

USER'S MANUAL

MMB566

Intel® Socket 1700 Core™ i9 /i7/ i5/
i3 Series Processors MicroATX
Motherboard

User's Manual



www.axiomtek.com

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

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. It discharges static electricity from your body.
- Wear a wrist-grounding 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	1
1.2 Specifications	2
1.3 Utilities Supported	3
1.4 Block Diagram.....	4
Section 2 Board and Pin Assignments.....	5
2.1 Board Layout.....	5
2.3 Jumper and Switch Settings.....	6
2.3.1 Auto Power On (JP1)	7
2.3.2 Clear CMOS (SW1).....	7
2.4 Connectors.....	8
2.4.1 HDMI Type-A Connector (CN5).....	9
2.4.2 Audio Jack (CN6)	9
2.4.3 DisplayPort++ and HDMI Connector (CN7)	10
2.4.4 VGA Connector (CN8).....	10
2.4.5 USB 3.2 Type A Port (CN9).....	11
2.4.6 LAN and USB 3.2 Double-deck Ports (CN10 and CN11)	12
2.4.7 10G LAN Port (CN12)	13
2.4.8 Digital I/O Wafer Connector (CN13).....	13
2.4.9 COM Wafer Connectors (CN14, CN15, CN20, CN23, CN26 and CN27) .	14
2.4.10 ATX Power Input Connectors (CN16 and CN36)	15
2.4.11 PCI-Express x1 Slot (CN17)	16
2.4.12 PCI-Express x4 Slots (CN18 and CN19)	17
2.4.13 M.2 Key M Connector (CN21).....	18
2.4.14 M.2 Key E Connector (CN24)	19
2.4.15 Fan Wafer Connectors (CN28, CN30 and CN40)	20
2.4.16 USB 2.0 Wafer Connector (CN29)	20
2.4.17 Front Panel Connector (CN31)	21
2.4.18 SATA Connectors (CN32, CN33, CN34, CN35, CN38 and CN39)	22
2.4.19 USB 3.2(5Gbps) Wafer Connector (CN37)	22
Section 3 Hardware Description	23
3.1 Microprocessors	23
3.2 BIOS.....	23
3.3 System Memory	23

3.4	I/O Port Address Map	24
3.5	Interrupt Controller (IRQ) Map.....	25
3.6	Memory Map	31

Section 4 AMI BIOS Setup Utility 33

4.1	Starting.....	33
4.2	Navigation Keys	33
4.3	Main Menu	35
4.4	Advanced Menu	36
4.5	Chipset Menu	48
4.6	Security Menu	53
4.7	Boot Menu	55
4.8	Save & Exit Menu.....	56

Appendix A Watchdog Timer 59

A.1	About Watchdog Timer	59
A.2	Sample Program Sample Code(Daniel provide it).....	59

Appendix B Digital I/O..... 61

B.1	Digital I/O Programming	61
B.2	Sample Code	62

Appendix C iAMT Settings 65

C.1	Entering MEBx	65
C.2	Set and Change Password.....	65
C.3	iAMT Settings.....	66
C.4	iAMT Web Console	67

Appendix D TPM Settings 69

Appendix E VMD (RAID) Configuration..... 77

Section 1

Introduction



The MMB566 Micro-ATX motherboard supports the new 12th Generation Intel® Core™ i9/ i7/ i5/ i3 (65W CPU) and Pentium® processors in LGA1700 package. Featuring the new Intel® Q670E Express chipset with four DDR4 3200MHz memory support (R680E support ECC), this motherboard is built to perform best stability and reliability for industrial applications.

It comes with 6 x SATA 3.0, 10 x USB 3.2 and 6 x serial ports (2 x RS-232/422/485, 4 x RS-232) providing robust storage and I/O options. Users also can increase board functionality with PCI-Express x16 and M.2 slot. The high quality MMB566 allows four display interfaces via VGA, DisplayPort++ and 2 HDMI in quad views, making it an ideal solution for gaming, workstation, digital signage, medical and other IoT&M2M applications.

1.1 Features

- LGA1700 Socket for 12/13/14th Gen Intel® Core™ processors (up to 65W) (Alder Lake-S)
- 4 DDR4 3200Mhz U-DIMM Memory up to 128 GB (Optional R680E support ECC Memory)
- 1 PCI-Express x16, 2 PCI-Express x4, 1 PCI-Express x1
- 1 M.2 Key E, size: 22x30 for WiFi (Support PCIE x1, USB 2.0 signal)
- 1 M.2 Key M, size: 22x60, 22x80 (Support PCIE x4 signal)
- 2 2.5GbE Ethernet Port, 2 10GbE by Optional
- 6 SATA-600 support RAID 0/1/5/10
- 10 USB 3.2Gen1(5Gbps)and 2 USB 2.0(H610E supports 4xUSB 3.2Gen1 and 2xUSB 2.0)
- TPM 2.0 supported.
- 4 Displays
- AMT supported.

1.2 Specifications

- **CPU**
 - LGA1700Socket for 12/13/14th Generation Intel® Core™ i9 /i7/ i5/ i3 processors (up to 65W CPU), Celeron and Pentium® processor.
- **Chipset**
 - Intel® Q670E
 - Intel® R680E (Optional)
 - Intel® H610E (Optional)
- **BIOS**
 - AMI BIOS via SPI interface
- **System Memory**
 - 4 x 288 pin ECC/Non-ECC Un-buffered Long-DIMM slots
 - Maximum 128GB DDR4 memory (Max. 32GB per slot)
 - Support DDR4 3200MHz
- **Onboard Multi I/O**
 - Controller: F81966
 - 6 x serial ports: (2x5P 2.0mm box header)
 - COM1~2 with RS-232/422/485 by BIOS selectable (with +5V/+12V power, Baud rate:115200)
 - COM3~6 with RS-232 (Baud rate:115200)
- **USB Interface**
 - 8 x USB 3.2 Gen1 (5Gbps) ports (Rear I/O)
 - 2 x USB 3.2 Gen1 (5Gbps) via 19pin 2.0mm box header (Internal)
 - 2 x USB 2.0 ports via 2x5-pin 2.54mm wafer (Internal)
- **Ethernet**
 - LAN1: 2500/1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel® i226LM
 - LAN2: 2500/1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with Intel® i226LM
- **Serial ATA**
 - 6 x SATA 3.0 ports (6Gb/s) with RAID 0/1/5/10
- **Audio**
 - Realtek ALC888S 5.1 channel HDA codec
 - Support MIC-in/line-out (Rear I/O)
- **Display**
 - 2 x HDMI 1.4b connector in wafer connector. Resolution max. up to 4096x2304 @30Hz
 - 1 x DisplayPort++ with resolution max. up to 4096x2304 @60Hz
 - 1 x VGA with resolution max. up to 1920x1200 @60Hz
- **Expansion Interface**
 - 1 x PCI-Express x16 slot.
 - 2 x PCI-Express x4 slot
 - 1 x PCI-Express x1 slot
 - 1 x M.2 key M slot (support PCIE x4 signal).
 - 1 x M.2 Key E slot (support PCIE x1, USB 2.0 signal).

- **Power Input**
 - One ATX power input connector
 - One 12V ATX power input connector for CPU power
- **Watchdog Timer**
 - 1~65536 seconds or minutes, up to 65536 levels
- **Operating Temperature**
 - 0°C ~ 60°C
- **Storage Temperature**
 - -10°C ~ 60°C
- **Form Factor**
 - Micro-ATX (9.6" x 9.6", 24.4cm x 24.4cm)



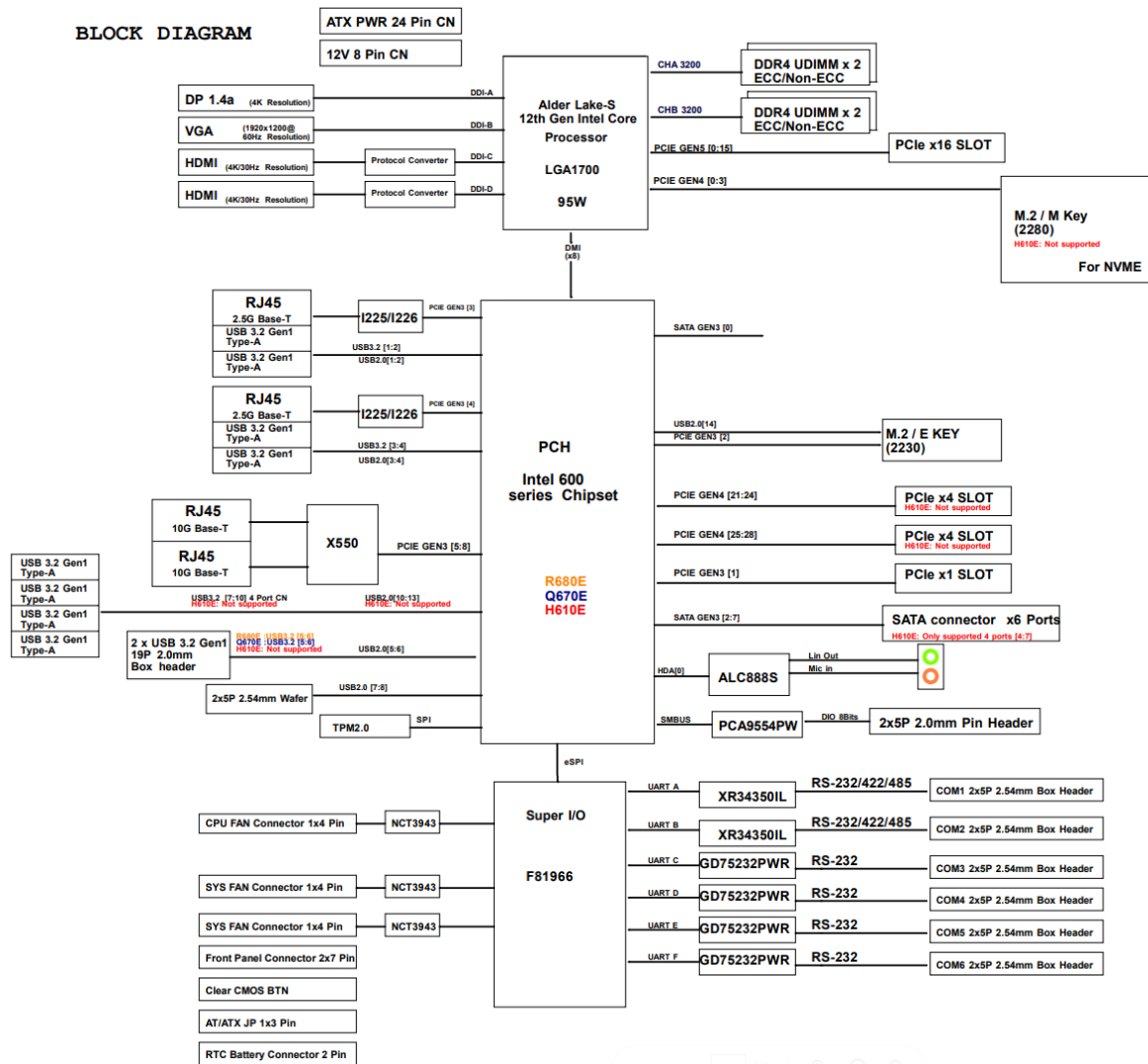
Note

All specifications and images are subject to change without notice.

1.3 Utilities Supported

- Chipset driver
- Graphics driver
- Intel ME driver
- Ethernet driver
- Audio driver
- Intel_Rapid_Storage_Technology driver

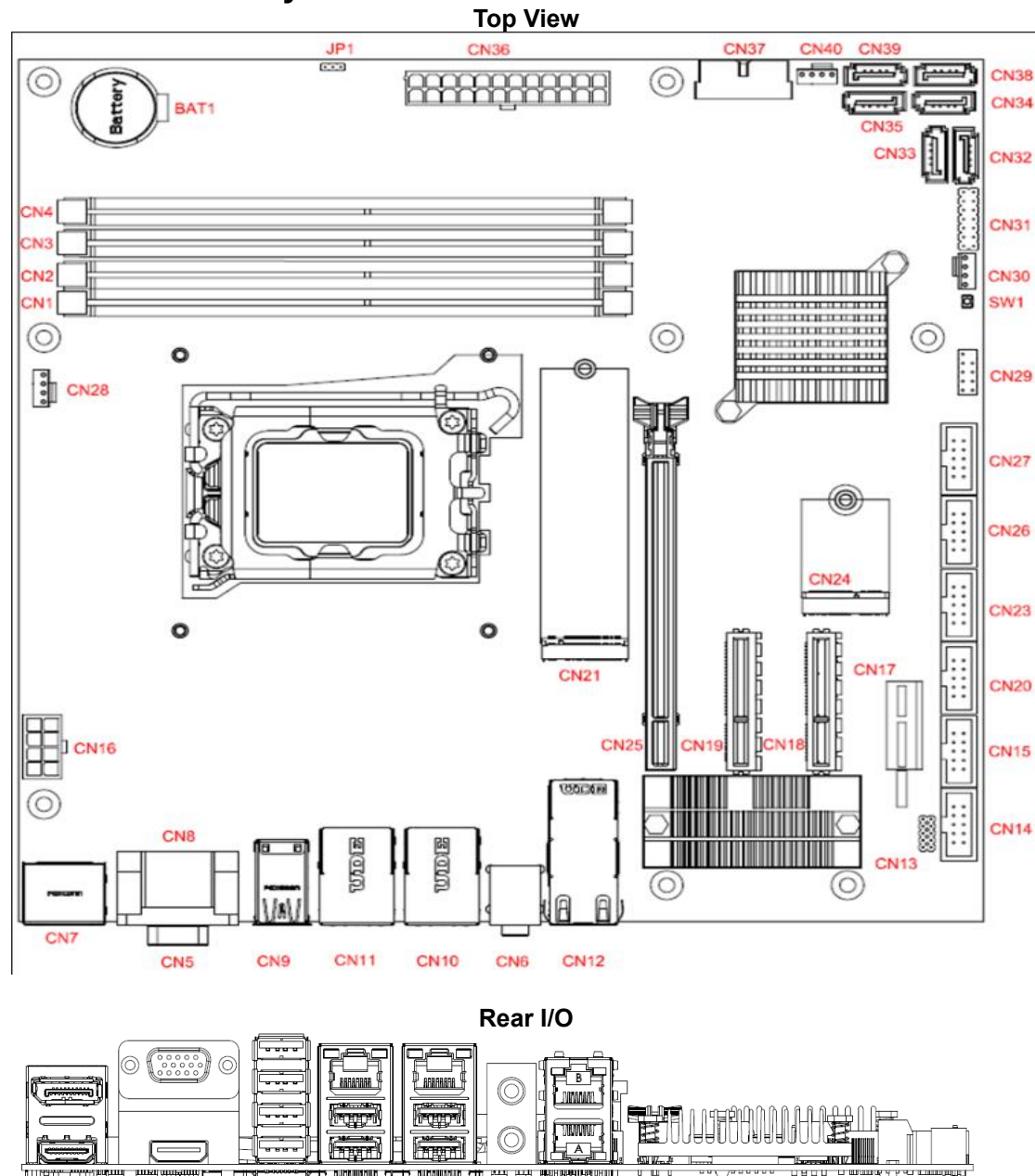
1.4 Block Diagram



Section 2

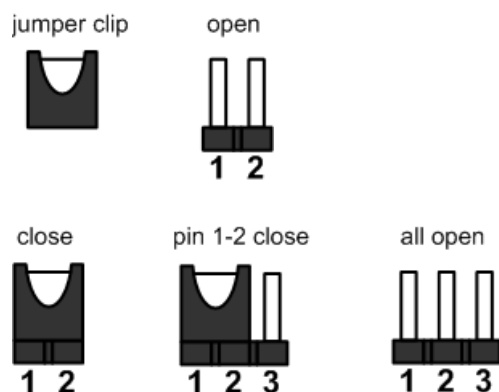
Board and Pin Assignments

2.1 Board Layout



2.3 Jumper and Switch Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.



Before applying power to MMB566 Series, please make sure all of the jumper and switch are in factory default position. Below you can find a summary table of jumper, switch and onboard default settings.



Note

Once the default jumper and switch settings need to be changed, please do it under power-off condition.

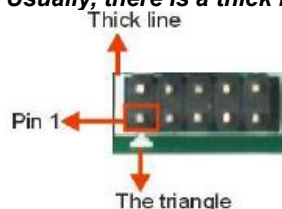
Jumper	Description	Setting
JP1	Auto Power On Default: Disable	2-3 Close
SW1	Clear CMOS Default: Normal Operation	Release



Note

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

- *Usually, there is a thick line or a triangle near the header or jumper pin 1.*



2.3.1 Auto Power On (JP1)

If JP1 is enabled for power input, the system will be automatically power on without pressing soft power button. If JP1 is disabled for power input, it is necessary to manually press soft power button to power on the system.

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



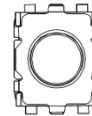
2.3.2 Clear CMOS (SW1)

This switch allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Press the tact switch for at least 1 second.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the key during the boot process and enter BIOS setup to re-enter data.

Function	Setting
Normal (Default)	Release
Restore BIOS optimal defaults	Press



2.4 Connectors

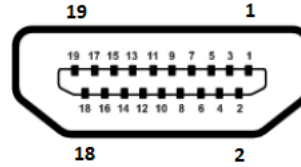
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table showing connectors on the hardware.

Connector	Description
CN1, CN2, CN3, CN4	DDR4 LONG-DIMM CHA~CHD Connectors
CN5	HDMI Type-A Connector
CN6	Audio Jack
CN7	DisplayPort++ and HDMI Connector
CN8	VGA Connector
CN9	USB 3.2 Gen1Type A Port
CN10, CN11	LAN and USB 3.2 Double-deck Ports
CN12	10G LAN Port
CN13	Digital I/O Wafer Connector
CN14, CN15, CN20, CN23, CN26, CN27	COM Wafer Connectors
CN16, CN36	ATX Power Input Connectors
CN17	PCI-Express x1 Slot
CN18, CN19	PCI-Express x4 Slots
CN21	M.2 Key M Connector
CN24	M.2 Key E Connector
CN25	PCI-Express x16 Slot (Gen4)
CN28, CN30, CN40	Fan Wafer Connectors
CN29	USB 2.0 Wafer Connector
CN31	Front Panel Connector
CN32, CN33, CN34, CN35, CN38, CN39	SATA 3.0 Connectors
CN37	USB 3.2 Wafer Connector

2.4.1 HDMI Type-A Connector (CN5)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pin	Signal
1	DATA2
2	GND
3	DATA2#
4	DATA1
5	GND
6	DATA1#
7	DATA0
8	GND
9	DATA0#
10	Clock
11	GND
12	Clock#
13	NC
14	NC
15	SCL
16	SDA
17	GND
18	+5V POWER
19	Hot Plug Detect



2.4.2 Audio Jack (CN6)

The motherboard provides HD audio jack on the rear I/O.

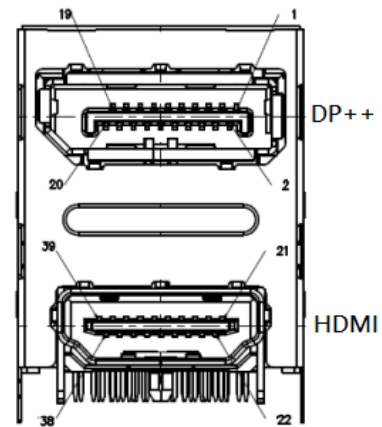
Pin Color	Signal
Green	Line-out
Pink	MIC-in



2.4.3 DisplayPort++ and HDMI Connector (CN7)

The motherboard comes with DisplayPort++ and HDMI interface on the rear I/O.

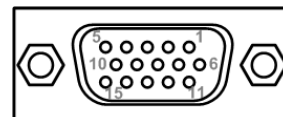
Pin	Signal	Pin	Signal
1	LANE 0	21	DATA2
2	GND	22	GND
3	LANE 0#	23	DATA2#
4	LANE 1	24	DATA1
5	GND	25	GND
6	LANE 1#	26	DATA1#
7	LANE 2	27	DATA0
8	GND	28	GND
9	LANE 2#	29	DATA0#
10	LANE 3	30	Clock
11	GND	31	GND
12	LANE 3#	32	Clock#
13	Detect Pin	33	NC
14	GND	34	NC
15	AUX CH	35	SCL
16	GND	36	SDA
17	AUX CH#	37	GND
18	Hot Plug Detect	38	+5V POWER
19	GND	39	Hot Plug Detect
20	DP_PWR(3.3V)		



2.4.4 VGA Connector (CN8)

This is a standard 15-pin D-Sub connector which is commonly used for VGA display.

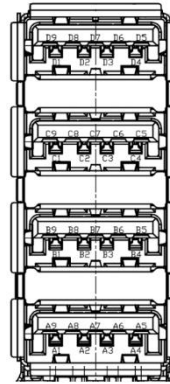
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.4.5 USB 3.2 Type A Port (CN9)

The motherboard comes with Universal Serial Bus (compliant with USB 3.2 Gen1(5Gbps) port on the rear I/O for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin				Signal
A1	B1	C1	D1	USB_VCC (+5V level standby power)
A2	B2	C2	D2	USB_Data-
A3	B3	C3	D3	USB_Data+
A4	B4	C4	D4	GND
A5	B5	C5	D5	SSRX-
A6	B6	C6	D6	SSRX+
A7	B7	C7	D7	GND
A8	B8	C8	D8	SSTX-
A9	B9	C9	D9	SSTX+

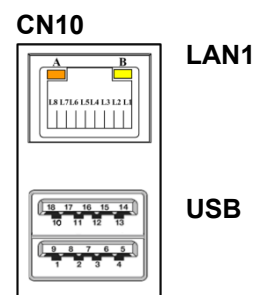


2.4.6 LAN and USB 3.2 Double-deck Ports (CN10 and CN11)

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 2500/1000/100/10 Base-T hub. Note that only LAN1 with Q670E/R680E support Intel AMT(Active Management Technology).

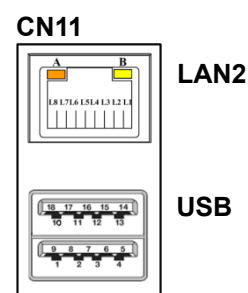
The Universal Serial I/O (compliant with USB 3.2 Gen1) are for connecting USB peripherals such as a keyboard, mouse, scanner, etc.

Pin	LAN Signal	Pin	LAN Signal
L1	LAN1_MDI0_P	L2	LAN1_MDI0_N
L3	LAN1_MDI1_P	L4	LAN1_MDI1_N
L5	LAN1_MDI2_P	L6	LAN1_MDI2_N
L7	LAN1_MDI3_P	L8	LAN1_MDI3_N
A	Speed LED	B	Active LED



Pin	USB Signal	Pin	USB Signal
1	+5V	10	+5V
2	USB#_D-	11	USB#_D-
3	USB#_D+	12	USB#_D+
4	GND	13	GND
5	USB#_SSRX-	14	USB#_SSRX-
6	USB#_SSRX+	15	USB#_SSRX+
7	GND	16	GND
8	USB#_SSTX	17	USB#_SSTX
9	USB#_SSTX+	18	USB#_SSTX+

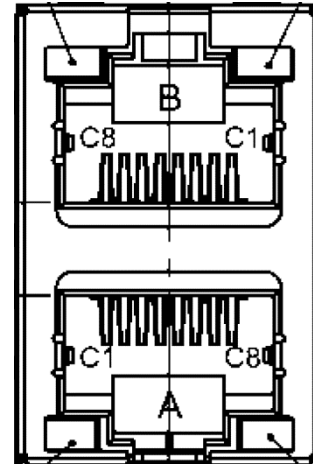
Pin	LAN Signal	Pin	LAN Signal
L1	LAN2_MDI0_P	L2	LAN2_MDI0_N
L3	LAN2_MDI1_P	L4	LAN2_MDI1_N
L5	LAN2_MDI2_P	L6	LAN2_MDI2_N
L7	LAN2_MDI3_P	L8	LAN2_MDI3_N
A	Speed LED	B	Active LED



Pin	USB Signal	Pin	USB Signal
1	+5V	10	+5V
2	USB#_D-	11	USB#_D-
3	USB#_D+	12	USB#_D+
4	GND	13	GND
5	USB#_SSRX-	14	USB#_SSRX-
6	USB#_SSRX+	15	USB#_SSRX+
7	GND	16	GND
8	USB#_SSTX	17	USB#_SSTX
9	USB#_SSTX+	18	USB#_SSTX+

2.4.7 10G LAN Port (CN12)

Pin	Description
A_C1	MDI0_0+
A_C2	MDI0_0-
A_C3	MDI0_1+
A_C4	MDI0_2+
A_C5	MDI0_2-
A_C6	MDI0_1-
A_C7	MDI0_3+
A_C8	MDI0_3-
A Right LED	Speed LED: 10G (Green) 1G (Orange) 100M (No light)
A Left LED	Active LED (Green)
B_C1	MDI1_0+
B_C2	MDI1_0-
B_C3	MDI1_1+
B_C4	MDI1_2+
B_C5	MDI1_2-
B_C6	MDI1_1-
B_C7	MDI1_3+
B_C8	MDI1_3-
B Right LED	Speed LED: 10G (Green) 1G (Orange) 100M (No light)
B Left LED	Active LED (Green)



2.4.8 Digital I/O Wafer Connector (CN13)

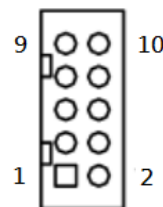
The motherboard comes with a 2x5-pin (pitch=2.00mm/ Model:2417SJ-10-PHD) header for 8-bit digital I/O interface.

Voltage on an input/output pin : -0.5V~5V

Each I/O must be externally limited to a maximum of 25 mA.

The total current sourced by all I/O must be limited to 85 mA.

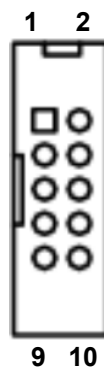
Pin	Signal	Pin	Signal
1	DIO1	2	DIO8
3	DIO2	4	DIO7
5	DIO3	6	DIO6
7	DIO4	8	DIO5
9	+5V	10	GND



2.4.9 COM Wafer Connectors (CN14, CN15, CN20, CN23, CN26 and CN27)

The motherboard comes with six 2x5-pin (pitch=2.54mm/ Model:520-90-10GB00) wafer connectors for COM1~COM6 serial port interfaces (Baud rate:115200). Only COM1 and COM2 are selectable for RS-232/422/485 mode by BIOS setting (see section 4.4). The pin assignments are listed in table below.

Pin	RS-232	RS-422	RS-485
1	DCD#	TX-	485-
2	RXD	TX+	485+
3	TXD	RX+	N/C
4	DTR#	RX-	N/C
5	GND	GND	GND
6	DSR#	N/C	N/C
7	RTS#	N/C	N/C
8	CTS#	N/C	N/C
9	RI#	N/C	N/C



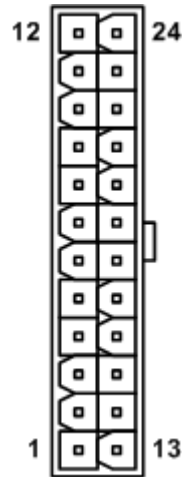
2.4.10 ATX Power Input Connectors (CN16 and CN36)

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

External power supply plug fits into the connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

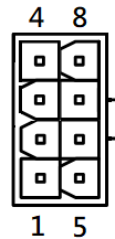
CN36: 24-pin connector for DC power input.

Pin	Signal	Pin	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



CN16: 8-pin connector for +12V DC power input.

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



2.4.11 PCI-Express x1 Slot (CN17)

The motherboard supports one PCI-Express x1 slot (Gen3).

Pin	Signal	Pin	Signal
B1	+12V_PS	A1	N/C
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	WAKE_N	A11	PLTRST
B12	N/C	A12	GND
B13	GND	A13	CLKOUT_PCIE_P1
B14	PCIE_TX_DP1	A14	CLKOUT_PCIE_N1
B15	PCIE_TX_DN1	A15	GND
B16	GND	A16	PCIE_RX_DP1
B17	N/C	A17	PCIE_RX_DN1
B18	GND	A18	GND

2.4.12 PCI-Express x4 Slots (CN18 and CN19)

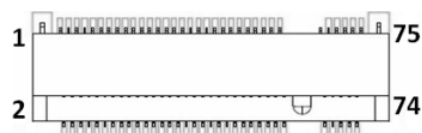
The motherboard supports two PCI-Express x4 slots (Gen3).

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	PCIEX4_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

2.4.13 M.2 Key M Connector (CN21)

The motherboard comes with one M.2 Key M connector suitable for mounting PCIe x4 NVMe storage card.

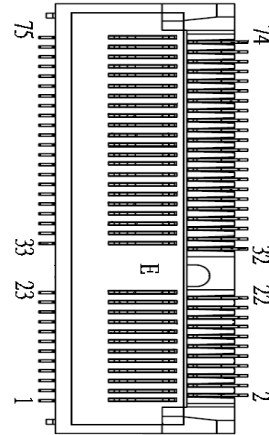
Pin	Signal	Pin	Signal
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PCIE_RX3_N	6	NC
7	PCIE_RX3_P	8	NC
9	GND	10	NC
11	PCIE_TX3_N	12	+3.3V
13	PCIE_TX3_P	14	+3.3V
15	GND	16	+3.3V
17	PCIE_RX2_N	18	+3.3V
19	PCIE_RX2_P	20	NC
21	GND	22	NC
23	PCIE_TX2_N	24	NC
25	PCIE_TX2_P	26	NC
27	GND	28	NC
29	PCIE_RX1_N	30	NC
31	PCIE_RX1_P	32	NC
33	GND	34	NC
35	PCIE_TX1_N	36	NC
37	PCIE_TX1_P	38	DEVSLP
39	GND	40	NC
41	PCIE_RX0_N	42	NC
43	PCIE_RX0_P	44	NC
45	GND	46	NC
47	PCIE_TX0_N	48	NC
49	PCIE_TX0_P	50	PERST#
51	GND	52	CLKREQ#
53	REF_CLK_N	54	PEWAKE#
55	REF_CLK_P	56	NC
57	GND	58	NC
59	Key M	60	Key M
61		62	
63		64	
65		66	
67	NC	68	SUSCLK
69	NC	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		



2.4.14 M.2 Key E Connector (CN24)

The motherboard comes with one M.2 Key E connector.

Pin	Signal	Pin	Signal
1	GND	2	+3.3V
3	USB_D+	4	+3.3V
5	USB_D-	6	NC
7	GND	8	NC
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC
17	NC	18	GND
19	NC	20	NC
21	NC	22	NC
23	NC	24	KEY E
25	KEY E	26	
27		28	
29		30	
31		32	NC
33	GND	34	NC
35	PCIE_TX_P	36	NC
37	PCIE_TX_N	38	NC
39	GND	40	NC
41	PCIE_RX_P	42	NC
43	PCIE_RX_N	44	NC
45	GND	46	NC
47	REF_CLK_P	48	NC
49	REF_CLK_N	50	SUSCLK
51	GND	52	PERST#
53	CLKREQ#	54	W_DISABLE2#
55	PEWAKE#	56	W_DISABLE1#
57	GND	58	I2C_DAT
59	NC	60	I2C_CLK
61	NC	62	ALERT#
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	+3.3V
73	NC	74	+3.3V
75	GND		



2.4.15 Fan Wafer Connectors (CN28, CN30 and CN40)

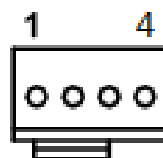
The motherboard has three 1x4-pin (pitch=2.54mm) fan connectors. You can find fan speed option within BIOS Setup Utility if fan is installed. For further information, see BIOS Setup Utility: Advanced\Hardware Monitor\PC Health Status in section 4.4.

CN28: CPU fan

CN30: SYS fan

CN40: AUX fan

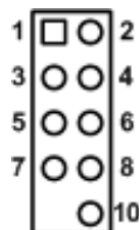
Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control



2.4.16 USB 2.0 Wafer Connector (CN29)

This is a 9-pin (pitch=2.54mm/ Model:CSI-2211-101R) connector for USB 2.0 interfaces.

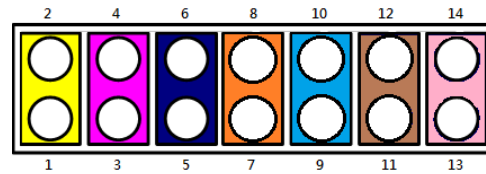
Pin	Signal	Pin	Signal
1	USB VCC (+5V_SBY)	2	USB VCC (+5V_SBY)
3	USB_D7_N	4	USB_D8_N
5	USB_D7_P	6	USB_D8_P
7	GND	8	GND
9		10	GND



2.4.17 Front Panel Connector (CN31)

The CN31 is a 2x7-pin (pitch=2.54mm) header for front panel interface.

Pin	Signal
1	Power LED+
2	SPK-
3	GND
4	BUZZER-
5	Power LED-
6	NC
7	NC
8	SPK+
9	PWRSW-
10	PWRSW+
11	HWRST-
12	HWRST+
13	HDDLED-
14	HDDLED+



Power LED

Pin 1 connects LED+ and pin 5 connects LED-. The power LED lights up when the system is powered on.

External Speaker and Internal Buzzer

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button

Pin 9 and 10 connect the power button on front panel to the board, which allows users to turn on or off power supply.

System Reset Switch

Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

HDD Activity LED

This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.4.18 SATA Connectors (CN32, CN33, CN34, CN35, CN38 and CN39)

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

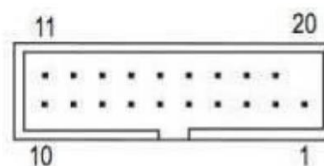
Pin	Signal
1	GND
2	SATA_TX_P
3	SATA_TX_N
4	GND
5	SATA_RX_N
6	SATA_RX_P
7	GND



2.4.19 USB 3.2(5Gbps) Wafer Connector (CN37)

The motherboard comes with one internal 19-pin (pitch=2.00mm, WUIR-19A2N4BU3N) USB 3.2 Gen1 (5Gbps) connector.

Pin	Signal	Pin	Signal
1	+5VA_USB		
2	SSRX9-	19	+5VA_USB
3	SSRX9+	18	SSRX10-
4	GND	17	SSRX10+
5	SSTX9-	16	GND
6	SSTX9+	15	SSTX10-
7	GND	14	SSTX10+
8	USB2_DP5	13	GND
9	USB2_DN5	12	USB2_DP6
10	N/C	11	USB2_DN6



Section 3

Hardware Description

3.1 Microprocessors

The MMB566 Series supports Intel® Core™ i9/ i7/ i5/ i3 processors (95W CPU), Celeron and Pentium® processor, which enable your system to operate under Windows® 11/10 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.

3.2 BIOS

The MMB566 Series uses AMI Plug and Play BIOS with a single SPI Flash.

3.3 System Memory

The MMB566 supports four DDR4 LONG-DIMM sockets for maximum memory capacity up to 32GB DDR4 SDRAMs. The memory module comes in sizes of 4GB, 8GB, 16GB and 32GB.



Note

- ***For single memory channel configuration, install memory module in CHA (CN1) DDR4 LONG-DIMM socket.***
- ***For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in both CHA (CN1) and CHB (CN2) DDR4 LONG-DIMM sockets.***

3.4 I/O Port Address Map

Input/output (IO)	
[0000000000000000 - 000000000000CF7]	PCI Express Root Complex
[000000000000020 - 000000000000021]	Programmable interrupt controller
[000000000000024 - 000000000000025]	Programmable interrupt controller
[000000000000028 - 000000000000029]	Programmable interrupt controller
[00000000000002C - 00000000000002D]	Programmable interrupt controller
[00000000000002E - 00000000000002F]	Motherboard resources
[000000000000030 - 000000000000031]	Programmable interrupt controller
[000000000000034 - 000000000000035]	Programmable interrupt controller
[000000000000038 - 000000000000039]	Programmable interrupt controller
[00000000000003C - 00000000000003D]	Programmable interrupt controller
[000000000000040 - 000000000000043]	System timer
[00000000000004E - 00000000000004F]	Motherboard resources
[000000000000050 - 000000000000053]	System timer
[000000000000061 - 000000000000061]	Motherboard resources
[000000000000063 - 000000000000063]	Motherboard resources
[000000000000065 - 000000000000065]	Motherboard resources
[000000000000067 - 000000000000067]	Motherboard resources
[000000000000070 - 000000000000070]	Motherboard resources
[000000000000080 - 000000000000080]	Motherboard resources
[000000000000092 - 000000000000092]	Motherboard resources
[0000000000000A0 - 0000000000000A1]	Programmable interrupt controller
[0000000000000A4 - 0000000000000A5]	Programmable interrupt controller
[0000000000000A8 - 0000000000000A9]	Programmable interrupt controller
[0000000000000AC - 0000000000000AD]	Programmable interrupt controller
[0000000000000B0 - 0000000000000B1]	Programmable interrupt controller
[0000000000000B2 - 0000000000000B3]	Motherboard resources
[0000000000000B4 - 0000000000000B5]	Programmable interrupt controller
[0000000000000B8 - 0000000000000B9]	Programmable interrupt controller
[0000000000000BC - 0000000000000BD]	Programmable interrupt controller
[0000000000000E0 - 0000000000000E7]	Communications Port (COM6)
[0000000000000E8 - 0000000000000EF]	Communications Port (COM4)
[0000000000000F0 - 0000000000000F7]	Communications Port (COM5)
[0000000000000F8 - 0000000000000FF]	Communications Port (COM2)
[00000000000003E8 - 00000000000003EF]	Communications Port (COM3)
[00000000000003F8 - 00000000000003FF]	Communications Port (COM1)
[00000000000004D0 - 00000000000004D1]	Programmable interrupt controller
[0000000000000680 - 000000000000069F]	Motherboard resources
[0000000000000A00 - 0000000000000A0F]	Motherboard resources
[0000000000000A10 - 0000000000000A1F]	Motherboard resources
[0000000000000A20 - 0000000000000A2F]	Motherboard resources
[0000000000000D00 - 0000000000000FFF]	PCI Express Root Complex
[0000000000000164E - 0000000000000164F]	Motherboard resources
[00000000000001854 - 00000000000001857]	Motherboard resources
[00000000000002000 - 000000000000020FE]	Motherboard resources
[00000000000003000 - 0000000000000303F]	Intel(R) UHD Graphics 770
[00000000000003060 - 0000000000000307F]	Standard SATA AHCI Controller
[00000000000003080 - 00000000000003083]	Standard SATA AHCI Controller
[00000000000003090 - 00000000000003097]	Standard SATA AHCI Controller

3.5 Interrupt Controller (IRQ) Map

The interrupt controller (IRQ) mapping list is shown as follows:

Interrupt request (IRQ)			
(ISA) 0x00000000 (00)	System timer	(ISA) 0x00000060 (96)	Microsoft ACPI-Compliant System
(ISA) 0x00000003 (03)	Communications Port (COM2)	(ISA) 0x00000061 (97)	Microsoft ACPI-Compliant System
(ISA) 0x00000004 (04)	Communications Port (COM1)	(ISA) 0x00000062 (98)	Microsoft ACPI-Compliant System
(ISA) 0x00000005 (05)	Communications Port (COM3)	(ISA) 0x00000063 (99)	Microsoft ACPI-Compliant System
(ISA) 0x00000006 (06)	Communications Port (COM4)	(ISA) 0x00000064 (100)	Microsoft ACPI-Compliant System
(ISA) 0x0000000A (10)	Communications Port (COM5)	(ISA) 0x00000065 (101)	Microsoft ACPI-Compliant System
(ISA) 0x0000000B (11)	Communications Port (COM6)	(ISA) 0x00000066 (102)	Microsoft ACPI-Compliant System
(ISA) 0x0000000E (14)	Intel(R) Serial IO GPIO Host Controller - INTCT1056	(ISA) 0x00000067 (103)	Microsoft ACPI-Compliant System
(ISA) 0x00000037 (55)	Microsoft ACPI-Compliant System	(ISA) 0x00000068 (104)	Microsoft ACPI-Compliant System
(ISA) 0x00000038 (56)	Microsoft ACPI-Compliant System	(ISA) 0x00000069 (105)	Microsoft ACPI-Compliant System
(ISA) 0x00000039 (57)	Microsoft ACPI-Compliant System	(ISA) 0x0000006A (106)	Microsoft ACPI-Compliant System
(ISA) 0x0000003A (58)	Microsoft ACPI-Compliant System	(ISA) 0x0000006B (107)	Microsoft ACPI-Compliant System
(ISA) 0x0000003B (59)	Microsoft ACPI-Compliant System	(ISA) 0x0000006C (108)	Microsoft ACPI-Compliant System
(ISA) 0x0000003C (60)	Microsoft ACPI-Compliant System	(ISA) 0x0000006D (109)	Trusted Platform Module 2.0
(ISA) 0x0000003D (61)	Microsoft ACPI-Compliant System	(ISA) 0x0000006E (110)	Microsoft ACPI-Compliant System
(ISA) 0x0000003E (62)	Microsoft ACPI-Compliant System	(ISA) 0x0000006F (111)	Microsoft ACPI-Compliant System
(ISA) 0x0000003F (63)	Microsoft ACPI-Compliant System	(ISA) 0x00000070 (112)	Microsoft ACPI-Compliant System
(ISA) 0x00000040 (64)	Microsoft ACPI-Compliant System	(ISA) 0x00000071 (113)	Microsoft ACPI-Compliant System
(ISA) 0x00000041 (65)	Microsoft ACPI-Compliant System	(ISA) 0x00000072 (114)	Microsoft ACPI-Compliant System
(ISA) 0x00000042 (66)	Microsoft ACPI-Compliant System	(ISA) 0x00000073 (115)	Microsoft ACPI-Compliant System
(ISA) 0x00000043 (67)	Microsoft ACPI-Compliant System	(ISA) 0x00000074 (116)	Microsoft ACPI-Compliant System
(ISA) 0x00000044 (68)	Microsoft ACPI-Compliant System	(ISA) 0x00000075 (117)	Microsoft ACPI-Compliant System
(ISA) 0x00000045 (69)	Microsoft ACPI-Compliant System	(ISA) 0x00000076 (118)	Microsoft ACPI-Compliant System
(ISA) 0x00000046 (70)	Microsoft ACPI-Compliant System	(ISA) 0x00000077 (119)	Microsoft ACPI-Compliant System
(ISA) 0x00000047 (71)	Microsoft ACPI-Compliant System	(ISA) 0x00000078 (120)	Microsoft ACPI-Compliant System
(ISA) 0x00000048 (72)	Microsoft ACPI-Compliant System	(ISA) 0x00000079 (121)	Microsoft ACPI-Compliant System
(ISA) 0x00000049 (73)	Microsoft ACPI-Compliant System	(ISA) 0x0000007A (122)	Microsoft ACPI-Compliant System
(ISA) 0x0000004A (74)	Microsoft ACPI-Compliant System	(ISA) 0x0000007B (123)	Microsoft ACPI-Compliant System
(ISA) 0x0000004B (75)	Microsoft ACPI-Compliant System	(ISA) 0x0000007C (124)	Microsoft ACPI-Compliant System
(ISA) 0x0000004C (76)	Microsoft ACPI-Compliant System	(ISA) 0x0000007D (125)	Microsoft ACPI-Compliant System
(ISA) 0x0000004D (77)	Microsoft ACPI-Compliant System	(ISA) 0x0000007E (126)	Microsoft ACPI-Compliant System
(ISA) 0x0000004E (78)	Microsoft ACPI-Compliant System	(ISA) 0x0000007F (127)	Microsoft ACPI-Compliant System
(ISA) 0x0000004F (79)	Microsoft ACPI-Compliant System	(ISA) 0x00000080 (128)	Microsoft ACPI-Compliant System
(ISA) 0x00000050 (80)	Microsoft ACPI-Compliant System	(ISA) 0x00000081 (129)	Microsoft ACPI-Compliant System
(ISA) 0x00000051 (81)	Microsoft ACPI-Compliant System	(ISA) 0x00000082 (130)	Microsoft ACPI-Compliant System
(ISA) 0x00000052 (82)	Microsoft ACPI-Compliant System	(ISA) 0x00000083 (131)	Microsoft ACPI-Compliant System
(ISA) 0x00000053 (83)	Microsoft ACPI-Compliant System	(ISA) 0x00000084 (132)	Microsoft ACPI-Compliant System
(ISA) 0x00000054 (84)	Microsoft ACPI-Compliant System	(ISA) 0x00000085 (133)	Microsoft ACPI-Compliant System
(ISA) 0x00000055 (85)	Microsoft ACPI-Compliant System	(ISA) 0x00000086 (134)	Microsoft ACPI-Compliant System
(ISA) 0x00000056 (86)	Microsoft ACPI-Compliant System	(ISA) 0x00000087 (135)	Microsoft ACPI-Compliant System
(ISA) 0x00000057 (87)	Microsoft ACPI-Compliant System	(ISA) 0x00000088 (136)	Microsoft ACPI-Compliant System
(ISA) 0x00000058 (88)	Microsoft ACPI-Compliant System	(ISA) 0x00000089 (137)	Microsoft ACPI-Compliant System
(ISA) 0x00000059 (89)	Microsoft ACPI-Compliant System	(ISA) 0x0000008A (138)	Microsoft ACPI-Compliant System
(ISA) 0x0000005A (90)	Microsoft ACPI-Compliant System	(ISA) 0x0000008B (139)	Microsoft ACPI-Compliant System
(ISA) 0x0000005B (91)	Microsoft ACPI-Compliant System	(ISA) 0x0000008C (140)	Microsoft ACPI-Compliant System
(ISA) 0x0000005C (92)	Microsoft ACPI-Compliant System	(ISA) 0x0000008D (141)	Microsoft ACPI-Compliant System
(ISA) 0x0000005D (93)	Microsoft ACPI-Compliant System	(ISA) 0x0000008E (142)	Microsoft ACPI-Compliant System
(ISA) 0x0000005E (94)	Microsoft ACPI-Compliant System	(ISA) 0x0000008F (143)	Microsoft ACPI-Compliant System
(ISA) 0x0000005F (95)	Microsoft ACPI-Compliant System	(ISA) 0x00000090 (144)	Microsoft ACPI-Compliant System

[illegible]

	(ISA) 0x0000018C (396)	Microsoft ACPI-Compliant System		(ISA) 0x000001BD (445)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018D (397)	Microsoft ACPI-Compliant System		(ISA) 0x000001BE (446)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018E (398)	Microsoft ACPI-Compliant System		(ISA) 0x000001BF (447)	Microsoft ACPI-Compliant System
	(ISA) 0x0000018F (399)	Microsoft ACPI-Compliant System		(ISA) 0x000001C0 (448)	Microsoft ACPI-Compliant System
	(ISA) 0x00000190 (400)	Microsoft ACPI-Compliant System		(ISA) 0x000001C1 (449)	Microsoft ACPI-Compliant System
	(ISA) 0x00000191 (401)	Microsoft ACPI-Compliant System		(ISA) 0x000001C2 (450)	Microsoft ACPI-Compliant System
	(ISA) 0x00000192 (402)	Microsoft ACPI-Compliant System		(ISA) 0x000001C3 (451)	Microsoft ACPI-Compliant System
	(ISA) 0x00000193 (403)	Microsoft ACPI-Compliant System		(ISA) 0x000001C4 (452)	Microsoft ACPI-Compliant System
	(ISA) 0x00000194 (404)	Microsoft ACPI-Compliant System		(ISA) 0x000001C5 (453)	Microsoft ACPI-Compliant System
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	(ISA) 0x0000019C (412)	Microsoft ACPI-Compliant System		(ISA) 0x000001CD (461)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019D (413)	Microsoft ACPI-Compliant System		(ISA) 0x000001CE (462)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019E (414)	Microsoft ACPI-Compliant System		(ISA) 0x000001CF (463)	Microsoft ACPI-Compliant System
	(ISA) 0x0000019F (415)	Microsoft ACPI-Compliant System		(ISA) 0x000001D0 (464)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A0 (416)	Microsoft ACPI-Compliant System		(ISA) 0x000001D1 (465)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A1 (417)	Microsoft ACPI-Compliant System		(ISA) 0x000001D2 (466)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A2 (418)	Microsoft ACPI-Compliant System		(ISA) 0x000001D3 (467)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A3 (419)	Microsoft ACPI-Compliant System		(ISA) 0x000001D4 (468)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A4 (420)	Microsoft ACPI-Compliant System		(ISA) 0x000001D5 (469)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A5 (421)	Microsoft ACPI-Compliant System		(ISA) 0x000001D6 (470)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A6 (422)	Microsoft ACPI-Compliant System		(ISA) 0x000001D7 (471)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A7 (423)	Microsoft ACPI-Compliant System		(ISA) 0x000001D8 (472)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A8 (424)	Microsoft ACPI-Compliant System		(ISA) 0x000001D9 (473)	Microsoft ACPI-Compliant System
	(ISA) 0x000001A9 (425)	Microsoft ACPI-Compliant System		(ISA) 0x000001DA (474)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AA (426)	Microsoft ACPI-Compliant System		(ISA) 0x000001DB (475)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AB (427)	Microsoft ACPI-Compliant System		(ISA) 0x000001DC (476)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AC (428)	Microsoft ACPI-Compliant System		(ISA) 0x000001DD (477)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AD (429)	Microsoft ACPI-Compliant System		(ISA) 0x000001DE (478)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AE (430)	Microsoft ACPI-Compliant System		(ISA) 0x000001DF (479)	Microsoft ACPI-Compliant System
	(ISA) 0x000001AF (431)	Microsoft ACPI-Compliant System		(ISA) 0x000001E0 (480)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B0 (432)	Microsoft ACPI-Compliant System		(ISA) 0x000001E1 (481)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B1 (433)	Microsoft ACPI-Compliant System		(ISA) 0x000001E2 (482)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B2 (434)	Microsoft ACPI-Compliant System		(ISA) 0x000001E3 (483)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B3 (435)	Microsoft ACPI-Compliant System		(ISA) 0x000001E4 (484)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B4 (436)	Microsoft ACPI-Compliant System		(ISA) 0x000001E5 (485)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B5 (437)	Microsoft ACPI-Compliant System		(ISA) 0x000001E6 (486)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B6 (438)	Microsoft ACPI-Compliant System		(ISA) 0x000001E7 (487)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B7 (439)	Microsoft ACPI-Compliant System		(ISA) 0x000001E8 (488)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B8 (440)	Microsoft ACPI-Compliant System		(ISA) 0x000001E9 (489)	Microsoft ACPI-Compliant System
	(ISA) 0x000001B9 (441)	Microsoft ACPI-Compliant System		(ISA) 0x000001EA (490)	Microsoft ACPI-Compliant System
	(ISA) 0x000001BA (442)	Microsoft ACPI-Compliant System		(ISA) 0x000001EB (491)	Microsoft ACPI-Compliant System
	(ISA) 0x000001BB (443)	Microsoft ACPI-Compliant System		(ISA) 0x000001EC (492)	Microsoft ACPI-Compliant System
	(ISA) 0x000001BC (444)	Microsoft ACPI-Compliant System		(ISA) 0x000001ED (493)	Microsoft ACPI-Compliant System
				(ISA) 0x000001EE (494)	Microsoft ACPI-Compliant System

	(ISA) 0x000001EF (495)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F0 (496)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F1 (497)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F2 (498)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F3 (499)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F4 (500)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F5 (501)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F6 (502)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F7 (503)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F8 (504)	Microsoft ACPI-Compliant System
	(ISA) 0x000001F9 (505)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FA (506)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FB (507)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FC (508)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FD (509)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FE (510)	Microsoft ACPI-Compliant System
	(ISA) 0x000001FF (511)	Microsoft ACPI-Compliant System
	(PCI) 0x00000010 (16)	Intel(R) Innovation Platform Framework Processor Participant
	(PCI) 0x00000010 (16)	Intel(R) Serial IO UART Host Controller - 7AA8
	(PCI) 0x00000011 (17)	High Definition Audio Controller
	(PCI) 0x0000001B (27)	Intel(R) Serial IO I2C Host Controller - 7ACC
	(PCI) 0x0000001D (29)	Intel(R) Serial IO I2C Host Controller - 7ACE
	(PCI) 0x0000001F (31)	Intel(R) Serial IO I2C Host Controller - 7AFC
	(PCI) 0x00000020 (32)	Intel(R) Serial IO I2C Host Controller - 7AFD
	(PCI) 0x00000025 (37)	Intel(R) Serial IO SPI Host Controller - 7AAB
	(PCI) 0x00000028 (40)	Intel(R) Serial IO I2C Host Controller - 7ACD
	(PCI) 0x0000002B (43)	Intel(R) Serial IO I2C Host Controller - 7ACF
	(PCI) 0xFFFFF8B5 (-75)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8B6 (-74)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8B7 (-73)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8B8 (-72)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8B9 (-71)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BA (-70)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BB (-69)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BC (-68)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BD (-67)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BE (-66)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8BF (-65)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C0 (-64)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C1 (-63)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C2 (-62)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C3 (-61)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C4 (-60)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C5 (-59)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C6 (-58)	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
	(PCI) 0xFFFFF8C7 (-57)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFF8C8 (-56)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFF8C9 (-55)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFF8CA (-54)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFF8CB (-53)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFF8CC (-52)	Intel(R) Ethernet Converged Network Adapter X550-T2

	(PCI) 0xFFFFFCD (-51)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFCE (-50)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFCF (-49)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD0 (-48)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD1 (-47)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD2 (-46)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD3 (-45)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD4 (-44)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD5 (-43)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD6 (-42)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD7 (-41)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD8 (-40)	Intel(R) Ethernet Converged Network Adapter X550-T2
	(PCI) 0xFFFFFD9 (-39)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDA (-38)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDB (-37)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDC (-36)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDD (-35)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDE (-34)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFDF (-33)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE0 (-32)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE1 (-31)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE2 (-30)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE3 (-29)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE4 (-28)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE5 (-27)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE6 (-26)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE7 (-25)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE8 (-24)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFE9 (-23)	Intel(R) Ethernet Controller I226-LM #2
	(PCI) 0xFFFFFEA (-22)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFEB (-21)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFEC (-20)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFED (-19)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFEE (-18)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFEF (-17)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF0 (-16)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF1 (-15)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF2 (-14)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF3 (-13)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF4 (-12)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF5 (-11)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF6 (-10)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF7 (-9)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF8 (-8)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFF9 (-7)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFFA (-6)	Intel(R) Ethernet Controller I226-LM
	(PCI) 0xFFFFFFB (-5)	Intel(R) Management Engine Interface #1
	(PCI) 0xFFFFFFC (-4)	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Micr
	(PCI) 0xFFFFFFD (-3)	Intel(R) UHD Graphics 770
	(PCI) 0xFFFFFFE (-2)	Standard SATA AHCI Controller

3.6 Memory Map

The memory mapping list is shown as follows:

Memory	
[0000000000A0000 - 0000000000BFFFF]	PCI Express Root Complex
[000000005040000 - 00000000506FFFF]	Intel(R) PCI Express Root Port #4 - 7ABB
[000000005040000 - 00000000BFFFFFF]	PCI Express Root Complex
[00000000505FC000 - 00000000505FFFF]	Intel(R) Ethernet Controller I226-LM #2
[0000000050600000 - 00000000506FFFF]	Intel(R) Ethernet Controller I226-LM #2
[0000000050700000 - 00000000509FFFF]	Intel(R) PCI Express Root Port #3 - 7ABA
[00000000508FC000 - 00000000508FFFF]	Intel(R) Ethernet Controller I226-LM
[0000000050900000 - 00000000509FFFF]	Intel(R) Ethernet Controller I226-LM
[0000000050A00000 - 0000000050AFFFF]	Intel(R) PCI Express Root Port #5 - 7ABC
[0000000050B00000 - 0000000050B01FFF]	Standard SATA AHCI Controller
[0000000050B02000 - 0000000050B027FF]	Standard SATA AHCI Controller
[0000000050B03000 - 0000000050B030FF]	Standard SATA AHCI Controller
[00000000C0000000 - 00000000CFFFFFFF]	Motherboard resources
[00000000E0690000 - 00000000E069FFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1056
[00000000E06A0000 - 00000000E06AFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1056
[00000000E06B0000 - 00000000E06BFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1056
[00000000E06D0000 - 00000000E06DFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1056
[00000000E06E0000 - 00000000E06EFFFF]	Intel(R) Serial IO GPIO Host Controller - INTC1056
[00000000FE010000 - 00000000FE010FFF]	Intel(R) SPI (flash) Controller - 7AA4
[00000000FED00000 - 00000000FED003FF]	High precision event timer
[00000000FED20000 - 00000000FED7FFFF]	Motherboard resources
[00000000FED40000 - 00000000FED44FFF]	Trusted Platform Module 2.0
[00000000FED45000 - 00000000FED8FFFF]	Motherboard resources
[00000000FED90000 - 00000000FED93FFF]	Motherboard resources
[00000000FEDA0000 - 00000000FEDA0FFF]	Motherboard resources
[00000000FEDA1000 - 00000000FEDA1FFF]	Motherboard resources
[00000000FEDC0000 - 00000000FEDC7FFF]	Motherboard resources
[00000000FEE00000 - 00000000FEEFFFFF]	Motherboard resources
[0000004000000000 - 000000400FFFFFFF]	Intel(R) UHD Graphics 770
[0000006000000000 - 00000060003FFFFF]	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
[0000006000000000 - 00000060008FFFFF]	Intel(R) PCI Express Root Port #5 - 7ABC
[0000006000400000 - 00000060007FFFFF]	Intel(R) Ethernet Converged Network Adapter X550-T2
[0000006000800000 - 0000006000803FFF]	Intel(R) Ethernet Converged Network Adapter X550-T2 #2
[0000006000804000 - 0000006000807FFF]	Intel(R) Ethernet Converged Network Adapter X550-T2
[0000006001000000 - 0000006001FFFFF]	Intel(R) UHD Graphics 770
[0000006002120000 - 000000600212FFFF]	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
[0000006002130000 - 0000006002137FFF]	Intel(R) Crashlog - 467D
[0000007FFFE00000 - 0000007FFFE0FFFF]	Intel(R) Innovation Platform Framework Processor Participant
[0000007FFFEF3000 - 0000007FFFEF3FFF]	Intel(R) Serial IO UART Host Controller - 7AA8
[0000007FFFEF4000 - 0000007FFFEF4FFF]	Intel(R) Serial IO I2C Host Controller - 7AFD
[0000007FFFEF5000 - 0000007FFFEF5FFF]	Intel(R) Serial IO I2C Host Controller - 7AFC
[0000007FFFEF6000 - 0000007FFFEF6FFF]	Intel(R) Management Engine Interface #1
[0000007FFFEF7000 - 0000007FFFEF7FFF]	Intel(R) Serial IO I2C Host Controller - 7ACF
[0000007FFFEF8000 - 0000007FFFEF8FFF]	Intel(R) Serial IO I2C Host Controller - 7ACE
[0000007FFFEF9000 - 0000007FFFEF9FFF]	Intel(R) Serial IO I2C Host Controller - 7ACD
[0000007FFFEFA000 - 0000007FFFEFAFFF]	Intel(R) Serial IO I2C Host Controller - 7ACC
[0000007FFFEFB000 - 0000007FFFEFBFFF]	Intel(R) Serial IO SPI Host Controller - 7AAB
[0000007FFFEFC000 - 0000007FFFEFFFFF]	High Definition Audio Controller
[0000007FFFF00000 - 0000007FFFFFFFFFFF]	High Definition Audio Controller

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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 SW1 (see section 2.3.2).

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.



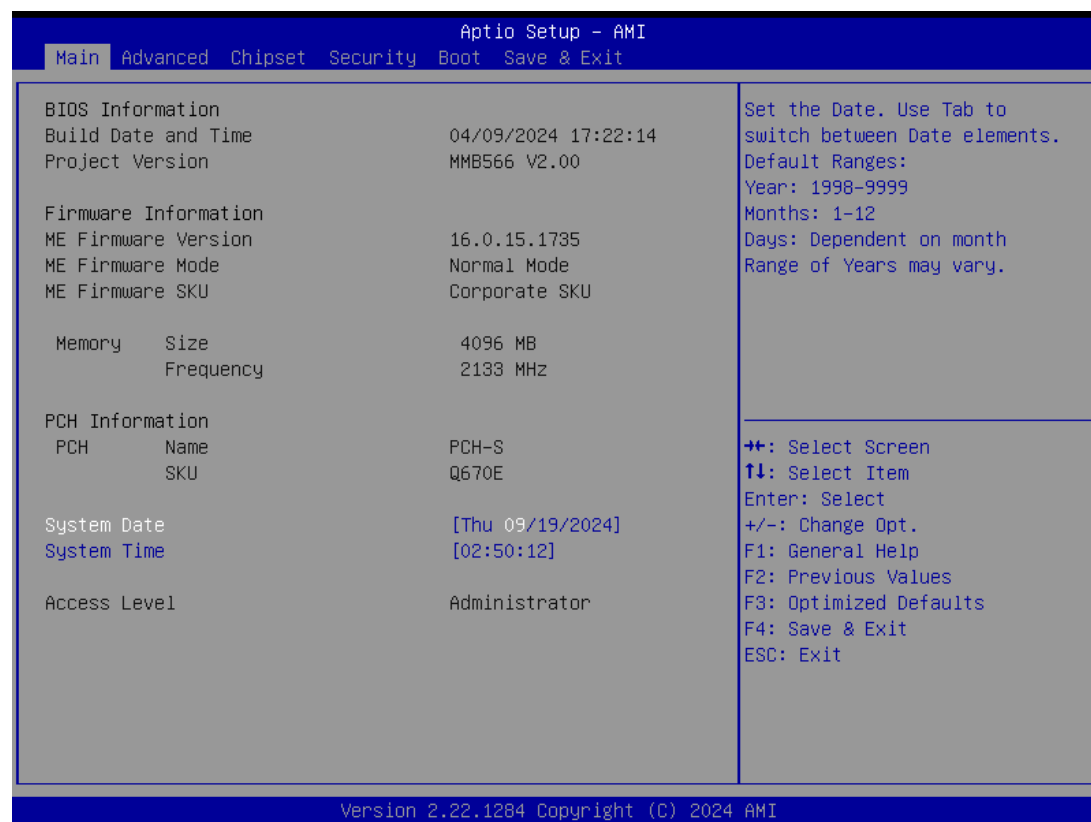
Note

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.

Firmware Information

Display the firmware 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

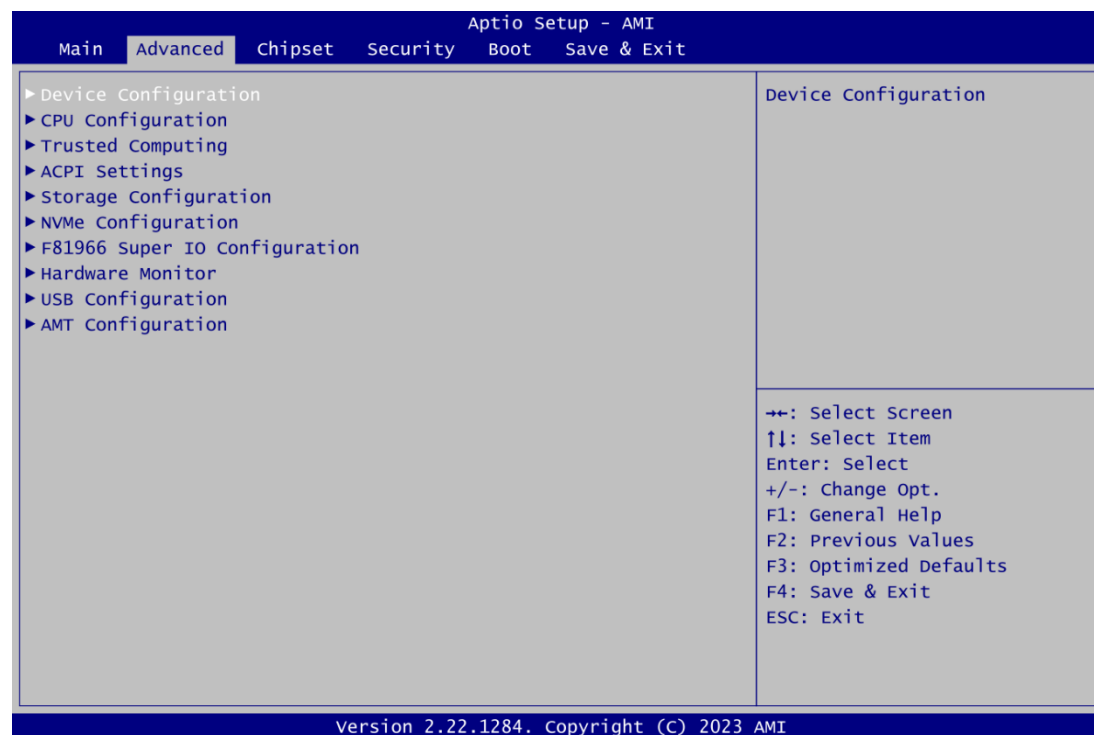
Display the access level of current user.

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:

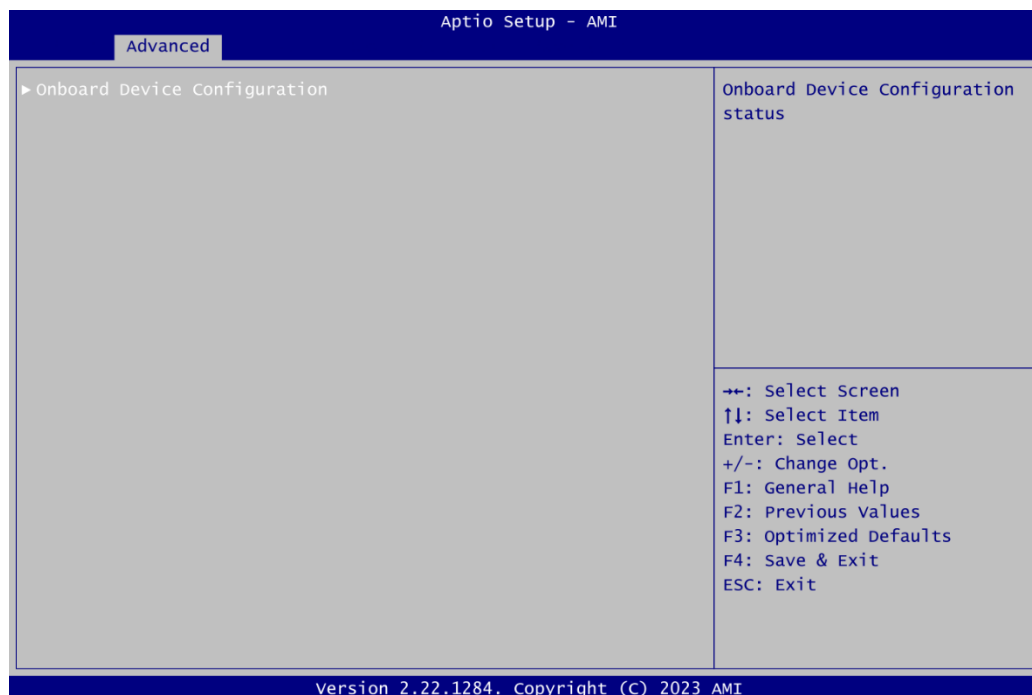
- ▶ Device Configuration
- ▶ CPU Configuration
- ▶ Trusted Computing
- ▶ ACPI Settings
- ▶ Storage Configuration
- ▶ NVMe Configuration
- ▶ F81966 Super IO Configuration
- ▶ Hardware Monitor
- ▶ USB Configuration
- ▶ AMT Configuration

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



- **Device Configuration**

A description of the selected item appears on the right side of the screen. For items marked with “►”, please press <Enter> for more options.

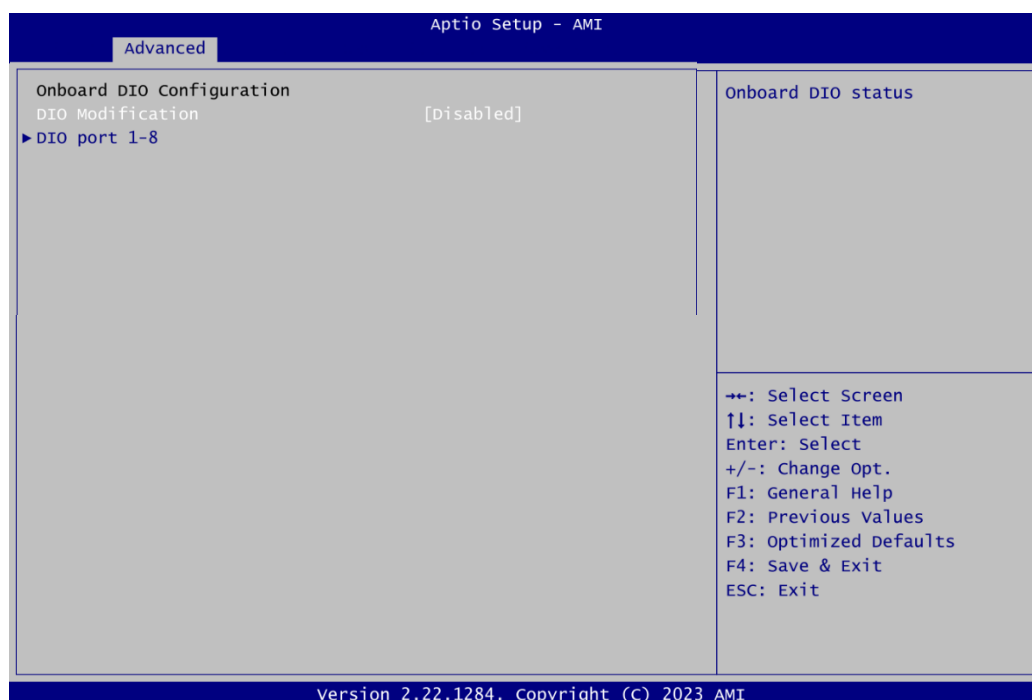


Onboard Device Configuration

Use this option to configure onboard device (e.g., Digital I/O setting).

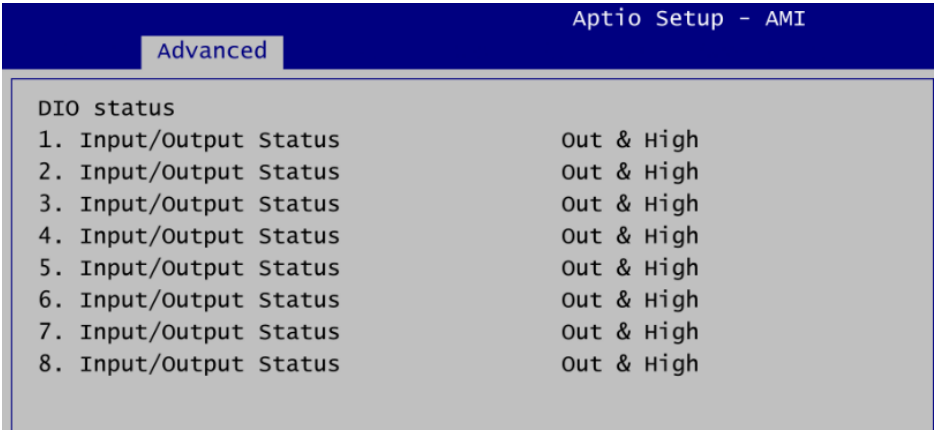
- **Onboard DIO Configuration**

You can use this screen to select options for the 8-bit Digital I/O Configuration. A description of the selected item appears on the right side of the screen. For items marked with “►”, please press <Enter> for more options.

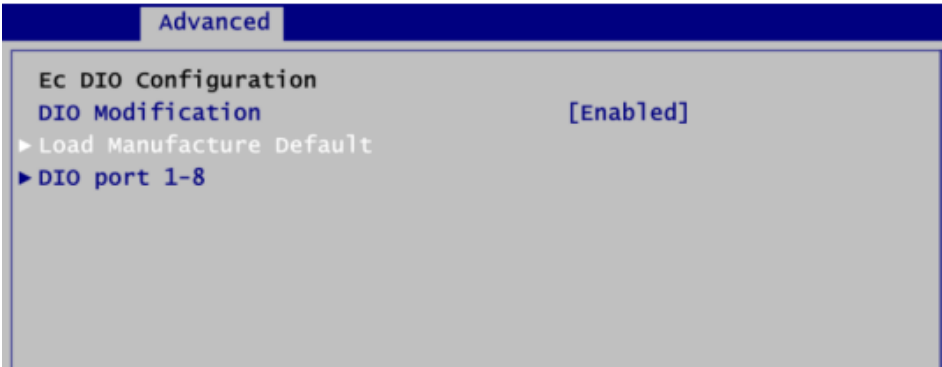


DIO Modification

Enable or disable digital I/O modification. If modification is disabled, the DIO status sub screen is as follows:

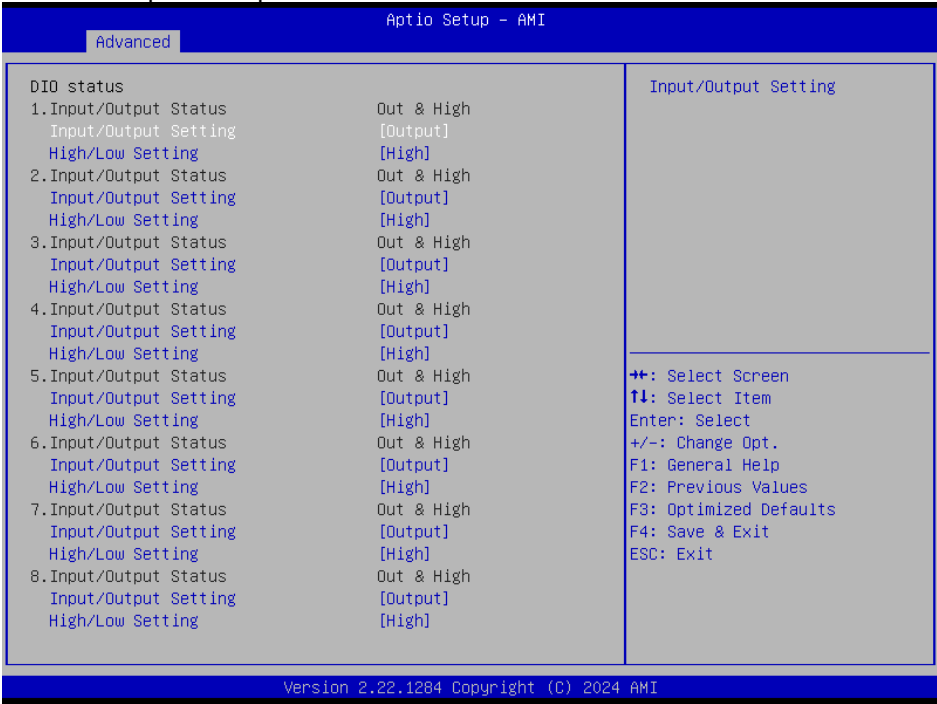


Once it is enabled, you can load manufacture default and access to the DIO status sub screen to set output or input, see image below.



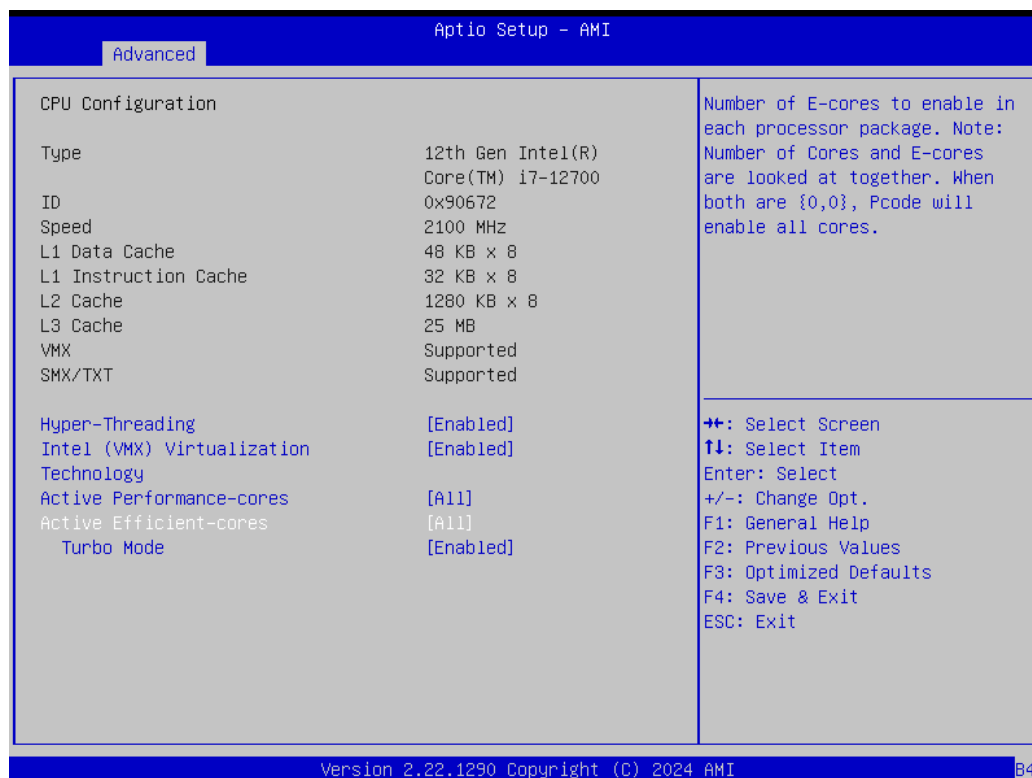
DIO port 1-8

Select this option to open DIO status sub-screen.



- **CPU Configuration**

You can use this screen to select options for CPU Configuration, and change the value of the selected option. (Daniel provide it)



Hyper-Threading

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

Intel (VMX) 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

The number of cores to be enabled in each processor package.

Active Efficient-cores

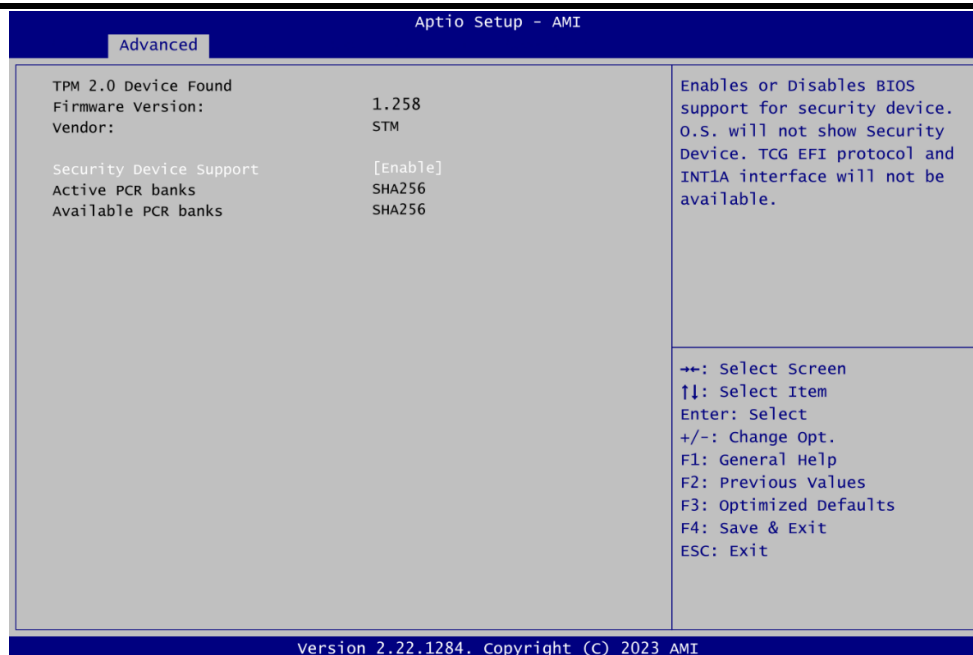
Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

Turbo Mode

Enable or disable processor Turbo Mode (requires Intel® Speed Shift to be available and enabled).

- **Trusted Computing**

This screen provides function for specifying the TPM (Trusted Platform Module) settings.



Security Device Support

Enable or disable BIOS support for security device. (Jerry provide to Daniel)

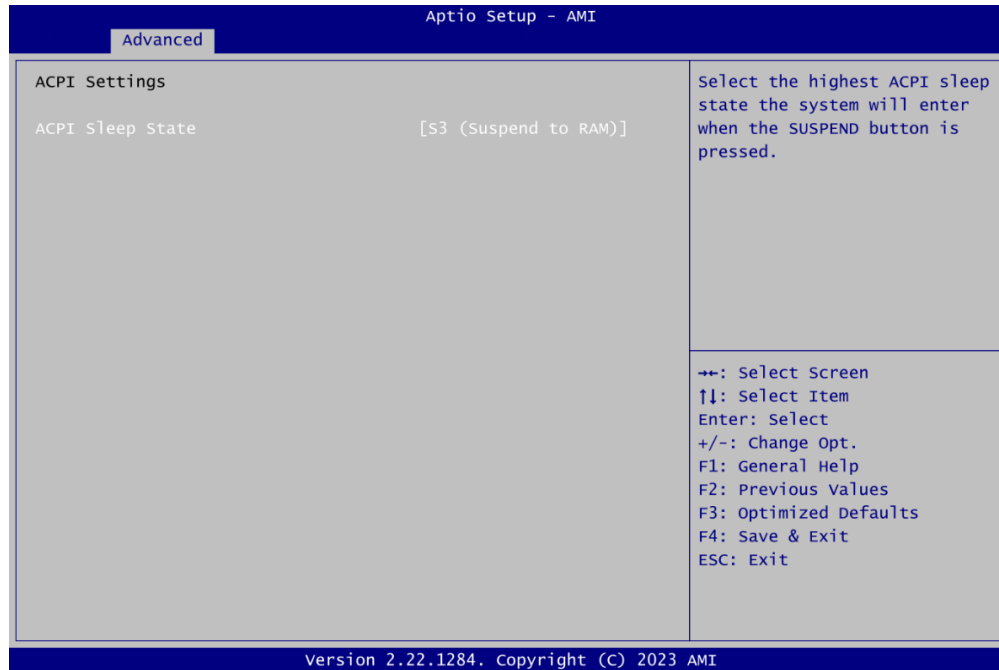


Enable BIOS support for the security device, allowing it to appear in the OS (e.g., visible in Device Manager on Windows) and enabling related security features required by some operating systems, such as Windows 11.

Disable BIOS support for the security device, making it hidden from the OS and disabling certain security protocols (e.g., TCG EFI Protocol and INT1A interface). Note: Disabling this option may prevent certain operating systems from functioning correctly.

- **ACPI Settings**

You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

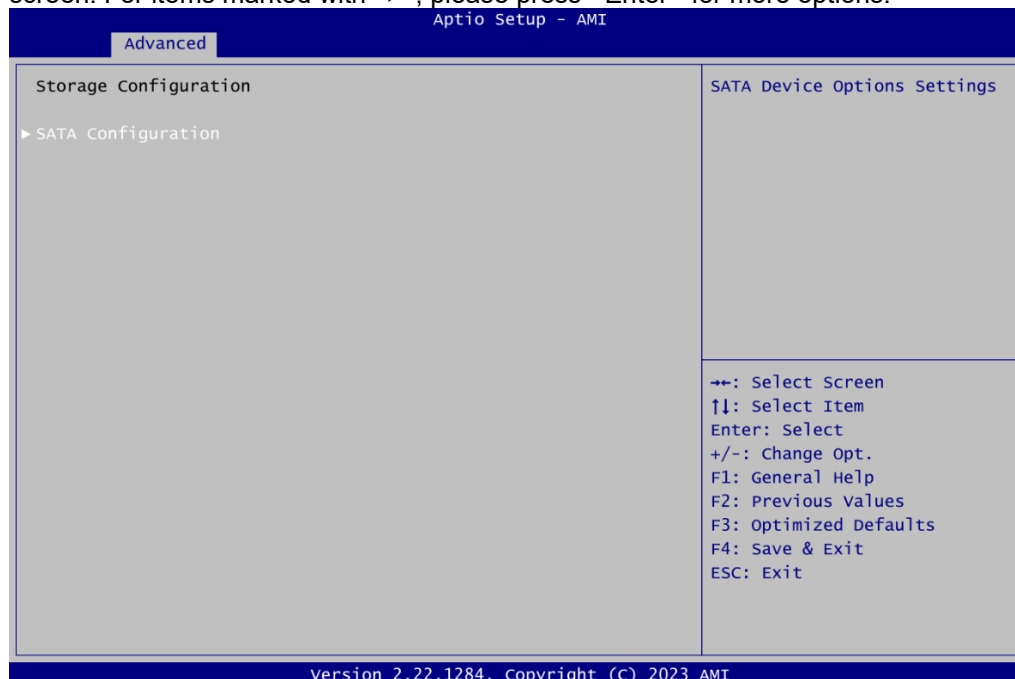


- **ACPI Sleep State**

Select the ACPI (Advanced Configuration and Power Interface) sleep state. The S3 (Suspend to RAM) option selects ACPI sleep state the system will enter when suspend button is pressed.

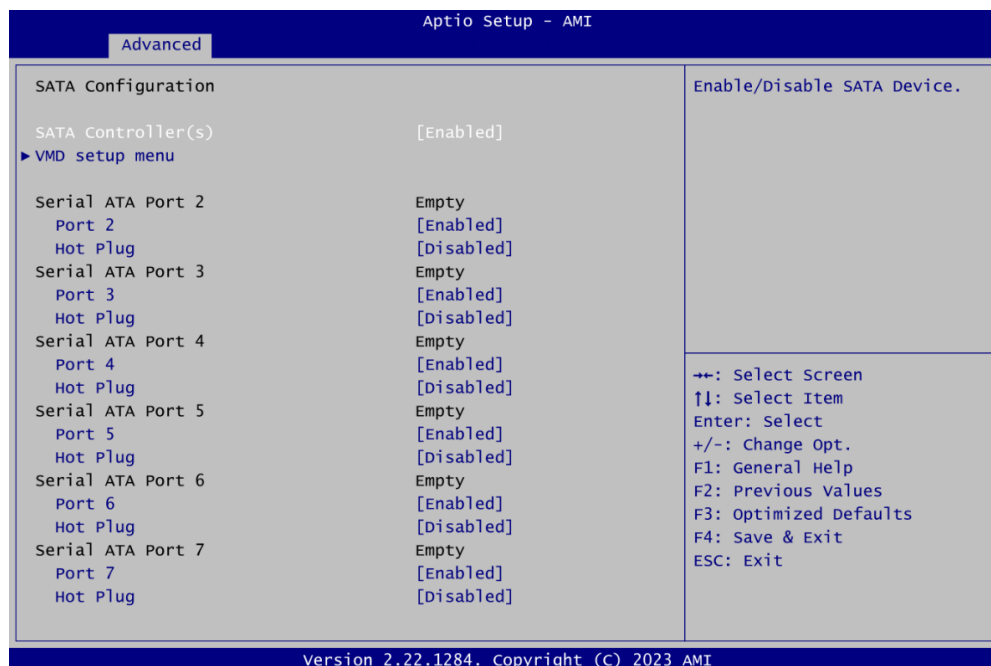
- **Storage Configuration**

You can use this screen to select options for storage 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.



SATA Configuration

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

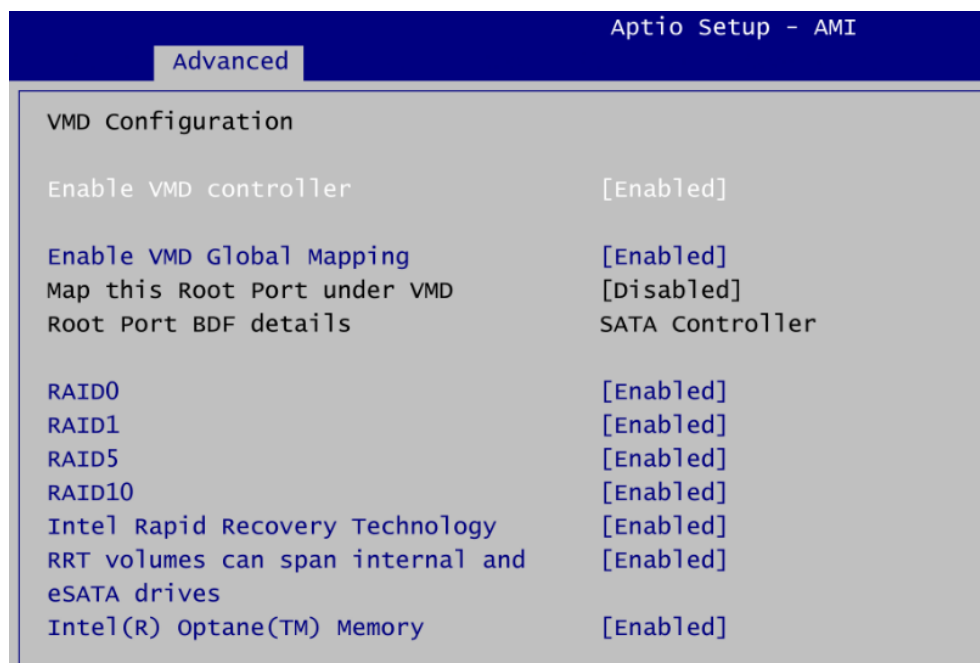


SATA Controller(s)

Enable or disable the SATA Controller feature.

VMD setup menu

Allows user to configure the VMD controllers.



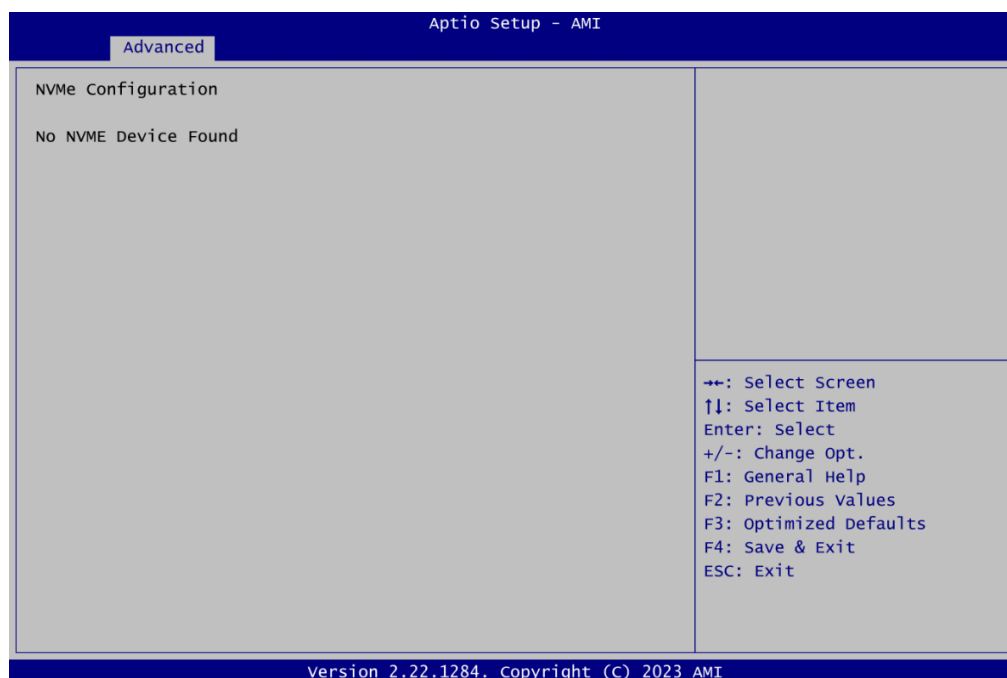
Enable VMD controller

The Enable VMD to optimize the performance and management of NVMe SSDs. This will unlock the following settings:

- Enable/Disable VMD Global Mapping: Centrally manage all NVMe SSDs.
- Map this Root Port under VMD: Assign specific PCIe root ports to VMD for enhanced control."

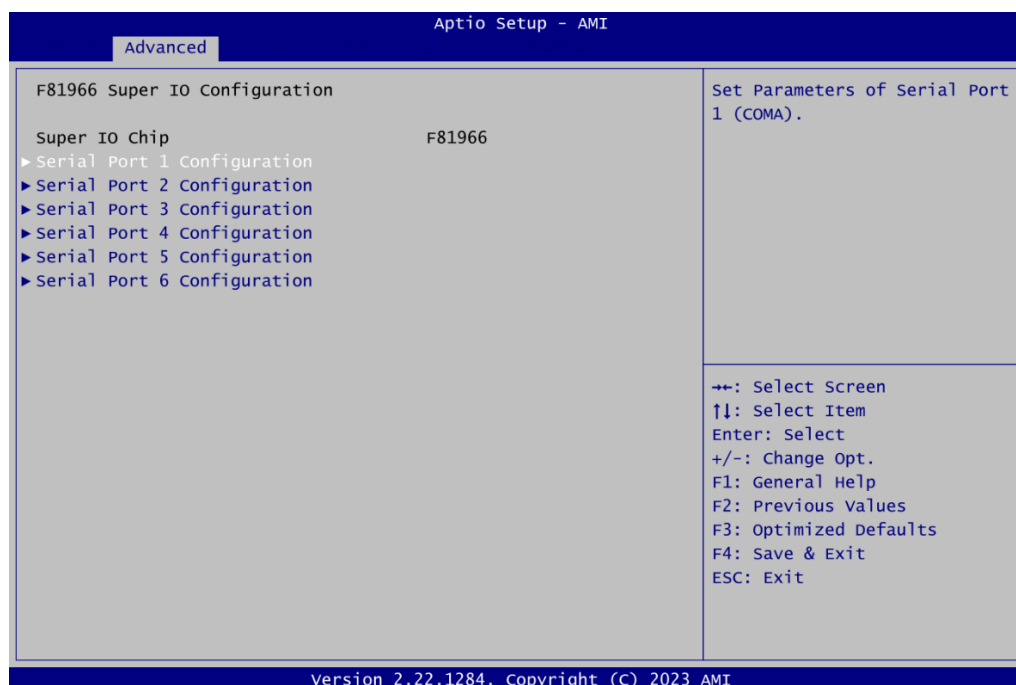
- **NVMe Configuration**

This screen displays NVMe (Non-Volatile Memory Express) controller and drive information.



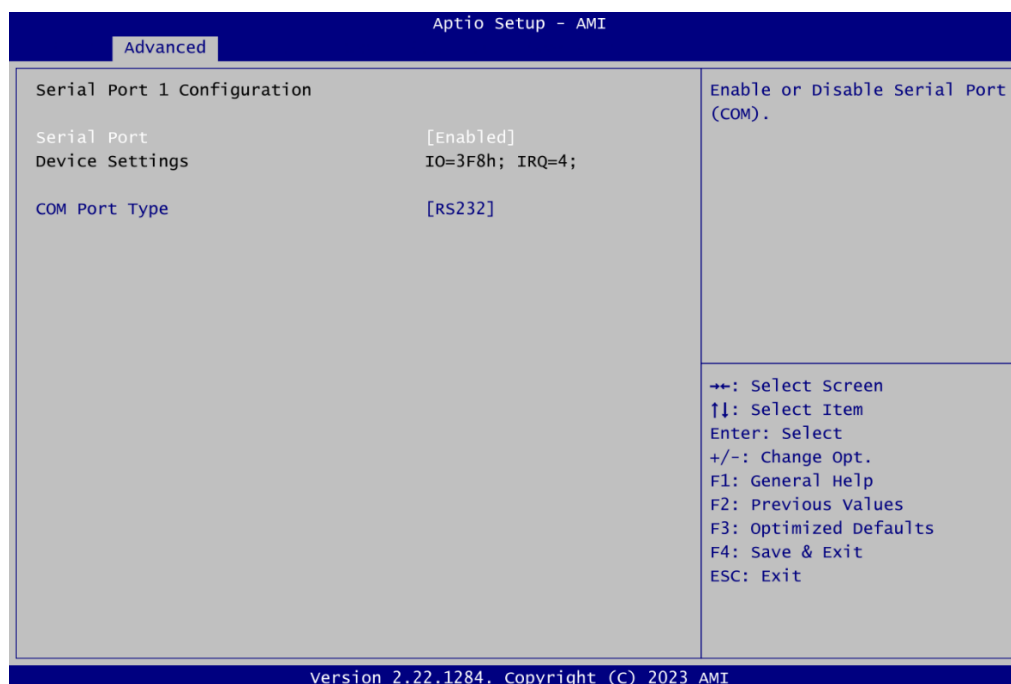
- **F81966 Super IO Configuration**

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 1~6 Configuration

Use these items to set parameters related to serial port 1~6.

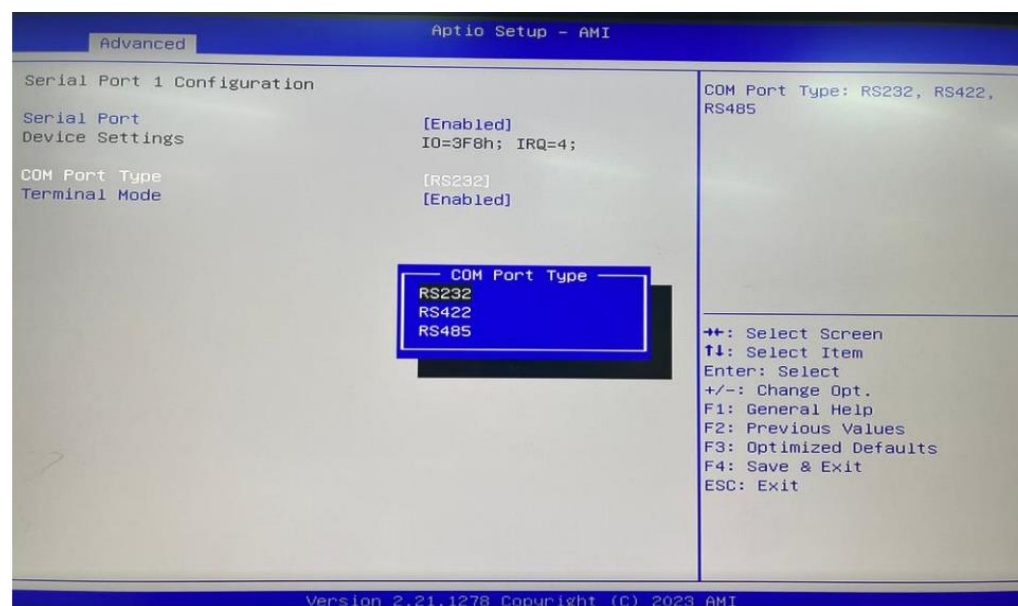
**Serial Port 1~6**

Enable or disable serial port 1~6. The optimal settings for base I/O address and for interrupt request address are:

- Serial port 1: 3F8h, IRQ4
- Serial port 2: 2F8h, IRQ3
- Serial port 3: 3E8h, IRQ5
- Serial port 4: 2E8h, IRQ6
- Serial port 5: 2F0h, IRQ10
- Serial port 6: 2E0h, IRQ11

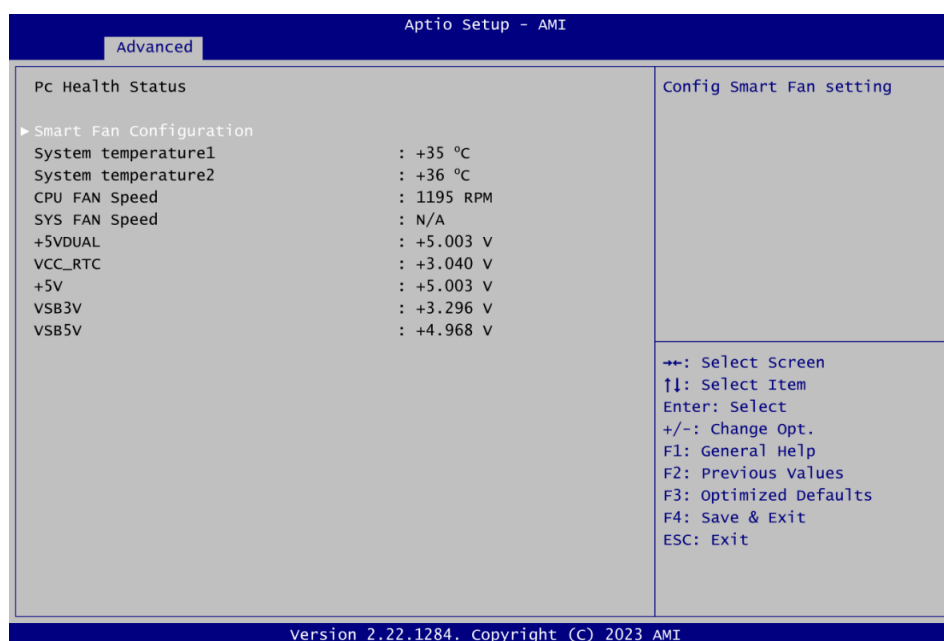
COM Port Type

Use this item to set RS-232/422/485 communication mode (for COM1 and COM2 only).



- **Hardware Monitor**

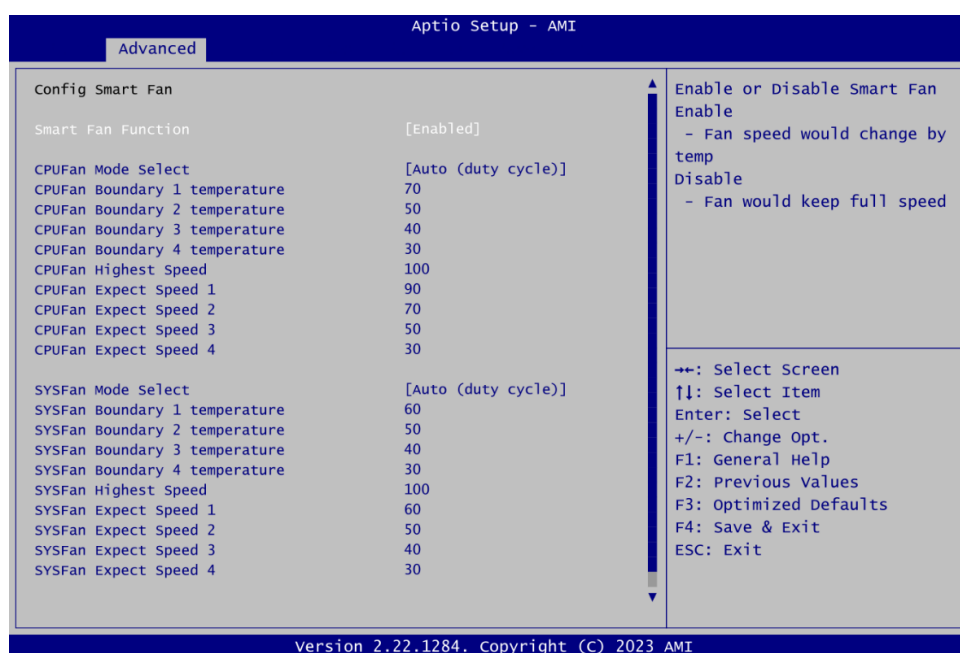
Monitors hardware health status.



This screen displays the temperature of system, cooling fans speed in RPM and system voltages (+5VDUAL, VCC_RTC, +5V, VS3V and VS5V).

Smart Fan Configuration

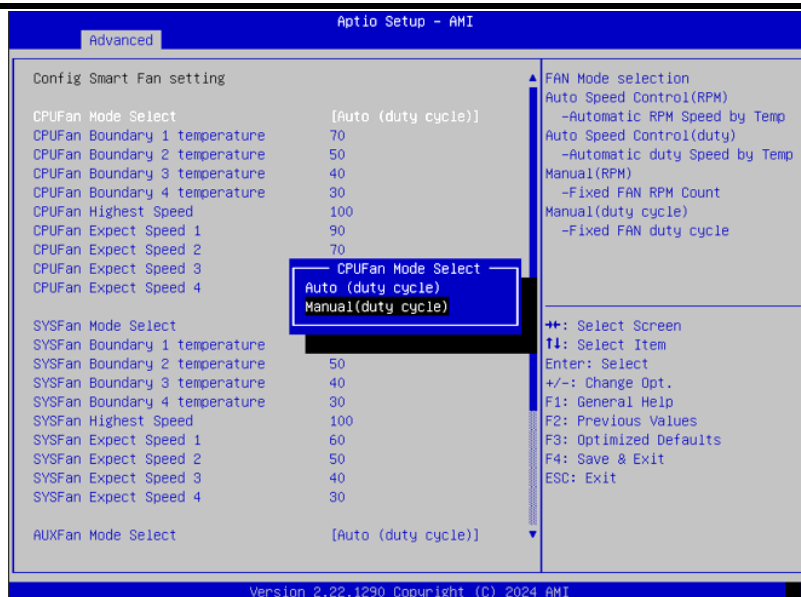
Allows users to configure CPU fan and system fan mode.



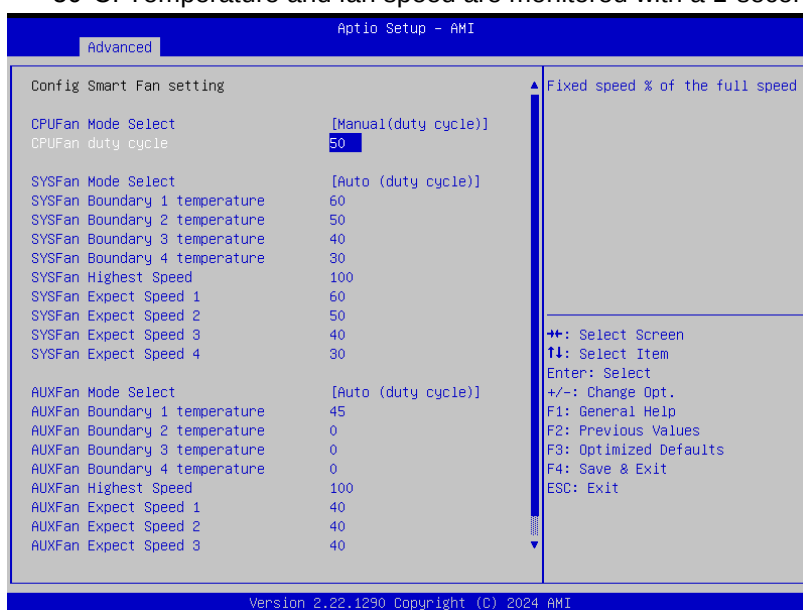
Smart Fan Function

Enable or disable Smart Fan:

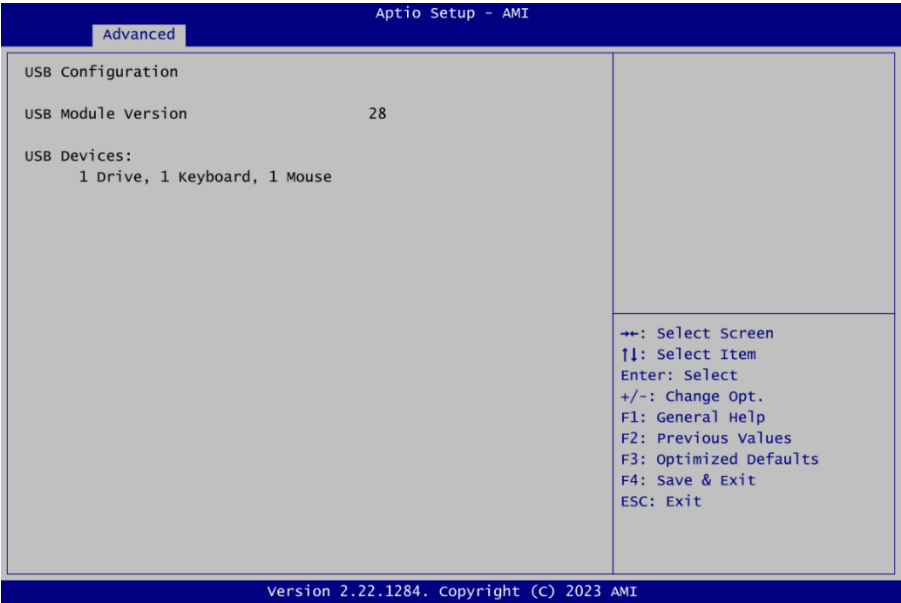
- Enable: Fan speed would change according to temperature.
- Disable: The fan always runs at full speed.



- ▶ The following is an example of adjusting CPU fan speed.
Setting the fan to 50 means it will operate at 50% of its maximum speed. For a fan with a maximum speed of 7200 RPM, this would run the fan at 3600 RPM. Adjust this setting to manually control the fan's cooling intensity based on the system's needs.
- ▶ Set the temperature thresholds at 50°C, 40°C, 30°C, and 20°C, with corresponding fan duty cycles of 100%, 80%, 60%, 40%, and 20%.
- When the temperature drops below 20°C, the fan maintains a minimum speed of 20% PWM duty.
- As the temperature rises above 20°C, 30°C, and 40°C, the fan speed will increase linearly from 20% to 80% PWM duty according to the temperature :
 - Highest Speed
 - Expect Speed 4
 - Expect Speed 3
 - Expect Speed 2
 - Expect Speed 1
- The fan will operate at full speed (100% duty cycle) once the temperature surpasses 50°C. Temperature and fan speed are monitored with a 1-second interval.



● **USB Configuration**

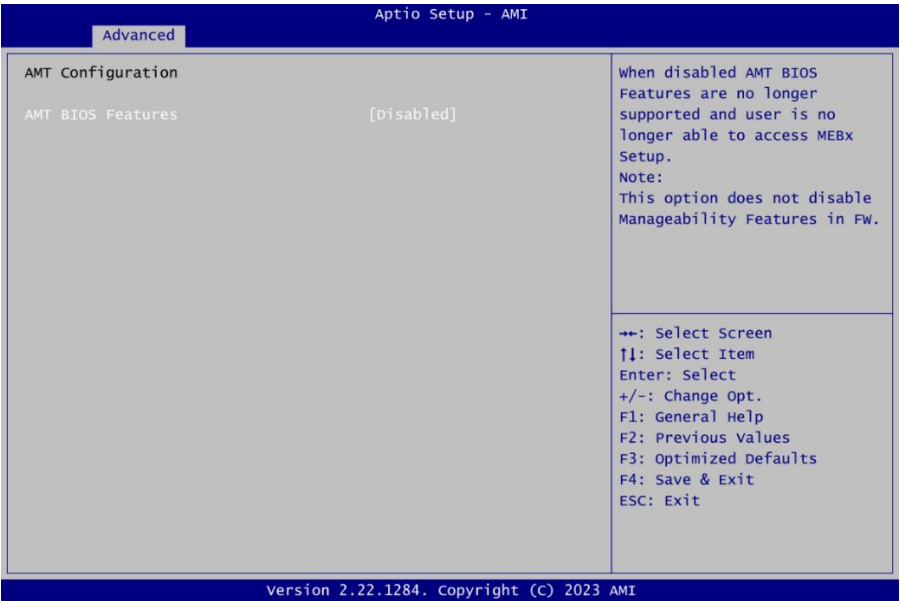


USB Devices

Display all detected USB devices.

AMT Configuration

Use this screen to configure AMT parameters.
Please see the more details in the appendix C.



AMT BIOS Features

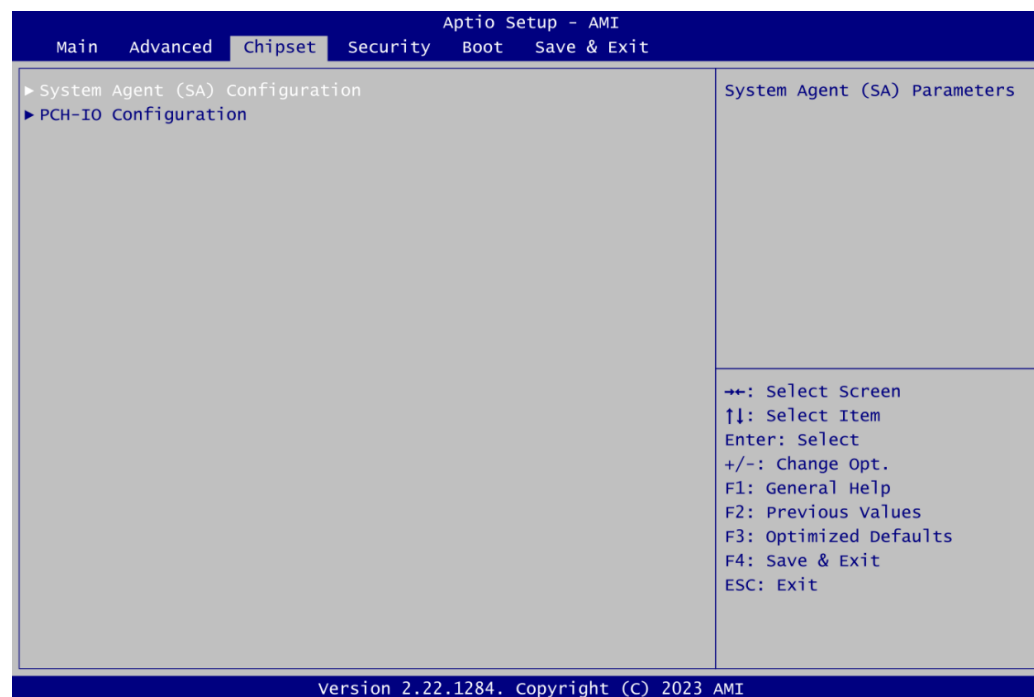
Enable or disable Active Management Technology BIOS features.

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:

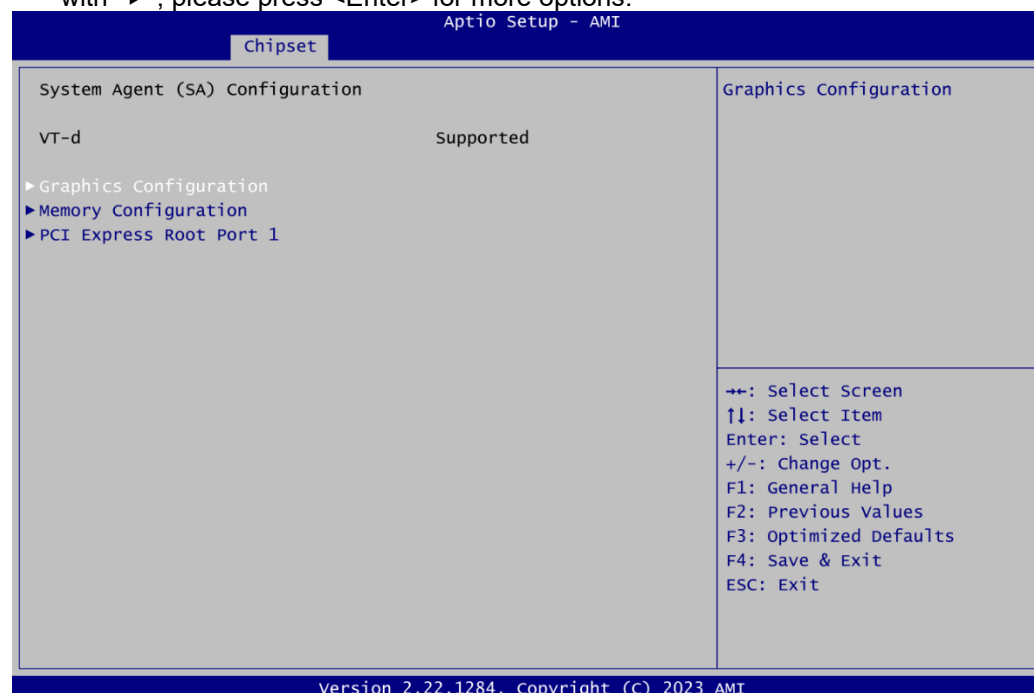
- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration

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.



Graphics Configuration

Open sub menu for parameters related to graphics configuration.

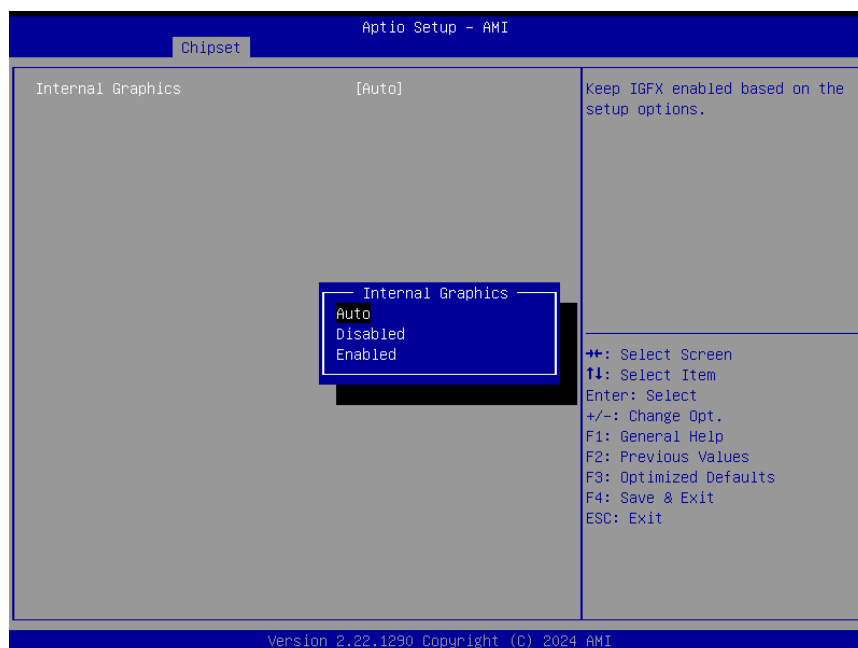
Memory Configuration

Open sub menu for information related to system memory.

PCI Express Root Port 1

Change PCI Express root port 1 settings.

- **Graphics Configuration**



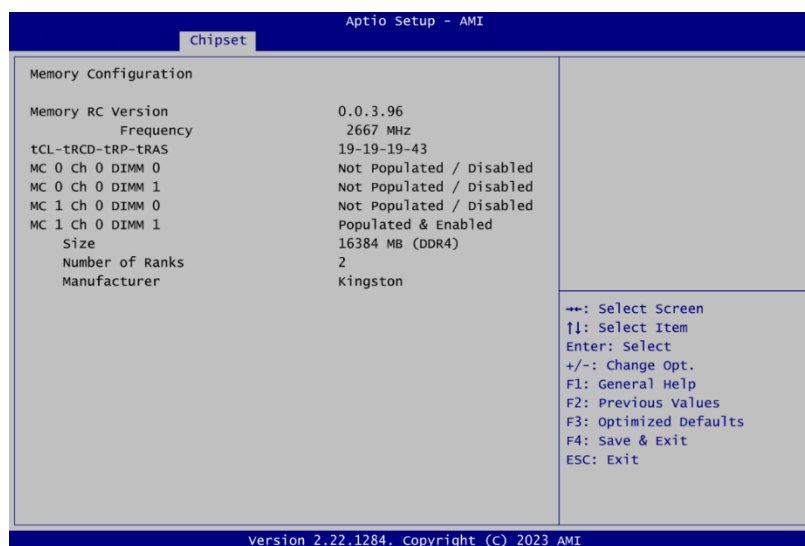
Internal Graphics

Use this item to set parameters related to internal graphics controller.

- **Auto** : Automatically detects if a discrete (external) graphics card is present. If detected, the system will prioritize using external graphics for output, both during boot and in the operating system.
- **Enable** : Keeps internal graphics enabled for simultaneous use with external graphics. During boot, if an external graphics card is present, it will be used as the primary display. Once in the OS, both internal and external graphics can operate concurrently.
- **Disable** : Completely disables the internal graphics, making only the external graphics card available for use, if present.

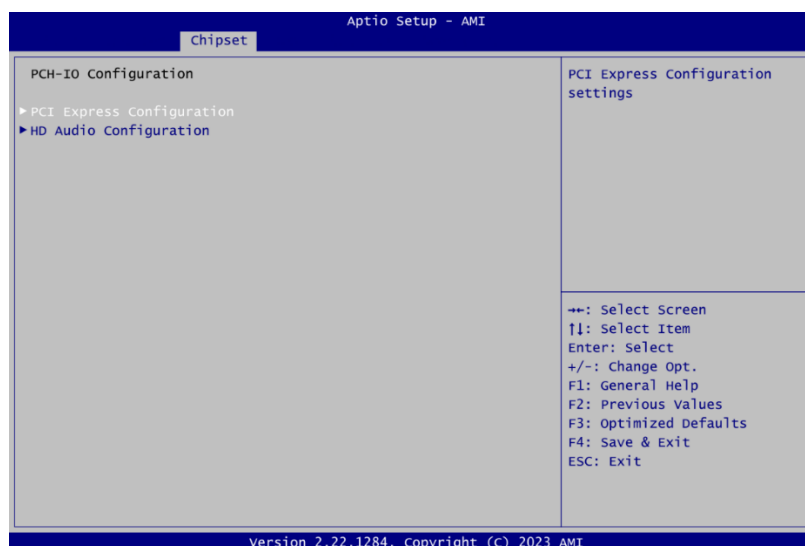
- **Memory Configuration**

This screen displays the system memory information.

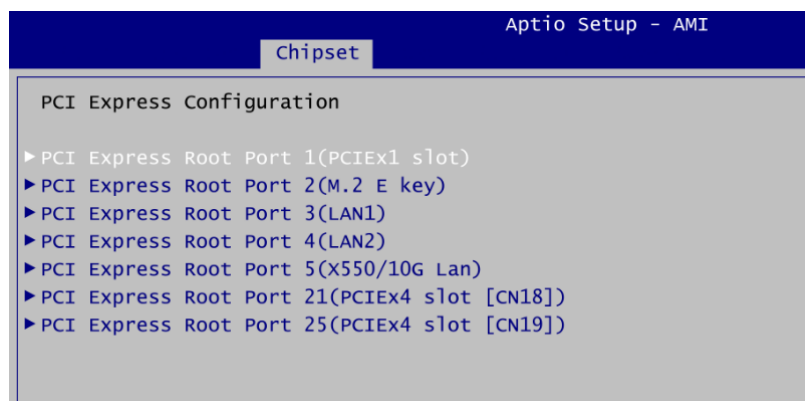


- **PCH-IO Configuration**

This screen allows you to set PCH parameters.

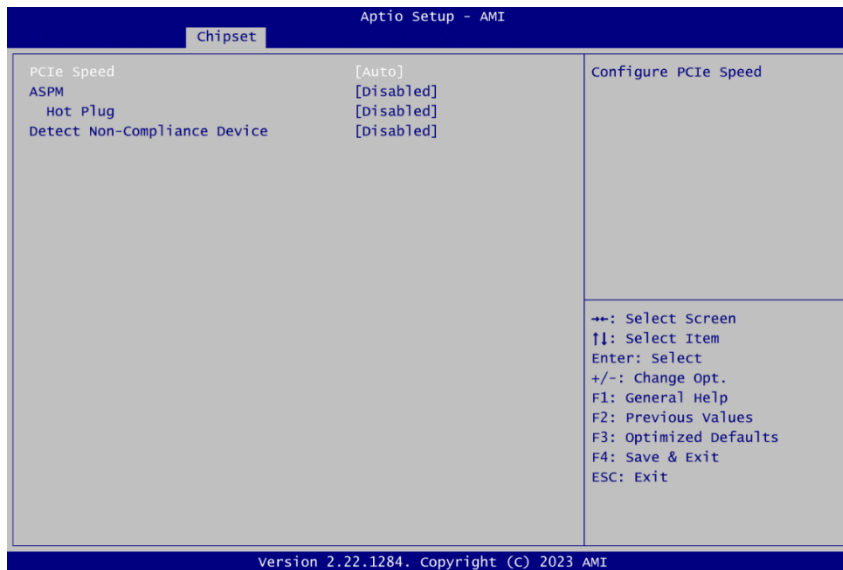
**PCI Express Configuration**

PCI-Express Configuration settings.



PCI Express Root Port 1,Port 5,Port 21,Port 25

PCI-Express root port settings.

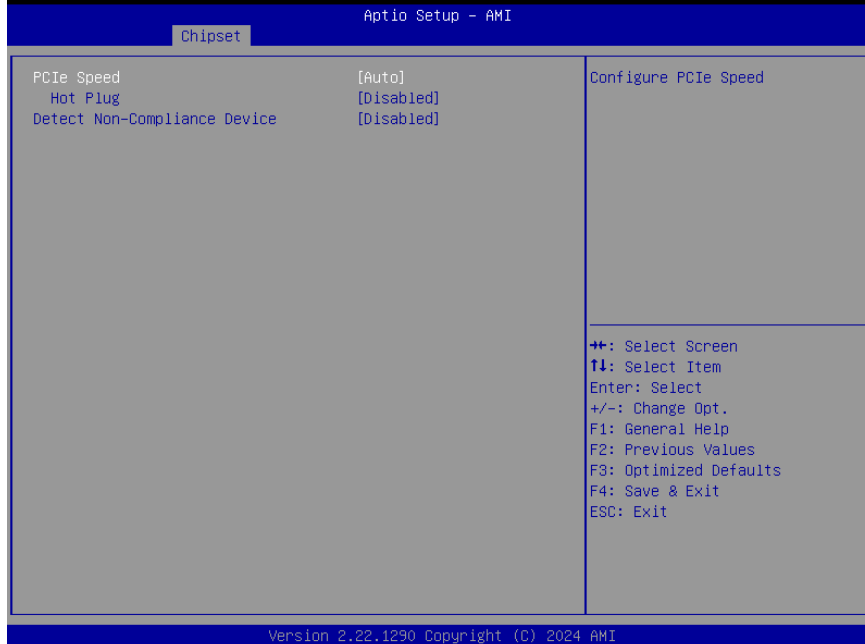
**ASPM**

Sets the ASPM (Active State Power Management Settings) level.

- Force L0 : Force all links to L0 state.
- Auto : BIOS auto configures.
- Disabled : Disables ASPM.

PCI Express Root Port 2,Port 3,Port 4

There is no support for ASPM.

**PCIe Speed**

Allow user to configure PCI-Express speed.

Hot Plug

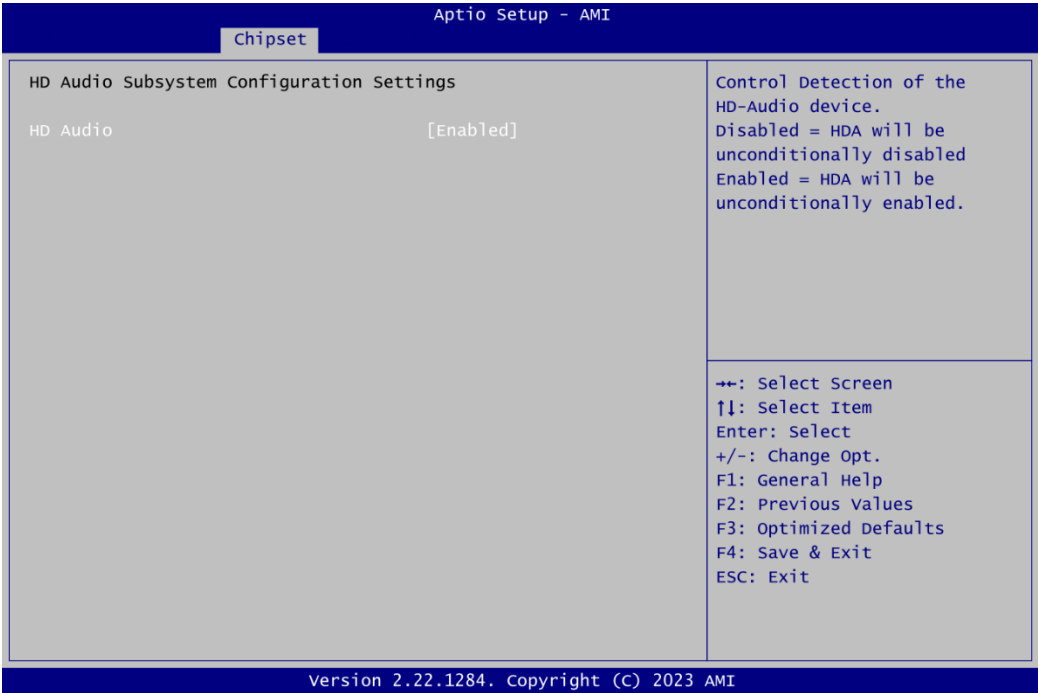
Enable or disable PCI-Express Hot Plug.

Detect Non-Compliance Device

Enable or disable the detection of a non-compliance PCI-Express device in PEG.

HD Audio Configuration

HD Audio subsystem configuration settings.



HD Audio

Control detection of the HD Audio device.

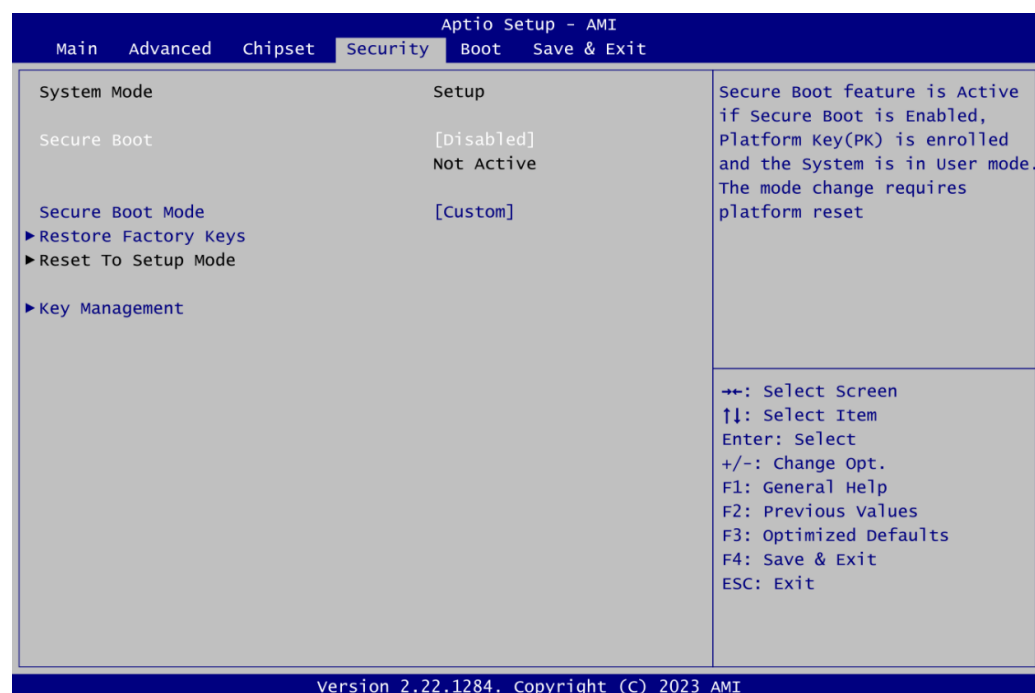
- Disabled: HDA will be unconditionally disabled.
- Enabled: HDA will be unconditionally enabled.

4.6 Security Menu

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



- **Administrator Password**
Set administrator password.
- **User Password**
Set password.
- **Secure Boot**



Secure Boot

Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset. Secure Boot ensures that the system only boots from trusted software, preventing malicious software from loading and compromising the device. It checks the digital signatures of boot loaders, firmware, and operating systems to verify that they are from trusted sources and have not been tampered with. Users can choose to enable it or not, between standard and custom mode.

Secure Boot Mode

Secure Boot mode options: Standard or Custom. In Custom mode, the policy of Secure Boot variables can be configured by a physically present user without full authentication.

Restore Factory Keys

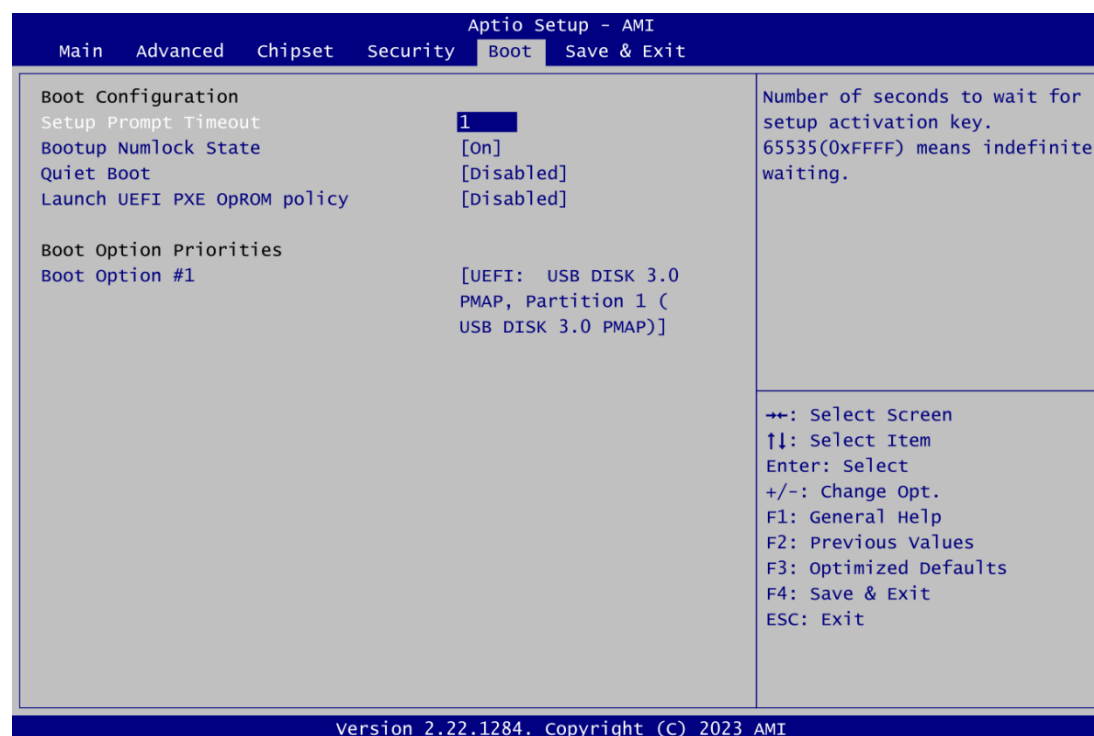
Force the system into User Mode. Install factory default Secure Boot key databases.

Key Management

Enables expert users to modify Secure Boot Policy variables without full authentication.

4.7 Boot Menu

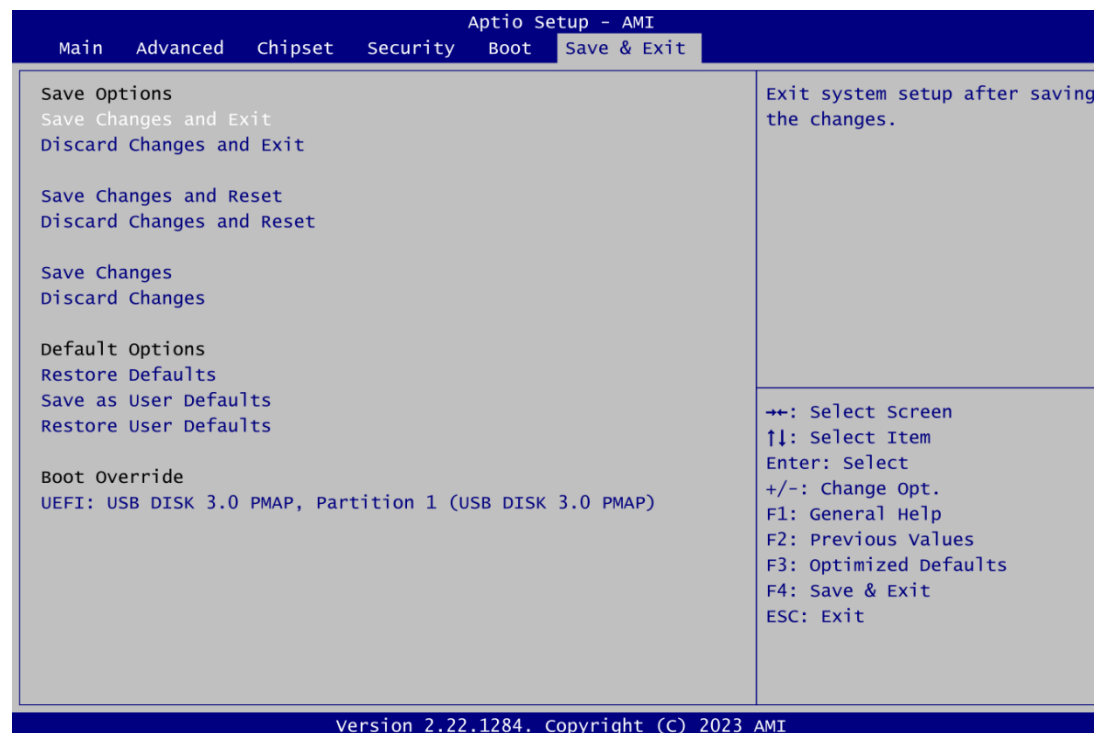
The Boot menu allows users to change boot options of the system.



- 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.
- Launch UEFI PXE OpROM policy**
 Control the execution of UEFI PXE OpROM. When enabled, you may select LAN1 or LAN2 as PXE LAN port.
- 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.

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Appendix A

Watchdog Timer

A.1 About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human 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 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 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 Sample Program Sample Code(Daniel provide it)

```
////////////////////////////////////
#include <stdio.h>
#include <stdlib.h>

#include <sys/io.h>

#define SIO_INDEX 0x2E
#define SIO_DATA 0x2F

#define SIO_ENTRY_KEY 0x87
#define SIO_EXIT_KEY 0xAA

#define SIO_LD_WDT 0x07

#define SIO_REG_LDN 0x07
#define SIO_REG_ACTIVATE 0x30
#define SIO_REG_IOBASE_HIGH 0x60
#define SIO_REG_IOBASE_LOW 0x61

#define WDT_IOBASE_HIGH 0x0A
#define WDT_IOBASE_LOW 0x10
#define WDT_IOBASE 0x0A10
#define WDT_CONFIG 0x05
#define WDT_TIME 0x06

int main()
{
    unsigned char Count = 10; // 10 Seconds
    unsigned char DataBuffer; // Operate Io Data

    //Get Io Port Read/Write Permission
    iopl(3);
```

```
//Enter SIO Config
outb_p ( SIO_ENTRY_KEY, SIO_INDEX);
outb_p ( SIO_ENTRY_KEY, SIO_INDEX);

// Set WDT IOBASE
// Select Logical Device = 07 (WDT)
outb_p ( SIO_REG_LDN , SIO_INDEX);
outb_p ( SIO_LD_WDT , SIO_DATA);

// set IOBase
outb_p ( SIO_REG_IOBASE_HIGH , SIO_INDEX);
outb_p ( WDT_IOBASE_HIGH , SIO_DATA);

outb_p ( SIO_REG_IOBASE_LOW , SIO_INDEX);
outb_p ( WDT_IOBASE_LOW , SIO_DATA);

// Activate Wdt IO Decode
outb_p ( SIO_REG_ACTIVATE , SIO_INDEX);
outb_p ( 1 , SIO_DATA);

//Exit SIO Config
outb_p ( SIO_EXIT_KEY, SIO_INDEX);

// Clear And Set Wdt Status
/*
Wdt Config Reg Bit Definition
7 : Reserved
6 : WDT time out Status (Write 1 Clear)
5 : Watch dog counting Enable
4 : Set Output mode (0 Level,1 Edge)
3 : Time Unit (0 : 1sec , 1: 60Sec)
2 : Output Polarity (0 : low active , 1 : High active)
1-0 : (output pulse width of Wdtrst# ,
      00 1ms , 01 25ms ,
      10 125ms ,11 :5sec)
*/
outb_p ( 0x40 , WDT_IOBASE + WDT_CONFIG);

//Set WatchDog Count Time
outb_p ( Count , WDT_IOBASE + WDT_TIME);

//Start WatchDog Count
outb_p ( 0x20 , WDT_IOBASE + WDT_CONFIG);

//Print Remain Time
while(1)
{
    DataBuffer = inb_p ( WDT_IOBASE + WDT_TIME );
    printf(" reset in %d sec\n",DataBuffer);
}
return 0;
}
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
```

Appendix B

Digital I/O

B.1 Digital I/O Programming

1. IOBASE: 0xEFA0
2. Registers:

Command byte

Command	Protocol	Function
0	Read byte	Input port register
1	Read/write byte	Output port register
2	Read/write byte	Polarity inversion register
3	Read/write byte	Configuration register

The command byte is the first byte to follow the address byte during a write transmission. It is used as a pointer to determine which of the following registers will be written or read.

Register 0: Input port register.

This register is a read-only port. It reflects the incoming logic levels of the pins, regardless of whether the pin is defined as an input or an output by Register 3. Writes to this register have no effect. The default 'X' is determined by the externally applied logic level, normally '1' when no external signal is externally applied because of the internal pull-up resistors.

Bit	Symbol	Access	Value	Description
7	I7	Read only	X	Determined by externally applied logic level.
6	I6	Read only	X	
5	I5	Read only	X	
4	I4	Read only	X	
3	I3	Read only	X	
2	I2	Read only	X	
1	I1	Read only	X	
0	I0	Read only	X	

Register 1: Output port register.

This register reflects the outgoing logic levels of the pins defined as outputs by Register 3. Bit values in this register have no effect on pins defined as inputs. Reads from this register return the value that is in the flip-flop controlling the output selection, not the actual pin value.

Bit	Symbol	Access	Value	Description
7	O7	R	1*	Reflects outgoing logic levels of pins defined as outputs by Register 3.
6	O6	R	1*	
5	O5	R	1*	
4	O4	R	1*	
3	O3	R	1*	
2	O2	R	1*	
1	O1	R	1*	
0	O0	R	1*	

* : Default value

Register 3: Configuration register.

This register configures the directions of the I/O pins. If a bit in this register is set, the corresponding port pin is enabled as an input with a high-impedance output driver. If a bit in this register is cleared, the corresponding port pin is enabled as an output. At reset, the I/Os are configured as inputs with a weak pull-up to VDD.

Bit	Symbol	Access	Value	Description
7	C7	R/W	1*	Configure the directions of the I/O pins. 0 = Corresponding port pin enabled as an output. 1 = Corresponding port pin configured as input (default value).
6	C6	R/W	1*	
5	C5	R/W	1*	
4	C4	R/W	1*	
3	C3	R/W	1*	
2	C2	R/W	1*	
1	C1	R/W	1*	
0	C0	R/W	1*	

*: Default value

B.2 Sample Code

```

////////////////////////////////////
#include <stdio.h>
#include <stdlib.h>

#include <sys/io.h>

//SMBUS IO base, Host Status Register Address(HSTS)
#define HSTS 0xEFA0
//Host Control Register (HCTL)
#define HCTL 0xEFA2
//Host Command Register (HCMD)
#define HCMD 0xEFA3
//Transmit Slave Address Register (TSA)
#define TSA 0xEFA4
//Data 0 Register (HD0)
#define HD0 0xEFA5
#define DIO_SLAVE_ADDR_WRITE 0x44
#define DIO_SLAVE_ADDR_READ 0x45
#define DIO_INPUT_OFFSET 0x00
#define DIO_OUTPUT_OFFSET 0x01
#define DIO_CONFIG_OFFSET 0x03

// Set DIO to output and print configuration register value
int SetDIO_to_output()
{
    unsigned char config_value;
    //Get Io Port Read/Write Permission
    iopl(3);
    // Clear host status register
    outb_p (0xFF, HSTS);

    //Set DIO device slave address and set command to write(slave
    //addr+0)
    outb_p ( DIO_SLAVE_ADDR_WRITE, TSA);

    //Set DIO offset to configuration register
    outb_p ( DIO_CONFIG_OFFSET, HCTL);

```

```

//Set DIO configuration register bit 0~7 to 0 which means set all
//DIO ports to output (0 -> output, 1 -> input)
outb_p (0x0, HD0);

//Raise the START bit(bit 6) of HCTL and set SMB_CMD (bit2~4) of
//HCTL to 0x010(Byte Data) to start transfer
outb_p (0x48, HCTL);

//print configuration register value
// Clear host status register
outb_p (0xFF, HSTS);

//Set DIO device slave address and set command to read(slave //addr+1)
outb_p ( DIO_SLAVE_ADDR_READ, TSA);

//Set DIO offset to configuration register
outb_p ( DIO_CONFIG_OFFSET, HCTL);

//Raise the START bit(bit 6) of HCTL and set SMB_CMD (bit2~4) of
//HCTL to 0x010(Byte Data) to start transfer
outb_p (0x48, HCTL);
//Read from HS0 to print configuration register value
config_value = inb_p (HD0);
printf(" configuration value = %d\n",config_value);

return 0;
}

// Set DIO output to low/high
int SetDIOoutput_low_high()
{
    //Get Io Port Read/Write Permission
    iopl(3);
    // Clear host status register
    outb_p (0xFF, HSTS);

    //Set DIO device slave address and set command to write(slave
    //addr+0)
    outb_p ( DIO_SLAVE_ADDR_WRITE, TSA);

    //Set DIO offset to output register
    outb_p ( DIO_OUTPUT_OFFSET, HCTL);

    //Set DIO 0~3 output low, 4~7 output high by configure DIO output
    //port register bit 0~7, 0x0F means bit 0~3 =1, 4~7 =0, 0-> low,
    // 1->high
    outb_p (0x0F, HD0);
    //Raise the START bit(bit 6) of HCTL and set SMB_CMD (bit2~4) of
    //HCTL to 0x010(Byte Data) to start transfer
    outb_p (0x48, HCTL);

    return 0;
}

```

```
// Set DIO to input and print status (should be 0xFF, all ports read
high)
int SetDIO_to_input()
{
    unsigned char input_value;
    //Get Io Port Read/Write Permission
    iopl(3);
    // Clear host status register
    outb_p (0xFF, HSTS);

    //Set DIO device slave address and set command to write(slave
//addr+0)
    outb_p ( DIO_SLAVE_ADDR_WRITE, TSA);

    //Set DIO offset to configuration register
    outb_p ( DIO_CONFIG_OFFSET, HCTL);

    //Set DIO configuration register bit 0~7 to 1 which means set all
//DIO ports to input (0 -> output, 1 -> input)
    outb_p (0xFF, HD0);

    //Raise the START bit(bit 6) of HCTL and set SMB_CMD (bit2~4) of
//HCTL to 0x010(Byte Data) to start transfer
    outb_p (0x48, HCTL);

    //print configuration register value
    // Clear host status register
    outb_p (0xFF, HSTS);

    //Set DIO device slave address and set command to read(slave //addr+1)
    outb_p ( DIO_SLAVE_ADDR_READ, TSA);

    //Set DIO offset to configuration register
    outb_p ( DIO_INPUT_OFFSET, HCTL);

    //Raise the START bit(bit 6) of HCTL and set SMB_CMD (bit2~4) of
//HCTL to 0x010(Byte Data) to start transfer
    outb_p (0x48, HCTL);
    //Read from HS0 to print configuration register value
    input_value = inb_p (HD0);
    printf(" input value = %d\n",input_value);

    return 0;
}
```

////////////////////////////////////

Appendix C

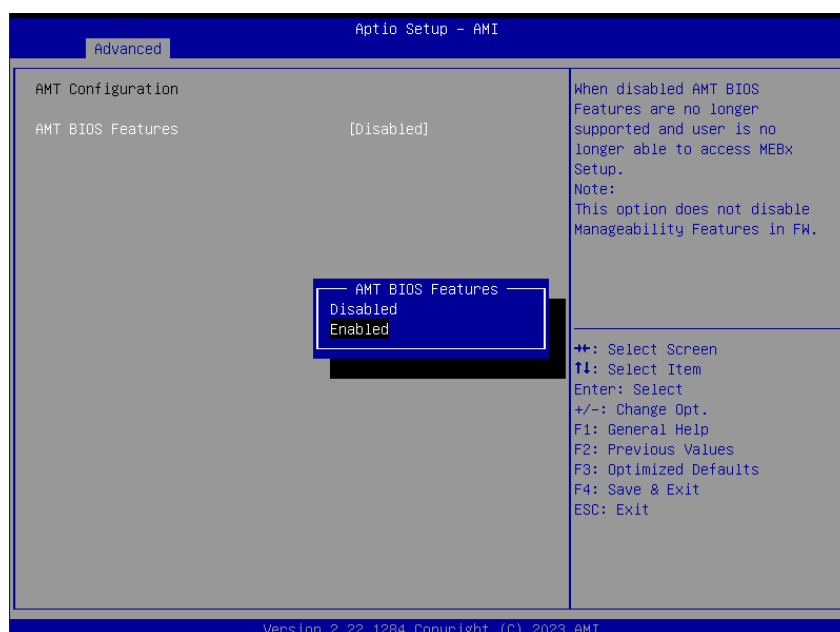
iAMT Settings

The Intel® Active Management Technology (Intel® AMT) utilizes built-in platform capabilities and popular third-party management and security applications to allow IT administrators to remotely discover, repair and better protect their networked computing assets, thus significantly improving IT management efficiency.

In order to use Intel® AMT you must enter the ME BIOS, change the ME BIOS password, and then select “Intel® iAMT” as the manageability feature.

C.1 Entering MEBx

1. Go to BIOS to enable the iAMT function.



2. After restarting BIOS, exit and enter MEBx Setting.

C.2 Set and Change Password

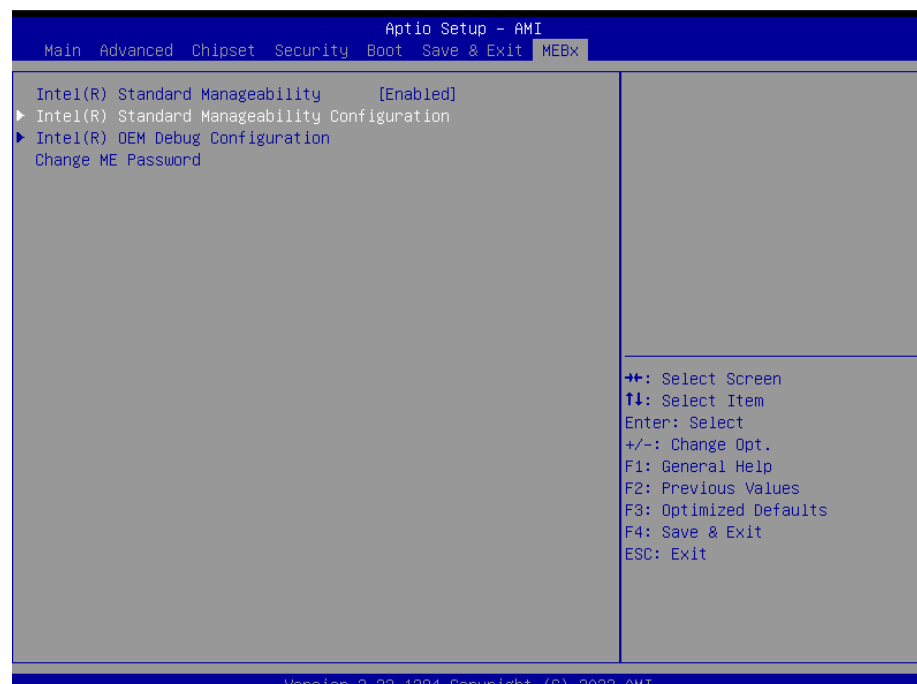
1. You will be asked to set a password when first logging in. The default password is “admin”.
2. You will be asked to change the password before setting ME.
3. You must confirm your new password while revising. The new password must consist of eight characters, including at least:
 - One upper case
 - One lower case
 - One number
 - One special symbol, such as ! , \$ or ; , (, " , excepted)

The default value demonstrates an example of a valid password: **!!11qqQQ**

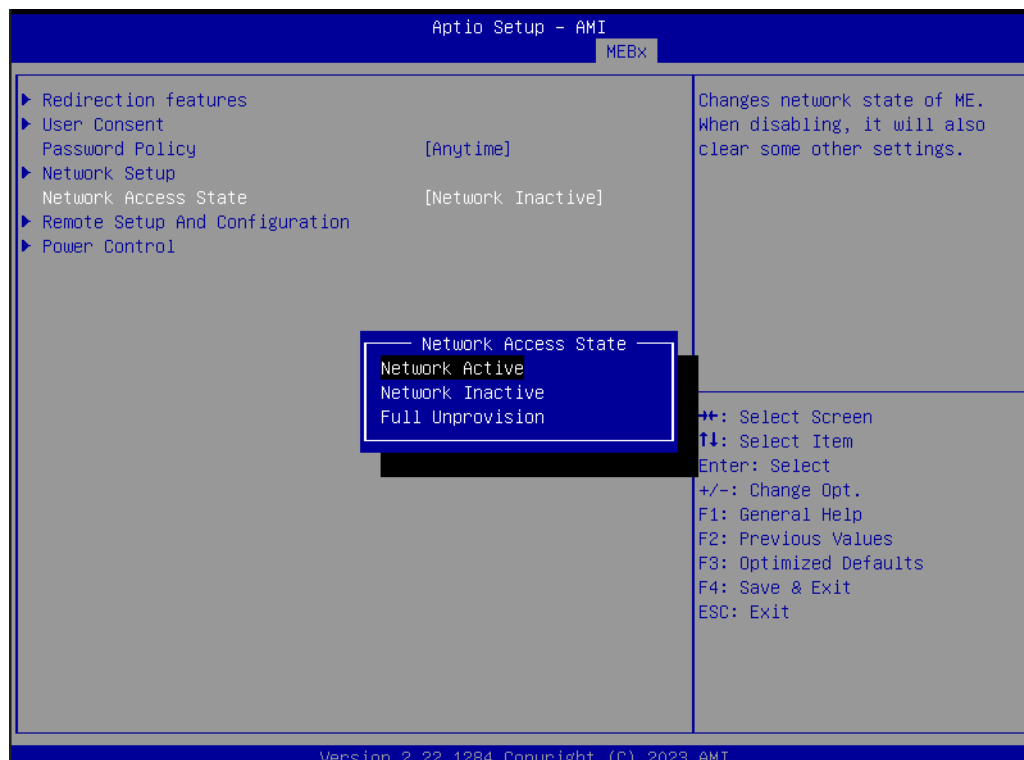
Underline (_) and space are valid characters for password, but they won't make higher complexity.

C.3 iAMT Settings

Select Intel® iAMT configuration and press <Enter>.



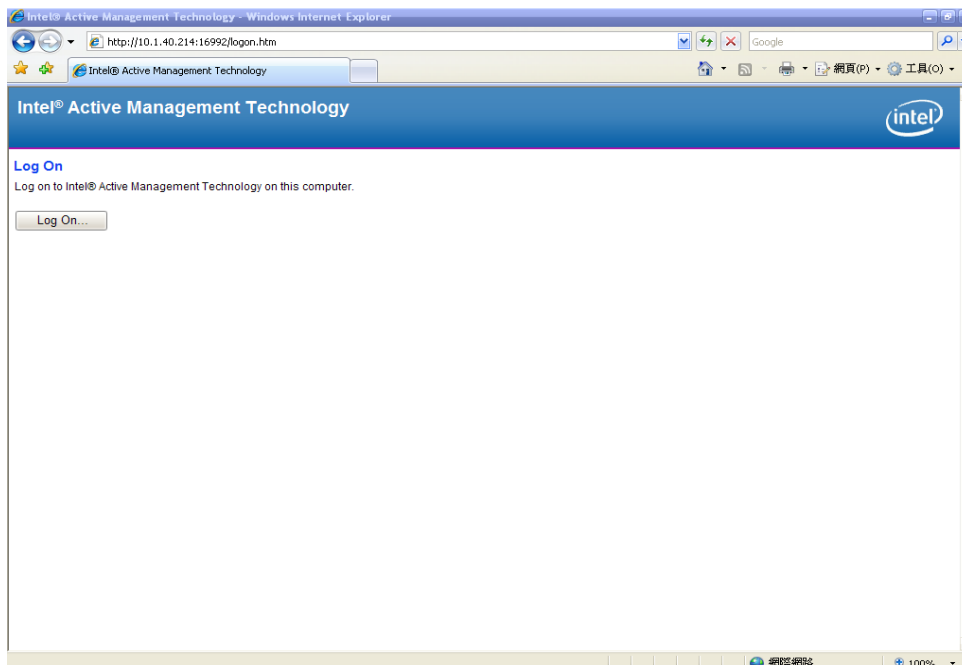
1. Select Network Setup to configure iAMT.



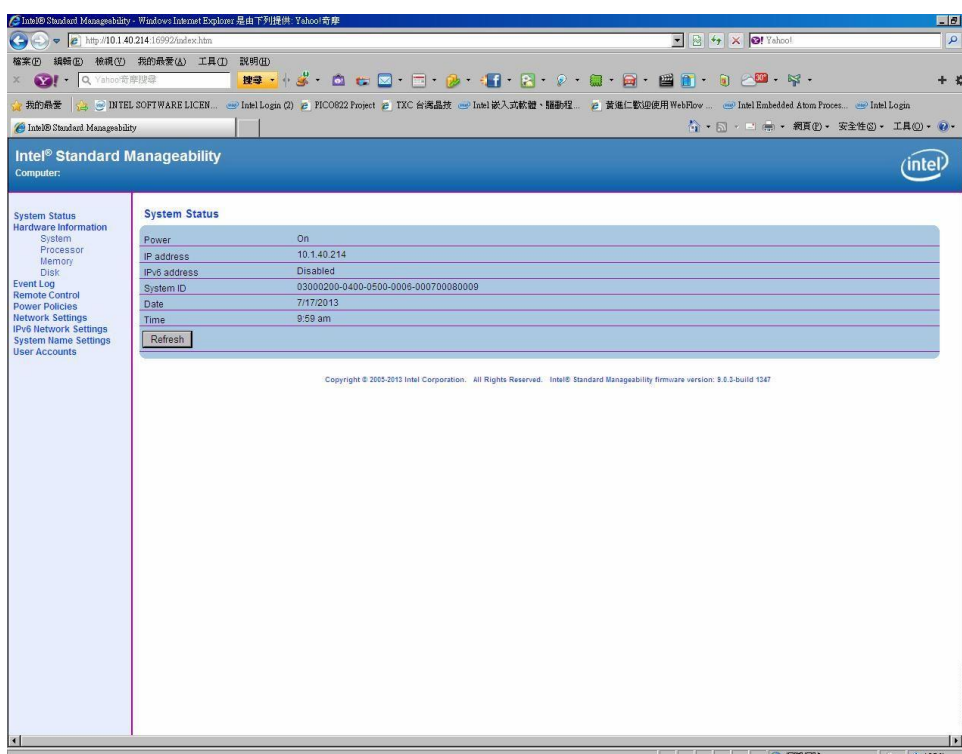
2. Exit from MEBx after completing the iAMT settings.

C.4 iAMT Web Console

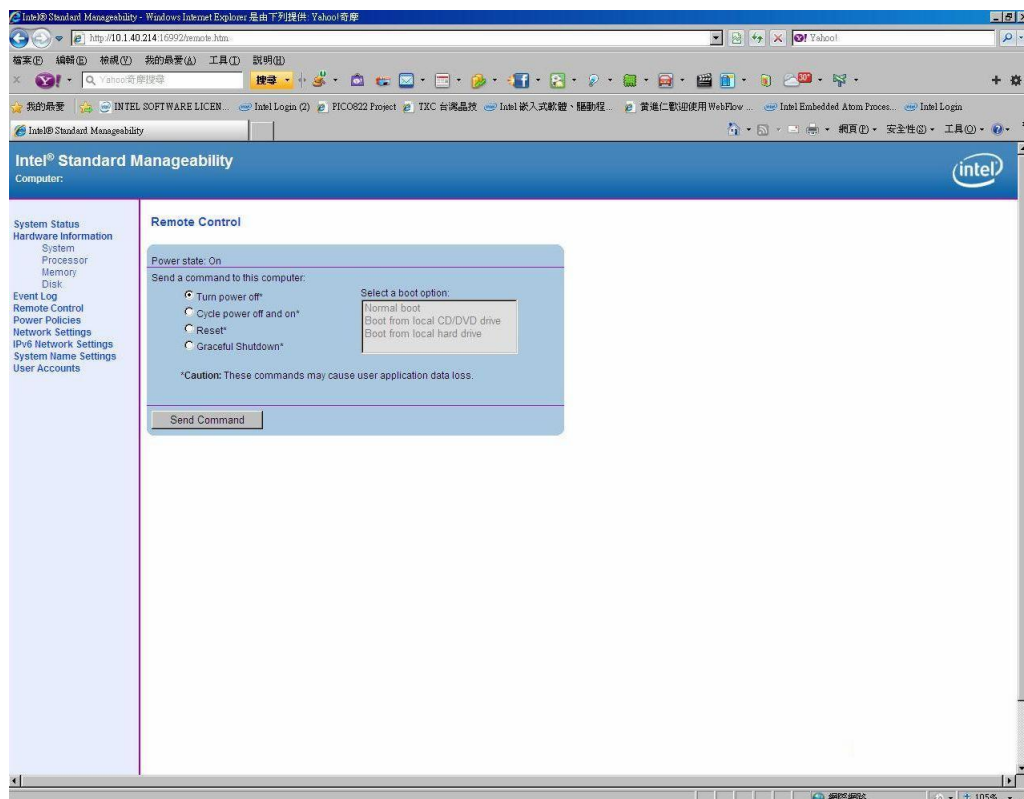
1. On a web browser, type `http://(IP ADDRESS):16992`, which connects to iAMT Web.
Example: `http://10.1.40.214:16992`



2. To log on, you will be required to type in username and password for access to the Web.
USER: admin (default value)
PASS: (MEBx password)
3. Enter the iAMT Web.



- Click Remote Control, and select commands on the right side.

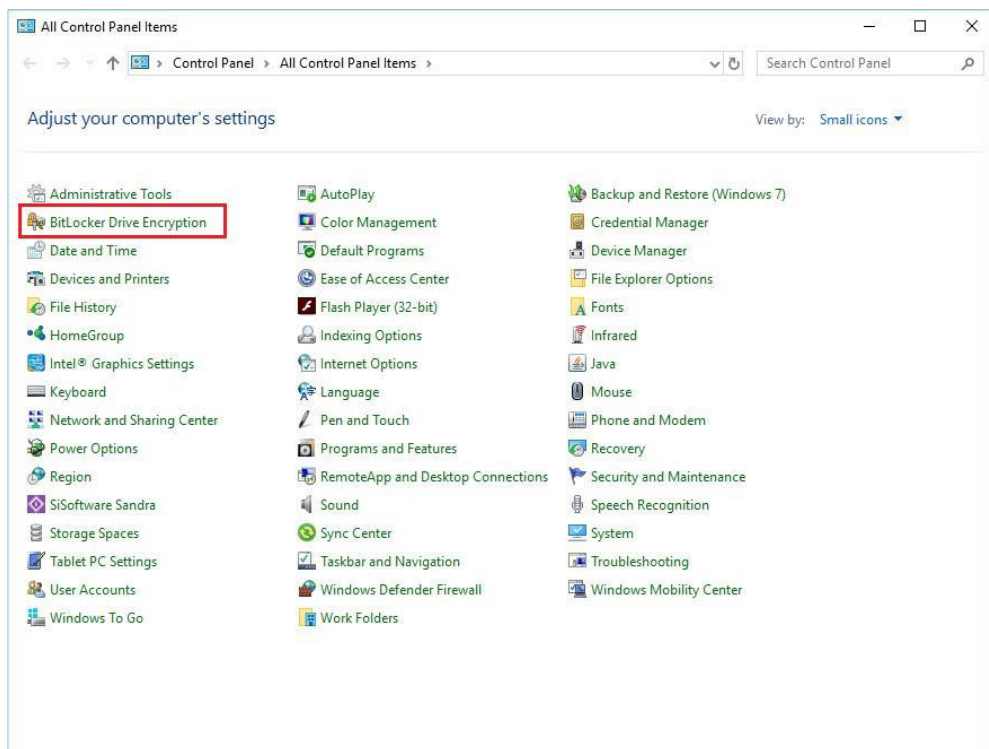
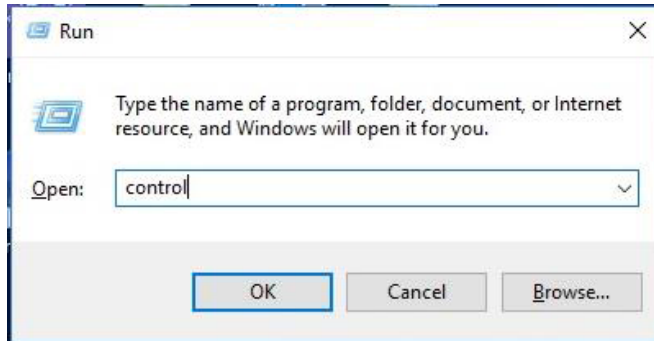


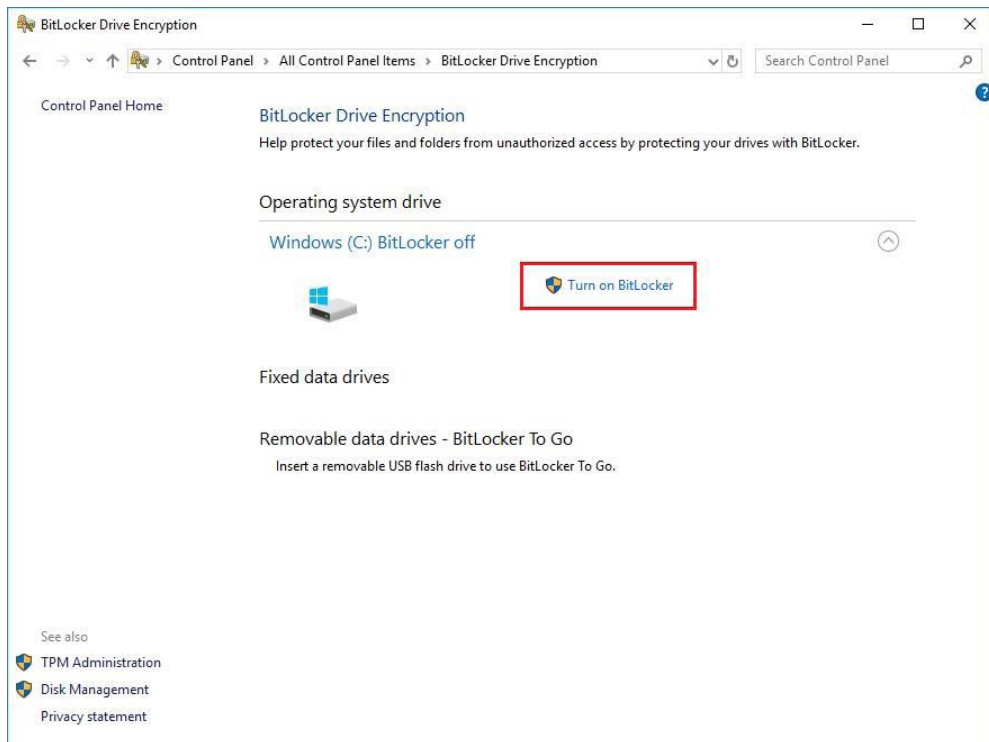
- When you have finished using the iAMT Web console, close the Web browser.

Appendix D

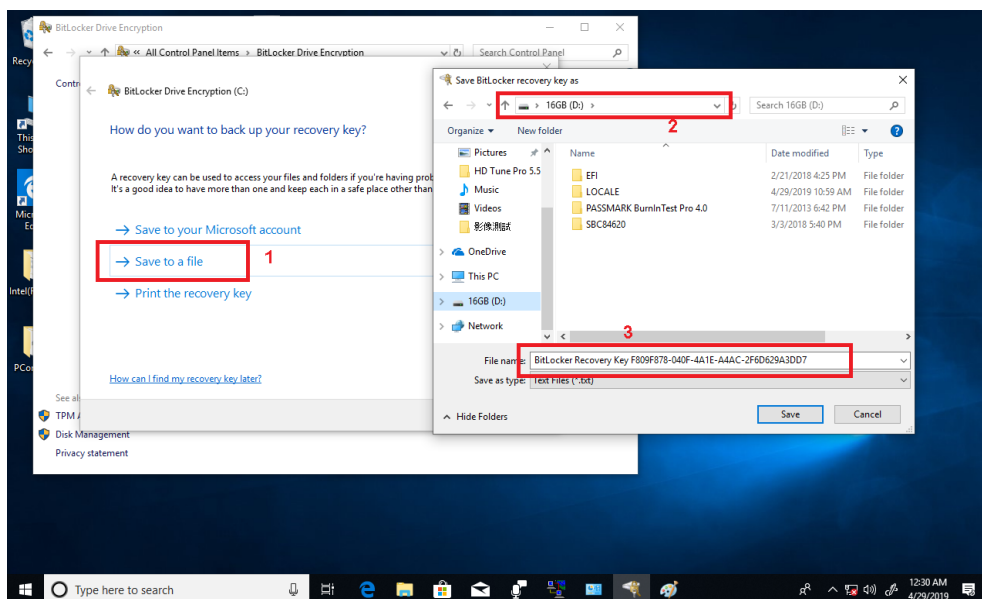
TPM Settings

1. Setup BitLocker Drive Encryption main storage. Press <Win + R> and type "Control Panel", then select BitLocker Drive Encryption.

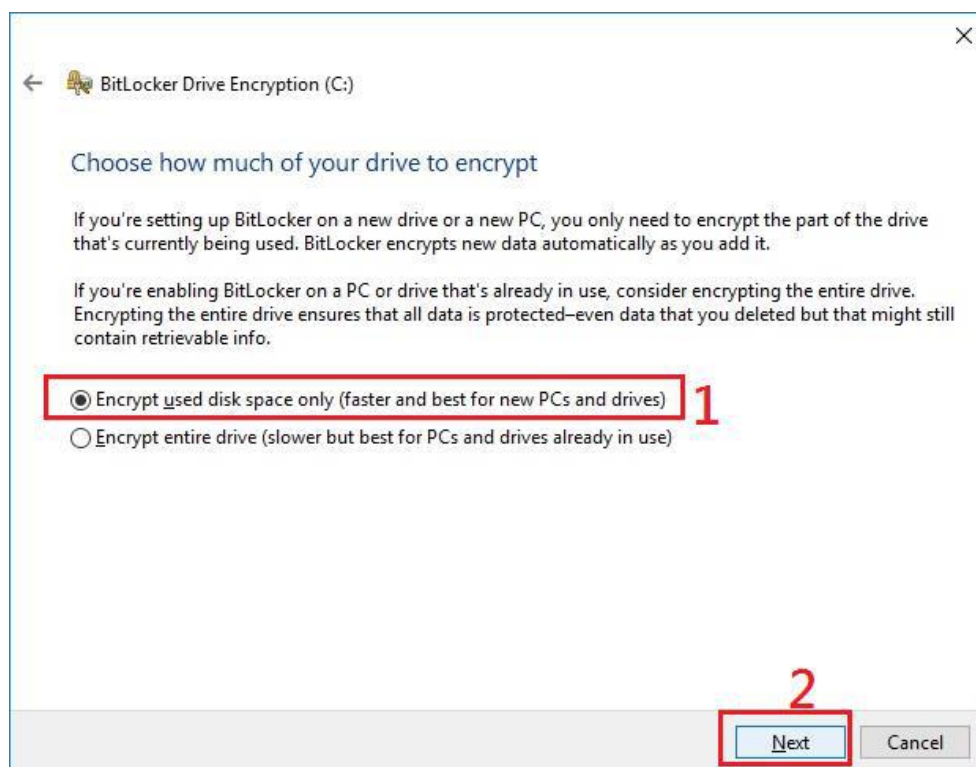


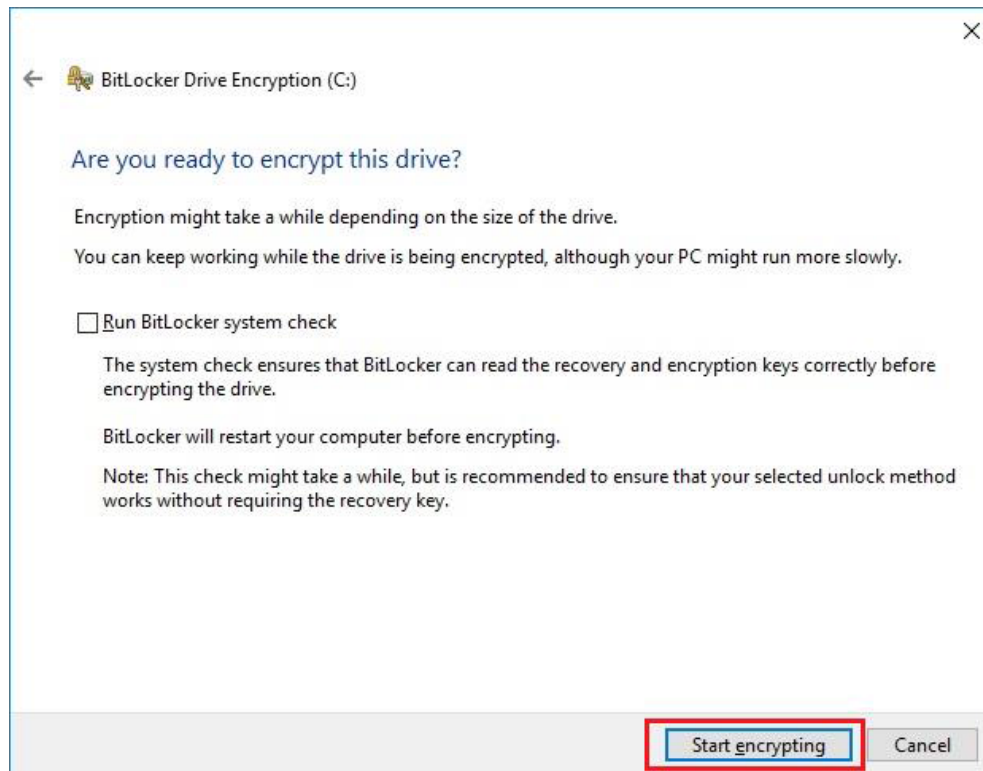


2. Insert an external storage device, for example USB Storage. Back up BitLocker recovery key in a new file and save it to the USB Storage.

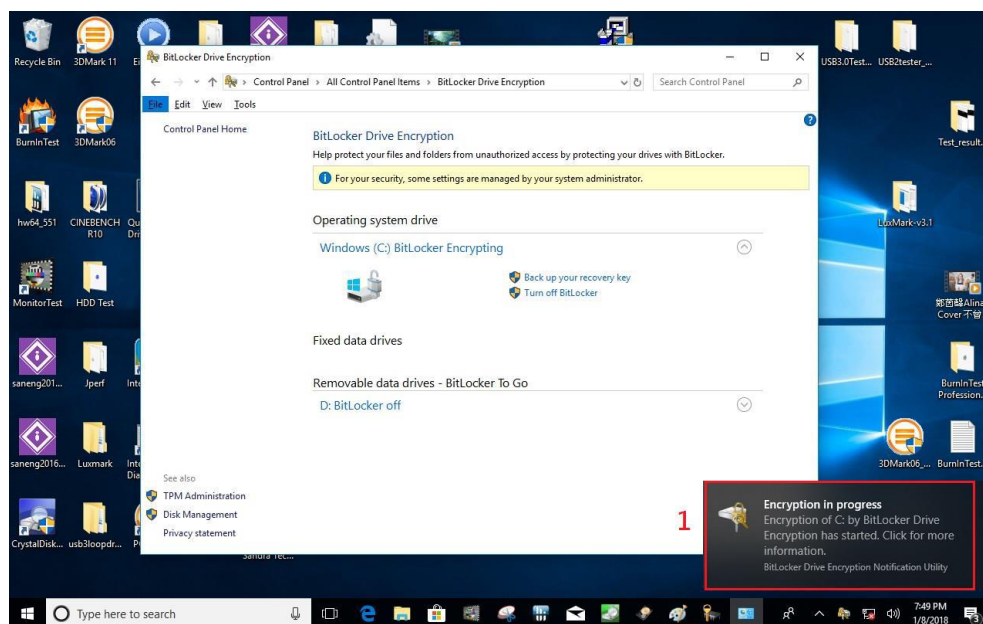


3. Please follow the steps below to encrypt your storage device:

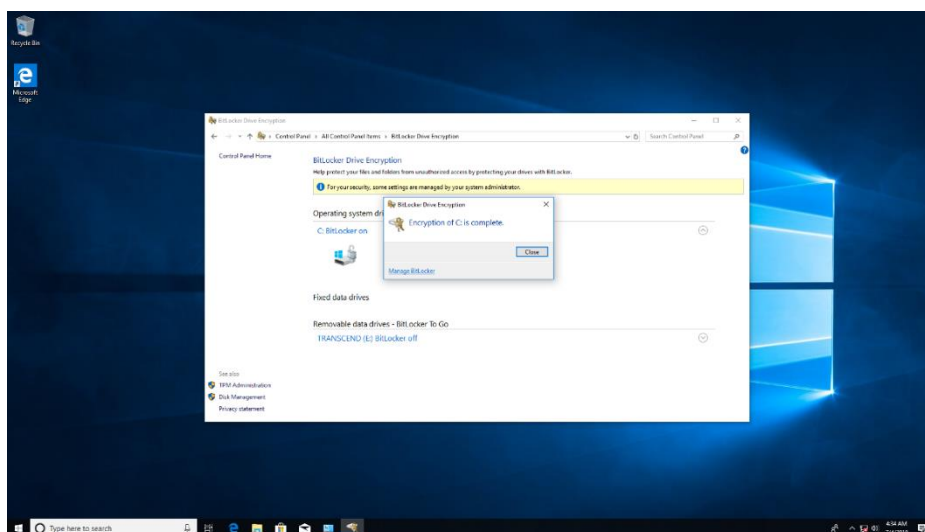
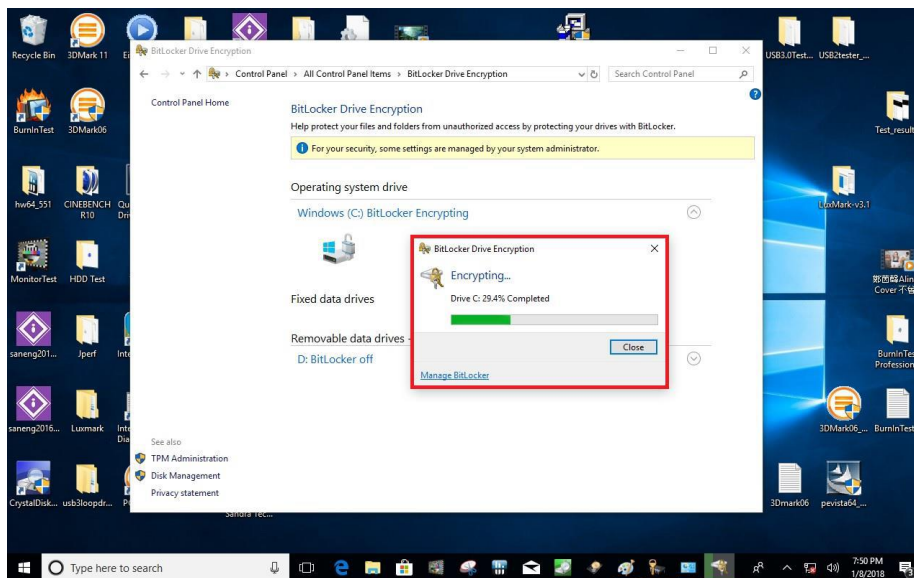
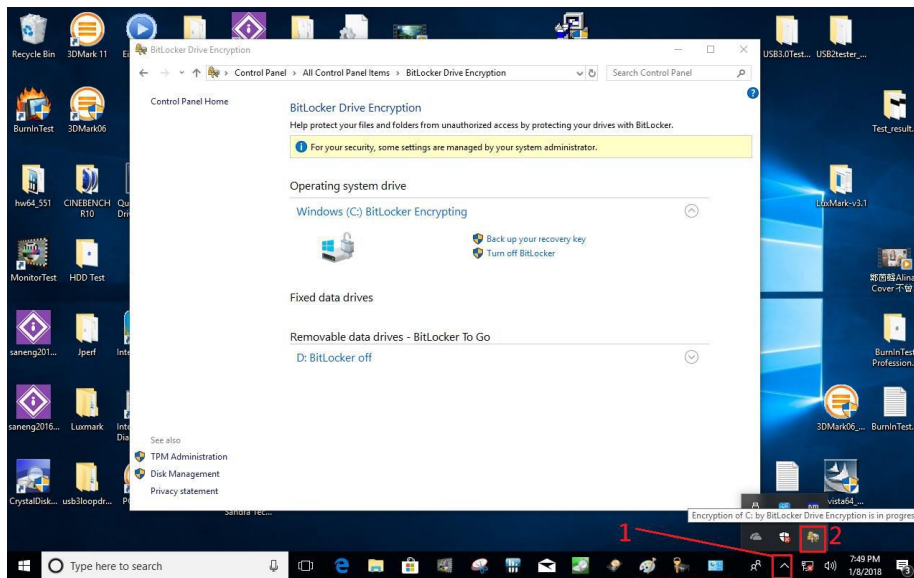




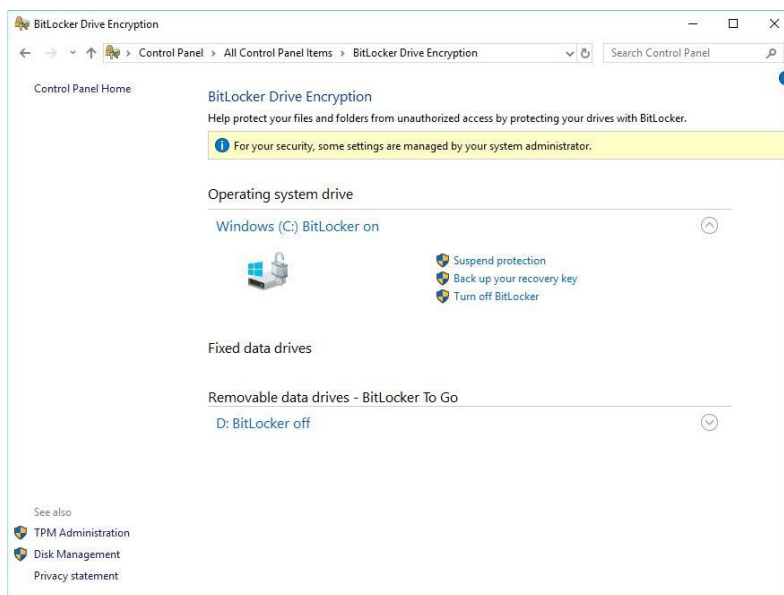
Now, the system prompts that the operating system drive encryption is in progress, and the encryption progress is checked.



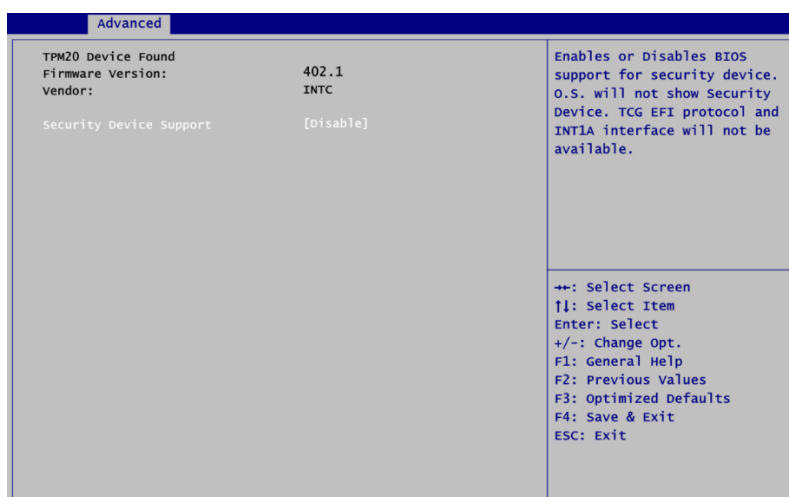
Select and click the icon in the lower right corner to complete the encryption.



4. Confirm the completion of encryption.



5. Disable TPM function in BIOS Setup Utility.



6. When the system is powered on and you see the following screen, it means the TPM module function is working fine. Note that BitLocker cannot be executed if your system does not have TPM function.

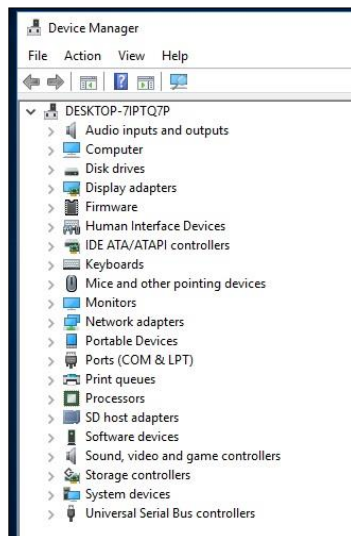


System with no TPM function support is as below:

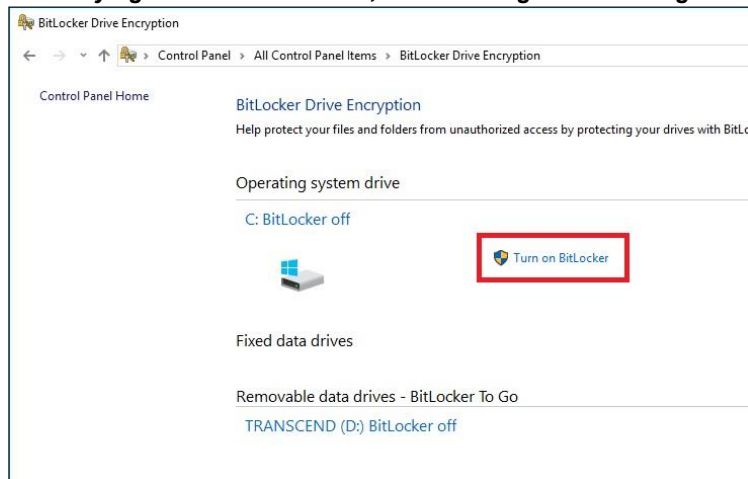


Note

1. **TPM information is not found in Device Manager.**



2. **When trying to turn on Bitlocker, the following error message shows up.**



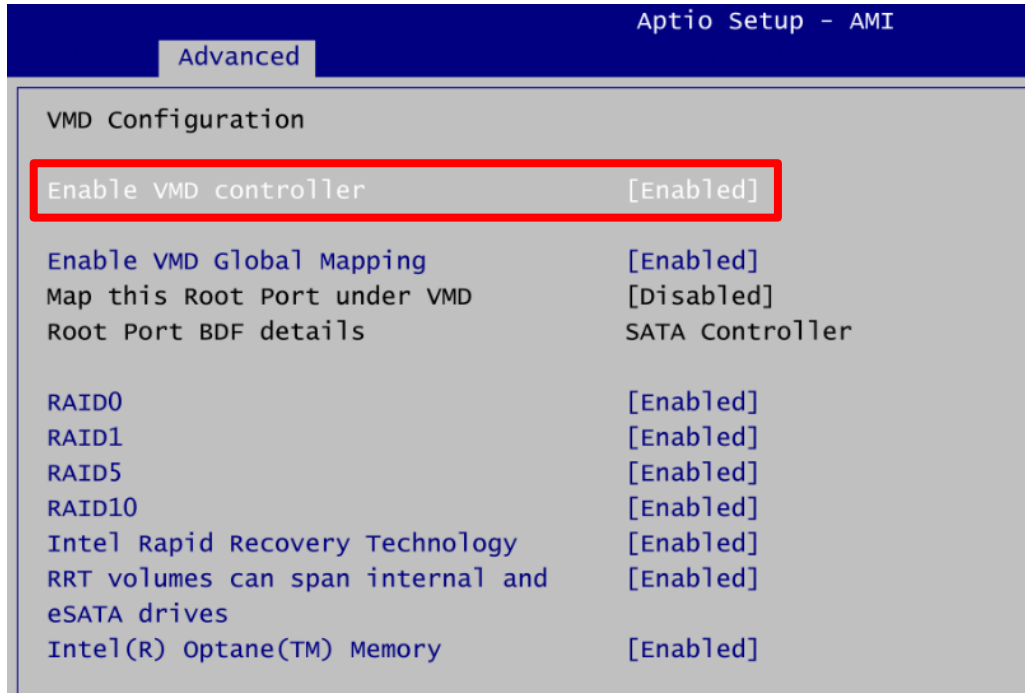
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Appendix E

VMD (RAID) Configuration

How to Create Raid? (Only support Q670E & R680E version)

1. In SATA Configuration, enable VMD Controller, then save and restart.



Enable VMD Global Mapping

Enable/Disable to VMD Global Mapping

RAID0

Enable/Disable RAID0 support

RAID1

Enable/Disable RAID1 support

RAID5

Enable/Disable RAID5 support

RAID10

Enable/Disable RAID10 support

Intel Rapid Recovery Technology

Enable/Disable Intel Rapid Recovery Technology

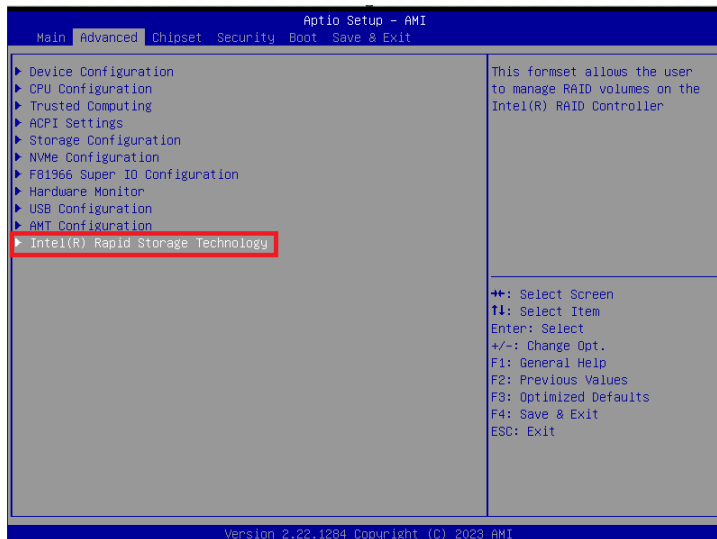
RRT volumes can span internal and eSATA drives

Enable/Disable RRT volumes can span internal and eSATA drives.

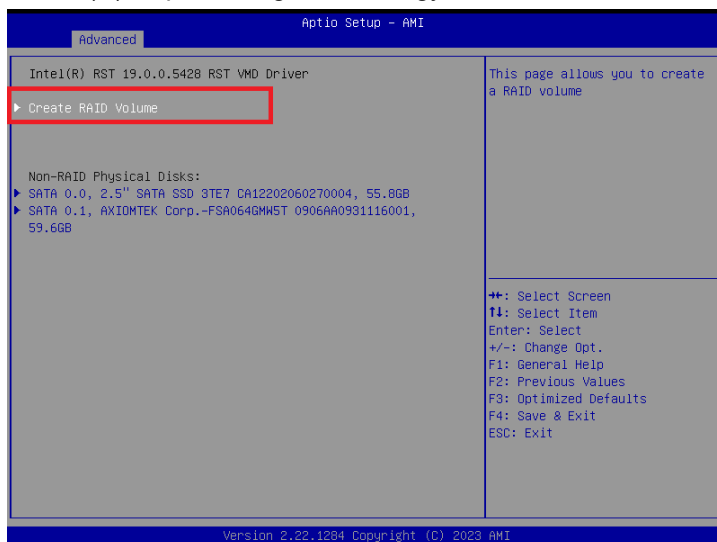
Intel(R) Optane(TM) Memory

Enable/Disable System Acceleration with Intel(R) Optane(TM) Memory feature.

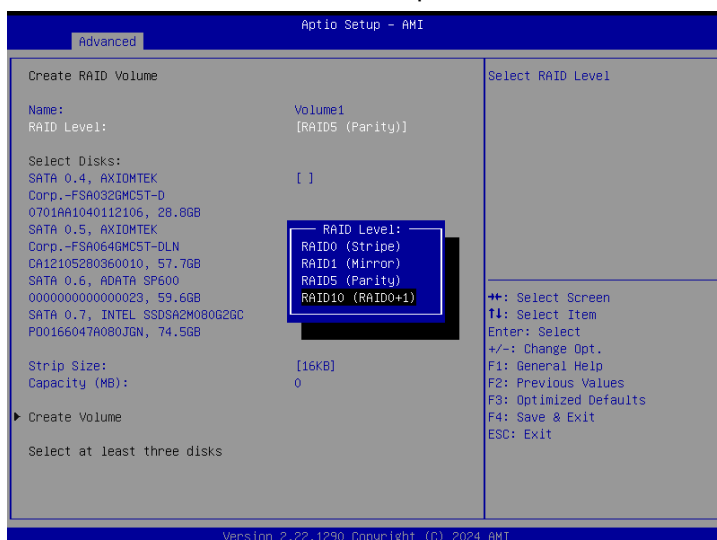
- After restart, press to enter BIOS setup. In Advanced menu, choose Intel(R) Rapid Storage Technology.



- In Intel(R) Rapid Storage Technology screen, choose Create RAID Volume.



- Select RAID Level 0/1/5/10, correspond to RAID Level in VMD Configuration.



5. Select the disk to be merged.

RAID0

Aptio Setup - AMI

Advanced

Create RAID Volume

Name: Volume1
RAID Level: [RAID0 (Stripe)]

Select Disks:

SATA 0.0, 2.5" SATA SSD 3TE7 []
CA12202060270004, 55.8GB
SATA 0.1, AXIOMTEK []
Corp.-FSA064GMHST
0906AA093111600

SATA 0.0, 2.5" SATA SSD 3TE7 CA12202060270004, 55.8GB

Strip Size: X
Capacity (MB):

► Create Volume

Select at least two disks

Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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RAID5

Aptio Setup - AMI

Advanced

Create RAID Volume

Name: Volume1
RAID Level: [RAID5 (Parity)]

Select Disks:

SATA 0.4, AXIOMTEK []
Corp.-FSA032GMC5T-D
0701AA1040112106, 28.8GB
SATA 0.5, AXIOMTEK []
Corp.-FSA032GMC5T-D
CA12105280

SATA 0.4, AXIOMTEK Corp.-FSA032GMC5T-D 0701AA1040112106, 28.8GB

Strip Size: [16KB]
Capacity (MB): 59155

► Create Volume

Select at least three disks

Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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RAID10

Aptio Setup - AMI

Advanced

Create RAID Volume

Name: Volume1
RAID Level: [RAID10 (RAID0+1)]

Select Disks:

SATA 0.4, AXIOMTEK []
Corp.-FSA032GMC5T-D
0701AA1040112106, 28.8GB
SATA 0.5, AXIOMTEK []
Corp.-FSA032GMC5T-D
CA12105280

SATA 0.4, AXIOMTEK Corp.-FSA032GMC5T-D 0701AA1040112106, 28.8GB

Strip Size: [16KB]
Capacity (MB): 0

► Create Volume

Select four disks

Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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6. Finally, implement create volume.

RAID0

Advanced

Aptio Setup - AMI

Create RAID Volume		Create a volume with the settings specified above
Name:	Volume1	
RAID Level:	[RAID0 (Stripe)]	
Select Disks:		
SATA 0.0, 2.5" SATA SSD 3TE7	[X]	
CA12202060270004, 55.8GB		
SATA 0.1, AXIOMTEK	[X]	
Corp.-FSA064GMH5T		
0906AA0931116001, 59.6GB		
Strip Size:	[64KB]	
Capacity (MB):	114479	
▶ Create Volume		→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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RAID5

Advanced

Aptio Setup - AMI

Create RAID Volume		Create a volume with the settings specified above
Name:	Volume1	
RAID Level:	[RAID5 (Parity)]	
Select Disks:		
SATA 0.4, AXIOMTEK	[X]	
Corp.-FSA032GMC5T-D		
0701AA1040112106, 28.8GB		
SATA 0.5, AXIOMTEK	[X]	
Corp.-FSA064GMC5T-DLN		
CA12105280360010, 57.7GB		
SATA 0.7, INTEL SSDSA2M080G2GC	[X]	
P00166047A080JGN, 74.5GB		
Strip Size:	[32KB]	
Capacity (MB):	59155	
▶ Create Volume		→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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RAID10

Advanced

Aptio Setup - AMI

Create RAID Volume		Create a volume with the settings specified above
Name:	Volume1	
RAID Level:	[RAID10 (RAID0+1)]	
Select Disks:		
SATA 0.4, AXIOMTEK	[X]	
Corp.-FSA032GMC5T-D		
0701AA1040112106, 28.8GB		
SATA 0.5, AXIOMTEK	[X]	
Corp.-FSA064GMC5T-DLN		
CA12105280360010, 57.7GB		
SATA 0.6, ADATA SP600	[X]	
0000000000000023, 59.6GB		
SATA 0.7, INTEL SSDSA2M080G2GC	[X]	
P00166047A080JGN, 74.5GB		
Strip Size:	[32KB]	
Capacity (MB):	59155	
▶ Create Volume		→+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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