

AFE-E350

**Intel® Atom™ x6000E Series and
Intel® Celeron® J Series (Code
Name: Elkhart Lake)
3.5" SBC**

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This manual is for the AFE-E350.

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.

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



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

- 1 x AFE-E350 SBC
- 1 x SATA Cable 30cm (p/n: 1700006291)
- 1 x SATA Power Cable 35cm (p/n: 1700031583-01)
- 1 x USB 2.0 Cable, 20 cm (p/n: 1700030406-01)
- 2 x COM RS-232/422/485 Cable 20cm (p/n: 1700030404-01)
- 2 x COM RS232 4-Wire Cable 20cm (p/n: 1700031582-01)
- 1 x Heatsink for Wide Temp -40 ~ 85°C or (p/n: 1970005855T001)
- 1 x Heatsink for Standard Temp 0 ~ 60°C (p/n: 1970005873T001)
- 1 x Startup Manual (p/n: 2046E35000)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Optional Accessories

Part number	Description
TBU	CPU Heat spreader of AFE-E350
MIOE-PSE-DPA1	MIOe-PSE dual-port PSE power module
1700035016-01	4-wire COM RS-422/485 cables
1700032181-01	USB 3.0 USB-A 9P(F) x 2 35cm
MIOE-PSE-SPA1	MIOe-PSE PoE Module A1 Single 30W
1700019584-01	Audio Cable 20cm

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Chapter 1

General Information

This chapter gives background information on the AFE-E350.

Sections include:

- Introduction
- Specifications
- Block Diagram

1.1 Introduction

The AFE-E350 is designed for Electric Vehicle Supply Equipment (EVSE) solutions and harsh industrial environment applications. It features a wide voltage range of 12V to 24V and multiple I/O options. The AFE-E350 includes three Ethernet ports (one for out-of-band management) and two optional PoE ports, CAN bus, and high-speed UARTs. Additionally, it offers network expansion capabilities through M.2 E-Key and B-Key ports, supporting Wi-Fi and 5G/LTE modules.

The AFE-E350 features EdgeBMC and DeviceOn system monitoring and control. EdgeBMC ensures device restart under any circumstances, using Out-of-Band Management (OOBM) to create a distinct management network accessible via the Internet. This allows administrators to remotely manage devices, even if the OS or BIOS has crashed.

1.2 Specifications

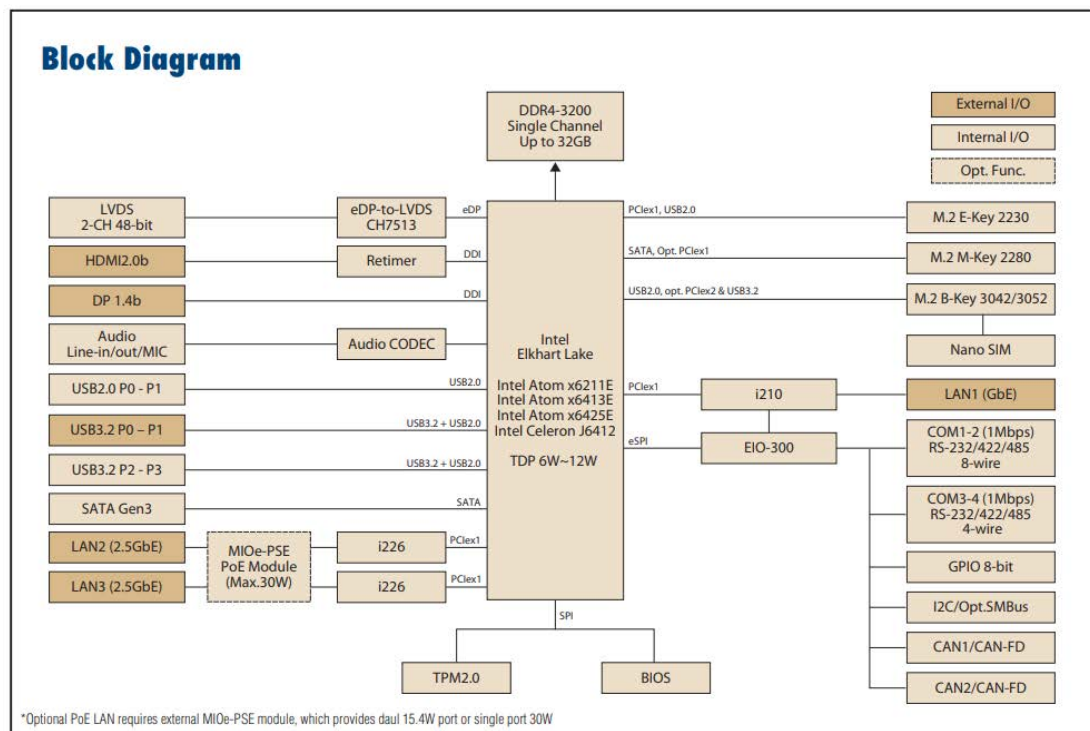
Table 1.1: Specifications

Platform	Processor	Intel® Atom® x6211E	Intel® Atom® x6413E	Intel® Atom® x6425E	Intel® Celeron® J6412
	Max. Frequency	3.0GHz	3.0GHz	3.0GHz	2.6GHz
	Base Frequency	1.3GHz	1.5GHz	2.0GHz	2.0GHz
	Cores/Threads	2/2	4/4	4/4	4/4
	LLC	L2	L2	L2	L2
	CPU TDP	6W	9W	12W	10W
	Chipset	Intel® Chipset (SoC Integrated)			
	BIOS	AMI UEFI 256Mbit			
Memory	Technology	DDR4-3200 SDRAM			
	Max. Capacity	Up to 32GB			
	Channel/Socket	Single Channel / 1 Socket			
Graphics	Controller	Intel Gen11 Graphics Engines (SoC integrated)			
	Max. Frequency	750MHz	750MHz	750MHz	800MHz
	Base Frequency	350MHz	500MHz	500MHz	400MHz
	3D/HW Acceleration	DX12, OGL4.5, OCL1.2, Vulkan 1.1; HW encode HEVC/H.265, MPEG2, JPEG/MJPEG			
Display I/F	LCD	LVDS Dual Channel 18-/24-bit LVDS			
	HDMI	1 x HDMI 2.0 up to 4096 x 2160 x 24bpp @60Hz			
	DP	1 x DP 1.4a, up to 4096 x 2160 x 36bpp @60Hz			
	Multiple Displays	3 simultaneous displays: LVDS/HDMI/DP			
Ethernet	Controller	LAN1: Intel i210; LAN2&3: Intel i226 Support TSN			
	Speed	LAN1: 1Gbps; LAN2&3: 2.5Gbps			

Table 1.1: Specifications			
External I/O	Ethernet	3 x RJ-45 LAN1: Supports EdgeBMC Out-of-Band (OOB) remote control LAN2 & LAN3: Support optional PoE PSE compliant with 802.3af (PSE module: MIOe-PSE)*	
	HDMI/DP	1/1	
	USB 3.2	2	
	Power DC-Jack	2-pin Phoenix connector, optional 4-pin ATX connector*	
Internal I/O	SATA	1 x SATA Gen III 6.0 Gbps	
	USB	2 x USB 3.2; 2 x USB 2.0	
	Serial Bus	I2C default, optional SMBus	
	COM Port	2 x RS-232/422/485(8-wire), 2 x RS-232/422/485 (4-wire)	
	GPIO	8-bit general purpose input output I/O	
	Audio	Realtek ALC888S, Line-In/Line-Out/MIC	
	Inverter	12V/5V	
	CAN Bus	2 x CAN-FD up to 8Mbps	
	Fan	4-wire smart fan	
	Front Panel Control	Power-On, Reset, Buzzer, 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 (default USB 2.0, optional PCIe x2*) w/ Nano-SIM	
	M.2 M-Key	1 x M-Key 2280 (default SATA III, optional PCIe x1*)	
Power	Supply Voltage	Vin: DC 12~24V +/- 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	Extended: -40 ~ 85°C (-40 ~ 185°F)	Standard: 0 ~ 60°C (32 ~ 140°F)
	Humidity	Operating: 40°C @ 95% relative humidity, non-condensing Storage: 60°C @ 95%relative humidity, non-condensing	
	Vibration Resistance	3.5 Grms	
Certifications	EMC	CE, FCC Class B	
Mechanical	Dimensions	146 x 102 mm (5.7" x 4")	

*Note: Supported by request

1.3 Block Diagram



Chapter 2

Mechanical

This chapter provides mechanical information on the AFE-E350.

Sections include:

- Mechanical Drawings
- Assembly Drawing

This chapter includes dimensions for the motherboard and the standard thermal solution.

2.1 Board Layout: Dimensions

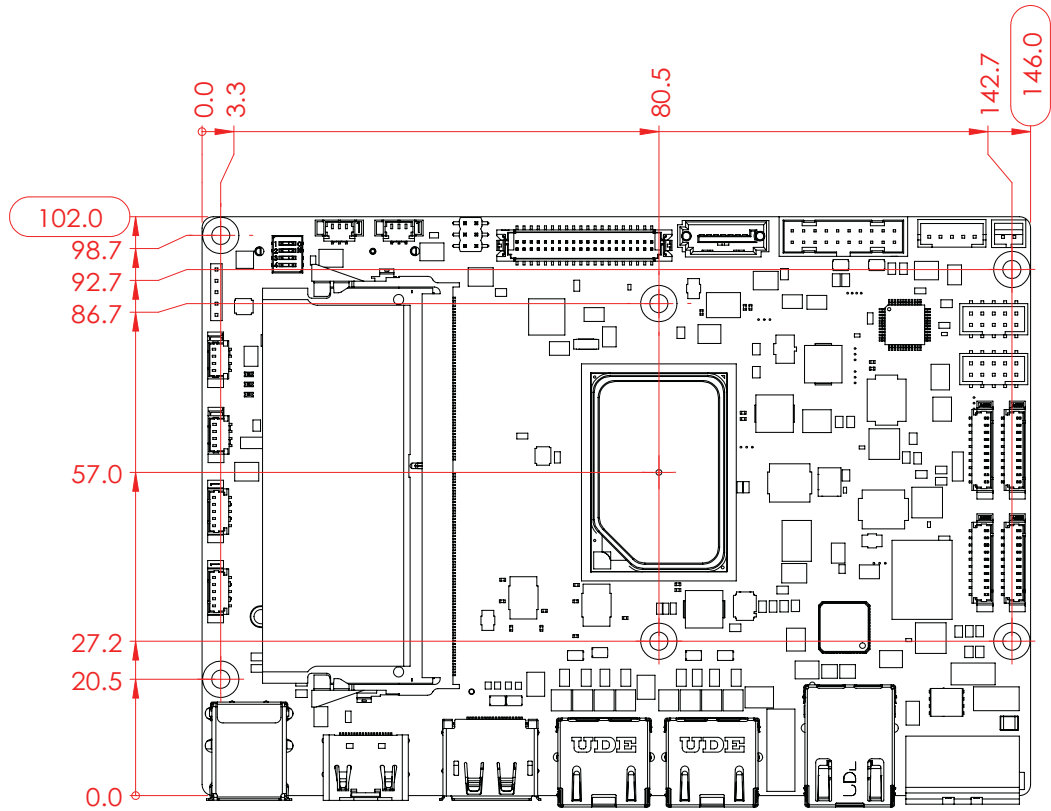


Figure 2.1 AFE-E350 Mechanical Diagram (Top Side)

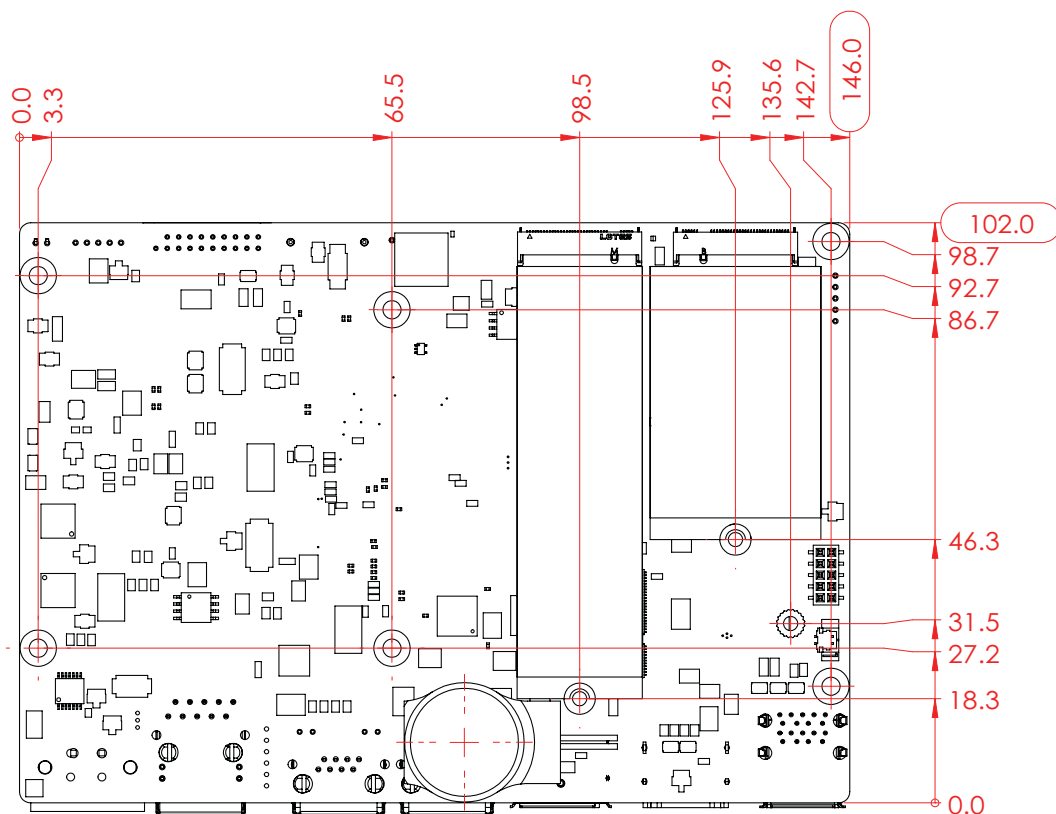


Figure 2.2 AFE-E350 Mechanical Diagram (Bottom Side)

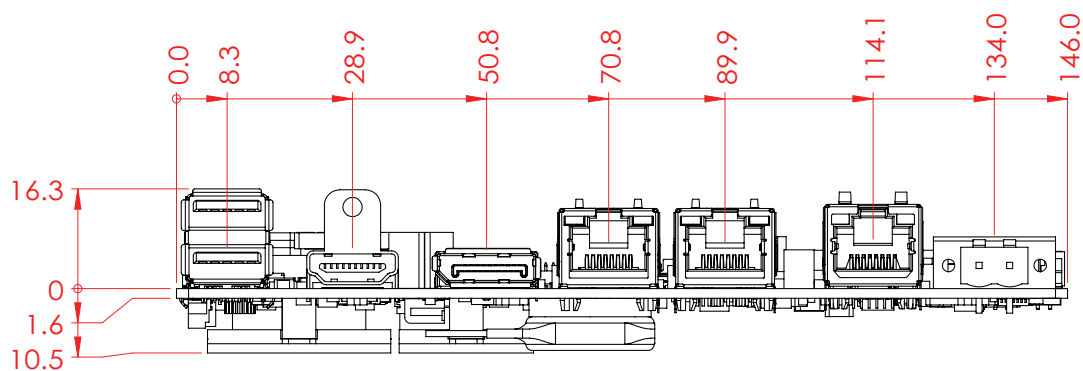


Figure 2.3 AFE-E350 Mechanical Diagram (Coastline)

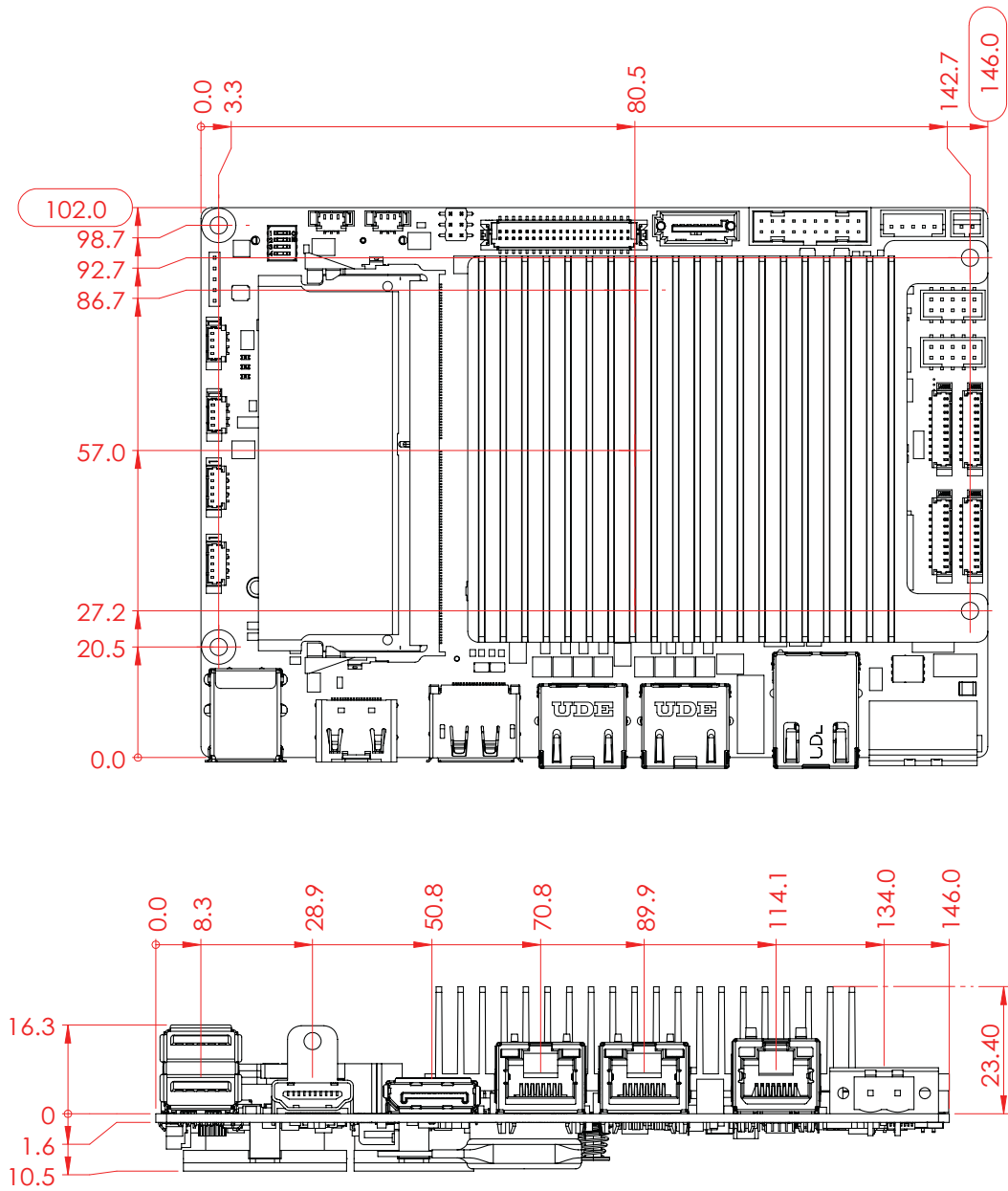


Figure 2.4 AFE-E350 Mechanical Diagram (With 0 ~ 6°C Heatsink)

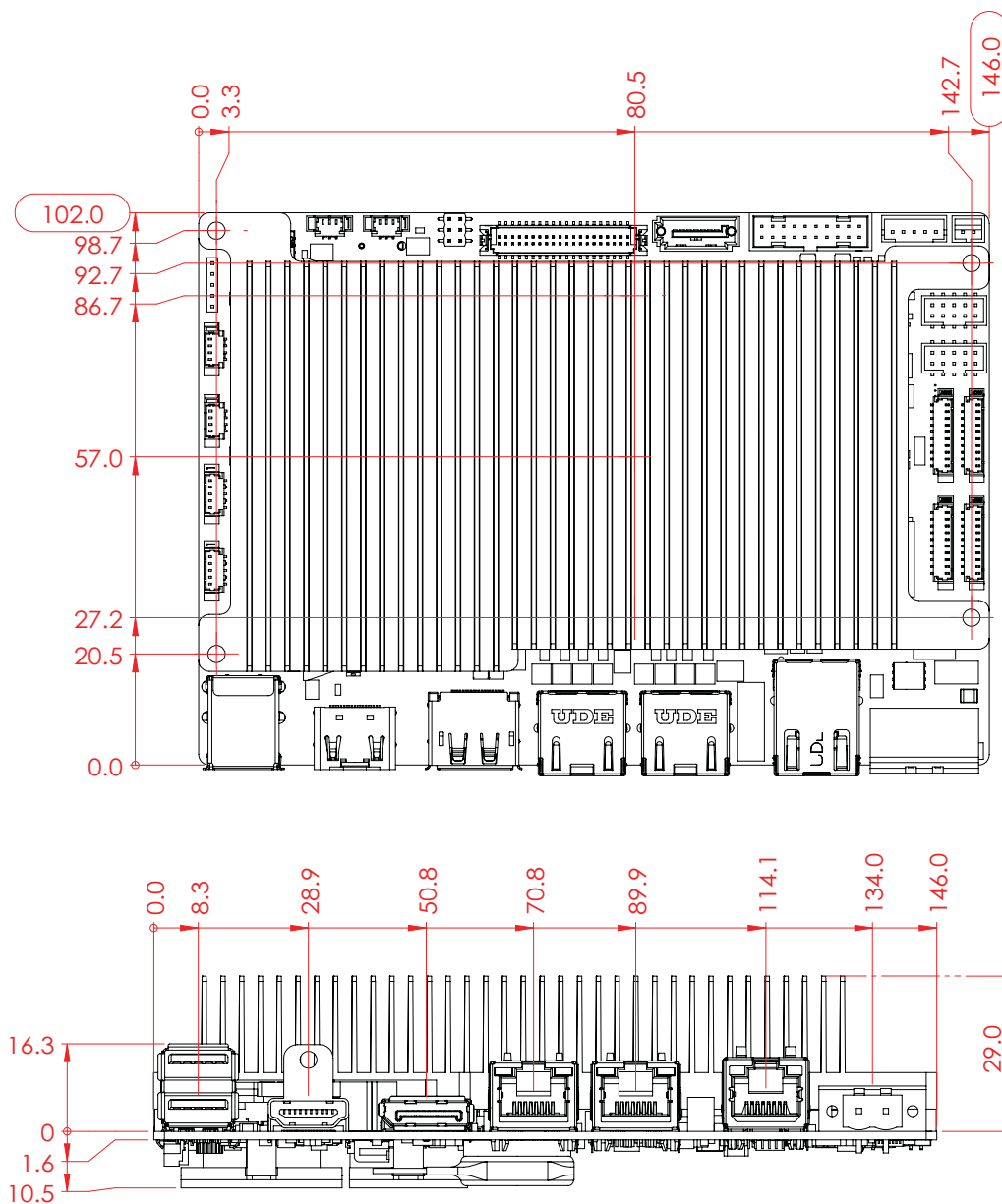


Figure 2.5 AFE-E350 Mechanical Diagram (With -40 ~ 85°C Heatsink)

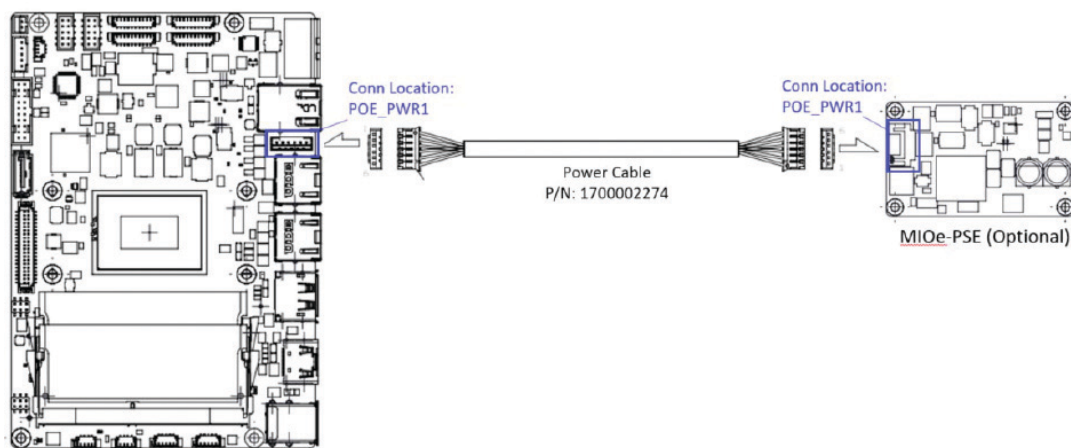


Figure 2.6 AFE-E350 PoE Module Assembly Guide (Optional MIOe-PSE Module)

Chapter 3

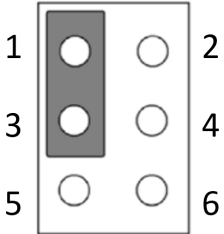
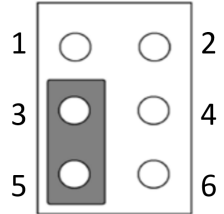
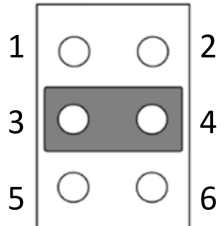
Installation

This chapter explains the setup procedures for the AFE-E350 hardware, including instructions on setting jumpers and connecting peripherals, switches, and indicators. Be sure to read all safety precautions before you begin the installation procedure.

3.1 Jumpers & Switches

The AFE-E350 has a number of jumpers that allow you to configure your system to suit your application. The table below lists the functions of the various jumpers.

3.1.1 Panel Voltage Selection Jumper: VDD1

VDD1	LCD Power Setting
Jumper position for +3.3V (Default)	
Jumper position for +5V	
Jumper position for +12V	
VDD1	LCD Power Setting
Setting	Function
1-3	+3.3V (*Default)
3-5	+5V
3-4	+12V

3.1.2 AT Mode / Load BIOS Default: SW1

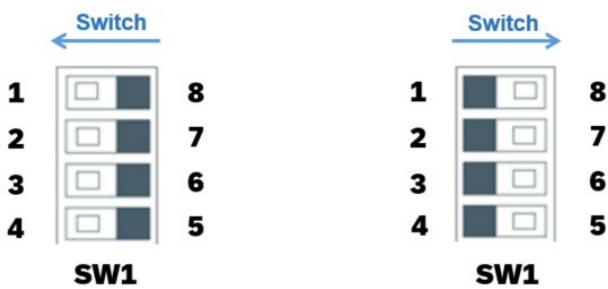


Figure 3.1 SW1: Miscellaneous Selection

Jumper Short	Panel Functional
1	ATX_DET
2	LOAD_BIOS_DEFAULT (Default_off)
3	GPI (no function)
4	Topswap (Default_off)
5	Topswap (On)
6	GPI (no function)
7	LOAD_BIOS_DEFAULT (On)
8	AT_DET# (Default)

3.2 Connectors

Onboard connectors link the AFE-E350 to external devices such as hard disk drives and a keyboard. The table below lists the function of each of the board's connectors.

	Description	Part Reference
1	I2C_1	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	USB2	USB 3.2 Dual-Port Connector
6	CANBUS2	CAN Bus Internal Connector
7	DIMMA1	DDR4 SODIMM Connector
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, DCIN2	DC Power Input Connector
15	COM2	COM-Port Internal Connector 2
16	COM1	COM-Port Internal Connector 1
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	CANBUS1	CAN Bus Internal Connector

3.3 Locating Connectors

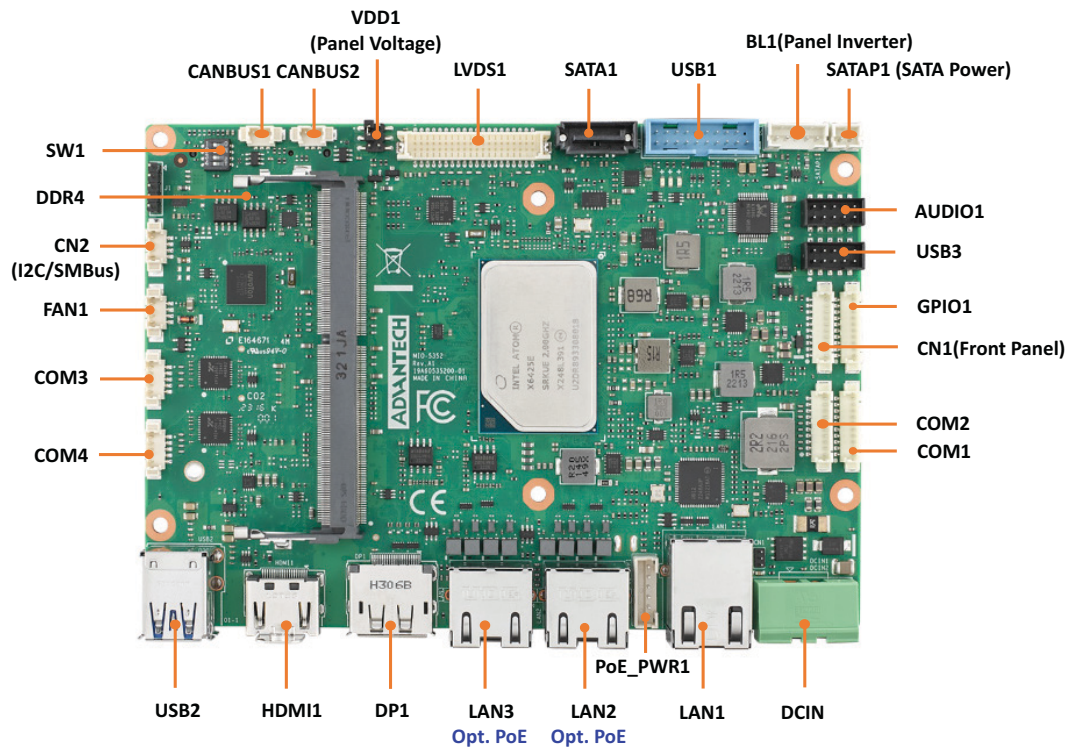


Figure 3.2 AFE-E350 Connector Locations (Top Side)

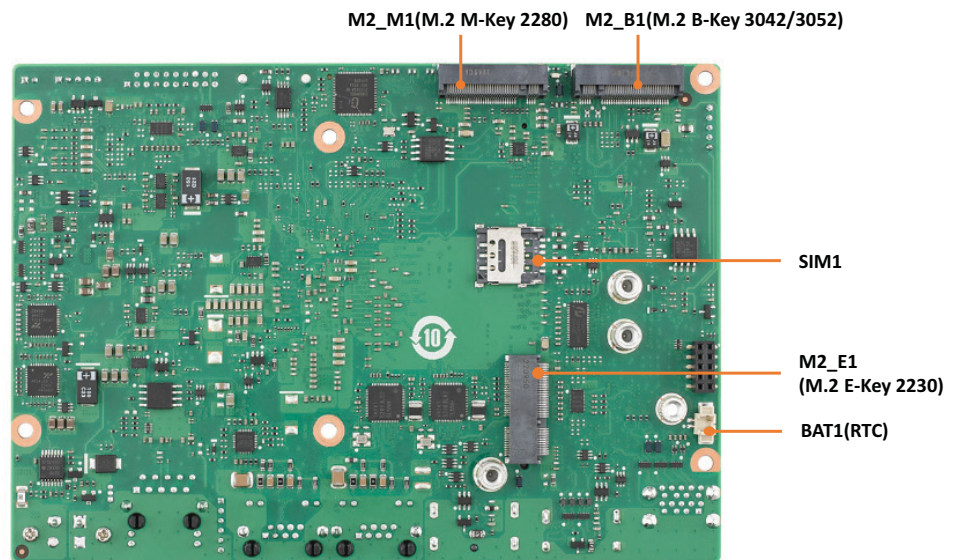
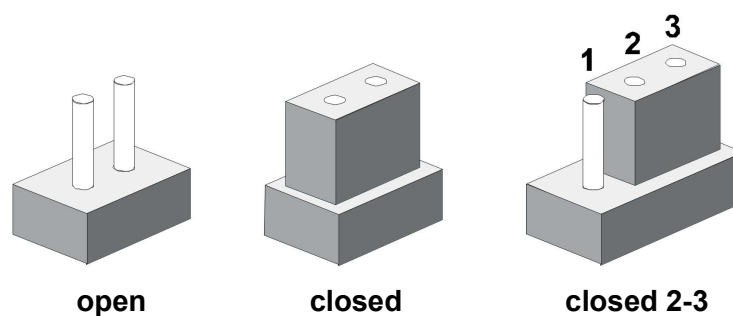


Figure 3.3 AFE-E350 Connector Locations (Bottom Side)

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: I2C_1

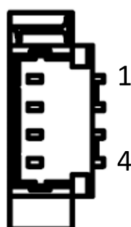


Table 3.1: I2C Internal Connector: I2C_1

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

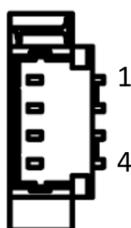


Table 3.2: Smart Fan Internal Connector: FAN1

Pin	Signal Pin Definition
1	GND
2	+V12
3	FAN_SPEED
4	FAN_V5_PWM

3.4.3 COM-Port Internal Connector 3: COM3

**Table 3.3: COM-Port Internal Connector 3: COM3**

Pin	Signal Pin Definition
1	COM3_RS232-TXD_RS422-RX+
2	COM3_RS232-RTS#_RS422-RX-
3	COM3_RS232-RXD_RS422-TX+_RS485-DAT+
4	COM3_RS232-CTS#_RS422-TX-_RS485-DAT-
5	GND

3.4.4 COM-Port Internal Connector 4: COM4

**Table 3.4: COM-Port Internal Connector 4: COM4**

Pin	Signal Pin Definition
1	COM4_RS232-TXD_RS422-RX+
2	COM4_RS232-RTS#_RS422-RX-
3	COM4_RS232-RXD_RS422-TX+_RS485-DAT+
4	COM4_RS232-CTS#_RS422-TX-_RS485-DAT-
5	GND

3.4.5 POE Power Internal Connector: POE_PWR1

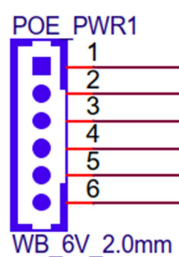


Table 3.5: POE Power Internal Connector: POE_PWR1

Pin	Signal Pin Definition
1	+V48_LAN2+
2	+V48_LAN2-
3	+V48_LAN3+
4	+V48_LAN3-
5	GND
6	+VDCIN (12V~24V)

3.4.6 COM-Port Internal Connector 1: COM1

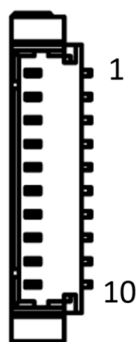


Table 3.6: COM-Port Internal Connector 1: COM1

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

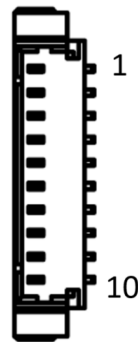


Table 3.7: COM-Port Internal Connector 2: COM2

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 DB9 Connector Pinout

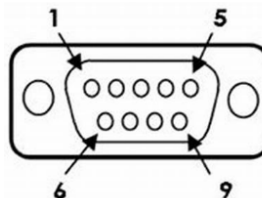


Table 3.8: DB9 Connector Pinout

DB9 Pin	RS-232	RS-485/RS-422 Full Duplex	RS-485 Half Duplex
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	RX+	
4	DTR	RX-	
5		Ground	
6	DSR		
7	RTS		
8	CTS		
9	RI		

3.4.9 Front Panel Internal Connector: CN1

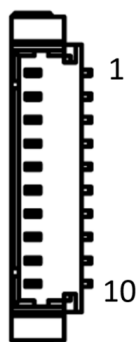


Table 3.9: Front Panel Internal Connector: CN1

Pin	Signal Pin Definition
1	GND
2	BUZZER-
3	BUZZER+
4	RDC_CASEOPEN
5	FP_HDD_A_LED#
6	FP_a_PSIN#
7	FP_a_RST#
8	+V3.3
9	NC
10	+V5

3.4.10 GPIO Internal Connector: GPIO1

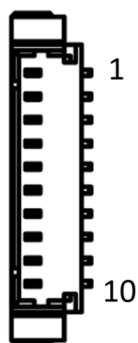


Table 3.10: GPIO Internal Connector: GPIO1

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

3.4.11 USB 2.0 Dual-Port Internal Connector: USB3

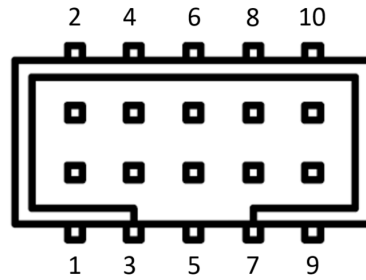


Table 3.11: USB2.0 Dual-Port Internal Connector: USB3

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

3.4.12 Audio Internal Connector: AUDIO1

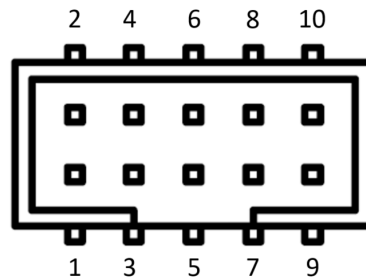


Table 3.12: Audio Internal Connector: AUDIO1

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

3.4.13 CAN Bus Internal Connector: CANBUS1, CANBUS2

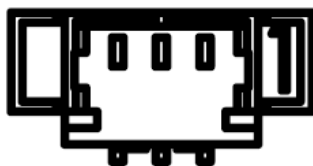


Table 3.13: CAN Bus Internal Connector: CANBUS1, CANBUS2

Pin	Signal Pin Definition
1	CAN1_D+
2	CAN1_D-
3	GND

3.4.14 SATA Power Connector: SATA_PWR1



Table 3.14: SATA Power Connector: SATA_PWR1

Pin	Signal Pin Definition
1	+V5SATA0
2	GND

3.4.15 Panel Inverter Connector: BL1

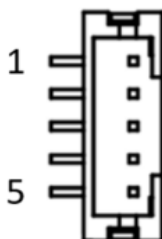


Table 3.15: Panel Inverter Connector: BL1

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

3.4.16 USB 3.2 Dual-Port Internal Connector: USB1

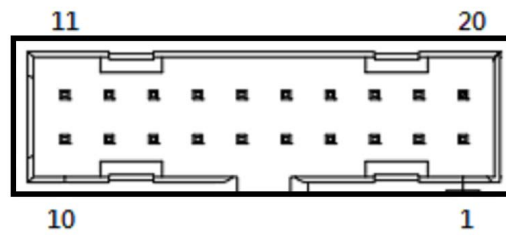


Table 3.16: USB 3.2 Dual-Port Internal Connector: USB1

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

3.4.17 LVDS Connector: LVDS1

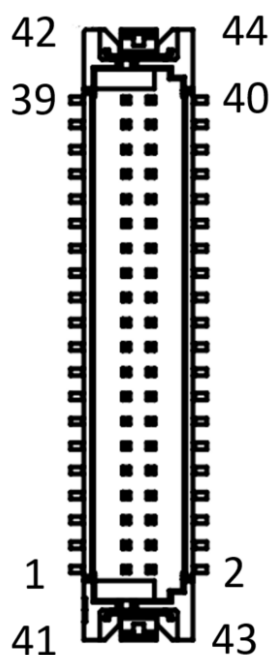


Table 3.17: LVDS Connector: LVDS1

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+

Table 3.17: LVDS Connector: LVDS1

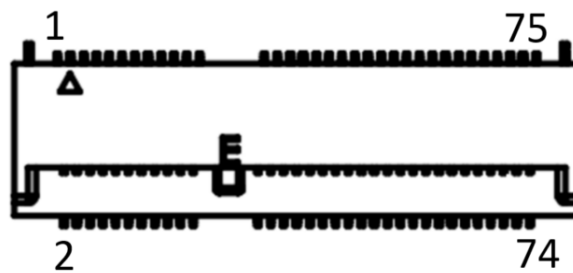
28	LVDS1_1_CLK+
29	GND
30	GND
31	LVDS0_DDCCLK_AUX+
32	LVDS0_DDCCLK_AUX-
33	GND
34	GND
35	LVDS1_0_D3-
36	LVDS1_1_D3-
37	LVDS1_0_D3+
38	LVDS1_1_D3+
39	NC
40	LVDS1_VCON
41	NC
42	NC
43	NC
44	NC

3.4.18 RTC Battery Connector: BAT1

**Table 3.18: RTC Battery Connector: BAT1**

Pin	Signal Pin Definition
1	GND
2	+VBAT_a1

3.4.19 M.2 E-Key Connector: M2_E1

**Table 3.19: M.2 E-Key Connector: M2_E1**

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#

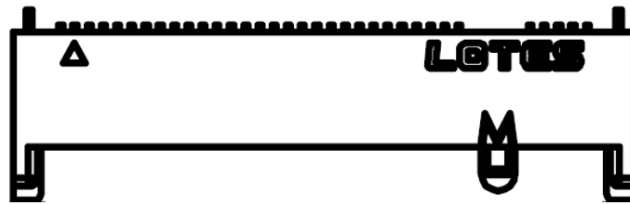
Table 3.19: M.2 E-Key Connector: M2_E1

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

Table 3.19: M.2 E-Key Connector: M2_E1

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

3.4.20 M.2 M-Key Connector: M2_M1

**Table 3.20: M.2 M-Key Connector: M2_M1**

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

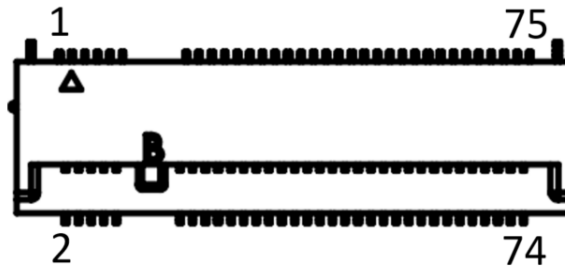
Table 3.20: M.2 M-Key Connector: M2_M1

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

Table 3.20: M.2 M-Key Connector: M2_M1

74	+V3.3A_M.2_M
75	GND
H1	NC
H2	NC
H3	NC
H4	NC

3.4.21 M.2 B-Key Connector: M2_B1

**Table 3.21: M.2 B-Key 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	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

Table 3.21: M.2 B-Key Connector: M2_B1

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

3.4.22 DC Power Input Connector: DCIN1

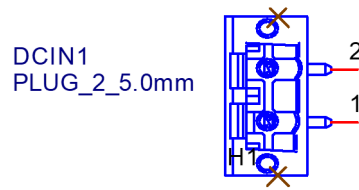


Table 3.22: DC Power Input Connector: DCIN1

Pin	Signal Pin Definition
1	GND
2	+VIN_DCIN (DC12V~24V)

3.4.23 DC Power Input Connector: DCIN2

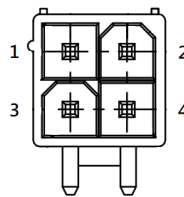


Table 3.23: DC Power Input Connector: DCIN2

Pin	Signal Pin Definition
1	GND
2	GND
2	+VIN_DCIN (DC12V~24V)
2	+VIN_DCIN (DC12V~24V)

3.4.24 Nano SIM Connector: SIM1

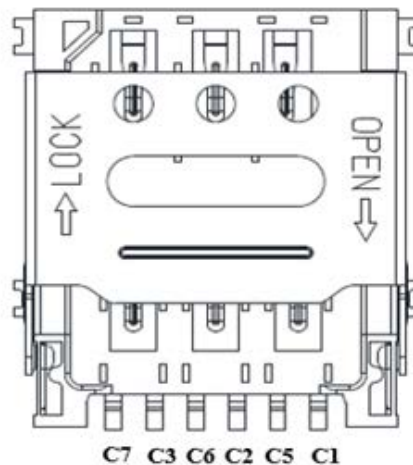


Table 3.24: Nano SIM Connector: SIM1

Pin	Signal Pin Definition
C1	VCC
C2	RESET
C3	Clock
C5	GND

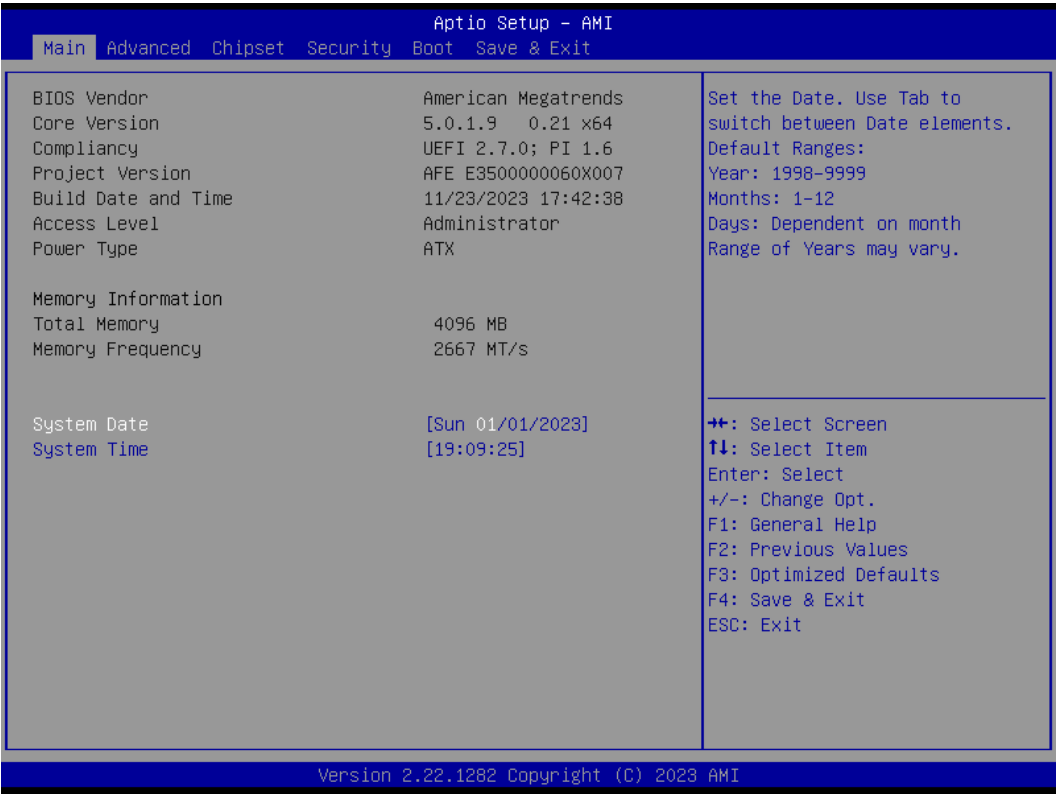
Table 3.24: Nano SIM Connector: SIM1

C6	VPP
C7	DATA

Chapter 4

BIOS Setup

AMIBIOS has been integrated into a plethora of 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 AFE-E350 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 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 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.

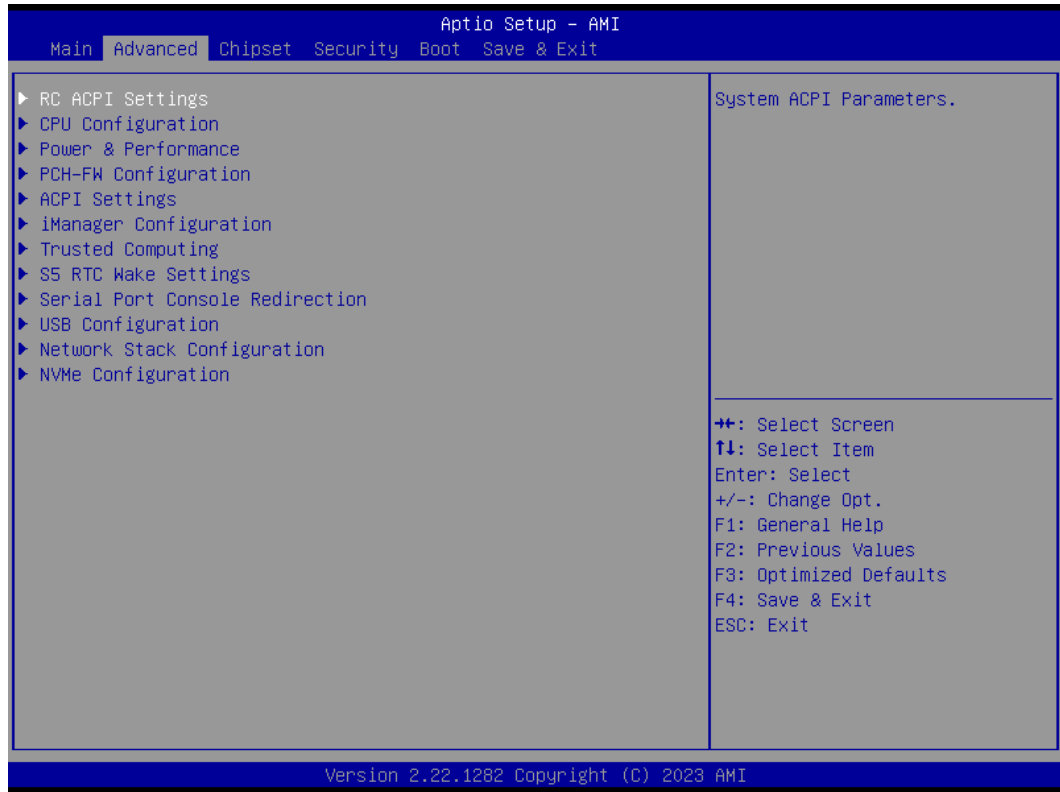
■ System Time / System Date

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.

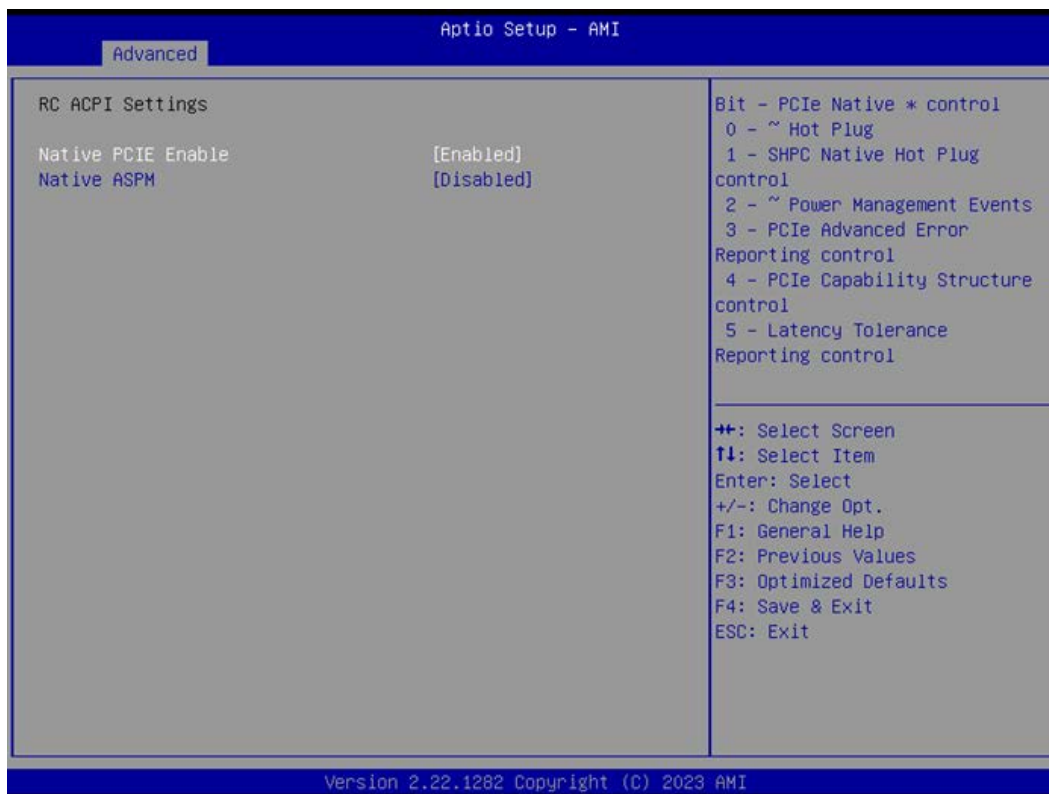
Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

4.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the AFE-E350 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub-menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub-menus are described on the following pages.

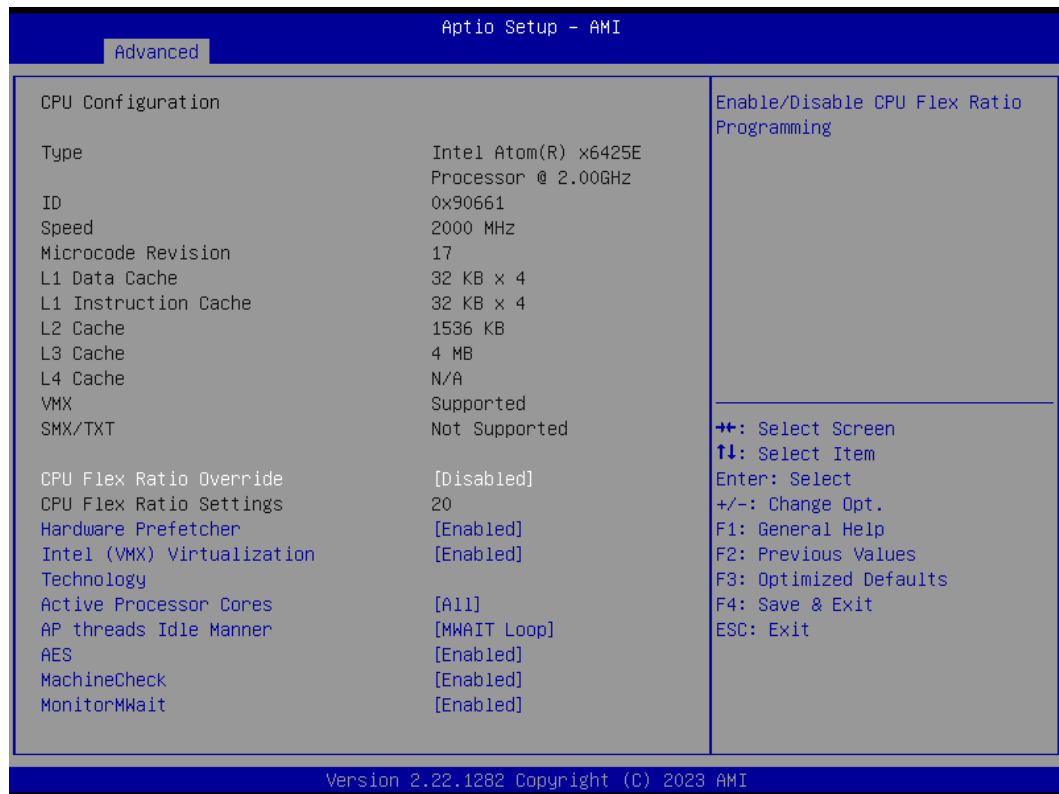


4.1.2.1 RC ACPI Settings



- **Native PCIE Enable**
Enable/Disable PCIE Native Control reported in the ACPI Table.
- **Native ASPM**
Choose if the ASPM feature is controlled by OS or BIOS.

4.1.2.2 CPU Configuration



- **CPU Flex Ratio Override**
Enable/Disable CPU Flex Ratio Programming.
- **Hardware Prefetcher**
This item allows users to enable or disable the hardware prefetcher feature.
- **Intel (VMX) Virtualization Technology**
When Enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology.
- **Active Processor Cores**
This item allows users to set how many processor cores should be active.
- **AP threads Idle Manner**
AP threads Idle Manner for waiting signal to run.
- **AES**
Enable/Disable AES (Advanced Encryption Standard).
- **MachineCheck**
Enable/Disable Machine Check.
- **MonitorMWait**
Enable/Disable MonitorMWait.

4.1.2.3 Power & Performance



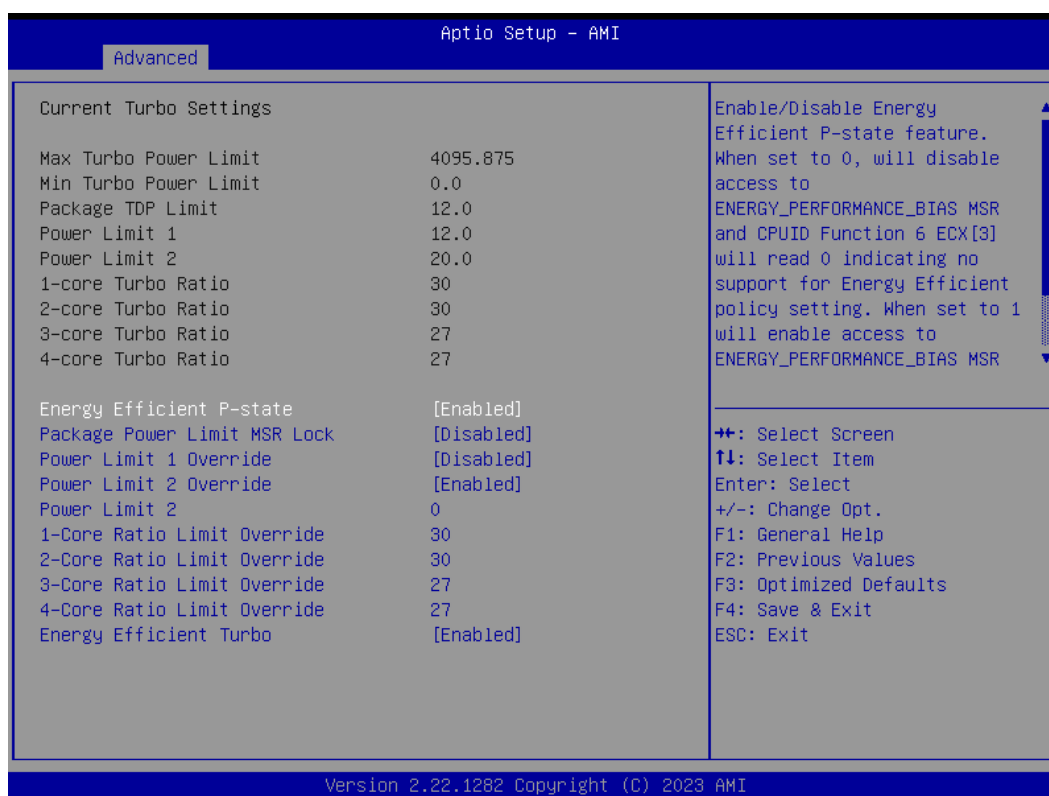
- **CPU – Power Management Control**
CPU – Power Management Control Options.
- **GT – Power Management Control**
GT – Power Management Control Options.

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.
- **Race to Halt (RTH)**
Enable/Disable the Race to Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power.
- **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.
- **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.
- **Power Limit 3 Settings**
Power Limit 3 Settings.

View/Configure Turbo Options



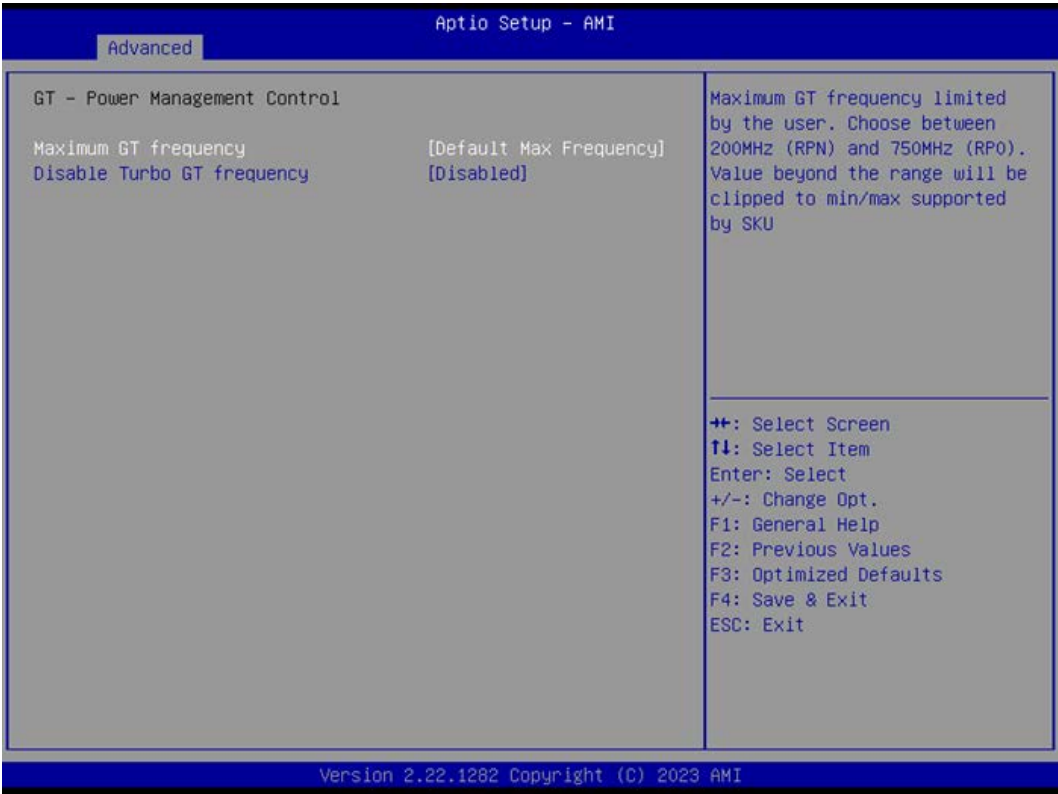
- **Energy Efficient P-state**
Enable/Disable Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**
Enable/Disable locking of Package Power Limit settings.
- **Power Limit 1 Override**
Enable/Disable Power Limit 1 override.
- **Power Limit 2 Override**
Enable/Disable Power Limit 2 override.
- **Power Limit 2**
Power Limit 2 value in milliwatts. BIOS will round to the nearest 1/8W when programming.
- **Energy Efficient Turbo**
Enable/Disable Energy Efficient Turbo feature.
- **1-Core Turbo Ratio Limit Ratio (TRLR) Override**
1-Core Turbo Ratio Limit Ratio (TRLR).
- **2-Core Turbo Ratio Limit Ratio (TRLR) Override**
2-Core Turbo Ratio Limit Ratio (TRLR).
- **3-Core Turbo Ratio Limit Ratio (TRLR) Override**
3-Core Turbo Ratio Limit Ratio (TRLR).
- **4-Core Turbo Ratio Limit Ratio (TRLR) Override**
4-Core Turbo Ratio Limit Ratio (TRLR).

Power Limit 3 Settings



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

4.1.2.3.2 GT - Power Management Control



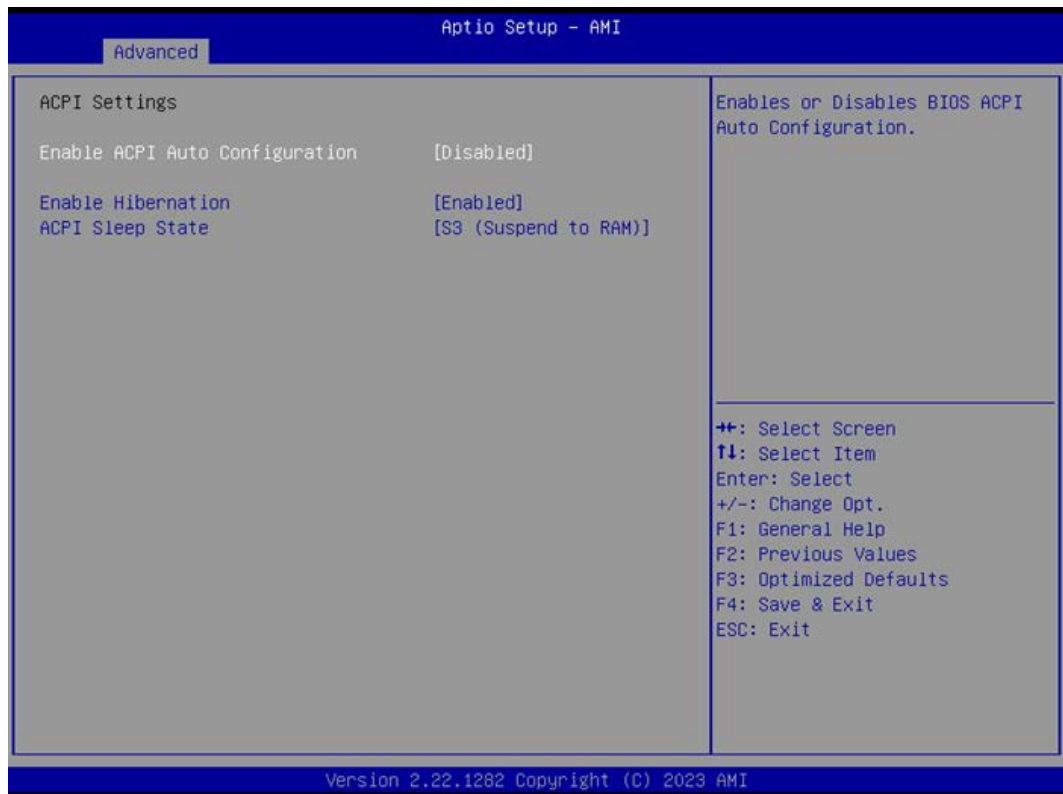
- **RC6 (Render Standby)**
Check to enable render standby support.
- **Maximum GT frequency**
Maximum GT frequency limited by user.
- **Disable Turbo GT frequency**
Enabled/Disabled Turbo GT frequency.

4.1.2.4 PCH-FW Configuration



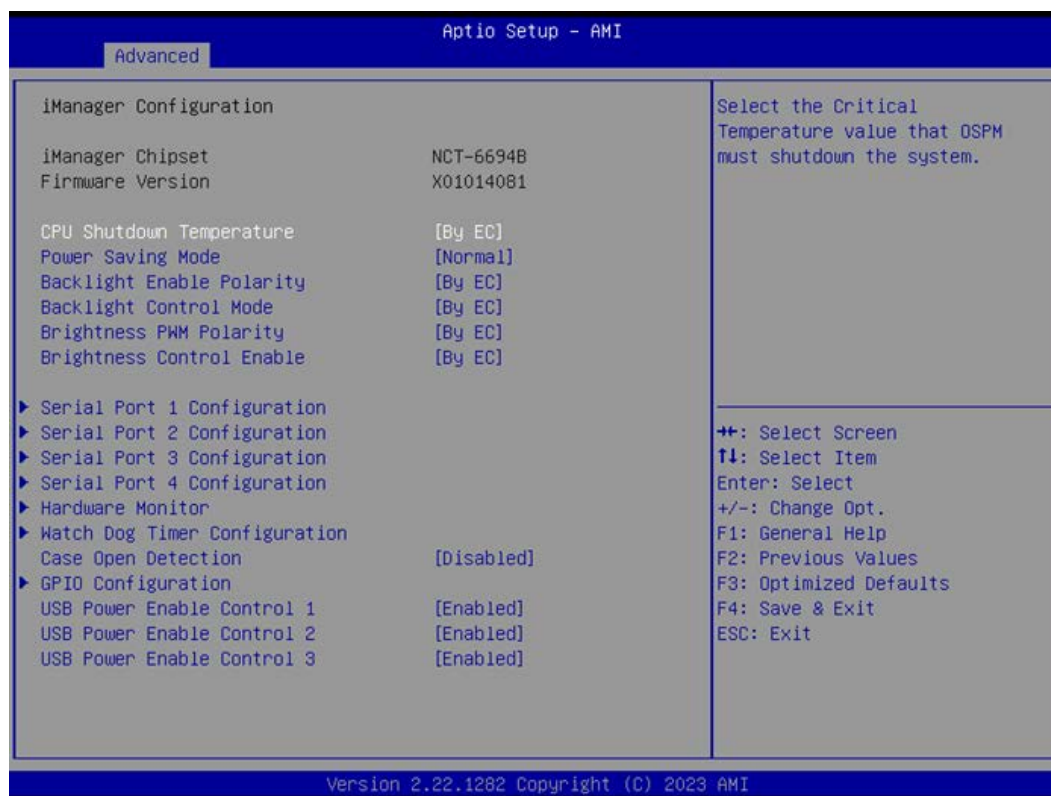
- **ME State**
When Disabled, ME will be put into Temporarily Disabled Mode.
- **ME Unconfig on RTC Clear**
When Disabled, ME will not be unconfigured on RTC Clear.
- **Core BIOS Done Message**
Enable/Disable Core BIOS Done message sent to ME.
- **Firmware Update Configuration**
Configure Management Engine Technology Parameters.

4.1.2.5 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 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.

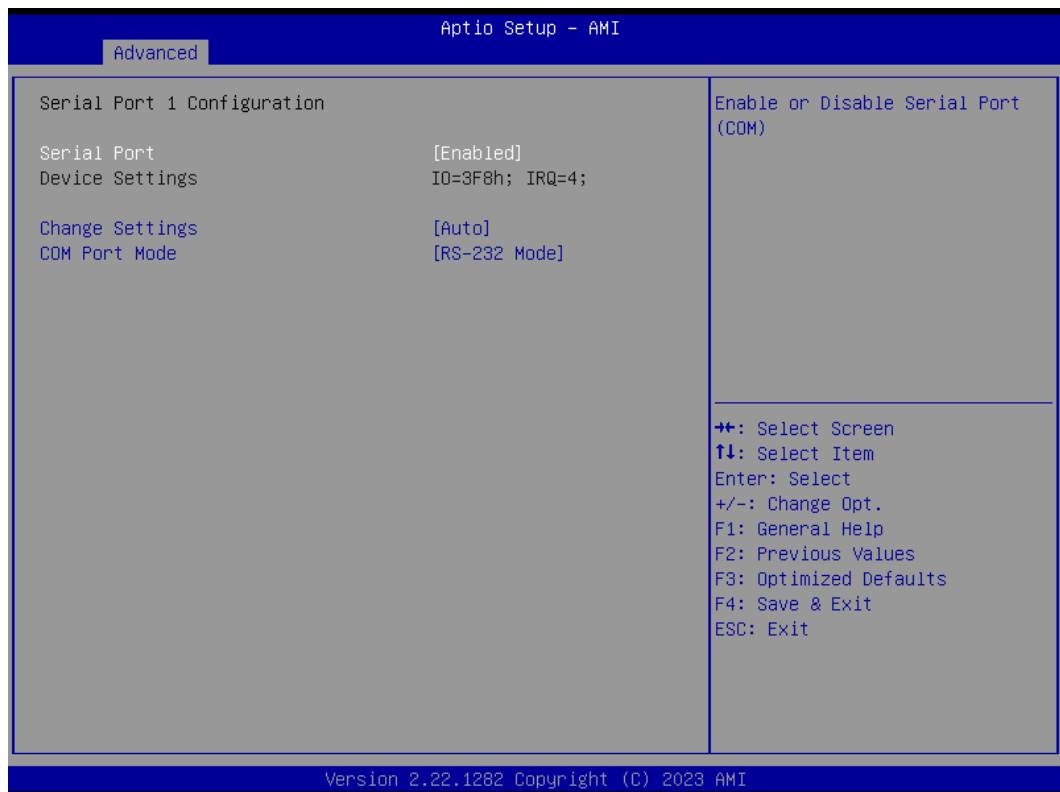
4.1.2.6 iManager Configuration



- **ACPI Shutdown Temperature**
Select the Critical Temperature value at which the OSPM must shut down the system.
- **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 the 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.

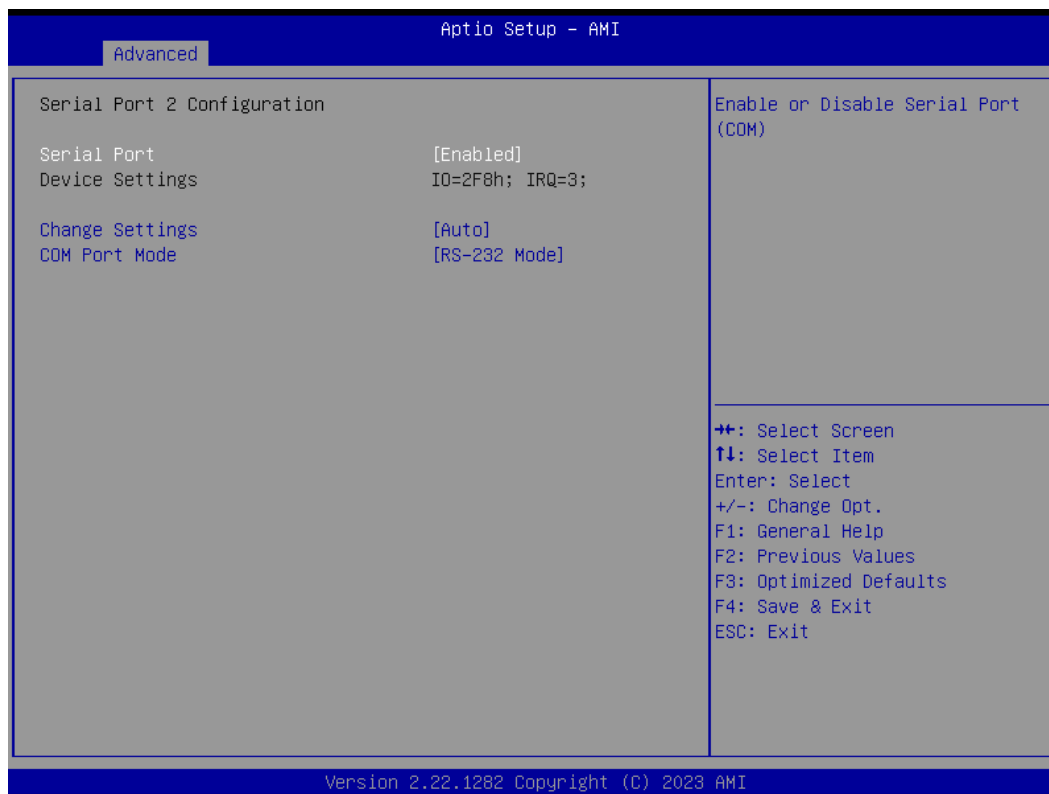
- **Watch Dog Timer Configuration**
Watch Dog Timer Configuration Page.
- **Case Open Detection**
Enable or Disable Case Open Detect Function.
- **GPIO Configuration**
GPIO Configuration Settings.
- **EdgeBMC Network Configuration**
EdgeBMC Network Configuration Parameters.
- **USB Power Enable Control 1/2/3**
Enable or Disable USB SS/HS Port Power in S4/S5.

4.1.2.6.1 Serial Port 1 Configuration



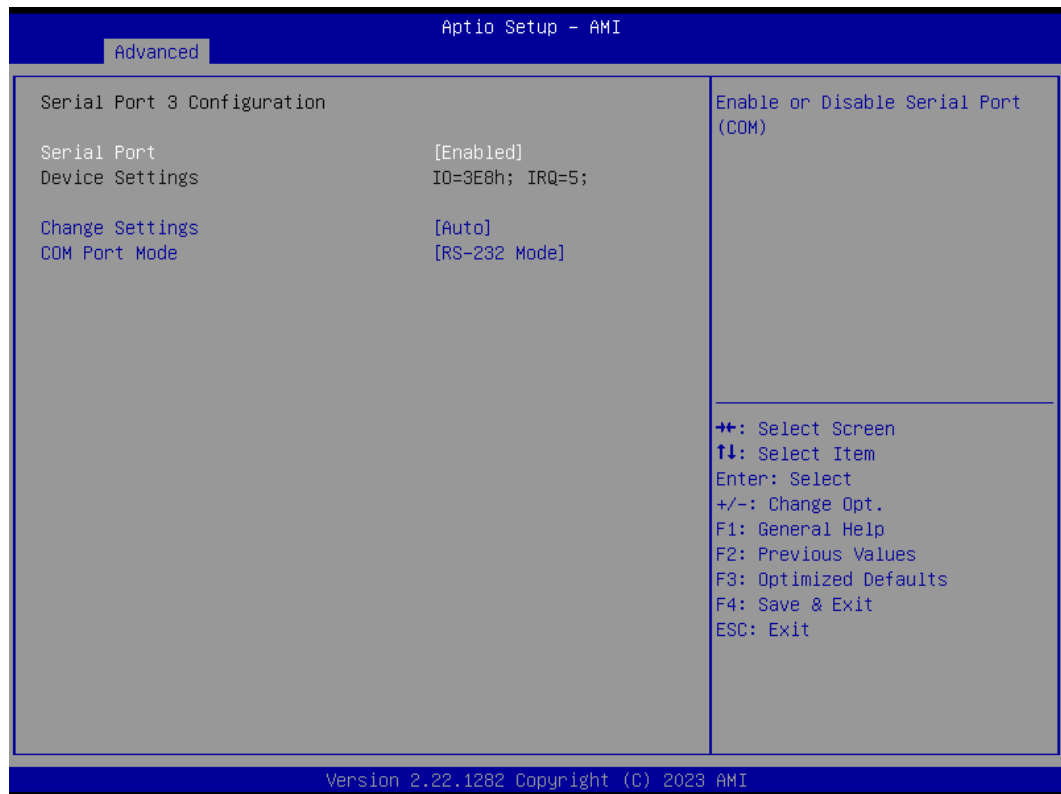
- **Serial Port**
Enable or Disable Serial Port (COM).
- **Change Settings**
Select optimal settings for a Super IO device.
- **COM Port Mode**
COM Port Mode Select.

4.1.2.6.2 Serial Port 2 Configuration



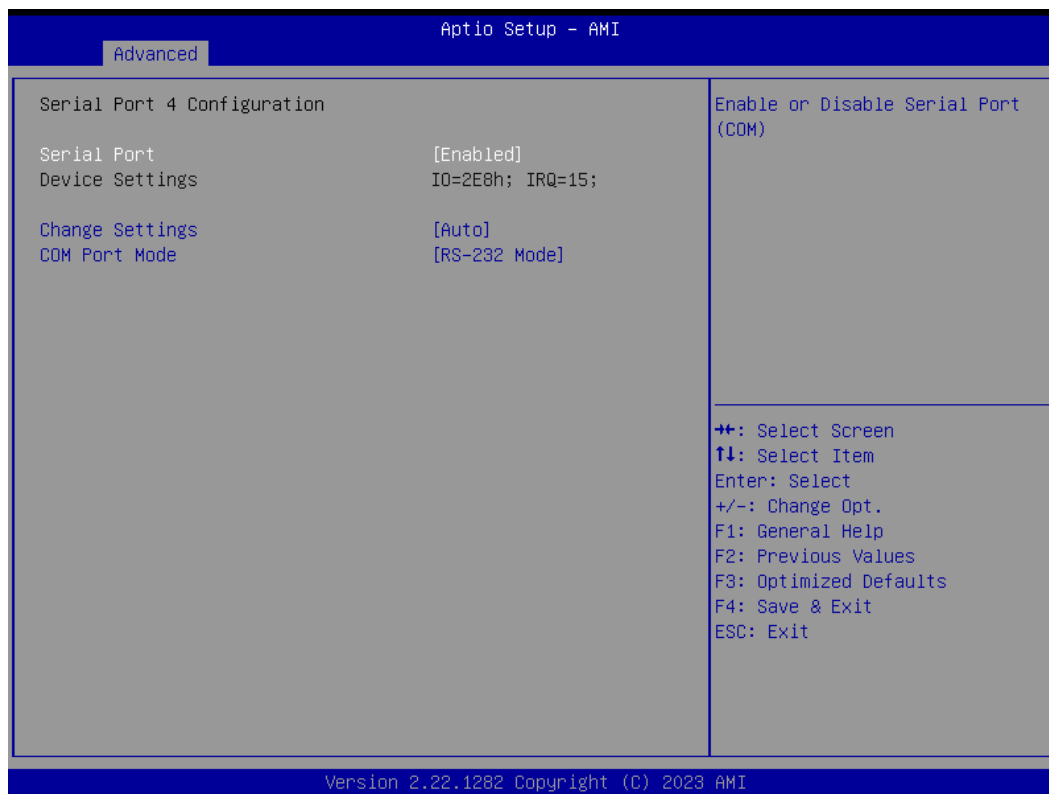
- **Serial Port**
Enable or Disable Serial Port (COM).
- **Change Settings**
Select optimal settings for a Super IO device.
- **COM Port Mode**
COM Port Mode Select.

4.1.2.6.3 Serial Port 3 Configuration



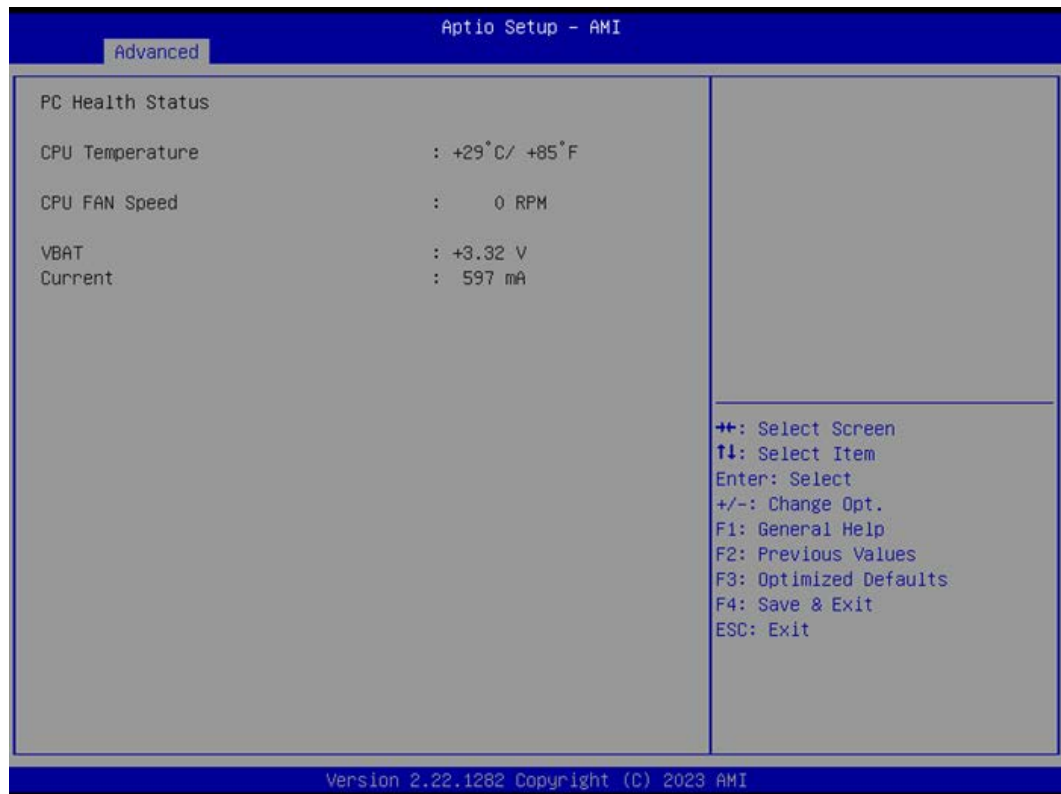
- **Serial Port**
Enable or Disable Serial Port (COM).
- **Change Settings**
Select optimal settings for a Super IO device.
- **COM Port Mode**
COM Port Mode Select.

4.1.2.6.4 Serial Port 4 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.

4.1.2.7 HW Monitor



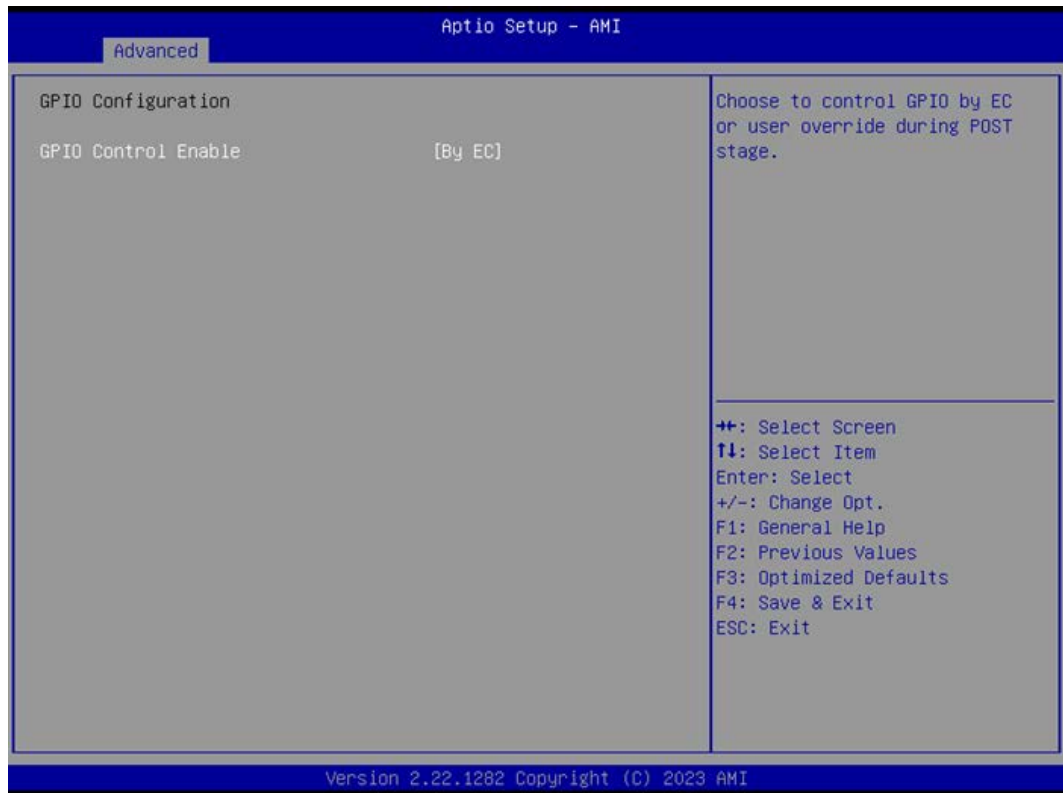
- **Smart Fan Function**
Enable or Disable Smart Fan.
- **Smart Fan Function**
Enable or Disable Smart Fan.
- **Digital I/O Configuration**
Configure the digital I/O Pins.
- **ACPI CPU Shutdown Temperature**
Select the Critical Temperature value at which OSPM must shut down the system.
- **Case Open Detection**
Enable or Disable Case Open Detect Function.
- **Watch Dog Timer**
Enable or Disable the Watch Dog Timer Function.

4.1.2.7.1 Watch Dog Timer Configuration



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

4.1.2.7.2 GPIO Configuration



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

4.1.2.7.3 EdgeBMC Network Configuration

Aptio Setup - AMI	
Advanced	
EdgeBMC Network Configuration	
***** EdgeBMC IPv4 Network Configuration *****	
Current Configuration Address Mode	DHCP
Current MAC Address	CC-82-7F-50-30-75
Current IPv4 Address	Invalid Network Status
Current Subnet Mask	Invalid Network Status
Current Gateway IP Address	Invalid Network Status
++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.22.1282 Copyright (C) 2024 AMI	

4.1.2.8 Trusted Computing

Aptio Setup - AMI	
Advanced	
TPM 2.0 Device Found	
Firmware Version:	7.2
Vendor:	NTC
Security Device Support	[Enable]
Active PCR banks	SHA256
Available PCR banks	SHA256,SHA384
SHA256 PCR Bank	[Enabled]
SHA384 PCR Bank	[Disabled]
Pending operation	[None]
Platform Hierarchy	[Enabled]
Storage Hierarchy	[Enabled]
Endorsement Hierarchy	[Enabled]
Physical Presence Spec Version	[1.3]
TPM 2.0 InterfaceType	[TIS]
Device Select	[Auto]
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.	
++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.22.1282 Copyright (C) 2023 AMI	

- **TPM Device Selection**
Select TPM Device: fTPM or dTPM.

- **Security Device Support**
Enable or disable BIOS support for the 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.

4.1.2.9 S5 RTC Wake Settings



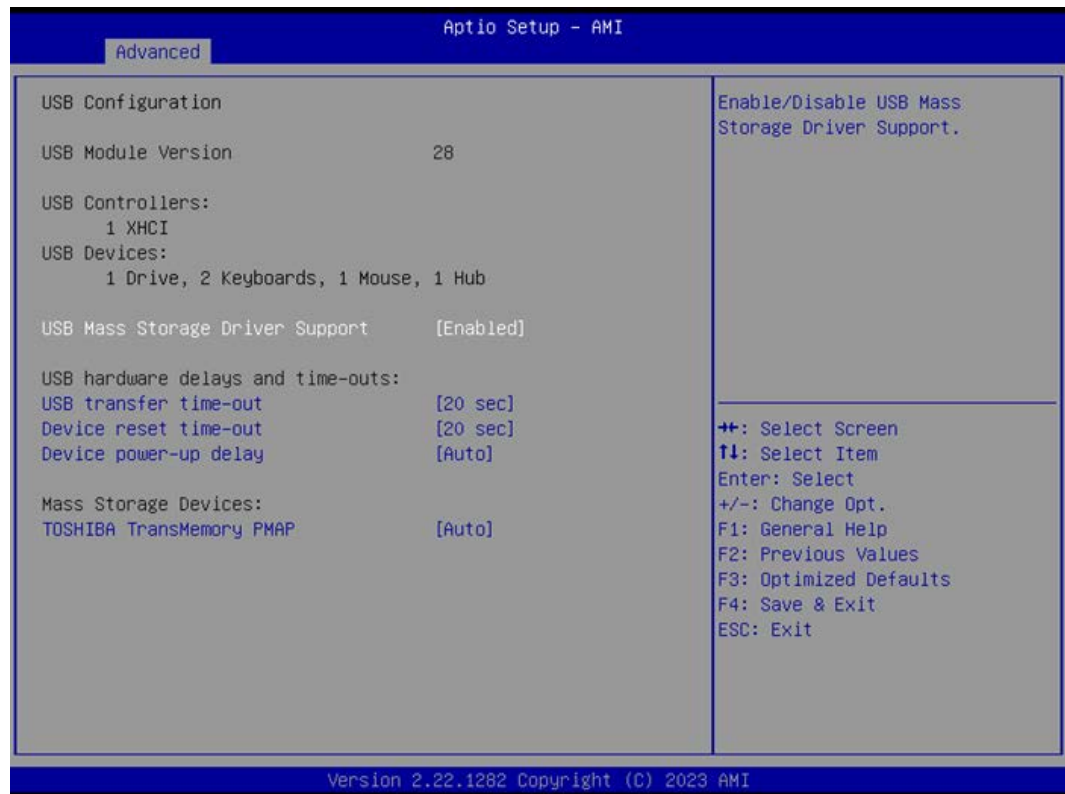
- **Wake system from S5**
Enable or disable System wake on alarm event. Select FixedTime for the system to wake on the hr:min:sec specified.

4.1.2.10 Serial Port Console Redirection



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

4.1.2.11 USB Configuration



- **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 starts 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 the default value: for a Root port it is 100 ms, for a Hub port the delay is taken from the Hub descriptor.

4.1.2.12 Network Stack Configuration



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

4.1.2.13 NVMe Configuration

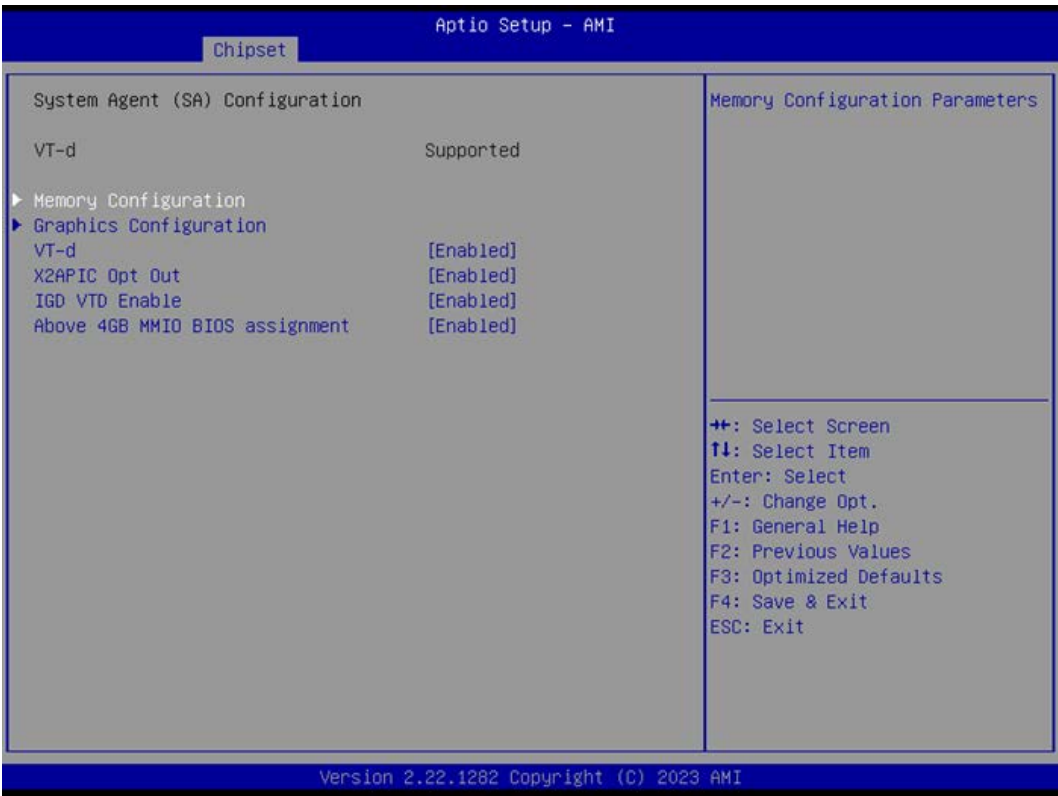


4.1.3 Chipset Configuration

Select the Chipset tab from the AFE-E350 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.

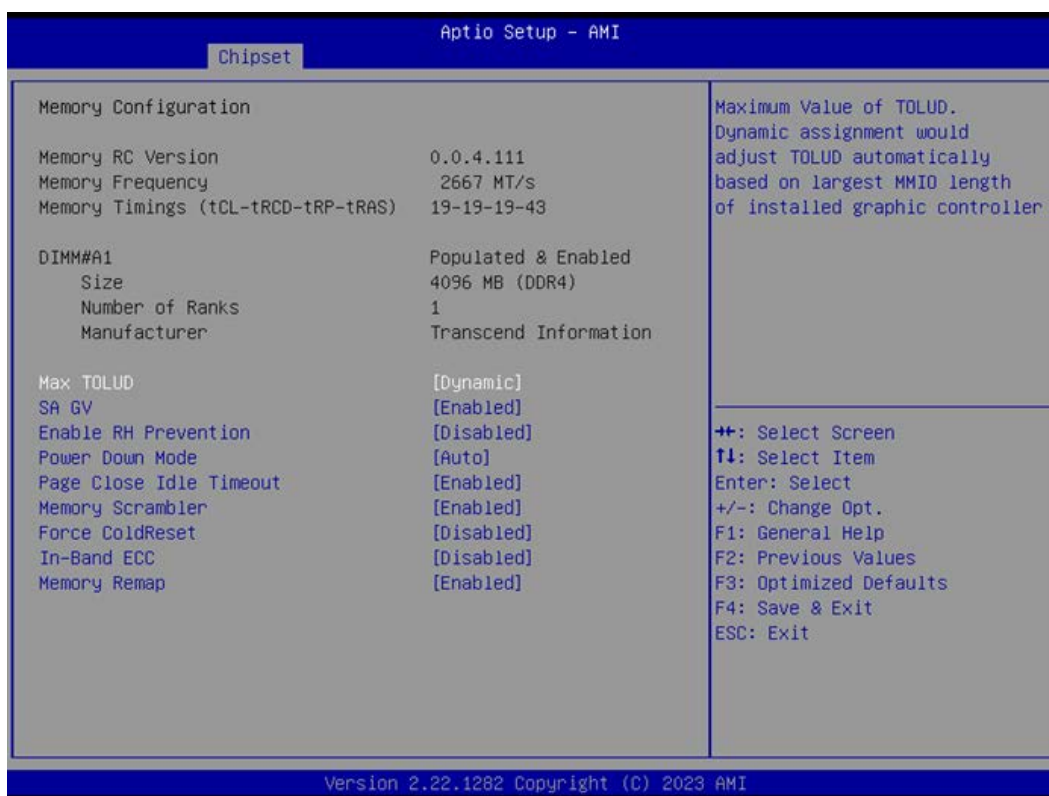


4.1.3.1 System Agent (SA) Configuration



- **Memory Configuration**
Memory Configuration Parameters.
- **Graphics Configuration**
Graphics Configuration Parameters.
- **VT-d**
VT-d capability.
- **X2APIC Opt Out**
Enable/Disable X2APIC Opt Out Bit.
- **Above 4GB MMIO BIOS assignment**
Enable/Disable above 4GB Memory Mapped IO BIOS assignment.

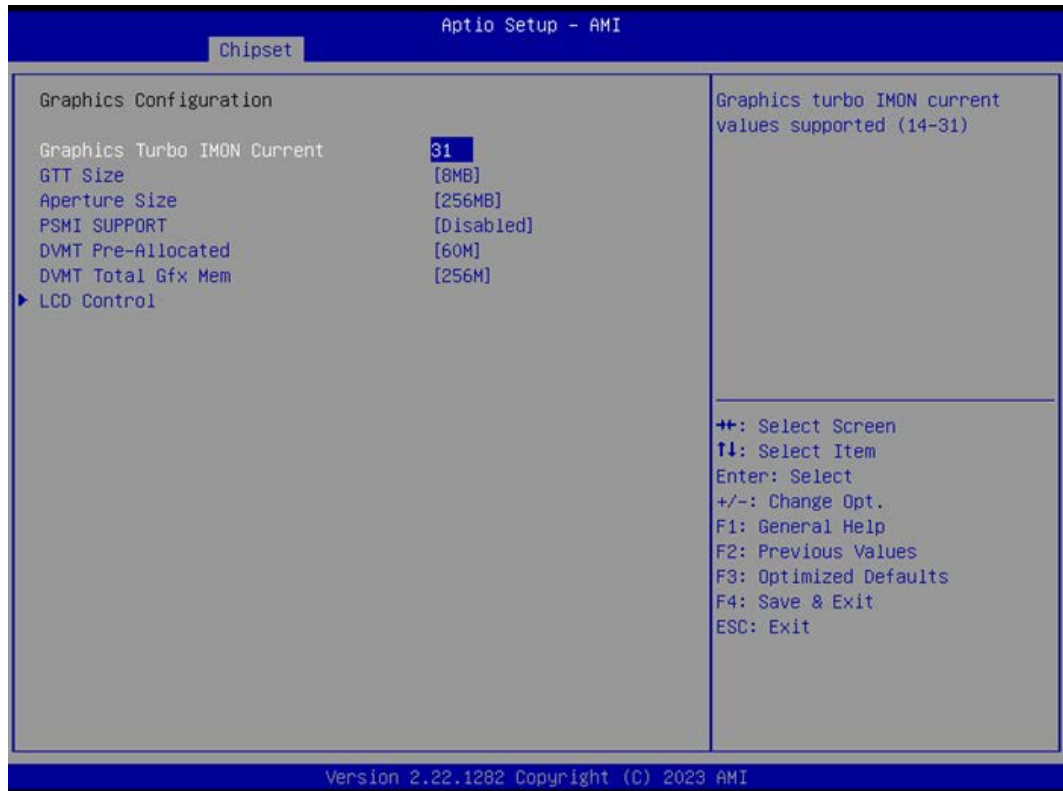
4.1.3.1.1 Memory Configuration



- **Memory Test on Warm Boot**
Enable/Disable Base Memory Test Run on Warm Boot.
- **Max TOLUD**
Maximum Value of TOLUD.
- **SA GV**
System Agent Geyserville.
- **Enable RH Prevention**
Actively prevent Row Hammer.
- **Power Down Mode**
CKE Power Down Mode Control.
- **Page Close Idle Timeout**
Page Close Idle Timeout Control.
- **Memory Scrambler**
Enable/Disable Memory Scrambler support.

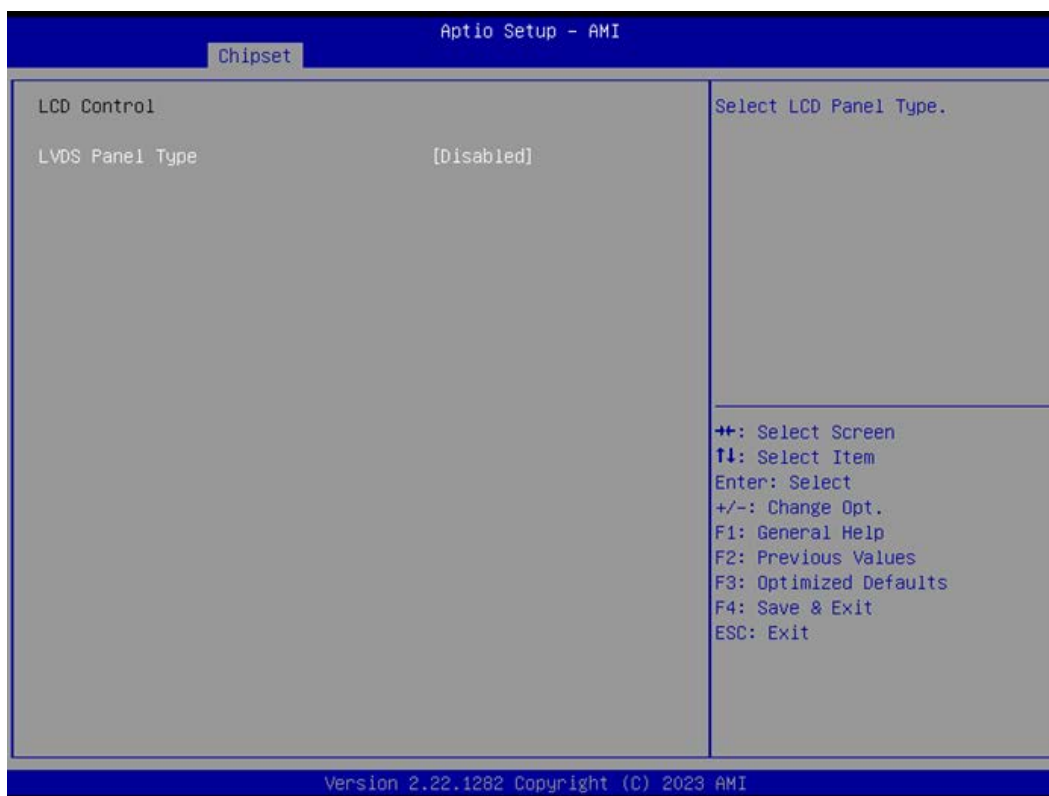
- **Force ColdReset**
Force ColdReset OR Choose MrcColdBoot mode.
- **In-Band ECC Support**
Enable/Disable In-Band ECC.
- **Memory Remap**
Enable/Disable Memory Remap above 4GB.

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.
- **DVMT Total Gfx Mem**
Select DVMT 5.0 Total Graphics Memory size used by the Internal Graphics Device.
- **LCD Control**
LCD Control.

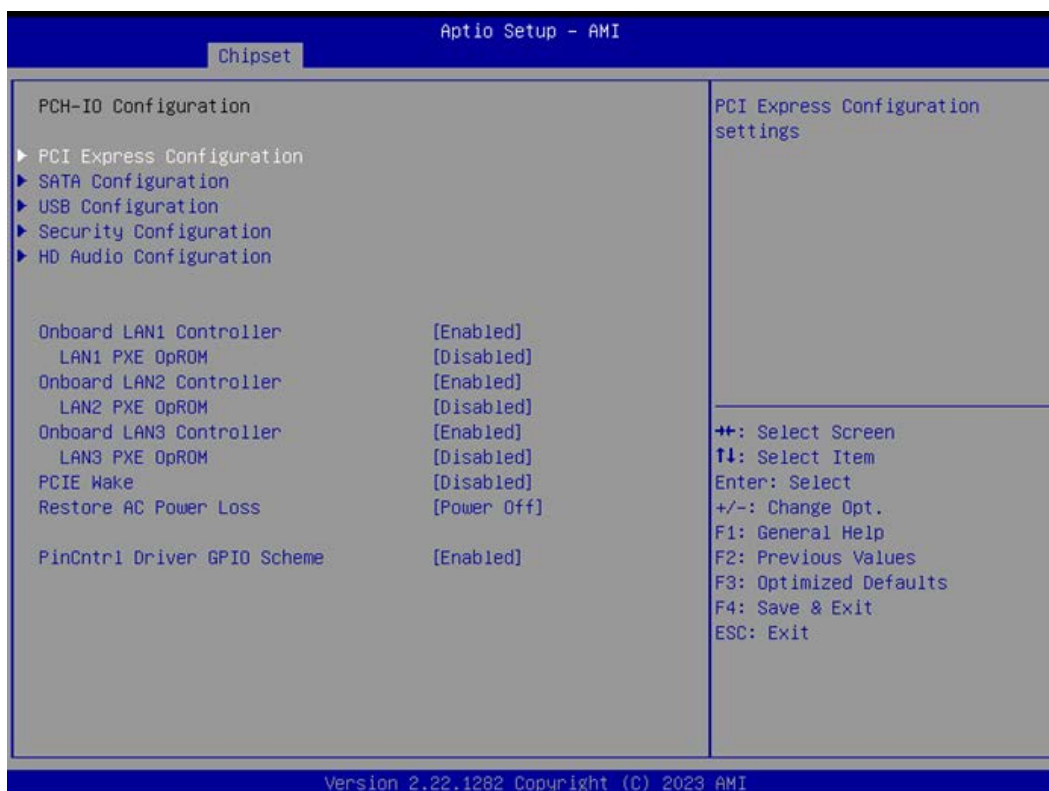
LCD Control



■ LVDS Panel Type

This item allows the user to select the 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.
 - **Serial IO Configuration**
Serial IO Configuration Settings.
 - **Onboard LAN1 Controller**
Select to Enable or Disable the onboard LAN1 Controller.
 - **LAN1 PXE ROM**
Enable or Disable onboard LAN1's PXE option ROM.
 - **Onboard LAN2 Controller**
Select to Enable or Disable the onboard LAN2 Controller.
 - **LAN2 PXE ROM**
Enable or Disable onboard LAN2's PXE option ROM.
 - **Onboard LAN3 Controller**
Select to Enable or Disable the onboard LAN2 Controller.
 - **LAN3 PXE ROM**
Enable or Disable onboard LAN2's PXE option ROM.
 - **PCIE Wake**
Enable or Disable PCIE to wake the system from S5.
 - **Restore AC Power Loss**
Specify what state to go to when power is re-applied after a power failure (G3 state).
 - **PinCntrl Driver GPIO Scheme**
Enable/Disable PinCntrl Driver GPIO Scheme.

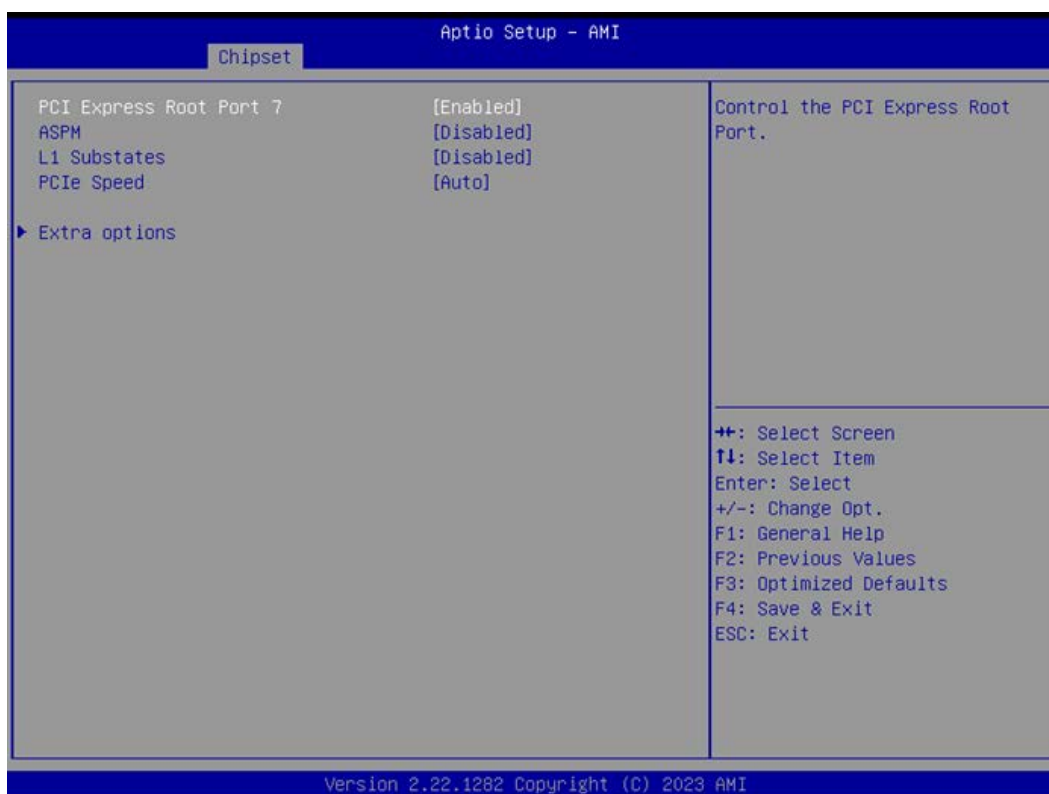
4.1.3.2.1 PCI Express Configuration



■ DMI Link ASPM Control

This item controls Active State Power Management of the DMI Link.

PCI Express Root Port 7



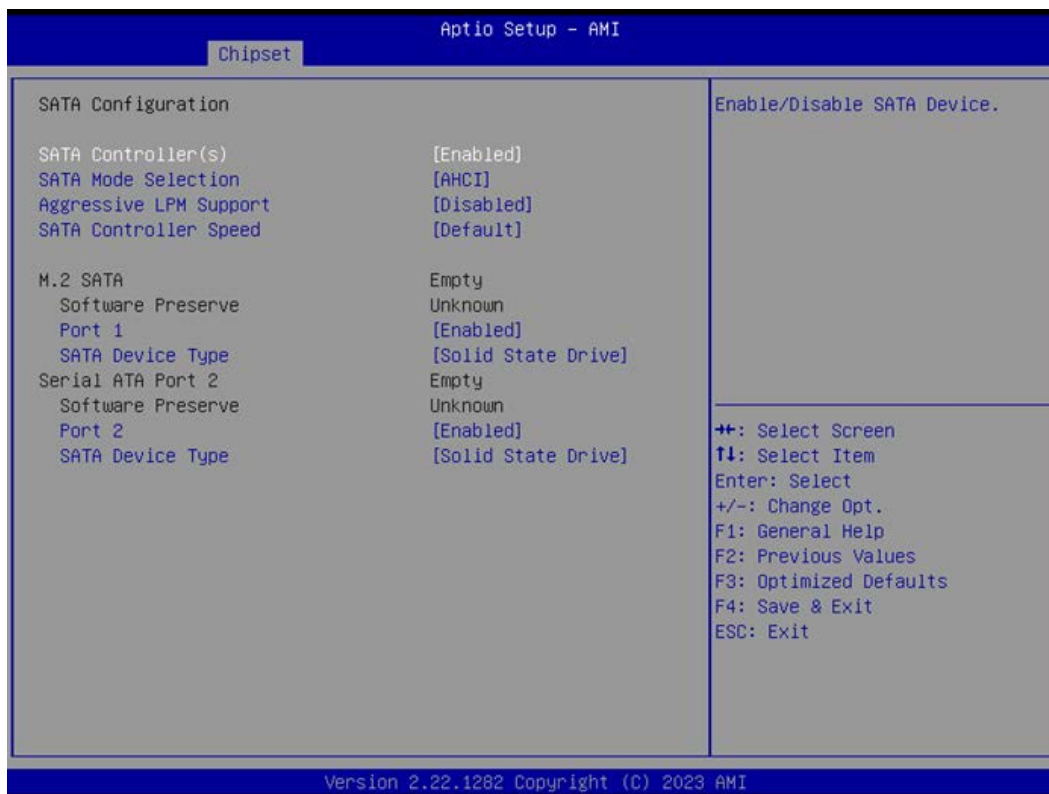
- **PCI Express Root Port 7**
Control the PCI Express Root Port.
- **ASPM**
Set the ASPM Level.
- **L1 Substates**
PCI Express L1 Substates settings.
- **PCIe Speed**
Configure PCIe Speed.
- **Extra options**
PCI Express Root Port extra options.

Extra options



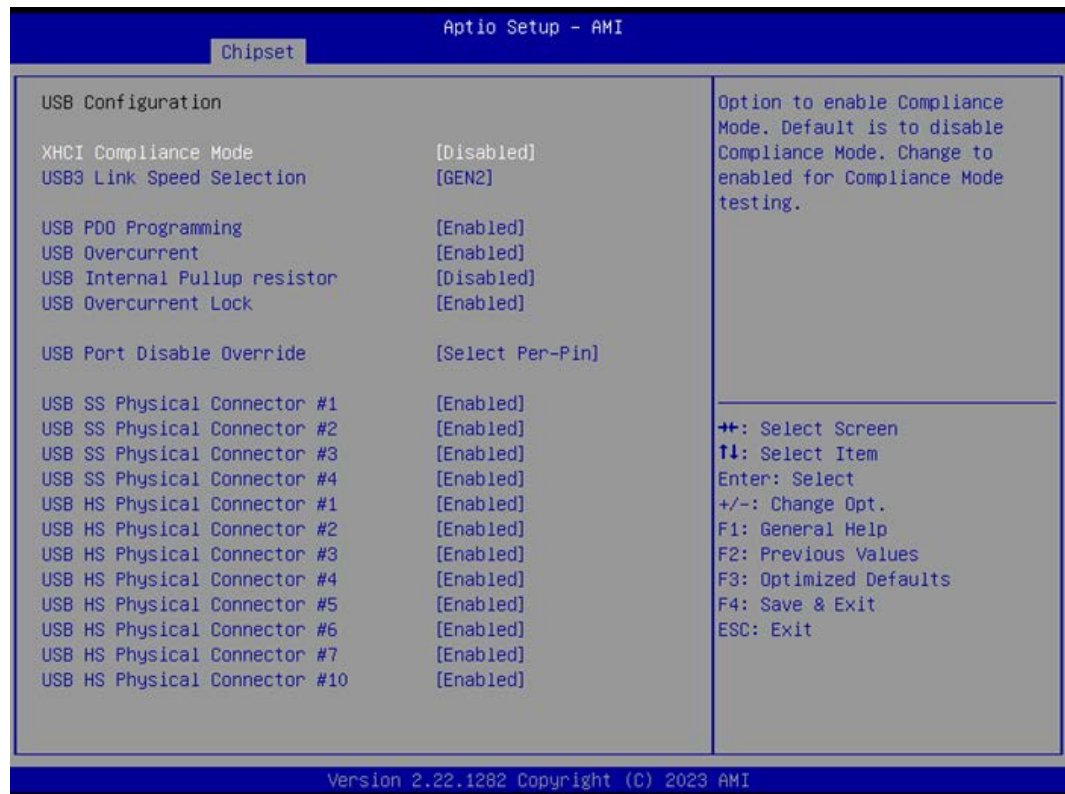
- **Detect Non-Compliance Device**
Detect Non-Compliance PCI Express Device.

4.1.3.2.2 SATA Configuration



- **SATA Controller(s)**
Enable/Disable SATA Device.
- **SATA Mode Selection**
Determine how the SATA controller operates.
- **Aggressive LPM Support**
Enable PCH to aggressively enter link power state.
- **SATA Controller Speed**
Indicates the maximum speed the SATA controller can support.

4.1.3.2.3 USB Configuration



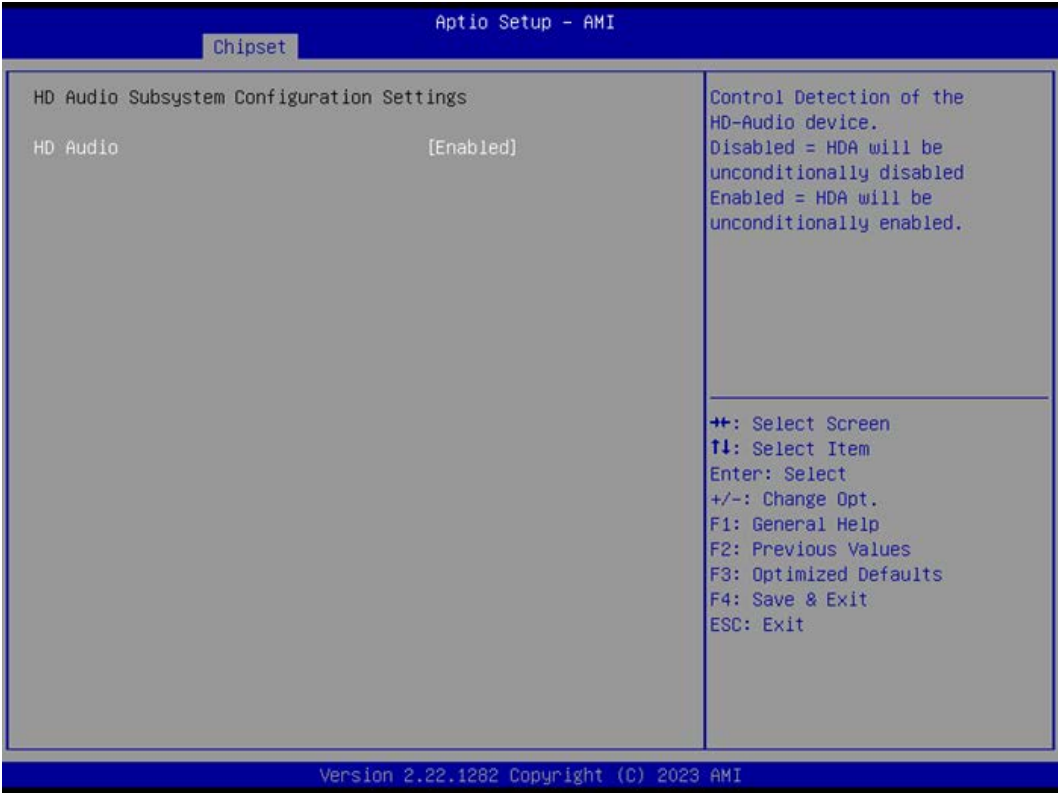
- **XHCI Compliance Mode**
Option to enable Compliance Mode.
- **USB3 Link Speed Selection**
This option is to select USB3 Link Speed GEN1 or GEN2.
- **USB PDO Programming**
Select "Enabled" if Port Disable Override functionality is used.
- **USB Overcurrent**
Select "Disabled" for pin-based debug.
- **USB Overcurrent Lock**
Select "Enabled" if Overcurrent functionality is used.
- **USB Port Disable Override**
Selectively Enable/Disable the corresponding USB Port from reporting a Device Connection to the Controller.
- **USB SS Physical Connector #1/2/3/4**
Enable/Disable this USB Physical Connector.
- **USB HS Physical Connector #1/2/3/4/5/6/7/10**
Enable/Disable this USB Physical Connector.

4.1.3.2.4 Security Configuration



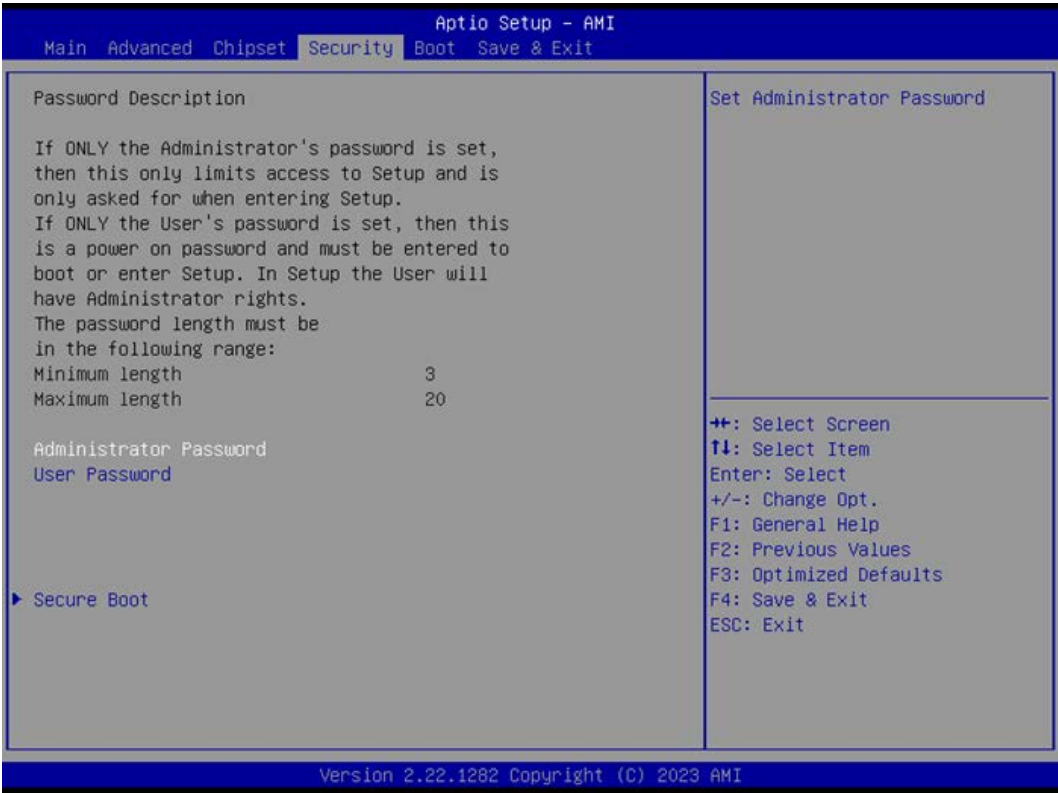
- **RTC Memory Lock**
Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
Enable or Disable the PCH BIOS Lock Enable feature.
- **Force unlock on all GPIO pads**
If Enabled, BIOS will force all GPIO pads to be in the unlock state.

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.

4.1.4 Security





Select Security Setup from the AFE-E350 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>:

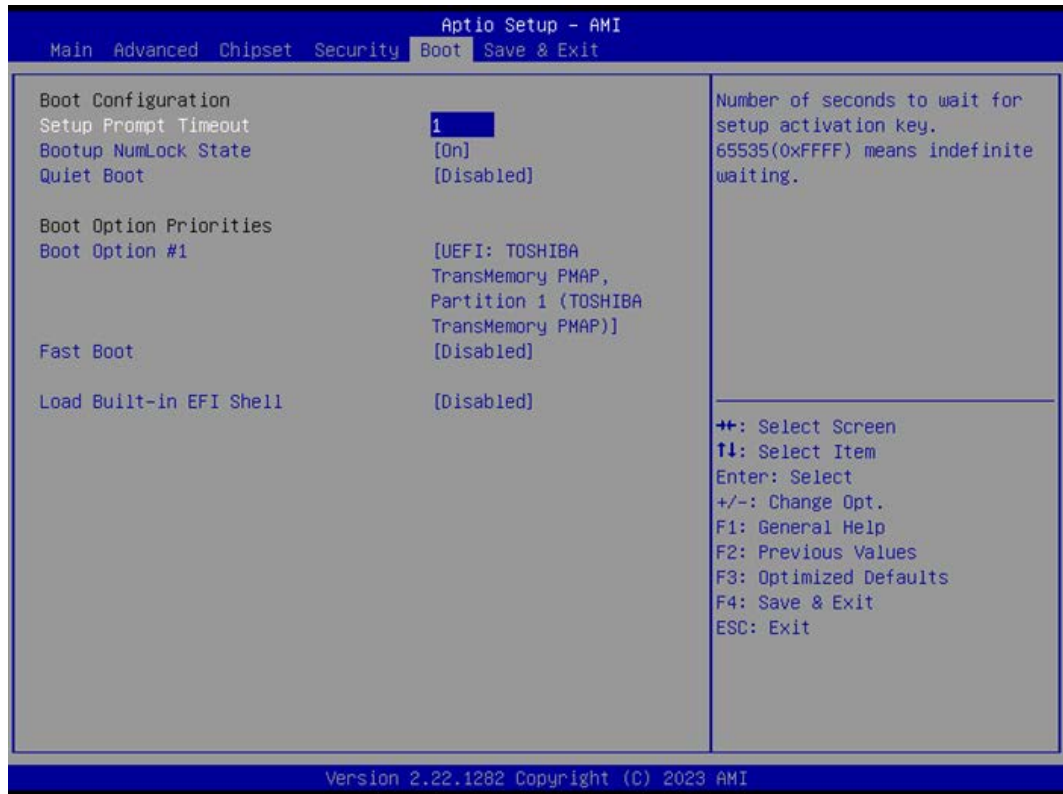
- **Change Administrator / User Password**

Select this option and press <ENTER> to access the sub-menu, and then type in the password.

- **Secure Boot**

Secure Boot 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.

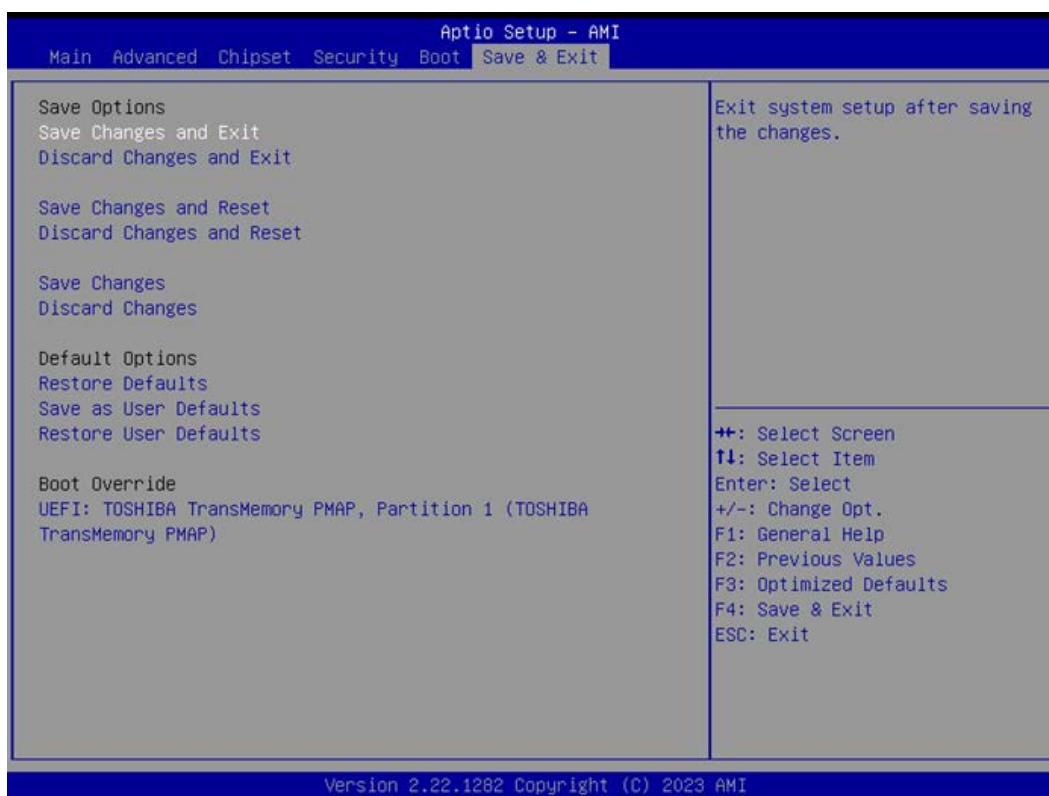
■ Fast Boot

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.

■ Load Built-in EFI Shell

Load/Unload the internal built-in EFI shell image inside BIOS. (Built-in EFI Shell will still be loaded into any bootable device found).

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 reset 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

Address Range (Hex) Device

20h-2Dh	Programmable Interrupt Controller
2Eh-2Fh	Motherboard resources
30h-3Dh	Programmable Interrupt Controller
40h-43h	System Timer/Counter
4Eh-4Fh	Motherboard resources
50h-53h	System 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	Programmable Interrupt Controller
B0h-B1h	Programmable Interrupt Controller
B4h-BDh	Power Management
29Ch-29Dh	Motherboard resources
2E8h-2EFh	Communications Port (COM4)
2F8h-2FFh	Communications Port (COM2)
3E8h-3EFh	Communications Port (COM3)
3F8h-3FFh	Communications Port (COM1)
4D0h-4D1h	Programmable Interrupt Controller
680h-69Fh	Motherboard resources
164Eh-164Fh	Motherboard resources
1854h-1857h	Motherboard resources
2000h-69Fh	Motherboard resources
CF9h-CF9h	Reset Generator

A.2 1st MB Memory Map

Address 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.3 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	Reserved
IRQ7	Available
IRQ8	System CMOS / real time clock
IRQ9	Microsoft ACPI-Compliant System
IRQ10	Available
IRQ11	Display Controller
IRQ12	Available
IRQ13	Numeric Data Processor
IRQ14	GPIO Controller
IRQ15	Communications Port (COM4)



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