adjacent Cache Line Prefetch**
  This item allows users to enable or disable the adjacent cache line prefetch feature.
- **Intel (VMX) Virtualization Technology**
  When Enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology.
- **AVX**
  Enable/Disable the AVX 2/3 Instructions.
- **Active Performance-cores**
  Number of P-cores to enable in each processor package.
- **Active Efficient-cores**
  Number of E-cores to enable in each processor package.
- **Hyper-Threading**
  This item allows users to Enable/Disable Hyper-Threading Technology.
- **AES**
  Enable/Disable AES (Advanced Encryption Standard).
- **MachineCheck**
  Enable/Disable Machine Check.
- **MonitorMWait**

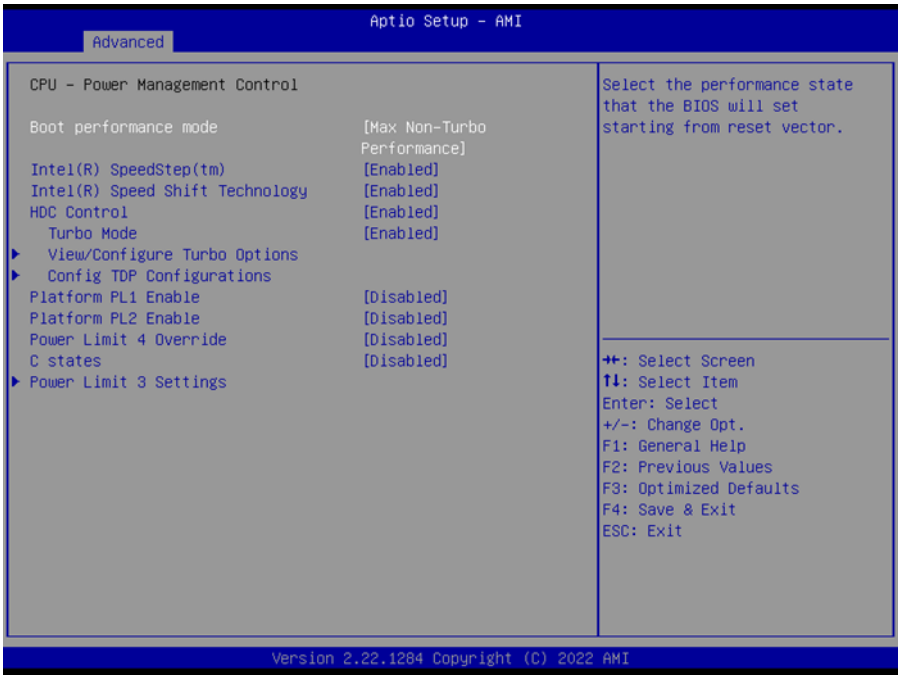
Enable/Disable MonitorMWait.

- **Intel Trusted Execution Technology**
  Enables utilization of additional hardware capability provided by Intel® Trusted Execution Technology.
- **Total Memory Encryption**
  Configure Total Memory Encryption (TME) to protect DRAM data from physical attacks.

4.1.2.3 Power & Performance

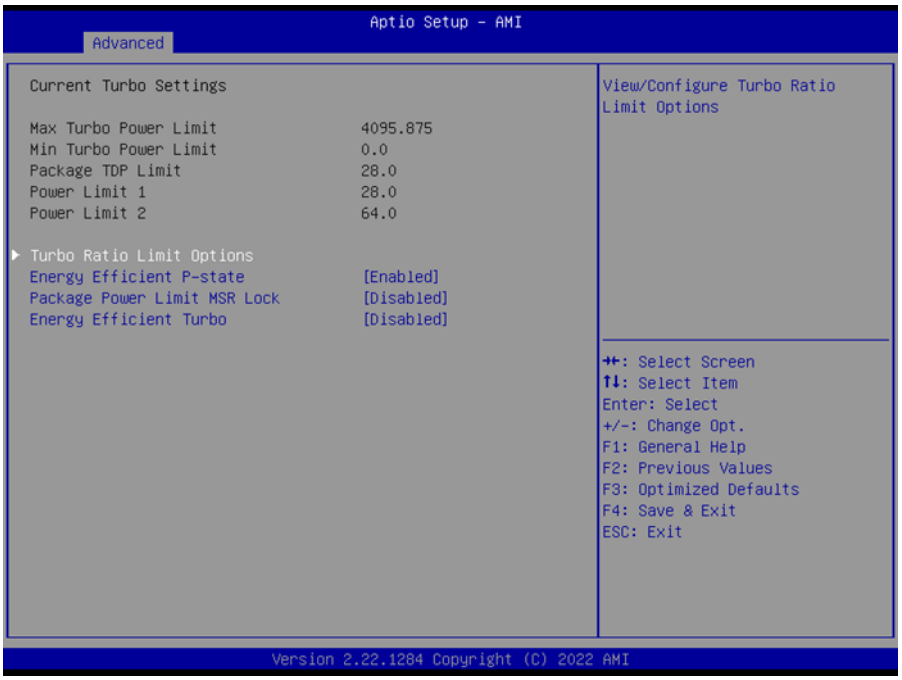
- **CPU – Power Management Control**
  CPU – Power Management Control Options.
- **GT – Power Management Control**
  GT – Power Management Control Options.

4.1.2.3.1 CPU - Power Management Control



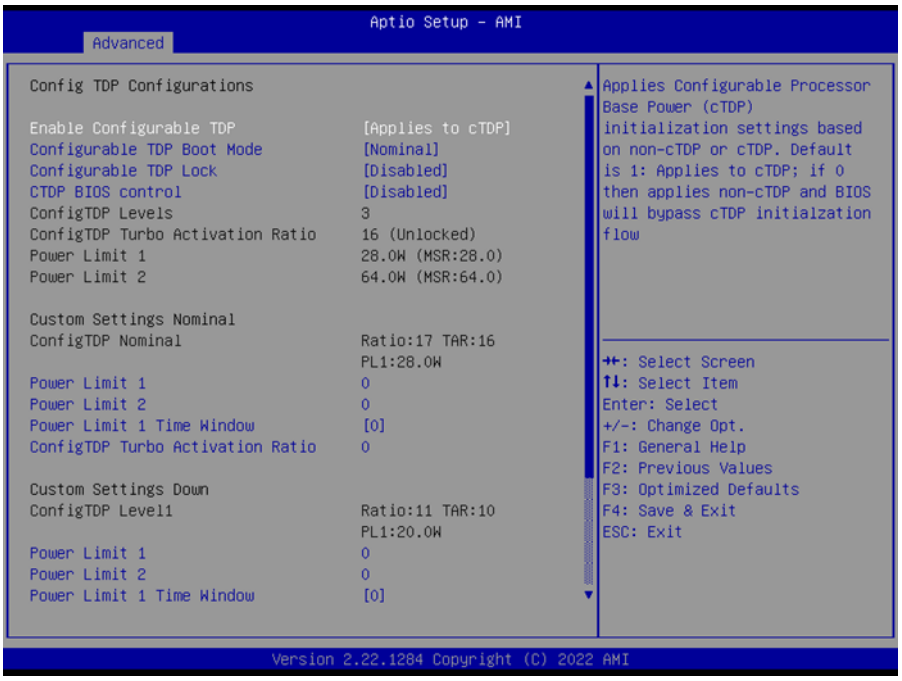
- **Boot performance mode**
  Select the performance state that the BIOS will set before OS handoff.
- **Intel® SpeedStep™**
  Allows more than two frequency ranges to be supported.
- **Intel® Speed Shift Technology**
  Enable/Disable Intel® Speed Shift Technology support.
- **HDC Control**
  Enable/Disable Intel HDC.
- **Turbo Mode**
  Enable/Disable processor turbo mode.
- **View/Configure Turbo Options**
  View and Configure Turbo Options.
- **Config TDP Configuration**
  Config TDP Configuraitons.
- **Platform PL1 Enable**
  Enable/Disable Platform Power Limit 1 programming.
- **Platform PL2 Enable**
  Enable/Disable Platform Power Limit 1 programming.
- **Power Limit 4 Override**
  Enable/Disable Power Limit 4 override.
- **C states**
  Enable/Disable CPU Power Management.
- **PowerLimit 3 Settings**
  Power Limit 3 Settings.

View/Configure Turbo Options



- **Turbo Ratio Limit Option**
  View/Configure Turbo Ratio Limit Options.
- **Energy Efficient P-state**
  Enable/Disable Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**
  Enable/Disable locking of Package Power Limit settings.
- **Energy Efficient Turbo**
  Enable/Disable Energy Efficient Turbo feature.

Config TDP Configurations

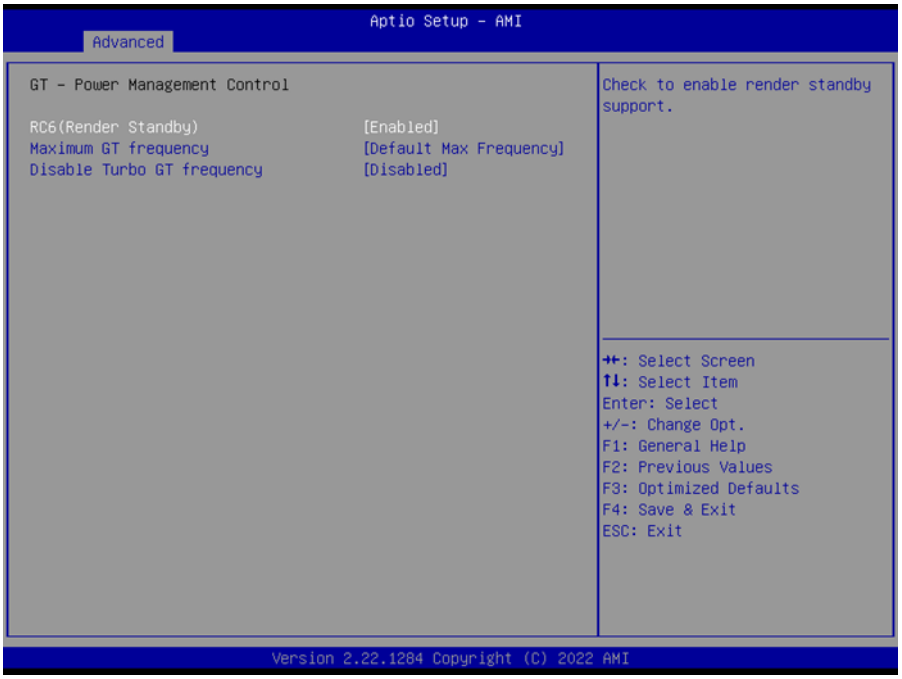


- **Enable Configurable TDP**
  Applies TDP initialization settings based on non-cTDP or cTDP.
- **Configurable TDP Boot Mode**
  Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection.
- **Configurable TDP Lock**
  Configurable TDP Mode Lock sets the Lock bit.
- **CTDP BIOS control**
  Enables CTDP control via runtime ACPI BIOS method.

Power Limit 3 Settings

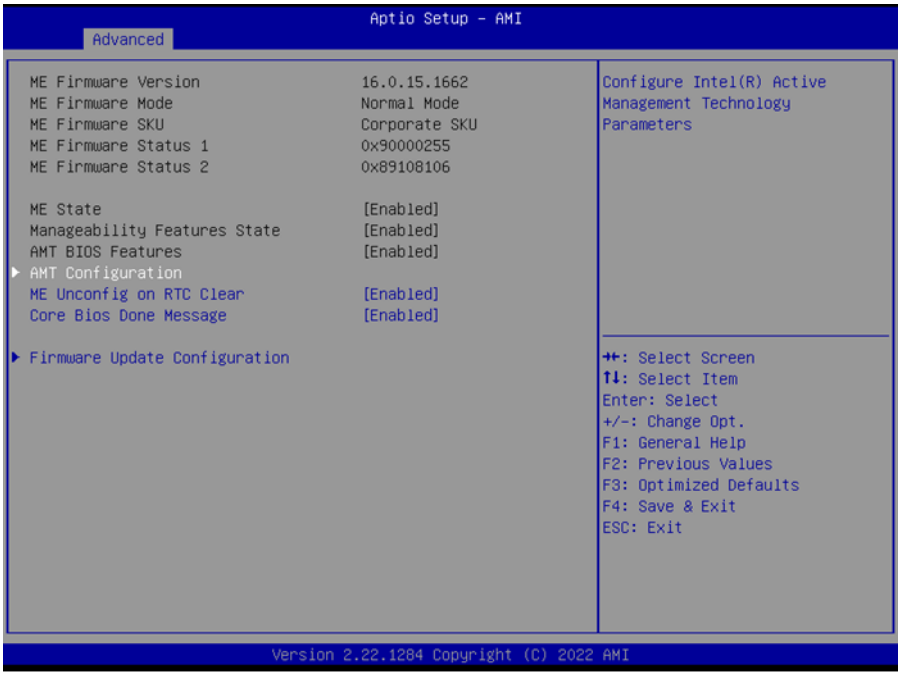
- **Power Limit 3 Override**
  Enable/Disable Power Limit 3 override.

4.1.2.3.2GT - Power Management Control



- **RC6(Render Standby)**
  Check to enable render standby support.
- **Maximum GT frequency**
  Maximum GT frequency limited by user.
- **Disable Turbo GT frequency**
  Enabled/Disabled Turbo GT frequency.

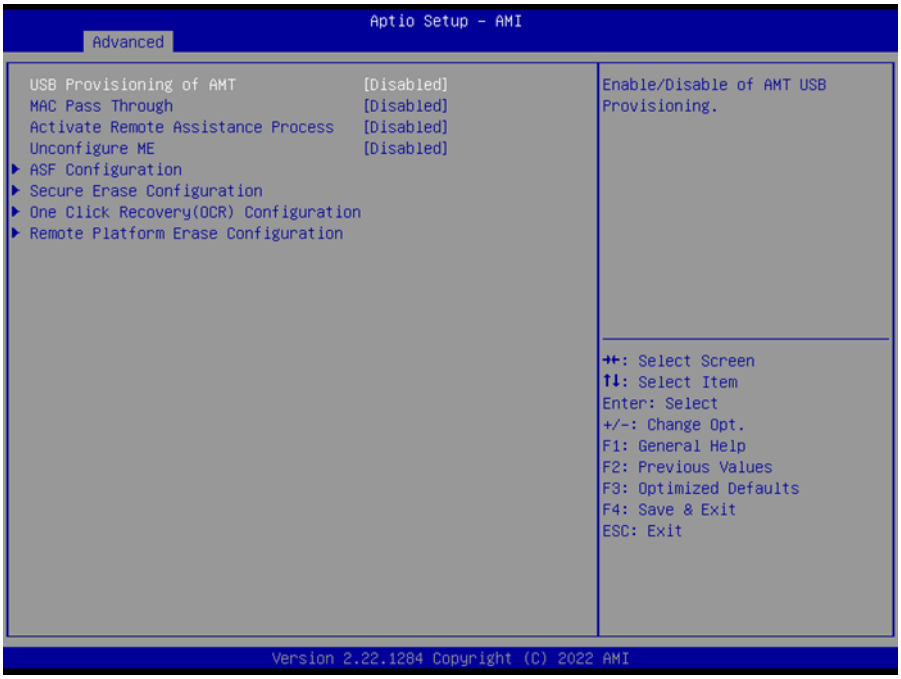
4.1.2.4 PCH-FW Configuration



- **ME State**
  When Disabled ME will be put ME into Temporarily Disabled Mode.

- **Manageability Feature State**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **AMT BIOS Features**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **AMT Configuration**
  Configure Intel® Active Management Technology Parameters.
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **Core BIOS Done Message**
  Enable/Disable Core BIOS Done message sent to ME.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.

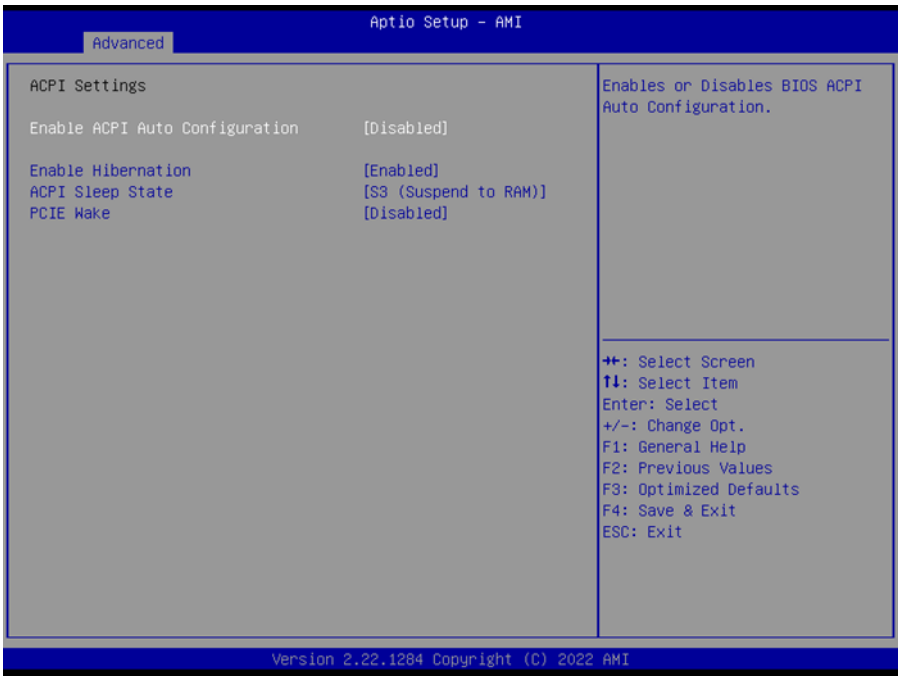
4.1.2.4.1 AMT Configuration



- **USB Provision of AMT**
  Enable/Disable of AMT BIOS Provisioning.
- **MAC Pass Through**
  Enable/Disable MAC Pass Through function.
- **Active Remote Assistance Process**
  Trigger CIRA boot.
- **Unconfigure ME**
  Unconfigure ME with resetting MEBx password to default on next boot.
- **ASF Configuration**
  Configure Alert Standard Format parameters.
- **Secure Erase Configuration**
  Secure Erase configuration menu.
- **One Click Recovery(OCR) Configuration**
  Configuration setting for One Click Recovery.
- **Remote Platform Erase Configuration**

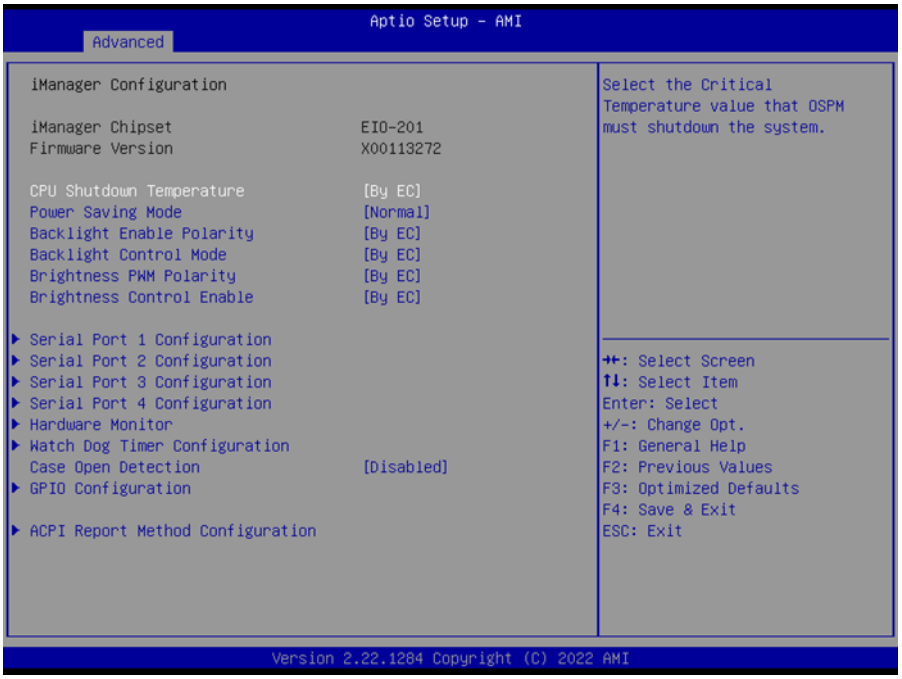
Remote Platform Erase configuration menu.

4.1.2.5 ACPI Settings



- **Enable ACPI Auto Configuration**
  Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not 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**
  Enable or disable PCIE to wake the system from S5.

4.1.2.6 iManager Configuration

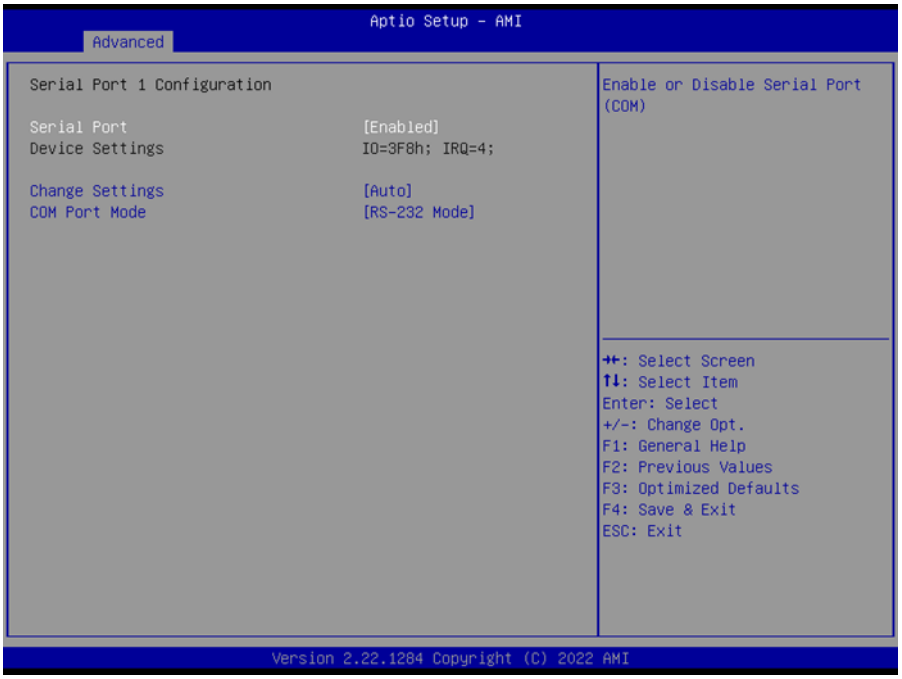


- **CPU Shutdown Temperature**
  Enable/Disable CPU Shutdown Temperature.
- **Power Saving Mode**
  Enable/Disable power saving mode.
- **Backlight Enable Polarity**
  Switch Backlight Enable Polarity for Native or Invert.
- **Backlight Control Mode**
  Switch Backlight Control to PWM or DC mode.
- **Brightness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

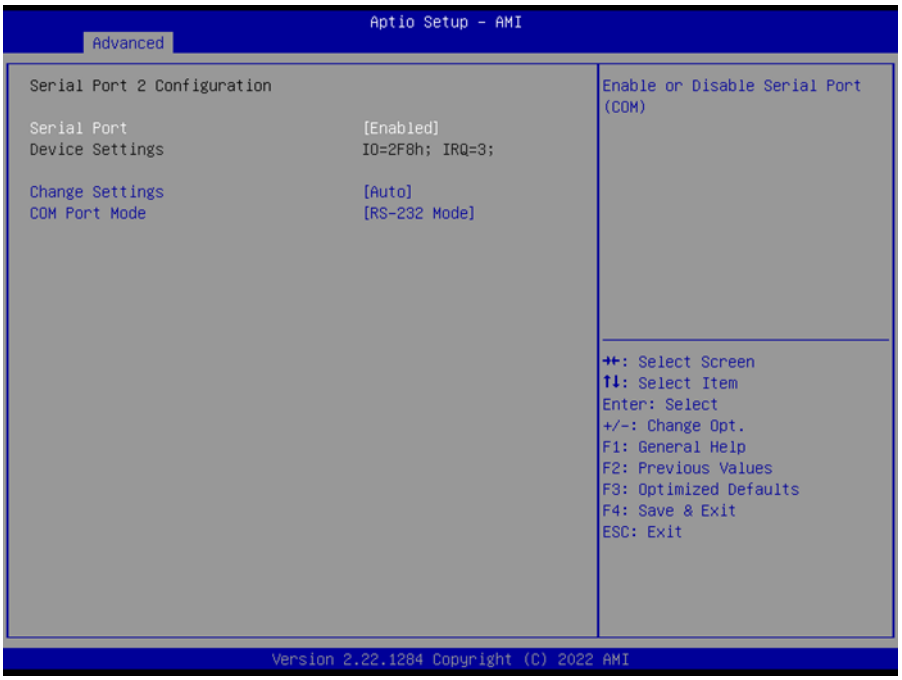
- **ACPI Report Method Configuration**
  Select ACPI Reporting Method for EC Devices.

4.1.2.6.1 Serial Port 1 Configuration



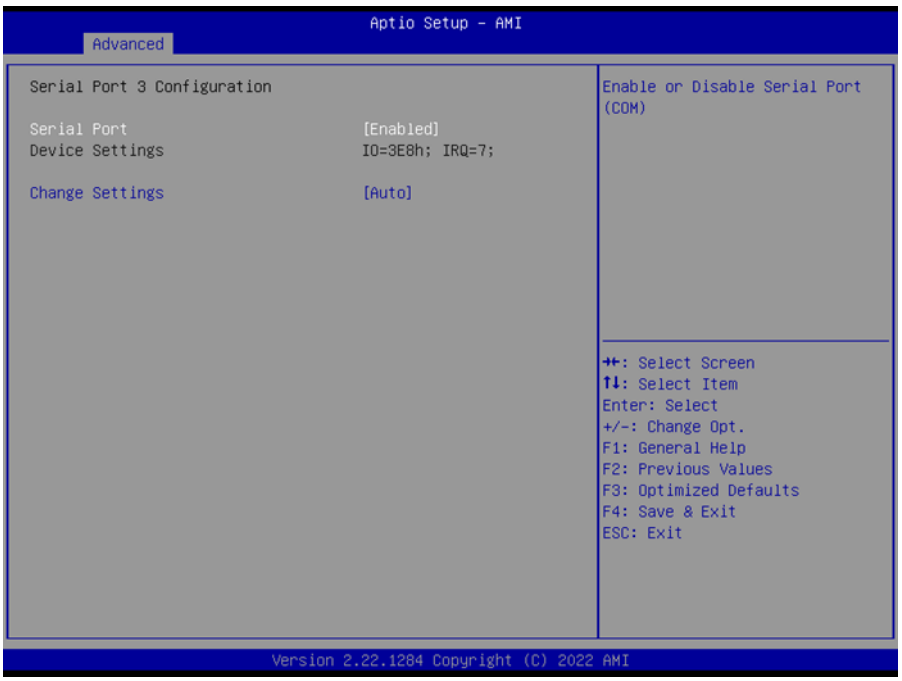
- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal settings for Super IO device.
- **COM Port Mode**
  COM Port Mode Select.

4.1.2.6.2 Serial Port 2 Configuration



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

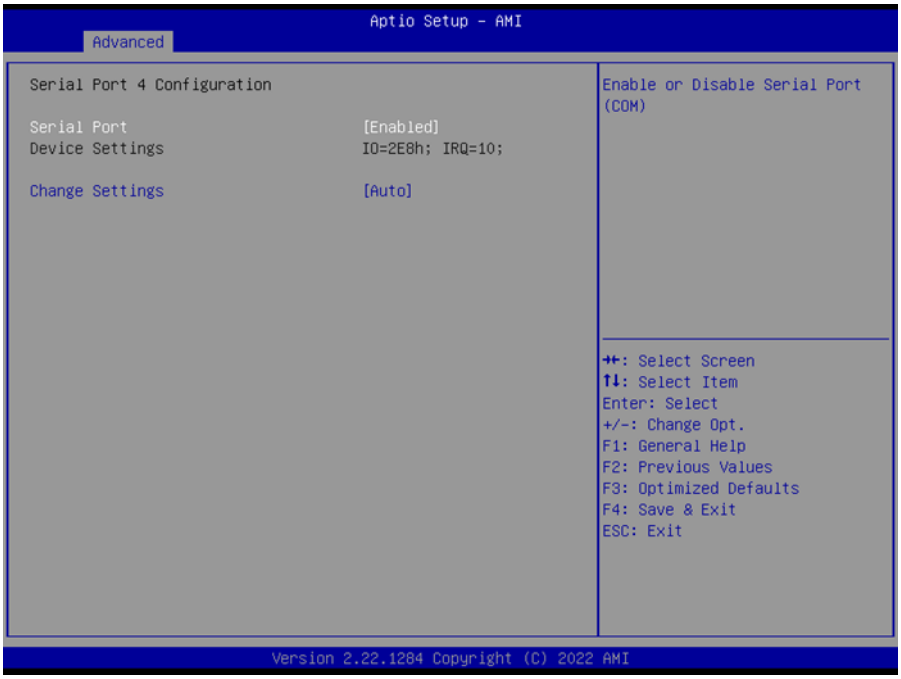
4.1.2.6.3 Serial Port 3 Configuration



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

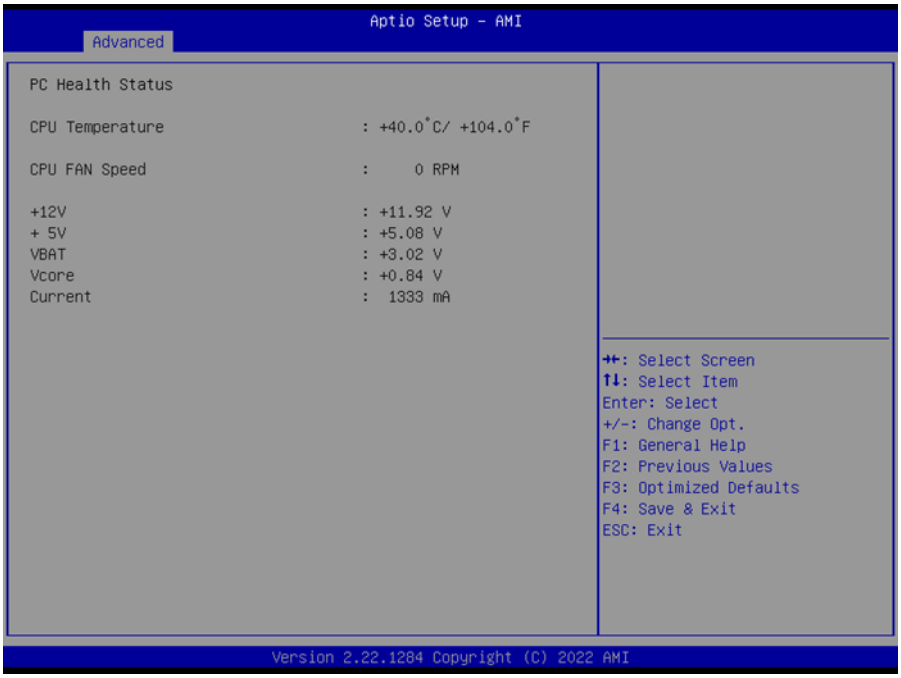
Select an optimal settings for Super IO device.

4.1.2.6.4 Serial Port 4 Configuration

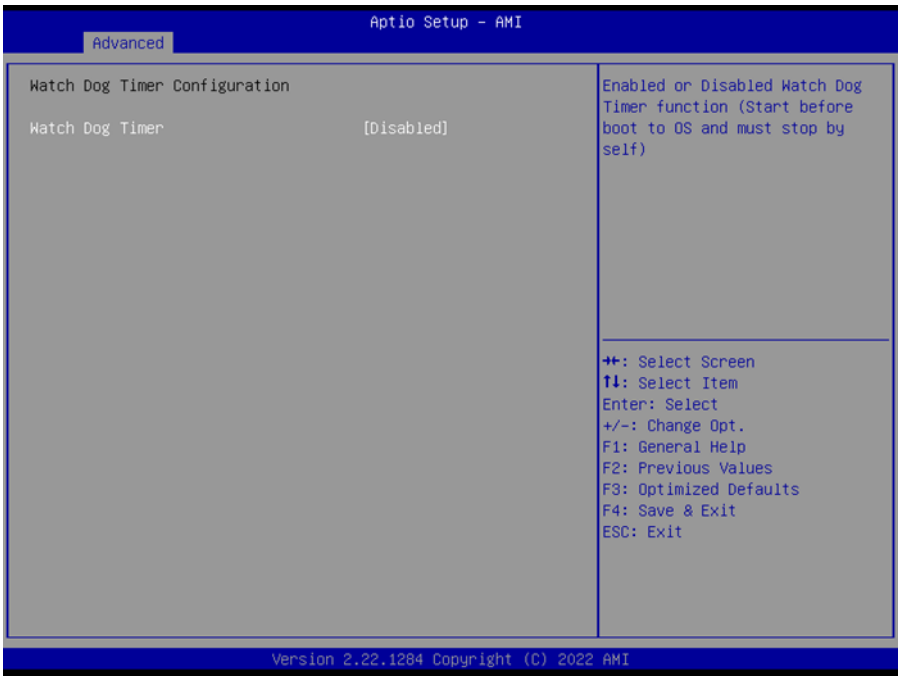


- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal settings for Super IO device.

4.1.2.6.5 Hardware Monitor

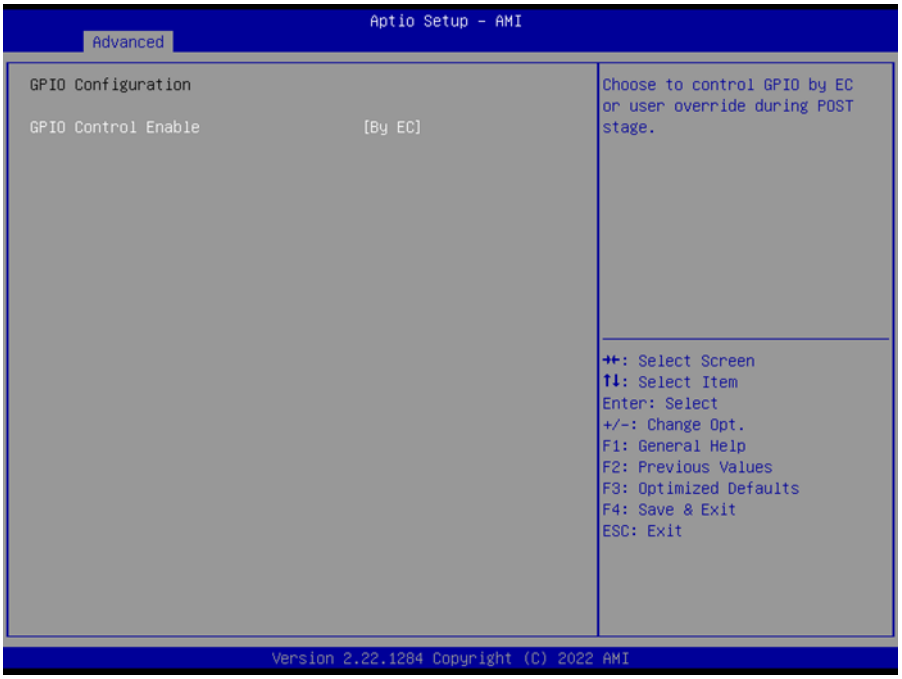


4.1.2.6.6 Watch Dog Timer Configuration



- **Watch Dog Timer**
  Enable or Disable Watch Dog Timer Function.

4.1.2.6.7 GPIO Configuration

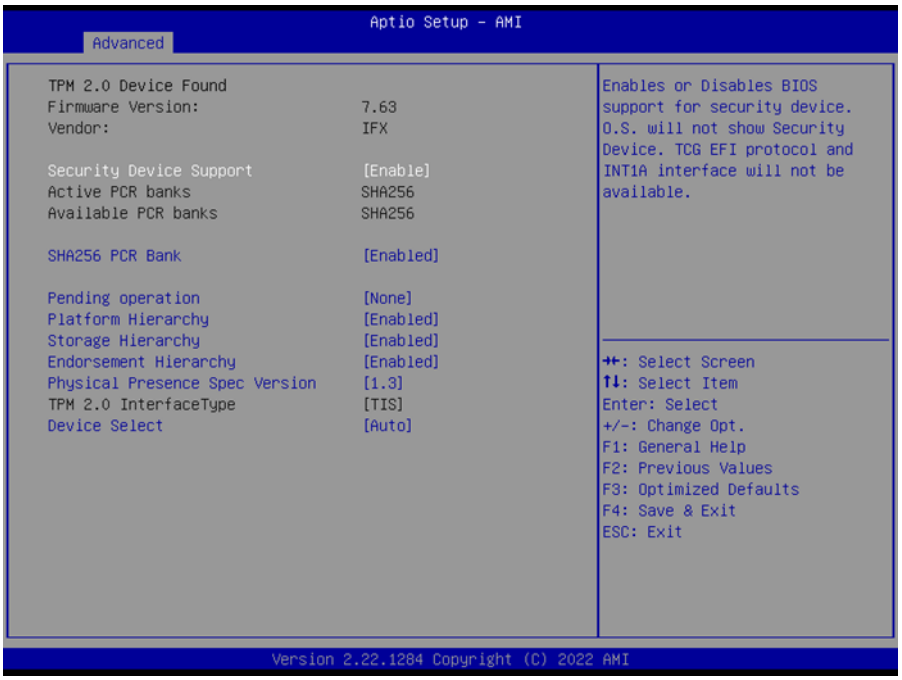


- **GPIO Control Enable**
  Choose to control GPIO by EC or user override during POST stage.
- **GPIO0/1/2/3/4/5/6/7**
  Configure GPIO0/1/2/3/4/5/6/7.

4.1.2.6.8 ACPI Report Method Configuration

- **ACPI 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.

4.1.2.7 Trusted Computing



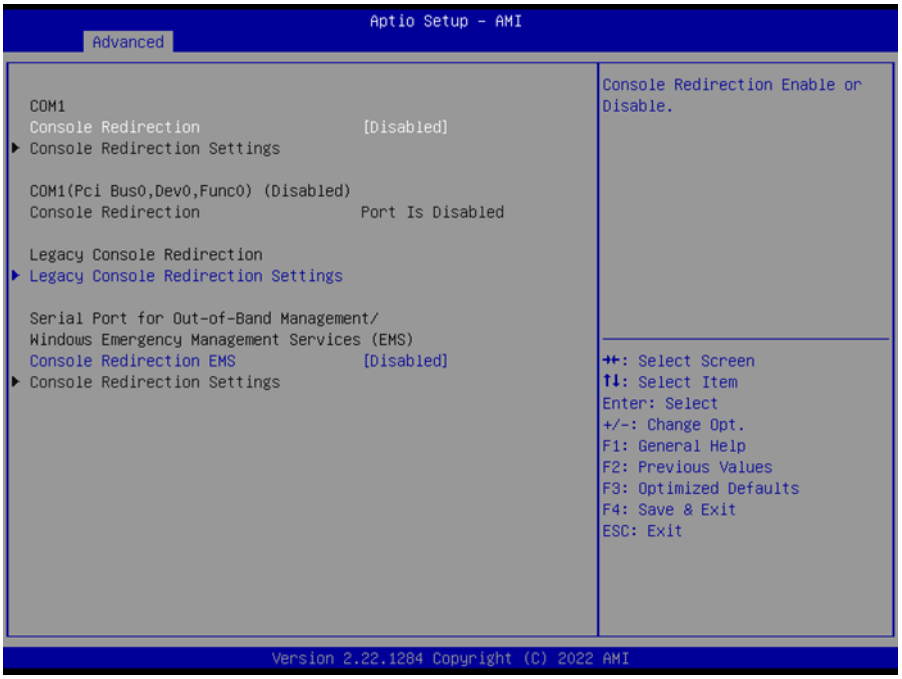
- **Security Device Support**
  Enable or disable BIOS support for security device.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **Pending operation**
  Schedule an Operation for the Security Device.
- **Platform Hierarchy**
  Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable or Disable Endorsement Hierarchy.
- **Physical Presence Spec Version**
  Select to Tell O.S. 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.

4.1.2.8 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.

4.1.2.9 Serial Port Console Redirection



- **Console Redirection**

  This item allows users to configuration console redirection detail settings.

- **Console Redirection EMS**

  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).

4.1.2.10 Intel TXT Information

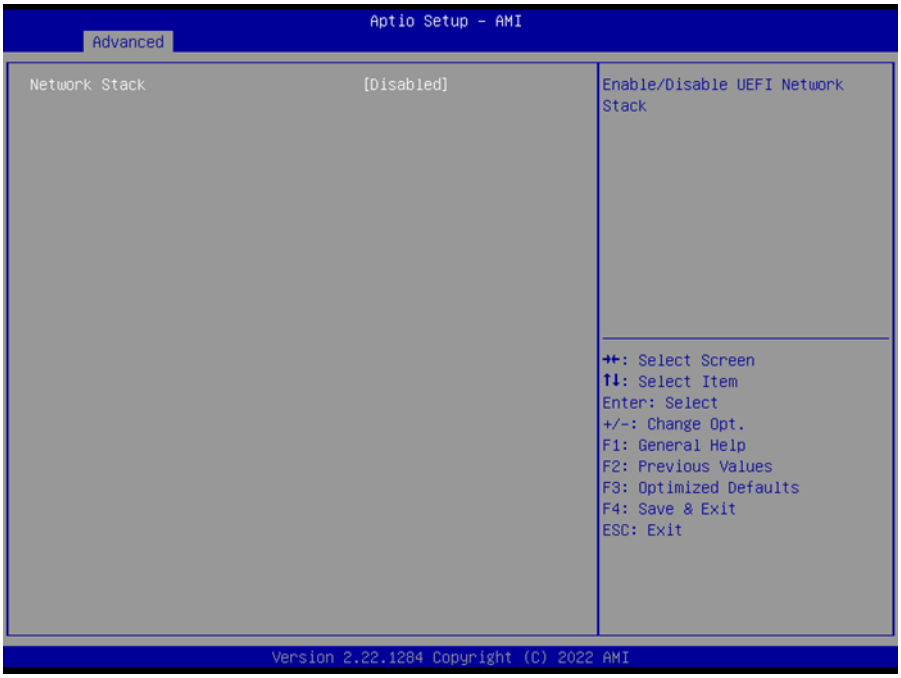
- **Intel TXT Information**
  Display Intel TXT information.

4.1.2.11 USB Configuration

- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-off**
  This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

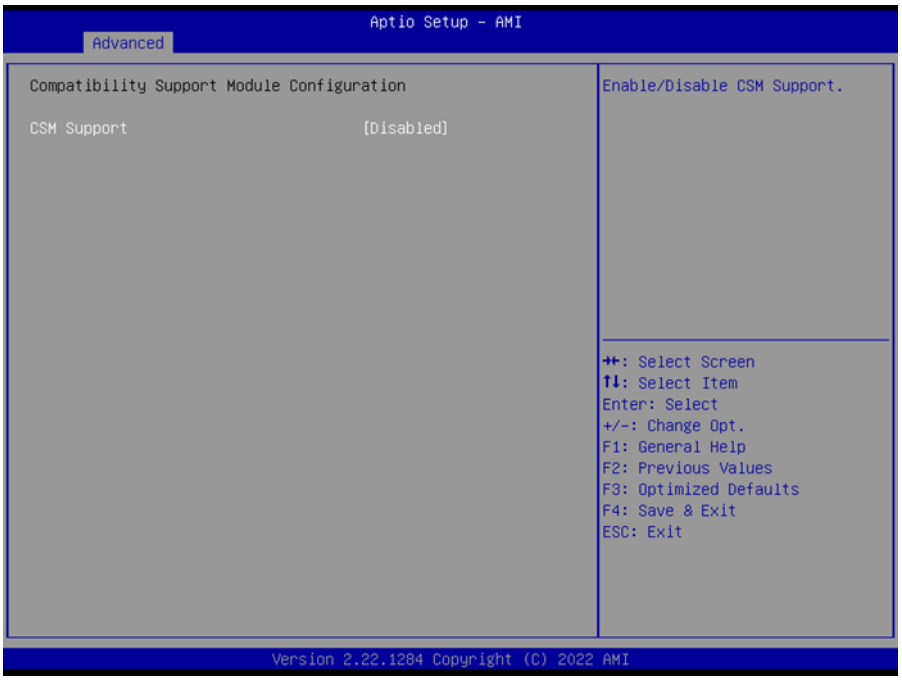
- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
  Time-out value for control, Bulk, and interrupt transfers.
- **Device reset time-out**
  USB mass storage device start unit command time-out.
- **Device power-up delay**
  Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

4.1.2.12 Network Stack Configuration



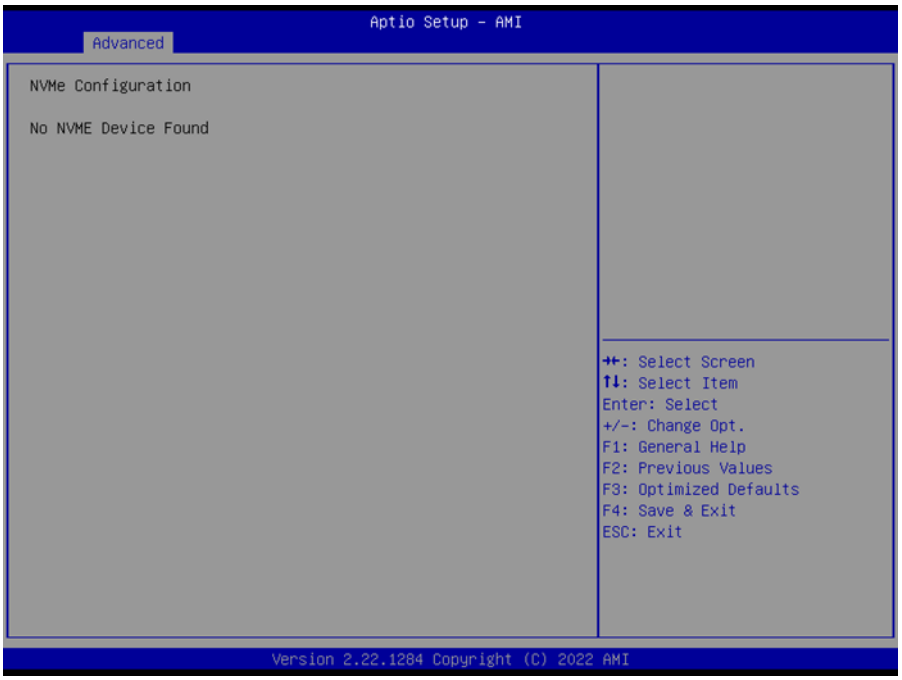
- **Network Stack**
  Enable/Disable UEFI Network Stack.

4.1.2.13 CSM Configuration



- **CSM Support**
  Enable/Disable CSM Support.
- **GateA20 Active**
  UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
- **INT19 Trap Response**
  BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
- **Boot option filter**
  This option controls Legacy/UEFI ROMs priority.
- **Network**
  Controls the execution of UEFI and Legacy PXE OpROM.
- **Storage**
  Controls the execution of UEFI and Legacy Storage OpROM.
- **Video**
  Controls the execution of UEFI and Legacy Video OpROM.
- **Other PCI devices**
  Determines OpROM execution policy for devices other than Network, Storage, or Video.

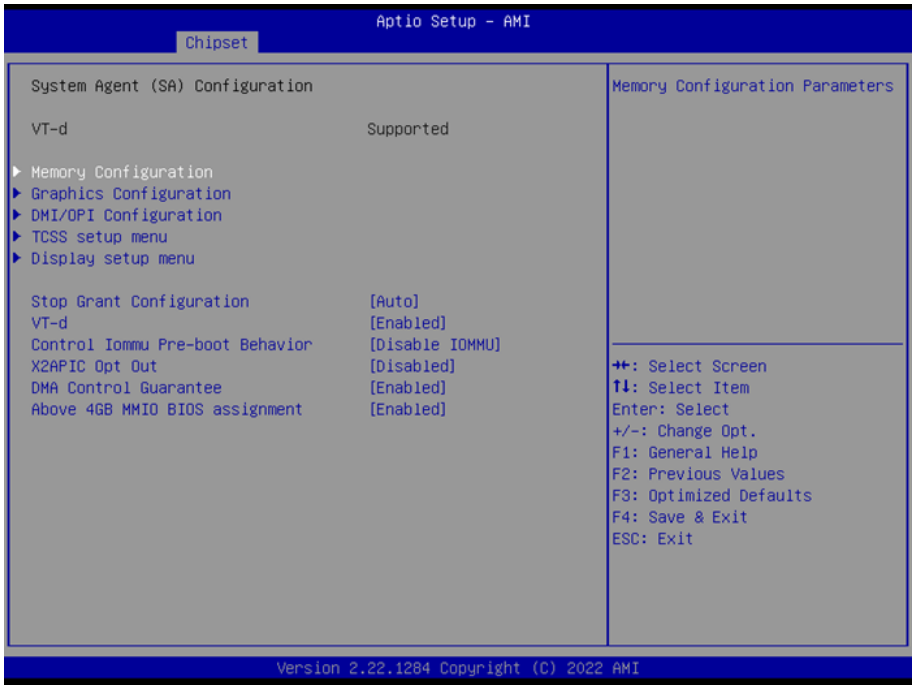
4.1.2.14 NVMe Configuration



4.1.3 Chipset Configuration

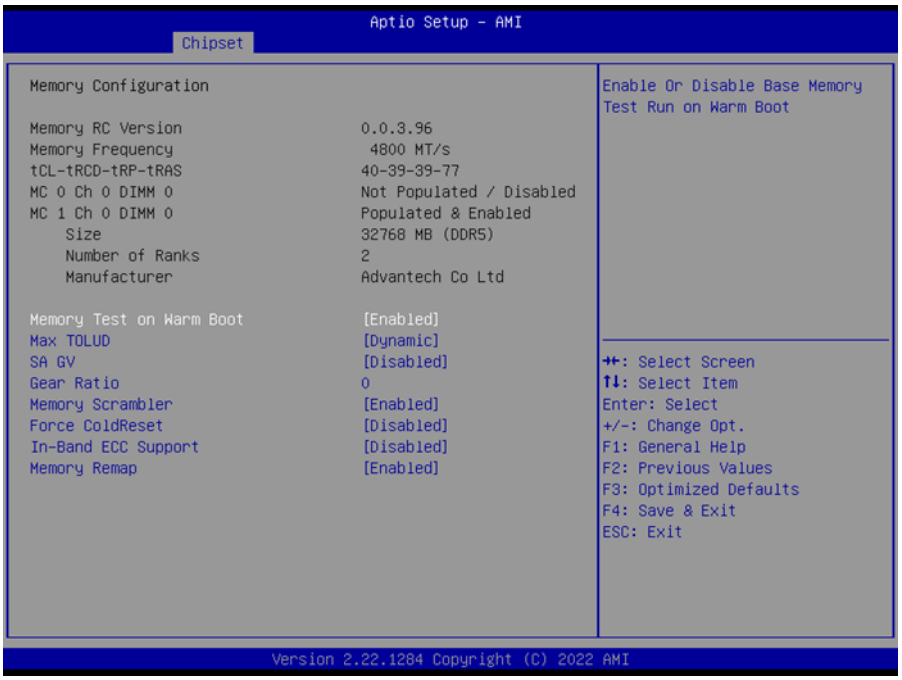
Select the Chipset tab from the MIO-5377 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

4.1.3.1 System Agent (SA) Configuration



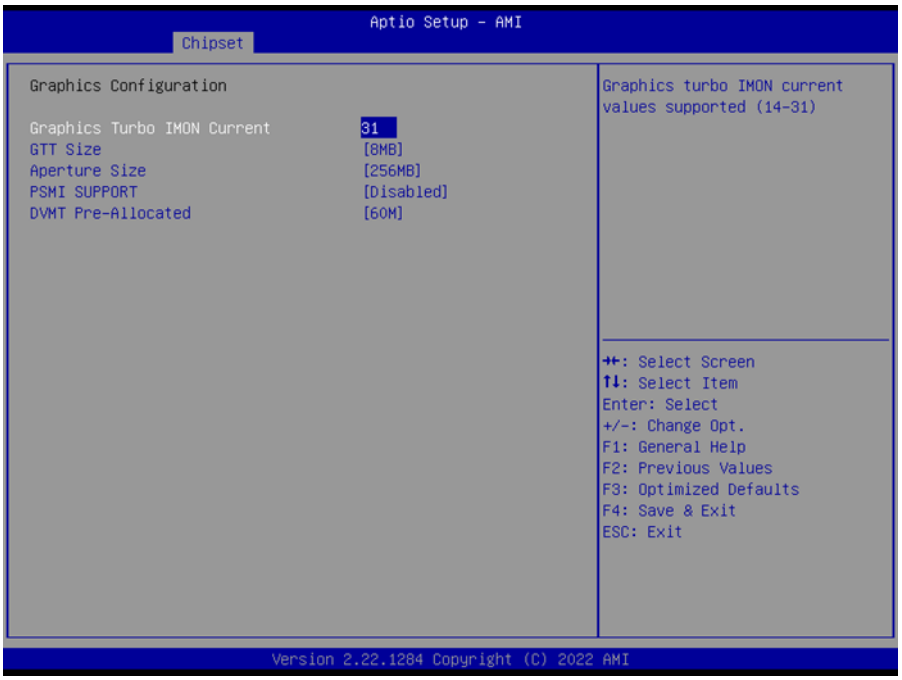
- **Memory Configuration**
  Memory Configuration Parameters.
- **Graphics Configuration**
  Graphics Configuration Parameters.
- **DMI/OPI Configuration**
  Control various DMI functions.
- **TCSS setup menu**
  TCSS Configuration settings.
- **Display setup menu**
  Display Configuration settings.
- **Stop Grant Configuration**
  Automatic/Manual stop grant configuration.
- **VT-d**
  VT-D capability.
- **Control Iommu Pre-boot Behavior**
  Enable IOMMU in Pre-boot environment.
- **X2APIC Opt Out**
  Enable/Disable X2APIC Opt Out Bit.
- **DMA Control Guarantee**
  Enable/Disable DMA_CONTROL_GUARANTEE bit.
- **Above 4GB MMIO BIOS assigment**
  Enable/Disable above 4GB Memory Mapped IO BIOS assignment.

4.1.3.1.1 Memory Configuration



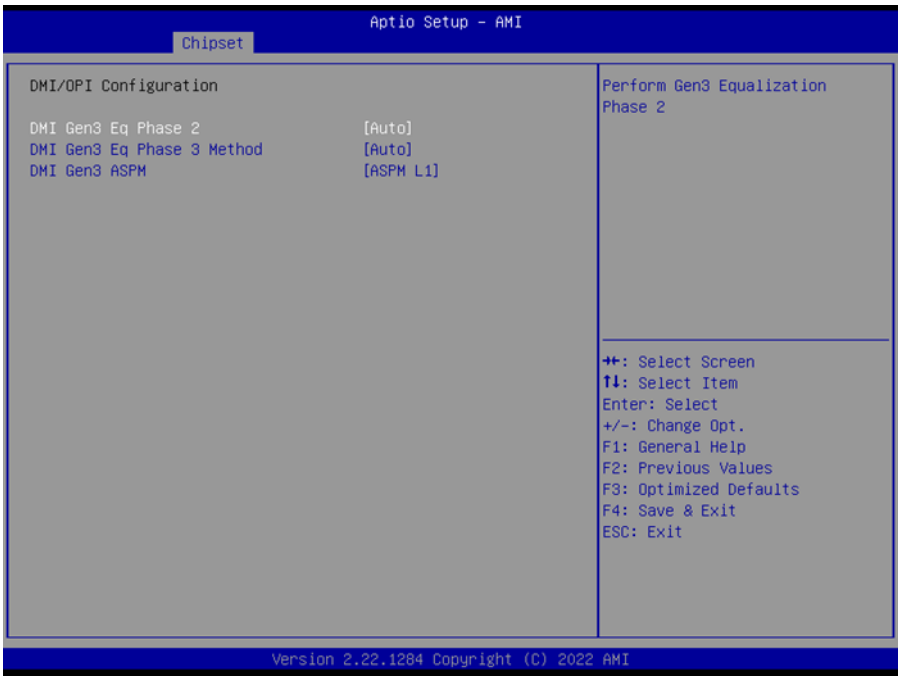
- **Memory Test on Warm Boot**
  Enable/Disable Base Memory Test Run on Warm Boot.
- **Max TOLUD**
  Maximum Value of TOLUD.
- **SA GV**
  System Agent Geysetville.
- **Gear Ratio**
  Gear ratio when SAGV is disabled.
- **Memory Scrambler**
  Enable/Disable Memory Scrambler support.
- **Force ColdReset**
  Force ColdReset OR Choose MrcColdBoot mode.
- **In-Band ECC Support**
  Enable/Disable In-Band ECC.
- **Memory Remap**
  Enable/Disable Memory Remap above 4GB.

4.1.3.1.2 Graphics Configuration



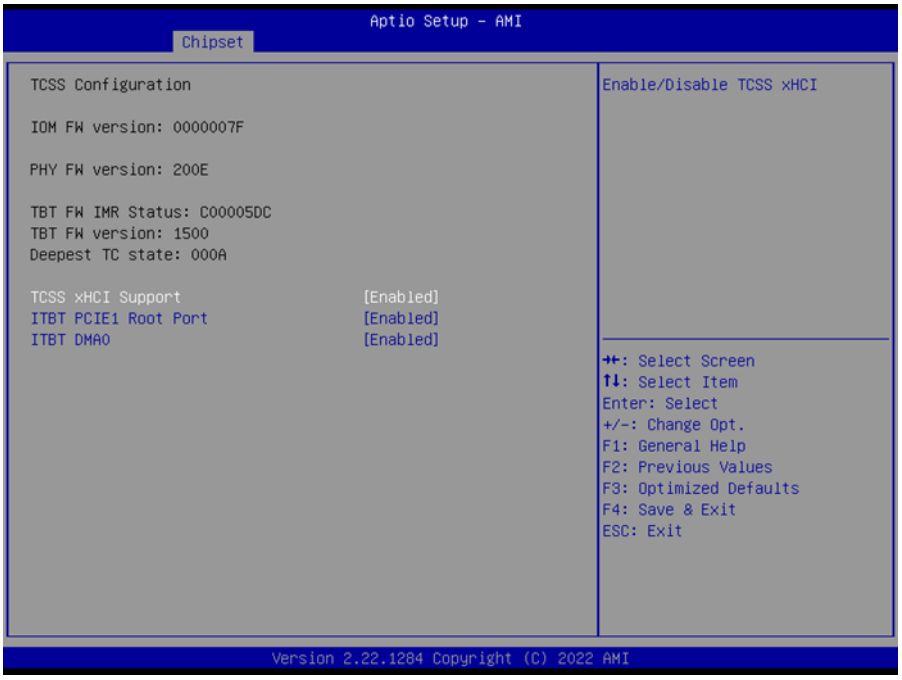
- **Graphics Turbo IMON Current**
  Graphics turbo IMON current values supported.
- **GTT Size**
  Select the GTT Size.
- **Aperture Size**
  Select the Aperture Size.
- **PSMI Support**
  Enable/Disable PSMI.
- **DVMT Pre-Allocated**
  Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

4.1.3.1.3DMI/OPI Configuration



- **DMI Gen3 Eq Phase 2**
  Perform Gen3 Equalization Phase 2.
- **DMI Gen3 Eq Phase 3 Method**
  Select Method for Gen3 Equalization Phase 3.
- **DMI Gen3 ASPM**
  DMI Gen3 ASPM Support.

4.1.3.1.4TCSS setup menu

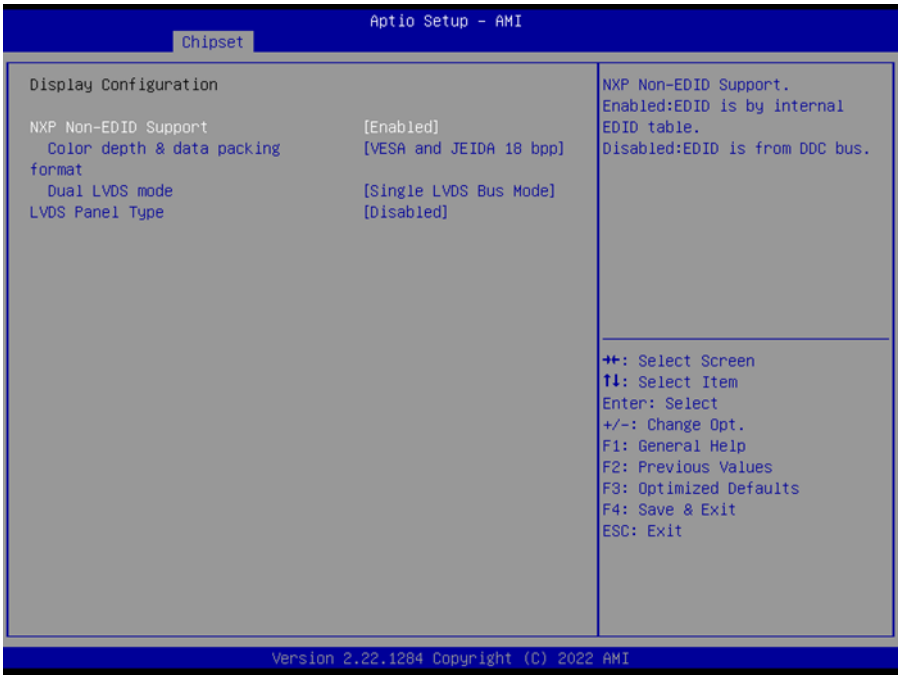


- **TCSS xHCI Support**
  Enable/Disable TCSS xHCI.
- **ITBT PECI1 Root Port**

Enable/Disable ITBT PCIE Root.

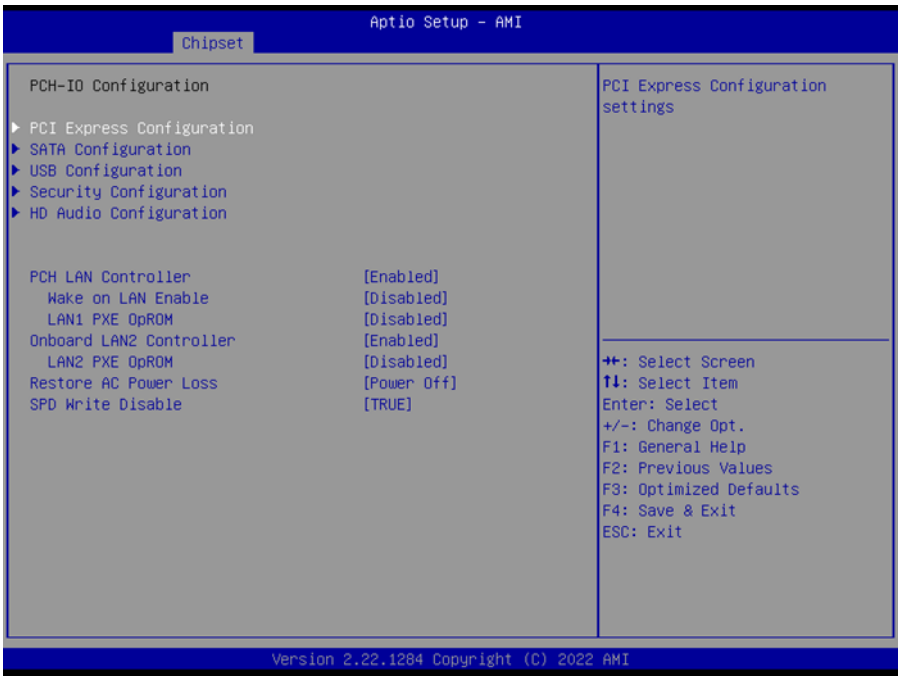
- **ITBT DMA0**
  Enable/Disable ITBT DMA0.

4.1.3.1.5 Display setup menu



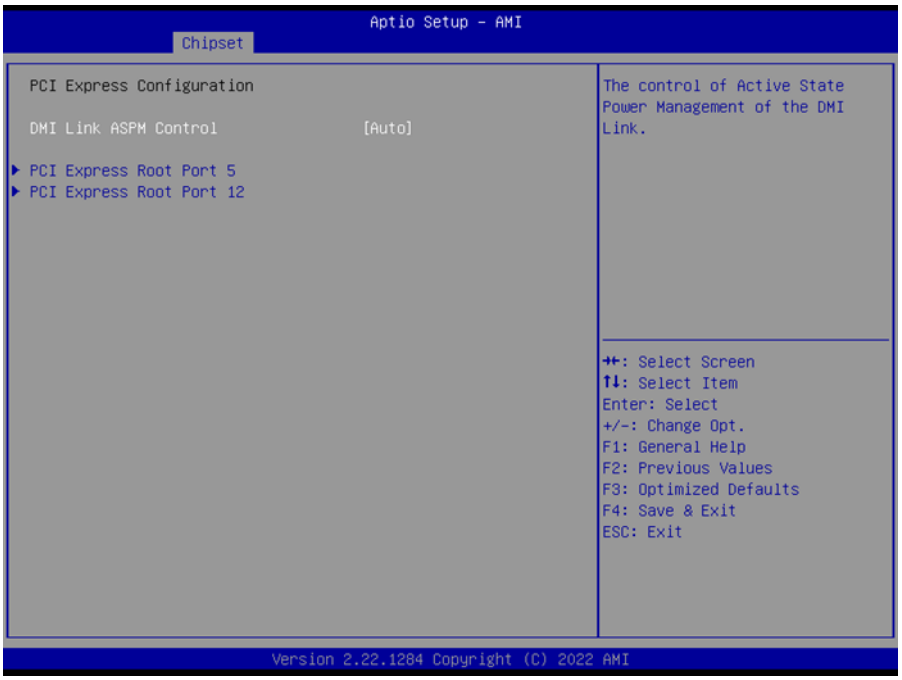
- **NXP Non-EDID Support**
  Non-EDID Support.
- **Color Depth & Data Packing**
  Color depth and data packing format for Non-EDID Support.
- **Dual LVDS Mode**
  Select LVDS bus to Single bus mode or Dual bus mode.
- **LVDS Panel Type**
  This item allow user to select LVDS panel resolution type.

4.1.3.2 PCH-IO Configuration



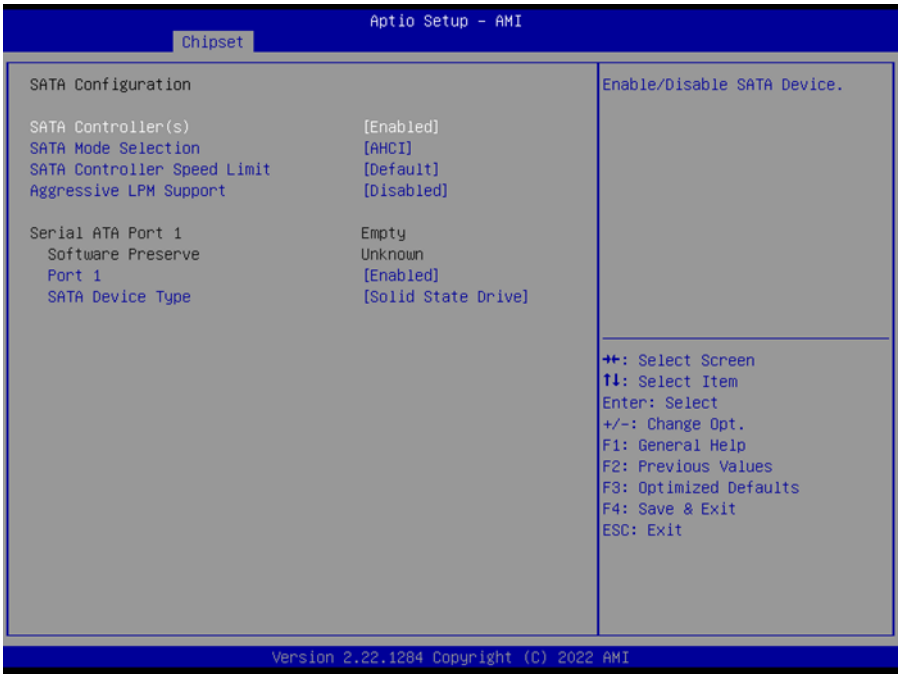
- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **SATA Configuration**
  SATA Device Options Settings.
- **USB Configuration**
  USB Configuration Settings.
- **Security Configuration**
  Security Configuration Settings.
- **HD Audio Configuration**
  HD Audio Subsystem Configuration Settings.
- **PCH LAN Controller**
  Enable or Disable onboard NIC.
- **Wake on LAN Enable**
  Enable or Disable Integrated LAN to wake the system.
- **LAN1 PXE ROM**
  Enable or disable boot option for LAN1 Controller.
- **Onboard LAN2 Controller**
  Select to Enable or Disable onboard LAN2 Controller.
- **LAN2 PXE ROM**
  Enable or disable boot option for LAN2 Controller.
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **SPD Write Disable**
  Enable/Disable setting SPD Write Disable.

4.1.3.2.1 PCI Express Configuration



- **DMI Link ASPM Control**
  This item controls Active State Power Management of the DMI Link.
- **PCI Express Root Port 5/12**
  PCI Express Port 5/12 Settings.

4.1.3.2.2 SATA Configuration

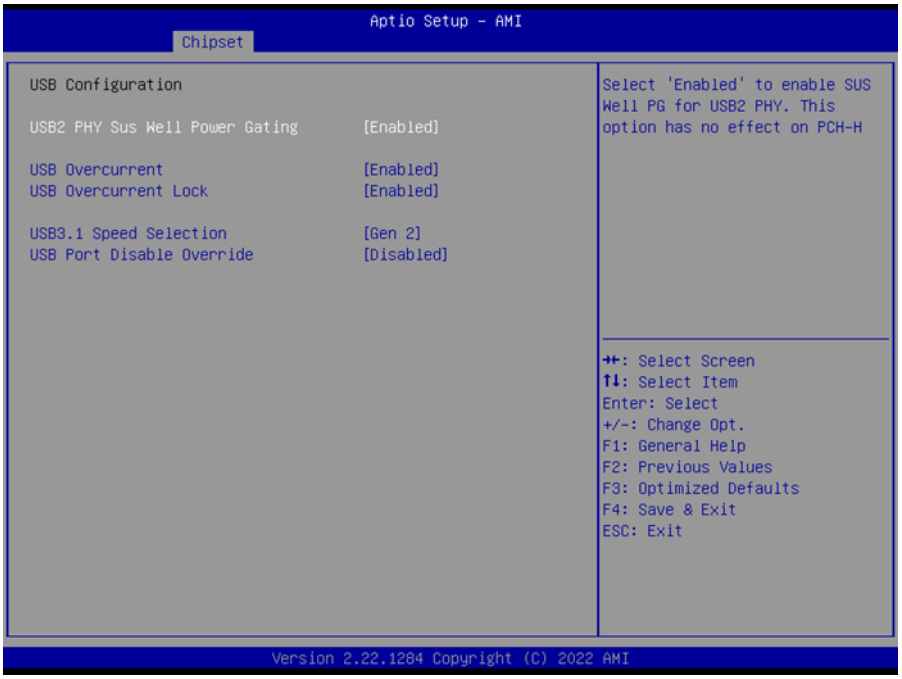


- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Mode Selection**
  Determine how SATA controller operate.
- **SATA Controller Speed Limit**

Indicates the maximum speed the SATA controller can support.

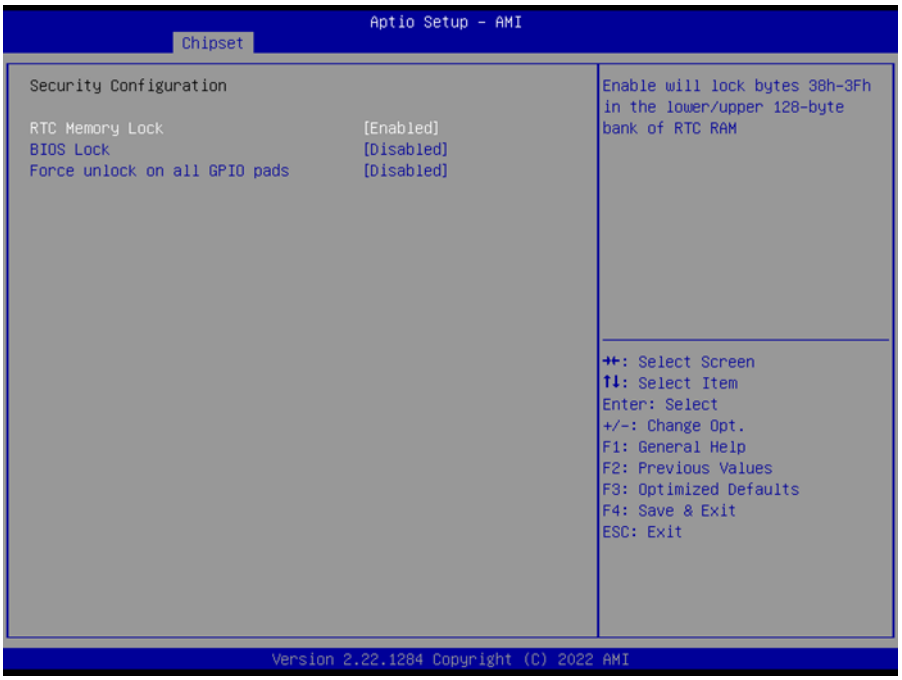
- **Aggressive LPM Support**
  Enabled PCH to aggressively enter link power state.

4.1.3.2.3 USB Configuration



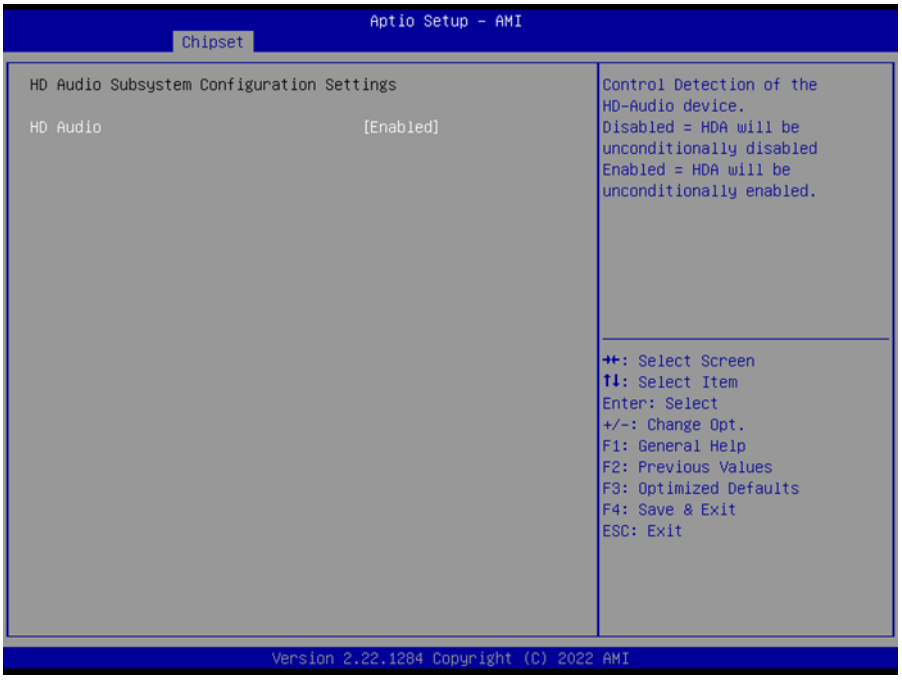
- **USB2 PHY Sus Well Power Gating**
  Select ‘Enabled’ to enable SUS Well PG for USB2 PHY.
- **USB Overcurrent**
  Select ‘Enabled’ if Overcurrent functionality is used.
- **USB Overcurrent Lock**
  Select ‘Enabled’ if Overcurrent functionality is used.
- **USB3.1 Speed Selection**
  USB3.1 Speed selection; GEN1 or GEN2.
- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB Port from reporting a Device Connection to the Controller.

4.1.3.2.4 Security Configuration



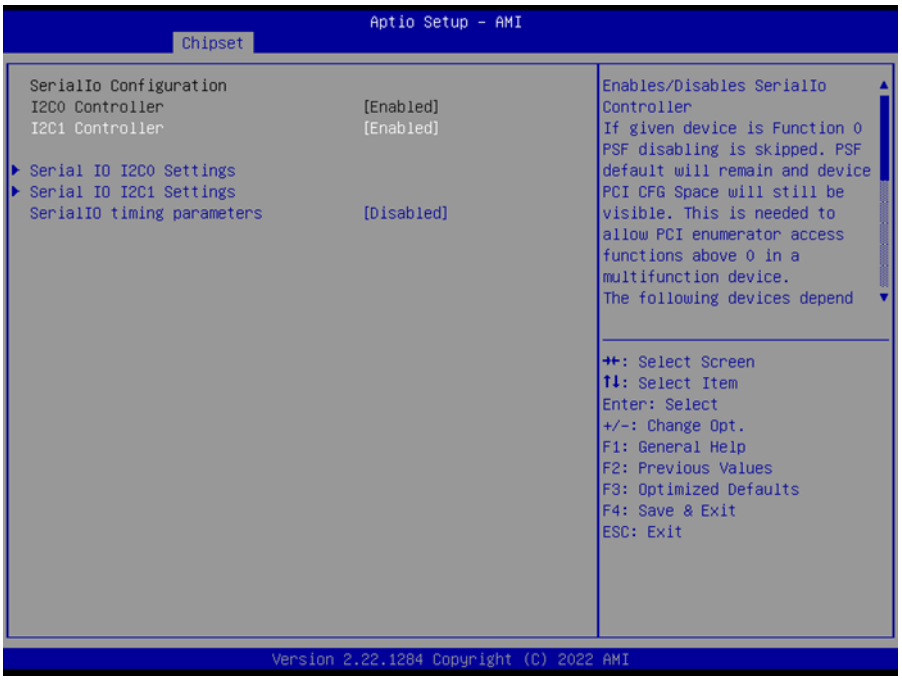
- **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
  Enable or Disable the PCH BIOS Lock Enable feature.
- **Force unlock on all GPIO pads**
  If Enabled BIOS will force all GPIO pads to be in unlock state.

4.1.3.2.5 HD Audio Configuration



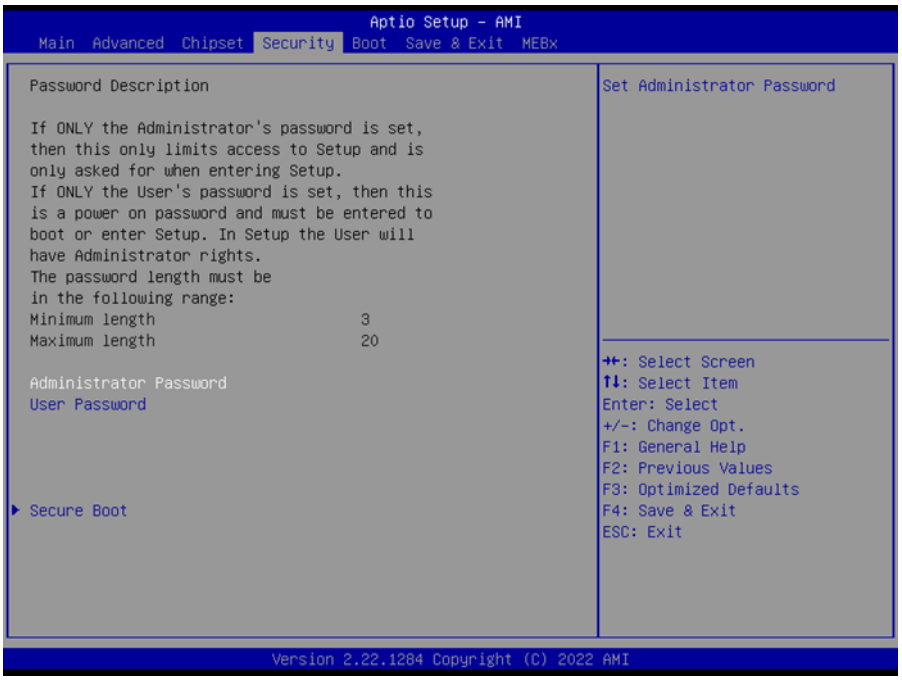
- **HD Audio**
  Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally Enabled.

4.1.3.2.6SerialIO Configuration



- **I2C0/I2C1 Controller**
  Enable/Disable SerialIO Controller.
- **Serial IO I2C0/I2C1 Settings**
  Configure SerialIo Controller.
- **SerialIO timing parameters**
  Enable additional timing parameters for all SerialIO controllers.

4.1.4 Security

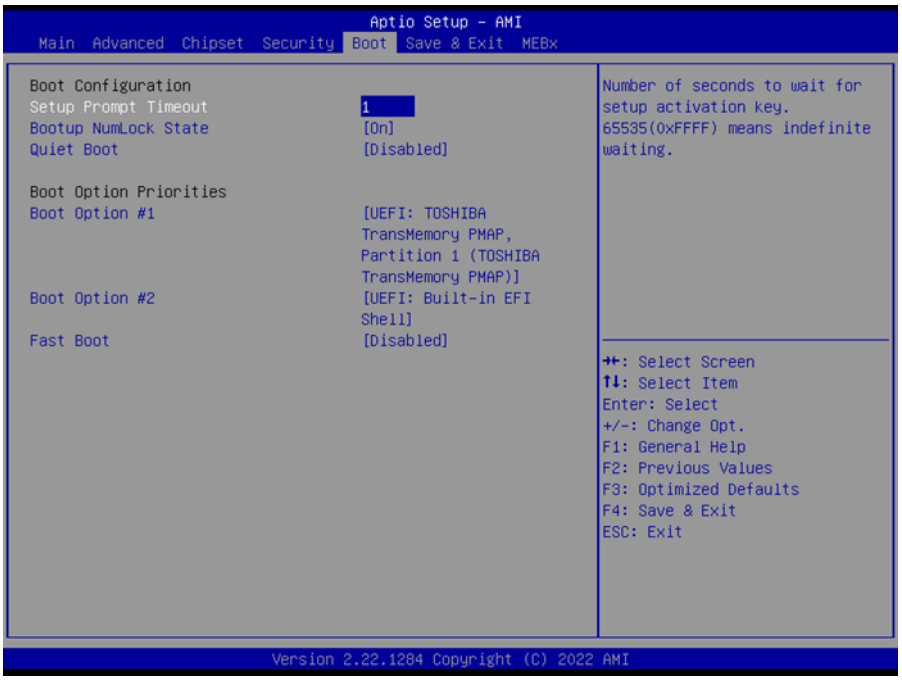


Select Security Setup from the MIO-5377 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this

section. To access the sub menu for the following items, select the item and press <Enter>:

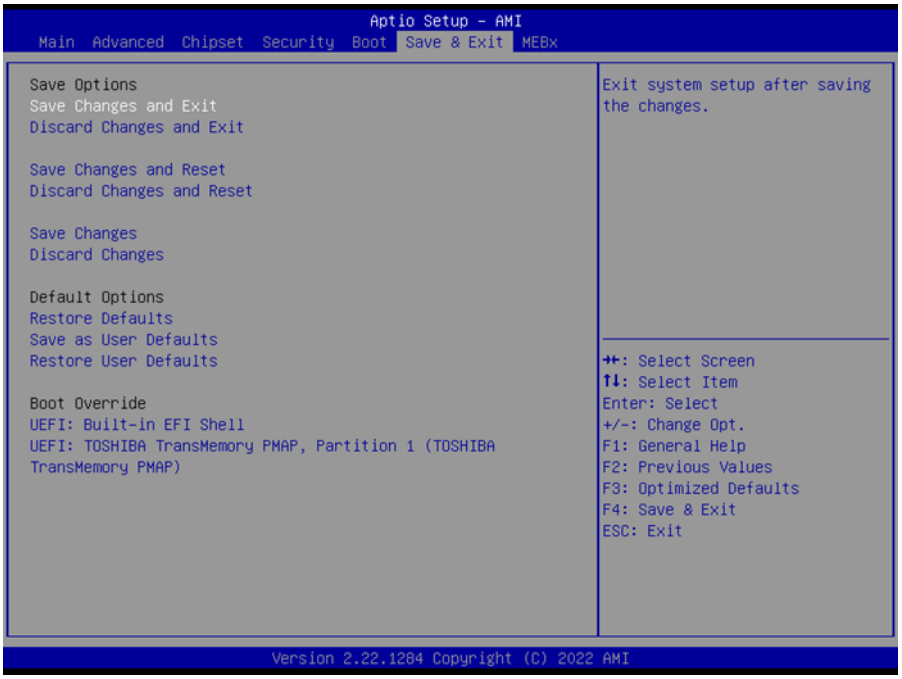
- **Change Administrator / User Password**
  Select this option and press <ENTER> to access the sub menu, and then type in the password.
- **Secure Boot**
  Secure Boot Configurations.

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 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 active boot option. 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.

Appendix A

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
2E8h-2EFh	Communications Port (COM4)
2F0h-2F7h	EC/PMC Controller
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 Graphic
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	EC Watch Dog
IRQ6	CANBus Controller
IRQ7	Communications Port (COM3)
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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