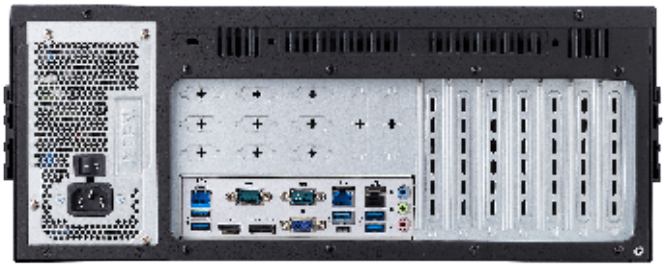
IAP-M47-4U

User's Manual

4U Rack Mounted ATX MB IPC with
12 th/13 th/14th Gen Intel® CPU Socket (LGA 1700)



Manual Rev.:	0.1 Preliminary
Revision Date:	June 25, 2024
Part Number:	50M-12900-1000

Leading **EDGE COMPUTING**

Preface

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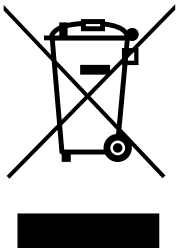
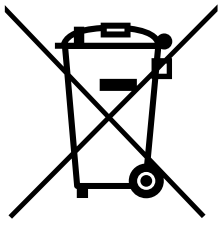


Battery Labels (for products with battery)



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WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Revision History

Revision	Description	Date	By
0.1	Preliminary release	2024-06-25	AL

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1 Introduction

The ADLINK's IAP-M47-4U IPC system is an industrial motherboard supporting 12th/13th/14th Generation Intel® Core™ i9/i7/i5/i3 desktop processors with an Intel® Q670 Chipset, and provides 7 PCIe expansion slots for a cost-competitive embedded computing solution. It includes high-speed data transfer interfaces such as PCIe 5.0, USB 3.2 Gen2, and SATA 6 GB/s (SATA III), along with dual-channel DDR5 4800/5600 MHz RAM for industrial automation applications.

With an industrial-grade I/O port design, the IMB-M47 offers a significant competitive advantage for embedded computing applications in terms of device compatibility, durable connectivity, and extreme environment readiness.

Model Number	Chipset
IAP-M47-4U	Q670

Latest revisions of the datasheet, user's manual, BIOS, drivers, and board support packages, can be downloaded from the product webpage on the ADLINK web site: www.adlinktech.com

1.1 Packing List

- IMB-M47-4U IPC system

Rear I/O shield

1.2 Optional Accessories

- 2-port USB 2.0 cable with bracket (Part Number: 30-25010-3010)
- 2-port USB 3.0 cable with bracket (Part Number: 30-25046-0100)
- 1-port LPT cable with bracket (Part Number: 30-25019-2000)
- 2-port COM cable with bracket (Part Number: 30-25116-0000-A0)

1.3 Features

Dimension	427 mm (W) x 177 mm (H) x 447.9 mm(D)
CPU	Intel® Core™ i9-12900E Processor
Motherboard	ALDINK IMB-M47
DRAM	128GB DDR5 4800MHz DIMM Non-ECC
Storage	128GB MLC SATA SSD
Display	1* DP++ connector (rear I/O) 1* HDMI connector (rear I/O) 1* VGA connector (rear I/O)
COM	2* RS-232/422/485 (rear I/O) 4* RS-232 pin headers
USB	5* USB 3.2 Gen2, 1x USB 3.2 Gen2x2 (Connector type: Type C) 2* USB 3.1 via header, 2x USB 2.0 via header, 2x vertical USB 2.0 connectors
Ethernet	3* 2.5GbE (rear)
Expansion Slot	2x PCIe x16 slots (Gen5, single x16 card in PCIE1,or two x8 cards in PCIE 1 and PCIE4,PCIE1 supports riser card x8/x8) 2x PCIe x4 (Gen4) 3x PCIe x1 (Gen3)
Audio	High-Definition Audio. Line-in, Line-out, and Mic-in
Button	Power button, reset button
LED Indicator	Power LED, storage LED
PSU	Built in 1200W ATX

2 Specifications

2.1 Core System

CPU	Intel® 13th Gen (Raptor Lake-S) and 12th Gen (Alder Lake-S) Core™ processors, up to 125W
Chipset	Intel® Q670 Express Chipset
Memory	4x 288-pin DDR5 NON ECC socket, dual-channel DDR5 4800/5600 MHz, up to 128 GB (based on CPU)
Embedded BIOS	AMI SPI 256 Mbit
Hardware Monitor	CPU voltage • +3.3V voltage • +5V voltage • +12V voltage • CPU temperature • System temperature • CPU fan speed • System fan speed

2.2 I/O Interface

Expansion Slot	1x PCIe x16 Gen5 1x PCIe x8 Gen5 2x PCIe x4 Gen4 3x PCIe x1 Gen3
SATA	8x SATA 6.0 Gb/s connectors, Intel® software RAID 0/1/5/10 support
USB	1x USB 3.2 Gen2 type C connector (rear) 5x USB 3.2 Gen2 connectors (rear) 2x USB 3.1 via pin headers 2x USB 2.0 via pin headers 2x USB 2.0 vertical connectors
COM	2x RS-232/422/485 (rear), 4x RS-232 pin headers
Parallel Port	1x LPT pin header
PS/2 Combo Port	1x PS/2 keyboard/mouse pin header
DIO	8x GPI, 8x GPO (shared with LPT header)
TPM	TPM 2.0 onboard IC
M.2 Connectors	1x M.2 (Key E, 2230) with PCIe x1, USB 2.0 and CNVi for Wireless 1x M.2 (Key B, 3042/3052) with PCIe x1, USB 3.2 Gen1, USB 2.0 and SIM 1x M.2 (Key M, 2242/2260/2280/25110) with PCIe x4 Gen4

2.3 Graphics

Interfaces	1x VGA connector (rear I/O), resolution up to 1920 x 1200@60Hz 1x HDMI connector (rear I/O), resolution up to 4096 x 2160@60Hz 1x DP++ connector (rear I/O), resolution up to 4096 x 2160@60Hz

2.4 Audio

Audio Codec	Realtek ALC897
Interfaces	1High Definition Audio. 1x Mic-in, 1x Line-in, and 1x Line-out connectors (rear)

2.5 LAN

LAN	**LAN1:** Intel® I226-V via RJ45 connector, with 10/100/1000/2500 Mbps **LAN2:** Intel® I226-LM via RJ45 connector, with 10/100/1000/2500 Mbps, vPro support **LAN3:** Intel® I226-V via RJ45 connector, with 10/100/1000/2500 Mbps

2.6 Environmental

Temperature	**Operating Temperature**	0 - 40° C (32 - 104° F)
	Storage (Non-Operating) Temperature	-20°C - 60°C (-4°F - 140°F)
Humidity	**Operating Humidity**	10% - 85% (non-condensing)
	Storage (Non-Operating) Humidity	10% - 95% (non-condensing)

2.7 Certification

EMC	CE/FCC Class B EN55032/EN55035 compliance EN61000-6-4/EN61000-6-2 compliance
Safety	UL

2.8 Form Factor

System	427 mm (W) x 177 mm (H) x 447.9 mm(D)

2.9 Operating Systems

Standard Support	Microsoft® Windows® 10, 64-bit Microsoft® Windows® 11, 64-bit Linux

2.10 Functional Block Diagram

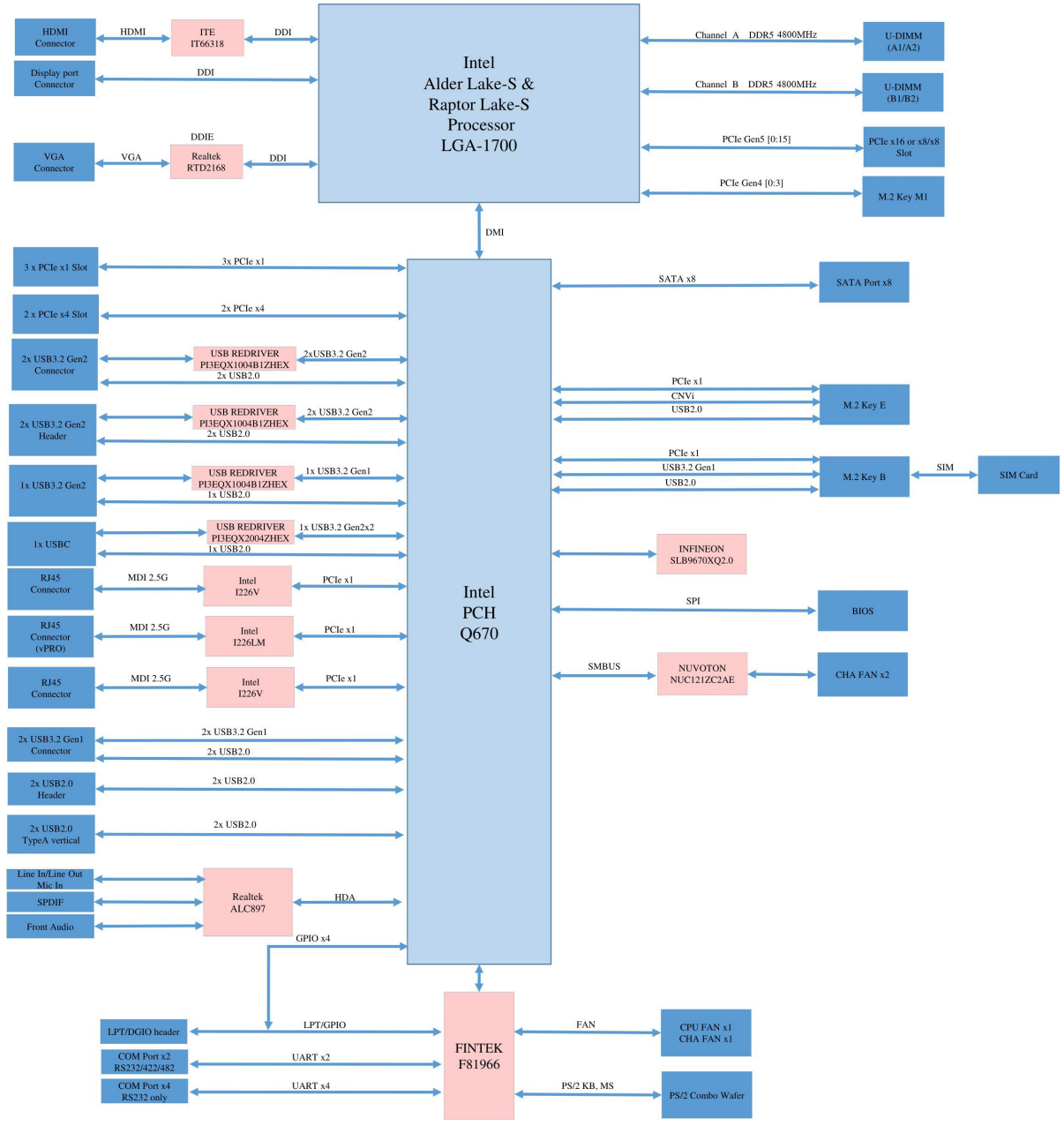

Figure 1: Functional Block Diagram

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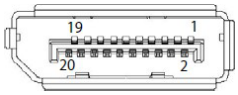
3 Connectors and Jumpers

3.1 Rear IO Connectors

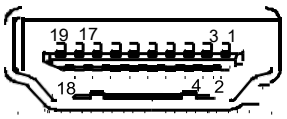
3.1.1 DisplayPort

Pin	Signal	Pin	Signal
1	CN_DDPx0+	2	GND
3	CN_DDPx0-	4	CN_DDPx1+
5	GND	6	CN_DDPx1-
7	CN_DDPx2+	8	GND
9	CN_DDPx2-	10	CN_DDPx3+
11	GND	12	CN_DDPx3-
13	CN_DDPx_AUX_SEL	14	CN_DDPx_CONFIG2
15	CN_DDPx_AUX+	16	GND
17	CN_DDPx_AUX-	18	CN_DDPx_HPD
19	GND	20	+V3.3_DDPx_PWR_CN



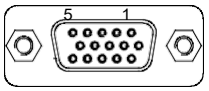
3.1.2 HDMI

Pin	Signal	Pin	Signal
1	HDMI1_CON_DP2	2	GND
3	HDMI1_CON_DN2	4	HDMI1_CON_DP1
5	GND	6	HDMI1_CON_DN1
7	HDMI1_CON_DP0	8	GND
9	HDMI1_CON_DN0	10	HDMI1_CON_CKP
11	GND	12	HDMI1_CON_CKN
13	NC	14	NC
15	HDMI1_DDC_CLK	16	HDMI1_DDC_DATA
17	GND	18	+5V_HDMI
19	HDMI1_CON_HPD		



3.1.3 VGA Connector

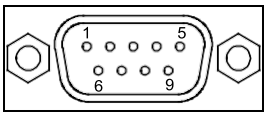
Pin	Signal	Pin	Signal
1	VGA_CON_RED	2	VGA_CON_GREEN
3	VGA_CON_BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	+5V_HDMI	10	GND
11	NC	12	VGA_DDCDAT
13	VGA_CON_HS	14	VGA_CON_VS
15	VGA_DDCCLK		



3.1.4 COM 1-2 Connectors

COM1 and COM2 ports (RS232/422/485) can be adjusted in BIOS setup utility > Advanced Screen > Super IO Configuration

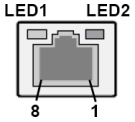
Pin	Signal		
	RS-232	RS-422	RS-485
1	DCD#	Tx-	Tx/Rx-
2	RxD	Tx+	Tx/Rx+
3	TxD	Rx+	N/A
4	DTR#	Rx-	N/A
5	GND	GND	GND
6	DSR#	N/A	N/A
7	RTS#	N/A	N/A
8	CTS#	N/A	N/A
9	No Power / 5V / 12V	N/A	N/A



3.1.5 Etrhernet Connectors (LAN1, LAN2, LAN3)

Three 10/100/1000/2500 Mbps LAN Ethernet controllers based on Intel® i226LM, support PXE and WOL. LAN2 supports vPro.

Pin	10BASE-T/100BASE-TX	1000BASE-T
1	TX+	LAN_MDI0+
2	TX-	LAN_MDI0-
3	RX+	LAN_MDI1+
4	--	LAN_MDI2+
5	--	LAN_MDI2-
6	RX-	LAN_MDI1-
7	--	LAN_MDI3+



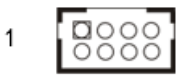
Pin	10BASE-T/100BASE-TX	1000BASE-T
8	--	LAN_MDI3-

LED1 (Speed)		LED2 (Link/Activity)	
Status	**Description**	**Status**	**Description**
	10/100 Mbps connection	Off	No Link
Orange	1 Gbps connection	On	Linked
Green	2.5 Gbps connection	Blinking	Data Activity

3.2 Onboard Headers / Connectors

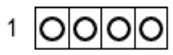
3.2.1 PS/2 Keyboard/Mouse Header

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	KBCLK	3	KBDATA	5	MSDATA	7	MSCLK
2	+5V	4	+5V	6	GND	8	GND



3.2.2 LAN LED Header

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	LILEDP	2	LED_LNK#_ACT	3	LED_1000#	4	LED_2500#



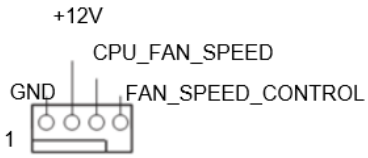
3.2.3 ATX12V Power Connectors

This motherboard provides an 8-pin ATX 12V power connector. To use a 4-pin ATX power supply, please plug italong Pin 1 and Pin 5.

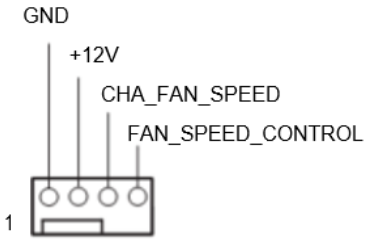
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
8	ATX12V	7	ATX12V	6	ATX12V	5	ATX12V
4	GND	3	GND	2	GND	1	GND

3.2.4 CPU Fan Connectors (+12V)

Please connect the CPU fan cable to the connector and match the black wire to the ground pin.



3.2.5 Chassis Fan Connectors(+12)



3.2.6 USB 2.0 Connectors

There are two USB 2.0 Type-A vertical connectors on this motherboard.

Pin	Signal
4	GND
3	USB_D+
2	USB_D-
1	USB_PWR

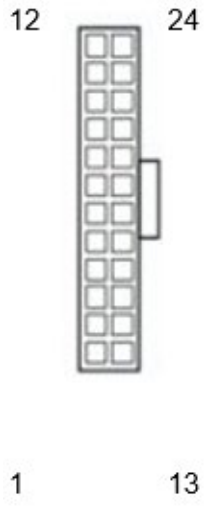
3.2.7 PSU_SMB1

Pin	Signal
1	SMB_CLK
2	SMB_DATA
3	SMBALERT#
4	GND
5	+3V

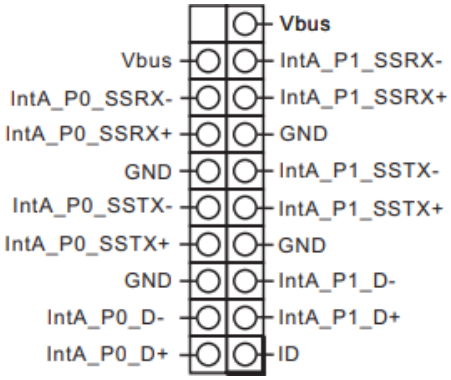
3.2.8 24-Pin ATX Power Input Connector

This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, plug it along Pin 1and Pin 13.

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



3.2.9 USB 3.2 Gen 1 Header



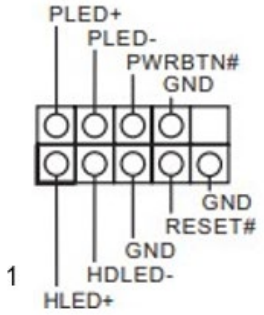
3.2.10 SATA3 Connectors

The Serial ATA3 (SATA3) connectors support SATA data cables for internal storage devices. The current SATA3 interface allows up to 6.0 Gb/s data transfer rate.

Pin	Signal	Pin	Signal
1	GND	5	SATA-B-
2	SATA-A+	6	SATA-B+
3	SATA-A-	7	GND
4	GND		

3.2.11 System Panel Header

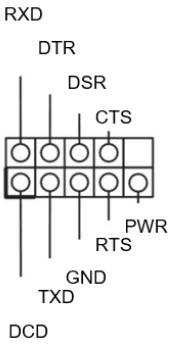
This header accommodates several system front panel functions.



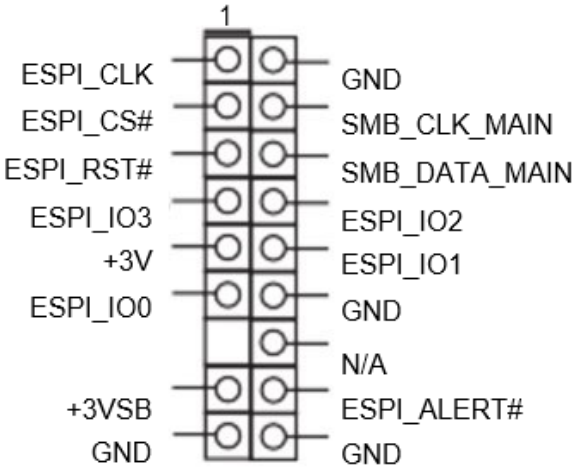
3.2.12 COM Port Header (RS232)

2x5-pin 2.54mm pitch header

Pin	Signal	Pin	Signal
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	PWR
5	GND		



3.2.13 ESP1 Header (ESP1)

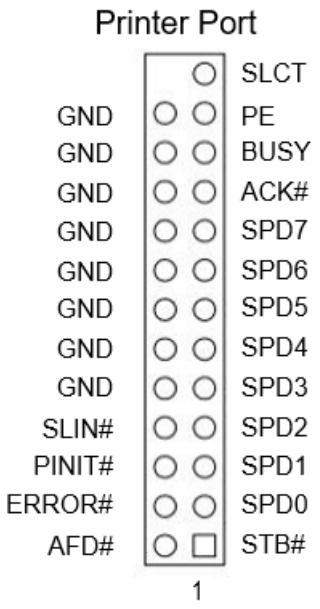


3.2.14 Print Port/GPIO Header

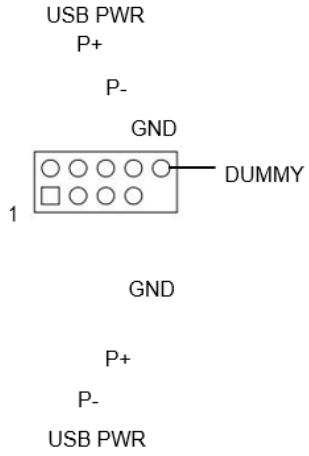
For printer port function, short pin4 and pin5 on Digital Input / Output Power Select(JGPIO_PWR1).

GPIO

Pin	Signal	Pin	Signal
		25	NA
24	GND	23	SIO_GP70/GPP_E6
22	GND	21	SIO_GP71/GPP_E5
20	GND	19	SIO_GP72/TIME_SYNC1
18	GND	17	SIO_GP87/TIME_SYNC0
16	GND	15	SIO_GP86
14	GND	13	SIO_GP85
12	JGPIOPWR	11	SIO_GP84
10	JGPIOPWR	9	SIO_GP83
8	SIO_GP73	7	SIO_GP82
6	SIO_GP74	5	SIO_GP81
4	SIO_GP75	3	SIO_GP80
2	SIO_GP76	1	SIO_GP77

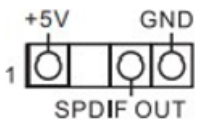


3.2.15 USB 2.0 Header



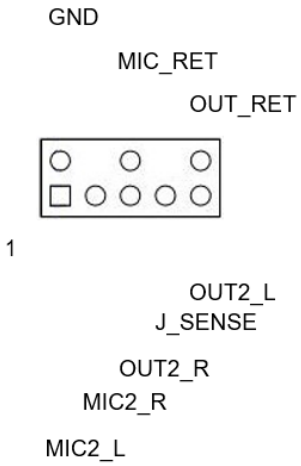
3.2.16 SPDIF Header

The SPDIF headerprovides SPDIF audio output to HDMI VGA card, allowing the system to connect HDMI DigitalTV/projector/LCD devices. Connect the SPDIF connector of HDMI VGA card to this header.



3.2.17 Jumper and Switch Settings

This is interface for the front panel audio cable allows convenient connection and control of audio devices.



3.2.18 Buzzer Header

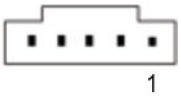
Pin	Signal
1	+5V
2	BUZZ_LOW

3.2.19 LAN LED Headers

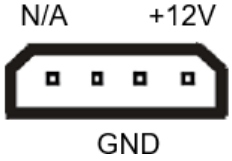
Pin	Signal
1	LILEDP
2	LED_LNK#_ ACT
3	LED_1000#
4	LED_2500#

3.2.20 5-Pin Thunderbolt AIC Connector

Pin	Signal
1	TB_FRC_PWR
2	TBCIO_PLUG_EVENT_R2
3	SLP_S3
4	TBT_SLP_S5_S4#
5	GND



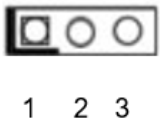
3.2.21 PCIe Power Connector



3.3 Jumper and Switch Settings

3.3.1 COM Port Pin9 PWR Setting Jumpers (#1,2,25)

3-pin PWR for COM port 1, COM port 2, and COM port 3-6



1-2: +5V

2-3: +12V

3.3.2 Chassis Intrusion Headers (#10, 13)

This motherboard supports CASE OPEN detection feature that detects if the chassis cover has been removed. Thisfeature requires a chassis with chassis intrusion detection design.

CI1:

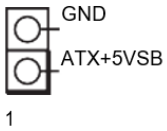
Short: Active Case Open
Open: Normal

CI2:

Short: Normal

Open: Active Case Open

3.3.3 PWR LOSS Header (#12)



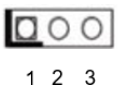
Short: Power Loss
Open: No Power Loss

3.3.4 ATX/AT Mode Jumper (#26)

Short: AT Mode

Open: ATX Mode

3.3.5 Digital Input/Output Default Value Setting (#29)



1-2: Pull-High

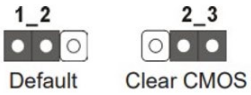
2-3: Pull-Low

3.3.6 Digital Input/Output Power Select (#30)

1-2: +12V
2-3: +5V
3-4: +5V
4-5: GND

3.3.7 Clear CMOS Jumpers (#35)

(3-pin CLRMOS1)



1-2 : Normal
2-3 : Clear CMOS

CLRMOS1 lets you to clear the CMOS data. To reset system parameters to default, turn off the computer and unplug the power cord. After 15 seconds, use a jumper cap to short pin2 and pin3 on CLRMOS1 for 5 seconds. Do not clear CMOS right after updating the BIOS. If you need to clear the CMOS, boot up the system, then shut it down before clearing CMOS. Note: The date, time, and user default profile will only be cleared if the CMOS battery is removed.

(2-pin CLRMOS2)

CLRMOS2 :
Open : Normal
Short : Auto Clear CMOS
(Power Off)

CLRMOS2 automatically clear CMOS cata when AC power is on. The data in CMOS includes system setup information, such as system password, date, time, and system setup parameters. To reset system parameters to default, turn off the computer, unplug the power cord, and use a jumper cap to short the pins on CLRMOS2.

3.3.8 PWR_BAT1 (#36)

Open: Normal
Short: Charge Battery

3.3.9 PWR_BAT1 (#36)

Open: Normal
Short: Auto Clear CMOS
(Power off)

Auto clear CMOS when the system boots improperly.

3.4 Expansion Slots

There are 7 PCI Express slots, 3 M.2 sockets, and 1 SIM socket on this motherboard.

PCIe and PCI slots:

	Slot 1 (PCIe1)	Slot 2 (PCI2)	Slot 3 (PCIe3)	Slot 4 (PCIe4)	Slot 5 (PCIe5)	Slot 6 (PCIe6)	Slot 7 (PCIe7)
Source	CPU	PCH	PCH	CPU	PCH	PCH	PCH
Bandwidth	PCIe 5.0	PCIe 3.0	PCIe 3.0	PCIe 5.0	PCIe 4.0	PCIe 3.0	PCIe 4.0
Lane Config 1	x16	x1	x1	N/A	x4	x1	x4
Lane Config 2	x8			X8			

SIM socket: 1 x SIM socket connected to M.2 key B

M.2 Sockets:

M.2 Key-M (M2_M1)

Pin	Signal	Signal	Pin
1	GND	+3.3V	2
3	GND	+3.3V	4
5	PERn3	NA	6
7	PERp3	NA	8
9	GND	LED	10
11	PETn3	+3.3V	12
13	PETp3	+3.3V	14
15	GND	+3.3V	16
17	PERn2	+3.3V	18
19	PERp2	NA	20
21	GND	NA	22
23	PETn2	NA	24
25	PETp2	NA	26
27	GND	NA	28
29	PERn1	NA	30
31	PERp1	NA	32
33	GND	NA	34
35	PETn1	NA	36
37	PETp1	DEVSLP	38
39	GND	SMB_CLK	40
41	PERn0	SMB_DATA	42
43	PERp0	NA	44
45	GND	NA	46
47	PETn0	NA	48
49	PETp0	PERST#	50

Pin	Signal	Signal	Pin
51	GND	CLKREQ#	52
53	PEFCLKn	WAKE#	54
55	PEFCLKp	NA	56
57	GND	NA	58
67	NA	NA	68
69	PEDET	+3.3V	70
71	GND	+3.3V	72
73	GND	+3.3V	74
75	GND		

M.2 Key-E (M2_E1)

Pin	Signal	Signal	Pin
1	GND	+3VSB	2
3	USB_D+	+3VSB	4
5	USB_D-	NA	6
7	GND	NA	8
9	CNV_WGR_D1-	CNV_RF_RESET	10
11	CNV_WGR_D1+	NA	12
13	GND	MODEM_CLKREQ	14
15	CNV_WGR_D0-	NA	16
17	CNV_WGR_D0+	GND	18
19	GND	NA	20
21	CNV_WGR_CLK-	CNV_BRI_RSP	22
23	CNV_WGR_CLK+		
33	GND	CNV_BGI_DT	32
35	PETp	CNV_RGI_RSP	34
37	PETn	CNV_BRI_DT	36
39	GND	NA	38
41	PERp	NA	40
43	PERn	NA	42
45	GND	NA	44
47	PEFCLKp	NA	46
49	PEFCLKn	NA	48
51	GND	SUSCLK	50
53	CLKREQ#	PERST0#	52

Pin	Signal	Signal	Pin
55	WAKE#	W_DISABLE1#	54
57	GND	W_DISABLE2#	56
59	CNV_WT_D1-	SMB_DATA	58
61	CNV_WT_D1+	SMB_CLK	60
63	GND	NA	62
65	CNV_WT_D0-	CLKIN_XTAL_LCP	64
67	CNV_WT_D0+	NA	66
69	GND	NA	68
71	CNV_WT_CLK-	NA	70
73	CNV_WT_CLK+	+3VSB	72
75	GND	+3VSB	74

M.2 Key-B (M2_B1)

Pin	Signal	Signal	Pin
1	NA	+3.3V	2
3	GND	+3.3V	4
5	GND	FuLL_Card_Power_off	6
7	USB_D+	W_DISABLE	8
9	USB_D-	WWAN_LED#	10
11	GND		
21	GND	NA	20
23	NA	NA	22
25	NA	NA	24
27	GND	NA	26
29	USB3_RX-	NA	28
31	USB3_RX+	UIM_RESET	30
33	GND	UIM_CLK	32
35	USB3_TX-	UIM_DATA	34
37	USB3_TX+	UIM_PWR	36
39	GND	NA	38
41	PERn0	NA	40
43	PERP0	NA	42
45	GND	NA	44
47	PETn0	NA	46
49	PETP0	NA	48
51	GND	PERST#	50

Pin	Signal	Signal	Pin
53	PEFCLKn	CLKREQ#	52
55	PEFCLKp	WAKE#	54
57	GND	NA	56
59	NA	NA	58
61	NA	NA	60
63	NA	NA	62
65	NA	NA	64
67	NA	NA	66
69	NA	NA	68
71	GND	+3.3V	70
73	GND	+3.3V	72
75	NA	+3.3V	74

4 BIOS Setup

4.1 Menu Structure

This section presents the primary menus of the BIOS (UEFI) Setup Utility. Use the following table as a quick reference forthe contents of the UEFI Setup Utility. The subsections describe the submenus and options for each menu item.

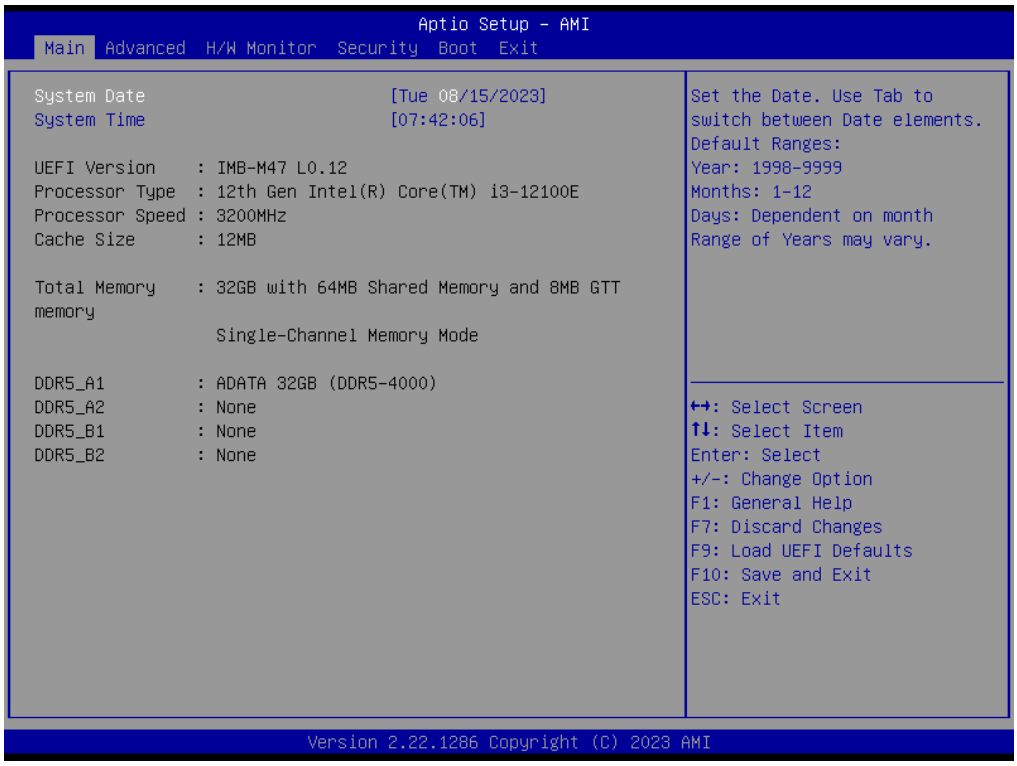
Options to enter UEFI Setup Utility:

- Press [F2] or [Del] during POST (Power-On-Self-Test)
- Press [Ctl] + [Alt] + [Del] after POST

Main	**Advanced**	**H/W Monitor**
Sets up the system time/date and displays the system information: - System Date - System Time	Contains advanced system configurations, including: ▶ CPU Configuration ▶ Chipset Configuration ▶ Storage Configuration ▶ Super IO Configuration ▶ AMT Configuration ▶ ACPI Configuration ▶ USB Configuration ▶ Trusted Computing ▶ Thunderbolt™ Configuration ▶ Instant Flash	Displays Hardware Status info, including: - CPU_FAN1 Setting - CHA_FAN1 Setting - CHA_FAN2 Setting - CHA_FAN3 Setting - Case Open Feature
Security	**Boot**	**Exit**
Changes or clears the supervisor/user password for the system: - Supervisor Password - User Password - Secure Boot	Configures the boot settings and boot priority for available devices: - Boot Option #1 - Boot From Onboard LAN - Setup Prompt Timeout - Bootup Num-Lock - Full Screen Logo	Exits the UEFI Setup Utility while saving or discard the changes made: - Save Changes and Exit - Discard Changes and Exit - Discard Changes - Load UEFI Defaults - Launch EFI Shell from filesystem device

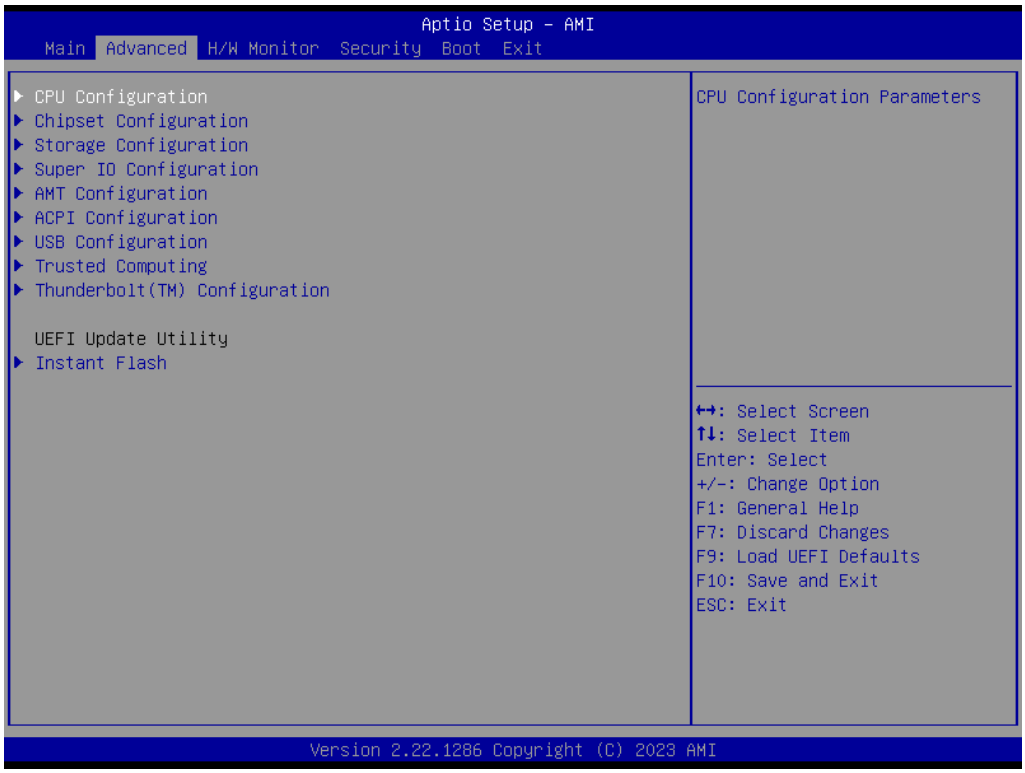
4.2 Main Menu

Upon entering the UEFI Setup Utility, the Main Menu is displayed, providing read-only information about your system and also allows you to set the System Date and Time. Refer to the screenshots and tables below for details of the submenus and settings.



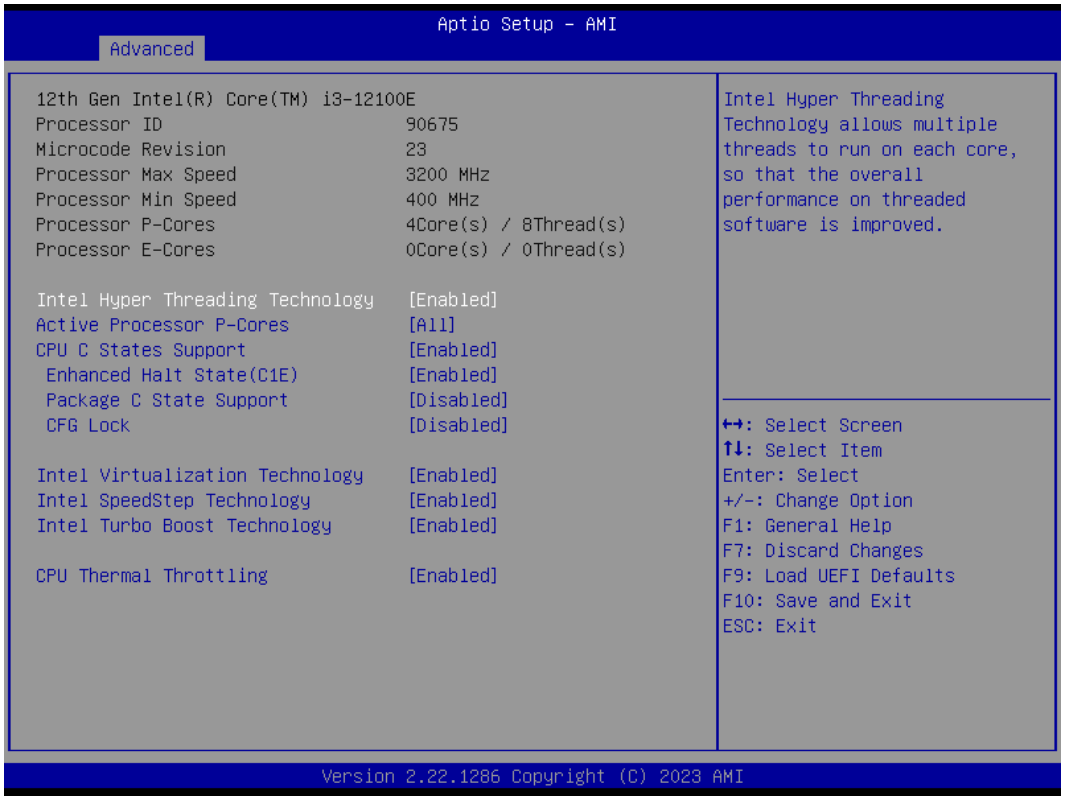
4.3 Advanced Menu

This section contains the configurations for the following: CPU Configuration, Chipset Configuration, Storage Configuration,Super IO Configuration, AMT Configuration, ACPI Configuration, USB Configuration, Trusted Computing, and Thunderbolt(TM) Configuration.



Feature	Description
Instant Flash	Instant Flash is a UEFI flash utility embedded in Flash ROM that allows you to update system UEFI without entering an operating systems, like MS-DOS or Windows®. Launch this tool and save the new UEFI file to your USB flash drive, floppy disk or hard drive, and then update your UEFI in only a few clicks without preparing an additional floppy diskette or other complicated flash utility. The USB flash drive or hard drive must use FAT32/16/12 file system. If you execute Instant Flash utility, the utility will show the UEFI files and their respective information. Select the proper UEFI file to update your UEFI and reboot your system after UEFI update process completes.

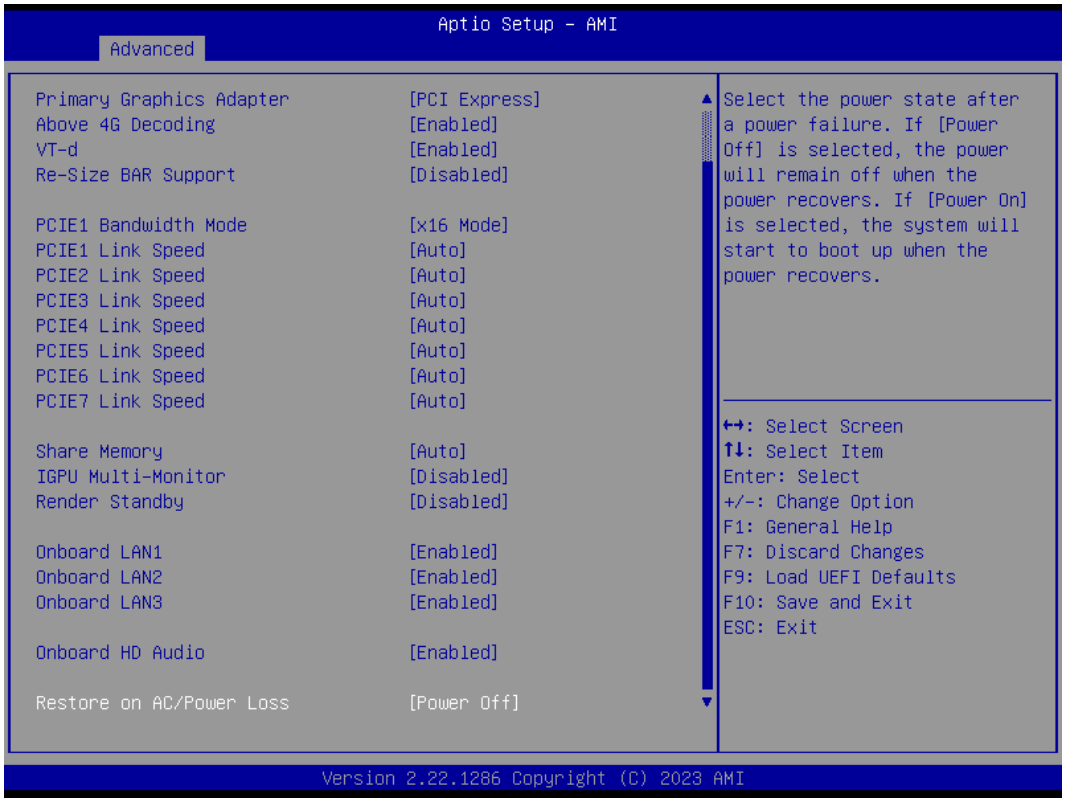
4.3.1 Advanced > CPU Configuration



Feature	Description
Intel Hyper Threading Technology	This option allows multiple threads to run on each core, so thatthe overall performance on threaded software is improved. Configuration options: [Enabled] [Disabled]
Active Processor P-Cores	This allows you to select the number of cores to enable in each processor package.
Active Processor E-Cores	This allows you to select the number of E-Cores to enable in each processor package. NOTE: Number of P-Cores and E-Cores are looked at together. When both are {0,0}, Pcode will enable all cores.
CPU C States Support	This enables CPU C States Support for power saving. It is recommendedto keep C3, C6 and C7 all enabled for better power saving. Configuration options: [Enabled] [Disabled]
Enhanced Halt State (C1E)	The option enables Enhanced Halt State (C1E) for lower power consumption. Configuration options: [Enabled] [Disabled]
Package C State Support	It enables CPU, PCIe, Memory, Graphics C State Support forpower saving.
CFG Lock	It enables or disables the CFG Lock.Configuration options: [Enabled] [Disabled]
Intel Virtualization Technology	It allows a platform to run multiple operating systems andapplications in independent partitions, so that one computer system can function as multiple virtual systems.
Intel SpeedStep Technology	It allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation. CPU turbo ratio can befixed when Intel SpeedStep Technology is set to [Disabled] and Intel Turbo Boost Technology is set to [Enabled]. Configuration options: [Enabled] [Disabled]. If you install Windows® 10 and want to enable this function, please set this item to [Enabled]. This item will be hidden if the current CPU does not support Intel SpeedStep technology.

Intel Turbo Boost Technology	It enables the processor to run above its base operatingfrequency when the operating system requests the highest performance state. The default value is [Enabled]. Configuration options: [Enabled] [Disabled]
CPU Thermal Throttling	It enables CPU internal thermal controlmechanisms to keep the CPU from overheating. Configuration options: [Enabled] [Disabled]

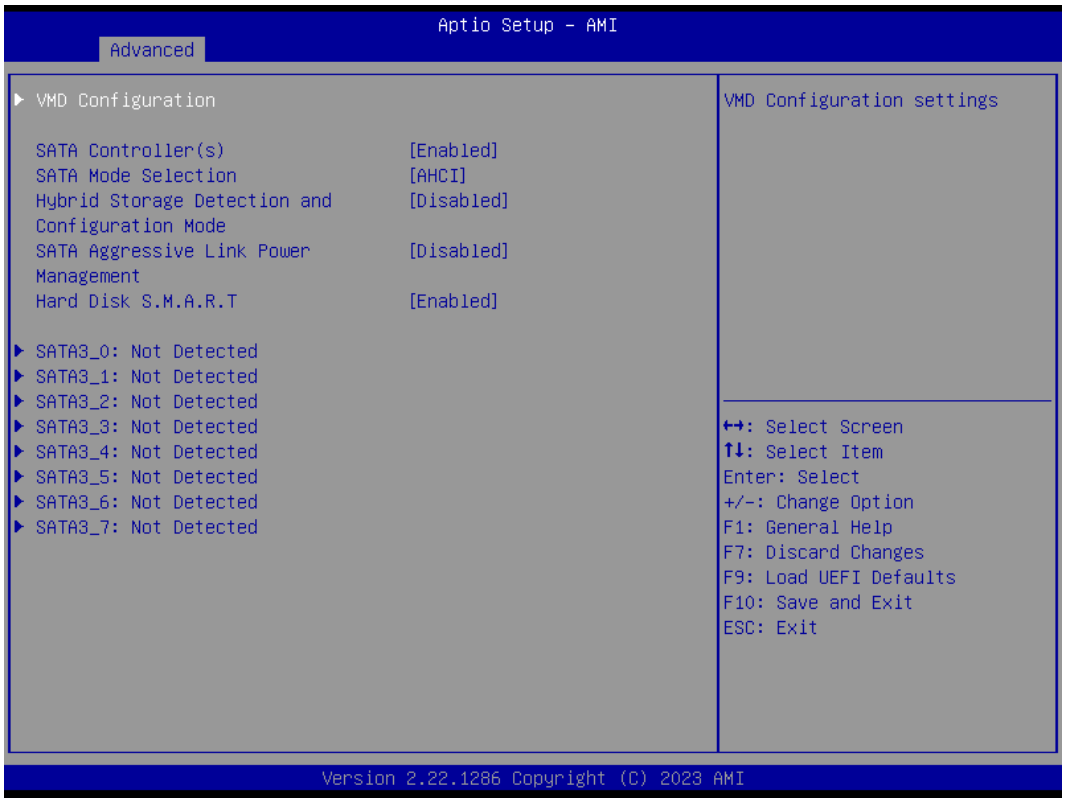
4.3.2 Advanced > Chipset Configuration



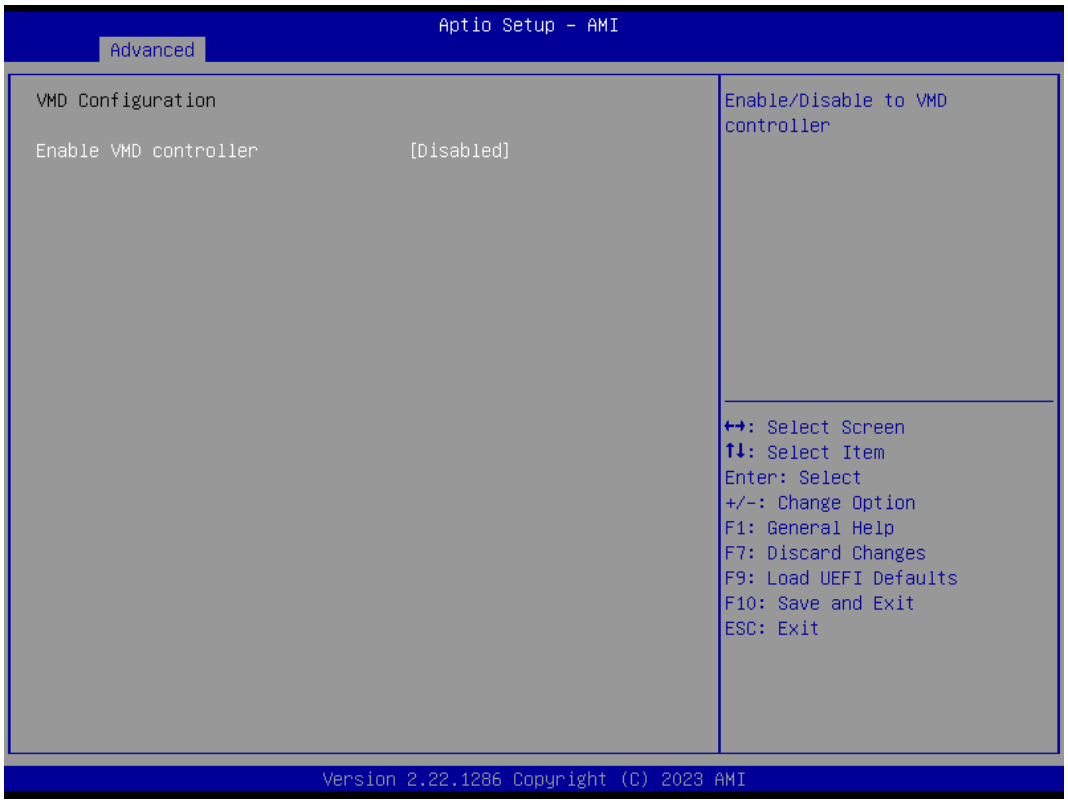
Feature	Description
Primary Graphics Adapter	The option allows you to select a primary VGA. Configuration options: [Onboard] [PCI Express] (Options vary when you have installed agraphics card on your motherboard.)
Above 4G Decoding	The option allows you to enable or disable above 4G Memory Mapped IO decoding. This is disabled automatically when Aperture Size is set to 2048MB. Configuration options: [Enabled] [Disabled]
VT-d	Intel® Virtualization Technology for Directed I/O helps your virtual machine monitor betterutilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance. Configuration options: [Enabled] [Disabled]
Re-Size BAR Support	If system has Resizable BAR capable PCIe Devices, this option enables or disablesResizable BAR Support.
PCIE1 Bandwidth Mode	Select PCIE1 Bandwidth. Select [PCIE4] when using PCIE4 slot. Select [x8 / x8 Mode]when using Riser card on PCIE1 slot. (PCIE4 slot will be disabled)
PCIE1 Link Speed	The option allows you to configure PCIE1 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4] [Gen5] (Options vary dependingon your motherboard.)

PCIE2 Link Speed	The option allows you to configure PCIE2 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] (Options vary depending on your motherboard.)
PCIE3 Link Speed	The option allows you to configure PCIE3 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] (Options vary depending on your motherboard.)
PCIE4 Link Speed	The option allows you to configure PCIE4 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4] [Gen5] (Options vary dependingon your motherboard.)
PCIE5 Link Speed	The option allows you to configure PCIE5 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4] (Options vary depending onyour motherboard.)
PCIE6 Link Speed	The option allows you to configure PCIE6 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] (Options vary depending on your motherboard.)
PCIE7 Link Speed	The option allows you to configure PCIE7 Slot Link Speed. Auto mode is optimizing for overclocking. Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4] (Options vary depending onyour motherboard.)
Share Memory	Share memory allows you to configure the size of memory that is allocated to theintegrated graphics processor when the system boots up. Configuration options: [Auto] [32 M] [64 M] [128M] [256M] [512 M] Options vary dependingon the memory you use on your motherboard.
IGPU Multi-Monitor	Select [Disabled] to disable the integrated graphics when an external graphics card isinstalled. Select [Enabled] to keep the integrated graphics enabled at all times. Configuration options: [Enabled] [Disabled]
Render Standby	Power down the render unit when the GPU is idle for lower power consumption.
Onboard LAN (1,2,3)	Enables the Onboard LAN1,2,3 features
Onboard HD Audio	Onboard HD Audio a l lows you to enable or disable the onboard HD audio controller. Setthis item to [Auto] to enable the onboard HD and automatically disable it when a sound card is installed. Configuration options: [Enabled] [Disabled]
Restore on AC/Power Loss	The option allows you to select the power state after a power failure. [Power Off] sets the power to remain off when the power recovers. [Power On] sets the system to start to boot up when the power recovers.

4.3.3 Advanced > Storage Configuration

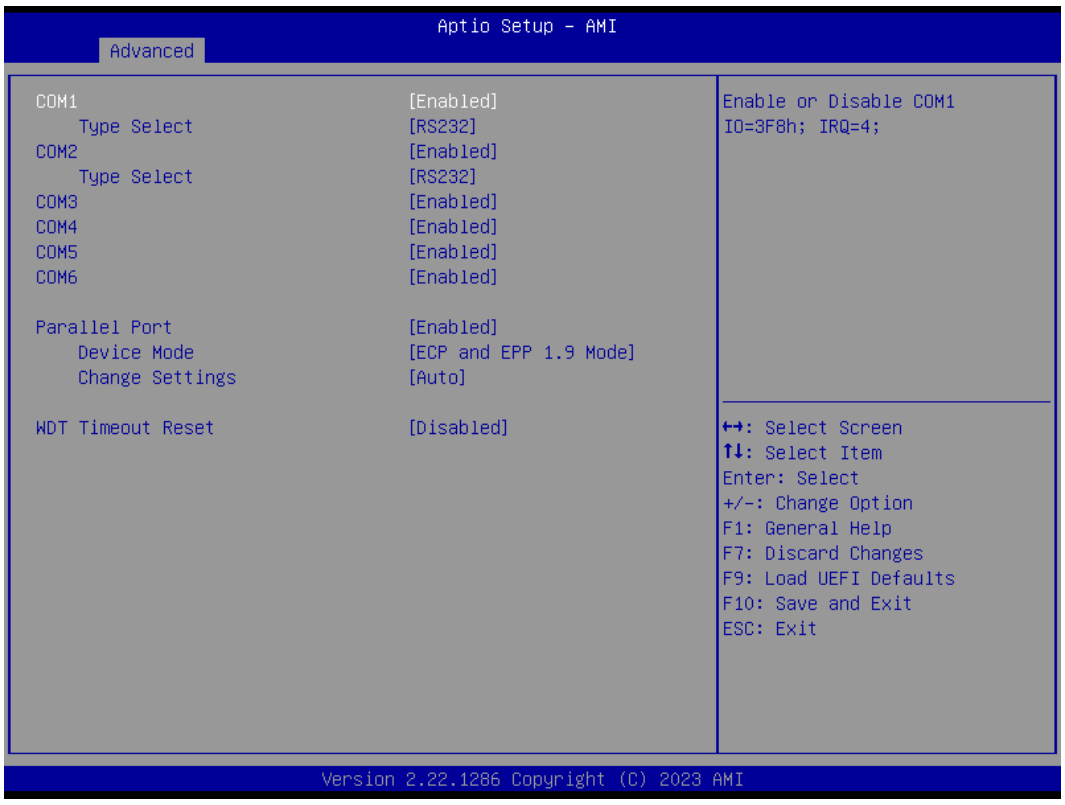


Feature	Description
VMD Configuration	This item allows you to enable or disable the Intel VMD support function.
SATA Controller(s)	The option allows you to enable or disable the SATA controllers.Configuration options: [Enabled] [Disabled]
SATA Mode Selection	AHCI supports new features that improve performance.Configuration option: [AHCI]
Hybrid Storage Detection andConfiguration Mode	The option allows you to select Hybrid Storage Detection and Configuration Mode. Configuration options: [Dynamic Configuration for Hybrid Storage Enable] [Disabled]
SATA Aggressive Link PowerManagement	SATA Aggressive Link Power Management allows SATA devices to enter a low power state during periods of inactivity to save power. It is supported only by AHCI mode. Configuration options: [Enabled] [Disabled]
Hard Disk S.M.A.R.T.	S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drives to detect and report on various indicatorsof reliability. Configuration options: [Enabled] [Disabled]



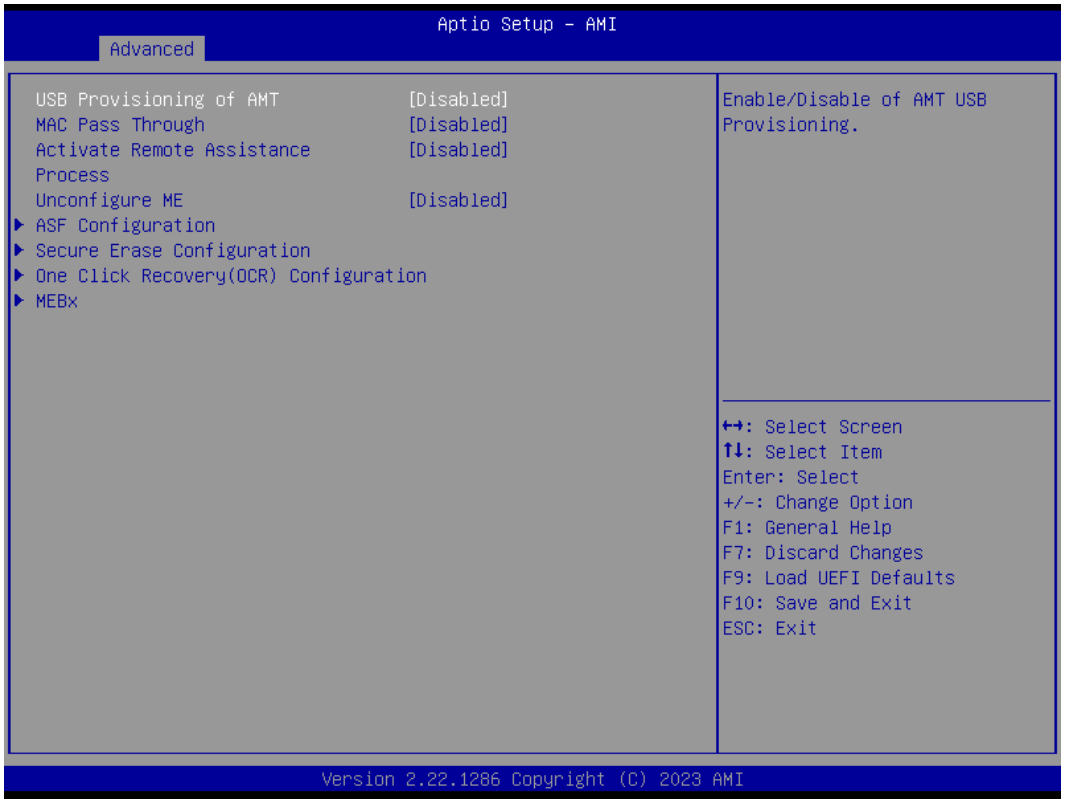
Feature	Description
Enable VMD Controller	Enables or disables the Intel VMD controller.The following items appear when it is set to [Enabled].

4.3.4 Advanced > Suprt IO Configuration

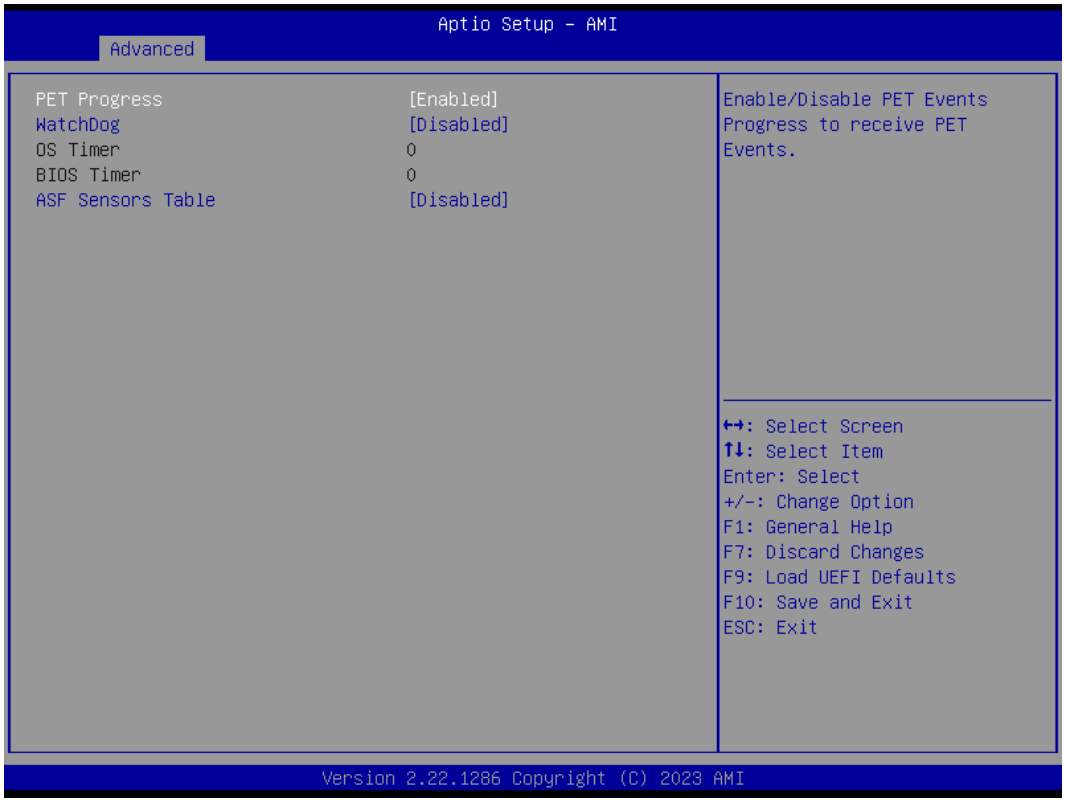


Feature	Description
COM1 Configuration	Use this to set parameters of COM1.
Type Select	Use this to select COM1 port type: [RS232], [RS422] or [RS485].
COM2 Configuration	Use this to set parameters of COM2.
Type Select	Use this to select COM2 port type: [RS232], [RS422] or [RS485].
COM3 Configuration	Use this to set parameters of COM3.
COM4 Configuration	Use this to set parameters of COM4.
COM5 Configuration	Use this to set parameters of COM5.
COM6 Configuration	Use this to set parameters of COM6.
Parallel Port	The option enables or disables the Parallel port.
Device Mode	Selects the device mode according to your connected device.
Change Settings	Select the address of the Parallel port.
WDT Timeout Reset	Use this to set the Watch Dog Timer.

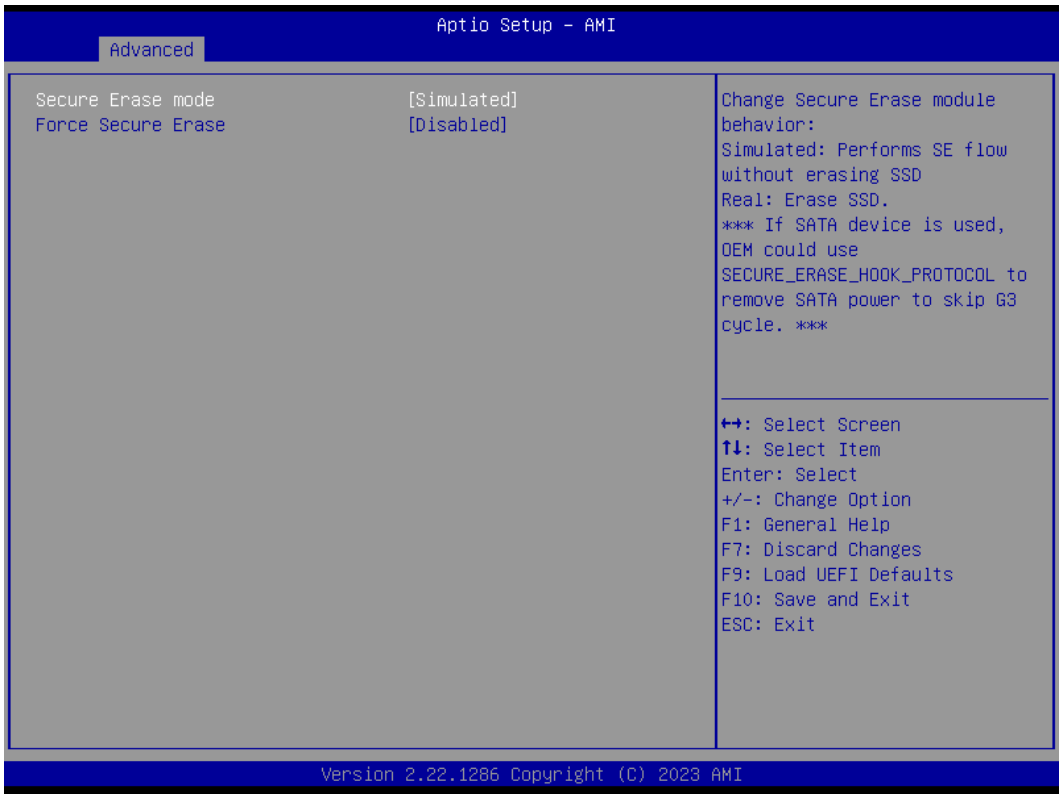
4.3.5 Advanced > AMT Technology



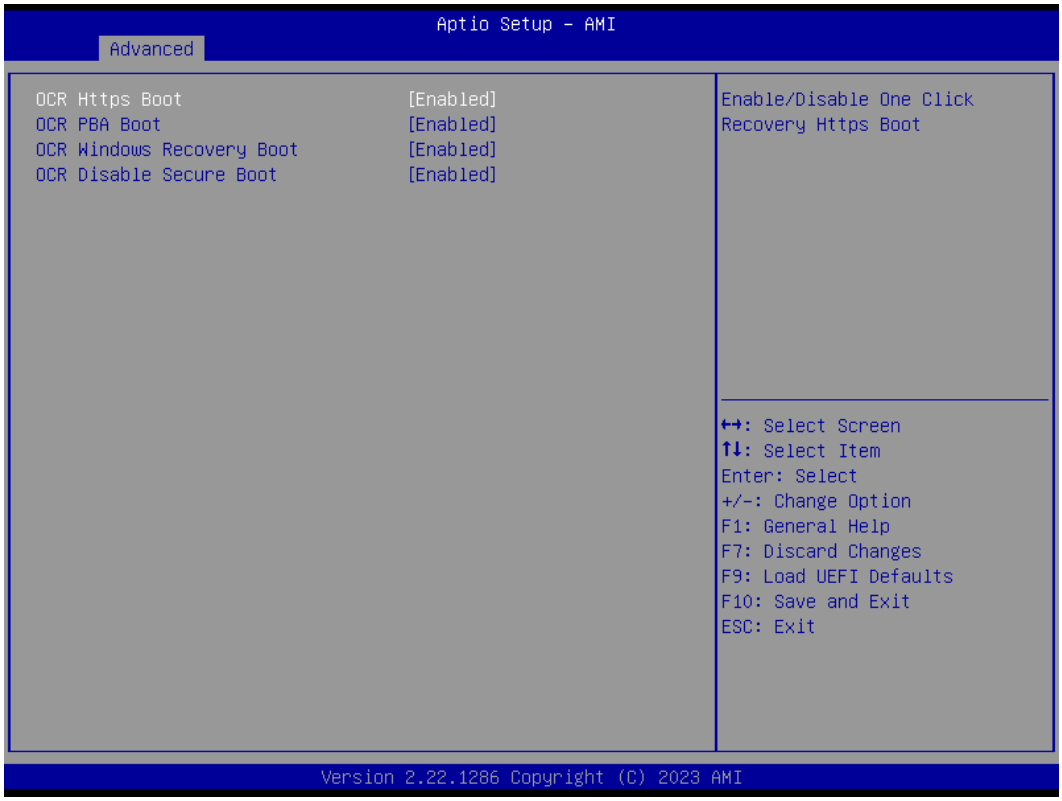
Feature	Description
USB Provisioning of AMT	Use this to enable or disable AMT USB Provisioning. The default is [Disabled].
MAC Pass Through	The option enables or disables MAC Pass Through function.
Activate Remote AssistanceProcess	Trigger CIRA boot. The default is [Disabled].
Un-Configure ME	Un-Configure ME without password. The default is [Disabled].
ASF Configuration	The option allows you to configure Alert Standard Format parameters.
Secure Erase Configuration	Secure Erase configuration menu.
One Click Recovery(OCR) Configuration	Configuration setting for One Click Recovery. This allows access for AMT to boot arecovery OS application
MEBx	This Formset contains forms for configuring MEBx.



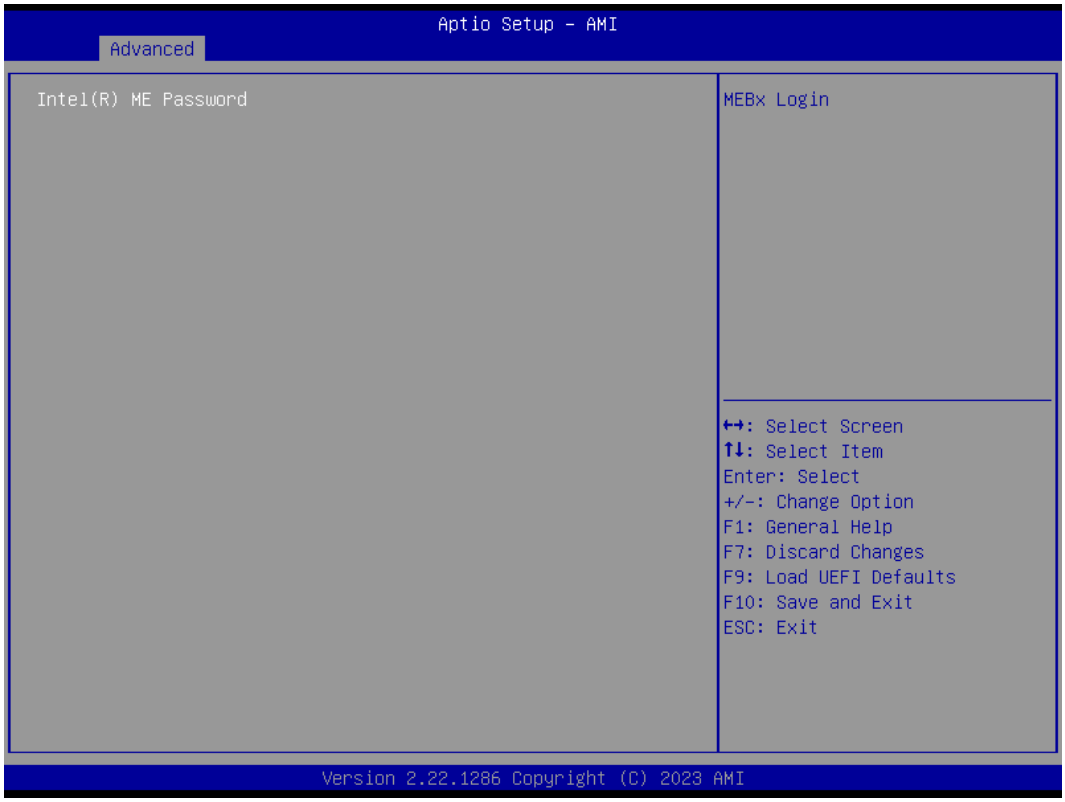
Feature	Description
PET Progress	User can enable or disable PET Events progress to receive PET events or not. Thedefault is [Enabled].
Watchdog	Use this to enable or disable AMT Watchdog Timer. The default is [Disabled].
ASF Sensors Table	Use this to enable or disable ASF Sensor Table. The default is [Disabled].



Feature	Description
Secure Erase mode	Change Secure Erase module behavior: Simulated: Performs SE flow without erasingSSD. Real: Erase SSD.
Force Secure Erase	Use this to enable or disable Force Secure Erase on next boot. The default is [Disabled].

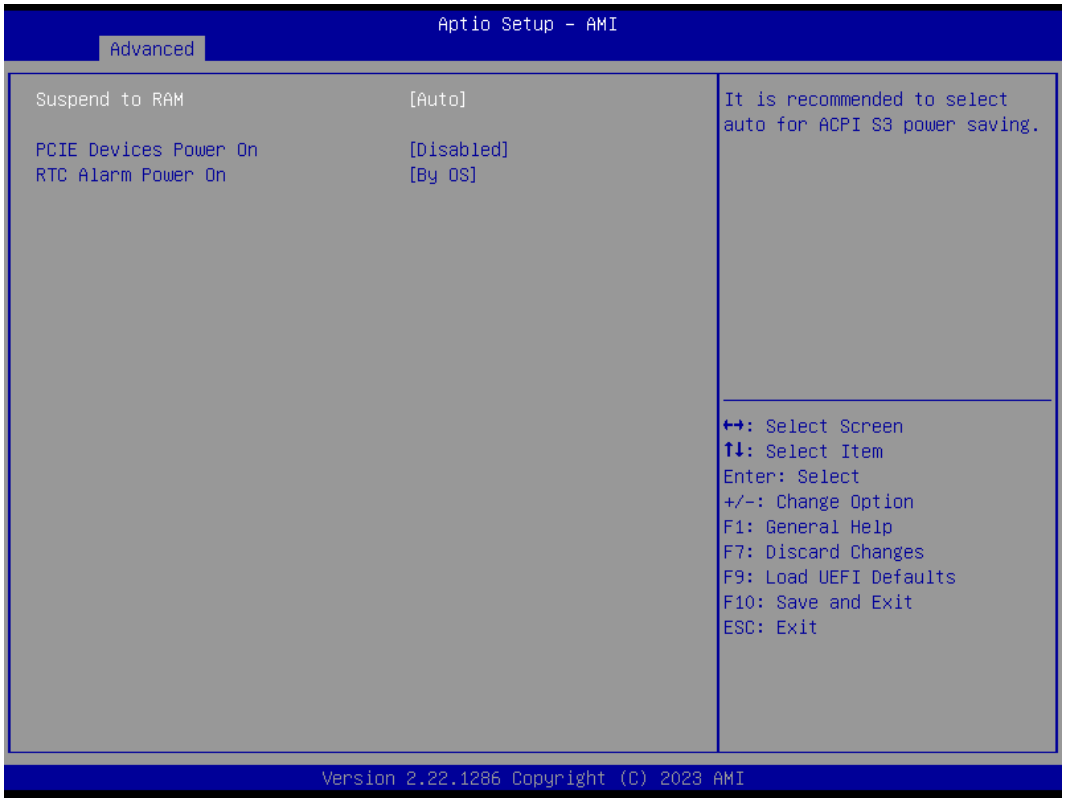


Feature	Description
OCR Http Boot	Use this to enable or disable One Click Recovery Https Boot. The default is [Enabled].
OCR PBA Boot	Use this to enable or disable One Click Recovery PBA Boot. The default is [Enabled].
OCR Windows Recovery Boot	Use this to enable or disable One Click Recovery Windows Recovery Boot. The default is [Enabled].
OCR Disable Secure Boot	Use this to allow CSME to request Secure Boot to be disabled for One Click Recovery.The default is [Enabled].



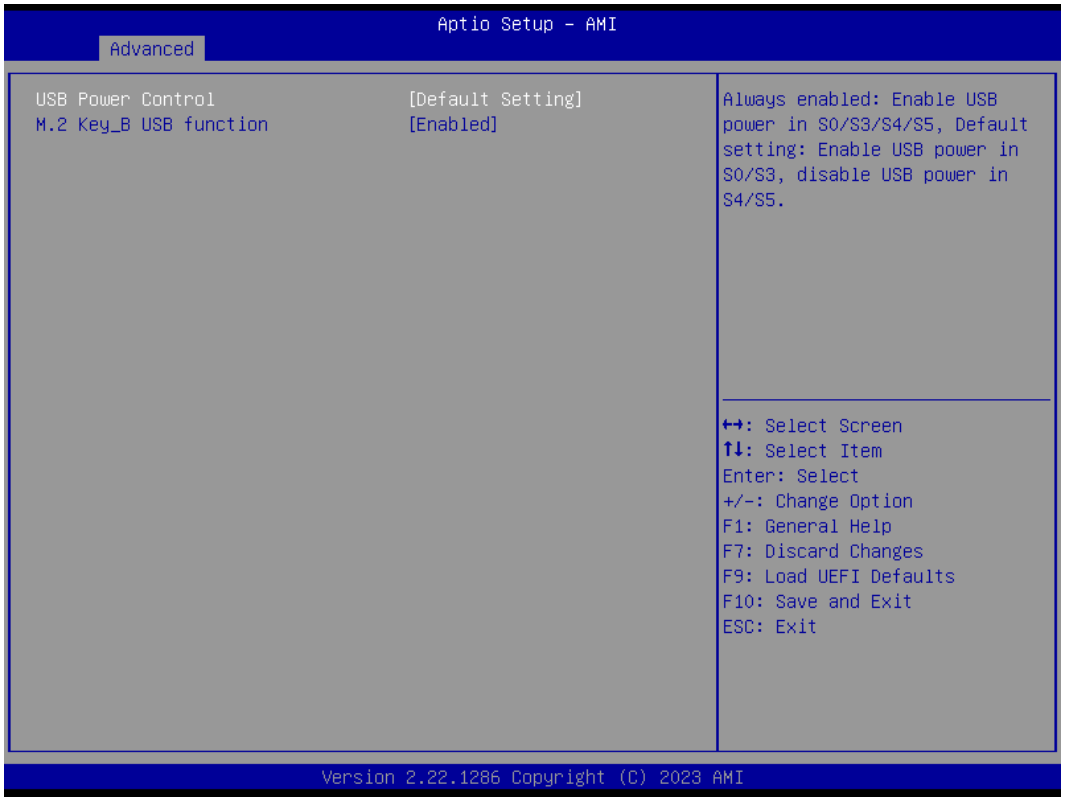
Feature	Description
Intel(R) ME Password	MEBx Login

4.3.6 Advanced > ACPI Configuration



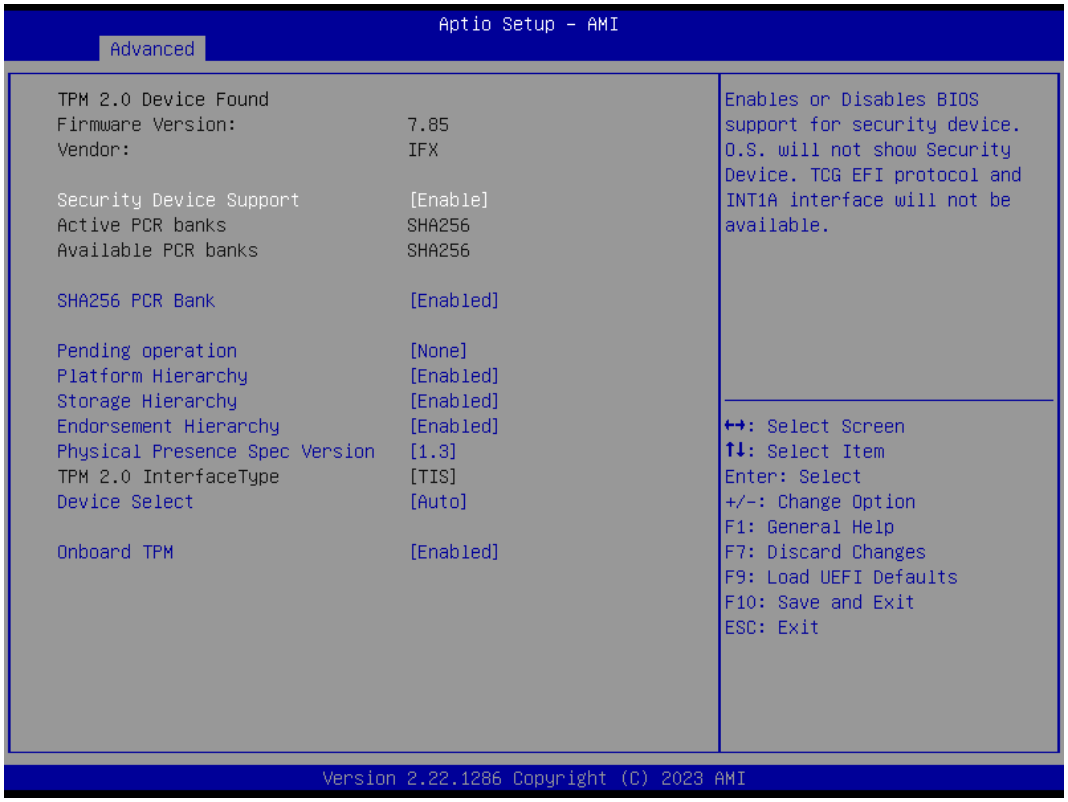
Feature	Description
Suspend to RAM	Suspend to RAM allows you to select [Disabled] for ACPI suspend type S1. It is recommended to select [Auto] for ACPI S3 power saving. Configuration options: [Auto] [Disabled]
PCIE Devices Power On	Use this item to enable or disable PCIE devices to turn on the system from the power-soft-off mode.
RTC Alarm Power On	RTC Alarm Power On allows the system to be waked up by the real time clock alarm. Setit to By OS to let it be handled by your operating system. Configuration options: [Enabled] [Disabled] [By OS]

4.3.7 Advanced > USB Configuration



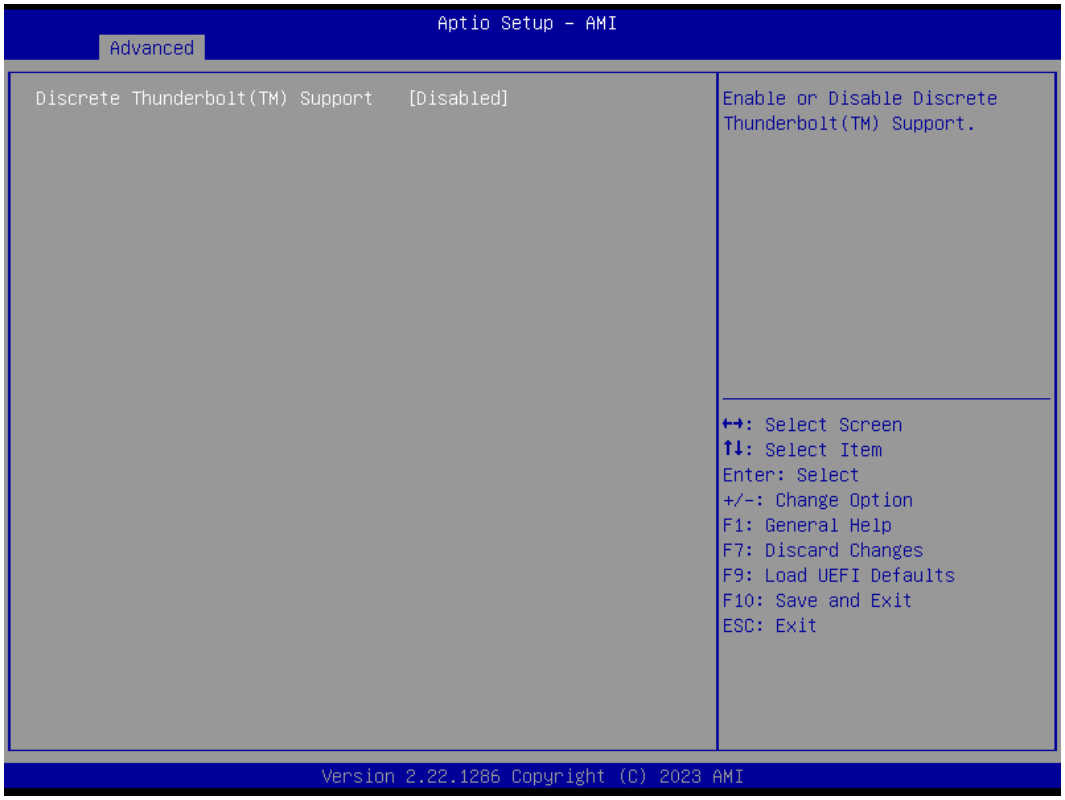
Feature	Description
USB Support	Use this option to control USB power.
M.2 Key_B Function	The item enables or disables M.2 Key-B USB function.

4.3.8 Advanced > Trusted Computing



Feature	Description
Security Device Support	Security Device Support allows you to enable or disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not beavailable. Configuration options: [Enabled] [Disabled]
Active PCR banks	This item displays active PCR Banks.
Available PCR Banks	This item displays available PCR Banks.
SHA256 PCR Bank	SHA256 PCR Bank allows you to enable or disable SHA256 PCR Bank. Configurationoptions: [Enabled] [Disabled]
Pending Operation	Pending Operation allows you to schedule an Operation for the Security Device. NOTE: Your computer will reboot during restart in order to change State of the Device.Configuration options: [None] [TPM Clear]
Platform Hierarchy	This item allows you to enable or disable Platform Hierarchy. Configuration options:[Enabled] [Disabled]
Storage Hierarchy	This item allows you to enable or disable Storage Hierarchy. Configuration options:[Enabled] [Disabled]
Endorsement Hierarchy	This item allows you to enable or disable Endorsement Hierarchy. Configuration options: [Enabled] [Disabled]
Physical Presence Spec Version	Select this item to tell OS to support PPI spec version 1.2 or 1.3. Please note that someHCK tests might not support version 1.3. Configuration options: [1.2] [1.3]
TPM 2.0 Interface Type	This item allows you to view the Communication Interface to TPM 2.0 Device: CRB orITS.
Device Select	This item allows you to select the TPM device to be supported.[TPM 1.2] restricts support to TPM 1.2 devices. [TPM 2.0] restricts support to TPM 2.0 devices. [Auto] supports both TPM 1.2 and TPM 2.0 devices with the default set to TPM 2.0devices. If TPM 2.0 devices are not found, TPM 1.2 devices will be enumerated.
Onboard TPM	The option enables or disables Intel PTT in ME. Disable this option to use discrete TPMModule.

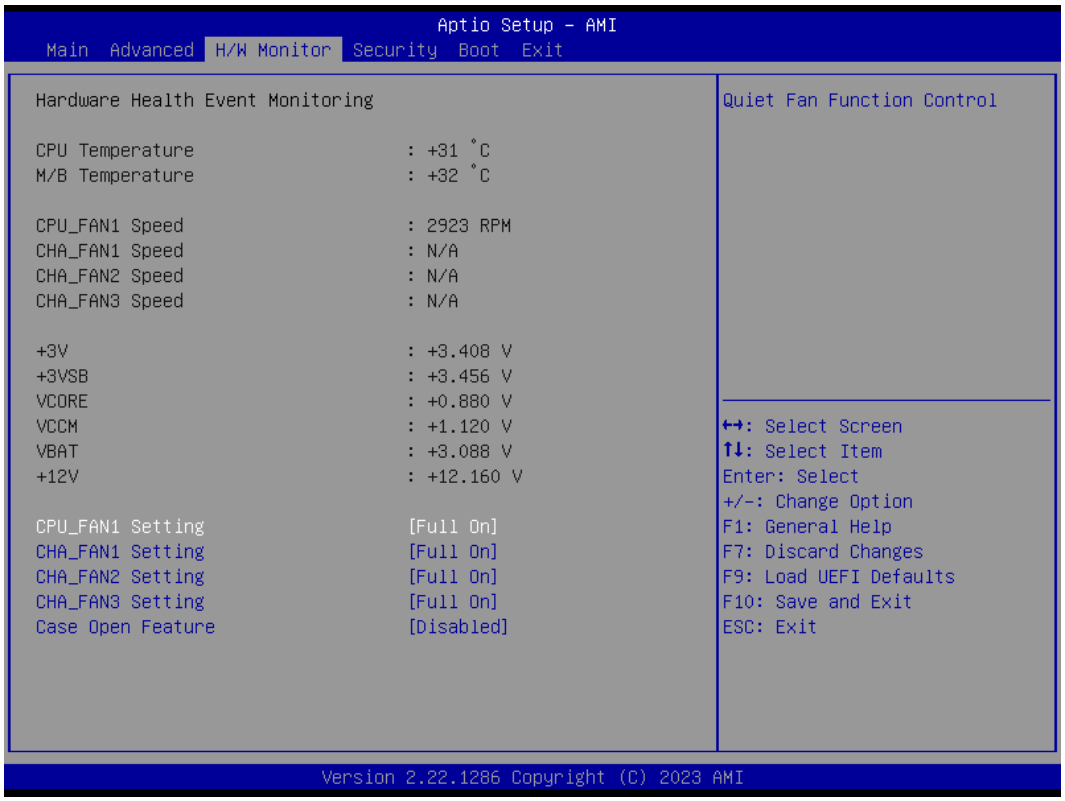
4.4 Thunderbolt (TM) Configuration



Feature	Description
Discrete Thunderbolt(TM)Support	This item enables or disables the Discrete Thunderbolt(TM) Support.

4.5 Hardware Health Environment Monitoring Screen

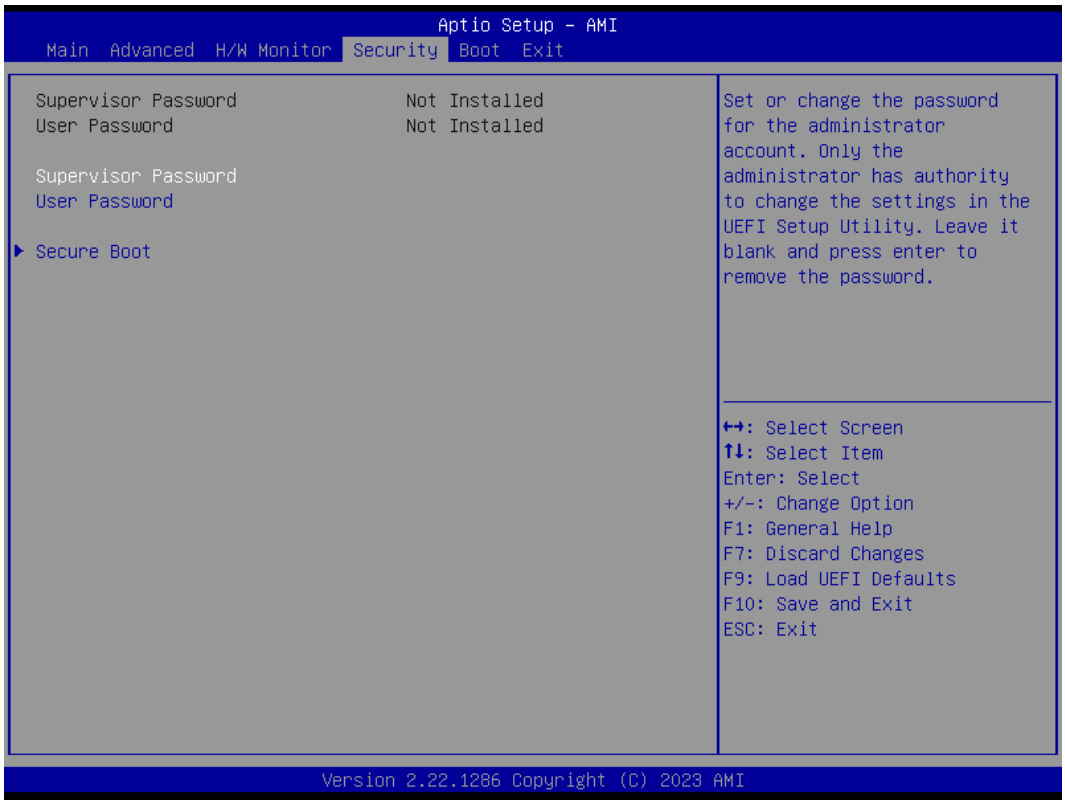
This screen allows you to monitor the status of your system and installed devices, such as CPU and motherboard temperature, CPU fan speed, chassis fan speed, and the critical voltage.



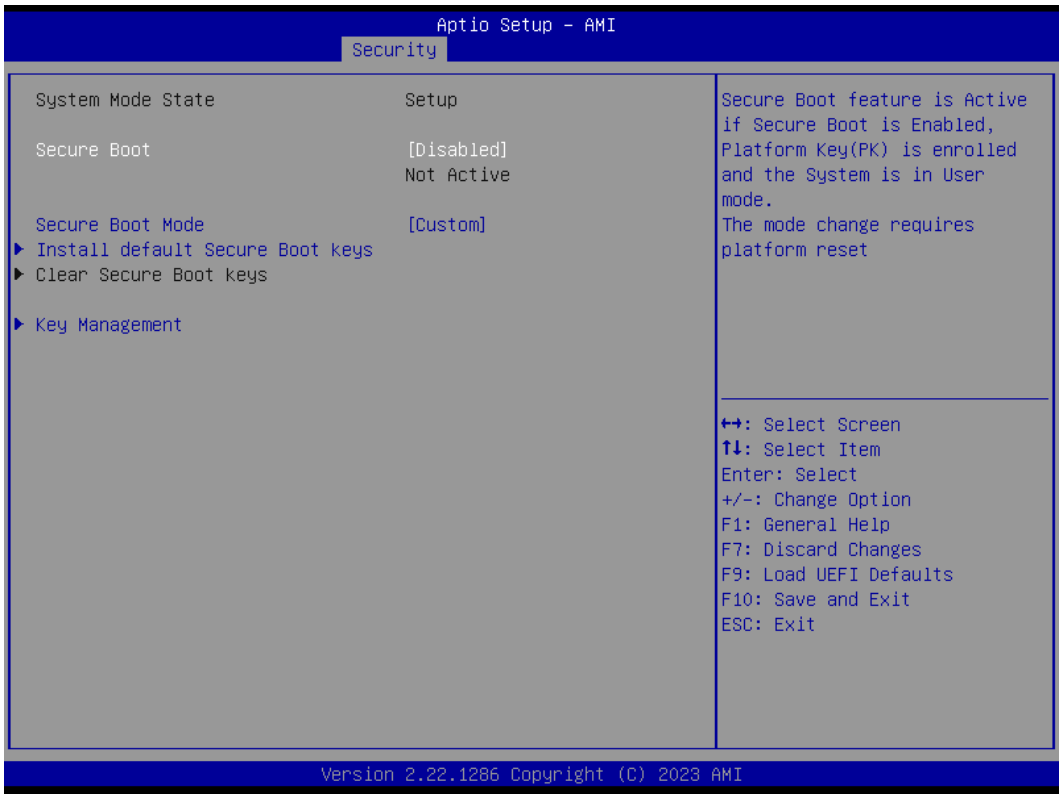
Feature	Description
CPU_Fan 1 Setting	This item allows you to select a fan mode for CPU Fan 1. The default value is [Full On]. Configuration options: [Full On] [Automatic Mode]
CHA_Fan 1 Setting	This allows you to set chassis fan 1's speed. The default value is [Full On]. Configurationoptions: [Full On] [Automatic Mode]
CHA_Fan 2 Setting	This allows you to set chassis fan 2's speed. The default value is [Full On]. Configurationoptions: [Full On] [Manual]
CHA_Fan 3 Setting	This allows you to set chassis fan 3's speed. The default value is [Full On]. Configurationoptions: [Full On] [Manual]
Case Open Feature	This item allows you to enable or disable case open detection feature. The default isvalue [Disabled].
Clear Status	This option appears only when the case open has been detected. Use this option to keepor clear the record of previous chassis intrusion status.

4.6 Security Screen

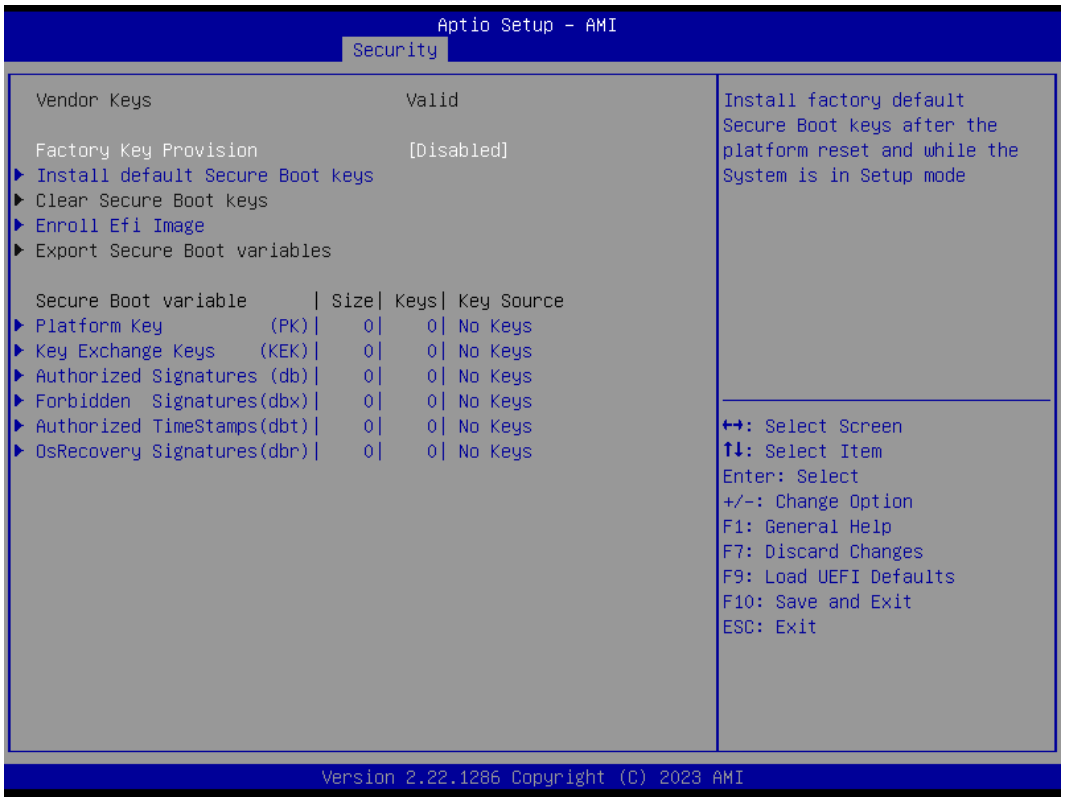
The Security Screen lets you change or clear the supervisor / user passwords for the system.



Feature	Description
Supervisor Password	Set or change the password for the administrator account. Only the administrator has the authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.
User Password	Set or change the password for the user account. Users are unable to change the set- tings in the UEFI Setup Utility. Leave it blank and press enter to remove the pass- word.
Secure Boot	Press [Enter] to configure the Secure Boot Settings. The feature protects the system from unauthorized access and malwares during POST.



Feature	Description
Secure Boot Mode	[Standard] Select this item and the system will automatically load the Secure Boot keysfrom the BIOS database. [Custom] Select this item and Secure Boot Policy variables can be configured by aphysically present user without full authentication.
Install Default Secure BootKeys	Please install default secure boot keys if it's the first time you use secure boot.
Clear Secure Boot Keys	This item appears only when you load the default Secure Boot keys. Use this item toclear all default Secure Boot keys.
Key Management	This item enables expert users to modify Secure Boot Policy variables without full authentication. This appears only when you set Secure Boot Mode to [Custom].

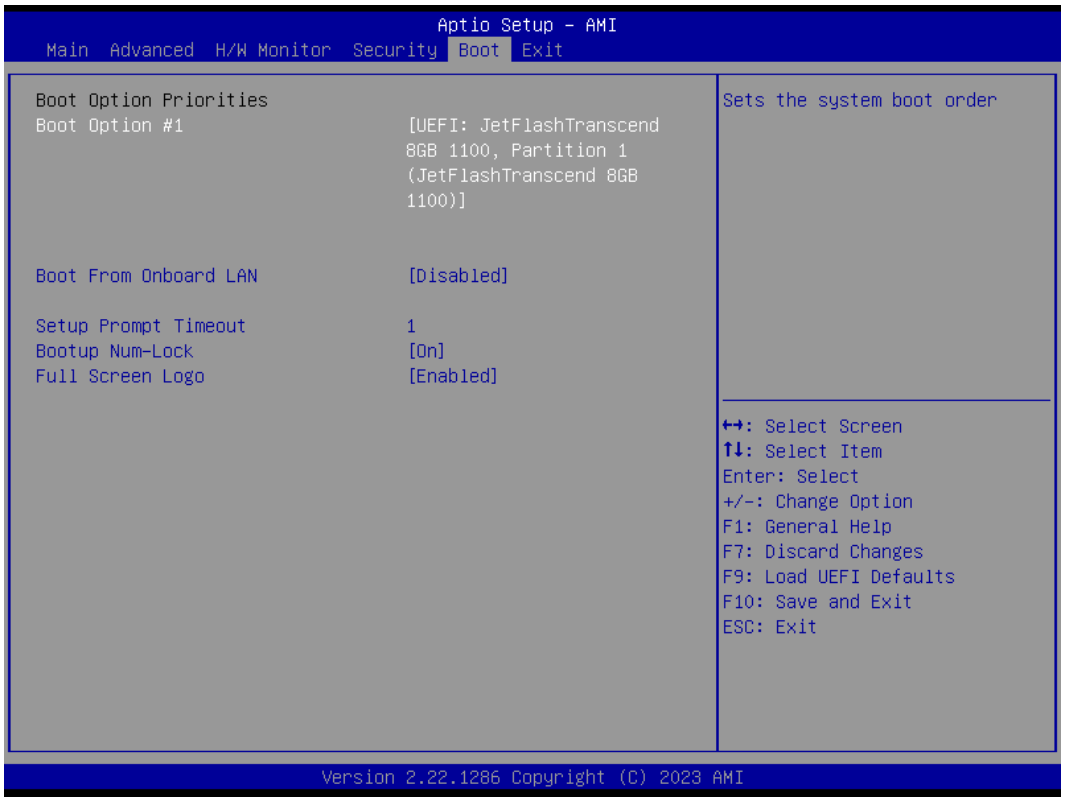


Feature	Description
Factory Key Provision	Allows you to install factory default Secure Boot keys after the platform reset and whilethe System is in Setup mode.
Install Default Secure BootKeys	Please install default secure boot keys if it's the first time you use secure boot.
Clear Secure Boot Keys	This item appears only when you load the default Secure Boot keys. Use this item toclear all default Secure Boot keys.
Enroll Efi Image	Allows Efi image to run in Secure Boot Mode. Enroll SHA256 Hash certificate of a PEimage into Authorized Signature Database (db).
Export Secure Boot variables	Allows you to copy NVRAM content of Secure Boot variables to files in a root folder on afile system device.
Platform Key(PK)	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed
Authorized Signatures	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed

Forbidden Signatures	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed
Authorized TimeStamps	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed
OsRecovery Signatures	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed
Authorized Signatures	Enroll Factory Defaults or load certificates from a file: 1. Public Key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2. Authenticated UEFI Variable 3. EFI PE/COFF Image(SHA256) Key Source: Factory, Modified, Mixed

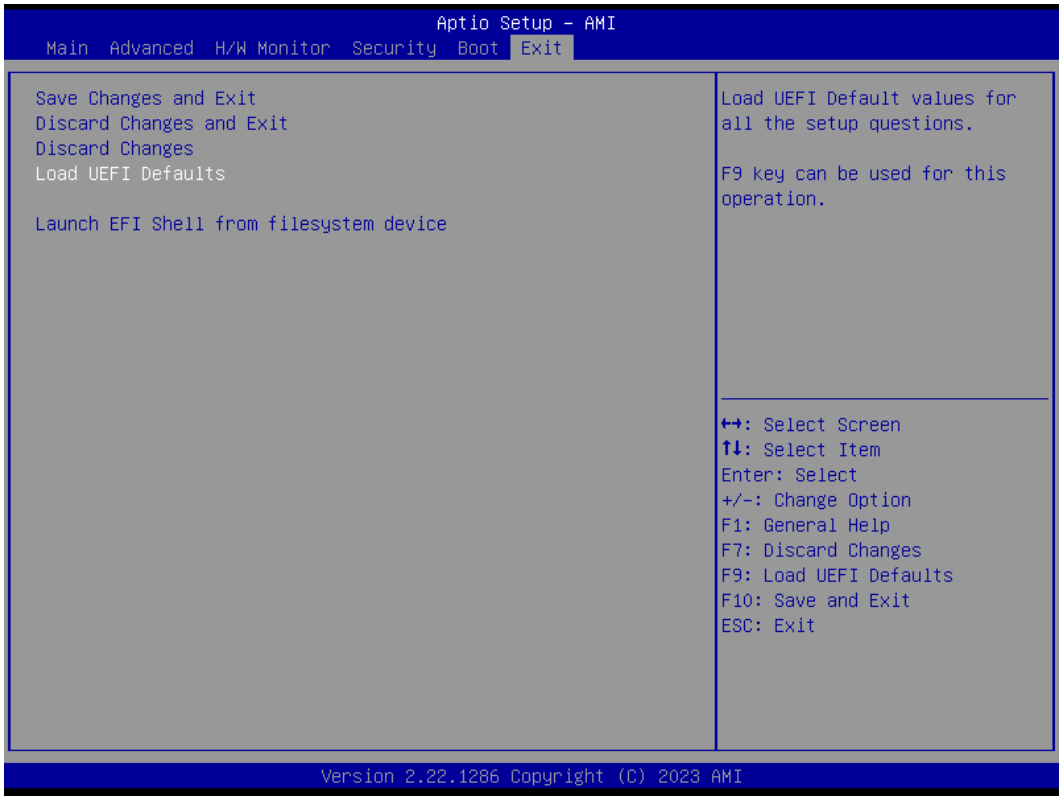
4.7 Boot Screen

This section displays the available devices on your system for you to configure the boot priority and settings.



Feature	Description
Boot Option #1	The item allows you to set the system boot order.
Boot From Onboard LAN	The item allows the system to be waked up by the onboard LAN.Configuration options: [Enabled] [Disabled]
Setup Prompt Timeout	The item allows you to configures the number of seconds to wait for the UEFI setuputility. Configuration options: [1] - [65535]
Bootup Num-Lock	The item allows you to select whether Num Lock should be turned on or off when thesystem boots up. Configuration options: [On] [Off]
Full Screen Logo	[Enabled] Select this item to display the boot logo. [Disabled] Select this item to show normal POST messages.

4.8 Exit Screen



Feature	Description
Save Changes and Exit	When you select this option, the following message “Save configuration changes and exitsetup?” will pop out. Select [Yes] to save the changes and exit the UEFI SETUP UTILITY.
Discard Changes and Exit	When you select this option, the following message “Discard changes and exit setup?” will pop out. Select [Yes] to exit the UEFI SETUP UTILITY without saving any changes.
Discard Changes	When you select this option, the following message “Discard changes?” will pop out.Select [Yes] to discard all the changes.
Load UEFI Defaults	The item allows you to load UEFI default values for all options. The F9 key can be usedfor this operation.
Launch EFI Shell from filesystem device	The item allows you to copy shellx64.efi to the root directory to launch EFI Shell.

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Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

Getting Service

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