

USER'S MANUAL

IMB541

**Intel® Socket 1700 Core™ i9/i7/ i5/ i3
/Pentium®/ Celeron® and Xeon® E
Processors ATX Industrial
Motherboard**

User's Manual



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Wrong type of batteries may cause explosion. It is recommended that users only replace with the same or equivalent type of batteries as suggested by the manufacturer once properly disposing of any used ones.

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Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. To discharge static electricity from your body.
- Wear a grounding wrist strap, available from most electronic component stores, when handling boards and components.

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Table of Contents

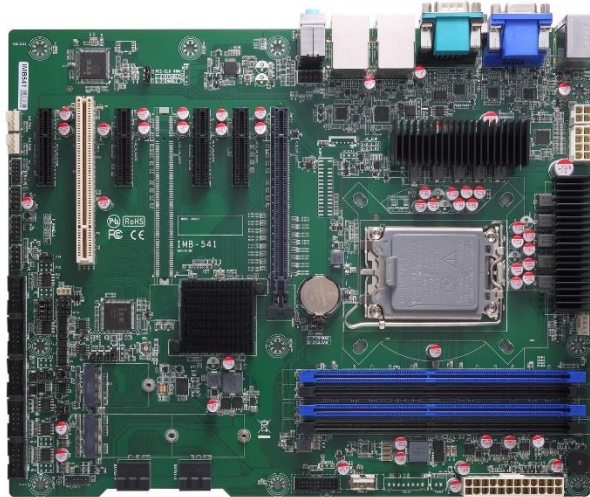
Disclaimers	ii
ESD Precautions.....	iii
Section 1 Introduction.....	1
1.1 Features.....	2
1.2 Specifications.....	2
1.3 Packing list.....	3
Section 2 Board and Pin Assignments.....	5
2.1 Board Layout.....	5
2.2 Block Diagram.....	6
2.3 Jumper Settings	7
2.3.1 AT/ATX Mode Select (J_AT/ATX1).....	7
2.3.2 Clear CMOS (CLR_CMOS1)	7
2.3.3 PS/2 Connector (Keyboard & Mouse) and Dual USB3.0 TYPE-A Connector (PS/2_USB1).....	10
2.3.4 COM Connector (COM1)	10
2.3.5 HDMI Connector (HDMI1).....	11
2.3.6 VGA and DVI-D Connector (VGA1, DVI1)	12
2.3.7 Audio Jack (AUDIO1).....	12
2.3.8 Front Audio Header (F_AUDIO1).....	13
2.3.9 LAN and USB 3.2 Connectors (RJ45_USB1 and RJ45_USB2)	13
2.3.10 GPIO Header (J_GPIO1)	14
2.3.11 WatchDog Reset Select Jumper (3*1 Pin 2.54mm) (JP19)	14
2.3.12 PCI CLK 66MHz Enable/Disable Select Jumper (3*1 Pin 2.54mm) (JP14)	14
2.3.13 M.2 2280 Key M NVMe SSD (M.2_PCIESSD_M1)	15
2.3.14 M.2 Key E Socket (M.2_KEYE_WLAN1)	16
2.3.15 SMBus Header (SMBUS1).....	17
2.3.16 Internal USB Headers (F_USB2_1, F_USB2_2 , USB2_1).....	17
2.3.17 ESPI Header (Debug Only) 6*2 Pin 2.00mm).....	18
2.3.18 Front Panel Header (F_PANEL1).....	18
2.3.19 Power Input Connectors (ATX1 and ATX2 and ATX3)	19
2.3.20 Internal USB 3.2 Gen1 (5Gbps) Connector (F_USB3_1)	20
2.3.21 COM3 RS422 RX Signal 120Ω Resistive termination Select Jumper (JP15)	20
2.3.22 COM3 RS422 TX/RS485 Signal 120Ω Resistive termination Select Jumper (JP16).....	20
2.3.23 COM4 RS485 Signal 120Ω Resistive termination Select Jumper(JP17)..	21
2.3.24 COM BOX Headers (COM2, COM3, COM4, COM5, COM6).....	21
2.3.25 COM3 Mode Select (JP4, JP5, JP6).....	21
2.3.26 COM4 Mode Select (JP7, JP18).....	22

2.3.27	Fan Connectors (CPU_FAN1, SYS_FAN1, SYS_FAN2).....	22
2.3.28	PCI-Express x4 Slots (PCIE_4X_SLOT1, SLOT2, SLOT3, SLOT4)	23
2.3.29	SATA 3.0 Connectors (SATA1-2, SATA3-4)	24
Section 3 Hardware Description		25
3.1	Microprocessors	25
3.2	BIOS.....	25
3.3	System Memory	25
Section 4 AMI BIOS Setup Utility		27
4.1	Starting.....	27
4.2	Navigation Keys	27
4.3	Main Menu	29
4.4	Advanced Menu	30
4.5	Chipset Menu	44
4.6	Security Menu	51
4.7	Boot Menu.....	52
4.8	Save & Exit Menu.....	53
Appendix A TPM Module Installation.....		55
Appendix B Watchdog Timer.....		59
A.1	About Watchdog Timer	59
A.2	How to Use Watchdog Sample Program.....	59
Appendix C VMD(RAID) Configuration.....		63

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Section 1

Introduction



The IMB541 is an advanced ATX industrial motherboard based on the 12th Generation Intel® Core™ i9 / i7/ i5/ i3/ Pentium®, Celeron® processors (Alder lake S) in an LGA1700 socket and comes with an Intel® Q670E chipset. Specially designed for optimal computing and visual performance, the IMB541 motherboard is an ideal solution for major industry applications ranging from financial modeling to designing complex buildings and vehicles. With its built-in Intel® HD Graphics GFX, this industrial grade motherboard delivers superb 3D visual performance and supports triple display through, DVI-D, HDMI and VGA ports to meet professional-grade CAD and media/entertainment needs.

In addition, the IMB541 supports Intel® Turbo Boost 2.0 technology, Intel® Hyper-Threading technology, Intel® UHD Graphics with DX12, 128GB DDR4-3200 Non-ECC un-buffered Long-DIMM, and PCI-Express 4.0 x16 slots. It also features Intel SATA RAID, as well as PCI Express expansion interfaces, making it specifically suited for applications with added security features.

1.1 Features

- LGA1700 socket 12th Generation Intel® Core™ i9 / i7/ i5/ i3/ Pentium®, Celeron® processors (Alder lake S) up to 125W
- 4 x 288-pin DDR4-3200 Non-ECC un-buffered Long-DIMM with maximum memory capacity up to 128GB (max. 32GB per slot)
- DVI-D, HDMI, and VGA with Triple-view support
- 4 x SATA-6.0Gb/s RAID 0/1/5/10
- 4 x USB3.2 Gen1x1 (5Gbps)(Rear I/O), 2 x Dual USB 3.2 Gen1x1(5Gbps) and 2 x USB 2.0 ports (Rear I/O) and 4 x USB 2.0 ports and 1 x USB 2.0 with 180D type A

1.2 Specifications

- **CPU**
- LGA1700 Socket 12th Generation Intel® Core™ i9 / i7/ i5/ i3/ Pentium®, Celeron® processors (Alder lake S) up to 125W
- **Chipset**
 - Intel® Q670E
- **BIOS**
 - AMI BIOS
- **System Memory**
 - 4 x 288-pin Non-ECC un-buffered Long-DIMM sockets
 - Maximum 128GB DDR4 memory (max. 32GB per slot)
 - Supports DDR4-3200Mhz
- **Onboard Multi I/O**
 - 1 x PS/2 keyboard (internal box headers)
 - 1 x PS/2 mouse (internal box headers)
 - 1 x SMBus
 - Serial ports:
 - 1 x RS232 (COM1, DB9/M)
 - 3 x RS232 (COM2/5/6, BOX Header).
 - 1 x RS232/RS422/RS485 (COM3, BOX Header)
 - 1 x RS232/RS485 (COM4, BOX Header)
- **USB Interface**
 - 4 x USB 3.2 Gen1x1 (5Gbps, rear I/O)
 - 2 x USB 2.0 (rear I/O)
 - 2 x USB 3.2 Gen1x1 (5Gbps, internal box header)
 - 4 x USB 2.0 (internal pin header)
 - 1 x USB 2.0 (internal 180D type A)
- **Ethernet**
 - LAN1: 10/100/1000/2500 Mbps with Intel® I225-V; supports Wake-on-LAN, PXE Boot ROM
 - LAN2: 10/100/1000 Mbps with Intel® I219-V
- **Serial ATA**
 - 4 x SATAIII with RAID 0/1/5/10
- **Audio**
 - Realtek ALC897 HDA Codec
 - Supports MIC-in/line-in/line-out

- **Display**
 - 1 x DVI :Support DVI-D, max resolution up to 1920x1200@60Hz
 - 1 x HDMI 1.4b (TYPE-A): up to 4096x2160@30Hz
 - 1 x VGA (DB15/F): max resolution up to 1920x1200@60Hz

- **Expansion Interface**
 - 1 x PCI-E x16 Slot (PCIe x16, GEN4)
 - 3 x PCI-E x4 Slot 1/ 3/ 4 (PCIe x4, GEN4)
 - 1 x PCI-E x4 Slot2 (PCIe x4, GEN3)
 - 1 x PCI Slot (Support CLK 66MHz)
 - 1 * M.2 Key-E Slot (PCIE+USB2.0+ CNVi, support WIFI +Bluetooth Module, 2230)
 - 1 * M.2 Key-M Slot (PCIe x4 GEN4 NVMe/SATA SSD Auto Detect,2280)

- **Power Input**
 - 1 * ATX 8P CPU Power Input Connector
 - 1 * ATX 4P CPU Power Input Connector
 - 1* ATX 24P CPU Power Input Connector

- **Operating Temperature**
 - 0°C ~ 60°C

- **Storage Temperature**
 - -20°C ~ 75°C

- **Form Factor**
 - 305 x 244mm



Note

All specifications and images are subject to change without notice.

1.3 Packing list

- **Bulk packing**
 - 1 x Motherboard
 - 1 x I/O bracket

- **Gift box**
 - 1 x Motherboard
 - 1 x I/O bracket

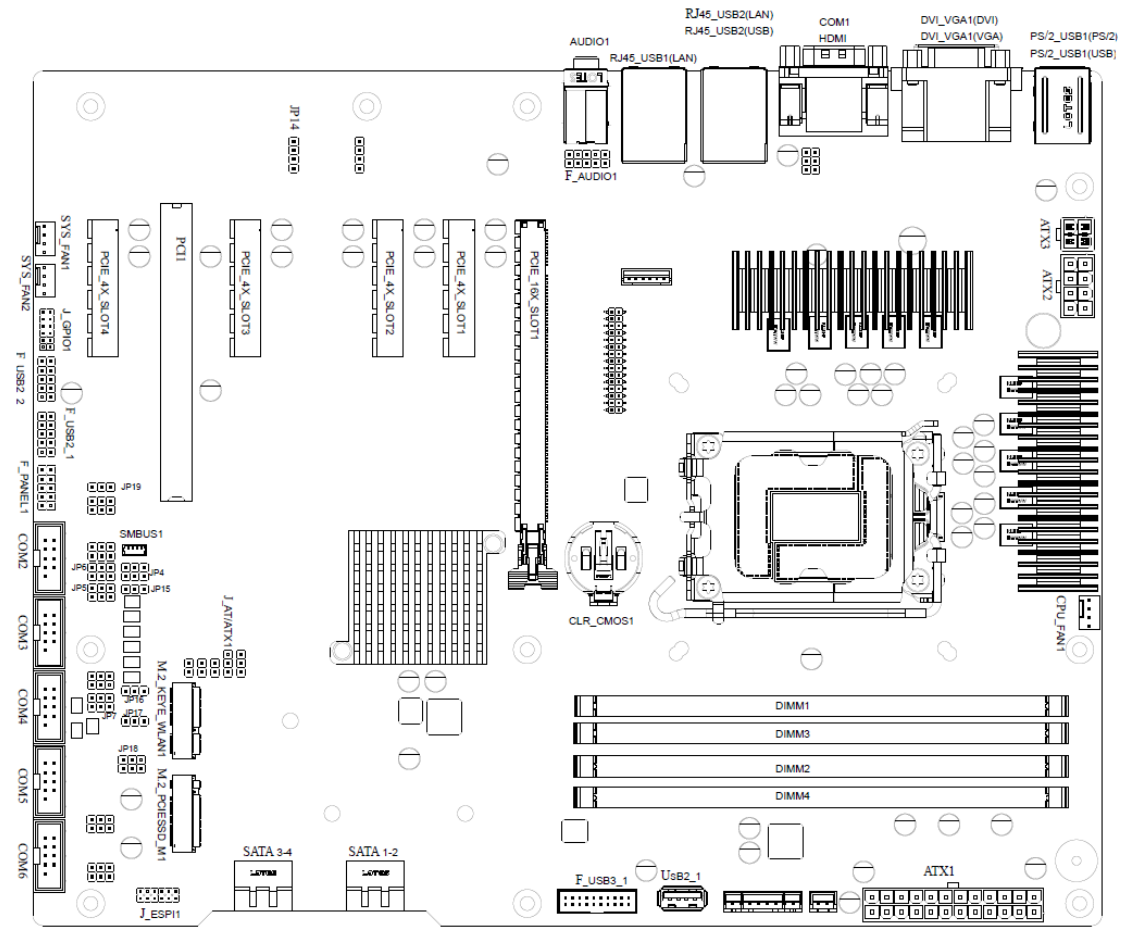
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Section 2

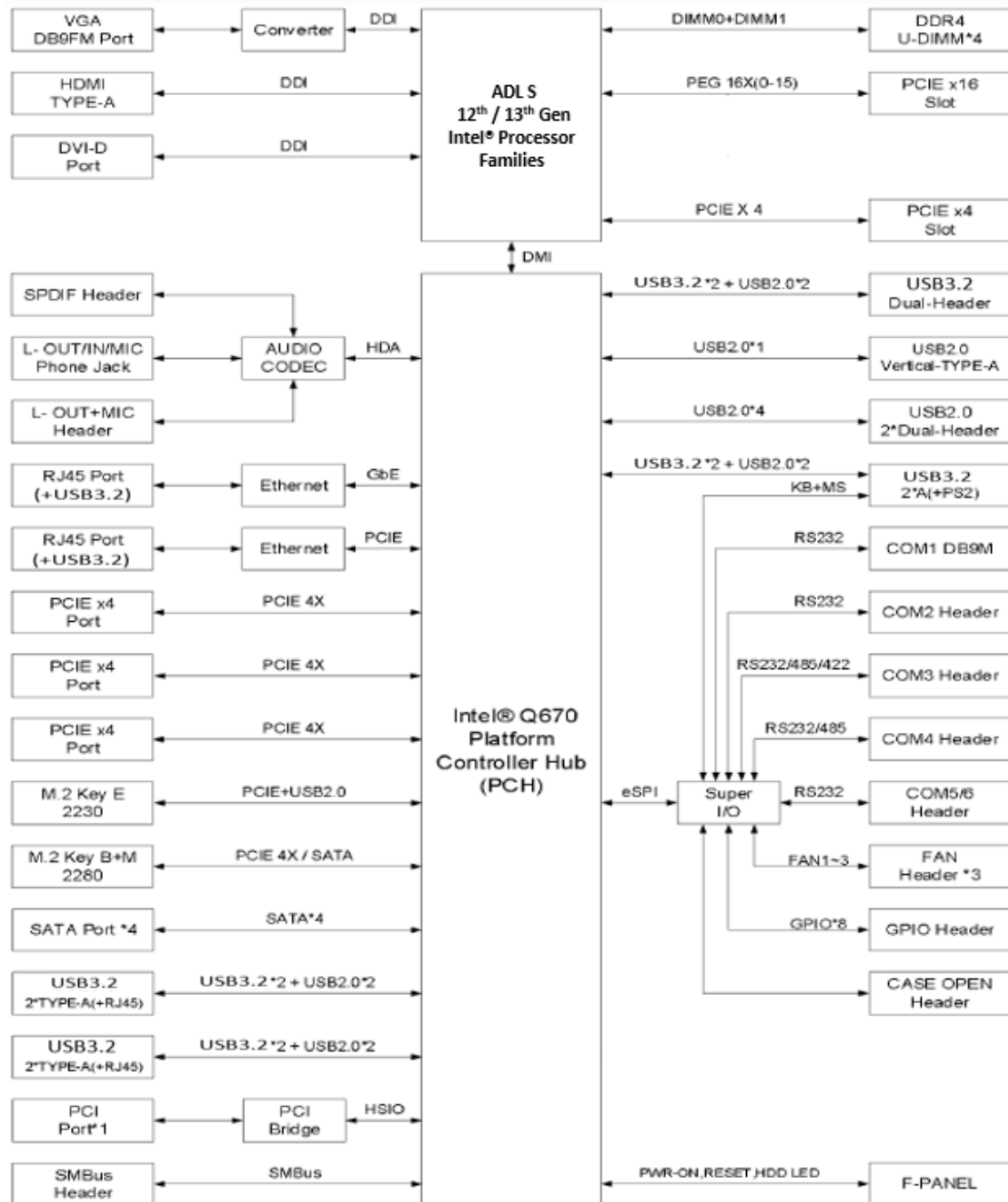
Board and Pin Assignments

2.1 Board Layout

Top side



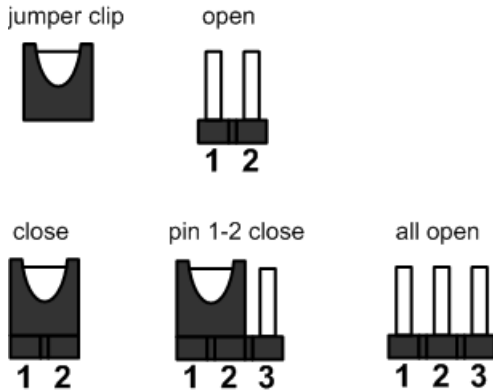
2.2 Block Diagram



2.3 Jumper Settings

Pin description

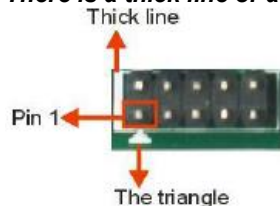
A jumper is a small component consisting of a jumper clip and jumper pins. Install a jumper clip on two jumper pins to close the jumper pins. Remove the jumper clip from two jumper pins to open the jumper pins. The following illustration shows how to set up a jumper.



Note

To identify the first pin of a header or jumper, please refer to the following information:

- There is a thick line or a triangle near the header or jumper pin 1.



- A square pad, which you can find on the back of the motherboard, is usually used for pin 1.



Before applying power to the IMB541 series motherboard, make sure all of the jumpers are in factory default position. Below you can find a summary table of all jumpers and onboard default settings.

2.3.1 AT/ATX Mode Select (J_AT/ATX1)

This 3x1-pin p=2.54mm jumper allows you to select AT or ATX power mode.

Function	Setting
ATX mode (Default)	1-2 close
AT mode	2-3 close



2.3.2 Clear CMOS (CLR_CMOS1)

Pressing the tact switch can restore BIOS optimal defaults.
(The button is next to the Front Panel Header connector)

Function	Setting
NORMAL(Default)	1-2 close
CLEAR	2-3 close



Signals go to other parts of the system through connectors. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a summary table showing the connectors on the motherboard.

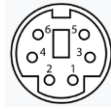
Connector	Description
CPU_FAN1	CPU FAN Wafer
SYS_FAN1	System FAN Wafer1
SYS_FAN2	System FAN Wafer2
J_GPIO1	GPIO Header
F_USB2_2	Front USB2.0 Header2
JP19	Watch Dog Reset Enable/Disable Select Jumper
F_USB2_1	Front USB2.0 Header1
F_PANEL1	Front Panel Header
JP6	COM3 RS232/RS422 Select Jumper2
JP5	COM3 RS232/RS422 Select Jumper1
JP15	COM3 RS422 RX Signal 120Ω Resistive termination Select Jumper
JP7	COM4 RS232/RS485 Select Jumper1
JP18	COM4 RS232/RS485 Select Jumper2
JP17	COM4 RS485 Signal 120Ω Resistive termination Select Jumper
COM2-6	COM2/3/4/5/6 Box Header
J_ESPI1	ESPI Header (Debug Only)
JP16	COM3 RS422 TX/RS485 Signal 120Ω Resistive termination Select Jumper
J_AT/ATX1	AT or ATX Select Jumper
F_USB3_1	Front USB3.0 Box Header
CLR_CMOS1	CMOS Clear Select Jumper
JP4	COM3 RS232/422/485 Select Jumper3
ATX1	ATX 24P CPU Power Input Connector
ATX2	ATX 8P CPU Power Input Connector
ATX3	ATX 4P CPU Power Input Connector
F_AUDIO1	Front Audio Header (Line-Out + MIC)
JP14	PCI CLK 66MHz Enable/Disable Select Jumper
SMBUS1	SMBUS Wafer
M.2_PCISSD_M1	M.2 Key-M Slot (PCIe x4 GEN4 NVMe/SATA SSD Auto Detect, 2280)
M.2_KEYE_WLAN1	M.2 Key-E Slot (PCIe+USB2.0+ CNVi, support WIFI+BT/ CNVi Module, 2230)
SATA3-4	SATA3.0 7P Upright Connector3-4
SATA1-2	SATA3.0 7P Upright Connector1-2
USB2_1	USB2.0 Internal Vertical TYPE-A Connector
DIMM4	DDR4 CHB DIMM Slot4

DIMM2	DDR4 CHB DIMM Slo3
DIMM3	DDR4 CHA DIMM Slot2
DIMM1	DDR4 CHA DIMM Slot1
PCIE_16X_SLOT1	PCI-E 16x Slot1 (PCIe 4X)
PCIE_4X_SLOT1	PCI-E 4x Slot1 (PCIe 4X)
PCIE_4X_SLOT2	PCI-E 4x Slot2 (PCIe 3X)
PCIE_4X_SLOT3	PCI-E 4x Slot3 (PCIe 4X)
PCIE_4X_SLOT4	PCI-E 4x Slot4 (PCIe 4X)
PCI1	PCI Slot
PS/2_USB1(PS/2)	PS/2 Connector (Keyboard & Mouse)
PS/2_USB1(USB)	Dual USB3.0 TYPE-A Connector
DVI_VGA1(DVI)	DVI-I 24+4P/F Connector (Support DVI-D)
DVI_VGA1(VGA)	VGA DB15/F Connector
COM1	COM1 DB9/M Connector
HDMI1	HDMI TYPE-A Connector
RJ45_USB2(LAN)	GBE LAN RJ45 Connector2
RJ45_USB2(USB)	Dual USB3.0 TYPE-A Connector2
RJ45_USB1(LAN)	GBE LAN RJ45 Connector1
AUDIO1	Line-Out + MIC + Line-In 3.5mm Jack

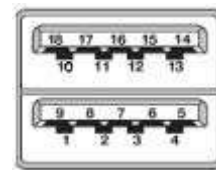
2.3.3 PS/2 Connector (Keyboard & Mouse) and Dual USB3.0 TYPE-A Connector (PS/2_USB1)

PS/2_USB1 is a double-deck connector comprised of an upper connector for PS (PS/2) and a lower connector for USB (USB1).

Pin	Signal
1	Keyboard Data
2	Mouse Data
3	GND
4	VCC
5	Keyboard Clock
6	Mouse Clock



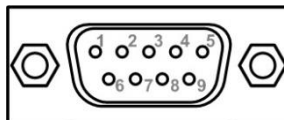
Pin	USB Signal	Pin	USB Signal
1	USB3_POWER	2	USB1 -
3	USB1 +	4	GND
5	USB3_SSRX1-	6	USB3_SSRX1+
7	GND	8	USB3_SSTX1-
9	USB3_SSTX1+	10	USB3_POWER
11	USB2 -	12	USB2 +
13	GND	14	USB3_SSRX2-
15	USB3_SSRX2+	16	GND
17	USB3_SSTX2-	18	USB3_SSTX2+



2.3.4 COM Connector (COM1)

This is a high rise 9-pin D-Sub connector for COM1 serial port interface. The pin assignments of RS-232 are listed in the table below.

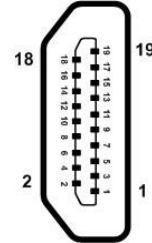
Pin	RS-232 [1]
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#



2.3.5 HDMI Connector (HDMI1)

connector for HDMI (HDMI1).

Pin	Signal
1	TMDS Data2+
2	GND
3	TMDS Data2-
4	TMDS Data1+
5	GND
6	TMDS Data1-
7	TMDS Data0+
8	GND
9	TMDS Data0-
10	TMDS Clock+
11	GND
12	TMDS Clock-
13	CEC
14	Reserved (N.C. on device)
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5V Power
19	Hot Plug Detect

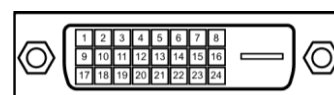


2.3.6 VGA and DVI-D Connector (VGA1, DVI1)

is a double-deck connector comprising a lower connector for DVI-D port and an upper connector for VGA port.

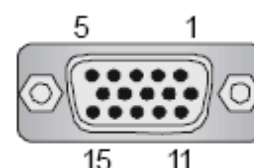
The high rise DVI-D connector provides transmission of fast and high quality video signals between a source device (graphic card) and a display device (monitor).

Pin	Signal	Pin	Signal
1	TX2-	2	TX2+
3	Ground	4	NC
5	NC	6	DVI_SPD_CLK
7	DVI_SPD DATA	8	NC
9	TX1-	10	TX1+
11	Ground	12	NC
13	NC	14	VGAVCC
15	Ground	16	HPDETECT
17	TX0-	18	TX0+
19	Ground	20	NC
21	NC	22	Ground
23	TXC+	24	TXC-



The 15-pin D-Sub connector is commonly used for VGA display.

Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.3.7 Audio Jack (AUDIO1)

Install an audio driver, and then attach audio devices to AUDIO1

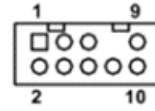
Pin Color	Signal
Blue	Line-in
Green	Line-out
Pink	MIC-in



2.3.8 Front Audio Header (F_AUDIO1)

This is a front audio header (5x2-pin p=2.54mm) for convenient connection and control of audio devices.

Pin	Signal	Pin	Signal
1	MIC_IN_L	2	GND
3	MIC_IN_R	4	VCC3.3
5	LINE_OUT_R	6	MIC_RET
7	GND	8	N.C
9	LINE_OUT_L	10	LINE_OUT_RET

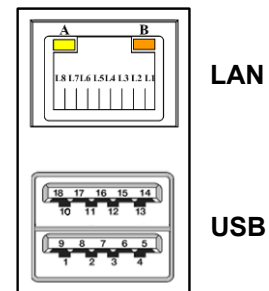


2.3.9 LAN and USB 3.2 Connectors (RJ45_USB1 and RJ45_USB2)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a (LAN1/ RJ45_USB1)1000/100/10 (LAN2/ RJ45_USB2)2500/1000/100/10 Base-T hub.

The Universal Serial Bus Compliant with USB3.2 Gen1(5 Gbps) (RJ45_USB1) or USB3.2 Gen1 (5 Gbps) (RJ45_USB2) connectors on the rear I/O are for connecting USB peripherals such as a keyboard, mouse, scanner, etc.

Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
A	100 LAN LED (Green) / 1000 LAN LED (Orange)	B	Active LED



Note

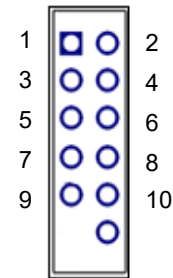
- **1GbE Speed LED** turns orange for 1000Mbps or green for 100Mbps. The light is off for 10Mbps.
- **2.5GbE Speed LED** turns orange for 2500Mbps / 1000Mbps or green for 100Mbps. The light is off for 10Mbps
- Both RJ45_USB1 and RJ45_USB2 support USB3.2 Gen1 (5 Gbps) and Wake-on-LAN.

Pin	USB Signal	Pin	USB Signal
1	USB3_POWER	2	USB1 -
3	USB1 +	4	GND
5	USB3_SSRX1-	6	USB3_SSRX1+
7	GND	8	USB3_SSTX1-
9	USB3_SSTX1+	10	USB3_POWER
11	USB2 -	12	USB2 +
13	GND	14	USB3_SSRX2-
15	USB3_SSRX2+	16	GND
17	USB3_SSTX2-	18	USB3_SSTX2+

2.3.10 GPIO Header (J_GPIO1)

This header (6x2-pin p=2.00mm) is for digital I/O interface.

Pin	Signal	Pin	Signal
1	SIO_GPI70	2	SIO_GPI71
3	SIO_GPI72	4	SIO_GPI73
5	GND	6	SIO_GPO74
7	SIO_GPO75	8	SIO_GPO76
9	SIO_GPO77	10	VCC5
		12	N/C



Note

The default value of GPI70 to GPI73 is set as GPI with high level(5V).; GPI74 to GPI77 is set as GPI with low level(0V)

2.3.11 WatchDog Reset Select Jumper (3*1 Pin 2.54mm) (JP19)

Function	Setting
Normal	1-2 close
Reset (Default)	2-3 close



- Timeout Value Range
- 1 to 255
- Minute / Second

2.3.12 PCI CLK 66MHz Enable/Disable Select Jumper (3*1 Pin 2.54mm) (JP14)

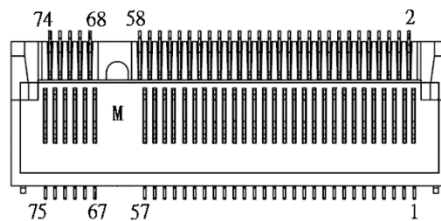
Function	Setting
Disable PCI CLK 66MHz(Default)	1-2 close
Enable PCI CLK 66MHz	2-3 close



2.3.13 M.2 2280 Key M NVMe SSD (M.2_PCIESSD_M1)

The M.2_PCIESSD_M1 (5x1-pin p=2.00mm) is for SMBus (System Management Bus) interface.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PERn3	6	NC	7	PERp3	8	NC
9	GND	10	LED_1#	11	PETn3	12	+3.3V
13	PETp3	14	+3.3V	15	GND	16	+3.3V
17	PERn2	18	+3.3V	19	PERp2	20	NC
21	GND	22	NC	23	PETn2	24	NC
25	PETp2	26	NC	27	GND	28	NC
29	PERn1	30	NC	31	PERp1	32	NC
33	GND	34	NC	35	PETn1	36	NC
37	PETp1	38	NC	39	GND	40	NC
41	PERn0 / SATA0	42	NC	43	PERp0 / SATA0	44	NC
45	GND	46	NC	47	PETn0 / SATA0	48	NC
49	PETp0 / SATA0	50	PERST#	51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#	55	REFCLKp	56	NC
57	GND	58	NC	59	CONNECTOR Key M	60	CONNECTOR Key M
61	CONNECTOR Key M	62	CONNECTOR Key M	63	CONNECTOR Key M	64	CONNECTOR Key M
65	CONNECTOR Key M	66	CONNECTOR Key M	67	NC	68	NC
69	OC_PE/GND_SATA	70	+3.3V	71	GND	72	+3.3V
73	GND	74	+3.3V	75	GND		



2.3.14 M.2 Key E Socket (M.2_KEYE_WLAN1)

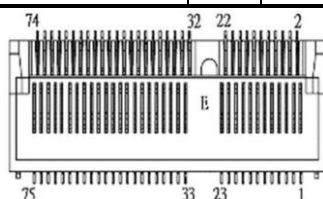
The motherboard comes with one M.2 Key E socket (PCIe & USB2.0)
M.2_KEYE_WLAN1 (5x1-pin p=2.00mm) supports CNVi module



Note

CNVi, the integrated wireless IP portion of Intel processors I/O Interface is Intel's proprietary connectivity interface for Wi-Fi and Bluetooth radios

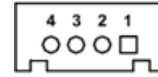
Pin	Signal	Pin	Signal
1	GND	2	+3.3V_SBY
3	USB_D+	4	+3.3V_SBY
5	USB_D-	6	NC
7	GND	8	M.2_BT_PCMCLK
9	CNVI_WGR_DATA1_D-	10	M.2_BT_PCMRST
11	CNVI_WGR_DATA1_D+	12	M.2_BT_PCMIN
13	GND	14	M.2_BT_PCMOUT
15	CNVI_WGR_DATA0_D-	16	NC
17	CNVI_WGR_DATA0_D+	18	GND
19	GND	20	UART_BT_WAKE-
21	CNVI_WGR_CLK_D-	22	CNVI_BRI_RSP
23	CNVI_WGR_CLK_D+	24	Key E
25	Key E	26	
27		28	
29		30	
31		32	CNVI_RGI_DT
33	GND	34	CNVI_RGI_RSP
35	PCIE_TX_+	36	CNVI_BRI_DT
37	PCIE_TX_-	38	CL_RST
39	GND	40	CL_DATA
41	PCIE_RX_+	42	CL_CLK
43	PCIE_RX_-	44	CNVI_GNSS_PA_BLANKING
45	GND	46	CNVI_MFUART_TXD
47	CLK_PCIE_+	48	CNVI_MFUART_RXD
49	CLK_PCIE_-	50	SUSCLK (+3.3V Level)
51	GND	52	PERST# (+3.3V Level)
53	CLKREQ0#	54	BT_RF_KILL
55	PEWAKE0#	56	WIFI_RF_KILL
57	GND	58	NC
59	CNVI_WT_DATA1_D-	60	NC
61	CNVI_WT_DATA1_D+	62	NC
63	GND	64	GND
65	CNVI_WT_DATA0_D-	66	NC
67	CNVI_WT_DATA0_D+	68	NC
69	GND	70	NC
71	CNVI_WT_CLK_D-	72	+3.3V_SBY
73	CNVI_WT_CLK_D+	74	+3.3V_SBY
75	GND		



2.3.15 SMBus Header (SMBUS1)

The SMBUS1 (4x1-pin p=1.25mm) is for SMBus (System Management Bus) interface.

Pin	Signal	Pin	Signal
1	GND	2	SMB_DATA
3	SMB_CLK	4	5V



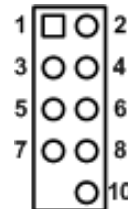
Note

Power on this Pin is 5V by default, 3.3V is available if specified. (resistor selectable)

2.3.16 Internal USB Headers (F_USB2_1, F_USB2_2 , USB2_1)

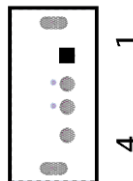
These are 5x2-pin p=2.54mm headers for USB 2.0 interface.

Pin	Signal	Pin	Signal
1	+5 V_DUAL	2	+5 V_DUAL
3	USB -	4	USB -
5	USB +	6	USB +
7	GND	8	GND
		10	GND



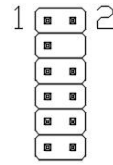
The USB2_1 is a Type-A 180D connector for USB2.0 signal.

Pin	Signal
1	+5 V_DUAL
2	USB -
3	USB +
4	GND



2.3.17 ESPI Header (Debug Only) 6*2 Pin 2.00mm)

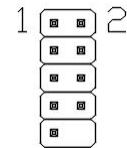
Pin	Signal	Pin	Signal
1	ESPI_IO0	2	VCC3.3_Dual
3	ESPI_IO1-		-
5	ESPI_IO2	6	ESPI_CLK
7	ESPI_IO3	8	GND
9	ESPI_CS0	10	VCC3.3S
11	ESPI_ALERT0_N	12	PLT_RST_N



2.3.18 Front Panel Header (F_PANEL1)

This is a front panel header (5x2-pin p=2.54mm).

Pin	Signal
1	HD LED+
2	Power LED+
3	HD LED-
4	Power LED-
5	RESET-
6	PWR+
7	RESET+
8	PWR-
9	N/C
10	



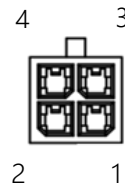
2.3.19 Power Input Connectors (ATX1 and ATX2 and ATX3)

Steady and sufficient power can be supplied to all components on the motherboard by connecting the power connector. Please make sure all components and devices are properly installed before connecting the power connector.

An external power supply plug fits into ATX1 and ATX2 and ATX3 in only one orientation. Properly press down power supply plug until it completely and firmly fits into the connector. Loose connection may cause system instability.

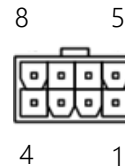
ATX3 CPU power input connector

Pin	ATX3 Signal
1	GND
2	GND
3	+12V
4	+12V



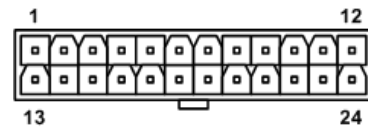
ATX2 CPU power input connector:

Pin	ATX2 Signal	Pin	ATX2 Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V



ATX1 24-pin power input connector:

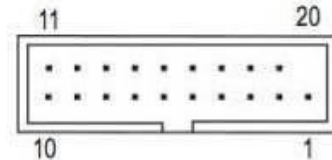
Pin	ATX1 Signal	Pin	ATX1 Signal
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	GND



2.3.20 Internal USB 3.2 Gen1 (5Gbps) Connector (F_USB3_1)

The F_USB3_1 is a 19-pin internal connector for installing various USB 3.2 Gen1(5Gbps) compliant peripherals.

Pin	Signal	Pin	Signal
1	VBUS0		
2	SSRX5-	19	VBUS1
3	SSRX5+	18	SSRX6-
4	GND	17	SSRX6+
5	SSTX5-	16	GND
6	SSTX5+	15	SSTX6-
7	GND	14	SSTX6+
8	USB10-	13	GND
9	USB10+	12	USB11-
10	ID	11	USB11+



2.3.21 COM3 RS422 RX Signal 120Ω Resistive termination Select Jumper (JP15)

Use these jumpers (3x1-pin p=2.54mm) to set signal

Function	Setting
Disable(Default)	1-2 close
Enable	2-3 close



2.3.22 COM3 RS422 TX/RS485 Signal 120Ω Resistive termination Select Jumper (JP16)

Use these jumpers (3x1-pin p=2.54mm) to set signal

Function	Setting
Disable(Default)	1-2 close
Enable	2-3 close



2.3.23 COM4 RS485 Signal 120Ω Resistive termination Select Jumper(JP17)

Use these jumpers (3x1-pin p=2.54mm) to set signal

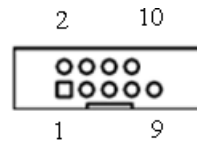
Function	Setting
Disable (Default)	1-2 close
Enable	2-3 close



2.3.24 COM BOX Headers (COM2, COM3, COM4, COM5, COM6)

The motherboard comes with 5x2-pin p=2.54mm box headers for COM serial port interfaces.

Pin	Signal	Pin	Signal
1	DCD#	2	DSR#
3	RXD#	4	RTS#
5	TXD#	6	CTS#
7	DTR#	8	RI#
9	GND	10	N/C



2.3.25 COM3 Mode Select (JP4, JP5, JP6)

Use these jumpers (3x2-pin p=2.54mm) to set COM3 port to operate in RS-232, RS-422 or RS-485 communication mode.

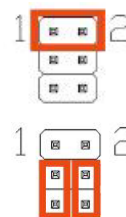
Function	Setting
RS232(Default)	JP4: 1-2 JP5: 3-5 · 4-6 JP6: 3-5 · 4-6
RS422	JP4: 3-4 JP5: 1-3 · 2-4 JP6: 1-3 · 2-4
RS485	JP4: 5-6 JP5: 1-3 · 2-4 JP6 (No Effect)



2.3.26 COM4 Mode Select (JP7, JP18)

Use these jumpers (3x2-pin p=2.54mm) to set COM4 port to operate in RS-232 or RS-485 communication mode.

Function	Setting
RS232(Default)	JP18: 1-2 JP7: 3-5、4-6(Default)
RS485	JP18: 5-6 JP7: 1-3、2-4



Note

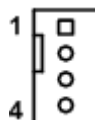
COM3 and COM4 are RS232 by default. COM3 can be RS485 or RS422 selecting by jumper and setting BIOS to RTS mode. COM3 can be RS485 selecting by jumper and setting BIOS to RTS mode.

2.3.27 Fan Connectors (CPU_FAN1, SYS_FAN1, SYS_FAN2)

This motherboard has three fan connectors. Find fan speed option(s) at BIOS Setup Utility:

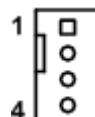
The CPU_FAN1 (4x1-pin p=2.54mm) is for the CPU fan connector.

Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control



The SYS_FAN1 and SYS_FAN2 (4x1-pin p=2.54mm) are for system fan connectors.

Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control



2.3.28 PCI-Express x4 Slots (PCIE_4X_SLOT1, SLOT2, SLOT3, SLOT4)

This motherboard has four PCI-Express x4 slots

Pin	Signal	Pin	Signal
B1	+12V_PS	A1	GND
B2	+12V_PS	A2	+12V_PS
B3	+12V_PS	A3	+12V_PS
B4	GND	A4	GND
B5	SMB_CLK_RESUME	A5	N/C
B6	SMB_DATA_RESUME	A6	N/C
B7	GND	A7	N/C
B8	+3.3V_PS	A8	N/C
B9	N/C	A9	+3.3V_PS
B10	+3.3V_SB	A10	+3.3V_PS
B11	PCH_WAKE_N	A11	PWRGD
B12	N/C	A12	GND
B13	GND	A13	CLKOUT_PCIE_P5
B14	PCIE1_SLOT1_TX_DP_C	A14	CLKOUT_PCIE_N5
B15	PCIE1_SLOT1_TX_DN_C	A15	GND
B16	GND	A16	PCIE1_SLOT1_RX_DP_C
B17	PCIE4_SLOT1_PRSENT2_N	A17	PCIE1_SLOT1_RX_DN_C
B18	GND	A18	GND
B19	PCIE2_TX_DP	A19	N/C
B20	PCIE2_TX_DN	A20	GND
B21	GND	A21	PCIE2_RX_DP
B22	GND	A22	PCIE2_RX_DN
B23	PCIE3_TX_DP	A23	GND
B24	PCIE3_TX_DN	A24	GND
B25	GND	A25	PCIE3_RX_DP
B26	GND	A26	PCIE3_RX_DN
B27	PCIE4_TX_DP	A27	GND
B28	PCIE4_TX_DN	A28	GND
B29	GND	A29	PCIE4_RX_DP
B30	N/C	A30	PCIE4_RX_DN
B31	N/C	A31	GND
B32	GND	A32	N/C



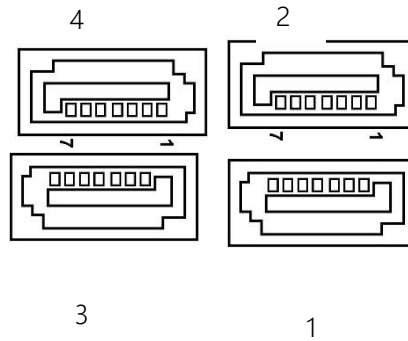
PCIE_4X_SLOT2 support the PCIE 4X GEN3 signal.

Note

2.3.29 SATA 3.0 Connectors (SATA1-2, SATA3-4)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to devices such as hard disk drive.

Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



Section 3

Hardware Description

3.1 Microprocessors

The IMB541 series supports Intel® Core™ i9 / i7/ i5/ i3/ Pentium®, Celeron® processors (Alder lake S), which enable your system to operate under Windows® 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.



Note

Caution: Make sure turnoff the power before you install the processor into the CPU socket.

3.2 BIOS

The IMB541 series uses AMI Plug and Play BIOS.

3.3 System Memory

The IMB541 supports four 288-pin DDR4 DIMM sockets for maximum memory capacity up to 128GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB, 16GB and 32GB.

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Section 4

AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.



Note

If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting press the tact switch "SW1" for 5 seconds (see section 2.3.3).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.



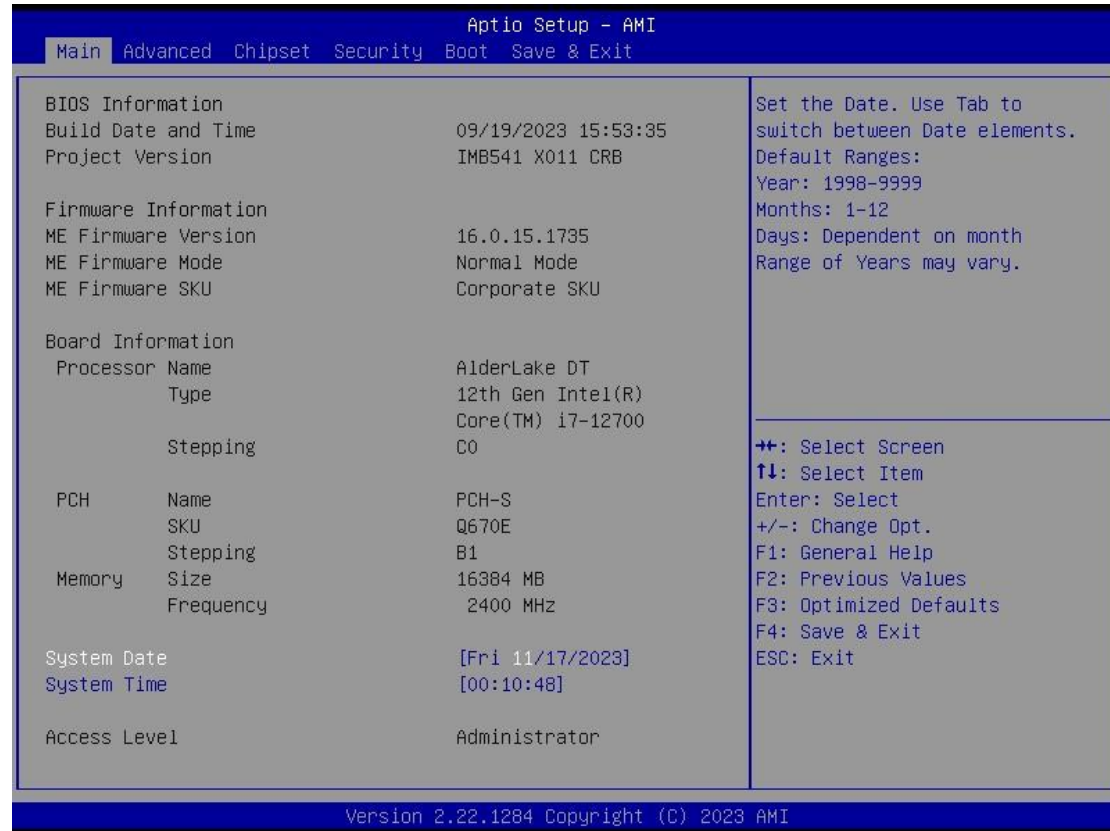
Note

Some of the navigation keys differ from one screen to another.

Hot Keys	Description
←→ Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub screen.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub screens.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



BIOS Information

Display the BIOS information.

System Date/Time

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 is entered in HH:MM:SS format.

Access Level

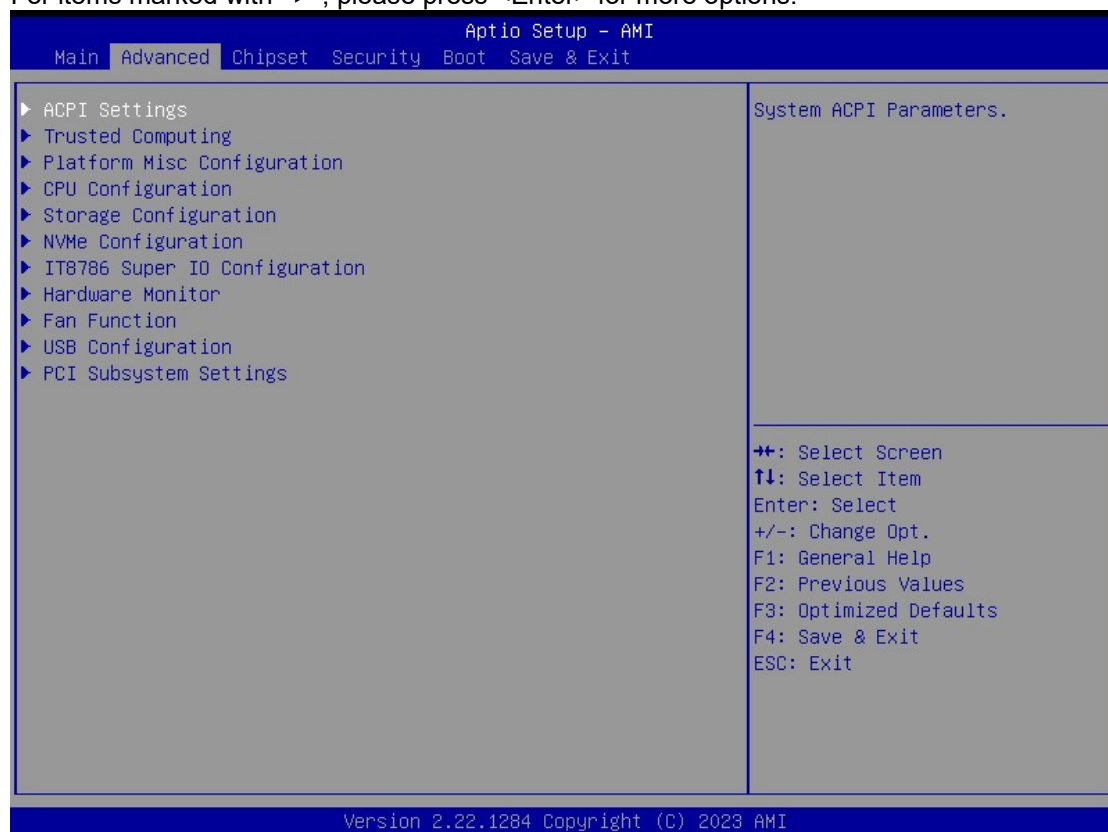
Display the access level of current user.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

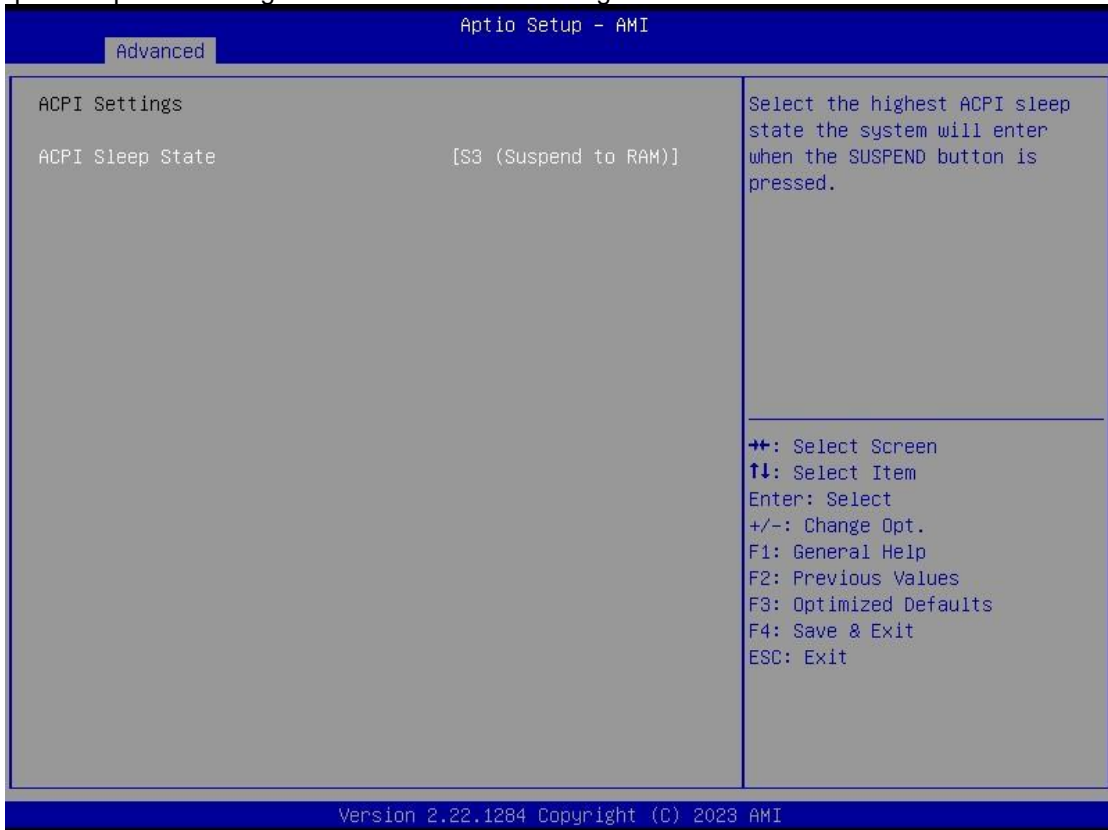
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ Platform Misc Configuration
- ▶ CPU Configuration
- ▶ Storage Configuration
- ▶ NVMe Configuration
- ▶ IT8786 Super IO Configuration
- ▶ Hardware Monitor
- ▶ Fan Function
- ▶ USB Configuration
- ▶ PCI Subsystem Settings

For items marked with “▶”, please press <Enter> for more options.



- **ACPI Settings**

It shows advanced configuration and power interface and hardware components to perform power management and status monitoring



- **Trusted Computing**

Enable or disable security device support.



- **Platform Misc Configuration**

This screen allows you to set Platform Misc Configuration.



Native PCIE Enable

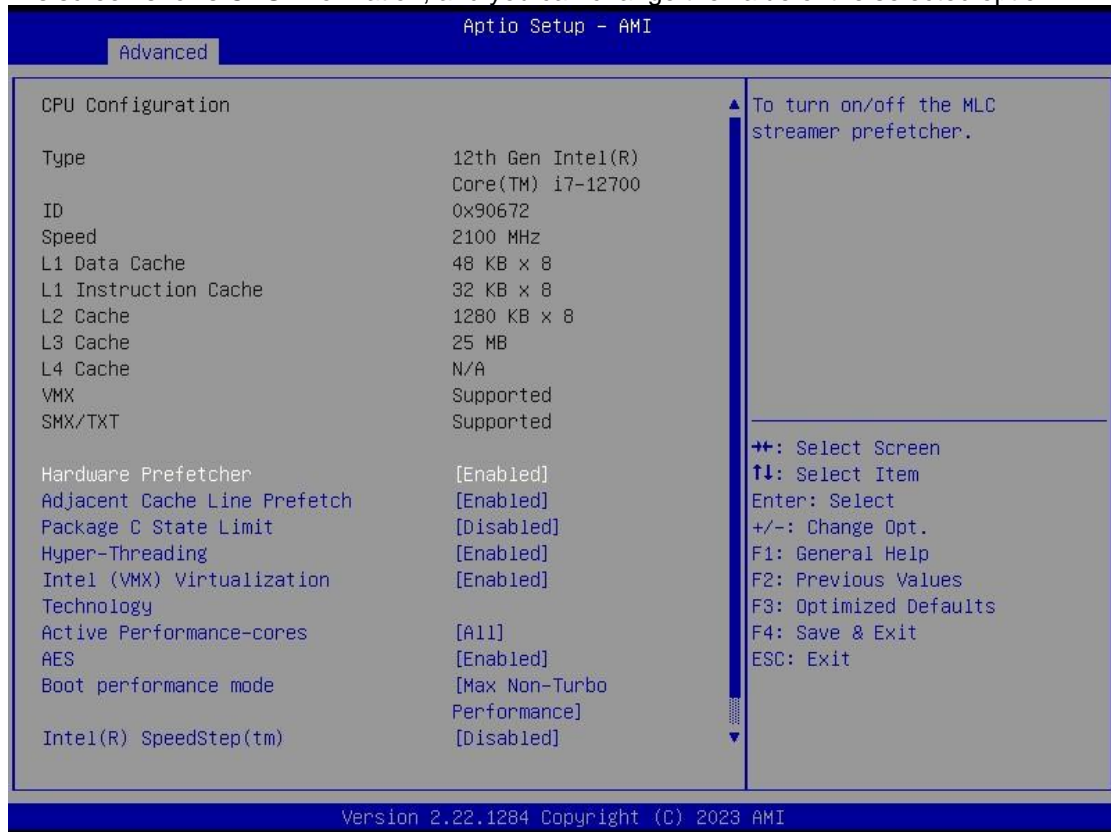
Bit - PCIe Native * control 0 - ~ Hot Plug 1 - SHPC Native Hot Plug control 2 - ~ Power Management Events 3 - PCIe Advanced Error Reporting control 4 - PCIe Capability Structure control 5 - Latency Tolerance Reporting control.

Native ASPM

Enabled - OS Controlled ASPM, Disabled - BIOS Controlled ASPM.

- **CPU Configuration**

This screen shows CPU information, and you can change the value of the selected option.



Hardware Prefetcher

Turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

Turn on/off prefetching of adjacent cache lines.

Package C State Limit

Maximum Package C State Limit Setting. CPU Default: Sets to Factory default value. Auto: Initializes to deepest available Package C State Limit.

Hyper-Threading

Enable or disable Hyper-threading Technology, which allows a single physical processor to multitask as multiple logical processors. When disabled, only one thread per enabled core is enabled.

Intel Virtualization Technology

Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

Active Performance Cores

Number of cores to enable in each processor package.

AES

Enable / Disable AES (Advanced Encryption Standard)

Boot performance mode

Select the performance mode that the BIOS will run after the reset.

Intel (R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

- **Storage Configuration**

This screen shows storage information.



- **SATA Configuration**

During system boot up, the BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see the hardware currently installed in the SATA ports.



SATA Controller(s)

Enable or disable the SATA Controller feature. The default is Enabled.

VMD Setup Menu

VMD Configuration settings. The default is Disabled.

Hot Plug

Designates this port as Hot Pluggable.

Spin Up Device

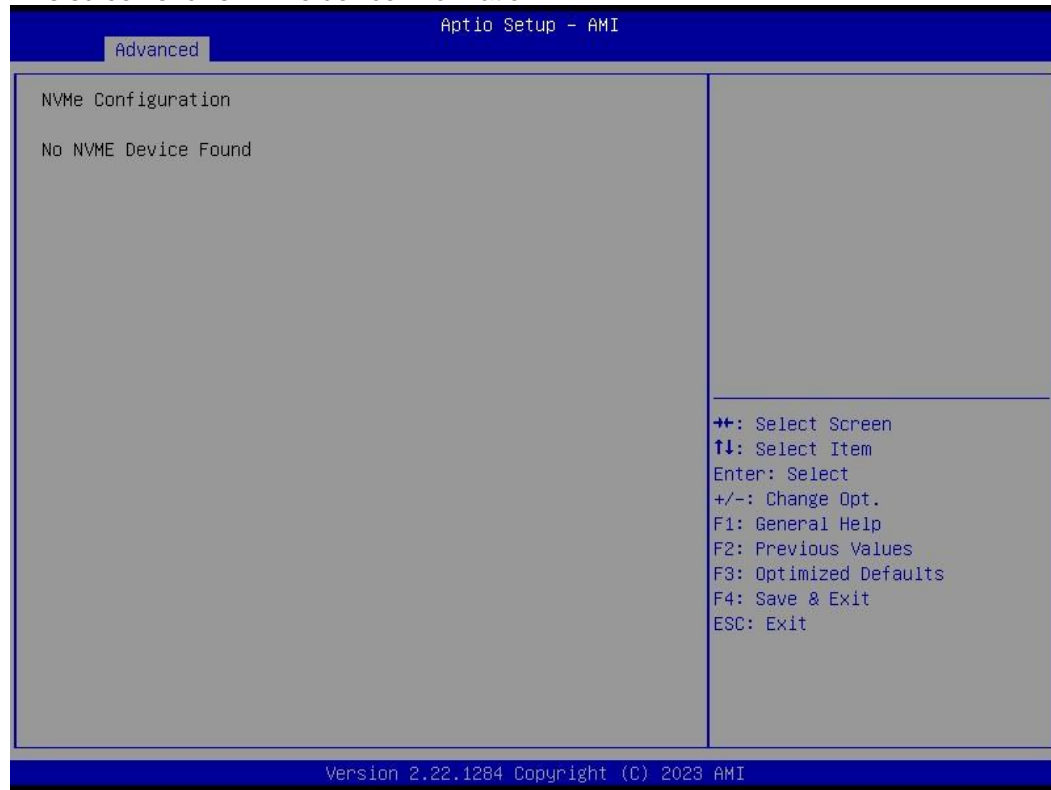
Staggered Spin Up will be performed when any of the drive is enabled for the performance strategy. Otherwise, all drives spin up at boot. Only HDD supports this function.

SATA Device Type

Identify the SATA port is connected to a solid-state drive (SSD) or hard disk drive (HDD).

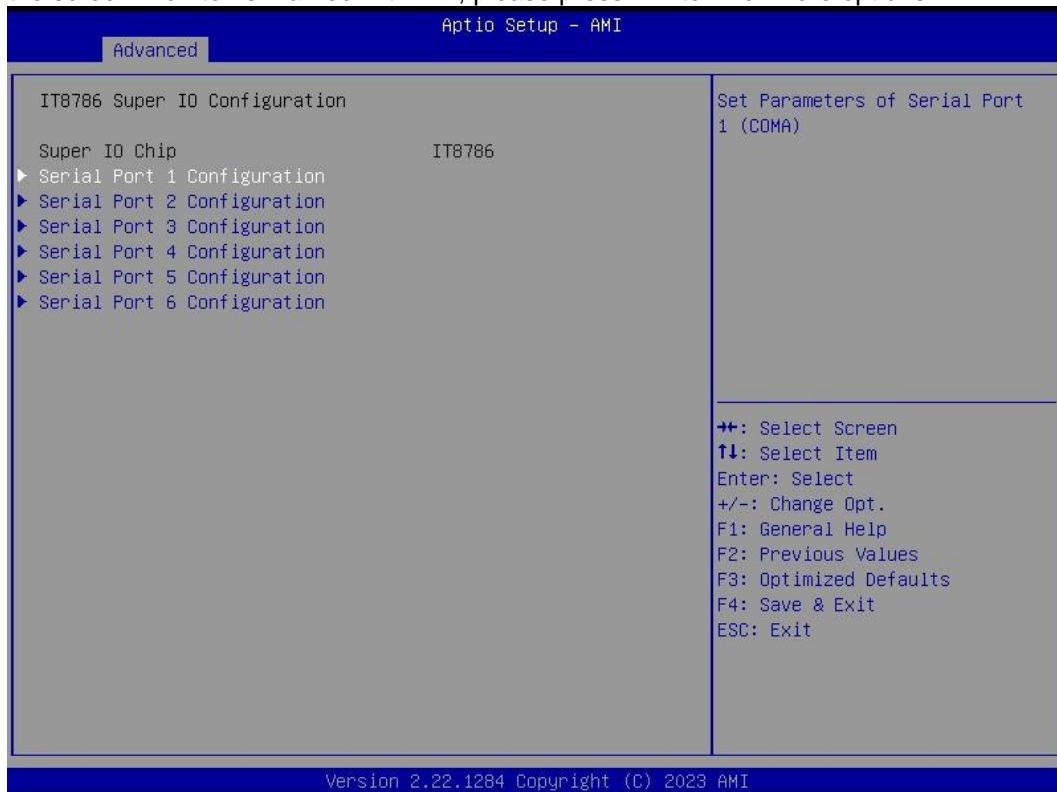
- **NVMe Configuration**

This screen shows NVMe device information.



- **IT8786 Super IO Configuration**

You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



Serial Port 1

This item allows you to use RS232 only .

Serial Port 2

This item allows you to use RS232 only .

Serial Port 3

This item allows you to use it as RS232/422/485. The default is RS232.

Serial Port 4

This item allows you to use it as RS232/485. The default is RS232.

Serial Port 5

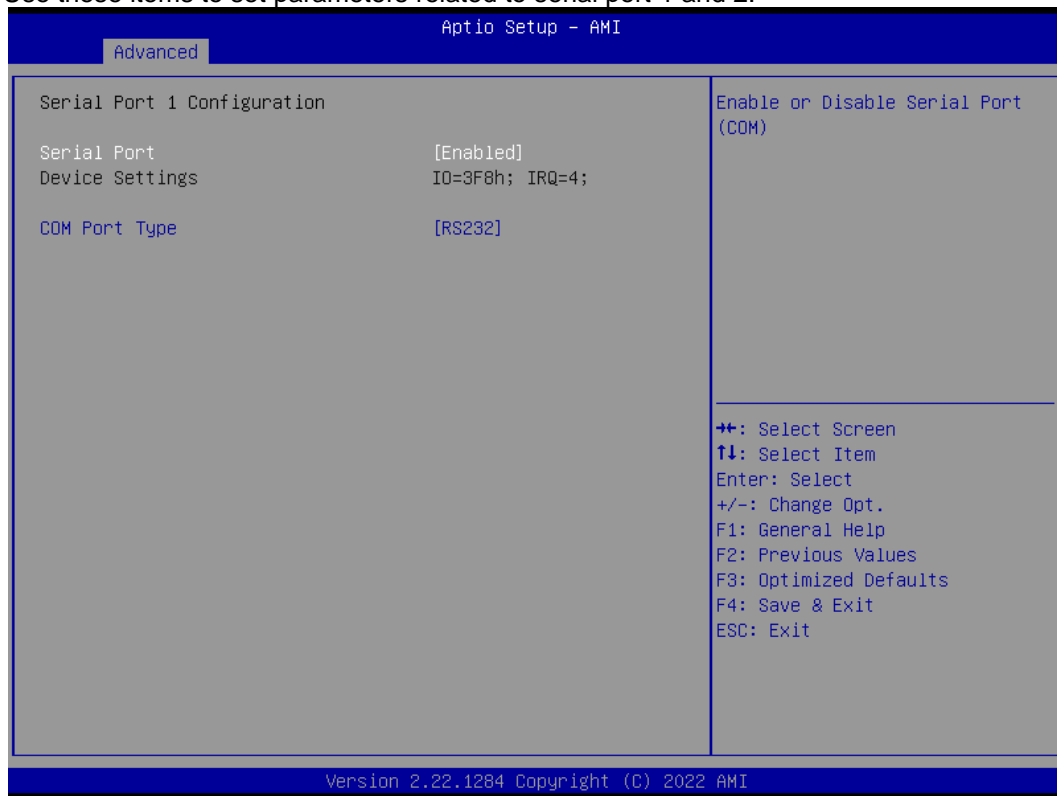
This item allows you to use RS232 only .

Serial Port 6

This item allows you to use RS232 only .

- **Serial Port 1 Configuration**

Use these items to set parameters related to serial port 1 and 2.



Serial Port 1

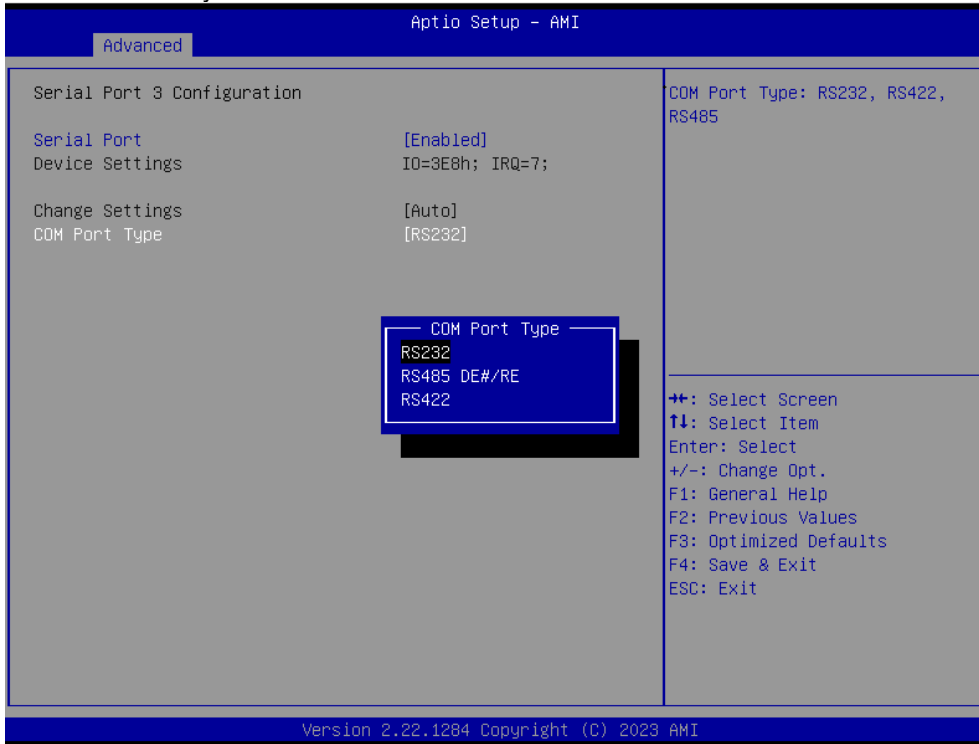
This item allows you to use RS232 only .

Serial Port 2

This item allows you to use RS232 only .

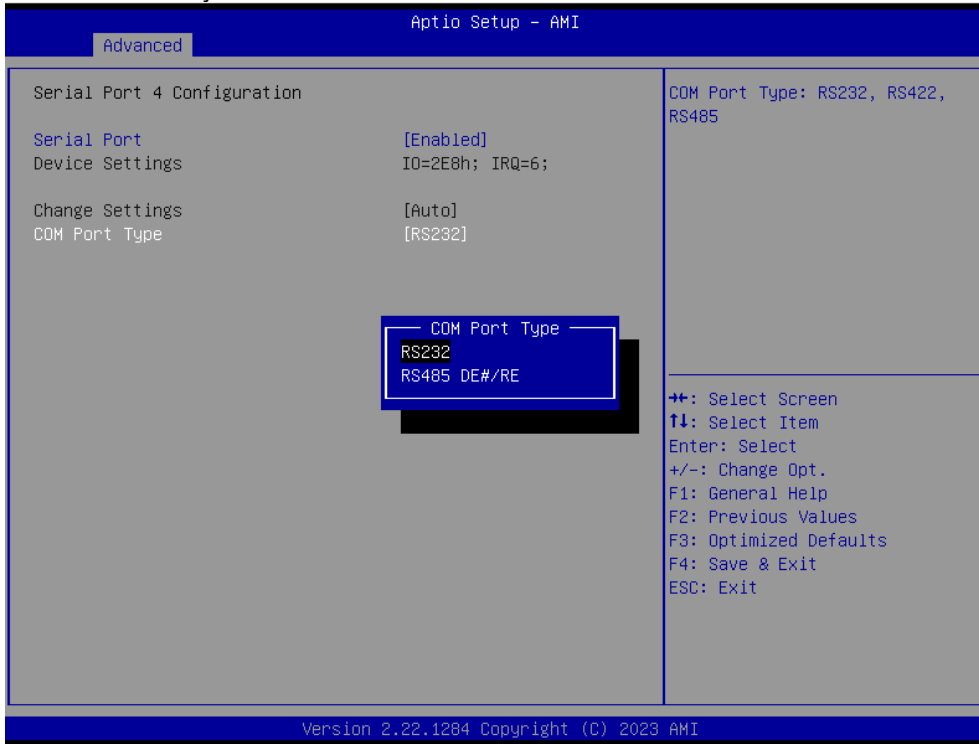
Serial Port 3

This item allows you to use it as RS232/422/485. The default is RS232.



Serial Port 4

This item allows you to use it as RS232/485. The default is RS232.



Serial Port 5

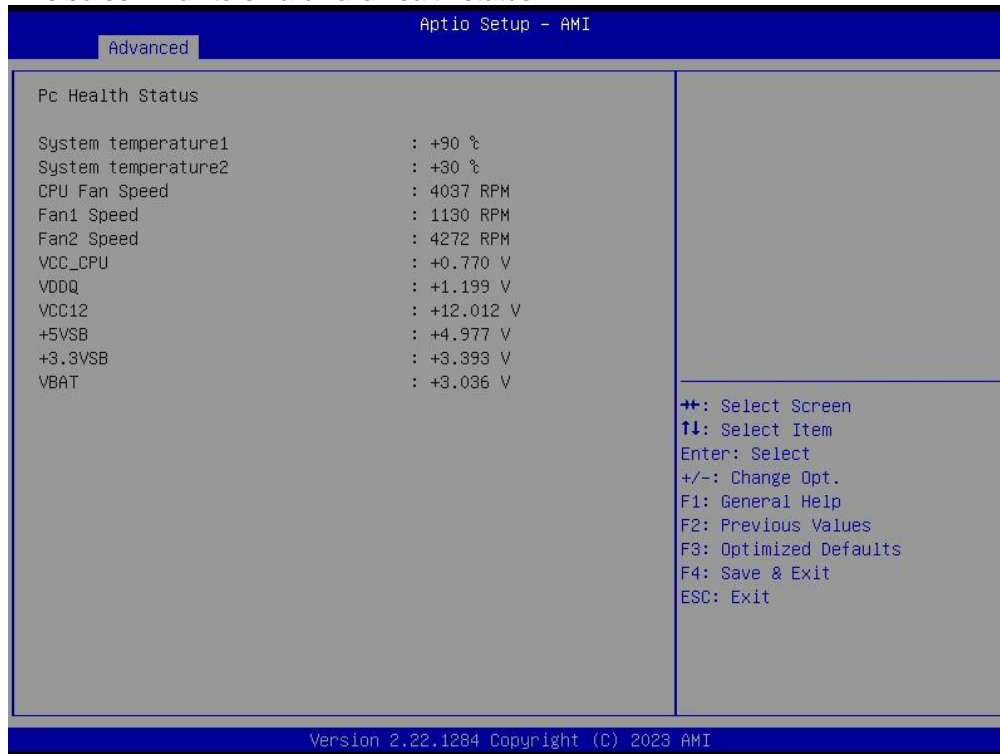
This item allows you to use RS232 only.

Serial Port 6

This item allows you to use RS232 only.

- **Hardware Monitor**

This screen monitors hardware health status.



This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCC CPU, DDR(VDDQ) +12V, +5V and +3.3V).

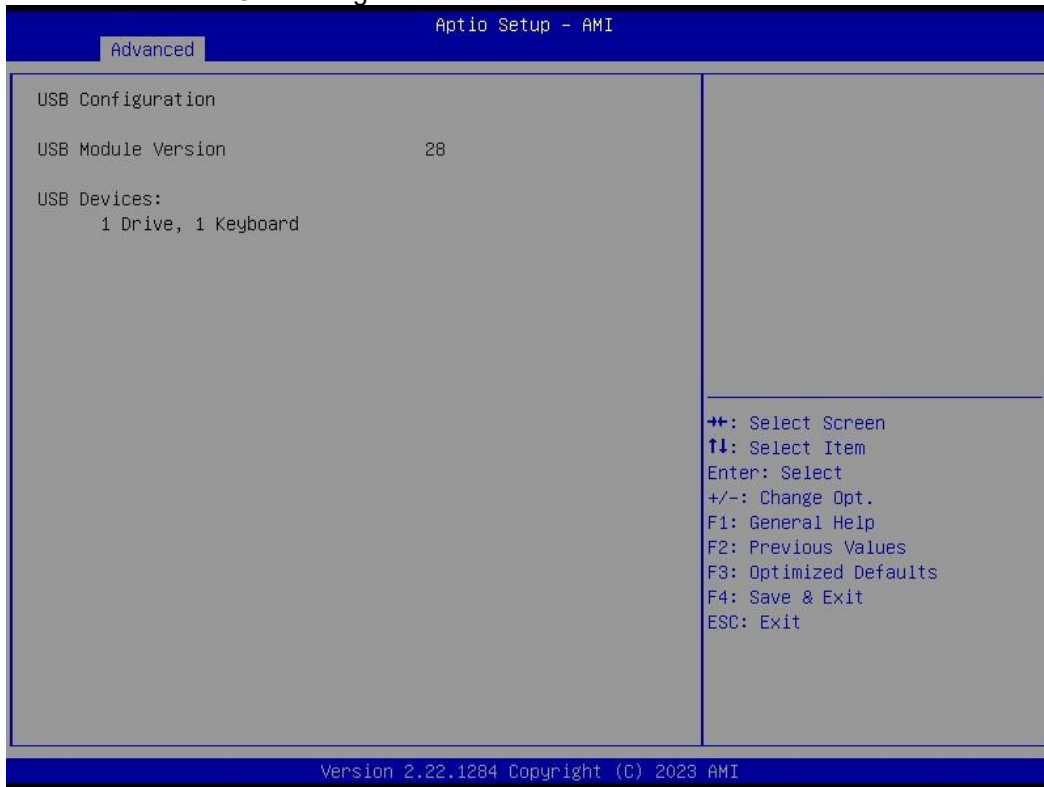


Note

CPU FAN = CPU FAN Speed; SYS FAN = FAN1/FAN2. (System Smart fan control integrated with fan1/fan2)

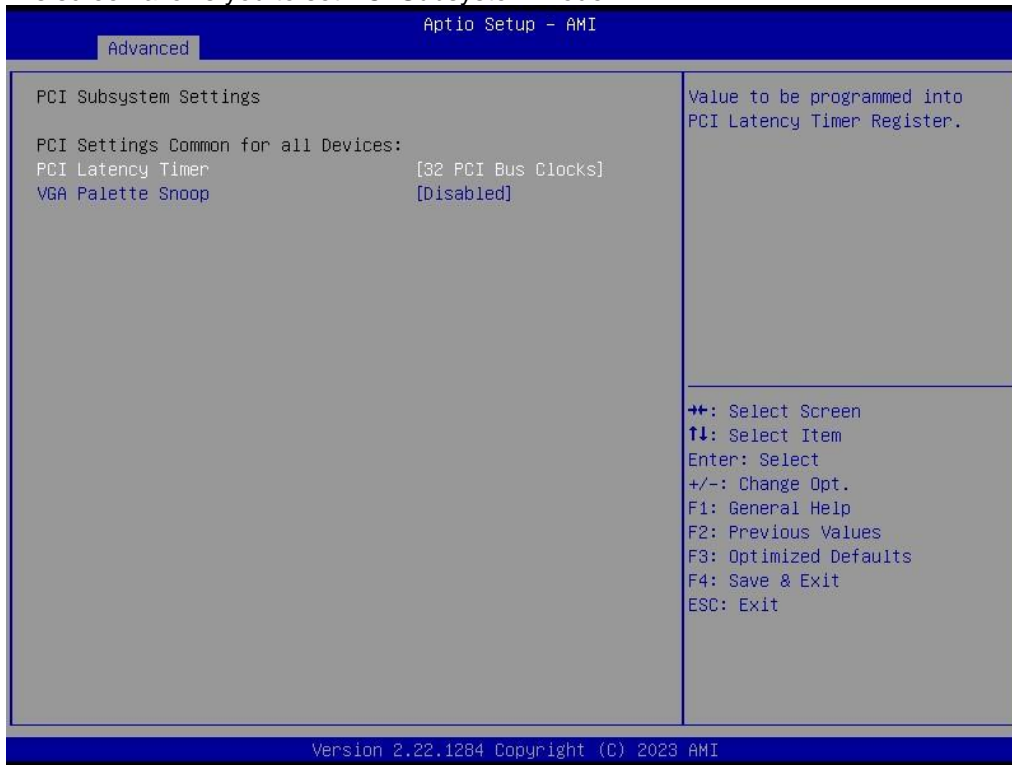
- **USB Configuration**

This screen shows USB configuration.



- **PCI Subsystem Settings**

This screen allows you to set PCI Subsystem mode.



PCI Latency Timer

Set the value to be programmed into PCI Latency Timer Register.

VGA Palette Snoop

Enables or Disables VGA Palette Registers Snooping.

4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

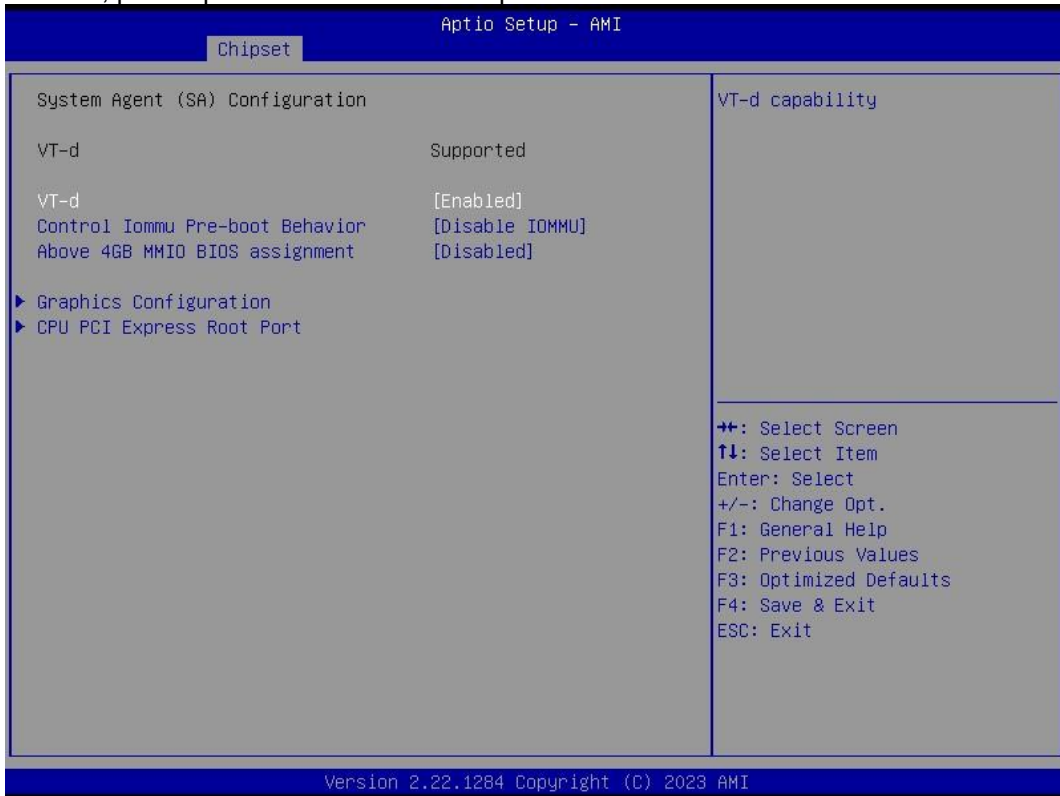
- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration

For items marked with “▶”, please press <Enter> for more options.



- **System Agent (SA) Configuration**

This screen allows users to configure System Agent (SA) parameters. For items marked with “▶”, please press <Enter> for more options.



VT-d

Check to enable VT-d function on MCH.

Graphics Configuration

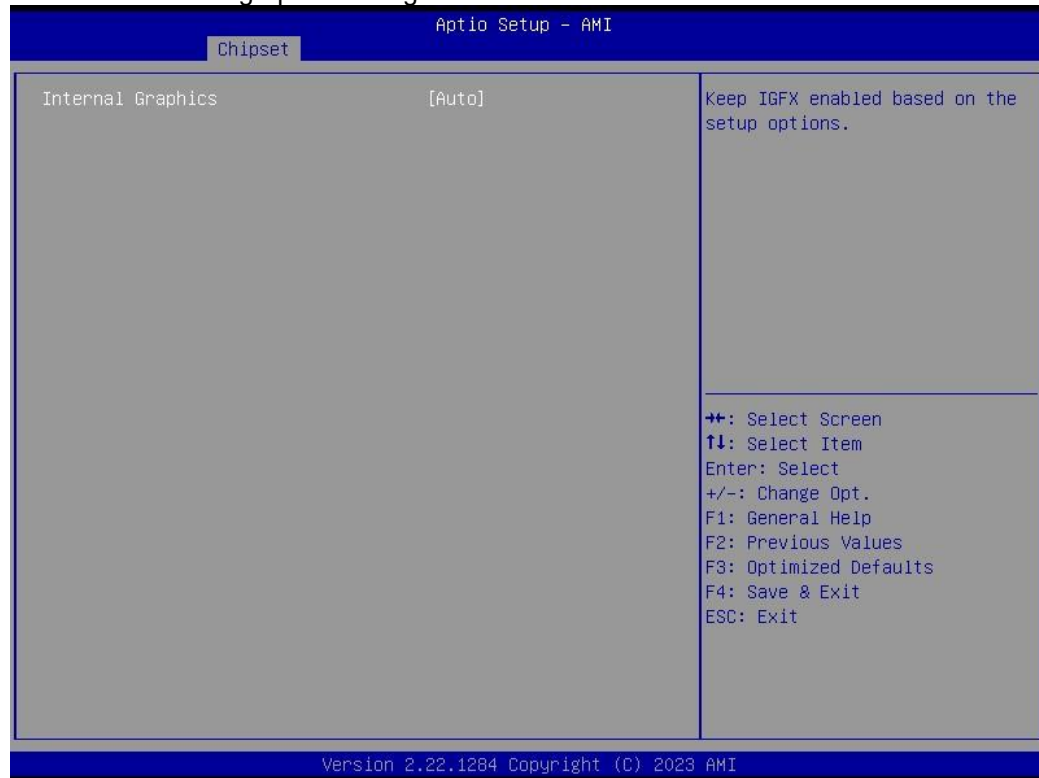
Open the sub menu for parameters related to graphics configuration.

CPU PCI Express Root Port

Set the ASPM Level and PCI Express Speed.

- **Graphics Configuration**

This screen shows graphics configuration.

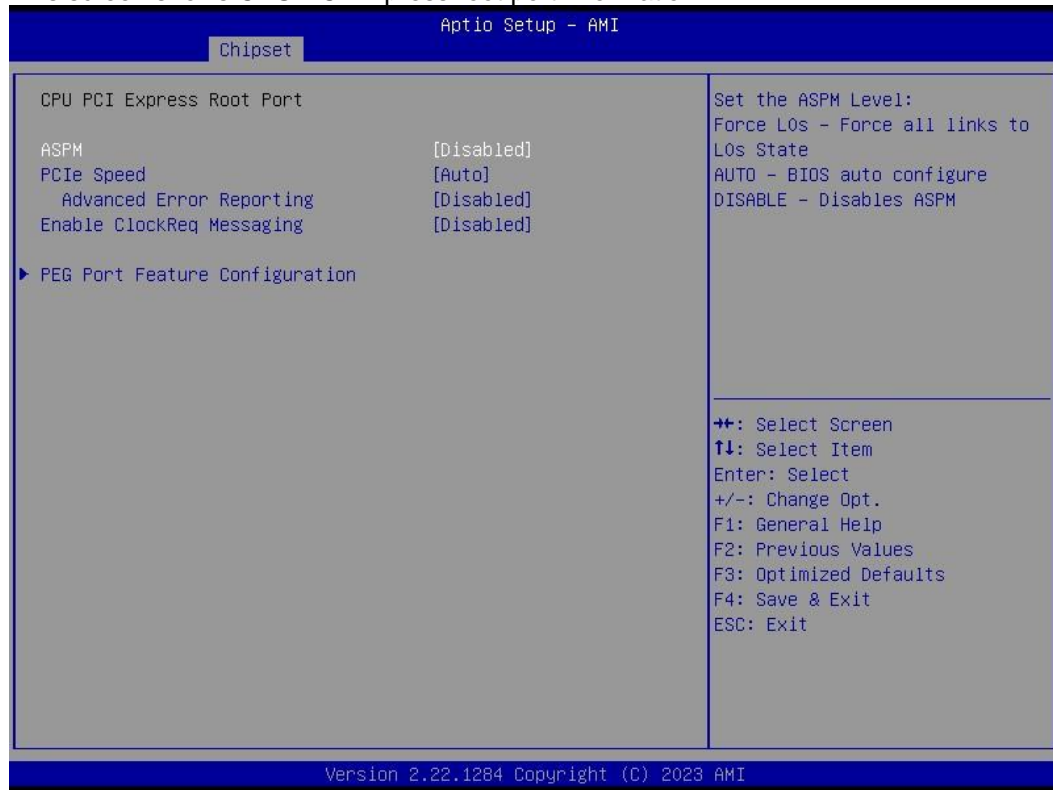


Internal Graphics

Keep IGFX enabled based on the setup options.

- **CPU PCI Express Root Port**

This screen shows CPU PCI Express root port information.



ASPM

Set the ASPM Level:\nForce L0s - Force all links to L0s State\nForce L1 - Force all links to L1 State\nForce L0sL1 - Force all links to L0SL1 State\nDISABLE - Disables ASPM.

PCIe Speed

Configure PCIe Speed.

PCIe Slot x16 = PCIE_16X_SLOT1

PEG Port Feature Configuration

Detect Non-Compliance PCI Express Device in PEG

- **PCH-IO Configuration**

This screen allows you to set PCH parameters.



PCI Express Configuration

Configure PCIe Speed.

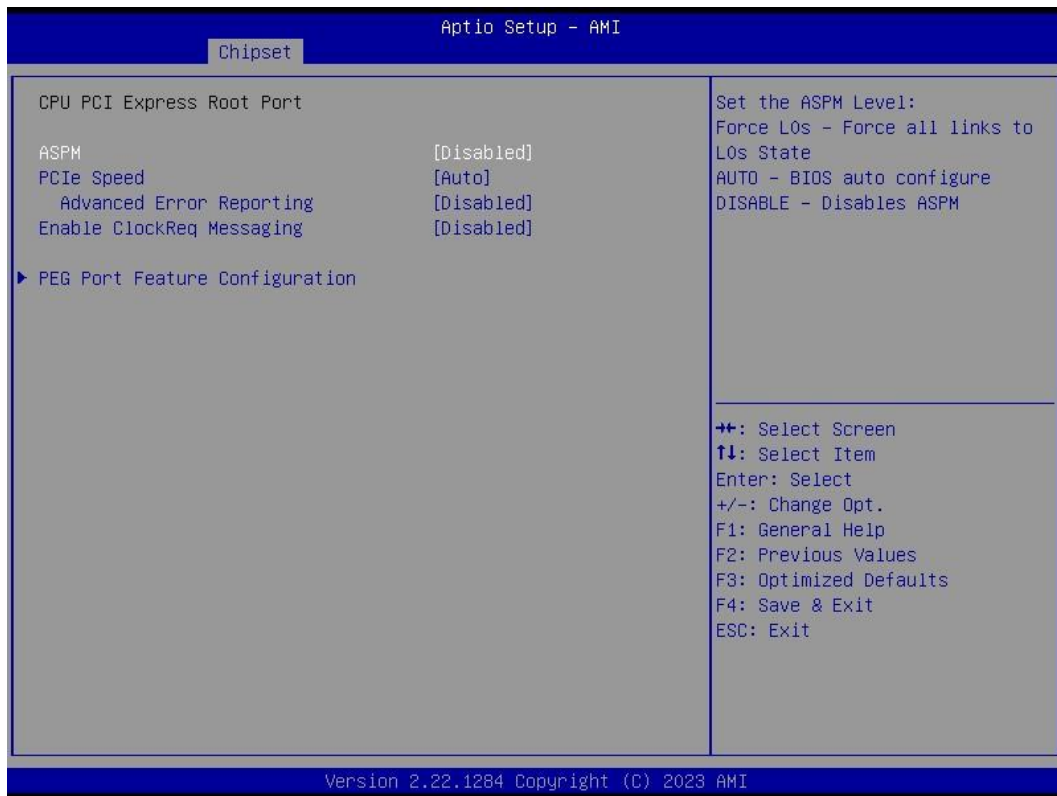
- PCI Express Root Port 1 = PCIE_4X_SLOT2
- PCI Express Root Port 21 = PCIE_4X_SLOT3
- PCI Express Root Port 25 = PCIE_4X_SLOT4

HD Audio Configuration

Enable or disable HD Audio.

Wake on LAN Enable

Enable or disable integrated LAN to wake the system.



PCIe Speed

Configure PCIe Speed.

ASPM

Set the ASPM Level:\nForce L1 - Force all links to L1 State\nAUTO - BIOS auto configure\nDISABLE - Disables ASPM.

Detect Non-Compliance Device

Detect Non-Compliance PCI Express Device. If enabled, it will take more time at POST time.

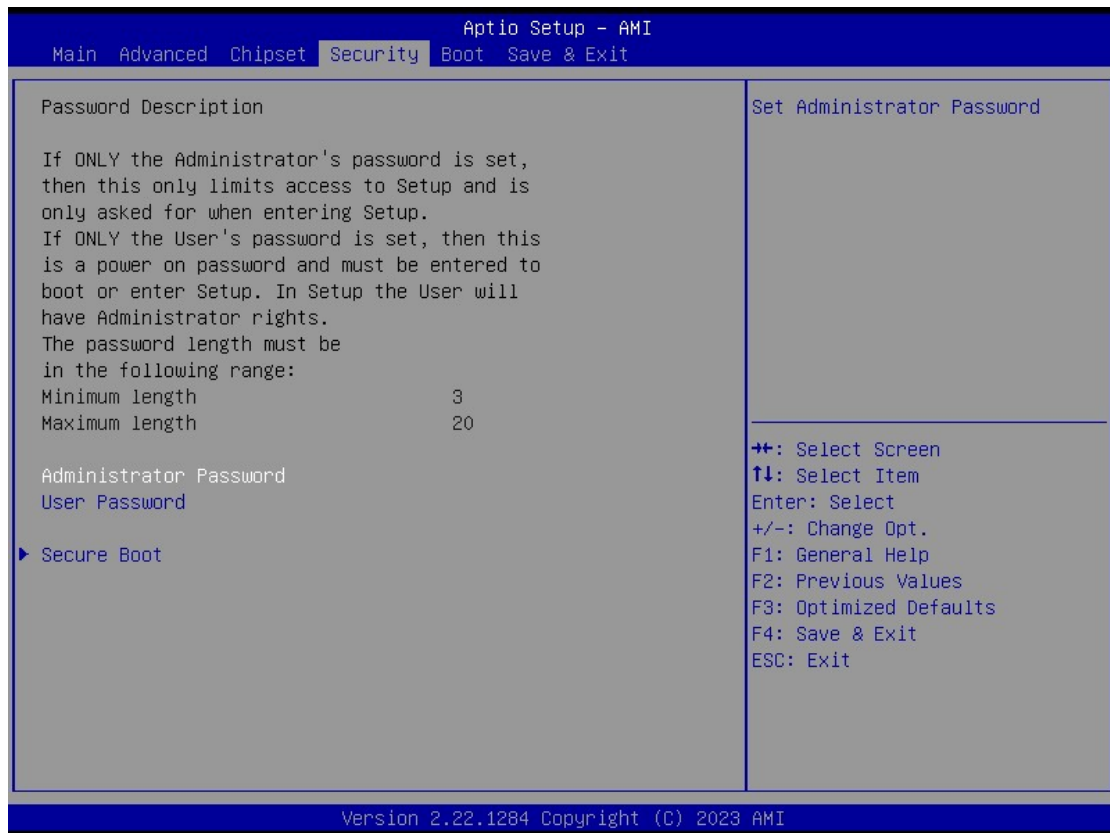
- **HD Audio Configuration**

This screen shows HD Audio information



4.6 Security Menu

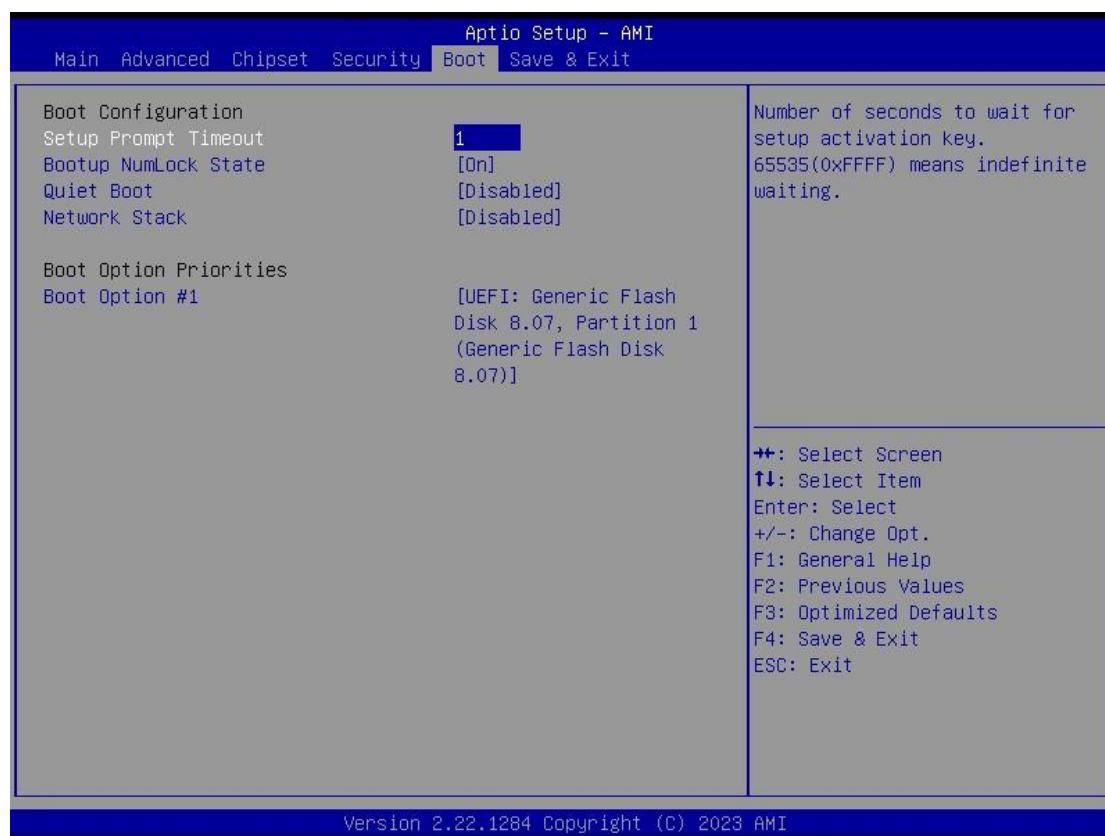
The Security menu allows users to change the security settings for the system.



- **Administrator Password**
This item indicates whether an administrator password has been set (installed or uninstalled).
- **User Password**
This item indicates whether a user password has been set (installed or uninstalled).
- **Secure Boot**
This item is available on the UEFI firmware to provide a secure environment.

4.7 Boot Menu

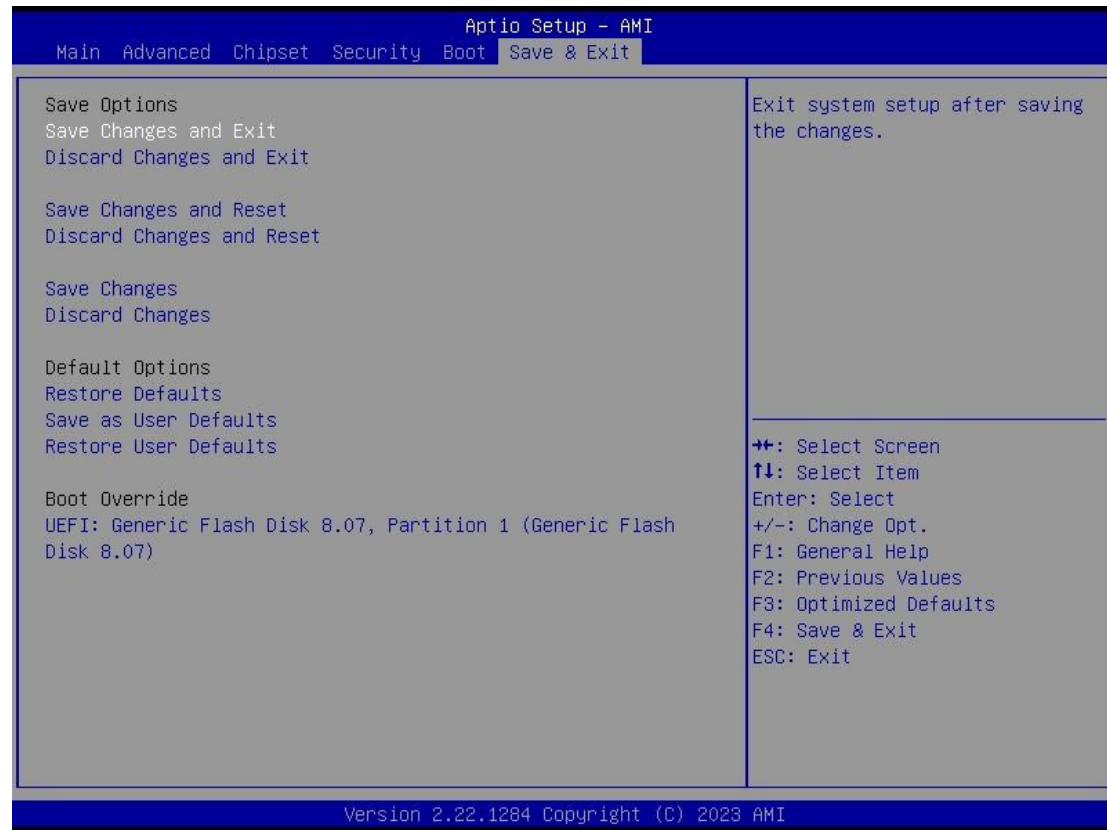
The Boot menu allows users to change boot options of the system.



- **Setup Prompt Timeout**
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
Use this item to select the power-on state for the keyboard NumLock.
- **Quiet Boot**
Select to display either POST output messages or a splash screen during boot-up.
- **Network Stack**
Use this item to run the BIOS of your device through the internet instead of Hard Drives
- **Boot Option Priorities**
These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- Save Changes and Exit**
 When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.
- Discard Changes and Exit**
 Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.
- Save Changes and Reset**
 When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.
- Discard Changes and Reset**
 Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

- **Save Changes**
When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.
- **Discard Changes**
Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.
- **Restore Defaults**
It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.
- **Save as User Defaults**
Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.
- **Restore User Defaults**
It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.
- **Boot Override**
Select a drive to immediately boot that device regardless of the current boot order.

Appendix A

TPM Module Installation

The TPM 2.0 (Trusted Platform Module 2.0) is design applying to the IMB541 and provides enhanced hardware security for the computer. In this appendix you will learn how to install the TPM 2.0 into the IMB541. Please read and follow the instructions below carefully.

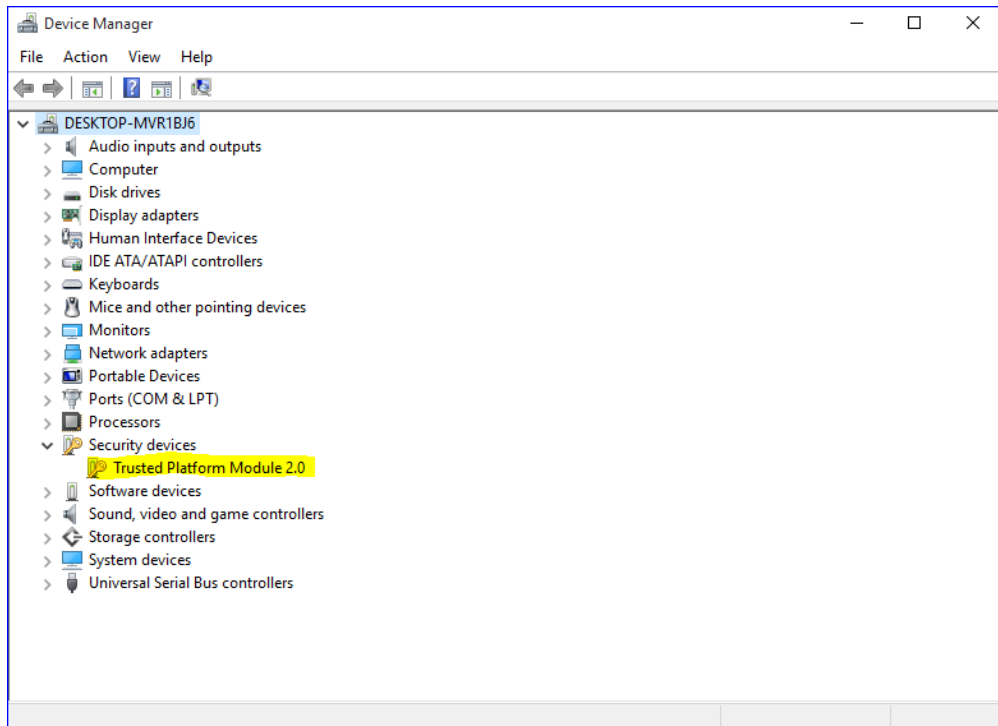
1. To confirm whether the TPM Module is installed successfully or not:
 - a. Enter the BIOS setup menu and go to Trusted Computing. On the first line it will show "TPM2.0 Device Found".



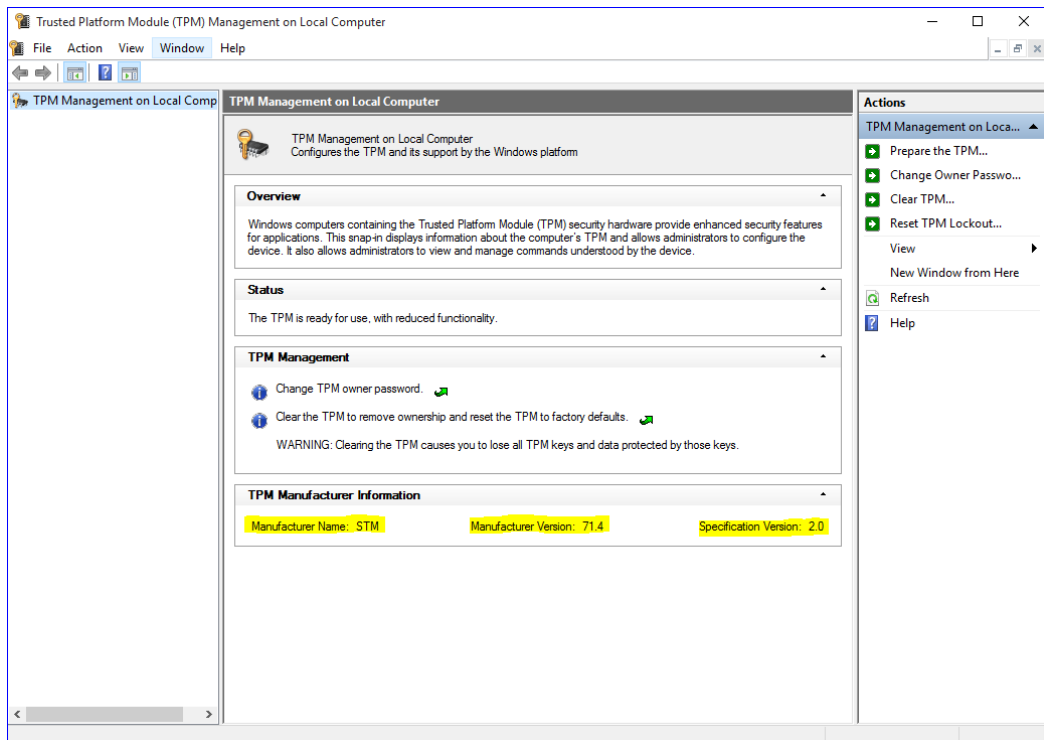
(In the Advance menu, go to Trusted Computing)

(In the Trusted Computing section, on the first of line it will show "TPM2.0 Device Found", if installation is successful.)

- b. In the Windows 10 OS environment, enter Device Manager, and select Security devices. The screen will show "Trusted Platform Module 2.0" if installation is successful.



- c. In the Windows 10 OS environment, enter Control Panel, select BitLocker Drive Encryption, and enter TPM Administration. The screen will show the information below if installation is successful.



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Appendix B

Watchdog Timer

A.1 About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by humans for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us that solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

A.2 How to Use Watchdog Sample Program

```
#include "stdafx.h"

#include <windows.h>
#include <stdio.h>
#include <tchar.h>
#include <stdlib.h>
#ifdef _DEBUG
#define new DEBUG_NEW
#endif

#pragma comment (lib, "User32.lib" )
#define IDT_TIMER WM_USER + 200
#define _CRT_SECURE_NO_WARNINGS 1
#define setbit(value,x) (value |= (1<<x))
#define clrbit(value,x) (value &= ~(1<<x))
HINSTANCE hinstLibDLL = NULL;

LONG WDTDATA = 0;

typedef ULONG(*LPFNDDLGETIOSPACE)(ULONG);
LPFNDDLGETIOSPACE lpFnDll_Get_IO;
typedef void(*LPFNDDLSETIOSPACE)(ULONG, ULONG);
LPFNDDLSETIOSPACE lpFnDll_Set_IO;
int _tmain(int argc, _TCHAR* argv[])
{
int unit = 0;
int WDTtimer = 0;
if (hinstLibDLL == NULL)
```

```
{
hinstLibDLL = LoadLibrary(TEXT("diodll.dll"));
if (hinstLibDLL == NULL)
{
//MessageBox("Load diodll dll error", "", MB_OK);
}

}

if (hinstLibDLL)
{
lpFnDll_Get_IO = (LPFNDDLGETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"),
"GetIoSpaceByte");
lpFnDll_Set_IO = (LPFNDDLSETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"),
"SetIoSpaceByte");
}

printf("Input Watch Dog Timer type, 1:Second ; 2:Minute :");
scanf("%d",&unit);
printf("\nInput Timer to countdown:");
scanf("%d", &WDTtimer);
printf("Start to countdown...");
//==Enter MB Pnp Mode==
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x07);
lpFnDll_Set_IO(0x2f, 0x07); //SET LDN 07
//set LDN07 FA 10 to 11
lpFnDll_Set_IO(0x2e, 0xFA);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 0);
lpFnDll_Set_IO(0x2f, WDTDATA);
if (unit == 1)
{
lpFnDll_Set_IO(0x2e, 0xF6);
lpFnDll_Set_IO(0x2f, WDTtimer);
//start watchdog counting
lpFnDll_Set_IO(0x2e, 0xF5);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 5);
lpFnDll_Set_IO(0x2f, WDTDATA);
}
else if (unit == 2)
{
//set WDT Timer
```

```
lpFnDII_Set_IO(0x2e, 0xF6);  
  
lpFnDII_Set_IO(0x2f, WDTtimer);  
//set watchdog time unit to min  
lpFnDII_Set_IO(0x2e, 0xF5);  
WDTDATA = lpFnDII_Get_IO(0x2f);  
  
WDTDATA = setbit(WDTDATA, 3);  
lpFnDII_Set_IO(0x2f, WDTDATA);  
//start watchdog counting  
lpFnDII_Set_IO(0x2e, 0xF5);  
WDTDATA = lpFnDII_Get_IO(0x2f);  
WDTDATA = setbit(WDTDATA, 5);  
lpFnDII_Set_IO(0x2f, WDTDATA);  
}  
system("pause");  
return 0;  
}
```

- **Timeout Value Range**
 - 1 to 255
 - Minute / Second

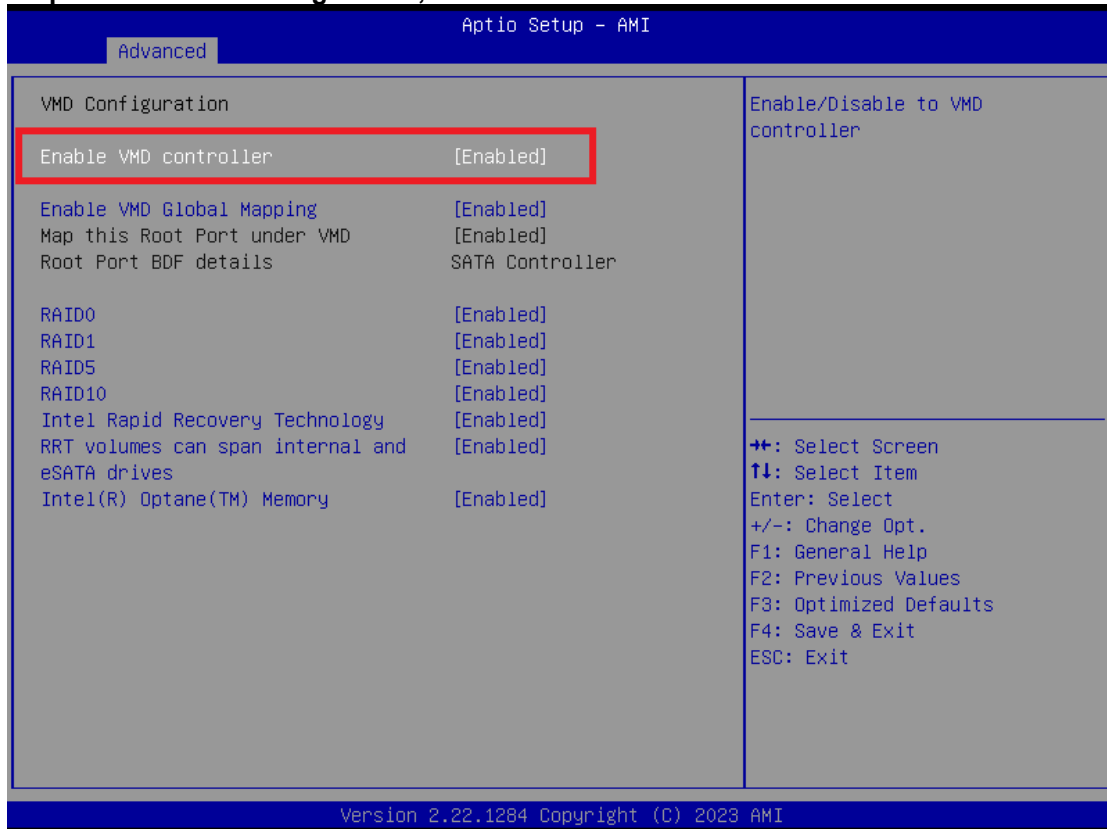
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Appendix C

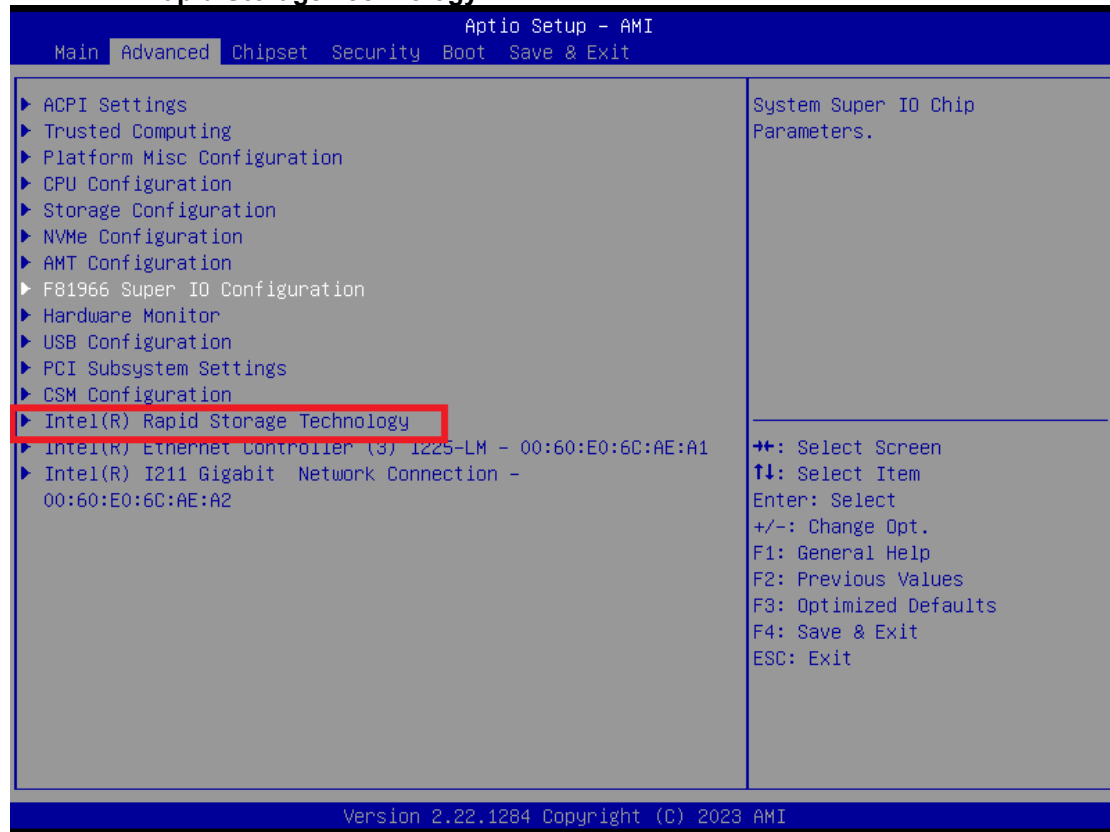
VMD(RAID) Configuration

How to Create Raid?

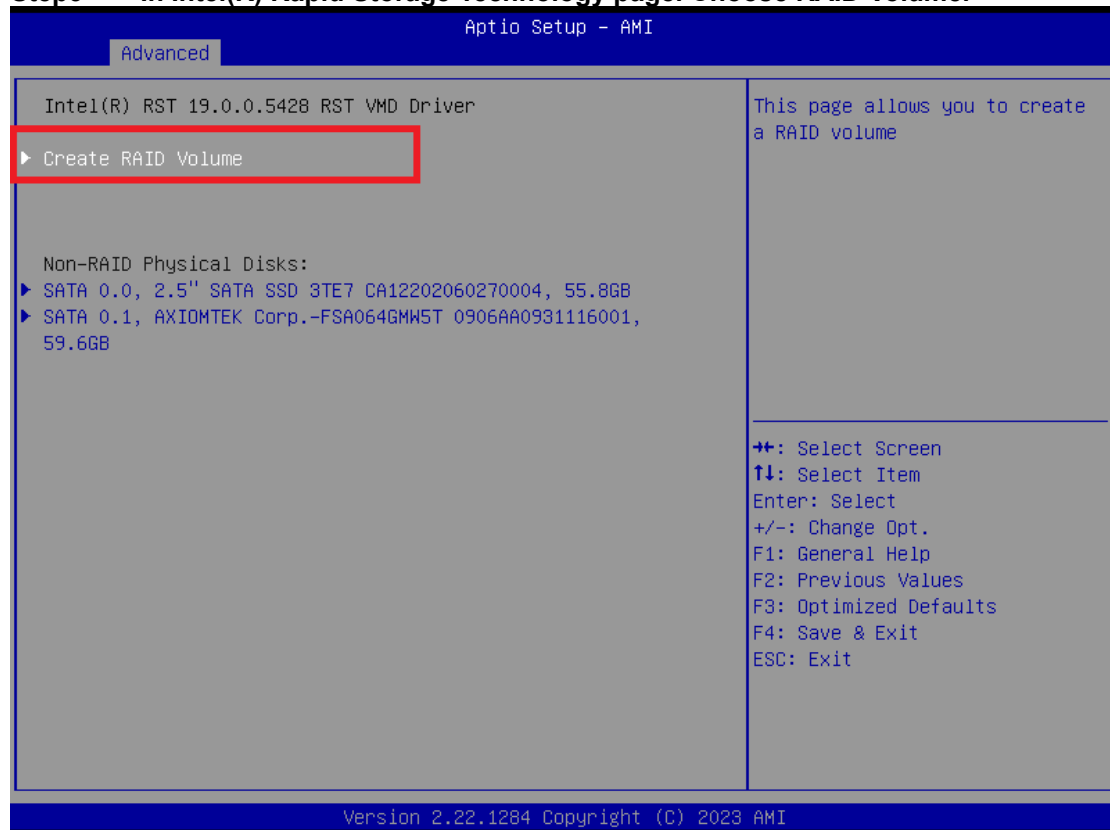
Step 1 In SATA Configuration, Enabled VMD Controller and save & reset.



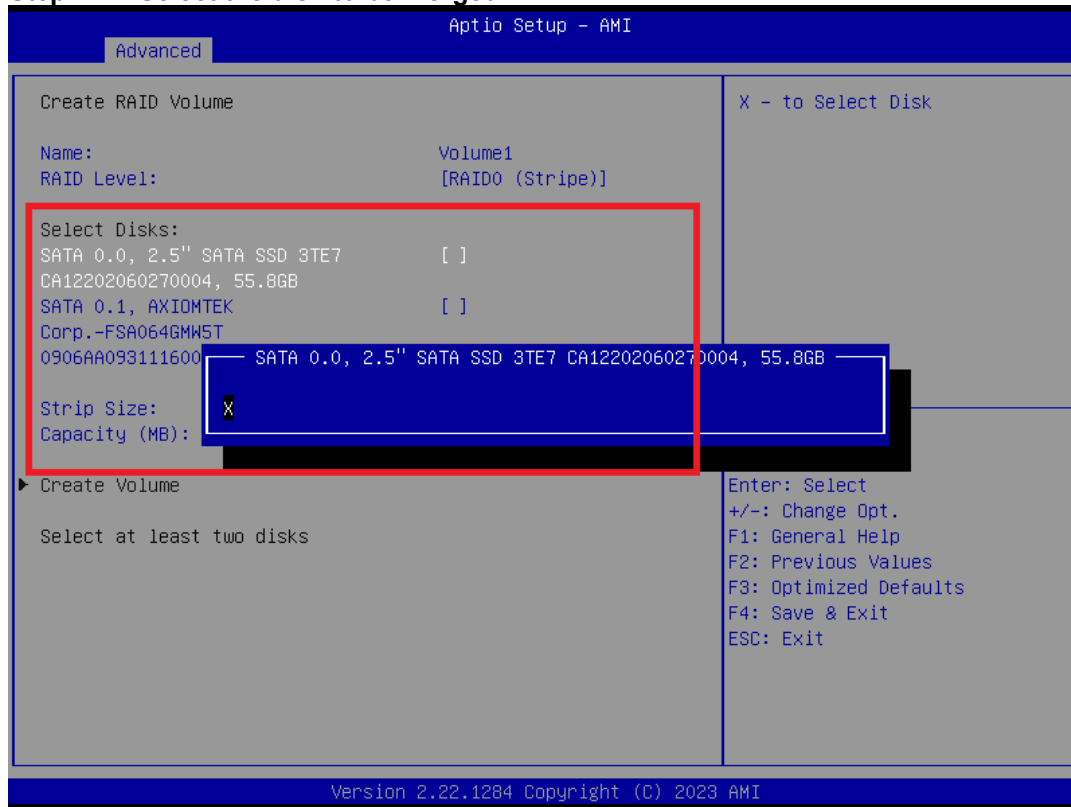
Step2 After Restart, enter del to Bios Setup Menu. In Advanced Page, choose Intel(R) Rapid Storage Technology.



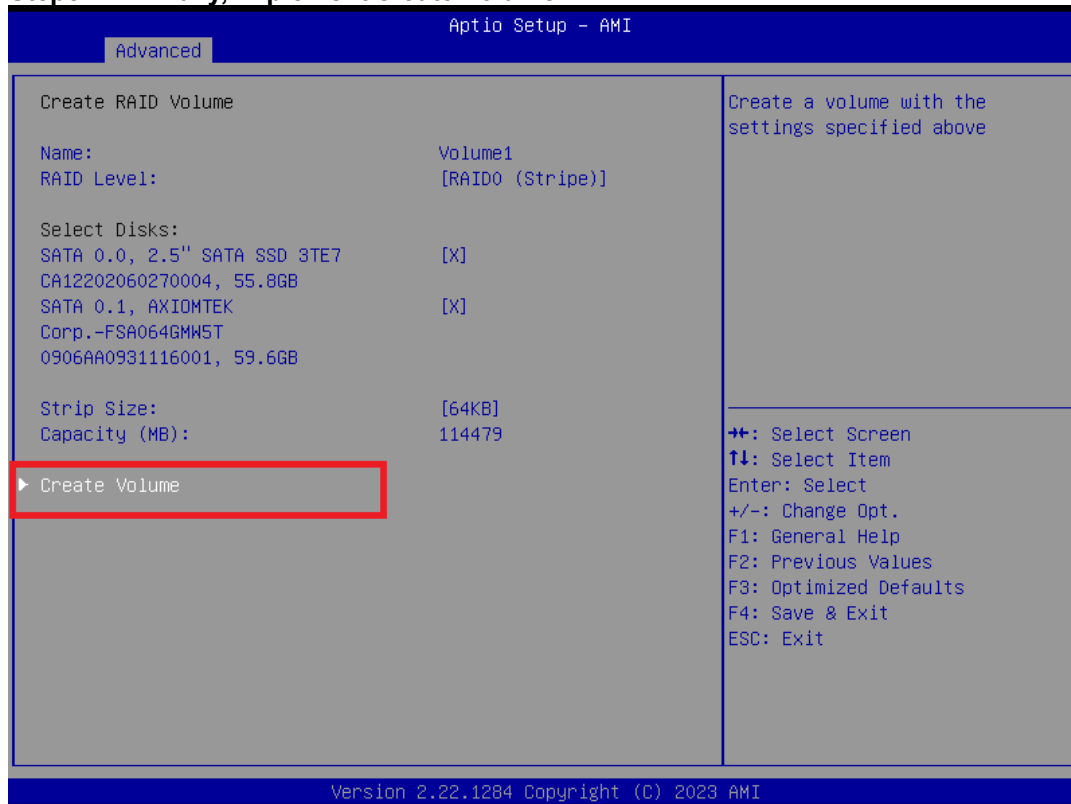
Step3 In Intel(R) Rapid Storage Technology page. Choose RAID Volume.



Step 4 Select the disk to be merged.



Step5 Finally, implement create Volume.



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